The Sulzer Metco 9MC Plasma Control Unit is a PLC-based system that provides accurate and repeatable semi-automatic control, monitoring, and operation of a Sulzer Metco air plasma spray system.

The 9MC is used in conjunction with the Sulzer Metco 9MCD Distribution Unit, which is a free-standing, mobile unit that houses electric power and plasma gun cooling water connections.

The 9MC Control Unit is a multi-gas compatible device that can accurately control plasma coating parameters using argon, nitrogen, helium, argon/hydrogen, nitrogen/hydrogen or argon/helium process gases.

An easy to read LED message display permits convenient, centralized monitoring of system operation status and alarm conditions. Messages include high water temperature, ignition failure, and low plasma gas flow. It displays self-diagnostic messages during alarm conditions to quickly identify the type of fault preventing normal operation.

Robotic gun and workpiece manipulation equipment, exhaust systems, and accessory controls are optionally interfaced with the 9MC to automate the entire plasma spray process. Two powder feeders can be connected for individual or simultaneous powder feed.

Multiple 9MC units can be configured in ‘Master / Slave’ configuration; a unique configuration that permits multiple 9MC units to be interfaced together, allowing control of multiple guns from a single 9MC operator console — a configuration ideal for high volume production environments.
1 General Description

The 9MC is designed to interface to a Sulzer Metco plasma spray gun, and is an integral part of a complete plasma spray system. It is capable of lighting the gun, adjusting the plasma plume to preset parameters and automatically starting the powder feeders. The control unit continuously monitors process gas and air supplies and is capable of shutting down the system if the conditions should change beyond safe operating limits.

At start-up, the 9MC will determine if the exhaust equipment is operating, verify that the plasma gases, powder carrier gas, and cooling air pressure are present and start the gas flow to the powder feeder. It will start the power supply, initiate cooling water from the cooling unit and verify that the water is circulating through the gun at the correct temperature. Once these checks are complete, it will turn on the primary plasma process gas to a preset flow and ignite the plasma gun.

During operation, the control unit will automatically ramp-up to preset coating parameters, and starts feeding of the coating material from the powder feeder. It continuously monitors plasma and powder carrier gas pressures, cooling water temperature and pressure, and cooling air pressure. It will stop the system in the event of unsafe operating conditions. Real time monitoring of process amperage and voltage are provided on convenient to read LED displays. Process voltage is measured directly at the plasma gun for improved accuracy. At normal system shut-down, the 9MC safely ramps down and shuts off all power, gas flows and connected equipment.

The Sulzer Metco 9MC Control Unit is engineered with safety as an important design element. Electrical and gas cabinets are separated. An exhaust fan continuously ventilates the gas enclosure to prevent accumulation of gases in the event of accidental leakage.

A compressed air purge continuously keeps the electrical enclosure under partial pressure to guard against the entrance of spray dust or gases. The unit monitors the fan ventilation and compressed air purge preventing start-up or operation under unsafe conditions. Interlocks disconnects the line voltage if the controller door is opened during operation.

Standard connections on the 9MC permit the addition of four customer remote alarms, an exhaust system interlock and remote emergency stop control. Any number of emergency stop controls can connected in series to instantly stop operation.

The use of a separate 9MCD Distribution unit has the advantage of allowing the 9MC to be positioned close to the spray operation, eliminating the need for extra long cables, thus minimizing electrical power loss and improving water flow.
2 Features and Benefits

- Accurately and repeatedly controls plasma spray parameters for consistent coating quality.
- Large easy to read message center clearly displays all alarms for safe and simple operation.
- Self-diagnostics and monitoring of safe operating conditions, with alarms and system shut down in the event an unsafe condition occurs.
- Automatic plasma process start and stop minimizes cycle time, reducing gas and powder consumption.
- Interfaces with and controls additional plasma system components including exhaust equipment, workpiece and gun handling equipment and accessories.
- Up to two feeders can be connected to permit individual or simultaneous powder feed.
- Rotameters with true flow readout (in SCFH) and pressure gages are large and easy to read.
- Unique, multi-unit operation with ‘Master / Slave’ mode for high volume production capability and control from a single controller.
- 9MCD Voltage Divider (supplied with the 9MCD) provides voltage readings at both the plasma gun and the 9MCD with an accuracy of + 0.01%.
- Versatile, allowing use of all standard plasma process gases and combinations of process gases.
- Convenient built-in modes for easy operation, including purge, feed test and ignition modes.
- Soft-start ignition permits ignition using only argon gas to maximize gun component life.
- Isolated high-frequency ignition protects sensitive equipment from electromagnetic interference.
- The combination of the 9MC and 9MCD allows flexible and convenient positioning of the 9MC unit

3 Accessories and Options

Sulzer Metco offers options that provide flexible configuration of the 9MC series controllers with a variety of components to meet different customer production requirements. These include hoses, cables, gas regulators and interface modules. For a complete list of optional parts and spare parts, please refer to the parts lists section of the reference manual.

9MCE CE-Conformant Controller: A CE-conformant version of the 9MC Control Unit is available as a special order. Please contact your Sulzer Metco Account Representative for further information.

9MC900 Remote Control Pendant provides start/stop control for spray operation up to 7.6 meters (25 feet) away from the 9MC controller.

9MC420 Transformer is used to connect the 9MC controller to 200, 220 or 240 VAC, single phase, 50/60 Hz power sources.

9MCD604 Electrode Fitting Adapter for use of a Sulzer Metco 3MB spray gun with the supplied 9MCD600 Voltage Divider.

4 Technical Data

4.1 Dimensions
## 4.2 Specifications

### Process gases
- Argon, Nitrogen, Helium and Hydrogen

### Gas requirements

<table>
<thead>
<tr>
<th>Gas</th>
<th>Flow</th>
<th>Purity</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hydrogen</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow</td>
<td>13 NLPM @ 5.17 bar</td>
<td>99.95 %, &quot;pre-purified&quot; grade</td>
<td>30 SCFH @ 75 psi</td>
</tr>
<tr>
<td>Argon</td>
<td>98 NLPM @ 6.9 bar</td>
<td>99.995 %, &quot;pre-purified&quot; grade</td>
<td>224 SCFH @ 100 psi</td>
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<tr>
<td>Nitrogen</td>
<td>91 NLPM @ 5.17 bar</td>
<td>99.7 %, &quot;pre-purified&quot; grade</td>
<td>207 SCFH @ 75 psi</td>
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<tr>
<td>Helium</td>
<td>88 NLPM @ 5.17 bar</td>
<td>99.995 %, &quot;pre-purified&quot; grade</td>
<td>200 SCFH @ 75 psi</td>
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</table>

### Air requirements

<table>
<thead>
<tr>
<th>Gas</th>
<th>Flow</th>
<th>Purity</th>
<th>Requirements</th>
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<tbody>
<tr>
<td>Flow</td>
<td>920 NLPM @ 5.9 bar</td>
<td>clean, dry and oil-free</td>
<td>2100 SCFH @ 85 psi</td>
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### Weight

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
<th>Compatibility</th>
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</thead>
<tbody>
<tr>
<td>9MC Controller</td>
<td>208 kg</td>
<td>Sulzer Metco 3MB, 9MB, 11MB, F4</td>
</tr>
<tr>
<td>9MCD Distribution Unit</td>
<td>161 kg</td>
<td>Powder Feeder 9MP, 5MPE (requires 5MPA Interface Assembly), Twin 10-C</td>
</tr>
</tbody>
</table>

### Compatibility

- Guns: Sulzer Metco 3MB, 9MB, 11MB, F4
- Powder Feeder: 9MP, 5MPE (requires 5MPA Interface Assembly), Twin 10-C

### Electric power requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Voltage</th>
<th>Amperage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>110 .. 120 V, single phase, 50/60 Hz</td>
<td>9.2 A @ 110 .. 120 VAC</td>
</tr>
<tr>
<td></td>
<td>110 / 220 / 240 V, single phase, 50/60 Hz with 9MC420 Transformer</td>
<td>4.6 A @ 200 .. 240 VAC</td>
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<tr>
<td>Plasma Power Control Capability</td>
<td>80 kW</td>
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