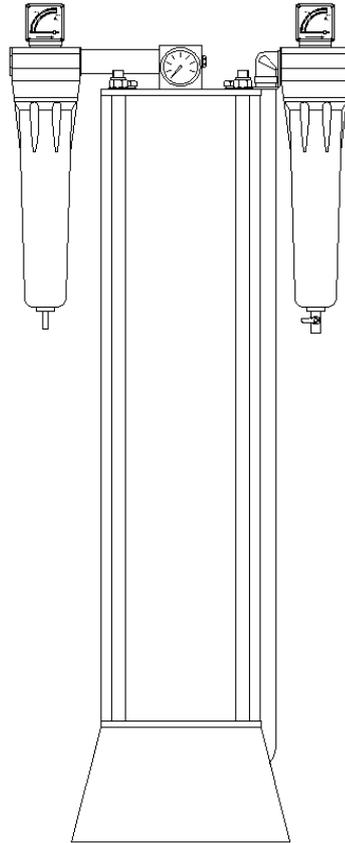


# INSTRUCTION HANDBOOK

## CAS SERIES



### ACTIVATED CARBON UNIT

**EVO<sup>cas</sup>**

Rev.	Description	Write	Check	Date
1	Graphic and schemes updates	A.M.	O.Z.	15-01-2010
0	First Emission	O.Z.	O.Z.	13-02-2009

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Cod. Fiscale e Partita IVA 02280990249 - VAT CODE IT 02280990249



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## DECLARATION OF CONFORMITY with Machinery Directive 2006/42/EC

We **ETHAFILTER s.r.l.**, via dell'Artigianato 16/18 – 36050 Sovizzo (VI) – Italy declare under our sole responsibility that the mentioned equipment in this manual, complies with the Directives (where applicable):

- 2006/42/EC, 2006/95/EC, 2004/108/EC, 2011/65/UE, 2012/19/UE, EN 61439-1,
- EN ISO 12100, EN ISO 13857, 2000/14/EC, EC 1907/2006,
- Ref. Directive 2011/65/EU (Waste of Electronic and Electrical Equipment) and RoHS (Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment):  
we declare with reference to polluting substances related to electronic parts the machinery is free of lead, mercury, cadmium, chrome 6 and prohibited flame retardants.
- EC 1907/2006, PED 2014/68/EU



## Chap. 1 – General safety instructions and warning

**& Before using your equipment, read carefully and understand this Manual for proper operation and service.**

The non observation of rules, instructions and guidance advices in this manual will invalidate possible warrantee claim against failure; preventing as well from potential hazards for the safety of the Personnel.

### SAFETY RULES

The filtration unit of the range **CAS** contain components under pressure:

- **Pressure components** (columns, filters and piping) which cycle is controlled by commutation valves pilot through an electronic time sequencer.

**ⓘ Before starting any maintenance or repair work on the unit, make sure that the entire unit is completely depressurised and insulated from the compressed air system by closing the inlet and outlet valves of the by-pass circuit (at Customer's care), by completely releasing the total pressure contained within the unit.**

- **An electronic circuit board for electronic drainers (optional)**

**ⓘ Before starting any maintenance or repair work on the unit, make sure that all power is switched off for complete isolation.**

**DO NOT REMOVE, REPAIR OR REPLACE ANY ITEM WHILE UNDER PRESSURE**

**DO NOT OPERATE IF THERE IS A LEAK: IMMEDIATELY TAKE VESSEL OUT OF LEAK AND REMEDY LEAK.**

**DO NOT OPERATE ABOVE MAXIMUM DESIGN PRESSURE, AND STAY WITHIN DESIGN TEMPERATURE RANGE.**

**SERIOUS PERSONAL INJURY CAN RESULT IF THESE INSTRUCTIONS ARE NOT FOLLOWED: only skilled, competent and authorized Personnel that are knowledgeable should carry out installation, service and inspection of the equipment.**

**MAINTAIN EQUIPMENT WITH CARE**, following the instructions herewith recommended for maintenance and conduction.

ETHAFILTER or their Representative are available to propose preventive maintenance contract.

**USE ORIGINAL SPARES**, consulting the list of recommended spares reported in this manual. The use of improper spares may cause hazards.



## Chap. 2 – Warrantee terms and conditions (extract from the commercial clauses)

**Art. 3 Prior to placing an order** the Customer must verify that the specifications and features of the product satisfy in full his needs and said product is suitable for the application it has been purchased for. The Supplier shall provide the Customer with all the necessary information considered reasonable permitting the Customer to decide whether the product in question is suitable for the desired application, being understood that the Customer shall be solely responsible for the choice of product and its fitness for a specific purpose.

The Supplier disclaims any responsibility for damages caused by a product purchased which results unsuitable for the specific purpose it was purchased for.

### Art. 15 Warrantee

The products supplied are declared free from material or fabrication defects. Under proper use, the warrantee covers a period of 12 (twelve) months from the first use or, at the latest, within 15 (fifteen) months commencing from the date of despatch (intended as ex-works), whichever date occurs the sooner. This warrantee clause shall be considered void in case:

- the Customer does not notify the Supplier in writing of the problems with the product without delay, and in all cases no later than 7 (seven) days from manifestation of evident defect. Any defects which could not be discovered within this period even on careful examination must be notified in writing to the supplier immediately upon discovery, though at the latest within 15 (fifteen) months from the date of shipment.
- in case products have been tampered with or modified by third parties.

The warrantee does not instead cover damages caused by lack of or incorrect maintenance or application in inadequate conditions.

In case of justified complaints, warrantee covers both labour and defective goods (or, at supplier's absolute discretion, parts or components) manufactured directly by the Supplier or by third parties and assembled by the Supplier, at the sole exception of motors and other electrical - electronic or consumable parts. For consumable parts in particular, Customer should note that the goods contain disposable or replaceable parts including filter elements which will need replacing from time to time according to use. The life of any such parts and in particular any filter elements will depend upon a large number of variable conditions and no guarantee can be given for their life.

Breach of warrantee is valid only after the Supplier's expertise have verified that the products have been used correctly for the purpose they have been designed for by suitably trained Customer's Personnel, also in accordance with the Supplier's instructions for installation and maintenance (shipped with goods). For that purpose, the Customer must allow the Supplier to verify and control the product at the Supplier's premises or, at the Supplier's unique and absolute discretion, inspected at site of installation. Once the claim is released as acceptable by the supplier, free of charge replacement of the goods judged as defective or repair including components and labour will be undertaken by the Supplier. Repairs under warranty shall be carried out at the Supplier's premises. All carriage charges for products or components to be replaced or repaired shall be at Customer's expense; therefore:

- all products returned to the Supplier shall be carriage free. In the event that the Supplier should be forced to pay carriage to the Forwarder Agent when receiving the returned goods for inspection, such costs shall nevertheless be charged to the Customer.
- all repaired products returned to the Customer by the Supplier shall be shipped carriage unpaid. Any packaging retained necessary shall be billed separately.

In the event that the Supplier's technicians are called out at site for controls or repairs during the warranty period, travelling hours as well as travel and living expenses shall be, unless otherwise expressly agreed, charged to the Customer in accordance with the category tariffs. When repair work is carried out at site, replaced materials as well as working and machining hours for making the material good shall be borne by Customer.

In case of warrantee claim, the Customer does not have the right to compensation, liquidation nor delay or suspend payments agreed upon. The Supplier shall not be liable to replace parts or repair products under this warranty clause if the Customer has outstanding payments with the Supplier of whatever nature and these payments are overdue in accordance with these conditions.

Where the attempt for repairing or replacing proves abortive or in the case the Supplier and Customer agree for not repairing or replacing the goods, the Customer will be credited for partial or entire ex-works amount of the part(s) less the costs of the consumable elements; and the products in question shall be returned to the Supplier. Should the Customer be credited or a concession is agreed upon or if the products are replaced as described in the foregoing, the Customer does not have the right to forward further complaints regarding the products or damages caused by the defective product.

**Art. 16 Installation, testing, start up and other technical interventions on site are not included in the price.** Upon specific request by the Customer, specialized technicians, direct or delegated by the Supplier, will be sent out at site. Their services, travel and living expenses shall be billed in full in accordance with the tariffs related to their category, applicable at the time of the intervention. Such costs shall be settled within the same calendar month the invoice is issued and dated.



### Chap. 3 – CAS unit description

It is very important to de-contaminate the compressed air from the load of volatile hydrocarbons and from oil vapours carried over from the compression phase.

The atmospheric air sucked by the compressors is in fact charged with organic odours and compounds of volatile hydrocarbon chains emanated by industrial processing, thermic power plants, road traffic, ...

In any case the accumulation of lubricants in the compression chamber improves a possible condensation phase and then an easier but partial separation through coalescing filtration. Their migration to the use may condition the performance of operating more and more exact processing and thus the elimination of the remaining gas phase must be completed by a process of absorption on activated carbon which will protect the conditioned purity.

The easiest and most effective method for the elimination of odours and vapours of hydrocarbons is the use of activated carbons, characterized by a special capacity to absorb its gas phase.

The column with deep layers of activated carbon is to be preferred instead of the filtering cartridge with a limited geometry, due to the fact that, for the foreseen purpose, it is possible to optimize an increased surface of absorption and a prolonged time between carbon grains and air to be purified over the whole development of the length of the column.

To this purpose a charge of activated carbon is stratified; this carbon is characterized by a special capacity to absorb the molecules of vapours and odours from volatile organic substances.

The air flow is made from the top to the bottom in order to avoid the danger of a possible fluidization of the activated carbon bed.

#### INLET AND OUTLET FILTERS

The filtration grades possibly available ranks generally as per the here below tabular whereby the composition varies according to the package version:

MOD	INLET FILTER (IF 1)	OUTLET FILTER (OF 1)
EVO cas	SMA	RD1

(rif. P&I Cap.8)

Remark: for unpackaged or job specification matters, the composition may vary and the chain of filtration needs to be defined upon consultation prior ordering.

The optional filter(s) may be fit with the following complementary accessories:

- differential pressure indicator (with or without electrical contact) for monitoring the evolution of the pressure drop and thus scheduling the element replacement.
- Automatic condensate drain, either internal float operated or external such as purge solenoid valve electronically time controlled, model **ETHADRAIN<sup>trim</sup>**, with purge phase (ON) as well as pause (OFF) both adjustable according to actual site load conditions.

Please refer to the specific attachments of the unit to identify the effective composition installed and the model of the replacement elements inside the inlet filter/s, as well as the model of the condensate drain assembled on the filter, and, if necessary, the correct electrical power supply.



## Chap. 4 – Transport, delivery and receipt

### TRANSPORTATION

For loading and moving the unit, indeed do use the lifting lugs or points provided on the unit as well as the dedicated area passages on the pallet or boxing  
The unit must by no means be lifted at the compressed air inlet- or outlet connections.  
Severe damage may result from such handling.  
In moving or transporting unit, do not tip unit onto its side.

### DELIVERY

The unit is thoroughly checked and packed, before it leaves the factory.  
It has been handed over to the forwarding agent in perfect condition.

### CHECKING AT RECEIPT

Upon receipt please check immediately the packing for visible damage.  
In case of visible damage of the packing, please insist upon a respective note on the delivery sheet of the forwarding agent.  
Please also check the unit for hidden damages.  
If a unit is delivered with apparently undamaged packing but with hidden damage, see to it, that the forwarding agent is informed at once and have the unit inspected.  
The manufacturer is not responsible for damages occurred during transport.

## Chap. 5 – Installation precautions and set-up

1. Install the package on a flat surface without undergoing vibrations.  
Keep a certain distance from the wall and other obstacles to ensure a suitable space for service operation.  
A fresh or ventilated space will improve the unit performance.
2. Be sure of the internal cleaning of pipings connected to the unit.
3. If equipped with separator and filters, remember that the condensate must reach a drain pit or a drain vessel, or a oil/water separator (well sized) in order to be effectively disposed.  
**Attention:** oily condensates cannot be freely drained into the surface or into the sewers according to general law. **Contact ETHAFILTER** to select the most convenient solution for the treatment of oily condensate.
4. It is necessary to install the unit on a by-pass circuit to exclude it when performing maintenance.  
It is recommended not to use check valves to insulate the systems under pressure (see by-pass scheme).
5. The electronic condensate drainers (optional) must be earthed and secured against short circuit by fuses in all phases.  
Check whether the electrical installation complies with the local regulations.  
Have a competent person fit an appropriate power plug to the power cable of the unit.  
The colour coding of the power cable are:  
Brown: Mains power, phase  
Blue: Mains power, neutral  
Yellow/green: Protective earth

## Chap. 6 – Activation - Deactivation

### IMPORTANT

The shelf life of the charges of the unit is strictly dependent upon the good conduction of the plant.

It is very important to install the unit with a "by-pass" system as shown in the plant scheme (pipings and valves to be provided by the User).

**A.** Connecting with the network of compressed air must be performed as follows:

**A.1** During each start-up and related pressure-rise of the compressed air network, the flow should not pass through the unit but through the "by-pass" piping.  
Then open valve **B**, while valves **A** e **C** remain closed.

**A.2** Activation instructions:

**A.2.0** air compressor, tanks and compressed air piping must be de-pressurised

**A.2.1** close **C** By-pass valve

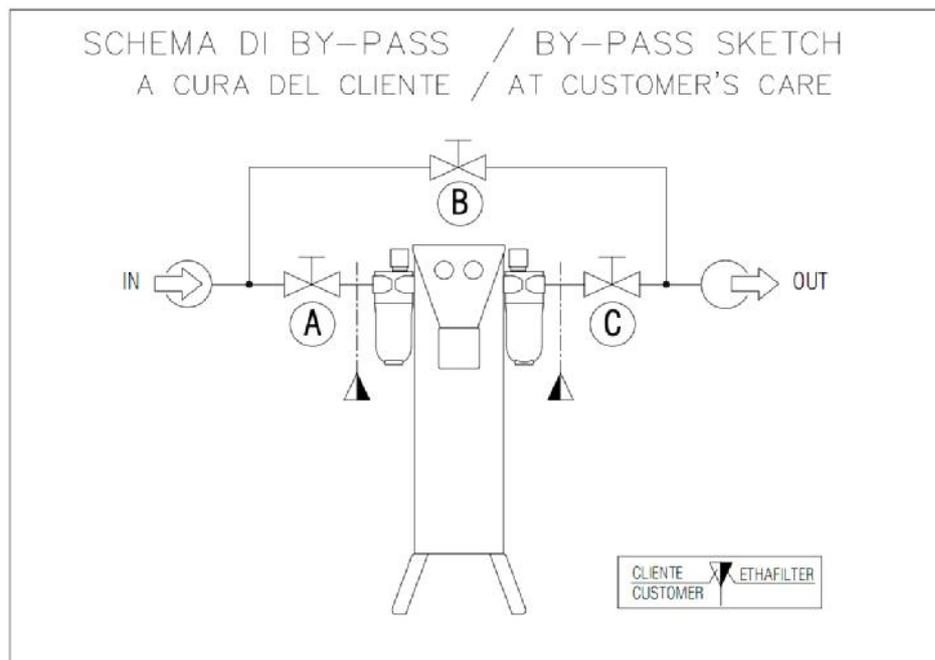
**A.2.2** open **B** By-pass valve

**A.2.3** switch ON the compressor to pressurise the piping until the operational level

**A.2.4** switch ON the electronic condensate drainers (if fitted - optional)

**A.2.5** slowly open **A** By-pass valve

**A.2.6** open **C** valve and close **B** By-pass valve





B. The stop of the unit must be done as follows:

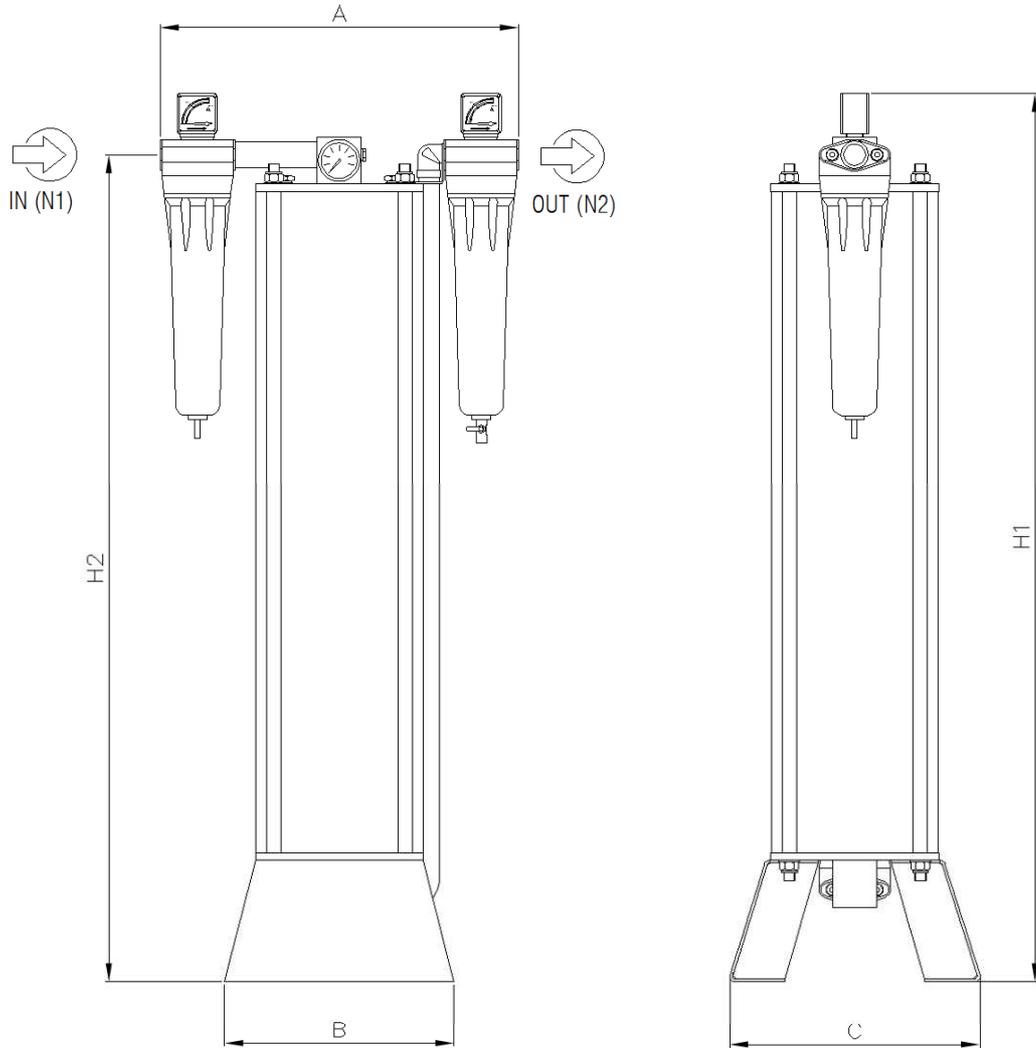
- B.1 slowly and step by step, **open** valve **B**
- B.2 slowly and step by step, **close** valve **C**
- B.3 slowly and step by step, **close** valve **A**
- B.4 complete depressurise the unit using the appropriate hand valves
- B.5 switch OFF the electronic condensate drainers (if fitted - optional)

### ATTENTION:

- At short time after the start up, the settling of the adsorbing layers may cause the clogging of the final dust filter element.  
The purchase of a set of filter elements spare parts kit is recommended for the first start-up, in order to allow an immediate reset of the equipment.

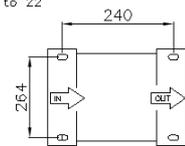
**Chap. 7 – Drawings**

**EVO cas:**

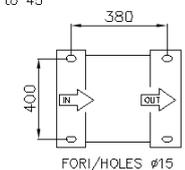


**IMPRONTA BASAMENTO / FOOT PRINT**

Dal 15 al 22  
From 15 to 22

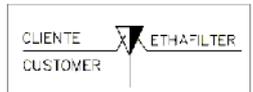
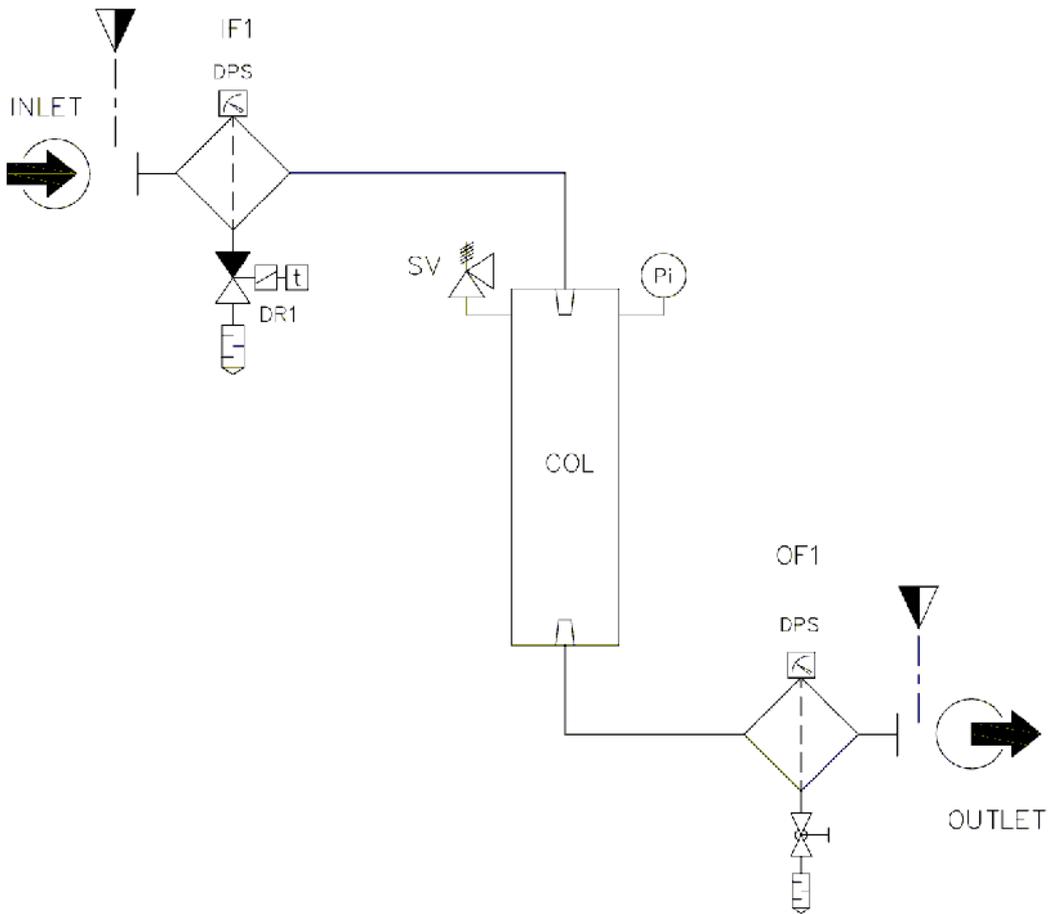


Dal 30 al 45  
From 30 to 45



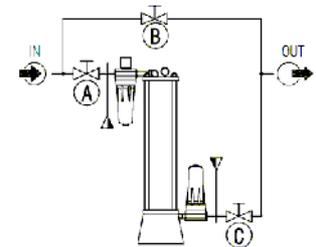
MODEL	FILTERS MODEL		PORTS (BSP)		A	B	C	H1	H2
	INLET	OUTLET	N1	N2					
EVOcas 15	NEA222SMA	NEA222RD1	1"	1"	665	275	313	1220	1123
EVOcas 18	NEA222SMA	NEA222RD1	1"	1"	665	275	313	1420	1323
EVOcas 22	NEA226SMA	NEA226RD1	1"	1"	665	275	313	1620	1523
EVOcas 30	NEA232SMA	NEA232RD1	1"1/4	1"1/4	790	412	450	1200	1099
EVOcas 37	NEA242SMA	NEA242RD1	1"1/2	1"1/2	790	412	450	1350	1249
EVOcas 45	NEA242SMA	NEA242RD1	1"1/2	1"1/2	790	412	450	1600	1499

Chap. 8 –P&I diagram



ITEM	DESCRIPTION	NOTE
IF 1	FILTRO INGRESSO 1 INLET FILTER 1	VEDI TAB. FILTRI SEE FILTERS TABLE
DPS	MANOMETRO DIFF. INTASAMENTO FILTRI DIFFERENTIAL PRESSURE GAUGE	OPTIONAL
DR 1	SCARICATORE ETHAcrain 1 ETHAcrain VALVE 1	OPTIONAL
COL	COLONNA CARBONE ATTIVO ACTIVATED CARBON COLUMN	
SV	VALVOLA SICUREZZA SECURITY VALVE	
Pi	MANOMETRO COLONNA PRESSURE GAUGE	
OF 1	FILTRO IN USCITA 1 OUTLET FILTER 1	VEDI TAB. FILTRI SEE FILTERS TABLE

SCHEMA DI BY-PASS / BY-PASS SKETCH





## Chap. 9 – Maintenance

### Weekly check if:

- All pipings and fittings in the unit are in proper conditions, firmly fixed and not loose
- There are no liquid or air leaks.
- All fittings are firmly attached.
- The electrical connections are secured and in proper conditions.
- Safety valves and other pressure venting devices are not obstructed
- The piping and the air system (i.e. joints, manifolds, valves, tubes etc.) are in proper conditions without any wear or defect.
- The index of the differential pressure indicator(s) are stable in the green sector. Otherwise, schedule for the element change (see par. 2).
- If provided, test the functionality of the drain devices (see par. 3).

### CAUTION !

***Before running any intervention on any piece of the machinery, thoroughly read and make sure you have acquired comprehension of the content of this manual and its attachments where ever mentioned.***

***Only a competent person should attempt to maintenance operations.***

***Serious personal injury can result if these instructions are not followed.***

***Do not remove, attempt repair or replace any item on vessel while it is under pressure.***

***Do not operate if there is a leak in the vessel.  
Immediately take vessel out of service and remedy leak.***

## Par. 1 – Replace and disposal filter elements

### **Replacement of filter element (general guide):**

The dust filter elements which operate in a dry atmosphere undergo an increase in the load loss only in proportion to the gradual accumulation of particles which they hold.

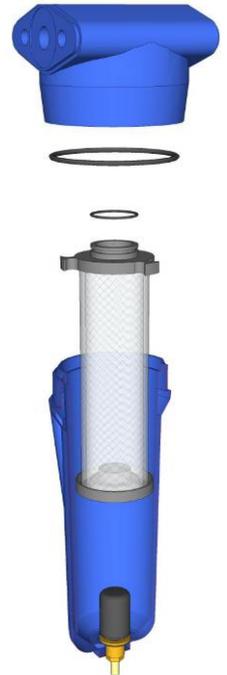


To this purpose we recommend that you check the evolution of the pressure loss shown on the differential pressure gauge.

The filter elements must be replaced when the differential pressure is near the red zone or the graduated scale (=  $D_p \sim 0,35$  bar), or if the pressure at the filter's outlet is insufficient for the specific application.

### **Guide to the installation of the filtering element:**

1. Stop compressed air feeding in communication with the filter housing. (see chap.6).
2. When all the pressure has been bled out of the filter, grasp the bowl with a belt type wrench, or place wrench on the hexagonal nut (if present) placed at the bottom of the bowl. Turn the bowl anticlockwise to unscrew it from the filter head.
3. For flanged housings, remove the nuts and bolts from the body of the filter, allowing the blind flange to be removed: by loosening only the last bolt it is easy to rotate the blind flange without using lifting devices.  
**WARNING!** On large models, provide support under bottom body flange before removing in order to hold the lower edge of the flange before removing it if you decide to remove the lower part of the flange completely: it is heavy and if it falls it may cause serious damage.
4. On threaded models, remove the used filter element by pulling it downwards. On flanged models, remove the bolt of the threaded rod passing through the lower head, unscrewing anticlockwise. Remove then the element, by pulling it downwards.
5. Check the integrity of the "O" ring inside the filter head seat. Replace it if it is consumed or damaged. Make sure that the seat of the ring is clean.
6. Locate the new filter elements equipped with the provided rings. Make sure that the ring is correctly placed on the end cap seat, and that it is slightly lubricated, possibly with neutral Vaseline. In case of elements with tie rods, screw the nut tightly and complete the operation with a toggle bar if needed.
7. Clean and lubricate the threads of the bowl with a light grease. This will allow the bowl to be easily removed at the following maintenance operation.
8. In case of threaded bowls and heads, place the bowl over the element, screw it to the head and tighten it. **Attention: Do not tighten too much.**  
In case of flanged housings replace the gasket. Screw all the bolts and nuts around the flanged vessel and be sure they are all tight.



***Disposal of exhausted filter elements:***

In case of use with **not lubricated** compressors, the exhausted filter elements do not constitute either a toxic or a noxious material. They are in any case industrial wastes because, due to their quantity and quality, they cannot be compared to urban wastes (see directive EEC n° 75/442).

In case of use **with lubricated** type compressors, the exhausted filter elements must be joined to the discipline concerning the exhausted oils disposal, according to EEC directive n° 75/439 and thus their disposal must be given to specially authorized Companies.

**ATTENTION !**

***Only a competent person should attempt to fit filter housings and change filter elements.***

***Serious personal injury can result if these instructions are not followed.***

***Do not remove, attempt repair or replace any item on vessel while it is under pressure.***

***Do not operate if there is a leak in the vessel. Immediately take vessel out of service and remedy leak.***

***Do not operate above maximum working pressure and at maximum operating temperature.***



## Par. 2 – Replacement and disposal of the active carbon

### ***Replacement:***

1. Be sure that the unit is not pressurised
2. Completely depressurise the unit (see the procedure in Chap. 6) and remove the external covers of the unit.
3. Remove the plugs only from the top end caps of each column.
4. Take a container/vessel and put it under the bottom end cap of the column. Remove the plugs of the bottom end cap of the column and hit repeatedly hit the column with a plastic hammer.
5. Put the exhaust carbon in tight containers/vessels in view of being disposed according to the Law.
6. Screw with sealant the plugs on the bottom end caps of each column and start to fill it from the top end cap with the new desiccant load.
7. Fill the volumes with new activated carbo through the two holes on the top end cap, hitting all along the column with a plastic hammer, in order to perfectly compact the desiccant. Once the column is filled until the upper edge, the desiccant has to be so compacted that it should not be possible to insert a screwdriver handle.
8. Put the plugs on the top end caps and carefully screw.
9. Pressurise the system. Be sure that this maintenance has been carefully done, immediately checking that there are no leaks. In case of a leak, depressurise the system and check it.

### ***Disposal of exhausted activated carbon material:***

In case of use with **non lubricated** compressors, the exhausted desiccant pellets do not constitute either a toxic, or a noxious material. They are in any case industrial wastes because, due to their quantity and quality, they cannot be compared to urban wastes (see directive EEC n. 75/442).

In case of use **with lubricated compressors** the desiccant loads must be joined to the discipline concerning the exhausted oils disposal, according to EEC directive n. 75/439 and thus their disposal must be given to specially authorized companies.

## **ATTENTION !**

***Only a competent person should attempt to replace desiccant material.***

***Serious personal injury can result if these instructions are not followed.***

***Do not remove, attempt repair or replace any item on vessel while it is under pressure.***



## A-4000 INSTRUCTIONS

Cod. doc.:

A-4000 - MU01

## OIL INDICATOR

Rev.: 0

Date:  
15/01/2010

The A-4000 Oil indicator is a calibrated measuring instrument used to detect aerosol-mist levels of oil entrainment that may be present in compressed air systems. Sensitivity of the indicator is limited only by the total number of hours it is allowed to remain on the air supply system. The indicator is sensitive enough to measure a concentration of oil entrainment as low as .01 PPM (.012 mg/m<sup>3</sup>) in a compressed air system. It can be used in systems with line pressures between 10 and 125 PSIG (70 and 875 kPa).

### Application

Oil entrainment in the control air supply to the pressure reducing valve may eventually have an adverse effect on the control system performance. Since some oil entrainment is inherent to lubricated compressors, all oil lubricated compressor installations must include factory approved oil filters to be reliably acceptable. The indicator can be used in two ways. Either it can be used to check for oil carryover from the compressor or it can be used to check out any filtered air supply source before connecting it to the system and also every few months after the system becomes operative. Once the needle valve of the oil indicator has been opened, one continuous uninterrupted exposure is recommended for greatest accuracy.

### Operation

When the needle valve of the oil indicator is open, less than 2 SCIM/PSIG (.08 mL/s/kPa) will flow through the calibrated plastic tube. Any oil present in the air will then carry a red oil soluble dye up the tube, coloring a white material in the tube. The rate of color travel will be proportional to the amount of oil present. The parts per million (PPM) value of oil entrained in the air can be determined using the conversion chart included with the instrument. After use, the needle valve should be closed and left in the line and the cartridge removed. At the time of the next test, a replacement cartridge will need to be installed on the needle valve fitting.



Fig. 1: A-4000 Oil Indicator Installed in Air Line

### Specifications

<b>Product</b>	A-4000-120 Oil Indicator and Needle Valve Assembly
<b>Air Consumption</b>	1.9 SCIM/PSIG (.07 mL/s/kPa)
<b>Maximum Temp. Rating</b>	120F (49°C) Internal and Ambient
<b>Pressure Range</b>	10 to 125 PSIG (70 to 875 kPa)
<b>Oil Concentration Range (W/W*)</b>	0 to 25 PPM By Weight @ 68F (20°C) 0 to 3 oz/100,000 SCF 0 to 30 mg/m <sup>3</sup>
<b>Accessory (Order Separately)</b>	A-4000-121 Oil Indicator Replacement Cartridge
<b>Shipping Weight</b>	0.2 lbs

\*W/W = Weight of oil per weight of air

*The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.*



## A-4000 INSTRUCTIONS

Cod. doc.:

A-4000 - MU01

## OIL INDICATOR

Rev.: 0

Date:  
15/01/2010

### Installation

In order for the oil indicator to properly measure a given oil entrainment, sufficient exposure time is required. The length of exposure time is inversely proportional to the pressure at the point of installation. When using the indicator to check for oil carryover from the compressor, it should be installed at the discharge of the tank. When using the indicator to measure oil entrainment in the air supply system, it should be installed between the oil filter and the pressure reducing valve (PRV). At this point, dry high pressure air will be present, resulting in the best accuracy and fastest indication.

**Note: In humid air, moisture may wash traces of dye up the tube, creating a light pink area above the dark red area. When calculating oil entrainment, measure only to the top of the dark red column. Locations involving excessive moisture, temperature, or velocity should be avoided. The indicator valve should remain closed except during the measuring period. For pressures above 125 PSIG (875 kPa) or below 10 PSIG (70 kPa), consult the factory.**

**WARNING:** If the pressure exceeds 125 PSIG or the retaining nut is loosened, the oil indicator tube could blow out of the compression fitting, creating a hazardous condition.

The indicator must be mounted within 45° of an upright position for best possible performance. Fittings (1/8 in N.P.T.) are provided on both high and low pressure sides of all A-4000 series filter and reducing station assemblies. Any other mounting location will require a 1/8 in. N.P.T. mounting tee as shown in Fig. 1.

Before installing a replacement cartridge, first check that the needle valve on the existing installation is closed all the way by making sure that the needle valve handle (see Fig. 2) is fully rotated in a clockwise direction. Install the replacement cartridge (see Fig. 3) by tightening the lower 1/8 in. nut in place.

**Note: Do not disturb the factory adjusted torque on the upper 3/16 in. retaining nut that holds the plastic tube in place. Also make sure that the indicator scale can be conveniently viewed before tightening the cartridge in place.**

### Readings and Measurements

1. Before taking a measurement, fill out the record tag furnished with the oil indicator. Record the line pressure or the average pressure (if it varies at the point of installation).
2. Fully rotate the needle valve handle (see Fig. 2) counterclockwise to open it and record the time that the needle valve was opened on the record tag. Slide the record tag over the oil indicator to avoid misplacing it.
3. At the following times and locations, visual inspections of the oil indicators should be made:
  - A. When checking for compressor oil carryover, inspection should be made after 4 hours at the compressor discharge.
  - B. When checking for oil entrainment in the air supply, inspection should be made after 40 hours between the oil filter and the PRV.

4. Judging from the rate of color travel established at the time of the first inspection, schedule the final reading of the indicator (and needle valve shut-off) at approximately 1 unit (marked "1.0" on the scale), and preferably not more than 1-1/2 units (marked "1.5" on the scale).
5. Close the needle valve, remove the oil indicator cartridge, and record the time. Leave the needle valve in the air line for future testing purposes.
6. Record the units of color travel (as read from the indicator scale) and the total time in hours.

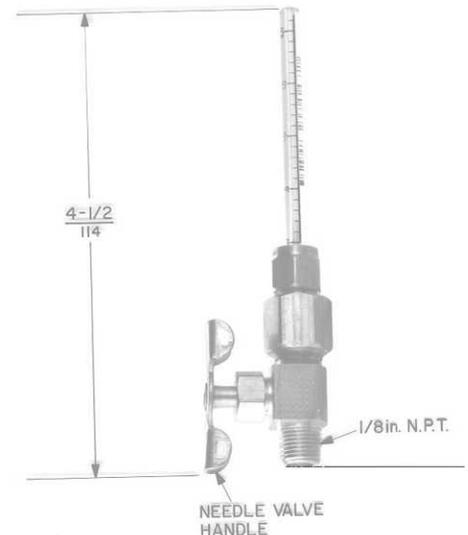


Fig. 2: Dimensions in/mm

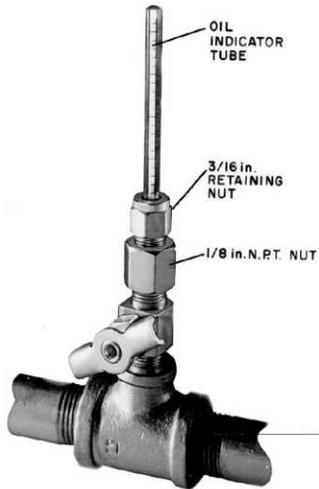
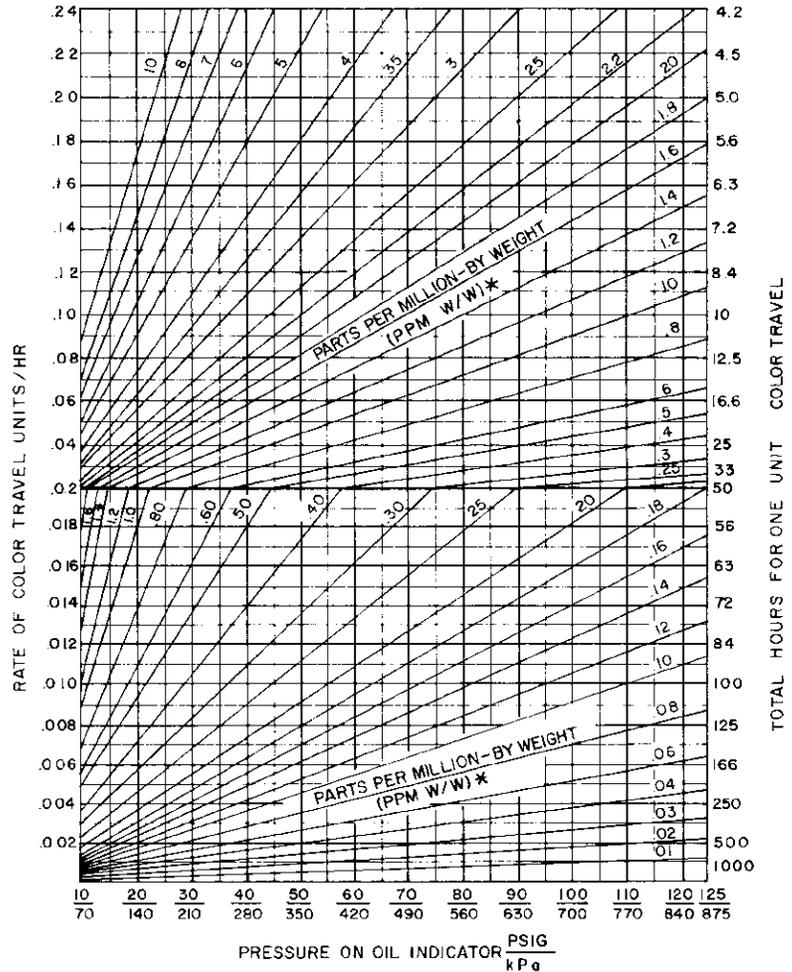


Fig. 3: A-4000-121 Replacement Cartridge

### Oil Concentration Determination (See Fig. 4)

1. If color travel is 1 unit at the final reading time, find the Total Hours on the right side of the conversion chart and the Pressure on the bottom of the chart. The point where Hours and Pressure intersect is the parts per million of oil concentration.
2. If the final reading occurs at other than 1 unit of color travel, divide the units traveled by the total hours to find the Rate of Color Travel.
3. Find the Rate of Color Travel on the left side of the conversion chart and the Pressure on the bottom of the chart. The point where Rate and Pressure intersect is the parts per million of oil concentration.

For any Rate of Color Travel beyond 0.24 units/hr., the measured rate should be divided by any factor which will bring it into the range of the chart. This number should then be used to determine the oil concentration (PPM). This concentration must then be multiplied by the same factor used previously to



\*W/W = Weight of oil per weight of air  
 Note: Multiply PPM by 0.12 to obtain oz/100,000 SCF  
 Multiply PPM by 1.2 to obtain mg/m<sup>3</sup>

Fig. 4: Conversion Chart for Oil Indicator

determine the actual oil concentration.

**Example:** The Rate of Travel on the high pressure side of a PRV (80 PSIG [560 kPa]) is found to be 0.5 units/hr. Divide this rate by five ( $0.5 \div 5 = 0.1$  units/hr) to bring it into the range of the conversion chart. Locate this new rate on the chart, showing a concentration of 1.4 PPM. Multiply this concentration by the previous factor ( $1.4 \times 5 = 7.0$  PPM) to obtain the actual oil concentration in the air being tested.