

# InReg Volume flow controller 0...300 Pa

Electrical volume flow controller (CAV / VAV) for use in safe areas  
24 VAC/DC supply, adaptive PID controller, alarm contact

InReg - V...
InReg - V... - A
InReg - V... - B
InReg - V... - CT
InReg - V... - OCT

Subject to change!

**Compact. Easy installation. Universal. Cost effective. Safe.**

Type	Sensor	Supply	Range	Connection / Interface (analogue)	Alarm contact	Wiring diagram
InReg- V300	Diff. pressure	24 VAC/DC	0...300 Pa	1 × actuator, 1 × set point	Relay contact 30 V, 0.1 A	SB 1.0
InReg- V300 - A	Diff. pressure	24 VAC/DC	0...300 Pa	1 × actuator, 1 × set point, 1 × actual value, 1 × position actuator	Relay contact 30 V, 0.1 A	SB 1.1
InReg- V300 - B	Diff. pressure	24 VAC/DC	0...300 Pa	1 × actuator, RS485 communication	Relay contact 30 V, 0.1 A	SB 1.2
InReg- ... - CT	as above with aluminium housing and Amercoat painting (cable glands nickel-plated, screws in stainless steel)					
InReg- ... - OCT	Offshore version with aluminium housing and seawater-resistant Amercoat painting (stainless steel tubes for 6 mm clamping ring connection, cable glands M20 × 1,5 mm nickel-plated, screws in stainless steel)					

## Product views / Applications

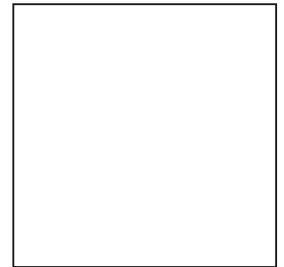
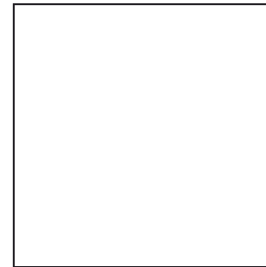
InReg-V



Application example:



InReg-V + InMax-...-CY



## Description

The new InReg-V... flow controller is an important innovation in Building Management Control Equipment for Chemical, Pharmaceutical, Industrial and Offshore plants.

InReg-V... is used for control of air flows in ventilation systems. To complete the technical solution an additional damper actuator type InMax-...-CY or InMax-...-CFY (with Fail Safe spring return) is required and also a ventilation damper with orifice plate and a known shield factor (called k-factor).

Housing protection IP66, small size and universal technical data guarantee safe operation even in harsh environments.

All controllers are programmable on site with menu guide. The internal PID control structure is simple to use and automatically configured for standard applications. The display shows the current status during operation for the actual value, setpoint and actuator position (can be disabled if required).

## Highlights

- ▶ Industrial use
- ▶ Sensor and controller in one housing
- ▶ Direct connection actuator in integrated terminal box
- ▶ Integrated junction box
- ▶ No additional Ex-i module in panel required
- ▶ No intrinsically safe wiring/installation between sensor and panel required
- ▶ No intrinsically safe wiring/installation and no space in the panel required
- ▶ Relay output with adjustable switch point NO
- ▶ Scalable analogue input and output, (selectable für setpoint, actual value)
- ▶ Optional analogue output for controller feedback
- ▶ Adjustable k-factor, universally applicable for any dampers
- ▶ Power supply 24 VAC/DC
- ▶ Applicable for ambient temperatures down to -20 °C
- ▶ Compact design and small dimension (L × W × H = 180 × 107 × 66 mm)
- ▶ Robust aluminium housing in protection class IP66
- ▶ Password locking
- ▶ Display with backlight, can be switched off

### Technical data

Power Supply	24 VAC/DC $\pm$ 15 % (20,4...27,6 VAC/DC) 50...60 Hz
Current, power consumption	150 mA, ~ 4 W, internal fuse 500 mA, without bracket, not removable
Galvanic isolation	supply – analogue output, relay output 1,5 kV
Electrical connection	terminals 0,14...2,5 mm <sup>2</sup> at integrated junction box, stripping length 9 mm, torque 0,4...0,5 Nm
Cable entry	2 $\times$ M16 $\times$ 1,5 mm, cable diameter ~ $\varnothing$ 5...10 mm (...-CT in nickel-plated)
Cable entry ...-OCT	2 $\times$ M20 $\times$ 1,5 mm, nickel-plated, cable diameter ~ $\varnothing$ 6...13 mm
Display	LCD matrix display with backlight, display for configuration, user guidance, parameter and actual value indication
Control elements	3 buttons for configuration
Housing protection	IP66 in acc. to IEC 60529
Housing material	Aluminium casting, coated PU varnish, ...-CT/...-OCT version with seawater-resistant Amercoat marine painting
Dimension	L $\times$ W $\times$ H = 180 $\times$ 107 $\times$ 66 mm
Weight	~ 950 g
Ambient temperature /-humidity	-20...+50 °C / 0...95 % rH, non condensed
Storage temperature	-40...+70 °C
Measuring range	0...300 Pa
Range scalable on site	minimum measuring range is 2 % of full scale
Maintenance	maintenance free, nevertheless maintenance must be complied with regional standards, rules and regulations
Sensor circuit	Internal intrinsically safe circuit
Sensor	Piezo-Pressure transmitter
Pressure connection	P+ / P-, tube connector $\varnothing$ 4...6 mm, ...-OCT version has a $\varnothing$ 6 mm stainless steel tube connection for clamp ring fittings
Sensor damping (filter)	1...50 seconds adjustable
Accuracy of pressure	$\pm$ 2,5 % full scale $\pm$ 1 Pa
Setting zero point	via menu, mechanical short circuit of P+ / P- for the moment of zero point setting
Air flow	Calculation on k-factor ("shield factor"); adjustable parameters: V <sub>max</sub> , V <sub>min</sub> , V <sub>rated</sub> , k-factor
Regulation	Adaptive PID controller (automatic and manual mode selectable)
Control tolerance	1...5 % adjustable
Delay time	3 s
Alarm monitoring	Monitoring the flow, adjustable functions: tolerance limit (fixed and variable value), alarm delay
Alarm contact (Terminal 3)	Relay; max. values: 0.1 A at 30 VAC/DC, min. values: 10 mW / 0.1 V / 1 mA
Life time mechanically	10 $\times$ 10 <sup>6</sup>
Life time electrically (rated)	100 $\times$ 10 <sup>3</sup>
Current output (Terminal 6)	Range 4...20 mA, invertible, accuracy $\pm$ 1.0 % FS, load < 500 $\Omega$ , influence < 0.1 %, open circuit voltage 24 V
Voltage input (Terminal 8)	Range 0...10 V, invertible, accuracy $\pm$ 1.0 % FS, over-voltage up to 30 V
Voltage input (Terminal 9)	Range 0...10 V, adjustable, basic accuracy $\pm$ 1.0 % FS, over-voltage up to 30 V
Voltage output (Terminal 11)	Range 0...10 V, adjustable, accuracy $\pm$ 1.0 % FS, load > 10 k $\Omega$ , influence < 0.1 %, short circuit proof (option InReg-V300-A)
Voltage input (Terminal 13)	Range 0...10 V, adjustable, basic accuracy $\pm$ 1.0 % FS, over-voltage up to 30 V (option InReg-V300-A)
Wiring diagram	SB 1.0 / 2.0
Installation	Safe areas

### Approbations

EMC	2004/108/EC
Low voltage	2006/95/EC
IP-Protection	IP66 in acc. with EN 60529
Electrical Safety	Protection Class I (grounded), Overvoltage category II acc. to EN 61010-1

### Special solutions and accessories

...-CT	Aluminium housing, Amercoat painting, parts nickel-plated, screws in VA
...-OCT	Offshore version with tubes for clamping ring connection, Al-housing, seawater-resistant Amercoat painting, parts nickel-plated, screws in VA
InMax-...-CY	Control actuator, 4...20 mA Input, 0...10 V output
InMax-...-CYF	Control actuator, 4...20 mA Input, 0...10 V output with spring return
InBox-Y/S	Terminal box, 4 $\times$ M20 $\times$ 1.5 mm cable glands $\varnothing$ 6 .. 13 mm
MKR	Mounting bracket for round ducts up to $\varnothing$ 600 mm
Kit 2	consists of 2 m flexible pressure tube $\varnothing$ 6 mm, 2 connection nipples
Kit PTC	consisting of 2 connecting tubes $\varnothing$ 6 mm for tube fittings

**Electrical Connection**

The controller requires a 24 VAC / DC power supply on terminal 1(-/~) and 2 (+/~). Terminals 1 and 2 are internally connected to terminals 4 and 5, and supplies the control actuator. (Note the actuator needs to initialize about 2 A starting current for 1 s max.). The wiring of the actuator can directly connected to terminals 4–8 with the controller. If there is less than 1 meter between the InReg controller and the actuator, the actuator may be connected directly without the use of an additional terminal box. Otherwise please order terminal box (see accessories).

**Attention** Do not open the cover when circuits alive

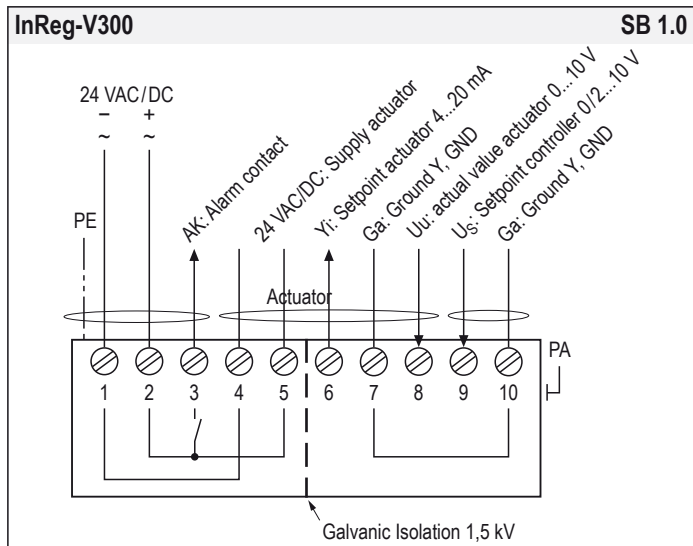
**Wiring InReg-V300**

The InReg-V300 is the basic version and can be used for the control of constant volumetric flow rates (CAV) and variable flow rates of (VAV). The alarm contact (terminal 3) is used as a feedback for normal operation, an analog feedback signal is not provided for these devices.

The setpoint is adjusted via terminal 9. The voltage range for the minimum and maximum flow rate is defined by a 2...10 V signal. A voltage value of about 12 V opens the damper below 0.2 V the damper closes completely. During these forced control functions (damper open / close) the controller is without function.

The CAV mode is configured in menu 2 by setting "CAV". The CAV mode is activated when the input voltage is not connected to terminal 9. In this case, the menu 7.2 "default" set value is used as a flow. The force control functions (damper open / close) can be applied by 0 V (close) and +24 V (open) to terminal 9. This can be done by connecting the supply voltage level 0 V and 24 V with two relays.

The simple VAV operation in menu 2 configured via the setting "VAV". This configuration allows a modulation operation in a 2...10 V signal range. In the case of 2 V it is regulated on the minimum value set in menu 5 "flow rate" and at 10 V to the maximum value. The intermediate values are according to the voltage level (2...10 V) linearly as setpoints available.

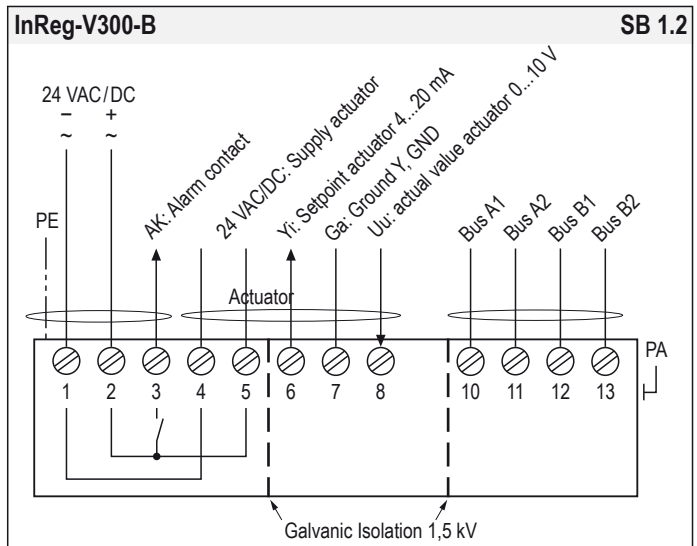
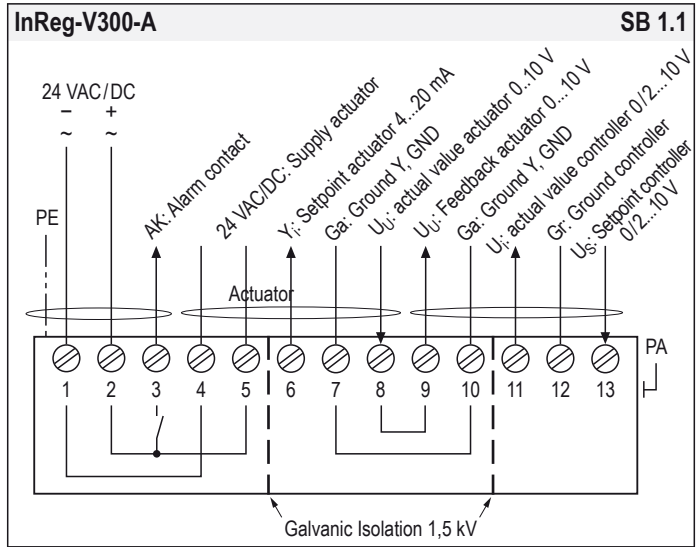


**Wiring InReg-V300 -A and ...-B**

InReg-V300-A is the standard version for the control of variable volume flow (VAV). The alarm contact (terminal 3) is used as feedback for normal operation and, in addition, the device has an analog output (terminal 11), which outputs the actual value as a continuous signal, and an analog feedback of the actuator position (terminal 9). This feature is primarily used for energy efficiency.

The setpoint is adjusted via terminal 13. The voltage range for the minimum and maximum flow rate is defined as either of 0...10 V or 2...10 V.

In addition, the positive control function can be used depending on the setting in menu 6 "set point". When the voltage value of about 12 V is exceeded the damper opens, when it drops below 0.2 V the damper is completely closed. When utilising these force control (damper open / close) the controller is without function. If the input is not connected, the flow control defaults to the set value in menu 7.2.



**Bus-Topologie**

- There must be connected to a bus only point-to-point connections
- Star wiring is not permitted
- Each device works automatically as a repeater

### Control configuration

InReg-V300 and ...-V300-A are designed for the control of volume flows. The control mode can be set in menu 8 "controller". Normally, the fully automatic determination of the control parameters (select "Auto") is sufficient. In addition, an adaptive PID (proportional component is calculated automatically) and a standard PID controller can be selected. These settings should only be used by trained personnel.

In certain cases – especially in severe pressure fluctuations in the air duct – the gain of the control loop (menu 8.2) and the control tolerance (menu 8.6) should be adjusted.

### Control speed

The control speed can be determined directly over the motor running time of the actuator. The control parameters in this case must not be changed. The controller recognizes the change automatically via the feedback signal of the actuator (terminal 7). This applies to all controller settings. The control speed depends only on the used motor running time. For more information see the data sheet of the drive.

### Zero point compensation

During commissioning, a zero point calibration should be performed to correct mounting position-dependent measurement errors. To achieve this compensation, the pressure of P+ and P- must be short circuited and "0-point" in menu 3.2 performed. Before the zero-point calibration, the controller should be connected for approximately 15 minutes to the supply voltage to achieve a uniform temperature!

### Password input

The default / delivery setup is **0000**. In this configuration the password input is not activated. To activate a password change the 4 digits into your chosen numbers (e.g. 1234) and press Enter. Due to a new parameter setup the password is requested.

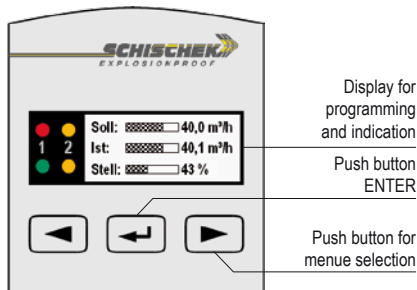
### Display / Push button

#### Display in operating mode

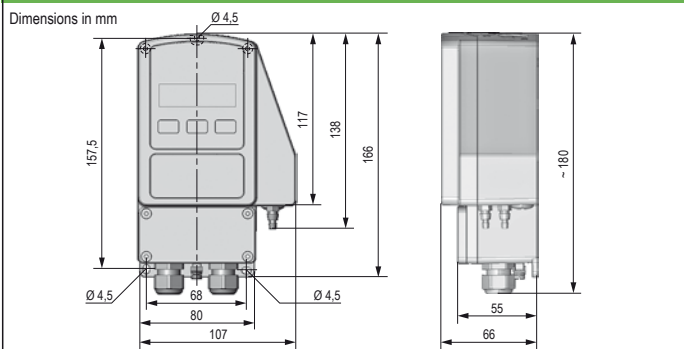
In operating mode the current set value, the actual value and the set value are displayed. The red and the green LED indicate the current operating status.

When the green LED is illuminated continuously, the system is in a stable state and indicates correct operation. If the limits of the actuator's position is reached or an internal fault is detected, the red LED lights up.

A flashing red LED indicates that the set point can not be achieved. The alarm function is active in this case. The yellow LEDs indicate during adjusting phase the direction of movement of the actuator. The upper LED denotes the actuator opens, the lower LED indicates the actuator closes. The yellow LED does not flash when the system is within the defined tolerance field (menu 12 "Controller / tolerance").



### Dimensions / Drillings



### Important information for installation and operation

#### A. Installation, commissioning, maintenance

The cable has to be drawn through the cable gland. After electrical connection the cable gland must be fixed tight. IP66 must be fulfilled. The sensors must not be opened by the customer. For electrical connection use the internal junction box.

#### B. Pressure sensors

After mounting and installation, a zero point compensation must be done, because the offset value depends on the installation position. Also see parametrisation.

#### C. Long cabling

When using long signal wires, shielded cables are recommended. The shield must be connected to the controller inside the terminal box.

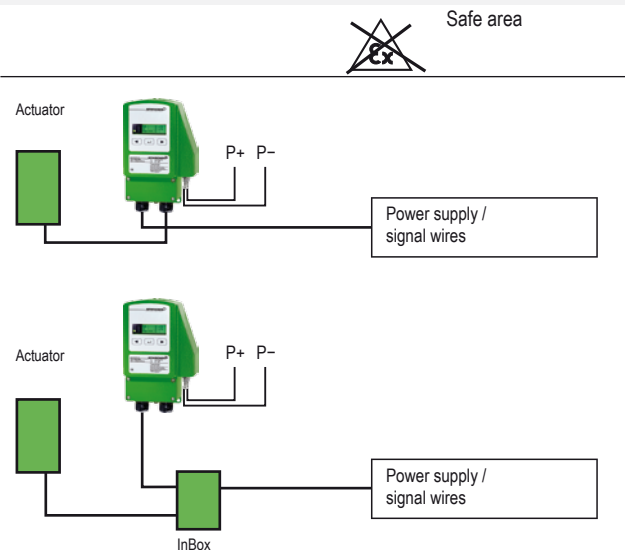
#### D. Separate ground wires

Use a separate ground for supply and signal wires.

#### E. Aggressive ambient / air

For aggressive media, compatibility should be checked

### Installation

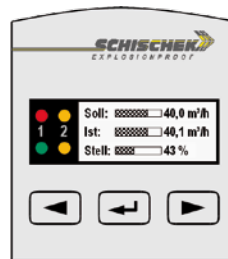


- Maintenance must comply with regional standards, rules and regulations
- Do not open covers when circuits are live
- For electrical connection use the integrated junction box
- The cable must be installed in a fixed position and protected against mechanical and thermal damage
- Connect protection earth
- Avoid thermal transfer from sensor probe to transducer (ensure max. ambient temperature)
- Ambient temperature  $-20...+50\text{ °C}$
- Close all covers, entries with min. IP66
- All transducers are maintenance free, an annual function test is recommended
- For outdoor installation a protective housing against rain, snow and sun should be applied
- Only wet cleaning

## Parametrisation and commissioning

### Change operation/parametrisation mode

To change from operation to parametrisation mode push "Enter button" (↵) for minimum 6 seconds. Back over the menu save. If password protected: type password and push (↵). Back over to the menu „Save“.























































































Operation Parametrisation,  
push (↵) for 6 s

If password (PW) protection is active:  
type PW, push (↵)






























































Menu	Function	ENTER	Indication	Select	ENTER	Description
Menu 1	<b>Language</b> Selecting the language	(↵)	1: Language English Deutsch, English, Français, Italiano, Español, back	(←) (→)	(↵)	
Menu 2	<b>Application</b> Selection the application	(↵)	2: Application VAV VAV, back	(←) (→)	(↵)	
2.1	<b>VAV</b> Selecting standard VAV-application (factory setting)	(↵)	Device'll be recon- figured. Continue? no yes	(←) (→)		
Menu 3	<b>Sensor</b> Configuration menu for sensor settings	(↵)	3: Sensor Filter Filter, 0-point comp., status, back	(←) (→)	(↵)	
3.1	<b>Filter</b> Selection filter/damping of sensor measurement	(↵)	3.1: Filter 20 s select filter time	(←) (→)	(↵)	
3.2	<b>Zero point compensation</b> Short circuit P+ and P- in final position	(↵)	Start 0-point compensation? no yes	(←) (→)		
3.3	<b>Status</b> Indication measurement value in Pa	(↵)	3.3: Status 87 Pa 5 ... 300 Pa		(↵)	
Menu 4	<b>Actuator</b> Config menu actuator	(↵)	4: Antrieb Invers Invers, test, status, back	(←) (→)	(↵)	
4.1	<b>Invers</b> Select inverse mode	(↵)	4.1: Invers off off, on, back	(←) (→)	(↵)	
4.2	<b>Test</b> Test actuator position manually	(↵)	4.2: Test 20 % position actuator 0 ... 100 %	(←) (→)	(↵)	
4.3	<b>Status</b> Indication of position actuator	(↵)	4.3: Status 20 % position actuator 0 ... 100 %		(↵)	
Menu 5	<b>Air volume</b> Configuration menu for air volume	(↵)	5: Air volume k-factor k-factor, V nominal, V maximal, V minimum, back	(←) (→)	(↵)	
5.2	<b>k-Factor</b> Input k-factor	(↵)	5.2: k-factor 50 adjust k-factor	(←) (→)	(↵)	
5.3	<b>V nominal</b> Input nominal air volume	(↵)	5.3: Vnom 1000 m³/h adjust nominal value	(←) (→)	(↵)	
5.4	<b>V maximum</b> Input maximum air volume	(↵)	5.4: Vmax 800 m³/h adjust max. Value	(←) (→)	(↵)	
5.5	<b>V minimum</b> Input minimum air volume	(↵)	5.5: Vmin 200 m³/h adjust min. value	(←) (→)	(↵)	
Menu 6	<b>Actual value</b> Configuration menu for actual value	(↵)	6: actual value Range, status, back	(←) (→)	(↵)	
6.1	<b>Range</b> Select output value	(↵)	6.1: Range 0...10 V 0...10 V, 2...10 V, 0/2...10 V, back	(←) (→)	(↵)	
6.2	<b>Status</b> Indication actual value in m³/h	(↵)	6.2: Status 100 m³/h		(↵)	

### Parametrisation and commissioning

Menu	Function	ENTER	Anzeige	Select	ENTER	Description
<b>Menu 7</b>	<b>Nominal value</b> Configuration menu for nominal value		7: Nominal value Range, status, back	 		
7.1	<b>Range</b> Select output value		7.1: Range 0...10 V 0...10 V, 2...10 V, 0/2...10/12+ V, back	 		
7.2	<b>Value</b> Adjust setpoint for CAV modus		7.2: Value 500 m³/h adjust CAV value	 		CAV modus is automatically activ if no input signal connected terminal 9 resp. 13 (...A version)
7.3	<b>Status</b> Indication of setpoint m³/h		7.3: Status 100 m³/h			
<b>Menu 8</b>	<b>Controller</b> Configuration menu for the controller		8: Controller Type, gain, P-, I-, D, tolerance	 		
8.1	<b>Type</b> Select controller type		8.1: Type Auto Auto, PID adaptive, PID norm	 		
8.2	<b>Gain</b> Adjust gain of control loop		8.2: Gain 100 % gain 1 ... 100 %	 		
8.3	<b>P-ratio</b> Adjust P-ratio		8.3: P-ratio 10 P-ratio 1 ... 100	 		
8.4	<b>I-ratio</b> Adjust I-ratio		8.4: I-ratio 2.0 s I-ratio 1 ... 10 s	 		
8.5	<b>D-ratio</b> Adjust D-ratio		8.5: D-ratio 1.0 s D-ratio 0 ... 10 s	 		
8.6	<b>Tolerance</b> Adjust contoller tolerance		8.6: Tolerance 2.0 % Tolerance 1 ... 5 %	 		
<b>Menu 9</b>	<b>Switch</b> Configuration menu for the alarm relay		9: Switch contact Alarm function, limit %, limit abs, delay time	 		
9.1	<b>Alarm function</b> Adjust alarm function		9.1: Alarm function on On, off, back	 		
9.2	<b>Limit (%)</b> Set alarm limit in %		9.2: Limit (%) 2.0 % Limit 0 ... 10 %	 		
9.3	<b>Limit (abs)</b> Set alarm limit in m³/h		9.3: Limit (abs) 20 m³/h Limit 0 ... 240 m³/h	 		
9.4	<b>Delay time</b> Set delay for alarm relay		9.4: Delay time 20.0 s Delay time 10 ... 200 s	 		
<b>Menu 10</b>	<b>No function</b> (Menu will be skipped)			 		
<b>Menu 11</b>	<b>Diagnostics</b> Electrical test of all in- and outputs		11: Diagnostics Input 1, input 2, input 3, output 1, output 2, switch, back	 		
11.1	<b>Input 1</b> Indication of status terminal 8		11.1: Input 1 10.0 V			
11.2	<b>Input 2</b> Indication of status terminal 9		11.2: Input 2 10.0 V			
11.3	<b>Input 3</b> Indication of status terminal 13		11.3: Input 3 10.0 V			
11.4	<b>Output 1</b> Test output value terminal 6		11.4: Output 1 20.0 mA Set 4 ... 20 mA	 		
11.5	<b>Output 2</b> Test output value terminal 11		11.5: Output 2 10.0 V Set 0 ... 10 V	 		



### Parametrisation and commissioning

Menu	Function	ENTER	Indication	Select	ENTER	Description
<b>Menu 11.6</b>	<b>Switch</b> Test relay function terminal 3		11.6: Switch Function: open Function open / close status open / close	 		
<b>Menu 12</b>	<b>Password</b> Configuration menu for the passwords		12: Password Level 1, level 2, level 3, back	 		
<b>12.1</b>	<b>Level 1</b> Level 1 password User level		12.1: Level1 0000 Password	 		
<b>12.2</b>	<b>Level 2</b> Level 2 password Installation level		12.2: Level 2 0000 Password	 		
<b>12.3</b>	<b>Level 3</b> Level 3 password Manufacturer level		12.3:Level 3 0000 Password	 		
<b>Menu 13</b>	<b>Indication</b> Configuration menu for the indication		13: Indication Display, contrast, brightness, short menu, back	 		Short menu „on“ reduces the parameterization to a minimum. Detail settings are not possible.
<b>13.1</b>	<b>Display</b> Set display function		13.1: Display on, lighted On lighted, on, off, back	 		
<b>13.2</b>	<b>Contrast</b> Set display contrast		13.2: Contrast 60.0 % 0 ... 100 %	 		
<b>13.3</b>	<b>Brightness</b> Set brightness for backlight		13.3: Brightness 100 % 0 ... 100 %	 		
<b>13.4</b>	<b>Short menu</b> Use short menu		13.4: Short menu off On, off, back	 		
<b>Menu 14</b>	<b>Parameter</b> Menu for parameter administration		14: Parameter Save, use, activate, erase, back	 		
<b>14.1</b>	<b>Save</b> Save parameter		14.1: Save P1 (active) P1, P2, P3, back	 		Save up to 3 different parameters to test the controller.
<b>14.2</b>	<b>Use</b> Edit parameter		14.2: Use P1 (active) P1, P2, P3, back	 		
<b>14.3</b>	<b>Activate</b> Define active parameter		14.3: Activate P1 (occupied) P1, P2, P3, back	 		
<b>14.4</b>	<b>Erase</b> Delete parameter		14.4: Erase P1 (occupied) P1, P2, P3, back	 		
<b>Menu 15</b>	<b>Leave menu</b> Leave menu and save		15: Leave menu Back, yes	