



DOUBLE ACTING ACTUATOR „DA“



SPRING RETURN ACTUATOR „SR“



Ex II 2 G D c - LCIE 05 AR 022

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1. APPLICABLE RANGE

FERGO pneumatic actuators use a rack and pinion sliding system that creates a linear torque with a quarter turn operation. The range is the following:

SERIE DA	SERIE SR	SPRING-COMBINATIONS					
DA-10 & DA-20	SR-20	S04	S06	S08			
DA-40	SR-40	S04	S06	S08	S10	S12	S14
DA-80	SR-80	S04	S06	S08	S10	S12	S14
DA-130	SR-130		S06	S08	S10	S12	S14
DA-200	SR-200		S06	S08	S10	S12	S14
DA-300	SR-300		S06	S08	S10	S12	S14
DA-500	SR-500		S06	S08	S10	S12	S14
DA-850	SR-850		S06	S08	S10	S12	S14
DA-1200	SR-1200		S06	S08	S10	S12	S14
DA-1750	SR-1750		S06	S08	S10	S12	S14
DA-2100	SR-2100		S06	S08	S10	S12	S14
DA-2500	SR-2500		S06	S08	S10	S12	S14
DA-4000	SR-4000		S06	S08	S10	S12	S14

1.1 Spring Combination by Type of Actuator

FERGO actuators use a maximum of seven springs on each side, always using a same type of spring independently of the combination of springs that will be used. The quantity of springs is identified as follows:

eg: **S14**

S = springs & **14** is the total number of springs assembled in the actuator.

1.1.1 Actuator Size SR-20

The actuator SR-20 uses a minimum of 2 springs and a maximum of 4 springs on each side, according to the diagrams below, depending on the springs combination that require to be assembled.



1.1.2 Actuator Size SR40 & SR80

The actuators SR-40 & 80 use a minimum of 2 springs and a maximum of 7 springs on each side, according to the diagrams below, depending on the springs combination that require to be assembled.

[S04]



[S06]



[S08]



[S10]



[S12]



[S14]
STANDARD



1.1.3 Actuator Size SR-130 ~ 4000

The actuators SR-130 ~ 4000 use a minimum of 3 springs and a maximum of 7 springs on each side, according to the diagrams below, depending on the springs combination that require to be assembled.

[S06]



[S08]



[S10]



[S12]



[S14]
STANDARD



2. GENERAL INFORMATION

Actuators sizes 300 and smaller

FERGO Armaturen GmbH states that actuators covered by this Certificate have been designed and manufactured in accordance with the following European Directives requirements:

- » *European Pressure Equipment Directive 97/23/CE: classified according to Article 3, Part 3, Cat. SEP, must not carry the CE label.*
- » *Machines Directive 89/392/CEE*
- » *Directive 94/9/CE ATEX, classification Group II, Cat. 2 for use in explosive atmospheres, Zones 1,2 & 21,22. Conformity evaluation according to Appendix VIII. Marking CE Ex II2GDc.*
- » *EN 15714-3: pneumatic part-turn actuators for industrial valves*

Applied harmonized and non-harmonized technical standards:

- » *See FERGO's catalogue & assembly & maintenance procedures*
- » *EN 13463-1:2001, EN 1127-1*

The electrical & mechanical accessories are not covered by this statement and will have to carry their own certificate in order to be assembled with the FERGO actuators.

Actuators sizes 500 and larger

FERGO Armaturen GmbH states that actuators covered by this certificate have been designed and manufactured in accordance with the following European directives requirements:

- » *European Pressure Equipment Directive 97/23/CE: classified according to Category I, Module A, Evaluation Procedure of Conformity mod. A certified by the manufacturer. Marking CE.*
- » *Machines Directive 89/392/CEE*
- » *Directive 94/9/CE ATEX, classification Group II, Cat. 2 for use in explosive atmospheres, Zones 1,2 & 21,22. Conformity evaluation according to Appendix VIII. Marking CE Ex II2GDc.*
- » *EN 15714-3: pneumatic part-turn actuators for industrial valves*

Applied harmonized and non-harmonized technical standards:

- » *See FERGO's catalogue and assembly & maintenance procedures*
- » *EN 13463-1:2001, EN 1127-1*

The electrical & mechanical accessories are not covered by this statement and will have to carry their own certificate in order to be assembled with the FERGO actuators.

The suitability of the materials and design of the actuator type in terms of its working conditions are the responsibility of the actuator's end user.

DESCRIPTION OF THE PRESSURE EQUIPMENTS

SERIE	SIZE	PN
Double Acting DA	10	PN-10
Double Acting DA & Spring Return SR	20	PN-8
	40	
	80	
	130	
	200	
	300	
	500	
	850	
	1200	
	1750	
	2100	
	2500	
	4000	

Material: Aluminium

Service conditions for standard actuators:

- » Maximum pressure: 8 bars (except DA-10, 10 bars)
- » Minimum temperature: -30 °C
- » Maximum temperature: +100 °C

Agreement evaluation process used: Category I Module A

Technical standards & applied specifications:

- » Solenoid direct assembly according to standard: NAMUR VDI / VDE 3845
- » Accessories assembly according to standard: NAMUR VDI / VDE 3845
- » Connections to valves according to standard: EN ISO 5211

3. INSPECTION AT DELIVERY & STORAGE

3.1 All actuators will be examined when delivered to ensure that they have not suffered any damage during transport. Inform the supplier immediately if there is any damage.

3.2 As standard, actuators will leave the factory in closed position. Open position configuration must be specially requested.

WARNING!

Actuators must be stored under cover and protected from inclement weather conditions and dampness with air conducts properly covered.

3.3 Actuators should not be unpacked until their definitive installation, except for inspection purposes.

4. INSTALLATION

4.1 The handling and transportation of actuators must be carried out with extreme precaution and using the necessary and adequate means depending on their size and weight in order to avoid risks to the operators handling them.

WARNING!

Check the physical conditions of the actuators in order to detect any damage incurred during transport and/or handling.

4.2 Actuators should be installed in such a way that they are easy to access in order to do the periodic inspections and corresponding maintenance operations necessary to guarantee the performance qualities that they have been designed for.

WARNING!

Actuators must not support unexpected stress. It is important to do the assemble with a correct alignment and parallelism to guarantee that it is not submitted to unexpected stress.

IMPORTANT!

After the installation carry out a final operational check of the actuator by making some opening and closing operations to ensure that it works properly.

The use of dry air increases the lifetime of the actuators, as well as the lifetime of their accessories, solenoids and other pneumatic accessories.

4.2.1 Recommended minimum air quality

For the best possible service life and trouble-free operation, ISO 8573-1 quality class 5.4.4 should be used. This means 40 µm filter, dew point +3°C for indoor operation (a lower dew point should be selected for outdoor operation, Quality class 3) and oil concentration 5,0 mg/m³.

QUALITY CLASS	POLLUTION		WATER	OIL
	Particle size (µm)	Max. concentration (mg/m ³)	Max. press. dew point (°C)	Max. concentration (mg/m ³)
1	0,1	0,1	-70	0,01
2	1	1	-40	0,1
3	5	5	-20	1,0
4	15	8	+3	5,0
5	40	10	+7	25
6	-	-	+10	-

4.2.2 Lubrication

Actuators are factory lubricated for the lifetime in normal working conditions. The standard lubricant is suitable for use from -30°C (-22°F) up to 100°C (212°F). For low and high temperature execution, where special grease is required please contact FERGO.

For our standard execution we recommend to use Molicote B2.2 Plus grease or similar.

WARNING!

Actuators are lubricated during assembly and do not require any further lubrication.

4.3 Make sure that both the actuator and valve are in the same position, open or closed.

4.4 When assembling the actuator on the valve, check their alignment to ensure that the coupling parts work perfectly aligned.

4.5 The coupling bolts, whether the actuator connects directly to the valve or uses a bracket, must be tightened proportionally, distributing the stress, before tightening them completely.

4.6 The normal performance of the actuators is to close clockwise and to open anticlockwise. However, this may be inverted under request.

4.7 The pneumatic actuators are provided with bi-directional pinion travel stops. Side located stops allow a full $\pm 5^\circ$ travel adjustment between 85° and 95° . Adjustment of the counter-clockwise and clockwise rotation limits is accomplished by unscrewing the locking nuts. 1/3 turn of those locking nuts means 1° of the stroke.

WARNING!

Do not adjust more than $2,5^\circ$ each side, designed by the manufacturer, Internal parts could be damaged.

IMPORTANT!

Is is advisable to operate teh actuator twice before fully tightening the coupling bolts in order to ensure a good centring.

5. PREVENTIVE MAINTENANCE

5.1 This basically consists in a periodic inspection to see the correct functioning of the actuator.

5.2 Actuators must be operated at least once every six months. However, depending on the application of the actuator, this may be done within shorter periods.

5.3 It is the end user's responsibility to establish these operation plans depending on the working conditions.

WARNING!

Never leave the actuators opened or closed during a long period of time.

5.4 It is recommended to replace O-rings, guides and washers when an in-depth revision of the installation is made.

6. MAINTENANCE OPERATIONS

6.1 Precautions before disassembly!!

- » Disconnect the actuator and its accessories from the air and electrical network.
- » Disassembly the solenoid from the actuator.
- » Disassembly the actuator from the valve and/ or from its couplings.

WARNING!

Always wear adequate protective clothing (Follow the safety guidelines established by your company!)

Any parts replacement should be done with the original spare parts!!

The manufacturer will not be responsible of the wrong functioning of the actuator if original parts have not been used.

7. REASONS FOR PARTS REPAIR AND REPLACEMENT

Parts of the actuator will have to be repaired or replaced as soon as leakage is detected through the upper O-ring (111) or lower O-ring (110) of the pinion, through the O-ring (109) of the piston or through the O-rings (118) of the end caps.

As soon as this happens, proceed with the disassembly of the actuator and replacement of all the O-rings, bushings, slide guides and washers as listed in the spare parts.

8. DISASSEMBLY OF THE ACTUATOR

Once the precautions prior to the disassembly have been taken, follow the next steps:

8.1 Disassembly the end caps (4) of the actuator by un-tightening the external bolts (113).

WARNING!

In SPRING RETURN ACTUATORS there is no danger during this operation as the fastening bolts of the caps are designed with adequate length to absorb spring stress.

8.2 Unfasten the nuts (934) in order to remove the levelling screws (16).

8.3 Turn the pinion (3) anticlockwise to disengage the pistons (2) in normally closed actuators and clockwise in normally open ones. Remove the pistons from the cylinder.

8.4 Disassemble the position indicator (20), the slip washer (471), the soft pinion washer (5) and the metallic pinion washer (8) from the upper side.

8.5 Disassemble the pinion (3) from the lower part of the body (1) of the actuator. To do this operation, disassemble the upper pinion bearing (10) and the stop (12) through the inside of the body.

8.6 Clean all the parts of the actuator.

8.7 Examine all the parts in order to see if there is any wear due to an over-use.

WARNING!

Carefully examine the inside of the cylinder.

8.8 If everything is in good conditions, replace the O-rings, bushings, slide guides included in our spare parts kits, before reassembling the actuator.

8.9 Lubricate the parts of the actuator with Molicote B 2-2 Plus grease. Apply a thin layer of grease on the O-rings (109, 110 & 111).

9. ASSEMBLY OF THE ACTUATOR

After the disassembly, the inspection and lubrication of the different parts, proceed to the assembly following the sequence below:

9.1 Correctly assemble all the parts included in our spare parts kit previously lubricated.

9.2 Place the pinion (3) in the body's (1) actuator from underneath. Once the pinion appears through the inside of the body, assemble the pinion the stop (12) in its correct position and the upper pinion bearing (10).

9.3 Place the soft pinion washer (5), the metallic pinion washer (8), the slip washer (471), the degree indicator (24) and the position indicator (20) in the upper part of the pinion.

9.4 Assemble both pistons, checking that they engage at the same time when turning the pinion (3) clockwise for normally closed actuators and anticlockwise for normally open actuators.

9.5 Assemble the end caps (4), tighten the bolts (113) adequately distributed.

9.6 Check that the open and closed positions coincide with the position indicated in the upper part of the pinion, then assemble the cover.

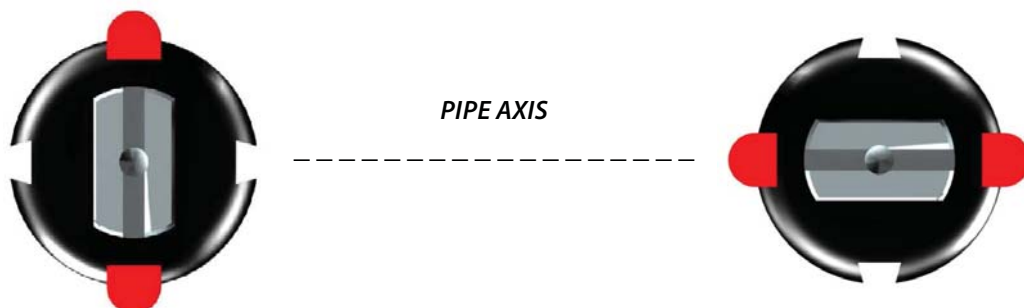
IMPORTANT!

Once the assembly is done, operate the actuator a few times.

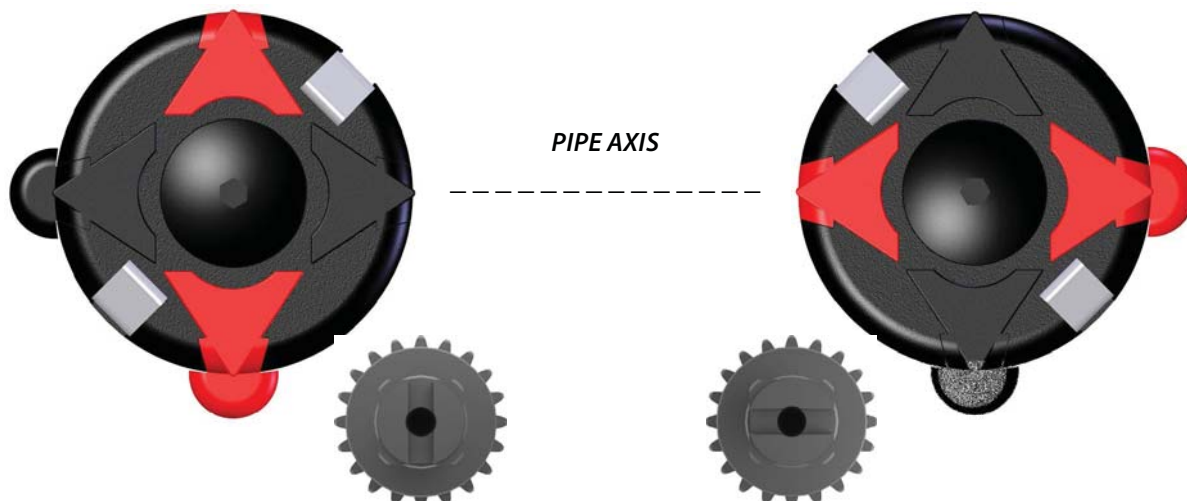
[Closed Position]

[Open Position]

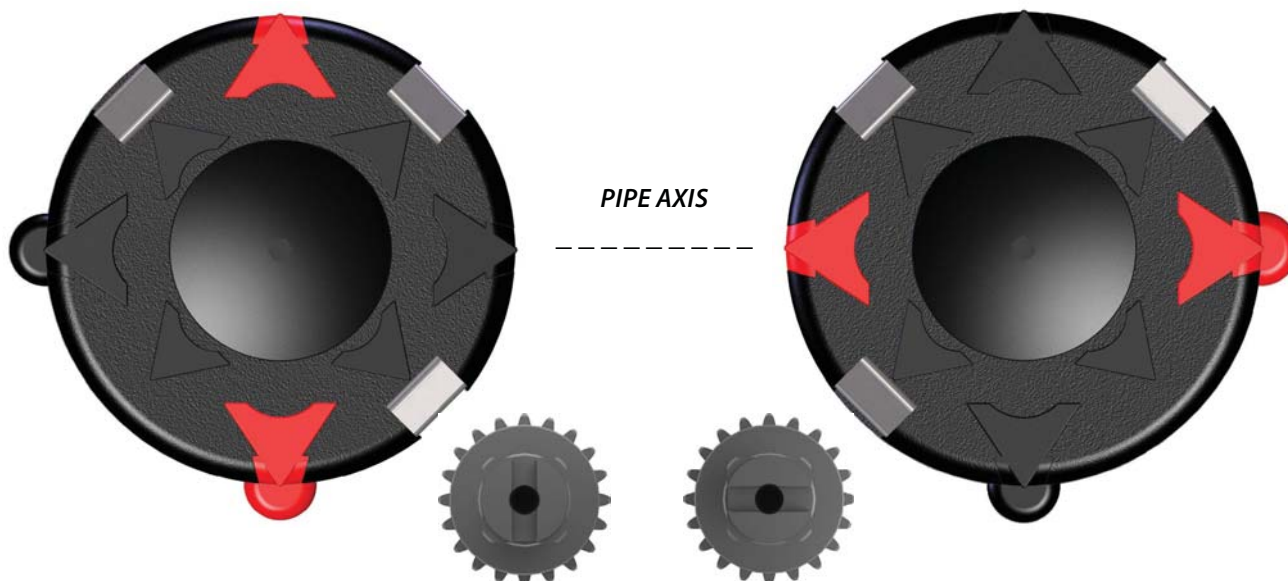
MODEL DA-10



MODEL 20 TO 850



MODEL 1200 TO 4000



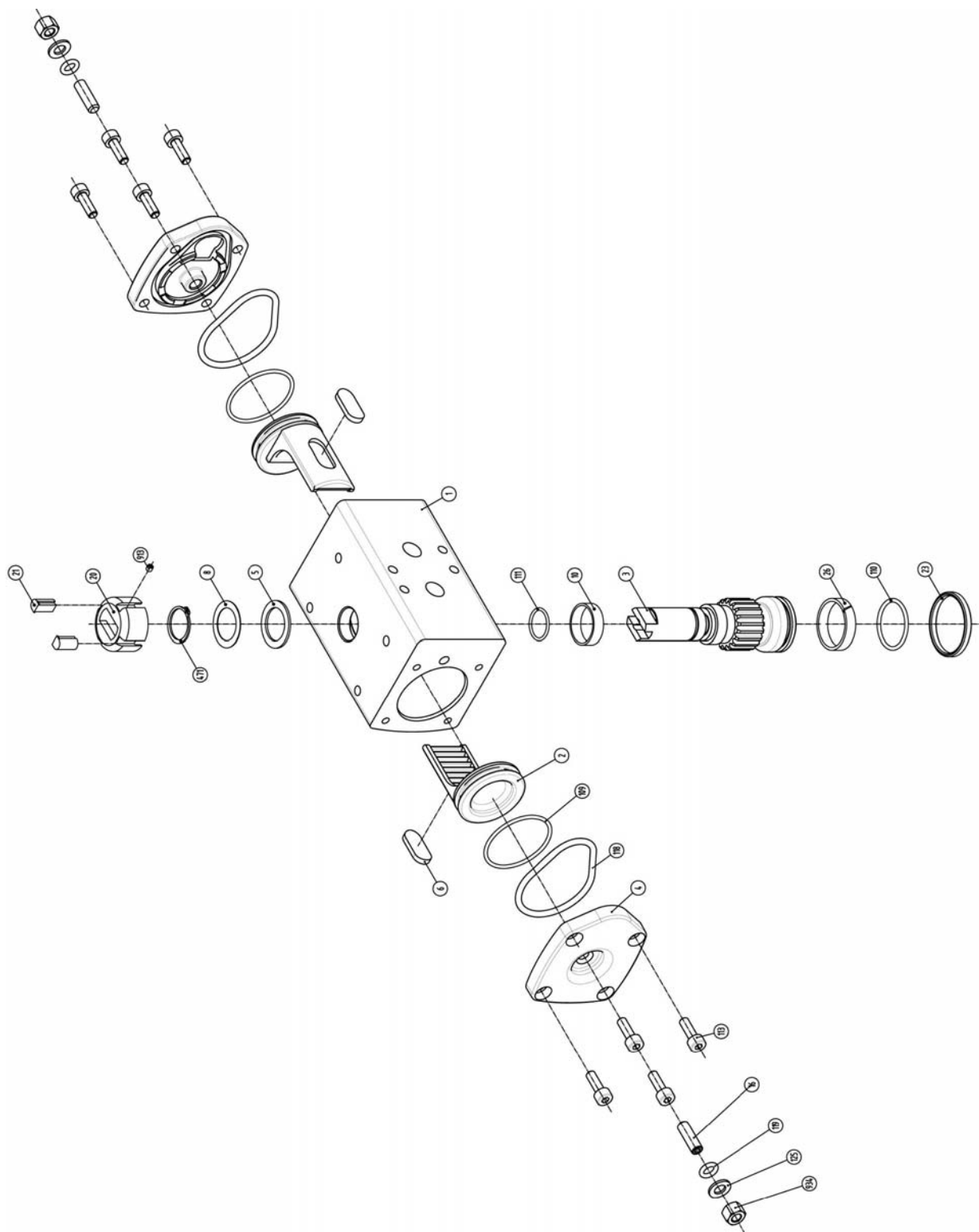
10. RECOMMENDED SPARE PARTS

The spare parts kit of the DA & SR actuator is made up of the following parts:

NUMBER	QUANTITY	NAME
5	1	Soft Pinion Washer
6	2	Slide Piston
8	1	Metallic Pinion Washer
10	1	Upper Pinion Bearing
24	2	Rubber Plug
25	2	Slide Guide
26	1	Lower Pinion Bearing
109	2	Piston's O-ring
110	1	Lower Pinion's O-ring
111	1	Upper Pinion's O-ring
118	2	Cap's O-ring
119	2	O-ring
471	1	Slip Washer

11. EXPLODED VIEW ACTUATOR, SIZE DA-10

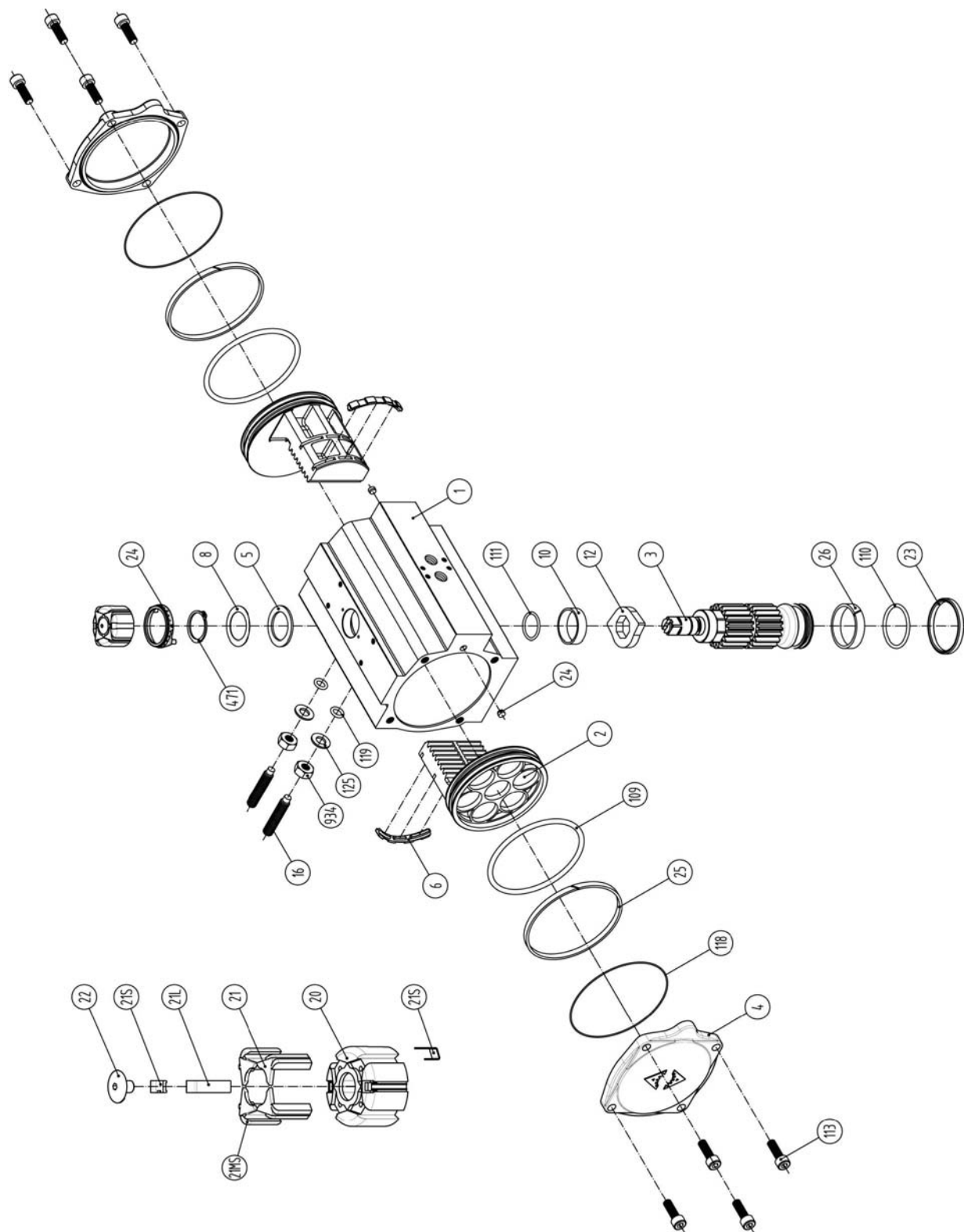
Revision 01 dd. 24.11.2014



Design and materials can be changed without notice. Errors and omissions excepted

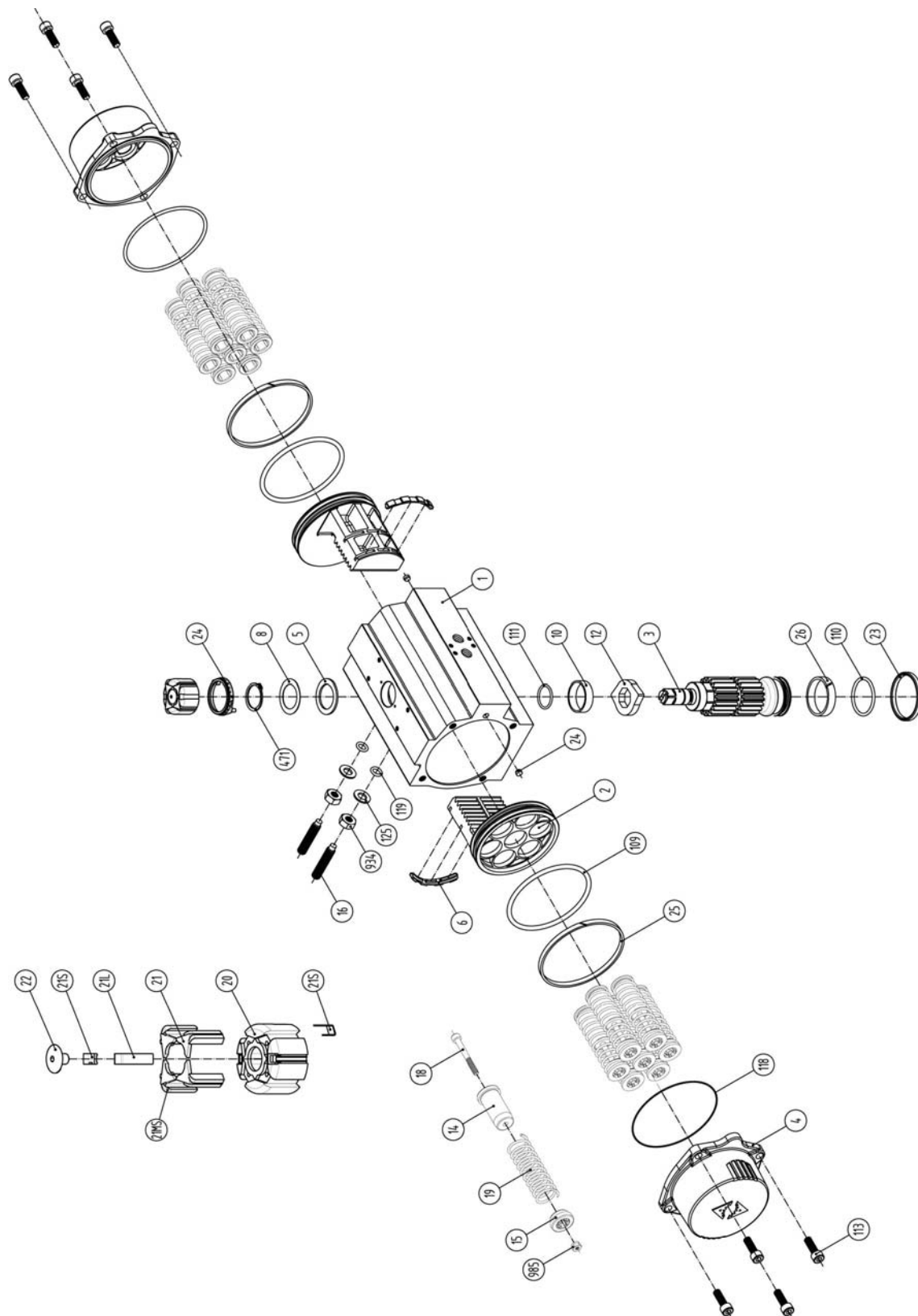
12. EXPLODED VIEW ACTUATOR, SIZE DA (20 ~ 850)

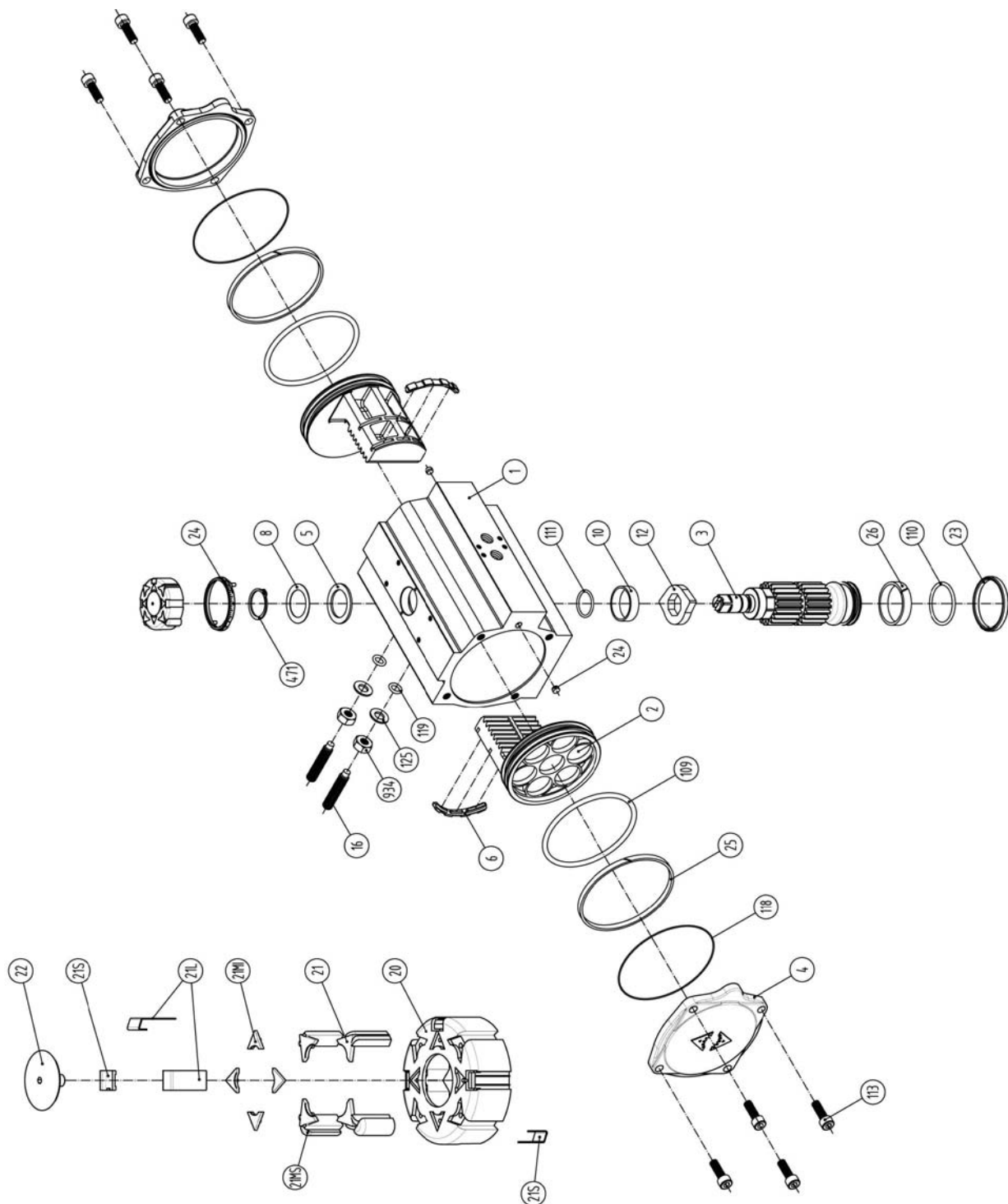
Revision 01 dd. 24.11.2014



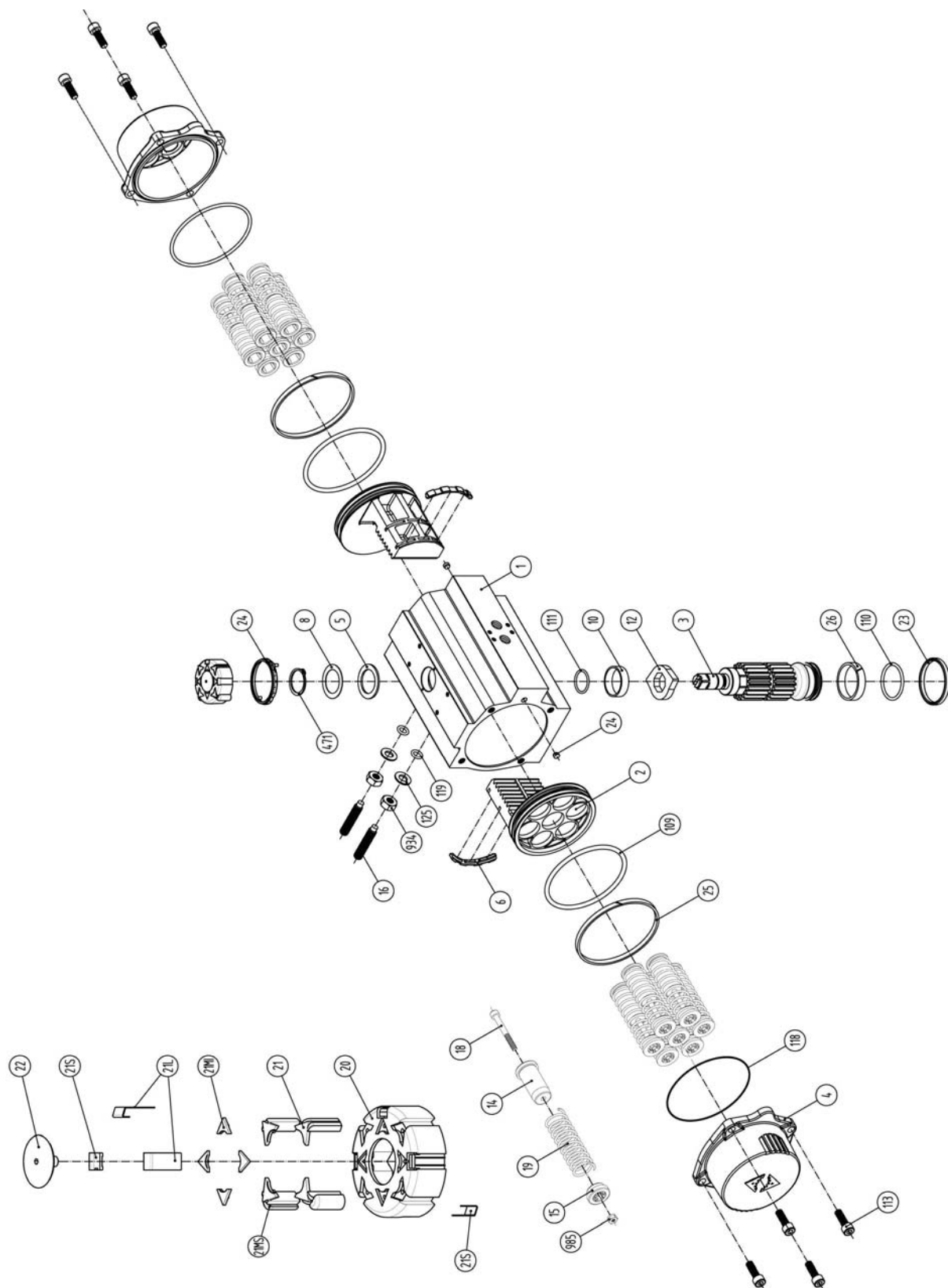
Design and materials can be changed without notice. Errors and omissions excepted

13. EXPLODED VIEW ACTUATOR, SIZE SR (20 ~ 850)

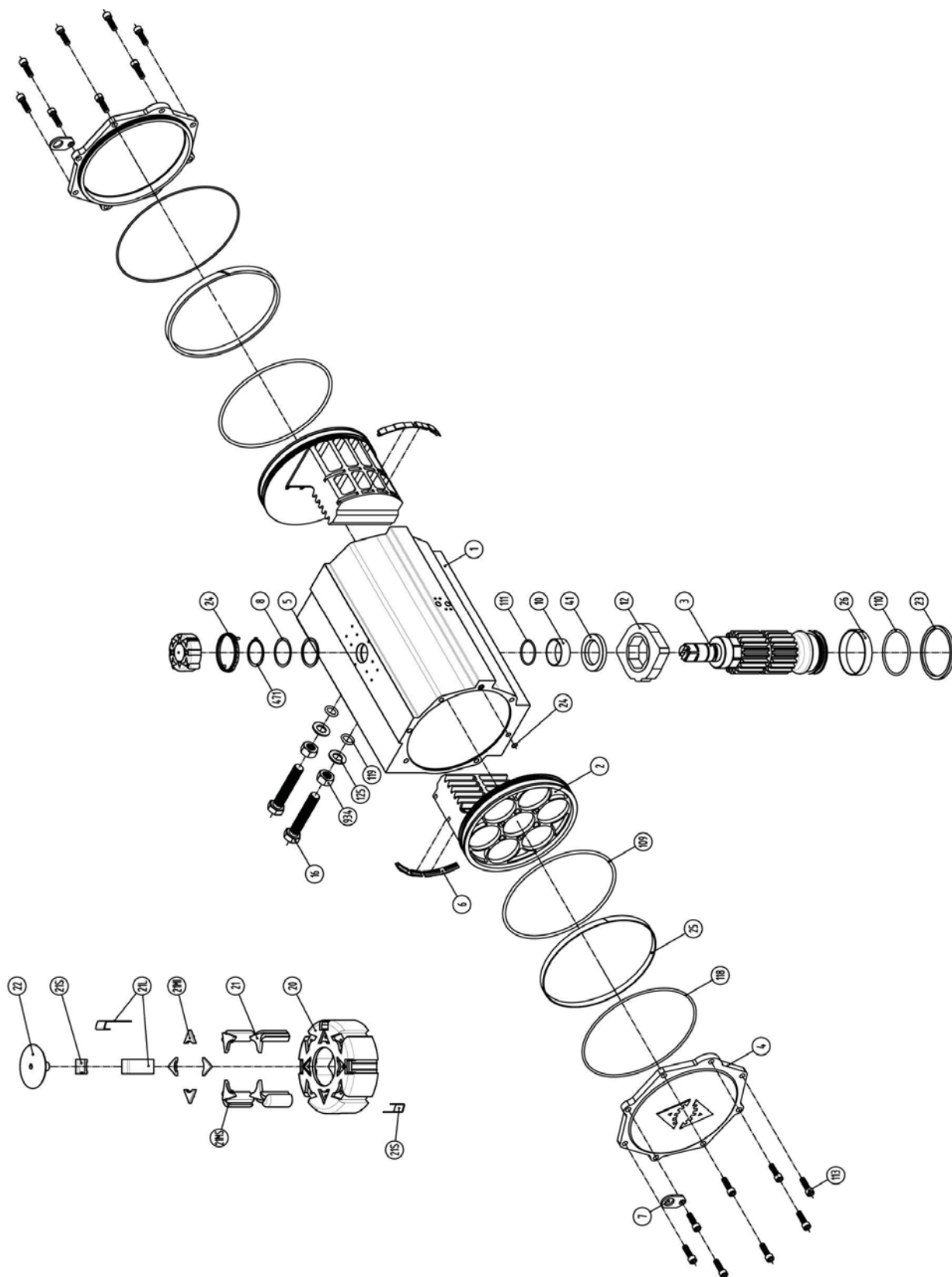




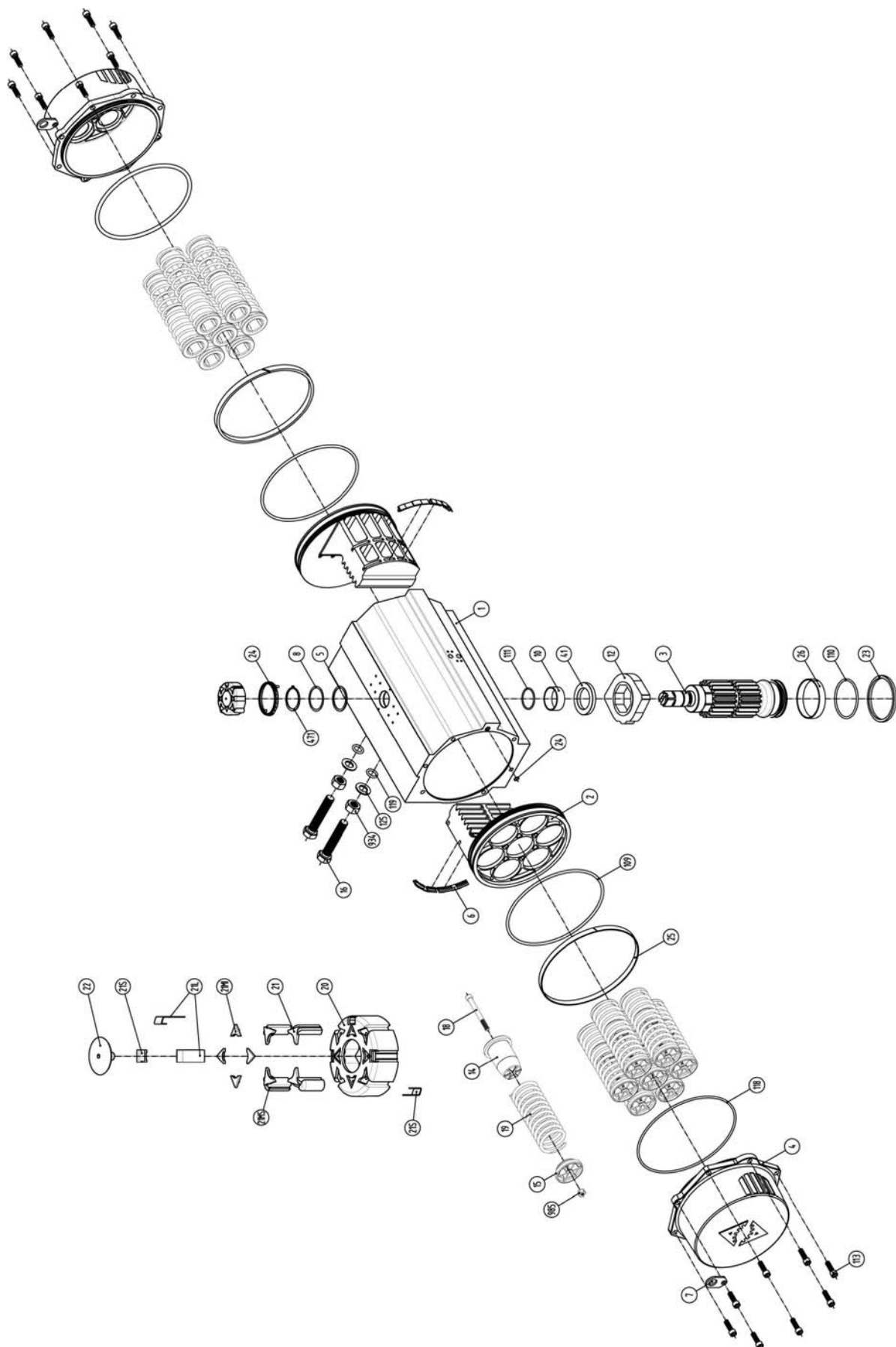
15. EXPLODED VIEW ACTUATOR, SIZE SR (1200 ~ 1750)



16. EXPLODED VIEW ACTUATOR, SIZE DA (2100 ~ 4000)



17. EXPLODED VIEW ACTUATOR, SIZE SR (2100 ~ 4000)



18. MATERIALS OF PARTS BEFORE

NO.	Q-TY	PART	MATERIAL
1	1	Body	Aluminium hard anodized
2	2	Piston	Aluminium
3	1	Pinion	Nickel plated carbon steel
4	2	End caps	Aluminium epoxy coated
5	1	Soft pinion washer	Polyamide PA 6,6
6	2	Slide piston	Polyamide PA 6,6 + 30% G.F.
7	2	Lug*	Nickel plated carbon steel
8	1	Pinion washer	Stainless steel
10	1	Upper pinion bearing	Polyamide PA 6,6 / Size 500 & larger in reinforced bronze
12	1	Stop	ASTM A 105
14	14	Spring's long support	Polyamide PA 6,6 (model 20 with only 6 pieces)
15	14	Spring's short support	Polyamide PA 6,6 (model 20 with only 6 pieces)
16	2	Leveling screw	Stainless steel
18	14	Bolt	Stainless steel (model 20 with only 6 pieces)
19	14	Spring	DIN 2076 • D-5,6 (model 20 with only 6 pieces)
20	1	Position indicator	Polypropylene (inserts in stainless steel)
21	2	Cam	Polypropylene
23	1	Centering ring	Nickel plated carbon steel
24	2	Rubber plug	NBR
25	2	Slide guide	Polyamide PA 6,6 + 30% G.F.
26	1	Lower pinion bearing	Polyamide PA 6,6
41	1	Stop washer pinion*	Stainless steel
109	2	O-Ring	NBR
110	1	O-Ring	NBR
111	1	O-Ring	NBR
113	8	Bolt	Stainless steel
118	2	O-Ring	NBR
119	2	O-Ring	NBR
125	1	Washer	Stainless steel
471	1	Slip washer	Stainless steel
934	2	Nut	Stainless steel
985	14	Nut	Stainless steel (model 20 with only 6 pieces)

* only for sizes 2500 & 4000

19. FAULT FINDING

WARNING!

Before disassembling the actuator, follow the instructions given below.

19.1 Actuator with solenoid valve

If the actuator does not function, check as follows:

- » The valve is free to rotate.
- » The actuator is of the correct size.
- » The correct voltage is supplied to the solenoid (the valve coil is tagged with the correct voltage).
- » Sufficient compressed air is supplied to the solenoid valve.
- » The solenoid is intact (plunger, seals, magnet). In case of any defects use a new solenoid or follow the instructions of the solenoid's manufacturer.

19.2 Actuator without a solenoid valve

For actuators without solenoid valve (or those where the solenoid valve and mounting block are working correctly), remove the actuator from the valve, disassemble and check the following:

- » Make sure all porting is clear of obstructions.
- » Make sure that the actuator is lubricated and that there is no solidified grease between the pinion and piston racks. If solidified grease is present, clean, dry, regrease and reassemble.
- » Verify that the actuator pinion shaft and / or pistons are not seized. If seized, reassemble as per instructions in section 8.
- » If the unit exhibits excessive backlash, check the teeth on the piston racks for wear.
- » With spring return actuators, check for misplaced or broken springs. If spring are broken check the body for scoring.
- » If the actuator and valve are free reassemble the actuator and retest. If the unit still fails to operate, contact FERGO.

20. SPRING RETURN ACTUATOR TORQUE OUTPUT in Nm

size	type	3 bar		3.5 bar		4 bar		4.5 bar		5 bar		5.5 bar		6 bar		6.5 bar		7 bar		8 bar		spring stroke		weight (kg)
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	END 0°	START 90°	
20	S04			8	5	9	7	11	8	13	10	14	12	16	13	17	15	19	17	22	20	4	7	1,51
	S06 ¹											12	9	14	10	15	12	17	13	20	17	7	11	1,54
	S08									11	7	10	5	12	7	14	9	15	10	18	14	9	15	1,56
	S14 ¹																							
40	S04	16	14	20	17	23	20	26	24	30	27	33	30	37	34	40	37	43	41	50	47	5	8	2,17
	S06	14	10	18	14	21	17	24	20	28	24	31	27	34	30	38	34	41	37	48	44	7	12	2,20
	S08			15	10	19	14	22	17	26	20	29	24	32	27	36	30	39	34	46	41	10	16	2,23
	S10							20	14	24	17	27	20	30	24	34	27	37	30	44	37	12	20	2,26
80	S04	31	27	38	34	44	40	50	46	57	53	63	59	70	66	76	72	82	78	95	91	9	13	3,28
	S06	27	21	34	28	40	34	47	41	53	47	59	53	66	60	72	66	79	73	92	86	13	20	3,36
	S08					37	29	43	35	49	41	56	48	62	54	69	61	75	67	88	80	17	27	3,43
	S10							39	29	46	36	52	42	59	49	65	55	71	61	84	74	22	33	3,51
130	S04	43	36	52	46	62	56	72	65	82	75	92	85	102	95	111	105	121	115	141	134	19	27	4,40
	S06			47	38	57	48	67	58	76	68	86	77	96	87	106	97	116	107	135	127	26	36	4,50
	S08					51	40	61	50	71	60	81	70	91	80	100	89	110	99	130	119	32	45	4,60
	S10							56	42	65	52	75	62	85	72	95	82	105	92	124	111	39	54	4,70
200	S04	61	49	76	63	90	78	105	92	119	107	134	122	149	136	163	151	178	166	207	195	31	46	6,50
	S06			67	50	81	65	96	79	111	94	125	109	140	123	154	138	169	152	198	182	42	61	6,70
	S08					72	52	87	66	102	81	116	96	131	110	146	125	160	139	189	169	52	77	6,90
	S10							78	53	93	68	107	83	122	97	137	112	151	126	180	156	63	92	7,00
300	S04	102	75	126	99	151	123	175	148	199	172	223	196	247	220	272	245	296	269	344	317	51	83	9,65
	S06			112	76	136	100	160	124	185	148	209	173	233	197	257	221	281	245	330	294	68	111	9,92
	S08					122	76	146	101	174	125	194	149	219	173	243	198	267	222	315	270	85	138	10,20
	S10							131	77	156	101	180	126	204	150	228	174	253	198	301	247	102	166	10,50
500	S04	152	119	188	155	224	191	260	227	296	263	333	299	369	335	405	371	441	407	513	480	76	115	13,33
	S06	131	86	167	122	203	158	239	194	275	231	311	267	347	303	383	339	419	375	492	447	101	153	13,84
	S08					181	126	217	162	254	198	290	234	326	270	362	306	398	342	470	414	126	192	14,35
	S10							196	129	232	165	268	201	304	238	340	274	376	310	449	382	152	230	14,85
850	S04	260	209	320	269	380	328	440	388	500	448	559	508	619	568	679	627	739	687	858	807	116	177	19,70
	S06	227	159	287	218	347	278	407	338	467	398	526	458	586	518	646	577	706	637	826	757	155	236	20,30
	S08			254	168	314	228	374	288	434	348	494	408	553	467	613	527	673	587	793	707	193	295	20,90
	S10							341	238	401	298	461	358	521	417	580	477	640	537	760	657	232	353	21,60
1200	S04	373	289	460	376	546	462	633	549	720	635	806	722	893	808	979	895	1066	981	1239	1154	171	271	30,10
	S06	325	213	411	299	498	386	584	472	671	559	758	645	844	732	931	818	1017	905	1190	1078	229	361	31,10
	S08	276	136	363	222	449	309	536	395	622	482	709	569	795	655	882	742	969	828	1142	1001	286	451	32,20
	S10					401	232	487	319	574	405	660	492	747	578	833	665	920	751	1093	924	343	541	33,20
1750	S04	477	349	595	466	712	584	830	702	948	820	1066	937	1183	1055	1301	1173	1419	1291	1654	1526	270	421	39,30
	S06	400	229	518	347	636	465	754	582	871	700	989	818	1107	936	1225	1053	1342	1171	1578	1407	360	562	41,00
	S08			441	228	559	345	677	463	795	581	912	699	1030	816	1148	934	1266	1052	1501	1287	451	702	42,70
	S10							600	344	718	461	836	579	954	697	1071	815	1189	933	1425	1168	541	843	44,40
2100	S04	702	509	883	690	1064	871	1245	1052	1426	1233	1607	1414	1788	1595	1969	1776	2150	1957	2512	2319	384	577	60,30
	S06	574	316	755	497	936	678	1117	859	1298	1040	1479	1221	1660	1402	1841	1583	2022	1764	2384	2126	512	770	62,50
	S08			627	305	808	486	989	667	1170	848	1351	1029	1532	1210	1713	1391	1894	1572	2256	1934	640	962	64,20
	S10							861	474	1042	655	1223	836	1404	1017	1585	1198	1766	1379	2128	1741	768	1154	66,30
2500	S04	1299	1045	1587	1333	1876	1622	2164	1910	2453	2199	2741	2487	3029	2775	3318	3064	3606	3352	4183	3929	508	806	85,90
	S06	1155	816	1444	1105	1732	1393	2020	1682	2309	1970	2597	2258	2886	2547	3174	2835	3462	3124	4039	3700	677	1075	89,40
	S08			1300	876	1588	1165	1877	1453	2165	1742	2453	2030	2742	2318	3030	2607	3319	2895	3895	3472	846	1344	92,90
	S10					1444	936	1733	1225	2021	1513	2310	1802	2598	2090	2886	2378	3175	2667	3752	3243	1015	1613	96,40
4000	S04	1763	1262	2165	1663	2566	2065	2967	2466	3369	2867	3770	3269	3956	3288	4358	3689	4759	4091	5068	4399	758	1348	158,70
	S06	1549	880	1950	1282	2351	1683	2752	2084	3154	2485	3555	2887	3742	2906	4143	3307	4544	3709	4853	4017	1264	2246	170,80
	S08					2136	1301	2538	1702	2939	2104	3340	2505	3527	2524	3928	2926	4329	3327	4638	3636	1516	2696	176,90
	S10							2323	1320	2724	1722	3125	2123	3312	2142	3713	2544	4115	2945	4423	3254	1769	3145	182,90

¹= Standard, unless otherwise ordered.

21. DOUBLE ACTING ACTUATOR TORQUE OUTPUT in Nm

size	type	3 bar		3,5 bar		4 bar		4,5 bar		5 bar		5,5 bar		6 bar		6,5 bar		7 bar		8 bar		10 bar		weight (kg)
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	
10	D	6,00		8,00		9,00		10,00		11,00		11,50		12,00		12,00		13,00		14,00		15,00		0,64
20	D	9,70		11,40		13,00		14,60		16,20		17,80		19,50		21,10		23,00		26,00				1,40
40	D	20,30		23,70		27,10		30,50		33,90		37,30		41,00		44,00		47,00		54,00				2,10
80	D	38,50		44,90		51,30		57,70		64,10		70,50		77,00		83,00		90,00		103,00				3,00
130	D	59,10		68,90		78,70		88,60		98,40		108,30		118,00		128,00		138,00		157,00				3,80
200	D	88,00		102,00		117,00		131,00		146,00		161,00		175,00		190,00		205,00		234,00				5,60
300	D	145,00		170,00		194,00		218,00		242,00		267,00		291,00		315,00		339,00		388,00				8,50
500	D	217,00		253,00		289,00		325,00		361,00		397,00		433,00		469,00		505,00		577,00				11,20
850	D	359,00		419,00		479,00		538,00		598,00		658,00		718,00		778,00		837,00		957,00				16,90
1200	D	519,00		606,00		692,00		779,00		865,00		952,00		1038,00		1125,00		1211,00		1384,00				25,80
1750	D	707,00		824,00		942,00		1060,00		1178,00		1295,00		1413,00		1531,00		1649,00		1884,00				32,50
2100	D	1086,00		1267,00		1448,00		1629,00		1810,00		1991,00		2172,00		2353,00		2534,00		2896,00				49,70
2500	D	1730,00		2019,00		2307,00		2596,00		2884,00		3172,00		3461,00		3749,00		4038,00		4614,00				69,60
4000	D	2408,00		2809,00		3210,00		3612,00		4013,00		4414,00		4816,00		5217,00		5618,00		6421,00				129,40