



Model RB-24SE - Conductance Type Low Water Cut-Off

www.xylem.com/mcdonnellmiller

For Residential 24 VAC Hot Water Boilers



1 General information

1.1 General Safety



WARNING:



Before using this product read and understand instructions. Save these instructions for future reference.



WARNING:

All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of plumbing, steam, and electrical equipment and/or systems in accordance with all applicable codes and ordinances.



WARNING:



To prevent electrical shock, turn off the electrical power before making electrical connections.



WARNING:

This low water cut-off must be installed in series with all other limit and operating controls installed on the boiler. After installation, check for proper operation of all of the limit and operating controls, before leaving the site.



WARNING:

California Proposition 65 warning! This product can expose you to chemicals including Lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to: www.P65Warnings.ca.gov.

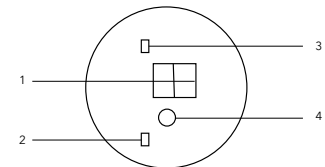
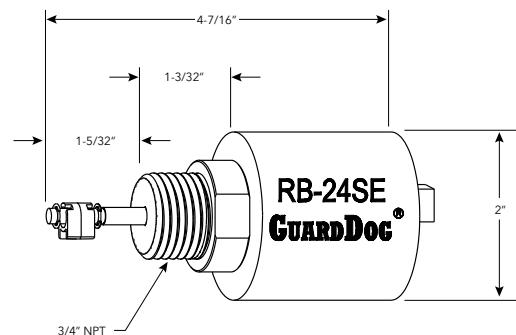
NOTICE:

Failure to follow warning could cause property damage, personal injury or death

2 Operation

The Model RB-24SE Low Water Cut-Off is specifically designed to provide burner cut-off if there is an unsafe water loss, which can result from a broken or leak-

ing radiator or pipe, or a cracked section in the boiler. Water/glycol mixtures up to 50% concentration may be used.



1. Cable Connector
2. Power On Green LED
3. Red LED Low Water
4. Test Button

2.1 Specification

Temperature:

Storage: -40°F to 120°F (-40°C to 49°C)

Ambient: 32°F to 120°F (0°C to 49°C)

Humidity: 85% (non-condensing)

Maximum Water Pressure: 160 psi (11.2 kg/cm²)

Maximum Water Temperature: 250°F (121°C)

Table 1: Electrical Ratings

Voltage	Power consumption	Switching Capacity
24 VAC	2.5 VA	2A at 24 VAC

DOB: up to 5 seconds.

Enclosure Rating: NEMA 1 General Purpose

Probe Sensitivity: 15,000 ohms Conductive liquid required (water/glycol mixtures up to 50% concentration may be used).

IMPORTANT: Do not use Model RB-24SE on steam boilers.

IMPORTANT: Do not use on millivolt systems.

NOTICE:

IMPORTANT: Before making any wiring connections to boiler with the connector or "Y" harness, You **MUST** wire the boiler per boiler manufacturer's recommendations and verify operation.

NOTICE:

IMPORTANT: Universal wiring harness adaptors are now available for use with systems having modular plug-on burner controllers and vent dampers (sold separately).

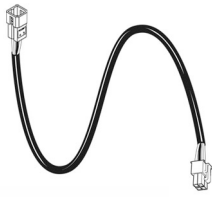


Figure 1: UWH-RB-24B PIN 144695

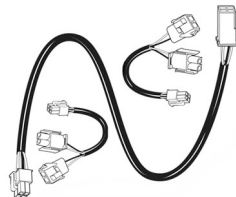


Figure 2: UWH-RB-24S PIN 144682

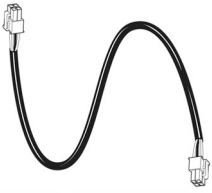


Figure 3: UWH-RB-24L PIN 144691

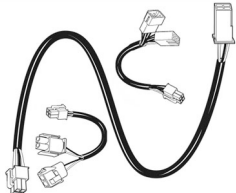


Figure 4: UWH-RB-24A PIN 144681

The **RB-24SE-B** is for use on hot water boilers that have a harness plug connection.

- 5 foot (1.52 meter) connector cable

The **RB-24SE-S** is for use on hot water boilers that have a transformer plug connection to the aquastat.

- 5 foot (1.52 meter) connector cable
- "Y" harness for Honeywell Aquastat
- "Y" harness for United Technologies burner control module

The **RB-24SE-L** is for use on hot water boilers that have a control panel plug connection.

- 5 foot (1.52 meter) connector cable

The **RB-24SE-A** is for use on hot water boilers that have a vent damper.

- 5 foot (1.52 meter) connector cable
- 6 pin connector "Y" harness
- 4 pin connector "Y" harness

3 Installation

TOOLS NEEDED:

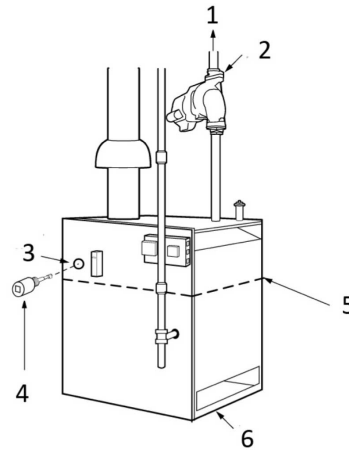
Pipe wrench or channel lock pliers.

3.1 STEP 1 - Determine the Location where to install the Low Water Cut-Off

Determine where to install the remote sensor based on the following requirements:

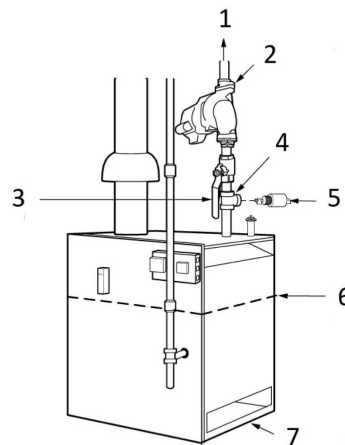
1. If tapings are provided on the boiler, install the probe control in one that is above the minimum safe water level, as specified by the boiler manufacturer. If no specified by the boiler manufacturer. If no specified minimum safe water level is designated, contact the boiler manufacturer.
2. If no tapping is provided on the boiler, install the probe control in a header or riser pipe above the boiler. Refer to the Typical Installation Diagrams below.

3.2 Typical Installations



1. To system
2. Circulating Pump
3. 3/4" (20 mm) NPT Tapping
4. Model RB-24SE Low Water Cut-off
5. Minimum Safe Water Level (as determined by the boiler manufacturer)
6. Hot Water Boiler

Figure 5: On the boiler (recommended)

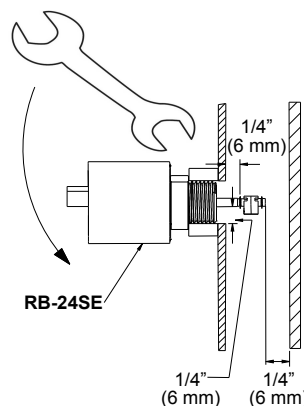


1. To system
2. Circulating Pump
3. Optional Insulation Valve (Must be installed above tee)
4. 3/4" (20 mm) NPT Tapping
5. Model RB-24SE Low Water Cut-off
6. Minimum Safe Water Level (as determined by the boiler manufacturer)
7. Hot Water Boiler

Figure 6: In a pipe tee above the boiler

For all applications:

1. Make sure probe is installed above minimum safe water line as determined by the boiler manufacturer.
2. Make sure that ends and sides of the probe are at least 1/4" (6.4 mm) from all internal metal surfaces.



3.3 STEP 2 - ELECTRICAL WIRING Options



WARNING:



To prevent electrical shock, turn off the electrical power before making electrical connections.



WARNING:

This low water cut-off must be installed in series with all other limit and operating controls installed on the boiler. After installation, check for proper operation of all of the limit and operating controls, before leaving the site.

NOTICE:

Failure to follow warning could cause property damage, personal injury or death

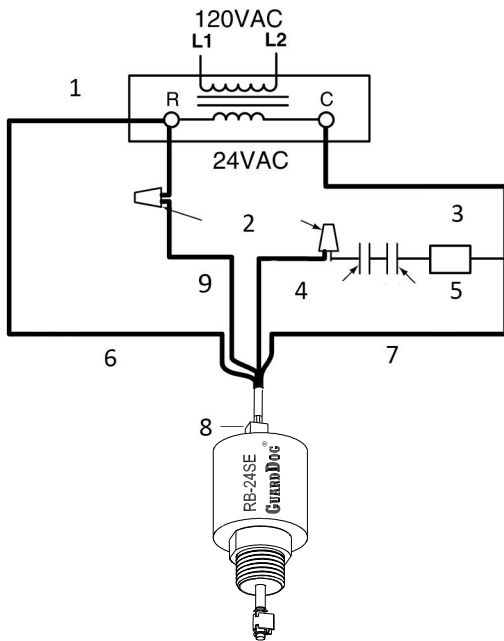
NOTICE:

IMPORTANT: Boiler manufacturer schematics should be followed. In the event that the boiler manufacturer's schematic does not exist, or is not available from the boiler manufacturer, refer to the schematics provided in this document.

3.3.1 Option 1

For hot water boilers which use a simple series circuit to operate the boiler, the RB-24SE can be wired as shown.

- Connect the **red** wire to the hot side (Terminal "R") of the (24 V) transformer on the boiler.
- Connect the **white** wire to the neutral side (Terminal "C") of the (24 V) transformer on the boiler.
- Connect one yellow wire to Terminal "R".
- Connect the other wire in series with all other limit and operation controls.

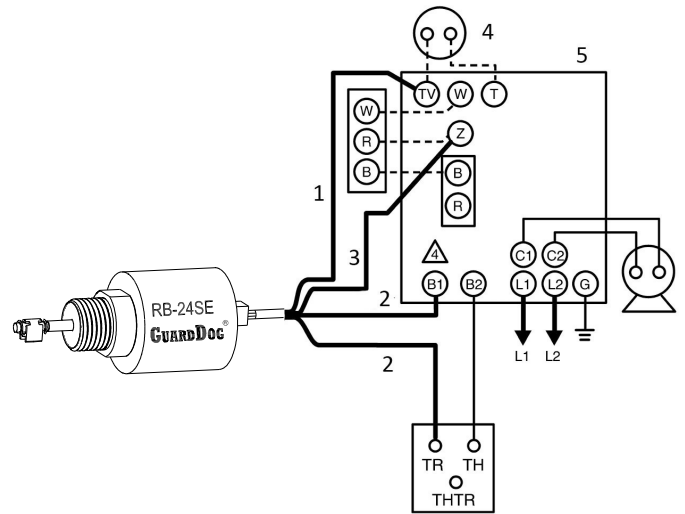


1. 120/24 VAC transformer furnished with boiler
2. Wire Nuts
3. Gas valve
4. Yellow Aquastat
5. Other limits
6. Red
7. White
8. Cable plug
9. Yellow

3.3.2 Option 2

For hot water boilers that utilize an aquastat relay to control the burner and circulator circuits. To wire a boiler of this type, the Model RB-24SE should be wired in series with the gas valve as shown.

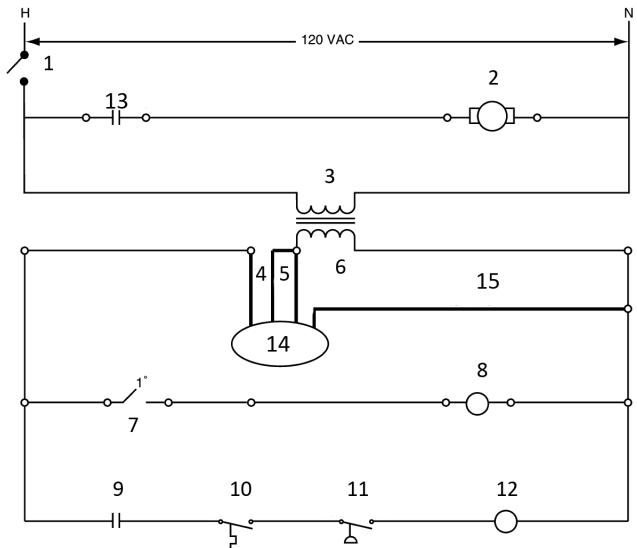
NOTE: The example shows wiring an RB-24SE to a Honeywell Model L8148E aquastat. For other manufacturers, refer to the electrical schematic to confirm appropriate connections for obtaining 24 VAC power and wiring in limit circuit. The diagram assumes "Z" is the hot side and "TV" is the neutral or grounded side of the transformer.



1. White
2. Yellow
3. Red
4. 24V Thermostat
5. L8148E

3.3.3 Option 3

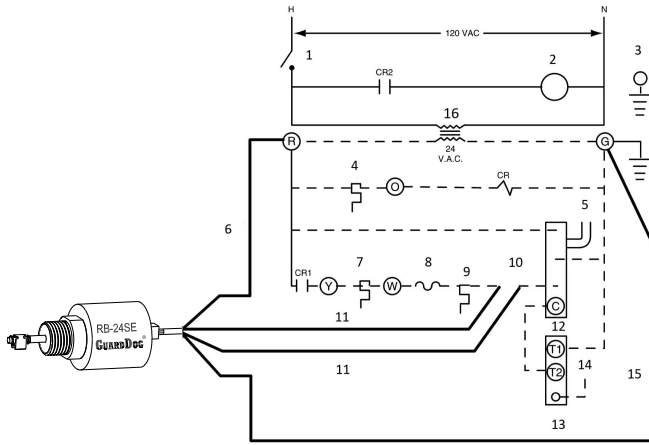
Certain types of boilers may utilize a relay or series of relays to control the burner and circulator circuits. To wire into a boiler of this type, the Model RB-24SE can be wired as shown.



1. Service switch (by others)
2. Circulator
3. Primary
4. Yellow
5. Red
6. Secondary (24 VAC)
7. White
8. Thermostat
9. Relay
10. Temperature Limit Control
11. Pressure Limit Control
12. Gas Valve
13. Relay contacts
14. Model RB-24SE
15. White

3.3.4 Option 4

Some boiler wiring diagrams indicate where an LWCO should be wired. In this diagram the RB-24SE can be wired as shown.



1. Service switch (by others)
2. Circulator
3. Equipment ground
4. Thermostat
5. Cable to Damper
6. Red Secondary (24 VAC)
7. Spill
8. Rollout IFE
9. Limit
10. Low Water Cut-off (when used)
11. Yellow
12. Gas Valve
13. Relite Control
14. To Pilot
15. White
16. Primary

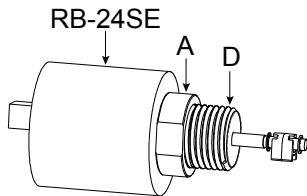
3.4 STEP 3 - Installation of the Low Water Cut-Off

1. Springily, apply pipe sealant to the external threads (D) of the probe (A).

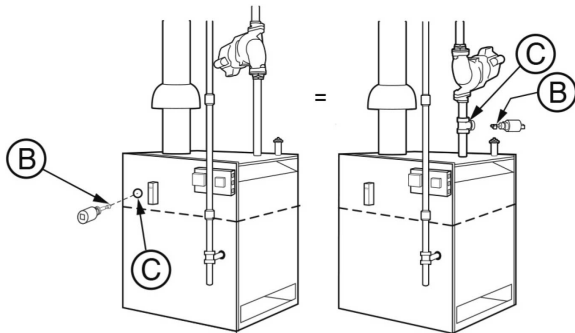


WARNING:

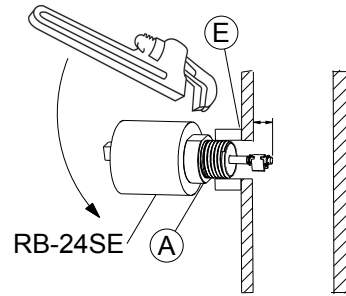
Do not use PTFE tape. Only use pipe sealant. Failure to follow these instructions will cause the probe not to function as intended and could cause property damage, personal injury or death.



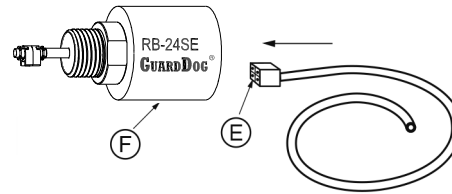
2. Insert the probe portion (B) of the low water cut-off into the 3/4" (20mm) NPT tapping (C) on the boiler **OR** into 3/4" (20mm) NPT pipe or reducing tee (D) above the boiler. Do not cross thread the low water cut-off. Fully **hand tighten** the low water cut-off (approximately 4 revolutions)..



3. Using a wrench, tighten the unit (A) into the tapped connection (E) that was determined in Step 1 of these instructions. Tighten to 47 lbf-ft (64 Nm).



4. Install the plug end of the cable (E) into the low water cut-off (F).



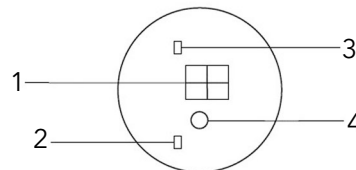
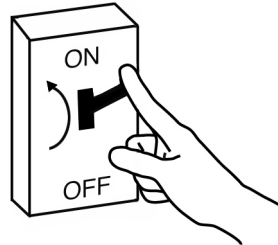
NOTICE:

To connect wires to the terminals on the water feeder, burner, or low water cut-off, place the bare end of the wire under the terminal screw and tighten the screw with a flathead screwdriver.

4 Testing

4.1 Testing

1. **Before filling the systems**, turn on the electric power to the boiler. The low water cut-off's green "Power On" LED should be illuminated. With the room thermostat set on "heat", confirm then the burner will not operate without water in the system, the low water cut-off's red LED should be illuminated.
2. Fill the system with water. When water is just above the probe, the low water cut-off's red LED should turn off.
3. Check and confirm that the boiler's thermostat, burner and safety limits are operating properly after filling system and before leaving the site.
4. Check the threaded connection of the low water cut-off for leakage. Tighten, if necessary.



1. Cable Connector
2. Red LED Low Water
3. Power On Green LED
4. Test Button

Testing Control Using The "Test Button"

Pressing the "Test Button" interrupts the probe circuit which simulates water off the probe.

1. Press and hold the "test button" while burner is running.
2. The burner should turn OFF and red light turn ON if burner is wired correctly.
3. Release the "test button" and the red light should turn off and the boiler should turn on provided that the boiler water is in contact with the probe.

5 Maintenance



WARNING:

- Maintenance and service must be performed by skilled and qualified personnel only.
 - Replace probe when PFA insulator is cracked or worn or probe is loose.
-

- Test the low water cut-off annually.
- Remove and inspect the self-cleaning probe every five years.
 - Use a non-abrasive cloth and rinse with clean water when the probe requires cleaning. Do not use sharp instruments to remove accumulations of rust or scale.
- Replace probe every ten years.
- Replace the low water cut-off control box every 15 years.

6 Troubleshooting

If control fails to operate, perform the following diagnostic checks.

1. Check to be sure that the water level in the boiler is at or above the level of the probe.
2. Re-check all wiring to ensure proper connections as specified in boiler manufacturer's wiring diagrams.
3. Check to ensure that PTFE tape has not been used on the threaded connection of the probe to the boiler.
4. Check the quality of the boiler water to ensure adequate conductance.

Boiler Does not Turn Off (when water is below probe)

- Turn off boiler and check boiler wiring connections.
- Turn off boiler, drain boiler and remove control to check if the tip of the probe is touching a metal surface.

Boiler Does not Turn ON

- Make sure water and check boiler wiring connections.
- Turn off boiler, drain boiler and remove control to check if the tip of the probe is touching a metal surface.
- Check boiler wiring connections.

Boiler does not turn ON and RB-24SE green LED continues blinking 13 times

- Problem is the probe shorting at power on.
- Turn off boiler and check probe wiring connection.
- Turn off boiler, drain boiler and remove control to check if the tip of the probe is touching a metal surface.

Boiler does not turn ON and both RB-24SE green and red LEDs are blinking

- Problem is wrong transformer "Y" harness.
- Turn off boiler and install correct transformer "Y" harness.

Boiler does not turn ON and RB-24SE green LED continues blinking from 1 to 10 times (Internal faults):

- Press the "test button" for more than 1 second until the Red LED turns off or perform a power cycle to reset the device.
- If the problem persists, replace the control with a new unit.

7 Warranty

7.1 Commercial warranty

Warranty. For goods sold to commercial buyers, Seller warrants the goods sold to Buyer hereunder (with the exception of membranes, seals, gaskets, elastomer materials, coatings and other “wear parts” or consumables all of which are not warranted except as otherwise provided in the quotation or sales form) will be (i) be built in accordance with the specifications referred to in the quotation or sales form, if such specifications are expressly made a part of this Agreement, and (ii) free from defects in material and workmanship for a period of one (1) year from the date of installation or two (2) years from the date of manufacture, whichever shall occur first, unless a longer period is specified in the product documentation (the “Warranty”).

Except as otherwise required by law, Seller shall, at its option and at no cost to Buyer, either repair or replace any product which fails to conform with the Warranty provided Buyer gives written notice to Seller of any defects in material or workmanship within ten (10) days of the date when any defects or non-conformance are first manifest. Under either repair or replacement option, Seller shall not be obligated to remove or pay for the removal of the defective product or install or pay for the installation of the replaced or repaired product and Buyer shall be responsible for all other costs, including, but not limited to, service costs, shipping fees and expenses. Seller shall have sole discretion as to the method or means of repair or replacement. Buyer’s failure to comply with Seller’s repair or replacement directions shall terminate Seller’s obligations under this Warranty and render the Warranty void. Any parts repaired or replaced under the Warranty are warranted only for the balance of the warranty period on the parts that were repaired or replaced. Seller shall have no warranty obligations to Buyer with respect to any product or parts of a product that have been: (a) repaired by third parties other than Seller or without Seller’s written approval; (b) subject to misuse, misapplication, neglect, alteration, accident, or physical damage; (c) used in a manner contrary to Seller’s instructions for installation, operation and maintenance; (d) damaged from ordinary wear and tear, corrosion, or chemical attack; (e) damaged due to abnormal conditions, vibration, failure to properly prime, or operation without flow; (f) damaged due to a defective power supply or improper electrical protection; or (g) damaged resulting from the use of accessory equipment not sold or approved by Seller. In any case of products not manufactured by Seller, there is no warranty from Seller; however, Seller will extend to Buyer any warranty received from Seller’s supplier of such products.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ANY AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, GUARANTEES, CONDITIONS OR TERMS OF WHATEVER NATURE RELATING TO THE GOODS PROVIDED HEREUNDER, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY EXPRESSLY DISCLAIMED AND EXCLUDED. EXCEPT AS OTHERWISE REQUIRED BY LAW, BUYER’S EXCLUSIVE REMEDY AND SELLER’S AGGREGATE LIABILITY FOR BREACH OF ANY OF THE FOREGOING WARRANTIES ARE LIMITED TO REPAIRING OR REPLACING THE PRODUCT AND SHALL IN ALL CASES BE LIMITED TO THE AMOUNT PAID BY THE BUYER FOR THE DEFECTIVE PRODUCT. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY OTHER FORM OF DAMAGES, WHETHER DIRECT, INDIRECT, LIQUIDATED, INCIDENTAL, CONSEQUENTIAL, PUNITIVE, EXEMPLARY OR SPECIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF PROFIT, LOSS OF ANTICIPATED SAVINGS OR REVENUE, LOSS OF INCOME, LOSS OF BUSINESS, LOSS OF PRODUCTION, LOSS OF OPPORTUNITY OR LOSS OF REPUTATION.

7.2 Limited consumer warranty

Warranty. For goods sold for personal, family or household purposes, Seller warrants the goods purchased hereunder (with the exception of membranes, seals, gaskets, elastomer materials, coatings and other “wear parts” or consumables all of which are not warranted except as otherwise provided in the quotation or sales form) will be free from defects in material and workmanship for a period of one (1) year from the date of installation or two (2) years from the product date code, whichever shall occur first, unless a longer period is provided by law or is specified in the product documentation (the “Warranty”).

Except as otherwise required by law, Seller shall, at its option and at no cost to Buyer, either repair or replace any product which fails to conform with the Warranty provided Buyer gives written notice to Seller of any defects in material or workmanship within ten (10) days of the date when any defects or non-conformance are first manifest. Under either repair or replacement option, Seller shall not be obligated to remove or pay for the removal of the defective product or install or pay for the installation of the replaced or repaired product and Buyer shall be responsible for all other costs, including, but not limited to, service costs, shipping fees and expenses. Seller shall have sole discretion as to the method or means of repair or replacement. Buyer’s failure to comply with Seller’s repair or replacement directions shall terminate Seller’s obligations under this Warranty and render this Warranty void. Any parts repaired or replaced under the Warranty are warranted only for the balance of the warranty period on the parts that were repaired or replaced.

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THE FOREGOING WARRANTY IS PROVIDED IN PLACE OF ALL OTHER EXPRESS WARRANTIES. ALL IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO ONE(1) YEAR FROM THE DATE OF INSTALLATION OR TWO (2) YEARS FROM THE PRODUCT DATE CODE, WHICHEVER SHALL OCCUR FIRST. EXCEPT AS OTHERWISE REQUIRED BY LAW, BUYER’S EXCLUSIVE REMEDY AND SELLER’S AGGREGATE LIABILITY FOR BREACH OF ANY OF THE FOREGOING WARRANTIES ARE LIMITED TO REPAIRING OR REPLACING THE PRODUCT AND SHALL IN ALL CASES BE LIMITED TO THE AMOUNT PAID BY THE BUYER FOR THE DEFECTIVE PRODUCT. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY OTHER FORM OF DAMAGES, WHETHER DIRECT, INDIRECT, LIQUIDATED, INCIDENTAL, CONSEQUENTIAL, PUNITIVE, EXEMPLARY OR SPECIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF PROFIT, LOSS OF ANTICIPATED SAVINGS OR REVENUE, LOSS OF INCOME, LOSS OF BUSINESS, LOSS OF PRODUCTION, LOSS OF OPPORTUNITY OR LOSS OF REPUTATION.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which may vary from state to state.

To make a warranty claim, check first with the dealer from whom you purchased the product or call +1-847-966-3700 for the name and location of the nearest dealer providing warranty service.

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