Series 430
Type 3430 Pneumatic Indicating Controller for Pressure
Type 3432 Controller Station
Type 3435 Transmitter Module

Application

Pressure controller for process engineering and industrial applications for liquids, gases and vapors · Set point ranges from 0 to 1.6 bar through 0 to 40 bar

Ex certified CE

The controller directly measures the pressure of the process medium, compares the measured variable to the set point and produces a pneumatic control signal of 0.2 to 1.0 bar (3 to 15 psi). The required supply pressure of 1.4 bar (20 psi) or an operating supply pressure from 2.0 to 12 bar (30 to 180 psi). The controllers consist of a controller station, a controller module with the required control mode and a transmitter module corresponding to the pressure set point.

Special features

- Controller and control valve form a unit to directly measure the pressure to be controlled which is easy to service and low in price.
- Set point, controlled variable, system deviation and output pressure are visible at a glance; all required adjusters and switches can be operated on the front panel.
- Can be equipped with modules for P, PI, PID or PD control modes and additional modules for special control tasks.
- Housing suitable for wall, pipe and panel mounting (front frame 192 x 228 mm), optionally with lockable door of transparent plastic (IP 65).

Versions

Type 3430 Indicating Pressure for Pressure consisting of a Type 3432 Controller Station, a control-specific Type 3433 or Type 3434 Controller Module and a Type 3435 Transmitter Module.

Controller station for use as ...

Fixed set point controller (Fig. 1 and Fig. 2) · With bourdon tube measuring unit for set point range between 0 to 1.6 bar through 0 to 40 bar

Follower controller · Same as fixed set point controller, but with additional input for external reference variable w_{ext} = 0.2 to 1 bar, 3 to 15 psi, 0/4 to 20 mA · Without set point adjuster

Fixed set point and follower controller · Combination of fixed set point and follower controller, with w_{int}/w_{ext} selector switch to change between internal and external reference variable

Can optionally be equipped with one or two adjustable inductive limit switches and/or supply pressure regulator for operating air pressures of 2.0 to 12 bar.
Controller stations with i/p converters and limit switches are available in type of protection Ex ia IIC.

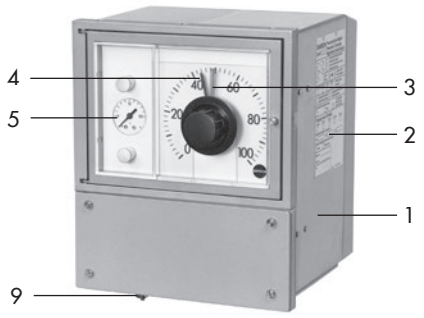


Fig. 1: *Fixed set point controller for pressure with Type 3432-01 Controller Station*

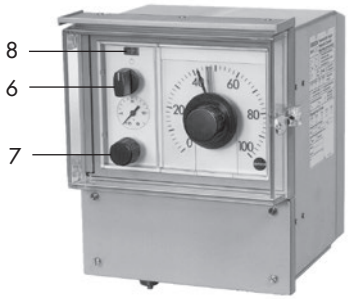


Fig. 2: *Fixed set point controller for pressure with Type 3432-02 Controller Station and lockable door*

1 Controller station
2 Label
3 Set point adjuster with set point display (w)
4 Controlled variable display
5 Output signal display (y)
6 Manual/automatic switch
7 Adjuster for manual mode
8 Differential pressure indication for bumpless manual/automatic switchover
9 Pressure connection

Principle of operation (see Fig. 3 and Fig. 4)

The Series 430 Pneumatic Controllers with their modular design can be used in all kinds of automation applications.

The pressure controllers consist of a Type 3432 Controller Station (as the basic module) with a Type 3433 or Type 3434 Controller Module with the required control mode and a Type 3435 Transmitter Module.

The pressure p of the process medium is fed to the transmitter module (2) where it creates a movement at the bourdon tube measuring system (2.1). The servo system (2.2) converts this movement into a pneumatic signal (controlled variable x), which is proportional to the pressure p. This signal is fed to the bellows measuring system of the controlled variable display (1.3) and the controller module (3).

The controller station shown in Fig. 3 (fixed set point controller) includes a scale (1.2), controlled variable display (1.3), set point adjuster (1.4) and plug-in connections for a controller module (3). These pneumatic connections are self-sealing when the module is unplugged. The controlled variable signal x produces a deflection on the bellows measuring system of the controlled variable display (1.3) which is transmitted to the pointer over a gear mechanism. The set point (reference variable w) can be adjusted on a scale (1.2) at the controller front. The position of the set point adjuster is transmitted to the set point calibrator (1.4) over a gear mechanism. This servo system (2.2) converts the adjusted set point into a pneumatic set point signal (w), which is fed to the controller module. The controller module compares the controlled variable signal and the set point signal (x and w) and produces an output signal y_A based on the system deviation and the adjusted control parameters.The output signal is connected to the output signal display (1.5) and output port y.

The controller station (Fig. 4) largely corresponds to the one shown in Fig. 3. However, it additionally contains a manual/automatic switch (1.6), adjuster for manual mode (1.7) and differential pressure indication (1.8). When the switch is in the AUTOMATIC position , the output signal display (1.5) and output port y are connected to the automatic output signal y_A. In MANUAL, the output signal display and output port y are connected to the manual output signal y_H set at the adjuster (1.7). A bumpless transfer from manual to automatic mode is possible when y_A and y_H are the same on the differential pressure indication.

The follower controllers (not shown) have an additional pneumatic or electric input for the external reference variable w_{ext} (at input w_{ext} = 0/4 to 20 mA with integrated i/p converter). Details on the i/p converter in Data Sheet ▶ T 7045.

The controller stations can be equipped with suitable controller modules, e.g. Type 3434 for common P or PI pressure control, Type 3433 for P, PI, PID and PD control and additional modules for special control tasks. Details on controller and additional modules in Data Sheets ▶ T 7040 and ▶ T 7041.

The controllers stations can optionally be equipped with one or two inductive limit switches adjustable on the scale.

They are also available with supply pressure regulator (Fig. 4, below). This allows the device to be used with operating air pressures from 2.0 to 12 bar. The additional supply pressure regulator reduces the operating air pressure (p_B) to the required supply pressure (p_Z) of 1.4 bar or 20 psi. The operating principle of this supply pressure regulator is similar to that of Type 3708-5003 described in Data Sheet ▶ T 8545.

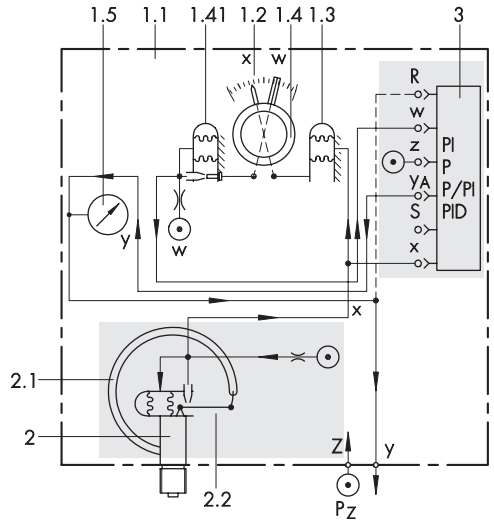
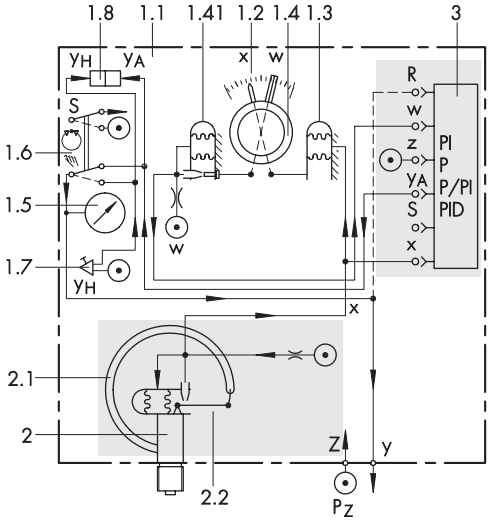


Fig. 3: *Schematic drawing of fixed set point controller for pressure with Type 3432-01 Controller Station*



Version with supply pressure regulator (1.9):

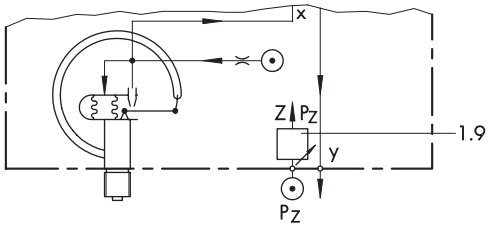


Fig. 4: *Schematic drawing of fixed set point controller for pressure with Type 3432-02 Controller Station*

1 **Controller station**
1.1 Housing with door
1.2 Dial plate
1.3 Controlled variable display with pointer, gear mechanism and bellows measuring system
1.4 Set point adjuster with pointer, gear mechanism and set point calibrator (1.41); follower controllers: set point display only
1.5 Signal pressure gauges
1.6 Manual/automatic switch
1.7 Adjuster for manual mode
1.8 Differential pressure indication for bumpless manual/automatic switchover
1.9 Supply pressure regulator

2 Transmitter module for pressure
2.1 Bourdon tube
2.2 Pneumatic servo system

3 Controller station

Table 1: *Technical data*

Type 3435 Transmitter Module										
Measuring range (set point range) in bar		0 to 1.6 · 0 to 2.5 · 0 to 4.0 · 0 to 6.0 · 0 to 10 · 0 to 16 · 0 to 25 · 0 to 40								
Overloadable up to ...		1.25 times the upper measuring range value								
Ultimate strength up to		Twice the upper measuring range value (max. 63 bar at 0 to 40 bar)								
Characteristic		Deviation from terminal-based conformity: ≤0.3 % Hysteresis: ≤0.5 % · Dead band: ≤0.1 %								
	Influence in %	Ambient temperature: ≤ 0.04 %/°C · Supply air: ≤0.25 %/0.1 bar Overload up to permissible value: <1 %								
Max. process medium temperature		60 °C								
Type 3432 Controller Station										
Controlled variable display		Measuring range 0.2 to 1.0 bar (3 to 15 psi) · Accuracy class 1.6 · Scale length 212 mm								
Set point adjustment [1]		Output 0.2 to 1.0 bar (3 to 15 psi) · Scale length 212 mm · Accuracy class 1.6								
Adjuster for manual mode		Output 0.2 to 1.0 bar (3 to 15 psi) · Max. 0.02 to 1.35 bar · Max. air delivery > 1.5 m_n^3/h								
Inductive limit switches		1 or 2 SC 3,5-NO-YE proximity switches acc. to DIN EN 60947-5-6, Ex II 2 G Ex ia IIC T6								
Input w_{ext} for follower controllers		0.2 to 1 bar · 3 to 15 psi · 0/4 to 20 mA								
i/p converter for w_{ext} [2] (Type 6112 with/without explosion protection Ex i)		Input 0/4 to 20 mA (R_i = 200 Ω ±7.5 % at 20 °C/max. 250 Ω at 60 °C)								
Can be equipped with ...										
Controller module [3]	**Type**	**3434-1**	**3434-2**	**3433-1**	**3433-2**	**3433-3**	**3433-4**	**3433-5**	**3433-6**	**3433-9**
	Controller action	P	PI	P	PI [4]	PID [4]	PD	P/PI	PD/PID	P [5]
	Proportional-action coefficient K_P	1 to 20		0.2 to 20 (0.4 to 40 on request)						
	Reset time T_n	–	0.05 to 20 min	0.03 to 50 min						
	Derivative-action time T_V	–	–	0.01 to 10 min · Derivative-action gain of x: ≈10						
Optionally with additional modules [3]	**Type**	–		**3437-1** [6] Signal limiter		**3437-2** [6] Control mode selector switch		**3437-3** [6] Bumpless manual/ automatic switchover		
Output		0.2 to 1 bar (3 to 15 psi) · Max. 0.02 to 1.35 bar								
Supply air	Standard version	Supply air 1.4 ±0.1 bar (20 ±1.5 psi) · Air consumption <0.6 m_n^3/h								
	Version with Type 3708-5003 Supply Pressure Regulator	Operating air 2.0 to 12 bar (30 to 180 psi) · Air consumption < 0.75 m_n^3/h								
	Version with i/p converter	w_{ext}: +0.13 m_n^3/h								
Air quality acc. to ISO 8573-1		Maximum particle size and density: Class 3 · Oil content: Class 2 · Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected								
Permissible ambient temperature		–20 to +60 °C (–40 to 60 °C on request)								
Degree of protection		IP 40 · Front panel with optional door: IP 65								
Pressure Equipment Directive		2014/68/EU, Article 4.3 (sound engineering practice)								
Total weight (approx.)		6 kg								
Materials										
Housing		Die-cast aluminum, plastic-coated								
Bourdon tube, process fluid connection		CrNiMo steel 1.4404 (316L)								

1) Version with follower controller: only set point display with 212 mm scale
2) ▶ T 7045
3) ▶ T 7040 and ▶ T 7041
4) Optionally with feedback limitation
5) With set-point-dependent operating point
6) No longer available

Table 2: *Controller station versions*

Controller station Type 3432-	01	02	03	04	05	06
Fixed set point controller	•	•				
Follower controller			•	•		
Fixed set point and follower controller					•	•
Equipped with ...						
Set point adjuster	•	•			•	•
Set point reading	•	•	•	•	•	•
Controlled variable and output signal display	•	•	•	•	•	•
Manual/automatic switch		•		•		•
Manual adjuster and differential pressure indication		•		•		•
w_{int}/w_{ext} selector switch					•	•
Transmitter module	•	•	•	•	•	•
Controller module – Type 3433-... [1]		•		•		•		•		•		•
Controller module – Type 3434-...	•		•		•		•		•		•	
Input wext – 0.2 to 1 bar					•	•	•	•	•	•	•	•
Input wext – 0/4 to 20 mA						•		•		•		•
i/p converter for wext						•		•		•		•
Can additionally be equipped with ...												
1 or 2 inductive limit switches	•	•	•	•	•	•	•	•	•	•	•	•
Type 3708-5003 Supply Pressure Regulator	•	•	•	•	•	•	•	•	•	•	•	•
Door IP 65, with conductive coating	•	•	•	•	•	•	•	•	•	•	•	•

[1] Optionally with additional module

Temperature decoupling · Type 3435 Transmitter Module

For the measurement of steam, the Type 3435 Transmitter Module must be used together with a siphon filled with water before start-up to decouple the temperature.
For the measurement of liquids and gases above 60 °C, use a siphon to decouple the temperature or install a correspondingly long capillary tube.
To decouple the temperature, a diaphragm seal can be mounted onto the Type 3435 Transmitter Module.

Use in hazardous areas

The Type 3430 Controller is suitable for use in hazardous areas of Zone 1 and 2 without its own EC-type examination certificate. A EC-type examination certificate according to 2014/34/EU (ATEX Directive) is not required for the controller. Mounted explosion-protected modules have their own EC-type examination certificate.

Pressure measurement of flammable process media

For pressure measurements of flammable process media falling into explosion groups IIA, IIB and IIC, install type-approved flame arresters into the measuring line.

Version with diaphragm seal

A diaphragm seal is used to separate the process medium and the transmitter's pressure measuring element.
A capillary tube is used to connect the diaphragm seal to the pressure measuring element (bourdon tube) of the Type 3435 Transmitter Module. The inside space between the diaphragm seal and pressure measuring element is filled with a pressure-transmitting fluid (fill fluid). The elastic diaphragm and fill fluid transmit the medium pressure to the bourdon tube.

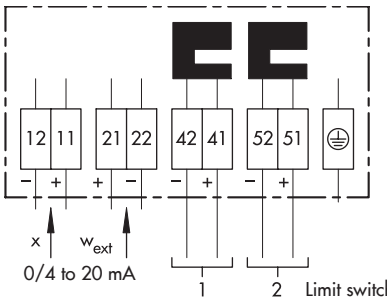
▶ See page 6 for the technical data and dimensional drawing

Electrical connection

When additionally equipped with i/p converter for w_{ext} and/or inductive limit switches.

Terminals for 0.5 to 1.5 mm² wires.

Connect suitable switching amplifiers into the output circuit to operate inductive limit switches.



Connect suitable switching amplifiers into the output circuit to operate inductive limit switches.

Fig. 5: *Terminal assignment*

Ordering text

- Type 3430 Pneumatic Indicating Controller for Pressure
- Type 3432-... Controller Station
- Type 3435 Transmitter Module
  Measuring range 0 to 1.6, 2.5, 4.0, 6.0, 10, 16, 25, 40 bar
- Type 3434-... or Type 3433-... Controller Module
- Input w_{ext} for follower controllers:
  0.2 to 1 bar, 3 to 15 psi, 4 to 20 mA, 0 to 20 mA
- Options:
  - Lockable, transparent door
  - Supply pressure regulator
  - 1 or 2 inductive limit switches

Dimensions in mm

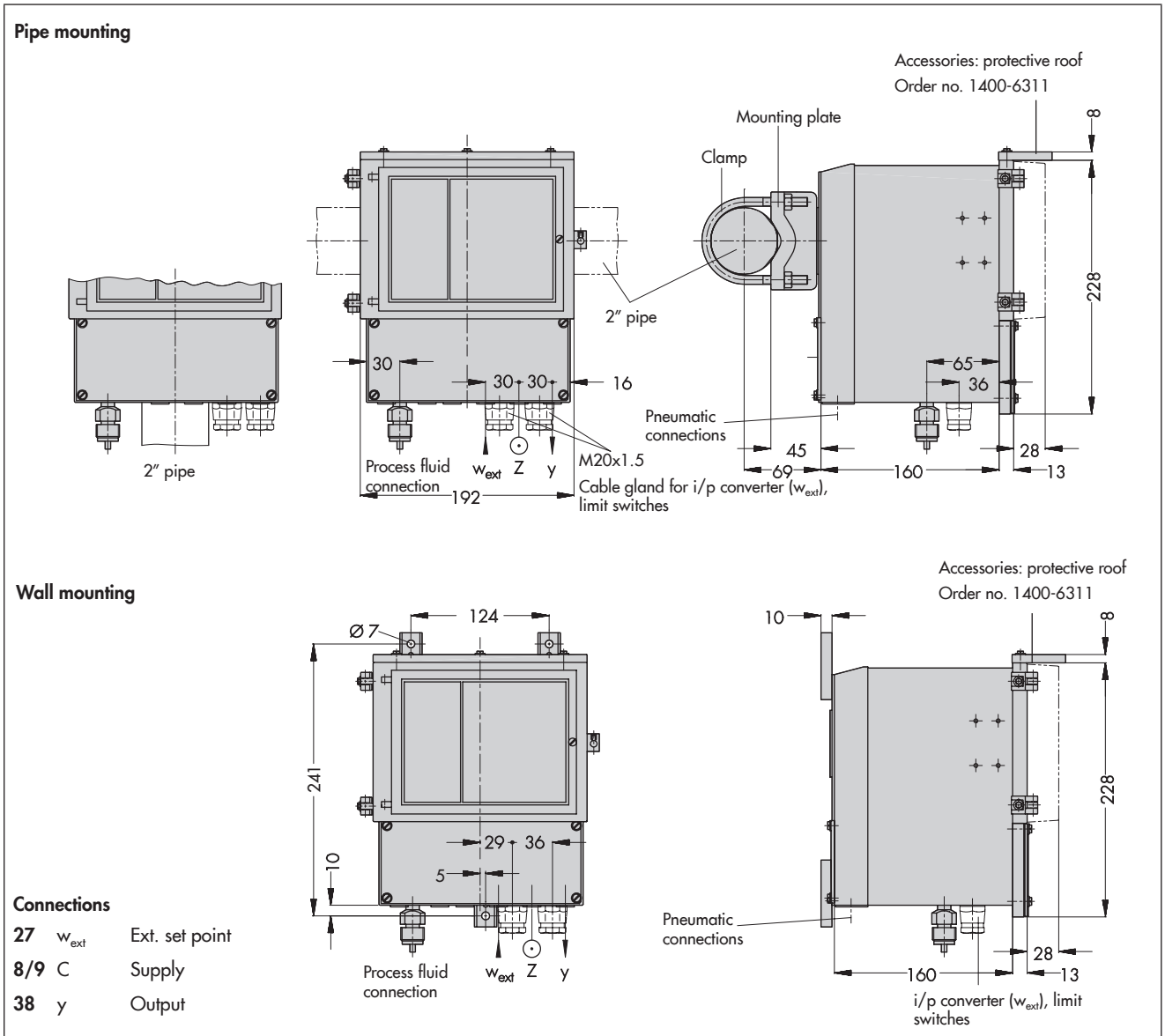


Fig. 6: *Dimensions of Type 3432 Controller Station · Pipe and wall mounting*

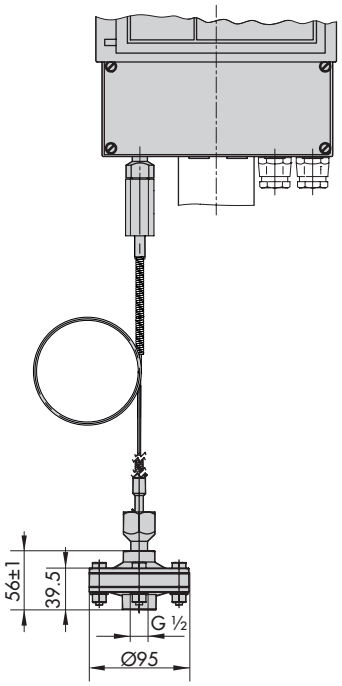
Installation and connections
The following mounting positions are possible (see Fig. 6):

Pipe mounting	With mounting part and clamp for attachment to a vertical or horizontal 2″ pipe · Order no. 1400-6302
Wall mounting	With three brackets for attachment to a wall · Order no. 1400-6301
Panel mounting	With four DIN 43835 fastening elements for attachment to the control panel · Cut-out for panel mounting 188^{+1} x 255^{+1} mm · Distance between center lines with door approx. 235 mm · Close-to-close arrangement in rows (without door) according to DIN 43700 · Order no. 1400-6300
Mounting position	Controller station mounted in the upright position
Pneumatic connections (output and supply air)	Tapped holes G ⅛ according to DIN EN ISO 228-1
Process fluid connection	Connection nipple G ½ according to DIN EN ISO 228-1

Table 3: *Technical data of diaphragm seal*

Diaphragm seal		
Construction	Top and bottom sections fastened together, inside diaphragm	
Process fluid connection	G ½ female thread	
Pressure rating	PN 100	
Top section material	CrNiMo steel 1.4404 (316L)	
Material of wetted components		
Bottom section with process fluid connection	CrNiMo steel 1.4404 (316L)	Titanium 3.7035
Diaphragm	CrNiMo steel 1.4435 (316L)	Titanium 3.7035
Gasket	PTFE	
Fill fluid	Silicone oil AK 50	
Mounting	Using a capillary tube: 2 m long, CrNiMo steel	
Temperature range of medium	–35 to +150 °C	
Weight	4.5 kg	

Dimensions in mm



Specifications subject to change without notice

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