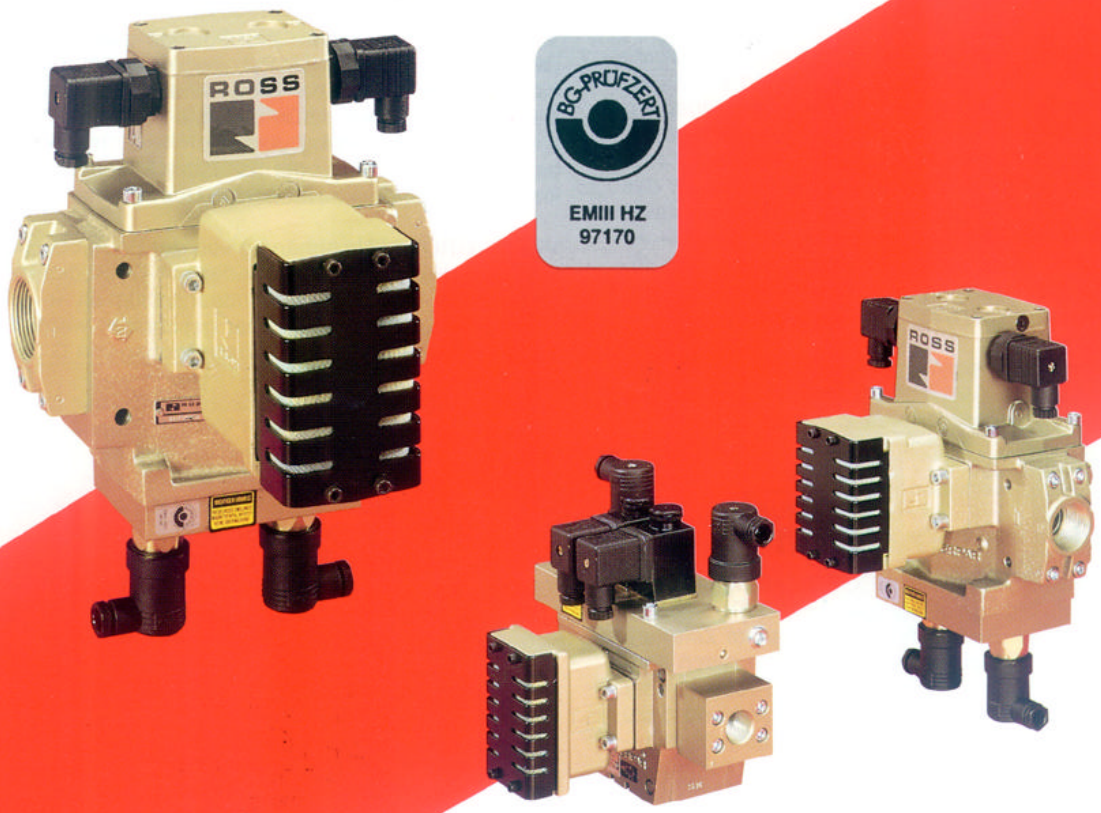
Bulletin E380B

SERPAR® Crossflow Double Valves with Pressure Switches



ROSS Air Controls

Why Use a Double Valve?

The double valves presented in this leaflet provide additional safety in the operation of pneumatically controlled presses and other power-driven machines, in accordance with current European health and safety requirements.

Every ROSS double valve has two valve elements in a common housing, which are both actuated - independently of each other - by separate solenoid pilot valves. The valve elements share common inlet, outlet and exhaust ports. When the pilot valves are energized simultaneously, the two main valve elements are operated simultaneously so that during normal operation the valve works like a 3/2 valve with a single valve element.

However, if one of the valve elements does not behave normally (either failing to open or failing to close) the valve is designed to keep the pressure at the outlet port at less than 2% of the inlet pressure. This residual pressure is not enough to operate the clutch or brake.

Because there is a second "redundant" valve element, the ROSS double valves presented in this leaflet meet high safety requirements. The likelihood of both valve elements malfunctioning on the same cycle is considered extremely remote.

CAUTION: *On mechanical presses and other hazardous machines with pneumatically operated clutches and brakes double valves at least should be used. Double valves without self-monitoring should only be used if current regulations permit this or if the valve is equipped with a control system which, in conjunction with the safety control system, makes possible the monitoring of valve and machine.* ***If the valves are used on presses in Germany, the "Safety Regulations For Control Systems On Power-driven Presses for Metalworking zH1/457" must be observed.***

For applications not covered by standard valves, please consult ROSS. We reserve the right to make technical modifications in the course of further product development.

A Valve Company with a Tradition

For almost 40 years ROSS has been developing double valves which have made a significant contribution to the operating safety of pneumatically controlled presses. During this period our range of double valves has been developed continuously in response to the needs of press manufacturers and users. Monitoring devices have also been offered in a variety of designs to satisfy different requirements.

The range of double valves with pressure switches presented in this leaflet incorporates all our experience and represents the state-of-the-art in ROSS double valves.

Selecting the double valve best suited to each application requires considerable technical knowledge. If you need further information or technical advice, please contact ROSS EUROPA or your ROSS sales office.

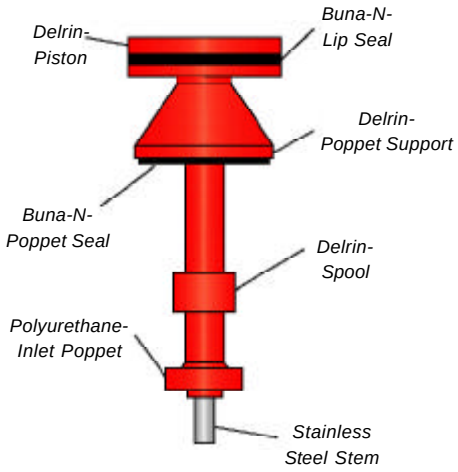
SERPAR® Crossflow Double Valves with Pressure Switches

The ROSS - SERPAR Crossflow series represents our latest developments in double valve technology. Its design is distinguished by two crossflow passages and special valve poppet and spool elements which provide the valve's unique flow characteristics.

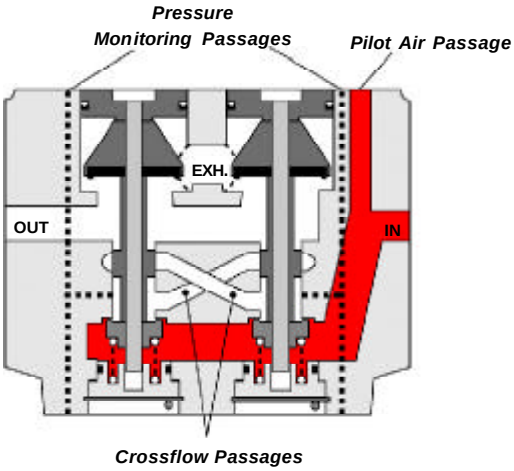
PRESSURE SWITCHES: The two pressure switches are mounted on an adaptor and measure the pressure in the crossflow passages of the main valve. In normal operation the two valve elements move simultaneously and the pressure switches send a matched pair of signals to the control system. If there is a malfunction and the valve elements do not move simultaneously, the pressure switches send an unmatched pair of signals, the control system switches off the valve and prevents any further valve operation. Therefore the two pressure switches, when correctly connected to the safety circuit, carry out a reliable monitoring function.

VALVE SIZES: Depending on the size (4, 8, 12 or 30) the valves are supplied with either threaded ports in the housing or threaded ports in mounting flanges which are screwed to the valve housing. Port sizes range from G 3/8 to G 1-1/2.

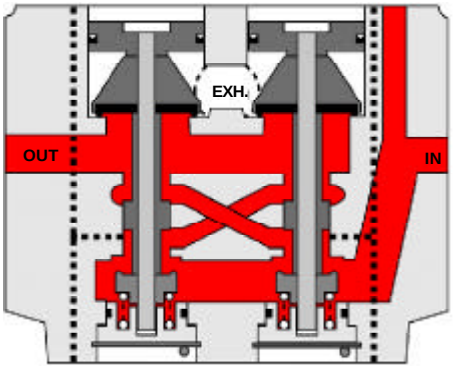
CONSTRUCTION: The valve housing is made of die-cast aluminium. The two valve elements (see diagram) are of lightweight construction for low actuating forces, fast response and long working life. Each valve element is guided at the top by the piston and at the bottom by the stainless steel stem, with no other sliding bearing surface in between.



AIR FLOW PATHS. Parallel flow paths develop equal forces on the valve elements in both actuated and deactuated modes. This enables both valve elements to respond equally to pilot pressures and to move simultaneously. The air flow paths of the valve in different operating modes are shown below.



VALVE ELEMENTS DEACTUATED. With both valve elements in the rest position, the two inlet valve poppets are held firmly against their seats by inlet air pressure. The exhaust poppets are open and the outlet port is connected to the exhaust port. The pressure monitoring passages (shown as broken lines) to the pressure switches are also exhausted.

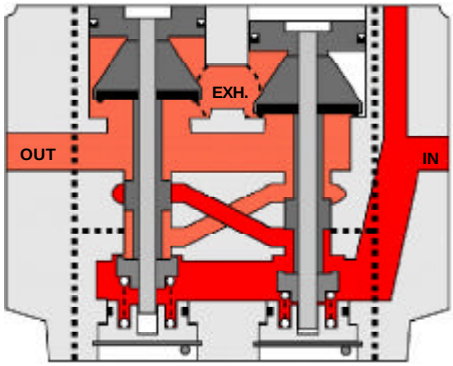


VALVE ELEMENTS ACTUATED. With both valve elements actuated, air flows from the inlet, past the two inlet poppets and through the two crossflow passages to the outlet port. The exhaust poppets are closed and the pressure monitoring passages to the pressure switches are both under the same pressure, corresponding to inlet pressure. When the two valve elements return to the rest position, the design of the spool elements on the valve stems allows the crossflow passages and the pressure monitoring passages to be exhausted through the exhaust port.

CONTENTS:

CAUTION: Our certification for product liability insurance relates only to the valve configurations described in this catalogue. If valves are modified, the certification becomes null and void.

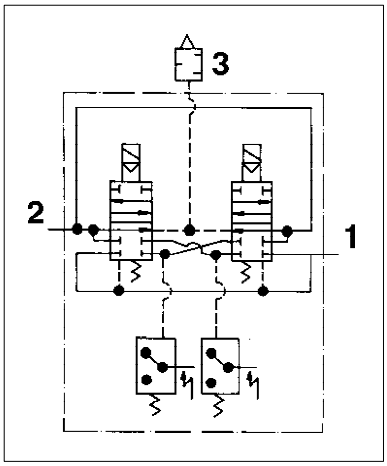
The pressure switches are designed to monitor the valve function, **NOT** the working air pressure. The adjustment is fixed and should not be changed.



MALFUNCTION. A malfunction in the system or in the valve itself could cause one valve element to be open and the other closed. In this event, inlet air can pass the inlet poppet of the open valve element but is mostly blocked by the spool of the closed valve element. The small amount of air which can pass the spool escapes through the open, over-dimensioned exhaust port, so that the pressure at the outlet port is less than 2% of inlet pressure.

The pressures in the two pressure monitoring passages are very different, so that only one of the two pressure switches is placed under inlet pressure and the monitoring system can detect the asynchronous condition and shut down the valve.

Size 4	**SERPAR®-Crossflow Double Valves with Pressure Switches***	Series **D3500**



Size	Port Size	Model numbers				Standard flow (l/sec.)	Resp. time (ms)	Weight (kg)
		Threaded port models		Flanged models				
		Inlet left	Inlet right	Inlet left	Inlet right			
4	G 3/8	D3573C3606	D3573C3604	D3573C3276	D3573C3270	90	see page 9	3,8
	G 1/2	D3573C4606	D3573C4604	D3573C4276	D3573C4270			
	G 3/4	D3573C5606	D3573C5604	D3573C5236	D3573C5230			

The valves listed above have been approved by the following European testing and certificating authorities:
Fachausschuss Maschinenbau, Hebezeuge, Hütten- und Walzwerksanlagen, Deutschland: Certificate No. 97170
Schweizerische Unfallversicherungsanstalt - SUVA: Certificate No. 4201
AB Svensk Anläggningsprovning Maskinteknik, Schweden: Certificate No. M118-92

STANDARD SPECIFICATIONS
Pilot Solenoids: Two, rated for continuous duty.
Standard voltages: 24, 48, 110, 220 volts; 50/60Hz; 24, 110 volts d.c. Other voltages are available.
Voltage at pressure switches must not exceed 250 volts.
Power Consumption: Each solenoid - 35 VA maximum in-rush, 22 VA holding on 50 or 60 Hz. 14 watts nominal on d.c.
Electrical Connection: Connectors according to DIN 43650 A (ISO 4400), must be ordered separately.
Ambient Temperature: 4°C to 50°C.
Media Temperature: 4°C to 80°C.
Flow Media: Filtered air (Filter rating < 50 µ).
Pressure Range: 2 to 8,5 bar.
Enclosure Rating: IP 65 according to IEC-Publication 144 and DIN 40050, Sheet 1.

*** EXTERNAL MONITOR REQUIRED**
The valves on this page do not have a built-in monitor, and so must only be used in conjunction with an external monitoring system. Such a monitoring system must be capable of inhibiting the operation of the valve and associated machinery in the event of a failure within the valve. Consult ROSS for more details.

OPERATION
Both solenoids must be energized simultaneously to shift the valve; maintained signal required to keep valve shifted; spring return.

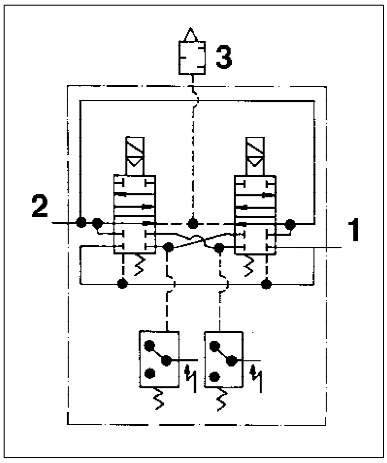
When the valve is not actuated a signal is present at the normally closed output line of each pressure switch. When the valve is actuated, the switch circuits are reversed and a signal is present at the normally open output lines.

Any abnormal pairing of output signals will tell the external monitoring system that a malfunction has accurred initiating a response to inhibit further valve actuation.

Caution: If the system must be reset, electrical signals to both solenoids must be removed to prevent the machine from immediately recycling and producing a potentially hazardous condition.

Please read carefully and thoroughly
all of the **CAUTIONS** on pages 2, 3 and 11.

Series **D3500**	**SERPAR®-Crossflow Double Valves with Pressure Switches***	Sizes **8, 12, 30**



Size	Port Size	Threaded port models	Flanged models	Standard flow (l/sec.)	Response time (ms)	Weight (kg)
8	G 1/2 G 3/4 G 1	D3573B4608 D3573B5608 -	D3573B4638 D3573B5638 D3573B6638	140	see page 9	5,2
12	G 3/4 G 1 G 1-1/4	D3573B5612 D3573B6612 -	D3573B5632 D3573B6632 D3573B7632	370	see page 9	7,0
30	G 1-1/4 G 1-1/2	- -	D3573B7630 D3573B8630	850	see page 9	15,4

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STANDARD SPECIFICATIONS
Pilot Solenoids: Two, rated for continuous duty.
Standard voltages: 24, 48, 110, 220 volts; 50/60Hz; 24, 110 volts d.c. Other voltages are available.
Voltage at pressure switches must not exceed 250 volts.
Power Consumption: Each solenoid, 87 VA maximum in-rush, 30 VA holding on 50 or 60 Hz. 14 watts nominal on d.c.
Electrical Connection: Connectors according to DIN 43650 A (ISO 4400); must be ordered separately.
Ambient Temperature: 4°C to 50°C.
Media Temperature: 4°C to 80°C.
Flow Media: Filtered air (Filter rating < 50 µ).
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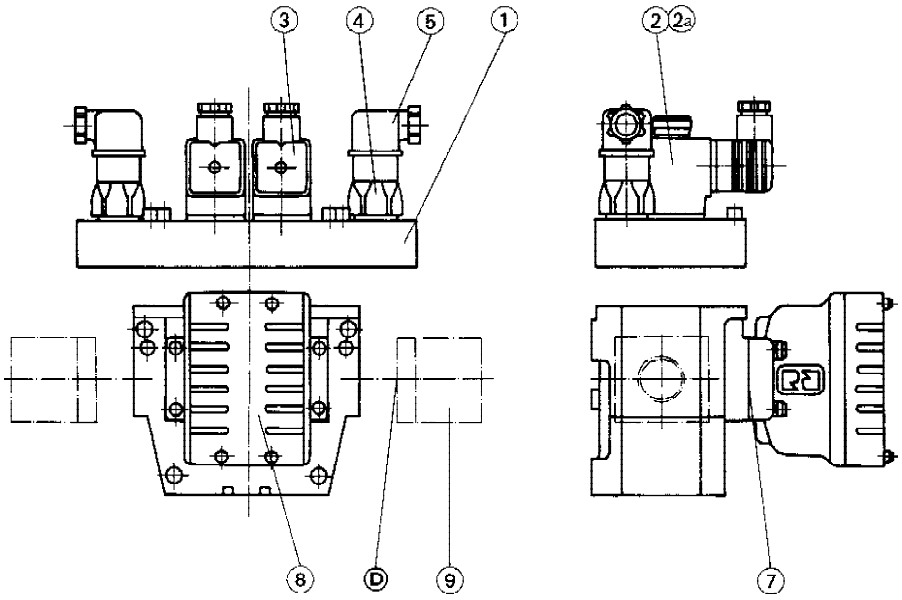
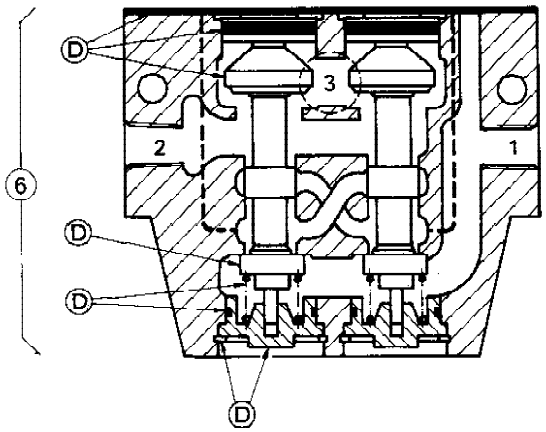
Size **4**	**SERPAR®-Crossflow** **Double Valves with Pressure Switches**	Series **D3500**





	Description	Size 4
1	Pilot Assembly (specify voltage)	924B79
2	Solenoid Valve	1037A79
2a	Coil (specify voltage)	319B33
3	Connector Socket	937K87
4	Pressure Switch	518E30
5	Connector Socket	522E30
6	Valve Body Assembly*	
7	Gasket	484B11
8	Silencer	318C86
9	Flange**	
D	Body Kit	541K77

* Flanged model (for model numbers of valve body assemblies with threaded port, refer to **Chart 1).**

**** see Chart 2 and 3.**

Chart 1 - Threaded Port Models

Size	Port Size	Inlet	Model-No. Valve Body Assembly
4	G 3/8	right	D1436B75
		left	D1438B75
	G 1/2	right	D1437B75
		left	D1439B75
	G 3/4	right	D1440B75
		left	D1441B75

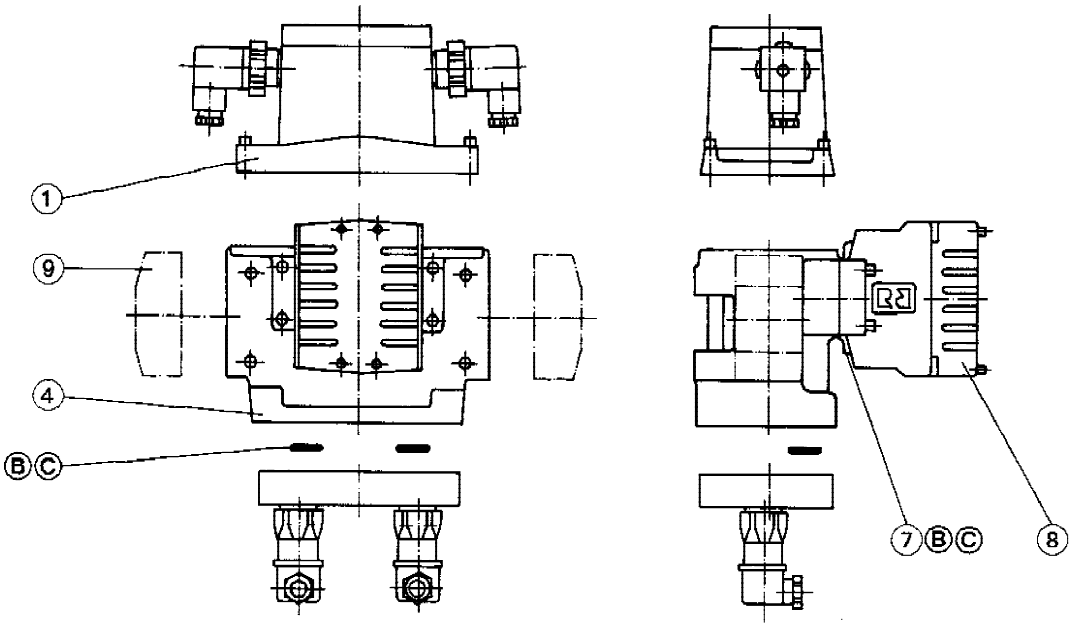
Chart 2
Flanged Models
(flanges not included)

Size	Inlet	Model-No. Valve Body Assembly
4	right	1434B75
	left	1435B75

Chart 3
Flange Model Numbers

Flange	Size 4
G 3/8	D730B25
G 1/2	D731B25
G 3/4	D732B25 and D739B25

Series **D3500**	**SERPAR®-Crossflow** **Double Valves with Pressure Switches**	Sizes **8, 12, 30**



	Description	Size 8	Size 12	Size 30
1	Pilot Assembly (specify voltage)	D997C79	D997C79	D997C79
2	Solenoid (specify voltage)	411B04	411B04	411B04
3a	Connector	886K87	886K87	886K87
3b	Connector Socket	937K87	937K87	937K87
4	Valve Body Ass.*	623C78	344C78	345C78
5	Pressure Switch	518E30	518E30	518E30
6	Connector Socket	522E30	522E30	522E30
7	Gasket	403B11	402B11	404B11
8	Silencer	310C86	309C86	308C86
9	Flange	For model numbers, refer to **Chart 2**		
A	Pilot Kit (2 required)	1189K77	1189K77	1189K77
B	Body Kit	429K77	432K77	435K77
C	Seal Kit	438K77	441K77	444K77
D	Adapter	367B86	367B86	374B86

***** Flanged model (for model numbers of valve body assemblies with threaded port, refer to **Chart 1)**.

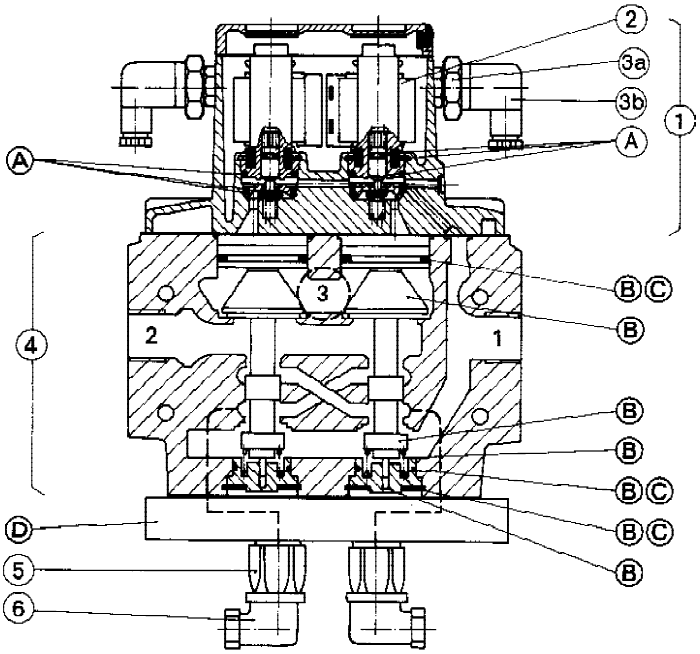


Chart 1
Threaded Port Models

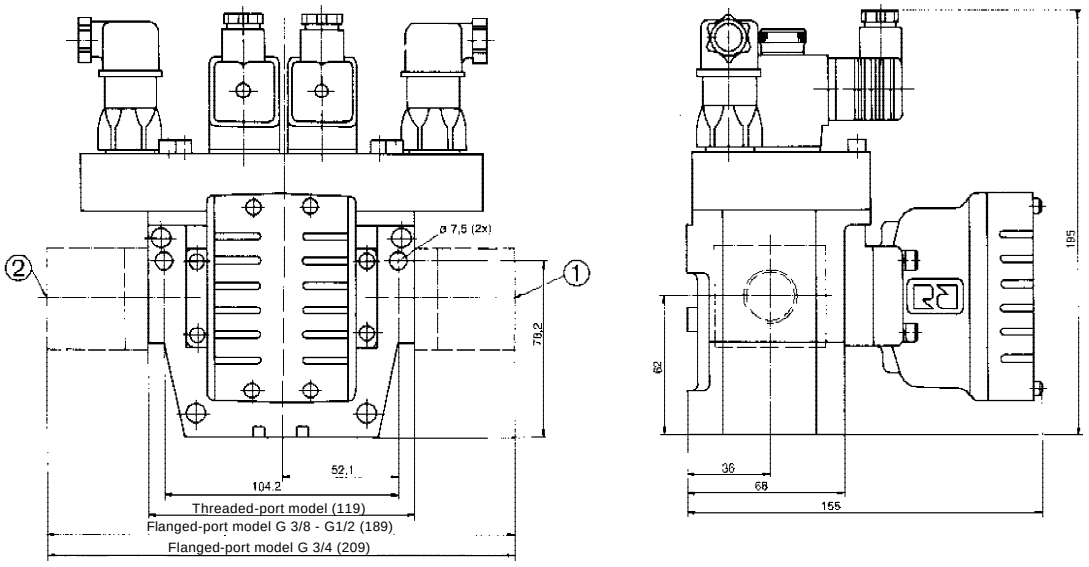
Size	In Out	Model No. Valve Body Assembly
8	G 1/2	D341C78
	G 3/4	D342C78
12	G 3/4	D320C78
	G 1	D321C78

Chart 2
Flange Model Numbers

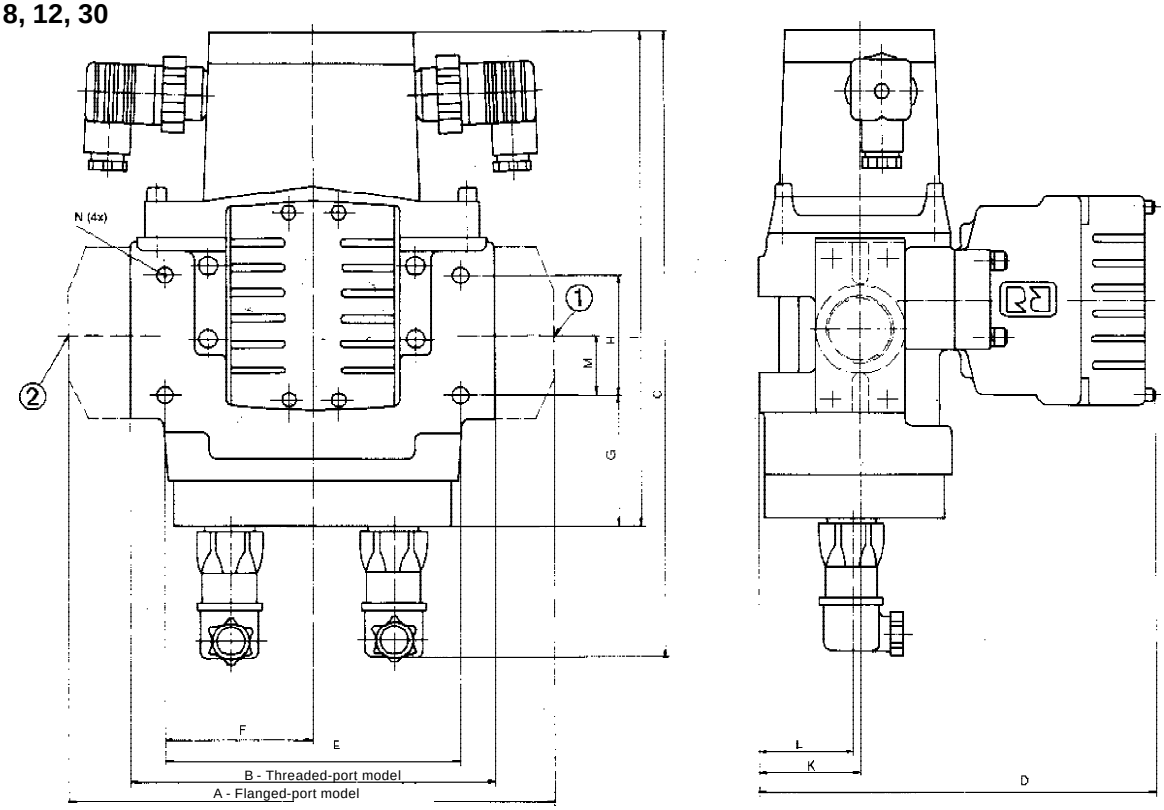
Flange	Size 8	Size 12	Size 30
G 1/2	D712B25	-	-
G 3/4	D713B25	D675B25	-
G 1	D729B25	D676B25	-
G 1-1/4	-	D677B25	D681B25
G 1-1/2	-	-	D682B25

Sizes **4, 8, 12, 30**	**SERPAR®-Crossflow** **Double Valves with Pressure Switches**	Series **D3500**

Size 4



Sizes 8, 12, 30



Size	① ②	A	B	C	D	E	F	G	H	I	K	L	M	N
8	G 1/2 - 3/4 - 1	224	172	284	184	128	64	55	53	220	46	46	32	7,2
12	G 3/4 - 1 - 1-1/4	230	178	316	219	140	70	65	76	225	42	46	46	8,2
30	G 1-1/4 - 1-1/2	315	-	420	282	218	110	48	150	356	56	52	115	13,5

Series **D3500**	**SERPAR®-Crossflow Double Valves with Pressure Switches**	Sizes **4, 8, 12, 30**

Pressurizing and Exhausting Times

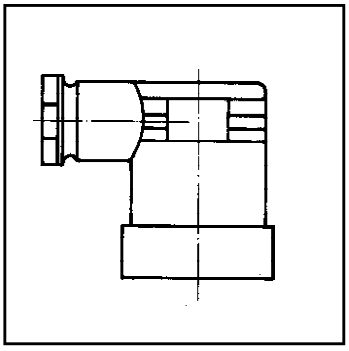
Comparison of Normal (Sides A+B) and Faulted (Side A or B) Pressurizing and Exhausting Times at 7 bar

Valve Type	Average k_v IN | OUT	Average k_v OUT | EXH.*	Flow to	Average Pressurizing and Exhausting Times (Milliseconds)														
				500 cm³			1.200 cm³			1.600 cm³			4.800 cm³			8.000 cm³		
				A+B	A	B	A+B	A	B	A+B	A	B	A+B	A	B	A+B	A	B
CF 4	2,6	5,9*	OUT	33	-	-	63	-	-	85	-	-	-	-	-	-	-	-
			EXH.**	32	45	44	52	75	73	67	98	94	-	-	-	-	-	-
CF 8	3,0	7,8*	OUT	31	-	-	60	-	-	81	-	-	-	-	-	-	-	-
			EXH.**	30	34	32	53	60	57	70	80	75	-	-	-	-	-	-
CF 12	8,2	20,9*	OUT	-	-	-	32	-	-	41	-	-	96	-	-	-	-	-
			EXH.**	-	-	-	26	36	38	32	44	48	72	102	112	-	-	-
CF 30	18,2	48,5*	OUT	-	-	-	-	-	-	42	-	-	65	-	-	89	-	-
			EXH.**	-	-	-	-	-	-	24	35	39	41	66	77	58	96	116

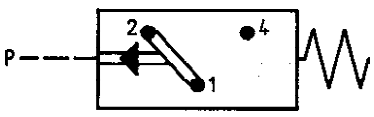
* without Silencer

** The use of surge suppressors in the solenoid circuits may slow down the de-energisation of the solenoid coils and thereby may delay response of the valve elements which may increase exhaust time.

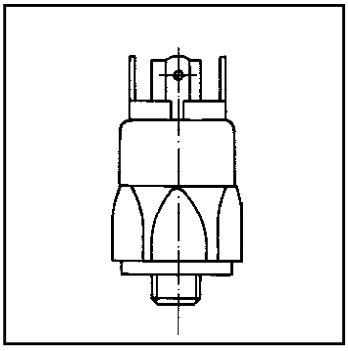
Diaphragm Pressure Switch with Stepless Adjustment



Connector Socket
Model No.: 522E30



SPECIFICATION



Pressure Switch
Model No.: 518E30

Duty: 4 A/250 V~
Protection: IP 65, terminals IP 00
Maximum operation: 200/min.
Temperature range: - 30°C to +100°C
Maximum current: 250 V~
Hysteresis adjustment: 10 to 30% (adjusted at factory)
Mechanical life: 10^6 operations (at pressures up to 50 bar)

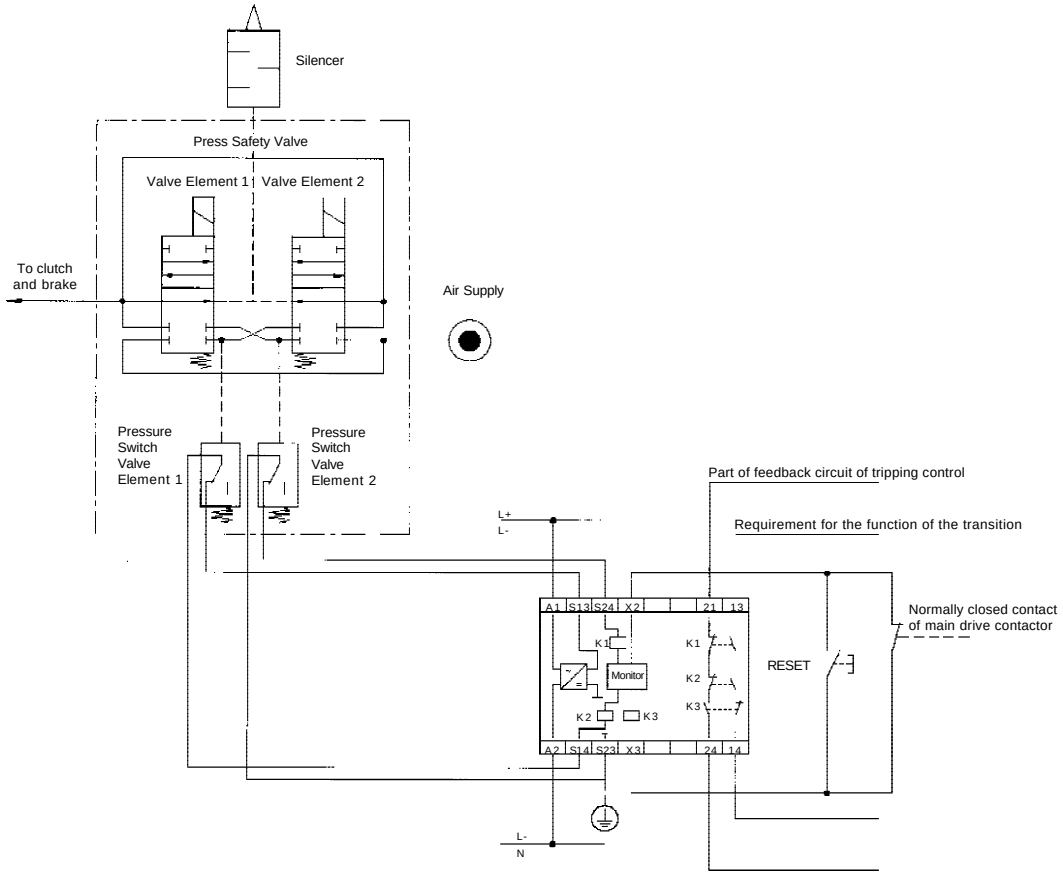
Protection to IP 65:
This type test is not transferable to all universal conditions. Checking the plug connections for suitability is the responsibility of the purchaser and user.

Body material: zinc plated steel (Fe/Zn 12 cB)
Thread: G 1/4
Adjustment: 1,5 bar
Tolerance in bar (at room temp.): ± 0,2
Over-pressure up to bar*: 100
Diaphragm compatibility: Air, hydraulic-oil, engine-oil etc.

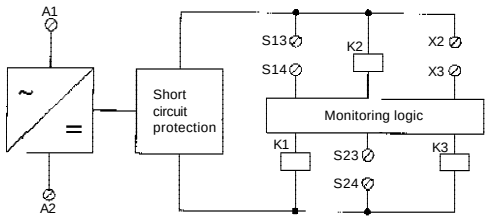
*Over-pressure safety levels refer to the hydraulic or pneumatic part of the pressure switch

Please read carefully and thoroughly all of the **CAUTIONS** on pages 2, 3 and 11.

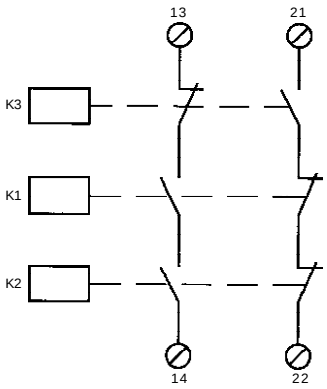
Suggested Connection between AZR 20P2*-Unit and Press Control System



Block Schematic



Connection Diagram



* Consult ROSS for details.

Cautions

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons and/or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do not fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquified petroleum gas, as they can cause bowls to rupture, creating a combustible con dition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked or deteriorated bowl. When the bowl gets dirty, replace it or wipe it with clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum base oils with oxidation inhibitors, and an aniline point between 82°C and 104°C, and viscosity VG 32 according to IOS 3448 (32mm^2/s at 40°C), or higher. Oils with phosphate type additives, such as zinc dithiophosphate, must be avoided because they can harm polyurethane valve components. The best oils to use in pneumatic systems are those specifically compounded for air line lubricator service.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a poppet valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure. *ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.*

DOUBLE VALVES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS L-O-X® and L-O-X®/EEZ-ON® products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

Warranty

Products manufactured by ROSS are warranted by ROSS to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the defective product or refund of the purchase price paid solely at the discretion of ROSS and provided such defective product is returned to ROSS freight prepaid and upon examination by ROSS such product is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering.

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