DATA SHEET

**T 7521 EN**

# Type 3423 Pneumatic Controller Module

for Type 7311 Air Control System

**Application**

Controller module for installation in the Type 7311 Air Control System · PI control loop

The Type 3423 Controller Module is designed for input and output signals of 0.2 to 1.0 bar and for a supply pressure of 1.4 bar.

The controller module is designed for installation in the Type 7311 Air Control System (see Data Sheet ▶ T 3992). The connectors of the controller module are plugged into the self-sealing sockets of the Type 3426. The controller module is held in place by a fastening screw.

**Version**

The controller module has a comparing element that operates according to the motion-balance method with four metal bellows arranged in a square and anchored by springs.

**Type 3423-2** (Fig. 1) · Controller module for PI control action

The proportional-action coefficient Kp, reset time Tn, direction of action and the controller zero are adjustable.

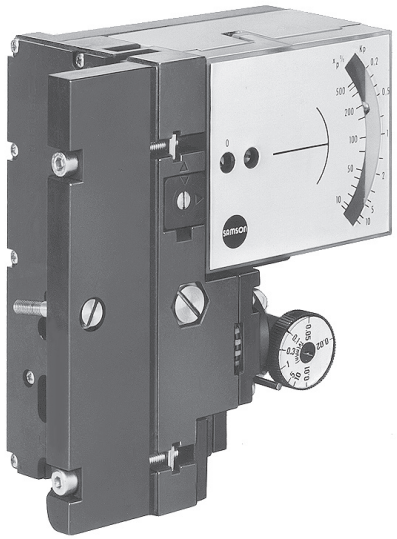

**Fig. 1:** *Type 3423-2 PI Controller Module*

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**Principle of operation**

**Type 3423-2 PI Controller Module** (Fig. 2 and Fig. 3)

The controlled variable x and the reference variable w are transferred as gauge pressures between 0.2 and 1 bar/3 and 15 psi over turnboard A to the metal bellows (5) and (7). When x exceeds w, the controlled variable bellows (7) tilts the taut-ban-suspended swashplate (1) around the pivot (2) towards the set point bellows (5). As a result, the nozzle (9) comes closer to the flapper plate (10). The pressure in the nozzle increases, causing the signal pressure $Y_A$ produced by the booster (16) to increase, which is fed back without delay to the bellows R2 (8) over the turnboard B and with delay to the bellows R1 (6) through the external connection R and the Tn restrictor (18). The position of the swashplate and the output pressure $y_A$ keep changing until the distance between nozzle and flapper reaches the output value and the output pressure $y_A$ assumes a value corresponding to the controlled variable x and the adjusted proportional-action coefficient Kp (i.e. until the system deviation is eliminated).

The proportional-action coefficient is adjusted at the screw (14), while the reset time Tn is adjusted at the restrictor (18). Zero adjustment (13) is used to calibrate the controller module. In the delivered state, the turnboard B is adjusted to $y_A$, i.e. the signal pressure $y_A$ is fed back directly to the bellows R2, and to the bellows R1 through the connection R. In this arrangement, the controller provides standard air delivery and output pressure damping. As a result, the function to supply additional air volume usually needed under extraordinary service conditions (such as especially short signal transmission distances and small connected air volume) does not come into force. Switching the turnboard B to position R is useful for a large connected air volume, for fast control loops, and if the control signal must cover a long transmission distance. In this arrangement, the signal pressure $y_A$ is fed back to the bellows R1 and R2 through the connection R. This ensures that the controller has a good air delivery characteristic for these applications.

Fig. 3 shows the schematic drawing of the PI controller module shown in Fig. 2. The direction of action, i.e. the output pressure increases or decreases when the controlled variable increases, is selected at the turnboard A.

Whenever a switching pressure is applied to the connection S in the manual mode, the Tn start-up relay (19) changes over. It opens the bypass to the Tn restrictor (18), and hence causes uniform pressure feedback to the bellows R1 and R2.

| Symbols for schematic diagrams | |
|---|---|
| Supply air | Booster |
| Exhaust | Turnboard |
| Fixed restriction | Adjuster |
| Adjustable restrictor | Start-up relay |

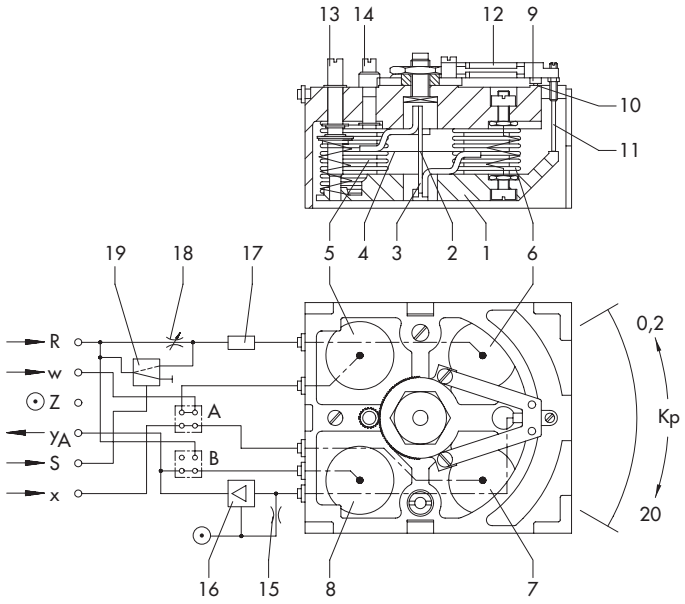


**Fig. 2:** *Type 3423-2 PI Controller Module*

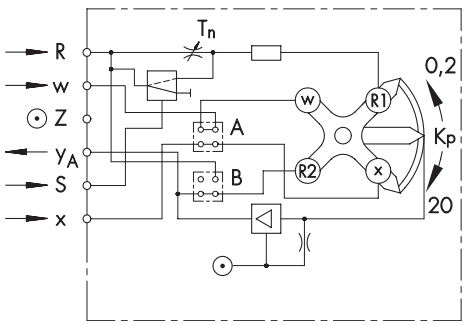


**Fig. 3:** *Schematic diagram of Type 3423-2 PI Controller Module*

**Legend**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| w | Reference variable (set point) | 1 | Swashplate | 8 | Feedback bellows R2 | 16 | Booster |
| x | Controlled variable (actual value) | 2 | Fulcrum | 9 | Nozzle | 17 | Volume |
| $y_A$ | Manipulated variable | 3 | Pin (suspension) | 10 | Flapper plate | 18 | $T_n$ restrictor |
| R | Feedback to bellows R1 | 4 | Taut band (suspension) | 11 | Pin | 19 | $T_n$ start-up relay |
| S | Switching pressure | 5 | Set point bellows (w) | 12 | Spring bearings | A | Turnboard for direction of action |
| | | 6 | Feedback bellows R1 | 13 | Zero adjustment | B | Turnboard for feedback function |
| | | 7 | Controlled variable bellows (x) | 14 | Adjuster for $K_p$ | | |
| | | | | 15 | Restrictor | | |

**Table 1:** *Technical data · All specified pressures in bar (gauge)*

| **Controller module** | **Type 3423-2** |
|---|---|
| Controller action | PI |
| Control parameters | Proportional-action coefficient Kp = 0.2 to 20<br>Reset time Tn = 0.03 to 50 min. |
| Input | 0.2 to 1.0 bar |
| Output | 0.2 to 1.0 bar · Max. 0.02 to 1.35 bar · Max. air delivery >1.5 $m_n^3/h$<br>Air output capacity when adjusted to 'yA': approx. 1 $m_n^3/h$ per % of the system deviation<br>When adjusted to 'R': approx. 3 $m_n^3/h$ per % of the system deviation |
| Supply | 1.4 bar supply air |
| Air consumption in steady state $m_n^3/h$ | < 0.05 |
| Alignment offset | < 0.5 % |
| Tracking error | < 0.5 % |
| Dead band | < 0.01 % |
| Effect of supply air at 1.4 ±0.1 bar | < ± 0.1 % |
| Effect of temperature/°C | < 0.01 % |
| Permissible ambient temperature range | –20 to +60 °C |
| Weight, approx. | 0.6 kg |