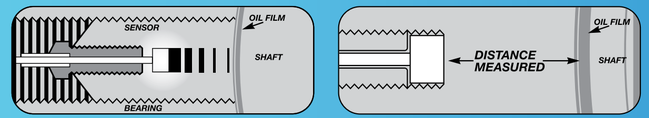
TecSonics™

A Precision Bearing Monitoring System

Six precision, ultrasonic sensors are mounted in both thrust and radial bearings at strategic points, becoming part of the bearing surface.

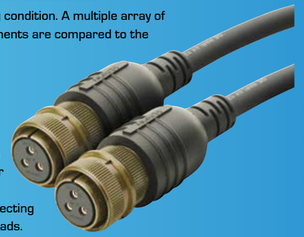
A signal from the *TecSonics*® instrument excites a piezoelectric crystal in each sensor which emits a high-frequency sound wave which echoes off the face of the sensor, re-exciting the crystal which sends a signal back to the instrument.



The instrument translates the echo time into distance (sensor length) and bearing condition. A multiple array of sensors provides the safety of redundancy and accuracy of +/- .0002". Measurements are compared to the baseline readings to determine if bearing wear has occurred.

WeatherAll®

Power Cords



Helps to ensure transformer pump and cooling fan motor performance. The cords have been field-tested to withstand ultraviolet rays, oil, water and extreme weather conditions. A unique Overmold Protectant restricts moisture from entering at the connecting points and prevents any movement of cord leads.

Common Isolation Valves

SIZE	STYLE #	BODY SHAPE	THICKNESS	# BOLT HOLES	BOLT PATTERN BOLT CIRCLE	# GASKET GROOVES	TRANSFORMER/ APPLICATION
2"	V200	5" ROUND	2-9/16"	4	6.5" BC/4" BC	1	GE PRESSURE RELAY
4"	V401	9" ROUND ANSI	2-1/4"	8	7.5" BC	2	
4"	V405	8" SQUARE	2-1/4"	4	5-7/8" x 5-7/8"	2	GE RADIATOR
4"	V406	9" SQUARE	2-1/4"	4	6-5/8" x 7-1/8"	1	MCGRAW RETROFIT
4"	V412	RECTANGULAR	2-1/4"	4	5-1/4 x 7-1/4"	1	WH RADIATOR
6"	V601	9" SQUARE	2-1/4"	4	10" BC	2	GE
6"	V602	11" ROUND ANSI	2-1/4"	8	9.5" BC	1	WH RETROFIT
6"	V612	12" ROUND	2-1/4"	6	10" BC	2	OLDER GE
6"	V617	11" ROUND ANSI	5"	8	9.5" BC	1	50's VINTAGE WH
8"	V804	13" ROUND ANSI	2-1/2"	8	11.5" BC	2	MCGRAW EDISON

Cardinal PUMPS & EXCHANGERS
A Wabtec company

A World Leader

Who We Are

Service...Speed...Dependability

At Unifin the cooling of Electric Machines is our only business. Every resource in the company has been directed towards research and development to acquire world leading heat transfer technology and manufacturing processes. Today, this investment has established Unifin as a global leader in the supply of:

- Transformer Oil Coolers
- Transformer Oil Pumps
- Transformer Oil Isolation Valves
- Generator Coolers
- TEWAC Motor Coolers

Our Brands

Unifin is a global company with worldwide recognized brands in transformer oil coolers, transformer oil pumps, generator coolers and TEWAC motor coolers.

- ***ForZair*** transformer oil coolers
- **HeatSink**™ portable transformer coolers
- HARLEY sleeve bearings
- *TecSonics*® bearing wear monitoring system
- Formerly **GE Tidewater Heat Transfer Products**™ generator coolers
- **RCP**™ coolers
- *WeatherAll*® power cords

Global Presence

Headquartered in London, Ontario, Canada, Unifin is a global organization with manufacturing locations in Canada, the United States and China.

The Hottest Name in Cooling

Unifin
A Wabtec company

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Pump it Up

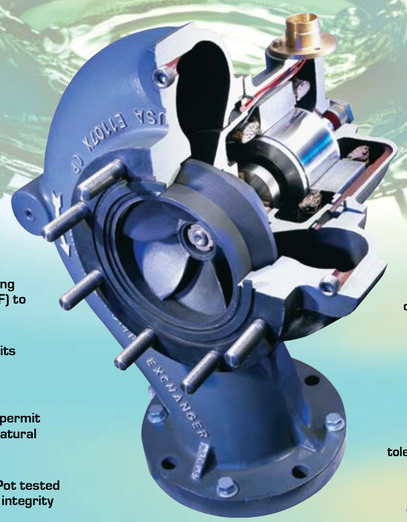
Centrifugal and Axial Flow Transformer Oil Pumps

Centrifugal and Axial Flow Transformer Oil Pumps

2 Equally Reliable Options to Meet Your Specific Requirements and Needs:

New Pumps

- Heavy-duty class 30 cast iron construction for long life
- Large thrust face sleeve bearings for long life and minimum wear
- Pump continuous duty operation temperatures ranging from –40˚C (–40˚F) to 100˚C (212˚F)
- Pump and motor units pressure-tested to assure integrity
- Pumps designed to permit thermo-siphon for natural convection flow
- Motor windings Hi-Pot tested to assure electrical integrity
- Special coatings applied to protect against rust inside and outside



Remanufactured Pumps

- Either yours or from our direct replacement core exchange stock
- Exactly the same manufacturing processes as new pumps
- Incorporates renowned HARLEY® sleeve bearing system, shaft, motor, internal elastomers and electrical connector
- Value-added internal component design changes to correct shortfalls of original designs
- New or rewound motor windings with high insulation class ratings
- Optimized high-strength materials using proper tolerances and surface finishes
- Tested to assure the integrity of the electrical & sealing systems
- Re-nameplated and carries a full 12/18 month warranty

Both options available with *TecSonics*® Bearing Wear Monitoring System

Cardinal PUMPS & EXCHANGERS
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Product Features

A division of Unifin International, Cardinal Pumps and Exchangers both manufactures and remanufactures hundreds of different configurations of pumps used in conjunction with our wide range of transformer oil coolers. These are applied for either Transformer OEM cooler/pump applications or directly to electric utility/industrial transformer end users. They are available in both centrifugal and axial flow impeller designs and are designed to perform in extreme temperatures, with extra long life and very low maintenance.

Rugged Cast Iron Body

All Cardinal pumps offer a rugged casting design with heavy-duty class 30 cast iron used for the pump casing, motor enclosures and impeller to provide long life in the field.

Precision-Made Sleeve Bearings

Cardinal offers three bearing types: standard sleeve bearing (For Transformer OEM Sales Only), the HARLEY® by Cardinal sleeve bearing, and the HARLEY® sleeve bearing with *TecSonics*® bearing wear monitoring

Ground Shafts & Dynamic Balancing

All Cardinal sleeve bearing pumps have the bearing journals and thrust surfaces ground between centers to assure alignment and surface finish. All pump shaft, impeller and motor assemblies are dynamically balanced for long term vibration compliant operation.

Fully Pressure-Tested

All Cardinal pump and motor units are pressure-tested to 50 PSIG to ensure the integrity of the complete unit.

Electrical Tested

Motor windings are all High Pot tested to assure electrical integrity/continuity and bench tested to obtain "no-load" motor amperage readings. Winding resistance readings are taken both before and after the pump is built. All Cardinal pumps are meggar tested to assure the integrity of the motor insulation.

Operating Temperatures

The pumps' continuous duty operating temperature ranges from –40˚C (–40˚F) to 100˚C (+212˚F)

Rust-Proofing

A special coating is applied to both the inside and outside of the pump to protect it from rust.

High-Efficiency Motors

Highly efficient oil-immersed motors with superior rated insulation class materials are available in single or three phase, and 50 or 60 hertz frequencies.

Motor Cooling

All Cardinal pump designs have an inherent oil circulation feature within the motor enclosure to positively circulate the oil for an even better cooling effect on the motor windings.

Thermo-Siphon Flow

All pumps are designed to permit unrestricted natural convection flow because of the openess of the hydraulic passages - even when the pump is not operating.

Proper Pump Rotation

All pumps have rotation indication arrows on the casing and motor enclosure as well as a shaft rotation sight plug at the rear of the motor to facilitate checking of the shaft rotation.

Standard Features Include:

- HARLEY® by Cardinal Sleeve Bearing (On all Remanufactured Pumps and all New Pumps for End Users)
- Performance Run-in Testing (On Customer's Remanufactured Pumps)
- *Weather*All® Power Cords and Installation Gaskets
- Epoxy Paint System
- Export Packaging

Optional Features Include:

- *TecSonics*® Bearing Wear Monitoring System
- Performance Run-in Testing (On New Pumps)
- Certified Performance Curves
- 3 and 4 Part Epoxy Paint System – For Coastal or Harsh Environments
- Metric-Sized Flange Connections for International Compatibility

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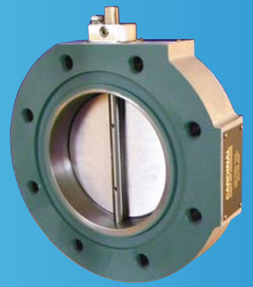
Heavy Duty Transformer Oil Valves

Cardinal Pumps & Exchangers also manufactures a line of heavy-duty butterfly type transformer oil valves ranging from 2" to 10" in size including ANSI standard and OEM specific flange configurations. Over 40 valve designs are available for use on new transformers or as replacements on existing transformer cooling loops to isolate the cooling equipment (pumps, coolers or radiators).

Features and Options

- Robust in design so that over tightening or mishandling during factory / field installation will not result in malfunctioning of the valve
- All valves are designed to hold full vacuum
- All valves are pressure tested to 50 psi
- Valve design temperatures are –40°C (–40°F) to 135°C (275°F)
- All parts are manufactured from non-corrosive or suitably protected material to withstand outdoor exposure on external surfaces and hot transformer oil on internal surfaces
  - Valve bodies are aluminum or steel
  - Valve discs are aluminum
  - Valve stems are ground stainless steel
  - Back-to-back shaft lip seals and disc O-rings are viton
- Fasteners are locked to prevent loosening from vibration during shipment and normal operating conditions
- In the open position, the valve disc will not vibrate or flutter. When the valve is installed close to the suction side of the pump, the disc acts as a fluid straightener, thus enhancing the pump's performance



- The operating handle displays the valve's "OPEN" and "SHUT" positions and is designed so it can be manually locked in either position with a bolt (supplied)
  - An optional "padlock" locking feature is available on some designs
- Valves are shipped individually packaged and sealed in specially coated bags to protect from contaminants and weather
- Nitrile gaskets are provided to match the gasket grooves on each valve
- Several common designs are stocked for immediate shipment

Field retrofit kits are available for **Westinghouse** and **McGraw Edison** valves

New valve bodies can be designed to suit specific applications, if required.

Avoid future forced outages due to oil leaks and reduce incremental maintenance costs due to unplanned oil handling.

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