

Operating instructions and spare parts list

- keep for future use -

Robot Automatic Spray Gun Typ: RA-2 HV3

Article No.:

0920-090-....

0921-090-....

Krautzberger 



1. Hazard and warning notes!

- Assembly of the automatic spray gun, type RA-2 HV3, and connection of the compressed air and material feed should be effected only by suitably qualified personnel! Check the mounting device and the connections from time to time!
- Always wear the protective equipment (e.g. protective clothing, goggles, breathing protection, ear muffers, gloves etc.) recommended by the supplier of the coating substance during maintenance, cleaning or repair work and when changing materials!
- Comply with the explosion protection regulations when using potentially flammable and explosive coating substances! Keep away from sources of ignition and open flames!
- Comply with the warning and hazard instructions of the supplier of the coating material (and, if necessary, of the detergent) with regard to emission, fire or explosion hazard or other hazards (where applicable)! In case of doubt, consult the supplier(s)!
- When mixing different components and/or when using solvents or thinning agents to make coating materials, take steps to ensure that no substances with increased hazard potential are created (e.g. flammability, explosion hazard, increased explosive tendency through spraying with air, toxicity, increased toxicity due to chemical reaction with air etc.)! Avoid increased hazard potential caused by undesired chemical reactions! In case of doubt, consult the supplier(s) of the components! Where necessary, take protective measures and effect special notification of the particular hazard!
- When using substances such as solvents which can generate an increased explosion potential due to atomisation or spraying in air, take protective measures and effect special notification of the particular hazard! In case of doubt, consult the supplier(s) of the components!
- The compatibility of the parts of the automatic spray gun which come into contact with the material cannot be guaranteed with all potential coating substances (see chart "Parts in contact with the material" in Section 10, Technical Data). In case of doubt, consult Krautzberger GmbH!
- Under no circumstances should the spray jet be directed at people or animals!
- Do not stand in the area of the material jet!
- Angle of material in front of nozzle: up to approx. 180° depending on setting. Length of material jet in front of nozzle: depends on setting (e.g. water with a material pressure of 4 bar sprayed through a 1 mm material nozzle hits a disc measuring 2 metres in diameter at a distance of 10 metres).
- Never direct the spray jet at electrical equipment or systems!
- During spraying, the coating substance escapes into the surrounding air: depending on the coating substance, there may be a risk of environmental, fire, explosion and health hazards. Therefore only use spraying equipment in the specially designed surroundings!
- Only work in adequately ventilated areas! If necessary, make use of suitable extraction systems!
- Ensure adequate earthing (e.g. connection to the building earth at the retaining bolt (124))!

- Radiators or water pipes do not provide sufficient earth contact! During breaks in operation or when shutting down the equipment as well as prior to dismantling or the start of repair and maintenance work, you should ensure that the automatic spray gun is no longer under pressure (close material feed, open control air until material pressure has dissipated, close control and atomiser air supply)!
- During breaks in operation (e.g. work breaks), shut off the air supply! In particular, shut off the control air! Check whether material escapes! Repair if necessary!
- Prior to each repeat startup, check the connections and settings and monitor the automatic spray gun type RA-2 HV3 for seal tightness (no uncontrolled air and/or material discharge)!
- Adhere to the pressures and temperatures listed under "Technical Data"!
- When working at temperatures above 43°C, attach protective devices and post notification concerning the risk of combustion due to coating substance and/or heated air, and draw particular attention to risks resulting from leakage or bursting of the spray gun!
- Ensure that neither spraying nor air or material discharge can be activated accidentally or by defects in the unit as long as one or more persons are in the hazard zone. Take steps to ensure that no alterations can occur or be made to the control and/or atomiser air feed or the material pressure during setting and maintenance work without the knowledge or consent of the setup technician!
- Check wearing parts at appropriate intervals and replace if necessary!
- Only use spare parts and accessories from Krautzberger GmbH! Krautzberger GmbH does not assume liability for damage if parts from other suppliers are used!
- The instructions and notes of EN 1953 "Spraying Equipment for Coating Substances; Safety Requirements" are to be adhered to, in particular the warning, hazard and safety notes pertaining to risks and safety requirements and/or measures

Hazards which exceed those normally expected with the use of spraying equipment have not come to our attention in the handling of the automatic spray gun type RA-2 HV3. If, however, accidents or hazardous situations occur during practical applications, please notify us accordingly.

1. Use for intended purposes

The automatic spray gun type RA-2 HV3 is designed to allow automatic (not manual) coating of metal, plastic, ceramics, wood and other suitable surfaces. Typical coating substances are, for example, lacquers, paints, water-soluble lacquer systems, adhesives, glazes, enamel, release agents etc.

The scope and shape of the jet can be influenced by the choice of nozzle (type and size), the pressure of the circular or flat jet pair feed and, in certain cases, the material pressure as well as (to a limited degree) via the limitation of the needle stroke. Depending on the requirements posed by the material to be processed and/or the shape of the surface to be

coated, the following nozzle versions can be used (also see the separate list on the application options of nozzles):

- **Circular jet:** conical jet in front of the nozzle
- **Flat jet:** width-adjustable jet for flat-shaped application (most common type). If there is no flat jet air feed, a circular jet is produced.

Note

- ☞ The coating substances approved by the manufacturer of the coating substance for spraying may be used; however, Krautzberger offers special designs for
- substances dissolved in CFC-containing solvents
 - abrasive or
 - corrosive materials.

Areas of application

The automatic spray gun type RA-2 HV3 is used as part of a fully automatic spraying system or a spraying robot. All functions such as circular jet air, flat jet air and material discharge are externally controlled. All parts coming into contact with the material are made of stainless steel.

2. Basic design, mode of operation

The design and the various versions of the automatic spray gun type RA-2 HV3 are shown in the diagram 140-0021; details and installation notes are shown in the diagram 140-603; the diagram 140-0019 shows accessories.

The automatic spray gun type RA-2 HV3 is supplied as standard with flat circular jet and single material connection. The automatic spray gun is also available with and without needle stroke adjuster. Further equipment versions are shown in the following chart.

Order/Article numbers for the automatic spray gun type RA-2 HV3				
Version	Material nozzle and needle			
	Stainless steel		Tungsten carbide	
	Needle stroke adjustment			
	without	with	without	with
	Article no.		Article no.	
Automatic spray gun RA-2 HV3	0920-090-2358	0920-090-2357	0920-090-2360	0920-090-2359
Automatic spray gun RA-2 HV3 for adapter, (drawing 140-0021)	0921-090-2362	0921-090-2361	0921-090-2364	0921-090-2363
Automatic spray gun RA-2 HV3 for circulation adapter, article no. 0909-080-0544	0921-090-2366	0921-090-2365	0921-090-2368	0921-090-2367

Automatic spray gun RA-2 HV3 for adapter with material pressure regulator, article no. 0909-080-0681	0921-090-2370	0921-090-2369	0921-090-2372	0921-090-2371
--	---------------	---------------	---------------	---------------

3. Assembly

The assembly of the automatic spray gun type RA-2 HV3 depends on the intended application. We recommend the screw connection with the retaining bolt, art. no. 6922-080-1256 as a standard fixing system. Further mounting/assembly options are shown in the diagram 140-0019 - e.g. mounting on the adapters (101 to 103).



Note

If the automatic spray gun is not adequately secured, it may become loose during operation - e.g. due to vibrations. There is also a risk of displacement due to recoil. Under certain circumstances, the coating substance may escape in an uncontrolled manner.



Caution Assembly should be performed by suitably trained personnel only!

4. Startup

4.1 Connections

- Control air to input (St); (symbol stamped next to connection)
- Circular jet air to input (R); (symbol stamped next to connection)
- Flat jet air to input (F); (symbol stamped next to connection)
- Material connection to input (M); (symbol stamped next to connection)



Caution

Compressed air and material feed should only be connected up by suitably trained personnel! Ensure that the pressures and temperatures listed under "Technical Data" are not exceeded!



Notes

- ☞ Air and material feed are connected via internal threads (e.g. nipple or nozzle-type connection depending on application). If you not sure about the best connection method, consult your supplier or Krautzberger GmbH.
- ☞ Material feed can be effected via a container (under the intrinsic hydrostatic pressure of the coating substance), a pressurised container or pumps. Circulation connection is possible (e.g. when applying settling coating substances).
- ☞ In the case of material feed under pressure (e.g. from pressure containers or via pumps), ensure that the material feed is interrupted if the atomiser air pressure falls rapidly due

to, for example, loosening of a hose connection, bursting of the hose or similar.

- ☞ Without atomiser air feed, the range of the material jet may be multiplied many times, depending on the material! It is important to ensure that the control air is immediately interrupted if there is a fall in atomiser air pressure in order to prevent material discharge. In particularly critical cases, a spray jet monitor should be installed (using, for example, a light barrier or a pressure monitor directly in front of the automatic spray gun - in other words, **behind** the control element (valve or regulator)). The spray jet monitor must be switched in such a way that the entire air feed is interrupted if there is a rapid fall in atomiser air pressure. This also ensures interruption of the material feed.
- ☞ The automatic spray gun RA-2 HV3 must always be operated using filtered air.
- ☞ Both the circular jet air pressure and (where applicable) the flat jet air pressure should be regulated via a proportional regulating valve or a pressure reducer.

Checking the connections

- Interrupt
 - material feed
 - control air supply
 - circular jet air supply and
 - flat jet air supply.

No air or material must be discharged from the automatic spray gun type RA-2 HV3.

- Where present, open the adjusting nut (36) of the needle stroke adjuster (see section 5.2, Mode of operation/Spray profile adjustment)
- Open control air supply (the needle in the material nozzle must retract)
- Open circular jet air pressure (air must flow out of the central borehole of the circular or flat jet air nozzle)
- Close circular jet air supply
- Open flat jet air supply (air must flow out of the humped boreholes of the flat jet air nozzle)
- Close air supply
- Connect or open material supply

Neither air nor material must be discharged from the automatic spray gun type RA-2 HV3.

Caution

Prior to starting work, ensure that the control air connection and the atomiser air connections have not been interchanged! Risk of uncontrolled material discharge!

4.2 Mode of operation / Spray profile adjustment

- Close control air supply
- "Open" material feed (see following instructions)
- Open circular jet air supply
- Open flat jet air supply
- Open control air supply (material needle (39 or 40) is pushed back by the air pressure and releases the material flow)

The coating substance is sprayed. It is generally now necessary to adjust the spray profile.

- If present, open the adjusting nut (36) of the needle stroke adjuster (see following instructions)

- Fully close the flat jet air supply (where flat jet nozzle is present)
- Set the circular jet air pressure (do not close completely!)
- Set the flat jet air pressure (where flat jet nozzle is present)
- Fine tune the settings of circular jet air pressure (and, where applicable, flat jet air pressure) until the desired spray profile is achieved (see following notes)

Notes

Depending on the type of material feed, the material feed is "opened"

- by opening the connection valve
- or by applying pressure to the storage container
- or by switching the material pump on
- or by filling the coating substance into the storage container, from where the coating substance then flows into the automatic spray gun type RA-2 HV3 under its intrinsic hydrostatic pressure.

☞ If material feed is effected under intrinsic hydrostatic pressure, the material pressure cannot be regulated.

☞ The optimum needle opening is 8 revolutions (from the opening point). In order to obtain reproducible settings, the opening point should be monitored after each maintenance routine and adjusted if necessary,

☞ As the settings of circular and flat jet air pressure as well as material pressure affect each other, the spray profile has to be set in several steps. It is advisable to set the spray profile by only varying the circular and flat jet air pressure. The material feed should only be altered if the desired spray profile cannot be achieved as described above. The material volume is altered by varying the material pressure and/or the nozzle size.

☞ A limited degree of fine adjustment (for example, to coordinate several automatic spray guns in a system) can be effected via the adjusting nut (36) - where present.

Setting the opening point of the needle

- Close the air supply
- Close the adjusting nut (36) in a clockwise direction
- One revolution of the needle stroke adjuster changes the needle path by 1 mm and corresponds to 18 locking positions.
- Open material feed
- Open control air supply; no material should be discharged.
- Close the control air, open the adjusting nut by locking position, open the control air, check whether material is discharged. If this is not the case, repeat these steps until the opening point is reached and material begins to be discharged.

Note

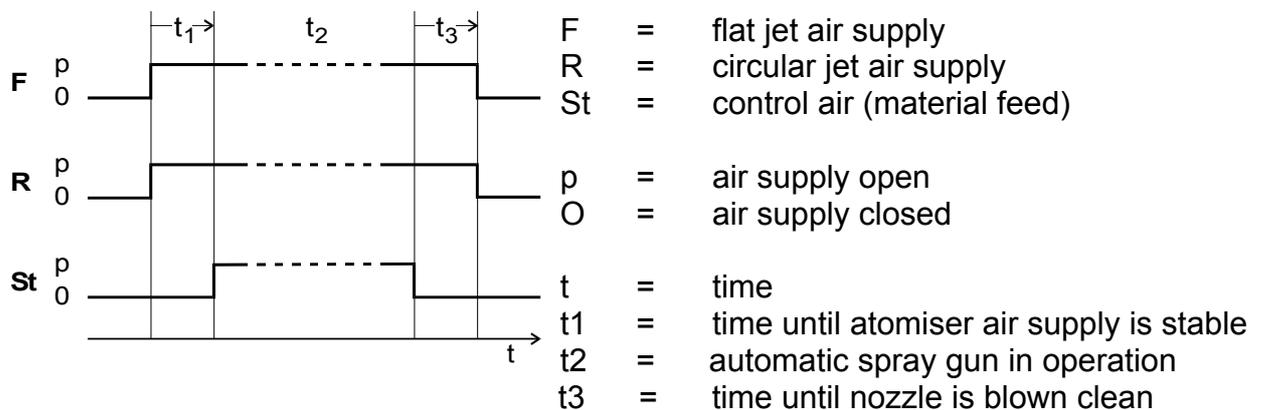
Rinse the automatic spray gun type RA-2 HV3 through with detergent before first-time use!

 **Caution**

When setting the spray profile, take steps to ensure that no changes can occur or be made to the settings (setting parameters) without the knowledge of the set-up technician.

The automatic spray gun type RA-2 HV3 is now ready for operation.

5. Operation of the automatic spray gun type RA-2 HV3 / Correct preliminary air control



 **Notes**

- ☞ Always adhere to the preliminary air control for (F) and (R) in line with the diagram. Otherwise
 - material may escape in non-atomised form from the material nozzle at the start of the spraying process
 - and the nozzles may become soiled or blocked at the end of the spraying process.
- ☞ Excessive air pressure not only leads to unnecessarily high air consumption but also generates heavy misting of the coating substance.
- ☞ Insufficient air pressure results in an unsatisfactory spray profile.
- ☞ Do not completely close the circular jet air control during operation
Select a low material pressure wherever possible!

7. Changing parts

⇒ **Material needle**

- Unscrew the entire closing piece (31 to 36, where present)
- Remove the spring (30)
- Pull out parts (38 to 42)
- Remove the jam nut (42) from the material needle (39 or 40)
- Unscrew the material needle (39 or 40) from the piston (41)

⇒ **Air gasket (material needle)**

- Unscrew the entire closing piece (31 to 36, where present)
- Remove the spring (30)

- Pull out parts (38 to 42)
- Unscrew the seal screw (28)
- Remove the gasket (29) on the air side
- Remove the gasket (21) on the material side
- Insert new gaskets (ensure correct fit!)

⇒ **Material gasket (material needle)**

- Unscrew the screws (11)
- Pull off the control section (26)
- Remove the washer (25), guide ring (24) and gasket (21)
- Insert new gasket (21) (ensure correct fit!)

⇒ **Material and air nozzle**

- Unscrew the clamping nut (1) or the jam nut (2)
- Remove or unscrew the air nozzle (3-6)
- Unscrew the material nozzle (7-10)

Assembly is performed in the reverse order. Lightly lubricate the moving parts using a suitable grease, e.g. article no. 7026-120-0351 from Krautzberger GmbH (supplied in 250 g cans)

 **Notes**

- ☞ Always change the material nozzle (7 to 10) and the material needle (39 or 40) together!
- ☞ Occasionally check the moving parts for free range of motion and lubricate with grease if necessary!

8. Operating breaks, cleaning, maintenance

Wearing parts such as material nozzle (7 to 10), air nozzle (3 to 6), material needle (39 or 40), material needle gaskets (21 and 29), guide ring (24) and other gaskets as well as fastening components should be checked at appropriate intervals and replaced if necessary (e.g. if the material needle does not close sufficiently or if there is uncontrolled discharge of coating substance or air, or displacement of the automatic spray gun on the fastening device).

 **Caution**

Close the supply of control, circular jet and flat jet air as well as the material feed during maintenance and repair work.

 **Notes**

- ☞ The automatic spray gun type RA-2 HV3 is never to be dismantled into its individual parts except when this is necessary for repair or maintenance purposes. When cleaning and during material change, the gun should be rinsed through using a detergent recommended by the supplier of the coating substance until it is discharged clear.
- ☞ The automatic spray gun RA-2 HV3 should never be completely immersed in detergent! This could destroy the gaskets and rinse out the lubricant.

- ☞ If the automatic spray gun is to be dismantled when work has been completed, ensure that no residues of toxic, flammable or explosive material or detergent remain in the automatic spray gun (avoidance of hazard during storage or transport).
- ☞ During **lengthy breaks in operation**, the automatic spray gun should be stored in a suitable place in a cleaned condition.
- ☞ Do not clean material and air nozzles using hard, sharp-edged objects! (*The following are recommended for cleaning of the nozzles: round brush, article no. 7025120-0055 or flat brush, article no. 7025-120-0053 from Krautzberger GmbH.*)
- ☞ A cloth soaked in detergent is recommended for external cleaning.

9. Disposal

Following dismantling of the automatic spray gun type RA-2 HV3, the metal parts can be sorted and forwarded to a recycling process; the non-metal parts should be disposed of as special waste.

10. Technical data

Operating pressures / Operating temperature

Max. material pressure:	1.2 MPa (12 bar)
Max. material temperature:	100°C
Max. atomiser air pressure (R and F):	0.8 MPa (8 bar)
Min. control air pressure:	0.4 MPa (4 bar)
Max. control air pressure:	0.8 MPa (8 bar)
Max. air temperature:	50°C

Connections (see dimension sheet 140-0021)

Material (M):	G1/8 IG
Atomiser air (R and F):	G1/8 IG
Control air (St):	PK-3/5 or M5 IG

Weight

(without add-on parts) approx. 500 g

Material spray zone

Angle of material jet in front of nozzle: up to approx. 180° depending on setting
 Length of material jet in front of nozzle: depends on setting (e.g. water with a material pressure of 4 bar sprayed through a 1 mm material nozzle hits a disc measuring 2 metres in diameter at a distance of 10 metres).

Noise emission

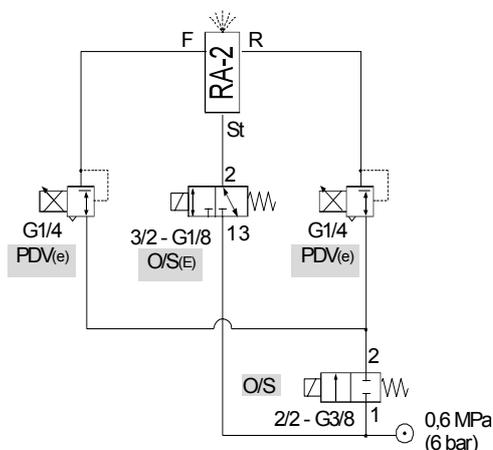
Continuous sound pressure level: nozzle-dependent, 73 to 96 dB(A)

Available nozzles

Material nozzles

Flat/Circular jet: stainless steel	0.3 - 2.5 mm
st. steel, hardened	0.3 - 2.5 mm
tungsten carbide	1.2 - 2.5 mm

Examples for pneumatic circuitry of the automatic spray gun type RA-2 HV3



Analogue control

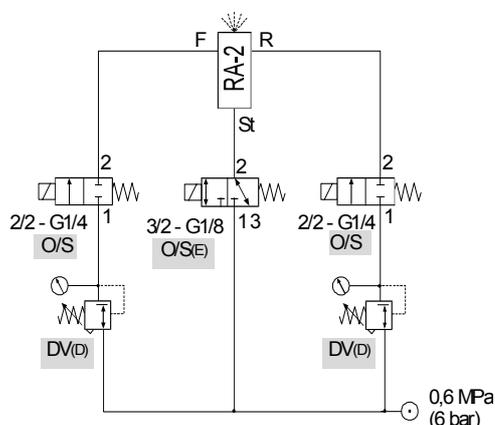
Control of flat and circular jet air via proportional pressure regulating valves with analogue target value preset to ensure optimum adjustment of the spraying parameters to changing spraying situations.

Preliminary air control is to be assured by external control of the pressure regulating valves.

Start of spraying: first activate spraying air R (and, if applicable, F), then open control air St!

End of spraying: first shut off St, then close R and F.

PDV (e) = proportional pressure regulating valve, electrically controlled
O/S (E) = opener/closer with vent
O/S = opener/closer



Fixed setting

Control of flat and circular jet air via pressure regulating valves to ensure optimum adjustment of the spraying parameters to a constant spraying situation.

Preliminary air control is to be assured by external control of the pressure regulating valves.

Start of spraying: first activate spraying air R (and, if applicable, F), then open control air St!

End of spraying: first shut off St, then close R and F.

DV (D) = pressure regulating valve, adjusted to pressure range
O/S (E) = opener/closer with vent
O/S = opener/close

 Notes

In particularly critical cases (such as the processing of substances with increased hazard potential), it is advisable to equip the circular jet air (R) with a pressure monitor, which should be installed directly in front of the automatic spray gun. This can prevent the generation of a far-reaching material jet if there is insufficient air. A PE converter is suitable for this purpose, for example. *The accessories required for this (e.g. control valves, regulators etc.) are available from Krautzberger GmbH*

Special equipment

Nozzle extensions

Nozzle extensions are particularly suitable for the coating of cavities such as pipes, canisters, cans or other containers. In many cases it is possible to adapt the length and shape of the nozzle extension to the special requirements on the customer's premises. Ready-made nozzle extensions are also available (see Krautzberger GmbH order catalogue).



Caution

When working with a nozzle extension, note that explosive mixtures can be created extremely easily due to the interaction of flammable materials and air in cavities! Ensure adequate ventilation!

11. Special designs

- Automatic spray gun type RA-2 HV3 with circulation connections

The coating substance can be circulation pumped (e.g. in the case of coating substances which settle during application).

Declaration of conformity

under the terms of the EC Directive 89/392 EEC and the amendment directives 91/368/EEC and 93/44/EEC

Krautzberger GmbH, Stockbornstrasse 13, D-65343 Eltville

Design of unit: **Automatic spray gun**
Type designation: **RA-2 HV3**
Make: **Krautzberger GmbH**
Serial no.: **0920-000, 0921-000**

The automatic spray gun type RA-2 HV3 was developed, designed and produced in compliance with the EC Directive 89/392/EEC.

The following harmonised standards were applied:

- EN 292, Safety of Machines, Plant and Equipment
- EN 1953, Spraying Equipment for Coating Substances, Safety Requirements (German version prEN 1953: 1995)

The following documents are fully available:

- Overall diagram of the automatic spray gun type RA-2 HV3
- Detailed and complete diagrams for the checking of compliance of the automatic spray gun type RA-2 HV3 with the basic safety and health safety requirements
- A list of the basic requirements from EC Directives, standards and specifications applied during the development, design and production of the automatic spray gun type RA-2 HV3
- A description of the solutions to prevent hazards arising from use of the automatic spray gun type RA-2 HV3
- A copy of the operating instructions



Head of design at Krautzberger GmbH

13. Spare parts list for automatic spray gun, type: RA-2 HV3

Item	Article no.	Designation	Item	Article no.	Designation	
	1	0902-040-0051	Clamping nut	* 27	0902-010-0512	Gasket
**	3	0920-060-....	Air cap, HV3 A	28	0902-040-0047	Seal screw
**	3	0920-060-....	Air cap, HV3 G	* 29	0902-010-0186	Gasket
**	3	0920-060-....	Air cap HV3 H	30	0902-020-0074	Spring
**	7	0920-050-....	Material nozzle, HV3	31	0902-040-0066	Sealing element (for needle stroke limiter)
**	7	0920-050-....	Material nozzle, HV3			
			hardened steel	32	0902-040-0043	Cover (without needle stroke limiter)
**	7	0920-050-....	Material nozzle, HV3, tungsten carbide	33	0902-030-3298	Screw (4 pcs)
11	0902-030-3297		Screw (4 pcs)	34	0902-030-2730	Ball (2 pcs)
12	0902-040-0262		Head section (incl. items 13 and 14)	35	0902-020-0151	Lock washer
13	0902-040-2711		Ring	36	0902-040-0067	Adjusting nut
14	0902-040-2710		Ring	37	0902-080-0207	Screw connection
*	15	0902-010-0362	Gasket	* 38	0902-010-0144	Gasket
*	16	0902-080-0176	Gasket	** 39	0902-070-....	Material needle
	17	0902-040-0068	Transition piece (standard)	** 39	0902-070-....	Material needle, hardened
■	18	0902-040-....	Transition piece no. 1 (for adapter)	** 39	0902-070-....	Material needle, hard chrome-plated
■	19	0902-040-....	Transition piece no. 2 (for adapter)	** 39	0902-070-....	Material needle, tungsten
■	20	0902-040-....	Transition piece no. 3 (for adapter)	** 40	0902-070-....	Material needle, with carbide
*	21	0902-010-0364	Gasket, UHMW-PE (standard) (2 pcs)			Material needle, with carbide
*	21	0902-010-0365	Gasket, PTFE (2 pcs)	41	0902-040-0045	Piston
*	21	0902-010-0186	Gasket, glaze (2 pcs)	41	0902-040-0054	Piston (for tungsten carbide needle)
	22	0902-040-0069	Sealing screw (2 pcs)	42	0902-040-0044	Lock nut
	23	0902-030-0627	Sealing screw	42	0902-040-0053	Lock nut (for tungsten carbide needle)
*	24	0902-040-0049	Guide ring	43	0902-010-0739	Plug
	25	0902-040-0048	Washer	**	0920-090-....	Nozzle set, HV3
■	26	0902-080-....	Control section	(items 1,		
				0902-010-0478		Gasket set

* contain in the gasket set

** Please state type and size when ordering these parts.

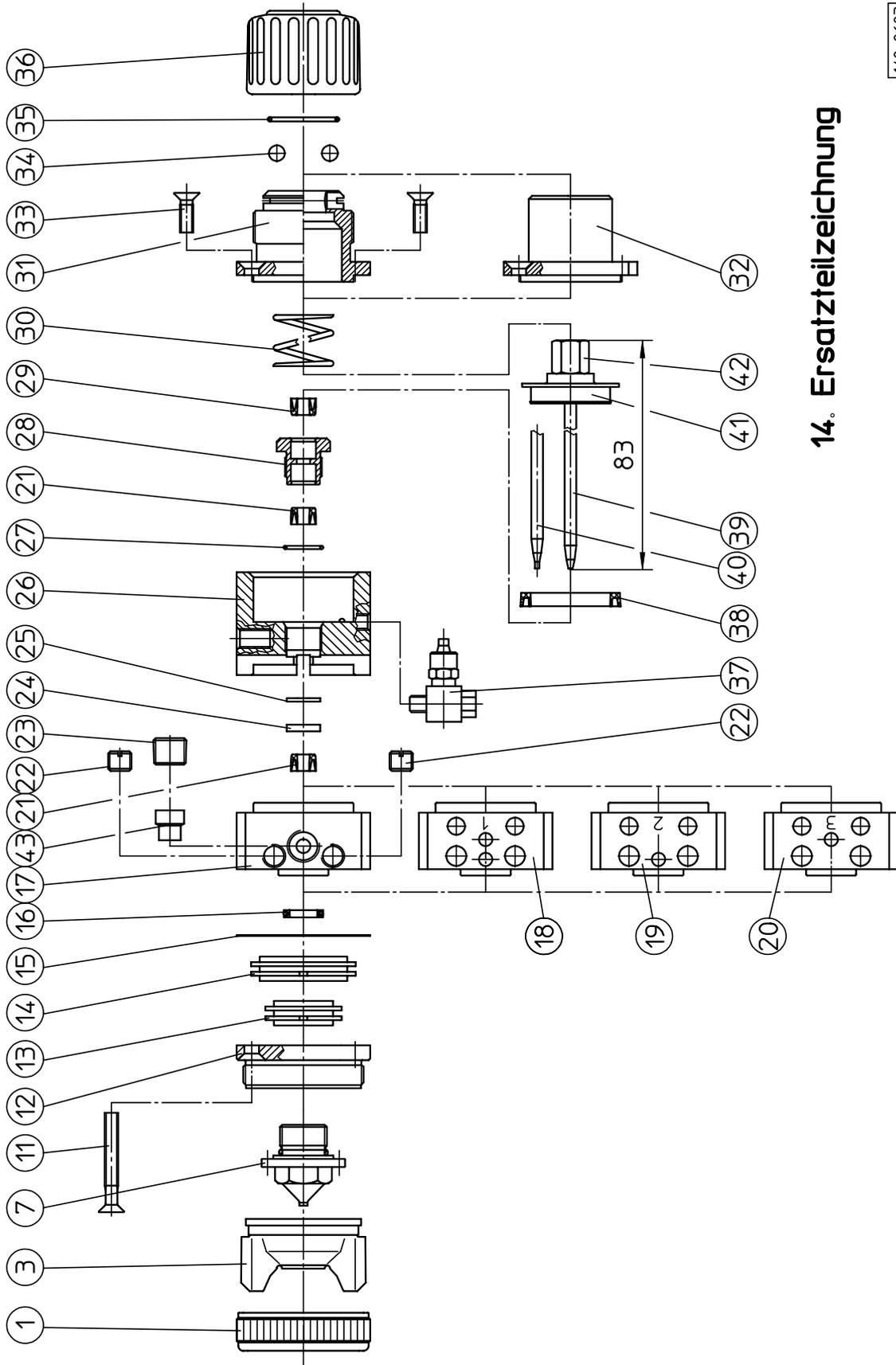
■ parts should be replaced in the factory

Material nozzles and material needles are made of stainless steel as standard.

Available nozzle sizes: 0.3, 0.5, 0.8, 1.0, 1.2, 1.5, 1.8, 2.0, 2.5

Available tungsten carbide nozzle sizes: 1.2, 1.5, 1.8, 2.2, 2.5

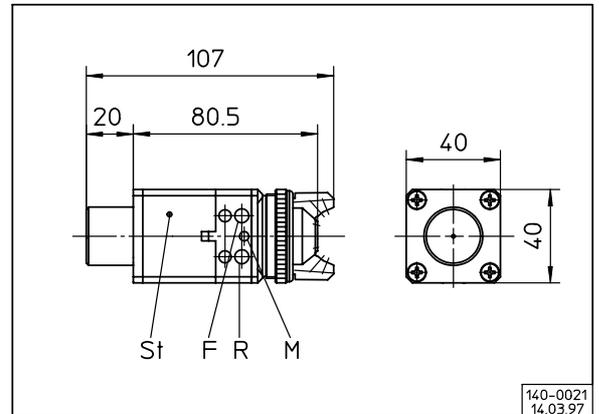
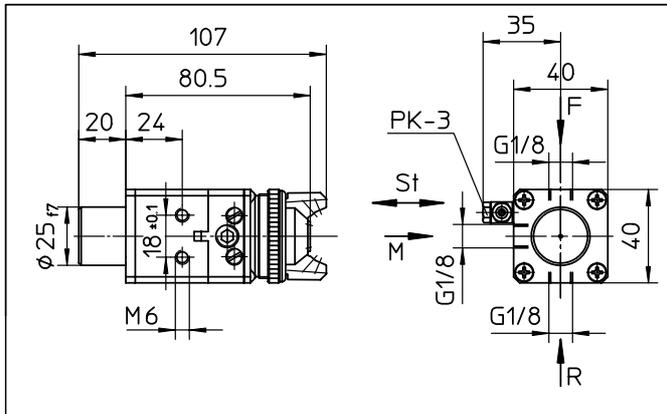
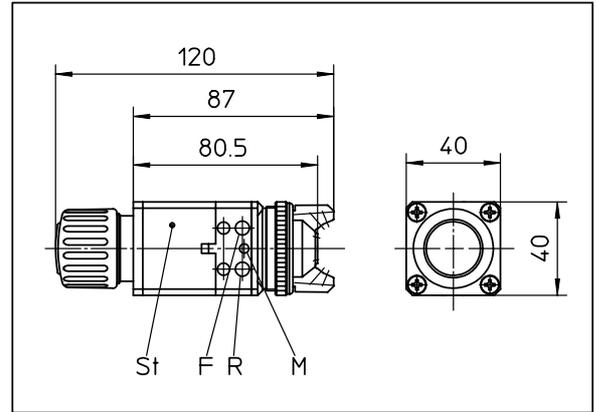
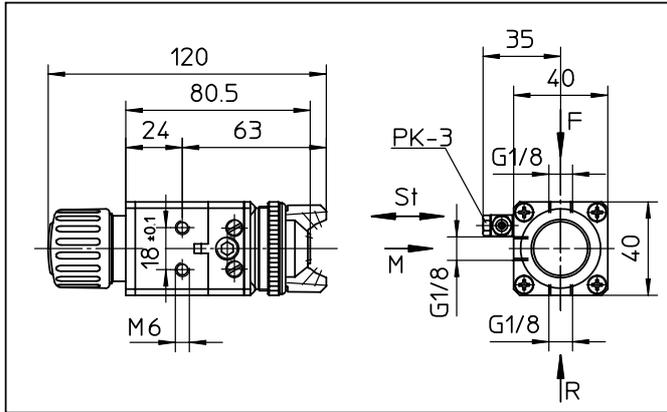
Nozzles in other sizes and materials on request.



140-0603
11.12.98

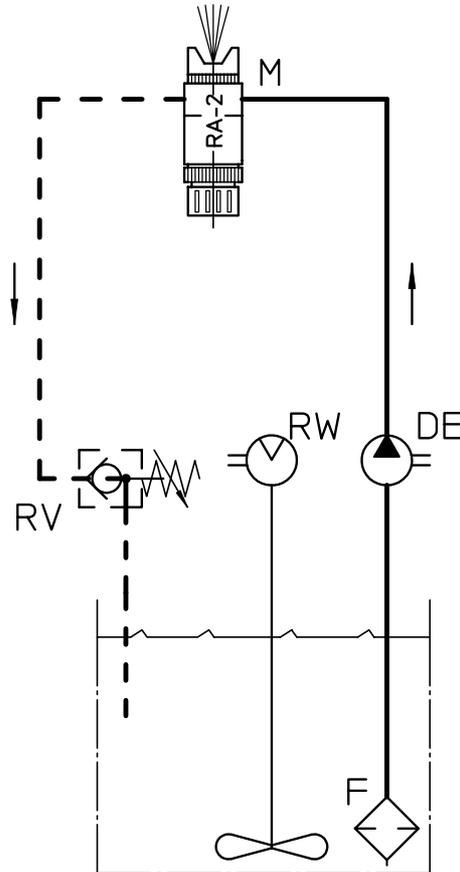
14. Ersatzteilzeichnung

Dimensions



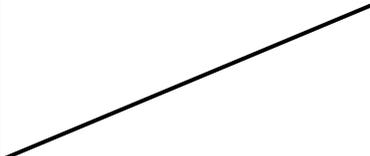
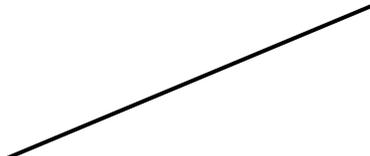
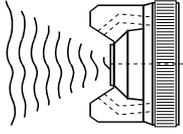
140-0021
14.03.97

Schematic diagram coating substance



- F = Filter
- DE= pump
- RV= pressure regulating valve
- RW= Stirrer (optional)
- M= coating substance
- circulation connection (optional)

14. Operating malfunctions and spray profile defects

Defect	Cause	Remedy
<p>Normal spray profile</p> 		
<p>Excessive spray profile toward the top and bottom</p> 	<p>Soiled air nozzle Soiled material nozzle</p>	<p>Clean nozzles</p>
<p>Spray profile veers markedly to left or right</p> 	<p>Soiled air nozzle Soiled material nozzle</p>	<p>Clean nozzles</p>
<p>Heavy application in the centre of the spray profile</p> 	<p>Too much material Excessively thick material</p>	<p>Reduce material feed Dilute material</p>
<p>Split spray profile</p> 	<p>Insufficient material Flat jet air pressure too high</p>	<p>Increase material feed Reduce flat jet air pressure</p>
<p>Surging or halting material jet</p> 	<p>Insufficient material in pressure vessel Blocked material path Loose or damaged material nozzle Worn needle packing</p>	<p>Refill pressure vessel Clean Tighten or renew Replace</p>
<p>Material leakage at packing screw</p>	<p>Needle packing defective</p>	<p>Replace needle packing</p>
<p>Material nozzle drips</p>	<p>Worn or damaged needle Soiled or damaged material nozzle</p>	<p>Replace needle Clean or replace material nozzle</p>