RCP 30, 31: P+PI cascade controller

How energy efficiency is improved
Enables the implementation of individually optimised controls for maximum efficiency in pneumatic installations.

Areas of application
Room-temperature control (P) with supply-air temperature as auxiliary control loop (PI) in ventilation and air-conditioning equipment. Pneumatic control of temperature, pressure, differential pressure, humidity and flow rate in combination with appropriate transducers.

Features
- P+PI cascade controller
- P+PI cascade schedule controller
- Controllers can be used universally for the most varied of applications
- Housing, rack and front doors made of thermoplastic
- Suitable for wall or panel mounting
- Functional description and commissioning help inserted in front door
- Front panel with adjusters and 3 covered recesses for plug-in pressure gauge (XMP) making commissioning easier
- Setpoint adjuster XS adjustable manually with scales for all Centair measuring ranges
- All settings very easy to make with a coin and % scale
- M4 measuring connections, control action adjustable (delivered with control action B)
- Compressed-air connections Rp 1/8" female thread
- Complies with directive 97/23/EC Art. 3.3 on pressure equipment

Technical description
- Supply pressure 1.3 bar ± 0.1
- Easily accessible adjusters for XS (setpoint), X P4 (P range), Tn (reset time), E (influence) and FF (schedule start point)
- Inputs for:
  - remote setpoint adjustment
  - main controlled variable
  - auxiliary controlled variable
  - command variable
- Outputs for:
  - output pressure for dampers or actuator

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Air capacity</th>
<th>Air consumption 1)</th>
<th>Weight</th>
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<tr>
<td>RCP 30 F001</td>
<td>fixed-value controller, P+PI</td>
<td>400</td>
<td>70</td>
<td>0,7</td>
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<tr>
<td>RCP 31 F001</td>
<td>fixed-value + schedule controller, P+PI</td>
<td>400</td>
<td>90</td>
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</table>

RCP 30:
- Setpoint XS 0...100%
- Remote adjust. of setpoint 0...100%
- P-band XP3, XP4 0...100%
- Reset time Tn 1...15 min
- Zero point 0...100%
- Limiter B 0...100%

RCP 31:
- Setpoint XS 0...100%
- Remote adjustment of setpoint 0...100%
- P-band XP3, XP4 0...100%
- Reset time Tn 1...15 min
- Zero point 0...100%
- Limiter B 0...100%
- Shift starting point FF 0...100%
- Influence E 0,25...3

Supply pressure 2) 1,3 bar ± 0,1
Input pressures 0,2...1,0 bar
Output pressures 0,2...1,0 bar
Permissible amb. temp. 0...55 °C

Connection diagram, RCP 30 A02688
Connection diagram, RCP 31 A02689
Dimension drawing M297100
Fitting instructions MV 3246

Accessories
0297103 000 Additional bag of scales with 8 different scales according to the transducer used.
0297133 000 Universal scales for setpoint adjuster XS; gradation 120, 80/160, 50/100, 30/60

1) Without transducer; air consumption for transducer connections 3 and 4 is 33 ln/h more in each case.
2) See Section 60 on regulations concerning the quality of supply air, especially at low ambient temperatures.
Operation
RCP 30 and RCP 31
The transducer at connection 3 converts the control variable into the pneumatic standard signal 0.2...1.0 bar (equivalent to 0...100%) within its measuring range. This actual-value signal $x_i3$ is compared with the fixed setpoint $X_s$.

Depending on the P-band $X_{P3}$, the control deviation is amplified by a P-controller (master), limited by limiter B to a (variable) minimum value, and then fed as the command variable to a PI-controller (slave). When the actual value is equal to the setpoint ($x_i3 = X_s$), the PI-controller controls to the value zero = 50%, i.e. to a value that is 50% of the transducer range at connection 4.

With a pressure of 0.2...1.0 bar at input 6, the setpoint can be set remotely from 0...100%. The internal setpoint setting then functions as a minimum limitation.

A restrictor (Ø 0.2 mm) for supplying the transducer is fitted at connections 3 and 4. The signals from the transducer and the output pressure can be checked via the M4 measuring connection or shown via the manometer.

RCP 31: additional functions
The transducer at connection 5 converts the command variable (e.g. outside temperature) into the pneumatic standard signal 0.2...1.0 bar (equivalent to 0...100%). This signal ($x_i5$) is fed to the command circuit which, together with the setting parameters FF and E, creates a program for the setpoint shift of the following P-controller (master). The characteristic for the influence E can be placed in any of the four quadrants.

Because the outside temperature is often fed to more than one controller, the transducer at connection 5 must be supplied by a separate (Ø 0.2 mm) restrictor.

Additional details
RCP 30: Front plate with adjusters for setpoint ($X_s$), P-bands ($X_{P3}$, $X_{P4}$), zero, reset time ($T_r$) and minimum limitation (B).
RCP 31: Front plate with adjusters for setpoint, P-bands, ($X_{P3}$, $X_{P4}$), zero, reset time, minimum limitation, influence (E) and shift starting point (FF).

Additional information on accessories
0297103 000  Additional bag of eight alternative scales
- 5...35 °C  20...90 %rh
- 20...40 °C  0...5 mbar
- 0...120 °C  5...10 mbar
- 80...200 °C  10...15 mbar

Technical information
Technical manual: centair system  304991 003

Dimension drawing
### Connection diagrams

**RCP 30**

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<p>| | | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>p</td>
<td>P</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>1.3 bar</td>
<td>Master</td>
<td>B (A)</td>
<td>A02688a</td>
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<tr>
<td>0.2...1 bar</td>
<td>0.2...1 bar</td>
<td>0.2...1 bar</td>
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Example: Supply-air/return-air cascade

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**RCP 31**

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<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>A (B)</td>
<td>FF, E</td>
<td>B (A)</td>
<td>A02688a</td>
</tr>
<tr>
<td>Ø0.2 mm</td>
<td>Master</td>
<td>B (A)</td>
<td>A02688a</td>
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<tr>
<td>0.2...1 bar</td>
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Example: Supply-air/return-air cascade

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<tbody>
<tr>
<td>1</td>
<td>Supply pressure</td>
<td>T_n</td>
</tr>
<tr>
<td>2</td>
<td>Output pressure</td>
<td>X_s</td>
</tr>
<tr>
<td>3</td>
<td>Actual value for P-controller</td>
<td>X_p3</td>
</tr>
<tr>
<td>4</td>
<td>Actual value for PI-controller</td>
<td>X_p4</td>
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<tr>
<td>5</td>
<td>Command variable for</td>
<td>zero</td>
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<tr>
<td>fixed-value + schedule</td>
<td>FF</td>
<td>Shift starting point for</td>
</tr>
<tr>
<td>6</td>
<td>Remote setpoint adjustment</td>
<td>FF</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>Influence</td>
</tr>
</tbody>
</table>

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1. Supply pressure
2. Output pressure
3. Actual value for P-controller
4. Actual value for PI-controller
5. Command variable for fixed-value + schedule
6. Remote setpoint adjustment

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- B: Limiter
- X_s: Main control variable
- X_p: Secondary control variable
- X_x: Command variable
- y: Output pressure
- S1: Control action for fixed-value + schedule
- S2: Control action for controller

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N.B.: A comma between cardinal numbers denotes a decimal point

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