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INTRODUCTION

The control is a computer based, demand initiated controller for commercial and industrial filter, softener, and dealkalizer systems. The controller operates by sensing water flow and remembering water usage history to anticipate future water requirements and to optimally control system operation. Softeners, Dealkalizers or Filters can be operated as single tank systems, alternating two tank systems, or parallel two tank systems. Additionally, the controller provides powerful features, which allow precise monitoring of system performance and detailed assistance in diagnosing problems.

The VIP control works with a full line of 1”, 1.5”, 2” and 3” commercial and industrial softener, dealkalizer and filter multi-port valves. The VIP control also works in conjunction with stagers for operation of a complete line of valve nest systems. The control accepts flow signals from a number of Hall effect type flow sensors. When operated in conjunction with 1”, 1.5”, or 2” VIP flow sensors, the control will automatically make low flow rate corrections to improve accuracy. For larger system requirements, the controller operates with 3”, 4” and larger insertion type paddlewheel flow meters.

**VIP-1E Features**

- Nema-4X Enclosure
- Alphanumeric Display
- 4-Button Pad
- Twist Lock Connectors
**Four Button Pad** - The Button pad is used for both operating and programming the system.

- **[Select]** is the navigation button. **[Select]** is used to advance display screens and to access higher level programming and diagnostics screens.

- **[▲]** (up) and **[▼]** (down) are the change buttons. Whenever a display value is flashing, the **[▲]** (up) and **[▼]** (down) buttons can be used to change that value.

- **[Regen]** is used for manual control. The **[Regen]** button can be used to schedule regeneration tonight by pushing the button once. Pushing and holding the **[Regen]** button for 4 seconds will initiate an immediate regeneration. The **[Regen]** button can also be used to manually index systems through the steps of regeneration after initiation.

**Alphanumeric Display** - The display is an illuminated, alphanumeric, liquid crystal display (LCD) which presents the information used to program, operate, and diagnose the systems and performance. The normal time of day is displayed along with the percent capacity remaining for the system. When programming for Softeners, Filters or Dealkalizers the critical parameters can be set and are displayed.

**Twist Lock Connectors** - All interconnections to the VIP I Controllers are plastic, water resistant, indexed, turn-to-lock, quick connectors. The control interconnecting cables are pre-installed on valves and turbines. No wiring is required.

- **Flow Meter Connector** - one flow meter is used in conjunction with single or duplex systems.

- **Unit 1 Control Connector** - contains all the wiring required to power and control a first unit.

- **Unit 2 Control Connector** - on single valve systems, its connections allow remote initiation and provide a 24 VAC alarm signal. On two valve systems, it is the second unit's power and control connection.

**Nema-4X Enclosure** - The enclosure is constructed of corrosion resistant plastic. It is a watertight enclosure measuring 6-1/2" wide x 8-1/2" high x 5" deep. The controller may be wall mounted or bracket mounted to a nearby pipe. The VIP is UL listed as an Enclosed Industrial Control Panel for US and Canada per UL508A.
Optional Control Features

• **Service and Regeneration Outputs**

The VIP control has two relay outputs available for adding Service and Regeneration indicator lights. Each relay is off when its respective unit is in the service position and activated when in the regeneration mode. The relays are Single Pole Double Throw relays with 10 amp contacts. A terminal strip is provided inside the control for connection to the indicator lights. The terminal strip has the common, normally open and the normally closed connections to the relays. Wiring diagrams are included at the end of this programming manual.

• **Remote Alarm Output**

The VIP is equipped with an alarm relay output. When an Error has occurred the control will flash Error on the screen and both of the relays for the service and regeneration indicators are activated. A wiring diagram is included at the end of this programming manual.

• **Brine / Caustic Pump Output**

The control has a relay built in that can operate a pump for brine or a chemical pump for caustic feed. The length of time it is activated during the brine draw cycle is controlled independently of the regeneration time. TDRA can be turned off or set for a specific time from 1 minute up to 120 minutes. The default time is 50 minutes.

• **Salt Monitor**

The Salt Monitor feature indicates the amount of salt that is in the brine tank and will alert the user when the level is low. This option is only available on the VIP-1 single and duplex systems. The brine tank should be divided into 10 equal segments, which shows the level of dry salt it contains. The level can be adjusted between 1 and 10. Bars shown on the display of the control relate to the levels indicated in the brine tank. An alarm sounds when the level drops to a programmed level in the brine tank.

The current salt level is displayed on the control when the Salt Monitor is enabled and the type of unit selected is a softener. Start with the current time of day on the display. The Level of Salt can be displayed by pressing the Select button twice. There are 10 bars on the display of the control, corresponding to the 10 levels of salt in the brine tank. The current salt level can be adjusted by pressing the Up or Down arrows until the level of salt in the brine tank is matched. The level on the control is then automatically reduced based on the amount of salt dissolved by the water put into the brine tank during the refill cycle at the end of each regeneration.

• **Modbus 485 DCS Interface**

The VIP control is equipped with a two wire 485 Modbus connection and can be connected to a factory DCS system. The VIP must be ordered special with this option activated. Documentation containing the information stored in the holding registers is included as part of this option. Each register is described along with allowable data ranges for the contents of each register.
CONTROL INSTALLATION

Wall Mounting

Plastic Wall Mounting brackets are supplied with the VIP Control. The brackets should be bolted onto the back of the control with the screws provided. The mounting tabs are shown at the top and bottom of the control at the right.

Pipe Mounting

Attach the Wall Mount brackets (rotated 180°) on the back of the control. Mount the section of Unistrut in the position indicated in the photographs below (screws and washers are provided). The photo on the left can be used as a guide if the support pipe runs horizontally. If the support pipe runs vertically then the photo on the right can be used as a guide. The Unistrut pipe clamp is then mounted to the Unistrut and positioned as desired and held in place with the nut and bolt provided.
WIRING CONNECTIONS

SINGLE SYSTEM

UNIT 1

VIP-I CONTROL

TRANSFORMER

SEE FLOW METER SECTION

DUPLEX SYSTEM

UNIT 1

UNIT 2

24 VAC TRANSFORMER

Contact Factory for following options:
1) Remote initiation of regeneration.
2) External remote alarm output.
3) Regeneration and service output signals.

Note:
- All 2750 and 2850 valves use 1 – 50VA transformer per system.
- All 2900 valves use 1 – 50VA transformer per valve.
- All 3150 and 3900 valves use 1 – 100VA transformer per valve.
VIP VALVE WIRING HARNESS CONNECTIONS

The small red and black wiring harness is connected to the Program Switch. This switch tells the VIP Control the position of the valve. The other wiring harness is connected to either the Home Switch or the Drive Switch dependant on the function of the valve. Single and Parallel operation requires the wiring harness to be on the Drive Switch. Alternating and Variable Flow systems require the harness to be on the Home Switch.

2750 – 2850 and 2900 Upper Drive Motor Assembly

3150 and 3900 Upper Drive Motor Assembly
MAIN SCREEN

- The Main Screen - The time and charge bar screen is the default display screen for the controller. The Main Screen is the starting point from which system, status, settings, configuration, and diagnostics can be reached. Once the control has been initially programmed or after being left idle for four (4) minutes, the display will always revert back to the Main Screen from any other screen.

- Basic operating information is supplied by the Main Screen such as Time of Day, Charge Bar, and Recharge Tonight segments as explained in detail below.

Time of Day

- The Time of Day appears (non-flashing) in a four-character display. The display format can be 12 hour (with AM or PM) or 24 hour as designated during programming.

Charge Bar

- The Charge Bar indicates the percentage of unused operating capacity remaining. The figure above indicates that 50% of the operating capacity remains. As capacity is depleted, the charge bar segments are reduced. During reconditioning, the charge bar segments are added as the regeneration cycle takes place.

- On Alternating Systems, the charge bar indicates the capacity remaining in the service tank. On Parallel Systems, the charge bar shows the capacity of unit 1 for six (6) seconds, blanks for one (1) second, and then shows the capacity of unit 2 for two (2) seconds.

ReCharge Tonight – (Single and Alt2 Systems Only)

- The words Recharge Tonight flash in the display when the controller has determined that a regeneration is needed. At the next programmed recharge time, regeneration will occur. Time of regeneration can be changed in Level 2 Programming.

- When the word Recharge flashes in the display, regeneration is currently underway. The Recharge segment will continue to flash until the regeneration is complete.
SYSTEM STATUS – FIRST LEVEL PROGRAMMING

The [SELECT] button is the navigational button. By pressing and releasing this button repeatedly, operation and status information screens can be accessed.

NOTE: BEEPER - A beeper sounds while pressing buttons for setup. One beep signals a change in the display. Several repeat beeps indicates the button pressed is invalid, telling you to try another button.

Change Time of Day

The Time of Day screen is entered by a press and release of the [SELECT] button. Should a power outage occur, the Time of Day is maintained for a minimum of 96 hours. The Time of Day is changed using the [▲] up and [▼] down buttons. Each push changes the display by one (1) minute. If the buttons are held, the time display changes at a faster rate.

The [▲] up and [▼] down buttons are used to change the selection. Press the [SELECT] button to advance the control to the next screen.

Brine Tank Salt Level

The brine tank salt level is indicated on the display using the bars on the right. Only if the salt monitor is activated in “Level Three Programming” of the control. When filling the brine tank, use the [▲] up to increase the number of bars displayed. This will correspond to the number on the sticker in the brine tank. The bars will be depleted as the unit regenerates. “Load” “Salt” will alternate on the main screen when the level drops below the predetermined alarm level. If the salt monitor is turned off, this display will not show. This screen is not available on filters. See “Third Level Programming” for more information.

Average Daily Gallons

The Average Daily Gallons screen displays the average daily gallons (liters) based upon the past 7 days of water usage. The figure adjusts daily at midnight. The display uses all 5 digits to show values from 0 to 1,040,000 gallons.

NOTE: For usage greater than 99,999, the display uses exponential notation. For example to display 100,000 the display would read “100E3” (100E3 = 100 x 10^3 = 100,000 just like many calculators show).

This is a display only screen and can not be changed. Press and release the [SELECT] button to advance to the next screen.
Flow Rate

The Flow Rate screen indicates the current flow rate in gallons (or liters) passing by the flow sensor. Flow rates can be displayed from 0 to 999 GPM (LPM) using up to three LCD digits. When the flow rate is under 100, the tenths indicator is used.

This is a display only screen and can not be changed. Press and release the [Select] button to advance to the next screen.

Gallons

The Gallons screen indicates the amount of treated water that has passed by the turbine. Bypass water is not included. Accumulated flow is shown in gallons (liters) up to 1,040,000 gallons. For display values greater than five (5) digits, scientific notation is used. When 999E4 (9,990,000) is reached the counter will roll over back to 0 and resume counting.

Press and release the [▼] down button to manually reset this value to zero. Press and release [Select] button to advance to the next screen.

Capacity (grains)

The Capacity screen indicates the total gran 
s capacity of each unit. It is based on the cubic feet of resin, the hardness of the water, and the salt setting. Display values greater than five (5) digits are shown in scientific notation. 177E3 indicates that each unit has 177,000 grains capacity. The display will alternate between CAP and 177E3.

Total Capacity (gallons)

The Total Capacity screen indicates the total gallons capacity of treated water for each unit, which can be obtained between the regeneration cycles. This capacity is based on the input hardness, amount of resin in the vessel and the salt dosage in pounds per cubic foot. Display values greater than five (5) digits will use scientific notation. The 11,800 in the display at the right, indicates that each unit will provide 11,800 gallons of treated water between regenerations. The display will alternate between tCAP and 11800.
INITIATING EXTRA REGENERATIONS

**Single Tank Systems -**
- Press and release [Regen] to schedule a regeneration. *Recharge Tonight* will flash in the display. Press and release [Regen] a second time to deselect a scheduled regeneration.
- Press and hold [Regen] for three (3) seconds to initiate an immediate regeneration.

**Duplex Alternating Systems -**
- Press and release [Regen] to initiate an immediate regeneration of the service or primary tank.

**Duplex Parallel Systems -**
- Press and release [Regen] to initiate an immediate regeneration of the primary tank. If in the Time Clock mode, both tanks will regenerate in sequence.

There are 4 - Buttons located on front of the VIP-1E control:
1 – Select
2 – Regen
3 – Up Arrow
4 – Down Arrow
START-UP

When the control is powered up, the programmed model designation is displayed for 4 seconds. Next, the software release version is displayed for 4 seconds. Finally, the time of day is displayed. Programming is started at Level 3. If the Modbus RTU Communication Option was purchased and it has been activated, then -dCS- will be displayed first for 4 seconds when the control is powered up. The industry standard Modbus RTU Protocol over a 2-wire EIA-485 bus has been incorporated into the Control.

Push and hold the select button for 3 seconds and the control will advance from Level 1 to Level 2. Push and hold for an additional 3 seconds and the control will advance from Level 2 to Level 3. Level 3 is where programming is started. Push and hold for 3 seconds again and the control will advance from Level 3 to the diagnostics mode, Level 4.

THIRD LEVEL PROGRAMMING

Model or Type Selection

The Model or Type Selection screen is used to designate the type of system the control will operate. Go to level 3 to change the type of equipment or to program the other parameters.

The three types of equipment are:

SOFTENER
FILTER
DEALKALIZER

In addition to the above selections, if a softener is to be chosen then the model of the softener may be entered. The model designations are S-30 through S-1200. Fourteen (14) predefined models can be chosen. Selecting a pre-defined model option loads default values for most programming choices, simplifying start-up of the system.

Screen Navigation

The [▲] up and [▼] down buttons are used to change the selection. Pressing the [SELECT] button confirms the choice and advances the control to the next screen. The [REGEN] button initiates regeneration and advances the control through a regeneration cycle.

NOTE: BEEPER - A beeper sounds while pressing buttons for setup. One beep signals a change in the display. Repeat beeps indicate the button pressed is invalid, telling you to try another button.
Mode Selection

Different Softener valves can be operated in a variety of different modes. Five (5) choices are possible with the VIP I Control:

- **SNGL** — A single tank, single control valve system. (Motor driven)
- **ALT1** — A two tank, single valve twin system. (Motor driven)
- **ALT2** — A two tank, two control valve system that operates in a duplex alternating mode. (Motor driven) Choose immediate regeneration or delayed regeneration.
- **PAR2** — A two tank, two control valve system that operates in a duplex parallel mode. (Both tanks on line – motor driven)
- **ECO** — A Single tank, 5-cycle control valve system. (Solenoid operated)

Use the [▲] up or [▼] down buttons to identify the correct choice and press [SELECT].

**NOTE:** When an operating mode is first selected or whenever the mode is changed, the control will execute a routine designed to verify the presence and position of the control valve. The control will drive the valve motor(s) through approximately two revolutions and stop in the service or standby position as is appropriate for mode chosen.

Gallons / Liters Selection

All water flow or usage displays can be shown in gallons (gallons per minute) or liters (liters per minute).

Use the [▲] up or [▼] down buttons to identify the correct choice and press [SELECT].

12 / 24 Hour Selection

Indications of time can be in either 12 or 24-hour format. When **12-hour** is selected, the time displays are shown in standard clock time (1am to 12pm, 1pm to 12am). When the **24-hour** clock is selected, the time displays are shown in military time (1:00 to 24:00).

Use the [▲] up or [▼] down buttons to identify the correct choice and press [SELECT].
ERROR BEEP OFF / ON SELECTION

If the controller should encounter an error condition and the beeper is ON, the speaker will beep 5 times every second and the error code will be displayed. If this feature is turned OFF, the error code will be displayed, but no beeping will occur.

Use the [▲] up or [▼] down buttons to identify the correct choice and then press [SELECT].

RESIN QUANTITY SELECTION

The Resin Quantity select or display is used to let the controller know how much resin (per tank) is being used in a softener or dealkalizer. The controller allows a range of .5 - 150 ft³ per tank. The display at the right shows 10.0 ft³. This screen is not available when FILTER is selected.

Use the [▲] up or [▼] down buttons to identify the correct choice and then press [SELECT].

REFILL RATE SELECTION

<table>
<thead>
<tr>
<th>VALVE SIZE – RESIN QUANTITY – REFILL RATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve Size</td>
</tr>
<tr>
<td>Resin (Ft³)</td>
</tr>
<tr>
<td>Refill (GPM)</td>
</tr>
</tbody>
</table>

The Refill Rate selection screen identifies the brine tank refill rate to the controller. This value is used to calculate the correct refill time for a given salt setting. The control valve brine system is stamped or labeled with this rate. Alternatively, look at the standard rates in the table above. This screen is not available when FILTER has been selected.

NOTE: Always check the refill rate setting versus the actual refill rate as measured. An accurate setting is essential for correct operation of your system.

Use the [▲] up or [▼] down buttons to identify the correct choice and then press [SELECT].

The brine refill step can be eliminated by selecting OFF. The refill step can be turned off when pumped brine or an external brine maker is used.
**LBS per Selection**

The optional salt level monitor is turned on or off with this selection. The default value is OFF. The amount of salt per level is shown in the chart below. The brine tank is split into 10 levels by an optional black and yellow sticker for the brine tank, which is placed on the brine well.

<table>
<thead>
<tr>
<th>Brine Tank Size</th>
<th>Length of Brine Label</th>
<th>Inches per Level</th>
<th>Lbs of SALT* per Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 lb. – 18&quot; x 39&quot;</td>
<td>30&quot;</td>
<td>3&quot;</td>
<td>32</td>
</tr>
<tr>
<td>700 lb. – 24&quot; x 41&quot;</td>
<td>30&quot;</td>
<td>3&quot;</td>
<td>58</td>
</tr>
<tr>
<td>1000 lb. – 24&quot; x 50&quot;</td>
<td>40&quot;</td>
<td>4&quot;</td>
<td>78</td>
</tr>
<tr>
<td>1500 lb. – 30&quot; x 50&quot;</td>
<td>40&quot;</td>
<td>4&quot;</td>
<td>122</td>
</tr>
<tr>
<td>2500 lb. – 39&quot; x 48&quot;</td>
<td>40&quot;</td>
<td>4&quot;</td>
<td>208</td>
</tr>
<tr>
<td>4500 lb. – 52&quot; x 60&quot;</td>
<td>50&quot;</td>
<td>5&quot;</td>
<td>375</td>
</tr>
</tbody>
</table>

* The weight of the salt is based on White Crystal Rock Salt from Morton Salt Company.

The lbs per level can be programmed from OFF up to 510, in two lb increments. The control calculates the lbs of salt used per regeneration and sends an alarm signal when it has determined that the salt level is below the preset value. The amount of salt in the brine tank is programmed on the main menu, by activating the number of bars on the right of the screen equivalent to the level of salt in the brine tank. A prompt will appear in the Level 1 programming asking for the level of salt in the brine tank. Increase or decrease the number of bars showing on the right side of the screen by pushing the [▲] up or [▼] down buttons.

**Brine / Caustic Pump Selection**

The control has a relay built in which can operated a pump during the brine draw cycle of regeneration. This relay can also be used to operate a chemical feed pump for the caustic feed of a dealkalizer, 10 amps maximum. The timing starts when brine draw starts and ends as programmed. This timing is independent of the brine draw cycle. The time the relay is activated can be programmed from OFF up to 120 minutes in 1-minute increments. Default is 50 minutes.

**Caustic Feed Pump Activation – (Dealkalizer only)**

A caustic feed pump may be activated during brine draw, only if Dealkalizer is chosen under type of equipment. The caustic pump default is "no", but can be turned on any time. The length of time that the pump is activated is equal to the time set in the tdrA screen. Answering "YES" to caustic also allows the control to calculate the capacity of the dealkalizer based on caustic addition. If the pump is off, the capacity calculated is based on sodium chloride only regenerations, which is approximately 30% less capacity than using salt and caustic. This screen will not appear if Filter or Softener is selected.
**Salt Alarm Level Selection**

The level at which the alarm to Load Salt activates is programmable. Select the number of bars at which the alarm will activate. When the salt level drops below the chosen number of bars, the alarm will sound, and “Load” “Salt” will alternate being displayed on the main screen. The alarm beeper will sound until salt is added to the brine tank and the level on the main screen is increased above the alarm level setting. This display will only appear if a value is programmed in the LBS per screen. The display at the right shows 3 bars lit, which is approximately 1/3 of the brine tank.

Use the [▲] up or [▼] down buttons to increase or decrease the number of bars, and then press [SELECT].

**Turbine Selection**

The Turbine selection screen displays the nominal size of the turbine being used by the unit. Five turbine size selections are available - .75", 1.0", 1.5", 2.0", “ADJ” or “none”. “ADJ” allows the programming of the “K” factor for the flow meter being used. “None” converts the control to time clock operation.

Use the [▲] up or [▼] down buttons to identify the correct choice and then press [SELECT].

**Turbine “Adjustable” Selection**

If the “ADJ” setting was selected on the previous screen, the turbine pulses per gallon value must be programmed into the control. The tables on page 24 will be helpful in making the correct choice. Consult your supplier if you have any questions.

*NOTE: If this is an initial programming sequence or if the model or system has been changed, programming will continue with the operating settings (second level select). If only configuration items (other than the model and system) have been changed; or, after a 4-minute idle period, the control will revert back to the Main Screen.*

**Turbine “nonE” Selection**

If “nonE” is selected the control automatically converts to a time clock. The next prompt is for the days of regeneration. The display will flash between dAY 1 and OFF. Use the [▲] up or [▼] down buttons to change to ON. This will continue through all 7 days of the week. The system will regenerate on the days selected. “Today” is selected in the first level of programming. The display will show dAY= 1. Change the 1 using the [▲] up or [▼] down buttons, to the number corresponding to today.
SECOND LEVEL PROGRAMMING

The Second Level select screens are accessed in two ways:

- **By Continuation** — After completing the third level programming screens on an initial start-up, the control continues with second level select screens.
- **Manual Entry** — Press and hold the [SELECT] button for 3 seconds to access the second level screens.

### Hardness Selection – (Softener only)

Hardness is required when setting up a softener. Set the grains per gallon hardness of the water supply (determined by the water analysis or contact the local water department).

Use the [▲] up button to increase the number and the [▼] down button to reduce the number. Each press of a button changes the display by 1, between 1 and 25. Between 25 and 125, the display changes by 5. Press and hold the buttons for fast advance. This screen is not available when **Filter** or **Dealkalizer** is selected.

**NOTE:** To compensate for iron in the water supply, add 4 to the hardness number for each 1-ppm of iron.

Use the [▲] up or [▼] down buttons to identify the correct choice and press [SELECT].

### Total Exchangeable Anions – (Dealkalizer only)

Total Exchangeable Anions (TEA) is required when setting up a dealkalizer. Set the grains per gallon of the total exchangeable anions of the water supply (determined by the water analysis). Default is 20 grains.

Use the [▲] up button to increase the number and the [▼] down button to reduce the number. Each press of a button changes the display by 1, between 1 and 25. Between 25 and 125, the display changes by 5. Press and hold the buttons for fast advance. This screen is not available when **Filter** or **Softener** is selected.

### Chlorides Selection – (Dealkalizer only)

The chloride content of the water being treated in conjunction with the total exchangeable anions is used to calculate the capacity of the dealkalizer. Chlorides are settable in increments of 1 from 0 to 25 grains and in increments of 5, between 25 and 100 grains. Default is 5 grains. This screen is not available when **Filter** or **Softener** is selected.

Use the [▲] up or [▼] down buttons to identify the correct choice and press [SELECT].
**Backwash Time Setting**

The Backwash Time screen is used to tell the controller how long to backwash a softener or filter during the first step of a reconditioning cycle. The recommended setting is 10 minutes for a clean, clear raw water supply. If the water condition is too poor, recommended pretreatment equipment should be installed. The backwash time is adjustable from 1-30 minutes.

Use the [▲] up or [▼] down buttons to identify the correct choice and press [Select].

**Brine Draw Time Setting**

The Brine Time screen is used to tell the controller how long to allow for brine eduction and slow rinse. As the programmed salt dose increases, the amount of time required by a softener to draw brine and slow rinse increases.

As a rule of thumb, the following settings are suggested, yet should be adjusted as experience and observation with a particular installation dictate. The first regeneration cycle should be observed and timed to verify this setting.

```
5 lb./ Ft³ ............................................................. 60 minutes
10 lb./ Ft³ ............................................................ 80 minutes
15 lb./ Ft³ .......................................................... 100 minutes
```

Use the [▲] up or [▼] down buttons to identify the correct choice and press [Select]. This screen is not available when FILTER is selected. Set the salt dosage for Dealkalizers at minimum setting.

**Fast Rinse Time Setting**

The Fast Rinse Time screen is used to tell the controller how long to fast rinse a filter, softener or dealkalizer.

Use the [▲] up or [▼] down buttons to identify the correct choice and press [Select].
Salt Dosage Setting – (Softener only)

The salt dose screen is used to tell how much salt per ft³ of resin should be used when regenerating the softener. The nominal capacity of a softener is achieved when 15 lbs./ft³ is used for regeneration. More efficient operation can be achieved with lower salt settings such as 10 lbs./ft³ or 5 lbs./ft³; however, the capacity of the system will be lower. The following table will be useful in selecting the appropriate settings. (Salt dose settings can be set in the range of 4 - 20 lbs./ft³.)

<table>
<thead>
<tr>
<th>Dose (lbs./ft³)</th>
<th>Capacity (grains/ft³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>17,700</td>
</tr>
<tr>
<td>10</td>
<td>24,900</td>
</tr>
<tr>
<td>15</td>
<td>29,400</td>
</tr>
<tr>
<td>20</td>
<td>32,400</td>
</tr>
</tbody>
</table>

Use the [▲] up or [▼] down buttons to identify the correct choice and press [Select].

Recharge Time – (Single Systems and ALT-2 with Delayed Regen)

The Recharge Time screen is used on Single, Alt-2 with Delayed Regen (VIP-1E) softener or filter systems to specify the time at which regeneration will begin. Time Clock mode of operation also uses this feature for time of regeneration. The recharge time can only be set to a whole hour increment in the 24-hour mode. The default time for Softeners and Dealkalizers is 2:00 am. The default for filters is 12:00 midnight.

Use the [▲] up or [▼] down buttons to identify the correct choice and press [Select].

Fixed Reserve – (Single Systems only)

The Fixed Reserve screen is used to choose whether or not the control will be allowed to determine the best choices of when to regenerate a single softener, dealkalizer or filter. In AUTO mode, the control uses sophisticated rules to examine water usage and history to make decisions about scheduling regenerations in anticipation of demand.

There are certain situations where the control’s decision may not provide the best choice of when to regenerate. In these situations, the controller can be set to regenerate based upon a preset trip point rather than a variable. This trip point is adjustable from 0% (all capacity depleted) to 100% (schedule the next available regeneration).

The fixed reserve is indicated by the number of charge bar segments showing (each segment equals 10%). Press [Select] to advance to the next screen.
Maximum Days Between Regenerations

The Maximum Days Screen is used to force a regeneration if one has not occurred within a given number of days. The control default is AUTO. This means that regeneration occurs only as called for by the control.

Use the [▲] up or [▼] down buttons to identify the correct choice and press [Select].

97% Capacity Setting – (Single Systems only)

When the 97% screen is selected ON, a single softener, filter and dealkalizer will regenerate immediately, when 97% of the capacity is depleted. The default for this setting is OFF. When the 97% screen is OFF, and capacity is depleted, regeneration is scheduled for the preset Recharge Time. The unit will remain on line and supply untreated water until regeneration is completed.

Use the [▲] up or [▼] down buttons to identify the correct choice and press [Select].

Filter Gallons

The Filter Gallons screen is used to set how many gallons (liters) is allowed to pass through a filter before backwashing is required. The filter gallons (liters) value has a range off 1000 to 999,000 gallons (378E4 liters) and is adjustable in 1000-gallon increments. If the value is adjusted to below 1000 gallons the display will read OFF indicating the gallons (liters) function is OFF and the unit will only regenerate manually or by an external signal. This screen is not available when Softener or Dealkalizer is selected. The display to the right shows 7000 gallons.

Use the [▲] up or [▼] down buttons to identify the correct choice and press [Select].
LEVEL 1 DISPLAY MAP

1. Current Time of Day
2. Set Current time
3. Set Day of Week
   - Skip if Flow Meter is used
   - After Day of Week is set - Return to Current Time if Flow Meter is not used.
4. Salt Level
   - Skip if Salt Level not enabled – see Level 3 Display Map
5. Average Daily Usage
6. Flow Rate
7. Total Flow
8. Tank Capacity (grains)
9. Tank Capacity (gallons)
   - Return to Time of Day
LEVEL 2 DISPLAY MAP

- Hardness: Skip if Filter or Dealkalizer
- TEA: Skip if NOT a Dealkalizer
- Chlorides
- Backwash Time
- Brine Time: Skip if Filter
- Fast Rinse Time: Skip if "Mode" is ECO
- Salt Dose: Skip if Filter
- Filter Gallons: Skip if NOT a Filter
- Recharge Time: Skip if 2 tank, or NOT Alt-2 Delayed
- Fixed Reserve: Skip if 2 tanks or a Filter
- Max Days
- Regen at 97%: Skip if 2 tanks
- Return to Time of Day
LEVEL 3 DISPLAY MAP

Model Selection

Mode Selection

Alt-2 Delayed  
Skip if NOT Alt2

Gallons / Liters

12 / 24 Hours

Error Beep

Resin Quantity

Refill Rate  
Skip if Filter

LBS per / Level

TDR-A Relay Time

Caustic Pump  
Skip if NOT a Dealkalizer

Salt Alarm Level  
Skip if Filter or Salt Monitor is NOT enabled

Turbine Selection

Size – Adjustable – or None (Time Clock)

Return to Time of Day

Model Selection:
- SOFnr

Mode Selection:
- Alt 2
- Gallon

Alt-2 Delayed:
- 12 hr

Gallons / Liters
- bEEP

12 / 24 Hours
- 100cF

Error Beep
- LbSPr

Resin Quantity
- CAUSSt

Refill Rate
- AL VL

LBS per / Level
- Adj

TDR-A Relay Time

Caustic Pump

Salt Alarm Level

Return to Time of Day
The VIP I Electronic Control offers an unprecedented amount of information and assistance for monitoring system performance and diagnosing system problems. The tools for accessing this information are reviewed in detail in the following sections - Automatic Diagnostics and Manual Diagnostics.

**INITIAL CHECKOUT**

Before moving to the more advanced tools, always perform the following initial checkout.

1. Is the display time correct?
   - If the display is blank, check power.
   - If the display time is flashing, there was a power failure for more than 4 days. The system will continue to operate correctly; however, reconditioning will occur at incorrect times. Reset the time of day to correct the problem.
   - If the Error code is showing, go to the Automatic Diagnostics section.

2. Are plumbing isolation valves fully open? Is the manual bypass valve fully closed?

3. Are power, control, and turbine cables installed correctly and securely?

4. Are inlet, outlet, and drain lines installed correctly (including brine well flow controls)?

5. Is there salt in the brine system? Is the brine tubing installed correctly? Has bridging occurred in the brine system? Does the valve draw and refill properly?

6. Is the hardness setting correct for your water supply? Has the hardness level changed since it was tested?

If you do not find the problem after making the initial check, go to the Manual Diagnostics section of this manual.

**AUTOMATIC DIAGNOSTICS**

The computer automatically performs a number of diagnostics checks during the normal operation of the system. If a condition is detected that would prevent the system from functioning properly, an error code is displayed and if the alarm feature is **ON**, the speaker will begin beeping.

When an error code is being displayed and the [Select] button is held, the controller will enter the manual diagnostics display screen to aid in trouble shooting.
**Error Code**

*Error* — Indicates one of the following is occurring:

- The motor is not running and/or the position switch is bad.
- A timing or valve position error has occurred during regeneration.
- The valve is unable to find the home position.
- The valve is cycling continuously.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty Motor.</td>
<td>Replace Motor</td>
</tr>
<tr>
<td>Faulty Position Switch</td>
<td>Replace Position Switch</td>
</tr>
<tr>
<td>Faulty Cable to Position Switches</td>
<td>Replace Cable to Position Switch</td>
</tr>
<tr>
<td>Bad Output Drive Circuit to Motor</td>
<td>Replace Electronics</td>
</tr>
<tr>
<td>Improperly Placed Position Switch</td>
<td>Reposition Switch</td>
</tr>
<tr>
<td>Bad Wiring or Connector to Motor</td>
<td>Replace Motor</td>
</tr>
<tr>
<td>Bad Position Input Circuits</td>
<td>Replace Face Plate</td>
</tr>
</tbody>
</table>

**Clearing the Error Code**

The Error Code can be cleared in two ways:

- **Turn off and then restore power** This will reset the error code and the system will return to normal operation. If the error code still exists, the controller will redisplay the error code the next time it checks for that condition.

- Pressing the [REGEN] button will direct the control to attempt to clear the error. If successful, normal operation will resume. If unsuccessful, the error code will reappear and operation will again be halted.
FOURTH LEVEL MANUAL DIAGNOSTICS

These functions are accessed through the Manual Diagnostics (fourth level select) screen. This screen is used to diagnose problems with the turbine, valve position, outputs, and inputs. The manual diagnostics screen can be accessed in two ways.

- Pressing the [SELECT] button when an error code is showing.
- Fourth Level Select Screens — Press and hold [SELECT] button for 3 seconds one time, repeat a second time, and then a third time.

Manual Diagnostics Display

46 - The first three places on the left side of the display are the Turbine pulses. This number will change as the turbine counts pulses.

5 – The valve position, matches number of bars lit.
   0 – Service
   1 – Backwash
   2 – Brine/Rinse
   3 – Fast Rinse
   4 – Refill
   5 – Standby
   H – Valve is Homing

2 – The unit being viewed (Unit #2 shown). Press the [▲] up button to alternate between unit 1 and unit 2.

Valve Switches – Shows when micro-switch on valve is closed, and does not show if switch is open.

Motor - segment will be displayed any time a valve motor is running.

RCHG – segment will be displayed when external switch is activated.

Display All Digits

If both of the [▲] up or [▼] down buttons are depressed while in the Manual Diagnostics display, the controller turns on all display segments. This verifies the segments and that the [▲] up or [▼] down buttons are working.
SYSTEM DIAGNOSTICS

**Number of Regenerations**

Pressing and holding the [▼] down button will temporarily display the **UNIT** and **RECHARGE** segments and the number of regenerations. Pressing and holding again will show the **UNIT** and **TIME** segments and the number of days in operation.

**Manually Advancing through the Regeneration Cycles**

The units can be manually advanced through the regeneration cycles utilizing the [REGEN] button. Place the control in the Fourth Level Diagnostics screen and depress the [REGEN] button. The unit will advance into the backwash cycle of regeneration.

*(Note: If system is an ALT2 system, then both units will advance into the service position. There will be a 20 second delay and then one unit will advance into backwash cycle.)*

When the motor stops, depress the [REGEN] button again and the unit in regeneration will advance one step. This function can be used to manually advance a valve through the regeneration cycle to check valve operation.

The system can be manually advanced through a regeneration cycle without going to the Diagnostics level, but there is nothing to indicate the cycle the unit is in.

**FIFTH LEVEL ADVANCED DIAGNOSTICS**

The Fifth Level Diagnostics will display the history of the control and should only be accessed by a qualified Technical Service Representative. The display will provide the following information:

- Status of Tank #1
- Status of Tank #2
- Tank #1 Days since last regen
- Tank #2 Days since last regen
- Tank #1 capacity left in gallons
- Tank #2 capacity left in gallons
- Tank #1 filter gallons used
- Tank #2 filter gallons used
- Total gallons through system
- Today’s water usage
- Average daily gallons
- Day counter
- Previous average daily gallons
- Number of regenerations
- Days in service
- Control state
- Error Code
- Digital input state
- Digital output state
- Regen Flags
- Regen phase timer
- Reason for last regeneration
- Current regen step
- Regen tank (1 or 2)
- Pounds of salt in brine tank
- Brine draw output time
- Daily gallons difference
- History of gallons
- Day counter
- Gallons capacity
CALIBRATION DATA for FLOW SENSORS

The proper size Flow Sensor must be specified in the Turbine Select screen of the VIP Control. The VIP Control has the “K” factors for the .75", 1", 1.5" and 2" built in to its algorithm. The “K” factor is the number of pulses per gallon. If ADJ is selected then the VIP has the capability to accept the “K” factor from any Flow Meter with a square wave output. Signet model 2536 is one such meter. The tables below provide the “K” factor associated with the type of pipe for standard meters offered.

<table>
<thead>
<tr>
<th>Type of Sensor</th>
<th>Pipe Size</th>
<th>Pulses per Gallon</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIP PVC &amp; Brass</td>
<td>.75&quot;</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>1.0&quot;</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>1.5&quot;</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>2.0&quot;</td>
<td>46</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Sensor</th>
<th>Pipe Size</th>
<th>Pulses per Gallon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signet 2536 for Iron Pipe</td>
<td>Sch 40 Pipe</td>
<td>Sch 80 Pipe</td>
</tr>
<tr>
<td>1&quot; Tee</td>
<td>287</td>
<td>-</td>
</tr>
<tr>
<td>1.5&quot; Tee</td>
<td>91</td>
<td>-</td>
</tr>
<tr>
<td>2&quot; Tee</td>
<td>54</td>
<td>-</td>
</tr>
<tr>
<td>2&quot; Saddle</td>
<td>54</td>
<td>65</td>
</tr>
<tr>
<td>3&quot; Saddle</td>
<td>23.2</td>
<td>26</td>
</tr>
<tr>
<td>4&quot; Saddle</td>
<td>13.3</td>
<td>14.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Sensor</th>
<th>Pipe Size</th>
<th>Pulses per Gallon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signet 2536 for PVC Pipe</td>
<td>Sch 40 Pipe</td>
<td>Sch 80 Pipe</td>
</tr>
<tr>
<td>1&quot; Tee</td>
<td>-</td>
<td>352</td>
</tr>
<tr>
<td>1.5&quot; Tee</td>
<td>-</td>
<td>117</td>
</tr>
<tr>
<td>2&quot; Tee</td>
<td>-</td>
<td>67</td>
</tr>
<tr>
<td>2&quot; Saddle</td>
<td>55</td>
<td>67</td>
</tr>
<tr>
<td>3&quot; Saddle</td>
<td>23.7</td>
<td>27</td>
</tr>
<tr>
<td>4&quot; Saddle</td>
<td>13.5</td>
<td>15.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Sensor</th>
<th>Pipe Size</th>
<th>Type K</th>
<th>Type L</th>
<th>Type M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signet 2536 for Copper Pipe</td>
<td>3&quot;</td>
<td>28</td>
<td>27</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>4&quot;</td>
<td>15.8</td>
<td>15.2</td>
<td>14.9</td>
</tr>
</tbody>
</table>
OPTIONAL RELAY OUTPUTS

The control is equipped with three - single pole double through relays. Relay #1 corresponds to Unit #1 and is “Off” during the Service cycle and “On” during the regeneration. Relay #2 is “Off” during the Service cycle and “On” during the regeneration. Relay #3 is only “On” during the brine draw cycle of Unit #1 or Unit #2 when the TDRA time in the control is programmed. See TDRA programming information.

<table>
<thead>
<tr>
<th>Cycle</th>
<th>Relay #1</th>
<th>Relay #2</th>
<th>Relay #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit #1 Service</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>Unit #1 Regeneration</td>
<td>On</td>
<td>Off</td>
<td>*</td>
</tr>
<tr>
<td>Unit #2 Service</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>Unit #2 Regeneration</td>
<td>Off</td>
<td>On</td>
<td>*</td>
</tr>
<tr>
<td>Error - Alarm</td>
<td>On</td>
<td>On</td>
<td>NA</td>
</tr>
<tr>
<td>* Unit #1 or #2 Brine Draw</td>
<td>NA</td>
<td>NA</td>
<td>On</td>
</tr>
</tbody>
</table>

Regeneration and Service Signals

The wiring diagram shows how to connect the regeneration indicators for systems #1 and #2. The terminal strip shown in the diagram is located on the back of the PC board. The contacts on the relays are isolated contacts. The relays must have an external power source connected. The relay contacts are rated for 10 amps. The regeneration signal outputs are labeled “R1” and “R2” in the diagram below, while the service signal outputs are labeled “S1” and “S2”. The “M” indicates the Brine or Caustic Pump Motor connection.

Alarm Connection

Should an alarm output be desired, wire the terminal block as shown. In an alarm or error condition both Relay #1 and Relay #2 are activated. An external power source may be used for the alarm. The relay contacts are rated for 10 amps. The alarm will activate when an Error code is encountered.