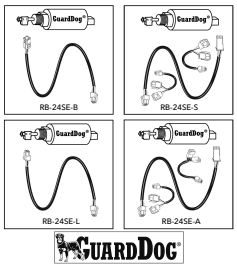
McDonnell & Miller
a xylem brand

INSTRUCTION MANUAL
MM-277L



Model RB-24SE-S Model RB-24SE-A Model RB-24SE-L Model RB-24SE-B Conductance Type Low Water Cut-Off

with Universal Wiring Harness For Residential 24 VAC Hot Water Boilers

www.xylem.com/mcdonnellmiller

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:

We recommend that secondary (redundant) Low Water Cut-Off controls be installed on all steam boilers with heat input greater than 400,000 BTU/hour or opening above 15 psi of steam pressure. At least two controls should be connected in series with the burner control circuit to provide safety redundancy protection should the boiler experience a low water condition. Moreover, at each annual outage, the low water cutoffs should be dismantled, inspected, cleaned, and checked for proper calibrations and performance.

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 Product Description

2.1 Applications

Model RB-24SE-S

Model RB-24SE-A

Model RB-24SE-L

Model RB-24SE-B

Conductance Type Low Water Cut-Off with Universal Wiring Harness

For Residential 24 VAC Hot Water Boilers

Each wiring harness includes connectors which allow an RB-24SE LWCO to be connected to most residential hot water boilers having a 24 volt burner circuit.

2.2 Operation for Models RB-24SE

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 leaking radiator or pipe, or a cracked section in the boiler.

Water/glycol mixtures up to 50% concentration may be used.

2.3 Specification

Temperature:

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

Ambient: 32°F to 120°F (0°C to 4°C)

Humidity: 85% (non-condensing)

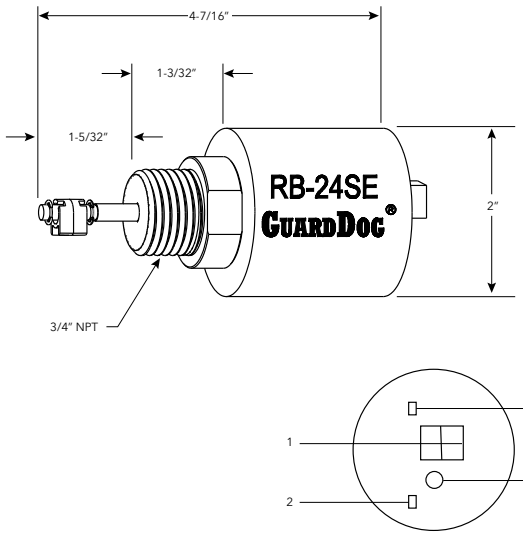
Maximum Water Pressure: 160 psi (11.2kg/cm^2)

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

Table 1: Electrical Ratings

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

Enclosure Rating: NEMA 1 General Purpose



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

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

IMPORTANT: Do not us on millivolt systems.

Figure 1: UWH-RB-24B PIN 144695

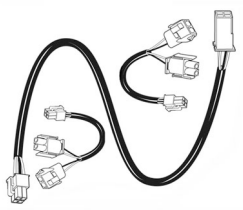


Figure 2: UWH-RB-24S PIN 144682

Figure 3: UWH-RB-24L PIN 144691

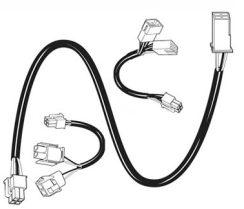


Figure 4: UWH-RB-24A PIN 144681

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

- 5 foot connector cable harness

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

- 5 foot 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 connector cable

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

- 5 foot connector cable
- 6 pin connector 'Y' hamess
- 4 pin connector 'Y' hamess

3 Installation

TOOLS NEEDED:

Pipe wrench or channel lock pliers.

3.1 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:

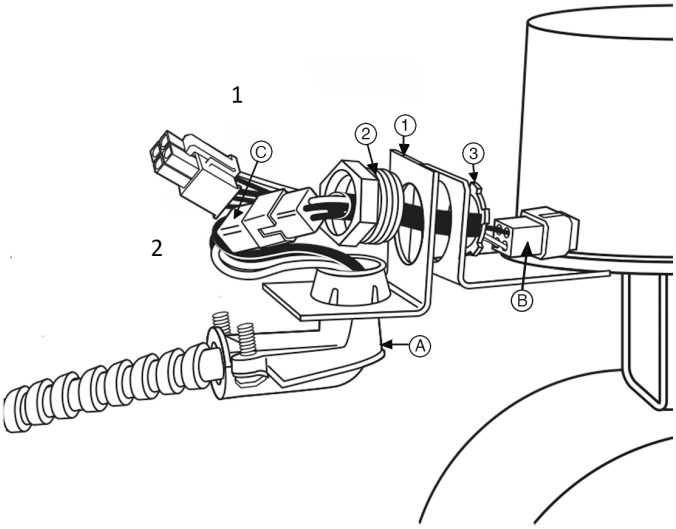
Failure to follow warning could cause property damage, personal injury or death

3.1.1 Option 1

RB-24SE-A 4-pin Damper "Y" Harness with GRAY Color Tubing for Atmospheric Boilers.

Install angle bracket (1) on vent damper using fitting (2) and nut (3).

1. Install BX connector to angle bracket.
2. Plug 4-pin connector of "Y" harness to 4-pin connector on vent damper.
3. Plug 4-pin connector of boiler´s vent damper wiring harness to connector of "Y" harness.



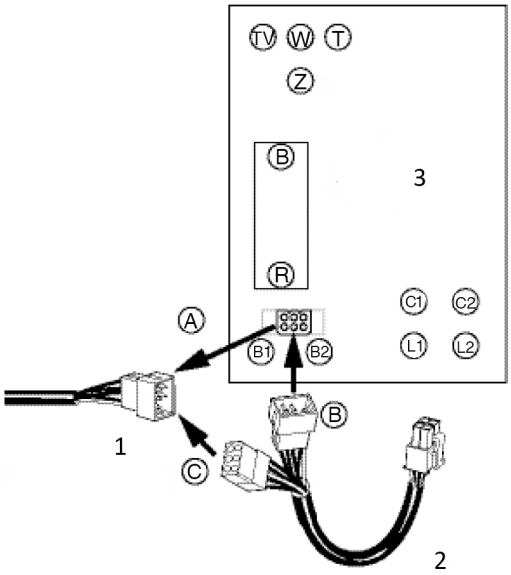
1. "Y" Harness with GRAY Color Tubing
2. Boiler Vent Damper Wire Harness

NOTE: This "Y" Harness can only be used with vent dampers with 4-pin connectors.

3.1.2 Option 2

RB-24SE-A 6-pin Damper "Y" Harness with BLACK Color Tubing for Atmospheric Boilers.

1. Remove 6-pin connector of damper wiring harness from connector on aquastat.
2. Plug 6-pin connector of "Y" harness to connector on aquastat.
3. Plug connector of damper to connector of boiler´s damper wiring harness.



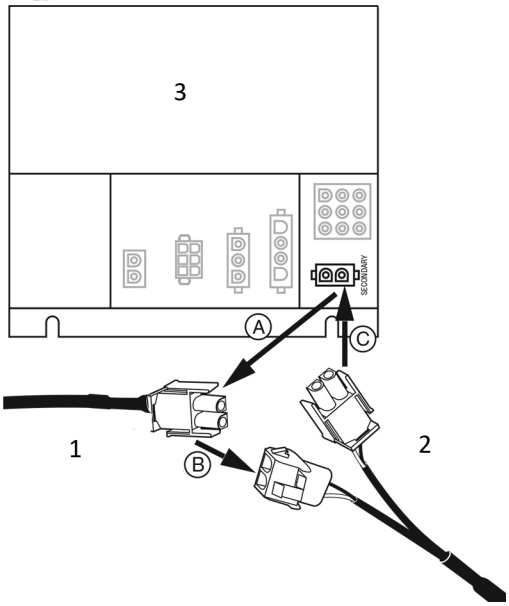
1. Boiler Damper Wire Harness
2. "Y" Harness with BLACK Color Tubing
3. Aquastat

NOTE: This "Y" Harness can only be used with vent dampers with 6-pin connectors.

3.1.3 Option 3

RB-24SE-S Transformer "Y" Harness with BLUE Color Tubing

1. Remove connector of boiler wiring harness from boiler control transformer connector.
2. Plug connector of boiler wiring harness to connector of "Y" harness with BLUE color tubing.
3. Plug connector of of "Y" harness with BLUE color tubing to boiler control transformer connector.



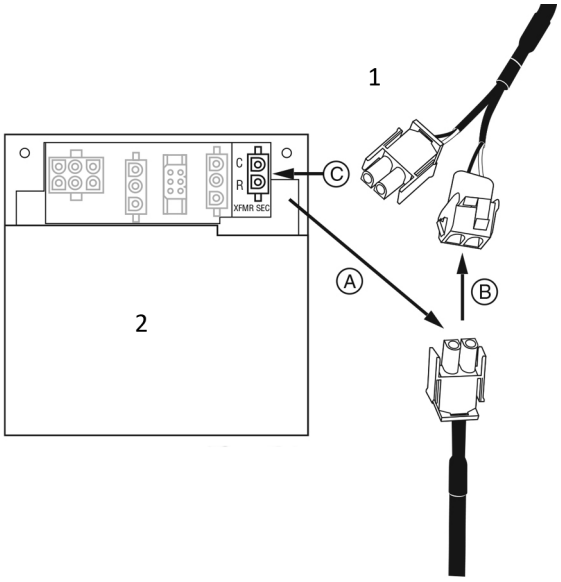
1. Boiler Wire Harness
2. "Y" Harness with BLUE Color Tubing
3. United Technologies Integrated Boiler Control

NOTE: Burner will not operate and RB-24SE red LED will blink if wrong "Y" harness is used.

3.1.4 Option 4

RB-24SE-S Transformer "Y" Harness with GREEN Color Tubing

1. Remove connector of boiler wiring harness from Aquastat transformer connector.
2. Plug connector of boiler wiring harness to connector of "Y" harness with GREEN color tubing.
3. Plug connector of of "Y" harness with GREEN color tubing to Aquastat transformer connector.



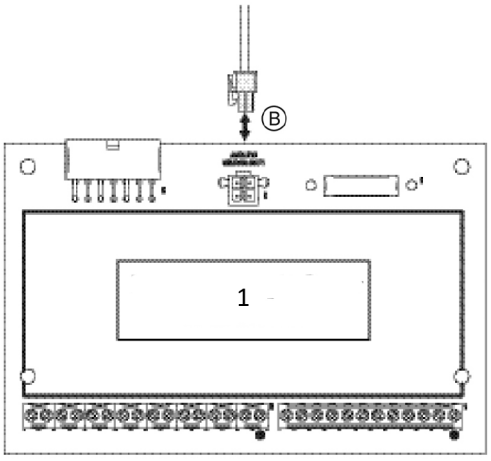
1. "Y" Harness with GREEN Color Tubing
2. Honeywell L7148 Electronic Aquastat
3. Boiler Wire Harness

NOTE: Burner will not operate and RB-24SE red LED will blink if wrong "Y" harness is used.

3.1.5 Option 5

RB-24SE-L Connector with GRAY or ORANGE Color Tubing for Control Panel Connection.

1. Remove jumper plug from plug-in connector on control panel.
2. Plug connector of wiring harness into plug-in Connector on control panel.



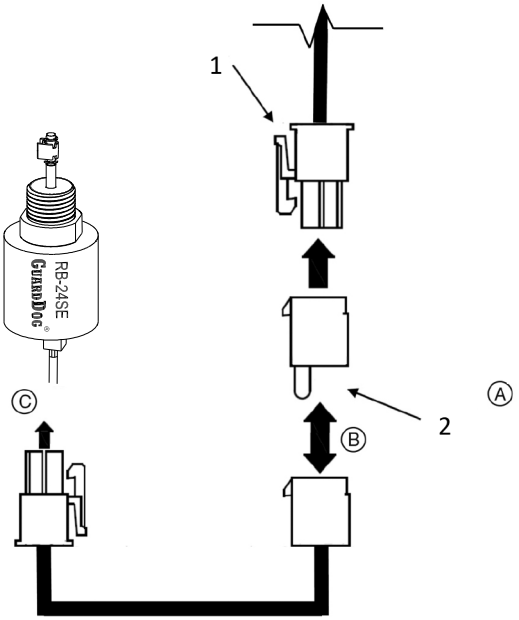
1. Lochinvar Knight Boiler Control Panel

3.1.6 Option 6

RB-24SE-B Connector with PURPLE Color Tubing for Harness Plug Connection.

1. Remove jumper plug from plug-in connector on control panel.
2. Plug connector of wiring harness into plug-in Connector on harness plug connection.

NOTE: For Burnham Alpine Boiler



1. Wiring harness supplied by boiler manufacturer
2. Remove jumper

3.2 STEP 2 - Determine the Location of the Low Water Cut-Off

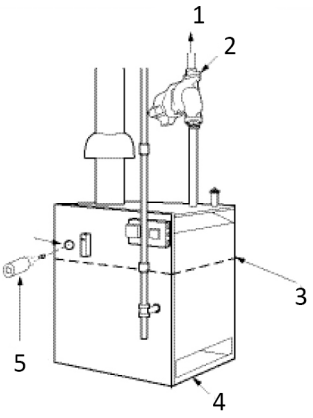
Determine where to install the probe control based on the following requirements:

1. **If tappings are provided** on the boiler, the probe control must be installed in a tapping above the minimum safe water level, as specified by the boiler manufacturer. If no specified minimum safe water level is designated, contact the manufacturer.
2. **If no tapping is provided** on the boiler, the probe control can be installed in a header or riser pipe above the boiler. Refer to the Typical Installation Diagrams below.

NOTICE:

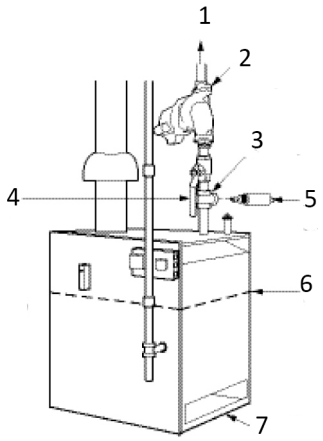
Make sure RB-24SE is located close enough (no more than 4 ft.) to burner control so the harness can be connected.

TYPICAL INSTALLATIONS



1. To System
2. Circulating Pump
3. Minimum Safe Water level (as determined by the boiler manufacturer)
4. Hot Water Boiler
5. Model RB-24SE Low Water Cut-off

Figure 5: On the Boiler (recommended)



1. To System
2. Circulating Pump
3. ¾" (20mm) NPT Pipe Tee
4. Optional Isolation Valve (Must be installed above tee)
5. Model RB-24E Low Water Cut-ott
6. Minimum Safe Water Level (as determined by the boiler manufacturer)
7. Hot Water Boiler

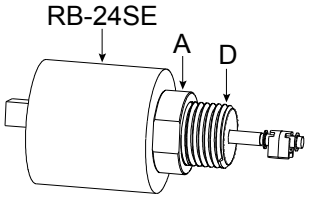
Figure 6: In a Pipe Tee Above the Boiler

3.3 STEP 3 - Installing the Low Water Cut-Off

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

WARNING:

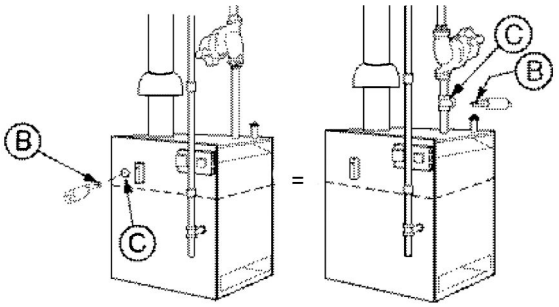
Do not use PTFE tape. Only use pipe sealant. Failure to follow these instructions will cause the probe not to function as intended and could cause property damage, personal injury or death.



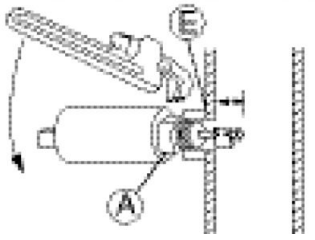
2. Insert the probe part (B) of the low water cut-off into the ¾ in (20 mm) NPT tapping (C) on the boiler

   OR into a ¾ in (20 mm) NPT pipe or reducing tee (D) above the boiler. Do not cross-thread the low water cut-off.

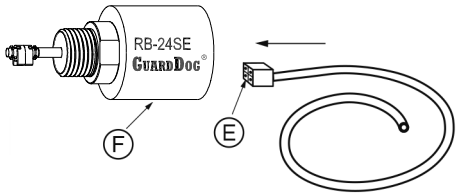
   Fully **hand tighten** the low water cut-off (approximately four revolutions) to approximately 6 lbf·ft (8 Nm).



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).

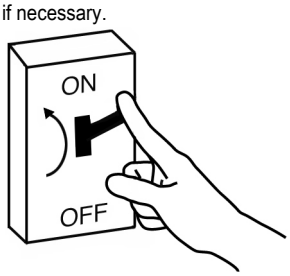


4. Install the plug end of the cable (E) into the low water cut-off (F).

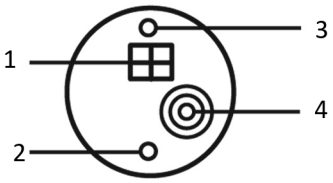


4 Testing

1. **Before filling the system**, 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 that the burner **will not** operate without water in the system, the low water cut-off´s red LED should be illuminated. **NOTE**: The burner will come on briefly (1 second or less) and then shut off to verify proper operation.
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.



5.



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

Testing Control Using "The Button"

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

1. Press and hold "test button" while burner is running.
2. The burning 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 in contact with the probe.

5 Maintenance

- **Test the low water cut-off annually or more frequently.**
- **Remove and inspect the self-cleaning probe every 5 years.**
- **Replace the low water cut-off every 15 years.**

NOTICE:

Clean probe by wiping with non-abrasive cloth and rinsing with clean water. DO NOT use sharp instruments to remove any accumulations of rust or scale.

CAUTION:

Replace probe if:

- PFA insulator is cracked or worn.
- Probe is loose. Failure to follow this caution could cause property damage, personal injury or death.

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 manufacturers 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 is above the level of the probe.
- Make sure probe is installed in a location where an air pocket cannot develop.
- Check boiler wiring connections.

Boiler does not turn ON and RB-24SE red LED blinking

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

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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MM-277_L_2023-05_IOM_Model RB-24SE-S Model RB-24SE-A Model RB-24SE-L Model RB-24SE-B Conductance Type Low Water Cut-Off