



BRC FuelMaker

Models FMQ-2,
FMQ-2.5 & FMQ-2-36

Vehicle Refueling Appliance



Argentina
Gas Association



German Gas
Association



Operating Instructions

**BRC FuelMaker VRAs Shall Only be Used by a Properly Trained
Vehicle Owner and/or Operator**

BRC FuelMaker

M.T.M - S.r.l - Via La Morra, 1-12062 Cherasco (Cn) Italy

*Technical Support (North America):
Telephone: 1 714 656-5905
Email: fnitech@impcotechologies.com
Internet: www.impcotechologies.com*

*Technical Support (Europe and Asia):
Telephone: +39.0172.486.628
Faxsimile: +39.0172.486.630
Email: compressorservice@brc.it
Internet: www.brcfuelmaker.com*



SAFETY INSTRUCTIONS

PLEASE READ CAREFULLY

Read and understand these instructions as well as the operating instructions before installing the BRC FuelMaker Vehicle Refueling Appliance (VRA). Failure to follow these instructions may result in serious injury, death or property damage.

1. NO USER-SERVICEABLE COMPONENTS

The FMQ-2 / FMQ-2.5 / FMQ-2-36 Vehicle Refueling Appliance (VRA) Modules (Control Module, Compression Module, Electronics Module, Motor Module) shall only be installed and field-replaced by personnel specifically trained and authorized by BRC FuelMaker.

Do not attempt to dismantle the modules or tamper with any components. To do so will void all warranties and could result in serious injury.

The requirements of these instructions take precedence over local codes and regulations unless those codes and regulations are more stringent than the recommendations. Particular attention should be paid to the Codes and Standards dealing with natural gas refueling.

2. READ INSTRUCTIONS CAREFULLY

Please read this manual carefully and those of other equipment supplied prior to installation and operation.

If you experience any difficulties or are unsure about any feature, contact BRC FuelMaker's Technical Support Group at :

1-714-656-5905 (North America)
+39.0172.486.628 (Europe and Asia)

3. LOCATION OF THE FUELMAKER VRA

The BRC FuelMaker is to be installed outdoors in non-hazardous locations as defined by the C22.1 Canadian Electrical Code (Canada), and the NFPA 70 National Electrical Code (USA). Do not install the BRC FuelMaker under or near a window or directly under potential gas accumulating overhangs. Leaves, snow and other debris should be kept clear of the air inlet and outlet of the BRC FuelMaker. Do not install the BRC FuelMaker beneath overhangs which can shed snow or rain directly

onto the unit. The BRC FuelMaker and the cylinders being filled must be located so they are both exposed to the same ambient temperature during refueling.

4. FOR NATURAL GAS ONLY

The BRC FuelMaker is for use with Natural Gas only and shall not be used for any purpose other than the refueling of cylinders certified for gas storage. The maximum cylinder pressure for the Model FMQ-2 or FMQ-2.5 is 20.7 MPa (3000 psi) or higher. The Model FMQ-2.36 requires a maximum cylinder pressure of 24.8 MPa (3600 psi) or higher. Attempts to use the BRC FuelMaker VRA for any other purpose could result in serious injury.

The BRC FuelMaker may be used for residential, commercial and industrial applications only in accordance with the requirements of the authorities having jurisdiction.

Do not run vehicle engine while refueling and ensure all ignition sources are OFF (including pilot lights in recreational vehicles). Do not smoke or bring an open flame within 3 m (10 ft.) of the vehicle being refueled.

5. IF YOU SMELL GAS

Shut off the manually-operated valve in the gas supply to the BRC FuelMaker. If possible, close the manual gas valve of the storage cylinder being refueled. Extinguish any open flames. Contact an authorized service representative.

6. REFUELING HOSE

The fill hose must be protected from physical damage, abrasion or from being driven over. When a sign of wear, deterioration, or other damage is apparent in the hose or nozzle, the hose or nozzle must be inspected or replaced immediately by an authorized service representative.



NATURAL GAS VEHICLE REFUELING APPLIANCES

Natural Gas is currently utilized for home, industrial and electricity generation use. In addition, it has been utilized as a Vehicle Fuel since the 1930s. Early vehicles used low pressure Natural Gas and carried it in balloons on trailers or the roof of the vehicle. Modern personal and fleet vehicles use compressed Natural Gas stored in cylinders.

Currently, Natural Gas powers over one million vehicles worldwide and 1/3 of all new transit buses ordered are Natural Gas powered. Natural Gas is currently utilized in passenger vehicles, fleet vehicles, taxis, buses, lift trucks and ice resurfacers. Natural Gas is a safe viable alternative to gasoline. Natural Gas has a higher octane rating and burns cleaner with less emissions. Natural Gas powered vehicles require less maintenance and have longer engine life. It is lighter than air, and if Natural Gas escapes, it dissipates very rapidly.

BRC FuelMaker Vehicle Refueling Appliances can be found in residences to fuel personal vehicles, in hockey rinks to fuel ice resurfacers, in warehouse operations to fuel lift truck fleets and in many businesses to fuel company vehicles.



TABLE OF CONTENTS

1 INTRODUCTION 1

2 TECHNICAL SPECIFICATIONS 1

3 OPERATING PARAMETERS 2

 3.1 Delivery-Side Refueling Components 2

 3.2 Temperature/Pressure Compensation 2

 3.3 Pressure Start System..... 2

 3.4 Vent Connection 2

 3.5 Verification of Proper Installation 3

 3.6 Storage System 4

4 OPERATING INSTRUCTIONS 6

 4.1 Standalone User Interface 6

 4.2 Remote Start 7

 4.3 Remote Fueling Panel 7

 4.4 Auxiliary Fueling Panel 8

 4.5 Pressure Start System 8

5 DIAGNOSTICS AND TROUBLESHOOTING..... 10

 5.1 Abnormal User Panel Indications (Flashing) 10

 5.2 Indicator Lights Check 11

 5.3 Service Hours 11

 5.4 Diagnostics When in "Incorrect Mode" 12

 5.5 Call for Service Mode..... 16

 5.6 Blowback Error 17

 5.7 Breakaway Assembly..... 17

 5.8 Preventative Maintenance 18

6 ANCILLARY DEVICES 19

 6.1 Pressure Start System 19

 6.2 Remote Fueling Panel 19

 6.3 Auxiliary Fueling Panel 19

 6.4 Remote Start 20

 6.5 Fast Fill & Integrated Start 20

 6.6 Low Pressure Tower Dryer..... 20

 6.7 Hoses 21

 6.8 Lock Assembly 21

7 INSTALLATION COMPLETION DETAIL 22

8 WARRANTY..... 23



TABLES and FIGURES

Table 1	Technical Specifications	1
Table 2	Shutdown Pressure vs Ambient Temperature	3
Table 3	User Panel Normal Operating Modes	7
Table 4	Abnormal User Panel Indications	10
Table 5	Hours Remaining Before Service	11
Table 6	Diagnostics for "INCORRECT" Mode	12
Table 7	Diagnostics for "CALL FOR SERVICE " Mode	16
Table 8	Installation Details	22
Figure 1	BRC FuelMaker VRA Exterior	4
Figure 2	BRC FuelMaker VRA Interior	5
Figure 3	User Panel	6
Figure 4	Remote Fueling Panel	19
Figure 5	Auxiliary Fueling Panel	19
Figure 6	Remote Start	20
Figure 7	Fast Fill Station	20
Figure 8	Low Pressure Dryer Tower	20



1 INTRODUCTION

The BRC FuelMaker model FMQ-2, FMQ-2.5, and FMQ-2-36 *Vehicle Refueling Appliances (VRAs)* are self-contained oil-free outdoor appliances used for Natural Gas refueling of vehicles and storage cylinders. The BRC FuelMaker VRA can be used in direct fill applications where one or two hoses are connected to the vehicle to be filled or configured for remote time-fill applications by connecting to a *Remote Fueling Panel (RFP)* or for manifolded time-fill applications by connecting to one or more *Auxiliary Fueling Panels (AFP)*. The BRC FuelMaker VRA can also be connected to a *Fast-Fill Storage System* for use with fast-fill applications.

Clean burning Natural Gas is less volatile than traditional fuels and decreases required maintenance on your vehicle or equipment. The BRC FuelMaker VRA compliments the existing network of Natural Gas Fueling Stations.

The model FMQ-2 is designed to fill 20.7 MPa (3000 psi) fuel systems at a nominal flow rate of 3.4 m³/hr (2 scfm). The model FMQ-2.5 is designed to fill 20.7 MPa (3000 psi) fuel systems at a nominal flow rate of 4.25 m³/hr (2.5 scfm). The model FMQ-2-36 is designed to fill 24.8 MPa (3600 psi) fuel systems at a nominal flow rate of 3.1 m³/hr (1.8 scfm).

The BRC FuelMaker VRA contains *Ambient Temperature Sensors* which allow the *Electronics Module* to determine the

maximum temperature compensated fill pressure the BRC FuelMaker VRA will deliver to the storage cylinder. This prevents over-pressurization of the fuel cylinder should it warm up after being filled.

The BRC FuelMaker VRA is air-cooled and is rated for an operating ambient temperature range of -40°C to +45°C (-40° F to +113°F). Air is drawn into the BRC FuelMaker VRA through a set of louvers in the rear of the housing and is exhausted through another set of louvers in the front of the housing (See Figure 1). The BRC FuelMaker VRA has a *User Panel* located at the front of the unit where the current operating status and error messages are displayed.

Important: *FMQ-2 and FMQ-2.5 are CGA and AGA certified for Canada and the United States. FMQ-2-36 is AGA certified only for the United States. VRAs equipped with Pressure Start System are AGA certified for commercial and industrial applications only for the United States of America. If a model FMQ-2-36 VRA is used to fill a system designed to deliver fuel to a vehicle with a lower pressure rating, a pressure compensating system must be installed to ensure the vehicle cylinder is not over-pressurized. Serious injury or damage to the equipment may result if these precautions are not taken.*

2 TECHNICAL SPECIFICATIONS

GAS	FMQ-2	FMQ-2.5	FMQ-2-36
Maximum Discharge Pressure:	20.7 MPa @ 21°C (3000 psig @ 70°F)	20.7 MPa @ 21°C (3000 psig @ 70°F)	24.8 MPa @ 15°C (3600 psig @ 59°F)
Minimum Inlet Pressure:	1.7 kPa (7" w.c.) at rated flow	1.7 kPa (7" w.c.) at rated flow	1.7 kPa (7" w.c.) at rated flow
Maximum Inlet Pressure:	14 kPa (2 psig) at rated flow	3.5 kPa (14" w.c.) at rated flow	3.5 kPa (14" w.c.) at rated flow
Nominal Flow Rate (60 Hz):	3.4 m ³ /hr @ 21°C and 1.7 kPa inlet (2.0 SCFM @ 70°F and 7" w.c. inlet)	4.25 m ³ /hr @ 21°C and 1.7 kPa inlet (2.5 SCFM @ 70°F and 7" w.c. inlet)	3.1 m ³ /hr @ 15°C and 1.7 kPa inlet (1.8 SCFM @ 59°F and 7" w.c. inlet)
ELECTRICAL			
Electrical Supply:	240 Volt AC Single Phase 60 Hz 220 Volt AC Single Phase 50 Hz	240 Volt AC Single Phase 60 Hz 220 Volt AC Single Phase 50 Hz	240 Volt AC Single Phase 60 Hz 220 Volt AC Single Phase 50 Hz
Circuit Ampacity:	15 Amps	15 Amps	15 Amps
Full Load Amperage (60/50Hz):	7.0 / 6.5 Amps	8.0 / 7.25 Amps	7.0 / 6.5 Amps
Average Power Consumption:	0.9 to 1.2 kWh	1.1 to 1.5 kWh	0.9 to 1.2 kWh
MECHANICAL			
Dimensions (L x W x H):	540 mm x 500 mm x 990 mm (21" x 20" x 39")		
Unit Weight / Shipping Weight:	66 kg (145 lbs)		
Noise Level:	49 dBA @ 5 m (16.5 ft), hemispherical field		
Ambient Temperature Rating:	-40°C to +45°C (-40°F to +113°F)		

Table 1 Technical Specifications



3 OPERATING PARAMETERS

3.1 DELIVERY-SIDE REFUELING COMPONENTS

The BRC FuelMaker VRA is supplied with a fiber-reinforced coiled high pressure hose to deliver fuel to the vehicle. Optional hose lengths of up to 8m (26 ft) for FMQ-2 / FMQ-2.5 and 6.5m (21ft) for FMQ-2-36 are available by special order. The hose is connected to the BRC FuelMaker VRA via a breakaway fitting. This allows the hose to be pulled free from the BRC FuelMaker VRA without damage in the event the User drives the vehicle away without disconnecting. The breakaway force is approximately 150 N (34 lbs.) and is independent of the pressure contained in the fill hose. The BRC FuelMaker VRA will shut down immediately after a breakaway occurs. The fill hose can be easily re-connected by pushing the hose tip into the *Breakaway Guide* (Figure 1) until it snaps positively into position.

The BRC FuelMaker VRA must be used with a refueling nozzle that is AGA/CGA NGV 1 Type 3 approved for Natural Gas "Slow-Fill" applications. The nozzle must seal reliably throughout the temperature range and conditions anticipated for the location. An integral normally-closed poppet valve in the nozzle is absolutely essential as it must maintain a positive pressure in the VRAs Blow-Down System at all times; air must not migrate up the fill hose and into the blow-down vessel during standby.

All AGA/CGA application-approved nozzles are available from BRC FuelMaker.

IMPORTANT

The breakaway fitting in the FMQ-2-36 will not engage the hose designed for the FMQ-2 / FMQ-2.5 or vice versa. If you are experiencing any difficulty or are unsure of any feature, please contact an Authorized Dealer.

At the completion of each refueling cycle the high pressure gas contained downstream of the compressor is returned to a Blow-down Vessel (located inside the VRA) thus reducing the pressure in the fill hose to approximately 2 bar (29 psig). "Blow-down" allows the nozzle to be disconnected from the vehicle. The Blow-down System has been designed to accommodate the volume of gas contained by the fill hose, refueling nozzle and space between the vehicle receptacle and check valve only. Therefore, the maximum allowable length of fill hose has been limited to a combined length of 9m (29 ft) for FMQ-2 / FMQ-2.5 and 6.5 m (21 ft) for FMQ-2-36, which accounts for the fact that two fill hoses may be used on one FuelMaker VRA. Single hose lengths of 4.5 m (13 ft) to 6.5 m (21 ft) are available.

Do not connect additional devices or hose lengths to the delivery side of the BRC FuelMaker. To do so will over-pressurize the Blow-down System and cause the pressure relief valve to vent natural gas to the atmosphere. Do not connect any hose or device which has not been approved as part of the BRC FuelMaker VRA package.

3.2 TEMPERATURE/PRESSURE COMPENSATION

The BRC FuelMaker VRA contains a temperature sensor in the inlet air stream which determines the allowable fill pressure for a particular ambient temperature. Once a cylinder has been refueled, any increase in ambient temperature will cause the pressure to rise in the cylinder. The temperature/pressure compensation feature attempts to fill the cylinders with a constant mass of gas, regardless of the ambient temperature. Therefore, in very cold temperatures the fill pressure will be quite low, but the same mass of gas that constitutes a full cylinder is present. This feature prevents the vehicle cylinders from being over-pressurized if the ambient temperature rises (e.g. as the day warms). In order for the temperature/pressure compensation system to function properly, the vehicle to be refueled must be parked in a location where the gas cylinders in the vehicle will be exposed to the same ambient temperature as the temperature sensor located in the BRC FuelMaker VRA.

If, after refueling, the maximum filling pressure falls outside the allowable range as indicated in Table 2 contact an Authorized FuelMaker Dealer.

3.3 PRESSURE START SYSTEM (Optional)

All BRC FuelMaker VRAs equipped with the Pressure Start option will automatically restart and fill the storage or the manifold line. All VRAs are equipped with automatic temperature compensation and will shut down at a maximum pressure determined by the ambient temperature sensed at the BRC FuelMaker VRA (see Table 2). When connected to a storage system or manifold line the Pressure Start System continuously monitors the line pressure and turns the VRAs on when the line pressure drops below a pre-determined level.

3.4 VENT CONNECTION

A 3/8" NPT vent port is located as shown in Figure 1 and is protected by a screen fitting. The vent port discharges any gas released by the pressure relief valve in order to protect the *Blow-down System* from over-pressurization.

Do not allow ice to build up at the open vent connection. It must remain clear if it is to be able to vent gas and protect the Blow-down System from over-pressurization.



FMQ-2 & FMQ-2.5		FMQ-2-36	
20.7 MPa @ 21°C	3000 psig @ 70°F	24.8 MPa @ 15°C	3600 psig @ 59°F
18.3 MPa @ 10°C	2660 psig @ 50°F	23.2 MPa @ 10°C	3370 psig @ 50°F
16.6 MPa @ 0°C	2410 psig @ 32°F	21.0 MPa @ 0°C	3050 psig @ 32°F
15.0 MPa @ -10°C	2180 psig @ 14°F	18.8 MPa @ -10°C	2730 psig @ 14°F
13.3 MPa @ -20°C	1930 psig @ -4°F	16.5 MPa @ -20°C	2390 psig @ -4°F
11.6 MPa @ -30°C	1690 psig @ -22°F	14.3 MPa @ -30°C	2073 psig @ -22°F
10.0 MPa @ -40°C	1450 psig @ -40°F	12.1 MPa @ -40°C	1754 psig @ -40°F

Note: Pressure readout may vary ± 1 MPa / 145 psig from the above theoretical values.
 At temperatures below -45°C (-49°F) and above +55°C (+131°F) the micro-processor will not allow the BRC FuelMaker to start and indicate an "Incorrect" condition at the user panel.

Table 2 Shutdown Pressure vs. Ambient Temperature

3.5 VERIFICATION OF PROPER INSTALLATION

The BRC FuelMaker VRA must be installed outdoors and be mounted on a firm, level, non-combustible base such as poured or pre cast concrete slab placed on a suitably prepared base (e.g. crushed stone, 150 mm (6") deep). Areas should be avoided where damage from excessive ice build-up may occur such as building overhangs or where vegetation, snow or debris may clog the cooling air inlet/outlet. The BRC FuelMaker VRA should not be situated where the vehicle refueling hose must cross a walkway or access route to reach the vehicle. If the BRC FuelMaker VRA is installed near building openings, a 10 mm (3/8") minimum inside diameter steel vent line should be connected to the vent port and routed to a safe place of discharge as required by local codes. The maximum allowable vent line length is limited to 5 m (16.5 ft.). This is to protect the low pressure switch from over-pressurization. The screen fitting should (if applicable) be transferred to the end of a remote vent line to protect it from blockage.

It is extremely important to have the remote vent line terminated in such a way that water cannot enter the line and freeze.

The BRC FuelMaker VRA should only be installed in distribution areas of relatively dry gas, typically containing not more than 110 mg/m³ (7 lbs per million cubic feet) of water vapor.

It is recommended that units not be located where direct or reflected noise is aimed at neighboring windows or other

building openings. The BRC FuelMaker VRA should be positioned in a location where it will not become damaged from possible vehicle impact. If the FuelMaker VRA is located close to or on a driveway, provisions must be made to protect the BRC FuelMaker VRA from damage (bollards). It is very important to secure the VRA to the non-combustible base. The BRC FuelMaker VRA must resist the break-away force applied to it in the event of a break-away (e.g. vehicle driving away with the *Fill Hose* still attached).

The BRC FuelMaker VRA can be programmed by the Installer, to change the following parameters in the field:

- Recognition of remote connected (e.g. RFF or APT) _____
- Maximum tank volume, 140 or 280 litres (37 or 74US gal.) _____
- Recognition of remote shutdown device (e.g. Natural Gas Detector) connected _____
- Pressure rise monitoring ON/OFF _____
- External interlock ON/OFF _____
- Fill time limit _____

Upon receipt of a new BRC FuelMaker, the parameters have been factory-set to: Remote panel not connected, 280 litres, Shutdown device not connected and Pressure rise monitoring ON.

The BRC FuelMaker VRA monitors the pressure rise at the *Fill Hose* during refueling in order to check for possible leaks. A leak is presumed if the pressure does not rise at a sufficient rate. Since the rate of pressure rise depends on the volume of the cylinder being filled, some adjustment must be

made to accommodate the slower pressure rise associated with the larger tanks; the Installer can program such an adjustment. For the greatest leak detection sensitivity, the lowest tank setting (140 litres) should be used, unless the tank volume exceeds 140 litres. In the rare case where the tank volume is in excess of 280 litres, or where the a BRC FuelMaker VRA is connected to a ground storage of larger than 280 litres water capacity, the pressure rise monitoring system will have to be programmed "OFF"; this setting should not be used unless absolutely necessary and the User should be aware that hose leakage will not be monitored in this case.

If an interlocking (remote shutdown) device such as a natural gas detector has been connected to the VRA, the Installer must program VRA to acknowledge the presence of an external interlock

When BRC FuelMaker VRAs are connected to a manifolded

system with AFPs or RFPs the line must be equipped with a Pressure Relief Valve and Purge Valve. This will allow the fill hose to be reconnected in the event of a breakaway.

3.6 STORAGE SYSTEM

The BRC FuelMaker VRA can be connected to a Storage System with 1/4" stainless steel high pressure tubing. A Storage System must incorporate a check valve at the high pressure inlet to the storage tanks. When connecting the VRA to a Storage System, please contact BRC FuelMaker Technical Support for assistance.

CAUTION: High pressure tubing between the BRC FuelMaker VRA and a Storage System is not blown down; high pressure remains in this stainless steel tubing at all times and caution must be exercised when servicing the tubing or pressure fittings.

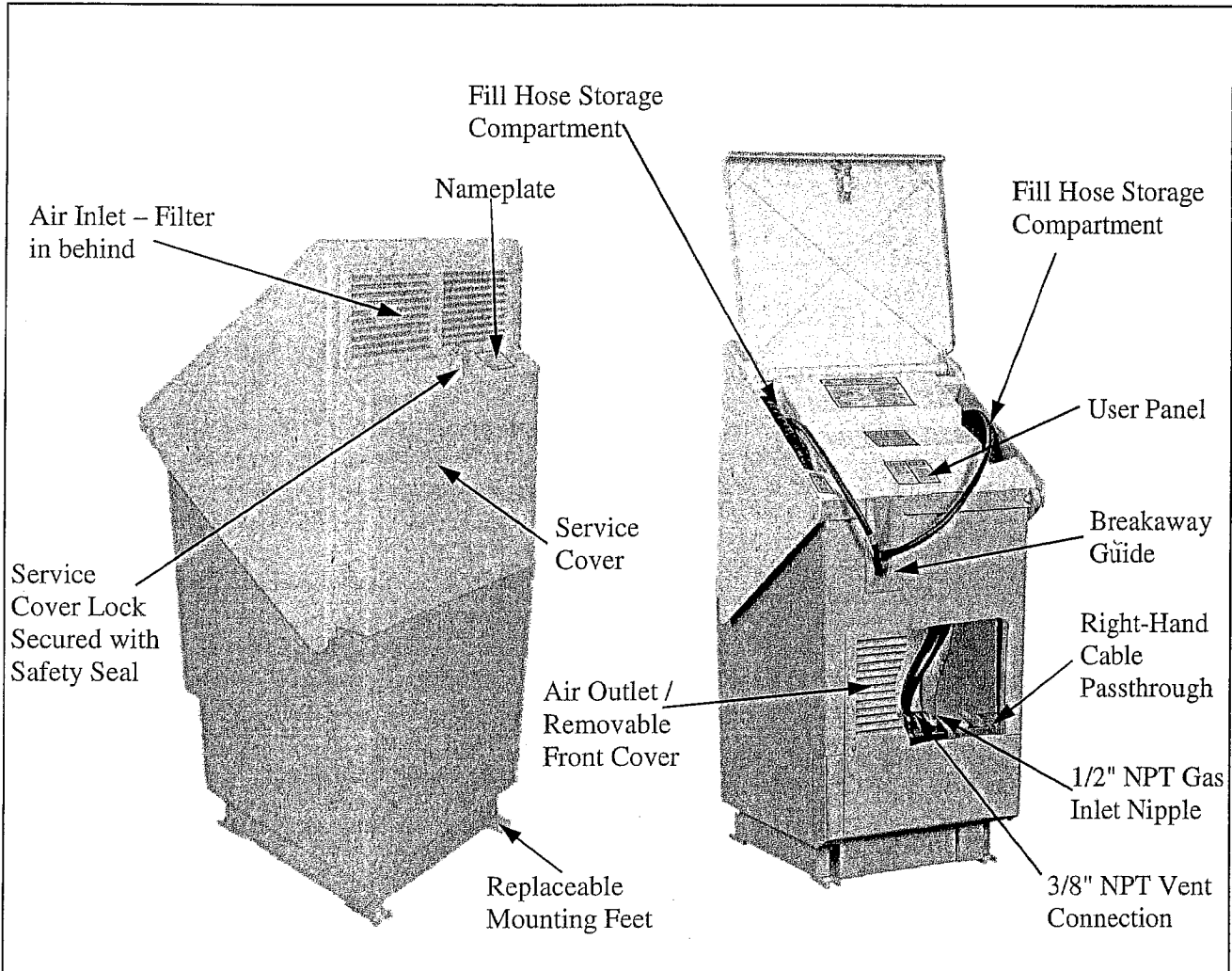


Figure 1 BRC FuelMaker VRA —Main Components

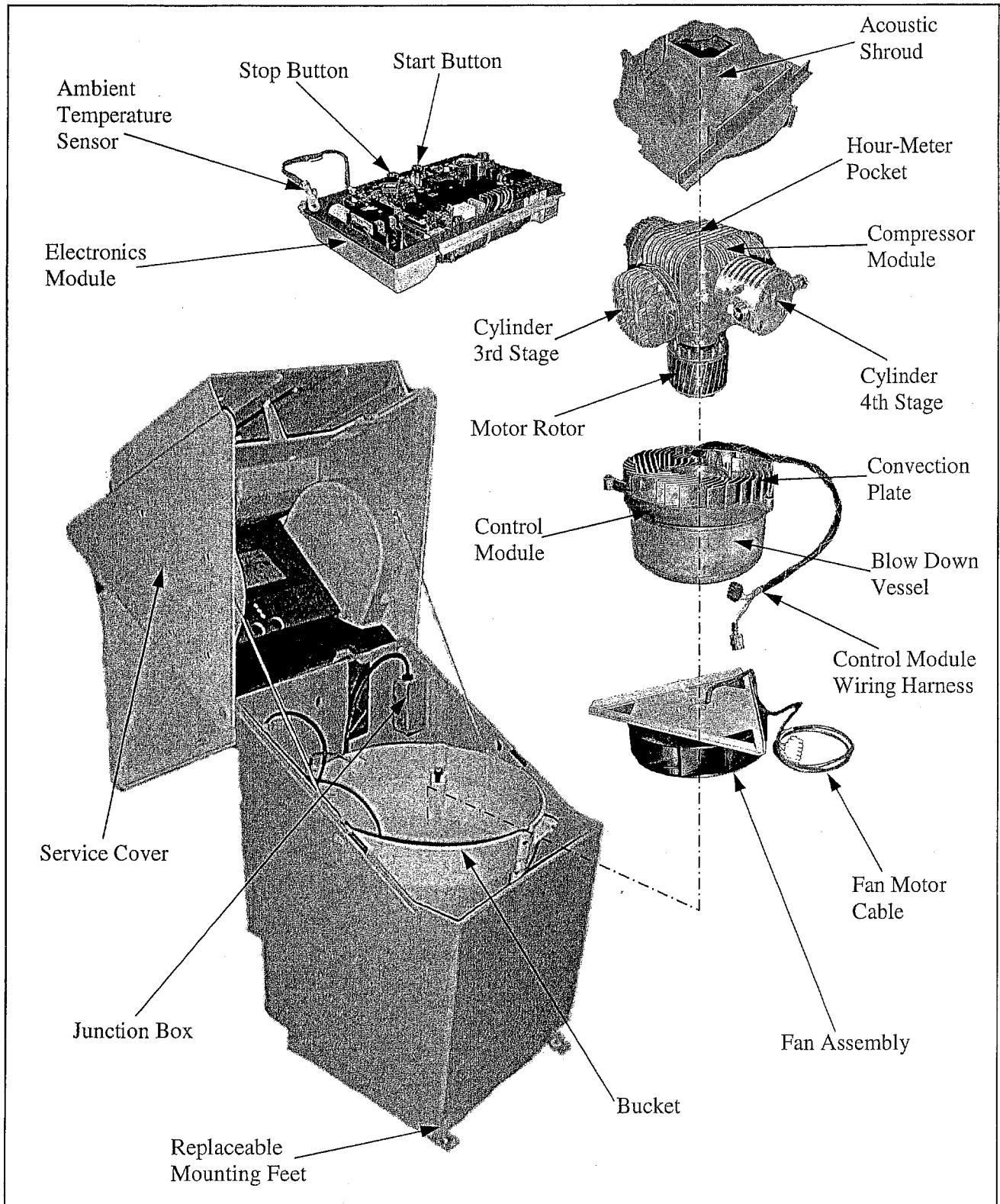


Figure 2 BRC FuelMaker VRA Interior

4 OPERATING INSTRUCTIONS

The BRC FuelMaker FMQ-2, FMQ-2.5 and FMQ-2-36 can be configured for operation as a standalone unit or by utilizing other accessories. The Operational Configurations are as follows:

- Standalone user interface
- Remote start
- Remote fueling panel
- Auxiliary fueling panel
- Pressure start
- Integrated start and fast fill

Regardless of the operational configuration, it is strongly recommended that the BRC FuelMaker VRA unit be inspected on a regular basis. The inspection should ensure that debris, ice or snow is not blocking the air inlet and air outlet louvers; ensure that the VRA has no visible damage; the user membrane is not damaged; and that the User Panel is showing no error codes. Regular lubrication of the nozzle with dry Teflon should be scheduled.

4.1 STANDALONE USER INTERFACE

Starting, stopping and monitoring of the BRC FuelMaker VRA takes place at the User Panel. The User Panel has sepa-

rate "START" and "STOP" buttons and three indicator lights, as shown in Figure 3.

Ensure there is sufficient lighting in the refueling area to see the User Panel and refueling hose assembly.

1. Connect the BRC FuelMaker VRA's refueling nozzle to the vehicle by aligning with the vehicle receptacle. Push the nozzle until the sleeve moves forward to firmly lock it onto the vehicle receptacle.
2. Press the START button on the User Panel to begin the refueling operation.
3. When refueling has stopped automatically, or when the STOP button is pressed, wait ten seconds. Push the nozzle assembly towards the vehicle receptacle while pulling back on the outer sleeve of the nozzle to disconnect it from the vehicle receptacle. Place nozzle and hose into the fill hose storage compartment.

If the Green and Red LEDs are flashing and you cannot disconnect the nozzle from the vehicle, refer to section 5.6 ERROR CONDITIONS, Blowback" of these instructions for details.

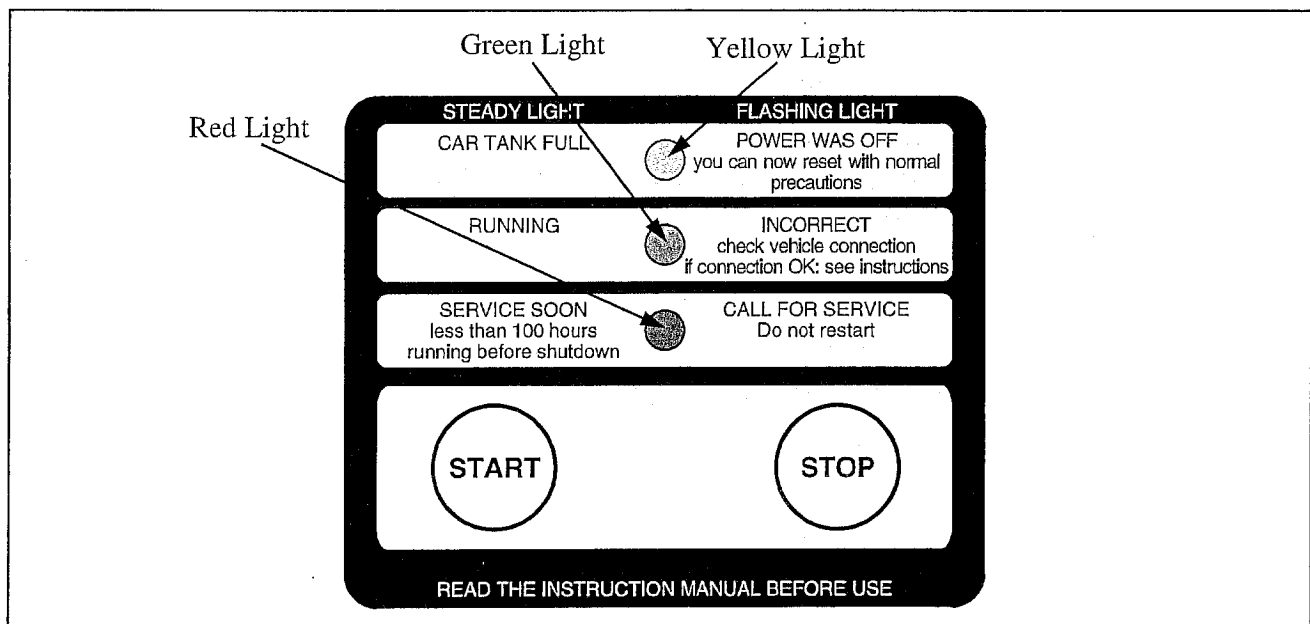


Figure 3 User Panel



INDICATION	DESCRIPTION
No Light Illuminated	READY to start, or electrical power is disconnected, or fuses require replacement. Note: if VRA is running and a power failure occurs and lasts less than 15 seconds, the VRA will start automatically 15 seconds after the return of power.
Yellow Light Steady	VEHICLE CYLINDERS(S) FULL The vehicle is full or the maximum pressure has been reached in a disconnected <i>Fill Hose</i> . The VRA can be restarted by pressing the START button.
Green Light Steady	RUNNING The VRA is running.
Red Light Steady	SERVICE SOON The VRA will run for less than 100 hours after which it will shut down if not serviced. Note: During the last 100 hours of operation, both the green light and red light will illuminate steadily while the VRA is in operation.

Table 3 User Panel Normal Operating Modes

4.2 REMOTE START

With a Remote Start (RS) System, a single BRC FuelMaker VRA or multiple BRC FuelMaker VRAs can be started. To operate the RS System, follow the operating instructions on the Instruction Plate supplied with the Control Station. The instructions consist of two steps.

1. With BRC FuelMaker VRAs powered up but off, press the **START** button. BRC FuelMaker VRAs will start randomly within one minute. The randomized delay is to avoid starting all VRAs at the same time and overloading the electrical and gas supply.
2. BRC FuelMaker VRAs will stop automatically when maximum pressure is reached.

The RS System does not affect the operation of the User Panels on the VRAs. Start and Stop functions, accessing error codes and operating hours may be performed as usual.

Ensure that you refer and read the Remote Start System Installation and User Instructions before using equipment.

4.3 REMOTE FUELING PANEL

The Remote Fueling Panel (RFP) delivers pressurized Natural Gas at a location remote from the BRC FuelMaker VRA. The temperature sensors within the RFP allow the electronics module in the BRC FuelMaker VRA to determine the maximum pressure to which the cylinder can be filled for a particular ambient temperature. This ensures that the cylinder being refueled is subjected to the same ambient temperature as the RFP.

The RFP has a hinged cover to allow access to the user panel

and fill hose. Starting, stopping and monitoring the BRC FuelMaker VRA takes place at the user panel.

To start fueling:

1. Connect the fill hose to the fill receptacle. (If the refueling hose assembly is equipped with a nozzle vent valve, place the valve in the "FILL" position).
2. Press the "START" button on the RFP.

Fueling will continue until the cylinder has been filled to the maximum temperature compensated pressure, or until the "STOP" button is pressed.

To stop fueling:

1. Check the indicator lights on the user panel. If the Yellow Light is on, the last fill cycle was completed and the cylinder is fully pressurized. If the Green Light is on steady, the fill cycle is still in progress. However, the STOP button may be pressed to interrupt the fill cycle manually.
2. Wait 10 seconds for the pressurized gas in the hose and nozzle to blowdown into the VRA. While the system is pressurized, the nozzle cannot be removed from the fill receptacle. (if the refueling hose assembly is equipped with a nozzle vent valve, place the valve in the "VENT" position).
3. Disconnect the refueling nozzle from the cylinder. Coil the fill hose and stow it inside the RFP or on one of the stowage hooks mounted beneath the RFP housing.

The User Panel is exactly the same as the User Panel on the BRC FuelMaker VRA.

Ensure that you refer and read the Remote Fueling Panel Installation and Operating Instructions before using equipment.



4.4 AUXILLIARY FUELING PANEL

The Auxiliary Fueling Panel (AFP) delivers pressurized Natural Gas at a location remote from the BRC FuelMaker VRA. The temperature sensors within the VRA (or Remote Fueling Panel if installed) allow the electronics module to determine the maximum pressure to which the cylinder can be filled for a particular ambient temperature. Ensure that the AFP and cylinder being refueled is subjected to the same ambient temperature as the VRA (or RFP if installed).

To start fueling:

1. Connect the fill hose to the fill receptacle. Turn the nozzle vent valve to the "FILL" position.
2. If the BRC FuelMaker VRA is equipped with a pressure start option, it will start automatically as the pressure in the high pressure tubing drops. If the VRA is equipped with a remote start system or RFP, push that device's "START" button.

Fueling will continue until the cylinder has been filled to the maximum temperature compensated pressure (or until the "STOP" button is pushed on the RFP).

To stop fueling:

1. Turn the nozzle vent valve to the "VENT" position and wait ten seconds for the pressurized gas in the refueling nozzle to dissipate.
2. Disconnect the refueling nozzle from the receptacle. Coil the fill hose and stow it inside the AFP or on one of the stowage hooks mounted beneath the AFP housing.

Ensure that you refer and read the Auxiliary Fueling Panel Installation and Operating Instructions before using equipment.

4.5 PRESSURE START SYSTEM

When the Pressure Start System (PSS) is installed, the BRC FuelMaker VRA may start at any time without prior warning. Always disconnect electrical power to the VRA before servicing.

In the event that the power to the VRA is interrupted, press the START button to re-initiate the PSS.

After initial power up of the BRC FuelMaker VRA, the PSS must be initialized by pressing the "START" button on the user panel of the FuelMaker VRA. The FuelMaker VRA will start and run until the storage system or pressurized manifold reaches the maximum temperature compensated pressure. The VRA will then shut down indicating FULL (solid yellow LED) on the user panel display. The PSS will monitor the high pressure tubing for a drop in pressure. When the pressure drops by

the pre programmed amount, the VRA will start.

The VRA will not automatically restart if the "STOP" button is pressed, an Incorrect mode is indicated on the user panel, or in the event of a power interruption. To resume operation, press the "START" button.

Ensure that you refer and read the Pressure Start System Kit Installation and Operating Instructions before using equipment.



Vehicle Refueling Appliance

Models FMQ-2, FMQ-2.5 and FMQ-2-36



5 DIAGNOSTICS AND TROUBLESHOOTING

5.1 ABNORMAL USER PANEL INDICATIONS (Flashing)

INDICATION	DESCRIPTION
Yellow Light Flashing	<p>POWER WAS OFF for more than 15 seconds. Press START to operate the BRC FuelMaker VRA.</p> <p>Note: If the power failure lasts for less than 15 seconds, the BRC FuelMaker VRA will start automatically 15 seconds after the return of power (providing that the VRA was running before the power failure).</p>
Green Light Flashing	<p>INCORRECT –The BRC FuelMaker VRA is shut down in an INCORRECT state but may be restarted by the User if the fault is corrected.</p> <p>The most common causes of an "INCORRECT" indication will be:</p> <ul style="list-style-type: none"> • incorrect or damaged connection to the vehicle. • a closed gas supply shut-off valve. • a blockage of in the FuelMaker VRA air vents. • a faulty filling hose (e.g. leak) • excessive filling time (25 hours continuous running). <p>Note: Vehicles, with total tank capacities in excess of 140 litres (37 US gal), may take longer than 25 hours to fill from empty under certain conditions (e.g. high ambient temperature, <i>Compression Module</i> approaching service interval, etc.)</p> <p>In this case, a thorough check for gas leakage shall be conducted. The BRC FuelMaker VRA may be simply restarted after a positive check that there is no other cause of the "INCORRECT" indication. If the User is routinely filling vehicles with a cylinder capacity greater than 140 litres, the maximum tank volume can be set by your local authorized dealer with a programming device.</p> <p>Details on the above faults are given in the "FAULT DIAGNOSTICS" tables. When the above have been checked and any obvious faults corrected, the unit may be restarted after first pressing the "STOP" button.</p>
Red Light Flashing	<p>CALL FOR SERVICE - The BRC FuelMaker VRA is shut down and a CALL FOR SERVICE is necessary.</p> <p>The automatic safety system will prevent a restart unless the fault is corrected by authorized personnel.</p>
Yellow, Green and Red lights flashing (simultaneously)	<p>HOURL-METER MISSING - The BRC FuelMaker VRA is shut down and the automatic safety system will prevent a restart. IMPORTANT: Before plugging the <i>hour-meter</i> into the <i>Electronics Module</i> circuit board, the main electrical power must be disconnected. Hour-meter data will be destroyed if power is not disconnected and the BRC FuelMaker VRA will not restart unless the <i>Compression Module</i> is changed.</p>
Yellow, Green and Red lights flashing (sequentially)	<p>SYSTEM LOCKOUT FOR APPROXIMATELY 15 SECONDS - The BRC FuelMaker VRA automatic safety system will prevent immediate restart due to internal requirements.</p>

Table 4 Abnormal User Panel Indications



5.2 INDICATOR LIGHTS CHECK:
(BRC FUELMAKER VRA Not Running)

To check that the indicator lights are working correctly, press and hold the **STOP** button. All three indicator lights should light briefly (about one second) and then go out. If no indicator lights come on, there is probably no power to the *Electronics Module* or the fuses require replacement. (If one or more indicator lights fail to illuminate there is probably an error in the *User Panel*).

5.3 SERVICE HOURS:

Table 5 displays the operating hours until the BRC FuelMaker VRA requires service (or hours since service up to the first 50 hours). To obtain the indications, the following button(s) have to be pressed:

If the BRC FuelMaker VRA is "RUNNING" press and hold the "START" button.

If the BRC FuelMaker VRA is "NOT RUNNING" First press and hold the "STOP" button, then press the "START" button.

After the code is displayed, release the "START" button first, followed by the "STOP" button (the VRA will not start if this sequence is not followed)

At first, all lights are illuminated briefly as a light check. The light check is followed by the operating hours check.

CODE	YELLOW	GREEN	RED	HOURS REMAINING UNTIL SERVICE
0 0 1	○	○	●	1450 and Higher
0 1 0	○	●	○	650 — 1449
0 1 1	○	●	●	350 — 649
1 0 0	●	○	○	250 — 349
1 0 1	●	○	●	150 — 249
1 1 0	●	●	○	50 — 149
1 1 1	●	●	●	0 — 49

Table 5 Hour Remaining before Service



5.4 DIAGNOSTICS WHEN IN "INCORRECT" MODE (Green Light Flashing) :

Pressing and holding the "STOP" button first acts as a light check by illuminating all 3 lights briefly. After this brief delay, error codes are displayed, Table 6 displays error codes for incorrect mode.

The BRC FuelMaker VRA has diagnostic capabilities both in

the "INCORRECT" (green light flashing) and the "CALL FOR SERVICE" (red light flashing) mode. To display the cause of an "INCORRECT" or a "CALL FOR SERVICE" mode, press and hold the "STOP" button. Tables 6 and 7 show the fault diagnostics and corrective actions.

The digits 0, 1 and 2 in Tables 6 and 7 correspond to the following light status:

0 = Light Off 1 = Steady 2 = Flashing

ERROR CODE		DESCRIPTION	CORRECTIVE ACTION
0	YEL off	Error indication lost or error in display or <i>Electronics Module</i> , or in connecting cables.	Check power and lights by pressing and holding "STOP" button. All lights should illuminate briefly. If OK: try normal filling procedure. If fault persists, contact Local Authorized Dealer.
0	GRN off		
0	RED off		
0	YEL off	Excessive motor temperature	Check if cooling path is clear. If OK: Try normal filling procedure. If fault persists, contact Local authorized Dealer.
0	GRN off		
1	RED steady		
0	YEL off	Insufficient rise of filling pressure at beginning of fill cycle, and below 20 bar g (290 psig). [7 minutes for 280 liters (74 US gal.) setting].	Check that refueling nozzle is properly connected to vehicle. If OK: check that total vehicle cylinder volume does not exceed the maximum volume of 140 litres (37 U.S. gal.) [may be reset to 280 litres (74 U.S. gal.) by authorized Dealer]. If OK: Check high pressure system for leaks. If leaks are found, contact Local Authorized Dealer. If no leaks are found, restart the VRA. If fault persists, contact Local Authorized Dealer.
1	GRN steady		
0	RED off		

Table 6 Diagnostics for "INCORRECT" Mode



Vehicle Refueling Appliance

Models FMQ-2, FMQ-2.5 and FMQ-2-36

ERROR CODE		DESCRIPTION	CORRECTIVE ACTION
0	○ YEL off	Sudden pressure drop in high pressure system to below 20 bar g (290 psig).	<p>Check high pressure system for leaks.</p> <p>If OK: start VRA with refueling nozzle disconnected from vehicle (approved refueling nozzles will seal when disconnected from vehicle). Allow VRA to run until "FULL" is indicated.</p> <p>If the BRC FuelMaker VRA continues to run for longer than 1 minute with disconnected refueling nozzle, contact Local Authorized Dealer.</p>
1	● GRN steady		
1	● RED steady		
<p>Note: Error Code 011 can also result from:</p> <p>a) When filling two vehicles simultaneously if either of the vehicle check valves stick, or if a second vehicle is connected while the BRC FuelMaker VRA is running. To start filling procedure, always connect the refueling nozzle to the vehicle receptacle first, open the nozzle shut-off valve if provided, and subsequently start the FuelMaker VRA.</p> <p>b) Hydrate (ice) blockages (snow-like) within the fill hose fittings that are suddenly blown clear. Low temperatures and wet gas contribute to hydrate formation.</p>			
0	○ YEL off	External Interlock (remote shut-down).	<p>Check condition which caused interlock (e.g. Remote Panel R410, gas sensor) if an external interlock has been installed.</p> <p>Restart the unit, if safe to do so.</p> <p>If fault persists, contact Local Authorized Dealer.</p>
2	⊗ GRN flashing		
1	● RED steady		
1	● YEL steady	Temperature too low or too high or failure of temperature sensor.	<p>Restart the unit if cause was temperature below -45° C (-49° F) or above +45° C (+113° F).</p> <p>If fault persists, contact Local Authorized Dealer.</p>
0	○ GRN off		
0	○ RED off		
1	● YEL steady	Insufficient inlet pressure.	<p>Check that the main Natural Gas supply valve is open.</p> <p>If OK: restart the BRC FuelMaker VRA.</p> <p>If fault persists, contact Local Authorized Dealer.</p>
0	○ GRN off		
1	● RED steady		
1	● YEL steady	Excessive surface temperature or failure of temperature sensor while BRC FuelMaker VRA is running.	<p>Check to see if the cooling air path is clear.</p> <p>If OK: restart the BRC FuelMaker VRA.</p> <p>If fault persists, contact Local Authorized Dealer.</p>
0	○ GRN off		
2	⊗ RED flashing		

Table 6 Diagnostics for "INCORRECT" Mode (continued)



Vehicle Refueling Appliance

Models FMQ-2, FMQ-2.5 and FMQ-2-36

ERROR CODE		DESCRIPTION	CORRECTIVE ACTION
1	● YEL steady	Stop button sequencing error.	Press "STOP" button then "START" button to restart the unit. If fault persists, contact Local Authorized Dealer.
1	● GRN steady		
0	○ RED off		
1	● YEL steady	Electronics error.	Press "STOP" button then "START" button to restart the unit. If fault persists, contact Local Authorized Dealer.
1	● GRN steady		
1	● RED steady		
1	● YEL steady	No storage of operating hours during last power failure.	Restart the unit. If fault persists, contact Local Authorized Dealer.
1	● GRN steady		
2	⊙ RED flashing		
1	● YEL steady	Failure of motor controls	Restart the unit. If fault persists, contact Local Authorized Dealer.
2	⊙ GRN flashing		
0	○ RED off		
1	● YEL steady	Excessive Pressure Rise	Ensure that the refueling hose is properly connected to the vehicle. If OK: Check for refueling hose blockage. If OK: Restart the FuelMaker VRA
2	⊙ GRN flashing		
1	● RED steady		
1	● YEL steady	Maximum running time exceeded (more than 25 hours).	Verify that the maximum vehicle cylinder volume does not exceed the maximum volume of 140 litres (37 U.S. gal.) [may be set to 280 litres (74 U.S. gal.) by Local Authorized Dealer]. If Cylinder volume is correct, check for leaks (smell). If leaks detected, contact Local Authorized Dealer. If no leaks detected, restart the FuelMaker VRA and complete the fill. If fault persists, contact Local Authorized Dealer.
2	⊙ GRN flashing		
2	⊙ RED flashing		

Table 6 Diagnostics for "INCORRECT" Mode (continued)



Vehicle Refueling Appliance

Models FMQ-2, FMQ-2.5 and FMQ-2-36

ERROR CODE		DESCRIPTION	CORRECTIVE ACTION
2	- YEL flashing	Power was off.	Restart the VRA.
0	GRN off		
0	RED off		
2	- YEL flashing	Failure of Blow-down System.	<p>If refueling nozzle is difficult to disconnect, reduce pressure in the hose by closing the fuel supply valve between the vehicle cylinder(s) and engine, then start and run the engine until it quits.</p> <p>Open the fuel supply valve and restart the VRA.</p> <p>If fault persists, contact Local Authorized Dealer.</p>
0	GRN off		
1	RED steady		
2	- YEL flashing	<p>Insufficient pressure rise with tank pressure exceeding 20 bar g (290 psig) or beyond 6 minutes after start up</p> <p>[with 280 litre (74 U.S. gal.) setting: 14 minutes]</p>	<p>Check high pressure system for leaks.</p> <p>If OK: turn off gas supply and restart the VRA. It should shut down within 1 minute indicating "INCORRECT" 101.</p> <p>If fault persists, contact Local Authorized Dealer.</p>
1	GRN steady		
0	RED off		
2	- YEL flashing	Faulty Hour-meter	<p>Restart the VRA.</p> <p>If fault persists, contact Local Authorized Dealer.</p>
2	- GRN flashing		
0	RED off		

Table 6 Diagnostics for "INCORRECT" Mode (continued)



Vehicle Refueling Appliance

Models FMQ-2, FMQ-2.5 and FMQ-2-36

5.5 "CALL FOR SERVICE MODE" (Red Light Flashing)

Pressing and holding the "STOP" button first acts as a light check by illuminating all three lights briefly. After this brief delay, the error codes described in Table 5 are displayed by pressing and holding the "STOP" button. Up to five error

conditions are stored and retrieved by respectively pressing the "START" button (while the "STOP" button remains pressed continuously) until the 222 indication (end of stored messages) is given. Corrective action must be performed by authorized service personnel.

ERROR CODE		DESCRIPTION	CORRECTIVE ACTION
0	YEL off	Service Interval Overdue	Contact Local Authorized Dealer.
0	GRN off		
2	RED flashing		
0	YEL off	Excessive Blow-down Pressure or vehicle check valve stuck	Contact Local Authorized Dealer.
1	GRN steady		
2	RED flashing		
0	YEL off	Failure of High Pressure Transducer.	Contact Local Authorized Dealer.
2	GRN flashing		
0	RED off		
1	YEL steady	Failure of Motor Controls	Contact Local Authorized Dealer.
2	GRN flashing		
0	RED off		
2	YEL flashing	Faulty <i>Hour-meter</i>	Contact Local Authorized Dealer.
2	GRN flashing		
0	RED off		
2	YEL flashing	End of stored messages	No action required.
2	GRN flashing		
2	RED flashing		

Table 7 Diagnostics for Call for Service Mode



5.6 BLOWBACK ERROR

If the Green and Red LEDs are flashing and a blowback condition has been detected. A blowback occurs when the check valve in the vehicle receptacle is unable to seal after the BRC FuelMaker VRA shuts down and natural gas from the vehicle flows back through the hose causing the pressure inside the BRC FuelMaker VRA to build up. The BRC FuelMaker VRA's sensors and software will detect this condition and automatically seal off the blowback until the user can intervene. However, the resulting high pressure in the hose will prevent the nozzle from being removed from the vehicle receptacle.

If the nozzle cannot be removed from the vehicle or equipment receptacle, DO NOT attempt to force the nozzle off or separate the refueling hose breakaway. Refer to the following instructions or contact an authorized service representative.

If you experience a blowback condition, press the STOP button, wait ten seconds and disconnect the nozzle. Depending on the vehicle or equipment fuel system, you may need to repeat this procedure 2 or 3 times before the nozzle releases.

If you are still unable to disconnect the nozzle, the pressure in the vehicle fuel system must be reduced manually to facilitate removal of the nozzle. There are two types of vehicle or equipment fuel systems and it is important to follow the appropriate procedure.

The following instructions for reducing the vehicle or equipment fuel system pressure manually must be clearly understood and carefully followed. If you are unsure or unable to carry out this procedure, contact an authorized service representative.

Vehicles With Manually Operated Tank Valves

If the vehicle has a manually operated tank valve, close the valve and then press the STOP button on the BRC FuelMaker VRA. Wait ten seconds and disconnect the nozzle. Depending on the vehicle fuel system, you may need to repeat this procedure 2 or 3 times before the nozzle releases.

IMPORTANT NOTE: *Many vehicles and equipment have a 1/4 turn shutoff valve in the fuel line between the cylinder and the engine. Do not mistake this valve for the manually operated tank valve mentioned above. A manually operated valve is located directly on the end of the cylinder.*

Once you have disconnected the BRC FuelMaker VRA nozzle from the vehicle, do not attempt to use the vehicle or the BRC FuelMaker VRA until the cause of the blowback has been determined. Contact the vehicle manufacturer or their representative.

Vehicles Without Manually Operated Tank Valves

If the vehicle or equipment does not have a manually operated tank valve, the pressure in the vehicle cylinder must be released by allowing it to vent to atmosphere through the VRA. Follow these steps:

1. Do Not disconnect the BRC FuelMaker VRA nozzle.
2. Extinguish all open flames in the area.
3. Ensure that the vent line from the BRC FuelMaker VRA terminates outdoors and that the vented natural gas will not impinge on building openings (e.g. windows, doors, mechanical air intakes etc.) or potential gas-trapping pockets (e.g. overhangs etc.)
4. Turn off the circuit breaker supplying power to the BRC FuelMaker VRA. Natural gas will begin to vent through the VRA vent line.
5. Carefully monitor the venting of gas throughout the process to ensure it disperses safely. This may take up to 30 minutes depending on the capacity of the vehicle cylinder and how full it was when the condition occurred.

IMPORTANT NOTE: *If you need to stop or interrupt the flow of gas at any time, turn on the circuit breaker supplying power to BRC FuelMaker VRA. The BRC FuelMaker VRA will automatically seal off the flow of gas until the process can be resumed.*

7. Once the flow of vented gas has slowed and stopped, the vehicle cylinder is empty and the BRC FuelMaker VRA nozzle can be disconnected.
8. Turn on the breaker supplying power to the BRC FuelMaker VRA.

Once you have disconnected the BRC FuelMaker VRA nozzle from the vehicle, do not attempt to use the vehicle or the BRC FuelMaker VRA until the cause of the blowback has been determined. Contact the vehicle manufacturer or their representative.

5.7 BREAKAWAY ASSEMBLY

In the event that the vehicle is driven away with the BRC FuelMaker VRA refueling hose still connected to the vehicle, the refueling hose will safely separate at the breakaway assembly located in the VRA housing and stop the flow of gas.

If the vehicle is driven away while the BRC FuelMaker VRA is refueling and the refueling hose is still connected to the vehicle, the hose will safely separate at the breakaway and stop the flow of gas.

The hose can be quickly reattached at the breakaway by pushing the hose end into the guide until it snaps into place.



5.8 PREVENTATIVE MAINTENANCE

To ensure many years of trouble free operation it is recommended that preventative maintenance be practiced. Ensure no items are placed against the BRC FuelMaker VRA and that the service clearances are maintained at all times.

Visual Inspection of the BRC FuelMaker VRA and Venting

Periodically inspect the BRC FuelMaker VRA for any damage and:

1. Check for obstructions or damage to the cooling air intake louver.
2. Inspect the cooling exhaust ducting and PRV vent line for damage, obstructions or leaks.
3. Inspect User Membrane for cuts, punctures or lifting.

Refueling Hose

The refueling hose shall be inspected regularly, checking for kinks, cuts, holes or abrasions.

Refueling Nozzle

The nozzle must not be exposed to debris, dirt, water or chemicals. Contamination increases the potential for nozzle malfunction and decreases nozzle life

The refueling nozzle should be cleaned and lubricated periodically to keep the assembly parts moving freely. Clean the inside of the nozzle with rubbing alcohol and a clean lint free cloth to remove debris from the assembly. Lubricate the nozzle by spraying a dry Teflon lubricant, into the nozzle opening.

Do not use petroleum based lubricants (such as WD40) as these products leave a film that will attract dirt and other contaminants.

Vehicle and Equipment Refueling Receptacles

The vehicle or equipment refueling receptacles be should be inspected whenever the vehicle is serviced. Refer to the vehicle or equipment owners manual for details. Always keep the vehicle or equipment receptacle covered when not in use.

6 ANCILLARY DEVICES

6.1 PRESSURE START SYSTEM

The *Pressure Start System (PSS)* is an optional feature which will monitor the pressure downstream of the outlet of the *Vehicle Refueling Appliance (VRA)* and cause the BRC FuelMaker VRA to re-start automatically when a pre-programmed drop in pressure is sensed. The *PSS* may be installed on a BRC FuelMaker VRA used to fill a pressurized manifold or storage system. The pressure start drop setting is pre-programmed using a Field Programmer (P/N FP4TT).

6.2 REMOTE FUELING PANEL

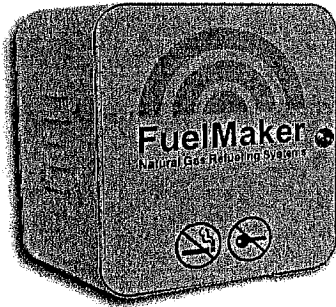


Figure 4 Remote Fueling Panel

A *remote fueling panel (RFP)* is connected to a BRC FuelMaker VRA through *high pressure tubing* and provides a means to connect to the cylinder for refueling. The *RFP* is typically installed indoors. The *RFP* incorporates a *manifold block* which can accept one or two *refueling hose assemblies*. An *RFP* also houses a control panel with “START” and “STOP” buttons and 3 warning lights to display the current status of the BRC FuelMaker VRA. The *RFP* also incorporates *ambient temperature sensors* which override those in the *VRA* when determining the maximum temperature compensated pressure to deliver to the cylinder.

When an *RFP* is to be used, the *electronics module* in the *VRA* must be programmed to accept input from the *RFP*. Only one *RFP* may be connected to a single BRC FuelMaker VRA.

An *RFP* may be used without a pressurized manifold system if the total length of tubing between the *RFP* and the BRC FuelMaker VRA does not exceed certain limits (refer to the *RFP* manual for more details).

Connect the *refueling nozzle* to the cylinder and, where equipped, turn the *nozzle vent valve* to the “FILL” position. Push the “START” button to activate the BRC FuelMaker

VRA and begin the fueling cycle. The unit will shut down automatically when the cylinder reaches its maximum temperature compensated pressure. The BRC FuelMaker VRA can also be shut down by pushing the “STOP” button. The 3 LEDs show the current operating status of the BRC FuelMaker VRA and will display some of the error codes generated by the BRC FuelMaker VRA. Refer to the *RFP* manual for more details.

6.3 AUXILIARY FUELING PANEL

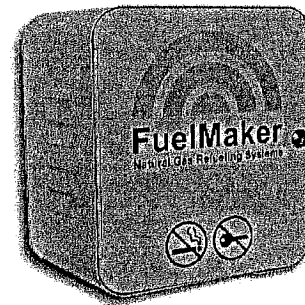


Figure 5 Auxiliary Fueling Panel

The *Auxiliary Fueling Panel (AFP)* is similar to the *RFP* as it provides a means to connect up to 2 *refueling hose assemblies*. The *AFP* does not contain the *user panel* or *ambient temperature sensors* of the *RFP*. Multiple *AFPs* may be connected to one or more *VRAs* as the customer requires. If mounted indoors, an *AFP* must be installed in conjunction with an *RFP*.

An *AFP* may be used without a pressurized manifold system if the total length of tubing between the *AFP* and the BRC FuelMaker VRA does not exceed specified limits (refer to the *AFP* manual for more details) and if another ancillary device is installed which controls the operation of the BRC FuelMaker VRA (i.e. *RFP*, *remote start*).

When used with a pressurized manifold (i.e. *Pressure Start*), connect the *refueling nozzle* to the receptacle and turn the *nozzle vent valve* to the “FILL” position. When used with other start devices, connect the *refueling nozzle* to the receptacle and activate the other system (i.e. push the “START” button on the *RFP* or *remote start system*).

6.4 REMOTE START

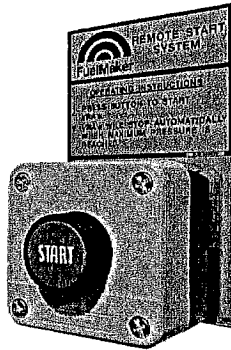


Figure 6 Remote Start

A Remote Start System (RSS) adds a "START" button at a location near to the fueling point. Pressing the button will start all of the VRAs connected to that Switch. The BRC FuelMaker VRA(s) will continue to run until the maximum temperature compensated pressure is reached in the cylinder.

6.5 FAST FILL & INTEGRATED START

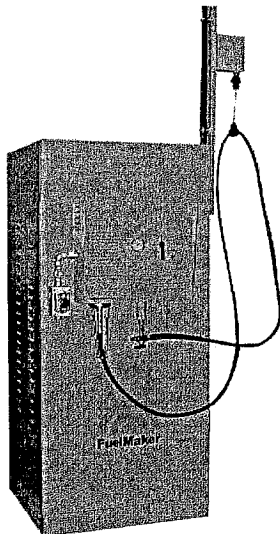


Figure 7 Fast Fill Station

Time-fill, also called Direct-Fill applications take time to fill a cylinder. Shorter filling times can be achieved by using pressurized storage cylinders to fill a vehicle tank instead of the BRC FuelMaker VRA.

The storage cylinders are kept pressurized and have a larger volume than the vehicle tank so the fueling cycle will take seconds or minutes instead of hours. The pressure start system in the BRC FuelMaker VRA monitors the pressure in the storage cylinders and will restart when a sufficient pressure drop is detected. In this configuration, the BRC FuelMaker VRA replenishes the gas in the storage cylinders and not in the vehicle.

The maximum pressure in the vehicle tank will not be as high as with time-fill applications since the maximum pressure has already been reached in the storage system. The existing pressure is equalized between the storage and vehicle tanks, so the maximum pressure reached by the end of the fill cycle will be lower.

NOTE: Contact BRC FuelMaker Technical Support for assistance in connecting a BRC FuelMaker VRA to a storage cylinder system. Storage Cylinder systems cannot be used for residential applications.

6.6 LOW PRESSURE TOWER DRYER

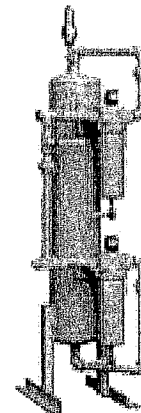


Figure 8 Low Pressure Tower Dryer

Natural gas contains water and Low Pressure Tower Dryers remove excess moisture from the gas before it enters your BRC FuelMaker VRA.



Compressed natural gas dryers are designed for installation at the low pressure side of the gas compressor. These units are engineered to ensure that the water dewpoint of the fuel gas meets or exceeds the safety requirements of ISO 15403:2000(E).

Compressed natural gas dryers eliminate problems occurring due to hydrate formation at low temperatures.

6.7 HOSES

Different hose configurations are available from BRC FuelMaker to meet your fueling needs. Standard hoses and Hot hoses are available. Hot hoses have high temperature insulation. In addition, straight molded refueling handles or 90° elbow molded refueling handles are available.

The FMQ-2 and the FMQ-2.5 require a minimum combined hose length of 4.5m (15ft), a maximum single hose length of 7.5m (25ft) and a maximum combined dual hose length of 9m (30ft).

The FMQ-2-36 requires a minimum combined hose length of 3 meters (10ft) and a maximum combined dual hose length of 6 meters (20ft).

Please note that the hose may be increased by using a Nozzle Vent Valve also available from BRC FuelMaker.

6.8 LOCK ASSEMBLY

A lock kit to allow you to secure your VRA.



7 INSTALLATION COMPLETION DETAILS

Name of Authorized Dealer _____

Name of Authorized Service Representative _____

Telephone Number _____

Date of Installation _____

VRA Serial Numbers _____

Ancillary Device Model/Serial Numbers _____

External Interlock Installed (Model, Purpose, etc.) _____

Maximum Total Cylinder Size That May Be Filled 140 litres (37 US gal.) 280 litres (74 US gal.) >280 litres (>74 US gal.)

VRA Programmed to Recognize: Remote Panel On Off
Pressure Rise On Off
External Interlock On Off

Number of Breakaways One Two

Table 8 Installation Details (To be completed by the Installer)



8 WARRANTY

BRC FuelMaker is continuously improving the Vehicle Refueling Appliance product line. For Warranty on the FMQ-2/FMQ-2.5/FMQ-2-36, please refer to the BRC FuelMaker

Basic Limited and Prorata Warranties. A copy of the warranty can be obtained from your BRC FuelMaker Dealer or authorized representative.