



# Firesafe™ Flowmeter

## Instructions for Use

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**CE**  
1639

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# 1. Symbols

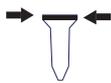
**Warning!** Indicates a potentially hazardous situation which, if not avoided, could result in personal injury to the user or others

**Caution!** Indicates a potentially hazardous situation which, if not avoided, could result in damage to the equipment or property

**Note** Highlights points that might allow more convenient or efficient operation of the equipment



Use no oil



Flow should be read level with the top of the float

# 2. Warnings and Cautions

## 2.1. Warnings!

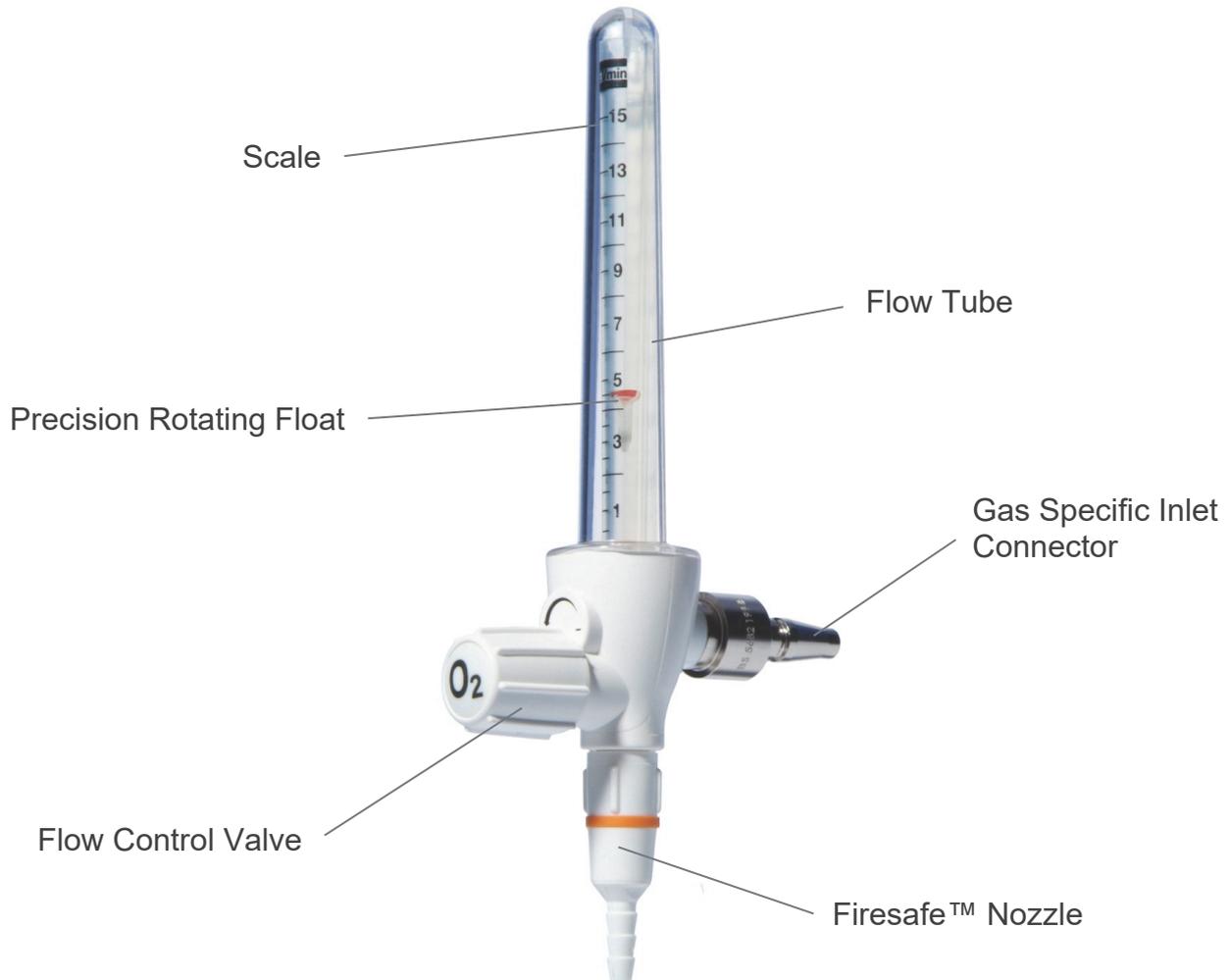
- ▶ Read through this entire instruction manual before using or showing others how to use this flowmeter. As with all medical equipment, attempting to use this device without a thorough understanding of its operation may result in patient or user injury.
- ▶ Medical gases are, or should be considered a drug and should only be used for medical purposes as prescribed by a physician or authorised clinician and in accordance with their instructions.
- ▶ Oxygen therapy may be a critical treatment. Additional risk control measures such as SpO<sub>2</sub> monitoring with an alarm and a backup oxygen supply with delivery device should be provided for patients who might suffer distress or injury if their oxygen supply is not available or is stopped unexpectedly.
- ▶ The flowmeter is not MRI compatible.
- ▶ Ensure that the medical gas supply is sufficient for the proposed therapy and is supplied within the pressure range given in the Device Specification. If the supply is a gas cylinder, check the cylinder contents gauge regularly.
- ▶ This flowmeter is only for use with the medical gas indicated on the device label. Check the cylinder or supply is the correct medical grade gas before use. Always check that the flowmeter is connected to the correct gas specific terminal unit.
- ▶ Gas specific connectors are fitted to the flowmeter. Do not attempt to modify the fittings to suit other gases or fitting systems.
- ▶ Oxygen is not flammable; however the presence of it will drastically increase the rate and severity of combustion. Oil and/or grease in the presence of an oxygen enriched atmosphere will become highly combustible. Oxygen must never be allowed to come into contact with oil, grease or other petroleum-based substances. Do not use oil or grease on this flowmeter.
- ▶ Many hand creams and moisturisers contain paraffin and petroleum bases which are highly flammable and must never be allowed to contact the Firesafe Flowmeter. Ensure hands are clean and dry before operating the equipment.
- ▶ Do not smoke around oxygen equipment.

- ▶ Only appropriately trained personnel working in controlled conditions may disassemble or assemble this flowmeter.
- ▶ Do not disassemble the flowmeter whilst under pressure.
- ▶ Secure cylinders to a wall, stand or cart in accordance with local safety regulations.
- ▶ Do not stand in front of a flowmeter or regulator outlet when opening a cylinder valve.
- ▶ Do not allow any fluid to enter this device.
- ▶ The accuracy of the flowmeter can be affected significantly if the input pressure is other than stated in the technical specification and the device label.
- ▶ Do not directly connect the flowmeter output to another pressurised gas source as this may lead to corruption of one or other of the gas supplies (e.g. connecting an oxygen flowmeter to an air flowmeter via a Y-piece in an attempt to blend their outputs).
- ▶ Only use this flowmeter with the flow tube in a vertical position. Failure to do so may result in incorrect flow rates being displayed.
- ▶ Arrange the oxygen tubing and gas hose carefully to avoid damage to the hose and the potential for causing a trip hazard. Never pull or apply excessive force to the gas hose. A leaking hose may result in high local oxygen and nitrous oxide concentrations and an increased risk of fire.
- ▶ Gas flow may be prevented if the supply tubing is kinked or occluded.
- ▶ Care should be taken to ensure that the flow control valve is free from obstruction and unintended pressure. These scenarios may result in temporary changes in flow.

## **2.2. Cautions!**

- ▶ The performance of the flowmeter may be affected if it is stored or transported in temperatures outside of the range -20 °C to 60 °C (-4 °F to 140 °F).
- ▶ The flowmeter is not suitable for autoclaving.
- ▶ Where a threaded fastener is used, do not use the device to tighten or lock connection.
- ▶ The performance of the flowmeter may be affected if the flow control valve is over-tightened when switching off flow. Apply the minimum force required to switch off gas flow.

### 3. Functional Description



#### 3.1. Intended Use

The Firesafe™ Flowmeter is used to precisely control the flow of medical oxygen or medical air (model dependant) from a low pressure supply. Inlet pressure ranges can be found in the Technical Specification.

Medical gases are, or should be considered, drugs and should only be used for medical purposes on the authority of a physician or authorised clinician and then strictly in accordance with their instructions.

This product is designed for use in homecare applications, in hospitals, other managed clinical environments and by the emergency services.

#### 3.2. Technical Description

The Firesafe™ enables accurate control of the flow of either medical oxygen or medical air (model dependent) in the range of 1 to 15 l/min.

A precision rotating float rises inside a transparent graduated flow tube. The flow tube has a scale printed upon it that indicates the rate of gas flow in litres per minute (l/min). The reading should be taken at the top of the float. The flow of gas through the tube is controlled by a valve downstream of the flow tube.

BPR Medical Ltd products enhance patient and user safety and as such the Firesafe™ Flowmeter includes many unique features to maximise safety and minimise exposure to risk. These features include:

### **3.2.1. Firesafe™ Nozzle**

Every Firesafe™ Flowmeter is fitted with a Firesafe™ Nozzle, minimising the known risks of fire associated with oxygen therapy. The Firesafe™ Nozzle is discernible from a standard tubing connector as it features a bright orange band. The Firesafe™ Nozzle can limit the impact of an oxygen fire by automatically arresting the oxygen flow. Acting like a fuse, it automatically isolates the oxygen supply as a fire tracks back along the tubing towards the oxygen source. Activation of the Firesafe™ Nozzle during a fire requires is highly reliable at oxygen flows above 1 l/min. The Firesafe™ Nozzle is not suitable for use as a fire risk control measure outside this range.

### **3.2.2. Flowsafe™ Valve**

The Flowsafe™ Valve is another feature unique to the Firesafe™ Flowmeter that further lowers the risk of fire associated with oxygen use. In the event of the flow tube being inadvertently sheared from the flowmeter body, it automatically isolates the oxygen flow, preventing a free flow of oxygen into the hospital ward. The pipeline pressure is therefore maintained, negating the need to isolate the ward oxygen supply, upon which other patients may be dependent.

### **3.2.3. Precision Rotating Float**

Unlike conventional ball and glass style flowmeters, the Firesafe™ Flowmeter incorporates a precision float with a fluted rim, which continuously rotates in the gas stream to provide visual confirmation that gas is flowing and the device is providing an accurate reading. Historically, incidents have occurred with conventional designs whereby static charge within the flow tube has caused the ball to stick to the surface and provide a false reading.

Unlike conventional ball style flowmeters, where there is often doubt as to where a reading should be taken, the Precision Rotating Float has a red band indicating the position at which the flow reading should be taken.

### **3.2.4. Static Control (Triboelectric Charge Dissipation)**

The Firesafe™ Flowmeter incorporates two separate static control measures in order to rapidly dissipate any charge generated during use. These unique measures control the recognised phenomena of static charge, which is known to cause the ball in conventional flowmeters to stick to the flow tube inner surface, leading to either an inaccurate reading or indicating a flow exists when the valve is closed.

### **3.2.5. Flush Flow Mode**

The flowmeter has a Flush Flow Mode. This mode may be used to deliver approximately 25-30 l/min to supply a resuscitation bag.

### **3.2.6. Inlet Filter**

The flowmeter is fitted with a 25 µm filter to ensure that large particles of debris that might be resident in the gas supply do not contaminate the flowmeter or pass through to the patient.

### **3.2.7. Gas Specific Connector**

The gas specific quick connection probe has characteristics to prevent connections between different gas services.

## 4. Operating Instructions

### 4.1. Connecting to Gas Supply

Before use, visually check both the flowmeter and hose (if fitted) for any damage or contamination. Do not connect or use the device if there are any doubts about its condition.

The flowmeter is supplied with a gas specific connector that is designed to connect to a mating gas specific outlet. Gas specific outlets might be a terminal unit in a medical gas pipeline system or part of a pressure regulator outlet on a gas cylinder.

If you are using a cylinder supply, ensure that the cylinder contents are adequate for planned therapy and turn on the supply at the cylinder.

Connect the gas specific quick connect to the appropriate gas specific outlet.

For indirect connection flowmeters the Medirail bracket should be fastened to a suitable medical rail system (compliant with BS EN ISO 19054 Rail systems for supporting medical equipment) using the thumb screw in the Medirail bracket.

**Warning!** Where the gas specific connector is dependent on a threaded fastener (e.g. DISS CGA – V5 1240, AS 2896/SIS handwheel) offer device to outlet and connect a few turns. Align device to the final vertical position and fully hand tighten the connection before turning on the supply pressure. Do not use the device to tighten or lock the connection.

For quick connector probes (e.g. BS 5682, DIN, AFNOR), ensure that the connection is correctly made by gently pulling the flowmeter body or hose (as applicable) before turning on the supply pressure.

Connect a sufficient length of patient tubing (not supplied) to the outlet barb.

**Note:** Removal of the Firesafe™ Nozzle when fitting a humidifier will temporarily disable the oxygen arresting capability of the flowmeter in the event of a cannula fire. Always remember to refit the Firesafe™ Nozzle (indicated by a distinctive orange band) when the humidifier is no longer needed.

### 4.2. Adjusting the Flow

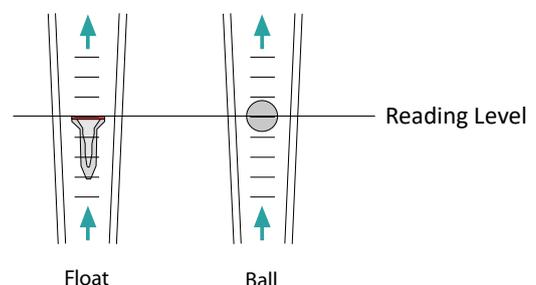
Turn the flow control valve anti-clockwise to turn on and increase the flow of gas.

If the flowmeter does not operate correctly, remove it from use and refer to the trouble shooting guide in Section 8 of this booklet.

### 4.3. Reading the Flowmeter

The diagram opposite shows the correct reading level in relation to the float position for both float type and ball type variable area flowmeters.

The right hand illustration indicates the correct reading level for this Firesafe™ Flowmeter i.e. at the top of the float.



### 4.4. Connecting to Patient

Connect the other end of the oxygen tubing to the patient or patient enclosure using the appropriate connector (not supplied).

#### **4.5. During Use**

Continue to monitor the level of gas flow during the procedure or therapy and the contents level of the cylinder (if applicable) and be aware that the supply tubing and hose (if applicable) may be a trip hazard.

#### **4.6. After Use**

If the supply is from a gas cylinder, close the cylinder valve and disconnect the flowmeter when therapy is no longer required.

## **5. Cleaning and Disinfection**

Ensure the flowmeter is disconnected from the gas supply before attempting to clean it.

**Caution!** The flowmeter is not suitable for autoclaving.

#### **5.1. Cleaning**

Wipe over the outside of the flowmeter and the gas supply hose with an alcohol or disinfecting wipe.

#### **5.2. Suspected Contamination**

If you suspect that the flowmeter is contaminated, remove it from use and refer the device to the appropriate department.

Never immerse the flowmeter in any fluid or attempt to clean internal parts.

## **6. Maintenance**

#### **6.1. Interim Inspection**

The flowmeter should be regularly cleaned, inspected for damage and checked for performance. The frequency of inspection and performance checks depends upon usage. As a guideline, if the flowmeter is used daily this may need to be performed every six months; if used infrequently an annual check may suffice.

##### **6.1.1. Leak Test**

Attach the flowmeter to a low pressure medical gas supply with a nominal supply pressure as specified on the rating label of the device and close the flow control valve. Connect supply tubing to the outlet barb and immerse the other end of the tube in water, the presence of gas bubbles in the water indicates a leak. Remove the tube and apply an oxygen compatible leak test solution to all outlets and fittings and check for leaks. A flowmeter that fails these tests should be removed from use.

##### **6.1.2. Flow Test**

Verify flow rates at all flow settings against those given in the Device Specification in section 6. Mass flow meters with appropriate full-scale ranges for the flow rates are particularly suitable for this.

Alternatively, where flow measuring equipment is not available, a qualitative check can be performed by confirming that gas flow can be sensed to be increasing with each step increase in flow across the full flow range. For higher flow rates, this can be sensed audibly or by holding a hand close to the flow outlet; moistening the skin can increase the cooling sensation and therefore sensitivity to the flow.

For very flow rates, this may better be achieved by placing the end of a connected tube in a glass of water to observe the bubbles.

## 6.2. Service and Repair

Direct connection flowmeters do not require routine servicing but can be repaired. The device can be returned to a recognised BPR Medical Service Centre, details of which can be found at [www.bprmedical.com](http://www.bprmedical.com).

Indirect connection flowmeters should have the hose assembly replaced after four years use or five years from the date of manufacture. The manufacture date can be found on the device label. Device life can be calculated by adding 7 years to the date of manufacture.

Disassembly, repair or reassembly must be carried out by a suitably qualified person working in a controlled environment.

## 7. Specification

Specification	Value
Flow Scale	0 – 15 l/min
Inlet Pressure Range	Model specific between 370 – 550 kPa Note: The flowmeter is able to operate safely within the pressure range 370 kPa to 550 kPa, but the flowmeter will only deliver accurately when connected to an input pressure as shown on the device. Any input pressure other than shown on the device will result in flow rates different from the flow settings
Supply Pressure Range	Minimum 370 kPa Maximum 550 kPa
Accuracy	Nominal Pressure: $\pm 10\%$ of indicated reading between 1 – 15 l/min Valve Settling: $< 2\%$ from initial setting within 3 hours Temperature: 3 % flow increase/decrease per 5 °C temperature increase/decrease Inlet Pressure: 4 % increase/decrease per 10 kPa increase/decrease from nominal pressure Outlet Flow Resistance: Negligible up to 230 kPa gauge back pressure
Gas Compatibility	Medical Oxygen or Medical Air (model dependant)
Maximum Flow (Flush Flow Mode)	25 – 30 l/min
Firesafe™ Nozzle Flow Range	1 – 25 l/min
Inlet Filtration	25 $\mu\text{m}$
Environmental	Transport and Storage Temperature: -20 °C to 60 °C (-4 °F to 140 °F) Operating Temperature: 0 °C to 40 °C (32 °F to 104 °F) Humidity: 0-100% RH non-condensing
Regulatory	CE: Medical Device Directive 93/42/EEC – Active Medical Device – Class IIa
Applied Standards	
BS EN ISO 5359	Low pressure hose assemblies for use with medical gases
BS EN ISO 15001	Anaesthetic and respiratory equipment. Compatibility with oxygen
BS EN ISO 15002	Flow-metering devices for connection to terminal units of medical gas pipeline systems
BS EN ISO 19054	Rail systems for supporting medical equipment

BS 5682	Probes (quick connectors) for use with medical gas pipeline systems
AS 2902	Medical gas systems. Low pressure flexible hose assemblies

## 8. Troubleshooting

Fault	Possible Cause	Solution
No gas flow	Flowmeter is not connected properly.	Check gas supply. Check that the gas specific probe is correctly connected.
	Gas cylinder empty.	Replace gas cylinder.
	Medical gas terminal unit on a pipeline system is isolated.	Seek advice from someone authorised to operate the medical gas pipeline system isolation valves.
	Inlet filter blocked.	Repair required.
	Flowsafe™ Valve has activated.	Flowsafe™ Valve is designed to activate when an exceptionally high flow of gas passes through the device. Disconnect from the gas supply and check the flow meter for damage or rupture.
	Firesafe™ Nozzle has activated due to fire or mechanical damage.	Replace Firesafe™ Nozzle.
Audible gas leak	Seal is worn or damaged.	Repair required.
	Flow tube cracked or damaged.	Repair required.
	Probe nose worn or damaged.	Repair required.
	Medical gas hose damaged.	Replacement required.
Constant gas flow	Valve or valve seat damaged.	Repair required.

## 9. Parts and Spares

Part Number*	Description	Calibration Pressure
829-0301	Firesafe™ Flowmeter - O <sub>2</sub> Single Direct 0 – 15 l/min - BS 5682 connector	400 kPa
829-0302	Firesafe™ Flowmeter - O <sub>2</sub> Dual Direct 0 – 15 l/min - BS 5682 connector	400 kPa
829-0303	Firesafe™ Flowmeter - O <sub>2</sub> Single Indirect (1.5m) 0 – 15 l/min - BS 5682 connector	400 kPa
829-0304	Firesafe™ Flowmeter - O <sub>2</sub> Dual Indirect (1.5m) 0 – 15 l/min - BS 5682 connector	400 kPa
829-0351	Firesafe™ Flowmeter - Air Single Direct 0 – 15 l/min - BS 5682 connector	400 kPa
829-0352	Firesafe™ Flowmeter - Air Dual Direct 0 – 15 l/min - BS 5682 connector	400 kPa
829-0353	Firesafe™ Flowmeter - O <sub>2</sub> Dual Indirect (3m) 0 – 15 l/min - BS 5682 connector	400 kPa
829-0901	Firesafe™ Flowmeter - O <sub>2</sub> Single Direct 0 – 15 l/min - SIS connector (AS 2896)	400 kPa
829-0902	Firesafe™ Flowmeter - O <sub>2</sub> Dual Direct 0 – 15 l/min - SIS connector (AS 2896)	400 kPa
829-0951	Firesafe™ Flowmeter - Air Single Direct 0 – 15 l/min - SIS connector (AS 2896)	400 kPa
829-0952	Firesafe™ Flowmeter - Air Dual Direct 0 – 15 l/min - SIS connector (AS 2896)	400 kPa
829-1001	Firesafe™ Flowmeter - O <sub>2</sub> Single Direct 0 – 15 l/min - BS 5682 connector (New Zealand)	400 kPa
829-1002	Firesafe™ Flowmeter - O <sub>2</sub> Dual Direct 0 – 15 l/min - BS 5682 connector (New Zealand)	400 kPa
829-1051	Firesafe™ Flowmeter - Air Single Direct 0 – 15 l/min - BS 5682 connector (New Zealand)	400 kPa
829-1052	Firesafe™ Flowmeter - Air Dual Direct 0 – 15 l/min - BS 5682 connector (New Zealand)	400 kPa

\*All listed part numbers are standard configurations; please contact your BPR Medical distributor for others

### Spare Parts

827-0031	Firesafe™ Nozzle (10 pack) 9/16" UNF (DISS) Female
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## 10. Distributor Details

### Australia

BOC Healthcare  
Customer Service Centre  
10 Julius Avenue  
North Ryde  
Sydney  
NSW, 2113  
T: +61 (0)2 8874 4400  
F: +61 (0)2 9886 9000  
[www.boc.com.au](http://www.boc.com.au)

### New Zealand

BOC Healthcare  
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