

T 7038 EN

Type 3430 Pneumatic Indicating Controllers for Standardized Signals Type 3431 and Type 3432 Controller Stations

Series 430



Application

Standardized controllers for connection to pneumatic or electric transmitters in process engineering or industrial applications · Input **0.2 to 1 bar/3 to 15 psi** · **0/4 to 20 mA**

The controller receives the electric or pneumatic standardized signal from a transmitter, indicates the operating value and 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. A supply pressure of 1.4 bar/20 psi or an operating pressure of 2.0 to 12 bar/30 to 180 psi is required.

The controllers for standardized signals consist of a controller station and a controller module with the required control mode.

Special features

- Easy-to-service and low-priced automation unit
- Set point, controlled variable, set point 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 192x144 mm or 192x228 mm), optionally with lockable door of transparent plastic (IP 65) with conductive coating

Versions

Indicating controller for standardized signals consisting of a Type 3431 or Type 3432 Controller Station and a control-specific Type 3433 or Type 3434 Controller Module.

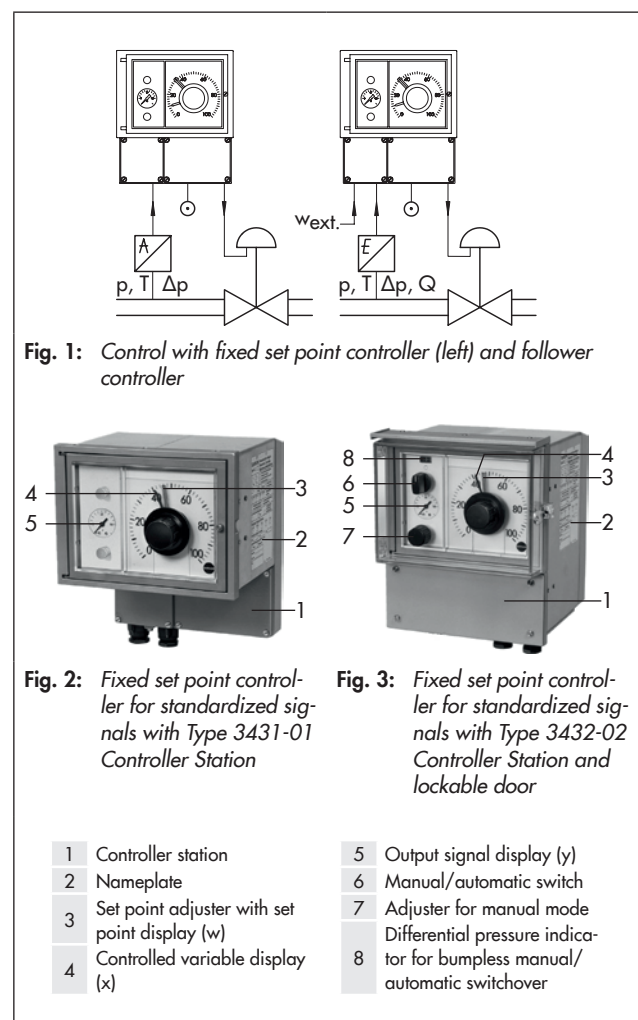
The controller station is used as:

Fixed set point controller · (Fig. 2 and Fig. 3) with 0.2 to 1 bar, 3 to 15 psi or 0/4 to 20 mA input

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 switch¹⁾ to change between internal and external reference variable

¹⁾ Only with Type 3432 Controller Station



Can optionally be equipped with one or two adjustable inductive limit contacts and/or supply pressure regulator¹⁾ for operating air pressures of 2.0 to 12 bar.

Controller stations with i/p converters and limit contacts are available in type of protection Ex ia IIC.

Principle of operation (see Fig. 4 to Fig. 8)

The Series 430 Pneumatic Controllers with their modular design can be used in all kinds of automation applications. The controllers for standardized signals consist of a Type 3431 or Type 3432 Controller Station (as the basic module) with a Type 3432 or 3433 Controller Module with the required control mode.

The pneumatic standardized signal (controlled variable x) 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. 4 (fixed set point controller with pneumatic input) 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 (1.41) 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 set point deviation and adjusted control parameters. The output signal is connected to the output signal display (1.5) and output port y . The controller station (Fig. 5, follower controller with pneumatic input) largely corresponds to the one shown in Fig. 4.

However, it additionally contains a manual/automatic switch (1.6), adjuster for manual mode (1.7) and differential pressure indicator (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 indicator. The follower controllers are not equipped with a set point adjuster (1.4); instead, they come with a set point display. The version shown here includes a pneumatic input for the external reference variable w_{ext} .

The Type 3432 Controller Station for combined fixed set point and follow-up control is equipped with an additional unit (1.10). It contains a w_{int}/w_{ext} selector switch, a set point adjuster and a differential pressure indicator (Fig. 6). A bumpless transfer is possible when w_{int} and w_{ext} are the same on the differential pressure indicator.

1	Controller station	1.6	Manual/automatic switch
1.1	Housing with door	1.7	Adjuster for manual mode
1.2	Dial plate		Differential pressure indicator
1.3	Controlled variable display with pointer, gear mechanism and bellows system	1.8	Differential pressure indicator for bumpless manual/automatic switchover
1.4	Set point adjuster with pointer, gear mechanism and set point calibrator (1.41); follower controllers: set point display only	1.9	Supply pressure regulator
1.41	Pneumatic servo system	1.10	Additional unit with w_{int}/w_{ext} selector switch, set point adjuster and differential pressure indicator
1.5	Output signal display	2	i/p converter
		3	Controller module

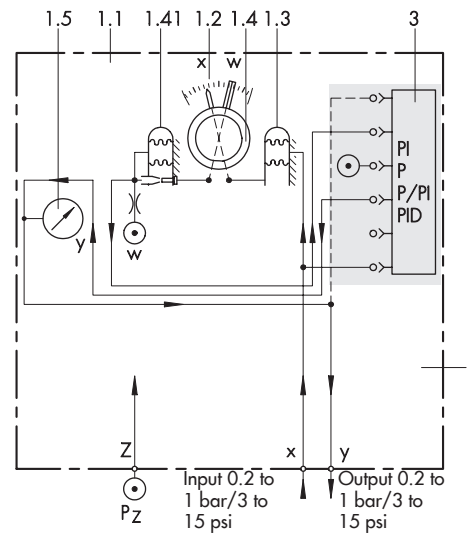


Fig. 4: Schematic drawing of fixed set point controller for pneumatic standardized signals, version with Type 3431-01 Controller Station

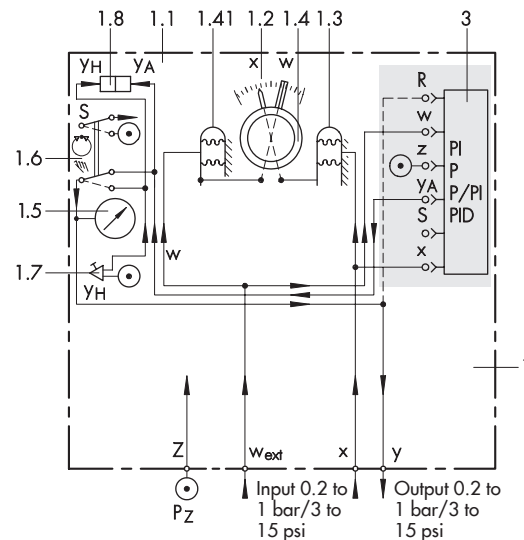


Fig. 5: Schematic drawing of fixed set point controller for pneumatic standardized signals and pneumatic input for w_{ext} , version with Type 3431-04 Controller Station



Fig. 6: Fixed set point and follower controller with additional unit (1.10) to switch between the internal and external reference variable, version with Type 3432-06 Controller Station

The version with i/p converter (Fig. 7) is suitable for connection of 0/4 to 20 mA electric input signals (controlled variable x). The standardized input signal of a transmitter is fed to the i/p converter (2) and converted into a pneumatic standardized signal from 0.2 to 1 bar. The controller stations largely correspond to the versions shown in Fig. 4 to Fig. 6. However, the stations additionally contain an i/p converter (2) whose output signal is applied to the bellows measuring system of the controlled variable display (1.3) and the controller module (3). Follower controllers with electric input $w_{ext} = 0/4$ to 20 mA are equipped with an additional i/p converter.

The controller stations can be equipped with the Type 3434 P or PI Controlle Module for various control tasks, Type 3433 Controller Modules 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 controller stations can optionally be equipped with one with two adjustable inductive limit contacts.

Supply pressure regulator

The versions with Type 3432 Controller Station are also available with a supply pressure regulator. In this case, the device is suited for connection to an operating air pressure from 2.0 to 12 bar. The additional supply pressure regulator reduces and controls the operating 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.

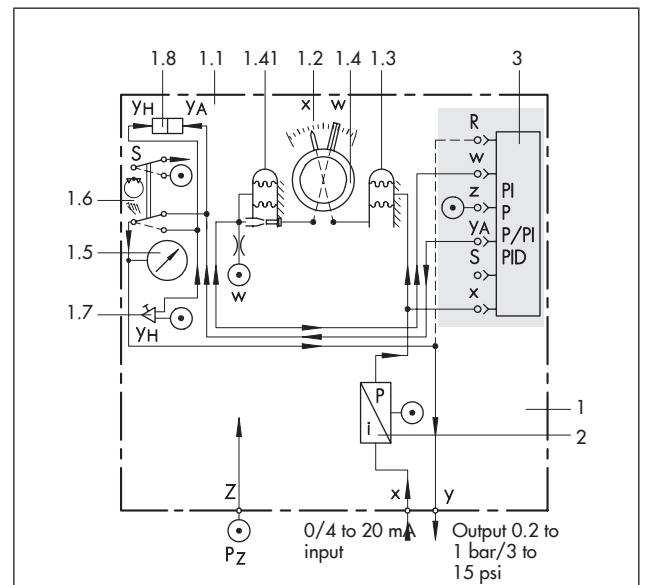


Fig. 7: Schematic drawing of fixed set point controller for electric standardized signals, version with Type 3431-02 Controller Station

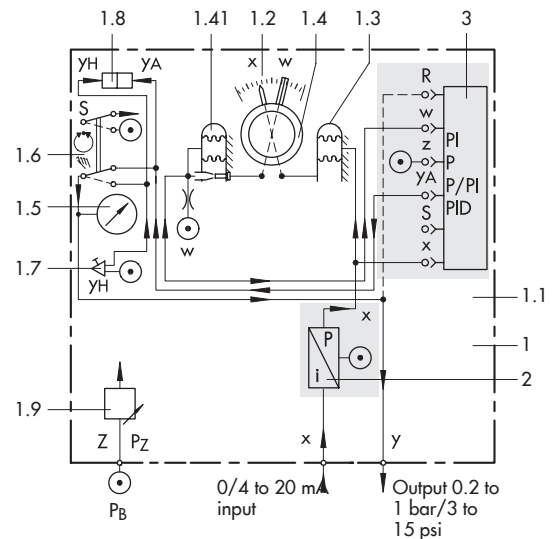


Fig. 8: Version with supply pressure regulator (1.9)

Table 1: Technical data of controllers for standardized signals

Type 3432 Controller Station										
Input x and w_{ext}	0.2 to 1.0 bar · 3 to 15 psi · 0/4 to 20 mA									
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 contacts	1 or 2 SC 3,5-NO-YE proximity switches acc. to DIN EN 60947-5-6, Ex II 2G Ex ia IIC T6									
i/p converter for x and/or w_{ext} ²⁾	Input 0/4 to 20 mA ($R_i = 200 \Omega$)									
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⁾
Prop.-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 Signal Limiter		Type 3437-2 Control Mode Selector Switch		Type 3437-3 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 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 converters	$w_{ext} = + 0.13 \text{ m}_n^3/\text{h}$								
Air quality acc. to ISO 8573-1	Max. 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 with door: IP 65									
Total weight (approx.)	6 kg									
Materials										
Housing	Die-cast aluminum, plastic-coated									

1) Version with follower controller: only set point display with 212 mm scale

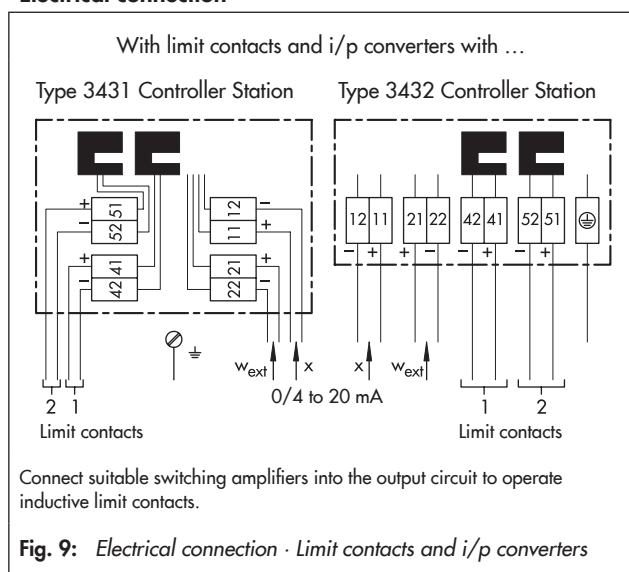
2) Details in ► T 7045.

3) Details in ► T 7040 and ► T 7041.

4) Optionally with feedback limitation

5) With set-point-dependent operating point

Electrical connection



Ordering text

Pneumatic Indicating Controller for Standardized Signals
With **Type 3431-.../3432-...** Controller Station

Input x:

0.2 to 1 bar/3 to 15 psi/4 to 20 mA/0 to 20 mA

Input w_{ext} for follower controllers:

0.2 to 1 bar/3 to 15 psi/4 to 20 mA/0 to 20 mA

Optionally with lockable door/with 1 or 2 inductive limit contacts

With supply pressure regulator (only with Type 3432)

With **Type 3433-.../3434-...** Controller Module

Optionally, **Type 3437-...** Additional Module (only with Type 3433)

Table 2: Controller station versions

Controller station	Type	3431-...				3432-...					
		01	02	03	04	01	02	03	04	05	06
	No explosion protection	01	02	03	04	01	02	03	04	05	06
	With Ex components	11	12	13	14	11	12	13	14	15	16
Fixed set point controller		•	•			•	•				
Follower controller				•	•			•	•		
Fixed set point and follower controller										•	•
Equipped with ...											
Set point adjuster		•	•			•	•			•	•
Set point display		•	•	•	•	•	•	•	•	•	•
Controlled variable and output signal display		•	•	•	•	•	•	•	•	•	•
Manual/automatic switch			•		•		•		•		•
Manual adjuster and differential pressure indicator			•		•		•		•		•
w _{int} /w _{ext} selector switch										•	•
Controller module	Type 3433-... ¹⁾		•		•		•		•		•
	Type 3434-...	•	•	•	•	•	•	•	•	•	•
Input x	0.2 to 1 bar	•	•	•	•	•	•	•	•	•	•
	0/4 to 20 mA (i/p converter)		•		•		•		•		•
Input w _{ext}	0.2 to 1 bar				•	•	•	•		•	•
	0/4 to 20 mA (i/p converter)				•	•				•	•
Can additionally be equipped with ...											
1 or 2 inductive limit contacts		•	•	•	•	•	•	•	•	•	•
Type 3708-5009 Supply Pressure Regulator						•	•	•	•	•	•
Lockable, transparent door (IP 65), with conductive coating		•	•	•	•	•	•	•	•	•	•

¹⁾ Optionally with additional module

Installation and connections

Mounting position · Controller station mounted in the upright position

Pipe mounting: with mounting part and clamp for attachment

to a vertical or horizontal 2" pipe

Wall mounting: 3 brackets for attachment to a wall

Panel mounting: with 4 type C fastening elements (DIN 43835) for attachment to the control panel

Pneumatic connections: tapped holes ISO 228/1-G 1/8

Electrical connection: terminals for 0.5 to 1.5 mm² wires

Dimensions in mm

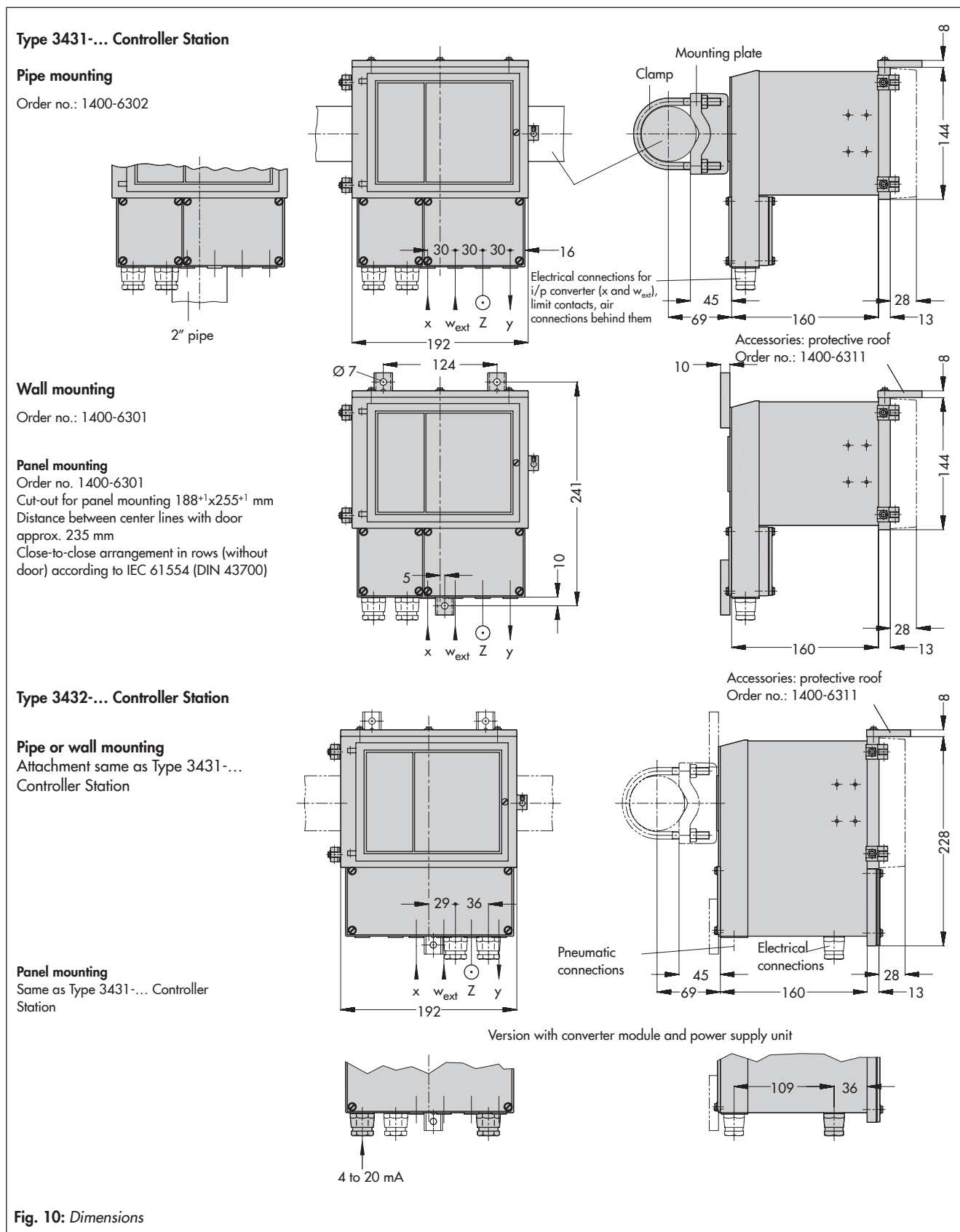


Fig. 10: Dimensions