



**2004 TROUBLESHOOTING
AND
OPERATIONAL
REFERENCE
GUIDE**

MODELS

**QVM9 - Dual Purpose Water Heater
QVW8 - On Demand Water Heater**

INDEX

Page #	Contents
1	Introduction
2	Installation Issues – Poor Performance
3	Installation Issues – Poor Performance
4	Installation Issues – No DHW
5	Installation Issues – No DHW
6	Installation Issues – Abnormal Noise
7	Installation Issues – Abnormal Noise
8	Installation Issues – Abnormal Noise
9	Installation Issues – Trial Operation
10	SECTION 2 – Individual Fault codes QVM9
11	Index of QVM9 Individual Fault codes
12	Fault Code 01 – Overheating
13	Fault Code 02 – Low water level
14	Fault Code 03 – Ignition Failure
15	Fault Code 03 – Ignition Failure
16	Fault Code 03 – Ignition Failure
17	Fault Code 04 – Pseudo Flame
18	Fault Code 05 – Heating Sensor
19	Fault Code 06 – Heating Sensor
20	Fault Code 09 – Abnormal RPM
21	Fault Code 10 – Air Pressure
22	Fault Code 12 - Flame Failure
23	Fault Code 12 - Flame Failure
24	Fault Code 13 – Heating Flow Sensor
25	Fault Code 15 – MICOM failure
26	Fault Code 16 – Overheat
27	Fault Code 17 – DIP Switches
28	Faults – Pressure/Relief valve opens
29	Faults – No Domestic Hot water
30	Faults – No Heating water
31	Faults – No Power
32	Faults – Noisy
33	QVW8 On Demand Water Heaters
34	No Ignition – Gas Pressure etc
35	No Ignition – Gas Pressures etc
36	No Ignition - No Airflow
37	No Ignition - No Airflow / No DHW Signal
38	No Ignition - No DHW Signal / No Spark
39	No Ignition - No Spark
40	QVW8 - Mechanical Failures
41	QVW8 - Poor Unit Performance

Introduction

This manual has two functions.

Firstly the manual will provide detailed information on the specific fault codes provided by the self diagnostic functions, the cause of these faults and the required steps needed to correct these faults. For your convenience these are arranged in several sections by unit type.

The other function this manual serves is to provide information on fine tuning the unit to specific installation parameters, where the factory setting for the unit needs to be altered to serve the specific installation.

Section 1 will cover the specific installation issues as they pertain to almost all the units.

Section 2 will cover both the individual fault codes for the QVM9 plus

The QVW 8 Water Heater will only diagnose that a fault has occurred. The unit will not provide information on the location of the fault. However as this unit is of simple design, very few areas exist that can create problems. These are explained fully at the end of the manual

As a rule faults in any unit, can be traced to these four areas :

1. Low water level, or lack of water leads to overheating situations
2. No Fuel available, either NG or LP
3. No Ignition source, either no spark or no flame detection
4. No Air for combustion, without air you cannot obtain combustion



Installation Issues

Poor Unit Performance

Poor unit performance is often caused by an inadequate gas supply. These units **MUST** have a minimum of a 3/4" gas line connection, EVEN though the gas valve connection is 1/2" on some units.

Refer to the following table for selecting the correct gas pipe size for your unit. Simply find the length of gas pipe and the input rating of your unit, and correlate to the pipe size required.

Example : The unit gas pipe needs to run approximately 30 feet from the existing gas main. Our Unit has an input requirement of 135,000 Btu/h.

Using these two figures we can see that 3/4" gas pipe is the correct size.

Pipe Size	Length Of Pipe In Feet							
	10 ft.	20 ft.	30 ft.	40 ft.	50 ft.	60 ft.	70 ft.	80 ft.
3/8"	74k	50k	41k	35k	31k	28k	26k	24k
1/2"	135k	94k	75k	65k	57k	51k	47k	44k
3/4"	285k	195k	156k	133k	118k	108k	98k	92k
1"	533k	359k	292k	251k	220k	200k	184k	174k
1-1/4"	1076k	748k	605k	513k	451k	410k	379k	359k
1-1/2"	1640k	1128k	912k	779k	687k	625k	574k	543k

EVEN IF THE STANDARD TABLE ABOVE ALLOWS THE USE OF 1/2" GAS PIPE YOU MUST USE A MINIMUM OF 3/4"

Cont

When the pipe size is correct, the next method of determining if the unit is firing correctly is to time the gas meter to ensure that the unit is firing correctly.

Operate the unit at maximum load, and ensure that the unit is the only gas appliance operating at the time. Then, using a watch check the time taken for one revolution of the one cubic foot dial, and using the table below check the quantity of gas consumed. Use this as a balance against the rated heat input.

Time/Sec 1 Cubic Dial	Input Rate Natural Gas
18-Sec	200,000
20-Sec	180,000
22-Sec	163,600
24-Sec	150,000
26-Sec	138,500
28-Sec	128,500
30-Sec	120,000
32-Sec	112,500
34-Sec	105,900
36-Sec	100,000
38-Sec	94,700
40-Sec	90,000
42-Sec	85,700
44-Sec	81,800
46-Sec	78,200
48-Sec	75,000
50-Sec	72,000
52-Sec	69,200
54-Sec	66,700
56-Sec	64,300
58-Sec	62,000
1-Min	60,000

None or Insufficient Domestic Hot Water

First item is to check the quantity of hot water used and the temperature split against the specifications published by Quietside for the quantity of hot water and the delta T produced by the specific model of Dual Purpose Water Heater

To clarify in the spec sheets the production is provided in GPM against a delta T of the domestic hot water.

This means that with a Delta T of 72 DegF if the incoming water temperature is eg. 55 DegF the leaving water temperature would be:

$$55 + 72 = 127 \text{ DegF}$$

At a 72 DegF delta T a QVM9 125W1-NG will produce approximately 2.8 GPM of DHW. Conversely with a desired water temperature of 115 DegF and an incoming water temperature of 55 DegF the same unit will produce 4.0 GPM.

This basic rule applies ; The lower the delta T, the higher the GPM, and vice versa.

THE MIXING VALVE USED ON THE SYSTEM WILL INCREASE THE GPM PROVIDED AT A FAUCET, WHILE REDUCING THE TEMPERATURE TO THAT SELECTED ON THE MIXING VALVE.

Therefore you must measure the domestic water temperature at the unit, not the faucet.

IF YOU USE A LARGER GPM THAN THE UNIT IS RATED FOR, THE DELIVERED WATER TEMPERATURE WILL BE REDUCED

USING AN INSTANTANEOUS OR ON DEMAND WATER HEATER REQUIRES DIFFERENT HOT WATER HABITS THAN USING A STORAGE TYPE WATER HEATER. IF YOU STAY WITHIN THE RATED GPM THESE UNITS WILL DELIVER ENDLESS HOT WATER

DOMESTIC WATER PRESSURE IS OF NO IMPORTANCE IN THIS ISSUE, THE ONLY FACTOR ON DELIVERED TEMPERATURE IS DHW VOLUME

For further information on this subject and options on how to increase DHW quantity please refer to the Quietside 104 Application manual

None or Insufficient Domestic Hot Water – QVM9 Units

If the flow rate is acceptable, next check the operation of the 3 way valve, which switches the QVM9 units from space heating to domestic hot water heating when the domestic water is called for.

The 3 way valve operates on 115V power supply from the microprocessor

The easiest way to check the operation of the valve is to :

- a) Check the voltage supplied to the valve

The voltage is applied across the black and blue wires to supply water for space heating, and across the black and red wires to switch to domestic hot water production. It takes approximately 10 seconds to fully switch the valve.

- b) Check the supply pipe temperature to the space heating loop. In domestic hot water production, the valve is closed and no water should flow into the space heating loop. Therefore the pipe temperature should rapidly reduce towards the room temperature.

If the temperature does not reduce by a large amount it may be that the valve is not sealing correctly and allowing water to flow in both modes, which will not provide the required heat input into the domestic hot water system, lowering the delivered water temperature to a shower or faucet.

The valve is not serviceable, if it defective it must be replaced.

Abnormal Noise during Combustion

If the unit makes a sound akin to a wounded elephant or vibrates excessively during combustion, check both the inlet and the secondary gas pressure being delivered to the burners/nozzle.

The Minimum required static Natural Gas Inlet pressure is 5.80" WC

The Dip switches on the microprocessor can allow you to control the combustion of the unit. To force the QVM9 and QVW8 units into maximum combustion, switch dip switch #2 to the ON position.

For operation at minimum combustion, turn dip switch #2 to the OFF position and then switch dip switch #3 to the ON position.

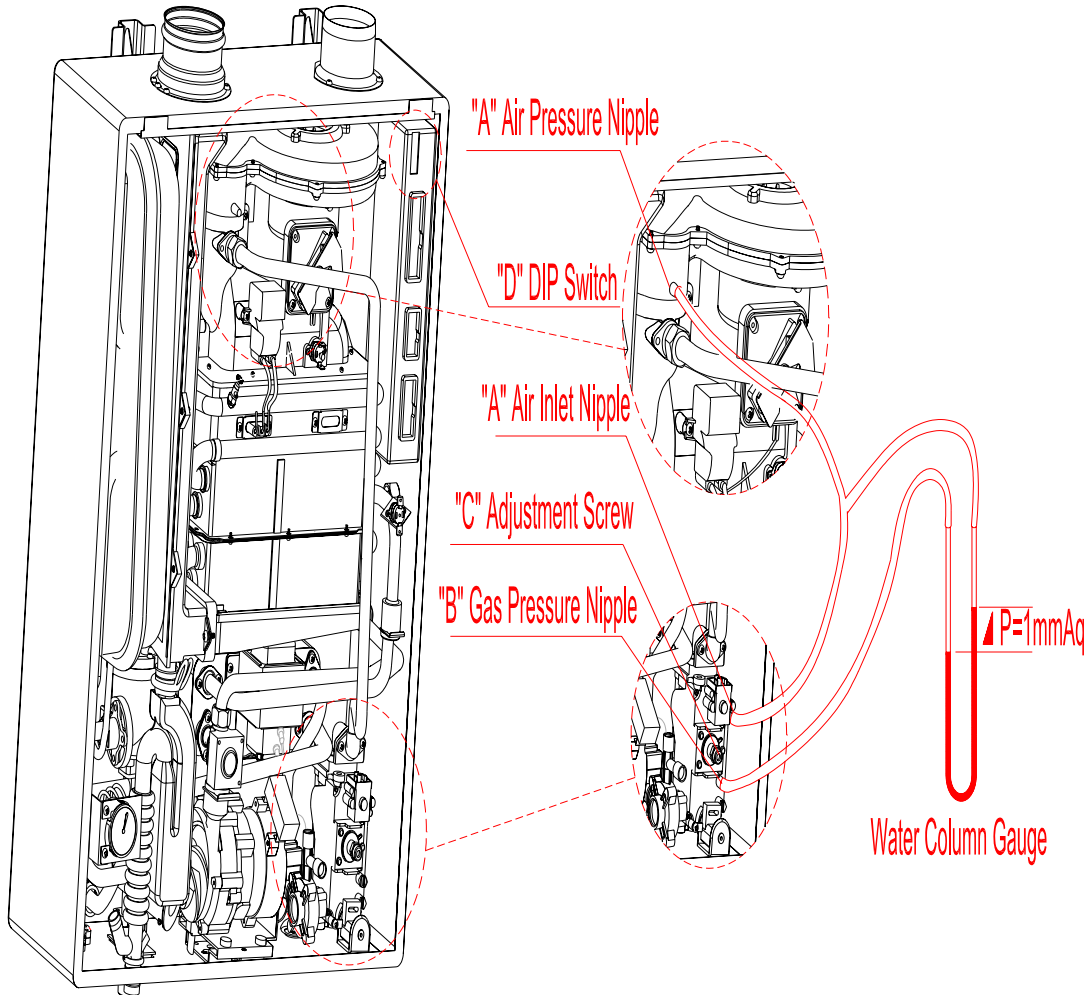
Measure the secondary or combustion gas pressure using a manometer.

On the QVW8 units, there is a brass Phillips head screw located approximately half way up the burner stem. Remove this and use a flexible 3/8" ID hose to connect to the 1/4" connection on a manometer.

QVW8

MODEL	FUEL TYPE	Gas Modulating head Pressure – Inch W.C. (mmH2O)				Applied Nozzle Inch (mm)
		Max. Load		Min. Load		
		Front Cover ON	Front Cover OFF	Front Cover ON	Front Cover OFF	
QVW8-100W1-NG	Natural Gas	3.78" (96)	3.94" (100)	0.55" (14)	0.47" (12)	φ0.058" (1.48)
100W1-LP	L.P. Gas	5.51" (140)	5.35" (136)	0.71" (18)	0.63" (16)	φ0.043" (1.08)
QVW8-120W1-NG	Natural Gas	4.09" (104)	4.25" (108)	0.47" (12)	0.39" (10)	φ0.064" (1.62)
120W1-LP	L.P. Gas	5.75" (146)	5.91" (150)	0.63" (16)	0.55" (14)	φ0.046" (1.16)
QVW8-175W1-NG	Natural Gas	4.18" (106)	4.73" (120)	0.63" (16)	0.79" (20)	φ0.062" (1.58)
175W1-LP	L.P. Gas	6.38" (162)	6.78" (172)	0.87" (22)	0.95" (24)	φ0.043" (1.58)

QVM9



"A" Air Inlet Nipple is marked – **Air In** on the Gas Valve, connect a tee to both the yellow hose & the manometer and a 3/8" ID hose to the Gas Valve

"B" Gas Pressure Nipple is marked – **Out** on the Gas Valve – it is the secondary gas pressure to the unit, use a 3/8" ID hose on the connection

"C" Adjustment Screw is found behind the Brass screw cover in the center of the valve – it requires a Phillips head screwdriver – Turn clockwise to increase the secondary gas pressure anti clockwise to decrease the secondary gas pressure Adjust the Gas pressure until the following criteria is met for both forced Maximum and Minimum combustion operation

$$P_{\text{gas}} - P_{\text{air}} = 1/16" \text{ WC } (\Delta P)$$

If the noise still persists check the flue design.

The noise can be caused by the flue length being longer than allowed (31 feet equivalent length) or by an extremely short flue length.

A flue longer than the allowed length, will cause the quantity of intake air to be greatly reduced, leading to an imbalance of the incoming gas and combustion air quantities (too much gas) causing incomplete combustion and the noise.

Extremely short, less than 6 feet equivalent vent lengths, i.e. an elbow out of the top of the unit virtually straight into the termination, will allow an excess of combustion air into the unit leading to an imbalance of the incoming gas and combustion air quantities (too much air) causing incomplete combustion and the noise.

The length of the air intake is also very important when using the SCF-8 flue kit on the QVW8 units.

If the total flue run is very short, ensure that you cut the flexible intake hose down to the MINIMUM LENGTH that is required to run from the intake connection on the flue termination to the connection on the unit.

Vent termination location is also very important.

Check the location of the vent termination outside the building; ensure that it is not installed in a location exposed to prevailing wind gusts exceeding 30 MPH

Wind gusts above that speed can cause the flue gas to be blown back into the unit, causing incomplete combustion and the loud noise or vibration to occur

After checking all of the above, if the noise still persists contact the factory for additional troubleshooting.

Trial Operation of the QVM9 Units

The QVM9 units have a dip switch, #1 located on the unit microprocessor, which can be used to disable the low water level sensor and other fault codes during the initial filling of the unit.

When the unit is in the trial operation mode, the red power LED on the microprocessor will blink on and off. If the switch is not turned back to the original position the TRIAL MODE WILL LAST FOR A PERIOD OF 2 HOURS

In the trial mode the pump will operate in the unit, however the unit will not fire. The operation of the pump is designed to allow the auto fill valve to open and the heating system to fill.

Quietside recommends that a hose bib or other quick fill device be added to the heating system to provide the initial filling of the heating system. Remember that the Pressure Relief valve fitted to the QVM9 will open if the system pressure exceeds 49 psig.

ALWAYS use the Trial Mode to provide the final fill and check prior to the unit start up.

If the unit is in the trial mode BUT it only operates for a short period of time and then displays a 02 (low water level) fault on the FR5, then

The manual air bleed switch must be opened to remove the air contained in the heat exchangers, relieving the inbuilt pressure and allowing the unit to be filled.

Remember that the manual air vent will bleed both water and air into the condensate drain siphon. **Also ensure that the Automatic Air Vent bleed screw is loose to allow any collected air to be vented out of the system.**



Section 2

INDIVIDUAL FAULT CODES

This section will deal with the individual fault codes displayed by the units.

The first part of this section will focus on the QVM9 units

These units will display 14 Individual Fault Codes on the LED display of the FR5 Controller. Each individual Fault Code is covered in depth with the reason for the fault, the possible causes and solutions

The QVW8 "On Demand" water heater will only display a general fault code on the unit water temperature controller. The possible reasons, together with solutions are discussed in this section

II. Individual Fault Codes QVM9 units

Failure code #01, Overheat

Failure code #02, Low Water Level

Failure code #03, Ignition Failure

Failure code #04, Pseudo Flame

Failure code #05, Heating Temp Sensor disconnected

Failure code #06, Short circuit - Heating Temp Sensor

Failure code #09, Abnormal RPM – Fan Motor

Failure code #10, Air Pressure Failure

Failure code #12, Flame Failure during Combustion

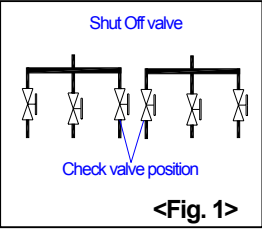

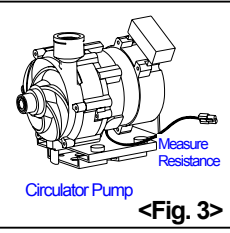
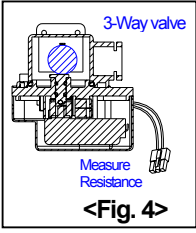
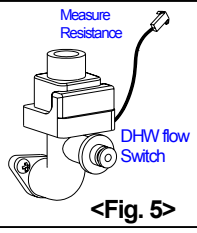
Failure code #13, Heating Flow Switch Failure

Failure code #15, MICRO (PCB) Failure

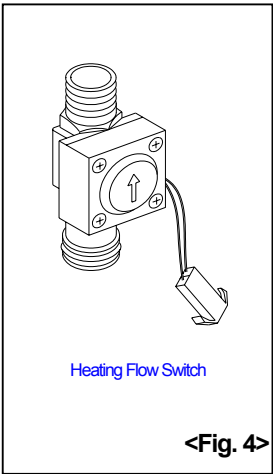
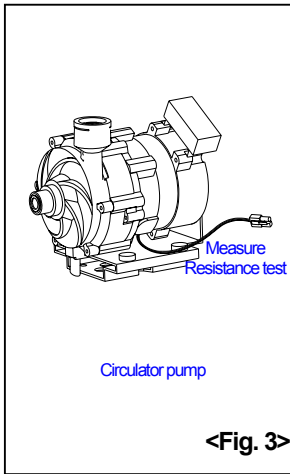
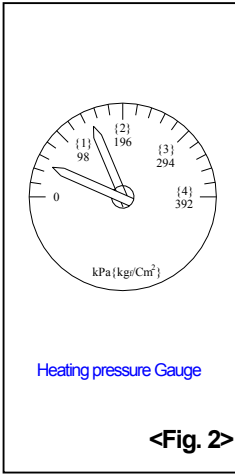
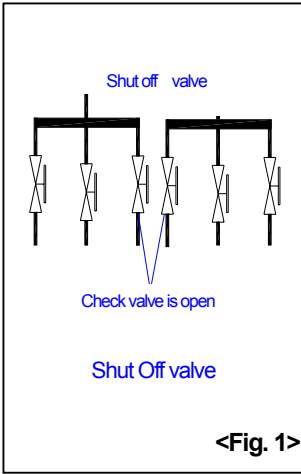
Failure code #16, Mechanical Overheat

Failure code #17, DIP Switch Setting Error

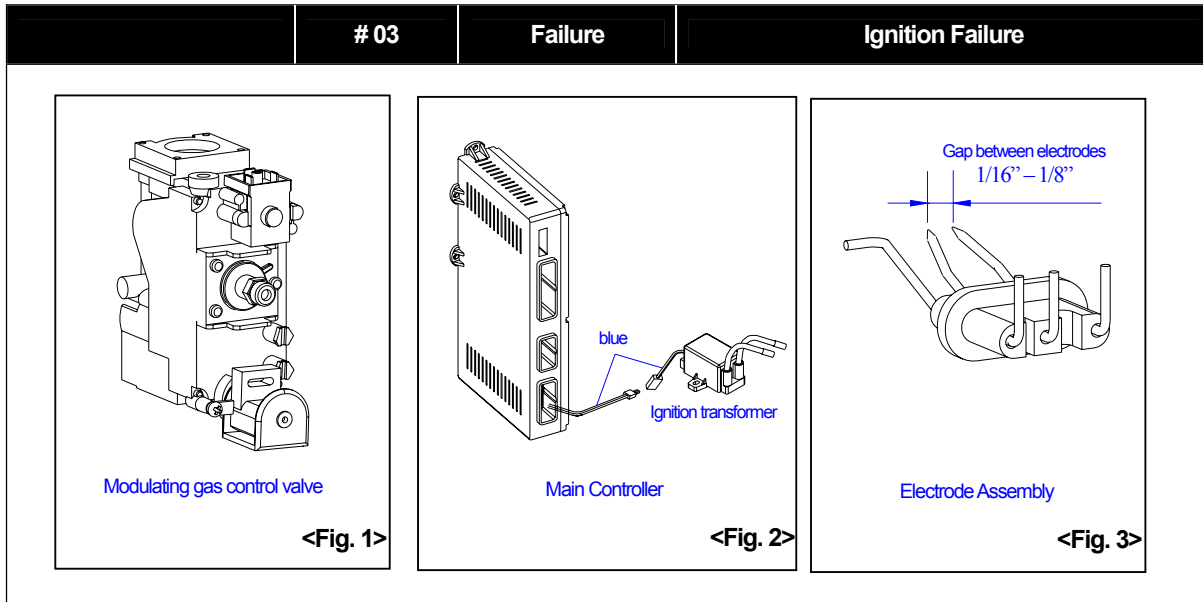
Other Failures – Problems that don't cause codes

		# 01	Failure	Overheat		
						
		<Fig. 1>	<Fig. 2>	<Fig. 3>	<Fig. 4>	<Fig. 5>
No	Symptom and Cause	Solution			Reference	
1	<p>If the water temperature inside the heat exchanger exceeds 203°F the sensor opens, shuts down the unit and indicates failure code #01</p> <p>1) The shut off valves are closed</p> <p>2) Clogged Strainer</p> <p>3) The circulator pump is not working</p> <p>4) 3-way valve is defective</p> <p>5) DHW Flow Switch is not working</p>	<p>- Open the valves</p> <p>- Clean the strainer</p> <p>- Check the operation of the circulator pump and the motor condition</p> <p>- Measure the resistance across the Blue/White pump wires using a multi meter. A cold ohm reading is 30 Ohms. If it shows infinity or no reading, the motor windings have short circuited and the pump should be replaced.</p> <p>- Check whether the 3-way valve motor has short-circuited using a multi meter. 3500 Ohms between both Blue/Black and Red/Black is normal. If it reads infinity or no reading the motor has short-circuited and the 3-way valve has to be replaced.</p> <p>- Check if the 3-way valve seals when in DHW by checking for heat from the heating system. Check the connection at the molex plug. Check for voltage to the Valve, 115V across Blue/Black for Heating, Red/Black for DHW</p> <p>If the DHW flow switch incorrectly indicates that hot water is flowing, overheating can occur. Check the flow switch for operation.</p> <p>Check the resistance and if it reads 0 Ohms when DHW is not flowing, it is defective and needs to be replaced.</p> <p>- If the symptoms remain after performing the checks described above, replace the microprocessor controller and the heating water temperature sensor.</p>			<p><Fig. 1></p> <p><Fig. 2></p> <p><Fig. 3></p> <p><Fig. 4></p> <p><Fig. 5></p>	

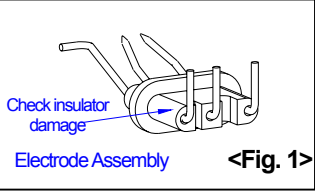
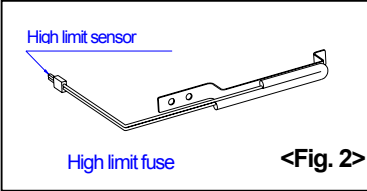
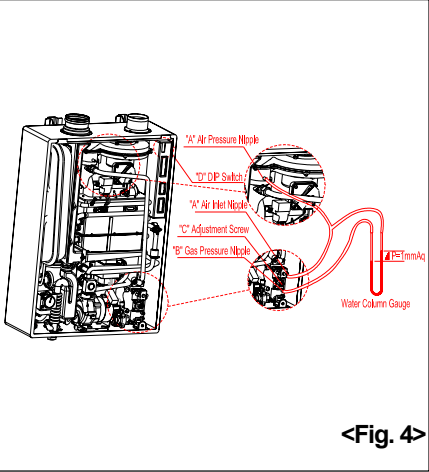
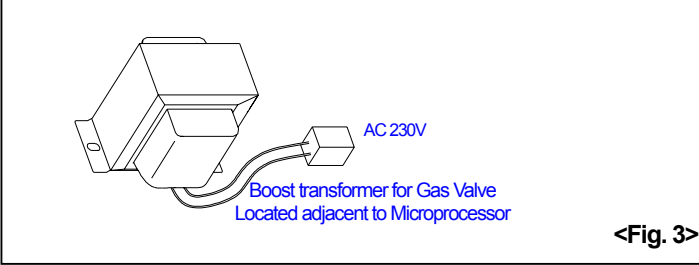
	# 02	Failure	Low Water Level
--	------	---------	-----------------



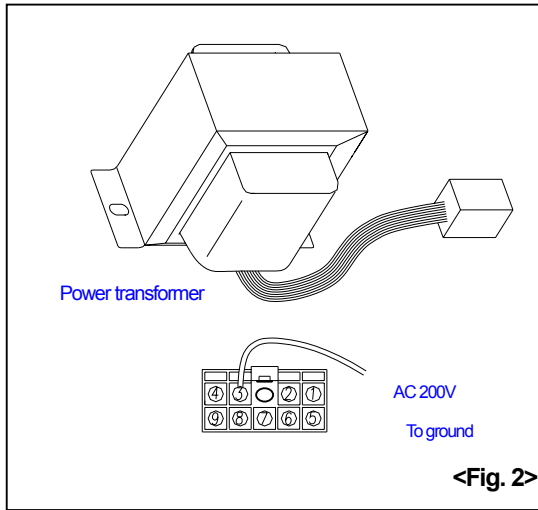
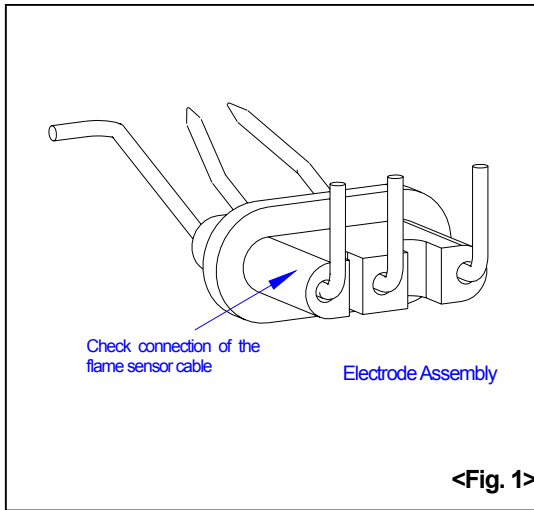
No	Symptoms and Causes	Solutions	Reference
2	<p>This occurs in the heating or sealed system</p> <p>The Heating Flow Switch has to reach the ON (Closed) position within 3 seconds after the call for heating. If it is still OPEN after 3 seconds, failure code #02 is displayed.</p> <p>1) Heating shut off valves closed</p> <p>2) Low water level in heating system</p> <p>3) Air in the heating system.</p> <p>4) The circulator pump is working but there is not enough RPM or the impeller is damaged.</p> <p>5) There is NO contact made by the Heating Flow switch.</p>	<p>Check with a multi-meter, a Closed switch reads 0 Ohms and an Open switch reads Infinity or no reading</p> <p>- Open the shut off valves</p> <p>- Check the heating pressure gauge it should read between 7 to 21 psig or 0.5~1.5 kg/cm².</p> <p>- Purge air from the heating system.</p> <p>- Check the resistance of the circulator pump motor, 30 Ohms is normal. If it shows infinity the motor is short-circuited and the circulator pump has to be replaced. Check for air inside the pump assembly</p> <p>- When the unit is running and the Heating Flow switch contact is closed (correct position), the resistance should be 0 Ohms. If it shows infinity or no reading the switch is not making and has to be replaced.</p> <p>- Check the unit connection to ground, internally and externally</p>	<p><Fig. 1></p> <p><Fig. 2></p> <p><Fig. 3></p> <p><Fig. 4></p>



No	Symptoms and Causes	Solutions	Reference
	<p>Failure code #03 indicates ignition failure Unit will attempt ignition 3 times before displaying 03</p> <p>If there is no combustion and Failure code #03 is displayed.</p> <p>1) Gas supply is not normal.</p> <p>2) Ignition transformer is not working.</p> <p>3) Gap between electrodes and discharge.</p>	<p>BEFORE ADJUSTING THE GAS VALVE TO COMPENSATE FOR AN 03 CHECK THE INCOMING GAS PRESSURE</p> <p>Inlet Gas pressures required LNG: 5.8 ~ 9.7 inch W.C. LPG: 8.7 ~ 12.6 inch W.C.</p> <ul style="list-style-type: none"> - Check supply pressure and call the gas company if outside required range. Check inlet gas pressure during combustion. Check gas line size – minimum 3/4" is required - Check power supply from the controller to the ignition transformer. Should be 115V - If there is no power supply, check the connections, then the controller output. - If there is power supply to the ignition transformer, check the resistance of wires leading to the igniter. Resistance is 700-750 Ohms. If the resistance shows infinity or no reading, it is faulty – Replace the TX. - The secondary voltage should be 19.5kV and if it measures below this, the ignition transformer has to be replaced. Caution only check this with GAS SUPPLY TURNED OFF - Check whether gap between the electrodes is 1/16 to 1/8" and adjust accordingly. - Make sure that the electrodes are not bent; they should be in the same plane. - Check for a crack in the electrode insulator and replace the electrode if a crack is found. - Ensure flame detector is turned away from electrodes 	<p style="text-align: right; color: black;"><Fig. 1></p> <p style="text-align: right; color: black;"><Fig. 2></p> <p style="text-align: right; color: black;"><Fig. 2></p> <p style="text-align: right; color: black;"><Fig. 3></p> <p style="text-align: right; color: black;"><Fig. 3></p>

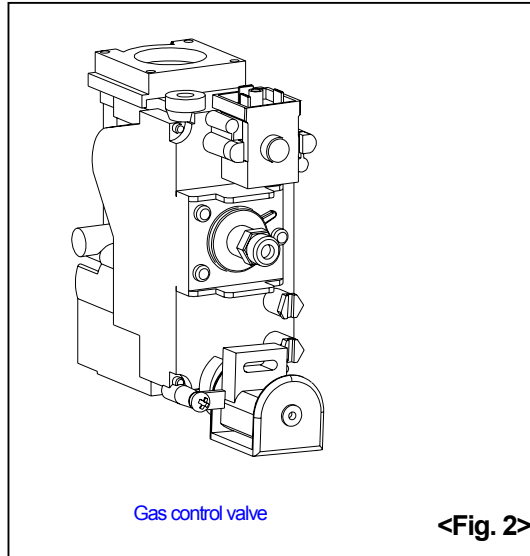
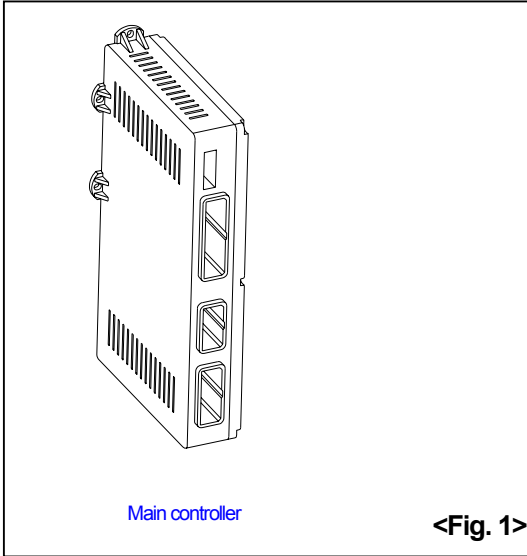
		# 03	Failure	Ignition Failure
 <p>Electrode Assembly <Fig. 1></p>		 <p>High limit fuse <Fig. 2></p>		 <p><Fig. 4></p>
 <p><Fig. 3></p>				
No	Symptoms and Causes	Solutions		Reference
	4) No power supply to the modulating gas control valve. – The 115V to 230V Transformer for the Gas Valve solenoids is located underneath the fan next to the microprocessor	<ul style="list-style-type: none"> - Check whether the in line fuses are good. - Check for power 230V AC from the gas valve boost transformer to the solenoid coils on the gas control valve. Check power 115V into the transformer. If there is 115v but no 230V, replace the transformer. - If the symptoms remain after performing the check up described above, then check the output from the controller. If no output exists replace the controller. 		<p><Fig. 2></p> <p><Fig. 3></p>
	5) There is 230V to the modulating gas control valve but it is still not opening	<ul style="list-style-type: none"> - Check resistance of the modulating gas control valve coils. Solenoid coil resistances EV1 500 Ohms, EV2 3000 Ohms. If a resistance shows infinity or no reading, replace the modulating gas control valve. 		<Fig. 4>
	6) There is power supply to the modulating gas control valve and the coil is not damaged but still there is no ignition.	<ul style="list-style-type: none"> - Check that the ratio of the secondary gas pressure of the gas control valve and the air pressure is 1:1 (measure pressure across gas valve and fan, they should be equal) - Check that the yellow plastic hose connecting the fan motor and the solenoid valve is connected correctly, free from cuts, holes and obstructions - If the symptoms remain after performing the checks described above, then replace the modulating gas control valve. 		<Fig. 4>

	# 03	Failure	Ignition Failure
--	-------------	----------------	-------------------------



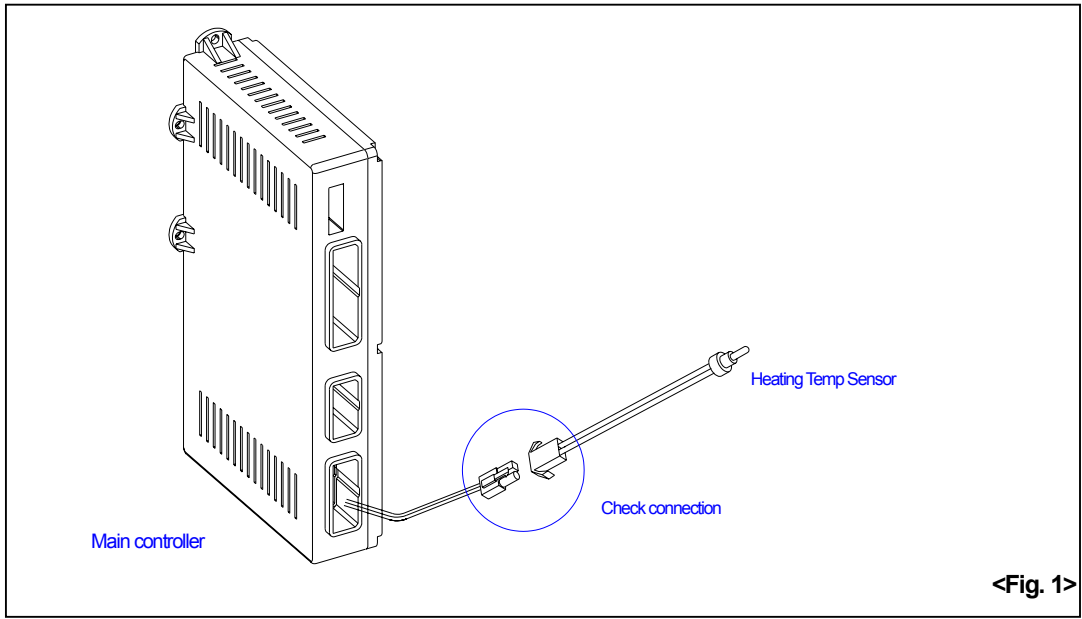
No	Symptoms and Causes	Solutions	Reference																		
	(7) Unit will fire but failure code #03 is displayed	<ul style="list-style-type: none"> - Check the connection of the flame sensor on the electrode – crimp for a tight connection - Reconnect the flame sensor - If problem persists, replace electrode assembly - Check for power (200V to ground) from the power transformer connection on microprocessor to the flame sensor. If not, replace the power transformer. - If the symptoms remain after performing the check up described above, then the controller is defective and has to be replaced. <p>※ Voltage Supply Transformer to Controller</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 10%;">No</th> <th style="width: 15%;">Voltage</th> <th style="width: 75%;">Wiring Connectors</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">200V AC</td> <td style="text-align: center;">For Flame sensor</td> </tr> <tr> <td style="text-align: center;">1, 5</td> <td style="text-align: center;">20V AC</td> <td style="text-align: center;">For Controller power</td> </tr> <tr> <td style="text-align: center;">4, 7</td> <td style="text-align: center;">12V AC</td> <td style="text-align: center;">Flow Sensor</td> </tr> <tr> <td style="text-align: center;">2, 6</td> <td style="text-align: center;">40V AC</td> <td style="text-align: center;">Fan motor control</td> </tr> <tr> <td style="text-align: center;">8, 9</td> <td style="text-align: center;">115V AC</td> <td style="text-align: center;">Modulating gas valve Solenoid Coil TX</td> </tr> </tbody> </table>	No	Voltage	Wiring Connectors	3	200V AC	For Flame sensor	1, 5	20V AC	For Controller power	4, 7	12V AC	Flow Sensor	2, 6	40V AC	Fan motor control	8, 9	115V AC	Modulating gas valve Solenoid Coil TX	<p><Fig. 1></p> <p><Fig. 2></p>
No	Voltage	Wiring Connectors																			
3	200V AC	For Flame sensor																			
1, 5	20V AC	For Controller power																			
4, 7	12V AC	Flow Sensor																			
2, 6	40V AC	Fan motor control																			
8, 9	115V AC	Modulating gas valve Solenoid Coil TX																			

# 04	Failure	Pseudo Flame
------	---------	--------------



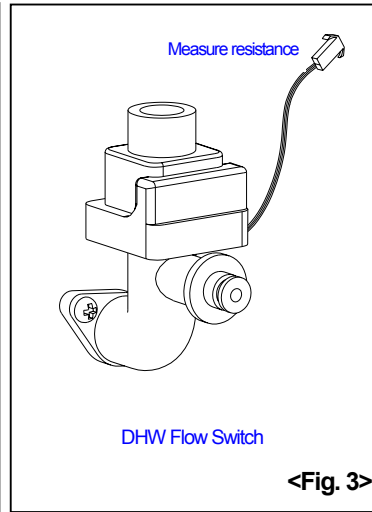
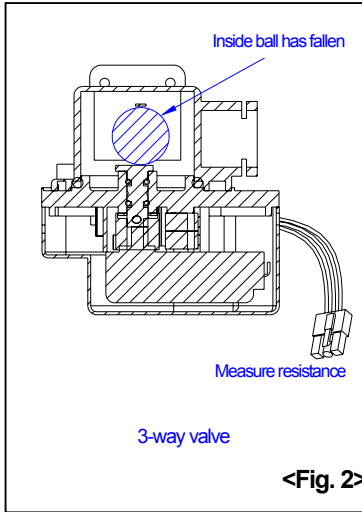
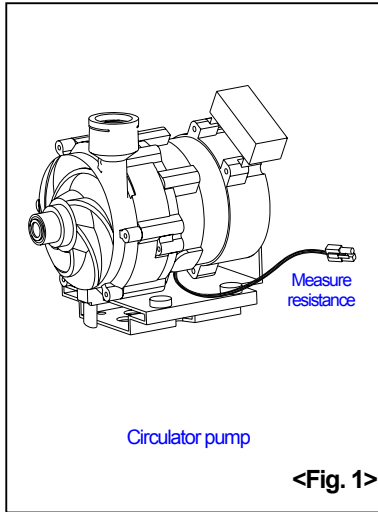
No	Symptoms and Causes	Solutions	Reference
1	<p>What's a pseudo flame?</p> <p>Combustion occurs but the flame is detected in the combustion chamber before the modulating gas control valve starts opening,</p> <p>This requires the unit to stop operation and display fault code #04.</p> <p>The unit has cycled off but 230V power is still supplied to solenoid coils on the modulating gas control valve.</p>	<p>- If voltage is present then check for voltage to the boost transformer from the controller. If 115V is found to the TX the controller is faulty. Replace the controller.</p>	<Fig. 1>
2	<p>There is no voltage to the gas valve but there are small flames in the combustion area when the unit stops running.</p>	<p>- There is a problem with the diaphragm inside the gas control valve. Replace the gas control valve.</p> <p>- If the symptoms remain after performing the checks described above, then the controller is defective and has to be replaced.</p>	<Fig. 2>

# 05	Failure	Heating Temp Sensor disconnected
-------------	----------------	---



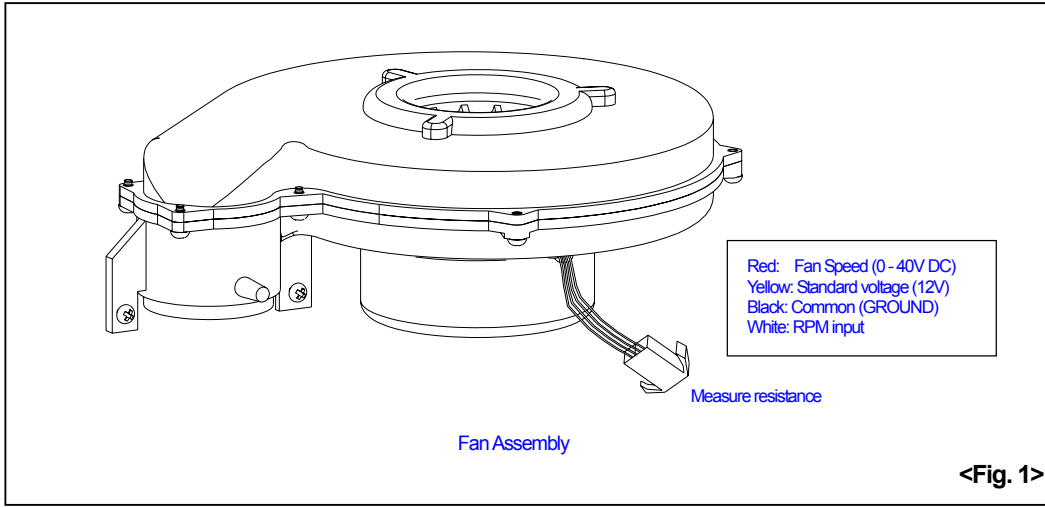
No	Symptoms and Causes	Solutions	Reference
1	<p>Failure code #05 is displayed when the heating temperature sensor is short circuited or disconnected.</p> <p>A bad connection between the heating temperature sensor and the harness connecting it to the controller.</p>	<p>- Check the molex connector, especially the pins inside the connector – reconnect if necessary</p>	<Fig. 1>
2	<p>The heating temperature sensor is short-circuited.</p>	<p>- The heating temperature sensor is defective and has to be replaced. Check resistance of the sensor against the heating water temperature eg. 160F = 1800 Ohms, 140F = 2500 Ohms, 120F = 3600 Ohms, 100F = 5250 Ohms, 80F = 8000 Ohms, 60F = 12200 Ohms</p> <p>- If there is nothing wrong with the above, the controller is defective and has to be replaced.</p>	

	# 06	Failure	Short circuit - Heating Temp Sensor
--	-------------	----------------	--



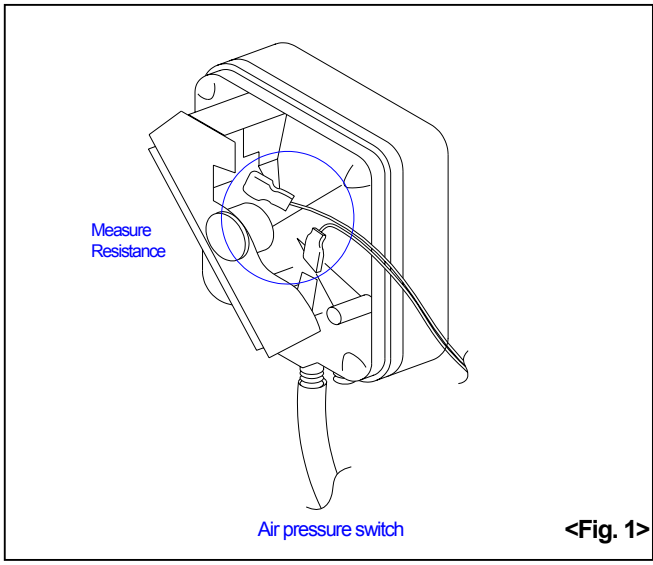
No	Symptoms and Causes	Solutions	Reference
1	<p>Failure code # 06 is displayed when the heating temperature sensor reads a temperature greater than 248 °F. The unit sees this as a short circuit of the sensor. Poor water circulation or a mechanical problem may also abruptly increase the water temperature inside the unit.</p> <p>Check if the circulator pump is working.</p>	<p>- Check for a short circuit of the circulator pump motor. Measure the resistance of the motor – Blue and White wires, if it displays infinity or no reading (30 Ohms is normal) the motor is short-circuited and the pump has to be replaced.</p>	<Fig. 1>
2	<p>If the 3 way valve fails when the units is operating in Domestic Hot Water mode, the DHW Flow switch will still be closed requiring operation of the unit but because the water is now circulating in the heating system the temperature could increase rapidly as the unit continues to operate thinking it still is in DHW mode.</p>	<p>- Check whether the 3-way valve motor is short-circuited. Measure the resistance – Red/Black 3500 Ohms, Blue/Black 3500 Ohms, if it displays infinity or no reading the motor is short-circuited and the 3-way valve has to be replaced. Check if the internal sealing ball inside the 3-way valve has broken off it's stem If it did replace the 3-way valve.</p> <p>- Check the DHW Flow Switch when the unit is not running. A resistance of infinity or no reading is normal but if it shows 0 it is defective and the DHW Flow Switch has to be replaced.</p> <p>- If the symptoms remain after performing the check up described above, then replace the DHW Flow Switch and the controller.</p>	<p><Fig. 2></p> <p><Fig. 3></p>

	# 09	Failure	Abnormal RPM
--	-------------	----------------	---------------------



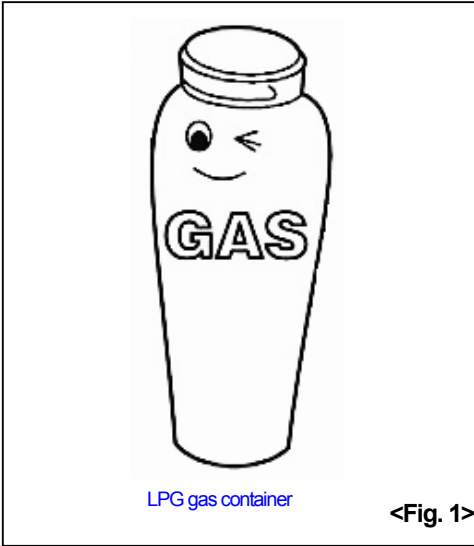
No	Symptoms and Causes	Solutions	Reference
1	Fan motor RPM is too slow.	- Replace the fan assembly – the motor can be replaced but it is easier to replace the assembly. To replace the fan assembly remove the 2 Philips head screws adjacent to the gas nozzle and the single Philips screw at the Gas Valve Transformer	
2	The fan does not rotate.	- Check whether the fan motor is short-circuited. - Measure the resistance and if it displays infinity or no reading the motor is short-circuited and the fan assembly has to be replaced. Standard cold Ohm reading across Red & Black is 150,000 Ohms	<Fig. 1>
	The fan RPM cannot be read by the unit controller.	- The motor is not signaling the RPM to the controller. Replace the fan motor or assembly	
4	The connection from the fan to the controller is bad.	- Reconnect the molex connector. Check the pins for looseness or damage - If the symptoms remain after performing all of the above, replace the controller.	

# 10	Failure	Air Pressure Failure
------	---------	----------------------



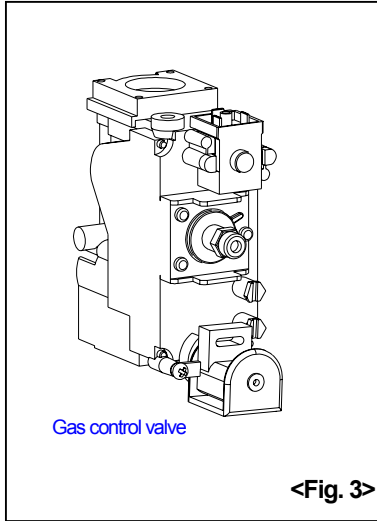
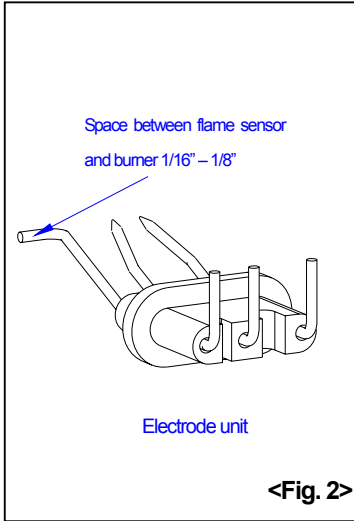
No	Symptoms and Causes	Solutions	Reference
1	<p>The QVM9 air pressure switch operates as a normally closed contact using the common & terminal B. Failure code #10 occurs if a clogged flue or excessive back flow of the exhaust (due to prevailing winds) prevents the switch from making</p> <p>The diaphragm inside the air pressure switch is defective and the contact remains OPEN.</p>	<ul style="list-style-type: none"> - Check the resistance of the air pressure switch across Common and B s when the unit is NOT OPERATING. If it shows infinity or no reading, it is defective and the air pressure switch has to be replaced. A normal reading is 0 Ohms - Check the air tube connection 	<Fig. 1>
2	<p>The installation and the termination location of the exhaust flue are not correct.</p>	<ul style="list-style-type: none"> - Check the termination location for prevailing winds above 30 mph. Relocate the vent termination if these winds are present - Check whether all the flue connections are well assembled and sealed. Reconnect if necessary - If the symptoms remain after checking the above, replace the controller. <p>※ Prevailing Wind : Wind gusts directly entering the vent termination. MAXIMUM ALLOWABLE WIND SPEED IS 30 MPH.</p>	

# 12	Failure	Flame Failure in Combustion
------	---------	-----------------------------



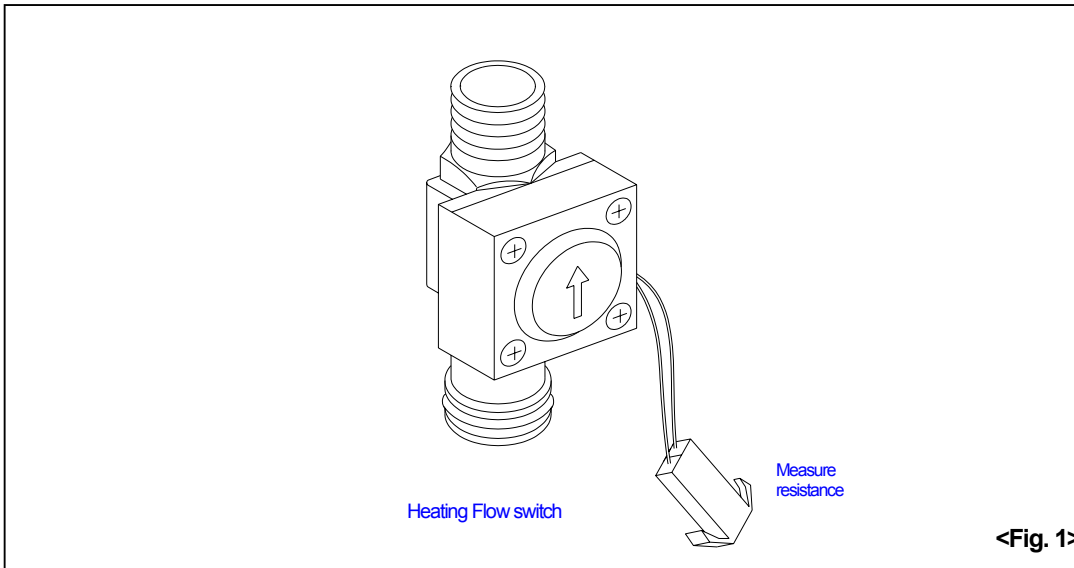
No	Symptoms and Causes	Solutions	Reference
1	<p>Flame failure in combustion occurs when the flame disappears during combustion – Unit will attempt to re-ignite 10 times before this fault code is displayed</p> <p>Gas supply pressure is not adequate.</p>	<ul style="list-style-type: none"> - Check inlet gas supply pressure : LNG: 5.8 ~ 9.7 inch W.C., LPG: 9.0 ~ 13.0inch W.C. - When LP gas pressure is low check if the LPG tank is empty, and if so replace with a new full tank. - In cold weather, the LPG tank may not supply gas at normal pressure. Warm up the tank if required. - Gas line may be too long, blocked or less than 3/4" diameter. Replace the line or shorten distances between tank and unit - The gas meter or regulator may be defective. Contact the gas company for replacement. - Check to ensure that an adequate Gas supply exists <p>Initial gas pressure supplied may drop to under 3.9" W.C. during start up/combustion. Ensure Gas line is a minimum of 3/4", if it is check the gas regulator setting or contact the gas company.</p>	<p style="text-align: center;"><Fig. 1></p> <p style="text-align: center;"><Fig. 2></p>

	# 12	Failure	Flame Failure in combustion
--	-------------	----------------	------------------------------------



No	Symptoms and Causes	Solutions	Reference
2	Gas meter capacity is insufficient.	- Ensure gas meter is capable of supplying the rated input to the unit as required. Check gas pipe size to the household and to the unit as required	<Fig. 1>
3	Flame sensor is too close to the burner metal fiber plate (Adiabatic plate)	- Adjust spacing as required.	<Fig. 2>
4	Gas control valve does not adjust gas volume.	- Replace gas control valve - If symptoms remain after the checks above, replace the controller.	<Fig. 3>

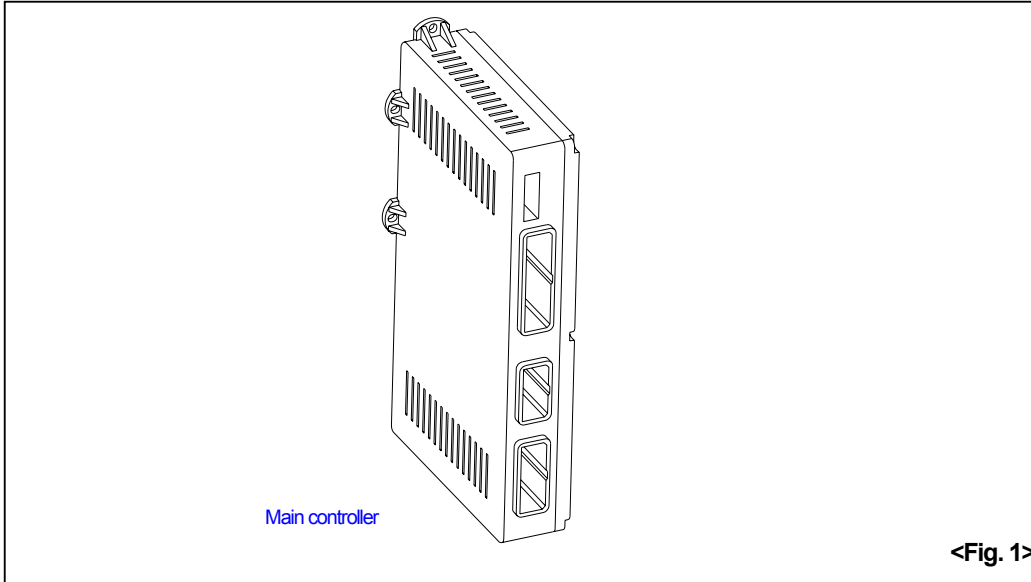
	# 13	Failure	Heating Flow Switch Failure
--	------	---------	-----------------------------



<Fig. 1>

No	Symptoms and Causes	Solutions	Reference
1	<p>Heating Flow switch failure occurs due to low flow or air in the heating system</p> <p>Before changing any component make sure you are using Primary – Secondary piping for the system</p> <p>Heating Flow switch is made (ON) although the unit's pump is not operating due to no call for heat or DHW or off cycle for the pump</p>	<ul style="list-style-type: none"> - Measure the resistance of the Heating Flow switch - When the circulator pump is not working resistance should indicate infinity or no reading (switch in the open position) and 0 when the pump is working and the switch is closed. - If there is no change in the switch resistance when the pump is cycled off and on, clean the Heating Flow switch or replace the switch 	<Fig. 1>

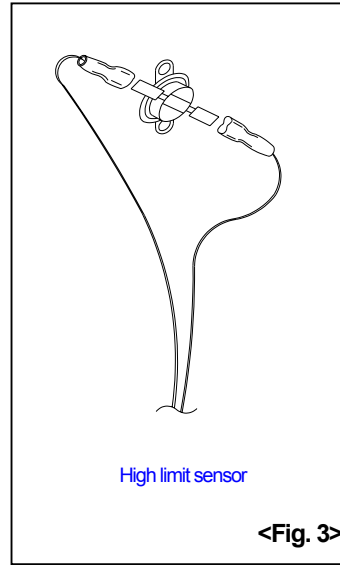
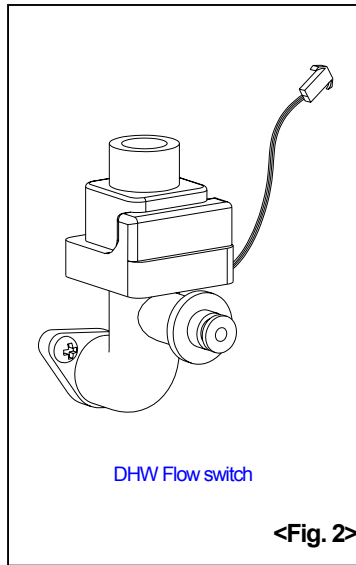
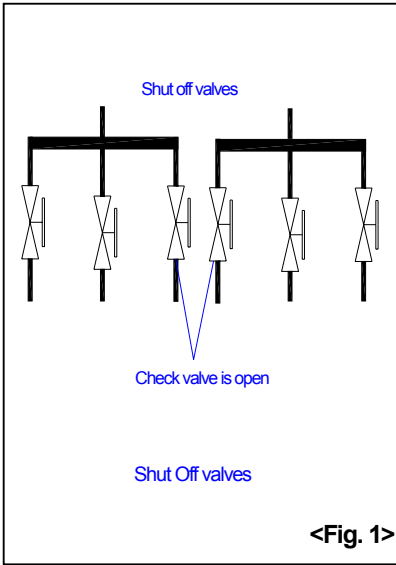
# 15	Failure	MICOM Failure
------	---------	---------------



<Fig. 1>

No	Symptoms and Causes	Solutions	Reference
1	MICOM (PCB) (controller) failure AKA the big gray box	<ul style="list-style-type: none"> - If failure code #15 is displayed, replace the main controller. - When replacing the controller check the unit controller specifications, see below - Ensure dip switch settings are correct for unit 	<Fig. 1>
		Main controller	Room thermostat
		QVM9	FR-5

	# 16	Failure	Mechanical Overheat
--	-------------	----------------	----------------------------



No	Symptoms and Causes	Solutions	Reference
1	<p>When the high limit sensor located on the upper right tube of the main heat exchanger goes from Normally Closed to Open Circuit – Detecting a water temperature above 203 DegF</p> <p>Heating supply shut off valves are closed and the temperature rapidly rises.</p>	<p>- Open the closed shut off valves.</p>	<Fig. 1>
2	<p>The DHW Flow switch in the ON position with no call for domestic hot water, causing the 3-way valve to shut off the flow to the heating system.</p>	<p>- Disconnect the DHW Flow switch and if the 3-way valve goes back to its initial position, the DHW Flow switch is defective and has to be replaced.</p>	<Fig. 2>
3	<p>The high limit sensor is defective and failure code #16 is displayed when the unit does not operate. Sensor should be normally closed, open on overheat.</p>	<p>- Check the sensor using the “buzzer” mode of a multi meter – Buzz = Closed, no buzz = Open. Replace the high limit sensor if faulty</p> <p>- If the symptoms remain after checking the above, jump sensor wires together if fault still exists, replace the main controller.</p>	<Fig. 3>

# 17	Failure	DIP Switch Setting Error
-------------	----------------	---------------------------------

Main controller

DIP SW Setting on Main Controller

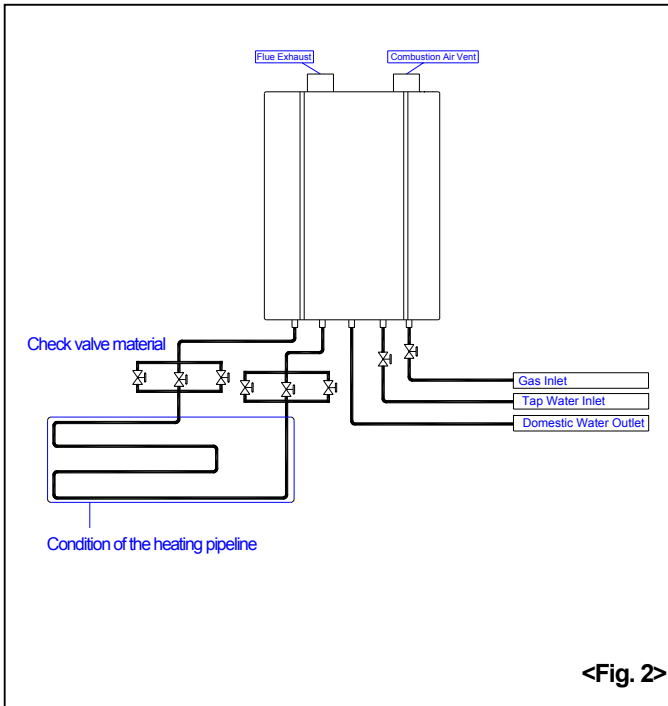
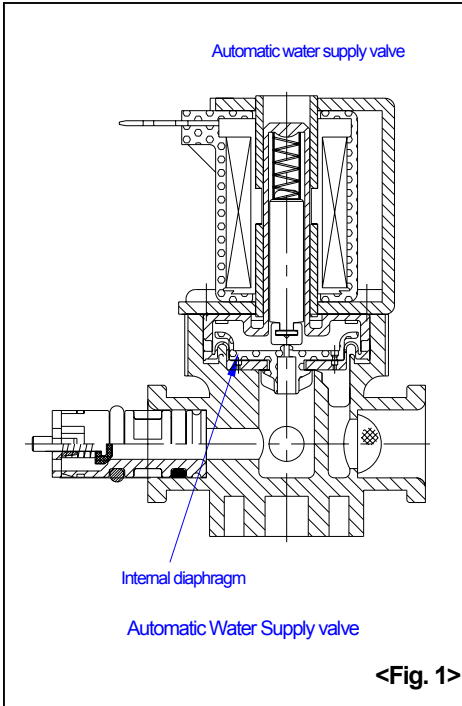
NO	ON	OFF
1	Trial Run	Normal
2	Forced Max. Combustion	Normal
3	Forced Min. Combustion	Normal
4	Air intake connected	N/A
5	LPG	NG
6	Sealed Combustion	N/A
7	-	QVM9

NO	Check	IOM	For
8	correct	settings	per
9	Unit	Capacity	

<Fig. 1>

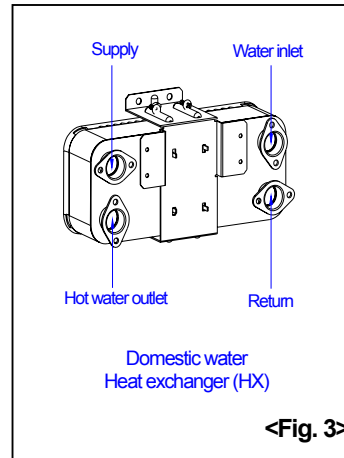
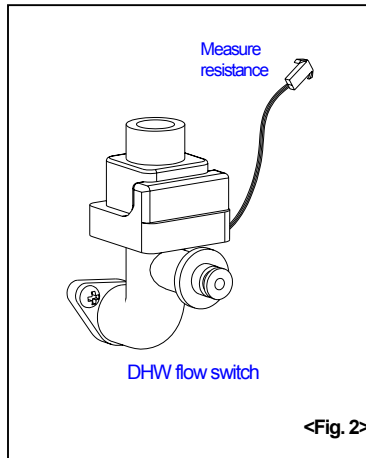
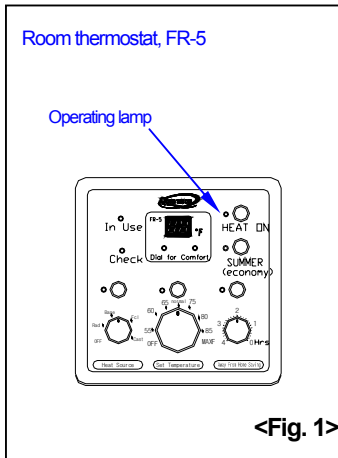
No	Symptoms and Causes	Solutions	Reference
1	DIP Switch failure.	<ul style="list-style-type: none"> - Check whether DIP switches are set correctly according to capacity, operation and fuel type - adjust if needed. - If symptoms remain after checking the above, replace the controller. 	<Fig. 1>
2	Air pressure switch connection to the controller	<ul style="list-style-type: none"> - Replace air pressure switch if the fault is cleared after jumping out the wires to the air pressure switch. 	

	Others	Failure	Unit is operating normally but the Pressure/Relief Valve opens
--	--------	---------	--



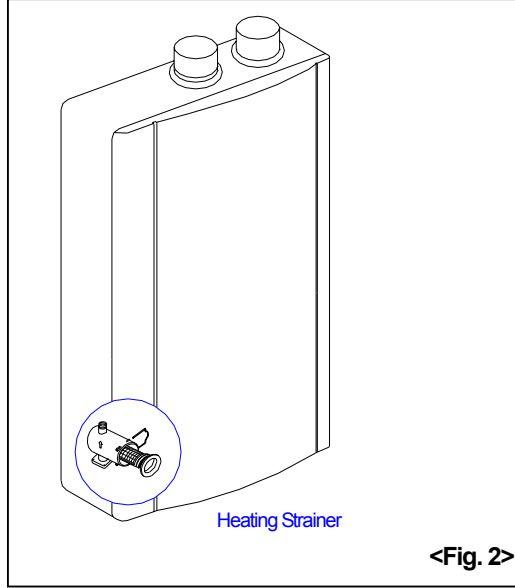
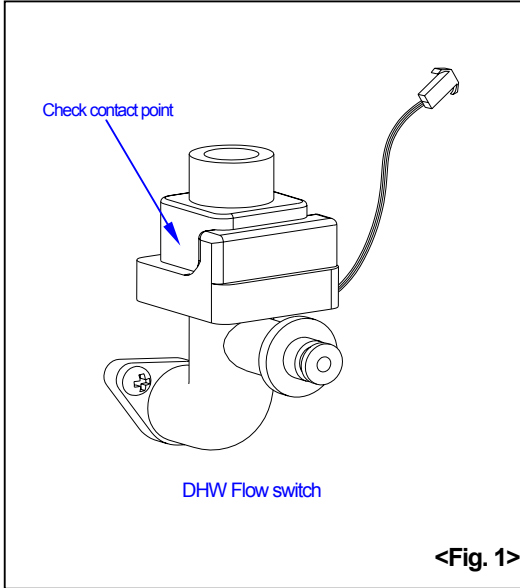
No	Symptoms and Causes	Solutions	Reference
1	The Automatic water supply valve is defective and cannot stop water entering into the heating water system	<ul style="list-style-type: none"> - Corrosion or debris (Sediment) in the Cold Domestic inlet to the unit can become attached to the make up water solenoid valve diaphragm causing water to slowly enter into the heating system. Clean the valve or replace as necessary 	<Fig. 1>
		<ul style="list-style-type: none"> - If the Heating system valves or manifold material is aluminum, corrosion is quick to form. Replace with copper or stainless steel piping and valves. 	<Fig. 2>
2	P/R Valve opens due to an internal crack in the DHW heat exchanger.	<ul style="list-style-type: none"> - If the valve still overflows after checking the above, there could be an internal crack in the DHW heat exchanger allowing domestic water to enter the heating system, raising the system pressure. Replace the DHW heat exchanger 	

	Others	Failure	Unit operates but DHW temperature is cold or DHW is not produced at all
--	--------	---------	---



No	Symptoms and Causes	Solutions	Reference
1	First, set the room thermostat to the SUMMER mode and open a hot water faucet. The operating lamp does not light up.	- The operating lamp does not light up because the hot water sensor is defective and does not sense the DHW flow - Jump out the switch, if the unit operates the switch is faulty – Replace it	<Fig. 1>
2	Unit is operating but DHW is not produced.	- Measure the resistance of the hot water sensor terminal. If it shows 0 Ohms it is normal , if it shows infinity or no reading it is defective.	<Fig. 2>
3	The operating lamp is on but the DHW outlet pipe is not hot and no DHW is produced	- Replace the 3-way valve, if the Heating system pipe is hot, it means the transition to DHW supply mode has not been made due to a failure of the 3-way valve.(check whether the valve is short circuited , damaged or for voltage at the valve) - If there is no heat exchange across the DHW heat exchanger, check the heat exchanger. If one side is very hot and the other side cold the HX is blocked or plugged - Replace the HX. - If symptoms remain after the checking the above, it is possible that the DHW flow exceeds the capacity of the unit – Check flow rate by timing the fill of a gallon bucket – Convert to GPM and check unit specs for delivered temp at that flow	<Fig. 3>
4	If no DHW is not produced, check that the incoming cold and DHW supply pipes are correctly piped to the unit	- Check the pipe connections for the cold water inlet and DHW outlet.	

	Others	Failure	DHW is produced but the Heating system does not operate
--	---------------	----------------	--

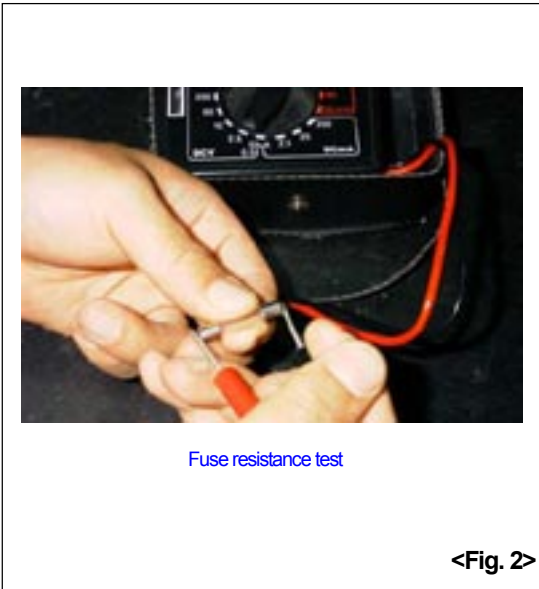


No	Symptoms and Causes	Solutions	Reference
1	The Heating system shut off valves are closed.	- Open valves as required.	
2	Too much air inside the unit and the heating system	- Purge the air from the unit and the Heating system – ensure that good quality air vent(s) are fitted to the system at the highest point	
3	DHW is always supplied because the 3-way valve is faulty.	- Replace the DHW Flow switch or - The 3-way valve is defective and shuts down the heating. Replace the 3-way valve.	<Fig. 1>
4	Debris has collected in the strainer and there is no flow in the heating system because it is clogged.	- Clean the strainer by removing the clip to gain access to the strainer – relieve pressure and water from the unit prior to removing the heating strainer.	<Fig. 2>
5	The heating system is blocked so no water is flowing inside the heating system.	- Check for blockage and remove - Check field installed pump in Primary/Secondary system for operation	
6	Combustion occurs as normal but the water temperature goes up very slowly.	- Check whether the gas to air ratio is 1 : 1 and adjust the gas pressure using a manometer. - The heating load may be too large for the unit capacity. Check the heating load and capacity of the unit. - Check the gas consumption of the unit at the meter – Gas line should be ¾” minimum	

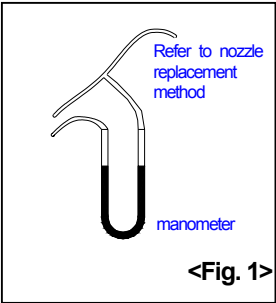
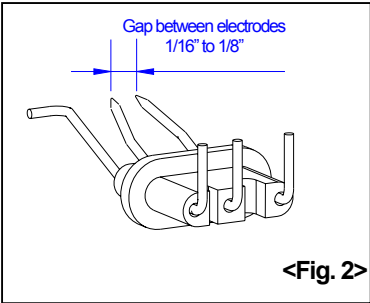
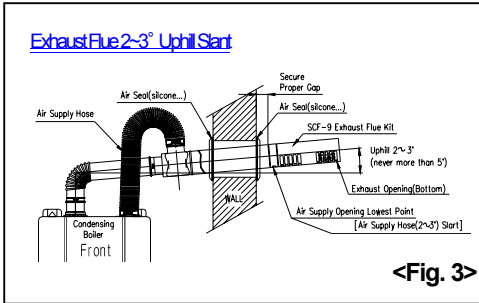
	Others	Failure	Unit power lamp indicator does not light up
--	--------	---------	---

Hard Wire connection from a dedicated breaker to the White and Black power wires in the gray wire covering and coiled inside the unit

<Fig. 1>



No	Symptoms and Causes	Solutions	Reference
1	Unit power lamp indicator does not light up.	<ul style="list-style-type: none"> - Check if 115V is available to the unit. - Check whether the unit internal fuses are short-circuited. - Test the fuse resistance. If it is 0 Ohms it is OK, if it is infinity or has no reading the fuse is short-circuited and has to be replaced. Also can be checked using the buzzer function 	<p><Fig. 1></p> <p><Fig. 2></p>
2	Power is available to the unit, a hot water faucet is open, the unit is operating but DHW is not produced	<ul style="list-style-type: none"> - Check whether the FR5 wiring has a short-circuit (remove the FR5 from the mounting bracket and check the connections). 	

	Others	Failure	Too noisy
	 <p><Fig. 1></p>	 <p><Fig. 2></p>	 <p><Fig. 3></p>
No	Symptoms and Causes	Solutions	Reference
1	Loud noise during ignition.	There is an imbalance of gas and air supplied during the initial ignition. Using a manometer adjust the gas-air ratio to 1:1. Especially if the vent length is extremely short or long	<Fig. 1>
2	Noise due to delayed ignition.	<ul style="list-style-type: none"> - Gap between electrodes is too close or too far away. Adjust the gap to 1/16" – 1/8" between them. - The electrode may be too close or too far away from the metal fiber, causing a delayed ignition. Adjust the electrode. - The electrode insulator may be damaged causing a discharge. Replace if necessary. - The secondary voltage of the ignition transformer is weak (should be 19.5kV). Replace the ignition transformer. 	<Fig. 2>
3	Noise during combustion.	<ul style="list-style-type: none"> - The number of flue bends and length may be beyond the maximum. - If using a SCF9 flue the airtight chamber in the termination may be damaged causing a flow of waste gas to the air intake. Check the flue and replace if needed. 	<Fig. 3>
4	Boiling noise.	<ul style="list-style-type: none"> - Boiling noise may occur when the heating water temperature goes beyond 212 DegF This can be due to air in the heating system or a defect in the main heat exchanger brazing. - Remove the air and/or replace the main heat exchanger. 	

QVW8 On Demand Water Heater

The QVW8 water heater does not have specific error codes determined by the water heater; but if a fault is detected the unit will illuminate the CHECK light on the AR3 water temperature controller

Control voltage for this unit is 5V DC.

Typical faults can be broken down into 3 areas :

1. No Ignition
2. Mechanical Failures
3. Poor Performance

These faults are discussed at length in the following pages

1. No Ignition

A. No or Low Gas Pressure & Gas Valve Operation

Check the incoming gas pressure to the unit – Should be a minimum of 5.8” WC and a maximum of 9.7” WC. For LP units the minimum incoming pressure is 8” WC and the maximum 13” WC.

Check the secondary gas pressures delivered to the burner assembly

Natural Gas

QVW8 100W1-NG	Max Combustion	3.94” WC
Front Cover OFF	Min Combustion	0.55” WC

QVW8 120W1-NG	Max Combustion	4.25” WC
Front Cover OFF	Min Combustion	0.47” WC

Units converted to LP

QVW8 100W1-NG	Max Combustion	5.35” WC
Front Cover OFF	Min Combustion	0.71” WC

QVW8 120W1-NG	Max Combustion	5.91” WC
Front Cover OFF	Min Combustion	0.63” WC

Cont

MAXIMUM Combustion is obtained by switching Dip Switch #2 on the microprocessor to ON

Adjusting the secondary gas pressure for MAXIMUM combustion can be performed by turning the adjustment knob (found on top of the microprocessor controller) clockwise to increase the pressure and anti clockwise to decrease the pressure

MINIMUM Combustion is obtained by switching Dip Switch #2 on the microprocessor to ON

Adjusting the secondary gas pressure for MINIMUM combustion can be performed by turning the adjustment knob (found under the solenoid coil on the gas valve) clockwise to increase the pressure and anti clockwise to decrease the pressure

Ensure that the unit has a minimum of $\frac{3}{4}$ " Gas Line, so that the correct volume of gas can be provided to the unit – this is very important, especially when replacing a tank type water heater – typically it has an input of 40,000 Btu/h max, but it will be replaced by a unit having 3 TIMES the maximum input (120,000 Btu/h)

If the Gas Pressure appears to be acceptable check the Gas Valve for operation

EV1 & EV2 are the safety solenoids for the Gas Valve – they must have voltage supplied to them to open so the valve can flow gas through it. The voltage supplied to the coils is 230V AC, across either the Brown wires or the Blue wires

If voltage is supplied to the coils, but no gas is flowing check the resistance of the coils, both EV1 and EV2 should measure **5500 Ohms**, if either of the coils measures Infinity, or no reading the valve is faulty and must be replaced.

The proportional control of the valve is based on a 40V DC output from the Microprocessor. If the valve will not allow gas flow through it, check the voltage output across the two Black wires.

If voltage is present, check the resistance of the proportional coil, it should measure **75 Ohms** if the coil measures Infinity or no reading the coil is faulty and the valve must be replaced.

Cont

B. No Airflow

The unit is designed for sealed combustion operation; if it cannot bring sufficient air into the unit for combustion, or exhaust the flue gas correctly it will trip the air pressure switch on the unit.

The reasons for this could be

Blocked Flue or Air Intake – Inspect and remove any blockages

Wind – Ensure that the Vent Termination is installed in an area away from wind gusts which could re-circulate flue gas back into the unit – Wind speed must be below 30 MPH

Vent design is above the maximum allowed – the maximum vent length is 31 equivalent feet with three 90 Degree elbows allowed. Each elbow is the equivalent of 5 feet which must be subtracted from the total allowed length.

Other reasons for no airflow could be :

No Output from the Microprocessor to the Fan Motor

Voltage to the fan motor is 230V AC, measured across the 2 white wires leading to the motor

Faulty Fan Motor

Check the resistance of the motor – it should measure **80 Ohms across the two white wires** (with a cold motor) – if the resistance measures Infinity or no reading the motor is faulty and should be replaced

Cont

Faulty Air Pressure Switch

The air pressure switch is a Normally Closed Type which will go to Open circuit in the event of a fault.

Check the continuity of the switch when the unit is turned off, it should measure 0 Ohms resistance or buzz in the buzzer mode. If it does not the switch is faulty and should be replaced.

Also check the hose attached to the switch for any cracks or poor connections – reconnect or replace if those are found

Switch can be “jumped” out to test the unit, or operate in an emergency mode if it is faulty

C. No DHW Flow Signal

The unit has 2 DHW Flow switches, mounted on the cold water inlet piping of the unit.

The first switch is the signal to operate the unit – this requires a flow of 1.06 GPM through the unit – either by opening a faucet or running an appliance.

This is a Normally Open switch which will go Closed circuit on a call for DHW

To check switch operation, open a faucet fully – Check the resistance of the switch, using a multi-meter, it should be 0 or buzz, if on the buzzer setting.

If the resistance is Infinity or no reading the switch is faulty.

Turn the faucet on and off to check for a change in the signal for the switch – if there is none

Either take apart the switch and clean it or replace.

If the faucet is running, but the flow from the unit is below 1.06 GPM the unit will not start – check the strainer assembly mounted below the cold water inlet for clogs before replacing the DHW Flow switch

Cont

No Spark - Check the electrodes for the gap – Should be between 1/16” and 1/8” – Check for Carbon build up on the electrodes and clean if required

Check the ceramic for any cracks – replace the Igniter if a crack is detected

Flame Detection - The flame detection is provided by a signal to the microprocessor – Check the wire crimp on the electrode for tightness. Signal should be 5 to 20V DC from the flame detector to ground.

During initial ignition the unit may fire, provide the correct signal and then when the unit modulates into High Fire, the unit fails as the flame ROLLS OFF the burner assembly. The reason for this issue is that the secondary gas pressure on High Fire is too high, and then the flame sensor does not see the flame and then the unit will shut down in a failure code.

Cont

2. Mechanical Failures

A. Overheat

The Overheat Cut Out on the unit is designed to shut off the unit if the discharge temperature of the water exceeds 203 DegF.

This is a Normally Closed Bi-metallic switch – When it detects the temperature it will go to Open Circuit

To check the switch, switch off the unit and check the switch. If the resistance is 0, the switch is OK. If the resistance measures Infinity or shows no reading the switch is faulty and must be replaced.

B. Mechanical Fuse

The final failure of the unit is the Mechanical Fuse, which will fail at 512 DegF. This will stop operation of the unit and needs to be replaced if it should fail. It is a FINAL safety to stop the unit operation should the temperature reach the 512 DegF level.

C. Temperature Sensors

The temperature sensors mounted in the cold water inlet and the DHW Outlet, these ensure that the unit provides the correct outlet temperature compared to the set-point of the unit from the AR3.

To check if the sensors are sensing the correct temperature, turn the unit OFF, open the faucet and check the resistance of the sensors – they should measure equal or approximately equal, within 500 Ohms

A Temperature vs Resistance chart for the Sensor is as follows

130F =	3000 Ohms
120F =	3600 Ohms
100F =	5250 Ohms
80F =	8000 Ohms
60F =	12200 Ohms
50F =	15500 Ohms
40F =	19,500 Ohms
35F =	22,200 Ohms

Cont

3. Poor Unit Performance

Poor unit performance can be usually traced to 2 separate issues

A. Too much flow from the faucets

The unit can only heat a certain volume of water to the set-point temperature. If the faucet flow is above the rated GPM, the delivered water temperature is lower than the set-point, leading to colder showers and unhappy customers

To correct this, the unit should be correctly sized to the DHW requirements of the house. If the unit is under sized the delivered temperature will be lowered or if over sized, the unit will short cycle, and turn on and off during operation.

If the unit is over sized, Quietside recommend that a storage tank is employed in conjunction with the QVW8. See the Quietside 104 manual for correct sizing and application of the QVW8 unit

B. Gas Input

If the Gas pressure is not correct, or the Gas line size is incorrect, the unit will not flow the correct volume of gas and the unit capacity will be lowered. To check the Btu/h consumption of the unit – Clock the gas meter to determine the gas consumption.

C. Low Incoming Water Temperatures

If the incoming cold water to the unit falls below 37 DegF, the unit will show this by flashing the ON/OFF light on the AR3 Thermostat. If the incoming water is this cold the ability of the unit to produce the required hot water temperature is severely reduced

To correct this Quietside recommends using a storage tank in conjunction with the unit.

Quietside Corporation | www.quietside.com

8750 Pioneer Blvd., Santa Fe Springs CA 90670 **Tel: (562)463-0880** Fax (562)463-5665
6 Pine Hill Drive, Carlisle PA 17013 **Tel: (717)243-2535** Fax (717)243-7917

QS-TRES-001