



TURBO s.r.l.

Electronic Control Systems for dust collectors
e-mail: info@turbocontrols.it web: www.turbocontrols.eu
TEL. ++39 (0)362 574024 FAX ++39 (0)362 574092

ECONOMIZER ECO-NET128

24 Vac Vdc



User Manual

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General Description

The master economiser implements RS-485 serial interface and Modbus RTU protocol (Plus version only) for controlling compressed air cleaning cycles in industrial dust collection systems. The pressure differential is digitally controlled by an internal transducer allowing to determine filter obstruction with accuracy.

The device has two output relay contacts and four clean digital input contacts, together with a black and white backlit graphic liquid crystal display for reading the filter obstruction level, the active solenoid valves and the time remaining before the next air jet in any moment. The device has two output relays that can be activated in case of failure of a solenoid valve or minimum and maximum obstruction.

The innovative software managed by a powerful microprocessor makes the device easy to use by everyone. No special skills needed. The menu is available in five languages.

Technical Specifications

Container

- ABS base and polycarbonate lid.
- IP65 degree of water and dust protection (EN60529).
- IK08/07(8 joule) impact resistance (EN62262).

Device Features

- Backlit display with interactive menu in five languages.
- Four operating modes: manual, automatic, proportional, manual special.
- Operating times expressed in seconds and minutes with selectable ranges for any application.
- Four selectable pressure measurement units: kPa, millibar, mmH₂O, Inch w.c.
- Solenoid valve serial line output voltage: 24 VDC.
- Power voltage 24 Vac / Vdc without needing to select jumpers.
- “Fan off” (post-cleaning) washing function using the “fan Δp ” threshold in automatic/proportioning mode and by means of contact in manual/manual special mode with selectable number of cycles up to 100 cycles.
- Hour meter and pulse count.
- Two alarm relays.
- Minimum “Broken Hose” Δp alarm (with on/off selection).
- Maximum Δp (filter obstructed) alarm.
- Solenoid valve not working alarm.
- Filtering element maintenance alarm (with on/off selection).
- External contact cleaning activation.
- Compressed air presence enable input.
- Precoating function.
- 4-20mA output proportional to dP reading for remote pressure reading.
- Manual solenoid valve activation.
- 4-20mA input (optional).
- RS-485 serial interface with Modbus RTU protocol (Plus version only).

Electric Specifications

Electric power:

24VAC $\pm 10\%$ 50-60 Hz

24VDC $\pm 10\%$

Important: Read the installation instruction section before connecting the device.



Output voltage:

24VDC (MAX 25W @ Ton Max 10s)

The solenoid valves connected to the master unit are normally closed. The activation of a solenoid valves causes them to open and consequently let out a jet of air.

Fuse

1 x 3A (optional, with 24 Vac/Vdc)

Working temperature

from -10°C to 55°C

Storage temperature

-20°C to 60°C

Timer specifications

Pulse time (valve opening)

from 50 ms to 10 s

Pause time (interval between valve openings)

from 1 sec. to 7600sec.

Important: Higher pressures may damage the device. Do not connect the obstruction measuring pipes to the compressed air circuit.



Differential pressure gauge

Measurable pressure range: from 0 to 10 kPa

Maximum applicable pressure: 50 kPa - 0.5 bar

Installation Standards/Notes and Warnings



- Protect the device from direct exposure to sunlight.
- Do not position the device near or directly in contact with sources of heat or electromagnetic fields.
- Connect the device to power lines other than those for operating motors or other large power devices that could generate network interference.
- Fix the device at a height of at least 60 cm from the ground.
- Use flame-retardant cables with a minimum cross-section area of 0.25 mm^2 for all control signals.
- Check that atmospheric conditions are safe before starting any operation on the device.
- For electric operations, always remove voltage, wait 30 seconds for the inside capacitors to discharge before opening. At the end of the operations, close the device to restore the correct degree of protection before powering up.
- Use flame-retardant cables with a minimum cross-section area of 0.75 mm^2 to connect to the power supply.
- Use flame-retardant cables with a minimum cross-section area of 1.5 mm^2 to connect to the indicating relays.
- Use the cable supplied by Turbo Srl only to connect the master controller to the first solenoid valve in the serial system.
- Any use not described in this user instruction manual or incorrect use of the device may cause damage to the device or to the devices connected to it.
- Furthermore, incorrect use or tampering with the device may cause injury.
- The container is guaranteed waterproof when the flap is closed.
- Make sure that rigid or flexible ducts used for wiring, if any, do not fill up with water or other liquids.
- Any holes made in the container must be protected by accessories with degree of protection equal to at least that of the economizer.
- Cut off power supply immediately if water is found in the container.
- Do not use the master economizer if you have not read or do not understand this manual.

Display/Keypad

There are five round buttons on the front panel for controlling the master and turning on the display as shown in the following figure.

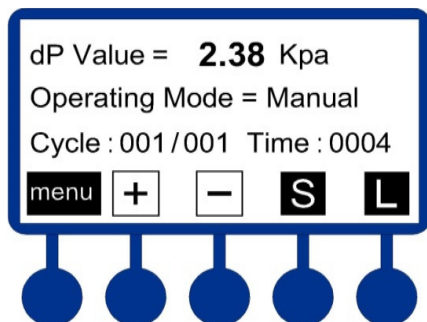


Figure 1

- The menu button is used to enter programming mode (the word RESET will appear instead if an alarm is present)
- Buttons + and - allow to increase/decrease the values, to manually activate valves in TEST mode and scroll the alarm list.
- The S button is used to start/stop solenoid valve activation in manual/special manual mode (the function is not available in automatic/proportioning mode).
- The L button is used to select one of the five available languages: Italian, English, French, German, Spanish.

Menu Diagram

How to access Main Set Up:

Press the **menu** button.

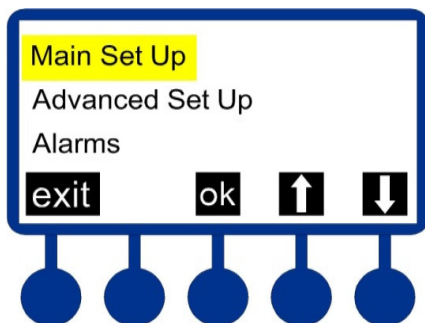




Figure 2

Select Main Set Up using the arrows.  

Press the **OK** button.

Main Set Up configuration options:

Select the required option using the arrows.  

Buttons **+** and **-** increase/decrease the value or change the condition of an option: for example, to switch from Manual, Autom., Proport., Special or mmH₂O, Mbar, kPa, Inch w.c.

Press the **Exit** button to quit and save.

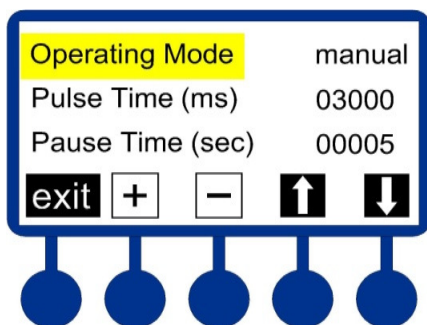


Figure 3

Operating Mode

This is used to select the operating mode (Manual, Autom., Proport., Special).

Pulse Time (ms)

Valve opening time (50 msec. - 10 sec.).

Pause Time (sec)

Pause time between valve openings
(1 sec – 7200 sec).

No. Valves

This is used to select the number of connected valves (1 - 128).

Unit Measure dP

This is used to select the dP unit of measure (mmH₂O, Mbar, kPa, Inch w.c.).

dP Start Cleaning

This is used to set the start of cleaning dP value (for Autom., Proport. operating modes only).

dP Stop Cleaning

This is used to set the end of cleaning dP value (for Autom. operating mode only).

How to access advanced configuration:

Press the **menu** button.

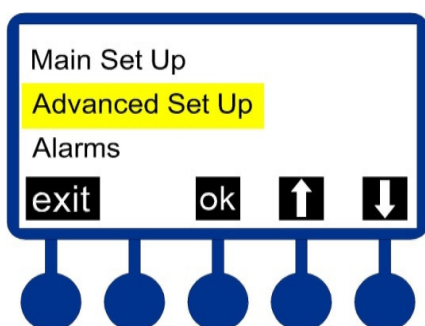






Figure 4

Select Advanced Config. using the arrows.  

Press the **OK** button.

Advanced configuration options:

Select the required option using the arrows.  

Buttons **+** and **-** increase/decrease the value or change the condition of an option: for example, enable/disable.

Press the **Exit** button to quit and save.

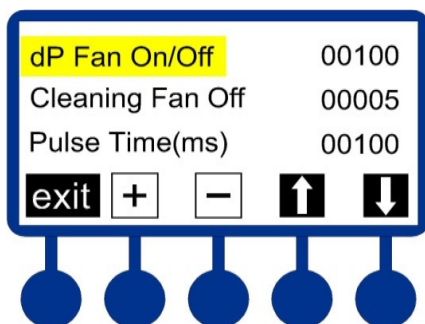


Figure 5

dP Fan On/Off

Fan on/off dP threshold over which the instrument detects suction and under which it starts cleaning cycles when the fan is off (post- cleaning).

Cleaning Fan Off

Number of complete cleaning operations with fan off for the number of connected solenoid valves

Pulse Time (ms)

Valve opening time in cycles with fan off
(50 msec. - 10 sec.)

Pause Time (sec)

Interval of time between valve opening in cycles with fan off (1 sec - 7200 sec)

Pre-coating

Pre-coating function enable

dP Precoating

dP value for which the precoating function must be kept running after which the instrument will return to the originally set operative mode

Cycles Man. Spec.

If the Special operating mode is chosen in the basic configuration menu, enter the number of complete cycles for the number of solenoid valves

Pause Man. Spec.



If Special operating mode was chosen in the basic configuration menu, enter the required pause between numbers of cycles.

How to access the alarm menu:

Press the **menu** button.





Figure 6

Select Alarms using the arrows.  

Press the **OK** button.

Alarms menu options:

Select the required option using the arrows.  

Buttons **+** and **-** increase/decrease the value or change the condition of an option: for example, enable/disable.

Press the **exit** button to quit and save.

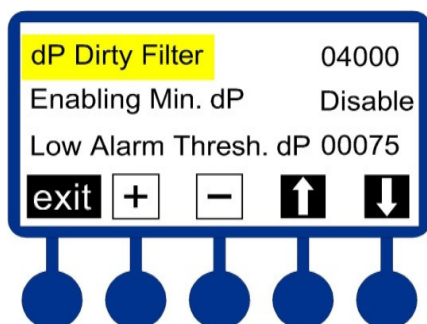


Figure 7

dP Dirty Filter

This is used to enter the required dP threshold to activate the obstructed filter alarm.

Enabling Min. dP

Minimum dP alarm enabling (broken hose).

Low Alarm Thresh. dP

This is used to enter the required dP threshold to activate the minimum dP alarm.

Hourmeter Fan

Fan hour meter enable

The actual hours of suction operation are counted when the filter fan relay is connected to Dig. In 3, terminals 8-9.

Filter Replacement (h)

Enter here the required number of working hours to make the filtering element (hoses/cartridges) replacement alarm trip. The alarm is generated only if the fan hour meter is connected to fan relay terminals 8-9 of the electronic control unit.

How to access the Calibration/Test menu:

Press the **menu** button (see figure 1).

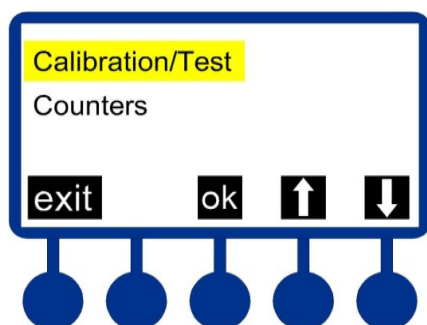


Figure 8

Select the Calibration/Test option using the arrows.  

Press the **OK** button.

Calibration/Test menu options:

Select the required option using the arrows.

Buttons **+** and **-** increase/decrease the value or change the condition of an option: for example, enable/disable.

Press the Exit button to quit and save.

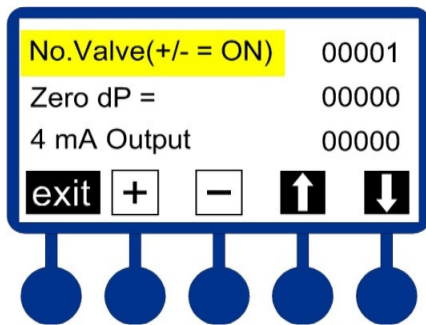


Figure 9

No. Valve (+/- = ON)

Press **+** and **-** to manually activate the solenoid valves connected to the control unit in sequential manner.

Zero dP =

Press **+** and **-** to calibrate dP zero.
Carry out this operation with the filter fan off.

4 mA Output

Press **+** and **-** to calibrate 4mA output corresponding to dP zero.

20 mA Output

Press **+** and **-** to calibrate 20mA output corresponding to dP full scale

How to access the Counters menu:

Press the **menu** button

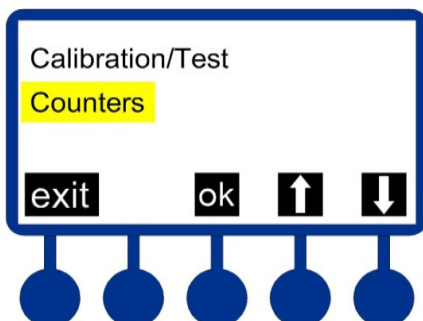


Figure 10

Select Counters using the arrows. **↑** **↓**

Press the **OK** button.

Counter Read Only Menu Options

Hours Power

Electronic control unit hours of operation.

Pulse Count

Counter showing number of activations of the valves connected to the electronic control unit.

Hours Fan

Hours of operation of the filter fan.
This counter is only active if filter fan relay is connected to Dig.In.3 contact terminals 8-9 and enables the fan hour meter in the Alarms menu.

Description of operations

When the economizer is turned on the display will light up and after an initial welcome message, a message similar to the below image will be displayed:

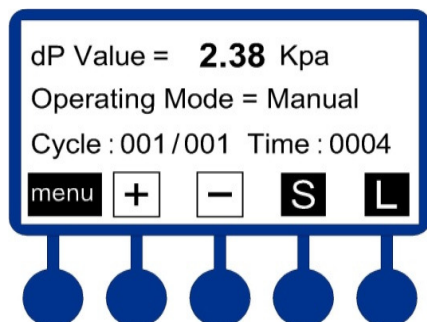


Figure 11

The following information is shown: operating mode, pressure inside the dust collector, active outputs and time needed before activating the next output.

Manual Operative Mode

The economizer will work as a programmable cycle sequencer in manual mode. The connected outputs will be activated at programmable time intervals. Access the basic configuration menu (fig. 3) to activate manual mode.

The time intervals (activation time, pause time and number of solenoid valves connected to the device) can be programmed in the same menu.

Automatic Operating Mode

Select AUTOM. mode in the basic configuration menu (fig. 3) to run the economizer automatically and operate the compressed air cleaning cycle only when needed. The device will activate the cleaning cycle when it detects obstruction higher than the “dP Start Cleaning” threshold. The cleaning cycle is suspended when obstruction drops under the “dP Stop Cleaning” level until it reaches a value higher than the “dP Start Cleaning” threshold once again. When cleaning is active, the economizer cleaning times can be set in the basic configuration menu (fig. 3).

Proportioning Operative Mode

Select PROPORTIONING mode in the basic configuration menu to make the device work in fully automatic mode after having set the “Start Cleaning” threshold, the pulse time and the pause time. The solenoid valves will be automatically activated in sequence when the “Start Cleaning” threshold is reached. Cleaning is suspended once the dP threshold decreases by 15% at the end of an entire solenoid valve pulse cycle and is restarted when the pressure rises to a value higher than the “dP Start Cleaning” threshold. The pause time frequency is automatically reduced in proportional manner for each complete pulse cycle of the connected solenoid valves to reach a minimum pause time between solenoid valves equal to 10 seconds if the dP value does not decrease by at least 15% with respect to the “Start Cleaning” threshold. The minimum 10 second threshold was chosen to avoid disrupting air delivery by the compressor connected to the filter.

Special Manual Operative Mode



Select SPECIAL MANUAL mode in the basic configuration menu (fig. 3) and enter the required pulse time and pause time. Go to the advanced configuration menu (fig. 4) and enter the complete number of cycles, the pause time between cycles and the connected solenoid valves.

Unlike manual mode, in this mode the device will work with the solenoid for the set number of cycles only and will then stand by until an operator presses the S (Start/Stop) button on the main menu (fig. 1) to repeat the cycles. This mode is particularly suited for small-sized filters, filters with low dP value or filters in which an inverter maintains pressures constant and in which working in automatic or proportional modes could be problematic.

Description Of Other Functions

Alarms

This function is used to connect an alarm device. The alarm device may be connected to the two alarm relays (see wiring diagram) which are opened when the programmable threshold is exceeded in the ALARMS menu. See menu options for more details (figure 7).

The word RESET and the  and  buttons blink on the line which normally contains the Menu button on the display when an alarm is active. The alarms may be scrolled. Alarms for relay 1 may be: minimum dP (if activated from menu), fouled filter dP, filter replacement (if activated from menu). Failed valve activation is shown for relay 2.

Cleaning Function With Fan Off (Post-Cleaning)

The function allows to run a cleaning cycle when the fan is off. Automatic post-cleaning activation in AUTOMATIC and PROPORTIONAL operating systems occurs when the differential pressure drops under a threshold which is programmable in the advanced configuration menu (figure 5).

In MANUAL and MANUAL SPECIAL modes, this is carried out by connecting the fan to terminal 4-5 (P15) (see wiring diagram).

The following post-cleaning parameters can be programmed in the advanced configuration menu:

Cleaning activation with fan off (enable/disable)

Activation pressure (fan dP threshold ON/OFF) Number of cycles (cycles down)

Pause time (pause between solenoid valve activations during post-cleaning) Pulse time (cleaning pulse time regardless of working time with fan on).

Output Number Selection

The number of outputs (solenoid valves) on which the economizer will run the cleaning cycle can be selected. Cleaning will be carried out in order from the first to the last solenoid valve. The valves can be adjusted in the basic configuration menu.

Precoating Function

This function is used to carry out precoating. Precoating is a filtering element treatment carried out with precoating powder. Cleaning is suspended during precoating until the precoating threshold is reached. The following precoating parameters can be programmed in the advanced configuration menu: Precoating activation: Enable (on) / Disable (off)
Deactivation pressure (precoating dP)

Cleaning Enabling Function From Remote Control

This function is used to carry out pneumatic cleaning only after having received an external enabling control. External enabling may be connected to prevent cleaning in absence of pressure in the high pressure circuit or of air in the compressed air tank.

The external contact must be clean, normally open and connected to terminal 6-7 (P16) (see wiring diagram).

4-20mA Out function

This function is used to measure pressure remotely by means of 4-20mA transmitter. Connect the signal for the device to terminal 14-15 (P14). The gain scale can be set on the CALIBRATION/TEST menu (figure 9). This function is for expert users only.

mA IN Function

This function is active on PLUS version only.

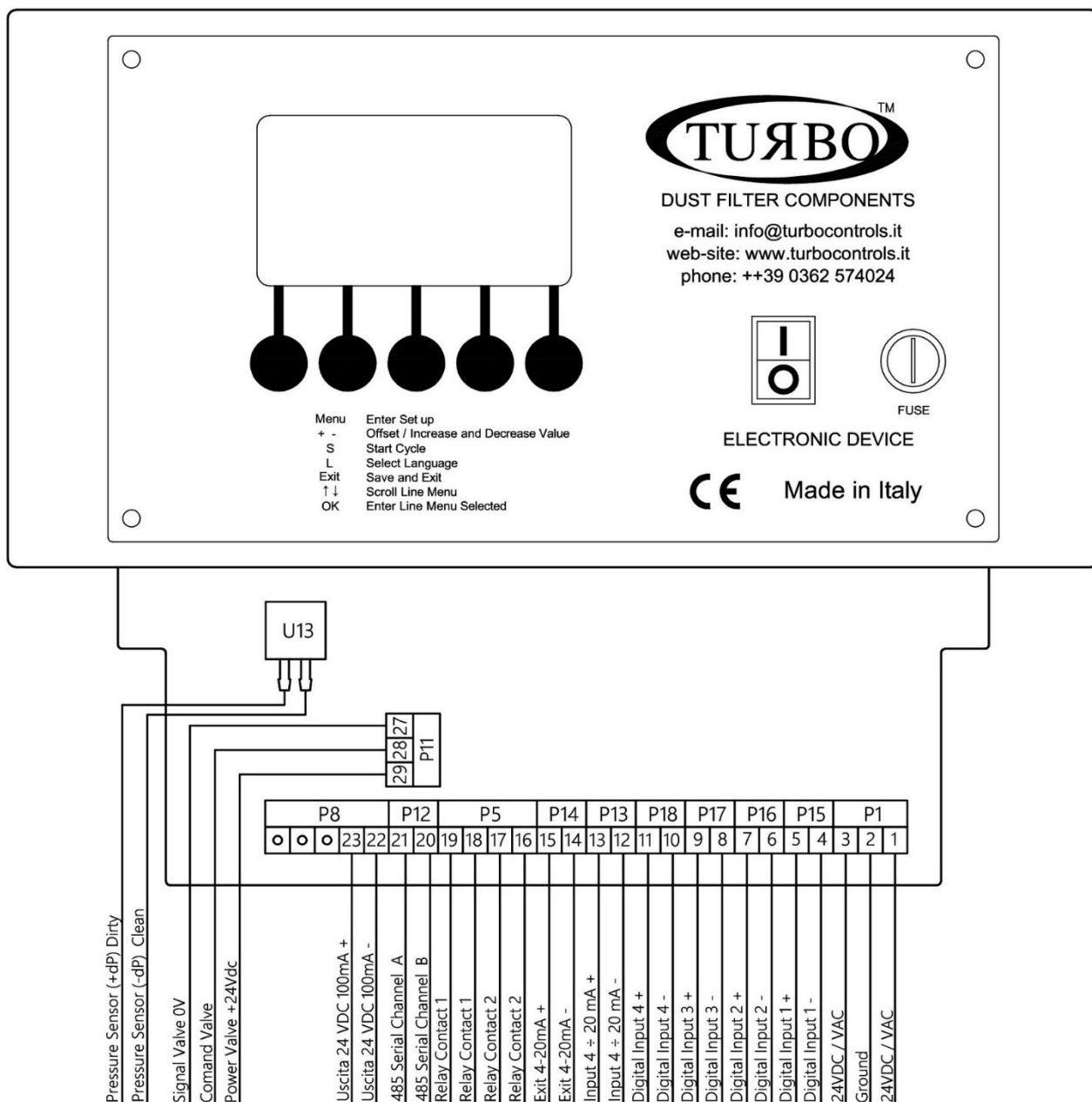
dP Zero Calibration

This function is used to reset dP reading with the fan off. Reset the value in the CALIBRATION/TEST menu.

Fuse

A fuse which can be used to reset in case of need without needing to open the electronic control unit is located on the front panel.

Wiring Diagram



Terminal board key

P1 = Economizer power 24 Vac / Vdc

P15 = Cleaning with fan off (post-cleaning) contact (clean contact)

P16 = Remote enabling contact (clean contact)

P17 = Filter fan hour meter contact (clean contact)

P18 = Digital input (clean contact) - Spare (optional)

P13 = 4-20mA in input (optional)

P14 = 4-20mA output (the maximum applicable load is 300 Ohm)

P5 = Alarm relay contacts

Important note: Terminal relay contacts 16-17/18-19 must only be used for SELV voltages
(max. 24 Vac/ 24 Vdc) supplied via a safety isolation transformer.

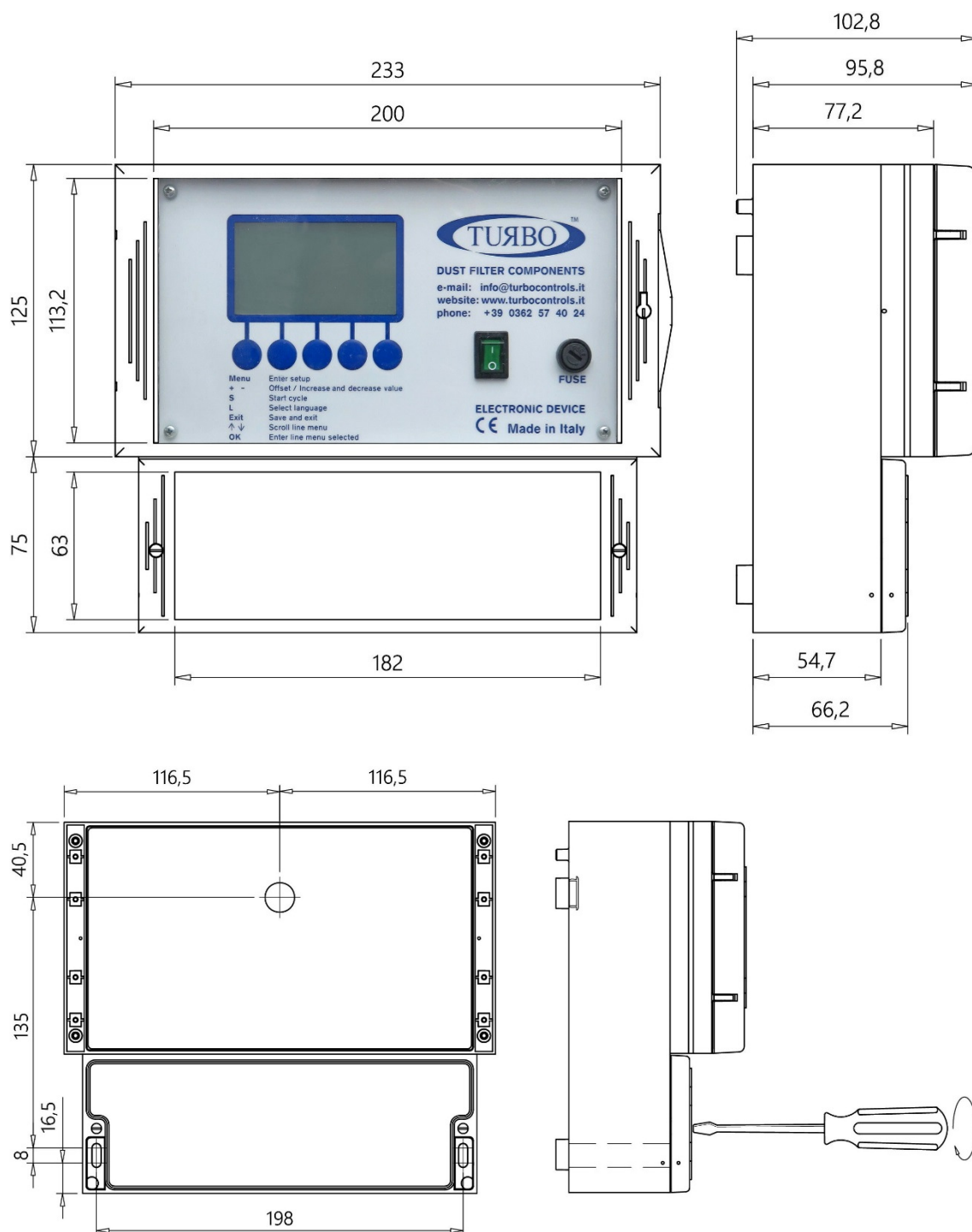
P12 = RS485 serial port (PLUS version only) P8 = Future expansion (spare)

P8= Output and future expansion unassigned.

P11 = Solenoid valve connector

U13 = Differential pressure sensor (dP internal transducer + dirty / dP - clean)

Container size



Container specifications:

Material: ABS base and polycarbonate lid.

Degree of protection: IP 65

Flammability: (UL 746 C 5): UL746C 5V

Shock resistance: (EN62262): IK 08/07

UV resistance: UL508

Seals: EPDM and polyurethane

Temperature: from -10°C to 55°C Colour:

RAL 7035 light grey

Maintenance

The only parts which may be replaced are fuses.
All other operations must be carried out by the manufacturer.

Scrapping

Dispose of properly after use. Dispose of the product according to laws in force for electronic equipment.



This device is for use in a dust collection system and is therefore part of a fixed installation.

Default settings

The default settings are:

Setting	Value
Operating mode	Automatic
Start of cleaning dP/end of cleaning dP	0.80 kPa / 0.40 kPa
Pulse time	200 msec
Pause time	20 s
Post-cleaning activation	0.10 kpa
Start precoating dP	1.50 kpa
Language	Italian

Warranty

The warranty lasts for two years. The manufacturer will replace any faulty electronic component exclusively at their own facilities only, unless otherwise authorized in advance by the manufacturer.

Warranty Exclusions

The warranty will be cancelled in case of:

- Signs of unauthorized tampering or repairs.
- Incorrect use of the device not respecting technical data.
- Incorrect electric connections.
- Failure to respect system standards.
- Use not in accordance with EC standards.
- Atmospheric events (lightening, electrostatic discharges,), power surges.
- Obstructed pneumatic connections. Damaged tubes.

Trouble Shooting (FAQ)

FAULT

The display does not light up.

POSSIBLE CAUSE

Burnt fuse.
Power voltage.

SOLUTION

Check the protection fuse on the power voltage.
Check that the power voltage is present and compliant with that required for the device (terminals 1 and 3).

The outputs do not light up.

Output voltage.
Wiring to solenoid valves.

Check that the timer and solenoid valve output voltage agree.
Check wiring between timer and solenoid valves.

The differential pressure reading is not correct.

Obstructed pneumatic connections.
Damaged pipes.

Check that the differential pressure is 0.00 kPa with the pipes disconnected. In this case, check that the connection pipes between device and filter are not obstructed or damaged.

The cleaning cycle is not carried out.

The economizer is in economy mode and therefore does not start up.

Adjust the start-up pressure threshold or set the economizer to MANUAL mode.

OTHER

Do alarm messages appear?

Check the Alarms menu.

Do the alarms fail to activate signaling devices?

The alarm devices must be powered by voltage external to the economizer. A relay opening is needed to activate them.

Does post-cleaning start during normal cleaning?

Change the post-cleaning start-up threshold by lowering it.

Does post-cleaning fail to start when the normal cleaning cycle ends?

Activate post-cleaning from the advanced configuration menu.

Check that the measured pressure is lower than the post-cleaning activation pressure when the fan is off.

Does the economizer occasionally reset?

Check that there are no unfiltered pulse loads on the power line (spot welding machines, welding machines, plasma cutters etc.).
Install a filter on the economizer power line, if needed.

Does 0.0 kPa-mmBar-mmH₂O-Inch w.c. fail to appear when the fan is off?

Set the reading to 0 under the zero dP option in the Calibration/Test menu.

Declaration Of Conformity Of The Manufacturer



The manufacturer:

TURBO SRL

The manufacturer's address:

Via Po 33/35 20811 Cesano Maderno, Italy

declares that:

Product Name:

Serial Master Economizer

Model:

ECO-NET128

Product Options:

ALL

Serial Number:

Complies with the following directives:

Machinery Directive 2006/42/EC 'Electromagnetic compatibility', compliant with Harmonized European standards EN61000-6-2:2005 class B of EN61000-6-4:2001

Low Voltage Directive 2006/95/EC, compliant with Harmonized European Standards EN 60947-1:2004

This product was tested using standard settings.

Cesano Maderno, 28 January 2013

F. MESSINA (C.E.O.)

TURBO s.r.l.