



BRADFORD WHITE[®]
W A T E R H E A T E R S

EcoStor2™ Solar
Gas Water Heaters



SERVICE
MANUAL
SUPPLEMENT

Troubleshooting Guide
and Instructions for Service

(To be performed ONLY by
qualified service providers)

**Models Covered
by This Manual:**

SDW2504T*F(BN,SX)
SDW265T*F(BN,SX)
SDW275S*(BN,SX)
SDW2TW50T*F(BN,SX)
SDW2TW65T*F(BN,SX)
SDW2TW75T*(BN,SX)
(* Denotes Warranty Years)

SDW275S6BN shown above

The Bradford White EcoStor2™ Solar Gas Water Heaters

Table of Contents

	<u>Page</u>	<u>Service Procedure</u>
How to use this manual	3	---
Introduction	4	---
Thermistor Wiring	5	---
Thermistor Wiring Test Procedure	6	ST-I
Gas Control Temperature Sensor	7	---
Temperature Sensor and Harness Testing	8	ST-II
Temperature Sensor Measurement	9	ST-III
Solar Thermal Troubleshooting	10	---
Solar Thermal Parts List (Atmospheric)	11	---
Solar Thermal Parts List (Ultra Low NOx)	12	---
Solar Thermal Parts List (TTW)	13	---
Notes	14	---

EcoStor2™ Solar

How to use this Manual

It is intended for this manual to be used by qualified service personnel for the primary purpose of troubleshooting and repair of the Bradford White EcoStor2™ Solar with Gas Backup Water Heaters. Understanding the solar thermal sequence of operation section of this manual will contribute greatly to troubleshooting the water heater.

This manual serves as a water heater supplement to service and troubleshoot specifically the solar features of the water heater. Please refer to the table below to determine which base model service manual is appropriate for the non-solar features of the water heater.

Solar Model	Base Model	Service Manual
SDW4U5036FRN	U45036FRN	238-47132-00
SDW2504T6F(BN,SX)	M2XR504T6F(BN,SX)	238-44923-00
SDW2TW50T6F(BN,SX)	M2TW50T6F(BN,SX)	238-46238-00
SDW2U65T6FRN	U2XR65T6FRN	238-47132-00
SDW265T6F(BN,SX)	M2XR65T6F(BN,SX)	238-44943-00
SDW2TW65T6F(BN,SX)	M2TW65T6F(BN,SX)	238-46238-00
SDW275S6(BN,SX)	M2XR75S6(BN,SX)	238-46647-00
SDW2TW75T6(BN,SX)	M2TW75T6(BN,SX)	238-47150-00

The Bradford White EcoStor2 Solar Water Heater System

The new Bradford White Solar with Gas Backup water heaters are designed to provide reliable performance with enhanced standard features. New design features include an internal double-wall, atmospherically vented heat exchanger for safe and effective heat transfer, a gas control temperature sensor in the upper portion of the water heater to maximize solar efficiency and thermistor wires to allow seamless connection to a solar controller.

Double-wall Heat Exchanger—An atmospherically vented double-wall heat exchanger allows an internal heat exchanger to safely use a propylene glycol/water mix commonly applied in solar thermal heating systems. In the unlikely event that either wall of the heat exchanger leaks, the fluid will follow a vent path to exit the water heater through the heat exchanger fitting. This fluid will run down the outside of the water heater to indicate a leak to the home owner.

Having an immersed heat exchanger enhances heat transfer, being able to heat directly to the potable water.

Gas Control Temperature Sensor—A temperature sensor located in the upper portion of the water heater allows the solar thermal system to maximize the solar collector efficiency. This is due to the potential low temperatures observed in the tank bottom where the immersed heat exchanger is located. The gas backup will only heat the water when the solar thermal system is not producing enough heat to keep the gas control temperature sensor at the temperature level indicated on the gas control, thereby requiring the backup heat.

Thermistor Wiring—Thermistor wiring is provided to allow thermistor connection to the solar thermal control without running wires outside the water heater. Thermistors are not included due to multiple thermistor possibilities with the various solar thermal controls that may be installed on-site. There are 2 pair of wires provided; one in the lower portion of the tank to allow the temperature difference to be read between the water heater and the solar collector, and a second in the upper portion of the water heater to allow a solar control to read the expected delivered temperature.

This service manual supplement is designed to facilitate problem diagnosis and enhance service efficiency. To further promote quicker service times, the gas valve can be removed and replaced without draining the water heater. A special tool is required and will be provided with each gas valve kit shipped from our Service Parts department.

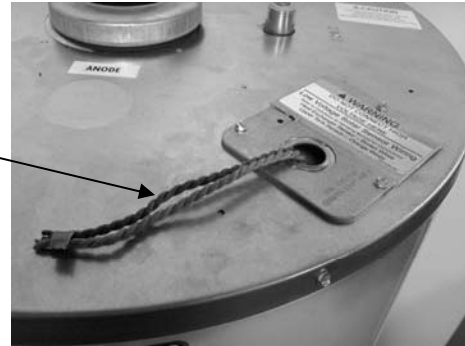
Please read the service manual supplement completely before attempting service on this new series of solar thermal models.

This section is intended to provide a better understanding of the solar thermal design application and how it varies from the base model listed on page 3.

Solar Thermistor Wiring

The solar with gas backup water heater comes provided with two sets of twisted thermistor wiring. They are color coded for ease of use.

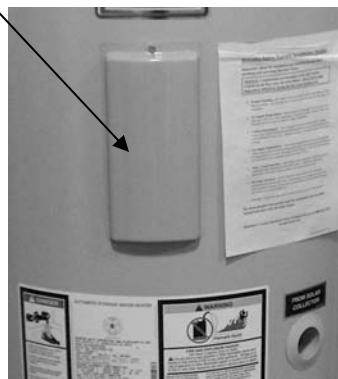
Brown and Orange twisted thermistor wires



The solar with gas backup models come with an internal double-wall heat exchanger. Brown thermistor wiring is provided under an access panel between the solar heat exchanger connections. A thermistor (**not included**) wired to this pair can be connected to the solar control to determine the temperature differential between the tank and the solar collector. The control can then activate a circulator to heat the tank. To assist in connecting the thermistor, the end has a supplied wire nut. A bracket and plate is supplied to mechanically press the thermistor against the tank wall.

A twisted orange wire set is provided under the upper access panel. Some solar controllers have locations for a second tank temperature input. This is not used for controlling the solar thermal system, but helps the end user understand what an anticipated delivered temperature may be.

**Upper Access Location
(Orange Twisted Pair)**



**Lower Access Location
(Brown Twisted Pair)**



Thermistor Wire Testing

- Step 1. Disconnect and unplug the solar control.
- Step 2. Disconnect the thermistor twisted pair from the control or control sensor wiring.
- Step 3. Connect a multimeter set to read ohms to the twisted wire stripped ends. Determine the resistance value of the attached thermistor. NOTE: The thermistor is field supplied and various thermistors have different ohm values for different temperatures. Refer to the temperature specification sheet for the thermistor installed on the water heater to determine if the resistance value is correct.

The image to the side shows a resistance value for a thermistor at ambient temperature connected under the lower access cover (brown twisted pair). The same procedure can be followed to determine if the upper thermistor value is correct.



- Step 4. If the multimeter indicates a resistance that does not match the actual temperature of the thermistor, replace the thermistor. Reconnect the wiring, verify that the new thermistor does match, and reconnect to the solar control. Turn on the power to the solar control.

If the multimeter indicates a short or open, disconnect the thermistor from the connection made under the access cover. Measure the thermistor ohm value directly. If the multimeter indicates an open, replace the thermistor. If the multimeter indicates an appropriate ohm value, determine which wire is open by measuring directly from one end of the wire to the other, or if short; verify by measuring both wire ends from the same location. If the wiring cannot be fixed, the wiring for the thermistor may have to be ran on the outside of the water heater. Replace the wiring, and reconnect it to the solar control. Turn on the power to the solar control.

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Gas Control Temperature Sensor

The solar with gas backup water heater senses temperature from the upper portion of the tank. This allows the solar thermal heating system to maximize the ability to heat the water inside the tank. Only when the upper portion of the water heater tank reaches the water temperature to turn on the gas control, does the backup heat begin. This is achieved by placing a thermistor sensor inside a thermal well and connecting the sensor by means of a wire harness to the gas control. The thermistor well, sensor and wire harness connection is located under the top access cover.

Thermistor sensor in well



Thermistor sensor outside well



Wire harness connection to thermistor



Wire harness connected to the gas control



Wire harness plug in location to the gas control

NOTE: Depending on the solar with gas backup model, the gas control may vary. Refer to the base model service manual as indicated on page 3.

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ST-II Temperature Sensor and Harness Testing

If the control has gone into lockout due to excessive tank temperature (four flash, 3 second pause) reset the control by rotating the gas control knob to "OFF" position. Then follow the lighting instructions and return the gas control knob to the desired setpoint.

Observe the water heater operation. If the gas control continues to lockout due to excessive tank temperature, proceed to thermal sensor and harness testing to determine the cause.

THERMAL SENSOR AND HARNESS TESTING
Position the gas control knob to the "OFF" position and disconnect the thermal sensor harness from the gas control.

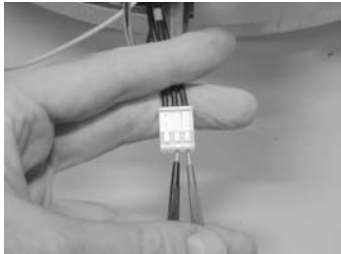
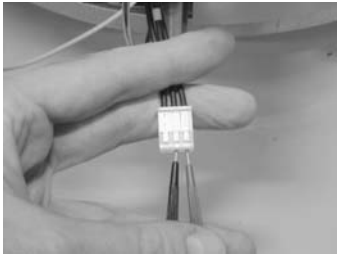
Using a multi-meter set to the Ohms setting, determine the resistance of thermal sensor .
(see caution photos at right)

Once the thermal sensor resistance values are known, the water temperature must also be known to determine if the resistance values are correct. See page 9 to obtain water temperature.

Are thermal sensor and harness resistance values correct?

Y
Replace gas control

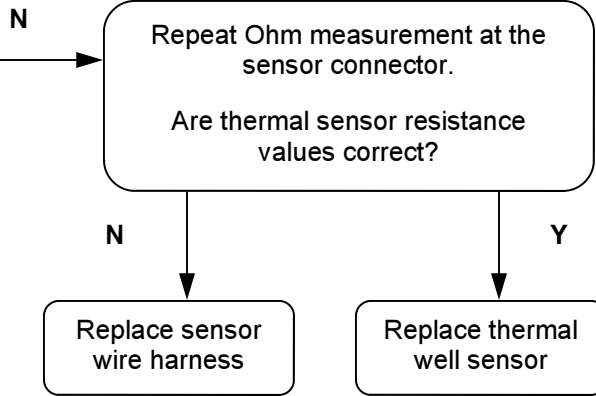
Disconnect thermal well wire harness



CAUTION
DO NOT use standard multimeter probes for this test. Doing so will damage connector. Use special pin type electronic probes or small diameter wire pins inserted into connector.

Using a multi-meter set to the ohms setting, insert one meter probe (see caution) into center wire position of thermal well connector, insert the second probe (see caution) into either of the outside wire positions (see photo on left).

Alternate the probe on the outside position to the opposite outside wire position (see photo on right).



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ST-III Temperature Sensor Measurement

⚠ WARNING

Stored water may be **HOT** when performing the following steps in this procedure. Take necessary precaution to prevent personal injury.

DETERMINE THE WATER TEMPERATURE INSIDE THE STORAGE TANK

NOTICE

It is important to understand once the resistance for the temperature sensor is determined from the previous page, water flow through the water heater should not occur. Prior to drawing water from drain valve, turn off the cold water supply to the water heater. This will prevent cold water flow into the tank affecting the resistance value of the temperature sensor.

- Step 1. Set the Gas Control knob to the "OFF" position.
- Step 2. Turn off inlet water supply to water heater.
- Step 3. Draw approximately 4 gallons of water from drain valve into a container, or suitable drain, and discard. Draw an additional gallon and immediately measure water temperature using an accurate thermometer. It may be necessary to open a hot water faucet to allow water heater to drain.
- Step 4. Using the chart below, determine correct resistance value for the water temperature from step 3.

Example: If the temperature of the water is 84°F, then the resistance through the sensor would be 8449 (see shaded area). NOTE: Sensor resistance increases as the temperature decreases.

In Degrees F										
°F	0	1	2	3	4	5	6	7	8	9
40	26109	25400	24712	24045	23399	22771	22163	21573	21000	20445
50	19906	19383	18876	18383	17905	17440	16990	16553	16128	15715
60	15314	14925	14548	14180	13823	13477	13140	12812	12494	12185
70	11884	11592	11308	11032	10763	10502	10248	10000	9760	9526
80	9299	9078	8862	8653	8449	8250	8057	7869	7685	7507
90	7333	7165	7000	6839	6683	6531	6383	6238	6098	5961
100	5827	5697	5570	5446	5326	5208	5094	4982	4873	4767
110	4663	4562	4464	4368	4274	4183	4094	4006	3922	3839
120	3758	3679	3602	3527	3453	3382	3312	3244	3177	3112
130	3048	2986	2925	2866	2808	2752	2697	2643	2590	2538
140	2488	2439	2391	2344	2298	2253	2209	2166	2124	2083
150	2043	2004	1966	1928	1891	1856	1820	1786	1753	1720
160	1688	1656	1625	1595	1566	1537	1509	1481	1454	1427
170	1402	1376	1351	1327	1303	1280	1257	1235	1213	1191
180	1170	1150	1129	1110	1090	1071	1053	1035	1017	999
190	982	965	949	933	917	901	886	871	857	842
200	828	814	801	788	775	762	749	737	725	713

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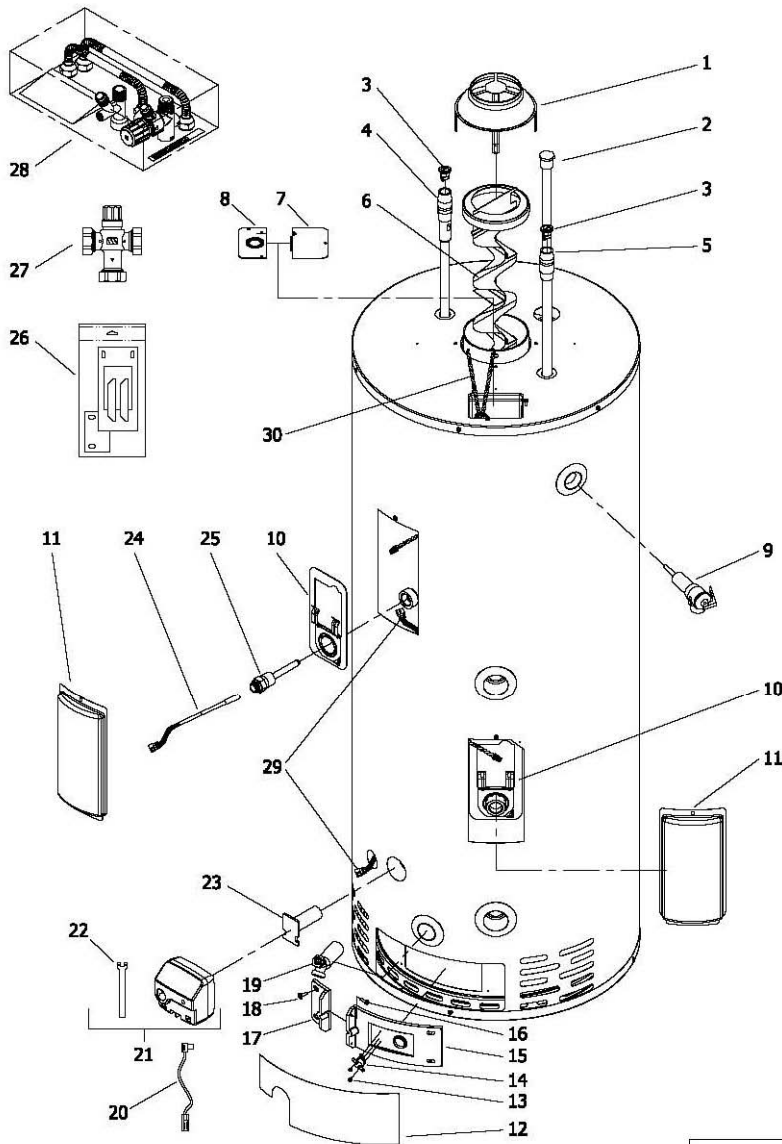
Solar Thermal Troubleshooting Chart

This troubleshooting chart serves as a water heater supplement to troubleshoot specifically the solar features of the water heater. Please refer to page 3 to determine which base model service manual is appropriate for the non-solar troubleshooting chart for the water heater.

<u>SYMPTOM</u>	<u>PROBABLE CAUSE</u>	<u>CORRECTIVE ACTION</u>	<u>SERVICE PROCEDURE</u>
Not enough hot water	<ol style="list-style-type: none">1. Gas control temperature sensor out of spec.2. Improperly sized solar collector(s).3. Gas backup not functioning.4. Solar thermal system not functioning.	<ol style="list-style-type: none">1. Verify accurate temperature is sensed.2. Review calculations to determine appropriate collector array.3. Review service manual for base model.4. Review solar thermal system for functionality.	<ol style="list-style-type: none">1. See service procedure ST-II.

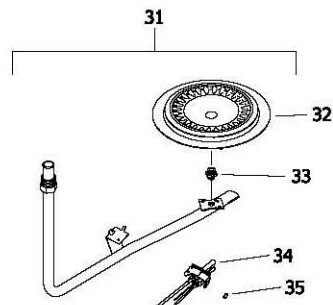
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Solar Thermal Parts List (Atmospheric)



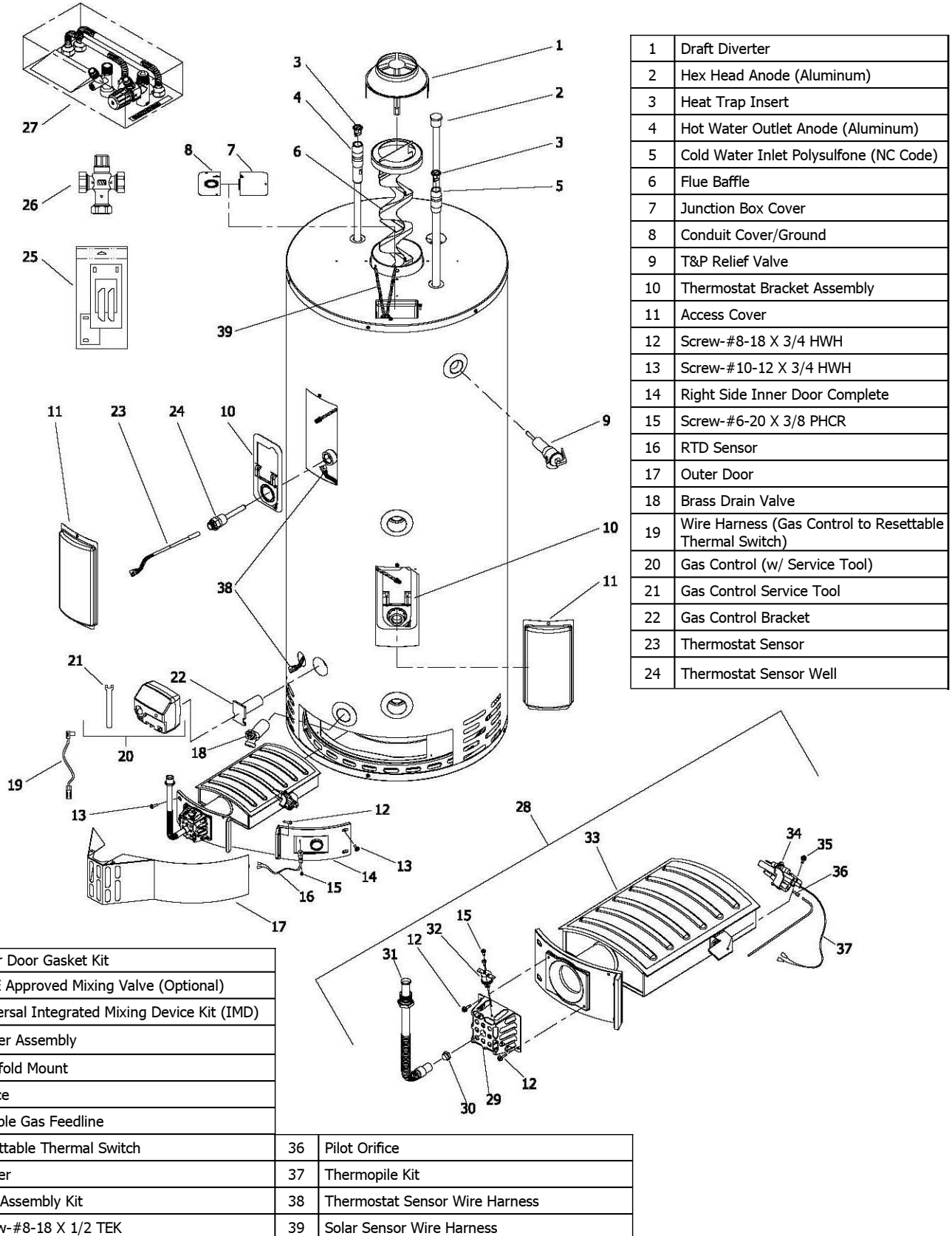
1	Draft Hood
2	Hex Head Anode Aluminum
3	Heat Trap Insert
4	Hot Water Outlet Anode Aluminum
5	Cold Water Inlet Polysulfone (NC Code)
6	Flue Baffle Complete
7	Junction Box Cover
8	Conduit Cover/Ground
9	T&P Relief Valve
10	Thermostat Bracket Assembly
11	Access Cover
12	Outer Door
13	Screw-#6-20 x 3/8 PHCR
14	Nat. Gas Resettable Thermal Switch
15	Nat. Gas Right Side Inner Door Complete
16	Screw-#8-18 x 3/4 HWH
17	Left Side Inner Door Complete
18	Screw-#10-12 x 3/4 HWH
19	Brass Drain Valve
20	Wire Harness (Gas Control to Resettable Thermal Switch)
21	Gas Control Natural Gas (w/ Service Tool)
22	Gas Control Service Tool
23	Control Bracket
24	Thermostat Sensor
25	Thermostat Sensor Well
26	Inner Door Gasket Kit
27	ASSE Approved Mixing Valve (Optional)
28	Universal Integrated Mixing Device Kit (IMD)

29	Thermostat Sensor Wire Harness
30	Solar Sensor Wire Harness
31	Burner Assembly Complete
32	Burner
33	Main Burner Orifice
34	Pilot Assembly
35	Pilot Orifice



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Solar Thermal Parts List (Ultra Low NOx)

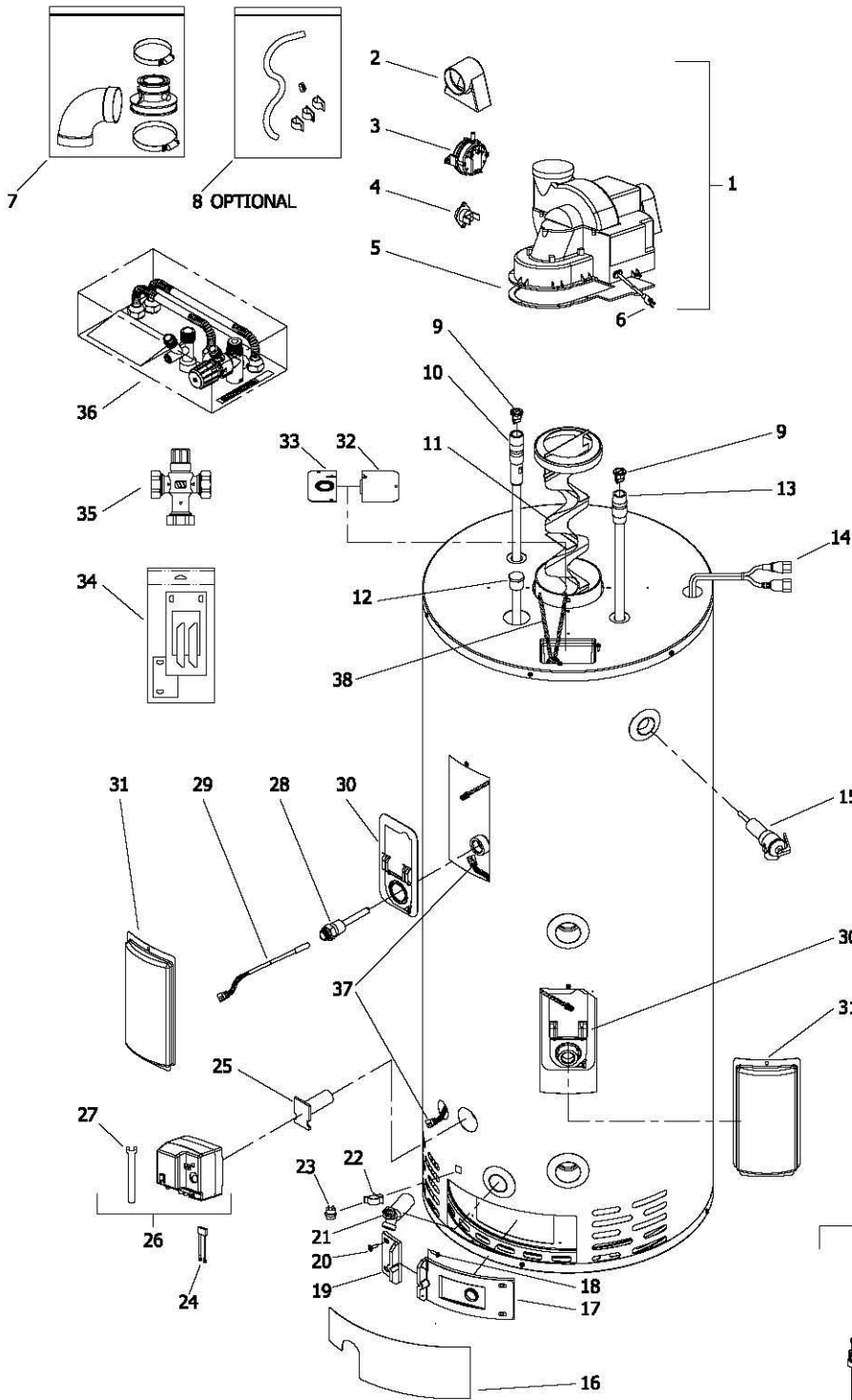


1	Draft Diverter
2	Hex Head Anode (Aluminum)
3	Heat Trap Insert
4	Hot Water Outlet Anode (Aluminum)
5	Cold Water Inlet Polysulfone (NC Code)
6	Flue Baffle
7	Junction Box Cover
8	Conduit Cover/Ground
9	T&P Relief Valve
10	Thermostat Bracket Assembly
11	Access Cover
12	Screw-#8-18 X 3/4 HWH
13	Screw-#10-12 X 3/4 HWH
14	Right Side Inner Door Complete
15	Screw-#6-20 X 3/8 PHCR
16	RTD Sensor
17	Outer Door
18	Brass Drain Valve
19	Wire Harness (Gas Control to Resettable Thermal Switch)
20	Gas Control (w/ Service Tool)
21	Gas Control Service Tool
22	Gas Control Bracket
23	Thermostat Sensor
24	Thermostat Sensor Well

25	Inner Door Gasket Kit
26	ASSE Approved Mixing Valve (Optional)
27	Universal Integrated Mixing Device Kit (IMD)
28	Burner Assembly
29	Manifold Mount
30	Orifice
31	Flexible Gas Feedline
32	Resettable Thermal Switch
33	Burner
34	Pilot Assembly Kit
35	Screw-#8-18 X 1/2 TEK
36	Pilot Orifice
37	Thermopile Kit
38	Thermostat Sensor Wire Harness
39	Solar Sensor Wire Harness

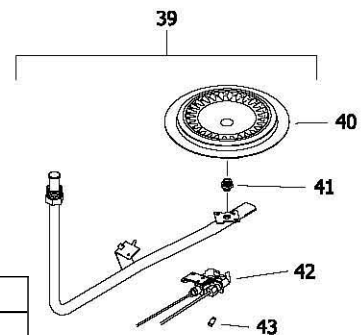
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Solar Thermal Parts List (TTW)



1	Blower Complete
2	Air Mixing Inlet
3	Pressure Switch
4	Blower Temperature Switch
5	Blower Gasket
6	Blower Power Cord
7	3" Exhaust Adaptor w/Vent Terminal
8	Condensate Hose Kit (Optional)
9	Heat Trap Insert
10	Hot Water Outlet Aluminum
11	Flue Baffle
12	Hex Head Anode Aluminum
13	Cold Water Inlet
14	Safety Circuit Wire Harness
15	T&P Relief Valve
16	Outer Door
17	Right Side Inner Door Complete
18	Screw-#8-18 x 3/4 HWH
19	Left Side Inner Door Complete
20	Screw-#10-12 x 3/4 HWH
21	Brass Drain Valve
22	Flammable Vapor Sensor Clip
23	Flammable Vapor Sensor
24	Flammable Vapor Sensor Harness/ Simulated Resistive Device
25	Control Bracket
26	Gas Valve Natural Gas
27	Gas Valve Service Tool
28	Temperature Sensor Well
29	Temperature Sensor
30	Solar Sensor Bracket Assembly
31	Access Cover
32	Cover Junction Box
33	Cover Conduit/Ground

34	Inner Door Gasket Kit	39	Burner Assembly Complete
35	ASSE Approved Mixing Valve (Optional)	40	Burner
36	Universal Integrated Mixing Device Kit (IMD)	41	Main Burner Orifice
37	Thermostat Sensor Wire Harness	42	Pilot Assembly
38	Solar Sensor Wire Harness	43	Pilot Orifice





BRADFORD WHITE®
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Ambler, PA

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