

## Now wet transformers can be dehydrated without being taken out of service!

The TDS® transformer dry-out system incorporates all the necessary features to allow a transformer to remain in-service while moisture from its insulation is effectively removed. The system is safe with several alarm features that shut the system off, isolating it from the transformer, in the event of any abnormal signal. The TDS5-1 unit provides a non-intrusive, cost effective and convenient method of maintaining transformers in a dry condition. In addition, once the transformer is dried, the system can be retrofitted with Activated Alumina cartridges to reduce acidity in the transformer oil. This flexibility allows increased oil processing application compared to heat and vacuum systems.

### APPLICATIONS

- Dry wet transformers and insulation
- Dry transformers not braced for vacuum
- Dry transformers that cannot be taken out of service

### BENEFITS

- Transformer remains in-service during process
- Reduce transformer dry-out costs
- Improve oil dielectric values
- Improve transformer power factor
- Operates continuously unattended
- Extend oil service life
- Extend transformer service life

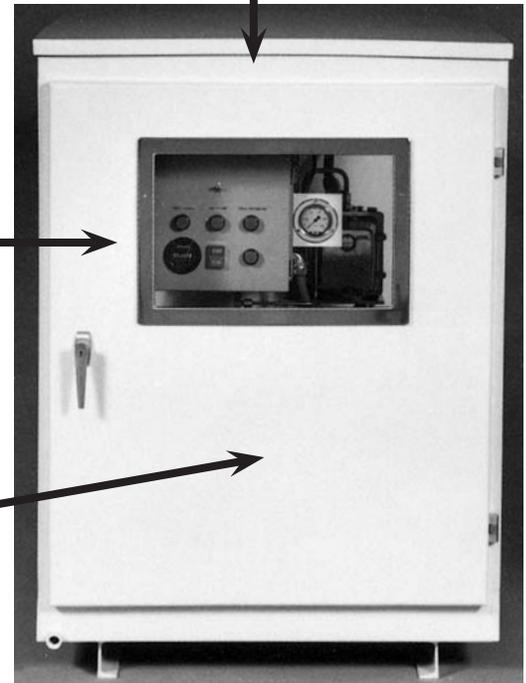
### SYSTEM OVERVIEW

The TDS® oil processing system is designed to allow a transformer under load to dry itself out. A quantity of four part number SD-1107 **Superdri**® cartridges are installed in the filter vessel, through which oil is processed at a rate of 5 gpm. The filtering system removes dissolved water from oil to less than 10 ppm, and includes 1 micron nominal particle removal capabilities. The process does not affect dissolved gas in oil, and does not remove oil oxidation inhibitors. The system is complete with all components necessary to monitor the mechanical and electrical operating conditions of the unit. The system includes components to purge air during start up and after filter changes.

Top of enclosure is hinged to allow access for filter changes

A window is installed for visual checks of system

Enclosure is sand blasted to bare metal and powder coat painted



### PROCESS OVERVIEW

The on-line dryout process is designed for safe, unattended, 24-hour operation. The system suction line is connected to the transformer bottom fill connection. The oil is then returned from the TDS® to a top connection valve. The number of cartridge changeouts required to dry the transformer insulation to an acceptable level and cartridge change-out intervals will vary according to moisture content and moisture transfer rate from the insulation to the oil. One set of **Superdri**® cartridges will remove a minimum of 1.4 gallons of dissolved water from the oil. Periodic moisture readings, from both the inlet to and outlet from the system can be taken to determine the amount of moisture being removed and are also used to determine when cartridges should be changed.

## GENERAL CONDITIONS AND GUIDELINES

The TDS5-1 relies on load from the energized transformer to push moisture from the insulation out to the surrounding oil. As the moisture is released into the oil, it is removed by the **Superdri**® cartridges which continually dry the oil to less than 10 ppm total water. Transformer top oil temperature should be kept at least 40 - 60 degree C for moisture equilibration between insulation and oil to continue in a timely fashion. A single set of **Superdri** cartridges will remove approximately 1.4 gallons of water. Cartridge performance can be monitored by observing the Doble **DOMINO**® moisture sensor (see options below). The process will not release moisture back into the oil even if cartridges are fully saturated.

### Results obtained during actual transformer dry-outs using TDS5-1:

CONDITION	JEFFERSON CITY, MO		FRESNO, CA	
	BEFORE	AFTER	BEFORE	AFTER
POWER FACTOR (TEMP CORRECTED): CH	3.31%	1.32%	1.18%	0.33%
POWER FACTOR (TEMP CORRECTED): CL	4.31%	1.59%	1.39%	0.38%
POWER FACTOR (TEMP CORRECTED): CHL	5.48%	1.77%	1.35%	0.35%
ACID CONTENT			.047 MG KOH/G	.016 MG KOH/G
INTERFACIAL TENSION	-	-	29 DYNES/CM	37 DYNES/CM
MOISTURE CONTENT	50 PPM	5 PPM	25 PPM	5 PPM
OXIDATION INHIBITOR	-	-	NO CHANGE	
DISSOLVED GAS	-	-	NO CHANGE EXCEPT DECREASE IN CO2	

For guidelines to estimate process cost and duration, contact Velcon Filters, Inc.

## TDS® SPECIFICATIONS

**Power Requirements:** 120 vac, 1-ph, 60 Hz, 12 amps, comes with 25-ft power cord.

**Control Box:** NEMA 4 enclosure with motor starter, motor overload protection, programmable logic controller, start/stop/reset switch, run light indicator, high pressure cutoff switch and indicating light, and elapsed hour meter.

**Electric Motor:** ½ hp, TEFC, 1750 rpm.

**Fan:** 6" for enclosure ventilation, with thermostat and filtered louver.

**Electronic Flow Meter:** 0 - 30 gpm, indicates flow rate, resettable batch totalizer, and cumulative gallons pumped, battery powered.

**Oil Pump:** 5 gpm positive displacement gear pump with mechanical seal and internal pressure bypass.

**Vacuum Pump:** 3 CFM displacement, close coupled motor and wired to main electrical control box for power source.

**Coaxial Hoses with Oil Level Alarm:** (2) 25-ft coaxial lengths of suction and discharge ¾" hose are provided with N.C. solenoids wired to main control panel. If a leak should develop on the hose connections to the transformer, oil will collect in the bottom of the enclosure and the system will shutoff automatically. Extra contacts are provided for remote alarm detection.

**Self Draining:** Oil in the vessel is safely pumped back into the transformer during cartridge changeouts.

**Dry Contact Relay:** A dry contact relay is provided that can be wired to the transformer's low oil level alarm to shut the system off if a low oil level is sensed.

**Detachable Hoses:** Have disconnect fittings at the enclosure end. When disconnected, the hoses can be stored more conveniently in a separate hose storage area.

## OPTIONS

Doble **DOMINO**® on-line direct reading moisture sensor continuously displays oil temperature and ppm of total water in the oil (or percent saturation of the oil). The piping layout of the TDS system allows easy checking of both the influent and effluent moisture contents with a single sensor. A "Change Filter" alarm light is also mounted to the control panel door.

*Please see data sheet #1995 for remote monitor and control options*

## DIMENSIONS

**Depth:** 36" **Width:** 38" **Height:** 49" (85" with lid open) **Shipping Weight:** 1,125 lbs

## ORDERING INFORMATION

TDS5-1 Standard unit, 120 vac, 1-ph, 60 Hz power requirement  
 746Y012 Moisture Sensor Option, 120 vac, 1-ph, 60 hz  
 SD-1107 **Superdri**® cartridge, 4 required per change-out (not included with unit)  
 LB-1107 Activated alumina cartridge for acid removal, 4 required per changeout



Velcon products are sold and serviced by a world-wide representative network. To order, contact Headquarters or your **LOCAL REPRESENTATIVE:**

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