



General Room Pressure Monitoring PM100



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Room Pressure Monitoring PM 100

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Room Pressure Monitoring PM 100

Description

Product description

For use as room pressure monitoring for rooms that require constant room pressure regulation. Clean rooms or laboratories must be kept at a constant degree of overpressure or underpressure compared with adjacent rooms (e.g. corridor). Depending on the application in question, this prevents toxic or polluted air of high dust content from entering or leaving the room.

The PM100 is suitable for monitoring the required over- or underpressure

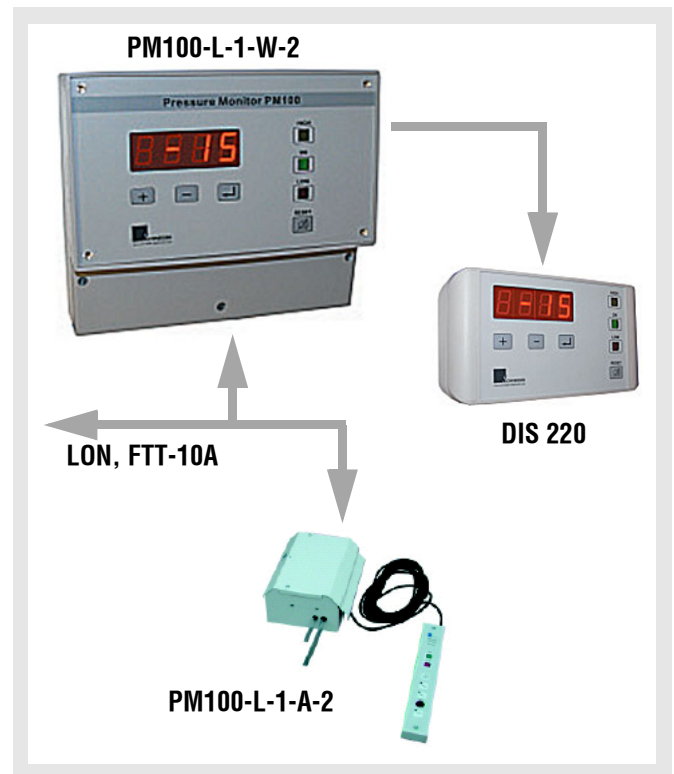
in the room and will signal when setpoint value to be monitored is exceeded or the value falls below it. The setpoint value input is effected via digital inputs by parameterisation using the SVM 100 service module or optionally via the LON network.

The following options are available:

- Differential pressure measurement with status display (red/green), alarm acknowledgement and two potential-free contacts for limit value monitoring (optional).
- Differential pressure measurement with status display (red/green), alarm acknowledgement, numeric digital display of the room pressure and two potential-free contacts for limit value monitoring (optional).

In addition to the digital display, an external display can be connected as a second display.

For maintenance, service, retrofitting, etc., inspection openings in sufficient number and size must be provided on-site.



Functional description

Microprocessor-controlled monitoring and alarm system of constant-pressure-regulated rooms. A high-speed control algorithm compares the setpoint value with the measured room pressure of the static differential pressure sensor and issues an alarm when it is exceeded or the room pressure falls below it. The setpoint values to be monitored are freely programmable and saved in the power-failure-proof EEPROM.

The PM100 automatically detects the opening of doors and windows via a special algorithm and automatically extends the alarm delay time by a parameterisable time (standard = 10 sec). If, for instance, the door is closed again within this period, monitoring will not continue until the door has been closed.

This innovative monitoring concept minimises false alarms caused by external interferences (doors, windows, etc.), thus significantly increasing operational safety.

The room pressure monitoring unit PM100 can be used as redundant monitoring system for an existing room pressure regulation (e.g. room pressure regulation CRP from SCHAKO). The potential-free contacts will signal the upper and lower limit values during limit value monitoring.

Via the optional LON interface, the room pressure monitoring unit PM can be connected to the building control system (GLT), thus making all relevant data and information available.

Performance features

- Microprocessor-controlled monitoring system
- Digital room pressure display in Pascal (optional)
- Additional external digital room pressure display in Pascal (optional second display)
- Limit value monitoring of the room under-/overpressure with acoustic alarm and acknowledgement key.
- All system data are saved power-failure-proof in the EEPROM
- Free system data parameter setting via the service module SVM-100, such as alarm delay time, room under-/overpressure.
- Retrieval of all actual values via the optional LON network
- Static differential pressure sensor of high long-term stability for the continuous measurement of the actual value in the range from 5 Pa to 100 Pa or ± 50 Pa (external)
- Monitoring of the on-site ventilation system
- Suitable as redundant room under-/overpressure regulation
- Analog actual value output 0(2)...10V DC/10mA
- Two digital inputs for setpoint value switchover
- Relay contact 1 x A for upper limit value
- Relay contact 1 x A for lower limit value
- Programming sockets on the board
- External on-site 24 V AC supply voltage
- Internal power supply unit 230V AC (optional)

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Functional description

Parameterisation

The setpoint value input is effected via digital inputs by parameterisation using the SVM 100 service module or optionally via the LON network

LON network (optional)

Parameterisation of setpoint values and actual values is possible via the LON network using standard variables (SNVT). Faults (e.g. room pressure limit values are not reached, value drops below them, etc.) are detected and signalled via the LON network.

LON networking offers maximum flexibility and reliability. Link-up to the building control system (BCS) allows complete air-related control and monitoring of all laboratory rooms and remote maintenance of the LabSystem product range.

LON Standard Network Variable Type (SNVT)

The LonMark specifications are met, thus guaranteeing easy integration of different units. The LON functionality can be easily retrofitted in all LabSystem products from SCHAKO at any time.

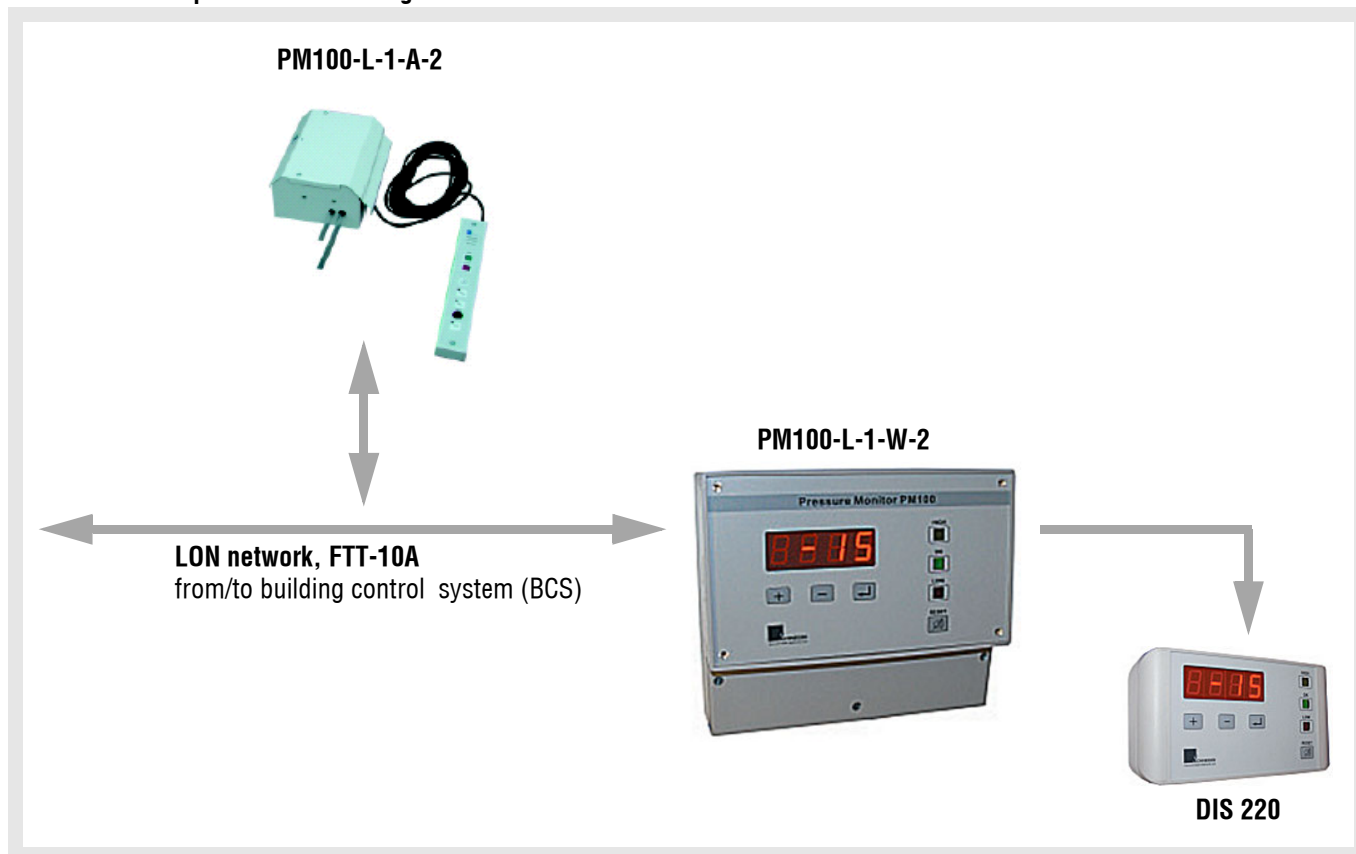
Building control system

The building control computer balances the air demand of the entire building and can additionally check all room controllers for plausibility.

This design guarantees the user a very high security standard. The building control system can be integrated at any point in the LON network.

All actual, setpoint, alarm and limit values are available via the optional LON interface and can be integrated into the building control system.

Overview: Room pressure monitoring unit PM 100



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Operating modes

Room Pressure Monitoring

In room pressure monitoring, the controlled room pressure is monitored redundantly as a function of the digital input wiring. The available monitoring stages can be seen from diagram 1 and Table 1. A 1-point, 2-point or 3-point operation (setpoint values 1 to 3) can be simply effected by directly activating the digital inputs.

Setpoint values 1 to 3 for monitoring different room pressure values

The room pressure setpoint values in diagram 1 have been set to the following setpoint values:

- Setpoint value 1** = + 40 Pascal
- Setpoint value 2** = + 20 Pascal
- Setpoint value 3** = + 10 pascal

The room pressure actual value signal (A-Out1) correlates with the measured room pressure.

For the wiring of the digital inputs, see Table 1 and terminal layout, page 9.

For lock pressure controls, positive and negative room pressure setpoint values can be controlled via a suitable differential pressure transmitter (± 50 Pascal or -80 to $+ 20$ Pascal).

Diagram 1: Room pressure monitoring

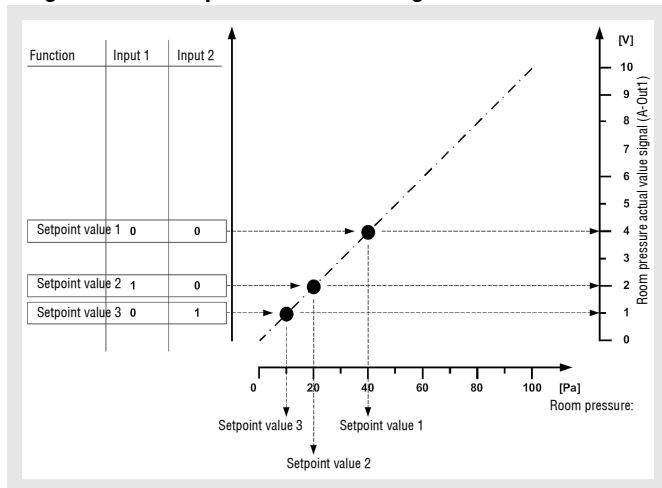


Table 1: PM monitoring setpoint values

Function	Digital inputs	
	Input 1	Input 2
Setpoint value 1	0	0
Setpoint value 2	1	0
Setpoint value 3	0	1

If inputs 1 and 2 are not wired (no current), setpoint value 1 will be controlled.

Alarm thresholds

Two independent alarm thresholds can be set to any alarm values of ± 30 Pascal. Alarm threshold 1 affects relay 1 and alarm threshold 2 affects relay 2. If the corresponding relay drops off, either the alarm threshold has been exceeded or the value has dropped below it, signalling an alarm status.

The alarm threshold values always refer to the room pressure setpoint value being currently controlled.

Example:

- Alarm threshold value 1** = + 5 Pascal
- Alarm threshold value 2** = - 3 Pascal
- Setpoint value 1** = + 20 Pascal
- Setpoint value 2** = - 15 Pascal

In room pressure monitoring by means of setpoint value 1 (+20 Pascal), the alarm threshold value 1 (relay 1 drops off) is signalled when the pressure exceeds +25 Pascal and the alarm threshold value 2 (relay 2 drops off) is signalled when the pressure drops below +17 Pascal.

In room pressure control by means of setpoint value 2 (-15 Pascal), the alarm threshold value 1 (relay 1 drops off) is signalled when the pressure exceeds -10 Pascal and the alarm threshold value 2 (relay 2 drops off) is signalled when the pressure drops below -18 Pascal.

Alarm delay time

The alarm delay time is freely programmable between 0 and 240 s. For an alarm to be triggered, the alarm status must be active for at least this set time. This time reduces wrong alarm triggers, for example in the case of an unstable air network.

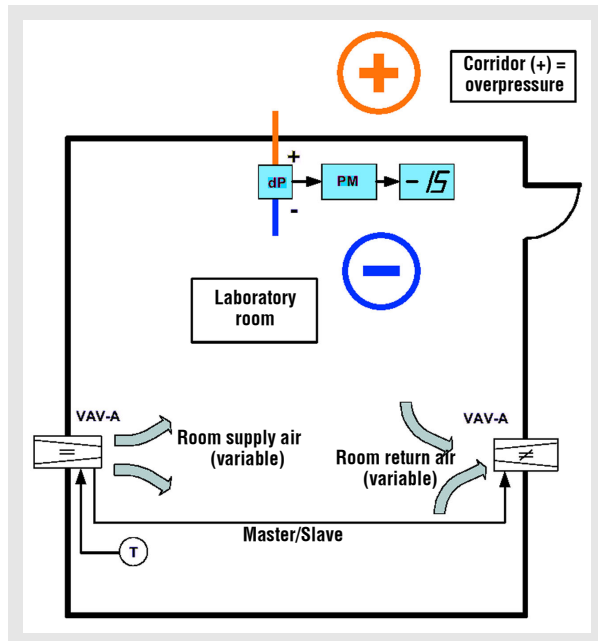
PM/CRP delay (door detection)

An additional internal delay time of 0 to 240 s is started when the differential pressure transmitter detects a sudden drop in pressure (e.g. opening a door or a window). Room pressure monitoring is discontinued and not resumed until this timer has expired.

This prevents false alarms in case of room pressure drop upon entering a room. Opening and closing a door takes less than 10 s if the room is entered rapidly. This means that at a PM/CRP delay of, for example, 15 s sudden pressure drops within this period are not signalled by an alarm.

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Room pressure monitoring of rooms controlled by master/slave



Room diagram 1 shows a variable volumetric flow controller (VAV) for room supply air, which is controlled, for example by a thermocouple. Control via a building control system (BCS) is also possible. The room supply air and room return air volumetric flow controllers are wired in master/slave mode, i.e., the room return air follows the room supply air such that a constant room underpressure is guaranteed.

The room pressure monitoring unit PM100 monitors the parameterisable room underpressure (-), for example -15 Pa, redundantly and signals when the value to be maintained is exceeded or the pressure drops below this value. Opening or closing doors within < 10 sec (programmable between 0 and 240 s) is ignored and does not result in error messages.

Via an optional LON interface, the Standard Network Variable Type (SVNT) provides, among other things, the room pressure actual value and alarm and operating messages of the building control system.

The room pressure monitoring unit PM100 can monitor a room under- or a room overpressure as desired. The volumetric flow can, of course, also be provided in 2-stage operation (day/night operation). Laboratory rooms are mainly controlled in the underpressure mode, which will prevent hazardous materials from escaping from the laboratory room.

The static differential pressure transmitter of the PM100 measures the pressure difference between the corridor (+) and the laboratory room (-) and generates the actual value signal for the numeric pressure display (e.g. -15 Pa).

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Room pressure monitoring of laboratory rooms

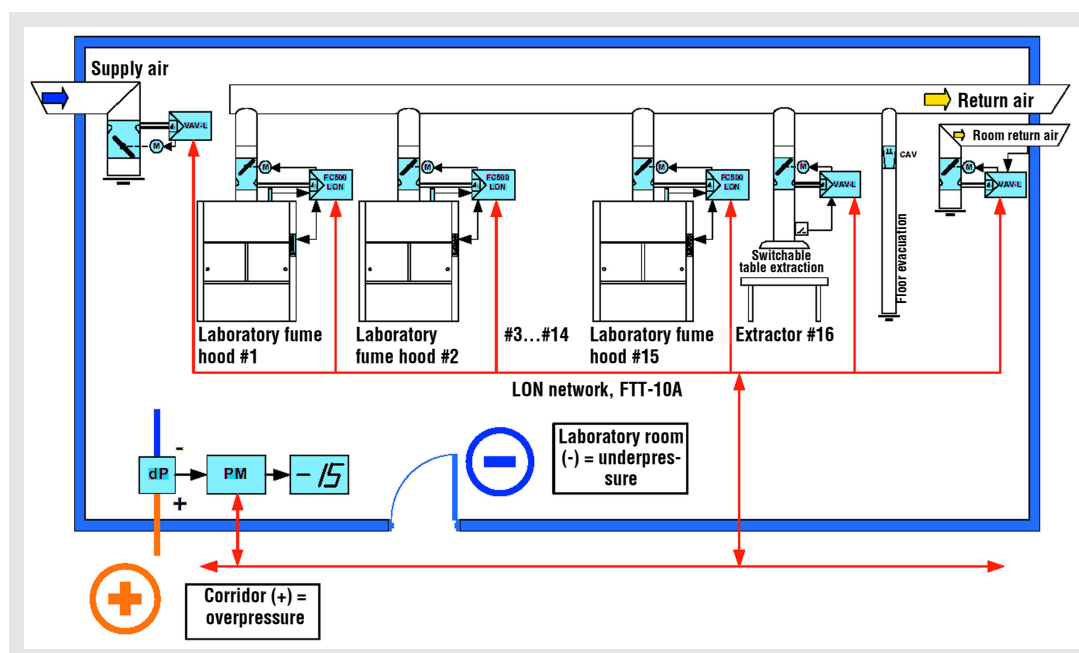
Room diagram 2 shows the wiring of up to 16 laboratory fume hoods equipped with the variable front-damper-dependent fume hood control

FC500. All lab fume hood controls are connected to one another and to the building control system via the LON network. The room supply air and the additional room return air are controlled variably. The room air change rate is always kept constant, independently of the laboratory fume hood return air, such that the room underpressure is guaranteed under all operating con-

ditions.

The room pressure controller type PM100 monitors the parameterised room underpressure (-) redundantly, for example to -15 Pa, and keeps it constant. Opening or closing doors within < 10 sec (programmable) is ignored and does not result in error messages.

Via an optional LON interface, the Standard Network Variable Type (SVNT) provides, among other things, the room pressure actual value and alarm



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Room pressure monitoring / External display

Order code: Room pressure monitoring unit

PM100 - L - 1 - W - 2	
Type	
Setpoint input/Interface	
LON field bus module, FTT-10A	L
Analog input	A
Differential pressure transmitter	
internal, 3...100 Pascal	1
external, ± 50 Pascal	2
external, - 80...+ 20 Pascal	3
	Fitted relays
0	no relay
2	2 relays for upper and lower limit value alarm
	Housing model
W	Wall housing, with display for pressure display in Pa
A	Mounting case, without display, including external control panel

Order example: Room pressure monitoring unit PM 100
 Room pressure control via LON module, differential pressure transmitter 5 ... 100 Pa, wall housing with internal display and 2 relays for upper and lower limit values.
 Product: SCHAKO type **PM100-L-1-W-2**

Design of display:
 numeric room pressure display (3½ digits) in Pascal and status display (red, green) with alarm acknowledgement.

Design of external control panel:
 Status indicator (red, green) with alarm acknowledgement

Order code: External display

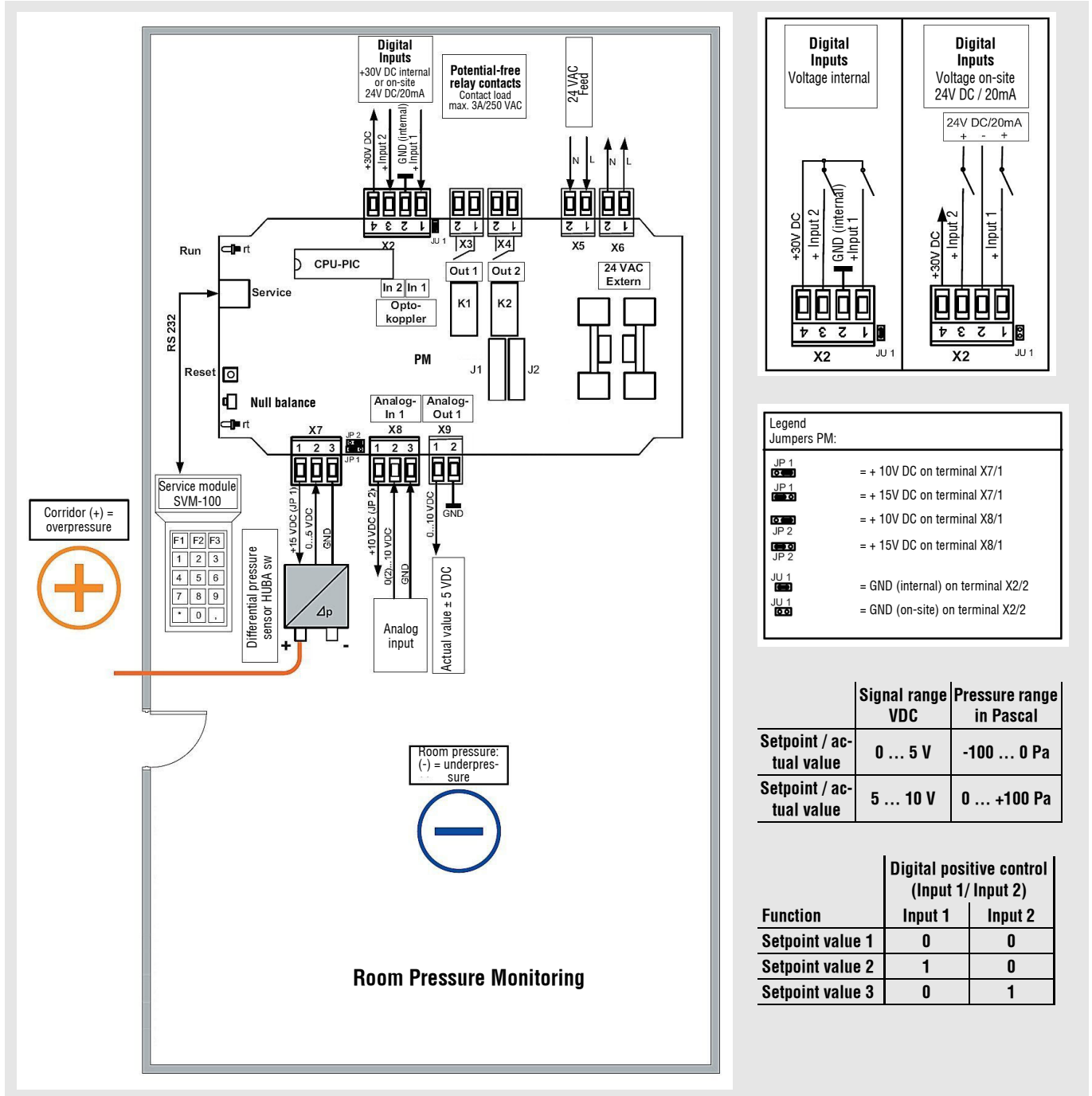
DIS 220	
Type	

Order example: External display
 External additional display with numeric room pressure display (3½ digits) in Pascal and status display with alarm acknowledgement.
 Product: SCHAKO type **DIS220**

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Terminal layout

Terminal layout: Room pressure monitoring including analog input PM100-L-1-x-2



Cable specification:	
	Cable type for 24V AC feed: at least NYM 3 x 1.5 ²
	Cable type for inputs/outputs: IY(St)Y 2x2x0.8 Lg for operating voltages < 60 V at least NYM 2 x 1.5 ² for operating voltages > 60 V to a maximum of 250 V

Sensor zero point calibration	
	Prior to startup, carry out null balance of sensor.
	1. Pull air hoses P1 and P2
	2. Press service key (about 5 sec) until Service LED flashes rapidly OR carry out null balance via the SVM100 service module
	3. Replace air hoses P1 and P2

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Technical Data

◆ General	
Rated voltage	24V AC/50/60Hz/+-15%
Current consumption	max. 350 mA
Power consumption	max. 15 VA
Recovery time	600 ms
Operating temperature	0 °C to +55 °C
Humidity	max. 80% relative, non-condensing

◆ Mounting case	
Protection type	IP 20
Material	Sheet steel
Colour	white, similar to RAL 9002
Dimensions (BxHxT)	(185 x 167 x 92) mm
Weight	approx. 1.2 kg
Device terminals	Screw terminal 1.5 mm ²

◆ Wall housing	
Protection type	IP 20
Material	Plastic PVC
Colour	white, similar to RAL 9002
Dimensions (BxHxT)	(235 x 205 x 105) mm
Weight	approx. 1.0 kg
Device terminals	Screw terminal 1.5 mm ²

◆ External second display	
Protection type	IP 20
Material	Plastic PVC
Colour	white, similar to RAL 9002
Dimensions	(200 x 110 x 60) mm
Weight	approx. 0.3 kg
Device terminals	Screw terminal 1.5 mm ²

◆ Relay outputs	
Number	2 relays (K1, K2)
Contact type	Work contact
Switching voltage	max. 250V AC
Continuous current	max. 3A

◆ Digital inputs (galvanically separated)	
Number	2 optocouplers
Input voltage	max. 24V DC +-15%
Input current	max. 10mA (per input)

◆ Digital inputs (galvanically separated)	
Number	2 optocouplers
Input voltage	max. 24V DC +-15%
Input current	max. 10mA (per input)

◆ Analog outputs	
Output	0(2)...10V DC, 10mA

◆ Analog inputs	
1 input	0(2)...10VDC, 1mA 0(2)...5V DC, 1mA

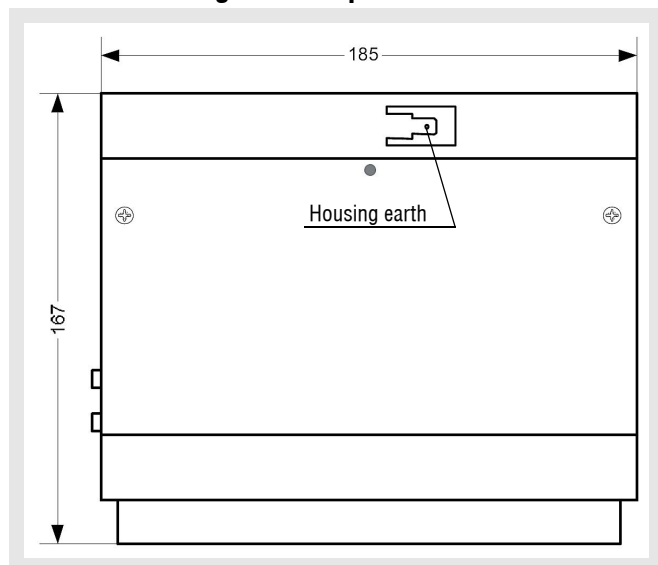
◆ Differential pressure transmitter	
Measuring principle	static
Pressure ranges	5...100 Pascal ± 50 Pascal -80...+20 Pascal
Response time	<10 ms
Sensor bursting pressure	500 mbar

◆ LON specification	
	FTT-10A, free topology
Network variables	Standard Network Variable Type (SNVT) to LONMark

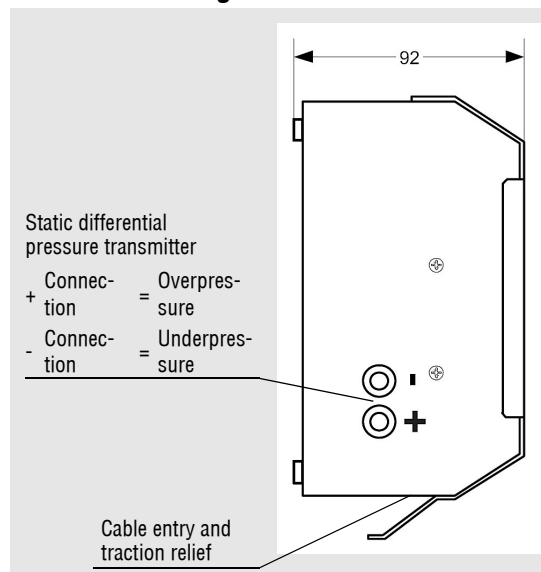
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Dimensions

PM100 mounting case: Top view



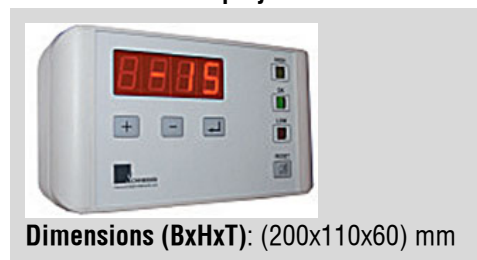
PM100 mounting case: Side view



PM100 wall housing including display



External second display



Specification text

Room pressure monitoring unit with integrated microprocessor, static differential pressure transmitter and plug-in LON module(optional). High-speed monitoring of the room under/overpressure with optic and acoustic alarm and provision of relay contacts for exceeding the upper limit value and for the pressure to drop below the lower limit value. Opening or closing doors within < 10 sec (programmable) is detected automatically and not signalled as alarm. All setpoint values can be programmed via the SM100 service module or laptop.

.Saving all of system data in the power-failure-proof EEPROM. Suitable for redundant room pressure monitoring. The room pressure is displayed (Pascal) on the 3½ digit internal display. An external second display can be connected as an option.

LON integration is done via the transceiver FTT-10 A, free topology. Standard Network Variable Type (SNVT) according to Lon-Mark specification.

Product: SCHAKO type PM100