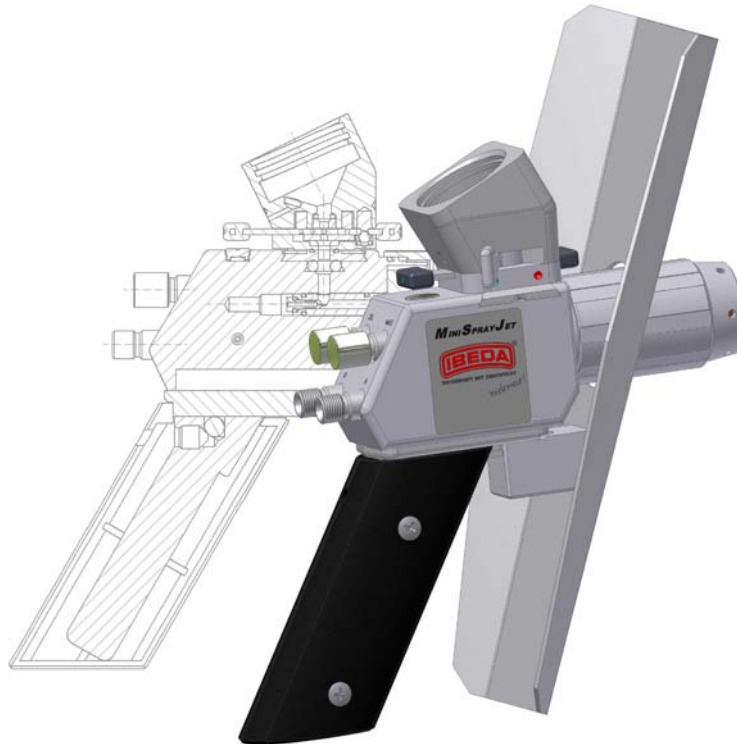


## Powder Flame Spraying

Powder flame spray gun **MINISPRAYJET**



**Superflash Compressed Gas  
Equipment / IBEDA Inc.**

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## Preamble

With your Powder Flame Spray Gun MiniSprayJet you have purchased a quality product.

Please read through this user manual carefully before installing and using your system. Its purpose is to enable you to use the Flame-spray-system safely and properly.

The German version of this user manual is deemed to be the original.

## Transport

Transport and handling has to be done carefully by qualified staff with appropriate equipment. Storage of work equipment (temporary storage) have to be at a temperature of +5°C to +35°C and have to be kept free from dust and moisture.

**Please check the goods for transport damage upon receipt. It is not approved for use with damaged components.**

## Function

The MiniSprayJet can be used to process a variety of flame-sprayable, powder additives in the field of coating workpieces in manufacturing, repair and preventative maintenance. The MiniSpray-Jet flame spray powder unit has an integrated powder supply system and has been developed in line with the latest research with regard to operational and functional safety.

The mixture of flammable gas and oxygen is created in a gas-mixing precision spray nozzle. This gas mixing concept ensures maximum safety in terms of avoiding flashbacks or backfires and the negative consequences of this.

**User's Technical knowledge  
and instruction**

work equipment are only to be used by people over the age of 18, who are physically qualified, have required knowledge and were instructed by a qualified person. Documented training instruction is recommended to be done at periodical intervals, at least once a year.

**Personal protection  
equipment**

The necessary personal protection equipment has to be used. Additional security arrangements may be anticipated according to requirements.

Users guide for dangerous goods has to be considered.

## Contents of the case

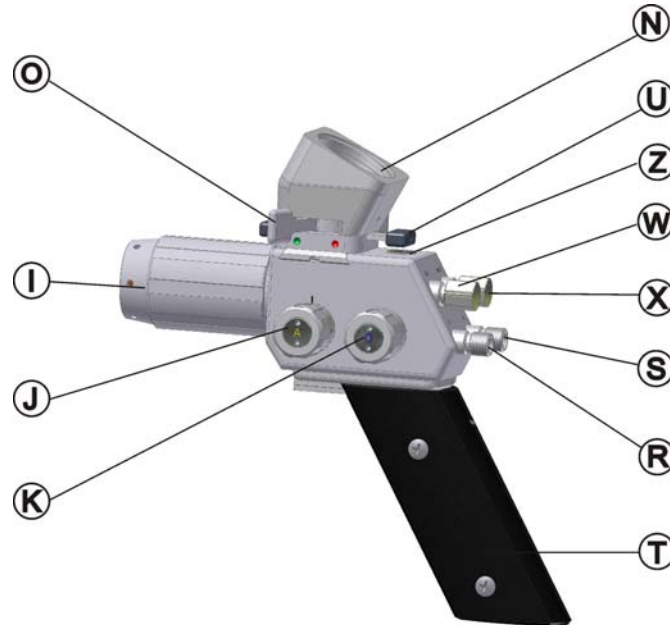


### Case-set for flame spraying with metal powder

Ref.-No.	Description
1014-0013	RF/N-A spray nozzle (built in)
1014-0001	P/K ring nozzle (built in)
1383-0005	Carrier support attachment
1383-0004	Heat shield with clip-on shoe
7730-0007	Nozzle cleaning needle set
7730-0002	Adjustable wrench
7730-0001	Open ended fork wrench 24 mm
7730-0005	Brass wire brush
7730-0006	Gas lighter
7730-0008	Protective welding goggles
7730-0003	Allen key 4 mm
7440-0394	1 x O-ring 29,87 x 1,78 NBR70Shore C36624
7440-0010	1 x O-ring 5 x 1,5 FPM75
7440-0383	4 x O-ring 2,5 x 1,5 Material 36624
	Instruction manual



**Operating elements**



**Position:**

- I Air cap
- J Fuel gas regulating and shut-off valve
- K Oxygen regulating and shut-off valve
- N Powder module head
- O Locking lever for Powder flow
- R Oxygen connection G 1/8RH
- S Fuel gas connection G1/8LH
- T Detachable grip
- U Powder dosing slide controller
- W Added gas connection G1/8RH
- X Connection for external Powder transport gas G1/8RH
- Z Gasdeflector

## Technical data

### Connection thread:

Heating gases and internal powder transport gas:			
	Flammable gas (acetylene or hydrogen),		R 1/8" LH
	Oxygen		R 1/8" RH
Added gases			
	Non-flammable gases	1.0 to 6.0 bar	G 1/8 RH
Optional: External powder transport			
	Non-flammable gases		G 1/8 RH

### Powder supply system:

Injector suction powder transport gas	
-	Pressure nozzle »N« 0.45 mm Ø
-	Pressure nozzle »S« 0.30 mm Ø
-	Pressure nozzle »X« 1.0 mm Ø

### Spray output:

~1.0-8.0 kg/h depending on the powder grade, machine setting, spray nozzle and integrated powder supply system

### Operating pressures and gas consumption values

Oxygen 2.5 to 3.0 bar - 1500 NL/h±50 NL/h  
 Acetylene 0.7 bar - 1100 NL/h±50 NL/h  
 Hydrogen 0.8 bar – 1.2 bar

### Internal powder transport gas:

(»N« pressure nozzle)	Oxygen 2.5 bar - 300 NL/h±30 NL/h
(»S« pressure nozzle)	Oxygen 2.5 bar - 100 NL/h±15 NL/h

### Optional :

#### External powder transport gas

(Inert gas Ar or N <sub>2</sub> )	0.5 bar – 5.0 bar
-----------------------------------	-------------------

### Flammable gas/oxygen mixture

Injector principle (gas mixing spray and heating nozzle)

**Spray distance**

100-200 mm, depending on the spray additive

**Circumferential speed**

(with cylindrical or rotation-symmetrical workpieces): 15-50 m/min  
depending on spray additive and increase in layer thickness per spray pass!

**Advance per rotation**

With EXOLOY 1001 - 4.0 – 6.0 mm/ rotation,  
With all other EXOLOY and UNILOY powders 4.0 – 8.0 mm/ rotation  
With METOXID powder, depending on single or multiple layer coating = 0.2 – 0.5 mm/ rotation

**Increase in layer thickness**

EXOLOY 1001 powder approx. 0.15 mm per spray pass  
Covering layers with all other EXOLOY powders 0.2 mm per spray pass  
UNILOY powder: 0.20 – 0.30 mm per spray pass  
METOXID powder: 0.05 – 20 mm per spray pass

When using hydrogen or acetylene as the burnable gas  
Observe the settings in the spray table!

## Safety information

This flame spray unit conforms to the latest state-of-the-art technology and the requirements of the established standards and regulations.

Refrain from every mode of operation that affects the safety of the flame spray unit. The operating company must ensure that the flame spray unit is only operated in a proper and sound condition.

No modifications to or rebuilding may be carried out without permission from the manufacturer.



### NOTICE

This system consists of non-electrical gas supply components without its own source of ignition and is not subject to the Directive about devices for the proper use in potentially explosive areas. (Germany Directive 94/ 9/ EG (ATEX guideline))

## Intended use

Operate the MiniSprayJet flame spray powder unit with fuel gas (acetylene, hydrogen or propane) and oxygen. It is intended for spraying a wide range of EXOLOY, UNILOY, METOXID and other powders.

The equipment may only be utilised for this stated purpose.

To a correct use as well the following of the advices of the instructions sheet do belong. Observing the inspection cycles and respecting the type plates and data sheets.

## Non-intended use

Every use which goes beyond the intended use:

e.g. operation with other gases, gas sources, pressures, gas quantities or temperatures and not observing minimum distances.

**A non-intended use is prohibited!**

## Explanation of safety alert signals

Any information which is marked with a safety notice warns of danger and has to be followed in order to avoid injuries and damages.

## Safety alert signals



### **DANGER**

Imminent danger!

Death or severe injuries can result from non-observance.



### **WARNING**

A possibly dangerous situation!

Death or severe injuries can result from non-observance.



### **BEWARE**

A dangerous situation!

Death or severe injuries can result from non-observance.



### **NOTICE**

Notice for proper handling.

Device error can result from non-observance

## General Safety Instructions



### **WARNING**

The local legislation has to be considered.

Regarding the BGR500 paragraph 2.33 of the employers liability insurance association the operator has to display the user manual



### **WARNING**

Regarding the BGR500 paragraph 2.33 it is only allowed for skilled people to operate gas manifold systems.

Skilled people are instructed in:

Knowledge of handling dangerous gases

Knowledge of handling the instruction manual

Knowledge of the safety instructions

Knowledge of first aid

Knowledge how to use the personal protective equipment

The management has to notice the date in written form when the instruction was given. The has to confirm his instruction by sign.

## Instructions

Please follow the local national instructions, standards and laws ( for Germany as following):

98/37/EG	Machinery Directive
97/ 23/ EG	Pressure Equipment Directive
Directive 73/ 23/ EWG	Low Voltage Directive
89/336/EWG	Electromagnetic compatibility

## BGR

(German Employers' Liability Insurance Association Rules and Regulations)

BGR 500 Chap.2.26	Welding, cutting and related processes
BGR 500 Chap.2.31	Working on gas lines
BGR 500 Chap.2.32	Operation of oxygen systems
BGR 500 Chap.2.33	Gases

## Standards

EN 559	Rubber hoses
EN 560	Hose connections
EN 561	Quick-action couplings
EN 562	Pressure gauge
EN 730-1	Safety devices
EN 954 Teil 1	Safety related parts of control systems
EN ISO 2503	Pressure regulator
EN ISO 12100	Maschine safety
EN ISO 14114	Acetylene cylinders - Manifolds
DIN EN ISO 5172	Burner for welding, warming and cutting
DIN EN 657	Thermal spraying - Terminology, classification
DIN EN 13214	Thermal spraying - Coordination Tasks and Responsibilities
DIN EN 13214	Thermal spraying - Coordination Tasks and Responsibilities
DIN EN 14616	Thermal spraying - Recommendations for thermal spraying
DIN EN 1395	Approval test for thermal spraying plants
DIN ISO 9090	Gas proofness
DIN ISO 9539	Materials
VDE 0113 / EN 60204	Safety of machinery – Electrical equipment of machines, part 1: Specification for general requirements

## Laws

GPSG	Product Safety Act
BetrSichV	Health and Safety at Work Regulations
GefStoffV	Ordinance of Hazardous Substances
BImSchG	German Federal Emissions Protection Law

## Technical regulations

TRAC 204,206,207,401,402	Technical regulations for acetylene and calcium carbide systems
TRG	Technical regulations pressure gases
TRF	Technical regulations liquid gases
DVS-Data-Sheet	DVS 0221, DVS 2307, DVS 2314, DVS M 2304 etc.

## Individual safety instructions



### DANGER

- Risk of explosion: All components on the flame spray systems are to be kept free of oil, grease and other contaminants.
- Do not wear clothing that has been contaminated with oil or grease. Be sure your hands are clean. Do not use ointments or gels.
- After spending time in an oxygen-enriched atmosphere clothing must be carefully aired out because the oxygen can cling very well there. A source of ignition could cause clothing to catch fire.
- No access to flame spray systems with open flame and fire. Do not smoke where there is a suspected excess of an oxygen/industrial gas!
- Ensure that the room is well-ventilated.
- No access for unauthorised persons!



### WARNING

- The improper use of oxygen and industrial gases is forbidden: e.g. cooling and improving the ambient air, cooling off and dusting, air-blasting persons, clothing or equipment.
- Always open all valves slowly and fully.
- Check screw connections for leak tightness at the prescribed intervals.
- The tested sealing materials in the valves and system parts may not be replaced with other materials or products from other manufacturers without being tested again.
- Flame spray systems in continuous operation are to undergo a visual inspection once a day.
- Gas cylinders must be secured against falling over. Use appropriate cylinder cages.
- Maintain safe distances.
- Always ensure that the flame spray unit and the flame spray system are used correctly.



### WARNING

Observe the safety regulations regarding maximum discharge pressure levels with acetylene (max. 1.4 bar)!





**WARNING**

With thermal spraying, a variety of hazardous situations may occur at the place of work due to the process itself:

- Air contaminated with substances and particles
- Noise
- Optical radiation (light, heat, UV radiation)

Personal safety equipment to be worn:

(Type depends on the additives being used)

- Respiratory protection (observe safety data sheet)
- Face protection with suitable welder's safety filter
- Noise safety equipment
- Strong safety suit
- Protective gloves
- Safety shoes

Please also observe data sheet DVS 2307-2 "Work safety and environmental protection in thermal spraying"



**DANGER**

When operating the flame spray unit manually, it is advisable to fit the protective heat shield. This protects the user's hand and the powder container against heat and flying sparks.

## Installation

The flame spray powder unit is supplied ready for assembly.



### WARNING

Before carrying out conversion work on the flame spray units, all gases must be shut off and the pressure is dissipated via pressure release.

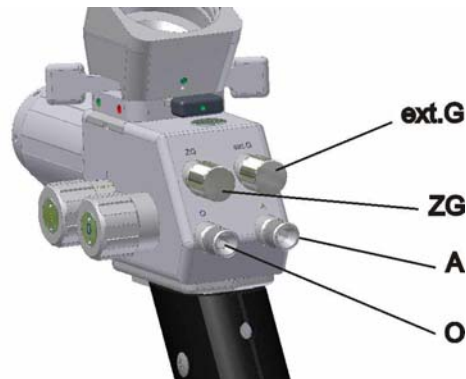


### CAUTION

Flexible connection lines must be properly handled and installed. Avoid torsion, kinking, too small a bending radius and compression along the longitudinal axis.

The fuel gas and oxygen tube is connected on the relevant connecting socket:

## Connection



### WARNING

The sealing nuts on connection **ZG** and connection **ext.G** must always be fitted when not using these connections and must be checked for secure connection. Otherwise there is a risk of flashbacks!

**ZG** Added gas

**ext.G** External gases

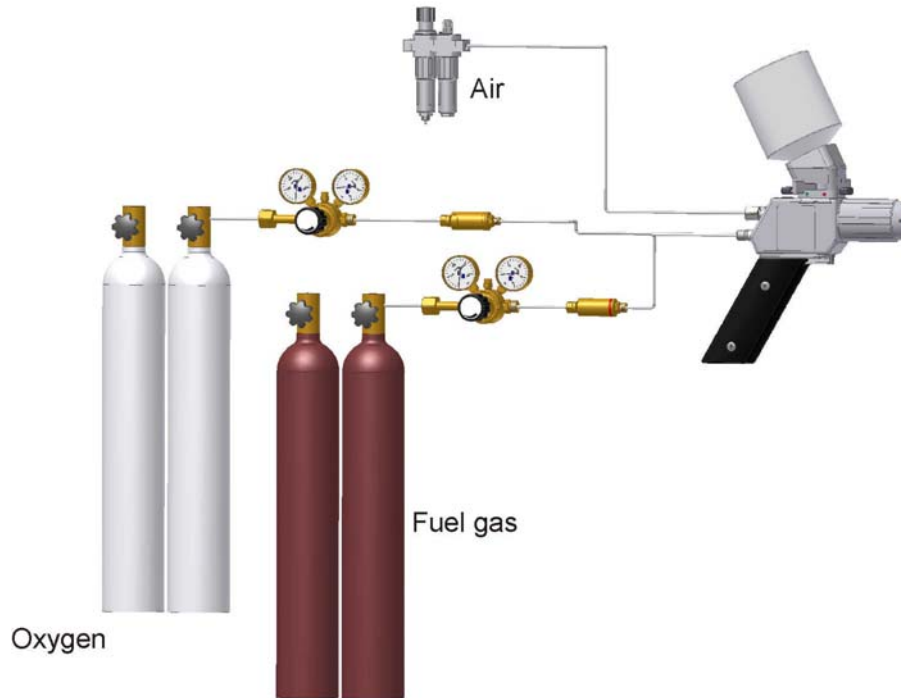
**A** Fuel gas

**O** Oxygen

## Gas supply

The connections need to be made according to the diagram.

In normal situations - with short-term spray usage - connecting to one gas cylinder each is sufficient. With daily usage or long-term operation, one cylinder bank (group of cylinders) each should be for oxygen and acetylene. (see spray table appendix, page 7)



## Set up-Operation



### **WARNING**

A gas tightness test must be carried out before commissioning the flame spray unit.

The tightness of the powder connection must also be checked.

A test should be conducted on the spray nozzle injector.

## Condition before commissioning

- Perfect technical condition of the flame spray powder unit.
- The gas supply (cylinders, cylinder banks, gas supply system) is in perfect technical condition and conforms to technical safety regulations.

## Tests before commissioning



### DANGER

Oxygen flows.

Ensure that the room is well-ventilated.

After spending time in an oxygen-enriched atmosphere clothing must be carefully aired because the oxygen adheres onto the fibres very easily. A source of ignition could cause clothing to catch fire.

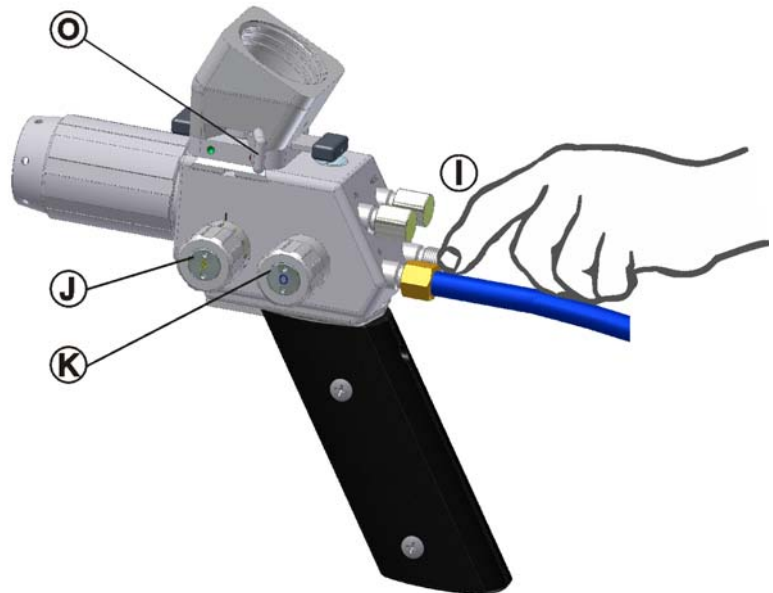
Test the spray nozzle injector

- Connect oxygen to the connecting socket (2.5 - 3.0 bar).
- Close locking lever **item O** for powder supply. (Lever is located after the red dot)
- Fully open the oxygen regulating and shut-off valve **item K**. (By turning the valve wheel to the left)
- Set the fuel gas regulating and shut-off valve **item J** to position » N «. (Turn the valve wheel a 1/2 turn to the left)
- A vacuum is produced on the fuel gas connecting socket (finger test, see diagram **item I** )



### NOTE

If no vacuum is produced, the spray nozzle is faulty and needs to be replaced.



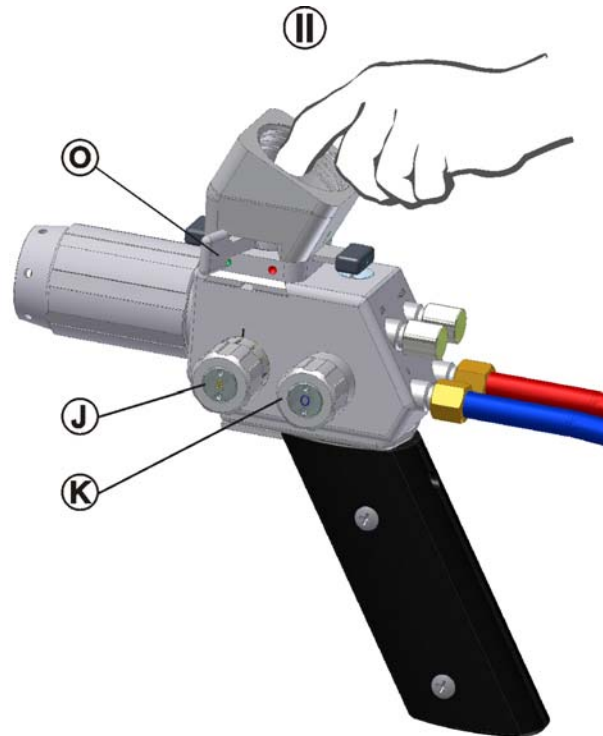
Check powder injector

- Close the fuel gas regulating and shut-off valve **item J**. (By turning the valve wheel to the right)
- Fully open the oxygen regulating and shut-off valve **item K**. (By turning the valve wheel to the left)
- Open locking lever **item O** for powder supply. (Lever is located after the green dot)
- A vacuum powder fill opening is produced. (Finger test, see diagram **item II**)



**NOTE**

If no vacuum is produced, the carrier gas nozzle or an o-ring is faulty and needs to be replaced.



Test for correct gas tightness

Internal gas tightness:

Gas switch is in normal mode (see set up operation chapter)

- Open the oxygen regulating and shut-off valve and the fuel gas regulating and shut-off valve by turning to the left.
- Pressurise connection ext.G (see Assembly chapter) with compressed air.

Air escapes at the oxygen connection **O!**

Gas switch is on »ext.« operating mode (see set up operation chapter)

- Open the oxygen regulating and shut-off valve and the fuel gas regulating and shut-off valve by turning to the left.
- Pressurise connection ext.G (see Assembly chapter) with compressed air.

No air should escape from oxygen connection **O!**

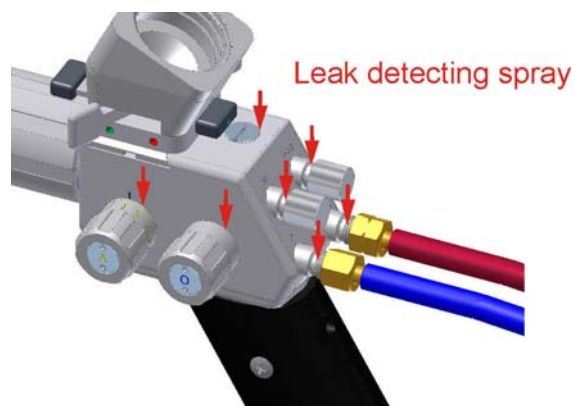
External gas sealing:

Connect gas hoses to connections **A** (fuel gas) and **O** (oxygen) (see Assembly chapter).

- Seal-tightness to atmosphere test with inert gas.

Open the fuel gas regulating and shut-off valve and the oxygen regulating and shut-off valve by turning to the left and check for correct sealing using an appropriate leak detector spray (see diagram).

No gas must be escaping!



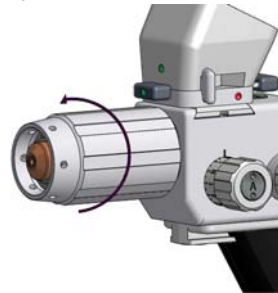


**WARNING**

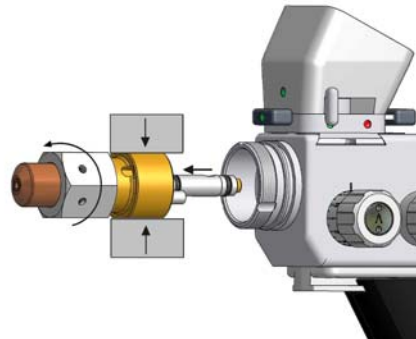
Before carrying out conversion work on the flame spray powder units, all gases must be shut off and the pressure is dissipated via pressure release.

**Converting the spray nozzle**

1. Unscrew the air scoop.

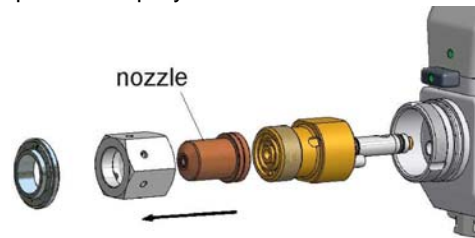


2. Remove the nozzle mount from the housing and clamp in a vice. Remove the crown nut by turning to the left. Hold the lock nut with a wrench and turn in the opposite direction.

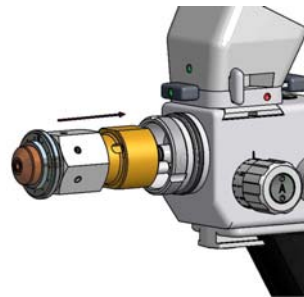




3. Replace the spray nozzle.



4. Clamp the nozzle mount in a vice. Tighten the crown nut by turning to the right. Tighten the lock nut by turning in the opposite direction. Then fit the nozzle mount and spray nozzle.

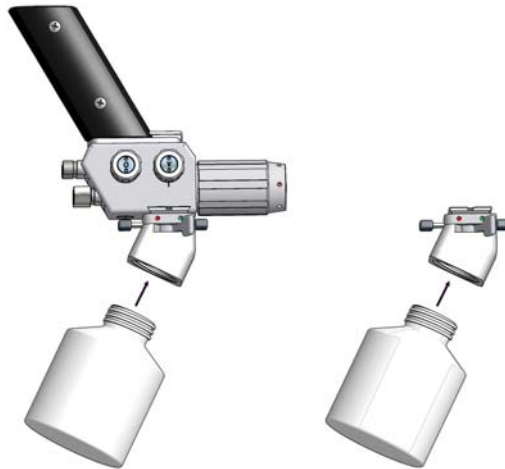


5. Tighten the air scoop by hand.

## Fixing the powder cartridge

Version 1:

- Rotate the flame spray powder unit with closed locking lever (lever is located above the red dot) by 180°. Fit the powder cartridge and secure by turning to the right.



Version 2:

- Remove the powder module head with closed locking lever (lever is located above the red dot) from the unit. Fit the powder cartridge and secure by turning to the right. Then fit the powder module head and powder cartridge on the flame spray powder unit.



### Conversion to external powder transport gases



#### **WARNING**

Before converting the Powder flame spray gun unit use external powder transport gases, all other gases must be shut off and the pressure released.

By using external powder transport gases, e.g. Ar, N<sub>2</sub>, etc., instead of oxygen (internal powder transport gas), special spray coating properties when spraying fine-grain powder grains can be produced.

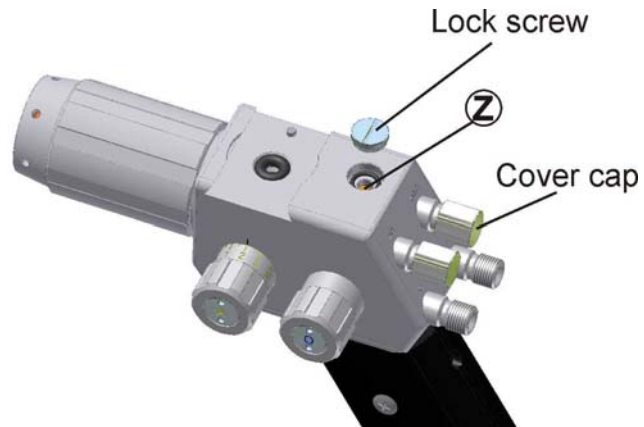
Cobalt-based powder and powders with a high affinity with oxygen can be processed using argon as external powder transport gas with great results.

When using the special technique described above, the appropriate operating pressure levels relevant to the external powder transport gas need to be determined by the operator using empirical tests, depending on the powders being sprayed and the associated spray output.

If the flame spray powder unit is being operated with external powder transport gas (EX connection), the unit must be converted to this operating mode.

This is carried out by setting the gas switch **item Z**:

- Remove the lock screw.
- Screw in the stud screw on the gas switch by turning to the right until it reaches its limit stop.
- Fit the lock screw.
- Remove the cover cap.



#### Disassembly to internal powder transport gases

Resetting to normal mode:

- Remove the lock screw.
- Unscrew the stud screw on the gas switch by turning it to the left until it is flush with the top edge of the tapped hole.
- Fit the lock screw
- Re-fit the cover cap.

## Operation

### Preparing the surface

The bond between the spray material and the base metal is crucial to the thermal spraying process. In a "cold" spray process, the bond is formed mechanically or by micro-welding.

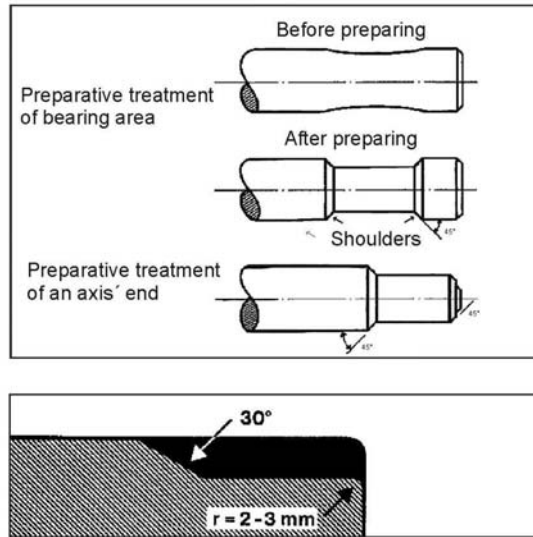
If spraying is following by melting, surface impurities can negatively influence the metallurgic bond. For this reason, cleaning metal surfaces and surface roughness are very important. to achieve a sound, stable bond, carry out the following recommendations exactly.

### Cleaning and degreasing

Remove impurities caused by corrosive effects, rust or paint residue mechanically by grinding or blasting. Pre-heating to slightly more than room temperature prevents condensation. Heat oil-saturated grey cast iron workpieces to approx. 200 °C to remove oil and grease residue. Surfaces that are to be sprayed must be free of oil, grease or lubricant residue. Use standard industrial solvents to clean these surfaces. Only trained personnel should use such products and only in well-ventilated work areas. Observe then normal precautions. Afterwards, blow clean, dry air over the prepared workpiece surfaces. Prevent the workpiece from subsequently coming into contact with any impurities.

## Preparing for the process

Finish-turn the surface that is to be coated to remove all fatigued metal and all unevenness from abrasion. Shafts: Process as in Fig. below.

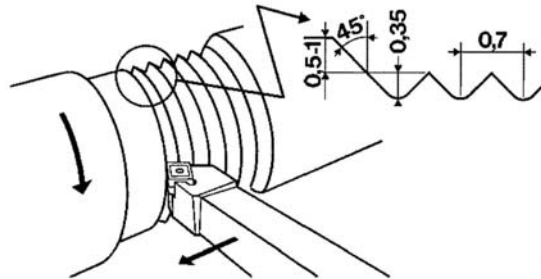


**Do not use liquid lubricant under any circumstances.**

## Surface roughness

There are various methods for achieving a surface roughness with the best qualities for a strong, stable bond with the base metal

- **Tread cutting**  
This preparation is generally used with cylindrical work-pieces that will be coating in a "cold" process. A thread is cut in a quick pass: feed 0,7 mm/rev., depth of cut 0,35 mm. This preparation achieves an oxide-free surface for the cold process. Do not use lubricants here either. This technique is not recommended for thin coatings.  
**Attention! use only carbon tool steel for "rough turning".**



- **Grinding**  
This surface preparation can be used for both cold and melting (fusion) processes. Either ceramic bonded grinding discs or grinding tools can be used. Make sure that grinding dust or used and dirty grinding discs come into contact with the surface. The grinding tools should be self-sharpening.

- **Blasting**

This preparation method offers the best performance if clean shot is used (not contaminated by paint or other residue). The compressed air must also be clean, dry and free of oil. The quality of surface preparation with blasting depends on the type and grain size of the shot and blast parameters, e.g. blasting time, distance, angle, speed of the shot and type of the blasting unit. In addition, the wear condition of the shot significantly influences the characteristics of a blasted surface.

Fused corundum (aluminium oxide) and sharp-edged steel shot or - depending on the application - other types of shot, e.g. silicon carbide (SiC), chilled cast iron shot, copper mill an melting chamber slag or quarry sand are also suitable blasting materials. The roughness of the blasted surface depends on the shot size and the air pressure. Coarse shot yields a higher surface roughness and consequently good adhesion to the base material, but also yield a rough surface after finish-coating. The pressure used for blasting should not be too high so that the shot, particularly aluminium oxide, does not become embedded in the surface.

Thoroughly cleaning the blasted surface of shot residue and dust is very important in terms of the bond strength of the coating layer. The best way to clean the surface is with suction or by blowing dry, oil-free compressed air over the surface.

### Protecting the adjacent zones

The zones adjacent to the coating are masked and protected by brushing on the masking emulsion.



**Notice**

**Important:**

It is recommended that the coating process take place immediately after preparing the surface to avoid new problems with oxidation or contamination. Nevertheless, if the surface is damaged, repeat the preparation as described previously.



## Spray additives



### **DANGER**

All materials are supplied with a safety data sheet. Never spray a substance without having read and observed the safety precautions given on the safety data sheet.

The IBEDA MiniSprayJet flame spray powder unit can be used to spray the following powder-based spray additives:

Standard operation **without** added air:

(Fuel gas combination: acetylene + oxygen)

- IBEDA EXOLOY – spray powder in the "cold process"
- IBEDA EXOLOY – One-step spray powder in the "cold process"
- IBEDA UNILOY – spray powder in the "hot process"

Standard operation **with** added air:

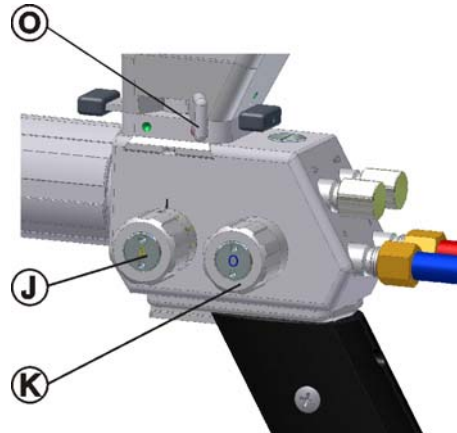
- IBEDA EXOLOY – spray powder in the "cold process"
- IBEDA EXOLOY – One-step spray powder in the "cold process"
- IBEDA Metoxid - Ceramic powder in the "cold process"
- IBEDA Zinc - White metal powder, including in the "cold process"
- IBEDA UNILOY – spray powder in the "hot process"

The spray output is 1.0 - 8.0 kg/h depending on the unit setting and depending on the spray additive.

Due to the universal application of the unit with the wide range of accessories and special components, this can be applied by any occasional user, such as professionals for repair and preventative maintenance.

## Starting operations

Before opening the gas feed on the gas supply system, both regulating shut-off valves **item J** and **item K** on the flame spray powder unit must be closed. Close locking lever **item O** . (Lever is located after the red dot)



## Setting the working pressure

1. Open the oxygen gas supply and set the operating pressure on the oxygen pressure regulator to 2.5 - 3 bar (see spray table)
2. Open the acetylene gas supply and set the operating pressure on the acetylene pressure regulator. (see spray table)
3. Open the oxygen regulating and shut-off valve **item K** (approx. 1/2 a turn to the left of the valve wheel).



### WARNING

Oxygen then flows out of the outlet holes of the gas-mixing spray and heating nozzles of the flame spray powder unit.

4. Set the fuel gas regulating and shut-off valve **item J** to the **N** position (approx. 1/2 turn to the left of the valve wheel).



### WARNING

An ignitable gas mixture then flows out of the outlet holes of the gas-mixing spray and heating nozzles of the flame spray powder unit. The flame then needs to be ignited as quickly as possible.

### Igniting the flame

1. Igniting the outgoing acetylene/oxygen mixture.
2. In position »N« on the fuel gas regulating and shut-off valve **item J**, a neutral flame is set by adjusting the acetylene pressure regulator.

**This completes the basic setting work for the flame!**

Most powders are sprayed using a neutral flame setting (see spray table).

This basic setting is set first. An oxidising flame is set by continuing to close the fuel gas regulating and shut-off valve **item J** (turn the valve wheel to the right). The flame is reduced more and more by continuing to open the fuel gas regulating and shut-off valve **item J** (turn the valve wheel to the left). Cobalt powder alloys are sprayed using a reduced flame.

### Possible flame setting



Neutral flame  
(Stoichiometric mixture of oxygen and fuel gas)



Oxidized flame  
(Excess oxygen)



Reduced flame  
(Excess fuel gas)

## Switch off

### End of the working day

1. Switch off the powder feed by actuating the locking lever **item O** to the "red dot" position.
2. Close the fuel gas regulating and shut-off valve **item J** (by turning the valve wheel to the right).
3. Close the oxygen regulating and shut-off valve **item K** (by turning the valve wheel to the right).
4. Shut off the cooling air supply.



#### **WARNING**

Do not allow gas to escape in areas where there is a risk of an explosive gas-air mixture forming.

## Maintenance

Details on test schedules and the scope of the tests can be found on DVS Data Sheet 2304 (appendix 1, appendix 2) and standard DIN EN 1395!



#### **WARNING**

Only skilled and qualified personnel is allowed to do any maintenance, who have the required specialist knowledge for testing the working materials through their professional training, their professional experience and their contemporary professional occupation. (Germany Operational Safety Ordinance (Betr.SichV) §2 (7))

## Testing periods

Minimum recommendation of the manufacturer:

### Daily/ Operator of the system

- Before start of work, perform a visual check of all hose connections for damage and porosity. Check the entire system for corrosion, damages and loosened screw connections.
- Check appliances for correct functioning.
- Test the spray nozzle injector. (see set up operation chapter)

### At regular intervals/ qualified personnel

- Check thermal spraying system for leak tightness against the atmosphere and for proper condition.
- Check the master pressure regulator for leak tightness against the atmosphere.

### Yearly/ qualified personnel

- Check the gas non return valve for leak tightness against the atmosphere.
- Check the high-pressure hose lines for leak tightness against the atmosphere.
- Checks of the condition, designation, corrosion, damage, design, mounting and sealing materials.

### Every five years/ qualified personnel

- High-pressure hose lines must undergo a pressure test with 300 bar or 350 bar.

**Keep a record of the tests! The records are to be stored at the operating site of the system.**

## Troubleshooting

Unusual occurrences, defects or damages to the thermal sprayer system as well as the response of their safety devices are to be immediately reported to the person(s) responsible for the operation.

## Remedy

- **Leakage to atmosphere**  
Tighten the loose screw connection. Check sealing surfaces and clean if necessary.
- **Uneven flame aspect**  
Check the spray nozzle injector. If no vacuum is produced, the spray nozzle is faulty and needs to be replaced. (see set up operation chapter)
- **Insufficient powder throughput**  
Check the powder injector. If no vacuum is produced, the carrier gas nozzle is faulty and needs to be replaced. (see set up operation chapter)

## Repair



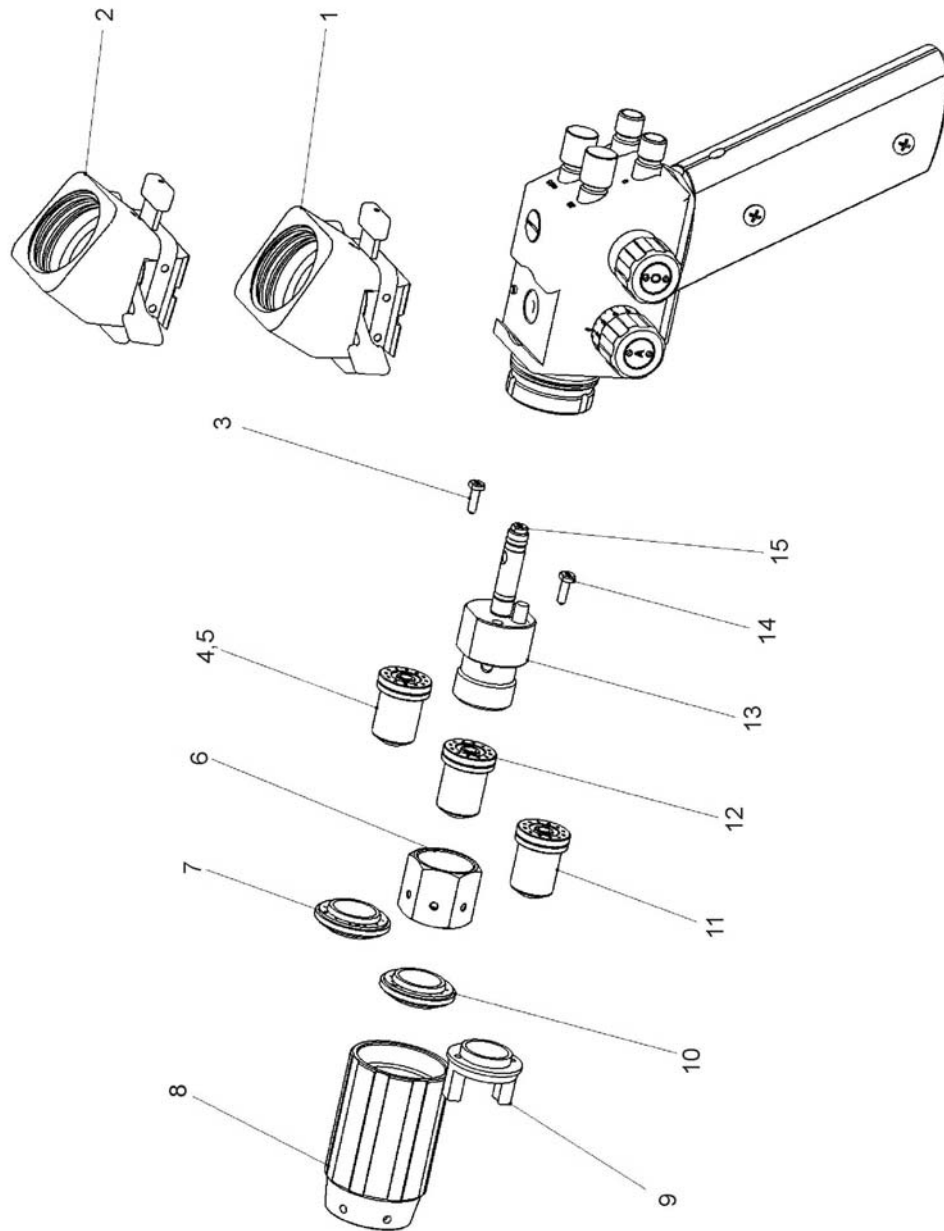
### WARNING

Repairs may only be carried out by an authorised repair workshop, and by professional trained persons.

## Disposal

- All operating equipment and accumulated spray mist residue must be disposed of in accordance with the relevant legal regulations.
- Some substances are classified as hazardous. Follow the relevant legal regulations and information on the safety data sheet.

**Modification parts**



**Modification parts to use from:**



- Metal powder - EXOLOY, UNILOY
- Zinc powder - EXOLOY 1025
- Ceramic powder - METOXID
- Plastic powder - IBEDA-Plast

Standard parts for Metal powder	Modification parts for Zinc powder	Modification parts for Ceramic powder	Modification parts for Plastic powderer	Pos.	Description	Article-No.
x	x	x	x	6	Swivel nut M22 x 1	1005-0003
x	x	x	x	8	Air Cap M32x1	1077-0012.EN
x	x	x	x	13	Nozzle with pressure nozzle-N	1014-0008
x	x	x		1	Powder module head complete	1067-0007
x	x			15	Powder pressure nozzle -N-0,45	1014-0003
x				10	P/K ring nozzle	1014-0001
x				12	RF/N-A spray nozzle	1014-0013
		x		9	Fan nozzle F	1014-0051
		x		11	HT/S-A high temprature nozzle	1014-0018
		x		14	Pressure nozzle -S 0,3	1014-0004
	x		x	4	L/T/A nozzle (Acetylene)	1014-0015
	x		x	5	L/T/P nozzle (Propane)	1014-0016
	x		x	7	Blindring- B/R	1010-0009
			x	3	Pressure nozzle - X-1,0	1014-0052
			x	2	Powder module head complet	1067-0008



## Accessories

Figure	Description	Article-No.
	Refillable powder cartridge 250 cm <sup>3</sup>	1383-0001
	pneumatic vibrator	1383-0018
	Manual slide valve	1401-0001
	Filter-regulator	1432-0002
	Hose package AHPMY -O 5m G1/8RH-G1/8LH	0181-0528
	Compressed air hose 1 Mpa-4x3,5 G3/8RH-G1/8RH 6,5m	7640-0617

	D1 Coupling pin -F G1/8LH -red	0069-4026
	D1 Coupling pin -O G1/8RH -blue	0069-4027
	Coupling DKG G3/8LH Fuel gas EN 561	3000-0074
	Coupling DKG G1/4RH Oxygen EN 561	3000-0068
	Flashback arrestor DGN G3/8LH EN 730	3000-0064
	Flashback arrestor DGN G1/4RH EN 730	3000-0065
	Cylinder regulator Acetylene 25/1,5 bar	6454-0068
	Cylinder regulator Oxygen 200/10 bar	6454-0065
	Cylinder regulator Nitrogen	6454-0067
	Cylinder regulator Inert gas	6454-0092
	Swivel nut EN 560 G1/8LH SW12 B7,2	0005-0500
	Swivel nut EN 560 G1/8RH SW12 B7,2	0005-0501
	Hose pin EN560 G1/8x4mm	0006-0549

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## Attachment

Spare parts list

Additives/coating with powder

Spray table

Manufacturer's declaration

