

BATCHEN LPG  
ELECTRIC VAPORISER

**PRODUCT MANUAL**

For Models: "ELECTRICALLY HEATED FEED BACK LPG VAPORISER"

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**Every effort has been made to supply complete and accurate information at the time of publication. However due to continual product improvement, the manual may not contain all ongoing changes. D. J. Batchen Pty. Ltd. assumes no liability resulting from the use or misuse of the information contained herein.**

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## **WARNING!!**

THIS EQUIPMENT IS DESIGNED TO VAPORISE LIQUEFIED PETROLEUM GAS FOR COMMERCIAL AND INDUSTRIAL USE. IT CONTAINS FLAMMABLE LIQUEFIED GAS UNDER PRESSURE AND MUST BE SERVICED ONLY BY PERSONS FULLY TRAINED AND EXPERIENCED IN THE SAFE HANDLING OF LPG IN ACCORDANCE WITH ALL LOCAL STATUTORY REQUIREMENTS AND RECOGNISED INDUSTRY SAFETY STANDARDS. FAILURE TO DO SO MAY RESULT IN (BUT NOT LIMITED TO) THE ESCAPE OF FLAMMABLE LIQUID OR VAPOUR, WHICH MAY CAUSE FROSTBITE IN CONTACT WITH EXPOSED FLESH AND MAY CAUSE A FIRE OR AN EXPLOSION IF IN CONTACT WITH A SOURCE OF IGNITION. SUDDEN UNCONTROLLED DE-PRESSURING MAY ALSO RESULT IN THE PROPULSION OF COMPONENTS AT HIGH VELOCITY.

This equipment operates on 240V & 415V AC (unless otherwise specified) supply and any maintenance required on the electrical components shall be performed by qualified and trained electrician in accordance with local statutory requirements and recognised industry standards referring to circuit and wiring diagrams supplied by D.J Batchen Pty. Ltd as a part of this manual.

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## LPG ELECTRIC VAPORISER

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## 1.0 INTRODUCTION

This manual describes in sections, the operating and installation instructions for Batchen Electrically Heated Feedback LPG vaporisers (from here on called vaporisers). Included with this manual are comprehensive product data sheets enabling identification and replacement of parts required for maintenance.

A complete set of assembly and installation drawings is included for ready reference.

### 1.1 Description

Batchen Vaporisers produce LPG vapour (Propane, Butane or a mix) from liquid on Feedback application of heat from electrical heating elements. The vaporisers operate as heat exchangers, connected to the storage tank. Refer Drawing DJB 2546 for a typical illustration and Appendix A for a complete Vaporiser Specification.

### 1.2 Principles of Operation

Liquid LPG enters the vaporiser by gravity and passes over heating tubes and the vapour outlet is connected back to the top of the storage tank. A separate outlet on the tank is required for connecting to load.

In course of normal operation, the heating elements come on automatically, controlled by a pressure switch mounted on the vaporiser stack sensing the outlet vapour pressure. An adjustable pressure switch (supplied with the vaporiser) has normally closed contacts in series with the hold-in coil on the main heating element contactor. Thus, the pressure switch automatically controls the main contactor, which will pull-in on falling pressure and dropout on rising pressure. The pressure switch operates over a pressure differential and the pressures at which it operates can be adjusted to the desired settings. **(Refer UE120 Series Pressure Switch or SOR Series B & J Pressure switch Setpoint adjustments in Section 5.)**

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## **2.0 SAFETY FEATURES**

### 2.1 Excess flow valves

The inlet and outlet connections of the vaporiser are fitted with internal excess flow valves to prevent a large escape of LPG if the lines are severed between the vaporiser, the tank or the load line.

### 2.2 Safety Relief Valve

A safety relief valve (SRV) factory set at 250 PSI, is fitted to the stand pipe to vent LPG vapour on excess pressure build up. This valve should be replaced if the pressure setting of the SRV on the stack is higher than that of the storage vessel, with a setting lower or equal to that of the storage vessel(s) to which the vaporiser is connected.

### 2.3 Over-temperature Switch

An over-temperature switch (also supplied with the vaporiser) is included in the control circuit to prevent damage to the equipment if an abnormal operating condition should arise, eg: lack of liquid in the vaporiser. This switch is non-adjustable (FACTORY SET TO 45c) and is inserted in the 10mm dia. tube welded to the tubeplate. Its normally closed contacts are wired in series with the coil of a manually reset relay having normally open contacts and the contacts of this relay are in series with the pressure switch.

When the temperature switch opens due to a high temperature condition, power to the elements is interrupted (main contactor drops out because hold-in coil de-energises). Power will not be restored automatically when the equipment cools down and the temperature switch closes again. The relay must first be reset. However, this should only be done after a competent person has investigated and corrected the fault causing the over-temperature condition.



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## 3.0 INSTALLATION INSTRUCTIONS

Vaporisers are shipped internally dry and clean and with temporary covers fitted over all flanged openings.

Each unit is complete with electric heating elements; pressure switch and over-temperature switch (along with float switches and inlet solenoid valve where fitted). Excess flow valves are factory fitted to the liquid inlet and the vapour outlet. All other **switchgear and wiring** must be supplied by others.

### 3.1 Shipping List

The vaporiser standpipe and the body are shipped in partly assembled condition. (refer drawings in Appendix C for sizes)

- \* The body assembly consists of
  - Vaporiser body with ANSI 300# inlet flange and connecting flange for standpipe
  - 11.5 kw heating elements wired internally to Power Terminals
  - Over-temperature switch wired internally to Control terminals
  - Internal excess flow valve on inlet flange
  - Drain valve connected to body sub-assembly
  
- \* The standpipe assembly consists of:
  - Standpipe with ANSI 300# outlet flange and connecting flange to body assembly
  - Pressure switch complete with vapour sensing line
  - Internal excess flow valve on vapour outlet flange
  - Pressure relief valve
  
- \* A box of galvanised nuts and bolts and fibre gaskets are supplied for assembly.
- \* A small bag of silica-gel is located in the flameproof end of the vaporiser to prevent contamination of elements with moisture during shipping.

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## 3.2 Mechanical Assembly

Note: Before installation, make sure that the unit is still clean and dry and that the excess flow valves operate freely.

Install the vaporiser on a level surface with the standpipe end fixed and the liquid inlet end free to slide with expansion due to heat. 18mm slotted holes are provided 140 mm apart in width and 1420 mm in length, suitable for 16mm holding down bolts.

Ensure all flange faces are clean and free from any foreign material prior to connection. Fibre gaskets and fasteners are provided for the vaporiser connections.

The vaporiser works on thermo syphon principle. It relies on liquid entering the vaporiser from the tank by gravity and the vapour returning back to the top of the storage tank. The inlet of the vaporiser needs to be approximately 1000mm lower than the bottom of the tank.

The vapour outlet needs to be approximately 600 mm higher than the top surface of the tank for the vaporiser to operate normally.

For correct installation, refer to local LP Gas installation codes. Automatic shutdown valves and internal safety valves eg. Excess flow valves shall be installed on the storage tank and manual isolation valves (eg ball valves) shall be installed on the inlet and outlet of the vaporiser.

Once the vaporiser is assembled and prior to letting any LPG through, proceed with electrical installation. Refer drawings and wiring diagram included in Appendix

## 3.3 Electrical Assembly

Unscrew the flameproof end of the vaporiser and check and complete wiring of the following items as per the list below.

Item	Status
Heating-element - Power Terminal	Factory Wired
Thermostat - Control terminal	Factory Wired
Pressure Switch - Control Terminal	To be completed
415V Supply - Power Terminal	To be completed
(or other supply voltage – refer to Appendix A)	

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All wiring is labelled as per the circuit diagrams and shall be followed during installation.

All wiring shall be in accordance with the requirements of the local Electricity Supply and conduit seals/ explosion proof glands are required at the point of entry to the vaporiser and/or the hazardous area.

The thread of the flameproof enclosure at the end of the vaporiser has been fitted with a neoprene rubber gasket. This is to prevent ingress of atmospheric moisture during operation and it is essential that this seal be maintained.

External & Internal Earth Bonding M10 &M6. As Per AS/NZS 60079-0

Please provide mechanical protection against correction and self loosening due to vibration. E.g. tin plated or s/s spring washer and nuts, eye terminal.

Only IEC Ex or ANZ Ex Ex d Certified cable glands to be used.

- M20 x 1.5 and
- M25 x 1.5

## 3.4 Ratings of Fuses, etc

For calculating the ratings of fuses, contactors, circuit-breakers, etc., the elements are rated at 11.5 kw per unit, total loading and are connected in Delta, 3-phase, 415 volts, 50 Hz (or other nominated voltage – see Appendix A for the applicable vaporiser).

Current draw per unit is 16 amps per phase approximately for a 415V supply. That is, vaporiser fitted with one element would draw 16 amps per phase, a total loading of 11.5 kw, a vaporiser with two elements fitted would draw 32 amps per phase, a total loading of 23 kw and so on.

## 3.5 Recommended Features

ALL WIRING TO COMPLY TO AS/NZS 3000 WIRING RULES. (e.g. conductor size and earthing etc)

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The vaporiser is supplied partially wired in accordance with titles. To complete installation it is recommended to follow.

Further, the following features are included in the electrical installation as described by the list of drawings in appendix C.

- (i) Indicator lamp to show that main's power is "on" to the main contractor and control circuit.
- (ii) Indicator lamp to show when main contactor has pulled in and power is being supplied to the vaporiser elements.
- (iii) Indicator lamp to function when the Panel emergency stop switch has operated.
- (iv) A local isolating switch in the power circuit and an emergency stop switch shall be provided to turn off the heating elements.

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## 4.0 TESTING AND COMMISSIONING

On completion of Installation, the vaporiser shall be tested for correct operation prior to commissioning with power and LPG. Proceed with electrical testing prior to testing the vaporiser for leaks with LPG.

### 4.1 Controls

It is essential to check all electrical wiring and control circuits as per the following sections.

#### 4.1.1 Normal Operation

The control logic for the vaporiser under normal operation is best described in the following table

Heating Element	Outlet Pressure	Temperature of Vaporiser	Consequence
"ON"	Lower than PRESET pressure	Lower than 45C	Normal Operation
"OFF"	Higher than PRESET pressure	Lower than 45C	Normal Operation
"OFF"	Any of above	Higher than 45C	Over-temperature switch activated. Manual Reset necessary

The PRESET pressure is individually set and adjusted on the pressure switch and is dependant on the load, the duty cycle, the pressure drop between the vaporiser and the load. The switch supplied is suitable for adjustment between 200 - 2000kPa and has a adjustable deadband between 7 - 28 kPa. Refer Pressure Switch Installation Instruction Pamphlet.

The Over temperature is supplied factory set to 45C to prevent the vaporiser safety relief valve discharging on over pressure caused by excessive heat.

***Hold operated/reset button to start vaporiser. Refer circuit diagram attached in Appendix C.***

### 4.2 Electrical Testing

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On completion of electrical wiring and testing of controls, the electrical elements shall be checked and tested in accordance with the following:

Megger check all phases of the elements for shorting to earth  
If the reading is too low ( $<1\text{M}\Omega$ ) indicating a possible shorting to earth, disconnect and remove the elements to dry out the insulation in an oven or apply low voltage to help dry. Alternately the megger may be used to dry out the elements.

## 4.3 Commissioning

Before supplying power to the vaporiser ensure that the site is free from any gas leaks and proper safety precautions maintained.

Adjust PRESET pressure setting based on the load and pressure requirements for the vaporiser.

Power up the vaporiser and check functioning of the following:

- \* Operation of the electric elements by making and breaking the contacts on the pressure switch. This may be done inside the flameproof junction box at the end of the vaporiser.
- \* Operation of the Over-temperature switch

*Do not power up the heating elements for more than a minute without introducing LPG in the Vaporiser.*

## 4.4 Testing and Commissioning with LPG

On successful testing of electrics proceed to test the vaporiser and commission with LPG.

Purge all air from the vaporiser from the highest point of the vaporiser and introduce Nitrogen into the LPG vaporiser and the pipework.

Pressurise vaporiser to 300 kPa and check all connections for leaks. If no leaks found, vent off Nitrogen and introduce LPG vapour into the vaporiser.

Check all connections, threaded and flanged for leaks using soapy water. The flanges may be taped and pierced to facilitate testing.

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Introduce liquid by cracking the inlet valve to the vaporiser. Check the vaporiser for leaks. Allow the temperature to stabilise. If no leaks found, turn on power to the vaporiser.

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## 5.0 MAINTENANCE REQUIREMENTS

Once in operation, maintenance requirements are minimal but should include routine checks for corrosion, pipe joint leakage, dryness etc. It is advisable to check occasionally and drain non-volatile materials through the drain valve supplied.

### 5.1 Product literature

Product brochures of components of the various controls and valving are included with this manual. The product coding and part numbers are high lighted and marked to identify the component in the literature.

Detailed description of the operations and maintenance of the following components are included.

- UE 120 Series Pressure Switch  
Batchen Part No: 090-003-00 (where applicable)
- SOR Series B & J Pressure Switches  
Batchen Part No: 090-200-00
- Robertshaw EA 5 Series Electric Thermostat  
Batchen Part No: 090-002-00
- Batchen Electric Elements  
Batchen Part No: 090-001-00
- Rego Valves  
7550 PX Angle valve  
Batchen Part No: 375-506-00  
Modified 3282C Excess Flow valve  
Batchen Part No: 835-824-01  
3131G Safety relief valve  
Safety relief valve  
Batchen Part No: 331-314-00



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## **UE 120 MODEL FLAMEPROOF PRESSURE SWITCH**

A UE Model 120 flameproof pressure switch is provided with this vaporiser with the following specification. **IECEX UL 03.0001**

- (a) Model - 361
- (b) Adjustable Pressure range:
  - 30 PSI - 300 PSI
  - or
  - 0.20 Mpa - 2.0 Mpa
- (c) Adjustable deadband 1.00 PSI - 4.0 PSI
- (d) Proof pressure 800 PSI

For Set Point Adjustment refer to United Electric Controls Company Installation and Instructions attached.

## **SOR Series B & J MODEL FLAMEPROOF PRESSURE SWITCH**

A SOR Series B & J flameproof pressure switch is provided with this vaporiser with the following specification. Baseefa02ATEX0252/5 Issued 11 June 2008

- (a) Model – 6B4-K3-M4-C1A-CLX
- (b) Adjustable Pressure range:
  - 140 Kpa - 1240 Kpa
  - or
  - 85 Kpa - 690 Kpa
  - or
  - 50 Kpa - 210 Kpa
- (c) Typical deadband 0.9 PSI

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- (d) Proof pressure 17235 Kpa

For Set Point Adjustment refer to SOR Series B & J General Instructions attached.

## **SOR Series MINI-HERMET & Big-HERMET FLAMEPROOF PRESSURE SWITCH**

SOR Series MINI-HERMET & Big-HERMET Flameproof Pressure Switch  
is provided with this vaporiser with the following specification. **ANZEx 07.3018U**

- (a) Model – 6AG-EF3-M4-C1A-
- (b) Adjustable Pressure range: 85-690 KPA
- (c) Typical deadband 0.9 PSI
- (d) Proof pressure 17235 KPA

For Set Point Adjustment refer to SOR Series MINI-HERMET & Big-HERMET General  
Instructions attached.

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## 6.0 TROUBLE SHOOTING AND FAULTFINDING

### 6.1 System Fault

**Symptom:** Gas burners not working - No Gas into burners

- a: Tank empty or near empty
  - Check tank level, if tank level too low, refill tank
- b: Vaporiser not working
  - Check that Vaporiser Power in ON, if power is on and no gas comes out, follow Vaporiser Fault.
- c: No gas pressure at burners
  - Check for blockages in the burner, replace burner if necessary.
- d: No gas pressure in the lines
  - Check pipework and valves between regulator and burner. For multistage regulation, check all regulators for blockage.
  - Check that all isolation valves between regulator and vaporiser are open.
  - Check for premature closing of excess flow valve at the outlet flange of the vaporiser.
  - Check for blockage between the tank and the vaporiser
- e: Defective pressure regulator/ Incorrect setting
  - Check inlet and outlet pressure, if inlet pressure high - adjust and reset regulator; if inlet pressure low - trace the line back further for any blockages.
  - If Regulator cannot be set or adjusted, replace regulator, check selection chart for appropriate sizes.

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## 6.2 Vaporiser Fault

**Symptom:** Vaporiser is ON, but no outlet or low gas pressure

- a: Tank Empty or near empty  
- Check tank level
- b: Heating elements not functioning/operating

*(This should be checked only by licensed /authorised persons familiar with the hazards in working with LPG and with high Voltage Circuits)*

Trace Pressure switch contacts. If the contacts call for heating elements to be ON, check heating elements as below. If contacts calls for heating elements to be OFF, pressure setting may be low, re-adjust pressure switch as per Pressure Switch Pamphlet attached with this manual.

Check Over temperature Switch circuit. The elements would normally cut off if the vaporiser tubes exceed 45C.

If Vaporiser is too hot (over 45C), it is likely that the vaporiser is overheating due to the following:-

- \* Liquid not entering vaporiser
- \* Tank empty or near empty
- \* Inlet to vaporiser blocked
- \* Outlet from vaporiser blocked
- \* Overtemperature switch incorrectly set too high
- \* Heating element contactor(s) defective

It is important that all of above are investigated and vaporiser allowed to cool down prior to resetting overtemperature cut out.

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If vaporiser is below 45C, and the elements are switched off, check for faulty over temperature switch. Replace if necessary.

Check current draw off for each element. Note each element draws approximately 16A/phase (wired to 415V AC 3 Phase). Replace Heating elements if found defective.

Check each element for shorting to earth