Product Data Sheet
SinplexPro Universal Plasma Spray Guns

Oerlikon Metco SinplexPro™ Plasma Spray Guns are high throughput and designed for use with conventional plasma spray systems.

SinplexPro Plasma Spray Guns combine the benefits of cascading anode design with the simplicity of a single-cathode. The result are guns that spray with higher deposit efficiencies at significantly higher powder feed rates than traditional single-cathode plasma guns.

Effective
SinplexPro series guns are universal. They have been designed to spray pure metals, metallic alloys, oxide ceramics, carbides and cermets. The coatings produced are of very high quality. SinplexPro guns also offer excellent stability as a result of the cascading anode design.

Efficient
SinplexPro spray guns save powder and save time. The constant energy state produced by SinplexPro spray guns provide very efficient heating conditions in the plasma stream, improving deposit efficiencies and application rates.

Economical
SinplexPro spray guns have low hourly operating costs compared to other single cathode spray guns as a result of their high throughput and improved deposit efficiencies. SinplexPro guns will provide economical benefits whether the plasma operating conditions are for short spray runs, with many cycle starts or long spray guns. Consumable parts are quickly exchanged at designated service intervals, and maintenance is easily performed in house, by the customer.

Environmentally Friendly
Operation of the SinplexPro reduces the use of strategic resources, waste and noise pollution. High throughput efficiency reduces overspray waste and reduces power consumption because spray runs will require less time. SinplexPro spray guns do not use thoriated tungsten components.

SinplexPro-90

SinplexPro-180

1 General Description

The SinplexPro series guns are universal. Because of the single cathode design, SinplexPro guns can be adapted for use with most existing plasma spray systems and provide the high throughput benefit of cascaded arc technology.

Two machine-mount gun models are available:

- SinplexPro-180 (180° spray angle)
- SinplexPro-90 (90° spray angle)

Both models employ the same consumable components for ease of inventory management; however, it is not feasible to convert one model to the other.

The SinplexPro-90, with its right angle hose and cable attachments, has a very small overall size. This provides flexibility in terms of the component configurations that can be coated, including some internal bores.

A choice of nozzles and powder ports allows use of the SinplexPro spray guns for a wide range of plasma spray applications. SinplexPro spray parameters can employ argon, argon-helium or argon-hydrogen as the plasma process gases.

1.1 Cascaded Arc Control

The key benefits of the cascaded arc design employed in SinplexPro series guns are:

- Higher voltage, lower amperage operation
- A magnitude of reduction in voltage oscillation
- The influence of gas flow and type on the arc behavior is eliminated

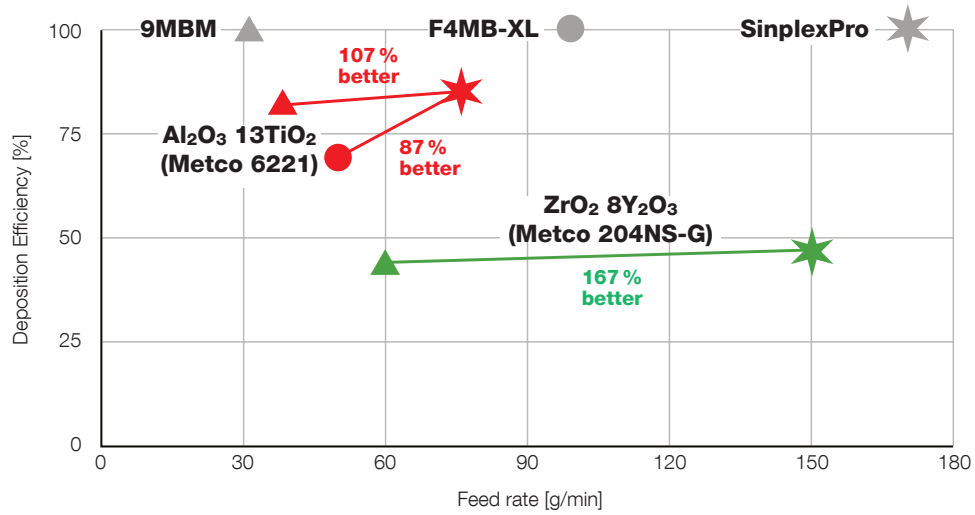
The cascade fixes the length of the electric arc and provides the arc with a starting path over a series of electrically neutral rings (neutrodes) within the arc chamber. Once the gun is fully ignited, only the common front anode (nozzle) is electrically connected to the power supply.

The fixed arc length stabilizes the plasma plume and eliminates the very high amplitude power oscillations inherent in plasma guns without arc stabilization. This effect is often overlooked as modern plasma controllers display filtered readings of the actual power and voltage signals from the gun. Thus, for plasma guns without arc stabilization, a plasma parameter that is displayed as 65 V may actually oscillate as much as 20 to 85 V. In contrast, the stable plume produced by SinplexPro guns results in more efficient heating and a more optimized flight path of the powder particles, resulting in increased deposit efficiencies, high throughput and better coating consistency.

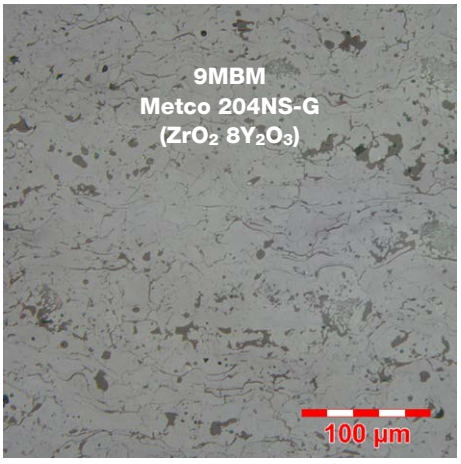
Item			Description / Application
Nozzles	9 mm	std	Wide spray pattern
	6.5 mm	opt	Narrow spray pattern
Injector rings		std	105° long, 90° long, 90° short
Powder injectors		std	2.0 mm, 1.8 mm
		opt	1.5 mm
		opt	Long Life: 2.0 mm, 1.8 mm, 1.5 mm

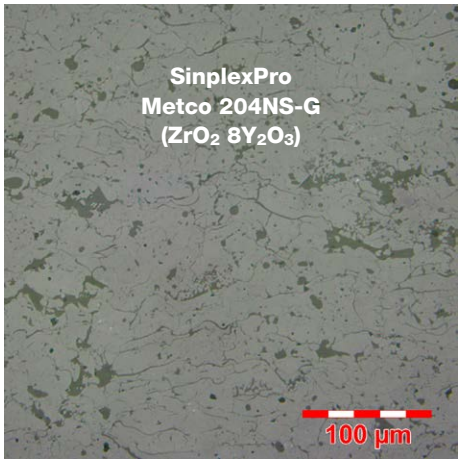
std = standard, supplied with the gun; opt = optionally available

SinplexPro Cascaded Arc Design



SinplexPro, 9MBM and F4MB-XL throughput comparison (feed rate vs. DE) to achieve similar coatings



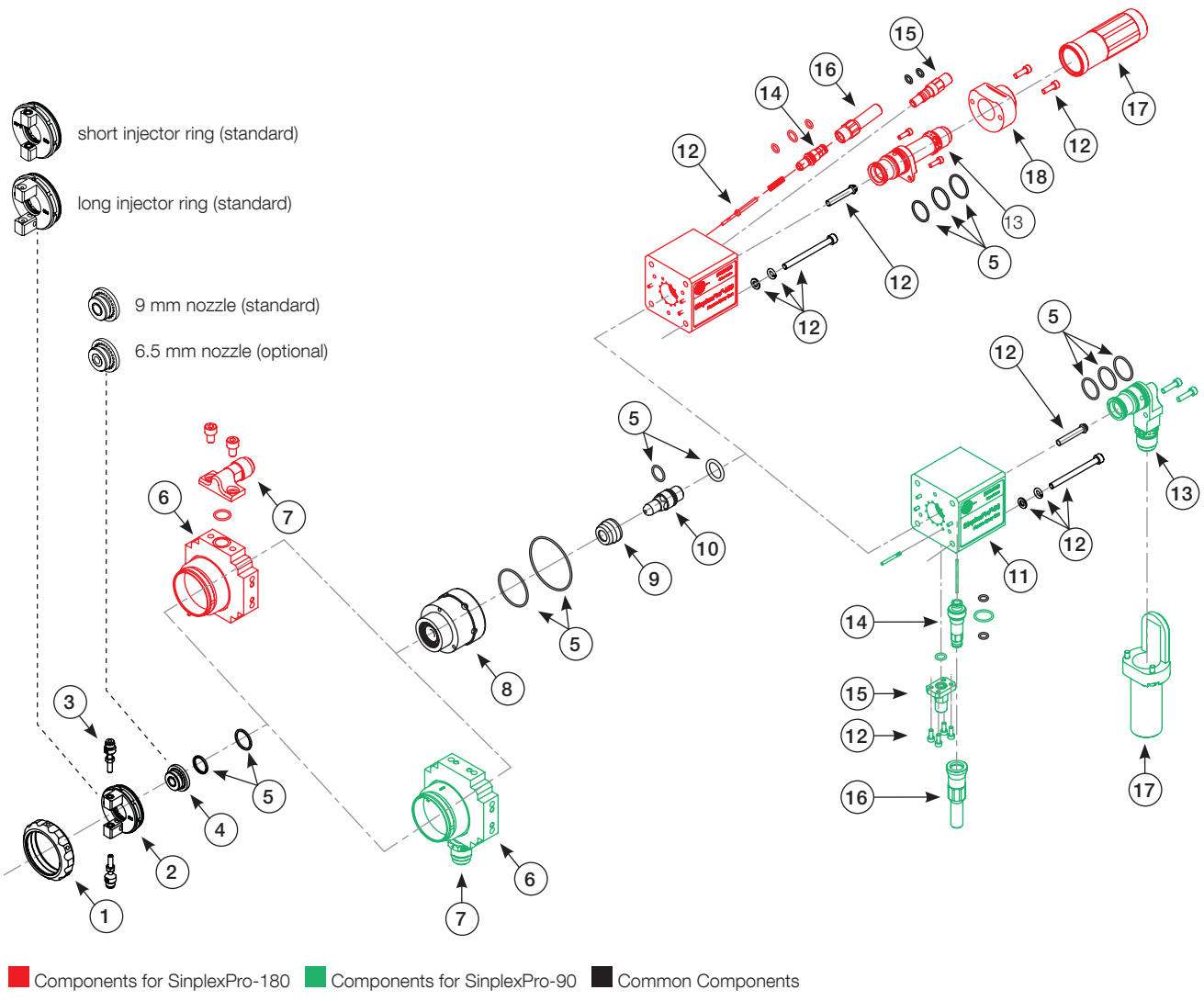


1.2 CPI-500 Pilot Ignition Unit

All SinplexPro plasma spray gun installations require a CPI-500 Pilot Ignition Unit. This wall-mountable unit retrofits into almost any plasma spray system. The CPI-500 senses the open circuit voltage on the power supply and initiates a temporary pilot ignition at the gun until actual ignition by the power supply occurs. This ensures the correct ignition sequence and power levels for the SinplexPro gun regardless of the power source or plasma controller being used. Thus, the SinplexPro spray gun will ignite reliably and safely.

For further information about the CPI-500, please refer to the CPI-500 datasheet.

1.3 Components



Balloon No.	Item Description
1	Nozzle Nut
2	Powder injector holder
3	Powder injector
4	Nozzle (anode)
5	O-rings (various sizes and types)
6	Front gun body
7	Hose fitting block
8	Neutrode stack assembly
9	Electrode insulator

Balloon No.	Item Description
10	Electrode (cathode)
11	Rear gun body assembly
12	Screws, washers, pins (various)
13	Electrode holder
14	Ignition fitting
15	Plasma gas fitting
16	Ignition insulator
17	Hose insulator cover
18	Hose insulator base

For complete part identification, please refer to the appropriate manual or parts list

2 Features and Benefits

Effective
- Designed for universal use, producing excellent coatings
- Enhanced flexibility with included standard nozzles
- Plasma arc is stable over a wide range of gas flows, gas mixtures and pressures
- Choice of gun configurations (180° or 90°) permits coating of many part configurations, including some internal bores

Economical
- High throughput reduces material usage, processing time and power consumption
- Excellent coatings can be produced with argon-only or argon-hydrogen parameters, reducing the need to use expensive helium gas
- Low investment: integrates into existing plasma systems (may require CPI-500 Pilot Ignition Unit and a system compatibility evaluation by Oerlikon Metco is required)

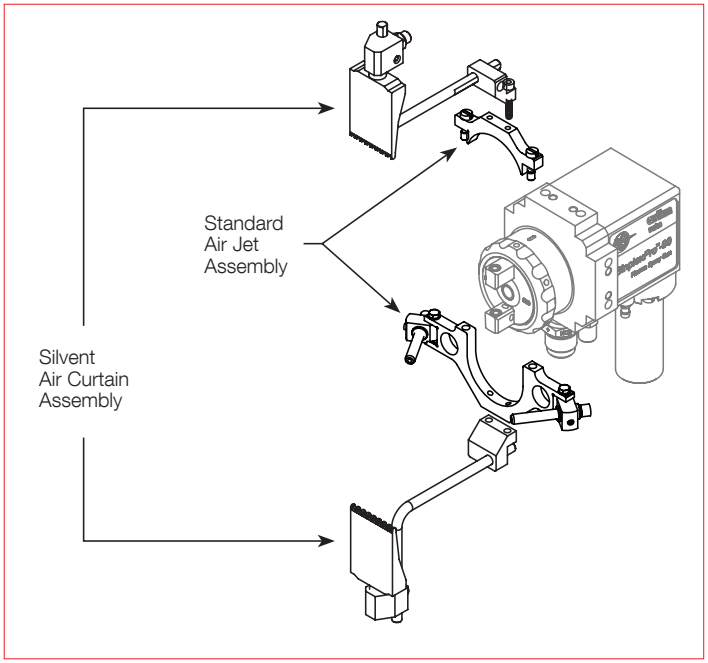
Efficient
- Arc is maintained at a fixed length for constant voltage and excellent stability
- Produces the ideal plasma state for all powder particles, improving deposit efficiency and application rates
- Highly reproducible, SinplexPro achieves the desired process window again and again
- Rugged and thermally robust design
- Designed for machine-mounted operation
- Gun consumables are easily and quickly changed by the customer
- Uses standard Oerlikon Metco 8MH style for convenient drop-in compatibility with many existing Oerlikon Metco plasma guns

Environmentally Friendly
- Higher deposit efficiencies reduce overspray waste
- Quiet operation with reduced noise
- No thoriated tungsten components, eliminating a waste disposal issue

3 Accessories and Options
Oerlikon Metco offers a choice of hoses and cables in different lengths, powder injectors of various bore sizes and nozzles for flexible spray processing. For a complete list of optional parts and spare parts, please refer to the parts list section of the instruction manual.

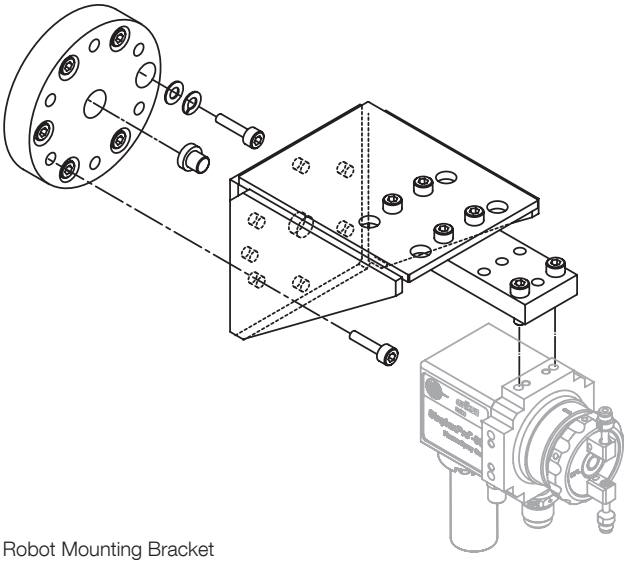
Customers can choose from Oerlikon Metco's extensive portfolio of thermal spray materials suitable for the plasma spray process. These include a variety of ceramics, alloys, superalloys, blends and self-fluxing materials to meet a wide range of surfacing needs.

3.1 Air Jets
Two types of air jets are available as options:
- **Standard Air Jet Assembly:** Designed to cool the substrate during the coating process
- **Silvent Air Curtain Assembly:** Attaches to the Standard Air Jet Assembly to aid in the removal of overspray dust and reduce the potential of unmelted particles in the coating



3.2 Robot Mounting Bracket

The optional robot mounting bracket includes an insulator plate and all mounting hardware. It allows the SinplexPro spray gun to be mounted on any of three sides of the front gun body so that connecting hoses and cables can be oriented in any direction. For some robots, an additional adapter plate may be required.



Robot Mounting Bracket

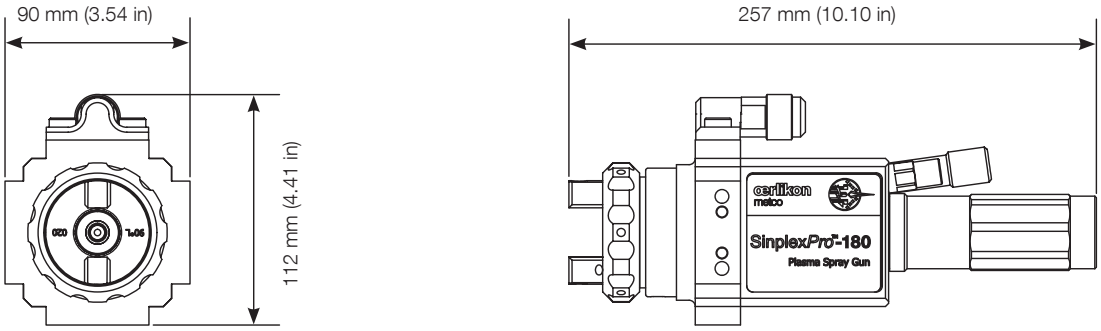
3.3 Water Conditioning Unit

The optional Water Conditioning Unit should be used on systems where the water conductivity is greater than 5 µS. SinplexPro requires water conductivity of ≤ 5 µS for proper operation.

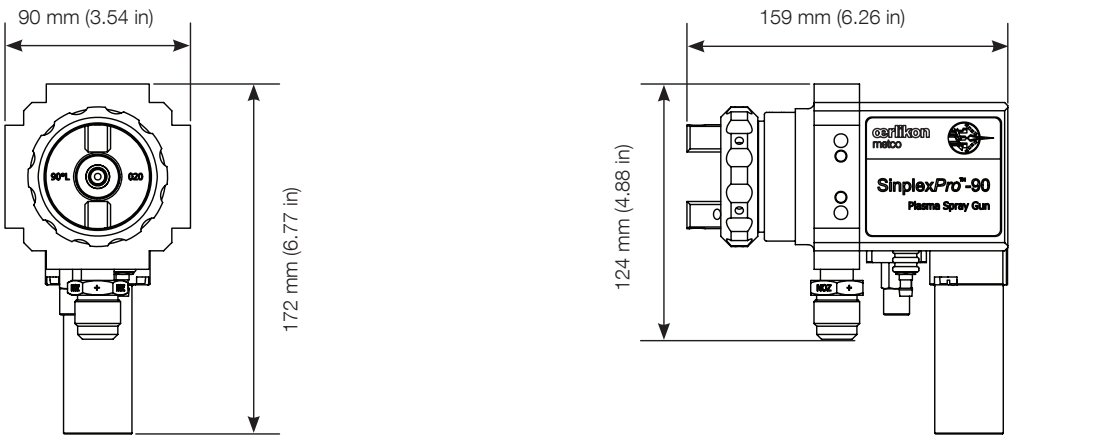
4 Technical Data

4.1 Dimensions

SinplexPro-180

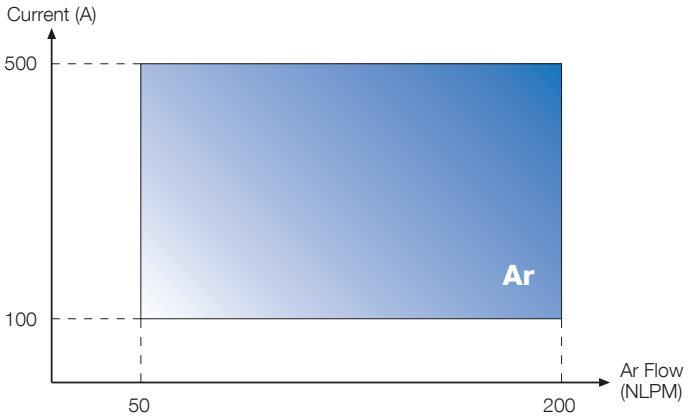


SinplexPro-90

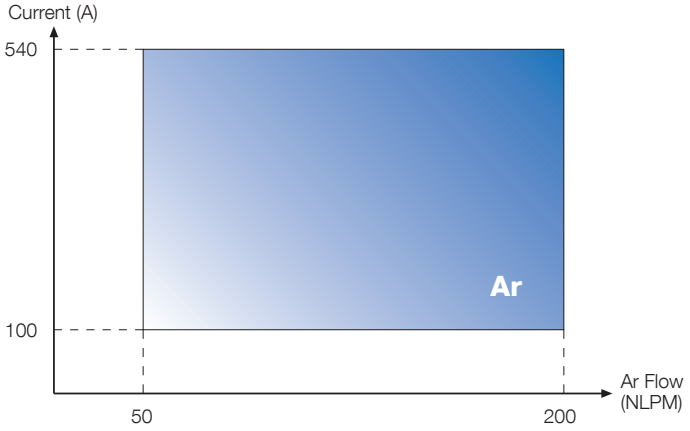


4.2 Process Gas Envelopes

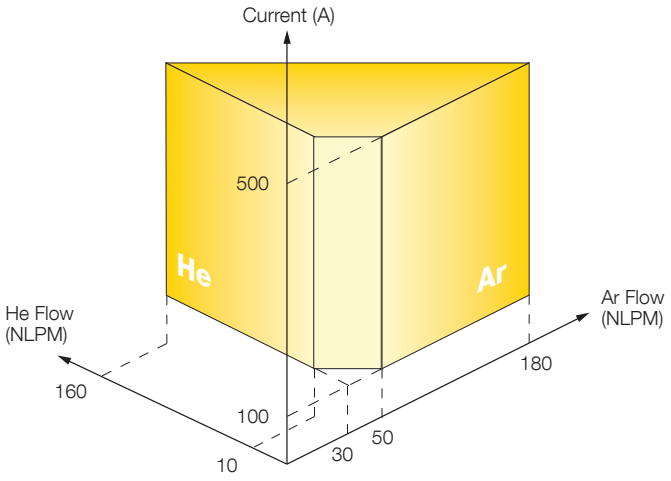
Argon Operation – 6.5 mm Nozzle



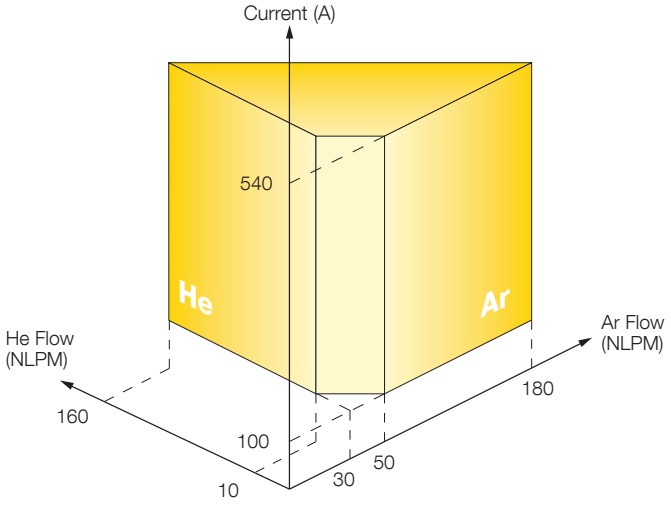
Argon Operation – 9 mm Nozzle



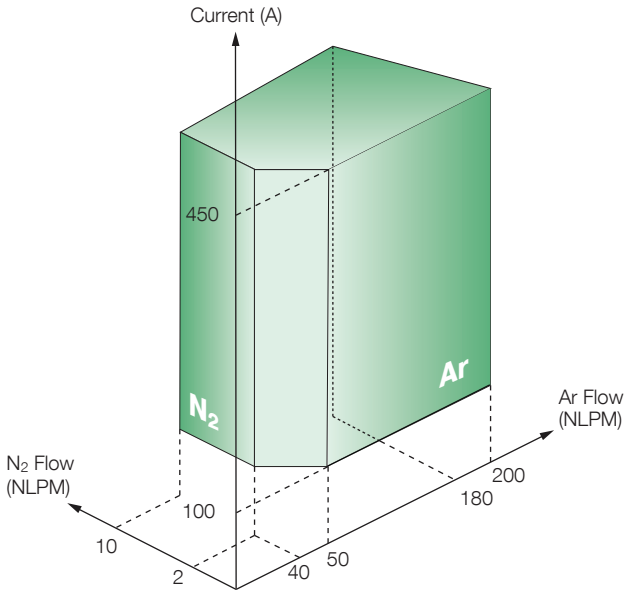
Argon/Helium Operation – 6.5 mm Nozzle



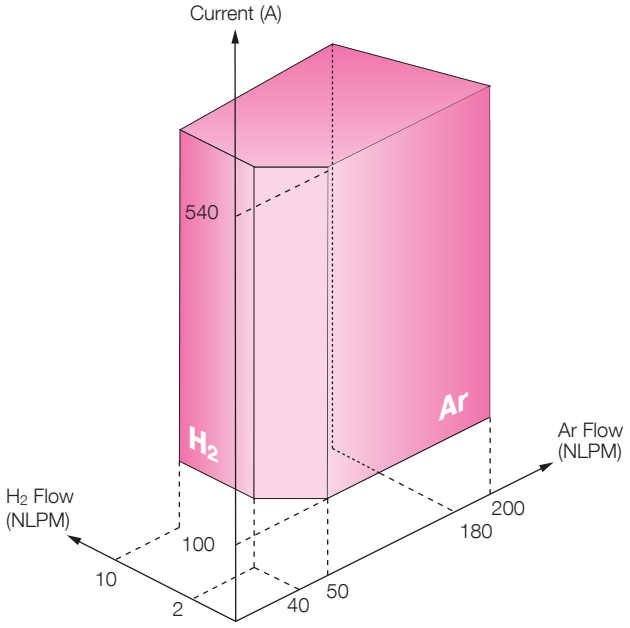
Argon/Helium Operation – 9 mm Nozzle



Argon/Nitrogen Operation – 9 mm Nozzle



Argon/Hydrogen Operation – 9 mm Nozzle



4.3 Specifications

Power Rating			
Maximum power – 100 % duty cycle		60 kW	
Maximum voltage		132 V	
Powder Feed			
Number of powder ports		2	
Number of radial detents		3	
Radial angles		0, 45, 90 °	
Gas Quality			
Argon – Ar			
Minimum requirements		99.95 %	
European standard		99.998 %	
Helium – He			
Minimum requirements		99.995 %	
European standard		99.998 %	
Nitrogen – N_2			
Minimum requirements		99.95 %	
European standard		99.996 %	
Hydrogen – H_2			
Minimum requirements		99.95 %	
European standard		99.998 %	
Cooling Water Requirements			
Inlet temperature		18 to 22 °C	65 to 72 °F
Inlet pressure		13.8 to 17 bar	200 to 250 psi
Outlet temperature	max.	50 °C	122 °F
Flow	min.	18 l/min	4.75 gal/min
Conductivity	max.	5 µS	
Dissolved oxygen	max.	10 ppm	
Total hardness	max.	10 ppm	
Weight			
Without cooling jets, hoses and cables (approx.)		2.5 kg	5.5 lb
Compatibility [a]			
Controllers		MultiCoat, UniCoatPro Plasma, 9MC series, most competitive plasma controllers	
Powder feeder		9MP series 5MPE, Single/Twin 120-A, Single 220-A, Twin 140, Twin 150, most competitive feeders	
Power supply		PT3X IPS-500/200, PT3X IPS-1000, 10MR, PT1110, PT1310, most competitive power supplies for plasma spray systems	

[a] For use of SinplexPro on existing plasma systems an evaluation of the current system is required by Oerlikon Metco (controller, power supply, chiller and exhaust conditions)

Information is subject to change without prior notice.

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