MANUAL

ASM - Aluminium Spraying Machine

This Manual is published by:

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SAFETY INFORMATION AND SYMBOLS

Read this manual in full before operating the appliance. Failure to follow the instructions may result in injury or equipment damage.

Read the instructions before operating the appliance.
Use only the original equipment provided by the manufacturer.

Put on eye protection

Wear hearing protection

Put on protective gloves

Put on an anti-dust mask

Remark! Hot surface!

General safety rules

1. Operate the ASM **only** in a dry, well-ventilated area free from flammable gases, vapours, and dust.
2. Keep the unit **upright** at all times. Laying it on its side can flood the heater with powder and cause a fire.
3. Never direct the spray jet at people or animals. The jet can embed metal particles in skin and eyes.
4. Isolate the machine from the mains and compressed air before servicing.
5. Children and untrained staff **must not** use the ASM.
6. Use clean, dry, oil-free compressed air (quality ISO 8573-1 Class 2.4.2). Moist or oily air causes clumping and erratic spray patterns.
7. Inspect hoses, cables, and couplings daily. Replace damaged parts immediately.
8. During extended operation (> 15 min) allow the heater to cool for 60 s every 30 min to reduce thermal fatigue.
9. Always keep a Class D fire extinguisher (metal powder) within reach.

Caution – Aluminium dust can explode. Do not accumulate powder in the booth. Vacuum with an ATEX-rated extractor or the WM710 or WM750 Wheel Blaster should be used as a spray room.

INTENDED USE

The ASM is a **cold-spray system** that accelerates aluminium powder to supersonic velocity in a heated air stream. Upon impact, the particles deform plastically and bond metallurgically to the substrate without significant melting. Typical applications:

- Corrosion protection for steel structures
- Dimensional restoration of worn shafts and housings
- Localised filling of galvanic holes prior to painting
- Electrical conductivity enhancement in bus bars

Prohibited uses – Spraying flammable, organic, or toxic powders; using the ASM as a paint spray gun; operating below 6 bar or above 10 bar.

3.1 Process Advantages

- **Low heat input** – Substrate temperature rarely exceeds 150 °C, avoiding distortion.
- **High deposition efficiencies** – 60–80 % for properly prepared surfaces.
- **Dense, ductile coatings** – Porosity ≤ 2 %; bond strength > 35 MPa.

TECHNICAL SPECIFICATIONS

Parameter	Value
Rated voltage	220 – 240 V AC, 50/60 Hz
Maximum heater power	3.3 kW
Spray-surface heating temperature range	0 – 250 °C
Heater operating temperature range	0 – 600 °C
Working pressure	6 – 8 bar
Air-flow requirement	0.45 m^3 min^{-1} (≈ 450 L min^{-1})
Air quality (ISO 8573-1)	Class 2.4.2 or better
Weight	7 kg
Heater-body temperature (max)	50 °C
Noise level @ 1 m	75 dB(A)

PRODUCT OVERVIEW

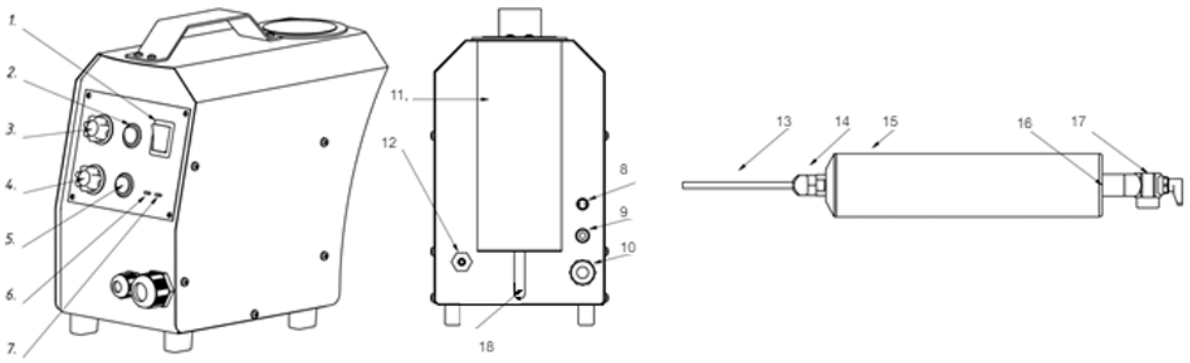

Fig.1 Description of the device

Front Panel Controls

1. Main power switch – Supplies power to control electronics.
2. Heater enable button – Activates heating element (indicator LED rings the button).
3. Temperature control dial – Sets nozzle temperature from ambient to 600 °C.
4. Powder-feed regulator – 0–100 % stepless control of feed screw speed.
5. Powder-feed enable button – Starts/stops auger motor.
6. Ready indicator (green) – Illuminates when air pressure and door interlocks are satisfied.
7. Fault indicator (red) – Over-temperature, motor overload, or interlock open.

Rear Panel Connections

8. Powder-tank electrical connector
9. Over-temperature fuse (resettable)
10. IEC C14 power-cord inlet with integrated filter
11. Protective earth stud (M5)
12. G ¼" compressed-air inlet with quick coupling

Heater & Nozzle Assembly

13. Swivel joint (360° rotation)
14. Converging–diverging nozzle
15. Cartridge heater
16. Manual powder-pulse button (clears clogs)
17. Air-supply shut-off valve

INSTALLATION AND COMMISSIONING

Prerequisite – Ensure the compressor can supply at least 500 L min^{-1} at 7 bar with a **pressure dew point ≤ 3 °C**.

1. Position the ASM on a **stable, level workbench**. Clearance: ≥ 300 mm rear, ≥ 500 mm top for ventilation.
2. Fit the supplied vibration-damped feet if the bench is metallic.

3. Connect power to a **grounded 230 V AC outlet** protected by a 10 A RCBO.
4. Install a twin-stage filter/dryer upstream and connect the air line with antistatic hose.
5. Securely fasten the powder-tank connector. Hand-tight only—overtightening damages pins.
6. Open valve 17. The **green Ready LED** lights within 2 s. If not, check:
    - Air pressure (gauge should read ≥ 6 bar)
    - Door interlock on spray booth (if wired)
    - Fuse 9 (push to reset)
7. Perform a **leak test**: pressurise the powder tank to 1 bar for 30 s. Spray soapy water—zero bubbles permitted.
8. Fill the tank with maximum 2 kg of **spherical aluminium powder, 15–45 µm**, ASTM B 214, purity ≥ 99.5 %. Fit desiccant capsule to the breather port.
9. Run the heater at 300 °C for 5 min without powder to outgas any residual moisture.

OPERATING INSTRUCTIONS

Surface Preparation

Cleanliness – Grit-blast to ISO 8501-1 **Sa 2½** using fused alumina 180–220 µm. Residual chlorides < 25 mg m^{-2}.

Roughness – Aim for **R_a 8–12 µm**. Coarse profiles reduce adhesion.

Degreasing – Wipe with methylated spirits or acetone; dry with oil-free air.

Spraying Parameters

Application goal	Temp. setting (dial 3)	Notes
Surface cleaning	0 – 3	Removes rust/oxides without melting.

Application goal	Temp. setting (dial 3)	Notes
Standard coating build-up	3 – 5	Balance of density and adhesion.
High build / cavity fill	5 – 7	Higher porosity for gap filling.

- Maintain a 15 – 20 cm stand-off distance.
- Traverse at 2 – 4 cm s^{-1} with 50 % overlap.
- Adjust powder-feed knob (4) until deposition is uniform.

Start-up Procedure

1. Press **Main power**; verify fan noise and display back-light.
2. Set heater dial to target temperature; wait until display reads *Ready* (≈ 90 s).
3. Set powder feed to zero, then press **Powder-feed enable**. Gradually increase until uniform plume appears.
4. Establish correct traverse speed: hold nozzle at 45° to substrate; deposit a 50 × 50 mm patch; measure thickness.

Shutdown Procedure

1. Release **Powder-feed enable**.
2. Keep airflow and heat ON for 60 s to flush residual powder.
3. Press **Heater enable** to OFF; continue airflow for 120 s minimum until nozzle < 80 °C (display shows temperature).
4. Close air valve 17; pull mains plug if storing.
5. Empty remaining powder into an antistatic jar; label with lot number and moisture indicator.

MAINTENANCE

Preventive Maintenance Schedule

Interval	Task

Per shift	Clean exterior; purge powder line; inspect cables/hoses
Weekly	Drain air dryer; clean powder screw; rotate nozzle ¼-turn
Monthly	Replace 5 µm filter element; test safety interlocks
Quarterly	Calibrate thermocouple; verify insulation resistance
2000 h	Replace cartridge heater; grease swivel joint

Cleaning Procedure

Shut down and isolate machine.

1. Remove nozzle and soak in **ultrasonic bath** (isopropyl alcohol) for 10 min.
2. Blow dry with ≤ 4 bar air; inspect for erosion. Replace if throat diameter > +0.3 mm.
3. Wipe heater body with lint-free cloth. Do **not** immerse heater.

Powder System Service

1. Unscrew powder tank; remove auger.
2. Brush threads; rinse with ethanol; dry.
3. Lightly coat auger flights with food-grade PTFE spray.

Air Filter Replacement

1. Depressurise system; unscrew filter bowl; discard element in sealed bag (WEEE waste).
2. Fit new element **code HF-5-A**. Torque bowl to 15 N m.

Temperature Calibration

Equipment required: Type-K thermometer, accuracy ±1 °C; reference block.

1. Set dial to 300 °C; wait for stabilisation (display steady ±2 °C).
2. Insert probe into nozzle throat via reference block; record reading.
3. If deviation > 5 °C, adjust **P-02** in technician menu (password 1604).

TROUBLESHOOTING

Symptom	Possible Cause	Remedy
Green indicator OFF	Air pressure < 6 bar	Increase compressor output; check lines.
Red indicator ON	Over-temperature trip	Allow cooling; verify airflow & filters.
Inconsistent powder feed	Tank empty or feed rod clogged	Refill tank; clean rod and hose.
Excessive nozzle wear	Abrasive powder flux too high	Reduce feed rate; rotate/replace nozzle.

STORAGE & TRANSPORTATION

Store upright in original crate at **0–40 °C, 20–80 % RH**. For transport:

- Fit protective caps to all ports.
- Use shock indicators; keep below 30 g acceleration.
- If transported by air, purge powder tank with nitrogen to < 1 mbar O_2.

RECYCLING & DISPOSAL

The ASM is subject to the **European WEEE Directive 2012/19/EU**. At end-of-life, return the machine to an authorised collection centre. Aluminium powder residues are **hazardous waste** (EWC 12 01 16) and must be disposed of in accordance with local regulations.

WARRANTY TERMS

HBC System warrants the ASM – Aluminium Spraying Machine against defects in materials and workmanship for 12 months from the date of purchase, provided the unit is operated and maintained as described in this manual.

Exclusions: consumables (filters, fuses, nozzles), damage caused by misuse, modifications, improper air quality, or operation in a non-upright position.

Claim procedure: complete the Failure Report Form and return the device carriage-paid with proof of purchase.

CONTACT & SUPPORT

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