TRENDI	OPERATION OF THE CLEAN FLOW MINI	Document No. OP-008 Version: 1 Effective Date: July 22, 2022

1 PURPOSE

To establish the operating procedure for the Clean Flow Mini.

2 SCOPE

This procedure applies to the Clean Flow Mini in the BT80.

3 RESPONSIBILITES

Head of Product Innovation, Food Scientist and Food Safety Specialist or its designate	1. Revising the standard operating procedure.
Department Manager, Supervisor or its designate	1. Ensure that personnel follow the standard operating procedure.

4 DEFINITIONS

BT80	Mobile Biotrim Unit
Clean Flow Mini	Equipment that exposes products to an atmosphere that quickly and effectively inactivates a wide range of pathogens.

5 EQUIPMENT AND MATERIALS

5.1 Clean Flow Mini

5.2 Clean Flow Solution

6 PROCEDURE

For the unit to create this atmosphere, three (3) ingredients must be mixed within a specific temperature range.

6.1 The three (3) ingredients are:

6.1.1 The three Ozone gas

6.1.2 Clēan Flow Solution

6.1.3 UV-C light

6.2 Human Machine Interface

6.2.1 The Human Machine Interface (HMI) terminal allows an operator to command and monitor the operation of the machine.

6.2.2 A touchscreen mounted near the infeed of the unit gives the operator the ability to start/stop the machine and diagnose faults.

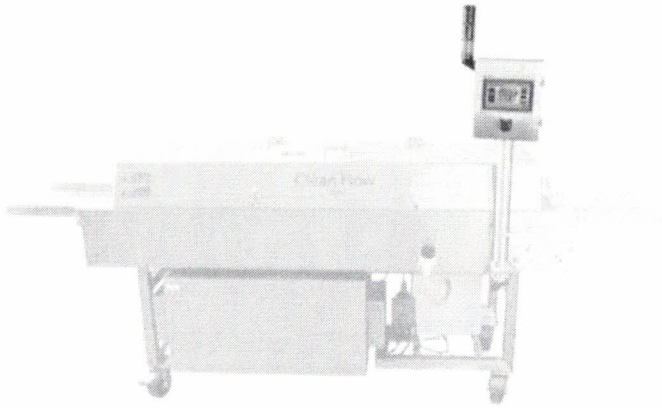

Figure 1 HMI Terminal

6.3 UV-C Light

6.3.1 The UV-C light system contains 22 UV-C bulbs placed above, to the sides and below the conveyor belt.

6.3.2 The UV-C light supplied by these bulbs initiates chemical reactions that are responsible for the decontamination.

6.3.3 The UV-C light also provides a level of disinfection through direct irradiation of the product being passed through.

6.3.4 A thin, transparent polymer film supported by a stainless-steel mesh separates the bulbs from the belt.

6.4 Ozone Generator Module

6.4.1 Ozone generator modules, installed on both sides of the unit, use a special wavelength of UV-C light to break apart oxygen molecules in the atmosphere and create ozone via a photolytic reaction.

6.4.2 Small fans draw in atmospheric air through louvers and pass the air over top of the ozone producing UV-C bulbs before entering the chamber.

6.4.3 A very thin stainless steel mesh, with a hole size of 0.0015", is between the bulb and the belt.

6.4.4 The mesh allows the ozonated air to pass through while protecting the bulbs.

6.5 Ozone Scrub Module

6.5.1 The ozone scrub module has fans that pull air from the treatment chamber at the outfeed of the system.

6.5.2 The air passes through an activated carbon filter, which converts the ozone into harmless oxygen and carbon dioxide molecules.

6.6 Spray System

6.6.1 The spray system delivers the Clēan Flow Solution to the chamber.

6.6.2 The spray system is made up of four main components:

6.6.2.1 storage tank,

6.6.2.2 air compressor,

6.6.2.3 dosing pump,

6.6.2.4 spray nozzle.

6.6.3 The seven (7) gallon (26.5 L) storage tank holds the Clēan Flow Solution.

6.6.4 The dosing pump and air compressor supply Clēan Flow Solution and compressed air to the spray nozzle.

6.6.5 Two spray nozzles use compressed air to finely atomize the Clēan Flow Solution.

6.6.6 Float switches installed in the storage tank will alert an operator when the storage tank runs low.

6.6.7 An empty storage tank will result in a machine fault and the system will shut down.

6.7 Heater Module

6.7.1 A heater module, placed at the infeed of the unit, draws in fresh air at room temperature and warms it as required.

6.7.2 This allows the unit to maintain the optimal temperature required for effective decontamination to take place.

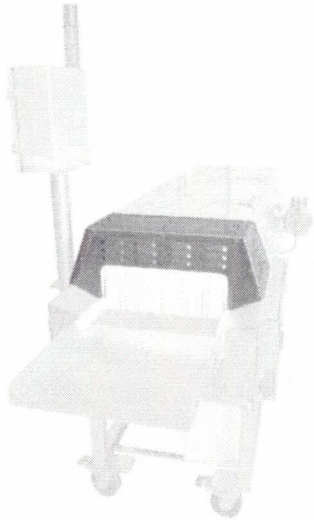

Figure 2 Heater Module

6.8 Drive System

6.8.1 A VFD controlled motor powers a tensionless flat-top belt.

6.8.2 The speed of the drive system has been optimized to maximize efficacy while minimizing treatment time.

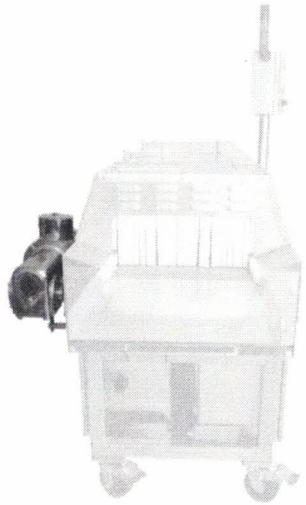

Figure 3 Drive Motor

6.9 Safety Circuit

6.9.1 One emergency stop button and three non-contact switches are connected to a safety relay.

6.9.2 When the emergency stop button is pressed or the non-contact switches are opened the machine immediately removes power from the belt, the heater module, the ozone generating models, the UV-C light panel and the spray system.

6.10 Emergency Stop Button

6.10.1 An emergency stop button is located below the HMI touchscreen as highlighted in Figure 4

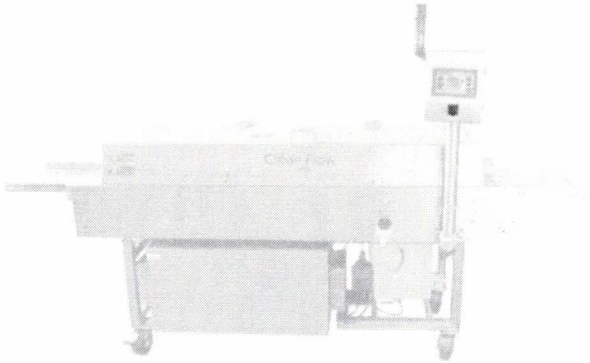

Figure 4 Emergency Stop Button

6.11 Non-Contact Switches

6.11.1 Safety-rated non-contact switches installed on the ozone generator modules and the UV-C light panel are connected to the safety relay to prevent the system from running with any of these modules in an open position.

6.12 Internal Sensors

6.12.1 Internal sensors installed within the unit measure the ingredients that are being introduced into the chamber.

6.12.2 The values outputted from these sensors are displayed on the HMI.

6.13 Temperature

6.13.1 A resistive temperature device (RTD) measures the temperature within the chamber.

6.13.2 The output of this sensor is used to control the heater module through a closed loop control system.

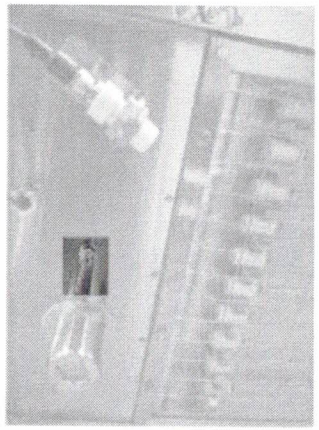

Figure 5 Resistive Temperature Device

6.14 UV-C Power

6.14.1 A UV-C sensor is placed below the UV-C light panel.

6.14.2 The output of this sensor can be used to diagnose the status of the bulbs and ensure the system is operating at optimal conditions.

6.14.3 The output of this sensor indicates the intensity of the UV-C light at the sensor, not at the belt.

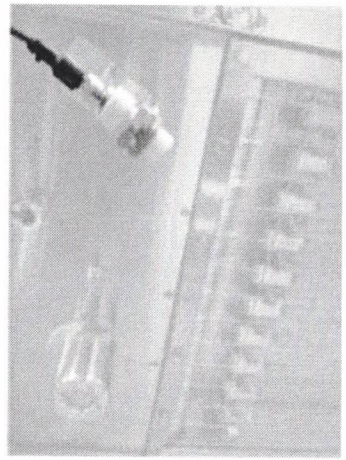

Figure 6 UV-C Sensor

6.15 Ozone Concentration

6.15.1 A gaseous ozone sensor is installed near the outflow of the machine.

6.15.2 This sensor measures the concentration of ozone within the chamber in parts per million (ppm).

6.15.3 Sensor appearance may vary slightly but functionality is consistent.

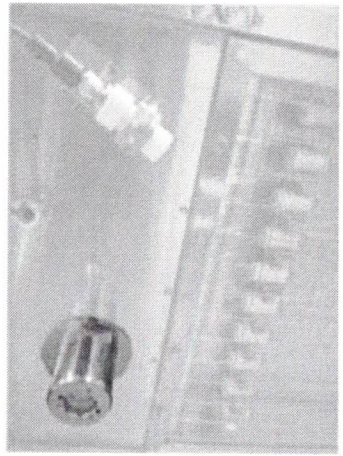

Figure 7 Ozone Sensor

6.16 Clēan Flow Solution Flow

6.16.1 A sensor integrated into the dosing pump ensures the amount of Clēan Flow Solution set in the HMI is exactly what is supplied to the nozzle.

6.16.2 Float switches in the tank ensure Clēan Flow Solution is in the system before running.

6.17 Ozone Room Sensor

A stand-alone sensor measures the concentration of ozone in parts per million (ppm) within the room.

The values are displayed through a colour-coded (green, auburn, red) bar graph display.

7 REFERENCES

Not applicable

8 REVISION HISTORY

SOP Version	Effective Date	Summary of Changes	Revised By
1	Jul 22, 2022	NEW	Precious Chigumo