PROPOSAL NO. : PROP-STL-VLV-1247-TEC00

Document : Technical Offer

Subject: BUTTERFLY VALVE 3 sets

Dear Sirs,

With many thanks for your enquiry for the subject project. Kindly find enclosed our Technical proposal # PROP-STL-VLV-1247-TEC00.
Please do not hesitate to contact us for any clarification you may require.

Looking forward to your kind response.

Best regards,

INDEX

A .TECHNICAL SECTION

B .ATTACHMENTS

A. Technical Section

A.1.GENERAL TECHNICAL SPECIFICATION

Item	*Description*	*QTY*
1	Butterfly Valves MFR : PFEIFFER	***3 sets***

A.2. DETAIL ITEM LIST

B	A	B	A	B	A	Item No.	
3		2		1		**Optional No.**	
PV-X171		PV-X116		PV-X415		Tag Number	
Butterfly Valve		Butterfly Valve		Butterfly Valve		Valve Type	
14b		14b		14b		Model	
Pfeiffer		Pfeiffer		Pfeiffer		Manufacturer	
16”		20”		10”		NPS	
cl150		cl150		cl150		Pressure Rating	
102		127		68		Face to Face (mm)	
SDW RF	Lug RF	SDW RF	Lug RF	SDW RF	Lug RF	Process Connection	
A216 WCB		A216 WCB		A216 WCB		Body material	
double eccentric		double eccentric		double eccentric		Trim Type	
CSS		CSS		CSS		Disc Material	
SS		SS		SS		Shaft material	
Nickel, spring loaded		Nickel, spring loaded		Nickel, spring loaded		Seatring Material	
Metal		Metal		Metal		Sealing Surface	
70		70		70		Stroke/Opening Angle	
SS		SS		SS		Tubing Material	
IV		IV		IV		Leakage	
SRP		ASP		SRP		Type	Actuator
BR31a		***		BR31a		Model	
rack and pinion		scotch yoke		rack and pinion		Style	
Pfeiffer		Avamo		Pfeiffer		Manufacture	
1000		090S		4000		Size	
Type 3730		Type 3730		Type 3730		Positioner	
Type 3755		Type 3755		Type 3755		Booster	
Type 4708		Type 4708		Type 4708		Air Filter Regulator	

YT3300-RSI54243

YT325

YT220

Technical Notes:

1- 3730-310010004000000 **Electro pneumatic Positioner** Type 3730-3 with LCD and AUTOTUNE, 4...20 mA reference variable, HART communication, 2 software limit switches/1 fault alarm contact; II 2 G EEx ia IIC T6 / II 2 D IP 66 T 80 °C ATEX; With analog position transmitter, 2-wire, 4 to 20 mA;

2- 4708-1252012300000 air filter regulator - Body and filter housing in aluminum, pneumatic connection 1/4"NPT, set pressure 0,5…6bar, with pressure gauge

3- 3755-12 kvs acting 2,5m³/h; kvs exhaust 2,5m³/h; max. pressure: 10barg; -40°C ... +80°C; pneumatic connection: supply: 3/4-14 NPT; output: 3/4-14-NPT; signal: 1/4-18 NPT; exhaust: G1"; exhaust silencer PE

A.3.Deviation Item List

Tag No.	Deviation From Data Sheet
PV-X415 PV-X116 PV-X171	Deviated Positioner; changed from Siemens to Samson as Siemens needs for a quotation the end user certificate. Siemens only available with Valid end-user certificate.

A.3.Project Services

A.3.1. SAT AND SUPERVISION ON INSTALLATION

SAT and Supervision on Installation will be charged based on Diem Rate.

A.3.2.PACKING

Packing will be accomplished as per your specification using wooden case and internal plastic bag, suitable for overseas transports.

A.3.3. TRAINING

Training courses will be held in supplier training course center.
Ticket and Hotel cost is excluded.

B. Attachments

B1. 14b, PFIEFFER SAMSON
B2. BR31a, SRP TYPE PFIEFFER SAMSON
B3. SCOTCH YOKE, AVAMO
B3. Accessories Catalogues
B3-1. Positioner Type 3730, PFIEFFER SAMSON
B3-2. Booster Type 3755, PFIEFFER SAMSON
B3-3. Air Filter Regulator Type 4708, PFIEFFER SAMSON

Pneumatic Butterfly Valves

Butterfly valve · Type 3331

High-pressure butterfly valve · LEUSCH Type LTR 43

Control butterfly valves · PFEIFFER Type 10a, 10e and 14b/31a

SAMSON PFEIFFER

SAMSON LEUSCH

Application

Control valves for process engineering and industrial applications

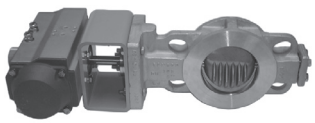
Versions

- **Type 3331:** swing-through or angle-seated disk for liquids, vapors and gases with Type 31a Pneumatic Actuator
- **LEUSCH Type LTR 43:** triple-eccentric, tight-closing, high-pressure butterfly valve with zero seat leakage in both directions of medium flow at full differential pressure. Optionally TA Luft packing, fire-safe version, extension for cryogenic or high temperatures

Technical data

Type		3331	LTR 43
Valve size	DN	50 to 400	80 to 2500
	NPS	2 to 16	3 to 100
Body material	DIN	1.0425, 1.4404, 1.4408 DN 150 and larger: 1.0619, 1.4581	1.4408 1.0619
	ANSI	A414 Gr D, 316L NPS 6 and larger: A216 WCC	A216 WCC/WCB A351 CF8M
Pressure rating	PN	10 to 40 ISO 20, 50	10 to 420
	Class	150, 300	150 to 2500
Body style		Wafer-type	Between flanges, lug-type, double flange
Butterfly disk material		1.4581	A216 WCC/WCB A351 CF8M
Gasket		Metal to metal	Graphite on metal core Stellite® faced, PTFE
Leakage		≤ 1 %	Class VI DIN EN 1349/ ANSI/FCI 70-2
Opening angle		90°, 70°	80° (90°)
Throttling service up to		70°	70°
Rangeability		50:1	> 50:1
Temperature range	°C	–10 to +400	–196 to +1000
	°F	14 to 752	–320 to +1830
Actuator	Type	Type 31a/Type 3278	On request
Data sheets		**T 8227**	**T 9923**

Accessories · Positioners, limit switches, solenoid valves



Type 3331 with Type 31a Actuator

Type LTR 43, double-flanged body in NPS 10, Class 1500 with pneumatic actuator and positioner

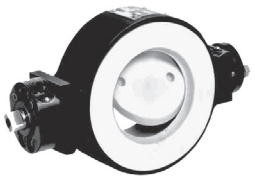
Type LTR 43 lug-type body version with manual gear

– **PFEIFFER Type 10a:** double-eccentric control butterfly valve with min. 8 to 12 mm thick M-PTFE lining
– **PFEIFFER Type 10e:** centric control and shut-off butterfly valve with minimum 3 mm thick isostatic PTFE lining
– **PFEIFFER Type 14b/31a:** double-eccentric butterfly valve with Type 31a Pneumatic Piston Actuator

Technical data

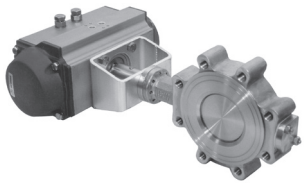
Type		**Type 10a**	**Type 10e**	**Type 14b**
Valve size	DN	100 to 800	50 to 400	50 to 800
	NPS	4 to 32	2 to 16	2 to 32
Body material	DIN	EN-GJS-400-18-LT St 52-3 PTFE lining	EN-GJS-400-18-LT PTFE lining	1.4408 1.0619
	ANSI	A395		A216 WCB A351 CF8M
Pressure rating	PN	10	10/16	10 to 40
	Class	150		150, 300
Body style		Wafer-type Lug-type	Wafer-type Lug-type	Wafer-type Lug-type
Butterfly disk material		1.4313 coated	1.4313 coated	1.4408
Gasket		PTFE		Metal seal: IV/V IEC 60534-4 Soft seal: A according to DIN EN 12266-1
Leakage		A according to DIN EN 12266-1 IV IEC 60534-4		IV/V IEC 60534-4
Opening angle		90°		
Temperature range	°C	–40 to +200	–35 to +200	–60 to +350
	°F	–40 to 392	–31 to +392	–76 to 482
Actuator	Type	Type 31a/30a	Type 31a/30a	Type 31a/30a
PFEIFFER data sheets		**TB 10a**	**TB 10e**	**TB 14b**

Accessories · Positioners, limit switches, solenoid valves



Type BR 10a

Type 10e/31a



Type 14b/31a

Pneumatic Rotary Actuators Types SRP and DAP
Pfeiffer Type BR 31a

Application
Single- or double-acting piston actuator for butterfly valves and other final control elements with rotary closure members
Maximum opening angle φ **= 94°**

The Types BR 31a Pneumatic Rotary Actuators are piston actuators for throttling or on/off service.

Special features
- Externally adjustable travel stops (±4°)
- Square-end position either diagonal (European standard) or parallel
- Position indicator can be customized (in steps of 45°)
- No special tools needed for mounting and conversion
- Various spring cartridges
- Power transmission without clearance thanks to involute serrations
- Direction of rotation can be reversed without additional components
- Special surface treatment method
- Designed for signal pressures up to 8 bar and for continuous operation at temperatures from –20 to 80 °C

Attachment of positioner, limit switch, solenoid valve, and other devices conforming to VDI/VDE 3845.

Versions
Type SRP (Figs. 1 and 2) · Single-acting pneumatic rotary actuator with spring-return mechanism in sizes 15 to 5000
Type DAP · Double-acting pneumatic rotary actuator without spring-return mechanism in sizes 15 to 5000

Further versions
– With manual override
– For continuous operation at temperatures from –20 to 150 °C using FPM (FKM) O-rings or
– For continuous operation at temperatures from –40 to 80 °C using silicone gaskets
– With opening angles of 120° and 180°
– Three-position actuator
– With hydraulic rotating speed adjuster
– Stainless steel rotary actuator

Fig. 1 · Pfeiffer Type BR 31a Rotary Actuator, Type SRP 220

Fig. 2 · Pfeiffer Type BR 31a Rotary Actuator, Type SRP 5000

Principle of operation

The signal pressure p_{st} generates a force at the piston surface which is balanced either by the compression springs in the actuator (single-acting version) or by a corresponding counterpressure (double-acting version).

The force generated at the pistons is converted into a rotary motion using the pinion shaft. The adjustable travel stops for OPEN and CLOSED position allow the end positions to be finetuned to ±4°.

In the single-acting version, the spring return torque and the required signal pressure are determined by the number of springs.

Fig. 4 shows the usable air torques

– M_{dLE} for the single-acting version

– M_{dLD} for the double-acting version

and the usable spring torques M_{dF} depending on the opening angle φ.

Fail-safe position

The Type SRP Rotary Actuator offers two possible fail-safe actions (rotary motions) in case the supply air fails or the pistons are relieved of pressure. The rotation directions apply when looking from the actuator towards the valve.

"Springs turn clockwise"
Springs rotate clockwise when the pressure drops.

"Springs turn counterclockwise"
Springs rotate counterclockwise when the pressure drops.

The Type DAP Actuator is designed without springs. The actuator does not move to a defined end position when the supply air fails.

Ordering text

Actuator type	BR 31a, Type DAP or SRP
Size	15, 30, 60, 100, 150, 220, 300, 450, 600, 900, 1200, 2000, 3000 or 5000
No. of springs	Only for single-acting Type SRP
Fail-safe action	Springs turn clockwise or counterclockwise (only for single-acting Type SRP)
Supply pressure	.... bar
Operating range	No. of springs or bench range
VDI/VDE bracket	For attachment of positioner or signaling devices

Specifications subject to change without notice.

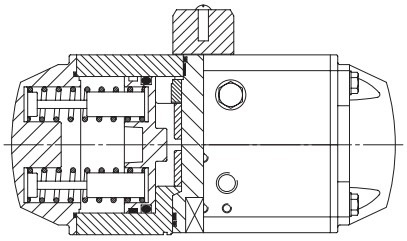


Fig. 3 · Pfeiffer Type BR 31a Rotary Actuator

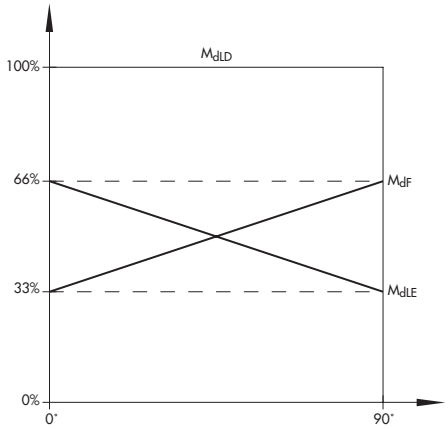


Fig. 4 · Torques at recommended supply pressure

Table 1 · Technical data for Type BR 31a Rotary Actuators

Principle of operation		**Single-acting or double-acting**
Max. permissible signal pressure		8 bar
Sizes		Type 15 to Type 5000 (8.3 to 6300 Nm)
Connection to valve		EN 12116/DIN 3337
Connection to positioner or signaling devices	Types 15 to 150	VDI/VDE 3845, size 1
	Types 220 to 600	VDI/VDE 3845, size 2
	Types 900 to 5000	VDI/VDE 3845, size 4
Connection to pilot valve		VDI/VDE 3845
Permissible temperature range		–20 to 80 °C in continuous operation

Table 2 · Materials

Housing	AlMgSi0.5 F25
Cover	GD-AlSi8.5 Cu3.5 Fe
Shaft	ASTM A 105
Compression spring cartridge	ASTM A 401
Piston	GD-AlSi8.5 Cu3.5 Fe

Table 3 · Torques in Nm for double-acting Type DAP Actuators

Type DAP	Torques in Nm at supply pressure												
	2.5	3	3.5	4	4.2	4.5	5	5.5	6	6.5	7	7.5	8
15	8.3	10	11.6	13.3	14	15	16.6	18.3	19.9	21.6	23.3	24.9	26.6
30	14.7	17.6	20.5	23.5	24.6	26.4	29.3	32	35.2	38.1	41	44	46.9
60	29.1	34.9	40.7	46.5	48.9	52.4	58.2	64	69.8	75.6	81.4	87.3	93.1
100	45.8	54.9	64.1	73.2	76.9	82.4	91.5	101	110	120	128	138	146
150	66.5	79.8	93.1	106	112	120	133	146	160	173	186	199	213
220	107	129	150	172	181	193	215	236	258	279	301	322	344
300	138	166	194	222	233	249	277	305	332	360	388	415	443
450	217	261	304	348	365	391	435	478	522	565	609	652	696
600	284	340	397	454	477	511	567	624	681	737	794	851	908
900	383	459	536	613	643	689	766	842	919	996	1072	1149	1225
1200	532	638	745	851	893	957	1064	1170	1276	1383	1489	1595	1702
2000	893	1072	1251	1430	1501	1608	1787	1966	2144	2318	2502	2684	2859
3000	1297	1556	1815	2075	2179	2334	2594	2853	3112	3372	3631	3890	4150
5000	2252	2703	3153	3604	3784	4054	4504	4955	5405	5855	6306	–	

Table 4a · Torques in Nm for single-acting Type SRP Actuators at 2.5 to 4.2 bar supply pressure
Recommended actuator setups highlighted in gray

Type SRP	No. of springs	Air torques in Nm at 2.5 to 4.2 bar										Spring torques	
		2.5 bar		3 bar		3.5 bar		4 bar		4.2 bar		Start	Stop
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	90°	0°
15	2/3	4.9	3.4	6.6	5.1	8.3	6.8	9.9	8.4	10.6	9.1	4.9	3.4
	3	4.3	2.5	5.9	4.1	7.6	5.8	9.3	7.4	9.9	8.1	5.8	4.0
	3/4			5.3	3.1	6.9	4.8	8.6	6.5	9.2	7.1	6.8	4.7
	4					6.2	3.8	7.9	5.5	8.6	6.2	7.8	5.4
	4/5			–				7.2	4.5	7.9	5.2	8.8	6.1
30	2/3	9.1	6.2	12	9.2	15	12.1	17.9	15	19.1	16.2	8.4	5.5
	3	8	4.5	10.9	7.5	13.9	10.4	16.8	13.3	18	14.5	10.1	7
	3/4			9.8	5.8	12.8	8.7	15.7	11.6	16.9	12.8	11.8	7.8
	4					11.6	7	14.6	10	15.7	11.1	13.5	8.9
	4/5			–				13.5	8.3	14.6	9.4	15.2	10
60	2/3	18	11.8	23.8	17.6	29.7	23.4	35.5	29.2	37.8	31.6	17.3	11.1
	3	15.8	8.3	21.6	14.1	27.5	19.9	33.3	25.8	35.6	28.1	20.8	13
	3/4			19.4	10.7	25.2	16.5	31.1	22.3	33.4	24.6	24.2	15.5
	4					23	13	28.8	18.8	31.2	21.2	27.7	17.7
	4/5			–				26.6	15.4	29	17.7	31.2	19.9
100	2/3	27.4	16.9	36.6	26	45.7	35.2	59.4	44.3	58.5	48	28.9	18.3
	3	23.8	11.1	32.9	20.3	42.1	29.4	51.2	38.6	54.9	42.2	34.7	22
	3/4			29.2	14.5	38.4	23.6	47.5	32.8	51.2	36.4	40.4	25.7
	4					34.7	17.9	43.9	27	47.5	30.7	46.2	29.3
	4/5			–				40.2	21.2	43.9	24.9	52	33
150	2/3	41.1	27.1	54.4	40.4	67.7	53.7	81	67	86.3	72.3	39.4	25.3
	3	36.1	19.2	49.4	32.5	62.7	45.8	76	59.1	81.3	64.4	47.3	30
	3/4			44.3	24.6	57.6	37.9	70.9	51.2	76.2	56.5	55.1	35.5
	4					52.5	30	65.8	43.3	71.1	48.7	63	40.5
	4/5			–				60.8	35.5	66.1	40.8	70.9	45.6
220	2/3	66.5	41.9	87.9	63.4	109.4	84.9	131	106.4	140	115	65.5	41
	3	58.3	28.8	79.7	50.3	101.2	71.8	123	93.3	131	101.9	78.6	49.2
	3/4			71.5	37.2	93	58.7	115	80.2	123	88.8	91.7	57.4
	4					84.8	45.6	106	67.1	115	75.7	105	65.6
	4/5			–				98	54	107	63.6	118	73.8
300	2/3	86	56	114	84	141	111	169	139	180	150	82	53
	3	75	40	103	67	131	95	159	123	170	134	99	63
	3/4			93	51	120	79	148	106	159	117	115	74
	4					110	62	138	90	149	101	132	84
	4/5			–				127	73	138	84	148	95

Type SRP	No. of springs	Air torques in Nm at 2.5 to 4.2 bar										Spring torques	
		2.5 bar		3 bar		3.5 bar		4 bar		4.2 bar		Start	Stop
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	90°	0°
450	2/3	135	89	179	132	222	176	265	219	283	236	129	82
	3	119	63	162	106	206	150	249	193	266	211	155	99
	3/4	–		146	80	189	124	233	167	250	185	180	115
	4			–		173	98	216	142	233	159	206	132
	4/5							200	116	217	133	232	145
600	2/3	171	118	228	174	285	231	342	288	364	310	166	112
	3	149	84	206	141	262	198	319	255	342	277	199	135
	3/4	–		183	108	240	165	297	221	319	244	233	157
	4			–		218	131	274	188	297	211	266	180
	4/5							252	155	275	178	299	202
900	2/3	225	146	301	223	378	299	455	376	485	406	237	158
	3	193	99	270	175	346	252	423	329	454	359	284	190
	3/4	–		238	128	315	205	391	281	422	312	332	221
	4			–		283	157	360	234	390	264	379	253
	4/5							328	186	359	217	426	285
1200	2/3	319	217	426	323	532	430	638	536	681	578	315	213
	3	277	154	383	260	489	347	596	473	638	515	378	255
	3/4	–		341	197	447	304	553	410	596	453	441	298
	4			–		404	241	511	347	553	390	504	340
	4/5							468	284	511	327	567	383
2000	2/3	533	372	712	551	890	730	1069	908	1141	980	521	360
	3	461	268	640	447	818	625	997	804	1068	876	625	433
	3/4	–		568	343	746	521	925	700	996	771	730	505
	4			–		674	417	853	596	924	667	834	577
	4/5							781	491	852	563	938	649
3000	2/3	751	496	1011	755	1270	1015	1529	1274	1633	1378	801	546
	3	642	336	902	595	1161	854	1420	1114	1524	1217	961	655
	3/4	–		792	435	1052	694	1311	954	1415	1057	1121	764
	4			–		943	534	1202	793	1306	897	1281	873
	4/5							1093	633	1197	737	1442	982
5000	2/3	1332	1014	1783	1465	2233	1915	2684	2365	2864	2546	1238	920
	3	1149	767	1599	1217	2049	1667	2500	2118	2680	2298	1486	1104
	3/4	–		1415	969	1865	1420	2316	1870	2496	2050	1733	1288
	4			–		1682	1172	2132	1623	2312	1803	1981	1472
	4/5							1948	1375	2128	1555	2229	1656

Table 4b · Torques in Nm for single-acting Type SRP Actuators at 4.2 to 8 bar supply pressure
Recommended actuator setups highlighted in gray

Type SRP	No. of springs	Air torques in Nm at 4.2 to 9 bar												Spring torques	
		4.2 bar		4.5 bar		5 bar		5.5 bar		6 bar		8 bar		Start 90°	Stop 0°
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°		
15	4	8.6	6.2	9.6	7.2	11.2	8.8	12.9	10.5	14.6	12.1	–		7.8	5.4
	4/5	7.9	5.2	8.9	6.2	10.6	7.8	12.2	9.5	13.9	11.2	20.5	17.8	8.8	6.1
	5			8.2	5.2	9.9	6.9	11.5	8.5	13.2	10.2	19.8	16.8	9.7	6.7
	5/6					9.2	5.9	10.9	7.6	12.5	9.2	19.2	15.9	10.7	7.4
	6			–				10.2	6.6	11.9	8.2	18.5	14.9	11.7	8.1
30	4	15.7	11.1	17.5	12.9	20.4	15.8	23.4	18.7	26.3	21.7	–		13.5	8.9
	4/5	14.6	9.4	16.4	11.2	19.3	14.1	22.3	17.1	25.2	20	36.9	31.7	15.2	10
	5			15.3	9.5	18.2	12.4	21.1	15.4	24.1	18.3	35.8	30	16.9	11.1
	5/6					17.1	10.8	20	13.7	23	16.6	34.7	28.3	18.6	12.2
	6			–				18.9	12	21.9	14.9	33.6	26.7	20.2	13.3
60	4	31.2	21.2	34.7	24.7	40.5	30.5	46.3	36.3	52.1	42.1	–		27.7	17.7
	4/5	29	17.7	32.5	21.2	38.3	27	44.1	32.8	49.9	38.6	73.2	61.9	31.2	19.9
	5			30.2	17.7	36.1	23.6	41.9	29.4	47.7	35.2	71	58.5	34.6	22.1
	5/6					33.8	20.1	39.7	25.9	45.5	31.7	68.7	55	38.1	24.3
	6			–				37.5	22.4	43.3	28.3	66.5	51.5	41.5	26.5
100	4	47.5	30.7	53	36.2	62.2	45.3	71.3	54.5	80.5	63.6	–		46.2	29.3
	4/5	43.9	24.9	49.4	30.4	58.5	39.5	67.7	48.7	76.8	57.8	113.4	94.5	52	33
	5			45.7	24.6	54.8	33.5	64	42.9	73.1	52.1	109.8	88.7	57.8	36.7
	5/6					51.2	28	60.3	37.1	69.5	46.3	106.1	82.9	63.5	40.3
	6			–				56.7	31.4	65.8	40.5	102.4	77.1	69.3	44
150	4	71.7	48.7	79.1	56.6	92.4	69.9	105.7	83.2	119	96.5	–		63	40.5
	4/5	66.1	40.8	74	48.8	87.3	62.1	100.6	75.3	113.9	88.6	167.1	141.8	70.9	45.6
	5			69	40.9	82.3	54.2	95.6	67.5	108.9	80.8	162	133.9	78.8	50.7
	5/6					77.2	46.3	90.5	59.6	103.8	72.9	157	126.1	86.7	55.7
	6			–				85.4	51.7	98.7	65	151.9	118.2	94.5	60.8
220	4	115	75.7	128	88.6	149	110.1	171	131.6	192	153.1	–		105	65.6
	4/5	107	62.6	120	75.5	141	97	163	118.5	184	140	270.1	225.9	118	73.8
	5			111	62.4	133	83.9	154	105.4	176	126.9	261.9	212.8	131	82
	5/6					125	70.8	146	92.3	168	113.8	253.7	199.7	144	90.2
	6			–				138	79.2	159	100.7	245.5	186.6	157	98.4
300	4	149	101	165	117	193	145	221	173	248	201	–		132	84
	4/5	138	84	155	101	182	129	210	156	238	184	349	295	148	95
	5			144	84	172	112	200	140	227	168	338	278	165	105
	5/6					161	96	189	123	217	151	328	262	181	116
	6			–				179	107	206	135	317	245	198	126

Type SRP	No. of springs	Air torques in Nm at 4.2 to 9 bar												Spring torques	
		4.2 bar		4.5 bar		5 bar		5.5 bar		6 bar		8 bar		Start 90°	Stop 0°
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°		
450	4	233	159	260	185	303	229	347	272	390	316	–		206	132
	4/5	217	133	243	159	287	203	330	246	374	290	547	464	232	148
	5			227	134	270	177	314	221	357	264	531	438	258	165
	5/6					254	151	297	195	341	238	515	412	283	181
	6			–				281	169	324	213	498	386	309	198
600	4	297	211	331	245	288	302	444	358	501	415	–		266	180
	4/5	275	178	309	212	365	268	422	325	479	382	706	609	299	202
	5			286	178	343	235	400	292	456	349	683	575	332	224
	5/6					320	202	377	259	434	315	661	542	365	247
	6			–				355	225	411	282	638	509	399	269
900	4	390	264	436	310	513	387	589	464	666	540	–		379	253
	4/5	359	217	405	263	481	340	558	416	634	493	941	799	426	285
	5			373	216	450	292	526	369	603	445	909	752	474	316
	5/6					418	245	495	321	571	398	877	704	521	348
	6			–				463	274	540	351	846	657	568	379
1200	4	553	390	617	453	723	560	830	666	936	772	–		504	340
	4/5	511	327	575	390	681	497	787	603	894	709	1319	1135	567	383
	5			532	327	638	434	745	540	851	646	1277	1072	630	425
	5/6					596	371	702	477	809	583	1234	1009	693	468
	6			–				660	414	766	520	1192	946	756	510
2000	4	924	667	1032	774	1210	953	1389	1132	1568	1310	–		834	577
	4/5	852	563	959	670	1138	849	1317	1028	1495	1206	2210	1921	938	649
	5			887	566	1066	745	1245	923	1423	1102	2138	1817	1042	721
	5/6					994	640	1173	819	1351	998	2066	1713	1146	793
	6			–				1101	715	1279	894	1994	1608	1251	865
3000	4	1306	897	1461	1053	1721	1312	1980	1571	2239	1831	–		1281	873
	4/5	1197	737	1352	893	1612	1152	1871	1411	2130	1671	3168	2708	1442	982
	5			1243	732	1503	992	1762	1251	2021	1510	3059	2548	1602	1091
	5/6					1393	832	1653	1091	1912	1350	2950	2388	1762	1200
	6			–				1544	931	1803	1190	2840	2228	1922	1309
5000	4	2312	1803	2582	2073	3033	2524	3483	2974	3934	3424			1981	1472
	4/5	2128	1555	2398	1825	2849	2276	3299	2726	3750	3177			2229	1656
	5			2215	1578	2665	2028	3115	2479	3566	2929	–		2476	1839
	5/6					2481	1781	2931	2231	3382	2682			2724	2023
	6			–				2748	1983	3198	2734			2971	2207

Table 5 · Dimensions in mm and weights for Pfeiffer Type BR 31a Rotary Actuators

Type	15	30	60	100	150	220	300	450	600	900	1200	2000	3000	5000
ISO flange	F04	F05	F05	F07	F07	F10	F10	F12	F12	F14	F14	F16	F16	F25
Square end	11	14	14	17	17	22	22	27	27	36	36	46	46	55
T-ISO 228	⅛"	⅛"	⅛"	⅛"	¼"	¼"	¼"	¼"	¼"	¼"	¼"	⅜"	½"	½"
A	140.5	158.5	210.5	247.5	268.5	315	345	408.5	437.5	487	543	621	684	876
B	69	85	102	115	127	145	157	177	196	220.5	245	298.5	330	410
C	59	72	84.5	97.5	111	127	136	156.5	169	190.7	213	251	298.5	383
D	M 5x8	M 5x8	M 5x8	M 5x8	M 5x8	M 5x8	M 5x8	M 5x8	M 5x8	M 5x8	M 5x8	M 6x10	M 6x10	M 6x10
E	4	8	8	8	8	8	8	8	8	8	8	8	8	8
F	80	80	80	80	80	80	80	80	80	130	130	130	130	130
G	30	30	30	30	30	30	30	30	30	30	30	30	30	30
H	20	20	20	20	20	30	30	30	30	50	50	50	50	50
I	30	35	35	55	55	70	70	85	85	100	100	130	130	200
L_{min}	12	16	16	19	19	24	24	29	29	38	38	48	48	58
M	29	36	42.5	49.5	56	64	69.5	80	88	99	110	131	163.5	204
N	41.5	47	52	56.8	67	77	82	91.5	99	105	112	131	166	214
O	11	11	19	19	19	27	27	27	27	42	42	42	42	42
P	26.5	30	30.5	32.5	37.5	42.5	45	47	52	58	62	78.5	165	185
Q	42	50	50	70	70	102	102	125	125	140	140	165	165	254
R	32	32	32	32	32	32	32	32	32	32	32	45	45	45
S	24	24	24	24	24	24	24	24	24	24	24	40	40	40
W	M 5	M 6	M 6	M 8	M 8	M 10	M 10	M 12	M 12	M 16	M 16	M 20	M 20	8xM 16
∅ d f8	30	35	35	55	55	70	70	85	85	100	100	130	130	200
h_{max}	2	3	3	3	3	3	3	3	3	4	4	5	5	5
h1	0.5	0.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2	2	2.5	2.5	2.5
∅ Z	40	40	40	40	40	56/65	56/65	65	65	80/115	80/115	115	115	115
Weight, kg	1.5	2	3.5	4.5	6.5	10	13	18.5	24	32	46	65	103	169

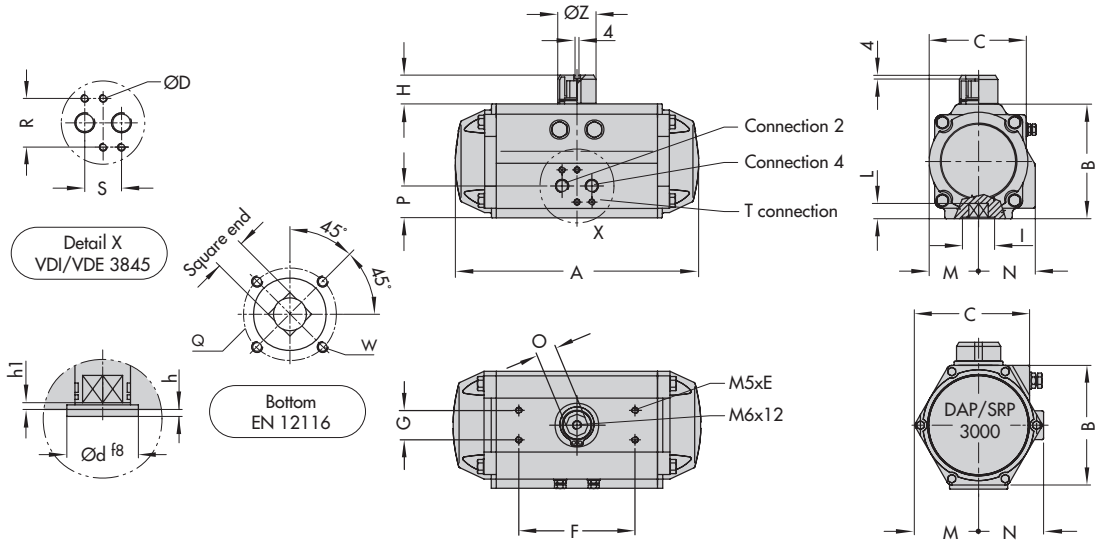


Fig. 5 · Dimensions and interfaces for attachment to valve and accessories

SAMSON AG · MESS- UND REGELTECHNIK
Weismüllerstraße 3 · 60314 Frankfurt am Main · Germany
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507
Internet: http://www.samson.de

AVAMO

ACTUATOR TECHNOLOGY | MADE IN GERMANY

AVAMO

Actutator technology - Made in Germany

AVAMO is a brand name of NTF Korfhage Maschinenbau GmbH. We are offering individual solutions for actuators and controls designed for a variety of industrial applications.

- **Scotch yoke actuators**
- **Rack & pinion actuators**
- **Linear actuators**
- **Control systems**

Among the diverse industrial applications of AVAMO-Products are the oil and natural gas industry, the chemical and petro chemical industry and the power generating industry.

We offer competent and expert solutions based on decades of experience in the production of actuators. Our experience, accompanied with advanced manufacturing technology and state of the art machines, results in the highest standard of production which enables us to offer, and provide, our widely diversified range of services.

We offer ***tailor made solutions*** for your projects!

AVAMO

Scotch Yoke Actuators

The AVAMO Scotch Yoke Actuators were developed for both opening/closing or modulating operations. The design accommodates modular assembly and provides lasting durability with minimal service requirements.

Features

Design:	Symetric or canted scotch yoke lever
Control pressure actuator:	Pneumatic up to 12 bar Hydraulic up to 210 bar Natural gas up to 200 bar
Torque:	Up to 600.000 Nm
Temperatur range:	-30°C to +110°C -40°C to +160°C -60°C to +160°C
Body:	Maintenance free, corrosion protected, welded or cast iron construction
Cylinder:	Cylinder with nickel plated running surfaces against corrosion providing a long lifetime for gaskets
Versions:	Single or double acting
End stops:	Adjustable leak free end stops +/- 5°
Available options:	Manual emergency override Actuating time <0,5 Seconds Sour gas service
Certification:	• ATEX 94/9/EG • PED 2014/68/EU • TR-TS Approval • Applicable up to SIL 3 as per IEC 61508 • Machine directives 2006/42/EG

AVAMO

Rack & Pinion Actuators

AVAMO Rack & Pinion Actuators were developed for both opening/closing functions or modulating operations. The design accommodates modular assembly and provides lasting durability with minimal service requirements.

Features

Design:	Double-piston rack & pinion design
Control pressure actuator:	Pneumatic up to 12 bar Hydraulic up to 210 bar Natural gas up to 200 bar
Torque:	Up to 10.000 Nm
Temperatur range:	-30°C to +110°C -40°C to +160°C -60°C to +160°C
Body:	Maintenance free, corrosion protected construction
Versions:	Single or double acting
End stops:	Adjustable leak free end stops +/- 5°
Available options:	Manual emergency override Actuating time <0,5 Seconds
Certification:	• ATEX 94/9/EG • PED 2014/68/EU • TR-TS Approval • Applicable up to SIL 3 as per IEC 61508 • Machine directives 2006/42/EG

AVAMO

Linear Actuators

AVAMO Linear Actuators were developed for both Opening/Closing functions or modulating operations. The design accommodates modular assembly and provides lasting durability with minimal service requirements.

Features

Design:	Piston type
Control pressure actuator:	Pneumatic up to 12 bar Hydraulic up to 210 bar Natural gas up to 200 bar
Thrust:	Up to 5.500.000 N
Temperatur range:	-30°C to +110°C -40°C to +110°C -60°C to +160°C
Cylinder:	Cylinder with nickel plated running surfaces against corrosion providing a long lifetime for gaskets
Versions:	Single or double acting
Available options:	Manual emergency override Actuating time <0,5 Seconds Adjustable leak free end stops
Certification:	• ATEX 94/9/EG • PED 2014/68/EU • TR-TS Approval • Applicable up to SIL 3 as per IEC 61508 • Machine directives 2006/42/EG • TRD 421

AVAMO

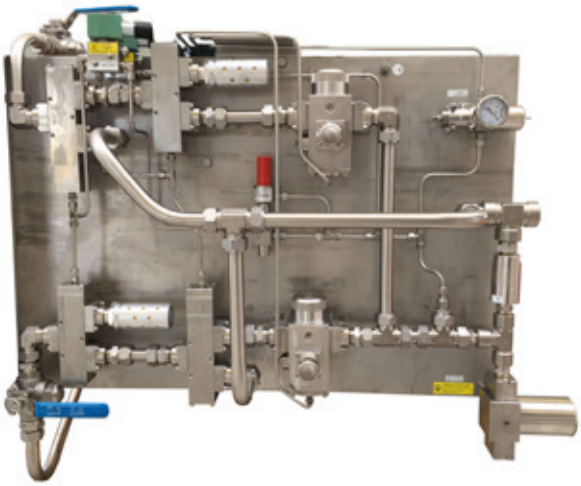
Control Units

In addition to the actuators AVAMO offers a wide variety of control units tailored to meet the customer's specific needs. They are characterized by their high quality standards' and ease of maintenance.

We offer you:

- Pneumatic controls
- Gas controls
- Electrohydraulic controls
- Gas over oil controls
- Wellhead controls
- Solar systems
- Line break systems
- High- und low-pilots
- Steam test device

Gas control



Pneumatic control

Electrohydraulic control

AVAMO

Quality

Consistent quality control is crucial in our branch. This is why our entire manufacturing process is constantly being monitored by our employees using state of the art measuring devices. All products are subjected to 100 percent control.

- DIN ISO 9001:2015
- ATEX Zone 1
- up to SIL 3
- CU-TR 012/2011
- Pressure equipment directives 2014/68/EU
- Machinery Directive

AVAMO

Our Service

Our experienced service technicians are available for a diverse variety of services worldwide:

- 24 hour standby
- On site installation and commissioning
- Spare parts management
- Servicing / Service contracts
- On-site training
- In house training in our own training center.

Contact us at:

service@avamo.eu

AVAMO

ACTUATOR TECHNOLOGY | MADE IN GERMANY

Nordring 15
49328 Melle-Buer
Germany

+49 (0)5427 9406 50

+49 (0)5427 9406 66

info@avamo.eu

www.avamo.eu

AVAMO is a brand of
NTF Korfhage Maschinenbau GmbH

Korfhage Maschinenbau NTF

Series 3730
Type 3730-0 Electropneumatic Positioner

Application

Single-acting or double-acting positioner for attachment to pneumatic control valves

Set point **4 to 20 mA**

Travel **5.3 to 200 mm**

CE Ex certified

The positioner ensures a predetermined assignment of the valve position (controlled variable x) to the input signal (set point w). It compares the input signal received from a control system to the travel of the control valve and issues a corresponding output signal pressure (output variable y).

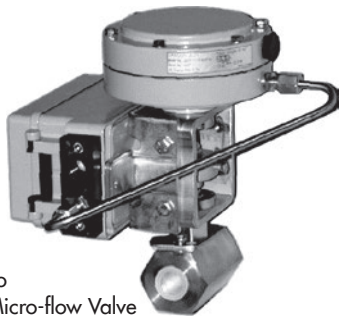
Special features

- Simple attachment to common linear actuators with interface for SAMSON direct attachment, NAMUR rib, valves with rod-type yokes according to IEC 60534-6 (Fig. 1) and attachment according to VDI/VDE 3847
- Any desired mounting position of the positioner
- Calibrated travel sensor without gears susceptible to wear
- Analog pneumatic output prevents pulsing in case of leaking actuator
- Fast-reacting analog control loop
- High control accuracy (fine tuning) without dead band and continuous pneumatic output
- Two-wire system with small electrical load below 300 Ω for explosion-protected version and version without explosion protection
- Output pressure limitation enabled by DIP switch
- Selectable tight-closing function with fixed switching point
- Low air consumption of approx. 110 l_n/h independent of supply and output pressure
- Aluminum housing with IP 66 degree of protection
- Check valve in the exhaust air port
- Resistant to shock and vibrations
- Extended temperature range also for intrinsically safe operation
- Travel range selectable within the rated travel range by setting DIP switch
- Zero and span adjusted by potentiometers
- Set point range and direction of action adjustable by setting DIP switches, e.g. for split-range operation

Additional options

– Stainless steel housing

Direct attachment to Type 3277 Pneumatic Actuator



Attachment to Type 3510 Micro-flow Valve

Attachment to NAMUR rib

Fig. 1: *Type 3730-0 Positioner*

Edition August 2017

Data Sheet **T 8384-0 EN**

Principle of operation

The positioner is mounted on pneumatic control valves and is used to assign the valve position (controlled variable x) to the control signal (set point w). The positioner compares the electric control signal of a control system to the travel of the control valve and issues a signal pressure (output variable y) for the pneumatic actuator.

The positioner consists of a travel sensor system proportional to resistance, an analog i/p converter with a downstream air capacity booster and the electronics with microcontroller.

The position of the valve stem is transmitted as a linear travel motion over the pick-up lever to the travel sensor (2) and supplied to an analog PD controller (3). The PD controller compares this actual value to the DC control signal coming from the control system, e.g. a 4 to 20 mA signal. In case of a system deviation, the activation of the i/p converter (6) is changed so that the actuator of the control valve (1) is pressurized or vented accordingly over the downstream booster (7).

This causes the valve plug to move to the position determined by the set point.

The supply air is supplied to the booster and the pressure regulator (8). An intermediate flow regulator (9) with fixed settings is used to purge the positioner and, at the same time, guarantees trouble-free operation of the booster.

The output signal pressure supplied by the booster can be limited by enabling the DIP switch setting S5 (4).

The volume restriction (10) and the DIP switch S6 (4) are used to optimize the positioner by adapting it to the actuator size and changing the gain factor.

Operation

The user can adjust the potentiometers and DIP switches to change the positioner settings. The configuration of the positioner is facilitated by instructions included on the inside of the cover which are intended to ensure a quick and trouble-free adaptation of the positioner to the control valve.

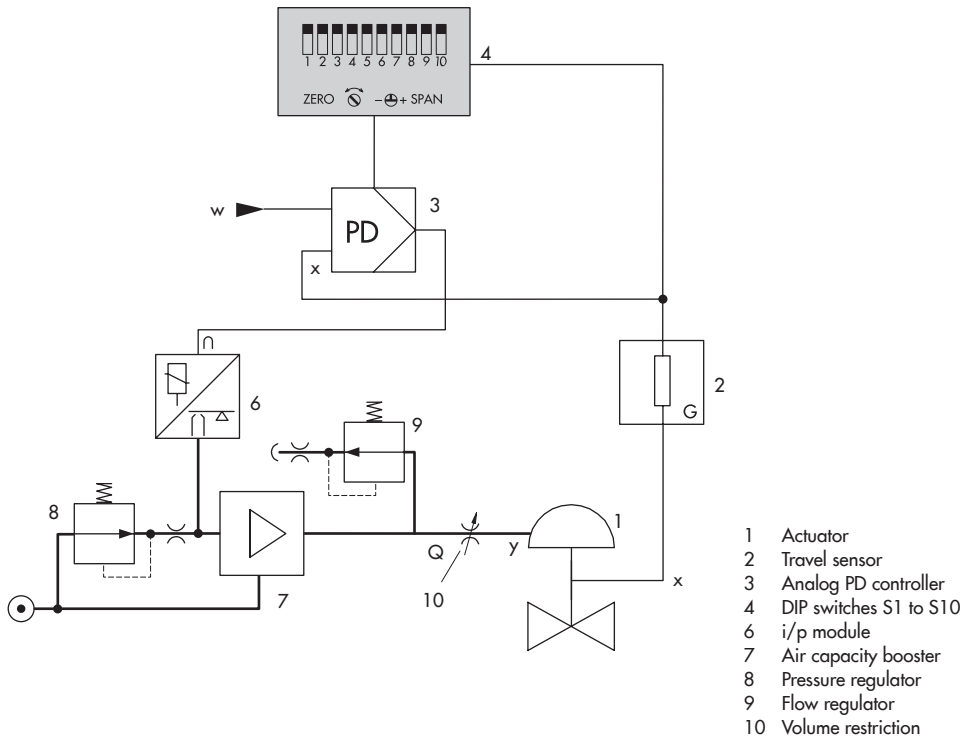


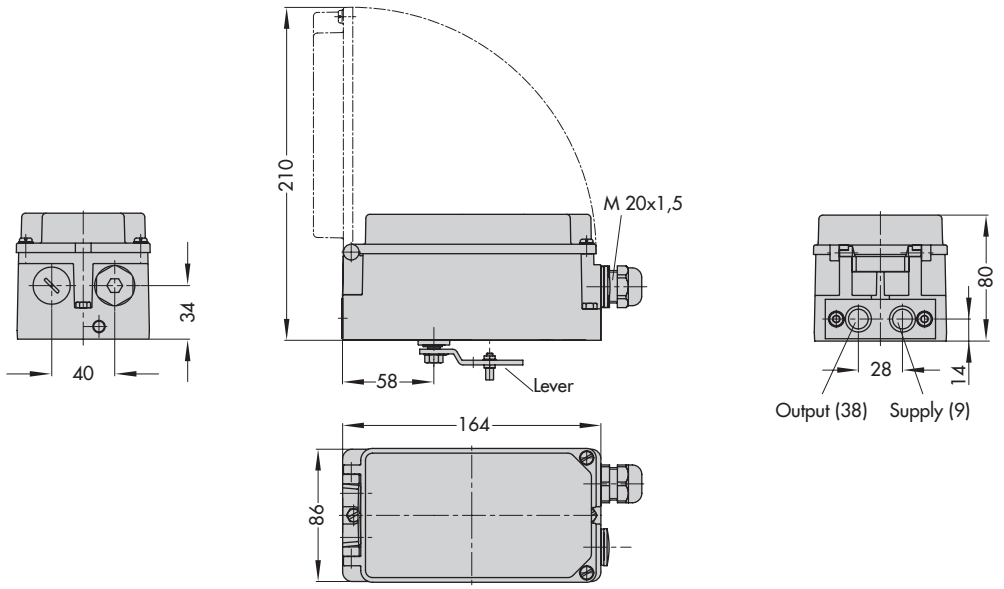
Fig. 2: *Functional diagram of Type 3730-0 Positioner*

Table 1: *Technical data*

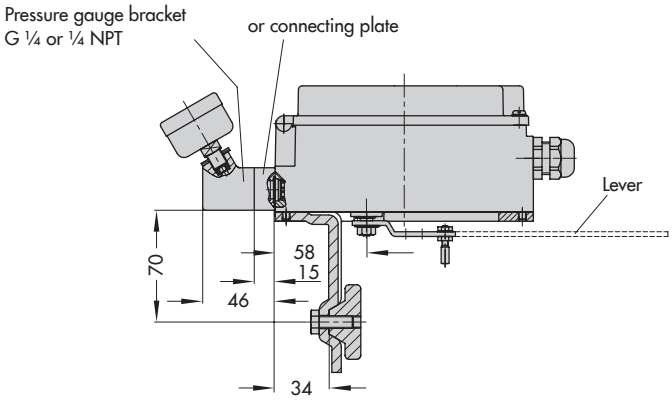
Type 3730-0 Positioner (technical data in test certificates additionally apply to explosion-protected devices)		
Travel	Adjustable	Direct attachment to Type 3277 Actuator 5.3 to 30 mm
		Attachment to Type 3510 Micro-flow Valve 5.3 to 15 mm
		Attachment according to IEC 60534-6 (NAMUR) 5.3 to 200 mm
Travel range		Adjustable within the initialized travel/angle of rotation; travel can be restricted to 1/5 at the maximum
Set point w	Signal range	4 to 20 mA, 4 to 12 mA and 12 to 20 mA Setting with DIP switches S6 and S7
	Static destruction limit	100 mA
Minimum current		3.6 mA
Load impedance		≤ 6 V (corresponding to 300 Ω at 20 mA)
Supply air	Supply air	1.4 to 7 bar (20 to 105 psi)
	Air quality acc. to ISO 8573-1 (edition 2001-02)	Max. particle size and density: Class 4 · Oil content: Class 3 · Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected
Signal pressure (output)		0 bar up to the capacity of the supply pressure Limitation to approx. 2.4 bar enabled by setting DIP switch S5
Characteristic		Linear · Deviation ≤1 %
Hysteresis		≤1 %
Sensitivity		≤0.1 %
Direction of action		Adjustable by changing DIP switch S4 setting
Air consumption		Independent of supply air approx. 110 l_n/h at a supply pressure of 4 bar
Air output capacity	Actuator filled with air	At Δp = 6 bar: 8.5 m_n^3/h · At Δp = 1.4 bar: 3.0 m_n^3/h · $K_{Vmax(20\ °C)}$ = 0.09
	Actuator vented	At Δp = 6 bar: 14.0 m_n^3/h · At Δp = 1.5 bar: 4.5 m_n^3/h · $KV_{max(20\ °C)}$ = 0.15
Permissible ambient temperature		–20 to 80 °C · –45 to 80 °C with metal cable gland The limits in the test certificate additionally apply for explosion-protected versions
Influences	Temperature	≤0.15 %/10 K
	Supply air	None
	Effect of vibration	≤0.25 % up to 2000 Hz and 4 g according to IEC 770
Electromagnetic compatibility		Complying with EN 61000-6-2, EN 61000-6-3, EN 61326-1 and NAMUR Recommendation NE 21
Electrical connections		One M20 x 1.5 cable gland for 6 to 12 mm clamping range · Second M20 x 1.5 threaded connection additionally exists · Screw terminals for 0.2 to 2.5 mm² wire cross-sections
Explosion protection		See Table 2
Degree of protection		IP 66/NEMA 4X
Use in safety-instrumented systems (SIL)		Observing the requirements of IEC 61508, the systematic capability of the pilot valve for emergency venting as a component in safety-instrumented systems is given.
		Use is possible on observing the requirements of IEC 61511 and the required hardware fault tolerance in safety-instrumented systems up to SIL 2 (single device/HFT = 0) and SIL 3 (redundant configuration/HFT = 1).
Weight		1.0 kg
Materials	Housing	Die-cast aluminum EN AC-AlSi12(Fe) (EN AC-44300) acc. to DIN EN 1706, chromated and powder coated · Special version: stainless steel 1.4581
	External parts	Stainless steel 1.4404/316L
	Cable gland	M20x1.5, black polyamide
Compliance		CE · EAC

Dimensions in mm

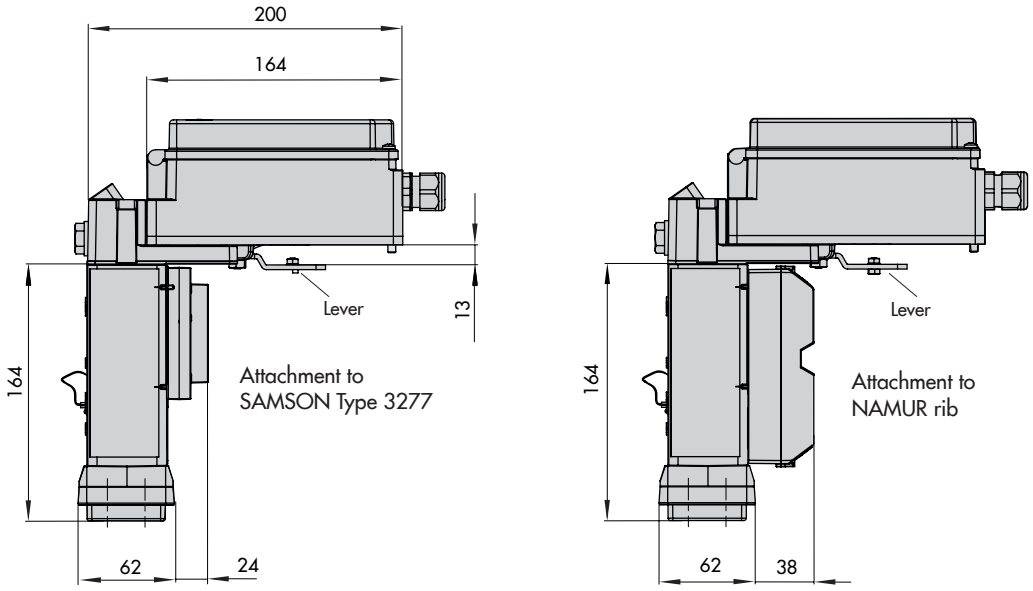
Direct attachment



Attachment according to IEC 60534-6 (NAMUR)

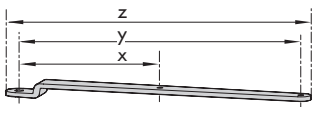


Attachment according to VDI/VDE 3847



Lever

Lever	x	y	z
S	17 mm	25 mm	33 mm
M	25 mm	50 mm	66 mm
L	70 mm	100 mm	116 mm
XL	100 mm	200 mm	216 mm



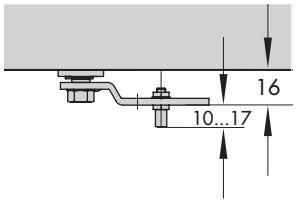


Table 2: *Explosion protection certificates*

Type	Certification			Type of protection/comments
-01	EC type examination certificate	Number	PTB 03.ATEX 2099	II 2G Ex ia IIC T6 Gb II 2D Ex ia IIIC T80°C Db
		Date	2016-04-19	
	EAC Ex	Number	RU C-DE.08.B.00113	1Ex ia IIC T6/T5/T4 Gb X Ex tb IIIC T80°C Db X
		Date	2013-11-15	
		Valid until	2018-11-14	
-03	**CSA**	Number	1613095	Ex ia IIC T6; Class I, Zone 0; Class II, Groups E, F, G Ex nA II T6; Class I, Zone 2; Class II, Div. 2, Groups E, F, G
		Date	2005-02-11	
	FM	Number	3021579	Class I, Zone 0 AEx ia IIC; Class I, II, III, Div.1, Groups A, B, C, D, E, F, G Class I, Div.2, Groups A, B, C, D; Class II, Div.2, Groups F, G
		Date	2004-12-01	
-05	EC type examination certificate	Number	PTB 03.ATEX 2099	II 2D Ex tb IIIC T80°C Db IP66
		Date	2016-04-19	
-07	**JIS**	Number	TC17330	Ex ia IIC T6
		Date	2017-07-29	
		Valid until	2020-07-28	
-08	EC type examination certificate	Number	PTB 03.ATEX 2179 X	II 3G Ex nA II T6; II 3G Ex ic IIC T6; II 3D Ex tc IIIC T80°C IP66
		Date	2013-09-17	
	EAC Ex	Number	RU C-DE.08.B.00113	2Ex nA IIC T6/T5/T4 Gc X 2Ex ic IIC T6/T5/T4 Gc X 2Ex tc IIIC T80°C Dc X
		Date	2013-11-15	
		Valid until	2018-11-14	

Article code

Positioner	Type 3730-0	x	0	0	0	0	0	0	0	0	x	0	0	x	0	x	x
Explosion protection																	
Without		0															
ATEX:	II 2G Ex ia IIC T6 Gb; II 2D Ex ia IIIC T80°C Db	1															
FM/CSA:	Class I, Zone 0 AEx ia IIC; Class I, II, III, Div.1, Groups A-G; Class I, Div.2, Groups A-D; Class II, Div.2, Groups F, G/ Ex ia IIC T6; Class I, Zone 0; Class II, Groups E-G; Ex nA II T6; Class I, Zone 2; Class II, Div. 2, Groups E-G	3															
ATEX:	II 2G Ex tb IIIC T80°C Db IP66	5															
JIS:	Ex ia IIC T6	7															
ATEX:	II 3G Ex nA II T6; II 3G Ex ic IIC T6; II 3D Ex tc IIIC T80°C IP66	8															
Housing material																	
Aluminum											0						
Stainless steel 1.4581											1						
Special applications																	
Without														0			
Compatible with paint														1			
Exhaust air with ¼ NPT connection, back of housing sealed														2			
Special version																	
Without																0	0
EAC Ex:	1Ex ia IIC T6/T5/T4 Gb X; Ex tb IIIC T80°C Db X	1														1	4
EAC Ex:	2Ex nA IIC T6 /T5/T4 Gc X; 2Ex ic IIC T6/T5/T4 Gc X; 2Ex tc IIIC T80°C Dc X	8														2	0
Attachment according to VDI/VDE 3747 with interface														6			
Attachment according to VDI/VDE 3747 prepared for interface														7			

Mounting the positioner

The Type 3730 Electropneumatic Positioner can be attached directly to the Type 3277 Actuator over a connection block.

In actuators with fail-safe action "actuator stem extends" and Type 3277-5 Actuator (120 cm²), the signal pressure is routed over an internal hole in the actuator yoke to the actuator.

In actuators with fail-safe action "actuator stem retracts" and in actuators with effective diaphragm areas of 175 cm² or larger, the signal pressure is routed to the actuator over ready-made external piping.

Using the appropriate bracket, the positioner can also be attached according to IEC 60534-6-1 (NAMUR recommendation). The positioner can be mounted on either side of the control valve.

A special version of the positioner allows it to be attached according to VDI/VDE 3847. This type of attachment allows the positioner to be replaced quickly while the process is running by blocking the air in the actuator. The positioner can be attached directly to the Type 3277 Actuator using an adapter bracket or adapter block. Alternatively, it can be attached to the NAMUR rib of a control valve using an additional NAMUR connection block.

Ordering text

Type 3730-0x Positioner

- Without pneumatic connecting rail
  (only when directly attached to Type 3277)
- With pneumatic connecting rail ISO 228/1-G ¼
- With pneumatic connecting rail ¼-18 NPT
- Without/with pressure gauge up to max. 6 bar
- Attachment to Type 3277 Actuator (120 to 750 cm²)
- Attachment acc. to IEC 60534-6-1 (NAMUR)
  Travel: ... mm, if applicable, stem diameter: ... mm
- Attachment according to VDI/VDE 3847
  Valve travel: ... mm, if applicable, rod diameter: … mm
- Adapter M20x1.5 to ½ NPT
- Metal cable gland

Series 3755
Type 3755 Pneumatic Volume Booster

Application

The Type 3755 Pneumatic Volume Booster is used together with positioners to increase the positioning speed of pneumatic actuators with an effective area ≥ 1000 cm² or a travel volume ≥ 6 l.

K_{VS} for exhaust and supply **2.5 m³/h**
Pressure ratio: Signal to output **1:1**

The pneumatic volume booster is mounted between the positioner and actuator. It supplies the actuator with an air flow output whose pressure corresponds exactly to the signal pressure, except that it has a much higher volume output.

Special features

- Excellent control accuracy
- Fast dynamic response due to low hysteresis
- Balanced plug ensures constant reversing pressure
- Bypass restriction with linear characteristic
- Bypass restriction setting can be lead-sealed
- Body material aluminum or stainless steel
- Sintered polyethylene filter disk ensures low noise emissions
- Low-noise venting or exhaust port connected to a pipe
- Standard or low-temperature version
- Version with G or NPT thread

Versions

– **Type 3755-1** (Fig. 1) · Pneumatic volume booster (cast aluminum body) with low-noise sintered polyethylene filter disk

– **Type 3755-2** (Fig. 2) · Pneumatic volume booster (cast aluminum body) with flanged-on threaded exhaust port

– **Type 3755-2** (Fig. 3) · Pneumatic volume booster (stainless steel body), threaded exhaust port

Fig. 1: *Type 3755-1 (cast aluminum body), low-noise venting over a sintered polyethylene filter disk*

Fig. 2: *Type 3755-2 (cast aluminum body) with flanged-on threaded exhaust port*

Fig. 3: *Type 3755-2 (stainless steel body), threaded exhaust port*

Principle of operation (Fig. 4)

If the positioner signal to supply air to the actuator increases, the pressure above the diaphragm (1) increases. The differential pressure at the diaphragm causes the supply plug (2) to open, providing supply air up to a maximum of 10 bar to the actuator.

In contrast, a positioner signal to vent the actuator causes the exhaust plug (3) to open. The pressure in the actuator is relieved over the exhaust port.

The bypass restriction screw (4) is used to adjust the response of the pneumatic volume booster to match the closed control loop requirements. The setting of the bypass restriction screw can be locked in position to prevent it from being turned and can additionally be lead-sealed.

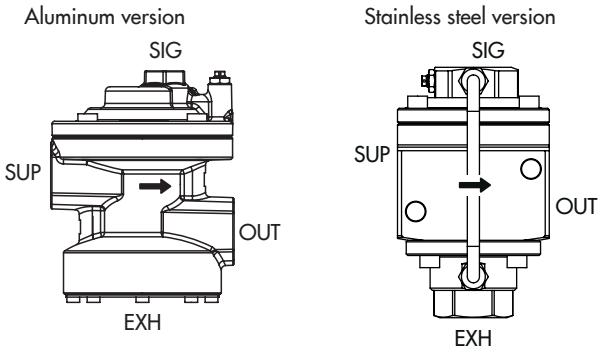
Mounting on control valves

Mount the volume booster with the air flowing from the supply port to the actuator port in the direction indicated by the arrow (see Fig. 4). The volume booster is mounted between the positioner and actuator.

Pneumatic connections

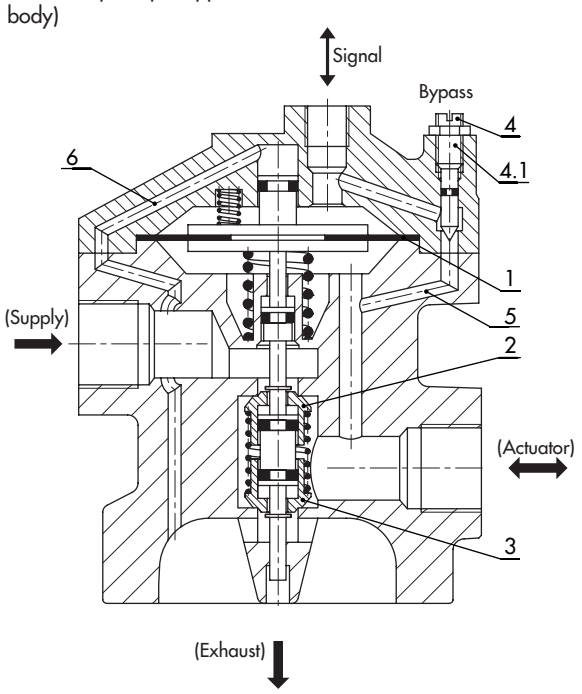
The air connections for signal, supply, actuator and for the version with (flanged-on) exhaust port are designed with G or NPT threads depending on the pipe female thread selected.

Connections:



SIG Signal
SUP Supply air
OUT Output (to actuator)
EXH Exhaust air

Sectional drawing of version with aluminum body:
(the same principle applies to the version with stainless steel body)



1 Diaphragm
2 Supply plug
3 Exhaust plug
4 Bypass restriction screw
4.1 Lock nut
5 Bypass duct [1)]
6 Duct for pressure balancing [1)]

[1)] Through piping in version with stainless steel body

Fig. 4: *Pneumatic connections and sectional drawing*

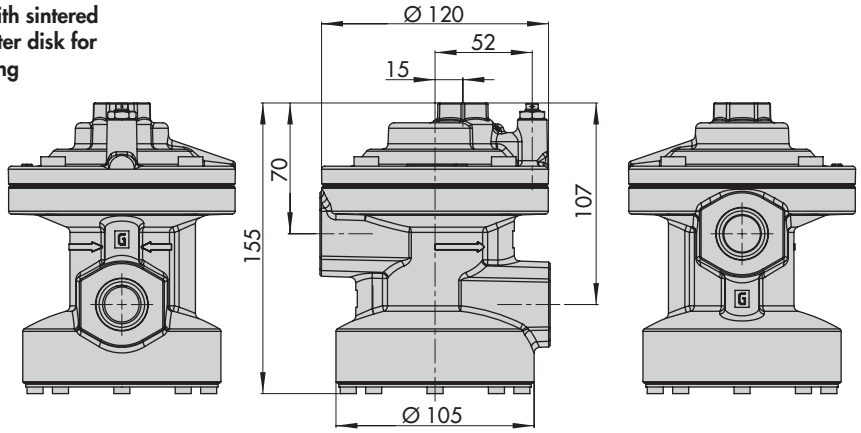
Technical data

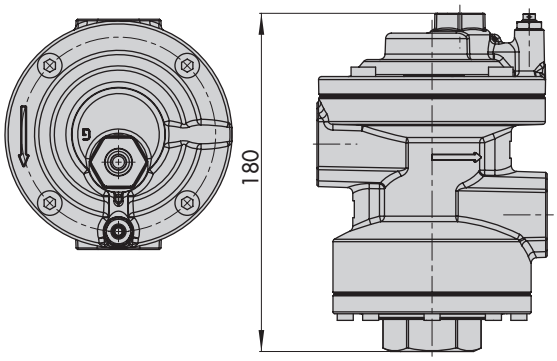
Type	3755-1 (aluminum)	3755-2 (aluminum)	3755-2 (stainless steel)
Flow coefficient			
K_{VS} Supply	2.5 m³/h		
K_{VS} Exhaust	2.5 m³/h		
K_{VS} Bypass	0.3 m³/h		
Closed loop control			
Pressure ratio	Signal:output = 1:1		
Response pressure	Standard temperature range: 80 mbar · Low-temperature range: 100 mbar		
Pressure			
Supply	Max. 10 bar · Max 145 psi		
Actuator	Max. 7 bar · Max 101.5 psi		
Signal	Max. 7 bar · Max 101.5 psi		
Air quality acc. to ISO 8573-1	Max. particle size and density: Class 4 · Oil content: Class 3 · Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected		
Connecting thread			
Supply (SUP)	G ¾ (optionally ¾ NPT)		
Actuator/output (OUT)	G ¾ (optionally ¾ NPT)		
Signal (SIG)	G ¼ (optionally ¼ NPT)		
Exhaust (EXH)	–	G 1 (optionally 1 NPT)	
Safety integrity level			
Use in safety-instrumented systems acc. to IEC 61508/ IEC 61511 [1]	**Suitable for use in safety-instrumented systems up to SIL 2:** applies to a single device **Suitable for use in safety-instrumented systems up to SIL 3:** applies to redundant configuration of valves according to IEC 61508 ➔ See Manufacturer's Declaration HE 1193 (available on request)		
Degree of protection according to IEC 60529			
Degree of protection provided by enclosure	IP 44 [2]	IP 66	
Compliance	EAC		
Other operating parameters			
Permissible ambient temperature	Standard temperature range: –40 to +80 °C · Low-temperature range: –55 to +60 °C		
Service life	≥1 x 10^7 full strokes		
Weight	2.1 kg	2.4 kg	5.2 kg
Materials			
Body	Cast aluminum, powder paint coated (RAL 1019)		1.4404 and 1.4571
	EN AC-43000KF according to DIN EN 1706	EN AC-43000KF according to DIN 1706 and EN AW-5083-H112 according to DIN EN 755-3	
Exhaust side	Silencer with sintered polyethylene filter disk and stainless steel retaining plate	Flanged-on threaded port made of aluminum, powder coated (RAL 1019)	Threaded port made of stainless steel
Diaphragm	Standard temperature range: VMQ · Low-temperature range: PVMQ		
Seat-plug seal	VMQ		
Other seals	NBR		
Other external parts	Stainless steel		

1) Only suitable for the standard temperature range and with the aluminum body
2) Exhaust side facing downward or to the side

Dimensions in mm · Version with cast aluminum body

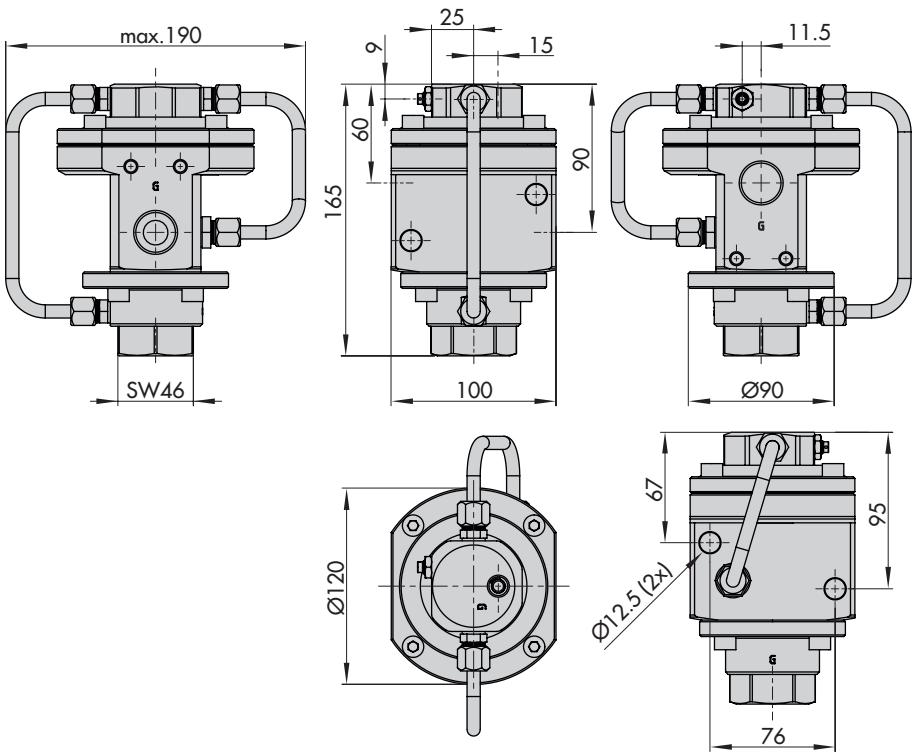
Type 3755-1 with sintered polyethylene filter disk for low-noise venting





Type 3755-2
Flanged-on threaded exhaust port connected to a pipe

Dimensions in mm · Version with stainless steel body



Article code

Pneumatic Volume Booster Type 3755-	x	x	x	0	0	x	x	0	0	x	0	0	0	0
Type														
Low-noise venting over a sintered polyethylene filter disk	1		0			0								
(Flanged-on) threaded exhaust port	2		3/5			0/1								
Pneumatic connections														
Supply air and actuator ISO 228 - G ¾, signal ISO 228 - G ¼		1												
Supply air and actuator ¾-14 NPT, signal ¼-18 NPT		2												
Exhaust version														
Sintered polyethylene filter disk			0											
(Flanged-on) threaded exhaust port ISO 228 - G 1			3											
(Flanged-on) threaded exhaust port 1-11½ NPT			5											
Flow coefficient														
Supply air K_{VS} = 2.5 m^3/h, exhaust K_{VS} = 2.5 m^3/h				0										
Dynamic response														
Standard (normal control)					0									
Body material														
Aluminum						0								
Stainless steel						1								
Color														
Gray-beige, structured finish, RAL 1019 (aluminum body)							0							
Without (stainless steel body)							1							
Temperature range														
Standard temperature, –40 to +80 °C										0				
Low temperature version, –55 to +60 °C										1				

Ordering text

Pneumatic volume booster	Type 3755
Type	Low-noise venting or exhaust port connected to a pipe
Pneumatic connections	G or NPT
Exhaust version	Sintered polyethylene filter disk or (flanged-on) threaded exhaust port
Body material	Aluminum/stainless steel
Temperature range	Standard or low temperature

Type 4708 Supply Pressure Regulators

Application

Supply pressure regulator used to provide pneumatic measuring and control equipment with a constant air supply

Set point ranges **0.2 to 1.6 bar (3 to 24 psi) or**
0.5 to 6 bar (8 to 90 psi)

The supply pressure regulator reduces and controls the maximum pressure of 12 bar (180 psi) in a compressed air network to the pressure adjusted at the set point adjuster.

Special features:

- Air blow-off and low air consumption
- Almost independent of upstream pressure
- Any mounting position (except version with filter receptacle)
- Suitable for pipe and panel mounting as well as for attachment to various positioners and actuators
- Optionally with pressure gauge with CrNiMo steel body and brass measuring element or pressure gauge completely made of CrNiMo steel (these regulator versions are completely free of any copper alloy)
- Threaded ends G according to DIN ISO 228/1 or with NPT tapered pipe thread
- Air filtering with venting option:
  – Type 4708-45 with 15 µm mesh size, all other filters with 20 µm (5 µm as special version)

Versions

Supply pressure regulators with continuously adjustable set point range from 0.5 to 6 bar (8 to 90 psi)

– **Types 4708-10 to -17** (Fig. 3) · Supply pressure regulators with optional set point range 0.2 to 1.6 bar (3 to 23 psi) Mounted on rails conforming with EN 50022/EN 50035 with accessories or mounted using a universal bracket
Type 4708-45 (Fig. 4) · Supply pressure regulator with increased air capacity

– **Types 4708-53 to -55** (Fig. 1) · Supply pressure regulators for direct attachment to various positioners

– **Types 4708-62 and -64** (Fig. 2) · Supply pressure regulators for direct attachment to Type 3277 and Type 3372 Pneumatic Actuators

– **Types 4708-65 and -66** · Supply pressure regulators for direct attachment to Type 3379 Pneumatic Actuator

Further versions

– **Type 4708-82** · Manual/automatic switchover functioning as a pneumatic bypass for positioners

– **Types 4708-83 to -87** · Filters for compressed air

Fig. 1: *Type 4708-53*

Fig. 3: *Type 4708-12*

Fig. 2: *Type 4708-64*

Fig. 4: *Type 4708-45 aluminum version*

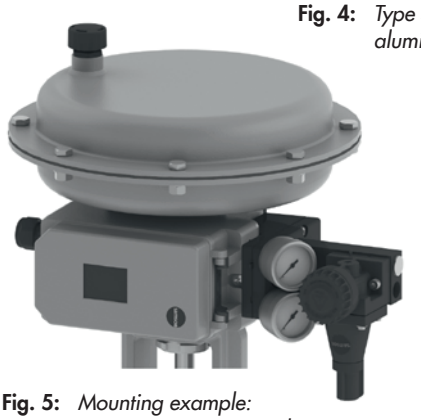


Fig. 5: *Mounting example: Type 4708-64 mounted onto Type 3730 Positioner with Type 3277 Actuator*

Principle of operation (Fig. 6)

The Type 4708 Supply Pressure Regulator operates according to the force-balance principle. By turning the set point screw (7), the tension of the set point spring (6) is changed and the output pressure is adjusted accordingly. The set point ranges from 0.2 to 1.6 bar or from 0.5 to 6 bar are obtained by using two different springs.
The regulator contains a filter cartridge (11). The condensate is drained by opening the screw plug (12) by half a turn. The screw plug must be in the horizontal or suspended position when the regulator is mounted.
For versions with separate filter receptacle and condensate drainage, the regulator must be installed with the receptacle suspended.

Supply pressure regulators in combination with positioners/ actuators

Various adapter plates allow the supply pressure regulator to be attached to the various devices (see page 3 and page 4).

Installation

To avoid the formation of excessive condensate, the supply pressure regulator is to be installed as closely as possible to the compressor or the compressed air tank. The regulator is either mounted directly in the pipeline or into the appropriate panel cut-out. In addition, it may be attached directly to the positioner or the pneumatic actuator. The air connections are designed either with G ¼ or ¼-18 NPT threads, depending on the version, or G ½ or ½-14 NPT in Type 4708-45.

Manual/automatic switchover

The positioner output is routed to the actuator over an manual/automatic switchover unit. In automatic mode, the positioner is in closed-loop operation. In manual mode, the output pressure of any supply pressure regulator is directly applied to the actuator. This creates a manual bypass of the positioner.

The manual/automatic switchover unit is mounted directly onto Types 3766/3367 and 3730/3731 (Fig. 7) Positioners or on an adapter plate with hook-up to the actuator. The Type 4708-53 or Type 4708-54 Supply Pressure Regulator can be directly mounted. All other supply pressure regulators can be connected to the manual/automatic switchover unit using piping (hook-up).

Accessories

An additional filter (Fig. 19, page 4) can be fitted on Type 4708-53 and Types 4708-55 to -63. The filter housing can be turned 360° to ensure that the filter and condensate drainage always face downwards.

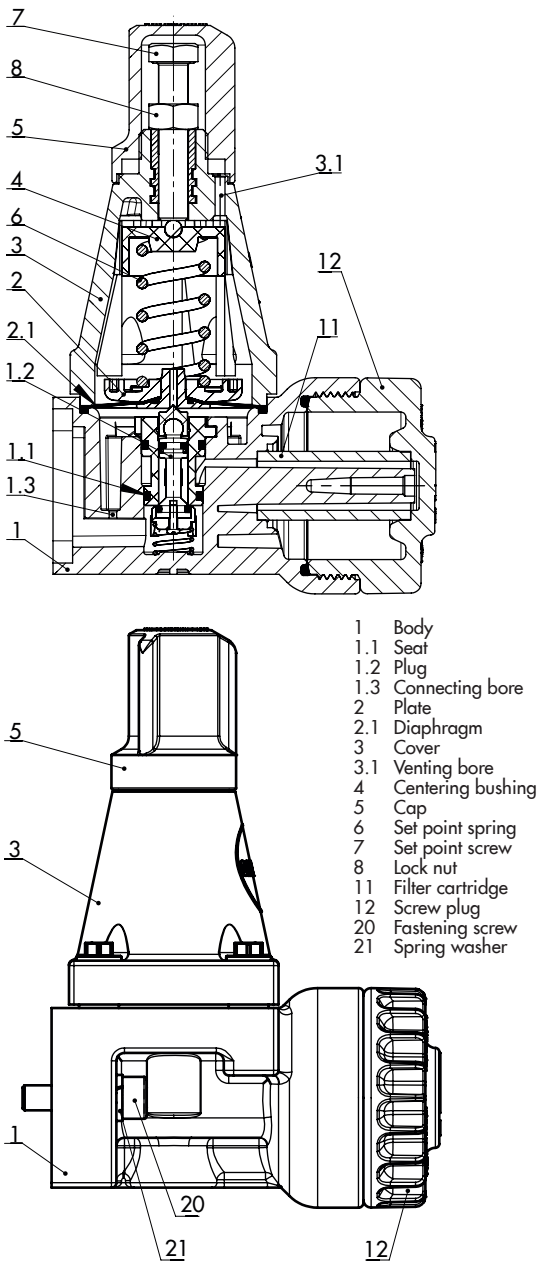


Fig. 6: *Side view and sectional drawing of Type 4708 Supply Pressure Regulator*

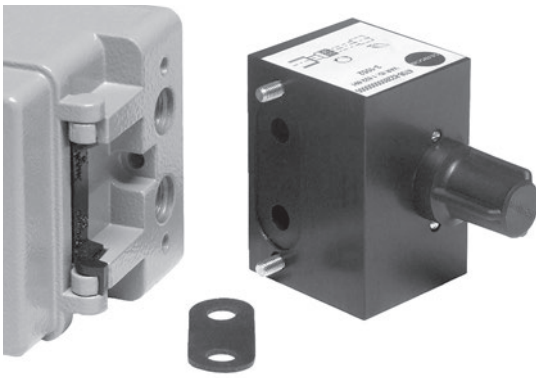
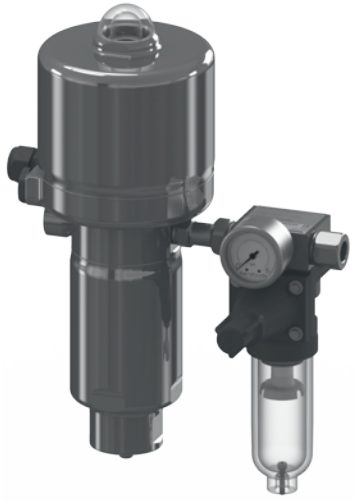
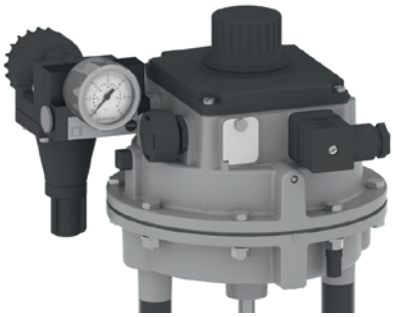


Fig. 7: *Type 4708-82 Manual/automatic Switchover Unit for direct attachment to Types 3730/3731 Positioners*

Positioner	For actuator/combination	Associated supply pressure regulator
Type 3725	Rotary actuators – Accessories (1400-7806) required – Also with Type 4708-82	**Fig. 8:** *Type 4708-**54**xx* 
	➔ Pressure gauge bracket (1402-1515) required Type 3271 Type 3277 – 120 cm² – with hooked-up accessories (solenoid valve, Type 3709-2 Lock-up Valve) – Also with Type 4708-82 Type 3372 (120 cm²)	**Fig. 9:** *Type 4708-**55**xx* 
	Type 3277 (175 to 750 cm²) – without any hooked-up accessories and without manual/automatic switchover – Type 4708-82 (mounting block and pressure gauge are included in the scope of positioner delivery)	**Fig. 10:** *Type 4708-**64**xx* 
Type 3730 Type 3731 Type 376x	Type 3271 Type 3277 – 120 cm² – with hooked-up accessories (solenoid valve, Type 3709-2 Lock-up Valve) – Also with Type 4708-82 Type 3372	**Fig. 11:** *Type 4708-**53**xx* 
	Rotary actuators – also with Type 4708-82 (not with Type 3709-1)	**Fig. 12:** *Type 4708-**54**xx* 
	Type 3730 – Version with external position sensor and fastening bracket for wall mounting	
	Type 3277 (175 to 750 cm²) – without any hooked-up accessories and without manual/automatic switchover – Type 4708-82 (mounting block and pressure gauge are included in the scope of positioner delivery)	**Fig. 13:** *Type 4708-**64**xx* 
Type 4763 Type 4765	Type 3271 (except with Type 3241 Valve, NPS 6)	**Fig. 14:** *Type 4708-**55**xx* 

Positioner	For actuator/combination	Associated supply pressure regulator
Type 3724	Type 3379	**Fig. 15:** *Type 4708-**65**xx and Type 4708-**66**xx* 
Version for integral attachment	Type 3372-x5x1 (120 cm²) – for Series V2001 Valves	**Fig. 16:** *Type 4708-**62**xx* 

Universal supply pressure regulators and filters	Type
Manual/automatic switchover	**Fig. 17:** *Type 4708-**82*** 
Filter with filter receptacle – for universal attachment with piping	**Fig. 18:** *Type 4708-8xxx shown here: -83* 
Accessories – Rotating supplementary filter for mounting onto supply pressure regulators	**Fig. 19:** *Filter for Type 4708-53 and Types 4708-55 to 4708-64* 

Table 1: *Technical data* [1]

Supply pressure regulator	Type 4708-xx	Type 4708-45
Air supply	1.6 to 12 bar (24 to 180 psi)	1 to 12 bar [2] (15 to 180 psi)
Set point range	0.2 to 1.6 bar (3 to 24 psi) or 0.5 to 6 bar (8 to 90 psi)	
Air consumption at 7 bar supply pressure	≤0.05 m_n^3/h	≤0.1 m_n^3/h
Dependency on inlet pressure	< 0.01 bar/Δp = 1 bar	Negligible (< 10 mbar/4 bar)
Reversing error	0.1 to 0.4 bar (depending on set point)	50 mbar with set point range 0.5 to 6 bar (8 to 90 psi)
Hysteresis	< 0.1 bar	50 mbar with set point range 0.5 to 6 bar (8 to 90 psi)
Filter cartridge mesh size	20 µm · Optionally 5 µm	15 µm · Optionally 5 µm
Compliance	EAC	
Pressure gauge		
Indicating range	0 to 1.6 bar (0 to 24 psi) or 0 to 6 bar (0 to 90 psi)	
Connection	G ⅛	

1) Values measured for Type 4708-xx with ¼" connection and for Type 4708-45 with ½" connection
2) Recommendation: min. 1.0 bar (15 psi) above the adjusted set point

Table 2: *Materials*

Supply pressure regulator		Type 4708-xx	Type 4708-45
Body	Metal parts	Aluminum [1] (3.3547) or stainless steel (1.4404)	
	Plastic parts	Polyamide, glass fiber reinforced	
Cover		Polyamide, glass fiber reinforced	
Cap		Polyamide, glass fiber reinforced	
Plug		Polyamide, glass fiber reinforced and polyoxymethylene	1.4305 and polyoxymethylene
Diaphragm		NBR · FVMQ for low-temperature version	
Diaphragm plate		Polyamide, glass fiber reinforced or aluminum	
Set point spring		1.4310	
Filter receptacle [2]		UV-resistant polyamide (Grilamid TR90UV), aluminum (3.3547) or stainless steel (1.4404)	
Filter cartridge		20 µm: polypropylene · 5 µm: stainless steel	15 µm: polypropylene and polyethylene
Pressure gauge			
Body		Stainless steel	
Connection and measuring element		Nickel-plated brass or stainless steel for copper-free version	

1) Anodized
2) See article code for material version

Table 3: *Ambient temperature ranges*

Type 4708-	10	11	12	13	14	17	45	53	54	55	62	64	65	66	82	83	84	86	87
Version for standard temperatures																			
–25 to +70 °C [1]		•	•	•	•		•						•	•		•		•	
–25 to +80 °C	•					•		•	•	•	•	•			•		•		•
Version for low temperatures																			
–40 to +80 °C												•							
–50 to +70 °C [1]		•	•	•	•		•									•		•	
–50 to +80 °C	•					•		•	•	•	•				•		•		•

1) Applies also to rotating supplementary filter

Table 4: *Weights*

Type 4708-	10	11	12	13	14	17	45 [1]	53	54	55	62	64	65	66	82	83	84	86	87
kg (approx.)	0.48	0.58	0.66	1.65	1.2	1.0	0.74	0.68	0.95	0.37	0.4	0.5	0.45	0.45	0.4	0.24	0.32	0.59	0.95

[1] With aluminum body and polyamide filter receptacle

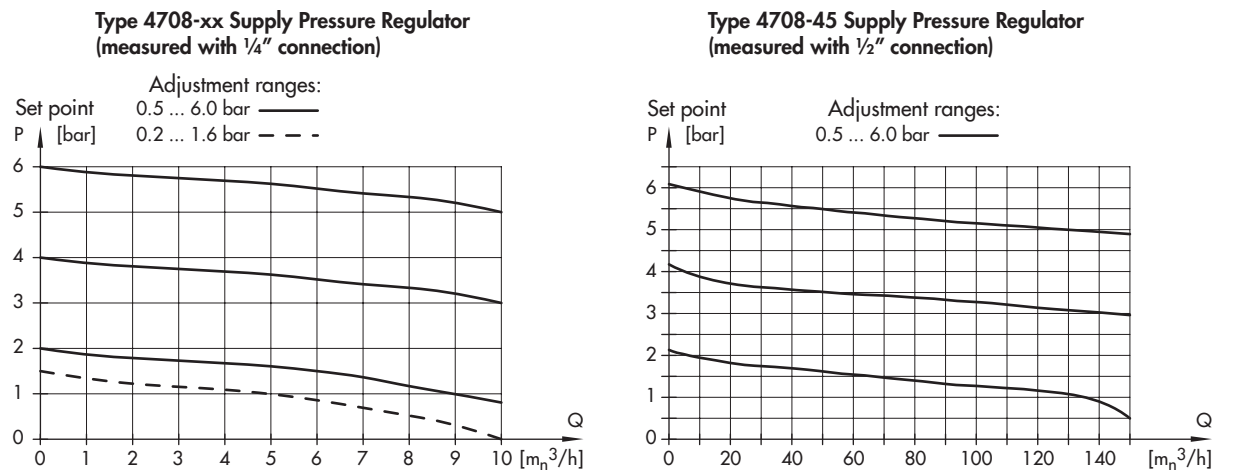


Fig. 20: *Air output at 8 bar supply pressure*

Article code

Supply pressure regulators Type 4708-	x	x	x	x	x	x	x	x	x	x	x	x	x
Standard version													
Aluminum mounted parts, plastic body, with filter, without separate filter receptacle	1	0											
Aluminum mounted parts, plastic body, with transparent filter receptacle	1	1											
Completely of aluminum, no plastic parts	1	2											
Stainless steel version													
Completely of stainless steel, no plastic parts	1	3											
Stainless steel mounted parts, plastic body, with transparent filter receptacle	1	4											
Stainless steel mounted parts, plastic body, with filter, without separate filter receptacle	1	7											
Version for increased air capacity													
Aluminum or stainless steel body, plastic cover, transparent plastic or metal filter receptacle	4	5											
Version with adapter plate for positioners													
Aluminum mounted parts, plastic body, with filter, without separate filter receptacle, for mounting onto Type 3730/3766/3767 Positioners	5	3											
Aluminum mounted parts, plastic body, with filter, without separate filter receptacle, for mounting onto Type 3730/3766/3767 Positioners	5	4											
Aluminum mounted parts, plastic body, with filter, without separate filter receptacle, for mounting onto Type 4763/4765 Positioners	5	5											
Version with adapter plate for pneumatic actuators													
Aluminum mounted parts, plastic body, with filter, without separate filter receptacle, for mounting onto Type 3277 Actuators (240 to 700 cm²) with Type 3730/3766/3767 Positioners	6	2											
Aluminum mounted parts, plastic body, with filter, without separate filter receptacle, for mounting onto Type 3277 Actuators (175 to 750 cm²) with connection block	6	4											
Version for mounting onto Type 3379 Pneumatic Actuator													
Stainless steel mounted parts, plastic body and filter receptacle, for mounting onto Type 3379 Actuator (31 cm²), G ⅛	6	5											
Stainless steel mounted parts, plastic body and filter receptacle, for mounting onto Type 3379 Actuator (63 cm²), G ¼	6	6											

Supply pressure regulators	Type 4708-	x	x	x	x	x	x	x	x	x	x	x	x	x
Further versions														
Manual/automatic switchover		8	2											
Filter for compressed air, aluminum body, transparent plastic filter receptacle		8	3											
Filter for compressed air, aluminum body and filter receptacle		8	4											
Filter for compressed air, stainless steel body, transparent plastic filter receptacle		8	6											
Filter for compressed air, stainless steel body and filter receptacle		8	7											
Connecting thread														
ISO-228/1-G ¼				2										
¼-18 NPT				5										
ISO-228/1-G ½				6										
½-14 NPT				7										
Set point range														
0.5 to 6.0 bar, without pressure gauge					0	0								
0.5 to 6.0 bar, with pressure gauge completely of stainless steel (device free of copper)					1	0								
0.5 to 6.0 bar, with pressure gauge (nickel-plated brass connection)					2	0								
0.2 to 1.6 bar, without pressure gauge					3	0								
0.2 to 1.6 bar, with pressure gauge completely of stainless steel (device free of copper)					4	0								
0.2 to 1.6 bar, with pressure gauge (nickel-plated brass connection)					5	0								
0.5 to 6.0 bar, with pressure gauge (nickel-plated brass connection, dial in MPa and kg/cm³)					6	0								
Without					8	0								
No. of pressure gauges														
Without							0							
One pressure gauge							1							
Two pressure gauges							2							
Material														
Aluminum mounted parts (plastic cover)								0						
Stainless steel mounted parts (plastic cover)								1						
Aluminum mounted parts and cover								2						
Stainless steel mounted parts and cover								3						
Filter														
Without									0					
In black plastic regulator body									1					
in transparent plastic receptacle (cannot be aligned)									2					
in aluminum receptacle (cannot be aligned)									3					
in stainless steel receptacle (cannot be aligned)									4					
Temperature range														
–25 to +70 °C (standard)										0				
–40 to +70 °C										1				
–50 to +70 °C										2				
Application														
Standard											0			
Device compatible with paint											1			
Exhaust port with thread											2			
Special version														
Without												0	0	0
Filter cartridge 5 µm												0	0	1
Pressure gauge connection ⅛ NPT												0	0	2
Special paint coating RAL 1019												0	0	2

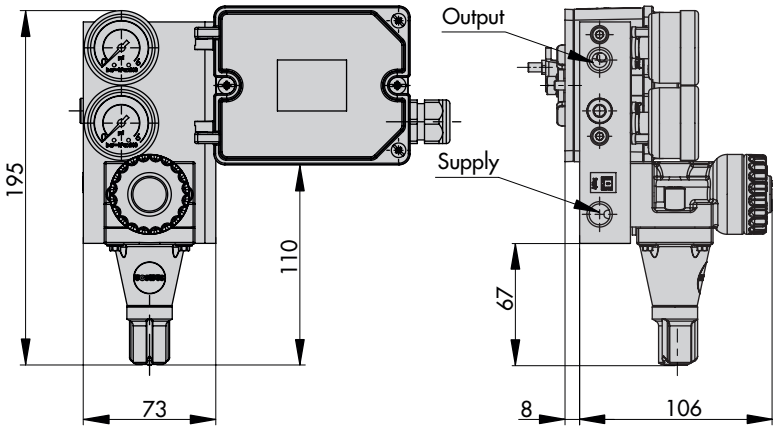


Fig. 21: *Type 4708-54xx mounted onto Type 3725 Positioner*

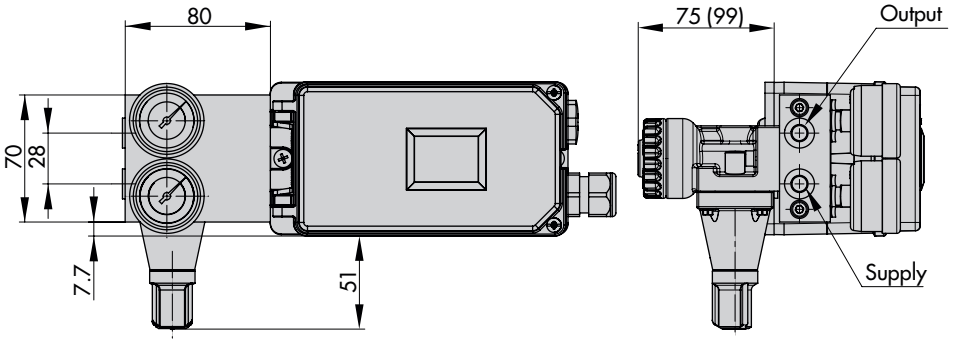


Fig. 22: *Type 4708-53xx mounted onto Types 376x and 373x Positioners*

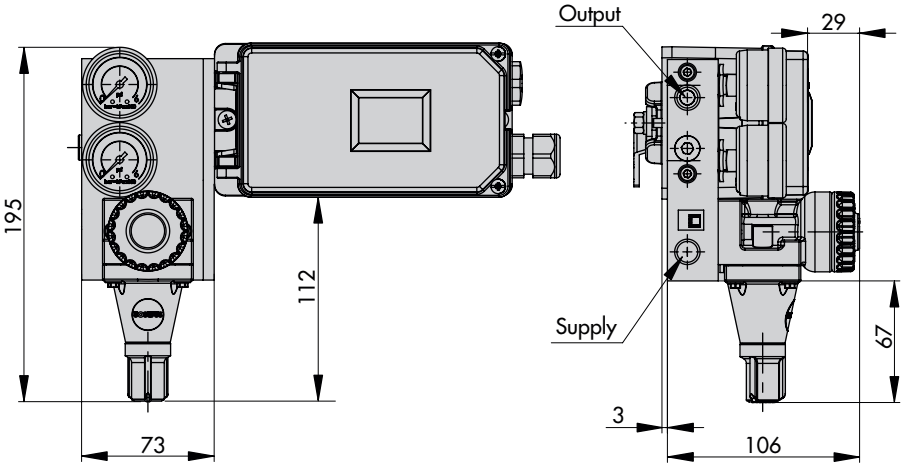


Fig. 23: *Type 4708-54xx mounted onto Types 376x and 373x Positioners*

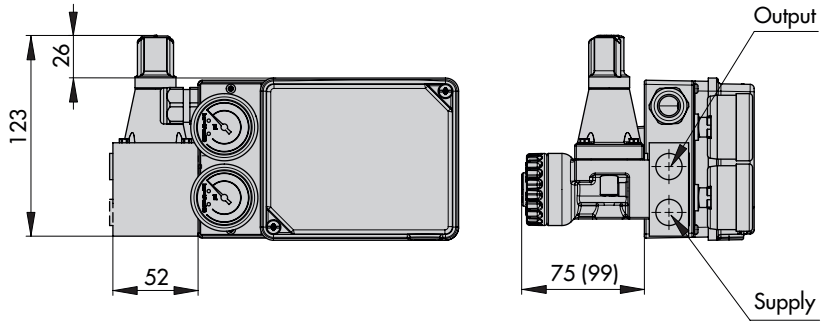


Fig. 24: *Type 4708-55xx mounted onto Type 4763 or 4765 Positioner*

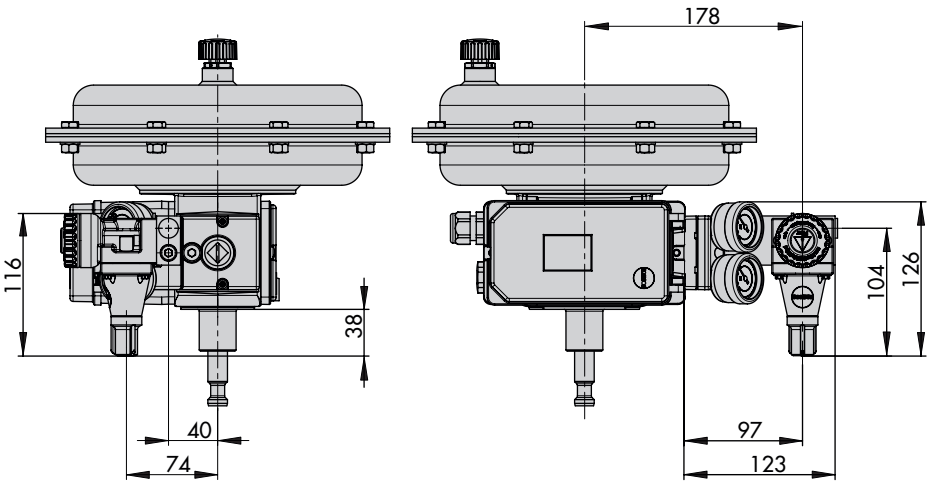


Fig. 25: *Type 4708-64xx for Type 3277 Pneumatic Actuator and Type 376x or 373x Positioner*

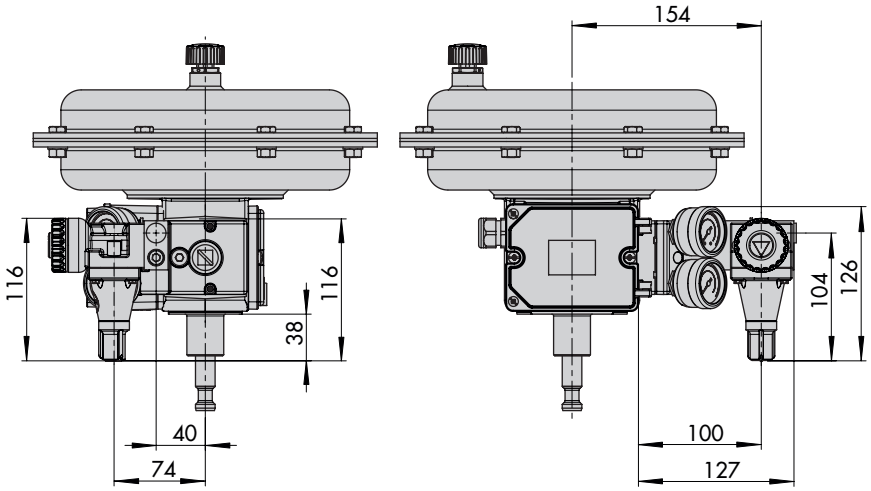


Fig. 26: *Type 4708-64xx for Type 3277 Pneumatic Actuator and Type 3725 Positioner*

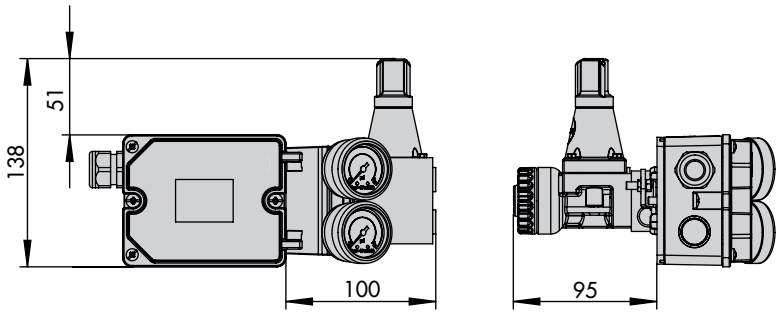


Fig. 27: *Type 4708-55xx mounted onto Type 3725 Positioner*

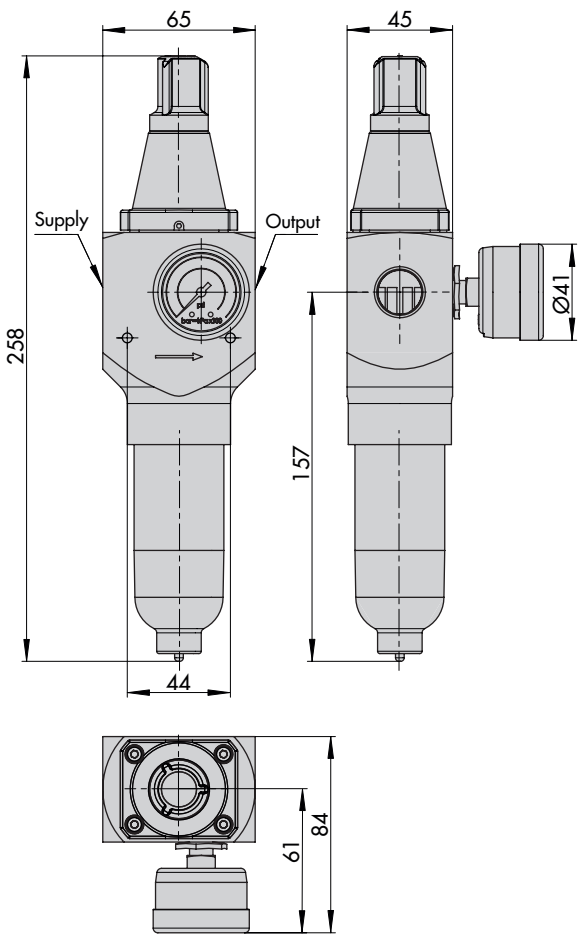


Fig. 28: *Type 4708-45 Supply Pressure Regulator aluminum version*

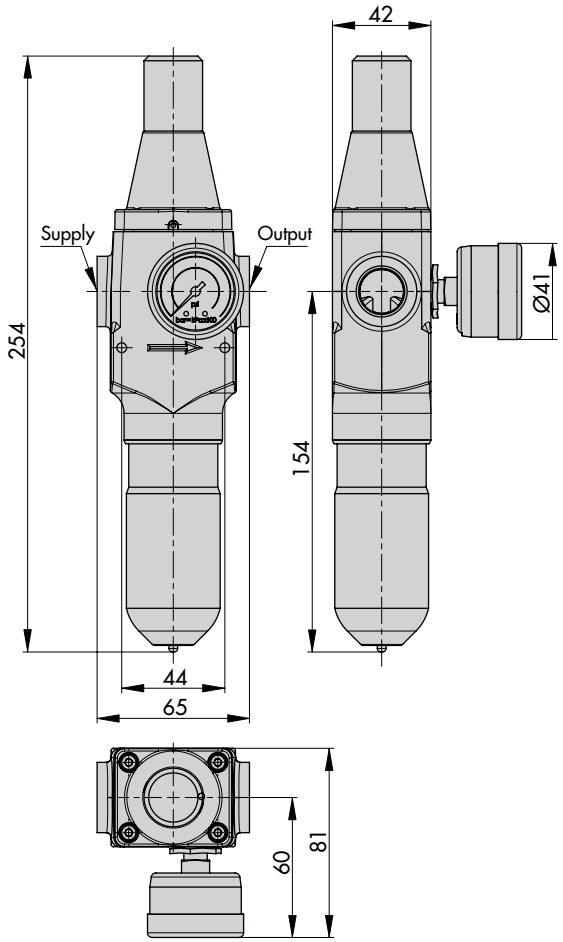


Fig. 29: *Type 4708-45 Supply Pressure Regulator, stainless steel version*

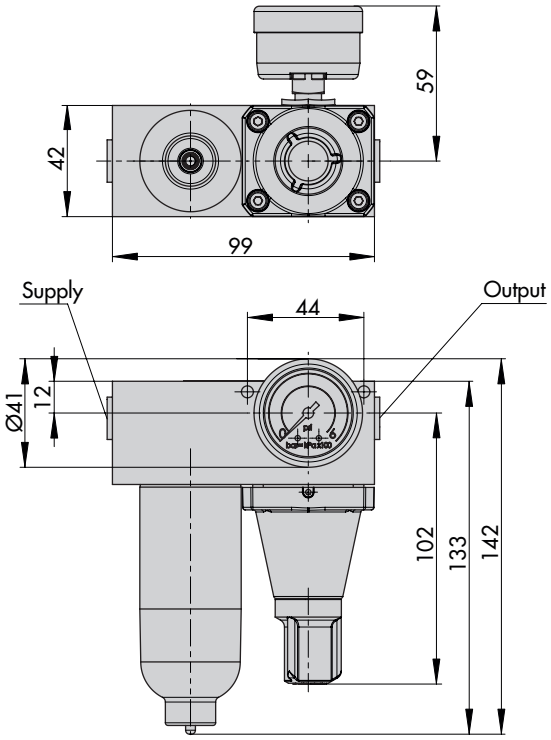


Fig. 30: *Types 4708-12xx/-13xx Supply Pressure Regulators*

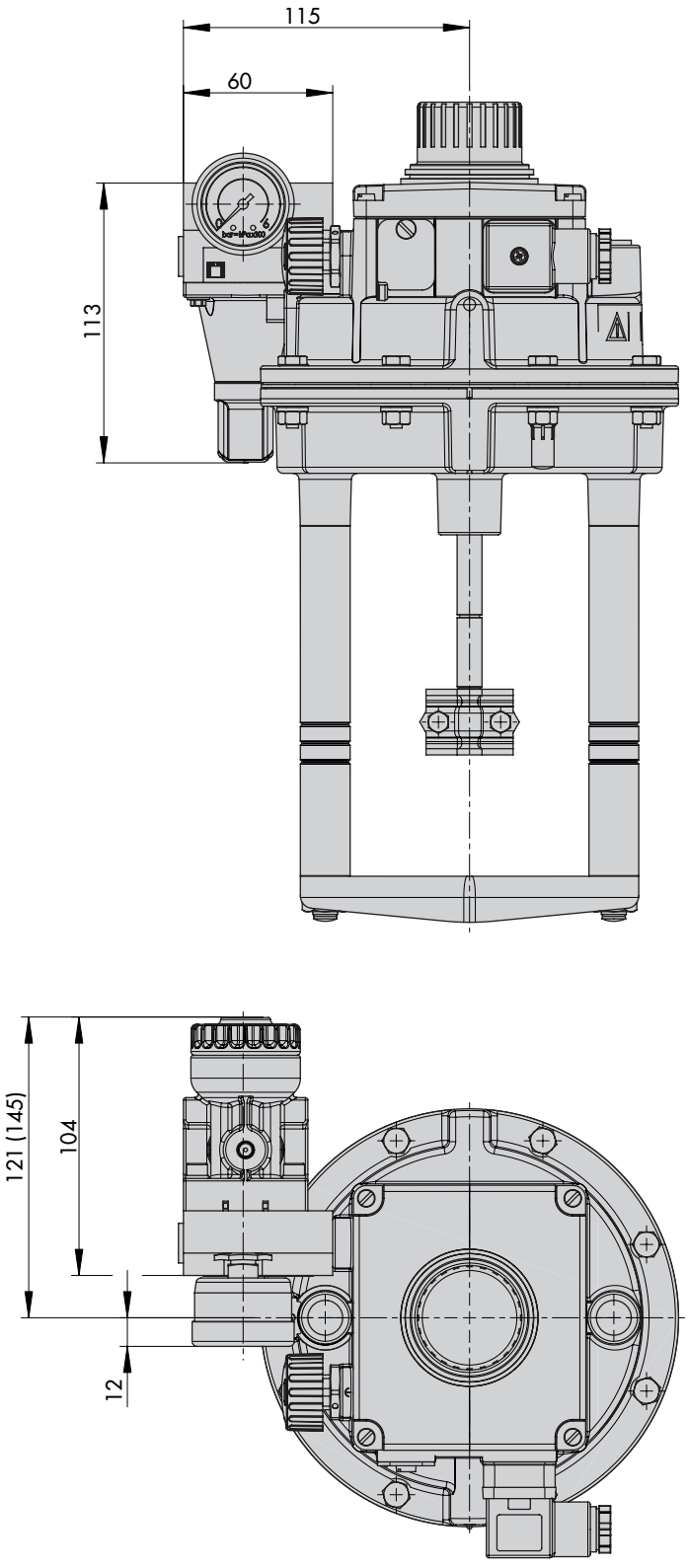


Fig. 31: *Type 4708-62xx Supply Pressure Regulator for Type 3372 Pneumatic Actuator*

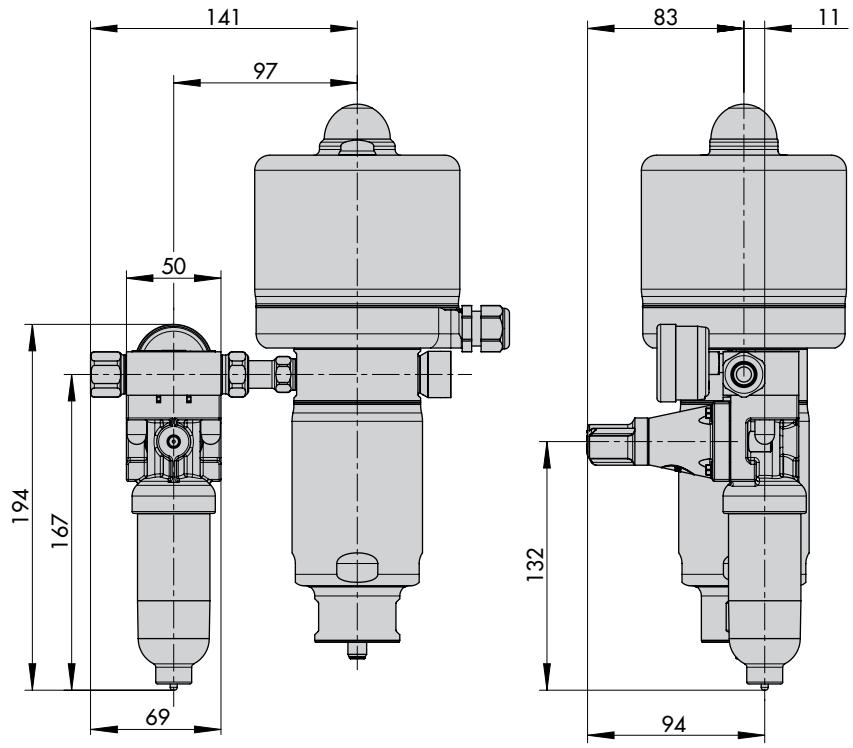


Fig. 32: *Type 4708-65xx Supply Pressure Regulator for Type 3379 Pneumatic Actuator (31 cm²)*

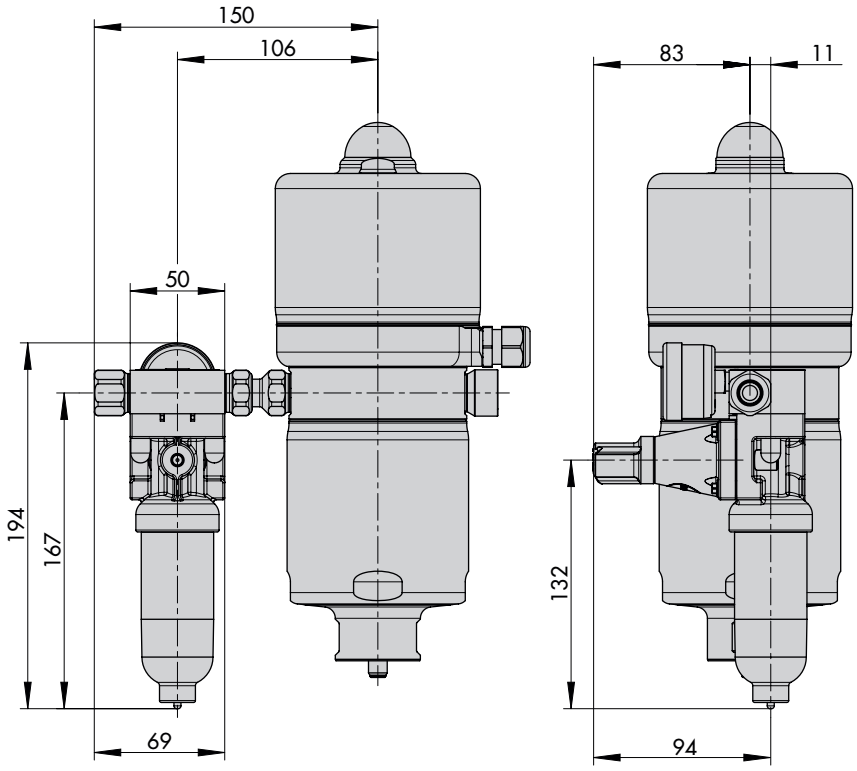


Fig. 33: *Type 4708-66xx Supply Pressure Regulator for Type 3379 Pneumatic Actuator (63 cm²)*

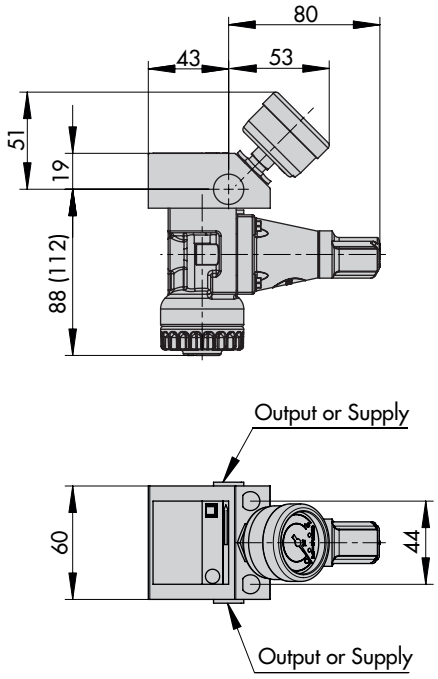


Fig. 34: *Types 4708-10xx/-17xx Supply Pressure Regulators*

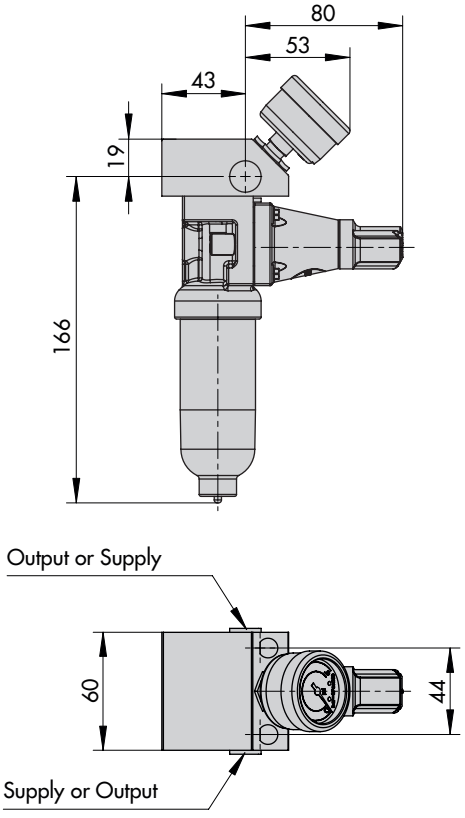


Fig. 35: *Types 4708-11xx/14xx Supply Pressure Regulators*

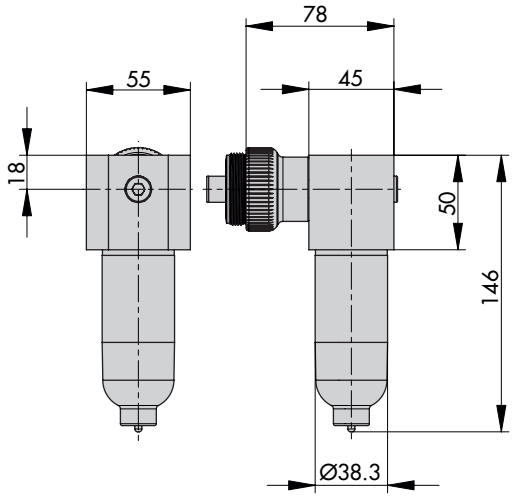


Fig. 36: *Rotatable filter receptacle*

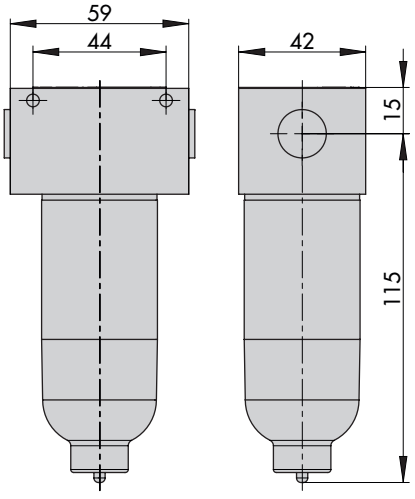


Fig. 37: *Types 4708-83xx/-84xx/-86xx/-87xx Air Filter*

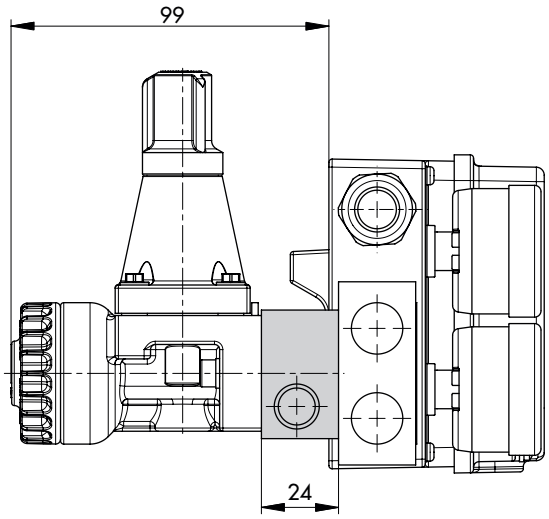


Fig. 38: *Intermediate plate for additional compressed air shown here: Type 4708-55xx*

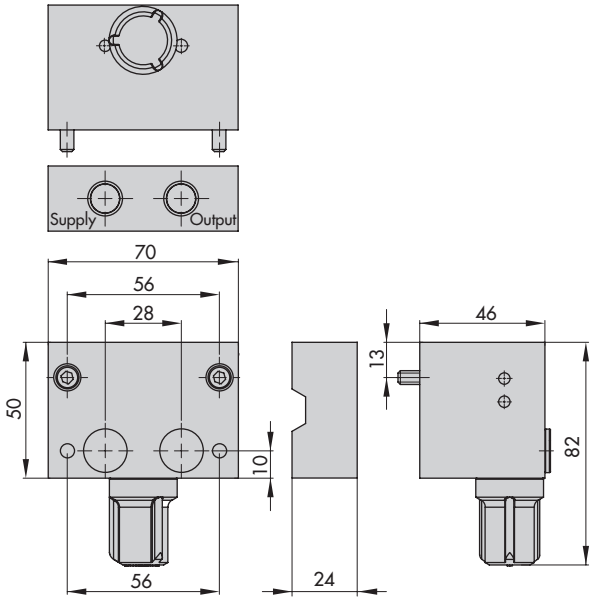


Fig. 39: *Type 4708-82 Manual/automatic Switchover with adapter plate*

Ordering text

– Supply pressure regulator according to article code

Accessories

For Types 4708-10 to -45 and Types 4708-81 to -87:
- Mounting parts for valve attachment or DIN rails according to EN 50022 or DIN rails according to DIN EN 50035

For Types 4708-10, -11, -14, -17, -53, -55:
- Intermediate plate for additional compressed air (G ¼ or ¼ NPT)

For Type 4708-53 and Types 4708-55 to -64:
- Rotatable filter receptacle

For Type 4708-82:
- Adapter plate for freely configurable hook-up or NAMUR attachment (G ¼ or ¼ NPT)

Further information:

▶ EB 8546 for **Type 4708-xx**
▶ EB 8546-1 for **Type 4708-45**