Metallisation
Thermal spray equipment and consumables

Equipment Specification

MK66E-M-PC Flamespray System

CONTROLLER / OPERATOR INTERFACE

PISTOL

GAS BOX

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Thermal spray equipment and consumables

1 GENERAL

The following specification covers the standard range of the MK66E-M-PC Flamespray system. For the specific offer, please refer to the attached quotation and cross-reference the part numbers for each piece of equipment.

Safety: The equipment quoted will produce levels of noise and dust that will require safety measures to be taken by those using the equipment. It will use pressurised air and will also use flammable gases. Careful consideration should also be given to the positioning of this equipment. It is the responsibility of the user to ensure that all appropriate measures are taken to ensure safe operation in accordance with local requirements. Metallisation will be pleased to advise as appropriate.

2 BENEFITS

2.1 Overview

The NEW Metallisation MK66E-M-PC is a Flamespray system with massflow control, which offers the ability to produce the highest quality coatings with repeatability. The system provides a fully programmed ignition and spray initiation; with an intermediate system of stationary wire and reduced pilot flame. This special design ensures that the wire does not stick in the nozzle bore even when left for long periods. Fault sensors check for loss of flame, wire stoppages or run out. These features ensure continued operation, improved coating quality and minimised downtime.
This unit contains all the electronic and gas controls necessary for automatic operation.
The system is PC controlled with distributed I/O, for extreme reliability, comprising a touch screen HMI (with optional keyboard), mass flow control gas box, and compact pistol.

- Mass flow control of Oxygen, Fuel Gas and Air = repeatability
- Easy to use, intuitive operator interface
- PC control with touch screen operator interface
- Optional keyboard control or operator interface unit
- Unlimited recipes and parameter recording
- Manual or fully sequenced start-up, operation and shut-down
- Safety interlocks to prevent running without Nozzle Air.

3 MK66E PISTOL

Available pistols:

Part No	Description
GAS66E*1.5	MK66E Flamespray pistol for 1.5mm wires
GAS66E*1/8	MK66E Flamespray pistol for 3.17 (1/8")mm wires

3.1 Technical overview:

- Primarily for spraying engineering coatings (steel, copper and molybdenum).
- Flame produced by burning Acetylene or Propane and Oxygen gases.
- Most commonly used variant is 1/8" stop start pistol as it maximises spray rate whilst giving the benefits of being able to stop and start spraying and keep the main flame alight.
- Wire drive via DC Electric drive motor with Tacho feedback for closed loop control.
- Simple pistol maintenance for reduced downtime when changing consumables.
- Sturdy, robust design for long service life.
- Can be Robot mounted.

Metallisation
Thermal spray equipment and consumables

Typical performance figures for the MK66E pistol:

MATERIAL	WIRE SIZE	THROUGHPUT KG/HR	GAS CONSUMPTION L/min	
			FUEL GAS	OXYGEN
Metallisation Wire 99E Molybdenum (Acetylene)	1/8"	0.7 (Bond Coat) 2.5 (Hard Coat)	19.0 9.5	19.9 42.6
Metallisation Wire 30E/35E/45E/55E/ 57E/60E/65E/80E Steels (Acetylene)	1/8"	4.0 – 4.5	14.2	26.1
Metallisation Wire 05E Copper (Acetylene)	1/8"	5.9	14.2	26.1
Metallisation Wire 10E and 15E Bronzes (Acetylene)	1/8"	5.7	14.2	26.1
Metallisation Wire 02E Zinc (Propane)	1/8"	16.0	11.4	55.9
Metallisation Wire 01E Aluminium (Propane)	1/8"	3.6	11.4	55.9

Pistol Dimensions:

Overall Length	380mm
Overall Width	130mm
Overall Height	200mm
Weight (excl hoses)	5 Kgs

NOTE: The gas and oxygen pressure and consumption figures shown cover the full range of possible nozzle assemblies; which could be used.

These range from 1.5mm fine spray with the lowest consumption to 1/8" standard with the highest consumption and pressures.

All above figures are approximate as equipment settings and coating parameters/applications can affect the throughput from the pistol.

4 HOSES

4.1 General specification:

Red	Tubing to BS 5120:1987 for Acetylene
Blue	Tubing to BS 5120:1987 for Oxygen
Black	Tubing to BS 5118:1980 for Compressed Air

4.2 Output Hoses:

Available Console to Pistol hoses:

Part No	Description
SUP-MK66E	Console to Pistol Hoses 7m

Technical overview:

- Hoses conform to the specifications detailed in section 4.1
- Standard hose lengths are 7m
- Non-standard lengths are available on request
- Supplied with fittings appropriate to connect to all Metallisation supplied Flamespray equipment

4.3 Input hoses:

Not Shown 21512
Acetylene hose – 6m

Part number 21503
Air hose – 6m

Part number 21521
Oxygen hose – 6m

Available supply hoses to Console:

Part No	Description
21512	Flamespray Acetylene hose x 6m
21521	Flamespray Oxygen hose x 6m
21503	Flamespray Air hose x 6m

Technical overview:

- Hoses conform to the specifications detailed in section 4.1
- Standard hose lengths are 6m
- Non-standard lengths are available upon request
- Propane / Acetylene and Oxygen hose fitted with safety check valves to prevent back-feeding of gases
- Maximum safety when hoses with check valves are used together with flame arrestors (see section 7)
- Supplied with fittings appropriate to connect to all Metallisation supplied Flamespray equipment.

5 CONTROL SYSTEM

Part No	Description
MK66E-M-CTRL	66E control interface and gas box

The operator interface is shown connected to the gas box for pictorial purposes only. In a typical installation, the gas box would be inside the spray booth. The operator interface would be outside the spray booth.

Metallisation
Thermal spray equipment and consumables

5.1 Technical overview:

The control system for the MK66E-M-PC consists of a PC with a touch-screen operator interface and a gas box.

The PC provides a means of operator interface and overall system control. For reliability of operation, the actual control, of the individual operations of the system are controlled by PLC's in the gas box. The PC and PLC's are all linked by serial bus to minimise wiring and increase reliability.

5.1.1 Gas box contains:

- Oxygen, Air and Fuel Gas mass flow controller
- 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, gas detectors etc. can all be linked into the system
- Interlocks to inhibit system operation unless the following are within preset limits: oxygen pressure and flow; fuel gas pressure and flow; Air pressure and flow
- Fault indication strobe
- Interface between the gas box and robot by serial bus interface. Up to 255 items can be interfaced.
- Fixing points to floor or wall mount

5.1.2 Operator interface:

- Integrated PC with 17" touch screen, mounted into an industrial enclosure
- Mounting system for operator interface as shown for wall mounting. Additional or alternative mounting methods are possible
- Security levels, password protected for operation or programming
- Comes with Windows XP as an operating system that is widely familiar
- Real time data logging with programmable intervals. System logs the required parameters and actual operating parameters 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
- Full, on screen diagnostics to advise operator of the system status

As the operator interface is PC based, it is extremely flexible to control. The functionality can be as complex or as simple as needed. However, as standard, the system can run in 3 modes of operation: manual; recipe or external interface

5.1.3 Manual operation:

- Operator first selects MANUAL from the 'MODE' box
- Operator manually sets the desired parameters for Acetylene, Oxygen and Air. This can be done with either the + or – buttons or by pressing the Set button which displays a calculator style keypad
- Once parameters are set, the green buttons are manually sequenced through from left to right.
- The sequence continues from left to right until, if appropriate, the robot sequence is started. Operation of the next button in sequence is inhibited until the interlocks are satisfied, e.g., the main flame cannot be lit until the pilot flame is detected to be lit and stable.
- During running, the gas flow parameters and wire speed can be adjusted
- To stop the system, the button sequence must be actuated in reverse
- Operating status and faults are displayed in the messages box

5.1.4 Recipe operation:

- Operator first selects RECIPE from the 'MODE' box
- Operator scrolls the recipe screen (that has a familiar Excel look to it) and selects the required recipe. The recipe selection screen is programmable so it can show recipe numbers or recipe descriptions. For example, the description could be the name of the part being sprayed
- Once the recipe is chosen, the operator presses the SET RECIPE button. The parameters are loaded
- Once the operator is happy that the components are ready to spray, the green AUTO SPRAY SEQUENCE button is pressed
- The system automatically sequences the spraying cycle.
- If manually manipulating the pistol, the system will spray until the operator presses the OFF button
- If automatically manipulating the pistol, the system will interface with the robot or automation and start the spraying sequence. Once complete, the system will automatically sequence through to shutdown
- Operating status and faults are displayed in the messages box and data logging can be activated during spraying
- Pre-loading of up to 10 recipes is included

Metallisation
Thermal spray equipment and consumables

5.1.5 External interface operation:

The system is capable to interface via USB to an external interface source. This could, for example, be a barcode reader, an interlocked signal to production automation or a manual component selection switch box.

If, for example the system is barcode interfaced, once the barcode is scanned, it will set the correct parameters. Once the component is ready to spray, the system is started in an automatic sequence in the same way as recipe operation above.

Data can be logged against individual bar-codes and stored to produce traceability of the coating and component.

External interface integration and programming can be quoted to your exact specification.

Services required (maximum values):

	METRIC
Single Phase Electricity	230v / 110v 5 / 10 amps
Compressed Air	59 m^3/hr @ 5 bar
Oxygen with Acetylene	3.42 m^3/hr @ 4.5 bar
Acetylene	1.02 m^3/hr @ 1.5 bar
Oxygen with Propane	7.98 m^3/hr @ 5 bar
Propane	1.68 m^3/hr @ 4.5 bar

NOTE: The gas and oxygen pressure and consumption figures shown cover the full range of possible nozzle assemblies; which could be used.

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6 REGULATORS

6.1 Gas and Oxygen Regulators

Part number: 21238
Acetylene regulator

Part number: 21237
Propane regulator

Part number: 21236
Oxygen regulator

Available regulators:

Part No	Description
21238	Flamespray Acetylene regulator
21237	Flamespray Propane regulator
21236	Flamespray Oxygen regulator

Technical overview:

- Used together with Metallisation MK66E-M-CTRL (section 5) and flame arrestors (section 7)
- Complies with BS5741 and IS02503 standards

7 FLAME ARRESTORS

Part number: 21123
Flame arrestor, Oxygen

Part number: 21122A
Flame arrestor, Propane/Acetylene

Available flame arrestors:

Part No	Description
21123	Flame arrestor, Oxygen
21122A	Flame arrestor, Propane/Acetylene

Technical overview:

The flame arrestors are designed as a regulator mounted unit to protect the operator, regulator/manifold and gas supply from flashbacks. The design features: -

- Use together with Metallisation regulators and hoses with check valves for maximum safety
- Mount to the regulator
- Sintered metal flame arrestor quenches the flame front resulting from a flashback.
- Pressure relief valve safely vents excess pressure and fumes
- Pressure sensitive cut-off valve, incorporating a tamper-proof reset mechanism, prevents the re-ignition of unburnt gases after a flashback.

8 WIRE DISPENSE

Two methods of wire dispense are normal for Flamespray applications; from coils on a wire stand (Metallisation wire swift) or from production packs with a wire dispensing cone.

Available wire dispensers:

Part No	Description
24750A	Wire Swift – Wire Dispenser/Straightener
21252	Wire dispensing cone with pulley

8.1 Wire swift

Wire straightener

Part number: 24750
Wire swift

Technical overview:

- Wire tripod base giving stability and strength
- Ball race thrust bearing for continued free rotation
- Easily adjusted wire retention arms which may be used for dispensing from coils or removed for dispensing from MIG or LAYER reels
- Ability to carry wire coils of diameters from 10" (250mm) - 30" (750mm) inside diameter
- Provision for a wire straightener for stiff materials such as 1/8" steels etc
- Adjustable brake preventing over-run of wires
- All engineering and anti-corrosion wires will be available in either coil or reel formats

Metallisation
Thermal spray equipment and consumables

Wire dispensing cone

Part number: 21252
Wire dispensing cone with pulley for Zn or Al

Technical overview:

The Metallisation wire dispensing cone offers the ability to conveniently dispense anti-corrosion wires from production packs (drums). The wire is neatly guided to a dispense point, then over the pulley to give a free passage of wire from the drum to pistol. Benefits include:

- Reduces snagging of wire against edge of drum when dispensing
- Fits standard 250kg and 125kg production packs
- Covers wire to minimise dust and moisture contamination
- Reduces kinking of wire when pulling from drum
- Reduces load on pistol drive system which increases the life on the motor and reduces wear on the rollers
- Production packs available as standard for the following materials:
    - Zinc – 1.6mm, 2mm, 2.3mm, 3mm, 4mm, 1/8” and 3/16”
    - Aluminium – 1.6mm, 2mm and 2.3mm
    - Zinc/Aluminium 85/15 - 1.6mm, 2mm, 2.3mm, 3mm, 1/8” & 3/16”
    - Tin/Zinc 80/20 – 2mm
    - Tin/Zinc 70/30 – 2mm