FILLING MACHINE TO FILL MONOTUBE HEATING ELEMENTS

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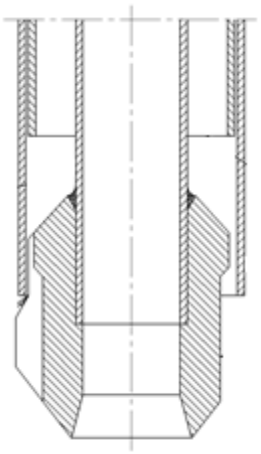
ADVANTAGES

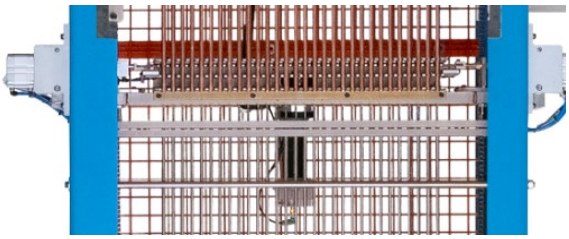
HIGH FILLING SPEED

New-patented 3-tube system for MgO flow control, which allows for greater filling speeds. The system is fitted with a mechanical closing/opening device that not only allows higher MgO flow rates, but keeps MgO from flowing once closed.



- Higher filling speed and improved uniformity
- Reduced wear of components in contact with the oxide.
- Effective closure of the conduit with no material leakage.
- Large oxide flow passages without compromising shut-off capability.

UNIFORM MGO COMPACTION



Electromechanical vibration system, driven by a d.c. motor. The system is stable and characterized by symmetrical oscillations even when varying the vibration frequency. By changing the rotational speed of the motor, it is possible to obtain different vibration frequencies.

Travelling vibrator which moves from the bottom to the top of the tube during the filling process.

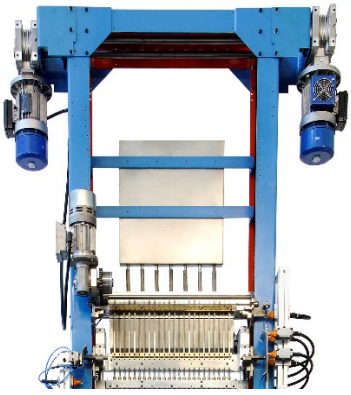
The electromechanical vibration system replaces the traditional electromagnetic vibration system, which is unstable and difficult to adjust.

The machine has the possibility to keep the upper part of the heating element under vibration for an adjustable time once the filling has ended, to increase the powder compaction in that area.

EASY SET-UP

Motorised set up when changing the length of the tubes to be filled.

Motorized adjustment of the top terminal pin protrusion from the tubes after being filled



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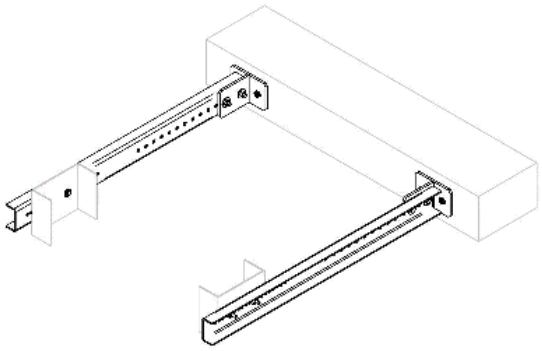
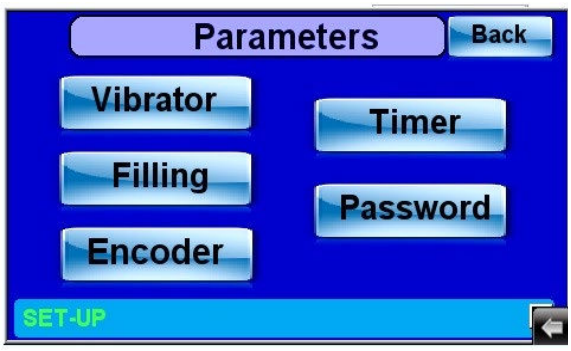
BRACKET FOR WALL MOUNTING

Two pairs of brackets are supplied with the machine to facilitate fixing the filling machine to the wall.



EASE OF USE

A simple and intuitive operator interface facilitates more intuitive operation and allows for quick setting and control of the main machine functions.

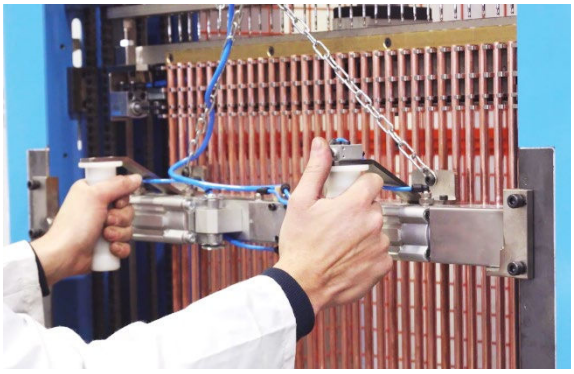


AUTOMATION

A number of options are available to automate the process and increase the productivity.

The machine is pre-arranged for the use of a pneumatic clamp, which gives the possibility to load and unload simultaneously up to 30 tubes in one go.

WATCH THE VIDEO



SCRAP REDUCTION

The machine control through an encoder the position of the vibrator group, so that when the tubes to be filled reach the lowest position, the carriage is stopped at a certain position. This is meant to allow the use of special plugs (such as plugs to be pulled) and avoid the collision of the pins with the lower bar.

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PATENTED THREE-TUBE FILLING SYSTEM

The patented three-tube magnesium oxide filling system is designed to achieve high filling speeds, improve filling quality, and prevent material leakage at the end of the cycle.
The concentric tube configuration also helps reduce wear on components in contact with the magnesium oxide, increasing the system's reliability and service life.

Components and Operation

1. First Tube (Inner Tube)

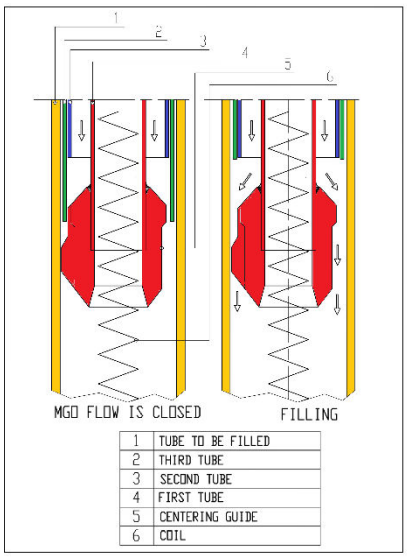
The first tube, positioned at the center of the system, is equipped with a tungsten-carbide centering head welded to its end, which guides the heating element coil throughout the entire filling phase.
The centering head, fitted with support fins, keeps the coil perfectly aligned with respect to the tube being filled, while also ensuring sufficient clearance for the magnesium oxide to flow outward.

2. Second Tube (Intermediate Conveying Tube)

The second tube is the channel through which the magnesium oxide actually flows. It directs the material into the tube being filled, ensuring a steady and consistent flow.

3. Third Tube (Shut-off Tube)

The third tube acts as an opening and closing valve for the magnesium oxide flow.
Separating the shut-off tube from the conveying tube helps limit wear on the component exposed to the magnesium oxide, while ensuring complete closure of the channel at the end of the cycle. This design eliminates leaks and accidental discharge of material.



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DESCRIPTION OF THE WORKING CYCLE

a) For tube open on both ends and with two coils and two terminal pins at either end, the machine for all aspects runs as a standard CSM filling machine except for two guide inner tubes, because there are two coils.
   - Assembling of the coils on the hooks
   - Descent of the tubes, protecting the coils, on the vibration combs
   - Rise of the coils inside the 1st tube and stretching of the coils
   - Rise of the tubes, protecting the coils
   - Loading of tubes
   - Descent of the centralizers/coils inside the tubes
   - Stop of the hooks and continuous descent of the coils in the tubes
   - Closure of the bottom clamp with deformation of tube ends
   - Automatic MgO filling cycle
   - End of MgO filling cycle
   - Manual unloading of the heating elements, one by one or all simultaneously
   - Preparation for next cycle

b) Filling of monotube (one end of the tube is closed). There are two terminals at the open end of the tube. A crushable ceramic is to ensure that the coil stays inside the tube without touching it. Once the element goes through the rolling mill, the ceramic plug crushes and becomes powder mingling with the MgO.
   As an initial set up, the operator has to mount an insert on the bottom clamp (back and front), which will dent the tube just above the crushable ceramic when it is inserted and in position in the tube (very near the closed bottom).

   Then, on the operator console, he selects the mode of operation as “Monotube with closed end”.
   The machine in this case will be left the machine top position that is the position of a normal filling cycle, where the operator can remove the element from the machine. One by one, the operator hooks the terminal pins to the filling hooks. When all the coils are hanging (with the ceramic at the bottom), the operator activates the system to move the coils up until the ceramic is touching the centralizer.

The mobile hopper moves down to the machine zero position.
The operator then loads one element at a time ensuring that the open end of the tube is pushed over ceramic and ends just above the bottom of the filling tube.

Once all tubes are loaded, the filling tubes are brought down inside the tubes; during this movement the filling hooks wires that moved up with the coils, come down until they are at the zero position. When the machine stops, the bottom ceramic plug should be about 1-2 mm above the closed bottom end of the tube. Then pressing the “start filling” button, the bottom clamp activates the “denting” system which blocks the ceramic plug and the filling process starts. The MgO comes out and fills all the spaces between the tube and the ceramic plug helping to hold it even better.

After a few seconds the mobile carriage moves up as far as the standard filling machines. At a certain distance from the top, the filling movement is arrested while the vibrator is still on with the filling powder gate open (this to increase slightly the density at the top end). At the end of the set time, the machine stops the powder flow and vibration and moves up to the unloading position.

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TECHNICAL CHARACTERISTICS

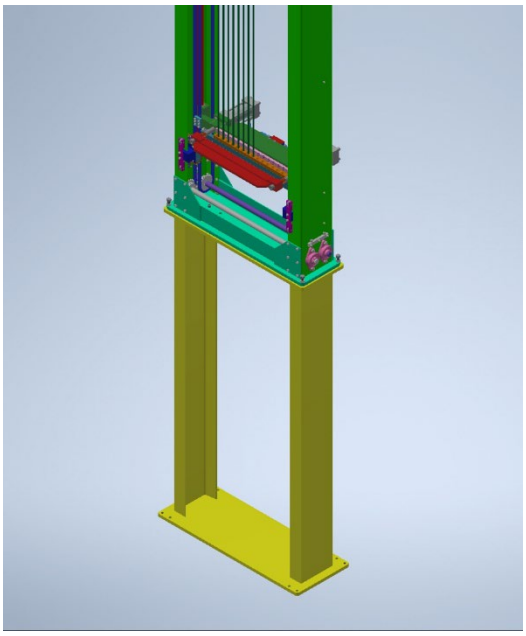
Manual adjustment of top terminal pin extension	mm	25
Diameter of tubes to be filled	mm	10-22
Max. length of tubes to be filled	mm	to be defined
Min. length of tubes to be filled	mm.	450
Number of tubes to be filled	No	to be defined
Filling speed for up to*	mm/min.	400
Vibration intensity (frequency)		adjustable from 0 to 60 Hz
Installed electric power	KW	3
Power supply	V	to be defined
Pneumatic supply	Ate	6
Set up time when changing the length of the tube to be filled	min.	2-4
Set up time when changing the extension of the terminal pins	min.	5-7

* The speed may be lower depending on the materials and the geometry of the element to be filled.

OPTIONAL

SPACER ELEMENT FOR FILLING MACHINES
Dedicated spacer, designed to raise the filling machine to a predefined height level.

- **Mod. 135/00.000010:** max spacer length 2000 mm
- **Mod. 135/00.000020:** max spacer length 4000 mm
- **Mod. 135/00.000030:** max spacer length 6000 mm



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AVAILABLE VERSIONS

15-TUBE FILLING MACHINES FOR TUBE DIAMETER 10 TO 15 MM

		non-programmable	programmable
Maximum tube length mm	1000	131/15.100000	132/15.100000
	1500	131/15.150000	132/15.150000
	2000	131/15.200000	132/15.200000
	2500	131/15.250000	132/15.250000
	3000	131/15.300000	132/15.300000
	3500	131/15.350000	132/15.350000
	4000	131/15.400000	132/15.400000
	4500	131/15.450000	132/15.450000
	5000	131/15.500000	132/15.500000
	6000	131/15.600000	132/15.600000

10-TUBE FILLING MACHINES FOR TUBE DIAMETER 15 TO 22 MM

		non-programmable	programmable
Maximum tube length mm	1000	131/10.100000	132/10.100000
	1500	131/10.150000	132/10.150000
	2000	131/10.200000	132/10.200000
	2500	131/10.250000	132/10.250000
	3000	131/10.300000	132/10.300000
	3500	131/10.350000	132/10.350000
	4000	131/10.400000	132/10.400000

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	4500	131/10.450000	132/10.450000
	5000	131/10.500000	132/10.500000
	6000	131/10.600000	132/10.600000

Notes: for the programmable machine, the minimum number of tubes a particular group can hold is 3 tubes.

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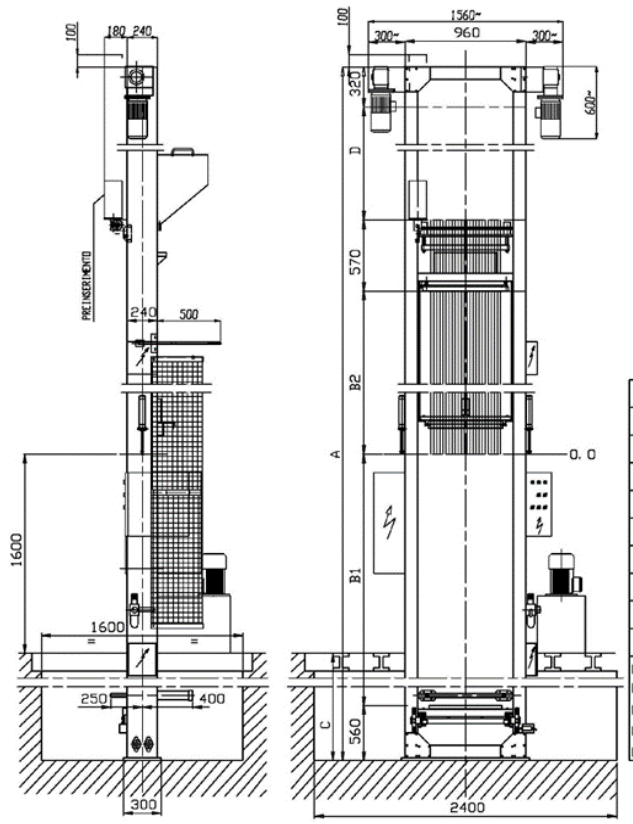
LAYOUT



6000	16200	6000	6350	4960	2400
5000	13800	5000	5350	3960	2000
4500	12600	4500	4850	3460	1800
4000	11400	4000	4350	2960	1600
3500	10200	3500	3850	2460	1400
3000	9000	3000	3350	1960	1200
2500	7800	2500	2850	1460	1000
2000	6600	2000	2350	960	800
1500	5400	1500	1850	460	600
1000	4200	1000	1350	-	400
Lunghezza tubo da riempire Length of the tube to be filled Länge zu füllender Rohre Longueur du tube a remplir Longitud tubo de llenar	A	B1	B2	C	D

NOTES: We recommend an additional 500 mm (20") above the primary hopper for loading the MGO powder in the primary hopper.

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