Operating Instructions

Filter trolley with Fluidizing plate
- MRS Multi Recovery System

Translation of the original operating instructions
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1. **Installation**
   Installation work to be done by the customer must be carried out according to local safety regulations.

2. **Grounding**
   All parts of the Filter Trolley must be grounded. The ground connection must be done by the customer on site.

3. **Repairs**
   Repairs should only be carried out by trained personnel.
   Before carrying out repairs or maintenance work the following procedures are to be observed:
   - The Filter Trolley must only be started/shut down by authorized persons.
   - The Filter Trolley must never be put into operation without the interlocking safety devices provided.
   - Make sure that the powder spraying equipment is never put into operation without the Filter Trolley.
   Observe the following procedures when working on the filter valves, and filter plates:
   - Close down the compressed air supply, and depressurize the system.
   - Do not change the preset cleaning pressure of the filter regulator.
   - Shut off the compressed air supply and secure it to prevent unintentional opening!
   - Allow the plant to run without powder loading until the pressure in the compressed air tank has dropped to zero (0)!
Technical Data
(subject to change)

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

Exhaust fan performance:

For Organic powder:
- 7.5 kW with 8 filter plates or 6000 m$^3$/h
- 11 kW with 10 filter plates or 7500 m$^3$/h
- 11 kW with 12 filter plates or 9000 m$^3$/h
- 15 kW with 14 filter plates or 10500 m$^3$/h
- 15 kW with 16 filter plates or 12000 m$^3$/h

For Enamel powder:
- 5.5 kW with 8 filter plates or 4400 m$^3$/h
- 7.5 kW with 10 filter plates or 5500 m$^3$/h
- 7.5 kW with 12 filter plates or 6600 m$^3$/h
- 11 kW with 14 filter plates or 7700 m$^3$/h
- 11 kW with 16 filter plates or 8800 m$^3$/h

Fan pressure difference:
- with 8,000 m$^3$/h: 4.2 kPa
- with 12,000 m$^3$/h: 4.5 kPa

Compressed air connection:
- Inlet pressure: min. 6 bar / max. 10 bar
- Recommended inlet pressure: 7 bar

Minimum compressed air quality:
- Water vapour content: max. 1.3 g/m$^3$
- Oil content: max. 0.1 mg/kg
  (Oil/Air)
Filter trolley with Fluidizing plate - MRS Multi-Recovery System.

1 Sealing frame
2 Solenoid valve cover plate
3 Exhaust air fan housing

MRS Multi-Recovery System Powder Coating Booth with Filter trolley with Fluidizing plate.

Figure 1
Powder Recovery

The actual powder recovery takes place in the filter trolley. The powder/air mixture is sucked onto the filter plates (8). The front opening (1) in the filter trolley forms the intake (2), where satisfactory suction is available. The powder/air mixture is sucked into the filter trolley intake (1) and is filtered with a very high separation coefficient by the filter plates (8). The separated powder falls to the floor of the filter trolley (3). Depending on its use the powder is transported by means of a powder pump (4) from the booth fluidizing channel (9) to the external powder hopper (5). The remaining exhaust air, escapes from the filter trolley through the exhaust fan housing (10) to the workshop environment. The filter trolley is connected to the exhaust fan (7 - with the Jet pulse cleaning unit) by a pneumatically operated sealing unit (6).

Powder recovery process on an MRS booth with a filter trolley with fluidizing plate.

Figure 2
**Exhaust air system (recirculated air)**
*(Bold numbers refer to Fig. 2, page 2)*

The fan of the exhaust system is located in the housing above the filter trolley. The fan draws air from inside the booth, first through the filter plates (8), and then through the exhaust fan housing (10), the clean air is then returned into the workshop.

The suction capacity depends on the total area of the booth openings (gun slots, manual coating openings, etc), and the permissible powder/air concentration. The required volume of air is adjustable with throttle vanes, which are installed on the fan housing exhaust air outlet and are set on assembly and do not normally require resetting.

The efficiency of the exhaust system depends on how severely the filter plates (8) are clogged. For this reason the suction efficiency is determined by measuring the pressure difference between the suction chamber, and the exhaust side, and indicated on the gauges of the pressure monitoring unit.
*Rising pressure indicates increasing clogging of the filter plates.*

**Filter cleaning**
*(Bold numbers refer to Fig. 2, page 2)*

The filter plates (8) are periodically cleaned, in pairs, with short blasts of compressed air (jet cleaning - 7) 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 onto the filter trolley fluidizing plate (3). 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 (7) into the top of the filter plates through solenoid valves. The pressure tank, and the solenoid valves are integrated into the clean air housing in the middle section of the exhaust fan housing (10).

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.

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*CAUTION*

Good quality 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 Booth settings - Overview

The values given in this table are used on setting up the system, but may be changed to suit the conditions existing at the individual sites.

**Pneumatic:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input pressure</td>
<td>6 bar (min.)</td>
</tr>
<tr>
<td>Filter cleaning pressure</td>
<td>5.5 bar</td>
</tr>
<tr>
<td>Sealing frame</td>
<td>2 bar</td>
</tr>
<tr>
<td>Fluidizing plate</td>
<td>2-4 bar*</td>
</tr>
</tbody>
</table>

*Must be set according to the type of powder used. The powder must flow.

**Filter cleaning:**

Valve control A56/A156:

- Valve opening time: 100-160 ms *(The cleaning pressure should sink by 2-2.5 bar).*
- Single colour pause time: 20-30 secs.

Check the powder transport efficiency of the pumps. Set the times accordingly.

*The adjustment of the cycle time should only be set by trained personnel.*

The control printed circuit is in the switch cabinet.

**Fan pressure monitoring:**

<table>
<thead>
<tr>
<th>Pressure condition</th>
<th>Gauge</th>
<th>Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under-pressure 1</td>
<td>A222</td>
<td>B30</td>
</tr>
<tr>
<td>Over-pressure 1</td>
<td>A222</td>
<td>B31</td>
</tr>
<tr>
<td>Under-pressure 2</td>
<td>A224</td>
<td>B32</td>
</tr>
<tr>
<td>Over-pressure 2</td>
<td>A224</td>
<td>B33</td>
</tr>
</tbody>
</table>

Set the Alarm/Vane setting motors according to the fan curve diagram.
Start-up Preparations

Overview
1. Refer to the safety recommendations.
2. Perform the following checks, and the corresponding steps where applicable:
   a. Connect the filter trolley.
   b. Connect the exhaust fan housing.
   c. Check that the filter plates are firmly seated.

Connecting the Filter trolley

Procedure:
1. Check the sealing strips.
2. Install the filter trolley in the position foreseen for it on the booth.
3. Fit the toggle catches, and lock the levers.
   The filter trolley is pressed against the booth and has an airtight connection with the booth through the rubber sealing strip.
4. When the booth is switched on the sealing frame (1) is automatically pressed onto the exhaust fan housing frame with compressed air.
5. The filter trolley is now connected airtight with the exhaust fan housing (Sealing frame pressure setting = 2 bar).

Check the sealing strips for a perfect seal. Damaged or missing sealing strips will lead to problems! The exhaust fan housing must always have an airtight connection with the filter trolley!!

Figure 3
Filter cleaning

Filter plates must never be cleaned manually, only with compressed air blasts at a steep angle to the sides the filter plates.

The filter plates are cleaned automatically (by an air blast, from the inside to the outside) at regular intervals during the coating operation. The cycle times are preset by the factory. If the maximum pressure difference is exceeded repeatedly (an alarm is triggered), then the pressure must be reset. (*Initial filter cleaning pressure = 5.5 bar*).

The pressure difference is indicated on the pressure monitoring equipment:
- "Filter pressure monitoring" is indicated optically on the pressure gauge only.
- "Fan pressure monitoring" is indicated optically on the pressure gauge, and an optical and acoustic alarm is released by two pressure switches, B30 and B31 (Fig. 4).

The upper limit, at which the alarm is released is specific to the plant and is set by the ITW Gema service engineer on assembly of the booth.
Powder recovery - with the FPS Fresh Powder System - Automatic.

An automatic refill operation is started by the integrated FPS Fresh Powder System when a powder shortage is detected.

When the powder level in the powder hopper drops below the upper level sensor, the PTC 1 Powder Transfer Control switches the PP 1 Powder Pump on at the Suction point 1 (Fluidizing channel on the filter trolley, if fitted). The powder transfer setting should be 2.5-3.5 bar. Powder is then pumped from the filter trolley to the PH powder hopper. The PP 1 Powder Pump transport efficiency is 2 kg/min at 3 bar with a hose length of 10 m.

If the lower level sensor remains uncovered for any length of time the PP 1 Powder Pump at Suction point 2 (Fresh Powder System) is switched on for a certain time. If an acoustic alarm is actuated and the powder shortage is indicated by the lamp - H6, then the refilling time must be checked or reset (The resetting of the corresponding relays must be done by trained personnel only, see the circuit diagram).
Repairs to Pneumatic gauges, and regulating valves

Before starting the following repairs the booth must be switched off at the Mains and should only be made by trained personnel.

Replacing a pressure gauge (See Fig. 7)

Vent the compressed air network of the booth. For this purpose close the inlet pressure regulator and operate the booth until all the compressed air has been consumed. The input pressure gauge should read 0 (Zero).

⚠️ CAUTION ⚠️

Switch off the booth at the Mains.

- Remove the corresponding curved corner panel (orange) from the booth.
- Remove air hose from the valve connection.
- Carefully push in the tongues on the inside of the panel holding the gauge.
- Remove the pressure gauge (4).
- Push the new pressure gauge into the hole and fit the air hose in the corresponding connection.

Replacing a pressure regulating valve (See Fig. 7)

Vent the compressed air network of the booth. For this purpose close the inlet pressure regulator and operate the booth until all the compressed air has been consumed. The input pressure gauge should read 0 (Zero).

⚠️ CAUTION ⚠️

Switch off the booth at the Mains.

- Remove the corresponding curved corner panel (orange) from the booth.
- Remove the air hoses from the connectors
- Unscrew the locking ring on the front of the panel
- Unscrew the split double adapter nut
- Lift out the pressure gauge.
- Remove the split double adapter half from the defect valve.
- Screw the double adapter half into the new valve with the corresponding Allen key.
- Replace the new pressure regulating valve in the reverse order.
- Check that there are no air leaks at the joints.
Pneumatic gauges, and regulating valves

1 Compressed air input.
2 After Filter rinsing.
   (24 VDC Solenoid valve).
3 Filter trolley filter rinsing.
4 Sealing frame connection.
5 Filter trolley fluidizing plate.
6 Fluidizing channel.
7 Squeegee cable rinsing.
8 Not connected.
9 Not connected.
10 Pressure regulating valves.
11 Booth panel
12 Base cover plate

Pressure gauge assembly (Viewed from the side, and above)

1 Booth panel
2 Air distributor bar
3 Regulating valve
4 Pressure gauge
5 Solenoid valve
6 Main air input (with water/oil separator)
Before starting the following repair the booth must be switched off at the Mains and should only be made by trained personnel.

Replacing a pressure monitoring gauge (See Fig. 9 on the next page)

- Remove the corresponding curved corner panel (orange) from the booth.
- Remove air hoses from the connections.
- Loosen the outer screws (4) holding the meter clamps.
- Remove the inner screws (5) holding the meter clamps.
- Push the meter out of the front panel and replace with a new meter.
- Reassemble in the reverse order, making sure that the meter clamps sit correctly before tightening the long screws.

Before starting the following repair the booth must be switched off at the Mains and should only be made by trained personnel.

Replacing a pressure monitoring switch (See Fig. 9 on the next page).

![CAUTION] Push-in type hose fittings must **not** be used on pressure or monitoring gauges.

Pressure gauges, and switches for filter pressure monitoring are fitted in the corner elements of the booth.
1. Remove the corresponding corner panel (orange) from the booth.
2. Remove air hoses from the pressure switch (1 or 2) connections.
3. Unscrew the locking ring (6) from the pressure switch.
4. Push the pressure switch body (1 or 2) out of the panel.
5. Remove the cover of the electrical housing.
6. Loosen the screws of the electric cable terminals. *Note the terminal allocation!*
7. Remove the cable from the housing.
8. Replace with a new pressure switch (1 or 2). *Note the correct hose connection of the air hoses: H = High, L = Low*
9. Reassemble in the reverse order. *Care should be taken when connecting the wiring.*
Pressure monitoring gauges

1 Fan monitoring gauge.
2 After Filter monitoring gauge.
3 Filter trolley monitoring gauge.
4 Reserve.
5 Pressure switches.
6 Booth panel.
7 Base cover plate.

Pressure Monitoring Assembly (Viewed from the rear, and side)

1 Pressure switch
2 Pressure switch
3 Pressure monitoring gauge
4 Outer screw (long)
5 Inner screw (short)
6 Locking ring
Replacing the solenoid valve for cleaning the filter plates

The solenoid valves for jet cleaning are located in the clean air chamber in the exhaust fan housing (see Fig. 10 below) and are accessible through the rear panel on the housing. If a solenoid valve is faulty, it is usually only necessary to clean the upper part of the solenoid housing where the diaphragm is fitted. If the fault is not corrected with this operation the solenoid must be replaced completely.

Procedure :
1. Vent the compressed air network of the booth:
   for this purpose close the inlet pressure regulator and let the booth operate until all the compressed air in the pressure tank in the fan housing has been consumed.
   The pressure gauge of the pressure tank should stand at 0 (zero).
2. Switch off the booth.
3. Open the solenoid valve cover plate (2 - Fig. 1, page 1). The solenoid valves are now accessible.
4. Unplug the control cable of the defect solenoid valve.
5. Unscrew the screws (S - Fig. 10) from the pressure tank, remove the upper section of the solenoid valve and replace with a new one (Take care with the gasket).
6. Assemble in the reverse order.

CAUTION
Care should be taken when retightening the screws - S (Aluminium housing !!). M = 14 Nm
Replacing the filter plates in the Filter Trolley

Note:
Before removing the filters, be sure to order:
- **Gaskets** and **seals**, to be able to replace any defective gaskets or seals right away.
- **Coated screws**. The coating of the thread sealant will have worn off after the filter elements have been removed/reinstalled 5 times.

⚠️ CAUTION Before starting repair, and maintenance work switch off, and depressurize the systems. **Lock the main compressed air supply.**

Run the booth and the cleaning systems until the pressure in the compressed air tank has dropped to zero. Turn the main switch on the switch cabinet to the O (Off) position.

*Check the pressure gauge display again to be sure there is no pressure in the tank.*
- **There could be a considerable risk of injury if the tank is not empty!!**

Replacing filter elements

It only takes **one** defective filter element to cause the destruction of a **complete** filter set because leakage will result in internal fouling of all the filter elements.

1. Open the filter trolley door (Fig. 11).
2. Unscrew the screw on the side of the door and turn the comb bar (Fig. 12) downwards.
3. Unscrew the fixing screw (1 - Fig. 13, page 14) only so much that the sealing strip is not compressed.
4. Release the other side of the filter plate, remove the screw (1 - Fig. 13, page 14), the washer (2 - Fig. 13, page 14), and spacer (3 - Fig. 13, page 14).
5. Number the filter plates, then remove to check their condition. If necessary clean or replace.
6. Check the condition, and seating of the sealing strip. If necessary replace (see "Replacing the sealing strip", page 15).
- **Store the filter elements horizontally on suitable supports with packing (cardboard strips) placed between them.**
7. Repeat these operations until all defect filter plates are replaced.
Fitting a filter plate

1. Coat the thread of the screw (1 - Fig. 13) with sealing compound. If the screw coating is worn it must be replaced.
2. Place the washer (2 - Fig. 13), and spacer (3 - Fig. 13) on the screw shank.
3. Align the filter element approximately under the perforated plate.
4. Insert the screw, washer, and spacer through the oblong hole in the filter bracket and screw into the tapped hole in the perforated plate, without tightening.
5. Screw the other side of the filter plate to the perforated plate, also without tightening.
6. Tighten both screws with a torque spanner.

**CAUTION**

*Prescribed torque : Mt = 40 Nm.*

7. After installing the first filter element, turn up the locating bars far enough to permit the lower filter bar to seat about 5 mm (Fig. 14) into the recess of the locating bar.
8. Repeat Steps 1-6 until all defect filter plates are replaced.
9. Turn up both locating bars to a point where the filter bars seat about 15 mm into the recess (Fig. 15), and then tighten the clamping screws. After all filter plates have been installed; turn up the comb bar and secure with a screw on the side of the door.
Replacing the sealing strip

Aged, inelastic or porous rubber sealing strips must be replaced, without exception.
1. Carefully remove the faulty sealing strip (Fig. 16).
2. Thoroughly clean the top of the filter (contact surfaces for the sealing strip), and the groove.
3. Fit a new sealing strip.

**CAUTION**

The vent holes in the sealing strip must face inwards.

4. The joint of the sealing strips should be located on the long side of the filter element (Fig. 17). Make sure that the sealing strip sits uniformly in the groove. Carefully tap into place with a rubber hammer.
# Troubleshooting Guide

**CAUTION** Repairs must only be undertaken by qualified personnel!

<table>
<thead>
<tr>
<th>Fault / Error / Problem</th>
<th>Solution</th>
</tr>
</thead>
</table>
| Alarm has been activated, Lamp - **H39** is illuminated.                                 | - Sealing sleeve not airtight  
- Filter plates damaged or not screwed tight.                                             |
| Min. pressure in filter housing not reached                                             |                                                                         |
- Manostat activated.                                                                     |                                                                         |
| Alarm has been activated, Lamp - **H38** is illuminated.                                 |                                                                         |
- Max. pressure exceed in filter housing                                                 |                                                                         |
- Filter Manostat activated.                                                              |                                                                         |
- Object sucked into intake causing malfunction.                                          |                                                                         |
- Filter clogged (Valve defect or cleaning pressure too low - min. 5 bar).                |                                                                         |
- Contaminated compressed air (contains oil and/or water)                                 |                                                                         |
- Malfunctioning on running-in the plant, until a powder cake has built up on the filter plates (acts as an additional fine filter). |                                                                         |
| If none of the above mentioned faults appear then the throttle vanes on the exhaust fan housing must be reset. |                                                                         |
| - Powder on fluidizing plate                                                             |                                                                         |
| - Fluidizing pressure too low                                                            |                                                                         |
- Fluidization does not switch on                                                         |                                                                         |
| - Filter pressure too high                                                               |                                                                         |
- Filter cleaning pressure too low                                                         |                                                                         |
- Cleaning sequence time set too long                                                     |                                                                         |
- Exhaust air volume too large                                                            |                                                                         |

**CAUTION** If the pressure gauge shows an increase in pressure greater than 2.2 kPa, consult an ITW Gema Service Centre as soon as possible.