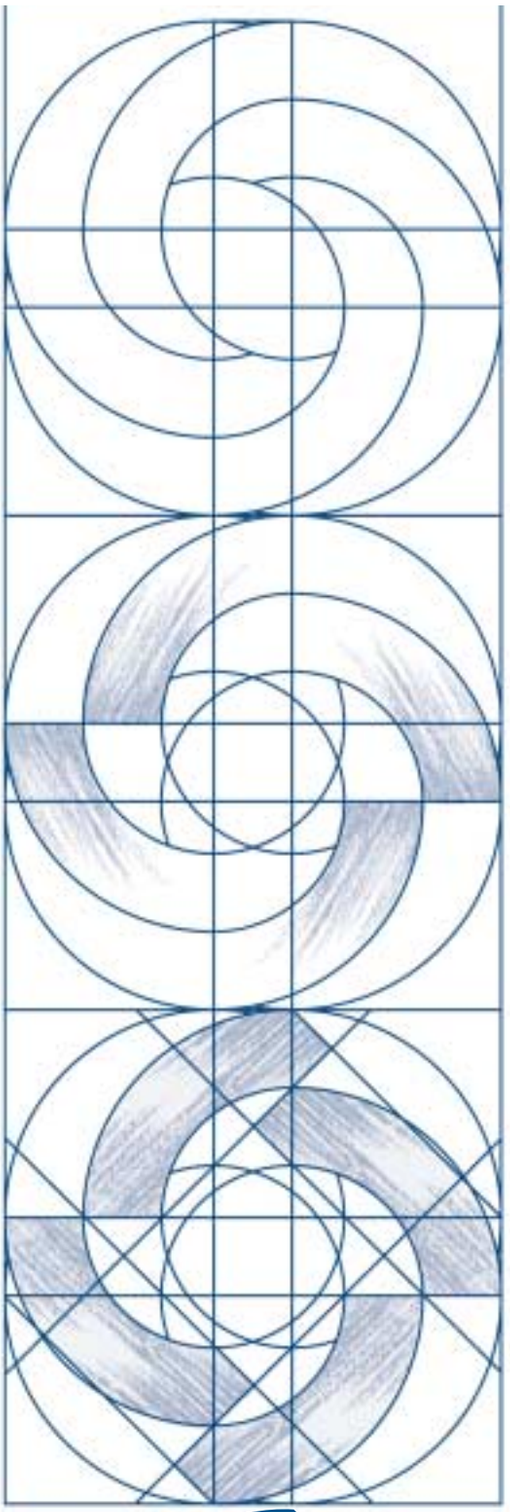

“GIG” DOUBLE ACTING DIRECT GAS QUARTER-TURN ACTUATORS

BIFFI

tyco flow control

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“GIG” Double Acting Direct Gas Quarter-Turn Actuators

Double Acting
Direct Gas Quarter-turn Actuators
Output Torques to 750.000 Nm

Features and Benefits

- Separate gas and hydraulic cylinders prevent commingling of gas and oil, eliminating any possibility of oil release to the atmosphere during the opening or closing cycle.
  On request the version with twin gas/hydraulic cylinders is available, assuring the best lubrication and protection.
- Scotch yoke mechanism generates high break torque for the actuation of quarter-turn pipeline valves.
- Totally enclosed, weatherproof carbon steel housing protects the critical internal components against corrosive elements.
- Heavily chrome plated guide bar provides support for the transverse forces generated during rotation of the scotch yoke, ensuring proper support of the piston rod and valve stem.
- All load-bearing components supplied with bronze or PTFE-graphite-bronze bearings, eliminating the need for lubrication maintenance and ensuring durable, smooth operation.
- Electroless nickel plated cylinder wall provides a smooth, long lasting sealing surface for the piston seal, assuring maximum sealing integrity and long service life.
- ISO 9001 certified design and manufacturing process provides assurance of a quality finished product.

  PED directive 97/23/EC is normally certified for cylinders and tanks

- Integral manual hand pump provides a means of cycling the valve when sufficient line pressure is not available.
- Power gas consumption is significantly reduced as there are no gas/hydraulic tanks incorporated in the design.
- Independently adjustable ‘open’ and ‘close’ travel stops are located on center with the piston rod thus eliminating sideloading to the output shaft.
- Internationally recognized ISO 5211 mounting patterns facilitate in-field interchangeability of adaption hardware.

General Application

Typically used for the local or remote operation of quarter-turn ball, plug or butterfly valves when using high-pressure gas as a supply media.

Technical Data

Supply pressure: 10 to 100 barg

Supply medium: high pressure gas

Temperature rating:
Standard range: -30° to 100°C
Optional range: -60° to 140°C

Angular rotation: 90 degrees ± 4 degrees at each end of travel

Contents may change without notice

Principles of Construction

Biffi direct gas actuator incorporates the field proven scotch yoke design. The scotch yoke mechanism, yoke bearings, guide bar, guide block, guide block bearing, guide block pin and sliding block are contained in the totally enclosed, weatherproof carbon steel housing. Bearings are provided for each moving part. The guide bar prevents the scotch yoke, piston rods and valve stem from operating under excessive side loads. Biffi’s direct gas actuator is designed and manufactured to ISO 9001 standards.

Separate Gas and Hydraulic Cylinders

Gas and hydraulic fluid cannot mix with foaming in the Biffi direct gas actuator. The gas and hydraulic fluid are contained in totally separate cylinders mounted on opposite ends of the actuator housing. The actuator is cycled by introducing gas directly from the pipeline to the gas cylinder of the actuator. Movement of the gas cylinder piston/piston rod is transmitted to the scotch yoke which, in turn, moves the piston/piston rod of the hydraulic cylinder. Check valves and adjustable orifices in the hydraulic circuit regulate the cycle speed of the actuator.
On Customer request Biffi can provide the special execution with twin gas-hydraulic cylinders, where the same cylinder contains gas from one side of the piston, oil from the other side of the piston.

Reduced Gas Consumption

Introducing the power gas directly to the gas cylinder of the actuator requires significantly less power gas than systems using external gas/hydraulic tanks. The Biffi GIG actuator is also more compact and lighter than actuators incorporating gas/hydraulic tanks as the GIG actuator design does not require external gas/hydraulic tanks. This feature also makes the GIG actuator a more cost effective solution.

Integral Manual Hand Pump

Each Biffi GIG direct gas actuator is equipped with an integral manual hand pump and hydraulic oil reservoir. When pipeline pressure is not available, the manual hand pump can be used to safely and reliably open or close the valve at its maximum torque requirement.
The standard hydraulic group must be positioned in the “remote” position, before starting the gas operation.
A special hydraulic group is also available with priority of the gas operation, being the system always ready for the “remote” operation.
For smaller models also the version with screw-jack is available “MSJ”.

Speed Control

Independently adjustable opening and closing speed controls are built into the manual hand pump module and are easily adjusted in the field without the need for special tools. The speed at which the actuator cycles the valve is controlled by adjusting the oil flow rate in the hydraulic circuit. Using the hydraulic circuit to control the cycling speed provides smooth operation.

Linear Travel Stops

The externally adjustable travel stops are on center with the piston rod, eliminating side loading to the scotch yoke. Located at either end of the actuator, these travel stops provide precise adjustment of the rotary output. Both the ‘open’ and ‘close’ travel stops are independently adjustable.

Electroless Nickel Plated Cylinders

Both the gas and hydraulic cylinder walls are electroless nickel plated and precision honed to ensure long lasting, trouble free service. This plating process provides an extremely smooth and corrosion resistant surface for the piston seals.

Guide Bar

All Biffi GIG direct gas actuators have a heavily chrome-plated guide bar that supports the transverse forces generated by the scotch yoke while maintaining precise alignment of the piston rod and preventing sideloading to the output shaft. This feature greatly increases the cycle life of the actuator. This guide bar technology was originated by Biffi and has proven to be the most effective way of controlling the forces generated by a scotch yoke. The heavily chrome-plated guide bar also provides an excellent bearing surface upon which the guide block travels.

Yoke Design

Valve torque requirements are the most critical elements to consider when sizing an actuator. The torque requirements of a typical pipeline quarter-turn ball valve can vary greatly as the valve is moving from the closed to open or open to closed position.
The Biffi GIG direct gas actuator is available with either a canted or symmetric scotch yoke mechanism. The actuator size is optimized by using the scotch yoke mechanism that will produce the proper amount of torque at any point during the valve stroke from 0 degrees to 90 degrees travel. The torque output characteristics of each of these mechanisms are documented in this brochure.

Mounting

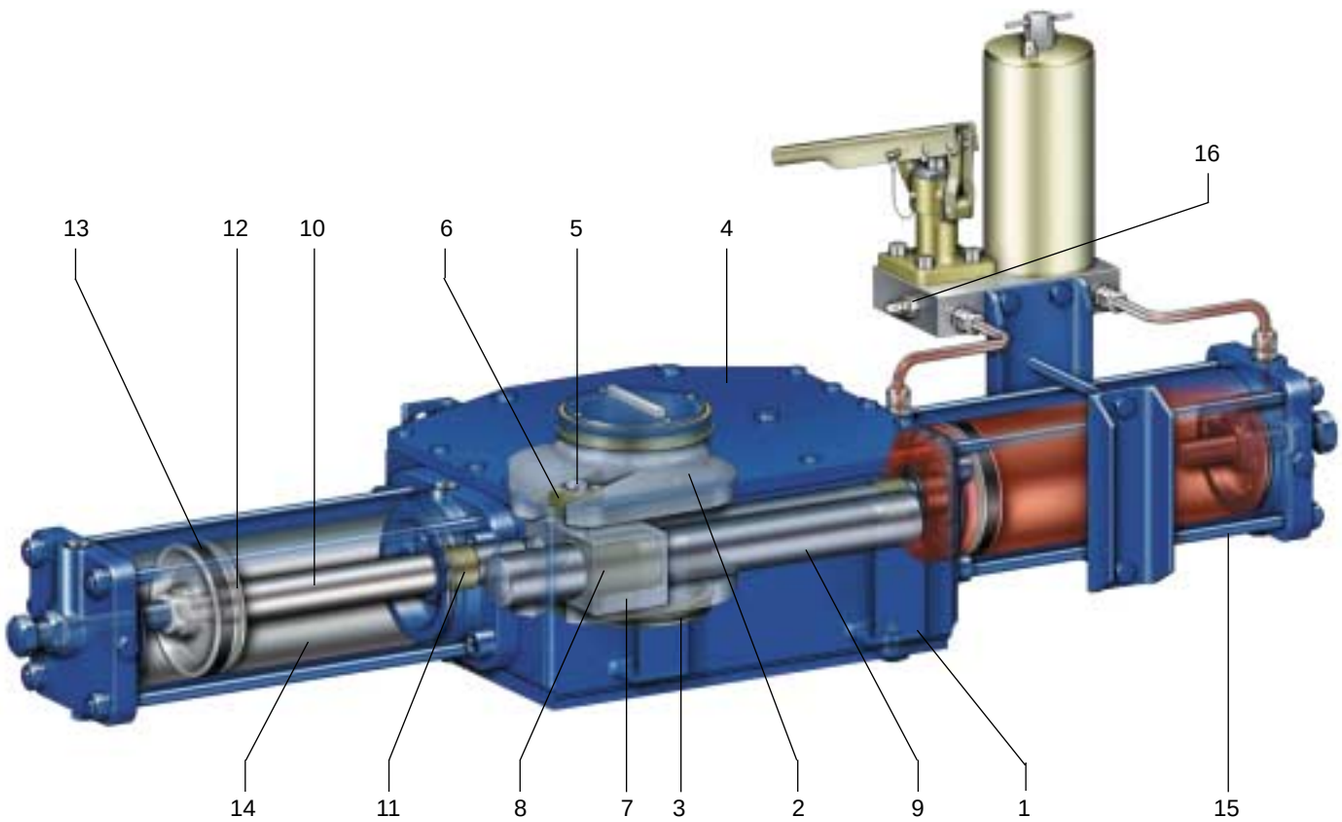
ISO 5211 mounting pads utilize internationally recognized mounting patterns. The Biffi GIG direct gas actuator can be provided as part of a new ball, plug or butterfly valve and actuator package or can easily be installed on existing valves in the field.

Actuator Control Components

Since 1955, Biffi has been supplying the petroleum industry with the highest quality actuators and control components and can accommodate requirements from a basic local/manual control to a sophisticated line-break system. High pressure, poppet type control valves are available, suitable for long stillstand and for low temperature ambient.

Explosion-proof version according to ATEX directive 94/9/EC or to Factory Mutual for the electric controls.

For details, see brochure BIFFC-0077-EN.



Materials of Construction

	Item	Material	Material Standards
1	Housing	Carbon steel	ASTM A537 cl1 + ASTM A283 gr D
2	Yoke	Carbon steel	API 5LX gr X52 (C<0.2%) + ASTM A537 cl1
3	Bushing	Bronze	ASTM B427 Alloy UNS No. C90800
4	Cover	Carbon steel	ASTM A283 gr D
5	Guide block pin	Alloy steel	AISI 4340
6	Sliding block	Bronze	ASTM B427 Alloy UNS No. C90800
7	Guide block	Carbon steel	ASTM A537 cl1
8	Guide block bushing	Bronze	ASTM B427 Alloy UNS No. C90800
9	Guide bar	Alloy steel (hard chrome plated)	AISI 4340
10	Piston rod	Alloy steel (hard chrome plated)	AISI 4340
11	Piston rod bushing	Bronze	ASTM B427 Alloy UNS No. C90800
12	Piston	Carbon steel	ASTM A283 gr D
13	Guide ring	Teflon® + graphite	—
14	Pneumatic cylinder tube	Carbon steel (ENP)	API 5LX GR X52
15	Hydraulic cylinder tube	Carbon steel (ENP)	API 5LX GR X52
16	Manual hydraulic hand pump/speed control module	Carbon steel	ASTM A537 cl1 + A283 gr.D

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Contents may change without notice

Performance tables

“GIG” Canted Yoke Mechanism

Actuator model	Max. operating torque (Nm)	Output torque at 0° (Nm/bar) to close	to open	Output torque at 45° (Nm/bar)	Output torque at 90° (Nm/bar) to close	to open	Max. operating pressure (bar)*	Gas consumption (Litres)
0.3C-75	3000	64	65	23	31	37	47	0.8
0.3C-100	3000	117	115	42	57	65	25	1.4
0.9C-100	9000	134	132	48	65	74	67	1.6
0.9C-135	9000	247	243	88	120	137	36	2.8
1.5C-135	15000	309	304	110	150	172	47	3.5
1.5C-175	15000	522	512	188	255	289	28	5.6
3C-135	30000	500	493	184	244	278	60	5.6
3C-175	30000	845	829	311	412	467	36	9.5
6C-175	60000	989	970	364	482	547	60	11
6C-200	60000	1280	1267	471	624	714	47	14
14C-200	120000	1460	1446	515	713	815	82	15
14C-235	120000	1984	1912	730	969	1080	60	21
14C-280	120000	2825	2715	1040	1379	1531	42	30
18C-235	180000	2282	2197	840	1114	1240	78	25
18C-280	180000	3249	3122	1196	1586	1760	55	35
32C-235	300000	2709	2616	986	1323	1472	105	29
32C-280	300000	3857	3707	1404	1883	2090	78	41
50C-235	400000	3044	2934	1095	1486	1654	105	32
50C-280	400000	4334	4165	1560	2116	2348	92	45
50C-300	400000	4930	4782	1775	2407	2696	81	52
80C-280	750000	5056	4859	1820	2468	2739	105	52
80C-300	750000	5751	5579	2070	2808	3145	105	61
80C-350	750000	7827	7566	2817	3822	4280	95	83

Notes

1. The max allowable pressure is 105 bar (static pressure applicable to fully stroked actuator against the travel stops)
2. * The max operating pressure is the pressure required to produce the maximum operating torque of the actuator
3. The listed output torque values are the minimum guaranteed ones

“GIG-MHP” Canted Yoke Mechanism

Actuator model	Max. operating torque (Nm)	Output torque at 0° (Nm/bar) to close	to open	Output torque at 45° (Nm/bar)	Output torque at 90° (Nm/bar) to close	to open	Max. allowable pressure (bar)*	Max. operating pressure (bar)**
0.3C-75MHP 75	3000	64	65	23	31	37	105	47
0.3C-100MHP 75	3000	117	115	42	57	65	60	25
0.3C-100MHP 100	3000	117	115	42	57	65	105	25
0.9C-100MHP 100	9000	134	132	48	65	74	105	67
0.9C-135MHP 100	9000	247	243	88	120	137	60	36
0.9C-135MHP 135	9000	247	243	88	120	137	105	36
1.5C-135MHP 135	15000	309	304	110	150	172	105	47
1.5C-175MHP 135	15000	522	512	188	255	289	60	28
1.5C-175MHP 175	15000	522	512	188	255	289	105	28
3C-135MHP 135	30000	500	493	184	244	278	105	60
3C-175MHP 135	30000	845	829	311	412	467	60	36
3C-175MHP 175	30000	845	829	311	412	467	105	36
6C-175MHP 175	60000	989	970	364	482	547	105	60
6C-200MHP 175	60000	1280	1267	471	624	714	80	47
6C-200MHP 200	60000	1280	1267	471	624	714	105	47
14C-200MHP 200	120000	1460	1446	515	713	815	105	82
14C-235MHP 200	120000	1984	1912	730	969	1080	75	60
14C-235MHP 235	120000	1984	1912	730	969	1080	105	60
14C-280MHP 200	120000	2825	2715	1040	1379	1531	50	42
14C-280MHP 235	120000	2825	2715	1040	1379	1531	75	42
14C-280MHP 280	120000	2825	2715	1040	1379	1531	105	42
18C-235MHP 235	180000	2282	2197	840	1114	1240	105	78
18C-280MHP 235	180000	3249	3122	1196	1586	1760	75	55
18C-280MHP 280	180000	3249	3122	1196	1586	1760	105	55
32C-235MHP 235	300000	2709	2616	986	1323	1472	105	105
32C-280MHP 235	300000	3857	3707	1404	1883	2090	75	78
32C-280MHP 280	300000	3857	3707	1404	1883	2090	105	78
50C-235MHP 235	400000	3044	2934	1095	1486	1654	105	105
50C-280MHP 235	400000	4334	4165	1560	2116	2348	75	75
50C-280MHP 280	400000	4334	4165	1560	2116	2348	105	92
50C-300MHP 235	400000	4930	4782	1775	2407	2696	60	60
50C-300MHP 280	400000	4930	4782	1775	2407	2696	90	81
50C-300MHP 300	400000	4930	4782	1775	2407	2696	105	81
80C-280MHP 280	750000	5056	4859	1820	2468	2739	105	105
80C-300MHP 300	750000	5751	5579	2070	2808	3145	105	105
80C-350MHP 350	750000	7827	7566	2817	3822	4280	95	95

Notes

1. ⁎ Is the maximum static pressure that may be applied to a fully stroked actuator against the travel stops.
2. ⁎⁎ The max. operating pressure is the pressure required to produce the maximum operating torque of the actuator (if lower than max. allowable pressure)
3. The listed output torque values are the minimum guaranteed ones

“GIG” Symmetric Yoke Mechanism

Actuator model	Max. operating torque (Nm)	Output torque at 0° (Nm/bar) to close	to open	Output torque at 45° (Nm/bar)	Output torque at 90° (Nm/bar) to close	to open	Max. operating pressure (bar)*	Gas consumption (Litres)
0.3S-75	3000	40	40	23	38	47	64	0.8
0.3S-100	3000	75	73	42	69	84	36	1.4
0.9S-100	9000	86	85	49	80	97	105	1.6
0.9S-135	9000	158	154	89	146	177	51	2.8
1.5S-135	15000	217	212	113	169	204	66	3.5
1.5S-175	15000	367	356	191	287	344	38	5.6
3S-135	30000	354	346	187	285	344	84	5.6
3S-175	30000	599	582	316	482	578	49	9.5
6S-175	60000	699	679	370	565	677	85	11
6S-200	60000	905	887	479	732	884	66	14
14S-200	120000	1004	985	523	786	949	105	15
14S-235	120000	1425	1360	742	1115	1312	84	21
14S-280	120000	2028	1931	1056	1588	1863	59	30
18S-235	180000	1638	1564	853	1283	1509	105	25
18S-280	180000	2332	2220	1215	1827	2143	77	35
32S-235	300000	1989	1812	1003	1529	1799	105	29
32S-280	300000	2703	2573	1428	2177	2554	105	41
50S-235	400000	2109	2013	1114	1699	1999	105	32
50S-280	400000	3003	2858	1586	2419	2837	105	45
50S-300	400000	3416	3281	1804	2751	3257	105	52
80S-280	750000	3503	3334	1850	2822	3309	105	52
80S-300	750000	3985	3827	2104	3182	3799	105	61
80S-350	750000	4649	5208	2863	4331	5170	105	83

Notes

1. The max allowable pressure is 105 bar (static pressure applicable to fully stroked actuator against the travel stops)
2. *The max. operating pressure is the pressure required to produce the maximum operating torque of the actuator
3. The listed output torque values are the minimum guaranteed ones

“GIG-MSJ” Symmetric Yoke Mechanism

Actuator Model	Max. operating torque (Nm)	Output torque at 0° (Nm/bar) to close	to open	Output torque at 45° (Nm/bar)	Output torque at 90° (Nm/bar) to close	to open	Max. operating pressure (bar)**	Max. allowable pressure (bar)*	Jackscrew turns per stroke	Gas consum. (litres)
0.3S-75MSJ	3000	40	40	23	38	47	64	105	30	0.8
0.3S-100MSJ	3000	75	73	42	69	84	36	105	30	1.4
0.9S-100MSJ	9000	86	85	49	80	97	92	105	35	1.6
0.9S-135MSJ	9000	158	154	89	146	177	51	105	35	2.8
1.5S-135MSJ	15000	217	212	113	169	204	66	105	35	3.5
1.5S-175MSJ	15000	367	356	191	287	344	38	75 •	35	5.6
3S-135MSJ	30000+	354	346	187	285	344	41	105	56	5.6
3S-175MSJ	30000+	599	582	316	482	578	24	75 •	56	9.5

Notes

1. Max. operating torque with jackscrew manual override = 19000 Nm
2. * Static pressure applicable to fully stroked actuators against the travel stops
3. • Special execution with 105 bar max allowable pressure available on request
4. ** The max. operating pressure is the pressure required to produce the maximum operating torque of the actuator
5. The listed output torque values are the minimum guaranteed ones.

“GIG-MHP” Symmetric Yoke Mechanism

Actuator model	Max. operating torque (Nm)	Output torque at 0° (Nm/bar) to close	to open	Output torque at 45° (Nm/bar)	Output torque at 90° (Nm/bar) to close	to open	Max. allowable pressure (bar)*	Max. operating pressure (bar)**
0.3S-75MHP 75	3000	40	40	23	38	47	105	64
0.3S-100MHP 75	3000	75	73	42	69	84	60	36
0.3S-100MHP 100	3000	75	73	42	69	84	105	36
0.9S-100MHP 100	9000	86	85	49	80	97	105	72
0.9S-135MHP 100	9000	158	154	89	146	177	60	40
0.9S-135MHP 135	9000	158	154	89	146	177	105	40
1.5S-135MHP 135	15000	217	212	113	169	204	105	66
1.5S-175MHP 135	15000	367	356	191	287	344	60	38
1.5S-175MHP 175	15000	367	356	191	287	344	105	38
3S-135MHP 135	30000	354	346	187	285	344	105	84
3S-175MHP 135	30000	599	582	316	482	578	60	49
3S-175MHP 175	30000	599	582	316	482	578	105	49
6S-175MHP 175	60000	699	679	370	565	677	105	85
6S-200MHP 175	60000	905	887	479	732	884	80	66
6S-200MHP 200	60000	905	887	479	732	884	105	66
14S-200MHP 200	120000	1004	985	523	786	949	105	105
14S-235MHP 200	120000	1425	1360	742	1115	1312	75	84
14S-235MHP 235	120000	1425	1360	742	1115	1312	105	84
14S-280MHP 200	120000	2028	1931	1056	1588	1863	50	59
14S-280MHP 235	120000	2028	1931	1056	1588	1863	75	59
14S-280MHP 280	120000	2028	1931	1056	1588	1863	105	59
18S-235MHP 235	180000	1638	1564	853	1283	1509	105	105
18S-280MHP 235	180000	2332	2220	1215	1827	2143	75	77
18S-280MHP 280	180000	2332	2220	1215	1827	2143	105	77
32S-235MHP 235	300000	1989	1812	1003	1529	1799	105	105
32S-280MHP 235	300000	2703	2573	1428	2177	2554	75	90
32S-280MHP 280	300000	2703	2573	1428	2177	2554	105	90
50S-235MHP 235	400000	2109	2013	1114	1699	1999	105	105
50S-280MHP 235	400000	3003	2858	1586	2419	2837	75	75
50S-280MHP 280	400000	3003	2858	1586	2419	2837	105	105
50S-300MHP 235	400000	3416	3281	1804	2751	3257	60	60
50S-300MHP 280	400000	3416	3281	1804	2751	3257	90	90
50S-300MHP 300	400000	3416	3281	1804	2751	3257	105	105
80S-280MHP 280	750000	3003	3334	1820	2822	3309	105	105
80S-300MHP 300	750000	3985	3827	2070	3182	3799	105	105
80S-350MHP 350	750000	4649	5208	2817	4331	5170	105	105

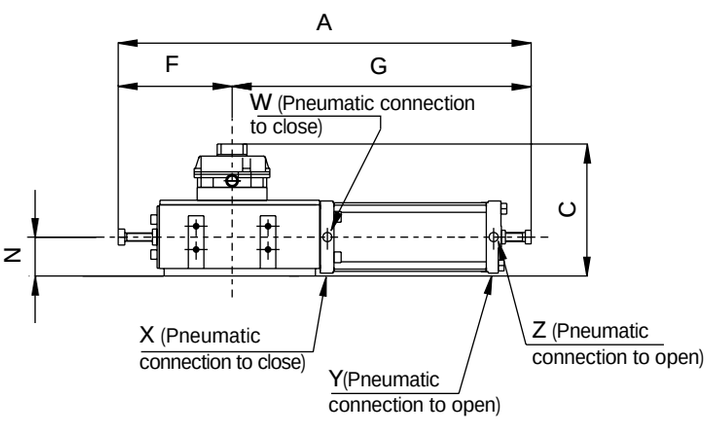
Notes

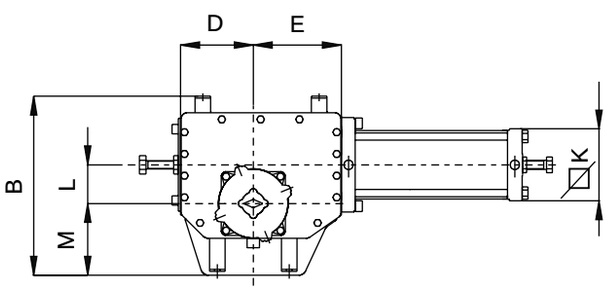
1. * Is the maximum static pressure that may be applied to a fully stroked actuator against the travel stops.
2. ** The max. operating pressure is the pressure required to produce the maximum operating torque of the actuator (if lower than max. allowable pressure)
3. The listed output torque values are the minimum guaranteed ones.

Technical data

“GIG-MHP” Canted and Symmetric Yoke Mechanism			
Actuator model	Gas consumption (litres)	Handpump operations per stroke	Oil content (litres)
0.3*-75MHP 75	0.8	40	0.9
0.3*-100MHP 75	1.4	40	0.9
0.3*-100MHP 100	1.4	70	1.6
0.9*-100MHP 100	1.6	80	1.8
0.9*-135MHP 100	2.8	80	1.8
0.9*-135MHP 135	2.8	150	3.3
1.5*-135MHP 135	3.5	180	3.6
1.5*-175MHP 135	5.6	180	3.6
1.5*-175MHP 175	5.6	300	6
3*-135MHP 135	5.6	290	6.6
3*-175MHP 135	9.5	290	6.6
3*-175MHP 175	9.5	490	11
6*-175MHP 175	11	400	12
6*-200MHP 175	14	400	12
6*-200MHP 200	14	520	17
14*-200MHP 200	15	580	17
14*-235MHP 200	21	580	17
14*-235MHP 235	21	800	23
14*-280MHP 200	30	580	17
14*-280MHP 235	30	800	23
14*-280MHP 280	30	1140	32
18*-235MHP 235	25	900	26
18*-280MHP 235	35	900	26
18*-280MHP 280	35	1300	36
32*-235MHP 235	29	1080	31
32*-280MHP 235	41	1080	31
32*-280MHP 280	41	1500	42
50*-235MHP 235	32	1200	34
50*-280MHP 235	45	1200	34
50*-280MHP 280	45	1700	47
50*-300MHP 235	52	1200	34
50*-300MHP 280	52	1700	47
50*-300MHP 300	52	1930	54
80*-280MHP 280	52	1983	55
80*-300MHP 300	61	2251	63
80*-350MHP 350	83	3063	86

Overall dimensions



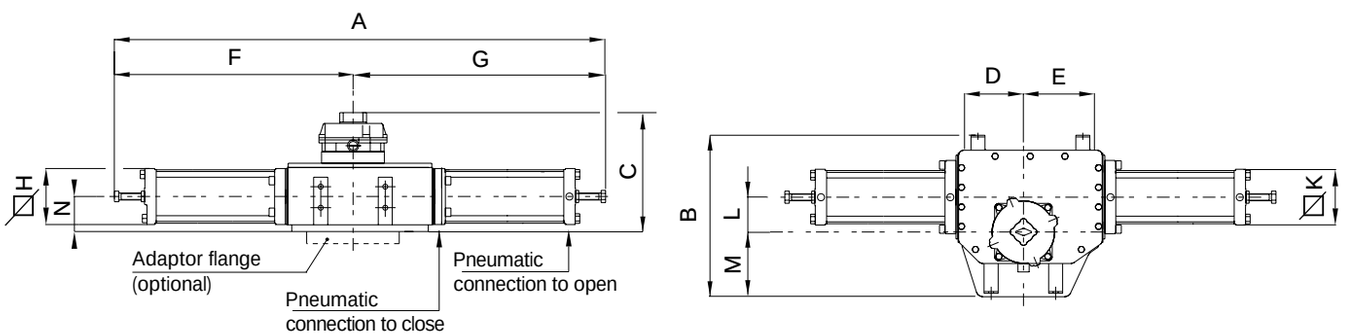


“GIG” Direct Gas Actuator

Actuator model	A	B	C	D	E	F	G	☐K	L	M	N	Pneumatic connection NPT (X-Y)	Pneumatic connection NPT (W-Z)	Weight (Kg)
0.3*-75	756	319	279	136	151	222	534	116	70	119	70	1/2	-	44
0.3*-100	803	319	279	136	151	222	581	125	70	119	70	1/2	-	48
0.9*-100	870	413	303	160	190	245	625	160	80	170	83	1/2	-	60
0.9*-135	921	413	303	160	190	245	676	160	80	170	83	1/2	-	79
1.5*-135	1011	469	343	187	227	293	718	160	100	185	100	1/2	-	116
1.5*-175	1056	469	343	187	227	293	763	196	100	185	100	1/2	-	135
3*-135	1451	586	351	285	330	391	1060	160	160	215	106	1/2	-	190
3*-175	1532	586	351	285	330	391	1141	196	160	215	106	1/2	-	220
6*-175	1625	740	414	327	379	430	1195	196	185	260	140	1/2	-	360
6*-200	1705	740	414	327	379	430	1275	230	185	260	140	-	3/4	398
14*-200	1826	873	527	376	435	496	1330	230	200	330	193	-	3/4	600
14*-235	1806	873	527	376	435	496	1310	Ø340	200	330	193	-	3/4	650
14*-280	1842	873	527	376	435	496	1346	350	200	330	193	-	3/4	700
18*-235	1972	880	511	424	492	548	1424	Ø340	230	330	196	-	3/4	800
18*-280	1953	880	511	424	492	548	1405	350	230	330	196	-	3/4	850
32*-235	2263	1055	583	505	585	643	1620	Ø340	270	395	232	-	3/4	1350
32*-280	2263	1055	583	505	585	643	1620	350	270	395	232	-	3/4	1380
50*-235	2460	1092	584	548	633	700	1760	Ø340	300	387	233	-	3/4	1500
50*-280	2460	1092	584	548	633	700	1760	350	300	387	233	-	3/4	1540
50*-300	2500	1092	584	548	633	700	1800	392	300	387	233	-	1	1580

Notes

1. All dimensions are in mm
2. Weights are referred to base contruction (without adaptor)
3. * C for Canted yoke,
   S for Symmetric yoke

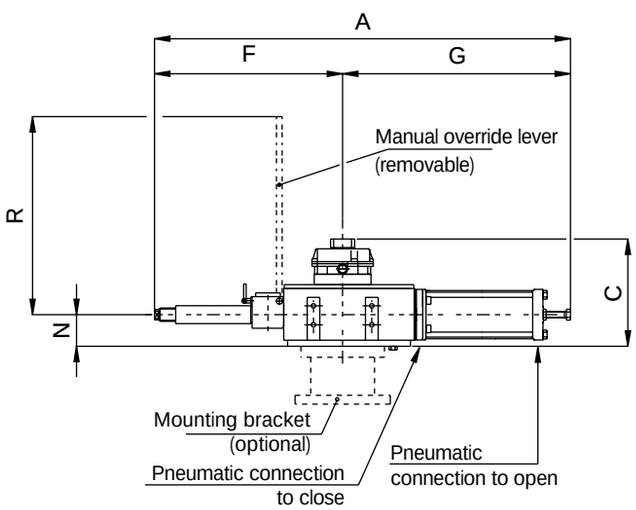


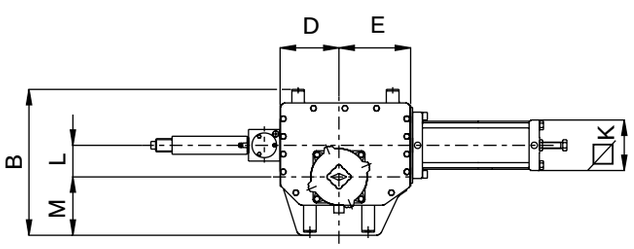
“GIG” Double Cylinder Direct Gas Actuator

Actuator model	A	B	C	D	E	F	G	⊠H	⊠K	L	M	N	Pneumatic connection NPT	Weight (Kg)
0.3*2-75	1053	319	279	136	151	519	534	116	116	70	119	70	1/2	50
0.3*2-100	1147	319	279	136	151	566	581	125	125	70	119	70	1/2	58
0.9*2-100	1220	413	303	160	190	595	625	160	125	80	170	83	1/2	71
0.9*2-135	1322	413	303	160	190	646	676	160	160	80	170	83	1/2	109
1.5*2-135	1396	469	343	187	227	678	718	160	160	100	185	100	1/2	150
1.5*2-175	1486	469	343	187	227	723	763	196	196	100	185	100	1/2	188
3*2-135	2075	586	351	285	330	1015	1060	160	160	160	215	106	1/2	233
3*2-175	2237	586	351	285	330	1096	1141	196	196	160	215	106	1/2	291
6*2-175	2338	740	414	327	379	1143	1195	196	196	185	260	140	1/2	430
6*2-200	2498	740	414	327	379	1223	1275	230	230	185	260	140	3/4	508
14*2-200	2602	873	527	376	435	1272	1330	230	230	200	330	193	3/4	718
14*2-235	2562	873	527	376	435	1252	1310	∅340	∅340	200	330	193	3/4	750
14*2-280	2634	873	527	376	435	1288	1346	350	350	200	330	193	3/4	790
18*2-235	2780	880	511	424	492	1356	1424	∅340	∅340	230	330	196	3/4	850
18*2-280	2742	880	511	424	492	1337	1405	350	350	230	330	196	3/4	880
32*2-235	3160	1055	583	505	585	1540	1620	∅340	∅340	270	395	232	3/4	1530
32*2-280	3160	1055	583	505	585	1540	1620	350	350	270	395	232	3/4	1590
50*2-235	3435	1092	584	548	633	1675	1760	∅340	∅340	300	387	233	3/4	1670
50*2-280	3435	1092	584	548	633	1675	1760	350	350	300	387	233	3/4	1750
50*2-300	3515	1092	584	548	633	1715	1800	392	392	300	387	233	1	1860

Notes

1. All dimensions are in mm
2. Weights are referred to base construction (without adaptor)
3. * C for Canted yoke,
   S for Symmetric yoke



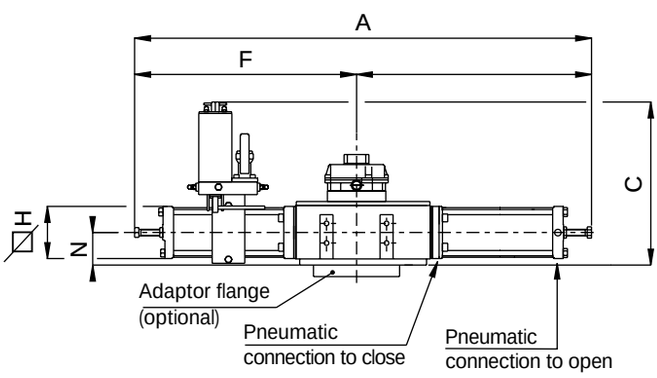


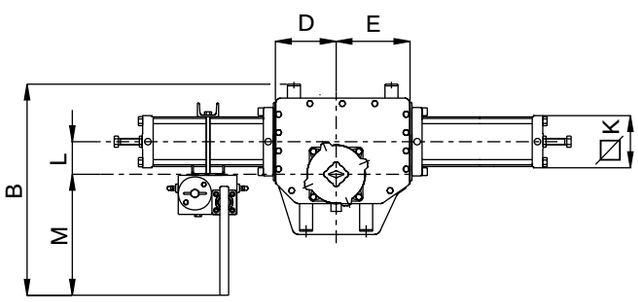
“GIG-MSJ” Direct Gas Actuators

Actuator model	A	B	C	D	E	F	G	☒K	L	M	N	R	Pneumatic connection NPT	Weight (Kg)
0.3*-75 MSJ	1021	319	279	136	151	487	534	116	70	119	70	437	1/2	55
0.3*-100 MSJ	1068	319	279	136	151	487	581	125	70	119	70	437	1/2	59
0.9*-100 MSJ	1136	413	303	160	190	511	625	160	80	170	83	437	1/2	71
0.9*-135 MSJ	1187	413	303	160	190	511	676	160	80	170	83	437	1/2	90
1.5*-135 MSJ	1314	469	343	187	227	596	718	160	100	185	100	627	1/2	130
1.5*-175 MSJ	1359	469	343	187	227	596	763	196	100	185	100	627	1/2	149
3*-135 MSJ	1977	586	351	285	330	917	1060	160	160	215	106	621	1/2	207
3*-175 MSJ	2058	586	351	285	330	917	1141	196	160	215	106	621	1/2	237

Notes

1. All dimensions are in mm
2. Weights are referred to base construction (without adaptor)
3. * C for Canted yoke,
   S for Symmetric yoke



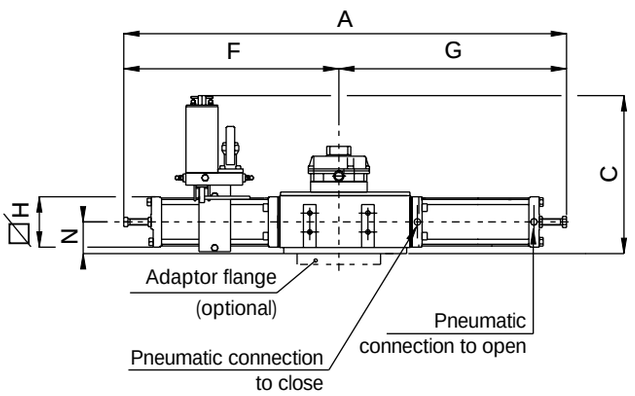


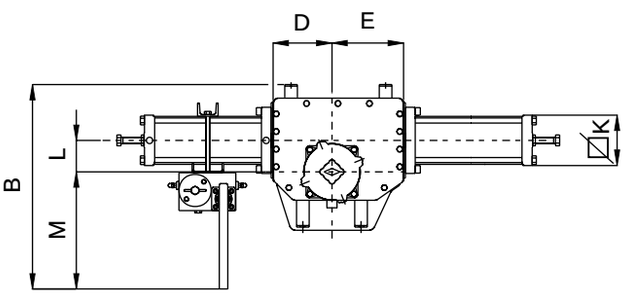
“GIG-MHP” Direct Gas Actuators

Actuator model	A	B	C	D	E	F	G	⊠H	⊠K	L	M	N	Pneumatic connection NPT	Weight (Kg)
0.3*-75 MHP 75	1053	584	487	136	151	519	534	116	116	70	384	70	1/2	66
0.3*-100 MHP 75	1100	584	487	136	151	519	581	116	125	70	384	70	1/2	70
0.3*-100 MHP 100	1147	584	471	136	151	566	581	125	125	70	384	70	1/2	74
0.9*-100 MHP 100	1220	617	484	160	190	595	625	125	125	80	374	83	1/2	87
0.9*-135 MHP 100	1271	617	484	160	190	595	676	125	160	80	374	83	1/2	106
0.9*-135 MHP 135	1322	635	484	160	190	646	676	160	160	80	392	83	1/2	125
1.5*-135 MHP 135	1396	656	501	187	227	678	718	160	160	100	372	100	1/2	166
1.5*-175 MHP 135	1441	656	501	187	227	678	763	160	196	100	372	100	1/2	185
1.5*-175 MHP 175	1486	684	544	187	227	723	763	196	196	100	400	100	1/2	204
3*-135 MHP 135	2075	683	507	285	330	1015	1060	160	160	160	312	106	1/2	249
3*-175 MHP 135	2156	683	507	285	330	1015	1141	160	196	160	312	106	1/2	278
3*-175 MHP 175	2237	711	550	285	330	1096	1141	196	196	160	340	106	1/2	307
6*-175 MHP 175	2338	900	727	327	379	1143	1195	196	196	185	420	140	1/2	462

Notes

1. All dimensions are in mm
2. Weights are referred to base construction (without adaptor)
3. * C for Canted yoke,
   S for Symmetric yoke





“GIG-MHP” Direct Gas Actuators

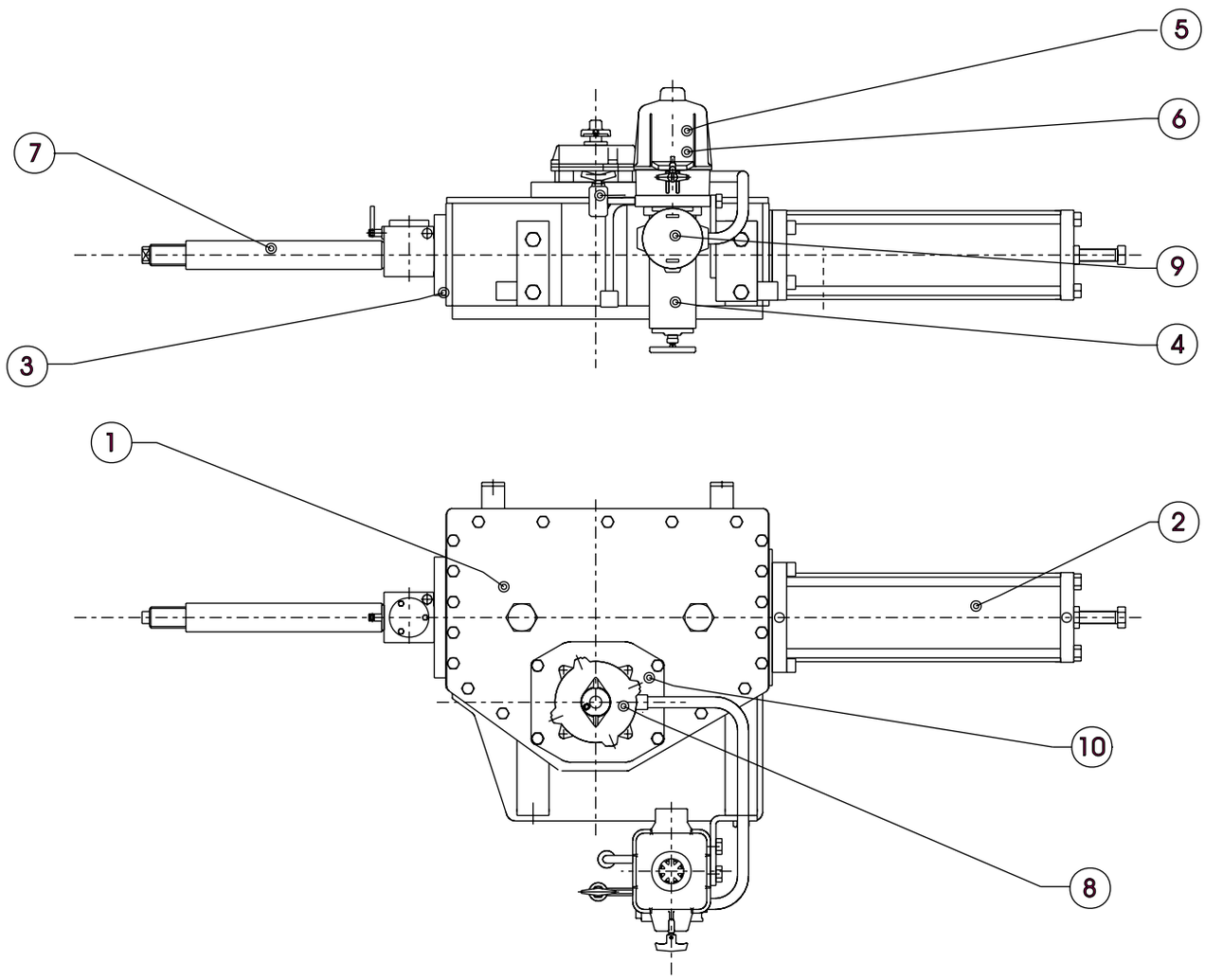
Actuator model	A	B	C	D	E	F	G	⊠H	⊠K	L	M	N	Pneumatic connection NPT	Weight (Kg)
6*-200 MHP 175	2418	900	727	327	379	1143	1275	196	230	185	420	140	3/4	500
6*-200 MHP 200	2498	915	740	327	379	1223	1275	230	230	185	435	140	3/4	540
14*-200 MHP 200	2602	961	793	376	435	1272	1330	230	230	200	418	193	3/4	750
14*-235 MHP 200	2582	961	793	376	435	1272	1310	230	∅340	200	418	193	3/4	765
14*-235 MHP 235	2562	978	810	376	435	1252	1310	∅340	∅340	200	435	193	3/4	780
14*-280 MHP 200	2618	961	793	376	435	1272	1346	230	350	200	418	193	3/4	790
14*-280 MHP 235	2598	978	810	376	435	1252	1346	∅340	350	200	435	193	3/4	805
14*-280 MHP 280	2634	1000	835	376	435	1288	1346	350	350	200	457	193	3/4	820
18*-235 MHP 235	2780	955	810	424	492	1356	1424	∅340	∅340	230	405	196	3/4	880
18*-280 MHP 235	2761	955	810	424	492	1356	1405	∅340	350	230	405	196	3/4	895
18*-280 MHP 280	2742	977	835	424	492	1337	1405	350	350	230	427	196	3/4	910
32*-235 MHP 235	3160	1025	850	505	585	1540	1620	∅340	∅340	270	365	232	3/4	1540
32*-280 MHP 235	3160	1025	850	505	585	1540	1620	∅340	350	270	365	232	3/4	1570
32*-280 MHP 280	3160	1047	875	505	585	1540	1620	350	350	270	387	232	3/4	1620
50*-235 MHP 235	3435	1040	851	548	633	1675	1760	∅340	∅340	300	335	233	3/4	1700
50*-280 MHP 235	3435	1040	851	548	633	1675	1760	∅340	350	300	335	233	3/4	1740
50*-280 MHP 280	3435	1062	876	548	633	1675	1760	350	350	300	357	233	3/4	1780
50*-300 MHP 235	3475	1040	851	548	633	1675	1800	∅340	392	300	355	233	1	1780
50*-300 MHP 280	3475	1062	876	548	633	1675	1800	350	392	300	357	233	1	1820
50*-300 MHP 300	3515	1075	890	548	633	1715	1800	392	392	300	370	233	1	1890

Notes

1. All dimensions are in mm
2. Weights are referred to base construction (without adaptor)
3. * C for Canted yoke,
   S for Symmetric yoke

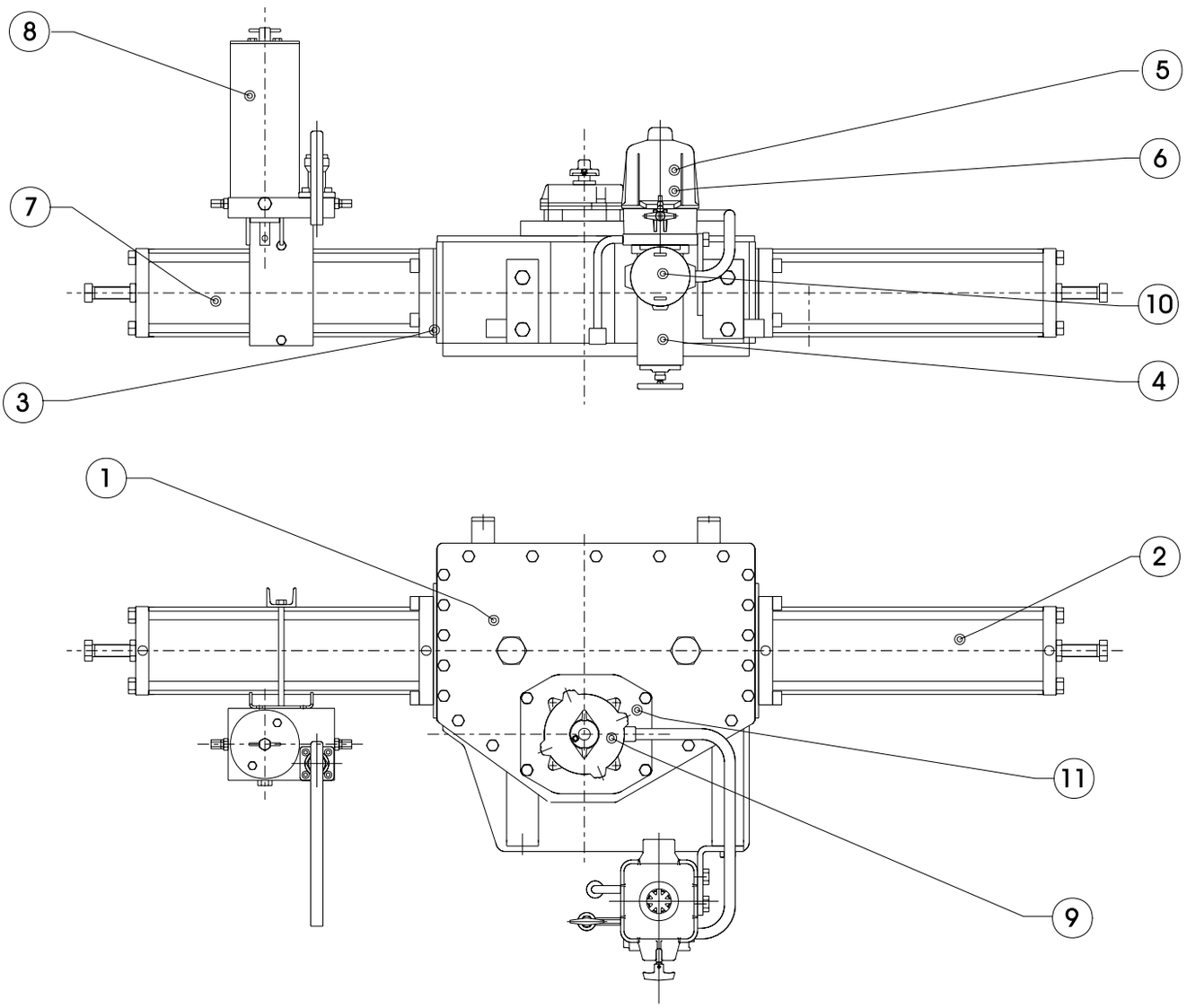
Assembly drawings

“GIG” Direct gas actuator with jackscrew manual override (MSJ)



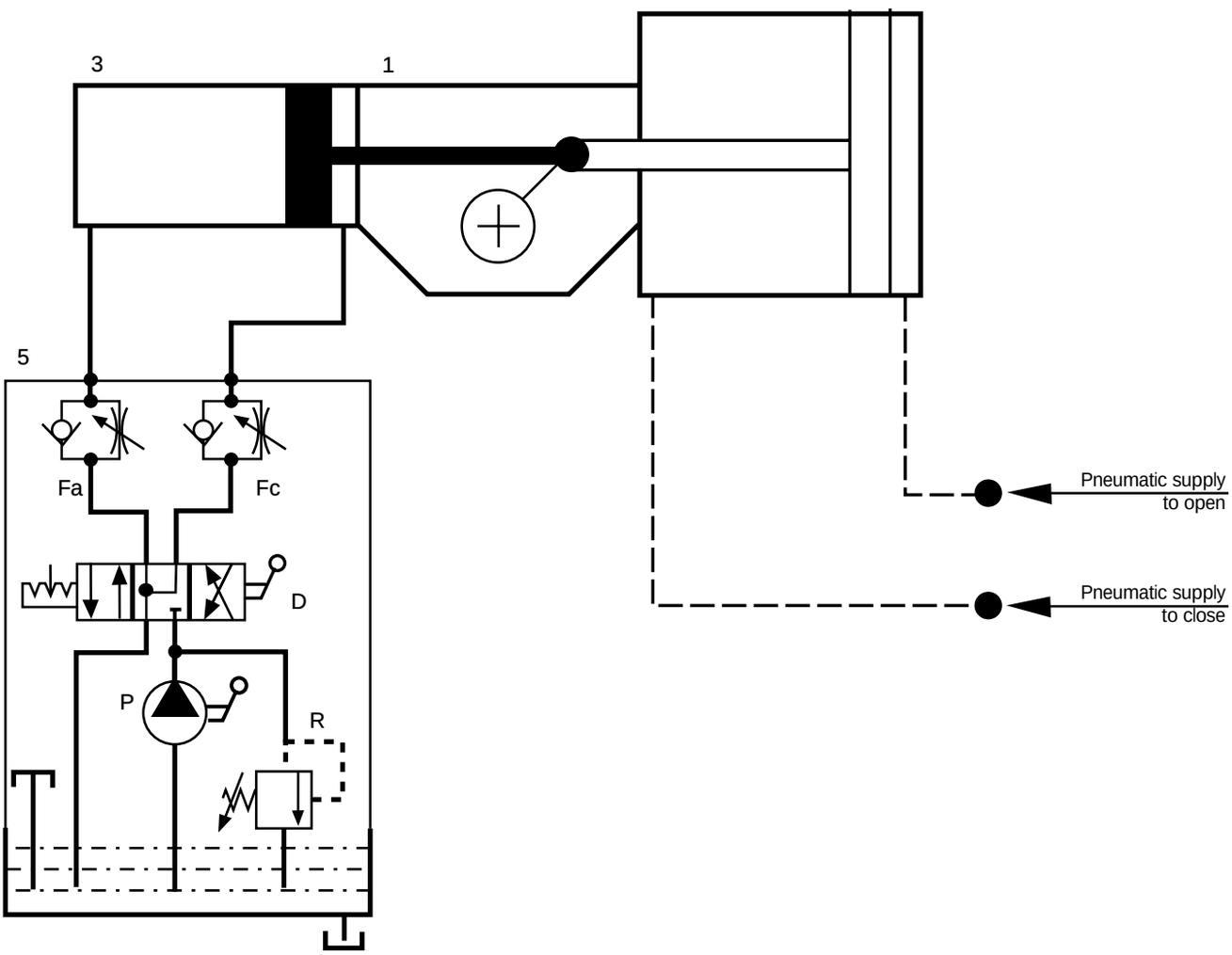
Material specifications	
Item	Description
1	Scotch yoke mechanism
2	Pneumatic cylinder
3	Assembly kit
4	Dehydrating filter cartridge
5	Solenoid valve
6	Control unit container with vent valve
7	Mechanical manual override
8	Limit switches enclosure
9	Terminals enclosure
10	Mounting kit for limit switches enclosure

“GIG” Direct gas actuator with hydraulic manual override (MHP)



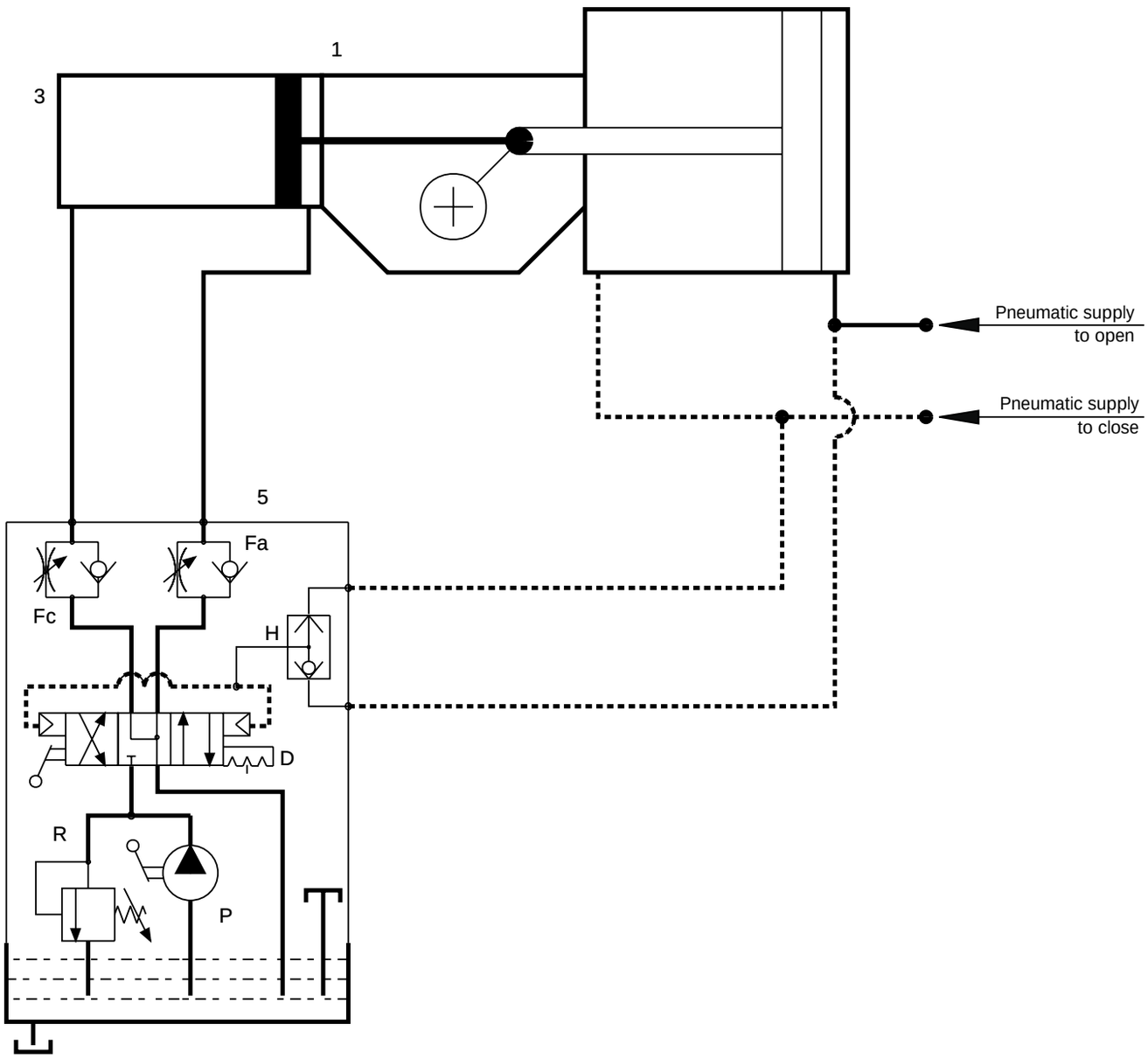
Material specifications	
Item	Description
1	Scotch yoke mechanism
2	Pneumatic cylinder
3	Assembly kit
4	Dehydrating filter cartridge
5	Solenoid valve
6	Control unit container with vent valve
7	Hydraulic cylinder
8	Hydraulic control unit
9	Limit switches enclosure
10	Terminals enclosure
11	Mounting kit for limit switches enclosure

“GIG” double acting pneumatic actuator with standard “MHP” hydraulic manual override



Item	Description
1	Double acting pneumatic actuator
3	Hydraulic cylinder
5	Manual override
	R - Relief valve
	P - Hand pump
	D - Hand operated directional control valve
	Fa - Unidirectional flow regulator (opening operation)
	Fc - Unidirectional flow regulator (closing operation)

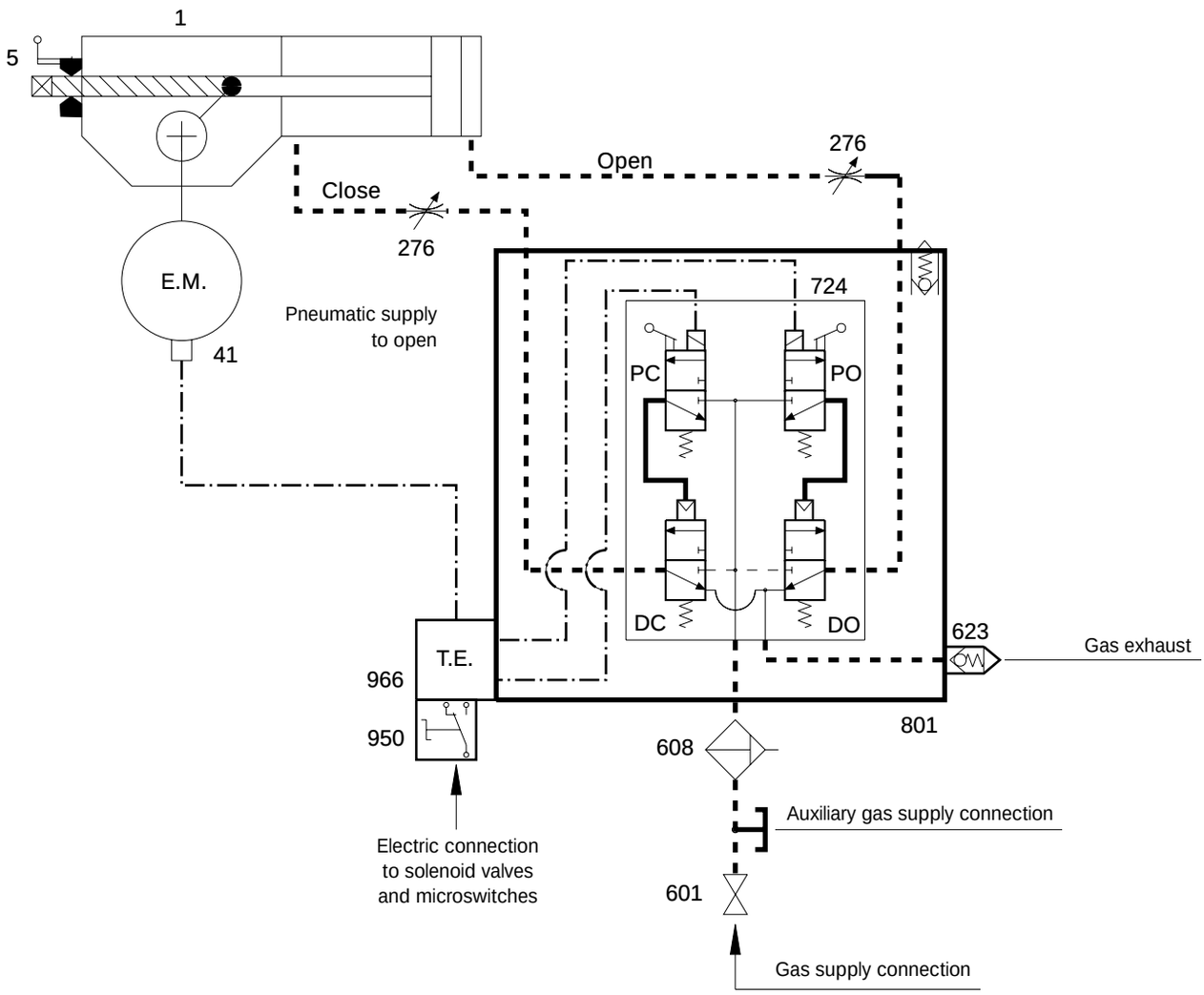
“GIG” double acting pneumatic actuator with special “MHP” hydraulic manual override



Item	Description
1	Double acting pneumatic actuator
3	Hydraulic cylinder
5	Manual override
	R - Relief valve
	P - Hand pump
	D - Hand & pneumatic operated directional control valve
	H - Higher pressure shuttle valve
	Fa - Unidirectional flow regulator (opening operation)
	Fc - Unidirectional flow regulator (closing operation)

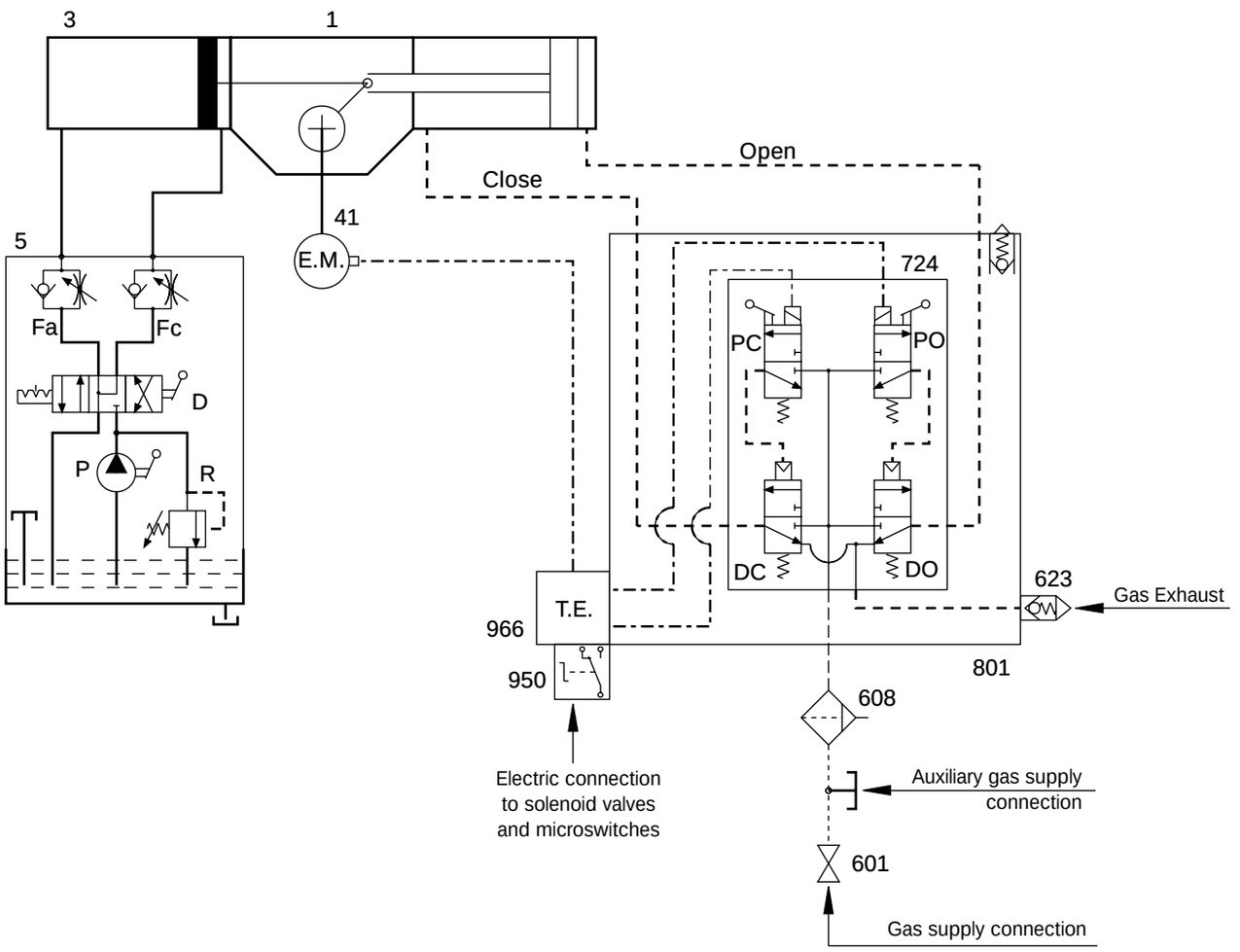
Typical control schematics

Direct gas actuator local and remote control with “MSJ” (GIG-1)



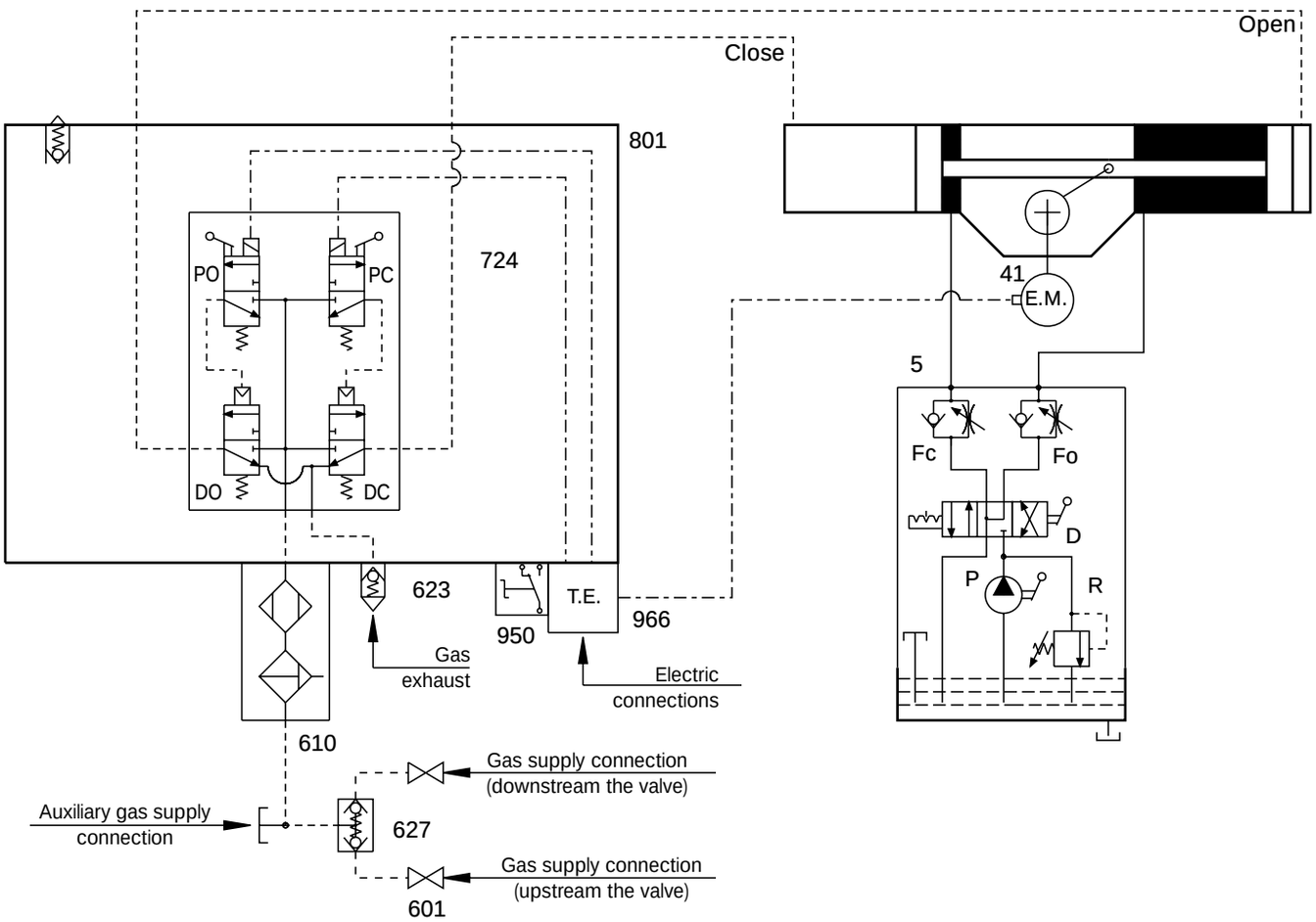
Item	Description
1	Double acting pneumatic actuator
5	Manual override
41	Electric microswitches
276	Bidirectional flow regulator (adjustable setting)
601	Stop valve
608	Gas filter/condensate separator
623	Dust excluder with check valve
724	Double 3/2 N.C. Solenoid valve with manual override Pc - 3/2 N.C. Pil. Solenoid valve with manual override (to close) Po - 3/2 N.C. Pil. Solenoid valve with manual override (to open) Dc - 3/2 N.C. Pneumatic pilot/spring return valve (to close) Do - 3/2 N.C. Pneumatic pilot/spring return valve (to open)
801	Control valves enclosure with vent valve
950	Hand operated electric switch
966	Terminal enclosure

Direct gas actuator local and remote control with “MHP” (GIG-2)



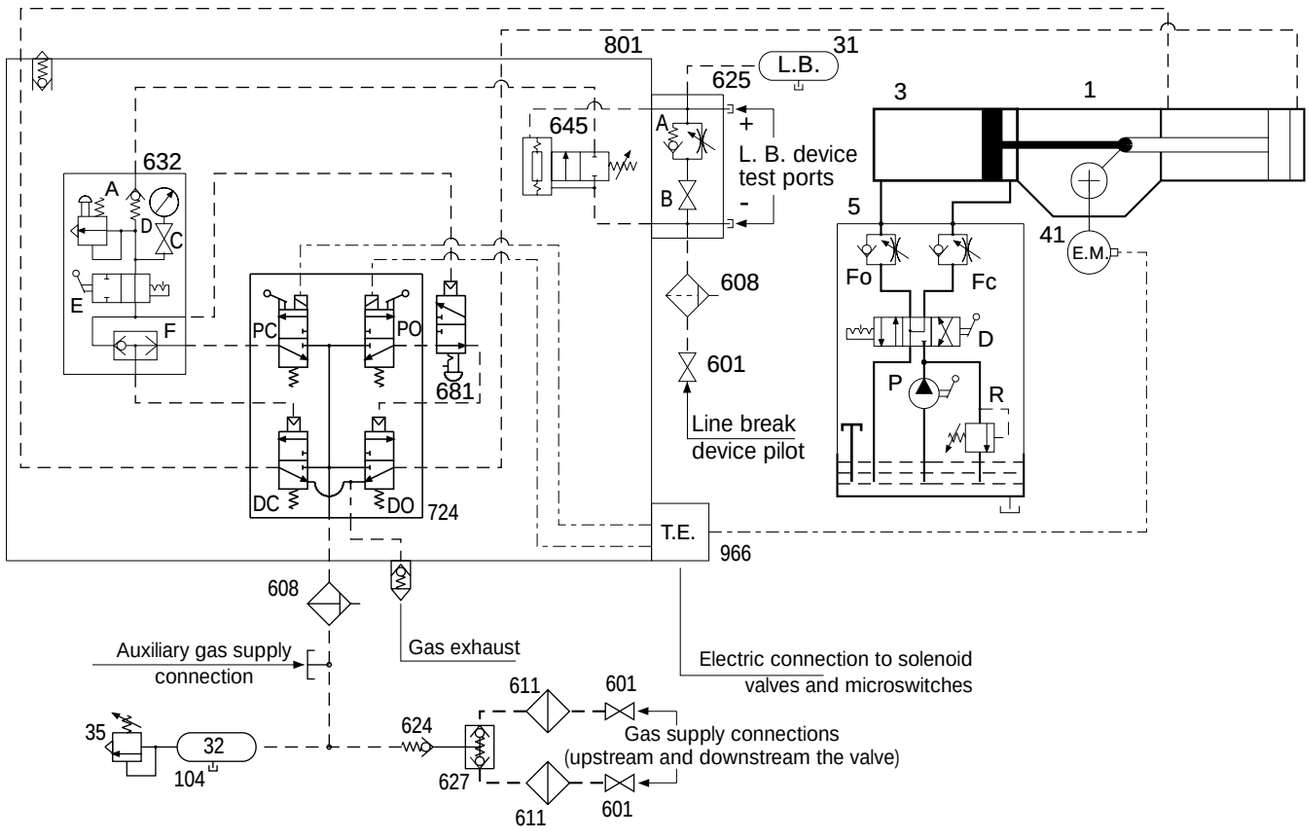
Item	Description
1	Double acting pneumatic actuator
3	Hydraulic cylinder
5	Manual override
R	Relief valve
P	Hand pump
D	Hand operated directional control valve
Fa	Unidirectional flow regulator (opening operation)
Fc	Unidirectional flow regulator (closing operation)
41	Electric microswitches
601	Stop valve
608	Gas filter/condensate separator
623	Dust excluder with check valve
724	Double 3/2 N.C. Solenoid valve with manual override Pc - 3/2 N.C. Pil. Solenoid valve with manual override (to close) Po - 3/2 N.C. Pil. Solenoid valve with manual override (to open) Dc - 3/2 N.C. Pneumatic pilot/spring return valve (to close) Do - 3/2 N.C. Pneumatic pilot/spring return valve (to open)
801	Control valves enclosure with vent valve
950	Hand operated electric switch
966	Terminal enclosure

Direct gas actuator local and remote control (twin gas cylinder) (GIG-3)



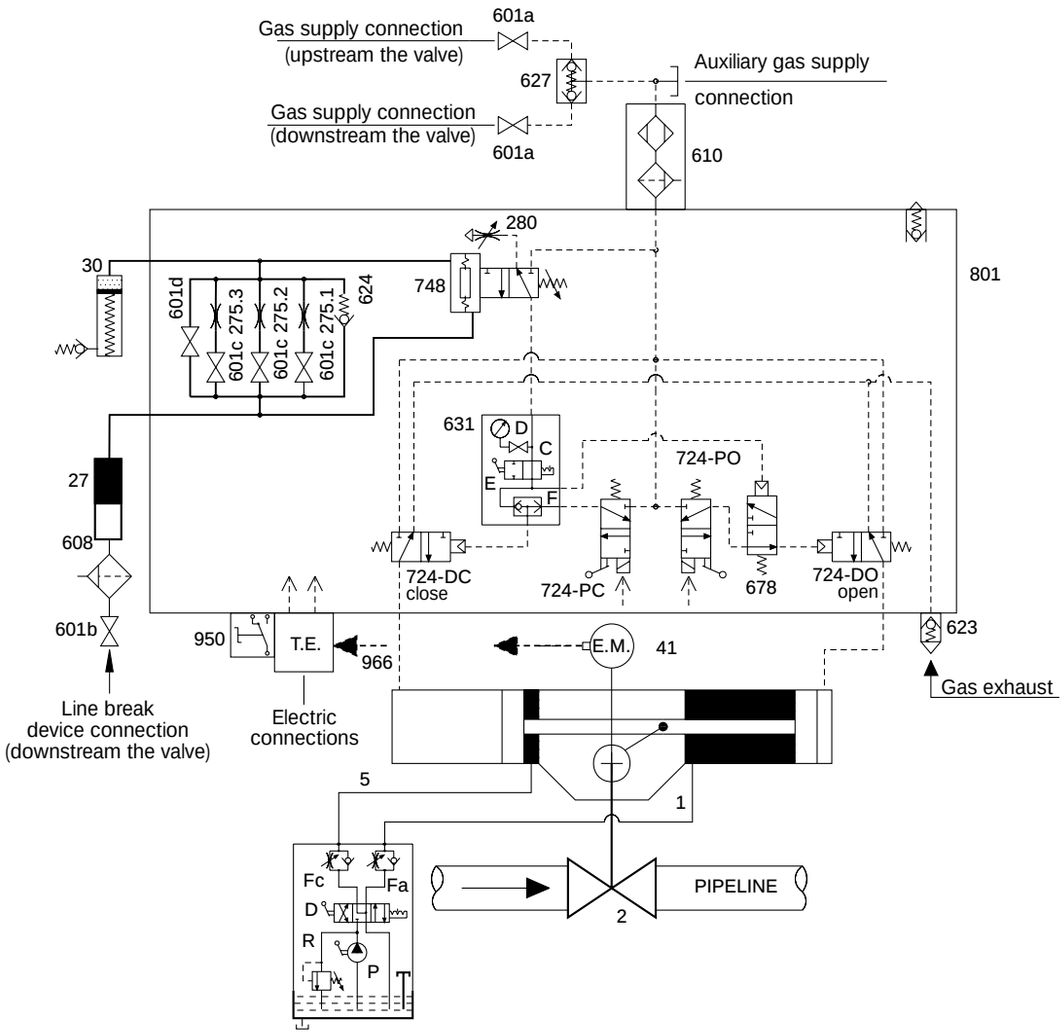
Item	Description
1	Double acting pneumatic actuator
5	Manual override
	R - Relief valve
	P - Hand pump
	D - Hand operated directional control valve
	Fa - Unidirectional flow regulator (opening operation)
	Fc - Unidirectional flow regulator (closing operation)
41	Electric microswitches
601	Stop valve
610	Gas dehydrating filter/condensate separator
623	Dust excluder with check valve
724	Double 3/2 N.C. Solenoid valve with manual override
	Pc - 3/2 N.C. Pil. Solenoid valve with manual override (to close)
	Po - 3/2 N.C. Pil. Solenoid valve with manual override (to open)
	Dc - 3/2 N.C. Pneumatic pilot/spring return valve (to close)
	Do - 3/2 N.C. Pneumatic pilot/spring return valve (to open)
801	Control valves enclosure with vent valve
950	Hand operated electric switch
966	Terminal enclosure

Direct gas actuator local and remote control
Standard Line-break device (GIG-4)



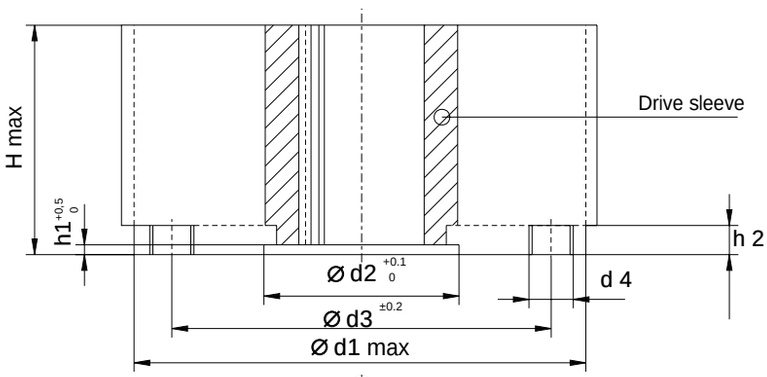
Item	Description
1	Double acting pneumatic actuator
3	Hydraulic cylinder
5	Manual override
	R - Relief valve
	P - Hand pump
	D - Hand operated directional control valve
	Fa - Unidirectional flow regulator (opening operation)
	Fc - Unidirectional flow regulator (closing operation)
31	Reference tank for line break device
32	Air storage tank (optional)
35	Relief valve (optional)
104	Manual drain valve (optional)
601	Stop valve
608	Gas filter/condensate separator
611	Mechanical filter
623	Dust excluder with check valve
624	Check valve (optional)
625	Check valve with orifice for line break device
	A - Check valve with orifice
	B - Stop valve
627	Higher pressure shuttle valve (double check valve)
632	Shuttle valve device
	A - Check valve
	B - Low pressure vent valve
	C - Stop valve for pressure gauge
	D - Pressure gauge
	E - 2/2 hand operated valve
	F - Higher pressure shuttle valve
645	2/2 N.C. Diaphragm pilot valve (adjustable)
681	3/2 N.C. Pneumatic pilot/hand return valve
724	Double 3/2 N.C. Solenoid valve with manual override
	Pc - 3/2 N.C. Pil. Solenoid valve with manual override (to close)
	Po - 3/2 N.C. Pil. Solenoid valve with manual override (to open)
	Dc - 3/2 N.C. Pneumatic pilot/spring return valve (to close)
	Do - 3/2 N.C. Pneumatic pilot/spring return valve (to open)
801	Control valve enclosure with vent valve
966	Terminal enclosure

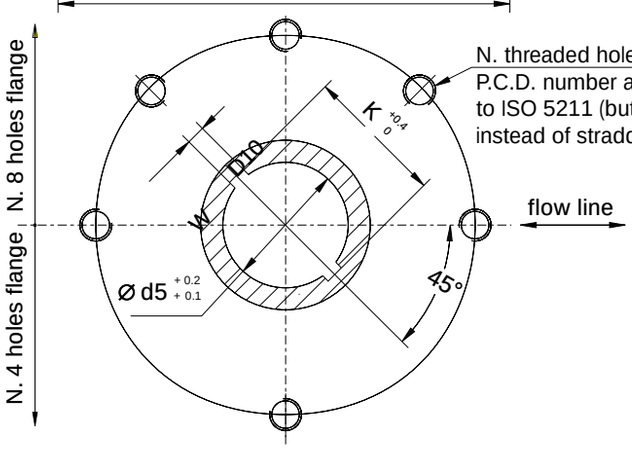
Direct gas actuator local and remote control
Special Line-break device (twin gas cylinder) (GIG-5)



Item	Description
1	Double acting pneumatic actuator
2	Line valve
5	Manual override
27	Separator (piston type)
30	Hydraulic accumulator (piston type/spring return)
41	Electric microswitches
275.1	Orifice “1”
275.2	Orifice “2”
275.3	Orifice “3”
280	Exhaust flow regulator
601	Stop valve
608	Gas filter/condensate separator
610	Gas dehydrating filter/condensate separator
623	Dust excluder with check valve
624	Check valve
627	Higher pressure shuttle valve (double check valve)
631	Shuttle valve device C - Stop valve for pressure gauge D - Pressure gauge E - 2/2 hand operated valve F - Higher pressure shuttle valve
678	3/2 Norm. open pneum. pilot-spring return valve
724	Double 3/23/2 N.C. Solenoid valve with manual override Pc - 3/2 N.C. Pil. Solenoid valve with manual override (to close) Po - 3/2 N.C. Pil. Solenoid valve with manual override (to open) Dc - 3/2 N.C. Pneumatic pilot/spring return valve (to close) Do - 3/2 N.C. Pneumatic pilot/spring return valve (to open)
748	Diaphragm pilot differential press. switch n.c. (adj.sett.)
801	Control valves enclosure with vent valve
950	Hand operated electric switch
966	Terminals enclosure

Coupling dimensions for scotch yoke standard actuators





Top view of the scotch yoke mechanism
(actuator shown in closed position)

Models 0.3 to 6

Model	Ød1	Ød2	Ød3	Ød4	N	h1	h2	H max	Ød5	W	K
0.3	240	93	165	M20	4	5	17	127	70	12	75.6
0.9	310	112	254	M16	8	5	19	150	86	14	93.6
1.5	360	144	298	M20	8	6	19	190	112	18	119
3	430	195	356	M30	8	9	23	200	157	25	167.8
6	520	250	406	M36	8	14	29	260	200	28	212.8

Stem acceptance for insert bushes

Materials specification

Actuator model	Max operating torque (Nm)	Max. stem diameter with square key (key dimension)	Max. stem diameter with rectangular key (°)	Square stem W	Square stem S*	Maximum protrusion**
0.3S	2500	52(14)	55	46	64	120
0.9S	7000	66(16)	70	55	77	140
1.5S	12000	85(18)	90	73	103	180
3S	25000	120(32)	130	104	147	190
6S	50000	150(36)	170	133	188	250

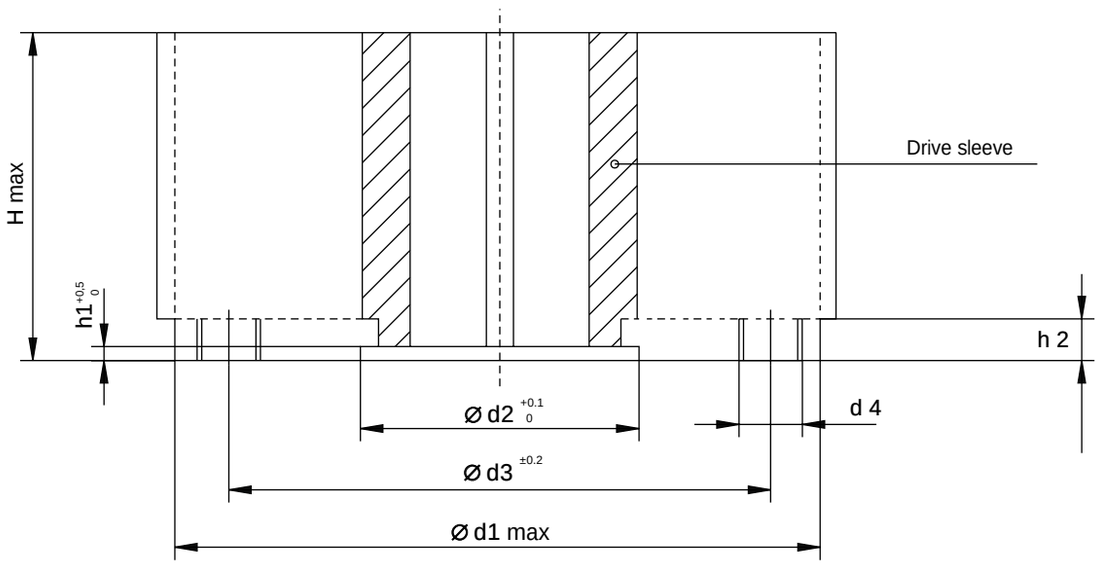
Notes

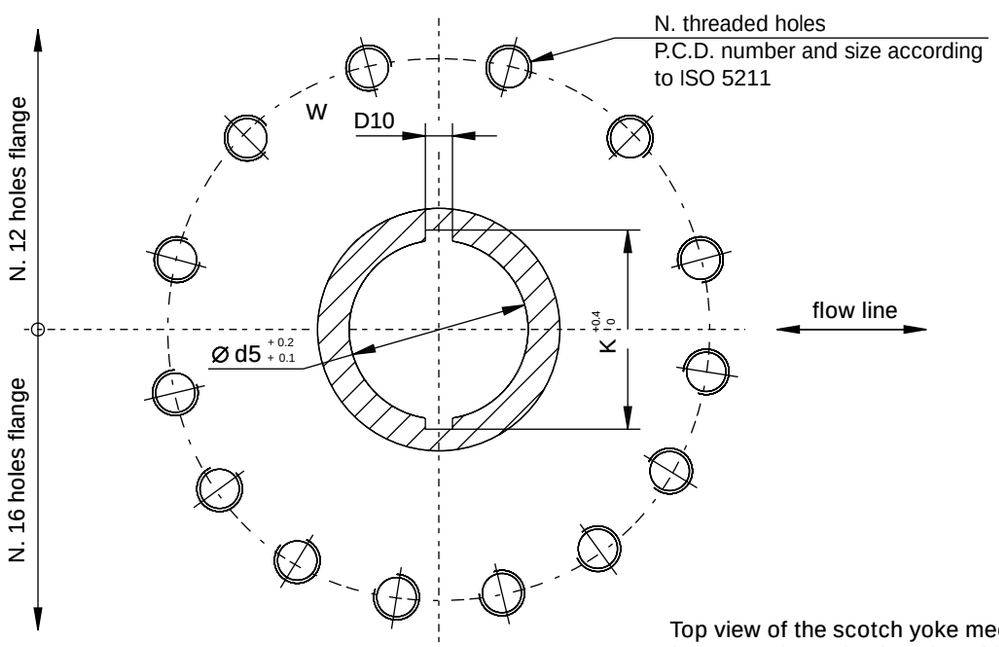
°= key according to UNI6604 or DIN 6885 sh.1 or BS4235 part 1 or ISO 773 or equivalent

*= S max: maximum external diameter in case of rounded edge

**= without adaptor flange

The listed max acceptance values are applicable for stems with keyways parallel or perpendicular to the flow line and for square stems with diagonal in parallel to the flow line.
Dimensions are in mm.





Top view of the scotch yoke mechanism (actuator shown in closed position)

Models 14, 18 and 32

Model	Ød1	Ød2	Ød3	Ød4	N	h1	h2	H max	Ød5	W	K
14	580	250	483	M36	12	10	29	340	175	45	195.8
18	680	290	603	M36	16	12	32	350	200	45	220.8
32	780	290	603	M36	16	12	32	400	220	50	242.8

Your enquiries for pneumatic actuators can be efficiently processed when you supply the information requested on this page.
Please use this page as guidance when sending your enquiries; if you need assistance, directly contact our offices.

Applicable documents

Customer requisition n° .....

Data sheet .....

Specification .....

Valve data

Manufacturer .....
Model .....Type .....
Size: ND ..... ☐ mm ☐ inches
Class .....
Max diff. pressure ..... ☐ bar ☐ PSI
Medium .....
Service ☐ on-off ☐ modulating
☐ .....

Valve required torques
☐ Nm ☐ Lbs-in
safety factor: included .....% ☐ not incl.
break to open (0°) .....
break to close (90°) .....
end to close (0°) .....
end to open (90°) .....
running .....
dynamic torque (at.....°) .....
max allowable .....

Stem size
diameter/square side .....mm
height .....mm
key dimension ..... x .....mm
Coupling dimensions
customer's drawing .....
Installation
pipe axis: ☐ vertical ☐ horizontal
valve stem: ☐ vertical ☐ horizontal
cylinder axis: ☐ parallel ☐ perpendicular to the pipe axis

notes .....
.....
.....
.....
.....

Actuator data

Actuator type
☐ double acting
☐ single acting spring to close
☐ single acting spring to open

Gas supply
☐ air ☐ natural gas ☐ nitrogen
☐ .....
connections size: ..... ☐ ISO 7/1 Rp
☐ NPT
☐ .....
Gas supply pressure: ☐ bar ☐ PSI
min ..... normal ..... max .....

Operating time (sec)
opening: from ..... to .....
closing: from ..... to .....
Ambient temperature
min ..... max ..... ☐ °C ☐ °F
Environment conditions .....
Required painting cycle .....
Manual override:
☐ no ☐ jackscrew ☐ hand pump
☐ .....

Notes

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Enquiry and Ordering Data

Valve position signaling

Electric limit switches
open q.ty ..... closed q.ty .....
intermediate q.ty .....
Supply voltage ..... ☐ DC
..... ☐ AC ..... Hz
load:
resistive ..... Amps
lamps ..... Amps
inductive ..... Amps
Cam actuated
☐ SPDT ☐ sealed ☐ sealed under inert gas
☐ gold contact ☐ DPDT ☐ .....
Proximity
☐ inductive
☐ magnetic ☐ NO ☐ NC ☐ SPDT
type/manufacturer .....
.....

Pneumatic limit switches
open q.ty ..... closed q.ty .....
intermediate q.ty .....
Supply pressure ..... ☐ bar
..... ☐ PSI
pneum. connection size .....☐ ISO7/1RP
☐ NPT
☐ .....

Electric position transmitter
☐ 4-20 mA output signal ☐ contact type
☐ contactless type ☐ .....
☐ resistive from ..... to ..... Ohm
☐ .....
type/manufacturer .....
notes .....
.....

Local position indicator
☐ standard
☐ special .....
Enclosure
Protection degree
☐ weatherproof IP.....
☐ explosionproof .....
.....
☐ intrinsically safe .....
code: ☐ CENELEC ☐ .....
Material
☐ alum. (std) ☐ cast iron ☐ .....
Cable entries
q.ty ..... size .....

Customer wiring diagram .....
.....

Control system

On-off service
☐ by electric signal
☐ by pneumatic signal
☐ by local manual control
☐ .....
1 signal ☐ to close ☐ to open
2 signals ☐ to close ☐ to open
Control signal:
voltage ..... ☐ DC
..... ☐ AC ..... Hz
pressure ..... ☐ bar ..... PSI
notes .....
.....
.....

Modulating service
☐ by electric signal ..... mA (closed valve)
..... mA (open valve)
☐ by pneum. signal ..... (closed valve)
☐ bar ☐ PSI ..... (open valve)
☐ .....

Control system reset
☐ automatic ☐ local manual
☐ remote .....
☐ after any closing operation
☐ after any opening operation
☐ after emergency operation only
☐ .....

Emergency action
☐ closing operation
☐ opening operation
☐ stay in position
☐ for pneumatic supply failure
☐ for low pressure in the storage tank
☐ for low pressure in the process line
☐ for high pressure in the process line
☐ for electric supply failure
for ☐ electric ☐ pneumatic control signal
☐ failure
☐ present from rem. control room
☐ for high rate of pressure drop in the process line

Control system components

Solenoid valves
Body material
☐ aluminium/brass
☐ stainless steel
☐.....
Action
☐ direct ☐ servopiloted
Coil enclosure protection
☐ weatherproof IP .....
☐ explosionproof .....
.....
☐ intrinsically safe .....
code: ☐ CENELEC ☐ ATEX
Coil enclosure material
☐ aluminium ☐ cast iron/steel
☐ .....
Function
☐ universal ☐ NC ☐ NO
Supply voltage ..... ☐ DC
..... ☐ AC ..... Hz
Max consumed power ..... ☐ W ☐ VA
notes .....
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Pipe and fittings
☐ copper pipe and brass nickel plated fittings
☐ carbon steel
☐ 316 stainless steel
☐ .....
notes .....
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Junction box
Protection degree
☐ weatherproof IP .....
☐ explosionproof .....
☐ intrinsically safe .....
☐ increased safety .....
code: ☐ CENELEC ☐ ATEX
Material
☐ aluminium ☐ cast iron ☐ GRP
☐ stainless steel ☐ .....
Cable entries
☐ q.ty ..... size .....

Customer operating diagram .....
Customer wiring diagram .....

Control system valves
Body material
☐ aluminium/brass
☐ stainless steel
☐ .....
notes .....
.....

Control system assembling
☐ on panel:
panel material ☐ carbon steel (std)
☐ stainless steel
☐ into cabinet:
cabinet material ☐ carbon steel (std)
☐ GRP
☐ stainless steel
notes .....
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Storage tank

no of strokes .....
starting pressure ..... ☐ bar ☐ PSI
assembling: ☐ on actuator ☐ separate
code: ☐ PED
☐ ASME VIII Div.1 not stamped
☐ .....
.....
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design pressure ..... ☐ bar ☐ PSI
design temperature ..... ☐ °C ☐ °F
required non destructive test .....
.....
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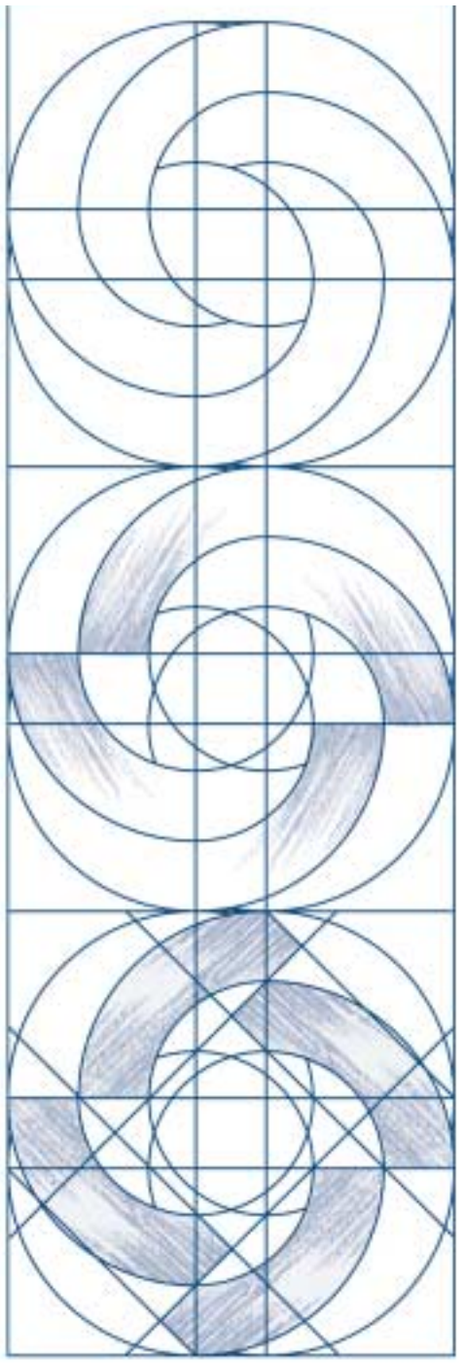
Safety valve:
☐ yes ☐ no code .....
set at ..... ☐ bar ☐ PSI
body material ☐ brass
☐ carbon steel ☐ stainless steel
notes .....
Other accessories .....
.....

Notes



BIFFI

tyco flow control

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A.Cavazzuti/