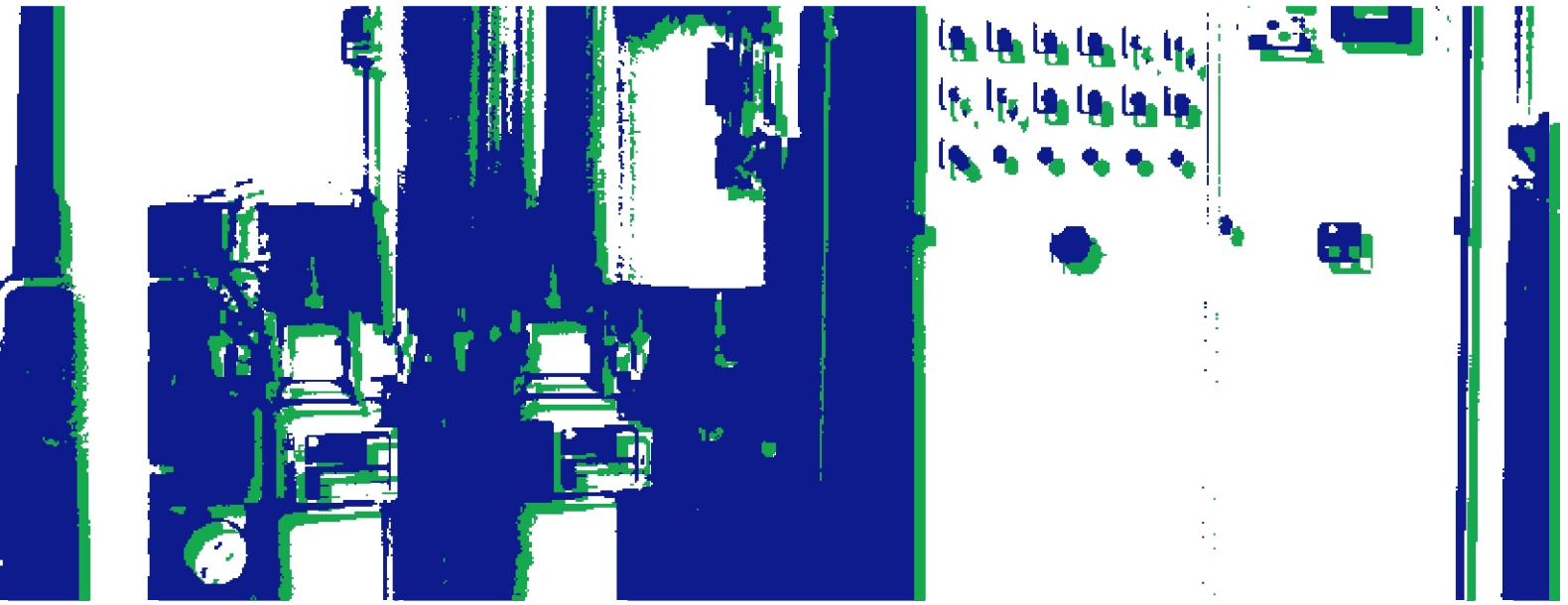
HEDRICH
vacuum systems

Standard Purification Equipment for Insulating Oils



customer driven technology!

customer driven technology!



The manufacture of electric components and equipment parts like transformers, switches, capacitors, cable without suitable insulating media such as e.g. oils, resins, waxes and NDC (Non Draining Compound) is inconceivable.
The insulating property of these media strongly depends on the amount of gas, moisture and impurities contained. During transport and storage even new insulating media are absorbing gas and humidity, so these media have to be treated again before use.
Oils in transformers or switches need to be regenerated at certain intervals, as due to the absorption of gas and humidity over a longer period of use as well as owing to aging products the insulating property deteriorates considerably.
For purification and regeneration of insulating media we supply a great deal of equipment which are mainly used for:

- Degasification and dehumidification of insulating media.
- Extraction of fibres, dust, other solid particles as well as aging products by filtering.
- Addition of oxidation inhibitors to postpone the aging process of the insulating media.
- Regeneration of used oils in transformers and switches involving a purging and cleaning of the transformers or switches.

The principle of the purification of insulating media is to heat them up and distribute them to very thin layers in a thin-film degasser by leading them across tower packings extracting gas and moisture under vacuum. Solid particles are removed by means of coarse and fine filters. In addition, for the regeneration of oil a Fuller's earth filtering device can be installed into the equipment.

We supply:

- **Single-stage standard equipment,** up to a throughput of 6,000 l/h
- **equipment** designed to exactly fit the **specific operating conditions** at our customer's. This equipment can be built in single- and in double-stage design as well as for higher throughputs, for single or repeated passage through the equipment and provided with various accessory parts.

All pieces of equipment are available in stationary, movable or mobile design.

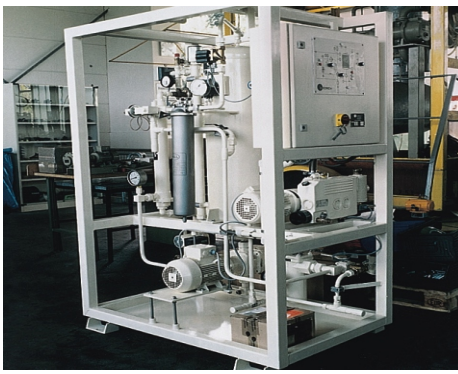
Stationary equipment

Stationary equipment is delivered by us in components and subassemblies for firm installation into the production equipment at our customer's taking into account the specific spatial conditions. Often stationary equipment is part of the vacuum drying and impregnating equipment supplied by us.
Just as movable and mobile equipment the stationary equipment is provided with indirect, electric hot-water heating, vacuum pumps, thin-film degasser, condensers, feeder pumps, filtering and safety devices as well as electric control cabinet, completely ready for use.
As accessory parts devices for measuring the gas content, moisture and dielectric strength of the oil as well as inhibition devices, Fuller's earth filters and devices for heating-up according to the oil spray process are available.



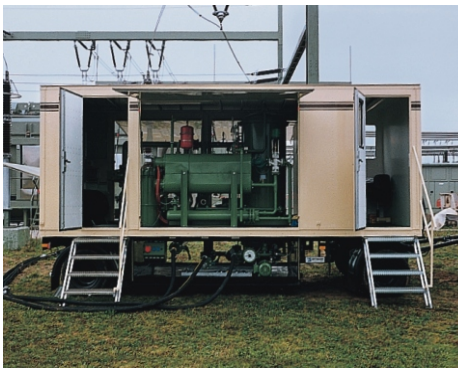
Movable equipment

Movable equipment is installed into a sturdy frame and delivered ready for use. No foundations are necessary, and the equipment can be moved to any requested location for operation by means of a crane or fork-lift truck. As accessories isolating valves as well as connecting hoses are supplied as flexible connecting lines between the purification equipment and the object to be treated. All available accessory parts for stationary equipment can also be used for movable equipment.



Mobile equipment

Mobile equipment is mounted onto a base frame with rollers or installed into a trailer which is licensed for public roads and delivered ready for use. Mobile equipment is used for filling of distribution transformers at the location where the components have been installed, for regeneration of oils in transformers and power switches or for assembly of cable heads when installing oil-filled cable.
For the protection from weather influences the mobile equipment is provided with either a frame and tarpaulin or an aluminum-sheet casing with upward folding and lockable side walls in order to additionally protect against unauthorized operation.



Purification equipment concepts

Standard oil purification equipment series AP

Standard oil purification equipment of series AP can be used for objects which are already under vacuum. They are equipped with a feeder pump which pumps the insulating medium through the heating and filtering device into the degassing vessel. In the degassing vessel the degassing and dehydrating process takes place under vacuum. After treatment, a high vacuumtight pump which is mounted under the degasser delivers again the insulating medium into the transformer. The process takes place under vacuum in a closed circuit. Standard oil purification equipment of series AP is available for throughputs of 500; 1000; 2000; 4000 and 6000 l/h in movable and mobile design as well as mounted on a trailer. After a single passage, the purified oil has reached a residual moisture content of abt. 5 ppm and a residual gas content of abt. 0.2 % by volume. After several passages, a residual moisture content of abt. 3 ppm and a residual gas content of abt. 0.1 % by volume are reached.

Efficiency, quality and process reliability through:

- Two feeder pumps for exactly defined supply and discharge of the medium.
- The throughput is infinitely variable by frequency transformation.
- Indirect electric heating of the medium.
- Cracking of the medium is excluded.
- Fine filter with dirt indicator.
- Fine filter elements can be used up to 1 μm.
- Low energy consumption, reduced operating costs.
- Easy handling and control.
- Long service intervals.
- Oil drip pan as standard equipment.
- Alarm signal in case a leakage occurs.
- Low noise level.
- The operating states are indicated by luminous-circuit diagrams.
- Operation of the equipment without supervision.

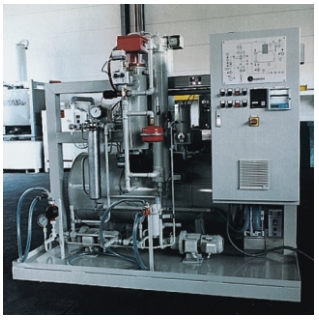
Purification equipment for insulating media for special requirements

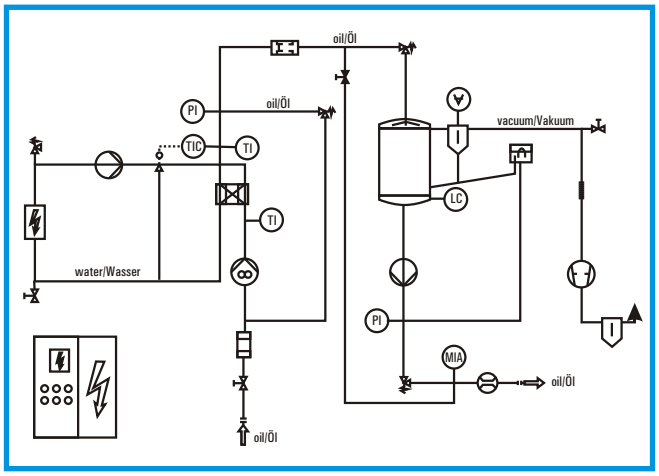
Purification equipment for insulating media is designed according to our customers' specific requirements. Such systems are for example provided for throughputs up to 20,000 l/h, for increased heating capacity, lower residual gas content of 0.01 % by volume and a residual moisture content of 1 ppm or breakdown voltages of 100 kV. These special systems are essentially used for purifying insulating fluids in the field of extra-high-tension units.

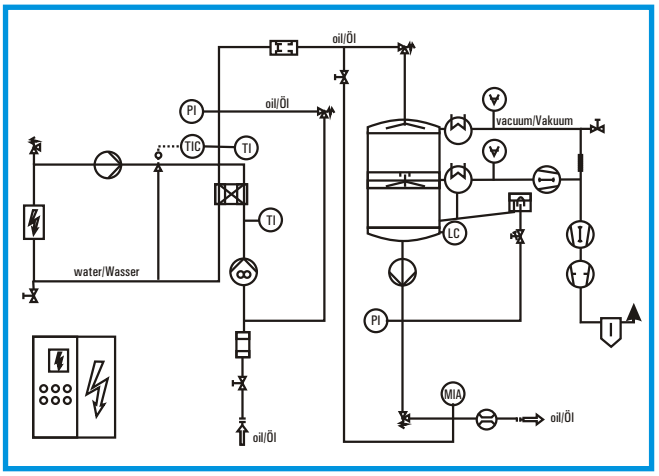
Efficiency, quality and process reliability through:

- Integration into existing concepts is possible.
- The throughput is infinitely variable by frequency transformation.
- Indirect electric heating of the medium.
- The coarse filter is equipped with magnetic inserts.
- Fine filter with dirt indicator.
- Fine filter elements can be used up to 1 μm.
- Low energy consumption, reduced operating costs.
- Easy handling and control.
- Long service intervals.
- Alarm signal in case a leakage occurs.
- Low noise level.
- The operating states are indicated by luminous-circuit diagrams.









Quality control devices

Residual gas content meter

This measuring apparatus is especially recommended for continuous checking of the gas content during the purification of insulating oil. The measuring range is between 10 and 0.01 % by volume. The apparatus is integrated into the purification equipment. The insulating oil required for the measurement is delivered in a partial flow into the measuring apparatus. After the measurement, the oil flows back into the degasser and is thus led back to the circuit.

Advantages:

- Integration into existing concepts is possible
- The throughput is infinitely variable
- Reliable measurement
- Conclusions on the residual moisture are possible
- Low operating costs
- Easy handling and control
- Long service intervals
- Adjustable switch point
- The operating states are indicated by luminous-circuit diagrams

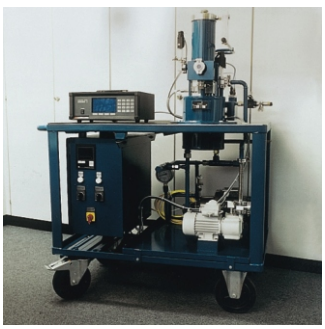


Residual moisture meter

The moisture meter is used for continuous supervision of the moisture content during purification of the insulating oil. A measuring sensor is directly installed in the insulating oil flow behind the degasser. The low oil moisture values of the purified liquid are determined and represented on the monitor in ppm / dew point data. By additional mounting of a moisture sensor at the oil intake, the efficiency of the oil purification can be proved in online process.
Registration of the measured values is possible.

Advantages:

- Oil moisture values up to 1 ppm can be measured
- Short reaction times of the sensors
- Up to 6 sensors per measuring apparatus are possible
- Registration for audit documentation of oil-filled units
- Long service intervals



Insulating oil testing apparatus

The insulating oil tester operates with a voltage in the range from 0 kV to 75 kV, alternatively from 0 kV to 100 kV and can be used for either continuous or discontinuous operation.
In continuous operation, a partial flow of the insulating oil is first delivered into the testing cell provided for this purposes. After the oil has been measured, this partial flow is returned to the circuit. In case the values measured are below the set dielectric strength values, the oil supply to the unit to be filled is automatically interrupted. When the desired values are reached, the oil supply is released again.The insulating oil testing apparatus is programmed in compliance with the known standards VDE, IEC, ASTM, UTE, CEI.

Advantages:

- Conclusion on the dielectric oil quality by fully automatic test procedure
- Online measurement is possible
- Compliance with all common standards
- Determination of oil temperature
- Built-in printer for data documentation
- Bidirectional PC interface for control and data acquisition



Standard purification equipment for insulating oils for heating up, filtering, drying, degassing in movable and mobile design. Movable systems (T) are mounted onto a sturdy base frame for easy transport to the requested location by means of a crane. Mobile systems are either provided on rollers (2fixed and 2 guide rollers) for moving within a workshop resp. on the works´ premises (R) or are mounted onto a trailer (H) with frame and tarpaulin or with aluminium casing which is licensed for public roads and provided with upward folding and lockable side walls.

Technical specification

	AP 5 (T,R,H)	AP 10 (T,R,H)	AP 20 (T,R,H)
Oil throughput	500 l/h	1000 l/h	2000 l/h
Max. oil content of transformer	2 m^3	4 m^3	10 m^3
Initial moisture content of oil	50 ppm	50 ppm	50 ppm
Residual moisture content after 1 pass	approx. 5 ppm	approx. 5 ppm	approx. 5 ppm
Residual moisture content after several passes	approx. 3 ppm	approx. 3 ppm	approx. 3 ppm
Initial gas content of oil	10 Vol. %	10 Vol. %	10 Vol. %
Residual gas content after 1 pass	< 0,2 Vol. %	< 0,2 Vol. %	< 0,2 Vol. %
Residual gas content after several passes	< 0,1 Vol. %	< 0,1 Vol. %	< 0,1 Vol. %
Heating capacity of indirect electrical heating	10 kW	20 kW	40 kW
Temperature difference at an inlet temp. of 20°C	40 °C	40 °C	40 °C
Oil temperature adjustable	RT - 80 °C	RT - 80 °C	RT - 80 °C
Pump speed of air cooled vacuum pump	25 m^3/h	40 m^3/h	100 m^3/h
Ultimate vacuum approx.	1 mbar	1 mbar	1 mbar
Filter fineness approx.	5/1 micron	5/1 micron	5/1 micron
Connected load of equipment	15 kVA	25 kVA	50 kVA
Dimensions and weights			
Design: Movable (T):			
Length x Width x Height (mm)	1200 x 900 x 1800	1350 x 900 x 1900	1650 x 1100 x 2200
Weight (kg)	500	700	1200
Design: Mobile (R):			
Height of rollers (mm)	180	200	200
Design: Mobile on trailer (H):			
Casing with shaft (mm)	2800 x 1600 x 2500	2800 x 1600 x 2500	3500 x 1900 x 3000
Admissible weight (kg)	1300	1300	2000

RT = Room temperature

Special design on request

AP 40 (T,R,H)	AP 60 (T,R,H)
4000 l/h	6000 l/h
20 m³	30 m³
50 ppm	50 ppm
approx. 5 ppm	approx. 5 ppm
approx. 3 ppm	approx. 3 ppm
10 Vol. %	10 Vol. %
< 0,2 Vol. %	< 0,2 Vol. %
< 0,1 Vol. %	< 0,1 Vol. %
80 kW	120 kW
40 °C	40 °C
RT - 80 °C	RT - 80 °C
160 m³/h	250 m³/h
1 mbar	1 mbar
5/1 micron	5/1 micron
85 kVA	150 kVA
2000 x 1400 x 2400	2500 x 1750 x 2400
1700	2000
200	250
4000 x 2200 x 3000	4000 x 2200 x 3000
2500	3000



Automatic Fuller´s earth filtering inhibition device, designed for a transformer oil throughput of 200 to 1.500 l/h, infinitely adjustable.



Automatic double-stage movable transformer oil purification equipment with a throughput of 6.000 l/h. This equipment will reach in one single circulation through the equipment a residual moisture content of 2 ppm and a residual gas content of 0,01 percent per volume.



Automatic single-stage movable purification equipment for silicone oil with a throughput of 1.000 l/h.



Automatic single-stage movable transformer oil purification equipment with adjustable throughput up to 4.000 l/h.

customer driven technology!

R&D, design and production of vacuum equipment from high quality components and most advanced technology; vacuum systems exactly adapted to our customers´ needs; our philosophy technology for the benefit of the customer

.

Fulfilling your needs gives us the motivation to find innovative solutions. In this partnership, we contribute many new ideas based on hands-on experience.

HEDRICH BUSINESS UNITS

Equipment for reactive resin insulation

- Vacuum casting equipment
- Vacuum pressure gelation equipment
- Vacuum meter/ mix/dispensing equipment

Equipment for oil-paper-insulation

- Vacuum drying and impregnating equipment
- Vapour phase-transformer drying equipment
- Vacuum oil purification equipment

Vacuum-pumping units

- Stand-alone
- Integrated into vacuum plants

160 employees at Hedrich in Germany, Switzerland, USA and China as well as 30 agencies ensure a worldwide distribution network and a complete system of services.
Challenge us - with your individual requirements and make the same experience as more than 2,000 satisfied customers did before.

Wilhelm Hedrich
Vakuumanlagen GmbH & Co. KG
Greifenthaler Strasse 28
D-35630 Ehringshausen-Katzenfurt
fon ++49 6449 929-0
fax ++49 6449 929-149
E-Mail hedrich@hedrich.com
Internet www.hedrich.com

Technical modifications reserved. E400-1