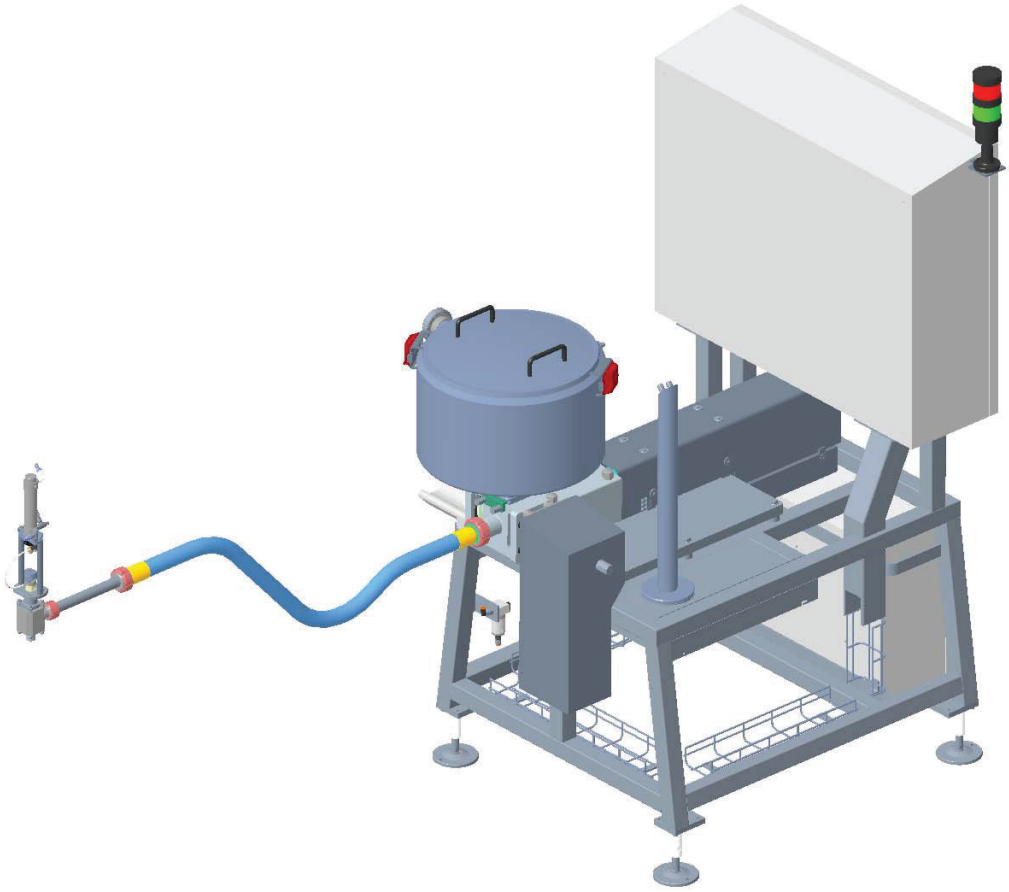
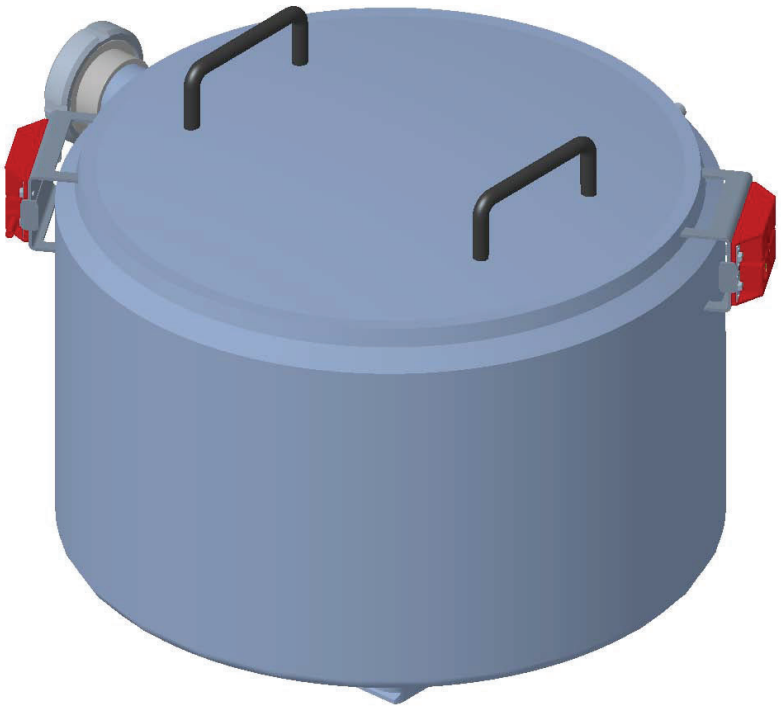


G.1.1 Feed hopper

The feed hopper is a metal “casing”, normally cone-shaped, in which the product is placed during operation before it is filled into the tray on the in-line conveyor.



More complex hoppers are also available to heat the product and keep it at the desired temperature.

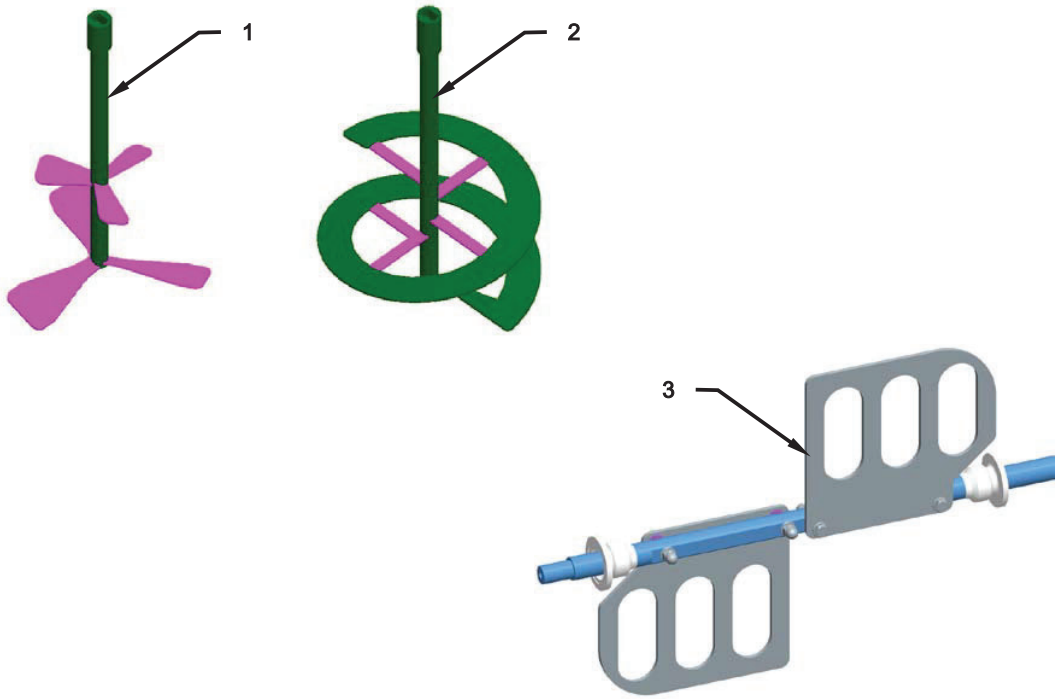
The hoppers can have a double cavity, for use with double-piston metering units with a single or double motor; and can be equipped with an automatic internal cleaning system, and a pneumatic tilting system as with hoppers of a capacity of 200 litres (all these features are optional).

The hopper is equipped with electronic level probes and product-call sensors that guarantee a constant level of product in the hopper; and mechanical agitators that keep moving the product inside the hopper to prevent the product from clotting and increase downward force to facilitate the delivery of the product.

G.1.2 Agitator / Worm screw

The figure below shows two types of agitators used inside the hoppers of the **VF/SP-E** machines.

These are generally used when the product handled is highly dense and pasty, as when it is held for long in the feed hopper, without being mixed, it might cause the formation of clots and deposits that are hygienically harmful.



Agitator (1), with side paddle, ensures continuous mixing of the product, without conveying it down to the bottom.

Worm screw (2), with a helical band, ensures continuous mixing of the product with enhanced push-down to the bottom.

Agitator (3), with horizontal rotation, ensures continuous mixing of the product and avoids the division between liquid and solid product.

Plates, called “SCRAPERS” can also be mounted inside the hopper to counteract the push-down effect at the bottom, externally caused by the agitators, and remove any product residue stuck to the hopper wall.

These scrapers are connected to the same rotating shaft of the agitators and hence have the same operating speed.

G.1.3 Electrical control panel

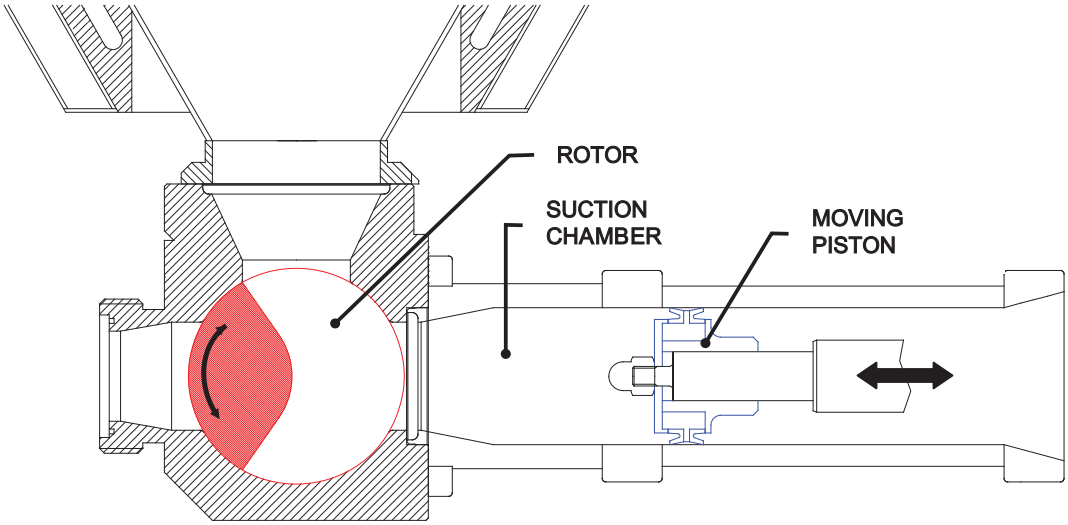
The electrical control panel is where the operator interacts almost exclusively when using the filling machine.

It consists of a metal box with a series of buttons, selectors and indicator lights for complete efficient operation of the **VF/SP-E**.

On the electrical control panel of the **VF/SP-E**, there is an OPERATOR PANEL with an internal PLC acting as a machine-operator interface.
This device improves and further facilitates the use of the filling machine by providing the operator with an indispensable help in understanding the operating cycles, alarms, work times and all the parameters that, if only mechanically adjusted, would be limited and restrictive.

G.1.4 Piston and metering chamber

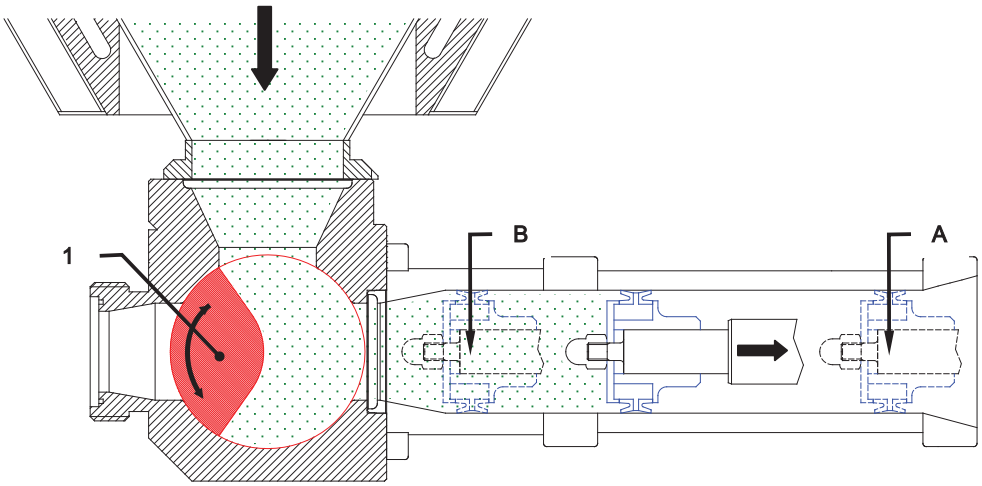
The piston and metering chamber are the mechanical parts controlling filling of product in the VF/SP-E machine. As shown in the figure, there are three main elements: the ROTOR, the MOVING PISTON and the SUCTION CHAMBER.



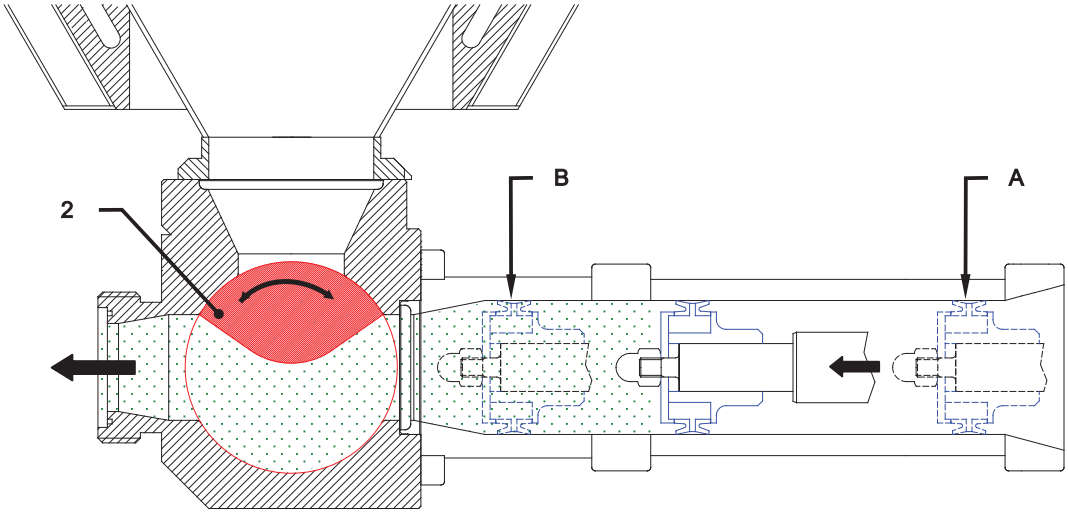
Filling takes place following a continuous sequence which, depending on the duration of each movement and the size of these three components, ensures constant delivery of the same amount of product per cycle.

- Operating sequence:

. The rotor is in position (1) and the moving piston moves from position (B) to position (A), and starts extracting the product from the hopper so as to fill the metering chamber completely.



. The rotor moves to position (2) and the moving piston starts its stroke to position (B) so as to extract the product contained in the metering chamber within the set time.



. The rotor returns to position (1) and the cycle restarts.

Running this cycle in a short or long time affects the pressure of the product when it leaves the chamber, while the size of the metering chamber affects the amount of product being ejected per cycle.

G.1.5 Metering valve

The metering valve is located at the far end of the filling machine and is the part in direct contact with the tray receiving the product.

The metering valve is the standard type but other types of valves can also be used, depending on the product being handled and the type of tray used.

The metering valve is not necessarily mounted on the filling machine but, depending on the application, it can be cantilevered through a connection using rigid pipes or hose pipes.

When hose pipes are used, the valve is placed on a device called “moving head”, whose movement is synchronised with the conveyor and the tray underneath, which increases the metering time available.

G.1.6 Photoelectric cells, level sensors and position micro-switches

These three elements are placed on the filling machine to ensure correct operation at every stage of processing.
The photocells are placed on the tray conveyor to detect the passage and presence of the tray and enable filling.

The level sensors, if requested, are mounted in the filling hopper and, combined with the associated device, ensure constant feeding of the product in the metering hopper.

The position micro-switches are mounted on the extraction and metering piston of the filling machine and are used to establish the zero position required by the machine when starting production.

G.2 LIST OF HAZARDS

1) Hot hopper with stirrer / worm screw and heating (if envisaged)

2) Filling valve

3) Voltage

4) Compressed air pipes

5) Maintenance and cleaning with the machine stopped

G.3 RISK ANALYSIS

G.3.1 Hopper with stirrer / worm screw and heating (if envisaged)

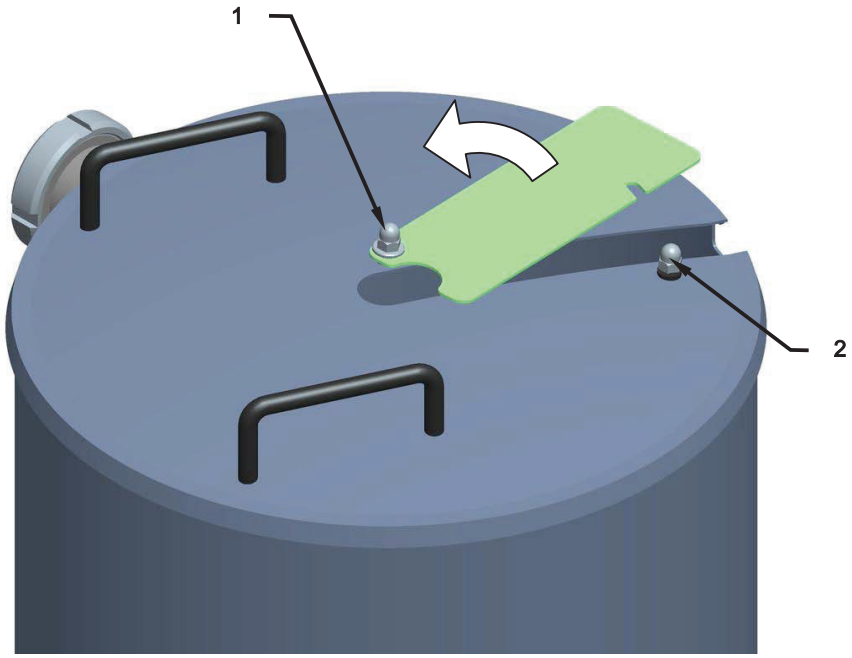
The hopper may be the ordinary type, with a product loading chute or heated. In either case it has a lid with a mechanical lock to prevent it coming off during operation. The use of a mechanical lock without electric micro-switches complies with the safety requirements of directives 2006/42/CE, attachment I, points 1.3.7 and 1.3.8, and attachment, points 1.4.1 and 1.4.2, EN 953+A1 and EN 349.

Never remove the lid with the stirrer moving and the filler in operation.

Washing and routine and extraordinary maintenance must be carried out by an expert operator who has been trained to work with this type of equipment. To remove the mechanical lock, loosen nuts **1** and **2** using the tool provided (in the expert's possession only) and turn the locking device to free the port in the lid. Wash the hopper with a jet of water through the port in the lid.

Never insert the hands in the hopper with the lid off.

Bear in mind that the hopper may reach a high temperature at the product discharge stage, so do not touch the hopper as there may be the risk of getting burnt.



G.3.2 Dosing valve

The dosing valve is designed to guarantee efficient operation of the doser. It comes with moving mechanical parts that can create a serious hazard when they come into contact with foreign bodies.

- Solution: The dosing valve is equipped with guards or safety devices that prevent the insertion of foreign bodies that may cause a damage to the production line or injury to the user's hands and fingers.

For construction and operating requirements (such as the passage of product and hygiene), these guards are placed along the line so as to prevent any hazardous situation. In any case, the dosing head is designed and mounted on the production line in such a way as to prevent:

- foreign bodies or other objects from falling off inside;

- access to the dosing area as it is placed very close to the tray track and in an area where the operator **MUST NOT** perform any control or maintenance operations or cleaning product-safe interventions for hygienic reasons.

There exist a risk for the user whenever he performs prohibited manoeuvres. The following precautions must always be taken when using our equipment:

A) Cleaning and maintenance operation must be effected with the machine stopped.

B) In the event of failure, **DO NOT INSERT FOREIGN BODIES FROM THE HOPPER OR THE BOTTOM DOSING TRACK.** You must switch off the machine first.

N.B. ***If the doser is separate from the processing line, this is not the ideal condition for providing this device with suitable guards.***

- Residual risks: None if the above instructions are followed carefully and the safety devices are not bypassed or removed.

G.3.3 Live parts

The machine runs on electricity.

- Solutions: The machine is designed, built and equipped to prevent all electrical hazards. The entire machine is IP65-guarenteed against dust and water and there are no user hazards during normal operation. The only important recommendation is:

DO NOT ATTEMPT TO OPEN THE CONTROL CUBICLE WITH THE POWER ON

It can only be opened with the power switched off.

Residual risks: None if the above instructions are followed carefully.

G.3.4 Air pipes under pressure

This doser runs on electricity but it also requires other types of supply for correct operation, such as the compressed air or hydraulic oil supply.

The compressed air is supplied at an average pressure of 6 bar. The pipes that are used for normal operation of the doser can cause a hazard when they are disconnected and are remounted incorrectly.

- Solution: The compressed air pipes are connected to “power conduits” using push-in fittings that are easy and safe to use.

- Residual risks: If these pipes are not connected properly, when the machine is switched on, they come under pressure and cause a whipping effect.

G.3.5 Cleaning and maintenance with the machine stopped

The electronic doser needs to be cleaned at the end of each production run. This is because food, often at room temperature, is used and, if it is left in the feed hopper and in the body of the valve for long, it can go off quickly, causing serious hygienic problems.

The entire doser must be cleaned both inside and outside. Since the machine uses mechanical moving parts and runs on electricity, the power supply **must always be switched off** before cleaning or servicing it.

- Solutions: Press the stop button or turn the master switch to **0** before cleaning or servicing the machine.

- Residual risks: None if the above rules are followed carefully and the safety devices are not bypassed or removed.

G.4 PROTECTION SYSTEMS AND TYPES

IMPORTANT NOTE

The system must not be modified in any way and the safety guards must not be removed or disactivated without first informing the Manufacturer. If these instructions are not complied with, the Manufacturer DECLINES ALL RESPONSIBILITY for any situations that might occur. The Manufacturer cannot be held liable for:

A) THE USER'S SAFETY.

B) PROPER OPERATION of the machine supplied.

- IMPORTANT: If the system supplied is to be linked to an existing installation, the costumer must - unless agreed otherwise - provide adequate protection for the area where the two systems are linked. Mondini S.p.a. declines all liability if damage or injury is caused bacause this protection has not been provided.

This filler is provided with fixed safety guards, designed in such a way that special tools are required to open them.

The main control panel is protected by metal guards, locked with screws and for safety reasons it can only be opened with a special key.

The filler comes with the following safety guards:

1) Guards protecting all moving mechanical parts.

2) Guards protecting the filling head.

3) All gearmotors are protected by magnetothermal switches.

Do not move the filler from the designated operating area. If required for cleaning or other purposes, turn off the electricity supply to stop the filler.

Warning: When there are not guards on the filling area because of it is possible protect this valve only when the filler is positioned on the working line. Therefore when this machine will be used it is necessary to fit the correct protection and guards, so that the filling valve is far from the operator.

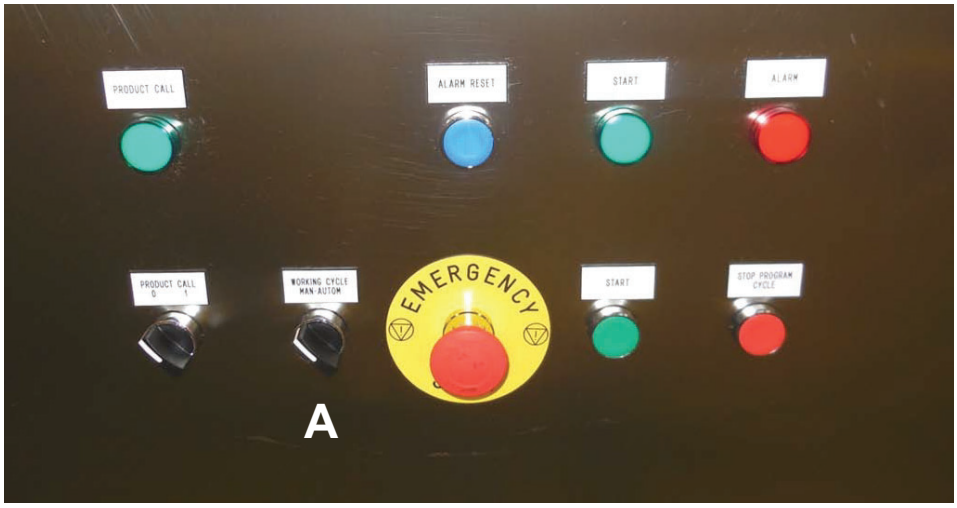
G.5 WASHING THE DOSER

G.5.1 Discharge cycle

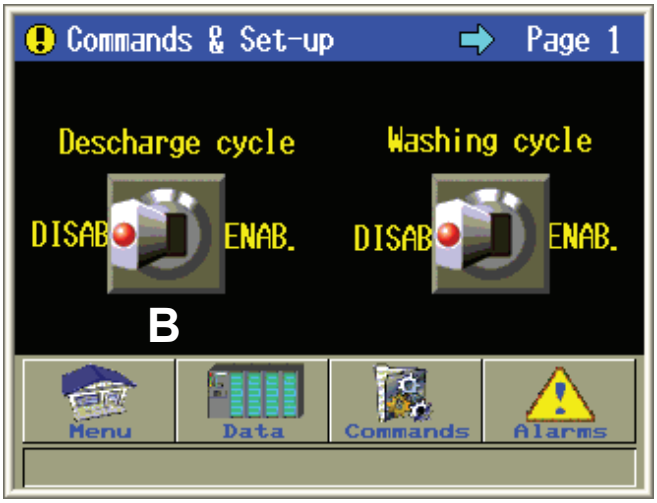
IMPORTANT

Don't put your hands into any section of the system, even when it is disconnected from the electricity. Both standard and reactive machine cleaning and maintenance operations must be performed using appropriate tools, to ensure complete and overall operator safety.

1. Stop the work cycle.
2. Disconnect the valves from the hoses.
3. Guide the head of the tubes in a container for discharged product recovery.
4. Turn the selector (**A**) to manual.



5. Enable DISCHARGE CYCLE (**B**) on the Commands page.

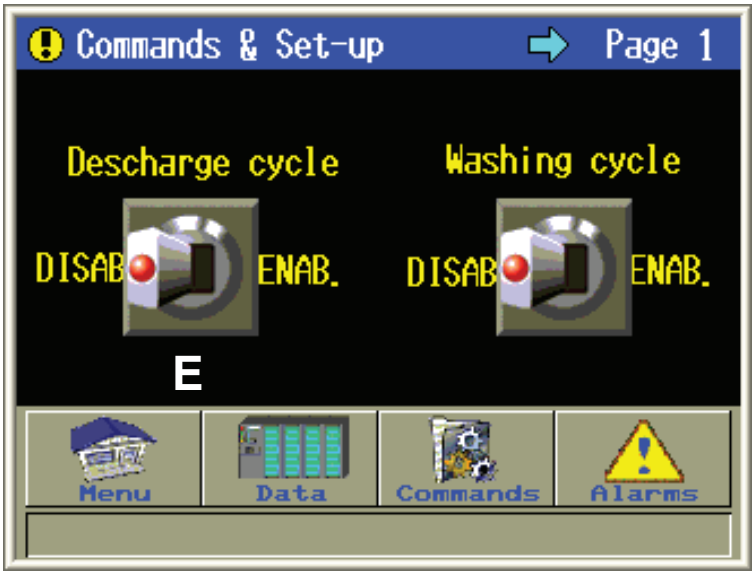


6. Press the START button (**C**).

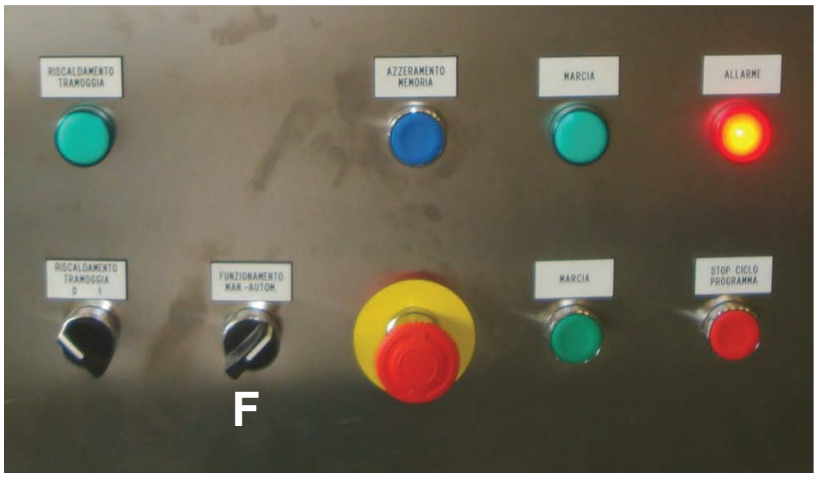
The doser performs a discharge cycle to empty all product remaining in the hopper.

7. When the hopper is empty, press the STOP CYCLE button (**D**).

8. Disable DISCHARGE CYCLE (**E**) on the Commands page.



9. Rotate the selector (**F**) in automatic position.



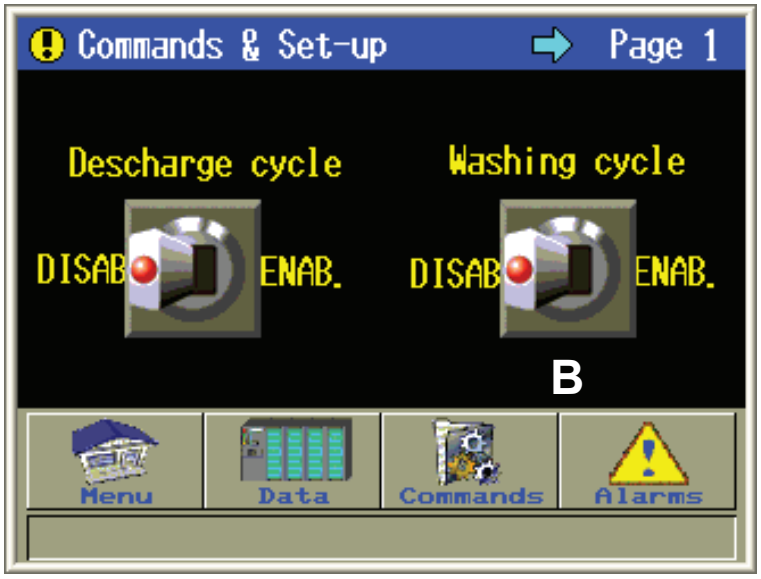
G.5.2 Washing cycle

IMPORTANT

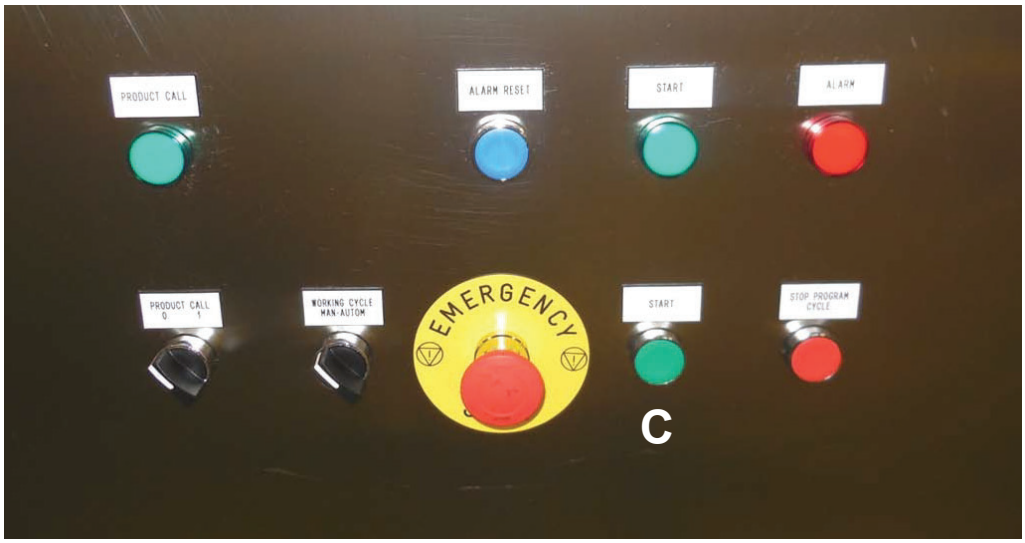
Don't put your hands into any section of the system, even when it is disconnected from the electricity. Both standard and reactive machine cleaning and maintenance operations must be performed using appropriate tools, to ensure complete and overall operator safety.

1. Perform a complete DISCHARGE CYCLE first (see paragraph).
2. Move the doser away from the production line.
3. Fill the hopper with neutral pH detergent solution (max. 50°C).
4. Turn the selector (**A**) to manual.

5. Enable WASHING CYCLE (**B**) on the Commands page.



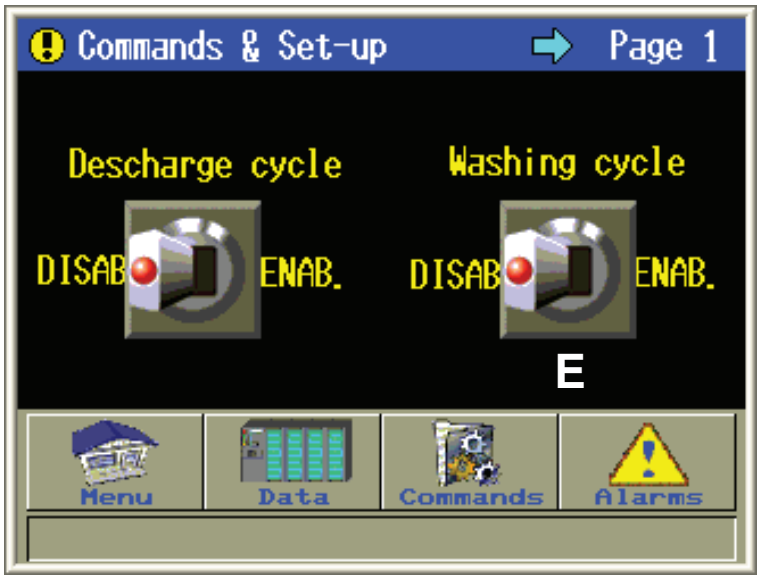
6. Press the START button (**C**).



7. The washing cycle starts and used detergent is discharged.
8. Allow the detergent to flow until the hopper, the chambers and the hoses are clean and sanitised.

9. When the hopper is empty, press the STOP CYCLE button (**D**).

10. Disable WASHING CYCLE (**E**) on the Commands page.



11. Remove the dosing hoses and valves and wash them separately.

IMPORTANT!

The doser must be washed every day.

G.5.3 Dosing chamber cleaning and sanitisation check

IMPORTANT

Don't put your hands into any section of the system, even when it is disconnected from the electricity. Both standard and reactive machine cleaning and maintenance operations must be performed using appropriate tools, to ensure complete and overall operator safety.

After the washing cycle, the operator can fully retract the pistons until they reach the dosing chambers and remove the rotor.

This check enables you to see whether the chambers and of the rotor have been washed properly, and facilitates cleaning if necessary.

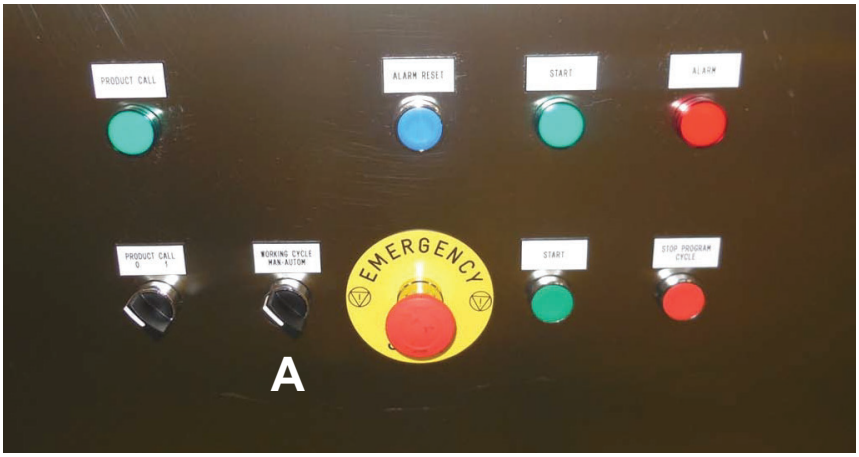
IMPORTANT

MAKE SURE THE HOPPER IS EMPTY
BEFORE LAUNCHING THIS PROCEDURE.
FAILURE TO DO SO WOULD CAUSE THE CONTENTS
TO EMPTY OUT OF THE BACK OF THE CHAMBERS.

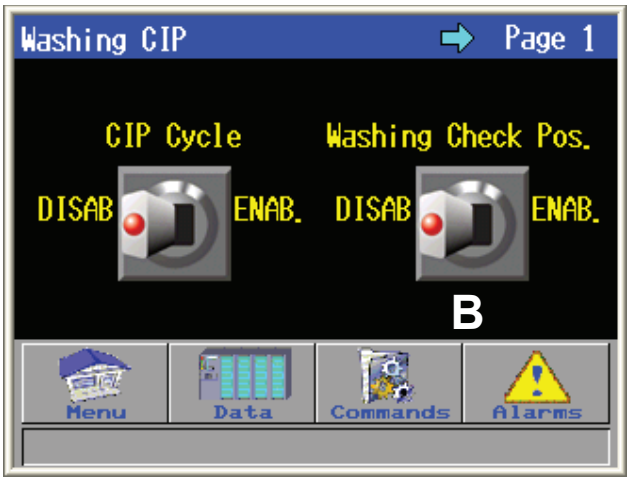
IMPORTANT!

This check must be performed at the end of the washing cycle.

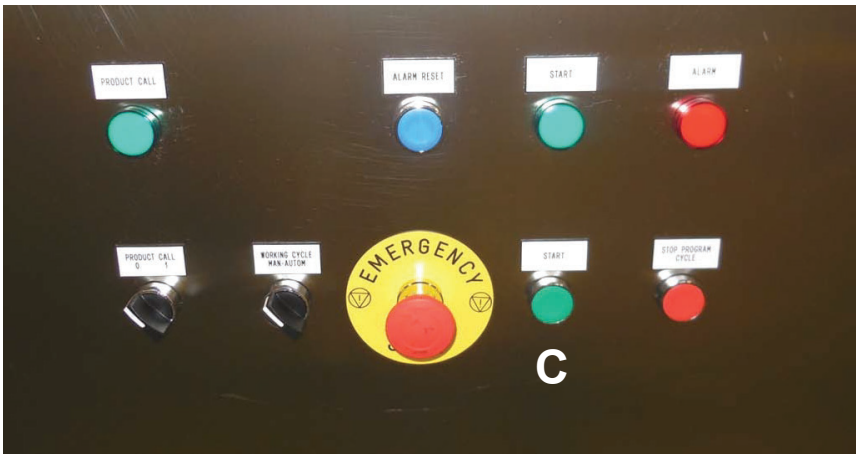
1. Check whether the hopper is empty. If it is not, perform a DISCHARGE CYCLE (see paragraph).
2. Turn the selector (**A**) to manual.



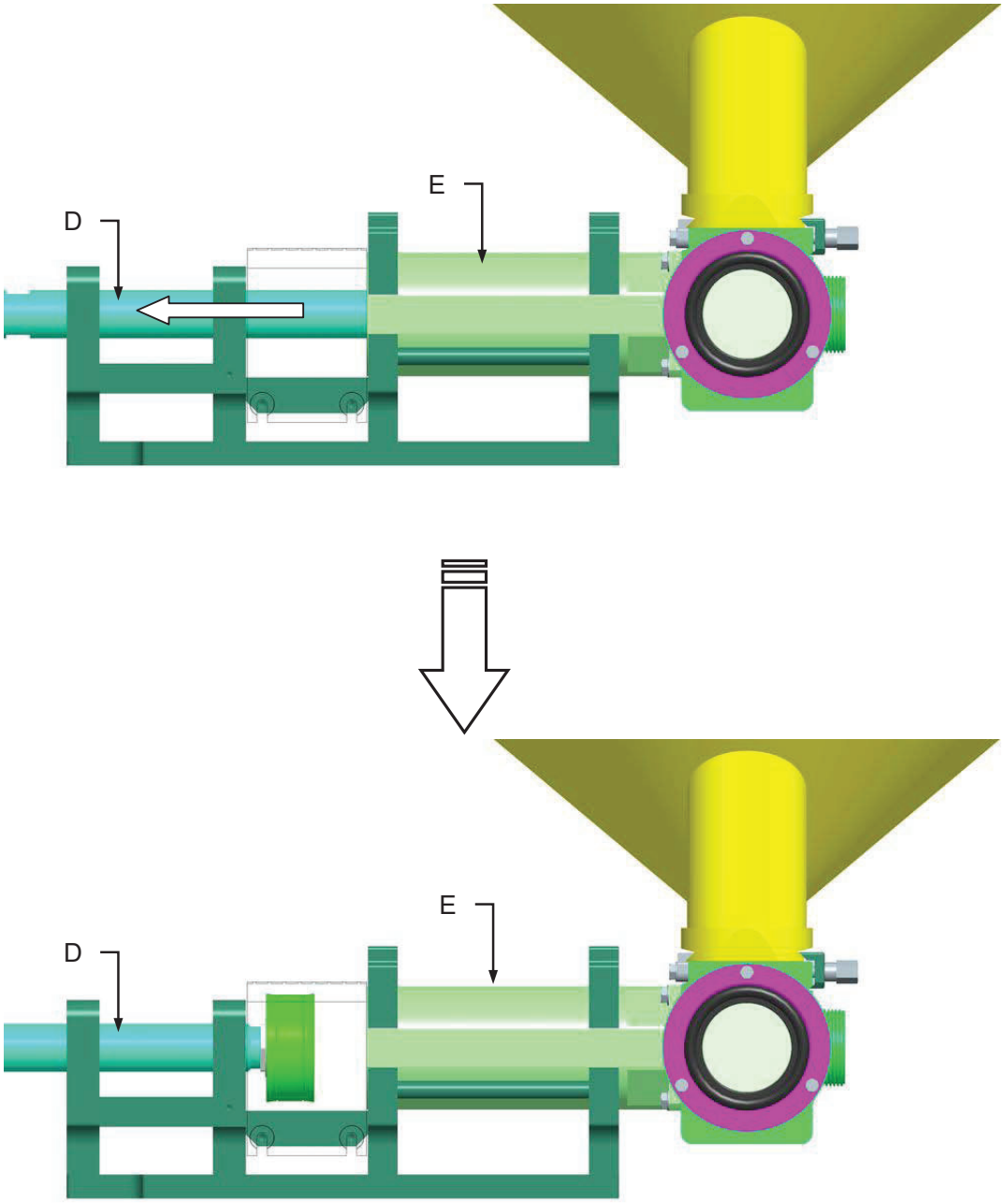
3. Enable WASHING CHECK POS. (**B**) on the CIP pages.



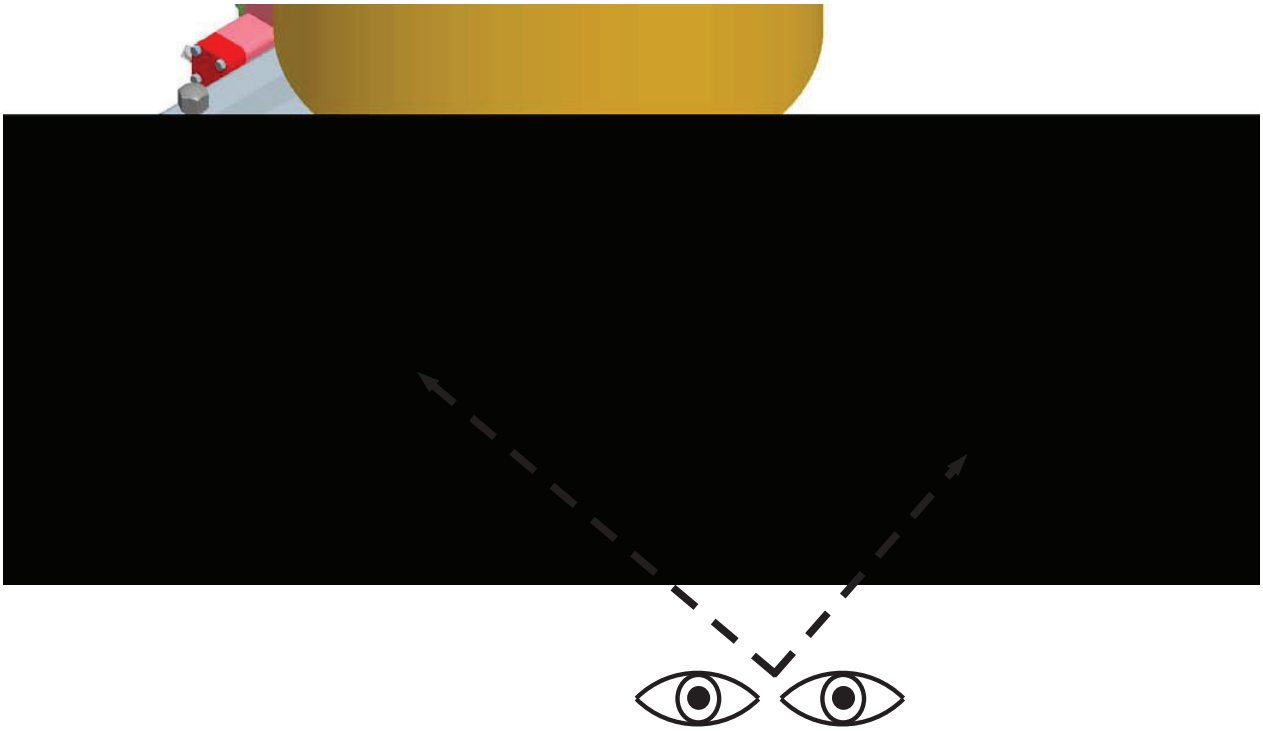
4. Press the START button (**C**).



5. During this cycle, the pistons (**D**) retract from the chambers (**E**).



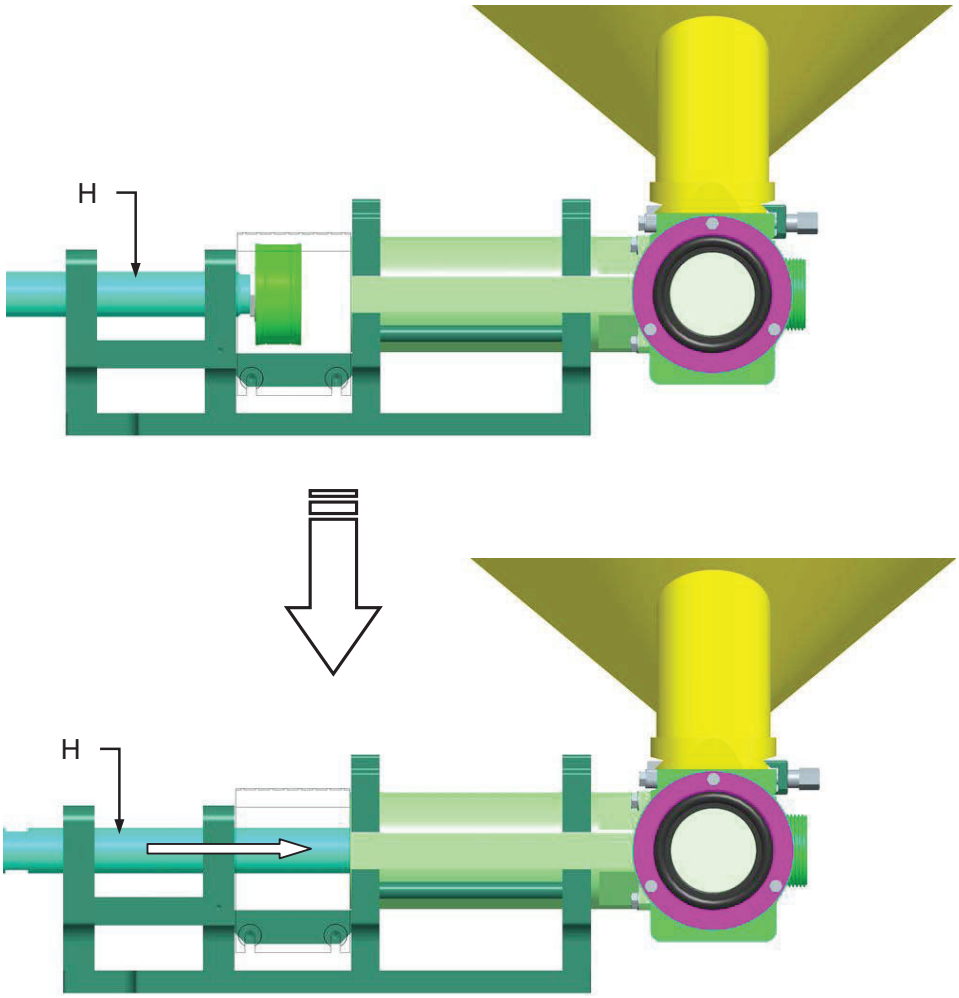
6. From this position you can check chamber washing visually. If necessary, you can perform more accurate cleaning using a high-pressure lance (maximum pressure 40 bar and maximum temperature 50°C). Take extra care not to direct the jet towards delicate or unprotected parts. It is also possible to replace damaged gaskets if necessary.



DANGER
Before servicing the machine or performing any other intervention, always press the emergency button associated with the opening of the moving guards to disconnect the machine from the power supply. Check operation of this safety device regularly.

7. After washing the chambers, disable WASHING CHECK POS. (**F**) on the CIP pages.

8. Press the START button (**G**) to return the pistons (**H**) to the work position.



9. Rotate the selector (**L**) in automatic position.

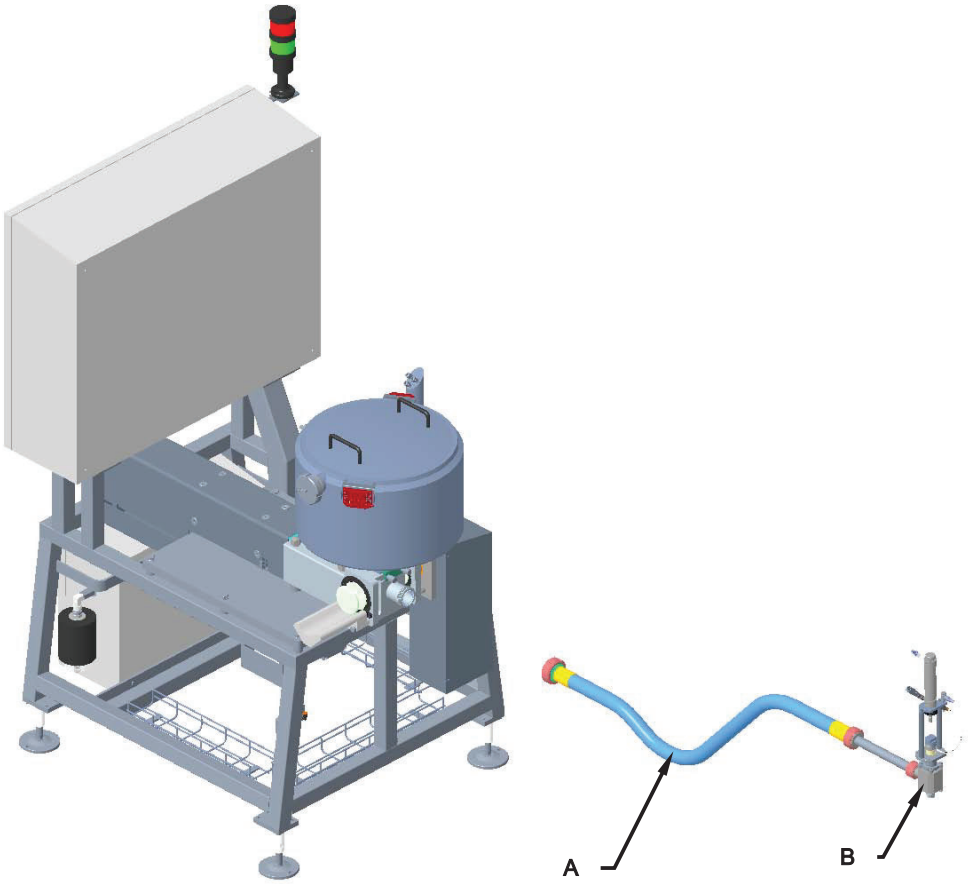
G.5.4 Hoses and valves cleaning

IMPORTANT

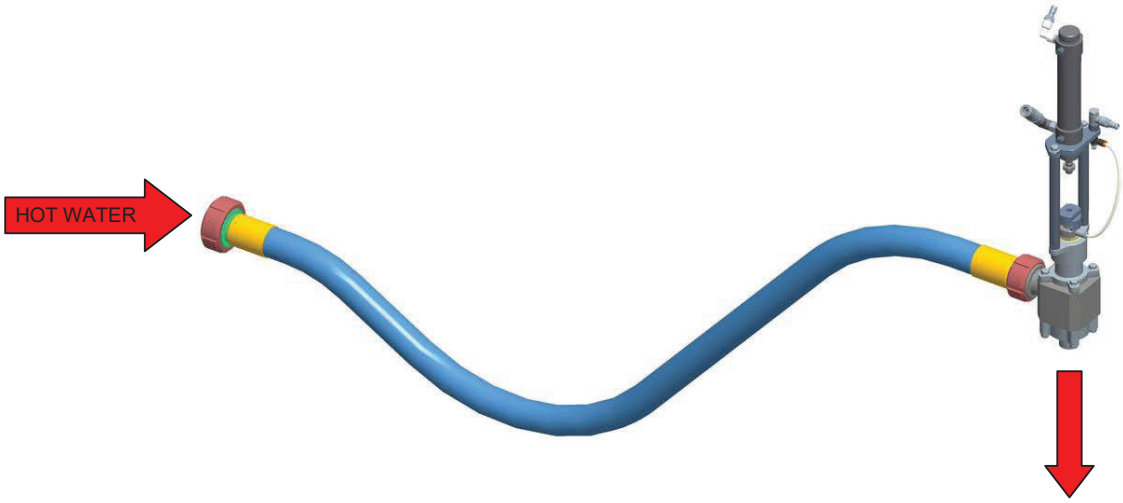
Don't put your hands into any section of the system, even when it is disconnected from the electricity. Both standard and reactive machine cleaning and maintenance operations must be performed using appropriate tools, to ensure complete and overall operator safety.

In order to properly sanitize the dosing circuit, it is necessary to sanitize the hoses and valves.

Remove the hoses (**A**) and valves (**B**) from the filler.

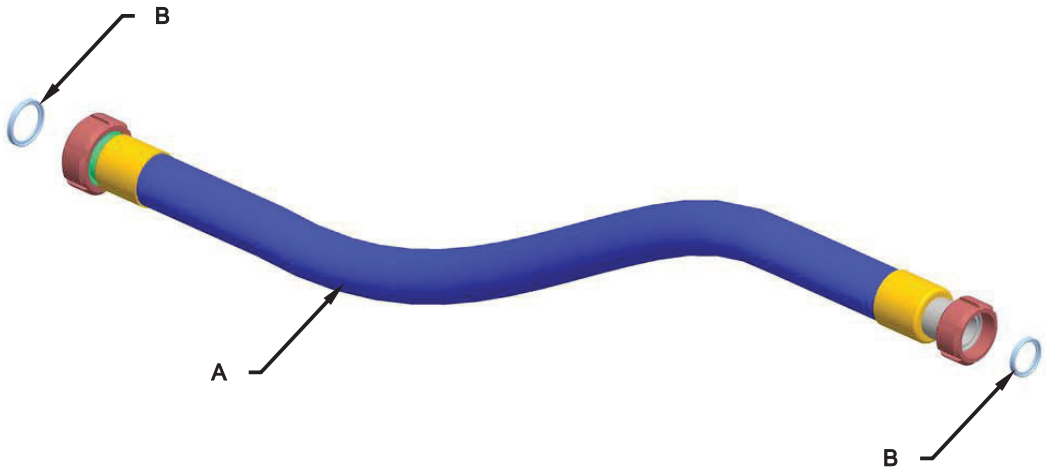


Wash the inside of the tubes with hot water jets under pressure (maximum pressure 40 bar and maximum temperature 50°C).



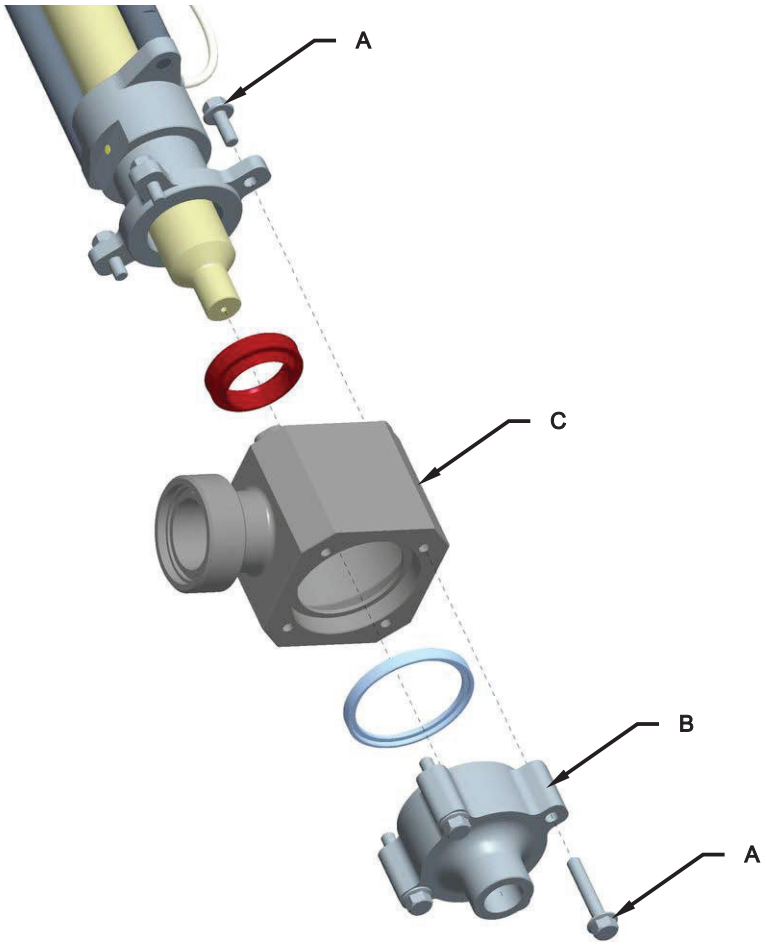
To properly clean the hoses (**A**), immerse them in a neutral pH solution for at least ten minutes and rinse them thoroughly with pressurized hot water jets.

In addition it is necessary to weekly check the good state of the hose gaskets (**B**) and replace them every three months.



For cleaning the piston valves, it is necessary to:

1. Unscrew the screwa (**A**), remove the nozzle (**B**) and the valve body (**C**).



2. Wash the inside of the valve with hot water jets under pressure (maximum pressure 40 bar and maximum temperature 50°C) and immerse them in a neutral pH solution for at least ten minutes and rinse them thoroughly with pressurized hot water jets.

IMPORTANT!

This check must be performed at the end of the washing cycle.