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Pneumatic Control Unit RP 5340





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Pneumatic control unit (next CU only) RP 5340 is designed for control of additional loading of full-lift spring loaded safety valves (next SV only) type SiZ 1508 and PV 1509, produced by LDM Česka Trebova Co.Ltd., eventually other types of SV equipped with air cylinder. The CU replaces still produced CU RP5330, the main improvement is lower pressure air consumption and more easy opening pressure setting.

CU RP 5340 retains all useful functions of previous type, as possibility to set opening pressure of CU not only during normal working condition of protected vessel but even in case of pressure vessel outage (without pressure inside it), to set opening pressure of SV during normal working condition by using relation between opening pressure and „Lifting“ air pressure, to remote control of SV etc. One control unit can operate two safety valves.

Description

Base of CU RP 5340 is steel frame, to which all equipment is fixed. Also, the CU anchor holes (4x M16) are bored into it. The CU case serves as cover/protection against CU misuse, damage and influence of environment (dust, humidity, ..)

There are three pressure tapping line connections in the lower side of the unit (tube 36x2, steel 1.0570). Connection of pressure air (thread M22x1,5, male), connector with cable for solenoid valve control (230V/50Hz) and connections for lifting and loading air (thread M27x1,5, male) are placed on upper side of the unit.

Permissible ambient temperature for reliable CU operation is in range 0 to +60 degC. Designs for temperatures below 0 degC are offered as option (additional heating unit).

Prior dispatching, the CU is tested and set pressure is adjusted according to the order. This setting is sealed. Weight of CU is 65 kgs approx.

Function of CU

The CU operates connected SV by pressure air (lifting and loading). It increases SV sealing force, when the pressure in protected vessel (1) is lower than the CU set pressure, so the SV tightness and service life are improved. In the moment when the set pressure is reached, the CU releases loading air from SV pneumatic cylinder (3) and, thanks to the lifting air, the SV very quickly reaches full lift opening. When the pressure in protected vessel (1) drops again, the CU rapidly closes the SV and increases the force on the disc.

Pressure air, necessary for operation of CU taken from connection (12) through On-Off valve (13) and reduction valve with filter (14). The pressure is reduced to 4 barg. Through lifting air pipeline (37) is the air supplied below the piston of pneumatic cylinder (3). Control air goes through fine filter (17) and is reduced to 1,4 barg in the reducing valve (16).

Subsequently, it passes through air jets (21) into diaphragm valves (22) and keeps them closed. Thus, the air passing through the orifice (23) and loading air pipeline (38) above the piston of pneumatic cylinder (3) can reach the pressure 4 barg (i.e. the same pressure as lifting air). Because the upper area of piston is bigger than lower, the piston increases spring force on the disc of SV (2) in normal operating condition.

When the pressure in protected vessel (1) reaches the set pressure value, the Bourdon spirals (10) are warped and the control flags (11) are shifted between the air jets (21). It causes the breaking of control air flow into diaphragm valves (22). The valves (22) open and loading air from the space above piston in SV pneumatic cylinder (3) is released into atmosphere. Thanks to it, the SV (2), connected to CU, reaches full lift in very short time (the lifting air acting under the piston in SV pneumatic cylinder (3) increases opening force).

Consequently, when the pressure inside protected vessel falls down, the Bourdon spirals (10) are unwrapped and the control flags (11) leave the space between the air jets (21). The supply of control air into the diaphragm valves (22) is reestablished and the valves close. So, the loading air is supplied into space above piston in SV pneumatic cylinder (3) and the SV (2) closes again.

Demanded Air Quality

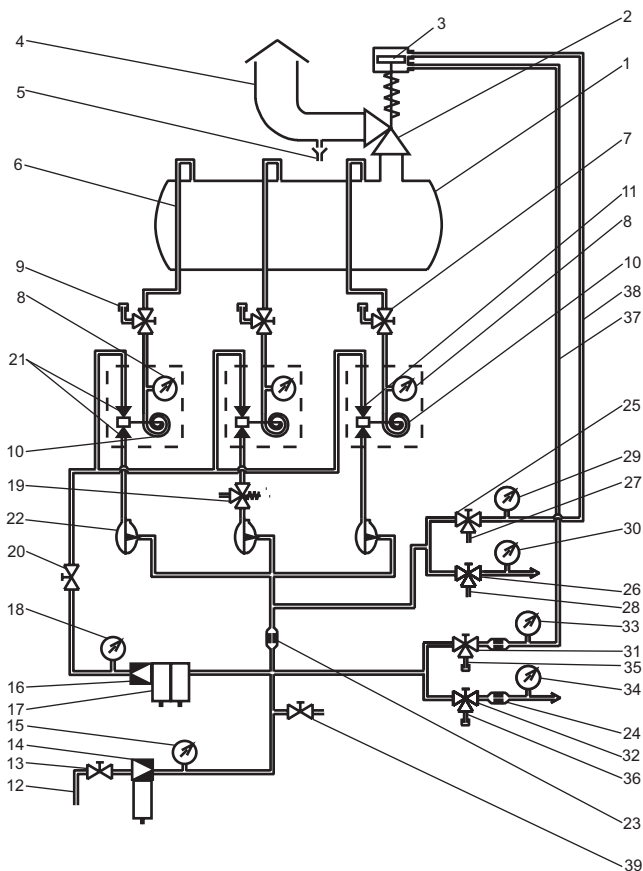
The quality of air, supplied into CU, has to fulfill the demands of ISO 8573-1 standard:

- a) solid particles (dust) class 4 or better (max. size 15 μm , max. quantity 8 mg/m^3)
- b) water class 4 or better (condensation point +3 °C)
- c) oil class 3 or better (max. 1 mg/m^3)

Diagram of RP 5340

HP Circuit

- 1) Protected Vessel
- 2) Safety Valve (SV)
- 4) Outlet Pipeline
- 5) Drainage
- 6) Pressure Taping Line
- 7) 3-way On-Off Valve
- 8) Tapping Line Gauge
- 9) High Pressure External Source Connection
- 10) Bourdon Spiral
- 11) Control Orifice

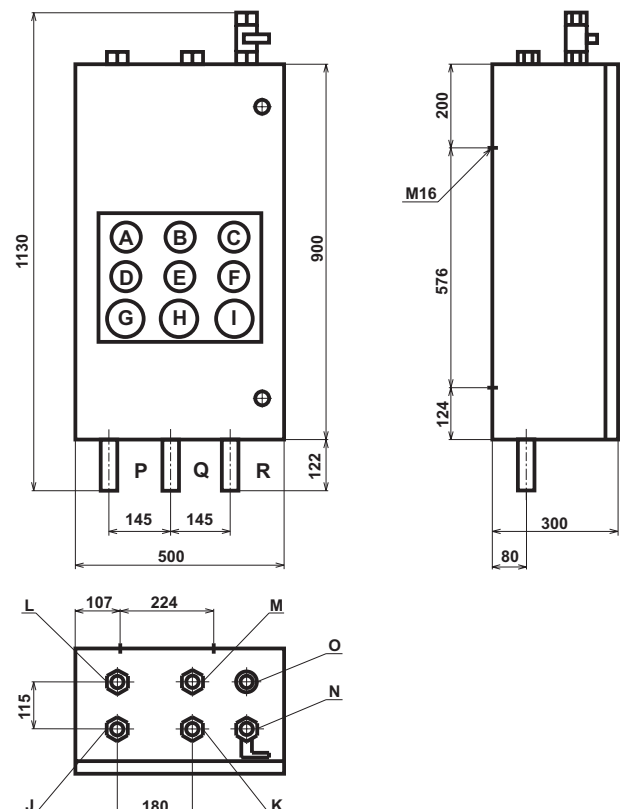


LP Circuit

- 3) SV Pneumatic Cylinder
- 12) Air pressure Connection
- 13) 2-way On-Off Valve
- 14) Main Pressure Reducing Valve (6 4 barg) with Air Filter (5µm)
- 15) Operating Air Pressure Gauge
- 16) Control Air Pressure Reducing Valve (4 1,4 barg)
- 17) Fine Air Filter (0,01µm)
- 18) Control Air Pressure Gauge
- 19) 3-way On-Off Solenoid Valve (SV Remote Control)
- 20) 2-way On-Off Ball Valve
- 21) Air jets
- 22) Diaphragm Valve
- 23) Loading Air Orifice
- 24) Lifting Air Orifice
- 25) Loading Air 3-way On-Off Valve (1st SV)
- 26) Loading Air 3-way On-Off Valve (2nd SV)
- 27) Loading Air Release (1st SV)
- 28) Loading Air Release (2nd SV)
- 29) Loading Air Pressure Gauge (1st SV)
- 30) Loading Air Pressure Gauge (2nd SV)
- 31) Lifting Air 3-way On-Off Valve (1st SV)
- 32) Lifting Air 3-way On-Off Valve (2nd SV)
- 33) Lifting Air Pressure Gauge (1st SV)
- 34) Lifting Air Pressure Gauge (2nd SV)
- 35) Lifting Air Release/External pressure source connection (1st SV)
- 36) Lifting Air Release/External pressure source connection (2nd SV)
- 37) Lifting Air Pipeline
- 38) Loading Air Pipeline
- 39) 2-way On-Off valve (Fine Lift Control, for Safety Valve Setting)

Dimensions, position of fixing points and pipe connection

- | | |
|-------|--|
| A | Lifting Air Pressure Gauge (1 st SV) |
| B | Loading Air Pressure Gauge (1 st SV) |
| C | Operating Air Pressure Gauge |
| D | Lifting Air Pressure Gauge (2 nd SV) |
| E | Loading Air Pressure Gauge (2 nd SV) |
| F | Control Air Pressure Gauge |
| G,H,I | Tapping Line Gauge |
| J,K | Lifting/loading air of 1 st SV (thread M27x1,5) |
| L,M | Lifting/loading air of 2 nd SV (thread M27x1,5) |
| N | Operating air On-Off Valve |
| O | Remote Control connection |
| P,Q,R | Tapping line connection (tube 32x6, material steel 1.0570) |





LDM, spol. s r.o.
Litomyšlská 1378
560 02 Česká Třebová
Czech Republic

tel.: +420 465 502 511
fax: +420 465 533 101
E-mail: sale@ldm.cz
<http://www.ldm.cz>

LDM, spol. s r.o.
Office in Prague
Podolská 50
147 01 Praha 4
Czech Republic

tel.: +420 241 087 360
fax: +420 241 087 192

LDM, spol. s r.o.
Office in Ústí nad Labem
Mezní 4.
400 11 Ústí nad Labem
Czech Republic

tel.: +420 475 650 260
fax: +420 475 650 263

LDM servis, spol. s r.o.
Litomyšlská 1378
560 02 Česká Třebová
Czech Republic

tel.: +420 465 502 411-3
fax: +420 465 531 010
E-mail: servis@ldm.cz

LDM, Polska Sp. z o.o.
Modelarska 12
40 142 Katowice
Poland

tel.: +48 32 730 56 33
fax: +48 32 730 52 33
mobile: +48 601 354 999
E-mail: ldmpolska@ldm.cz

LDM Bratislava s.r.o.
Mierová 151
821 05 Bratislava
Slovakia

tel.: +421 2 43415027-8
fax: +421 2 43415029
E-mail: ldm@ldm.sk
<http://www.ldm.sk>

LDM - Bulgaria - OOD
z. k. Mladost 1
bl. 42, floor 12, app. 57
1784 Sofia
Bulgaria

tel.: +359 2 9746311
fax: +359 2 9746311
GSM: +359 888 925 766
E-mail: ldm.bg@stark-net.net

OOO "LDM Promarmatura"
Moskovskaya street,
h. 21, Office No. 520
141400 Khimki
Russian Federation

tel.: +7 495 777 22 38
fax: +7 495 777 22 38
E-mail: inforus@ldmvalves.com

TOO "LDM"
Lobody 46/2
Office No. 4
100008 Karaganda
Kazakhstan

tel.: +7 7212 566 936
fax: +7 7212 566 936
mobile: +7 701 738 36 79
E-mail: sale@ldm.kz
<http://www.ldm.kz>

LDM Armaturen GmbH
Wupperweg 21
D-51789 Lindlar
Germany

tel.: +49 2266 440333
fax: +49 2266 440372
mobile: +49 177 2960469
E-mail: ldmmaturen@ldmvalves.com
<http://www.ldmvalves.com>

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