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OWNER'S MANUAL

Power Injection Gun

P I G

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Revision: 4

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1 General Description

1.1 Scope of manual

This manual covers the operation and maintenance of the Power Injection Gun.

1.2 Using the owner's manual

This owner's manual is part of the technical documentation for the machine. It contains the information required for use, as well as warning notices for residual risks.

Side note	Side notes refer to additional information such as documents or chapter providing more detail.
Sketches	The sketches and drawings in the manual are not to scale.
Drawings	More detailed technical information is provided in the appendix.

The following requirements apply when using the owner's manual:

- Store the manual where it can easily be accessed by all users.
- Keep the manual in a complete and legible condition throughout all phases of the machine life cycle.
- Before working on the machine for the first time, make sure you have read and understood the owner's manual.
- Always consult the manual if any uncertainties arise relating to use of the machine.
- Contact the manufacturer if you become aware of any inconsistencies when reading the manual, or if anything is unclear.

2 Safety Information

2.1 Intended use

The Power Injection Gun is used for surface treatment on components with fine-grained material accelerated using compressed air, for example:

- Substrate pre-treatment of defects on coated metal surfaces.
- Removal of coating materials, dirt, rust and scale around weld seams prior to
- roughening of surfaces for subsequent metal coating, bonding or similar procedures.
- Subsequent blasting work on installed structures that can no longer be transported and therefore cannot be cleaned in blast rooms.

The Power Injection Gun can be used for the same work as a blast machine, although the method used means that the efficiency will be lower. It should be used wherever blast machines are ineffective due to their high weight and constant change of location.

2.2 Suitable blast media

All blast media up to a grain size of 1.5 mm can be used.

2.3 Maximum concentration of hazardous substances in blast media

Hazardous substance designation	Information
Antimony, lead, cadmium, tin, arsenic, beryllium, chromate, cobalt nickel	Total: 2 percent by weight
Arsenic, beryllium, chromate, cobalt and nickel	Total: 0.2 percent by weight
Beryllium, chromate, cobalt, cadmium	0.1 percent by weight each
Metallic compounds	To be calculated as CrO3 like metals and chromates
Free crystalline silicic acid (SiO2)	2 percent by weight

2.4 Prohibited use

Note that the any variation from the intended use can cause serious hazards.

All safety measures are designed to provide state of the art mitigation of the risks occurring during intended use. Any other usage of the machine can cause hazards that are not or insufficiently mitigated by the safety measures provided.

In particular, the following uses are not intended and thus prohibited:

(1) Use of other parts and materials to be blasted than those specified in the intended use.

(2) Operation of the Power Injection Gun in a defective or damaged condition.

(3) Operation of the Power Injection Gun without prior reading of the relevant owner's manual.

(4) Aiming blasting medium from the blast nozzle directly onto protective clothing.

The examples cited are not intended to be a complete list.

The operator of the machine is responsible for any accidents resulting from a prohibited use. Modifications, additional fittings, (partial) dismantling or any other alterations must be agreed with the machine manufacturer before being carried out. Failure to observe the intended use of the machine renders all claims under the warranty void.

2.5 Residual risks

The machine is state of the art and has been manufactured in compliance with recognised safety regulations. Nevertheless, hazards during use cannot be completely ruled out.

Residual risks for specific tasks are listed in the relevant chapters.

DANGER

Risk of injury due to blast media

Even after impact with the workpiece, the accelerated blast media particles can still have sufficient energy to cause injuries.

The compressed air jet can cause large parts of the workpiece detached by the blasting to fly off.

- Never aim the spray blasting gun at people
- Cordon off a wide working area.
- If possible, screen off the working area to protect against flying parts.

DANGER

Risk of explosion due to resulting dusts

The dusts produced during blasting can be flammable or explosive. Using prohibited abrasive material / blast media combinations can result in dangerous chemical reactions.

- Do not use light metal alloys in combination with steel.
- Before switching from light metal alloy to steel and vice versa, the spray blasting gun must always be thoroughly cleaned of dust.
- Avoid a build-up of dust inside the working area and on the workpiece.
- Avoid ignition sources such as naked flames, hot surfaces or similar in the vicinity of the working area.

DANGER

Risk of injury due to dust hazardous to health

The dust produced from the removed workpiece surfaces is deposited loose throughout the working area. Depending on the type of material removed (paints, coatings, base material), there may be hazards in the form of poisoning, genetic damage and mutation. Some of the dust remains mixed with the blast media, thus contaminating it.

The operator can come into contact with this dust when working on and cleaning the component.

- Do not touch any surfaces with blasting dust on them without appropriate personal protective equipment.
- Avoid contact with all surfaces with blasting dust on them and stirring up the dust.

CAUTION

Trip hazards with all equipment

During blasting work, there is a risk of slipping on blast media lying around or of tripping over the blasting or air line.

- Clean the working area regularly.
- As far as possible, run the air and blast media hoses outside the working area.

2.6 Personal protective equipment

Use personal protective equipment properly and in the specified condition.

Use the following personal protective equipment:

	Requirement	Operation
	Wear helmet and face protector	Blasting work
	Use ear protectors	Blasting work
	Protective gloves	Blasting work
	Protective clothing	All work
	Safety shoes, min. protection class S1P	All work
	Use mask	Provision of blast media Disposal of blast media

2.7 Operator information

Operating instructions must be created for all necessary work associated with residual risks and provided at an easily accessible location on the machine

Due to operator-specific conditions, there may be additional hazards that need to be considered by creation of a risk assessment by the operator.

	Appropriate equipment and protective facilities must be provided and used to perform the required work.
Chapter 2.6	The operator has an obligation to provide users with the required personal protective equipment in proper condition. Correct use of the personal protective equipment must be monitored regularly by the responsible senior staff. The exact choice of personal protective equipment is to be made based on the risk assessment for the affected work stations on the machine.
Safety data sheets	Safety data sheets for the operating materials used must be provided.
Blast media	The blast media must be specified by the operator depending on the component material.
ASR A3.4 Lighting	If additional lighting is required for specific work, this must be provided by the operator if the general lighting does not provide a sufficient light level.
ASR A2.2 Fire prevention measures	A sufficient amount of fire fighting equipment must be available. Fire extinguishers or extinguishing materials must be assigned to one or more fire classes based on their suitability. Fire extinguishers with an appropriate fire classification must be provided on the machine.

3 Application and Limitations

Excellent results can be achieved up to an intake length of 10m, a delivery height of 4m and a blasting pressure of 7 bar. (Test with steel shot with grain up to 0.8mm)

In Germany and many other countries, injection spray blasting guns may not be used outdoors. For environmental reasons, suitable enclosures (such as spray tents with extraction) are required.

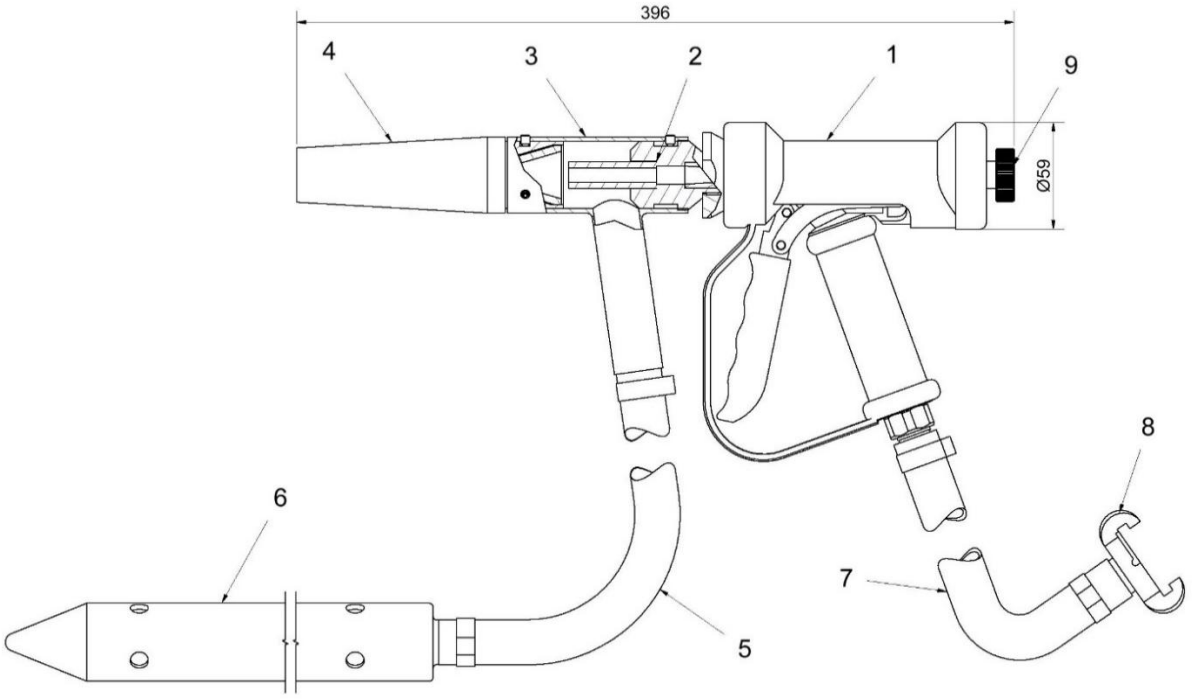
4 Description of the Equipment

The arrangement of the POWER INJECTION GUN is shown in the diagram.

Pressing the deadman handle on the gun body (1) allows compressed air to flow through the air nozzle (2). This expands in the mixing chamber (3) causing a partial vacuum which sucks the blast media from an open container through the suction hose (5) and the suction lance (6). This blast media flow is picked up by the compressed air flow and accelerated up to working velocity in the nozzle (4).

The suction lance (6) is designed to ensure an even intake of blast media.

The control button (9) can be used to limit the maximum travel of the deadman handle to limit the air quantity and thus the blast media quantity and energy when working on sensitive components.



No.:	Designation	No.:	Designation
1	Gun body	7	Air line
2	Air nozzle	8	Hose coupling SKG 19
3	Mixing chamber	9	Control button
4	Nozzle	-	Container (not shown)
5	Blast media hose	-	Chassis (not shown)
6	Suction lance		

4.1 Technical Data

4.1.1 Dimensions and weight

Spray blasting gun length	400 mm
Spray blasting gun weight (single)	3.5 kg
Suction hose length	5 m
Pressure hose length	5 m
Spray blasting gun weight inc. hoses	6.5 kg

4.1.2 Connection specifications

Compressed air connec-	Claw coupling in compliance with DIN 3489
Compressed air quality:	5 : 3 : 3 in compliance with ISO 8573-1:2010
Working pressure:	3 – 12 bar

4.1.3 Ambient conditions

Operating temperature range:	10 to 45 °C
Humidity:	10 to 85 %, non-condensing

4.2 Compressed air consumption

Pressure [bar]	3	4	5	6	7	8	9	10	11	12
Air consumption[m3/min]	2.4	3.0	3.6	4.2	4.8	5.4	6.1	6.7	7.3	8.0

4.3 Airborne noise emission

A-rated airborne noise emission level (when idle):	Noise emissions must be measured and logged as part of the risk assessment on the machine.
If an average noise level > 85 dB(A) occurs in the overall space due to the combined operation of multiple machines and equipment, the workplace must be designated as a high noise zone.	

5 Operation

5.1 Set-up for initial installation and reinstallation

The POWER INJECTION GUN is supplied ready to use. It is essential to check that the clamps on the hoses are tightly fitted.

5.2 Daily set-up

(1) Before starting blasting, check that:

- all connections and hose clips are tight.
- there is no undue wear evident on the suction hose or air line.
- there is sufficient light and the field of view is clear.
- there is sufficient room to work.

(2) Connect the compressed air hose.

(3) Insert the suction lance into the container

Make sure that the air holes in the suction lance are outside the container.

(4) Put on protective equipment

- Blast suit.
- Leather gloves.
- Air-fed helmet with air filter.

DANGER

Risk of injury due to blast media

Even after impact with the workpiece, the accelerated blast media particles can still have sufficient energy to cause injuries.

The compressed air jet can cause large parts of the workpiece detached by the blasting to fly off.

5.3 Startup and operation

(1) Fill the container with blast media.

(2) Start blasting by operating the deadman handle. Make sure that the Power Injection Gun is only directed towards the surface to be blasted.

5.4 Shutdown after finishing work

(1) Take the suction lance out of the blast media, and blow the remainder of the blast media out of the suction hose.

(2) Switch off the external compressed air supply.

5.5 Shutdown when moving equipment

No special action is required.

6 Maintenance

Blast machines are subject to wear during operation. To ensure safety and maintain high efficiency, they must be serviced regularly using the following check lists.

Before servicing is started, the air feed from the compressor must be shut down and the entire system depressurised.

6.1 Daily check list

(1) Check that the (hose clip) connections are tight.

6.2 Weekly check list

(1) Check the suction hose for wear.

(2) Check the compressed air hose for wear.

(3) Check the nozzle for wear.

Note that a 10% increase in diameter corresponds to a 20% loss of efficiency.

6.3 Monthly check list

(1) Check the mixing chamber for wear. If it is heavily worn, replace it without delay.

(2) Check the air nozzle for wear. This requires removal of the mixing chamber. Even small changes in the air nozzle length cause a significant loss of efficiency.

6.4 Air nozzle fitting instructions

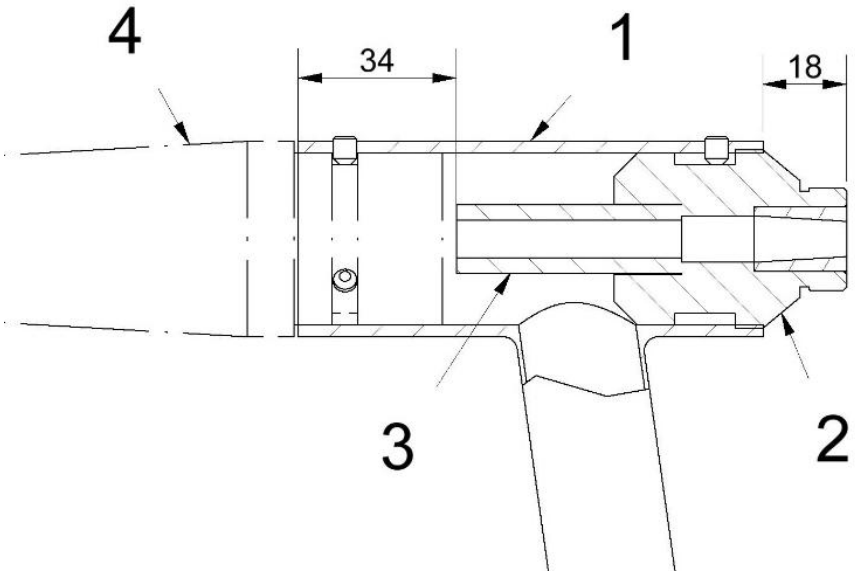
To obtain optimum spray blasting gun performance, the nozzle must be fitted as shown in the sketch below

1 = Mixing chamber

2 = Air nozzle collar

3 = Air nozzle

4 = Blasting nozzle



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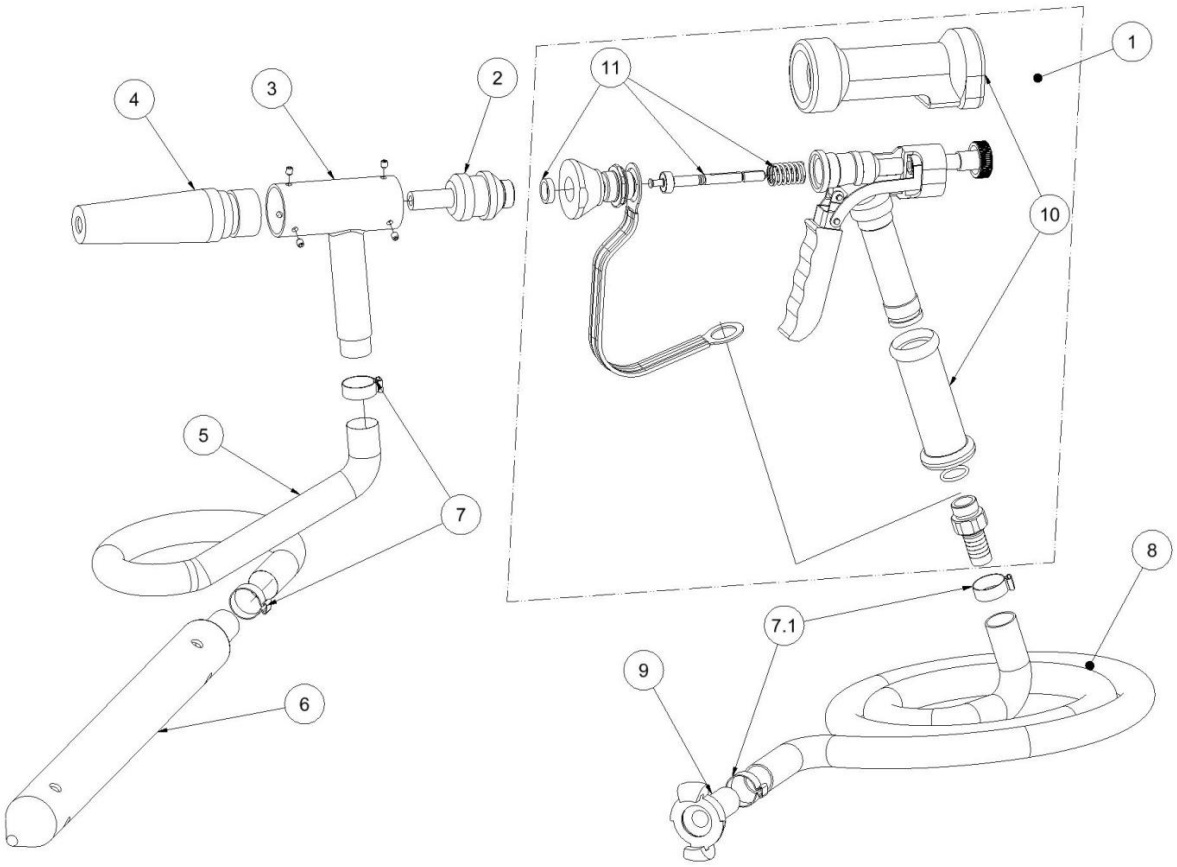
7 Troubleshooting

Symptom	*Possible cause*	*Remedy*
Air comes out of the nozzle but no blast media.	Blast media damp or blocked.	- Close the spray nozzle outlet by pressing it firmly against a resilient surface such as a leather glove. - Depress the deadman handle. The air flow then reverses and cleans the affected parts. - Only if that fails should the suction lance, the suction hose and the mixing chamber be cleaned. - Replace the blast media.
	External air is being drawn in.	- Tighten the clips on the suction hose. - Replace the suction hose and mixing chamber if worn.

8 Disposal

Check how best to properly recycle or dispose of specific materials in line with the applicable legal regulations.

9 Replacement Parts



ITEM	*ART. NO.*	*DESCRIPTION*
(-)	31250D	Power Injection Gun, complete with chassis and container, 5m hoses
(-)	31249D	Power Injection Gun, complete without chassis and container, 5m hoses
(-)	31248D	Power Injection Gun without hoses
1	31247D	Power Injection Gun (body)
2	90213D	Air nozzle
3	90366D	Mixing chamber
4	90209D	Nozzle
5	90042D	1” suction hose (per m)
6	90214D	Suction lance
7	31257D	Hose clip 28.5 - 31.5 for suction hose
7.1	31256D	Hose clip 22.5– 25.5 for air line
8	90045D	Air line (per m)
9	93245D	Hose coupling SKG-19
10	31251D	Replacement rubber cover set
11	31252D	Replacement valve set
(-)	90368D	Container (not shown)
(-)	90367D	Chassis (not shown)
(-)	99899D	Chassis with container and cover