



Pressure gauge for super-
vising cleanrooms series
DMG5
Usermanual

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DMG5 „Of wall mounting“ (AP)



DMG5 „In wall mounting“ (UP)

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1. Safety device:

The DMG5 is used for controlling the pressure in a cleanroom. It is important to use the technical devices from the users' manual or from the machine sign. The producer is not sue able if the client used it in a wrong way. In this case the guarantee goes out, too. The installation and the electrical connection has to be done by service personal. It is not allowed to test the function with air pressure or breath. In that case, the sensitive pressure measure cells could get damaged. The machine should be installed at place where it is not in the direct sun. A permanent extreme heating could cause measure faults. The machine must be connected with earth like described at drawing shown below. Before the opening the machine the machine must get disconnected from the electricity, so that the machine is not on voltage.

2. Device description:

The pressure gauge DMG5 is used for pressure measuring in cleanrooms. The room pressure has to be bigger than the pressure outside of the cleanroom so that no polluted air could get into the inside of the room. The pressure gauge DMG5 is provided in two different ways. For over plaster assemble (order description AP) and under plaster assemble (UP). The „under plaster“ version got an front plate made out of painted steal, in fact it is possible to install the DMG5 on a wall. The pressure difference is some Pascal and it is shown on a 3.5- digit red shine LED-Display. For controlling are two settable limiting value switch with relay- output. Also, the limiting value switch „Alarm 1“ controls a super bright, sparkle LED and an acoustic signal transmitter. If the alarm is activated once, because of to low pressure difference, it can only be stopped with the red button „Quit“ (beeper off) which is below the LED-Display. Should the pressure raise again after the activating of „Alarm 1“, the alarm stops automatically, but it is possible that polluted air got into the room without recognizing it. That is why the alarm has to be stopped manually with the „Quit“. The limiting value switch „Alarm 2“ is used for realization extra controlling functions and got separate settable on- and off value. Also the hysteresis is variable. The distribution of the gear condition occurs with a left attached red LED next to the LED-Display. Apart of the relay- gear outs got the DMG5 analogue signal outs from 0-10 V to 4 – 20 mA and optional an RS232- port. The voltage supply is 24 VDC/AC, optional 230 VAC or 115 VAC. The DMG5 got a tube connection for 4 or 6 mm inner diameter or optional with a connection opportunity for an external pressure sensor (e.g type DS1-420). If measure and display place are far away from each other, it is not necessary to use long tubes.

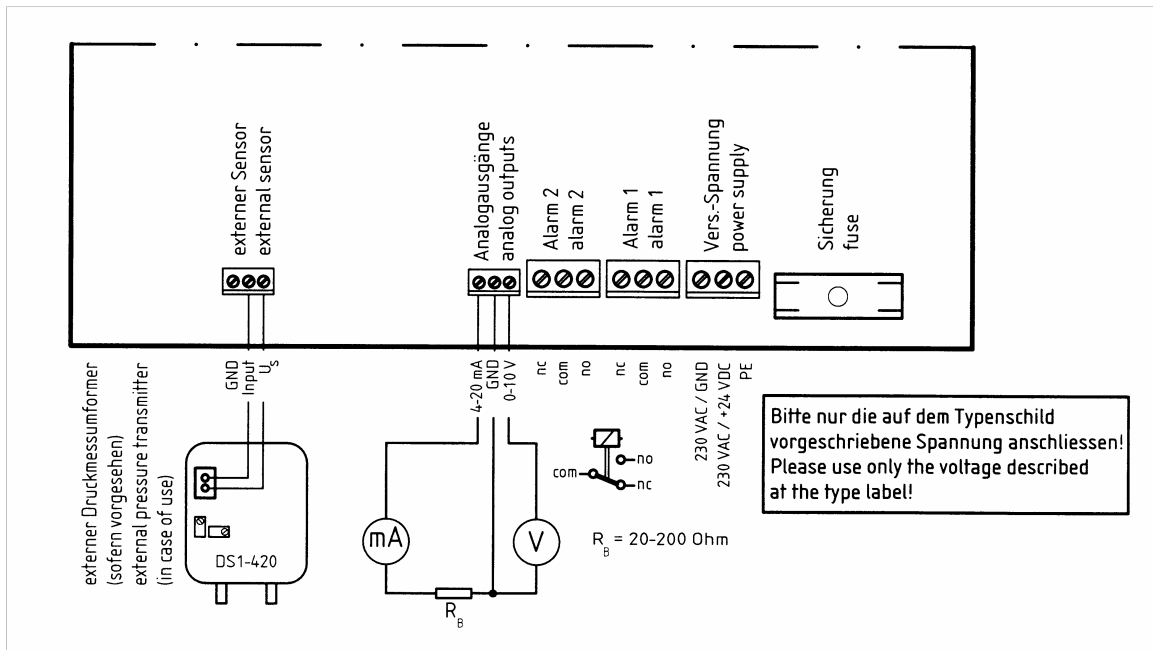
3. Electrical connections:

After you have opened the DMG5, at the bottom of the board you can see extensions like the voltage support, limiting value switch, analogue out 0-10 V and 4-20 mA, if available the connection for the external pressure sensor. In the illustration you can see the order of the connections:



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To ensure a convenient assembly at mounting in a cleanroom wall DMG5 uses a very flat enclosure. Because of a small place for the cables be carefully at connecting cables. Make attention at connection cables to ensure no loops of cables grow in the enclosure. If loops of cables in the enclosure its possible the cables presses against the printed circuit board, bend it and prevent the correct function of the buttons. All cables should be stripped that no loops grow and fixing with help of cable glands makes no difficulties. After that the cables must pull through the cable glands and fix it with print clamps like described at the figure above. The cable glands should not fixed in this moment. While you set the rear part of the enclosure to the front part together, pull carefully at the cables so that no loops grow. At last the cable glands will be screwed down to ensure a strong fixing.

4. The „pressure measuring“- mode

After connecting the DMG5 with the voltage support, for a few seconds the Software version will be shown on the Display, afterwards the DMG5 shows the pressure difference and then it is ready for operation. If range will be exceed display shows "OL" (overload), in case of negative direction "-OL". With the "Set" button you can change the machine configuration. For that you need a 3- digit PIN- number, in fact no one else can reset the settings. In the "pressure measuring" mode you can only switch between PIN- petition mode and pressure display mode.

With the arrow-buttons it is possible to show the minimum and the maximum room pressure since the connecting with the voltage support, for a moment. The right button (arrow downwards) shows the minimum value and the left button (arrow upwards) shows the maximum value. If you push one of the arrow-buttons, it shows for ca. 3 seconds the minimum or the maximum value, then the machine automatically turns back into the "pressure-display" mode. The minimum- / maximum-value-store can only be resetted by inserting the PIN-number or by disconnecting the voltage support



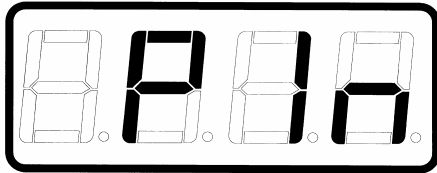
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5. Configuration of the instrument

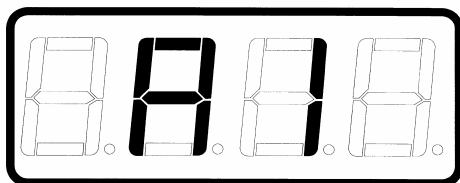
All configuration setups are saved even if the machine gets turned off. In fact, you only need to set the DMG5-configuration once. The storing of the settings is shown shortly on the display with the letters „Sto“(Storage).

6. PIN- number



The configuration can only be completed by inserting the 3-digit PIN-number. The standard PIN-number is "000". With the "set"-button, you can display to the PIN-mode, on the LED-display. To complete the action you have to push the "Quit"- button. Now the left "0" is sparking. At the first insert (0 standard) you have to verify with the "Set"-button, otherwise you need to select the numbers with the arrow buttons, which are on the left and the right side of the "Set"- button. Now you have to verify with the "Set"- button and repeat this process two-times for number 2 and 3. With the "Quit"-button you can return into the highest menu-level. Now it is possible to set all the other configurations of the machine. By inserting a wrong or an uncompleted Pin number shows the DMG5 error message "Err". You have to choose the wanted menu by pushing the "Set"- button, now you have to verify with the "Quit"- button. If the machine is unused more then 5 minutes, then it turns back into the "pressure measuring" mode. For configuration you have to insert the PIN-number again. In case of emergency i.e. if PIN- number was forgotten or personnel has been changed after software version 2.4 "general key" was created. Its possible to make all settings by using PIN- number "154". (Its the birthday of software development engineer)

7. Configuration of the Alarm1



The limiting value switch Alarm1 activates not just the relay 1, it also activates the ultrabright, flashing LED on top of the Display and an acoustic signal, if the difference pressure is lower than the setted value. If the alarm is activated once, then it can only be

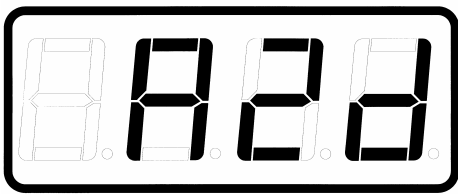


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turned off with the “Quit”-button. This prevents, that the alarm message and the possibility, that dirt could have get into the room after the rising of the room pressure. The resetting of the Alarm1 in the “pressure measuring” mode is possible. Only by inserting the Pin-Number it is possible to insert or change the alarm threshold. The Input of the alarm threshold takes place by 0.1- Pa steps. Press the “Quit”-button in the “AL1” menu for inserting the alarm value. Following the value is changed in the array inside choosed measurement range by using the arrow-buttons. With the “Set”-button you verify after each decimal place. If the array left selected measurement range, then the Display will show the error message “Err”.

8. Switch- direction select of Alarm 1 and 2

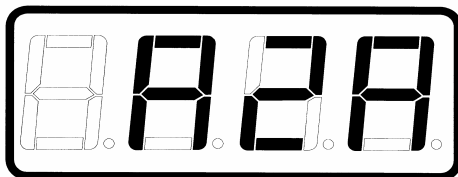
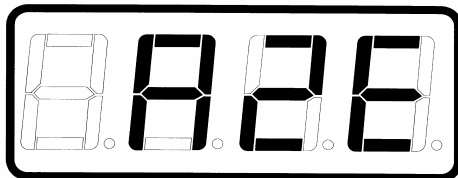


Both switching outputs Alarm 1 and Alarm 2 may be used to indicate if the pressure is to high or to low respectively. With help of menu “A1d” or “A2d” (“d” means direction) it’s possible to select the switch- direction. After select menu “A1d” or “A2d” the user can



choose “O” for overpressure or “U” for underpressure. The available mode is blinking. After pressing “Set” the last selected mode will be saved and by using “Quit” the DMG5 returns to main menu.

9. Configuration of Alarm2



The assortment of the switch values takes place in the same way as the inserting if alarm 1. This time you need to insert 2 values, the “on-value” and the “off-value”. The hysteresis of the limiting value switch is unlocked now. The switch-state is shown by the red LED on

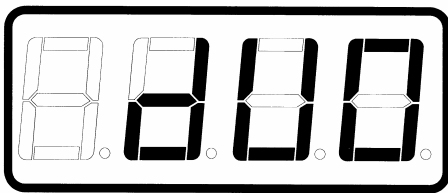


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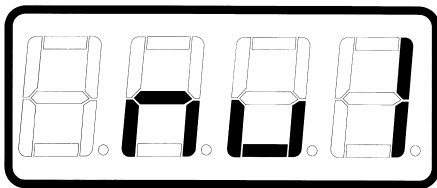
the left side of the Display. It is the same as in Alarm 1, the DMG5 can only use values inside selected measurement range. By inserting the limiting values you need to pay attention, because if the turn-on-value is lower than the turn-off-value there would be a logical failure and the sensor would display "Err". If there is a low pressure in the cleanroom then the Alarm will activate. In fact the turn on value has to be lower than the turn off value.

10. Damping factor (low pass filter)



Often its useful to make a damping of measurement values to avoid activate the alarm messages by air movements. At DMG5 there are a filter function by using an average computing method. The average computing method is selectable by 10 ranges. Range 0 means that the damping is switched off. The menu to select the filter function shows i.e. "dU1" at the display. After pressing the "Quit"- button its possible to select the damping factor by using the arrow- buttons. After that the "Quit"- button must be used to save the choosed damping factor. Note, that damping capability works at analogue outputs 0-10V and 4-20 mA also, depending of selected output configuration mode (see chapter 17).

11. The zero adjustment



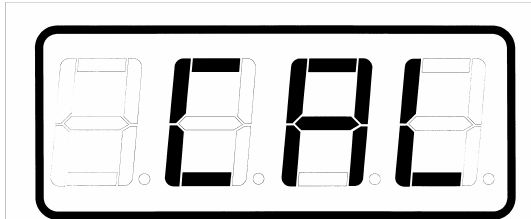
The zero adjustment will be realised by using menu „nul“. Before you make zero adjustment you should switch on the power supply and waiting 15 minutes to minimize thermal effects of the piezoresistive cell. A zero adjustment after power up produces a wrong adjustment. The measuring results after warming up are false because of the incorrect zero. Additionally the user must remove the pipes because the differential pressure is exactly zero in this case. After select the "nul"- Menu and confirmation with "Quit" the blinking display can zeroed by using arrow buttons. The resolution is always 0,1 Pa independent of the chose resolution at the "rES" menu. After abandon this menu DMG5 recalls the resolution selected before. Press "set" the zero adjustment will be saved and DMG5 enters the main menu again.



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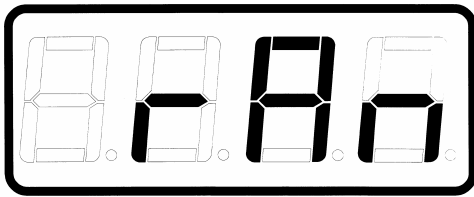
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12. The calibration



After software release 2.0 DMG5 has calibration capability. Stability of full scale value is very high, that's why calibration should be made at first after 1 to 2 years. Before calibration pipes has to be removed to ensure an exactly differential pressure of zero pascal. After that zero adjustment referred chapter 11 must performed. The "CAL" menu should be choosed and confirmed with "SET"- button. DMG5 shows actual pressure yet. A reference pressure nearly 50 Pa or 100 Pa (depends of selected measurement range) must be generated and measured by using a reference instrument. The pressure displayed by DMG5 should be equal to value at reference instrument. In case of differences between both instruments its possible to adjust display of DMG5 by using arrow buttons. If both instruments shows the same value calibration factor will be stored by pressing "SET"- button and calibration process is completed.

13. Select measurement range



After software release 2.4 DMG5 has 2 different measurement ranges capability. The "rAn" menu should be choosed and confirmed with "SET"- button. DMG5 shows actual measurement range yet.



for +/- 50 Pa and



for range +/- 100 Pa. Default value is

+/- 50 Pa. After that may be switched between both ranges by using arrow keys. Selected range will be stored by pressing "SET"- button and by using "Quit"- button to return to main menu. In case of reduce measurement range from 100 Pa to 50 Pa limit values will be increased to -50 Pa if smaller as - 50 Pa or decreased to + 50 Pa if larger than +50 Pa to avoid exceed smaller new measurement range. Automatic changing of limits will be displayed at LED- display i.e. "A1" for Alarm1 or "A2E" for A2 switching on value etc. The same applies for limiting values at output configuration mode "dUn" (undelayed universal output) or "uUn" (delayed universal output), see chapter 18. The

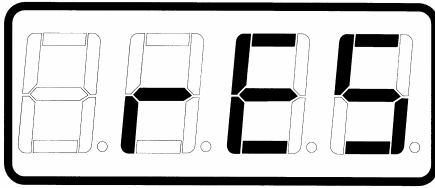


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predefined output configurations will be adapted to selected range automatically. (see table 1 chapter 18)

14. Change resolution of LED- display

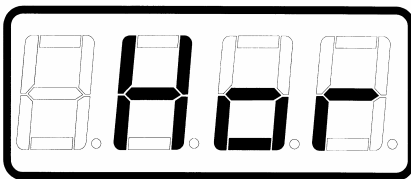


The resolution of LED- Display can choose between 1 Pa and 0.1 Pa. To do this you must enter the menu „rES“. The resolution chose before is blinking at the display.



By using the arrow keys it's possible to change the resolution. The "Set"- button confirms the choice and the „Quit“- button enters the main menu.

15. Signal horn control



At service of cleanrooms it's possible that the doors are open for a long time and the acoustic alarm would be activated permanently. After input the PIN- number the time of acoustic alarm can be changed or switched on or off permanently. The optical alarm by using the flashing LED cannot switched off because of security reasons. At main menu is to select the menu "Hor" (like Horn). A 3- digit number appears to showing the signal time



in seconds. The predefined alarm time by the manufacturer is 30 seconds. The signal time of acoustical alarm is adjustable between 1 und 254 seconds. Input of "000" means the horn is permanently off, number "255" means the horn is permanently on until "Quit" will be pressed after alarm in pressure measurement- mode. After confirmation "255" with "Set" the display shows "Per" (like permanently).



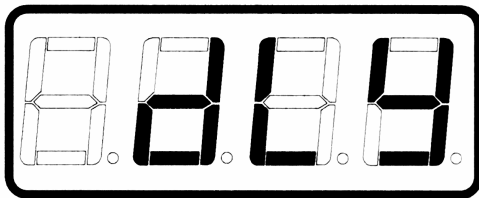
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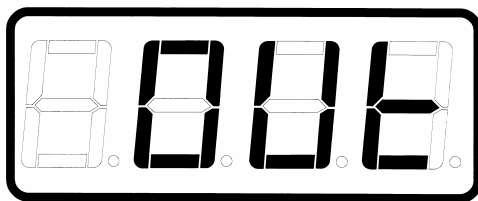
Press "Quit" and enter the main menu. All configuration settings are stored permanently also if the power supply will be interrupted.

16. Time delay of switching outputs



Anytime time delay of alarm outputs are required to avoid activate that if switching levels will be exceed for a short time. In this case time interval may be chosen which disables alarm outputs also if differential pressure exceeds switching levels. After this time interval alarm outputs will be enabled. Alarm conditions within time interval will be ignored. After choosing menu "dLy" (delay) and using "Quit"- button a 3 digit number appears and displays time interval in seconds. "000" (default value by manufacturer) means to disable this function. Delay time between 1 and 999 seconds are possible. Time interval takes effect for both alarm outputs in the same manner. After digitwise input and confirmation by using "Set"- button value will be stored and menu will be left.

17. Configuration analogue outputs



Analogue outputs 4-20 mA and 0-10V may be adapted to many different needs of customers Its possible to choose if the output signal referred selected dumping factor appears or without damping. Because the analogue outputs are often used for control purposes an extremely strong damping would be produce bad behaviour of the whole system.

All settings appears at output 4-20 mA and 0-10V in the same manner. All possibilities are summarized at table 1. Output mode "uUn" (undelayed Universal output) and "dUn" (delayed Universal output) must get 2 limit values. Between this both values 4-20 mA / 0-



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10V signal will be created. (like magnifying glass) Note that difference between 4- mA / 0V- value (I 4) and 20 mA /10V- value should be not smaller than 10% of full scale. In other case display shows "Err" and input will be denied. Direction of 4-20 mA / 0-10V- signal may be positive or negative, depends if 4 mA / 0V value is smaller (positive direction) or larger (negative direction) as 20 mA / 10V value. After input of value "I 20" and confirm with SET- button all settings are stored and by using QUIT- button user returns back to main menu.

Anytime in case of installation of the DMG5 and for service purposes its necessary to test all components of a cleanroom supervising equipment. For this situation DMG5 offers functions "C4" and "C20". By using this functions analogue outputs gives the minimum value (4mA / 0V) or the maximum value (20 mA / 10V) respectively. The minimum or maximum output signals can taken from the connection clamps. Simultaneously both relays turns off (C4) or on (C20) and the LED's "Alarm" and "Al2" are switched off (C4) or on (C20). By using this procedure the correct function of relays may be tested anytime.



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Table 1

Picture at display	description	Delay referred damping	Analogvalue at -50 Pa (-100 Pa)	Analogvalue at 0 Pa	Analogvalue at +50 Pa (+100 Pa)
	undelayed positive and negative	off	4 mA 0V	12 mA 5 V	20 mA 10V
	undelayed positive	off	4 mA 0V	4 mA 0V	20 mA 10V
	undelayed negative	off	20 mA 10V	4 mA 0V	4 mA 0V
	delayed positive and negative	on	4 mA 0V	12 mA 5 V	20 mA 10V
	delayed positive	on	4 mA 0V	4 mA 0V	20 mA 10V
	delayed negative	on	20 mA 10V	4 mA 0V	4 mA 0V
	undelayed universal output	off	 4mA /0V	Depends of I 4 and I 20	 20mA /10V
	delayed universal output	on	 4mA /0V	Depends of I 4 and I 20	 20mA /10V
	constant 4 mA /0V	off	4 mA 0V	4 mA 0V	4 mA 0V
	constant 20 mA /10V	off	20 mA 10V	20 mA 10V	20 mA 10V

18. Searching failures

failure	reason	activity
Instrument out of order no display	No power supply	Check power supply and connections
Pressure decreases	Leaky tubes, failures at tube connectors	Check tubes, searching of damages at pipes
RS 232- port out of order	Baudrate is not the same like baudrate of computer	Select equal baudrate like computer

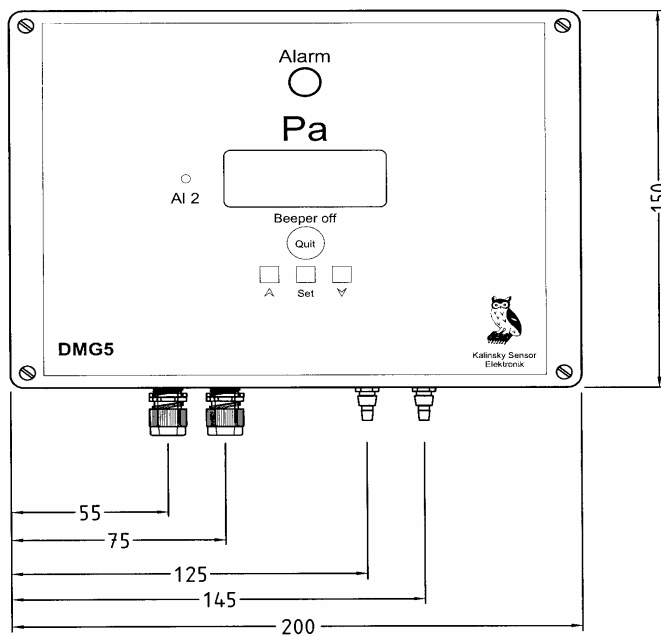
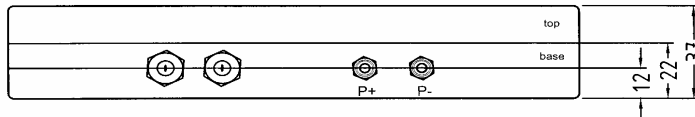


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19. Drawings

Maßstab: 2 : 1



Cover made of steel for in- wall mounting applications

