BALCO™

PrintMaker

INSTRUCTION MANUAL

VERSION 1.0

Contents

Introduction

Congratulations on the purchase of your new Balco PrintMaker 3D Printer!

3D Printing is a process whereby a real object is created from a 3D Design. Fused Filament Fabrication (FFF) is one of the most common technologies used by 3D Printers to achieve this. FFF works on an 'additive' principle by laying down material, such as PLA or ABS filament, in layers to create a 3D object.

With hours of fun awaiting you, we're sure you are excited to start printing, however, please read this manual thoroughly before first use and keep it in a safe place for future reference, along with the warranty card and purchase receipt.

Safety

Before you get started, please read these important safety instructions

CAUTION: *The Balco PrintMaker generates high temperatures and includes moving parts that can cause injury. Never reach inside of the Balco PrintMaker while it is in operation, and allow time for the printer to cool down after operation.*

- *Vapours/fumes may be irritating at operating temperatures. Always use the Balco PrintMaker in an open, well ventilated area*

- *Do not leave the Balco PrintMaker unattended during operation*

- *Contact with extruded material may cause burns. Wait for printed objects to cool before removing them from the build platform.*

- *Always take care when using the scraper. Never direct the scraper towards your fingers.*

- *Only use the PrintMaker in a clear working area*

1. The printer must not be exposed to water or rain, or damage will occur.

2. The printer is designed to be used with ambient temperature ranging 15°C - 30°C (59°F - 86°F), and humidity ranging 20% - 50%. Operating outside these limits may result in low quality models.

3. In case of emergency, turn off the PrintMaker at the power outlet.

4. The device must be placed in a dry and ventilated environment. The distances of the left, right and back side space should be at least 20cm (7.8in), and the distance of the front side space should be at least 35cm (13.7in). Device storage temperature: RT 0-40°C (32°F - 104°F)

5. It is recommended that you use eye protection when cleaning/sanding printed models to avoid small particles contacting eyes.

6. Please read and understand the contents of this installation and user manual carefully. Failure to read the manual may lead to personal injury, inferior results, or damage to the PrintMaker. Always make sure that anyone who uses the 3D printer knows and understand the contents of the manual and makes the most out of the PrintMaker.

7. PrintMaker is not intended for use by persons with reduced physical and/or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning the use of the appliance by a person responsible for their safety. Children should be under constant supervision when using the printer.

8. Before installation, you should make sure that the PrintMaker is unplugged from the power supply. Only using furniture that can safely support PrintMaker.

9. The socket-outlet shall be installed near the equipment and shall be easily accessible

Glossary of Terms

Build Tape: The black tape that covers the PrintMaker's print bed so that the object can stick to the print bed well

Build Volume: The three dimensional amount of space that an object will use once it is completed. The largest build volume is 150*150*150mm

Cooling Fan: Cools the outer assembly of the extruder and gear motor

Extruder: The integral extruder device installed on the X-Axis. The extruder draws the filament from the spool, melts it and pushes it through the nozzle onto the print bed

Filament Compartment: Internal storage area located at the right of printer to store Balco Filament

Filament Bowden Tube: A white plastic tube that guides the filament from the filament storage compartment to the filament intake
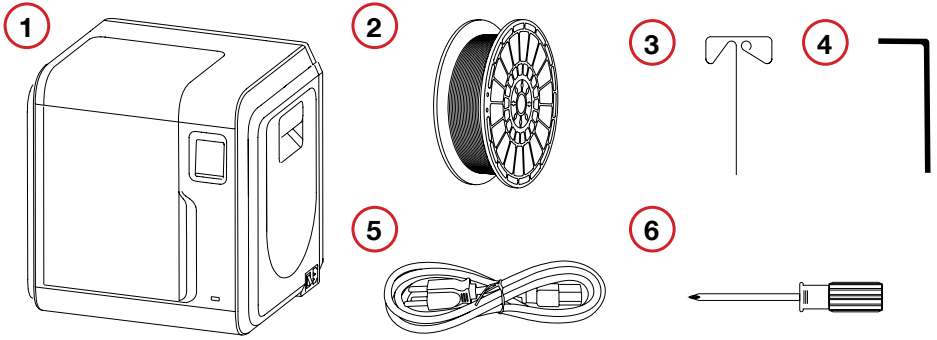
Filament Intake: An opening located at the top of the extruder

Nozzle: Also called "print head", located at the bottom of the extruder where heated filament is pushed out

Print Bed: The surface on which the PrintMaker builds an object

Parts List

1.1 Accessories

1. 3D printer
2. Filament
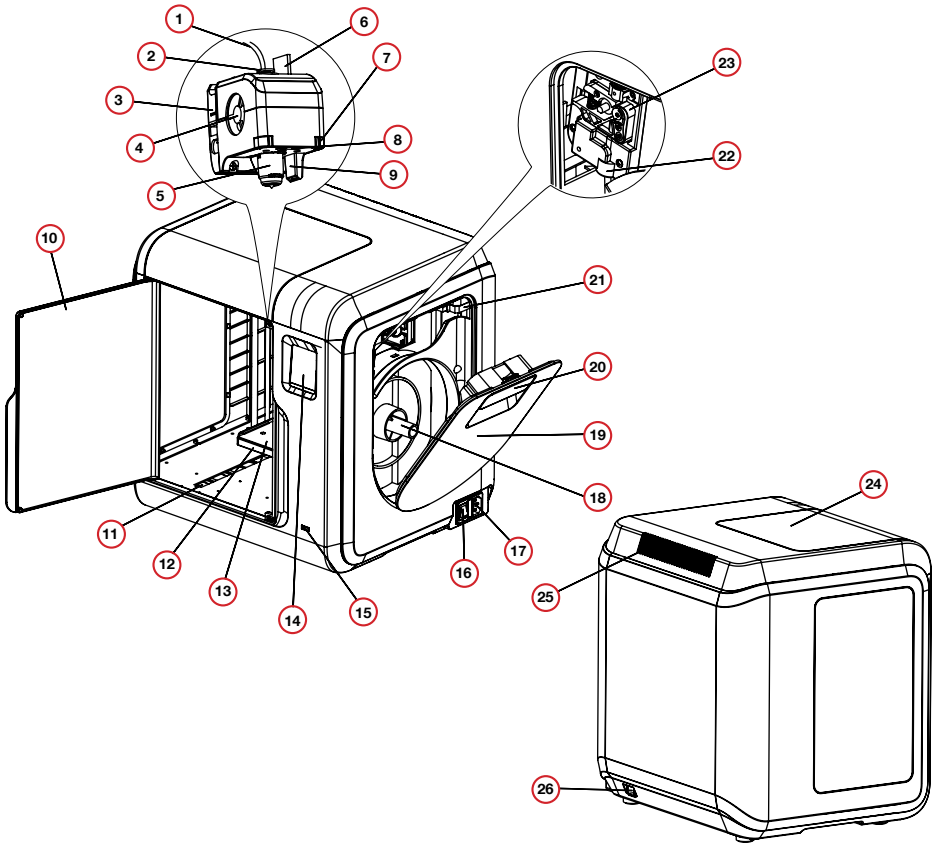3. Unclogging pin tool
4. Allen wrench
5. Power cable
6. Screwdriver
7. Grease*

Not pictured

Product Overview

2.1 Front & Back View

1. Bowden tube	**10.** Front door	**19.** Filament cover
2. Bowden quick coupler	**11.** Y-Axis sliding slot	**20.** Filament cover handle
3. Extruder base	**12.** Print base	**21.** Motor
4. Cooling Fan	**13.** Removable print bed	**22.** Filament intake
5. Removable nozzle	**14.** Touch-screen	**23.** Filament feeding wheel
6. Extruder cables	**15.** USB stick input	**24.** Top cover
7. Clip	**16.** Power switch	**25.** Air outlet
8. Led light	**17.** Power input	**26.** Ethernet input
9. Turbo Fan Baffle	**18.** Spool holder	

Technical Specifications

Name	PrintMaker
Number of Extruder	Single Removable Extruder
Print Technology	Fused Filament Fabrication (FFF)
Screen Size	2.8" color IPS Touch Screen
Build Volume	150×150×150mm (5.9 x 5.9 x 5.9in)
Layer Resolution	0.1-0.4mm
Build Accuracy	±0.2mm
Positioning Accuracy	Z axis 0.0025mm; XY axis 0.011mm
Filament Diameter	1.75mm (±0.07mm)
Nozzle Diameter	0.4mm
Build Speed	10~100 mm/s
Software	FlashPrint
Support Formats	Input: 3mf/stl/obj/fpp/bmp/png/jpg/jpeg File
	Output: gx/g File
Memory Size	8G
OS	Windows (XP and up), Mac OS, Linux
AC Input	150W (24V, 6.25A)
Connectivity	USB stick, Wi-Fi, Ethernet
Device Size	388×340×405mm (15.27 x 13.38 x 15.94in)
Net Weight	9 kg (19.8lb)
Maximum radio-frequency power transmitted:	Less than 20dBm

Setup Instructions

3.1 Unboxing & Setup

1. Carefully remove your PrintMaker 3D Printer from the box, along with any additional packaging around the printer

2. Plug the power cable into the side of the printer and press the power switch to **ON** to operate the 3D Printer

3. To remove the protective cardboard inside the printer, go to **Tools ➔ Settings ➔ Move** on the Touch Screen then long press the up arrow on the Z axis until the extruder is high enough to remove the packaging
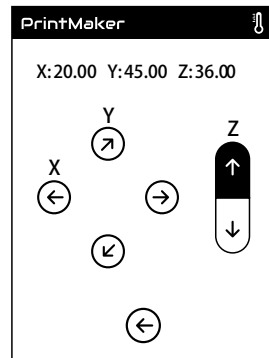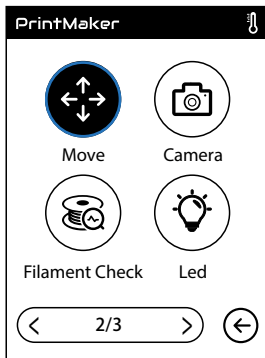
3.2 Navigating the Menus

This section provides a brief description of each menu function and its associated sub-menu. Further details of each menu are explained throughout the manual.

3.2.1 Build

Use the build menu to select and print files. Files can be loaded to the PrintMaker 3D Printer via PC, USB, Wi-Fi or Cloud. Further information on this menu under **section 5.1 Printing a File on page 17.**

The following sections explain the settings available within the **Build** menu, when loading files and during print.

Setup Instructions

File Interface

1. **File details:** Including picture of file, time needed, filament needed

2. △ **Build:** Begin printing the file

3. ⊞ **Copy:** Copy the files to the internal memory card from the USB stick

4. 🗑 **Delete:** Delete the print file

Print Screen Interface

1. ⊝ **Cancel:** Cancel the print job

2. ⏸ ▶ **Pause/Resume:** Suspend or resume the print job

3. ⋯ **More:** Check additional settings during printing

   🔄 **Replace:** Change filament during printing

   💡 **Led Light:** Turn ON/OFF the led light

   📄 **Detail:** Check additional printing details:

   🔺 Extruder temperature

   🔻 Print bed temperature

   🕐 Used time

   🕑 Printing progress

   🧵 Filament needed

3.2.2 Tools

📶 **Network:** Connect printer to the internet via Wi-Fi, cloud or ethernet

🌡 **Preheat:** Preheat the extruder and print bed

⚙ **Setting:** Contains printer and operating functions

ⓘ **About:** Information about the printer
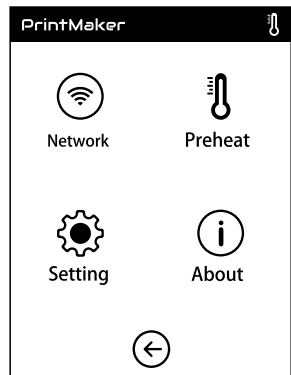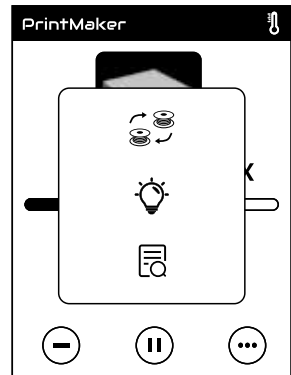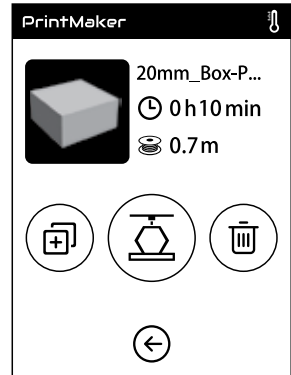
Setup Instructions

3.3 Filament

This setting allows you to add, change and remove filament. The Balco PrintMaker uses high quality PLA and ABS filaments. We highly recommend using quality Balco filaments as using generic filaments may cause damage to your PrintMaker 3D Printer or affect the print quality.

For beginners, we recommend using PLA materials as they are easy to print and do not produce toxic fumes when printing. Before using other types of filaments, ensure you understand the advantages and disadvantages of other filaments and their proper usage.

3.3.1 Filament Types

Filament Type	PLA	ABS	PVA	HIPS	PETG
Extruder Temp	215ºC (419°F)	240ºC (464°F)	175ºC (347°F)	240ºC (464°F)	220ºC (428°F)
Heat Bed Temp	60ºC (140°F)	90ºC (194°F)	50ºC (122°F)	60ºC (140°F)	70ºC (158°F)
Official Name	Polyactic Acid	Acrylonitrile Butadiene Styrene	Polyvinylv Alcohol	High Impact Polystyrene	Polyethylene Terephthalate
Printing Level	Basic	Advanced	Advanced	Advanced	Intermediate
Advantages	• Bioplastic • Non-Toxic • Less warping issues • Hard or soft/ flexible variants • High print speed	• High strength • Scratch resistant • Smooth finish • Ideal for mechanical parts	• Water soluble • Non-Toxic	• Lightweight • Cost effective • Dissolvable in Limonene • Good for support materials	• Very durable • More flexible than PLA & ABS • Stronger than most filaments • Odorless when printing
Disadvantages	• Low heat resistance • Easier to break than ABS • Requires thicker walls than ABS	• Petro-leum-based • Non-biode-gradable • Heated print bed required • Fumes when printing • Sunlight de-terioration	• Sensitive to high heat. • Risk of fumes • **Do not heat over 190C**	• Fumes when printing • Layer separation can occur • Heated chamber is ideal • Heated print bed required	• Stickier filament when printing • Prone to stringing affect • Can cause drips if left in hot extruder when not printing • Heated print bed required
Finishing	• Sanding possible • Limited gluing	• Easy sanding • Easily soluble in acetone	Gluing only	Gluing only	• Sanding possible • Limited gluing

Setup Instructions

3.3.2 Loading the Filament

1. Open the filament cover located on the right-hand side of the printer. Insert the filament into the filament intake (see the sticker arrow located on the printer for its location) and push the filament into the feeding wheel until some resistance is felt

2. Once the filament is loaded, place the spool inside the filament cavity holder

Note:

- *Ensure the filament has been pushed into the feeding wheel*
- *The loading direction of the filament wheel must be clockwise*

3. On the touch screen, select **Filament ➔ Load.** The printer will heat the extruder to the required temperature and will automatically feed the filament through the printer's bowden tube Please note this will take some time

4. Following the prompts on screen, tap **OK** once you see the filament extruding from the nozzle

5. Your filament is now loaded. Place the filament cover back onto the printer and close properly

6. Remove the extruded filament from the print bed area

3.3.3 Changing / Removing Filament

1. Remove the filament cover located on the right-hand side of the printer

2. On the touch screen select **Filament ➔ Change**, the extruder will start preheating automatically. Once the desired temperature is reached, the printer will push the filament out of the bowden tube and past the feeding wheel

3. Once the filament reaches the feeding wheel, remove the filament spool from the printer

4. To load a different filament type, following instructions under **section 3.3.2 Loading the Filament on page 13**, otherwise place the filament cover back onto the printer
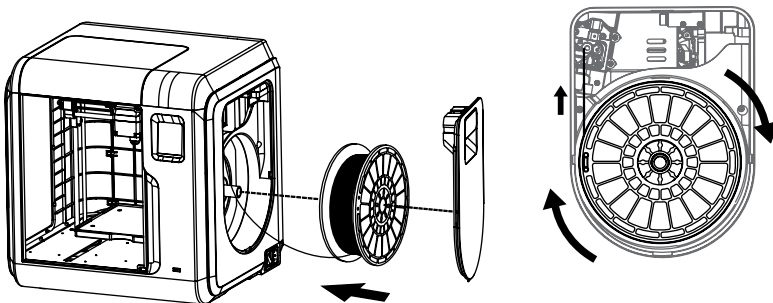
Additional Settings

The following section provides further information about the Tools main menu which includes Network, Preheat Settings, General Settings and About sub-menus.

4.1 Network

4.1.1 Wi-Fi

1. Connect to wi-fi by selecting the ON/OFF button
2. Choose a network from the list and input the password
3. When connected, the wi-fi symbol will display on the top of the main menu

4.1.2 Ethernet Connection

1. Simply follow the prompts on screen by connecting the ethernet cable attached to your modem into the back of the 3D printer
2. Once connected, a tick will appear on screen

4.1.3 Cloud Connection

To connect to either Polar Cloud or Flash Cloud, you must have a working internet connect via Wi-Fi or ethernet. Secondly, you will need to register an account – to do this, visit one of the following websites and follow the prompts to register an account:

- **Polar Cloud – polar3D.com**
- **Flash Cloud – https://cloud.sz3dp.com/**

Further instructions are provided under **section Operation and Printing on page 17**

Additional Settings

4.2 Preheat Settings

This menu allows you to adjust the temperature of the extruder and/or print bed. To do this:

1. Turn ON/OFF of the area you would like to preheat i.e. extruder and/or print bed
2. Using the plus / minus buttons, adjust the temperature accordingly and press the start button once complete
3. A screen will appear showing the heating progress of each area
4. If you need to cancel the pre-heating, simply press the abort button
5. Hit the start button and your printer will commence changing the temperature of the required area

Please note:
-   *Maximum extruder preheat temperature: 240°C (464°F)*
-   *Maximum preheat temperature: 100°C (212°F)*

4.3 Settings

1. **Status:** Displays the real-time coordinates of X-axis, Y-axis, Z-axis and the real-time temperature of the extruder and platform
2. **Language:** Choose the required language
3. **Calibration:** Calibrate the initial distance between extruder and platform. After homing completed, slide the piece of paper continuously back and forth between the nozzle and the print bed. And simultaneously manually tap up and down arrow to adjust the distance until the paper causes a slight friction. Tap [OK] to complete the calibration
4. **Homing:** Move the X, Y and Z axes back to the mechanical zero point
5. **Move:** Manually adjust the positions of extruder and print bed
6. **Camera:** Allows you to watch your print live. This setting can be turned ON/OFF
    a. **Auto Mode:** During printing, camera will be on, USB off. When in idle/not printing, camera will be off, USB on
    b. **Manual Mode:** Users to manually choose when camera is turned on

Note: *The USB and camera cannot be on at the same time*

7. **Filament Check:** A notification which tells you when filament is used up or unable to extrude. This notification can be turned on/off
8. **Led:** To turn on/off the light located inside the printer
9. **Buzzer:** Turns on/off buzzer which sounds when certain functions are made
10. **Factory Reset:** Deletes all internal memory and returns printer to original factory settings
11. **Update:** Update printer firmware

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Additional Settings

4.4 About

Shows the basic information about the printer

PrintMaker	**PrintMaker**	**PrintMaker**

Machine Type:
    Adventurer 3
Serial No:
    123456
RegisterCode:
    XXXXXX
Polar Serial No:
    XXXXXX
 	
< 1/3 > ←
	Firmware Version:
	    v1.03-1.1
	Build Volume:
	    150 x 150 x 150
	Usage counter:
	    12 hours
	IP Address:
	    10.90.243.184: 8899
	
	< 2/3 > ←
		WiFi MAC:
		    02:00:00:00:11:66
		
		< 3/3 > ←
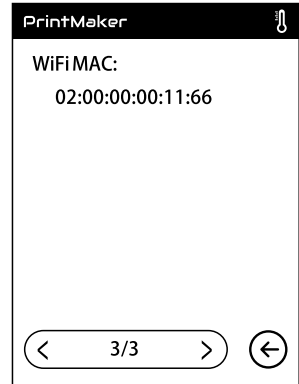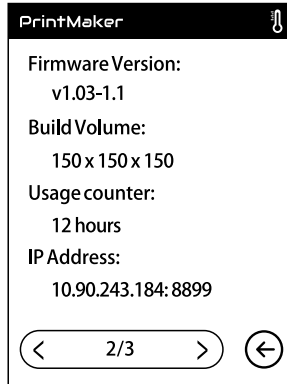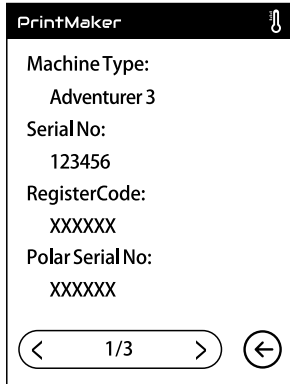
Operation and Printing

5.1 Printing a File

Having a 3D design file is the first step to creating a 3D object. The Balco PrintMaker accepts multiple print files (see **section Technical Specifications on page 9)**. Print files can be accessed by the PrintMaker via USB, Wi-Fi (via PC Software), Cloud connection and internal memory. We highly recommend that you print your first object using the files supplied in the printer's internal memory prior to attempting to use 3D designs from other sources.

5.1.1 Internal Memory

1. From the main menu select **Build** then select the first icon 🖳 at the top of the list which is internal memory
2. From the list provided, select the file you would like to print. Details of the file including a picture, print time and filament length required, will appear on screen
3. Select the print button ⏁ icon as shown
4. The printer will commence heating the print bed as well as the nozzle extruder. This will take some time before the printer will start to print the file
5. To pause or cancel a print simply follow the prompts on screen as outlined on **section 3.2.1 Build on page 10 and 11**

5.1.2 USB Stick

1. Insert a USB stick into the USB port located the front of the printer
2. From the main menu select **Build** then select the second icon at the top of the list which is USB 🖳
3. From the list provided, select the file you would like to print. Details of the file including a picture, print time and filament length required, will appear on screen
4. Select the print button ⏁ icon as shown
5. The printer will commence heating the print bed as well as the nozzle extruder. This will take some time before the printer will start to print the file
6. To pause or cancel a print simply follow the prompts on screen as outlined on **section 3.2.1 Build on page 10 and 11**

### 5.1.3 Wi-Fi Connection using Flash Print PC Software

1. Ensure you have a working internet connection – see **section 4.1 Network on page 14**
2. Download the FlashPrint PC software by visiting **www.flashforge.com/download-center** then select **Software Download** and choose the option best suited to your computer

Operation and Printing

3. Once installed, open the program and add the PrintMaker printer by selecting the **Print menu ➔ Connect Machine**
   - Choose machine type **FlashForge Adventurer 3**

4. Change the connection mode to Wi-Fi and input your printers IP address (port). This can be found by going to main menu on your printer, select **Tools ➔ About**, toggle to the second page to find IP-address. Enter this information into the Flash Print PC software and select **connect**

5. Now that the printer is connected to the FlashPrint PC software, load your file by clicking on the load button at the top of the screen or by going to **File menu ➔ Load File**
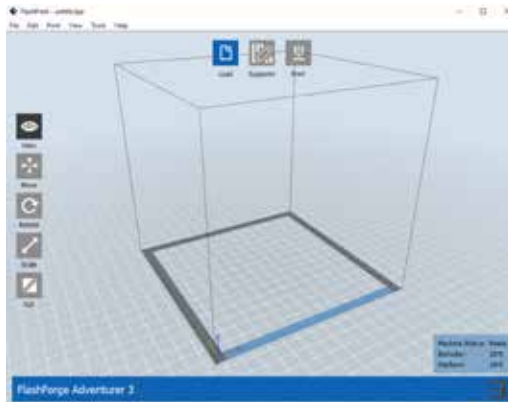
6. Once your file is loaded you can make adjustments to the size of the print, placement, supports and various other settings. Once you are happy with the file, select the print button at the top of the screen

7. A window will appear requesting further information. Adjust these settings accordingly and press ok. Your file will then be sliced to the correct file type

8. Once the file has been sliced correctly, your printer will start to warm up and prepare for printing. The PC software screen will also change to show you the progress of printing
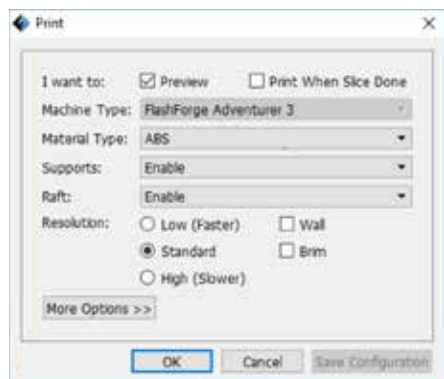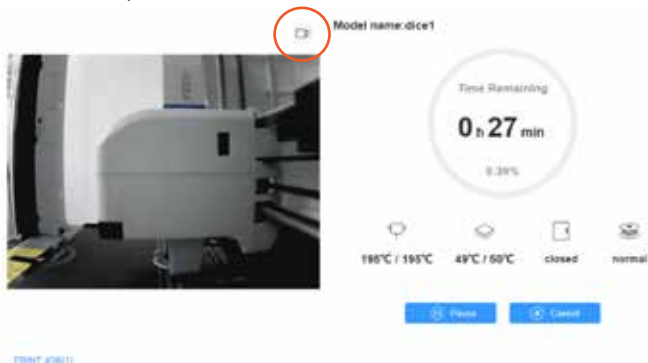
Operation and Printing

5.1.4 Flash Cloud Print

1. Ensure you have a working internet connection and that you have registered a Flash Cloud account as outlined on **section 4.1 Network on page 14**

2. Once registered, login to your account. Select **My Printer ➔ Add Printer**

3. Enter the printer's name and register code. These details can be found on the printer **Tools ➔ Network ➔ Cloud ➔ Flash Cloud menu**. After entering the details, also turn ON Flash Cloud on your printer. Your printer should come up on screen and show as "idle" in the state column

4. To load a file, go to 'My Model' on the left hand panel, select **Upload Model** to select a file. Once found, hit the upload button to return to the My Model screen, click on the uploaded object and then click **Print**

5. Your file will appear on screen along with settings such as position and scale that can be adjusted. Adjust accordingly and then select **Print**

6. A print screen will appear. Select **start** to commence warm up and printing. The Flash Cloud screen will also change to show you the progress of printing

7. To turn on the camera during print, simply go to the **My Printer** screen, select your printer and then click on the camera icon in the top right hand corner of the printer's working area (as illustrated below)

8. To pause or cancel a print, simply follow the prompts on screen or on your printer
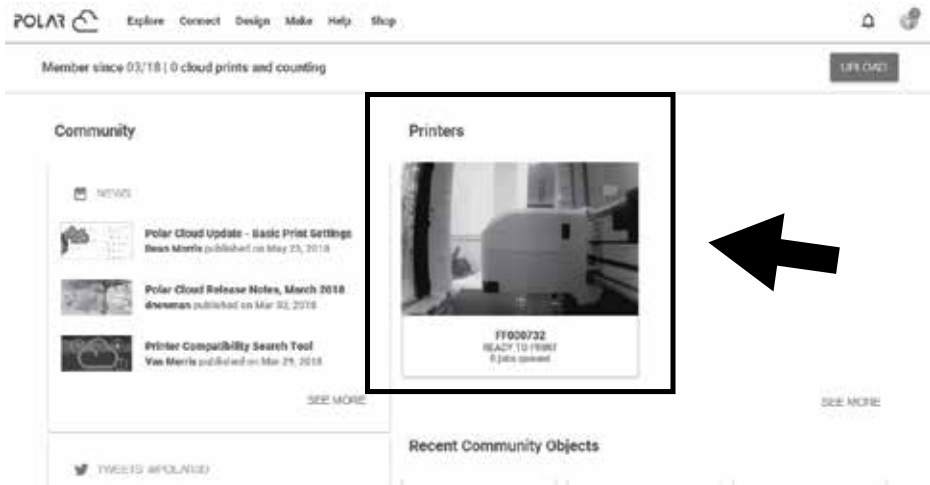
Operation and Printing

5.1.5 Polar Cloud

1. Ensure you have a working internet connection and that you have registered a Polar Cloud account as outlined on **section 4.1 Network on page 14**

2. To setup your printer login to the Polar Cloud website and click the icon on the top right corner to go to **Settings**

3. Scroll to the bottom of the settings page to find a 'PIN Code' which will be four digits

4. Connect your 3D printer to the Polar Cloud by going to the main menu and select **Tools ➔ Network ➔ Cloud ➔ Polar Cloud**

5. Enter your account (email) and pin code details from the Polar Cloud settings menu as noted in point 3, turn the Polar Cloud ON and hit **save**

6. After the connection is completed, you can see the printer's information on the Polar Cloud home page. Click on the printer

7. Click on **Build Plate ➔** ☁ to load a file. Select your required file and upload to the print bed. Adjust any placement and/or print settings then select **print**

8. Your print will appear in the bottom left corner of the screen and will start to slice your file. Once sliced, a note saying "slicing completed" will appear on the print file

9. Finally select the start button on screen and your printer will commence printing

10. To pause or cancel a print, simply follow the prompts on screen or on your printer

Note:
- *If you turn on the camera function, you can see the real time picture on the page*
- *When selecting a file, there are restrictions on file types that can be uploaded. These are noted in the upload menu*

Operation and Printing

5.2 During Printing

Closely monitor the first layer being printed to ensure the PrintMaker is operating smoothly and your file is being printed correctly

As outlined in the section titled "Navigating the Menus", the printer interface will show the following options:

1. ⊖ **Cancel:** Cancel the print job
2. ⏸ ▶ **Pause/Resume:** Suspend or resume the print job
3. ⋯ **More**:
   a. 🔄 Change filament
   b. 💡 Turn on/off LED light
   c. 🔍 Shows you print details such as extruder and bed temperatures, time printing, % of print completed, Amount of filament required to print the file

Some other important tips:

- Do not leave the 3D Printer unattended while in operation
- Keep hands clear while machine is operating and ensure the door is closed

5.3 Removing 3D Objects from the Print Bed

Once your print is completed, although the extruder and print bed will automatically commence cooling down, they may still be hot. Please take caution when removing objects from the print bed

To remove objects simply:

1. Push down on the dotted area marked on the print bed and pull towards you (as illustrated in the image below)
2. Bend the print bed to separate the object from the bed. If required use the supplied scraper to remove the object. Carefully wedge under one side of the object and keep the scraper flat with the bed to avoid damaging the print mat
3. Once you have released the object, place the print mat back on the print base by pressing the plate down and sliding the print bed in

Operation and Printing

5.4 Using the Camera

The Balco PrintMaker 3D Printer gives you the flexibility to view the progress and results of your print jobs remotely from your internet connected device via the FlashCloud. If you are using a USB, you will not be able to use the camera.

See **section 5.1.4 Flash Cloud Print on page 19** for instructions on operating the camera via Flash Cloud

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