



O & M MANUAL
ORE/A MOTORIZED
SELF-CLEANING FILTER

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SECTION 1 - CONSTRUCTION

The housing and covers of standard ORE/A Series of filters are made from high grade, low carbon steel. A thick, durable coating protects all exposed surfaces, both inside and out. Access to the internal components of the filter is through a removable Front Cover, with gripping handles, that is secured to the front end of the filter housing with washers and nuts. Additionally, there are one or two side covers in the rear chamber section of the filter body. These covers allow for easy access for servicing and maintenance purposes. All wetted components are constructed of either engineered plastics or non-corrosive metals, providing for an extended service life. ORE/A Series are also available in 304 and 316 grades of stainless steel, and other materials as required.

This filter is equipped with a Geared Motor Assembly, externally mounted on the back end of the filter housing, opposite the Front Cover. During the rinse cycle, the motor rotates the Dirt Collector Assembly allowing its suction nozzles to clean narrow bands on the inner surface of a cylindrical fine screen. A Linear Motion Shaft supports the front end of the Dirt Collector Assembly and reverses the Dirt Collector Assembly's longitudinal motion. The rotational and longitudinal motions combine to produce an overlapping helical cleaning pattern resulting in a thorough cleaning of the entire surface of the screen. The filter is equipped with self-adjusting nozzles that maintain contact with the screen's surface during the rinse cycle. This feature reduces the volume of wastewater while improving screen-cleaning efficiency. This filter also features atmospheric vents to reduce frictional stresses that could affect the wear and tear on the drive components.

The Control System consists of an OMNITROL 4000E Controller housed in a NEMA 4X enclosure, a Differential Pressure Switch (DPS) plus a Solenoid Valve. The Controller mounted DPS monitors inlet and outlet pressures and comes factory preset to 7 psi, increasing. The Solenoid Valve is a 3-way normally open valve, activated by 24 Vac from the Controller. An enclosure mounted pressure gauge with a 3-way mini-valve has been provided to allow the reading of three different pressures with a single gauge. The Controller requires a single-phase, 110-120 Vac, 60 Hz **OR** 220-240 Vac, 50 Hz external power source depending available power. All controller voltages are generated from this input power. Refer to the OMNITROL 4000E Controller's O& M Manual for additional information.

SECTION 2 - OPERATING PRINCIPLES

A. Normal Flow Pattern - Clean Screen

The raw water enters the filter's inlet and passes through holes in the cylindrical Coarse Screen Assembly. This is the first stage of filtration. This prevents passage of any large particles that may damage the Fine Screen Assembly or prevent the Dirt Collector Assembly from rotating properly.

The water then enters the second stage of filtration, where the Fine Screen Assembly is located. As the water passes through this screen from the inside out, suspended solids are trapped and accumulate, creating a "cake" of dirt on the inner surface of the cylindrical screen. This cake produces a finer filtration than the screen itself, increasing the filter's particle removal efficiently. This build-up of cake also creates an increasing pressure differential across the screen.

B. Rinse Cycle Flow Pattern

The OMNITROL 4000E Controller monitors the Differential Pressure Switch (DPS) for contact closure due to high differential pressure, and issues a rinse signal when DPS contact closure is sensed (~ 7 psi). The Controller's Processor energizes the 24 Vac coil of the 3-way, normally open Solenoid Valve and applies power to the geared motor. The energized Solenoid Valve relieves pressurized water from the chamber of the diaphragm rinse valve causing the valve to open.

As the rinse valve opens, the pressure in the filter housing's rinsing chamber is reduced to near atmospheric pressure. As a result of this pressure difference, water begins flowing through the dirt collector assembly's nozzles and along the dirt collector tube and into the rinsing chamber, then to the drain through the open rinse valve. The pressure differential created at the nozzles provides a spot backwashing effect, drawing a portion of the water back through the screen and removing the accumulated solids. The geared motor, at one end, imparts a rotational movement to the Dirt Collector Assembly and Linear Motion Assembly on the other end controls the back and forth motion of the dirt collector assembly, allowing the nozzles to sweep the entire screen area in a helical fashion. Upon completion of the rinse cycle, the Solenoid Valve and geared motor are de-energized. The Solenoid Valve closes, and pressure is restored to the chamber of the rinse valve, causing the rinse valve to close.

SECTION 3 - INSTALLATION PROCEDURES

3.1 - ASSEMBLY PRIOR TO INSTALLATION

The filter is supplied completely assembled and ready for installation. Lift the filter from its shipping carton with the lifting eyes provided and place the filter into position on isolation valves and plumbing provided by others. Use appropriate hardware to complete the installation.

3.2 - PIPING CONNECTIONS

A. Filter Installation

1. For best results, the filter should be installed as near as possible to the equipment it is required to protect. However, if low filter inlet pressure is a concern, either before or during rinse, the filter may need to be installed closer to the pressure source.
2. Ensure that the filter's inlet pressure will not fall below 30 psig during the rinse cycle with the rinse valve open.
3. Ensure that the upstream pipe size from the pressure source to filter is equal to or greater than filter inlet size.
4. Inlet and outlet isolation valves must be installed.
5. A bypass valve must be installed in situations where a constant supply of water is required downstream during filter servicing.
6. A check valve should be installed downstream of the filter where water hammer or reverse flow is possible.
7. Ensure that the filter is mounted in the proper direction of flow as indicated by the arrows on the filter housing. As a check, the inlet is closer to the cover end of the filter.
8. Ensure that sufficient space is provided around the filter for maintenance as indicated on the filter's DATA SHEETS supplied with the filter.

B. Drain Line Installation

1. A drain line matching the rinse valve's opening should be attached to the valve, according to the following conditions.
 - Maximum piping run should not exceed 30 feet. If a longer run is required, increase drain line size, up to a maximum of 100 feet.
 - Piping should not include more than two (2) elbows.
 - Piping should be installed level or pitch down to avoid backpressure.
 - The open end of piping should be securely mounted to avoid flutter during the rinse cycle.
 - The end of the drain line must terminate to the atmosphere. The addition of backpressure on the drain line could reduce filter efficiency.

2. For ease of maintenance, it is recommended to install a drain lines to the manual ball valves located in the lower ports of the filter. This will allow for easier draining of the filter for servicing purposes.
3. A 1/4" vent tube has been connected to the Solenoid Valve and should be directed to a suitable atmospheric drain. Its length can be increased as required as long as it is open to the atmosphere.

C. Hydraulic Connections

All hydraulic tubing connections to the DPS, rinse valve and solenoid have been completed prior to shipment. See the Appendix for a typical connection drawing.

3.3 PRESSURE GAUGE & 3-WAY MINI-VALVE

A 3-way mini-valve and pressure gauge mounted in an enclosure has been provided to assist in troubleshooting and commissioning of the filter. The enclosure is installed on the filter's mounting bracket, the 3-way valve and pressure gauge allows for three independent pressure sources to be individually monitored with the use of a single pressure gauge. The 3-way valve serves as a selector to three ports located on alternating sides of the hex-shaped mini-valve body, one for inlet pressure, one for rinse valve chamber pressure and one for outlet pressure. The common port is connected to the pressure gauge.

The procedure for reading the pressures is as follows:

1. To read inlet pressure:

Rotate the knob until the arrow points to the port labeled **HIGH PRESSURE**, which senses pressure at the inlet leg of the filter.

2. To read rinse valve chamber pressure:

Rotate the knob until the arrow on the knob points to the port labeled **CHAMBER PRESSURE**, which senses pressure in the rinse valve chamber.

Note: During normal (filtering only) operation, chamber pressure should be equal to the inlet pressure. During the rinse cycle, the chamber pressure should drop to 25-40% of the inlet pressure.

3. To read outlet pressure:

Rotate the knob until the arrow on the knob points to the port labeled **LOW PRESSURE**, which sense pressure at the outlet leg of the filter.

Note: To determine differential pressure across the filter, subtract the outlet pressure from the inlet pressure.

3.4 CONTROLLER

The OMNITROL 4000E Controller has been completely pre-wired. The only required on-site wiring is for external power, which must be connected to the Circuit Breaker and terminals provided. See the APPENDIX for OMNITROL 4000E Controller Panel Layout, Terminal Strip and Schematic.

SECTION 4 - FIRST COMMISSIONING AND ROUTINE START-UPS

NOTE: The DPS has been factory preset for proper operation. **DO NOT ADJUST**

4.1 - FIRST COMMISSIONING

1. Check that power is available to the OMNITROL 4000E Controller, but that the Circuit Breaker & Power Switch on the control panel is in the **OFF** position.
2. Refer to the OMNITROL 4000E Controller O&M for programming information. Typical values have been preset at the factory but can be changed by the operator once filter operating experience is gained.
3. Check that the line pressure will always be at least 30 psig at the filter inlet during the rinse cycle with the rinse valve open.
4. Check that there are no upstream pipeline restrictions.
5. Check that the filter is mounted in the correct flow orientation as indicated by the arrows on the filter body.
6. Check that the rinse valve and Solenoid Valve drain lines are routed to appropriate atmospheric drains.
7. Check that the inlet and outlet isolation valves are closed and the bypass valve is open.
8. Check that adequate space has been provided around the filter for maintenance.
9. Depress the OMNITROL 4000E Controller's Circuit Breaker until it clicks. The Power Switch should glow green. Turn the Power Switch to the **ON** position. The Processor's display screen will display:

**ORIVAL, Inc.
OMNITROL 4000E
VERSION xx/xx
PRESS OK TO START**

10. Depress the Green **OK** button.
11. The following "MAIN/STATUS" screen is displayed:

**MAIN/STATUS
1 MANUAL 2 FAULT
RINSE OFF
00000 (flashing)**

12. Depress the Orange **ESC** button and the flashing **00000** alternate with 6 solid rectangles.
13. Depressing the **A** & **B** buttons scrolls through the various screens, and depressing the **ESC** button returns the display to the MAIN/STATUS screen.

4.2 - START-UP

1. Slowly open the filter's inlet isolation valve, to pressurize the filter.
2. Check for any external leakages and eliminate.
3. Check to ensure that the filter inlet pressure is higher than 30 psig – see Step 3 of section 4.1 – First Commissioning.
4. Ideally, a manual rinse should be initiated with the filter dead headed. Close or restrict the bypass valve and initiate a manual rinse cycle.
5. A manual rinse is initiated by depressing the OMNITROL 4000E Controller's **ESC** button to display the MAIN/STATUS screen.
6. Depress the **OK** button and observe flashing **00000**.
7. Depress the **+** button once and observe a flashing **00001**.
8. Depress **OK** to select the "MANUAL RINSE" screen the following is displayed:

MANUAL RINSE PRESS OK TO START RINSE

9. Depress the **OK** button to start the rinse. After a 5 second delay the filter's rinse valve solenoid is energized (the connector on the solenoid's coil is lit) and the motor turns on for a preset 30 seconds.
10. During this rinse, observe the inlet and hydraulic motor chamber pressures. The chamber pressure should be between 25 and 40 % of the filter inlet pressure during the rinse cycle as described in Section 3.1 F.
11. At the completion of the rinse the display to returns to the MAIN/STATUS screen.
12. If the filter rinsed properly with correct pressures, open the bypass and outlet valves to place the filter in service.

SECTION 5 – CONTROLLER OPERATION

The OMNITROL 4000E Controller automatically performs a rinse whenever a high differential pressure is detected or when the value set for the countdown timer reaches zero without any other rinse occurring. The operator can also perform manual rinses for testing purposes or when a persistent high Dp is observed. The Controller also accepts an external command to rinse when an external dry contact switch closes two terminal pins provided with the Controller.

5.1 AUTOMATIC OPERATION

Automatic rinsing occurs whenever the Controller is on and the red FAULT light is not lit.

1. The filter will perform a single rinse cycle after a preset interval in which no DP initiated rinse took place (countdown timer).
2. The filter will perform a rinse cycle due to the DPS contact closure.
3. If the DPS contacts remain closed, the filter will continue to perform consecutive rinse cycles up to the preset number allowed. If the high Dp persists beyond this number, the Controller's Processor will issue a fault. The red FAULT is lit, and the terminal strip provides two pins with dry contact closure to indicate the Fault. The Processor stops works and operator intervention is required to reset the fault.

5.2 MANUAL RINSING

The operator performs manual rinses.

1. A manual rinse is initiated by depressing the OMNITROL 4000E Controller's **ESC** button to display the MAIN/STATUS screen.
2. Depress the **OK** button and observe flashing **00000**.
3. Depress the **+** button once and observe a flashing **00001**.
4. Depress **OK** to select the "MANUAL RINSE" screen the following is displayed:

**MANUAL RINSE
PRESS OK TO
START RINSE**

5. Depress the OK button to start the rinse. The filter's rinse valve solenoid is energized (the connector on the solenoid's coil is lit) and the motor turns on for a preset 30 seconds.
6. At the completion of the rinse depress the ESC button to return the display to the MAIN/STATUS screen.

SECTION 6 – TROUBLESHOOTING

Refer to symptoms listed in the table below to check possible causes and try recommended solutions.

Item	Problem	Check	If	Solution
1	System does not work	Power	Circuit Breaker OFF	Depress the Controller's Circuit Breaker to ON . Check if power is available to the Controller
			Circuit breaker tripped	Reset breaker. Check for possible reason and remedy.
2	FAULT light lit	Motor	Shorts	Check for possible reason and remedy.
		Fine Screen	Clogged	Dead-Head filter and perform several manual rinses
3	No water flowing	Isolation Valves	Not open	Open valves.
		Bypass Valve	Not closed	Close valve.
4	Flow rate is low or Outlet pressure is low.	Inlet pressure	Pressure is Low (usually below 30 psi),	Increase pressure to normal. Install better pump. Check for line blockage
			Pressure Normal	Go to 5
5	Pressure drop too high	Difference of inlet to outlet pressures on gauge	D P is high, over 7 psi	Dead-Head filter and perform several manual rinses
			D P remains high	Check flow rate – to see if it is excessive (higher than design flow rate).

Item	Problem	Check	If	Solution
5 cont				<p>Repeat the above mentioned Manual flush, and if the D P is still high:</p> <p>a - Check for any</p> <ul style="list-style-type: none"> - disconnected or leaking control tubing lines. <p>b – Unusually high dirt load beyond design meanwhile reduce flow rate.</p> <p>c – Unusual Blocking of filter (close isolation valves) dismantle filter and clean screens .</p>
6	Rinse valve does not close	Solenoid Valve in manual override	In Manual Override	Adjust Solenoid Valve screw so that it is horizontal (parallel to ports)
7	Rinse valve does not open	Solenoid Valve coil light not ON		Wiring problem, or Replace Solenoid Valve if faulty.
8	Flush cycles are too frequent	Raw water	Dirt load is high	Change to a screen with bigger opening or add more filters

SECTION 7 – MAINTENANCE

The filter has been ruggedly designed to provide years of service without frequent maintenance. However, preventive maintenance is suggested to inspect and replace components based on operational wear and tear.

Annually

NOTE: Large particulates (greater than 9 mm) are trapped by the Coarse Screen Assembly are not removed by automatic cleaning, and will accumulate over a period of time. The recommended annual interval for the inspection and maintenance may have to be shortened based on site conditions. During normal filtration, the inlet pressure and rinse chamber pressure should equal each other. A decreasing value of rinse chamber pressure over time is an indication that large particulates are accumulating on the outside of the Coarse Screen Assembly. This reduces filter efficiency by increasing the frequency of rinse cycles since the filter is starting at a higher DP even though the Fine Screen Assembly has been cleaned.

Divert the filter's flow by closing the filter's inlet and outlet valves. Refer to the Control System's manual rinse feature to command a rinse of the filter to release pressure. Open the filter's two drain ports to allow the filter to drain, and then loosen the Front Cover Tube Vent Fitting to allow the Vent Tube to slide through. Loosen and remove the Cover Nuts & Cover Washers, and then remove Front Cover. Caution: the Front Cover is heavy.

The Coarse Screen Assembly and Fine Screen Assembly should be removed to check for any accumulation of large particulates trapped by the Coarse Screen Assembly and to inspect for potential damaged to the Fine Screen Assembly. The Dirt Collector Assembly should be removed and the Dirt Collector Nozzles inspected for wear. The Dirt Collector Assembly and both screens are removed as a complete assembly.

In addition to screen and Dirt Collector Assembly maintenance, the Drive Shaft and Dirt Collector Extension Shaft might require maintenance. The Drive Shaft is located in the area beyond the rear of the filter body that includes the Geared Motor Assembly. The cylindrical Drive Shaft & Support Cover encloses the Drive Shaft.

The Coarse Screen, the Fine Screen Assembly, the Dirt Collector Assembly, the Dirt Collector Extension Shaft and Driver Shaft are all removed as a single assembly.

To remove this whole assembly, first remove the Chamber Cover. Remove the Drive Shaft & Support Cover's screws, washers and nuts then remove the Drive Shaft & Support Cover.

The Drive Shaft is connected to the motor's gearbox shaft by a screw, two (2) washers and a locking nut that are removed next to free the drive shaft from the gearbox shaft.

The screens, Dirt Collector Assembly Dirt Collect Extension Shaft and Drive Shaft can now be removed through the filter's open front end by using the grab handles on the Coarse Screen Assembly. This requires two men due to the long length of the assembly. Once this assembly has been removed, first make an alignment mark on the Coarse Screen Assembly and Fine Screen Assembly interface. The Coarse Screen Assembly can be detached by removing the six (6) screws near the screen interface. The Coarse Screen Assembly and Fine Screen Assembly can now be separated.

To separate the Fine Screen Assembly from the Dirt Collector Assembly, first disconnect the 8 mm Vent Tube from its fitting. Then remove the single screw at the end hub of the grey Linear Motion Shaft Cover. By removing this screw, the Dirt Collector's Linear Motion Shaft is freed from the Fine Screen Assembly. Next remove the six (6) bolts and washers securing the Linear Motion Shaft Cover to the Fine Screen Handle, and then remove the Linear Motion Shaft Cover.

Removing this cover exposes the Linear Motion Shaft. The Linear Motion Shaft Bearing and Linear Motion Shaft Drive Pin are removed next. An O-Ring secures the Linear Motion Shaft Bearing Cover. Roll the O-Ring over and onto the Linear Motion Shaft Bearing Cover and slide the cover off. With the cover off, the Linear Motion Shaft Drive Pin can be removed from the Linear Motion Shaft Bearing. Lubricant may hold this pin in place, so gently pry it from the Linear Motion Shaft Bearing. With the Linear Motion Shaft Drive Pin removed, the Linear Motion Shaft can be removed by pulling it through the Linear Motion Shaft Bearing. Finally, the Linear Motion Shaft Bearing can be removed from the front end of the Dirt Collector Assembly by loosening three (3) screws around the Linear Motion Shaft Bearing's circumference, then pulling the Linear Motion Shaft Bearing free. It is not necessary to completely remove the screws from the Linear Motion Shaft Bearing.

At this point, the Dirt Collector Assembly and Fine Screen Assembly can be separated. The Dirt Collector Assembly is removed from the back end of the Fine Screen Assembly. Remove the Fine Screen Seal at the rear of the Fine Screen Assembly, then make an alignment mark on the inside diameter of the Fine Screen Assembly and the Dirt Collector Support Disk. Loosen and remove the screws holding the Dirt Collector Support Disc to the inside diameter of the Fine Screen Assembly. The Dirt Collector Assembly, with the Dirt Collector Support Disc, can now be removed from the Fine Screen Assembly. Before removing the Dirt Collector Assembly, it should be rotated manually such that the Dirt Collector Nozzles are horizontal. Care should be exercised while removing the Dirt Collector Assembly to insure the Dirt Collector Nozzles do not contact the screen's wire mesh surface. Pull the Dirt Collector Assembly rearward until it is free of the Dirt Collector Bearing Housing. Support the Dirt Collector Assembly after it passes through the Dirt Collector Bearing Housing.

Remove the Dirt Collector Bearing Housing from the Fine Screen Handle and remove the six (6) long screws that secure the Dirt Collector Rear Bearing Housing.

COMPONENT INSPECTION

Coarse Screen Assembly: Remove any debris or particles stuck in the Coarse Screen's openings.

Fine Screen Assembly: Wash the screen as required, and inspect the wire mesh for holes, tears, separation or other problems.

Dirt Collector Nozzles: Replace any nozzles showing significant wear.

Linear Motion Shaft: Remove old lubricant and inspect for wear and replace as required.

Linear Motion Shaft Drive Pin: Inspect for excessive wear and replace as required.

Front and Rear Dirt Collector Shaft O-Rings and Dirt Collector Shaft Seal Sets: These components are found within the Dirt Collector Bearing Housing and Dirt Collector Rear Bearing Housing. The Dirt Collector Shaft Seal Set consists of a fine O-Ring and U-Ring. First, wipe away excess lubricant, then remove the fine O-Ring from around the U-Ring, and then gently pry the U-Ring from the housing. The larger Dirt Collector Shaft O-Ring should also be wiped free of lubricant and removed. Inspect the Dirt Collector Shaft O-Rings and Dirt Collector Shaft Seal Sets each time the filter is disassembled, and replace as required.

Dirt Collector Extension Shaft: This shaft has a Dirt Collector Shaft Coupling attached at one end and Slotted Drive Shaft Bearing on the other end. Inspect these components and replace if excessive wear is observed.

REASSEMBLY PROCEDURES

During the dis-assembly process it becomes obvious that lubrication is a vital part of the filter's design. During the inspection process, old lubricants should be cleaned away.

During re-assembly, lubricants should be re-applied to the cleaned surfaces as directed.

Use grease to lubricate the large internal Dirt Collector Shaft O-Ring and Dirt Collector Shaft Seal Set after they are in place on the Dirt Collector Rear Bearing Housing. Note that the open face of the U-Ring faces toward the inside of the filter body.

Insert the Dirt Collector Rear Bearing Housing through the Rear Cover & Motor Support's opening and align it with the threaded holes in the Rear Cover & Motor Support. The vent hole in the Dirt Collector Rear Bearing Housing's circumference must face down.

Secure the Dirt Collector Rear Bearing Housing to the Rear Cover & Motor Support with the six (6) long bolts previously removed. Insert the 8 mm Vent Tube through the bottom of the Rear Cover & Motor Support's lower frame and insert its end into the vent hole at the bottom of the Dirt Collector Rear Bearing Housing.

Note: The Vent Tube provides an atmospheric vent to reduce forces on the Dirt Collector Shaft. A small amount of water dripping from the Vent Tube is possible and is acceptable.

Dirt Collector Extension Shaft & Drive Shaft Re-Assembly

The Dirt Collector Extension Shaft is the tube that extends through the Rear Cover Motor Support and into the rinse chamber area. If previously dis-assembled, reconnect The Dirt Collector Extension Shaft to the Dirt Collector Shaft Coupling with a screw, two (2) washers and locking nut on one end, and using two (2) screws secure the slotted Drive Shaft Drive Bushing to the opposite end. Slide the Drive Shaft into the slot of the Drive Shaft Drive Bushing.

Dirt Collector & Fine Screen Re-Assembly

If the Fine Screen's Dirt Collector Support Disk was removed, it is placed over the rear of the Dirt Collector Assembly's shaft. Note: the Dirt Collector Rear Guide with its Dirt Collector Rear Guide O-Ring should face outward. No lubrication is required. Carefully insert the Dirt Collector Assembly, including the Dirt Collector Extension Shaft and Drive Shaft, into the rear of the Fine Screen Assembly's opening and try to avoid contact of the Dirt Collector Nozzles with the Fine Screen Assembly's wire mesh. Align the marks previously made, and secure the Dirt Collector Support Disk to the Fine Screen Assembly with the screws previously removed.

Since the front end of The Dirt Collect Assembly has passed through the opening of the Fine Screen Handle, the Dirt Collector Bearing Housing can now be installed. Prior to installing the Dirt Collector Bearing Housing, install the large Dirt Collector Shaft O-Ring and Dirt Collector Shaft Seal Set. The Dirt Collector Shaft Seal Set's U-Ring is inserted in the housing's groove with the opening facing out, and the fine O-Ring fits over the inner edge of the U-Ring. The larger Dirt Collector Shaft O-Ring fits in the other groove. Lubricate these rings with grease prior to sliding the Dirt Collector Bearing Housing on to the Dirt Collector's shaft. Note that the Dirt Collector Housing is installed with its rings facing into the Fine Screen Assembly. Position the Dirt Collector Bearing Housing into the Fine Screen Handle opening.

The Linear Motion Shaft Bearing is installed next. This bearing fits on the end of the Dirt Collector shaft. Align the holes with the counter bored holes on the end of the Dirt Collector Assembly's shaft. Thread locking compound should be used on the screw threads. With the Linear Motion Shaft Bearing in place, the Linear Motion Shaft is lubricated with grease and inserted in the Linear Motion Shaft Bearing with the end with the hole facing out.

Next inset the Linear Motion Shaft Drive Pin into the Linear Motion Shaft Bearing and rotate the Linear Motion Shaft until the Linear Motion Shaft Drive Pin fully engages the grooves in the Linear Motion Shaft. Slide the Linear Motion Shaft Bearing Cover over the Linear Motion Shaft Bearing to retain the Linear Motion Shaft Drive Pin, and roll the Linear Motion Shaft Bearing Cover O-Ring into the groove to retain the Linear Motion Shaft Bearing Cover.

Next, the Linear Motion Shaft Cover is installed over the Linear Motion Shaft. Rotate the Linear Motion Shaft to fully extend it. The hole at the end of the shaft should be vertical. Make sure the large O-Ring is in place on the large end of the Linear Motion Shaft Cover and place the cover over the Linear Motion Shaft. Use the screw washers and locking nut to secure the Linear Motion Shaft to its cover. The end of the cover should not be in contact with the Fine Screen Handle. The entire Dirt Collector Assembly with the Linear Motion Shaft is now pushed rearward until the Linear Motion Shaft Cover contacts the Fine Screen Handle. Use the six (6) screws and washers previously removed to secure the cover.

Connect the 8 mm Vent Tube to the fitting on the Linear Motion Shaft Cover.

The Fine Screen Assembly, the Dirt Collector Assembly, the Dirt Collector Extension Shaft and Drive Shaft are now ready to install back into the filter housing. Verify that there are Fine Screen Seals at the rear on the Fine Screen Assembly and in a groove on the outside on the fine Screen near its front. These seals have an open edge that should both be facing toward the front of the filter. Just prior to installing the assembly into the filter, lubricate both seals with silicone grease. Two men should lift the assembly and insert it into the filter opening trying to keep it level so it easily passes through the internal bulkheads. Stop the insertion process once the Fine Screen Assembly has just one foot protruding from the filter housing.

Place the Coarse Screen Assembly onto the Fine Screen Assembly and use the alignment marks to align the holes, then use the screws to attach the screens together. With the Coarse Screen Assembly in place, the insertion process can continue. This assembly must be oriented with the vent tube facing down. Rotate the assembly while inserting to maintain the vent tube's orientation. While this assembly is being inserted, a second man reaches into the access port to align the rear of the Dirt Collector Extension Shaft so it passes through the Dirt Collector's Rear Bearing Housing.

Re-assemble the Chamber Cover to the access port with the gasket and hardware previously removed. Place the open end of the Vent Tube through the hole in the Front Cover as the cover is placed on the filter housing's studs. Verify that the Cover Seal is in place in the groove on the inside face of the Front Cover before securing the Front Cover to the housing with the Cover Nuts and Cover Washers previously removed.

Tighten the Front Cover Vent Tube Fitting to prevent the Vent Tube from leaking. This Vent Tube provides an atmospheric vent for the sealed Linear Motion Shaft to reduce forces on the Linear Motion Shaft and Linear Motion Shaft Drive Pin. A small amount of water dripping from the Vent Tube is possible and is acceptable.

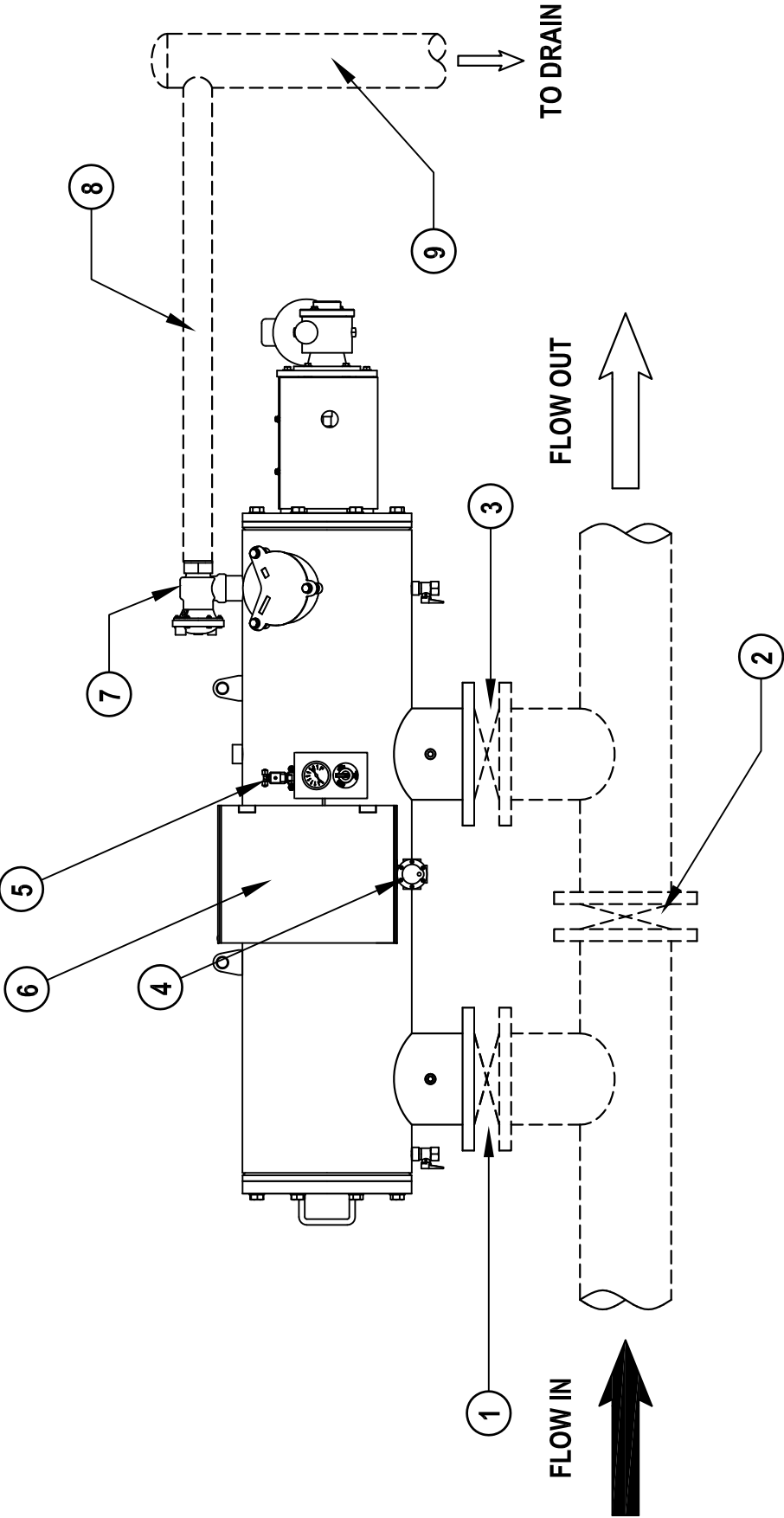
Extend the flat Drive Shaft and place it onto the motor's gearbox shaft. Align the holes and pin with the screw, two (2) washers and locking nut previously removed. Place the Drive Shaft & Support Cover over the Rear Cover & Motor Support and secure with the screws, washers and nuts previously removed.

SECTION 8 – SPARE PARTS

ORIVAL maintains a stock of parts requiring replacement due to normal wear and tear. Several Filter Assembly drawings are provided in the APPENDIX to help identify replacement parts. These drawings, together with the Parts List that is provided with the filter, help identify all the parts. Not all parts are shown on each drawing, and the same item number may appear on several drawings to better identify the same part. These drawings represent a typical filter. Your filter may look different, but the components are still identifiable. The item number in the drawings are the same as the first digits of the part number on the list.

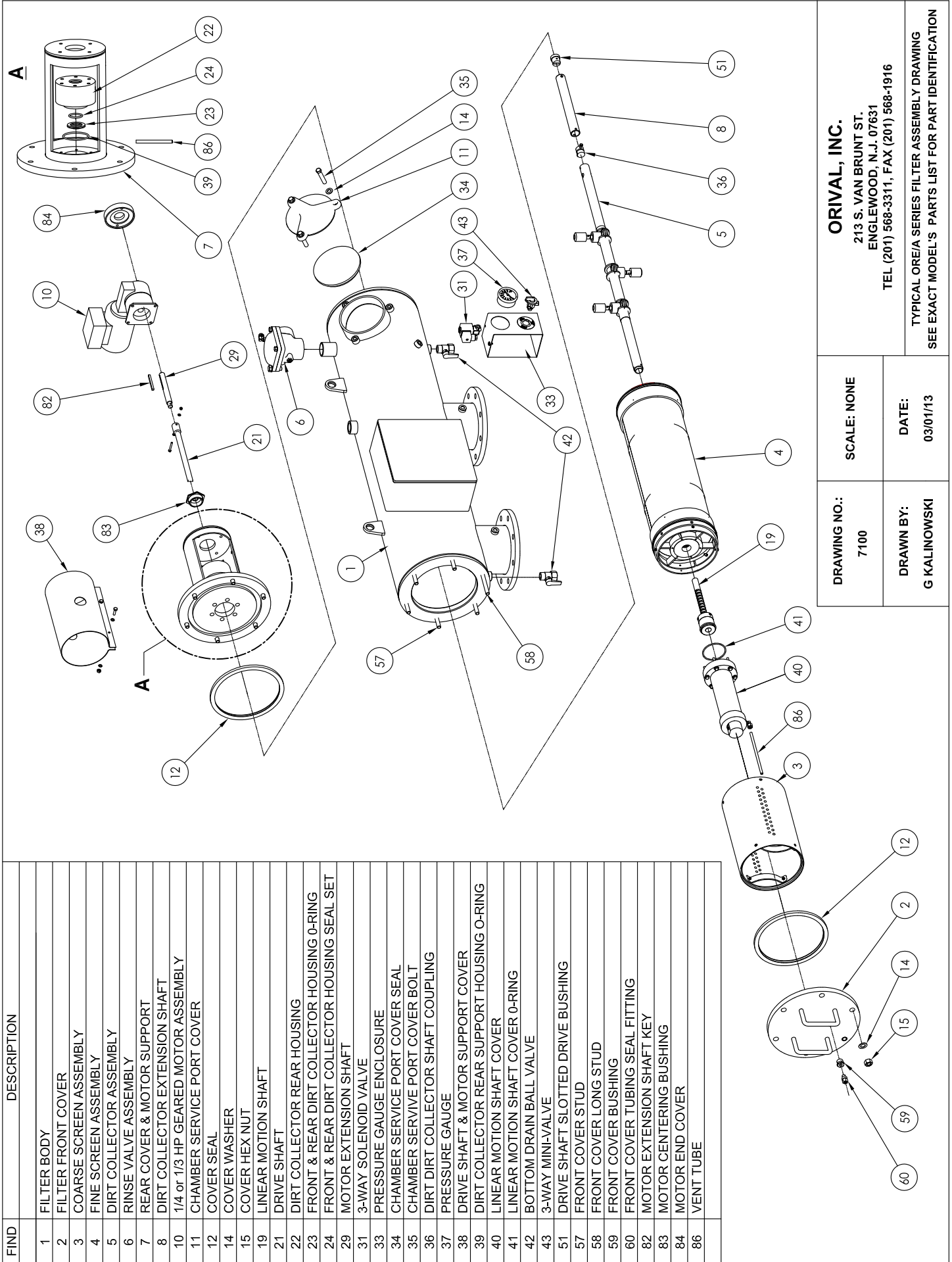
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No.	Description	Notes
9	Drain Header	Customer Supplied
8	Drain Line	Customer Supplied
7	Rinse Valve	Supplied with Filter
6	OMNITROL 4000E Controller	In NEMA 4X Enclosure
5	3- Way NO Solenoid Valve	24 Vac, 60 Hz, N.C.
4	Differential Pressure Switch	Preset to 7 psi
3	Outlet Isolation Valve	Customer Supplied
2	System Bypass Valve	Customer Supplied
1	Inlet Isolation Valve	Customer Supplied

DWG. NO. 3001	SCALE: NONE	INSTALLATION LAYOUT FOR A TYPICAL ON-LINE ORE/A SERIES FILTER WITH BYPASS	
	DRAWN BY: G KALINOWSKI	DATE: 12/31/03	ORIVAL, INC. 213 S. VAN BRUNT ST. ENGLEWOOD, N.J. 07631 TEL (201) 568-3311, FAX (201) 568-1916 www.orival.com -- filters@orival.com



ORIVAL, INC.

213 S. VAN BRUNT ST.
ENGLEWOOD, N.J. 07631
TEL (201) 568-3311, FAX (201) 568-1916

TYPICAL ORIVA SERIES FILTER ASSEMBLY DRAWING
SEE EXACT MODEL'S PARTS LIST FOR PART IDENTIFICATION

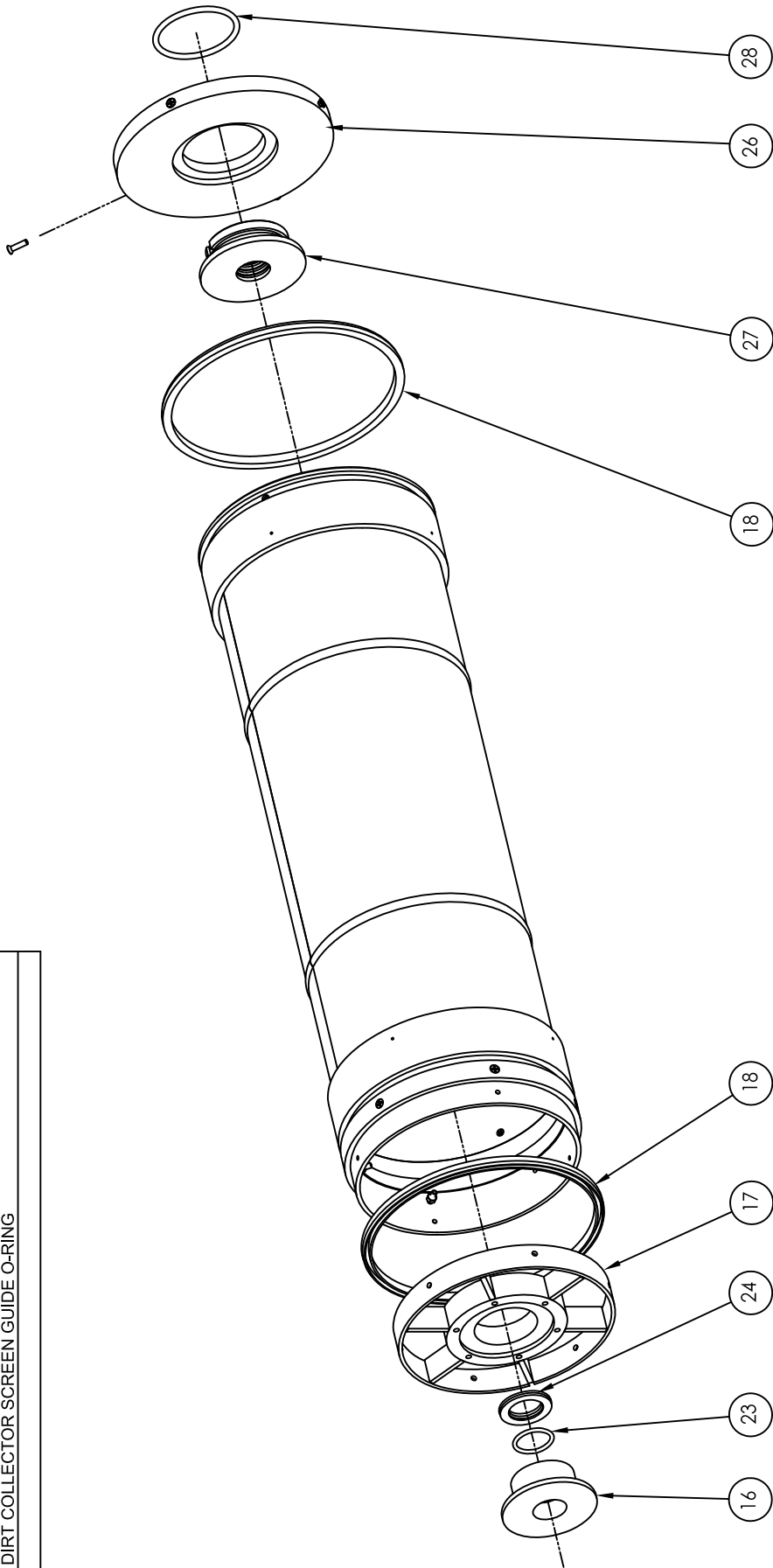
SCALE: NONE

DRAWING NO.:
7100

DATE:
03/01/13

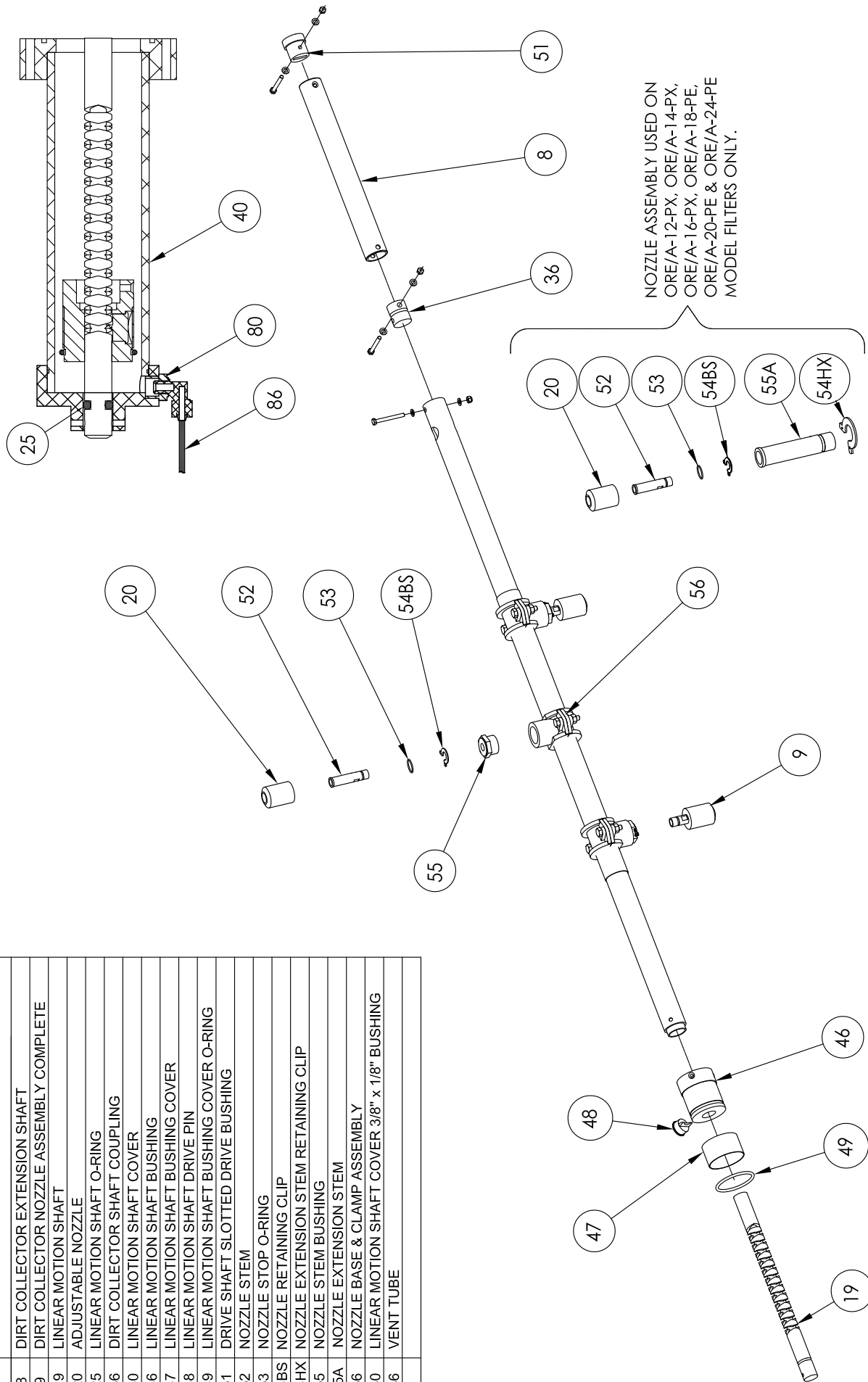
DRAWN BY:
G KALINOWSKI

FIND	DESCRIPTION
16	DIRT COLLECTOR FRONT SUPPORT HOUSING
17	FINE SCREEN HANDLE
18	FINE SCREEN SEAL
23	FRONT & REAR DIRT COLLECTOR SUPPORT HOUSING O-RING
24	FRONT & REAR DIRT COLLECTOR SUPPORT HOUSING SEAL SET
26	DIRT COLLECTOR SCREEN GUIDE DISC
27	DIRT COLLECTOR SCREEN GUIDE
28	DIRT COLLECTOR SCREEN GUIDE O-RING



DRAWING NO.: 7102	SCALE: NONE	ORIVAL, INC. 213 S. VAN BRUNT ST. ENGLEWOOD, N.J. 07631 TEL (201) 568-3311, FAX (201) 568-1916
DRAWN BY: G KALINOWSKI	DATE: 03/01/13	
TYPICAL ORE/A SERIES FINE SCREEN ASSEMBLY SEE EXACT MODEL'S PARTS LIST FOR PART IDENTIFICATION		

FIND	DESCRIPTION
8	DIRT COLLECTOR EXTENSION SHAFT
9	DIRT COLLECTOR NOZZLE ASSEMBLY COMPLETE
19	LINEAR MOTION SHAFT
20	ADJUSTABLE NOZZLE
25	LINEAR MOTION SHAFT O-RING
36	DIRT COLLECTOR SHAFT COUPLING
40	LINEAR MOTION SHAFT COVER
46	LINEAR MOTION SHAFT BUSHING
47	LINEAR MOTION SHAFT BUSHING COVER
48	LINEAR MOTION SHAFT DRIVE PIN
49	LINEAR MOTION SHAFT BUSHING COVER O-RING
51	DRIVE SHAFT SLOTTED DRIVE BUSHING
52	NOZZLE STEM
53	NOZZLE STOP O-RING
54BS	NOZZLE RETAINING CLIP
54HX	NOZZLE EXTENSION STEM RETAINING CLIP
55	NOZZLE STEM BUSHING
55A	NOZZLE EXTENSION STEM
56	NOZZLE BASE & CLAMP ASSEMBLY
80	LINEAR MOTION SHAFT COVER 3/8" x 1/8" BUSHING
86	VENT TUBE



DRAWING NO.: 7101	SCALE: NONE	ORIVAL, INC. 213 S. VAN BRUNT ST. ENGLEWOOD, N.J. 07631 TEL (201) 568-3311, FAX (201) 568-1916 TYPICAL ORE/A SERIES DIRT COLLECTOR ASSEMBLY SEE EXACT MODEL'S PARTS LIST FOR PART IDENTIFICATION
	DATE: 03/01/13	
DRAWN BY: G KALINOWSKI		

L or L1 Power In

N or L2 In

Ground In

L or L1 Test Point (not used)

DP L or L1 Voltage

DP Contact Closure

Remote Rinse L or L1 Voltage

Remote Rinse Closure

Lockout L or L1 Voltage

Lockout Contact Closure

Open COV L or L1 Voltage

Open COV Signal

Multi-Filter Alarm L or L1 Voltage

Multi-Filter Alarm Signal

24 Vac Test Point

Rinse Solenoid 24 Vac

Rinse Solenoid Return

COV Solenoid 24 Vac

COV Solenoid Return

Bypass Solenoid 24 Vac

Bypass Solenoid Return

Actuator 1 Open L or L1

Actuator 1 Return

Actuator 1 Close L or L1

Actuator 2 Open L or L1

Actuator 2 Return

Actuator 2 Close L or L1

No Alarm Dry Contact

Alarm Dry Contact Common

Alarm Dry Contact

End of Rinse Dry Contact #1

End of Rinse Dry Contact #2

Motor Ground

Motor U

Motor V

END BLOCK**CURCUIT BREAKER**☐ ☐**GROUND BLOCK**1 ☐ ☐3 ☐ ☐5 ☐ ☐7 ☐ ☐9 ☐ ☐11 ☐ ☐13 ☐ ☐15 ☐ ☐17 ☐ ☐19 ☐ ☐21 ☐ ☐23 ☐ ☐25 ☐ ☐27 ☐ ☐29 ☐ ☐**GROUND BLOCK****END BLOCK**

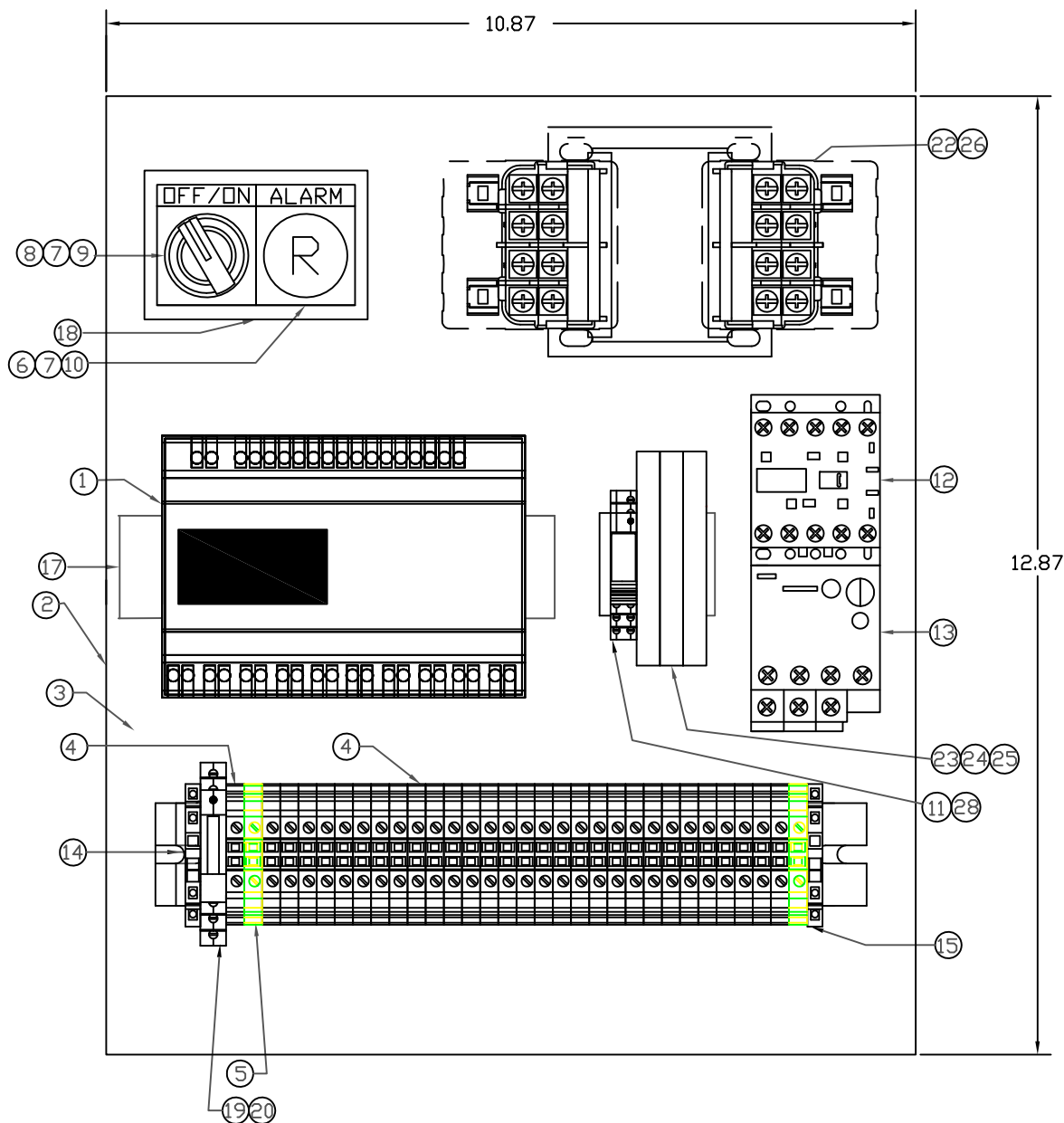
To T1 on Overload Relay

To T2 on Overload Relay

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE STATED

ORIVAL Inc. reserves the right to incorporate changes and make improvements to its products without prior notice.

4			DRAWN BY: G KALINOWSKI	ORIVAL, INC. 213 S. Van Brunt St. Englewood, NJ 07631 (201) 568-3311 Fax: (201) 568-1916	OMNITROL 4000E TERMINAL BLOCK TERMINAL DESIGNATIONS		
3			APPROVED: S. G.		DRAWING NO.	OMNITROL 4000E TERM BLOCK	SHEET: 1 of 1
2			DATE: 11/15/09				
1	1/22/10	G.K.	SCALE: NONE				
REV	DATE	APP'D					



TERMINAL BLOCK LAYOUT

End Block	C. Breaker	N / L2	GND	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	GND	End Block
-----------	------------	--------	-----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----------

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE STATED

ORIVAL Inc. reserves the right to incorporate changes and make improvements to its products without prior notice.

4			DRAWN BY: G KALINOWSKI	ORIVAL, INC. 213 S. Van Brunt St. Englewood, NJ 07631 (201) 568-3311 Fax: (201) 568-1916	OMNITROL 4000E COMPONENT ARRANGEMENT WITH ITEM NUMBER DESIGNATIONS		DRAWING NO. OMNITROL 4000E COMPONENTS	SHEET: 1 of 1
3			APPROVED: S. G.					
2			DATE: 11/15/09					
1	1/22/10	G.K.	SCALE: NONE					
REV	DATE	APP'D						

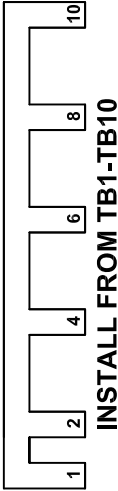
BILL OF MATERIALS - 120VAC

ITEM	QTY	DESCRIPTION
1	1	LOGIC PROCESSOR - 16 IN / 10 OUT 100-240 Vac
2	1	NEMA 4X FIBERGLASS ENCLOSURE - 14 X 12 X 6
3	1	MOUNTING PANEL FOR ENCLOSURE
4	30	TERMINAL BLOCKS
5	2	GROUNDING BLOCKS
6	1	RED LED LIGHT - 120 Vac
7	2	LED LIGHT BASE
8	1	ON/OFF SWITCH & GREEN LIGHT- 120 Vav
9	1	"ON / OFF" LABEL
10	1	"FAULT" LABEL
11	1	DPDT RELAY - 120 Vac COIL
12	1	CONTACTOR - 6A, 120 Vac COIL, NC AUX
13	1	OVERLOAD RELAY (to match motor current)
14	1	DIN RAIL
15	2	END BLOCK
17	1	RAISED DIN RAIL
18	1	MOUNTING BRACKET
19	1	TERMINAL BLOCK CIRCUIT BREAKER HOLDER
20	1	10A CIRCUIT BREAKER
21	1	JUMPER STRIP - 19 PINS - CUT INTO 3 JUMPERS
22	1	TRANSFORMER 240/120 X 24, 50 VA
23	3	FUSE BLOCK
24	2	1 A PRIMARY FUSE
25	1	2.5 A SECONDARY FUSE
26	2	TRANSFORMER PRIMARY JUMPER
28	1	RELAY BASE

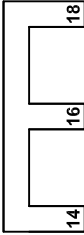
240 VAC SUBSTITUTED ITEMS

ITEM	QTY	DESCRIPTION
6	1	RED LED LIGHT - 240 Vac
8	1	ON/OFF SWITCH & GREEN LIGHT- 240 Vav
11	1	DPDT RELAY - 240 Vac COIL
12	1	CONTACTOR - 6A, 240 Vac COIL, NC AUX
13	1	OVERLOAD RELAY (to match motor current)
24	2	0.5 A PRIMARY FUSE
26	1	TRANSFORMER PRIMARY JUMPER

USE ITEM 21
CUT AS SHOWN:



USE ITEM 21
CUT AS SHOWN:



INSTALL FROM TB14-TB18

USE ITEM 21
CUT AS SHOWN:

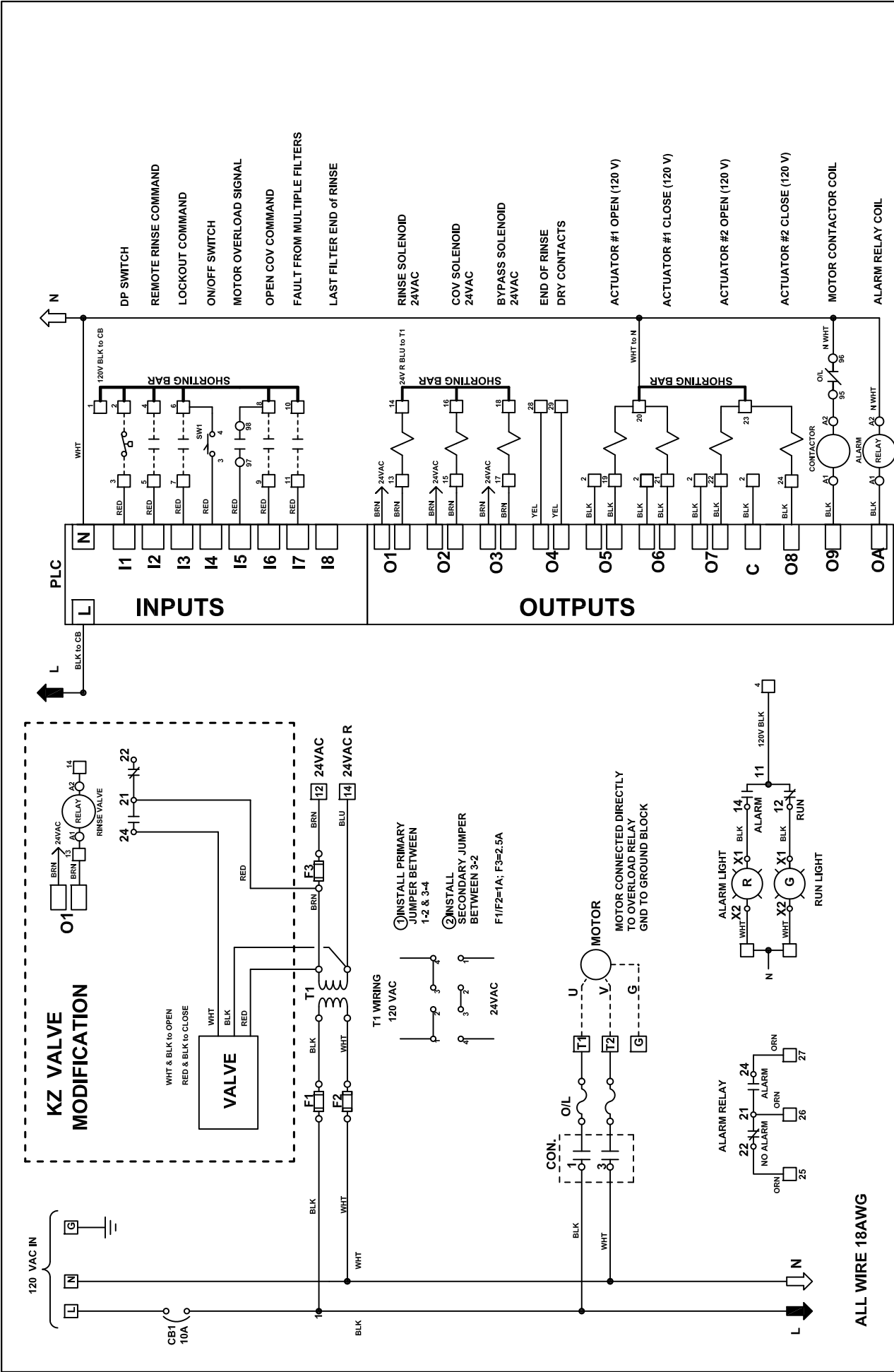


INSTALL FROM TB20 -TB23

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE STATED

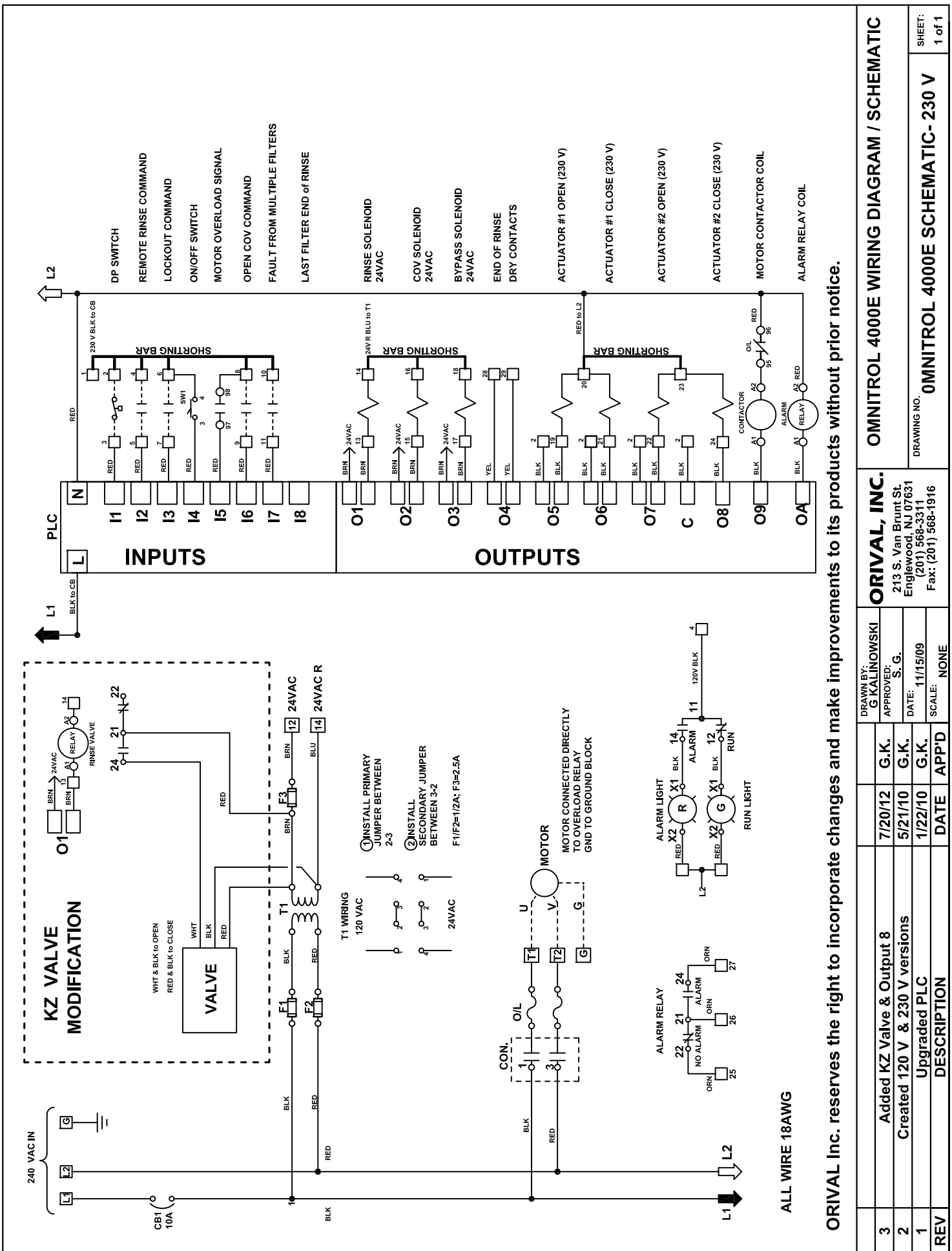
ORIVAL Inc. reserves the right to incorporate changes and make improvements to its products without prior notice.

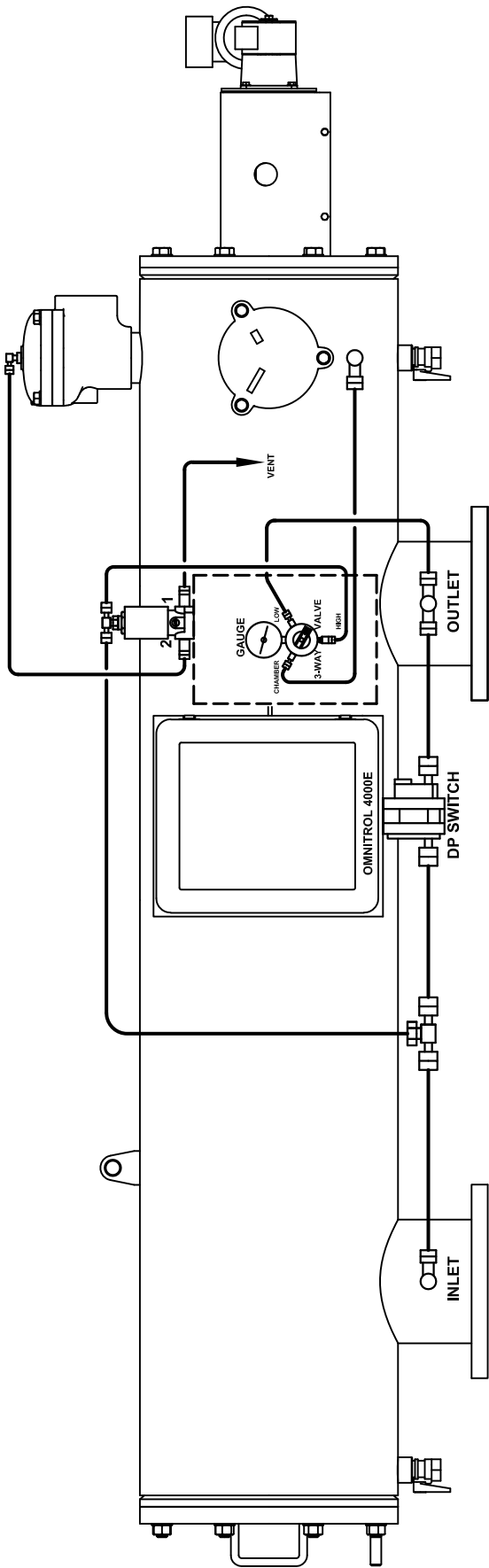
				ORIVAL, INC. 213 S. Van Brunt St. Englewood, NJ 07631 (201) 568-3311 Fax: (201) 568-1916		OMNITROL 4000E BILL OF MATERIALS WITH ITEM NUMBER DESIGNATIONS		SHEET: 0MNITROL 4000E BOM 1 of 1
3				DRAWN BY: G KALINOWSKI		DRAWING NO.		
2				APPROVED: S. G.				
1				DATE: 11/15/09				
REV		DESCRIPTION	DATE	APP'D	SCALE: NONE			



ORIVAL Inc. reserves the right to incorporate changes and make improvements to its products without prior notice.

ORIVAL, INC.		OMNITROL 4000E WIRING DIAGRAM / SCHEMATIC	
DRAWN BY: G KALINOWSKI		DRAWING NO. OMNITROL 4000E SCHEMATIC- 120 V	
APPROVED: S. G.		SHEET: 1 of 1	
DATE: 11/15/09			
SCALE: NONE			
REV	DESCRIPTION	DATE	APP'D
3	Added KZ Valve & Output 8	7/20/12	G.K.
2	Created 120 V & 230 V versions	5/21/10	G.K.
1	Upgraded PLC	1/22/10	G.K.





TYPICAL INSTALLATION SHOWN

DRAWING NO.: EL7100		SCALE: NONE	ORIVAL, INC. 213 S. VAN BRUNT ST. ENGLEWOOD, N.J. 07631 TEL (201) 568-3311, FAX (201) 568-1916
DRAWN BY: G KALINOWSKI		DATE: 06/06/14	
TYPICAL HYDRAULIC TUBING CONNECTIONS for ORE/A FILTERS			