

## Technical Manual

# Thor



ORIGINAL INSTRUCTION

Code:	
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Year:	2020
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Rev.:	01
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## 0. FOREWORD

### 0.1. HOW TO USE THE MANUAL

#### 0.1.1. IMPORTANCE OF THE MANUAL

This manual provides instructions on the ordinary and extraordinary maintenance of product Thor.

Further ordinary maintenance instructions are provided in the Operator Manual.

Before performing any repair or extraordinary maintenance operation, carefully read this manual in all its parts, paying more attention to the paragraphs relating to precautions and safety alerts.

In case problems or difficulties should arise, the TECHNICAL SERVICE SUPPORT of Alfa Srl is always available to provide the right support, advice, explanation and assistance.

Alfa Srl reserves the right to make modifications for improving its own products without prior notification.

The incorrect use of the system can lead to loss of warranty in all its forms and terms.

#### 0.1.2. HOW TO KEEP THE MANUAL

Do not remove, modify, rewrite contents of this manual for any reason.

Keep the manual in a safe place, protected from heat and humidity.

#### 0.1.3. HOW TO CONSULT THE MANUAL

This manual comprises:

- COVER PAGE IDENTIFYING THE TYPE OF PRODUCT
- TABLE OF CONTENTS
- INSTRUCTIONS AND/OR NOTES ON THE PRODUCT

The COVER PAGE identifies the product described in this manual.

Use the CONTENTS to find the list of CHAPTERS and PARAGRAPHS contained in the manual and their subjects.






The INSTRUCTIONS AND/OR NOTES ON THE PRODUCT define the safe working practices and advice on the correct procedures and the skills required to correctly operate and maintain the system.

Some images of this manual having been enclosed for easier identification of the described parts may not be exactly the same as the ones in your System.

#### 0.1.4. SYMBOLS USED IN THE MANUAL

The safety and advice symbols used in this manual are used to draw the reader's attention to warnings concerning safety or indicating good working practices.  
The same symbols are also placed on the machine to indicate dangerous areas and refer to the relevant safety notes in the manual.

#### MEANING OF THE SYMBOLS

	<b>WARNING! GENERAL DANGER</b>
	<b>WARNING! HIGH VOLTAGE</b>
	<b>WARNING! RISK OF CRUSHING.</b>
	<b>WARNING! LASER RADIATION DANGER</b>
	<b>GROUND CABLES THIS SYMBOL INDICATES GROUND REFERENCE POINT.</b>

#### 0.1.5. PROCEDURE FOR UPDATING THE MANUAL IN CASE OF MODIFICATIONS TO MACHINE

If the MACHINE or MANUAL is MODIFIED in any way, an UPDATE could be sent for insertion into the printed Manual.

#### 0.2. INSTRUCTIONS FOR ORIGINAL SPARE PART AND CONSUMABLE ORDER




To provide a fast and efficient service, always specify the following information when ordering replacement and consumable parts:

- **Machine type:** as indicated on nameplate.
- **Serial number:** as indicated on nameplate.
- **Quantity** of each item required.
- **Code** of required part.
- **Description** of required part.








### 0.3. SAFETY INFORMATION

#### 0.3.1. PRECAUTIONS AND USAGE REGULATIONS

The machine must be positioned in an enclosed area that complies with the environmental requirements set out in the relevant paragraph.

	<p>Do not install the machine in a dusty environment. Do not expose the machine to sources of heat, excessive cold, water, electromagnetic energy, or sources of smoke. The machine must be positioned on perfectly level flooring.</p>
	<p>Always make sure that the power cable is intact and free of any cuts or cracks. In case of cable damage, renew the cable using genuine spare parts.</p>
	<p>The noise level generated by the machine is less than 70 DB (measured at a distance of 1 m and at a height of 1.60 m from the floor). This value can be exceeded in certain work environments. If the noise to which the operator is exposed on a daily basis is presumably greater than 85 DB, effective hearing protections must be used, as required by the 86/188/EEC regulations.</p>

#### 0.3.2. GENERAL SAFETY WARNINGS

	<p>Thor is compliant with all the safety requirements of the main European and extra-European Standards and Institutions. Despite that, it is suggested to read carefully the information contained in this chapter and in the next pages since they show the possible dangerous situations and the necessary precautions to take.</p>
	<p>The machine is provided with doors and guards that prevent the operator from getting in contact with mechanical and electrical hazardous parts. A periodical check on the safety devices must be performed according to the instructions provided by this manual. If the safety protection systems are damaged, turn off the machine and call the technical service.</p>
	<p><b>High voltage parts - Risk of electric shock</b> No high voltage part is accessible from the User area. All the high voltage circuits are contained into enclosed areas and protected by fixed guards. The high-voltage internal parts are accessible to the maintenance operator and are protected against direct contact with dangerous parts by means of IP 2X or higher class protection. Dangerous parts are marked by the symbol indicated on the side.</p>
	<p><b>Dangerous mechanical parts - Risk of crushing or trapping.</b> Internal moving parts are accessible only to technical personnel. Do not put your hands into the machine working areas. Tie hair to avoid the risk that it can be trapped in the machine. For the same reason, keep away of the machine or avoid wearing any hanging objects such as ties, necklaces, pendants or other similar items.</p>
	<p><b>High-temperature parts - Risk of scalds</b> The machine includes no components or areas that may reach so high temperature as to become dangerous for the user, the maintenance operator or the technician. The areas where this risk can occur, under faulty conditions, are marked by the symbol indicated on the side.</p>
	<p><b>Flammable parts - Risk of fire</b> The machine is made from materials which do not propagate fire in order to minimise fire risk. Nevertheless, the machine must be installed in a duly ventilated room, complying with the manufacturer's installation requirements. Never leave materials, fluid or foreign objects that might increase the risk and spread of a fire inside the machine.</p>
	<p>It is forbidden to modify the machine's internal an external protections. Contact Alfa's Technical Support Service if necessary. Alfa Srl shall bear no responsibility for any damage that may arise due to the failure to comply with the above instructions. In the event of a malfunction, contact the manufacturer's technical support service.</p>





### GROUND CONNECTION

Ground wire connection point.

Always ensure that yellow-green ground leads are duly fastened to the ground point indicated by the symbol on the side.

**DO NOT REMOVE GROUND CONNECTIONS.**

In case of lead damage, switch machine off and immediately contact the technical service support.

**IF THE EQUIPMENT HAS BEEN USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER, THE PROTECTION PROVIDED BY THE EQUIPMENT MAY BE IMPAIRED**

### 0.3.3. USERS AND ACCESS LEVELS

The machine has three different user interfaces:

- **USER:** an operator who uses the machine for the purpose of producing a colour sample;
- **MAINTENANCE OPERATOR:** user in charge of performing ordinary maintenance operations, such as canister and tank filling, nozzle cleaning and autocap moisturising. Access to the dedicated software area is protected by a first level password;
- **TECHNICIAN:** an expert operator authorised to access the machine's special diagnostic, calibration, configuration, troubleshooting, and extraordinary maintenance functions. Access on the part of these operators is protected by a second level password.
- **ADMINISTRATOR:** a superuser who's authorised to access the machine's software in order to add or delete users, change user rights, reset passwords, etc.

In order to identify the various areas of intervention, the following definitions must be taken into account:

- **USER AREA:** the area outside the machine that the user accesses in order to produce a colour sample and to perform ordinary maintenance operations;
- **MAINTENANCE AREA:** the area inside the machine, which can be accessed with a key, where ordinary maintenance operations are usually performed (on Thor such operations are performed by the MAINTENANCE OPERATOR); extraordinary maintenance operations require the access to the SERVICE AREA and are performed by the TECHNICIAN (replacement of dispensing units, circuits, electric parts);
- **SERVICE AREA (FOR USE BY TECHNICIANS):** the internal areas of the machine that can not be accessed using a single key, but with other tools (circuits electrical cabinets);

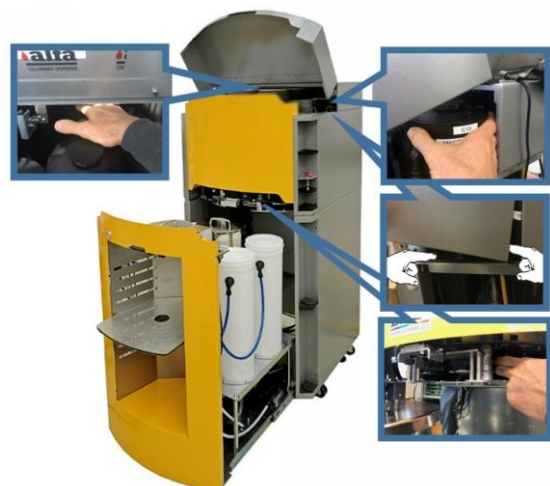
### 0.3.4. RESIDUAL RISKS AND DANGEROUS AREAS

#### USER AND MAINTENANCE OPERATOR

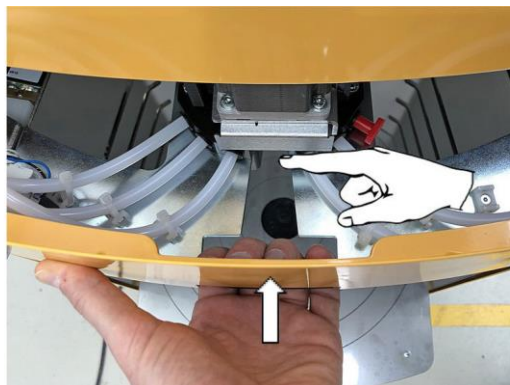
The potentially dangerous areas associated with mechanical moving parts:

- Colorant turning table movement\*; the colorant support base rotation during dispensing or refill operations does not present any risk that is not obvious; however, it is advisable to be careful and not to approach the parts with hands, arms, hair or clothes during operation.
- Paint tanks\*: risk of squeezing arms, hands or fingers due to the movement of stirring blade. The stirring cycle activation is timed by the software and may occur unexpectedly. Do not insert your hands into the tanks. Always shut off the machine prior to performing any necessary interventions.

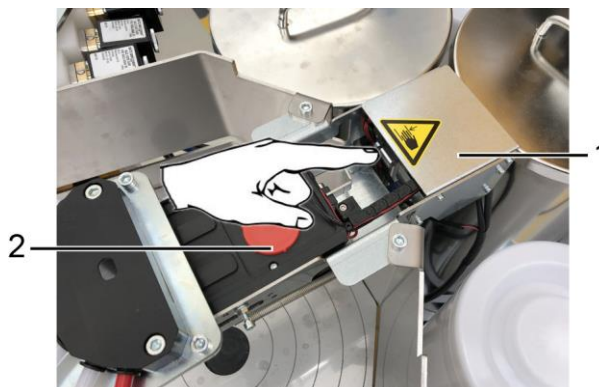
(\*) only in case of failure of the door opening control circuit.



- Master module extraction: be careful when refitting the master carriage. Possible risk of squeezing hands and fingers between the fixed and the mobile parts (figures on the side).




- Autocap movement; pay attention to possible risks of crushing. Never insert your hands or fingers between fixed protection (1) and mobile autocap (2).



**TECHNICIAN:** The authorised technician can remove the machine fixed protections and access the internal parts containing live electrical components.

- Electrical panel area: risk of electric shock.

Any intervention that requires the operator to access zones where risks of electric shock are present must be performed with the machine off.

	<p><b>REMOTE ASSISTANCE:</b> The machine may also be remotely activated via Personal Computer or Smart device. Pay maximum attention during access to dangerous areas.</p>
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### 0.3.5. CONTACT WITH COLORANTS OR BASES

Always beware of any product leaks from the machine or circuits during production, as well as during cleaning and maintenance operations.

Contact with the products (colorants or bases) can cause irritations or injuries if not properly treated.

In case of need always refer to the safety sheet of the concerned liquid, available at the colorant manufacturer.

#### 0.3.5.1. GENERAL FIRST AID MEASURES

In the event of eye contact: remove contact lenses, if present. Immediately rinse the eyes with running water for at least 15 minutes, holding the eyelids open. Consult a physician immediately.

In the case of skin contact: remove the contaminated garments. Wash the skin thoroughly with soap and water.

Ingestion: immediately consult a physician and show them the can, label or material safety data sheet. Keep the person warm and relaxed. Do not induce vomiting.

## 0.4. TECHNICAL SPECIFICATIONS

### 0.4.1. ELECTRICAL SPECIFICATIONS

Power supply	100-240Vac $\pm$ 10% 50/60Hz
Max current	5.0 $\div$ 2.5A
Absorbed power	400W max (+200W AUX)
Fuses 5X20 mm	T6.0A-250V Q.ty 2pcs
Working noise (*)	Lower than 70 dB (A)

(\*) A-weighted sound pressure level determined during normal use to 1 m distance far from the surface of the machinery and to 1.60 m height from the floor.

### 0.4.2. EQUIPMENT CLASSIFICATION AND REFERENCE STANDARDS

Overvoltage category	II See note (1)
Protection classification	IP 20
Class of equipment	I
Reference standards	IEC 61010-1 IEC EN 61326-1
Airborne noise (*)	Lower than 70 dB (A)

Note (1):

The equipment is protected for overvoltage up to 1500V. For power lines subjected to transients with peaks of voltage greater than 1500V, the use of external suitable protection devices is recommended.

### 0.4.3. OPERATING CONDITIONS

Operating temperature (*)	+5 $\div$ +35°C
Relative humidity	30% $\div$ 90% without condensate
Storage temperature	-25 $\div$ +55°C
Altitude	2000 m

(\*) The products (colorants and semi-finished products) lose their rheological characteristics outside the temperature range of 15 $\div$  +35°C.

## 1. DESCRIPTION OF THE MACHINE

This paragraph shows the main external and internal components of the product Thor and describes the replacement modes.

### 1.1. MAIN COMPONENTS

#### 1.1.1. MAIN COMPONENTS (THOR MASTER)

1. Colorant group cabinet
2. Semi-finished product cabinet (extractable type)
3. Adjustable can base worktop
4. Autocap
5. CT kit (option)
6. Electric panel (on the back side)



#### 1.1.2. COLORANT TURNING TABLE

The machine can house up to 16 colorant groups. Circuits are placed on a “turning table” (1), which allows dispensing from the various circuits sequentially.

Machine configurations are available with 12 groups of 1.5 litres + 4 groups of 3 litres, or 16 groups of 2.5 litres, each equipped with its own dispensing unit.

There is only one actuator allowing dispensing (2) and is exclusively coupled with the group opposite to dispensing (in front of the operator). Therefore there is only one dispensing station, which is the same where circuit recirculation can be executed.

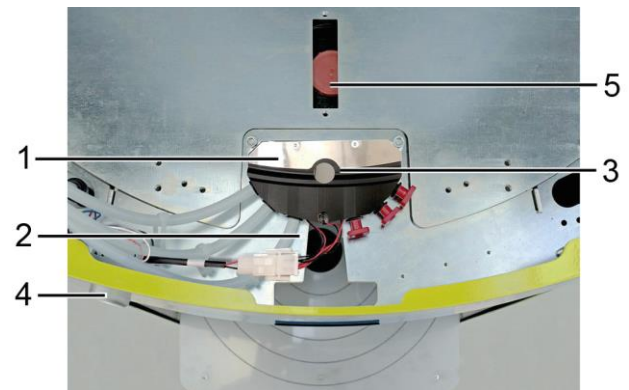


### 1.1.3. DISPENSING STATION WITH MOISTURISED AUTOCAP

The dispensing unit is on the upper part of the master module, where the sequentially dispensing units as well as the instantaneous dispensing units converge.

The figure on the side shows the front upper part of a master module with the nozzle station (1) where semi-finished products dispensing pipes (2) converge. In the central part of the nozzle station there is the hole (3) where colorants, which are placed in the upper part of the machine, are dispensed.

On the front panel of the machine there is a button/ignition light/status (4) which also serves as a stop control, while the autocap (6) moisturising cap (5) is partially hidden by the upper base.

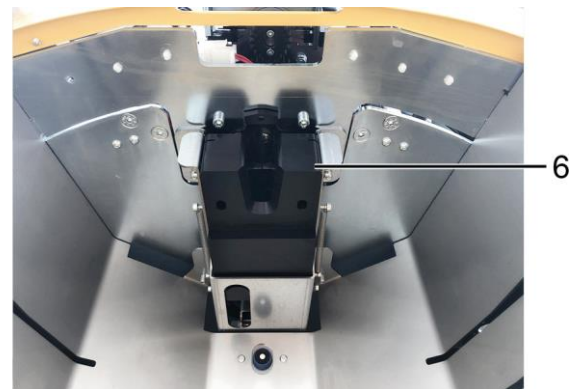


The warning light can take three different statuses:

- Steady light = machine ON (STANDBY/DISPENSING)
- Flashing light 1s ON / 1s OFF = RESET/ROTATING
- Flashing light 1s ON / 1s OFF = DIAGNOSTIC
- Flashing light 0.5s ON / 0.5s OFF = ALARM

When the stop button is pressed, the machine switches to error status (ERR.10), and a RESET is required.

During refill operations the turning table moves at high speed if the cover is closed or at lower speed if the cover is open. During the movements, the machine is in a status called ROTATING, characterised by a slow flashing light. When the cover is closed, the turning table goes back to zero position and a reset is necessary to go back to standby.



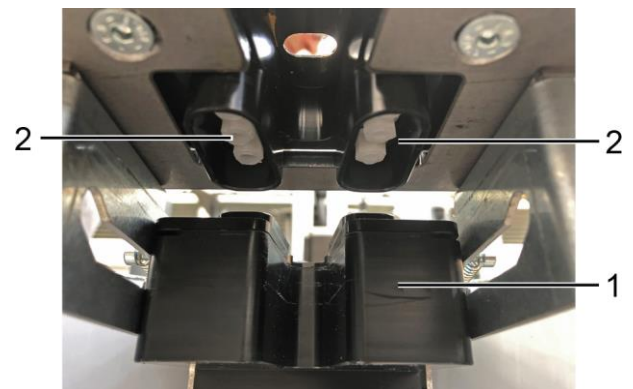
### 1.1.4. AUTOCAP

Autocap (1) is included in the master circuit cabinet. It is placed under the semi-finished product dispensing nozzles (2) and its function is to keep the volume around the nozzles normally closed and moisturised to prevent any product drying issues.

The unit is electronically controlled: it is opened a few seconds before dispensing, and immediately closed after dispensing is completed.

The Autocap can take two different statuses, corresponding to two different positions: CLOSED (moisturising) and OPEN (dispensing/maintenance).

Inside the autocap there is a moisturising water tank, which is heated at suitable temperature by means of an immersed resistance.



*Technical Manual – Thor*

Extract the master cabinet to access the parts to be upkept:

- Tank for distilled water (3) top-up;
- Nozzle moisturising sponges (4).



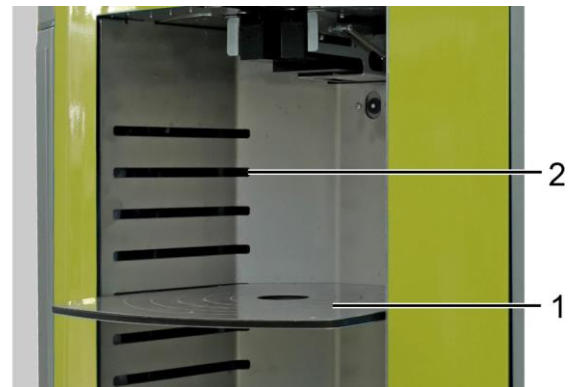
### 1.1.5. STOOL

The machine produces colour samples in volumes ranging from 100cc to 20 litres.

The can lifter is the adjustable base (1) on which to position the can to be filled. It can be positioned at different heights in order to accommodate cans of appropriate volumes, based on the quantity to be dispensed.

The bearing surface features concentric circles that indicate the exact position of the can according to its diameter.

The can lifter is manually moved: the operator raises and lowers the can lifter by manually removing it from the guide (2) and repositioning it at the desired height.

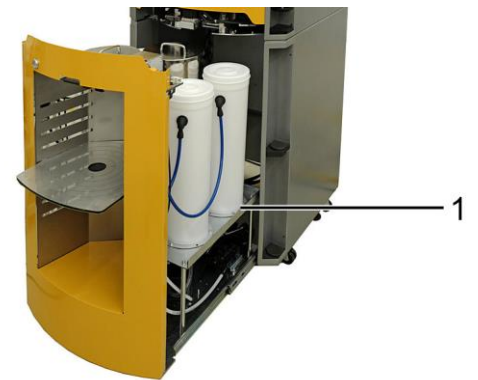


### 1.1.6. SEMI-FINISHED PRODUCT CIRCUIT CABINET

The lower part of the cabinet is designed to accommodate the semi-finished product dispensing circuits.

The structure containing the circuits (1) is provided on a mobile carriage; for easy circuit maintenance operations extract it.

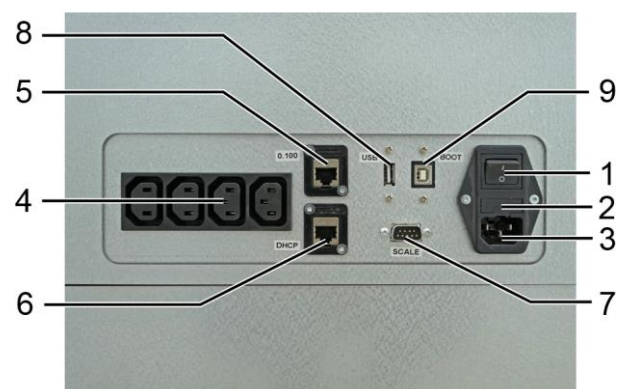
Appropriate presence sensors detect when the cabinet is not in the working position.



### 1.1.7. ELECTRICAL CONTROL PANEL

It is located on the rear side of the machine and provides the main electrical connections of the system.

1. On/off Switch
2. Fuse holder 5x20mm T4A 250Vac
3. Standard CT-120 Power Socket 100-240Vac
4. 4 x standard C14 connector (200W MAX\*)
5. "0.100": RJ45 socket for direct communication with the machine
6. "DHCP": RJ45 socket for local Ethernet network connection
7. "SCALE": Port RS-232 (for scale)
8. "USB": port for Spectrophotometer or other USB device connection, if needed
9. "BOOT": USB-B service port that can be used for firmware updates via BOOT



\* total power available at the 4 external sockets.

**NOTE:**

- Port "0.100" is used for the connection of an LTE router modem;
- The port set in DHCP will take the IP address which the network to which it is connected will attribute. This will allow users connected to the same network/subnetwork to communicate with the machine.

### 1.1.8. LTE ROUTER MODEM

The product can be provided with a LTE connection device for an easy remote monitoring and piloting, even if no wired Ethernet connection is present.

### 1.1.9. “CT” OPTION

The “CT” option configured machines can dispense 100 cc paint samples, just like the samples dispensed by an Alfa ColorTester.

The CT option provides for the use of circuits for base dispensing and a “sample kit” that allows accommodating a small 100 cc can storage inside the cabinet, with relevant lids and a manual capping system.





## 2. PARTS REMOVAL AND REPLACEMENT

### 2.0. SAFETY REGULATIONS ON MAINTENANCE

#### 2.0.1. AUTHORISED PERSONNEL


The operations described in this chapter must be carried out in dangerous service areas **RESERVED TO TRAINED AND AUTHORISED TECHNICAL PERSONNEL.**

#### 2.0.2. MACHINE SWITCHING OFF

In order to switch off the machine, turn the main switch to its “O” position and disconnect the power cable from the socket.

**NOTE: in order to disconnect the machine, the operator must not rely exclusively upon the power switch, but must also unplug the machine power cable.**

#### 2.0.3. ACCESS TO THE REPAIR AND MAINTENANCE OPERATIONS

	<p><b>THE MACHINE POWER CABLE MUST BE UNPLUGGED FROM THE MAINS BEFORE ACCESSING THE SERVICE AREA AND BEFORE PERFORMING ANY REPLACEMENT/REPAIR OPERATIONS. IT IS ALSO RECOMMENDED TO POSITION THE CABLE SO THAT THE PLUG IS ALWAYS VISIBLE TO THE OPERATOR DURING THE COURSE OF THE MAINTENANCE INTERVENTION.</b></p>
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#### 2.0.4. MACHINE RESTORATION AND START AFTER THE INTERVENTION

Once the repair intervention has been completed:

- **RESTORE ALL THE ELECTRICAL CONNECTIONS**
- **RESTORE ALL THE GROUNDING CONNECTIONS**
- **REINSTALL ALL THE REMOVED PROTECTION DEVICES**
- **PLUG THE MACHINE TO THE MAINS**
- **PERFORM A FUNCTIONAL CHECK (SEE PARAGRAPH 3.4 AND CHAPTER 4 OF THE OPERATOR MANUAL)**

**ALFA SHALL BEAR NO RESPONSIBILITY FOR ANY MACHINE MALFUNCTIONS OR PROBLEMS THAT MAY ARISE DUE TO THE OMISSION OR INCORRECT EXECUTION OF THE MAINTENANCE OPERATIONS.**

#### 2.0.5. PRODUCT DISPOSAL

During the maintenance or repair interventions it may be necessary to empty canisters and tanks from the paints contained in the circuits.

Colorants and base must be disposed of in suitable collector tanks to be treated and disposed of in a suitable way.

It is forbidden to release the products in the environment or in the public sewers.

## 2.1. EXTERNAL COVER REMOVAL

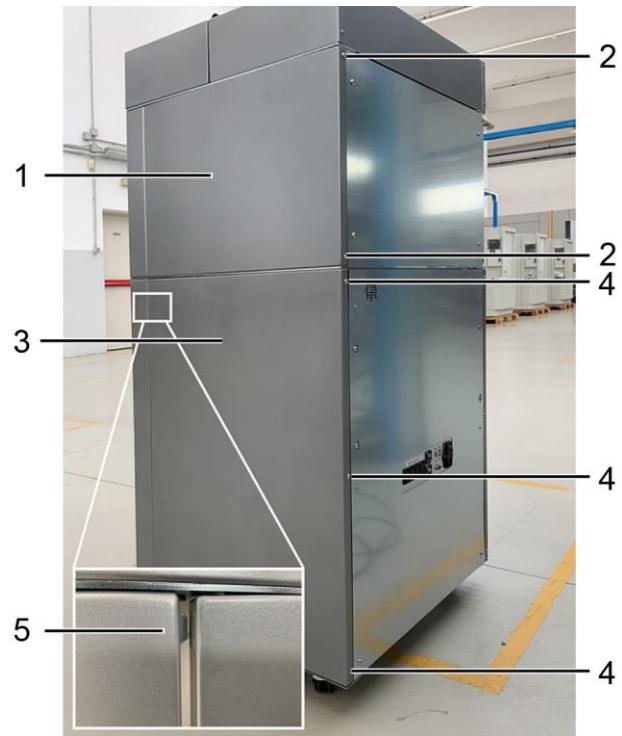
To reach the colorant groups and the turning table and stirring movement mechanisms, it is necessary to remove the covers of the machine as described in this paragraph.

### 2.1.1. SIDE PANELS

To remove the side panels, proceed as follows.

- Upper panel (1): Loosen the 2 M6 button head screws present inside rear profile (2) with a 4mm Allen wrench;
- Lower panel (3): Loosen the 3 M6 button head screws present inside rear profile (4) with a 4mm Allen wrench;
- Remove the panel by sliding it out in the direction indicated by the arrow and releasing it from the retainers (5) in the relevant adjacent front upright.

Repeat the operations described above to remove the panel on the opposite side of the machine.

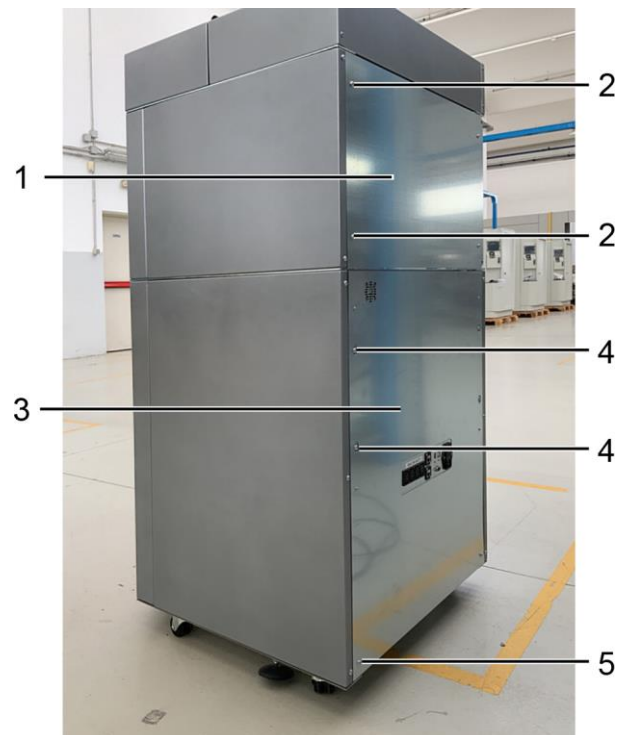


### 2.1.2. REAR PANELS

To remove the rear panels, proceed as follows.

- Upper panel (1): Loosen the 4 M6 button head screws (2) with a 4mm Allen wrench;
- Lower panel (3): Loosen the 4 M4 screws (4) and the two M6 button head screws (5) with a 2.5mm and a 4mm Allen wrench, respectively;

**WARNING:** Collect the any toothed washer under the screws! When reassembling the panels, fit said washers to their original position.



### 2.1.3. FRONT PANEL

To remove the front panel, which allows reaching and removing the groups, proceed as follows.

- Loosen the 2 M6 TCEI screws (1) on the sides with a 5mm Allen wrench;
- Loosen any flanged nuts present on the pins (2);
- Remove the panel by lifting it upwards in order to release slots from pins (2);



### 2.1.4. UPPER COVER

To remove machine upper cover, proceed as follows.

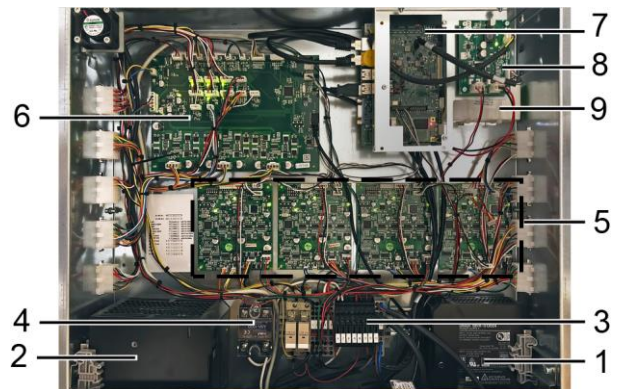
- After removing the top side panels, loosen the 4 M6 screws (1) visible under the horizontal uprights using a 5mm Allen wrench and the inner M6 flanged nuts (2), one on each side;
- Lift the upper cover (3). Taking into account the weight of the cover, it is recommended to have it removed by at least 2 people.



## 2.2. ACCESS TO THE ELECTRICAL PARTS

Inside the rear removable panel of the machine there is an electric box with:

1. power supply unit, 100-240Vac, 24Vdc
2. power supply unit, 100-240Vac, 48Vdc
3. circuit protection fuses
4. Heater relay
5. semi-finished product circuit SCCB boards
6. MMT board
7. PC board (Linux or Raspberry Pi)
8. SPB board (with Linux board only)
9. battery (with Linux board only)



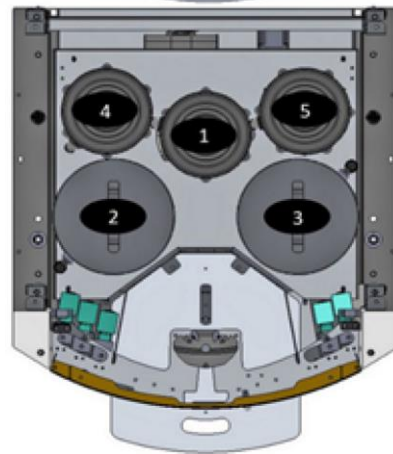
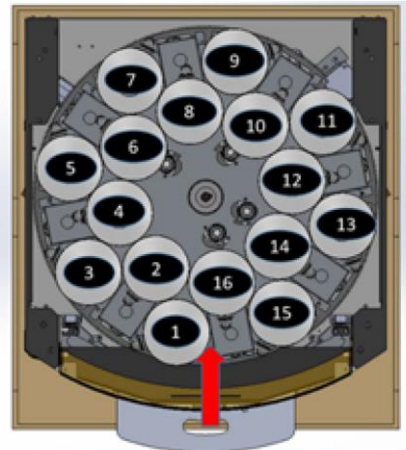
### 2.3. COLORANT CIRCUIT REMOVAL

To replace the colorant group proceed as follows:

- Make sure the machine is disconnected from the power supply as described in para. 2.0.3.
- Identify the colorant group to be replaced.

The arrow indicates the position of the zero tab.

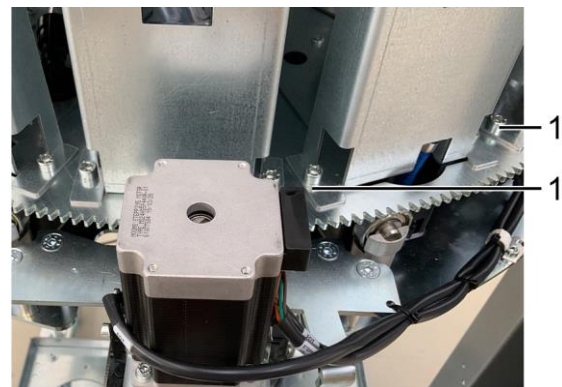
In case of different circuit configuration, refer to the numbers indicated on the machine.



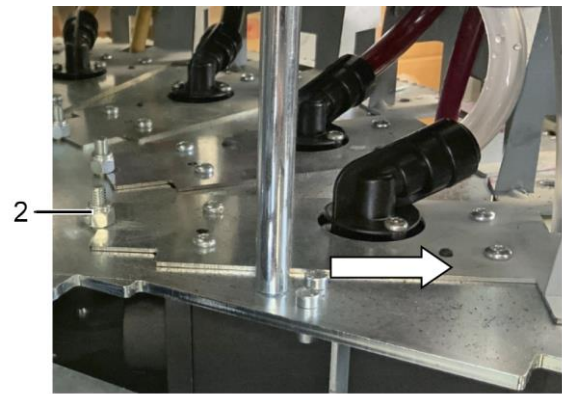
- Then turn the turning table manually so as to position the group in one of the two positions indicated by the arrow in the figure.



- Using a 5mm Allen wrench, loosen the two M6 screws (1) retaining the group to the support surface.



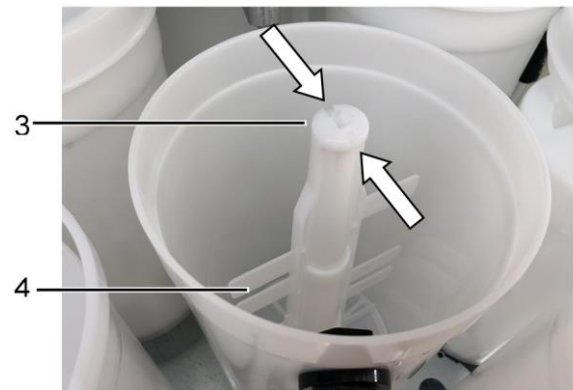
- Slightly pull the group outwards so that the lower metal sheet is pulled out from underneath the fixed locking pin (2).
- When the metal sheet is free, gently lift the colorant group to be replaced until it is removed from its seat.
- Insert the new colorant group, taking care to fit the metal sheet profile into the pin (2).
- Screw the M6 screws (1) back on to secure the group to the support surface.



### 2.3.1. STRAINER CLEANING

Clean the colorant filters as described below:

- Remove the lid of the colorant group with the filter to be cleaned.
- Lift the cross element located inside the colorant tank and release the filter by pressing the tabs (3) indicated in the figure.
- Lift the stirring blade (4), with the filter fixed on its bottom.
- Remove the filter and rinse it with running water paying attention not to damage it.
- Engage the filter back to the end part of the stirring blade and reinsert the components inside the tank by pressing on the central rod to engage the tabs.



Reposition the cross element and the colorant tank lid.

## 2.4. REMOVING THE SEMI-FINISHED PRODUCT GROUPS

### 2.4.1. REMOVING THE 6 OR 12-LITRE TANK

The 6 or 12-litre tanks for semi-finished products are housed inside the lower removable cabinet.

Make sure the machine is disconnected from the power supply as described in para. 2.0.3.

To remove and change a 6-litre tank, proceed as follows:

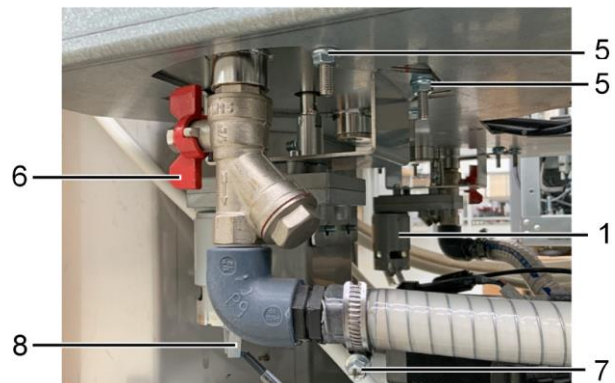
- Disconnect the recirculation hose present on tank upper side;
- Loosen the three M6 screws (1) with a 4mm Allen wrench.
- Close inlet tap of circuit (2) and disconnect pump using the special quick coupling (3);
- Lastly, disconnect the stirring motor wiring (4) and slide the tank up until complete removal.

**NB: the stainless steel tank could weigh some tens of Kg, especially if not completely empty. Take the suitable safety measures to carry out lifting and removal.**



To remove and change a 12-litre tank, proceed as follows:

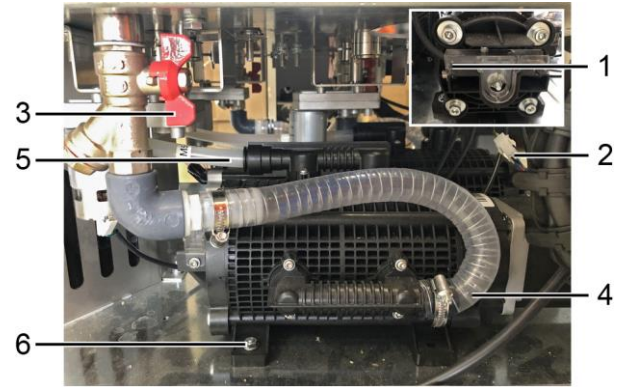
- Disconnect the recirculation hose present on tank upper side;
- Loosen the three M6 nuts (5) with a 4mm Allen wrench.
- Close the inlet tap of circuit (6) and disconnect the pump by loosening hose clamp (7) with a cross-head screwdriver and pulling out the inlet hose;
- Lastly, disconnect the stirring motor wiring (8) and slide the tank up until complete removal.



### 2.4.2. 3 LITRE PUMP REPLACEMENT

Remove the 3-litre pump as follows:

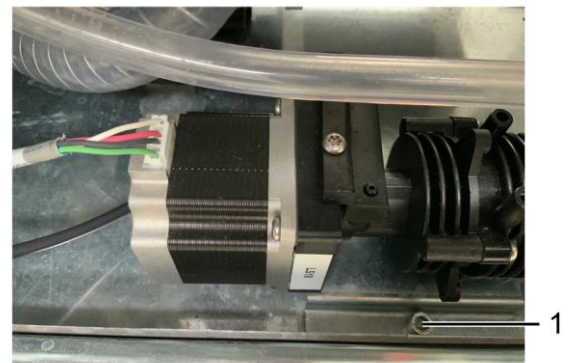
- Disconnect the electric connectors of photocell (1) and motor (2);
- Close inlet tap of circuit (3) and disconnect inlet circuits (4);
- Disconnect the delivery hose (5);
- Use a 10 mm wrench to loosen the two M6 nuts (6) retaining the pump to the base.
- Remove the pump and replace it with the spare pump, then reconnect the electric and hydraulic circuits according to the original layout.



NOTE: To limit any leak, keep disconnected hose ends upwards and plug them using caps of suitable size or with adhesive tape (in this case, take care that no tape residues remain inside hoses during removal).

### 2.4.3. 0.5 LITRE PUMP REPLACEMENT

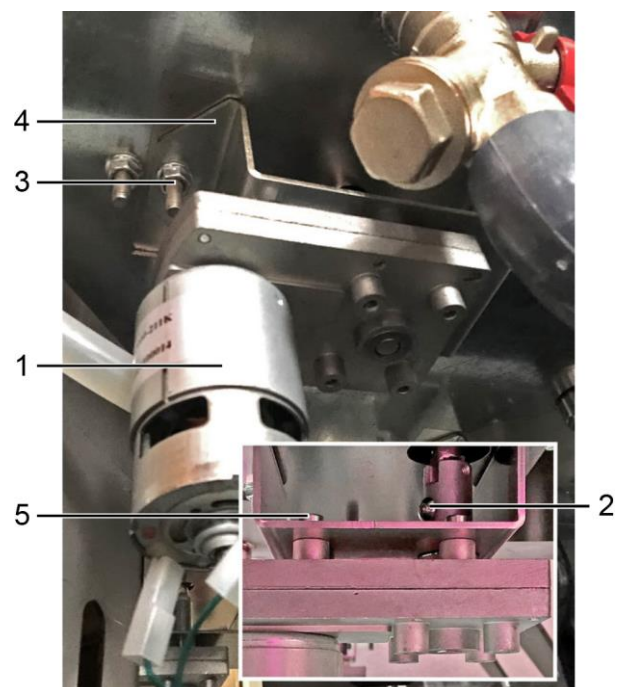
To remove the 0.5-litre pump, disconnect the connectors and circuits as described in the previous paragraph, then loosen the two M6 TCEI screws using a 5mm Allen wrench.



### 2.4.4. REPLACEMENT OF MASTER MODULE TANK STIRRING MOTOR

To replace the stirring motor of the master circuits (1) proceed as follows:

- Loosen the M4 screw retaining the coupling (2) with a 2.5 mm Allen wrench.
- Loosen the 2 M6 retaining nuts (3) with a 10mm wrench, then remove the motor support (4) with motor.
- Loosen the 4 M4 retaining screws (5) with a 3mm Allen wrench to remove the motor from its mount.
- Change the motor and refit it to the support, making sure to refit any original washers.



## 2.5. REPLACING THE ELECTROVALVES

To replace an electrovalve, proceed as follows.

Slide the carriage out of the cabinet and locate the circuit electrovalve to be replaced.

All electrovalves are identified by an adhesive indicating the number of the relevant circuit (EV1, Ev2, ...).

- Loosen the two M4 screws that secure the valve to the support surface (1), then disconnect the electrical and hydraulic connections and remove the electrovalve support.
- To limit any leak, keep disconnected hose ends upwards and plug them using caps of suitable size or with adhesive tape.
- Place an empty container under the nozzle to collect any product leaking from the interrupted circuit.

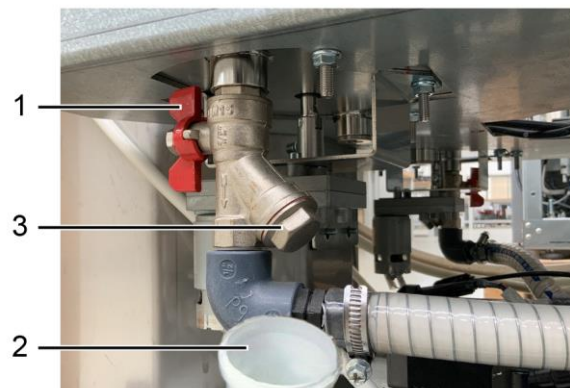


## 2.6. CLEANING OF MASTER CIRCUIT FILTERS

Upstream of the master pump, at tank outlet, is a combined valve including a tap and a filter. It is recommended to periodically clean the filter, since during use it tends to hold all impurities of the paint.

To clean the base or semi-finished product circuit filter proceed as follows:

- Close tap upstream of filter (1).
- Set a can under the filter bottom end (2).
- Loosen the filter holder cap using a 22 mm wrench (3).
- Remove filter and flush with running water to clean it.
- Refit filter and its screw cap, then work on tap to open the circuit.
- At the end of the cleaning procedure, restart the machine by performing the necessary tank recirculation.

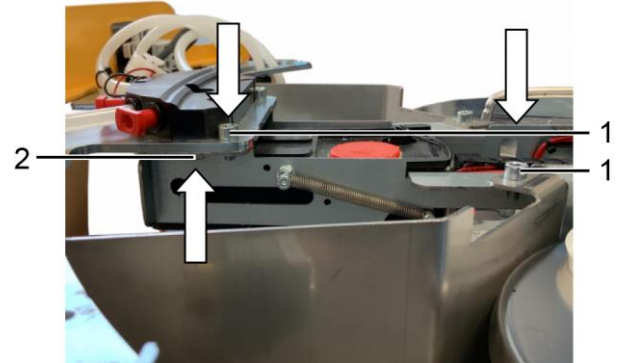




## 2.7. AUTOCAP GROUP REPLACEMENT

To replace the Autocap group proceed as follows:

- Remove the 6 retaining screws (3 on each side): 2 M6 screws (1) can be reached from the upper side, while the third M5 screw can be reached from the bottom (2).
- Disconnect all electrical connections, then remove the group by sliding it out from the bottom.



## 2.8. REPLACING THE AUXILIARY ACTUATORS AND SENSORS

### 2.8.1. CAN PRESENCE MOTOR REPLACEMENT

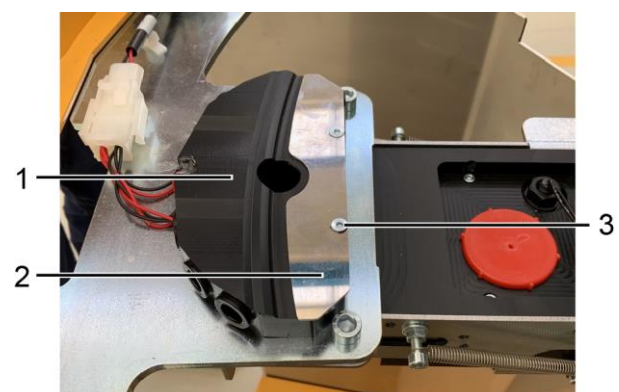
- To replace the CanPresence sensor (1) it is necessary to remove the support bracket by loosening the two M4 button head screws (2) with a 2.5mm Allen wrench.
- Disconnect the sensor by loosening the ring nut on wiring (3) and tighten the new sensor.



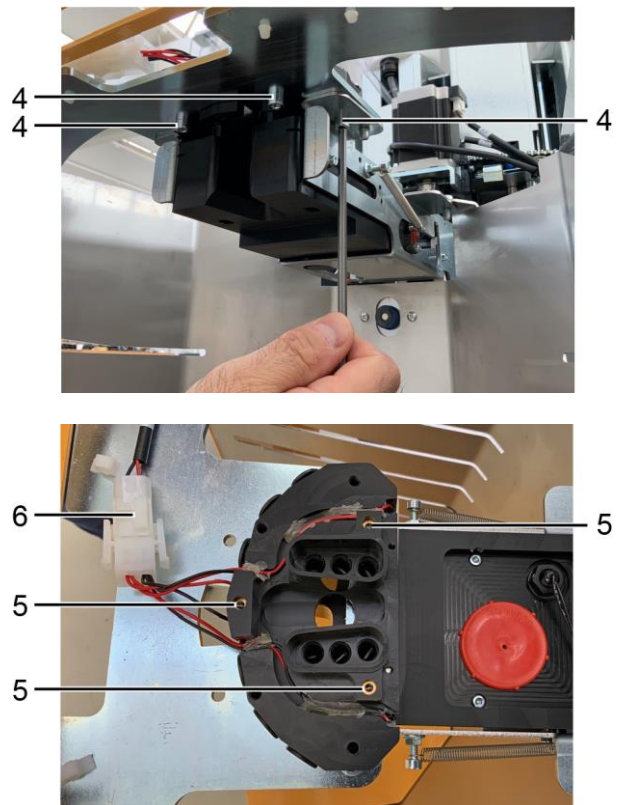
### 2.8.2. REPLACING THE LASER

The lasers of the hole beam locator system are located inside nozzle (1). To replace one or more elements, proceed as follows:

- Remove the protective plate (2) by loosening the two M3 countersunk head screws (3) with a 2mm Allen wrench;



- Loosen the four M5 screws (4) present in the lower part of the support plate that secure the nozzle to the surface;
- Remove the lasers from their seats (5) and disconnect connector (6), then replace the laser emitter group and refit the nozzle in its seat.

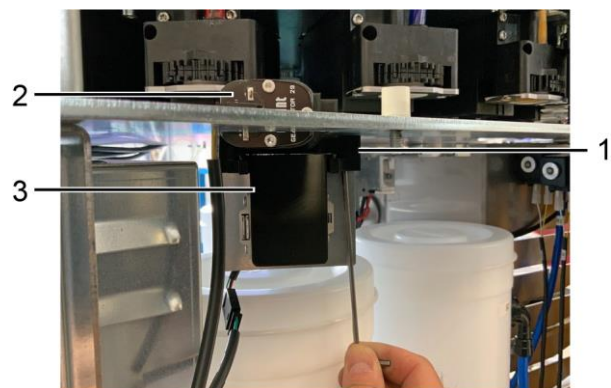


### 2.8.3. NOZZLE CLEANING GROUP MAINTENANCE/REPLACEMENT

To replace the cleaning brush located on machine back side, remove the lower right side panel (refer to 2.1.1), then proceed as follows:

- Loosen the 2 M4 screws (1) to release the cleaning group (2) from the group support surface, then remove the group from below;
- Disconnect the electrical connections and then replace with the replacement group, restoring connections and fixing;

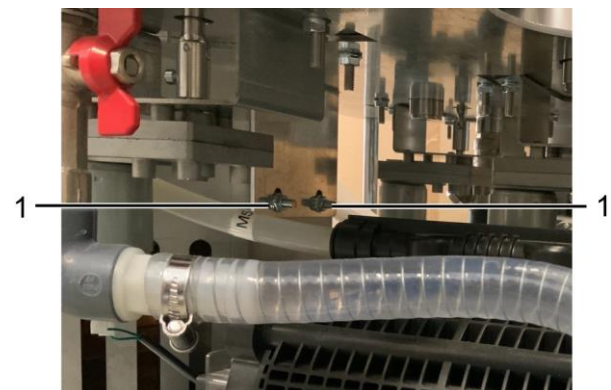
As part of a periodic maintenance/overhaul activity, remove and clean the removable drawer located in the lower part of the cleaning group (3).



### 2.8.4. REPLACING THE HEATER

Heater is located inside the front casing of the carriage. To replace the heater, proceed as follows:

- After removing the carriage from the machine, loosen the two M6 nuts (1) at the bottom that secure the cover fixing pins;



- Loosen the two M6 screws (2) with a 5mm Allen wrench, then remove the front panel of the carriage;



- To replace the heater, loosen the 4 M6 screws that secure it to the support feet (3) and disconnect the electrical wiring (4).

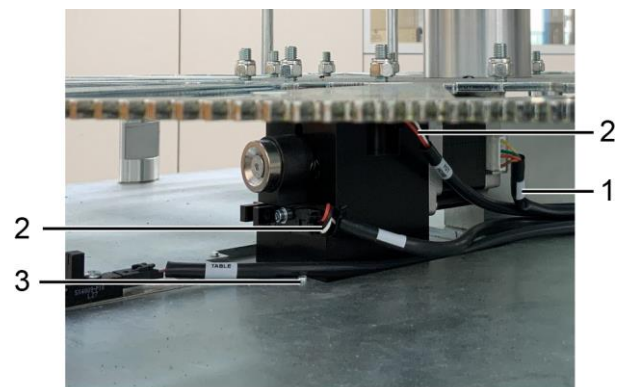


### 2.8.5. DISPENSING/RECIRCULATION MOTOR MAINTENANCE

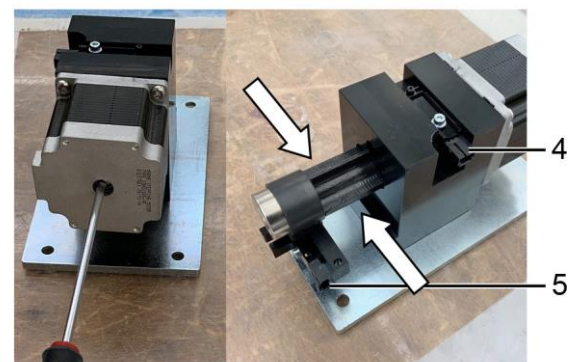
If the dispensing and recirculation operations become noisy over time, the dispensing motor must be disassembled and greased.

To disassemble the dispensing motor:

- Disconnect the motor (1) and photocell (2) connectors;
- Loosen the M6 retaining screws (3) underneath the lower surface, then pull the motor unit downwards;
- Proceed with the replacement or with the recommended lubrication and greasing operations:



- Use a flat screwdriver to rotate the lead screw so that the pusher comes out of its seat;
- Lubricate the horizontal tabs (indicated by the arrows) with graphite grease; **DO NOT grease the top tab as the grease could dirty the HOME photocell and cause malfunctions;**
- Once maintenance operations are completed, screw the lead screw back on so as to take pusher back to its original position.

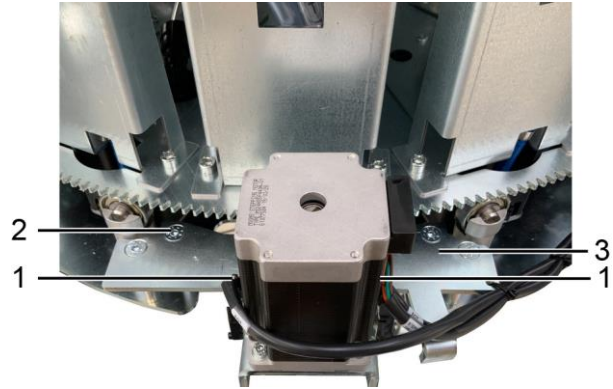


- If necessary, replace the HOME photocell (4) or the CONNECTION photocell (5) by loosening the corresponding M4 retaining screw with an Allen wrench.
- Reassemble the group and restore the connections.

### 2.8.6. REPLACING THE CERAMIC VALVE DRIVE MOTOR

To remove the ceramic valve drive motor, proceed as follows:

- Disconnect the motor and photocell connectors (1);
- Loosen the 4 M6 countersunk head screws (2) and remove the motor with the relevant support plate (3);
- Move to the bench to replace the motor by removing it from the support flange, then reassemble the group and restore the connections.



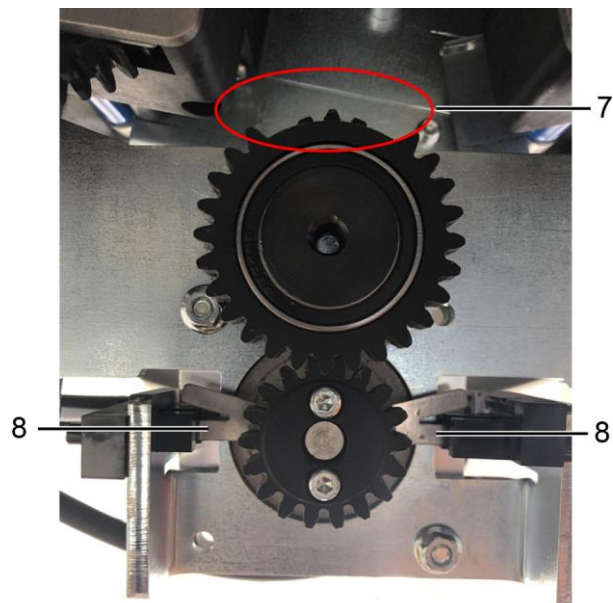
If the pinion under the motor, the gear or the photocells have to be removed and replaced, proceed as follows:

- Loosen the two motor retaining screws shown in figure (5) and remove motor lower protection (6).
- Replace damaged parts with original Alfa spare parts.

Pay attention to the following during assembly:



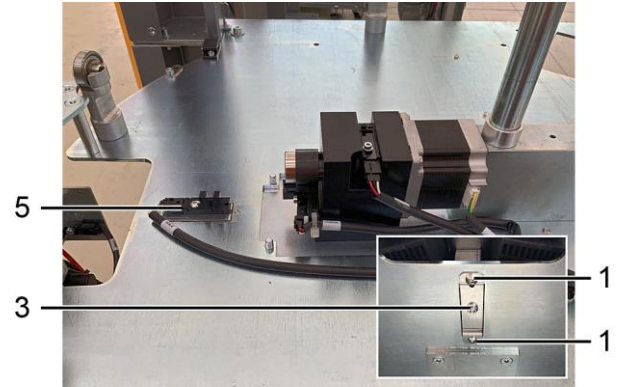
The group is correctly reassembled when the toothless gear part (7) is facing the turning table and, at the same time, the two tabs (8) are both inside photocell.



### 2.8.7. REPLACING THE TURNING TABLE ROTATION HOME PHOTOCELL

To replace the turning table rotation home photocell, proceed as follows:

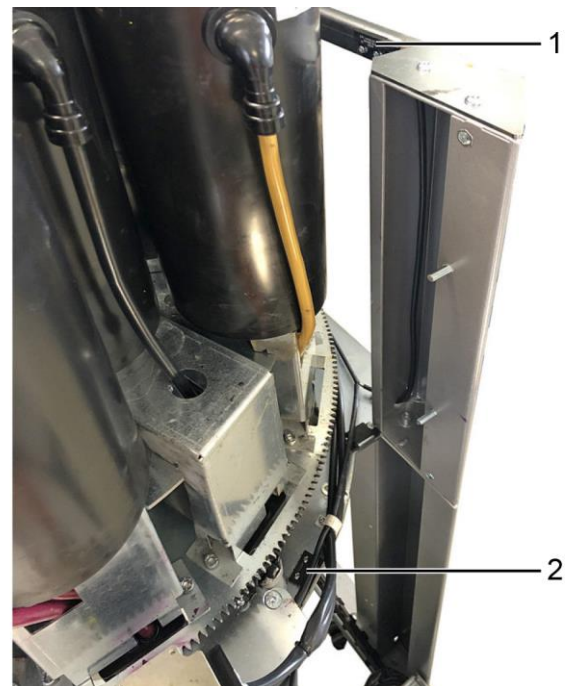
- Loosen the two M5 button head screws (1) underneath the colorant support base that hold the photocell holder plate (2), which can then be removed from below. Loosen the screw (3) securing the photocell to the support and disconnect the connector.



### 2.8.8. REPLACING THE DOOR SENSORS

To replace open door or open carriage sensors, proceed as follows:

- Locate the door sensor (1) or the carriage sensor (2) to be replaced;
- Disconnect sensor connector;
- Loosen the 2 M4 retaining screws and remove sensor;
- Fit the new sensor and restore connections.

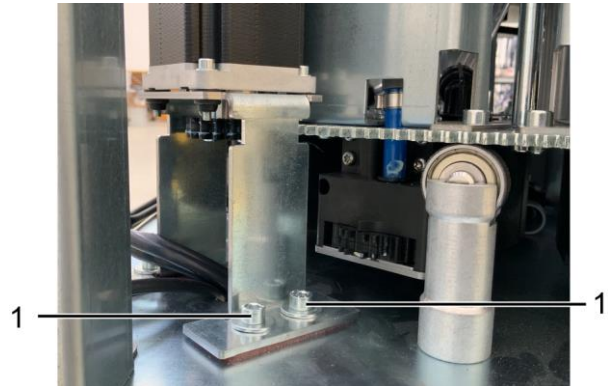


## 2.9. REPAIR INTERVENTIONS ON THE COLORANT TURNING TABLE

### 2.9.1. REPLACING/ADJUSTING THE TURNING TABLE ROTATION MOTOR

Over time, the coupling between motor pinion and turning table toothed gear can show some backlash. To eliminate the backlash or to replace the motor, proceed as follows:

- Remove the upper body parts as described in 2.1.
- Loosen the 4 M6 screws securing the motor support (1) with a 5mm Allen wrench;
- When adjusting for backlash reduction, tighten the screws while keeping the motor pressed against the toothed gear of the turning table. Then rotate the turning table by hand, making sure that each movement corresponds to a movement of the pinion coupled to it.
- In case of motor replacement, remove the motor from the support by loosening the 4 flange retaining screws and disconnecting the electrical connection.



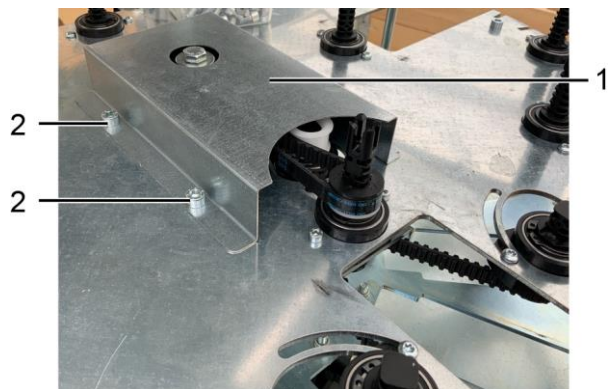
**IMPORTANT:** Use threadlocker when reassembling the support to the plate underneath. Tighten the screws using a torque wrench calibrated to 5Nm.

### 2.9.2. REPLACING THE STIRRING BELT AND/OR THE DRIVE COUPLING

Colorant circuit stirring is transmitted by the rotation of the turning table as well as by a belt drive system. The central belt is subject to greater wear and may require replacement. Below are the instructions for correct belt replacement and for the main maintenance operations of the turning table group.

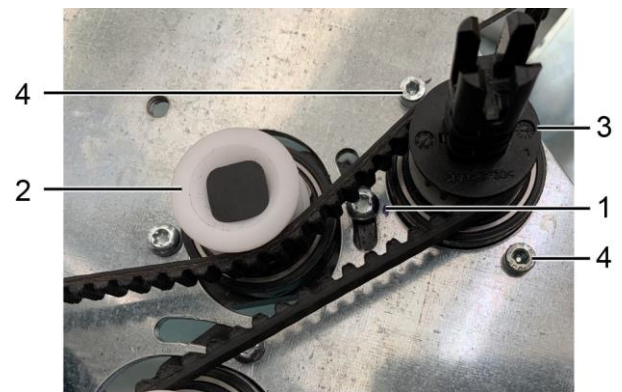
To access the belt, some colorant groups must be removed. In particular:

- In the case of a machine set with 1.5-litre canisters: remove circuit no.9;
- Then remove the metal sheet protection (1) by loosening the 4 M6 screws (2) with a 5mm Allen wrench.
- In the case of a machine set with 2.5-litre canisters: remove circuits no.7, 8 and 9;



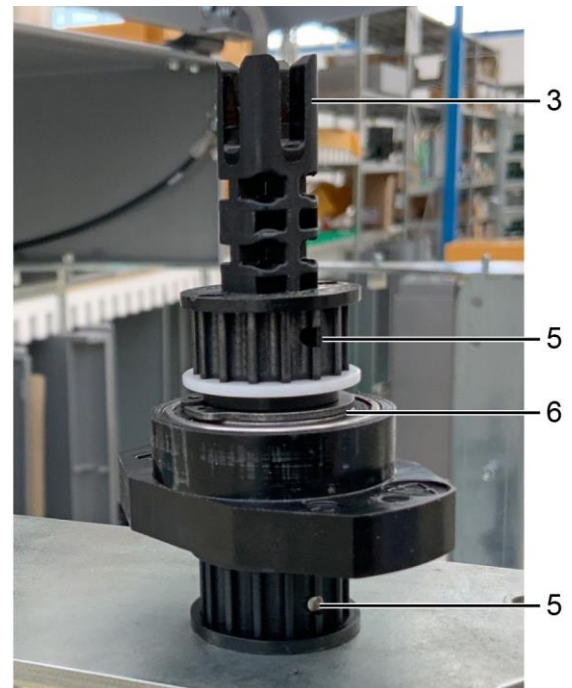
Instructions for removing the groups are given in 2.3. If deemed necessary to gain a better access to the work area, remove other circuits.

- In order to restore the correct tensioning of the new belt it is recommended to mark the position of the belt tensioner screws with a marker pen (1);
- Then loosen the belt tensioners (2) by loosening the screws with a T20 torx driver and slide out the worn belt;
- Insert the new belt, then push the belt tensioners into their original positions and tighten the screws.



- To replace the drive coupling (3) loosen the two M4 screws (4) with a 3mm Allen wrench, then pull out the coupling from below. On the machine with 2.5-litre circuits, the screws are of the torx type.
- Remove pins (5) and circlip (6);

NOTE: to replace group transmission belt, the entire turning table must be disassembled. In this case, refer to par. 2.9.4.



### 2.9.3. REMOVING THE TURNING TABLE, REPLACING THE BEARINGS AND THE BELT

Should it be necessary to replace the turning table bearings or the transmission belt of the stirring motion to the individual circuits, proceed as follows:

- Remove all covers following the instructions given in 2.1, the turning table rotation motor as described in 2.9.1 and all groups following the instructions set forth in 2.3.
- Remove the central pinion (1), secured in place by the M8 hex. head screw, using a 13mm wrench;



- To replace the transmission belt it is not necessary to remove the turning table from the machine. To replace the bearings, slide the wheel upwards and place it on a comfortable and appropriate work surface and continue;
- Loosen the 3 M6 countersunk head screws (2) with a 4mm Allen wrench and the 8 M6 screws (3) with a 5mm Allen wrench;
- Remove the stirring support plate (4) to have complete access to the belt (5);
- To remove the belt, loosen belt tensioners following the same procedure set forth in 2.9.2;



To replace hub bearings, proceed as follows:

- Loosen the other 3 M6 countersunk head screws (6) with a 4mm Allen wrench, then remove hub (7) from toothed gear turning table;
- Remove bearings from hub and replace them with the new bearings, then reassemble by carrying out the disassembly operations in reverse order.



### 3. ELECTRIC REPAIRING OPERATIONS

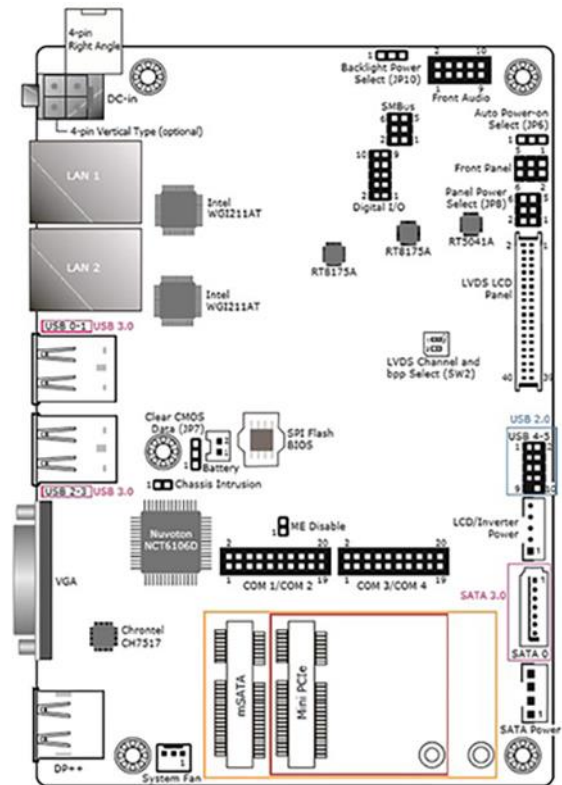
#### 3.1. DIAGNOSIS AND ELECTRONIC PART DESCRIPTION

##### 3.1.1. PC LINUX BOARD

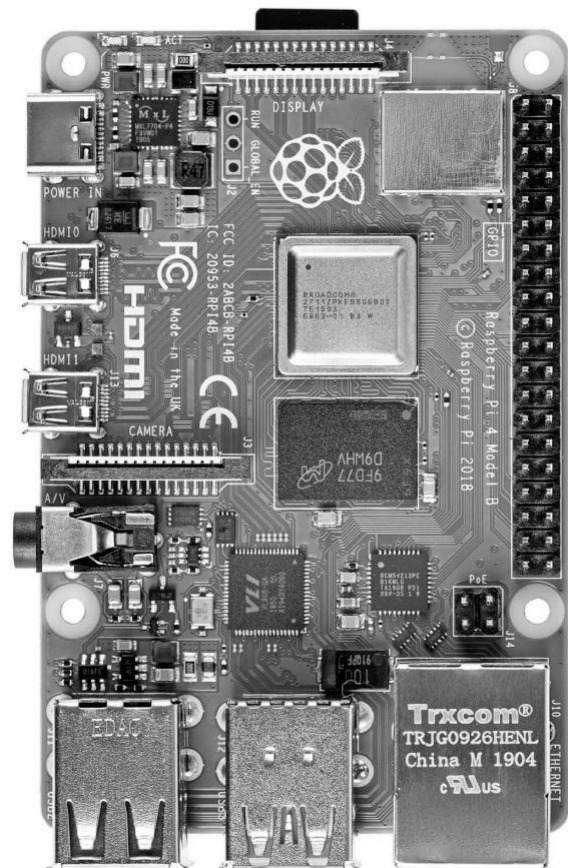
The machine is provided with a PC board (Linux or Raspberry Pi) on which the high-level machine software is memorised.

The Linux PC board receives the Ethernet connection from the outside (LAN1 port) and is internally connected to the Main board (refer to next paragraph) via RS-232. The Linux board has RS-232 and USB ports necessary to connect some accessories like the scale.

The Linux PC board is powered with 12V.



The Raspberry Pi board, present as an alternative to the Linux board, features the same functions.



### 3.1.2. MMT BOARD

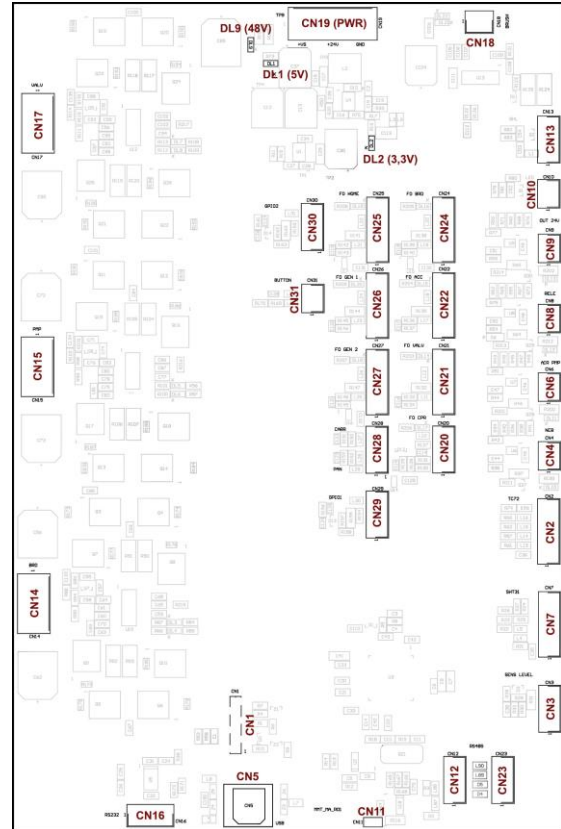
MMT is the Main board on which machine management firmware is saved. The orders sent by the high-level software are managed at MMT level. This board organises the machine cycle by interrogating and sending orders via RS-485 to the slave boards of the single circuits.

MMT board receives the external 48Vdc and 24Vdc power supplies, while it internally generates the 5Vdc and 3.3Vdc voltages.

- DL1 = +5V
- DL2 = +3.3V
- DL9 = +48V

MMT also directly controls many actuators and sensors, as summarised in the table below:

CN5 is used for firmware programming via USB with bootloader (refer to chapter 4 – PROGRAMMING THE ELECTRONIC BOARDS)



### 3.1.3. SCCB BOARD

Each circuit, not directly piloted by the Main board, is managed by a dedicated SCCB board addressed according to the machine configuration set in the software.

Each board is powered with 24 V (two separate lines for logics and power) and 48V, controls the digital sensor inputs and integrates the control drivers of two DC 24V peripheral units (DC motor stirring and/or electrovalves) and of one stepper motor.

The board generates the necessary on-board service voltage. To facilitate the diagnosis, each power supply features a status LED (on = power connected):

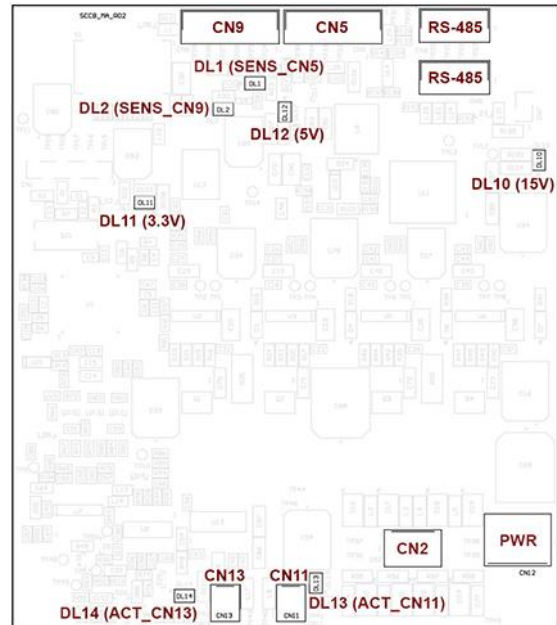
DL11 = 3.3V

DL12 = 5V

DL10 = 15V

In case one or more power supply LEDs is OFF, check the fuse relevant status (see para. 3.2).

Likewise, the CN13 and CN11 outputs have a status LED that indicates when they are powered.



Following is a list of the controls of each SCCB board.

The CN1 connector, now no longer in use, was dedicated to firmware programming and updating through PICKit (refer to chapter 4 – PROGRAMMING THE ELECTRONIC BOARDS).

CIRCUIT	CN2	CN5	CN6	CN8	CN9	CN11	CN12	CN13
<b>SLAVE PUMP3..4</b>	STEPPER	HOME PHOT.	RS485	RS485		E.VALVE	PWR	STIR MOT
<b>SLAVE PUMP5</b>	STEPPER	HOME PHOT.		RS485		E.VALVE	PWR	STIR MOT
<b>DOUBLE GROUP</b>	STEPPER	HOME PHOT.	RS485	RS485		E.VALVE M	PWR	E.VALVE S

### 3.1.4. SPB BOARD

The SPB board is powered at 24Vdc and produces 12Vdc on board. These power supplies are also used to power the Linux board and any accessories. It is only used in combination with Linux board, not with Raspberry Pi.

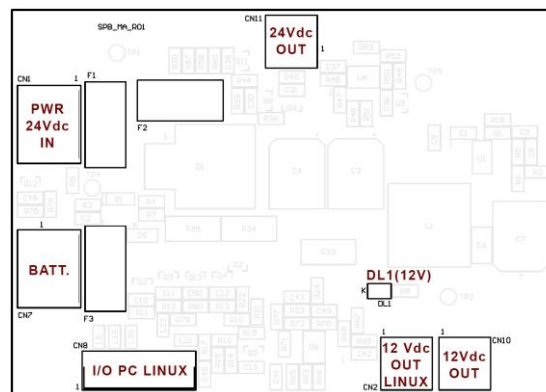
In case of machine shut-off or power failure (voltage interruptions or dips), the SPB board has the function to keep the Linux board powered at 12V for the time necessary for the controlled shutdown of the operating system.

A 16.8V - 1800mAh NI-MH battery is used to store the 12V power: it features a safety PTC inside and is connected to the board at CN7.

The board features two inner fuses:

- F2=0.5A on recharge branch (protection against a charging current higher than the maximum allowed by the battery);
- F3=2.5A on the battery (protection in case of excess power absorption).

The DL1 LED indicates the presence of 12V voltage.

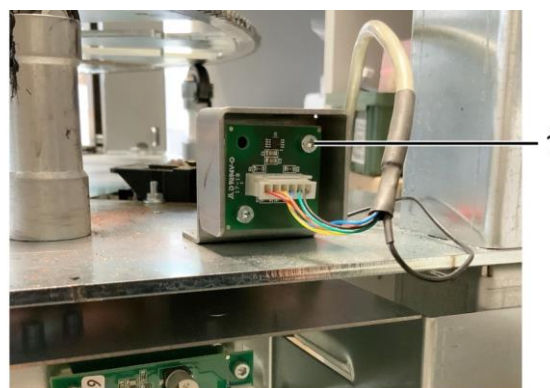


### 3.1.5. HUTTS BOARD

The HUT\_TS board (1) is the board supporting the temperature sensor TC72 used to monitor the temperature of the products (colorants and bases).

The board is located inside the cabinet, fixed on the back of the colorant support base.

The signal is acquired by the MMT board.



## 3.2. CHECKING AND REPLACING THE NETWORK FUSES

In case of mains malfunction or problems, the safety fuses could blow and cut power.

Fuses are located in the fuse holder built in the plug with switch on the back panel.

To replace the interrupted fuse open fuse holder using a flat screwdriver to prise it open.

Remove the fuse and its holder and install a new fuse.



**USE ONLY FUSES OF THE SAME TYPE AND THE NOMINAL RATING SHOWN IN THE PRODUCT LABEL.**

**Fuse requirements:**

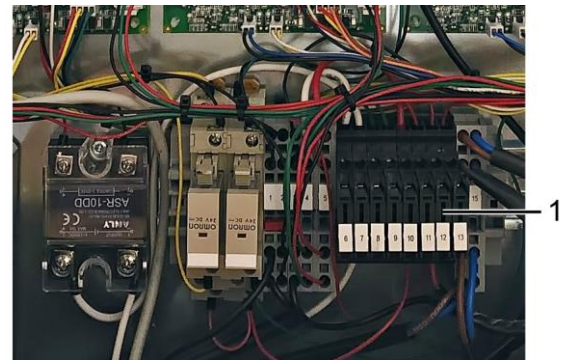
**EU - IEC 60127 Approval**

**US - UL248-1 and UL248-14 Approval**

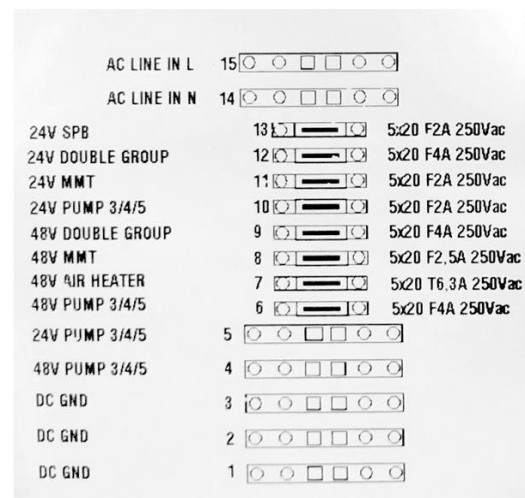
### 3.3. REPLACING THE SECONDARY CIRCUIT FUSES (INTERNAL TERMINAL BOARDS)

In case of malfunction or faults, the safety fuses could interrupt the output power supply of the terminal boards. The fuses are located on the terminal boards located inside the rear electric compartment (see chapter 2 - ACCESS TO THE ELECTRIC PARTS).

- In order to replace the fuses, proceed as follows:
- Remove the rear panel as described in chapter 2 - EXTERNAL COVER REMOVAL to reach the fuse carrier terminal boards (1).



- Find the circuit of the interrupted power supply line and take a fuse with a correct rating according to the diagram to the side.
- Lift the fuse holder until it is possible to manually remove the damaged fuse.
- Insert the new fuse in the fuse holder.
- Close the fuse holder by slightly pressing on it.
- Reposition and fix the machine rear panel using the previously removed screws.

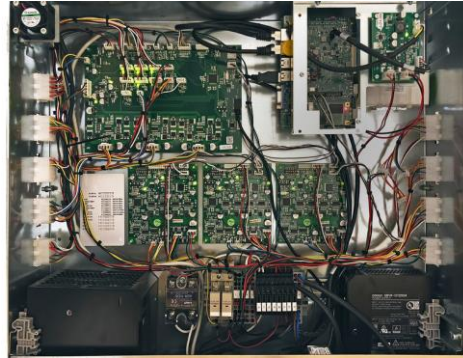


**WARNING:** use only fuse of the same type and with the same nominal rating specified by the manufacturer.

### 3.4. REPLACING THE POWER SUPPLY UNITS

In case of an electric fault in one or more power supply units of the machine, proceed as follows to replace them:

- To reach the power supply unit compartment, remove the rear panel as described in chapter 2 - EXTERNAL COVER REMOVAL.
- Disconnect the wiring between the power supply unit to be replaced and the rest of the machine.
- Remove the power supply unit by fitting a small flat screwdriver in the suitable retaining tab and remove the unit from the DIN bar.



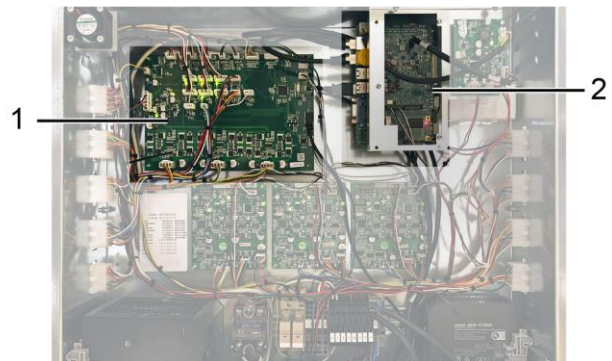
- Fit the new power supply unit manually on the DIN bar.
- Reconnect the power supply unit to the wiring according to the attached wiring diagram.
- Reposition the previously removed protection panel.

**WARNING:** use only genuine spare parts supplied by the manufacturer.

### 3.5. REPLACING THE PC AND MAIN BOARDS

To replace the PC (Linux or Raspberry) or Main (MAB or MMT) boards, proceed as follows:

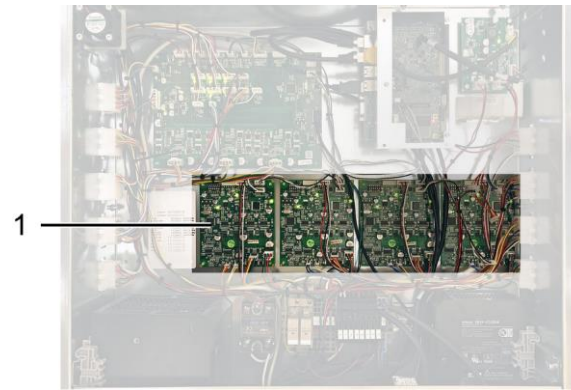
- Remove the rear panel as described in chapter 2 - EXTERNAL COVER REMOVAL.
- Disconnect the power supply and signal cables from the board to be replaced.
- Remove the Main (1) or PC (2) board from the supports at the corners (pressure-fit plastic supports for the Main board and M3 retaining screws for the PC board).
- Insert a new board on the supports having care not to damage its components.
- **WARNING:** Use an already programmed board or the suitable programmer to install the correct software/firmware. To reprogramme the boards refer to chapter 4.
- Restore the electric connections.



### 3.6. REPLACING THE SEMI-FINISHED PRODUCT SCCB BOARD

The SCCB boards of the semi-finished product circuits (1), when present, are also located inside the electrical box. To replace them, proceed as follows:

- Remove the rear panel as described in chapter 2 - EXTERNAL COVER REMOVAL.
- Disconnect the power supply and signal cables from the board to be replaced.
- Remove the board by releasing it from the plastic supports on its corners.



- Insert a new board on the supports having care not to damage its components.
- **WARNING:** Use a board already programmed with the function of the replaced board. To reprogramme the boards refer to chapter 4.
- Restore the previously disconnected connections according to the wiring diagram.

### 3.7. REPLACING THE HUTTS BOARD

The board is located inside the cabinet, fixed on the back of the colorant support base.

To change the board, remove the top rear panel as described in Chap. 2 - REMOVING THE EXTERNAL COVERS, then:

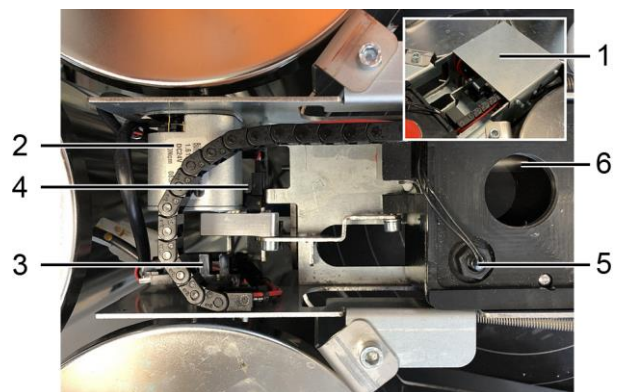
- Disconnect board connector.
- Loosen the two M3 screws that secure the board to the support, then proceed with the replacement by restoring the connections.



### 3.8. REPLACING THE AUTOCAP PARTS

By removing the metal sheet protection on the auticap (1), held in place by 3 M3 screws at the sides, it is possible to access group driving parts, such as motor and photocells.

For targeted interventions on motor (2), open group photocell (3), closed group photocell (4), level sensor (5) and heater (6) contact the assistance service.



### 3.9. LTE ROUTER SETTINGS

When a hard-wired ethernet network is not available, it is still possible to obtain a remote connection to the machine via an LTE Router.

A VPN client - duly installed and set up - is necessary to connect to the machine.

#### 3.9.1. CONNECTION VIA VPN CLIENT ON WINDOWS 7 AND 10

To install the VPN Client, proceed as described below:

- Open an internet browser at <https://openvpn.net/index.php/open-source/downloads.html>
- Click “openvpn-install-2.4.4-l601.exe” (1) and download the file.

Please note that OpenVPN 2.4 installers *will not* work on Windows XP.

If you find a bug in this release, please file a bug report to our [Trac bug tracker](#) first, either using the [openvpn-devel mailinglist](#) or the developer IRC channel ( help take a look at our official [documentation](#), [wiki](#), [forums](#), [openvpn-users ma](#) [irc](#).freenode.net).

Source Tarball (gzip)	<a href="#">openvpn-2.4.4.tar.gz</a>	Gn
Source Tarball (xz)	<a href="#">openvpn-2.4.4.tar.xz</a>	Gn
Source Zip	<a href="#">openvpn-2.4.4.zip</a>	Gn
Installer, Windows Vista and later	<a href="#">openvpn-install-2.4.4-l601.exe</a>	Cc

1

**NOTE:** the GPG key used to sign the release files has been changed since OpenVPN 2.4.0, as well as the new GPG public key are available [here](#).

We also provide static URLs pointing to latest releases to ease automation. For more information, see [here](#).

- Open the downloaded file, then press “Next” (2) on the following screen page.



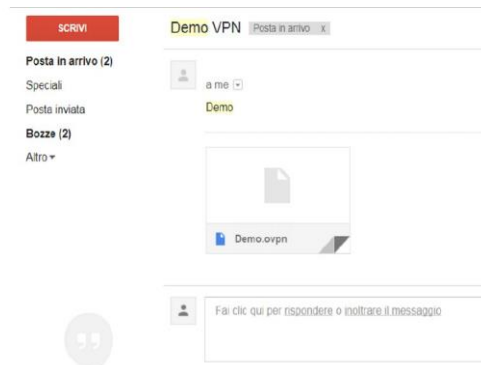
2

- Check the boxes indicated in the figure on the side, then press “Next”.



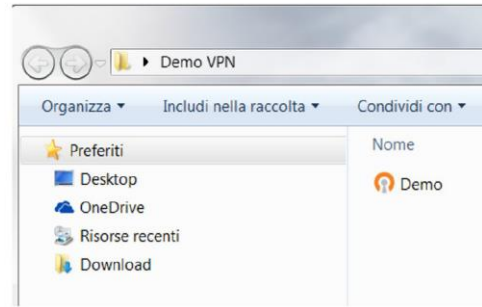
To connect to the machine via the VPN Client, proceed as described below:

- Download the file containing the login credentials sent by Alfa via email.

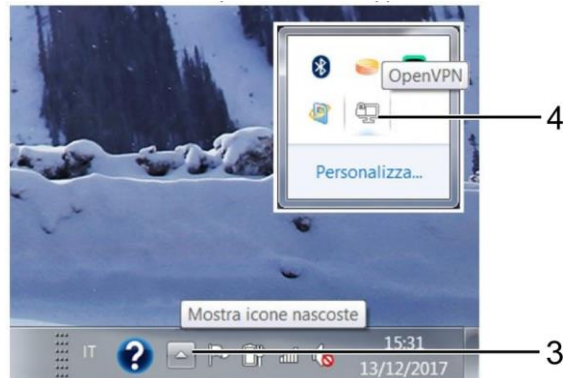




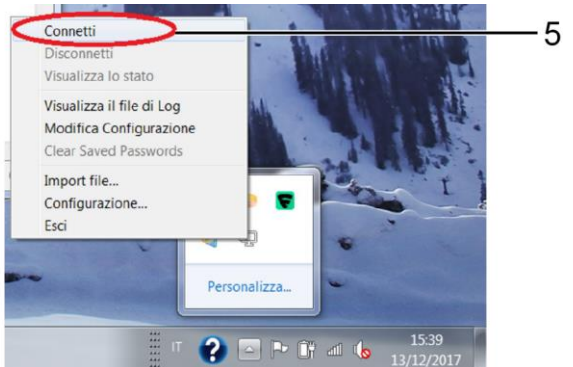
- Save the file containing the credentials in C:/programs/OpenVPN/Config
- Make sure you save it as an “.opvn” file.



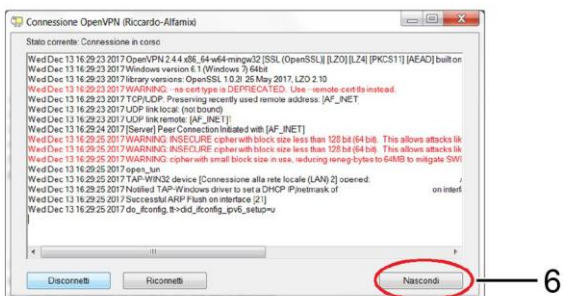
- On Windows Toolbar, click the arrow icon “show hidden icons” (3) then find the icon “OpenVPN” (4) in the pop-up.



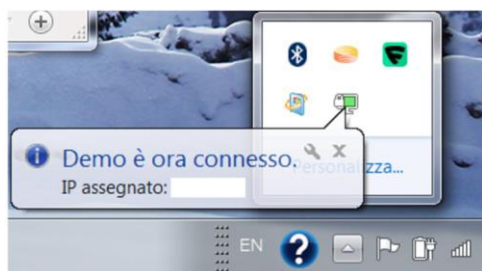
- Right click on the icon and select “Connect” (5);



- Press “Hide” (6) to close the following page;



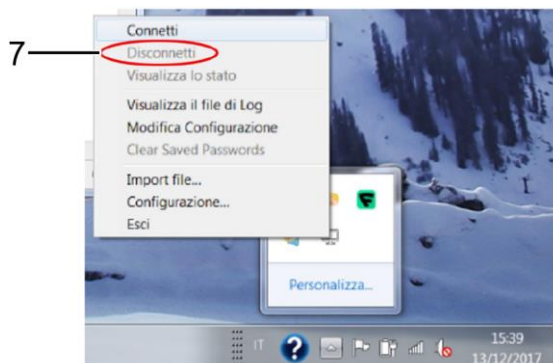
- After a few seconds a new pop-up will open on the toolbar, near the clock indicating that the PC is connected. This window could close automatically, while the OpenVPN icon will become green.



- To connect to the machine, open your internet browser.
- In the address bar, enter the IP address of the machine you wish to establish connection with, usually indicated on the LTE router.
- Enter the login credentials given by Alfa.



To disconnect from the machine, right click on OpenVPN icon and select “Disconnect” (7).



### 3.9.2. CONNECTION VIA VPN CLIENT FROM ANDROID DEVICES

To install the VPN Client, proceed as described below:

- From the Home screen of your device, open Play Store.
- In the search bar, type “openvpn for android”.
- Click the green button (1) to install the application.

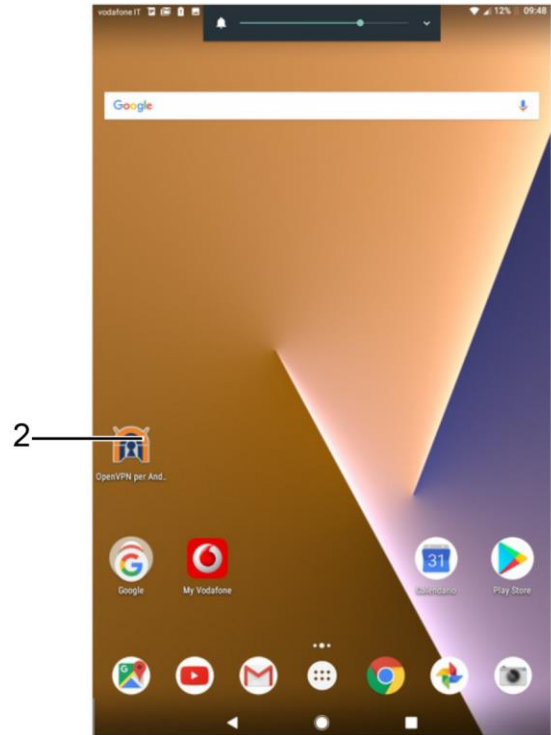


To connect to the machine via the VPN Client, proceed as described below:

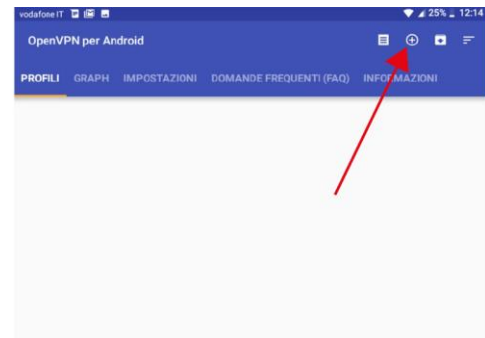
- Download the file containing the login credentials sent by Alfa via email.



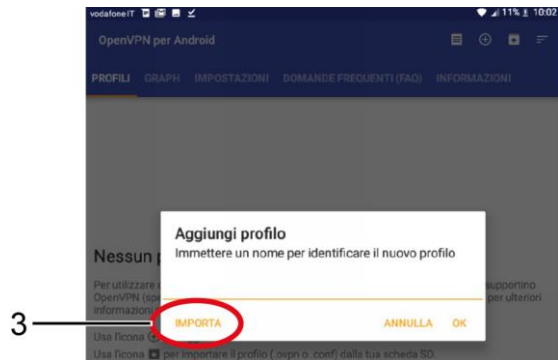
- Run the app OpenVPN (2) previously installed.



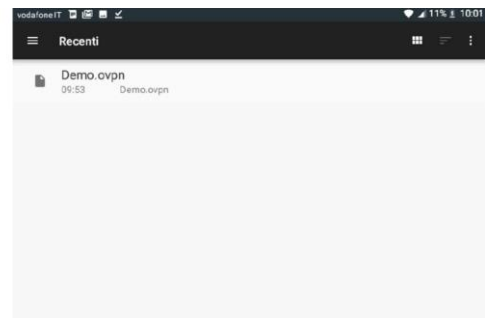
- Press symbol “+” present on the bar at top right of the app screen.



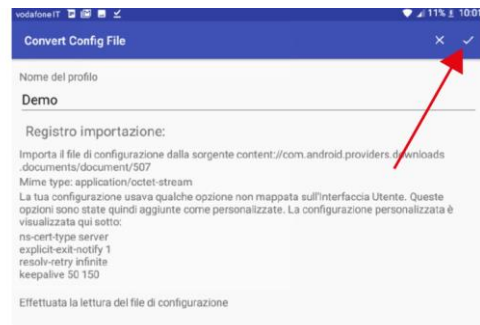
- Press “Import” (3).



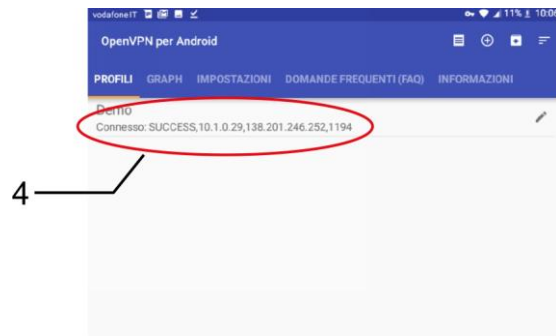
- Select the “.ovpn” file previously downloaded;



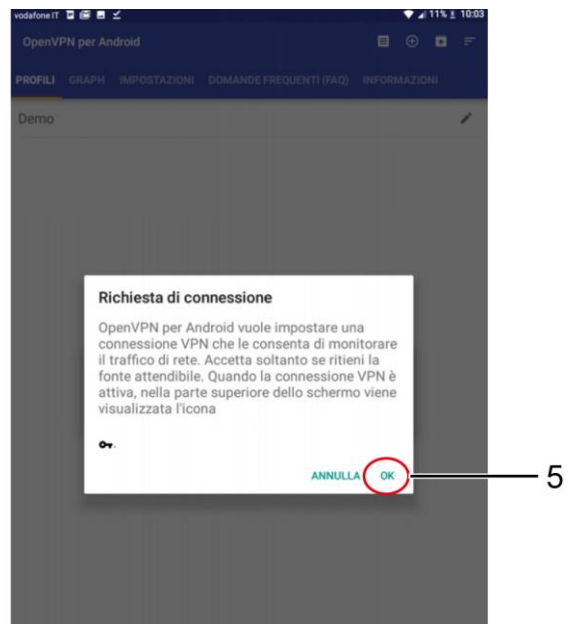
- Press on the check mark in the top right corner;



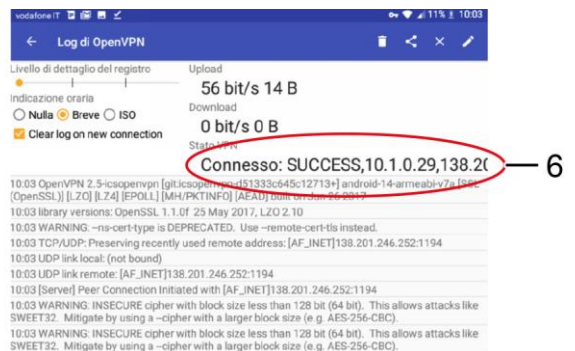
- Press on the just-added file (4).



- Press OK (5) on the next window.



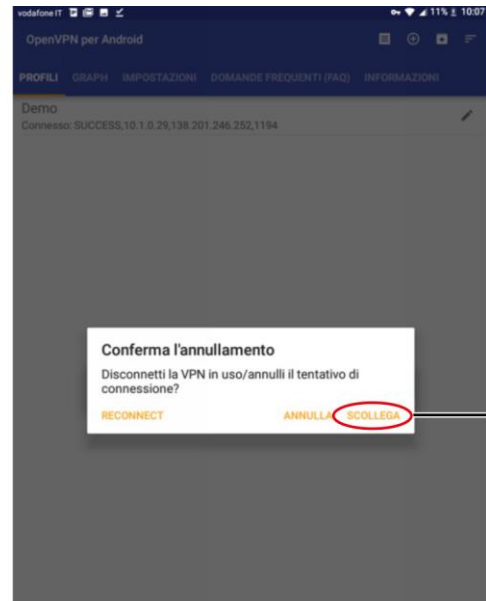
- Now the VPN status must be “Connected” (6).



- To connect to the machine, open your internet browser.
- In the address bar, enter the IP address of the machine you wish to establish connection with, usually indicated on the LTE router.

Enter the login credentials given by Alfa.

- To disconnect from the machine, open the app OpenVPN, then select the “Profiles” menu and press “Disconnect” (7).



## 4. PROGRAMMING THE ELECTRONIC BOARDS

Depending on board version, programming can be carried out in either of two different methods:

- Boards without bootloader (programming through PICKit / ICD3).
- Boards with bootloader.

Alfa products are delivered with the Bootloader loaded on all boards.

Each FW update therefore includes the procedure using the BootLoaderAPP Software (also called AlfaUSBProgrammer), described in paragraph 4.2 below.

### 4.1. PROGRAMMING OF BOARDS WITH NO BOOTLOADER

The procedure through PICKit (or ICD3 for MMT and HUTBRD boards) is still necessary only to load the Boot on boards without it, in particular on first-generation machines. This procedure can only be performed by Alfa Service. Each spare part is shipped with the Boot already preloaded.

### 4.2. PROGRAMMING OF BOARDS WITH BOOTLOADER

#### 4.2.1. SOFTWARE “BOOTLOADERAPP”

The most recent boards are preloaded with BOOT firmware for the management of the BootLoader, i.e. the application that allows the updating of the machine control firmware.

NOTE: To program a board that does not feature preloaded BOOT, please contact Alfa technical service.

To program a hard-wired board via BootLoaderAPP, it is necessary to follow this procedure:

1. Shut off the machine;
2. connect the special Alfa USB BOOT LOADER cable (code 305001893) across the dedicated connector of the Main board (CN13 for the MAB, CN5 for the MMT, if it is used instead of the MAB) and a USB port of the PC / LAPTOP on which the BootloaderAPP.exe application resides; Machine side, use the "BOOT" panel connector when present.
3. run BootloaderAPP;
4. switch the machine on.


TO USE A MACHINE IN BOOT MODE, YOU MUST FIRST CONNECT THE USB CABLE FROM MAB/MMT TO PC / LAPTOP AND THEN SWITCH MACHINE ON.

BootLoaderAPP installation procedure is described in the following paragraph. If the software is already installed on the PC, go directly to the following paragraph explaining software use for programming boards.

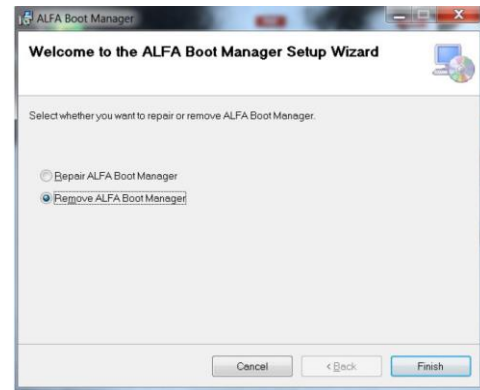
#### 4.2.2. INSTALLATION OF “BOOTLOADERAPP”

If a version of the application is already present on the PC, you must first remove it before installing a new version.


In this case, run the installation software

 ALFA Boot Manager and select option “Remove ALFA Boot Manager”, then press “Finish”.

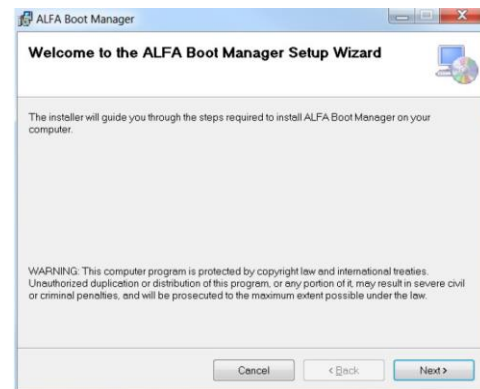
Wait until uninstall is completed and press “Close”.



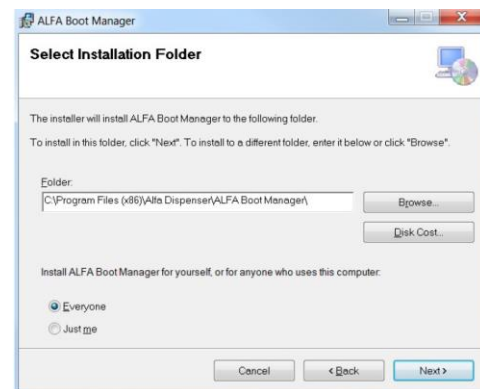
To install the application:

1. Run the installation file  ALFA Boot Manager .

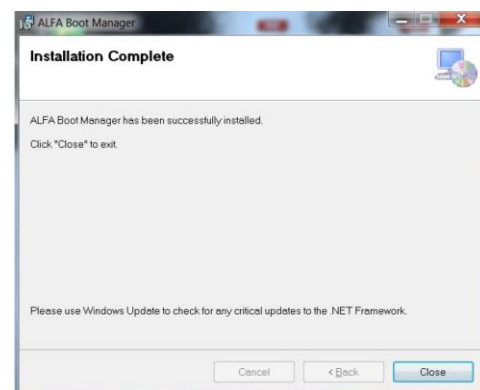
The page on the side will open.



2. In the following window, select the software installation path and select option “Everyone”, then press “Next >”.

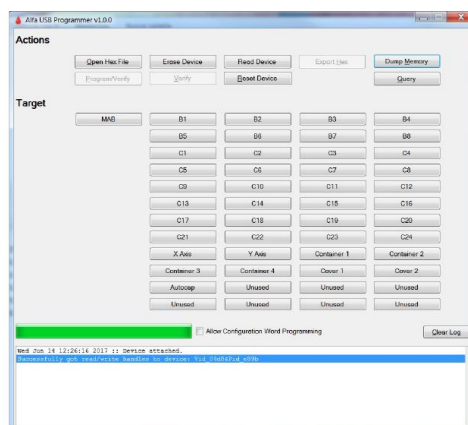


3. When prompted, press “Next >” until completing the installation procedure, then press “Close” to end the installation procedure.



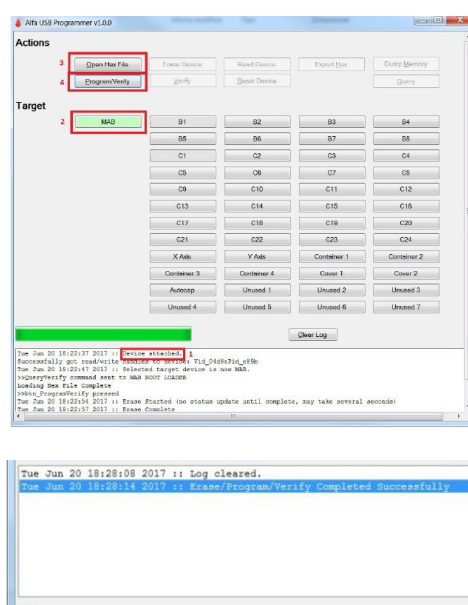
### 4.2.3. STARTING THE BOOTLOADER

Run BootloaderApp on the PC (the application is in the folder selected in step 2 of the installation procedure). The following window will open.



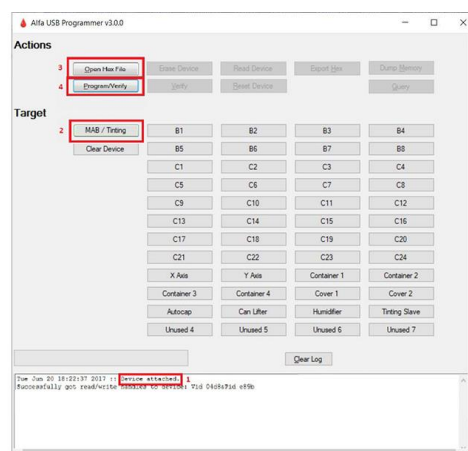
### 4.2.4. MAB FIRMWARE UPDATE

- Check that the software detected the presence of a MAB 'Device attached' (1)
- Select the MAB board to be used by pressing the MAB button (2) 'Selected target device is now MAB' + 'QueryVerify command sent to MAB BOOT LOADER'
- Select the Intel HEX file to be programmed, and press 'Open Hex File' (3) 'HEX File Complete'
- Proceed with Programming and Verification, by pressing 'Program/Verify' (4) ": wait for the final message 'Erase/Program/Verify Completed Successfully'
- If programming is successful, the 'MAB' button becomes GREEN.



### 4.2.5. UPDATING THE MMT FIRMWARE

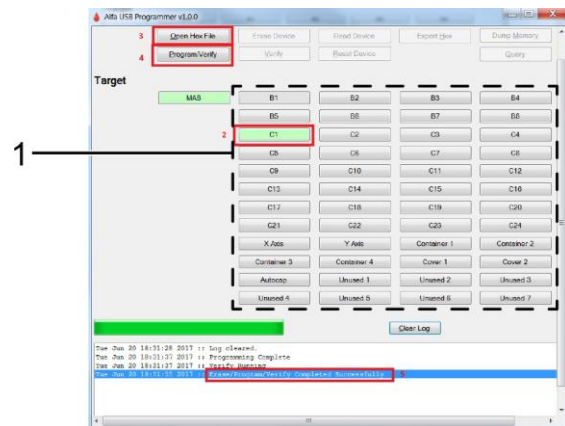
- Check that the software detected the presence of a MMT 'Device attached' (1).
- Select the MAB board to be used by pressing the MAB button (2) 'Selected target device is now MAB' + 'QueryVerify command sent to MAB BOOT LOADER'.
- Select the Intel HEX file to be programmed, and press 'Open Hex File' (3) 'HEX File Complete'.
- Proceed with Programming and Verification, by pressing 'Program/Verify' (4) ": wait for the final message 'Erase/Program/Verify Completed Successfully'.
- If programming is successful, the 'MAB/Tinting' button becomes GREEN.





#### 4.2.6. UPDATING THE ACTUATOR FIRMWARE (SCCB, MMT THOR 1.0 with BRUSH, HUTBRD THOR 1.0 BOARDS)

- Connect the special Alfa USB BOOT LOADER cable (code 305001893) across the dedicated connector of the Main board (CN13 for the MAB, CN5 for the MMT, if it is used instead of the MAB) and a USB port of the programming PC; Machine side, use the "BOOT" panel connector when present.
- Switch the machine on (or the board when programming it on a bench);
- Check that the software detected the presence of a MAB (MMT for Thor 2.0) 'Device attached';
- Select actuator board (1) to be programmed by pressing the corresponding button (Fig. C1) (2) 'Selected target device is now C1' + 'QueryVerify command sent to MAB BOOT LOADER' (MMT for Thor 2.0);  
Check that the address set in the actuator board to be programmed is consistent with the selected device (please refer to the following paragraph "SETTING ADDRESSES");  
NOTE: THE MMT BOARD FEATURES NO DIP SWITCH, ITS ADDRESS IS WIRED INTO THE FIXED FIRMWARE.
- Select the Intel HEX file to be programmed, and press 'Open Hex File' (3) 'HEX File Complete';
- Proceed with Programming and Verification, by pressing 'Program/Verify' (4), then wait for the final message 'Erase/Program/Verify Completed Successfully' (5);
- If programming is successful, the 'C1' button becomes GREEN.



#### 4.2.7. SETTING ADDRESSES

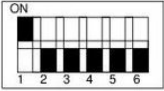

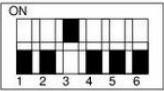
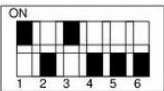
For programming an SCCB actuator board, the address set via the dip-switches must be consistent with the Target selected via the programming software (see previous paragraph).

Before programming a board, set the corresponding dip-switches accordingly.

Dip-switch addressing is a binary code.

The less significant bit is the leftmost; A dip switch set to ON corresponds to a bit with a value equal to '1'.

SCCB boards must have a fixed addressing according to the following coding:

GROUP OR CIRCUIT	DIP-SWITCH
DOUBLE GROUP	
PUMP 3	
PUMP 4	
PUMP 5	

Each address must be unique in the machine.

After programming, board address can be changed but only into addresses belonging to the same group of circuits (colorants, bases, etc.).

## 5. HANDLING THE MACHINE

### 5.1. MOVING THE MACHINE

Machine Thor must be moved in full safety.

In order to move the machine with the cabinet, it is possible to raise the support feet and use the dedicated wheels.

**IN ORDER TO AVOID THE RISK OF PAINTING SPILLS INSIDE THE MACHINE, NEVER MOVE THE MACHINE WITH THE COLORANT CIRCUITS FULL.**

**BEWARE OF ANY STEPS OR IRREGULARITIES IN THE FLOORING/TERRAIN THAT COULD RESULT IN SUDDEN STOPPAGES, AS THESE COULD CAUSE MACHINE TO BECOME UNBALANCED. ALWAYS PROCEED AT A LOW SPEED WITH TWO PEOPLE HANDLING THE MACHINE AT ALL TIMES.**

For bigger movements, it is necessary to use a suitable lifting mean. In this case, proceed as follows:

- Switch the machine off and disconnect all electric connections (power supply, ethernet, etc.);
- Remove PC, keyboard, monitor and any other device from the machine bearing surfaces;
- Push the machine on the forks of a forklift truck or a manual lift truck having a suitable capacity, after checking the weight of the configuration in section 1.5 – DIMENSIONS AND WEIGHT of the operator's manual;

**EMPTY ALL TANKS OR BRING THEM TO MINIMUM LEVEL BEFORE LIFTING AND/OR MOVING THE MACHINE. BASED ON THE MOVEMENT TO BE MADE, CHECK FOR THE POSSIBLE NEED TO LOCK ALL MOBILE PARTS BY RESTORING THE LOCKS SPECIFIED IN CHAP.3 – INSTALLATION – OF THE OPERATOR'S MANUAL.**

**LIFT THE MACHINE CAREFULLY, TAKING CARE TO MAKE SURE THAT IT IS GRIPPED PROPERLY AND IS NOT AT RISK OF TIPPING OVER**

- Handle the machine using the fork lift truck and position it in the installation space.

Always place the machine on a surface suitable for sustaining its weight or on perfectly smooth and level flooring.

Once the movement has been completed, lower the support feet to stabilise the machine and reconnect the electrical circuits. Use a spirit-level to level the machine.

## 6. ACCESS TO THE DIAGNOSTIC FUNCTIONS

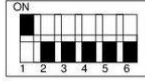
### 6.1. ADMIN CONTROL AND DIAGNOSTIC INTERFACE

The web control browser Admin interface has diagnostic functions that indicate the status of the machine and of the relevant circuits, as well as specific controls to activate and test each single circuit or the valve and motor functions.

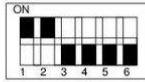
For information about the interface access modes and the function description refer to the software manual.

## 7. CONNECTION DIAGRAMS

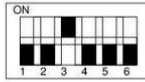
DOUBLE GROUP



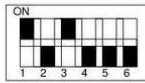
PUMP 3

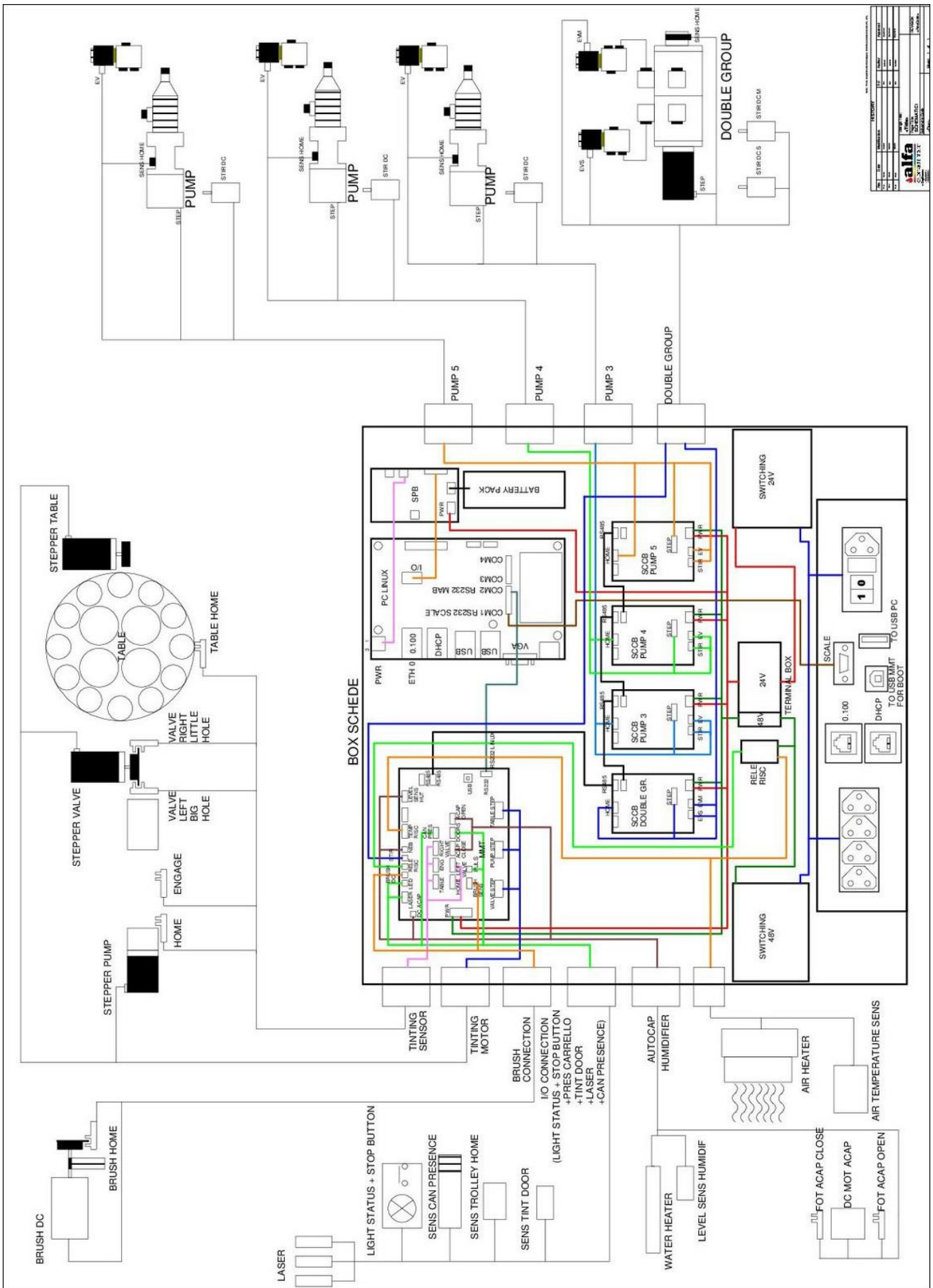


PUMP 4

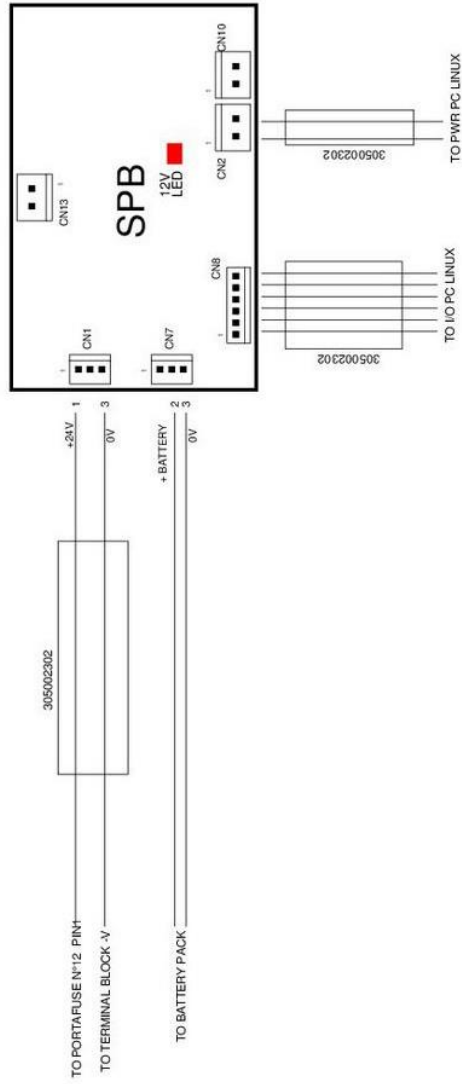


PUMP 5





# SPB BOARD



HISTORY							
REV.	REVISION	BY	DATE	DESCRIPTION	REV.	DATE	DESCRIPTION
01	01				01		
02	01				02		
03	01				03		
04	01				04		
05	01				05		
06	01				06		
07	01				07		
08	01				08		
09	01				09		
10	01				10		
11	01				11		
12	01				12		

**alfa**  
 COLORPAINT DISPENSER  
 Via M. Perugina, 101  
 00144 ROMA, ITALIA  
 Tel. +39 06 47811111  
 Fax +39 06 47811112  
 E-mail: alfa@alfa.com  
 Website: www.alfa.com

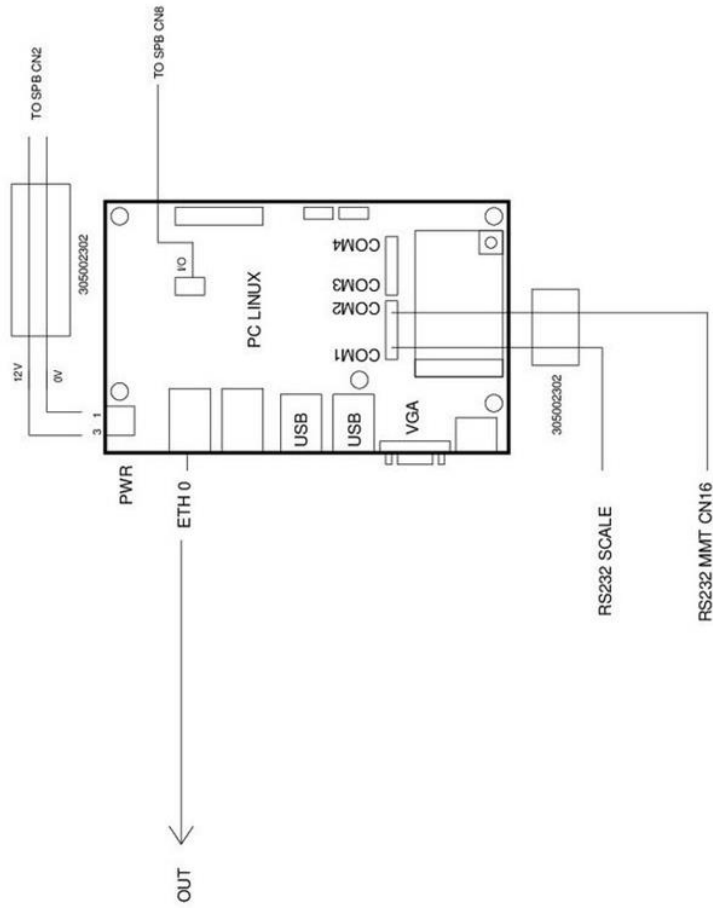
PRODOTTO IN ITALIA  
 MADE IN ITALY  
 -EBC-

Pagina 1 di 1





# PC LINUX



Rev. 10/2014

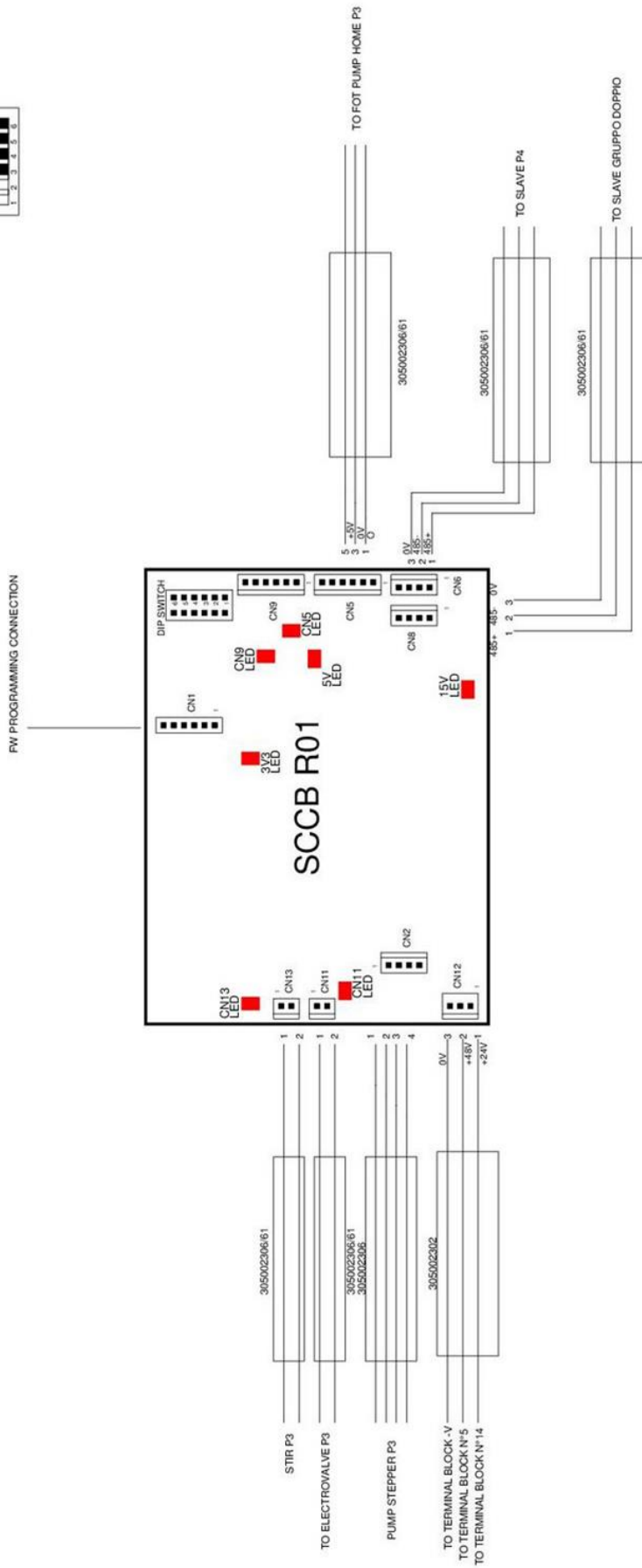
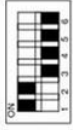
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2	10/2014	1.1	REVISION
3	10/2014	1.2	REVISION
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5	10/2014	1.4	REVISION
6	10/2014	1.5	REVISION
7	10/2014	1.6	REVISION
8	10/2014	1.7	REVISION
9	10/2014	1.8	REVISION
10	10/2014	1.9	REVISION
11	10/2014	2.0	REVISION

**alfa**  
 AUTOMATIKA 2023/23  
 ALFA INDUSTRIAL SYSTEMS  
 SLOVENSKO DRŽAVNO  
 PODJETJE  
 Ljubljana, Slovenija

Project Name: **COMMISSION PC LINUX**  
 Project No.: **ALFA-PC-LINUX-01**  
 Revision: **1**  
 Date: **10/2014**  
 Drawn by: **...**  
 Checked by: **...**  
 Approved by: **...**  
 Date: **...**

Sheet 3 of 13

# SLAVE PUMP 3



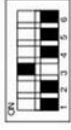
Rev. 10/2018

REVISIONI		AUTORE		APPROVATO	
Rev.	Descrizione	Rev.	Autore	Rev.	Approvato
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03	...	03	...	03	...
04	...	04	...	04	...
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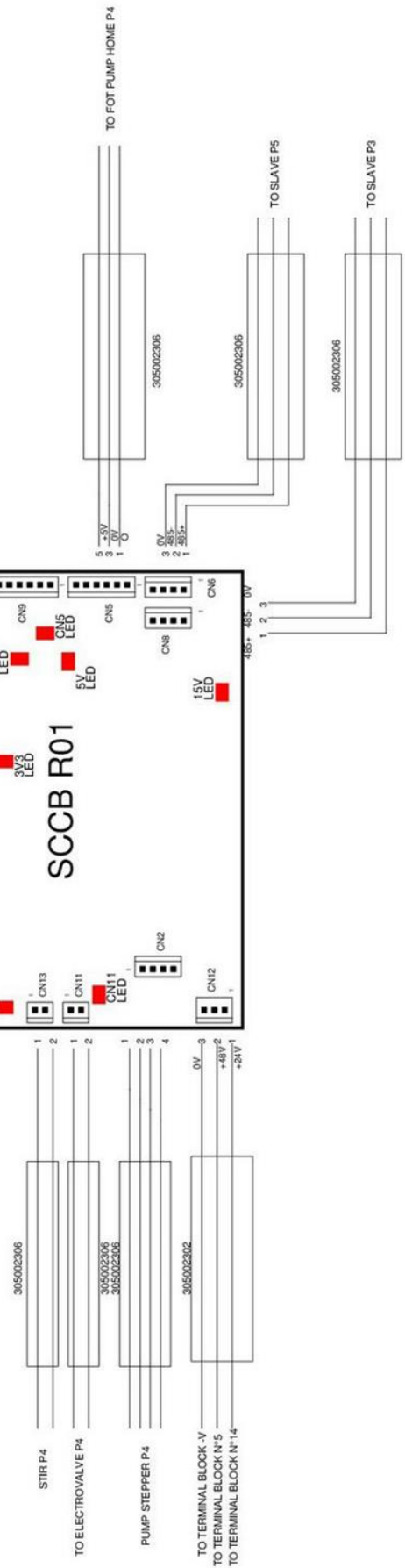
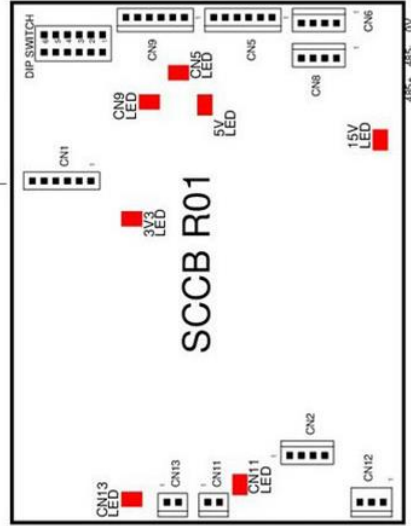
Disegnato: **CONNESSIONE SLAVE BASE 1**  
 Verificato: **SCHEMATICI**  
 Disegnato: **ALFA**  
 Verificato: **ALFA**

Sheet 5 of 13

# SLAVE PUMP 4



FW PROGRAMMING CONNECTION

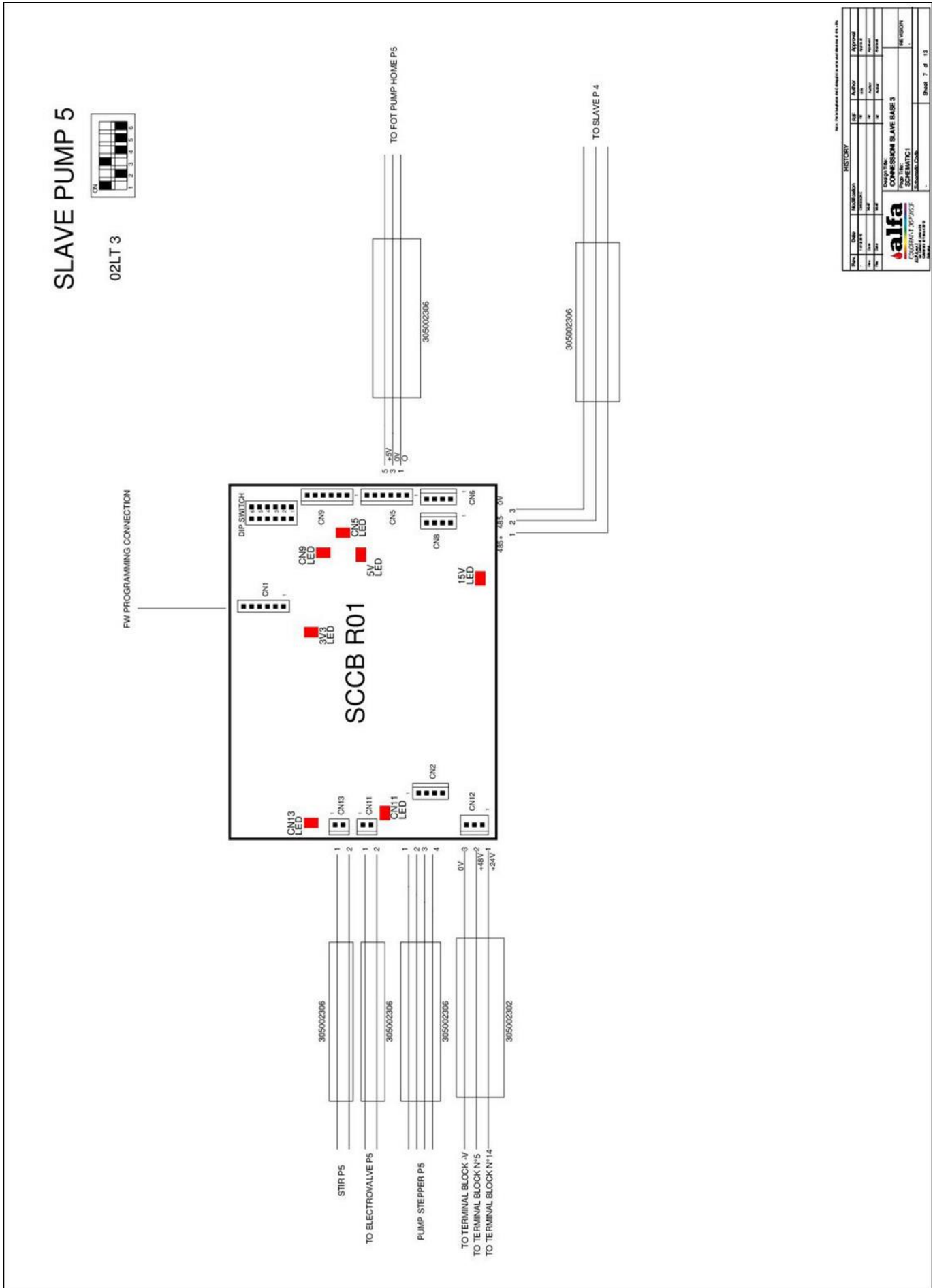


alfa  
COLORPAINT DISPENSER

REVISION	DESCRIPTION	DATE	BY	APPROVED
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3	...	...	...	...
4	...	...	...	...
5	...	...	...	...
6	...	...	...	...

SCCB R01  
COMMISSION SLAVE BASE 2

Sheet 6 of 13



See the legend and change in the manual for details.

DATE	OPERATION	DESCRIPTION	APPROVAL

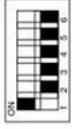
**alfa**  
COLORPAINT DISPENSER

Doc N°: 02LT 3  
 COMPONENT: SLAVE PUMP 5  
 CODE: 02LT 3  
 VERSION: ...

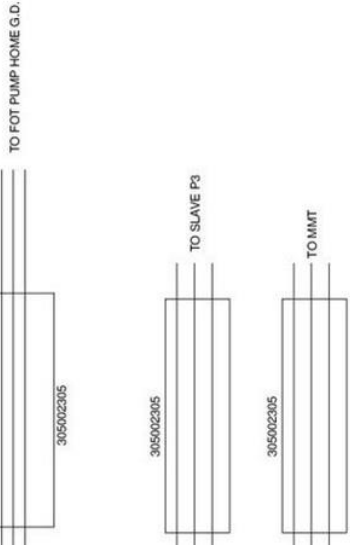
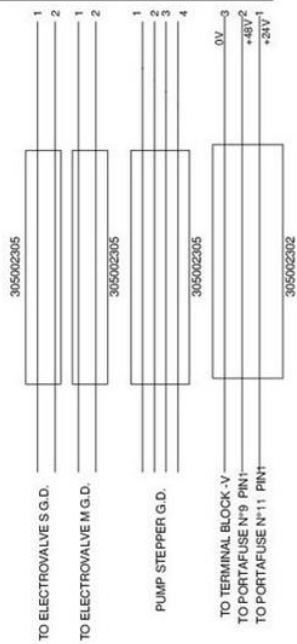
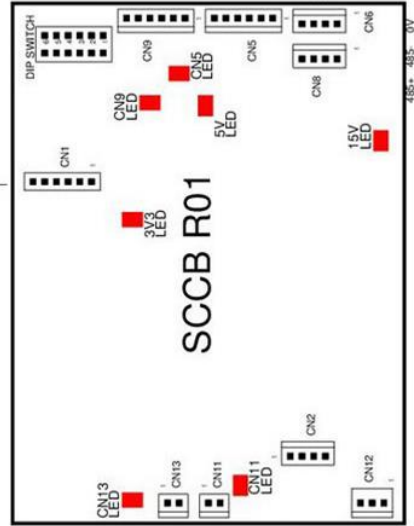
Sheet 7 of 13

# DOUBLE GROUP SLAVE

## DOUBLE GROUP

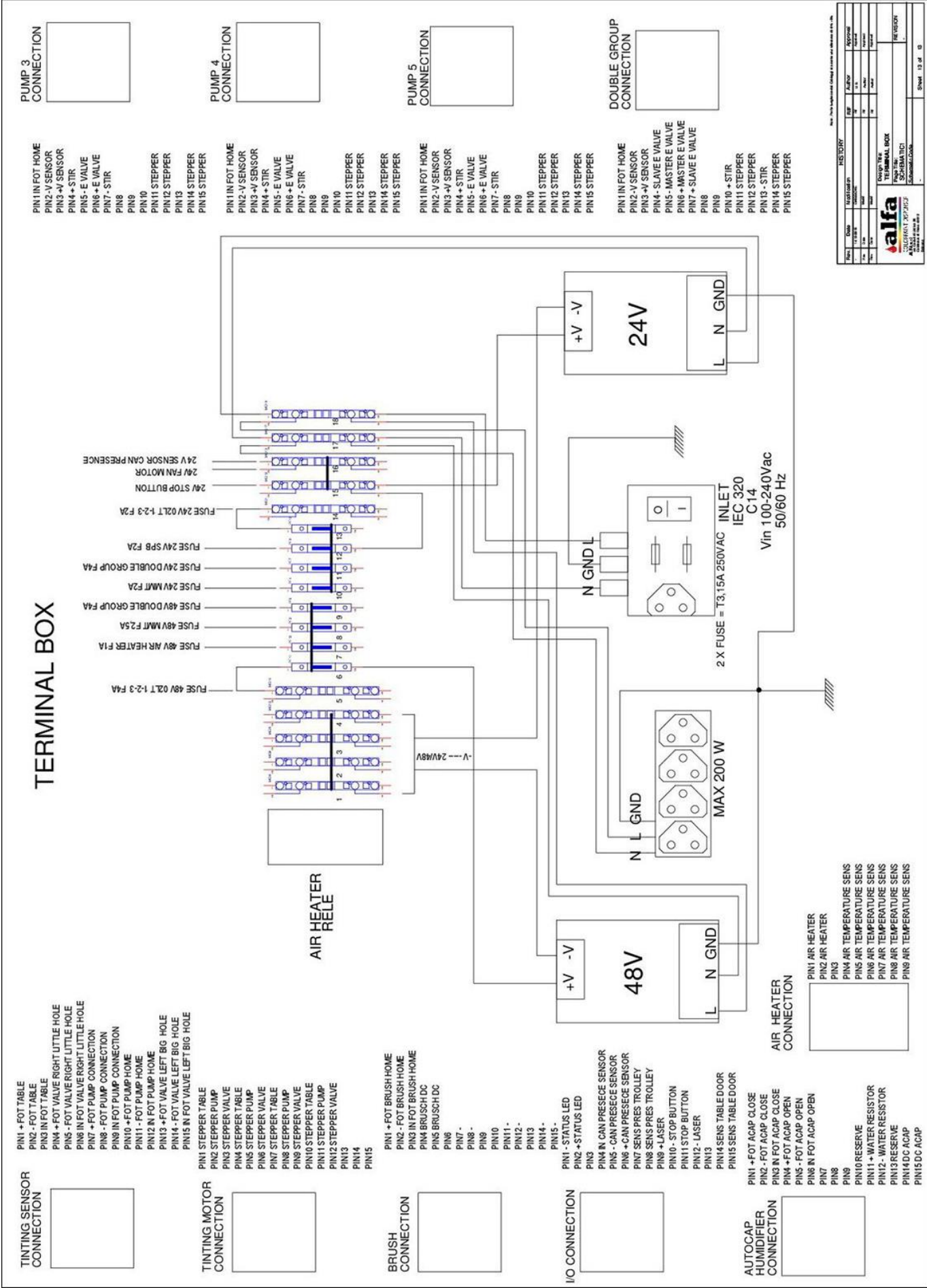


FW PROGRAMMING CONNECTION



alfa  
AUTOMATI 307302  
SISTEMI A PUMPARE

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99	14/11/2018	REP.	1.0	1
100	14/11/2018	REP.	1.0	1



## 8. TROUBLE SHOOTING

Error code	Error detected	Error description	Resolution of the problem
1	TIMERMG_TEST_FAILED	Timer operation test failure	Test failure means that the program on the MAB board has stopped working. Restart the program
2	EEPROM_COLOR_CIRC_PARAM_CRC_FAULT	Circuit parameter CRC fault	Check for the absence of parameters in the case of MAB replacement. Load the master/colorant circuit parameters onto the new MAB board
3	EEPROM_CALIB_CURVES_PARAM_CRC_FAULT	Calibration curve parameter CRC fault	Check for the absence of parameters in the case of MAB replacement. Load the calibration parameters onto the new MAB board
5	EEPROM_SLAVES_EN_PARAM_CRC_FAULT	Slave configuration CRC fault	Check for the absence of parameters in the case of MAB replacement. Load the SLAVE configurations onto the new MAB board
8	EEPROM_HUM_20_PARAM_CRC_FAULT	Humidifier 2.0 parameter CRC fault	Check for the absence of parameters in the case of MAB replacement. Load Humidifier 2.0 parameters onto the new MAB board
9	EEPROM_CIRCUIT_PUMP_TYPES_CRC_FAULT	For each circuit type pump CRC fault	Check for the absence of parameters in the case of MAB replacement. Load the types of pumps onto the new MAB board
10	USER_INTERRUPT	Machine operation Software interruption	HALT has been pressed
11-18	TIMEOUT_COM_MAB_ACT B"X", where "X" = 1..8	"X" BASE slave communication time-out (detected on the MAB side)	Check the SCCB power supply wiring and replace it if damaged. Check the RS485 communication connector, and visually check the board hardware. If damaged, replace the "X" BASE slave board
19-34	TIMEOUT_COM_MAB_ACT C"Y", where "Y" = 1..16	Slave "Y" COLORANT communication time-out (detected on the MAB side)	Check the SCCB power supply wiring and replace it if damaged. Check the RS485 communication connector, and visually check the board hardware. If damaged, replace the "Y" COLORANT slave board

Error code	Error detected	Error description	Resolution of the problem
51	AUTOCAP_IDX	Slave AUTOCAP communication time-out (detected on the MAB side)	Check the SCCB power supply wiring and replace it if damaged. Check the RS485 communication connector, and visually check the board hardware. If damaged, replace the AUTOCAP slave board
53	HUMIDIFIER_IDX	Slave HUMIDIFIER communication time-out (detected on the MAB side)	Check the HUTBRD power supply wiring and replace it if damaged. Check the RS485 communication connector, and visually check the board hardware. If damaged, replace the HUMIDIFIER slave board
54	TIMEOUT_COM_MAB_ACT_TINTING	TINTING slave communication time-out (detected on the MAB side)	Verify the MMT power supply wiring and replace it if damaged. Check the RS485 communication connector, and visually check the board hardware. If damaged, replace the TINTING Slave board
59	TIMEOUT_COM_MAB_MGB	MAB-MGB Communication time-out	Check MAB and MGB power supply wiring and replace it if damaged. Check the SERIAL communication connectors, and visually check the hardware of the 2 boards
61-68	B"X"_BASE_TOUT_ERROR, where "X" = 1..8	"X" BASE slave communication time-out (detected on the SLAVE side)	Check the SCCB power supply wiring and replace it if damaged. Check the RS485 communication connector, and visually check the board hardware. If damaged, replace the "X" BASE slave board
69-82	C"Y"_COLOR_TOUT_ERROR, where "Y" = 1..16	Slave "Y" COLORANT communication time-out (detected on the SLAVE side)	Check the SCCB power supply wiring and replace it if damaged. Check the RS485 communication connector, and visually check the board hardware. If damaged, replace the "Y" COLORANT slave board



Error code	Error detected	Error description	Resolution of the problem
101	AUTOCAP_TOUT_ERROR	AUTOCAP slave communication time-out (detected on the SLAVE side)	Check the SCCB power supply wiring and replace it if damaged. Check the RS485 communication connector, and visually check the board hardware. If damaged, replace the AUTOCAP slave board
102	HUMIDIFIER_20_TOUT_ERROR	HUMIDIFIER slave communication time-out (detected on the SLAVE side)	Check the HUTBRD power supply wiring and replace it if damaged. Check the RS485 communication connector, and visually check the board hardware. If damaged, replace the HUMIDIFIER slave board
103	TINTING_TOUT_ERROR	TINTING slave communication time-out (detected on the SLAVE side)	Verify the MMT power supply wiring and replace it if damaged. Check the RS485 communication connector, and visually check the board hardware. If damaged, replace the TINTING Slave board
201	RESET_TIMEOUT	RESET process time-out	The RESET process was NOT completed within the maximum set time. Check for a mechanical jam in the dispenser and eliminate it if possible
202	TIMEOUT_SUPPLY_START	Time-out at Dispensing start	Dispensing did NOT start within the maximum set time. Check for a mechanical jam in the dispenser and eliminate it if possible
203	TIMEOUT_SUPPLY_FAILED	Dispensing duration time-out	Dispensing did not end within the maximum set time. The formula is too long, or check for a mechanical jam in the dispenser and eliminate it if possible

Error code	Error detected	Error description	Resolution of the problem
230	AUTOCAP_HOME_POS_ERROR	Loss of steps: deviation upon the detection of slave AUTOCAP HOME position	<p>Verify the cleanliness of the mechanical parts and sensors, and remove any residues if necessary. Verify the integrity of the motor and replace it if deterioration is encountered. If any mechanical parts are damaged or jammed, remove or change the mechanical parts in question.</p> <p>Verify the electrical connections and change them if damaged. Check the photocell sensors and reposition them or change them if damaged.</p>
301-308	B"X"_BASE_RESET_ERROR, where "X" = 1..8	"X" BASE slave reset procedure duration time-out	<p>Verify the cleanliness and positioning of the photocell mounted on the "X" BASE, then clean or reattach the sensor. Verify the integrity of the "flag", the pusher, the motor, and the connectors, and replace the parts or the entire unit if any mechanical wear or damage is found. If the communication is present but an electronic type problem remains, replace the SCCB board.</p>
342	AUTOCAP_HOMING_ERROR	Loss of steps: deviation upon the detection of slave AUTOCAP HOME position	<p>Verify the cleanliness of the mechanical parts and sensors, and remove any residues if necessary. Verify the integrity of the motor and replace it if deterioration is encountered. If any mechanical parts are damaged or jammed, remove or change the mechanical parts in question.</p> <p>Verify the electrical connections and change them if damaged. Check the photocell sensors and reposition them or change them if damaged.</p>
346	TINTING_PUMP_RESET_ERROR	Tinting Pump reset procedure duration time-out	<p>Verify the integrity of the Pump motor, of connectors, the connection on the MMT board</p>
347	TINTING_VALVE_RESET_ERROR	Tinting Valve reset procedure duration time-out	<p>Verify the integrity of the Valve motor, of connectors, the connection on the MMT board</p>

Error code	Error detected	Error description	Resolution of the problem
348	TINTING_TABLE_RESET_ERROR	Tinting Table reset procedure duration time-out	Verify the integrity of the Table motor, of connectors, the connection on the MMT board
351-358	B"X"_DATA_SUPPLY_FAILED, where "X" = 1..8	Invalid table parameters	Check for consistency errors between the tables and the circuit installed on the machine. Verify the proper installation of the calibration tables in the Machine menu.
359-374	C"X"_DATA_SUPPLY_FAILED, where "X" = 1..16	Invalid table parameters	Check for consistency errors between the tables and the circuit installed on the machine. Verify the proper installation of the calibration tables in the Machine menu.
401-408	B"X"_SUPPLY_CALC_ERROR, where "X" = 1..8	In CONTINUOUS dispensing the Number of steps of the "X" BASE to carry out is NOT a multiple of a whole stroke	Check for consistency errors between the tables and the circuit installed on the machine. Verify the proper installation of the calibration tables in the Machine menu.
409-424	C"X"_SUPPLY_CALC_ERROR, where "X" = 1..16	In CONTINUOUS dispensing the Number of steps of the "X" COLORANT to carry out is NOT a multiple of a whole stroke	Check for consistency errors between the tables and the circuit installed on the machine. Verify the proper installation of the calibration tables in the Machine menu.
451-475	DISABLED_REQUIRED_CIRCUIT_"X"_ERROR, where "X" = 0..24	"X" Slave must dispense but is erroneously Disabled	Load the Slave configurations onto the new MAB board.
501-508	B"X"_COLOR_HOME_POS_ERROR, where "X"=1..8	Error in the HOMING procedure of the "X" BASE	Check the correct operation of the photocell and the correct movement of the "X" BASE stepper
534	TINTING_VALVE_HOME_POS_ERROR	Error in the HOMING procedure of the Tinting Valve	Verify the correct operation of the 2 photocells and the correct movement of the stepper
535	TINTING_TABLE_HOME_POS_ERROR	Error in the HOMING procedure of the Tinting Turning Table	Verify the correct operation of the photocell, that there is at least one flag on the table and the correct movement of the stepper
551-558	B"X"_COLOR_HOME_BACK_ERROR, where "X" = 1..8	Loss of steps error in "X" BASE Dispensing	Decrease the dispensing speed
601-608	B"X"_COLOR_POS0_READ_LIGHT_ERROR, where "X" = 1..8	At the end of the movement from HOME position to POS0 the photocell is NOT engaged in the "X" BASE	Check photocell and stepper operation

Error code	Error detected	Error description	Resolution of the problem
633	TINTING_PUMP_POS0_READ_LIGHT_ERROR	Tinting Pump Home photocell NOT engaged at the end of pump step movement, or never engaged within an undefined time or number of steps, or NOT engaged during Tinting Table movement	Check Home photocell and Stepper operation
634	TINTING_VALVE_POS0_READ_LIGHT_ERROR	No. 2 Valve photocells NOT engaged during Tinting Table movement or at the end of Homing procedure, or CLOSED valve during Dispensing	Verify operation of the 2 photocells and stepper
651-658	B"X"_COLOR_END_STROKE_READ_DARK_ERROR, where "X" = 1..8	At the end of the dosing stroke the photocell is engaged in "X" BASE	Check photocell and stepper operation
701-708	B_"X"_OVERCURRENT_ERROR, where "X" = 1..8	"X" BASE stepper motor overcurrent	Check wirings, stepper operation
733	TINTING_PUMP_OVERCURRENT_ERROR	Overcurrent on a Tinting Pump stepper motor driver jumper	Verify wirings and operation of Pump L6482H driver on MMT board
734	TINTING_VALVE_OVERCURRENT_ERROR	Overcurrent on a Tinting Valve stepper motor driver jumper	Verify wirings and operation of Valve L6482H driver on MMT board
735	TINTING_TABLE_OVERCURRENT_ERROR	Overcurrent on a Tinting Table stepper motor driver jumper	Verify wirings and operation of Table L6482H driver on MMT board
751-758	B"X"_SOFTWARE_ERROR, where "X" = 1..8	Logic error in the process statuses on "X" BASE	Replace electronic board, if the problem persists request a Firmware update
759-774	C"X"_SOFTWARE_ERROR, where "X" = 1..16	Logic error in the process statuses on "X" COLORANT	Replace electronic board, if the problem persists request a Firmware update
791	AUTOCAP_SOFTWARE_ERROR	Logic error in the process statuses on AUTOCAP	Replace electronic board, if the problem persists request a Firmware update
792	TINTING_PUMP_SOFTWARE_ERROR	Logic error in the Tinting Pump process statuses (including the Valve)	Replace the MMT electronic board, if the problem persists request a Tinting Firmware update
793	TINTING_TABLE_SOFTWARE_ERROR	Logic error in the Tinting Table process statuses	Replace the MMT electronic board, if the problem persists request a Tinting Firmware update
801-808	B"X"_COLOR_DRV_OVER_CURR_TEMP_ERROR, where "X" = 1..8	"X" BASE Stepper motor overtemperature	Check wirings, stepper operation
841	AUTOCAP_DRV_OVER_CURR_TEMP_ERROR	AUTOCAP Stepper motor overtemperature	Check wirings, stepper operation

Error code	Error detected	Error description	Resolution of the problem
851-858	B"X_COLOR_OPEN_LOAD_ERROR, where "X" = 1..8	Load missing in "X" BASE Stepper	Check wirings, stepper operation
891	AUTOCAP_OPEN_LOAD_ERR	Load missing in AUTOCAP Stepper	Check wirings, stepper operation
895	TOO_LOW_WATER_LEVEL	Insufficient Water level in Humidifier tank	Refill Water in the tank. If the problem persists, check connection of the level sensor to the board that manages it
896	HUMIDIFIER_20_PARAM_ERROR	Error in Humidifier 2.0 parameters reception	Check the correctness of parameters sent. The duration of Pump and Heater activation must NEVER be greater than Period
898	TEMPERATURE_ERROR	Error in Temperature measurement	Check connection of T/H Sensor housing board with HUTBRD board. Check that T/H sensor is not wet. If the problem persists, replace the board and/or the connection cable
899	TEMPERATURE_TOO_LOW	Temperature on board the machine too Low	Check Heater operation
907	TINTING_TIMEOUT_TABLE_MOVE_ERROR	Timeout expired during Tinting Table Homing, or in positioning to one circuit	Verify Tinting Table stepper motor wirings, the Table characteristic parameters sent to the Tinting and operation of Table photocell
908	TINTING_TABLE_SEARCH_POSITION_REFERENCE_ERROR	The reference mark found in the Tinting Table Homing differs from the theoretical value set by a quantity in steps greater than the tolerance set	Verify that there is a reference mark on the Tinting Table, that the Table characteristic parameters sent to the Tinting are correct and operation of Table photocell
909	TINTING_LACK_OF_CIRCUITS_POSITION_ERROR	Absence of the circuit positional table at the beginning of a Tinting Table positioning	The self-learning procedure has not been completed correctly, or has never been carried out
911	TINTING_SELF_LEARNING_PROCEDURE_ERROR	Error in the Self-learning procedure of the Tilting Table: at the start the Table is not on the Reference mark, or the Table photocell is not engaged, or the number of circuits found is > 16, or the number of circuits found in one rotation direction is different from the other	A Reset must be successfully completed before performing Self Learning. Check Tinting Table photocell operation

Error code	Error detected	Error description	Resolution of the problem
912	TINTING_BAD_PUMP_PARAM_ERROR	No response within the timeout set when the Pump parameter setting command is sent to Tinting, or when the Tinting Pump characteristic parameters are incorrect	Check 485 MAB- Tinting connections. Verify the set parameters and send the command to set the Pump parameters again
913	TINTING_BAD_TABLE_PARAM_ERROR	No response within the timeout set when the Table parameter setting command is sent to Tinting, or when the Tinting Table characteristic parameters are incorrect	Check 485 MAB- Tinting connections. Verify the set parameters and send the command to set the Table parameters again
914	EEPROM_PUMP_PARAM_CRC_FAULT	Tinting Pump parameter CRC fault	Check for the absence of parameters in the case of MAB replacement. Load the Tinting Pump parameters onto the new MAB board
915	EEPROM_TABLE_PARAM_CRC_FAULT	Tinting table parameter CRC fault	Check for the absence of parameters in the case of MAB replacement. Load Tinting Turning Table parameters onto the new MAB board
916	TINTING_BAD_PERIPH_PARAM_ERROR	No response within the timeout set when the Peripheral units setting command is sent to Tinting, or when the command parameters are incorrect	Check 485 MAB- Tinting connections. Verify the set parameters and send the command to set the Peripheral units again
918	TINTING_PUMP_PHOTO_HOME_READ_DARK_ERROR_ST	The Tinting Pump Home photocell is engaged while it should not be engaged	Verify pump home photocell and Tinting stepper operation
919	TINTING_PUMP_PHOTO_INGR_READ_LIGHT_ERROR	Tinting Pump Coupling photocell is in a wrong state: engaged while it should not be engaged or vice-versa.	Verify Pump and Tinting Stepper coupling photocell operation. Verify the Pump characteristic parameters sent to the Tinting

Error code	Error detected	Error description	Resolution of the problem
920	TINTING_TABLE_TEST_ERROR	Tinting Table test failed: the starting position is NOT on the reference mark, or no circuit has been detected, or the number of detected circuits is > 16, or the position of at least one detected circuit in one direction differs from that in the opposite direction by a quantity in steps > of the set threshold, or the position of at least one detected circuit differs from that obtained in the Self Learning of a quantity > of the set threshold, or the map of detected circuits differs from that configured by software	Perform a Reset and try the Table Test again, verify the operation of the Tinting Table photocell, check the consistency between the circuits present on the Table and those configured in the software, try again to perform Self Learning, increase the tolerance on the positions of the Table by sending the Table Parameter configuration command again
922	TINTING_BASES_CARRIAGE_ERROR	Base carriage off-position when the machine is NOT in Diagnostic mode	Replace the carriage into its position. Verify carriage microswitch wiring on Tinting board
923	TINTING_PANEL_TABLE_ERROR	Open panel for Refill on the Tinting Table when the machine is NOT in Diagnostic mode, or it is in Diagnostic mode and you want to activate operations involving the movement of something that is NOT the Rotation of the Tinting Table	Close the panel. Verify the Tinting board panel microswitch wiring
926	TINTING_HEATER_OPEN_LOAD_ERROR	No load at CN4 output reserved to water heating Resistance on MMT board	Verify the connections and wiring of the Heating Resistance on the MMT board
927	TINTING_HEATER_OVERCURRENT_THERMAL_ERROR	Current circulating in the water heating resistance is higher than the threshold set in the MMT board driver, or overtemperature detected on the driver	Verify the connections and wiring of the Heating Resistance on the MMT board
934	TINTING_PUMP_MOTOR_THERMAL_SHUTDOWN_ERROR	Tinting Pump stepper motor controller internal overtemperature	Shut off the machine, wait some minutes and turn in on again. If the problem persists, verify the electric connections with the Pump stepper motor. If the problem persists, replace the MMT board

Error code	Error detected	Error description	Resolution of the problem
935	TINTING_VALVE_MOTOR_THERMAL_SHUTDOWN_ERROR	Tinting Valve stepper motor controller internal overtemperature	Shut off the machine, wait some minutes and turn in on again. If the problem persists, verify the electric connections with the Valve stepper motor. If the problem persists, replace the MMT board
936	TINTING_TABLE_MOTOR_THERMAL_SHUTDOWN_ERROR	Tinting Table stepper motor controller internal overtemperature	Shut off the machine, wait some minutes and turn in on again. If the problem persists, verify the electric connections with the Table stepper motor. If the problem persists, replace the MMT board
937	TINTING_PUMP_MOTOR_UNDER_VOLTAGE_ERROR	Tinting Pump stepper motor controller gate control voltage too low	Verify the electric connections with the Pump stepper motor. If the problem persists, replace the MMT board
938	TINTING_VALVE_MOTOR_UNDER_VOLTAGE_ERROR	Tinting Valve stepper motor controller gate control voltage too low	Verify the electric connections with the Valve stepper motor. If the problem persists, replace the MMT board
939	TINTING_TABLE_MOTOR_UNDER_VOLTAGE_ERROR	Tinting Table stepper motor controller gate control voltage too low	Verify the electric connections with the Table stepper motor. If the problem persists, replace the MMT board
940	EEPROM_TINTING_COLORANTS_STEPS_POSITION_CRC_FAULT	CRC fault of positional table of the circuits on the Tinting Table stored on the MMT board EEPROM	Perform Tinting Table Self-Learning. If the problem persists, replace the MMT board



Error code	Error detected	Error description	Resolution of the problem
984-1007	C"X"_TURN_TABLE_MISMATCH_POSIT ION_ERROR, where "X" = 1..24	The circuits detected at the end of the Tinting Table Homing do not coincide with those found by the Self-Learning and stored in the MMT board EEPROM, or the positional tables of at least one circuit found in the two directions by the Self-Learning differ by a quantity in steps > of the tolerance set in the Table parameter configuration command, or the positional table of at least one circuit found by the Self-Learning differs from the theoretical value of a quantity in steps > of the tolerance set in the Table parameter configuration command, or incorrect matching between the positional table found in the Self-Learning and the colorant configuration set in the software	Verify Tinting Table photocell operation. Repeat Self-Learning, verify that the circuits physically present on the Table coincide with those set in the software configuration page, increase the Tolerance on the positions of the circuits and postpone the Tinting Table parameter setting command
1000	SCALE NOT RESPONDING	The scale is not connected to the machine	Connect a scale to calibrate it, or disable the scale Device within machine configuration in Admin mode



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