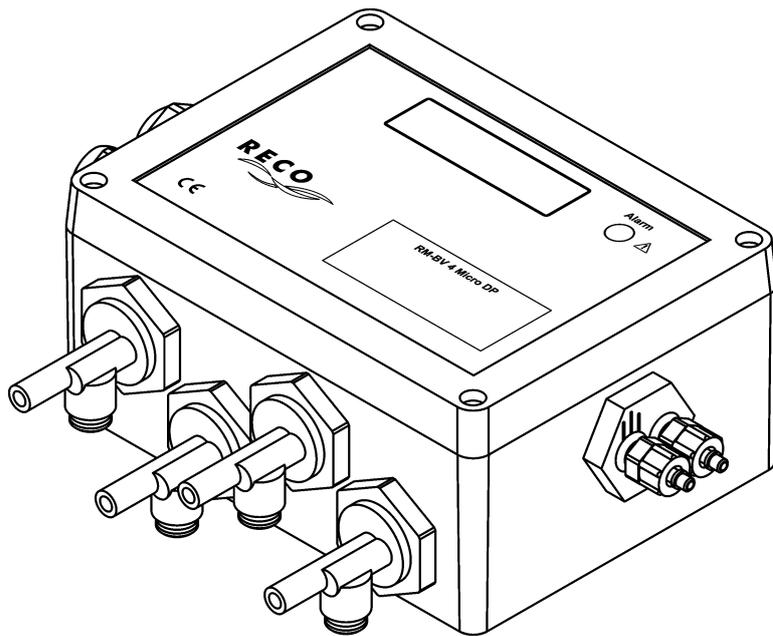


Documentation

RM-BV4 Micro DP

Filter control



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Regulations

VDE 0160

EN 60.439 Part 500

EN 50178

2004/108/EC

Symbol explanation



Important note



Important warning

1 Safety instructions

Improper installation of the *RM-BV 4 Micro 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 4 Micro 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 4 Micro DP* is only allowed to be operated in its specified operating range.

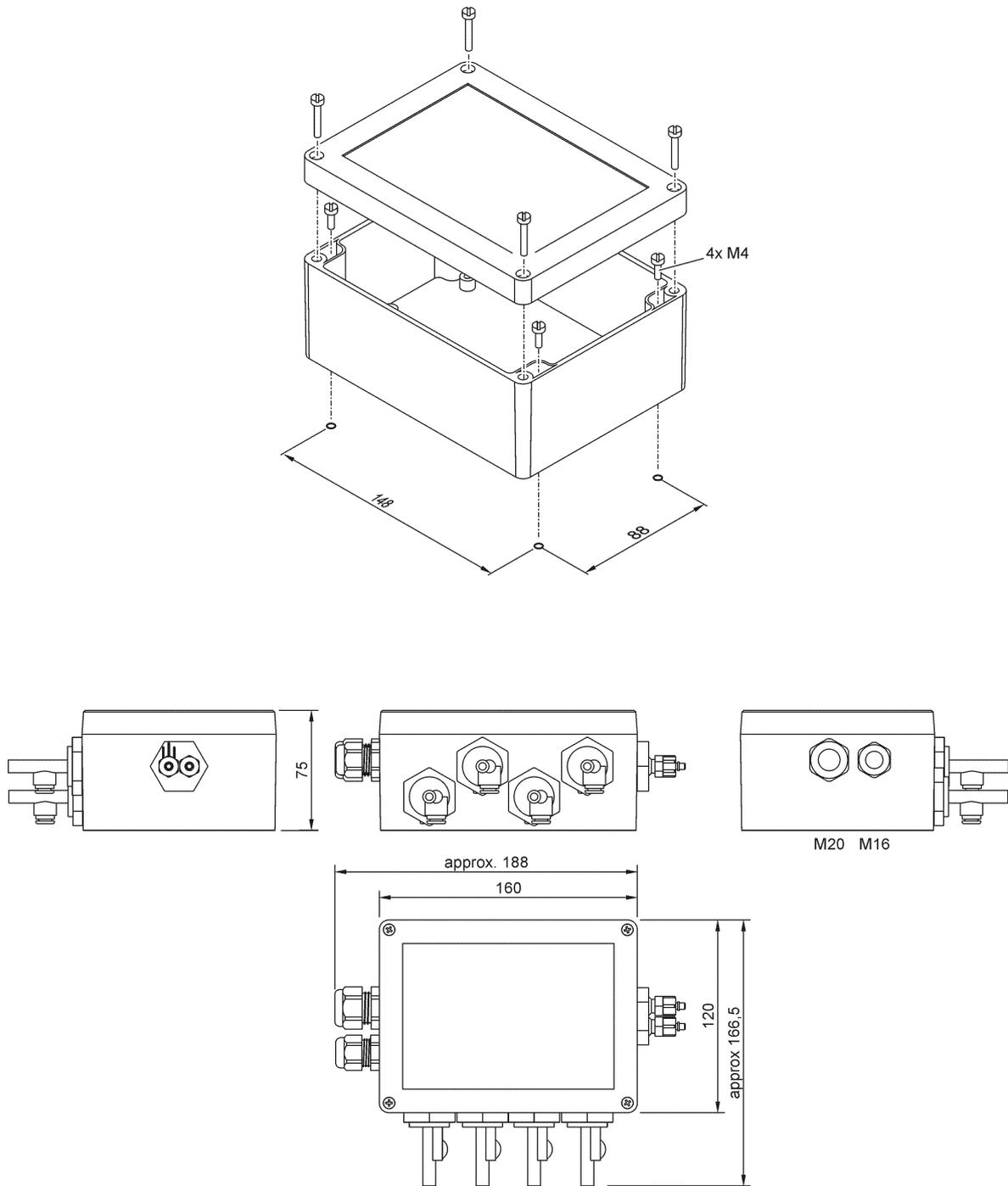


Switch off the supply voltage before replacing the *RM-BV 4 Micro DP* or components connected to it. Failure to do so may cause equipment damage.

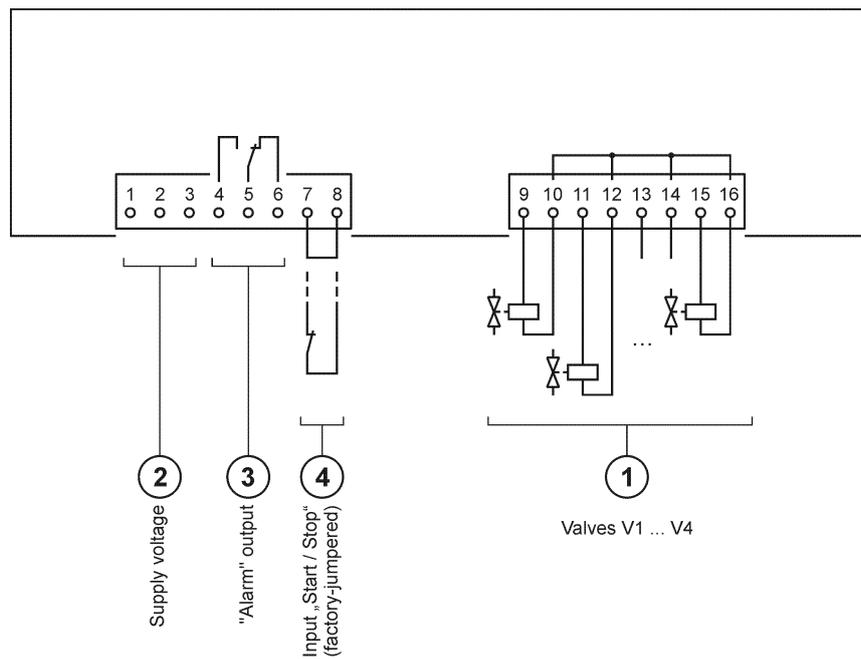
2 Device description

The *RM-BV 4 Micro DP* is used to control 24VDC solenoid valves on filtering separators with pressure pulse cleaning. Once connected to the power supply, the filter control works automatically without further operating.

3 Installation



4 Installation



① Valve outputs

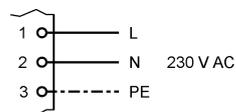
It is possible to connect up to 4 solenoid valves featuring a rated voltage of 24 V DC to the terminals 9, 10, 11 ... 16.

② Supply voltage

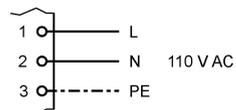


There are separate controller models for the supply voltages 230 V AC, 110 V AC and 24 V DC. Before connecting the supply voltage, check whether the rated voltage of the controller matches with the supply voltage (see nameplate).

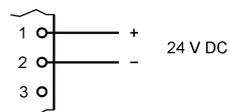
230 AC version



110 VAC version



24 VDC version



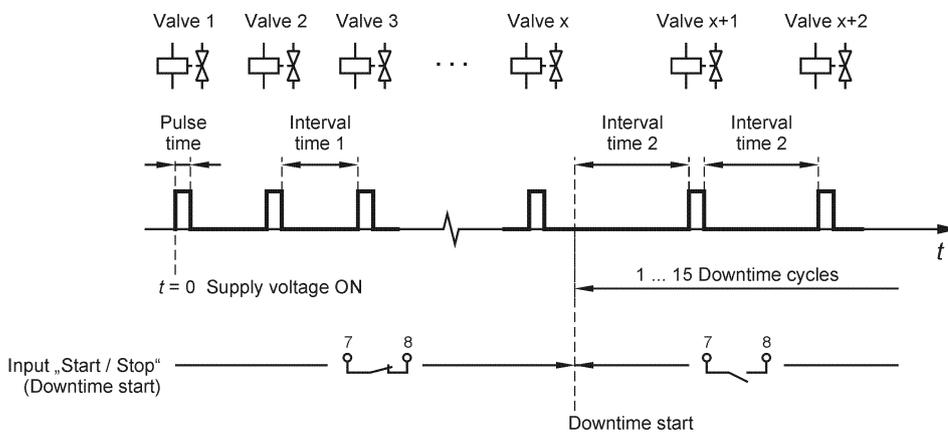
3 Alarm output

The potential-free "Alarm" relay output, terminals 4 (NO), 5 (COM) and 6 (NC) is used for self-monitoring of the *RM-BV 4 Micro DP*. This output is energised during trouble-free operation. Following events will cause the relay contact to drop off:

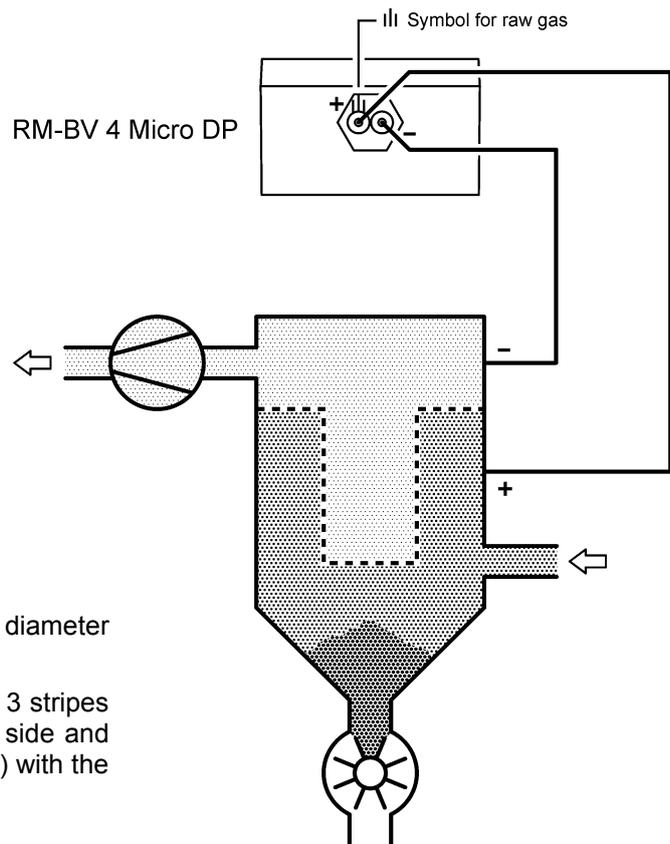
- Failure of the supply voltage
- Broken wire on one of the connected valves
- The differential pressure has fallen below the set Δp -Min switch point (parameter 09).
- The differential pressure has exceeded the set value Δp Max. alarm switch point (parameter 10).

4 Input „Start / Stop“

The input „Start / Stop“ for downtime cleaning (terminals 7, 8) is factory-bridged. When a contact (NC) connected to this input is opened, the set downtime cycles are started, beginning with the interval time 2. Downtime cleaning is resumed with the valve following to the last controlled valve.



4.1 Connection of the differential pressure measuring hoses

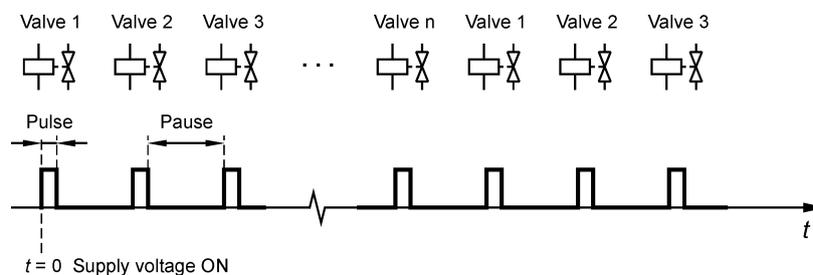


- i**
- Use the hoses with 4 mm internal diameter and 6mm outside diameter.
 - Connect the connector marked with 3 stripes (black screw cap) with the raw gas side and the other connector (blue screw cap) with the clean gas side of the filter.

5 Settings

5.1 Function in "as delivered" condition

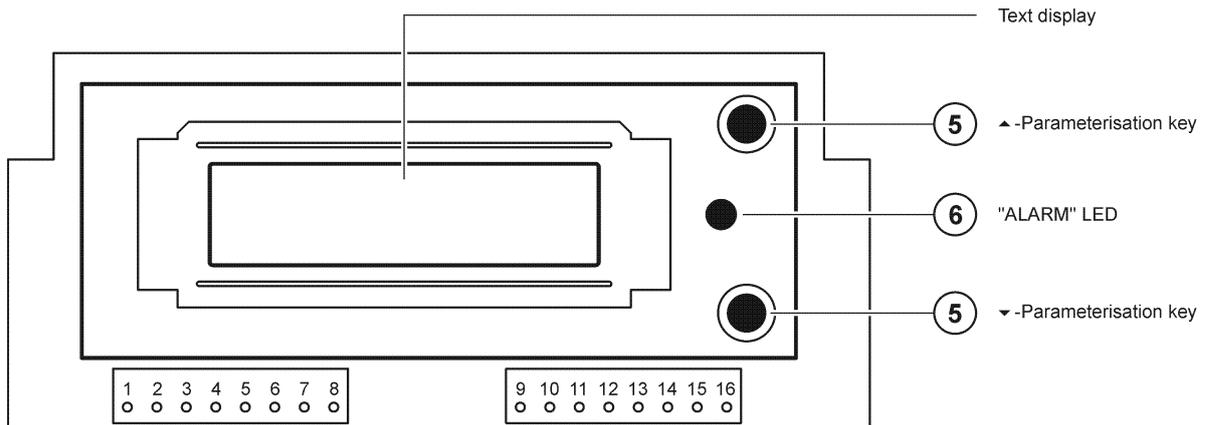
Using the set control times for pulse time and pause time, all connected solenoid valves are controlled one after the other starting with a cleaning pulse. Once the last valve has been operated, the control circulation is continued with the first valve. This happens until the supply voltage is turned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



i The input „Start / Stop“ is factory-jumpered. The function of the input is described in chapter 4 „Installation“ under item ④.

If a different function is desired, the parameter setting of the *RM-BV 4 Micro DP* needs to be changed. For this, see section 5.2 „Indication and setting elements“ under item ⑤

5.2 Indication and setting elements



⑤ Parameterisation keys

- Parameter selection:

Press the ▲ and ▼ keys simultaneously longer than 3 seconds. Then, select your desired parameter by short pressing on the keys ▲ (scroll up) or ▼ (scroll down).

- Parameter value setting:

After parameter selection, by simultaneous pressing of the keys ▲ and ▼ longer than 3 seconds. Then, set your desired value by short pressing on the keys ▲ (scroll up) or ▼ (scroll down). Then, confirm the set value by simultaneous pressing the ▲ and ▼ keys longer than 3 seconds. The new value is stored. You can select further parameters for setting or checking by short pressing the ▲ or ▼ key.

- To return to the "Operation" mode:

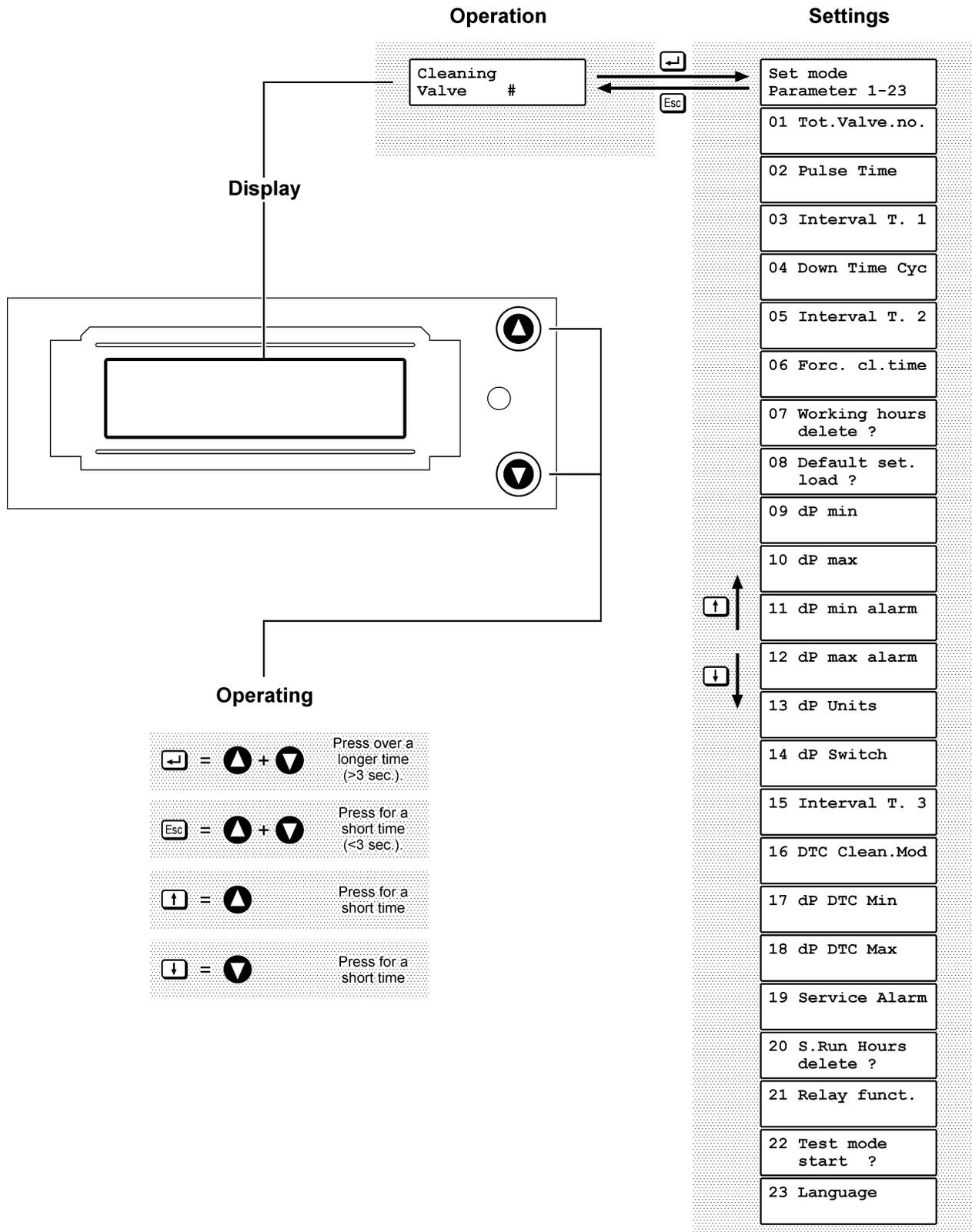
Press the ▲ and ▼ keys simultaneously for a short time.

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

⑥ "Alarm" LED

The LED will flash if the "Alarm" output is disabled (see chapter 4 "Installation" under ③).

5.3 Parameter setting



5.4 Parameter list

Parameters	Display text	Meaning	Factory setting	Setting range
01	01 Tot.Valve.no.	Number of valves	4	1-4
02	02 Pulse Time	Pulse time of the cleaning valves	100 ms	30-900 ms
03	03 Interval T. 1	Interval time 1	12 s	2-250 s
04	04 Down Time Cyc	Downtime cycles	0 ¹	0 ¹ , 1-15
05	05 Interval T. 2	Interval time 2 (pause in down time)	5 s	2-250 s
06	06 Forc. cl.time	forced cleaning time	0 ¹	0 ¹ , 1-24 h
07	07 Working hours delete ?	Resets the working hour counter ² to 0 h.	–	No / yes
08	08 Default set. load ?	Resets the device to the factory setting.	–	No / yes
09	09 dP min	Δp -Min alarm switch point	700 Pa	200-2000 Pa
10	10 dP max	Δp -Max switch point	1300 Pa	0 ¹ , 300-3000 Pa
11	11 dP min alarm	Δp -Min alarm switch point	0 ¹	0 ¹ , 200-2500 Pa
12	12 dP max alarm	Δp -Max alarm switch point	2300 Pa	0 ¹ , 1000-3500 Pa
13	13 dP Units	Unit of the displayed differential pressure value	Pa	Pa, mbar, mmWG, inWG
14	14 dP Switch	Δp change-over value from interval time 1 to interval time 2	1500 Pa	500-2500 Pa
15	15 Interval T. 3	Reduced interval time in DP mode	5 s	2-250 s
16	16 DTC Clean.Mod	" Δp -controlled down time" mode	1	1-3 ³
17	17 dP DTC Min	Δp Min. switch point for the down time	260 Pa	200-1000 Pa
18	18 dP DTC Max	Δp MAX switch point for the down time	1000 Pa	300-1200 Pa
19	19 Service Alarm	Service operating hours alarm ⁴	25000 h	2000-25000 h

¹ 0 = function deactivated

² Working hours: Sum of all time periods during which cleaning was active.

³ 1 = DTC mode 1: Down time cleaning will be started via the contact 7, 8.
 2 = DTC mode 2: Down time cleaning will only be started after the fan shut-down if the differential pressure has exceeded the „dP DTC Max“ value during operation..
 3 = DTC mode 3: Down time cleaning will be started if the differential pressure was under the (parameter 17) „dP DTC Min“ has fallen below, after the value „dP DTC Max“ (Parameter 18) was first exceeded. The signal at input 7, 8 is not considered.

⁴ The service hour counter runs when the differential pressure $\square P$ is higher than 200 Pa and the parameter 19 „Service Alarm“ is not set to "0".

Parameters	Display text	Meaning	Factory setting	Setting range
20	20 S.Run Hours delete ?	Resets the service hour counter to 0 h.	–	No / yes
21	21 Relay funct.	Relay function selection	1 ⁵	1-3 ⁵
22	22 Test mode start ?	Testing of the connected valves	–	No / yes
23	23 Language	Language of display text	D	D, GB, F, E

- ⁵
- 1 = mode 1: The relay output is active when a fan alarm is present.
 - 2 = mode 2: The relay output is active when the fan alarm and the Δp -Max alarm are active.
 - 3 = mode 3: The relay output is active during the cleaning.

6 Operating modes

6.1 Standard cleaning

For this, see the section 5.1 „Function in "as delivered" condition"..

6.2 DP-controlled cleaning

In "Operation" mode, the filter's current differential pressure Δp is displayed in the text display. Cleaning starts when the differential pressure has reached the value „10 dP max“. The solenoid valves are controlled one after the other using the interval set in parameter 15. By cleaning the differential pressure drops after a certain period of time. When the differential pressure has reached the value „09 dP min“, the current cleaning cycle is run up to the end. Then, the cleaning process stops.

6.3 Down time (down time cleaning)

For this, see chapter 4 „Installation“ under item ④

6.4 Forced cleaning

A complete cleaning cycle is performed when the set forced cleaning time (parameter 06) has lapsed.

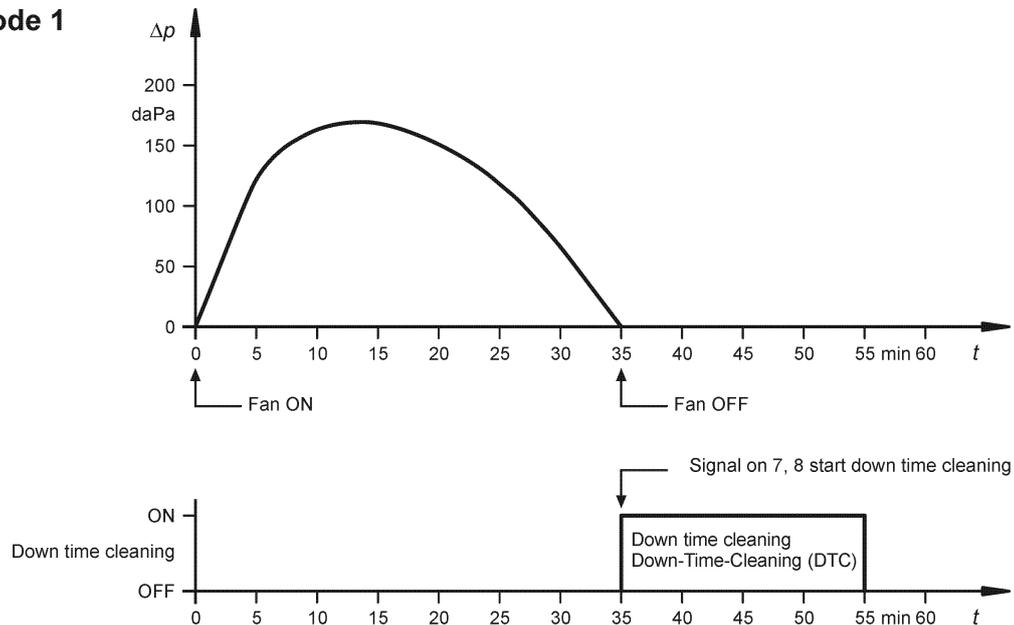
6.5 Valve test

For the execution of a valve test, the parameter 22 „Test mode“ must be set to the value „yes“. Then, all valves are operated one after the other for one cycle with the set pulse time (parameter 02) and an interval time of 4 seconds. After the completion of the test, the device automatically returns to the current operating mode.

6.6 DTC, Down Time Cleaning

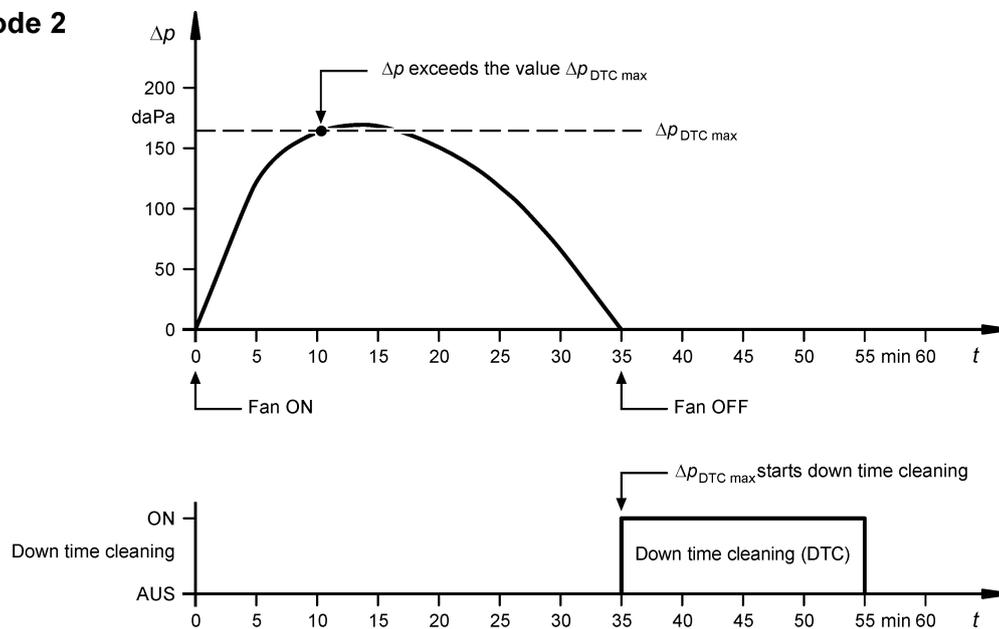
Down time cleaning is activated differently, depending on the mode selected.

DTC mode 1

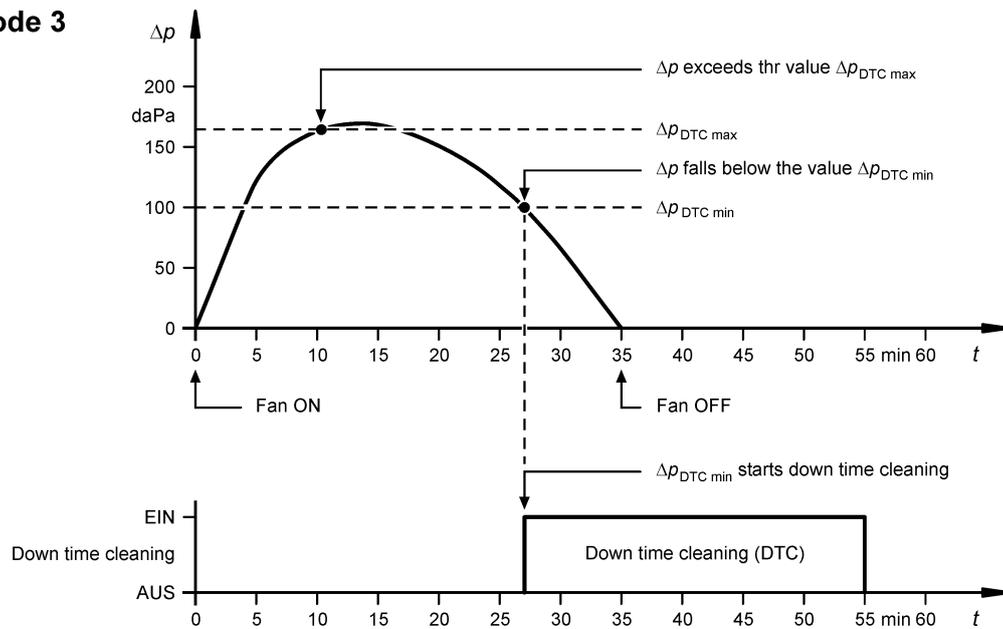


With the DTC mode 1, down time cleaning is started via contact 7, 8 (fan stop: Contact 7, 8 must open).

DTC mode 2



With DTC mode 2, down time cleaning after deactivation of the fan is started only if the differential pressure has exceeded the value „dP DTC Max“ (Parameter 18) during operation. Contact 7, 8 must open).

DTC mode 3

With DTC mode 3, down time cleaning is started if the differential pressure has fallen below the value „dP DTC Min“ (Parameter 17). after the value „dP DTC Max“ (Parameter 18) was first exceeded. The signal at input 7, 8 is not considered.

7 Troubleshooting

Fault	Possible causes	Recommended action
No display text message	- No mains voltage	- Check the power supply
	- Fuse in device defective	- Replace fuse
	- System EMERGENCY-STOP actuated	- Check EMERGENCY-STOP
No valve activity and text message "Alarm valve #"	- Wiring to valves interrupted	- Check cables and electrical connections
	- Solenoid defective	- Replace coil
No valve activity and text message "Cleaning stop"	- Cleaning stopped via the "Start / Stop" input (terminals 7, 8).	- Input „Start / Stop“ bridge terminals 7, 8.
No downtime cleaning	- Parameter 04 = 0 (downtime cycles)	- Set parameter 04 "Downtime cycles" to another value
	- No signal from the fan control present	- Apply signal to input „Start / Stop“ terminals 7, 8.
Cleaning not effective	- Interval too long	- Set parameter 03 "Interval 1" to a lower value
	- Pressure too low	- Pressure to 6 ... Set pressure to 8 bar (min. 5 bar) - Set parameter 03 "Interval 1" to a higher value
	- Valve defective	- Check / replace valves
	- Pulse time too short	- Set parameter 02 "Pulse time" to higher value

8 Text messages

8.1 Operating messages

Display	Meaning
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> RM-BV 4 Micro+dP Version #.## </div>	<p>After applying the voltage, the text message is displayed for approx. 1 second. The device powers up during this time and conducts a self-test.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> Cleaning # dP ##### Pa </div>	<p>The cleaning is active.</p> <p># The currently operated valve is displayed in row 1 as number 1 ... 4 "displayed.</p> <p>##### If the differential pressure sensor is connected to the filter via the measuring hoses the current differential pressure Δp of the filter will be displayed in row 2 in Pa.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> DTC Cleaning. # dP ##### Pa </div>	<p>Cleaning is stopped via the "Start / Stop" input and the down time cleaning is active.</p> <p># The currently operated valve is displayed in row 1 as number 1 ... 4 "displayed.</p> <p>##### If the differential pressure sensor is connected to the filter via the measuring hoses the current differential pressure Δp of the filter will be displayed in row 2 in Pa.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> Stand By dP ##### Pa </div>	<p>Cleaning is stopped via the "Start / Stop" input and the down time cleaning is disabled or the set down time cleaning cycles are executed.. The control is in stand-by mode.</p> <p>##### If the differential pressure sensor is connected to the filter via the measuring hoses the current differential pressure Δp of the filter will be displayed in row 2 in Pa.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> Forced cleaning# dP ##### Pa </div>	<p>The forced cleaning is active.</p> <p># The currently operated valve is displayed in row 1 as number 1 ... 4 "displayed.</p> <p>##### If the differential pressure sensor is connected to the filter via the measuring hoses the current differential pressure Δp of the filter will be displayed in row 2 in Pa.</p>

8.2 Additional information

Depending on the operating status, you can display further information by short pressing the ▲ or ▼ key. If no key is pressed within one minute, the display will automatically change to the original text message.

Example

With enabled forced cleaning and stopped cleaning ("Start / Stop" input), the display shows the message „Stand By“. Once the ▲ key is shortly pressed, the messages „Hours in operat.“ (operating hours), „Working hours“ (working hours), „Time to service “ (time remaining to the next filter maintenance) and „Time unt.forc.cl“ (time remaining to the next forced cleaning) are displayed.

Display	Meaning
Hours in operat. ##### h	Display of the operating hours (sum of all time periods during which the supply voltage was ON).
Working hours ##### h	Display of the working hours (sum of all time periods during which the cleaning was active).
Time to service #### h	The time remaining to the next maintenance of the filter is displayed.
Time unt.forc.cl ## h ## min	Cleaning is stopped via the "Start / Stop" input and the forced cleaning is active. The time remaining to the start of the forced cleaning is displayed.

8.3 Alarm message

Display	Meaning
Valve # Error	Wire break on the indicated valve output.

i Alarm messages are saved. This alarm remains after the root cause for the alarm has been eliminated.

You can acknowledge the alarm by shortly pressing the ▲ or ▼ key.

9 Technical specifications

Item	Data	Terminals
Supply voltage	Device version 230 V AC: 230 V AC +/- 10 %	1 (L), 2 (N), 3 (PE)
	Device version 110 V AC: 110 V ... 120 V AC +/- 10 %	1 (L), 2 (N), 3 (PE)
	Device version 24 V DC: 24 V DC +10 % / -0 %	1 (+), 2 (-)
Outputs for solenoid valves	4 outputs, 24 V DC, max. 1.9 A	9, 10 (Valve 1), 11, 12 (Valve 2), 13, 14 (Valve 3) 15, 16 (Valve 4)
Signal input	1 inputs 24 VDC, to be served potential-free	7, 8
Signal output	1 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)	4, 5, 6
Δp measuring range	0 ... 5000 Pa	
Measuring sensor	piezoresistive	
Power consumption	Device version 230 V AC: 0.2 A	
	Geräte-Version 110 V AC: 0,35 A	
	Device version 24 V DC: 1,13 A	
Fuse	Device version 230 V AC: T 0.3 A, 250 V, 5 x 20 mm	
	Device version 110 V AC: T 0,4 A, 250 V, 5 x 20 mm	
	Device 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	approx. 950 g	
Altitude	Max. 3000 m above sea level	

Disclaimer

The contents of this documentation have 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.