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Instruction manual for BM76S
General Information

High-speed machine for cutting scions

Version: 10/2021

Original manual

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1 Introduction

1.1 Presentation of the machine

The **BM76S** machine - designed and manufactured by **SFERE BM** - automatically cuts the cleaned branches at a very high throughput rate to obtain scions.

The machine has been installed, connected and commissioned by **SFERE BM** personnel.

1.2 Purpose of this manual

This instruction manual is intended for production technicians, operators and maintenance technicians.

It has been compiled to provide you with important information on the safety, operation, servicing and first-level maintenance of the **BM76S** machine.

Read this manual carefully before using the machine.

It has been prepared so that you can use the machine under the best possible conditions.

Keep it in a safe place close to the device, in a place accessible to servicing and maintenance personnel.

The illustrations in this manual are provided for ease of understanding. They are not contractual in nature.

The information contained in this manual was checked as of the date of issue. However, specifications are subject to change without notice.

1.3 Information and warning symbols

The following symbols are intended to draw your attention to information that clarifies a procedure or warns you of potential risks.

Indicates information relevant to the use of the machine or which will help optimise a procedure.

Indicates a hazard that could cause serious injury or death and serious property damage if the procedure is not followed.

1.4 Safety symbols

To inform technicians and operators of the dangers involved, you will find various safety symbols in this document.

The messages contained in these inserts inform you of the prohibitions to be observed, the potential risks involved and the steps to be taken to prevent these risks.

The definitions of the symbols are given below.

Electrical hazard.

Cut hazard.

Entanglement hazard.

Safety symbols on the device

Safety symbols and warnings affixed to the machine must never be removed or covered up. They must remain legible throughout the service life of the machine.

1.5 Warranty and liability

Warranty and liability are based on contractual provisions.

Spare parts and components

You should only use original **SFERE BM** spare parts or spare parts approved by **SFERE BM**. Only these parts guarantee complete occupational and functional safety. If you use non-approved parts, we accept no liability.

Components from other manufacturers

For all work performed on components from other manufacturers, you must follow the advice of individual instruction manuals.

Software changes

Any change made to software without prior notice or authorisation from **SFERE BM** will result in the expiration of the liability and warranty.

Intellectual property rights

SFERE BM reserves all rights over plans and software, and any other document including the right to dispose thereof, such as the right to photocopy or reproduce them.

Storage

SFERE BM shall not be held liable for damage due to corrosion that may occur due to improper storage of the equipment.

Transport and handling

Please note that improper transport and handling of the equipment does not entitle you to claims for compensation or warranty claims.
When in doubt about transport conditions, please contact **SFERE BM** before proceeding.
If a technician from **SFERE BM**'s technical department is present, he/she can be contacted for any questions relating to transport. He/she shall under no circumstances be held liable for transport or any damage that may result therefrom.

2 Safety instructions

2.1 Intended use

The **BM76S** machine is only intended to be used to cut scions automatically.

Any other use is considered contrary to the intended use.
The warranty shall not cover any damage resulting therefrom, and the **SFERE BM** Company shall not be held liable in any way.

2.2 Important notes for the operator

The machine was manufactured in accordance with the regulations in force at the time of delivery, and corresponds with existing rules in terms of technical safety.

Any residual risks are specified in this manual. All safety instructions must be complied with.

Have protective devices, interlocks etc. inspected at least once a year by an expert to ensure proper operation.

The operator is required to carry out an inspection in accordance with the accident prevention and electrotechnical regulations prior to commissioning.

It is forbidden to make any changes, fit additional parts or make structural changes to the machine.
The machine is equipped with protective casings and safety features to ensure safe operation.
Any removal or inhibition of one of the protective features shall directly release **SFERE BM** from any liability in the event of an accident.

2.3 Personnel training

Before starting work, operating and qualified personnel must have read and understood the instruction manual, particularly the "Safety Instructions" section and the regulations in force.
Specific instructions applicable to certain operations are provided in the following sections.

Anyone required to operate the machine must be trained in its use.

Personnel working on the machine must be regularly informed of the dangers which may arise while operating the machine.

2.4 Personnel protection

The operator is required to take adequate preventive measures to protect their personnel against the risks that may result from the machine, particularly when working outside the normal course of operations (cleaning, waste disposal, maintenance, repairs).

The operator must make the following protective equipment available to the personnel.

Safety goggles	Safety footwear	Safety gloves	Noise protection
			

You should check on a regular basis that this equipment is complete and functional.

2.5 Safety in the working environment of the machine

- Before switching on the machine, make sure there are no obstructions in the working environment of the machine.
- Never reach inside the guards and casings when the machine is in operation.
- Wear tight fitting clothes, remove jewellery. Protect long hair, e.g. with a net.

2.6 Measures to be taken before carrying out work on the machine

- It is strictly forbidden to work on the machine when it is not at a standstill. Working on a machine in operation may cause serious personal injuries.
- Before carrying out any servicing/maintenance work on the machine, switch the machine off (see **4.6**).
- Secure the machine against unintentional start-up.
- Before restarting the machine, make sure the persons in the vicinity of the system are safe.

2.7 Electrical/electronic work safety

This symbol, which can be found at various points on the machine, indicates that there is a risk of electric shock. Serious personal injury or death may result.

Only qualified and trained electricians may carry out electrical/electronic work on the machine and work in the areas marked with this symbol.

Before working on electrical or electronic components, observe the following instructions:

- Do not connect or disconnect live parts.
- Set the machine's button to OFF (HORS).
- Secure the machine against start-up.

2.8 Machine safety features

The machine is equipped with the safety features marked on Figure 1 on page10:

- Disconnect/Main switch.
- EMERGENCY STOP button.
- Voltage indicators.

- Covers and drawer with security-protected opening.
- Casings providing dual protection.

The EMERGENCY STOP should be used in the event of serious risk to personnel or property.

3 Description

3.1 General presentation

Left - Right convention.
The visible side in the figure above is the left side, in relation to the direction of wood flow.

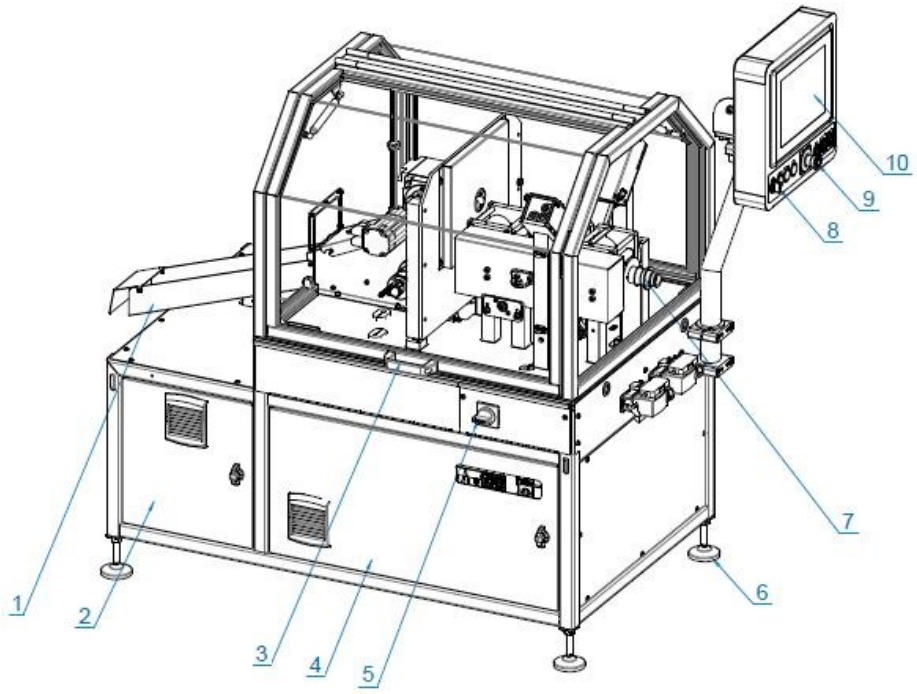


*Figure 1 – Overview of the **BM76S** machine*

1. Scion outlet chute.
2. Access to pneumatic valves.
3. Handles/Hinged covers.
4. Access to the electrical panel (circuit breakers), the PC, the PLC and the motor inverters
5. Main switch.
6. Adjustable feet (x4).
7. Feeding funnel.
8. Control buttons.
9. Emergency stop.
10. Touch screen.

Left - Right convention.
The visible side in the figure below is the right side, in relation to the direction of the wood movement.

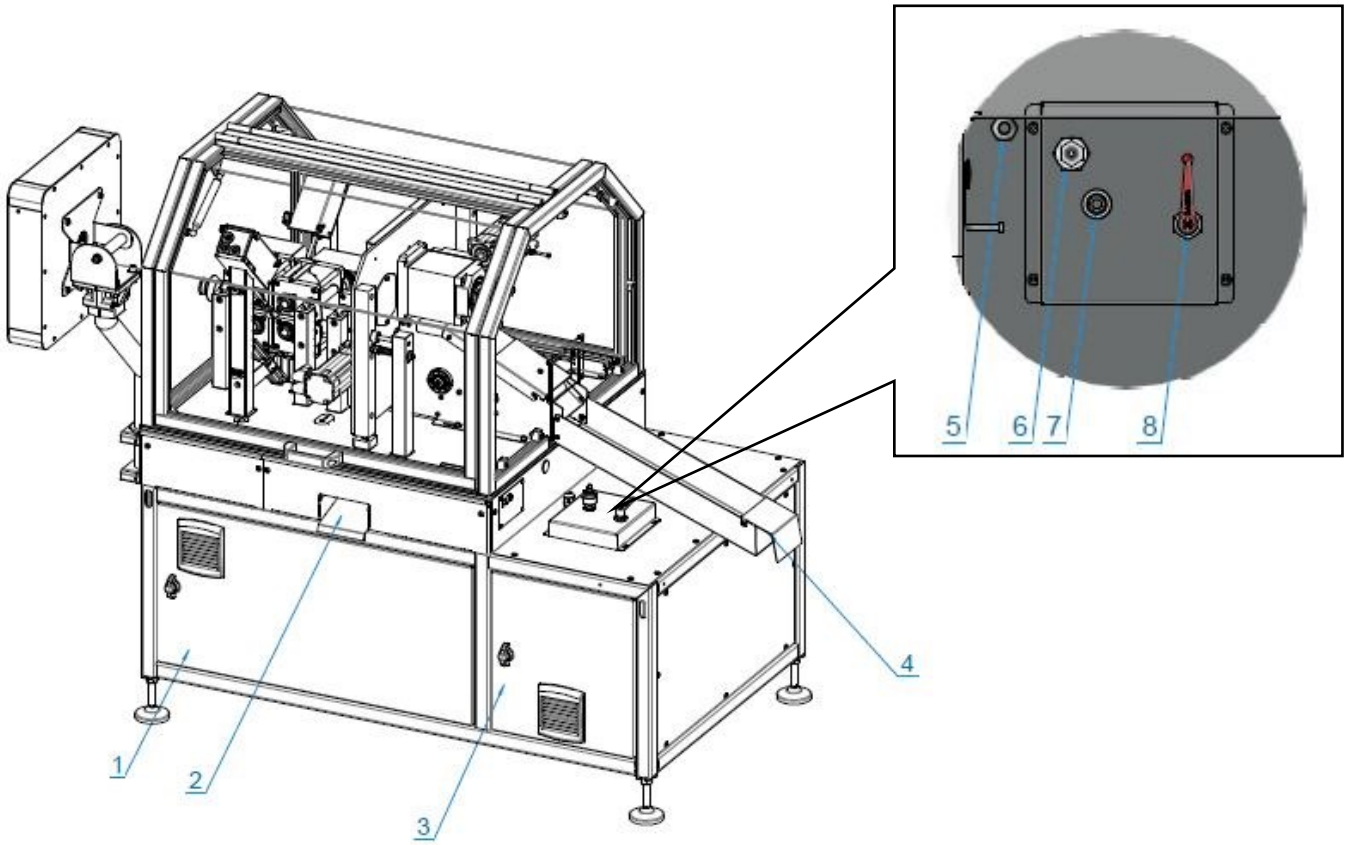


*Figure 2 – Overview of the **BM76S** machine*

1. Access to the electrical panel (circuit breakers), the PC, the PLC and the motor inverters
2. Waste outlet.
3. Access to the compressor.
4. Scion outlet chute.
5. Power supply cable.
6. Pneumatic inlet.
7. Quick connector for pneumatic blower.
8. Pneumatic valve.

3.2 Functional description

The **BM76S** cuts scions from cleaned wood.

After configuring the desired settings via the touch screen (see the instruction manual - Touch screen), the operator introduces the wood into the feeding funnel.

The two cameras read the wood "profile" and automatically determine the ideal cutting position.

A double rotating blade performs the cutting.

The scion produced after cutting is automatically directed into the ejection chute.

Scraps are ejected to the side of the machine into a collecting tray.

3.3 Control buttons and indicators

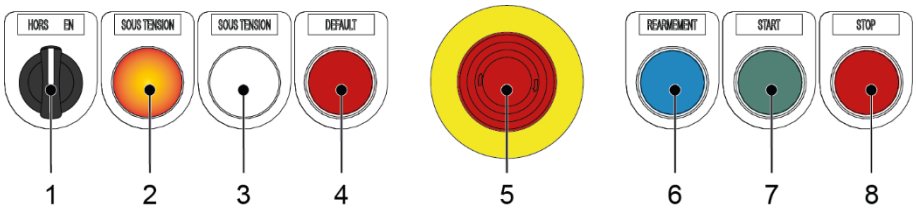
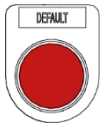
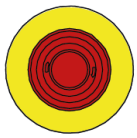
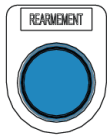


Figure 3 – Control buttons and indicators of the BM76S (on HMI)

Marker		Functions
		Main switch. • Position **1**: Switching on the machine and the computer section. • Position **0**: Main shutdown of the machine's power supply.
1		Power on/off The disconnect switch is set to **1**: ► Turn the button to "**ON**" (En) (return to the centre): to switch on the machine. ► Turn the button to "**OFF**" (Hors) (return to the centre): to switch off the machine.
2		24 V voltage presence indicator. • On: presence of 24 V at the machine's PC. • Off: 24 V power down
3		230 V voltage presence indicator. • On: machine switched on. • Off: after turning the main switch to "**0**" position.
4		Fault indicator. A fault can cause the machine to stop. Check the alarm on screen, solve the problem, acknowledge the alarm.
5		EMERGENCY STOP (**ES**). When an Emergency Stop is triggered, the "EMERGENCY STOP FAULT" message is displayed (in blue) and the Fault indicator turns red (**4**). To get out of an EMERGENCY STOP situation: • Resolve the fault. • Turn the EU button to unlock it. • Press the RESET button (**6**).
6		RESET. • On: waiting for reset, message in blue on screen. • Off: reset.

Marker		Functions
7		START. • Flashing: waiting for machine to start, according to the production programme selected. • Press to start production. • Lit: production in progress.
8		STOP. • Press to stop ongoing production.

4 Production launch

4.1 Before you start

Follow the safety instructions for personnel set out in paragraph 2.4

Tools:

- Clean microfibre cloth.
- Pneumatic blower.
- Secateurs.

Before starting the machine, check the following conditions:

- Open both covers of the **BM76S**.
- Remove large debris/wood chips.
- Remove wood debris from roller assemblies. To dispose of debris, gently blow by moving the blower from left to right.
- Blow harder if necessary to remove any remaining debris.
- Blow over the inside of the evacuation chute.
- Check that there is no wood inserted in one of the cylinder barrel pincers.
- Check the cleanliness of the cameras and LED spotlights.
  Clean camera glass and spotlights with a clean microfibre cloth.
- Visually check the condition of the belts and gears.
- Close both covers of the **BM76S**.

4.2 Preparing and inserting the vine shoots

To optimise the use of the machine, the shoot must be prepared and inserted correctly.

4.2.1 Preparing the front part of the shoot

A shoot prepared as shown in the figure below is not optimised because the length of the internode (**1**) before the first eye is not long enough to make a scion.

The first cut (**2**) will therefore only create waste and prepare the right internode length for the first scion.

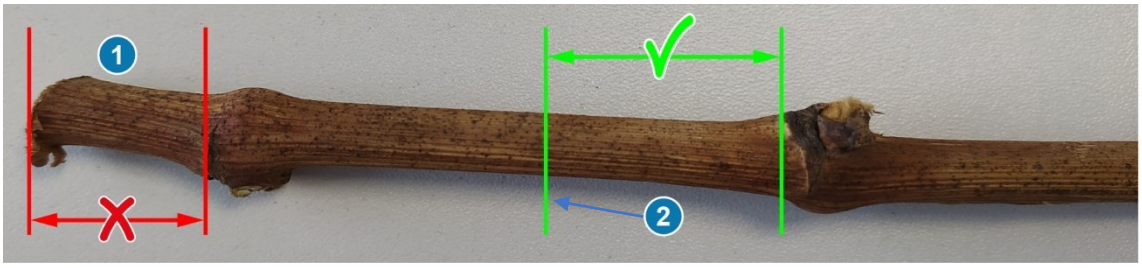


Figure 4 - Figure - Non-optimised shoot

The machine's productivity can be optimised by keeping the desired internode length before the first eye (see figure below).

The first cut (**3**) will allow a scion to be created directly.

Figure 5 - Figure - Optimised shoot

4.2.2 Preparing the back part of the shoot

There are two possible scenarios:

- **Case 1**: End of wood with a short inter-node and/or with too small a diameter for the last eyes to be converted into scions.
- **Case 2**: All the wood has a suitable internode and diameter.

Example of preparation in the first scenario:

The last scion is situated to the left of the green marker (**4**) because the end of the wood to the right has internodes that are too close together and too small a diameter.

A gap of **7 et 10 cm** behind the green marker (**4**) should be left so that the wood is well gripped between the rollers of the drive system when the last scion is cut.

If there is not a 7-10cm gap, the cut will automatically be inaccurate or the scion will be sent to the waste.

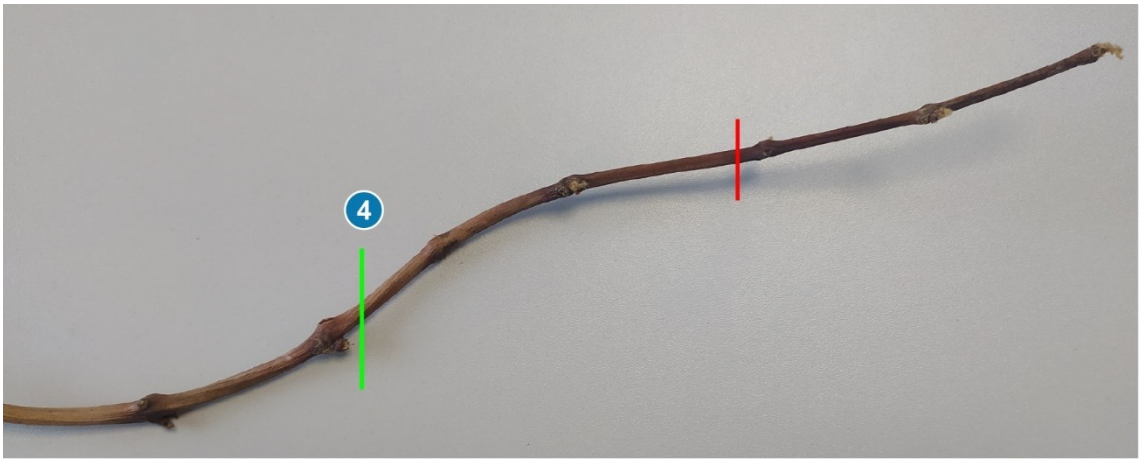


Figure 6 - Figure - Non-optimised shoot

The shoot should therefore be prepared as follows:

The last compliant scion is situated to the left of the green marker (**5**), and the remainder on the right only serves to maintain a sufficient grip.

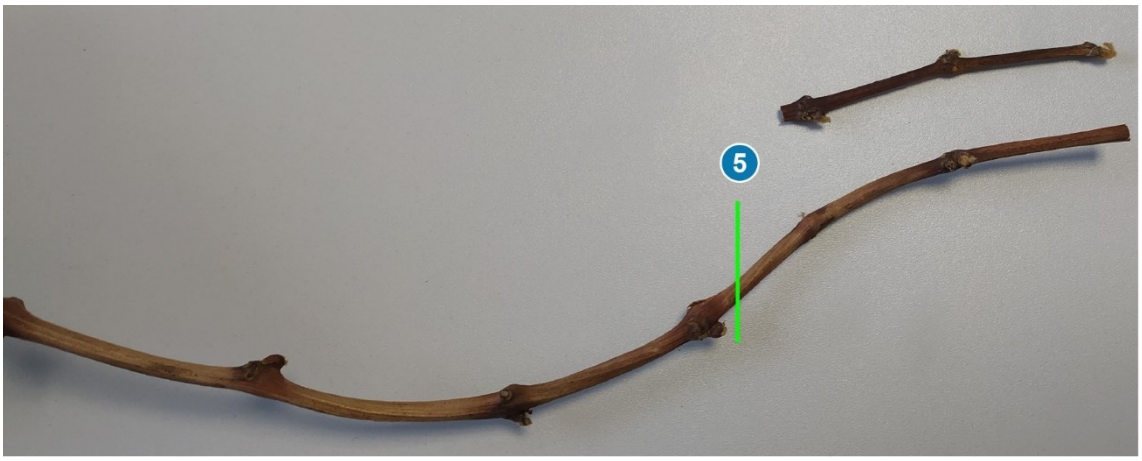


Figure 7 - Figure - Optimised shoot

Example of preparation in the second scenario:

The figure below shows that all eyes can be converted into grafts.

The last cut will be on the green marker (**6**).

Enough distance should be left behind this green marker (between **7** and **10 cm**) so that the wood is well gripped between the drive system's rollers at the time of the last cut.

The correct distance for the feeder unit to be able to grip the wood is marked in yellow in the illustration.

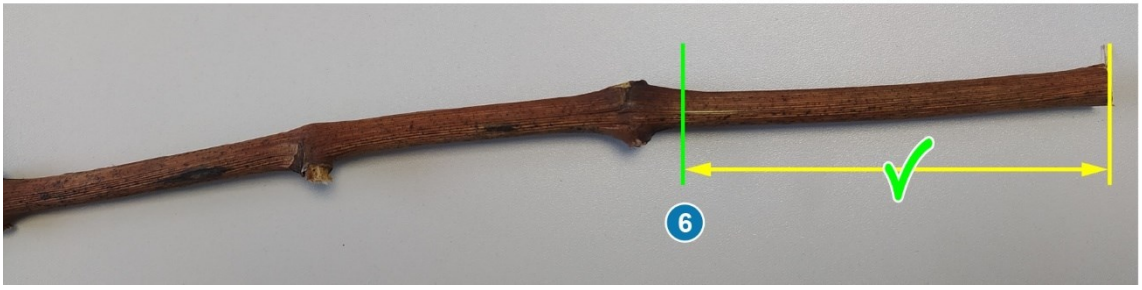


Figure 8 - Sufficient distance

Do not do this.

If the shoot is prepared as shown below, the last cut will not be precise.

The last scion will risk falling into the waste because its movement will not be controlled.

The distance for the feeder unit's to correctly grip the wood, marked in yellow, is not enough.

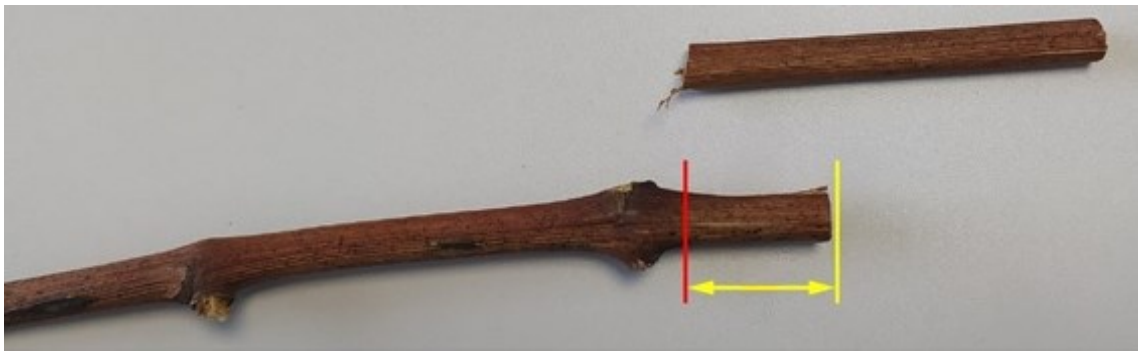


Figure 9 - Loss of the last scion

4.2.3 Inserting the wood into the machine

- The buds must point backwards.

Figure 10 - Direction of the wood

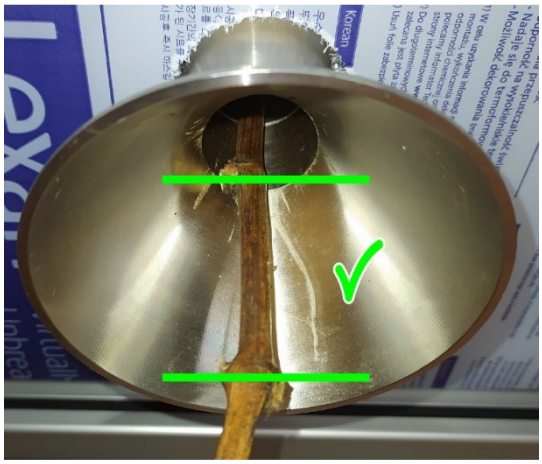


Figure 11 - Positioning of the shoot

- The eye should be inserted horizontally. This limits the variation of the wood's diameter in the drive system and increases the accuracy of the cut.

4.3 Starting production

- The main switch is on **1**.
- Turn the "**OFF/ON**" button to "**ON**".
- Wait until the orange "**POWER ON**" light comes on.

> Do not press the "**OFF/ON**" button during the machine ignition phase.

- The start screen will appear (See the instruction manual - Touch screen).
- The machine automatically performs a camera check (light flash).
- The "**RESET**" button lights up.
- Press the blue "**RESET**" button and, if necessary, acknowledge on the screen (red button).

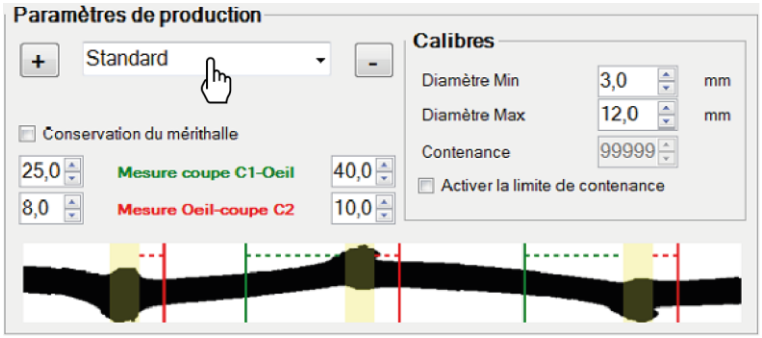


Figure 12 - Configuration screen

- Check the selected production programme.
- Press the "START" button on the machine.
- The machine is ready to start when the "START" button flashes green.

4.4 Monitoring the machine

The **BM76S** machine is fully automated during production.

The scions accumulate in the collection tray until the maximum number of scions has been reached. The machine will automatically stop so that the full tray can be replaced.

> Check the waste evacuation chute regularly. It must not get blocked.

4.4.1 Stoppage during production

- To intentionally stop production, press the "**STOP**" button on the machine.
- To restart, press the "**START**" button.

4.4.2 Emergency stop

- If there is a risk to the machine, press the "**EMERGENCY STOP**" button.
- The "**emergency stop fault**" message is displayed on screen.

4.4.3 Restarting after an emergency stop

To restart the machine after an emergency stop:

- Fix the problem that led to the emergency stop.
- Check that the machine is ready to restart (no tools, cloths in the way, etc.).
- Turn the emergency stop button to unlock it.
- Press "Acknowledge" and press the "**RESET**" button.
- Press "**START**" button.

4.5 Fault Management

When an error message appears on screen, please refer to § 5.1 .

There are several types of fault that can occur on the **BM76S** machine.
Some of these faults can be managed by the operator.
In some cases the operator will be unable to address the faults.
The Maintainer is responsible for resolving these faults.

The BM76S machine may trip and stop during production.

- Resolve the problem(s) displayed on screen.
- Acknowledge the fault(s) on the screen.
- Press the "**START**" button if it is flashing.

4.6 Stoppage at the end of production

To stop the machine at the end of production:

- Press the "**STOP**" button.
- Turn the "**OFF/ON**" button to "**OFF**".
- The "voltage loss" message is displayed on screen.
- Wait until the BM76S machine has stopped. The machine is stopped and the orange indicator goes out.

WARNING

Do not restart the machine while the orange indicator is still on.

The main switch normally remains on "**1**", to maintain the temperature of the electrical part.

WARNING

Switch off the machine before any work or maintenance operation.

5 Appendices

5.1 List of BM76S error messages

5.1.1 List of Machine faults

Fault	Description	Solution
"Time period without production exceeded" fault	No shoots have been inserted into the machine in the last minute.	-
Emergency stop fault	Emergency Stop is activated.	Press the blue reset button on the control panel after the emergency stop button has been deactivated.
PLC communication fault	Failed to connect to the PLC.	▶ Turn the switch to "0". ▶ Wait 1 minute ▶ Turn the switch to "1" to restart the machine. ▶ If the problem persists, contact the After Sales Service.
Line contactor fault	Problem with the electrical power to the machine.	
PLC initialisation error	Failed to initialise the PLC parameter values.	
Failed to launch automatic mode	The production cycle could not start normally due to a defect (machine fault).	▶ Try to restart a production cycle. ▶ Close the MCG application and restart it.
Pressure switch fault	Insufficient pneumatic pressure supply.	Check the air supply (compressor, pneumatic circuit, etc.).
Cover safety fault	One of the casing covers is open.	Press the blue reset button on the control panel when the covers have been closed.
End of operator cycle	Indicates that the operator has completed the production cycle normally by pressing the red button on the control panel.	-

5.1.2 List of Vision Unit faults

Fault	Description	Solution
Free camera acquisition start fault	Feed camera malfunction, no image of the wood acquired.	▶ Acknowledge the fault and restart a production cycle. ▶ If the problem persists, contact the After Sales Service.
Camera servo acquisition start fault	Feed camera malfunction, no image of the wood acquired.	
Failure to connect to cameras	One or both cameras are not connected.	Reconnection required.
Unmanaged camera fault	Feed camera malfunction, no image of the wood acquired.	

Fault	Description	Solution
Camera pulse width fault	Feed camera malfunction, no image of the wood acquired.	▶ Acknowledge the fault and restart a production cycle. ▶ If the problem persists, contact the After Sales Service.
Camera configuration fault	Feed camera malfunction, no image of the wood acquired.	
Camera temperature fault	Camera temperature too high.	
Camera "overtrigger" fault	Failed to trigger the acquisition of wood images by the feed unit cameras.	
Camera calibration fault	Presence of wood in the feed section of the machine. Faulty calibration of the feed unit cameras.	▶ Remove the shoot by moving the feed rollers in reverse (in manual mode) or open the machine cover to remove the wood by hand. ▶ Clean the feed rollers by the cameras with the blower ▶ If the problem persists, carry out the camera calibration procedure.
Camera power supply failure	Malfunctioning feed cameras, power supply problem.	Check the connection of the cameras.
Vision processing delay	Malfunction of the feed unit cameras.	▶ Acknowledge the fault and restart a production cycle. ▶ If the problem persists, contact the After Sales Service.
Camera capture fault	Malfunction of the feed unit cameras.	
Camera user settings fault	Faulty configuration of the feed unit cameras.	
Manual spotlight fault in progress	In manual mode, activation of the lighting linked to the feed unit cameras.	
Camera loss of communication fault	Production stoppage due to loss of connection with a camera.	
Time-out fault, waiting for PC command (camera communication)	Communication problem between the PC and the feed cameras.	
Wood accumulation fault	Accumulation of wood in the feed unit (jamming, cutting defect)	Open the cover to remove the wood by hand.

5.1.3 List of Feed Unit faults

Fault	Description	Solution
Communication fault with the feed inverter	Communication problem between the PLC and the inverter connected to the motor driving the feed rollers.	▶ Acknowledge the fault and restart a production cycle.
Feed position setpoint fault	Inconsistency in wood-feed instructions.	
Feed inverter fault	Problem with the inverter connected to the motor driving the feed rollers.	
Prolonged stoppage of the feed rollers fault	Stoppage of feed-through (mechanical blockage of the rollers, etc.).	

Fault	Description	Solution
Waiting for feed setpoint fault	Inconsistency in wood-feed instructions.	▶ If the problem persists, contact the After Sales Service.
Wood blockage fault	Stoppage of feed-through (mechanical blockage of the rollers, etc.).	
Position setpoint exceeded fault	Inconsistency in wood-feed instructions.	
Negative cut	Inconsistency in wood-feed instructions.	
Unreachable cutting position fault	Inconsistency in wood-feed instructions.	

5.1.4 List of Cutting Unit faults

Fault	Description	Solution
Communication fault with the cutting inverter	Communication problem between the PLC and the inverter connected to the motor driving the cutting blades.	▶ Acknowledge the fault and restart a production cycle. ▶ If the problem persists, contact the After Sales Service.
Cutting acceleration setpoint fault	Problem with the PLC configuration for actuating the cutting motor.	
Cutting deceleration setpoint fault	Problem with the PLC configuration for actuating the cutting motor.	
Cutting speed setpoint fault	Problem with the PLC configuration for actuating the cutting motor.	
Blade position deviation fault	Problem with the PLC configuration for actuating the cutting motor.	
Cutting inverter fault	Problem with the inverter connected to the motor driving the cutting blades.	
Blade original plug fault	Problem with the setting of the original cutting blade position.	Enter the initial position of the cutting blades in the PLC parameters.
Rotating actuator fault	The rotating actuator (chute/scion) does not return to its end position	Check the pneumatic pressure supply If the problem persists, contact the After Sales Service.

5.2 Technical features

5.2.1 Characteristics of the machine

- ▶ High-speed machine for cutting scions.
- ▶ Cutting, sorting of scions and scraps in one fully automated operation.
- ▶ Improved efficiency and reliability compared to manual processing.
- ▶ Management of all operations and settings from the touch screen:
  - Scion length,
  - Cutting length,
  - Min/max diameter of scions (6 to 14 mm),

- Number of scions to be grouped in one container (bag, buckets, etc.),
- Statistics (day, production history, etc.),
- Data exportable in CSV, XML or BMP formats,

- Automatic waste/scraps ejection via the side of the machine
- Detection of wood blockages and automatic shutdown.
- Network connection: RJ45 or Wi-Fi.
- CE standard compliant equipment.

5.2.2 Footprint

Dimensions of the **BM76S** Machine

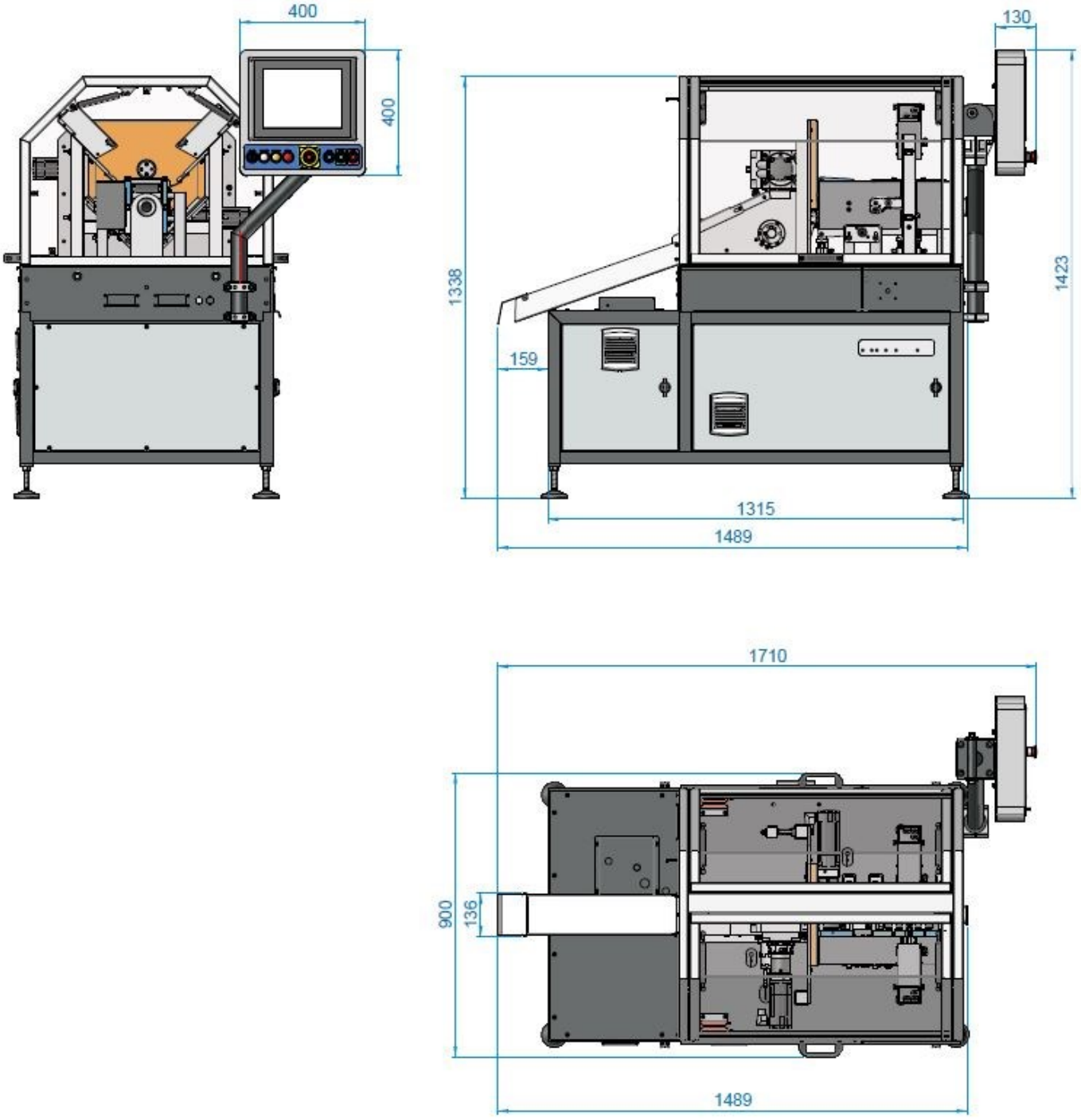


Figure 13 - Machine dimensions

- Working height ..... From 911mm to 1010 mm
- Weight ..... 370 kg

5.2.3 Pneumatic supply

- Supply ..... 6 bars minimum
- Consumption ..... 1 m³/h

5.2.4 Power supply / Mains

- Plug type for **BM76S** ..... Type E
- Socket adapter for **BM76S** ..... Type C / Type F
- Voltage ..... 230 VAC 1 Phase + E + N.
- Supply frequency 50Hz
- Network connexion ..... RJ45 / Wi-Fi.

5.2.5 Operating conditions

- Ventilated to remove heat and odours from the machine
- Outside temperature ..... 0°C ≤ T° < 40°C
- Relative humidity ..... 30 % < µ < 90%
- Acoustic power ..... ≤ 70 dB (A).

5.2.6 Storage conditions

5.2.6.1 Storage prior to commissioning

The machine, still in its crate, must be placed in a room where the temperature is between 0°C and 40°C with moisture content below 90%.

5.2.6.2 Long-term storage

Once unpacked, the machine must be put back into its crate if possible, or at least covered with cardboard packaging and stored in a room away from a corrosive atmosphere and where the temperature is between 0°C and 40°C and moisture level below 90%.

The machine must be cleaned before storage.

5.3 Nameplate

The machine's nameplate is located on the supply side (power/pneumatic) of the **BM76S**.

The following information is provided:

- Description of the machine.
- Type of machine.
- Year of construction.
- Reference of the machine.
- Serial number.
- Electrical voltage of the machine.
- Current intensity of the machine.
- Pressure required to operate the machine.
- Output rate required to operate the machine.
- "CE" mark.
- Telephone number of **BM Emballage**.

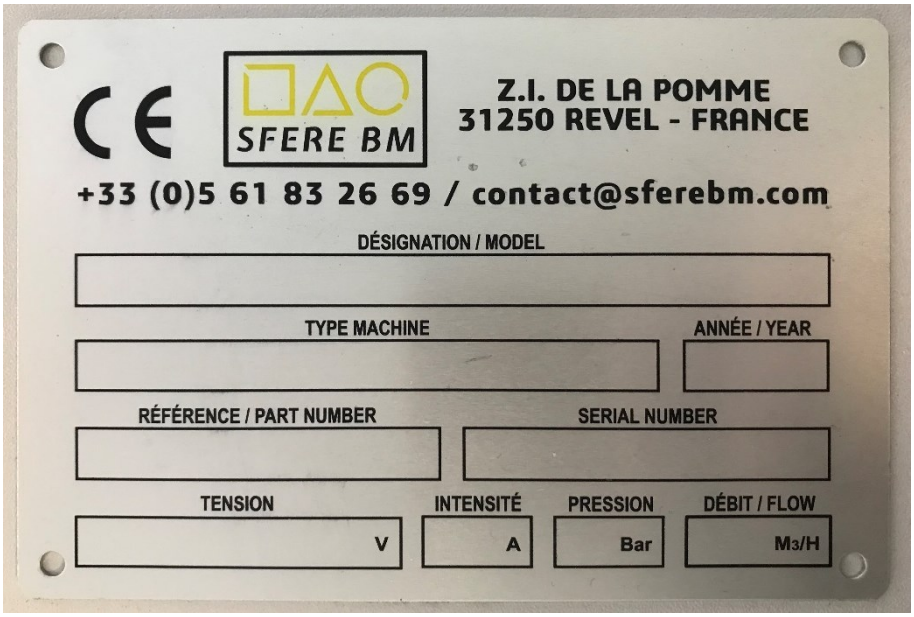


Figure 14 - Nameplate

5.4 EC Declaration of Conformity

EC DECLARATION OF CONFORMITY

Machinery Directive Annex II. A

The manufacturer, importer or person responsible for placing on the market:

Company: **SFERE BM SAS**
Address: Zone Industrielle de la Pomme - 31250 REVEL

Hereby declares that the new (or considered new) work equipment or protective means described hereafter:

Brand: **BM packaging**

Type: **999-18-018; SCION CUTTING MACHINE BM76S.**

Serial No.: **serial from No. 91818001 to No.91818040**

Year: **2021**

1- Complies with:

- ❒ Machinery Directive 2006/42/EC
- ❒ EMC Directive 2014/30/EU
- ❒ low voltage directive 2014/35/EU

2- Has been built in accordance with harmonised standards:

- ❒ EN ISO 12100: 2010
- ❒ EN415-8: 2008
- ❒ EN60204-1: 2006/A1: 2009
- ❒ EN61000-6-1:2007
- ❒ EN61000-6-3:2007
- ❒ EN62233: 2008

Signed in Revel on

In generic form.
The signed declaration is delivered with the machine.

5.5 Transport/handling

5.5.1 Preparation before handling

- Dispose of containers and products from the machine.
- Carry out external cleaning. Check for cleanliness.
- Remove moisture.
- Close the doors and drawers of the machine.
- Set the disconnect switch to OFF (HORS) and turn off the compressed air. Lock out these devices.
- Make sure the machine cannot be restarted.
- Storage should be in a temperate room, protected from moisture.

5.5.2 Restarting a locked-out machine

To restart a locked-out machine:

- Remove the protective covers from the **BM76S** machine.
- Connect the electrical, pneumatic circuits.
- Check the connections made.
- Check for moisture inside the machine.
- Clean the interior with the blower.
  Remove debris if necessary.
- Clean the outside of the machine and check for cleanliness.
- Set the disconnect switch to ON (EN).
- Start the machine.

5.6 Scrapping/Withdrawal from operation

- Dispose of containers and products from the machine.
- Carry out external cleaning. Check for cleanliness.
- Remove moisture.
- Close the doors and drawers of the machine.
- Set the disconnect switch to OFF (HORS) and turn off the compressed air. Lock out these devices.
- Make sure the machine cannot be restarted.
- Disconnect the electrical, pneumatic and hydraulic circuits.
- Dismantle the machine if necessary.
  Dispose of materials in accordance with recycling and environmental standards.
- Cover/wrap the machine with protective covers.

5.7 Customer service contact

After Sales

Tel: +33 (0)5 61 83 26 69

Email: contact@sferebm.com

Spare parts

Tel: +33 (0)5 61 83 26 69

Email: pieces@sferebm.com