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**MRS - General Information**
Safety Recommendations

Installation

The services and facilities to be provided by the customer should be installed according to local regulations.

Ground connections

The ground connection of the booth should be checked each time the equipment is put into operation. The ground must be connected by the customer to the base of the booth, Multicyclone, and filter housing(s). Also make sure that the workpieces, and all other systems are properly grounded.

Control inspection

Before switching on the booth, check the following points (where necessary):
- there are no foreign objects in the intake channel of the Multicyclone
- the Multicyclone is connected, the toggle catches are locked in
- the powder hopper is in place, the toggle catches are engaged and locked in, the pneumatic, and powder hoses connected to the powder pumps
- the After Filter is connected, the sealing frames are properly sealed, the pneumatic hoses are connected
- the Filter plate doors are closed and the waste powder trolley is in place

Entering the booth

In order to protect personnel when entered the booth for inspection and cleaning purposes, the switch - S3 must be actuated. This switch starts ventilation, however the electrostatic control units, and other systems are locked and cannot be started.

When entering the booth make sure not to step on powder covering the floor.

Danger of Slipping!

Repairs

Repairs and cleaning inside the booth (coating area) may only be performed after the switch - S3 (Booth cleaning) has been actuated.

Repairs should only be performed by trained personnel.
Technical Data
(subject to change)

Power requirements:
  Voltage: 3 x 380 V / 50 Hz
  Other voltages, and frequencies on request

Compressed air connection:
  Inlet pressure: min. 6 bar / max. 10 bar
  Recommended inlet pressure: 7 bar
  Water vapour content: max. 1.3 g/m³
  Max. oil content: max. 0.1 mg/kg (oil/air)

Compressed air consumption:
  Rinsing air in the filter housing: max. 18 Nm³/h
MRS - Multi Recovery System Powder Booth

Field of application

MRS powder coating booths are suited for electrostatic powder coating of any type of workpiece in large series. Since they are part of a process-controlled coating system, they are designed for fully automatic operation.

\[ \text{MRS} = \text{Multi Recovery System} \]

Design

MRS booths are built from modular assemblies to suit the customer’s individual requirements, i.e. the configuration is adapted to specific applications. Automatic operation is possible with a fully configured system.

<table>
<thead>
<tr>
<th>Version</th>
<th>Powder recovery system</th>
<th>Suitable for</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Multicyclone + After Filter</td>
<td>Quick colour change for operation with multiple colours</td>
</tr>
<tr>
<td>B</td>
<td>Filter trolley with filter plates</td>
<td>One colour only</td>
</tr>
<tr>
<td>C</td>
<td>Multicyclone and/or filter plates</td>
<td>One main colour and additional colours</td>
</tr>
</tbody>
</table>

Booth versions (option)

There are two versions of MRS powder coating booths available. One version is fitted with a squeegee unit and the other version is not. Booths fitted with a squeegee unit are highly recommended for single colour operation. Booths without a squeegee unit are more suitable for short production runs with multiple colours where colour changes are frequent. The version without a squeegee unit can also be fitted with a fluidizing channel to remove the powder from the inside of the booth, but is not absolutely necessary. In this case the overspray powder is removed (or pushed into the fluidizing channel) manually.

Squeegee unit (option)

The squeegee unit pushes oversprayed powder along the floor of the booth into the fluidizing channel where it is returned to the powder hopper to be reused. Operation is automatic, but the operating interval can be preset to the customer’s requirements, etc.

Manual coating

Depending on customer specifications or requirements, in addition to gun slots the MRS powder booth can be equipped with a manual coating opening. This opening can be used for manually precoating or touching-up workpieces.

PTS Powder Transport System

In order to transport the powder used in the automatic coating process efficiently the PTS Powder Transport System is used. The system, specially developed for use with MRS booths, consists of a vibrator sieve, powerful PP 1 Powder Pumps, and a PTC 1 Powder Transfer Control unit.
Operating Principle

The operating principle of the booth is determined essentially by the requirements placed on it by:
- protection of the coating process from external influences, combined with the cleanliness of the booth surroundings
- recovery of oversprayed powder, and
- the avoidance of an explosive powder/air mixture inside the booth.

For keeping the booth surroundings clean and for preventing the build-up of an explosive powder/air mixture, an efficient exhaust air system is used which draws air from the booth and then exhausts it out into the workshop. The resulting negative pressure produces an air flow from the outside of the booth to the inside, thus preventing powder from escaping into the environment, this means that the booth surroundings are kept clean. There must be no moving air (e.g. draughts) in the area around the booth.

Powder recovery takes place through powder separation during operation and, if fitted, a mechanical squeegee pushes the oversprayed powder along the floor of the booth, into the fluidizing channel.

Powder not adhering to the workpieces drops to the booth floor or is sucked up as a powder/air mixture. Powder is separated by centrifugal force and falls directly into the collecting hopper. This powder is transported via the sieve back into the powder hopper, where it is reused for coating.

Operating procedure

When the booth is switched on, a fan starts up and after an acceleration phase releases the systems interlocked with the booth.

The system is ready for operation as soon as other external components, such as the chain conveyor, fresh powder hopper, reciprocator, fire protection, etc. have been switched on.

All operating functions on the control cabinet are now enabled and can be initiated.

The coating process can start. It is interrupted only in the event of a fan motor fault. Other faults are indicated by the triggering of an alarm or by the switching on of a signal lamp on the control cabinet.

The strength of the suction through the filter is monitored during operation. The pressure difference, and the suction performance of the exhaust system are also measured. Clogging of the filter plates is indicated by a drop in suction performance (the difference in pressure rises). When a preset threshold is reached, a warning lamp illuminates on the control cabinet, and an audible alarm is initiated.

The booth control is equipped with an Emergency Stop function. When this function is activated, the booth, and all interlocked systems are switched off. The system must be restarted by operating the key switch on the control cabinet.
Filter cleaning

The filter plates are periodically cleaned, in pairs, with short blasts of compressed air (jet pulse cleaning) in the opposite direction to filtration (from the inside of the filter outwards) while the booth is in operation. The powder dislodged from the filter plates falls into the collecting hopper. The cleaning procedure is initiated when the booth is started and remains enabled until the booth is switched off again.

The air for blasting off the filters is injected from a compressed air tank into the top of the filter plates through solenoid valves. The pressure tank, and the solenoid valves are integrated into the clean air housing.

The duration of the cleaning blast, and the interval between the air blast for the next filter pair is monitored by an electronic control circuit. The blast time, and the interval time are preset at the factory. However, these settings can be changed if the warning - "Pressure rise" appears too frequently.

The cleaning process can be initiated separately for cleaning, and control purposes.

⚠️ CAUTION ⚠️

A certain quality of compressed air is a prerequisite for trouble-free operation. Contamination by dirt, rust particles, oil residue or dampness lead to faults in the pneumatic components and influence the filtration performance of the filter plates.

MRS Multi Recovery System Powder Coating Booth

![Diagram of the MRS Multi Recovery System Powder Coating Booth]

1. Booth entrance
2. Pressure monitoring panel
3. Booth base
4. Manual coating opening
5. Gun slots
6. Opening for filter system
7. Pneumatic regulating valve panel

Figure 1
**Key to version designation**

**MRS-MX -12.0-6.14- 200**

- **H (cm)**: height of superstructure (inside booth)
- **B (dm)**: width of superstructure (inside booth)
- **L (m)**: length of superstructure (inside booth)
- No. of filter trolleys
- No. of filter plates (total)
- Type of powder hopper**
- Type of filter system*

Booth system: **Multi Recovery System**

*Type of filter system

- **M** = Multicyclone with After Filter (for organic powder)
- **L** = Filter trolley with filter plates (for organic powder)
- **E** = Filter trolley with filter plates (for enamel powder)
- **B** = Multicyclone with filter trolley (for organic powder)

**Type of powder hopper

- **X** = Intermediate powder transport
- **F** = Fluidizing channel (with squeegee)
Functional Check
(Bold numbers refer to the ICS Control unit on the next page)

Performing functional checks

A functional check should be performed:
- after replacing spare parts on the booth, the electrical section or system components connected to the booth
- after working on the electrical section or control units of external systems connected to the booth control or on the booth control itself.
- after prolonged idle periods

Prerequisites for functional checks

- Powder hopper is empty or powder level is below the sensor
- Switch S7 (Alarm): ON
- Switch S19 (Fresh powder): OFF

Procedure:

- Turn on the main switch - Q0: It should not be possible to start the electrostatic control units and any interlocked systems
- Turn on the key switch - S0.1: Lamp - H0 should illuminate. It should not be possible to start the electrostatic control unit or any of the interlocked systems
- Press button - S2: The exhaust air fan should start after the acceleration phase:
  - Lamp - H1 should be illuminated
  - Prefluidization, and the sieve in the PTS Powder Transport System start
  - The cleaning cycle for the filter plates starts
After approximately 40 seconds:
- The prefluidization should switch to continuous fluidization
- The electrostatic control unit and all the interlocked systems should be ready for operation
- The level control starts up: Lamp - H6 illuminates (Powder hopper empty)
- With a delay to the message ‘Powder hopper empty’ an alarm signal must be released and the lamp - H6 remains illuminated (Powder hopper empty).

Delay: approximately 6 minutes.
ICS Control unit

Operator controls on the switch cabinet
The number, and positioning of the elements on the switch cabinet can vary according to the plant specifications.

Figure 2

S0    Emergency stop (Mushroom type - not shown)
S0.1  Key switch: control voltage - ON/OFF
S1    Plant - OFF
S2    Plant - ON
S5    Booth cleaning
S6    Lighting
S7    Alarm - OFF
S10   Squeegee - Manual
S19   Fresh powder - Automatic/OFF
Q0    Main switch (not shown)
H0    Control voltage - ON (white)
H1    Plant - ON (green)
H2    Booth cleaning
H6    Powder hopper - Empty
H7    Alarm - OFF
H8    Motor - Fault
H20   Alarm signal
H32   Squeegee fault
H38   Too much exhaust air (Fan 1)
H39   Too little exhaust air (Fan 1)
Quick-Reference Guide

*(Bold numbers refer to the ICS Control unit on the previous page).*

**Prior to start-up**
- Carry out the start-up procedure and/or functional checks before switching on the coating system.
- Please read the safety recommendations (red page) in the corresponding Operating Instructions.

**Switching the booth ON:**
- Turn on the main switch - **Q0**.
- Turn the key switch - **S0.1** on : the control is enabled, **H0** illuminates.
- Press button - **S2** : the fan starts up; as soon as the run-up phase is completed :
  - the pilot lamp **H1** illuminates,
  - the vibrator of the FPS Fresh Powder System switches on,
  - the PTC Powder Transfer Control unit is released and the vibrator of the PTS Powder Transport System is switched on,
  - the PMC Powder Master Control is released and the prefluidization in the powder hopper is switched on,
  - the cleaning cycle of the filter plates is activated.
- after approximately 40 seconds continuous fluidization is switched on and all the inter-locked systems are released.
- Check the fluidization and switch on all plant systems such as the electrostatic control unit, etc.

**Switching the booth OFF :**
- Switch off the electrostatic control unit and all external systems.
- Press Button - **S1** : the pilot lamp - **H1** goes out.
- Switch off the main switch - **Q0** : the pilot lamp - **H0** goes out.

**Alarm (see also Troubleshooting guide of the corresponding Operating Instructions)**

The alarm signal (horn) is activated by the following situations :
- Powder hopper is empty, i.e. as soon as the powder level drops below the lower level sensor.
- Increase in pressure in the exhaust air system (Overstepping a predetermined value).
The alarm can be switched off with the Button - **S7**.

**Maintenance**

_The maintenance schedules of the corresponding Operation Instructions should be observed completely!_
Booth cleaning

Coarse booth cleaning

Danger of overfilling the powder hopper!

Coarse cleaning of the booth should **not** be performed immediately after the powder hopper has been filled/refilled. In addition, the fresh powder hopper should be switched off some time before cleaning to allow the powder to settle.

Procedure:
- Switch on the booth.
- Check the vibration sieve of the PTS Powder Transport System and remove any dirt and contamination with an industrial vacuum cleaner.
- Tap the booth walls from the outside so that the powder adhering to the walls falls down.
- Use a rubber squeegee to remove the powder through the booth openings.

Never clean the filter plates with a scraper or any hard objects!

Booth cleaning

(Bold numbers refer to ICS Control unit on page 6)

Danger of overfilling the powder hopper!

Cleaning of the booth should **not** be performed immediately after the powder hopper has been filled/refilled. In addition, the fresh powder hopper should be switched off some time before cleaning to allow the powder to settle.

Procedure:
- Switch on the booth.
- Press the Button - **S5** (booth cleaning) : all interlocked systems, and the APS Automatic Powder System switch off. The booth can now be entered.
- Clean the booth walls with a hand squeegee.
- Clean the booth floor.
- Switch booth off, press the Button - **S1**.
- Uncouple the collecting hopper and clean it (see the applicable Operating Instructions).
- Check the vibrator sieve of the PTS Powder Transport System powder hopper remove any contamination with an industrial vacuum cleaner.
- Clean the booth walls.
- Switch the booth on again.
Maintenance

Maintenance schedule

Daily or after each shift :
- Blow out the powder hoses.
- Clean the outside of the guns and check the wear parts.
- Perform coarse booth cleaning (see "Coarse booth cleaning", on the previous page).
- Check the sieve screen of the PTS Powder Transport System, remove any dirt and contamination with an industrial vacuum cleaner.

Weekly :
- Check the clean air filter cells in the After Filter housing for powder deposits through the observation hole above the door of the filter housing. If powder is present this means that there is a defect in the filter plates (For instructions for replacing the filter plates, see the Operating Instructions for the relevant filter system).
- Clean the booth completely (never ever wet clean!).

CAUTION: Booth cleaning should not be performed immediately after the powder hopper has been refilled with fresh powder because the powder could possibly overflow!

- Empty the powder hopper and clean it (see previous page).
- Check all oil separators. If necessary, empty (if oil is present, check the air compressor plant).

Half-yearly :
- Disconnect the hoses to the manostats at the pressure gauge and blow out the hoses in the direction from the pressure gauge to the measuring point (at the head of the line - see Fig. 3 below).

Hose colour code : red = high, blue = low.

CAUTION: It is very important to blow out the hoses in the specified direction!

NOTICE: All components to be replaced as a part of maintenance are available as spare parts. Please refer to the Spare Parts List.
Replacement of Spare Parts

General
The plant must always be shut down before any parts are replaced. Parts should be replaced only by trained personnel!
Use only original ITW Gema parts. Using spare parts from other manufacturers will invalidate ITW Gema guarantee conditions.
Please order all spare parts according to the Spare Parts List.

Replacing the bulbs in the signal lamps on the ICS control cabinet

Signal lamp:
- Unscrew the plastic cap (K)
- Remove the cap (I), with the aid of the special key supplied.
- Remove the defect bulb with the aid of the bulb extractor supplied.
- Replace the new bulb and reassemble the signal lamp in the reverse order.

Figure 4
Notes: