

OSCAR-II Multi Zone
O& M and Troubleshooting Manual

Manufactured by:

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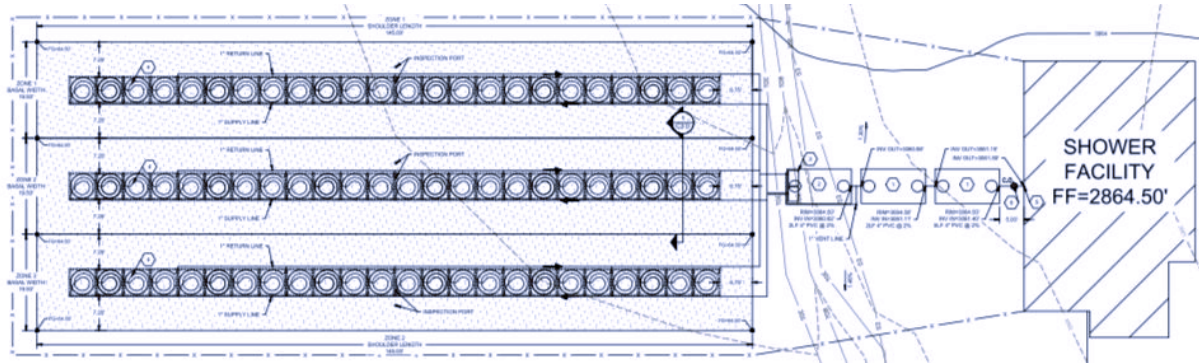
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System Description



The *OSCAR-II* is an onsite sewage dispersal component for use with treated wastewater meeting concentrations of no more than 100 mg/l carbonaceous biological oxidation demand and 75 mg/l total suspended solids. Wastewater first passes through a treatment vessel and then into a dosing tank where it is dosed to the *OSCAR* coils. Effluent is micro dosed into a layer of ASTM C-33 or medium sand where physical, biological, and chemical treatment processes remove organic compounds and pathogens from the waste stream. Treated liquid then migrates downward to the receiving soil where final discharge of treated wastewater enters the soil environment.

Performance expectations

The typical performance of the *OSCAR-II* system produces final effluent quality that is clear, odorless, or a slight musty smell. The *OSCAR-II* system meets Class I wastewater treatment standards set forth in NSF/ANSI standard. Testing performance during NSF testing was:

<u>CBOD</u>	<u>TSS</u>	<u>Fecal coliform w/UV</u>	<u>Turbidity</u>
<2	<2	<2000 MPN/100ml	<5 NTU

Parts list

Discharge tank:

- HWN-1-RF-CX Headworks (X = number of zones)
- HWN-1-checkX (x = number of zones)
- LOT-30, 1/2 hp, 30 gpm, pumps
- Floats switches, normally open (SJ Rhombus)
- Control panel (**LF1P-RF-DAX-CX**), *Lowridge Onsite Technologies, Inc.*, X = number of zones)
- HV-100BCK, hose & valve assemblies

Headworks:

- Housings
- 1" *Netafim*[™] disc filter, 120 mesh, 130 micron (part number 25A45-120)
- 1" flow meter
- 6 or more - 1" 24 volt solenoid valves, model number LVET1GH2 (made by *DOROT*)
- 3-Pressure gauges: 0-100 psi oil filled
- 1" check valves (same number as zones)

OSCAR-II Media:

ASTM C-33 concrete sand as per WADOH *Recommended Standard & Guidance for Intermittent Sand Filter* or medium sand.

Basic Tools and Equipment

Cordless drill motor & misc. bits
 Philips and flat head screwdrivers
 Multi test meter

DO test kit (recommend ampoule type)
Litmus paper
Shovel
Channel locks
Pipe cutter
Pipe saw
Glue
Water hose and nozzle
Extension cord
Wire cutters
Wire strippers
Turkey baster
Sump pump w/adapter to garden hose
Rubbing alcohol
Dielectric grease

Spare Parts

1" disc filter cartridge, 120 mesh, 130 micron
1" normally closed two- way solenoid valve, Netafim™
Normally open float switches
Splice box screws
Riser lid bolts
Wire nuts for 12 gauge and 16 gauge wire

Maintenance Schedule:

During the first two years after installation there are 4 inspections: two six month and two annual inspections. The items and intervals to be inspected are as follows:

Six month inspections: At six months and 18 months after installation the inspections are cursory in nature. Components to be checked and observations recorded are: Headworks pressure and forward flow, and surfacing effluent on OSCAR.

Annual inspections: All components listed for the six month inspection plus all other items listed on the O&M inspection check list

Routine Procedures

The most important aspects of operation and maintenance of onsite systems are the accurate observation of system performance and the complete recording of the observations. Incomplete or inaccurate data will lead to false conclusions and the corresponding maintenance activities could be un-necessary and costly. In a majority of cases, monitoring visits will result in a confirmation that the system is functioning as intended. Other than routine, preventative maintenance, very little should be required to keep the system functioning properly. In the few instances where something is actually wrong with the system and corrective action is needed, proper diagnosis starts with correct observation. To insure no component of the system is skipped, follow the flow of wastewater: treatment vessel, discharge tank, headworks, OSCAR field. For details of how to perform the specific operations mentioned below, see appendices.

Treatment Vessel:

Follow recommendations of treatment vessel's manufacturer.

Headworks:

Observations:

- Check and record pressures and flow.
- Check proper operation of flushing sequence.

Maintenance:

- Clean disc filter.

Discharge tank:

Observations:

- Measure sludge level.
- Check clarity of liquid.
- Check float switches: properly attached and function.

Maintenance:

- When 6" of sludge accumulates, pump the tank.
- Check inside splice box and remove any accumulated condensation.

Trouble Shooting

This section will outline the common problems that may arise. There will follow a detailed description of how to diagnose the critical internal components. For further information contact *Lowridge Onsite Technologies, Inc., 877-476-8823*.

Problem:	Possible causes:	Solutions:
No flow through the <i>Coils</i> .	Dosing pump doesn't run. Valves 1 or 2 don't open Disc filter plugged Emitters plugged	Repair or replace pump Repair or replace valve(s) Clean or replace disc cartridge Chlorine wash or replace
Disc filter clogging	Flush sequence failed Tanks need servicing	Restore flushing sequence Pump tanks
Two zones dose simultaneously	One C valve stuck open One check valve broken	Fix valve Replace check valve

Failed float switch: If all other indicators test negative (no high water conditions and pumps work) a float switch may be shorting out. Use a clamp type amp meter to measure possible amperage on float switch leads inside the control panel. The float that registers current is shorting out and needs to be replaced.

Leaky tanks: If alarms are occurring during periods of rain fall, the tanks maybe leaking. Connections at the riser/tank connects, pipe connection to tanks, and protrusions through risers could be leaking. Inspect and seal as needed.

No Flow Through *Coil*:

Pump doesn't work:

See section on "**High Level Alarms**".

Valves #1 and #C1 (C2, C3,..) Don't Open: See "**Disc Filter Clogging**" section.

Disc Filter Clogged: "**Disc Filter Clogging**" section.

Emitter Clogged: Flush Coil into septic tank with chlorine solution or replace *Coil*.

Liquid Surfacing on OSCAR:

Wrong Media: Refer to the media specifications in "**Parts List**".

Biological Overloading: Examples of the causes of biological overloading can be one or a combination of the following: heavy use of medications by the residence of the house, heavy use of disinfectants and cleaners, certain cooking habits (heavy use of cooking oils and fats), heavy use of oil based soaps and lotions. This list is not inclusive!

Effluent samples must be sent to a certified laboratory for analysis: biological oxidation demand (BOD), total suspended solids (TSS), and fats, oils and grease (FOG).

A professional should be consulted to determine what the cause of the over load is before lasting corrective action can be taken.

Disc Filter Plugging:

To determine if the disc filter is plugged, review the pressure gauge readings. For pressure gauge readings refer to the original start-up pressures. A pressure drop between #1 and #2 indicates the disc filter is plugging and restricting flow to the *Coil*. If so, conduct a manual flush of the disc filter. If the pressures are not corrected then disassemble and replace disc cartridge with a clean unit. The disc filter could be plugging for a variety of reasons.

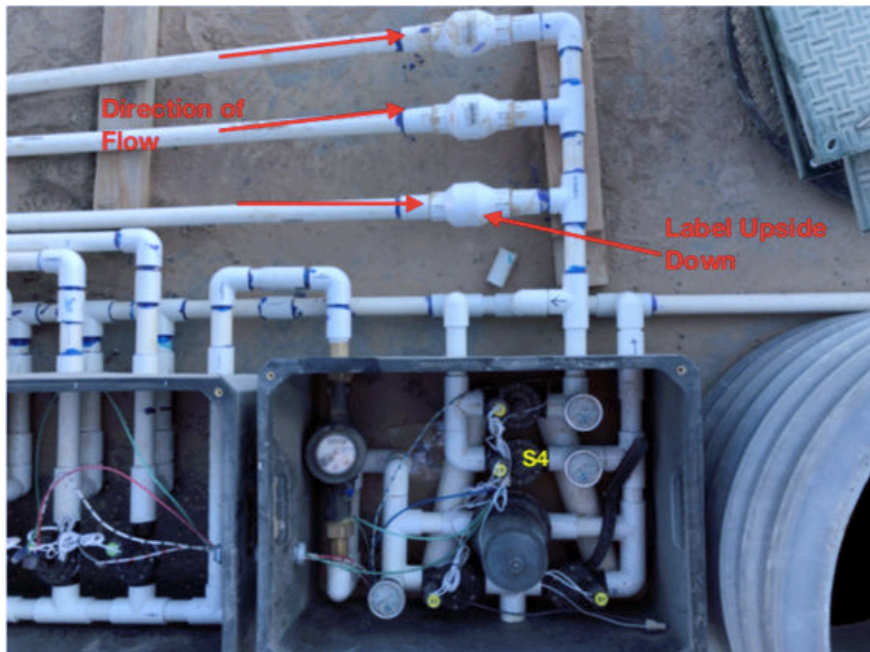
- If the treatment vessel has not been serviced adequately, excessive solids may carry-over from the septic to the recirculation tank.
- Inappropriate wastewater habits in the facility may cause a biological upset in the septic tank resulting in higher organic concentrations in the septic tank effluent.

- The Headworks valves malfunction and do not properly flush the disc filter or *Coil*.

Two Zones Dose Simultaneously:

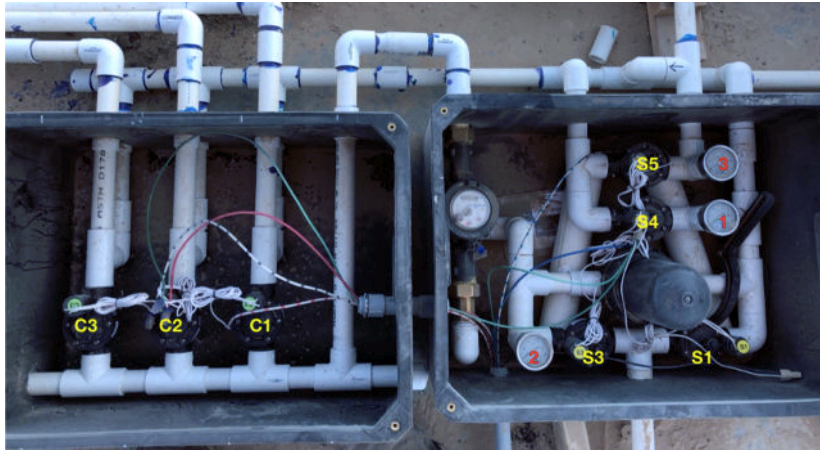
There are two causes for two zones to dose simultaneously: one of the C valves is stuck open or one of the check valves in the HWN-1-checkX headworks is broken. The zone that has the malfunction is the zone that will operate correctly during the start-up procedure.

Once the zone is identified as the problem, inspect the check valve first by removing it from the headworks. Each check valve is installed with two unions. Check to make sure the flapper is operating properly and is installed correctly: directional arrow is pointed the right direction (toward valve 5) and the "This side up" label is on top.



Headworks Diagnostics:

To trouble shoot the headworks, refer to the following illustration and Appendix B:



C1, C2, & C3 are zone valves. S1 and a C valve doses a zone. S1, a C valve and S5 flushed a zone. S3 & S4 backflushes the disc filter.

Diagnostic check of reverse flush headworks:

Position all toggle switches inside the control panel to "OFF" mode.
Position pump 1 and valves S1 & C1 in "HAND" mode.

Pump runs but no pressure on any gauges. While pump is running manually open S1. If pressures on all three pressure gauges begin to rise, the solenoid for S1 needs replacing or solenoid is not being energized (possible bad wire connection). Check voltage at panel between V1 and VN, and in the headworks at the corresponding wire connections. If voltage is good (24-27 volts) the solenoid is bad. Repeat for other "C" valves.

Pump runs and gauges G1 and G2 register pressure and G3 is "0". Manually open C1. If the readings on G3 begin to rise, the solenoid for C1 needs replacing or solenoid is not being energized (or wire connection is bad). Check voltage at panel between V1 and VN and C1 and VN, and in the headworks at the corresponding wire connections. If voltage is good (24-27 volts) solenoid is bad. Repeat for all "C" valves.

Pump runs and all gauges read the same pressure (more than 0 psi) with no flow. Emitters are plugged.

Pump runs and G1 registers pressure and G2 and G3 read 0 psi (or significantly less than G1). The disc filter is plugged. Further diagnostic work is needed to determine why filter is not functioning (see below).

Disc Filter Flush Diagnostics: Open inlet of septic tank. Position pump #1A and #1B and valves 3 & 4 in "HAND" mode (all other toggles in OFF). G2 will have a higher reading than G1, and G3 will be zero and water will be entering into the inlet of the septic tank at a rapid rate. If not, follow the diagnostic steps:

Pump running with no pressure and no flow into septic tank inlet. Manually open S3. If pressure on G2 and G1 rise and water flows into septic tank inlet, S3 needs replacing or is not getting energized (possible bad wire connection). If pressures rise with no water flowing into septic tank inlet, manually open S4. If pressures drop and water flows into septic tank, both S3 and S4 are bad or both are not getting energized. Check voltage at panel between V2 and VN, and in the headworks at the corresponding wire connections. If voltage is good (24-27 volts) one or more solenoids are bad.

Coil Flush Cycle Diagnosis: Position pump #1A & B, valves S1 & C1, and 5 in "HAND" position.

Pump runs, pressures on all gauges are close to identical and no flow into septic tank inlet. Manually open S5. If pressure on G2 and G3 drop and water flows into septic tank inlet, S5 solenoid is bad or valve is not being energized (or has a bad wiring connection). Check voltage at panel between V3 and VN, and in the headworks at the corresponding wire connections. If voltage is good (24-27 volts) solenoid is bad. Repeat for all "C" valves.

At completion of the diagnostic steps position all toggle switches in the "AUTO" position.

Appendices

Measuring *Coil* Dose Discharge Rate:

Position all Toggle switches in the "OFF" position. Switch pump 3, valves S1 & C1 to "HAND" and allow pump to run until all pressure gauge readings are stable. While pump is running, measure flow for 1 minute on the flow meter. Flow for one OS-50 is 0.35 gpm. Flow for an OS-100 is 0.7 gpm. Repeat for all "C" valves.

Reposition all toggle switches to the "AUTO" position.

Panel Operations

The **LF1P-RF-CX** control panels are 110 volt universal panels for larger *OSCAR-II* systems. It has the capacity to operate two major outputs: discharge pump, and the "Reverse Flush" headworks. All logic is controlled by an Siemens LOGO . The pump operation options are as follows:

- Discharge Pumps (Pump #3 A&B): are operated in a time-dose mode, duplex (alternating) sequence. Pump #3A and #3B alternate between doses and pressurize the *Coil*. Both pumps run to back-flushes the disc filter and forward flushes the *Coils*. The LOGO allows the operator to determine the number of dose cycles before the disc filter flush and *Coil* flush cycles.

The timers have the following factory default settings:

- Discharge-pump dosing: 30 seconds off, 30 seconds on. (V1_OFF, V1_ON)
- Disc filter flush: after pre-set number of dose cycles have completed, the disc filter flush "ON" cycle runs for 30 seconds. (V2_ON).
- *Coil* flush: after Disc filter flush is completed, the *Coil* flushes for 2 minutes (V1V3_ON). The V1V3 count in the parameter settings will be set for the number of zones: ON = 4 for four zones. This way each zone will be flushed before the next series of doses.

Parameter Setting Instruction: See instruction inside panel.

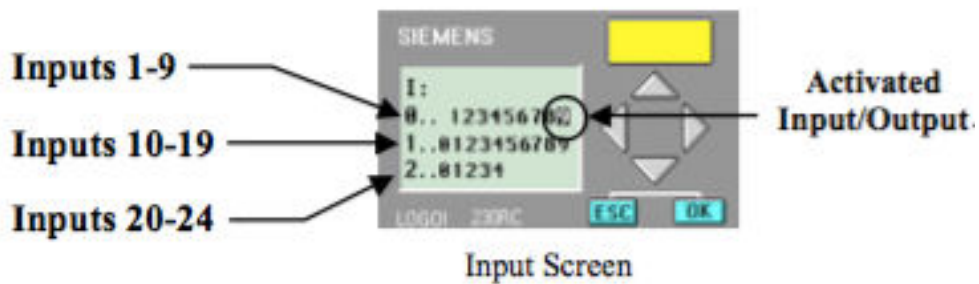
Start Up Procedures:

Start Up Procedures:

Prior to conducting any of the following procedures, inspect the wiring to insure the system is correctly wired. Pull the float tree from the tank and place across the tank opening so all the floats hang down. Now power up the system and turn all the breakers to the “ON” position and all of the toggle switches in the off position. Ensure there is enough water in tanks to conduct pump tests.

a. Test floats:

On the Siemens Logo scroll to the input screen as shown here:



When lifting the floats check this screen to determine if the floats are wired into the correct position. When the floats are lifted a corresponding digit will be back lit. The input values are as follows:

- 1 = bottom reducing OFF float
- 2 = timer enable float.
- 3 = high level alarm float

Test Discharge floats:

Lift top float. Input indicator “3” will back light and the alarm should sound and the beacon should illuminate.

Lift the middle float and input “2” will light.

Lift bottom float. Input indicator “1” will back light.

b. Test pumps and valves:

Discharge pumps and valves:

Place valve S1 & C1 toggle switch and pump 3A toggle switch to HAND position. Pump should dose and all three pressure gauges should stabilize. No water should be flowing into septic tank. Repeat this step by alternating to Pump 1B and C2. Keep repeating this step until all “C: valves have been tested.

Place valve 3 & 4 toggle switch to HAND and all other valve toggle switches to OFF, and both pumps #3A & B in HAND. Pumps should run, pressures should change: gauge 2 highest pressure, gauge 1 less than 2, and gauge 3 should indicate 0 psi. Water should be flowing into septic tank very rapidly. There should be no flow registered on the flow meter.

Place valves S1 & C1 and valve S5 in HAND position and valves S3 & S4 in OFF position, and both pump 3A & B in HAND. Pressure on gauge 1 should indicate the highest pressure, gauge 2 less than 1, and gauge three should indicate between 0-3 psi and water should be flowing into septic tank at a moderate rate. Repeat this step with all of the “C” valves.

Position all toggle switches in the AUTO position.

Aerators:

Aerators each have its own pressure switch. To test each aerator individually turn all the aerators on. Disconnect each clear tube from the pressure switches, one at a time. An audible alarm and a corresponding alarm light should illumine. Test each aerator until all are completed.

When all the testing is completed, reconnect all the clear tubes to the pressure switches, all circuit breakers placed in the up (ON) position, and all toggle switches ion the up (AUTO) position.