

# INTEGRA



## **FIREBOY eco**      Operating instructions



# Declaration of conformity

**INTEGRA Biosciences AG – 7205 Zizers, Switzerland**

declares on its own responsibility that the devices

Description	Models
<b>FIREBOY plus</b>	<b>144000</b>
<b>FIREBOY eco</b>	<b>144010</b>

comply with:

<b>EU Directives</b> (DoW: Date of Withdrawal)	Before DoW	DoW	After DoW
Low Voltage Equipment	<b>2006/95/EC</b>	20.04.2016	<b>2014/35/EU</b>
Electromagnetic Compatibility	<b>2004/108/EC</b>	20.04.2016	<b>2014/30/EU</b>
Restriction of Hazardous Substances	<b>2011/65/EU</b>		
Waste Electrical and Electronic Equipment	<b>2012/19/EU</b>		
Battery Directive	<b>2006/66/EC</b>		

## EU Regulations

Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)	<b>1907/2006</b>
Capacity Labelling of Portable Secondary Batteries	<b>1103/2010</b>
Ecodesign - Power supplies	<b>278/2009</b>

## Standards for EU

Safety requirements for electrical equipment for measurement, control and laboratory use - General requirements.	<b>EN 61010-1: 2010</b>
Electrical equipment for measurement, control and laboratory use - EMC requirements.	<b>EN 61326-1: 2013</b>


## Standards for Canada and USA

Safety requirements for electrical equipment for measurement, control and laboratory use - General requirements.	<b>CAN/CSA-C22.2 No. 61010-1</b>
Safety requirements for electrical equipment for measurement, control and laboratory use - General requirements.	<b>UL 61010-1</b>

Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.	<b>Part 15 of the FCC Rules Class A</b>
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Zizers, January 17, 2020

  
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## Imprint

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These operating instructions have the part number 144951; the version is V08. They apply for firmware Version 1.n.

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# 1 Introduction

These operating instructions contain all information required for the start-up, operation, and maintenance of the safety Bunsen burner FIREBOY eco.

## 1.1 Explanation of symbols

### 1.1.1 Hazard warnings in these operating instructions

These operating instructions specifically advise of residual risks with the following symbols:

**WARNING**

*This safety symbol advises of hazards that could result in injury or death. It also indicates hazards for machinery, materials, and the environment. It is essential that you follow the relevant precautions.*

**CAUTION**

*This symbol cautions about potential material damage or data loss in a microprocessor controller. Follow the instructions.*

**NOTE**

*This symbol identifies important notes regarding the correct operation of the device and labor-saving features.*

### 1.1.2 Hazard warnings on the device

**ATTENTION HOT**

*Risk of burns from the flame.*

### 1.1.3 Hazard warnings and caution notes of the red LED



#### RED LED IS FLASHING OR ILLUMINATED

*Error.*

The warnings are explained in detail in Chapter 4, see [“4.5 Troubleshooting” on page 17.](#)

## 1.2 Appropriate use

The FIREBOY eco is an automatic safety Bunsen burner for heating or flame-sterilizing suitable laboratory materials. For continuous operation over an extended period of time, the optionally available long burner head (see [“7.1 Accessories” on page 22](#)) must be used.

If the FIREBOY eco is used in a manner not specified by INTEGRA Biosciences, the protection provided by the FIREBOY eco may be impaired.

FIREBOY eco may not be altered in design or in any of its safety aspects. If alterations are made, INTEGRA Biosciences is not liable for resulting damage.

## 1.3 Safety features of the FIREBOY eco

The FIREBOY eco is equipped with the following safety devices:

- If the flame has not ignited after about 3 seconds, the flame monitor closes off the gas valve.
- If the flame is inadvertently extinguished, an attempt will be made to reignite it. If this is not successful, a message is displayed.
- The burner chamber and the valve housing are monitored by a temperature sensor. If the temperature exceeds the safety level, the gas valve is automatically closed off.

## 1.4 Safety notes

### 1.4.1 Operation of the FIREBOY eco



The FIREBOY eco corresponds to state of the art and recognized safety regulations and is safe to operate. The FIREBOY eco may be operated only in flawless condition while observing these operating instructions.

The device may be associated with residual risks if it is used or operated improperly by untrained personnel.

Any person charged with the operation of the FIREBOY eco must have read and understood these operating instructions, and particularly, the safety notes, or must have been instructed by the supervisors so that safe operation of the device is guaranteed.

Regardless of the listed safety notes, additionally applicable regulations and guidelines of the trade associations, the health authorities, and the trade supervisory office, e. g. GLP, GMP, FDA, must be observed.

Please visit our website [www.integra-biosciences.com](http://www.integra-biosciences.com) on a regular basis for up to date information regarding REACH classified chemicals contained in our products.

### 1.4.2 General safety notes



- Do not carry out any conversions and alterations on the device.
- Defective parts may only be replaced with original INTEGRA Biosciences spare parts.
- Do not open the FIREBOY eco. Repairs may only be performed by INTEGRA Biosciences or an authorized after-sales service member.
- The device may be operated only under constant supervision.
- Always wear protective goggles when working with the FIREBOY eco.
- Work only in well ventilated areas.
- Do not use the FIREBOY eco near flammable material or in explosive areas.
- Use only approved and tested safety gas tubing with threaded or hose connectors and inspect the device regularly for damage.
- Firmly tighten all gas connections and verify gas tightness using test equipment.
- Never remove the gas cartridge adapter while it is connected to the gas cartridge.
- Only use the original INTEGRA Biosciences power supply pack.
- Observe the hazard warnings on the device.

The gas supply must be closed off when:

- the device is being transported or installed
- the gas cartridge is being changed
- extended breaks are taken and after the work has been completed
- cleaning and repair work is being performed
- the adapter is being replaced

### 1.4.3 Restrictions for use



The following uses of the FIREBOY eco are prohibited:

- rotating it and using it upside down
- using it as a cooker without the optionally available long burner head, see "7.1 Accessories" on page 22
- carrying it by the burner head because the device may fall down



## 2 Description of the device

### 2.1 Scope of delivery

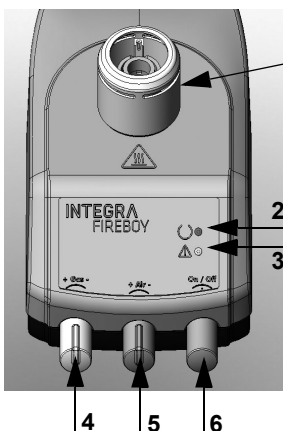
- FIREBOY eco device
- Power supply
- Foot switch
- Nozzle P60 propane/butane gas (fitted ex-factory)
- Nozzle N80 natural gas
- Adapter for gas hose, inner diameter 10 mm
- Operating instructions



#### CAUTION

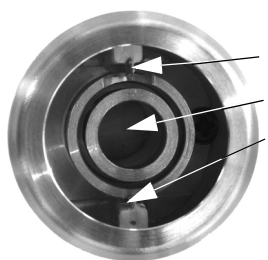
*Verify the scope of delivery when unpacking the device and check for potential transportation damage. Do not operate the device if it is damaged.*

### 2.2 Overview FIREBOY eco

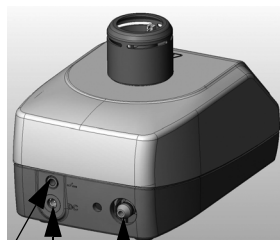


#### Front view

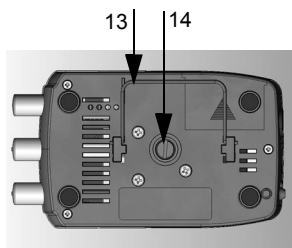
- 1 Burner head
- 2 Green LED
- 3 Red LED
- 4 GAS KNOB: to adjust the gas supply (flame size).
- 5 AIR KNOB: to adjust the air supply (flame temperature).
- 6 PUSH BUTTON: to switch the device on and off and for the CONTINUOUS operating mode.

**Burner head**

- 7 Ignition electrode
- 8 Burner chamber with flame opening
- 9 Electrode of the flame monitor

**Rear view**

- 10 Switch connection (jack)
- 11 Mains plug socket (mains plug)
- 12 Gas adapter opening (for engaging)

**Bottom**

- 13 Folding stand, to position device at an angle
- 14 Brass screw, access to the nozzle

## 3 Installation

### 3.1 Connecting FIREBOY eco to the electricity supply

- ▶ Insert the mains plug in the socket on the reverse side of the device (see “Rear view” on page 10) and connect to the power source.

### 3.2 Connecting FIREBOY eco to the gas supply

FIREBOY eco is appropriate for use with natural gas (gas mixture, >81% methane, further alkanes) and commercial butane/propane gas (mixture 65%–10% butane, 20%–40% propane).

#### 3.2.1 Fitting the nozzle for the gas in use

The P60 nozzle for butane/propane gas is fitted ex-factory for FIREBOY eco. If necessary, the nozzle must be fitted for the gas in use.

Type of gas	Gas input pressure	Inscription nozzle
Natural gas (methane)	20 mbar	N80
Butane/propane gas	50 mbar	P60

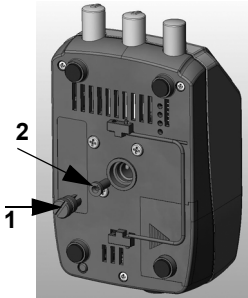
The nozzles are marked on the lower surface with the appropriate designation.



#### CAUTION

*FIREBOY eco may only be operated with the nozzle that corresponds to the gas type in use. Only use the nozzles supplied. Prior to every nozzle installation, inspect the O-ring in the brass screw for damage and if necessary replace it.*

When replacing the nozzle, proceed as follows:



- ▶ Unscrew the brass screw (1) on the lower surface of the device using a small coin or screwdriver.
- ▶ Turn over the device, allow the nozzle to drop out, and insert the desired new nozzle (2).
- ▶ Retighten the brass screw to the stop.
- ✓ The nozzle is now inserted.

### 3.2.2 Installation and removal of the adapters for the gas connection

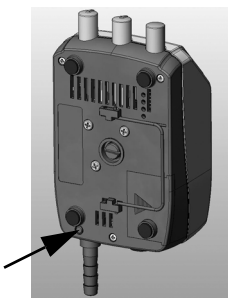
The adapters for the central gas supply, the gas cylinder, or the gas cartridge are inserted in the gas adapter opening of the FIREBOY eco without the gas cartridge (see “Rear view” on page 10).

- ▶ Insert the appropriate adapter in the gas adapter opening of FIREBOY eco, making sure it audibly clicks into position.
- ✓ The adapter is now installed.



#### **WARNING**

*When replacing the adapters, always switch off the device, disconnect the mains plug, and close off the gas supply.*



- ▶ In order to remove the adapter, use a pointed tool to press the adapter mechanism inward on the lower surface of the device and remove the adapter by pulling toward the rear.
- ▶ Insert the requested new adapter until it audibly clicks into position.
- ✓ The adapter is now replaced.

### 3.2.3 Connecting the gas cartridge

The following gas cartridge types may be used:

- CV 360 (about 30 min. flame duration)
- CP 250 (about 200 min. flame duration)
- CV 300 Plus (about 180 min. flame duration)
- CV 470 (about 400 min. flame duration)
- EXPRESS 444 (about 35 min. flame duration).

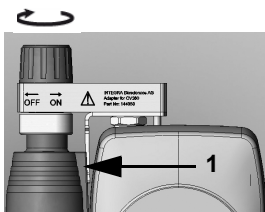
The gas cartridges can be purchased from a local dealer.



#### **WARNING**

*For operation with a gas cartridge, the P60 nozzle must be inserted in the device and the gas cartridge adapter must be installed. Gas cartridges may only be used at an ambient temperature of 15-35 °C (see note in the cartridge instructions).*

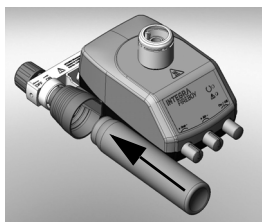
The connection of the CP 250, CV 300 Plus/CV 470 and EXPRESS 444 cartridges is described in the enclosed instructions. The CV 360 gas cartridge is connected as follows:



- ▶ Verify that the gas cartridge adapter is inserted and has audibly clicked into position.
- ▶ Ensure that the smooth side of the cap (1) points toward the device.
- ▶ Turn the milled knob on the cartridge adapter fully clockwise in the "OFF" direction.
- ▶ Insert the gas cartridge into the cap until it audibly clicks into position.

Then open the gas cartridge adapter:

- ▶ Turn the milled knob fully counterclockwise in the "ON" direction.



✓ The gas cartridge is now open and ready for use.

The flame can now be ignited using any of the three operating modes.

### 3.2.4 Removing and changing the gas cartridge

**WARNING**

*The gas cartridge may only be replaced if the gas cartridge adapter is connected to the device and closed off, if possible.*

The different gas cartridges are removed and changed as follows:

- ▶ If the gas cartridge adapter is equipped with a milled knob, turn the knob fully clockwise in the "OFF" direction.
- ▶ Remove the empty cartridge.
- ▶ Fit a new cartridge.
- ▶ If the gas cartridge adapter is equipped with a milled knob, turn the knob fully counterclockwise in the "ON" direction.
- ✓ The gas cartridge has been changed.

**CAUTION**

*Gas will begin to flow.*

### 3.2.5 Connecting to the central gas supply or to a gas cylinder

- ▶ Connect the tubing from the central supply or from the gas cylinder to the previously installed adapter and fix it with a clip if necessary.
- ✓ FIREBOY eco is now connected to the gas supply.

### 3.2.6 Setting the right flammable mixture

The GAS KNOB (gas) can be used to set the gas supply and therefore the flame size while observing the flame itself. Rotating the knob clockwise reduces the gas supply (-), rotating it counterclockwise increases it (+):

The AIR KNOB (air) can be used to regulate the air supply and therefore the flame temperature. Rotating the knob clockwise reduces the air supply (-), rotating it counterclockwise increases it (+).

### 3.3 Connecting the foot or benchtop switch

- ▶ Insert the plug of the foot or benchtop switch in the socket on the reverse side of the device (see "Rear view" on page 10).
- ✓ The switch is now connected.

### 3.4 Removing and adding the burner head

- ▶ To remove the burner head, pull it out vertically upward.
- ▶ To install the burner head, place it on the device with the 3 contact pins and push it down vertically until it clicks into position.
- ✓ The burner head is now reinstalled.

**CAUTION**

*Never carry the device by the burner head.*

### 3.5 Long burner head

If the FIREBOY eco is used for continuous operation, the optionally available long burner head must be used. For installation see previous section.

**CAUTION**

*The minimum distance between the tip of the burner head and the object to be heated, e. g. cover plate of quadruped, must be at least 60 mm.  
The duration of continuous operation should not exceed 60 min.*

## 4 Operation

### 4.1 Switching FIREBOY eco on and off

FIREBOY eco is a mains-dependent device. FIREBOY eco is switched on by briefly pressing on the PUSH BUTTON. The green LED is illuminated, and the device is ready for use. It is switched off by pressing the button for a longer period of at least 2 seconds.

**CAUTION**

*Risk of burns! Even after it is switched off, the device may still be hot.*

### 4.2 FOOT SWITCH operating mode

FIREBOY eco is ignited by activating the foot or benchtop switch. The flame burns as long as the switch is depressed.

### 4.3 CONTINUOUS operating mode via the PUSH BUTTON

Alternatively, FIREBOY eco can be ignited and also extinguished by pressing the PUSH BUTTON. The maximum burning time is 60 min.

**WARNING**

*Never let the burner burn unattended!*



#### 4.4 Working with liquids



In order to protect the burner chamber from contamination when working with liquids, the folding stand at the base of FIREBOY eco can be used to incline the device.

The inclination direction can be modified by removing the folding stand after pressing it together and inserting it on the opposite side.

#### 4.5 Troubleshooting

The warnings and notes are displayed via the red LED. In the event of an error, the flame is automatically extinguished. Every message must be confirmed by pressing the PUSH BUTTON.

The following table lists the possible errors and the recommended action for elimination.

Error message	Technical cause	Possible cause and correction
Red LED is flashing (1x per sec), green LED is on.	The flame monitor does not detect a flame. The valve is closed.	No gas supply is connected. ▶ Connect the gas supply ▶ Open the gas connection  Flame was blown out several times. ▶ Correctly set the gas/air mixture ▶ Prevent draft  Electrode of the flame monitor is broken or dirty. ▶ Visually inspect electrode ▶ Clean electrode with alcohol
Red LED is on, green LED is on.	Prior to ignition process, the contact pin on the burner head is not detected.	Burner head not added or not added correctly. ▶ Add burner head  Contact pin on burner head is contaminated. ▶ Clean the contact pin
Red LED is flashing quickly (5x per sec), green LED is on.	Burner chamber temperature measured exceeds the critical value.	Continuous operation overheated the device. ▶ Wait until device has cooled off  Ambient temperature exceeds the permitted value.  Reflection of the flame on the device due to unauthorized use.
Red LED is flashing slowly (every 3 sec), green LED is on.	Failure of flame monitor.	Electrode of the flame monitor is kinked or dirty. ▶ Visually inspect, if necessary clean
Red LED is on, green LED is off.	Technical error.	▶ Call service technician

## 5 Maintenance

**WARNING**

*Allow the burner head to cool off before cleaning, disinfecting and servicing the device. Switch off the device and disconnect it from the gas supply. Allow the device to dry before operating it again.*

### 5.1 Cleaning and servicing

FIREBOY eco body and burner head should be regularly cleaned in order to maintain a high availability. Maintenance intervals depend on operating conditions and degree of pollution.

Use a cloth moistened with soapy water or a 70% ethanol solution to clean FIREBOY eco.

Longest life span of burner head is reached with a splash-free application in a clean working environment (see also "4.4 Working with liquids" on page 17). If the burner head gets soiled, it can be removed for cleaning purposes (see "3.4 Removing and adding the burner head" on page 15) and cleaned with commercially available disinfecting or cleaning agents. It can also be replaced with a new one, see "7.1 Accessories" on page 22.

**CAUTION**

*Ignition and flame monitoring electrodes (white ceramic posts) only tolerate low mechanical forces!*

In the event of an error, carefully clean the ignition electrode with a lint-free cotton swab saturated with 70% ethanol solution. If any of the ceramic posts is loose or broken, the burner head must be replaced.

For proper function, all three contact pins and their correspondent spring contacts must be clean and free of corrosion. Same applies for the burner head shaft (plug) and the burner chamber (socket), especially the spring-loaded ball (lock pin) and the nozzle with orifice (pinhole).

### 5.2 Decontamination

If the housing of the FIREBOY eco have been in contact with biohazardous material, it must be decontaminated in accordance to good laboratory practice. Do not spray directly on the instrument but use a lint-free cloth, lightly soaked with a disinfectant and wipe dry directly after decontamination. Never use acetone or other solvents! Follow the instructions provided by the disinfectant manufacturer.

### 5.3 Disposal



The FIREBOY eco device must not be disposed of with unsorted municipal waste.

Dispose of the FIREBOY eco in accordance with the laws and regulations in your area governing disposal of devices.

## 6 Technical data






### 6.1 Specifications



<b>Device</b>	
Type	Safety Bunsen burner
Dimensions (W x D x H)	100 x 150 x 60 mm without burner head
Weight	1.3 kg
<b>Electricity supply</b>	
Mains adapter	Input: 100–240 VAC, 50/60 Hz
Device	Input: 8–10 VDC, 5 W
<b>Materials</b>	
	Metallic Housing: zinc
	Burner head: stainless steel, brass
	Display: glass
	Base: PBT (polybutylene terephthalate) / PC (polycarbonate)
<b>Operating conditions</b>	
Operation	15–35 °C, 15–80% RH (not condensing)
Storage	-10–60 °C, 5–80% RH (not condensing)
<b>Nominal thermal rating</b>	
Propane/butane gas (liquid gas)	2.0 kW
Natural gas E (~94% methane)	1.0 kW
Natural gas LL (~81% methane)	0.8 kW
<b>Nominal = maximal gas input pressure</b>	
Propane/butane gas (liquid gas)	50 mbar
Natural gas E, LL	20 mbar

## 7 Accessories

A variety of accessories are available, which adapt FIREBOY eco to the respective application requirements and work environments.

### 7.1 Accessories

Accessories		Part No.
	Gas cartridge adapter for 52 g butane cartridge, e.g. Campingaz CV 360.	144 050
	Gas cartridge adapter for 250 g butane cartridge, e.g. Campingaz CP 250, with safety stand and connecting hose.	144 051
	Gas cartridge adapter for 230 g butane cartridge, e.g. Campingaz CV 300/470 Plus, with safety stand and connecting hose.	144 052
	Gas cartridge adapter for EXPRESS 444.	144 053
	Foot switch and connecting cable.	143 200
	Benchtop switch and connecting cable.	171 081
	Windshield for hoods	143 205

Accessories		Part No.
	Borosilicate glass splash protector	143 210
	Burner head	144 300
	Long burner head, for continuous operation	144 306
	Mains adapter Europe 230 VAC	156 631
	Mains adapter UK 240 VAC	156 632
	Mains adapter US 120 VAC	156 630
	Mains adapter AU 240 VAC	156 633
	Mains adapter JP 100 VAC	156 634
	Gas safety tubing Ø 10 mm. Length 2 m, max. pressure 100 mbar, DVGW approved	140 055
	Adapter for gas hose, inner diameter 10 mm	144 240
	Adapter for 1/4" left-hand thread	144 227
	Nozzle N80	143 350
	Nozzle P60	143 355