OPERATING MANUAL

Z-JET 2®
FLAME SPRAY GUN

SAINT-GOBAIN Coating Solutions
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SAS au capital de 99 990 Euros – RCS Avignon B707120556

SAINT-GOBAIN
GRAINS & POWDERS

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CHAPTER 1 - "CE" DECLARATION OF CONFORMITY N° DCE 07021201

SAINT-GOBAIN coating Solutions, represented by **Claude SZANIAWSKI,** general manager,

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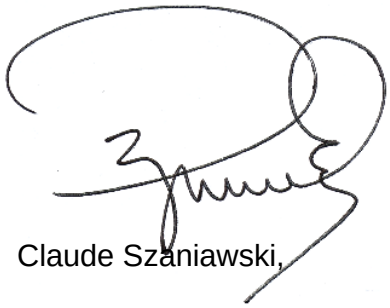
Public corporation with capital of 99 990 Euros,

declares that the **Z-JET 2** ® gun, designed for thermal spray application,

- conforms to the clauses of the modified "Machines" directive (directive 89/392/EEC) and national legislation transposing it,

- conforms to the European directive "Electromagnetic Compatibility" (89/336/EEC).

Issued in AVIGNON on February 12th, 2007,



Claude Szaniawski,

VERY IMPORTANT:

- Saint-Gobain - Coating solutions, manufacturer of thermal spray equipment, declines any responsibility in the event of accident occurring following a disassembling, or a reassembly, or a use of the gun not-envisaged in this handbook. We decline also any responsibility in the event of exchange of parts not provided/supplied by Saint-Gobain – Coating Solutions.
- In all the cases, the customer or the user must conform to the regulation in force (for example: regulations, standards and laws applied in the concerned country), and to be held informed regular updates.
- Certain sprayed materials can generate dust being explosive. Please contact qualified organizations in this matter in your country.
- Certain materials can generate dust and fumes able to involve problems of health. Please contact qualified organizations on this matter and the Health organizations in your country.

CHAPTER 2 – SAFETY / CONDITIONS OF USE

1. Normal use

The **Z-JET 2** ® is used manually for anti-corrosion protection work. The spraying distance must be about 100 to 200 mm from the part to be coated.

Residual noise level produced by flame thermal spraying depends on the gas and type of material being sprayed. The equivalent loudness level (LEQ) is 112 dB (A) and the acoustic pressure level (LP) is 110.5 dB (C) both measured at 1 meter from the Flame spray Gun using Zinc wire. This means that for normal use, the operator must wear a noise-reducing helmet.

Z -JET 2 ® flame spray Gun is held manually by the operator. The weighted root mean square value of acceleration frequency to which the upper limbs are subjected does not exceed 2.5 m/s/s. A fixing device, available as an option, can be fitted to the casing. It reduces excessive operator's fatigue in cases of continuous or repetitive spraying. In any case an operator must stay closed to the gun, in order to verify the correct operation (not suitable for robots use).

The **Z-JET 2** ® equipment must be placed in a ventilated area (with a hood) having a minimum speed of air : 0.5 m/s. All gas leak detectors are at customer charge. The spray area must have an adequate lighting (120 lux minimum).

Very careful attention must be paid to the type of materials sprayed. Refer to the data sheets of the products or supplier's recommendations. This flame spray system must be used by operators who have been trained in thermal spraying procedures and associated safety rules according to .the standard EN 14918. The operators must be trained to the safety measures for the use of the gases.

When spraying, the operator must wear protective items (breathing mask FPP3 level, tinted glasses (level 5), metal spraying helmet, gloves, leather apron, etc.). The choice of the protective items is under user or buyer responsibility.

The **Z-JET 2** ® equipment is not subject to "emergency stop" appliance.
The **Z-JET 2**® equipment is considered as portative equipment.

2. Other uses

Other uses such as heating, painting, liquid pulverization, powder spraying… are not permitted with the Z JET gun. Saint-Gobain Coating Solutions will not be held liable for any contingent damages of any kind such as, but not limited to, production delays, losses or downtime, for the client or any other company.

3. Safety recommendations

- Carefully read this user notice and the instructions before installation & operating.
- Before igniting the gun, safety equipments must be activated, maintained in operation during the spraying operation, up to complete extinction of the procedure. The operator must always wear the protective items.
- The exhaust devices must remain operational and must be "ON" during the spraying operation, up to complete extinction of the procedure.
- The gas panel and the set of hoses carrying the gases must be located in a sufficiently ventilated area. Installation must be approved by a certified control organization (APAVE, VERITAS, TUV… at customer charge and responsibility).
- If required, devices for detecting gas leakage must be installed. Those devices can be supplied by SAINT-GOBAIN CS on request.
- Only qualified operators (according to EN14918) are authorized to use the equipment. Only qualified technician for gas, mechanic and electric maintenance are authorized to set-up and maintain the equipment.
- Refer only to parameter adjustment tables communicated by SAINT-GOBAIN CS.
- Never aim or point the flame spray gun in the direction of :
  - any person and any animal,
  - any electrical device (components, electrical cables, motors…),
  - any flammable or non-flammable product such as gas or liquid or solid,
  - any pipe or hose carrying flammable or non-flammable products,
  - any container under pressure containing liquid or gas (gas cylinder, oxygen cylinder, air cylinder…)
- Never use the flame spray gun in a confined area such as a pipe, tank… even if the area is ventilated. This operation must be subject to prior approval by a certified safety organization.
- Never use the flame spray gun in an explosive area (oil rig, gas plant, oil plant…)
- The equipment must be used in compliance with the procedures for ignition, utilization and extinction defined by SAINT-GOBAIN CS. Any non-controlled interruption must be prohibited.
- STOP during ignition, emergency stop, stop related to defects are considered as abnormal interruptions of the process, and are subject to diagnostic and re-start operations.
- Deliberate or accidental interruptions must be followed by a phase of air purge and adjustment of parameters.
- The operator must wear ear safety protections, eye safety protections, gloves and adapted wear, ear protection.
- Never use the gun without wire, cord or rod inside the nozzle. The wire or the cord must be tight between the wheels. Always verify that the material is carefully locked between the feed rolls.
- Possible risk of injury for fingers or hand, due to the tight between the feed rolls.
- Possible risk of injury with hot parts. After spraying, the temperature of the nozzle set can exceed 50°C.

4. Dust and fumes

Thermal spraying generate dust and fumes (Nickel, Chrome, Copper…). In order to set up an efficient prevention and safety plan, it is important to verify and conforms to regulations, standards and laws applied in the concerned city, province, state or country, and to be held informed regular updates, where the gun will be used.

5. Basic prevention / frequent operator's mistakes

- Don't forget to set a wire in the gun and don't forget to lock it.
- When a flame-stop or flame back appears, check the O-rings 'especially check the O-ring ref 1700 5214 " front side of the gas mixer and small O-ring".
- Air cap must be not jammed on gas nozzle: air cap must rotate free (auto air cap).
- Verify, if the air cap support is well screwed on the gun. The thermal expansion can affect the tightening. Control frequently the tightening.
- If the ignition time is too long, the air cap can burn and the wire can clog.
- Don't forget to open air supply: air cap will burn.
- Don't forget to set the 5 x different O-rings and the air cap ring.
- Gas nozzle, mixer, air cap must be not damaged or scratched.
- Before operation, verify the quality and the diameter of the spray materials.
- Before operation, control the tightening of the air cap.
- When the equipment is under pressure from the 3 fluids and the gun is on "STOP" (the gas valve is on OFF position), make sure that the 2 flowmeters balls are at 0mm.
- For a long life of the gun, control frequently the lubrication and greasing. In order to improve the gun life time, feed periodically the oil tank with oil.
- When acetylene pressure is too low, reduce oxygen flow and wire speed.
- STOP flame first and after the wire feeding (if not, the wire will stick).
- Never turn the gear knob without rotation of the air motor.
- Proceed and change the mixer O-rings each 40 h of use (5 O-rings). In case of flame back, do not hesitate to change all the O-rings of the gas mixer.

CHAPTER 3 – DESCRIPTION/ PRINCIPLE

1. Description

Z-Jet 2 ® is a spraying system used for producing high-quality, reproducible coatings. A large range of coating are possible using low melting point wires such as Zinc, Zinc-Aluminum, Aluminum, Tin with diameters ranging from 1,5 to 3mm (contact us for wire diameter 4mm).

It is particularly suitable for meeting the requirements of reliability and reproducibility imposed by continuous production. By virtue of its design, **Z-Jet 2** ® is a reliable tool with very low maintenance costs and very straightforward operation.

The Z Jet set comprises:

- a thermal spray Gun,
  dimensions: 230 x 150 x 90 mm
  weight: 2.20 Kg.
- a gas control panel,
  dimensions: 450 x 750 x 200 mm
  weight: 14 Kg.
- a set of 3 x 8+2 meters connecting hoses.

2. Principle of the process

The thermal spraying consists in

1. The gas nozzle generates a flame: oxygen + combustible gas,
2. The metal wire is feed to the center of a gas nozzle,
3. The material is then melted and atomized by compressed air,
4. The stream of molten particles is sprayed onto a substrate in the form of fine droplets.
5. The coating is build-up by superposition of droplets.

Coating quality can be mainly affected by:

- the wire feed rate,
- the diameter of the wire,
- the type of gas used,
- the delivery rate of combustible gas,
- the delivery rate of oxygen,
- the delivery rate of compressed air,
- the constant material feeding.

Note :Other parameters can affect the coating quality but they are not listed (contact us).

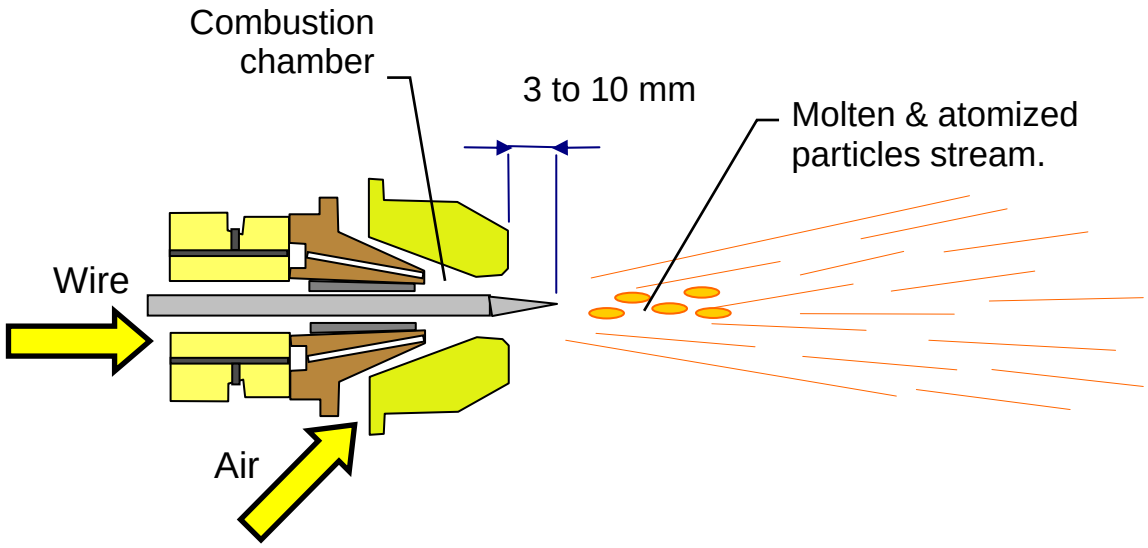
The torch assembly is composed of a :

- A gas mixer specific for each gas,
- A gas nozzle specific for each diameter and material to be sprayed,
- An air cap specific for each diameter and material to be sprayed,

Refer to our technical team to know the suitable spare parts.

The torch assembly ensures :

- homogeneous distribution of the flame around the wire,
- perfect centering of the wire to ensure total melting of the material,
- optimum spraying efficiency, material speed versus coating quality.



CHAPTER 4 - EQUIPMENT AND ACCESSORIES

1. Standard equipment

a. Z-Jet 2 ®Flame Spray Gun,

Ref. 1500 1315 (fast air motor)

A lightweight gun combining easy handling with rugged construction and capable of spraying materials such as Zinc, Zinc-Aluminum, Aluminum and Tin alloys (specific nozzle sets could be required for each configuration and are not included in the basic supply). The gun is equipped with a fast speed air motor.

b. Gas Control & Setting Panel, Ref. 11001018A or 11021103

Very easy to install and use, this control panel is indispensable to ensure safety and coating quality and accurate information of acetylene and oxygen flow.

c. Set of hoses

Allows to link the gas setting panel and the Flame spray Gun. The hoses are 10 meters long and available for the types of gases (acetylene or propane)

Acetylene hoses : Ref11001310A + 17001319A.

Propane hoses : Ref11001331A + 17001318A

2. Optional accessories

a. Air Filter, Ref. 11001391

The compressed air delivered by the compressor is polluted with impurities (water, oil). SAINT-GOBAIN CS SNMI can supply a filter. It must be placed as far as possible from the compressor and usually fitted on the side of the gas control panel (filter cartridge, ref. 11001394).

It is recommended to install a oil purifier-separator after the compressor if the compressed air is loaded with oil.

To condense the water impurities, install a dryer/cooler after the compressor.

b. Wire feeder, Ref. 11001353

This wire feeder is designed for uncoiling out the coils of soft metal wire such as : Zinc, Tin, Aluminum. If wire is stiff the wire feeder straightener must be chosen.

11001355

11001353

c. Wire feeder straightener, Ref. 11001355

This wire feeder is designed for usually feeding out the coils of stiff metal wire having a diameter over 3mm or for wires having problems to be uncoiled.

d. Angle Air cap, Ref. 170057xx or 170058xx – refer to chapter 9. "Torch assembly charts"

Angle air cap provides an angle sprayed particles stream from the gun axis. Specially designed by SAINT-GOBAIN CS SNMI, the angle air cap must match the corresponding wire diameter. This nozzle is used especially with extensions (see Page 14). The angle of the particle stream is between 30° to 45° from the gun axis.
Refer to parts number :

- 1700 5715, 1700 5720, 1700 5730, 1700 5740, 1700 5750
- 1700 5815, 1700 5820, 1700 5830, 1700 5840, 1700 5850

e. Flat Jet Air Cap, Ref. 170059xx – refer to chapter 9. "Torch assembly charts"

When a width spray pattern is required, you can use the flat jet nozzle. It is manufactured and sold by SAINT-GOBAIN CS SNMI to match the corresponding wire diameter.
Refer to parts number :

- 1700 5715, 1700 5720, 1700 5730,1700 5740, 1700 5750 (automatic air cap)
- 1700 5815, 1700 5820, 1700 5830, 1700 5840, 1700 5850 (screw air cap)

g. Extensions

Extensions (see Page 14) are designed for spraying inside diameter or in inaccessible areas which cannot be reached by the gun. Shorter extension are also used for keeping the gun head at a distance from the sprayed part or the hot zone. Extensions are available in four different lengths: 200 mm - 330 mm - 660 mm - 1000 mm.
The extension is fitted and tight on the gun head, and the nozzle set is fitted at the other extremity. Our extension are built and assembly so that the gas and the oxygen circulate separately in the extension. It ensure safe operation. Extensions are suitable for wire spraying.
The nut of the extension is tight on the gun head by using a 35-mm flat wrench 2429.

NOTE: Do not forget to replace wire guide 5230 on the gas nozzles using wire guide tube 2427 supplied with the extension.

h. Pressure reducers for gas cylinders

These pressure reducers are used to reduce the gas/oxygen pressure at the exit of the cylinders. They are rugged devices suitable for workshops or worksites. Reading pressure levels is made easy by using pressure gages with large displays.

- Acetylene pressure reducer: Ref. 11001211
- Propane pressure reducer: Ref. 11001210
- Oxygen pressure reducer: Ref. 11001209

i. Sand Blasting and Metal Spraying Helmet, Ref. 11001465

This helmet is a breathing device supplied with breathable air from a compressed air source in compliance with EN 132. It comprises an acetate screen mounted on a helmet with a flow rate valve. As option an "active carbon" cartridge can be supplied. The screen can be fitted with a grade 5 tinted visor. It complies with standard CE approved by the H.S.E - TM 14/7.25 Class 2. (For more details, contact us).

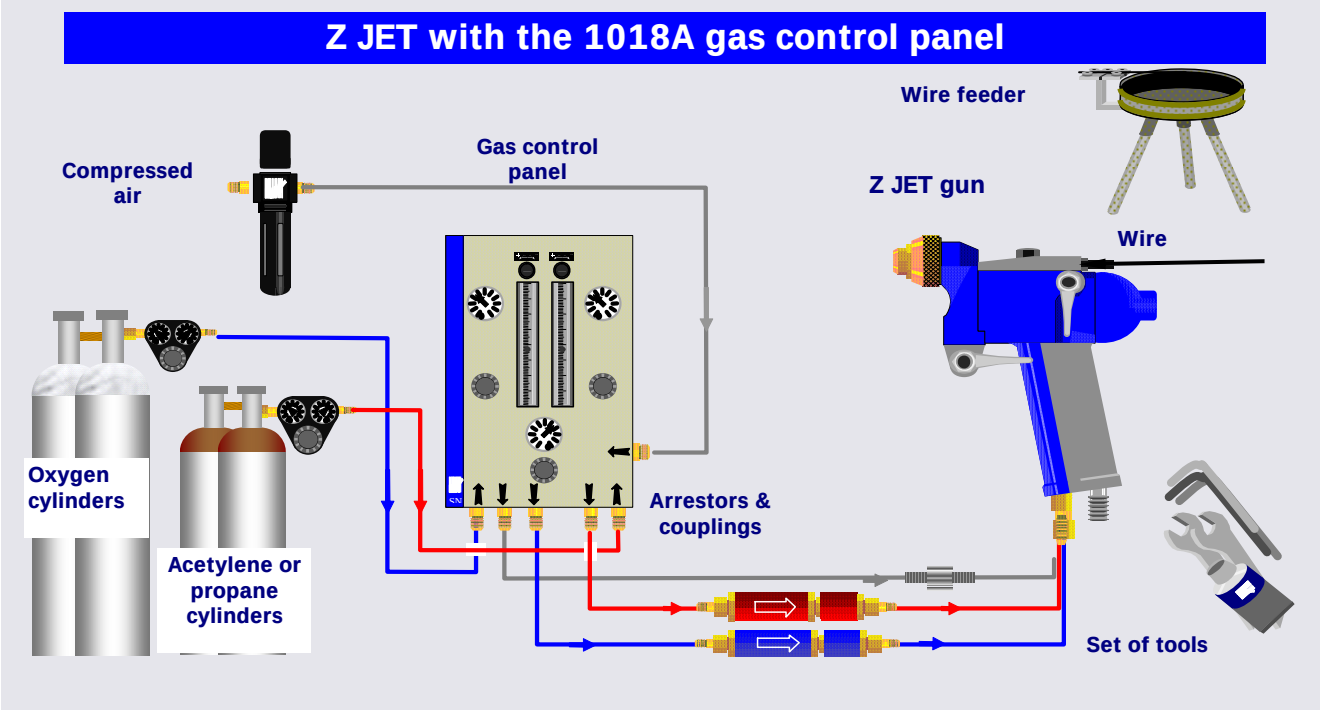
j. Coating Thickness Measuring Device, Ref. 11001476

This measuring device is used for non-destructive measurement of coatings applied to ferrous substrates. It operates on the principle of magnetic induction measurement (DIN 50981, 50982, ISO 2178). It measures the thickness of coatings such as: chromium, zinc, brass, bronze, copper and also varnish, paint, plastic materials, enamels and ceramic.
Consult us for other substrates (non-ferrous).

CHAPTER 5 – SETTING AND FITTING

1. Equipment to be installed

The **Z-JET 2** ® spraying system requires the installation of the following components : (see figure) :

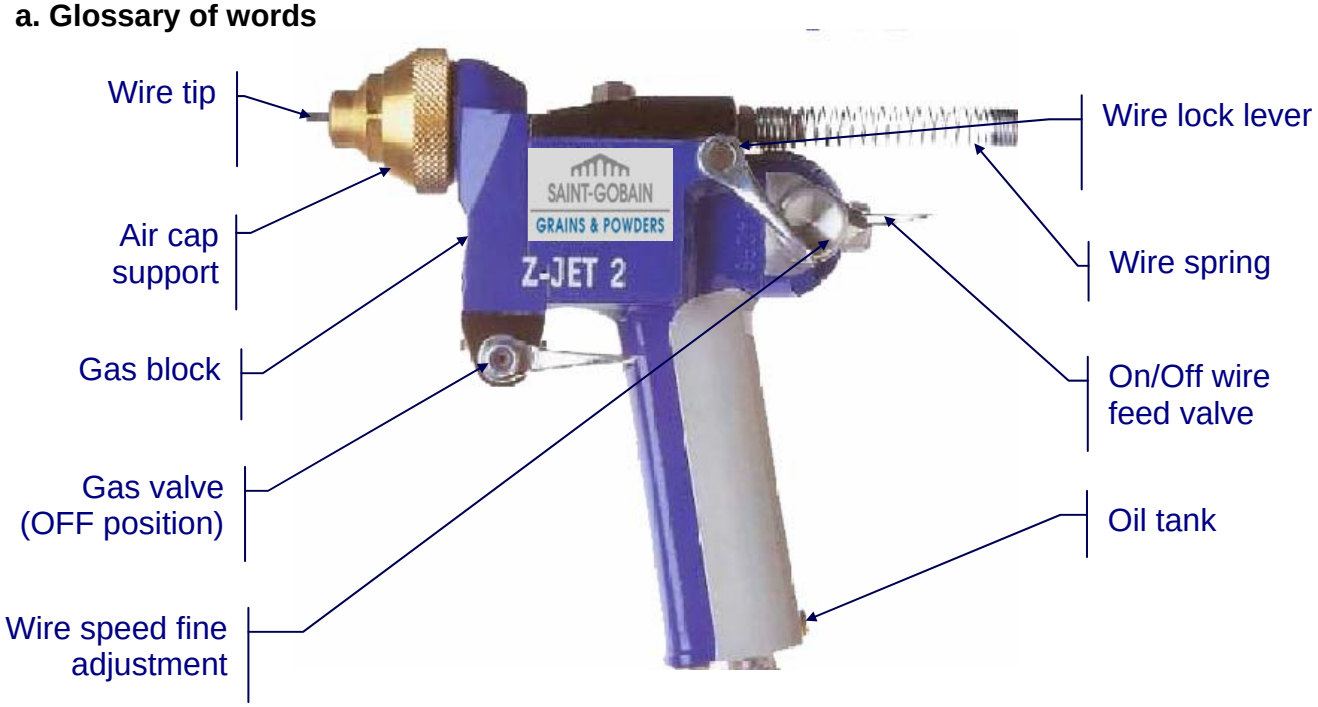


Make sure that you have all of these equipments :

- **Z-JET 2** ®**Flame spray Gun** fitted with 2m hoses, quick-connect couplings,
- **Gas control panel 1018A** with an air filter (optional) to be fitted on the compressed air hose,
- Two coupled **cylinders of acetylene** or propane or Propylene fitted with a pressure regulator, the exit tail must be 6,35mm (1/4") diameter,
- Two coupled **cylinders of oxygen** (item 8), not supplied, to be fitted with a pressure reducer, the exit tail must be 6,35mm (1/4") diameter,
- **Air pressure regulator,** fitted with air dryer and air cleaner if required. The exit tail must be 10mm diameter
- **Wire feeder,** with a wire straightener if wire is stiff.

2. Preparation of the Z JET 2 ® gun

a. Glossary of words



b. Lubrication of the gun

◀ 1) ***Remove the screw-cover of the oil-tank from the gun***

2) Fill the oil tank and screw again the cover ▶

With the Z-Jet : it is not required to remove the oil tank from the gun body. The oil tank can be fiiled out without removing the oil tank.

Use the oil supplied by Saint-Gobain

If you are supposed to remove the oil-tank, verify O-ring. Do not hesitate to replace the O-ring. Be sure that the oil tank is well fitted and sealed against the gun body (no gap is allowed between the both parts).

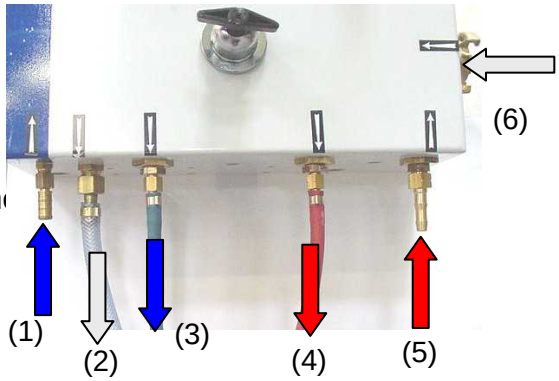
3. Setting up the equipment

For Z-Jet supplied with the basic flow-meter set ref 11021103 refer to chapter 8,

- Secure the gas control panel 1018A to a stable frame such as a wall or to a mobile support.

- Install and fit the gas and oxygen hoses between the cylinder pressure regulators and the inlets of the gas control panel :
  - oxygen hose 6,35 mm (1) BLUE,
  - gas hose 6,35mm (5) RED or ORANGE,
  - oxygen hose 10mm (6) WHITE,

Cut the hose length according to your need.



- Install and fit 8+2-meters hoses between th control panel and the gun :
  - oxygen hose 6,35 mm (3) BLUE ,
  - gas hose 6,35mm (4) RED or ORANGE,
  - oxygen hose 10mm (2) WHITE,

The setting and installation must be made by an authorized and competent technician. Contact a gas specialist and an electrician if required.

Use leak spray detector on all fittings to detect the leaks. Repair immediately the leak and make again the leak control operation.

Refer to safety and prevention rules in chapter §2

WARNING: Acetylene, propane, natural gas are a combustible gas when ignited. This operation should be done with the exhaust system "ON". The gas storage area must be an open area. Smoking is forbidden.

CAUTION : For combustible gas hoses (refer to ISO or AFNOR or EN):

- red colour SAINT-GOBAIN CS SNMI hose n° 1101312 must be used for acetylene,
- orange colour SAINT-GOBAIN CS SNMI hose n° 1101320 must be used for LPG, Propylene and Propane.

4. Fluid supplies

A. Acetylene Tanks

The fuel gas used with this flame spray unit can be acetylene, propane or natural gas.
Before attaching the regulator to the acetylene tank, open the tank valve very slightly and release a small amount of gas to blow out any dust or foreign material that may have collected in the valve exhaust port.

> WARNING: Acetylene, propane, natural gas are a combustible gas when ignited. This operation should be done with the exhaust system "ON". The gas storage area must be an open area. Smoking is forbidden.

Next, attach the regulator to the tank with the valve closed, pulling the attaching nut up tight while holding the regulator in an upright position. The regulator adjustment screw should be turned outward counter clockwise until there is no spring pressure against the screw. Refer to Fig 1. It is recommended that two or more tanks be manifolded together to provide the optimum operating conditions.

Many setup are possible for the gas supply, contact your gas supplier expert for more advise.

B. Oxygen Tanks

Open the valve of the oxygen tank very carefully and release a small amount of oxygen for the same reason described in section A. Then attach the regulator to the tank, with the valve closed, pulling the attaching nut up tight while holding the regulator in an upright position. The regulator adjustment screw should be turned outward counter clockwise until there is no spring pressure against the screw. Refer to Fig .2.

WARNING: Attach all compressed gas cylinders firmly to stationary fixtures. Cylinders upon falling may release gas and cause severe injury through explosion or by being jet-driven.

Many setup are possible for the gas supply, contact your gas supplier expert for more advise.

Never use fat products or grease or oil or powder to lubricate the fiitings dedicated to oxygen component.

C. Compressed air:

For a Flame spray Gun, a flow rate of 35 Nm^3/hour of air must be available. The delivery rate at the compressor (8 HP) outlet must be 50 Nm^3/hour of air under 6 bar. When the compressor is far away from the gun, its delivery rate must be increased to compensate for the pressure drop.
For a fixed installation, seam-less stretched steel hoses provide the best operation. The radius of connection must not be too slight and there must be no throttling. In the circuit, between the compressor and pressure reducer, the pipe diameter must not be less than 20 mm (3/4").

5. Supplies recommendation

The gas and oxygen supplies must be located in a area approved by your gas supplier.
For the location, the gas and oxygen cylinders must be located as closed as possible from the gas control panel 1018A or 11021103. Loose of power, loose of pressure results from a too long distance between the cylinders and the gas control panel 1018A or 11021103.

a. Pressure and max flow required at the outlet of the gas containers and the compressor.

For spraying wires with the best operating conditions the following minimum flow and pressure shall be available, at the cylinders outlets.

	Dynamic Pressure (bars)	Max. rate (Nm^3/h)
Compressed air	Mini 4 – Maxi 5	50
Oxygen	Mini 4 – Maxi 5	5
Acetylene	1,4 to 1,5	2.9
Propane	3	2.9

- If the spray equipment is not used in accordance to our parameters and the dynamic pressures listed above the guaranty is not applicable and the safety of the operator can be endangered.
- Air must be dry without oil,
- Propane could requires gas heater.

b. Typical consumptions with wire

	Pressure (bars)	Max. rate (Nm^3/h)
Compressed air	4 to 5	25 to 30
Oxygen	4	2,2 to 2,8
Acetylene	1.4	1,1 to 1,4

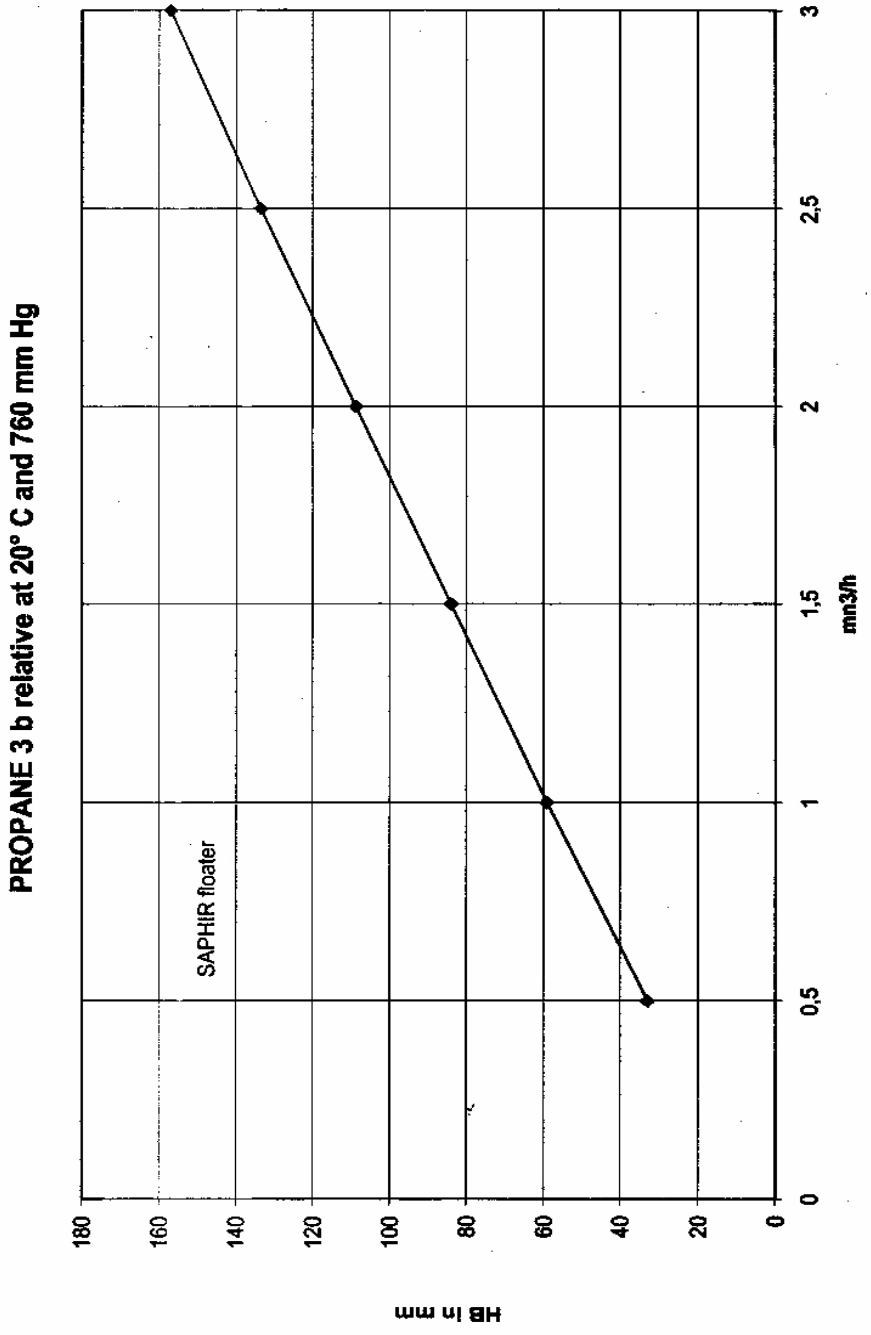
	Pressure (bars)	Max. rate (Nm^3/h)
Compressed air	4 to 5	25 to 30
Oxygen	4	3,3 to 4,2
Propane	3	0,7 to 0,9

NOTA: 14 to 18 Nm^3/h of air motor consumption must be add to the above values.

6. Gas weight

FUEL	PROPYLEN	ACETYLENE	OXYGENE	PROPANE
Mass of 1 m^3	1,81 Kg	1,10 Kg	1,35 Kg	1,86 Kg

7. Ball heights / flow rates conversion curves



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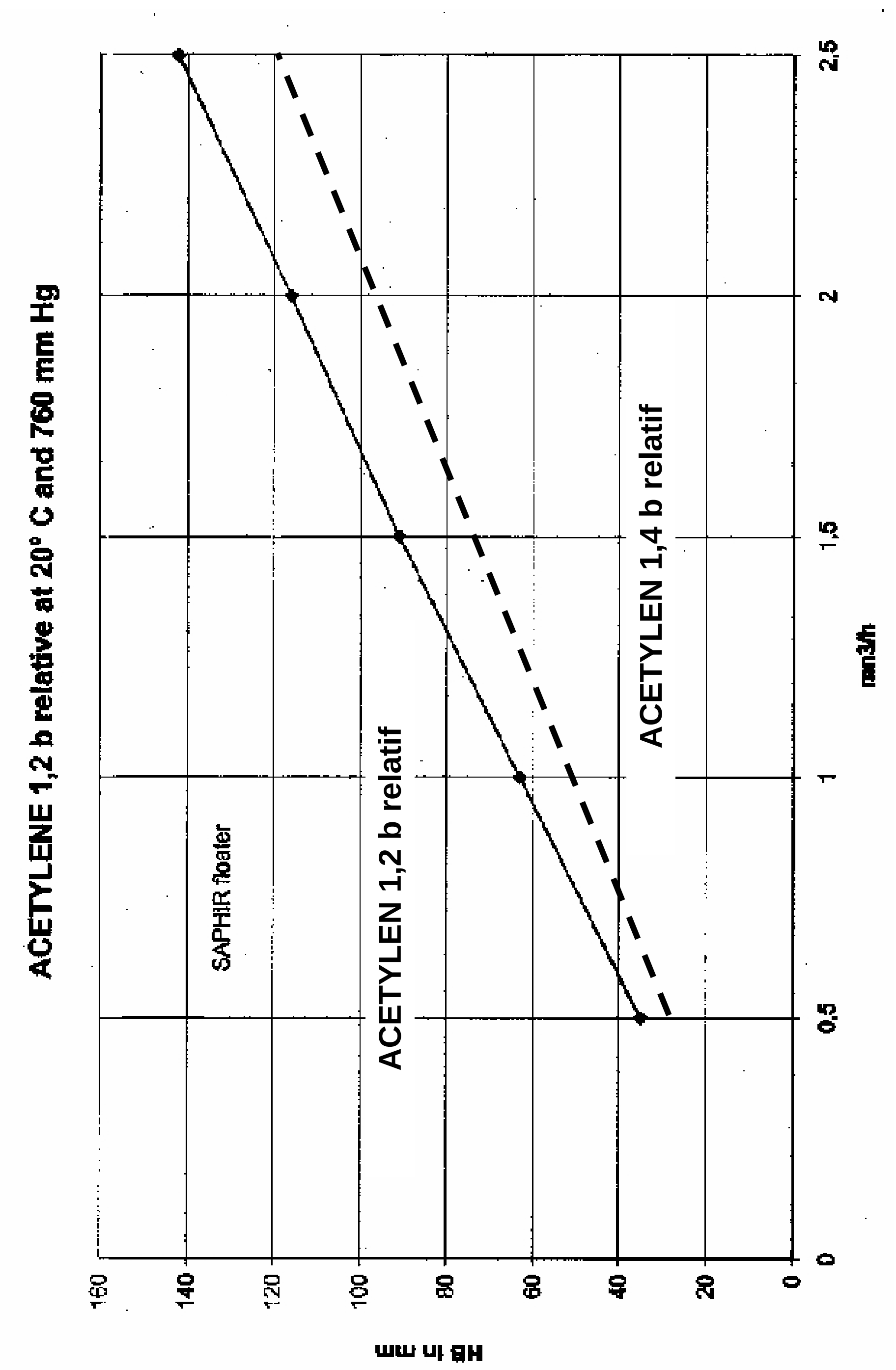
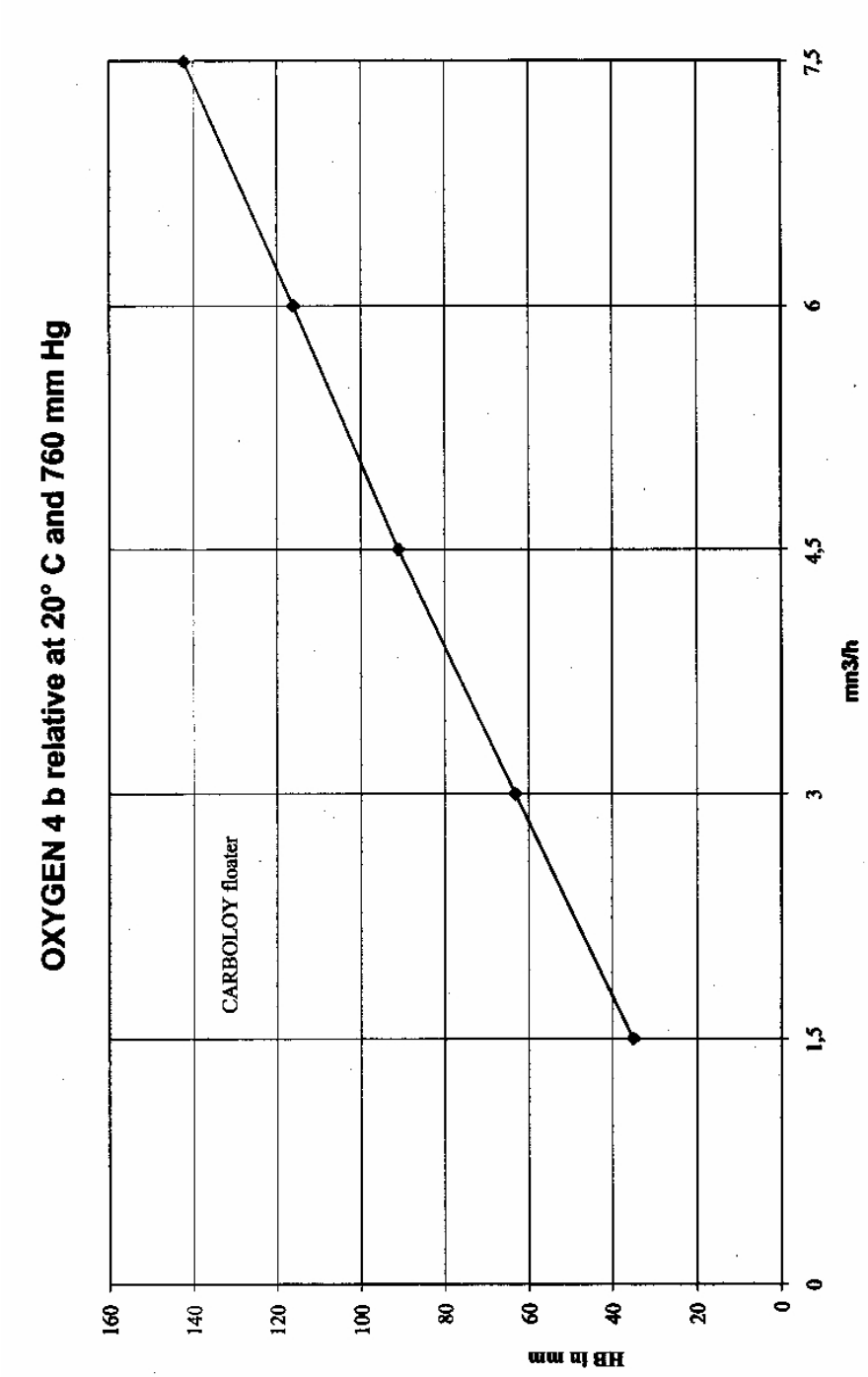
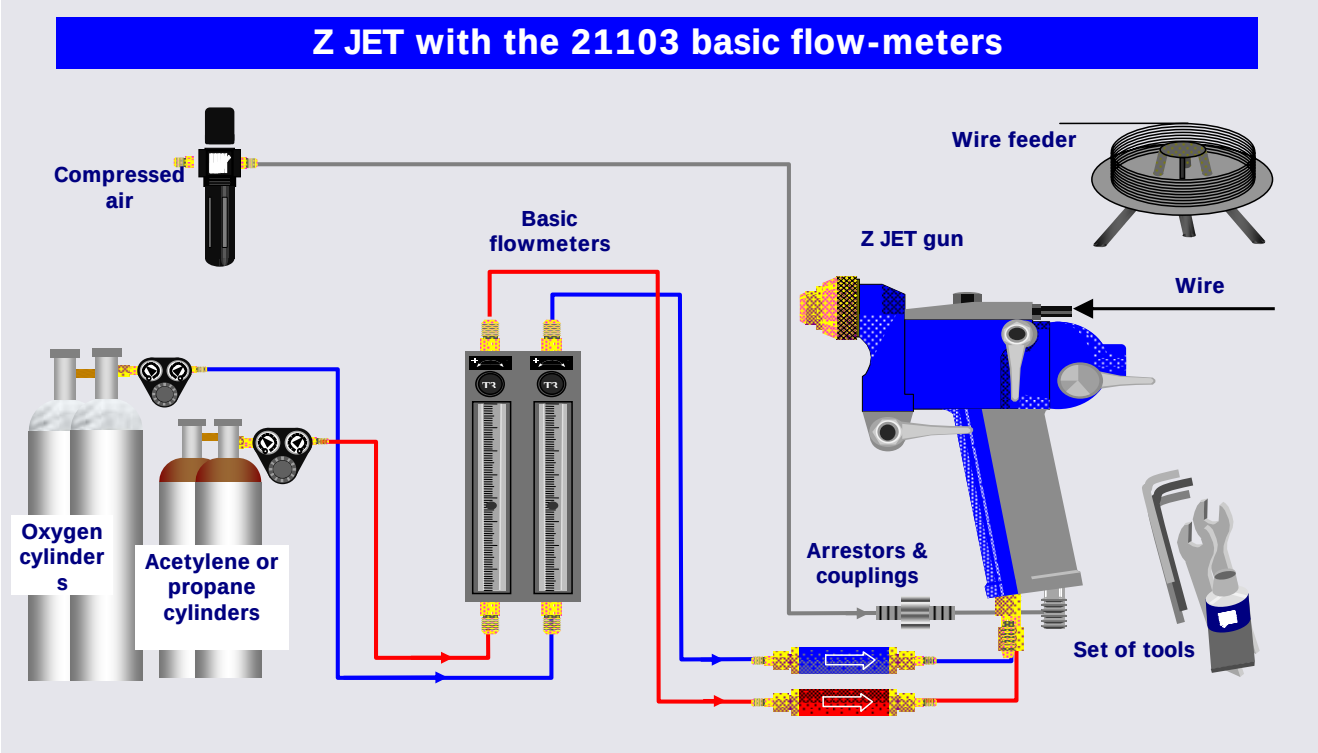



OXYGEN 4 b relative at 20° C and 760 mm Hg
CARBOLOY floater
HB in mm
160
140
120
100
80
60
40
20
0
7,5
6
4,5
3
1,5
0
mn3/h

8. Specific notice : Basic flow-meters 11021103

a. Description

The basic flow meters set reference 11021315, is designed as a basic flow-meter set to be directly connected to the pressure regulators of the fuel and oxygen cylinders. Refer to your gas supplier for the set-up and verify if additional arrestors are required.
The **Z-JET 2** ®BASIC spraying system requires the installation of the following components : (see figure) :



Make sure that you have all of these equipments :

- **Z-JET 2 ®Flame spray Gun** fitted with 2m hoses, quick-connect couplings,
- **Gas control panel 11021103** with an air filter (optional) to be fitted on the compressed air hose,
- Two coupled **cylinders of acetylene** or propane or propylene fitted with a pressure regulator, the exit tail must be 6,35mm (1/4") diameter,
- Two coupled **cylinders of oxygen** (item 8), not supplied, to be fitted with a pressure reducer, the exit tail must be 6,35mm (1/4") diameter,
- **Air pressure regulator,** fitted with air dryer and air cleaner if required. The exit tail must be 10mm diameter
- **Wire feeder,** with a wire straightener if wire is stiff.

The basic flow meters set is designed with the same model of flow-meters than the 1018A. In the future, the basic flowmeters can be replaced easily by the upgraded gas control panel reference 11001018A.

For the setting, installation and use, follow the same procedure than for the 1018A excepted for air hose. Follow also the same safety recommendations.

CHAPTER 6 - STARTUP

WHEN ADJUSTING OR USING THE GUN, YOU MUST WEAR THE PROTECTIONS AND START THE EXHAUST SYSTEM (refer to Chapter 2)

1. Preparation and setup for wire spraying

a. Make sure that :

- The fuel, oxygen and air inlet hoses are connected to the flame spray Gun.
- Open the air supply only,
- The wire is inside the gas nozzle of the gun with the feed rolls released,

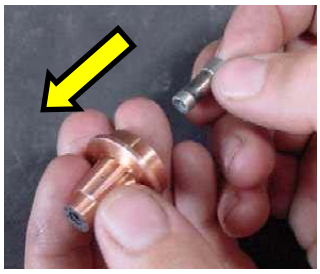
b. Wire speed set-up

- Open the gas valve and turn "on" the valve controlling the air motor (see glossary p14),
- Make a pre-adjustment of the speed by turning the Knob located in the valve controlling the air motor (for calibrating the wire feed : length of wire feed during one minute)

c. Torch Setting

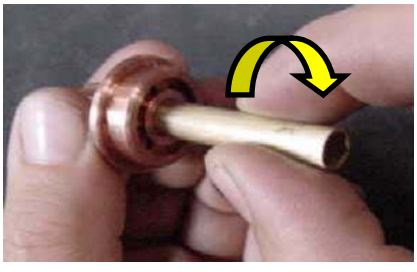
- Fit the torch with the recommended spare parts according to wire diameter (refer to chapter (spare part list),

Insert 5x O-rings. **Use specific O-rings supplied by SG-SNMI. Each O-ring is different: the 2 mat color O-ring must be on the front.**



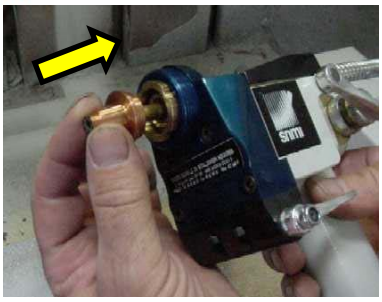
▲ Insert the front wire guide

▲ Insert the ring on the air cap

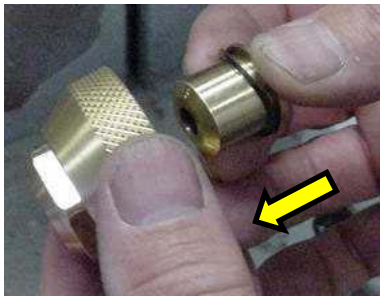


▲ Insert and screw the wire guide tube

1



2



3

4

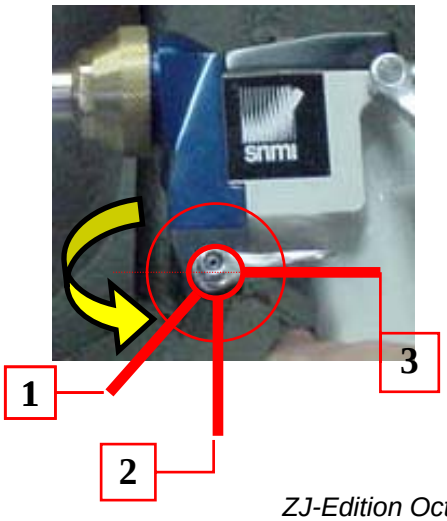
d. Parameters setting

WEAR THE PROTECTIONS AND START THE EXHAUST SYSTEM

- Set the gases to the pressures and ball heights indicated in the setting table for the wire used (refer to chapter PARAMETERS),
- Open the fuel and oxygen supplies, checking that there is no leak,
- Usually set the acetylene pressure to 1,4 bar (or propane to 3 bar) by adjusting the gas pressure reducer and checking on the corresponding pressure gage,
- Usually set the oxygen pressure to 4 bar by adjusting the oxygen pressure reducer and checking on the corresponding pressure gage,
- Usually set the air pressure to 4 to 5 bar (refer to value indicated in the setting tables see chapter PARAMETERS),

When the equipment is under pressure of the 3 fluids and the gun is STOP (the gas valve is on OFF position), make sure that the 2 flowmeters balls are at 0mm.

e. Gas control valve – description of the valve function



OFF
The valve lever is on position STOP (1).
No fluid can flow.

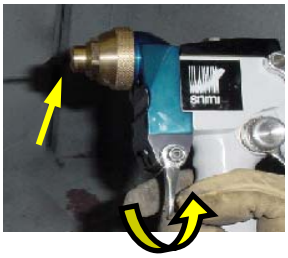
IGNITE
The valve lever is on ignition position (2).
Only gas can flow.

ON
The valve lever gun is on position ON (3).
Gas, oxygen, air flow at full flow.

- Set the gas control valve to position **3** " Full gas ",
- Install the wire, the wire tip must not exit out of the air cap (better is to set the tip just at the outlet of the gas nozzle).
- Set the ball heights (HB) recommended in the setting table for the wire used (refer to chapter PARAMETERS), by adjusting the oxygen and gas delivery rates respectively and readjusting the pressures if necessary,
- When using auto air cap for wires, the automatic air cap should move forward under the air pressure,

- Move the gas control valve back to position **1** " OFF "

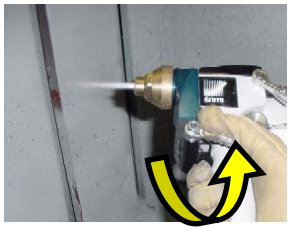
g. Ignition and spraying



Move the valve control lever vertically to position **2** "Ignite",

Strike a spark at the air cap outlet,

Ignition of the gun (over 3sec air cap could be damaged)



Turn the gas valve gradually and smoothly to position **3** "Full gas" and start the wire,

- If ignition is difficult, adjust the wire tip just at the exit of the gas nozzle,
- Make sure the ball heights match the values indicated in the setting table ± 2 graduations,
- If you can not re-adjust correctly the balls, slightly increase the pressure at regulators.
- Turn "ON" the valve controlling the air motor, to start up the motor.
- If the balls (especially the combustible gas ball) are at an abnormal height, close the valve, wait a few seconds and restart the ignition procedure.
- While the gun is operating, the position of the balls must be checked on the rotameters and the fluid pressures must be checked on the pressure gages. If there is a drop on the graduated tubes, check your bottles.
- Also check the wire feed rate, in order to set a wire tip 3 to 10mm out of the air cap.
- If the wire tip is moving in the flame, you must set a wire straightener.

f. STOP the gun

- Turn the gas valve on position (1) to stop fluid flow.
- Turn "OFF" the valve controlling the air motor, to stop the motor.

Prefer to stop the flame first, before to stop the wire. If not, wire will stick inside the nozzle.

CHAPTER 7 – Spray parameters

1. Wire spray parameters

a. Wire spraying with acetylene

Acetylene mixer reference 1700 5220 or 3761

(1)		(2)	(3)	(4)	(5)	(6)
Ref Setting	Diam. wire (mm)	Pressure in bars			Ball height	
		Air	Oxygène	Acétylène	Oxygen	Acetylene
R1,5	1,5	4 to 5	4	1,4	23	35
R1,6	1,6	4 to 5	4	1,4	34	50
R2	2	4 to 5	4	1,4	34	50
R2	2,3	4 to 5	4	1,4	40	54
R3	3	4 to 5	4	1,4	27* / 48	35* / 65
R3	3,17	4 to 5	4	1,4	30* / 48	40* / 65

Basically it is important to notice :
Notice 1: If acetylene ball heights can not be reached, the operator must set oxygen ball height 10 to 15% lower than acetylene ball height,
Notice 2: Oxygen and acetylene ball heights are given during spraying,
Notice 3: For comments relatives to "(1)… (6)" refer to § **c. recommendations for wire spraying**,
Notice 4: If more power is required, use Rn+1 parameters,
Notice 5: When spraying Babbitt, tin… use the parameters marked with *

b. Wire spraying with propane

Propane mixer reference 17005221 or 5223

(1)		(2)	(3)	(4)	(5)	(6)
Ref Setting	Diam. wire (mm)	Pressure in bars			Ball height	
		Air	Oxygène	Propane	Oxygen	Propane
R1,5	1,5	4 to 5	4	3	62	35
R1,6	1,6	4 to 5	4	3	67	38
R2	2	4 to 5	4	3	74	40
R2	2,3	4 to 5	4	3	74	40
R3	3	4 to 5	4	3	40* / 85	20* / 45
R3	3,17	4 to 5	4	3	43* / 85	23* / 45

Basically it is important to notice :
Notice 1: Oxygen and propane ball heights are given during spraying,
Notice 2: For comments relatives to "(1)… (6)" refer to c. recommendations for wire spraying,
Notice 3: If more power is required, use Rn+1 parameters,
Notice 4: For wire 1,5 to 1,6mm, it could be required to ignite the gun at lower flow rates.
Notice 5: When spraying Babbitt, tin… use the parameters marked with *

c. Recommendation for wire spraying

These parameters are indicative parameters producing an usual coating quality. Each application requires specific parameters. All parameters tables are given for your own information to start using the gun.
Higher spray rates can be achieved, by the modification of the spray parameters, but you must notice that it can affect the coating qualities. The definition of the parameters is at user's entire responsibility.

(1) Wire diameter is given as information. Other diameters or nozzles are available.

(2) (3) (4) A range of pressure is given. According to your gas supply design, your gas supplier, the quality of gas, these values could change and affect the spraying rate. An higher pressure could help to increase the spray rate.

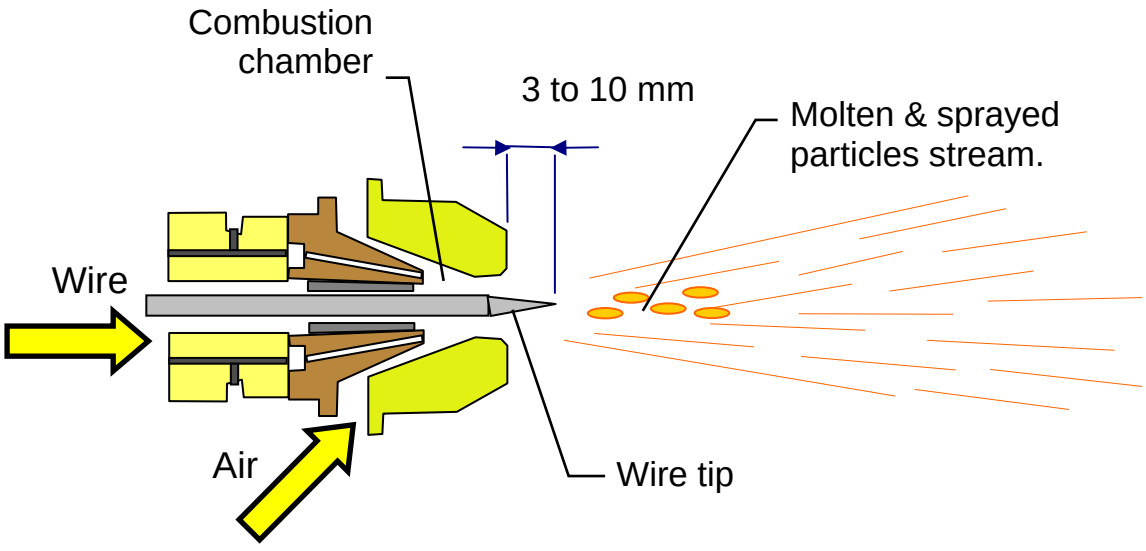
(5) Ball height for oxygen is function of the oxygen pressure, the adjustment of the valve of the flowmeter and the back pressure generated by the gas and air.

(6) Ball height for gas is function of the gas pressure, the adjustment of the flowmeter valve and the back pressure generated by the oxygen and air.

For acetylene, if the recommended ball height for the acetylene can not be reached, reduce oxygen ball height in order to be set 10% to 15% lower than the acetylene ball height.

d. Wire speed adjustment

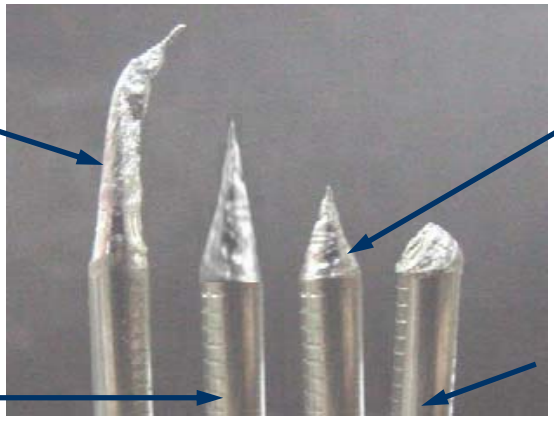
- For most of the wire, we usually recommend to adjust the wire tip during spraying. The wire tip must be at 3 to 10mm from the outlet of the air cap.
- For zinc, zinc/aluminum and aluminum wires, the tip length can be increased up-to 15mm.
- For Tin (Sn), Babbitt: Refer carefully to the Notice 5, and spray at the highest speed 6 to 8m/min in order to prevent wire sticking inside the gas nozzle.



- If higher wire speeds (higher spray rates) are required : contact us , we can recommend specific set-up or specific nozzles configurations or the specific spray parameters.
- In each case, the speed shall be adjusted in order to reach the suitable melting of the wire, the best grain size, roughness… The experience of the operator is required to adjust the length of wire tip inside the flame, according to the wire speed.
- The following usual principle of wire speed adjustment is applicable to most of the wires.

1) TIP TOO LONG ▶
•Non melted areas appear
•Spitting can appear
= Reduce wire speed

2) TIP IS LONG ▶
•Tip is well melted
•Spray rate is good
= Reduce wire speed if finer grain is required



◀ 3) TIP IS SHORT
•Tip is well melted
•Surface grain is fine
= Increase wire speed for higher spray rate

◀ 4) TIP IS TOO SHORT
•Tip is well melted but too short
•Wire melt close to the gas nozzle holes
•Wire will stick in the gas nozzle
= Increase wire speed

- **Usual shape of tip.**

As an indication you can refer to the following tip picture.

Aluminum Zinc Zinc/aluminum

- Indicative wire speed and spray rate chart

METAL	Wire diam. (mm)	Wire Feed (m/mn)	Sprayed rate (Kg/h)
TIN	3	6 to 7	23,2
Babbitt N° 1 & 3	3	6 to 7,5	23,2
ZINC	1,5	2 - 3	
	2	6,2	8,4
	3	4 to 5,3	16,2
	4	4,2	22,8
	5	3,6	30,5
DUNOIS	2	4,2	4,4
	3	3,5 to 5	8,5
	4	2 to 2,7	11,5
ALUMINUM and ALLOYS	1,5	5	1,4
	2	4,3	2,2
	3	3,4	3,9
	4	2,8	5,7
	5	2,6	8,3

WITH THE Z-JET, DON'T SPRAY OTHER WIRES THAN THE WIRES LISTED ABOVE

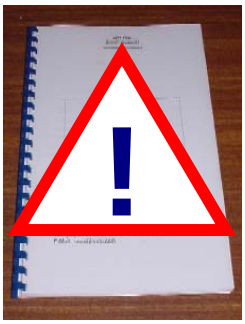
2. Spray parameters for flexi-cords and rods

DON'T SPRAY CORDS WITH THE Z-JET

DON'T SPRAY CERAMIC RODS WITH THE Z-JET

CHAPTER 8 – Trouble shooting guide

BEFORE TO START ANY TROUBLE SHOOT MAINTENANCE OPERATION, CHECK FIRST:



1. Gas, Oxygen, Air pressure at control panel,
2. Gas, Oxygen, Air availability at the air cap outlet (gas valve opened),
3. Gas, Oxygen, Air availability to the gun (after the flame back arrestors),
4. Position of gas valve lever, wire lock lever,
5. Wire feed ON/OFF lever, wire speed fine adjustment knob, gear knob position.

For other trouble shooting items, refer to chapter "**maintenance**".

1. Ignition is impossible

- One of the two gases is missing: check the flow-meters.
- Check the gas pressures on the pressure regulators. If they match to the pressures on the 1018A panel, check the gas and oxy hoses from the pressure reducer to the gun outlet.
- A gas hose may be obstructed by foreign matter.
- Change pressure at gas & oxygen cylinders in order to verify if the pressure change on the gage, verify that both static pressure are the same.
- One mixer O-rings is missing or damaged,
- If acetylene ball chutes down when oxygen ball goes up, look carefully the back of the gas mixer, probably 1 O-ring is sticking on front head.
- One part is missing or damaged,
- Compressed air pressure too high,
- Verify the spray parameters
- The air cap tight on the gas nozzle,
- The transition between ignition and spraying is too short in time,
- The gas nozzle is too old or damaged,
- Inspect the parts of the torch,
- If ignition still impossible, disassembly the valve and check the membrane,
- With wire diameter less than 2mm, it could be required to re-adjust parameters, to make ignition possible,
- Inspect the gas valve.

2. Wire Diameter not Suitable for the Torch

It is essential that the nozzle set fitted to the gun corresponds to the diameter of the wire or the material sprayed. Comply with the information given in the tables. Call our technical team for more information.

3. Backfire

a. Description

Sometimes at ignition or during operation certain incidents may cause the gun to go out with a pop. The flame only appears to have gone out; in fact it came back into the mixing chamber and the gases continue to burn. This phenomenon is called "backfire".

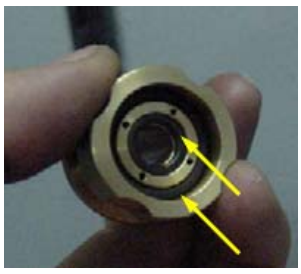
In this event, action must be taken quickly. The phases of this action are described in chronological order below:

- close the valve (the torch may be damaged otherwise),
- close the oxygen bottles,
- close the combustible gas bottles (acetylene, propane or natural gas),
- re-open the gas valve to cool the torch components (mixer, nozzle…),
- remove the nozzle holder and the air cap,
- clean the torch : gas mixer, gas nozzle, air cap…
- check the O-rings and change the damaged O-rings,
- check if one O-ring is sticking inside the torch head,
- Backfire can damage the hoses, the gas membrane, the flame arrestors, in case of back fire check those items and proceed to the change if required.
- Verify again the pressure and flow without flame.

If there are no damaged parts, re-assemble and ignite.

b. Cause of backfire

Back fire are abnormal interruptions of the spray process, and are subject to diagnostic and re-start operations. The exhaust devices must remain operational.



- A pressure regulator is pulsating,
- Hoses are obstructed by impurities, or damaged, etc.
- Control the quality of the 5 mixer O-rings,
- One of the 5 O-ring is missing,
- One part is missing (mixer, nozzle),
- The gas nozzle is too old or damaged,
- The air cap support is not tightened,
- Check if the mixer, the gas nozzle are scratched,
- Verify the spray parameters (pressure & flow),
- Air pressure is too high,
- Verify the compatibility in diameter wire/guides,
- Verify the size or the wear of the air cap,
- Air cap is jammed on gas nozzle,
- Possible gas/oxy leak (fittings, pipes),
- The operator turns the gas valve too quickly,
- If the flame back do not disappears, disassembly the valve and check the membrane

"Backfire" is always due to failure and non-observation of the basic recommendations.

4. Air cap is clogged

A clogged air cap affect mainly the coating quality, it usually cause spitting.

- Compressed air pressure too low,
- Bad spray parameters,
- Wire speed is too low (or too high),
- The air cap is too old or damaged,
- The transition between ignition and spraying is too long in time,
- The air cap temperature is too high,
- The air cap tight on the gas nozzle,
- The size of the air cap is not suitable,
- Bad quality of the wire,
- Wire diameter gage is not suitable,
- Wire is not enough straightened,
- Bad quality of the combustible gas,
- Bad choice of the gas mixer.

5. Low quality wire or damaged wire

The wires sold and delivered by SAINT-GOBAIN CS SNMI are protected by packaging. During transportation and when handling, some wires may however be distorted or damaged. When sprayed, the wire no longer melts at the center of the nozzle and the coating qualities are affected.
Particular care must therefore be paid when using soft materials zinc, lead, aluminum, Dunois, tin...

6. Poor or incorrect spraying

This fault may have several causes and must be identified step by step. Operator must verify all the previous items 1 to 5 and then verify these following items:

- gas flow rate are insufficient,
- incorrect proportions of combustible gas and oxygen: in particular, if the combustible gas setting is too high (green cone very visible at torch outlet) the wire speed can drop to a considerable extent,
- insufficient compressed air pressure,
- air cap worn or dirty,
- incorrect material speed adjustment,
- inappropriate quality of the wire.

8. Troubleshooting with the air motor

Refer to the complement user manual with the picture. If you need to call us, proceed before to the following check-up, and notice carefully your answer.

a) Do you hear the air exhaust from the gun body ?
- IF NOT, verify all the air line from the compressor to the gun fittings

b) Remove the air motor from the gun, turn ON the wire feed lever. Do you hear air ?
- IF NOT, verify all the air pressure available at the compressor and at the pressure regulator of the spray equipment.

c) Is air available at the gun ?
- IF NOT, verify all the air line from the compressor to the gun fittings

d) Verify that the air supply pressure is between 3 < … < 4 bars.
- IF NOT, verify all the air pressure available at the compressor and at the pressure regulator of the spray equipment.

e) Verify that the air motor is rotating, when it is located inside the gun.
- If you can't diagnostic when the air motor is inside the gun, proceed as explain below and on the picture. Remove the air motor from the gun and insufflate compressed air trough the little hole located at the rear of the air-motor.

f) Rotate by hand the rotor of the air motor, is it easy to turn the rotor ?
- IF NOT, you may overall the air motor and lubricate with oil periodically, refer to Chapter 9 / §7. / d) sequence 5.

g) Do you lubricate the air motor each week (oil tank filled with oil) ?
- IF NOT, you may overall the air motor and lubricate with oil periodically, refer to Chapter 9 / §7. / d) sequence 5.

h) Can you actuate the wire feed ON/OFF lever ?
- IF NOT, you may have a problem with the lever, refer to Chapter 9 / §7. / e)

i) Can you actuate the wire speed fine adjustment knob ?
- IF NOT, you may have a problem with the knob, refer to Chapter 9 / §7. / e)

j) When turning the wire speed fine adjustment knob, do you hear any air flow noise change,?
- IF NOT, you may have a problem with the lever, refer to Chapter 9 / §7. / e)

k) When you hear the air-motor rotating, verify that the wire feed rolls are correctly tight with the nut.
- IF NOT, tight the feed rolls.

l) When you hear the air-motor rotating, Remove the nut 5039 and the feed rolls 5038. When starting the air-motor, the shafts supporting the feed rolls are rotating ?
- IF NOT, refer to the next check point.

CHAPTER 9 - MAINTENANCE

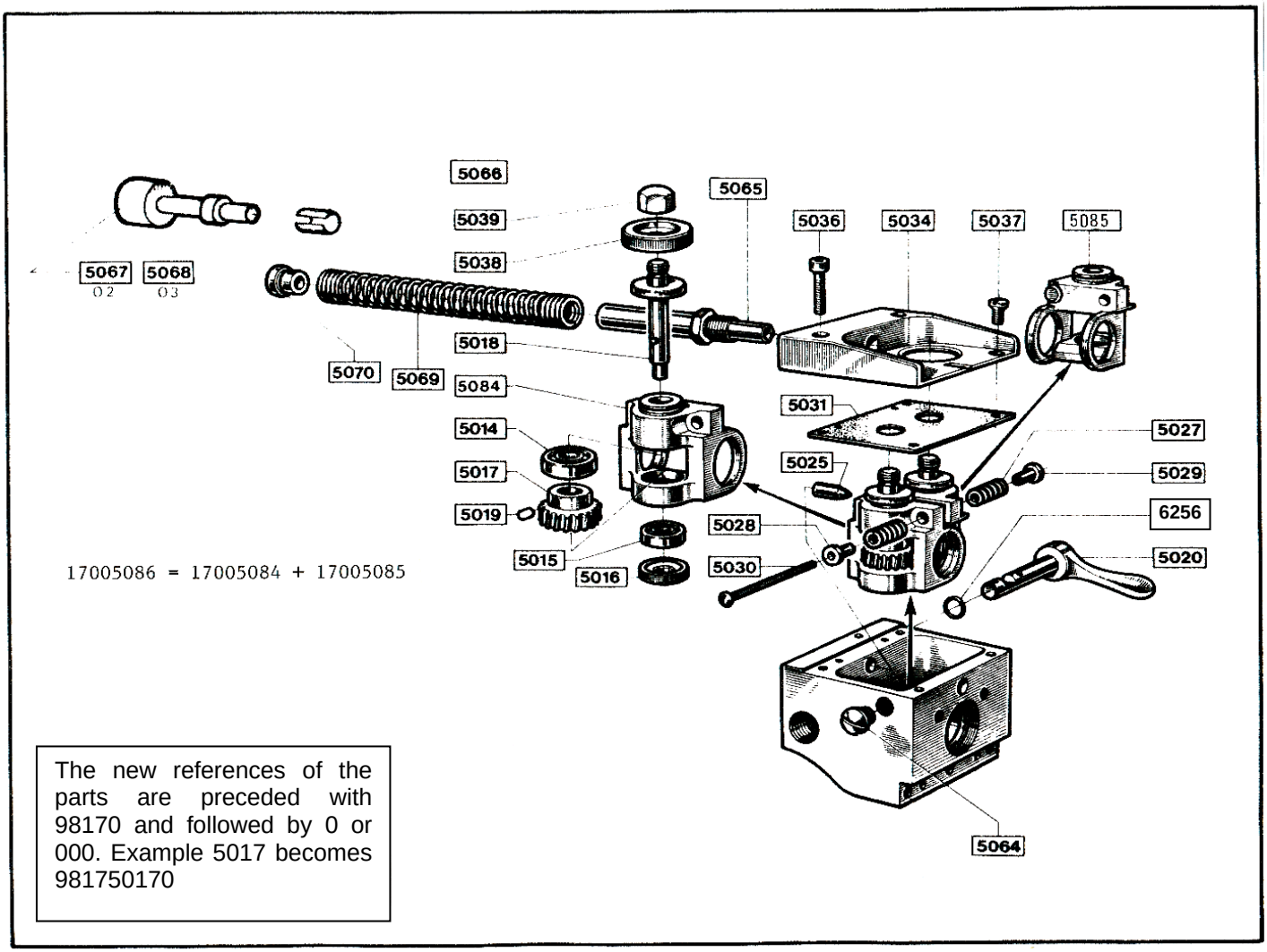
The maintenance chapter is shared in 3 main items :

- Z-JET 2 ® spray gun,
- Nozzles,
- Air motor and gear,
- Gas control panel 11001018A and hoses,

1. Z-JET 2 ® Flame spray Gun – exploded views

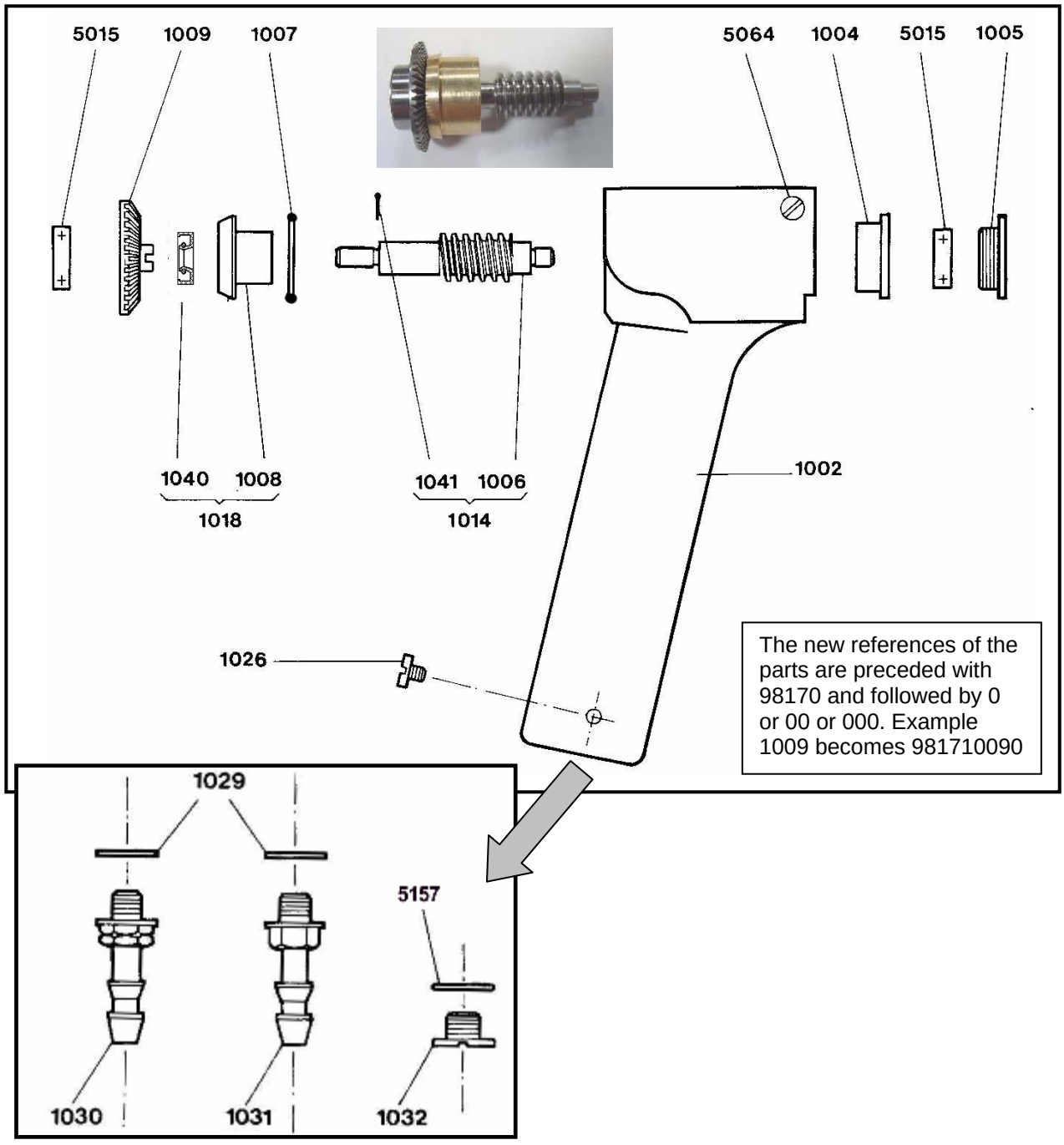
The Z jet gun can be supplied with a fast air motor version. To order spare parts refer to the following main block exploded view :

Exploded view with sub-assemblies

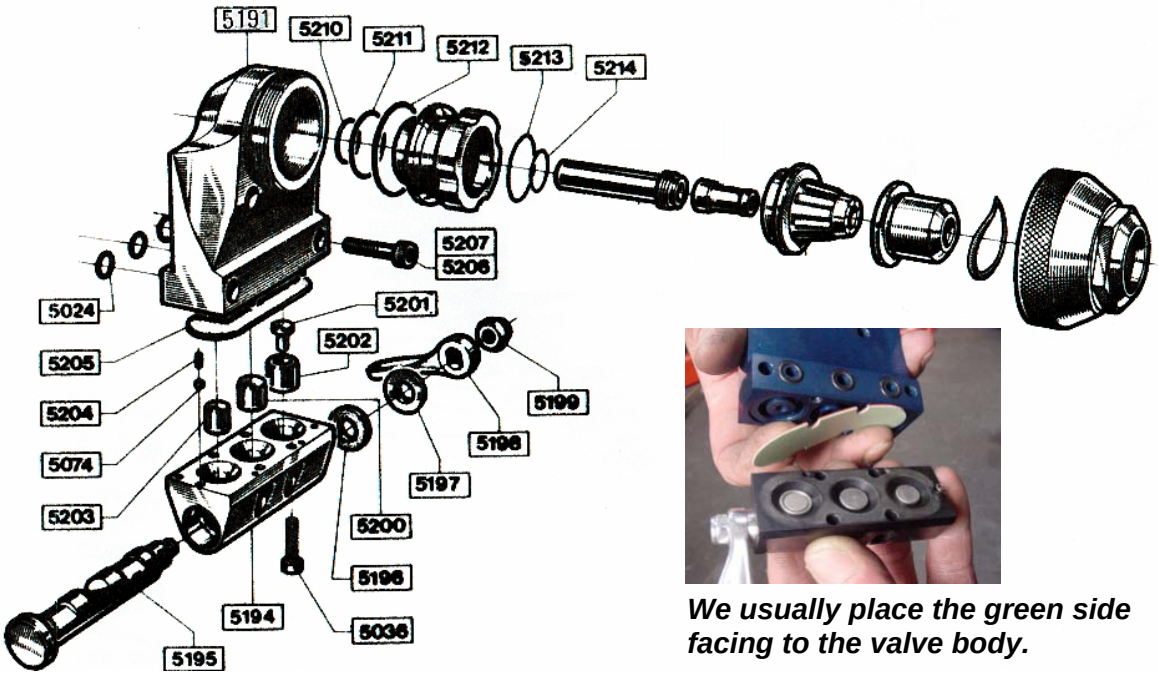


The new references of the parts are preceded with 98170 and followed by 0 or 000. Example 5017 becomes 981750170

Exploded view with detailed parts



Front head exploded view



We usually place the green side facing to the valve body.

a. Gun head disassembly

- To remove the gun head 5191, unscrew the 2 screws 5206 and 2 screws 5207.
- When gun head is reassembled, notice that the screws 5206 and 5207 have different length.

b. Gas valve block

The gas valve of the **Z-JET 2** ® gun is a single cam shaft mechanism for controlling the flow of the three fluids into the torch : gas, oxygen, air.

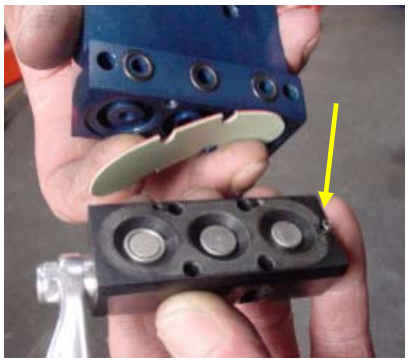
The gas valve block is composed a membrane pressed against the seats 3+1 pistons ref 5200, 5201,5202 and 5203. The gas inlet and outlet holes are co-axis machined seats. When the membrane presses against the seats, the gas cannot flow. The membrane is pressed by pistons. When the pistons are moving away, the gas inlet pressure pushes the membrane off and the fluid can flow.

The camshaft 5195 is used to move the pistons backwards and forwards. The camshaft is secured to the gas lever 5196.
Notice that, the combustible gas has a double co-axial piston in order to get the ignition gas flow.

No fluid flows in the camshaft mechanism.

Disassembling the valve

- Unscrew the 4 screws 5036,
- Remove the membrane 5205,
- Don't loose the spring 5204 and the ball 5074 (see arrow),
- Remove the lever 5198, the camshaft exit from the side opposite to the lever.



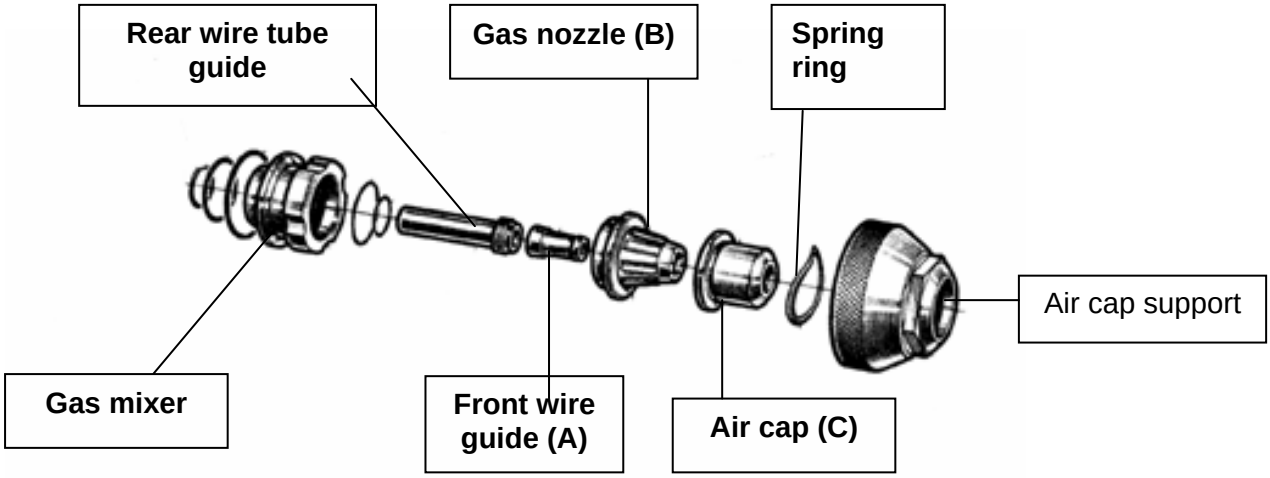
The special synthetic rubber membrane is designed to provide long operating life. If it needs to be replaced, the procedure is straightforward and requires no special care beyond ensuring that the recess remains perfectly clean. The membrane as two colors, both side are compatible with gas. Usually, gun are assembled with the green side in contact to the pistons.

Refitting the valve

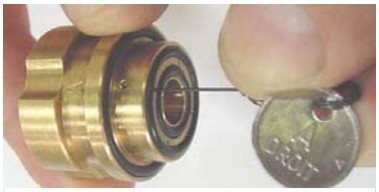
Carry out the operations in reverse order. The pistons are not interchangeable. The double piston for the combustible gas must be fitted in the correct position, i.e. the large diameter of small pushrod 5201 towards the membrane. Fit again the valve and secure the screws 5036 with a torque of 2Nm. The pistons must be kept free of grease.

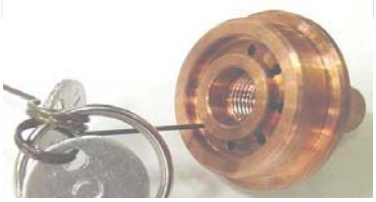
c. Torch : nozzle, air cap, gas mixer, O-rings – wires and cord

Refer to the exploded view to understand a typical torch set for wire spraying spraying. This setting is not applicable for the rod spraying.



- The gas mixer is mixing the fuel and oxygen. The gas mixer must be changed according to the gas : acetylene, propane…
- The gas nozzle must be changed according to the diameter or material type,
- The front wire guide is used for wire spraying only, it is used to prevent excessive wear of the gas nozzle,
- Air cap support allow to set different air cap according to the diameter or material type.
- Use the calibration kit to clean the holes of the gas mixer and the holes of the gas nozzle ref 2471. Clean with the needle oriented in the direction of gas flow.

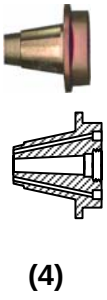
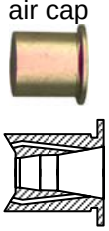
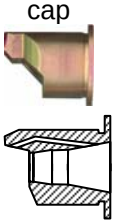




2. Wire spraying – Conical front wire guide - Torch Assembly chart

Conical shape front wire guide – called also universal torch set

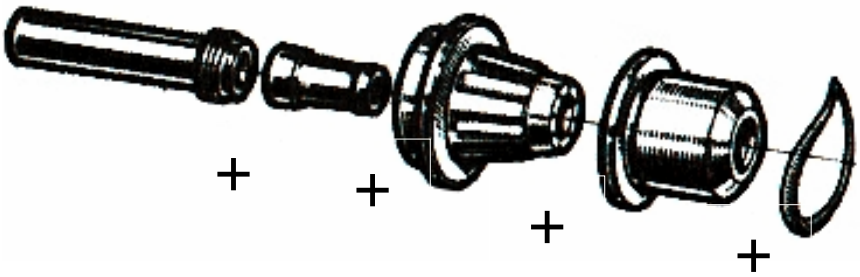
Standard and universal set of parts to spray metal wires : Aluminum, zinc, brass, copper, steel, nickel alloys, tin, babbit. (Could be not suitable for molybdenum).

			A	**B**			**C**		
Wire diameter (mm)	Gas mixer + 5xO-ring 2875 	Rear wire tube guide 	Front wire guide 	Gas nozzle  **(4)**	Air cap support 	Metal Ring (spring for air cap) 	Straight jet air cap 	Flat jet air cap 	Angle air cap 
1,5		5230	5315	**R1,5** / 5415	5240	5241	5515		5715
1,6		5230	5316	**R1,5 or R1,6** / 5415	5240	5241	5515/5520 **(2)**		5715/5720 **(2)**
2	5220 acetylene	5230	5320	**R2** / 5420	5240	5241	5520	5920	5720
2,3		5230	5323	**R2** / 5420	5240	5241	5520	5920	5720/5730 **(2)**
2,5	Or	5230	5325	**R3** / 5430	5240	5241	5520/5530 **(2)**	5930	5720/5730 **(2)**
2,3 *special*	(3761 **(1)** acetylene)	5230	2387	**R3** / 5430	5240	5241	5520/5530 **(2)**	5930	5730
3		5230	5330	**R3** / 5430	5240	5241	5530	5930	5730
3,17	Or	5230	5331	**R3** / 5430	5240	5241	5531 (5530)	5930	5730
3,17 *stop wire*	5221 propane	5231	4252	**R4** / 4251	5240	5241	5540	5940	5730
Wire diameter (mm)	Gaz mixer + 5xO-ring (2875)	Rear wire tube guide	Front wire guide	Gas nozzle	Air cap support	Metal Ring (spring for air cap)	Straight jet air cap	Flat jet air cap	Angle air cap

(1) *5223 and 3761 gas mixer are designed to increase the gas flow capability.*
(2) *two references of air cap could be possible, due to the quality of gas and the sprayed metal*
(3) *this table could be unvalid in case of specific material used under specific conditions, with specific gas configuration, in case of doubt, consult us.*
(4) R_ *; refer to the spray parameter table*

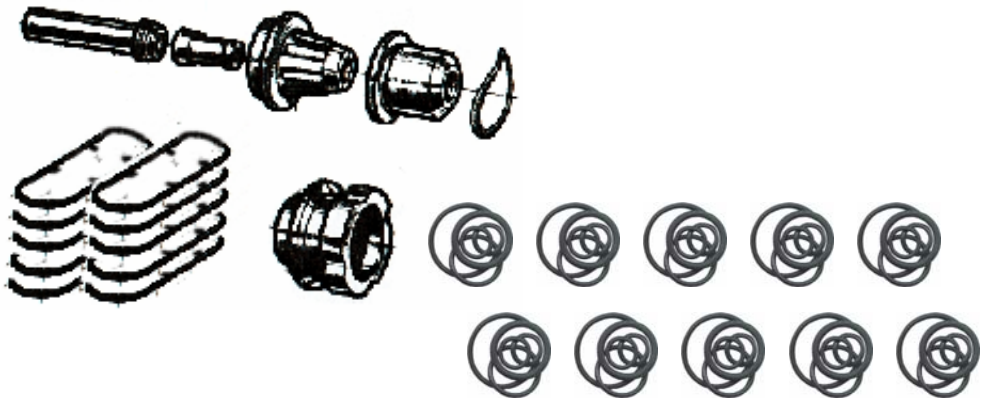
Quick order set reference

Complete set composed of : • Spring ring • Air cap • Gas nozzle • Front wire guide • Rear wire tube guide	17006115 17006116 17006120 17006123 17006130 17006131 17006132 17006133	Complete set diameter 1,5 Complete set diameter 1,6 Complete set diameter 2 Complete set diameter 2,3 Complete set diameter 3 Complete set diameter 3,17 Complete set diameter 3 CYLINDRICAL Complete set diameter 3,17 CYLINDRICAL



Quick order set reference : Wear Parts 1700 5701

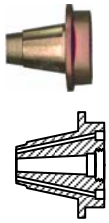
Complete set composed of :
- 1700 5241 Spring ring 1x
- 1700 55XX Air cap 1x
- 1700 54XX Gas nozzle 1x
- 1700 53XX Front wire guide 2x
- 1700 52XX Rear wire tube guide 1x
- 1700 52 75 Ste of 10 membranes 1x
- 1700 52 78 Set of 10 set of mixer O-ring 1x
- 1700 5221/20 Gas mixer 1x



3. Wire spraying – Cylindrical wire front guide - Torch Assembly chart

Cylindrical shape front wire guide – used eventually for aluminum

Customized set of parts to spray metal wires : molybdenum, brass, steel, nickel alloys. (Could be not suitable for Aluminum, zinc, copper, tin, babbit).

			A	**B**			**C**	
Wire diameter (mm)	Gas mixer + 5xO-ring 2875 	Rear wire tube guide 	Front wire guide 	Gas nozzle  **(4)**	Air cap support 	Metal Ring (spring for air cap) 	Straight jet air cap 	Angle air cap 
2,3	5220 acetylene)	5230	5391	**R3** / 5488	5240	5241	5520/5530 **(2)**	5730
3	5221 propane)	5230	5389	**R3** / 5489	5240	5241	5530	5730
3,17	(3761 **(1)** acetylene)	5230	5390	**R3** / 5490	5240	5241	5531 (5530)	5730
	(5223 **(1)** propane)							
Wire diameter (mm)	Gaz mixer + 5xO-ring (2875)	Rear wire tube guide	Front wire guide	Gas nozzle	Air cap support	Metal Ring (spring for air cap)	Straight jet air cap	Angle air cap

(1) *3761 & 5223 gas mixer is designed to increase the gas flow capability.*
(2) *two references of air cap could be possible, due to the quality of gas and the sprayed metal*
(3) *this table could be non-valid in case of specific material used under specific conditions, with specific gas configuration, in case of doubt, consult us.*
(4) R_ *; refer to the spray parameter table section G*
(5) *Suitable only with Molybdenum wire with a very good straightening.*

4. Flexicord spraying – Torch Assembly chart

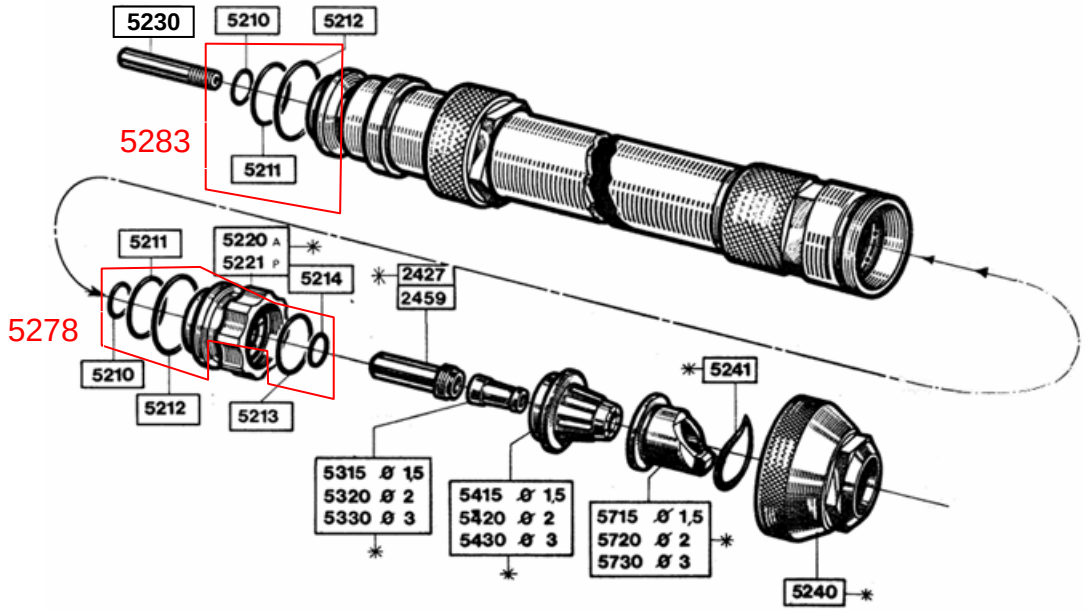
Flexicord spraying is not recommended with the Z JET gun.

5. Rod spraying - Torch Assembly chart

Rod spraying is not recommended with the Z JET gun.

6. Extensions for flame spray guns

"EXTENSION" CONVERTION KIT REFERENCES

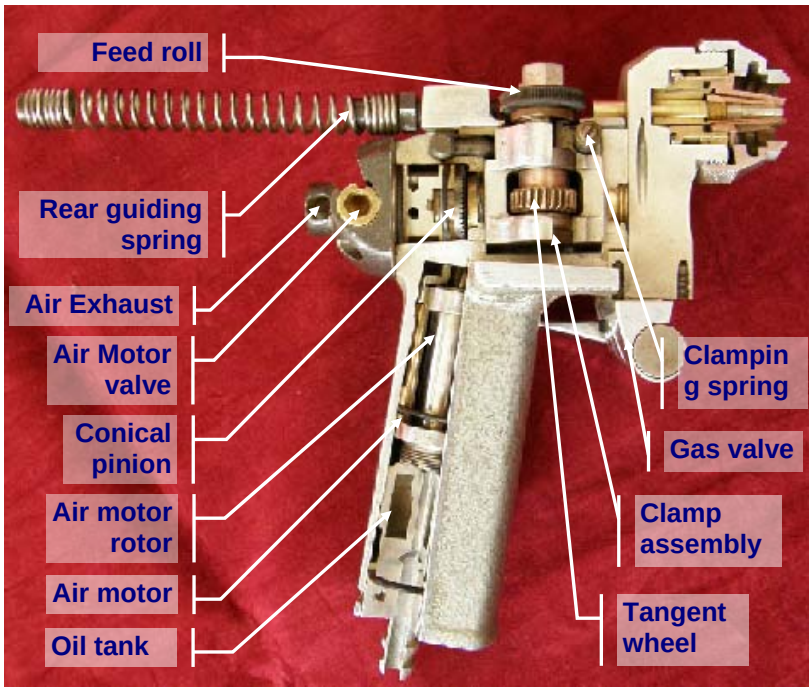


	Références	Désignation
Extension set	17011302 17011303 17011306 17011310	Extension length 200 mm Extension length 330 mm Extension length 660 mm Extension length 1000 mm
O-ring Wire guide	17005278 17005283 17002427	Set of 10 O-rings gas mixer Set of O-rings (back) Guide fil pour rallonge
Tools	17002429	35mm wrench

- All the extensions are supplied with angle jet air cap.
- Extension are suitable for wire spraying only.

7. Wire feeding unit

a. Glossary



If you are supposed to remove the oil-tank, verify O-ring. Do not hesitate to replace the O-ring. Be sure that the oil tank is well fitted and sealed against the gun body (no gap is allowed between the both parts).

b. Air Motor

The Z JET is equipped with a air motor type "Fast" ref 17001037:
The steel sleeve of the air motor has 3 holes,
The motor ensure a wire speed from 1,5 to 6m/min

Note : the above minimal and maximal speed are given as indication and can vary according to the maintenance of the gun, state of wear of the air motor and of the gear assembly…

The air motor consists in a rotor equipped with 4 blades and a stator lined with a heat treated sleeve. This air motor provide a high torque. For a long life the motor must be lubricated with the appropriate oil and the motor (thus the gun) must not be exposed to excessive dust and abrasive powders. Use a box to store the gun or cover the gun with a plastic bag, when stored.

The air motor must be lubricated 2 to 4 times a week, 8 hours / day working time..
Follow the lubrication procedure written in Chapter 5 §°2.b

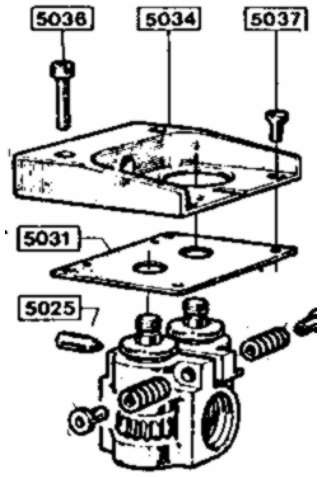
c. Gear unit

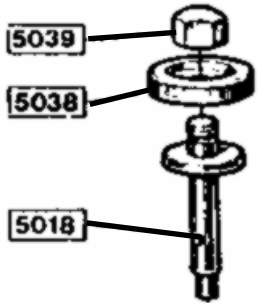
Principle of the gear unit.

- The wire speed reduction is performed by a worm screw (1006) actuating two tangent wheels (5017).
- The entire tangent wheel/feed roll assembly rotates concentrically to the worm screw in order to adapt automatically to the diameter of the wire used.
- The worm screw is fitted on the shaft where a large conical pinion is fitted (1009).
- The conical pinion is actuated directly by the shaft of the air motor (1013).

d. Disassembly the gear unit

Sequence N°1: cover + feed roll





- Unscrew the nuts 5039 located on the feed roll 5038.
- Remove the two feed rolls 5038.
- Unscrew the 4 screws 5036 and 5037 securing the cover 5034.
- Remove the cover 5034 and the seal plate 5031.
- Remove the cover-screw 5064 (left side of the gun).
- Unscrew and remove the spring set 5030.
- From the top of the gun, remove the two springs 5027 that clamping the feed rolls and space the parts 5028 and 5029.
- Pull open the clamp assembly 5086 to its full extent
- Eject the wheel spacing piston 5025 by pushing spacing lever assembly 5020 backwards and forwards.

For re-assembly, carry out the operations in the reverse order.

Sequence N°2 : remove air motor + oil tanbk

- From the handle of the gun, remove the oil tank 1022.
- Remove the air motor 1037 from the bottom. Use the tool ref 5149 if required.

For re-assembly, carry out the operations in the reverse order.

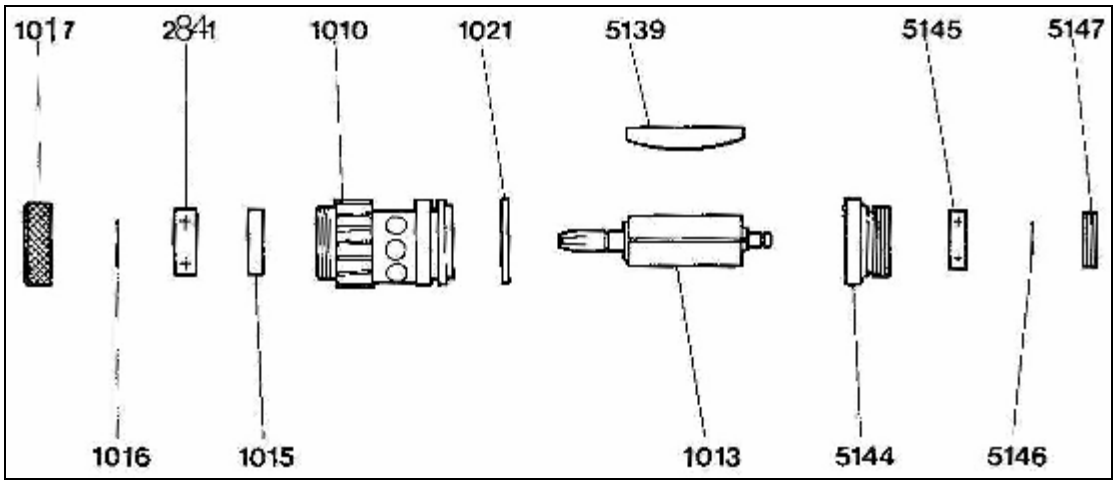
Sequence N°3 : Valve controlling the air motor speed

Remove the 2x screws 6250, if you want to remove the air motor valve.

For re-assembly, carry out the operations in the reverse order.

Sequence N°4 : air motor

- Unscrew the front aluminum ring 1017 and the clip 1016,
- Push out the rotor out of the sleeve by taking care, the rotor is extracted through the "rear" of the stator,
- Unscrew the back aluminum cover 5147 and remove the clip 5146,
- Clean the motor with a solvent, if required polish the steel sleeve with #4000 abrasive paper or replace the sleeve 1010.
- Replace the ball bearing (2841+5145), change the O-ring 1021
- The blades ref 5139 must slide freely inside the grooves of the rotor,
- If the pinion integrated to the rotor is damaged, proceed to its replacement with ref 1013.



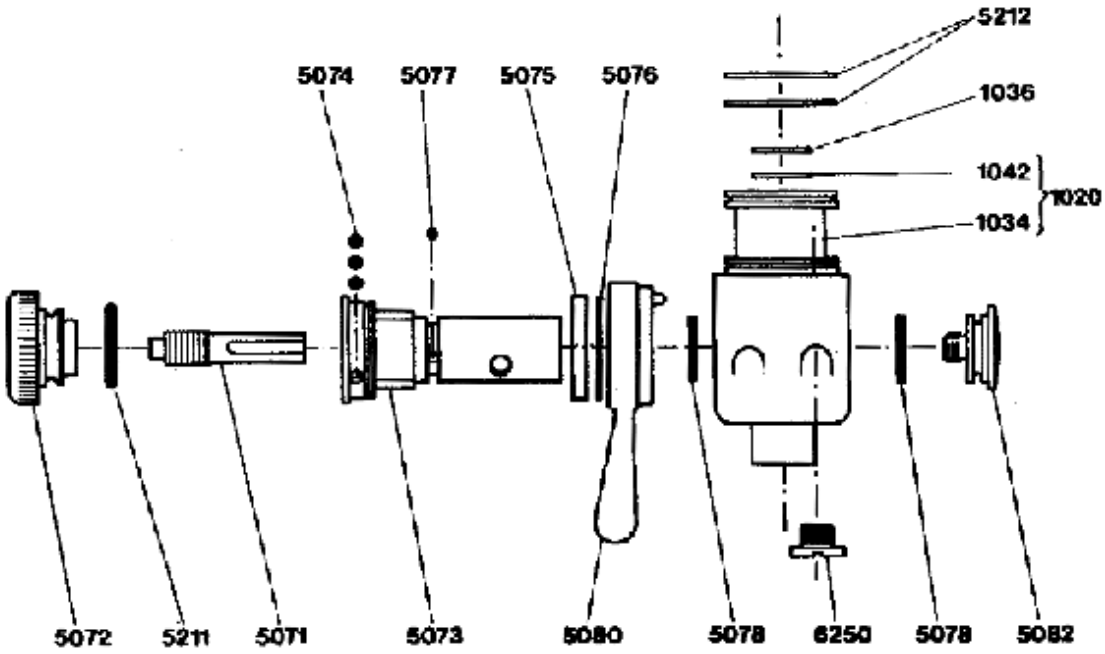
For re-assembly, carry out the operations in the reverse order.

Be sure that the oil tank is well fitted and sealed against the gun body (no gap is allowed between the both parts).

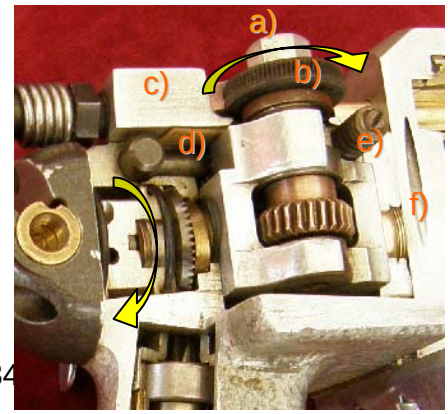
e. Air motor valve unit

The air supply to the air motor is done with the lever 5080 and adjusted by actuating the knob 5072. The entire valve is referenced and sold as ref 5257.

- To access to the valve mechanism, unscrew the screw 5082.
- Inside the groove of the shaft 5073, you must be able to see the piston 5071, moving forwards and backward, when turning the knob 5072.
- Remove the lever 5080,
- Remove the ring 5076 & 5075 to disassembly the valve.
- ***Take care*** : don't loose the 3 little steel ball 5074.

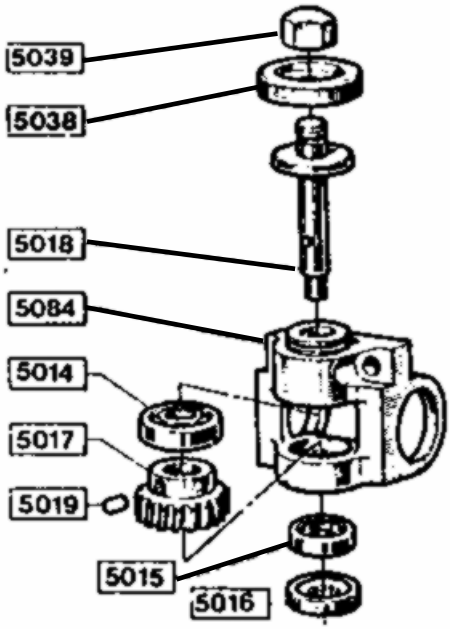


f. Wire feeding



The wire speed reduction is performed by a worm screw actuating two tangent wheels.
The entire tangent wheel/feed roll assembly rotates concentrically to the worm screw in order to adapt automatically to the diameter of the wire.

- Remove the nuts 5039 (a) located on the feed roll 5038 (b).
- Remove the 4 screws 5036 and 5037 securing the cover 5034
- Remove sealing plate 5031 (d)
- Remove the front block 5191 (f) secured by the 4 screws 5106 & 5207.
- Remove the cover-screw 5064 (left side of the gun).
- Remove spring setting (e) 5027 + 5028 + 5029 +5030.
- From the Z of the gun, space the parts 5028 and 5029.
- Pull open clamp assembly 5086 (5084+5085) to its full extent
- Eject wheel spacing piston 5025 by pushing spacing lever assembly 5020 backwards and forwards.
- From the front of the gun, remove the brass nut 5026 with an 6mm "Alen" wrench ref 2331.
- Remove the oil tank 5269, air motor 5267/5268, speed reducer 5263/5264 and conical pinion 5120.
- From the rear of the gun, remove the 5256 + 5255 gear change unit (refer to the previous chapter: Sequence 6),
- From the Z, remove the 5086 (5084+5085) assembly.
- Remove little pin 5019 from the tangent wheel.
- Remove from the Z, the 2 feed rolls shafts 5018.
- Remove the cap 5016 and push the roll bearing 5015 downwards. Push also the ball bearing 5014 from the Z of the clamp 5084 & 5085.



For re-assembly, carry out the operations in the reverse order.

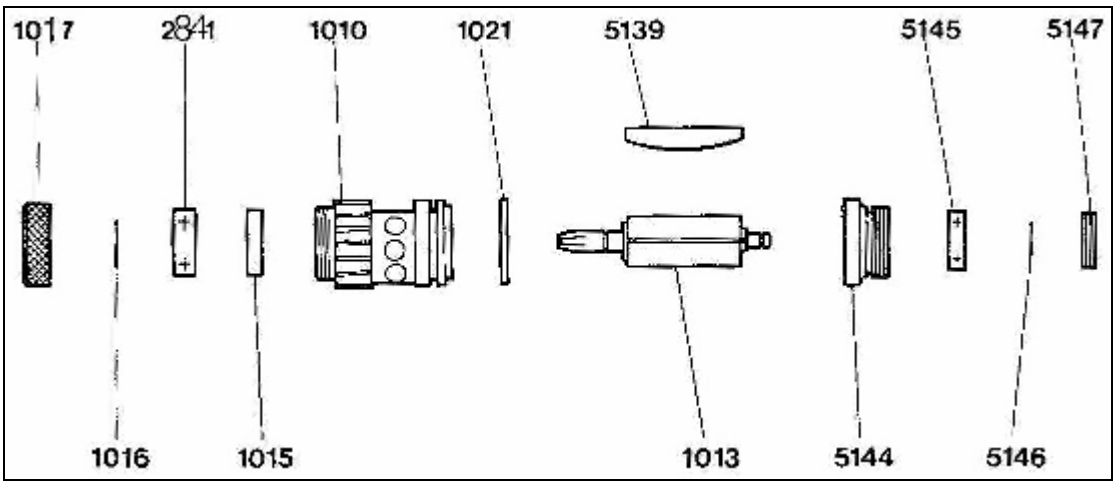
8. List of references for the wire feed mechanism

17005014	Ball bearing (up)
17005015	Ball bearing (down)
17005016	Caps to lock 5015 ball bearing
17005017	1 x Tangent wheel 25-teeth
17005018	Shaft carrying the feed roll & tangent wheel
17005019	"Mécanindus" pins
17005020	Cam shaft for opening the feed rolls
17005024	O-ring
17005025	Piston spacing the feed rolls
17005027	Springs clamping the feed rolls
17005028	Feed roll clamping sleeve for the 5030 screw
17005029	Feed roll clamping nut for the 5030 screw
17005030	Feed roll clamping adjusting screw
17005031	Seal plate
17005034	Cover (black)
17005036	Hexagonal socket head screws CHC 4 x 15
17005037	Countersunk securing SS screws FB 4 x 8
17005038	1 x Feed roll
17005039	Nuts
17005064	Casing cover
17005086	Set of clamp assemblies (5084 + 5085)
17001006	Worm screw

9. List of references for the rear spring

17005065	Rear wire guide
17005066	Ring for 5067 and 5068
17005067	Intermediate wire guide: Ø 2
17005068	Intermediate wire guide: Ø 3
17005069	Flexible wire guide
17005070	End piece

10. List of references for the sub-assemblies



17005250	Clamping device assembly with tightening device
17005251	2 tangent wheels and pins assembly
17005252	Wire rollers spacing assembly
17005253	Cover equipped with attaching devices and sealing plate
17005254	Bag of 10 sealing plates
17005257	Air-motor valve assembly
17005258	2 wire shafts (for feed rolls)
17005259	2 wire feed rolls with attaching nuts
17005260	Rear wire guide assembly
17005271	Set of 20 blades
17005272	Gas valve shaft assembly
17005273	Gas valve body with screws
17005274	Gas pistons assembly (4 pieces)
17005275	Set of 10 gas membrane
17005276	Torch head with screws
17005277	Set of O-rings for the front head
17005278	10 sets of 5 gas mixer O-ring

1700 1002	Gun body
1700 1006	Worm screw
1700 1009	Conical pinion

11. Gas control panel 1018A

a. Description

The gas control panel 11001018A is designed to monitor the flow rates indications and pressures values of the three fluids.

The front panel is composed of :

- a pressure reducer, a pressure gage and a rotameter for gas,
- a pressure reducer, a pressure gage and a rotameter for oxygen,
- a pressure reducer and a pressure gage for air,

In the back side of the gas control panel, each component is connected one to the other one with metal pipes.

If maintenance is required, this operation must be made by a specialist of gas. The use of grease is strictly prohibited in the fluid network. Use leak spray detector on all fittings to detect the leaks. Repair immediately the leak and make again the leak control operation. Verify frequently all the potential leaks.

b. Flow meters information

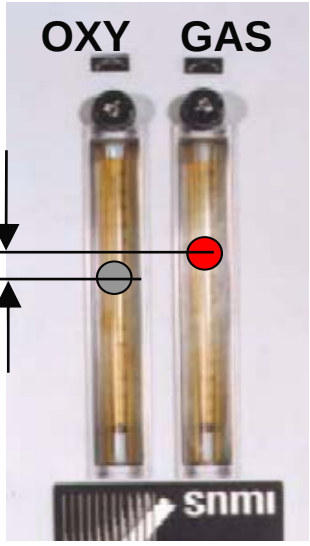
Flow meters are called also rotameters. The flow meters are defined as "variable cross-section type flow meters" in which the measurement ball moves along a conical tube. The ball height is proportional to the fluid flow rate.
The ball rises when flow rate increases and decrease when flow rate decreases. The flow meter is equipped with an adjustment valve allowing to adjust the flow rate.
The ball height is an indicative value and is valid at a pressure value. Even if ball height is the same, if pressure increases, the real flow will be higher. The curves given in the chapter 5 allows to convert ball height to flow rates.

c. How to use the flow meters

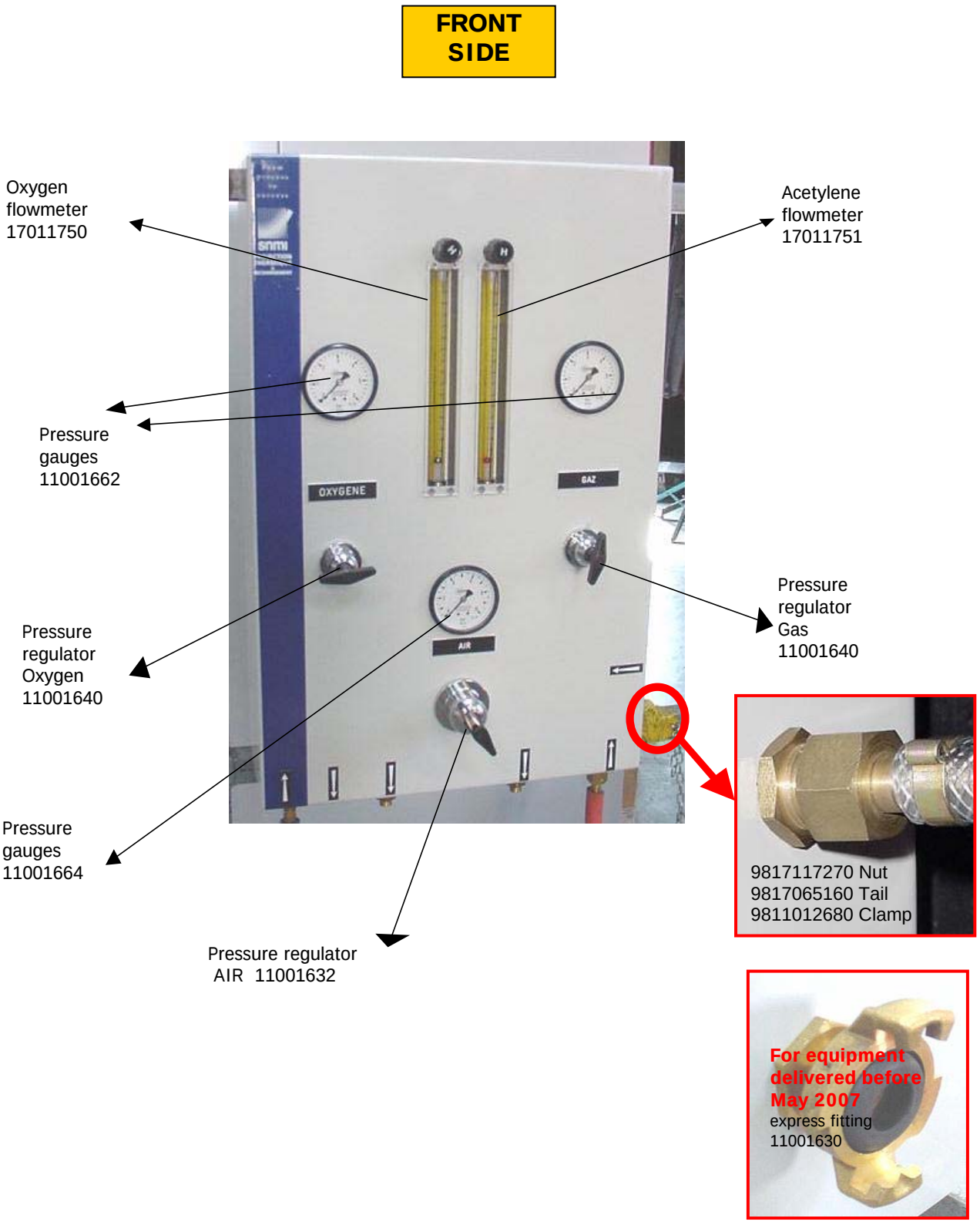
The ball heights are read from the center of the balls. The values given in the tables are nominal values. In practice, the following factors may have a slight influence on the flow rates:

- machining tolerance of the gas circuits of the gun,
- calibration tolerance of the pressure reducer gages,
- tolerance of the graduations of the flow rate measuring tube.

Turn the valve-know in order to adjust the flow-rate according to the recommended spray parameters. Refer to the curves given in the next chapter in order to convert ball height to flow rates.



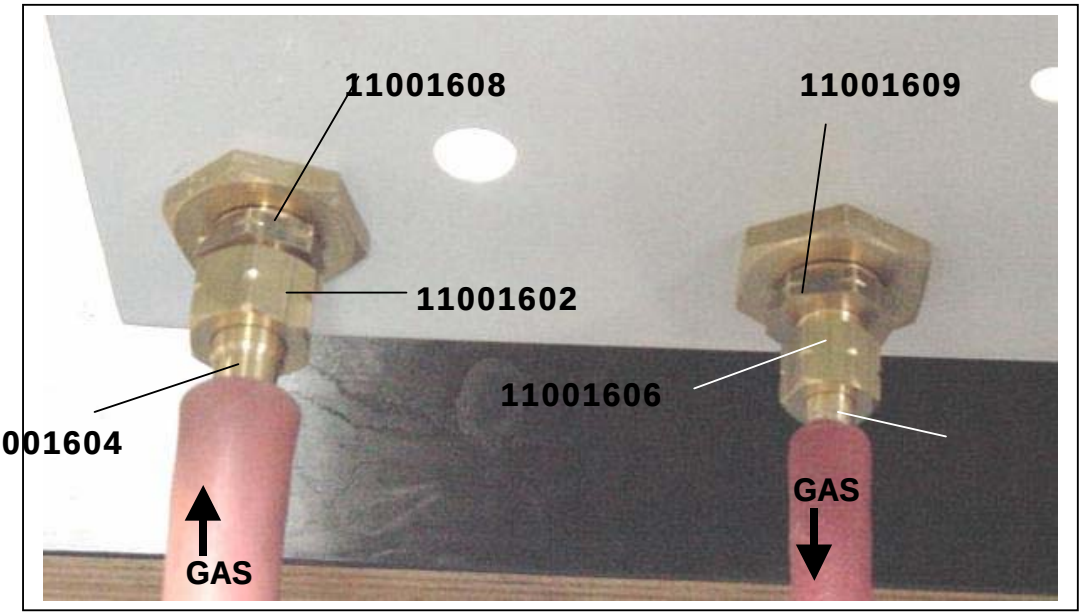
d. 1018/A - gas control panel features

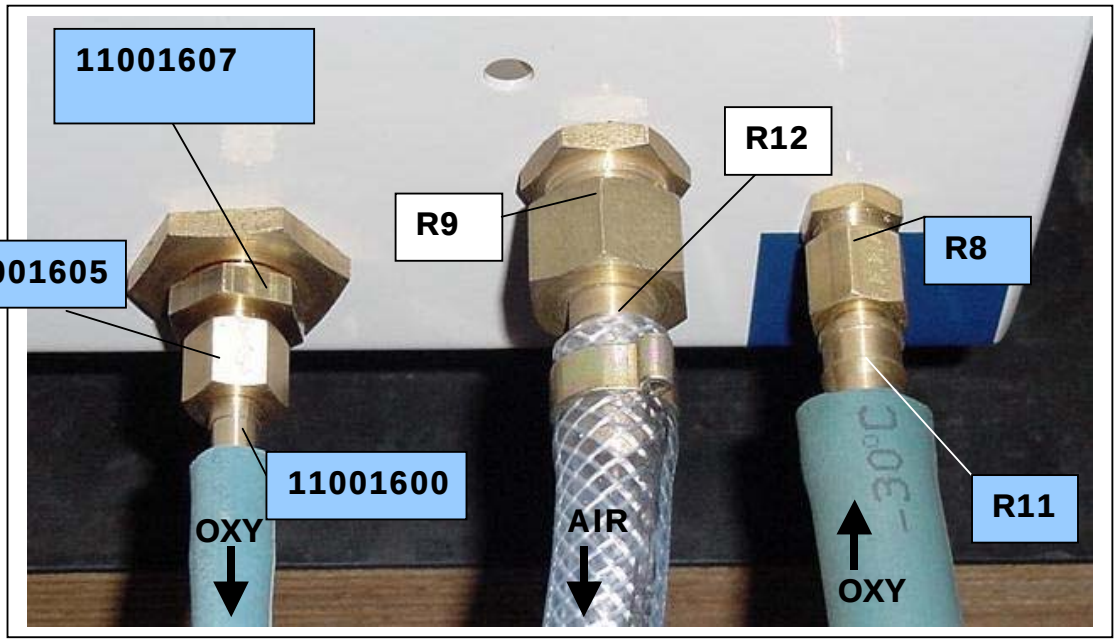


e. 1018/A - fittings

For the good operating of the set gun/panel and to ensure safety, the hoses must be properly fitted onto the tails of the gas panel and onto the tails of the gun. The replacement of the hoses (gas, oxygen and air) et the clamping of the hose onto the tails is done under the entire responsibility of the customer. In case of doubt, send us back the set panel, hose & gun.

Fittings





SAINT-GOBAIN
GRAINS & POWDERS

Z JET

GAS

P=11001320

A=11001313

Ø6.3x12

Lg= 2m

GAS

Lg= 2m

P=11001320

A=11001313

Ø6.3x12

Male tail
Gas
17005168

Paire of fittings:
17005160 =
17005164 +
17005168

OXY

Lg= 2m

11001312

Male tail
Oxy
17005164

AIR

Lg= 2m

11001311

Ø10x16

17005161

Mini hose - Acét = 17001319A / / Prop = 17001318A

OXY

11001312

Ø6.3x12

Lg= 2m

Hose - Acét = 11001310A / / Prop = 11001331A

Flame back
arrestor Oxy +
Acét=17005159
Prop=17005170

Lg= 8m

A=11001313

P=11001320

Ø6.3x12

Lg= 8m

11001312

17005169

Ø10x16

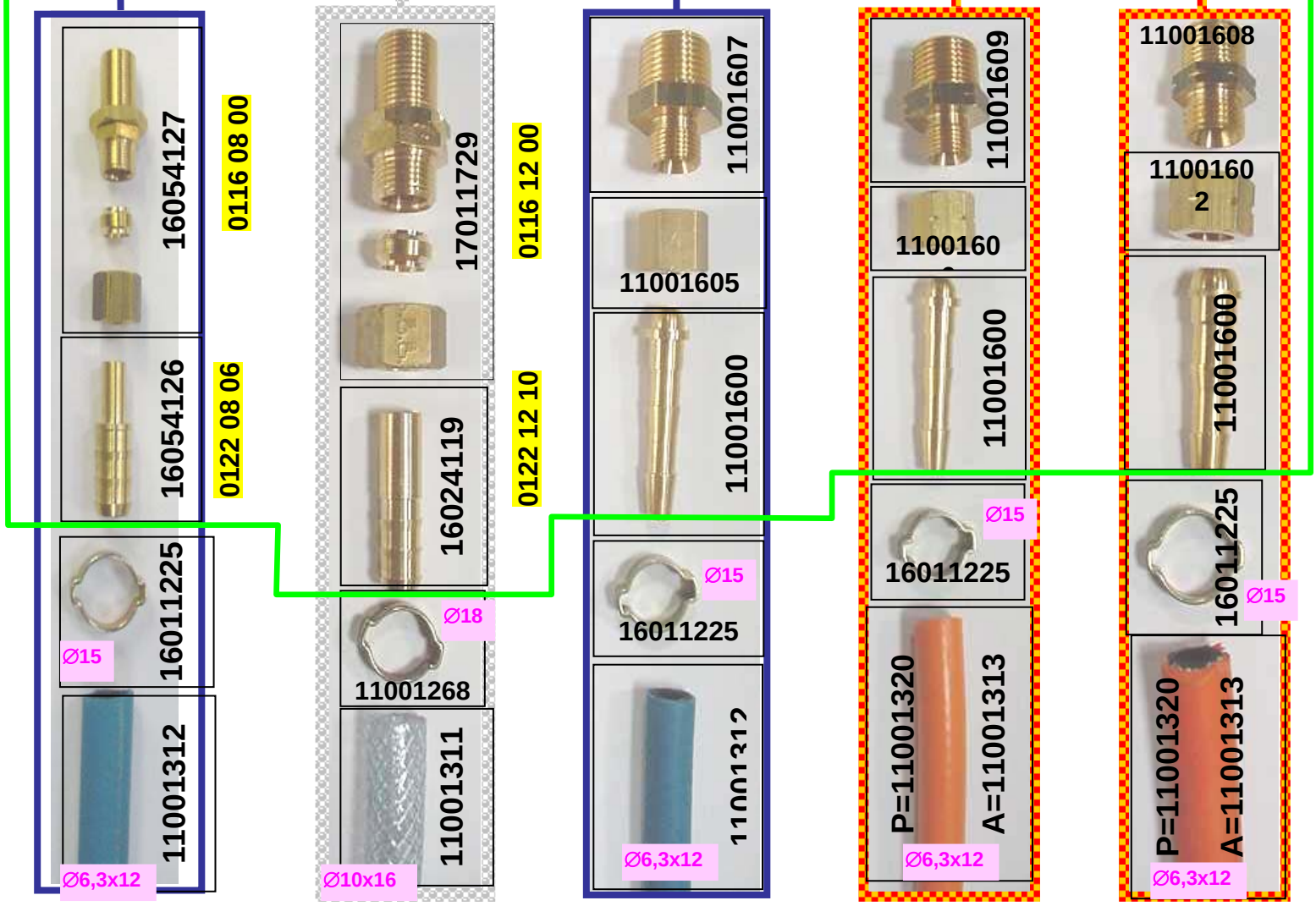
Lg= 8m

11001311

Ø18
11001268

Ø15
16011225

Kit réf. 11001020



f. Z Jet - fittings

For the good operating of the set gun/panel and to ensure safety, the hoses must be properly fitted onto the tails of the gas panel and onto the tails of the gun. The replacement of the hoses (gas, oxygen and air) et the clamping of the hose onto the tails is done under the entire responsibility of the customer. In case of doubt, send us back the set panel, hose & gun.
On the gun side, the fittings are fit with sealing ring. When replacing the sealing ring, you must clean and glue carefully the threads of the fittings by using the seal gel LOCTITE® OLEOETANCHE (ref SG-CS 1100 1028.).

12. Specific notice : Basic flow-meters 11021103

a. Description

The basic gas control panel 11021103 is designed to monitor the flow rates indications and pressures values of fuel & oxygen.

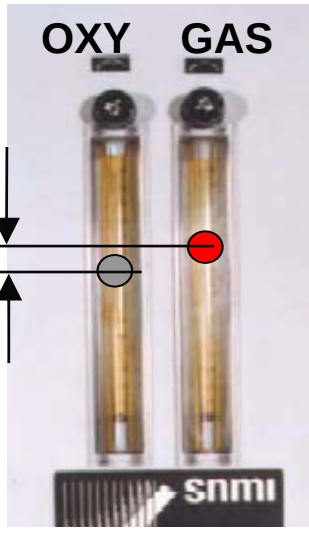
The front panel is composed of :

- a rotameter for gas,
- a rotameter for oxygen,

If maintenance is required, this operation must be made by a specialist of gas. The use of grease is strictly prohibited in the fluid network. Use leak spray detector on all fittings to detect the leaks. Repair immediately the leak and make again the leak control operation. Verify frequently all the potential leaks.

b. Flow meters information

Flow-meters are called also rotameters. The flow-meters are defined as "variable cross-section type flow-meters" in which the measurement float moves along a conical tube. The ball height is proportional to the fluid flow rate.
The float rises when flow rate increases and descends when flow rate decreases. The flow meter is equipped with an adjustment valve allowing to adjust the flow rate.
The ball height is an indicative value and is valid at a pressure value. Even if ball height is the same, if pressure increases, the real flow will be higher. The curves given in the next chapter allows to convert ball height to flow rates.



c. How to use the flow meters

The ball heights are read from the center of the balls. The values given in the tables are nominal values. In practice, the following factors may have a slight influence on the flow rates:

- machining tolerance of the gas circuits of the gun,

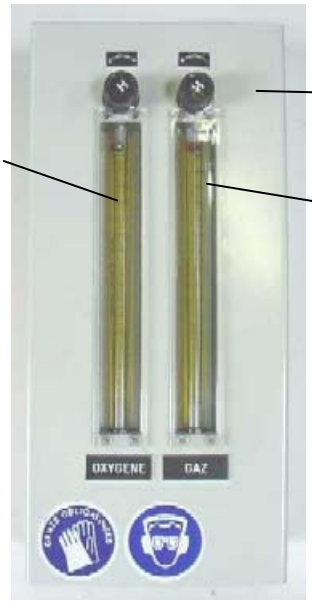
- calibration tolerance of the pressure reducer gages,

- tolerance of the graduations of the flow rate measuring tube.

Turn the knob in order to adjust the flow-rate according to the recommended spray parameters. Refer to the curves given in the next chapter in order to convert ball height to flow rates.

d. 11021103- Basic flow-meters features

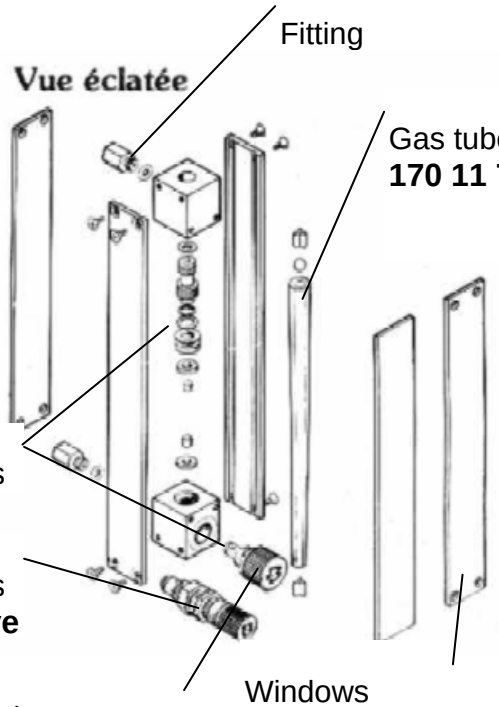
For the good operating of the set gun/panel and to ensure safety, the hoses must be properly fitted onto the tails of the gas panel and onto the tails of the gun. The replacement of the hoses (gas, oxygen and air) et the clamping of the hose onto the tails is done under the entire responsibility of the customer. In case of doubt, sned us back the set panel, hose & gun.
On the flowmeters side, the fittings are fit with sealing ring or they must be carefully cleaned and sealed using the seal gel LOCTITE® OLEOETANCHE (ref SG-CS 1100 1028.).



Frame

Oxy flowmeter

Gas



Fitting

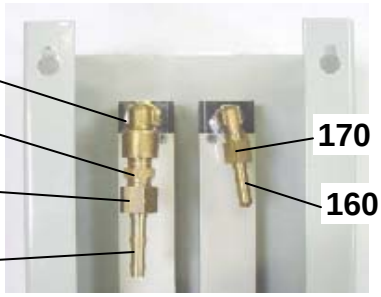
Gas tube
170 11 755

Set of O-rings

Set of O-rings
for the valve

Windows

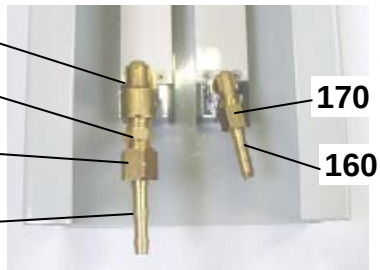
Valve



170 11
170 11
170 11
170 11

170 11 781
160 54 126

The tails 170 54 126 must be fitted thanks to the rings Ref 160 11 225



170 11
170 11
170 11
170 11

170 11 781
160 54 126

NPT-BSP

13. List of tools necessary for the maintenance of the Z jet 2 ®

REFERENCE	QTY	DESIGNATION
17001697	1	Tube of grease
17001702	1	Size 4 mm hexagonal wrench
17001883	1	Size 3 mm hexagonal wrench
17002331	1	Size 6 mm hexagonal wrench
17002820	1	10 x 12 flat wrench
17001705	1	Diameter 2 mm wire guide extractor
17001706	1	Diameter 3 mm wire guide extractor
17002333	1	Diameter 4 mm wire guide extractor
17005149	1	Air motor extractor
17002867	1	Gas igniter
17002491	1	Oil can
17002455	1	Gas mixer extractor
17002471	1	Gas nozzle calibration set
11001130	1	Ear plugs (not suitable for an intensive use of the gun, contact your specialist for hear protection)