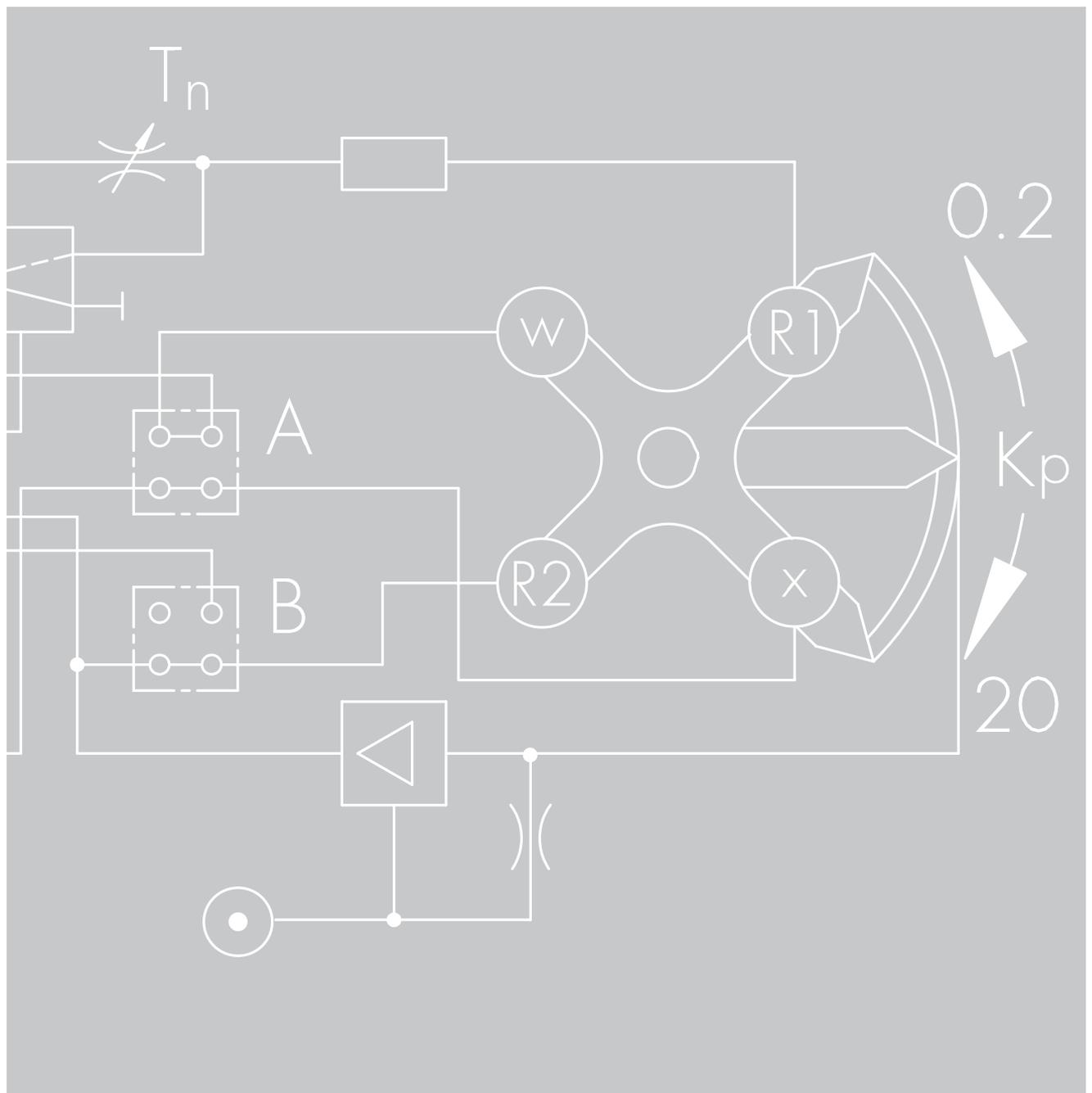


Pneumatic Measuring and Control Equipment



The compressed air transfers the pneumatic signal from 0.2 to 1.0 bar (3 to 15 psi). A supply pressure of 1.4 bar (20 psi) is used as the auxiliary energy.

SAMSON has been developing and producing pneumatic measuring and control equipment for over 40 years. Experience gained in this field and constant development ensures that SAMSON products have excellent operating reliability, a broad range of application and a compact design.

This Information Sheet provides an overview of the pneumatic control equipment available from SAMSON, in particular, the Series 420 Pneumatic Control System. Other pneumatic controllers are described in the Information Sheet T 7030 EN and the pneumatic control valves in Information Sheets T 8000 EN to T 8350 EN.

The transmitters of pneumatic signal systems convert the measured value into a pneumatic output signal which is compared with the set point by the controller. The controller processes the signals received and issues a pneumatic control signal to the control valve.

The compact control equipment from the Series 420 is designed according to the modular-assembly principle and can be combined with various controller modules and additional modules. As a result, they are flexible in application and easily adaptable to the process and the conditions on site since instrumentation with panel-mounted controllers (Fig. 1), with manual control units and separate controllers for control room or field installation (Fig. 2) as well as a combination of instruments is possible.

The Series 420 Control System can be used for applications with P, PI, PID and PD control loops, for control loops with control mode changeover or signal limitation, for ratio, cascade, or slave control loops as well as other control loops and process-oriented solutions.

Note

All pressures are stated as gauge pressures in bar.

Only the specifications in the Data Sheets concerned apply for the delivered products.

- 1 Pneumatic transmitter
- 2 Pneumatic transmitter for electric sensors
- 4 Compact controller
- 5 Manual control unit/station
- 6 Pneumatic controller for control room or field installation

Instrumentation with compact controllers

- A With pneumatic transmitters and direct measurement
- B With pneumatic transmitters and electric sensors

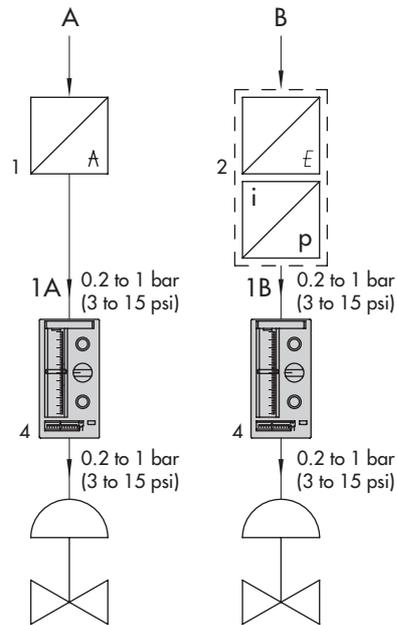


Fig. 1 · Instrumentation with panel-mounted Type 3421 Controllers

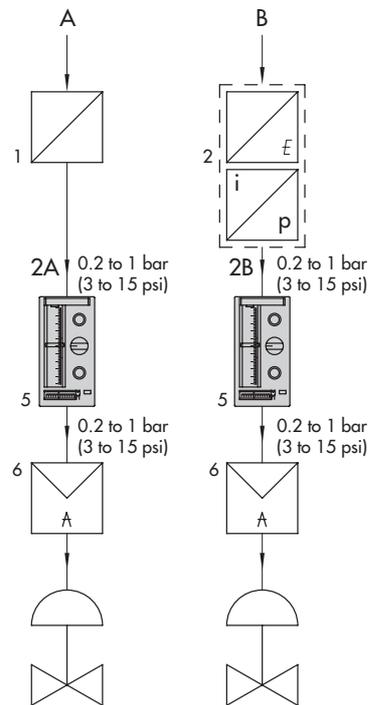


Fig. 2 · Instrumentation with Type 3427 Manual Control Units or Type 3422 Manual Control Stations and Type 3425 Pneumatic Controllers for Control Room or Field Installation

Table 1 · Overview of pneumatic measuring and control equipment

Transmitters for ...	Pressure			Temperature
Details in Data Sheet	T 7540 EN	T 7550 EN	T 7554 EN	T 7575 EN
Type	3804-1	3804-1 with pressure seal	3814	3812-1
Pressure	•	•	•	
With pressure seal		•	With flange	
Temperature				•
Measuring span in ...	bar	bar	bar	°C
min.	0.016	1	0.016	50
max.	100	100	100	200
Lower measuring range	min.	0	0	-40
max.	90	90	90	200

Table 2 · Series 420 Pneumatic Control System

Input	0.2 to 1 bar · 3 to 15 psi		0.2 to 1 bar · 3 to 15 psi	
Instrumentation with ...	Panel-mounted controllers		Controllers for control room/field installation	
In the control panel	Compact controllers		Manual control unit	Manual control station
Front frame 72 x 144 mm				
Additionally: Type 3416 Indicator (T 7526 EN) Type 3417 Pneumatic Control Units (T 7527 EN)	Type 3421 with Type 3422 Manual Control Unit and Type 3423-5 Module		Type 3427-1 Manual Control Unit	Type 3422 Control Station
Type	3421		3427	3422
Data Sheet	T 7506 EN		T 7511 EN	T 7506 EN
Equippable with ...	Two inductive limit switches · Two LEDs · Two inductive limit switches with LED actuation			
Controller module	3423-1 to -9		-	-
Additional module	3424-4/-5/-6	-	-	-
Controllers for control room/field installation equippable with: Type 3423-1 to -5 and Type 3424-4, -5 or -6 ¹⁾	-		Type 3425 (T 7512 EN) 	

¹⁾ Type 3423-1 to -6 Controller Modules for P, PI, PID, PD/PID and P/PI control loops (Data Sheet T 7521 EN)
Additional modules: Type 3424-4 Bumpless Manual/Auto Transfer, Type 3424-5 Control Mode Changeover or
Type 3424-6 Signal Limiter (Data Sheet T 7524 EN)

Output		0.2 to 1 bar · 3 to 15 psi			
Valves	Series	240	250	280	230
	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
Type		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.				

Series 420 · A versatile control system

Instrumentation with manual control unit and controllers for control room or field installation

Type 3427
Manual
Control
Unit



Type 3421 Compact Controller



Type 3425 Control
Room Controller



Type 3425 Field
Controller



For input **0.2 to 1 bar** equippable with controller module:

- Type 3423-1 (P controller)
- Type 3423-2 (PI controller)
- Type 3423-3 (PID controller)
- Type 3423-4 (PD controller)
- Type 3423-5 (P/PI controller)
- Type 3423-6 (PD/PID controller)
- Type 3423-7 (Ratio relay)
- Type 3423-9 (P controller, set point dependent)



Type 3423-1/-7 Controller Module



Type 3423-1/-7 Controller Module and additional module:
Type 3424-4 (bumpless transfer)
Type 3424-5 (control mode changeover)
Type 3424-6 (signal limiter)



The **Series 420** instruments can be used in all industrial processes because of their special features:

The compact controller design saves space. For example, the panel-mounted controllers feature a mounting depth of 320 mm and an installation depth of just 400 mm. The manual control units have a mounting depth of just 180 mm and are suitable for installation depths of ≥ 260 mm.

The instruments meet not just special process specifications, but are also user-friendly. Set point, controlled variable and the system deviation are easily read off at a 100 mm-long flat scale. All adjustments, switches and displays required for manual and automatic modes are located on the front panel of the instruments.

They are suitable for processes which require, for example, P, PI, PD or PID control equipment, a bumpless manual/automatic transfer, a control mode changeover, a cascade or ratio control.

Additional equipment for monitoring and control, for example, using limit switches, optical alarms, indicators, control units and counters.

The **Type 3421 Compact Controller** consist of a Type 3422 Manual Control Station, Type 3423 Controller Module and Type 3424 Additional Module, needed just for special control tasks.

The control parameters, selector switch w_{int}/w_{ext} and the limit switches can be accessed and set after pulling the plug-in unit out of the control panel. The device without components can also take on the tasks of a manual control station for controllers for control room or field installation.

The **Type 3427 Manual Control Unit** is the same as Type 3422 Manual Control Station, except it cannot house a controller module or additional module. The device is suitable for connection to the following controllers:

Type 3425 Controller with Type 3426-2 Control Room Housing for installation in control rooms and control cabinets.

With Type 3426-3 Field Housing for installation near to manual control unit or with Type 3426-4 Field Housing for installation in the field or on control valves.

Type 3422 Manual Control Station and Type 3427 Manual Control Unit are available in various versions (circuit 1, 2 or 9). The basic version completely equipped with components (circuit 1) is ready for universal applications. Circuit 2 (for slave controllers) does not include the set point adjuster and selector switch w_{int}/w_{ext} and circuit 9 (for ratio relays) does not include the set point display either. The instruments can be upgraded with two inductive limit switches, two LEDs or limit switches with LED actuation.

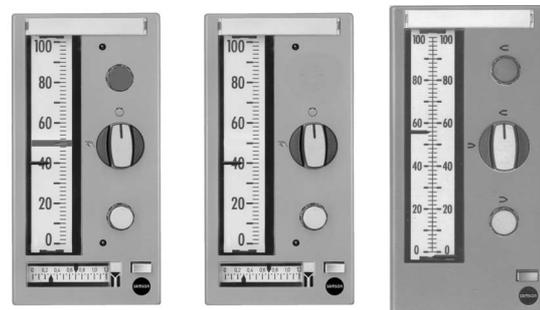


Fig. 3 · Front view of Types 3421, 3422, and 3427 version acc. to circuit 1 (left), circuit 2 (center) and circuit 9 (right)

Controller modules · Additional modules

The **Type 3423 Controller Modules** are plug-in units for Type 3421 Compact Controllers as well as for Type 3425 Pneumatic Controllers for Control Room or Field Installation. They have a comparator operating according to the motion-balance principle with four metal bellows arranged in a square. The proportional-action coefficient K_p can be adjusted manually.

Standard version: $K_p = 0.2$ to 20;
special version $K_p = 0.4$ to 40.

The **Type 3423-2¹⁾ PI Controller Module** has a T_n restrictor for reset times between 0.03 and 50 min.

The **Type 3423-1 P Controller Module** is largely the same as Type 3423-2. However, it has an operating point adjuster instead of the integral element.

The **Type 3423-3¹⁾ PID Controller Module** is the same as Type 3423-2 and the **Type 3423-4 PD Controller Module** the same as Type 3423-1. However, they include a derivative element that forms the rate action in the input branch of the input x. The derivative element has a rate gain of approximate 10-fold and a derivative-action time adjustable at the T_v restrictor between 0.01 and 10 minutes.

The **Type 3423-5 P/PI Controller Module** with P/PI selector switch can be used optionally as a P controller with operating point adjustment or as PI controller.

The **Type 3423-6 PD/PID Controller Module** with PD/PID selector switch can be used optionally as a PD controller with operating point adjustment or as PID controller.

The **Type 3423-7 Ratio Relay** has the same structure as the Type 3423-1. The ratio of the output pressure to the input pressure can be adjusted between 0.2 and 20.

The **Type 3423-9 P Controller Module** is the same as the Type 3423-1, except it has a set point dependent operating point.

The **Type 3424-4 Bumpless Manual/Automatic Transfer** is used for a bumpless switchover from manual to automatic mode.

The **Type 3424-5 Control Mode Changeover** switches the connected controller from PI or PID action to P action when the system deviation exceeds the limit adjusted.

The **Type 3424-6 Signal Limiter** is an additional module for minimum and maximum limitation of the controller output signal y_A , the feedback signal (port R) or the reference variable w.

Additional modules

Available for mounting depths of 180 mm or 320 mm.

The **Type 3416 Pneumatic Indicators** display two or four input signals between 0.2 and 1.0 bar as well as monitoring the limits of one or two signals.

The following versions are available:

Double and quadruple indicators · Double indicator with two scales, either one or both of them with two inductive, electric or pneumatic limit switches.

The **Type 3417 Pneumatic Control Units** are control signal transmitters, selector switches and indicators for set point or control signals. Refer to T 7526 EN and T 7527 EN for details concerning Type 3416/17.

¹⁾ Optionally with maximum feedback limitation

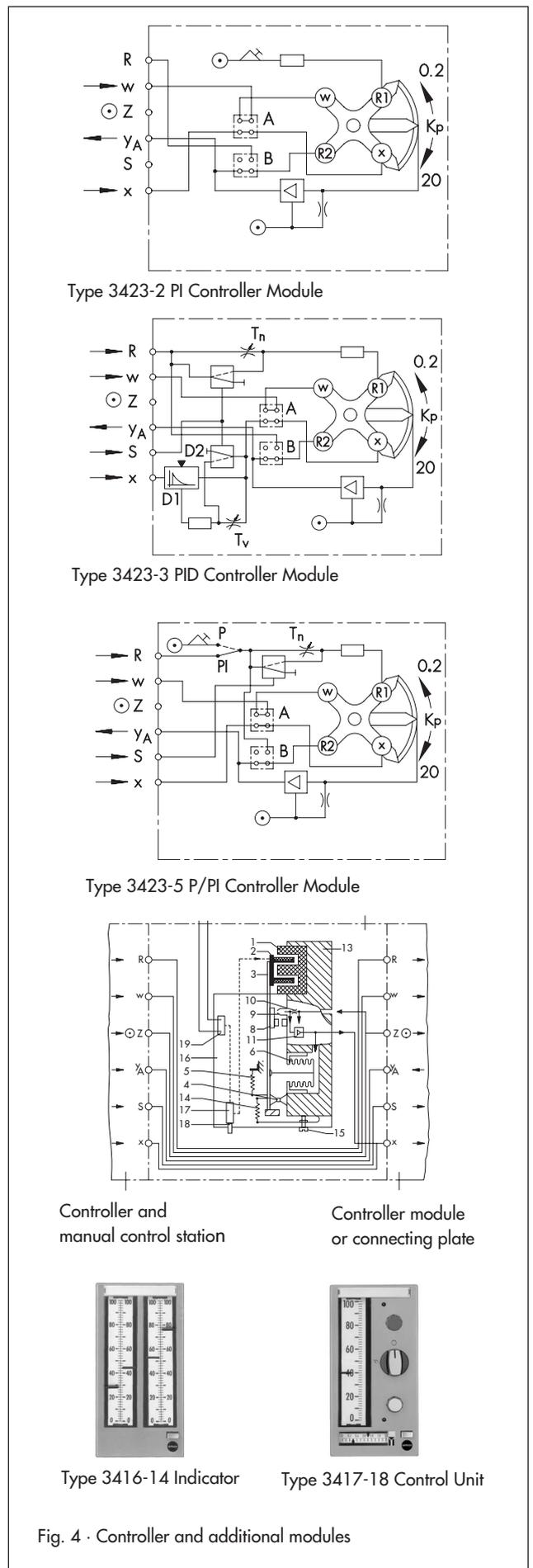


Fig. 4 · Controller and additional modules

Pneumatic transmitters

The Series 3804-1 Transmitters and Type 3814 Transmitter convert a pressure into an output signal ranging from 0.2 to 1.0 bar (3 to 15 psi).

They consist of a transmitter operating according to the force-balance method and a stainless steel measuring element. All transmitters are available with lower range value displacement up to approx. 90 % of the maximum measuring span. The top measuring limit of versions with maximum measuring span up to 20 bar is about 1.9 times the maximum measuring span and 1.5 times the maximum span for versions with larger spans.

Type 3804-1 Pressure Transmitter · Standard version for measuring spans between 0.016 to 100 bar, operating pressure from -1 to 150 bar and ambient temperatures ranging from -35 to +120 °C.

Refer to Data Sheet T 7540 EN for details.

Type 3804 -1 with pressure transmitting sealing element · For operating pressures ranging from 0 to 150 bar and process medium temperature between -40 to 150 °C (special version up to 300 °C). On request also pressure seal made of special materials (e.g. Hastelloy, tantalum).

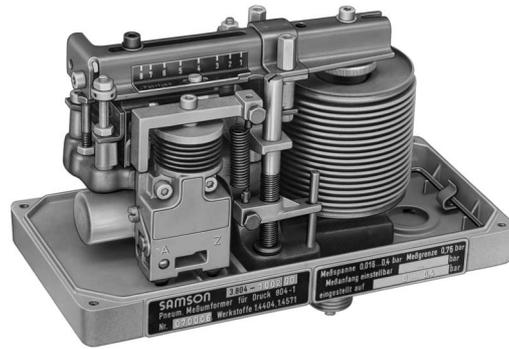
Refer to Data Sheet T 7550 EN for details.

Table 3 · Technical data for Type 3804-1

Type 3804-1	Standard version			
Measuring span, bar continuously adjustable	0.016 to 0.4	0.25 to 6	0.8 to 20	4 to 100
Measuring limit bar	0.76	11.4	38	150
Pressure measuring element	Metal bellows			
Type 3804-1	With pressure seal			
Measuring span, bar continuously adjustable	1 to 20		16 to 100	
Measuring limit bar	38		190	
Pressure measuring element	Separating diaphragm and metal bellows			

Type 3814 Flanged Pressure Transmitter · Measuring spans ranging from 0.016 to 6 bar for liquid level measurements for highly viscous media and media that readily settle, for food and beverages with process medium temperatures up to +150 °C.

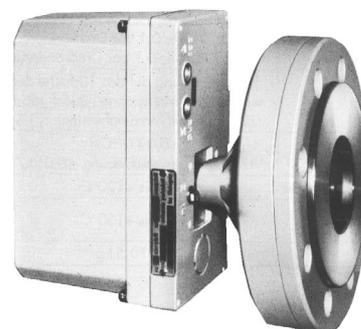
Refer to Data Sheet T 7554 EN for details.



Type 3804-1 Transmitter, standard version



Type 3804-1 Transmitter with Pressure Seal



Type 3814 Flanged Pressure Transmitter

Fig. 5 · Pneumatic transmitters

Type 3812-1 Temperature Transmitter · With directly attached gas expansion sensor or connected over a capillary tube as well as a pneumatic force-balance system with measuring bellows. For measuring spans ranging from 50 to 200 °C (measuring limits -40 to 300 °C).

Refer to Data Sheet T 7575 EN for details.

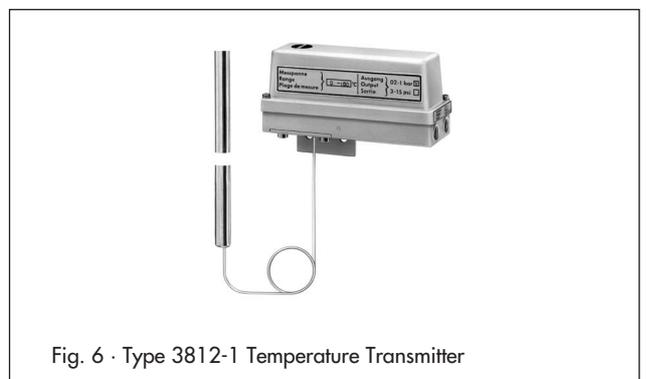


Fig. 6 · Type 3812-1 Temperature Transmitter

Electropneumatic converters

i/p converters · Device for converting a DC current signal into a pneumatic control signal, in particular, as an intermediate component to transfer from electric measuring equipment to pneumatic controllers or from electric control equipment to pneumatic control valves.

p/i converters · Device for converting a pneumatic standardized signal into an electric standardized signal.

Table 4 · Electropneumatic converters

Type	6111	6116	6127	6126	6132	6134
p/i converter					•	•
i/p converter	•	•	•	•		
Explosion protection	•	•				•
Out-put					•	•
4 to 20 mA (0 to 20 mA)						
0.2 to 1 bar	•	•	•	•		
Plug-in unit			7 HP			
Field unit (IP 54/IP 65)	•	•		•		•
Rail-mounting unit	•				•	•
Data Sheet T...EN	6111	6116	6127	6126	6132	6134



Type 6111 i/p Converter rail-mounting unit

Type 6116 i/p Converter in die-cast enclosure

Type 6127-04 i/p Converter plug-in unit

Type 6126 i/p Converter field unit

Type 6111 i/p Converter stainless steel field unit

Type 6134-04 p/i Converter rack-mounting unit

Fig. 7 · Electropneumatic converters

Pneumatic supplementary instruments

- Type 3759 Pneumatic Remote Adjusters (Data Sheet T 8510 EN),
- Air supply equipment such as Type 4708 Supply Pressure Regulator (Data Sheet T 8546 EN).



Type 3759 Pneumatic Remote Adjuster



Types 4708-10, -11 and -12 Supply Pressure Regulator

Fig. 9 · Pneumatic supplementary instruments

Specifications subject to change without notice.



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