Product description

For use as a room pressure control system for maintaining constant room pressure. Clean rooms or laboratories must be maintained in a state of constant positive or negative pressure relative to neighbouring rooms (e.g. corridor). Depending on the area of application, the infiltration or leakage of contaminated or impure air with excess levels of dust is thus avoided.

CRP is suitable for self-sufficient regulation of the required positive or negative room pressure. The specification of setpoints is done via the digital inputs, by programming via the service module SVM100 or optionally via the LON network.

CRP is available in various configurations:

- Differential pressure control (room pressure control) with a digital display (wall mounted case) and two potential-free contacts for monitoring thresholds (optional)
- Differential pressure control without a digital display (mounting case) and with two potential-free contacts for monitoring thresholds (optional)

In addition to the digital display an external display can also be connected as a secondary display.

DA-250-S-MM-1

DIS220

CRP-L-1-W-2

LON, FTT-10A

Functional description

Microprocessor controlled rapid regulation system for constant pressure control in rooms. A rapid control algorithm compares the constant setpoint value with the room pressure measured by the static differential pressure sensor and regulates the pressure quickly, precisely and steadily, independent of pressure fluctuations in the duct system. The programmed constant positive or negative room pressure is thus maintained.

The constant negative pressure is freely programmable and is saved mains voltage failure-safe in the EEPROM. The control curve is automatically calculated in relation to the specified setpoint value. The control speed is very fast (regulation time < 3 s) and the motor running time for 90° is freely programmable from 3 s to 24 s.

CRP automatically recognises when doors and windows are opened and automatically delays the regulation of the required room pressure by a programmable time period (default = 10 sec). If, for example, the door is shut within this time, regulation takes place again only after the door has been shut. This novel control concept devised by SCHNEIDER reduces unnecessary regulation cycles and thus significantly increases durability and operating safety.

SCHNEIDER CRP room pressure controllers are available as round and rectangular models in galvanised steel or PPs (round model only).

The CRP room pressure controller works self-sufficiently and has an internal setpoint monitoring system with a potential-free relay output for both the upper and lower setpoints.

Performance features

- Microprocessor controlled room pressure controller
- Digital room pressure display in pascal (optional)
- Additional external digital room pressure display in pascal (optional secondary display)
- External control panel with status display and alarm acknowledgement
- Integrated optional setpoint monitoring of negative/ positive room pressure with acoustic alarm
- Freely programmable constant pressure maintenance
- All system data are saved mains voltage failure-safe in the EEPROM
- Servo motor running time < 3 s for 90°, running time delay freely programmable
- Free programming of system data via the service module SVM100, such as regulation time, positive or negative pressure
- Retrieval of all actual values via the LON network (optional)
- Static differential pressure sensor with high long-term stability for continuous measurement of the actual value in the range 5 pa to 100 pa or ± 50 pa (external)
- Rapid predictive control algorithm
- Rapid, stable and precise control through direct activation of the servo motor with feedback potentiometer
- Closed loop
- Monitoring of the customer ventilation system
- Suitable as a room supply air or exhaust air controller
- Analogue actual value output 0(2)...10V DC / 10mA
- Two digital inputs for up to three different room pressure setpoint specifications (e.g. air locks, daytime/nighttime operation)
- Relay contact 1 x A for monitoring the upper setpoint
- Relay contact 1 x A for monitoring the lower setpoint
- Programming plug on the circuit board
- External customer supply voltage 24V AC

Functional description

Programming

Programming of setpoint values and readout of the actual value is done via the service module SVM100, laptop or LON network.

LON network (optional)

Programming of setpoint values and the actual values are available via the LON network as standard variables (SNVT). Malfunctions (e.g. maintenance of room pressure is not achieved, setpoint values exceeded/underrun, etc.) are recognised and signalled via the LON network.

The LON network offers maximum flexibility and security. The connection to the building services management system (BSM) enables monitoring and control of the entire ventilation system of all laboratories as well as remote maintenance of the LabSystem product range.

LON standard network variable type (SNVT)

The LonMark specifications are fulfilled, guaranteeing trouble-free integration of different subsections. The LON functionality can easily be retrofitted in all SCHNEIDER LabSystem products at any time.
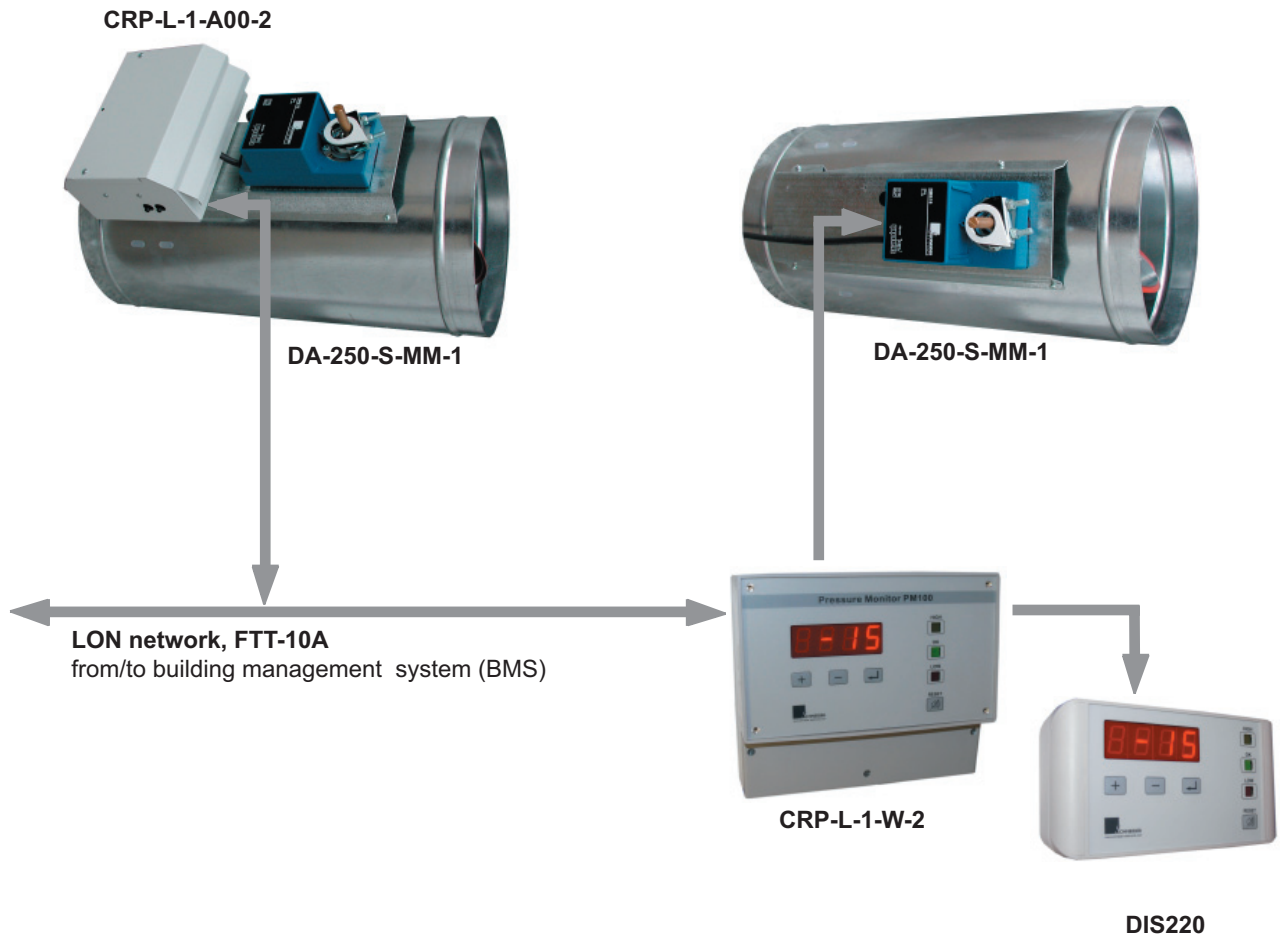
Building services management system

The building's central computer balances the entire air requirement of the building and can also test all room pressure controllers for plausibility.

This concept ensures a very high security standard for the user. The building services management system can be integrated anywhere in the LON network.

All actual, setpoint, alarm and threshold values are available via the optional LON interface and can be integrated in the building services management system.

Overview:
Room pressure controller CRP

CRP-L-1-A00-2

DA-250-S-MM-1

DA-250-S-MM-1

LON network, FTT-10A
from/to building management system (BMS)

CRP-L-1-W-2

DIS220

Constant room pressure (CRP)

At constant room pressure regulation of the desired volume flow is dependent on the digital input wiring.

The available stages of operation can be seen in diagram 1 and table 1. 1 point, 2 point or 3 point operation (setpoint 1 to 3) can easily be achieved by direct activation of the digital inputs.

Setpoints 1 to 3 to room pressure specification

The room pressure setpoints in diagram 1 are programmed to the following setpoints:

> **Setpoint 1 = + 40 pascal**
> **Setpoint 2 = + 20 pascal**
> **Setpoint 3 = + 10 pascal**

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

See table 1 and the terminal connection diagram on page 6 for the wiring of the digital inputs.

For air lock pressure controllers positive and negative room pressure setpoints can be regulated with a suitable differential pressure transmitter (± 50 pascal or - 80 to + 20 pascal).

Alarm thresholds

Two independent alarm thresholds can be programmed with user-defined alarm values of von ± 30 pascal. Alarm threshold 1 operates on relay 1 and alarm threshold 2 operates on relay 2. If one of the relays drops out the alarm threshold is exceeded or underrun and the alarm status is signalled.

The alarm threshold values always relate to the room pressure setpoint value that is currently to be regulated.

Example:

> **Alarm threshold 1 = + 5 pascal**
> **Alarm threshold 2 = - 3 pascal**
> **Setpoint 1 = + 20 pascal**
> **Setpoint 2 = - 15 pascal**

When the room pressure is maintained at setpoint 1 (+20 pascal) alarm threshold 1 (relay drops out) is exceeded or underrun and signalled at > +25 pascal and alarm threshold 2 (relay 2 drops out) is exceeded or underrun and signalled at < +17 pascal.

When the room pressure is maintained at setpoint 2 (-15 pascal) alarm threshold 1 (relay 1 drops out) is exceeded or underrun and signalled at < -10 Pascal and alarm threshold 2 (relay 2 drops out) is exceeded or underrun and signalled at > -18 pascal.

Diagram 1: Constant room pressure controller (CRP)
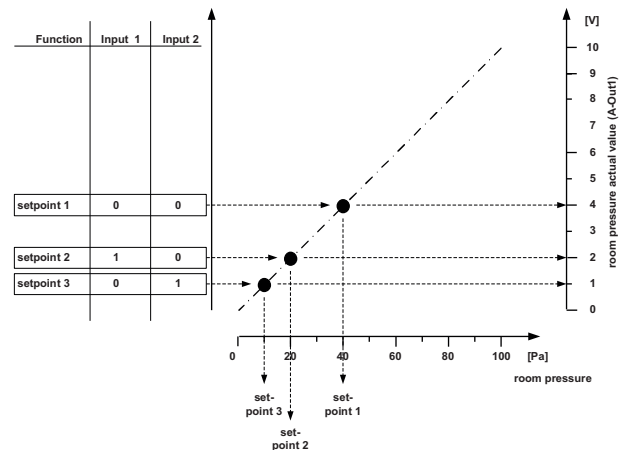
Table 1: CRP operating modes

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

When inputs 1 and 2 are not wired (without current) setpoint 1 is regulated.

Alarm delay time

The alarm delay time is freely programmable from 0...240 s. Alarm status must be in force for at least this programmed time in order for the alarm to be activated. This time reduces false alarm activations, e.g. when the ventilation system is unstable.

CRP delay (door recognition)

An additional internal delay period of 0...240 s is started when the differential pressure transmitter detects a sudden change in pressure (e.g. when a door or window is opened). The damper on the room pressure controller stalls and the room pressure is only regulated when this timer has stopped.

This prevents unnecessary room pressure maintenance attempts when a room is entered. The time taken to open and close a door when the room is entered quickly is less than 10 s. That means that with a CRP delay of e.g. 15 s sudden pressure changes are not regulated within this time.

Room plan 1 ● CRP room pressure controller with variable or constant room supply air

Room plan 1 shows a variable volumetric flow controller (VAV) for the room supply air, which is activated by a thermal element, for example. Activation via a building management system (BMS) is also possible.

The CRP room pressure controller automatically regulates the programmed negative room pressure (-) via the room supply air, e.g. -15 pa, and maintains it at a constant level, although the supply air volume flow is subject to variable control. Opening and closing of doors within < 10 s (0...240 s programmable) are ignored and have no effect on the control process.

Via an optional LON connection, the room pressure actual values as well as building services management alarm and operating notifications are available via the standard network variables (SNVT).

The room pressure controller can optionally regulate negative or positive room pressure. The volume flow for the room supply air can of course be supplied in a 2-stage operation (daytime/nighttime operation) or via a constant volume flow controller (CAV). Laboratories are primarily regulated at a state of negative pressure, whereby the escape of contaminants from the laboratory is avoided.
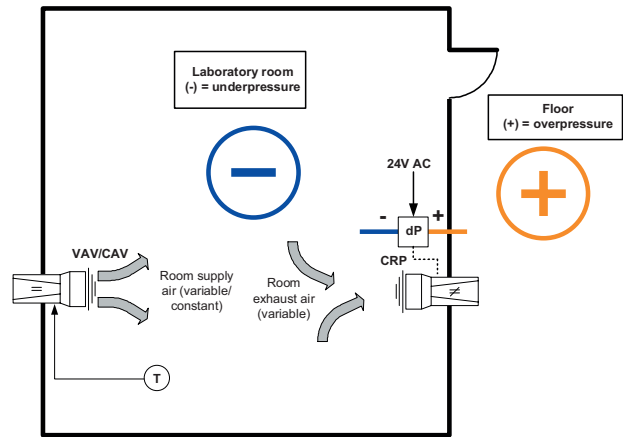

The CRP's static differential pressure transmitter measures the differential pressure between the corridor (+) and the laboratory (-) and generates the actual value signal for the setpoint that is to be regulated.

Room plan 2 ● CRP room pressure controller with variable or constant room exhaust air
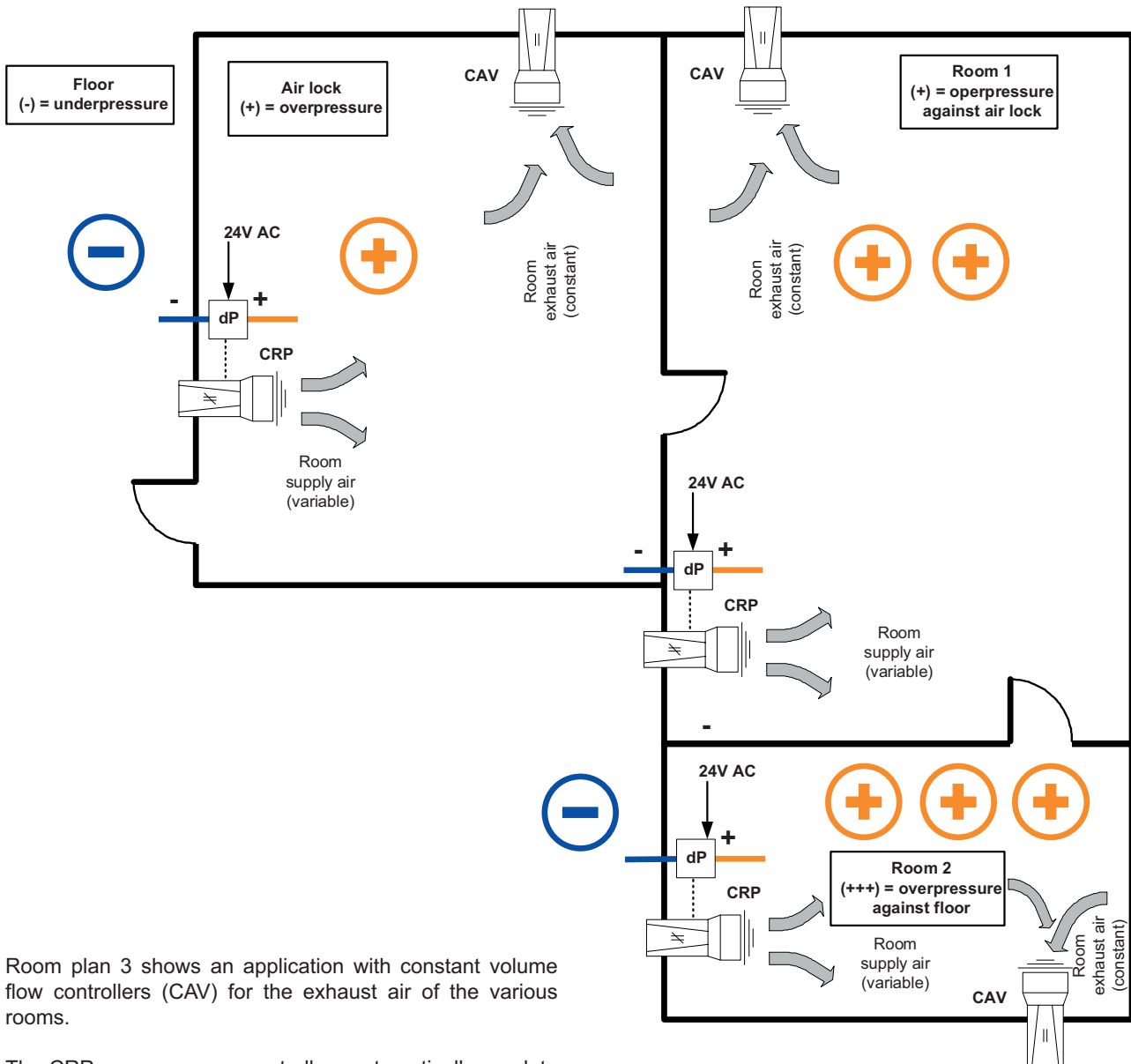
Room plan 2 is the same as room plan 1, except that here the room exhaust air is controlled via a variable (VAV) or constant (CAV) volume flow controller.

The CRP room pressure controller follows the room exhaust air and maintains the room pressure at a constant level of positive pressure (e.g. +10 pa) via the room exhaust air.

Clean rooms are primarily regulated at positive pressure, whereby the infiltration of „unclean" air into the clean room is avoided.
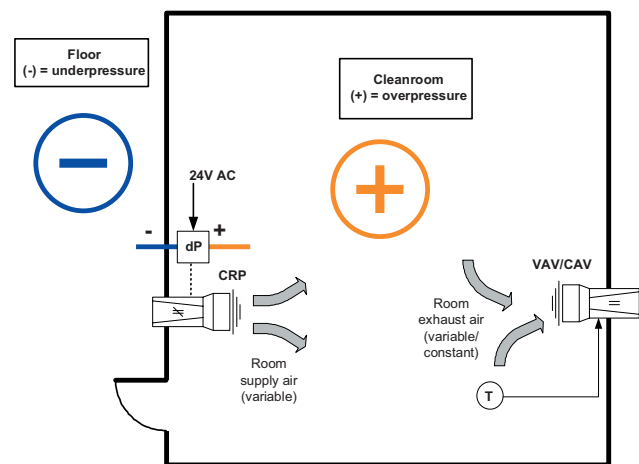
Room plan 3 ● CRP air lock room pressure controller with variable or constant room exhaust air

| Floor (-) = underpressure | Air lock (+) = overpressure | CAV | CAV | Room 1 (+) = operpressure against air lock |

Room exhaust air (constant)

Room supply air (variable)

CRP

24V AC

Room exhaust air (constant)

Room supply air (variable)

24V AC

CRP

24V AC

CRP

Room 2 (+++) = overpressure against floor

Room supply air (variable)

Room exhaust air (constant)

CAV

Room plan 3 shows an application with constant volume flow controllers (CAV) for the exhaust air of the various rooms.

The CRP room pressure controllers automatically regulate the programmed positive room pressure (+) for each room. The programmed values and the reference measurements of the differential pressure transmitter are are shown in Table 2.

Table 2: Sample values and reference measurements

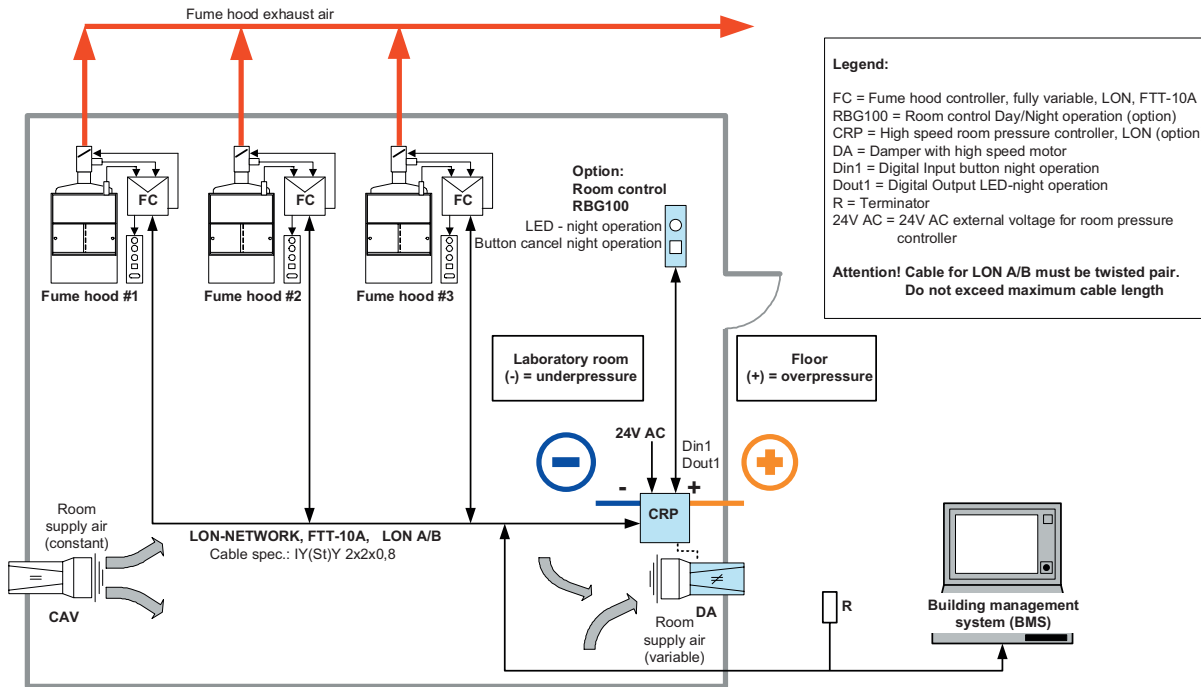| Room	Reference measurement against	Programmed value [pascal]	Differential pressure against corridor (atmosphere) [pascal]
Air lock	Corridor	+10	+10
Room 1	Air lock	+10	+20

The air lock CRP measures and controls the differential pressure between the corridor (-) and the air lock (+), while the room 1 CRP measures and controls the differential pressure between the air lock and room 1. The positive pressure of room 1 therefore follows the positive pressure of the air lock with a differential pressure of +10 pa. The room 2 CRP references the corridor directly and maintains a constant positive pressure of +30 pa.

User-defined reference measurements and CRP configurations (room supply air or exhaust air) are possible, depending on the application.

Room plan 4 ● Room pressure controller CRP with constant room supply air and variable room exhaust air

Room plan 4 shows the interconnection of three fume hoods with variable sash-dependent FC500 extraction controllers. All fume hood controllers are connected to one another via the LON network and with the building services management system. The room supply air is constantly controlled, e.g. by a mechanical volume flow controller. Thus the room air rate is always constant, independent of the fume hood exhaust air. The CRP room pressure controller automatical-
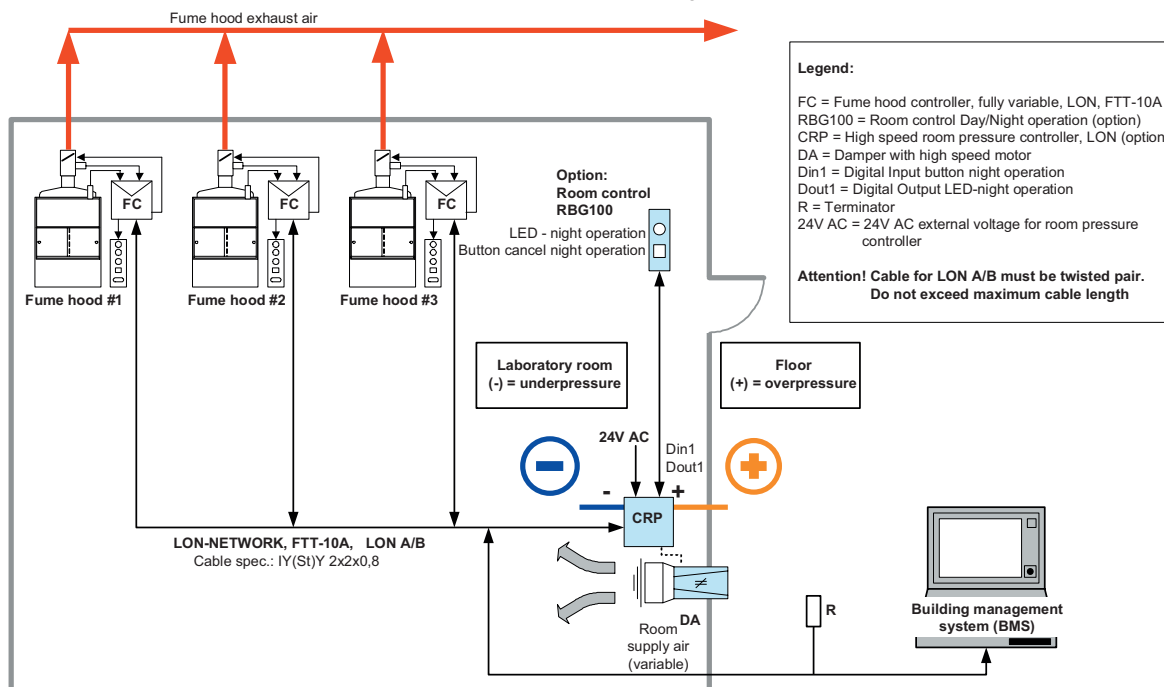
ly regulates the programmed negative room pressure (-), e.g. -10 pa, and maintains it at a constant level. Opening and closing of doors within < 10 s (programmable) is ignored and does not affect the regulation process. An optional LON connection is also possible, whereby the CRP room pressure controller can balance the fume hood exhaust actual values and alarm and operating notifications for the building control technology are available.

Legend:

FC = Fume hood controller, fully variable, LON, FTT-10A
RBG100 = Room control Day/Night operation (option)
CRP = High speed room pressure controller, LON (option)
DA = Damper with high speed motor
Din1 = Digital Input button night operation
Dout1 = Digital Output LED-night operation
R = Terminator
24V AC = 24V AC external voltage for room pressure controller

**Attention! Cable for LON A/B must be twisted pair.
Do not exceed maximum cable length**

Room plan 5 ● CRP room pressure controller with variable room supply air

Room plan 5 is a simpler version of the above example. Here the room supply air follows the food hood exhaust air variably, provided that the negative room pressure always remains constant (e.g. -10 pa). Here as well, the CRP room

pressure controller automatically controls the programmed negative room pressure. Via the optional LON connection all implemented functions can be controlled or called up via the standard variables (SNVT) in accordance with Lon-Mark.

Legend:

FC = Fume hood controller, fully variable, LON, FTT-10A
RBG100 = Room control Day/Night operation (option)
CRP = High speed room pressure controller, LON (option)
DA = Damper with high speed motor
Din1 = Digital Input button night operation
Dout1 = Digital Output LED-night operation
R = Terminator
24V AC = 24V AC external voltage for room pressure controller

**Attention! Cable for LON A/B must be twisted pair.
Do not exceed maximum cable length**

Order code: Room pressure controller / Damper with servo motor / External display

Order code: **Room pressure controller**

CRP - L - 1 - W - 2

Type

Setpoints/interface

| LON field bus module, FTT-10A | L |
| Digital/analogue | D |

Differential pressure transmitter

internal, 3...100 pascal	1
external, ± 50 pascal	2
external, - 80...+ 20 pascal	3

Relay equipment

| 0 | no relay |
| 2 | 2 relays for upper and lower threshold alarms |

Case type and display variations

| W | Wall-mounted case, with display for pressure in Pa |
| A | Mounting case, without display |

Internal display model:
Numerical room pressure display (3½ -digit) in pascal and status display (red, green) with alarm acknowledgement.

Ordering example: Room pressure controller CRP
Room pressure controller, with LON module, differential pressure transmitter 5...100 pa, wall-mounted case with internal display and 2 relays for upper and lower thresholds.

Make: SCHNEIDER

Type: **CRP-L-1-W-2**

⚠ **CAUTION!**

If used as a room pressure controller, order the damper with servo motor (e.g. DA-250-S-MM-1) as well.

Order code: **Damper with servo motor**

DA - 250 - S - MM - 1

Type

Nominal diameter [mm]

DN 160	160
DN 200	200
DN 250	250
DN 315	315

Material

Polypropylene (PPs)	P
FM 4910	F
Galvanised steel	S
Stainless steel V4A	V

Servo motor type

| 1 | SCHNEIDER standard 12V, 3sec for 90° |
| 2 | Continuous drive 24V, 5sec for 90° |

Pipe connections inflow/outflow

MM	Socket/socket
FF	Flange/flange
MF	Socket/flange
FM	Flange/socket

Ordering example: Damper with servo motor
DN250, galvanised steel, socket/socket, fast servo motor 3sec for 90° (SCHNEIDER standard).

Make: SCHNEIDER

Type: **DA-250-S-MM-1**

Order code: **External display**

DIS220

Type

Order code: External display
Additional external display with numeric room pressure display (3½ -digit) in pascal and status display with alarm acknowledgement.

Make: SCHNEIDER

Type: **DIS220**

Terminal diagram: room pressure controller with analog input CRP-A-1-xxx-2

Digital inputs
+30V DC internal or 24V DC/20mA external

Potential-free relay contacts
contact load max. 3 A/250 VAC

24 VAC supply voltage

Digital inputs
internal voltage

Digital inputs
external voltage 24V DC/20mA

24V DC/20mA

Legend
Jumper CRP-AN1-NMQ15:

JP 1	= +10V DC to connector X7/1
JP 1	= +15V DC to connector X7/1
JP 2	= +10V DC to connector X8/1
JP 2	= +15V DC to connector X8/1
JU 1	= GND (internal) to connector X2/2
JU 1	= GND (external) to connector X2/2

Floor (+) = overpressure

Room pressure (-) = underpressure

Actuator with feedback potentiometer
NMQ 15
3 Nm
3 sec

Air-direction

Room pressure controller

Cable specification:

⚠ **Cable type for 24V AC for main power:**
minimum NYM 3 x 1,5²

⚠ **Cable type for In-/Outputs:**
IY(St)Y 2x2x0,8 Lg for votage < 60 V
minimum NYM 2 x 1,5² for voltage > 60 V up to 250 V

	Voltage range in VDC	Pressure range in Pascal
Set / actual value	0...5 V	-100...0 Pa
Set / actual value	5...10 V	0...+100 Pa

Function	Digital forced control (Input 1/Input 2)	
	Input 1	Input 2
Set point 1	0	0
Set point 2	1	0
Set point 3	0	1

Zero point calibration of the sensor

⚠ **Before commissioning complete the zero point calibration.**
1. **Disconnect air hoses P1 and P2**
2. **Push button Service for app. 5 s till the Service-LED is blinking fast OR complete zero point calibration via the Service module SVM100**
3. **Connect air hoses P1 and P2**

TERMINAL CONNECTION DIAGRAM

Room pressure controller 5...100Pa, ANALOGUE, without Display	CRP-AN1-NMQ15
SCHNEIDER ELEKTRONIK	Rev.: 1.0	Date: 20. January 2006

General

Nominal voltage	24V AC/50/60Hz/+-15%
Max. charging rate	350 mA
Max. power input	15 VA
Reactivation time	600ms
Operating temperature	0 °C to +55 °C
Humidity	max. 80 % relative, non-condensing

Case

Protection type	IP 20
Material	sheet steel
Colour	white, similar RAL 9002
Dimensions (WxHxD)	(185 x 167 x 92) mm
Weight	approx. 1.2 kg
Terminals	screw terminal 1.5 mm^2

Wall mounting case

Protection type	IP 20
Material	PVC
Colour	white, similar RAL 9002
Dimensions (WxHxD)	(235 x 205 x 105) mm
Weight	approx. 1.0 kg
Terminals	screw terminal 1.5 mm^2

External secondary display

Protection type	IP 20
Material	PVC
Colour	white, similar RAL 9002
Dimensions (WxHxD)	(200 x 110 x 60) mm
Weight	approx. 0,3 kg
Terminals	screw terminal 1.5 mm^2

Relay outputs

Number	2 relays (K1, K2)
Contact type	front contact
Max. switching voltage	250V AC
Max. continuous current	3A

Digital inputs (galvanically separated)

Number	2 optocoupler
Max. input voltage	24V DC +-15%
Max. continuous current	10mA (per input)

Analogue outputs

1 output	0(2)...10V DC, 10mA

Analogue inputs

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

Differential pressure transmitter

Measuring principle	static
Pressure range	3...100 pascal
	± 50 pascal
	-80...+20 pascal
Response time	<10 ms
Overpressure	500 mbar

Servo motor with damper

Torque	3 Nm
Running time	3 sec. für 90 Grad
Activation	direct with integrated flow monitoring
Angle resolution	< 0,5°
Angle response	linear via potentiometer

LON-specification

Transceiver	FTT-10A, free topology
Network variables	Standard network variable (SNVT) to LonMark

Dimensions ● Dimensional diagrams

Mounting case CRP: Top view

185

167
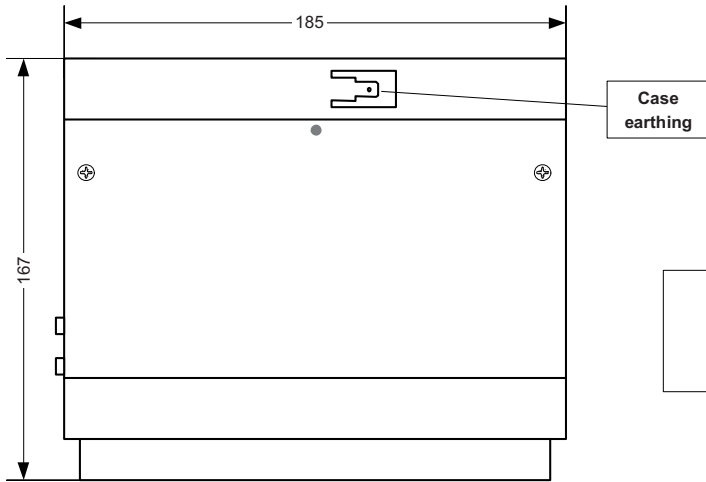
Case
earthing

Mounting case CRP: Side view

92

Static differential
pressure transmitter
+ = overpressure
- = underpressure

Cable entry point
and pull relief
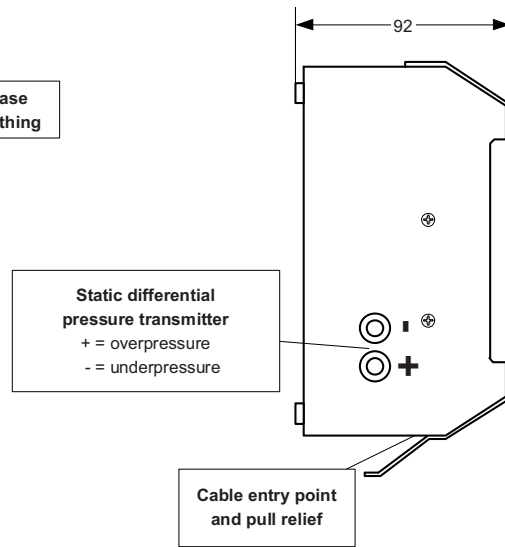
**Damper with fast servo motor, Model:
galvanised steel socket/socket**

DA-250-S-MM-1

Wall-mounted CRP with display

Dimensions (WxHxD): (235 x 205 x 105) mm

Volume flow and dimensions

Nominal diameter [mm]	Length [mm]	V_1 (7m/s) [m³/h]	V_2 (10m/s) [m³/h]
DN 160	410	500	720
DN 200	450	800	1150
DN 250	500	1200	1750
DN 315	600	2000	2800

**Volume flows V_1 and V_2 relate to a flow velocity of 7m/
sec and 10m/sec.**

**DIS220
External secondary
display**

Dimensions (WxHxD): (200 x 110 x 60) mm

Tender specification CRP

Room pressure controller with integrated microprocessor,
static differential pressure transmitter and pluggable LON
module (optional). Rapid, constant, automatic regulation (<
3 s) of negative and positive room pressure with integrated
monitoring function and acoustic alarm as well as provision
of relay contacts for exceedance of the upper threshold and
underrun of the lower threshold. The opening and closing of
doors for < 10 s (programmable) is automatically recognis-
ed and not regulated. All setpoint values are programmable
via the service module SVM100 or laptop. All system data
are saved mains voltage failure-free in the EEPROM. Sui-
table for room supply air and exhaust air regulation. The
room pressure (pascal) is displayed via the 3½-digit internal
display. Optionally an external secondary display can be
connected.
The LON connection is done via the FTT-10A transceiver,
free topology. Standard network variables (SNVT) in accor-
dance with the LonMark specification.

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