

BREATHERS & DRYERS: TRANSFORMER BREATHERS

The first line of defense against lubricant contamination and dielectric loss



The failure or malfunction of many transformers or similar equipment can be directly attributed to the lack of proper control of the level of moisture entering the equipment. It is essential, therefore, that a very low level of humidity is maintained in the air space in the top of the conservator tank to avoid deterioration of the insulating properties of the cooling medium.

Transformer breathers provide an economic and efficient means of controlling the level of moisture entering the conservator tank during the change in volume of the cooling medium and/or airspace caused by temperature changes. However, with a new moisture content specification of oil being kept at less than 35 ppm moisture (ASTM D-1533 test method), higher performance desiccant than silica gel is needed. ZEOZORB transformer breathers exceed the ASTM D-1533 testing specifications and out perform silica gel breathers by over 75% at average operating temperatures 77°F.

In addition, testing shows that if the free air volume above the conservator tank oil is kept very dry, below 100 PPM it will actually liberate and pull moisture from within the transforming insulating lubricant, maximizing performance and life. This dynamic is crucial to optimize operations and maintenance procedures.



QUICK FACT:

Drytech Transformer breathers reduce the relative humidity levels in a conservator tank to less than 5% RH

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Transformer/Dehydrating Breathers



Advantages

- Extend the life cycle of your lube oil
- Minimize component wear, down time and repairs
- Protects against high humidity, water condensation, pressure variations
- Maintain ISO cleanliness codes
- Protects against dielectric loss, mold growth
- Extend MTBF and reduce O&M costs

Features & Performance

1. Bi-directional valved Air Flow

- Air entering the breather is filtered and dried. Each unit is valved to ensure the most efficient flow possible, prolonging the life of the breather.

2. Rugged construction

- ZEOZORB transformer breathers are made of robust cast aluminum, or robust ABS plastic and UV resistant polycarbonate tube.

3. ZEOLITE adsorbent

- ZEOLITE adsorbent provides up to 28% by weight adsorption and provides clean dry air less than 100 PPM. ZEOLITE also maintains performance in high temperature environments, unlike Silica Gel.

4. Easy to use and ergonomically friendly

- All ZEOZORB transformer breathers use a visual sight window to indicate when replacement is necessary. To replace, simply empty the spent breather contents and refill with new desiccant.

5. Protective housings

- Optional protective stainless steel and expanded metal housings are available for additional protection

6. Application flexibility

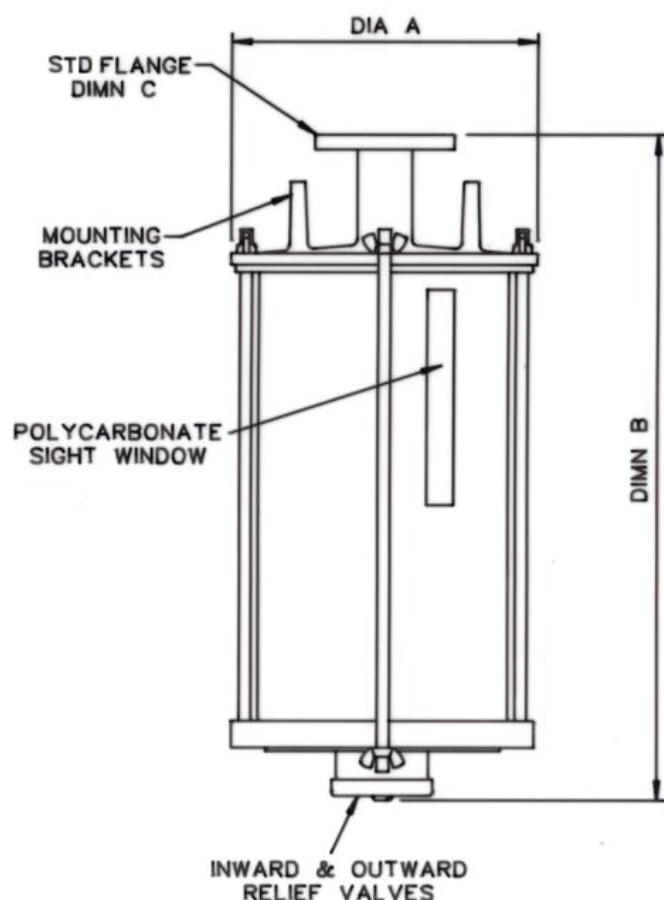
- Transformer breathers are offered in a variety of NPT/BSP and flanged connections. See our Adapters section for various fittings and DIN flange applications.

7. Color Indication

- When maximum adsorption is reached, the blue indicating ZEOLITE beads will turn from blue to beige, to indicate that a replacement is required.

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V, W, X, Y, Z Transformer Breather



Drytech Transformer Breathers operate as your first means of protection against moisture contamination. Transformer breathers take the approach of filtering atmospheric air BEFORE it enters your equipment, rather than trying to take moisture out AFTER it has been introduced into a system.

Inhale Cycle

1. Air will enter the base of the breather
2. As the air is drawn into the breather, the moisture is adsorbed
3. This dry air will then flow upward and into the tank or reservoir being protected
4. The very dry air will blanket the free air volume inside the tank and will liberate moisture from within the tank

Exhale Cycle

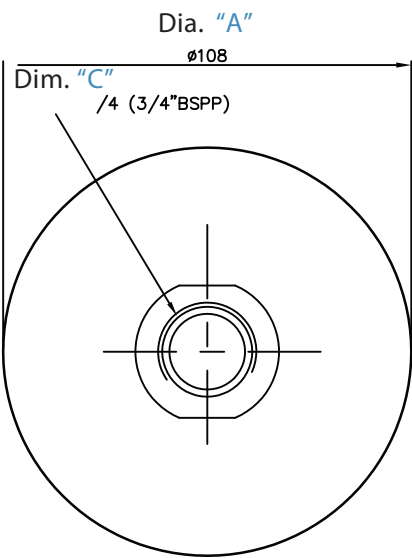
5. Air will be pushed down through the top of the breather
6. The air will flow back down through the desiccant and out of the bottom of the breather

Technical & Dimensional

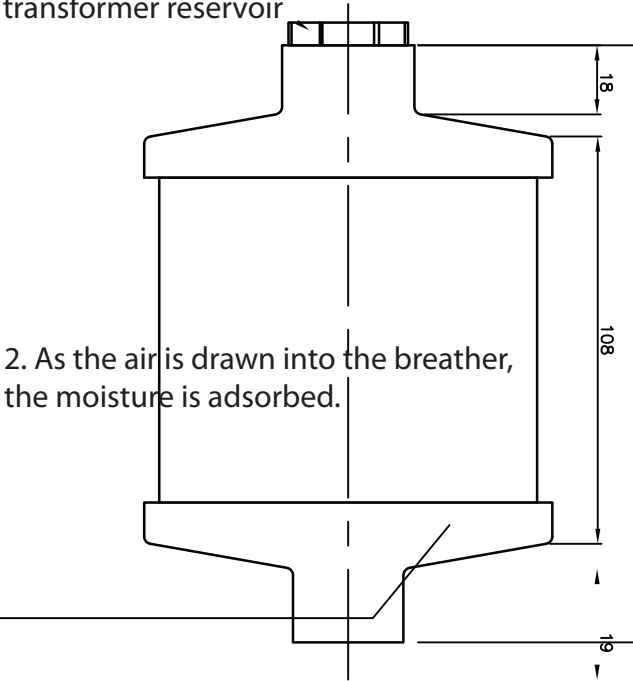
Series "W-Z"	ZEOZORB Transformer Breathers							
Model	R	R1	R2	V	W	X	Y	Z
Dim. "B"	6.22" (158mm)	9.84" (250mm)	13.85" (352mm)	14.76" (375mm)	21.85" (555mm)	28.94" (735mm)	19.09" (485mm)	25.39" (645mm)
Dia. "A"	4.25" (108mm) diameter			10.03" (255mm) diameter			13.97" (355mm) diameter	
Dim. "C"	3/4" FNPT, see adapters for other configurations			'V,W, & X' uses 3/4" FNPT, 'Y&Z' uses 1" FNPT				
Transformer Rating	< 1.25mVA	3 mVA	6 mVA	9 mVA	30 mVA	60 mVA	100 mVA	180 mVA
Max Transformer Oil Quantity	1,500 liters	3,000 liters	4,750 liters	11,350 liters	22,700 liters	34,050 liters	45,450 liters	68,150 liters
Desiccant weight	2.2 (1kg)	3.3 (1.5kg)	4.4 (2kg)	7.2 (10kg)	10.5 (4.75kg)	13.2 (6kg)	17.6 (8kg)	22 (10kg)
Unfilled weight	4.7 (2.1kg)	5.8 (2.6kg)	6.9 (3.12kg)	13.3 (6kg)	17.6 (8kg)	24.25 (11kg)	30.8 (14kg)	39.7 (18kg)

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R, R1, R2 Transformer Breather



3. This now dry air will exit the breather into the transformer reservoir



The desiccant will provide a color change from blue to beige, indicating the desiccant is saturated and should

Dim. "B"

2. As the air is drawn into the breather, the moisture is adsorbed.

1. Air will enter the base of the breather

Drytech Transformer Breathers operate as your first means of protection against moisture contamination. Transformer breathers take the approach of filtering atmospheric air BEFORE it enters your equipment, rather than trying to take moisture out AFTER it has been introduced into a system.

Inhale Cycle

1. Air will enter the base of the breather
2. As the air is drawn into the breather, the moisture is adsorbed
3. This dry air will then flow upward and into the tank or reservoir being protected
4. The very dry air will blanket the free air volume inside the tank and will liberate moisture from within the tank

Exhale Cycle

5. Air will be pushed down through the top of the breather
6. The air will flow back down through the desiccant and out of the bottom of the breather

Series "R"	ZEOZORB Transformer Breathers		
Model	R	R1	R2
Dim. "B"	6.22" (158mm)	9.84" (250mm)	13.85" (352mm)
Dia. "A"	4.25" (108mm) diameter		
Dim. "C"	3/4" FNPT, see adapters for other configurations		
Transformer Rating	< 1.25mVA	3 mVA	6 mVA
Max Transformer Oil Quantity	1,500 liters	3,000 liters	4,750 liters
Desiccant weight	2.2 (1kg)	3.3 (1.5kg)	4.4 (2kg)
Unfilled weight	4.7 (2.1kg)	5.8 (2.6kg)	6.9 (3.12kg)

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Transformer Breather Adaptors

<i>BLD10090</i>	<i>BLD10995</i>
	
Reducing adaptor 3/4" MBSP to 1/2" FBSP	Reducing adaptor 3/4" MBSP to 2" FBSP

<i>BLD10914</i>	<i>BLD10841</i>
	
Reducing adaptor 3/4" MBSP to 1/2" MBSP	Reducing adaptor 3/4" FBSP to 1/2" MBSP

<i>BLD10915</i>	<i>BLD10916</i>
	
Reducing adaptor 3/4" MBSP to 1" MBSP	Reducing adaptor 3/4" MBSP to 1-1/4" FBSP

<i>BLD12308</i>	<i>BLD12307</i>
	
Reducing adaptor 3/4" MBSPP to 1/4" MBSPP	Reducing adaptor 3/4" MBSPP to 3/8" MBSPT

QUICK FACT:

Over 70% of lubrication failures are caused by surface degradation, of which 50% is from mechanical wear (particulates) and 20% is from corrosive wear (water)

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Transformer Breather Adaptors

BLD12214	BLD12305	BLD11000	BLD10996
			
Adaptor 3/4" MBSP to 1-1/2" MBSP	Adaptor 3/4" MBSP to 3/4" MBSP	Triangular adaptor flange w/ 3/4" MBSP to DIN SPEC 42562	Flanged elbow adaptor to DIN SPEC 42562
BLD10930	BLD11103	BLD11915	BLD12213
			
DIN 42567 flanged adaptor straight to MBSP	Plate adaptor with elbow to 3/4" MBSP	1" PNG flange adaptor to 3/4" MBSP	3/4" MBSP adaptor to DN40 PN6 flange

QUICK FACT:

ASTM D-1533 test method states that moisture content of conservator tank lube oils should be kept under 35 PPM (parts per million) moisture

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Switchgear SF6

Drytech Inc. offer a range of desiccant solutions to combat the problems of moisture within SF6 filled High Voltage switchgear enclosures.

Sulphur hexafluoride (SF6) is used as an insulating gas in transmission and distribution equipment such as switchgear and circuit breakers.

In order to maintain SF6 insulation properties and to reduce the formation of unwanted secondary decomposition products, the amount of water vapor in the gas insulated system (GIS) should be kept to a minimum.

If moisture levels are not kept to a minimum then formation of acid by-products, such as Hydrogen fluoride, Sulphur dioxide, Sulphur fluoride, & Thionyl fluoride can be generated.

This reaction may yield hydrofluoric acid. Hydrofluoric acid is extremely corrosive and will react with electrical equipment components.

Moisture limit recommendations vary between equipment manufacturers but typically should be around -45°C to -25°C dewpoint (atmospheric)

In order to maintain these low moisture levels a passive desiccant solution must be included within the cabinet.

Drytech suggests that a large pore molecular sieve be used as this has the ability to co-adsorb both moisture and arcing by-products.



DH/D1110-11

High Voltage Enclosures

High voltage motor protection desiccators provide protection against corrosion, dampness, and contamination in electrical, high voltage motors and switchgear.

These desiccators incorporate a humidity which monitors saturation and indicates when desiccant change or cartridge replacement is required.

They are blue when the desiccant is dry and turn to pink when the maximum amount of moisture has been adsorbed



DH/D1099



DH/D1078

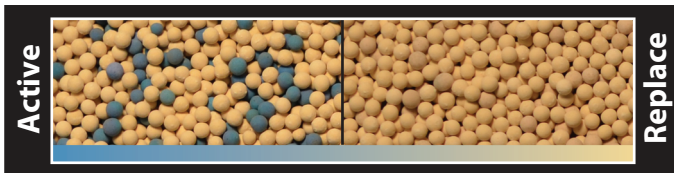


DH/D6088

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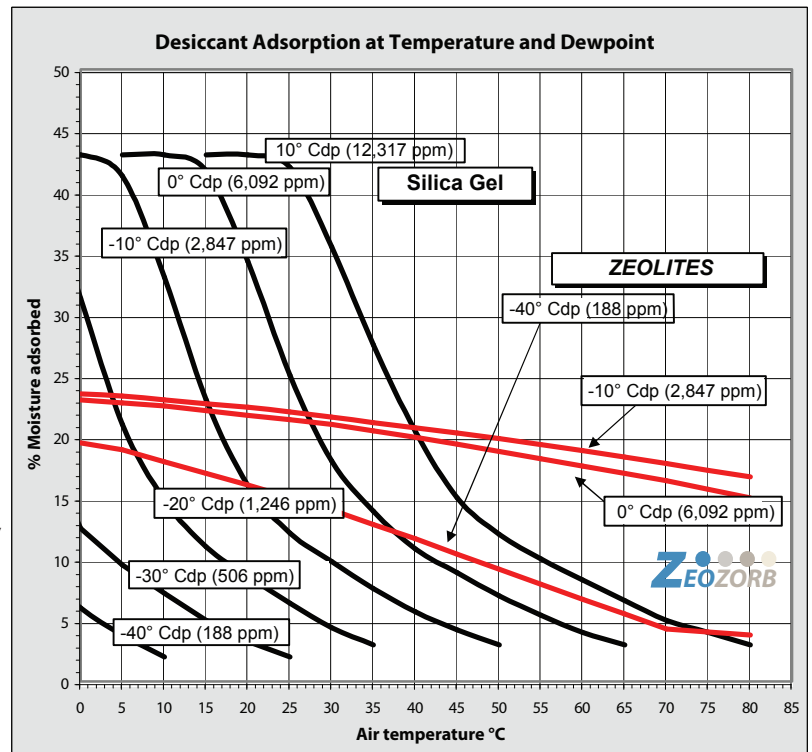
ZEOZORB Desiccant

Drytech Inc. Transformer breathers are filled with our high performing **ZEOZORB** desiccant which changes color from blue to beige as it becomes saturated with water vapor.



ASTM D-1533 specifications state that transformer conservator tank oil should be kept below 35 ppm (parts per million) water vapor. The current industry standard desiccant Silica Gel, can not meet this standard, which is why we use our **ZEOZORB** desiccant, which is capable of conditioning air below 10 ppm.

Drytech Inc. Transformer breathers are designed to enable the easy and quick replacement of the desiccant charge. When the color change from blue to beige has reached the level shown on the label, the desiccant should be replaced. Now that the old type oil-seal has been replaced by inward and outward relief valves, the replacement of the desiccant charge is the only maintenance activity required.



The isotherm above illustrates the performance benefits of **ZEOZORB** desiccant, especially at higher temperatures. Silica Gel's adsorption capacity % drops off drastically as temperatures increase, whereas ZEOZORB maintains its efficiency. In addition, ZEOZORB can achieve a much lower dew point, less than 10 PPM.

Ordering & Delivery

To order one of our Transformer Breathers, please contact our commercial sales administrator, Cliff Jones, jonesc@drytechinc.com. Typical questions about the application will include:

1. Size of conservator tank
2. Tank pipe connection
3. Max flow rate
4. Desired life of desiccant

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