

**02 - 07.2**

12.14.GB

**Control unit RP 5330**





# RP 5330

## Control Unit

### Application

Pneumatic control unit RP 5330 is designed for control of spring loaded safety valves with additional pneumatic loading (pneumatic actuator), type SiZ 1508 and PV 1509, manufactured by LDM Co. Ltd., Česká Třebová, respective for control of other types of safety valves operated with pneumatic cylinder (B&R, Sempell, etc.). It's more than equal replacement of old unit type SiZ 5320. Regarding the same mechanical main parts (coil springs, control flags, air nozzles, ..), the reliability and accuracy in hard working conditions were preserved. Moreover, the RP 5330 offers new, for the operator very important, functions. For example possibility to set value of opening pressure of control unit during boiler out of operation, possibility to set opening pressure of safety valve according to curve of relation between opening pressure and lifting air pressure (K line).

### Description

Base of control unit is robust steel frame, to which all parts are fastened. Four anchor holes (thread M16) are bored into it, for fixing the unit on the wall, boiler steel construction etc. Steel case serves only as a cover, to protect the internal parts again the damage, nonauthorised manipulation and influence of environment (dust, humidity, ..).

There are three tapping line connections in the lower side of the unit (tube 33,7x5 / (32x6), material 1.0425/1.0426/1.7335 (1.0577)). At the upper side of control unit, connection of pressure air (thread M22x1.5 male), cable for solenoid valve control (230V/50Hz) and two connections for lifting and loading air (thread M27x1.5 male) are placed. Pressure air must be delivered continually to the control unit. The cable serves as connection for manual remote control by the boiler operator or for connection between the control unit and the boiler control system. It allows to check the function of control unit and the safety valves too, or to put automatic control above adjusted opening pressure of control unit. Through lifting and loading air connections is the control unit linked with safety valves air cylinder.

Standard admissible ambient temperature is from 0°C to 60°C, higher temperature as option. Design with heating for temperature below 0°C can be asked as option too.

Prior the expedition from production plant, the control unit is adjusted to the opening pressure given in the order. This setting is sealed.

Weight of the control unit is approximately 80 kg.

### Operation

The control unit operates connected safety valves by pressure air (lifting and loading). It increases the sealing force on the plug before the opening overpressure is reached. Better valve tightness and long service life is provided by this way. Then, after the adjusted opening overpressure is reached, control unit opens the valve to full lift instantly. When the pressure drops again, the control unit rapidly closes the valve and increases the pressing force on the plug. One control unit can operate max. two safety valves.

Pressure air necessary for operation of control unit is extracted from pressure air line (12) through shut-off valve (13), filter (14) and main pressure reduction valve (15). Pressure is reduced to 0,4 MPa.

One part of pressure air (lifting air) is then supplied through the lifting air pipeline (37) below the piston of pressure air cylinder (3). The control air reduction valve (17) serves to reduce the air pressure to 60 kPa and this, low pressure control air is then supplied to the air nozzles (21). Until the control flags (11) of coil springs (10) brake the air flow between the nozzles, the control air is supplied into three diaphragm valves (22) and keeps them closed. So, the loading air passing through the nozzle (23) fills the space above the piston of pressure air cylinder (3) and its pressure reaches the 0.4 MPa value (i.e. the same pressure as lifting air). Differential piston of pressure air cylinder (3) has a larger effective area in the closing direction and so, in the normal state, the piston acts with additional sealing force to the plug of safety valve (2).

When the pressure in protected device is increased above the adjusted value of the control unit opening overpressure, the coil springs (10) are deformed and their control flags (11) get the position between air nozzles (21). Flow of control air is interrupted, which causes a pressure relief in diaphragm valves (22). Diaphragm valves open and loading air from the space above the piston of air pressure cylinder (3) blows off into atmosphere. As a result of it, the safety valves (2) open to full lift in a very short time because the lifting air acting on the lower side of the piston of air pressure cylinder (3) increases the opening force.

Opening of the safety valves (2) causes pressure drop in the protected device. Subsequently, the coil springs (10) move contrary and control flags (11) protrude back from the spot between the air nozzles (21). Flow of control air is re-created, which causes increasing of air pressure in diaphragm valves (22). The supply of loading air above the piston of air pressure cylinder (3) is restored, which causes rapid closing of safety valve (2).

### Requirements for air quality

**Pressure air quality must meet ISO 8573-1 standard :**

- a) Class of dust particles 4 or better  
(i.e. particle max. size 15 µm, concentration max. 8 mg/m<sup>3</sup>)
- b) Class of water 4 or better  
(i.e. condensation point max. +3°C)
- c) Class of oil 3 or better (i.e. concentration max 1mg/m<sup>3</sup>)

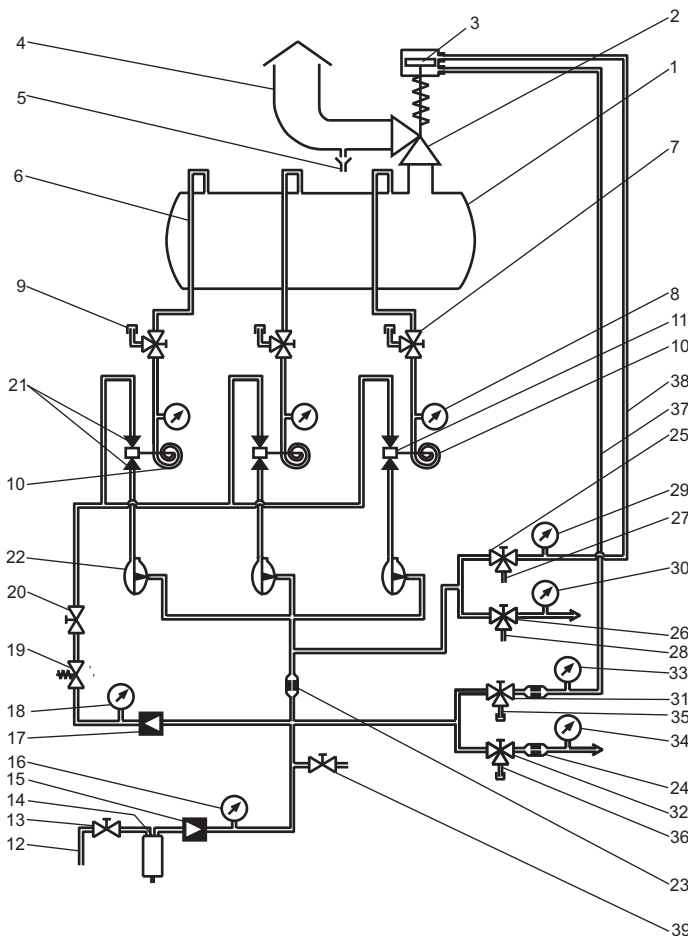
## Functional chart of RP 5330 control unit

### HP part:

1. Protected appliance
2. Safety valve (SV)
3. Piston of pneumatic actuator
4. Blow-off piping
5. Drain pipe
6. Pressure tapping line
7. Three way shut-off valve
8. Tapping line pressure gauge
9. Connection of independent pressure source
10. Coil springs
11. Control flag

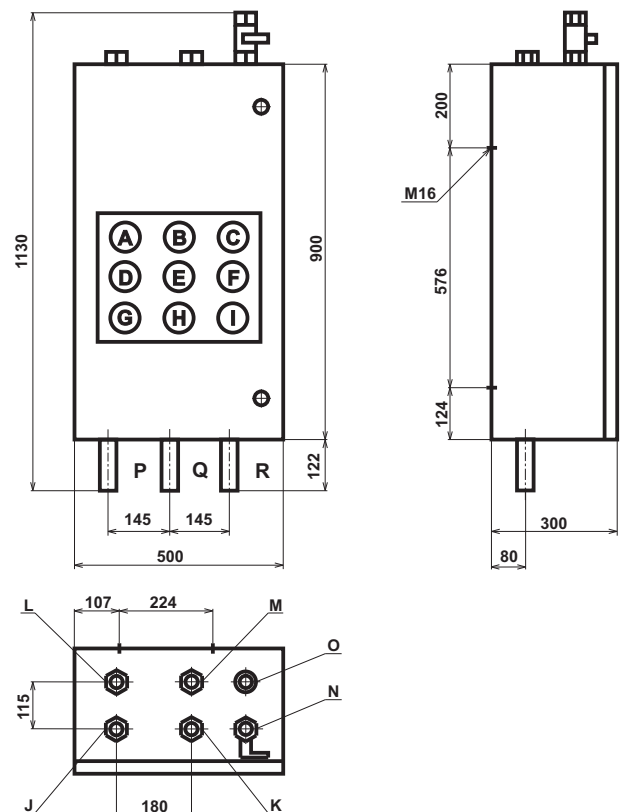
### NT part:

12. Pressure air line
13. Shut-off valve
14. Filter
15. Main pressure reduction valve (6 - 4 barg)
16. Operating air pressure gauge
17. Control air reduction valve (4 - 0.6 barg)
18. Control air pressure gauge
19. Solenoid valve
20. Shut-off valve
21. Air nozzle
22. Diaphragm valve
23. Loading air orifice
24. Lifting air orifice
25. Loading air Three way shut-off valve - 1<sup>st</sup> SV
26. Loading air Three way shut-off valve - 2<sup>nd</sup> SV
27. Loading air discharge - 1<sup>st</sup> SV
28. Loading air discharge - 2<sup>nd</sup> SV
29. Loading air pressure gauge - 1<sup>st</sup> SV
30. Loading air pressure gauge - 2<sup>nd</sup> SV
31. Lifting air Three way shut-off valve - 1<sup>st</sup> SV
32. Lifting air Three way shut-off valve - 2<sup>nd</sup> SV
33. Lifting air pressure gauge - 1<sup>st</sup> SV
34. Lifting air pressure gauge - 2<sup>nd</sup> SV
35. Lifting air external source connection - 1<sup>st</sup> SV
36. Lifting air external source connection - 2<sup>nd</sup> SV
37. Lifting air piping
38. Loading air piping
39. Shut-off control valve (K-linie)



### Main dimensions

- |       |   |
|-------|---|
| A     | Lifting air pressure gauge - 1 <sup>st</sup> SV       |
| B     | Loading air pressure gauge - 1 <sup>st</sup> SV       |
| C     | Operating air pressure gauge                          |
| D     | Lifting air pressure gauge - 2 <sup>nd</sup> SV       |
| E     | Loading air pressure gauge - 2 <sup>nd</sup> SV       |
| F     | Control air pressure gauge                            |
| G     | 1 <sup>st</sup> tapping line pressure gauge           |
| H     | 2 <sup>nd</sup> SV tapping line pressure gauge        |
| I     | 3 <sup>rd</sup> tapping line pressure gauge           |
| J,K   | Air connection to 1 <sup>st</sup> SV (thread M27x1.5) |
| L,M   | Air connection to 2 <sup>nd</sup> SV (thread M27x1.5) |
| N     | Shut-off valve (thread M22x1.5)                       |
| O     | Remote control connection                             |
| P,Q,R | Tapping lines connection                              |





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