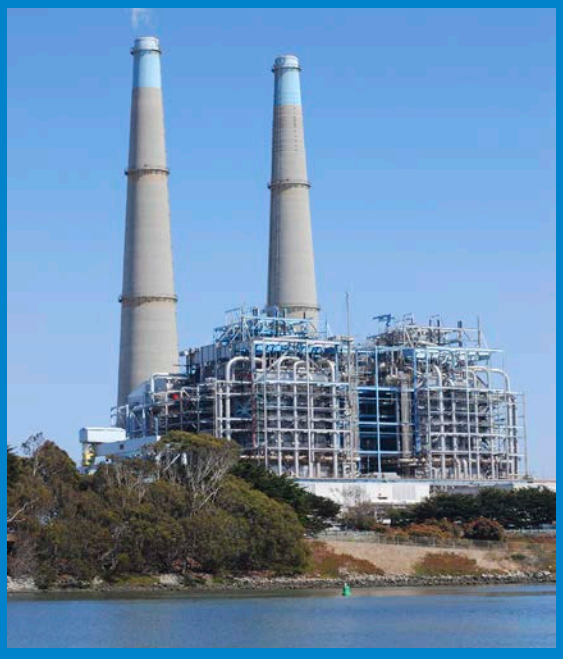
KAYDON FILTRATION

TURBO-TOC®

KL SERIES · OIL CONDITIONING SYSTEMS

Making the world safer, healthier and more productive®



KAYDON FILTRATION
Filtration Group®

Protect the Performance of Your Turbine-Driven Equipment

To achieve long-term, predictable, and profitable performance from your turbine-driven equipment, you need water-free and particulate-free lubrication. However, keeping lubricating oils clean and dry — while maintaining maintenance budgets and operational schedules — is no easy task without an oil conditioning system you can count on.

At Kaydon Filtration, we specialize in keeping the lubricants for turbines and turbine-related equipment in optimal condition. In fact, since our founding in 1885, our oil conditioning systems have been a critical component in preventing the oxidation and viscosity breakdown that set the stage for equipment failure from metal-to-metal contact.

Kaydon defined the world of turbine oil conditioning in 1939 with the introduction of the world's first effective oil conditioning system. We rein- forced our leadership position in the 1980s by delivering the world's first proven coalescing system, optimized specifically for turbine applications. And we've extended our oil conditioning expertise into the 21st century with the introduction of our new generation of Turbo-TOC® KL Series oil conditioning systems.

Designed to maximize the returns from your equipment investments while strengthening your bottom line, Turbo-TOC® KL oil conditioning systems quickly and efficiently remove harmful water, particulates and other contaminants from turbine lubrication oils. Scaled to address the specific needs of both large and small facilities, Turbo-TOC® KL systems bring predictability to your maintenance schedules, enhance long-term equipment operation, and significantly reduce the likelihood of equipment failures or unscheduled maintenance.

Discover how effectively Turbo-TOC® KL oil conditioning systems from Kaydon Custom Filtration Corporation can enhance the operation of, and the financial returns from, your turbine oil-lubricated equipment installations.

The Conditioning Power of Coalescence

Turbo-TOC® KL oil conditioning systems were the first turbine oil conditioning systems to effectively employ coalescing technology. In a coalescing system, water and other particulates are gathered by and trapped within the filters, separated from the lubricants, and then effectively removed from the oil flow.

Coalescing technology effectively removes suspended water from turbine oil lubrication systems by grabbing the water in the inner layers of the filter medium, coalescing it into droplets which then collect in the bottom of the filter housing and are subsequently removed.

Installation of a Turbo-TOC® KL system can enhance the performance of equipment by:

Extending Turbine Oil Life:

Using Kaydon Turbo-TOC® KL equipment keeps turbine oil systems clean by removing harmful contaminants. When a Turbo-TOC® KL system is used instead of other oil conditioning systems, turbine oil life can be extended for the life of the turbine.

Reducing Bearing Failures:

When water and particulates are reduced to acceptable levels, bearing failures decrease significantly or can be eliminated completely. Field research indicates that a properly maintained and operating Turbo-TOC® KL system can virtually eliminate failures.

Minimizing Forced Outages:

Contaminated oil — particularly oil with high water levels — can cause unwanted outages due to equipment failure. A Turbo-TOC® KL system can quickly remove suspended water and prevent outages. Turbo-TOC® KL systems have been documented to reduce oil contamination more effectively and more quickly than competitive systems.

Compared to other oil conditioning systems, Turbo-TOC® KL systems are:

- 100% faster than vacuum distillation systems
- 33% more efficient than centrifugation systems
- 20% less costly than centrifugation systems
- 25% less expensive to maintain than centrifugation systems
- 200% more effective in removing water than mass transfer equipment
- 75% to 80% more effective in removing water than electrostatic separators

For performance that enhances the efficiency of your facility, the choice is Turbo-TOC® KL systems.

TURBO-TOC®

Innovations that Revolutionize Oil Conditioning

Since introducing the Turbo-TOC® oil conditioning system in the mid 1980s, Kaydon has continually worked to enhance and expand operational capabilities. The latest generation of Turbo-TOC® KL systems include the following technological advances:

Turbo-TOC® High Performance Filter Elements:

For more than 50 years, Kaydon Custom Filtration has been defining and improving coalescing and oil conditioning technology. Our complete line of filters ensures that every Turbo-TOC® KL delivers exceptional performance over the long term. Our selection of filters includes:

Particulate Removal

The K1100 pre-filter features a rugged, corrosive-resistant design that minimizes the possibility of pleat bunching or collapse during cold start up. These filters are effective in removing particulates from turbine lubricating oils, based on turbine manufacturers' specifications. K1100 filters, along with particulate layers in the coalescer and separator, keep inlet oil cleanliness to 18/16/13 per ISO 4406, and outlet cleanliness to 16/14/11.

Water Removal

The K2100 coalescer is the first stage element in the water removal process, gathering water particles into large drops that fall to the bottom of the housing. The upgraded K2100 features a single-length, pleated coalescer design for greater water removal effectiveness. The K3100 separator is utilized for second stage water removal, stripping out water that then falls and collects along with the coalesced water. The water is removed automatically when it reaches a certain level in the housing. The Turbo-TOC® coalescer and separator elements are capable of removing Total Water to below 100 PPM[1] with greater than 95% efficiency.

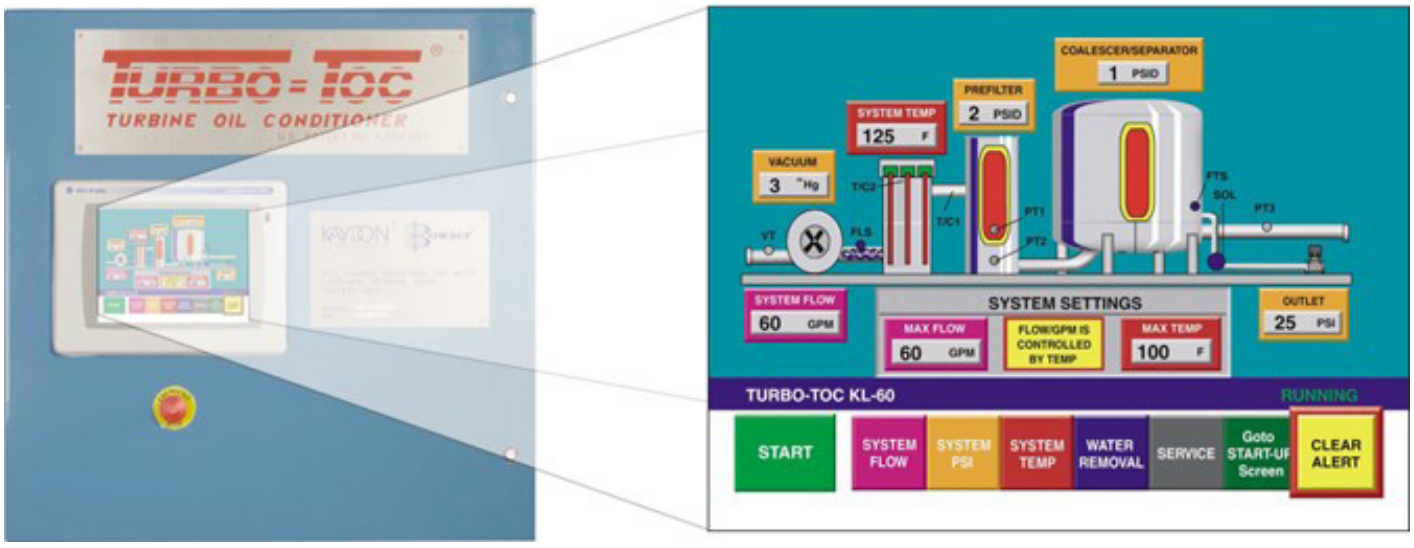
K1100 · K2100 · K3100

(1) Water removal is based upon an initial water concentration of 5,000 ppm. If water ingression is significantly higher, results may vary. Under normal operating conditions, the Turbo-TOC® will provide oil cleanliness to a water level below 100 ppm Total Water (total water is equal to the ppm of free, emulsified, and dissolved water).

K-Touch® Technology Control Panel

K-Touch® Technology Control Panels are featured on all KL100, KL60, KL30, and KL10 Turbo-Toc® units. Each panel is outfitted with a PLC controller that can be interfaced with other monitoring systems, and can be operated remotely. Every K-Touch® is equipped with the following features:

- **Easy-to-Use Operator Interfaces**
  The simple control format makes operator training quick and easy.
- **Start and Stop Window Controls**
  A simple touch of the window starts and stops the system.
- **Pump Pressure, Element Differential Pressures, and Oil Temperature and Grapics**
  All important system information is easily attained from the Touch Window. Evaluation of system performance is immediate.
- **Water Removal Data Displays**
  The K-Touch provides water removal data for each hour, day, month, and year the system is in operation, documenting the amount of water removed. The window helps document the existence and extent of water ingression into lubricants.
- **Alarm History Documentation**
  The system automatically documents alarm shutdowns, and does so for the life of the system.
- **Flow-Rate Adjustment Controls**
  If rapid water and particulate removal is required, system flow rate can be raised. If the most efficient water and particulate removal is required, slower flow rates can be selected.
- **Automatic Flow Control**
  The system automatically adjusts flow rate to accommodate changes in oil temperature, maintaining water removal efficiency with respect to oil temperature.
- **Oil Heater Adjustment Window Control**
  When oil needs to be heated quickly, the heater adjustment window makes temperature adjustment easy.



TURBO-TOC®

Innovations that Revolutionize Oil Conditioning

Ergonomic Skid Design

Our “U-shaped,” ergonomically-designed configuration positions system components for faster and easier element change: any operator fatigue and discomfort are significantly reduced. In addition, all components are skid-mounted for easy transport and installation.

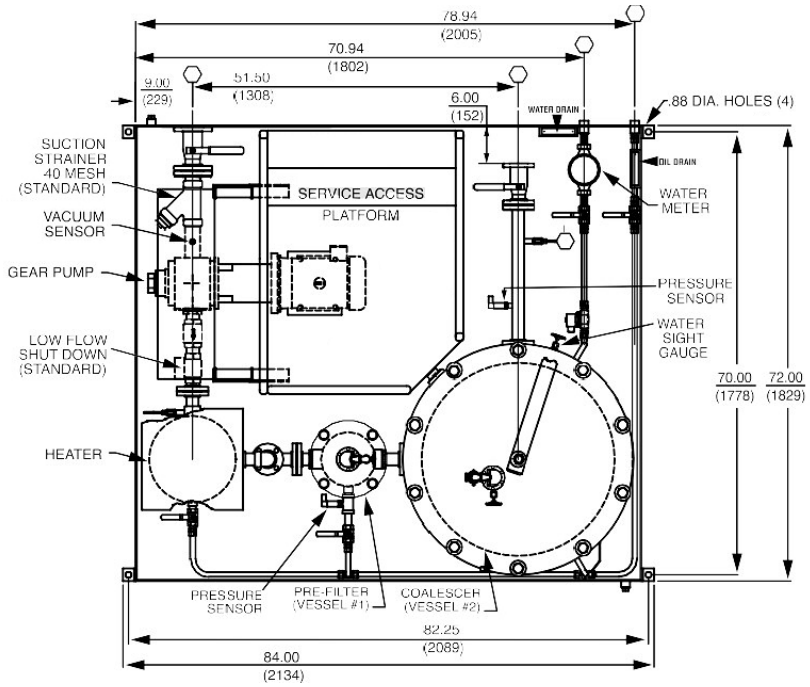
Larger 75-KW Heater on Turbo-TOC® KL100

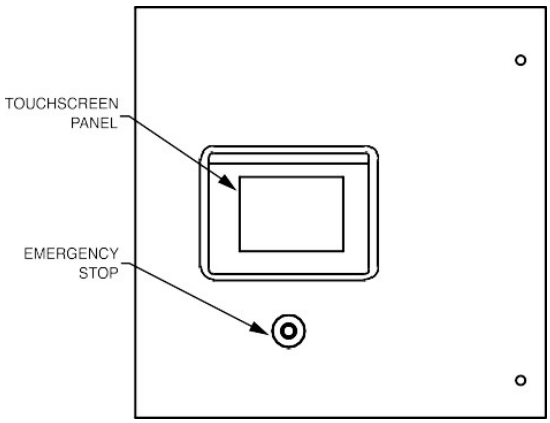
One of the cornerstones of coalescing technology is to have oil at the correct temperature for water removal. To facilitate faster heating of your oil, all Turbo TOC® KL systems have large heaters, more than adequately sized based on system/reservoir size recommendations. For example, the KL100 features a 75-KW heater, cutting in half the previous rate for bringing oil to temperature.

Safety Overflow Sight

All Turbo-TOC® KL models can be equipped with an optional Model 825 Safety Overflow Sight Accessory. The overflow sight allows convenient viewing of oil flow and helps operators maintain the desired level of oil in a lube oil reservoir. Available in 2" and 3" NPT sizes, the overflow sight features clear glass walls that can be removed for cleaning, a cast iron body with a white enamel interior, and a metal top with a 1/2" NPT connection for venting oil back to the reservoir.

Discover how Kaydon innovations can help you streamline oil conditioning in your facilities. Connect with Turbo-TOC® coalescing technology today.

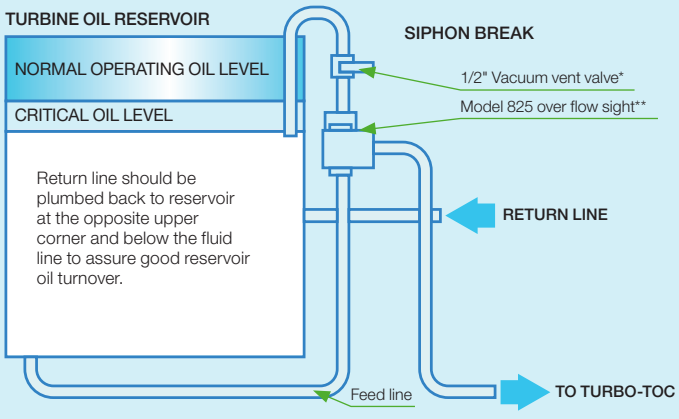




Turbo-TOC® Performance Considerations

Maximum performance is achieved from Turbo-TOC® systems when the following conditions are considered:

- **Proper Installation**
  The Turbo-TOC® performance depends upon the location of the feed line. Installation of the feed line at the bottom of the reservoir helps draw in both solid contamination and water that has settled to the bottom.
- **Oil Temperature**
  The optimum temperature range for the Turbo-TOC® system is 110ºF — 135ºF (43ºC — 57ºC). These are the temperatures at which turbine oil most effectively coalesces.
- **Sampling Location**
  Representative oil samples for the oil condition of the reservoir should be taken at the inlet sample port of the KL system. To check the cleanliness performance of your Turbo-TOC®, take oil sample from the outlet sample port.
- **Element Changes**
  The consistent practice of changing filter elements, using genuine Kaydon Turbo-TOC® filters, every six months will allow your Turbo-TOC® to perform at its maximum level.



*Vacuum vent valve is normally open, and closed only for draining tank. Vent line inlet must be located at critical oil level inside tank.

**Model 825 Over Flow Sight (top of inlet pipe/bottom of glass) must be installed slightly higher than critical oil level.

TURBO-TOC®

Turbo-TOC® KL Specifications

Sizing

A properly sized Turbo-TOC® will quickly remove solid contamination to a level of ISO 16/14/11 (outlet of Turbo-TOC®) and rapidly remove harmful water from the turbine lube oil system. Serious water contamination typically occurs when a gland seal fails or a heat exchanger leaks.

Under these extreme conditions, a properly-sized Turbo-TOC® can remove water twice as fast as competitive technologies: both centrifugation and vacuum dehydration.

Turbo-TOC® Sizing

Turbine Oil Reservoir Size	Turbo-TOC® Model
7201 to 12000 gallons (27256 - 45425 L)	KL100
3601 to 7200 gallons (13628 - 27255 L)	KL60
1201 to 3600 gallons (4543 - 13627 L)	KL30
601 to 1200 gallons (2272 - 4542 L)	KL10
241 to 600 gallons (9090 - 2271 L)	KL5
Up to 240 gallons (908 L)	KL1

Turbo-TOC® Model Specifications

Criteria	KL100	KL60
Dimensions	91" L x 80" W x 85" H (2311 x 2032 x 2159 mm)	80" L x 76" W x 88" H (2032 x 1940 x 2235 mm)
Weight	6100 pounds - dry (2767 Kg)	5000 pounds - dry (2268 Kg)
Inlet	3" (76.2 mm)	2" (50.8 mm)
Outlet	2" (50.8 mm)	1.5" (38.1 mm)
Flow rate	20 - 100 gpm (75 - 378 lpm)	20 - 60 gpm (75 - 227 lpm)
Auto water drain	Yes	Yes
Motor	10 hp (7.5 kw)	5 hp (3.7 kw)
Heater	75 kw	45 kw
Controls	PLC	PLC
Electrical requirements	460 VAC/60 Hz/3 PH (575 VAC & 380 VAC available)	460 VAC/60 Hz/3 PH (575 VAC & 380 VAC available)
Element requirements *Quantity in ( )*	K1100 (1), K2100 (10), K3100 (9)	K1100 (1), K2100 (8), K3100 (4)

Criteria	KL30	KL10
Dimensions	72" L x 60" W x 83" H (1829 x 1524 x 2108 mm)	51" L x 44" W x 75" H (1295 x 1118 x 1905 mm)
Weight	3800 pounds - dry (1746 Kg)	1750 pounds - dry (714 Kg)
Inlet	2" (50.8 mm)	1.5" (38.1 mm)
Outlet	1.5" (38.1 mm)	1" (25.4 mm)
Flow rate	10 - 30 gpm (38 - 113 lpm)	10 gpm (38 lpm)
Auto water drain	Yes	Yes
Motor	5 hp (3.7 kw)	1.5 hp (1.1 kw)
Heater	22.5 kw	7.5 kw
Controls	PLC	PLC
Electrical requirements	460 VAC/60 Hz/3 PH (575 VAC & 380 VAC available)	460 VAC/60 Hz/3 PH (575 VAC & 380 VAC available)
Element requirements *Quantity in ( )*	K1100 (1), K2100 (5), K3100 (3)	K1100 (1), K2100 (2), K3100 (1)

Turbo-TOC® KL Specifications

Criteria	KL5
Dimensions	60" L x 38" W x 77" H (1524 x 965 x 1956 mm)
Weight	1250 pounds - dry (567 Kg)
Inlet	1.5" (38.1 mm) / 1" (25.4 mm)
Outlet	1" (25.4 mm)
Flow rate	5 gpm (19 lpm)
Auto water drain	Yes
Motor	.75 hp (.56 kw)
Heater	4 kw
Controls	K-E-Z Control Panel
Electrical requirements	460 VAC/60 Hz/3 PH (575 VAC & 380 VAC available)
Element requirements	K1100, K2100, K3100
Explosion proof motor	Option
Safety Alarms	Low Flow, Dirty Strainer

Criteria	KL1
Dimensions	21" L x 19" W x 38" H (533 x 483 x 965 mm)
Weight	125 pounds - dry (57 Kg)
Inlet	1/2" (12.7 mm)
Outlet	1/2" (12.7 mm)
Flow rate	1 gpm (3.8 lpm)
Auto water drain	Option
Totalizing water meter	Yes
Strainer	Yes
Controls	ON/OFF Switch
Electrical requirements	120 VAC/60 Hz/1 PH (460 VAC available)
Element requirements	K500, Combination Coalescer & Separator Elements
Explosion proof motor	Option
Indicators	Element Differential Pressure Gauge
Sump heater	Option
Wash-down motor	Option
Automatic water drain	Option

Put your Turbo-TOC® KL System to Work Today

Industries

Power Generation
Pulp and Paper
Primary Metals
Petroleum Refining
Fuel Distribution
Marine
Mining

Warranty

Kaydon offers a standard 3-year warranty on Turbo-TOC® system.

This warranty will continue for the life of the Turbo-TOC®, excluding normal wear items, if genuine Turbo-TOC® elements are used in the system.

Discover how easy it can be to effectively remove damaging water and contaminants from your turbine lubrication reservoirs with a Turbo-TOC® KL system.

TURBO-TOC®

KAYDON FILTRATION
Filtration Group®

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12062023