0 Contents

1 Safety instructions

1.1 General

The equipment is manufactured using state of the art and recognized safety regulations. However, incorrect operation or misuse may jeopardize

- the health and life of the operator or third parties
- the equipment or other property

All persons involved in the commissioning, operation, servicing and maintenance of the equipment must

- either be suitably qualified
- read these instructions completely and carefully follow.

1.2 Regulations

1.2.1 Intended use

This arc metal spray equipment is used exclusively for surface coating of metallic workpieces. The equipment is only being used as intended when in addition the following points are considered:

- The labor regulations and operating instructions of the operator must be followed.
- Potentially supplied personal protective equipment by the operator must be used, respectively worn.
- The instructions from the instruction manual and operating instructions must be followed.
- The operating personnel must be properly trained on the metal spray equipment.
- The statutory provisions for prevention of accidents must be followed.

1.2.2 Misapplication and misuse

Misapplication is be deemed as:

- the operation of the metal spray equipment with non-safety related technical defects or deficiencies and
- the unauthorized and unapproved change of parameters by the operator
- the use of accessories or spare parts from third-party without the consultation with the OSUCAS GmbH.
- the spraying of non-approved materials.

Misuse is be deemed as:

- the operation of the equipment with manipulated safety devices or other safety-related defects and

1.2.3 Restrictions of use

The metal spray equipment must not be operated in an explosive atmosphere.

1.3 Description of the workplace

1.3.1 Operating personnel

The equipment must be operated only by trained and instructed personnel.

This presupposes:

- Medical examination of aptitude
- Education and training in arc spraying
- Safety thinking
- Basic knowledge of electrical
- Knowledge of hazardous materials
- Appropriate working with hazardous materials

1.3.2 Work tasks

Operator:

- Connecting the hose package and preparing the metal spray equipment (inserting the spray wire, etc.)
- Operate the equipment functions
- Coating the workpiece surfaces
- Function check of the equipment
- Troubleshooting of simple malfunctions
- Visually inspection of the equipment for damage before starting work
- Cleaning of the equipment

Maintenance personnel

- Disassembly, maintenance respectively overhauling and assembly of the metal spray equipment.
- Detection of faults and possibly resolve errors of all kinds.
- Conducting of checks and trial runs

1.3.3 Work equipment and personal protective equipment

Additional tools and personal protective equipment for the use and maintenance respectively the repair of the metal spray equipment are:

- Full-protection suit and face protection
- Various hand tools for the maintenance and repair of metal spray equipment.
- Compulsory workwear and personal protective equipment on the factory premises.

1.3.4 Work environment

- The required illuminance at the site of operation must be while operation ≥ 750 lx at Rz ≥ 80.
- The required illuminance on installation, servicing and maintenance is ≥ 500 lx at Rz ≥ 80.
- The exposure level (8 hours) must be determined by the work safety.
- For the metal dust an appropriate extraction system must exist (if necessary in explosion-proof design)
- Ambient temperature and relative humidity must be within the permissible limits (see chapter "Technical Data").

1.3.5 Hazardous materials

Never spray a material, without reading and obeying the safety precautions listed on the supplied Material Safety Data Sheet.

For the respiratory harmful substances (such as beryllium, tellurium and its oxides) should not be used respectively only used under the supervision of a safety inspector.

The blasting and finishing is because of the resulting dust as hazardous as the spraying of such materials itself.

It is strongly recommended to read and obey the notes of the safety data sheet attached to the material, because of the constantly changing and new policies and information. Complete and updated information are provided by the state and local authorities.

The Federal Ministry of Labor and Social Affairs (BMAS) announces the Technical Rules for Hazardous Substances (TRGS) for Germany. The TRGS give occupational exposure limits (AGW) for the average concentration of a substance in the workplace air. The system operator is responsible for compliance with these limits.

The TRGS 900 list includes corresponding limits for elements of wire.

1.3.6 Spray dust disposal

- The filtered metal and metal oxide dusts have to be disposed of safely
- Therefor the regulation on dangerous working materials is relevant (Arbeitsstoffverordnung - ArbStoffV).
- It is labeling obligation in order their handling as well as the transport, are guaranteed without risk.
- The ArbStoffV sets in §4 the packaging of the materials, in §5 the labeling of substances and in §9 the traffic regulations on the transport of dangerous goods.
- Annex I and II of the regulation contains lists of the classification of dangerous and labeling obligatory substances.
- All relevant national regulations and safety rules on dust combustion and dust explosion hazards must be observed.

1.4 Hazard notes and symbols

DANGER!

Indicates an immediate threat of danger.

If not avoided, the result will be death or serious injury.

WARNING!

Indicates a possible threat of danger.

If not avoided, the result could be death or serious injury.

CAUTION!

Indicates a possible threat of danger.

If not avoided, the result could be slight or minor injury.

NOTE!

Indicates a potentially dangerous situation.

If not avoided, the result could be damage to the equipment or an object in its environment.

Mandatory signs


Use hearing protection


Disconnect mains power plug


Use foot protection


Use hand protection


Use protective wear


Use face protection


Use respiratory protection


Isolate before maintenance or repair work

Warning signs


General warning sign


Warning of dangerous explosive material


Warning of a magnetic field


Warning of obstacles on the ground


Warning of electrical voltage


Warning of suspended load


Warning of hot surface


Warning of substances harmful to health or irritating


Warning of inflammable substances


Warning of cutting damage (stab wound)


Warning of counter rotating rollers


Warning of optical radiation


Warning of noise with high sound pressure level

Prohibition signs

Fire, open light and smoking prohibited

No admittance for persons with a heart pacemaker or implanted heart defibrillator

Extinguishing with water prohibited

Do not point spray device at persons

1.5 Hazards which occur while arc spraying

1.5.1 Electrical energy

DANGER!

The power source is connected to a high supply voltage, which can cause burns and fatal injuries if touched!

Even low voltages can be dangerous because they can lead to secondary accidents!

Danger of electric shocks!

Strong electric currents produce magnetic fields that can interfere with the function of heart pacemakers!

- All work on electrical equipment must be carried out accordingly to the electro technical safety regulations and national accident prevention regulations only by authorized electrically qualified persons.
- Electrical equipment should only be used if it complies with the operational and local requirements on safety and any environmental effects
- Electrical systems or equipment must be checked to ensure they are in a proper condition before being used for the first time, following repair or at the set inspection intervals.
- Live parts of an electrical system must not be worked on.

- Work should only take place on active parts of electrical systems and equipment if the five safety rules have been followed:
  1. **Insulate**
  2. **Protect against reactivation**
  3. **Verify safe isolation from the supply**
  4. **Ground and short-circuit**
  5. **Cover or safeguard live neighboring parts**
- Take special care in humid areas.
- Do not clean power source with water.
- Power source should not be exposed to rain.
- Sweaty or damp clothing and shoes are a hazard as they are electrically conductive.

1.5.2 Metal dusts and metal fumes

WARNING!

During arc spraying metal dusts and metal fumes are generated which can be toxic and lead to health problems!

Use respiratory protection!

Observe the hazard warnings of the safety data sheets of spray wires!

- Metal dusts and metal fumes must be extracted and filtered!
    - Extraction and filter system must have an adequate capacity.
    - Installed extraction walls / hoods must be arranged aerodynamically efficient. An expert can advise you.
- Ventilate spray booths and spray areas adequate and aerodynamically efficient. **Do not ventilate with oxygen!**
- You need additional filtering and regulatory approval, if you want to return the filtered air into the working area.
- Start the extraction before operating the metal spray equipment.
- Ensure that the occupational exposure limits (OEL) are complied with.
- Personal respiratory protection.
    - Wearing a fresh air helmet has proven itself in practice.
    - Check the condition of the breathing air supplied to the fresh air helmet.
- During meal breaks ensure that toxic metallic dust does not enter the digestive tract. Before eating, drinking, smoking or taking snuff, wash hands and face thoroughly.
- When disposing of metal dust the local and national regulations must be observed! (see chapter “Spray dust disposal”)

1.5.3 Molten Particles

WARNING!

During arc spraying a spray beam is generated which consists of molten particles!

Fire and burn hazard!

Use protective equipment!

Do not point spray device at persons or inflammable objects!

- Inflammable substances must not be in the spray area (room).
- Never spray in rooms where a risk of explosion is present.
- Beware of explosive inflammation of leaking fuel gas when handling gas cylinders.
- Use protective equipment:
  - Protective wear
  - Face protection
  - Foot protection
  - Hand protection
- Protective equipment must be flame retardant.
- Prevent spontaneous combustion, by taking appropriate measures when flammable substrates have to be coated.

1.5.4 Ultraviolet- and infrared radiation

WARNING!

During arc spraying ultraviolet and infrared radiation is generated by the arc!

Risk of injury for eyes and skin!

Use protective equipment!

- Ultraviolet and infrared radiation is hazardous to the eyes and skin.
    - Looking into the arc results in keratitis or conjunctivitis as well as retinal damage!
    - Unprotected body parts which are exposed to the arc radiation suffer skin burns
- Use protective equipment
    - Eye protection
      Use only protective glasses with an adequate filter effect in accordance with DIN EN 169 or other comparable relevant national standard.
      Protective glasses with side shields also protect against reflected radiation.
    - Skin protection
      All body parts which are exposed to the arc radiation must be protected by covering.
- Persons who are in the immediate vicinity of the radiation supply must also wear personal protection or be protected from the radiation by effective vision protection.

1.5.5 Dust combustion and dust explosion hazard

WARNING!

During arc spraying spray dust is generated!

Fire and explosion hazard!

Do not bring open fire or any other open ignition sourecs in contact with the spray dust!

Do not extinguished dust combustions with water!

Protection against dust combustion and dust explosions only makes sense if the knowledge about the dangers and measures to be applied to their prevention are well known.

- The arc and the spray jet with the molten Metal particles are unavoidable sources of ignition. Reduce the risk of explosion and never direct the spray jet on dust accumulation.
- Preventing dust accumulation at the workplace, as well as in the extraction and in the pipe system of the filter, provides the best protection against explosions. (Primary explosion protection)
- An industrial vacuum cleaner with the use category C is recommended for cleaning.
- Avoid dust swirls!
  They can together with atmospheric oxygen, at a certain concentration, result in an explosive dust-air mixture, which is brought to explosion by initial spark.
- Avoid any ignition sources!
- Use appropriate extinguishing agent for extinguishing metal fires.
  Seek advice from the Fire Department.

- Moist or wet dust from zinc, aluminum, magnesium and alloys of these tend towards spontaneous combustion. A chemical reaction with water leads to a build-up of hydrogen, especially with aluminum. Suitable safety measures must be taken when filtering and storing the dust.
- Aluminum and aluminum alloy dust and other rapidly reacting metallic dusts should only be extracted using filter systems designed for the purpose. These dust/air mixtures are easily combustible and explosive.
- • The relevant national regulations must be observed.

1.5.6 Compressed air

WARNING!

During arc spraying compressed air is used for atomizing the molten metal!

Risk of injury in case of improper use!

Use face protection!

Do not point spray device at persons!

- The cleaning of cloth directly worn on the body with unreduced compressed air is prohibited. There is a risk of injury! In addition, metal dust, which can be toxic, is swirled up and these can pass through the respiratory system into the bloodstream.
- Protect the eyes!
  Solids that are swept away by compressed air, can cause injury.

1.5.7 Lubricated compressed air (at spray devices with an air motor)

WARNING!

With an incorrect set lubricator oil mist can leave the air motor of the spray device!

Fire and explosion hazard!

Health risk by inhalation of oil mist!

Use respiratory protection!

Do not extinguished combustions with water!

- Oil mist which is leaving the air motor of the spray device can form an ignitable or explosive mixtures.
- This can together with atmospheric oxygen, at a certain concentration, result in an explosive oil-air mixture, which is brought to explosion by initial spark.
- Avoid any ignition sources!
- To avoid danger, the exhaust jet of the air motor should not be pointed in the direction of ignition sources.
- Use appropriate extinguishing agent for extinguishing oil fires.
  Seek advice from the Fire Department.
- Provide adequate ventilation of the working area respectively exhaust the oil-air mixture. The room temperature must not be too high.
- Prevent the inhalation of oil mist by wearing respiratory protection. In case of overexposure to oil mist remove the affected person from the danger zone.

1.5.8 Noise with high sound pressure level

CAUTION!

During arc spraying noise with high sound pressure level is generated by the arc and the atomizer air.

Danger of hearing damage!

Use hearing protection!

- The sound pressure level measured at 1 m from the arc, is 104 - 118 dB(A). It increases with rising current and arc voltage.
- Apply noise abatement measures
    - Provide soundproof rooms as work area
    - Install soundproof cabinet
    - Install soundproof encapsulation
    - Use hearing protection
- Persons who are in the immediate environment of the supply of noise must wear personal hearing protection.
- At noise level >85 dB(A), hearing protection appropriate to the noise level must be used.
    - Earplugs; worn in the ear
    - Ear muffs; worn over the ear
- The "TA Lärm" defines the intensity of the noise level allowed to break outside.
- In other countries the relevant national regulations that must be observed are applicable.

1.5.9 Rotating parts

CAUTION!

The spray wire is transported by rotating feed rollers inside the feed gear!

Risk of injury by pulling in (e.g. loose clothing, long hair, etc.)!

- Danger from rotating parts at the running equipment:
  - Feed gear
  - Wire dispenser
- Therefore, observe the following guidelines:
  - Never reach in with your hand, fingers or any object into the rotating feed rollers
  - Keep long open hair, loose clothing, etc. away from rotating parts.

1.5.10 Hot surface

CAUTION!

Through the spray process, the radial nozzle nut can heat up significantly!

Risk of burns (e.g. for hands)!

Use hand protection!

- Touch the radial nozzle nut only with protected hands or allow it to cool down.
- The heating temperature of the radial nozzle nut is influenced by:
  - Deposition rate
  - Spraying duration
  - Use wire material

1.5.11 Emerging spray wire

CAUTION!

During setting up of the arc spray equipment the spray wire is emerging from the spray device!

Risk of stitch damage (e.g. for eyes, face, hands, etc.)!

Do not point spray device at persons!

- During setting up the arc spray system the nozzle system of the spray gun must not be aimed in the direction of the face, hands or other body parts.

1.5.12 Risk of tripping and falling

CAUTION!

The power supply, the spray device and the feed gear are connected with hoses and cable!

Risk of tripping and falling by hoses and cable lying on the ground!

- Position connection cable and hose package at a safe place and protect if necessary.

2 Technical Data

2.1 Power Source

	OC380 Corr		OC600 Corr
	400 V	**230/400 V (umschaltbar)**	**400 V**
Mains voltage	3 x 400 V AC	3 x 230/400 V AC	3 x 400 V AC
Mains voltage tolerance	±5 %		
Mains frequency	50/60 Hz		
Connection current	< 23 A	< 39 A / < 23 A	< 34,6 A
Main fuse	35 A	50 A	63 A
Connection power	< 15 kVA		< 24 kVA
Spray current max. (at 100 % duty cycle)	350 A DC		600 A DC
Open-circuit voltage	26 – 39 V DC		26 – 39 V DC
Spray voltage	22 – 34 V DC		22 – 34 V DC
Connection cable			
up to 20 m	4 x 6 mm²		4 x 10 mm²
up to 100 m	4 x 16 mm²		4 x 16 mm²

2.1.1 Spray wire and deposition rate

Spray wire quality	DIN EN ISO 14919			
Spray wire diameter	2,5 mm (other diameter on request)			
	OC380 Corr		**OC600 Corr**	
Authorized spray wires and deposition rates (at 380 / 600 A)	Zn ZnAl Al AlMg	38,0 kg/h 33,6 kg/h 11,4 kg/h 10,2 kg/h	Zn ZnAl Al AlMg	60 kg/h 53 kg/h 18 kg/h 16,1 kg/h

2.1.2 Ambient conditions

2.1.2.1 Temperature range

Admissible current load for silicon rectifier		
Continuous DC [%]	Ambient temperature [°C]	Altitude of site [m above sea level]
100	45	1000
90	54	1700
80	63	2900
70	72	4200
60	81	6000
50	90	
40	100	

For other combinations of values for ambient temperature and altitude, the values of continuous direct current (from the same line) are to be multiplied.

Example:

Ambient temperature = 63 °C (corresponds to 80 % continuous direct current)

Altitude of site = 1700 m (corresponds to 90 % continuous direct current)

Continuous direct current = 80 % x 90 % = 72 %

NOTE!

The rectifier is protected by a built-in thermal switch from overheating.

Short circuits destroy the silicon rectifier within a short time. Destruction caused by short circuit overloads cannot be claimed as liability for defects.

2.1.2.2 Relative humidity

Up to 50 % at 40 °C

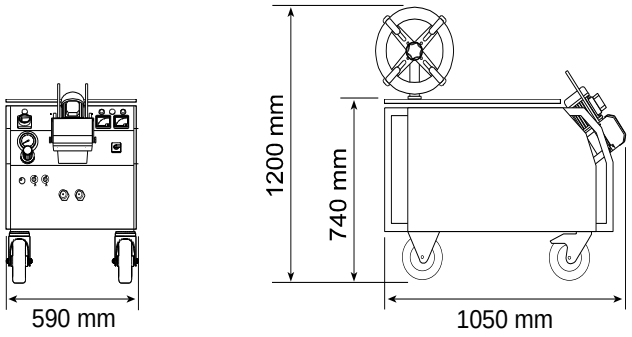
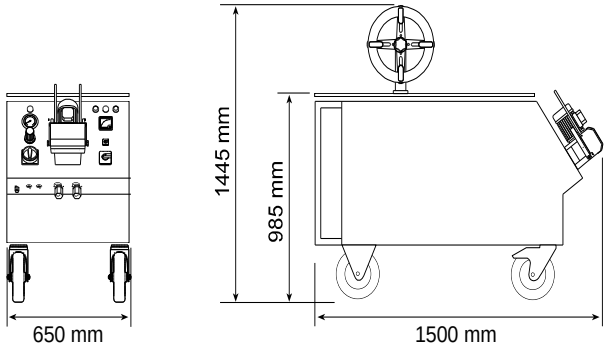
Up to 90 % at 20 °C

2.1.3 Compressed air supply

Required compressed air quality	DIN ISO 8573-1 class 1
Compressed air temperature	Re-cooled to at least 25 °C
Nominal width of compressed air ring line	25 mm (1 inch)
Nominal width of compressed air hose (Connection power source)	25 mm (1 inch)
Connection type	Compressor coupling G1/2”
Inlet pressure max.	10 bar
Consumption compressed air	
Air motor	25 m³/h
Atomizer air	60-100 m³/h

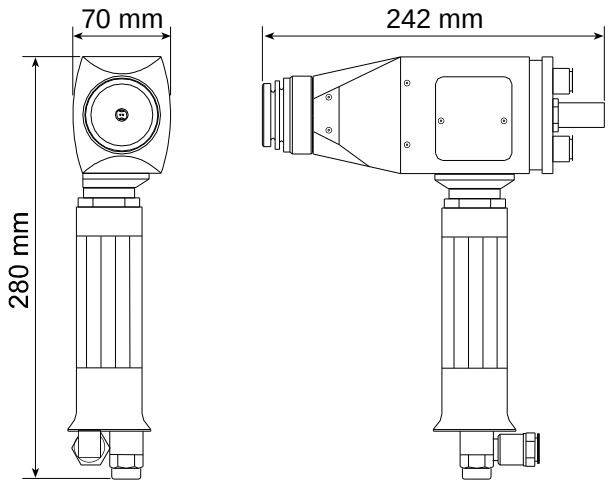
- To achieve 6 bar atomizer air pressure the inlet pressure must be at least 8 bar.
- The incoming compressed air is directed through a separator at the input to the power source. An ongoing maintenance of the filter is required.
- The compressed air from mobile compressors contains lots of oil and water. Therefor it needs special preparation.
- The separator from the power source is not designed to prepare high contaminated compressed air for spray operation. It is recommended to install an additional separator preliminary to the power source.
- Additionally a compressor is needed as buffer, since the pressure sensor shuts down the equipment at pressure variations or undersupply.

2.1.4 Measures and miscellaneous data

OC380 Corr	OC600 Corr
	

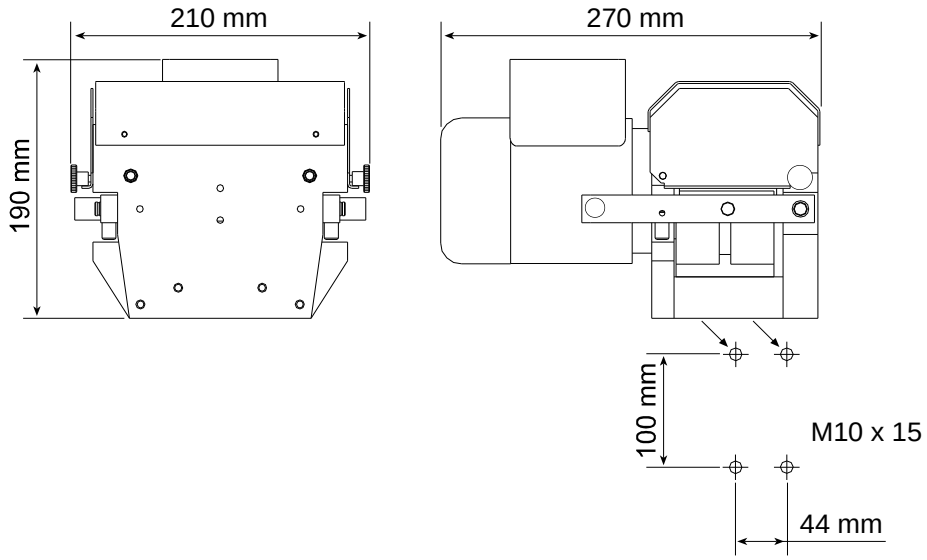
Protection class	IP 21
Cooling	convection
Weight	200 kg **(OC380 Corr)** 410 kg **(OC600 Corr)**
Mark of conformity	CE

2.2 Spray device OC1



Compressed air consumption	
Air motor	25 m³/h
Atomizer air	60-100 m³/h
Nominal power of motor	320 W
Weight	2,4 kg (incl. air motor)

2.3 Feed gear WF4



Connection voltage motor	
• via mains voltage	3 x 400 V AC
• via frequency converter	3 x 230 V AC
Nominal power of motor	90 W
Gear ration	
• OC380 Corr	20:1
• OC600 Corr • OC380 Corr (2,0 mm)	12:1
Weight	9 kg

3 Description of equipment

3.1 General Information

The equipment includes the following components:

- 1x power source OC380 Corr or OC600 Corr
- 1x feed gear WF4 (mounted onto power source)
- 1x hand-held spray device OC1
- 1x cable and hose set

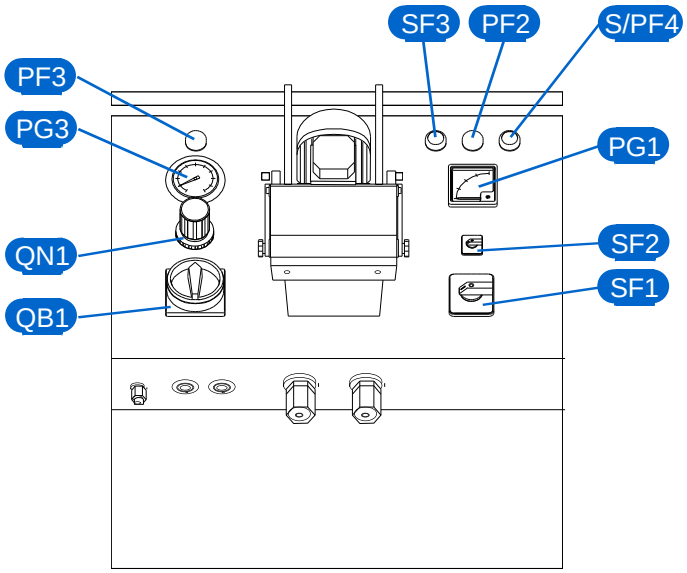
The OC380 Corr / OC600 Corr features integrated safety equipment such as automatic deactivation in the event of a pressure failure and if the nominal load is exceeded, temperature control for the transformer, rectifier and AC motor and electrical safety circuits to prevent uncontrolled reactivation after faults.

NOTE!

Due to the high current (600 A) and the resulting heat development the length of cable and hose set (coaxial cable) is limited to 8 m with the OC600 Corr.

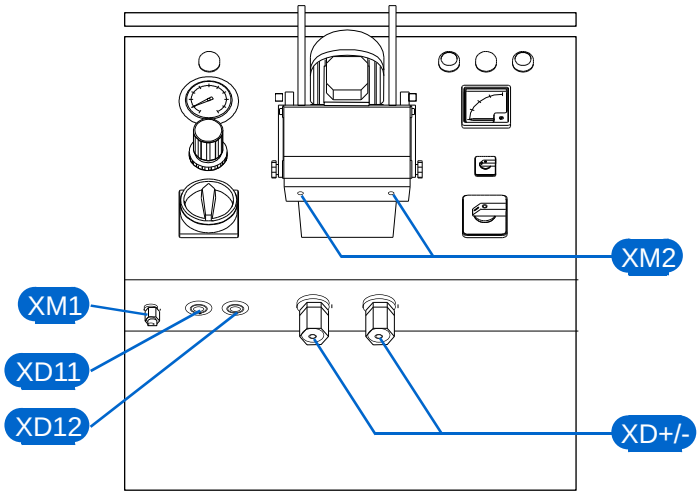
3.2 Front view of power source

3.2.1 Control and indicator elements of power source



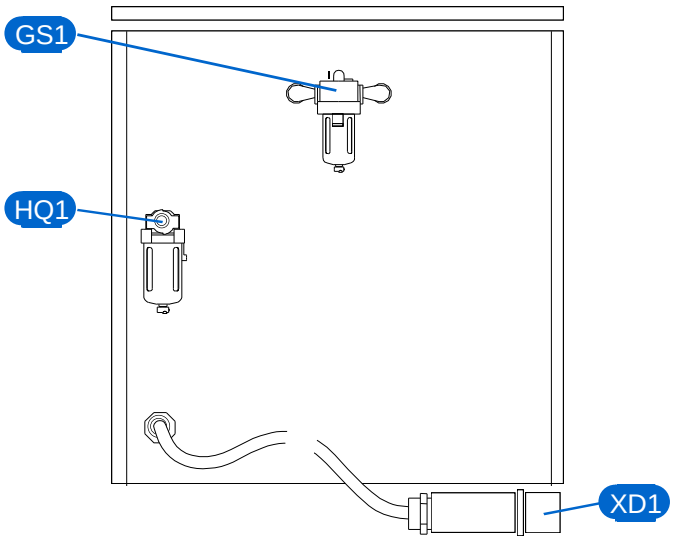
Pos.	Description
PF2	**Signal lamp white** Equipment switched on
PF3	**Signal lamp green** Equipment ready
PG1	**Ammeter** Indication of spray current
PG3	**Manometer** Indication for pressure of atomizer air
QB1	**Main switch** Power source on/off
QN1	**Pressure regulator** For regulating the atomizer air
SF1	**Step switch** Setting of spray voltage
SF2	**Code switch** Setting of wire feed speed WF4
SF3	**Push button wire feed** Wire feed without spray voltage, without atomizer air
S/PF4	**Illuminated push button yellow** Reset button and indicator for errors

3.2.2 Connectors of power source



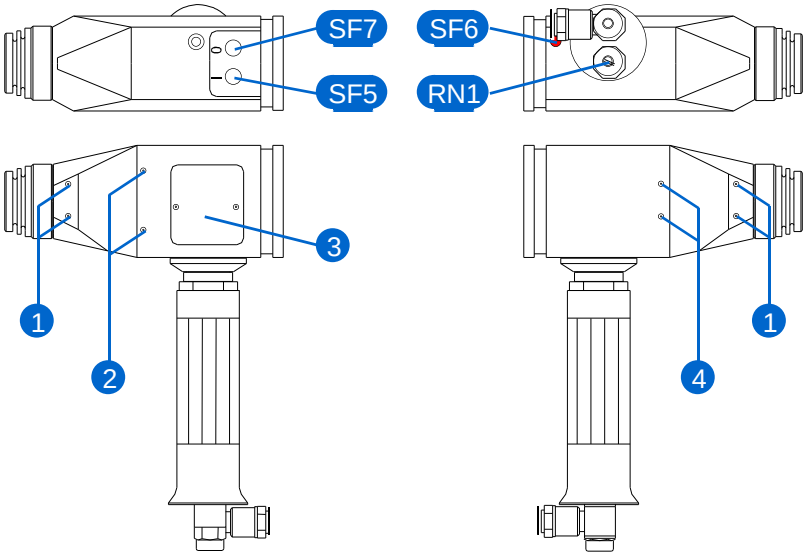
Pos.	Description
XD+/-	**Current-air connectors** Connector for current-air hoses
XD11	**Connector socket (3-pol.)** Connector socket for control cable on/off switch
XD12	**Connector socket (5-pol.)** Connector socket for control cable of light beam (dead man´s control)
XM1	**Quick-lock coupling** Connector for supply hose of compressed air motor
XM2	**Connector wire guide tubes** Slot for wire guide tubes (feed gear)

3.3 Rear view of power source



Pos.	Description
GS1	**Oiler** Supplies compressed air with oil for lubricating the air motor
HQ1	**Water separator / filter** Filters water and dirt particles from the compressed air
XD1	**Power cable with CEE plug** Connection to three-phase current supply

3.4 Hand-held spray device OC1



Pos.	Description
1	**Adjusting screws** Fine adjustment of contact nozzles
2	**Clamping screws** Fixing of current-air hoses
3	**Wire pressure plate (adjustable)**
4	**Clamping screws** Fixing of contact nozzles
RN1	**Regulation valve with adjusting screw** Setting of motor rotating speed (= regulation of spray current)
SF5	**On button** Starts spray process
SF6	**Light beam** Dead man´s control
SF7	**Off button** Stops spray process

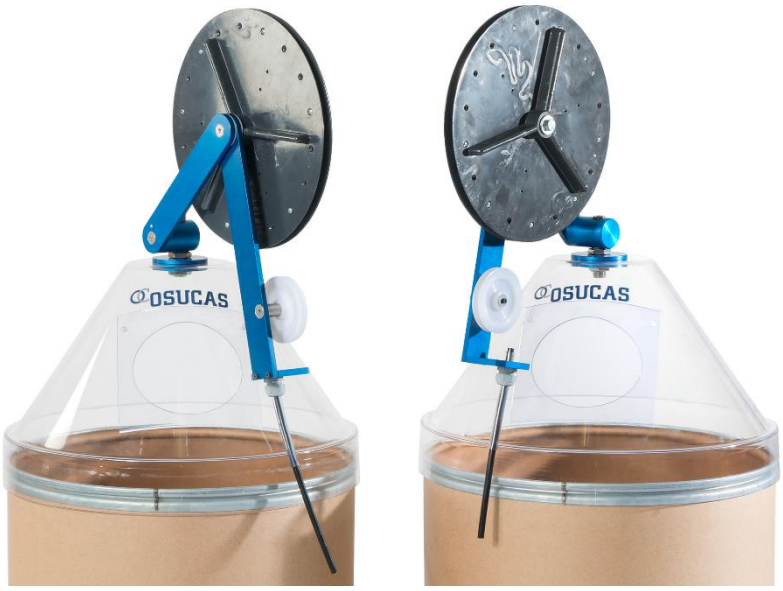
3.5 Optional components

3.5.1 Multi-purpose wire dispenser

The multi-purpose wire dispenser is suitable for processing spray wires from spools. It can be used (by conversion) for the following spool types.

- Hasp spools
- Mig reel spools
- Basket spools

3.5.2 Drum hood cover with wire dispenser

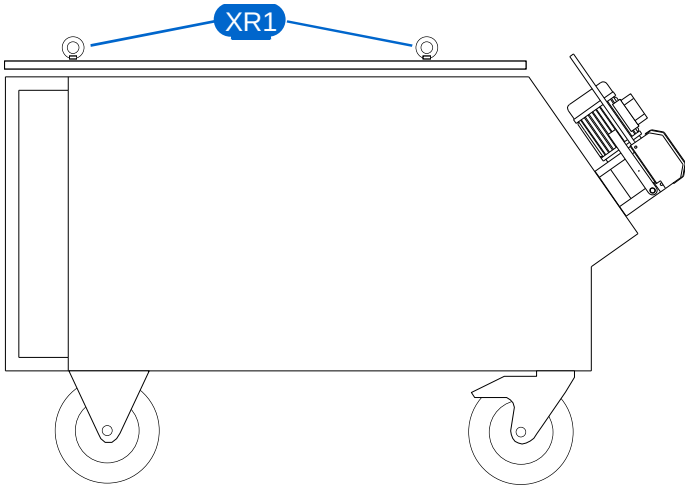


The drum hood cover with wire dispenser is suitable for processing spray wires from round drums. It is available for two drum diameters.

- Drum diameter 505 mm
- Drum diameter 574 mm

4 Installation

4.1 Transport



WARNING!

The power source can be transported with a forklift or a hoist / crane together with rope hooks and screwed on eyelets (XR1). When lifting the power source use carrying straps which are in proper condition and appropriate to the load!

Do not stand under the suspended load!

Danger of falling load!

NOTE!

Transport the power source without exposing it to strong shocks or vibrations.
By shocks or vibrations connections can become lose, in particular cable and control cable connections.

Loose connection can cause errors.

In order to prevent bending of cable and hoses these have to be dismounted from the power source before transporting.

4.2 Positioning

NOTE!

The installation and operation of the equipment is only allowed in dry environment!

The power source requires convection flow for cooling.

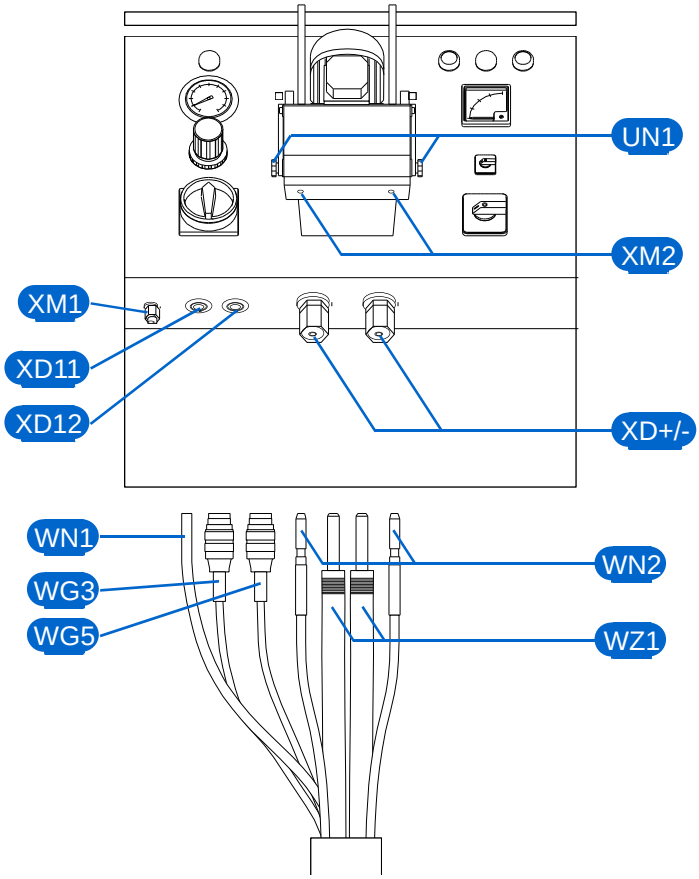
Therefore the power source must not be covered or blocked with objects.

The power source must have a clearance around of at least 30 cm.

Risk of heat accumulation!

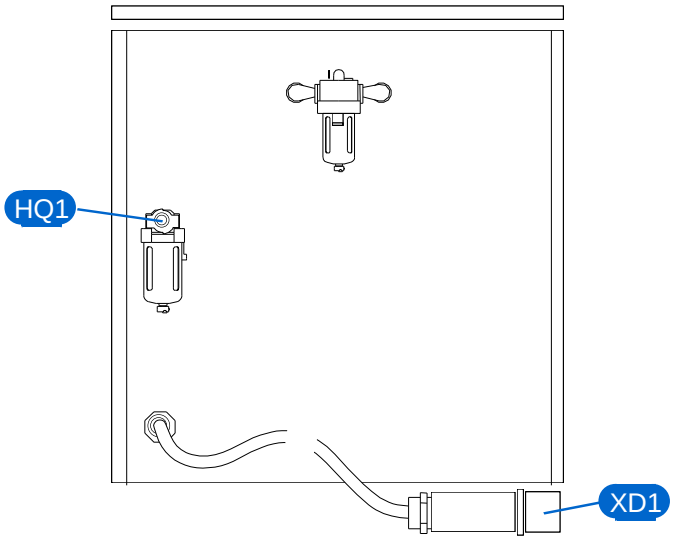
- In case a convection cooling is not ensured the power source must be cooled in a different, adequate way.
- The power source should not be positioned in the blasting area or in the direct spraying area, because blasting and spraying dust
    - reduces the cooling capacity,
    - leads to the build-up of dust bridges which can result in leakage current and charring,
    - settles on the spray wires as far as the hose and cable set and is transported by the spraying device into the contact tips. This significantly impairs wire transport and spray wire contact. It can lead to faults and interruptions in spraying.
- To eliminate the risk of short circuit the following must be taken into account when positioning the drum dispensers:
    - Sufficient spacing between the drum dispensers, especially if steel drums are used.
    - Prevent respectively remove metal dust bridges.
    - In case the ground is electrically conductive the drums have to be positioned isolated.

4.3 Connecting OC1 to power source



- Line the hose package straight, without loops or kinks.
- Insert current-air-hoses (WZ1) all the way into current-air-connectors (XD+/-) and tighten firmly with cap nuts.
- Loosen the knurled screws (UN1).
- Insert the wire guide tubes (WN2) all the way into the connectors (XM2).
- Tighten the knurled screws (UN1).
- Connect air motor hose (WN1) to quick-lock coupling (XM1).
- Connect 3-pole control cable (on/off switch) (WG3) to socket (XD11).
- Connect 5-pole control cable light beam (dead man´s control) (WG5) to socket (XD12).

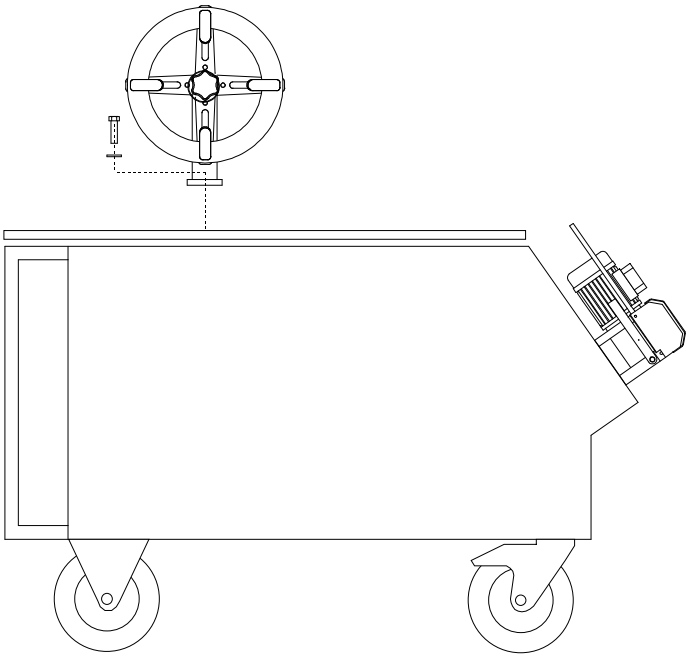
4.4 Connect power source to supply networks



- Use a suitable compressed air hose (see chapter “technical data”) to connect the coupling on the equipment (HQ1) to the plant's compressed air supply. Make sure that there are no foreign bodies in the hose.
- Connect the power cable with CEE plug (XD1) to the three-phase current supply in the plant. Ensure the correct connected voltage.

4.5 Installation of wire dispenser

4.5.1 Installation of multi-purpose wire dispenser



- Unscrew the middle screws on the power source.
- Position the multi-purpose wire dispenser on the power source and fix it with the screws and washers.

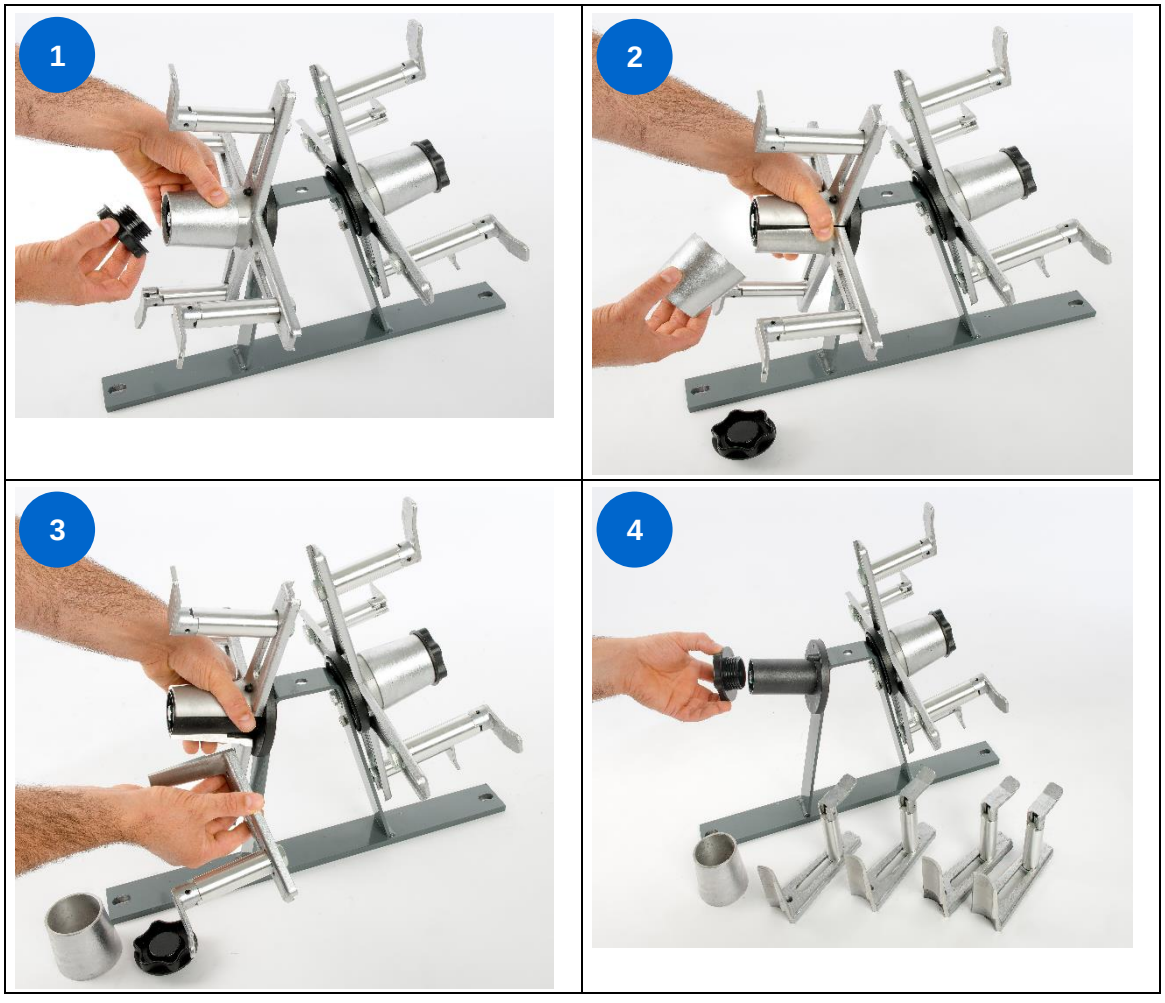
NOTE!

When processing spray wires from spools please note the following.

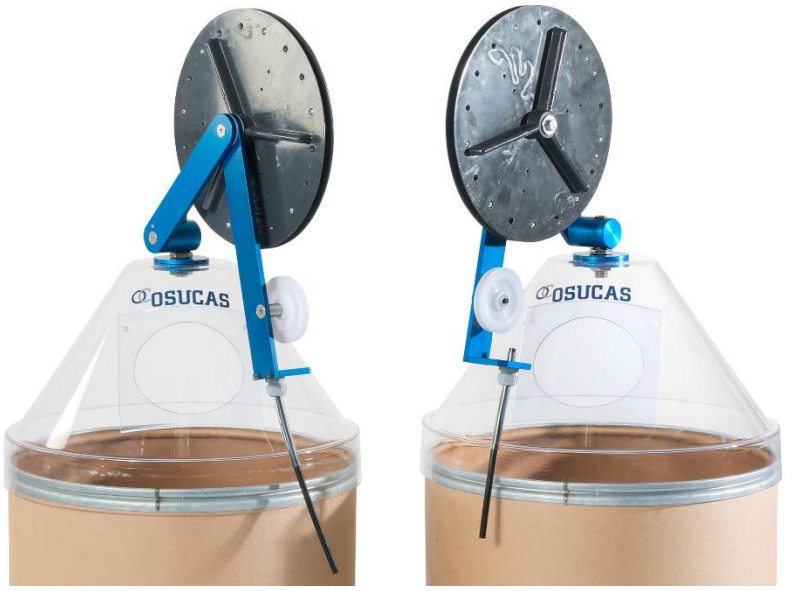
- The wires must not contact each other.
  Risk of short-circuit!
- Check the free movement of the wire guides.

4.5.2 Conversion of multi-purpose wire dispenser for mig reel spools

In the upper illustration the multi-purpose wire dispenser is suitable for the use of hasp and basket spools. For the use of mig reel spools the multi-purpose wire dispenser must be converted as follows.



4.5.3 Installation of drum hood cover with wire dispenser



- Mount the wire dispenser to the drum hood cover.
- Position the drum hood covers onto the drums.

NOTE!

When processing spray wires from drums please note the following.

- Maintain sufficient clearance for steel drums.
  Risk of short-circuit!
- Prevent or remove metal dust bridges.
  Risk of short-circuit!
- Insulate drums when setting them up on electrically conductive floors.
  Risk of short-circuit!
- The wires must not contact each other.
  Risk of short-circuit!

5 Commissioning

5.1 Measures prior to commissioning

NOTE!

Daily prior to work:

- Follow all safety measures and protective precautions for thermal spraying
- Check personal protective equipment
- Check electrical connections.
  Loose connections lead to scorching of cable
- Check cut-out function of dead man´s control
- Check production parameters
- Empty the water separator and check the filter insert.
  If the filter insert is very dirty or clogged, the compressed air supply to the equipment cannot be ensured.

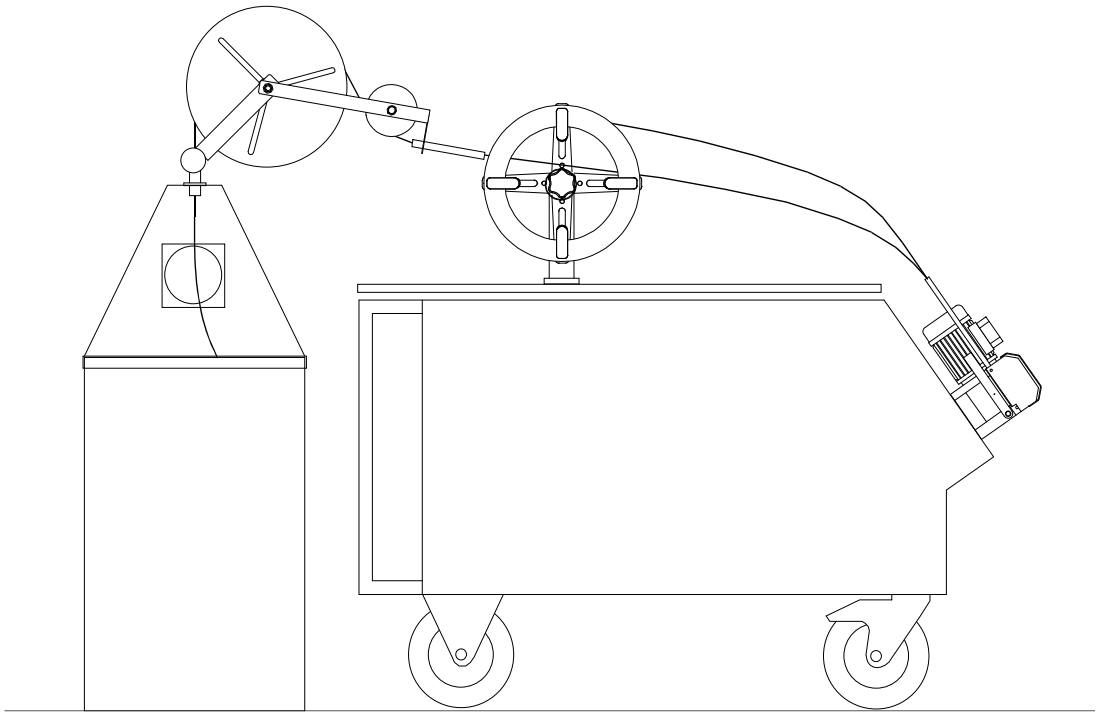
Weekly:

- Check filling level of oiler.
- Check condition of oil in the oiler.
  Change the oil if the compressed air has a high content of oil and water because this condensate also enters the oiler, where it causes undesirable changes to the air motor oil.

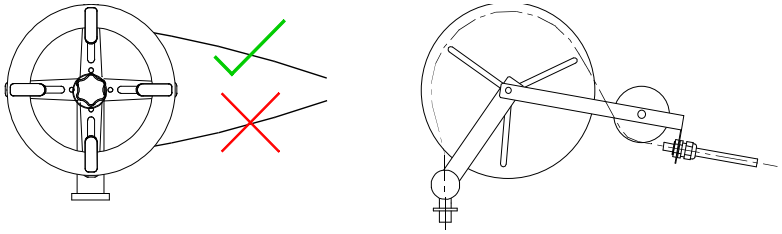
Miscellaneous:

- The hose package must not be kinked.
  Line only in large loops.
- Use clean and dust-free spray wire.
- If larger contiguous areas are to be coated, the use of a wide blast system instead of the standard round blast system is more suitable! Seek advice on the subject!
- Check quality of the compressed air

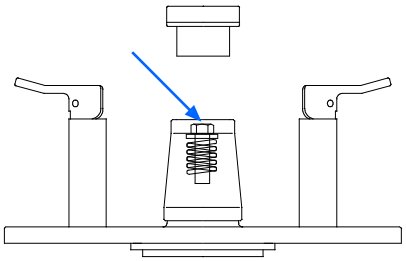
5.2 Preparing the equipment



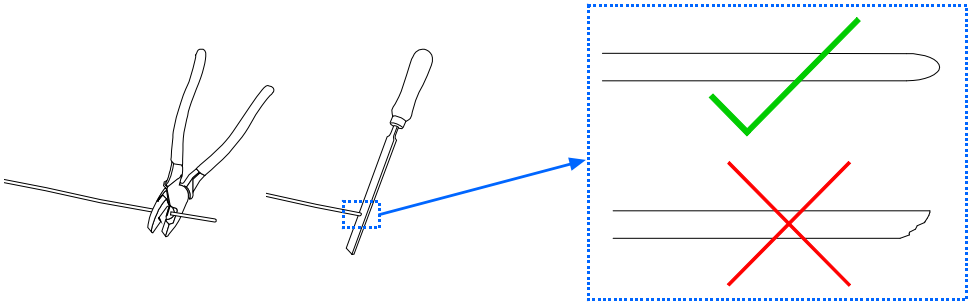
5.2.1 Preparing spray wire



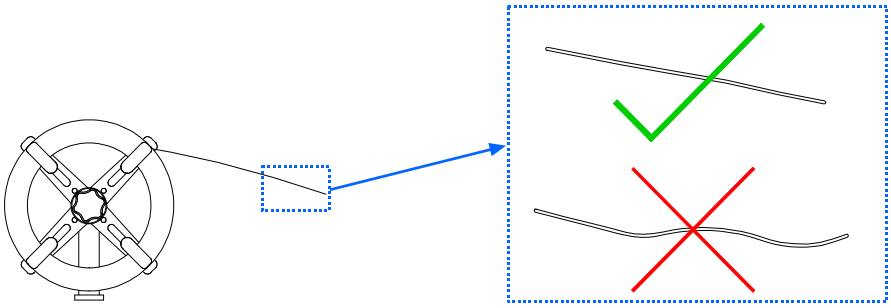
- The wire must enter the wire guide from above.
- Alternatively guide the wire from the drum through the pulley wheels.



- To prevent the reel from running on, gently tighten the spring brake.

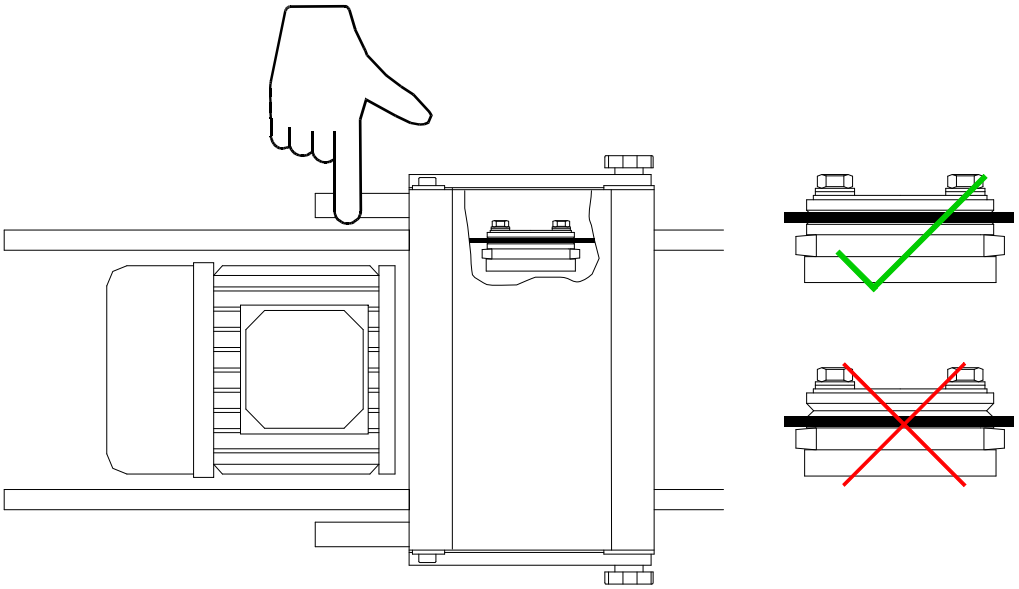


- Nip off the start of the wire and file to a rounded shape.



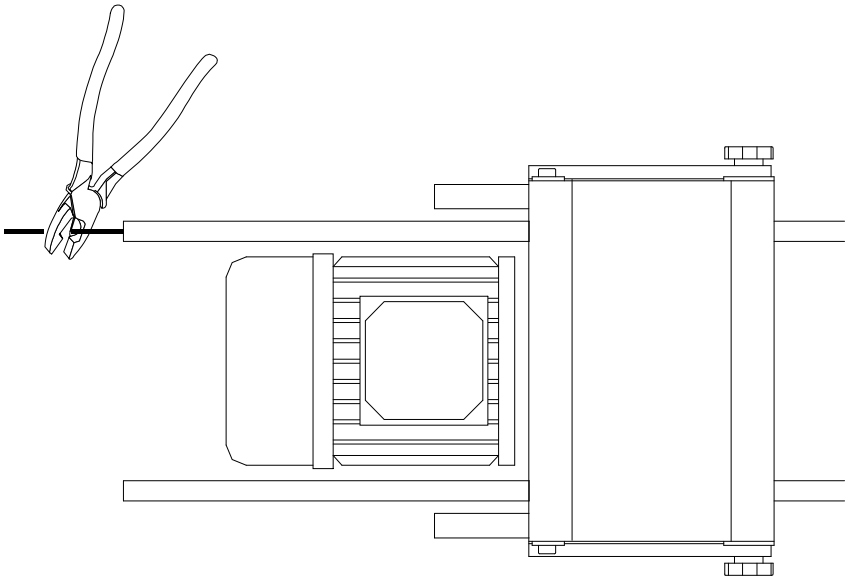
- Bend the wire end straight.

5.2.2 Inserting spray wire



- Press and hold down the wire clamping lever and slide the wire through the feed rollers into the wire guide tubes.
- Make sure that the wire is laying correctly in the groove of the feed rollers.

5.2.3 Changing spray wire



- Cut the wire in front of the feed gear.
- Spray the remaining wire.
- The spray process stops automatically after the wire passed the feed rollers of the spray device.
- Pull out the remaining wire from the contact nozzles of the spray device.

5.3 Starting the equipment

Follow the instructions given in chapter “Hazards which occur while arc spraying” as well as the following notes.

WARNING!

During arc spraying metal dusts and metal fumes are generated which can be toxic and lead to health problems!

Use respiratory protection!

Observe the hazard warnings of the safety data sheets of spray wires!

A filter/extraction device must be in continuous operation during spraying.

Do not point spray device at persons or inflammable objects!

The atomizer air starts blowing <u>immediately</u> after starting the spray process!

Risk of injuries by compressed air itself or solids that are swept away!

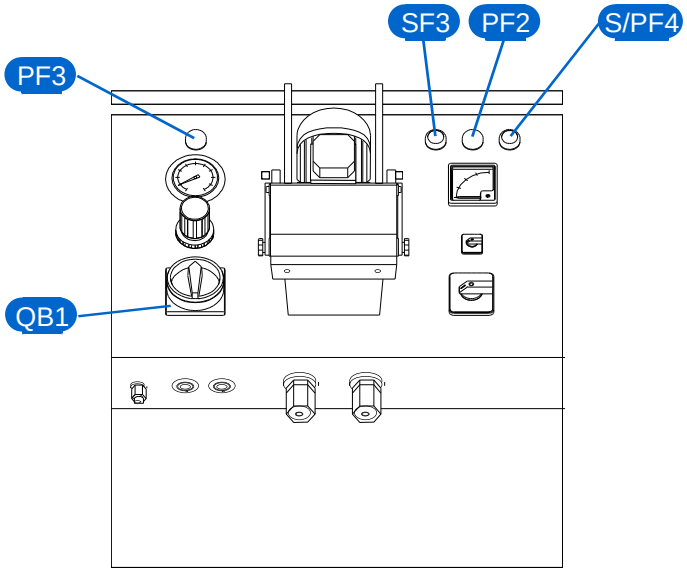
Use face protection!

NOTE!

Never switch the step switch (SF1) and coding switch (SF2) during the spray process.

The equipment may be damaged.

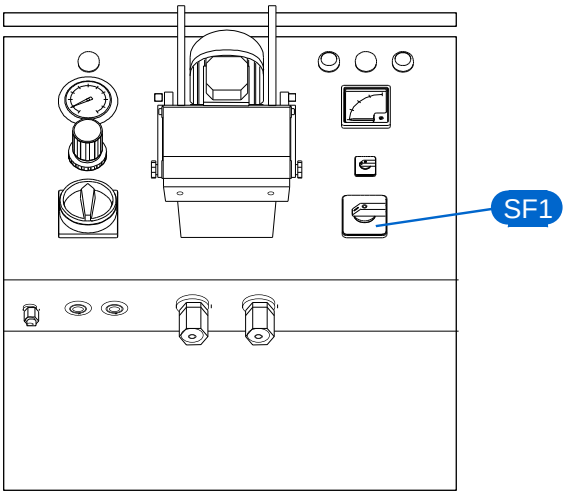
5.3.1 Starting wire feed



- Open the compressed air supply.
- Switch on power source with main switch (QB1).
  The white signal lamp (PF2) lights up and the yellow illuminated push button (S/PF4) flashes.
- Press the yellow illuminated push button (S/PF4) once to acknowledge.
  The white (PF2) and the green signal lamp (PF3) light up.
- Press and hold the black wire feed button (SF3) until the wires exit from the contact nozzles.
- Cut the wire ends short before the contact nozzles; they must not touch each other.
- The equipment is ready to spray.

5.3.2 Setting up spray parameters

5.3.2.1 Setting up spray voltage

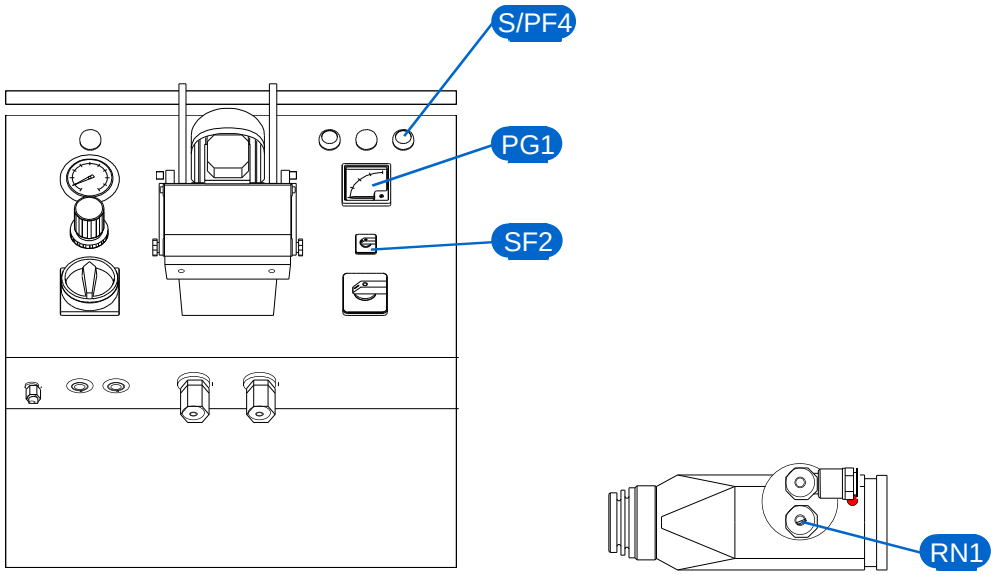


- The spray voltage regulates the temperature of the molten metal. The higher (lower) the spray voltage, the higher (lower) the temperature of the molten metal.
- The spray voltage is set with the step switch (SF1) in accordance with the used spray wire.
- Recommended spray voltages

  for Zn & ZnAl = Steps 1 to 3
  for Al & AlMg = Steps 4 to 5

- The spray voltage should be set as low as possible to minimize the vaporing of wire material. However, the arc must burn continuously without stuttering.

5.3.2.2 Setting up spray current (wire feed speed)



- The spray current is a resultant of the wire feed speed and regulates the amount of sprayed wire.
  The higher (lower) the wire feed speed, the higher (lower) the spray current, the higher (lower) the amount of sprayed wire.
- The spray current is infinitely adjustable via the adjustment screw (RN1) at the air motor. By screwing out (screwing in) the adjustment screw the spray capacity is increased (reduced).
- The ammeter (PG1) displays the spray current during the spray process.
- The systems are factory-set to the maximum spray current of 600 A:

  OC380 Corr => 380 A
  OC600 Corr => 600 A

- The equipment switches off automatically when the maximum spray capacity (600 A) is exceeded. The yellow illuminated push button (S/PF4) indicates the overload. After acknowledging the error on the illuminated push button (S/PF4), the equipment is ready again to operate.

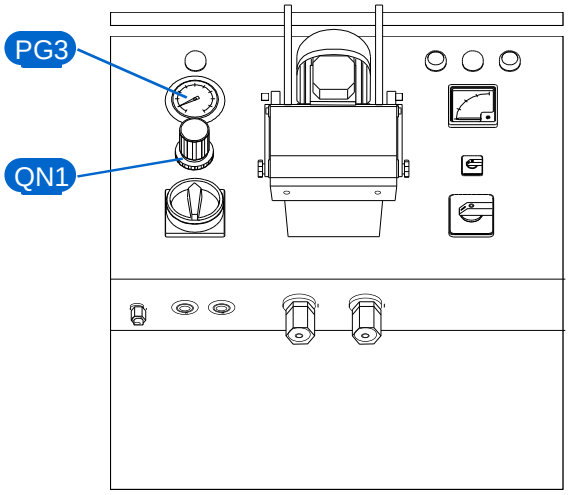
- With the coding switch (SF2) the wire feed speed of WF4 is synchronized to the used spray wire and spray current. The higher the chosen step, the higher the wire feed speed of the WF4.

	200 A	**400 A**	**600 A**
Zn	Step 1	Step 2	Step 3
ZnAl	Step 4	Step 5	Step 6
Al & AlMg	Step 7	Step 8	Step 9

NOTE!

Before spraying, check if the correct step is selected. If the step is set too low, feeding problems may occur. If the step is set too high, the feeding rollers of WF4 will wear off faster.

5.3.2.3 Setting up atomizer air



- The atomizer air regulates the roughness of the coating. The higher (lower) the pressure of the atomizer air, the smaller (bigger) the spray particles, the finer (rougher) the coating.
- The atomizer air is infinitely adjustable via the pressure regulator (QN1). For that, pull out the regulator button, set the necessary pressure and push in the button again. The maximum pressure is 6 bar.
- The manometer (PG3) displays the atomizer air pressure during the spray process.

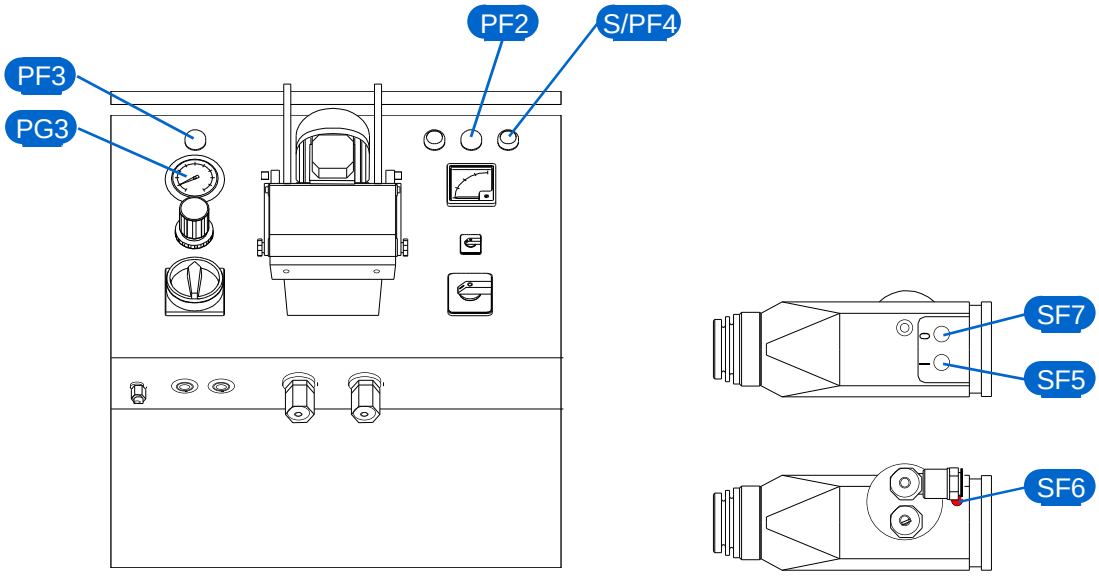
NOTE!

For efficient cooling of the current air hoses the atomizer air should be set as follows:

0 - 200 A = at least 1,5 bar
200 - 400 A = at least 3,5 bar
400 - 600 A = at least 5 bar

Otherwise there is the risk of scorching of current air hoses.

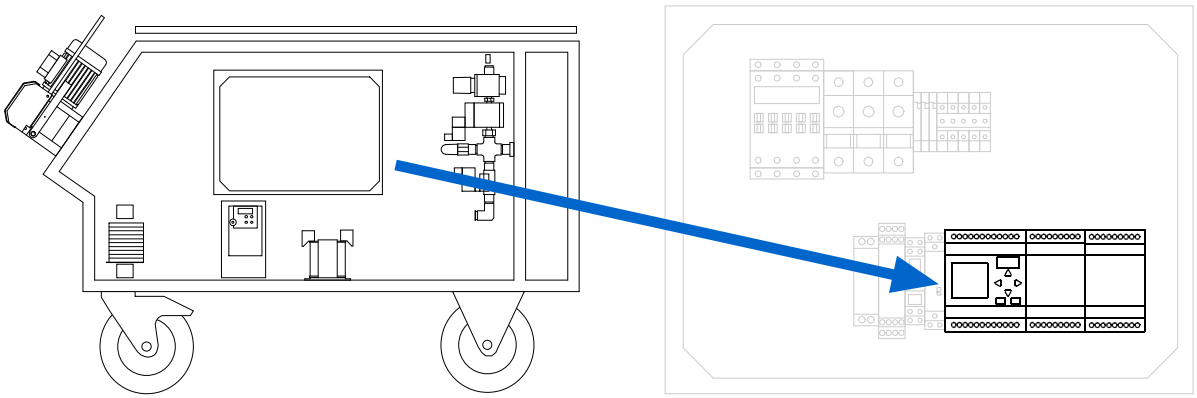
5.3.3 Starting spray process



- Open the compressed air supply.
- Switch on power source with main switch (QB1).
  The white signal lamp (PF2) lights up and the yellow illuminated push button (S/PF4) flashes.
- Press the yellow illuminated push button (S/PF4) once to acknowledge.
  The white (PF2) and the green signal lamp (PF3) light up.
- Take the spray device OC1 in your hand. The hand interrupts the light beam of the dead man´s control (SF6) whereby the spray process is enabled.
- Start the spray process by pushing the on button (SF5) at the spray device OC1.
- After a delay of approx. 2 seconds the spray process starts!
- Stop the spray process by pushing the off button (SF7) at the spray device OC1.

6 Troubleshooting

This arc metal spray equipment is equipped with a PLC. It is installed behind the right side panel of the power source in a plastic housing. On a small display status information and error messages are displayed.

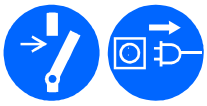


DANGER!

The power source is connected to a high supply voltage, which can cause burns and fatal injuries if touched!

Even low voltages can be dangerous because they can lead to secondary accidents!

Danger of electric shocks!



Before doing any troubleshooting inside the power source, it must be isolated and separated by pulling the power plug from the mains.

Follow the five safety rules.

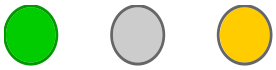
All work on electrical equipment must be carried out accordingly to the electro technical safety regulations and national accident prevention regulations only by authorized electrically qualified persons.

6.1 Legend of signal lamp codes

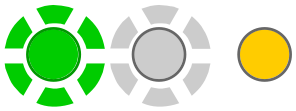
	Off	On	Flashing
Signal lamp			

6.2 Errors and its troubleshooting

6.2.1 Power source cannot be switched on

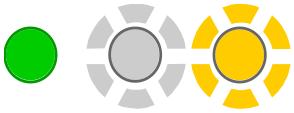
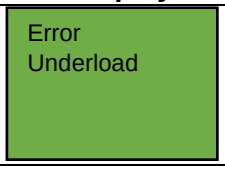
Signal lamp code	**PLC display indication**	
		
Error location	**Error description**	**Troubleshooting**
Voltage supply	Fuse defective.	Check mains fuse.
	Wrong supply voltage.	Check supply voltage. (see also type plate of power source)
Power source	Fuse defective.	Check fuses.
	Loose mains plug / plug connection.	Check mains plug / plug connections.
	Control transformer defective.	Check control transformer.

6.2.2 Spray process cannot be started

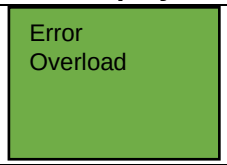
Signal lamp code	PLC display indication	
	System OFF	
Error location	**Error description**	**Troubleshooting**
Spray device	Defective control cable to spray device or no function of on / off button.	Check control cable and control signals.
	Light beam sensor (for dead man´s control) defective.	Check function of the sensor.

Signal lamp code	PLC display indication	
	Error No Air	
Error location	**Error description**	**Troubleshooting**
Compressed air supply	Compressed air not connected.	Check compressed air connection.
	Air compressor malfunction or switched off.	Check air compressor.
	Valve closed in compressed air mains.	Open valve.
	Low pressure.	The inlet pressure at the power source must be at least 2,5 bar.
	Cross-section of pipe is too small respectively volumetric flow too low.	Required cross-section of compressed air supply: min. 20 mm (3/4’’) for max. 10 m supply line, better 25 mm (1’’).
Power source (Comp. air supply)	Clogged filter element of drains.	Check, clean or replace filter element (see also chapter 8 “Repair work”).

6.2.3 Spray process stops

Signal lamp code	PLC display indication	
		
Error location	**Error description**	**Troubleshooting**
Power source	Solenoid valve defective (for air motor)	• Push off button at spray device. • Loosen air motor hose at connector at the power source. • Push on button at spray device. **Caution!** Compressed air blows at 5 bar! If no air is blowing from the air motor hose connector the solenoid valve is defective.
	Spray process stops shortly after starting (ca. 5-7 sec.).	Current transformer (BC1) or ammeter (PG1) defective.
Wire dispenser	Wire dispenser is rough-running.	Check spring brake at wire dispenser (see also chapter 5 “Commissioning”). Clean and grease all running and bearing surfaces.
Feed gear	Feed and/or pressure rollers stained or worn out.	Clean or replace if necessary.
	Motor does not run.	Neutral wire not connected. Check mains connection/ cable incl. plug. Check fuses (inside the power source).
	Pressure rollers are rough-running.	Clean and grease all running and bearing surfaces or replace if necessary.

Signal lamp code	PLC display indication	
	Error Underload	
Error location	**Error description**	**Troubleshooting**
Hose package	Air motor hose damaged.	Replace air motor hose or turn in for maintenance.
	Wire guide tube worn out or bent.	Replace wire guide tube or turn in for maintenance.
Spray device	Feed and/or pressure rollers are stained or worn out.	Clean or replace if necessary.
	Pressure rollers are rough-running.	Clean or replace if necessary.
	Air motor defective.	Compressed air is leaking. Replace air motor and/or turn in for maintenance.
	Contact nozzles poorly aligned, blocked or worn out. Spray wire scorched.	Check contact nozzles: Clean or replace if necessary. Align contact nozzles.
	No oil in the oiler or water contaminated oil (milky emulsion). Air motor is stuck.	Refill respectively replace the air motor oil (see also chapter 8 “Repair work”). Turn in air motor for maintenance.
Spray wire	Wire scorches inside the contact nozzles, has impure melting behavior, creates short circuits. Trouble due to poor quality wire.	Insert new contact nozzles and setup the spray wire. Possible improvement of melting behavior by greasing the spray wire with contact oil. Better: Use high-quality spray wire.

Signal lamp code	PLC display indication	
		
Error location	**Error description**	**Troubleshooting**
Voltage supply	Fluctuations in voltage supply.	Check voltage supply.
Hose package	Short circuit between both current-air-hoses.	Resistance measurement: Measuring whether there is a short circuit between the current-air hoses. The spray wire ends must not touch each other. Replace defective current-air-hoses or turn in hose package for maintenance.
Spray device	The air motor runs too fast. => Deposition rate (amperage) is too high.	Reduce speed of air motor (see also chapter 5 “Commissioning”).

Signal lamp code	PLC display indication	
	Error Temp. Transformer	
Error location	**Error description**	**Troubleshooting**
Power source	Heat accumulation: Power source covered, blocked or dusty from the inside. Thermo switch cuts out. Convection cooling not ensured.	Leave cooling air slots blank. Let cool down until green signal lamp lights. Cooling time: • Transformer: max. 2 h
	Ambient temperature too high.	Ventilate.

Signal lamp code	PLC display indication	
	Error Temp. Rectifier	
Error location	**Error description**	**Troubleshooting**
Power source	Heat accumulation: Power source covered, blocked or dusty from the inside. Thermo switch cuts out. Convection cooling not ensured.	Leave cooling air slots blank. Let cool down until green signal lamp lights. Cooling time: • Rectifier: approx. 5 min.
	Ambient temperature too high.	Ventilate.

Signal lamp code	PLC display indication	
	Error Temp. Wire feed motor	
Error location	**Error description**	**Troubleshooting**
Feed gear	Heat accumulation: Feed gear covered or dusty from the inside. Thermo switch cuts out. Cooling not ensured.	Let cool down until green signal lamp lights. Cooling time: • Motor: max. 30 min.
	Ambient temperature too high.	Ventilate.
	Motor of feed gear too hot. Thermo switch cuts out.	Feed gear: • Pressure rolls must run easily. • Clean pressure rolls and grease all running and bearing surfaces or replace if necessary.

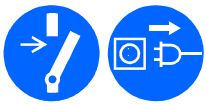
7 Maintenance

DANGER!

The power source is connected to a high supply voltage, which can cause burns and fatal injuries if touched!

Even low voltages can be dangerous because they can lead to secondary accidents!

Danger of electric shocks!



Before doing any repair work the power source must be isolated and separated by pulling the power plug from the mains.

Follow the five safety rules.

7.1 Power source

7.1.1 General maintenance

WARNING!

During arc spraying metal dusts and metal fumes are generated which can be toxic and lead to health problems!

Use respiratory protection!

Observe the hazard warnings of the safety data sheets of spray wires!

WARNING!

During arc spraying spray dust is generated!

Fire and explosion hazard!

Do not bring open fire or any other open ignition sourecs in contact with the spray dust!

Do not extinguished dust combustions with water!

Check monthly:

- Blow out the power source from inside regular.
- **Caution!**
  Only blow out in front of running extraction!
  If necessary use an industrial vacuum cleaner!
  Depending on the installation location of the equipment and the amount of dust the checking interval might be short-termed to a weekly check.

7.1.2 Filter (Rear panel of power source)

Check daily:

- Remove water from the drains. Depending on amount of water accumulation repeatedly per day.
- Check filter element and replace if necessary.
  If the filter is blocked, the entire equipment may break down (automatically switch off by observation of pressure).
  The filter element should be replaced at least all 2 years.

7.1.3 Oiler (Rear panel of power source)

Relevant only in combination with OC1

Check daily:

- Check condition of oil.
  There should be no water in the oiler (milky oil-water-emulsion).
  Hereby the air motor gets damage in a short time.
- Check oil level and refill if necessary.
- Check drop frequency in the oil sight glass.
  1 drop each 10 seconds while running spray process.

7.2 Wire dispenser

7.2.1 Wire dispenser for spools

Check weekly:

- Check braking mechanism.
  Tighten the mechanism as much as the spool is no longer over traveling.

7.2.2 Drum hood cover with wire dispenser

Check monthly:

- Check pulley wheels for smooth running, grease if necessary.

7.3 Spray device OC1

7.3.1 General maintenance

Check daily:

- Clean feed and pressure roller unit of spray device with compressed air (removal of swarf and dust).
- Check function of dead man´s control.
  Remove potential dust accumulation at the outlet of the light beam.

Check weekly:

- Remove spray dust from the inside and outside of the spray device (risk of leakage current!).
- Check contact nozzles for wear and center alignment.
- Clean atomizer nozzle.
- Clean gas nozzle.
- Clean radial nozzle nut inside and outside. Apply PTFE-Spray to the radial nozzle nut. Do not spray the thread.
- Lubricate the air motor ones a week with approximately 10 drops of air motor oil. Therefor remove the hose connector at the motor and dribble the oil directly into the motor. This also applies for a longer downtime (> 1 week) of the motor.

Check monthly:

- Check feed rollers
- Check pressure rollers (bearings) for smooth running

7.3.2 Hose package

Check monthly:

- Check hose package for external damage.
- Wire guide tube:
  Check wire for smooth running through the tubes. Therefore loosen wire guide tubes and lay out hose package straight. Grab the wire with pliers and slowly pull out in direct of spray. The wire must run smoothly. Replace wire guide tubes if you feel resistance when pulling the wire. Drip graphite powder into the new wire guide tubes and blow it through slightly with compressed air.

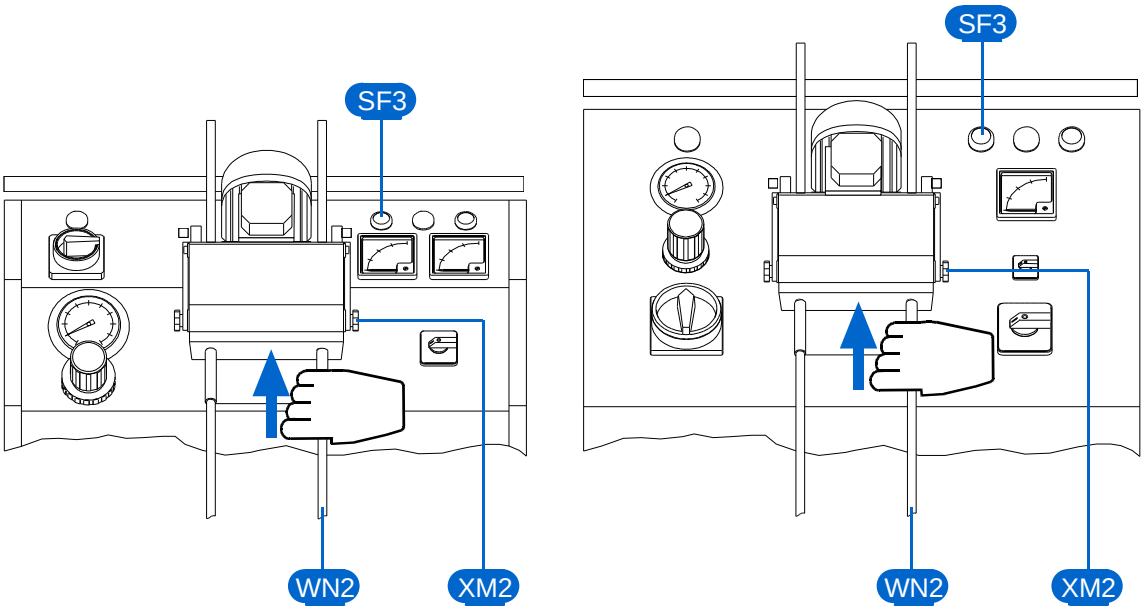
7.4 Feed gear WF4

7.4.1 General maintenance

Check weekly:

- Check wear of feed and pressure rollers.
- Check pressure rollers for smooth running, disassembly and lubricate if necessary (sliding fit)

7.4.2 Checking wear of feed and pressure rollers WF4



The equipment must be set up with spray wire and ready to spray.

- Loosen knurled screw (XM2) at feed gear.
- Hold the wire guide tube (WN2).
- Push the wire feed button (SF3).

If the rollers are in good condition the wire guide tube is pushed out of the feed gear. This means a force is needed to keep the wire guide tube in place. If no force is needed the rollers are worn.

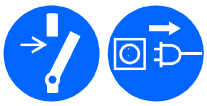
8 Repair work

DANGER!

The power source is connected to a high supply voltage, which can cause burns and fatal injuries if touched!

Even low voltages can be dangerous because they can lead to secondary accidents!

Danger of electric shocks!



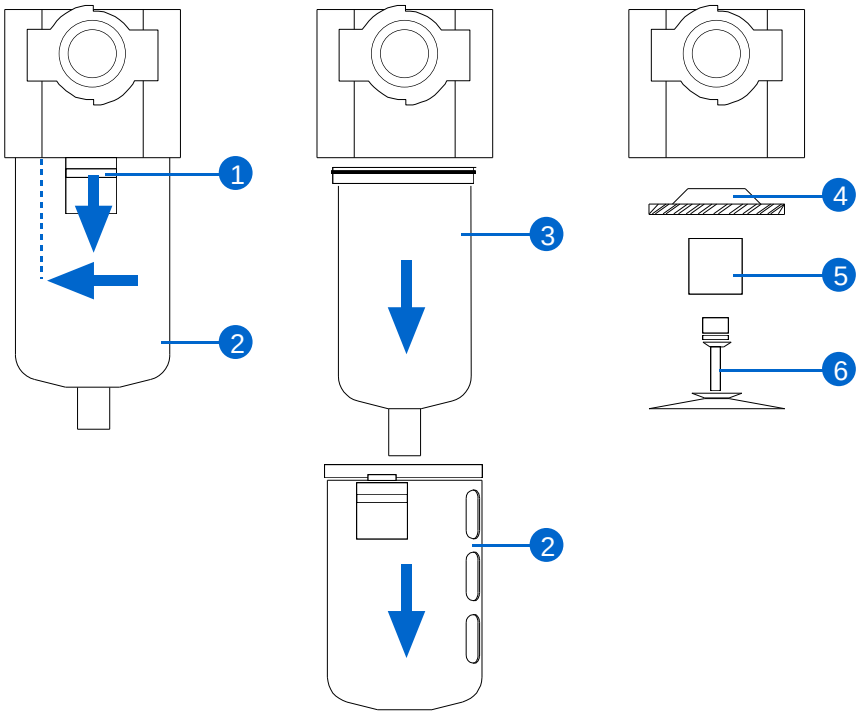
Before doing any repair work the power source must be isolated and separated by pulling the power plug from the mains.

Follow the five safety rules.

8.1 Repair work power source

8.1.1 Repair work filter

8.1.1.1 Replacing filter element



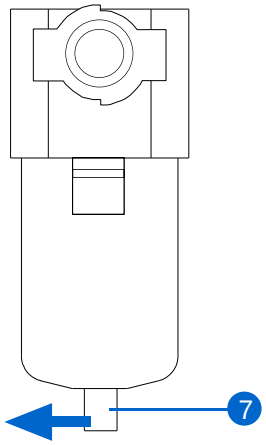
Disassembly:

- Press the locking lever (1) down and rotate the bowl guard (2) slightly.
- Pull off bowl guard (2) and bowl (3).
- Remove potential foreign bodies and clean the bowl (3).
- Unscrew locking plate (6) and remove the filter element (5). The filter element should be replaced at least all 2 years.

Assembly:

- Insert new filter element (5) and lock with the locking plate (6).
  Make sure that the centering element (4) is sitting correct.
- Insert bowl (3) and bowl guard (2) in the filter and rotate until it snaps.

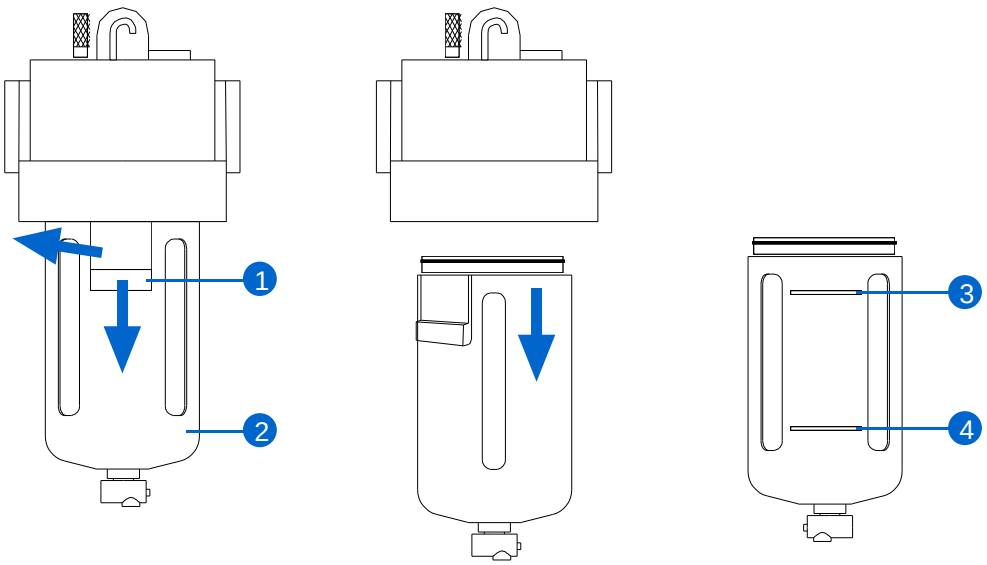
8.1.1.2 Empty the filter



- Empty the filter by pushing the drain valve nipple (7) from the side.
- Alternatively the filter can emptied by removing the bowl.

8.1.2 Repair work Oiler (Relevant only in combination with OC1)

8.1.2.1 Changing oil



Disassembly:

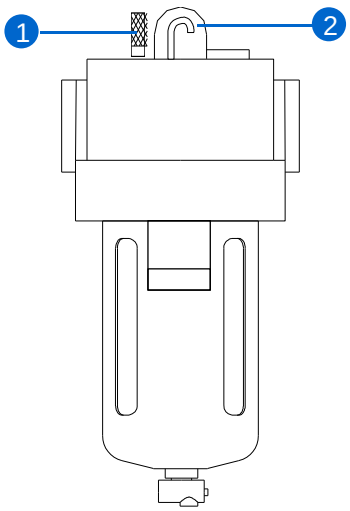
- Press the locking lever (1) down and rotate the bowl (2) by 45°.
- Pull off bowl (2).
- Dispose of potential contaminated oil (milky oil-water-emulsion) in accordance with environmental regulations.

Assembly:

- Fill the bowl with air motor oil. Consider maximum (3) and minimum (4) filling level.
- Insert bowl (2) in the oiler and rotate by 45° until it snaps.

8.1.2.2 Setup drop frequency

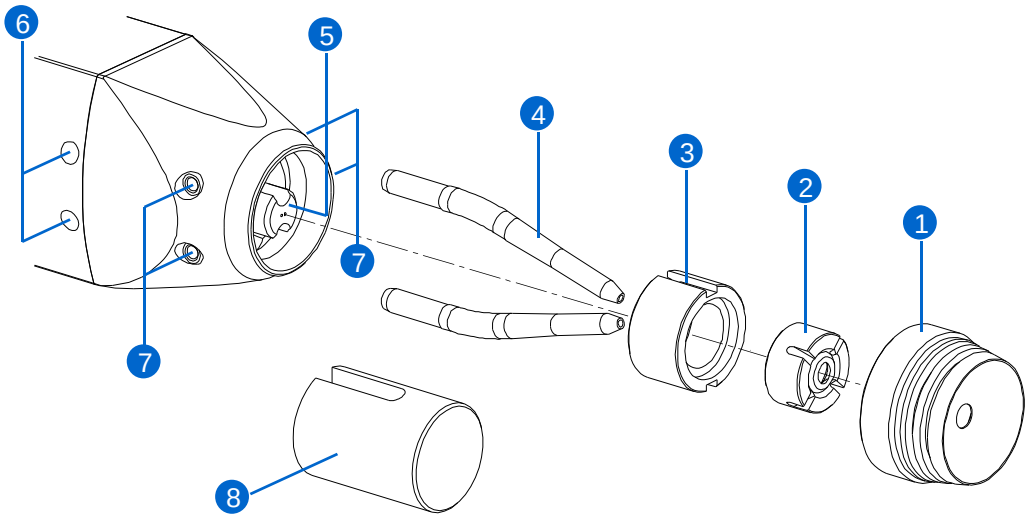
The drop frequency is already factory set (1 drop each 10 seconds). Further setup / adjustment is generally not required.



However if the setup does not match (or a new oiler is being installed) the drop frequency can be adjusted at the oiler by means of an adjustment screw (1). By screwing out (screwing in) the adjustment screw (1) the drop frequency is increased (reduced). The drop frequency can be controlled at the oil sight glass (2). The adjustment can only be done while running spray process.

8.2 Repair work OC1

8.2.1 Changing contact nozzles OC1



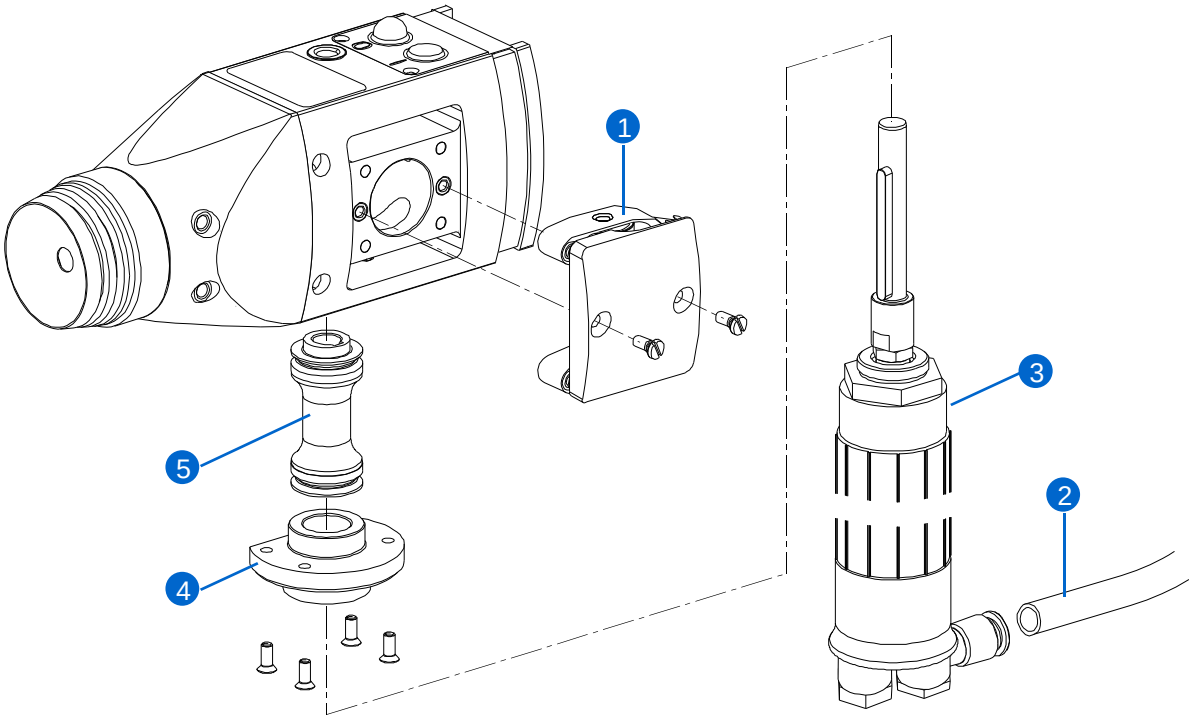
Disassembly:

- Unscrew radial nozzle nut (1).
- Remove gas nozzle (2).
- Remove gas nozzle receptacle (3).
- Push back atomizer nozzle (5).
- Loosen alignment screws (7).
- Loosen clamping screws (6).
- Pull out contact nozzles (4) with slight rotary motion.

Assembly

- Before insertion slightly grease the clamping seat of the new contact nozzle with contact grease. Grease the contact nozzles slightly from the inside by means of the contact grease. The contact grease comes with the tool kit.
- Insert the new contact nozzle as far as possible, align them with the contact nozzle adjusting device (8) and lock the clamping screws (6) tight.
  Remove the contact nozzle adjusting device (8).
- Make sure that the recesses of the atomizer nozzle (5) fit to the contact nozzles.
- Insert gas nozzle receptacle (3)
- Insert gas nozzle (2)
- Screw on the radial nozzle nut (1) tight.
- Align the contact nozzles with the alignment screws (7) exactly centered. Use the recesses at the gas nozzle (2) as help.
- Let the equipment spray for approximately 10 seconds and realign the melting point with the alignment screw (7) exactly centered.

8.2.2 Changing feed rollers OC1



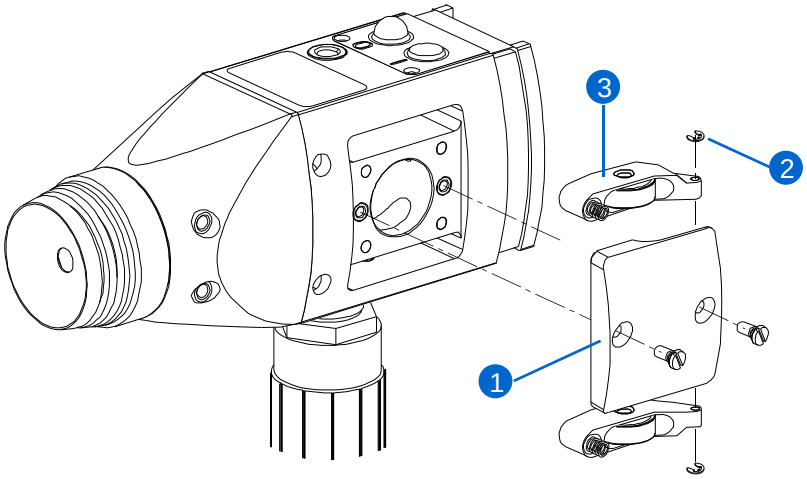
Disassembly:

- Remove wire pressure plate (1).
- Pull off air motor hose (2).
- Unscrew air motor (3) counter-clockwise.
- Disassemble motor flange (4).
- Remove wire feed unit (5).

Assembly:

- Insert wire feed unit (5).
- Assemble motor flange (4).
- Insert drive shaft with key in the wire feed unit and screw in the air motor (3) clockwise.
- Connect air motor hose (2).
- Install wire pressure plate (1).

8.2.3 Changing pressure rollers OC1



Disassembly:

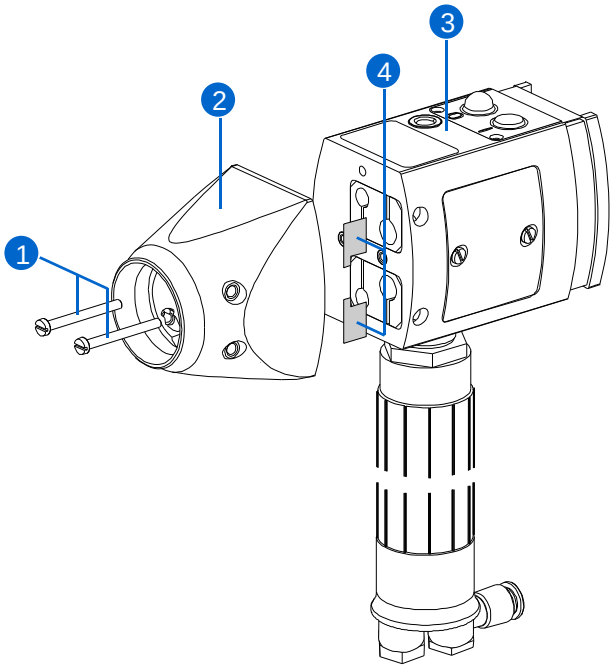
- Remove wire pressure plate (1).
- Remove circlip (2).
- Remove wire pressure unit (3).

Assembly:

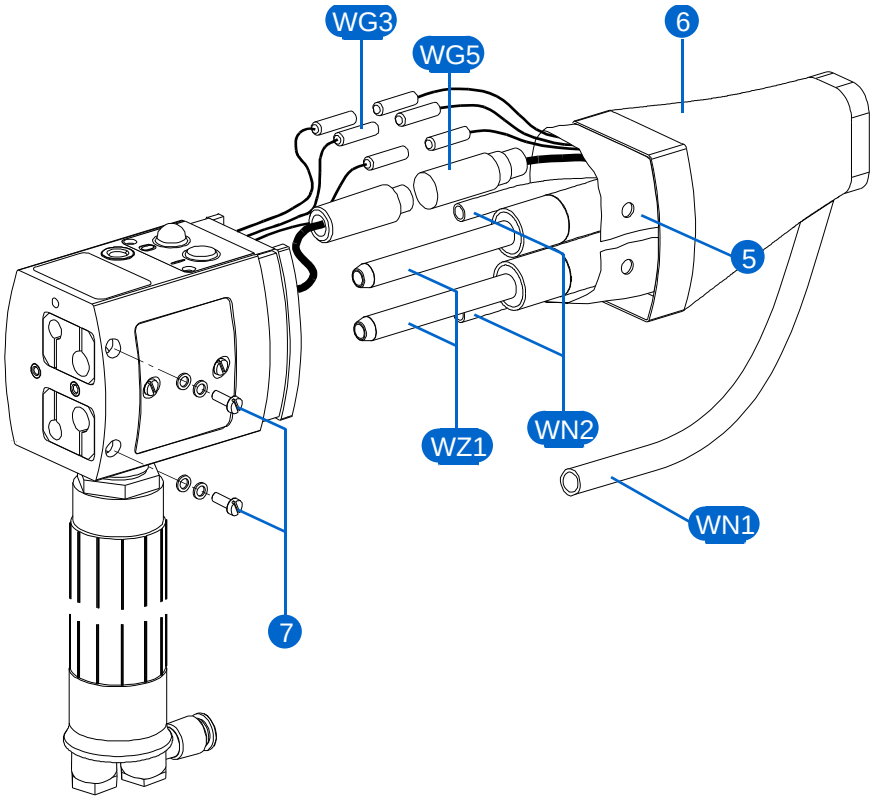
- Insert wire pressure unit (3) and lock with circlip (2).
- Install wire pressure plate (1).

8.2.4 Changing hose package OC1

Against accidental loosening of the current-air-hoses cover plates are inserted in front of the clamping screws. These need to be removed for loosening the current-air-hoses.

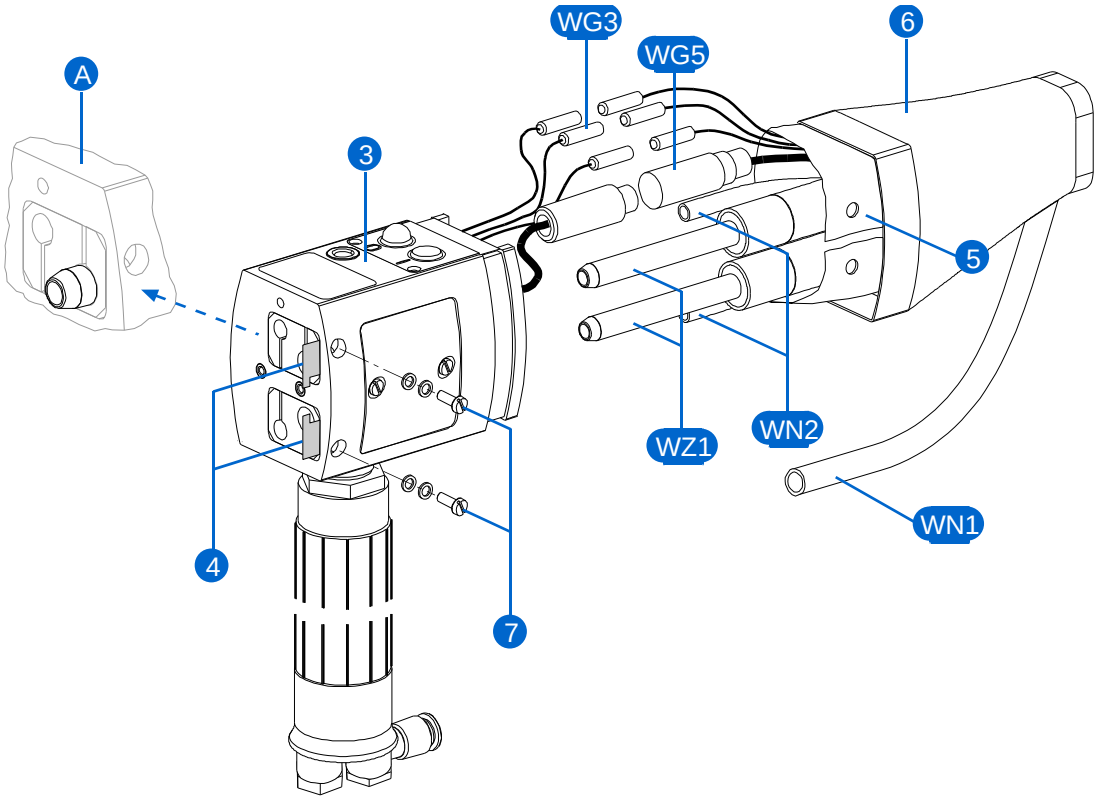


- Disassemble the nozzle system completely (see chapter “Changing contact nozzles”).
- Loosen screws (1) and remove the spray head (2) from the gear housing (3).
- Remove cover plates (4) by means of a pointed object.



Disassembly:

- Remove the cable ties and roll up / pull back the protective hose (5) as well as the protective bellow (6).
- Pull off air motor hose (WN1).
- Pull off wire guide tubes (WN2).
- Unscrew control cable of light beam (WG5).
- Pull off control cable connections (WG3).
- Loosen clamping screws (7) and remove current-air-hoses (WZ1).

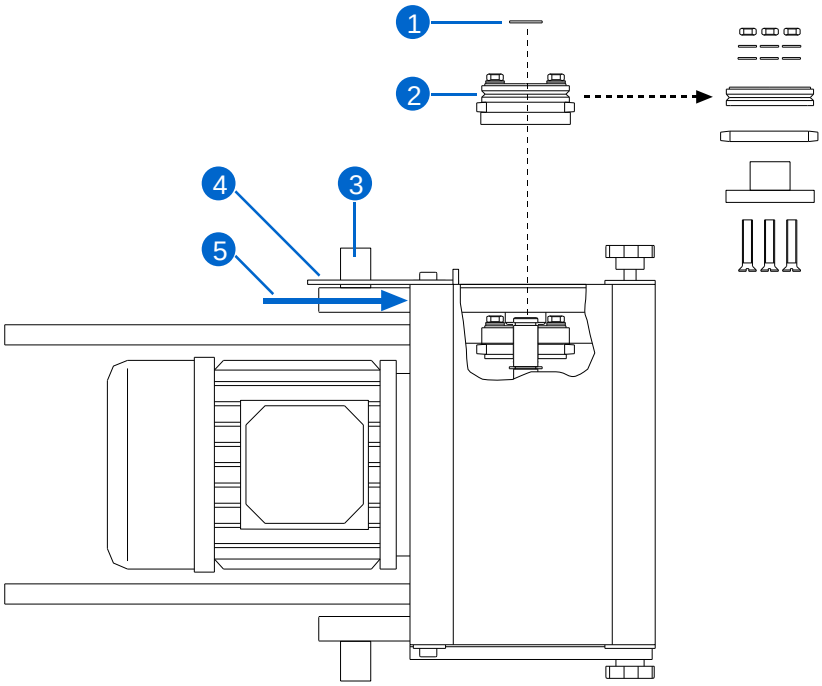


Assembly:

- Insert current-air-hoses (WZ1) into gear housing (3) as far as possible.
  The current-air-bolts from the current-air-hoses (WZ1) must stick out approx. 8 mm of the contact pieces (Pos. A).
- Tighten clamping screws (7).
- Insert cover plates (4) in front of the contact pieces.
- Reassemble spray head and nozzle system.
- Insert wire guide tubes (WN2).
- Insert air motor hose (WN1).
- Connect control cable connectors (WG3) (pay attention to number equality).
- Screw on control cable of light beam (WG5).
- Fix both control cable strain-relieved at one of the current-air-hoses.
- Fix protective hose (5) with cable ties to the current-air-hoses (WZ1).
- Fix protective bellow (6) with cable tie to the housing.

8.3 Repair work WF4

8.3.1 Changing feed rollers



Disassembly:

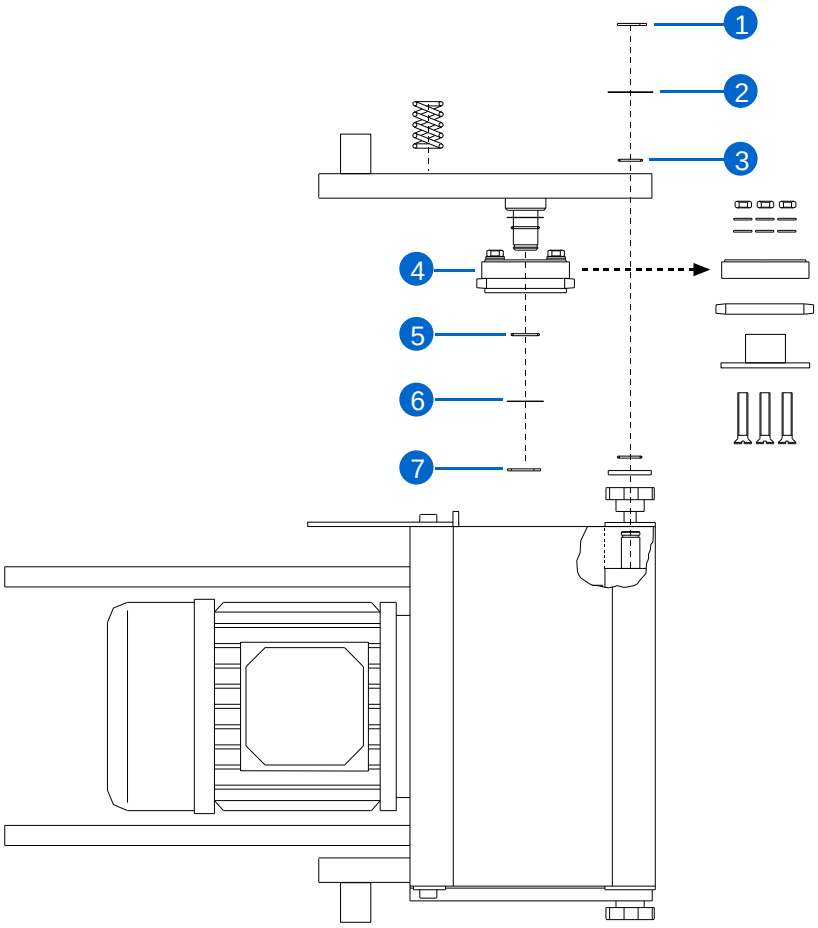
- Remove circlip (1).
- Push down wire pressure lever (3).
  The cover plate (4) can be taken for help.
- Lock wire pressure lever (3) by inserting a wedge or big screwdriver into position (5).
- Pull off feed roller (2).
  The feed roller can be disassembled in order to replace the rubber roller only.

Assembly:

If only the rubber roller is replaced, make sure when assembling that the rubber roller will not be squashed when tightening the screws.

- Fit feed roller (2) on the motor shaft and lock with circlip (1).
- Release the wire pressure lever (3).

8.3.2 Changing pressure rollers



Disassembly:

- Disassemble feed roller.
- Remove circlip (1), shim ring (2) and O-Ring (3).
- Remove wire pressure lever including pressure roller (4).
- Remove circlip (7), shim ring (6) and O-Ring (5).
- Pull off pressure roller (4).
  The pressure roller can be disassembled in order to replace the rubber roller only.

Assembly:

If only the rubber roller is replaced, make sure when assembling that the rubber roller will not be squashed when tightening the screws.

- Grease bearing pin of the pressure roller.
- Install pressure roller (4) on the bearing pin of the pressure lever.
- Install O-Ring (5), shim ring (6) and circlip (7) on the bearing pin.
- Install wire pressure lever including the pressure roller on the bearing pin of the feed gear. At the same time position the compression spring correctly.
- Install O-Ring (3), shim ring (2) and circlip (1) on the bearing pin.
- Assemble feed roller.

9 Spare and wear parts

NOTE!

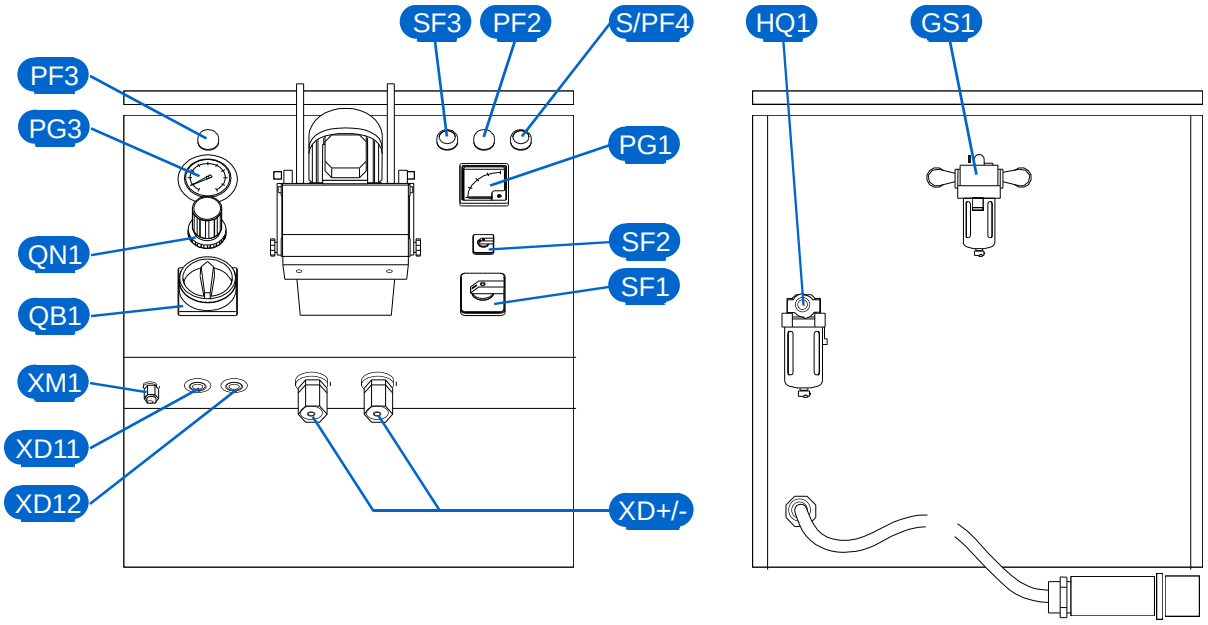
Third-party supplied accessories or spare parts are not tested or approved. If you use such parts, you might deteriorate the properties and the safety of your equipment. OSUCAS assumes no liability for damages arising from the use of non-original parts.

OSUCAS assumes no liability for damages caused by unauthorized modifications.

The guarantee conditions of OSUCAS GmbH apply.

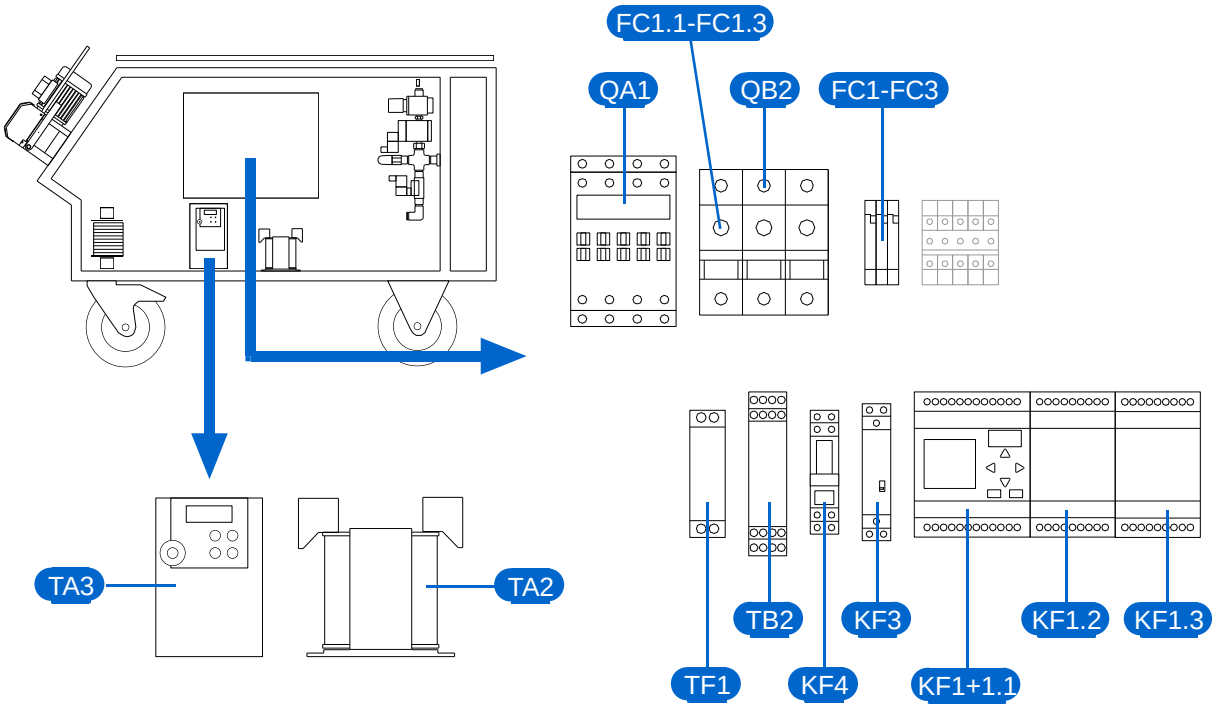
9.1 Power source OC380/600 Corr

9.1.1 Connectors and control / indicator elements



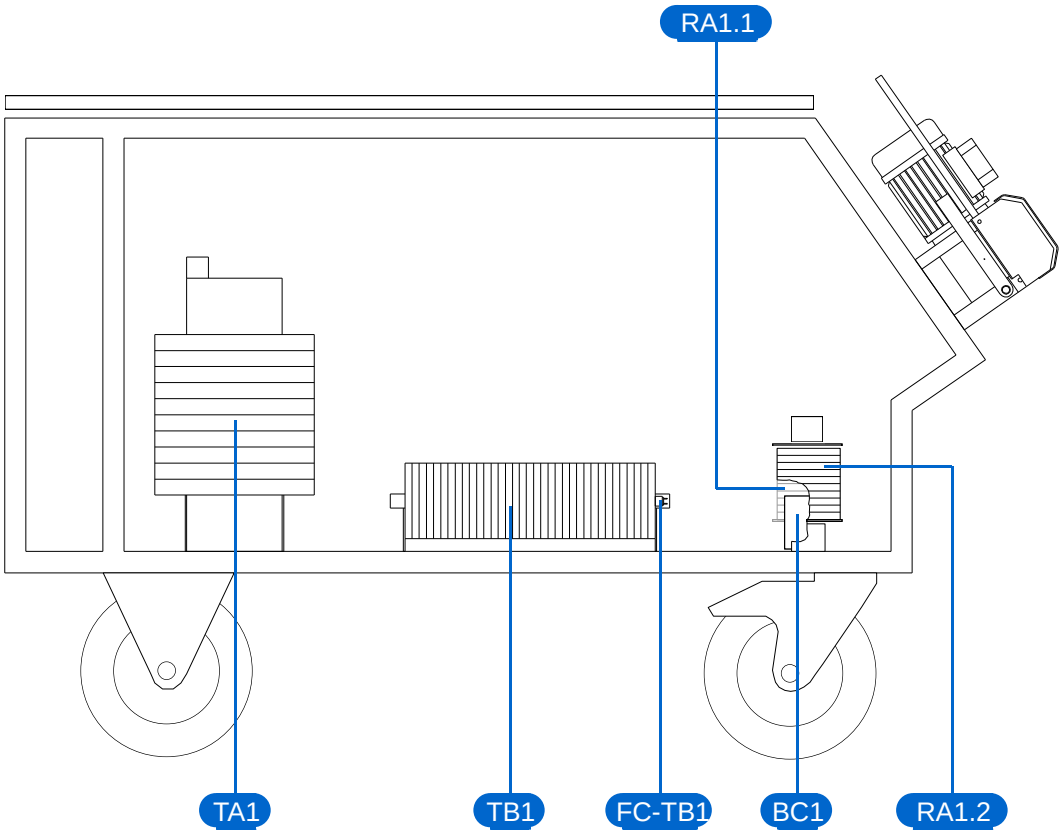
Pos.	Description	Article no.
GS1	Compressed air oiler AL460-F04	KT307-12
HQ1	Air filter F16-C4-000	KT307014-1
	Filter insert for F16-C4-000 (not illustrated)	KT307012/6-1
PF2	Signal lamp white	KT103070/1
	Fixed adapter	KP1032110
	LED element	KP103050/1
PF3	Signal lamp green	KT103030/1
	Fixed adapter	KP1032110
	LED element	KP103050/1
PG1	Ammeter (4-20 mA) (incl. 800 A scale)	KT102002
	Ammeter (4-20 mA) (inlc. 400A scale)	KT102002/1
PG3	Manometer	KT30803_2
QB1	Main switch 32A OC380 Corr	KT100246
	Main switch 63A OC600 Corr	KT100250
QN1	Pressure regulator atomizer air	KT30722
SF1	Cam switch (5 steps) 400V/63A	KT100451
SF2	Coding switch (9 steps) (OC600 Corr)	KT100476
SF3	Push button black	KT103110
	Fixed adapter	KP1032110
	LED element	KT103230/2
S/PF4	Illuminated push button yellow	KT103100/5
	Fixed adapter	KP1032110
	Contact element	KT103230/2
	LED element	KP103050/1
XD+/-	Current-air connection compl. OC380/600	LB52290
XD11	Connector (3-pol.)	KT112021
XD12	Connector (5-pol.)	KT112031
XM1	Plug connector G3/8" - 10 mm	KP30673810

9.1.2 Control box



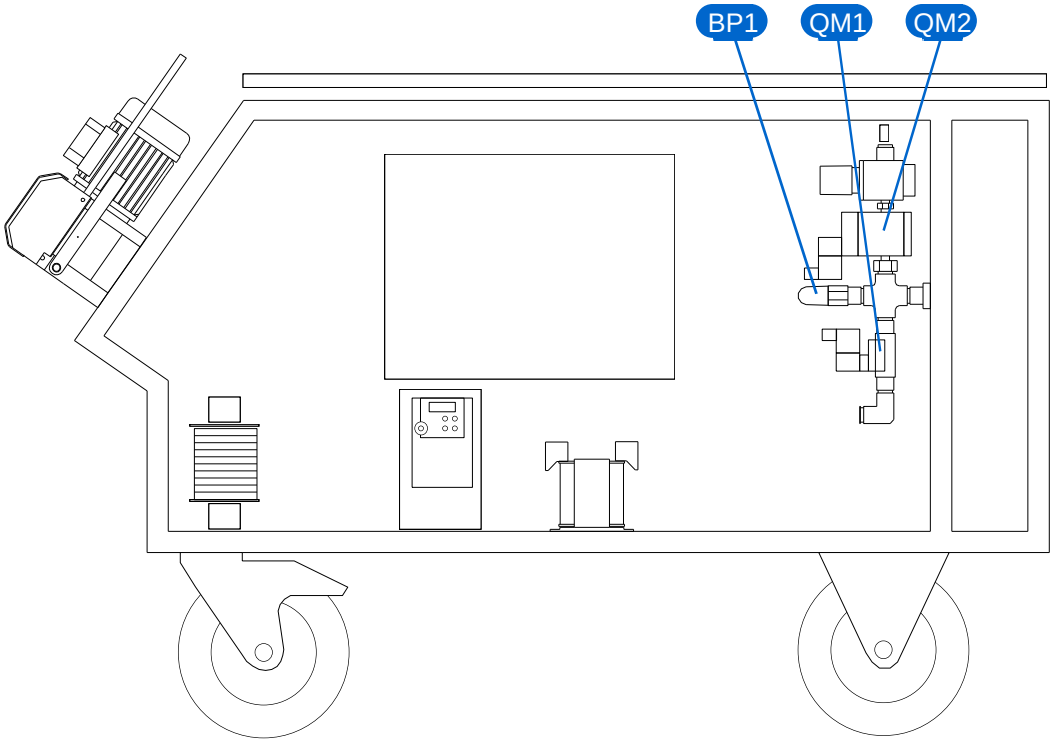
Pos.	Description	Article no.
FC1-2	Micro fuse 5x20 2A (M)	KT113519
FC3	Micro fuse 5x20 4A (M)	KT113520
FC1.1-1.3	Fuse insert 63A	KP113507
KF1+1.1	PLC control module Siemens LOGO! 12/24RC	KT1147001
KF1.2	PLC expansion module Siemens LOGO! DM8 12/24R	KT1147002
KF1.3	PLC expansion module Siemens LOGO! AM2	KT1147002/1
QA2	Contactor 4kW/400V AC-3 3-pole (OC380 Corr)	KT101061
KF3	Installation relay E297-16-20/24	KT10128
KF4	Print relay 24V DC - 2 changeover contacts (3 parts)	KT10716
QA1	Main contactor 63A	KT101018
QB2	Load disconnector	KT1089630855
TA2	Control transformer (230/400V - 24/230V)	KT10406-13
TA3	Frequency converter 0,25kW/1,5A	KT1145/21
TB2	Power supply MINI-PS-100-240AC/24DC/1	KT102801
TF1	Voltage transducer BUM 50VDC 24VAC/DC	KT102701

9.1.3 Power components



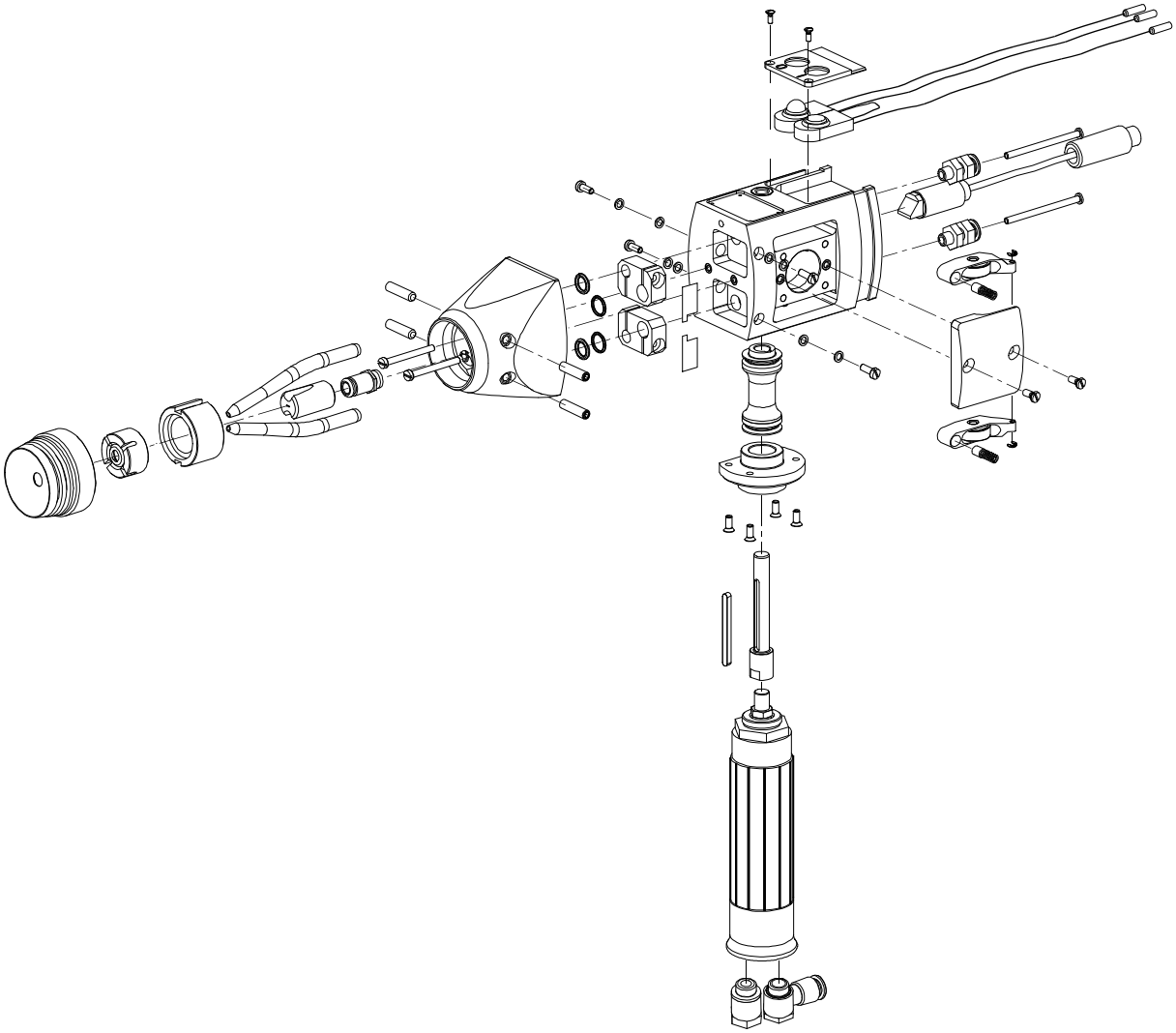
Pos.	Description	Article no.
BC1	Current transformer 24VDC 4-20mA	KT1025401
FC-TB1	Thermo switch for rectifier	KT100-2
RA1.1 RA1.2	Throttle	KT10441
TA1	Three-phase transformer 380A (400V)	KT104262
	Three-phase transformer 600A (400V)	KT104265
TB1	Rectifier 380A	KT105013
	Rectifier 600A	KT105016

9.1.4 Pneumatic

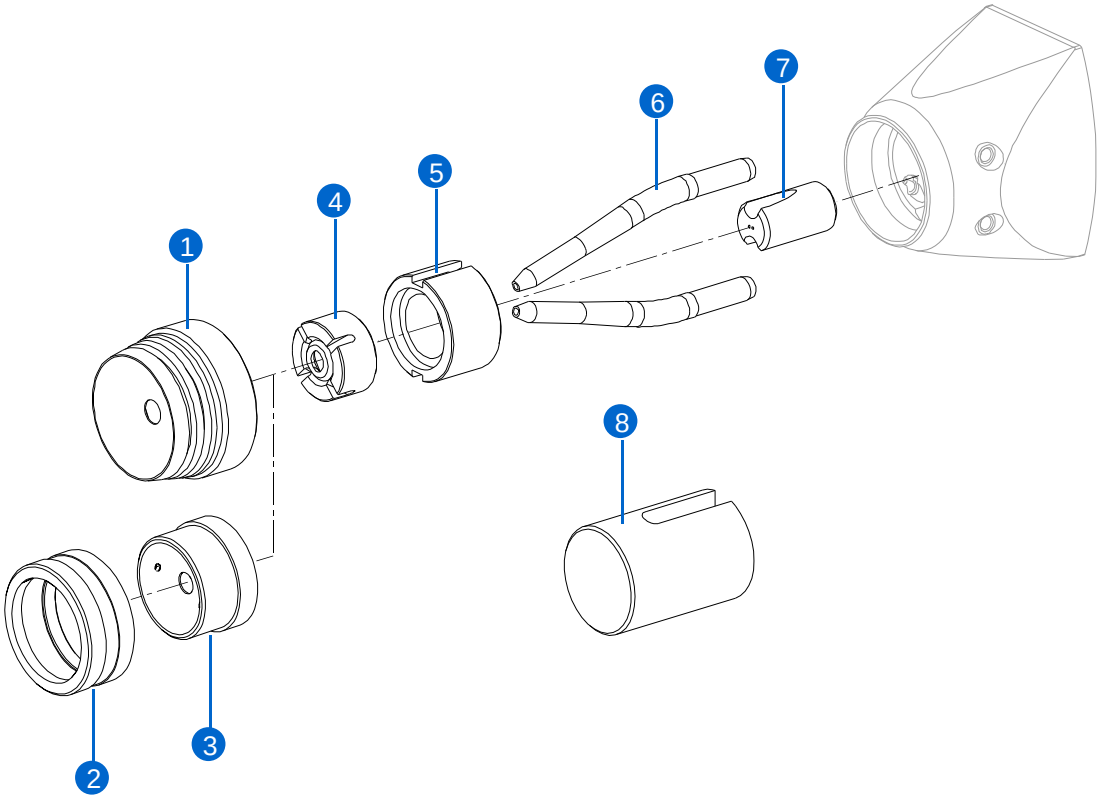


Pos.	Description	Article no.
BP1	Pressure sensor 1-10 bar	KT30900-2
QM1	Solenoid valve (atomizer air) 24V/50Hz	KT31011/24
QM2	Solenoid valve (air motor) 24V/50Hz	KT3102/24

9.2 Spray device OC1

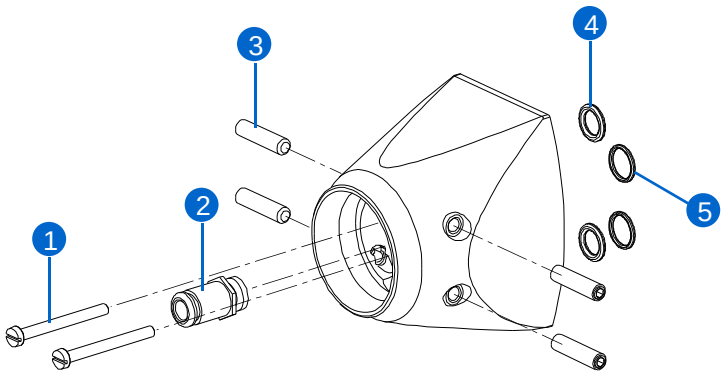


9.2.1 Nozzle system



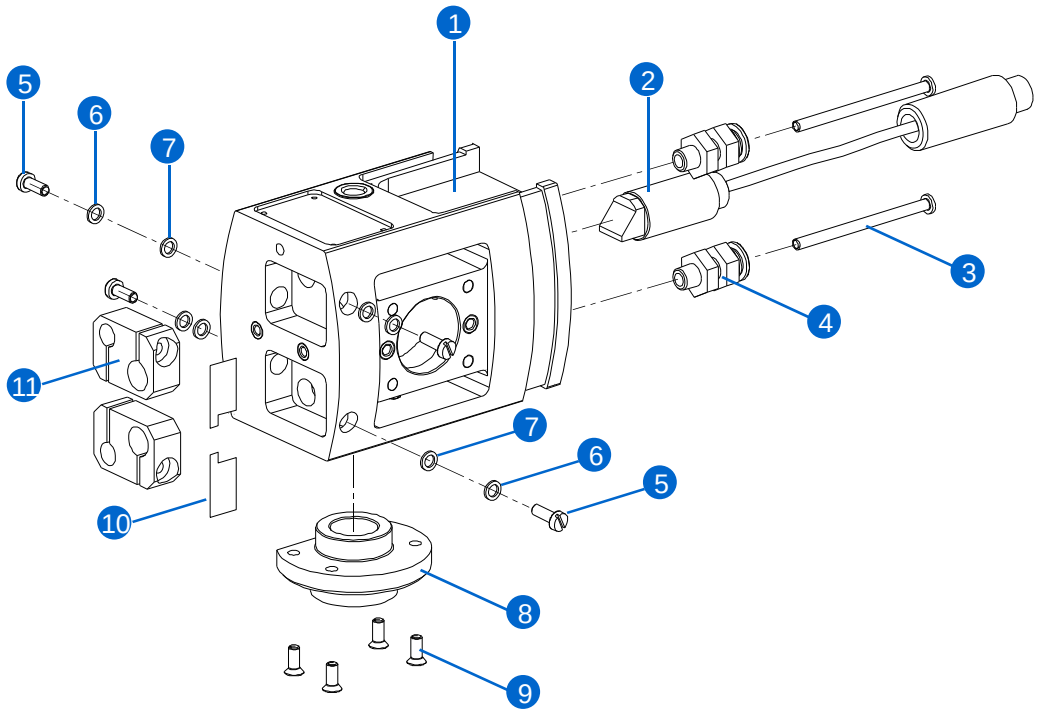
Pos.	Description	Article no.
1	Radial nozzle nut	LB408066
2	Fan spray nozzle nut	LB401002
3	Fan spray nozzle	LB401001
4	Gas nozzle Ø 1,6-2,0 mm	LB40434/20-2
	Gas nozzle Ø 2,5 mm	LB40434/25-2
5	Gas nozzle receptacle	LB408064
6	Contact nozzle Ø 2,0 mm (for Zn, ZnAl)	LB40135/20
	Contact nozzle Ø 2,0 mm Al (for Al, AlMg)	LB401351/20
	Contact nozzle Ø 2,5 mm (for Zn, ZnAl)	LB40135/25
	Contact nozzle Ø 2,5 mm Al (for Al, AlMg)	LB401351/25
7	Atomizer nozzle 2-hole	LB408065
8	Adjusting device for contact nozzles	LB40199

9.2.2 Spray head



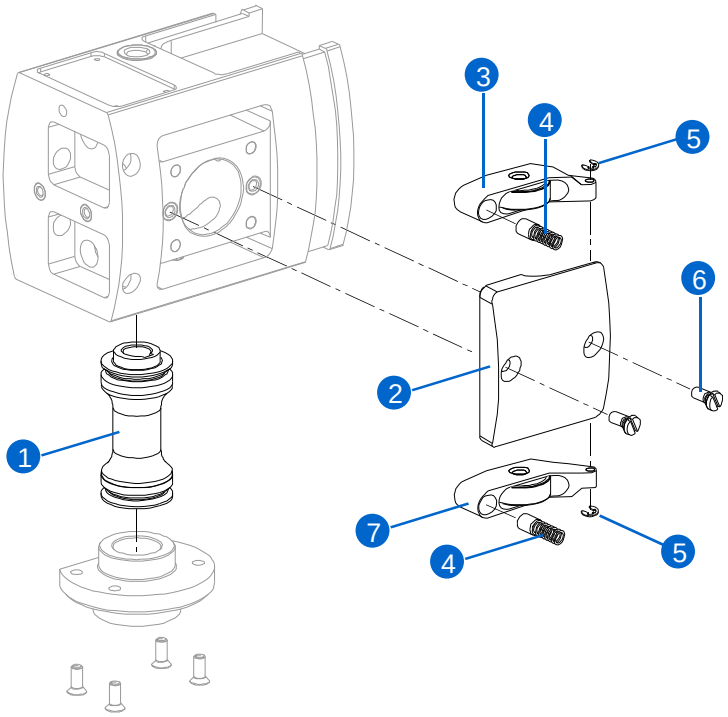
Pos.	Description	Article no.
	Spray head compl. (for OC380 Corr)	LB509002
	Spray head compl. (for OC600 Corr)	LB509002/1
1	Cylinder screw M4x40	KP2000210440
2	Set screw M6x25	KP2002100625
3	Neck tube	LB408041
4	O-Ring 9x2,5 mm	KP304090250
5	O-Ring 11x1,5 mm	KP304110150

9.2.3 Gear housing with attachment parts



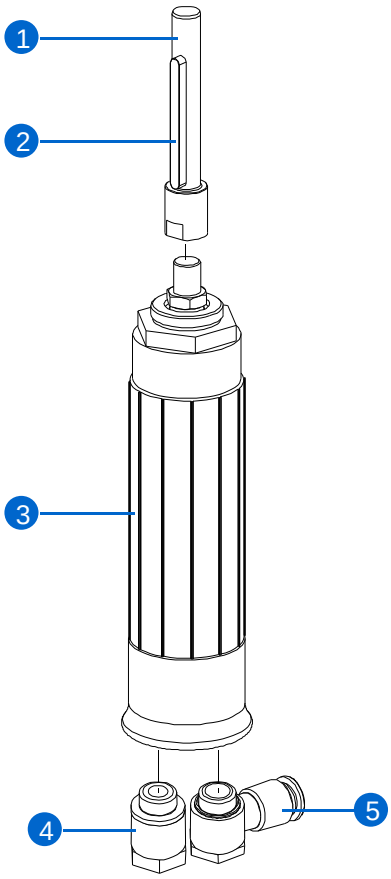
Pos.	Description	Article no.
1	Gear housing OC1	LB509001
2	Light beam OC1 (with cable and plug)	LB509070
3	Wire insertion OC1	LB409018
4	Plug connector for wire guide tube	LB40671810
5	Cylinder screw M4x10	KP2002000410
6	Lock washer A4	KP20009104
7	Spring washer A4	KP20010004
8	Motor flange OC1	LB409013/1
9	Countersunk head screw M4x10	KP2002910410-1
10	Cover plate (for contact piece OC1)	LB409007_01
11	Contact piece OC1	LB409007

9.2.4 Wire drive



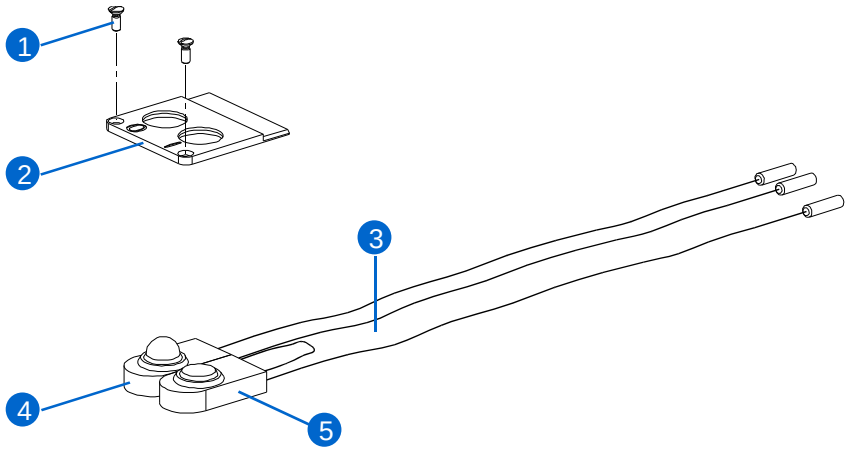
Pos.	Description		Article no.
1	Wire feed roller unit Ø 2,0 mm knurled (for Zn, ZnAl)		LB509003/920
	Wire feed roller unit Ø 2,0 mm splined (for Al, AlMg)		LB509003/20
	Wire feed roller unit Ø 2,5 mm knurled (for Zn, ZnAl)		LB509003/925
	Wire feed roller unit Ø 2,5 mm splined (for Al, AlMg)		LB509003/25
	Wire pressure unit OC1 compl.	(Pos. 2-7)	LB509009/1
2	Wire pressure plate OC1	(incl. Pos. 5)	LB509009_0
3	Pressure roller OC1 -top- compl.	(incl. Pos. 4)	LB509004/1
4	Setscrew with comp. spring (for wire pressure OC1)		LB409020
5	Circlip A2,3		KP203023
6	Countersunk head screw M4x16		KP2004200416-1
7	Pressure roller OC1 -bottom- cpl.	(incl. Pos. 4)	LB509004/2

9.2.5 Motor wire drive



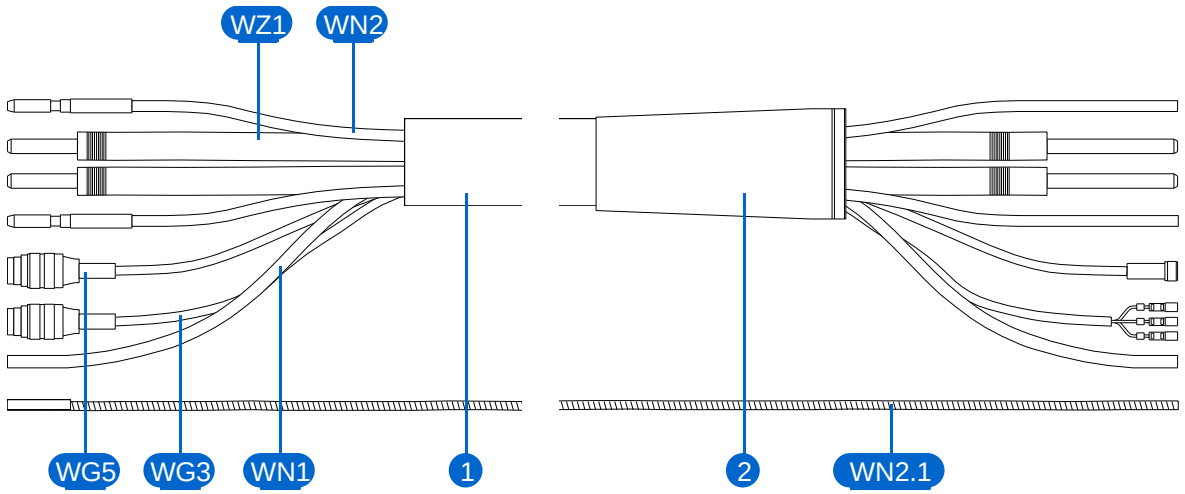
Pos.	Description		Article no.
	Gear OC1 compl.	(OC380 Corr)	LB509009
	Gear OC1 compl.	(OC600 Corr)	LB509009/01
1	Drive shaft compl.	(incl. Pos. 2)	LB509014
2	Key for drive shaft OC1		KP2022850
3	Air motor MD-Z-R-200		KT_MD60032635
4	Exhaust throttle 1/4"	(OC380 Corr)	KT31121/2
	Exhaust throttle 1/4"	(OC600 Corr)	KT31121/1
5	Elbow union OC1 compl.		KT306812

9.2.6 Switch



Pos.	Description	Article no.
1	Raised countersunk head screw M3x8	KP200302038
2	Switch plate	LB409011
3	On/Off Switch compl. (incl. Pos. 4-5)	LB508010
4	Switch cap Off (with knob)	KT10004_1
5	Switch cap On (without knob)	KT10004_2

9.2.7 Cable-hose assembly



Pos.	Description	Article no.
	Cable-hose assembly 8 m (excl. Pos. WN2.1)	LB61091-80
	Cable-hose assembly 10 m (excl. Pos. WN2.1)	LB61091-100
	Cable-hose assembly 15 m	LB6109-15
	Cable-hose assembly 20 m	LB61091-200
1	Protective hose 50x1.5 mm (yard ware)	KT3003368
2	Protective bellow	KT410302
WG3	Control cable On/Off (3-pole)	LB5107-xxx/5
WG5	Cable dead man´s control (5-pole)	LB51091-xxx/5
WN1	Air motor hose PA 10x7 mm (yard ware)	KT30021107
WN2	Wire guide tube	LB51091-xxx/2
WN2.1	Inner spiral	LB51091-xxx/99
WZ1	Current-air hose	LB51091-xxx/1

Hose length:

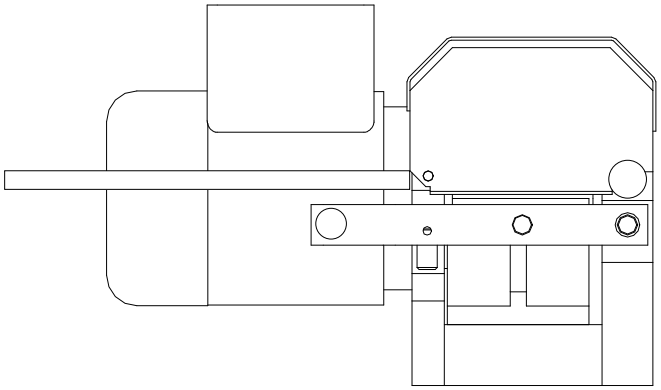
- 8 m: xxx = 80
- 10 m: xxx = 100; 15 m: xxx = 150; 20 m: xxx = 200 (not compatible with OC600 Corr)

Other lengths on request

9.3 Spare parts storage OC1

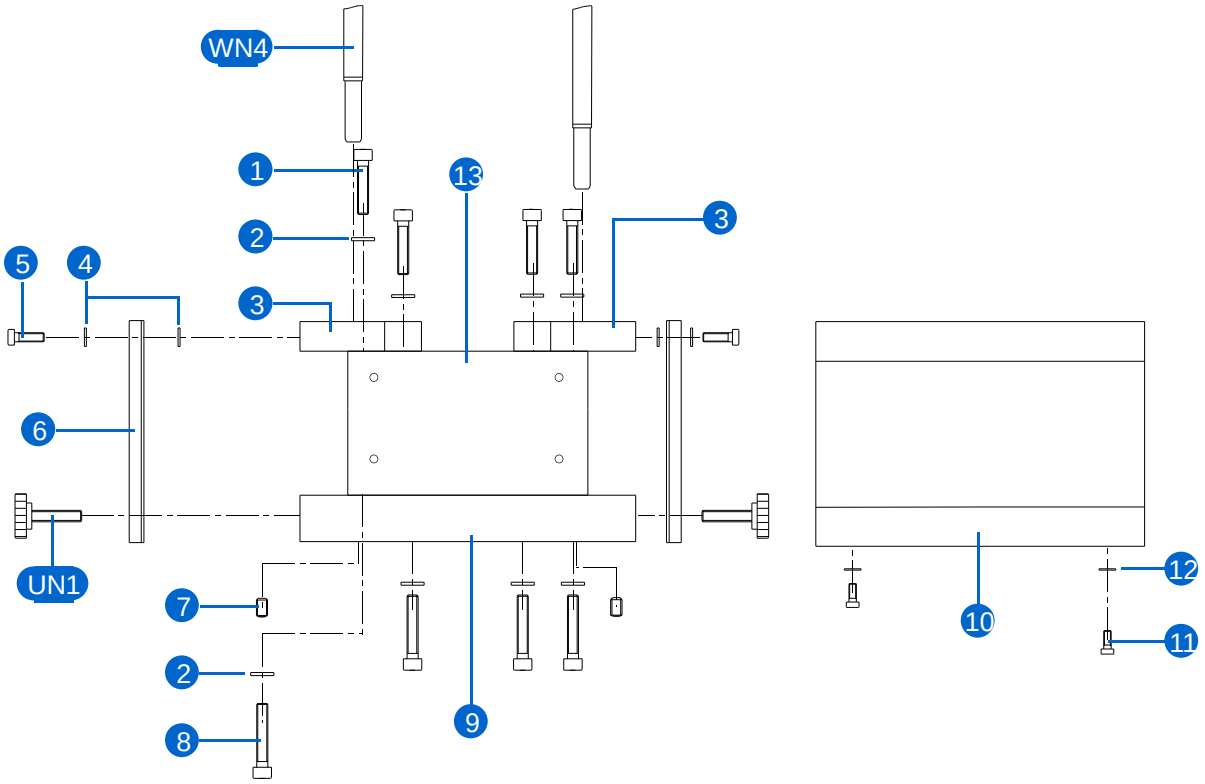
Quantity	Description	Article no.
	Nozzle system	
1	Radial nozzle nut	LB408066
	Fan spray nozzle nut	LB401002
	Fan spray nozzle	LB401001
1	Gas nozzle Ø 1,6-2,0 mm	LB40434/20-2
	Gas nozzle Ø 2,5 mm	LB40434/25-2
10	Contact nozzle Ø 2,0 mm (for Zn, ZnAl)	LB40135/20
	Contact nozzle Ø 2,0 mm Al (for Al, AlMg)	LB401351/20
	Contact nozzle Ø 2,5 mm (for Zn, ZnAl)	LB40135/25
	Contact nozzle Ø 2,5 mm Al (for Al, AlMg)	LB401351/25
1	Atomizer nozzle 2-hole	LB408065
	Wire drive	
1	Wire feed roller unit Ø 2,0 mm knurled (for Zn, ZnAl)	LB509003/920
	Wire feed roller unit Ø 2,0 mm splined (for Al, AlMg)	LB509003/20
	Wire feed roller unit Ø 2,5 mm knurled (for Zn, ZnAl)	LB509003/925
	Wire feed roller unit Ø 2,5 mm splined (for Al, AlMg)	LB509003/25
	Wire pressure unit	
1	Pressure roller OC1 -top- compl.	LB509004/1
1	Pressure roller OC1 -bottom- compl.	LB509004/2
	Cable-hose assembly	
2	Wire guide tube	LB51091-xxx/2
	8 m: xxx = 80	
	10 m: xxx = 100; 15 m: xxx = 150; 20 m: xxx = 200	
	Operating supplies	
1	PTFE-Spray	KT0403
1	Air motor oil	KT0900_1
1	Contact oil	KT0930
1	Contact grease	KT0931
1	Graphite powder	KT0932
10	Nozzle cleaner	KT0933

9.4 Feed gear WF4



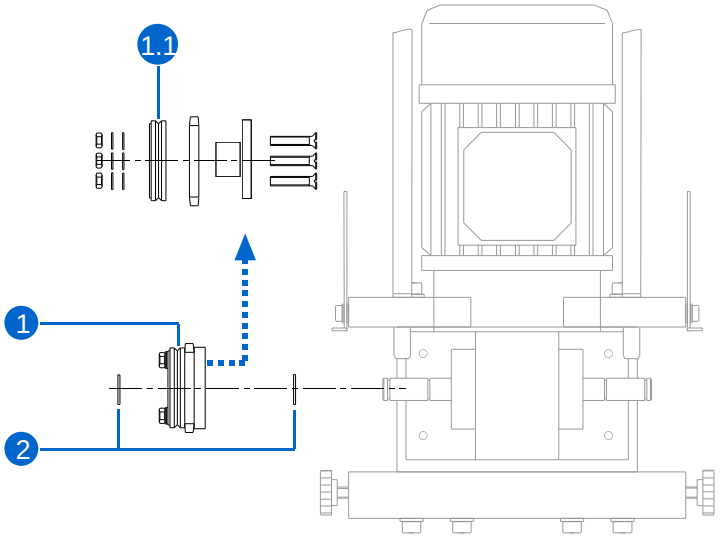
Pos.	Description	Article no.
	Feed gear WF4 (12:1) compl. (2,5 mm)	LB60410/540
	Feed gear WF4 (20:1) compl. (2,5 mm)	LB60410/5

9.4.1 Gear housing with attachment parts



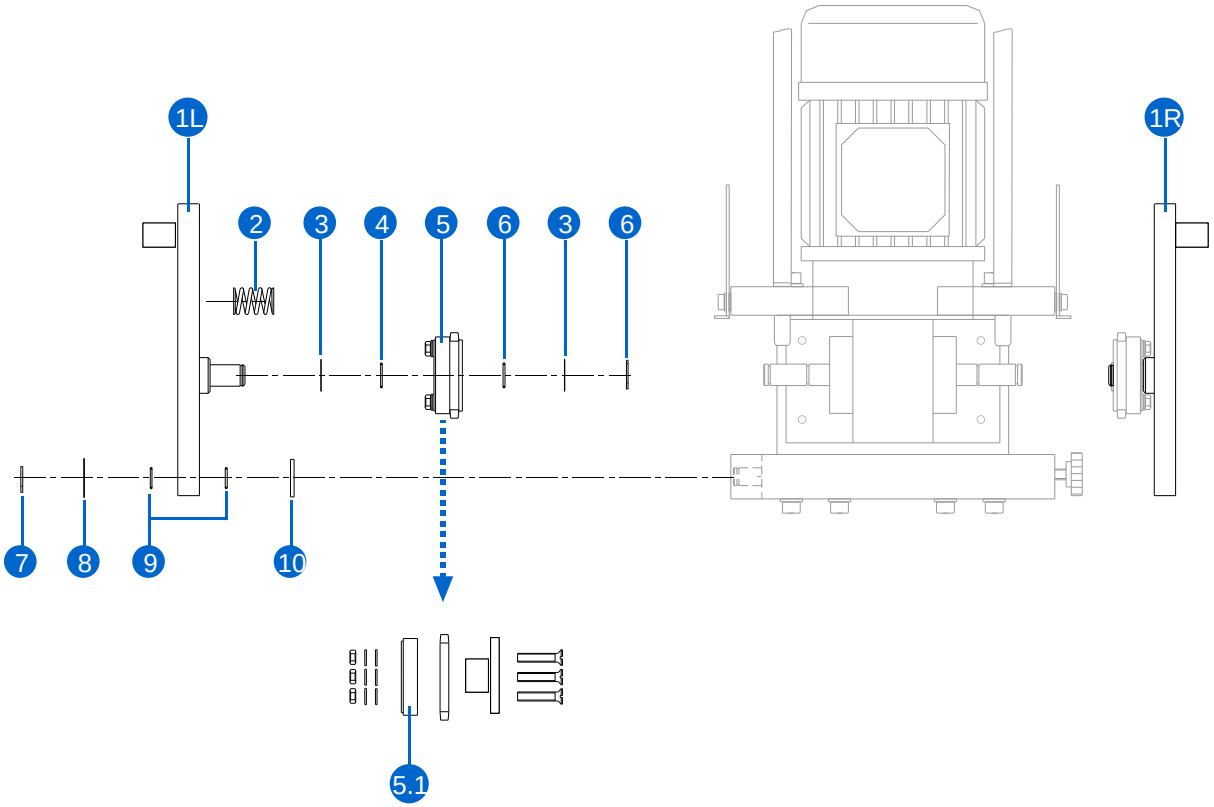
Pos.	Description	Article no.
1	Socket head screw M6x30	KP2002000630
2	Washer M6	KP20008106
3	Mounting left/right	LB404080
4	Washer M5	KP20008105
5	Socket head screw M5x15	KP2004000515
6	Cover plate 2-parts	LB40410
7	Setscrew M6x8	KP200210068
8	Socket head screw M6x35	KP2002000635
9	Gear face plate	LB404070
10	Cover hood	LB40411
11	Socket head screw M4x10	KP2004000410
12	Washer M4	KP20008104
13	Base plate	LB404060
UN1	Knurled screw M6x30	KP2005000630
WN4	Wire guide tube (short)	LB6127/4-1

9.4.2 Wire drive



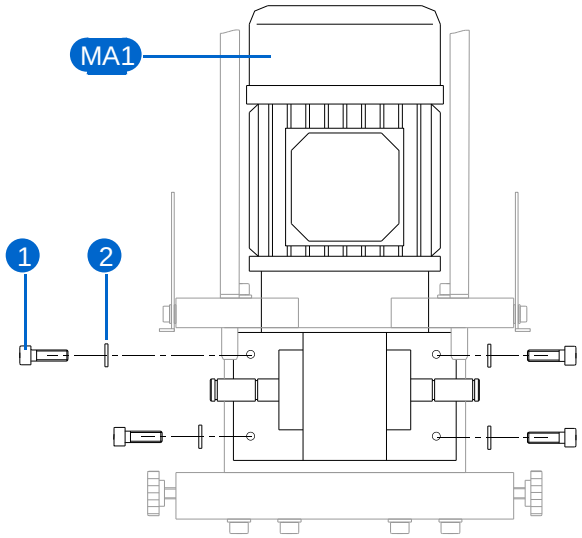
Pos.	Description	Article no.
1	Wire feed roller Ø 2,0 mm splined compl.	LB504821/20
	Wire feed roller Ø 2,5 mm splined compl.	LB504821/25
1.1	Ring for wire feed roller Ø2.0 mm splined	LB5048/20
	Ring for wire feed roller Ø2.5 mm splined	LB5048/25
2	Circlip 12x1	KP20210

9.4.3 Wire pressure



Pos.	Description	Article no.
1L	Pressure lever compl. (left)	LB504820/2
1R	Pressure lever compl. (right)	LB504820/1
2	Compression spring 2.2x12.8x20.8x3.5	KT401313
3	Shim ring 12x18x0.2	KP50113412802
4	O-Ring NBR 12x1	KP304120100
5	Pressure slip roller Ø1.6-3.2mm	LB504810/25
5.1	Ring pressure roller Ø1.6-3.2mm	LB5048/25-1
6	Circlip 12x1	KP20210
7	Circlip A10x1	KP2028
8	Spacer disc 10x22x0.3	KP2000430102203
9	O-Ring 10x1	KP304100100
10	Washer M10	KP20008210

9.4.4 Motor wire drive



Pos.	Description	Article no.
1	Socket head screw M6x20	KP2002000620
2	Washer M6	KP20008106
MA1	Gear motor WF4 (12:1)	KT11601/100
	Gear motor WF4 (20:1)	KT11601/20

9.5 Spare parts storage

Quantity	Description	Article no.
2	Wire feed roller Ø 2,0 mm splined compl.	LB504821/20
	Wire feed roller Ø 2,5 mm splined compl.	LB504821/25
2	Pressure slip roller Ø1.6-3.2mm	LB504810/25

10 Circuit diagram