

Das WALTHER PILOT- Programm

D

- Hand-Spritzpistolen
- Automatik-Spritzpistolen
- Niederdruck-Spritzpistolen (System HVLP)
- Zweikomponenten-Spritzpistolen
- Materialdruckbehälter
- Drucklose Behälter
- Rührwerk-Systeme
- Airless-Geräte und Flüssigkeitspumpen
- Materialumlaufsysteme
- Kombinierte Spritz- und Trockenboxen
- Absaugsysteme mit Trockenabscheidung
- Absaugsysteme mit Nassabscheidung
- Trockner
- Zuluft-Systeme
- Atemschutzsysteme und Zubehör

The WALTHER PILOT Programme

GB

- Hand-Held Spray Guns
- Automatic Spray Guns
- Low Pressure Spray Guns (System HVLP)
- Two-Component Spray Guns
- Material Pressure Tanks
- Nonpressurized Tanks
- Agitator Systems
- Airless Equipment and Transfer Pumps
- Material Circulation Systems
- Combined Spraying and Drying Booths
- Dry Back Overspray Extraction Systems
- Wet Back Overspray Extraction Systems
- Dryers
- Ventilation Systems
- Protective Respiratory Systems and Accessory Items

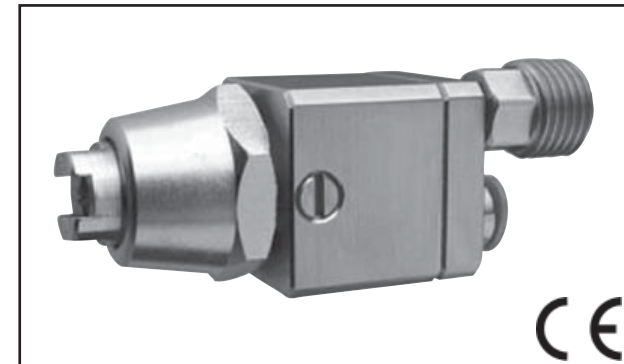
WALTHER PILOT

Betriebsanleitung / Operating Instructions

D GB

Airless-Automatik-Spritzpistole /
Airless-Automatic-Spray Gun

PILOT WA 21



AUSG. 07/10



Die Beschichtungs-Experten

WALTHER Spritz- und Lackiersysteme GmbH
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Die Beschichtungs-Experten

EG-Konformitätserklärung

D

Wir, der Gerätehersteller, erklären in alleiniger Verantwortung, dass das Produkt in der untenstehenden Beschreibung den einschlägigen grundlegenden Sicherheits- und Gesundheitsanforderungen entspricht. Bei einer nicht mit uns abgestimmten Änderung an dem Gerät oder bei einer unsachgemäßen Verwendung verliert diese Erklärung ihre Gültigkeit.

Hersteller	WALTHER Spritz- und Lackiersysteme GmbH Kärntner Str. 18 - 30 D - 42327 Wuppertal Tel.: +49(0)202 / 787 - 0 Fax: +49(0)202 / 787 - 217 www.walther-pilot.de • e-mail: info@walther-pilot.de			
Typenbezeichnung	Airless - Automatik Spritzpistole			
	PILOT WA 21		V 20 952	
	PILOT WA 21-U		V 20 953	
Verwendungszweck	Verarbeitung spritzbarer Materialien			
Angewandte Normen und Richtlinien				
EG-Maschinenrichtlinien 2006 / 42 / EG 94 / 9 EG (ATEX Richtlinien) DIN EN ISO 12100 Teil 1 DIN EN ISO 12100 Teil 2 DIN EN 1953 DIN EN 1127-1 DIN EN 13463-1				
Spezifikation im Sinne der Richtlinie 94 / 9 / EG				
Kategorie 2	Gerätebezeichnung		II 2 G c T 5	Tech.File,Ref.: 2405
Bevollmächtigt mit der Zusammenstellung der technischen Unterlagen: Nico Kowalski, WALTHER Spritz- und Lackiersysteme GmbH, Kärntner Str. 18 - 30 D- 42327 Wuppertal				
Besondere Hinweise : Das Produkt ist zum Einbau in ein anderes Gerät bestimmt. Die Inbetriebnahme ist so lange untersagt, bis die Konformität des Endproduktes mit der Richtlinie 2006 / 42 / EG festgestellt ist.				

Wuppertal, den 07. Juli 2003

i.V. 


Name: Torsten Bröker
Stellung im Betrieb: Leiter der Konstruktion und Entwicklung

Diese Erklärung ist keine Zusicherung von Eigenschaften im Sinne der Produkthaftung. Die Sicherheitshinweise der Produktdokumentation sind zu beachten.


Declaration of CE-Conformity

GB

We, the manufacturers of the equipment, hereby declare under our sole responsibility that the product(s) described below conform to the essential safety requirements. This declaration will be rendered invalid if any changes are made to the equipment without prior consultation with us.

Manufacturer	WALTHER Spritz- und Lackiersysteme GmbH Kärntner Str. 18 - 30 D - 42327 Wuppertal Tel.: +49(0)202 / 787 - 0 Fax: +49(0)202 / 787 - 217 www.walther-pilot.de • e-mail: info@walther-pilot.de			
Type Designation	Airless - Automatic Spray Gun			
	PILOT WA 21		V 20 952	
	PILOT WA 21-U		V 20 953	
Intended purpose	Processing of sprayable media			
Applied Standards and Directives				
EU-Mechanical Engineering Directives 2006 / 42 / EC 94 / 9 EC (ATEX Directives) DIN EN ISO 12100-1 DIN EN ISO 12100-2 DIN EN 1953 DIN EN 1127-1 DIN EN 13463-1				
Specification according 94 / 9 / EC				
Category 2	Part marking		II 2 G c T 5	Tech.File,Ref.: 2405
Authorized with the compilation of the technical file: Nico Kowalski, WALTHER Spritz- und Lackiersysteme GmbH, Kärntner Str. 18 - 30 D- 42327 Wuppertal				
Special remarks : The named product is intended for installation in other equipment. Commissioning is prohibited until such time as the end product has been proved to conform to the provision of the Directives 2006 / 42 / EC.				

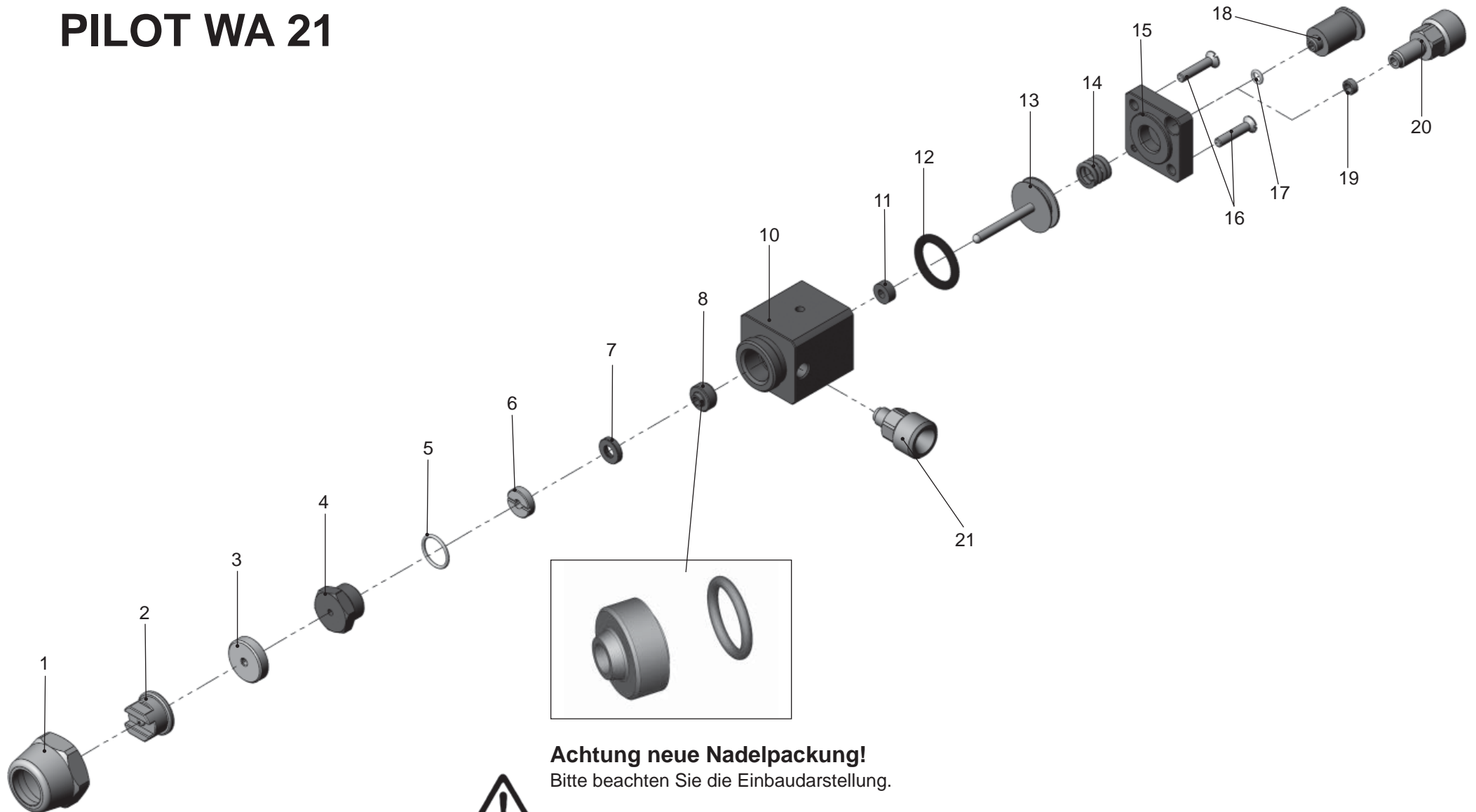
Wuppertal, the 7th of July 2003

i.V. 

Name: Torsten Bröker
Position: Manager, Design and Development

This Declaration does not give assurance of properties in the sense of product liability. The safety instructions provided in the product documentation must be observed at all times.

PILOT WA 21



Achtung neue Nadelpackung!

Bitte beachten Sie die Einbaudarstellung.



Attention new Needle Seal!

Please, follow the installation representation.

Listing of Replacement Parts PILOT WA 21

Art.No. V 20 952 00 003 (120 bar)

1	V 20 900 05 001	Sleeve Nut
2	G 16 3XXX	Material Nozzle
3	G 16 286 3	Nozzle Seal
4	V 20 950 15 003	Needle Seat komplett
5	V 09 103 33 001	O-Ring
6	V 20 952 05 003	Packing Screw
7	V 20 952 04 003	Pressure Peace
8	V 20 952 03 000	Neddle seal packing
10	V 20 952 01 003	Forepart
11	V 09 220 25 001	“V”-Package Ring
12	V 09 103 56 001	O-Ring
13	V 20 952 02 003	Material Control Needle kompl.
14	V 20 950 50 003	Piston Spring
15	V 20 950 02 003	Piston Casing
16	V 20 950 03 003	Countersunk Srew
17	V 09 102 20 001	O-Ring
18	V 66 101 53 317	Control Air Connection
19	V 20 950 30 000	Material seal
20	V 20 950 20 003	Material Connection

Variants for Art.-No. V 20 953 00 003 (Material Circulation Mode)

10	V 20 953 01 003	Forepart
21	V 20 950 20 103	Material Connection (Circulation Mode)

We recommend that the bold-faced replacement parts (i.e.wearing parts) are held on stock !

Repair Kit:

Art.-No.: V 16 952 00 000

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1 General

1.1 Identification of Model Version

Model:	PILOT WA 21	
Type:	Airless - Automatic Spray Gun	V 20 952
	Airless - Automatic Spray Gun - U	V 20 953
Manufacturer:	WALTHER Spritz- und Lackiersysteme GmbH Kärntner Strasse 18-30 D-42327 Wuppertal - Germany TEL: 0202/787-0 FAX: 0202/787-217 • www.walther-pilot.de	

1.2 Normal Use

The airless - automatic spray gun model PILOT WA 21 is exclusively designed for use with all airless-sprayable material types and grades such as, for example:

- paints and lacquers
- greases, oils and corrosion preventives
- adhesive compounds
- ceramic glazes
- pickling solutions

If your specific material is not listed above, please contact us for further and detailed information.

Please note that sprayable material may only be applied to workpieces and/or similar items.

The temperature of the spraying material shall never exceed 80° C.

The term "normal use" also implies that any and all safety warnings, operational handling details, etc., as contained in these Operating Instructions, are carefully read, understood and duly complied with.

This equipment complies with the explosion protection requirements of Directive 94/9/EC (ATEX) for the explosion group, equipment category and temperature class indicated on the type plate. When using the equipment, the requirements specified in these Operating Instructions must be observed at all times.

The technical data indicated on the equipment rating plates and the specifications in the chapter "Technical Data" must be complied with at all times and must not be exceeded. An overloading of the equipment must be ruled out.

The equipment may be used in potentially explosive atmospheres only with the authorisation of the relevant supervisory authority.

The relevant supervisory authority or the operator of the equipment are responsible for determining the explosion hazard (zone classification).

The operator must check and ensure that all technical data and the marking of the equipment in accordance with ATEX are compliant with the necessary requirements.

The operator must provide corresponding safety measures for all applications in which the breakdown of the equipment might lead to danger to persons.

If any irregularities are observed while the equipment is in operation, the equipment must be put out of operation immediately and WALTHER Spritz-und Lackiersysteme must be consulted.

Grounding / Equipotential Bonding

You must ensure that the spray gun is properly earthed (grounded) either separately or in connection with the equipment with which it is being used (maximum resistance $10^6 \Omega$).

1.3 Improper Use

This spray gun shall not be used for purposes other than set forth in the above Chapter "Normal Use". Any other form of use and/or application is prohibited and considered as improper use in contrast to the original engineering design concept. The term "improper use" also includes such operations as may be:

- spraying of material onto persons and animals
- spraying of liquid nitrogen, etc.

2 Technical Description

The WALTHER PILOT WA 21 is a pneumatic-controlled airless - automatic spray gun of extreme mini-sized design. Its maximum operating pressure rates 120 bar.

The gun body is made of stainless steel with hard-coated surfaces inside and outside. The spraying medium is fed to the gun in pressurized condition by a piston or diaphragm pump and atomized the moment it exits from the nozzle.

The PILOT WA 21 spray gun is controlled across a 3/2-way solenoid valve which, upon actuation, directs control air into the cylinder inside the gun body so as to open - in sequence - the material input.

Closing of the 3/2-way valve is followed by the control air escaping from the cylinder inside the gun body, upon which the spring-loaded material control needle returns to its initial position, where it shuts the material input off.

The control air pressure must rate at least 5 bar. This automatic spray gun is basically designed for operation in circulation systems, with one of the bores sealed with a screw plug which, once removed, can be replaced with a material connection (Item 21). The gun is now ready for connection to a circulation system.

All commercial airless spray nozzles can be used in this PILOT WA 21 gun.

3 General Safety Instruction

All applicable accident prevention rules and regulations as well as other recognised industrial safety, health rules and regulations must be observed at all times.

Fire, naked flames and smoking are strictly prohibited within the working area.

WARNING- during the spraying of flammable materials (e.g. lacquers, adhesives, cleaning agents, etc.), there is an increased risk to health as well as an increased risk of explosion and fire. Use the spray gun only in well-ventilated rooms.

You must ensure that the spray gun is properly earthed (grounded) either separately or in connection with the equipment with which it is being used (maximum resistance $10^6 \Omega$).

Before carrying out maintenance or servicing work, always ensure that the air and material feed to the spray gun have been depressurised. - Risk of injury!

Keep your hands and other extremities away from the front of the pressurised gun during the spraying process. - Risk of injury.

Piston or diaphragm pumps must always be operated in combination with a material flow regulator valve in order to ensure that the allowable maximum operating overpressure of 120 bar is never exceeded.

Never point the spray gun at person or animals. Risk of injury!

It is important that all processing specifications and safety warnings issued by the manufacturers of spraying and cleaning media are duly complied with. Remember: Aggressive and corrosive media represent risks and hazards to personal health, and may cause material damage.

Airborne particles represent a health hazard and must therefore be kept away from the working area, towards which end ventilation systems are used. Extra protection is still needed and it is therefore important that anybody engaged with spraying media wears proper respiratory protection masks and protective overalls.

Spray guns produce sound levels of up to about 82 dB (A). It is therefore important to wear suitable hearing protectors.

It is important to ensure that nuts, screws and fasteners are properly tightened, especially after servicing and repair work.

Make sure you use original WALTHER Spritz- und Lackiersysteme replacement parts designed for functional reliability and efficiency.

If you require further details concerning the safe use of this spray gun, do not hesitate to contact us.

4 Assembly / Installation / Supply Lines



Warning

Material and air hoses attached by way of a hose fitting must be secured by additional hose clips.

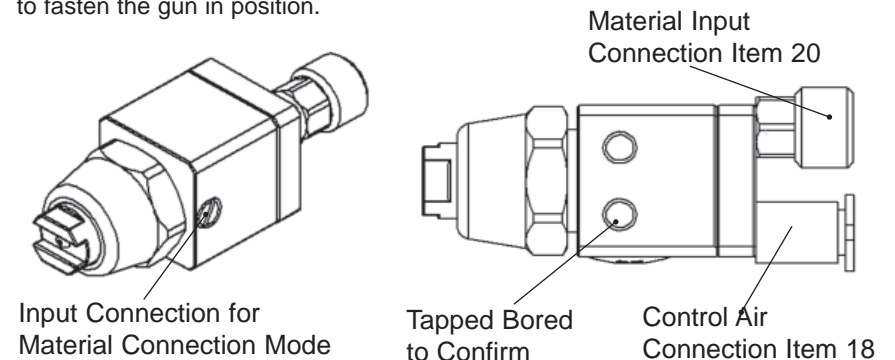


Warning

Make sure not to confuse the material and atomizing air connections.

4.1 Mounting of Spray Gun

Install the gun in a suitable and stable mounting device - use two Size M5 screws to fasten the gun in position.



4.2 Connection of Input Lines

Connect the grounded material hose to the material flow regulator valve and to the material connection (Item 20) of the gun. **WARNING:** Make sure that the transfer pump operates in combination with a material flow regulator valve - this is important to ensure that the allowable maximum operating overpressure of 120 bar is never exceeded.

Material Circulation Mode:

Remove the screw plug from the gun and replace it with the material connection (Item 21). Make sure that all connections are properly tightened.

Material Input Connection:

Connect the material input line to the barrel nipple (Item 20) of the gun and make sure that this connection is properly tightened (Item 19).

Control Air Connection:

Connect the control air line to the solenoid valve and to the quick-release fitting (Item 18) of the gun. Make sure that these connections are properly tightened.

The gun is now ready for operation.

5 Operational Handling

5.1 Safety Warnings

Make sure the following safety warnings are met to taking this spray gun into operation.

- Remove all pressures from the gun and the system whenever operations are interrupted.
- Make sure to wear proper respiratory protection masks and protective overalls whenever you are operating this spray gun.
- Air-borne particles represent a health hazard.
- Make sure to wear suitable hearing protectors. Spray guns produce sound levels of up to about 82 dB (A).
- Make sure your working area is absolutely free from open fires and naked lights - risk of fire and explosion.

5.2 Starting/Stopping Requirements

When taking the spray gun into operation, flush the gun with a solvent compatible with the medium last used.



Warning

Make sure that all pressures are removed from the gun and the system before retooling - risk of injury.

Make sure you have the right material pressure at the gun before you start with your job.



Warning

The material pressure shall never be set to a rating in excess of:
- 120 bar

The control air pressure shall not exceed 8 bar as, otherwise, the functional reliability of the spray gun will suffer.



Warning

The spray gun and the system must always be relieved of all pressures whenever work is terminated - lines left in pressurized condition could burst, with their contents likely to injure anybody present nearby.

5.3 Spray Pattern Test

Spray pattern tests should be performed whenever:

- the spray gun is taken into operation for the first time
- the spraying medium is changed
- the spray gun was taken apart for servicing or repairs

The spray pattern is best tested using a workpiece sample, a sheet of metal, cardboard or paper.



Warning

Keep your hands and other extremities away from the front of the pressurised gun during the spraying process. - the extremely high spraying pressure (120 bar) can cause severe injuries.



Warning

Make sure that nobody is present in the spraying zone when the gun is started - imminent risk of injury.

1. Start the gun to produce a spray pattern sample (see also 5.2 "Starting / Stopping Requirements).
2. Inspect the sample and readjust the settings of the gun as may be required (see also 5.4 "Spray Pattern Adjustments").

5.4 Spray Pattern Adjustments

The spray pattern of the PILOT WA 21 gun may be adjusted as follows:

Adjustment of the Material Flow Volume


The flow volume depends on the spray tip size which, in turn, determines the spray jet width. So it is best to start with selecting the appropriate spray tip size. The next step would then be an adjustment of the material pressure at the flow regulator valve.

Adjustment of the Material Pressure


Select the required material pressure by adjusting the pump pressure in combination with the material flow regulator valve. Make sure to comply with the Operating Instructions and Safety Warnings issued by the manufacturers concerned.

If you wish to change the spraying pattern beyond the adjustments outlined so far, you should retool the spray gun (see 5.5 "Retooling of Spray Gun").

5.5 Retooling of Spray Gun

 **Warning**
Make sure that all pressures are removed from the gun and the system before retooling - risk of injury.

 **Warning**
Shut the air and material input off before retooling - risk of injury.

 **Note**
See the drawing for detailed information when performing the retooling steps outlined below.

Replacement of Material Outlet Nozzle (i.e. Airless Spray Tip)

1. Remove the sleeve nut (Item 1) (use a Size 22 mm wrench)
2. Remove the Airless spray tip (Item 2) and seal (Item 3) from the gun body

Installation of another or new Airless spray tip to be in reverse order.

Replacement of Material Filters

Coarse- or fine-grade filters may be used for efficient material filtration.

1. Remove all pressures from the gun and the system.
2. Remove the material hose(s).
3. Remove the material filter.

Installation of new filters to be in reverse order.


6 Servicing and Maintenance


6.1 Safety Warnings

- Remove all pressures from the gun and the system before performing any servicing and/or maintenance work - imminent risk of injury.
- Shut the air and material input off before retooling - risk of injury.
- No open fires and naked lights as well as smoking are allowed in the work area - risk of fire and explosion, particularly when spraying readily flammable media such as, for example, paints, lacquers, cleaning solutions, etc.
- All processing specifications and safety warnings issued by the manufacturers of spraying and cleaning media must be duly complied with. Aggressive and corrosive media represent risks and hazards to personal health.

6.2 Cleaning - Complete

It is recommended practice to clean and lubricate the spray gun at regular intervals as this will greatly help towards ensuring a long service life and functional reliability.

 **Caution**
Never immerse the spray gun in solvent or any other cleaning solution as such measure is highly likely to affect the functional reliability and efficiency of the gun.

 **Caution**
Do not use any hard, pointed or sharp-edged objects when cleaning the spray gun. Any damage of the precision-made parts will certainly affect your spraying results.

Cleaning of the gun only with cleaning solutions recommended by the manufacturer of the spraying material used at the time. It is important to make sure that cleaning solutions do not contain any of the following constituents:

- halogenated hydrocarbons
(e.g. 1,1,1-trichloroethane; methylene chloride, etc.)
- acids and acidiferous cleaning solutions
- regenerated solvents (so-called cleaning dilutions)
- paint removers

The above constituents cause chemical reactions with electroplated components resulting in corrosion damage.

Claims for damage arising from non-compliance with the above requirements will not be accepted on the part of WALTHER Spritz-und Lackiersysteme.

Clean the spray gun

- prior to each change of the spraying medium
- at least once a week
- as often as may be required by the spraying medium handled and the resulted degree of fouling.

The above cleaning measures are designed to maintain the functional efficiency of the gun.

1. Dismantle the spray gun (see 5.5 "Retooling of Spray Gun").
2. Use a soft brush together with a compatible cleaning solution to clean the nozzle.
3. Use a suitable cloth with a compatible cleaning solution to clean the gun body and all remaining parts
4. Apply a thin film of the appropriate grease type/grade to the:
 - Material control needle
 - piston spring
 - all sliding parts and bearing surfaces
 - all internal moving parts should be greased at least once a week
 - all springs should be covered by a thin grease film at all times.

Make sure to use a non-acidic, non-resinogenic grease type/grade and apply same with a soft brush.

Assemble the spray gun in reverse order.

6.3 Cleaning - Routine

The spray gun need not necessarily be dismantled for cleaning if and when the spraying medium is changed in regular intervals or upon termination of work (depending, of course, on the material used).

The following requirements must be met before the routine cleaning work can be performed:

- Make sure that the cleaning solution is compatible with the material to be used.

Now proceed as follows:

1. Take the spray gun into operation (see 5.2 "Starting/Stopping requirements).
2. Flush the spray gun at the lowest possible pressure rating.
3. Do not stop the spray gun until clear cleaning solution emerges from the Airless spray tip.

All pressures should now be removed from the complete spraying system - which should be left in this condition until it is taken into operation again.

7 Repairs / Replacements



Warning

Air and material inputs must be shut off prior to re-tooling - risk of injury.



Warning

Prior to any repairs/replacements: Make sure that the spray gun is in unpressurized condition, i.e. all air and material inputs must be shut off - Risk of injury.



Note

Please refer to the exploded view at the beginning of this manual to perform the steps detailed below.

7.1 Replacement of defective Needle Seal

1. Remove the sleeve nut (Item 1).
2. Remove the needle seat (Item 4).
3. Take off the material connection (Item 20) with the material seal (item 19) and the piston casing (Item 15) by releasing the 2 countersunk screw (Item 16).
4. Push out the material control needle (Item 13) of the forepart (Item 10).
5. Pull the "V"-package ring (Item 11) off its seat - use a suitable piece of wire, with a small hook formed at one end, for this purpose.
6. Remove the packing screw (Item 6) of the forepart (Item 10).
7. Pull the pressure piece (Item 7) and the needle seal packing (Item 8) with the small hook off its seat.

8. Change used needle seal, "V"-package ring and the material seal by new parts. Assembly of the remaining parts to be in reverse order.



Note

Used parts removed from the gun are not to be used again because their sealing efficiency can no longer be relied upon.

7.2 Replacement of Material Control Nozzle

Dismantle the gun as outlined in 5.5 "Retooling of Spray Gun".

1. Remove the needle seat (Item 4).
2. Take off the material connection (Item 20) with the material seal (item 19) and the piston casing (Item 15) by releasing the 2 countersunk screw (Item 16).
3. Push out the material control needle (Item 13) backwards of the forepart (Item 10).

Assembly to be in reverse order.

Replacement of Material Filter

Replacement of material filter to be as outlined in 5.5 "Retooling of Spray Gun".



Note

All moving and sliding parts must be lubricated with a non-acidic, non-resinogenic grease type/grade prior to installation in the gun body.

Repair Kit:

A repair kit, made up of all wearing parts, is available from WALTHER PILOT for the Automatic Airless Spray Gun Model PILOT WA 21 (120 bar):

Art. No. V 16 952 000 00

consisting of: Nozzle seal (item 3), Needle seat complete (Item 4), O-Ring (Item 5), Needle seal packing (Item 8), O-Ring (Item 9), "V"-Packing Ring (Item 11), O-Ring (Item 12), Material control needle complete (Item 13), Piston Spring (Item 14), O-Ring (Item 17), Material seal (item 19).

8 Troubleshooting and Corrective Action



Warning

Make sure that the control air, atomizing air and material input to the spray gun are shut off prior to any repair work - risk of injury.

Fault	Cause	Remedy
Material nozzle is leaky	- Needle seal packing (item 8) - Needle seat (item 4) - O-Ring (item 5)	• Check • Clean and / or Replace
Insufficient Material Input	- Filter clogged - Material nozzle too small - Material Pressure too low	• Clean • Change to larger Size • Increase Material pressure
Spray Jet fails to reach the desired width	- Material nozzle (item 2) worn out	• Replace
Material leaks from leakage bore	- Needle seal packing (item 8)	• Replace

9 Disposal of Cleaning / Servicing Substances

Disposal of any such substances must be in accordance with all applicable local and national regulations, directives and laws.



Warning

All processing specifications and safety warnings issued by the manufacturers of spraying and cleaning media must be observed. The improper disposal of any toxic waste material represents a serious threat to the environment, i.e. to the health of mankind and animal life.

10 Specification Data

Net Weight:	158 g
Airless Spray Material nozzle Sizes to choice:	see Table below
Pressure Ranges	
max. Control Air Pressure	8 bar
max. Material Pressure	120 bar
max. Operating Temperature:	80° C
Sound Level (measured at a distance of 1 m from the spray gun):	82 dB (A)

Right to effect technical changes reserved.

Nozzle size	No. of Order	An-gel	Spray pattern in mm	VolumetricFlow/min low-viscosity/ high-viscosity Materials	Nozzle size	No. of Order	An-gel	Spray pattern in mm	Vol.Flow/min low-viskos./ viskos. Materials
0.18	163107	10°	50-100	0.189	0.43	163117	10°	50-100	1.136
	163207	20°	100-150			163217	20°	100-150	
	163307	30°	150-200			163317	30°	150-200	
	163407	40°	200-250			163417	40°	200-250	
0.23	163109	10°	50-100	0.303	0.48	163517	50°	250-300	1.363
	163209	20°	100-150			163617	60°	300-350	
	163309	30°	150-200			163717	70°	350-400	
	163409	40°	200-250			163817	80°	400-450	
	163509	50°	250-300			163917	90°	450-500	
	163609	60°	300-350						
0.28	163111	10°	50-100	0.454	0.53	163119	10°	50-100	1.741
	163211	20°	100-150			163219	20°	100-150	
	163311	30°	150-200			163319	30°	150-200	
	163411	40°	200-250			163419	40°	200-250	
	163511	50°	250-300			163519	50°	250-300	
	163611	60°	300-350			163619	60°	300-350	
0.33	163113	10°	50-100	0.643	0.58	163121	10°	50-100	2.082
	163213	20°	100-150			163221	20°	100-150	
	163313	30°	150-200			163321	30°	150-200	
	163413	40°	200-250			163421	40°	200-250	
	163513	50°	250-300			163521	50°	250-300	
	163613	60°	300-350			163621	60°	300-350	
0.38	163115	10°	50-100	0.871	0.74	163123	10°	50-100	3.331
	163215	20°	100-150			163223	20°	100-150	
	163315	30°	150-200			163323	30°	150-200	
	163415	40°	200-250			163423	40°	200-250	
	163515	50°	250-300			163523	50°	250-300	
	163615	60°	300-350			163623	60°	300-350	
0.58	163715	70°	350-400	2.082	0.79	163129	10°	50-100	0.871
	163815	80°	400-450			163229	20°	100-150	
	163923	90°	450-500			163329	30°	150-200	
	163125	10°	50-100			163429	40°	200-250	
	163225	20°	100-150			163529	50°	250-300	
	163325	30°	150-200			163629	60°	300-350	
0.63	163425	40°	200-250	2.498	0.79	163729	70°	350-400	3.861
	163525	50°	250-300			163829	80°	400-450	
	163625	60°	300-350			163929	90°	450-500	
	163725	70°	350-400						
	163825	80°	400-450						
	163925	90°	450-500						
0.68	163127	10°	50-100	2.914	0.79	163131	10°	50-100	1.098
	163227	20°	100-150			163231	20°	100-150	
	163327	30°	150-200			163331	30°	150-200	
	163427	40°	200-250			163431	40°	200-250	
	163527	50°	250-300			163531	50°	250-300	
	163627	60°	300-350			163631	60°	300-350	
163727	70°	350-400	163731	70°	350-400				
163827	80°	400-450	163831	80°	400-450				
163927	90°	450-500	163931	90°	450-500				