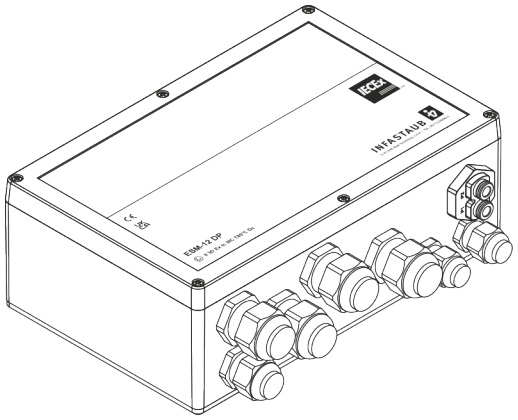
Operating and Installation Instructions

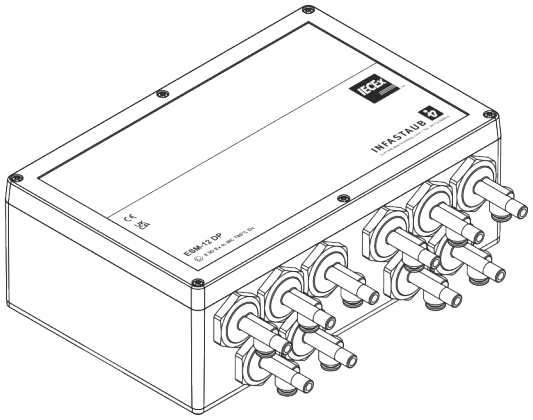
Filter controller

ESM-12 DP IECEx
ESM-12 DP ..V IECEx

Zone 22
Ignition protection type: Ⓔx II 3D Ex tc IIIC T85°C Dc



ESM-12 DP IECEx



ESM-12 DP 10V IECEx

Software version V1.00 29.10.2024

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Warning of physical and health hazards or damages to the product and other assets

1 Safety instructions

Improper installation of the *ESM-12 DP IECEx / ESM-12 DP ..V IECEx* or associated equipment may cause failure of the unit, 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 *ESM-12 DP IECEx / ESM-12 DP ..V IECEx* 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 qualified personnel when disconnected and whilst observing the local safety and accident prevention rules.
- The *ESM-12 DP IECEx / ESM-12 DP ..V IECEx* may only be operated within the permissible operating range (see section 9 "Technical specifications" on page 23).

Regulations for electrical equipment of the group II, cat. 3D, zone 22

Connection of the differential pressure measuring hoses
Differential pressure measuring hoses may only be connected to the filter controller or differential pressure transmitter via suited filter elements (zone separation). The filter manufacturer must ensure that the zone 22, cat. 3D is maintained.

Opening the unit
Before opening the unit, make sure that no explosive atmosphere is present and that there is no dust accumulation on the unit. Use a moist cloth only to clean the unit if required.

Installing the box cover
Install the box cover dust-tight after completed operation/repair of the unit. Before installing the cover, check the perfect condition of the cover seal. Firmly tighten the 6 screws of the box cover.

The supply voltage must be disconnected before replacing the *ESM-12 DP IECEx / ESM-12 DP ..V IECEx* or components connected to it. Failure to do so may cause equipment damage.

2 Unit description

The *ESM-12 DP IECEx / ESM-12 DP ..V IECEx* filter controller is used to control solenoid valves on bag filters.

Unit types

Product	integrated solenoid valves	Item no. of the manufacturer	Ident number
ESM-12 DP IECEx	–	12005286	355072
ESM-12 DP 1V IECEx	1	12005287	355073
ESM-12 DP 2V IECEx	2	12005288	355074
ESM-12 DP 3V IECEx	3	12005289	355076
ESM-12 DP 4V IECEx	4	12005290	355077
ESM-12 DP 5V IECEx	5	12005291	355078
ESM-12 DP 6V IECEx	6	12005292	355079
ESM-12 DP 7V IECEx	7	12005293	355080
ESM-12 DP 8V IECEx	8	12005294	355081
ESM-12 DP 9V IECEx	9	12005295	355082
ESM-12 DP 10V IECEx	10	12005296	355083

Continuous cleaning

With the appropriate settings, the *ESM-12 DP IECEx / ESM-12 DP ..V IECEx* can carry out continuous cleaning. 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.

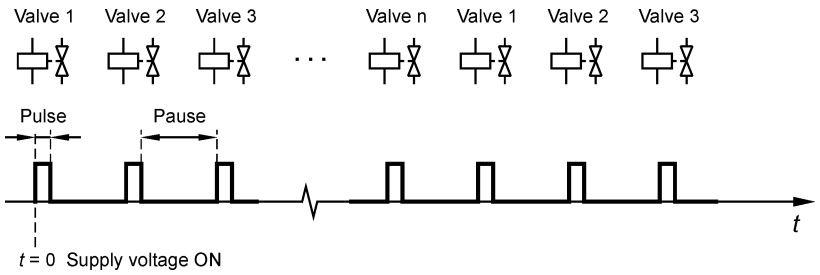


Figure 1: Continuous cleaning of the filter control system *ESM-12 DP IECEx / ESM-12 DP ..V IECEx*

Differential pressure-dependent cleaning / differential pressure monitoring

With the appropriate settings, the *ESM-12 DP IECEx / ESM-12 DP ..V IECEx* can carry out differential pressure-dependent cleaning and differential pressure monitoring. The filter control is set using the two buttons ▲ and ▼, taking into account the text messages appearing in the display.

3 Electrical connections / differential pressure connection

Figure 2 shows the electrical connections of the *ESM-12 DP IECEx / ESM-12 DP ..V IECEx* PC board. The following pages contain exact descriptions of the details marked by numbers.

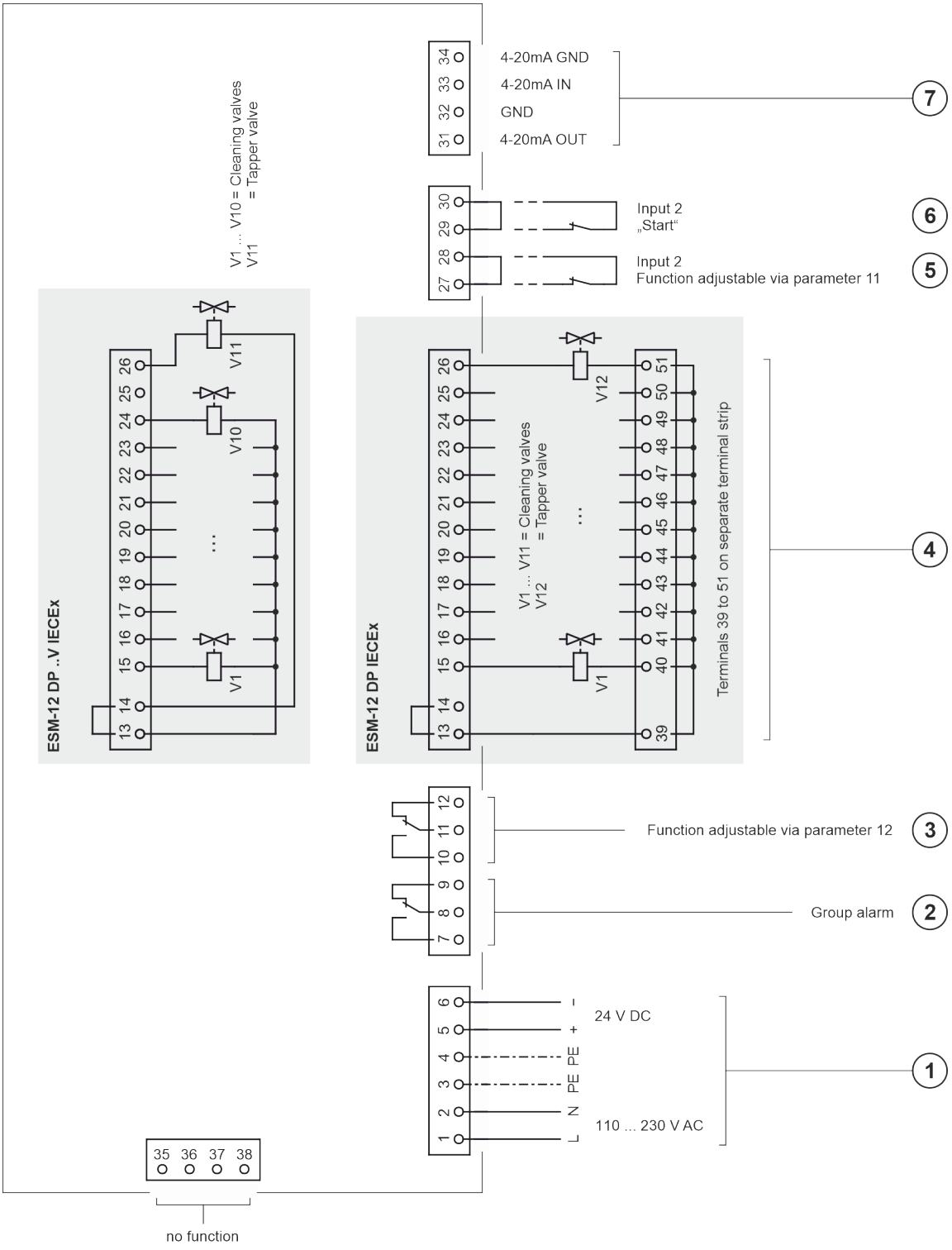


Figure 2: Wiring diagram of the *ESM-12 DP IECEx / ESM-12 DP ..V IECEx* PC board

Overview of the terminals

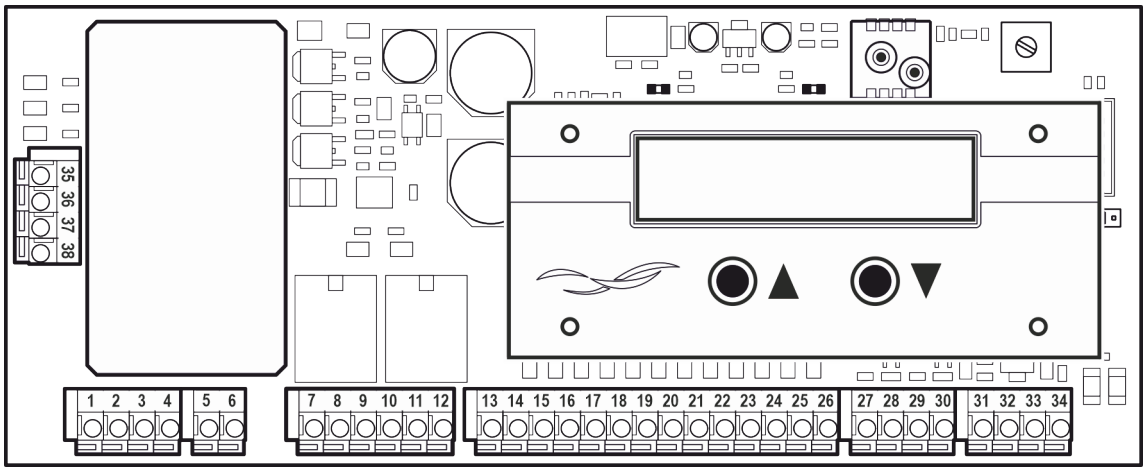
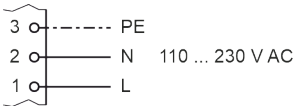


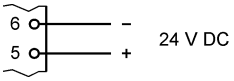
Figure 3: The terminals on the *ESM-12 DP IECEx / ESM-12 DP ..V IECEx* PC board

(1) Supply voltage

110 ... 230 V AC



24 V DC



(2) "Group alarm" output

The potential-free "Group alarm" relay output, terminals 7 (NO), 8 (COM) and 9 (NC) is used to signal faults. This output is energised during trouble-free operation. Following events will cause the relay contact to drop off:

- Failure of the supply voltage
- The supply voltage is higher than 27.6 V DC
- Broken wire on one of the connected valves
- the Δp alarm triggers

③ Relay output (function adjustable via parameter 12)

The function of the "Alarm" relay output, terminals 10 (NO) 11 (COM) and 12 (NC) is set by the parameter 12 "Relay funct." (refer to ⑫ "Parametrisation buttons" on page 11 and section 5 "Parameter setting"). You can choose from following functions:

- Parameter setting: Input 1
  Contact 10-11 closes (11-12 opens) when the contact connected to terminals 27 and 28 opens.
- Parameter setting: Cleaning On
  Contact 10-11 closes (11-12 opens) when cleaning is active or during downtime cleaning.
- Parameter setting: DP alarm
  Contact 10-11 closes (11-12 opens) at Δp max alarm (the set Δp max alarm switching point has been reached) and Δp min alarm (the set Δp min alarm switching point has been undershot).
- Parameter setting: Off
  The relay output is deactivated. Contact 10-11 is permanently open (11-12 permanently closed).
- Parameter setting: Operating mess. **factory setting**
  Contact 10-11 closes (11-12 opens) when the contact connected to terminals 29 and 30 closes and only opens when the downtime cleaning is complete.

④ Valve outputs

ESM-12 DP IECEx: Up to 11 solenoid valves for cleaning with a rated voltage of 24 V DC can be connected to terminals 15, 16, 17 ... 24, 25. Terminal 26 is intended for the connection of a tapper valve with a rated voltage of 24 V DC. The second connection of the valves is connected to the separate terminal strip (terminals 40, 41, 42 ... 50, 51).

ESM-12 DP ..V IECEx: Up to 10 solenoid valves for cleaning with a rated voltage of 24 V DC can be connected to terminals 15, 16, 17 ... 23, 24. Terminal 26 is intended for the connection of a tapper valve with a rated voltage of 24 V DC. The second connections of the cleaning valves are connected to each other with a multiple wire jumper and connected to terminal 13 (COM connection). The second connection of the tapper valve is connected to terminal 14.

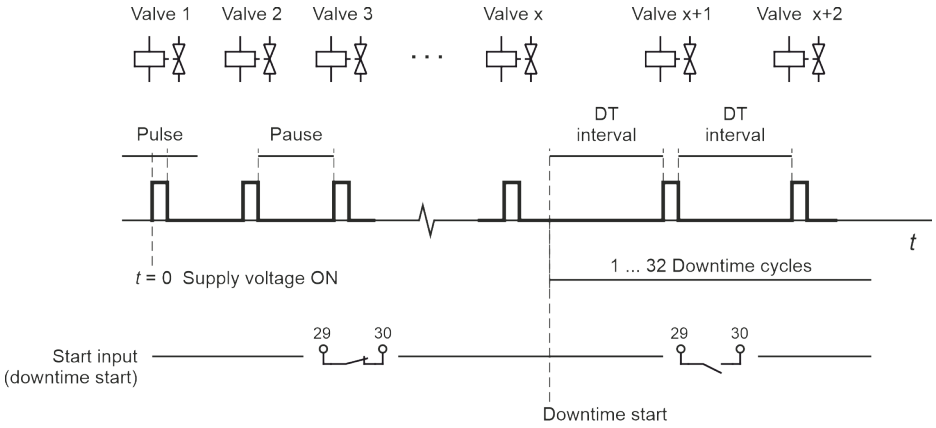
⑤ Input 1 (function adjustable via parameter 11)

The function of input 1, terminals 27 and 28, is set via parameter 11 "Option Input 1" (refer to ⑫ "Parametrisation buttons" on page 11 and section 5 "Parameter setting"). You can choose from following functions:

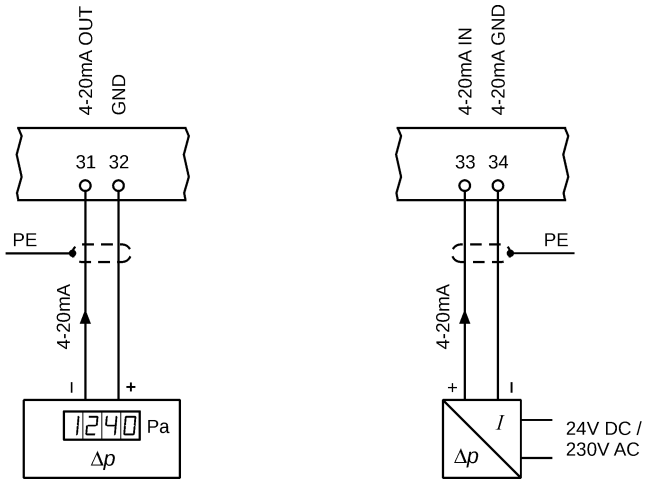
- Parameter setting: Off **factory setting**
  The input has no function.
- Parameter setting: Alarm Cl. Press.
  The input is intended for connecting a pressure switch (monitoring the compressed air in the compressed air tank). An error that occurs is reported via relay contact 7, 8, 9 and shown as a text message on the display.
- Parameter setting: Alarm DP Sec.fil
  The input is intended for connecting a differential pressure switch (monitoring a secondary filter). An error that occurs is reported via relay contact 7, 8, 9 and shown as a text message on the display.
- Parameter setting: Start - Stop
  The input is intended for cleaning release. If a contact (NO) connected to the input is closed, cleaning no longer takes place. Cleaning in progress is interrupted immediately. The start input for the downtime cleaning, terminals 29 and 30, retains its function.

(6) Input 2 "Start"

The start input for downtime cleaning (terminals 29, 30) 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 (downtime pause) can be set.



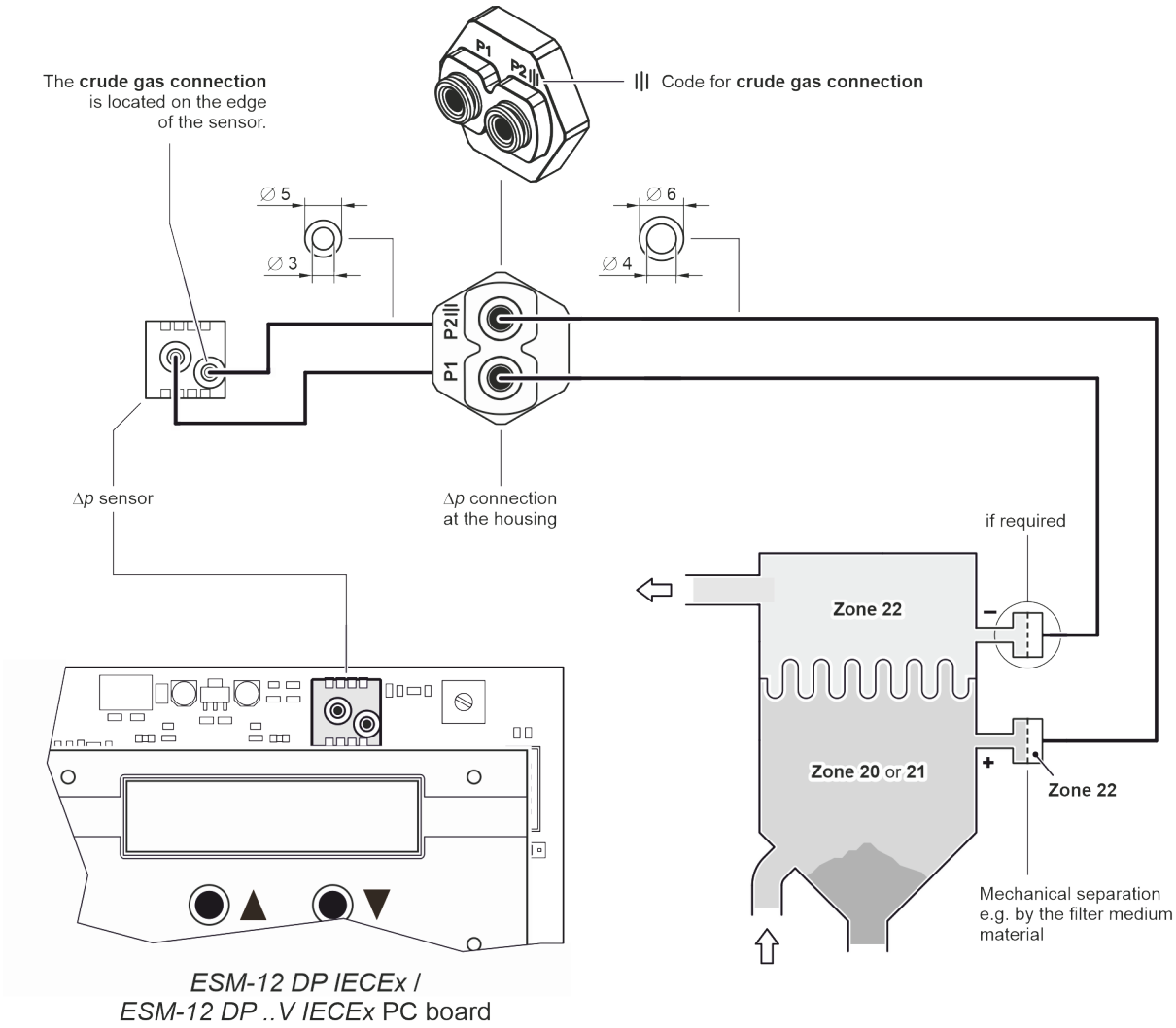
(7) Output 4-20 mA / Input 4-20 mA



4-20 mA output for connection of a Δp display

4-20 mA input for connection of a Δp sensor

Connection of the differential pressure measuring hoses



ESM-12 DP IECEx /
ESM-12 DP ..V IECEx PC board

4 Indication and setting elements

Figure 4 shows the display and setting elements of the *ESM-12 DP IECEx / ESM-12 DP ..V IECEx* PC board. The following pages contain exact descriptions of the details marked by numbers.

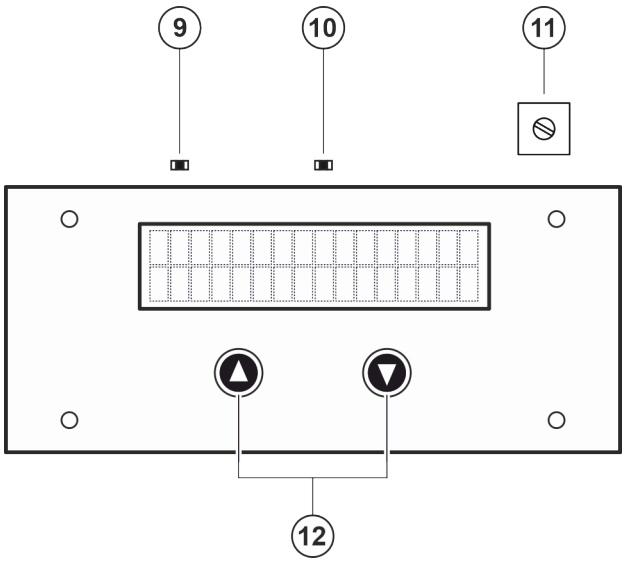


Figure 4: Indication and setting elements

(9) Service LED

flashes when the service hours set via parameter 14 have expired or when the filter control unit is in parameter setting mode.

(10) "Alarm" LED

lights up when an alarm is present. The corresponding alarm text is also shown on the display.

(11) Adjuster for the display contrast

Use a fitting screwdriver to adjust the trim potentiometer to the appropriate display contrast.

(12) Parametrisation buttons / Button for starting a cleaning cycle

- Change from the operating mode to the parameter setting mode:

  In the "Operation" mode, simultaneously press the ▲+▼ buttons until the message "Settings Parameter 1-25" appears on the display. The controller is now in the parameter setting mode.

- Parameter selection

  Once you have switched the controller from the operating to the parameter setting mode, you can select your desired parameter by briefly pressing the ▲ button (scrolling upward) or ▼ button (scrolling downward).

- Setting the parameter value (parameters 01-12, 14, 16 and 18-24)

  After you have selected the parameter to be set, press the buttons ▲+▼ simultaneously until the units digit of the displayed parameter value starts to flash. Briefly press the ▲ button several times to increase the displayed value of the units digit step by step or briefly press the ▼ button several times to decrease the displayed value of the units digit step by step. Once you have set the units digit, press and hold the ▲ button until the tens digit of the displayed parameter value starts to flash. Set the tens digit in the same way as described for the units digit. If there is a hundreds digit, press and hold the ▲ button until the hundreds digit starts to flash. Set the hundreds digit and, if there is a thousands digit, then also set the thousands digit in the same way as described above for the other digits. After you have set the complete parameter value, press the buttons ▲+▼ simultaneously until the message "Saved" appears on the bottom line of the display. The new value you have entered is now saved. You can select further parameters for setting or checking by short pressing the ▲ or ▼ button.

- Setting the parameter 04 "Unit type"

  Use parameter 04 "Unit type" to set how many cleaning valves are connected to the filter controller (internal valves).

  Select parameter 04 "Unit type" as described above. Press the ▲+▼ buttons simultaneously until the text "Internal valves" appears on the top line of the display. The number of valves currently set is displayed in the bottom line. Set the number of valves as described above in the section "Setting the parameter value". For example, if 6 cleaning valves are connected to the main unit, set the number of valves to 06. To save the new value, press the buttons ▲+▼ simultaneously until the message "Saved" appears on the bottom line of the display. The new value you have entered is now saved. Finally, briefly press the ▲+▼ buttons simultaneously to return to "Operation" mode.

  i If the parameter value for "Internal valves" is set to zero, no cleaning takes place. In this case, the device serves exclusively as a differential pressure monitor.

- Setting parameter 11 "Option input 1"

  Use parameter 11 to set the message text that is shown on the display when the contact connected to input 1 (terminals 27 and 28) opens.

  Select parameter 11 "Option input 1" as described under "Parameter selection" on page 11. Then press the buttons ▲+▼ simultaneously until the text shown in the bottom line of the display (1st option) begins to flash. Briefly press the ▼ button to select the 2nd option. Briefly press the ▼ button again to select the 3rd option. Select the "Off" option so that no message text is displayed. Select the option “Alarm Cl. Press.” so that the text “Alarm Cl. Press.” is displayed (a pressure switch for monitoring the cleaning pressure is connected to input 1). Select the option “Alarm DP Sec.fil” so that the text “Alarm DP Sec.fil” is displayed (a differential pressure switch for monitoring the secondary filter differential pressure is connected to input 1). After you have set the desired option, press the buttons ▲+▼ simultaneously until the message "Saved" appears on the bottom line of the display. The option you have selected is now saved. You can select further parameters for setting or checking by short pressing the ▲ or ▼ button.

- Setting parameter 12 "Relay function"

  Use parameter 12 "Relay function" to set how the relay output 10, 11, 12 should function.

  Select parameter 12 "Relay function" as described under "Parameter selection" on page 11. Then press the buttons ▲+▼ simultaneously until the text shown in the bottom line of the display (1st option) begins to flash. Briefly press the ▼ button to select the 2nd option. Briefly press the ▼ button again to select the 3rd option. Briefly press the ▼ button again to select the 4th option. Select the "Input 1" option so that the relay output switches when the contact connected to terminals 27 and 28 opens. Select the "Cleaning on" option so that the relay output switches when cleaning is active or during downtime cleaning. Select the "DP Alarm" option so that the relay output switches at Δp max alarm and Δp min alarm. Select the "Off" option so that the relay output is permanently deactivated (contact 10-11 is permanently open, contact 11-12 is permanently closed). After you have set the desired function, press the buttons ▲+▼ simultaneously until the message "Saved" appears on the bottom line of the display. The function you have selected is now saved. You can select further parameters for setting or checking by short pressing the ▲ or ▼ button.

- Display of operating hours (parameter 13 "operating hours")

  Select parameter 13 "operating hours" as described under "Parameter selection" on page 11 to display the operating hours. The number of current operating hours is displayed in the bottom line. Nothing can be set on this parameter.

- Setting the service interval (parameter 14 "Service hours")

  To set the service interval (time period after which the service LED lights up), select parameter 14 "Service hours" as described in "Parameter selection" on page 11. The number of service hours currently set is displayed in the bottom line. Press the buttons ▲+▼ simultaneously until the first digit of the number of hours displayed starts to flash. Set the number of service hours as described above in the section "Setting the parameter value" on page 11.

- Acknowledge the service message (parameters 15 "Maintenance acknowledge")

  To acknowledge the service message (after filter service was performed), select parameter 15 "Maintenance acknowledge" as described in "Parameter selection" on page 11. Now press the ▲+▼ buttons simultaneously until the message "Saved" appears on the bottom line of the display. The service message is now switched off.

- Setting the differential pressure unit (parameter 16 "DP-unit"):

  Set the desired unit of the differential pressure via parameter 16 "DP-unit". Select parameter 16 "DP-unit" as described under "Parameter selection" on page 11. Now press the buttons ▲+▼ simultaneously until the text shown in the bottom line of the display begins to flash. Briefly press the ▼ button to access the next selectable unit. Briefly press the ▼ button again to access the unit after the next one. The units Pascal (Pa), Millibar (mbar), Hektopascal (hPa) and Inch H_2O ("H2O) can be selected. After you have set the desired unit, press the buttons ▲+▼ simultaneously until the message "Saved" appears on the bottom line of the display. The unit you have selected is now saved. You can select further parameters for setting or checking by short pressing the ▲ or ▼ button.

- Display of software version (parameter 17 "Software Vers.")

  Select parameter 17 "Software Vers." as described under "Parameter selection" on page 11 to display the software version. The software version and the release date of the software are displayed in the bottom line. Nothing can be set on this parameter.

- Setting the language (parameter 18 "Language")

  Use parameter 18 "Language" to set the language in which the text messages are to be shown in the display. Select parameter 18 "Language" as described under "Parameter selection" on page 11. Then press the buttons ▲+▼ simultaneously until the text shown in the bottom line of the display (1st language) begins to flash. Briefly press the ▼ button to access the next se-

lectable language. Briefly press the ▼ button again to access the language after the next one. The following languages can be selected: German (DE), English (EN), French (FR), Spanish (ES), Italian (IT) and Russian (RU). After you have selected the desired language, press the buttons ▲+▼ simultaneously until the message "Saved" appears on the bottom line of the display. The language you have selected is now saved. You can select further parameters for setting or checking by short pressing the ▲ or ▼ button.

- Selection of the differential pressure measurement source (parameter 19 "Sensor int/ex")

  Use parameter 19 "Sensor int/ex" to set whether the internal differential pressure sensor (internal) or the 4-20mA input (external) is used as the source for the differential pressure measurement. Select parameter 19 "Sensor int/ex" as described under "Parameter selection" on page 11. Then press the buttons ▲+▼ simultaneously until the text "internal" or "external" shown in the bottom line of the display begins to flash. Briefly press the ▼ key to call up the alternative source. After you have selected the desired differential pressure measurement source, press the ▲+▼ keys simultaneously until the message "Saved" appears in the bottom line of the display. The source you have selected is now saved.

- Exit the setting mode and return to the "Operation" mode:

  If you are in the settings mode, briefly press the ▲+▼ buttons simultaneously to return to "Operation" mode.

  The program automatically returns to the operating mode when no button has been pressed for 1 minute.

- Start a cleaning cycle:

  If you are in the operation mode, press the ▼ button for at least 3 seconds to start a cleaning cycle. The cleaning cycle starts with the set pause time (parameter 01).

5 Parameter setting

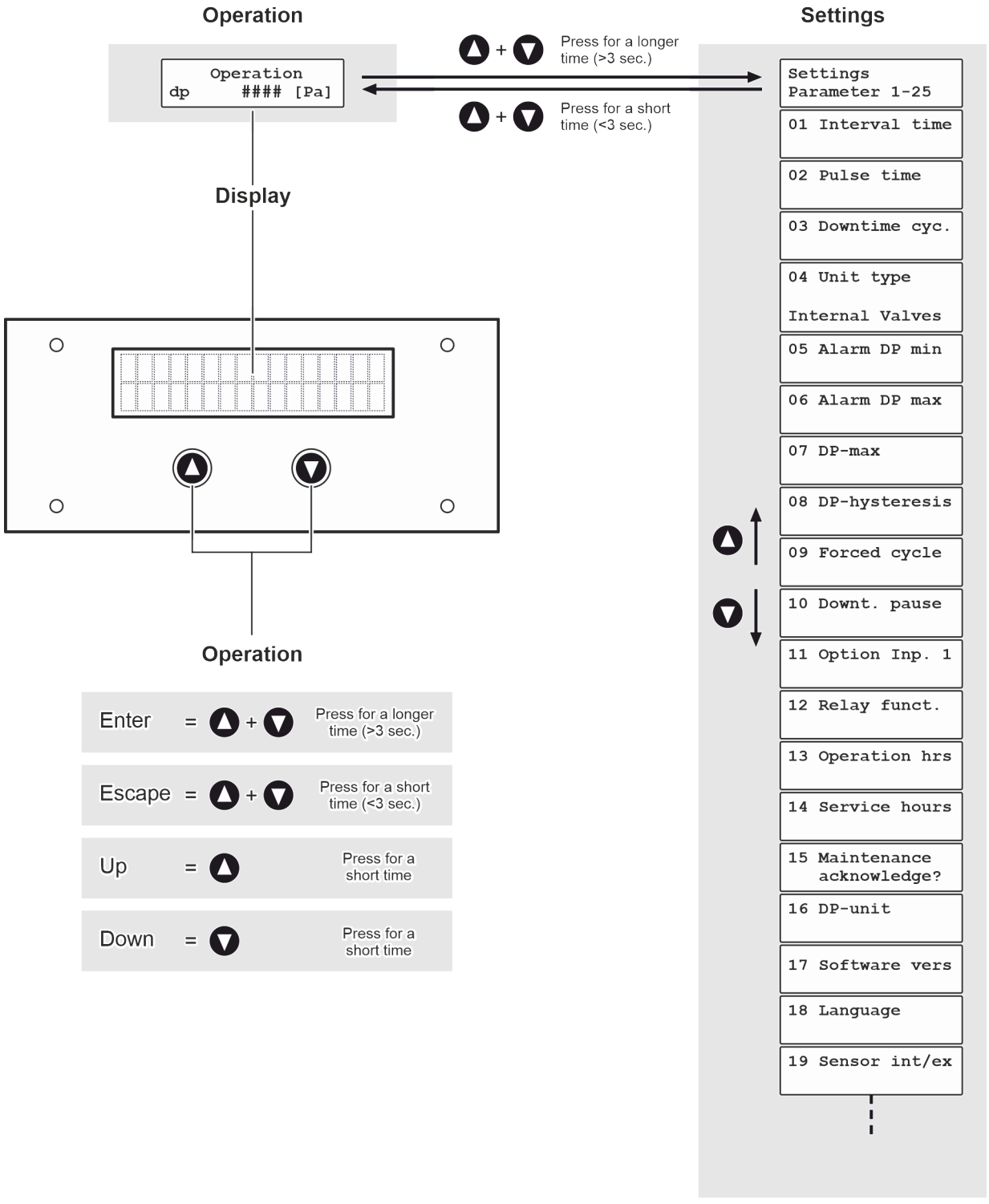


Figure 5: Brief instructions on how to check or edit parameter values – Part 1

Figure 6: Brief instructions on how to check or edit parameter values – Part 2

Parameter list

Parameters	Display text	Explanation	Factory setting	Setting range
01	01 Interval time	Interval	10 s	5-999 s
02	02 Pulse time	Pulse time of the cleaning valves	60 ms	30-2500 ms
03	03 Downtime cyc.	Number of downtime cycles	0	0-32
04	04 Unit type	Unit type	–	–
	Internal valves[1]	Number of cleaning valves	depending on the umit type	0-12
05	05 Alarm DP min	Δp min alarm switching point	0[2] Pa	0[2]-350 Pa
06	06 Alarm DP max	Δp max alarm switching point	2000 Pa	0[2], 300-5000 Pa
07	07 DP-max	Δp max switching point for starting the cleaning process	1000 Pa	0[2], 280-4400 Pa
08	08 DP-hysteresis	DP max value minus DP hysteresis value = DP value to stop cleaning	300 Pa	100-1900 Pa
09	09 Forced cycle	Time until start of forced cleaning (A complete cleaning cycle is run through.)	0[2] min	0[2], 10-600 min
10	10 Downt. pause	Pause time during downtime and forced cycle	10 s	5-100 s
11	11 Option Inp. 1	Use parameter 11 to set the message text that is shown on the display when the contact connected to terminals 27 and 28 opens (input 1) or select the alternative function of input 1.	Off	Off[3] Alarm Cl. Press.[4] Alarm DP Sec.fil[5] Start - Stop[6]

1 Internal valves = cleaning valves connected to the main unit.

2 0 = function deactivated.

3 Off = No message text is displayed.

4 Alarm Cl. Press. = Alarm – cleaning pressure is too low

5 Alarm DP Sec.fil = Alarm – Δp secondary filter (differential pressure is too high)

6 Start - Stop = This is not a message text! If you select this option, the second function of input 1 is activated as a cleaning enable input.

Parameters	Display text	Explanation	Factory setting	Setting range
12	12 Relay funct.	Function of the “Alarm” relay output (terminals 10, 11, 12)	Operating mess.[7]	Input 1[7] Cleaning on[7] DP alarm[7] Off[7] Operating mess.[7]
13	13 Operation hrs	Operating hour counter[8]	–	–
14	14 Service hours	Service interval[9]	8000[2]	0[2], 500-25000 h
15	15 Maintenance acknowledge?	Acknowledgement of the service message	–	–
16	16 DP-unit	Unit of the displayed differential pressure	Pa	Pa, mbar, hPa, inch H_2O
17	17 Software vers	Software version	–	–
18	18 Language	Language of display text	DE[10]	DE, EN, FR, ES, IT, RU[10]
19	19 Sensor int/ex	Selection of differential pressure measurement source (device-internal sensor / external sensor via 4-20mA input)	Internal	Internal External
20	20 Brushoffdelay	Pause time of the tapper output	0[2]	0[2], 1-60 s
21	21 Brushoff time	Duty cycle of the tapper output	0[2]	0[2], 30-999 ms or[11] 1-Maximum value[12] s

[2] 0 = function deactivated.

[7] Input 1 = Contact 10-11 closes when the contact connected to terminals 27 and 28 opens.
Contact 11-12 opens when the contact connected to terminals 27 and 28 opens.
Cleaning on = Contact 10-11 closes when cleaning is active or during downtime cleaning.
Contact 11-12 opens when cleaning is active or during downtime cleaning.
DP alarm = Contact 10-11 closes at Δp max alarm and Δp min alarm.
Contact 11-12 opens for Δp max alarm and Δp min alarm.
Off = The relay is switched off.
Operating mess. = Contact 10-11 closes when the contact connected to input 2 (start / terminals 29 and 30) is closed or when the downtime cleaning is active.
Contact 11-12 opens when the contact connected to input 2 (start / terminals 29 and 30) is closed or when the downtime cleaning is active.

[8] The operating hour counter runs when the supply voltage is applied.

[9] The service hour counter runs when the differential pressure Δp is greater than or equal to 200 Pa and the parameter "14 Service hours" is not set to "0".

[10] DE German, EN English, FR French, ES Spanish, IT Italian, RU Russian.

[11] The setting range depends on the setting of parameter 23.

[12] The maximum value of the setting range depends on the set interval time (parameter 01) or the set downtime pause (parameter 10), whichever is lower.

Parameters	Display text	Explanation	Factory setting	Setting range
22	22 Brushoff mode	Setting the operation of the tapper	Off	Off[13] After cycle[13] Below DP min[13] Timebased[13] Time+Cycle[13]
23	23 TimebaseB.Off	Setting range of the knocking time Parameter 21.	ms[14]	ms, s[14]
24	24 Valve current	Ventilstromüberwachung (Stromaufnahme der Abreinigungsventile)	Off	Off On
25	25 Default Set.	Über Parameter 25 setzten Sie die Parameter auf verschiedene Werkseinstellungen zurück.	Option 2[15]	Option 1[15] Option 2[15]

[13] Off = Tapper function deactivated.
After cycle = The tapper gets a pulse after each cleaning cycle.
Below DP min = The tapper gets a pulse when the filter differential pressure falls below the value DP-max minus DP-hysteresis.
Timebased = The tapper gets a rhythmic pulse in time with the set brushoff delay time (parameter 20).
Time+Cycle = The tapper gets a rhythmic pulse in time with the set brushoff delay time (parameter 20). It also gets a pulse after each cleaning cycle.

[14] ms = The adjustment range of parameter 21 is 30-999 ms.
s = The adjustment range of parameter 21 is 1-Maximum value s.

[15] Option 1 = Factory setting of the manufacturer
Option 2 = Factory setting of the INFASTAUB company

6 Operating modes

6.1 Differential pressure controlled cleaning (parameters 07, 08)

In "Operation" mode, the filter's current differential pressure Δ*p* is indicated in the display (line 2). Cleaning starts when the differential pressure has reached the value DP-max (parameter 07). The solenoid valves are activated one after the other with the pause time set under parameter 01. By cleaning the differential pressure drops after a certain period of time. When the differential pressure has reached the value DP-max (parameter 07) minus DP-hysteresis (parameter 08), cleaning stops.

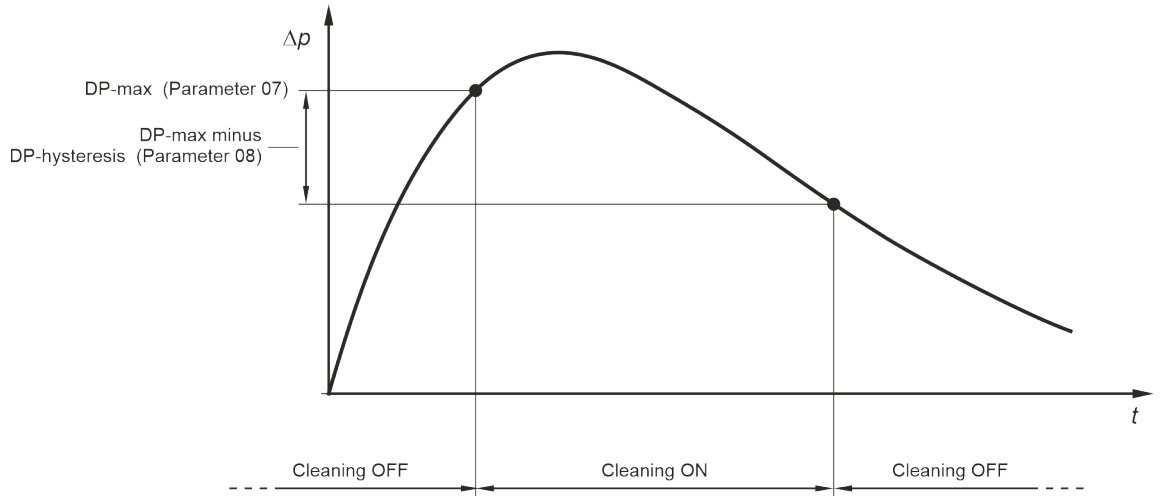


Figure 7: Diagram of cleaning activation depending on the differential pressure

If the parameter 07 is set to the value 0, a periodically recurring time-controlled forced cleaning takes place. After the time period set under parameter 09 has elapsed, a cleaning cycle is executed with the pause time set under parameter 01.

6.2 Downtime (parameters 03, 10)

The start input for downtime cleaning (terminals 27, 28) is factory-bridged. When a contact (NC) connected to this input is opened, the set downtime cycles are started, beginning with the interval time. Downtime cleaning is resumed with the valve following to the last controlled valve. The pause time during downtime can be set via parameter 10 "Downt. Pause".

6.3 Forced cycle (parameter 09)

The forced cycle is a cleaning cycle (all valves are actuated once in sequence), which is executed after the time period set in parameter 09 "Forced cycle" has elapsed, if no cleaning triggered by the differential pressure has taken place before the time has elapsed. To activate the forced cycle, parameter 09 must be set to a value greater than zero. If the differential pressure Δ*p* of the filter has not reached the DP-max switching point after the time set in parameter 09 has elapsed (the differential pressure-dependent cleaning has not been started), a cleaning cycle is executed.

If the differential pressure value DP-max has been reached before the time has elapsed (start of differential pressure-dependent cleaning), the internal time counting for triggering the forced cycle is restarted.

6.4 Tapper function

To activate the tapper function, you must set the following parameters:

Use **parameter 20** (Brushoffdelay) to set the interval at which the tapper pulses are emitted.

Use **parameter 21** (Brushoff time) to set the duration of the tapper pulses.

Use **parameter 22** (Brushoff mode) to set the mode of operation. The following 5 modes are available for selection.

- Off = Tapper function deactivated.
- After cycle = The tapper gets a pulse after each cleaning cycle.
- Below DP min = The tapper gets a pulse when the filter differential pressure falls below the value DP-max minus DP-hysteresis.
- Timebased = The tapper gets a rhythmic pulse in time with the set brushoff delay time (parameter 20).
- Time+Cycle = The tapper gets a rhythmic pulse in time with the set brushoff delay time (parameter 20). It also gets a pulse after each cleaning cycle.

Use **parameter 23** (TimebaseB.Off) to set whether the onset range of parameter 21 should be 30 ms to 999 ms or 1 s to the maximum value s, whereby the maximum value depends on the set interval time (parameter 01) or the set downtime pause (parameter 10), whichever is lower.

Connection of the tapper

The tapper is connected to terminals 26 (+24V DC) and 14 (GND).

7 Alarm messages in the display

Display text	Designation	Cause / Recommended action
`Alarm DP max` `dp >  #### Pa`	ΔP max alarm	The set Δ*p* max alarm switching point `####` is reached. **Cause**: The Δ*p*-max of the filter elements has been reached. **Recommended action:** Check the cleaning and replace the filter elements if necessary! **Cause**: The differential pressure connection is faulty. **Recommended action:** Check the differential pressure connection! **Cause**: Wrong parametrisation. **Recommended action:** Check the setting of the parameter 06.
`Alarm DP min` `dp <  #### Pa`	Δp min alarm	The set Δ*p* min alarm switching point `####` is undershot. **Cause:** The Δ*p* min switching point is not reached during operation. **Recommended actions:** Check whether the fan is running! Check that all filter elements are installed! **Cause:** The differential pressure connection is faulty. **Recommended action:** Check the differential pressure connection! **Cause:** Wrong parametrisation. **Recommended action:** Check the setting of the parameter 05.
`Alarm valve ##`	Fan alarm	In the event of a broken wire or short-circuit on the valve output indicated by a number (`##`) on the display. **Cause:** Wiring to the valves interrupted. **Recommended action:** Check cables and electrical connections! **Cause:** The solenoid coil is defective. **Recommended action:** Replace solenoid valve!
`Alarm Cl. Press.`	Cleaning pressure alarm	**Cause:** The required cleaning pressure has not been reached. **Recommended action:** Check whether the compressed air supply is connected or whether the interval time has been set too low. The alarm is automatically deleted once the error has been rectified.
`Alarm DP Sec.fil`	Secondary filter differential pressure alarm	The maximum permissible differential pressure of the secondary filter has been exceeded. **Cause:** The secondary filter is heavily soiled. **Recommended action:** Please observe the filter manufacturer's instructions and change the filter insert if necessary.

8 Troubleshooting

Fault / Error	Possible causes	Recommended action
No valve activity	Wiring to valves interrupted	Check cables and electrical connections
	Solenoid defective	Replace solenoid valve
	Cycle interrupted	- Check the hose connections! - Check parameters 07 and 08!
No downtime cleaning	Parameter P03 = 0 (downtime cycles)	Check parameter 03 "Downtime cycles"!
	No signal from the fan control present	Apply signal to input 2
Cleaning not effective	Interval time too long	Set parameter 01 "Interval time" to a lower value!
	Pressure too low	- Check the pressure in the purge gas tank! - Set parameter 01 "Pause time" to a higher value!
	Valve defective	Check / replace valves
	Pulse time too short	Set parameter 02 "Pulse time" to a higher value!
	Cycle frequently interrupted	Check differential pressure transmitter and hose connections
Differential pressure display error	Hose connection error	- Drain hoses. Clean hose connection points on the filter housing with compressed air (only in direction of filter, never in direction of sensor) - Install hoses without kinks - Check hose connections in the unit for water, kinks, etc.

For further troubleshooting instructions, refer to the section 7 "Alarm messages in the display" on page 21.

9 Technical specifications

Item	Data	Terminals
Supply voltage	110 V ... 230 V AC ±10% 50/60 Hz Power consumption: max. 30 VA Power consumption in stand-by mode: 6 VA or 24 V ... 28 V DC Power consumption: max. 30 W Power consumption in stand-by mode: 6 W	1 (L), 2 (N), 3 (PE) 5 (+), 6 (-)
Outputs for solenoid valves	12 short-circuit-proof outputs, 24 V DC, max. 24 W Maximum permissible pulse time: 2500 ms	15, 40 (Valve 1, COM) 16, 41 (Valve 2, COM) 17, 42 (Valve 3), COM etc. to 26, 51 (Valve 12, COM)
Signal inputs	2 inputs 24 VDC, to be served potential-free 1 analogue input 4-20 mA ≙ 0 ... 5000 Pa	27, 28 29, 30 33, 34
Signal outputs	2 relay outputs (changeover contact) potential-free Max. contact rating: 250 V AC, 7 A 50 V DC, 1.5 A / 30 V DC, 10 A (resistive load) 1 analog output 4-20 mA ≙ 0 ... 5000 Pa	7, 8, 9 and 10, 11, 12 31, 32
Fuses	110 V … 230 V AC: Power supply with internal fuse protection 24 V … 28 V DC : PTC fuse* 1.85 A	–
Δp measuring range	0 ... 5000 Pa	–
Measuring sensor	Piezoresistive, overpressure-proof up to 138 kPa	–
Accuracy (linearity and hysteresis)	≤ ± 1% FSO**	–

* PTC fuse = Electrical component that heats up when the device is overloaded, thus increasing its electrical resistance and limiting the current consumption of the device. After the component has cooled down, it regains its original properties and does not need to be replaced.

** FSO (Full Scale Output) is the algebraic difference between the final value and the initial value of the measuring range. In this case 5000 Pa – 0 Pa = 5000 Pa.

Item	Data
Terminals	Spring-loaded terminals Admissible cross section Single-wire: 0.75 ... 1.5 mm² / 24 ... 14 AWG stranded: 0.75 ... 1.5 mm² / 24 ... 14 AWG Stripping length: 9 … 10 mm ⚠ Use a screwdriver with a blade width of max. 3 mm to open the tension spring terminal blocks. The use of larger screwdrivers can damage the terminals.
Ambient temperature range in operation	-20 °C to +60 °C
Ambient temperature range during transport and storage	-20 °C to +60 °C
Humidity	75% relative humidity, no condensation
Protection classes	Box: IP-66 / NEMA 4 Cable glands IP-67 ∆p connection: IP-66
Ignition protection type	Ⓔx II 3D Ex tc IIIC T85°C Dc
Certificate numbers	ATEX: BVS 03 ATEX E141X IECEx: BVS 14.0123X UKEx: ITS22UKEX0573X
Air and creepage distances EN 61010	Contamination degree 2, overvoltage category II
Weight	*ESM-12 DP IECEx* (without integrated solenoid valves) approx. 2000 g *ESM-12 DP 10V IECEx* (10 integrated solenoid valves) approx. 2500 g
Altitude	Max. 3000 m above a.s.l.

10 Dimension drawings

ESM-12 DP IECEx

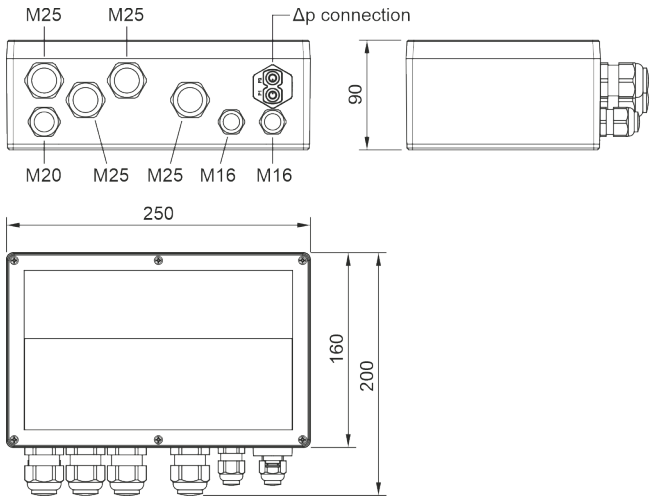


Figure 8: Dimensions *ESM-12 DP IECEx*

ESM-12 DP 10V IECEx

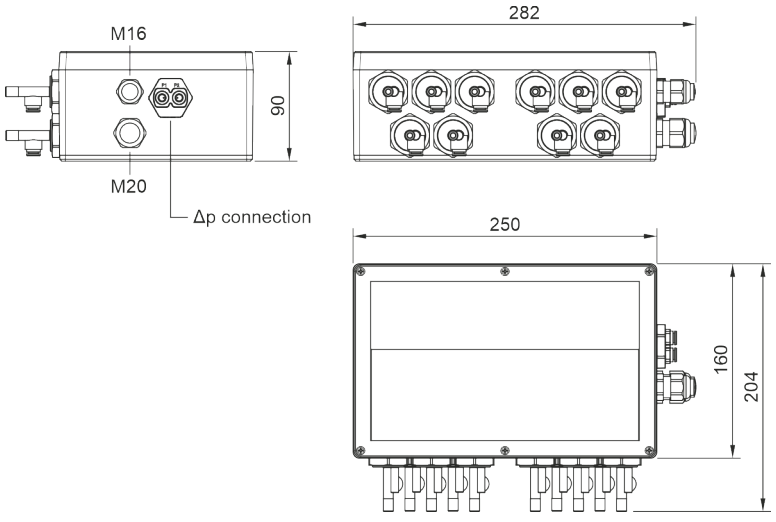
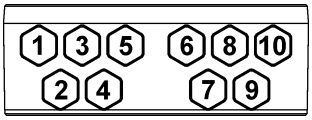


Figure 9: Dimensions *ESM-12 DP 10V IECEx*

Valve counting sequence



Housing assembly

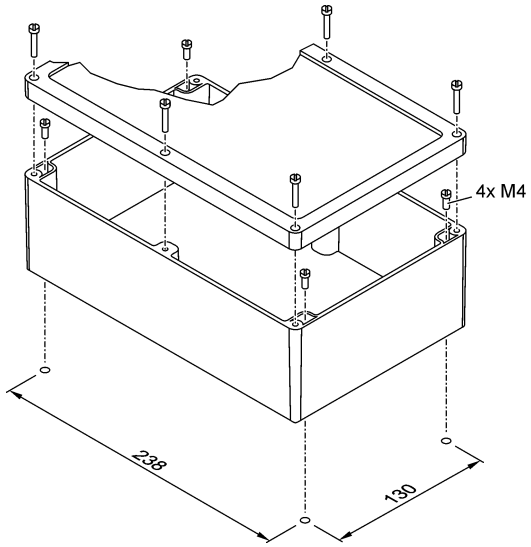


Figure 10: Valve counting sequence, enclosure installation

Disclaimer

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

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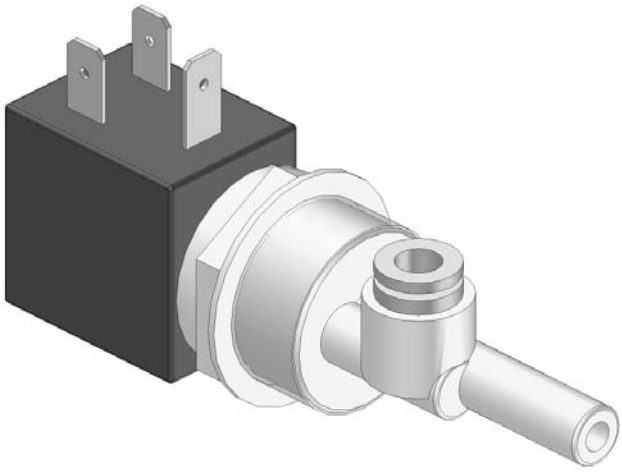
SUPPLEMENTARY OPERATING INSTRUCTIONS

Solenoid valve replacement ESM-3.. / ESM-9.. / MV-Box



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Translation of the original documentation, Version 1.1

1 Replacement of solenoid valve

The solenoid valves for controlling the diaphragm valves actuated by control air can wear out over time. This can lead to leaks at the solenoid valves or to malfunctions of the diaphragm valves and the cleaning system. In this case, the solenoid valves must be replaced.

Danger!

Electrical equipment can be live.

Touching live electrical parts could result in death or serious injury. For any work to be done on the filter:

→ *Disconnect the unit from the power supply.*

→ *Only work on electrical equipment when it is switched off.*

Warning!

Compressed air lines as well as the compressed air reservoir are under dangerous pressure.

When loosening connections of the compressed air components, there is a risk of injury from escaping compressed air.

→ *The compressed air supply must be shut off and the compressed air lines and the compressed air reservoir must be depressurised.*

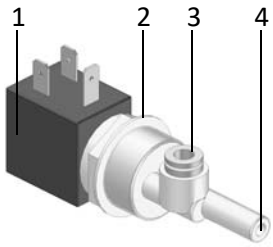

Figure 1: Solenoid valve type R

1 Solenoid coil
2 Plastic lock nut
3 Push-in fitting
4 Control air outlet

Notice!

If several solenoid valves are changed at the same time, the electrical connections and the control air lines between the diaphragm valves and the solenoid valves must be marked to prevent interchanging.

1.0.1 Removal solenoid valves

- Open the cover of the control unit or the solenoid valve box.
- Loosen the control air line on the solenoid valve by pressing the plastic ring of the push-in fitting (control air connection to diaphragm valve) and pull it off.
- Unplug the electrical connector from the solenoid.
- Loosen the plastic lock nut from the solenoid valve.
- Remove the solenoid valve and dispose of it in accordance with local regulations.

1.0.2 Installation solenoid valves

- Unscrew the plastic lock nut from the new solenoid valve.
- Insert the new solenoid valve into the control unit or the solenoid valve box and tighten the plastic lock nut from the outside.
- Attach the electrical plug connection to the solenoid coil.
- Connect the control air line by pushing it firmly into the push-in fitting of the solenoid valve.
- Close the cover of the control unit or solenoid valve box.