



User manual

Control module MCR

Operator Manual

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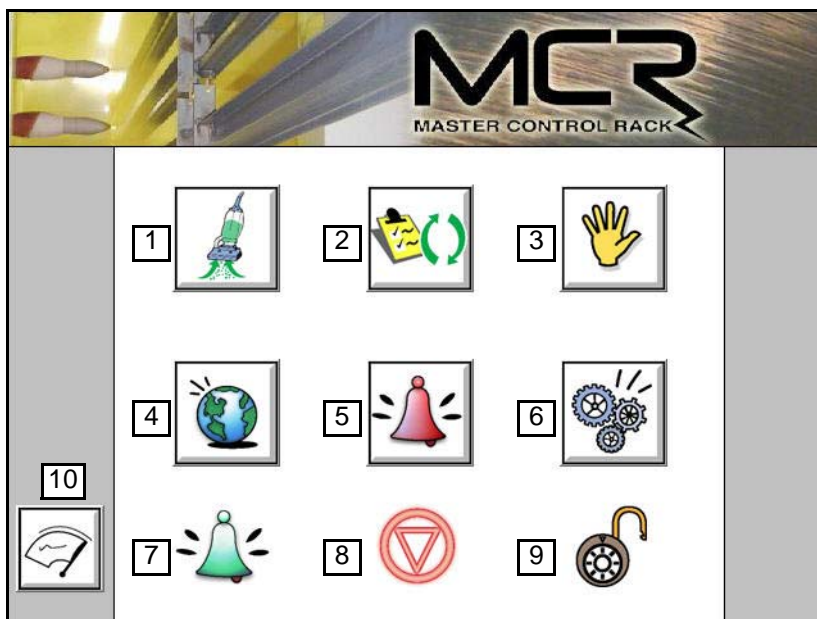
Control module MCR

Operator Manual

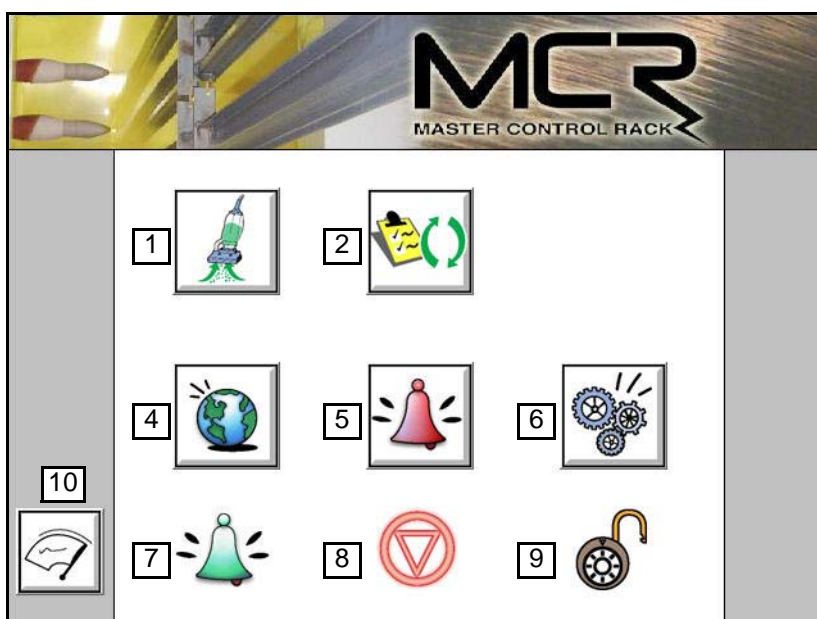
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1. Main Menu

RFV version :






Robotic version:







- 1 Cleaning Mode :
Allows access to the functions and settings of the cleaning operations.
- 2 Automatic mode :
Allows access to the functions of operation of the system in automatic mode, and to the spraying tables.
- 3 Manual mode : (not available on robotic version)
Allows access to the functions of operation of the system in manual mode.
- 4 Language :
Allows the customer to choose his language
- 5 Faults and Uptime :
Allows to check on, and reset, the faults of the system, and to view its uptime
- 6 Settings:
Allows to enter the spraying settings in the system and in its environment.



7 Faults visualisation:

- The system is at fault, the symbol is red 
- Some checks need to be done, the symbol is yellow 
- No fault, the symbol is green 

8 System operating status:

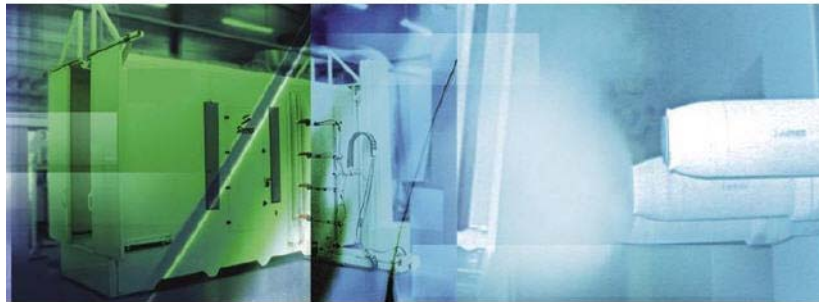
- The system is stopped, the manual and automatic functions have no bearing on the operation (Stop mode). 
- The system is operating automatically via orders inputted manually by the operator (Manual mode) . 
- The system is operating automatically without operator input (Automatic mode). 
- The system is operating automatically, carrying out the cleaning orders inputted by the operator (Cleaning mode) . 

9 Settings mode status:

- Access to the settings menu is locked with a password. This is to avoid any unwanted modification to the settings of the system. 
- Access to the settings menu is possible. 

10 Screen cleaning:

Pushing this key deactivates the touch-screen function, to avoid any unwanted operation of the system resulting from the cleaning of the screen.



One can clean the screen as long as the barcode is showing.

2. Language



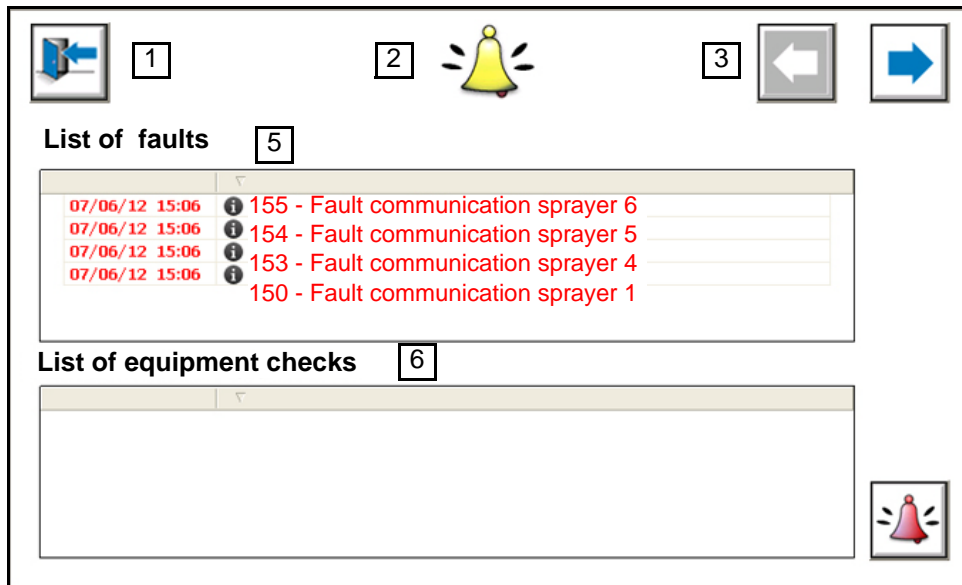
Available languages:

- 1 : Return to main.
- 2 : Symbol for sub-menu "language", allows to find the correct sub menu.
- 3 : Displays the language selected by the operator.
- 4 : Chooses the language by pressing the key.

	French			Greek
	English			Polish
	Spanish			Czech
	Portugese			Turkish
	German			Arabic
	Italian			Russian
	Dutch			Chinese
	Hungary			

3. Faults Menu

3.1. Faults : Display and reset of faults



1 : Return to main screen.

2 : Symbol indicating the "Faults" sub-menu, allows to navigate in the sub-menus.

3 : Arrow keys allow to navigate in the sub menus.
The left arrow key (greyish) is inactive in this screen.
The right key when pushed, accesses the uptime screen.

4 : Fault reset key.
One push on the key resets the faults, if the conditions which triggered them have been cancelled.
This key also resets a check, if its time left has become shorter than the entire time allotted for this particular check. (Case of resetting a counter).

5 : List of on-going faults.
A fault will be displayed if an operation defined as not normal shows up in the system.
See the list of possible faults in the chart below.

6 : List of on-going checks.
A check is shown if the time for a component requiring maintenance has been in use, exceeds that allowed by the system.
See the list of possible checks in the chart below.

List of possible faults	Diagnosis
100 / Sprayer fault 1 .. 123 / Sprayer fault 24	Locking fault on the CRN or TCR modules -> See the fault on the screen of the CRN or TCR modules, (See the user manual of the CRN or TCR). Warning: Once the problem is taken care of, reset the fault via the MCR module (case of a non locking fault) or turn off power to the faulty module (case of a locking fault).
150 / Fault sprayer communication 1 .. 173 / Fault sprayer communication 24	Detection of a communication error during the transmission of the signals between the MCR and the CRN module or the TCR -> Check the serial link wiring. Check that the CRN and TCR modules are powered up. Check the configuration of the serial link of the CRN,TCR or MCR modules.
2/ External fault	The information "Conveyor ON" is not activated on the MCR after requesting conveyor authorisation -> Check that the signal coming from the customer cabinet is wired correctly -> Check or adjust the parameter "inversion status conveyor signal" in the MCR
3/ Conveyor fault	The information "Conveyor ON" is not activated on the MCR after requesting conveyor authorization. -> Check that the signal coming from the customer cabinet is wired correctly. -> Check or adjust the parameter "inversion" status conveyor signal" in the MCR.
4/ Conveyor pulse fault	No conveyor pulse on the MCR after requesting conveyor authorization and activating the information "Conveyor ON". -> Check the wiring of the encoder -> Check the resolution of the encoder.
5/ Booth not ready fault (no ventilation)	The information "booth not ready" is missing on the MCR -> Check that the signal coming from the customer cabinet is wired correctly -> Check or adjust the parameter "inversion status booth not ready" in the MCR
6/ Powder level lower than the low level	The information "powder level upper to the mini." is missing on the MCR -> Check that the signal coming from the customer cabinet is wired correctly -> Check or adjust the parameter "inversion powder level" in the MCR

List of possible faults	Diagnosis
30/ Fault beam cell 1 31/ Fault beam cell 2 32/ Fault beam cell 3 33/ Fault beam cell 4 34/ Fault beam cell 5 35/ Fault beam cell 6	Fault related to the up/down detection cells which show as having their beam permanently broken. The information is not activated in the MCR. -> Check the wiring of the cells to the MCR. -> Check the alignment of the cells. -> Check the cleanliness of the cells .
40/ Fault beam cell 11 41/ Fault beam cell 12 42/ Fault beam cell 13 43/ Fault beam cell 14	Fault related to the left in/out detection cell. The cell shows as having their beam permanently broken. The information is not activated in the MCR. -> Check the wiring of the cell to the MCR. -> Check the alignment of the cell. -> Check the cleanliness of the cell.
45/ Fault beam cell 21 46/ Fault beam cell 22 47/ Fault beam cell 23 48/ Fault beam cell 24	Fault related to the right in/out detection cell. The cell shows as having their beam permanently broken. The information is not activated in the MCR. -> Check the wiring of the cell to the MCR. -> Check the alignment of the cell. -> Check the cleanliness of the cell.
10/ Fault module 1 not powered up 20/ Fault module 2 not powered up	Locking fault on the VCR variator module. -> Check that the variator module is powered up. -> Check the wiring, particularly the E-stop bypass, and the motor thermal probe. -> Check that while disconnected, the variator module is not actually activated in the control module MCR.
11/ Fault variator axis 1 module 1 12/ Fault variator axis 2 module 1 21/ Fault variator axis 1 module 2 22/ Fault variator axis 2 module 2	Locking fault on the VCR variator module. One of the variators is faulty . -> See the type of fault on the screen of the variator (see the variator instructions manual).
13/ Regulation fault axis 1 module 1 14/ Regulation fault axis 2 module 1 23/ Regulation fault axis 1 module 2 24/ Regulation fault axis 2 module 2	The actual motion of this axis does not match the motion intended by the software of the PLC. -> Check the wiring of the potentiometer. -> Check that the variator module is not activated while disconnected.
15/ Calibration fault axis 1 module 1 16/ Calibration fault axis 2 module 1 25/ Calibration fault axis 1 module 2 26/ Calibration fault axis 2 module 2	The calibration procedure did not unfold correctly, the values expected by the PLC software are not coherent. -> Check the wiring of the potentiometer. -> Check that distances values are correct (min<max).

List of possible checks	Diagnosis
125/ check gun electrode wear 1 .. 148/ check gun electrode wear 24	Non locking alarm -> The gun uptime exceeds the maximum determined in the parameters of the MCR. Carry out gun maintenance and reset the uptime counter.
175/ Check wear powder hose gun 1 .. 198/ Check wear powder hose gun 24	Non locking alarm ->The gun uptime exceeds the maximum determined in the parameters of the MCR. Carry out hose maintenance and reset the uptime counter.
50/ Check up/down motion reciprocator 1 51/ Check in/out motion reciprocator 1 52/ Check up/down motion reciprocator 2 53/ Check in/out motion reciprocator 2	Non locking alarm -> The reciprocator uptime exceeds the maximum determined in the parameters of the MCR. Carry out reciprocator maintenance and reset the uptime counter. See RFV reciprocator Instructions manual.
55/ Forcing on-going spraying	Non locking alarm -> Indicates that the guns forcing key remained engaged in the automatic mode screen. Disengage the forcing in the automatic mode screen.
56/ Forcing on-going output	Non locking alarm -> Indicates that one or more PLC outputs remained engaged in the setting mode . Disengage the forcing(s) in the setting mode screen.
57/ Forcing on-going input	Non locking alarm -> Indicates that one or more PLC inputs remained engaged in the setting mode screen. Disengage the forcing(s) in the setting mode screen.

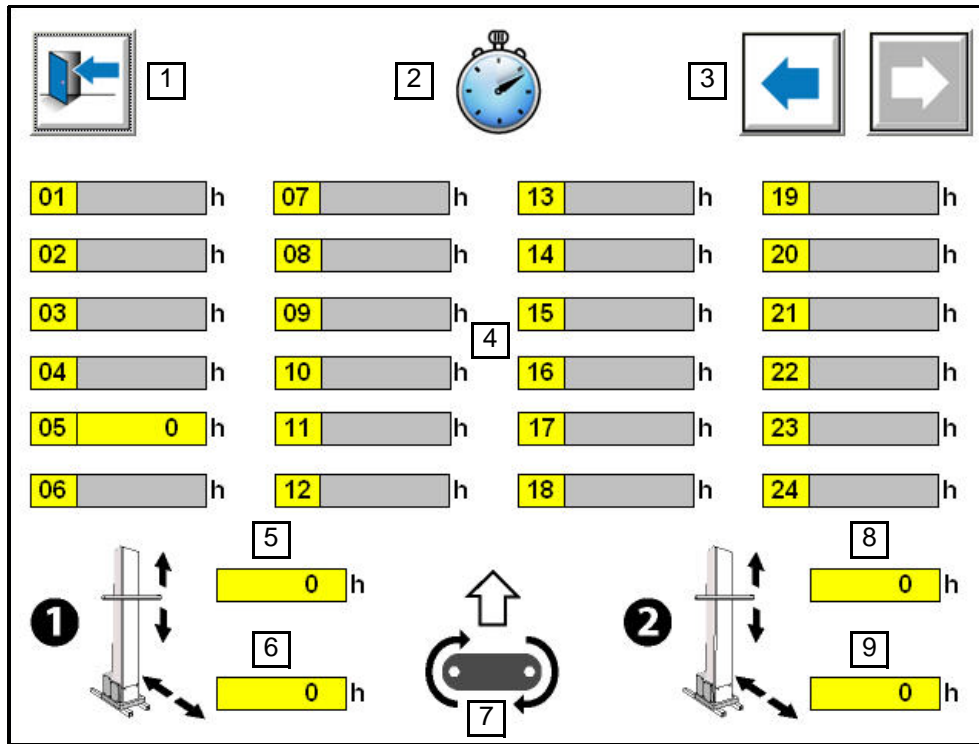
Robotic version: if a CRN 457 or TCR module is faulty, the conveyor authorization signal will be deactivated.

The robot will have to stop its trajectory.

The trajectory and spraying will restart as soon as the fault signal is restored to the initial state.

3.2. Faults : uptime

This screen is not for the robotic version.



1 : Return to main screen.

2 : Symbol indicating the sub-menu "Uptime". Allows scrolling through the sub-menus.

3 : Arrow keys allow scrolling through the sub-menus.

The left key accesses the "Faults" screen.

The right key (greyish) is inactive for being the last screen of the sub-menus.

4 : Number of hours of spraying time per gun. The number in the box is that of the gun. The counter is actuated by the triggering of the gun.

5 : Number of hours of operation of the up/down axis of reciprocator Nbr 1.

The counter is actuated by the return to the potentiometer.

6 : Number of hours of operation of the in/out axis of reciprocator Nbr 1.

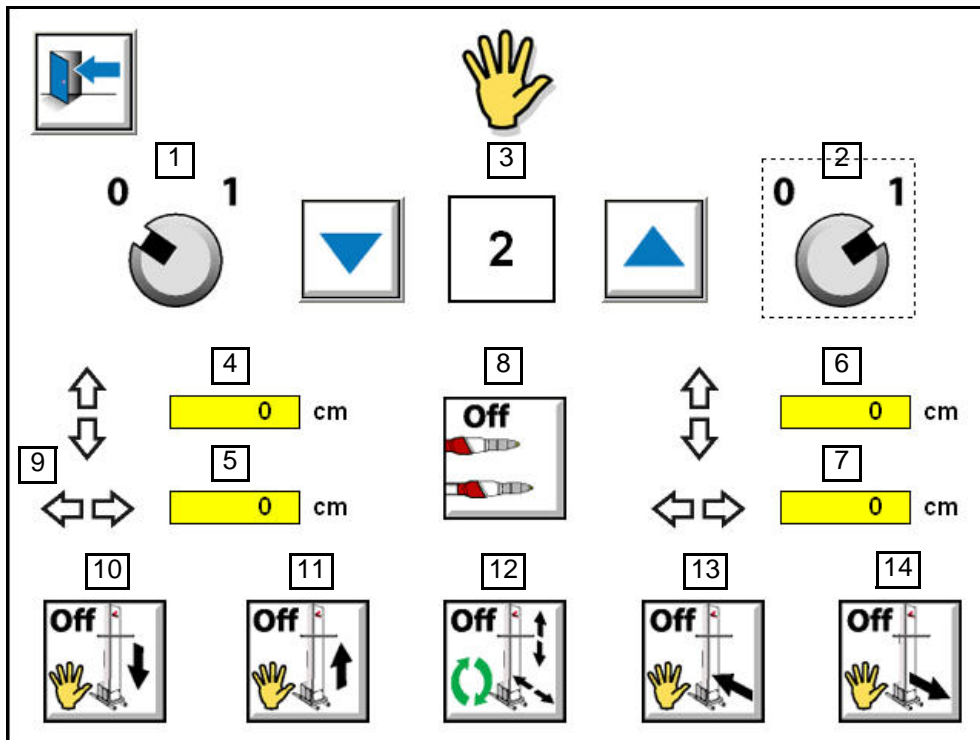
7 : Direction of the conveyor to facilitate laying out the reciprocators and guns numbers in the system.

8 : Number of hours of operation of the up/down axis of reciprocator Nbr 2.

9 : Number of hours of operation of the in/out axis of reciprocator Nbr 2.

4. Manual Mode

This screen is not for the robotic version.



- 1 : Selection of reciprocator Nbr 1 in manual mode.
 When the key is on 1, the manual mode is activated.
 Enables all manual functions on selected reciprocator.
 When the manual mode is inactive, and the automatic and cleaning modes as well, the system puts itself automatically in the stop mode.



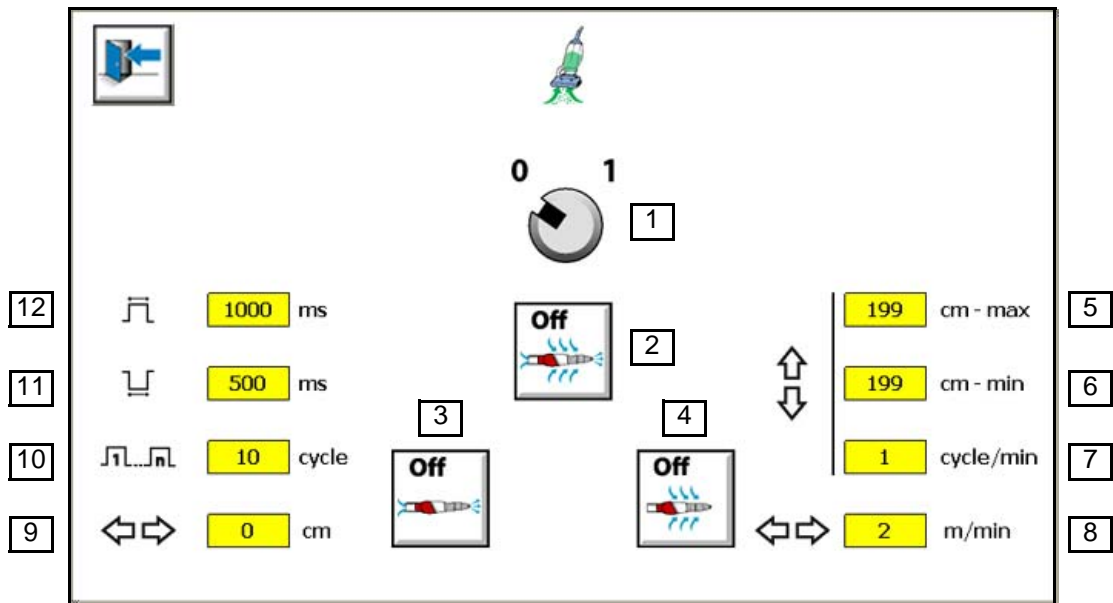
WARNING : The manual mode cannot be engaged while the automatic mode is operating.

- 2 : Selection of reciprocator Nbr 2 in manual mode.
 See point 1.
- 3 : Selection of the spraying table number in manual mode .
 The key with the arrow pointing downward permits to decrement the table number, the key with the arrow upward will increment the table number.
 Otherwise pressing on the number of the table creates a keyboard for the seizure.
 Keys 8 and 12 command the spraying tables functions.
- 4 : Display of the potentiometer return value, in cm , reciprocator 1, up/down axis .
 Compares the actual position of the reciprocator with that called for by the PLC ([see § 7.3 page 30](#)) and permits to check the return signal given by the potentiometer of the reciprocator.
- 5 : Display of the potentiometer return value, in cm , reciprocator 1, in/out axis .
 See point 4.

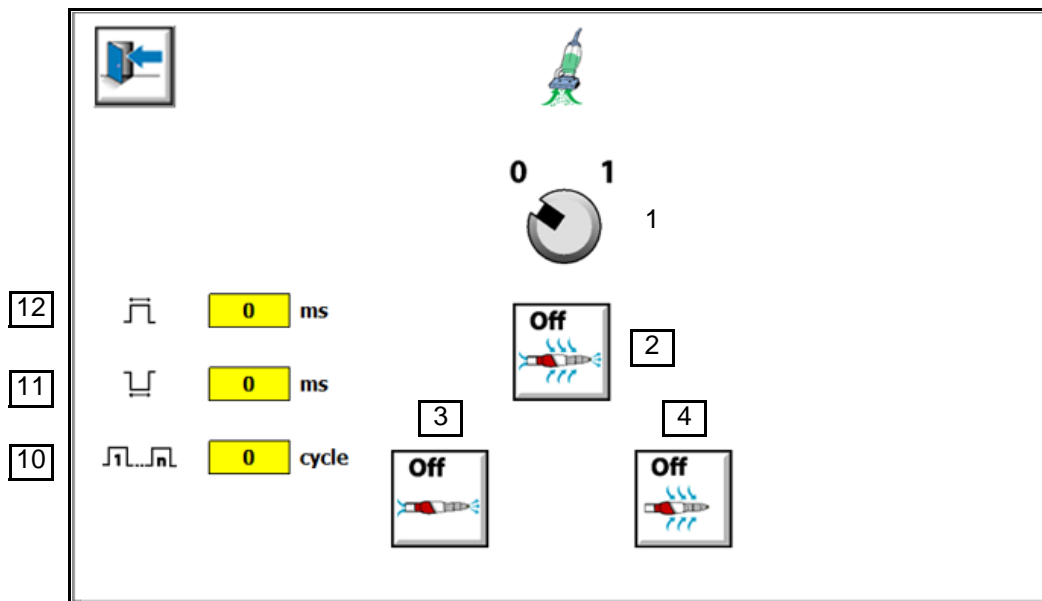
- 6 : Display of the potentiometer return value, in cm, up/down axis, reciprocator Nbr 2.
See point 4.
- 7 : Display of the potentiometer return value , in cm, in/out axis, reciprocator Nbr 2 .
See point 4.
- 8 : Triggers the spraying in semi-automatic mode, and applies the settings entered in the selected spray table (Nbr 3) for selected reciprocators.
One push on the key triggers spraying.
To stop spraying, push the key again.
- 9 : Shows the motions of the reciprocator.
The 2 vertical arrows symbolise the up/down motion.
The 2 horizontal arrows symbolise the in/out motion.
- 10 : Starts the up/down motion downward on selected reciprocator.s
Permits to move the reciprocators downward manually.
Pressing the key moves the reciprocators at reduced speed.
To stop the motion, press the key again.
- 11: Starts the up/down motion upward on selected reciprocators
Permits to move the reciprocators upward manually.
Pressing the key moves the reciprocator at reduced speed.
To stop the motion, press the key again.
- 12: Starts both up/down and in/out motions in semi-automatic mode, and applies the settings entered in the selected spraying table (Nbr 3), on selected reciprocators.
Pressing the key moves the reciprocator at reduced speed
To stop the motion, press the key again.
- 13: Starts the in/out motion toward the outside of the booth on selected reciprocators.
Permits to move the reciprocators backward manually
Pressing the key continually moves the reciprocator at reduced speed.
To stop the motion, press the key again..
- 14: Starts the in/out motion toward the inside of the booth on selected reciprocators.
Permits to move the reciprocators forward manually
Pressing the key continually moves the reciprocator at reduced speed.
To stop the motion, press the key again.

5. Cleaning Mode

RFV version :



Robotic Version:



1 : Selection of cleaning mode.

When the key is on 1, the cleaning mode is engaged.

Allows all cleaning steps to be carried out for selected reciprocator. The cleaning mode may be engaged from either manual or automatic modes.



WARNING : The cleaning mode may only be engaged while the manual or automatic modes are active. At the end of the cleaning cycle, the cleaning mode is automatically de-activated, and the system goes to stop mode.

2 : Starts the interior and exterior cleaning cycles on reciprocator.
The interior cycle is first, then the exterior. To start another cycle, one must wait until completion of the on-going cycle.

Implementation of interior and exterior blow-off cycles:

- 1/ Reciprocator interior blow-off cycle (per settings entered in PLC) .
- 2/ Reciprocator exterior blow-off cycle (per settings entered in PLC).

3 : Starts interior cleaning cycle on reciprocators.
The cycle is carried out according to the parameters 9,10,11 and 12.
To start another cleaning cycle,wait until the ongoing cycle is completed.

Implementation of interior blow-off cycles :

- 1/ The reciprocators go to its most forward position (per settings entered in PLC).
- 2/ Interior blow off cycle (per settings entered in PLC).

4 : Starts a cycle of exterior guns blow off on reciprocators.
The reciprocator moves back and forth during the cycle, in order to clean the exterior of the guns.
The motions, added to the blow off, enhance the cleaning.
The cycle of exterior cleaning is carried out according to the parameters 5, 6, 7 and 8
To start another cleaning cycle, wait until the ongoing cycle is completed.

Implementation of exterior blow-off cycles:

- 1/ The reciprocators go to the selected position (per settings entered in PLC).
- 2/ Exterior blow off cycle (per settings entered in PLC).



WARNING : The thoroughness of the exterior blow off relies on the good positioning of the blow off nozzles associated to the sweeping movements of both in/out and up/down motions.Should only one of the 2 axis be used (either up/down or in/out), the efficiency of the clean up shall be greatly reduced. For the parameter setting, in and out axis is necessary to start an exterior blowing cycle

Parameters 5 to 9 do not apply to the robotic version.

5 : Minimum up/down height during exterior blow off cycle.

6 : Maximum up/down height during exterior blow off cycle.

7 : Number of up/down strokes/mn during the exterior blow off cycle.

8 : In/out motion speed during the cleaning cycle.

9 : In/out movement's backward position to reach during the exterior cleaning cycle.
In order to avoid polluting the parts to be sprayed, the reciprocator must be backed out far enough

10: Number of air cycles during the interior cleaning phase.

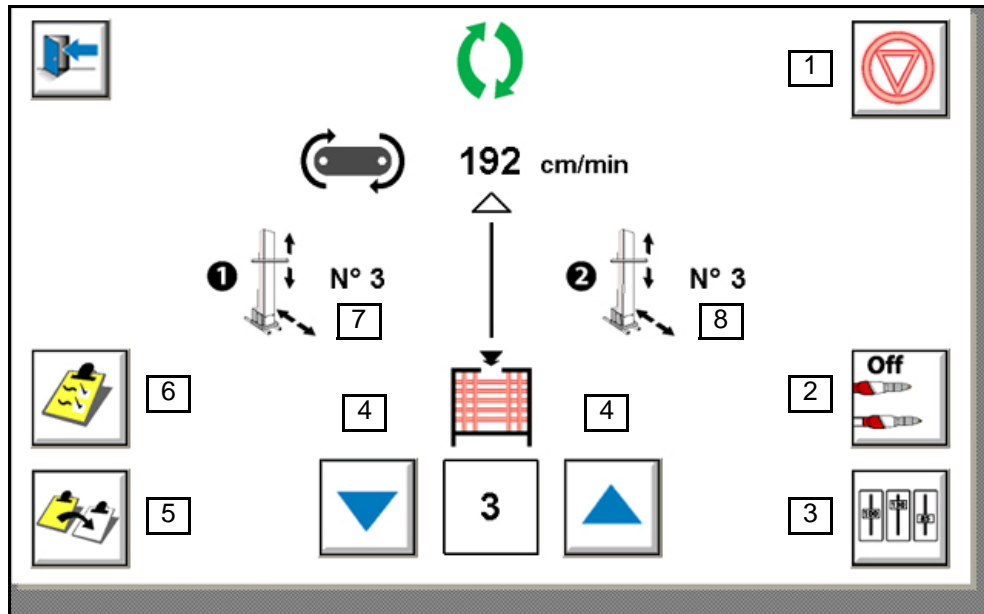
11: Duration of the gap between 2 air blows during the interior blow off cycle.

12: Duration of the air blow between 2 gaps during the interior blow off cycle.
When air is blowing, the corresponding digital output on the MCR is activated, and controls a solenoid valve releasing compressed air into the blow off nozzles.

6. Automatic Mode

6.1. Automatic Mode: General Controls

6.1.1. RFV version



- 1 : Starts the system in automatic mode .
Executes recip motions and spray settings entered in the spraying tables.



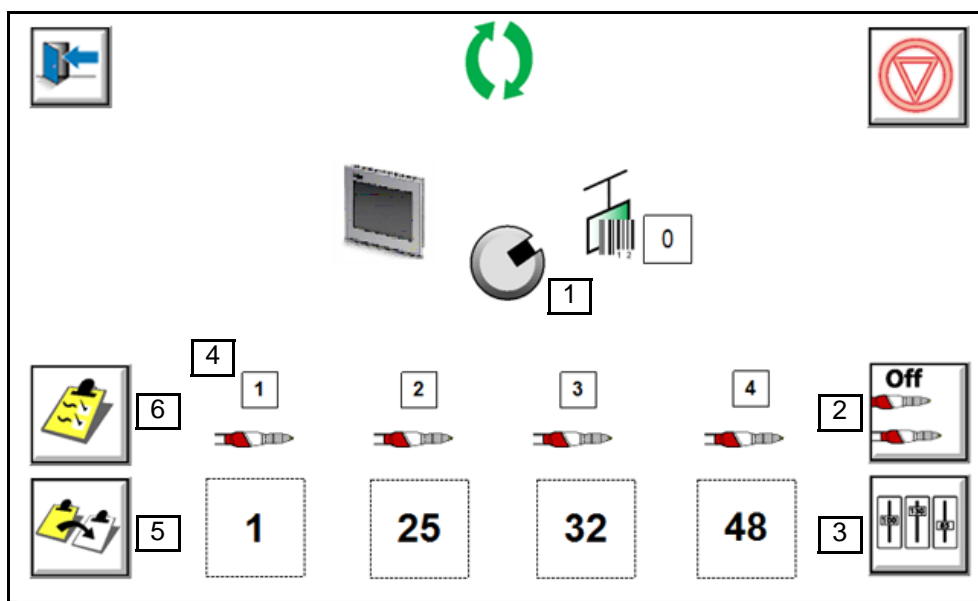
Start automatic mode



Stop automatic mode

- 2 : Forcing spraying only on the guns directed by the spraying table.
When forcing is selected, an alarm is shown on the fault screen.
- 3 : Global setting of the spray parameters ([see § 6.4 page 22](#)).
When at least one coefficient is adjusted (different from 100%), the screen flashes.
- 4 : Choice of the spray table nbr to use to match the part that is detected.
The down arrow decrements the table nbr, the up arrow increments it, otherwise pressing on the number of the table creates a keyboard for the seizure.
- 5 : Copy of spray tables ([see § 6.3 page 21](#)).
- 6 : Access to the spray tables ([see § 6.2 page 20](#)).
- 7 : Display of the ongoing spray table number, reciprocator 1.
- 8 : Display of the ongoing spray table number, reciprocator 2.
- 9 : Display of the actual conveyor speed, or of that called by PLC. The speed may be changed via the conveyor speed correction coefficient ([see § 6.4 page 22](#)).

6.1.2. Robotic version



1 : Allows code entry on the screen or code acquisition from the robot bay or line cabinet.

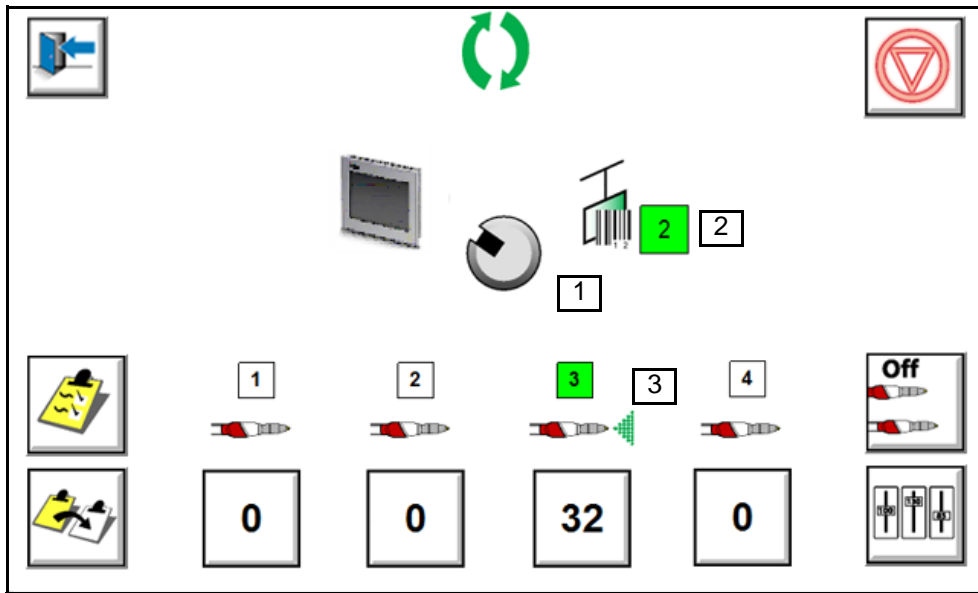
2 : Forçage de la pulvérisation uniquement sur les pulvérisateurs sélectionnés en table.
Si le forçage est activé, une alarme est affichée dans la vue des défauts.

3 : Global setting of the spray parameters ([see § 6.4 page 22](#)).
When at least one coefficient is adjusted (different from 100%), the screen flashes.

4 : Current table for each sprayer

5 : Copy of spray tables ([see § 6.3 page 21](#)).

6 : Access to the spray tables ([see § 6.2 page 20](#)).



1 : Highlight: reception in progress.

2 : Information is being received.

3 : Spray request in progress.

Sixty spray tables are distributed for Mach-Jet or Inobell projectors.

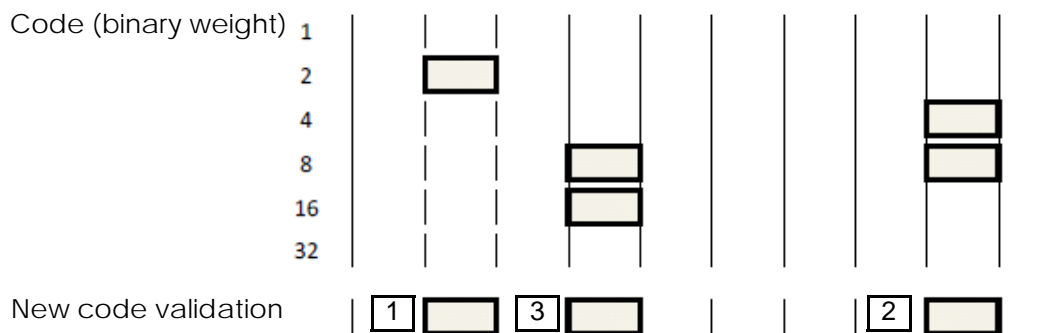
- From 1 to 15 : Projector 1
- From 16 to 30 : Projector 2
- From 31 to 45 : Projector 3
- From 46 to 60 : Projector 4.

The information will be delivered by dry contacts controlled by the online PLC.

The code will be maintained simultaneously with the new code information.

The code and new code information will be provided for 2 seconds.

After the first few seconds required to read back and process the information, all signals will be cancelled.

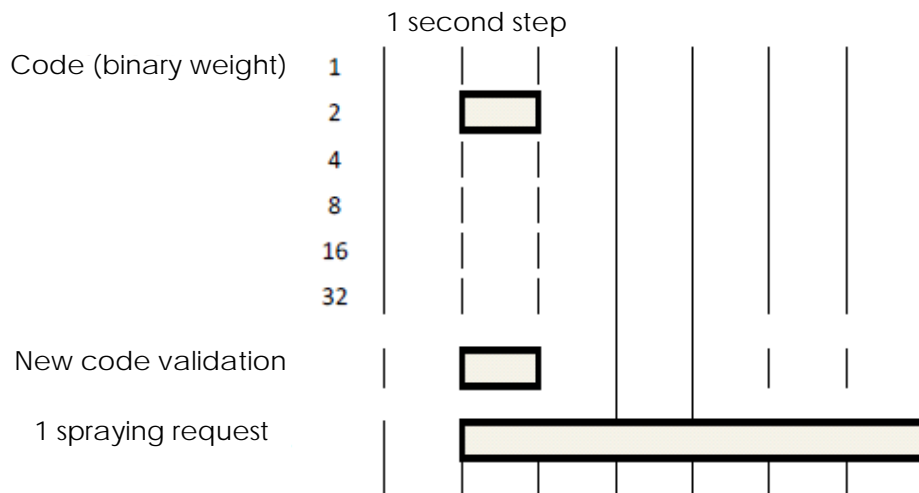


1 Code for use of table 2, parameters for projector 1.

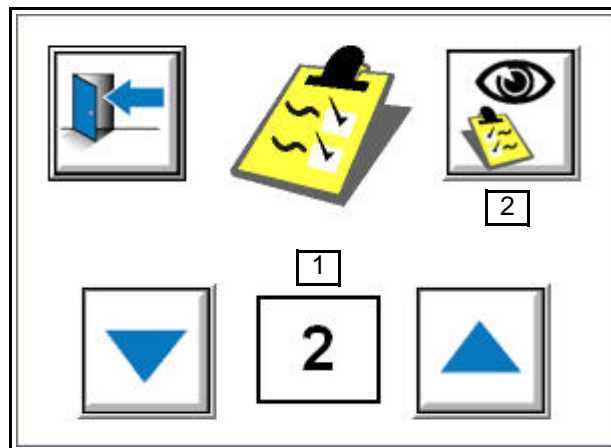
2 Code for use of table 12, parameters for projector 1.

3 Code for use of table 24, parameters for projector 2.

The projectors will be controlled by closing a dry contact controlled by the PLC. Each projector will have its own on/off control.



6.2. Spray tables: Access



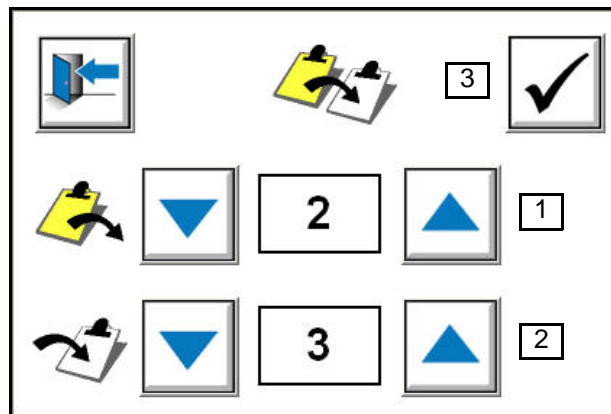
1 : On-screen selection of the spray table number.

2 : Access to the spray table on screen ([see § 6.5 page 23](#)).

By default, the number on screen is that of the last table called.

There are 64 tables available. Access to the spray tables for modifications is done during operation (on line).

6.3. Spray Tables: Copy



1 : Selection of the number of the table to be copied (source table).

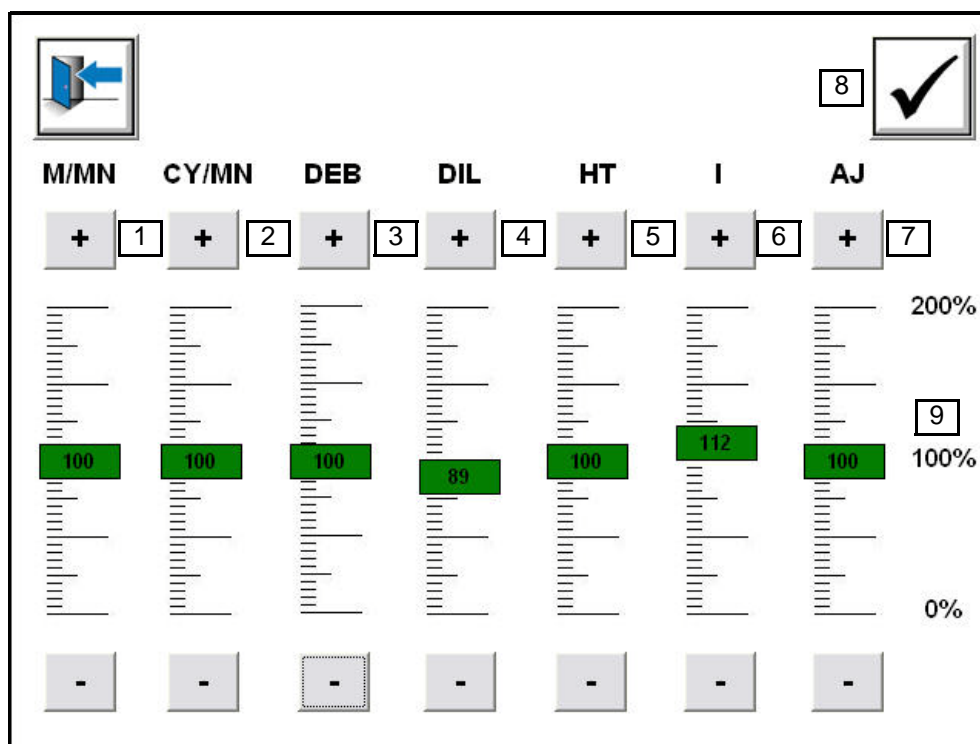
2 : Selection of the number of the table to copy to (target table).

3 : Copy table.

The copying of the tables is done during operation (on line).

Remarks: Le choix de la table se fait par les flèches, ou directement sur le numéro de la table à l'aide du clavier.

6.4. Spray tables: Correction Coefficients

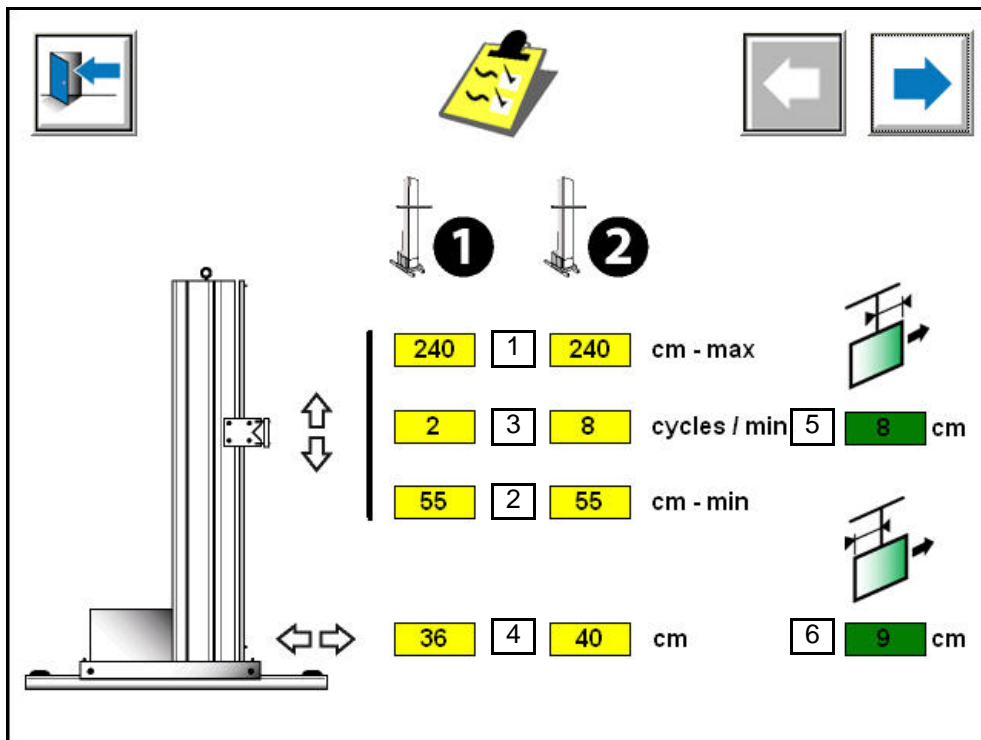


- 1 : Setting a new percentage for the conveyor speed, from 0 to 200% of the values entered in the table
- 2 : Setting a new percentage for the recips speed, from 0 to 200% of the values entered in the table.
- 3 : Setting a new percentage for the powder flow, from 0 to 200% of the values entered in the table.
- 4 : Setting a new percentage for the powder dilution, from 0 to 200% of the values entered in the table.
- 5 : Setting a new percentage for the high voltage, from 0 to 200% of the values entered in the table.
- 6 : Setting a new percentage for the current, from 0 to 200% of the values entered in the table.
- 7 : Setting a new percentage for the air shroud, from 0 to 200% of the values entered in the table (TCR module only).
- 8 : Validation and application to operation, of the new values just entered.
- 9 : If one pushes on the 100% number, all settings come back to 100%.
Access to coefficients and their modifications is done during operation (on line).
The % value displayed in the cursor is updated in real time as the cursor moves.
The adjustment of the coefficient is done via the - and + keys.



WARNING : Actual values are the values entered, multiplied by the value affected to the correction coefficient. When a modification is applied to a signal value in a table, the actual value may be different depending on the value of the correction coefficient applied.

6.5. Spray Tables : motion settings
 This screen is not for the robotic version.



1 : Maximum setting, up/down motion, reciprocator 1 or 2.

2 : Minimum setting, up/down motion, reciprocator 1 or 2.

3 : Speed of the up/down motion in number of complete cycles/mn, for reciprocator 1 or 2.
 o The up/down axis is only a vertical sweep, with a low and a high value; the low value being always smaller than the high one

The stroke, in cm, is measured between the ground and the recip's gun-carrying rod ([see § 7.3 page 30](#) axis calibration).

The signals must be comprised within the values determined at time of calibration of this axis.

Remarks : The system's limits are defined by the acceleration and deceleration times (0.3s) of the motion, and the inversion time (0.3s), depending on its speed. Too short sweeping strokes will be misinterpreted by the system. The (0.3s) acceleration and deceleration times contribute to reducing the actual speed of the recip, compared to the signal's speed.

The reciprocating speed is comprised between 5m/mn and 25m/mn for a powder system reciprocator.

How to determine the Nbr of cycles = speed (25m/mn) / 2 x stroke (m)

Example:

Stroke 2m @ speed 25 m /mn => 25 / 4 = 6.25 e.g 6 cycles.

Stroke 0.3 m @ speed 25 m/mn => 25 / 0.6 = 41.66 e.g 42 cycles

The minimum cycle value is 1, and the maximum value is 99.

The maximum cycle value is increased automatically, depending on the maximum speed, by the software.

4 : Positionning of the in/out axis.

The in/out axis is only used as a positioning motion.

The stroke, in cm, is measured between the tip of the gun and the center of the conveyor. The signals must be comprised within the values determined at time of calibration of the axis.

The position signal entered in the table is only actuated when the left or right in/out parts recognition is deactivated. (P 02 and P03 on 0 in the settings menu).

5 : Width of in-coming part.

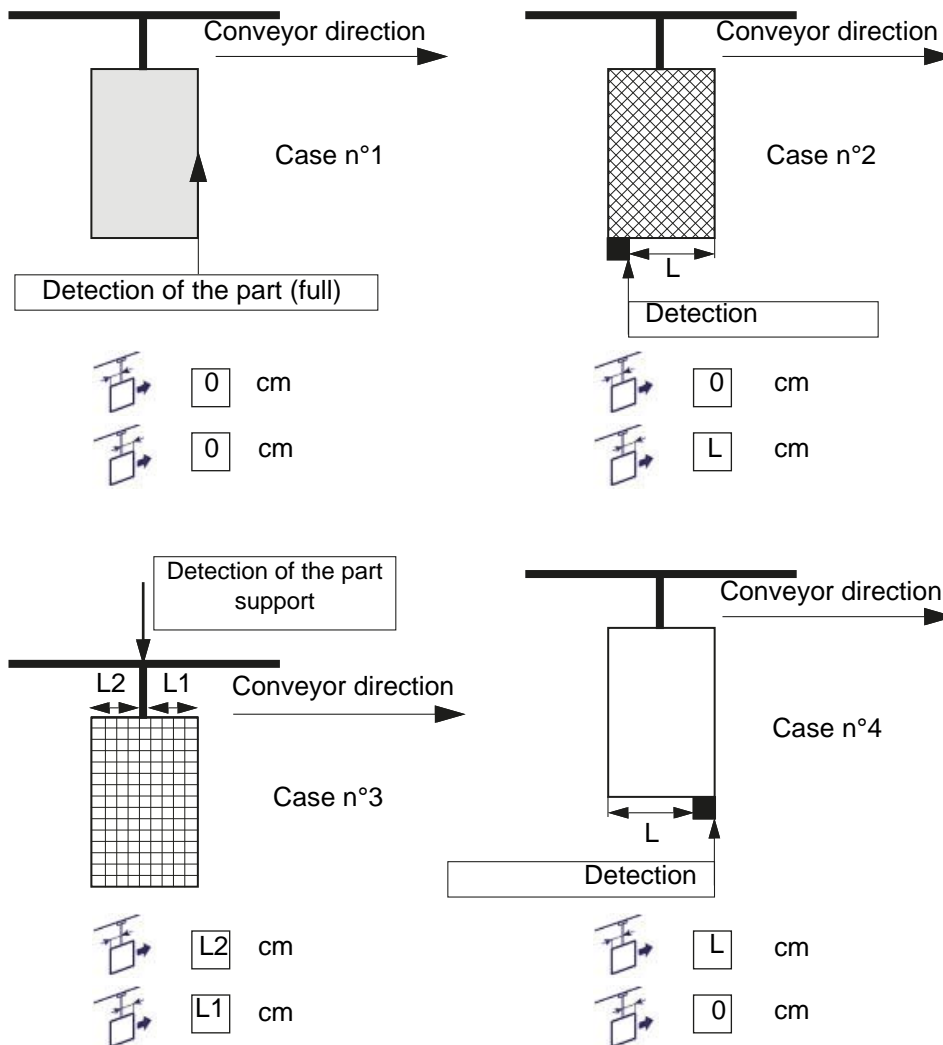
6 : Width of out-going part .

The maximum part width allowed is 200 cm.

It is necessary to know the part width for the tracking of the part along the conveyor displacement.

During the tracking, the module manages the powder triggers between parts. The parts can be tracked for 25m maximum from the moment they are detected.

Possible configurations depending on the type of detection:



DES02744

6.6. Spraying tables: application parameters
RFV version:

N°	DEB	DIL	HT	I	AJ	ROT
1	0	0	0	0	2	1
1	2	3	4	5	6	7
5	23	5	80	8	2	1

Robotic version :

N°	DEB	DIL	HT	I	AJ	ROT
1	25	6	56	45		
2	0	0	0	1	0	1
3	0	0	0	1	0	1
4	0	0	0	1	0	1
1	2	3	4	5	6	7

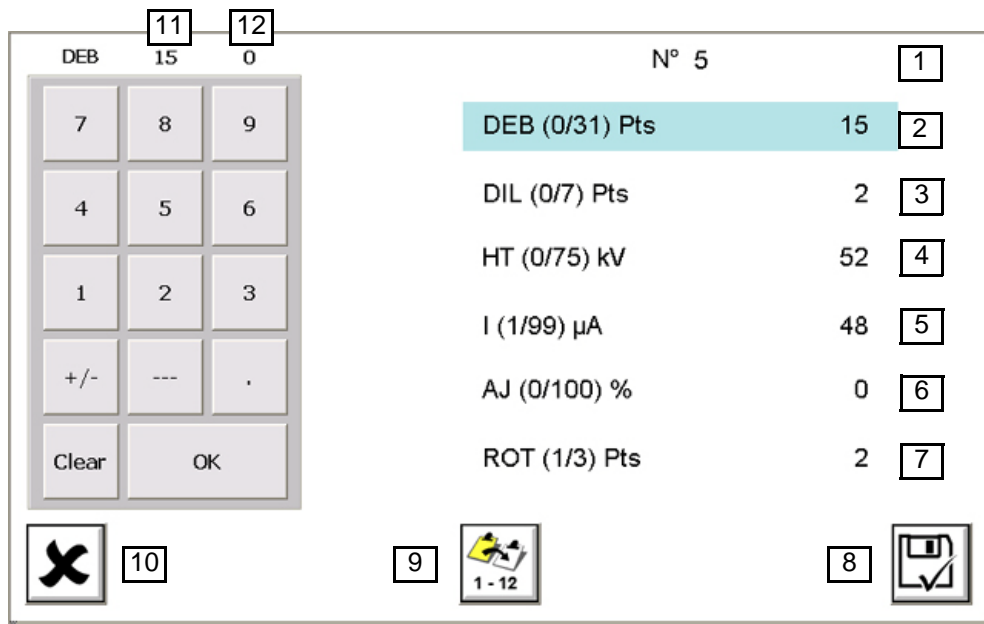
1 : Gun number.

2 : Powder Flow signal.
Displays the value entered in the table.

3 : Powder dilution signal.
Displays the value entered in the table.

- 4 : High voltage signal.
Displays the value entered in the table.
- 5 : Current signal.
Displays the value entered in the table.
- 6 : Shaping Air signal.
Displays the value entered in the table.
- 7 : Turbine speed signal.
Displays the value entered in the table.
- 8 : Spray selection (green= powder on / red= powder off).
- 9 : Select all guns .
- 10: De-select all guns .
- 11: Copy of the signals to left guns (1-12) to right guns (13-24).

6.6.1. Data Entry



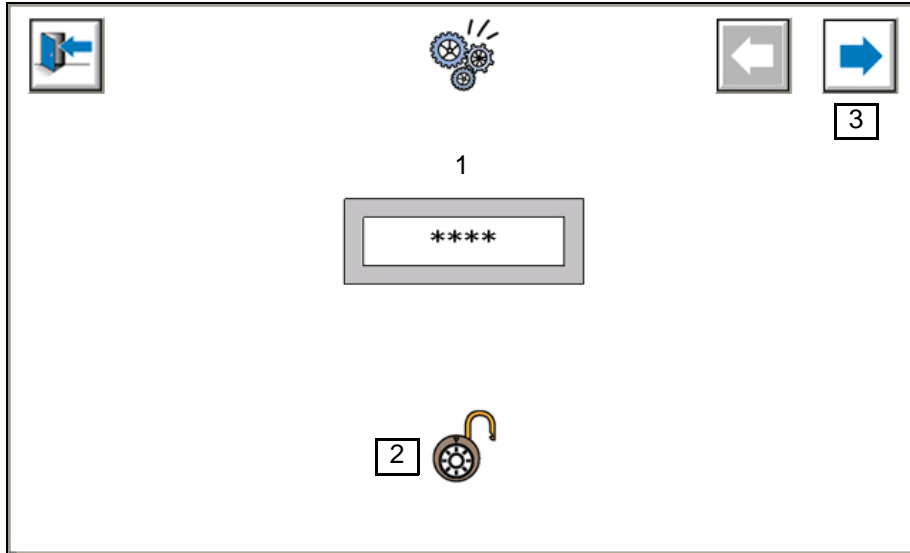
	CRN	TCR
1 : Number of the gun selected	-	-
2 : Powder flow signal DEB in points	0-31	0-31
3 : Dilution signal DIL in points	0-7	0-7
4 : High voltage signal HT in Kilo Volts	0-95	0-75
5 : Current signal I in Micro Amperes	0-110	0-100
6 : Shaping Air signal AJ in % (Module TCR only)	-	0-100
7 : Turbine speed signal ROT in points (Module TCR only) There are 3 pre-set speeds, in Kilo/rpm in the module TCR 1 (V-) = 6.5 Krpm 2 (V) = 7.5 Krpm 3 (V+) = 8.5 Krpm		1-3
8 : Enters the signals values, and returns to the on-going spray table.		
9 : Copy of the signal values of the selected gun, to guns 1 to 12 or guns 13 to 24 (left or right reciprocator)		
10 : Cancels the signals values, and returns to the on-going spray table.		
11 : Displays the original signal value in the spray table when it is opened.		
12 : Displays the signal value entered in the spray table.		


For further information on the signal values and their utilisation, see the instructions manuals for Modules CRN 457, and TCR.

7. Settings Process

7.1. Settings 1: Access to settings

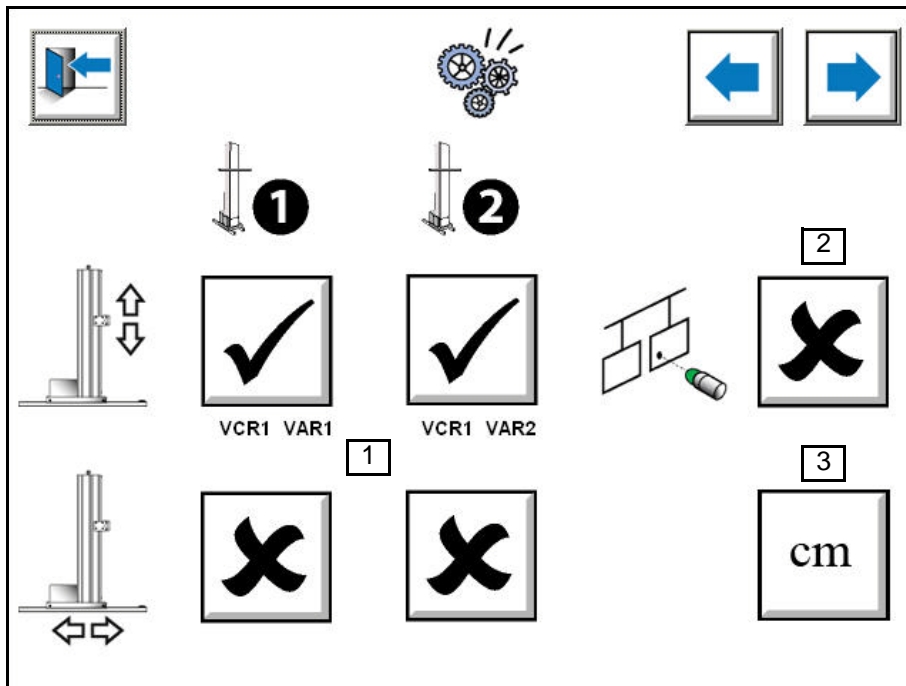
One accesses the settings via a 3-digit password. After exiting the settings screen, the settings are locked automatically, after a delay of a few minutes.



- 1 : The password may be any combination of up to 3 digits (0 to 999) for the user. The password is indicated by the number of stars. SAMES KREMLIN enters by default the password "111", which can later on be changed via the settings menu ([see § 7.8 page 38](#)).
Pressing the password creates a keyboard for the seizure.
Enter your password then press 'enter' to validate. In case of error, press 'DEL' and start again
- 2 : When the correct password is entered, the padlock opens 
- 3 : When the correct password is entered, the arrow is unlocked, and allows access to the settings screens.

7.2. Settings 2: Configuration Reciprocator

This screen is not for the robotic version.



Access via correct password in main screen.

1 : Configuration of the reciprocators axes .

Possible selections

- **No Reciprocator**
- **Reciprocator 1:** Up and down
- **Reciprocator 1:** Up and down and **Reciprocator 2:** Up and down
- **Reciprocator 1:** Up and down and **Reciprocator 1:** In and out
- **Reciprocator 1:** Up and down and **Reciprocator 1:** In and out and **Reciprocator 2:** Up and down (requires 2 variator modules)
- **Robot 1** altitude et **Robot 1** gabarit et **Robot 2** altitude et **Robot 2** gabarit (requires 2 variator modules).

The VCR module controlling the selected reciprocators axes is indicated under the key selecting the reciprocator axis.

If your selection is not included among the possibles above, all axes are selected.

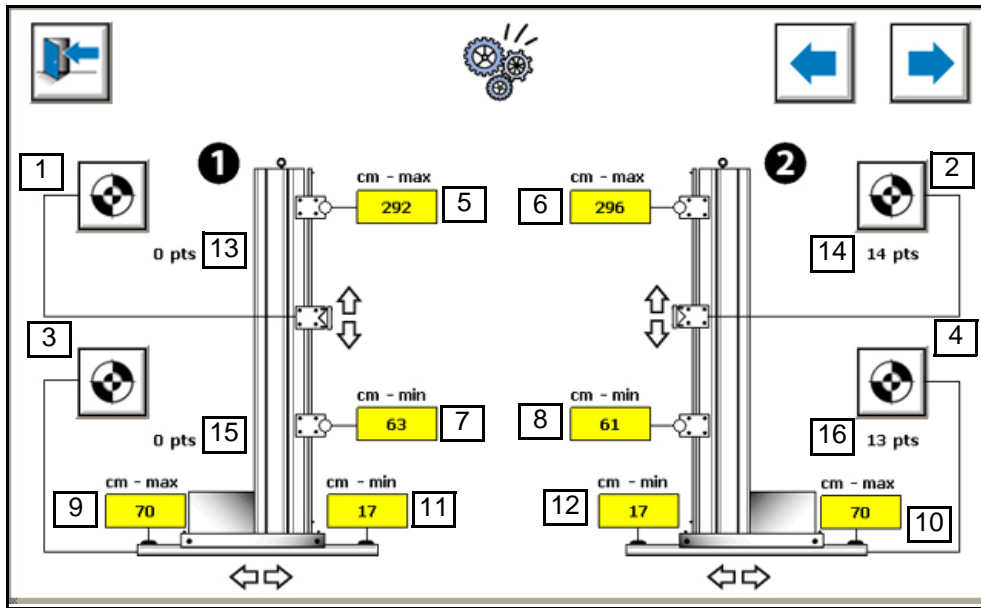
2 : Part detection, either via a jig swing rod, or I/R cells, or up/down recognition barrier (cell 1). Without detection, as soon as the system is started in automatic mode, the spraying of the guns is triggered via the serial link. The spraying is uninterrupted. With detection, the triggering of the guns is delayed in function of the location of the first or last part, depending on the distances between gun planes, and parts widths. The delay timing also depends on the conveyor speed, and the distance between the reciprocators and the detection captor.

3 : Selection of the type of unit.

Metric or fractional.

By pushing the key, the text changes in all screens. Values are automatically converted, and Min/Max values are modified on all screens.

7.3. Settings 3: Calibration of axis
 This screen is not for the robotic version.



- 1 : Start automatic calibration of up/down motion reciprocator N°1
 When pressing the "Start automatic calibration" key, the carriage slowly moves to the highest point, hits the hard stop and goes to the lowest point, hits the hard stop, and stops there. The calibration is completed. See the axes calibration procedure below.
- 2 : Start automatic calibration of up/down motion reciprocator N°2
 See point 1.
- 3 : Start automatic calibration of in/out motion reciprocator N°1
 See point 1.
- 4 : Start automatic calibration of in/out motion reciprocator N°2
 See point 1.
- 5 : Enter the height in cm of the top inversion point of the up/down motion reciprocator N°1.
 One must enter the distance measured between the ground and the gun carrying rod in its highest position. This value in cm will associate the reciprocator's high point to an actual height. Which height will be the max possible of the Up/down axis of reciprocator N°1, in the spraying tables.
- 6 : Enter the height in cm of the top inversion point of the up/down motion reciprocator N°2
 See point 5.
- 7 : Enter the height in cm of the low inversion point of the up/down motion reciprocator 1.
 One must enter the distance measured between the ground and the gun carrying rod in its lowest position. This value in cm will associate the reciprocator's low point to an actual height. Which height will be the min possible of the Up/down axis of reciprocator N°1, in the spraying tables.

- 8 : Enter the height in cm of the low inversion point of the up/down motion reciprocator N°2
See point 7.
- 9 : Enter the length in cm of the most retracted position of the in/out motion of reciprocator N°1.
One must enter the distance measured between the conveyor and the tip of the gun (in/out position farthest from the conveyor). This value, in cm, will associate the reciprocator's retracted position to an actual outer position. Which value will be the minimum value of the in/out axis reciprocator N°1 in the spraying tables.
- 10: Enter the length in cm of the most retracted position of the in/out motion of reciprocator N°2
See point 9.
- 11: Enter the length in cm of the most forward position of the in/out motion of reciprocator N°1.
One must enter the distance measured between the conveyor and the tip of the gun (in/out position closest to the conveyor). This value, in cm, will associate the reciprocator's most forward position to an actual inner position. Which value will be the maximum value of the in/out axis reciprocator N°1 in the spraying tables.
- 12: Enter the length in cm of the most forward position of the in/out motion of reciprocator N°2.
See point 11.
- 13: Display of the return value, in points, of the up/down axis reciprocator N°1.
Allows to check that the potentiometer return for this axis looks as it should. (no blockage, no reversed values,...). The range of possible variations is 0 -30 000 points.
- 14: Display of the return value, in points, of the up/down axis reciprocator N°2.
See point 13.
- 15: Display of the return value, in points, of the in/out axis reciprocator N°1.
See point 13.
- 16: Display of the return value, in points, of the in/out axis reciprocator N°2.
See point 13.

Calibration of the axis:

All axes must be calibrated at time of start up of the system, or after replacing a potentiometer on any of the axes.

To proceed with any axis calibration, go to the settings mode, and select the reciprocator first.

- Enter the minimum and maximum values in cm for all the axes, in the SAMES KREMLIN settings.
- Press the key to start the axis calibration.
- The reciprocator moves slowly toward the maximum position, hits the hard stop, and then proceeds toward the minimum position, hits the hard stop, and stops.
- The calibration is completed.

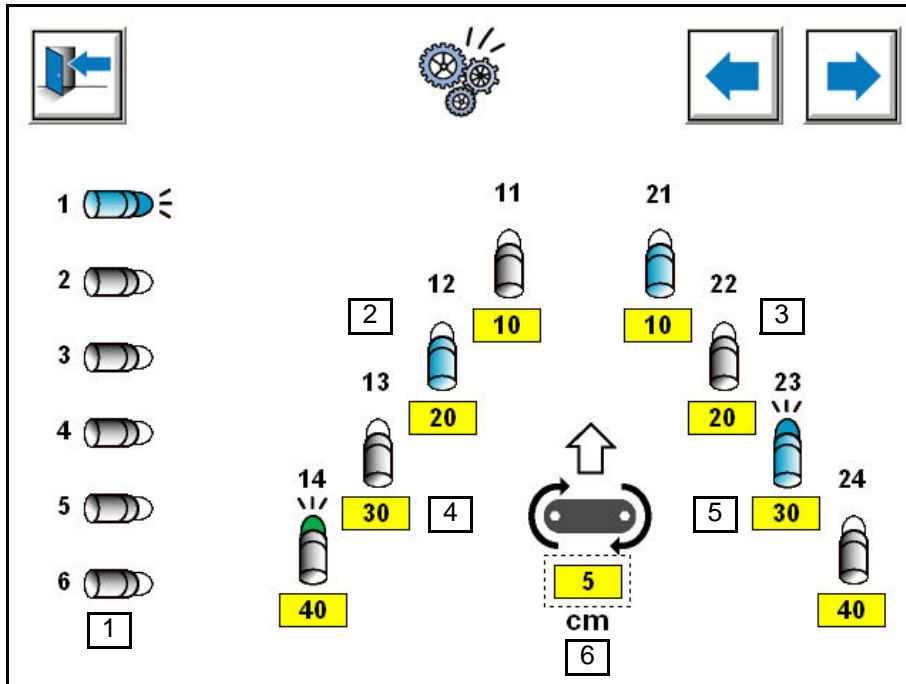
Referencing the axes:

Up/Down axis : reference = ground
 Distances measured from ground to gun carrying rod.

In/Out axis: reference = conveyor center line
 Distances measured from the tip of the gun to the conveyor center line.

7.4. Settings 4: Configuration parts recognition - General

This screen is not for the robotic version.



1 : Vertical cells for parts recognition or detection.

If no parts recognition has been entered in the settings, then vertical cell N°1 is used for parts detection for the whole system.

Parts detection is activated only if the setting "detection" is activated. ([see § 7.2 page 29](#)).

2 : Cells in/out for left parts recognition.

3 : Cells in/out for right parts recognition.

4 : Signals for the in/out axis, reciprocator N° 1, depending on the status of the detection cells.

5 : Signals for the in/out axis, reciprocator N° 2, depending on the status of the detection cells.

6 : Signal for the in/out axis reciprocators 1 and 2, if no cell is actuated.

Parts recognition cells:

if one vertical cell is activated, the gun whose number is defined in the following view, is selected for spraying following the advance of the conveyor (parts tracking).

If **one in/out cell** is activated, the corresponding reciprocator will automatically move to the position determined in the box under the cell, following the advance of the conveyor (parts tracking).

If **no in/out cell is activated**, the corresponding reciprocator will automatically move to the position determined in the box under the conveyor symbol

Color code:

- Cell beam unbroken (no part)

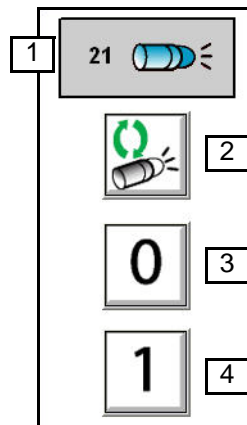


- Cell beam broken (presence of part)
- Cell forced to 1 (permanent presence of part)
- Cell forced to 0 (cell beam never broken)



Individual cell forcing

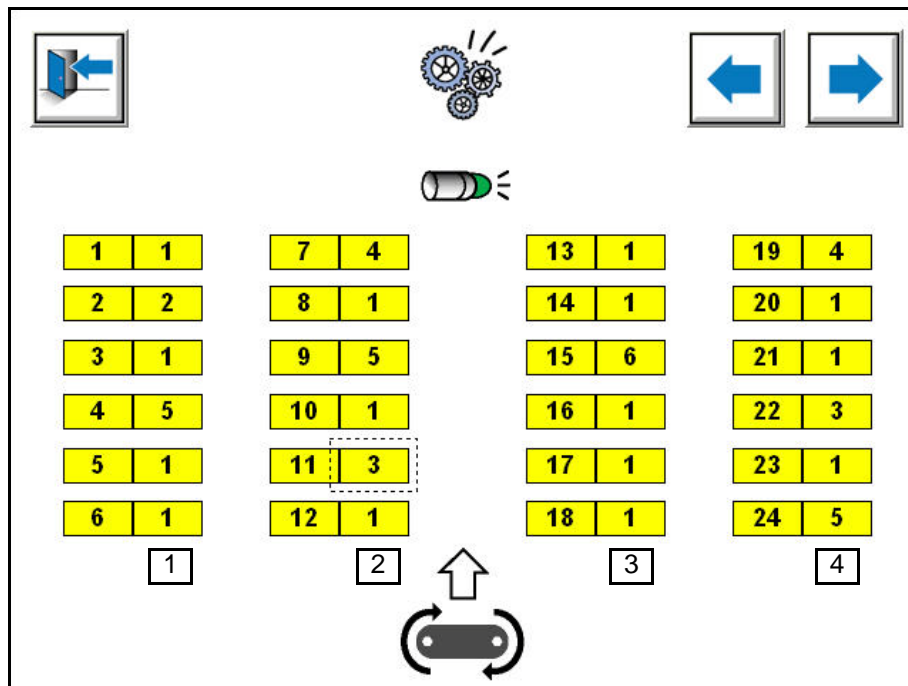
Pushing on a cell opens the forcing screen. Pushing on one of the keys of the forcing screen enters the selection, and closes the screen.



- 1 : Number of the selected cell
- 2 : Automatic detection
- 3 : Forcing on 0 (Cell beam never broken)
- 4 : Forcing on 1 (permanent presence of part)

7.5. Settings 5: Configuration parts recognition-vertical

This screen is not for the robotic version.

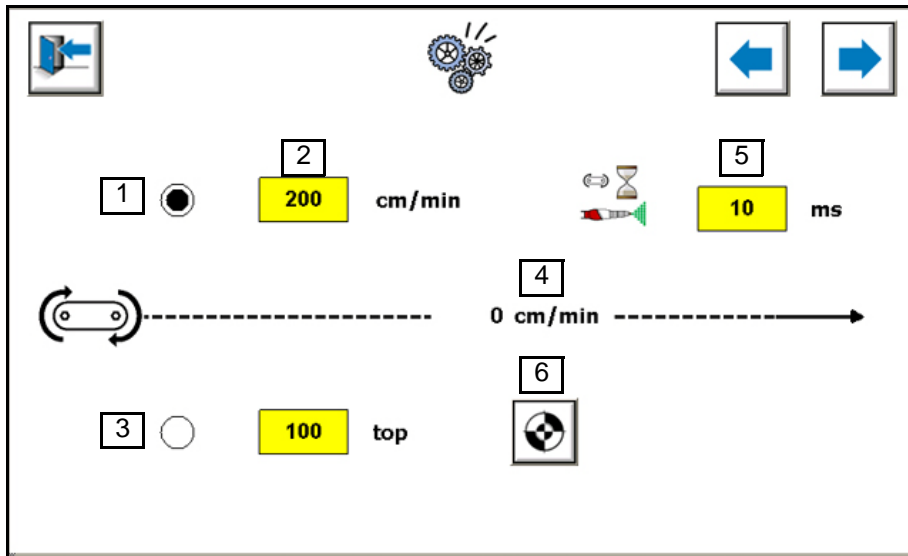


This screen allows to match a recognition cell number to a gun, in order to match the parts detection to the triggering of the gun.

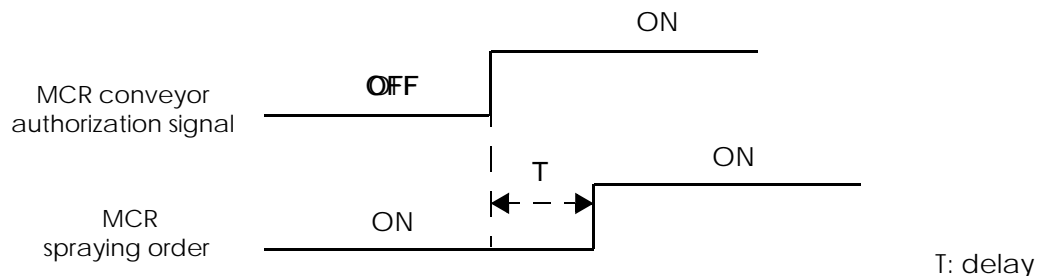
- 1 : Matching of a vertical recognition cell to one of the guns N°1 - 6
Allows to match one of the recognition cells N°1 to N°6 to each gun.
- 2 : Matching of a vertical recognition cell to one of the guns N°7 -12
Allows to match one of the recognition cells N°1 to N°6 to each gun.
- 3 : Matching of a vertical recognition cell to one of the guns N°13 to 18
Allows to match one of the recognition cells N°1 to N°6 to each gun.
- 4 : Matching of a vertical recognition cell to one of the guns N°19 - 24
Allows to match one of the recognition cells N°1 to N°6 to each gun.

7.6. Settings 6: Conveyor

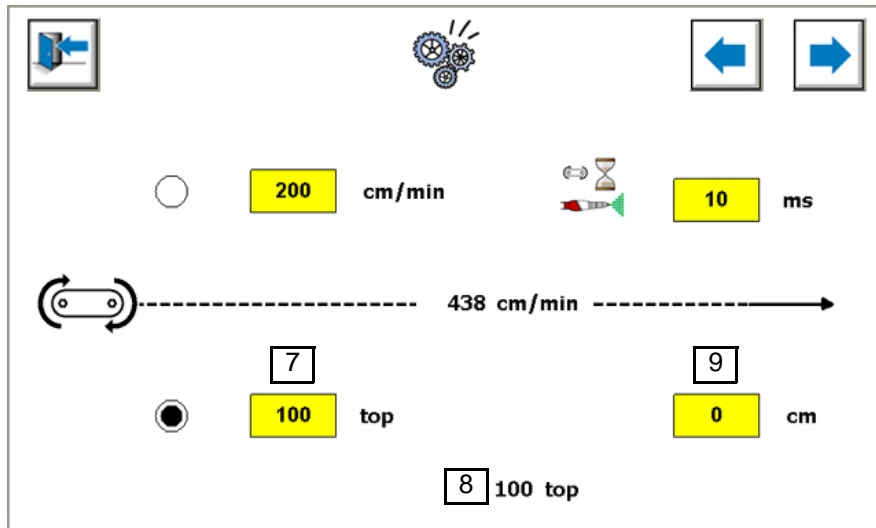
This screen is not for the robotic version.



- 1 : Selection internal conveyor speed.
The speed of the conveyor is simulated by the MCR module. The speed can be changed manually by the operator.
- 2 : Enter the value for the internal speed of the conveyor.
Permits to input the nominal speed of the conveyor of the system.
- 3 : Select actual conveyor speed.
The conveyor speed is received by the MCR module on the allocated input (top conveyor input).
- 4 : Display of the actual speed of the conveyor, depending on the pulses received by the MCR module.
- 5 : Delay allowing to delay the beginning of spraying when the conveyor restarts. Only in case the conveying system starts up after it received the order by the MCR (appropriate delay of the conveying system).
The advantage of this temporization is to avoid an overload of product on parts to be painted at the time of the restart of the conveyor.



- 6 : Activation of the conveyor calibration procedure.
New parameters appear.



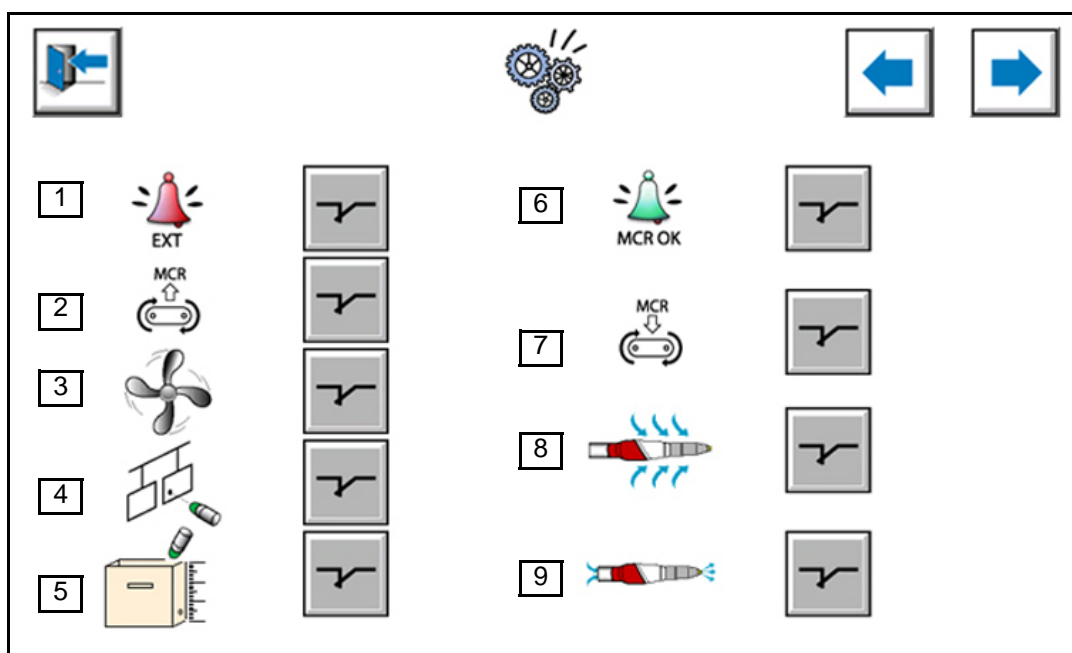
- 7: Number of conveyor pulses expected by the MCR module for conveyor calibration.
- 8: Display of the conveyor pulses incrementation during calibration.
Permits to check if the pulses are regular.
- 9: Enter the distance covered by the conveyor during calibration.

Calibration Procedure

We recommend to measure over at least 5 m of conveyor advance.

- **Step 1:** Put a marker on a fixed point and a point on the conveyor.
- **Step 2:** Choice the external conveyor speed mode [3].
- **Step 3:** Enter the number of pulses given by the conveyor during calibration [7]. (500 by default, as we recommend 1 pulse per cm).
- **Step 4:** Press the key to start the calibration procedure [6].
- **Step 5:** Move the conveyor along , until the pulse counter [8] reads the number of pulses entered [7].
- **Step 6:** When the pulse counter reaches the number entered, the control module stops the conveyor.
- **Step 7:** Inform the distance covered, the control moduleleaves the calibration mode.

7.7. Settings 7: Configuration signals clients interface




Allows to change the inputs/outputs logic interfaced with the client's equipment. This is in order to simplify the connection, as most times the connection logic from the customer's is unknown.

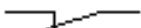
Inputs:

- 1 : Configuration input external fault .
- 2 : Configuration input "conveyor ON"
- 3 : Configuration input "booth ready" (ventilation ON).
- 4 : Configuration input part detection (all the inputs up/down detection).
- 5 : Configuration input detection of powder level.

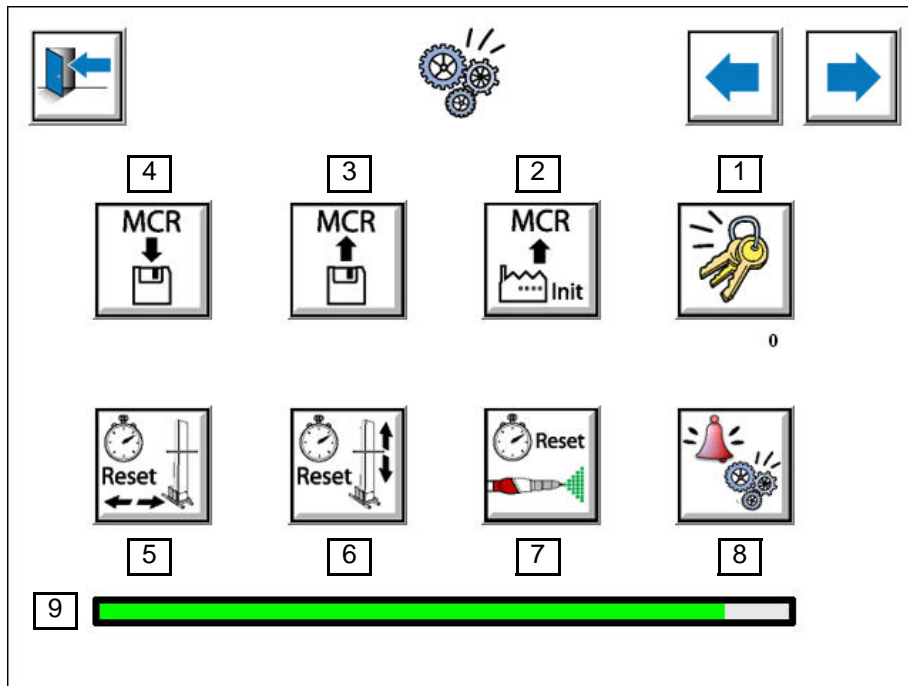
Outputs:

- 6 : Configuration output control module ready.
- 7 : Configuration output conveyor authorization .
- 8 : Configuration output external blow off reciprocator N°1.
- 9 : Configuration output external blow off recip N°2.

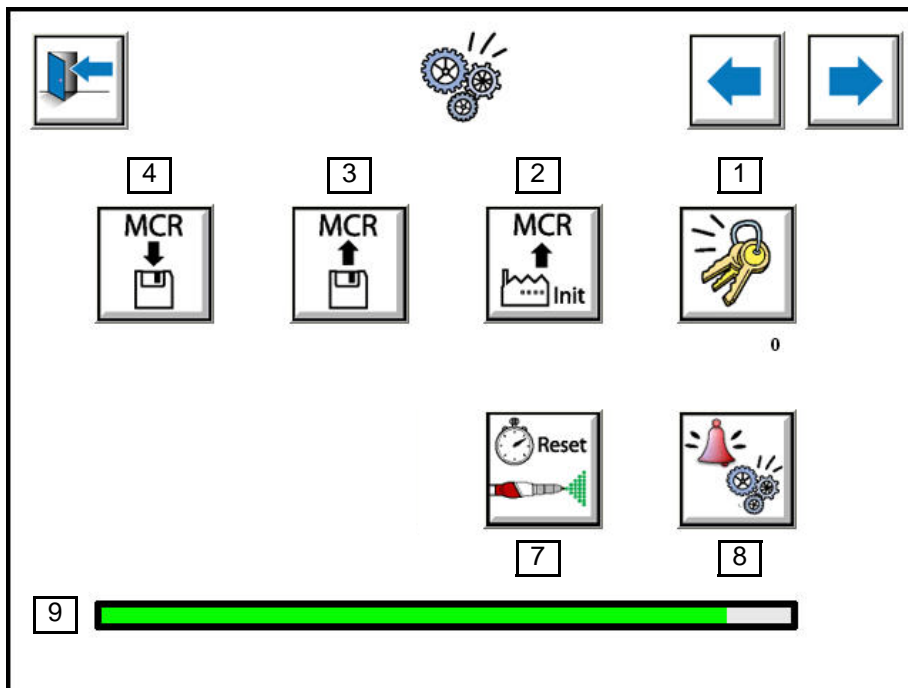
Normally Open: 

Normally closed : 

7.8. Settings 8: Management of the settings, and counter
RFV version:



Robotic version:



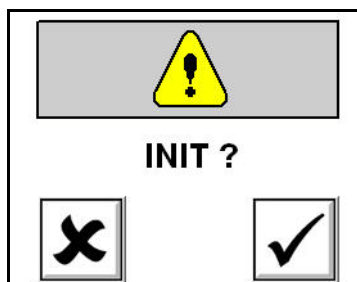
1 : Client's password change.

Allows to select a password giving access to the settings menus.

A password can be any combination of 3 digits (0 to 999), and is entered by default as "111" by SAMES KREMLIN.

2 : Return to default settings.

Allows to reset the MCR module to all settings originally entered by SAMES KREMLIN. When pushing this key, a confirmation window opens requiring the command to be either confirmed or cancelled.



WARNING : This operation may be irreversible if nothing has been preventively saved.
(see paragraph " Saving settings to memory ").

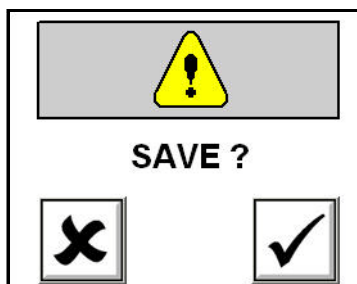
3 : Return to settings saved to memory

Return to settings saved to memory permits to go back to settings saved. They may be the default settings if your settings were not saved, or the last of the settings that were saved. Pushing this key, opens a confirmation window requesting the command to be either confirmed or cancelled.



4 : Saving settings to memory.

Allows to save customer's settings to memory, after system start up, or routinely after changes done by the operator. Pushing this key opens a confirmation window requesting the command to be either confirmed or cancelled.

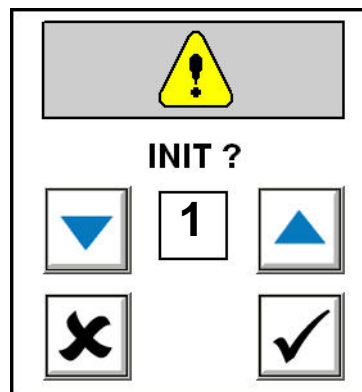




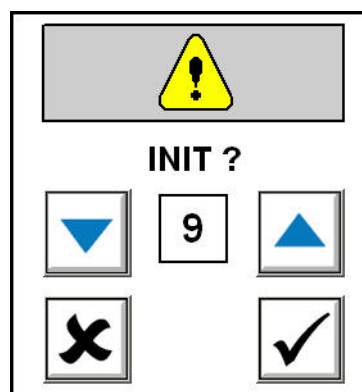
WARNING : SAMES KREMLIN recommends to carry out the saves routinely, in order to keep the settings up to date.

5 : Resetting the counters of the up/down motions of reciprocators N°1 and N°2.
See point 6.

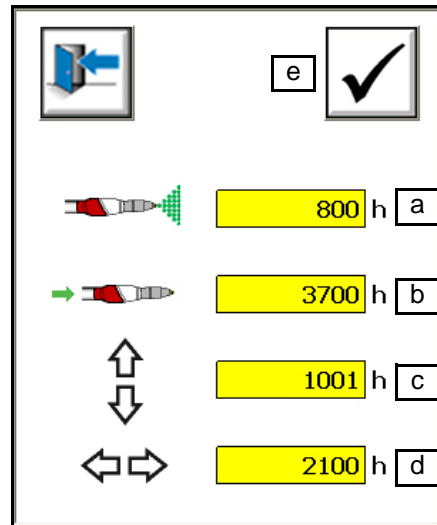
6 : Reset of the counters of the in/out motions of reciprocators N°1 and N°2.
This operation is to be done after all preventive maintenance inspections called for by an alarm from the control module. Resetting the counters will also reset the alarm in the check list.
Pushing this key opens a confirmation window which permits to choose the reciprocator number (by pressing the arrows), and then to confirm or cancel the command.



7 : Reset of the guns counters N°1 to N°24.
This operation is to be done after all preventive maintenance inspections called for by an alarm from the control module. Resetting the counters will also reset the alarm in the check list.
Pushing this key opens a confirmation window which permits to choose the sprayer number (by pressing the arrows or by the keyboard), and then to confirm or cancel the command.

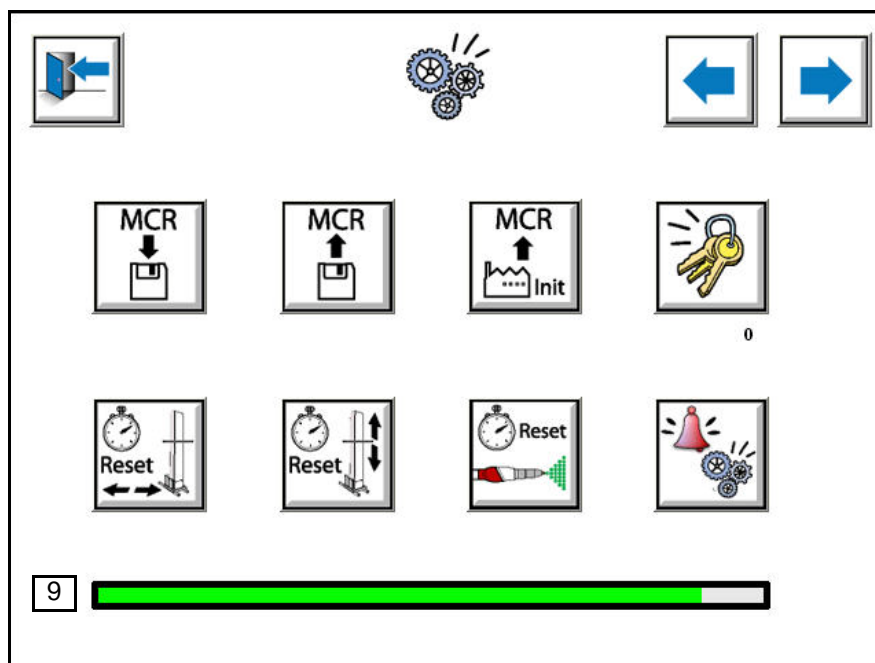


8 : Setting minimum uptimes before a preventive maintenance alarm in the system



- a: Minimum uptime for electrode Auto mach-jet alarm.
- b: Minimum uptime for powder supply alarm.
- c: Minimum uptime for recip up/down alarm.
- d: Minimum uptime for recip in/out alarm.
- e: Settings confirmation

9 : Progress status of saves and returns procedures.



7.9. Settings 9: Guns settings

RFV version:

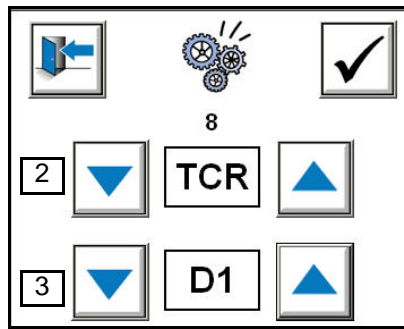
1	TCR	G1	7	----	----	13	CRN	G1	19	----	----
2	----	----	8	----	----	14	----	----	20	----	----
3	TCR	D1	9	----	----	15	CRN	G2	21	----	----
4	----	----	10	----	----	16	----	----	22	AM	D3
5	CRN	G1	11	----	----	17	CRN	G3	23	----	----
6	----	----	12	----	----	18	----	----	24	----	----

Remarks: The values entered in the boxes are for example only, to indicate the variety of choices. By default, SAMES KREMLIN does not enter any values (----).

Robotic version:

1	CRN
2	TCR
3	TCR
4	TCR

1 : Pushing on one of the boxes opens a window to select the gun version and its location on the reciprocator.



2 : Selection of the type of gun (CRN, TCR, ----).

CRN: Auto Mach-Jet

TCR: Powder projector Inobell

----: No gun

Different types of guns may be mixed in the system, as long as the maximum quantity for each type has been taken into account.

3 : Selection of the location of the guns on the reciprocators.

G1: Ramp 1 reciprocator N°1 (left)

D1: Ramp 1 reciprocator N°2 (right)

G2: Ramp 2 reciprocator N°1

D2: Ramp 2 reciprocator N°2





G3: Ramp 3 reciprocator N°1

D3: Ramp 3 reciprocator N°2

The MCR module can handle up to a maximum of 24 guns.

The various possible guns configurations are described in **SAMES KREMLIN'** sales catalog, with reference to the capabilities of the FCR control cabinet.

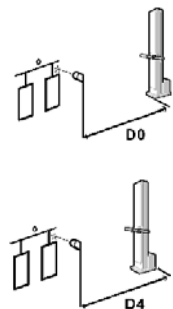
7.10. Settings 10: general settings 1
This screen is not for the robotic version.

			
P01 Number of up/down detection cells		<input type="text" value="6"/>	
P02 Number of in/out detection cells, left side		<input type="text" value="0"/>	
P03 Number of in/out detection cells, right side		<input type="text" value="0"/>	
		1	2
P04 Distance departure plane N°1	<input type="text" value="250"/>	<input type="text" value="400"/>	cm
P05 Distance departure plane N°2	<input type="text" value="300"/>	<input type="text" value="450"/>	cm
P06 Distance departure plane N°3	<input type="text" value="350"/>	<input type="text" value="500"/>	cm
P07 Distance upstream parts detection	<input type="text" value="100"/>	<input type="text" value="80"/>	cm
P08 Distance downstream parts detection	<input type="text" value="50"/>	<input type="text" value="40"/>	cm

- P01: total Number of up/down detection cells comprised between 0 and 6.
- P02: total Number of in/out detection cells, left side, comprised between 0 and 4.
- P03: total Number of in/out detection cells, right side comprised between 0 and 4.
- P04: Distance departure plane N°1 (ramp of guns N°1) comprised between 0 and 2500 cm.
- P05: Distance departure plane N°2 (ramp of guns N°2) comprised between 0 and 2500 cm.
- P06: Distance departure plane N°3 (ramp of guns N°3) comprised between 0 and 2500 cm.





Measure of the distance between the parts detection captor and the ramp of guns 1, for each reciprocator. This value is part of the calculation of the tracking of parts.
 The maximum possible tracking distance, measured from the parts detection captor, is 25m.

- P07: Distance upstream parts detection comprised between 0 and 2500 cm. Measure the distance between the captor of the parts detection and the upstream width of the reciprocator, or the first ramp of the guns, if the distance is shorter.
- P08: Distance downstream parts detection comprised between 0 and 2500 cm. Measure the distance between the captor of the parts detection and the downstream width of the reciprocator, or the last ramp of guns, if the distance is longer.



Allows to determine the width of the reciprocator/guns assembly within the system, in order to avoid collisions between guns and parts.

7.11. Settings 12: General settings 2
This screen is not for the robotic version.

			
P09 Speed of the up/down motion in manual mode	6	m/min	
P10 Speed of the in/out motion in manual mode	4	m/min	
P11 Speed of the in/out motion in automatic mode	8	m/min	
P12 Offset software stop	15	cm	
P13 Offset in/out in position	6	cm	
P14 Default occultation value	30000	cm	
P15 Time-out in/out position	10000	ms	
P16 Time-out inversion	10000	ms	

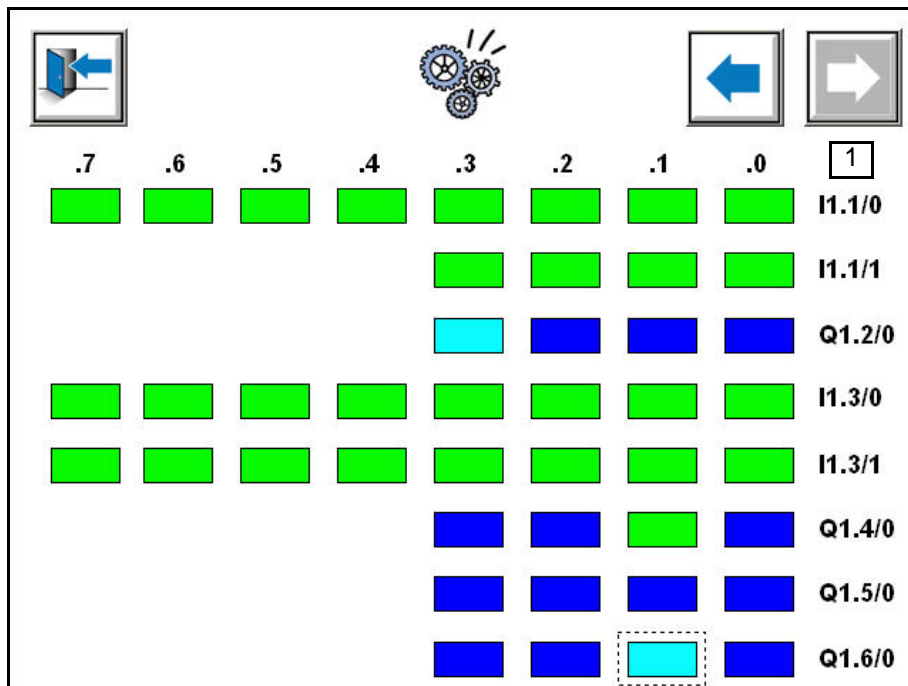
- P09: Speed of the up/down motion in manual mode (0 - 25 m/mn), preset to 5 m/mn.
- P10: Speed of the in/out motion in manual mode (0 - 25 m/mn), preset to 5 m/mn.
- P11: Speed of the in/out motion in automatic mode (0 - 25 m/mn), preset to 5 m/mn..
- P12: Offset software stop by mechanical stop, preset to 5 cm.
- P13: Offset in/out in position, preset to 5 cm.
- P14: Default occultation value, preset to 20000 cm.
- P15: Setting of Time Out for the positioning of in/out axes, preset to 10000 ms.
- P16: Setting of Time Out for the inversions of up/down axes.



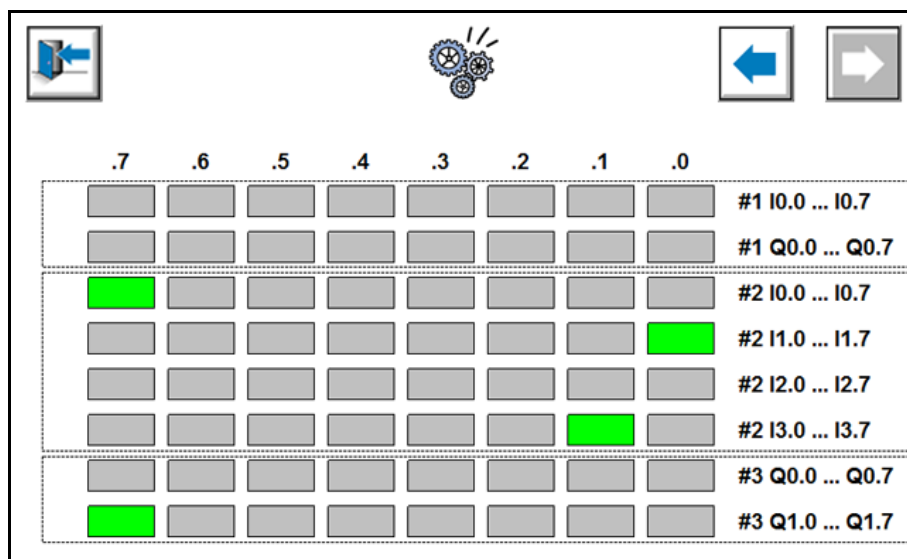
WARNING : These settings have been determined by SAMES KREMLIN to ensure the best possible operation of the system. We insist that they should not be tampered with, and any modification, even after consulting with SAMES KREMLIN, remains the customer's sole and entire responsibility.

7.12. Settings 12: Forcing of Inputs/Outputs "yes or no"

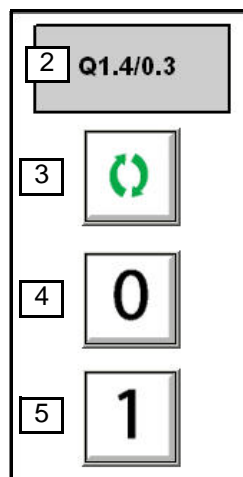
RFV version:



Robotic version:



1 : Pressing on one of the boxes opens a window for the selection of the type of forcing desired for the selected input or output.



2 : Adress of the selected Input/Output

3 : Management of the Inputs/Outputs by the module

4 : Forcing at 0 of the Input/Output

5 : Forcing at 1 of the Input/Output

Color code:



Input/Output not activated by the module



Input/Output activated by the module



Input/Output forced at 1 (permanent presence of part)



Input/Output forced at 0 (cell beam never broken)

When an Input/Output is forced at 0 or at 1, a non locking alarm shows on the fault screen as follows: "on-going input forcing" or "on-going output forcing".

	List of inputs			List of outputs
I1.1/0.0	In/out detection, left 1		Q1.2/0.0	Reset fault variator Axis 1
I1.1/0.1	In/out detection, left 2		Q1.2/0.1	Reset fault variator Axis 2
I1.1/0.2	In/out detection, left 3		Q1.2/0.2	Reset fault variator Axis 3
I1.1/0.3	In/out detection, left 4		Q1.2/0.3	Reset fault variator Axis 4
I1.1/0.4	In/out detection, right 1			
I1.1/0.5	In/out detection, right 2		Q1.4/0.0	Direction 1 Axis 1
I1.1/0.6	In/out detection, right 3		Q1.4/0.1	Direction 2 Axis 1
I1.1/0.7	In/out detection, right 4		Q1.4/0.2	Direction 1 Axis 2
I1.1/1.0	In operation		Q1.4/0.3	Direction 2 Axis 2
I1.1/1.1	Powder level detection			
I1.1/1.2	Spare		Q1.5/0.0	Direction 1 Axis 3
I1.1/1.4	Spare		Q1.5/0.1	Direction 2 Axis 3
			Q1.5/0.2	Direction 1 Axis 4
I1.3/0.0	Axis 1/2 powered up		Q1.5/0.3	Direction 2 Axis 4
I1.3/0.1	Variator Axis 1 OK			
I1.3/0.2	Variator Axis 2 OK		Q1.6/0.0	Exterior Blow off
I1.3/0.3	Axis 3/4 powered up		Q1.6/0.1	Interior Blow off
I1.3/0.4	Variator Axis 3 OK		Q1.6/0.2	MCR OK
I1.3/0.5	Variator Axis 4 OK		Q1.6/0.3	Authorization conveyor
I1.3/0.6	Conveyor pulses			
I1.3/0.7	Conveyor ON			
I1.3/1.0	Booth ready			
I1.3/1.1	External fault			
I1.3/1.2	Up/down detection 1			
I1.3/1.3	Up/down detection 2			
I1.3/1.4	Up/down detection 3			
I1.3/1.5	Up/down detection 4			
I1.3/1.6	Up/down detection 5			
I1.3/1.7	Up/down detection 6			