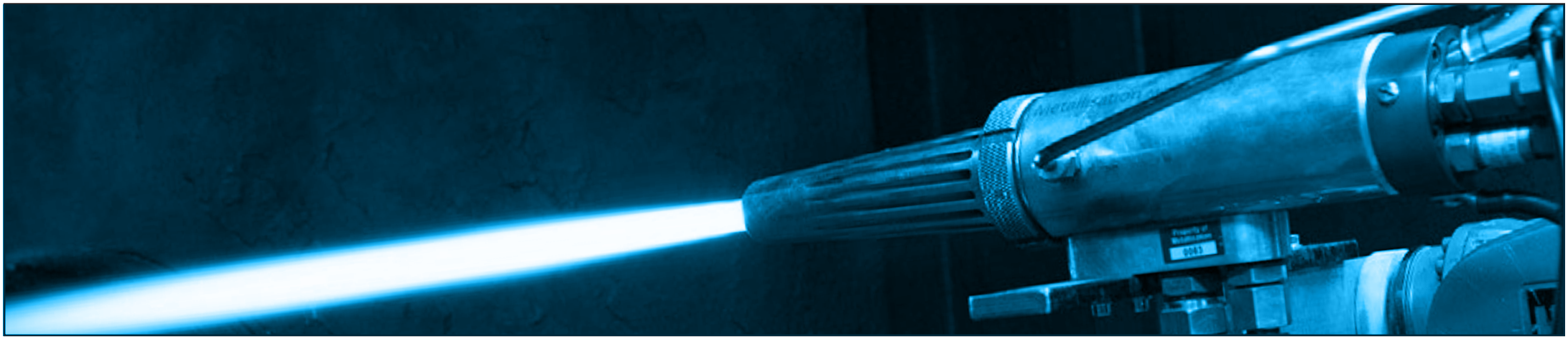
Met-PCC(HVOF-L)



Equipment Spec

Metallisation
thermal spray **solutions**

CE

Introducing the Met-PCC(HVOF-L)

Our liquid fuelled High Velocity Oxygen Fuel (HVOF) systems

- Intuitive interface
- Low porosity
- High bond strength

A complete HVOF spraying system combining our MET-PCC(HVOF-L) control system with PC touch screen operator interface and optional ME-JET 4L liquid fuel pistol and 2022 Mass Flow Powder Feeder

High Velocity Oxygen Fuel (HVOF) is a process to apply very dense, strongly adhered coatings.The Met-PCC(HVOF-L) system uses simple control and operator interface features. It can be interfaced with our own MET-JET 4L pistol and/or other non-Metallisation liquid fuel pistols. The Met-PCC(HVOF-L) system has re-packaged the control elements and utilised the latest technology to optimise functionality and reliability. At the front end, the operator interface utilises an intuitive Graphical User Interface (GUI), including the option to integrate video images into the display. The interface runs on a familiar touchscreen Windows PC platform with Intel Dual Atom processor which is great for usability, integration and communication. Behind the scenes, the latest PLC runs the system with communication between devices via the reliable Ethernet protocol. The gases mass-flow controlled for optimum repeatability of coatings. All spray parameters can have real-time trending on the system. The result is a truly unique, compact design, flexible, easy to operate HVOF system, backed up by Metallisation's 100 year+ industry experience and support.

HIGH ENERGY THERMAL SPRAY

KEY APPLICATIONS

- **Hard-chrome plate alternative.**
- **CGL mill rolls.**
- **Oil/Gas valves.**
- **Paper Rolls.**
- **Suspension Components.**
- **Landing Gear.**
- **Hydroelectric turbines.**
- **Automotive valves.**
- **Wire drawing blocks.**

HIGH HARDNESS

LOW OXIDE LEVEL

System Overview

HIGH LEVEL SURFACE FINISH

MET-JET 4L PISTOL

- Simple nozzle design.
- Sturdy, robust design.
- Simple pistol maintenance.
- Single point fuel injection.
- Robot mounting interface.
- Alternative pistols supported.

CONTROL BOX

- Oxygen mass flow controller.
- Control PLC.
- Liquid fuel holding tank.
- Fault indication Strobe.
- E-stop circuit with external interface.

HMI INTERFACE

- Industrial PC.
- 17” touch screen.
- Familiar Windows platform.
- Real time data logging.
- Full, on screen diagnostics.
- Intuitive and simple to use.

POWDER FEEDER

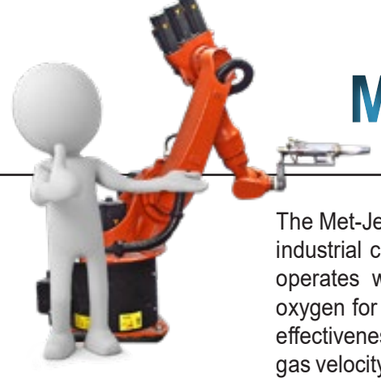
- Mass flow control.
- Volumetric feed.
- Two disc variant.
- Closed loop AC inverter.
- Multiple options with various sized hoppers.

HIGH QUALITY

DENSE COATING

PC CONTROL

HIGH BOND



MET-JET 4L PISTOL

The Met-Jet 4L is the ultimate solution for industrial coating applications. The pistol operates with kerosene liquid fuel and oxygen for maximum efficiency and cost-effectiveness and can achieve supersonic gas velocity with our converging/diverging nozzle at the combustion chamber exit. This ensures a smooth and even coating. A Low dwell time means quicker turnaround times for your projects and our radial, low-pressure powder injection system provides superior coating integrity and uniformity. The combustion chamber achieves clean burning and high quality coatings and the nozzle arrangement is simple which reduces running costs of consumables and enables quick and efficient maintenance. Three nozzle lengths are available to enable a wide range of coating properties to be achieved, from hard but ductile coatings, to extremely hard, but more brittle coatings.

DENSE & TIGHTLY BONDED COATINGS

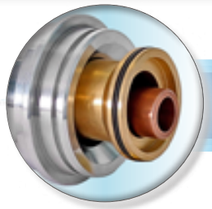
OPTIONS

Part No.	Description
JET4L-100	MET-JET4L liquid fuel pistol with 100mm nozzle
JET4L-ACC	MET-JET 4L toolkit and accessories

Pistol includes toolkit:

- Contains all tools for routine maintenance.
- Contains all spares to convert a 100mm pistol to a 200mm pistol (nozzle, nozzle housing and front baffle).

Radial low-pressure powder injection system



Simple nozzle design reduces consumable spares costs

Supersonic Gas Velocity

EFFICIENT COOLING FOR MAXIMUM PRODUCTIVITY AND LONGEVITY

EASY TO OPERATE & MAINTAIN FOR MAXIMUM PRODUCTIVITY

MULTIPLE GUN CONFIGURATIONS & BARREL LENGTHS

Robot mounting interface

Steel powder feed tubes for reliable operation

Low Dwell Time

Industry 4.0 Compliant

Superior Coating Integrity

Control System

The MET(PCC) control console is the heart of the system. It consists of a PC with a touch-screen operator interface, a control box and a standard robot interface (robot master). It provides integration and control of the complex component parts of the HVOF system. The operator interface is via a 17" touch-screen panel and is designed to be intuitive and simple to use. For reliability of operation, the actual control of the individual operations of the system are controlled by PLC's in the control box and powder feeder. Repeatable operations are easily programmed and actioned for day to day operation or can be linked to barcode systems for even simpler programming. The system can also be used for more in-depth coating and parameter development, still with simple and intuitive interface.

CONNECTIVITY

OPTIONS

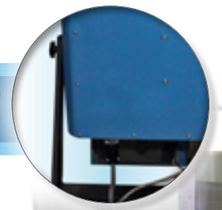
Part No.	Description
PCC(HVOF-L)-CTRL	Met-PCC(HVOF-L) Liquid Box Console
MF-PF-CTRL	Mass flow powder feeder kit in the gas box
PCC(HVOF-L)-FAK	Fuel Assist Kit
MET-TROL	Metallisation Ancillary Trolley
9880W	HMI Mounting Bracket Kit (WALL MOUNT)

Industrial Touch Screen PC running MS Windows O/S

Integrated E-stop button

Keyboard with Integrated Track Pad

USB Powerable Ethernet Hub



Freestanding, post or moving arm mounted HMI

Typical installation:
Control box = Inside spray booth.
Powder Feeder = Inside or outside spray booth.
HMI = Outside spray booth.

Easy access to connecting hoses and cables

SAFETY INTERLOCKS

LIQUID FUEL = THICK LOW STRESSED COATINGS

PLC For Control

Robot Interface via Ethernet

E-stop circuit with external interface

System Operation

The operator interface utilises an intuitive Graphical User Interface (GUI), including the option to integrate video images into the display. The interface runs on a familiar touchscreen Windows PC platform with Intel Dual Atom processor which is great for usability, integration and communication. The system is operational in 2 basic modes: Manual and Auto with the additional option for an unlimited number of definable recipes to be pre-programmed. By selecting a recipe, all of the parameters will automatically program the system.

INDUSTRIAL VARIABLE POSITION ENCLOSURE

MONITORING TABS FOR COMPLETE CONTROL

MODES OF OPERATION

MANUAL MODE

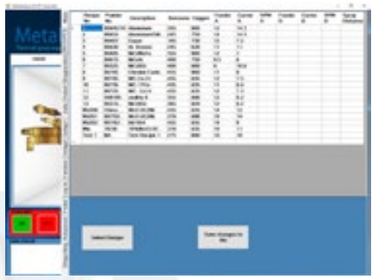
Enabling the operator to manually enter values prior to spraying.

Values are entered into appropriate fields then controls are started on command.

AUTOMATIC MODE

Simplifying the process, allowing operation to be started by a single button press allowing the system to sequence through to feed and follow a designated program (only when robot is master).

RECIPE SELECTION



Allowing pre-programmed parameter tables to be loaded.

The desired program is selected before the spraying process begins.

Auto & Manual Modes

Recipe Selector

Video Tab Option

Powder Feeder

Our powder feeders are positive displacement feeders which use an offset disc that rotates and collects powder in small holes. At a certain point powder is blown from the holes into the powder feed line where the Argon gas carries the powder through the powder feed hose to the required point of exit.

The powder feed rate depends upon the size of holes and number of holes per minute i.e. RPM. This system cannot pack powder if blocked unlike screw type powder feeders.

Our 2022MF-PF-S model uses a weigh scale under the canister frame work to enable logging of the rate of powder used and the amount of powder remaining in the canister. This data can then assist in determining the running time before the powder requires refill, thereby preventing any unexpected powder filling stoppages during the process operation.

CLOSED LOOP AC INVERTER

OPTIONS

Part No.	Description
2022MF-PF(**)	Mass Flow Powder Feeder, **Ltr Hopper
2022MF-PF(**)-QR	Mass Flow Powder Feeder, **Ltr with Quick Release Hopper
2022MF-PF(**)-S	Mass Flow Powder Feeder with Weigh Scales, **Ltr Hopper

** 2.8, 3.3 or 5 litre options

QRPFH-2.8	Quick Release Powder Feeder Hopper (2.8 L)
QRPFH-3.35	Quick Release Powder Feeder Hopper (3.35 L)
QRPF-BRKT	Quick Release Powder Feeder Hopper Support Bracket for 2 hoppers
MET-TROL	Metallisation Ancillary Trolley
6688C	Heater Jacket & Plug Assembly

Parameters Display

Direct control option for stand-alone operation

Optional Heater Jacket connection

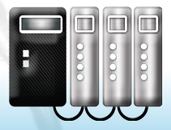
6688C - Heater Jacket & Plug Assembly

VOLUMETRIC FEED

ROTATING DISC DESIGN

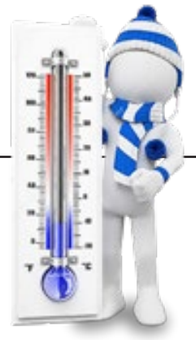
MASS FLOW CONTROL

Two Disc Variants



PLC For Control

Easy To Clean



CHILLER

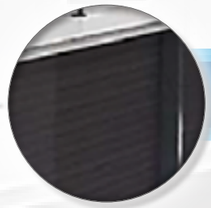
The Metallisation packaged water chiller is a complete, factory assembled unit, designed to provide chilled water for cooling HVOF systems. Designed specifcally for reliable and efficient process cooling. Immersed within a generously sized storage tank it ensures safe and reliable operation even during large fluctuations in cooling demand.

OPTIONS

Part No.	Description
JET4L-CHILL	MET-JET4L refrigerated chiller, max ambient 40 Degree C – 400v 50Hz 3 phase
PCC(HVOF)CHILL-MAN	HVOF Chiller Manifold

Chillers are rated for operation at the ambient temperatures stated. Other ambient temperatures or chillers for non-Metallisation pistols can be accommodated. Please contact Metallisation for a specific quotation.

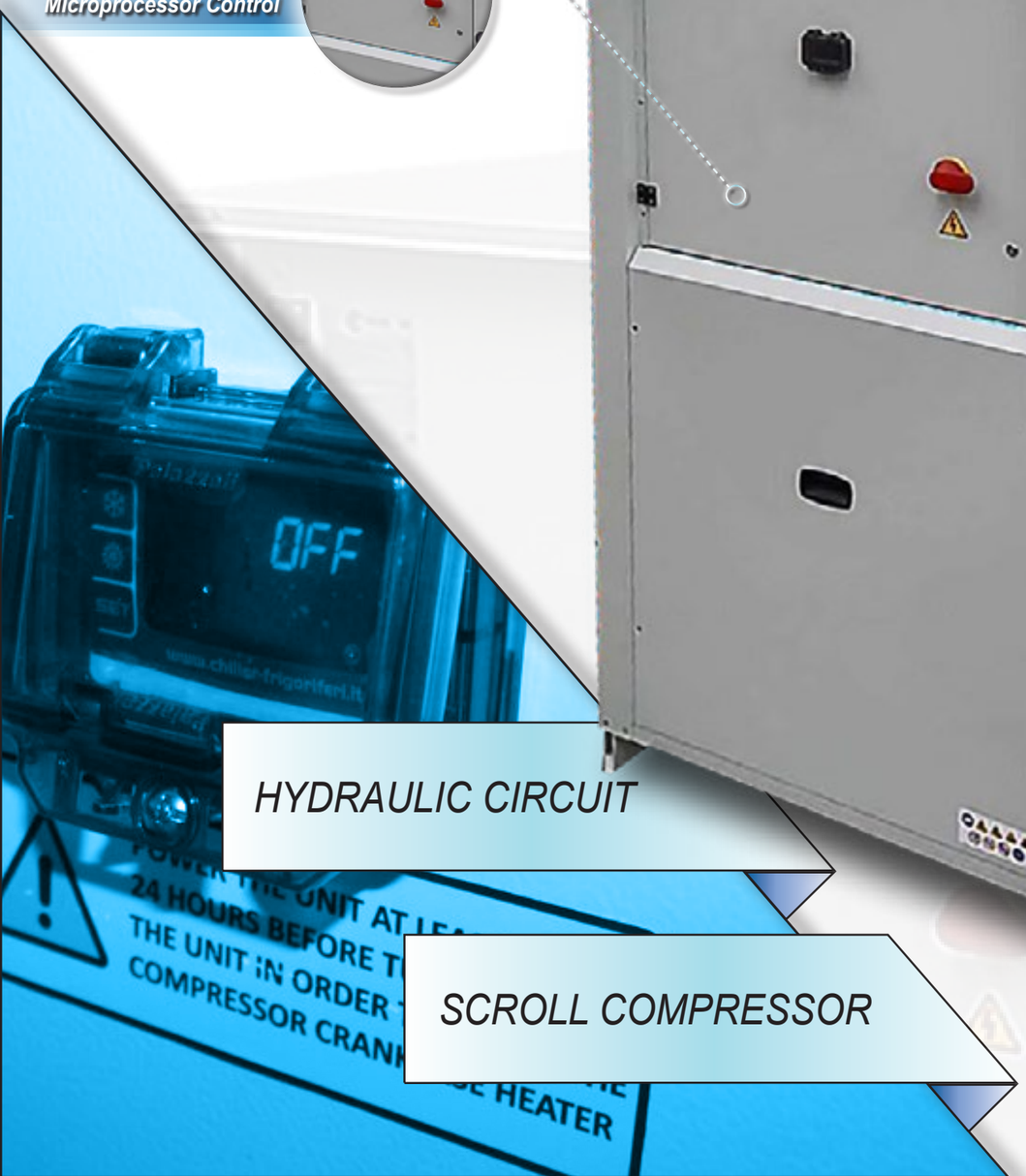
Electrical Panel with Microprocessor Control



Finned Coil Condensor

Axial Type Fans with IP54 Protection

Connecting Manifold at rear



HYDRAULIC CIRCUIT

SCROLL COMPRESSOR

DESIGNED TO RUN CONTINUOUSLY

Freeze Protection

Electronic Controller

Motor Protection

Detailed Specifications

PISTOL - MET-JET 4L

Detailed Specifications

- Optimised, single point fuel injection system to promote a complete, clean burn within the combustion chamber.
- Three nozzle lengths available, 100 mm, 150 mm and 200 mm enable a wide range of coating properties to be achieved from hard but ductile coatings to extremely hard but more brittle coatings.
- Very simple nozzle design reduces consumable spares costs.
- Simple pistol maintenance for reduced downtime when changing consumables.
- Steel powder feed tubes for reliable operation – do not melt in operation.
- Robust chamber pressure transducer provides accurate feedback directly from the chamber.
- Sturdy, robust design for long service life.
- Robot mounting interface.

Key Information

Length	With 100 mm Nozzle: 400 mm (15.7 ") With 150 mm Nozzle: 450 mm (17.7 ") With 200 mm Nozzle: 500 mm (19.7 ")
Width	With 100 mm Nozzle: 160 mm (6.3 “) With 150 mm Nozzle: 160 mm (6.3 “) With 200 mm Nozzle: 160 mm (6.3 “)
Height	With 100 mm Nozzle: 120 mm (4.7 “) With 150 mm Nozzle: 120 mm (4.7 “) With 200 mm Nozzle: 120 mm (4.7 “)
Weight	With 100 mm Nozzle: 4 kg (8.8 lbs) With 150 mm Nozzle: 4.2 kg (9.3 lbs) With 200 mm Nozzle: 4.4 kg (9.7 lbs)

Typical Performance Figures

Material	Reference	Throughput g/min	Deposit efficiency %
WC Co Cr (86/10/4)	99745	70	49
WC Co (83/17)	99735	70	45
WC Co (88/12)	99725	70	45
Ni Cr B Si	99325	70	48
Inconel 625	99405	70	47
Copper	99407	70	63
Chrome Carbide	99785	70	50
Stellite™6	99856	70	44

All figures are approximate and dependent on many factors including powder type, parameters and fuel grade / quality.

Non-Metallisation pistols can also be used with the Met-PCC(HVOF) control system:

ALTERNATIVE PISTOLS: Metallisation’s Met-PCC(HVOF-L) system can operate pistols from other manufacturers.
The Praxair JP5000 pistol has already been interfaced to the system but others could also be technically reviewed for suitability.

Alternative pistols can either be supplied by the customer or Metallisation can offer similar pistols to those mentioned.

The supplies package to each of the pistols would remain the same as the standard Metallisation supplies package. Adapter kits will be offers to fit at the pistol end to enable interchangeability of pistols if required.

Detailed Specifications

CONTROL - PCC(HVOF-L)-CTRL

Detailed Specifications

Key Information

Dimensions

Width	Control Box: 860 mm (33 ¾") Operator interface: 560 mm (22 ")
Depth	Control Box: 560 mm (22 ") Operator interface: 175 mm (6 ¾")
Height	Control Box: 1250 mm (49 ¼ ") Operator interface: 410 mm (16")
Weight	Control box: 100 kg (220.5 lbs) Operator interface: 20 kg (44.1 lbs)

Control System Supply Requirements

High grade premium paraffin	BS2869 Part 2:1988 Class C1
Oxygen	1200 l/min (2543 scfh) @ 21bar (305 psi)
Nitrogen	25 l/min (53 scfh) @ 4 bar (58 psi)
Coolant – deionised water	28 l/min minimum to 34 l/min (7.4 to 9 US Gal/min) maximum thru the system @ 5.5 – 7.5bar (80 – 109 psi)
Max. coolant inlet temperature at the pistol	17 degrees Celsius (62.6 Degrees Fahrenheit)
Max. coolant return temperature from the pistol	56 degrees Celsius (132.8 Degrees Fahrenheit)
Electrical	240/110V 1ph, 8A/15A
Cooling requirements	90 kW at 30 °C ambient (86 °F) 307,366 BTU/Hour

JP5000 is a brand name of TAFA Praxair.

Control console:

- Mass flow control of oxygen and carrier gas = repeatability.
- Liquid fuel holding tank, pump and flow meter.
- Control PLC with relevant input/output interface.
- Control valves and switching for sequencing and safe operation of the system.
- E-stop circuit with external interface to integrate into the safety circuit of the spray booth. Signals from the booth door, extraction system, robot, etc can all be linked into the system.
- Interlocks to inhibit system operation unless the following are within preset limits: coolant pressure, temperature and flow; oxygen pressure and flow; liquid fuel flow; carrier gas pressure and flow.
- Fault indication strobe.
- Interface between the gas box, powder feeders and robot by Ethernet interface. Up to 255 items can be interfaced, allowing multiple powder feeders to be linked.
- New enclosure allowing supplies to exit to the front, rear or sides of the gas box.
- MF-PF-CTRL is a kit that is factory fitted into the gas box to enable non-Metallisation powder feeders to be operated and mass flow controlled if they don’t have their own mass flow controller.
- PCC(HVOF-L)-FAK - Fuel Assist Kit allows the transfer of the fuel from a tank/drum at a low/ground level to the CTRL on the same level; this eliminates having to have a tank at a higher level to rely on gravity to feed the fuel into the CTRL ie: tank on the roof of the booth.

NOTE: Image shown is Kerosene Lift Pump ONLY - Included are supplies and fittings. Contact Metallisation for more information.

Operator Interface:

- Integrated PC with 17” touch screen, mounted in an industrial box with standard VESA mount.
- Security levels, password protected for operation or programming.
- Comes with Windows 10 as an operating system that is widely familiar.
- Parameter trending allows real-time monitoring of operation and setting of ‘out-of’range’ limits.
- Real time data logging with programmable intervals. System logs the required parameters and actual operating parameters (gas/liquid flows, powder feeder speeds, chamber pressure) against time and also logs sequence events and faults.
- Data log output via .csv data format through USB or Ethernet to enable remote SPC analysis.
- If touch screen operation is not desirable, USB interfaces are included to allow connection of a keyboard, mouse or other generic/custom USB input devices. Industrial keyboard is included.
- Full, on screen diagnostics to advise operator of the system status.

Detailed Specifications

Key Information

Dimensions

Width	Standard & QR Model: 400 mm (15.75 “) Scales Model: 508 mm (20.75 “)
Depth	Standard & QR Model: 400 mm (15.75“) Scales Model: 432 mm (17 “)
Height	Standard & QR Model: 700 mm (27.5 “) Scales Model: 762 mm (30 ")
Weight	Standard & QR Model: 40 kg (88.2 lbs) Scales Model: 50 kg (110 lbs)

Technical Specifications

Maximum Hopper Pressure	(2800 Model): 10 bar (145 psi) (3300 Model): 6 bar (87 psi)
Maximum Powder Volume	(2800 Model): 2.8 L (3300 Model): 3.3 L

Supply Requirements	Nitrogen or Argon @ 4 bar (58 psi)
Power Requirements	240/110 V 1 ph, 5 A (use a suitable MCB or Motor / T rated fuses)

An inverter controls the disc RPM, and a Mass Flow Controller controls the gas flow. Both these devices are connected by a data bus to a Programmable Logic Controller. A separate data bus connects the powder feeder to other Metallisation or proprietary equipment for control purposes. It can also be used as a stand-alone unit.

POWDER FEEDER

Detailed Specifications

- Mass flow control of the carrier gases = repeatability.
- Volumetric feed via hopper and rotating disc design.
- Two disc variants to allow optimum feeding of a wide range of powders.
- Parameters are displayed on the powder feeder and also relayed to the operator interface unit for display and logging.
- Contains PLC for control and integration to the to operator interface unit.
- Feed disc rotational speed is controlled via a closed loop AC inverter for improved feeding accuracy.
- Control can either be via the operator interface or directly at the powder feeder for stand-alone operation.
- Multiple power feeders can be integrated into the system.
- Powder Feeder comes complete with the connection for a Hopper Heater Jacket.
- A 2.8 L or 3.3 L canister.
- A compact, easy to mount design.
- Supplied with 1 x Powder Feeder control Ethernet cable from Control box to Powder Feeder Std 7m, longer lengths available at request.
- 4mm bore Anti-static powder feed hoses (max length of 5m) from powder feeder to the pistol. Optional 2.5mm bore powder feed hose (9641) available.
- Easy to fill, empty and clean – tilting hopper.
- Nitrogen/Argon carrier gas (Others on request).
- Various Powder Feeder options available with various sized hoppers, quick release hoppers or weigh scales to suit specific customer requirements.

2022MF-PF **2022MF-PF-QR** **2022MF-PF-S**

Detailed Specifications

Key Information

Dimensions (JET4L-CHILL Model)

Width	1115 mm (44 ")
Depth	2720 mm (107 ")
Height	1980 mm (78 ")
Weight	690 kg (empty of water)

CHILLER - JET4L-CHILL

Detailed Specifications

The Metallisation packaged water chiller is a complete, factory assembled unit, designed to provide chilled water for cooling HVOF systems.

- Self-contained, including all control items.
- Despatched with a running charge of refrigerant.
- Cool water is produced within the chiller and used to cool the pistol water.
- Demineralised water is pumped to the system via an integral pump.
- Units are designed to run continuously and will circulate chilled water as long as the unit is switched on.
- The chillers is rated for operation at the ambient temperatures stated. Other ambient temperatures or chillers can be accommodated. Please contact Metallisation for a specific quotation.

TROLLEY - MET-TROL

Information

- Ancillary Trolley sold separately.
- For use with HMI interface or Powder Feeder.

Detailed Specifications

Product Number and Description

SUP-PCC(HVOF-L)	Met-PCC(HVOF-L) 5m input and 10m output supplies pack for liquid fuel systems (MET-JET 4L)
AK-JP	Adaptor Kit for JP5000 style pistol on PCC system 5 &10 Mtr

SUPPLIES PACKAGE

SUP-PCC(HVOF-L) INCLUDES

- 5m input supplies for coolant (supply and return), oxygen and carrier gas into the gas box.
- 10m output supplies for coolant (supply and return), oxygen hose, fuel hose, anti-static powder feed hose, carrier gas hose and pressure transducer signal cable.

AK-JP INCLUDES

- Adapter fittings to interface between the end of our standard supplies pack hoses and the non-Metallisation pistol.
- Any additional hoses required.

GENERAL INFORMATION

- The fittings stated are those at the free ends of the hoses and not the interface at the control box.
- Liquid fuel will also need to be gravity fed to the control box and via a ¼"BSP fitting. Minimum 2m head is recommended unless the PCC(HVOF-L)-FAK fuel assist kit is used.
- Cabling to link the operator interface to the control box and powder feeder is included, 10m length plus the required plugs. Maximum possible distance is 250m.
- A 240/110v 1ph, 8A/15A supply will also be required to the control box and the powder feeder.
- The high tension ignition lead is included in the control box, 10m.

Product Number and Description

21245	High Pressure Oxygen Regulator
21262	Inert Gas Regulator 3/8"BSP, 2 Stage, 0-10 Bar

REGULATORS / ARRESTORS

Information

- 21245 bottle connection = 5/8" BSP.
- 21245 outlet connection = 3/4" BSP.
- 21262 bottle connection = 5/8" BSP.
- 21262 outlet connection = 3/8" BSP.
- Other bottle connections can be accommodated upon request.

Notes

Notes

Metallisation

thermal spray **solutions**

Metallisation Ltd

Peartree Lane
Dudley
West Midlands
DY2 0XH
United Kingdom

Tel: +44 (0)1384 252464
Fax: +44 (0)1384 237196
Email: sales@metallisation.com
Website: www.metallisation.com