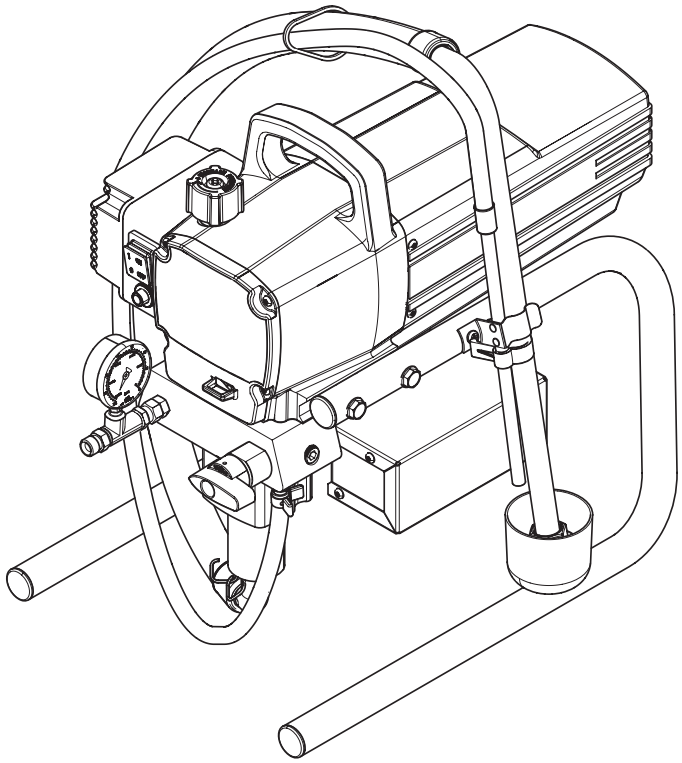
Service manual with electrical repair instructions for electrically instructed persons of the J. Wagner GmbH

ProSpray 20



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WAGNER

Contents

ELECTRICAL REPAIR INSTRUCTIONS

1 GENERAL SAFETY INSTRUCTIONS

WARNING!  ***Read all safety information, instructions, illustrations and technical data provided with this power tool.*** *Failure to observe the following instructions may cause electric shock, fire and/or severe injuries.* ***Keep all safety information and instructions for future reference.*** *The term "power tool" used in this safety information refers to mains-operated power tools (with power cable) and to battery-powered power tools (without power cable).*

1. Safety at the workplace

a) Keep your workplace clean and well lit. *Disorder or unlit workplaces may result in accidents.*

b) Do not work with the power tool in potentially explosive environments where there are flammable fluids, gases or dust. *Power tools generate sparks that can ignite the dust or vapors.*

c) Keep children and other persons away when using the power tool. *If distracted, you may lose control of the power tool.*

2. Electrical Safety

a) The connection plug of the power tool must fit in the socket. The plug may not be modified in any form. Verwenden Sie keine Adapterstecker gemeinsam mit schutzgeerdeten Elektrowerkzeugen. *Unmodified plugs and suitable sockets reduce the risk of an electric shock.*

b) Avoid physical contact with earthed surfaces such as pipes, heating elements, stoves and refrigerators. *The risk through electric shock increases if your body is earthed.*

c) Keep power tools away from rain or moisture. *Water penetrating into a power tool increases the risk of an electric shock.*

d) Do not misuse the power cord to carry the power tool, hang up the power tool or pull the plug out of the socket. Keep the power cord away from heat, oil, sharp edges or moving parts. *Damaged or entangled power cords increase the risk of an electric shock.*

e) If the power tool must be used in a moist environment, use a ground fault circuit interrupter. *Using a residual current operated circuit-breaker avoids the risk of electric shock.*

3. Safety of Persons

a) Be attentive. Pay attention to what you are doing and work sensibly with a power tool. Do not use the power tool if you are tired or under the influence of drugs, alcohol or medication. *One moment of carelessness when using the power tool may cause serious injuries.*

b) Wear personal safety equipment and always wear safety goggles *Wearing personal protective equipment, such as dust mask, non-slip safety shoes, safety helm or ear protection, depending on the type of power tools, reduces the risk of injury.*

c) Avoid accidental starting-up. Make sure that the power tool is switched off before you connect it to the power tool and/or battery, pick it up or carry it. *Accidents may happen if you have your finger on the switch while carrying the power tool or if the device is switched on when you connect it to the power supply.*

d) Remove setting tools or wrenches before switching on the power tool. *A tool or key in a rotating part of the power tool can cause injuries.*

e) Avoid an unnatural posture. Ensure that you are standing securely and have your balance at all times. *This allows you can better control the power tool in unexpected situations.*

f) Wear suitable clothing. Do not wear wide clothing or jewellery. Keep your hair, clothes and gloves away from moving parts. *Loose clothing, jewellery or long hair can be caught in moving parts.*

g) Do not lull yourself into a false sense of security and do not think yourself above the safety rules for electric tools, even if you are familiar with the electric tool following extensive practical experience. *Careless use can lead to serious injuries in fractions of a second.*

4. Usage and treatment of the electric tool

a) Do not overload the power tool. Use the power tool designed for the work that you are doing. *You work better and safer in the specified performance range if you use the suitable power tool.*

b) Do not use power tools whose switch is defective. *A power tool that cannot be switched on or off is dangerous and has to be repaired.*

c) Disconnect the plug from the socket and/or take out a removable battery before you make device adjustments, change accessories or put the power tool away. *This precautionary measure prevents the power tool from starting unintentionally.*

d) Store unused power tools so that they are inaccessible to children. Do not let persons use the tool who are not familiar with it or who have not read these instructions. *Power tools are dangerous when they are used by inexperienced persons.*

e) Maintain the power tool and insertion tools with care. Check whether moving device parts are working flawlessly and are not jamming, whether parts are broken or damaged so that as to impair the function of the power tool. Have damaged parts repaired before using the power tool. *Many accidents have their origin in power tools that have been maintained badly.*

f) Use the power tool, accessories, insert tools, etc. in accordance with these instructions and in a fashion specified for this special tool type. Take the working conditions and the activity to be carried out into consideration. *The use of power tools for purposes other than the intended ones can lead to dangerous situations.*

g) Keep the handles and grip surfaces dry, clean and free of oil and grease. Slippery handles and grip surfaces hamper safe operation and control of the electric tool in unforeseen situations.

5. Service

a) Only have your power tool repaired by a qualified specialist and only use original spare parts. *This ensures that the tool safety is maintained.*

b) If the supply cord is damaged, it must be replaced by the manufacturer or it's service agent or a similarly qualified person in order to avoid a safety hazard.

2 SAFETY REGULATIONS FOR AIRLESS SPRAYING

All local safety regulations in force must be observed.
The following safety regulations are to be observed in order to ensure safe handling of the Airless high-pressure spraying unit.

2.1 FLASH POINT

Danger	Only spray coating materials with a flash point of 21 °C or higher. The flash point is the lowest temperature at which vapors develop from the coating material. These vapors are sufficient to form an inflammable mixture over the air above the coating material.

2.2 EXPLOSION PROTECTION

Danger	Do not use the unit in work places which are covered by the explosion protection regulations. The unit is not designed to be explosion protected. Do not operate the device in explosive areas (zone 0, 1 and 2). Explosive areas are, for example, places where paints are stored and locations in direct proximity to the object being sprayed. Keep the device at least 3 m from the object you are spraying.

2.3 DANGER OF EXPLOSION AND FIRE FROM SOURCES OF IGNITION DURING SPRAYING WORK

Danger	There must be no sources of ignition such as, for example, open fires, lit cigarettes, cigars or tobacco pipes, sparks, glowing wires, hot surfaces, etc. in the vicinity.

2.4 DANGER OF INJURY FROM THE SPRAY JET

Danger 	Attention, danger of injury by injection! Never point the spray gun at yourself, other persons or animals. Only use the spray gun with spray jet touch protection. The spray jet must not come into contact with any part of the body. In working with Airless spray guns, the high spray pressures arising can cause very dangerous injuries. If contact is made with the spray jet, coating material can be injected into the skin. Do not treat a spray injury as a harmless cut. In case of injury to the skin by coating material or solvents, consult a doctor for quick and correct treatment. Inform the doctor about the coating material or solvent used.

2.5 SECURE SPRAY GUN AGAINST UNINTENDED OPERATION

Always secure the spray gun when mounting or dismounting the tip and in case of interruption to work.

2.6 RECOIL OF SPRAY GUN

Danger	When using a high operating pressure, pulling the trigger guard can effect a recoil force up to 15 N. If you are not prepared for this, your hand can be thrust backwards or your balance lost. This can lead to injury.

2.7 BREATHING EQUIPMENT AS PROTECTION AGAINST SOLVENT VAPORS

Wear breathing equipment during spraying work.

2.8 PREVENTION OF OCCUPATIONAL ILLNESSES

Wear safety goggles.
Wear hearing protection. This device can generate a sound pressure of over 85 dB.
Protective clothing, gloves and possibly skin protection cream are necessary for the protection of the skin.
Observe the regulations of the manufacturer concerning coating materials, solvents and cleaning agents in preparation, processing and cleaning units.

2.9 MAX. OPERATING PRESSURE

The permissible operating pressure for the spray gun, spray gun accessories, unit accessories and high-pressure hose must not fall short of the maximum operating pressure of 21,4 MPa (214 bar).

2.10 HIGH-PRESSURE HOSE

 Danger	Attention, danger of injury by injection! Wear and tear and kinks as well as usage that is not appropriate to the purpose of the device can cause leakages to form in the high-pressure hose. Liquid can be injected into the skin through a leakage.

- High-pressure hoses must be checked thoroughly before they are used.
- Replace any damaged high-pressure hose immediately.
- Never repair defective high-pressure hoses yourself!
- Avoid sharp bends and folds: the smallest bending radius is about 20 cm.
- Do **not drive over** the high-pressure hose. Protect against sharp objects and edges.
- Never pull on the high-pressure hose to move the device.
- Do not twist the high-pressure hose.
- Do not put the high-pressure hose into solvents. Use only a wet cloth to wipe down the outside of the hose.
- Lay the high-pressure hose in such a way as to ensure that it cannot be tripped over.

	Only use WAGNER original-high-pressure hoses in order to ensure functionality, safety and durability.

2.11 ELECTROSTATIC CHARGING (FORMATION OF SPARKS OR FLAMES)

 Danger	Electrostatic charging of the unit may occur during spraying due to the flow speed of the coating material. These can cause sparks and flames upon discharge. The unit must therefore always be earthed via the electrical system. The unit must be connected to an appropriately-grounded safety outlet.

An electrostatic charging of spray guns and the high-pressure hose is discharged through the high-pressure hose. For this reason the electric resistance between the connections of the high-pressure hose must be equal to or lower than 1 MΩ.

2.12 USE OF UNITS ON BUILDING SITES AND WORKSHOPS

The unit may only be connected to the mains network via a special feeding point with a residual-current device with INF ≤ 30 mA. An upstream circuit breaker (fuse) with 16 A (B or C characteristics) is required.

2.13 VENTILATION WHEN SPRAYING IN ROOMS

Adequate ventilation to ensure removal of the solvent vapors has to be ensured.

2.14 SUCTION INSTALLATIONS

The are to be provided by the unit user in accordance with the corresponding local regulations.

2.15 EARTHING OF THE OBJECT

The object to be coated must be earthed. (Building walls are usually earthed naturally)

2.16 COATING MATERIAL

Caution against dangers that can arise from the sprayed substance and observe the text and information on the containers or the specifications given by the substance manufacturer. Do not spray any liquid of unknown hazard potential.

2.17 CLEANING THE UNIT

When cleaning the gun, only rinse when the nozzle is removed and rinse at low pressure.

 Danger	When cleaning the unit with solvents, the solvent should never be sprayed or pumped back into a container with a small opening (bunghole). An explosive gas/air mixture can arise. Only use an earthed container made from metal. To earth the gun, hold it firmly on the edge of the container.
 Danger	Danger of short-circuits caused by water ingression! Never spray down the unit with high-pressure or high-pressure steam cleaners.

2.18 WORK OR REPAIRS AT THE ELECTRICAL EQUIPMENT

These may only be carried out by a skilled electrician. No liability is assumed for incorrect installation. Unplug the power plug from the outlet before carrying out any repair work.

2.19 MAINTENANCE WORK AND BREAKS

Before carrying out any work on the device and during any work break, release the pressure in the spray gun and high-pressure hose. Secure the spray gun's trigger guard and switch off the device.

2.20 SETUP ON AN UNEVEN SURFACE

The front end must always point downwards in order to avoid sliding away.
If possible do not use the unit on an inclined surface since the unit tends to wander through the resulting vibrations.

3 TECNICAL DATA

Voltage	
	100-110 VAC~, 50/60 Hz or 220-240 VAC~, 50/60 Hz
Max. current consumption	
100-110 VAC~	11.0 A
220-240 VAC~	5.9 A
Rated input of device	
	900 W
Power Cord	
	6 m long, 3 x 1.5 mm^2
Max. operating pressure	
	214 bar (21.4 MPa)
Max. volume flow	
	2.0 l/min
Volume flow at 12 MPa (120 bar) with water	
	1.60 l/min
Max tip size	
	0.021 inch – 0.53 mm
Max. temperature of the coating material	
	43°C
Max viscosity	
	20.000 MPa·s
Weight	
	15.2 kg
Special high-pressure hose	
	6,35 mm, 15 m - 1/4" - 18 NPSM
Dimensions (L X W X H)	
	480 x 360 x 405 mm
Vibration	
	Spray gun does not exceed 2.5m/s^2
Max sound pressure level	
	80 dB*

* Place of measurement: 1 m distance from unit and 1.60m above floor, 12 MPa (120 bar) operating pressure, reverberant floor

4 REPAIRS AT THE UNIT

⚠	Switch the unit OFF. Before all repair work: Unplug the power plug from the outlet.

4.1 RELIEF VALVE

⚠ **Attention**	The valve housing (4) should not be repaired. If worn, it should always be replaced with a new one.

1. Use a drift punch of 2 mm to remove the grooved pin (Fig. 8, Item 1) from the relief valve handle (2).
2. Remove the relief valve handle (2) and cam base (3).
3. Using a wrench, remove the valve housing (4) from the pump manifold (6).
4. Ensure that the seal (5) is seated correctly, then screw the new valve housing (4) completely into the pump manifold (6). Tighten securely with a wrench.
5. Align the cam base (3) with the hole in the pump manifold (6). Lubricate the cam base with grease and slide on the cam base.
6. Bring the hole in the valve shaft (7) and in the relief valve handle (2) into alignment.
7. Insert the grooved pin (1) to secure the relief valve handle in position.

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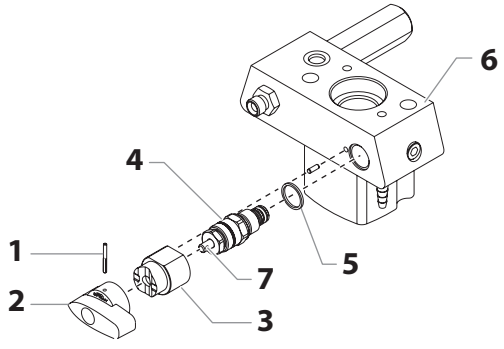

4.2 INLET AND OUTLET VALVE

1. Remove the four screws in the front cover and then remove the front cover.
2. Switch the unit ON and then OFF so that the piston rod is positioned in the lower stroke position.

⚠	Danger of crushing - do not reach with the fingers or tool between the moving parts.

3. Unplug the power plug from the outlet.
4. Remove the retaining clip from the connecting bend at the suction hose and pull off the suction hose.
5. Screw off the return hose.
6. Swivel the unit 90° to the rear in order to work more easily on the material feed pump.
7. Unscrew the inlet valve housing (Fig. 10, Item 1) from the pump manifold.
8. Remove the lower seal (2), lower ball guide (3), inlet valve ball (4), inlet valve seat (5) and O-ring (6).
9. Clean all the parts with the corresponding cleaning agent.

   Check the inlet valve housing (1), inlet valve seat (5) and inlet valve ball (4) for wear and replace the parts if necessary. If the worn inlet valve seat (5) is unused on one side, install it the other way round.

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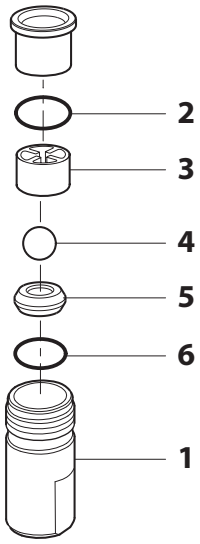

10. Unscrew outlet valve housing (Fig. 11, Item 7) from the piston (8) with adjusting wrench.
11. Remove the upper ball guide (10), crush washer (9) outlet valve ball (11), and outlet valve seat (12).
12. Clean all the parts with the corresponding cleaning agent. Check outlet valve housing (7), outlet valve seat (12), outlet valve ball (11) and upper ball guide (10) for wear and replace parts if necessary. If the worn outlet valve seat (12) is unused on one side, install it the other way round.
13. Carry out installation in the reverse order. Lubricate O-ring (Fig. 9, Item 6) with machine grease and ensure proper seating in the inlet valve housing (Fig. 10, Item 1).

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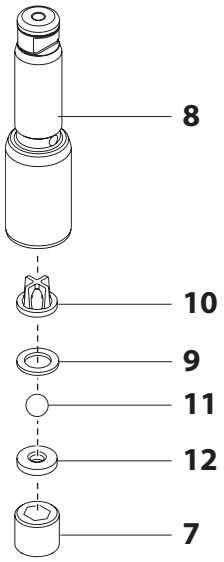

4.3 PACKINGS

1. Remove inlet valve housing in accordance with the steps in Chapter 4.2.
2. It is not necessary to remove the outlet valve.
3. Unscrew both cylinder head screws (Fig. 12, Item 1) from the pump manifold (2) with a 3/8 inch hexagon socket head wrench.
4. Slide the pump manifold (2) and piston (3) forward until the piston is out of the T-slot (10) on the slider assembly (5).
5. Push piston (3) downward out of the pump manifold (2).
6. Unscrew retainer nut (6) from the pump manifold (2) and remove piston guide (7).
7. Remove upper packing (8) and lower packing (9) from the pump manifold (2).

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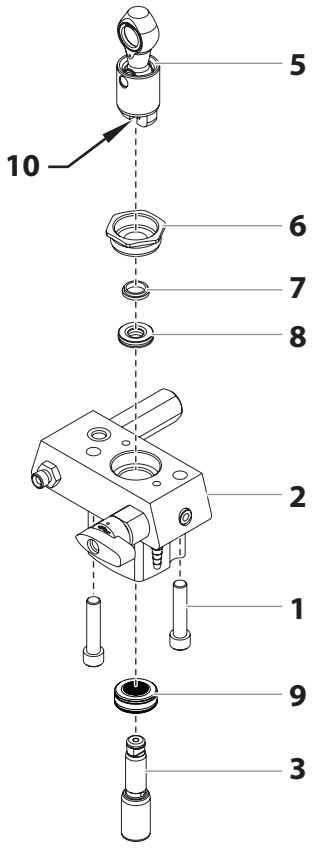

8. Clean pump manifold (2).
9. Lubricate upper packing (8) and lower packing (9) with machine grease.
10. Insert upper packing (Fig. 13) with O-ring (1) and protruding lip (2) downward.

⑬

11. Insert lower packing (Fig. 14) with the beveled edge (1) facing upward.

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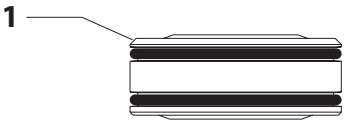


12. Insert piston guide (Fig. 12, Item 7) into the retainer nut (6). Screw retainer nut (6) into the pump manifold (2) and tighten by hand.
13. Push installation tool (included with the replacement packings) for the piston (3) from above onto the piston.
14. Lubricate installation tool and piston (3) with machine grease.
15. Guide piston (3) through the lower packings (9) into the pump manifold (2) from below. Using a rubber mallet, lightly tap the piston (3) from below until it can be seen above the pump manifold.
16. Remove installation tool from piston (3).
17. Carefully tighten retainer nut (6) with adjusting wrench.
18. Slide the top of the piston (3) into the T-slot (10) on the slider assembly (4).
19. Position the pump manifold (2) underneath the gear unit housing and push up until it rests against the gear unit housing.
20. Attach pump manifold (2) to the gear unit housing. Ensure that the pressure sensor does not damage the pressure sensor seal (10).
21. Screw pump manifold (2) tightly to gear unit housing.
22. Lubricate O-ring (Fig. 10, Item 6) between pump manifold (2) and inlet valve housing with machine grease. Screw inlet valve housing to the pump manifold.
23. Push connection bend of suction hose into the inlet valve housing (Fig. 10, Item 1) and secure with retaining clip. Screw on return hose and clamp to suction hose.
24. Install front cover.

4.4 REPLACING THE MOTOR

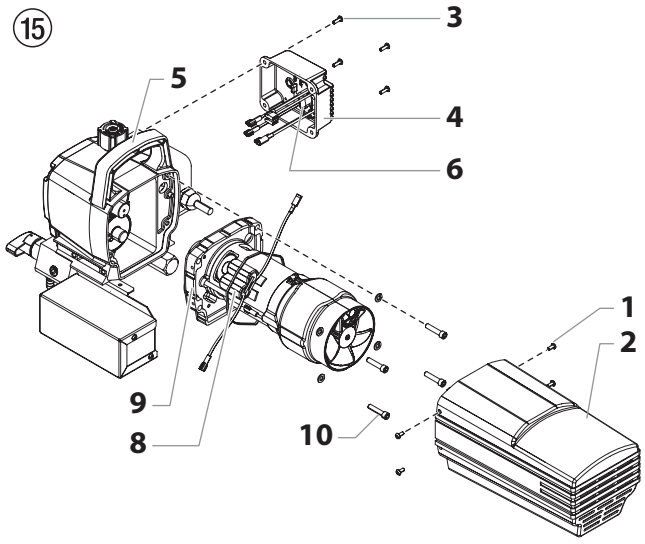
1. Open the relief valve, valve position PRIME (↻ circulation), switch the unit OFF, and unplug the power cord.
2. Remove the four motor cover screws (Fig. 15, Item 1). Remove the motor cover (2).
3. Remove the four heat sink assembly screws (3). Pull the heat sink assembly (4) away from the gear box housing (5).
4. Disconnect the five wires from the relay (6) that is mounted on the inside of the heat sink assembly.
5. Connect the five wires to the relay (refer to the electrical schematic in this manual).
6. Using the four heat sink assembly screws (3), install the heat sink assembly (4) onto the gear box housing (5). Tighten the screws securely.
7. Disconnect the black and red wires coming from the gear box housing. Disconnect the black and red wires from the capacitors (8). Disconnect the black and red wires from the motor (9).
8. Loosen and remove the four motor mounting screws (10).
9. Pull the motor out of the gear box housing.

i	If the motor will not dislodge from the pump housing: • Remove the front cover plate. • Using a rubber mallet, carefully tap on the front of the motor crankshaft that extends through the slider assembly.

10. With the motor removed, inspect the gears in the gear box housing for damage or excessive wear. Replace the gears, if necessary.
11. Install the new motor into the gear box housing.

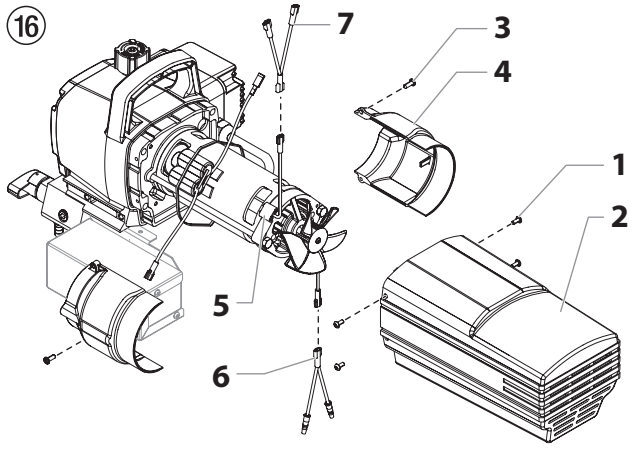
i	Rotate the motor fan manually until the armature gear engages with the mating gear in the gear box housing.

12. Secure the motor (9) with the four motor mounting screws (10).
13. Push the new capacitors into their clip (8) on the new motor.
14. Reconnect the wires (refer to the electrical schematic in this manual).
15. Slide the motor cover (2) over the motor. Secure the motor cover with the four motor cover screws (1).



4.5 CARBON BRUSHES IN MOTOR (MOTOR BRUSH KIT P/N 704-276)

1. Remove the four screws (Fig. 16, Item 1) at the motor cover (2). Remove motor cover.
2. Remove the two screws (3) at the shells (4). Remove shells.
3. Lift up both covers (5) with a small screwdriver.
4. Pull red wire (6) and black wire (7) out of the respective carbon brush.
5. Insert new carbon brush and snap cover (5) into place.
6. Insert red wire (6) and black wire (7) onto the respective carbon brush.
7. Screw down both shells (4).
8. Push motor cover (2) over the motor and fasten with the four screws (1).



4.6 REPLACING THE GEARS

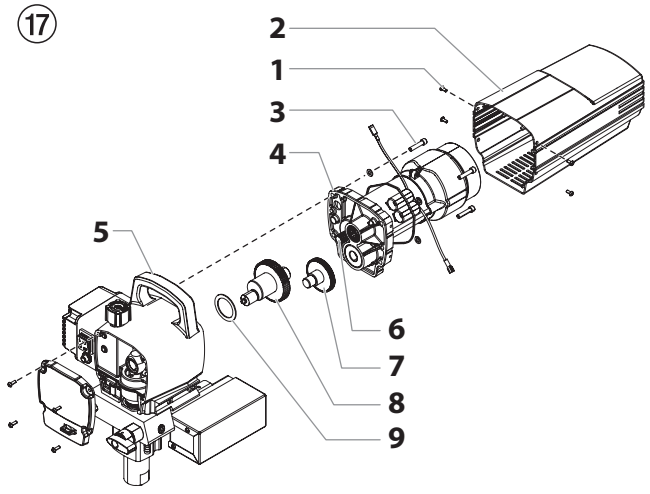
1. Open the relief valve, valve position PRIME (↻ circulation), switch the unit OFF, and unplug the power cord.
2. Loosen and remove the four motor cover screws (Fig. 17. 1). Remove the motor cover (2).
3. Disconnect the black and red wires coming from the gear box housing.
4. Loosen and remove the four motor mounting screws (3).
5. Pull the motor (4) out of the gear box housing (5).

i	If the motor will not dislodge from the pump housing: • Remove the front cover plate. • Using a rubber mallet, carefully tap on the front of the motor crankshaft that extends through the slider assembly.

6. Inspect the armature gear (6) on the end of the motor for damage or excessive wear. If this gear is completely worn out, replace the entire motor.
7. Remove and inspect the 2nd stage gear (7) for damage or excessive wear. Replace if necessary.
8. Remove and inspect the crankshaft/gear assembly (8) for damage or excessive wear. Replace if necessary.
9. Reassemble the pump by reversing the above steps. During reassembly, make sure the thrust washer (9) is in place.

i	Refill the gear box in the pump housing with five ounces of Lubriplate GR132 (P/N 0293396).

⑰



4.7 REPLACING THE TRANSDUCER

1. Open the relief valve, valve position PRIME (↻ circulation), switch the unit OFF, and unplug the power cord.
2. Loosen and remove the four front cover screws (Fig. 18, Item 1). Remove the front cover (2).
3. Stop the sprayer at the bottom of its stroke so that the piston is in its lowest position.
4. Tilt the sprayer back for easy access to the fluid section.
5. Using 3/8" a hex wrench, loosen and remove the two pump manifold mounting screws (5).
6. Pull the pump manifold (6) down approximately 1.3 cm from the pump housing to clear the transducer.
7. Slide the pump block and piston rod forward until the piston rod is out of the T-slot (4) on the slider assembly (3).
8. Using a wrench, remove the transducer assembly (8) from the pump manifold.
9. Thread the new transducer assembly into the pump manifold (6). Tighten securely with a wrench.
10. Reassemble the pump by reversing steps 2–7.

⚠	Make sure the transducer is aligned properly with the hole in the pump manifold during reassembly. Improper alignment may cause damage to the transducer o-ring.

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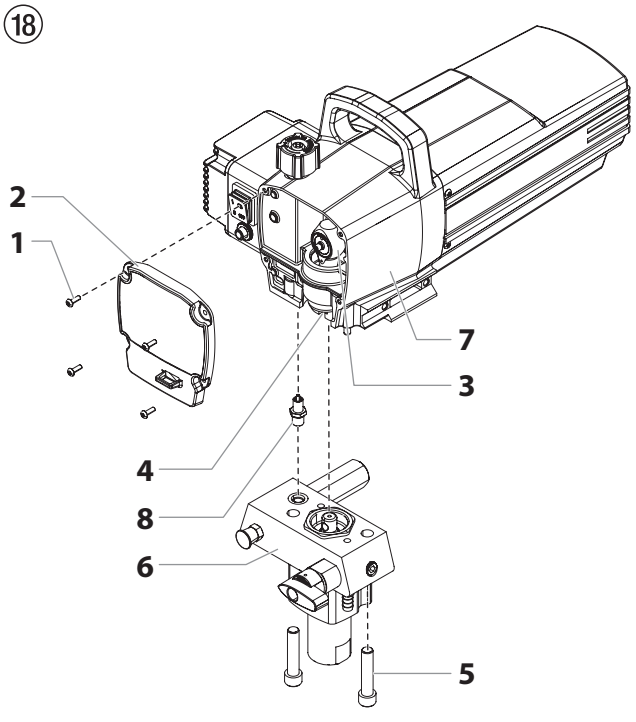

5 SPARE PARTS

5.1 MAIN ASSEMBLY

#	Part No.*	Description
1	0552 300	Motor shroud
	9805 287	Screw (4)
2	0558 555	Power cord jumper
3	0551 714	Cord grip (2)
4	9800 340	Ground screw
5	2409 554	Sevice Set heat sink cover
6	0509550	Screw (4)
7	03662	Microswitch insulator
8	0522 633	Microswitch
9	9800 604	Screw (2)
10	2406054	Washer,
11	2409 555	Sevice Set Druckregler
12	2406859	Face plate incl. 4 screws
13	2406860	Service Set Prime / Spray switch
14	730-197	Cap
15	193-200	Return tube fitting
16	704-117	Screw (2)
17	2383 995	Pressure gauge
18	0558 465	Power cord
19	275703	Cord grip
20	700-139	Screw (4)
21	9800 340	Ground screw (2)
22	0558 452	Bracket cover
23	0558 449	Bracket
24	765-087	Lock nut (2)
25	0522 424	EMI filter, 20A

* Order number for 1 piece. Quantities in brackets indicate the total number in the assembly.

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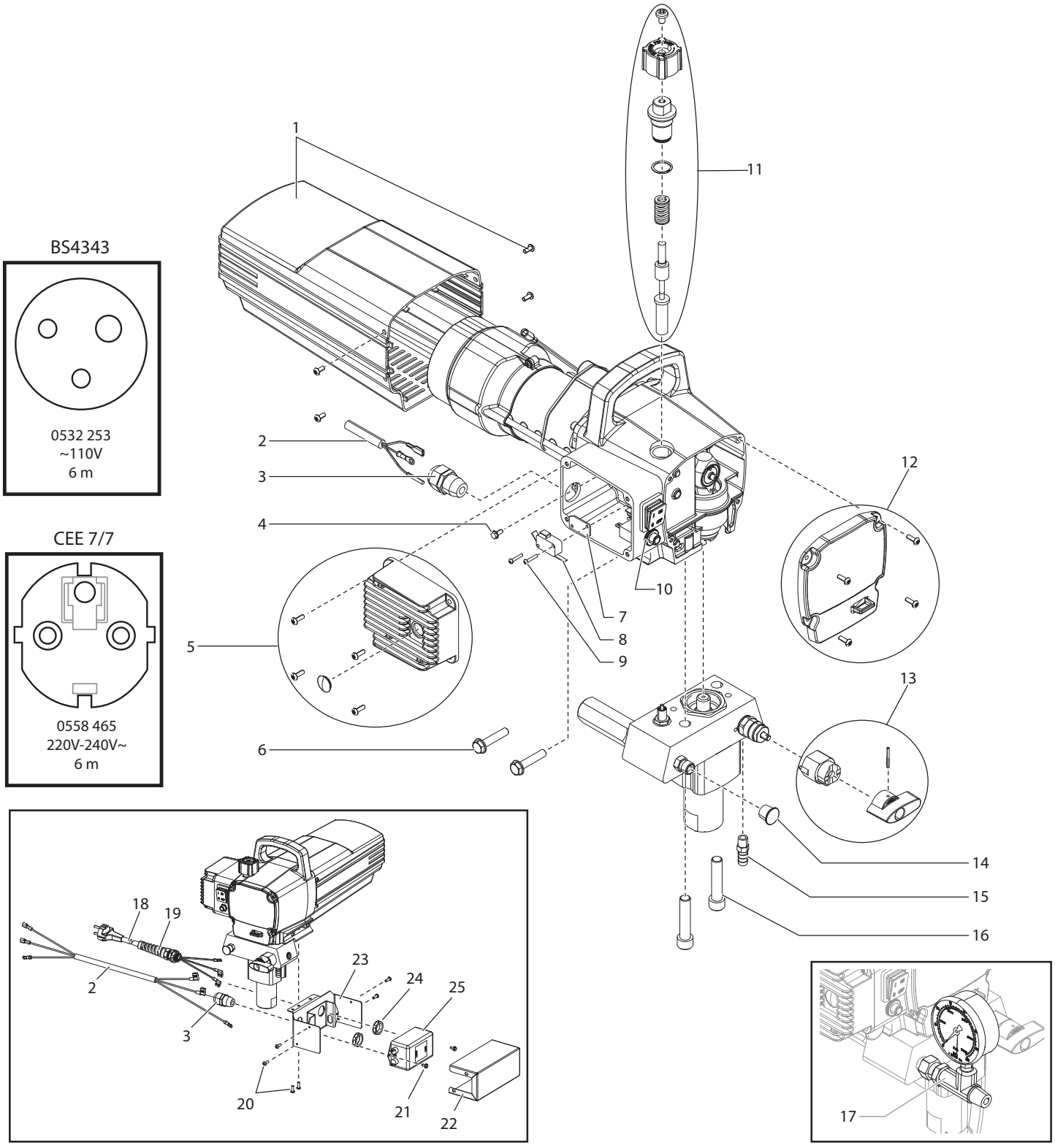
BS4343
0532 253
~110V
6 m
CEE 7/7
0558 465
220V-240V~
6 m
1
2
3
4
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6
7
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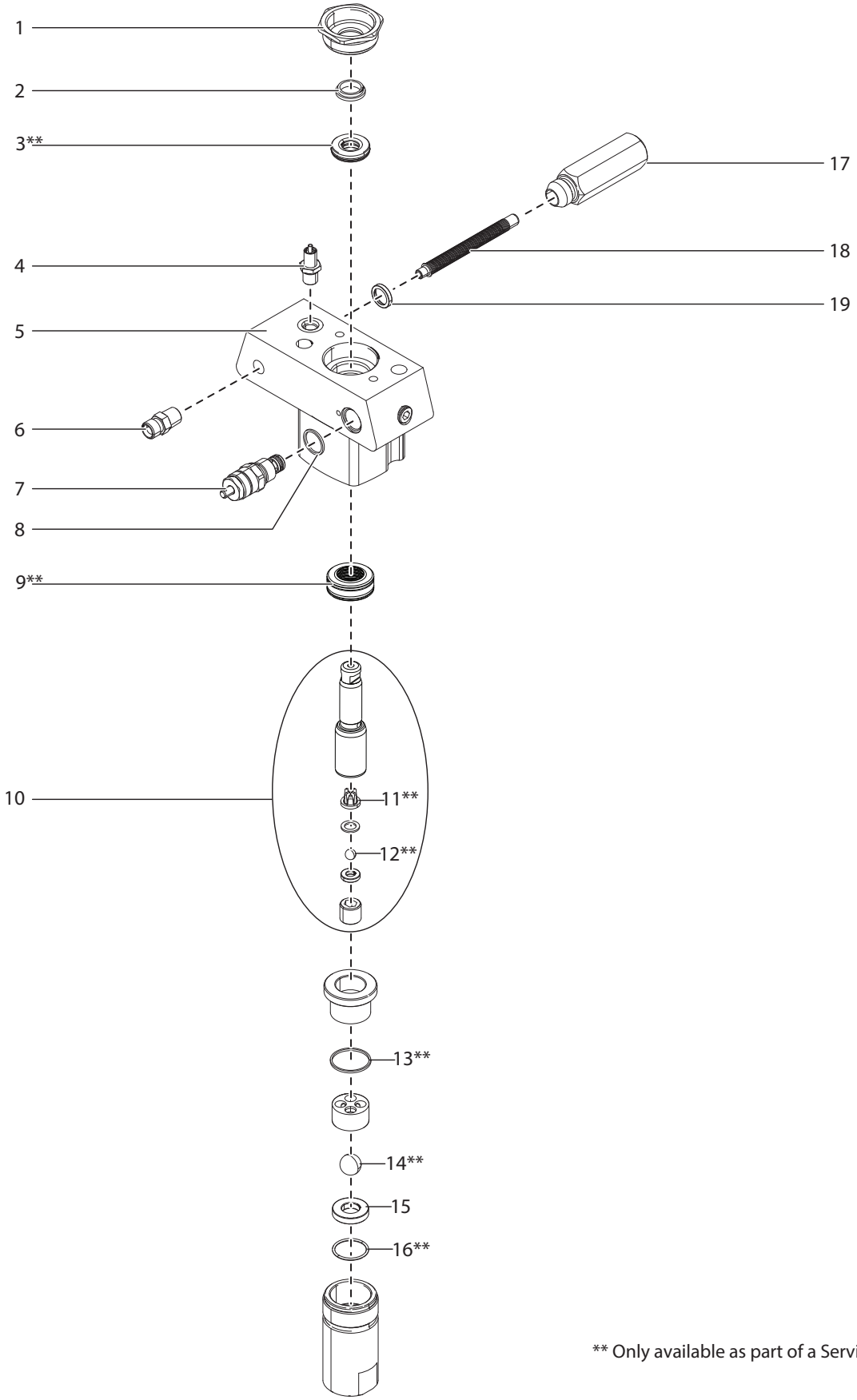
5.2 FLUID SECTION

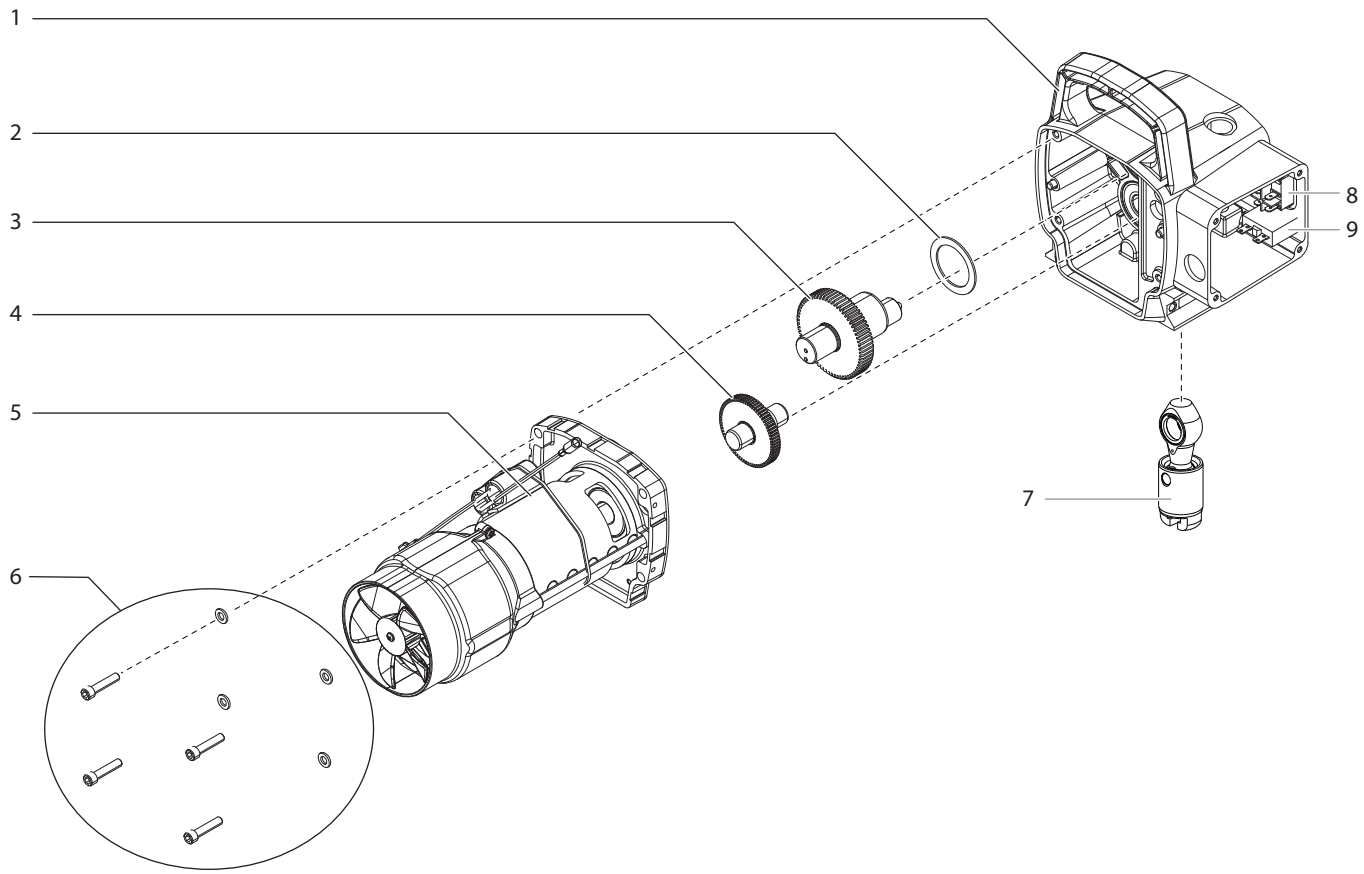
#	Part No.*	Description
1	730-508	Retainer
2	700-587	Piston guide
4	0551 112	Transducer assembly
5	806-106	Fluid section housing
6	227-006	Fitting
7	0507 690	Bypass valve assembly
8	0507 745	Gasket
10	0509 151	Service Set piston
15	762-137	Inlet valve seat
16	0551 533	Service Set (consits of item 2, 3, 9, 11, 12, 13, 14, 16)
17	0532360A	Filter housing
18	581-060	Filter
18	560-038	O-ring

* Order number for 1 piece. Quantities in brackets indicate the total number in the assembly.



** Only available as part of a Service Set

5.3 DRIVE ASSEMBLY



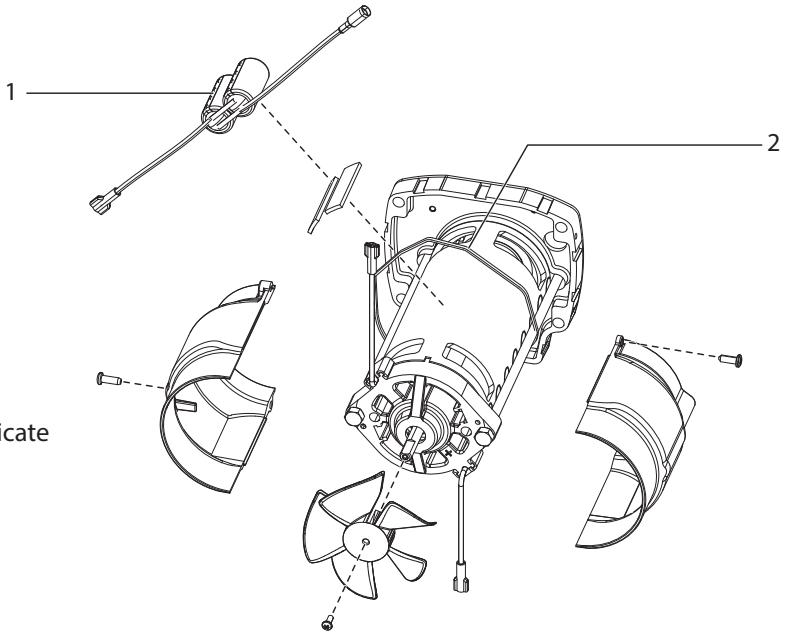
#	Part No.*	Description
1	806-100A	Housing assembly (includes item 8)
2	704-174	Thrust washer
3	0508 572A	Gear/crankshaft assembly
4	704-176	2nd stage gear
5	0558 314A 0558 353A	Motor assembly, 230V Motor assembly, 110V
6	2409 556	Service Set 4 screws and 4 washers
7	0508 208	Slider assembly
8	9850 936	Switch
9	0551991A 704-211A	Circuit breaker, 220-240V~ Circuit breaker, 100-110V~

* Order number for 1 piece. Quantities in brackets indicate the total number in the assembly.

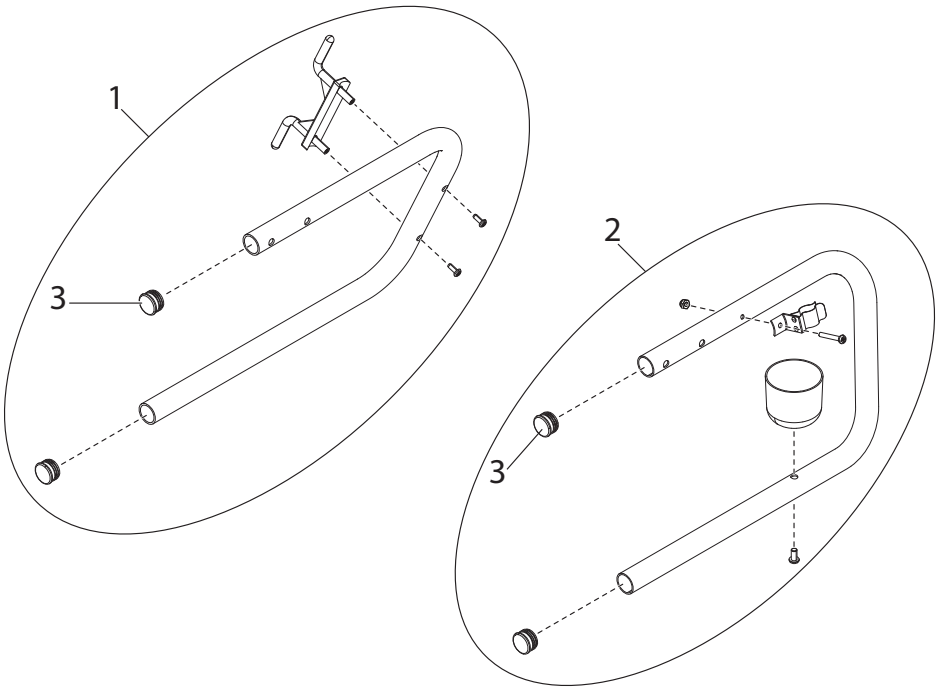
5.4 MOTOR ASSEMBLY

#	Part No.*	Description
1	0551 967 0522 100	Capacitor assembly, 230V Capacitor assembly, 110V
2	0551174A 0551 540	Motor, 230V Motor, 110V
	0532278A	Circuit board
	704-276	Motor brush kit

* Order number for 1 piece. Quantities in brackets indicate the total number in the assembly.



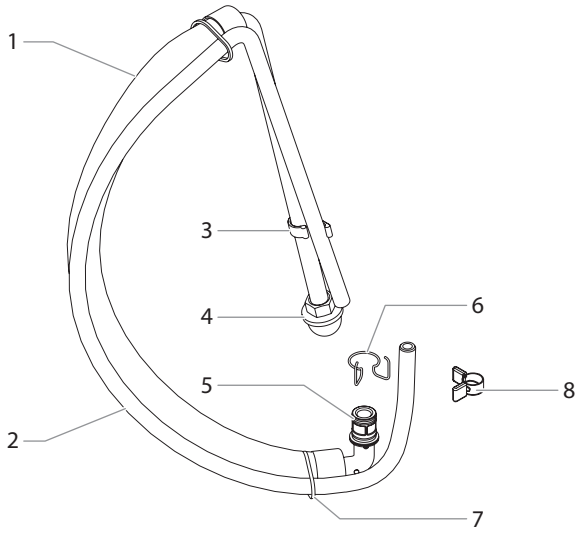
5.5 STAND ASSEMBLY



#	Part No.*	Description
1	2406 861	Leg, left (incl. item 3)
2	2406 862	Leg, right (incl. item 3)
3	9885 546	Plug

* Order number for 1 piece. Quantities in brackets indicate the total number in the assembly.

5.6 SUCTION SYSTEM



#	Part No.*	Description
1	0558672A	Siphon tube assembly (includes items 1-8)
2	0558659A	Return tube
3	0279459	Clip
4	0295565	Inlet screen
5	9871105	O-ring (2)
	704-109	O-ring (for hot solvents, optional) (2)
6	9822526	Retaining clip
7	9850638	Tie wrap
8	0327226	Return tube clamp

* Order number for 1 piece. Quantities in brackets indicate the total number in the assembly.

1 BASIC PRINCIPLES

1.1 ELECTRICALLY INSTRUCTED PERSON

In order to carry out work on electrical systems and equipment, a person must at least have training as an electrically instructed person.

However, an electrically instructed person is not authorised to autonomously set up, modify or repair electrical systems and equipment. Such tasks may only be performed under the direction and supervision of a skilled electrician.

The electrically instructed person must be trained on all systems and equipment. This training is carried out by the senior skilled electrician, who highlights the hazards and special features. The senior skilled electrician also ensures that the requirements and guidelines in respect of UVV, VDE and EN standards have been complied with.

All electrically instructed persons must receiving training at least once a year on the hazards, safe handling and correct conduct in relation to electrical systems.

Documents and work instructions must also be made available to electrically instructed persons. These must relate to the exact machine type and indicate potential hazards and special features. The work instructions must include safe and correct replacement of a connecting cable, for example.

1.2 SKILLED ELECTRICIAN FOR DEFINED TASKS

In order to autonomously carry out work on electrical systems and equipment, a person must have training as a skilled electrician for defined tasks.

However, the skilled electrician for defined tasks must also, like the electrically instructed person, be trained on all systems and equipment. This training is carried out by the senior skilled electrician, who highlights the hazards and special features. The senior skilled electrician also ensures that the requirements and guidelines in respect of UVV, VDE and EN standards have been complied with.
It is also necessary for a responsible skilled electrician to assume professional responsibility.

1.3 LEGAL FOUNDATIONS

Once a system and its equipment has been repaired, modified or set up, it must not constitute any hazard for users and their environment. To ensure that safety can still be guaranteed, an annual inspection is required for mobile systems and equipment.

1.4 WHICH TESTS MUST BE PERFORMED

A test in accordance with the guidelines of BGV A3 **must** be performed and verified. This test must be performed on all electrical equipment, even if "only" a mechanical repair has been carried out.

Contents of BGV A3: The test as per BGV A3 is divided into a visual and a metrological test.

Visual inspection:	- Protective conductors (protection class I)
	- Insulating parts
	- Housing
	- Connecting cables
	- Typeplate
	- Machine-specific components
Metrological test:	- Short-circuit test
	- Protective conductor resistance (RSL)
	- Equivalent leakage current (IEA)
	- Insulation resistance (Riso)
	- Functional test

Attention! If one of the above-specified criteria cannot be fulfilled, then the test is **considered a failure.**
If the customer refuses the necessary repair, he must be informed in writing to this effect. Clear reference must be made to the fact that safe operation of the system cannot be assured. This must be counter-signed by the operating company.
You must fulfil this obligation as you, as an expert, will be required to produce evidence in the event of damage.

1.5 FIVE SAFETY RULES

The Five Safety Rules are more than just rules. They are the precondition for working on electrical systems and appliances. Please take these rules seriously - they are essential for your safety.

Isolation

Isolation means all-pole disconnection of a system from live parts.
All live cables must be disconnected at all poles at the place of work before starting work. This can be done by means of main switches, expert removal of fuses, disconnection of plug connectors etc.

Protecting against restarting

In order to prevent inadvertent restarting of a system on which work is being carried out, restarting must be prevented reliably and safely. For example the unscrewed fuse elements can be replaced with lockable disabling elements or circuit-breakers can be masked with adhesive film. A "Please do not switch on - work in progress" sign can also be affixed. For appliances which are connected to the network by a plug connector, it is sufficient to store the unplugged connector on the machine in such a way that it cannot be mixed up with another connector. In addition, the connector must always be kept in the worker's immediate vicinity.

Verification of safe isolation from the supply

Verification of safe isolation from the supply in low-voltage networks, i.e. systems with operating voltages below 1000 V, must only be carried out using devices or equipment suitable for this purpose. A two-pole measuring instrument must be used. The voltage detectors used must comply with the respective rated voltage and must be tested before and after verification of safe isolation from the supply. I.e. the function of the detectors must be tested on a reliable live source.

Earthing and short-circuiting

After ensuring safe isolation from the supply, the conductors and earthing must be connected together with short-circuit-proof earthing and shorting jumpers. With this measure, the upstream overcurrent protective devices trigger and the system is immediately isolated in the event of inadvertent restoration of power. It should be noted that earthing is carried out first, then short-circuiting.

Cover or shield any adjacent live parts.

Often inadmissible approach to adjacent live system parts cannot be easily prevented. In such cases these system parts must be protected against accidental contact by permanent and securely fitted insulating covers.

1.6 CATEGORISATION OF PROTECTION CLASSES

Legal basis
In electrical engineering, protection classes enable the categorisation and identification of electrical equipment (for example, devices and installation components) in relation to the existing safety measures for protection against electric shock.
The protection classes are defined for all electrical equipment in DIN EN 61140 (VDE 0140-1).
A distinction is made between four protection classes for electrical equipment. Symbols are provided in order to identify equipment with the relevant protection class. These symbols are defined in IEC 60417. The use of safety precautions in the different classes of electrical equipment is described in DIN EN 61140 (VDE 0140-1):2007-03, section 7.

Protection class 0
There is no special protection against electric shock in addition to the basic insulation. Connection to the protective conductor system is not possible. Appliances with this protection class are not permitted in Germany and Austria. This protection class will not be included in any international standards in future. There is no symbol for protection class 0.

Protection class I 

All electrically conductive housing parts of the equipment are connected to the protective conductor system of the fixed electrical installation, which is at earth potential. Mobile appliances in protection class I have a plug connector with a protective conductor contact or an earthing pin plug. These must be executed so that the protective conductor connection is established as the first connection on plugging in. It must also be ensured that in the event of damage the protective conductor connection is disconnected last. The connecting cable entry into the appliance must be mechanically strain-relieved

Protection class II 

Equipment in protection class II has reinforced or double insulation around live parts, so that no conductive parts can be live even in fault conditions. This is also referred to as total insulation. Appliances in protection class II do not have a protective conductor contact.

Protection class III 

Appliances in protection class III operate with safety extra-low voltage (SELV).
Safety extra-low voltage means voltages that do not exceed 50 V AC (alternating voltage) or 120 V DC (direct voltage). This voltage must be generated by a safety transformer as per DIN VDE 0570-2-6 or EN 61558-2-6 for a mains-operated appliance.
Safety extra-low voltage taken from batteries or accumulators belongs to protection class III without the need for further measures.

1.7 EXPLANATION OF ELECTRIC VARIABLES AND COMPONENTS

Dimensional unit	Arithmetic unit	Explanation
A	I	Electric current in ampere
V	U	Electric voltage in volts
KV	U	Electric voltage in kilo-volts
VA	S	Apparent electric power
W	P	Electric power in watts
KW	P	Electric power in kilowatts
KWh	P	Electric power in kilowatt hours
Ω	R	Electric resistance in ohms
KΩ	R	Electric resistance in kiloohms
MΩ	R	Electric resistance in megaohms

Designation	Explanation
L1	External conductor
L2	External conductor
L3	External conductor
N	Neutral conductor
PE	Protective conductor
3~	Threephase AC voltage

1.8 EXPLANATION OF ELECTRICAL TERMS

Rated current
The rated current In is the rated value for a system, a power circuit or electrical equipment.

Operating current
The operating current Ib is the current that must flow during uninterrupted operation.

Overcurrent
Overcurrent is any current that exceeds the permissible current loading.
Overcurrent is the generic term.
Overload current is an overcurrent that occurs in an electrically fault-free power circuit.
Short-circuit current is an overcurrent that can occur due to an error.

Operating voltage
The operating voltage is the voltage present between the conductors during full function.

External conductor
External conductors are live conductors.

Neutral conductor
A neutral conductor is connected to the neutral point and star point, and is capable of contributing to the transmission of electrical energy.

Protective conductor
A protective conductor is necessary for certain protective measures against shock currents, in order to establish an electrical connection to one of the following parts.
- exposed conductive part of the electrical equipment
- external conductive parts
- earth electrodes, equipotential bonding

Earth fault
An earth fault is an electrical connection between an external conductor or neutral conductor to the protective conductor.

Interwinding fault
An interwinding fault is a short in a winding of the motor. This winding has a different resistance to the other windings.

PEN conductor
A PEN conductor is an earthed conductor which performs the function of protective conductor and neutral conductor simultaneously.

Active part (of an electrical system)
An active part is a live part of an electrical system or device (e.g. fuses, terminals, switches, capacitors, etc.) through which current flows during normal operation

Emergency switch, emergency stop
This switch is identified by its colouring (red on yellow) and serves to stop hazardous states or hazardous movements. The emergency switch does not serve for switching during normal operation or isolation in accordance with the Five Safety Rules (1.5).

Isolation
This is the disconnection of a system or its equipment from all sources.

Basic insulation
This is the insulation of active parts during normal operation to protect against direct contact.

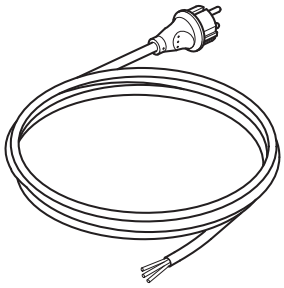
Direct contact
This is direct contact between an active part of an electrical system (an external conductor/phase) and the human body in normal operation.

Indirect contact
This is indirect contact between an active part and the human body due to an existing insulation fault. The housing of an electrical device which is not live under normal conditions is contacted (fault).

2 FUNCTIONAL TEST WORK INSTRUCTION

2.1 FUNCTIONAL TEST OF CORD SET

1. Ensure safe isolation from the supply before commencing work.
2. A multimeter or test buzzer should be used for testing. The function should be checked first of all.
3. Attach a measuring lead to one of the two pins on the connector.
4. Attach the second measuring lead to one of the device terminals N (blue) or L1 (brown). If no tone is audible or if the measuring device indicates an infinitely high resistance, the measuring lead must be attached to the other terminal, as it is not possible to tell to which pin the respective wire is connected on the earthing pin plug. If a tone is now audible or if the measuring device actuates, this wire is ok. Move the connecting cable in order to rule out a defective contact; if no interruption is discernible, this wire is ok. Repeat with the other wire N (blue) or L1 (brown).
5. Repeat point four in order to verify the functionality of the protective conductor (green/yellow). This is only necessary for equipment class I. See chapter 4.3
6. If an interruption or defective contact is found in one of the wires, then the wire is defective.
7. The defective component must be made inoperative in order to prevent further use.

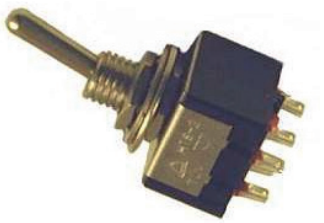


2.2 FUNCTIONAL TEST OF THE CAPACITOR

1. Ensure safe isolation from the supply before commencing work.
2. An insulation resistance tester (e.g. Metriso 500) must be used for the measurement.
3. The capacitor must be electrically isolated from the device. To do this, disconnect the plug connector on the capacitor.
4. Set the measuring device (Metriso 500) to measuring range III.
5. Connect the two test probes of the measuring device to the two terminal lugs on the capacitor.
6. To start the measurement, press the test button on the handle.
7. The measuring device deflects fully, then after approx. 20 sec. the pointer begins to wander to the left. The measurement is only complete when the pointer has moved all the way to the left (zero deflection).
8. Now disconnect the measuring device from the capacitor and switch to the Volt (V=) position.
9. After approx. two minutes, reconnect the test probes to the capacitor (point 5). The display begins to wander from right (full deflection) to left (zero deflection).
10. If a deviation is found at point seven, for instance if the pointer remains at full deflection (right) or zero deflection (left) for more than a minute, then this capacitor is defective.
11. The defective component must be made inoperative in order to prevent further use.

2.3 FUNCTIONAL TEST OF SWITCHES/BUTTONS

1. Ensure safe isolation from the supply before commencing work.
2. A multimeter or test buzzer should be used for testing. The function should be checked first of all.
3. First disconnect all electrical connections at the switch or button.
4. With the switch in the 0 position, all of the switch connections must be checked against each other. If a continuity is found, the switch is defective.
5 In position I of the switch the superimposed switch connections must have continuity. If no continuity is found, the switch is defective.
6. The defective component must be made inoperative in order to prevent further use.



2.4 FUNCTIONAL TEST OF EARTHING CONTACT SOCKET

1. Ensure safe isolation from the supply before commencing work.
2. First perform a visual inspection of the socket for damage.
3 If no mechanical damage is found, work through chapter1.5 (The Five Safety Rules) in the reverse order.
4. A two-pole measuring instrument should be used to check the electrical functionality. If a multimeter is used, it should be set to V~ or VAC.
5. Now check the voltage present between L1 and N. If this is 230 V AC then the voltage between L1 and PE must also be checked.
6. If a deviation is found in point 2 or point 5, there is a defect.
7. The defective component must be made inoperative in order to prevent further use.

2.5 FUNCTIONAL TEST OF THE MOTOR OVERCURRENT PROTECTION SWITCH

1. Ensure safe isolation from the supply before commencing work.
2. First perform a visual inspection of the motor protection switch for damage.
3. A multimeter or test buzzer should be used for testing. The function should be checked first of all.
4. Connect one test probe of the test buzzer to terminal N and the second one to terminal U1/Z1.
5. Now switch the motor overcurrent protection switch on and off two or three times. The buzzing tone sounds when the switch is at one; no buzzing tone should be audible in the OFF position.
6. Now connect the test probes to terminals L1 and U2. Repeat point 5 as a check.
7. If a deviation is found in relation to point 5 or 2, there is a defect.
8. The defective component must be made inoperative in order to prevent further use.

2.6 FUNCTIONAL TEST OF THE THREEPHASE MOTOR

1. Ensure safe isolation from the supply before commencing work.
2. A multimeter should be used for testing; this must be set to ohm (Ω) and tested.
3. In order to obtain a reliable and meaningful measurement, all cables of the motor must be disconnected first of all. Note down the connection plan.
4. In order to determine an interwinding fault, the Y/Δ jumpers must be removed. Note down the connection plan.
5. Measure all motor cables to the housing; if a continuity is found, then the motor has an earth fault and is defective.
6. Measure all three windings individually; they must present the same resistance. If a deviation of ≥ 2.0% is found, the motor has an interwinding fault and is defective.
7. If the motor is equipped with a thermal link, this must be tested for continuity. If no continuity is present or a resistance of ≥ 5Ω is present, the motor is defective.

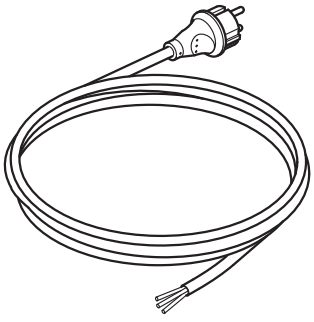
2.7 FUNCTIONAL TEST OF AC MOTOR

1. Ensure safe isolation from the supply before commencing work.
2. A multimeter should be used for testing; this must be set to ohm (Ω) and tested.
3. In order to obtain a reliable and meaningful measurement, all cables of the motor must be disconnected first of all. Note down the connection plan.
4. Measure all cables to the housing; if a continuity is found, then the motor has an earth fault and is defective.
5. Measurement of the individual windings is not possible, as they are internally bridged.
6. If the motor is equipped with a thermal link, this must be tested for continuity. If no continuity is present or if a high resistance is present, the motor is defective.

3 REPAIR WORK INSTRUCTION

3.1 REPLACING A CORD SET

1. Ensure safe isolation from the supply before commencing work.
2. Remove the old cable, noting the contact configuration.
3. Strip new cord set to desired length, taking care not to damage the insulation of the wires.
4. Shorten conductors N (blue) and L1 (brown) by 1.5 cm, to ensure that when there is a tensile load on the cable, the protective conductor (yellow/green) is disconnected from the machine last.
5. Press on the wire end ferrules, to ensure secure contact.
6. Install strain relief in order to prevent the connecting cable from being pulled out. Make sure that the strain relief is not excessively tightened, which could cause the cable to shear off.
7. Ensure secure contact when connecting the individual wires.
8. After completing the repair a measurement in accordance with BGV A3 must be carried out, in order to ensure electrical safety and functionality.
9. The defective component must be made inoperative in order to prevent further use.



3.2 REPLACING A 400 V CORD SET

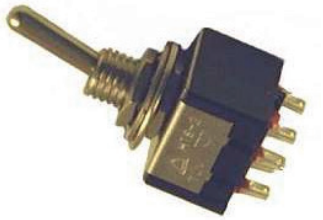
1. Ensure safe isolation from the supply before commencing work.
2. First of all loosen the strain relief until the cable can be freely moved.
3. Disconnect the defective cable, noting the exact pin assignment.
4. Strip the new cable to the desired length, taking care not to damage the insulation of the individual wires.
5. First shorten wires L1, L2, L3 and N by 1.5 cm. This ensures that when there is a tensile load on the cable, the protective conductor (PE) is disconnected last.
6. Now strip the individual wires to the desired length.
7. Now press the wire end ferrules on, making sure that the wires terminate flush with the sleeve and that no individual wires protrude.
8. Now connect the cable in accordance with the pin assignment noted in point 3. Make sure that secure contact is achieved.
9. Now tighten the strain relief - but not too much, as this could cause the cable or an individual wire to shear off.
10. After completing the repair a measurement in accordance with BGV A3 must be carried out, in order to ensure electrical safety and functionality. See chapter 1.4

3.3 REPLACING THE CAPACITOR

1. Ensure safe isolation from the supply before commencing work.
2. Remove the wires (plug connector on capacitor).
3. Loosen the fixing nut on the front of the capacitor.
4. Remove the capacitor.
5. Now install and connect the new capacitor in the reverse order.
6. After completing the repair a measurement in accordance with BGV A3 must be carried out, in order to ensure electrical safety and functionality. See chapter 1.4.
7. The defective component must be made inoperative in order to prevent further use.

3.4 REPLACING SWITCHES / BUTTONS

1. Ensure safe isolation from the supply before commencing work.
2. Remove the individual wires at the switch, noting the contact configuration.
3. Remove the switch, noting its installation position.
4. Install the new switch.
5. Establish the electrical connection, observing the contact configuration of point 2.
6. After completing the repair a measurement in accordance with BGV A3 must be carried out, in order to ensure electrical safety and functionality. See chapter 1.4
7. The defective component must be made inoperative in order to prevent further use.



3.5 REPLACING THE EARTHING CONTACT SOCKET

1. Ensure safe isolation from the supply before commencing work.
2. Loosen the fastening screws and remove the socket from the housing.
3. Loosen and remove all cables at the earthing contact socket, noting the contact configuration.
4. Establish the electrical connection to the new earthing contact socket, ensuring correct and safe contacting.
5. The earthing contact socket can now be re-installed in the housing.
   Pay attention to the installation position of the socket. This must ensure the best possible splash protection, even in operating status.
6. After completing the repair a measurement in accordance with BGV A3 must be carried out, in order to ensure electrical safety and functionality.
7. The defective component must be made inoperative in order to prevent further use.

3.6 REPLACING THE MOTOR PROTECTING SWITCH

1. Ensure safe isolation from the supply before commencing work.
2. Mark the individual wires with the relevant terminal designation of the motor protecting switch, in order to prevent mix-up.
3. Now disconnect all electrical connections from the motor protecting switch.
4. The motor protecting switch can now be removed.
5. Now install the new motor protecting switch and restore the electrical connection.
6. After completing the repair a measurement in accordance with BGV A3 must be carried out, in order to ensure electrical safety and functionality.
7. In order to prevent further use of the defective motor protecting switch, it must be made unserviceable and disposed of.

3.7 REPLACING THE THREEPHASE MOTOR

1. 1. Ensure safe isolation from the supply before commencing work.
2. First disconnect the defective motor, noting the exact pin assignment.
3. Now replace the motor.
4. Ensure correct positioning of the Y/Δ jumpers on the motor terminal board.
5. Observe the pin assignment noted in point 2 when connecting the individual wires. Make sure that secure contact is achieved.
6. After completing the repair a measurement in accordance with BGV A3 must be carried out.
7. If the direction of rotation of the motor is incorrect, external conductors L1 and L2 and U and V must be swapped over.
8. In order to exclude further use of the defective motor, all wires must be disconnected directly at the motor.
9. After completing the repair a measurement in accordance with BGV A3 must be carried out, in order to ensure electrical safety and functionality See chapter 1.4

3.8 REPLACING THE AC MOTOR

1. Ensure safe isolation from the supply before commencing work.
2. First disconnect the defective motor, noting the exact pin assignment.
3. Now replace the motor.
4. Observe the pin assignment noted in point 2 when connecting the individual wires.Also ensure secure contact when connecting the wires.
5. After completing the repair a measurement in accordance with BGV A3 must be carried out.
6. In order to exclude further use of the defective motor, all wires must be disconnected directly at the motor.

WAGNER

4 MACHINE-SPECIFIC DOCUMENTS

4.1 CONNECTION DIAGRAM PROSPRAY 20