



INTEGRA



FIREBOY eco Operating instructions

144951_V09





Declaration of conformity

INTEGRA Biosciences AG – 7205 Zizers, Switzerland

declares on its own responsibility that the devices

Description	Models
FIREBOY plus	144000
FIREBOY eco	144010

comply with:

EU Directives

Low Voltage Equipment	2014/35/EU
Electromagnetic Compatibility	2014/30/EU
Restriction of Hazardous Substances	2011/65/EU
Waste Electrical and Electronic Equipment	2012/19/EU
Battery Directive	2006/66/EC

EU Regulations

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

Standards for EU


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

Standards for Canada and USA

Safety requirements for electrical equipment for measurement, control and laboratory use - General requirements.	CAN/CSA-C22.2 No. 61010-1
Safety requirements for electrical equipment for measurement, control and laboratory use - General requirements.	UL 61010-1
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.	Part 15 of the FCC Rules Class A

Zizers, March 02, 2020


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Imprint

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These operating instructions have the part number 144951; the version is V09. They apply for firmware Version 1.n.

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1 Introduction

Working with gas always involves a certain residual risk. Therefore, caution is the top priority.

Important: Read these operating instructions carefully to familiarize yourself with the instrument before connecting it to the gas. Keep the operating instructions in a safe place so that you can read them again.

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 internally.
- 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 an internal 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, DVFG-TRF must be observed.

Please visit our website 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



- FIREBOY eco may only be used by properly trained personnel under constant supervision in a manner specified by INTEGRA Biosciences.
- Use only original INTEGRA Biosciences mains adapter.
- Do not use a FIREBOY eco or adapter which is leaking, damaged or which does not operate properly.
- Use only in well ventilated location in accordance with national requirements for the supply of combustion air.
- The FIREBOY eco shall be operated horizontally or with a maximum inclination allowed by the folding stand at the base.
- Do not use the FIREBOY eco near flammable material or in explosive areas.
- If there is a leak on your device (smell of gas), immediately turn off the gas supply, extinguish any open flames and ensure a sufficient supply of fresh air. Pull out the mains plug. If possible, wrap the FIREBOY eco in a fire blanket and take it outside immediately, into a well ventilated flame free location. Check all gas connections for tightness. Never detect leaks using a flame, use soapy water. If the smell of gas persists, the appropriate authorities must be notified, e.g. fire brigade. Leaking gas can cause a fire or an explosion. This may result in severe injuries, fatal accidents and damage to property.
- Always wear protective goggles when working with the FIREBOY eco.





The gas supply must be closed off and the device must be switched off when:



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

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

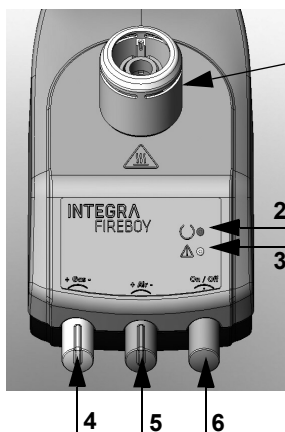
- FIREBOY eco device
- Mains adapter
- Foot switch
- Nozzle P60 propane/butane gas (fitted ex-factory)
- Nozzle N80 natural gas
- Adapter for gas hose, inner diameter 10 mm
- Operating instructions



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.

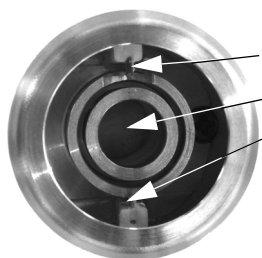
2.2 Overview FIREBOY eco



Front view

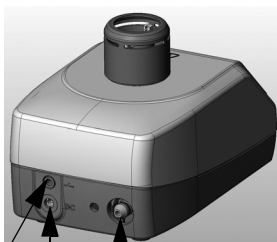
- 1 Burner head
- 2 Green LED
- 3 Red LED
- 4 GAS KNOB: to adjust the gas supply (flame size).
- 5 AIR KNOB: to adjust the air supply (flame temperature).
- 6 PUSH BUTTON: to switch the device on and off and for the CONTINUOUS operating mode.





Burner head

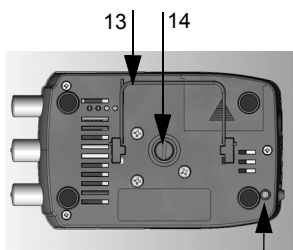
- 7 Ignition electrode
- 8 Burner chamber with flame opening
- 9 Electrode of the flame monitor



Rear view

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

10 11 12



Bottom

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

15





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 gas cylinders containing butane-propane mixtures with a minimum of 10% propane (LPG grades A-D), where the maximum input pressure must be guaranteed. Mixtures with less than 10% propane will not build up enough pressure for proper operation. Mixtures with minimum propane content offer longer burn time and higher heating power because Butane is 10% more energy dense than propane in gas phase and 30% in liquid phase.

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	Nominal = maximum 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.

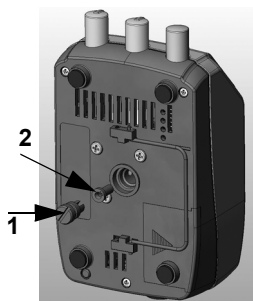
**CAUTION**

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).

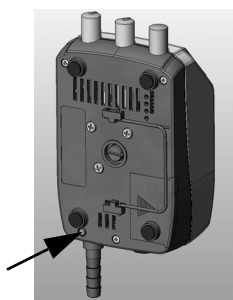
- ▶ Insert the appropriate adapter in the gas adapter opening of FIREBOY eco, making sure it audibly clicks into position. Check the connection for tensile strength.
- ✓ The adapter is now installed.



WARNING

Never remove the gas cartridge adapter while it is connected to the gas cartridge.

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 release pin 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. Check the connection for tensile strength.
- ✓ 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).

Visually check the seals of pierceable cartridges before connecting a new cartridge.

The connection of the cartridges is described in the enclosed instructions.

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.

Gas cartridges shall be changed in a well ventilated location, away from any sources of ignition and away from other people. Make sure to discharge static electricity accumulated beforehand, e.g. by touching a metallic water tap.

Only throw away completely empty cartridges (let them burn out beforehand).

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



WARNING

Use only approved and tested safety gas tubing with threaded or hose connectors and inspect them regularly for damage. Avoid twisting of the tubing.

- ▶ 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 Tightness test

Before using the FIREBOY, firmly tighten all gas connections and verify gas tightness, e.g. check for smell of gas; apply soapy water or a leak detection spray:

- Apply a leak detection spray to all connections (tubing/adapter/cartridge).
- Open the gas supply. If bubbles appear, this indicates a leak.
- Close the gas supply and replace defective parts.



3.2.7 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

**WARNING**

Observe the hazard warning on the device. The burner head and the device may become very hot. There is the risk of burns.

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.

If you want to finish your work, close off the gas supply and activate the flame again to depressurize the gas tubing and to burn the residual gas. Switch off the FIREBOY.

**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).

Check the gas tubing regularly for brittle or porous areas. Replace it, if damaged, or at the latest 8 years after production (year imprinted on the tubing). To find holes, spray the gas tubing with a leak detection spray at the sensitive points (especially the ends) and check the formation of bubbles at short gas flow at in a well ventilated location. Alternatively you can use soapy water.





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 Service

Do not modify the FIREBOY eco. Servicing work and repairs may only be performed by INTEGRA Biosciences or an authorized after-sales service member. Defective parts may only be replaced with original INTEGRA Biosciences spare parts.

For any service or repairs, please contact your local distributor (service technician).



WARNING

FIREBOY eco needs to be cleaned before sending it to service. The declaration on the absence of health hazards (DAHH) form must be completed and signed. This technical service form can be found in various languages at www.integra-biosciences.com in the menu Support under Download Center. This is necessary to protect service personnel.

5.4 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

Device

Type	Safety Bunsen burner
Dimensions (W x D x H)	100 x 150 x 60 mm without burner head
Weight	1.3 kg

Electricity supply

Mains adapter	Input: 100–240 VAC, 50/60 Hz
Device	Input: 8–10 VDC, 5 W

Materials

Metallic Housing: zinc
Burner head: stainless steel, brass
Display: glass
Base: PBT (polybutylene terephthalate) /
PC (polycarbonate)

Operating conditions

Operation	15–35 °C, 15–80% RH (not condensing)
Storage	-10–60 °C, 5–80% RH (not condensing)

Nominal thermal rating

Propane/butane gas (liquid gas)	2.0 kW
Natural gas E (~94% methane)	1.0 kW
Natural gas LL (~81% methane)	0.8 kW

Nominal = maximum gas input pressure

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 with pressure regulator for Campingaz CV 360.	144 055
	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





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Accessories

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

