

Documentation

RM-BV 12 DP

Filter control

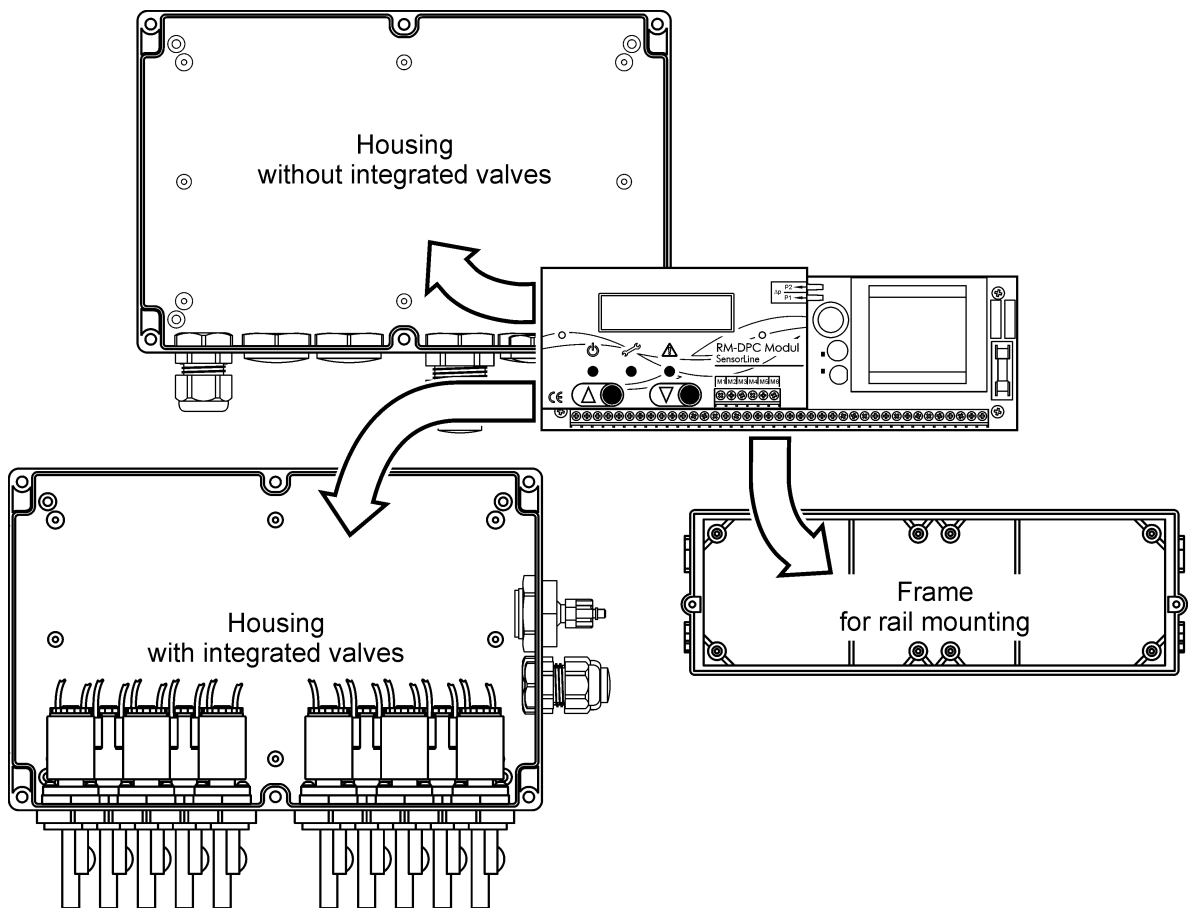


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Regulations

2014/30/EU

2014/35/EU

Legends



Important note



Important warning

1 Safety instructions

Improper installation of the *RM-BV 12 DP* or associated equipment may cause the failure of the device, serious or even fatal injuries. In addition to general safety rules for equipment in industrial electrical installations pay particular attention to the following points:

- The *RM-BV 12 DP* must only be installed by qualified persons according to the provisions of the standards IEC 364 and DIN VDE 0105 for electrical equipment.
- All applicable laws, conditions, rules and regulations governing the installation of electrical equipment must be observed.
- Equipment with protection rating IP00 without covers must only be configured by authorised expert staff when disconnected and whilst observing the local safety and accident prevention rules.
- The *RM-BV 12 DP* is only allowed to be operated in its specified operating range.



Switch off the supply voltage before replacing the *RM-BV 12 DP* or components connected to it. Failure to do so may cause equipment damage.

2 Device description

The *RM-BV 12 DP* filter controller is used to control solenoid valves on filtering separators. One *RM-BV 12 DP* can control up to 12 solenoid valves featuring a rated voltage of 24 VDC.

2.1 Function in "as delivered" condition

The start input for downtime cleaning (terminals 25, 26) is factory-bridged. Cleaning starts when the filter's differential pressure Δp has reached the "Press.thresh." value (factory setting: 10 mbar). The solenoid valves are controlled one after the other. By cleaning the differential pressure drops after a certain period of time. When the differential pressure has reached the value "Press.thresh." minus "dP Hysteresis" (factory setting: 4 mbar), i.e. the differential pressure is 10 mbar - 4 mbar = 6 mbar, cleaning stops.

If a different function is desired or additional functions shall be activated, the parameter setting of the *RM-BV 12 DP* must be changed. For this, refer to ⑭ "Parameterisation keys" on page 11 and section 6 "Parameter setting" on page 13.

3 Design versions

- Enclosed housing with integrated solenoid valves (refer to figure 1, left)
- Enclosed housing without integrated solenoid valves (refer to figure 1, right)
- on a carrier for rail mounting (refer to figure 6 on page 7)

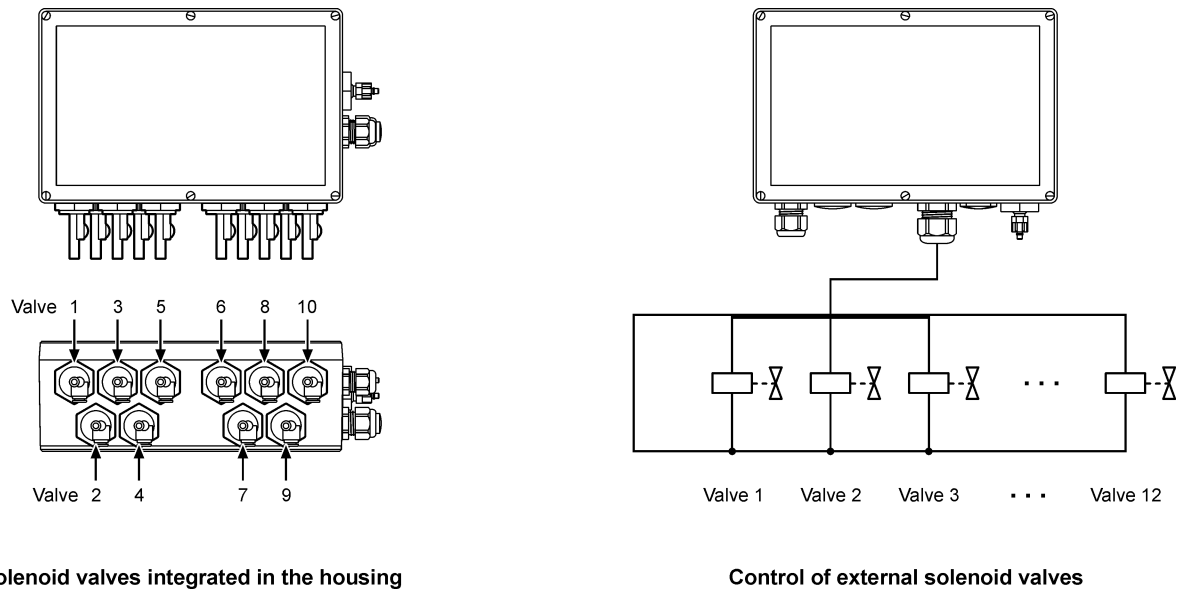
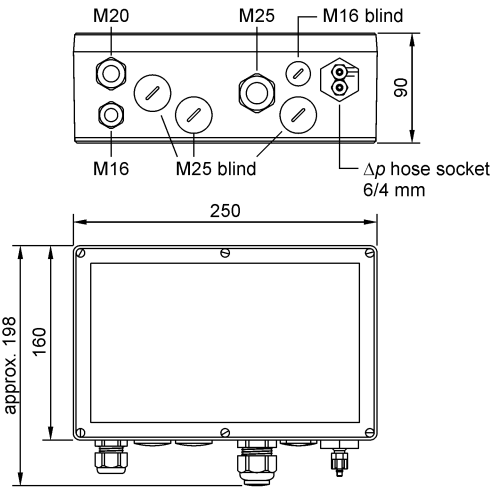
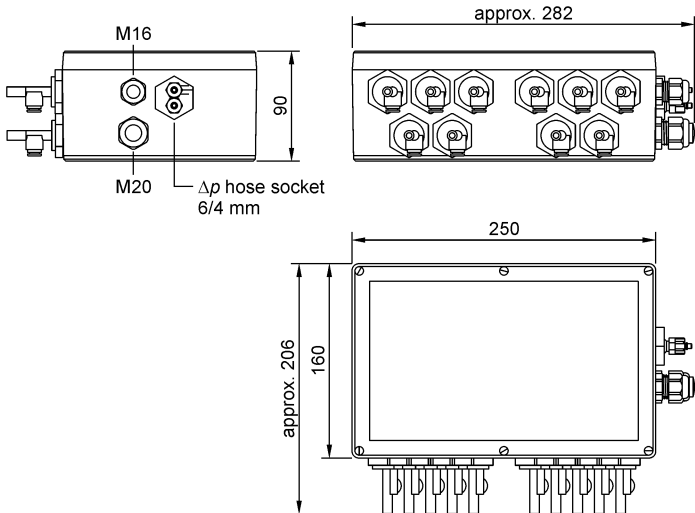


Figure 1: Design versions with and without solenoid valves

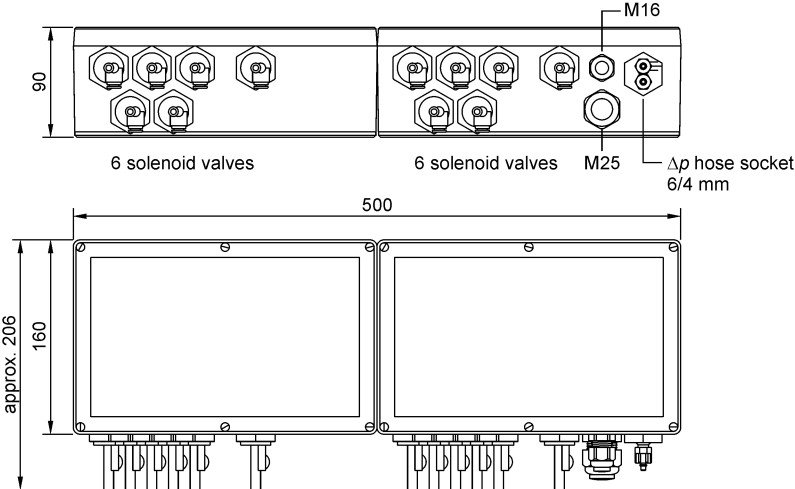
4 Assembly



RM-BV 12



RM-BV 12 with up to 10 integrated valves
(shown with 10 valves)



RM-BV 12 with 11 or 12 integrated valves
(shown with 12 valves)

Figure 2: Design versions within enclosed housings

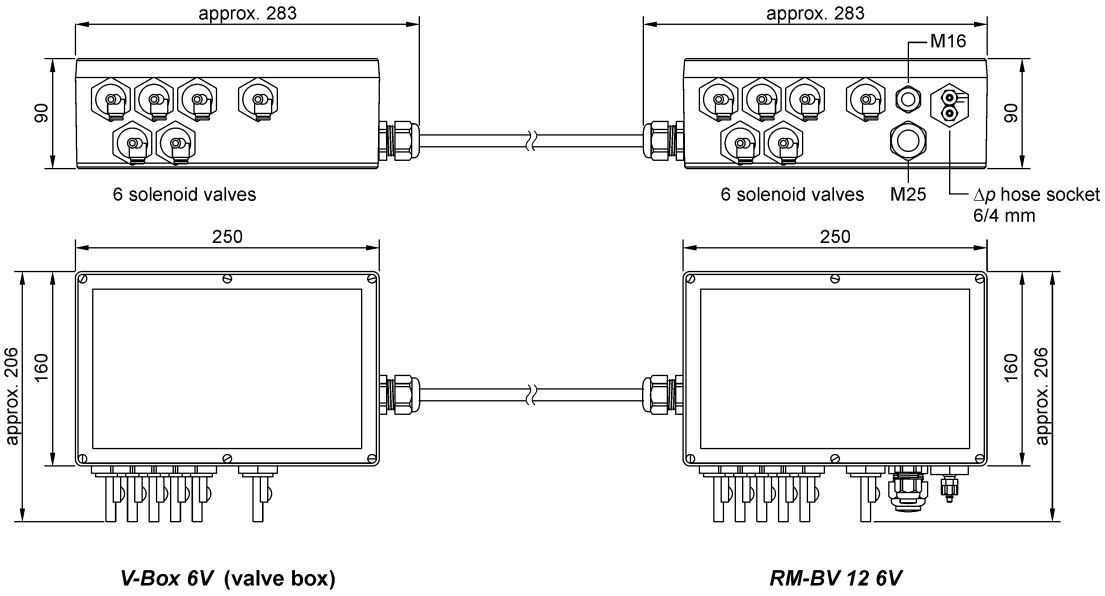


Figure 3: RM-BV 12 6V with separate valve box V-Box 6V

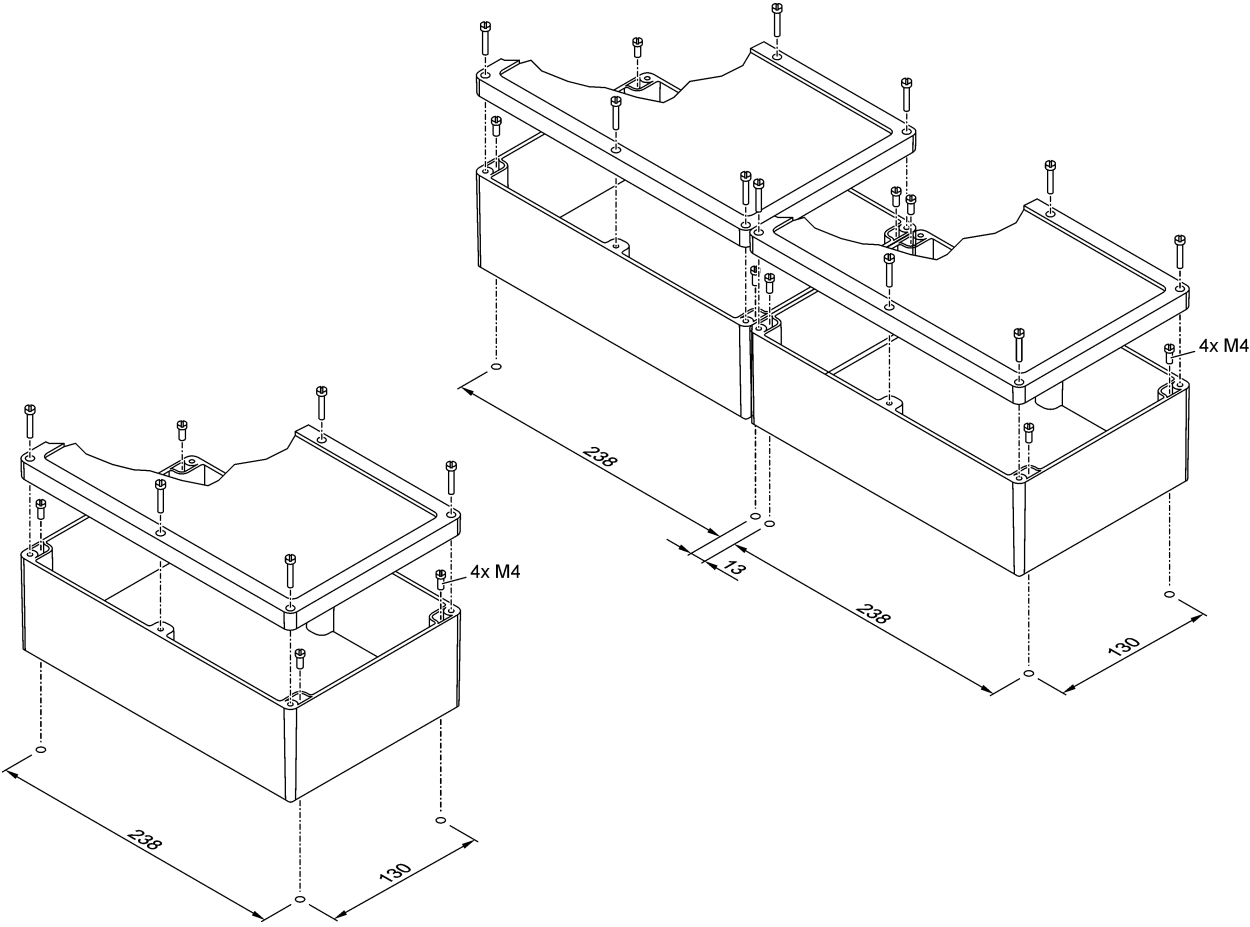


Figure 4: Housing assembly

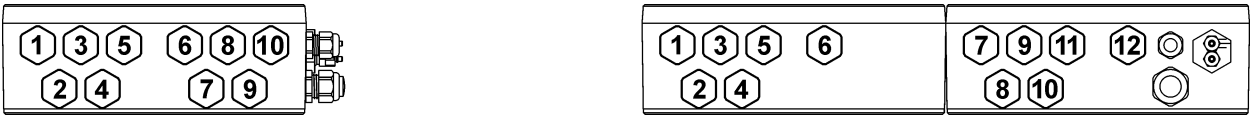


Figure 5: Valve numbering

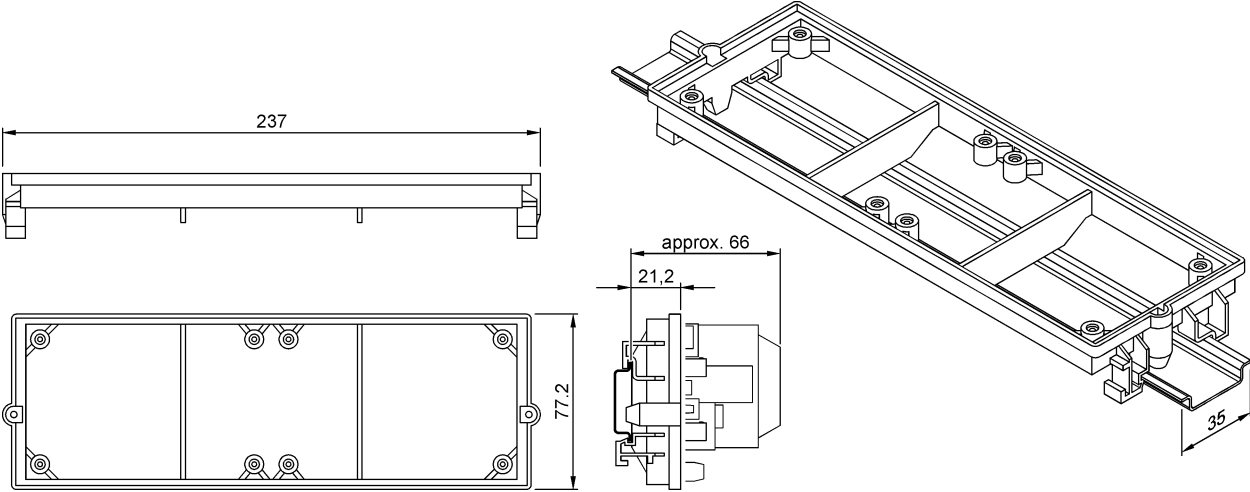


Figure 6: Design version with carrier for rail mounting

Connection of the differential pressure measurement lines

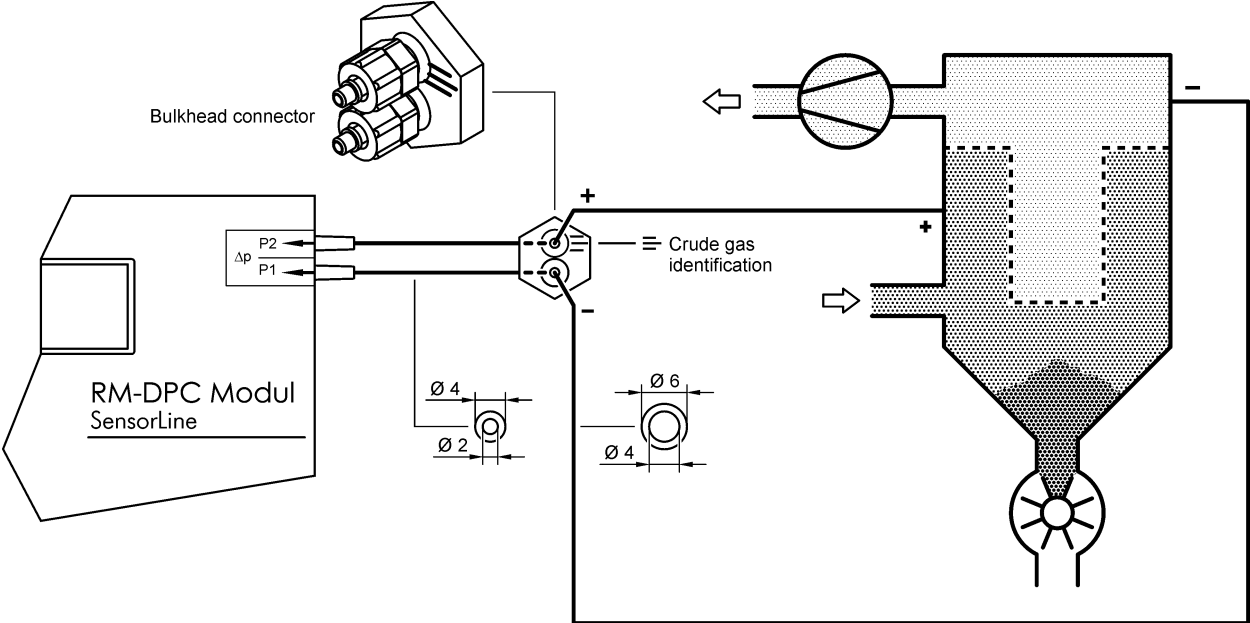


Figure 7: Connection of the differential pressure measurement lines

Item number
in figure 8

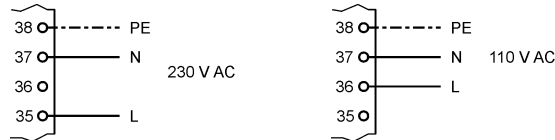
Description

① **Supply voltage**

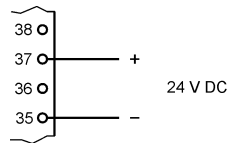


There are separate controller models for the supply voltages 230 V AC / 110 V AC and 24 V DC. Before connecting the supply voltage, check whether the rated voltage of the controller matches with the supply voltage (see nameplate).

230 / 110 VAC version



24 VDC version

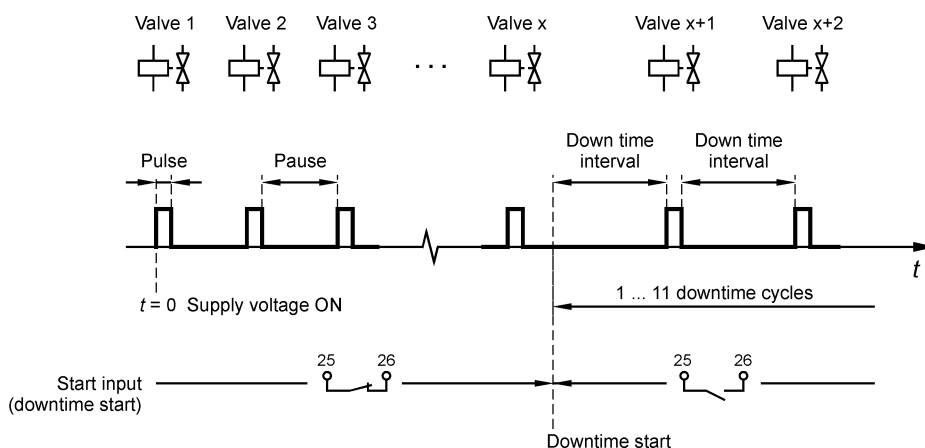


② **Valve outputs**

It is possible to connect up to 12 solenoid valves featuring a rated voltage of 24 VDC to the terminals 1 ... 24.

③ **Start input**

The start input for downtime cleaning (terminals 25, 26) is factory-bridged. When a contact (NC) connected to this input is opened, the set downtime cycles are started, beginning with the pulse time. Downtime cleaning is resumed with the valve following to the last controlled valve. The pause time during downtime can be set by the "10 DT pause" parameter.



Description

- 4 Stop input**
- When a contact (NO) connected to the input (terminals 27, 28) is closed, a running cleaning process (Δp -controlled cleaning, permanent cleaning and forced cleaning) is immediately stopped. When the contact opens again, cleaning is resumed with the valve that follows to the last operated valve. Active downtime cycles remain unaffected by the stop input.
- 5 Cleaning output**
- The potential-free relay output "Cleaning", terminals 29 (NO), 30 (COM) and 31 (NC), is active during a running cleaning process (Δp -controlled cleaning, permanent cleaning, downtime cleaning and forced cleaning).
- 6 Alarm output**
- The potential-free "Alarm" relay output, terminals 32 (NO), 33 (COM) and 34 (NC) is used for self-monitoring of the *RM-BV 12 DP*. This output is energised during trouble-free operation. Following events will cause the relay contact to drop off:
- Failure of the supply voltage
 - For the 24 V version: supply voltage higher than 25 VAC or 30 VDC
 - Broken wire on one of the connected valves
 - Short-circuit of a valve output
- 7 LED "ON"**
- The LED "ON" lights when the supply voltage is applied. This LED blinks during the downtime cleaning.
- 8 LED "Stop"**
- The "Stop" LED lights when the "Stop" input is energised (refer to ④ "Stop input").
- 9 LEDs V1 ... V12**
- A LED assigned to a valve output lights when the relevant output is closed.
- 10 Plug-type connectors for Δp module**
- The *RM-DPC module* is plugged on four 2-pin plug connectors on the base board.
- 11 LED "ON"**
- Lights when the supply voltage is applied.

Description

12 LED "Service"

Blinks when the set service hours have expired.

13 LED "Alarm"

Blinks when one of the following alarms occurs:

- Δp max alarm (the set " Δp max alarm" switch point is reached)
- Δp pre-alarm (the set " Δp pre-alarm" switch point is reached)
- Valve alarm (broken wire or short-circuit on the valve output indicated by a number on the display)



On the display, clear text indicates the alarm type. The valve alarm remains stored. With the \blacktriangle key, you can clear (acknowledge) the alarm. The "dP max alarm" and "dP pre-alarm" messages are not stored. They are automatically cleared when the pressure values drops under the " Δp max alarm" or " Δp pre-alarm" switch points again.

14 Parameterisation keys

- Parameter selection: Press
Simultaneous pressing of the \blacktriangle key and the \blacktriangledown key longer than 3 seconds. Then, select your desired parameter by short pressing on the keys \blacktriangle (scroll up) or \blacktriangledown (scroll down).
- Parameter value setting:
After parameter selection, by simultaneous pressing of the keys \blacktriangle and \blacktriangledown longer than 3 seconds. Then, set your desired value by short pressing on the keys \blacktriangle (scroll up) or \blacktriangledown (scroll down). Then, confirm the set value by simultaneous pressing of the keys \blacktriangle and \blacktriangledown longer than 3 seconds. The new value is stored. You can select further parameters for setting or checking by short pressing on the keys \blacktriangle -or \blacktriangledown .
- Returning to the "Operation" mode: Press
Simultaneous short actuation of the keys \blacktriangle - and \blacktriangledown .



The program automatically returns to the "Operation" mode when no key has been pressed for 1 minute.

Description

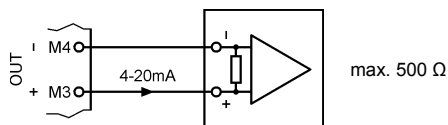
15 Alarm output, parameterisable

The function of the "Alarm" relay output, terminals M1, M2, is set by the parameter 12 "Relay funct." (for this, refer to ⑭ "Parameterisation keys" on page 11 and section 6 "Parameter setting" on page 13). You can choose from following functions:

- Parameter setting: /dP+valve alarm **factory setting**
The contact opens at Δp alarm (switch point " Δp pre-alarm" or " Δp max alarm" reached) or at valve alarm (broken wire or short-circuit on the valve output indicated by the number on the display).
- Parameter setting: /dP alarm
The contact only opens at Δp alarm (switch point " Δp pre-alarm" or " Δp max alarm" reached).
- Parameter setting: dP+valve alarm
The contact closes at Δp alarm (switch point " Δp pre-alarm" or " Δp max alarm" reached) or at valve alarm (broken wire or short-circuit on the valve output indicated by the number on the display).
- Parameter setting: dP alarm
The contact only closes at Δp alarm (switch point " Δp pre-alarm" or " Δp max alarm" reached).

16 4-20 mA output

4-20 mA output (4 ... 20 mA $\hat{=}$ 0 ... 50 mbar), active



6 Parameter setting

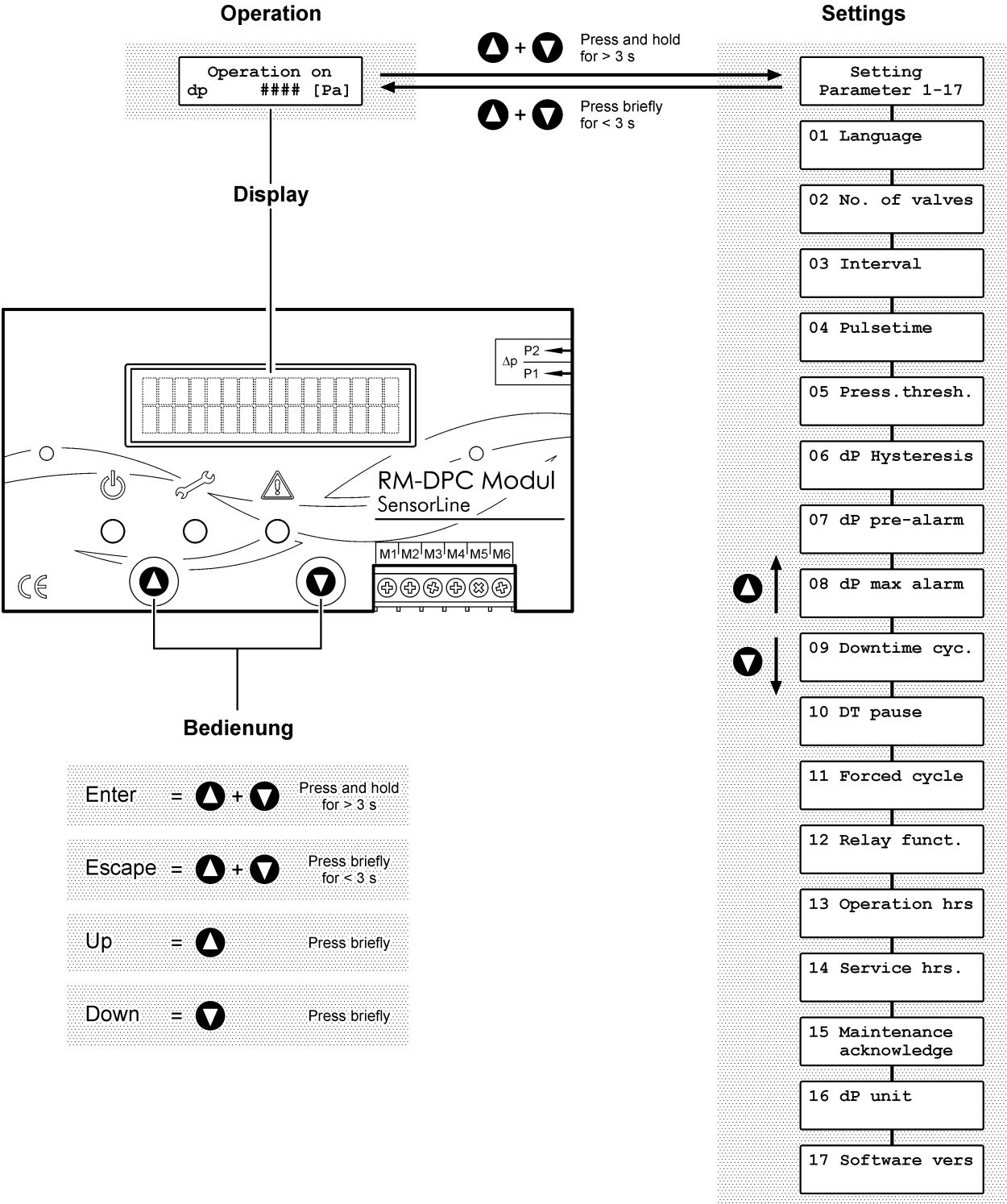


Figure 9: Brief instructions on how to check or edit parameter values

6.1 Parameter list

Parameter	Display text	Meaning	Factory setting	Setting range
01	01 Language	Language of display text	D	D, GB, F, E
02	02 No. of valves	Number of valves	Acc. to order	2 - 12
03	03 Interval	Pause time	10 s	5 - 99 s
04	04 Pulsetime	Pulse time of the cleaning valves	100 ms	50 - 200 ms
05	05 Press.thresh.	Δp ON	10 mbar	0 ¹ , 5 - 20 mbar
06	06 dP Hysteresis	Δp OFF	4 mbar	0.5 - 8 mbar
07	07 dP pre-alarm	Δp pre-alarm switch point	0 mbar ¹	0 ¹ , 10 - 19 mbar
08	08 dP max alarm	Δp -Max alarm switch point	20 mbar	0 ¹ , 15 - 30 mbar
09	09 Downtime cyc.	Number of downtime cycles	0	0 - 11
10	10 DT pause	Pause time during downtime and forced cycle	5 s	5 - 30 s
11	11 Forced cycle	Time until start of forced cleaning	0 min ¹	0 ¹ , 10 - 990 min
12	12 Relay funct.	Function of "Alarm" relay output, M1, M2	/dP+valve alarm ²	4 functions ²
13	13 Operation hrs	Operating hour counter ³	–	–
14	14 Service hrs.	Service interval ⁴	25000 h	0 ¹ , 5000 - 25000 h
15	15 Maintenance acknowledge	Acknowledgement of the service message	–	–
16	16 dP unit	Unit of the displayed differential pressure	mbar	mbar, Pa, inch H ₂ O, hPa
17	17 Software vers	Software version	–	–

¹ 0 = function deactivated

² dP+valve alarm (contact closes at Δp alarm and valve alarm),
dP alarm (contact only closes at Δp alarm),
/dP+valve alarm (contact opens at Δp alarm and valve alarm),
/dP alarm (contact only opens at Δp alarm),

³ The operating hour counter runs when the supply voltage is applied.

⁴ The service hour counter runs when the differential pressure Δp is 2 mbar or higher and the "14 Service hrs." parameter is not set to "0".

7 Operating modes

7.1 Differential pressure controlled cleaning (parameters 05, 06)

In "Operation" mode, the filter's current differential pressure Δp is displayed in the text display (row 2) of the Δp module. Cleaning starts when the differential pressure has reached the value "05 Press.thresh.". The solenoid valves are controlled one after the other using the interval set in parameter 03. By cleaning the differential pressure drops after a certain period of time. When the differential pressure has reached the value "05 Press.thresh." minus "06 dP Hysteresis", the current cleaning cycle is run up to the end. Then, the cleaning process stops.

7.2 Permanent cleaning (parameter 05)

If the parameter 05 is set to "0", cleaning will take place permanently. Using the set control times for pulse time and pause time, all connected solenoid valves are controlled one after the other starting with a cleaning pulse. Once the last valve has been operated, the control circulation is continued with the first valve. This happens until the supply voltage is turned off. Once the supply voltage has been turned on again, a restart occurs as described above.

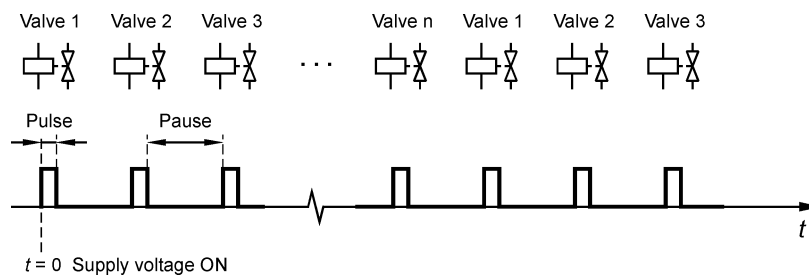


Figure 10: Permanent cleaning when the parameter 05 is set to "0"

7.3 Downtime (parameters 09, 10)

Refer to ③ "Start input" on page 9.

7.4 Forced cleaning (parameter 11)

To activate the forced cleaning, the parameter "05 Press.thresh." must be set to a value higher than "0". When the filter's differential pressure Δp does not reach the value "Press.thresh." after expiration of the time set under parameter "11 Forced cycle" (Δp -dependent cleaning was not started), a cleaning cycle is executed.

When the "Press.thresh." value has been reached before the above time has expired (start of Δp -dependent cleaning), the internal timer for forced cleaning initiation is restarted.

7.5 Stopping a running cleaning via the "Stop" input

Refer to ④ "Stop input" on page 10.

8 Technical specifications

Item	Data	Terminals
Supply voltage	Design version 230 / 110 V AC: 230 V AC +/-10 % 50-60 Hz Power consumption: approx. 125 mA	35 (L) 37 (N) 38 (PE)
	110 V AC +/-10 % 50-60 Hz Power consumption: approx. 220 mA	36 (L) 37 (N) 38 (PE)
	Design version 24 V DC: 24 V ... 30 V DC Power consumption: approx. 1.5 A	35 (-) 37 (+)
Outputs for solenoid valves	12 short-circuit-proof outputs, 24 V DC, max. 1.9 A	1 (valve 1) 3 (valve 2) 5 (valve 3) to 23 (valve 12) 2, 4, 6 ... 24 (COM)
Signal input	2 inputs 24 VDC, to be served potential-free	25, 26 27, 28
Signal outputs	2 relay outputs (changeover contact), potential-free Max. contact rating: 250 V AC, 10 A 50 V DC, 1,5 A / 30 V DC, 10 A (ohmic)	29, 30, 31 32, 33, 34
	1 relay output (configurable as NO or NC contact), potential-free Max. contact rating: 250 V AC, 10 A 50 V DC, 1,5 A / 30 V DC, 10 A (ohmic)	M1, M2
	1 analog output, active 4 ... 20 mA $\hat{=}$ 0 ... 50 mbar	M3, M4
Fuse	Design version 230 / 110 V AC: T 0.8 A, 250 V, 5 x 20 mm	
	Design version 24 V DC: T 2.5 A, 250 V, 5 x 20 mm	
Temperature range	-20 °C ... +60 °C	
Protection class	Housing IP66, NEMA 4	
Weight	within housing with 10 integrated valves: approx. 2,700 g on carrier: approx. 850 g	
Installation height	Max. 3000 m above sea level	
Measuring range	0 ... 50 mbar	
Dimensions	see section 4 "Assembly" on page 5	

Disclaimer

The contents of this documentation has been verified for correctness and completeness. Nevertheless, errors can not be excluded so that we cannot guarantee the correctness of this information. Subject to alterations at any time.