



INTRODUCTION TO MOISTURE REMOVAL SYSTEMS

Moisture in lubricating oils is the root cause of prematurely damaging oil and accelerating wear of machine components. As water invades your fluids it will not only attack the additives in the oils, destroying their beneficial properties; but it will also cause damage to the machine surfaces through corrosion, and rapidly degrade the oil through increased oxidation. By understanding the effects of water contamination, it is easy to see the importance of moisture detection and removal.

Once water has entered the lubricant, it can exist in one or more of the following forms; dissolved, emulsified, or free water.

- **Dissolved water** contains water molecules that are dispersed one-by-one through the air in contact with, or within the lubricant. This form of water is invisible to the naked eye.
- **Emulsified water** contains microscopic pockets of water that are dispersed in stable suspension in the oil. As the oil ages this area of water will expand, causing the lubricant to look cloudy.
- **Free water** is the phase separation of emulsified water. Free water when mixed with the lubricant readily settles to the bottom of the equipment.

The most damaging forms of water contamination, to both the lubricant and equipment, are emulsified and free water. Therefore, it is important to measure, and/or remove water contamination prior to the formation of emulsified and free water.

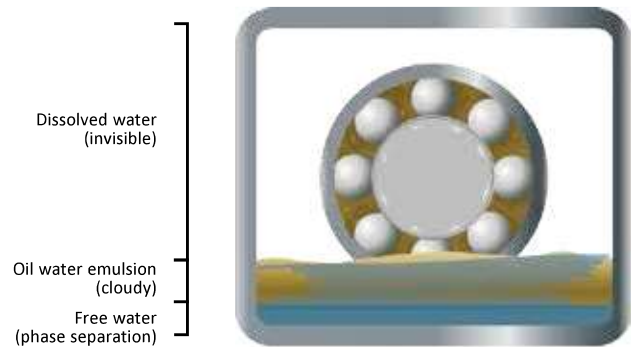
REMOVING WATER CONTAMINATION

A proven method of removing water contamination from lubricating fluids is using silica gel technology. Silica gel extracts water vapor from the air as it is drawn through a silica gel bed, as well as covering a wide range of temperatures. Most units using silica gel technology to remove moisture provide a fail-proof method of determining when replacement is necessary. Trico incorporates a visual indicator to accomplish this. The silica gel used changes from gold to dark green when maximum adsorption has been reached.

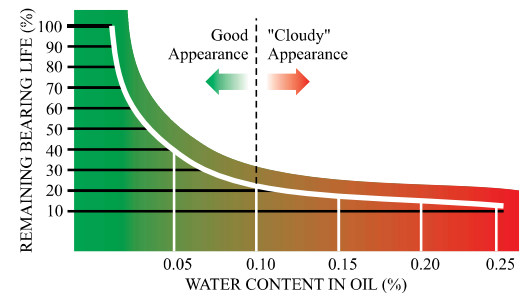
Trico provides products that will remove moisture from lubricating oils; however the root cause of moisture contamination should be identified and corrected to maximize the life of the lubricant and equipment.



Watchdog Breather installed on a hydraulic reservoir



Three stages of water within a lubricating oil



By the time free water becomes visible, damage is already occurring to the oil and equipment.



Watchdog Breather installed on a gearbox at a water treatment facility

DESICCANT BREATHERS



Watchdog Desiccant Breather



Watchdog EX Series Breather



Watchdog R Series Breathers



Watchdog Oil Dryer

Watchdog Desiccant Breathers are a powerful preventative maintenance tool to maximize equipment and lubricant life. They remove moisture and prevent moisture from entering lubricants, the root cause of premature damage to oil and acceleration of wear in components. When Desiccant Breathers are used, the benefits include; improve lubricant performance, corrosion and rust prevention, water contamination removal and elimination, reduce wear and downtime, and decreased maintenance costs.

DESICCANT BREATHER COMPARISON MATRIX

	Watchdog Desiccant Breathers	Watchdog EX Series Breathers	Watchdog R Series Breathers	Watchdog Oil Dryer
Reservoir Material	Acrylic	Acrylic	Acrylic	Polysulfone or Glass
Body Material	ABS Plastic	ABS Plastic	ABS Plastic with reinforced steel threads	Polysulfone or Aluminum
Filter Element	2 micron	2 micron	2 micron	No
Air Vents	Yes	No	Yes	No
Check Valves	No	Yes	No	No
Replacement Cartridge Available	No	Yes	Yes	Yes
FOR USE WITH:				
Drums	X			
Reservoirs	X			
Gearboxes	X			X
Pumps	X			X
Transformers	X			



DESICCANT BREATHERS

DESICCANT BREATHER COMPARISON MATRIX

	Watchdog Desiccant Breathers	Watchdog EX Series Breathers	Watchdog R Series Breathers	Watchdog Oil Dryer
FOR USE:				
Reservoirs	X			
Tanks	X			
Paper Mills		X		
Wash Down Areas		X		
Steam Areas		X		
Mine Quarries		X		
Railroad Equipment			X	
Cranes			X	
Harsh Environments with Vibration			X	
Mobile/Off-Road Equipment			X	
Windmill Turbines		X	X	

WATCHDOG® DESICCANT BREATHERS



Watchdog Desiccant Breathers ensure optimum protection of industrial equipment by prohibiting the entry of moisture and particulate contamination. Contaminants enter industrial equipment as pressure differentials or fluid level changes occur. The Watchdog Desiccant Breathers are ideal for circulating oil systems, oil sumps, process tanks, storage tanks, vacuum systems, hydraulic systems, transformer cases, or anywhere that equipment needs to be dry and clean.

Watchdog Desiccant Breathers perform two very important functions.

1. They adsorb unwanted moisture inside industrial equipment using silica gel technology. Unwanted moisture can lead to corrosion, shortened fluid life, and additive depletion.
2. They collect airborne solid particles by means of a dual, anti-static filter system. This reduces the amount of abrasive and damaging contaminants that create sludge build-up inside the fluid reservoir.

FEATURES

- **Bi-directional air flow** - A 360° air flow allows air to be breathed in and out as fluid level changes or differential pressures occur.
- **Dual filtration system** - A two micron filter is located at the top and bottom of the silica gel bed. The top filter removes particle contamination from atmospheric air and the bottom helps with dust created by the silica gel beads contacting each other.
- **Water vapor adsorbent** - The silica gel used in the Watchdog Desiccant Breathers adsorb up to 40% of its own weight.
- **Durable construction** - Watchdog Desiccant Breathers are manufactured from rugged ABS plastic and impact modified acrylic.
- **Color indicator** - When maximum adsorption is reached the silica gel turns from gold to dark green, indicating replacement is needed.
- **Activated carbon** - As air is expelled, it passes through activated carbon which removes oil vapors, fumes, and odors (except for 39131, 39132, 39133, and 39134).





WATCHDOG® DESICCANT BREATHERS



SPECIFICATIONS

Material	ABS plastic and impact modified acrylic
Max. Operating Temp.	-20°F to 200°F (-28°C to 93°C)

SELECTION CHART

(Desiccant Breathers)

Model No.	Height (in.)	Diameter (in.)	Connection Size	Silica Gel Volume	Water Capacity (fl oz)	Air Flow
39101	5	5	1" Male Friction Fit	1.4 lb.	8.6	20 CFM (150 gpm of fluid volume exchange)
39102	8	5	1" Male Friction Fit	2.7 lb.	16.56	
39103	8	5	1" Male NPT	2.7 lb.	16.56	
39108	10	5	2" Male NPT	3.5 lb.	21.47	
39131	2	2	1/2" Female NPT	.08 lb.	.49	5 CFM (37 gpm of fluid volume exchange)
39132	3.25	2	1/2" Female NPT	.1 lb.	.92	
39133	2	3.25	1/2" Female NPT	.3 lb.	1.84	
39134	3.25	3.25	1/2" Female NPT	.5 lb.	3.06	

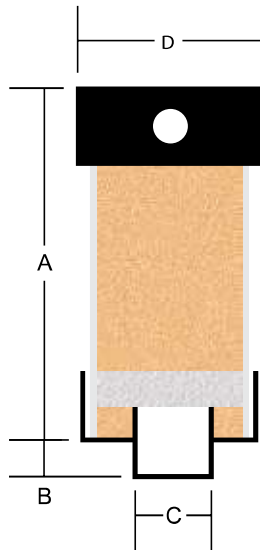
ACCESSORIES

Adapters are ordered separately, please see Watchdog Breather Adapters page 34.

WATCHDOG® EX SERIES BREATHERS



In certain extreme operating environments such as a paper mill or in food processing where regular steam cleaning occurs, the humidity level far exceeds normal industrial environments. In these situations, lubricants and other fluids stored in tanks and reservoirs need the protection of a desiccant breather even more. However, small temperature variations draw in the humid air and unnecessarily reduce the life of the breather. The Watchdog EX Series Breathers for extreme humidity applications incorporate two check valves, one to control airflow into the protected reservoir and one to control airflow out. This prolongs the life of the desiccant by allowing the air to flow through the breather only when needed to protect the integrity of the tank. Unlike a membrane system, which does not allow internally generated gases and contaminants to exit the system, the Watchdog EX Breather offers all of the advantages of breathing air in and out of the tank while removing water vapor and solid particles before they contaminate the fluid.



SPECIFICATIONS

Operating Temp. Range	-20°F to 200°F (-28°C to 93°C)
Material	ABS plastic and impact-modified acrylic
Particulate Filtration Level	2 Micron Filter
Check Valve Capacity	.1 psi in/2.0 psi out

SELECTION CHART

Model No.	Dim A	Dim B	Dim C	Dim D	Rate Airflow	Water Capacity	Replacement Cartridge Number
39110	6.25 in.	N/A	1/2" FNPT	3.25 in.	10 CFM	4.91 fl oz	39217
39111	5 in.	1.25 in.	1" slip	5 in.	20 CFM	8.6 fl oz	39218
39112	8 in.	1.25 in.	1" slip	5 in.	20 CFM	16.56 fl oz	39219
39113	5 in.	1.87 in.	2" MNPT	5 in.	20 CFM	8.6 fl oz	39310
39114	8 in.	1.87 in.	2" MNPT	5 in.	20 CFM	16.56 fl oz	39222



The reusable top cap contains the inlet and outlet valves which protect the silica gel from excess humidity.

The reusable top cap with inlet and outlet valves allows the economic replacement of the desiccant cartridge.



FEATURES

- **Water Vapor Adsorbent** - longer lasting desiccant formulated specifically for maximum efficiency at humidity levels of 80% and higher
- **Color Indicating** - When maximum adsorption is reached the silica gel turns from gold to dark green, indicating replacement is needed. The silica gel used is chemically inert, non-corrosive, and does not contain cobalt chloride, a heavy metal. The color changing dye used is environmentally safe and meets all health and safety requirements.
- **Durable Construction** - Watchdog Ex Breathers are manufactured from rugged ABS plastic and impact modified acrylic
- **Easy Connection** - Models are available with 1" slip fit connection which mates with the standard Watchdog Breather adapters or with a 2" male NPT connection
- **Reusable Top Cap** - Allows the economic replacement of the desiccant cartridge

ACCESSORIES

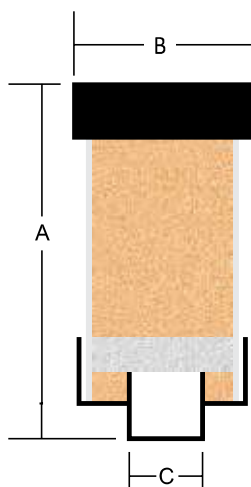
Adapters are ordered separately, please see Watchdog Breather Adapters page 34.



WATCHDOG® R SERIES BREATHERS

The Watchdog R Series Breathers are designed for applications where gearboxes and reservoirs are subjected to continuous vibration such as railroad maintenance equipment, off-road vehicles, mining equipment, and others. The units are easily attached to the equipment by rugged steel pipe threads.

When the silica gel cartridge turns from gold to dark green, simply install a new replacement cartridge to the reinforced metal base.



FEATURES

- **Water Vapor Adsorbent** - longer lasting desiccant formulated specifically for maximum efficiency at humidity levels of 80% and higher.
- **Color Indicating** - When maximum adsorption is reached the silica gel turns from gold to dark green, indicating replacement is needed. The silica gel used is chemically inert, non-corrosive, and does not contain cobalt chloride, a heavy metal. The color changing dye used is environmentally safe and meets all health and safety requirements.
- **Durable Construction** - Watchdog R Breathers are manufactured from rugged ABS plastic, impact modified acrylic, and metal base.
- **Easy Connection** - Models are available with 1" and 2" rugged steel male pipe threads.
- **Reusable Bottom Cap** - Allows the economic replacement of the desiccant cartridge.

SELECTION CHART

Model No	Dim A	Dim B	Dim C	Adsorption Capacity	Airflow	Replacement Cartridge Number
39150	5 in	5.2 in	1" MNPT	4.91 fl oz	25 CFM	39160
39151	6.5 in	5.2 in	1" MNPT	8.6 fl oz	25 CFM	39161
39152	9.5 in	5.2 in	1" MNPT	16.56 fl oz	25 CFM	39162
39153	6 in	5.2 in	1.125" female thread	8.6 fl oz	25 CFM	39161
39154	6.5 in	5.2 in	2" MNPT	8.6 fl oz	25 CFM	39161
39155	9.5 in	5.2 in	2" MNPT	16.56 fl oz	25 CFM	39162
39156	12 in	5.2 in	2" MNPT	21.47 fl oz	25 CFM	39166

ACCESSORIES

Adapters are ordered separately, please see Watchdog Breather Adapters page 34.



A replacement cartridge is easily threaded into the metal reinforced base.



SPECIFICATIONS

Operating Temp. Range	-20°F to 200°F (-20°C to 93°C)
Particulate Filtration Level	2 micron
Material	ABS plastic and steel threads

WATCHDOG® BREATHER ADAPTERS



ADAPTER SELECTION

Watchdog Desiccant Breathers are easily installed using one of several adapters designed for different applications.



ADAPTER SELECTION CHART

(part numbers with male friction slip fitting)

Model No.	Description
39200	Flange adapter, without mounting holes
39201	Flange adapter, with 6 ANSI mounting holes
39202	Threaded adapter, 1" NPT male x 1" slip fit
39203	Threaded adapter, 3/4" NPT male x 1" slip fit
39204	Bayonet adapter
39205	Spin-on adapter, 1"-12 UNF female x 1" slip fit
39206	Spin-on adapter, 1-1/2"-16 UNF female x 1" slip fit
39207	Bypass adapter
39216	Adapter, 1/2" NPT male x 1" slip fit

ADAPTER SELECTION CHART

(part numbers 39131, 39132, 39133 and 39134)

Illustration	Model No.	T1	T2
	39208	1/2" NPT	1/4 NPT
	39210	1/2" NPT	3/8 NPT
	39212	1/2" NPT	1/2" NPT
	39213	1/2" NPT	3/4 NPT
	39215	1/2" NPT	1" NPT
	39209	1/4 NPT	1/2" NPT
	39211	3/8 NPT	1/2" NPT
	39214	3/4 NPT	1/2" NPT



Bypass Adapter
(P/N 39207)

THE BYPASS ADAPTER

The Bypass Adapter is designed for applications where there is very heavy oil mist being expelled from the equipment.

When air is breathed into the equipment, it passes through the Watchdog® and is cleaned and dried. When the air is breathed out of the equipment it enters the adapter and is expelled to the outside without passing back through the breather. This protects the breather from oil contamination.



WATCHDOG® OIL DRYER

The Watchdog Oil Dryer is a non-vented system designed to remove water vapor from the air as it is drawn through a bed of silica gel. It is ideal for bearing housings and other applications where moisture condensation must be minimized.

The compact design and standard thread size are designed to simplify installation. Equipment can be protected from internal moisture damage when the Watchdog Oil Dryer is installed.

FEATURES

- Desiccant cartridges change color to indicate when replacement is required
- Cartridge replacement is simple and takes less than a minute
- Multi-purpose—serves as a viewport, a fillport and an oil dryer

SELECTION CHART

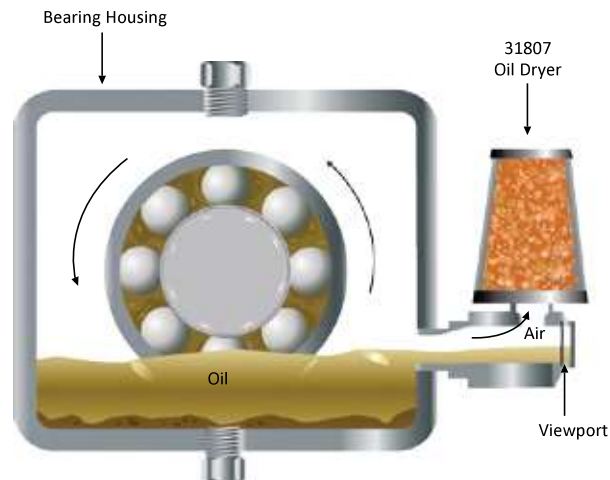
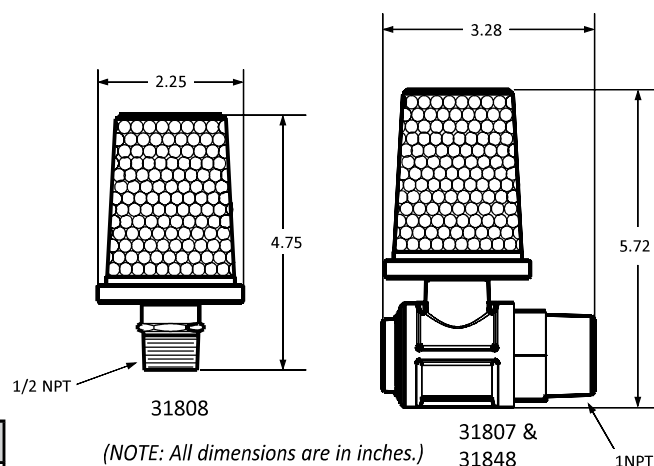
Model No.	Description
31807	1" NPT Polysulfone Oil Dryer with viewport
31808	1/2" NPT Polysulfone Oil Dryer without viewport
31847	1/2" Metal/Glass Oil Dryer with viewport and guard
31848	1" NPT Metal/Glass Oil Dryer with viewport
31849	1" Metal/Glass Oil Dryer with viewport & wire guard

SPECIFICATIONS

Connections	31807	31808	31848 & 31849
Material	Polysulfone	Polysulfone	Glass & Aluminum
Max. Operating Temp.	325°F/160°C	325°F/160°C	325°F/ 160° C

REPLACEMENTS

Model No.	Description
21841R	Replacement cartridge for model number 31807
31854	1 gal refill of desiccant



RESERVOIR BREATHER KITS



Because airborne contaminants can quickly disrupt and negate your sample, Trico offers specially designed Reservoir Breather Kits. These kits feature a two-stage breather system that utilizes a filter to block airborne particles and desiccant to remove harmful, unwanted moisture. The system ensures a permanent closure on all hydraulic reservoirs and makes sure the lubricating fluid remains closed off from airborne contamination throughout the sampling process.

An optional filter reminder vacuum gauge can be used to indicate when the filter element on the breather has become clogged.

A male quick connect can be plumbed to the 6-bolt adapter plate (this plate replaces the standard filler/breather cap) to fit a down pipe for filling reservoirs with new oil through a filter cart without opening the system to the environment.

For static sampling of oil from the system reservoir, the 6-bolt adapter plate can incorporate a sample port connected to a sample tube. The tube conveniently extends to the middle of the fluid level in the system reservoir to allow samples to be taken from the exact location inside the system every time.



FEATURES

- Optional filter reminder indicates remaining life of filter element
- Color coded desiccant changes colors indicating replacement is needed, when maximum adsorption is reached
- Optional sample port is available with sampling drop tubes of 12", 18", and 24" in length

SPECIFICATIONS DESICCANT BREATHERS

Breather Size	Filter	Desiccant	Silica Gel Volume	Water Capacity (lbs)	Air Flow	Desiccant Replaceable
39102	2 microns	Gold to dark green	2.31 lb	0.9	35 CFM (260 gpm of fluid volume exchange)	No

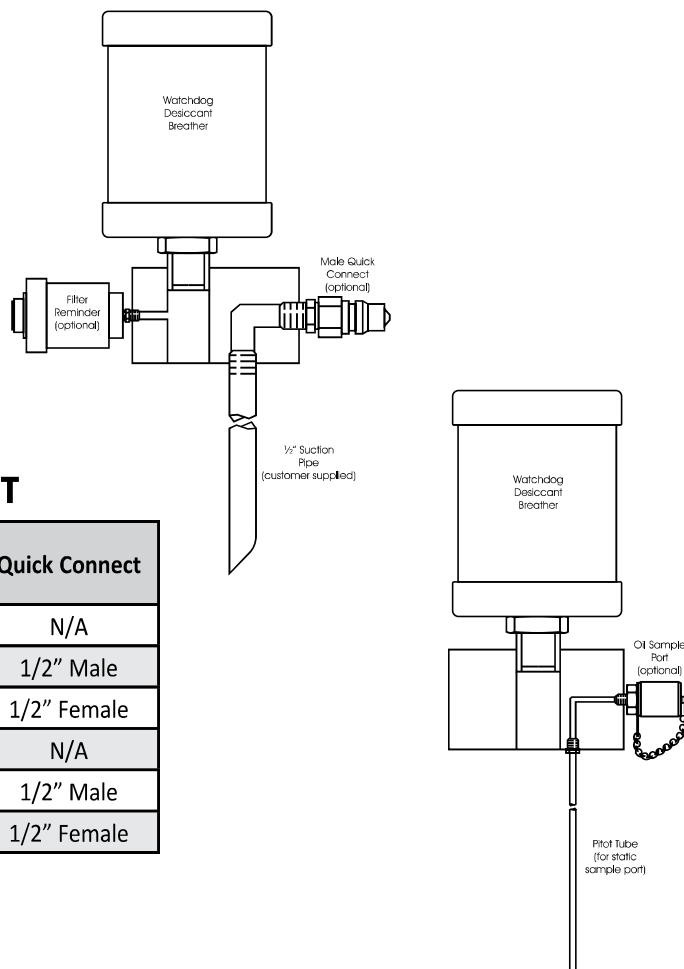
Note: Trico Watchdog and Watchdog EX Series Breathers can be readily used with the Reservoir Breather Kits, please contact your local Trico Authorized Distributor for additional information.



RESERVOIR BREATHER KITS

6 BOLT ADAPTER PLATE WITHOUT SAMPLE PORT

Model No.	Breather Size	Filter Reminder	Quick Connect
36902	39102	No	N/A
36903	39102	No	1/2" Male
36904	39102	No	1/2" Female
36914	39102	Yes	N/A
36915	39102	Yes	1/2" Male
36916	39102	Yes	1/2" Female



6 BOLT ADAPTER PLATE WITH SAMPLE PORT

Tube Length			Breather Size	Filter Reminder	Quick Connect
12"	18"	24"			
36905	36908	36911	39102	No	N/A
36906	36909	36912	39102	No	1/2" Male
36907	36910	36913	39102	No	1/2" Female
36917	36920	36923	39102	Yes	N/A
36918	36921	36924	39102	Yes	1/2" Male
36919	36922	36925	39102	Yes	1/2" Female

Breather Kit Adapter

FILTER REMINDER

The filter reminder indicates the service life of the filter element. The indicator allows the filter to be changed when needed, thus avoiding unnecessary labor and premature servicing. When filter reminder indicates the need for the filter element to be replaced, just push in the manual reset button when a new filter element is installed.



Normal, clean filter



Indicator shows filter is clogged and needs replacing.

BREATHING KIT ADAPTER

Model No.	Description
16207	2" NPT Male Adapter with 6 Bolt ANSI Threads

HELPFUL TIP:

Trico Watchdog® and Watchdog EX Breathers can be readily used with the Reservoir Breather Kits. Please call your local Trico Authorized Distributor for additional information.