



**ELECTRONIC CONTROLLER WITH DELTA P
INCORPORATED – “ECONOMIST”**

MCS Series

Instruction manual

**MCSeng – rev. 4
January 09**

MECAIR S.r.l.

Diaphragm valves and electronic controls for dust collector filters

Via per Cinisello 97 – 20054 Nova Milanese – Milano – Italy

Phone ++39 0362 3751, telefax ++39 0362 367279

ELECTRONIC CONTROLLER WITH DELTA P MCS SERIES – INSTRUCTION MANUAL

INDICE		
	1. MAIN FEATURES	Page 2
	2. TECHNICAL FEATURES	Page 3
	3. INSTALLATION GUIDELINES	Page 4
	4. PRELIMINARY CHECKS	Page 5
	5. ELECTRICAL CONNECTIONS	Page 5
	6. FILTERED PRESSURE TAPS	Page 5
	6.1 FILTERED PRESSURE TAPS: INSTALLATION	Page 5
	6.2 FILTERED PRESSURE TAPS: CONNECTION	Page 6
	6.3 DRAWING1: FILTERED PRESSURE TAPS	Page 6
	7. SETTINGS	Page 7
	7.1 SETTINGS: VOLTAGE SELECTION	Page 7
	7.2 MANUAL AND AUTOMATIC MODE OPERATION	Page 8
	7.2.1 MANUAL MODE OPERATION	Page 8
	7.2.2 AUTOMATIC MODE OPERATION	Page 8
	7.2.3 REMOTE SWITCHING	Page 8
	7.3 SETTINGS: PARAMETERS SELECTION	Page 9
	8. SHUT DOWN CLEANING	Page 11
	9. CODES AND ALARMS	Page 11
	9.1 LEDS	Page 11
	9.2 LED OK	Page 11
	9.3 CODE “_ _ _” ON THE DISPLAY, zero kPa regulation	Page 11
	9.4 LED ALARM	Page 12
	10. PRECOATING FUNCTION	Page 12
	11. DELTA-P / VALVES BUTTON	Page 13
	12. STAND-BY FUNCTION	Page 13
	13. ΔP VALUE PLAYBACK (option)	Page 13
	13.1 4÷20 mA CONNECTION	Page 13
	13.2 4÷20 mA ELECTRONIC BOARD	Page 14
	13.3 FULL-SCALE 4÷20 mA SETTING	Page 15
	14. HOURCOUNTER	Page 15
	15. SUBMENU	Page 15
	16. FACTORY PRESETTINGS	Page 16
	17. TROUBLESHOOTING	Page 17
	18. FUSES TABLE	Page 17
	19. LEGEND	Page 18
	20. MCS FRONT PANEL	Page 19
	21. MCS 4 – 32 GENERAL ASSEMBLY	Page 20
	22. MCS 36 – 64 GENERAL ASSEMBLY	Page 21
	23. MCS 68 – 128 GENERAL ASSEMBLY	Page 22
NOTE: figures shown inside square brackets [...] refer to positions on drawing pages 20.		

CAUTION: before use, read the instructions thoroughly to acquire sufficient knowledge of the product. For your convenience, keep this sheet as a quick reference.

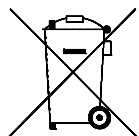
1. MAIN FEATURES

The MCS Economist completely controls the MECAIR diaphragm valves, on the dust collector filters, with pneumatic cleaning procedures (pulse-jet). The main features of the MCS Economist are:

- Automatic regulation of cleaning, according to the level of filter clogging (ΔP).
- Manual Cycle Time selection.
- Operating mode selection (MANUAL Mode or AUTOMATIC Mode).
- Automatic identification of connected valves (disconnected outlets are automatically skipped).
- Shut Down Cleaning, with programmable number of cycles.
- PRECOATING function.
- STAND-BY function.
- REMOTE function.
- Remote commutation of position (MANUAL or AUTOMATIC).
- ΔP value playback (option).

2. TECHICAL FEATURES

ENCLOSURE	Grey ABS – transparent cover
GRADE OF PROTECTION	IP65
DIMENSIONI	MCS from 4 to 32 outlets: case 296 × 256 × 118 mm MCS from 36 to 64 outlets: case 560 × 280 × 130 mm MCS from 68 to 128 outlets: case 600 × 400 × 170 mm
WEIGHT	MCS 32: approx. 3,3 kg. MCS 48: approx. 7 kg. MCS 128: approx. 9,1 kg
CONNECTIONS	Push in plugs – with max. wire section of 2,5 mm ²
TEMPERATURE	Storage: -20°C/+80°C. Working: -10°C/+50°C.
POWER SUPPLY	115-230 V (± 10%) – 50/60 Hz (2 ranges available via the selection plugs). On request: 24-48 V (±10%) – 50/60 Hz , or 24 V (+5%, -0%) DC .
OUTLETS	24-115-230 V (3 ranges available via the selection of plugs), AC or DC (2 ranges available via the selection of plugs). Special execution: 48 V – AC or DC . With power supply 24 V DC , it is available only the outlet 24 V DC .
POWER RELAY	Input: max 30 VA. Outlet: max 25 VA / AC or 20 W / DC.
RELAY	2 A – 250 V AC
FUSE	1 A delayed with 115-230V power. 2 A delayed with 24-48V AC and 24 V DC
PULSE TIME	0,01 ÷ 9,99 sec
MANUAL CYCLE TIME	1 ÷ 999 sec
MAXIMUM DUTY CYCLE	30%
SET DELTA-P	0,01 ÷ 9,99 kPa
SET DELTA-P ALARM	0,01 ÷ 9,99 kPa
PRESSOSTAT MAX. INPUT PRESSURE	75 KPa
ΔP PRECOATING	0 ÷ 9,99 kPa
NO. OF CYCLES FOR SHUT DOWN CLEANING	0 ÷ 99 times
STAND-BY CONTROL	To be operated from a non-powered external contact (normally open).
HOUR COUNTER	0 ÷ 65.999 hours



WEEE

The device should be disposed of in accordance with current European regulations

3. INSTALLATION GUIDELINES



- Do not expose the MCS to direct sunlight in order to avoid overheating of the circuit board.
- Connect MCS to a continually powered line to allow SHUT-DOWN CLEANING when the fan stops and to have maximum precision in the ΔP measurements.
- Protect MCS from rain, water infiltration and humidity. Incomplete closing of the cover may cause infiltration which can seriously damage the circuit board.
- The initial length of conduit which holds the electric cables which run to the MCS, should be turned upwards or interrupted before the appliance. This will stop any water or condensate entering the MCS.
- Avoid cables to enter via the upper part of the MCS.box.
- Avoid installing any electronic devices on vibrating structures
- Use Only cable gland with protection grade IP65 and of proper size (according to the cable used)



- A disconnecting switch has to be installed on the power line before the MCS
- Do not attempt to repair MCS – contact MECAIR!
- All wiring should be carried out by a qualified electrician to avoid risk of fire and electrical shocks
- MCS wiring has to be performed in order to separate the different types of cables, (power , relay's contact, valve output , 4-20ma output) and in order not to pass close to the PCB.
- Before opening the unit , be sure that ,MCS is switched off (switch on/off (1) on 0 and wires on clamps (4) disconnected , including connection to alarm / signal relays .
- All MCS electrical connections , including solenoid valves have to use separate paths in respect to the other loads .
- Voltage selectors jumpers have o be positioned only by skilled personnel and following the instructions.
- A wrong Voltage selectors jumpers positioning may cause potential danger to the personnel safety .

4. PRELIMINARY CHECKS

- 1) Check that the MCS has no power (switch on/off [1] on **0** and terminals [4] disconnected).
- 2) Check that the value of power supply, registered on the yellow label [22] at the heading INGRESSO-IN, is the same as the one of the available power supply of grid.
- 3) Check that the value of the outlets voltage (valves), registered on the yellow label [22] at the heading USCITA-OUT, is the same as the one of the voltage on the serigraphy of the solenoid valves.

5. ELECTRICAL CONNECTIONS

- 1) Check that the MCS has no power (switch on/off [1] on **0** and terminals [4] disconnected).
- 2) Unscrew and open the terminal cover [20].
- 3) Pull out the extractable terminals [2].
- 4) Check that the connections to the valves are correct and insulated respect to the ground. Therefore testing the insulation between ground [3] and common (C) with outlets connector disconnected.
- 5) Connect the valves to the terminals [2], between common (C) and numbered terminals of the outlets
 - The grounding [3] of the valves is necessary if the outlets voltage is greater or equal to **48V**.
 - Never connect the commons (C) or the outlets to ground [3].
 - The commons (C) are connected between them on the printed circuitry. Carry out a common to each valve or group together the commons in one wire.
 - The outlets are of static type, with “zero-crossing” command, to prevent electrical noises.
- 6) Put back the extractable terminals [2].
- 7) Power the MCS [4]:
 - a) with **230 V** of grid (L = phase, N = neutral)
 - b) with **115 V** from auxiliary transformer(solenoids, control switches, etc.).
It is necessary to connect to the ground one of two terminals of secondary and to connect it to the N [4].
 - c) – Special realization **24/48 V**: it is necessary to connect to the ground one of two terminals of secondary and to connect it to the N [4].
 - Special realization **24 V DC**: the terminals[4] are this:

+	-	///
---	---	-----
- 8) Close and screw the terminal cover [20].

6. FILTERED PRESSURE TAPS

The ΔP into the filter is measured by an internal probe, connected to the filter by 2 filtered pressure taps. The filtered pressure taps avoid that the process powders block the tubes connecting probe and filter.

6.1. FILTERED PRESSURE TAPS: INSTALLATION

For the depressurised filters install on the filter wall both the filtered pressure taps, one on the dusty air plenum and one on the clean air plenum. For the pressurised filters, install only one filtered pressure tap on the dusty air plenum. For each filtered pressure taps refer to the instructions below: (Drawing **6.3**):

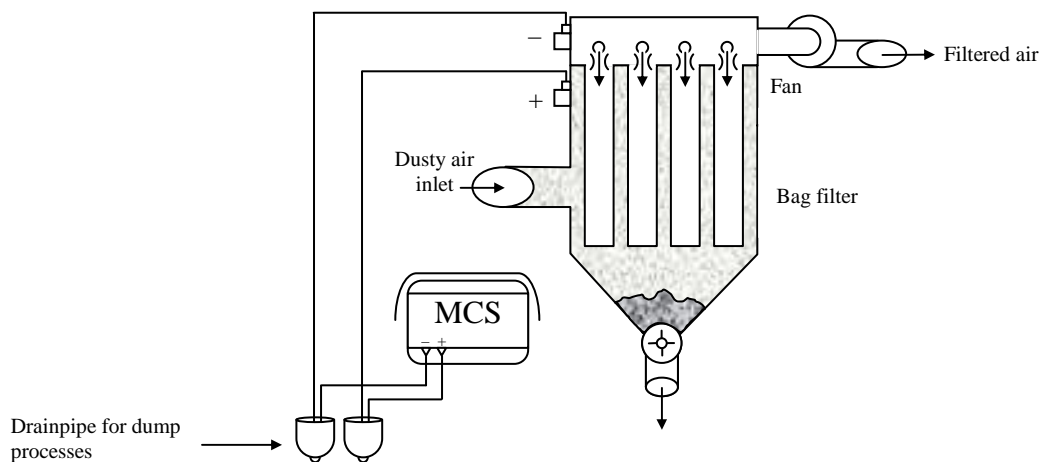
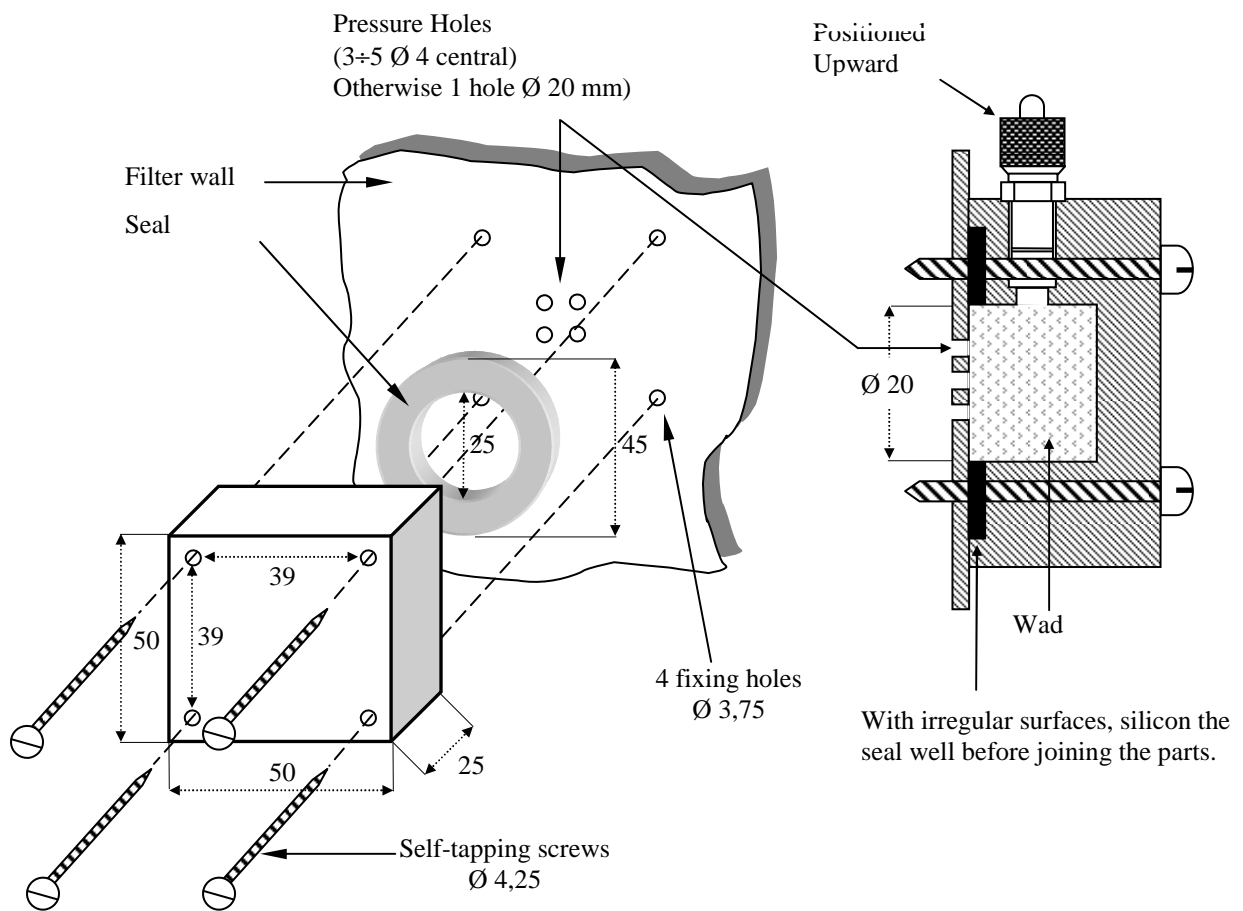
- 1) Drill , on the filter wall, the 4 fixing holes for the tap (\varnothing 3,75 mm., inter axial distance 39 mm.).
- 2) At the centre of the 4 fixing holes, make 3-5 pressure intake holes, all in a circle with radius of 10 mm. The \varnothing of the holes must be 4 mm.
- 3) Position the rubber seal. If the support surface is irregular, you must fill with silicon
- 4) Position the filtered pressure tap, with the tube connection turned upside.
- 5) Fix the filtered pressure tap with the self-tapping screws (\varnothing 4,25 mm.).

6.2. FILTERED PRESSURE TAPS: CONNECTION

Connect the 2 tubes of the filtered pressure taps to nipples [13]. Connect the tube of the tap of the filtered air to the “-” inlet. Connect the tube of the tap of the dusty air to “+” inlet.

- Note:**
- Install the pressure taps so that neither condensate nor powder can precipitated.
 - The 2 tubes ($\text{Ø } 6/4$) that connect the filtered taps to nipples [13], must be lead upwards in the first part of the circuit. This avoids that into the tubes precipitated condensation. In damp processes, where condensation is likely, for each tube there must be a drain pipe.
 - If the pressure taps are correctly installed and connected to nipples [13], the display [7] shows positive values of ΔP . If the display shows negative values of ΔP , the connections of 2 pressure taps are reversed.
 - If the ΔP goes below $-0,14 \text{ kPa}$, on the display [7] appears “- - -”. In this case, reverse the tubes of 2 filtered taps. If the problem persists, use the regulation [15] to reset the indication at 0 kPa.

6.3 DRAWING1: FILTERED PRESSURE TAPS



7. SETTINGS

7.1. SETTINGS: VOLTAGE SELECTION

Check that the MCS is not powered (switch on/off [1] on **0** and terminals [4] disconnected).

- Check:
- 1) that the value of the power supply voltage, registered on the yellow label [22] with the heading INGRESSO-IN, is the same as the one of the available power supply.
 - 2) that the value of the outlets voltage (valves), registered on the yellow label [22] with the heading USCITA-OUT, is the same as that printed on the solenoid valves.

**If this 2 conditions are met, go to the paragraph 7.2.
Otherwise, carefully follow the procedure below!**

A) Power supply selection:

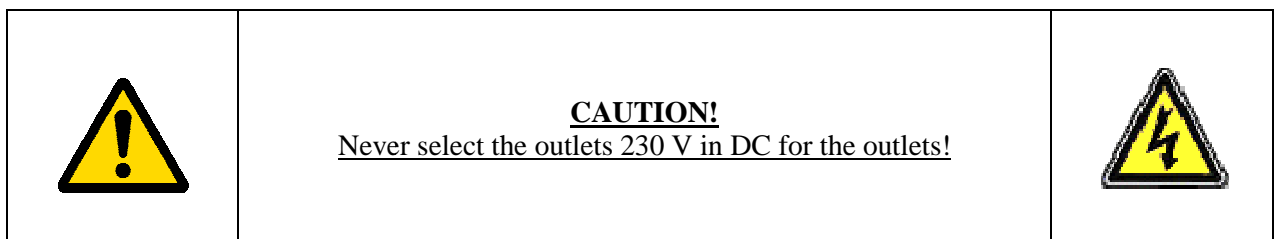
- 1) Unscrew to 45° anticlockwise the 2 screws [21]. Simultaneously push up and open the transparent cover of the MCS.
- 2) Unscrew the 4 screws of the green panel. Lift the green panel (do not remove it as it is connected to the base of the enclosure!).
- 3) Check that the power supply voltage, selectable with the jumpers [5], is the same as the power available (example.: both 230 V).
- 4) If the two voltages are different, move the jumpers [5] on the position selecting the same voltage as that available.

B) Outlets voltage selection:

- 1) Check that the outlets voltage, selectable with the jumpers [6], is the same as that indicated on the solenoid valves (example.: both 24 V).
- 2) If the two outlets voltage are different, move the jumpers [6] on the position selecting the same outlets voltage as that on the solenoid valves.
(ATTENTION: on the jumpers [6] select the same value for outlets voltage!).

C) Type of outlets voltage selection (AC / DC):

- 1) Check that the type of outlets voltage, selectable with the jumpers [8], is the same as that on the solenoid valves (example.: both AC).
- 2) If the two type of outlets voltage are different, move the jumpers [8] on the position selecting the voltage required.
- 3) Replace the front panel and tighten the 4 screws of the panel.
- 4) Close the transparent cover and tighten the 2 screws [21], rotating them to 45° in clockwise direction.



7.2. MANUAL AND AUTOMATIC MODE OPERATION

Note: select the shortest PULSE TIME possible, between all those compatible with maximum obtainable particle separation. This is valid both in MANUAL and AUTOMATIC Mode.

- Ideal time for “bag” filters: between 100 ms and 400 ms.
- Ideal time for “standard cartridge” filters: between 500 ms and 1 second.
- Ideal time for “rotating nozzle cartridge” filters: between 1sec and 4 seconds.

7.2.1 MANUAL MODE OPERATION

In MANUAL Mode, the MCS commands the valves with fixed PAUSE TIME. The cleaning is not dependant on the level of the filter bags clogging. The MANUAL Mode must be only used during the start-up phase.

When the MCS is in MANUAL Mode, the **LED MANUAL** [30] flashes.

In MANUAL Mode, the PAUSE TIME depends on selected TCM. The link is: $\text{PAUSE TIME} = \text{TCM} : \text{no. of connected valves}$. E.g.: if you connect 8 valves and you select a TCM of 360 seconds, $\text{PAUSE TIME} = 360 : 8 = 45$ seconds.

7.2.2 AUTOMATIC MODE OPERATION

In AUTOMATIC Mode, the cleaning is automatically adapted to the level of the filter bag clogging. The cleaning starts when the filter ΔP exceeds the value of selected SET DELTA-P (see 7.3). The SET DELTA-P to select depends on the structural characteristics and wear and tear of the filter and on the type of process.

When the MCS is in AUTOMATIC Mode, the **LED MANUAL** [30] is off.

In AUTOMATIC Mode, the PAUSE TIME depends on the selected TCM*. The link is: $\text{PAUSE TIME IN AUTOMATIC MODE} = (\text{PAUSE TIME IN MANUAL MODE} : \text{No. of connected valves}) : 3 = \text{TCM} : 3$. For example if you have set a TCM of 360 seconds with 8 valves connected, $\text{PAUSE TIME IN AUTOMATIC MODE} = (360 : 8) : 3 = 45 : 3 = 15$ seconds.

* *It is also possible to modify the pause time so as not to rely on the TCM. Refer to Point 15 p 4.*

7.2.3 REMOTE SWITCHING

It is possible to pass from AUTOMATIC Mode to MANUAL Mode (and vice versa) closing a remote contact. See below:

- 1) Unscrew and open the terminal cover [20].
- 2) Connect to terminals **A.M** and **ground** [26] an external contact free of power and normally open (NO).
- 3) Close and screws the cover terminal [20].
- 4) When the MCS is in AUTOMATIC Mode and you desire to pass in MANUAL Mode, close the remote contact on terminals **A.M** and **ground** [26].
- 5) To return in AUTOMATIC Mode, open the remote contact on terminals **A.M** and **ground** [26].

7.3 SETTINGS: PARAMETERS SELECTION

Check that all electrical connections have been done as described in Point 5.

Switch on/off [1] on 1. On the display [7] appears, for a few seconds the MCS identification code. Immediately after, on the display appears the value of the filter ΔP . If the **LED OK** [18] and **PAUSE** [12] turn on and the **LED MANUAL** [30] flashes, the MCS is in MANUAL Mode. If only the **LED OK** [18] turns on, the MCS is in AUTOMATIC Mode.

Choose between MANUAL or AUTOMATIC Mode, with **AUTOMATIC** button [16]. In MANUAL Mode the **LED MANUAL** [30] flashes; in AUTOMATIC Mode is off.

Attention! When the fan stops, the display [7] must indicate a filter ΔP value of 0 kPa. Otherwise, use the regulation [15] to reset the indication at 0.

- 1) Press SELECT MENU [9]: on the display [7] flashes the no. **1**:
with +/- buttons [10] select the **PULSE TIME** (0,01 ÷ 9,99 sec).
- 2) Press SELECT MENU [9]: on the display [7] flashes the no. **2**:
with +/- buttons [10] select the **MANUAL CYCLE TIME** (1 ÷ 999 sec).
The **TCM** is the number of seconds, after which, the MCS returns to activate the first valve. In other words, it is the duration, in seconds, of a complete cycle of cleaning, from the first to the last connected valve.

When you select the **TCM**, the MCS automatically calculates the **PAUSE TIME**, in this way:
 - In MANUAL Mode, the PAUSE TIME is given by the selected TCM divided by the no. of connected valves. E.g.: TCM = 360 sec and no. connected valves = 8. PAUSE TIME = 360 : 8 = 45 sec.
 - In AUTOMATIC Mode, the PAUSE TIME is given by the selected TCM divided by 3, divided by the no. of connected valves.
E.g.: TCM = 360 sec and no. of connected valves = 8. PAUSE TIME = 360 : 3 : 8 = 15 sec.
 - If the MCS has more than 32 outlets, it is useful to select a PAUSE TIME unrelated to the TCM (see Chap. 15).
- 3) Press SELECT MENU [9]: on the display [7] flashes the no. **3**:
with +/- [10] buttons select the **SET DELTA-P** (0,01 ÷ 9,99 kPa).
The cleaning starts every time that the filter ΔP exceeds the SET DELTA-P. The cleaning stops every time that the filter ΔP goes below the SET DELTA-P.
- 4) Press SELECT MENU [9]: on the display [7] flashes the no. **4**:
with +/- buttons [10] select the **SET DELTA-P ALARM** (0,01 ÷ 9,99 kPa).
When the filter ΔP exceeds the SET DELTA-P ALARM, you are in the presence of alarm.
- 5) Press SELECT MENU [9]: on the display [7] flashes the no. **5**:
with +/- [10] buttons select the **NO. OF CYCLES for the SHUT DOWN CLEANING** (0 ÷ 99 times).
(Select 0 to exclude the SHUT DOWN CLEANING).
 - The SHUT DOWN CLEANING automatically starts when the filter ΔP goes below 0,10 kPa.

- 6) Press SELECT MENU [9]: on the display [7] flashes the no. **6**:
with +/- [10] buttons select the **ΔP PRECOATING** (0 ÷ 9,99 kPa).
In both Modes, the cycle will start only when the filter ΔP will exceed the **ΔP PRECOATING**, whatever was the DELTA-ΔP selected. This allows to the filters to overload with preparation powders.
- Select 0 to disable the PRECOATING function.
 - Overpassed the ΔP PRECOATING, the function will auto delete: now the cycle will only depend from the SET DELTA-P. Insert a new ΔP PRECOATING value to restore the function.
 - For the ΔP PRECOATING, it is possible to select only values greater (at least of 0,10 kPa) than the SET DELTA-P.
 - The SHUT DOWN CLEANING only starts when the ΔP PRECOATING is overpassed. Otherwise, even if you stop the fan, the SHUT DOWN CLEANING does not start.
- 7) Press SELECT MENU [9]: On the display [7] appears the code **7L**. Immediately after it appears the letter **L** and the 3 last numbers (from 0 to 999) of the 5 which indicate the amount of hours for functioning of the MCS.
E.g.: MCS operating for 12.270 hours, on the display appears L270.
- Press SELECT MENU [9]: On the display [7] appears the code **7H**. Immediately after it appears the letter **H** and the first 2 numbers (from 0 to 65) of the 5 which indicate the amount of hours for functioning of the MCS.
E.g.: MCS operating for 12.270 hours, on the display appears H12.
- 8) Press SELECT MENU [9]: on the display [7] flashes the code **8PAS**.
From here it is possible to enter the submenu.
- 9) Press SELECT MENU [9]: on the display [7] appears the letter **E** (run): the cycle starts.

The functioning of the valve is indicated by the lighting up of the **LED PULSE** [11].
The pause between 2 valves firing is indicated by the lighting up of the **LED PAUSE** [12].

- Note:**
- The valves are activated from outlet no. 1.
 - The MCS skips the outlets disconnected. The relative numbers run, in rapid succession, on the display [7]. If there are no valves connected, on the display will show the numbers of all outlets.
 - During the first cycle, check that none of the connected valves are skipped.
 - MECAIR presets: PULSE TIME, TCM, SET DELTA-P, SET DELTA-P ALARM, NO. OF CYCLES for the SHUT DOWN CLEANING and ΔP PRECOATING (see Chap. 16).
 - We suggest setting MCS working parameters in order to clean the filter with the lowest possible frequency in order to reduce dust emissions due to bag stress, to achieve a longer lifetime of the bags and to reduce compressed air consumption.
 - The PAUSE TIME must not be lower than the time necessary to recharge the pressure into the tank!
 - Press the **DELTA-P/VALVES** button [14] to return in **E** (run) from every step of SELECT MENU. To change a parameter value immediately returning in **E**: a) enter SELECT MENU, until the step of the desired parameter; b) change its value; c) press SELECT MENU; d) press DELTA-P/VALVES button to return in **E**.
 - During the parameters selection (SELECT MENU), after 3 minutes from the last button pressed, the MCS automatically return in **E** (run).

8. SHUT DOWN CLEANING

After every utilization, it is useful to carry out one or more cycles of SHUT DOWN CLEANING, to free the filtering elements of residual dust. The SHUT DOWN CLEANING starts when the ΔP goes below 0,10 kPa..

- ATTENTION:
- The SHUT DOWN CLEANING only starts if the MCS is in AUTOMATIC Mode!
 - The SHUT DOWN CLEANING only starts if the ΔP PRECOATING is exceeded. Otherwise, even if you stop the fan, the SHUT DOWN CLEANING does not start.

To activate the SHUT DOWN CLEANING:

- 1) Check that the MSC is in AUTOMATIC mode.
- 2) Select the NUMBER OF CYCLES for the SHUT DOWN CLEANING (see 7.3). (Select 0 to exclude the SHUT DOWN CLEANING).
- 3) The MCS automatically calculates the PAUSE TIME for the SHUT DOWN CLEANING, which results from TCM selected divided by the number of valves connected*.
- 4) The SHUT DOWN CLEANING starts when the ΔP goes below 0,10 kPa **. On the display [7] flashes the letter **E**. The SHUT DOWN CLEANING does not start from the valve no. 1, but it completes the current cycle, counting it as first cycle of SHUT DOWN CLEANING. During the SHUT DOWN CLEANING, if the filter ΔP exceeds 0,10 kPa, the cleaning stops.
- 5) When the SHUT DOWN CLEANING finishes, on the display [7] appears **End**.

* It is possible to get the Shut Down Cleaning Pause Time independent of TCM. Refer Point 15 point 5.

** It is possible to change this value. Refer Point 15 point 8.

9. CODES AND ALARMS

9.1 LEADS

- 1) **LED MANUAL [30]:** flashes if the MCS is in MANUAL mode. It's off if the MCS is in AUTOMATIC mode.
- 2) **LED PULSE [11]:** It's on when a valve is firing.
- 3) **LED PAUSE [12]:** it's on between the firing of one valve and another
- 4) **LED PRECOATING [32]:** it flashes until the filter ΔP exceeds the ΔP PRECOATING; then it switches off.
- 5) **LED STAND-BY [31]:** it flashes when the MCS is in stand-by.

9.2 LED OK

Incidental damages of the microprocessor are shown by the turning off of the **LED OK** [18]. This problem is not able to be resolved by the customer: Refer problem directly to MECAIR.

Refer to terminals **WD** [24]. If the MCS has no power, the contact of the relay is on **N.C**. When you power the MCS, the relay is energized and the contact switches on **N.O**. If the contact switches on **N.C** when the MCS is powered, the **LED OK** [18] turns off.

9.3 CODE “-- --” ON THE DISPLAY

On the display [7] appears “-- --” if the filter ΔP goes below -0,14 kPa. In this is the case:

- 1) Check that the filtered pressure taps are connected to the pressure nipples [13] see chapter 6.2.
- 2) If the problem persists:
 - disconnect the connection pipes between the pressure filtered taps and pressure nipples [13]
 - use the regulation [15] to reset the indication at 0 kPa.
 - reconnect [13] the connection pipes between the pressure filtered taps and pressure nipples [13].

9.4 LED ALARM

The **LED ALARM** [30] switch on if the ΔP inside the filter exceed the **ΔP ALARM** selected, or if there is a short circuit on one or more outlets.

If the **LED ALARM** [30] is on, Press “+” [10]:

- a) If on the display [7] appears the code **PPP1**, the filter ΔP exceeded the selected **ΔP ALARM**. Operate as follows:
 - 1) Stabilise the filter ΔP .
 - 2) Press “-” to return in **E** (run).
 - 3) Press **RESET** [19]: the alarm disconnects.
- b) If on the display [7] appears the letter **A** followed by a number, the valve countermarked with that number is in short circuit. Operate as follows:
 - 1) Continue to press the button “+” [10], to read on the display the number of the faulty outlets. Attention: the alarm intervention excludes the faulty valve which is in short circuit.
 - 2) Repair the damages .
 - 2) Press “-” to return in **E** (run).
 - 3) Press **RESET** [19]: the alarm disconnects. The command of defective valves restarts.

Refers to terminals **ALL** [24]. If the MCS is not powered, the contact of relay is on **N.C**. When you power the MCS, the relay is energized and the contact switches on **N.O**. If the contact of relay switches on **N.C** when the MCS is powered, the **LED ALARM** [17] turns on.

10. PRECOATING FUNCTION

The **PRECOATING** function retards the cleaning cycle of the filter in order to allow that the filter bags collect and absorb/permeate the preparation powders.

ATTENTION: selected the ΔP **PRECOATING**, the cycle begins only when the ΔP in the filter exceeds the ΔP **PRECOATING**. This is the same in both modes (Manual/Auto), and whatever the desired **SET DELTA- ΔP** may be.

To activate the **PRECOATING FUNCTION**:

- 1) Select the ΔP **PRECOATING** at point 6) of **7.3**. The **LED PRECOATING** [32] flashing.
 - To exclude the **PRECOATING** function, select **0** at point 6) of **7.3**.
 - The ΔP **PRECOATING** selected must be between 0 and 9,99 kPa.
 - The ΔP **PRECOATING** must be higher (almost of 0,10 kPa) than the selected **SET DELTA-P**.
- 2) When the filter ΔP exceeds the ΔP **PRECOATING**, the cycle starts and the **PRECOATING** function auto deletes. The **LED PRECOATING** [32] turns off.
 - To reactivate the function, select a new value of ΔP **PRECOATING**.
 - The **SHUT DOWN CLEANING** only starts if the ΔP **PRECOATING** is already exceeded. Otherwise, even if you stops the fan the **SHUT DOWN CLEANING** doesn't starts.

11. DELTA P / VALVES BUTTON

On the **LED** display [7], the MCS shows the filter ΔP . Press **DELTA-P/VALVES** [14] to pass from filter ΔP indication to active valve indication (and vice versa). When you turn on the MCS, on the display automatically is visualised the filter ΔP .

12. STAND-BY FUNCTION

It is possible to put the MCS in **STAND-BY** from distance. When the MCS is in **STAND-BY**, all its functions are blocked.

To activate the **STAND-BY** function:

- 1) Unscrew and open the terminal cover [20].
- 2) Pull out the extractable terminal [27].
- 3) Connect to **S.B** and **ground** terminals [27] an external contact free of power and normally open (NO).
- 4) Put back the extractable terminal [27].
- 5) Close and screw the terminal cover [20].
- 6) Close the contact on **S.B** and **ground** terminals [27] to put the MCS in **STAND-BY**. The **LED STAND-BY** [31] flashes.
- 7) Open the contact on **S.B** and **ground** terminals [27] to restart the cycle. The **LED STAND-BY** [31] turns off.

13. ΔP VALUE PLAYBACK (option)

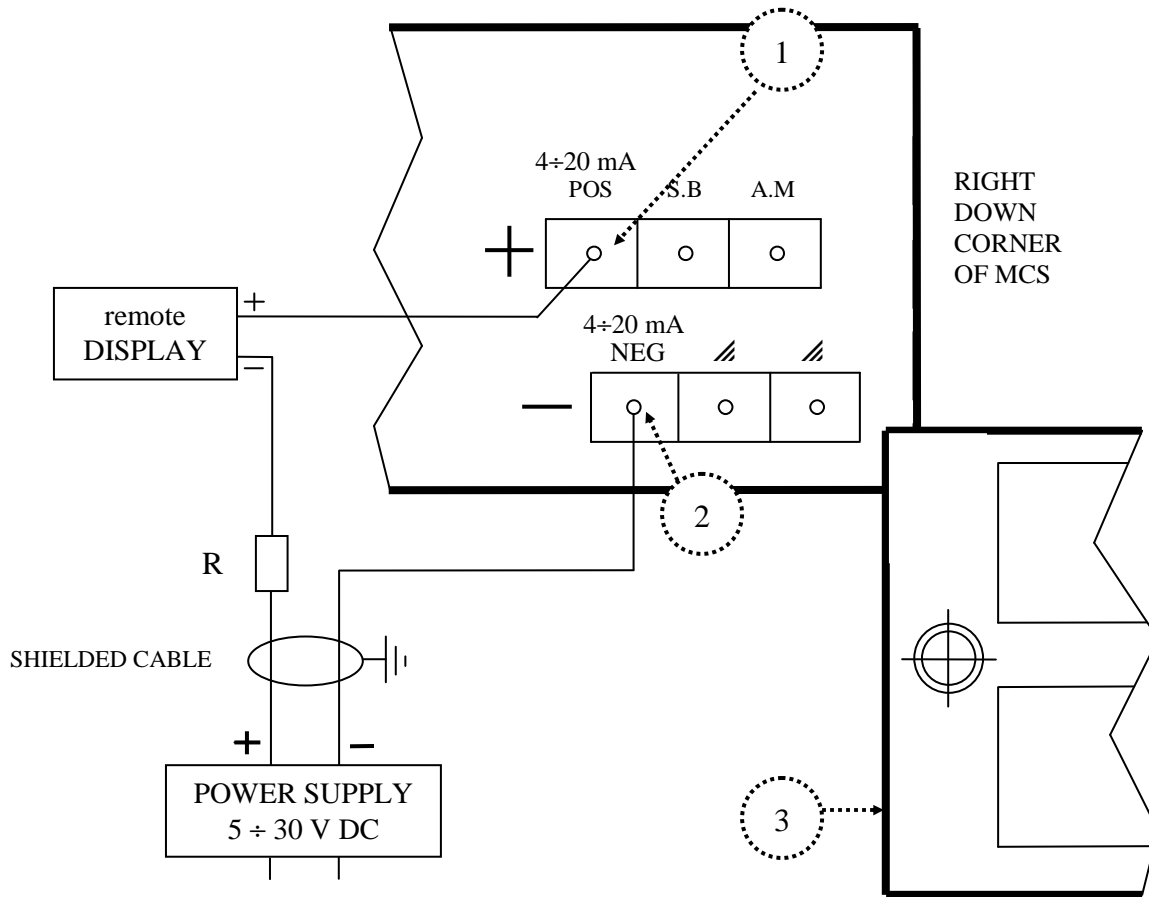
With the assembled board [4] is possible to broadcast to distance, on other unit, the ΔP value that is showed on MCS display [7]. Connect to the terminals **4+20 mA POS** [1] e **4+20 mA NEG** [2]. See drawing page 13.

13.1 4 + 20 mA CONNECTION

ATTENTION! The outlet 4 + 20 mA is passive: connect it to an external power supply!

- 1) Unscrew and open the terminals cover [3].
- 2) Pull out the extractables terminals from terminal [1] e [2].
- 3) Connect to **4 ÷ 20 mA POS** [1] the positive terminal (+) of the remote unit.
- 4) Connect to **4 ÷ 20 mA NEG** [2] terminal the negative (-) terminal of of a **STABILISED POWER SUPPLY** (5 ÷ 30 V DC).
- 5) Insert a **RESISTANCE** on the connections between negative terminal (-) of remote unit and positive terminal (+) of the **STABILISED POWER SUPPLY**.
 - If the power supply is lowest than 15 V DC, don't insert any resistance.
 - If the power supply is between 15 and 24 V DC, insert a resistance of $470 \Omega \frac{1}{2} W^{(*)}$.
 - If the power supply is higher than a 24 V DC, insert a resistance of $1000 \Omega 1 W^{(*)}$.
- 6) Use a **SHIELDED CABLE** for the connections.
- 7) Close and screw the terminals cover [3].

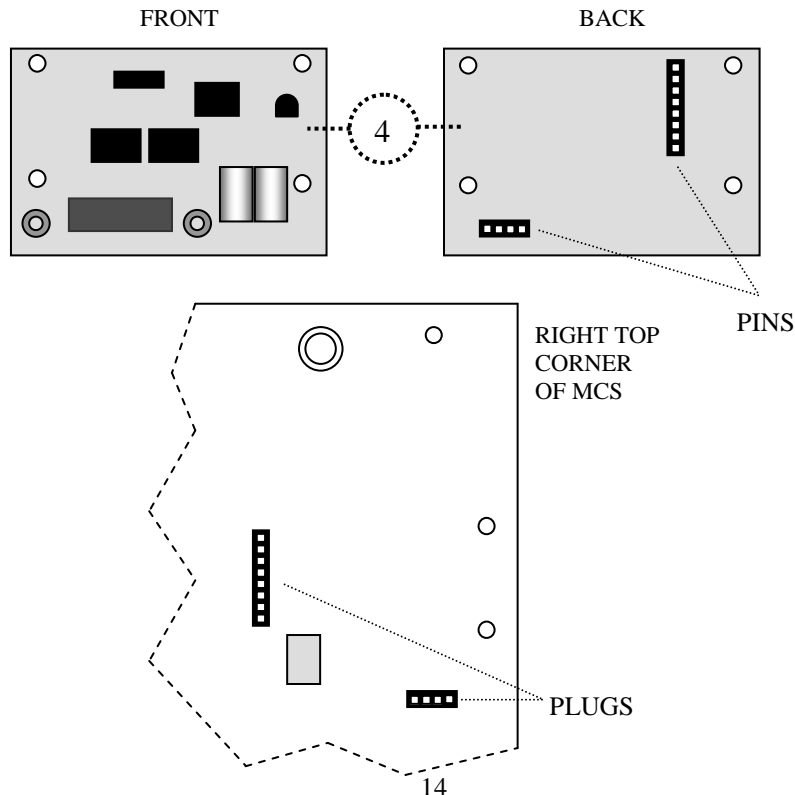
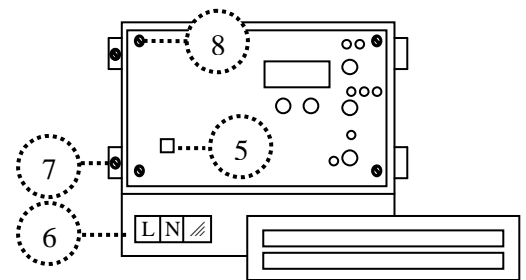
(*) indicative values! Make practical tests, to adapt it to your situation!



13.2 4 + 20 mA ELECTRONIC BOARD

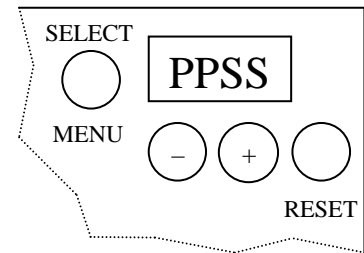
Check that the MCS is not powered: switch on/off [5] on 0 and terminals [6] disconnected.

Rotate to 45° anticlockwise sense the 2 screws [7], push up the 2 tongues and open the transparent cover of the MCS. Unscrew the 4 screws [8] and lift the green panel (do not remove it!).



13.3 FULL-SCALE 4 + 20 mA SETTING

1. Turn on the MCS (switch on/off [5] on **1**) keeping pressed the **RESET** key until code “**PPSS**” appears on the display. Release **RESET** key: on the display code “**A 0**” appears.
2. Press “-” until compose on the display the number “**A879**”.
3. Press **SELECT MENU**: on the display appears the letter **C** and the number of outlets of the MCS. (Example: in case of an MCS32, appears “**C 32**” on the display).
4. Press **SELECT MENU**: on the display appears “**P 0**”.
5. Leave “**P 0**” if you want the full-scale value of **9,99** kPa
With “+” select “**P 1**” if you want the full-scale value of **1,00** kPa.
With “+” select “**P 2**” if you want the full-scale value of **2,00** kPa.
With “+” select “**P 3**” if you want the full-scale value of **3,00** kPa.
With “+” select “**P 4**” if you want the full-scale value of **4,00** kPa.
With “+” select “**P 5**” if you want the full-scale value of **5,00** kPa.
Press **SELECT MENU**: on the display appears the ΔP into the filter.
6. Press “-”: on the display appears “**A 0**” code.
7. With “+” compose on the display “**A123**” code.
8. Press **SELECT MENU**: on the display appears “**nnnn**” for 3 seconds: the cycle restarts.



14. HOURLCOUNTER

The HOURLCOUNTER counts the number of working hours of the MCS. The counting starts every time that the filter ΔP exceeds 0,10 kPa. To visualise the HOURLCOUNTER on the display [7]:

- 1) Press SELECT MENU [9] until on the display [7] appears the code **7L**. Immediately after, it appears on the display the letter **L** and the last 3 numbers (from 0 to 999) of 5 which indicate the total of working hours of the MCS.
E.g.: if the MCS works from 12.270 hours, on the display appears L270.
- 2) Press SELECT MENU [9] until on the display [7] appears the code **7H**. Immediately after, it appears on the display the letter **H** and the first 2 numbers (from 0 to 65) of 5 which indicate the total of working hours of the MCS.
E.g.: if the MCS works from 12.270 hours, on the display appears H12.

15. SUBMENU

The submenu allows to modify parameters and set functions which are not accessible from SELECT MENU. You can access to submenu only if the MCS is in AUTOMATIC Mode. Follow this procedure:

- 1) Press SELECT MENU [9] until on the display [7] flashes the code **8PAS**.
Press the button “+” [10] until compose the number **123**.
- 2) Press SELECT MENU [9]: on display [7] flashes the letter **9**: select with +/- [10] buttons the function MANUAL PAUSE TIME. **0** = disable : MCS is normally working.
1 = enable : it is possible to set the pause time in step two of menu, the same time divided by 3 is the AUTOMATIC PAUSE TIME.
- 3) Press SELECT MENU [9]: on display [7] flashes the letter **A**:
select with +/- [10] buttons the function MINIMUM FREQUENCY OF CLEANING:
0 = disable, **1** = enable.

With new filters, the cleaning cycle needs to be at longer intervals, so the dust settles on the filter bags/cartridges. At the first command of cleaning, the detached material can cause the obstruction of dumping system. The MINIMUM FREQUENCY of CLEANING removes the problem. Enable the function, the MCS, cleans the filters, until the start of the cycle, with a minimum frequency. This prevents the dust to clog the filtering. To select the value of MINIMUM FREQUENCY of CLEANING, refer to point 6).

- 4) Press SELECT MENU [9]: on the display [7] flashes the letter **b**:
modify with +/- [10] buttons the **PAUSE TIME (in seconds) in AUTOMATIC Mode**.
As seen in chapter 7.3, the PAUSE TIME in AUTOMATIC mode depends on TCM selected. Here you can select a PAUSE TIME independently of TCM. If you select **0**, the PAUSE TIME in AUTOMATIC mode still depends by TCM.
 - 5) Press SELECT MENU [9]: on the display [7] flashes the letter **C**:
modify with +/- [10] buttons the **PAUSE TIME (in seconds) in SHUT DOWN CLEANING**.
As see in chapter 8, the PAUSE TIME in SHUT DOWN CLEANING depends on TCM selected. Here you can select a PAUSE TIME in SHUT DOWN CLEANING independents of TCM. If you select **0**, the PAUSE TIME in SHUT DOWN CLEANING still depends by TCM.
 - 6) Press SELECT MENU [9]: on the display [7] flashes the letter **d**:
it is possible to select the value of **MINIMUM FREQUENCY of CLEANING**:

If in 2) you selected **0**: leave **0**.
If in 2) you selected **1**:
 - leave **0** to have that the MINIMUM FREQUENCY of CLEANING is 15 times the TCM value.
 - Select with +/- [10] the value of MINIMUM FREQUENCY of CLEANING, independent of TCM selected.
 - 7) Press SELECT MENU [9]: on the display [7] flashes the letter **F**:
select with +/- [10] buttons the function **FINISHING of the CYCLE in AUTOMATIC Mode UNTIL the LAST VALVE: 0 = disable, 1 = enable**
 - 8) Press SELECT MENU [9]: on the display [7] flashes the letter **H**:
modify with +/- [10] buttons the **ΔP for the START of the SHUT DOWN CLEANING**, zapping the default value of 0,10 kPa.
Leave **0** to have the ΔP for the START of the SHUT DOWN CLEANING of 0,10 kPa.
- Attention! The ΔP for the START of the S.D.C. determines the start of the HOURCOUNTER: the counting starts when the filter ΔP exceeds the ΔP for the START of the S.D.C
- 9) Press SELECT MENU [9]: on the display [7] flashes the letter **L**:
modify with +/- [10] buttons the **TIME of RETARD for INSERTION of the HIGH ΔP ALARM** (0 - 99 seconds).

Press SELECT MENU: on the display [7] appears the letter **E** (run): the cycle starts.

Note: during the parameters and functions selection, after approximately 5 minutes from the last button pressed, the MCS return in **E** (run).

16. FACTORY PRESETTINGS

MECAIR presets the parameters of every MCS (to change the preselections see 7.3).

- PULSE TIME: 0,25 sec
- MANUAL CYCLE TIME: 300 sec
- SET DELTA-P: 0,80 kPa
- SET DELTA-P ALARM: 1,50 kPa
- NUMBER OF CYCLE for the SHUT DOWN CLEANING: 3 cycles
- ΔP PRECOATING: 0,00 kPa (PRECOATING function disabled)

17. TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	SOLUTION
Display is blank and all LED are off.	No power supply.	Check the tightening of the terminals [4] and the selection of the power supply voltage [5] check the main fuse [23]
Power supply is ok, but display is blank and all LED are off	Fuse [34] is broken	Replace the fuse (see fuses table)
External contacts for stand-by and auto/man are not working	Fuse [33] is broken	Replace the fuse (see fuses table)
On the display rapidly run the numbers of all outlets.	No one outlet connected.	Check the connections [2] and [3].
Some valves are skipped	The connections between MCS and solenoid valves are wrong.	Check the connections [2] and [3].
	The solenoid valves are discontinued.	Check the continuity of the solenoid valves.
On the display appears the sequence of shot of the valves, but they are not activated.	The secondary of the transformer is discontinued.	Apply to MECAIR.
	Faulty Main Board	Apply to MECAIR.
	Power supply to the valves are different from voltages indicated on the coils.	Move the two jumpers [6] on the position selecting a voltage <u>equal</u> to the one indicated on the coils.
The LED OK [18] is off	Microprocessor failure.	Apply to MECAIR
The LED ALARM [17] is on.	If pressing “+” [10] button, on the display appears PPPI , the filter ΔP exceeded the DELTA-P ALARM.	Operate as in chapter 9.4 point a).
	If pressing “+” [10] button, on display appears A and the number of a valve, that valve is in short circuit.	Operate as in chapter 9.4 point b).
On the display appears the indication “---”	The filter ΔP descended below -0,14 kPa..	Operate as in chapter 9.3 .
The MCS is blocked and the LED PRECOATING [32] flashes.	The PRECOATING function is enable.	Await the end of PRECOATING: the MCS will activate the cleaning.

IMPORTANT NOTE: if you use the MCS with power supply at **24V DC**, check that it isn't lower of 24V and the power is suitable at connected load.



18. FUSES TABLE

Dimension	Value	Type	N° on drawing	Descrizione
5 x20	1A	T	[23]	Main fuse with 115/230V supply
5 x 20	2A	T	[23]	Main fuse with 24/48V supply
5 x 20	200mA	T	[33]	External contacts supply
5 x 20	630mA	T	[34]	Internal +5v supply.(micro, display)

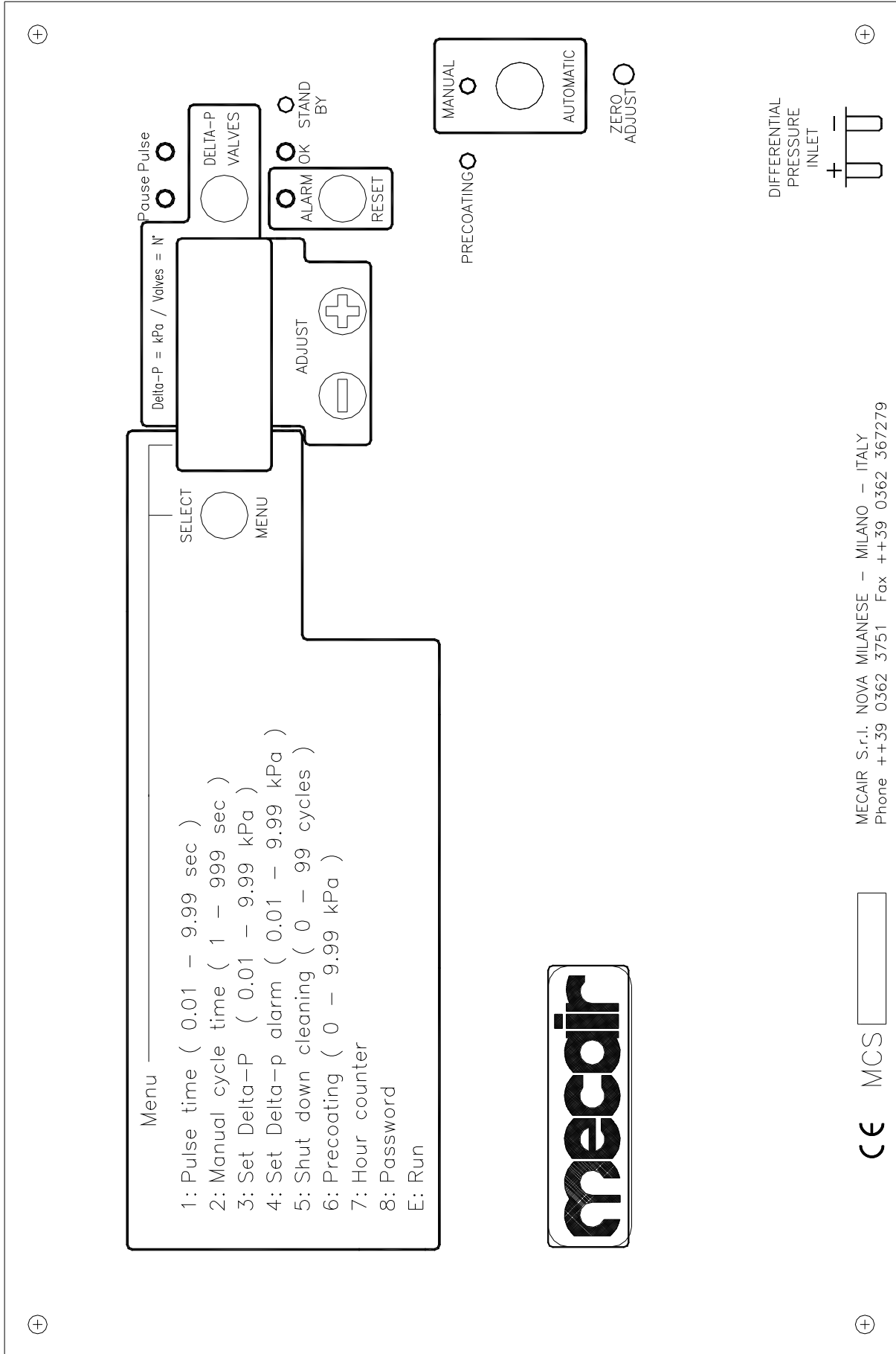
NB In case of replacement **you must respect** the above value

19. LEGEND

- 1) on/off switch
- 2) Extractable terminals (outlets and commons)
- 3) Ground terminals for outlets
- 4) Power supply terminals
- 5) Jumper for inlet power supply selection.
- 6) Jumper for voltage selection to valves
- 7) Display
- 8) Jumper for the frequency of outlet power supplies selection (A.C./D.C.).
- 9) SELECT MENU button
- 10) +/- buttons
- 11) LED PULSE
- 12) LED PAUSE
- 13) Inlet pressure nozzle
- 14) DELTA-P/VALVES button
- 15) Zero adjusting
- 16) AUTOMATIC/MANUAL mode button
- 17) LED ALARM
- 18) LED OK
- 19) RESET button
- 20) Terminals cover
- 21) 2 screws of transparent cover
- 22) Yellow label voltage setting
- 23) Fuse main supply
- 24) Relay ALL and relay WD terminals
- 25) Product code and registration number
- 26) Terminals for remote changing of the Mode
- 27) STAND-BY terminals
- 28) 4 ÷ 20 mA positive terminal.
- 29) 4 ÷ 20 mA negative terminal.
- 30) LED MANUAL
- 31) LED STAND-BY
- 32) LED PRECOATING
- 33) External contacts supply fuse
- 34) Internal +5v supply.(micro, display) fuse

	<p><u>ATTENTION!</u></p> <p>Before you open the MT and connect the terminals, check that the on/off [1] switch is on 0 and that the terminals [4] are disconnected.</p>	
-------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------

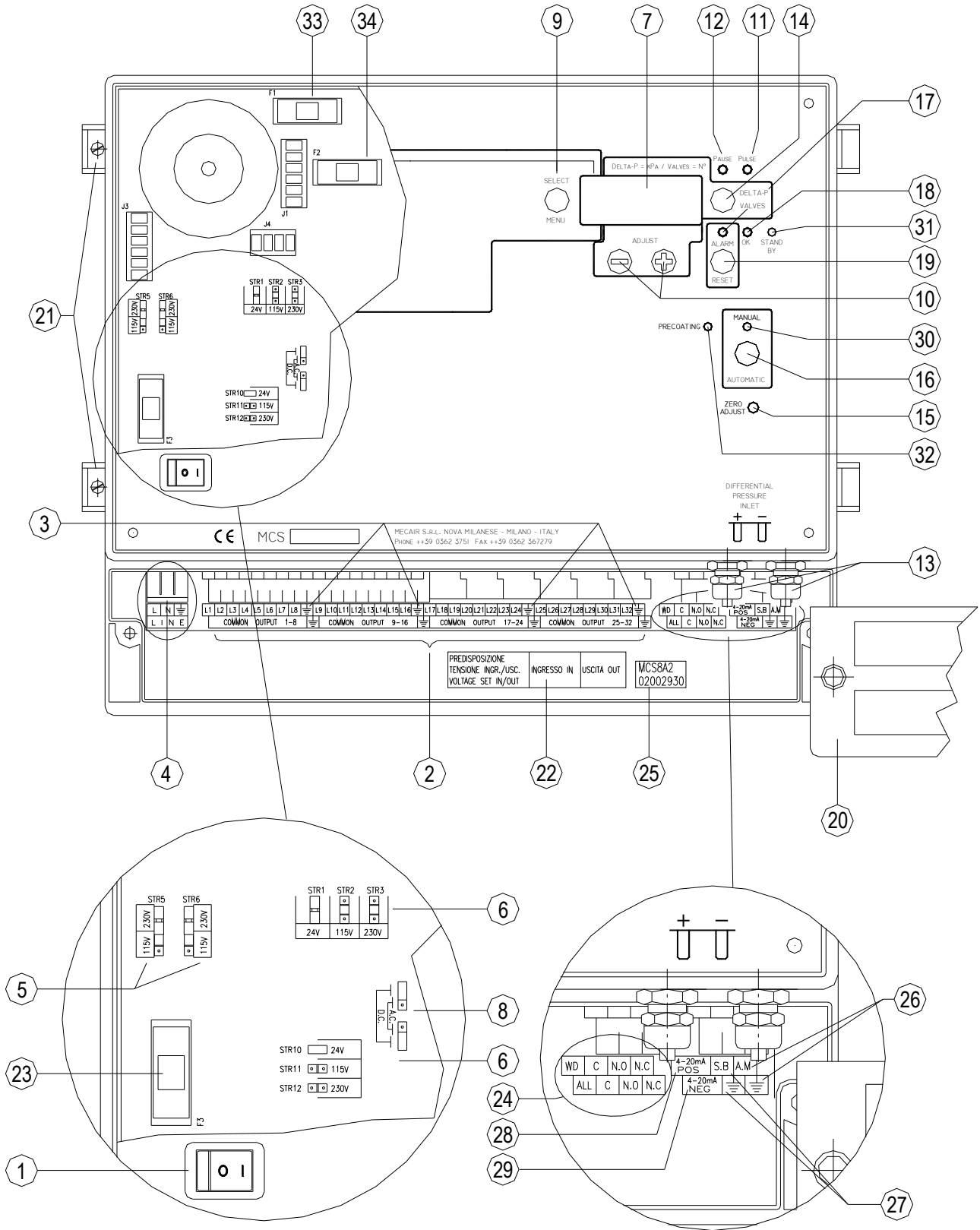
20. MCS FRONT PANEL



MECAIR S.r.l. NOVA MILANESE – MILANO – ITALY
 Phone ++39 0362 3751 Fax ++39 0362 367279

CE MCS

21. MCS 4-32: GENERAL ASSEMBLY



22. MCS 36-64: GENERAL ASSEMBLY
(Refer Page 19)

