

BREATHERS VE Series

The best-selling traditional breather type, with hydraulic valve



AIR DEHYDRATING BREATHERS
for Power Transformers
Single body / hydraulic valve models
type VEP 01-29-49 and VE 50-80-100-150/F, flanged connection
and type TV75, VE 05 - 10 (thread connection) for Distrib Transf,

1. GENERAL INFORMATION

Air dehydrating breathers are transparent hollow cylinder tubes which contain chemically pure silicium salt (silicagel) with coloured indicator. The air breathed inside the transformer due to the thermal contraction of the oil mass, passes through the silicagel.

The silicagel absorbs the humidity, indicating the saturation degree by changing colour as follows:

ORANGE silicagel completely dry
GREEN silicagel saturated with humidity

The salt contained in the breather, when saturated, may be easily removed and regenerated by heating it, inside a ventilated oven, at 120° - 150°C, until the colour becomes orange again.

The specific property of the silicagel is its high absorption power of humidity. This is total until the salt has absorbed water for about 15% of its weight, and saturation is reached when the salt has absorbed water for 30 to 40 % of its weight.

2. TECHNICAL FEATURES

The upper and lower parts are made in a non-porous corrosion-proof aluminium alloy casting. The hollow cylinder is made of Plexiglas (upon demand in glass) and it is protected by a stainless steel cylinder, with windows which allow the visual control of the silicagel colour.

In the bottom side of the breather, an hydraulic valve prevents continuous air contact with the silicagel and allows the air to pass in both direction (inlet or outlet) only when there is pressure deficiency or excess inside the transformer.

Pressure values for air passage into the dehumidifier are:

0.003 kg/cm² inlet , or 0.005 kg/cm² outlet

The hollow container and the hydraulic valve are separated by a drilled plate with a labyrinth system, which have the double purpose of diffusing inlet air uniformly, and of avoiding that any salt dust may damage the closing system.

3. DRAWINGS AND TECHNICAL DATA

A table on the drawings in the following pages shows, the general overall dimensions, the silicagel contained inside the cylinder, the max oil quantity, contained inside the transformer on which the breather must be installed, calculated for normal conditions, as below indicated, using the formula at paragraph 5:

| | |
|-------------------------------------|---------|
| Average air temperature | 20°C |
| Average air humidity | 60% |
| Average thermal cycle "Δ t " | 20°C |
| Average duration of thermal cycle T | 8 hours |
| Maintenance interval M | 90 days |

Different environment conditions of the site where the transformer is installed may influence the maintenance interval, when the choice of the size of the breather has been made.

4. PROTECTION OF OUTER SURFACES

Outer surfaces in aluminium painted with an epoxy primer coat and a finish paint suitable to resist to all weather conditions and ambient temperature between - 40°C and + 100°C. All the screws and nuts are in stainless steel.

5. CHOICE OF THE BREATHER SIZE (or of the maintenance interval)

The choice of the breather size (or maintenance interval) is directly related to the quantity of the breather silicagel contain. The mass of silicagel necessary for the proper functioning is given approximately by a function of 6 variable quantities, listed here following:

- Mass of oil "V" inside the transformer , denominated in dm³ or in litres.
- Average temperature of the air in the environment where the transformer is installed, denominated in °C
- Average Humidity of the air in the environment where the transformer is installed, denominated in %.
- Average thermal cycle "Δt" of the transformer, denominated in °C, to be calculated as difference between the minimum and the maximum temperatures reached by the oil inside the transformer within a time period.
- Average duration of thermal cycle "T" denominated in hours, to be calculated as the time interval between two thermal cycles.
- Maintenance interval "M" denominated in days.
- From the saturated steam table for water (see next pages), depending from the average temperature and humidity of the air, it is possible to calculate the quantity of water "A"(denominated in grams) for each m³ of air which enter inside the transformer.

Now, using the following formula, we are ready to calculate the quantity of silicagel (denominated in Kg) necessary for the proper functioning of the transformer:

$$\text{Mass of silicagel} = (127,056 \times 10^{-9} \times V \times \Delta t \times A \times M) : T \quad [\text{kg}]$$

It is important to note that the result of above formula is only a first approximation value, due to the simplification related to the average values considered as constant values for the duration of the thermal cycles between two following maintenance intervals

It is also evident that shortening the maintenance interval, the average conditions used in the formula simulate more exactly the true conditions of the transformer during its working life (i.e. the average temperature of the air for 30 days in January has a statistic scattering degree lower than the average temperature for 90 days in Dec/Jan/Feb); same comments must be done for humidity, thermal cycle duration and temperature

Only two data may be easily fixed without doubt: mass of oil inside the transformer and maintenance interval.

For a better understanding, we show here following three examples of the choice of quantity of silicagel necessary for the same transformer installed in three different places, but with the same thermal cycle and maintenance interval; the following conditions shall be the same in all the three cases:

- Average thermal cycle " Δt " 20 °C
- Average duration of thermal cycle T 8 hours
- Maintenance interval M 90 days
- Mass of oil V 10000 dm³

The mass of silicagel necessary for a good functioning of the transformer will be:

1° CASE: Transformer installed in normal European condition:

- Average air temperature 20 °C
- Average humidity 60%
- Silicagel mass 2,95 kg

Suggested size of the breather: size VEP 27/29

2° CASE: Transformer installed in tropical climate:

- Average air temperature 30 °C
- Average humidity 90%
- Silicagel mass 7,77 kg

Suggested size of the breather: size VE80-F

3° CASE: Transformer installed in desert condition:

- Average air temperature 35 °C
- Average humidity 40%
- Silicagel mass 4,50 kg

Suggested size of the breather: size VE50-F or VEP47/49 or VEL/VEP41

7. MANUFACTURING PROGRAM

We propose a full range of dehydrating breathers for *Power Transformers*, starting from 1 kg silicagel contain up to 15 kg; additionally, using dedicated modular unit, it is possible to assemble breathers in racks with high silicagel contain up to 45 kg, *see drg. 3482, 3536, 3537, 3632*.

All our models are identified with the letters 'VE' or 'VEP' followed by two figures which represent the size of each breather as indicated on the drawings, with a wide choice of silicagel contain, scaled in kg 1;3;5;8;10;15.

All these breathers can be connected to the tube coming from the conservator through a flanged connection (PN10); all models VEP have a special flange design which is suitable for fixation to a DIN 42567 flange with 3 holes and also to a DN25/PN10 standard flange; for threaded connections necessary to use adaptors, *see drg 3538*.

Starting from size VE50-F all the breathers are fitted with a side support which enable to make a bolted connection to a transformer wall or to a rack.

When there is a need of silicagel contain higher than kg 15, we propose a modular assy using multiple units of 5,8,10,15 kg silicagel contain each, as shown at page 5.50.B; the modular unit follow the same identification littering of the normal breathers adding the letter 'M' at the end

The dehydrating breathers, complete with salts are despatched in sealed packages in order to avoid alteration of the dry state of silicagel. Upon request, we supply also empty breathers with silicagel filling packed separately in hermetic bags, or even without filling, if the customer wants to manage silicagel separately from the breathers.

When they are mounted on the transformer, it is necessary to remove the protective plugs and pour mineral oil up to the mark on the jar.

For *Distribution Transformers* we propose the range of small breathers TV75/VE05 and VE10 which are available only with thread entry connection, *see drg 3535*.

8. ORDER INSTRUCTIONS

As said, the identification of a model start with two letters VE followed by two figures which identify the size of the breather and the letter M for the modular unit.

Few example, to make it completely clear:

- VEP 29 Breather with 3 kg silicagel contain
 - VE150-F Breather with 15 kg silicagel contain
 - VE100M-F Modular unit with 10 kg silicagel contain
- Special instruction must be indicated separately.

9. SATURATED STEAM TABLE FOR WATER

Showing the mass of water, in gram (10^{-3} kg), contained in one cubic meter of air (related to the air temperature and the air humidity).

| °C | AIR TEMPERATURE | | | | | AIR HUMIDITY [%] | | | | |
|----|-----------------|-------|-------|-------|-------|------------------|-------|--------|--------|--------|
| | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
| 0 | 0.49 | 0.98 | 1.47 | 1.96 | 2.45 | 2.94 | 3.43 | 3.92 | 4.40 | 4.90 |
| 5 | 0.68 | 1.36 | 2.04 | 2.72 | 3.40 | 4.08 | 4.76 | 5.44 | 6.10 | 6.80 |
| 10 | 0.94 | 1.87 | 2.82 | 3.76 | 4.70 | 5.64 | 6.58 | 7.52 | 8.50 | 9.40 |
| 15 | 1.28 | 2.56 | 3.84 | 5.12 | 6.40 | 7.68 | 8.96 | 10.20 | 11.50 | 12.80 |
| 20 | 1.72 | 3.44 | 5.16 | 6.88 | 8.60 | 10.30 | 12.00 | 13.80 | 15.50 | 17.20 |
| 25 | 2.29 | 4.58 | 6.87 | 9.16 | 11.45 | 13.70 | 16.00 | 18.30 | 20.60 | 22.90 |
| 30 | 3.02 | 6.04 | 9.05 | 12.10 | 15.10 | 18.10 | 21.10 | 24.10 | 27.20 | 30.20 |
| 35 | 3.94 | 7.88 | 11.80 | 15.80 | 19.70 | 23.60 | 27.60 | 31.50 | 35.40 | 39.40 |
| 40 | 5.08 | 10.20 | 15.30 | 20.40 | 25.40 | 30.50 | 35.60 | 40.70 | 45.80 | 50.90 |
| 50 | 8.27 | 16.50 | 24.80 | 33.10 | 41.40 | 49.60 | 57.80 | 66.20 | 74.40 | 82.70 |
| 60 | 13.00 | 26.00 | 39.00 | 52.00 | 65.00 | 78.00 | 91.00 | 104.00 | 117.00 | 130.00 |

Manufacturing program

| Type <i>drq 3482</i> | Silicagel contain in kg | Tube | Fixing Flange | Transformer oil | |
|-------------------------|-------------------------------|-------|------------------|--------------------|--------|
| | | | | in kg | in dm3 |
| VEP 01 | 1,00 | PMMA | DN25/PN10 | 3500 | 4000 |
| VEP 07 | | Glass | | | |
| VEP 29 | 3,00 | PMMA | or DIN 42562 | 10000 | 12000 |
| VEP 27 | | Glass | | | |
| VEP 49 | 5,00 | PMMA | (3 holes) | 18000 | 20000 |
| VEP 47 | | Glass | | | |

| <i>drq 3536</i> | | | | | |
|-----------------|-------------------------------|-------|----------------------------|--------------------|--------|
| Type | Silicagel contain in kg | Tube | Fixing Flange | Transformer oil | |
| | | | | in kg | in dm3 |
| VE 50-F STD | 5,00 | PMMA | DN40/PN10 | 18000 | 20000 |
| VE 50-F TVT | | Glass | | | |
| VE 80-F STD | 8,00 | PMMA | <i>(upon demand)</i> | 28000 | 32500 |
| VE 80-F TVT | | Glass | | | |
| VE 100-F STD | 10,00 | PMMA | <i>DN25/PN10</i> | 36000 | 40000 |
| VE 100-F TVT | | Glass | | | |
| VE 150-F STD | 15,00 | PMMA | <i>also available)</i> | 56000 | 65000 |
| VE 150-F TVT | | Glass | | | |

10. AIR DEHYDRATING BREATHING TYPE TV75 - VE05 – VE10 (*drq 3535*)

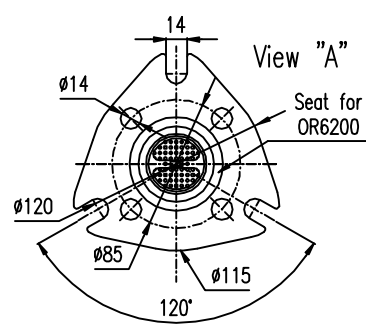
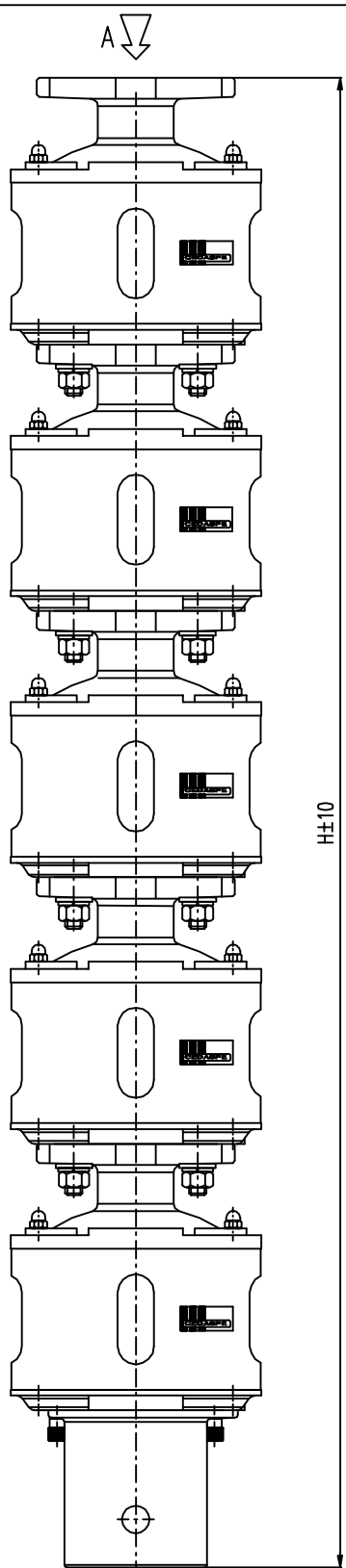
They are small sized dehydrating breathers, particularly fit for assembling on small distribution transformers

The type VE05 follows the same manufacturing principles of the bigger sizes like the type VE10.

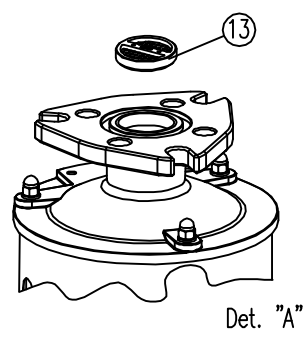
The type TV75 (or TV74) is the cheapest model of our breathers: its top flange is made in corrosion proof aluminium alloy.

The silicagel housing is made of cellulose triacetate (cellidor by Bayer), suitable for mineral oil; only upon request, this breather can be fitted with a stainless steel cylindrical protection.

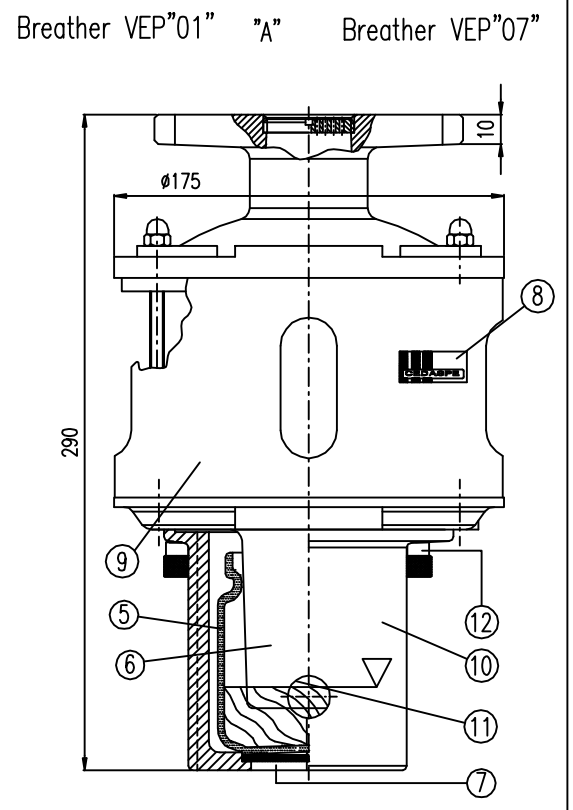
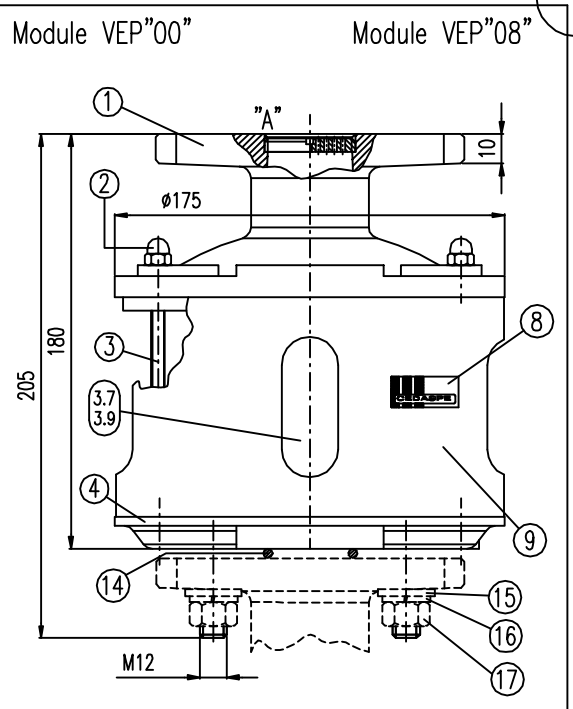
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 La CEDASPE S.p.A. si riserva a termini di legge la proprietà del presente disegno con divieto di riprodurlo o comunicarlo a terzi senza sua autorizzazione.



Double fixation:
 - DN25/PN10 4 holes flange
 or
 - DIN42562 3 holes flange



| Pos. | Description |
|------|-----------------------------------|
| 1 | Top cap |
| 2 | Domed nuts M6 DIN1587 |
| 3 | M6 rod |
| 3.7 | Gel container (glass) |
| 3.9 | Gel container (PMMA) |
| 4 | Bottom cap |
| 5 | Oil cup (transparent glass) |
| 6 | Fishing out cylider |
| 7 | Drain hole |
| 8 | Data plate |
| 9 | Stainless steel frame |
| 10 | Oil cup protection |
| 11 | Inspection window |
| 12 | knurled ferrule |
| 13 | Filter plug |
| 14 | OR6200 |
| 15 | Stainless steel washer M12 DIN125 |
| 16 | Spring washer M12 DIN127 |
| 17 | Stainless steel nuts M12 DIN934 |



| Breather with PMMA tube assembly Type | | | | | |
|---------------------------------------|---------------------|--------------------|---------------------|--------------------|---------------------|
| | VEP'01 | VEP'11 | VEP'21 | VEP'31 | VEP'41 |
| VEP'00 | / | 1 | 2 | 3 | 4 |
| VEP'01 | 1 | 1 | 1 | 1 | 1 |
| H(mm) | 290 | 470 | 650 | 830 | 1010 |
| G.W. Empty(Kg) | 3.5 | 7 | 10.5 | 14 | 17.5 |
| Silicagel Q.ty | 1Kg | 2Kg | 3Kg | 4Kg | 5Kg |
| Vol. | 1.35dm ³ | 2.7dm ³ | 4.05dm ³ | 5.4dm ³ | 6.75dm ³ |
| "DIN" SIZE | 1 | 2 | 3 | 4 | 5 |

| Breather with glass tube assembly Type | | | | | |
|--|---------------------|--------------------|---------------------|--------------------|---------------------|
| | VEP'07 | VEP'18 | VEP'28 | VEP'38 | VEP'48 |
| VEP'08 | / | 1 | 2 | 3 | 4 |
| VEP'07 | 1 | 1 | 1 | 1 | 1 |
| H(mm) | 290 | 470 | 650 | 830 | 1010 |
| G.W. Empty(Kg) | 3.5 | 7 | 10.5 | 14 | 17.5 |
| Silicagel Q.ty | 1Kg | 2Kg | 3Kg | 4Kg | 5Kg |
| Vol. | 1.35dm ³ | 2.7dm ³ | 4.05dm ³ | 5.4dm ³ | 6.75dm ³ |
| "DIN" SIZE | 1 | 2 | 3 | 4 | 5 |

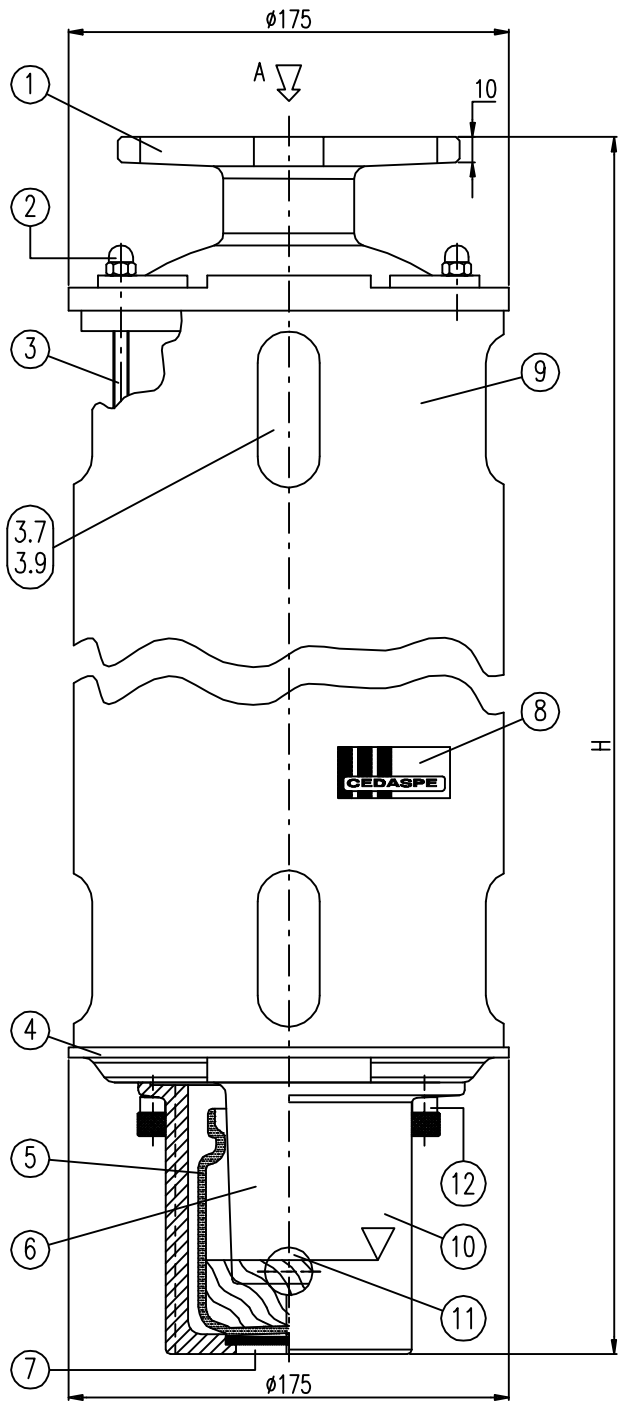
Scale 1:5



Titolo **Modular Breathers**
 assembly "VEP" series
 (PMMA/glass tube & S/S frame)

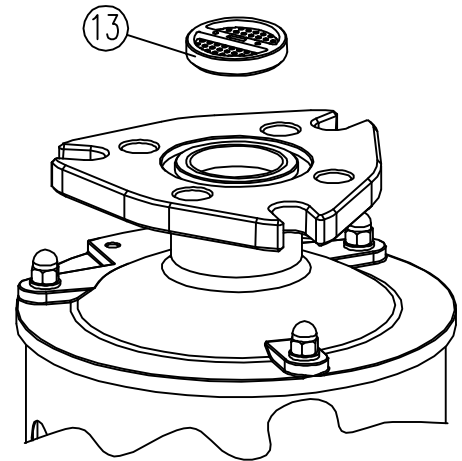
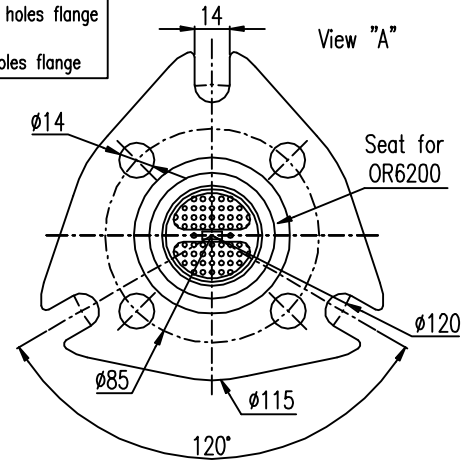
Data 19/05/11
 Scala ==
 Dis.
 Visto

Dis. Nr
3481
 1 2 3 4



| Pos. | Description |
|------|-----------------------------|
| 1 | Top cap |
| 2 | Domed nuts M6 DIN1587 |
| 3 | M6 rod |
| 3.7 | Gel container (Glass) |
| 3.9 | Gel container (PMMA) |
| 4 | Bottom cap |
| 5 | Oil cup (transparent glass) |
| 6 | Fishing out cylinder |
| 7 | Drain hole |
| 8 | Data plate |
| 9 | Stainless steel frame |
| 10 | Oil cup protection |
| 11 | Inspection window |
| 12 | knurled ferrule |
| 13 | Filter plug |

Double fixation:
 - DN25/PN10 4 holes flange
 or
 - DIN42562 3 holes flange



▽ Oil level

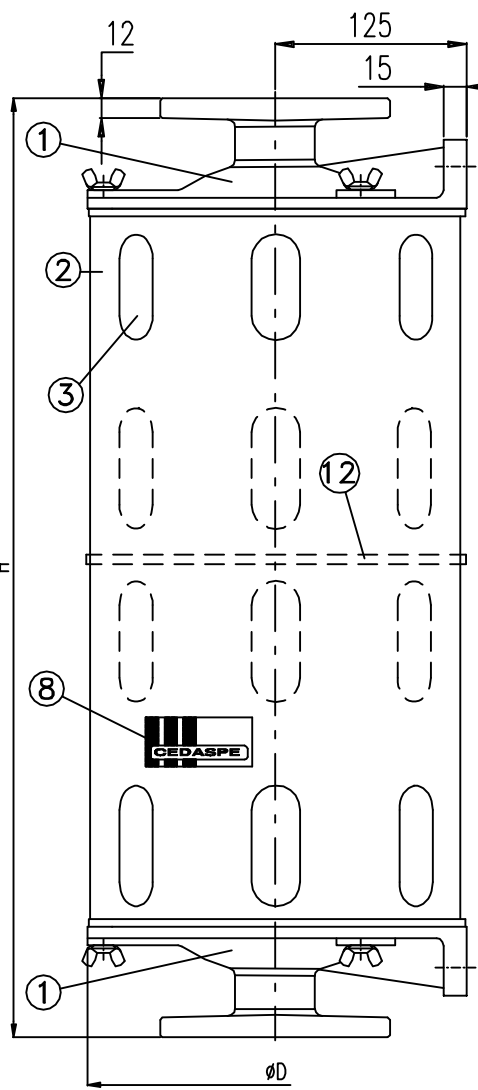
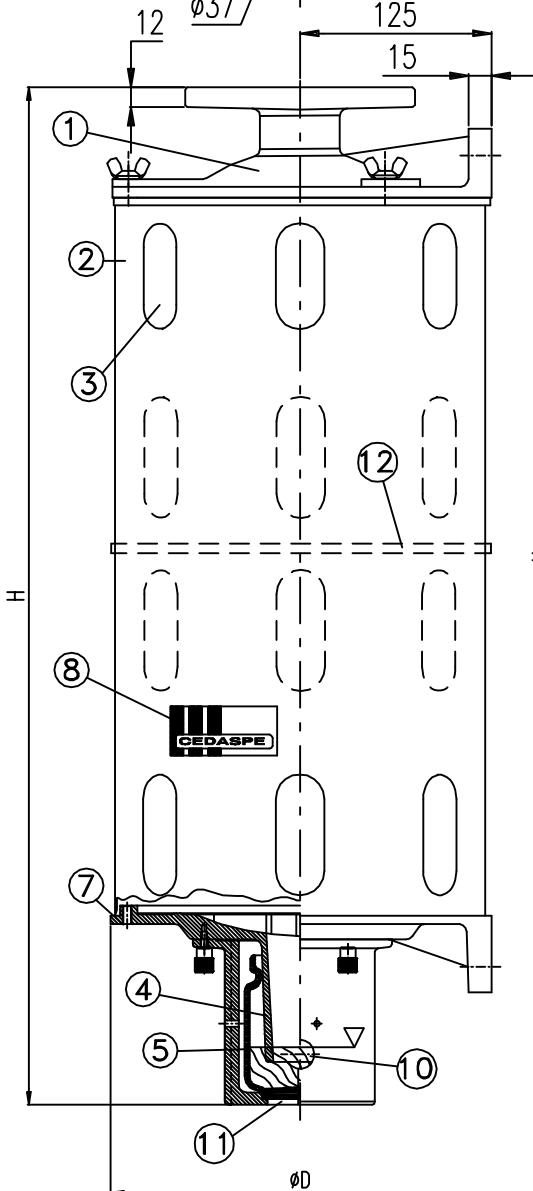
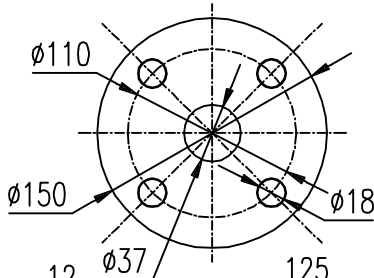
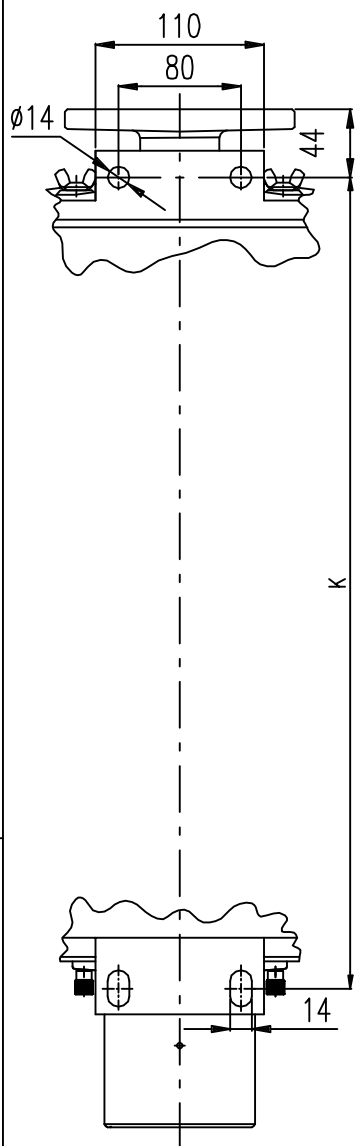
| Type | Transf. oil (Kg) | H (mm) | Gel container material | G.W. Empty (Kg) | Silicagel Q.ty | Vol. |
|----------|------------------|--------|------------------------|-----------------|----------------|----------------------|
| VEP "01" | 3500 | 290 | PMMA | 3.5 | 1 Kg | 1.35 dm ³ |
| VEP "07" | | | Glass | | | |
| VEP "29" | 10000 | 495 | PMMA | 5.5 | 3 Kg | 4.05 dm ³ |
| VEP "27" | | | Glass | | | |
| VEP "49" | 18000 | 685 | PMMA | 7.5 | 5 Kg | 6.75 dm ³ |
| VEP "47" | | | Glass | | | |



Titolo
Traditional single Breathers
 new "VEP" series

Data 19/05/11
 Scala 1:3
 Dis.
 Visto

Dis. Nr
3482
 1 2 3 4



VE50M-F.....VE150M-F (MODULE)

VE50-F.....VE150-F (BREATHER)

▽ Livello olio
Oil level

| CEDASPE CODE ROOT | Tipo Type | Olio nel trasformatore Transformer oil | H | D | K | G.W. Empty (Kg) | Silicagel | |
|----------------------|--------------|---|--------|--------|--------|-----------------------|-------------|-------------------------|
| | | | | | | | Q. ty kg | Vol. dm ³ |
| AEE050..... | VE50-F | 18000 Kg | 456 mm | 247 mm | 320 mm | 7 | 5,00 | 6,70 |
| | VE50M-F | | 410 mm | | | | | |
| AEE080..... | VE80-F | 28000 Kg | 546 mm | 247 mm | 410 mm | 7,5 | 8,00 | 10,70 |
| | VE80M-F | | 505 mm | | | | | |
| AEE100..... | VE100-F | 36000 Kg | 712 mm | 247 mm | 578 mm | 9 | 10,00 | 13,50 |
| | VE100M-F | | 670 mm | | | | | |
| AEE150..... | VE150-F | 56000 Kg | 900 mm | 247 mm | 760 mm | 10 | 15,00 | 21,00 |
| | VE150M-F | | 854 mm | | | | | |

| Pos | Descrizione/Description |
|-----|--|
| 1 | Coperchio Top cap |
| 2 | Protezione acciaio inox Stainless steel housing |
| 3 | Contenitore trasparente di sali Gel container (transparent) |
| 4 | Pescante Fishing out cylinder |
| 5 | Coppa olio (vetro trasparente) Oil cup (transparent glass) |
| 7 | Coperchio inferiore Bottom cap |
| 8 | Targhetta d'identificazione Data plate |
| 9 | Scarico condensa Drain hole |
| 10 | Spia olio Oil window |
| 11 | Presca d'aria Air intake |
| 12 | Flangia intermedia Frame (VE100/150) |

Scala 1:5 Dim. in mm Ex PAG.5.50.A

CEDASPE

Titolo
Dehydrating breathers for
power transformers
New model VE50.....150-F

Data 27/09/11

Scala 1:1

Dis.

Visto

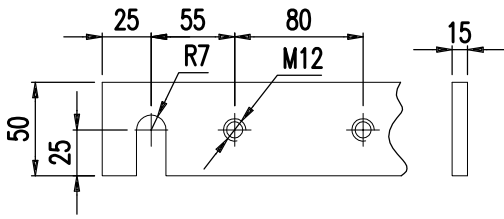
Dis. Nr

3536

1 2

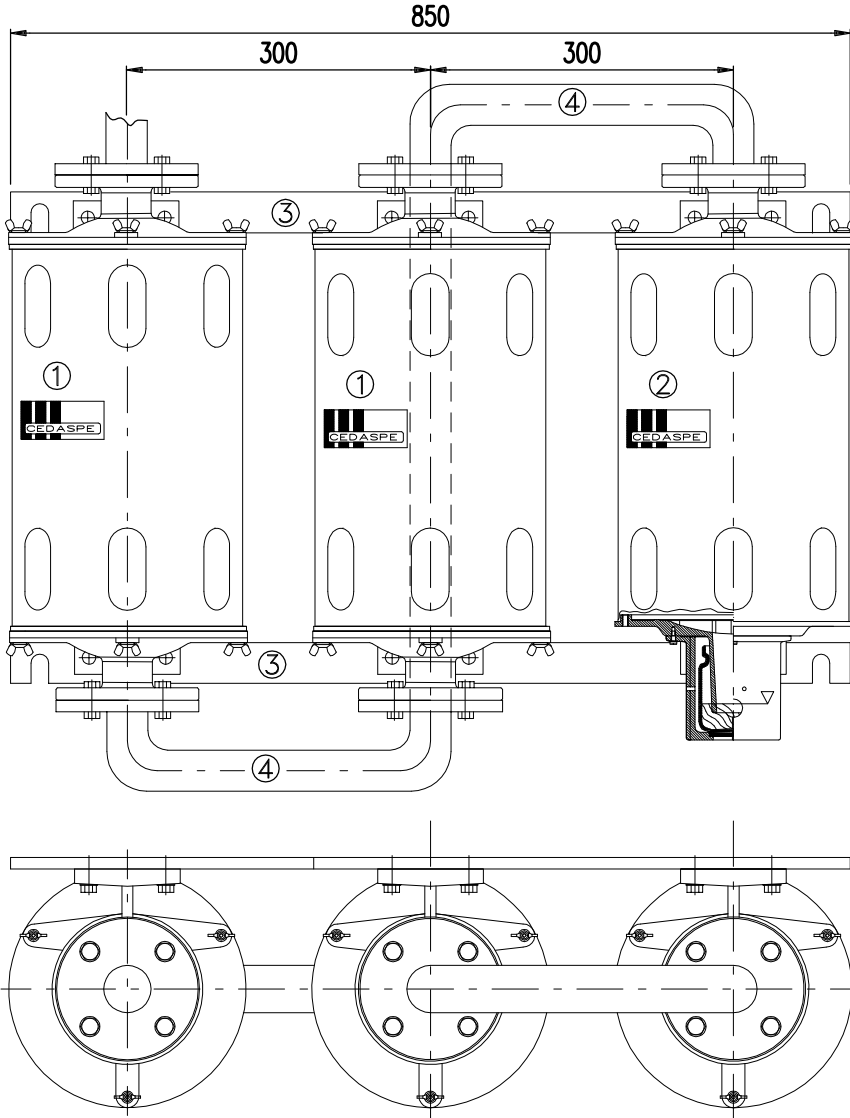
Fig. A1

– **Montaggio orizzontale**
– **Horizontal assembly**



Fixing Kit for vertical assembly

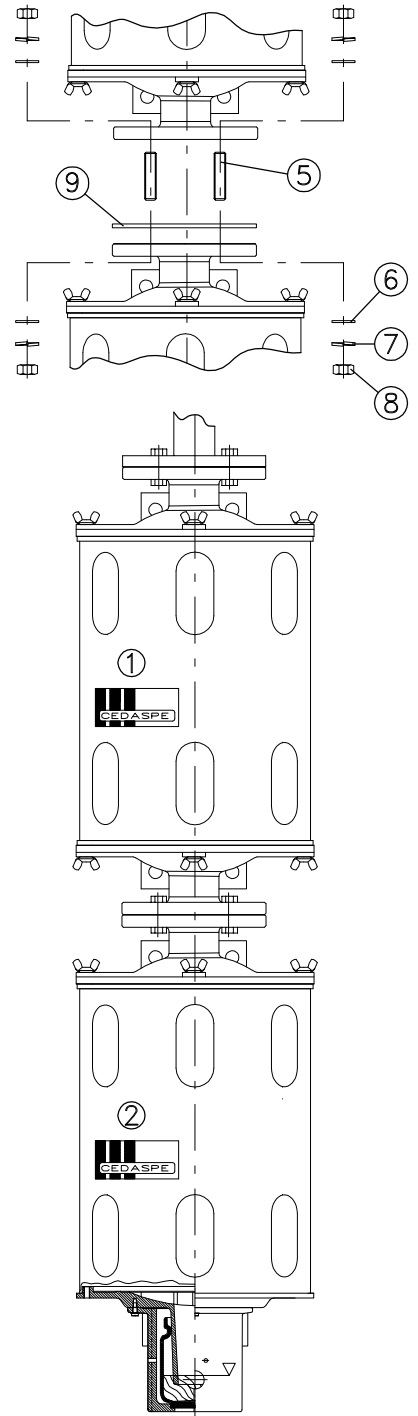
| Pos. | Description | Q.ty |
|------|-----------------------------------|------|
| 5 | Stainless steel stud M12x50 | 4 |
| 6 | Stainless steel washer M12 DIN125 | 8 |
| 7 | Spring washer M12 DIN127 | 8 |
| 8 | Stainless steel nuts M12 DIN934 | 8 |
| 9 | Flange gasket | 1 |



5.50.B

Fig. B1

– **Montaggio verticale**
– **Vertical assembly**



| | | |
|---|------------------------|-------------------|
| 1 | Breather module | VE50M-F pag 5.49 |
| | | VE80M-F pag 5.49 |
| | | VE100M-F pag 5.49 |
| | | VE150M-F pag 5.49 |
| 2 | Breather | VE50-F pag 5.47 |
| | | VE80-F pag 5.47 |
| | | VE100-F pag 5.48 |
| | | VE150-F pag 5.48 |
| 3 | Holder | Not supplied |
| 4 | Connecting pipe | Not supplied |

| | | |
|---|---------------------------|-------------------|
| 1 | Modulo essiccatore | VE50M-F pag 5.49 |
| | | VE80M-F pag 5.49 |
| | | VE100M-F pag 5.49 |
| | | VE150M-F pag 5.49 |
| 2 | Essiccatore | VE50-F pag 5.47 |
| | | VE80-F pag 5.47 |
| | | VE100-F pag 5.48 |
| | | VE150-F pag 5.48 |
| 3 | Supporto | Non fornito |
| 4 | Tubo collegamento | Non fornito |

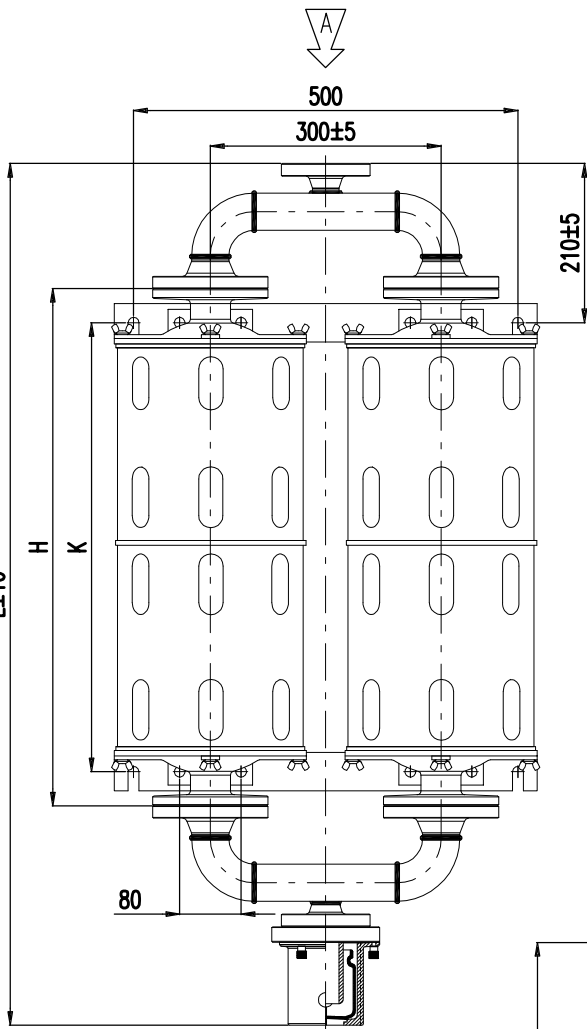
Dim. in mm; Scala 1:8;



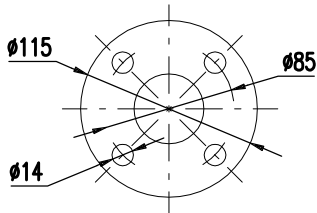
Titolo
Example of multiple assembly of dehydrating breathers

Data **27/09/11**
Scala **1:8**
Dis.
Visto

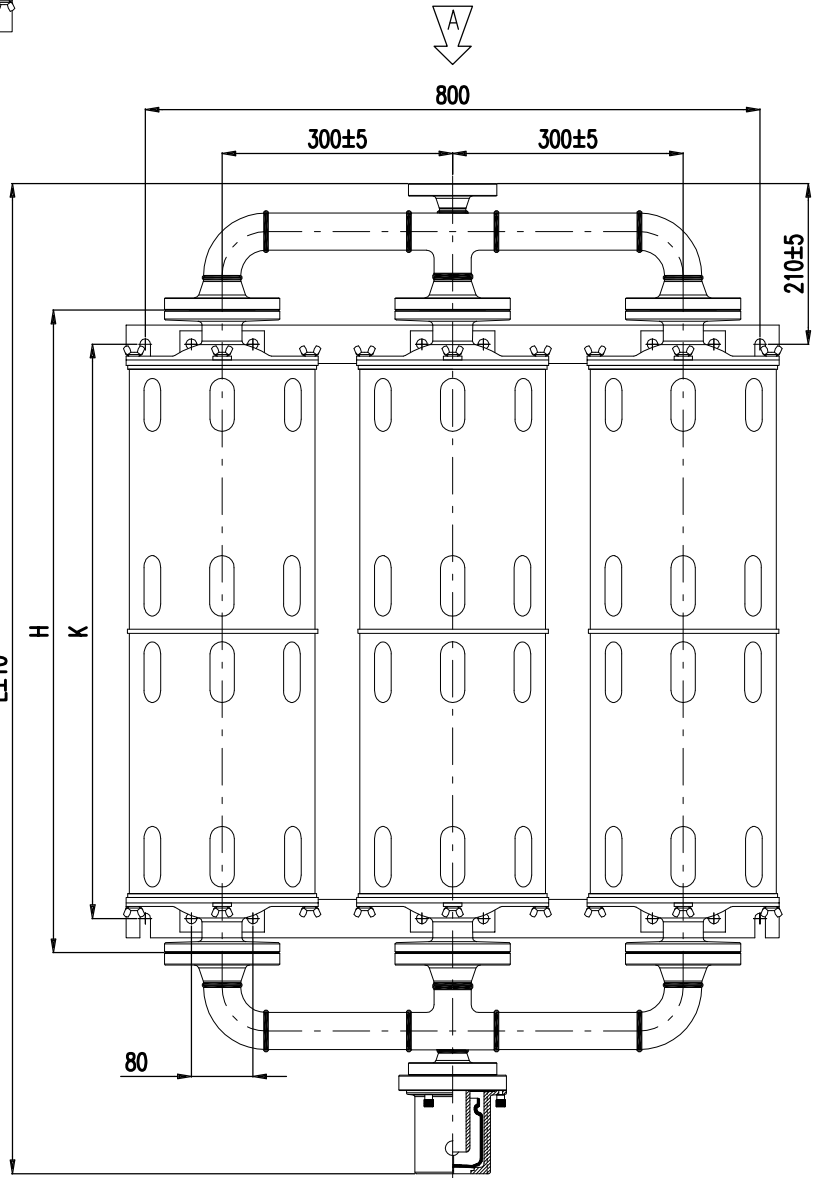
Dis. Nr
3537



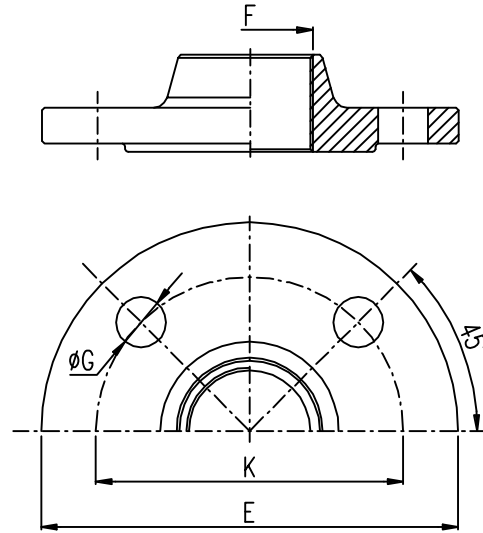
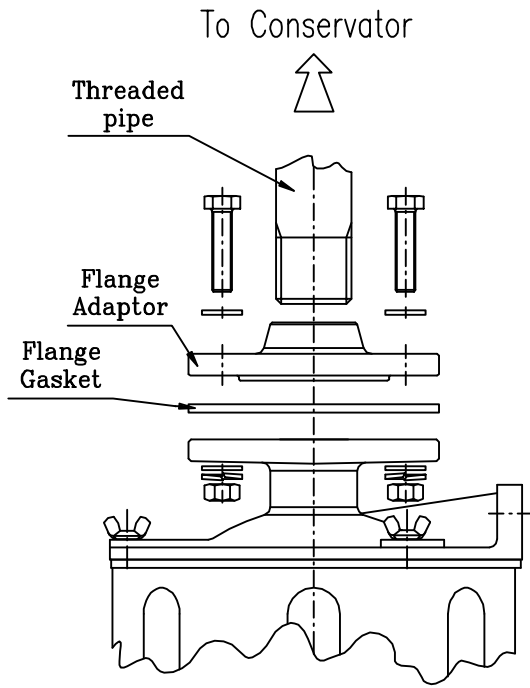
| | | | | | |
|------|---------------------|------|-----|-----|-------------------|
| 3 | VE450 (3 x VE150-M) | 1310 | 747 | 853 | 45 Kg |
| 2 | VE300 (2 x VE150-M) | 1310 | 747 | 853 | 30 Kg |
| 1 | VE200 (2 x VE100-M) | 1130 | 567 | 673 | 20 Kg |
| Pos. | Breather | L | K | H | Q.ty of Silicagel |



View "A"
Scale 1:2

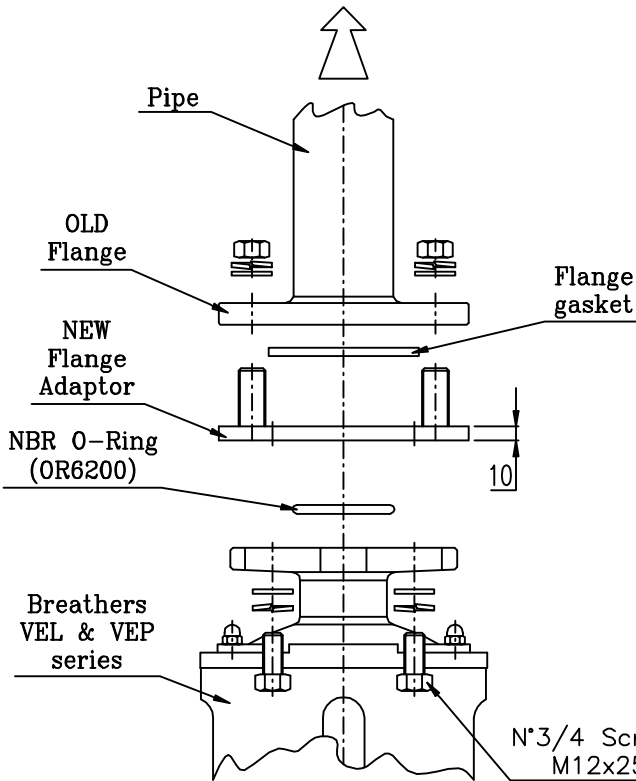


5.50.C

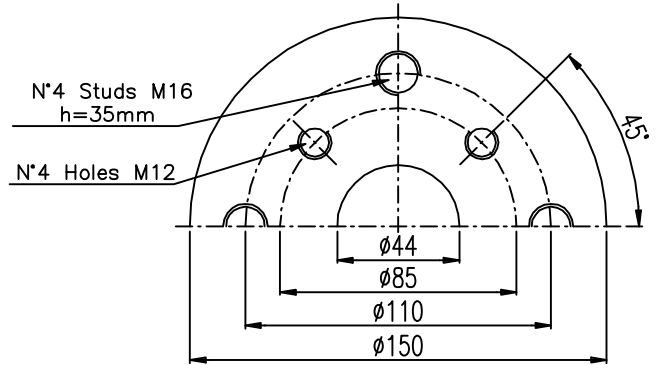


| | | | | | | | | |
|------|-----|-----|---------|----|----------------|---------------|----------------------------------|-------------|
| 3 | 115 | 85 | 1"1/2 G | 14 | VEP27-29-47-49 | VE30/VE4-EL | Flange adaptor to 1"1/2 BSP pipe | 9CE04DBF015 |
| 2 | 115 | 85 | 1"G | 14 | VEP01 ÷ VEP07 | VE10 | Flange adaptor to 1" BSP pipe | 9CE04DBF007 |
| 1 | 150 | 110 | 1"1/2 G | 18 | VE50 ÷ VE150 | VE50...150-A1 | Flange adaptor to 1"1/2 BSP pipe | 9CE04DBF012 |
| Pos. | E | K | F | øG | For breathers | Old breathers | Note | Code |

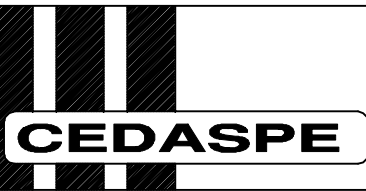
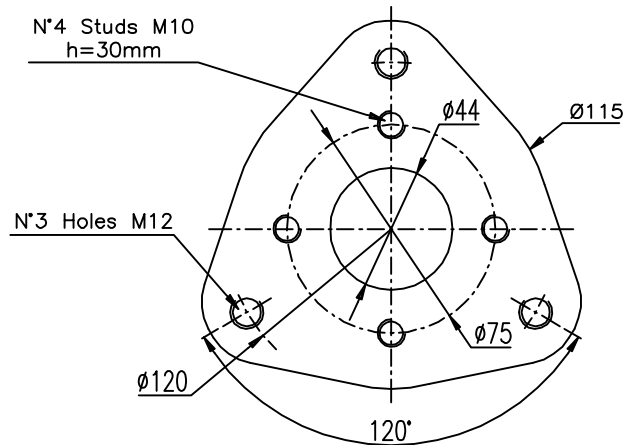
To Conservator



Pos. 4 For breathers VEP27-29-47-49
Flange adaptor DN25 to DN40/PN10 (Ex VE30/VE4-EL)
Code: 9CE04DBF014



Pos. 5 For breathers VEP01 ÷ VEP07
Flange adaptor to DN25/PN6 (Ex VE10)
Code: 9CE04DBF013



Titolo
**Special flange adaptor
for breathers**

Data 30/09/11
Scala ==
Dis.
Visto

Dis. Nr
3538
1 2 3 4

ORDER FORM

FILE = 4412 .DWG LMF [(0,0) (196,286)] A4 (210x297)
 REV. 00 DTD 05/12/17

Size:

(Single Body)

(Modular with double flange)

(Multiple assembly)

1Kg

1Kg

20Kg

3Kg

3Kg

30Kg

5Kg

5Kg

45Kg

8Kg

8Kg

10Kg

10Kg

15Kg

15Kg

Material of Tube:

PMMA

Tempered Glass

Sunshield protection:

YES

NO

Silicagel:

YES

NO

Colour:

RAL7030

RAL7032

RAL7033

RAL7038

RAL7035

ANSI70

Notes:

.....



Titolo
Breathers "VE Series"
 Order sheet

Data 05/12/17
 Scala ==
 Dis.
 Visto

Dis. Nr
4412

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