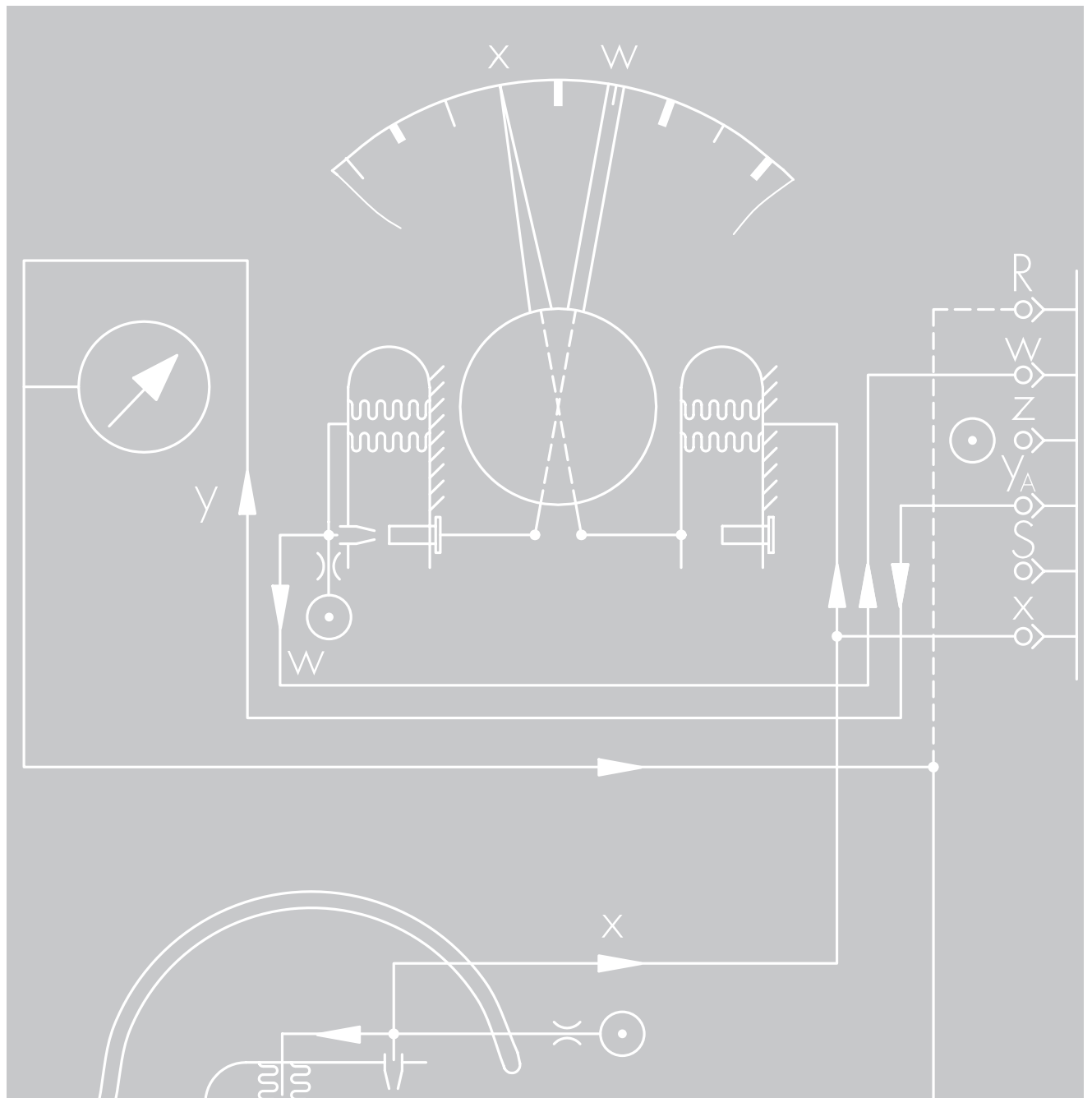


Equipment for Pressure · Temperature · Standard Signals



## Series 430 Pneumatic Indicating Controllers

Pneumatic indicating controllers are used for the automation of process and industrial plants. The controllers measure directly the controlled variable (pressure, temperature, electric or pneumatic standard signal), compare the measured value with the set point and issue a pneumatic control signal of 0.2 to 1 bar (3 to 15 psi). A supply pressure of 1.4 bar  $\pm$  0.1 bar (20 psi  $\pm$  1.5 psi) or an operating pressure of 2 to 12 bar (30 to 180 psi) is required.

The modular controllers represent a complete automation package consisting of a controller station, a controller module suitable for the respective task, and, if necessary, a transmitter module as well as other additional equipment. Thus, only one indicating controller and one control valve are needed to set up a pressure or a temperature control loop.


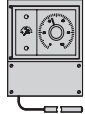

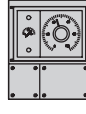










- Can be equipped with transmitter modules for pressure or temperature (capillary tube sensor or Pt 100 sensor)
- Controller for standard signals with input of 0.2 to 1 bar, 3 to 15 psi, 4 to 20 mA or 0 to 20 mA
- Suitable for fixed set point, follow-up or cascade control
- Set point, actual value, system deviation and signal pressure are visible at a glance. All adjusters and switches can be operated from the front
- Can be equipped with controller modules for P, PI, PID or PD control and additional modules for special control tasks
- Housing for wall mounting, pipe mounting and panel mounting (front frame 192 x 144 mm or 192 x 228 mm)

All pressures are stated in bar (gauge) unless specified otherwise.

**Table 1 · Instrumentation with Type 3430 Pneumatic Indicating Controllers**

Pressure control	Temperature control		Control using standard signal	
	Pneumatic instrumentation	Electropneumatic instrumentation	Pneumatic instrumentation	Electropneumatic instrumentation
<b>A Fixed set point control</b>				
<b>B Follow-up control</b>				
<b>C Cascade control</b>				
<ol style="list-style-type: none"> <li>1 Type 3432 Controller Station with transmitter module</li> <li>2 Type 3431 or Type 3432 Controller Station without transmitter module</li> <li>3 Transmitter module for pressure or temperature</li> <li>4 i/p converter for external reference variable <math>w_{ext}</math></li> <li>5 i/p converter or converter module for controlled variable <math>x</math></li> <li>6 Manual/automatic switch</li> <li>7 Pneumatic transmitter</li> <li>8 Electric transmitter</li> </ol>				

**Table 1 · Overview of pneumatic measuring and control equipment <sup>1)</sup>**

Controllers for ...	Pressure		Temperature				Standard signals			
			Capillary tube sensor		Pt 100 sensor					
Details in Data Sheet	T 7032 EN		T 7034 EN		T 7036EN		T 7038EN			
With <b>Transmitter Module</b>	<b>3435</b>		<b>3436</b>		<b>3438</b>		- <b>6112</b>			
For set point ranges (input)	0 to 40 bar		-40 to 300 °C		-30 to 300 °C		0.2 to 1 bar (3 to 15 psi) 4(0) to 20 mA			
With <b>Controller Station</b>	3432-01/-06				3432-01/-04		3432-01/-04, 3432-01/-06			
										
<b>Controller station</b>	Assignment of controller version and controller station only according to above table									
Type	3432-...						3431-...			
	01	02	03	04	05	06	01	02	03	04
Fixed set point controller	•	•					•	•		
Follower controller			•	•					•	•
Fixed set point/follower contr.					•	•				
Equipped with:										
Set point adjuster	•	•			•	•	•	•		
Set point display	•	•	•	•	•	•	•	•	•	•
Measured value and signal pressure display	•	•	•	•	•	•	•	•	•	•
Manual/automatic switch		•		•		•		•		•
Manual adjuster and differential pressure display		•		•		•		•		•
Selector switch $w_{int}/w_{ext}$					•	•				
Controller module	3433-...	•	•	•	•	•	•	•	•	•
	3434-...	•	•	•	•	•	•	•	•	•
Input x <sup>2)</sup>	0.2-1 bar	•	•	•	•	•	•	•	•	•
	4(0)-20 mA	•	•	•	•	•	•	•	•	•
i/p converter for x	•	•	•	•	•	•	•	•	•	•
Input $w_{ext}$	0.2-1 bar			•	•	•	•	•	•	•
	4(0)-20 mA			•	•	•	•	•	•	•
i/p converter for $w_{ext}$			•	•	•	•			•	•
Additional options										
1 or 2 inductive limit switches	•	•	•	•	•	•	•	•	•	•
3708-5003 Supply Pressure Reg.	•	•	•	•	•	•				
With <b>controller module</b>	Type	3433-1	3433-2	3433-3	3433-4	3433-5	3433-6	3433-9	3434-1	3434-2
	Controller function	P	PI	PID	PD	P/PI	PD/PID	P, set point dep.	P	PI
Combinable with Type 3437 Additional Modules										
Optionally with additional module	Type	3437-1 signal limiter			3437-2 contr. mode changeover		3437-3 bumpless transfer		-	
Function										
Details in Data Sheet		T 7040 EN						T 7041 EN		
Output of the controller		0.2 to 1 bar (3 to 15 psi)								
<b>Valves</b>	Series	<b>240</b>			<b>250</b>			<b>280</b>	<b>230</b>	
	Max. DN · Max. PN	DN 150 · PN 40			DN 500 · PN 400				DN 1000 · PN 16	
Suitable for	Industrial requirements			High industrial requirements				General applications		
<b>Type</b>		3241 · 3244 · 3248 · 3345 · 3347 · 3510			3251 · 3253 · 3254 · 3255 · 3256 · 3258			3281-1 to 3286-1	Butterfly valves	
Pneumatic control valves with globe, three-way, or angle valves, with steam-converting valves or butterfly valves and the associated positioners and limit switches. Refer to Information Sheet T 8000-1/-2 EN and the associated data sheets for more details.										

<sup>1)</sup> See page 8 for details on Type 301-1 Temperature controller with extension bulb sensor · <sup>2)</sup> Only controllers for standard signals

## Type 3430 Pneumatic Indicating Controllers

Type 3431 Controller Station (front frame 192 x 144 mm)



Type 3432 Controller Station (front frame 192 x 228 mm)



### Option

Controller module:

- Type 3433-1 (P controller)
- Type 3433-2 (PI controller)
- Type 3433-3 (PID controller)
- Type 3433-4 (PD controller)
- Type 3433-5 (P/PI controller)
- Type 3433-6 (PD/PID controller)
- Type 3433-9 (P controller, set point dependent)
- Type 3434-1 (cost-effective P controller)
- Type 3434-2 (cost-effective PI controller)

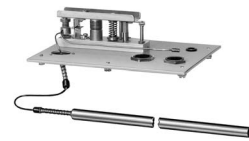


### Additional options

Type 3435 Transmitter Module for pressure



Type 3436 Transmitter Module for temperature with capillary tube sensor



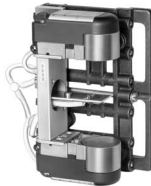
Type 3438 Transmitter Module for temperature with Pt 100 sensor



Type 3433-1/-9 Controller Module and additional module:  
 Type 3437-1 (signal limiter)  
 Type 3437-2 (control mode changeover)  
 Type 3437-3 (bumpless manual/auto transfer)



Type 6112 i/p Converter Module for controlled variable  $x$  and/or external reference variable  $w_{ext}$  (only with Type 3433 Controller Module)



Limit switches for controlled variable  $x$

Type 3708 Supply Pressure Regulator for supply air pressure from 2 to 12 bar



Fig. 1 · Overview of indicating pneumatic controllers

The controllers shown are suitable for any industrial process.

### Special features

- Set point, actual value and system deviation are clearly indicated on a scale (scale length 212 mm).
- All adjusters, switches and indicators required in manual/automatic mode are located in the front panel.
- Suitable for processes requiring, for example, a P, PI, PD or PID controller, bumpless manual/automatic transfer, control mode changeover or signal limitation, fixed set point control, follow-up control or cascade control.
- Additional monitoring and control equipment using limit switches.

The controllers can be equipped with transmitter modules for pressure and temperature (capillary tube sensor or Pt 100 sensor). With these versions, only one indicating controller and one pneumatic control valve are needed to set up a fixed set point or follow-up control loop.

Versions without transmitter module are standard controllers for connection of an external transmitter. Apart from pressure and temperature control, these controllers are also suitable for differential pressure, flow and other control variables. The controllers are available with:

- Input 0.2 to 1.0 bar or 3 to 15 psi
- Input 4 to 20 mA, 0 to 20 mA or 1 to 5 mA when an i/p converter is used

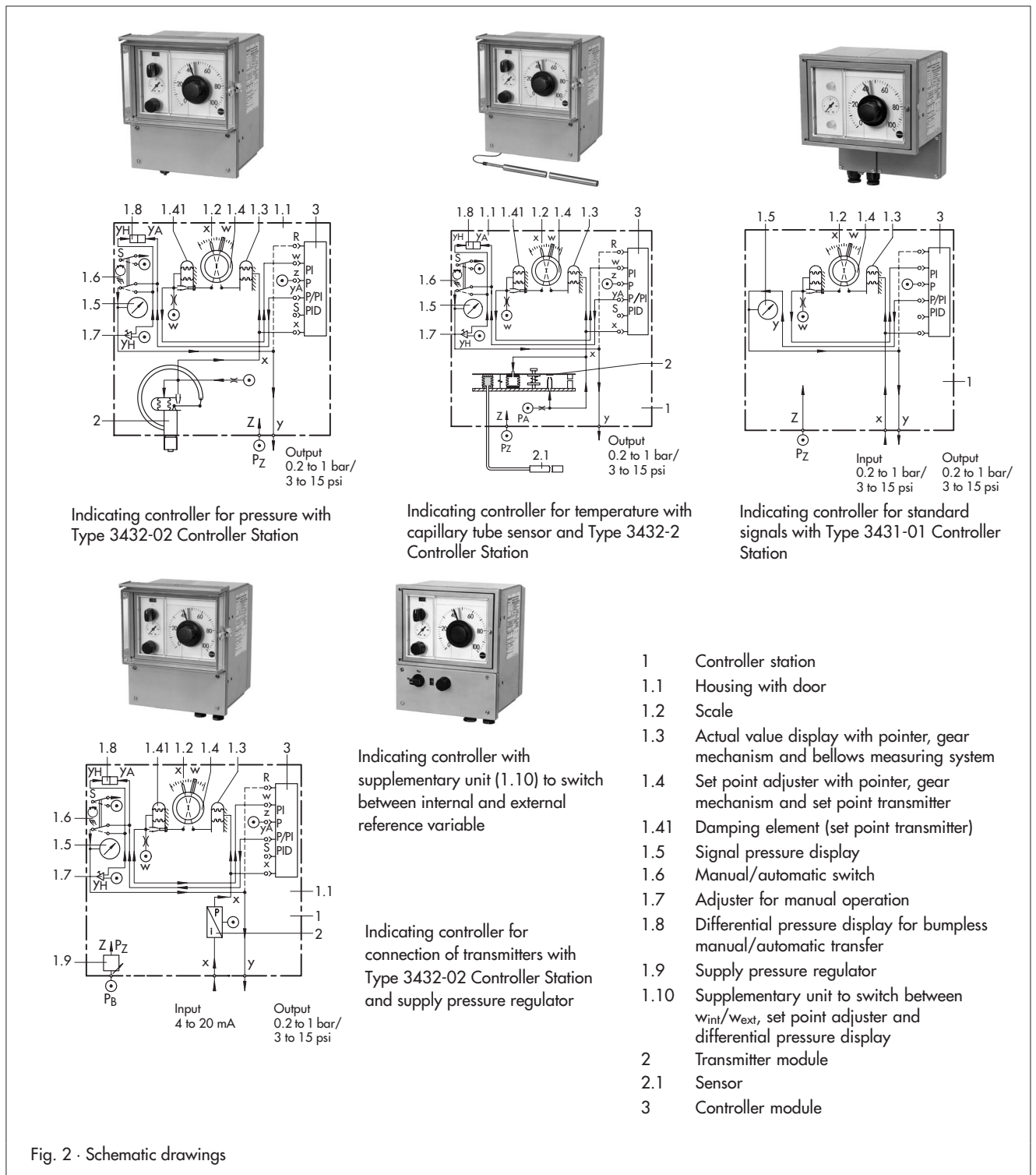


Fig. 2 · Schematic drawings

### Versions of Type 3430 Controllers

The **Type 3431 Controller Station** for controllers with standard signal consists of:

Housing with set point adjuster · Measured value and signal pressure display · Optional M/A switch · Adjuster for manual operation and differential pressure display · Versions for fixed set point or follow-up control with Type 3434 or Type 3433 Controller Module · Optional Type 3437 Additional Module for special control tasks · Optional Type 6112 i/p Converter Module for controlled variable · Follower controllers also for external reference variable  $w_{ext}$  · Optional inductive limit

switches · Limit switches and i/p converter optionally in type of protection EEx ia II C.

The **Type 3432 Controller Station** largely corresponds to the Type 3431. However, it can additionally be equipped with:

Transmitter module for pressure (Type 3435) or temperature (Type 3436, Type 3438), or electropneumatic transmitter · Optional supply pressure regulator or supplementary unit to switch between  $w_{int}$  and  $w_{ext}$ .

All controller stations are optionally available with a transparent plastic door that can be locked (IP 65).

## Transmitter modules · Electropneumatic converters · Supplementary units

The transmitter modules to measure variables in industrial and processing plants are designed for mounting in the Type 3432 Controller Station.

**Type 3435 Transmitter Module for pressure** with bourdon tube measuring element for set point ranges 0 and 1.6 and 0 to 40 bar; suitable for liquids, gases and vapors. All versions with bourdon tube are made of stainless steel (1.4571).

For details, see Data Sheet T 7032 EN.

**Type 3436 Transmitter Module for temperature** with **capillary tube sensor** for measuring ranges from  $-40$  to  $300$  °C. Thermowell versions made of stainless steel (1.4571) for pressures up to 16 bar, optionally with thermowells up to PN 100.

For details, see Data Sheet T 7034 EN.

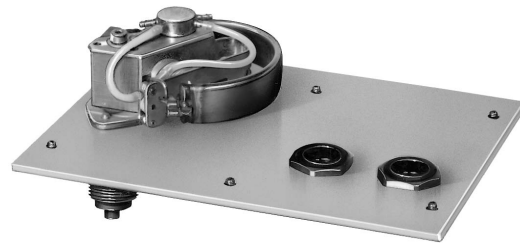
**Type 3438 Transmitter Module for temperature** for connection of a **Pt 100 resistance thermometer** for measuring ranges from  $-30$  to  $400$  °C. The module consists of an electric two-wire transmitter and a downstream i/p converter.

The **Type 6112 i/p Converter Modules** are used to convert current signals from 4 (0) to 20 mA into a pneumatic standard signal from 0.2 to 1 bar (3 to 15 psi). Follower controllers can be equipped with a converter for the external reference variable  $w_{ext}$ ; controllers for standard signals can be equipped with an additional converter for the controlled variable  $x$ . Optionally, the converters are available with an input circuit in type of protection EEx ia IIC.

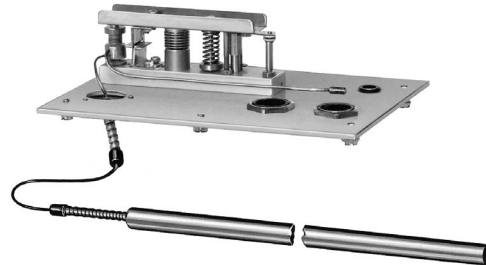
For details, see Data Sheet T 7045 EN.

If required, versions with Type 3432 Controller Stations can be equipped with a **Type 3708-5003 Supply Pressure Regulator**. Such versions are suitable for operating pressures from 2.0 to 12 bar. The additional supply pressure regulator reduces and controls the operating pressure, ensuring that the required supply pressure ( $p_z$ ) of 1.4 bar or 20 psi is reached.

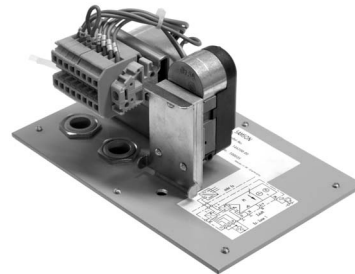
For details on the Type 3708 Supply Pressure Regulator, see Data Sheet T 8545 EN.



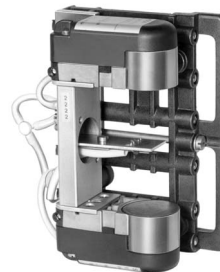
Type 3435 Transmitter Module for pressure mounted on base plate of Type 3432 Controller Station



Type 3436 Transmitter Module for temperature with capillary tube sensor



Type 3438 Transmitter Module for temperature with Pt 100 sensor



Type 6112 i/p Converter Module



Type 3708-5003 Supply Pressure Regulator

Fig. 3 · Transmitter module, i/p converter module and supply pressure regulator

## Controller modules · Additional modules

The **controller modules** are plug-in units designed for mounting in the Types 3431 and 3432 Controller Stations. The connectors of the controller modules are plugged into the self-sealing sockets of the controller station and held by a fastening screw.

The **Type 3433 Controller Modules** have a comparing element that operates according to the motion-balance method with four metal bellows arranged in a square. The proportional-action coefficient  $K_p$  can be mechanically adjusted. Standard version:  $K_p = 0.2$  to  $20$ , special version:  $K_p = 0.4$  to  $40$ .

The **Type 3433-2 PI Controller Module**<sup>1)</sup> is equipped with a  $T_n$  restrictor for reset times of 0.03 to 50 min.

The **Type 3433-1 P Controller Module** largely corresponds to the Type 3433-2, except that an operating point adjuster replaces the integral element.

The **Type 3433-3 PID Controller Module**<sup>1)</sup> corresponds to the Type 3433-2, the **Type 3433-4 PD Controller Module** corresponds to the Type 3433-1. These modules, by contrast, contain a derivative element producing the rate action in the input branch of the controlled variable  $x$ . The derivative element features a rate gain of approx. 10 and a rate time of 0.01 to 10 min that is adjustable at the  $T_v$  restrictor.

The **Type 3433-5 P/PI Controller Module** with P/PI selector switch can be used as either a P controller with operating point adjuster or a PI controller. The design corresponds to that of the PI and P controller module.

The **Type 3433-6 PD/PID Controller Module** with PD/PID selector can be used as either a PD or a PID controller.

The **Type 3433-9 P Controller Module** with set-point-controlled operating point corresponds to the Type 3433-1 P Controller Module, except that the operating point is shifted proportionally to the set point  $w$ .

The **Types 3437 Additional Modules** can be combined with the Type 3433 Controller Modules.

The **Type 3437-1 Signal Limiter** serves as lower and upper limitation of the controller output signal  $y_A$ , the feedback signal (connection R) or the reference variable  $w$ .

The **Type 3437-2 Control Mode Changer** changes the downstream controller from PI or PID action to P action when the system deviation exceeds the adjusted limit.

The **Type 3437-3 Manual/Automatic Transfer** is used for bumpless switching from manual to automatic operation.

For details, see Data Sheet T 7040 EN.

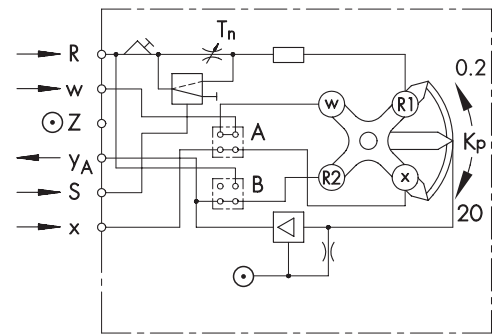
The **Type 3434 Controller Modules** are particularly cost efficient. They feature a box-shaped comparator that operates according to the force-balance method. The proportional-action coefficient  $K_p$  can be adjusted on the restrictor in the range of 1 to 20.

The **Type 3434-2 PI Controller Module** is equipped with a  $T_n$  restrictor for reset times of 0.05 to 20 min.

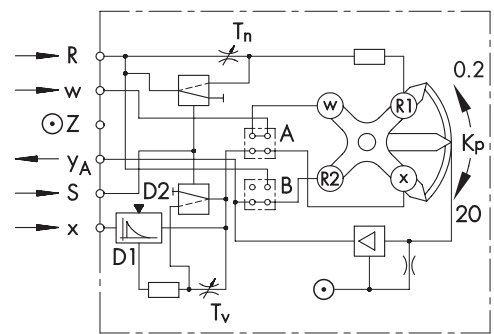
The **Type 3434-1 P Controller Module** largely corresponds to the Type 3434-2 PI Controller Module, except that a fixed operating point adjusted to 0.6 bar replaces the feedback over the  $T_n$  restrictor.

For details, see Data Sheet T 7041 EN.

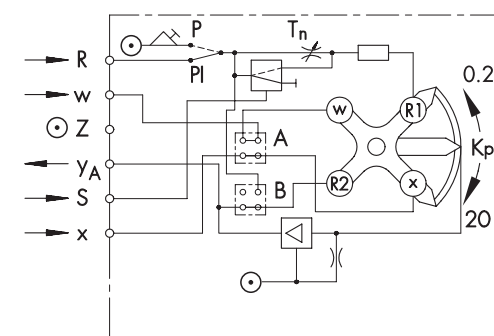
<sup>1)</sup> Optionally with maximum feedback limitation



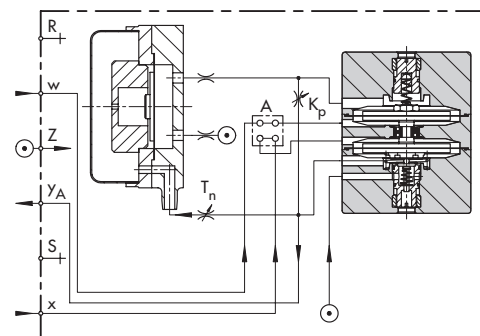
Type 3433-2 PI Controller Module



Type 3433-3 PID Controller Module



Type 3433-5 P/PI Controller Module



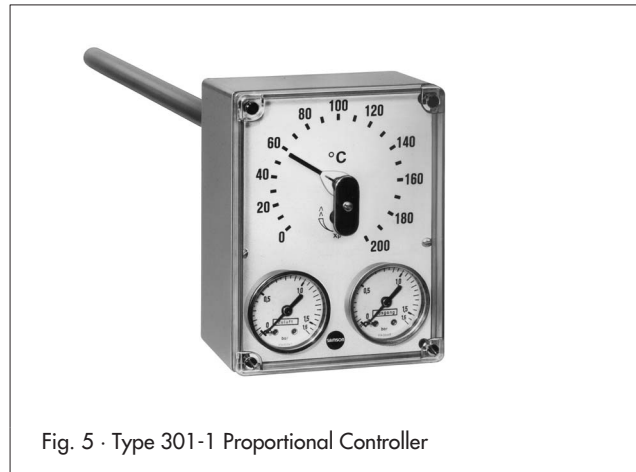
Type 3434-2 PI Controller Module

Fig. 4 · Schematic drawings for Type 3433-.../3434-... Controller Modules

### Type 301-1 Controller

The proportional controller with fixed mechanical expansion sensor is installed at the point of measurement. It is designed for a supply pressure of 1.4 bar, a signal pressure from 0.2 to 1.0 bar and for measuring ranges between 0 and 200 °C or 100 and 300 °C.

For details, see Data Sheet T 7065 EN.



Specifications subject to change without notice.

