



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

HERO 23D

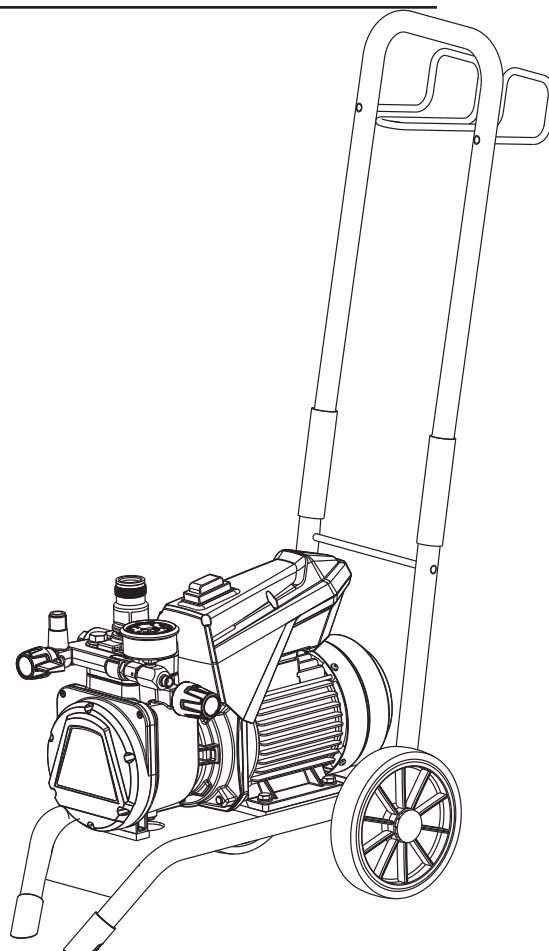
HERO 23

SF 23 PRO

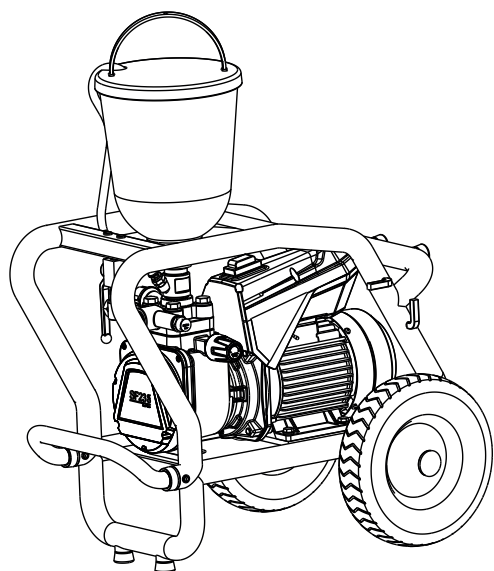
SF 23 PRO Select

SF 23 CR

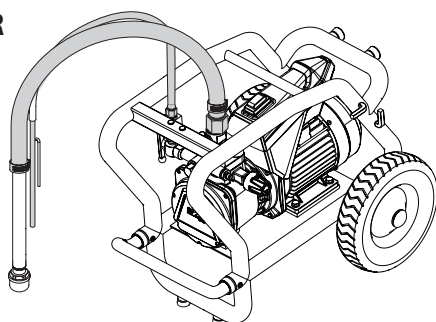
ELITE 3100



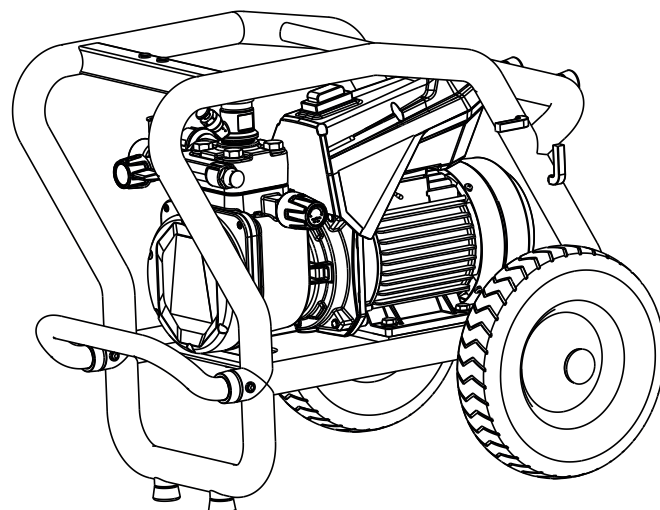
**Super Finish 23 Pro / Hero 23 / Hero 23D /
Elite 3100**



Super Finish 23 CR



Super Finish 23 CR

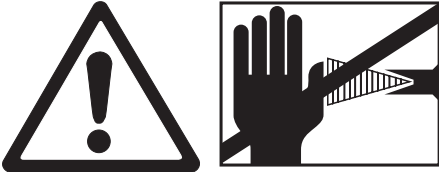


Super Finish 23 Pro Select

WARNING!

Attention, danger of injury by injection!

Airless units develop extremely high spray pressures.

	 <p>Danger</p>
<p>①</p>	<p>Never bring fingers, hands or other body parts into contact with the spray jet! Never point the spray gun at yourself, other persons or animals. Never use the spray gun without spray jet safety guard.</p> <p>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.</p>
<p>②</p>	<p>The following points are to be observed in accordance with the operating manual before every start-up:</p> <ol style="list-style-type: none">1. Faulty units may not be used.2. Secure a Wagner spray gun with the securing lever at the trigger guard.3. Ensure earthing.4. Check the permissible operating pressure of the high-pressure hose and spray gun.5. Check all the connecting parts for leaks.
<p>③</p>	<p>Instructions for regular cleaning and maintenance of the unit are to be observed strictly.</p> <p>Observe the following rules before any work on the unit and at every working break:</p> <ol style="list-style-type: none">1. Relieve the pressure from the spray gun and high-pressure hose.2. Secure a Wagner spray gun with the securing lever at the trigger guard3. Switch the unit off.

Ensure safety!

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1 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.


1.1 FLASH POINT

 Danger	<p>Only spray coating materials with a flash point of 21 °C or higher.</p> <p>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.</p>
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1.2 EXPLOSION PROTECTION

 Danger	<p>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.</p>
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1.3 DANGER OF EXPLOSION AND FIRE FROM SOURCES OF IGNITION DURING SPRAYING WORK

 Danger	<p>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.</p>
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1.4 DANGER OF INJURY FROM THE SPRAY JET

 Danger 	<p>Attention, danger of injury by injection! Never point the spray gun at yourself, other persons or animals.</p> <p>Never use the spray gun without spray jet safety guard.</p> <p>The spray jet must not come into contact with any part of the body.</p> <p>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.</p>
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1.5 SECURE SPRAY GUN AGAINST UNINTENDED OPERATION

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

1.6 RECOIL OF SPRAY GUN

 Danger	<p>When using a high operating pressure, pulling the trigger guard can effect a recoil force up to 15 N.</p> <p>If you are not prepared for this, your hand can be thrust backwards or your balance lost. This can lead to injury.</p>
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1.7 BREATHING EQUIPMENT AS PROTECTION AGAINST SOLVENT VAPORS

Wear breathing equipment during spraying work. A breathing mask is to be made available to the user.

1.8 PREVENTION OF OCCUPATIONAL ILLNESSES

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.

1.9 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 25 MPa (250 bar or 3625 psi); Japan 21 MPa (210 bar).

1.10 HIGH-PRESSURE HOSE

 Danger	<p>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.</p>
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- 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.

	<p>Only use WAGNER original-high-pressure hoses in order to ensure functionality, safety and durability.</p>
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1.11 ELECTROSTATIC CHARGING (FORMATION OF SPARKS OR FLAMES)

 Danger	<p>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.</p>
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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.

1.12 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.

1.13 VENTILATION WHEN SPRAYING IN ROOMS

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

1.14 SUCTION INSTALLATIONS

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

1.15 EARTHING OF THE OBJECT

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

1.16 CLEANING THE UNIT WITH SOLVENTS

 Danger	<p>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. The container must be earthed.</p>
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1.17 CLEANING THE UNIT

 Danger	<p>Danger of short-circuits caused by water ingress! Never spray down the unit with high-pressure or high-pressure steam cleaners.</p>
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1.18 WORK OR REPAIRS AT THE ELECTRICAL EQUIPMENT

These may only be carried out by a skilled electrician. No liability is assumed for incorrect installation.

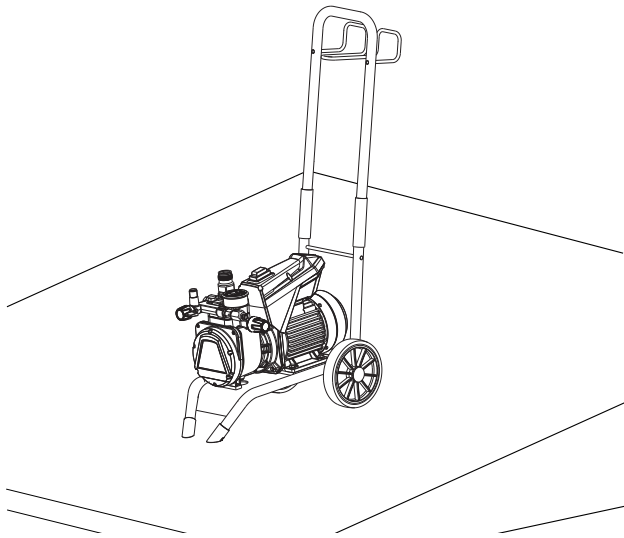
1.19 WORK AT ELECTRICAL COMPONENTS

Unplug the power plug from the outlet before carrying out any repair work.

1.20 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.



2 TECHNICAL DATA

China/EU/AUS

Voltage :	230 V AC, 50 Hz
Fuses :	16 A time-lag
Unit connecting line :	6 m long, 3 x 1.5 mm ²
Max. current consumption:	7.0 A
Degree of protection :	IP 54
Rated input of device:	1.3 kW
Max. operating pressure :	25 MPa (250 bar)
Max. volume flow :	2.6 l/min
Volume flow at 12 MPa (120 bar) with water :	2.3 l/min
Max. temperature of the coating material :	43 °C
Max. viscosity :	20,000 mPas
Empty weight :	27 kg
Hydraulic oil filling quantity :	
Hydraulics housing	1.3 liter
Gears (grease)	45 g
Max. vibration at the spraygun :	lower than 2.5 m/s ²
Max. sound pressure level:	75 dB (A)*

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

UK

Voltage :	110 V AC, 50 Hz
Fuses :	16 A time-lag
Unit connecting line :	6 m long, 3 x 1.5 mm ²
Max. current consumption:	11.0 A
Degree of protection :	IP 54
Rated input of device:	1.0 kW
Max. operating pressure :	25 MPa (250 bar)
Max. volume flow :	2.6 l/min
Volume flow at 12 MPa (120 bar) with water :	2.3 l/min
Max. temperature of the coating material :	43 °C
Max. viscosity :	20,000 mPas
Empty weight :	27 kg
Hydraulic oil filling quantity :	
Hydraulics housing	1.3 liter
Gears (grease)	45 g
Max. vibration at the spraygun :	lower than 2.5 m/s ²
Max. sound pressure level:	75 dB (A)*

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



Japan

Voltage:	100 V 50 Hz	100 V 60 Hz
Fuses:	15 A time-lag	
Unit connecting line :	6 m long, 3x2.0 mm ²	
Max. current consumption:	13.8 A	
Degree of protection :	IP 54	
Rated input of device:	1.4 kW	
Max. operating pressure :	21 MPa	
Max. volume flow :	2.5 L/min	3.1 L/min
Volume flow at 12 MPa (120 bar) with water :	2.3 L/min	2.7 L/min
Max. temperature of the coating material :	43 °C	
Max. viscosity :	20000 mPas	
Empty weight :	29 kg	
Hydraulic oil filling quantity :	1.3 Liter	
Hydraulics housing Gears (grease)	45 g	
Max. sound pressure level:	75 dB (A)*	

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

Taiwan

Voltage :	110 V AC, 60 Hz
Fuses :	16 A time-lag
Unit connecting line :	6 m long, 3 x 2 mm ²
Max. current consumption:	11.0 A
Degree of protection :	IP 54
Rated input of device:	1.3 kW
Max. operating pressure :	25 MPa (250 bar)
Max. volume flow :	3.2 l/min
Volume flow at 12 MPa (120 bar) with water :	2.8 l/min
Max. temperature of the coating material :	43 °C
Max. viscosity :	20,000 mPas
Empty weight :	27 kg
Hydraulic oil filling quantity :	
Hydraulics housing Gears (grease)	1.3 liter 45 g
Max. vibration at the spraygun :	lower than 2.5 m/s ²
Max. sound pressure level:	75 dB (A)*

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

3 REPAIRS AT THE UNIT



Danger

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

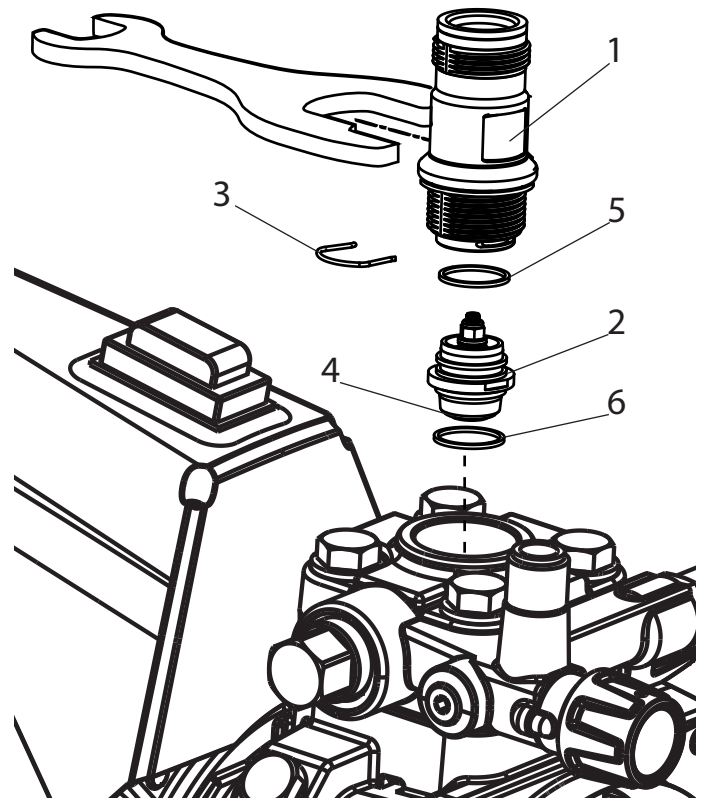
3.1 INLET VALVE

Disassembly

1. Place the enclosed 30 mm wrench on the housing (1).
2. Loosen the housing (1) with light blows of a hammer on the end of the wrench.
3. Screw out the housing with the inlet valve (2) from the paint section.
4. Pull of the clasp (3) using the enclosed screwdriver.
5. Place the enclosed 30 mm wrench on the inlet valve (2). Turn out the inlet valve carefully.
6. Clean the valve seat (4) with a cleaning agent and brush (ensure that no brush hairs are left behind).
7. Clean the seals (5, 6) and check for damage. Replace, if necessary.
8. Check all the valve parts for damage. In case of visible wear replace the inlet valve.

Installation

1. Insert the inlet valve (2) into the housing (1) and secure with the clasp (3). Ensure that the (black) seal (5) is mounted in the housing.
2. Screw the unit from the housing and the inlet valve into the paint section. The same (black) seal (6) has to be mounted in the paint section.
3. Tighten the housing with the 30 mm wrench. The torque for fitting the inlet valve is 90 Nm.

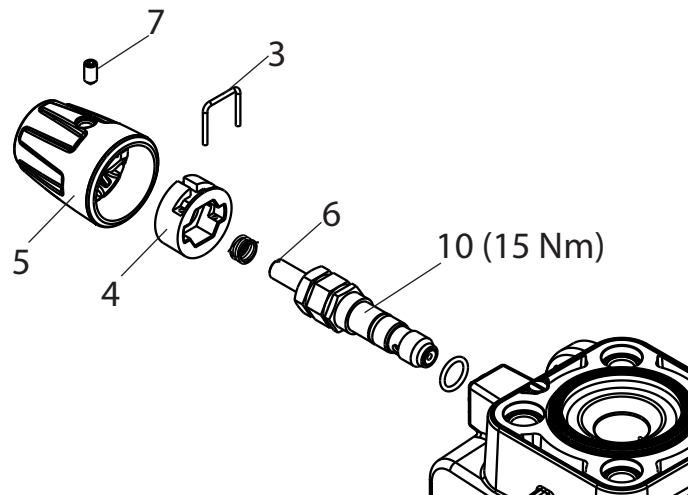
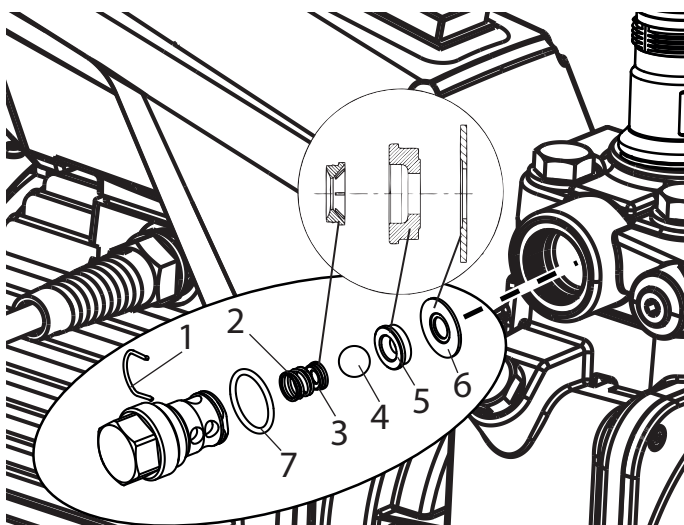


3.2 OUTLET VALVE

1. Use a 22 mm wrench to screw the outlet valve from the paint section.
2. Carefully remove the clasp (1) using the enclosed screwdriver. The pressure spring (2) pushes out ball (4) and valve seat (5).
3. Clean or replace the components.
4. Check the O-ring (7) for damage.
5. Check the installation position when mounting the spring support ring (3) (clipped onto spring (2)), outlet valve seat (5) and seal (6), refer to figure.

Please also pay particular attention to the following notes:

1. The torque for fitting the outlet valve is 50 Nm.
2. Always also replace the seal (6) if you have dismantled the outlet valve, regardless of which component you want to replace. Note: The seal (6) is located inside the paint section.
3. The groove in the seal (6) points outwards when replaced.



SETTING THE MAXIMUM OPERATING PRESSURE (CLOSING PRESSURE)

1. Lock the spray gun.
2. Set pressure relief valve to switch on the machine and let it run for 2-3 minutes for ventilation. Turn the pressure regulation screw (6) slowly until the machine starts to suck in water.
3. Set pressure relief valve to and trigger spray gun for ventilating high pressure hose and spray gun. Lock the spray gun .
4. Turn the pressure regulation screw (6) slowly until the pressure gauge shows 250 bar (25 MPa, 3625 psi); Japan 210 bar (21 MPa).
5. Put pressure regulation knob (5) on the pressure regulation screw and fully turn it to the right. Hold it in this position and tighten the pin (7) with a hexagonal wrench (2.5 mm).
6. Turn pressure regulation knob to the left.
7. Release pressure by pressing the trigger of the the spray gun.
8. Control setting while the gun is locked again.
9. Seal pin with red sealing wax (9992512) or use a sealing plug (2442189).
10. Set pressure relief valve to .
11. Machine is ready for operation!

3.3 PRESSURE CONTROL VALVE

	<p>Since the end of 2024, a sealing plug has also been used to secure the pressure regulation knob. To remove, pierce membrane in the centre of the plug with an hexagon key (SW 2.5). Unscrew the exposed pin to push out the plug. If the spanner flat is blocked by fragments, lever out the plug.</p>
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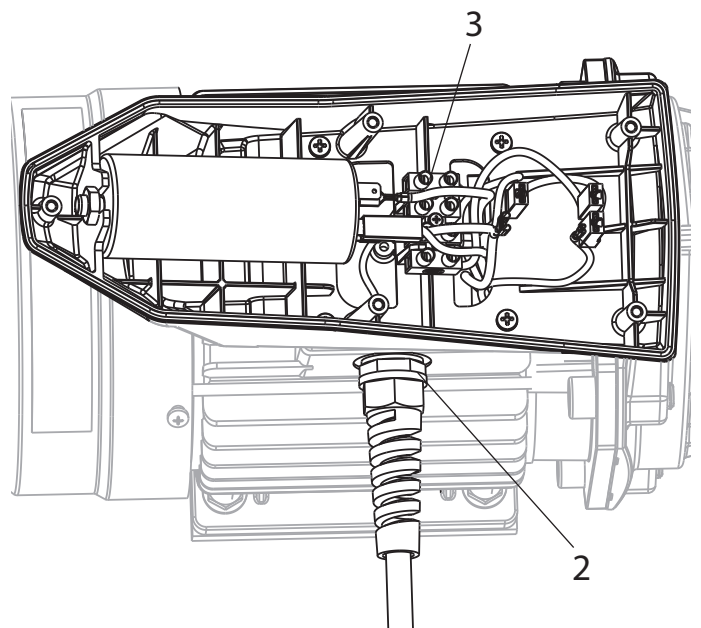
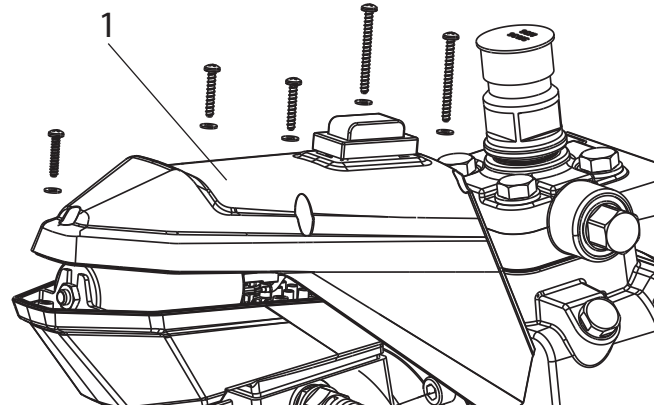
1. Insert regulator (10) and tighten it.
2. Mount stop sleeve (4) and clamp (3).
3. Turn pressure regulation screw (6) to the left until the spring snaps (pressure = 0).
4. Attach suction system or hopper.
Test medium: water
5. Mount a pressure gauge (0 – 400 bar), an original pressure hose from Wagner and a high pressure airless gun.

3.4 REPLACING THE POWER CABLE



This may only be carried out by a skilled electrician. No liability is assumed for incorrect installation.
Switch the unit off.
Before all repair work: Unplug the power plug from the outlet.

1. Remove the cover (1) by loosening the screws.
2. Loosen the cable threaded joint (2).
3. Loosen the wires (3).
4. Replace the unit connecting line.
(only an approved power cable with the designation H07-RNF with a splash-proof plug may be used).
5. Connect the green/yellow wire to the contact with the PE sign.
6. Remount the covers carefully (do not squeeze any cables!)



3.5 REMEDY IN CASE OF FAULTS

TYPE OF MALFUNCTION	WHAT ELSE?	POSSIBLE CAUSE	MEASURES FOR ELIMINATING THE MALFUNCTION
Unit does not start		Unit fuse has triggered	Let the motor cool down (you can also check the LED on the PCB -> see chapter 3.7)
		Multi-function switch not set back previously to „0“	Set multi-function switch to „0“ and then switch back on
Unit runs but makes a strange-noise	Motor runs without load (very silent), unit without function	Gearwheel inside the gearbox is damaged	Replace gearwheel, remove the broken pins inside the grooves of the gearbox housing (e.g. with compressed air)
	Motor produces a loud and high noise	Fan cover vibrates	Tighten the screws of the fan cover, if necessary place washer (A6,4) between motor and fan cover
Unit can't be ventilated	Ventilation possible in vertical position	Not enough oil	Check/correct oil level (Find reason for oil loss. Maybe there is oil in the gear box?)
Unit does not suck in	Most likely ->	Inlet valve damaged or clogged	Replace or clean inlet valve
		Outlet valve damaged or clogged	Replace or clean outlet valve
	Valve makes no sound	Unit not ventilated	Ventilate unit
Delivery rate too low	Most likely ->	Inlet valve damaged	Replace inlet valve
	Material sucked up hardly	Unit is sucking in air	Search for the problem: suction system?, Inlet valve pusher?, Gaskets inside the inlet valve? Red inlet installed?...
		Suction filter clogged	Clean or replace
		Viscosity of the material too high	Try to use outlet valve 341246 testen (stainless steel version from SF-31)
Unit does not generate pressure	Material comes out of the return hose	Wrong setting for the relief valve	Correct setting
		Relief valve leaks	Replace relief valve

4 SPARE PARTS

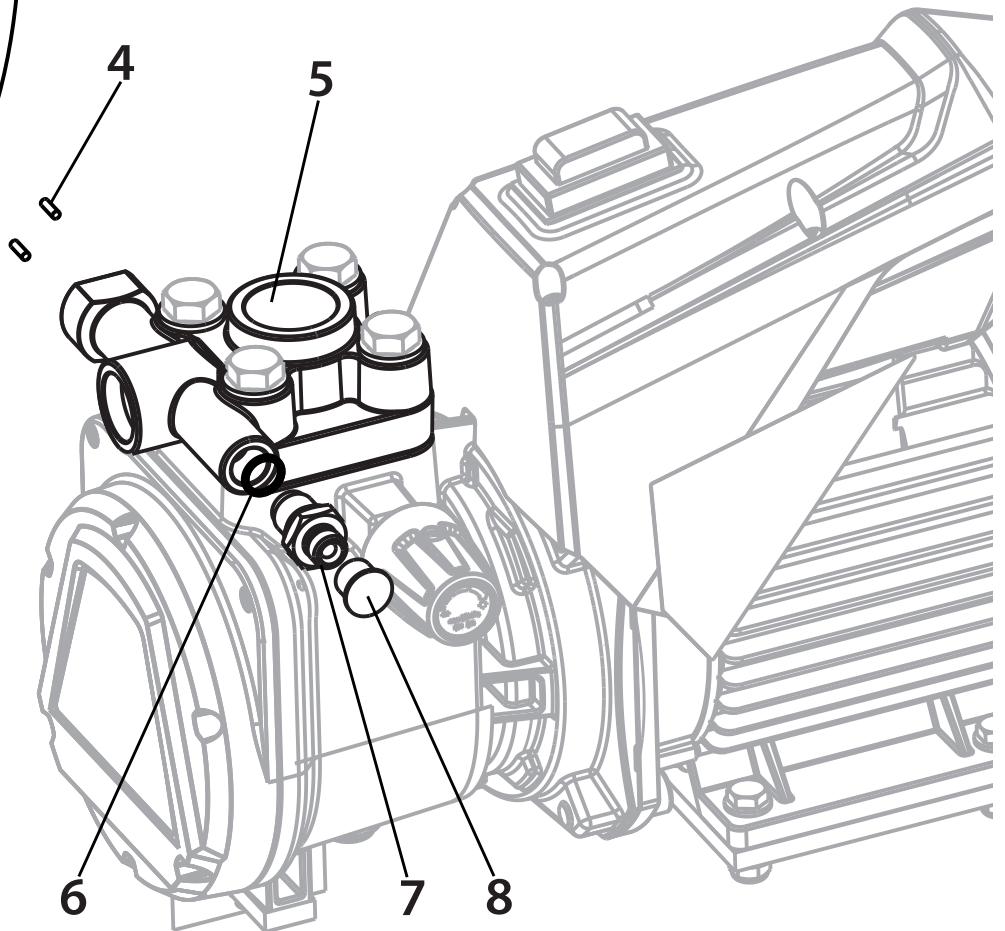
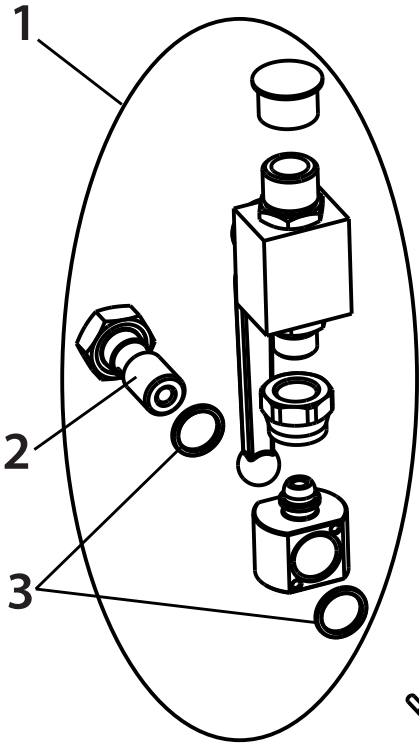
4.1 SPARE PARTS HERO 23D, HERO 23, SF 23 PRO, SF 23 PRO SELECT, SF 23 CR, ELITE 3100

ITEM	ORDER NO.	DESIGNATION
1	2369454	Inlet
2	2388291	Inlet valve housing
3	2369455	Clamp
4	2393043	Inlet valve assy. (incl. pos. 4)
5	2369458	Sealing ring
6	2383995 0340257	Pressure gauge assy. (China, Japan) Pressure gauge assy. (AUS)
7	2369436	Reducing double nipple
8	2369586	Fitting
9	2393047	Pressure relief knob assy.
10	2369631	Pressure relief valve (incl. pos. 11,36)
11	9971395	O-ring
12	2393049	Sealing ring and locking screw
13	2393102 2422747	Outlet valve housing assy. Outlet valve housing SF 23 CR assy.
14	2393105	O-ring and sealing ring
15	2393106	Outlet valve assy. (incl. pos. 14)
16	9900217	Hexagon head screw
17	9920134	Washer
18	2369435	Paint head
19	2393137	Service kit paint head (pos 16-18)
20	2369432	Inlet
21	2369431	Diaphragm assy.
22	2393138	Service kit diaphragm (pos 20-21)
23	2369422	Pressure inlet
24	2337112	O-ring
25	2337113	O-ring
26	2393139	Service kit pressure inlet (Pos. 21-23)
27	2369425	Compression spring
28	3061423	Washer
29	2369424	Piston
30	2337078	Retaining ring
31	0252776	Pressure gauge assy. (CE)
32	2422746	Inlet valve housing (stainless steel) SF 23 CR assy.

ITEM	ORDER NO.	DESIGNATION
33	2334383	Inlet valve housing (aluminium) SF 23 Pro Select
34	2337033	Inlet valve pusher
35	2450467	Sealing ring

SPARE PARTS SF 23 CR

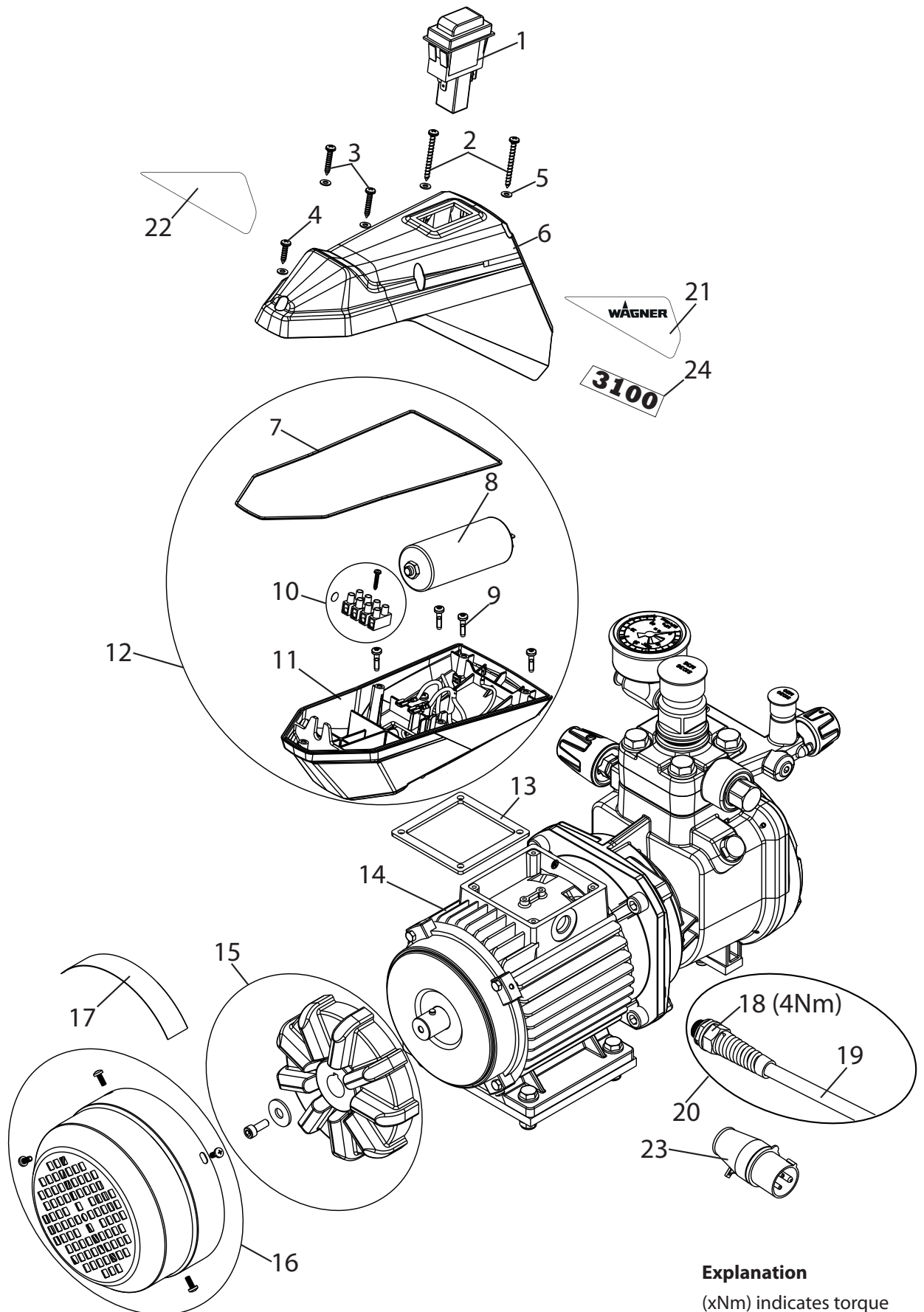
ITEM	ORDER NO.	DESIGNATION
1	2422749	Discharge tap assy.
2	2415593	Banjo bolt
3	2417151	Sealing ring (1 pc.)
4	2382401	Cylindrical pin (1 pc.)
5	2417149	Paint head SF 23 CR
6	9970103	Sealing ring (1 pc.)
7	344337	Reducing double nipple
8	2391210	Protective cap



ITEM	ORDER NO.	DESIGNATION
1	9953696 2411455	Motor protection switch (China, CE, AUS) Motor protection switch (Japan, Taiwan, UK)
2	2393002	Oval-head tapping screw 4,2 x 45 (2 pcs.)
3	2393003	Oval-head tapping screw 4,2 x 25 (2 pcs.)
4	2388381	Oval-head tapping screw 4,2 x 22
5	2388377	Washer
6	2369533 2411145	Cover (black, Wagner) Cover (red, Titan)
7	2422779	Round cord (1 m)
8	2393015* 2402475 2402476	Capacitor 25µF 400V assy. (China, CE, AUS) Capacitor 100µF 250V assy. (Japan) Capacitor 80µF 250V assy. (Taiwan, UK)
9	2393018	Oval-head screw M4x18 (4 pcs.)
10	2393029	Terminal strip assy.
11	2369520 2411144	Terminal box (black, Wagner) Terminal box (red, Titan)
12	2393035 2432886	Terminal box assy. Wagner (pos. 7-11) Terminal box assy. Titan (pos. 7-11)
13	2369517	Motor seal
14	2369513 2393242 2401124	Electric motor 230V China, CE, AUS (incl. pos 15-16) Electric motor 100V Japan (incl. pos 15-16) Electric motor 110V Taiwan, UK (incl. pos 15-16)
15	2393108	Fan assy.
16	2393109	Fan cover assy.
17	2390886 2393235 2393273 2399193 2411217 2401123 2412730 2416009 2416950 2438513	Rating label Hero 23D (China) Rating label Hero 23 (Japan) Rating label Hero 23 (CE) Rating label SF 23 Pro (CE/AUS) Rating label SF 23 Pro (UK) Rating label SF 23 Pro (formerly Hero 23) (Taiwan) Rating label SF 23 Pro (China) Rating label SF 23 CR (CE) Rating label Elite 3100 (CE) Rating label SF 23 Pro Select
18	2388374	Cable gland
19	2388383 2393241 2394776 0341520 2400736 2411792	Mains cable (China) Mains cable (Japan) Mains cable (CE) Mains cable (AUS) Mains cable (Taiwan) Mains cable (UK)

ITEM	ORDER NO.	DESIGNATION
20	2393107 2399031 2400157 2400156 2400737	Mains cable assy. China (pos 18-19) Mains cable assy. Japan (pos 18-19) Mains cable assy. CE (pos 18-19) Mains cable assy. AUS (pos 18-19) Mains cable assy. Taiwan (pos 18-19)
21	2398994 2437976	Wagner Label right side (only SF 23 Pro, CR) Brillux Label right side
22	2398998 2437975	Wagner Label left side (only SF 23 Pro, CR) Brillux Label left side
23	9952681	CEE-plug 110V (UK)
24	2416956	Label 3100 (Titan)

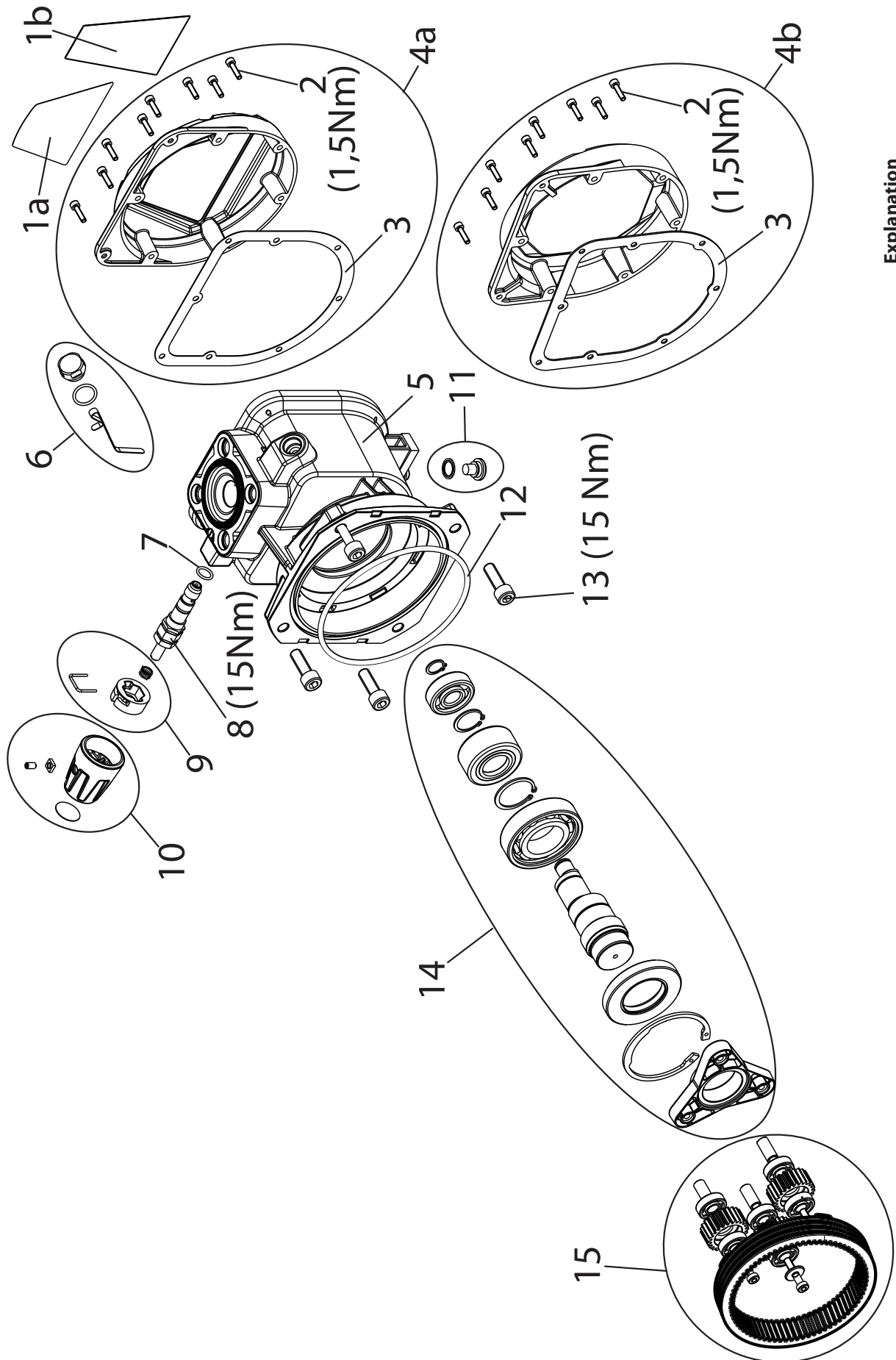
* A different capacitor with 450V is currently used in the series production. However, the previous 400V capacitor can still be used as a spare part.



Explanation
(xNm) indicates torque

SPARE PARTS

ITEM	ORDER NO.	DESIGNATION
1a	2389640	Label HERO 23D
1a	2398248	Label SF 23 Pro
1a	2393275	Label HERO 23
1a	2416965	Label SF 23 CR
1a	2401314	Label Elite 3100
1b	2437977	Label SF 23 Pro Select
2	2393126	Socket head screw (8 pcs.)
3	2369493	Seal
4a	2393127	Front cover assy.
4b	2439557	Front cover assy. (new 2022)
5	2424184	Hydraulic housing preassembled (incl. pos 14)
6	2393044	Oil cap screw assy.
7	9971365	O-ring
8	2369477	Regulating unit assy. (incl. pos. 7)
9	2393130	Stop bushing assy.
10	2393131	Pressure control knob assy.
11	2393132	Sealing screw and seal
12	2391115	O-ring
13	2393133	Socket head screw (4 pcs.)
14	2430715	Service kit crank shaft
15	2393134	Service kit planetary gear

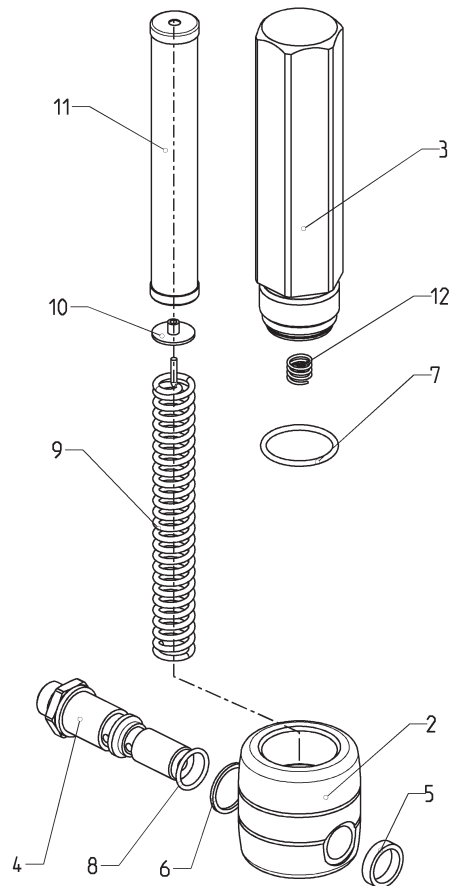


Explanation
(xNm) indicates torque

SPARE PARTS

4.2 SPARE PARTS LIST HIGH-PRESSURE FILTER

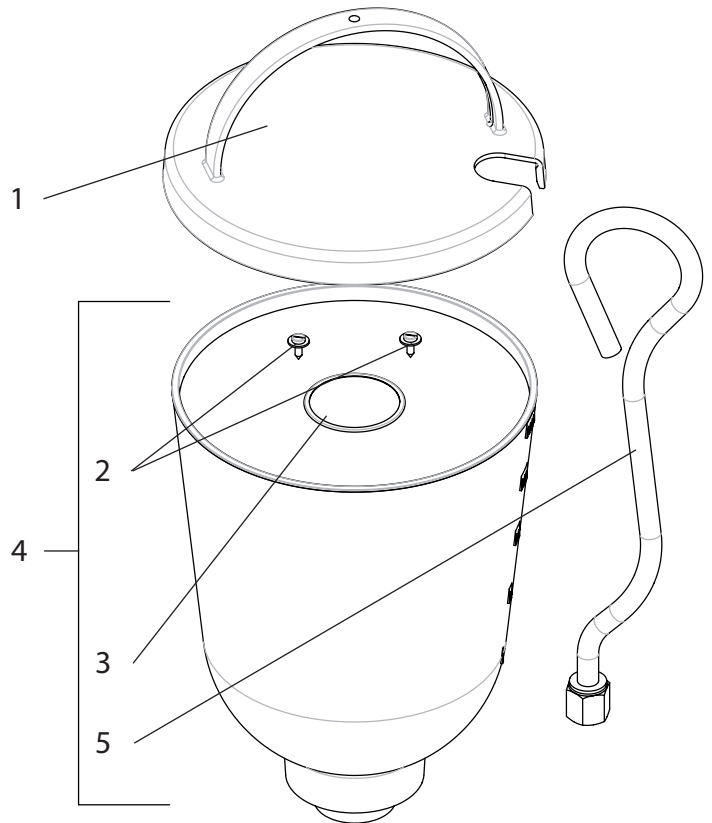
ITEM	ORDER NO.	DESIGNATION
1	0097 121	High-pressure filter HF- 01 compl. (pos. 2-12)
2	0097 301	Filter block
3	0097 302	Filter housing
4	0097 303	Hollow screw
5	0097 304	Seal ring
6	9970 110	Seal ring
7	9974 027	O-ring 30x2 (PTFE)
8	9971 401	O-ring 16x2 (PTFE)
9	0508 749	Bearing spring
10	0508 603	Bearing ring
11	0508 748	Filter insert 60 meshes
	0508 450	Optional: Filter insert 100 meshes
	0508 449	Filter insert 30 meshes
12	9994 245	Pressure spring



Spare parts diagram high-pressure filter

4.3 SPARE PARTS LIST HOPPER 5L

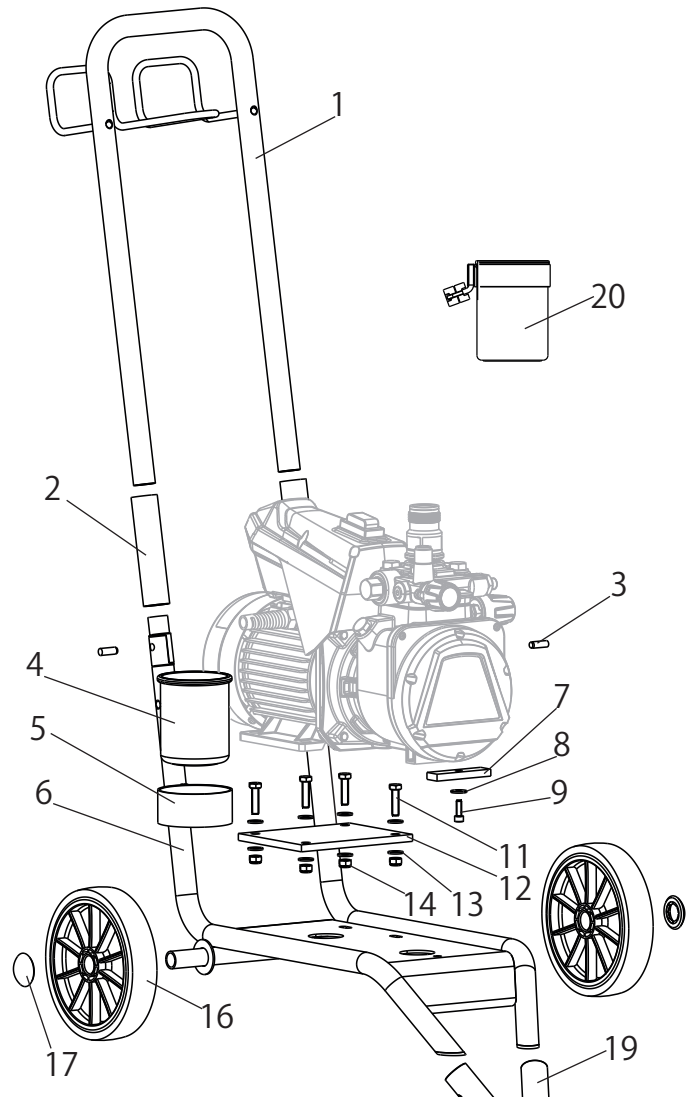
ITEM	ORDER-NO	DESIGNATION
	0341 265 2357 506	Hopper 5l, assy. Hopper for SF23 CR 5l, assy.
1	0340 901	Cover
2	9902 306	Sheet metal screw 3,9x13 (2)
3	0037 607	Filter disk, mesh width 0,8 mm
	0003 756	Optional: Filter disk, mesh width 0,4 mm
4	0340 904	Hopper
5	0340 908	Return tube
	2357 505	Return tube for SF23 CR



Spare parts diagram hopper

4.4 SPARE PARTS LIST TROLLEY

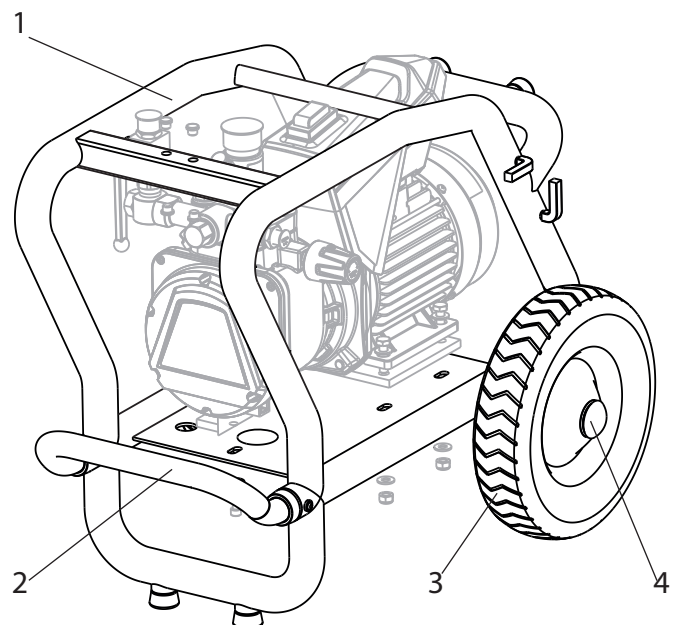
ITEM	ORDER NO.	DESIGNATION
1	2369570	Handle
2	13806	Sleeve
3	2396299	Half-hollow rivet
4	2369585	Cleaning cup
5	2393786	Cleaning cup holder
6	2369550	Bottom frame, cart
7	2369578	Foot, damping
8	9920304	Washer
9	2391181	Hexagon socket head cap screw
10	2393118	Foot, damping assy. (pos. 7-9)
11	9900118	Hexagon screw
12	2369545	Plate, damping
13	9920102	Washer
14	9910208	Hexagon nut
15	2393119	Plate, damping assy. (pos. 11-14)
16	2369556	Wheel
17	9994950	Wheel cap
18	2393121	Wheel assy. (pos. 16, 17)
19	2388543	Foot
20	2343481	Cleaning cup assy. (Japan)



Spare parts diagram trolley

4.5 SPARE PARTS LIST TROLLEY SF 23 CR/PRO SELECT

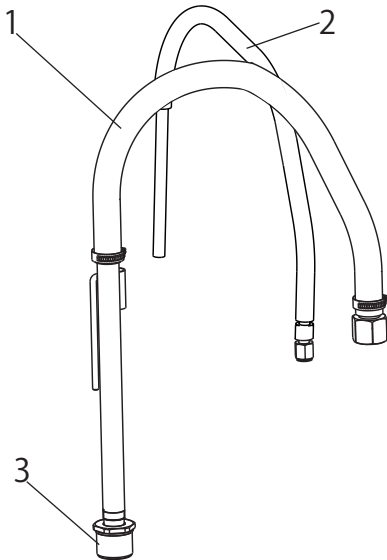
ITEM	ORDER NO.	DESIGNATION
1	2415521	Trolley assy. (incl. pos. 2-4)
2	2402496	Handle assy.
3	2402494	Wheel (1 pc.)
4	9994950	Wheel cap (1 pc.)



Spare parts diagram trolley Super Finish 23 CR

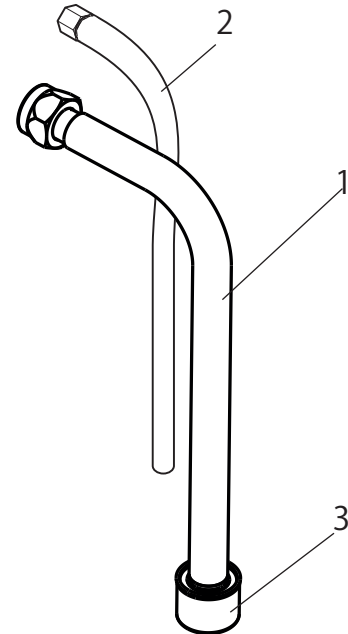
4.6.1 SPARE PARTS LIST SUCTION SYSTEM (FLEXIBLE)

ITEM	ORDER NO.	DESIGNATION
	2393123	Suction system assy.
1	2390605	Suction hose assy. (incl. filter)
2	2390606	Return hose assy.
3	2323325	Suction filter



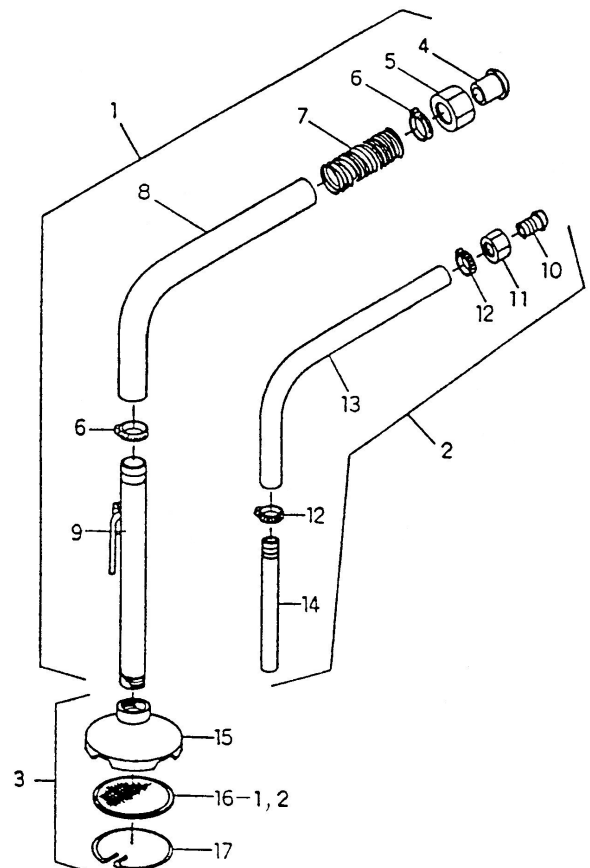
4.6.2 SPARE PARTS LIST SUCTION SYSTEM (RIGID)

ITEM	ORDER NO.	DESIGNATION
	2429697	Suction system assy.
1	2342682	Suction tube assy.
2	253211	Return tube assy.
3	2323325	Suction filter



4.7 SPARE PARTS LIST SUCTION SYSTEM JAPAN

ITEM	ORDER NO.	DESIGNATION	QTY.
1	2230341	Suction hose assy. 25×800	1
2	2230343	Return hose assy. 12×800	1
3	2230342	Filter assy.	1
4	34602	Suction hose fitting	(1)
5	2240009	Hexagon nut	(1)
6	2240083	Hose clamp 35	(2)
7	2240343	Protective spring	(1)
8	2240078	Hose 25×800	(1)
9	2240344	Suction tube	(1)
10	2241111	Return hose fitting	(1)
11	2240018	Hexagon nut	(1)
12	2240022	Hose clamp 20	(2)
13	2240071	Hose 12×800	(1)
14	2240349	Return hose	(1)
15	2240345	Filter cover	(1)
16-1	2240346	Filter 0.8mm (standard)	(1)
16-2	2240355	Filter 0.4mm	(1)
17	2240347	Spring washer 100	(1)



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 receive 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
K Ω	R	Electric resistance in kilohms
M Ω	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 I_n is the rated value for a system, a power circuit or electrical equipment.

Operating current

The operating current I_b 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 chapter 1.5 (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 $\geq 2.0\%$ 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 $\geq 5\Omega$ 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

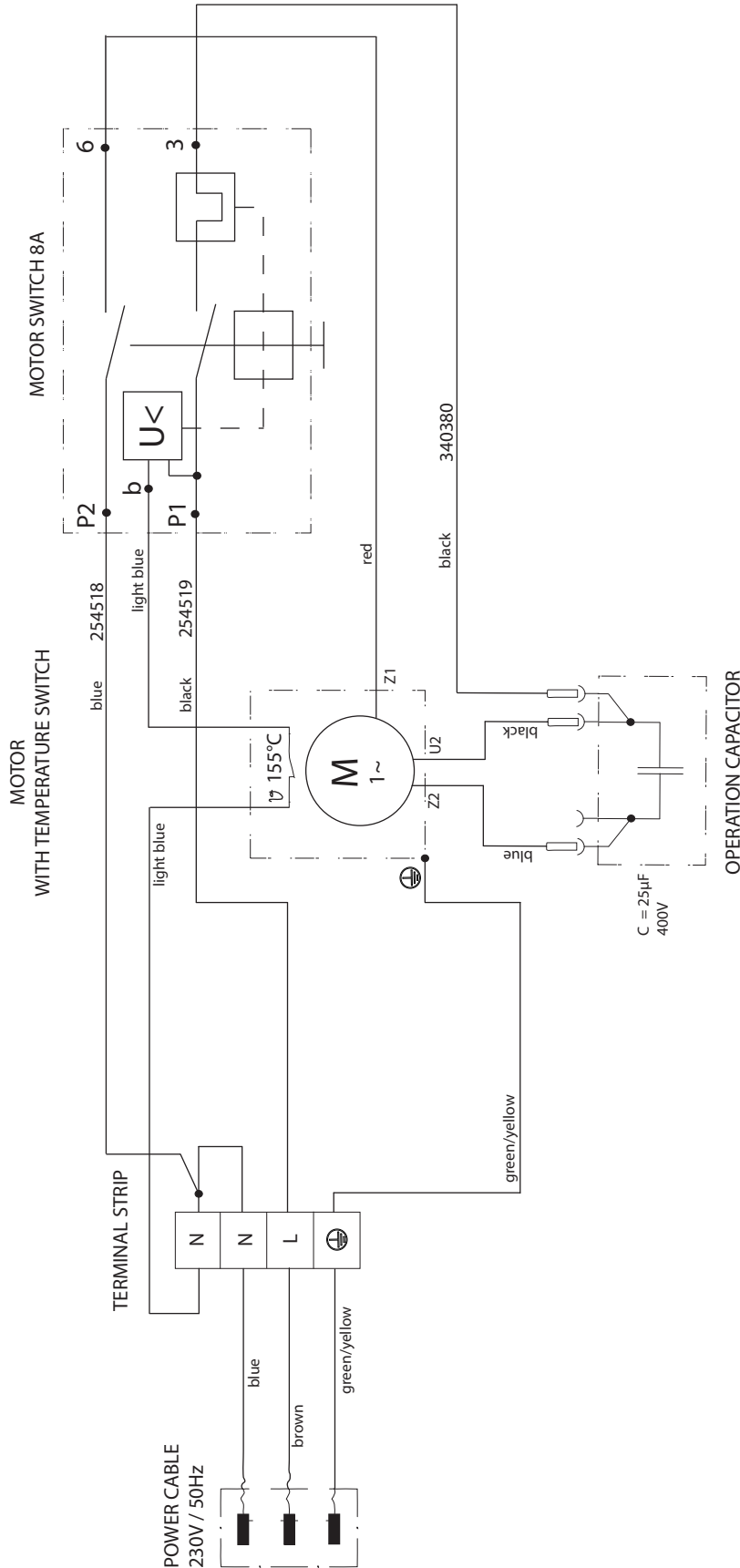
1. Ensure safe isolation from the supply before commencing work.
2. First disconnect the defective motor, noting the exact pin assignment.
3. Now replace the motor.
4. Ensure correct positioning of the Y/ Δ jumpers on the motor terminal board.
5. Observe the pin assignment noted in point 2 when connecting 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.

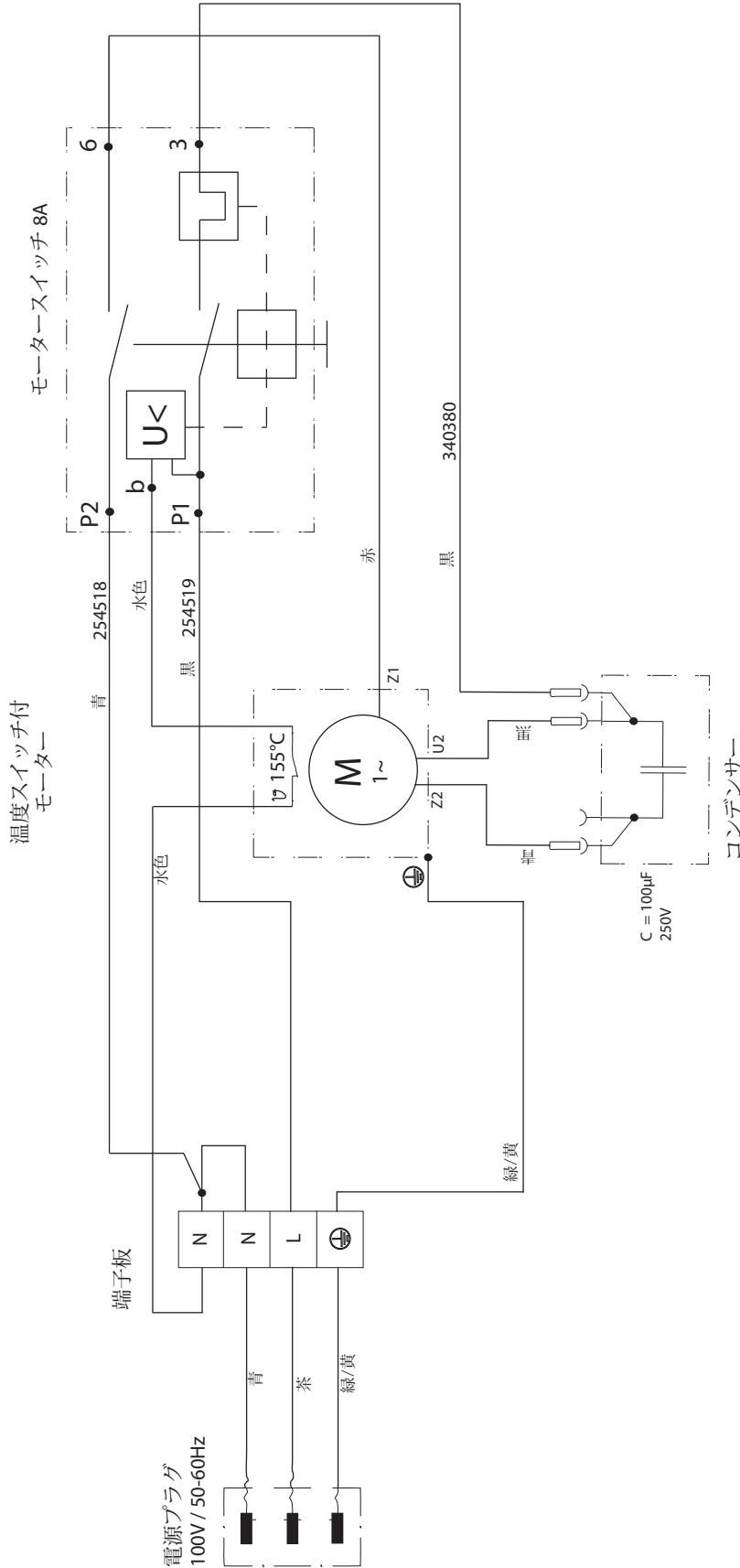
4 MACHINE-SPECIFIC DOCUMENTS

4.1 CONNECTION DIAGRAM HERO 23D / SF 23 PRO / SF 23 PRO SELECT / SF 23 CR / ELITE 3100





4.2 CONNECTION DIAGRAM HERO 23 (JAPAN)



4.3 CONNECTION DIAGRAM HERO 23 / SF 23 PRO (TAIWAN) / SF 23 PRO UK (110V)

