

### Application

Panel-mounted instruments (front frame 72 x 144 mm) for plant and process engineering for displaying and monitoring limits for pneumatic signals in the range of 0.2 to 1.0 bar (3 to 15 psi)

The Type 3416 Pneumatic Indicators are suitable for displaying measured variables that can be displayed as pneumatic signals, e.g. temperature or pressure.

The version with limit switches issues a limit signal when the limit value which can be adjusted at the scale is reached. The signal can trigger a visible or audible alarm or it can be connected to a central alarm systems.

### Special features

- Compact design with a mounted depth of 180 or 320 mm, resulting in an installation depth of 260 or 400 mm
- Measured values and set points are easy to read off the 100 mm-long flat scale
- Instruments with limit switches allow the maximum (4.1) and the minimum (4.3) limits to be adjusted after pulling out the plug-in section from the control panel.

### Versions

Instruments designed as rack-mounting units - Type 3416-1... and Type 3416-90 have a mounted depth of 180 mm. Type 3416-2... and Type 3416-91 have a mounted depth of 320 mm.

### Pneumatic indicators

**Type 3416-12/-22** (Fig. 1) · Double indicator with one scale

**Type 3416-13/-23** · Double indicator with two scales

**Type 3416-14/-24** (Fig. 2) · Quadruple indicator with two scales

**Type 3416-16/-26** · Double indicator with two scales, the left scale with two inductive limit switches

**Type 3416-18/-28** (Fig. 3) · Double indicator with two scales, each scale with two inductive limit switches

**Type 3416-90/-91** · Double indicator with two scales, the left scale with one or two pneumatic limit switches, optionally with pneumatic or electrical output

**Type 3416-90/-91** · Double indicator with two scales, each scale with one or two pneumatic limit switches, optionally with pneumatic or electrical output



Fig. 1 · Type 3416-12/-22 Indicator

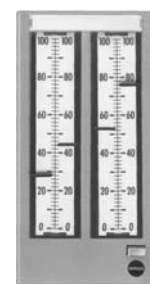


Fig. 2 · Type 3416-14/-24 Indicator

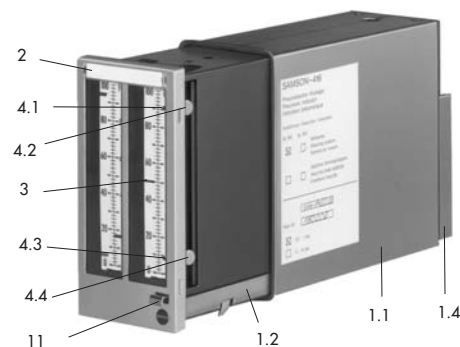


Fig. 3 · Type 3416-8 Indicator



Fig. 4 · Type 3416-90/-91 Single Indicator

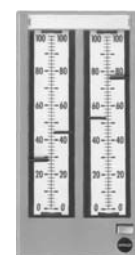


Fig. 5 · Type 3416-90/-91 Double Indicator

- 1.1 Housing with connecting plate
- 1.2 Plug-in section
- 1.4 Connecting plate
- 2 Identification label

- 4.1 Maximum limit pointer
- 4.2 Maximum limit adjuster
- 4.3 Minimum limit pointer
- 4.4 Minimum limit adjuster
- 11 Lock

## Design and principle of operation

The instruments belong to the Series 420 Pneumatic Control System and contain components which are also used in Type 3421 Compact Controllers (Data Sheet T 7506 EN) and Type 3427 Manual Control Unit (Data Sheet T 7511 EN). The illustrations on page 3 show the front view and the pneumatic connections at the back of the instruments.

The Type 3416 Indicators (see Figs. 1 to 5) are equipped with metal bellows measuring units. Each measuring unit converts the supplied signal pressure into a deflection which is transmitted over a direct guide to a pointer.

Instruments with limit switches have proximity switches (I1) or pick-ups with emitter sensor nozzle (P1) connected to the limit value pointers (4.1 and 4.3). A metal tag (P2) connected to the measured value pointer (3) triggers a limit signal when a limit is reached.

### Indicators with inductive limit switches (Fig. 6.1)

A proximity switch picks up the limit value. This does not affect the measuring accuracy. In normal operation, the proximity switches assumes a low resistance. When the pointer reaches the limit value adjusted at the scale, the switch assumes a high resistance. The switching function is similar to a mechanical make contact. Corresponding switching amplifiers must be connected in the output circuit for the operation of the inductive limit switches.

### Indicators with pneumatic limit switches and pneumatic output (Fig. 6.2)

The limit values are recorded without contact by pick-ups with an emitter sensor nozzle (P1). In normal operation, the metal tag (P2) is outside of the pick-up (P1). The supply air  $p_z$  flows unrestricted over the emitter nozzle (P1.1) to the pick-up nozzle (P1.2). Its output pressure corresponds with the binary signal "1". This signal is transmitted over the booster (P3) to the port 2 of the pneumatic switchover unit (P4) whose output (port 3) is connected to port 5.

On reaching a limit value, the air flow in the pick-up (P1) is interrupted by the metal tag (P2), the output pressure of the emitter nozzle drops and assumes "0". This causes the switchover unit (P4) to switch, the output (port 3) is connected to port 4.

In the event of supply air  $p_z$  failure, the same switching position occurs as in normal operation, i.e. the output (port 3) is connected to port 5.

The pressure to be switched can be connected to input 4 or 5 depending on the plant. One of the inputs must be connected to the atmosphere.

### Indicators with pneumatic limit switches and electrical output (Fig. 6.3)

The pick-up functions the same as in the instrument with pneumatic output. The binary signal formed at the pick-up nozzle (P1.2) controls the connected p/e converter (P5) with electric double-throw contact. This contact can be used as either a make or break contact.

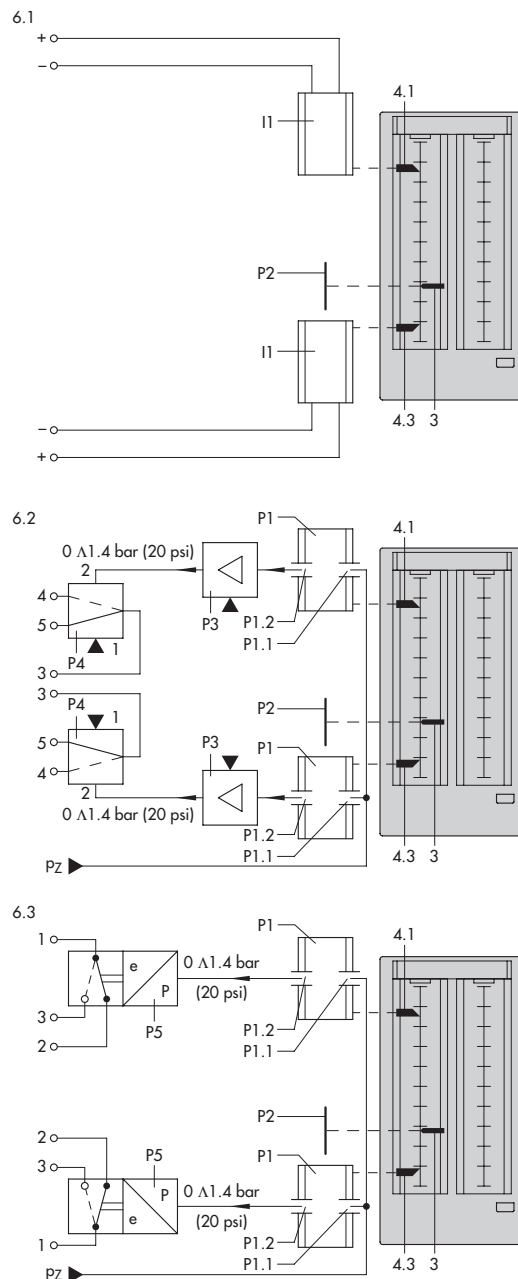


Fig. 6 · Functional diagrams of Type 3416-90/-91 Indicator

6.1 · With inductive limit switches

6.2 · With pneumatic limit switches and pneumatic output

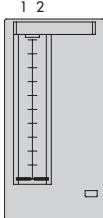
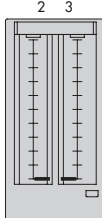
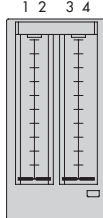
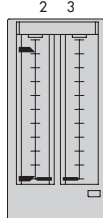
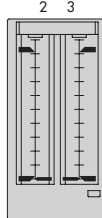
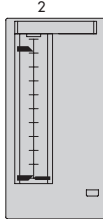
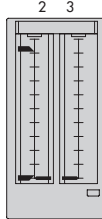
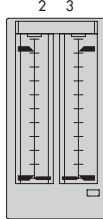
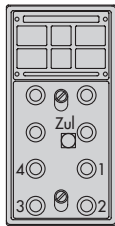
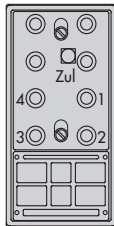
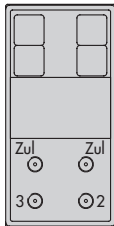
6.3 · With pneumatic limit switches and electrical output

3	Measured value pointer	P2	Metal tag
4.1	Maximum limit pointer	P3	Booster
4.3	Minimum limit pointer	P4	Pneumatic switchover unit
I1	Proximity switch	P5	p/e converter with double-throw contact
P1	Pick-up with emitter sensor nozzle		
P1.1	Emitter nozzle		
P1.2	Pick-up nozzle		

**Table 1 · Technical data · Pneumatic indicators**

Type	3416-12/-22	3416-13/-23	3416-14/-24	3416-16/-26	3416-18/-28	3416-90/-91			
Input	0.2 to 1.0 bar (3 to 15 psi) · Overloadable up to 1.4 bar (20 psi)								
Indication accuracy	≤ ±1 % (class 1)								
Scale	0 to 100 % linear, square root on reverse side (scale length 100 mm) For any linear measured variable · Any measured variable according to equation, curve or table								
Limit value						For one or two displays			
						Inductive pick-up		Pneumatic pick-up	
						Any distance between limits			
						Proximity switch SJ3,5-N-Y		Emitter sensor nozzle	
						≤ ±1.5 % of the scale length			
Pick-up									
Switching accuracy									
Output	Electric, over external switching amplifier				Electric or pneumatic				
Permissible ambient temperature range	-20 to +60 °C								
Weight, approx.	1.4/1.7 kg		1.6/1.9 kg		1.9/2.2 kg				

**Instrument versions**

Indicator			Indicator with inductive limit switches	
				
Type 3416-12/-22	Type 3416-13/-23	Type 3416-14/-24	Type 3416-16/-26	Type 3416-18/-28
Indicator with pneumatic limit switches				
			Type 3416-90/-91 Indicator optionally with pneumatic or electrical output; each scale also available with a limit switch.  The ports are numbered to match the measuring unit numbers over the displays.	
Type 3416-90/-91 Single Indicator	Type 3416-90/-91 Double Indicator, one display with limit switches	Type 3416-90/-91 Double Indicator, both displays with limit switches		
Connections at the back				
		Mounted depth 180 mm Types 3416-1... and Type 3416-90  Mounted depth 320 mm Types 3416-2... and Type 3416-91		
Type 3416-1...	Type 3416-2...		Type 3416-90/-91	

## Installation

The instrument is fixed in the control panel over two rails. The air lines are to be connected over the 1/8 NPT tapped holes in the connecting plate.

Pneumatic output of Types 3416-90/-91:

Connecting grommets for 1.8 x 1 hose.

## Electrical connection (only indicators with limit switches)

Corresponding switching amplifiers must be connected in the output circuit for operation of electric limit switches.

## Ordering text

### Type 3416-... · Pneumatic indicator

Input 0.2 to 1 bar/3 to 15 psi

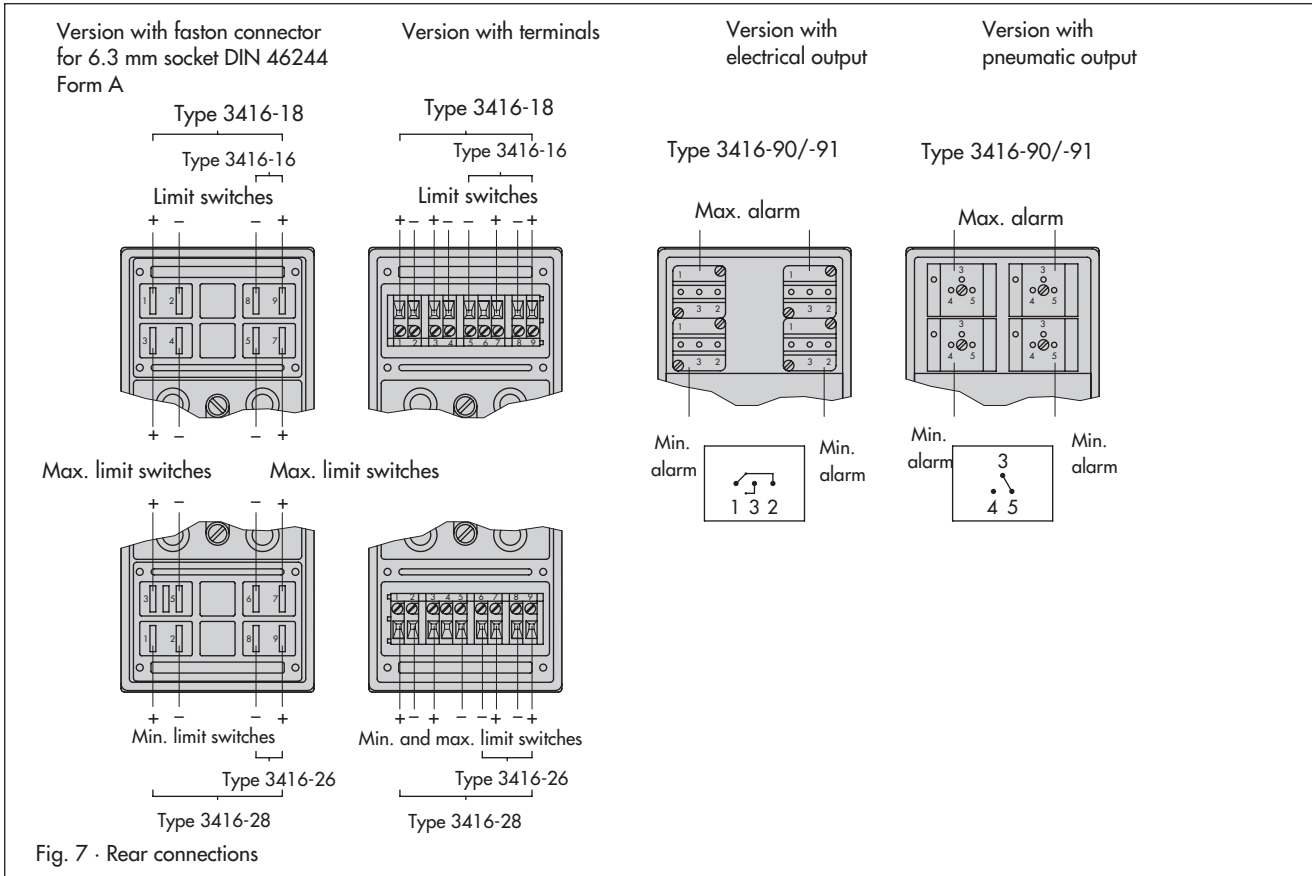
With/without inductive limit switches

Electrical connections with faston connectors/terminals

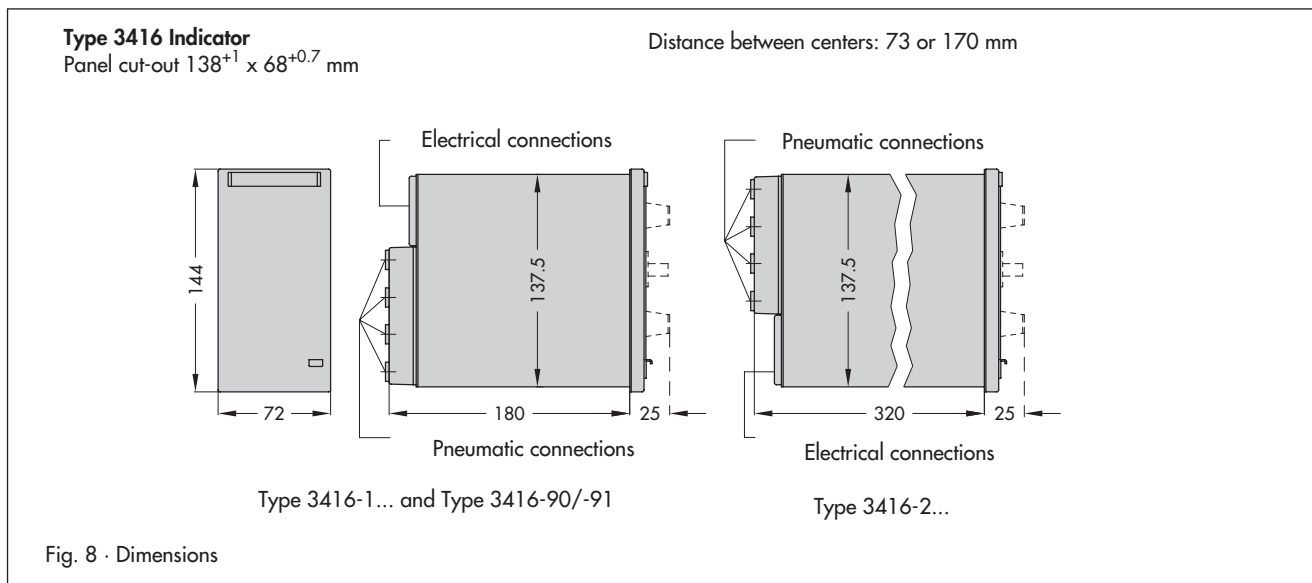
### Type 3416-90/-91 · Pneumatic indicator

Input 0.2 to 1 bar/3 to 15 psi

Single indicator with one scale/Double indicator with two scales, left/each scale with 1/2 pneumatic limit switches and pneumatic/electrical output.



## Dimensions in mm



Specifications subject to change without notice.



SAMSON AG · MESS- UND REGELTECHNIK  
 Weismüllerstraße 3 · 60314 Frankfurt am Main · Germany  
 Phone: +49 69 4009-0 · Fax: +49 69 4009-1507  
 Internet: <http://www.samson.de>

T 7526 EN