Water Specialist

1” Control Valve Series Model: WS1TC
1.25” Control Valve Series Model: WS1.25TC

Operation and Instruction Manual for OEM Only.

Please Note: This operation and instruction manual is for the training of the OEM and for the OEM to use to train their customers. This document is not to be used as the complete system manual.
**MANUAL REGENERATION**

**NOTE:** For softeners, if brine tank does not contain salt, fill with salt and wait at least 2 hours before regeneration.

If you need to initiate a manual regeneration, either immediately, or tonight at the preprogrammed time (typically 2 a.m.), complete the following steps.

**For Immediate Regeneration:**
Press and hold UP and DOWN simultaneously until valve motor starts (typically 3 seconds).

If the display shows “E1,” “E2” or “E3” (for error), call a service technician.

**For Regeneration Tonight:**
Press and release UP and DOWN simultaneously (notice that arrow points to Regen).

To **shut off water** to the system, please position arrow handles as shown in the **bypass operation** diagram below. If your valve doesn’t look like the diagram below, contact your service technician for instructions on how to shut off water.

**NORMAL OPERATION**

- Treated Water Exits
- Supply Water Enters

**BYPASS OPERATION**

- Supply Water Exits
- Supply Water Enters

**GENERAL OPERATION**
When the system is operating one of two displays will be shown: time of day or days until the next regeneration. Pressing UP or DOWN will toggle between the two choices.

**TO SET TIME OF DAY**
In the event of a power outage, time of day needs to be reset. All other information will be stored in memory no matter how long the power outage. Please complete the steps as shown to the right. To access this mode, press SET HOUR.

1. Accessed by pressing SET HOUR.
2. Adjust to the nearest hour using UP or DOWN. An arrow points to PM during p.m. hours.
3. Press SET HOUR to complete and return to normal operation.

**TO SET TIME OF REGENERATION**
For initial set-up or to make adjustments, please complete the steps as shown to the right. Access this mode by pressing SET HOUR and UP simultaneously for 3 seconds.

1. Accessed by pressing SET HOUR and UP simultaneously for 3 seconds.
2. Adjust time of regeneration hour using the UP or DOWN. An arrow points to PM during p.m. hours. Simultaneously press SET HOUR and DOWN to return to normal operation.
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FOR INFORMATION COMMON TO ALL 1” & 1.25” CONTROL VALVES REFER TO THE WS1&WS1.25 COMMON INFORMATION MANUAL  
The common manual contains the Table of Contents shown below  

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Installation  
**Service Instructions**  
**Troubleshooting**  
**Limited Warranty**  

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**Control Valve Function and Cycles of Operation**

This glass filled Noryl™ (or equivalent) fully automatic control valve is designed as the primary control center to direct and regulate all cycles of a downflow regeneration water softener or filter.

The time clock control valve can be set to perform downflow regeneration or simply backwash. The time clock control valve has two calendar options for regeneration frequency:
1. an option where the user can choose the number of days (1-99) between each regeneration; and
2. a seven-day option where the user can choose which day(s) of the week a regeneration should occur.

The control valve is compatible with a variety of regenerants and resin cleaners. The control valve is capable of routing the flow of water in the necessary paths to regenerate or backwash water treatment systems. The injector regulates the flow of brine or other regenerants. The control valve regulates the flow rates for backwashing, rinsing, and the replenishing of treated water into a regenerant tank, when applicable.

The control valve uses no traditional fasteners (e.g. screws); instead clips, threaded caps and nuts and snap type latches are used. Caps and nuts only need to be firmly hand tightened because radial seals are used. Tools required to service the valve include one small blade screw driver, one large blade screw driver, pliers and a pair of hands. A plastic wrench is available which eliminates the need for screwdrivers and pliers. Disassembly for servicing takes much less time than comparable products currently on the market.

Control valve installation is made easy because the distributor tube can be cut 1/2" above to 1/2" below the top of tank thread. The distributor tube is held in place by an o-ring seal and the control valve also has a bayonet lock feature for upper distributor baskets.

The AC adapter power pack comes with a 15 foot power cord and is designed for use with the control valve. The AC adapter power pack is for dry location use only. If the power goes out, only the time of day needs to be reset. All other values are permanently stored in the nonvolatile memory.

Table 1 shows the time for the backwash, regenerative, and rinse cycles for the ten available programming options. Six different programs are available for a softener, one for a regenerative filter, and three programs for backwash only filters. When the control valve is used as a:
1. softener, one or two backwashes occur and refill always occurs after the rinse cycle (P0 through P5);
2. regenerative filter, one backwash occurs and refill always occurs after the rinse cycle (P6); and
3. backwashing filter, one backwash occurs (P7 through P9).

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Regeneration Cycles and Times for Different Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program</td>
<td>All times in Minutes</td>
</tr>
<tr>
<td></td>
<td>C1 1st Backwash</td>
</tr>
<tr>
<td>P0</td>
<td>3</td>
</tr>
<tr>
<td>P1</td>
<td>8</td>
</tr>
<tr>
<td>P2</td>
<td>8</td>
</tr>
<tr>
<td>P3</td>
<td>12</td>
</tr>
<tr>
<td>P4</td>
<td>10</td>
</tr>
<tr>
<td>P5</td>
<td>4</td>
</tr>
<tr>
<td>P6</td>
<td>12</td>
</tr>
<tr>
<td>P7</td>
<td>6</td>
</tr>
<tr>
<td>P8</td>
<td>10</td>
</tr>
<tr>
<td>P9</td>
<td>14</td>
</tr>
</tbody>
</table>

NOTE: During regeneration the display will show C1, C2, etc. If the cycle is skipped, that cycle number will not be displayed.

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1 Noryl is a trademark of General Electric.
The user can initiate manual regeneration. The user has the option to request the manual regeneration at the delayed regeneration time or to have the regeneration occur immediately. Simultaneously press the UP + DOWN buttons to start a regeneration at the next delayed regeneration time. If a regeneration is to occur today an arrow will point to regeneration. For immediate regeneration, simultaneously press and hold the UP + DOWN buttons for three seconds.

When in regeneration, step through the different regeneration cycles by simultaneously pressing the UP + DOWN buttons.
OEM General Instructions

The control valve offers multiple procedures that allow the valve to be modified to suit the needs of the installation. These procedures are:

• OEM System Setup
• Installer Displays & Settings (either 1-99 Days Between Regeneration option or 7-Day option)
• User Displays

These procedures can be accessed in any order. Details on each of the procedures are provided below and on the following pages.

When in operation, normal user displays show the time of day or days remaining before regeneration. When stepping through a procedure, if no buttons are pressed within five minutes the display returns to a normal user display. Any changes made prior to the five minute time out are incorporated.

To quickly exit Installer Displays & Settings or OEM Setup, simultaneously press SET HOUR + DOWN. Any changes made prior to the exit are incorporated.

To reinitialize the control valve, check to make sure the valve is in the User Display. Then simultaneously press SET HOUR + DOWN or unplug power source plug (black wire) on the circuit board, and plug back in.

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**STEP 1SS**

**STEP 1SS** – From normal mode, press SET HOUR + UP buttons simultaneously for 3 seconds and release. Then press SET HOUR + UP buttons simultaneously for 3 seconds and release.

**STEP 2SS**

**STEP 2SS** – Choose the desired program by pressing the UP or DOWN buttons. Prior to selecting a program, verify the correct valve body, main piston, regenerant piston, and stack are being used, and that the injector or injector plug(s) are in the correct locations. See Compliance Table in Service Instructions under Injector Cap, Screen, Injector Plug and Injector section and Figure 6. Press SET HOUR button to go to Step 3SS.

**Regeneration Cycles and Times for Different Programs**

<table>
<thead>
<tr>
<th>Program</th>
<th>All times in Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C1 1st Backwash</td>
</tr>
<tr>
<td>P0</td>
<td>3 50 3 3 1-99</td>
</tr>
<tr>
<td>P5</td>
<td>4 50 Skipped 4 1-99</td>
</tr>
</tbody>
</table>

**STEP 3SS**

**STEP 3SS** – If program P0 through P6 was selected, enter in the minutes of fill using the UP or DOWN buttons. The allowable values vary from a low of 1 to a high of 99. If program P7, P8 or P9 was selected, dashes will appear for minutes of fill. Press SET HOUR button to go to Step 4SS. Note: For each minute of fill 0.5 gallons of water is added to the solution tank. With salt (sodium chloride) this equates to approximately 1 1/2 pounds of salt per minute of fill.
STEP 4SS — Use UP or DOWN buttons to switch between:
- 1-99 Days Between Regen; or
- 7-Day.
Press SET HOUR button to go to Step 5SS.

STEP 5SS — Use UP or DOWN buttons to switch between 60 Hz or 50 Hz option. Press SET HOUR button to go to Step 6SS.

STEP 6SS — If a differential pressure switch is installed and actuated:
- a regeneration will occur immediately if no arrow points at Regen Hour; or
- a regeneration will occur at the delayed regeneration hour if an arrow points at Regen Hour.
Use UP or DOWN buttons to switch between the two choices. If a differential switch is not installed the settings in this display are ignored. Press SET HOUR to exit OEM system setup.

NOTE: A regeneration will be initiated or scheduled after the control has received a signal for two minutes.
A. Differential pressure switch connection
B. Motor wire connection
C. AC adapter wire connection
Installer Displays & Settings (1-99 Days Between Regeneration option)

**STEP 1D** – From normal mode, press SET HOUR + UP buttons simultaneously for 3 seconds and release.

**STEP 2D** – Regeneration Time: Set the clock to the hour the regeneration should occur by using the UP or DOWN buttons. An arrow points to PM after 12. Press SET HOUR to go to STEP 3D.

**STEP 3D** – Days To Regen: Set the number of days between regenerations. The allowable range is 1 to 99. Press SET HOUR to exit Installer Displays & Settings.

Installer Displays & Settings (7 day option)

**STEP 1I7** – From normal mode, press SET HOUR + UP buttons simultaneously for 3 seconds and release.

**STEP 2I7** – Regeneration Time: Set the clock to the hour the regeneration should occur by using the UP or DOWN buttons. An arrow points to PM after 12. Press SET HOUR to go to STEP 3I7.

**STEP 3I7** – Current Day of Week: Set the current day of the week by using the UP or DOWN buttons (See chart at right for date codes). Press SET HOUR to go to STEP 4I7.

**STEP 4I7** – Sunday Regeneration: To regenerate on Sunday use the UP or DOWN button until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Sunday. Press SET HOUR to go to STEP 5I7.

**STEP 5I7** – Monday Regeneration: To regenerate on Monday use the UP or DOWN button until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Monday. Press SET HOUR to go to STEP 6I7.

<table>
<thead>
<tr>
<th>Display</th>
<th>Day of Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>d1</td>
<td>Sunday</td>
</tr>
<tr>
<td>d2</td>
<td>Monday</td>
</tr>
<tr>
<td>d3</td>
<td>Tuesday</td>
</tr>
<tr>
<td>d4</td>
<td>Wednesday</td>
</tr>
<tr>
<td>d5</td>
<td>Thursday</td>
</tr>
<tr>
<td>d6</td>
<td>Friday</td>
</tr>
<tr>
<td>d7</td>
<td>Saturday</td>
</tr>
</tbody>
</table>
STEP 6I7

STEP 6I7 – Tuesday Regeneration: To regenerate on Tuesday use the UP or DOWN button until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Tuesday. Press SET HOUR to go to STEP 7I7.

STEP 7I7

STEP 7I7 – Wednesday Regeneration: To regenerate on Wednesday use the UP or DOWN button until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Wednesday. Press SET HOUR to go to STEP 8I7.

STEP 8I7

STEP 8I7 – Thursday Regeneration: To regenerate on Thursday use the UP or DOWN button until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Thursday. Press SET HOUR to go to STEP 9I7.

STEP 9I7

STEP 9I7 – Friday Regeneration: To regenerate on Friday use the UP or DOWN button until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Friday. Press SET HOUR to go to STEP 10I7.

STEP 10I7

STEP 10I7 – Saturday Regeneration: To regenerate on Saturday use the UP or DOWN button until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Saturday. Press SET HOUR to exit Installer Displays & Settings.

NOTE: If all arrows are turned off in d1-d7, Days to Regen in the User Displays will always read 7 and a regeneration will never occur.

User Displays

General Operation

When the system is operating one of two displays will be shown. Pressing UP or DOWN button will alternate between the displays. One of the displays is always the current time of day (to the nearest hour). The second display is the days remaining until the next regeneration. If the days remaining is equal to one, a regeneration will occur at the next preset regeneration time. The user can scroll between displays as desired.

If the system has called for a regeneration that will occur at the preset time of regeneration, the arrow will point to Regen.

Regeneration Mode

Typically a system is set to regenerate at a time of low water usage. An example of a time with low water usage is when a household is asleep. If there is a demand for water when the system is regenerating, untreated water will be used.

When the system begins to regenerate, the display will change to indicate the cycle of the regeneration process (see Table 3) that is occurring and an arrow will also point to Regen. The system will run through the steps automatically and will reset itself to provide treated water when the regeneration is completed.
Manual Regeneration
Sometimes there is a need to regenerate the system sooner than when the system calls for it, usually referred to as a manual regeneration. There may be a period of heavy water usage because of guests or a heavy laundry day.

To initiate a manual regeneration at the preset delayed regeneration time, simultaneously press UP + DOWN buttons together and release. The arrow will point to the word Regen if a regeneration is expected “tonight.” To cancel the regeneration simultaneously press UP + DOWN buttons and release.

To initiate a manual regeneration immediately, simultaneously press UP + DOWN buttons together for three seconds. The system will begin to regenerate immediately. The request cannot be cancelled.
Note: For softeners, if brine tank does not contain salt, fill with salt and wait at least two hours before regenerating.

Set Time of Day

**STEP 1** – Press SET HOUR

**STEP 2** – Current time: Set the clock to the closest hour by using the UP and DOWN button. An arrow points to PM after 12. After a power outage, the time of day will need to be reset. Press SET HOUR to exit.

Power Loss

If the power goes out current time of day will need to be reset. If the power goes out while the system is regenerating, the cycle picks up where it was interrupted when the power returns.

Error Message

If “E1,” “E2” or “E3” appears on the display contact the OEM for help. This indicates that the valve did not function properly.
### Front Cover and Drive Assembly

<table>
<thead>
<tr>
<th>Drawing No.</th>
<th>Order No.</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V3175TC-01</td>
<td>WS1TC Front Cover ASY</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>V3107-01</td>
<td>WS1 Motor</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>V3106-01</td>
<td>WS1 Drive Bracket &amp; Spring Clip</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>V3108TC</td>
<td>WS1TC PC Board</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>V3110</td>
<td>WS1 Drive Reducing Gear 12 x 36</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>V3109</td>
<td>WS1 Drive Gear Cover</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>V3002TC</td>
<td>WS1TC Drive ASY</td>
<td>*</td>
</tr>
<tr>
<td>Not Shown</td>
<td>V3186</td>
<td>WS1 AC Adapter 110V - 12V</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>V3186</td>
<td>WS1 AC ADAPTER 110V-12V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V3186EU</td>
<td>WS1 AC ADAPTER 220-240V-12V EU</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>V3186UK</td>
<td>WS1 AC ADAPTER 220-240V-12V UK</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V3186-01</td>
<td>WS1 AC ADAPTER CORD ONLY</td>
<td></td>
</tr>
</tbody>
</table>

* Drawing number parts 2 through 6 may be purchased as a complete assembly, part V3002.
**WS1TC Drive Cap Assembly, Downflow Piston, Regenerant Piston and Spacer Stack Assembly**

<table>
<thead>
<tr>
<th>Drawing No.</th>
<th>Order No.</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V3005</td>
<td>WS1 Spacer Stack Assembly</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>V3004</td>
<td>Drive Cap ASY</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>V3178</td>
<td>WS1 Drive Back Plate</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>V3011</td>
<td>WS1 Piston Downflow ASY</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>V3174</td>
<td>WS1 Regenerant Piston</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>V3135</td>
<td>O-ring 228</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>V3180</td>
<td>O-ring 337</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>V3105</td>
<td>O-ring 215 (Distributer Tube)</td>
<td>1</td>
</tr>
<tr>
<td>Not Shown</td>
<td>V3001</td>
<td>WS1 Body ASY Downflow</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>V3001-02</td>
<td>WS1 Mixing Valve Body ASY</td>
<td></td>
</tr>
</tbody>
</table>

Note: The regenerant piston is not used in backwash only applications.

![Diagram of WS1TC Drive Cap Assembly](image-url)
### WS1.25TC Drive Cap Assembly, Downflow Piston, Regenerant Piston and Spacer Stack Assembly

<table>
<thead>
<tr>
<th>Drawing No.</th>
<th>Order No.</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V3430</td>
<td>WS1.5 Spacer Stack Assembly</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>V3004</td>
<td>Drive Cap ASY</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>V3178</td>
<td>WS1 Drive Back Plate</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>V3407</td>
<td>WS1.5 Piston Downflow ASY</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>V3174</td>
<td>WS1 Regenerant Piston</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>V3135</td>
<td>O-ring 228</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>V3180</td>
<td>O-ring 337</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>V3358</td>
<td>O-ring 219 (Distributor Tube Opening 1.32&quot;)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>V3357</td>
<td>O-ring 218 (Distributor Tube Opening 32mm)</td>
<td>1</td>
</tr>
</tbody>
</table>

**Not Shown**

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>V3020 WS1.25 Body ASY Downflow (Distributor Tube Opening 1.32&quot;)</td>
<td>1</td>
</tr>
<tr>
<td>V3020-01 WS1.25 Mixing Valve Body Downflow ASY (Distributor Tube Opening 1.32&quot;)</td>
<td>1</td>
</tr>
<tr>
<td>V3020-02 WS1.25 Body ASY Downflow (Distributor Tube Opening 32mm)</td>
<td>1</td>
</tr>
<tr>
<td>V3020-03 WS1.25 Mixing Valve Body Downflow ASY (Distributor Tube Opening 32mm)</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: The regenerant piston is not used in backwash only applications.

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*Grey Plug on all WS1.25 bodies
*Grey Ring
*Grey Distributor O-ring retainer

*Only for valves that have a 32mm Distributor Tube Opening
WS1 & WS1.25 Identification Figure

WS1TC with 1.050" Distributor Tube Opening Identification

WS1.25 with 1.32" Distributor Tube Opening Identification

WS1.25 with 32mm Distributor Tube Opening Identification

Note: The WS1 downflow piston is a solid amber color.

Grey Plug

Grey Ring

Grey Distributor O-ring Retainer
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- Bypass Valve
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- Flow Diagrams – Downflow and Upflow
- Flow Diagrams – Rinse and Fill
- WS1 Service Spanner Wrench

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- Specifications which must be included in OEM’s Manual
- Quick Reference Specifications
- Drive Assembly
- Drive Cap Assembly, Main Piston and Regenerant Piston
- Spacer Stack Assembly
- Injector Cap, Screen, Injector Plug and Injector
- Refill Flow Control Assembly or Refill Port Plug
- Drain Line Flow Control and Fitting Assembly
- Water Meter or Meter Plug
- Mixing Valve
- Installation Fitting Assemblies
- Bypass Valve

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