Installation and User Guide

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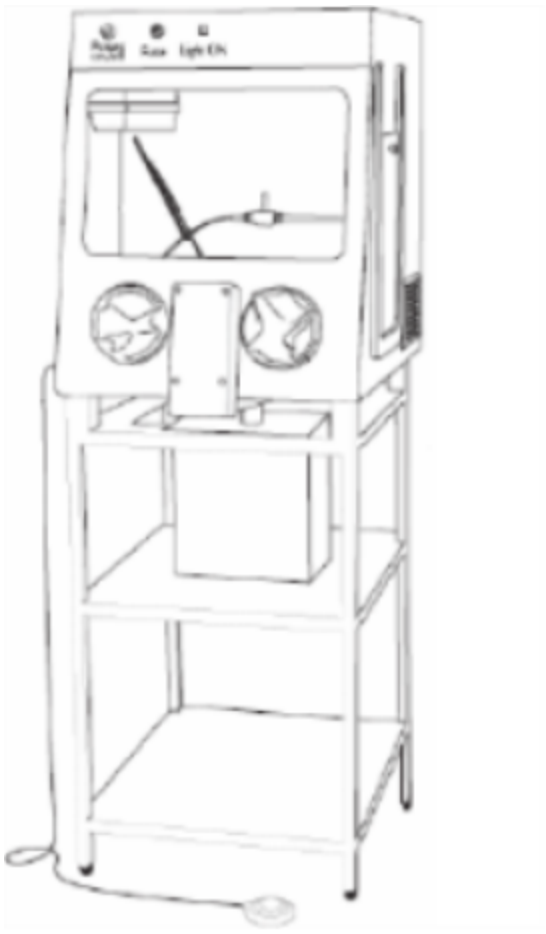
Balco WaterJet Cleaning System



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Contents

Introduction

Balco WaterJet

The Balco WaterJet provides easy and fast cleaning of support material from models printed on Stratasys 3D printing systems. The WaterJet comes equipped with two types of nozzles, enabling you to choose the flow rate and pressure suitable for cleaning, both delicate and robust models.

This user guide provides instructions for installing, operating and maintaining the following Balco WaterJet systems:

- OBJ-01007: 220 V WaterJet—Standard Size
- OBJ-03007: 220 V WaterJet—Large Body
- OBJ-01012: 110 V WaterJet—BOD/COD Standard Size
- OBJ-03008: 110 V WaterJet—BOD/COD Large Body
- OBJ-01006: 110 V WaterJet—Standard Size
- OBJ-03006: 110 V WaterJet—Large Body

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Terms Used in This Guide

Resin	The base substance from which photopolymer printing materials are made for use in Stratasys PolyJet printers.
Model material	Material used for building models.
Support material	Material used for supporting the structure of models during production. This material is later removed with the WaterJet.
Jet nozzle	High-pressure nozzle for removing Support material.
Spray nozzle	Medium-pressure nozzle for removing Support material.

Safety

Safety Guidelines

The following general guidelines, together with the instructions provided throughout this user guide, ensure user safety while operating and maintaining the Balco WaterJet . **If the system is not operated as specified, the user's safety may be compromised.**

- Installation and removal of the Balco WaterJet system should only be done by qualified Stratasys service personnel.
- Service operations should be performed only by personnel who have been instructed in relevant safety precautions.
- All personnel operating or maintaining the Balco WaterJet should know the location of first aid and emergency equipment and how to use it. **Never block access to this equipment.**
- Read and follow safety and maintenance instructions that come with the pressure pump.
- Do **not** direct the pressurized stream of water at people, animals, or objects.
- Check the WaterJet hoses before each cleaning session. Do **not** operate the WaterJet if a hose is damaged or crimped.
- Never operate the WaterJet while the cabinet cover is open.
- Wear earplugs for protection against loud noise.
- The power cable should be connected at an easily accessible electric socket near the WaterJet.
- Never connect the power plug to an outlet that does not have a ground (earth) wire, and never disconnect the ground. Doing so may expose the operator to serious danger from electric shock.
- The wall outlet must be protected by a residual current device (RCD).
- Protect electrical connections from contact with water spray and moisture.
- Never insert screwdrivers, wires, or other objects into the pump or power supply housing.
- Several parts of the WaterJet can remain extremely hot even after it has stopped operating. Avoid touching the main power supply, the wiper motor, the pressure pump and the lamps until they have cooled.
- Notify co-workers and those who have access to the Balco WaterJet system before beginning non-routine and hazardous work.
- Report any potential dangers and safety-related accidents to your safety officer or to other appropriate authorities.

First Aid for Working With Printing Materials

In general, try to avoid direct contact with uncured printing material. If skin or eyes come into contact with it, wash the area immediately and thoroughly with water, and follow the first-aid instructions below.

Contact with Skin

If uncured printing material comes in contact with skin:

- Immediately wash the affected area thoroughly with soap and cool water, then remove contaminated clothing. Pay particular attention to flushing the hair, ears, nose and other parts of the body that are not easily cleaned.
- Use cool water to prevent skin pores from opening, so that the liquid material does not easily penetrate the skin.
- Do not use solvents to clean skin.
- If large areas of skin have been exposed, or if prolonged contact results in blisters, seek medical attention. In any case, if irritation persists, seek medical attention.
- Avoid the accidental transfer of printing material from the hands to other areas of the body, especially to the eyes.
- If protective cream was used, do not reapply it until the skin has been completely cleansed.

Contact with Eyes

If uncured printing material comes in contact with the eyes:

- Flush immediately with large amounts of water for 15 minutes and seek medical attention.
- Avoid sunlight, fluorescent light, and other sources of ultraviolet radiation.

The wearing of contact lenses when handling liquid printing materials is not recommended. If the liquid splashes into the eyes when contact lenses are worn, immediately remove the lenses and flush the eyes with water.

- Immediately remove the lenses and flush the eyes with water.
- Clean and disinfect the contaminated lenses.
- Do not wear contact lenses until eye irritation disappears.

Ingestion

If printing material is swallowed, refer to the instructions included with the cartridge. **Seek medical attention immediately.**

Inhalation

Vapors from printing materials can be irritating to the respiratory system. If respiratory irritation occurs:

- Expose the victim to fresh air immediately.
- Seek medical attention immediately.
- Keep the patient warm but not hot.
- Never feed anything by mouth to an unconscious person.
- Oxygen should be administered by authorized personnel only.
- If the victim has stopped breathing, perform artificial respiration or cardiopulmonary resuscitation.

Waste Disposal

Fully cured models present no special safety or health-related issues. However, check if local regulations regard cured and partially cured resins as hazardous industrial waste, and comply with all applicable regulations governing their disposal.

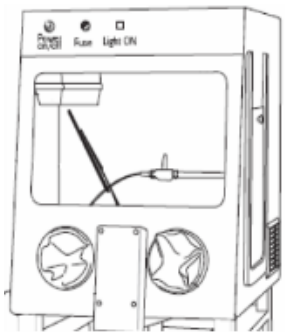
Overview

Configuration

The Balco WaterJet system consists of the following main components:

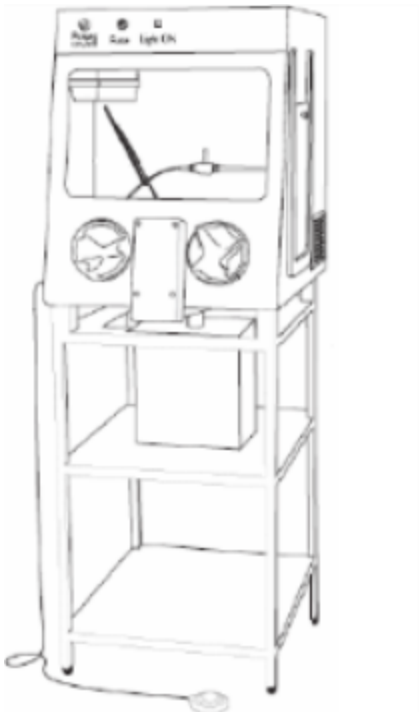
- Balco WaterJet cabinet
- stand

Figure 1 Balco WaterJet system components



The following figure shows the WaterJet unit set up.

Figure 2 WaterJet unit installed with stand



Size and Weight

The following table lists the size and weight of Balco WaterJet unit.

	W × H × D (cm)	W × H × D (in.)	Weight
WaterJet cabinet	72× 86 × 85	28.5" × 33.9" × 33.5	85 kg / 187.5 lb
WaterJet with stand	72 × 192 × 85	27.5" × 75.5" × 32.8"	95 kg / 209 lb

WaterJet Cabinet

Two types of WaterJet cabinets are available: standard and large. The cabinets differ in the size of the door opening. This determines the maximum dimensions of the model you can place in each cabinet for cleaning.

- Standard

  This cabinet is suitable for cleaning models printed on Objet260, Objet350, Eden260V, Eden350, Eden350V, Connex260, and Connex350 printers. It is *not* suitable for cleaning models whose dimensions are larger than the maximum tray size of these printers.

- Large

  This cabinet is suitable for cleaning all models printed on Objet500, Eden500V Connex500, and Stratasys J750 printers.

On/Off Switch

The power switch on the front of the cabinet turns the WaterJet on and off. The red LED on the front panel and the lamp inside the WaterJet cabinet lights when the WaterJet is switched on.

Figure 3 WaterJet On/Off switch

Important:

Switch the WaterJet off when not in use.

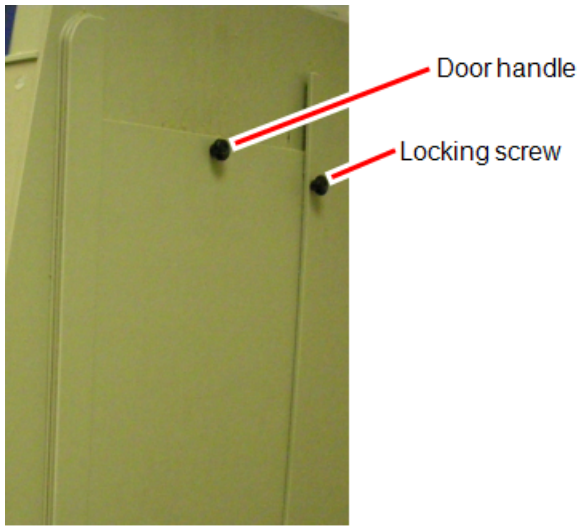
If the WaterJet is not used for an extended period of time, shut the water supply to the water pressure pump to prevent leaks. Make sure to open the water supply to the water pressure pump **before** using the WaterJet again.

Side Door

Place the models in the WaterJet cabinet via the side door. Raise and lower the side door using the handle. To keep the side door open, tighten the locking screw on the side.

Before starting to clean a model, make sure the side door is closed.

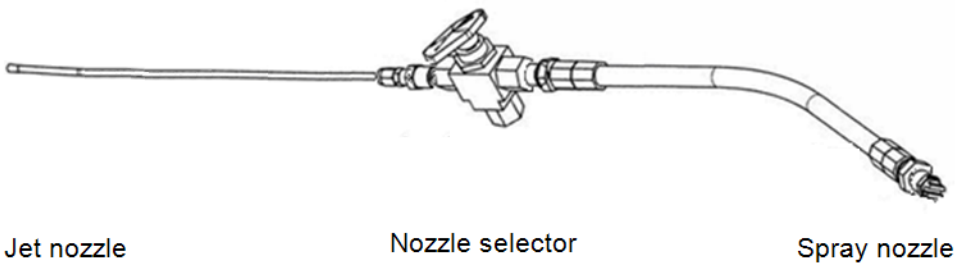
Figure 4 WaterJet side door



Nozzle Selection

You select which nozzle to use by turning nozzle selector valve. For example, in Figure 5, when the selector points to the right, the spray nozzle is used.

Figure 5 Nozzle selector valve



Foot Pedal

The WaterJet pump starts working as soon as you press the foot pedal. Make sure the side door is closed before stepping on the foot pedal.

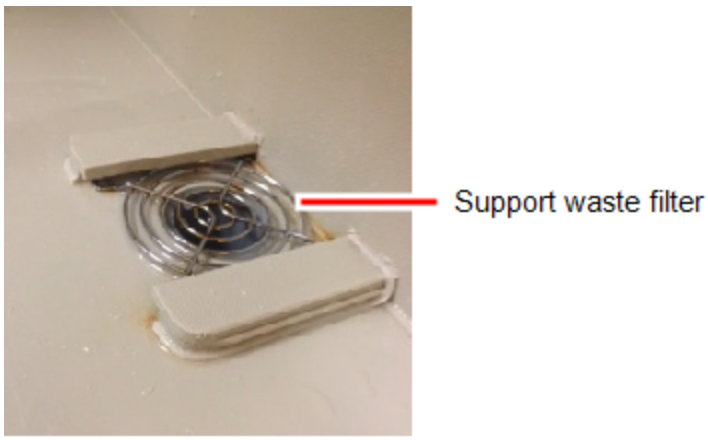
For optimum results, press the foot pedal down completely and continuously.

Figure 6 Foot pedal

Waste Filter

The Support material removed during the cleaning process washes down the water outlet at the bottom of the WaterJet cabinet. Make sure you place the waste filter over the water outlet before activating the WaterJet.

Figure 7 Waste filter

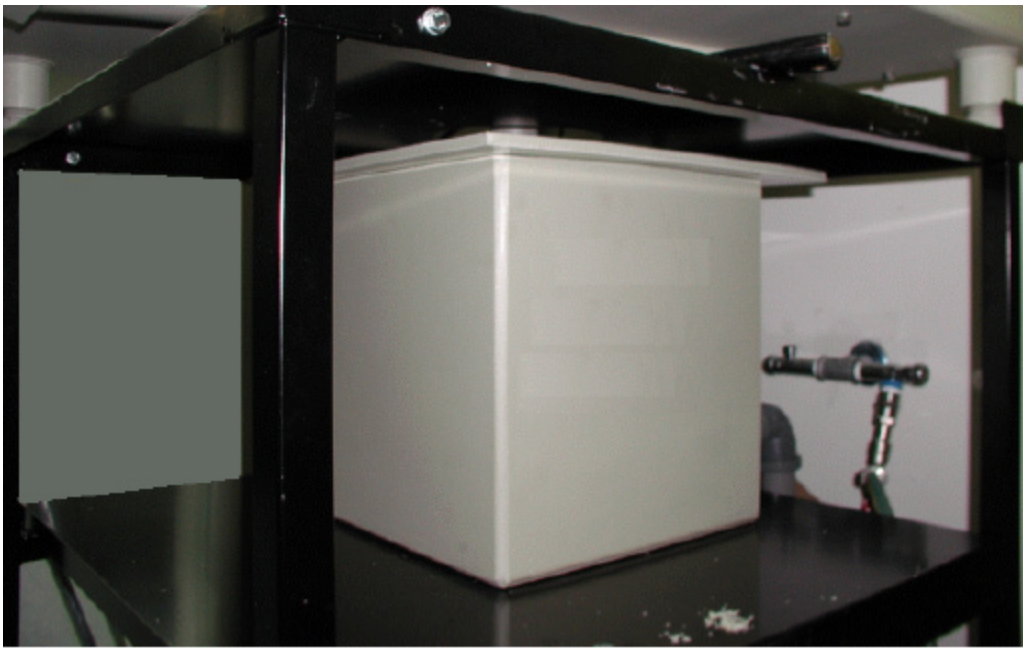


Waste Collector

The waste collector located underneath the WaterJet cabinet collects the waste and waste water. It is made up of two buckets: round and square. The round bucket sits inside the square bucket. When the round bucket fills up, the water spills into the square bucket and empties into the drainage system.

Empty the waste collector once a week to prevent waste build-up.

Figure 8 Waste collector



Installation

Configuring the WaterJet

Assemble the stand supplied with the WaterJet and place the WaterJet cabinet on it.

Assembling the Stand

The stand includes two metal feet, two shelves (top and bottom), and a rear panel.

1. Prepare—
   - a screwdriver
   - 35-mm x M6 bolts (supplied)
   - M6 nuts (supplied)
   - M6 washers (supplied)
2. Attach the top shelf to one of the metal feet (see Figure 9).

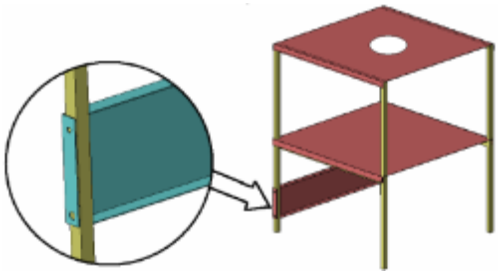
Figure 9 Assembling the top shelf

3. Attach washers to the bolts, insert the bolts, attach the nuts and tighten.
4. Attach the other metal foot.
5. Attach washers to the bolts, insert the bolts, attach the nuts and tighten.
6. Place the bottom shelf on the feet. (see Figure 10).

Figure 10 Assembling the bottom shelf

7. Attach the rear panel.(see Figure 11)
8. Attach washers to the bolts, insert the bolts, attach the nuts and tighten.

Figure 11 Attaching the rear panel



Leveling the WaterJet Unit

Attach the metal feet to the stand. The WaterJet unit should be level, with all four feet resting securely on the floor.

Once the WaterJet is placed on the stand, adjust the WaterJet feet so that the machine tilts slightly backwards. This ensures that the waste water flows to the water outlet at the back of the cabinet.

Attaching the Foot Pedal and Gloves

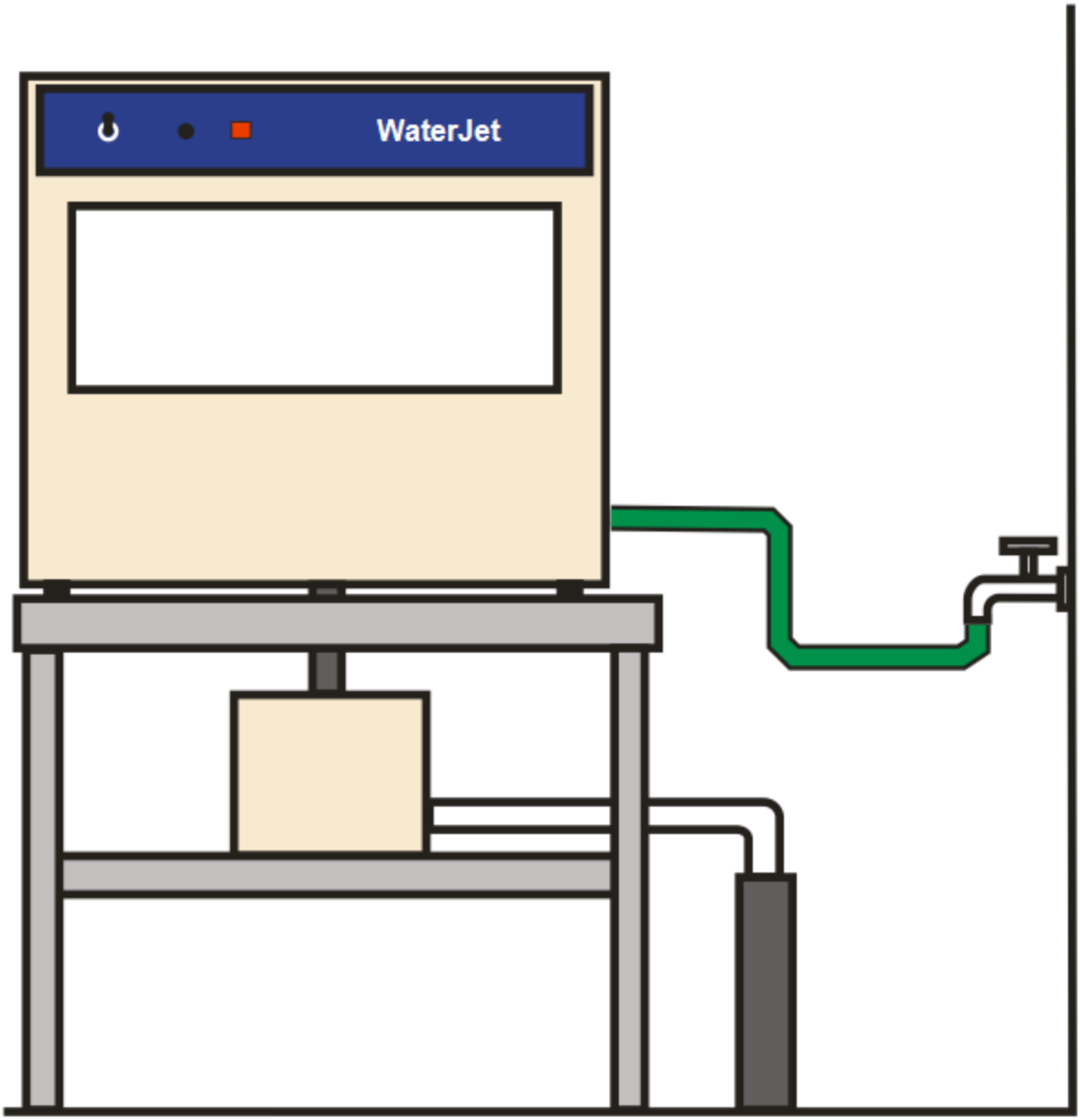
To attach the foot pedal and gloves:

1. Prepare—
   - gloves (supplied)
   - foot pedal (supplied)
   - two circular clips (supplied)
2. Plug the foot pedal into the mounted socket at the back of the WaterJet.
3. Fit the gloves onto the round openings on the front of the WaterJet cabinet.
4. Place a circular clip on each glove and tighten to secure the gloves to the WaterJet cabinet.

WaterJet Connections

The following figure shows the water supply and drain connections.

Figure 12 WaterJet connections



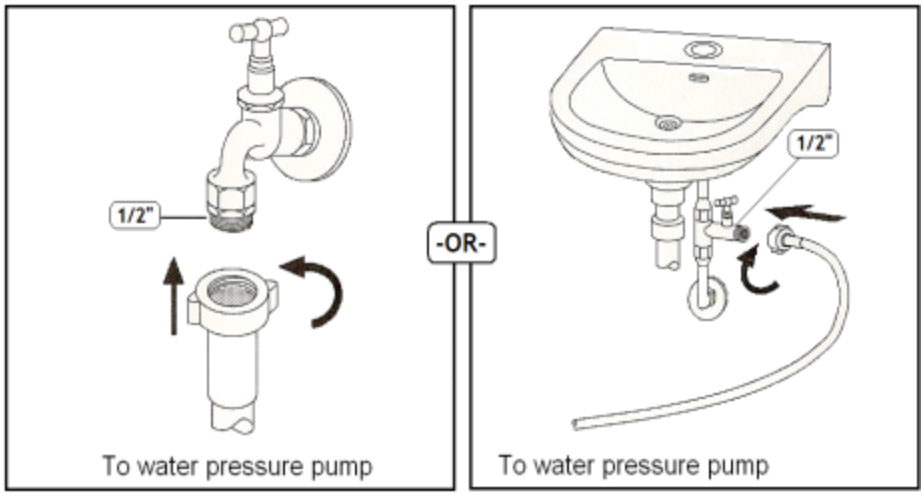
Connecting the Water Supply

To connect the water supply:

1. Prepare a garden hose (supplied).
2. Connect the garden hose to the water inlet of the WaterJet.
3. Connect the other side of the garden hose to the cold water tap.

> **Caution:**
> Lack of water or insufficient water pressure can cause the pump to operate improperly, overheat, or fail. Read the instructions that come with the water pressure pump.

Figure 13 Water supply connections



Connecting the Drain

To connect the drain:

1. Prepare—
   - two 40-mm 90°elbows (supplied)
   - two short 40-mm drain pipes (supplied)
   - a drain hose
   - waste collector (round bucket inserted in the square bucket)
2. Connect a drain pipe to the water outlet under the WaterJet cabinet.
3. Connect a 40-mm 90°elbow to the drain pipe and connect a drain pipe to the elbow.
4. Connect a 40-mm 90°elbow to the drain pipe and connect another drain pipe to the elbow.
5. Place the waste collector under drain pipe. The drain pipe empties into the waste collector.
6. Connect a drain hose between the water outlet on the waste collector and the building drainage system.

Connecting the Power Cable

To connect the power cable:

Warning: Electrical hazard.

Be sure the power cable is properly grounded, and that it can handle the electrical load of the WaterJet and the water pressure pump—

- 18 A for 110-120 V system (for running load)
- 15 A for 220-240 V system (for running load)

1. Make sure the main power switch on the front panel of the WaterJet cabinet is turned off (see "On/Off Switch" on page 10).
2. Install an appropriate power plug on the power cable at the back of the WaterJet cabinet.
3. Connect the WaterJet power cable between the socket at the back of the WaterJet cabinet and the power supply.

Cleaning Models

Cleaning Process

The cleaning process consists of different methods, depending on the size of the model, how delicate it is, and the amount and location of the support material.

Use the following methods for finishing the models you are handling.

Removing Excess Support Material by Hand

While wearing protective gloves, break away the excess support material on the outside of the model. For delicate models, use a toothpick, pin or small brush after dipping the model in water.

Removing Support Material with the WaterJet

For most models, the most efficient way to remove support material is by using the high water pressure, using the jet or spray nozzles.

Jet Nozzle

Use the jet nozzle like a scalpel to cut and trim large support-structure areas. The jet nozzle provides higher water pressure and is suitable for—

- large models without thin walls or fragile sections
- clearing support material from cavities, pipes, tubes and cylinders

Note:

The jet nozzle is not suitable for cleaning models made from flexible materials (such as Tango™ and Agilus30™) and their digital materials. Using it could leave noticeable marks on the model.

Examples of models suitable for cleaning with the jet nozzle are: engine blocks and shoe soles.

Spray Nozzle

Use the spray nozzle for cleaning—

- delicate parts
- parts with thin walls or fragile areas
- models made from TangoPlus, TangoBlack and TangoGray materials

Examples of models suitable for cleaning with the spray nozzle are: jewelry and dental appliances.

Caution:

Lack of water or insufficient water pressure can cause the pump to operate improperly, overheat, or fail.

- **Always** open the water supply source **before** activating the WaterJet. The water supply must remain open while the WaterJet is being used.
- Ensure that the water supply to the water pressure pump provides the required pressure. (A typical water pressure pump requires a supply pressure of at least 2 bar.)

Operating the WaterJet

To operate the WaterJet:

1. Turn on the main power switch on the front panel of the WaterJet (see "On/Off Switch" on page 10).
2. Open the WaterJet cabinet side door.
3. Place a model in the WaterJet cabinet.
4. Close the side door.

Note:

Do not continue until you make sure that you closed the side door.

5. Insert your hands in the built-in gloves.
6. Select a suitable cleaning nozzle (see "Nozzle Selection" on page 12).
7. Make sure you grasp the nozzle before you activate the WaterJet.
8. Activate the WaterJet using the foot pedal (see "Foot Pedal" on page 13) and clean the model.

Note:

For optimum results, press the foot pedal down completely and continuously.

9. When you have finished removing the support material, open the side door and remove the model.
10. If there are no more models to be cleaned at this time, switch off the WaterJet.
11. Turn off the water supply to the WaterJet.

Note:

Always turn off the water supply when the WaterJet is not being used. This prevents leaks and damage to the water hose and connections.

12. Empty the waste filter (see "Waste Filter" on page 13).

Note:

If it is necessary to remove support material from hard-to-reach areas and to give the model a smooth finish, continue by soaking the model in a solution of caustic soda (see below).

Removing Support Material with Caustic Soda

Note:

Use nitrile gloves to protect the your hands handling caustic soda and models soaked in it.

To remove thin layers of support material and to give the model a smooth, clean finish, soak the model in a solution of sodium hydroxide (NaOH, known as **caustic soda)**. For the exact composition of this solution, refer to the printer user guide.

The amount of time required to soak the model in the solution depends on how delicate it is and how much support material needs to be removed, but it is typically between half-an-hour and several hours (up to six hours). In any case, you should remove as much support material as possible before the treatment, and rinse the model thoroughly with the WaterJet afterwards.

Maintenance

Replacing a Fuse

Before replacing a fuse, make sure the main power connector is unplugged.

To replace a fuse:

1. Make sure that the WaterJet is switched off.
2. Disconnect the power plug from the wall socket.

> **Warning: Electrical Hazard**
> Contact with live circuits could cause serious electric shock. Do not continue before turning off the power switch and disconnecting the power cable.

3. Carefully remove the fuse.

Figure 14 Balco WaterJet Fuse

4. Replace the fuse with a fuse of the same type and rating.

Maintaining the Water Pressure Pump

Maintenance

You should perform the following maintenance checks at least once every six months.

Water Pressure

The water supplied to the pump should have a pressure of at least 2 bars, delivering 12 liters of water per minute. Pressure lower than this can damage the pump.

> **Note:**
> In case of low water pressure at the WaterJet, first check the water supply.

Water Leaks

Check the water pressure pump, water hoses, and their connections.

- If water leaks from a hose connection, open it and replace the O-ring.
- If a connector leaks, replace the thread-seal tape, as follows:

1. Open the connection and remove the old thread-seal tape.
2. Wrap fresh thread-seal tape (for example, **PTFE** or **Teflon®** tape) on the threads of the connector.

   Wrap thread-seal tape clockwise, in the direction of the thread, so that it doesn't unwrap when tightening the connection.
3. Close and tighten the connector.

Oil

- The oil level should be no lower than the middle of the sight glass.
- With high atmospheric humidity and temperature fluctuation there might be condensation (if the oil has a grayish color).

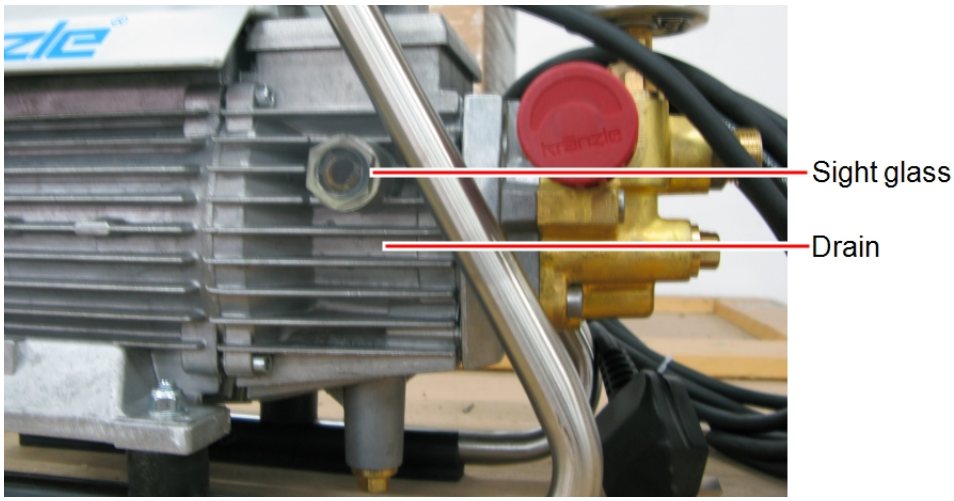
  If the oil has a grayish color, it must be changed, as follows:

1. Make sure the WaterJet is switched off.
2. Disconnect the power cable from the wall socket.

> **Warning: Electrical Hazard**
>
> Contact with live circuits could cause serious electric shock. Do not continue before turning off the power switch and disconnecting the power cable.

3. Drain the oil into a container.
4. Refill the water pressure pump with 0.25 liters of motor oil W 15/40.

Figure 15 220 V Water Pressure Pump (an example)



5. Dispose of the container in accordance with local regulation.

Troubleshooting

The following are some typical problems and their solutions.

The pump turns off every 10 to 15 seconds.

1. Detach the spray nozzle tip from nozzle selector valve in the WaterJet and let the water run for about five minutes with the pump on.

   Doing this removes air and dirt trapped in the water pressure pump and in the water supply hose.

2. Check that the nozzle tip is not blocked or damaged.
3. Reattach the spray nozzle tip.

Note:

A clogged nozzle can prevent the WaterJet from operating.

The pump stops working.

- Check the water pressure supplied to the pump. The minimum required pressure is 2 bars.

Caution:

Lower water pressure may cause the pump to overheat and stop.

- Check the motor safety overload switch:

1. Remove the rear cover of the WaterJet cabinet.
2. Press the (white) switch on the water pressure-pump motor.

- Check the main fuse and replace, if necessary (see "Maintenance" on page 23).

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