Master EcoNet Plus EC++LS

Use and Maintenance Instructions

Description

Master economizer with 2 RS-485 serial interfaces RTU protocols to control industrial dust collector system pneumatic cleaning.

Differential pressure digital control through internal transducer, which allows the accurate analysis of the cleaning filter clogging status.

Voltage free contact digital inputs, input and output relay contacts.

LCD backlit monochromatic graphic monitor where the following can be read at any time:

dP filter clog status

running solenoid valves

time remaining for next air jet start

emission value

The device has the output relays that can be activated in the event of solenoid valve fault or minimum and maximum clogging.

Interface menu available in five languages.

- Operating modes

  manual, automatic, proportional, special manual.
- Selectable pressure unit of measure

  kPa, millibar, mm H2O, Inch w.c.
- Manual solenoid valve activation.
- Operating time expressed in seconds and minutes with selectable values for any application.
- Cleaning function with fan off (post-cleaning) by "dP fan" threshold in automatic/proportional mode and by contact in manual/special manual modes, with selectable number of cycles up to 100.
- Signal 24 Vdc to the terminals 22_23 connector P11 active in output when operation is set to manual.

  With the automatic operation, is activated upon reaching the dP Start Cleaning value, turns off when the low threshold is reached dP End Cleaning.
- Hour counter and impulse counter.
- Minimum dP alarm "broken sleeve" (with the possibility of inclusion/exclusion).
- Maximum dP alarm (clogged filter).
- Faulty solenoid valve alarm.
- Filter element maintenance alarm (with the possibility of inclusion/exclusion).
- Cleaning start from external contact.
- Compressed air consent input.
- Pre-coating function.

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Technical Specifications

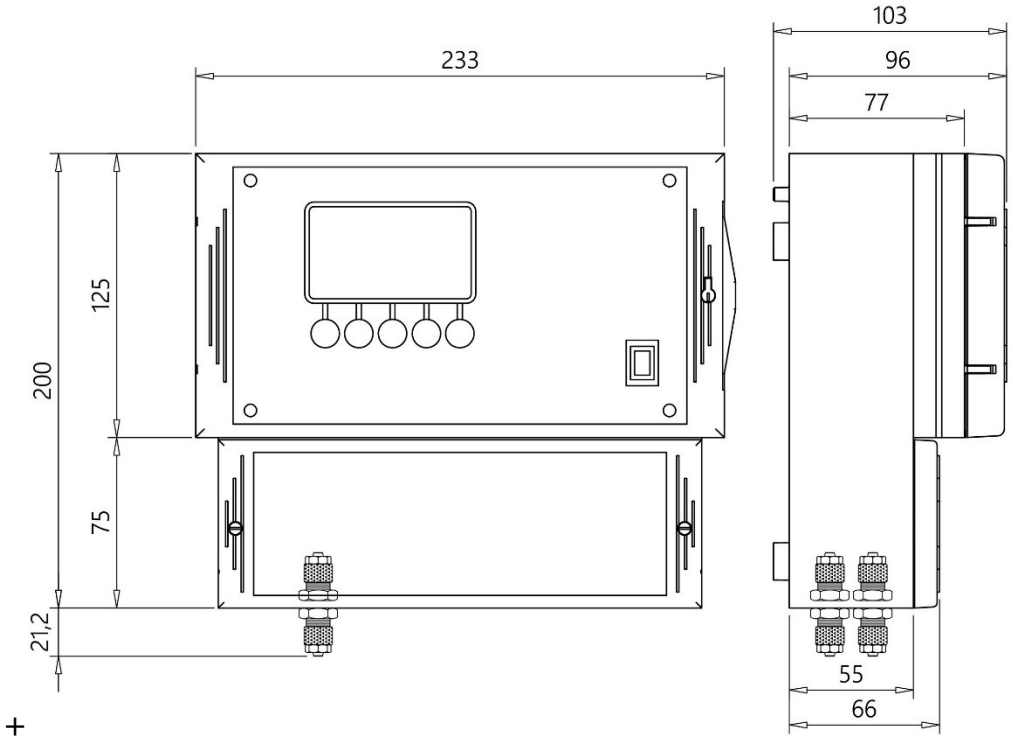
Master EcoNet Plus Device Features.

Power voltage with automatic switch	100 to 240 Vac ± 10% 50-60 Hz
Alternative power voltage upon request	24 Vac or 24 Vdc ± 10%
Output voltage for solenoid valve serial line	24 Vdc – 12 W
Inputs	from 4 to 20 mA x 2
Outputs proportionate to dP value for remote pressure reading	from 4 to 20 mA x 2
Power Consumption	28 Watt maximum load
Alarm Relays	2 normally closed
485 type serial transmission interfaces with Modbus RTU protocol	2
Digital Mosfet output to drive an external relay with coil up to 24 Vdc	1
Up to 250 solenoid valves can be managed with 36 Watt power supply	upon request
Display	LCD backlit monochromatic
5 x 20 mm glass fuse	100 to 240 Vac 1 x 1 A 24 Vac or 24 Vdc 1 x 3 A
Operating temperature	-10 °C ÷ 55 °C
Storage temperature	-20 °C ÷ 60 °C
Valve opening impulse time	50 ms ÷ 10 s
Interval pause time between valve opening	1 sec. ÷ 7200 sec.
Measurable pressure	0 - 10 kPa
Maximum pressure applicable to the gauge	50 kPa – 0.5 bar Higher Pressures Will Damage The Device 

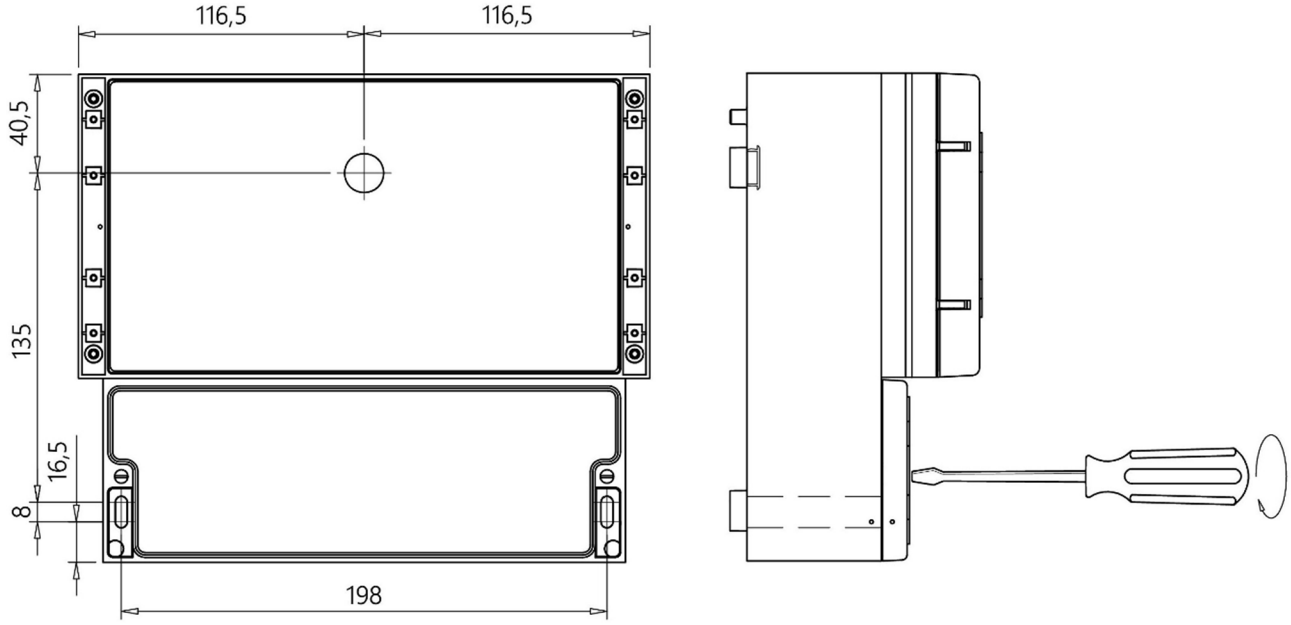
Container Features

- ABS base and polycarbonate lid.
- IP65 degree of water and dust protection (EN60529).
- IK08/07 2 Joule impact resistance (EN62262).

Dimensions And Measurements



Fastening



Weight 1.5 Kg

Warning Symbols Used In This Manual

The information regarding safety are highlighted using the symbols:

	Warning-Danger	Generic - Warning-
	Risk – Danger	Electric Current
	Dispose according to the standards for electrical and electronic equipment RAAE	

Installation Rules 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.
- Fix the device of a height of at least 60 cm from the ground.

  In a clearly visible place easily accessible.
- Connect the device to power lines other than those for operating motors or other large power devices which could generate network interference or instability.
- The electrical supply of the unit must be protected by a differential switch 230 Vac~ 30 mA and a bipolar magneto thermic 230 Vac~ 10 A, positioned in a place easily accessible.

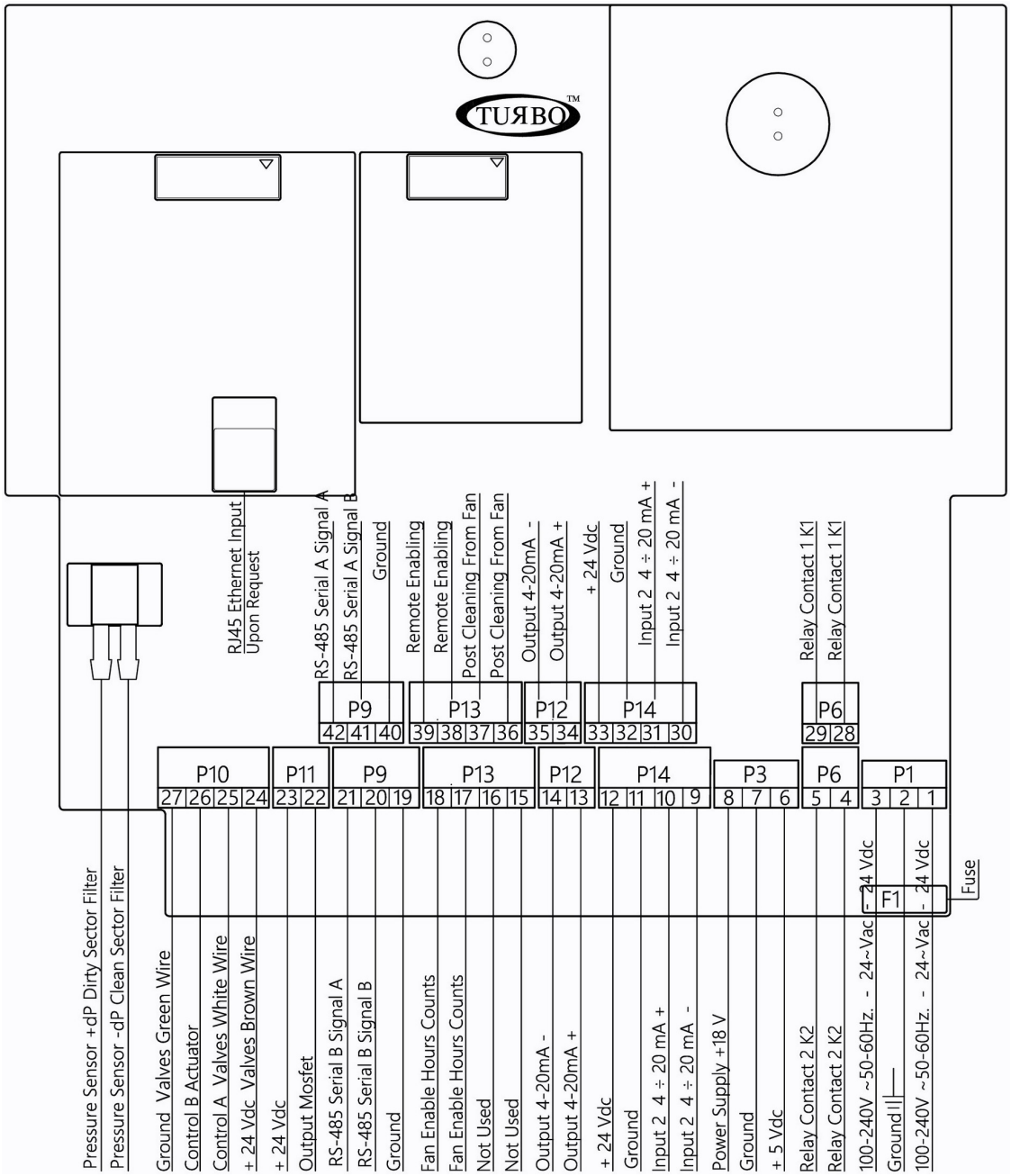
- Before working on the equipment to perform any operation switch off the magneto thermic differential switch.
- For electric operations, always remove voltage, wait 30 seconds for the inside capacitors to discharge before opening. At the end of the operations, close the device to restore the correct degree of protection before powering up.
- For the connection of the supply voltage, use anti-flame wires with a minimum section of 0.75 mm² certified and conform to the standard IEC60227 or IEC60245.
- Use flame-retardant cables with a minimum cross-section area of 0.75 mm² for all control signals.
- Use flame-retardant cables with a minimum cross-section area of 0.75 mm² to connect to the indicating relays.
- Use flame-retardant cables with a minimum cross-section area of 0.5 mm² for electro valves control signals.
- The wire ground conductor of protection must be yellow/green.
- The wire ground conductor of protection must be connected first.
- The wire which is colored yellow/green must only be used for the ground conductor.

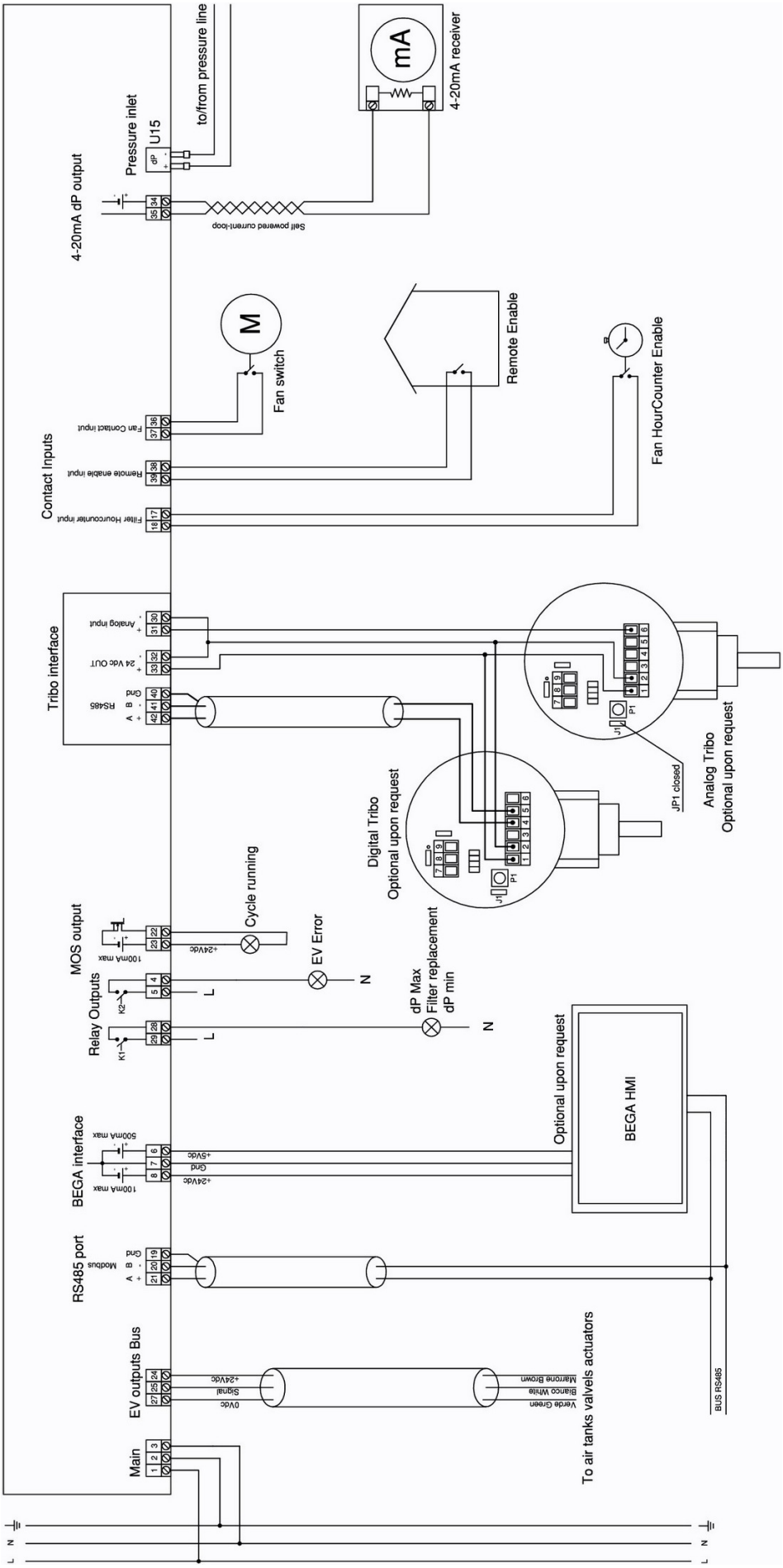
- The cable glands must be chosen according to the diameter of the cable to be used.
- The sealing of the press cable is guaranteed by the compression of the rubber gasket that tightens on the outer diameter of the cable.
- The tightness of the cable gland is guaranteed by the compression of the rubber seal that tightens on the outer diameter of the cable.
- The size of cable and cable gland must ensure that a power cord traction is not acting on the terminals.
- The terminal block must not be the point of mechanical anchoring of the conductors.
- The cable gland PG9 supplied on request, has cable diameter minimum of 4 mm and a maximum of 8 mm, with clamping nut by 19 mm.
- 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.
- Waterproofness of the casing is guaranteed 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.
- Do not make holes not protected on the container or protected by accessories with protection degree lower than that of the housing of the control unit.
- Cut off power supply immediately if water is found in the casing.
- If the control unit is used in ways not specified by the manufacturer, the protection provided by the device may be impaired.
- The Control Unit does not release potentially toxic or harmful substances to the health and the environment.
- No part with dangerous voltage is normally accessible.

Do not use the control unit if you have not read or do not understand this manual.

Electrical Connections

To connect the wires to the Master EcoNet Plus unit, remove the cover panel to access the terminal board, unscrewing the two screws.





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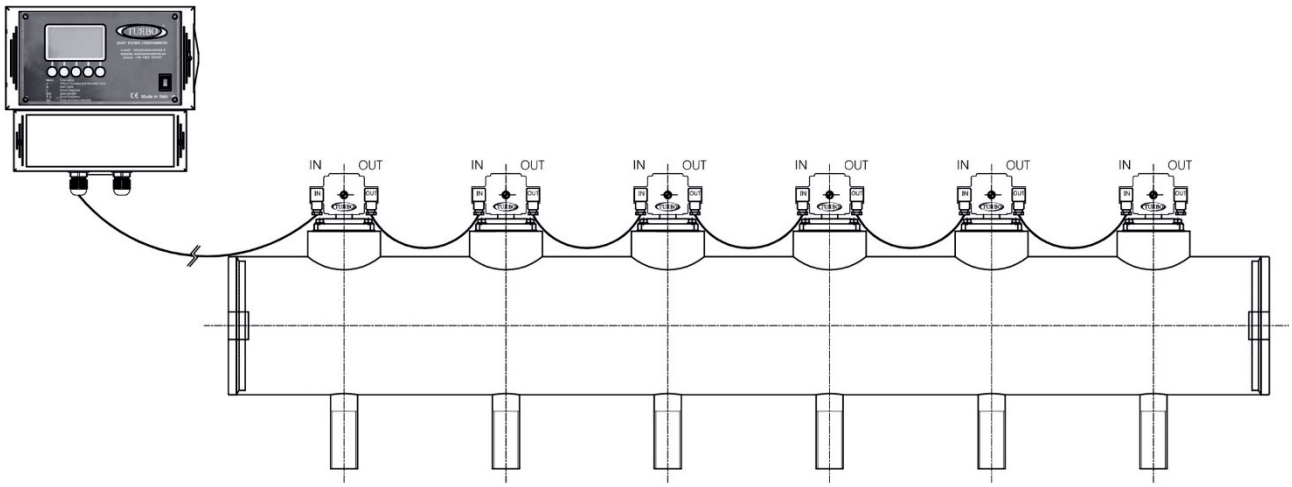
Connection To Pilot Valves

Connect the power supply wiring cable to the solenoid valves from the P10 connector on the terminal of control board to the first electro valve in the input indicated with IN:

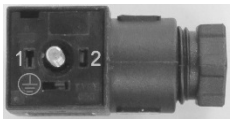


connect the other electro valves sequentially using the wiring harness with the PG7 connectors respecting the IN -> OUT polarity, assemble the gaskets to ensure the IP seal of the circuit.

The connector of the last electro valve marked OUT and not used must be closed with a PG7 connector by removing the cylindrical rubber plug provided as protection for transport-only.

Wires of the connection cable must be connected to the polarized connectors at the positions:

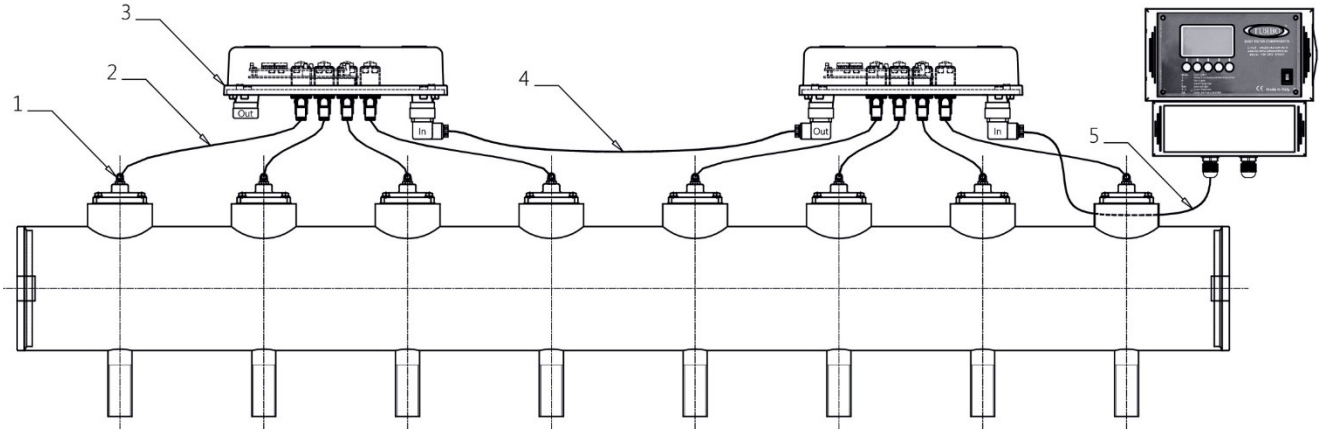
- 1 brown wire power supply +
- 2 white wire activation signal
- 3 green wire power supply
  central position with gnd symbol 0 V



The cable used for wiring is of the type H05VV-F 0.72 mm² - 19 Awg

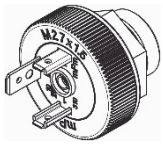
Connection To Pilot Enclosure For Valves

Connect the power supply wiring of the pilots enclosure for the solenoid valves from connector P10 of the terminal block of the control board, to the first ERCP enclosure pilots for the activation of the pneumatic valves, in the input indicated with IN:



1	Pneumatic valve with remote control actuation
2	Connection hose between the remote pilot and the valve
3	Enclosure box with integrated pilots for valve actuation
4	Connection wiring cable between the enclosure boxes ERCP
5	Connection wiring cable from control unit to enclosure boxes

Connect the ERCP enclosure boxes in sequence using the wiring harnesses with the DIN 43650 connectors to be fixed to the cylindrical sideburns.

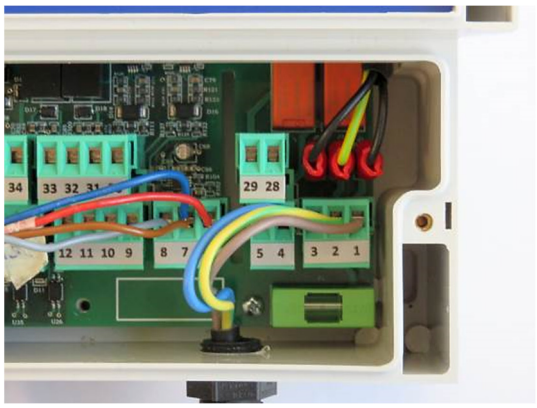


Respecting the IN -> OUT polarity, fit the gaskets to guarantee the IP seal of the circuit.

Fuse Replacement

The fuse is located under the terminal board in the bottom right-hand corner.

To replace it, remove the case cover and remove the fuse from its housing.

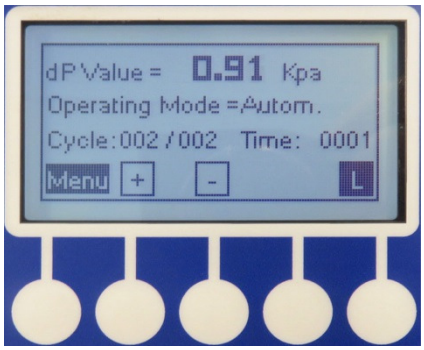


Keyboard And Monitor

There are 5 round keys on the front panel to control the Master and select functions.

When turned on, the screen displays the software version during initialisation:

The next screen is always displayed during normal operations:



- Menu

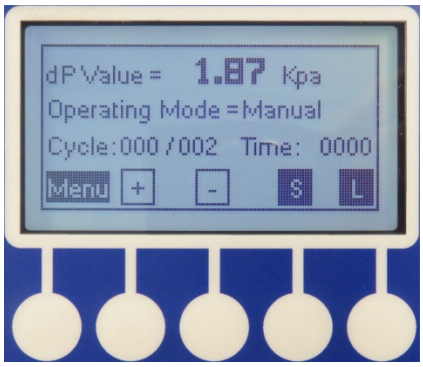
  Provides access to settings

  it is used as RESET in the event of alarms

- Keys [+] [−]

  Increase and decrease the display contrast on the main screen.

  In the other screens, increase and decrease the values and manually start valves in Test mode, used to scroll any alarms

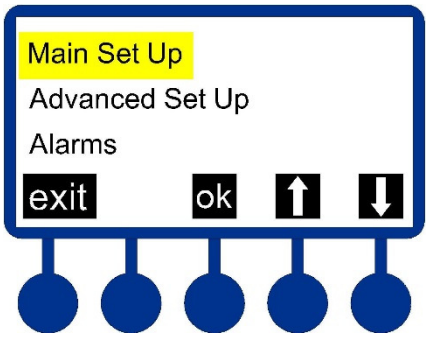


- The **S** key starts/stops solenoid valves in manual/special manual mode. It is not enabled in automatic/proportional mode.
- Use the **L** key to select one of the 5 available languages: Italian, English, French, German, Spanish.

On the main screen, when an alarm is active, the letter **L** changes state becomes **A**, pressing [+] [−] scrolls through the alarms, pressing **A** returns to the screen with dP reading.

Menu Layout

Accessing Basic Settings



Press the menu key.

Use the arrows ⇧ ⇩ to select Main Set Up

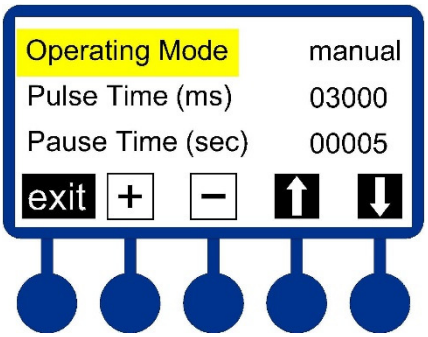
Press **OK**

Basic Set Up Items

Use the arrows ⇧ ⇩ to select the item to be set.

Use keys + − to increase or decrease the value and change the item conditions, for example switch between Manual, Autom, Proport, Special or between mm H2O, Mbar, kPa, Inch w.c.

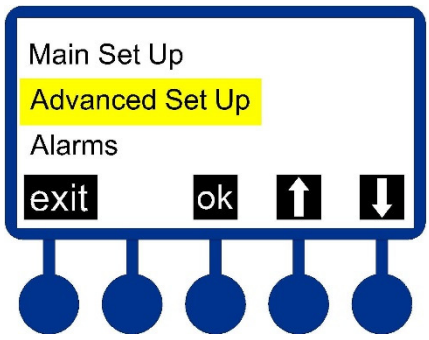
Press **exit** to save and exit.



Operating Mode	Select the operating mode (Manual Autom Proport. Special)
Pulse Time (ms)	Valve opening time (50 msec. – 10 sec.)
Cycle time (sec)	Interval time between valve opening (1 sec – 7200 sec)
No. valves	Select the number of connected valves (1 - 128).

Unit Measure dP	Select the dP reading unit of measure (mm H2O Mbar kPa Inch w.c.).
dP Start Cleaning	Enter the start cleaning dP value (for Autom. Proport operating mode only)
dP Stop Cleaning	Enter the end cleaning dP value (for Autom. operating mode only)

Advanced Settings



Press the **Menu** key in the home page.

Use the arrows to select Advanced Set Up.

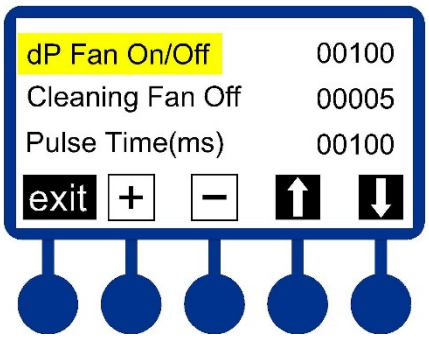
Press **OK**

Advanced Set Up Items

Use the arrows to select the item to be set.

Keys + − to increase/decrease the value or change an item condition such as Enable / Disable.

Press **exit** to save and exit.



dP Fan On/Off	dP threshold tied to fan on/off for which the tool recognises that suction is on over the set threshold while cleaning cycles are started with the fan off under it (Post-Cleaning)
Cleaning Fan off	Number of complete cleans with fan off for the number of connected solenoid valves.

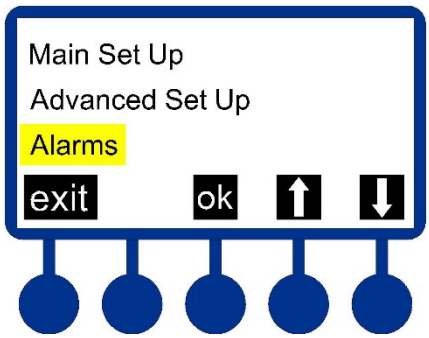
Pulse Time (ms)	Valve opening time in cycles with fan off (50 msec. – 10 sec.)
Cycle Time (sec)	Interval between valve openings in cycles with fan off (1 sec - 7200 sec.)
Precoating	Enables the Precoating function.
dP Precoating	Enter the dP value where the pre-coating function is kept enabled. When exceeded the instrument returns to the originally set operating mode.
Cycles Man. Spec.	If Special operating mode was selected in basic set up, enter the number of complete cycles for the number of connected solenoid valves to be completed
Pause Man. Spec.	If Special operating mode was selected in basic set up, enter the pause between the numbers of cycles.

Alarm Menu

Press the **Menu** key in the home page.

Use the arrows ⇧ ⇩ to select Alarms.

Press **OK**

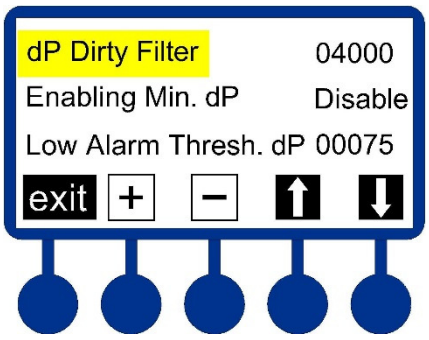


Alarm Menu Items

Use the arrows ⇧ ⇩ to select the item to be set.

Keys + − to increase/decrease the value or change an item condition such as Enable / Disable.

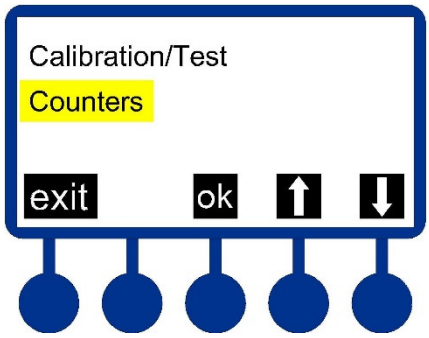
Press exit to save and exit.



dP Dirty Filter	Enter the dP threshold to trigger the clogged filter alarm.
Enabling Minimum dP	Minimum dP alarm enabling (broken sleeve).
Min. Alarm Thresh. dP	Enter the dP threshold to trigger the Minimum dP alarm.
Hour Meter Fan	Enabling the fan hour meter. Connect the fan filter remote switch to terminals 17_18 connector P13, to count actual suction working hours.

Replace Filters (h)	Enter the number of working hours desired to trigger the filtering element replacement alarm (sleeves/cartridges), the alarm is only generated if the fan hour meter is enabled and the fan remote switch connected to terminals 17_18 on connector P13 on the electronic board.

Calibration / Test Menu



Press the **Menu** key in the home page.

Use the arrows ⇧ ⇩ to select Calibration/Test.

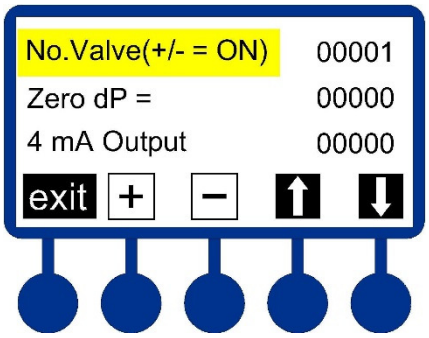
Press **OK**

Calibration / Test Menu Items

Use the arrows ⇧ ⇩ to select the item to be set.

Keys + − to increase/decrease the value or change an item condition such as Enable / Disable.

Press **exit** to save and exit.



No. Valve (+/- = ON)	Press the keys + − to manually start the solenoid valves connected to the electronic board in sequence.
Zero dP =	Press in sequence the keys + − to calibrate zero dP, press the + hold it down then press the -. Run this operations with the filter fan off.
4 mA Output	Press the keys + − to calibrate the 4mA output which corresponds to zero dP.

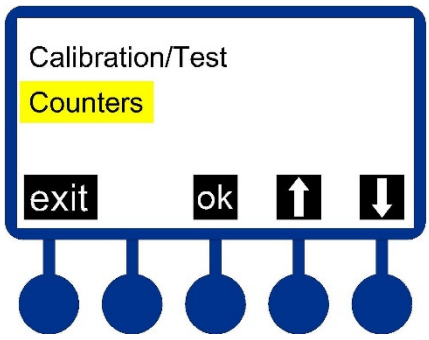
20 mA Output	Press the keys [+] [−] to calibrate the 20mA output which corresponds to dP full scale.

Counter Menu

Press the **Menu** key in the home page.

Use the arrows ↑ ↓ to select the Counter item to be set.

Press **OK**

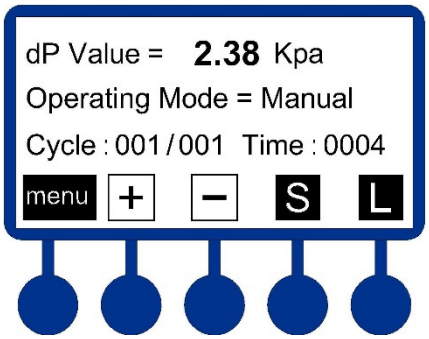


Counter Menu Read-Only Items

Hours Power	Hours the electronic board is on.
Pulse Count	Number of times the valves connected to the electronic board were started.
Hours Fan	Hours the filter fan is on. The counter is only on if the filter fan remote switch is connected to terminals 17_18 on connector P13 and the fan hour counter function enabled in the alarm menu.

Operation Description

When the economizer is powered, the display lights and, after the welcome message, the following type of message is displayed:



The displayed information is: the operating mode, the internal dust filter pressure, active outputs and the time necessary to activate the next output.

Manual Operating Mode

When manual operating mode is set, the economizer works as a programmable cycle sequencer. The connected outputs will be activated at programmed time intervals. Manual operating mode can be selected in the basic set up menu under the first menu item.

Intervals are programmed in the same menu where activation time, pause time and the number of solenoid valves connected to the device are set.

In Manual Operating Mode the signal 24 Vdc at terminals 22_23 connector P11 is always active.

Automatic Operating Mode

When Autom. Mode is selected from the basic set up menu, first menu item, the economizer will work autonomously running pneumatic cleaning only when necessary. If the device detects clogging over the dP Start Cleaning threshold, cleaning is started, and activates the signal 24 Vdc at terminals 22_23 connector P11.

If clogging drops under the dP Stop Cleaning threshold, cleaning is suspended and turns off the signal 24 Vdc to terminals 22_23 connector P11, until the pressure rises to a value over dP Start Cleaning.

When cleaning, the time in which the economizer cleans can be set in the basic set up menu.

Proportional Operating Mode

By selecting the PROPORT. mode in the basic set up menu, the economizer works autonomously initially setting the Start Cleaning threshold, pulse time and pause time.

Automatically, when the Start Cleaning threshold is exceeded, the solenoid valves are activated in sequence. If the dP threshold lowers 15% at the end of an entire pulse cycle for the connected solenoid valves, cleaning is suspended until the pressure rises over the dP Start Cleaning threshold.

If the dP value does not drop 15% under the Start Cleaning threshold, the pause time frequency is automatically reduced proportionately at each complete cycle of connected solenoid valve pulses, until a pause time between solenoid valves is minimum 10 seconds. The minimum 10 second threshold was chosen to not stress air distribution by the compressor connected to the filter.

Special Manual Operating Mode

In the basic set up men, first menu item, select SPECIAL mode, enter the pulse time and pause time. Open the advanced set up menu, second menu item, enter the number of complete cycles and pause time between these cycles for the connected solenoid valves.

With this mode, unlike manual mode, the device only runs the solenoid valves for the set number of cycles and will remain in stand-by until an operator presses **S** (start / stop) in the main menu to repeat the cycles. This mode is especially suited for small filters or filters where the dP has low values or the inverter keeps pressure constant and it is hard to work with automatic and proportional modes.

Cleaning Function With Fan Off Post-Cleaning

This function allows a cleaning cycle to be run with the fan off.

Post-cleaning is automatically activated in Automatic and Proportional operating modes and when differential pressure drops under a threshold that can be set in the advanced set up menu, second menu item.

While in Manual and Special Manual modes, it occurs through a contact connecting the fan to terminals 36_37 on connector P13, see wiring diagram.

In the advanced set up menu, the following post-cleaning settings can be set:

Start cleaning with fan off (Enable/Disable)

Activation pressure (dP fan ON/OFF threshold)

Number of cycles (cycles completed)

Pause time (pause duration between one solenoid valve start and the next during post-cleaning).

Pulse time (cleaning pulse duration regardless of the fan on operating time).

Selecting The Number Of Outputs

The number of outputs (solenoid valves) on which the economizer runs the cleaning cycle can be selected. Cleaning is run in order from the first solenoid valve to the last. Valve regulation is possible in the basic set up menu.

Pre-Coating Function

This function lets you run pre-coating. Pre-coating is a filter element treatment run with a powder called pre-coating powder. During the pre-coating phase, cleaning is suspended until the dP pre-coating threshold is reached.

In the advanced set up menu, the following pre-coating settings can be set:

Pre-coating start: Enable (on) / Disable (off)

Disable pressure (dP pre-coating)

Cleaning Function From Remote Control

This function lets you pneumatically clean only after an external consent is received. The external consent can be connected to prevent cleaning without pressure in the high pressure circuit or in the compressed air tank.

The external contact must be voltage free, normally open and connected to terminals 38_39 connector P13, see wiring diagram.

4-20 mA Out Function

This function lets you check pressure readings from remote through 4-20mA transmitter.

Connect the signal to be sent to the remote device to terminals 34_35 on connector P12.

The gain range can be set in the Calibration/Test menu, see Accessing the Calibration and Test Menu section.

4-20 mA IN Function

Terminals 30_31 on connector P14 can be connected to a tribo electric probe that generates a signal in current that varies from 4-20 mA.

The signal intensity varies as the concentration of dust in the air varies. With a low particle percentage, the signal is at the minimum. It increases as the particle concentration increases.

Active Cycle 24 Vdc Output Signal

The output signal from the mosfet transistor to terminals 22_23 P11 connector 24 Vdc value is active when the cycle is in progress.

The signal can be used with a relay, if used by a PLC, the input must be opto isolated, and otherwise there is the risk of breakage of the device.

When cleaning is activated, the contact is closed, while the cleaning it stops, the contact opens.

Alarms

This function allows an alarm device to be connected. The alarm device can be connected to two alarm relays (see wiring diagram) which are opened when the threshold set in the ALARMS menu is exceeded. For details, see the third menu item and the description in the Accessing the Alarm menu section.

When an alarm is triggered, it is signalled on the display by a blinking row that is normally occupied by the operating mode. The menu key is used for RESET and keys + − can be used to scroll any alarm items that may have triggered for:

- relay no. 1
- dP Dirty Filter - Tribo Probe Alarms If used
- dP minimum, Replace Filters if enabled in the menu
- relay no. 2
- failed valve activation

The relays are normally closed, opens in case of alarms and opens to the control unit switched off in the absence of power supply.

PP Open is indicated on the screen if the contact is not closed or the fan is not connected to terminals 36_37 connector P13.

Remote Open is reported on the screen if the contact is not closed or the remote control is connected to terminals 38_39 connector P13.

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Trouble Shooting *FAQ*

Fault	Possible Cause	Solution
The display does not light up.	Burnt fuse. Power voltage.	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 vale 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.
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 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.
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 0.0 kPa-mm Bar-mm H20-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.
Do alarm messages appear?		Check the Alarms menu.

Maintenance

The control unit has no parts that can be replaced, except for the fuse.

All repair operations must be carried out by the manufacturer.

To clean dust and dirt from the surfaces, gently rub with cotton or other soft cloth soaked with non-aggressive, non-abrasive detergents; use those for glass surfaces; do not use solvents or aromatic compounds and do not rub with abrasive sponges.

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.

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

Default Settings

Basic Setting		
Parameter	Setting Value	
Operating Mode	Automatico	
Valve Pulse Time	200 m. seconds	00200
Valves Pause Time	20 seconds	00020
Valves Number	1	00001
Units of Measure	kPa	
Start Of Cleaning dP	0.80 kPa	00800
Stop Of Cleaning dP	0.40 kPa	00400

Advanced Setting		
Parameter	Setting Value	
dP Fan Recognition	0.10 kPa	00100
Cleaning Cycles Fan Off	2	00002
Time Impulse Valve	200 m. seconds	00200
Time Valve Pause	20 seconds	00020
Precoating	Disabled	
Precoating Start dP	1.50 kPa	01500
Cycles Special Manual Mode	2	00002
Pause Special Manual Mode	200 m. seconds	00200

Alarms		
Parameter	Setting Value	
dP Dirty Filter	3 kPa	03000
Enable Minimum dP	Disabled	
Threshold dP Minimum Alarm	0.20 kPa	00200
Hours Counter For Fan	Disabled	
Replacement Filters Hours	1000	01000

Modbus Serial Comunication		
Parameter	Setting Value	
Address	1	00001
Baud rate	9600	09600
Parity	None	
Stop bit	1	00001

Declaration Of Conformity Of The Manufacturer

CE

The manufacturer:

TURBO SRL

The manufacturer's address:

Via Po 33/35 20811 Cesano Maderno, Italy

Declares that the product:

Serial Master Economizer

Model:

EcoNet Plus EC++PLS 128

Complies with the following directives:

Directive 2014/30/EU Electromagnetic Compatibility compliant with Harmonized European standards EN61000-6-2:2005 class B of EN61000-6-4:2001

Directive 2014/35/EU Low Voltage compliant with Harmonized European Standards EN 60947-1:2004

This product was tested using standard settings.

Cesano Maderno, 03 March 2016

F. Messina (C.E.O.)

TURBO s.r.l.

Code And Serial Number