

## Product Data Sheet

### WokaStar Series Advanced Liquid-Fuel HVOF Spray Guns

**The Oerlikon Metco WokaStar™ Advanced Liquid-Fuel HVOF Spray Guns are an excellent choice when coatings of the highest quality and density are required for the most critical of applications. These guns also feature long-lasting, robust components, ensuring very reliable application and reproducible coatings.**

The Oerlikon Metco WokaStar spray guns for liquid-fuel HVOF incorporate advanced design features for superior performance and coating quality.

Using economical kerosene fuel, WokaStar guns develop combustion chamber pressures that are 15% to 20% greater than conventional liquid fuel HVOF spray guns. An improved burner configuration with higher operating pressures and gas flows results in cleaner, denser and harder coatings for better wear resistance, corrosion resistance and dimensional restoration. Coatings can be very thick and can exhibit favorable compressive stresses that enhance bond and performance in service.

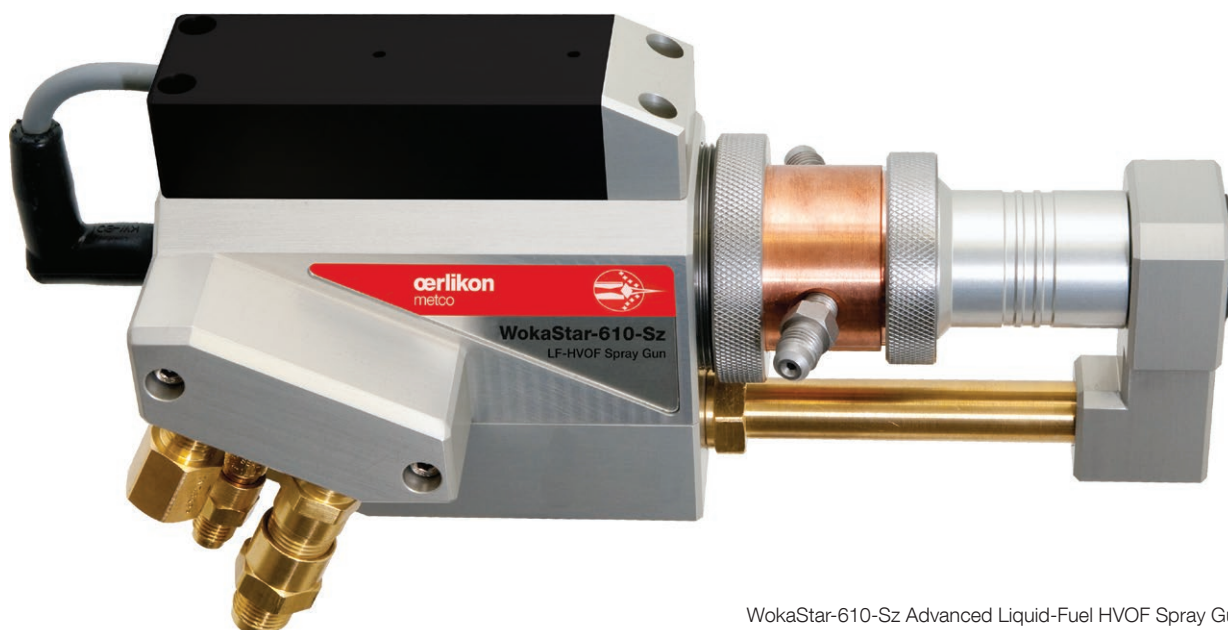
The unique design of the WokaStar series guns will allow the use of economical lower flow settings which will reduce

oxygen and kerosene costs by 10% over conventional liquid fuel guns while also reducing cooling requirements by 30%. Coatings consistent with the WokaStar series guns can be obtained at these economy settings.

WokaStar guns are rugged, featuring durable, long service life components to withstand the harshest industrial spray environments, reliably and repeatedly. A shorter combustion chamber produces more complete and efficient combustion compared to other liquid fuel guns, thus minimizing the possibility of spitting, carbon build-up in the gun barrel and heat loss to the cooling water.

The guns are designed for machine mounting and may be fixed on robots, linear traverse units and other manipulators.

Oerlikon Metco has paid extreme attention to the stability of operating conditions to maximize production, while minimizing service requirements. Long standing experience in the design of HVOF equipment for thermal spray is your insurance this equipment can be utilized with complete confidence. The WokaStar guns have been rigorously designed to the latest safety codes and is CE-conformant.



WokaStar-610-Sz Advanced Liquid-Fuel HVOF Spray Gun

## 1 General Description

The WokaStar series spray guns are designed for liquid fuel (kerosene) and oxygen operation. Fuel and oxygen are fed into the rear part of the gun, atomized by a mixer head and ignited in the combustion chamber as the heat source for the coating process. Spray powder from the powder feeder is fed radially into the gun through two powder ports into the gas stream. The spray stream is accelerated to a velocity of Mach 2 through a converging / diverging nozzle.

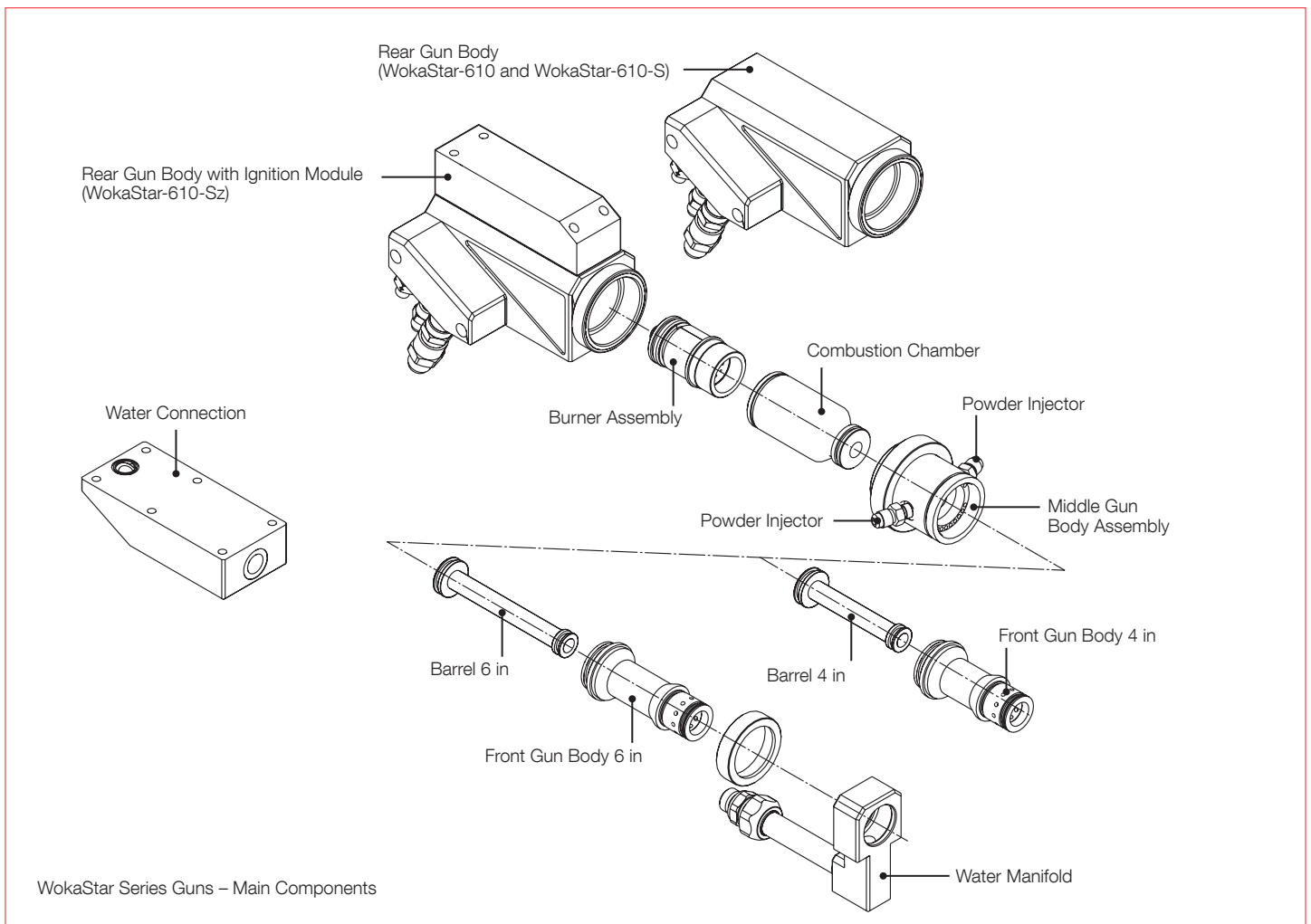
The spray particles are heated to a molten or semi-molten state, propelled at high velocity and impact the coating surface in a plastic state.

The long barrel optimizes the dwell time of the spray particles in the jet stream, while minimizing particle dwell time in air. This results in dense, intrinsically bonded coatings that

exhibit low oxide content. HVOF spray using liquid fuel offers certain advantages over other processes, such as easy availability and handling, and higher energy density associated with these hydrocarbons. The increased quantity of heat available results in denser coatings with higher bond strengths.

The WokaStar guns have been robustly designed, offering improved durability over liquid fuel HVOF guns currently on the market, while producing superior coatings.

The metal housing will withstand harsh spray environments, while nozzle nuts are constructed of steel to prevent warping and provide a safe and tight seal. The rear gun body connectors have been designed to provide years of trouble-free performance.



## 1.1 WokaStar Gun Series Comparison Chart

Gun Model	WokaStar-610	WokaStar-610-S <sup>a</sup>	WokaStar-610-Sz <sup>b</sup>
Ignition Type	Hydrogen	Spark Plug	Spark Plug
Controller Compatibility:			
MultiCoat5 LF			●
UniCoat3 LF			●
UniCoatPro LF			●
MultiCoat HVOF <sup>c</sup>	●	▲	▲
UniCoat LF	●	▲	▲
UniCoat GLF <sup>c</sup>	●	▲	▲

<sup>a</sup> Ignition module located in the JAMBox

<sup>b</sup> Ignition module mounted on the gun

<sup>c</sup> Requires that system is equipped with HVOF liquid fuel capability

● Compatibility

▲ Use with MultiCoat HVOF, UniCoat LF or UniCoat GLF requires special cable option supplied by Oerlikon Metco Systems Engineering.

## 2 Features and Benefits

### 2.1 WokaStar Coatings

- Excellent wear resistance and extended longevity for costly parts and components
- Superior microhardness compared to other thermal spray technologies
- Outstanding adhesion to substrate, with the bond strength of some coatings typically exceeding 69 MPa (10000 psi)
- Very high density coatings with minimal porosity
- Low to medium residual stresses within the coating structure, depending on spray material and component geometry
- Clean coatings with very low content of impurities and oxides
- Fine, homogeneous microstructures
- Thick coatings, up to or exceeding 6 mm (0.25 in) are possible
- Smooth “as-sprayed” surface finishes
- Excellent machinability and surface finishes, with super finishing possible for harder coating materials
- Predictable coating chemistry

### 2.2 WokaStar Gun Hardware

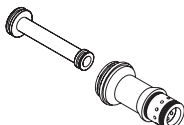
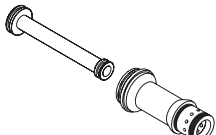
- Low-cost process using liquid fuel (kerosene)
- Dual port, radially fed powder injection
- Constructed of rugged materials for long service life with minimal maintenance
- Different barrel lengths available for specific spray materials
- Modular design allows for easy maintenance
- Safe, reliable ignition using hydrogen or spark ignition
- Polished barrel reduces internal carbon build up
- Machine mountable design can be used with robots and traverses
- Longer component life compared to conventional liquid fuel guns
- Improved combustion chamber design results in more complete and efficient combustion
- WokaStar-600 and WokaStar-600-S parameters can be used without modification with WokaStar-610 series guns

## 3 Accessories and Options

Oerlikon Metco offers a choice of options such as different barrel lengths to be used with specific spray powders, gun ignition using hydrogen gas or spark plug ignition. For a complete list of optional parts and spare parts, please refer to the parts lists section of the reference manual.

Oerlikon Metco offers a wide selection of Diamalloy™ and WOKA™ brand thermal spray materials optimized for the HVOF spray process. These include a variety of alloys, superalloys, blends and self-fluxing materials appropriate for many industrial applications and critical surfacing needs.

### 3.1 Optional Barrel and Front Gun Body Lengths:

Gun Barrel and Front Gun Body	Length	Application
	101.6 mm / 4 in	Standard: Recommended for most coating parameters.
	152.4 mm / 6 in	Optional: Recommended when a longer dwell time is required, such as for spraying some carbides, coarse materials or when high spray rates are a necessity.

Note: Customers should use the shortest barrel length possible that achieves the desired coating results as the length of the barrel is directly proportional to the amount of loading (material build-up) in the barrel. However, this will vary for different materials and spray parameters.

### 3.2 Remote Ignition Module

Required to upgrade a WokaStar-610 gun to a WokaStar-610-S gun. This module can be mounted on the gun, a robot or other location. Note that additional cables and controller features are required.

### 3.3 Air Jet Assembly

Supplies cooling gas to the substrate while spraying. Air or any inert gas, such as CO<sub>2</sub> or N<sub>2</sub>, may be used as the cooling medium. Item No. 1051091.

### 3.4 Hose Assemblies

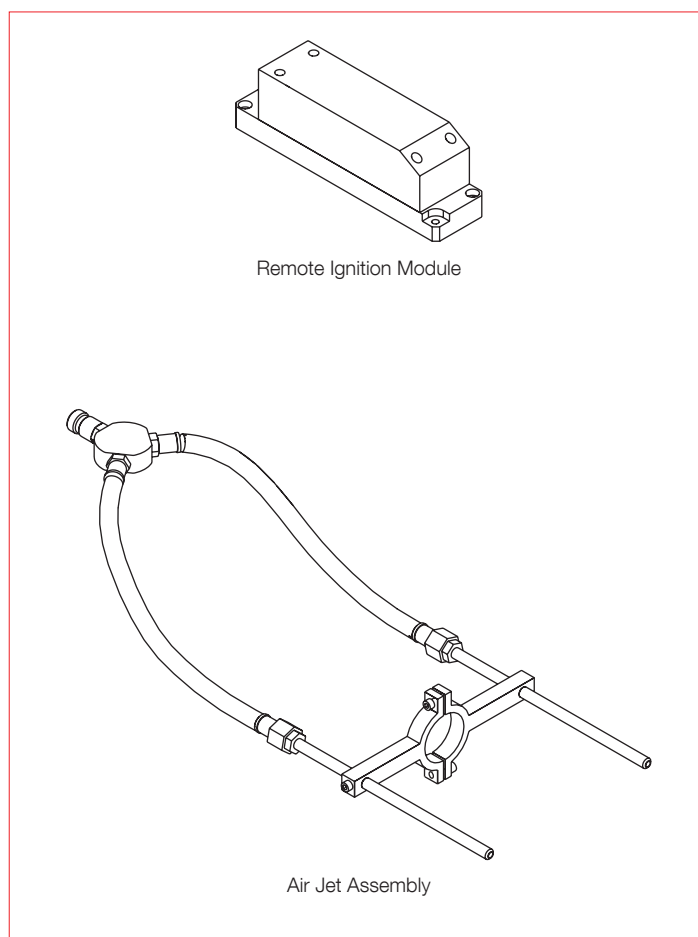
Includes water inlet and outlet hoses, oxygen and kerosene hoses to connect the gun to the controller. Available in 2 lengths:

Type	Length	Item No.
19H-25	8 m / 25 ft	1070914
19H-50	15 m / 50 ft	1070831

### 3.5 Electrical Connection Assemblies

Connects a WokaStar-610-S gun to UniCoatPro LF. Includes ignition device, ignition device supply cable, pressure transducer, pressure sensor cable and ground wire. Available in 2 lengths:

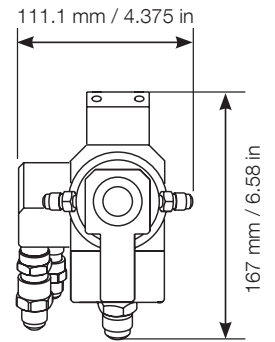
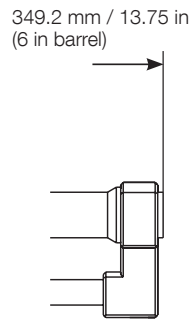
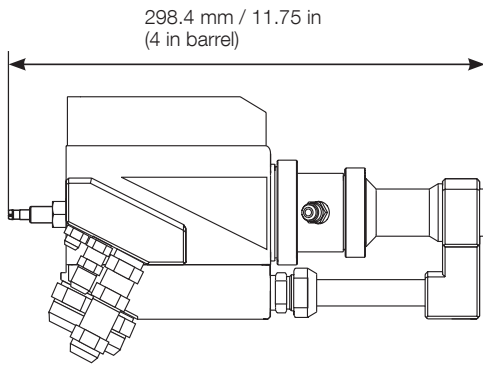
Length	Item No.
8 m / 25 ft	1070659
15 m / 50 ft	1070660



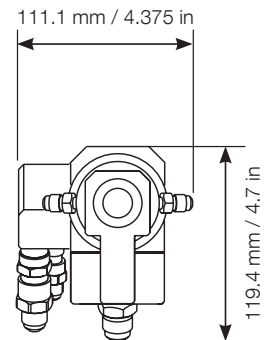
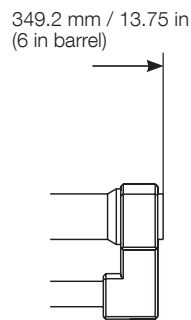
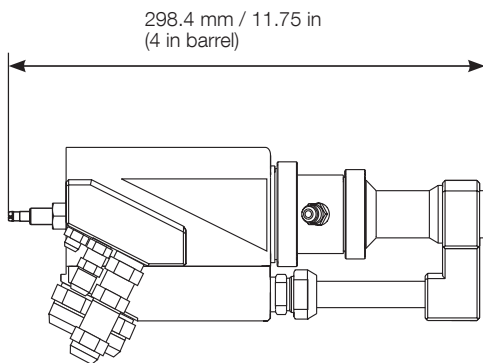
## 4 Technical Data

### 4.1 Dimensions

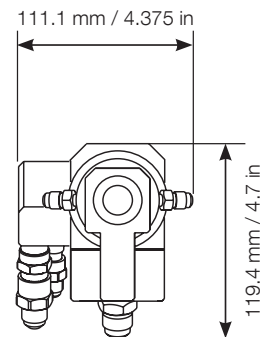
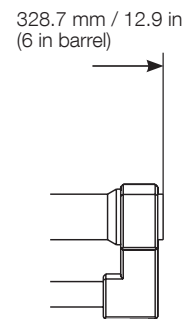
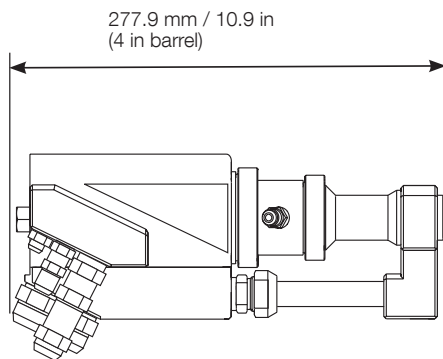
#### WokaStar-610-Sz:



#### WokaStar-610-S:



#### WokaStar-610:



## 4.2 Specifications

### General Specifications

Particle velocity	400 to 800 m/s	1300 to 2625 ft/s
Combustion pressure	7.5 bar	108.8 psig
Total heat input	293 kW	1,000,000 BTU/h
Heat loss to water (cooling capacity)	93 kW	318,000 BTU/h
Heat output	200 kW	682,000 BTU/h
Recommended exhaust flow (min.)	15,000 m <sup>3</sup> /h	8750 ft <sup>3</sup> /min

### Process Media

Hydrogen – H <sub>2</sub>	Pressure	6.9 bar	100 psig
	Flow	88 NLPM	200 SCFH
Oxygen – O <sub>2</sub>	Pressure	17 bar	250 psig
	Flow	1100 NLPM	2500 SCFH
Nitrogen – N <sub>2</sub> (carrier gas)	Pressure	12.1 bar	175 psig
	Flow	18 NLPM	600 SCFH
Kerosene	Pressure	17 bar	250 psig
	Flow	32.2 l/h	8.5 gal/h
Compressed Air	Pressure	5.5 bar	79 psig
	Flow	500 NLPM	1140 SCFH

### Weight

Approximate	5 kg	11 lb
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### Water Requirements

Pressure	14 bar	200 psi
Flow (min.)	39 l/min	10 gal/min
Inlet temperature (max.)	24 °C	75 °F
Quality	< 40 µS Potable (drinking water)	

### Compatibility

Controllers	For use with WokaStar-610; WokaStar-610-S guns: MultiCoat5-LF, UniCoat3-LF, MultiCoat HVOF, UniCoat LF, UniCoat GLF
	For use with WokaStar-610-Sz gun: UniCoatPro LF, MultiCoat HVOF
Powder Feeders	For use with MultiCoat HVOF, UniCoat LF, UniCoat GLF systems: Twin 160, SinglePro, 9MPE-DJ-CL20, Single-120-H, Single-120-AH, Twin-120-H, Twin-120-AH, Single-220-H, Single-220-AH, 5MPE-HP
	For use with UniCoatPro LF systems: Twin-140, 5MPE-HP, 9MPE-DJ

Specifications indicate the maximum output of the spray gun. Most controller platforms have lower output capabilities.