



Signature Series User Guide



Softeners & Filters
1", 1-1/4", 1-1/2", 2" & Twin Control Valves

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Regen & Error Screens

Regen Screen

Displays the time remaining in the current cycle. 2nd backwash cycle will flash.



Pressing **REGEN** advances to the next cycle.



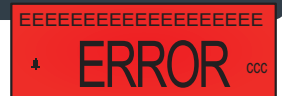
In Alternator Systems when a unit is waiting to initiate the first cycle step of regeneration, "REGEN PENDING" is displayed. "STAND BY" is displayed in Alternator Systems when a valve is in Standby state.



"DELAYED RINSE+FILL" is displayed whenever a zero-capacity tank has transferred to an off-line state and is currently waiting to initiate the second portion of a regeneration cycle. Viewed only when Delayed Rinse and Fill is set to ON.

Error Screens

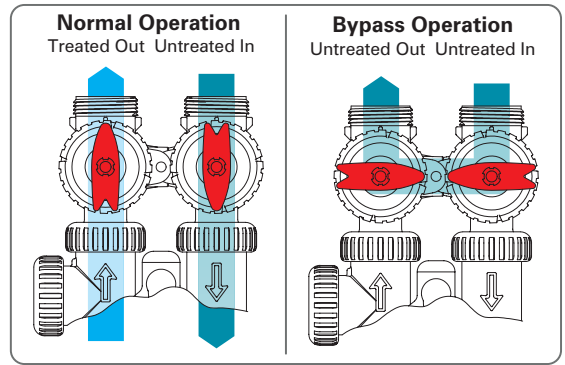
ERROR Screen displays when an error occurs and no Dealer Information is present. Top line will display specific error while the 3 digits in the lower right side will display specific error code. Top line error display longer than 18 characters will scroll across display from right to left.



Alternating ERROR and Dealer Contact Information will display when an error occurs and Dealer Contact Information is present.

ByPass Operation

To shut off water to the system, position arrow handles as shown in the bypass operation diagram to the right.



Button Operation & Functions

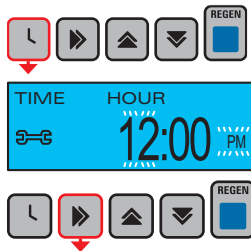
Button Operation and Function

- NEXT** (Right Arrow): Scrolls to the next display.
- REGEN** (Blue Square): Pressing once and releasing will schedule a regeneration at the preset delayed regeneration time. Pressing again and releasing will cancel the regeneration. Pressing and holding for 3 seconds will initiate an immediate regeneration. Pressing while in regeneration will advance to the next cycle. Pressing in the program levels will go backwards to the previous screen.

- UP** (Up Arrow) / **DOWN** (Down Arrow): Changes variable being displayed.

Setting Time of Day

Press and hold **CLOCK** until **TIME** **HOUR** is displayed and the Hour and AM/PM flashes. Press **▲** or **▼** until the correct hour is displayed. Then press **NEXT**. The Minutes will flash. Press **▲** or **▼** until the correct minute is displayed.



- NEXT** (Right Arrow) / **REGEN** (Blue Square): Holding **NEXT** and **REGEN** simultaneously for 3 seconds initiates a control reset. The software version is displayed and the piston returns to the home/service position re-synchronizing the valve.
- CLOCK** (Clock Icon) / **UP** (Up Arrow): Used with a twin valve, 1.0T, holding for at least 3 seconds causes a switch in the tank in Service without cycling the regeneration valve. After tank switch, days remaining and capacity remaining status is retained for each tank until the next regeneration.
- UP** (Up Arrow) / **DOWN** (Down Arrow): Holding **▲** and **▼** simultaneously for 3 seconds while in Control Programming initiates a master reset. Resets programming and diagnostic level. Displays back to factory defaults. Retains current history level displays.
- CLOCK** (Clock Icon) / **NEXT** (Right Arrow) / **UP** (Up Arrow) / **DOWN** (Down Arrow) / **REGEN** (Blue Square): Press any button to activate display.

Press **NEXT** to return to the Time of Day screen.

Time of day should only need to be set after power outages lasting more than 8 hours, if the battery has been depleted and a power outage occurs, or when daylight savings time begins or ends. If a power outage lasting more than 8 hours occurs, the time of day will flash on and off which indicates the time of day should be reset. If a power outage lasts less than 8 hours and the time of day flashes on and off, the time of day should be reset and the battery replaced.



User Displays

When the system is operating, one of five displays may be shown. Pressing **NEXT** will alternate between the displays shown below.

User 1

Typical user display shows Time of Day and droplet of water indicating water flow.



User 2

Shows volume remaining to regeneration. This screen will not be viewed if the control is set for time-clock operation.



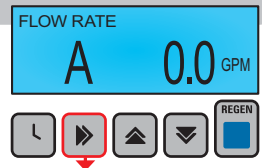
User 3

Displays number of days to next regeneration. Not shown when day override set to off.



User 4

Flow Rate displays the current flow rate of treated water through the valve. If Configuration 3CS is set to ALT A or B and the valve is in Standby, this display and the flashing Flow Indicator viewed in other User Screens will not be viewed.



A Tank In Service Indicator (A or B) is active whenever 1.0T Mode is set in Configuration 2CS.

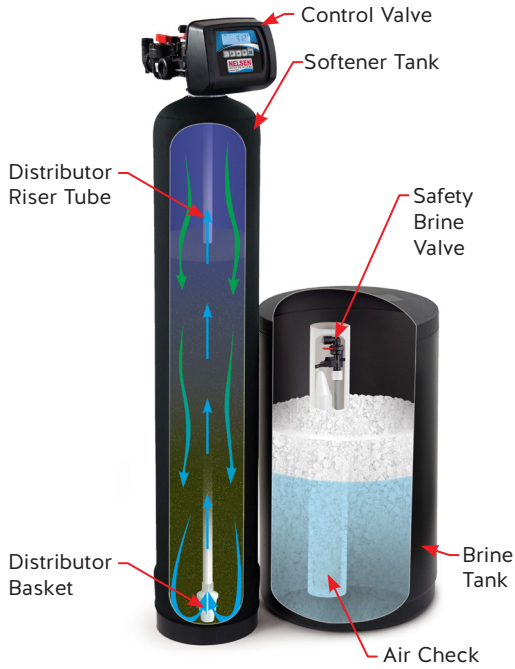
User 5

Displays dealer contact name and number when programmed in the Installer Level. Steps 7IL & 8IL.

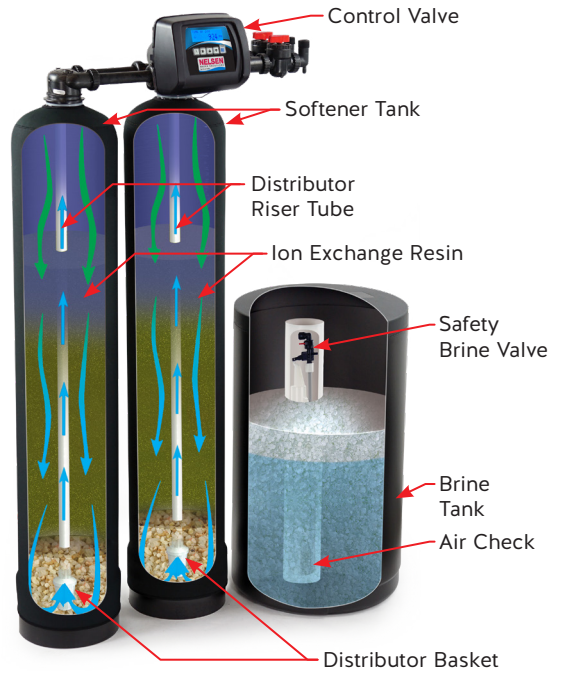


Nelsen Water Systems

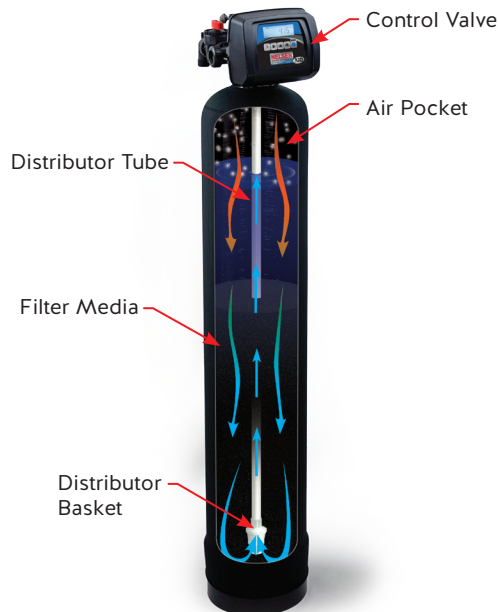
Single Tank Softener



Twin Tank Softener



Air Injection Oxidation (AIO) Filter System



Water Softener Maintenance

Maintenance of Your Conditioner

Salt: Salt is vital to your system working correctly. Not only must a softener have salt, but it should be the proper type to ensure efficient unit recharging. Ask your dealer what kind of salt may best suit your needs. Always have an adequate supply of salt on hand. Initially, check the salt level of your brine tank every couple of weeks to determine how much salt you use - this will depend on how much water you use. As a rule of thumb, with 20 gpg of hard water, about 1/2 lb. of salt per person per day is used. In other words, a family of four uses 60 lbs. of salt a month. Fill the tank approximately three-fourths full, with a minimum of 12" of salt. If your household does not use much water, do not fill your brine tank over 1/2 full, salt bridging may occur in the brine tank. This may result in hard water due to ineffective regeneration. **DO NOT USE Block Salt.** Block salt does not dissolve quickly enough to provide proper regeneration.

Cleaning Brine Tank: The brine tank may require periodic cleaning. Inspect the brine tank at least once a year for buildup of insoluble materials. It is recommended to periodically clean the brine tank no matter what salt you use. **REMEMBER:** Salt is the fuel to run your water conditioner. **Buy the best clean salt available.**

Operating Conditions

Your water conditioner has been designed to adequately handle up to 100 grains per gallon of hardness and up to 2 ppm of ferrous bicarbonate iron. This is iron dissolved in water and not visible to the eye in a freshly drawn sample. After standing in contact with air, the ferrous iron will oxidize to the ferric state and start precipitating as a reddish-brown floc. It can be seen and may cause discolored water. For your softener to remove the iron, air (oxygen) must be kept from coming in contact with water until after it has been passed through the water conditioner. In some cases, additional equipment may be required to treat water supplies having unique characteristics, such as ferric hydroxide iron, iron bacteria, low pH, unpleasant taste, and odors, etc. Contact your dealer if any questions should exist. This water softener is not intended to be used to treat microbiologically unsafe water or of unknown quality without adequate disinfection before or after treatment.

Power Loss and Battery Replacement

If an extended power outage occurs, the control valve will retain the time-of-day settings until the board's battery is depleted. After the battery power is depleted, the only item that needs to be reset is the time of day.

Other values are permanently stored in the nonvolatile memory. The control valve battery is not rechargeable but is replaceable.

To determine if the battery is depleted:

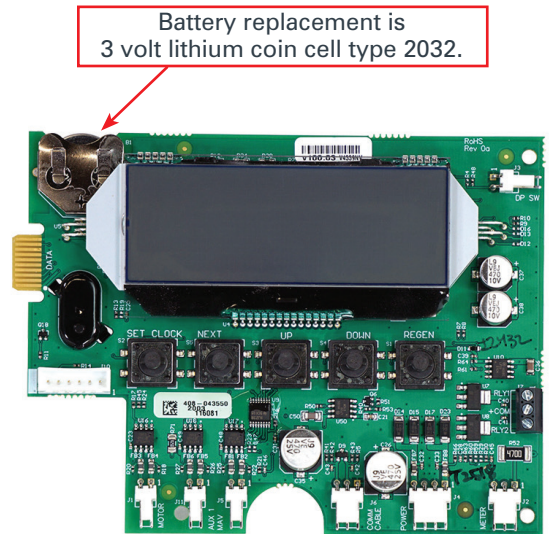
1. Remove valve cover—disconnect power from PC Board at the four-pin connector at the bottom of the board.
2. Wait five minutes for the board to de-energize. Remove the battery with a non-conductive/nonmetallic material. Reference the Parts Breakdown section of this manual for location.
3. Wait five minutes for the board to de-energize.
4. With the battery out, re-connect the power supply to the board. The board's display should begin to show information. This indicates that the board is operating correctly. If the display does not work, call installing dealer for service.
5. To replace with a new battery, unplug the transformer from the outlet. Install a 3-volt Lithium Coin Cell type 2032 battery, available at most stores.

Plug the unit back into the outlet.

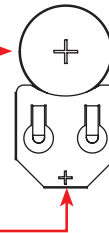
It is essential to replace the battery with the valve unplugged to avoid causing a short and potentially ruining the board.

6. Reset the time of day (see programming procedures) and initiate regeneration (see operating displays and maintenance).

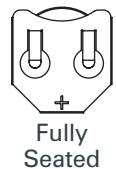
Please consult the installing dealer for service if these procedures do not remedy the problem.



Correct
Battery
Orientation



When replacing
the battery, align
positives and push
down to fully seat.



Error Codes

Error	Description of Error	
101	UNABLE TO START	Valve not sensing valve movement with motor output energized
102	MOTOR STALLED	Valve unable to find next cycle position (stalled)
103	MOTOR RAN TOO LONG	Valve unable to find next cycle position
104	VALVE HOMING	Valve unable to find HOME position
106	ALT MAV RAN TOO LONG	Alt MAV motor RAN TOO LONG - unable to find proper park position
107	ALT MAV STALLED	Alt MAV motor RAN TOO SHORT, STALLED - unable to find proper park position
109	INVALID MOTOR STATE	Control can no longer operate properly due to the detection of an invalid motor state
116	AUX MAV RAN TOO LONG	Aux MAV motor RAN TOO LONG - unable to find proper park position
117	AUX MAV STALLED	Aux MAV motor RAN TOO SHORT, STALLED - unable to find proper park position
201	INVALID REGEN STEP	Control can no longer operate properly due to the detection of an invalid regeneration cycle step - Internal Software Error
202	UNEXPECTED STALL	Motor encountered an unexpected stall but was able to recover from and proceed normally
402	POWER DOWN MEMORY	Control can no longer operate properly due to a check sum error for the Operational Data and Status Section of E ² PROM memory
403	PROGRAM MEMORY	Control can no longer operate properly due to a check sum error for the Programming Section of E ² PROM memory
404	DIAGNOSTIC MEMORY	Control can no longer operate properly due to a check sum error for the Diagnostic Section of E ² PROM memory
405	HISTORY MEMORY	Control continues to operate normally w/check sum error for the History Section of E ² PROM memory, however error is recorded in Error Log
406	CONTACT MEMORY	Control can no longer operate properly due to a check sum error for the Contact Screen Section of E ² PROM memory
407	STATUS RAM	STATUS RAM MEMORY FAILURE - Error generated when the microcontroller can't operate properly due to corrupted data contained in the Operational Data/Status Section of RAM memory. When this error is generated, like a "405" or "408" Error, a "407" is recorded in the Error Log, but the control does not enter Error Mode and continues to operate normally using previously stored Status RAM data (that can be up to 6 hrs. old). This portion of memory includes the state of motors, relays, flow, regen, and more. Most things that are tracked on a moment-by-moment basis that need to be able to recover in the event of a power loss or reset is saved here.
408	DIAGNOSTIC RAM	DIAGNOSTIC RAM MEMORY FAILURE - Error generated when the microcontroller can't operate properly due to corrupted data contained in the Diagnostic Section of RAM memory. When this error is generated, like a "405" or "407" Error, a "408" is recorded in the Error Log, but the control does not enter Error Mode and continues to operate normally using previously stored Diagnostic RAM data (that can be up to 6 hrs. old). This portion of memory includes parameters normally displayed in the diagnostic branch of the menu map.
410	CONFIG DOWNLOAD	Configurator file downloaded to the control was not originally uploaded from another control with the identical software revision

Troubleshooting

No Display on PC Board	No power at electric outlet	Repair outlet or use working outlet
	Control valve power adapter is not plugged into outlet or power cord end is not connected to PC board connection	Plug Power Adapter into outlet or connect power cord end to PC Board connection
	Improper power supply	Verify proper voltage is being delivered to PC Board
	Improper power supply	Replace power adapter
	Defective PC Board	Replace PC Board
PC Board does not display correct time of day	Power Adapter plugged into electric outlet controlled by light switch	Use uninterrupted outlet
	Tripped breaker switch and/or tripped GFI	Reset breaker switch and/or GFI
	Power outage	Reset time of day. If PC Board has battery back up present the battery may be depleted. See front cover and drive assembly drawing for instructions
	Defective PC Board	Replace PC Board
Display does not indicate that water is flowing. (Refer to user instructions for how the display indicates water is flowing)	Bypass valve is in bypass position	Turn bypass handles to place bypass in service position
	Meter is not connected to meter connection on PC Board	Connect meter to three pin connection labeled METER on PC Board
	Restricted/stalled meter turbine	Remove meter and check for rotation or foreign material
	Meter wire is not installed securely into three pin connector	Verify meter cable wires are installed securely into three pin connector labeled METER
	Defective meter	Replace meter
	Defective PC Board	Replace PC Board
Control valve regenerates at wrong time of day	Power outage	Reset time of day. If PC Board has battery back up present the battery may be depleted. See front cover and drive assembly drawing for instructions
	Time of day is not set correctly	Reset to correct time of day
	Time of regeneration is set incorrectly	Reset regeneration time
	None of the Above	Call Dealer for further troubleshooting
Time of day flashes on and off	Power outage	Reset time of day. If PC Board has battery back up present the battery may be depleted. See front cover and drive assembly drawing for instructions
Control valve does not regenerate automatically when the REGEN button is pressed and held	Broken drive gear or drive cap assembly	Replace drive gear or drive cap assembly
	Broken piston rod	Replace piston rod
	Defective PC Board	Defective PC Board
Control valve does not regenerate automatically but does when the REGEN button is pressed and held	Bypass valve is in bypass position	Turn bypass handles to place bypass in service position
	Meter is not connected to meter connection on PC Board	Connected meter to three pin connection labeled METER on PC Board
	Restricted/stalled meter turbine	Remove meter and check for rotation or foreign material
	Incorrect programming	Check for programming error
	Meter wire is not installed securely into three pin connector	Verify meter cable wires are installed securely into three pin connector labeled METER
	Defective meter	Replace meter
	Defective PC Board	Replace PC Board

Troubleshooting

Hard or untreated water is being delivered	Bypass valve is open or faulty	Fully close bypass valve or replace
	Media is exhausted due to high water usage	Check diagnostics for abnormal water usage
	Media is exhausted due to high water usage	Remove meter and check for rotation or foreign material
	Meter not registering	Test water and adjust program values accordingly
	Water quality fluctuation	Add proper salt to tank
	No brine or low level of brine in brine tank	Refer to <i>Control valve fails to draw in brine</i> below
	Control fails to draw in brine	Check refill setting in programming. Check refill flow control for restrictions or debris and clean or replace
	None of the above	Call your Water Treatment Dealer
Control valve uses too much brine	Improper refill setting	Check refill setting
	Improper program settings	Check program setting to make sure they are specific to the water quality and application needs
	Control valve regenerates frequently	Check for leaking fixtures that may be exhausting capacity or system is undersized
Residual brine being delivered to service	Low water pressure	Check incoming water pressure - water pressure must remain at minimum of 25 psi
	Incorrect injector size	Replace injector with correct size for the application
	Restricted drain line	Check drain line for restrictions or debris and clean
Excessive water in brine tank	Improper program settings	Check refill setting
	Plugged injector	Remove injector and clean or replace
	Drive cap assembly not tightened in properly	Re-tighten the drive cap assembly
	Damaged seal/stack assembly	Replace seal/stack
	Restricted or kinked drain line	Check drain line for restrictions or debris and or un-kink drain line
	Plugged backwash flow controller	Remove backwash flow controller and clean or replace
	Missing refill flow controller	Replace refill flow controller
Control valve fails to draw in brine	Injector is plugged	Remove injector and clean or replace
	Faulty brine piston	Replace brine piston
	Brine line connection leak	Inspect brine line for air leak
	Drain line restriction or debris cause excess back pressure	Inspect drain line and clean to correct restriction
	Drain line too long or too high	Shorten length and or height
	Low water pressure	Check incoming water pressure - water pressure must remain at minimum of 25 psi
Water running to drain	Power outage during regeneration	Upon power being restored control will finish the remaining regeneration time. Reset time of day
	Damaged seal/stack assembly	Replace seal/stack assembly
	Piston assembly failure	Replace piston assembly
	Drive cap assembly not tightened properly	Re-tighten the drive cap assembly

Limited Warranty

NELSEN CORPORATION - NWS WATER CONDITIONER

Nelsen Corporation (“Nelsen”) provides this limited warranty as described below (the “Limited Warranty”).

Limited Warranty - Subject to the terms of this Limited Warranty, Nelsen warrants to the original buyer (“Buyer”) of this Water Conditioner product (the “Product”) solely from a Nelsen authorized dealer that the Product will be free from defects in material or workmanship for a period of one (1) year after the date of original installation. This Limited Warranty shall apply only if the Product is installed, operated and maintained in strict accordance with Nelsen’s or the manufacturer’s guidelines and other legal requirements. The Product is sold with the understanding that Buyer has independently determined the suitability and compatibility of such Product for Buyer’s purposes. Any statements, technical information or recommendations concerning the Product or any parts therein by Nelsen are based upon data provided to Nelsen by its suppliers and believed to be accurate, but do not constitute a guarantee or warranty. This Limited Warranty shall not cover and shall be null and void if, in Nelsen’s discretion, the Product, or any parts therein, are: (a) manufactured by a third party manufacturer; (b) modified after sale or use of replacement parts not specified by manufacturer requirements; (c) improperly installed, stored, used, operated, handled or maintained; or (d) abused, misused or otherwise damaged for any reason, including due to negligence, weather, fire, lightning, power surges or other acts of God or exposure to freezing or hot water or the effects of normal wear and tear.

Third Party Warranties - In lieu of the above Limited Warranty, the Product, or any parts therein, may be covered by a third-party manufacturer’s warranty. Nelsen’s authorized dealer will provide Buyer with a copy of any third-party manufacturer warranty prior to purchase. Nelsen shall transfer and assign to Buyer any and all third-party manufacturer’s warranties on the Product, or any parts therein, subject to the conditions and exclusions in the manufacturer’s warranty. Buyer’s exclusive remedy under such third-party manufacturer’s warranty shall be against such third-party manufacturer and not Nelsen. Buyer may need to register the Product with a third party manufacturer in order to obtain its warranty.

Additional Conditions -

- This Limited Warranty only covers the Product, and any parts therein, if used exclusively for residential purposes in a single-family dwelling. This limited warranty shall be null and void if the Product is used for commercial, industrial or other non-residential applications.
- This Limited Warranty will not cover any Product used for outdoor installations unless a weather cover that complies with manufacturer requirements is utilized.
- This Limited Warranty shall not cover the Product if operated at water pressures or water temperatures or with water contaminants that exceed manufacturer’s guidelines.
- The Product may include interconnecting piping that may have leaks, even if tested at the time of manufacture, due to pipe vibrations and handling. For example, galvanized pipe threads are diligently assembled with recommended thread sealants but may have leaks discovered at the time of installation or start-up. The installer of the goods is responsible for checking the system for leaks upon start-up and making any repairs if necessary.
- This Limited Warranty does not cover damage or failure of the Product, or any part therein, caused by friction, wear, chemical attack or debris build-up on wear parts. For purposes hereof, “wear parts” shall include, without limitation, pistons, piston rods, seals, spacers, end cap quad rings, brine valves, valve disk flappers and parts requiring replacement under recommended maintenance procedures, including, without limitation, o-rings and gaskets.

Warranty Claims - All claims under this Limited Warranty shall be submitted by Buyer to the authorized Nelsen dealer who sold the Product in writing and shall include the Buyer’s name, address, telephone number, date of purchase of the Product, receipt evidencing proof of purchase and a copy of this Limited Warranty. Nelsen or its authorized dealer will investigate the claim. Buyer must fully cooperate in investigating and evaluating the claim, including, without limitation, providing additional information upon request. **TO BE ELIGIBLE FOR COVERAGE UNDER THIS LIMITED WARRANTY, BUYER MUST SUBMIT A CLAIM WITHIN SIXTY (60) DAYS OF THE DATE THAT THE ALLEGEDLY DEFECTIVE PRODUCT OR PART IS FIRST DISCOVERED BY BUYER AND, IN NO EVENT, LATER THAN SIXTY (60) DAYS AFTER THE WARRANTY PERIOD HEREIN.**

Repair or Replacement/Credit - Subject to the conditions and limitations herein, if Nelsen determines that the Product, or any part therein, does not conform to this Limited Warranty, Nelsen will repair or replace the defective Product or part therein. Non-conforming Products or parts therein must be returned to Nelsen’s authorized dealer at Buyer’s cost. Any replaced Products, or any parts therein, shall be retained by and become the property of Nelsen. If Nelsen determines that the repair or replacement of the Product or part

Continued Next Page

Limited Warranty

therein is not commercially practicable, Nelsen will issue a credit in favor of Buyer in an amount not to exceed the purchase price of the Product. Notwithstanding anything to the contrary herein, this Limited Warranty does not cover any cost or labor associated with the removal or re-installation of the replacement Product or part therein or any shipping costs associated with the returned Product or part therein, which remains the sole cost, risk and responsibility of Buyer, unless otherwise agreed in writing by Nelsen.

Eligibility/Non-Transferable - This Limited Warranty applies only to Buyer if the Product is purchased from a Nelsen authorized dealer. This Limited Warranty is personal to Buyer and may not be assigned or otherwise transferred by Buyer. Any attempt to transfer this Limited Warranty shall be null and void and not recognized by Nelsen.

Disclaimer of Other Warranties/Limitation on Liability

EXCEPT AS PROVIDED ABOVE AND TO THE EXTENT PERMITTED BY LAW, THERE ARE NO OTHER REPRESENTATIONS OR WARRANTIES WITH RESPECT TO THE PRODUCT, EITHER EXPRESSED OR IMPLIED, WRITTEN OR ORAL, OR ARISING UNDER CUSTOM OF TRADE, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NO REPRESENTATIONS OR WARRANTIES AT ANY TIME MADE BY ANY EMPLOYEE, AGENT OR REPRESENTATIVE OF NELSEN SHALL BE EFFECTIVE TO VARY OR EXPAND ANY WRITTEN WARRANTY OR THE TERMS HEREOF. TO THE EXTENT A WAIVER OF IMPLIED WARRANTIES IS PROHIBITED BY LAW, ANY IMPLIED WARRANTIES SHALL BE LIMITED TO THE DURATION OF ANY WRITTEN WARRANTY PROVIDED BY NELSEN.

IN NO EVENT SHALL NELSEN BE LIABLE TO BUYER OR TO ANY THIRD PARTY FOR CONSEQUENTIAL, INCIDENTAL, SPECIAL OR PUNITIVE DAMAGES, OR FOR LOST PROFITS OR LOSS OF USE, RESULTING FROM OR IN ANY MANNER RELATED TO THE PRODUCT, ITS DELIVERY, NON-DELIVERY, USE, OR INABILITY TO USE THE SAME, WHETHER SUCH DAMAGES BE CLAIMED UNDER CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

NELSEN'S TOTAL LIABILITY UNDER THIS OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, IS LIMITED TO REPAIR OR REPLACEMENT OF, OR CREDIT FOR, THE PRODUCT OR ANY PART, AS STATED HEREIN.

Waiver of Class Action

ANY AND ALL CLAIMS ASSERTED BY BUYER OR ANY OTHER PERSON OR ENTITY SHALL BE RAISED IN AN INDIVIDUAL CAPACITY AND NOT AS A PLAINTIFF OR CLASS MEMBER IN ANY PURPORTED CLASS OR REPRESENTATIVE PROCEEDING, WHICH ARE HEREBY WAIVED.

Applicable Law - This Limited Warranty shall be interpreted and governed under the laws of the State of Ohio without giving effect to the choice of law rules thereof. Nelsen and Buyer irrevocably consent and submit to the exclusive jurisdiction and venue within the courts of Summit County, Ohio and/or the United States District Court for the Northern District of Ohio in connection with any litigation arising out of, or in any way relating to, this Limited Warranty or the Product, including, but not limited to, any and all claims for breach of warranty or products liability, and Nelsen and Buyer expressly waive any objection to the jurisdiction and/or venue of such courts.