



Oreco Systems®
Incorporated

*Changing the Way the
World Does Wastewater®*

Oreco Systems® OWNER'S MANUAL

**High Head Effluent Pumps
Two and Three Wire, Single and Three Phase
1/2 through 5 HP 50 and 60 Hz.**

PRE-INSTALLATION:

Inspect pump and motor for delivery damage.
Report any damage immediately to the shipping
carrier and to your dealer.

Pump performance is based on pumping clear
water.

Warranty is void in the following conditions:

If pump has pumped excessive abrasives –
excessive abrasives can cause premature
pump wear.

If entrained gas or air are present in the water
being pumped – these can reduce flow and cause
cavitation which can damage pump.

If pump has been operated with discharge
valve closed – severe internal damage
will result.

All installation work on this pump should be done
by a certified installer. All electrical connections and
tests should be made by qualified personnel.

Installation Record

Record the following nameplate information here for
future reference

| |
|-----------------------------------|
| Pump Model No: |
| Motor Serial No Date Code: |
| Liquid end Date Code: |
| Installer: |
| Installer Phone Number: |
| Date of Purchase: |
| Date of Installation: |

LIMITED WARRANTY

Oreco warrants to the original consumer of the pump listed below, that it will be free from defects in material and workmanship for the Warranty Period from the date of manufacture as noted on the liquid end.


| Product | Warranty Period |
|-------------------------------|------------------------|
| 4" PF Series Submersible Pump | 5 Year |


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106193101 (Rev. 04/09)


GENERAL SAFETY:


Carefully read and follow all safety instructions in this manual or on pump. Keep this manual with pump to aid in installation and operation of the unit. Maintain all safety decals on pump.


 This Triangle is the safety alert symbol. When you see this symbol on your pump or in this manual, look for one of the following signal words and be alert to the potential for personal injury:


 **WARNING** warns about hazards that can cause serious personal injury, death or major property damage if ignored.


The word **NOTE** indicates special instructions which are important but not related to hazards.


 **WARNING** Risk of explosion or fire. Do not pump flammable or volatile liquids or gasses with this pump.


 **WARNING** Hazardous pressure. Under certain conditions, submersible pumps can develop extremely high pressure. If installing this pump in any system other than the original wastewater treatment system for which it was designed, install a pressure relief valve capable of passing entire pump flow at maximum allowable system pressure.


 **Do not allow pump, piping, or any other system component containing water to freeze. Freezing may damage system, leading to injury or flooding. Damage caused by freezing is not covered under warranty. Allowing pump or system components to freeze will void warranty.**


 **WARNING** Risk of electrical shock. Disconnect electrical power supply before installing or servicing pump.

 **Risk of electrical shock.** Do not use pump in open bodies of water such as lakes, swimming pools, etc. Pump is not designed for such use and a dangerous shock hazard could result.

 Install, ground and wire pump according to local code and National Electrical Code or Canadian Electrical Code requirements, as applicable.

 Make sure line voltage and frequency of power supply match motor nameplate voltage and frequency. Incorrect voltage can cause fire, damage motor, and will void the warranty.

 **Unexpected starts.** Disconnect the power supply before attempting to service or repair the pump. Single-phase motor is equipped with a thermal overload switch which stops the pump if the motor overheats. This switch will re-close as soon as the motor cools down and can cause injury to anybody working on the pump or motor.

 Install pump according to all applicable code requirements.

Assembled pump/motor unit is CSA® Certified to U.S. and Canadian standards.


Motor alone is UL® Recognized and CSA® Certified.


PIPING:


Make sure that all system piping conforms to all applicable local and national plumbing codes and to good piping practice.

Pipe joint compound can cause cracking in plastics. Use a proper sealant when sealing joints in plastic pipe or connecting pipe to thermoplastic pumps.

WIRING / GROUNDING:

 **WARNING** Hazardous voltage. Can shock, burn, or cause death. Permanently ground pump, motor and control box before connecting power supply to motor. Connect ground wire to approved ground first and then connect to equipment being installed.

 Install a disconnect switch near the pump that opens all legs of the circuit.

 Ground pump and motor in accordance with national and local codes and ordinances that apply. Use a copper ground wire at least as large as wires carrying current to motor.

Motor is supplied with a copper ground wire. Splice this ground wire to a copper conductor that matches motor wire size specified in your control panel installation instructions.

NOTE: Wire sizes must adhere to local and National Electrical Code or Canadian Electrical Code requirements, as applicable.

Do not ground to a gas supply line.

WIRING CONNECTIONS:

All wiring must meet National Electrical Code or Canadian Electrical Code (as applicable) and local code requirements.

Use only copper wire when making connections to pump and control box.

To avoid over heating wire and excessive voltage drop at motor, be sure that wire size is at least as large as size listed in your control panel installation instructions.

Follow splice box manufacturer's instructions for a water-tight splice.


ROTATION – (3 Phase only):

To make sure motor is running in the right direction, proceed carefully as follows:

After electrical connections have been made as outlined, and with pump supported in flow inducer, momentarily turn on then turn off the switch connecting the motor to the power supply line. Note rotation of pump as motor starts. If connections are properly made, pump will “jerk” clockwise when looking into the pump discharge when started. If “jerk” is counter-clockwise, the motor is running in the wrong direction. Interchange any two cable leads where they connect to the “lead” terminals in the magnetic starter. With connections properly made, and pump lowered into water, turn on the switch again and the pump should deliver water according to the performance charts.

Pump will pump in reverse, but performance will be poor. Continued Operation in reverse will damage the pump.

INSTALLATION:

 **WARNING** Risk of electrical shock. Do not lift pump by the electrical cable. Lifting or carrying the pump by the cable can damage the cable and the pump, possibly causing injury or burns from electrical shock.

Install and adjust the float switches as needed for your installation. Set the float switches so that the pump will shut off before it runs dry or breaks suction.

OPERATION:


Pump should operate automatically from float switches in system.

Do not allow pump to run dry; severe damage will result.

Do not run pump with discharge valve closed.

Be sure that air bypass hole in pump is clear and allows a small stream to run during pump operation.

Table 1: Motor Insulation Resistance Rating

| Condition of Motor and Leads | OHM Value | Megohm Value |
|--|----------------------|---|
| New motor, without power cable | 20,000,000 (or more) | 20.0 |
| Used motor, which can be reinstalled in tank | 10,000,000 (or More) | 10.0 |
| Motor in Tank – Readings are Motor plus motor’s Power Cable | | |
| New motor | 2,000,000 (or more) | 2.0 |
| Motor in reasonably good condition | 500,000 to 2,000,000 | 0.5 - 2.0 |
| Motor which may be damaged or have damaged power cable (Do not pull motor) | 20,000 to 500,000 | 0.02 – 0.5 |
| Motor definitely damaged or with damaged power cable (Pull motor and repair) | 10,000 to 20,000 | 0.01 – 0.02 |
| Failed motor or power cable (Pull motor and replace motor or cable) | Less than 10,000 | 0 – 0.01 |
| Courtesy of Franklin Electric Company | |  |

The table above is based on readings taken with a megohm meter with a 500 VDC output. Readings may vary using a lower voltage Ohmmeter, consult Franklin Electric if readings are in question.

Single-Phase Motor Specifications (50 Hz) 2875 RPM, 1.0 Service Factor

| TYPE | MOTOR MODEL PREFIX | RATING | | | | FULL LOAD WATTS | LINE TO LINE (1) RESISTANCE (OHMS) | | EFFICIENCY % | | | POWER FACTOR % | | | LOCKED ROTOR AMPS | CIRCUIT BREAKERS OR FUSE AMPS TYPICAL SUBMERSIBLES | |
|--------|--------------------|---------------|--------|-------|------|-----------------|------------------------------------|-------|--------------|-----------|-----|----------------|-----|-----|-------------------|--|------------------------------|
| | | HP | KW | VOLTS | AMPS | | MAIN | START | F.L. | 3/4 | 1/2 | F.L. | 3/4 | 1/2 | | NONTIME DELAY (STD.) FUSE OR CIRCUIT BREAKER | DUAL ELEMENT TIME DELAY FUSE |
| | | 4-INCH 2-WIRE | 244555 | 1/2 | 0.37 | | 220 | 3.9 | 610 | 6.3 - 7.7 | - | 62 | 59 | 51 | | 73 | 64 |
| 230 | 4.1 | | | | | 630 | 6.3 - 7.7 | - | 59 | 55 | 47 | 68 | 60 | 50 | 26.1 | 15 | 5 |
| 244557 | 3/4 | | 0.55 | 220 | 6.0 | 880 | 3.7 - 4.6 | - | 63 | 59 | 52 | 70 | 62 | 53 | 30.0 | 20 | 7 |
| | | | | 230 | 6.5 | 920 | 3.7 - 4.6 | - | 61 | 56 | 48 | 67 | 59 | 49 | 36.6 | 20 | 7 |
| 244558 | 1 | | 0.75 | 220 | 7.3 | 1180 | 3.2 - 3.9 | - | 65 | 62 | 55 | 75 | 66 | 54 | 42.0 | 20 | 9 |
| | | | | 230 | 7.6 | 1200 | 3.2 - 3.9 | - | 63 | 59 | 52 | 71 | 63 | 52 | 43.9 | 20 | 9 |
| 244559 | 1 1/2 | | 1.1 | 220 | 10.6 | 1800 | 2.2 - 2.7 | - | 64 | 56 | 56 | 78 | 70 | 58 | 50.6 | 30 | 12 |
| | | | | 230 | 10.8 | 1820 | 2.2 - 2.7 | - | 63 | 60 | 53 | 73 | 65 | 54 | 52.9 | 30 | 12 |

Single-Phase Motor Specifications (60 Hz) 3450 RPM

| TYPE | MOTOR MODEL PREFIX | RATING | | | | | FULL LOAD | | MAXIMUM (S.F. LOAD) | | WINDING (1) RES. IN OHMS | EFFICIENCY % | | POWER FACTOR % | | LOCKED ROTOR AMPS | KVA CODE |
|---------------|--------------------|--------|------|-------|----|------|-----------|-------|---------------------|-------|--------------------------|--------------|------|----------------|------|-------------------|----------|
| | | HP | KW | VOLTS | HZ | S.F. | (2) AMPS | WATTS | (2) AMPS | WATTS | M=MAIN RES. S=START RES. | S.F. | F.L. | S.F. | F.L. | | |
| 4-INCH 2-WIRE | 244504 | 1/2 | 0.37 | 115 | 60 | 1.6 | 10.0 | 670 | 12.0 | 960 | 1.0-1.3 | 62 | 56 | 73 | 58 | 64.4 | R |
| | 244505 | 1/2 | 0.37 | 230 | 60 | 1.6 | 5.0 | 670 | 6.0 | 960 | 4.2-5.2 | 62 | 56 | 73 | 58 | 32.2 | R |
| | 244507 | 3/4 | 0.55 | 230 | 60 | 1.5 | 6.8 | 940 | 8.0 | 1310 | 3.0-3.6 | 64 | 59 | 74 | 62 | 40.7 | N |
| | 244508 | 1 | 0.75 | 230 | 60 | 1.4 | 8.2 | 1210 | 9.8 | 1600 | 2.2-2.7 | 65 | 62 | 74 | 63 | 48.7 | N |
| | 244309 | 1.5 | 1.1 | 230 | 60 | 1.3 | 10.6 | 1700 | 13.1 | 2180 | 1.5-1.9 | 67 | 66 | 80 | 73 | 66.6 | M |

Single-Phase Motor Specifications (60 Hz) 3450 RPM

| TYPE | MOTOR MODEL PREFIX | RATING | | | | | FULL LOAD | | MAXIMUM (S.F. LOAD) | | WINDING (1) RES. IN OHMS | EFFICIENCY % | | POWER FACTOR % | | LOCKED ROTOR AMPS | KVA CODE |
|-----------|--------------------|--------|-----|-------|----|------|-------------------------|-------|-------------------------|-------|--------------------------|--------------|------|----------------|------|-------------------|----------|
| | | HP | KW | VOLTS | HZ | S.F. | (2) AMPS | WATTS | (2) AMPS | WATTS | M=MAIN RES. S=START RES. | S.F. | F.L. | S.F. | F.L. | | |
| 4" 3-WIRE | 224301 | 2 | 1.5 | 230 | 60 | 1.25 | W10.0 B9.3 R2.6 | 2060 | W13.2 B11.9 R2.6 | 2610 | M1.8-2.3 S5.8-7.2 | 71 | 73 | 95 | 93 | 51 | G |
| | 224302 (3) | 3 | 2.2 | 230 | 60 | 1.15 | W14.0 B11.2 R6.1 | 2940 | W17.0 B12.6 R6.0 | 3350 | M1.0-1.5 S3.5-4.4 | 77 | 76 | 97 | 97 | 83.5 | H |
| | 224303 (4) | 5 | 3.7 | 230 | 60 | 1.15 | W23.0 B15.9 R11.0 | 4920 | W27.5 B19.1 R10.8 | 5620 | M.68-1.0 S1.8-2.2 | 76 | 76 | 100 | 100 | 121 | F |

Three-Phase Motor Specifications (60 Hz) 3450 RPM

| TYPE | MOTOR MODEL PREFIX | RATING | | | | | FULL LOAD | | MAXIMUM (S.F. LOAD) | | LINE TO LINE RESISTANCE OHMS | EFFICIENCY % | | LOCKED ROTOR AMPS | KVA CODE |
|--------|--------------------|--------|------|-------|------|------|-----------|-------|---------------------|---------|------------------------------|--------------|------|-------------------|----------|
| | | HP | KW | VOLTS | HZ | S.F. | AMPS | WATTS | AMPS | WATTS | | S.F. | F.L. | | |
| 4-INCH | 234501 | 1/2 | 0.37 | 200 | 60 | 1.6 | 2.8 | 585 | 3.4 | 860 | 6.6-8.4 | 70 | 64 | 17.5 | N |
| | 234511 | | | 230 | 60 | 1.6 | 2.4 | 585 | 2.9 | 860 | 9.5-10.9 | 70 | 64 | 15.2 | N |
| | 234541 | | | 380 | 60 | 1.6 | 1.4 | 585 | 2.1 | 860 | 23.2-28.6 | 70 | 64 | 9.2 | N |
| | 234521 | | | 460 | 60 | 1.6 | 1.2 | 585 | 1.5 | 860 | 38.4-44.1 | 70 | 64 | 7.6 | N |
| | 234502 | 3/4 | 0.55 | 200 | 60 | 1.5 | 3.6 | 810 | 4.4 | 1150 | 4.6-5.9 | 73 | 69 | 23.1 | M |
| | 234512 | | | 230 | 60 | 1.5 | 3.1 | 810 | 3.8 | 1150 | 6.8-7.8 | 73 | 69 | 20.1 | M |
| | 234542 | | | 380 | 60 | 1.5 | 1.9 | 810 | 2.5 | 1150 | 16.6-20.3 | 73 | 69 | 12.2 | M |
| | 234522 | | | 460 | 60 | 1.5 | 1.6 | 810 | 1.9 | 1150 | 27.2-30.9 | 73 | 69 | 10.7 | M |
| | 234503 | 1 | 0.75 | 200 | 60 | 1.4 | 4.5 | 1070 | 5.4 | 1440 | 3.8-4.5 | 72 | 70 | 30.9 | M |
| | 234513 | | | 230 | 60 | 1.4 | 3.9 | 1070 | 4.7 | 1440 | 4.9-5.6 | 72 | 70 | 26.9 | M |
| | 234543 | | | 380 | 60 | 1.4 | 2.3 | 1070 | 2.8 | 1440 | 12.2-14.9 | 72 | 70 | 16.3 | M |
| | 234523 | | | 460 | 60 | 1.4 | 2 | 1070 | 2.4 | 1440 | 19.9-23.0 | 72 | 70 | 13.5 | M |
| | 234504 | 1.5 | 1.1 | 200 | 60 | 1.3 | 5.8 | 1460 | 6.8 | 1890 | 2.5-3.0 | 76 | 76 | 38.2 | K |
| | 234514 | | | 230 | 60 | 1.3 | 5 | 1460 | 5.9 | 1890 | 3.2-4.0 | 76 | 76 | 33.2 | K |
| | 234544 | | | 380 | 60 | 1.3 | 3 | 1460 | 3.6 | 1890 | 8.5-10.4 | 76 | 76 | 20.1 | K |
| | 234524 | | | 460 | 60 | 1.3 | 2.5 | 1460 | 3.1 | 1890 | 13.0-16.0 | 76 | 76 | 16.6 | K |
| | 234534 | 2 | 1.5 | 575 | 60 | 1.3 | 2 | 1460 | 2.4 | 1890 | 20.3-25.0 | 76 | 76 | 13.3 | K |
| | 234305 | | | 200 | 60 | 1.25 | 7.7 | 2150 | 9.3 | 2700 | 1.8-2.4 | 69 | 69 | 53.6 | L |
| | 234315 | | | 230 | 60 | 1.25 | 6.7 | 2150 | 8.1 | 2700 | 2.3-3.0 | 69 | 69 | 46.6 | L |
| | 234345 | | | 380 | 60 | 1.25 | 4.1 | 2150 | 4.9 | 2700 | 6.6-8.2 | 69 | 69 | 28.2 | L |
| | 234325 | 3 | 2.2 | 460 | 60 | 1.25 | 3.4 | 2150 | 4.1 | 2700 | 9.2-12.0 | 69 | 69 | 23.3 | L |
| | 234335 | | | 575 | 60 | 1.25 | 2.7 | 2150 | 3.2 | 2700 | 14.6-18.7 | 69 | 69 | 18.6 | L |
| | 234306 | | | 200 | 60 | 1.15 | 10.9 | 2980 | 12.5 | 3420 | 1.3-1.7 | 75 | 75 | 71.2 | K |
| | 234316 | | | 230 | 60 | 1.15 | 9.5 | 2980 | 10.9 | 3420 | 1.8-2.2 | 75 | 75 | 61.9 | K |
| | 234346 | 5 | 3.7 | 380 | 60 | 1.15 | 5.8 | 2980 | 6.6 | 3420 | 4.7-6.0 | 75 | 75 | 37.5 | K |
| | 234326 | | | 460 | 60 | 1.15 | 4.8 | 2980 | 5.5 | 3420 | 7.2-8.8 | 75 | 75 | 31 | K |
| | 234336 | | | 575 | 60 | 1.15 | 3.8 | 2980 | 4.4 | 3420 | 11.4-13.9 | 75 | 75 | 24.8 | K |
| | 234307 | | | 200 | 60 | 1.15 | 18.3 | 5050 | 20.5 | 5810 | .74-.91 | 74 | 74 | 122 | K |
| | 234317 | 7.5 | 5.5 | 230 | 60 | 1.15 | 15.9 | 5050 | 17.8 | 5810 | 1.0-1.2 | 74 | 74 | 106 | K |
| | 234347 | | | 380 | 60 | 1.15 | 9.6 | 5050 | 10.8 | 5810 | 2.9-3.6 | 74 | 74 | 64.4 | K |
| 234327 | 460 | | | 60 | 1.15 | 8 | 5050 | 8.9 | 5810 | 4.0-4.9 | 74 | 74 | 53.2 | K | |
| 234337 | 575 | | | 60 | 1.15 | 6.4 | 5050 | 7.1 | 5810 | 6.4-7.8 | 74 | 74 | 42.6 | K | |
| 234308 | 10 | 7.5 | 200 | 60 | 1.15 | 26.5 | 7360 | 30.5 | 8450 | .46-.57 | 76 | 76 | 188 | K | |
| 234318 | | | 230 | 60 | 1.15 | 23 | 7360 | 26.4 | 8450 | .61-.75 | 76 | 76 | 164 | K | |
| 234348 | | | 380 | 60 | 1.15 | 13.9 | 7360 | 16 | 8450 | 1.6-2.0 | 76 | 76 | 99.1 | K | |
| 234328 | | | 460 | 60 | 1.15 | 11.5 | 7360 | 13.2 | 8450 | 2.5-3.1 | 76 | 76 | 81.9 | K | |
| 234338 | 10 | 7.5 | 575 | 60 | 1.15 | 9.2 | 7360 | 10.6 | 8450 | 4.0-5.0 | 76 | 76 | 65.5 | K | |
| 234549 | | | 380 | 60 | 1.15 | 19.3 | 10000 | 21 | 11400 | 1.2-1.6 | 75 | 75 | 140 | L | |
| 234595 | | | 460 | 60 | 1.15 | 15.9 | 10000 | 17.3 | 11400 | 1.8-2.3 | 75 | 75 | 116 | L | |
| 234598 | | | 575 | 60 | 1.15 | 12.5 | 10000 | 13.6 | 11400 | 2.8-3.5 | 75 | 75 | 92.8 | L | |

- (1) Main winding - white to black
Start winding - white to red
- (2) W = White lead - line amps
B = Black lead - main winding amps
R = Red lead - start or auxiliary winding amps
- (3) Control Boxes date coded 02C and older have **35 MFD** run capacitors. Current values should be W14.0 @ FL and W17.0 @ SF Load.
B12.2 B14.5
R4.7 R4.5
- (4) Control Boxes date coded 01M and older have **60 MFD** run capacitors and the current values on a 4" motor will be W23.0 @ FL - W27.5 @ SF Load.
B19.1 B23.2
R8.0 R7.8

| TROUBLESHOOTING GUIDE | |
|--|--|
| <p>1. PUMP FAILS TO START</p> <ul style="list-style-type: none"> a) Electrical trouble b) Drawdown protection device has pump turned off. c) Overload tripped. | <p>3. PUMP GIVES REDUCED OUTPUT</p> <ul style="list-style-type: none"> a) Insufficient supply of water. b) Worn pump. c) Clogged intake screen. d) Low voltage. e) Incorrect rotation (3-phase only) |
| <p>2. PUMP FAILS TO DELIVER WATER</p> <ul style="list-style-type: none"> a) Air lock in pump. b) Clogged intake screen. | <p>4. OVERLOADS TRIP</p> <ul style="list-style-type: none"> a) Electrical trouble |
| <p>CALL INSTALLER OR SERVICE PROVIDER</p> | |