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OPERATIONS AND MAINTENANCE MANUAL FOR THE WATER OIL/SEPARATOR (F-2014)

RALPH M NIELSEN

WHC, Richland, WA 99352

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Abstract: THIS DOCUMENT PROVIDES OPERATIONG, MAINTENANCE AND SPARE PART INFORMATION FOR THE ULTRA AQUA UFA-6 WATER/OIL SEPARATOR INSTALLED AAAAT MASF.

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ultrafilter
international

OPERATOR'S MANUAL
UFA 6 & 12

BEST AVAILABLE COPY

ultrafilter is the first company in the sector that has been awarded the DQS certificate accreditation to DIN ISO 9001, the certificate for absolute and uncompromising quality assurance.

OPERATOR'S MANUAL ULTRAAQUA 6 & 12

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 - Spare parts
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October 1994, Waste Water Dept., MS
Subject to technical alternations

READ THIS ENTIRE MANUAL BEFORE OPERATING THE ULTRAAQUA

O. GENERAL SAFETY PRECAUTIONS

0.1 WORKING ON THE UNIT

Disconnect the unit from power mains before starting any work on the system. Any accidental switching on of the machine must not be possible.

0.2 WASTE WATER QUALITY

Waste water coming from this machine is not suitable for human consumption. Ultrafiltration is a mere particle filtration, soluble components are not held back.

0.3 APPLICATION

The plant has been designed for the processing of condensates from air compressors. Note that only lubricants suitable for the lubrication of compressors are used. Any other application of this unit only after prior consultation with the manufacturer.

0.4 ALTERATIONS ON THE UNIT

Any alterations and/or changes on the unit without the manufacturer's approval render the warranty null and void.

0.5 TRANSPORT DAMAGES, WASTE WATER QUALITY/LEAKS

Each and every unit is manufactured with the greatest care - but in principle there is always the danger of damages during transport which may result in either or both leakages in the unit or unsatisfactory waste water quality.

Please check the first waste water result of the ultraaqua unit and observe the system during the initial operation phase.

0.6 PROTECTION AGAINST FROST

The machine shall only be installed in a frost free location. Freezing of the membrane will destroy this part irreversibly. The residual oil content of the waste water would not meet legal requirements.

0.7 STORAGE OF USED MODULES

Once the membrane has been wetted it must not be allowed to dry out. This will destroy the membrane. When storing modules, keep them wet.

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0.8 OVERSTRESS/STORAGE TANK/COLLECTING TUB

CAUTION: Overcharging (Input exceeds output) can cause overflow.

In case of intermittent condensate amount it is generally advisable to install a storage tank beforehand. A connection to the automatic control which regulates the condensate supply out of the storage tank is prefitted.

The installation of a collecting tub

- ultrafilter art - no. 330616
- 52" x 36" x 9"
- Volume - 66 gallons
5 mm steel, primed and coated

protects from damage to the environment.

REMARK: By adding another membrane (see ultracarepac 6/12) the performance of ultraaqua can be increased.

1. DESCRIPTION OF ULTRAFILTRATION UNIT FUNCTION WITH BACK FLUSH

The condensate enters the pressure relief chamber through the condensate input. There the condensate is separated from the pressurized air, the air exhausts dry and silent to the atmosphere. The particles settle in the dirt collection chamber. The condensate flows through a coalescence filter. Small oil drops cling to its ribs, coalesce to form larger drops and rise to the surface even faster. This oil film is removed by means of the high-adjustable oil weir and is siphoned of into a can.

The condensate is sucked in by a pump, freed of particles by the prefilter and is subsequently pumped across the membrane module. The pressure difference resulting in the valves (K1) and (K2) is responsible for the passing of the water through the membrane, according to the principle of crossflow-ultrafiltration. The pump is switched off and on by means of two contacts and a third contact operates the overflow alarm.

The amount of condensate to be returned partially is set by valve (K2).

The back flush of the filter cake is effected by changing the pressure values created by the flowing condensate. For this purpose the permeate valve closes while pump continues running.

2. PREPARATION FOR OPERATION

Caution: Overcharging can cause overflow!

2.1 ASSEMBLY OF TANK

1. Accessibility

In order to have a proper and suitable access to all parts for checking tasks, maintenance and service jobs, an area of at least 50 cm width needs to be kept clear in front of the ultraaqua. Adequate space to access the drain plugs on the bottom of the UFA should be left to enable emptying the vessels. Every tank of the UFA may be drained separately (1/2" plug).

2. Horizontal positioning of the container

Lift the container on the sides and screw in all foot bolts as far as they will go. Ensure the separator is in a horizontal position by screwing foot bolts about approximately (spanner SW 17, spirit level). All feet should have solid and even floor contact as otherwise the container may later warp.

3. Sample tap installation

Screw the enclosed ball valve sealed with PTFE tape into the opening "Probe/sample".

4. Installation of connections

Secure all connections with hose clamps supplied. Cut all connection hoses to lengths as needed at your installation from the hose supplied. Make sure that all connections are as short and direct as possible so that no "backwater" may influence proper operation of the system. All fittings are to be mounted using Teflon tape as sealants.

5. Connection of water outlet to sewer

Screw one hose fitting into the opening marked "Wasser/water" and lead appropriately cut hose to the nearest sewer.

6. Connection of oil overflow to oil can

Screw one hose fitting into the opening marked "OI/oil" and lead appropriately cut hose into the can.

7. Filling of the container with water

Lift the cover and pull the adjustable oil weir to its highest possible position, then fill

- the large" tank and
- the circulation tank until the top level switch floats

Now push the oil weir down so it is 1/4" above the water level.

8. Connection of condensate inlet to the condensate network

Pressurized air condensate will accumulate at the preseparator of the compressor, at the cooling dryer, at the pressure tank and at every filter housing.

Each condensate drain must be connected to a condensate pipe. These pipes need to be laid out with a slight slope (minimum 1%) towards the ultraaqua and end just above the condensate inlet. The individual condensate pipes must be fed to a 1" collecting pipe in a bow from the top.

Note: Before any condensate is fed into the system for the first time, the performance of the system must be determined and taken note of using tap water (cf. next page!).

Mount a 1 inch pipe fitting to the end of the collection pipe and connect this with a piece of hose. Do not forget to secure with hose clamps!

Note:

- Installation of the ultraaqua only in frost free rooms.
- When using manually operated condensate drains the amount of condensate should be kept as small as possible in order to get continuous flow conditions in the tank.
- Timer controlled drains should only be used under observance of the maximum valve seat diameter (maximum 8 mm), and never should several of them be opened simultaneously.
- Simultaneous operation of several condensate drains may result in overloading of the pressure relief chamber and consequently in insufficient separation of condensate and pressurized air. The opening times should therefore be kept as short as possible (cf. also section on troubleshooting).

2.2 ADJUSTMENT OF OPERATION PARAMETERS

Note: Before starting operation with the system please make sure that all connections have been made accordingly to the above instructions.

Note: If the pump runs without water, the axial face seal can be destroyed.

1. Setting the pressure difference over the module

Lift system cover. Valve (K1) and (K3) should be fully opened. Valve (K2) should be fully closed. Turn the power switch to the system on. Wait until gauge (M2) shows a stabilized pressure. Once gauge (M2) shows a stable pressure, close valve (K1) slightly until gauge (M2) shows 2 bar. Then open valve (K2) slightly until gauge (M2) shows a pressure drop of 0.1 bar. Gauge (M2) should now read 1.9 bar.

2. Setting the back flush interval

Back flush occurs every 8 minutes and last 3 minutes. This is set at the factory.

3. Checking the membrane capacity

In order to determine the effectiveness of future cleaning procedures, the capacity of the system for 'filtering' clean tap water must be measured before the first condensate meets the membrane.

Take note of the volume of tap water the system shows with the above pressure settings and insert value in the following line:

water performance_{new} = _____gallons/hour

Upon closing the cover your ultraaqua is now ready for operation and will work automatically.

JOB INSTRUCTION: "CLEANING PROCEDURE ULTRAAQUA"

3. MEMBRANE CLEANING

Time to clean

Due to the process a very oily filter cake accumulates on the membrane. A cleaning procedure is necessary when the water performance is down to half of the nominal capacity. It is better to clean once too often than once too rare!

Preparation

Condensate input must be switched off during cleaning. For cleaning the circulation tank must be empty. The valves must be switched as follows:

valve (K1):	open
valve (K2):	closed
valve (K3):	closed

Cleaning

Mix 4 gallons of hot water (105-110°F) with ultrafilter cleaning agent (Concentration: 1 ounce/gallon).

NOTE: Any ph-value less than 4 and greater than 8 and/or temperatures of more than 122°F will destroy the membrane!

Fill the hot cleaning agent into the circulation tank and run the system for half an hour. The measure performance with cleaning agent by opening valve (K3) and determine the performance at correct pressure settings (cf. 2.2). The flow should approximate the capacity of a new membrane package. Then remove the cleaning agent from the circulation container. Open the condensate inlet and adjust operation parameters as described in 2.2.

4. TROUBLESHOOTING

1. The container seems not to separate oil

The free oil introduced into the system is in great quantities held back by the wall between the dirt collection chamber and the separation basin. The oil, then removed by the coalescence filter, needs to reach the thickness in the second separation basin which exceeds the height of the oil weir protruding from the surface. Depending on the adjustment of the oil weir it may last months before the first drop of oil flows into the can.

2. Presence of water in the oil can

The oil weir has been set too low. By turning it, pull it higher. Check the effect after a few days and correct the setting if required.

EXPLANATION: Excessive amounts of condensate in too short time may raise the water level in the container by several millimeters. The oil accumulated on the surface flows firstly into the tank, then condensate follows. The can is partially filled although inspection shows that the skimming ring is well above the fluid level. This operation mode may occur without any prior warning and at random, especially if e.g. various independent condensate drains open simultaneously. The waste water quality is, however, not affected!

TIP: The water in the can may carefully and in portions be filled back into the container.

In all other cases, please contact the manufacturer.

3. The system fails to attain the performance

When starting the system, the container is filled with water. This water is exchanged with condensate during the course of time; the oil concentration in the container rises continually. Slowly but surely a filter cake is formed, which, due to its high oil content, inhibits water flow through the membrane.

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Cleaning should be initiated no later than when the sewage performance has fallen below half of the nominal capacity. It is better to clean once to often than once to rare. Should any such cleaning not bring forth the desired effect, in most cases it's the blame of a too cold temperature of the cleaning agent. In all other cases please contact the manufacturer. Check whether all valves are switched and operate correctly.

4. Pre-filter

When gauge (M1) shows at correct pressure settings a pressure of 3 bar or less, the pre-filter must be replaced.

5. The "MAX" signal light shows

The condensate input exceeds the waste water capacity of the system. Check whether the waste water line is blocked. Check the waste water capacity of the system and, if necessary, clean.

In case of intermittent condensate amount it is generally advisable to install a storage tank beforehand. A connection to the automatic control which regulates the condensate supply out of the storage tank is prefitted (external feed ON/OFF).

The flashing of this LED can also mean an action of the pump's motor protection.

The installation of a collecting tub protects from damage to the environment.

5. MAINTENANCE ULTRAAQUA

5.1 WASTE WATER QUALITY (USE OF TEST SET T)

In order to provide proper function of ultraaqua a regular checking of the waste water is required.

For this purpose draw a sample at the water outlet. compare the sample with the reference windowlet supplied with the test set T. Should the sample be cloudier than the reference windowlet verify the torque ratio of the membrane's mounting device. If it is correct, a new module will need to be fitted.

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5.2 DIRT COLLECTION CHAMBER CLEANING

Depending on the nature and the quantity of condensate the dirt collection chamber will need to be cleaned regularly, e.g. annually.

First close the condensate input to the container. Then pump out the first chamber. Then pump out the first chamber. During this process the water level in the container will fall to the top level of the coalescence filter. Now remove any dirt accumulation.

Any removed condensate may slowly be re-introduced into the system.

Any oily waste must be disposed of properly!

5.3 COALESCENCE FILTER CLEANING

With some oils a film will accumulate and settle down on the coalescence filter foam. This will inhibit water flow through the coalescence filter. Therefore clean this foam once per year.

Simply pull the cushion out of the system and squeeze out any oil from the foam. This oil may dip back into the container. Replace the cushion by pushing it back into the container up to the stops.

5.4 MEMBRANE MODULE REPLACEMENT

Should several cleaning procedures of the membrane not show the desired effect, the membrane has to be replaced.

1. Removal of power mains and securing

Remove all power sources to the system and secure them against accidental switch on.

2. Replacement

Loosen the two nuts (M16) on the module and lift out the membranes. Then insert the new membranes. Tighten nuts with a torque wrench 50 Nm. After 30 minutes, check the system for leaks.

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5.5 STORAGE OF USED MODULES/SHUT-OFF OF THE SYSTEM FOR LONG PERIODS

Please note that the used ultrafiltration module should never be allowed to freeze or dry out.

Should your system be inoperative for a long period of time, the module can be subject to detrimental effects of bacterial contamination.

The modules may stay in the system for a period of up to one week. For this purpose please clean the modules. Then add one of the preservation media listed below. Add about 4 gallons of solution to the circulation container and recycle for approximately 5 minutes with the valves (K2) and (K3) closed. Then loosen the nuts to a torque of 20 Nm.

To store the modules for a longer time prepare the modules as described above and store away in a closed container.

Preservations to be used may be (e.g.)

<u>CHEMICAL</u>	<u>CONCENTRATION</u>
Formalin solution	2-3%
Pre-acetic acid	0.1%
Sodium disulfide	1% (recommended)

Oil and oily wastes present a great hazard to the environment. Therefore waste handling for these substances is managed by specialist companies. Addresses may be found in you local telephone book or consult your municipal authority for proper waste management.

7. TECHNICAL SPECIFICATIONS ULTRAAQUA

Dimensions:	16"x24"x34" (width x depth x height)
System weight:	125 lbs aprox.(w\o condensate charge)
Container material:	PP-grey
Container content:	approximately 32 gallons
Max. ambient temperature:	95°F
Max. operating temperature:	115°F
Condensate network connections:	1" hose fittings in 1" thread sleeve
Pump:	230/V, 50 Hz, 0.37 kW USA: 110 V, 60 Hz, 0.55 kW
Membrane module:	Cellulosis tri-acetate
Filter surface area:	ultraaqua 6: 0.1m ² ultraaqua 12: 0.2 ²

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APPENDIX

- Transport regulations
- Accessories and services
- Schematic diagram
- Electric
 - Electronic board/connections
 - Electronic board/function
- Spare parts
- Consumption materials
- Photos

These Transport Regulations shall be applicable for all and any transportation, shipping and/or transfer of the oil water separation systems and are enclosed with each unit.

TRANSPORT REGULATIONS ULTRASEP PLUS/ULTRAAQUA

1. For any transport or shipping of the plants only original ultrafilter boxes with cardboard cushions supporting the unit base shall be used. Transport of ultrasep plus and ultraaqua only on a pallet.
2. All packaging for ultrasep plus and ultraaqua shall be marked according to DIN (German Industrial Standard) 55402 and ISO R 780:
 - Keep dry = stylized umbrella
 - Top = two arrows pointing up
 - Fragile = stylized glass

In addition to the above, ultraaqua packaging shall be marked "DO NOT SUBJECT TO FROST" or equivalent. All markings shall be made on all four sides of the packaging on an upright standing unit in large and easily visible fashion.

3. The manufacturer fits shock and tilt indicators on the ultrasep plus and the ultraaqua packaging, which are to be checked before actually transporting the units. The recipient of any shipment shall confirm by signature the indicators intactness and thus the receipt of undamaged goods. Should the indicators be damaged please contact:

ultrafilter GmbH, Bussingstra. 1, 42781 Haan 1, phone 02129/560-0

4. ultrasep plus and ultraaqua may only be shipped with all four feet removed from the unit.
5. ultrasep plus and ultraaqua may only be shipped in a complete dry and oil-free state, i.e., without coalescence filter, without activated carbon and completely emptied.
6. For outside temperature of less than 32°F ultraaqua units must be completely emptied of all and any liquids (pipes, pump) and transport is only allowed under frost free conditions (membrane!).
7. These transport regulations are included with each unit and form part and portion of the manual.

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8. The note "We take reference to the special transport regulations of ultrasep plus and ultraqua units" shall be part and portion of all and any shipment papers, forwarder's instructions and/or delivery notes.

ACCESSORIES AND SERVICES

Collecting basin UFA-W

Base 52" x 36" x 9 high capacity 66 gallons, material 5 mm steel, primed and coated. Qualification approval to German Water Resources Law.

Residual oil content measurement

Residual oil content measurement for condensate of mineral or synthetic lubricated compressors.

NOTE: Please fill the sample into glass bottle. Don't forget to mark the bottle with name, address and telephone number. Without the trade name or an oil type sample it is impossible to work out precisely the measurement!
PRICED ON APPLICATION.

ELECTRONIC BOARD/CONNECTIONS

J1	(1 - 2)	:	Level a (= Minimum)
J2	(3 - 4)	:	Level b (= Middle)
J3	(5 - 6)	:	Level c (= Maximum)
J4	(7 - 9)	:	Alarm, potential free, 250 V/4 A max.
J5	(10-12)	:	Connection for external feed, potential free, 250 V/4A Max
J8	(12-21)	:	2/2-way-valve
J9	(22-24)	:	Pump, intern
J10	(25-27)	:	Mains voltage 110 V (-10%) to 230 V (+ 10%)

S1: Selection switch 50/60 Hz

S2: 2/2-way-valve operating time (=CLOSED)
Tracking range 30 s to 7 min. 30 s and

2/2-way= valve interval time (=OPEN)
Tracking range 2 minutes to 30 minutes

Adjustments by the manufacturer : S2:3 minutes
: :8 minutes

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ELECTRONIC BOARD/FUNCTION

- FUNCTION

The function of the board is controlled by three levels (a,b,c).

- EXTERNAL ALARM

Change-over contact, maximum 4A/250 V (AC), electrically isolated and potential free. The contact closes if the top level c is reached or if the motor protection is activated. Simultaneously the 'overload' LED flashes.

- EXTERNAL FEED

Change-over contact, maximum 4A/250 V (AC), electrically isolated and potential free. The contact is closed by the bottom level a and is opened by the top levels b or c. (LED 'External feed' ON/OFF). During filling operation pump and valves are currentless.

- INTERNAL PUMP

Make contact 20A/250 V (AC), short-term to 50A. The pump is supplied from electric mains. The pumps current limit adapts to varying electric mains; the limit is 10A +/-10% at an electric mains below 140 V (3.5A +/-10%) and 3.5A +/-10% above 190 V.

If this limit exceeds approx. 2 s the pump and the valves are switched off. After 43 s (50 Hz) resp. 34 s (60 Hz) a new start is initiated; during the quiescent period of the alarm contact is closed and the 'overload' LED flashes.

The pump is started by top levels b or c, bottom level a switches off the system. As long as the pump works, the LED's 'Pump on' AND 'External feed' off Light and the time meter works. The running times of the pump are added up, the time gets an impulse just once an hour.

- 2/2-WAY VALVE

Make contact 4A/250 V (AC). The valve is supplied from electric mains. While the internal pumps runs, the valve is switched in adjustable intervals. Operating time is adjustable with the first four switches of S2 in steps of 30 s to 7 minutes 30 s, D12 lights. The quiescent period is adjustable within the last four switches of S2 in setps of 2 minutes to 30 minutes.

- ELECTRIC MAINS

The electronic board may be supplied without adjustment with voltages between 110 V and 240 V. the adaption of the current limit to 110/127 v resp. 220/240 V pumps power supply works automatically. The adjustment of the electronic board to a frequency of 50 Hz or 60 Hz is made by the first switch of S1 - a wrong position causes just a 20% mistake in the peirods of the valves. The valves and the electronic control are protected by a common 1A fuse.

- TESTING DEVICE J12

- **ATTENTION:** the pins are not electrically isolated - its for testing the pjmps protection without connected pump.

Between pin 2 and 3 the reference voltage for the current measurement may be controlled: 212mV +/-110% for mains voltage below 140 V resp. 74 mV +/- 10% above 190 V.

By forming a bridge contact from pin 1 to pin 2 the function of the protection may be controlled: below 140 V there may be none, above 190 V there must be - after 2 S - a reaction release.

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ULTRAAQUA SPARE PARTS

POS	ultafilter Article No.	
1	330749	wet-pit pump, 230 V/50 Hz
	330750	wet-pit pump, 110 V/60 Hz
2	330681	pressure gauge, 0-4 bar, 1/4"
	330737	pressure gauge, 0-6 bar, 1/4"
3	330673	level switch
4	330748	2/2 way valve, NO, 110 V/60 Hz
5	330506	ball valve 1/4"
6	330020	assembly kit
	330505	4 feet,high adjustable
	330506	1 ball valve 1/4"
	330507	1 reduction double mioppel 1/2"-1/4"
	330557	4 hose nozzle d = 25, 1"
	330513	4 band clamp fitting 23-35/9
7	330705	ABS switch T 223 G, 200 x 150 x 75
8	330762	ultraaqua 6/12 control board 110-230 V/50/60 Hz

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ULTRAQUA CONSUMPTION MATERIALS

POS	ultrafilter Article No.	Quantity	
-	330037 ultracarepac 6		
	330300	1	membrane 971C-F014-4000
	218664-50	1	prefilter 'ultrapolydepth' 971C-F014-1500
	330039	1	cleaning set R 971C-F014-5000
	151021		O-ring, filter 971C-F014-5125
-	330038 ultracarepac 12	2	membranes
	330300	1	prefilter 'ultrapolydepth'
	218664-50	1	cleaning set R
-	330039 cleaning set R		
	330559		cleaning agent, suff. for about 10 applications, safety data sheet, instruction
-	218664-50		prefilter ultrapolydepth P-PP-TF 10/30 5 micron
-	218664-25		prefilter ultrapolydepth P-PP-TF 10/30 25 micron

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Photos ultraaqua

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DISTRIBUTION SHEET

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Project Title/Work Order OPERATION AND MAINTENANCE MANUAL FOR THE ULTRA AQUA UFA-6 9F-2014		EDT No. 608230 ECN No.

Name	MSI N	Text With All Attac h.	Text Only	Attach. / Append ix Only	EDT/E CN Only
RM NIELSEN	N2-56	X			
CG McCARGAR	N2-56	X			
WH PAYZANT	N2-54	X			
GJ BOEHNKE	N1-88	X			
GC PERKINS (JACKIE)	N2-12				
CENTRAL FILES	A3-88	X			

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