



*SPOT FREE RINSE SYSTEMS*  
by Reverse Osmosis



Installation and Operation  
**SYSTEM MANUAL**

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## 1. INTRODUCTION

Whatever your purified water application, the PROPAK® system is the ultimate solution to providing a spot free rinse by removing mineral salts and other impurities. The cleaning of automobiles, trucks, aircraft, windows, and even glassware has dramatically improved from this technology.

PROPAK® systems are designed, manufactured, and tested to give years of trouble free service with a minimum of maintenance. There is no other system available that incorporates the features and durability of components found in PROPAK® reverse osmosis equipment.

As with all products, the customer has certain responsibilities to insure that the system operates under proper conditions. Installation, start-up, and maintenance instructions must be followed closely. It is also important that the system log be kept accurately and current.

## 2. IMPORTANT TERMS

<b>Reverse Osmosis</b> A reversal of the natural phenomenon of osmosis by application of hydraulic pressure greater than the osmotic pressure in water (due to dissolved solids). The causes the water molecules to flow through a semi permeable membrane leaving the dissolved substances behind.	<b>Thin Film Composite Membrane (TFC)</b> A special type of high rejection, long lasting, cleanable membrane that is resistant to most adverse water conditions.
<b>Feed Water</b> The water supply that is fed in the reverse osmosis membrane under pressure for processing. Typically softened and conditioned to meet the parameters required by the membranes.	<b>Recovery</b> The amount of product water as compared with the total amount of feed water. This will give a measure of the efficiency of operation. For example, starting with 10 gallons of feed water, if we separate 6 gallons into product water and reject 4 gallons, the recovery is 60%.
<b>Reject Water (same as brine)</b> That portion of the feed water that does not pass through the reverse osmosis membrane, and carries the impurities to the drain.	<b>Percent Rejection</b> The percentage of TDS removed from the feed water. Typically, greater than 90% rejection is achieved with reverse osmosis.
<b>Product Water</b> The pure water that has been separated from the feed water stream by the reverse osmosis membrane.	<b>Backup Softener</b> A small softener before the reverse osmosis system to insure soft water during regeneration or failure of the main carwash softener.
<b>Pre-Treatment</b> Whatever alterations of the raw feed water are required to prevent damage to the membrane or more efficiently operate the membrane. This may include softening, carbon filtration, sediment filtration, addition of anti-scalant, etc.	<b>GAC Filter</b> Granular Activated Carbon media filter for removing chlorine from the water for protection of special composite reverse osmosis membranes.
<b>Total Dissolved Solids (TDS)</b> Generally, the total amount of mineral salts which are dissolved in water.	<b>Low Pressure Switch</b> A pressure sensing device that will turn off the reverse osmosis system if the feed pressure falls below a preset level (usually 30 psi).
<b>Parts Per Million (PPM)</b> The standard measure of total dissolved solids. Parts of dissolved material in one million parts of water. One pound of mineral salts dissolved in a million pounds of water would be one part per million.	<b>Temperature Blending Valve</b> A special valve which blends hot and cold water to raise the water temperature for increased product water flow.

### 3. FEED WATER REQUIREMENTS

The feed water must not contain more than the specified amount of impurities listed in the chart below, if the best and the most efficient system performance is to be achieved.

IMPURITY	LIMIT	PRE-TREATMENT
Hardness	1 grain for 50% recover*	Softener
Iron (Fe)	0.1 mg/l	Softener, Iron Filter
Free Chlorine (Cl <sub>2</sub> )	0.1 mg/l	Activated Carbon Filter
Turbidity (dirt)	SDI < 5	Sediment Filter
Manganese (Mn)	0.05 mg/l	Softener
Hydrogen Sulfide (H <sub>2</sub> S)	0.0 mg/l	Oxidation, Aeration
Organics	0.0 mg/l	Activated Carbon Filter
Total Dissolved Solids	2,000 mg/l	—
Temperature	40° – 80° F.	Mixing Valve, Pre-Heaters

\* Higher levels of hardness can be run through the reverse osmosis system provided it is operated at lower recovery levels. Consult the factory for further information.

NOTE: Failure or reduced performance of the reverse osmosis system due to improperly treated feed water is not covered under the limited warranty.

## 4. PRE-TREATMENT

### WATER SOFTENER

For the most efficient operation of the reverse osmosis system, the unit should be operated on softened water (less than 1-grain hardness). Soft water from an existing main carwash water softener can be used provided sufficient capacity remains in the softener and:

1. The softener is designed such that continuous soft water can be supplied even during regeneration (e.g. duplex softener); or
2. A timer cutout shuts off the reverse osmosis system during conventional softener regeneration; or
3. It can be assured that the reverse osmosis system has filled the storage tank and shut off (e.g. early morning) when the softener is set to regenerate.

If the existing softener is old, unreliable, or cannot provide continuous soft water, it is recommended that a small backup or polisher softener be installed prior to the reverse osmosis system. Consult the factory for recommendations.

An alternative is to install a separate softener just for the reverse osmosis system. It should be capable of providing continuous soft water while the reverse osmosis system is operating, or a timer cutout should be installed to shut off the reverse osmosis system during softener regeneration. Consult the factory for recommendations.

### CARBON MEDIA FILTER (for chlorinated water supply)

If a TFC type membrane is used and the water supply is chlorinated (don't guess – consult your water department), a properly sized carbon media filter must be installed prior to the reverse osmosis system.

### ADDITIONAL PRE-TREATMENT

Should the water analysis indicate other factors that would be harmful to the reverse osmosis system, the factory will make further recommendations as to additional pre-treatment equipment that may be required.

### TEMPERATURE BLENDING VALVE

If the water temperature is low, the reverse osmosis system will not produce its full rated capacity (based on 70° F. feed water temperature). With these cold water conditions, a temperature blending valve may be installed to increase the feed water temperature and thus the output of the reverse osmosis system. The blending valve should be a special type supplied by the factory with a built in thermometer. It should be installed prior to the optional backup softeners (if used) and the GAC carbon filter (See Fig 2). Both the cold water and the hot water supplied to the valve must be soft (less than 1 grain hardness) if 50% recovery is expected.

*Guidelines for the proper use of the temperature blending valve:*

1. The maximum recommended operating temperature range is 70°–77° F., with 77° F. being the ideal.
2. Operate at the lowest temperature that allows the RO SYSTEM to meet the car wash's needs.
3. Never increase the temperature above 70° F. in an attempt to increase RO production. This may seem like a good move in the short term. However, it will probably lead to the following problems below:
  1. The membrane may become fouled with hardness minerals due to the increase in membrane flux and greater tendency for scale formation.
  2. The membrane may become fouled with alum or cationic polymers much more rapidly than if operated at 70° F. or below.
  3. The membrane may become fouled with biological matter due to the elevated temperature which creates an environment conducive to the accelerated growth of bacteria.

All of these problems will decrease the output of the RO SYSTEM. Correction of these problems will require cleaning of the membranes at the very least. And if the conditions are allowed to continue for a prolonged period, the membranes may have to be replaced. None of these problems are covered under the system warranty.

## 5. INSTALLATION REQUIREMENTS

### IMPORTANT

The PROPAK® system installation must conform to local plumbing, electrical, and sanitation codes. Obtaining permits and meeting codes is the customer's responsibility.

### FOR WATER SUPPLY

Run a softened cold water supply to the vicinity of the reverse osmosis system location. Provide a ball or globe valve and a (female pipe thread) connection. If a temperature blending valve is used, run a softened hot water supply with valve and FPT connection.

See Figure 1 and Figure 2 for flow rates and suggested line size.

NOTE: The water supply must be continuously soft while the reverse osmosis system is running.

### FOR ELECTRICAL

A disconnect or junction box (consult local electrical codes) should be provided in the vicinity of the reverse osmosis system with the following service:

- **PROPAK® Reverse Osmosis System**

208-230/460 VAC, 3 Phase, with ground. (Single Phase for 1800 and 3000 models).

See Figure 6 for required Amp ratings. If your system included repressurization equipment, the electrical requirements will be greater.

- **Carbon Media Filter (if required)**

115 VAC, 1 Amp, grounded receptacle.

### FOR DRAIN

Use or provide a floor drain or a 1½" standpipe which ties into an existing drain having a proper trap and vent.

The reverse osmosis system and the carbon media filter (if required) require a drain connection. The drain flow from both of these units is pressurized so that the drain hose may be run fairly long lateral distances (up to 25 feet) at elevated heights – up to 3 feet above the carbon filter drain connection and up to 10 feet above the reverse osmosis drain connection.

### IMPORTANT

A properly designed air gap must be provided between the drain hose from the RO and GAC units and the sewer waste line in order to conform to plumbing codes. This prevents a cross connection which could result in contamination of potable water. An approved air gap is included in the installation kit option.

## 6. INSTALLATION PROCEDURE

### POSITION EQUIPMENT

See Figure 1 for Typical Layout

1. Individual components of the PROPAK® system should be positioned in acceptable locations with water, electrical, and drains provided.
2. As a rule, it is good to keep the repressurization pumps within 10 feet of the storage tanks.
3. The carbon media filter and prefilter should be close to the RO unit.
4. Storage tanks can be located up to 50 feet from the RO unit.
5. Optional temperature blending valve should be installed prior to the backup softener (if used) and the GAC. It can be mounted to the wall with the clamps supplied.

### MOUNTING PREFILTER

Mount prefilter assembly on the wall next to the reverse osmosis unit with suitable fasteners, such as concrete anchors, togglers, etc. Skid mounted PROPAK® systems may have prefilters mounted to a frame.

### FEED WATER CONNECTIONS

See Figure 2 for Flow Rate and Line Size data.

*NOTE: Hose clamps are required on all hose connections.*

1. Optional if a temperature-blending valve is used: run a hose from the soft water supply to the cold inlet connection on the temperature-blending valve. Run polybutylene tubing (included in the installation package) from the hot water supply to the hot inlet connection on the temperature blending valve.
2. Optional if a backup softener is used: run a hose from the soft water supply (cold, or from the temperature blending valve) to the inlet of the backup softener.
3. Optional if a GAC filter is used: run a hose from the soft water supply (either cold, temperature blending valve, or backup softener) to the inlet of the GAC filter.
4. Run a hose from the soft water supply (either cold, temperature blending valve, or backup softener) to the inlet of the prefilter.
5. Run a hose from the outlet of the prefilter to FEED inlet on the RO unit.

### POSITION EQUIPMENT

See Figure 3 for Flow Rate and Line Size data.

1. Run a hose from the REJECT outlet of the RO unit to a suitable drain (floor drain or standpipe). This connection should include proper air gap (included in installation package) to prevent possible cross connection (consult plumber).
2. Run a hose from the GAC filter (if required) drain outlet to a suitable drain.
3. Optional: run an appropriately sized hose from the backup or polisher softener (if required) drain outlet to a suitable drain.

### ELECTRICAL POWER CONNECTIONS

See Figure 4 and Figure 6

#### IMPORTANT: FOLLOW ALL LOCAL CODES!

Run electrical conduit (3/8" Liquid-Tite preferred) from the disconnect box (within 3 feet of the RO unit) or breaker box (if local codes allow) to the RO control box. Run appropriate power, neutral, and ground wires – see Figure 4. Connect the wires to the designated terminals – see Figure 6.

## 7. FLOAT SWITCH INSTALLATION PROCEDURE

*NOTE: All the operations listed to install the float switches may be done with the tank lying on its side. Be sure to remove any chips or other debris from the tank before filling with purified water.*

### REVERSE OSMOSIS (RO) SYSTEM SHUT-OFF – "TANK FULL" FLOAT SWITCH

Note: Blue and Black wire leads with Blue Color Band

Operation Description: The high water level control float contains one switch with a mechanical dead band action. The RO SYSTEM will turn on approximately 8" below the point it turns off.

Installation:

1. Access the inside of the tank through the manway or cover. Using a hole saw, drill a  $\frac{3}{4}$ " hole through the top of the tank near the high point (see Figure 5). Make to sure to prevent shavings from falling into the tank.
2. Adjust the weight on the cord sot that the bottom of the weight is about 6" above the top of the float. Snap the gripper wedge over the cord and secure the weight in this position.
3. Remove the hex nut from the cord grip fitting and push the free end of the float cord through the hex nut.
4. From the inside of the tank, push the free end of the float cord through the  $\frac{3}{4}$  " hole and then through the cord grip as shown. Push the threaded end of the fitting through the hole and tighten the nut from inside the tank to secure the fitting.
5. Pull the cord out until there is about 10" left between the top of the weight and the inside surface of the tank.
6. Slide the seal, gripper, and fitting nut over the end of the float cord and up to the fitting body. Secure the cord by tightening the fitting nut.

### REPRESSURIZATION (RP) SYSTEM SHUT-OFF – "TANK EMPTY" FLOAT SWITCH

Note: Brown and Black wire leads with Red Color Band

Operation Description: The low water level control float contains one switch and serves as a low level safety shut-off to protect the repressurization system pumps.

Installation:

1. Access the inside of the tank through the manway or cover. On the **opposite side** of the tank from the RO shut off float switch, using a hole saw drill a  $\frac{3}{4}$  " hole through the top of the tank near the high point (see Figure 5). Make sure to prevent shavings from falling into the tank.
2. Remove the hex nut from the cord grip fitting and push the free end of the float cord through the hex nut.
3. From the inside of the tank, push the free end of the float cord through the  $\frac{3}{4}$  " hole and then through the cord grip as shown. Push the threaded end of the fitting through the hole and tighten the nut from inside the tank to secure the fitting.
4. Pull the cord out until, in a free hanging position, the bottom of the float is about 2" above the top of the water outlet bulkhead fitting. This will cause the RP System pump to shut off when the water falls to about 7" above the outlet fitting.
5. Slide the seal, gripper, and fitting nut over the end of the float cord and up to the fitting body. Secure the cord by tightening the fitting nut.

### ELECTRICAL HOOK-UP – RO/RP SYSTEM SHUT-OFF FLOAT SWITCH

1. Run the cords to the system control box through the cord grip adapter on the box, and connect the wires to the appropriate terminals – see Figure 6.
2. If the tank is located too far away for the standard cord to reach the system control box, install a junction box as shown in Figure 6. Run a 4 wire cord (for RO and RP floats) or a 2 wire cord (for RO float only) from the system control box to the J-box. You may use  $\frac{1}{2}$ " conduit with 2 or 4 individual wires as needed.

*NOTE: If you are not using a PROPAK® RP System, consult the factory for appropriate connection points for the float switch.*



## 8. CONTROL SYSTEM

### RO SYSTEM CONTROL

The PROPAK® RO SYSTEM control function is accomplished by several integrated components. They have been selected for their proven performance and durability. Together they simplify installation, provide for long motor and pump life, protect the RO membranes from many common hazards, prevent system freeze-up, and allow the operator to monitor system performance. The parts are common to the industry and well understood by technicians or tradesmen. This translates into predictable long life and simple troubleshooting or service procedures.

### CONTROL COMPONENT DESCRIPTION

#### **Control Circuit Transformer**

208-240/460-480 VAC primary – 24 and 16 VAC secondary @ 75 VA.

It is a fully encapsulated machine-tool style transformer with screw terminals, designed for continuous operation. The secondary 24 VAC operates the control circuit (solenoids, lights, and starters). The secondary 16 VAC supplies power to the PLC. The low voltage control power increases safety and reliability in moist or wet environments. Both primary and secondary are provided with circuit breaker protection. The secondary is configured as a grounded neutral circuit to allow safe interfacing to external control circuits, such as self-serve bay or automatic tunnel repressurization pump start signals.

#### **Distribution Block**

Provides a single electrical connection point in the RO SYSTEM control panel for single or three phase 230 or 460 VAC.

#### **Motor Protection**

All RO SYSTEM motors have independent circuit breaker protection in the control box. This provides local wire and motor protection and prevents interruption of other equipment. Typically a non-fused safety disconnect is all that is required by the installing technician.

#### **PLC**

The PLC (programmable logic controller) is the heart of the control system, reading the state of the switches and turning the solenoids, motors and lights on or off as required. Each input and output is wired via pluggable screw terminals and the ON/OFF state is indicated by an LED. The PROPAK® PLC is fully encased in a metal enclosure limiting exposure to moisture and stray wires typical of "board" based products. The outputs are heavy duty, rated individually at 8 amps continuous duty. The prominent heat sink and heavy-duty construction allows for operation in environments which can destroy more common electronics. The PROPAK® PLC is rated to operate from minus 22°–175° F. (many control electronics are not stable below 30° F. and may not turn on at all at colder temperatures). Shock resistance is 10 G minimum. The operating program is held indefinitely without power. A battery back-up will hold process data (operating hours, PRO-FLUSH timing) for at least 10 years.

#### **TDS Transmitter**

Designed as a stand alone instrument, it interfaces to the PLC through a 0-5 volt input. The transmitter is designed to be extremely stable over a wide temperature and TDS range for greater accuracy

#### **Indicator Lights**

All RO SYSTEM motors have independent circuit breaker protection in the control box

#### **Panel Switches**

All RO SYSTEM motors have independent circuit breaker protection in the control box

#### **Pressure Switch**

All RO SYSTEM motors have independent circuit breaker protection in the control box

## 9. OPERATING INSTRUCTIONS

### OFF-AUTO-MANUAL SWITCH

#### **Select "OFF"**

Stops the RO SYSTEM Operation. Turns off power to the PLC and the PLC turns off all outputs.

#### **NOTE: THE 230 VOLT POWER REMAINS ALIVE!**

The transformer remains energized. All circuit breakers can be switched ON or OFF to isolate motors or the control circuit and the pumps can be operated manually engaging the starters.

#### **Select "AUTO"**

Continues the RO SYSTEM Operation. Turns on power to the PLC and the PLC resumes control at the same point at which it was turned off.

#### ***In "Auto" the PLC follows this sequence:***

1. **MONITOR THE RO FLOAT SWITCH.**
  - a. FLOAT SWITCH HIGH - contacts open, LED at X8 is OFF, RO SYSTEM remains OFF.
  - b. FLOAT SWITCH LOW - contacts closed, LED at X10 is ON, [→ go to 2.]
2. **MONITOR THE AUX INPUT SWITCH.**
  - a. AUX INPUT SWITCH OFF - contacts open, LED at X10 is OFF, RO SYSTEM remains OFF.
  - b. AUX INPUT SWITCH ON - contacts closed, LED at X10 is ON, [→ go to 3.]
3. **FEED SOLENOID IS ENERGIZED.**
  - a. LED at Y1 is ON, [→ go to 4.]
4. **MONITOR THE PRESSURE SWITCH.**
  - a. PRESSURE LOW - contacts open, LED at X9 is OFF, Low Pressure Light is ON  
LED at Y7 is ON, RO SYSTEM waits for adequate pressure
  - b. PRESSURE HIGH - contacts closed, LED at X9 is ON  
Once pressure goes high, pressure must go low and stay low for 3 seconds to reset control sequence, however low pressure light will come on instantaneously when pressure goes low.  
RO PUMP DELAY times for 30 seconds, [→ go to 5.]
5. **RO PUMP IS ON.**
  - a. LED at Y0 is ON, RO SYSTEM runs, [→ go to 6.]
6. **MONITOR THE RO FLOAT SWITCH.**
  - a. FLOAT SWITCH LOW - contacts open, LED at X8 is ON, RO SYSTEM continues to run.
  - b. FLOAT SWITCH HIGH - contacts open, LED at X8 is OFF,  
PRO-FLUSH initiated each 10 hours run time [→ go to 7.]
7. **RO PUMP IS OFF.**
  - a. LED at Y0 is OFF, [→ go to 8.]
8. **FEED SOLENOID IS OFF.**
  - a. LED at Y1 is OFF, [→ go to 1.]
9. **INTERRUPTIONS TO SYSTEM OPERATION.**
  - a. **LOW PRESSURE** for 3 seconds, RO pump shuts off, [→ go to 4.]
  - b. **AUX INPUT SWITCH OFF**, RO pump and FEED shut OFF, [→ go to 2.]
  - c. **HIGH TDS** (>40ppm) for 20 minutes during RO SYSTEM operation,  
Display reads 8888, RO pump and FEED shut OFF, Press SELECT to RESET, [→ go to 2.]
  - d. **HIGH TEMPERATURE** (>100° F.) for 10 minutes during RO SYSTEM operation,  
Display reads 8888, RO pump and FEED shut OFF, Press SELECT to RESET or reset is automatic after 30 minutes, [→ go to 1.]
  - e. **LOW TEMPERATURE** <38° F.)  
RO PUMP forced OFF, FEED and FLUSH forced ON,  
then wait until temperature rises above 38° F. [→ go to 5.]

## 9. OPERATING INSTRUCTIONS, continued

### **Select "MANUAL"**

FUNCTION: Provides a 7 minute over-ride of the RO FLOAT SWITCH

### **NOTE: "MANUAL" DOES NOT OVER-RIDE:**

1. LOW PRESSURE
2. HIGH TEMPERATURE
3. LOW TEMPERATURE
4. AUX INPUT SWITCH

### **"MODE" PUSHBUTTON**

FUNCTION: The "MODE" button scrolls through the 5 display modes. The current mode number (5 through 1) is displayed while the "MODE" button is pressed. The data is displayed when the "MODE" button is released.

MODE 5    Software Version

MODE 4    PRO-FLUSH time (minutes)

MODE 3    Water Temperature

MODE 2    TDS (parts per million, ppm)

MODE 1    RO SYSTEM operating time (hours) [0000] [000.0] alternating display to nearest 1/10<sup>th</sup> hour

### **"SELECT" PUSHBUTTON**

FUNCTIONS:

1. Enables PRO-FLUSH. Flush begins when RO unit shuts down or begins immediately if unit is OFF.
2. Clears HI TDS lockout and alarm.
3. Clears HI TEMP lockout and alarm.
4. Stops MANUAL operation.

### **SYSTEM PRESSURE CONTROL**

Sets the pressure on the filter membrane during pump operation. Turning the "SYSTEM PRESSURE CONTROL" clockwise increases the pressure and counter-clockwise decreases the pressure. The pressure is read on the SYSTEM PRESSURE GAUGE immediately above the valve.

### **REJECT CONTROL**

Sets the REJECT flow rate. Turning the "REJECT CONTROL" clockwise decreases the flow rate and counter-clockwise increases the flow rate. The flow rate is read on the REJECT FLOW meter immediately above and to the right of the valve.

## 10. START-UP PROCEDURE

1. Turn the "OFF-AUTO-MANUAL" SWITCH to OFF.
2. Turn all MOTOR CIRCUIT BREAKERS OFF.
3. Turn ON the MAIN WATER SUPPLY.
4. Back-flush the CARBON FILTER for at least 30 minutes. Then disconnect the carbon filter outlet from the pre-filter and run the outlet of the CARBON FILTER to drain for 20 minutes. Reconnect the pre-filter. (The loose carbon particles will foul the pre-filter on the first use if this procedure is eliminated).
5. Turn the "SYSTEM PRESSURE CONTROL" VALVE and the "REJECT CONTROL" VALVE fully open (counter-clockwise).
6. Direct the RO SYSTEM PRODUCT HOSE to the floor or drain.
7. Lift the HIGH LEVEL FLOAT out of the STORAGE TANK and place it on top of the tank.
8. Turn the "OFF-AUTO-MANUAL SWITCH to AUTO. Confirm that the "TANK FULL" LIGHT is ON.
9. Press SELECT to put the system into "PRO-FLUSH" allowing water to enter and flush through the unit.
10. Repeat pushing SELECT to put the system into "PRO-FLUSH" until water is visible in the REJECT FLOW METER.
11. Follow the GRUNDFOS PUMP instructions to vent the air. Remove the coupling cover to make sure the pump turns freely. Turn the RO PUMP CIRCUIT BREAKER ON. Push the motor starter in firmly and release to confirm correct pump rotation. Change rotation as required.
12. PROCON PUMPS may need to be run for a few seconds by manually engaging the starter to get water flowing into the REJECT FLOW METER.  
NOTE:
  - For GRUNDFOS PUMPS observe the shaft rotation.
  - For PROCON PUMPS the feed pressure will *drop for correct rotation* and *rise for incorrect rotation*. Make final confirmation by observing shaft rotation.
13. The RO SYSTEM can now be started at a low operating pressure and high reject rate. Return the RO FLOAT SWITCH to hang in the tank.
14. Allow the system to run for 5 minutes.
15. Slowly turn the "SYSTEM PRESSURE" CONTROL clockwise until the system pressure gage rises to 200 psi.
16. At the same time, reduce the REJECT FLOW RATE to equal to, or slightly greater than, the PRODUCT FLOW RATE. Reduce the system pressure if it rises above 200 psi.
17. MONITOR:
  - TDS and TEMPERATURE
  - PRODUCT FLOW RATE
  - REJECT FLOW RATE
  - FEED PRESSURE
  - SYSTEM PRESSURE
18. Compare these values to the approximate values in Figure 9.

## 11. REQUIRED MAINTENANCE

The **PROPAK® RO SYSTEM** is designed to require a minimum of maintenance over its lifetime. The most prudent course of action is to monitor the system performance and take corrective action as soon as it is indicated. A daily log of key parameters is presented in **Figure 8**. Following the suggested course of action to correct variations and/or periodically reviewing the data with your authorized distributor will insure years of trouble free operation.

### DAILY LOG PARAMETERS

#### FEED HARDNESS

TEST INTERVAL: DAILY  
 UNITS: COLOR STRIP, GRAINS PER GALLON (GPG)  
 NORMAL VALUE: GREEN, < 1 GRAIN

ACTION: Take a test sample from the valve at the pre-filter outlet. Do a quick test with a softener strip. If the result is green, write "green" in the log. If the result indicates hard water, use a hardness test kit to determine the exact hardness level. If less than 5 grains hard, shut the system down or set the reject flow to twice the product flow until soft water is restored. If the test shows greater than 5 grains, shut the RO SYSTEM down until the problem is corrected.

#### PRODUCT TDS

TEST INTERVAL: DAILY  
 UNITS: PARTS PER MILLION (ppm)  
 NORMAL VALUE: < 10 ppm

ACTION: Read the TDS ppm value from the **PROPAK® RO SYSTEM** display (MODE 2). Sudden increases in TDS may mean that the membranes are becoming fouled. EARLY corrective action can prevent permanent damage and allow the membrane to be restored to nearly new condition.

NOTE: The **PROPAK® RO SYSTEM** will not operate at TDS levels above 40 ppm for more than 20 minutes.

#### PRODUCT FLOW RATE

TEST INTERVAL: WEEKLY  
 UNITS: GALLONS PER MINUTE (GPM)  
 NORMAL VALUE: SEE FIGURE 8.

ACTION: Read the PRODUCT FLOW METER on the top of the instrument panel. Read the value in GPM at the top of the float.

#### REJECT FLOW RATE

TEST INTERVAL: WEEKLY  
 UNITS: GALLONS PER MINUTE (GPM)  
 NORMAL VALUE: SEE FIGURE 8.

ACTION: Read the REJECT FLOW METER on the top of the instrument panel. Read the value in GPM at the top of the float.

NOTE: The reject flow rate should always be equal to, or greater than the product flow rate, unless specifically authorized by Huron Valley Sales, Inc. on the basis of water analysis.

## 11. REQUIRED MAINTENANCE, continued

### FEED WATER PRESSURE

TEST INTERVAL: WEEKLY  
 UNITS: POUNDS PER SQUARE INCH (psi)  
 NORMAL VALUE: > 20 PSI

ACTION: Read the FEED PRESSURE GAUGE on the instrument panel.

NOTE: The Feed Pressure should be read when the RO SYSTEM is operating.

### SYSTEM OPERATING PRESSURE

TEST INTERVAL: DAILY  
 UNITS: POUNDS PER SQUARE INCH (psi)  
 NORMAL VALUE: > 200 PSI

ACTION: Read the SYSTEM PRESSURE GAUGE on the instrument panel.

NOTE: The System Pressure should be read when the RO SYSTEM is operating.

### WATER TEMPERATURE

TEST INTERVAL: WEEKLY  
 UNITS: DEGREES FAHRENHEIT (°F.)  
 NORMAL VALUE: 70° F.

ACTION: Read the TEMPERATURE VALVE from the **PROPAK® RO SYSTEM** display (MODE 3). If the system uses a blending valve, check the temperature gauge at the blending valve.

NOTE: The water temperature should be read when the system has been operating for at least 5 minutes.

### SYSTEM OPERATING TIME

TEST INTERVAL: WEEKLY  
 UNITS: HOURS  
 NORMAL VALUE: N/A

ACTION: Read the OPERATING HOURS value from the **PROPAK® RO SYSTEM** display (MODE 1).

### CHLORINE LEVEL (Cl<sub>2</sub>)

TEST INTERVAL: WEEKLY  
 UNITS: mg/l  
 NORMAL VALUE: 0 mg/l

ACTION: Take a test sample from the valve at the pre-filter outlet. Use a chlorine test kit to determine the presence of free chlorine. If free chlorine is detected, the carbon and gravel in the backwashing filter may have to be replaced. Prolonged contact (300 + hours) with chlorinated water will cause permanent deterioration of the membrane. The effect of chlorine on the membrane is cumulative.

NOTE: The chlorine level should be read when the system has been operating for at least a half hour.

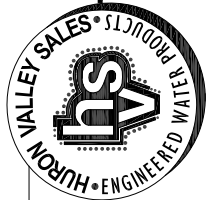
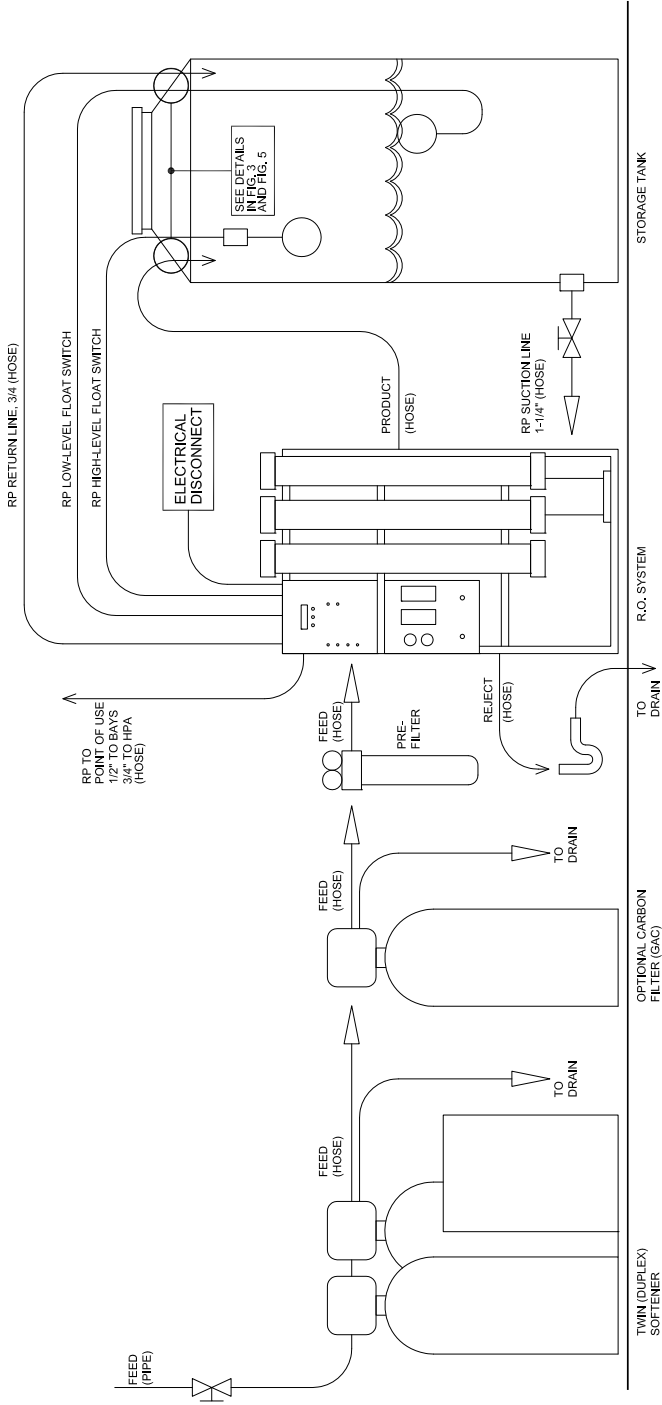
### OTHER DATA

Recording of this additional data will improve system performance monitoring.

- Date of last pre-filter change
- Date of softener salt change
- Volume of salt added to softener
- Feed water TDS using hand-held tester
- Date of last membrane cleaning
- Results of last membrane cleaning
- Feed Water Pressure: After FEED SOLENOID comes on, but prior to RO PUMP running. Record with a slash in front of system running feed pressure. For example: 40/25

FEED WATER SUPPLY		FLOW	SIZE	LOSS/20 FEET
PRO-PAK 1800, 3000		2 - 5 GPM	2 - 5 GPM	<2 PSI
PRO-PAK 4400, 6600		6 - 10 GPM	6 - 10 GPM	<2 PSI
PRO-PAK 8800, 10800, 12800		11 - 20 GPM	11 - 20 GPM	<2 PSI

PRODUCT AND REJECT		FLOW	SIZE	LOSS/20 FEET
PRO-PAK 1800, 3000		<3 GPM	1/2"	<3 PSI
PRO-PAK 4400, 6600		<5 GPM	3/4"	<3 PSI
PRO-PAK 8800, 10800, 12800		<10 GPM	3/4"	<8 PSI

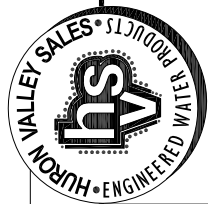
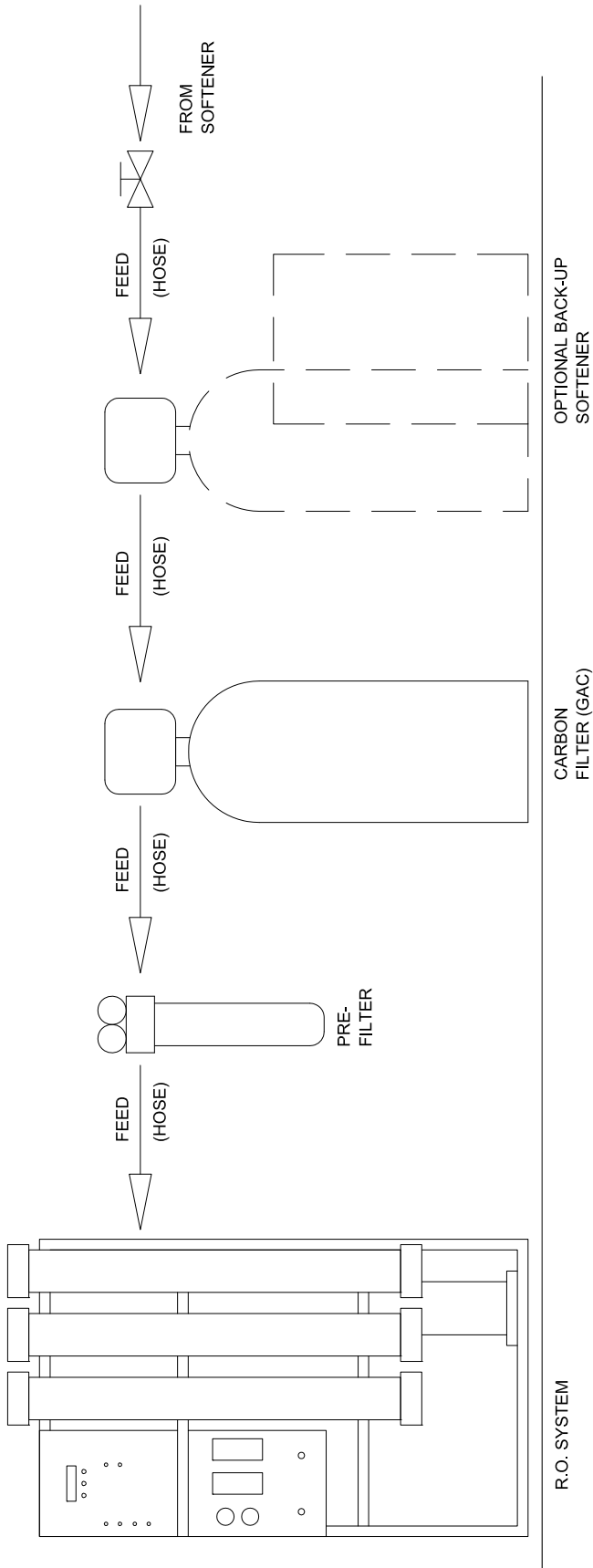


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SCALE: Scaled	AUTHOR: S.G.	DATE: 11-24-2009	FILE NUMBER: HVS REFERENCE NUMBER: 3826		

FIGURE 1 PROPAK SPOT FREE RINSE SYSTEM TYPICAL EQUIPMENT LAYOUT

FEED WATER SUPPLY		SIZE
PRO-PAK 1800, 3000		1/2"
PRO-PAK 4400, 6600		3/4"
PRO-PAK 8800, 10800, 12800		3/4"

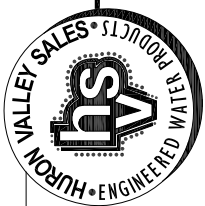
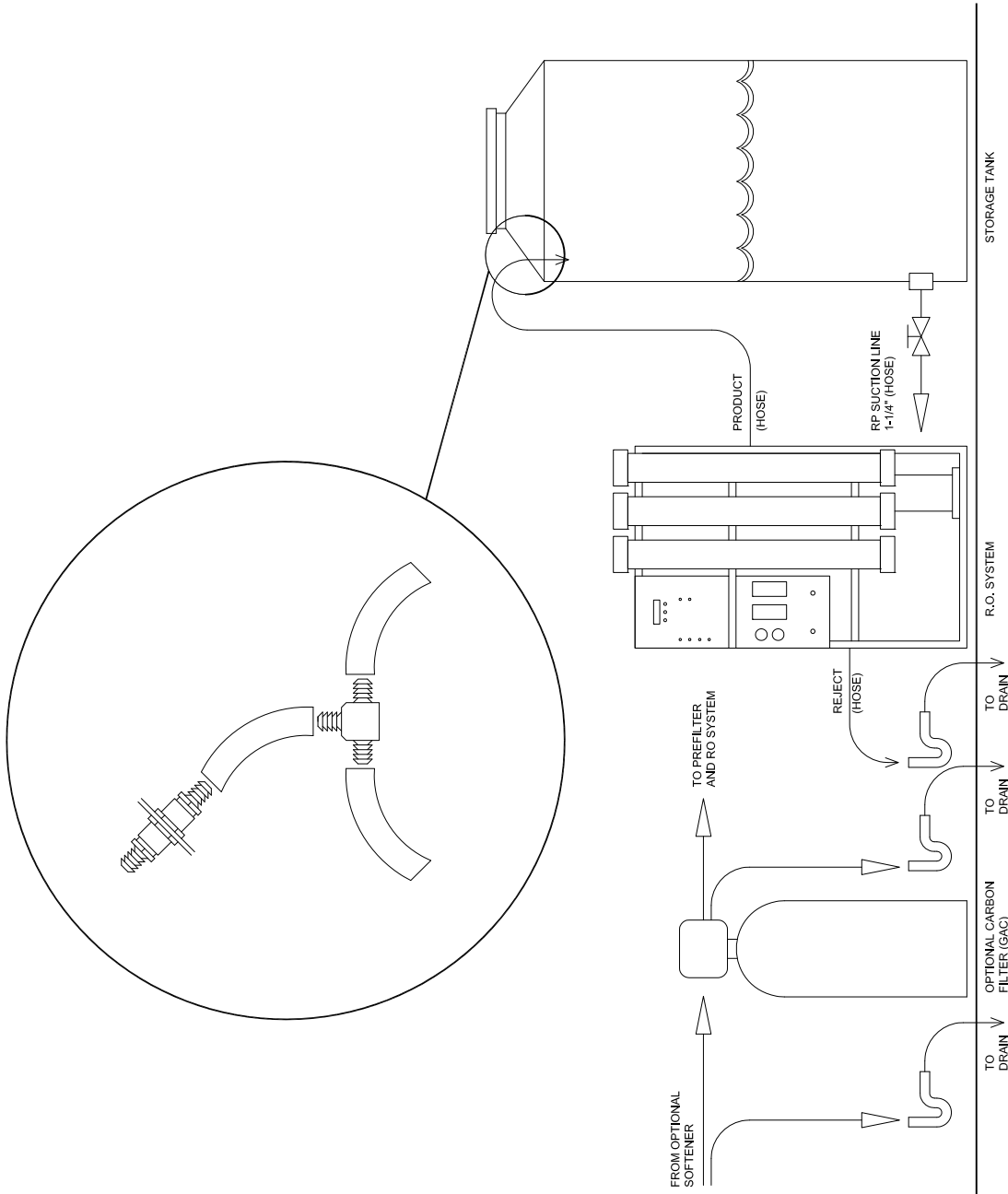


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FIGURE 2 FEED WATER CONNECTIONS





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**PROPAK**  
ENERGY EFFICIENT HEATING

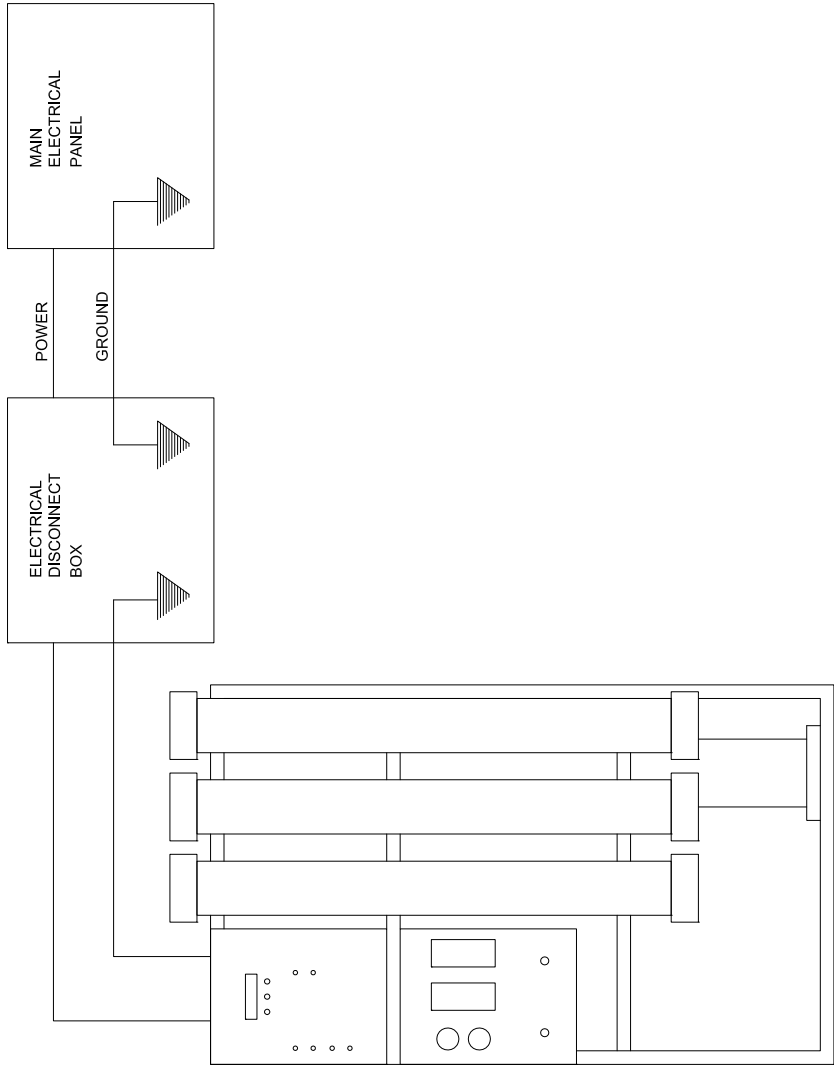
DRAWING TITLE:  
PRODUCT, REJECT  
AND DRAIN CONNECTIONS

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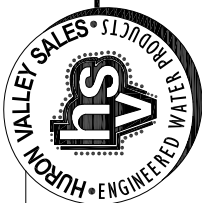
SCALE: Scaled  
AUTHOR: S.G.  
DATE: 12-1-2009  
FILE NUMBER: 3839  
HVS REFERENCE NUMBER: 3839

FIGURE 3 PRODUCT, REJECT AND DRAIN CONNECTIONS

ELECTRIC SERVICE REQUIREMENTS (NOT INCLUDING RP)		
PRO-PAK 1800, 3000	3/4 HP	208-230 VAC, 1 PHASE, 6 AMP
PRO-PAK 4400, 6600	3 HP	208-230/460 VAC, 3 PHASE, 8 1/4 AMP
PRO-PAK 4400, 6600, 8800, 10800, 12800	5 HP	208-230/460 VAC, 3 PHASE, 14 7/8 AMP



R. O. SYSTEM



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FAX: (734) 944-5800

DRAWING TITLE:  
ELECTRICAL POWER  
CONNECTIONS

SCALE:  
Scaled

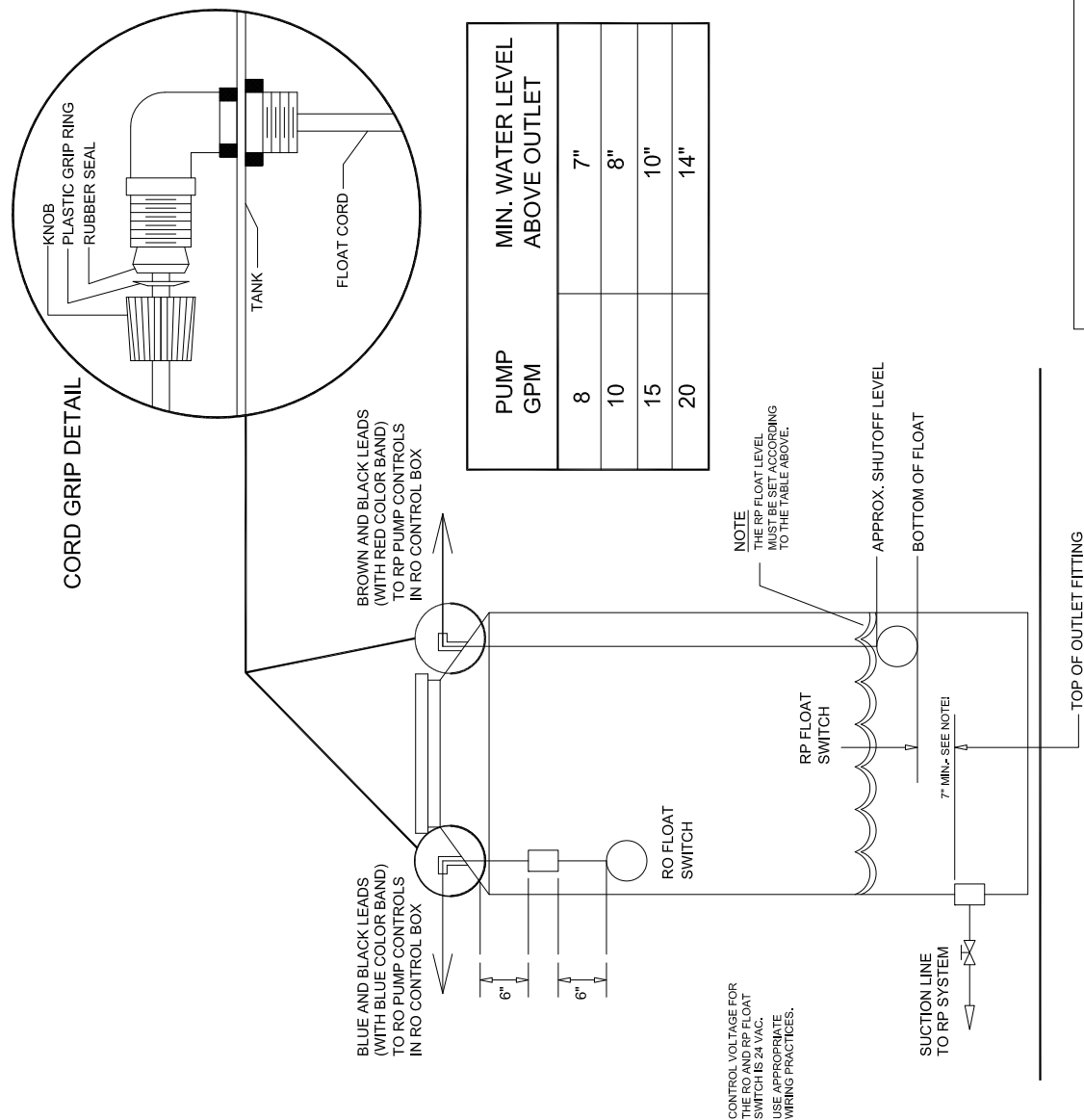
AUTHOR:  
S.G.

DATE:  
12-1-2009

FILE NUMBER:

HVS REFERENCE NUMBER:  
3840

FIGURE 4 ELECTRICAL POWER CONNECTIONS



PUMP GPM	MIN. WATER LEVEL ABOVE OUTLET
8	7"
10	8"
15	10"
20	14"

CONTROL VOLTAGE FOR THE RO AND RP FLOAT SWITCH IS 24 VAC. USE APPROPRIATE WIRING PRACTICES.

**NOTE**  
THE RP FLOAT LEVEL  
MUST BE SET ACCORDING  
TO THE TABLE ABOVE.

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**PROPAC**  
ENERGY EFFICIENT HEATING

**DRAWING TITLE:**  
RO AND LOW LEVEL  
FLOAT SWITCH INSTALLATION

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SCALE:	AUTHOR:	DATE:	FILE NUMBER:	HVS REFERENCE NUMBER:
Scaled	S.G.	12-1-2009		3841

### FIGURE 5

# ELECTRICAL CONNECTIONS REQUIRED PRIOR TO STARTUP

## RD SYSTEM CONNECTIONS

1. CONNECT MAIN POWER. 208/230 VAC SINGLE OR THREE PHASE AS REQUIRED. PROCON 3/4 HP PUMPS ARE SINGLE PHASE. GRUNDFOS 3 AND 5 HP PUMPS ARE THREE PHASE. CONNECT TO GROUND BAR.

CAUTION: 460 VAC MAIN POWER IS SPECIAL ORDER! CONTACT FACTORY FOR FIELD CONVERSION!

2. CONNECT TANK HI LEVEL FLOAT LEADS TO: ONE TO X8, ONE TO 24 VAC HOT TERMINAL. ETC. (BLUE AND BLACK LEADS WITH BLUE COLOR BAND) RP SYSTEM CONNECTIONS

3. CONNECT 24 VAC HOT FROM BAY TO X1, X2,

CONNECT ALL 24 VAC NEUTRALS TO 24 VAC COMMON.

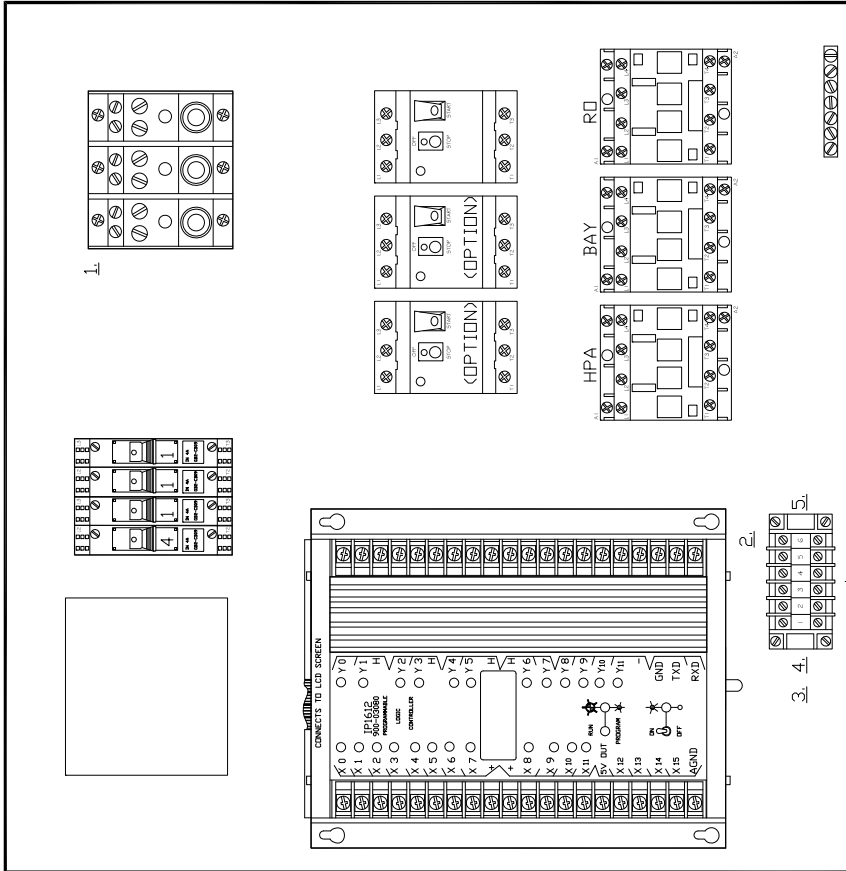
CAUTION: PROPAK 24 VAC NEUTRAL IS GROUNDED! CONFIGURE YOUR WIRING PROPERLY!

4. CONNECT 24 VAC HOT FROM HPA(S) TO X6 AND/OR X7.

CONNECT ALL 24 VAC NEUTRALS TO 24 VAC COMMON.

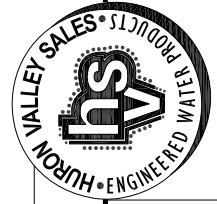
5. CONNECT TANK LOW LEVEL FLOAT TO:

ONE LEAD TO X0, ONE LEAD TO 24 VAC HOT. (BROWN AND BLACK LEADS WITH RED COLOR BAND)



NOTE: TERMINALS UNPLUG FOR EASY ACCESS.

COMMON HOT  
24 VAC



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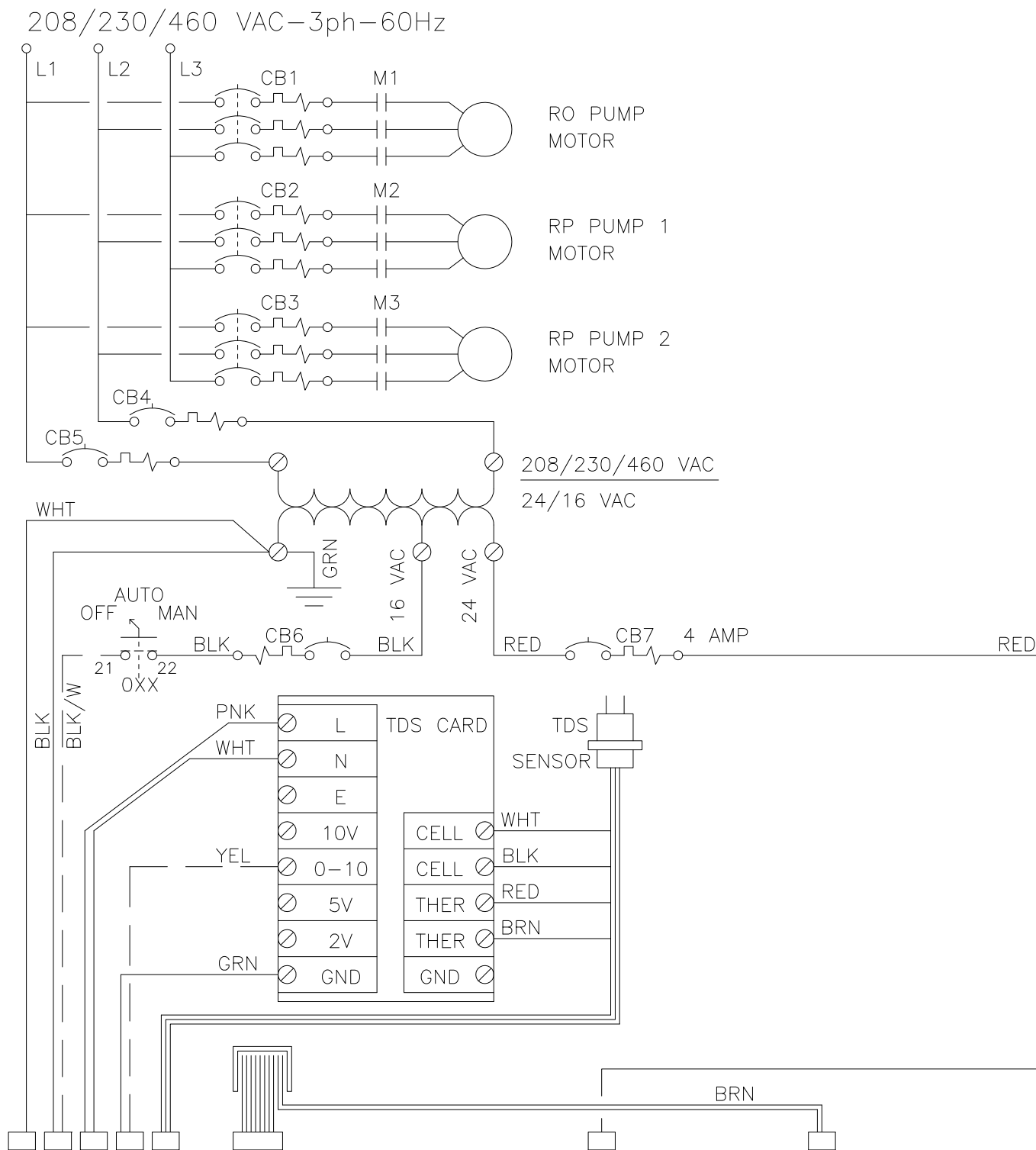
**PROPAK**  
ENERGY EFFICIENT HEATING

DRAWING TITLE:  
PROPAK CONTROL ENCLOSURE  
ELECTRICAL CONNECTIONS

HURON VALLEY SALES  
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BELLEVILLE, MI. 48111  
PHONE: (734) 944-5200  
FAX: (734) 944-5800

SCALE: Scaled	AUTHOR: B.W.	DATE: 10-2-2012	FILE NUMBER: HVS REFERENCE NUMBER: 3842
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FIGURE 6 PROPAK CONTROL ENCLOSURE ELECTRICAL CONNECTIONS



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PHONE: (734) 944-5200  
FAX: (734) 944-5800

**DRAWING TITLE:**  
PROPAK ELECTRICAL  
SYSTEM SCHEMATIC

**PROPAK**  
ENERGY EFFICIENT HEATING



**SCALE:**  
Scaled

**AUTHOR:**  
S.G.

**DATE:**  
12-1-2009

**FILE NUMBER:**

**HVS REFERENCE NUMBER:**  
3843

FIGURE 7A PROPAK ELECTRICAL SYSTEM SCHEMATIC



# RO SYSTEM DAILY LOG

DATE		DATA								
Month		Feed Hardness (grain)	Product TDS (ppm)	Product Flow (gpm)	Reject Flow (gpm)	Feed Pressure (psi)	System Pressure (psi)	Water Temp (°F.)	Run Time (hr)	Cl2 Level (mg/l)
Day										
1										
2										
3										
4										
5										
6										
7										
8										
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<b>Notes:</b>										

Figure 8 PROPAK® Daily Log



## PROPAK® SYSTEM SPECIFICATIONS

ITEM	OPERATING RANGE	APPLIES TO THESE MODELS
Feed Water Hardness	0-1 grain	ALL
Feed Water TDS	less than 1,000 ppm (at 50% recovery)	ALL
Product TDS	0-10 ppm (shut down above 40 ppm)	ALL
Chlorine	0-0.1 mg/l free chlorine (see additional water limits on page 2)	ALL
Feed Pressure (flowing)	20 psi (min) - 50 psi (max)	ALL
System Pressure	180-225 psi (250 psi max)	ALL
Ambient Temperature	35° F. - 140° F.	ALL
Water Temperature	40° F. - 90° F. (70° F. preferred)	ALL
Humidity	5% - 98%, non condensing	ALL
Power Supply - 3/4 HP	208-230 VAC - 1 Phase - 6 AMP	1800X - 3000
Power Supply - 3 HP	208-230 VAC - 3 Phase - 8.4/4 AMP	4400X - 6600X
Power Supply - 5 HP	208-230 VAC - 3 Phase - 13.6 AMP	8800X - 12,800
Power Supply - (2) 5 HP	230/460 VAC - 3 Phase - 14/7 AMP <u>each</u> (R.O. Requirements Only)	17,600 - 26,600
Operation Duty Cycle	100%	ALL
FEED FLOW RATE (MAX)	PRODUCT FLOW RATE (at 70° F. FEED) (and REJECT FLOW RATE at 50% RECOVERY)	APPLIES TO THESE MODELS
3.0 GPM	1.0 - 1.5 GPM	
4.5 GPM	1.8 - 2.2 GPM	
6.5 GPM	2.7 - 3.2 GPM	
10.0 GPM	4.4 - 4.9 GPM	
13.0 GPM	6.0 - 6.5 GPM	
16.0 GPM	7.5 - 8.0 GPM	
20.0 GPM	9.5 - 10.0 GPM	
26.0 GPM	12.0 - 13.0 GPM	17,600
32.0 GPM	15.0 - 16.0 GPM	21,600
40.0 GPM	18.0 - 20.0 GPM	26,600

Figure 10 PROPAK® RO SYSTEM SPECIFICATIONS



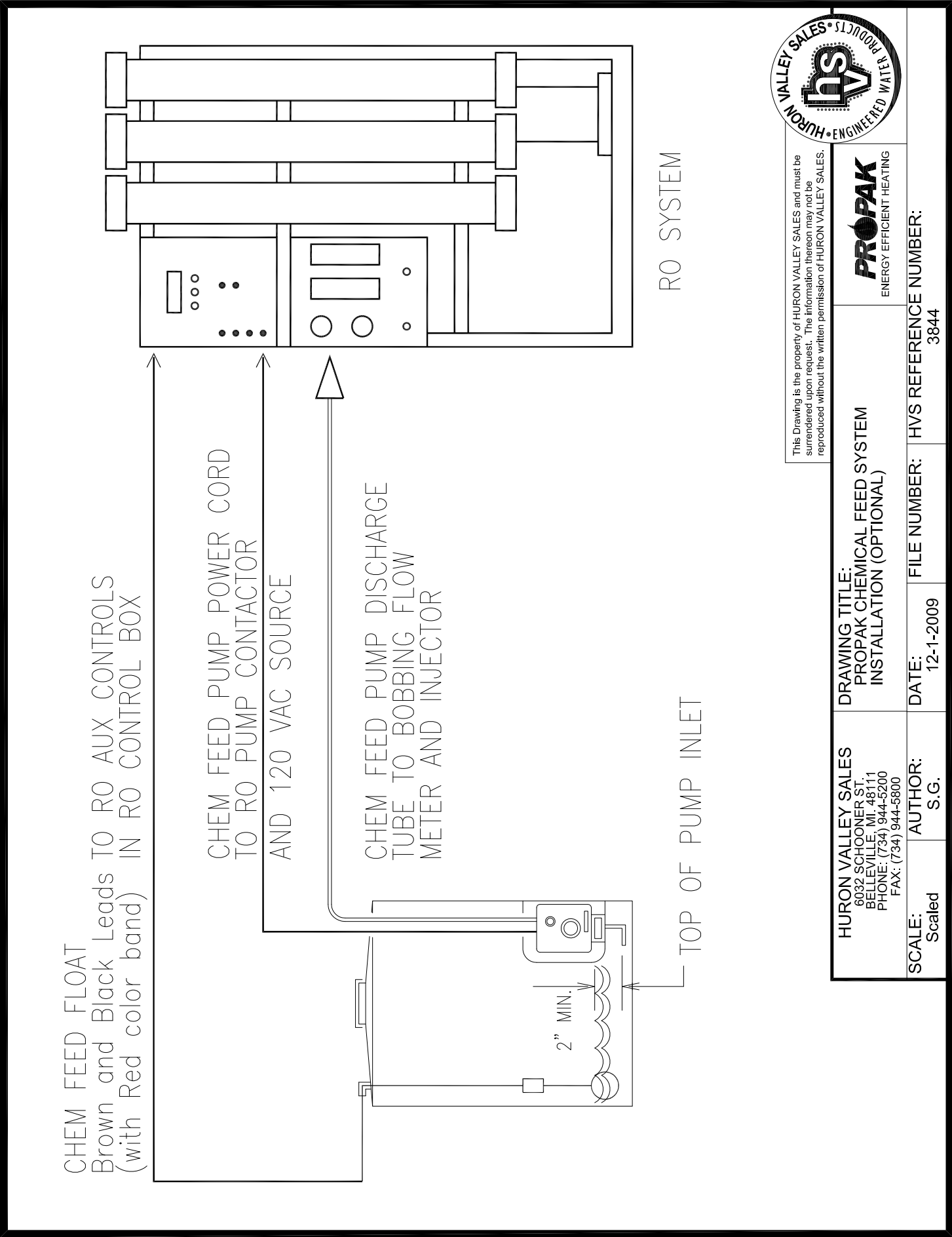
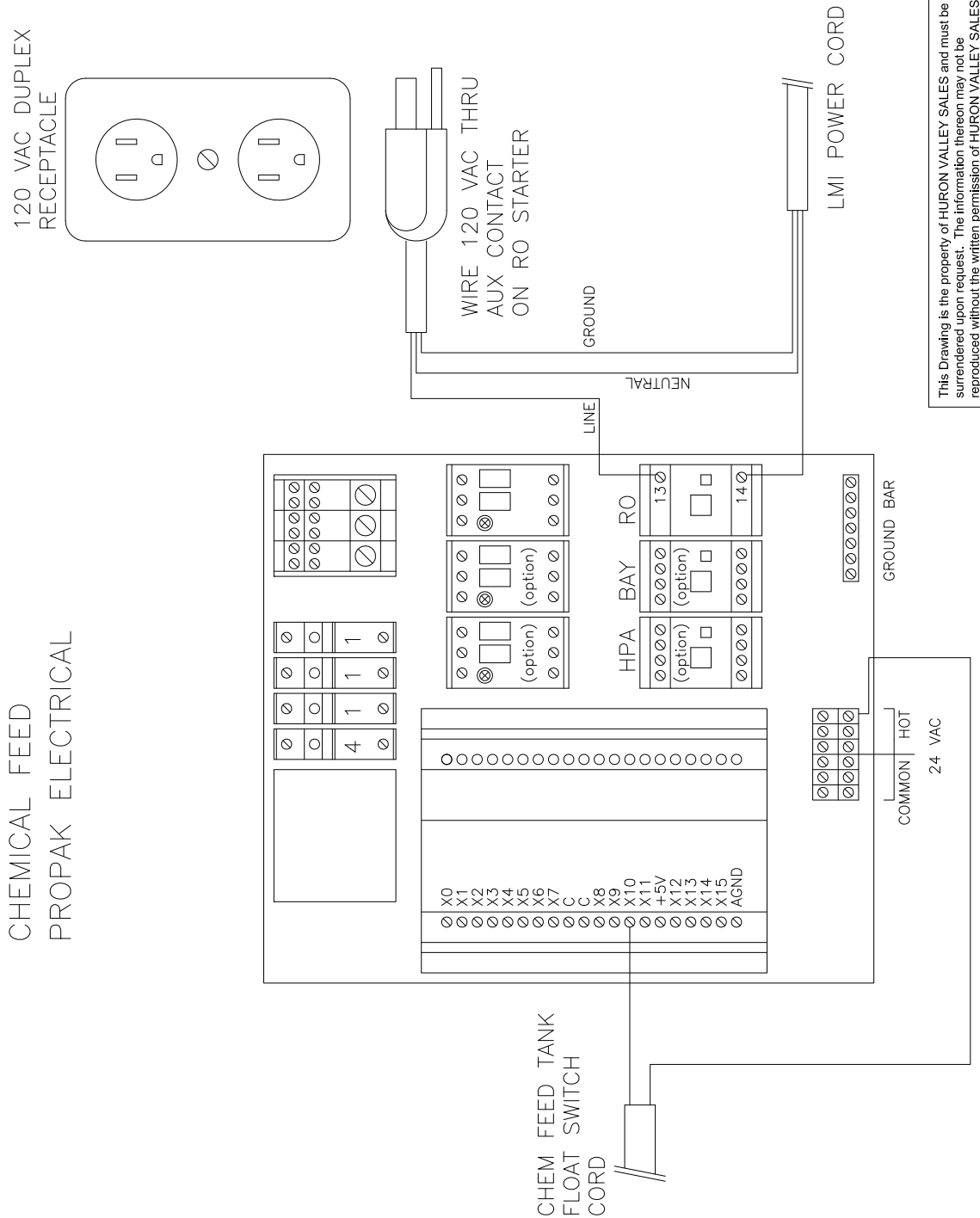


FIGURE 11 PROPAK CHEMICAL FEED SYSTEM INSTALLATION (OPTIONAL)



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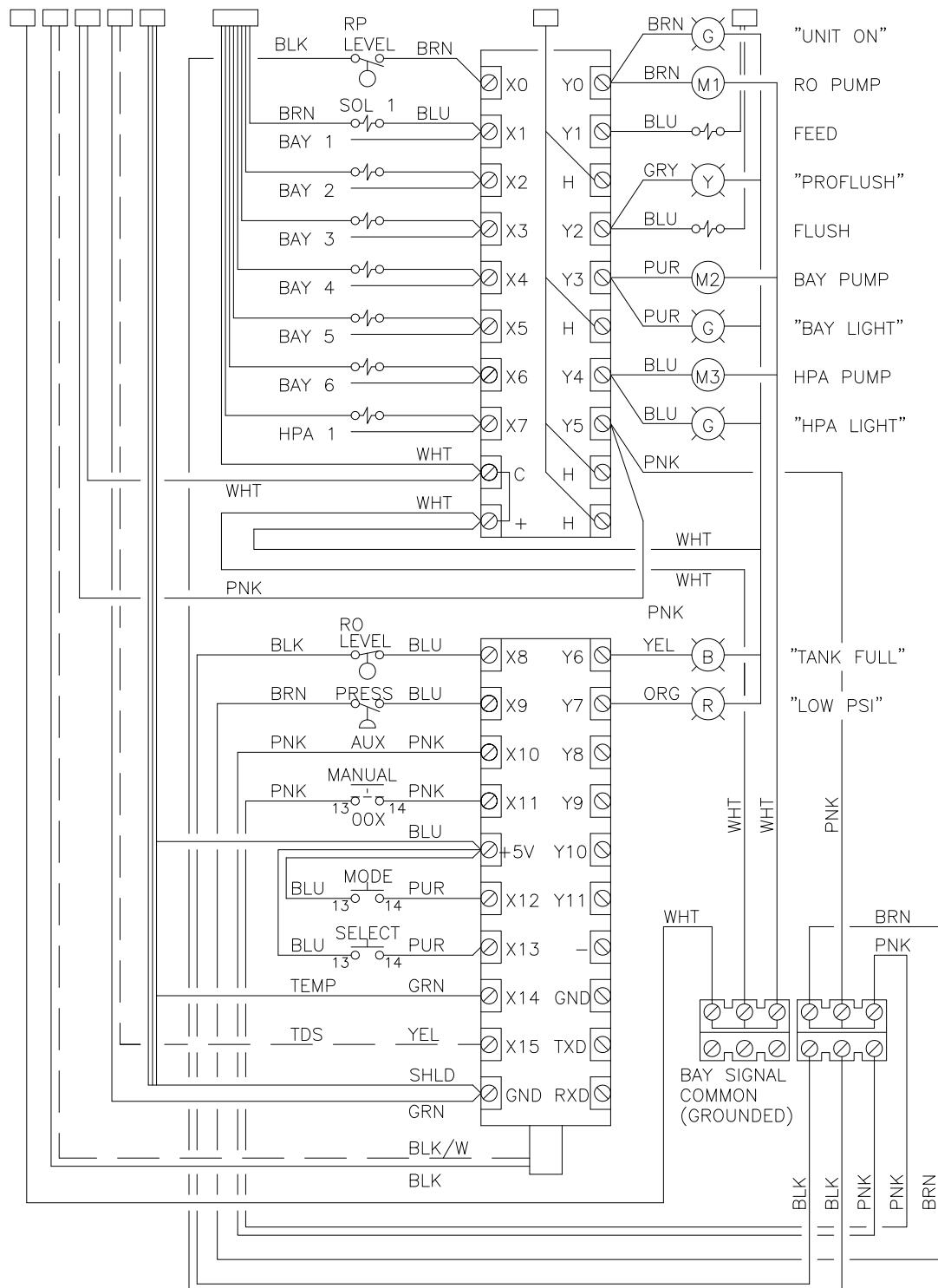
**DRAWING TITLE:**  
CHEMICAL FEED SYSTEM  
ELECTRICAL CONNECTIONS (OPTIONAL)

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SCALE: Scaled	AUTHOR: S.G.	DATE: 12-1-2009	FILE NUMBER: 3845	HVS REFERENCE NUMBER:
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## FIGURE 12 PROPAG CHEMICAL FEED SYSTEM ELECTRICAL CONNECTIONS (OPTIONAL)

# 6+1 STANDARD CONFIGURATION



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FAX: (734) 944-5800

**DRAWING TITLE:**  
ELECTRICAL SYSTEM SCHEMATIC

**PROPAK**  
ENERGY EFFICIENT HEATING



**SCALE:**  
Scaled

**AUTHOR:**  
S.G.

**DATE:**  
12-1-2009

**FILE NUMBER:**

**HVS REFERENCE NUMBER:**  
3846

**FIGURE 7B** PROPAK ELECTRICAL SYSTEM SCHEMATIC

# RO GUARD 7x

## Dosing Volumes For RO GUARD 7x

Model / GPD	Dosing Pump Settings
1 container of RO GUARD 7x mixed with 15 gallons of RO water	
1800	140 ml / hr
3000	230 ml / hr
4400	335 ml / hr
6600	500 ml / hr
8800	670 ml / hr

Model / GPD	Dosing Pump Settings
2 containers of RO GUARD 7x mixed with 15 gallons of RO water	
10,800	410 ml / hr
12,800	480 ml / hr
17,600	700 ml / hr
21,600	850 ml / hr
26,600	1050 ml / hr