



ULTIMATE WATER JETTING SOLUTION

C-110-150-170-200E

ELECTRICAL POWERED
HEAVY DUTY COLD WATER
HIGH PRESSURE CLEANER

USER GUIDE & SPARE PARTS MANUAL



www.densin.com

Introductions

Congratulations on your purchase of the: **DEN-SIN High Pressure Cleaner**

Model: C-110E, C-150E, C-170E & C-200E

Read this user manual before you start up your High Pressure Cleaner the first time.

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This machine is a High Pressure Cleaner producing water jet under high-pressure, which is why severe injuries can occur if the safety precautions are not observed.
Therefore a full understanding of the contents of this instruction manual is required, in order to prevent injuries to you, objects and persons nearby.

Safety

The following symbols are used in this manual to indicate procedures that if not followed, may results in personal injuries or damage to equipment.



WARNING is used to alert the reader of procedures or practice which if not followed correctly could result in personal injuries.



CAUTION is used to alert the reader of procedures or practice which if not followed correctly could result in damage to machine or other equipment.



NOTE is used to highlight important information that may assist the reader carrying out the procedure or understanding the text.



The information contained in this user guide is subject to change without notice.

Version 11: Nov 2017

Revision	Rev No.
Repair Kit for Unloader Valve	6
Repair Kit updating & Accumulator for 110V machine only	7
Updating of Manual with new configuration components Revise component P/N for Accumulator	8
Manual Update, Removal of CE declaration.	9
Manual Content Updating. Cable P/N update	10

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1. Getting acquainted with your High Pressure Cleaner

Fast and efficient cleaning

The **DEN-SIN** High Pressure Cleaners in the **C-110E, C-150E, C-170E, C-200E** series enables you to get more cleaning done in less time.

This series of **DEN-SIN** High Pressure Cleaners offers you high performance yet a compact design. The compact design enables the machines to be agile within inconvenient places even at staircases, and the high performance gives you the opportunity to solve an array of cleaning tasks. The High Pressure Cleaners in this series are designed for industrial and offshore use as well as for cleaning contractors. All pump parts, fittings and pipes in contact with water are made of non-corrosive materials. Together with the ceramic pistons, long life seals and stainless steel valves, it ensures long life and high durability.

Specifications

Model	Motor		Motor Speed rpm	Working Pressure		Flow Capacity		Power Supply Voltage	Dimensions LxWxH mm	Weight kg
	Hp	kW		psi	Bar	gpm	l/min			
C-110E	3.0	2.2	1450/ 1750	1600	110	2.6	11.7	220/240/1ph/50Hz 110/220/1ph/60Hz	720x480x900	45
C-150E	3.0	2.2	1450/ 1750	2175	150	2.1	8.0	230V / 1ph / 50Hz 220V / 1ph/ 60Hz	720x480x900	45
C-170E	6.0	4.4	1450/ 1750	2465	170	3.4	15.2	380/415/3ph/50Hz 220/440/3ph/60Hz	720x480x900	46
C-200E	7.5	5.5	1450/ 1750	2900	200	3.7	16.5	380/415/3ph/50Hz 220/440/3ph/60Hz	720x480x900	56

*** NOTE:** For C-110E 230V 50Hz, the min. voltage required to run machine without much problem is not less than 210V.

Applications

These heavy-duty High Pressure Cleaners are capable of removing any kind of dirt:

- Algae off concrete constructions
- Paint and graffiti off walls
- Dust, dirt, soil & mud off floors
- Oil & grease off engines and other mechanical parts
- Dirt and salt deposits off ship decks

And with the option for use of accessories even many more jobs are to be dealt with:

- Sand-blasting
- Drain-cleaning
- Dispensing of soaps and chemicals
- Sludge pumping
- Extra long lances for hard to reach places
- Floor cleaning equipment
- Rotary brushes



This machine is only to be used for the purposes it is designed for. Any other use shall be considered improper and therefore potentially dangerous. The manufacturer is not to be held responsible for any damages caused by improper use.

Unpacking

Remove the High Pressure Cleaner and its accessories from the packing material. For transport and packing reasons some accessories may be supplied disassembled.

Make sure all components are present:

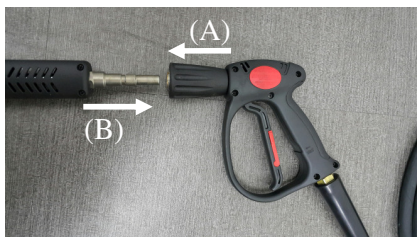
- High-pressure machine itself
- Handle bar (partly attached)
- Wing nuts for the handle bar
- Electrical cord (attached)
- High pressure hose with Spray-gun trigger
- Double barrel lance (disassembled)
- Water inlet male hose coupling

Machine Installation / Setup

Attach the handle bar to the machine using the wing nuts and bolts supplied and align the handle bar according to the cabinet moulding.



Mount the high-pressure hose on to the High Pressure Cleaner by pulling back the retainer on the high-pressure hose coupling, while sliding it onto the male outlet of the unloader till a click sound could be heard.



Assemble the double barrel spray-lance. To mount the assembled spray-lance on to the Spray-gun trigger, pull forward the front of the Spray-gun trigger (A) while sliding in the male swivel coupling part of the spray-lance. (B)

Prepare the water supply for the High Pressure Cleaner by attaching a hose to the supplied low pressure inlet male-coupling. Connect the other end of the water supply hose to a potable water tap. Turn on tap.



Notice

Connect to the public mains water supply in accordance to regulations.

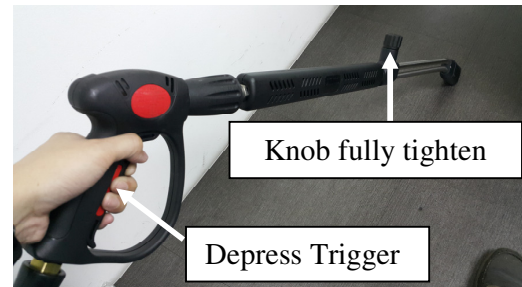


Before starting the machine, bleed out air by pulling the trigger-gun handle until any air has escaped the inlet hose. Release trigger once water flow is smooth at the outlet.



Put the power-plug into a main power supply socket. Turn on the power of the High Pressure Cleaner by turning the knob clockwise to the ON position.

The high pressure cleaner is now ready for operation. The spray-gun lance is affected by a recoil force during operation – therefore keep a firm grip with both hands on the Spray-gun handle and the lance. Press the trigger and tighten pressure regulating knob to achieve maximum pressure for effective cleaning.



Pressure Regulating Knob

The pressure can be regulated by turning the knob on the spray-gun lance. Tighten knob for maximum pressure and loosen for low pressure washing. When using chemical injector, pressure must be adjusted to low.



CAUTION

Make sure your local power supply specifications are in accordance with the motors requirement. Refer to the ID-plate on the machine. Do NOT run the High Pressure Cleaner without sufficient potable water supply as it can cause cavitation and serious damage to internal pump parts. Do not let the machine recycle the water (running with Spray-gun trigger not activated) for more than a minute. This can cause serious damage to the seals.

Machine Shut Down Procedure

Release trigger and lower down the pressure by loosening the knob on the lance.



Turn off the High Pressure Cleaner by turning the knob anti-clockwise to the OFF position. Switch off the main power supply

Once machine stop, depress trigger to release trap pressure in the pump and hose line. Make sure lance is pointing downwards when doing this as pressure could cause injury.

Once pressure is release, turn off water supply and disconnect inlet and outlet hose from machine. Dry the machine and store it.

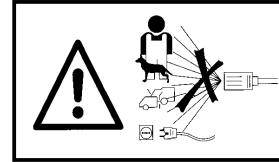


Operations

To prevent accidents from happening, ensure the safety of the person(s) who uses the equipment and to protect bystanders and nearby placed inventory or machinery, a few safety precautions needs attention

- 1) Treat the machine as a high-speed cutting tool.
- 2) Anyone under the age of 18 is NOT allowed to use the machine.
- 3) Always use a proper plug and socket specially designed with ground to earth wiring.
- 4) Only connect to an installation with earth wiring. A certified electrician shall make the installation. It is strongly recommended that the electric supply to the machine include a Residual Current Device/GFCI.

- 5) Always keep the High Pressure Cleaner and its accessories in good working condition. Check the machine for defects, especially the insulation on the electric cable. Do NOT start up the machine if there is any defect. Have the machine serviced.
- 6) When using the High Pressure Cleaner and its accessories, eye protection must be worn to protect against repelling or ricocheting matters causing eye damage.
- 7) Suitable clothing and footwear must be worn while using the equipment to protect the operator. Do not try to clean clothes or footwear with the machine.
- 8) Precautions must be made to keep bystanders away from the working range.
- 9) Do NOT spray-clean on yourself, others or live animals. The high-pressure beams are capable of making severe injuries.
- 10) Do NOT spray at electrical equipment OR the machine itself.
- 11) While repairing or servicing the equipment and its accessories, always make sure the machine is turned off and disconnected from the main power supply.
- 12) Only allow instructed personnel to operate the machine.
- 13) Activating the trigger/gun can cause backward force therefore always hold spray lance with both hands.
- 14) When pausing during operation, turned off the main switch of the machine and ensures that the trigger/gun is locked.
- 15) Only use high-pressure hoses, connections and nozzles specified by DEN-SIN.
- 16) **IMPORTANT** – Do not use the machine in a possible explosive environment in accordance with EN-50014.



2. Safety and protection information

General safety & application guidelines

- 1) It is not allowed to clean asbestos containing surfaces with high-pressure, unless using special equipment.
- 2) Persons under the influence of alcohol, drugs or medicine should not operate the machine.
- 3) Do not touch plug and socket with wet hands.
- 4) This machine has been constructed for use with Nilfisk-ALTO detergents. The use of other detergents or chemicals may cause problems as to the operation and the safety.
- 5) When using detergents the instructions should always be strictly observed.
- 6) Always flush the machine with clean water after use of chemical/detergents.
- 7) Always unplug power supply when cleaning and maintaining the machine.
- 8) Do NOT use the machine if important parts are damaged – i.e. safety devices, high-pressure hoses, spray handle.
- 9) The user is obliged to observe all national working environment and working safety regulations concerning “operation of high-pressure washers”.
- 10) It is not allowed to connect this machine directly to a potable water supply.

11) If the machine is to be connected to potable water supply it is strictly necessary to fit the machine with a water break tank, in accordance with EN1717.

Safety devices

The machine is equipped with the following safety devices:

- 1) Stop button. The stop button stops the machine when turned anti-clockwise to the 0 position.
- 2) Locking device on spray-gun handle. The locking device prevents the trigger from being activated when pulled out.



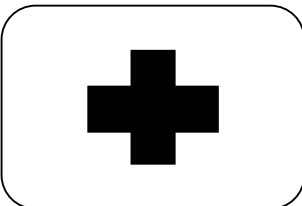
**Spray gun may change without notice*

- 3) Thermal sensor and over load relay. The thermal sensor and the overload relay protects the motor against overloading. The machine can be switched on again after a few minutes, when the sensor has cooled.

DO	DON' T
Two circular icons. The left one shows a person wearing safety glasses. The right one shows a person wearing large earplugs.	A large black triangle warning symbol. To its right is a diagram showing a person using a machine with a large 'X' over it, indicating that this action is prohibited. Below this is a small icon of a person using a machine with a warning symbol.

Important medical information

Immediate hospital attention should be given personnel who sustain equipment related injuries while operating the system. In such cases, it is vital that medical personnel be apprised of all facts relevant to such injuries. Therefore, all operating personnel should be provided with waterproof emergency medical alert tags or cards, describing the nature of their work and the possibility of injury inherent in the use of water jetting equipment. The below example of a standard card can be photo copied, laminated and used as medical alert tag.

 ULTIMATE WATER JETTING SOLUTION	
WARNING Obtain medical treatment immediately for ANY high-pressure water-jet injuries. Inform the doctor of the cause of the injury. Show this card to the doctor.	This card is to be carried by personnel working with high-pressure water jetting equipment. 
DEN-SIN - a division of Nilfisk Pte Ltd. 5 Tuas Ave 2, Singapore 639445 Tel: +65 6268 1006 Fax: +65 6268 4916	

 ULTIMATE WATER JETTING SOLUTION	MEDICAL ALERT NOTE TO PHYSICIAN
This patient may be suffering from a water jet injury. Evaluation and management should parallel that of a gunshot injury. The external manifestations of the injury cannot be used to predict the extent of internal damage. Initial management should include stabilization and a thorough neurovascular examination. X-rays can be used to access subcutaneous air and foreign bodies distant from the site of injury. Injuries to the extremities can involve extensive nerve, muscle, vessel damage, as well as cause a distal compartment syndrome. Injuries to the torso can involve internal organ damage. Surgical consultation should be obtained. Aggressive irrigation and debridement is recommended.	Surgical decompression and exploration may also be necessary. Angiographic irrigation studies are recommended pre-operatively if arterial injury is suspected. Bandages with a hygroscopic solution (MgSO₄) and hyperbaric oxygen treatment have been used as adjunctive therapy to decrease pain, edema and subcutaneous emphysema. Unusual infections with uncommon organisms in immunocompetent patients have been seen; the source of the water is important in deciding on initial, empiric antibiotic treatment, and broad spectrum intravenous antibiotics should be administered. Cultures should be obtained
DEN-SIN - a division of Nilfisk Pte Ltd. 5 Tuas Ave 2, Singapore 639445 Tel: +65 6268 1006 Fax: +65 6268 4916	

Safety precautions



The following protective clothing and devices should be worn both by personnel operating the water blaster system and equipment and by those working nearby:

Eye protection- Operators must wear visors and goggles to guard against spray and flying debris. A combination of both goggles and visor is advisable. And will protect the eyes and the face during both water-blasting as well as abrasive water-blasting Head protection- Helmets must be worn at all time by personnel within the work area. Helmet material must be able to withstand mechanical shock without fracturing. Hearing protection- Operators and other personnel exposed to noise levels of more than 90-dBa for more than 1 hour must wear suitable ear protection. Ear plugs or ear muffs are usually sufficient.	  
Hand protection- Shear proof gloves must be worn by the operator at all times. A glove combination of a cloth inner lining and a water tight outer layer is preferred.	
Foot protection- Safety footwear with steel toecaps must be worn. Basic safety footwear must also be equipped with metatarsal guards to protect the instep. Safety boots are available in other designs than the illustration. Gaiters- This is an additional layer of protection to the user foot that are not protected by the steel top cap. It is intended to be worn outside of the user's regular protective boots. Five clips ensure that gaiters securely stay in place. The entire area is protected. Very comfortable and light to wear.	 
Body protection- Waterproof garments protect the operator only from spray and flying debris. They do NOT deflect direct jet impact. Therefore, an operator must take care never to point a water-jet either at themselves or other personnel. Hose protection- Protect user from high pressure water injuries in-case hose connection is loose.	 

3. Maintenance and troubleshooting

Maintenance Schedule

Regular Service Period as indicated	Each use	1 st 50hrs	Every month / Every 500hrs	When needed	Procedure / Remarks
<i>Check pump oil level</i>	◇				• Top up if necessary.
<i>Change pump oil</i> Recommended Oil : SAE 15W40 Usage : Approx. 0.4kg of oil		◇	◇		Renewal of oil: • Turn off High Pressure Cleaner. • Loosen bolt (Hex) at bottom of pump housing. • Drain oil into a waste oil-tray. • Tighten bolt (Hex) • Add oil through pump inlet on top of the pump until the red point of the oil control glass has been reached. <i>Notice: Do not dispose of used oil in drain.</i>
<i>Cleaning of machine</i>	◇			◇	• Use damp cloth to wipe the cabinet and handle bar. Notice: <i>Do not use detergent cleaning chemicals</i>
<i>Cleaning of motor fan (to ensure sufficient airflow)</i>			◇	◇	• Clean the motor fan cover. • Clean the motor fan blade. Do NOT operate the machine with damaged or removed fan cover.

General Preventive Maintenance Guide					
No	Part No.	Description	Machine Model	Quantity required	Service Hours
1	700560004	Valve Kit	All	1	600-800
2	700560011	Oil seal kit	All	1	600-800
3	700560005	Piston kit 15mm	C-110E/C-150E	1	600-800
4	700560008	Piston kit 18mm	C-170E/C-200E	1	600-800
5	700560137	Water seal kit	C-110E/C-150E	1	600-800
6	700560139	Water seal kit	C-170E/C-200E	1	600-800
Unloader Valve					
7	700540991	Repair kit	All	1	400
Trigger Lance					
8	700551517	Seat gasket repair kit	All	1	400
9	700551520	Swivel repair kit	All	1	400



Above guide is based on machine operating with fresh water of ambient temperature not more than 30 degree Celsius. Preventive maintenance is necessary to maintain pump's performance, and Warranty on consumables parts only applies in the events of manufacturer's defects. Please read section 6 under WARRANTY clause for more information.

Machine Prevention

Do	Don't	Action	Cause
	◇	Spray directly onto the machine with high pressure water	Electrical shock may occurs
	◇	Operate the machine with damaged or removed fan cover	Motor will be overheated and malfunction
	◇	Operate/keep machine with frost built up	Flush pump with antifreeze fluids before use.
◇		Check hose and cord are not vehicle run over by heavy or squeezed in door opening	May cause machine not function properly.
◇		Check electrical cord and high pressure hose for wear and cracks	To prevent electrical shock and safety to the user
◇		Ensure coupling parts free of dirt to ensure long life of O-ring seals preventing water leaks.	Extend life span of the pump seals and maintaining correct pressure.

Troubleshooting

Symptom	Rectification
Main switch is turned on the High Pressure Cleaner will not run.	• Check power supply connection for faulty components • Make sure the socket is inserted correctly • Check if fuse is blown, replace if necessary.
Motor is humming & Pump does not give pressure or low pressure	• Voltage is too low as compare to specification. (Check main voltage) • Motor phase is missing (For 3 phase application). Check the connection box voltage with a meter • High-pressure pump is blocked
Pump pressure drops and the High Pressure Cleaner works irregularly	• Strain filter is clogged. • Water supply from the tap is insufficient. • Clean the strain water filter
Pump continuously stops and starts, when the spray-gun trigger is activated.	• The high pressure nozzle is partly clogged. Turn off the High Pressure Cleaner, dismantle the high-pressure nozzle and remove the extraneous matter. Replace if damaged
High pressure cleaner does not reach the proper working pressure when the spray-gun handle is activated	• The high-pressure nozzle is clogged. • Dirt in the by-pass valve. • The pump sucks air. • Turn off the High Pressure Cleaner. Clean the nozzle. • Inspect the low pressure supply, while spray-gun trigger is activated, ON the machine on again. • Repeat the procedure again; now with the trigger released. If the problem still occurs, by-pass valve should be dismantled and the extraneous matter removed.
High Pressure Cleaner only works with approximately 2/3 of the maximum pressure, and the high-pressure hose is vibrating.	• Valves are dirty • Remove the dirt and check to ensure the valve flaps are movable and fit tightly.
Noisiness	• The pump sucks air. • One or more valve springs are broken or down. • Extraneous matter in the valves. • Crankcase or motor bearings worn out. • Inspect the low-pressure supply. Replace springs. • Clean the valves. Replace the bearings.
Water in the oil	• The O-ring casing is worn out. • High moisture in the air (condensing inside the crankcase) • The seals are completely worn out. • Check or replace the O-ring. • Renewal of the crankcase oil more often. • Replace the seals.

The High Pressure Cleaner does not suck chemicals	• The chemical container is empty. • The High Pressure Cleaner has not been set to low-pressure (on the double barrel lance cock). • The low-pressure nozzle is clogged, or partly clogged. • The non-return valve of the chemical injector is stuck. • Ensure the chemical container contains sufficient fluid for proper suction. • Set the spray-lance to low pressure by turning the cock on the lance counter-clockwise. • Clean or replace the low-pressure nozzle. • Clean, correct or replace the non-return valve of the chemical injector.
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For any further inconveniences, not mentioned in this user guide or any damages of the machine, we strongly suggest you to make contact with your dealer for the repair or possible replacement of any original spare-parts.

Service instructions

Detach the high pressure hose, dump back hose, inlet hose, safety valve, and parts on the pump head before serving the pump.

(Please refer to Pump assembly (Page 18) unless otherwise stated.)

Servicing the valves:

1. Remove the valve cap (Pos: 2).
2. Inspect the valve cap O-Ring (Pos: 1) for any damage, replace if necessary.
3. Use the needle nose pliers to remove the valve (Pos: 3).
4. Use a small probe to move the poppet up and down to assure that the valve is functioning properly and that no debris is stuck in the valve (Pos: 3).
5. To reassemble the valves proceed the other way round and tighten the cover screws with a torque wrench. (Referring to torque specification)

Servicing the Packing/Seals:

1. Remove the bolts (Pos: 38) on the head (Pos: 36) of the pump.
2. Place the screwdrivers between the head (Pos: 36) and crankcase (Pos: 9) of the pump, lifting one up and the other down. The head should start to lift off of the plungers (Pos: 23).



3. When you remove the head, some of the water seals have stayed on the plungers (Pos: 23) and some in the head (Pos: 36). To remove the seals from the plungers (Pos: 23), simple turn the assemblies and pull off.



4. If the seal assemblies (Pos: 30~33) are in the head (Pos: 36) use the reversible pliers to grab the seal retainer on the outside ring, twist the retainer in either direction and lift out.



5. Pull out the guide ring (Pos: 31) with your finger.
6. Pull the high-pressure seal (Pos: 30) and support ring (Pos: 7) out of the head with your finger.
7. The low-pressure seal (Pos: 33) is located in the brass seal retainer. Using the mechanics pick, go in between the seal and retainer and pull the seal straight out.
8. Remove the seal retainer O-Ring (Pos: 32) with mechanics pick.
9. To reassemble the packing and seals proceed the other way round and tighten the cover screws with a torque wrench. (Referring to torque specification)

Servicing the Plungers (Pos: 23):

Recommend to replace Piston kits, Support Rings kits, and Water Seals kits whenever servicing the plungers.

1. Remove the plunger retainer nut (Pos: 25).
2. Insert the gasket scraper between the copper washer (Pos: 24) and plunger (pos: 23) to remove the washer (Pos: 22).
3. Twist and pull the plunger off the plunger rod.



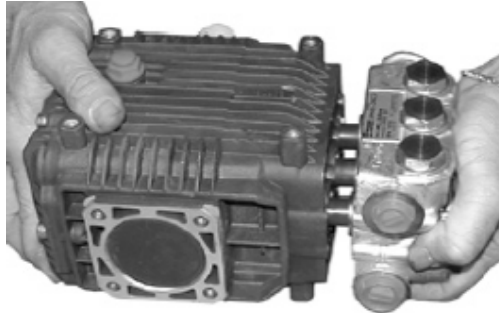
4. Remove the plunger rod O-Ring (Pos: 21) with the mechanics pick.
5. Remove the washer (Pos: 22). And clean any thread locker that is left on the plunger rod and retaining nut threads.
6. To reassemble the plungers, proceed the other way round and tighten the cover screws with a torque wrench. (Referring to torque specification)

Pump head (Pos: 36) to drive end (Pos: 9) Installation:

1. Turn the crankshaft to align the plungers as shown.

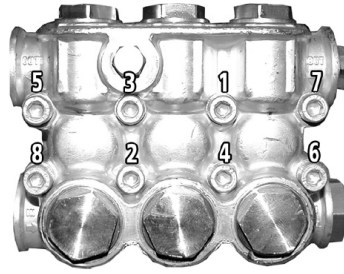


2. Place the head evenly onto the plungers and push it until it makes contact with the drive end of the pump.



3. Torque the head bolts (Pos: 38) as shown in the tightening sequence diagram.

Torque Specification:



Descriptions	Head (Pos: 38)	Piston Nut (Pos: 25)	Valve Cap (Pos: 2)
In .lbs	133	106	442
Kg.m/N.m	15	12	50

4. Accessories and Spare Parts

Accessories	part no.:
Chemical injector. w/ quick coupling	700550021
Rotary brush.	700550462
Foam injector complete	700550156
Foam lance w/ quick coupling	700550464
Foam sprayer w/quick coupling	700550463
Extension hose with quick couplings. from 10 - 50 m	Please inquire
Industrial drain cleaner (1 front, 3 rear jets).	700550508
Container for sandblasting grid, including regulator.	Please inquire
Rotating Nozzle 035 – C-150E	700551377
Rotating Nozzle 045 – C-110E	700550168
Rotating Nozzle 040 – C-170E /50Hz	700550167
Rotating Nozzle 055 – C-170E / 60Hz	700550308
Retractable hose reel.	700550208

Accessories	C110E 50HZ	C110E 60HZ	C170E 50HZ	C170E 60HZ	C200E 50/60HZ	C150E 50HZ
**Double Barrel Lance	700551473	700551473	700551472	700551474	700551473	700551395
*Single Barrel Lance	700550449	700550449	700550448	700550450	700550449	700550450
**Short Double Barrel Lance	700550488	700550488	700550489	700550491	700550488	700550490
Single Barrel Lance with Rotating Nozzle	700550470	700550169	700550170	700551288	700550171	700551378 (Pressure may be lower)
Single Barrel Lance with Multi-speed Nozzle	700551289	700550890	700550566	700551290	700550890	700551289
Industrial Sandblaster Kit with boron Carbide Nozzle	700550480	700550479	700550478	700550481	700550479	700550480

* With Straight Jet Nozzle **With Fan Jet Nozzle

Notice: Always state type of High Pressure Cleaner along with the part no.: when ordering accessories or spare-parts.

ID-plate

Refer to the identification plate on the machine:



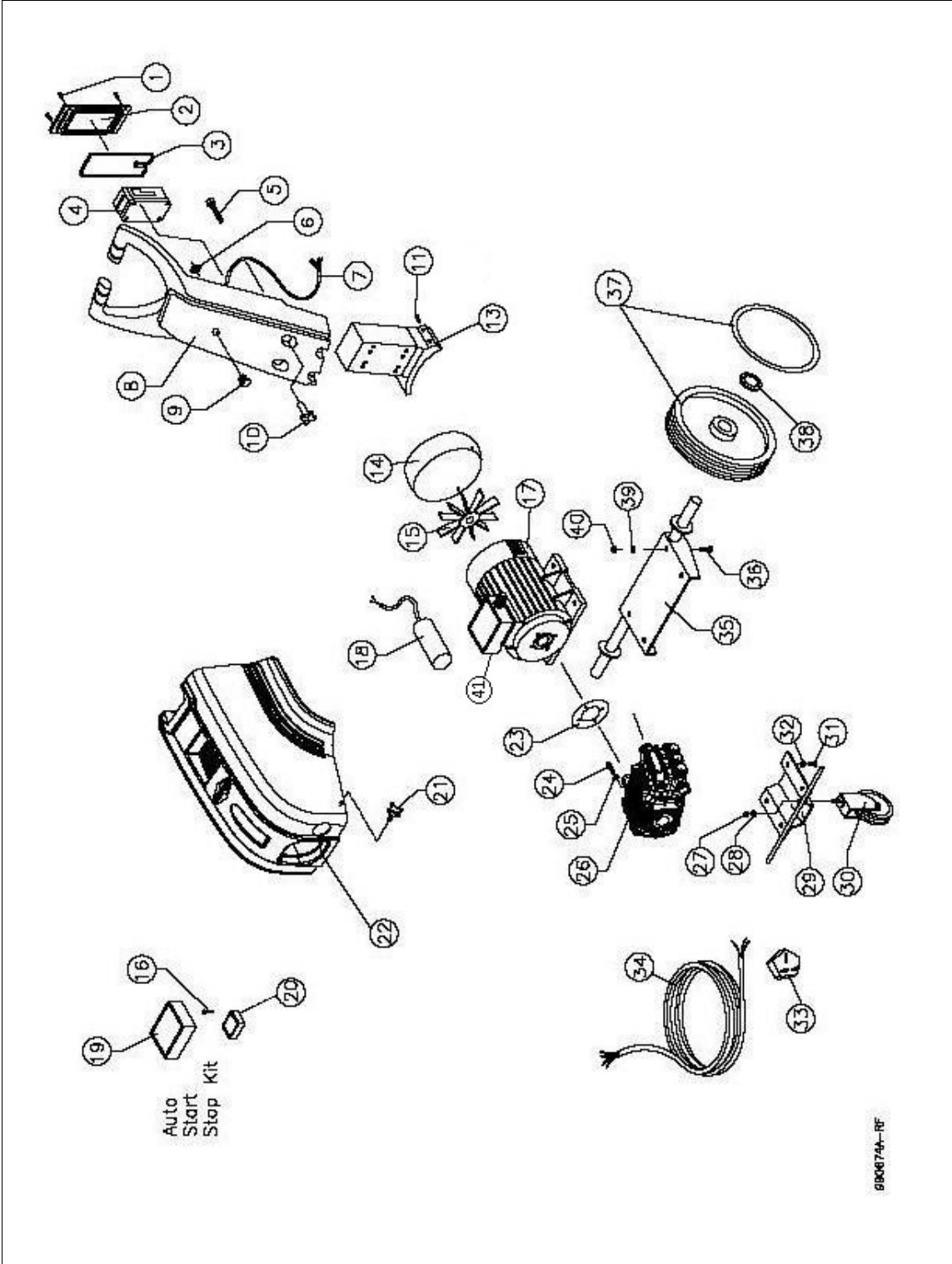
DEN-SIN
5 TUAS AVE 2 S(639445)
Tel: +65 6268 1006
Fax: +65 6268 4916

HIGH PRESSURE CLEANER

Model:		Noz:	
Item No.:		Amp:	
Rated Pres:		Noise:	
Max. Pres:			
Rated Flow:		Class:	
Volt :		Inlet °C:	
PH :	Freq:	IP:	Mass:
HP :		Serial:	
RPM:		Manu:	

DESIGNED & MADE IN SINGAPORE

Chassis assembly

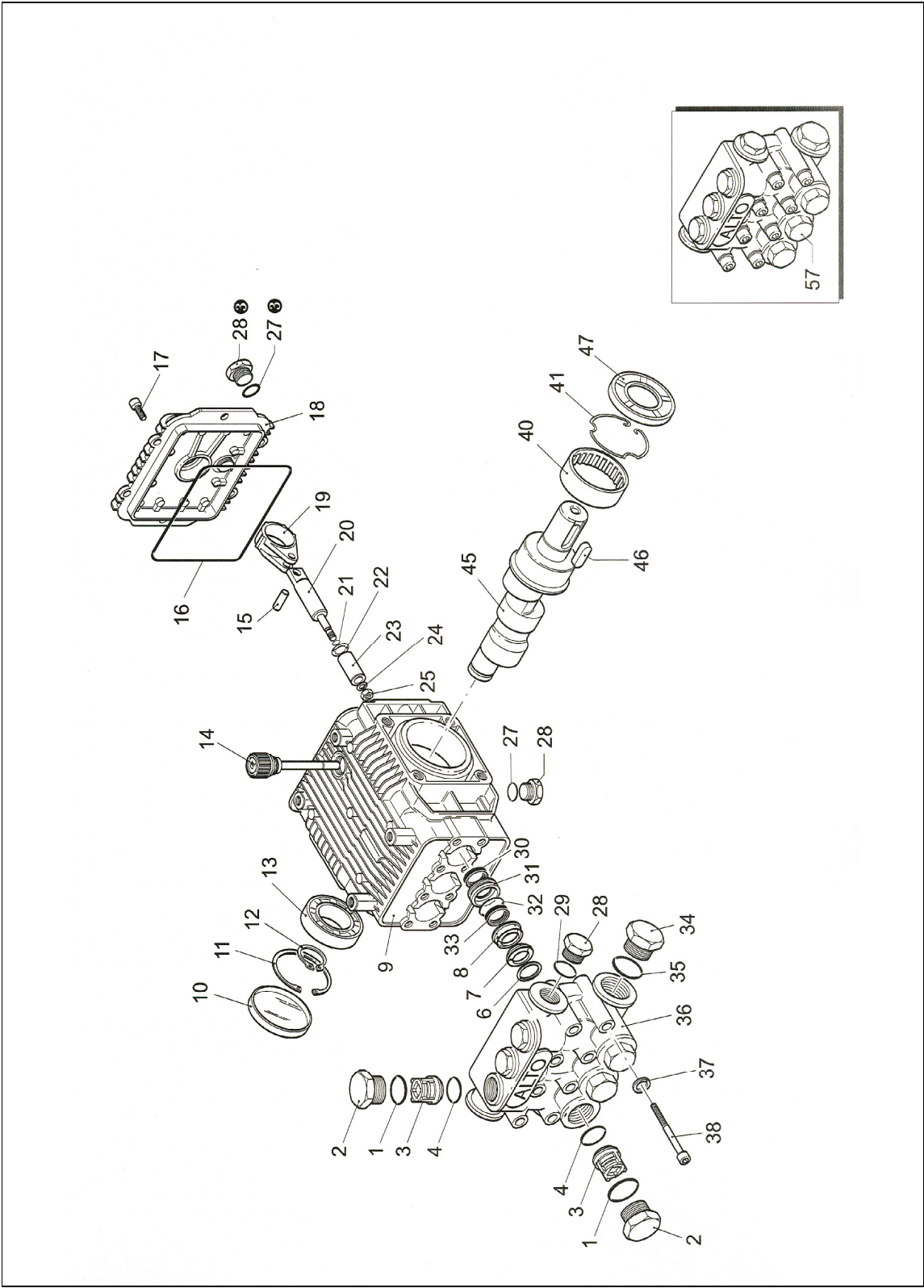


Chassis assembly spare-parts list

Pos:	Part no.:	Qty.:	Description:
1	700510040	4	Screw
2	700530109	1	Cover For El-Box
3	700530107	1	Gasket for El-Box
4	700530005	1	Overload Relay 16A C-110E 230V 50/60Hz; C-150E 230V 50Hz C-170/200E 400/440V 50/60Hz
	700530096	1	Overload Relay 22A C-150E 230V 50Hz C-170/200E 220V 50/60Hz
	700530115	1	Overload Relay 27A C-110/150E 110V 60Hz
5	700510043	4	Bolt M6 x 35
6	700520026	1	Steel lock Ø14
7	700951546	1m	Motor Cable C-110E 230V 50/60Hz; C-150E 220V/230V 50/60Hz
	700951548	1m	Motor Cable C-170/200E 230/400/440V 50/60Hz
	700951517	1m	Motor Cable C-110E 110V 60Hz
8	700520057	1	Handle
9	700530108	1	Switch Knob
10	700510050	4	Knob Screw Handle
11	700510051	4	Bolt M6 x 18
12	-	-	-
13	700520060	1	Bracket For Handle C-110/150/170E
	700520061	1	Bracket For Handle C-200E
14	700530763	1	Fan Cover For Motor C-110/150E
	700530794	1	Fan Cover For Motor C-170E
	700530796	1	Fan Cover For Motor C-200E
15	700530762	1	Fan Plastic C-110/150E
	700530795	1	Fan Plastic C-170E
	700530797	1	Fan Plastic C-200E
16	700510228	4	Screw M5 x 35
*	700530002	1	Bearing For Motor C-110/150E
	700530799	1	Bearing For Motor C-170E
	700530800	1	Bearing For Motor C-200E
17	700530769	1	Motor 24mm Shaft C-110/150E 230V 50/60Hz
	700530793	1	Motor 24mm Shaft C-110E 110V 60Hz
	700530784	1	Motor 24mm Shaft C-170E 220~460V 50/60Hz
	700530785	1	Motor 24mm Shaft C-200E 220~460V 50/60Hz
18	700530765	1	Capacitor 65uF C-110/150E
19	N/A	-	See Auto Start Stop section
20	700520712	1	Motor terminal spacer 20mm for A.S.S C-110/150E
21	700510010	2	Knob Screw Cabinet
22	700520510	1	Cabinet
23	700530693	1	Gasket for Motor-Pump
24	700510030	4	Bolt M8 x 25
25	700510034	4	Spring washer M8
26	700560158	1	Pump complete C-110E 230V 50Hz
	700560002	1	Pump complete C-170E 220~440V 50/60Hz C-200E 220V / 440V 60Hz
	700560003	1	Pump complete C-200E 230V / 380~415V 50Hz
	700560160	1	Pump complete C-150E 220V/230V 50/60Hz
27	700510068	1	Locknut M12
28	700510067	1	Washer flat M12
29	700520504	1	Bracket For Castor Wheel
30	700520456	1	Castor Wheel With Brake
31	700510009	4	Bolt M8 x 16
32	700510034	4	Spring washer M8

32A	700510005	4	Washer M8
33	700530097	1	3 Pin Plug 13 Amp 1Ph (Optional) C-110/150E 230V 50Hz
34	700951546	10m	Main Cable C-110/150E 220/230V 50/60Hz
	700951517	10m	Main Cable C-110E 110V 60Hz
	700951547	10m	Main Cable C-170/200E 415V 50Hz
	700951548	10m	Main Cable C-170/200E 230/440V 60Hz
35	700520519	1	Rear Wheel Bracket
36	700510011	4	Bolt M8 x 30
37	700520511	2	Wheel Cover
37A	700520511	2	Wheel
38	700520007	2	Star Lock
39	700510005	8	Washer M8
40	700510004	4	Locknut M8
41	700530821	1	Terminal Box 3hp
		1	Terminal Box 5.5hp
	700530807	1	Terminal Box 7.5hp
*	700510233	3	Bolt M6x230mm Hex (Parts for 700530769)
*	700520325	10m	Water Inlet Hose + Hose Nipple (Optional)

Pump assembly



Pump assembly spare-parts list

Pos	Part no.:	Qty.:	Description:
1	700560012	6	O-ring
2	700560013	6	Plug
3	Kit A	6	Complete valve
4		6	O-ring
6	Kit C2	3	Support ring Ø15 C-110/150E 50/60Hz
	Kit D2	3	Support ring Ø18 C-170/200E 50/60Hz
7	Kit C2	3	Gasket Ø15 C-110/150E 50/60Hz
	Kit D2	3	Gasket Ø18 C-170/200E 50/60Hz
8	Kit C2	3	Piston guide Ø15 C-110/150E 50/60Hz
	Kit D2	3	Piston guide Ø18 C-170/200E 50/60Hz
9	700560022	1	Pump body
10	Kit B	1	Cap
11	700560024	1	Circlip Ø52
12	700560025	1	Snap ring
13	700560026	1	Bearing
14	700560027	1	Oil Cap
15	700560028	3	Piston pin
16	Kit B	1	O-ring
17	700560030	6	Screw M6x16
18	700560031	1	Complete cover
19	700560032	3	Connecting rod C-110/150E 50/60Hz
	700560213	3	Connecting rod C-170/200E 50/60Hz
20	700560033	3	Guiding piston
21	700560034	3	O-ring
22	700560035	3	Spacer disc
23	Kit C1	3	Piston Ø15 C-110/150E 50/60Hz
	Kit D1	3	Piston Ø18 C-170/200E 50/60Hz
24	700560038	3	Piston washer
25	700560039	3	Nut M8
27	700560040	2	O-ring
28	700560041	3	G plug 3/8"
29	700560042	1	Washer
30	Kit B	3	Seal
31	Kit C2	3	Rear piston guide Ø15 C-110/150E 50/60Hz
	Kit D2	3	Rear piston guide Ø18 C-170/200E 50/60Hz
32	Kit C2 / D2	3	O-ring
33	Kit C2	3	Gasket Ø15 C-110/150E 50/60Hz
	Kit D2	3	Gasket Ø18 C-170/200E 50/60Hz
34	700560049	1	G plug 1/2"
35	700560050	1	Washer
36	700560051	1	Head
37	700560052	8	Washer
38	700560053	8	Screw M6x60
40	700560054	1	Bearing
41	700560055	1	Snap ring
45	700560056	1	Crank shaft 24mm C-150/170E 50/60Hz & C-200E 60Hz
	700560161	1	Crank shaft 24mm C-110E 230V 50Hz
	700560058	1	Crank shaft 24mm C-200E 50Hz
46	700560066	1	Key for Ø24mm Shaft C-110/170E/200E
	700560162	1	Key for Ø24mm Shaft C-150E
47	Kit B	1	Seal
-	700560127	1	Oil Indicator

Pos	Part no.:	Qty.:	Description:
57	700560061	1	Pump head pre-assembly (Dia 15) C-110E 50/60Hz
	700560163	1	Pump head pre-assembly (Dia 15) C-110E 110/220V 50Hz C-150E 50/60Hz
	700560062	1	Pump head pre-assembly (Dia 18) C-170/200E 50/60Hz
1-47	700560160	1	Pump complete C-110E 110V/220V 60Hz ; C-150E 50/60Hz
1-47	700560158	1	Pump complete C-110E 230V 50Hz
1-47	700560002	1	Pump complete C-170E 50/60Hz ; C-200E 60Hz
1-47	700560003	1	Pump complete C-200E 50Hz

Pump spare-parts kit

a.) For All Models

Part no.:/ Kit description	Pos:	Qty.:	Individual components Part no.:
Kit A - 700560004 Pump Valves Kit (1 SET)			
	3	6	Valve
	4	6	O-Ring
Kit B - 700560011 Oil seals (1 SET)	10	1	Cap
	16	1	O-Ring
	30	3	Oil Seal
	47	1	Seal

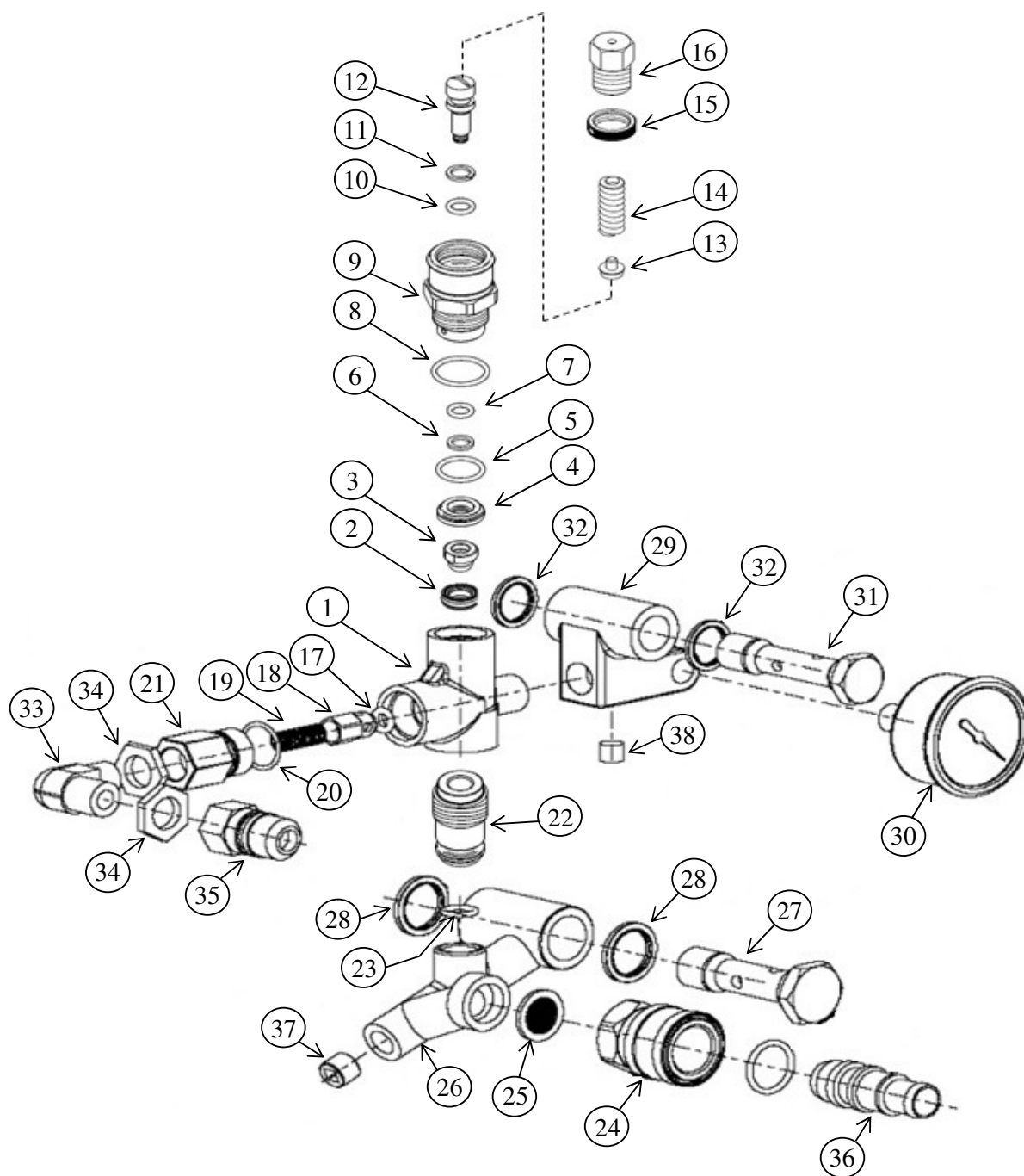
b.) For C-110E & C-150E (Ø15 Piston)

Part no.:/ Kit description	Pos:	Qty.:	Individual components Part no.:
Kit C1 - 700560005 Pistons (Ø15) (1 SET)	23	3	PISTON Ø15 FOR N3 PUMP
Kit C2 - 700560137 Water seals (Ø15) (1 SET)	32	3	O-Ring 23.52 x 1
	33	3	Gasket DM
	8	3	Piston Guide
	6	3	Support Ring
	7	3	Gasket W1
	31	3	Rear Piston Guide

c.) For C-170E & C-200E (Ø18 Piston)

Part no.:/ Kit description	Pos:	Qty.:	Individual components Part no.:
Kit D1 - 700560008 Pistons (Ø18) (1 SET)	23	3	PISTON Ø18 FOR N3 PUMP
Kit D2 - 700560139 Water seals (Ø18) (1 SET)	32	3	O-Ring 23.52 x 1
	33	3	Gasket DM
	8	3	Piston Guide
	6	3	Support Ring
	7	3	Gasket W1
	31	3	Rear Piston Guide

Un-loader valve assembly



Unloader valve assembly spare-parts list

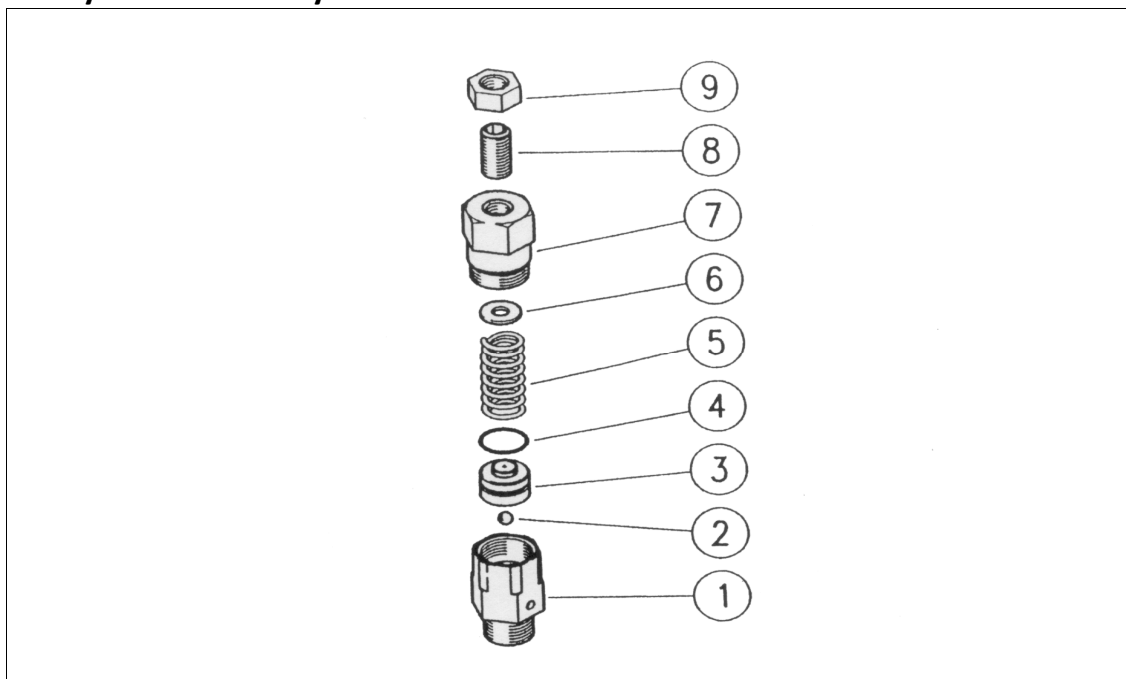
Pos:	Part no.:	Qty.:	Description:	
1	-	1	Valve Housing	
2	Kit E	1	Seat	
3		1	Shutter Unloader	
4	-	1	Spacer	
5	Kit E	1	O-Ring	
6		1	Anti-Extrusion Ring	
7		1	O-Ring	
8		1	O-Ring	
9	-	1	Piston Coupling	
10	Kit E	1	O-Ring	
11		1	Anti-Extrusion Ring	
12	-	1	Adjustable Piston	
13	-	1	Spring Holder Plate	
14	-	1	Spring	
15	-	1	Locking Nut	
16	-	1	Regulation Nut	
17	Kit E	1	O-Ring	
18	-	1	Shutter VRT3	
19	-	1	Shutter Spring	
20	Kit E	1	O-Ring	
21	700540992	1	Retention Coupling	
22	-	1	VR Coupling Bypass	
23	700540993	1	O-Ring	
1-23	700540989	1	Unloader Valve Complete	
24	700540034	1	Quick Coupling Female Inlet	
25	700540033	1	Strainer	
26	700540738	1	Water Inlet	
27	700540736	1	Banjo Bolt 1/2” (High flow)	
28	700540056	2	Dowty Seal 1/2”	
29	700540737	1	Holder For Un-Loader Valve	
30	700540193	1	Pressure Gauge	
31	700540734	1	Banjo Bolt 3/8”	
32	700550004	2	Dowty Seal 3/8”	
33	700540025	1	Elbow	
34	700510136	2	Contra Nut 3/8”	
35	700540026	1	Quick Coupling Male Outlet	
36	700540036	1	Hose Nipple	
37	700540194	1	Plug 1/4”	
38	700540195	1	Plug 1/8“	
1-38	700540994	1	Unloader System Complete	
*	700540186	1	Elbow 3/8” M-F (Safety Valve Installation)	C-200E 50/60Hz
*	700510136	2	Contra Nut 3/8“ (Safety Valve Installation)	C-200E 50/60Hz

* Not shown

Repair kit Unloader valve

Part no.:/ Kit description	Pos:	Qty.:	Description
Kit E - 700540991 (Unloader Valve Seal Kit)	2	1	Seat
	3	1	Shutter Unloader
	5	1	O-Ring
	6	1	Anti-Extrusion Ring
	7	1	O-Ring
	8	1	O-Ring
	10	1	O-Ring
	11	1	Anti-Extrusion Ring
	17	1	O-Ring
	20	1	O-Ring

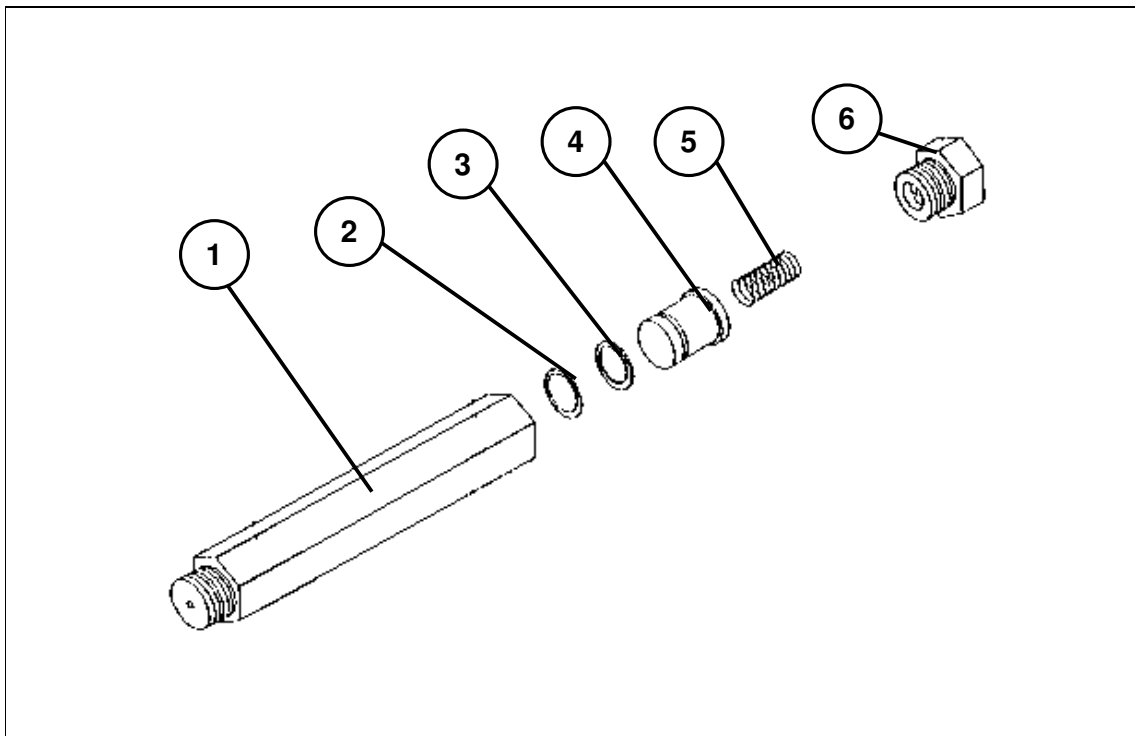
Safety valve assembly C-200E



Safety valve assembly spare-parts list C-200E

Pos:	Part no.:	Qty.:	Description:
1	700540119	1	Body Safety Valve 3/8"
2	700540115	1	Rubber Ball
3	700540121	1	Piston
4	700540120	1	O-Ring
5	700540122	1	Spring
6	-	1	Washer
7	700540124	1	Fitting
8	-	1	Adjusting Screw
9	700510008	1	Nut
1-9	700540110	1	Safety Valve Complete

Start-up accumulator assembly C-110E (110V 60Hz only)

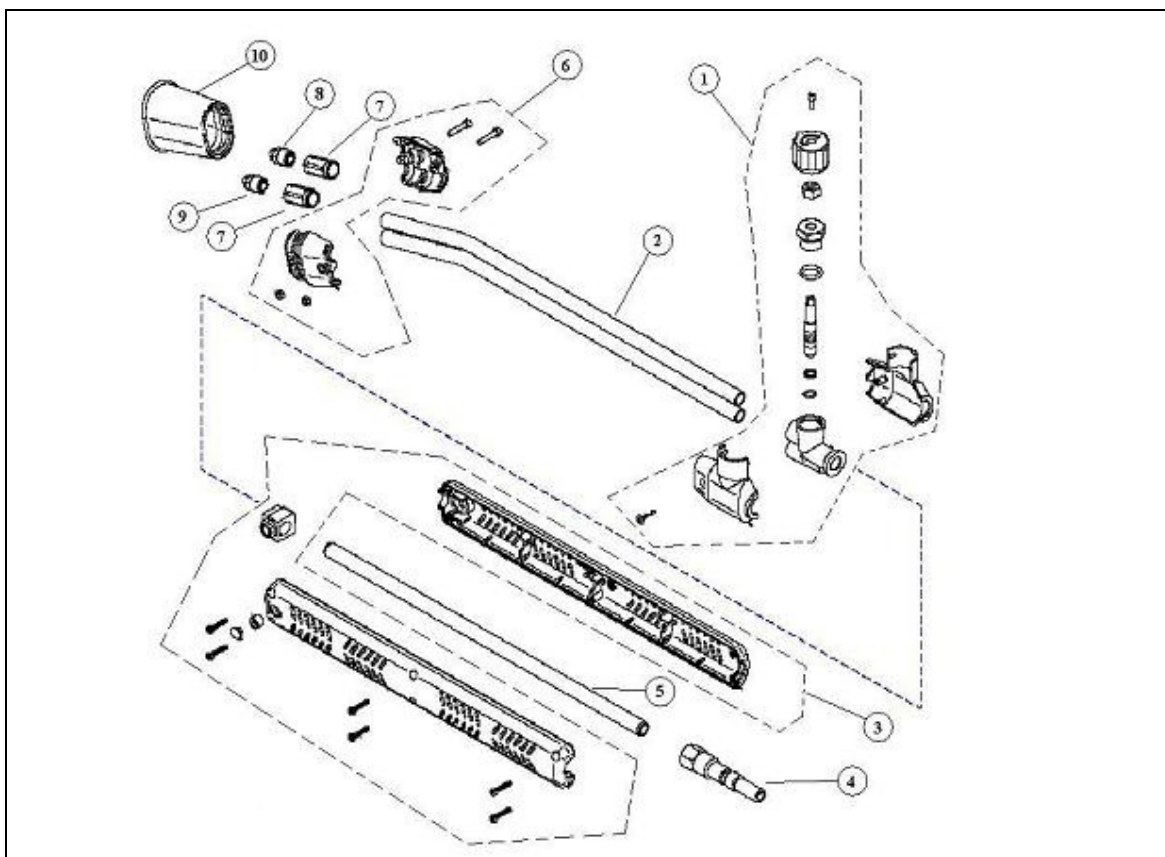


Start-up accumulator assembly spare-parts list C-110E

Pos:	Part no.:	Qty.:	Description:
1	-	1	Housing Accumulator
2	700540169	1	O-Ring
3	700540168	1	Back-Up Ring
4	-	1	Piston
5	700540914	1	Spring
6	-	1	Thrust Screw
1-6	700540915	1	Accumulator Complete
*	700550004	1	Dowty Seal 3/8"

*Not shown

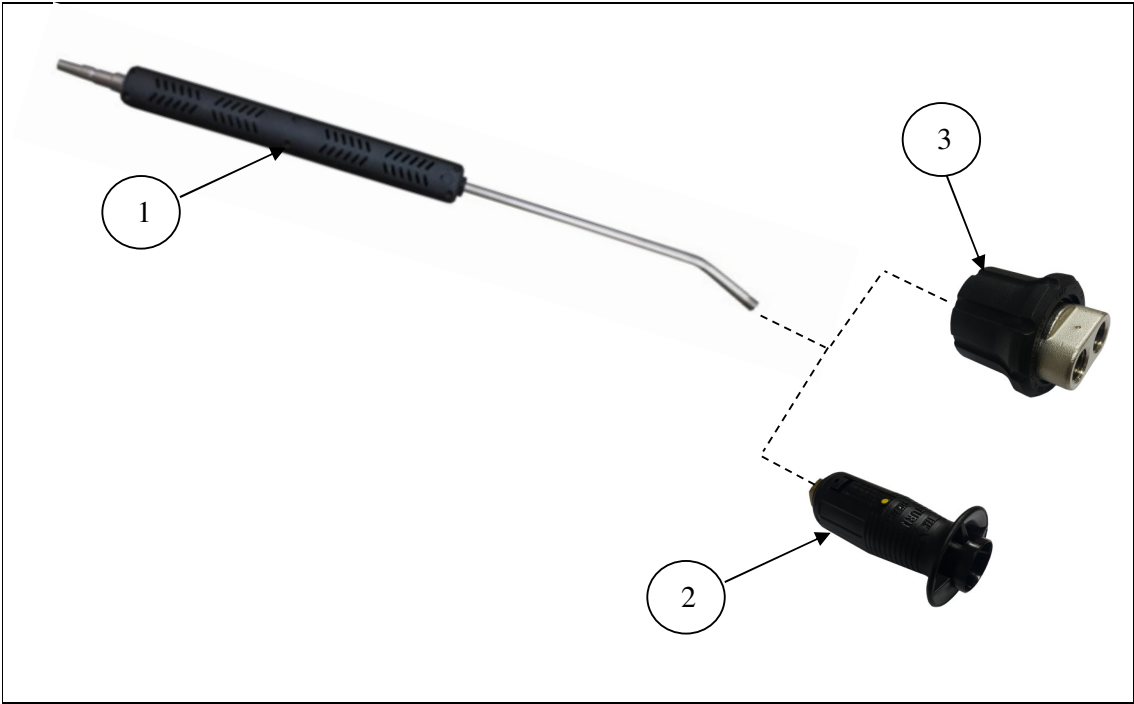
Lance assembly 1 (Standard)



Lance assembly spare-parts list

Pos:	Part no.:	Qty.:	Description:
1	700551471	1	Needle valve
2	700951001	1	Lance Pipe Top
	700951001		Lance Pipe Bottom
3	700551470	1	Lance Guard L+R Complete w/ Screws And Holder
4	700551469	1	Nipple, Quick Coupling Male
5	700951001	1	Lance Pipe For Double Barrel Lance
6	700551478	1	Nozzle Guard Shell
10	700551479	1	Nozzle Guard Cover
7	700550557	2	Bushing, High Pressure Nozzle Holder 1/4"
8	700551187	1	Nozzle Low Pressure
1-8	700551395	1	Lance D.B complete w/o nozzle
9	700550015	1	Nozzle 15045 C-110E 50/60Hz, C-200E 50/60Hz
	700550389	1	Nozzle 15035 C-150E 60Hz
	700550075	1	Nozzle 1504 C-170E 50Hz
	700550056	1	Nozzle 1505 C-170E 60Hz
1-9	700551472	1	Double Barrel Lance Complete Noz 1504 C-170E 50Hz
1-9	700551473	1	Double Barrel Lance Complete Noz 15045 C-110E 50/60Hz, C-200E 50/60Hz
1-9	700551474	1	Double Barrel Lance Complete Noz 1505 C-170E 60Hz
1-9	700551373	1	Double Barrel Lance Complete Noz 15035 C-150E 60Hz

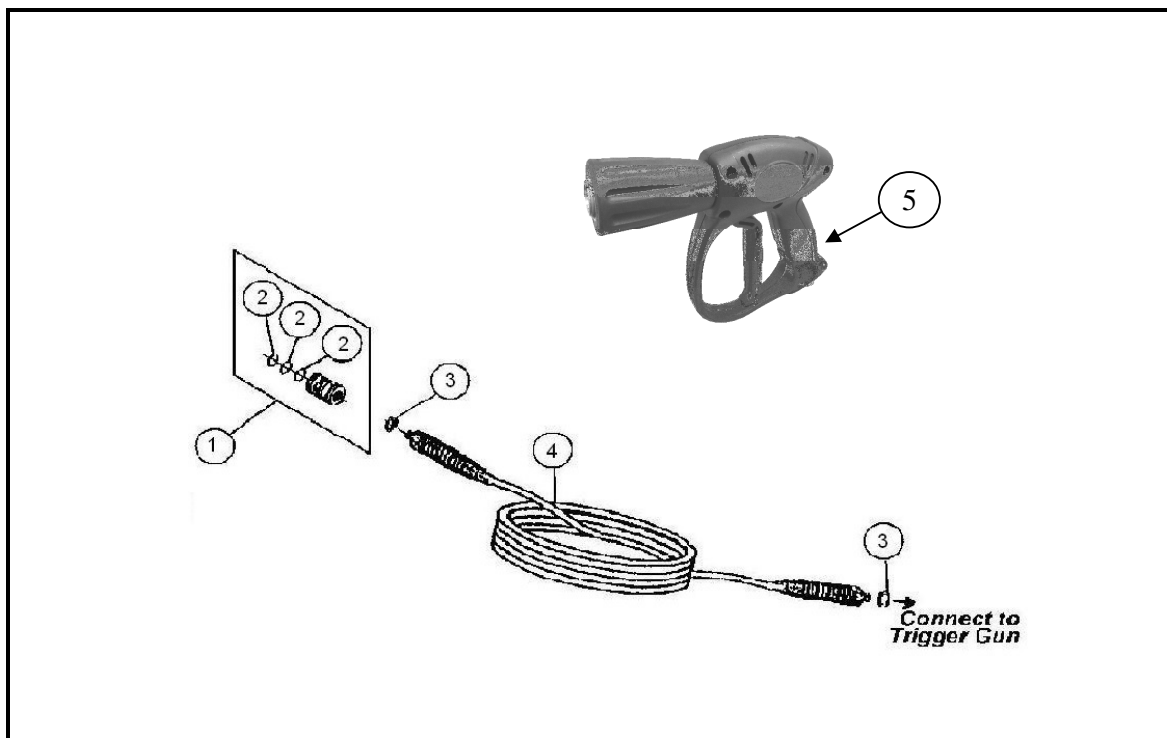
Optional Lance assembly 2 (Optional)



Lance assembly spare-parts list

Pos:	Part no.:	Qty.:	Description:
1	700551393	1	LANCE S.B. W/Q CPG ONLY
2	700550801	1	VARIABLE SPRAY + HI-LO 045 NOZ
3	700550087	1	CHANGEOVER NOZZLE
1+2	700550890	1	LANCE SB W/MSPEED NOZ 0045 STD
1+3	700551343	1	LANCE S.B W CHANGEOVER NOZZLE

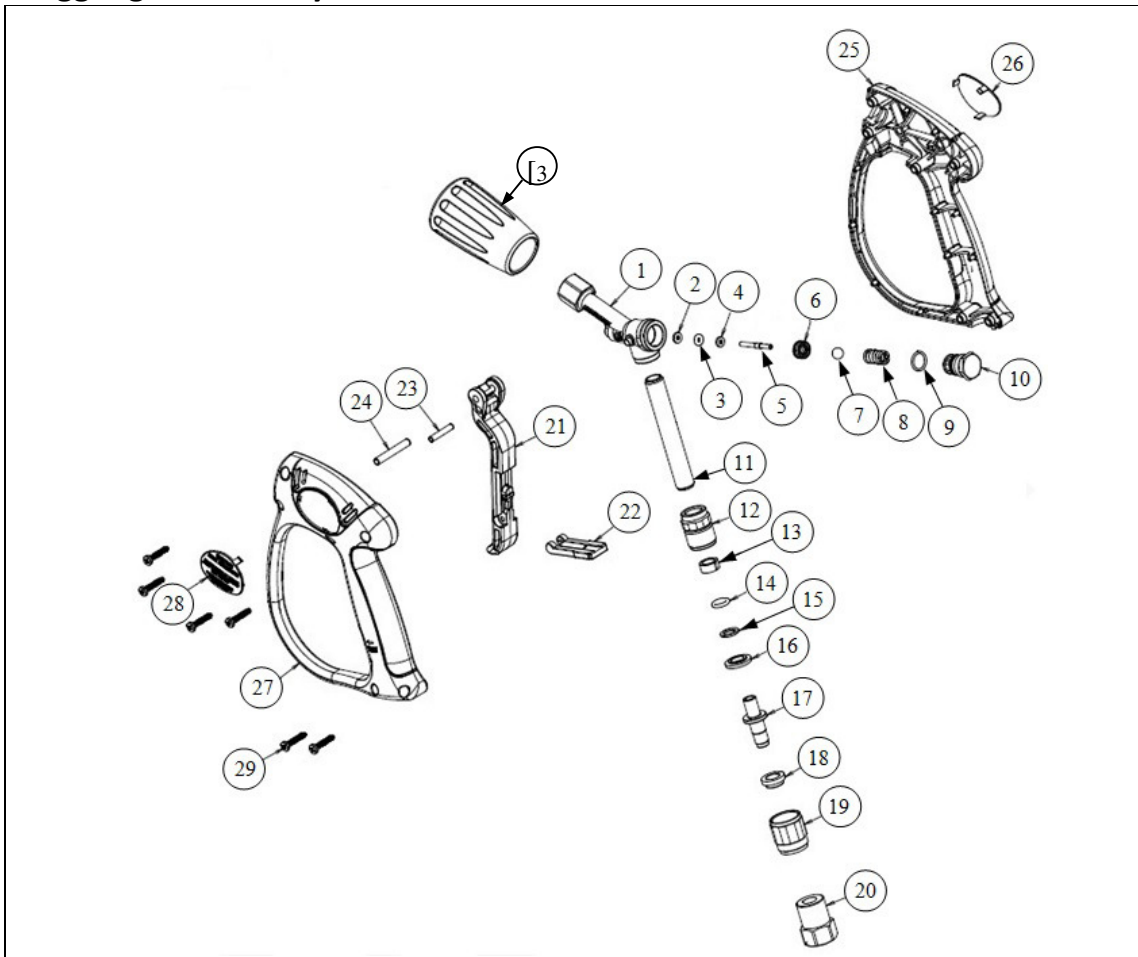
Complete HP hose assembly



Complete HP hose w/ Trigger gun

Pos:	Part no.:	Qty.:	Description:
1	700550003	1	Quick Coupling Female High Pressure
2	700540491	3	O-Ring
3	700550004	2	Dowty Seal 3/8"
4	700550039	1	High Pressure Hose 3/8" R1T 10m Length
5	700551511	1	Trigger Gun Complete
1-5	700551512	1	Hose HP 10m. R1T + Quick Coupling + Gun (Standard)

Trigger gun assembly



Trigger gun assembly spare-parts list

Pos:	Part no.:	Qty.:	Description:
1	-	1	Body
2	Kit F	1	Anti Extrusion Ring
3		1	O-Ring
4		1	Washer
5		1	Pin Press Sphere
6		1	Seat
7	-	1	Sphere 5/16
8		1	Spring S.S
9	Kit F	1	O-Ring
10	-	1	Plug
11	-	1	Pipe
12	-	1	Coupling G1/4F Outlet SW Top
13	Kit G	1	Bushing
14		1	O-Ring
15		1	Anti Extrusion Ring
16		1	Spacer
17		1	Rotating Joint Pin
18	-	1	Nut with Step
19		1	Nipple
20	700551521	1	Coupling G3/8F Inlet SW Top
21	-	1	Lever

22	-	1	Trigger Safety Lock
23	-	1	Lever Pivot D4x22
24	-	1	Lever Pivot D5x33
25	-	1	Right Trigger Cover
26	-	1	Right Label
27	-	1	Left Trigger Cover
28	-	1	Left Label
29	-	1	Screw
30	700551522	1	Quick Coupling Female Complete
1-30	700551511	1	Trigger Gun Complete

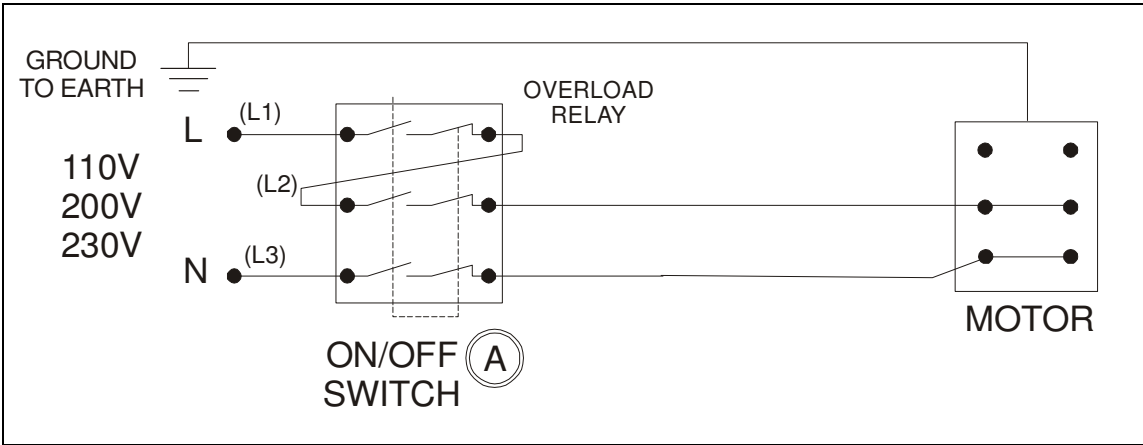
Trigger Gun Repair Kits

Part no.:/ Kit description	Pos:	Qty.:	Individual components Part no.:
Kit F – 700551517 Seat Gasket Repair Kit	2	1	Anti Extrusion Ring
	3	1	O-Ring
	4	1	Washer
	5	1	Pin Press Sphere
	6	1	Seat
	7	1	Sphere 5/16
	9	1	O-Ring
Kit G - 700551520 Swivel Repair Kit	13	1	Bushing
	14	1	O-Ring
	15	1	Anti Extrusion Ring
	16	1	Spacer
	17	1	Rotating Joint Pin
	18	1	Nut with Step

5. Wiring Diagram

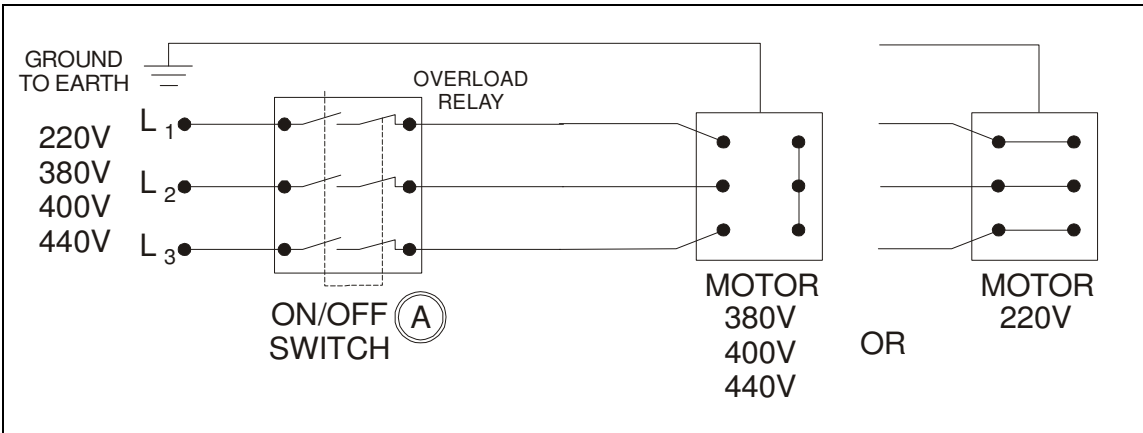
Wiring diagrams (Non-Auto Start Stop)

C-110E & C-150E standard



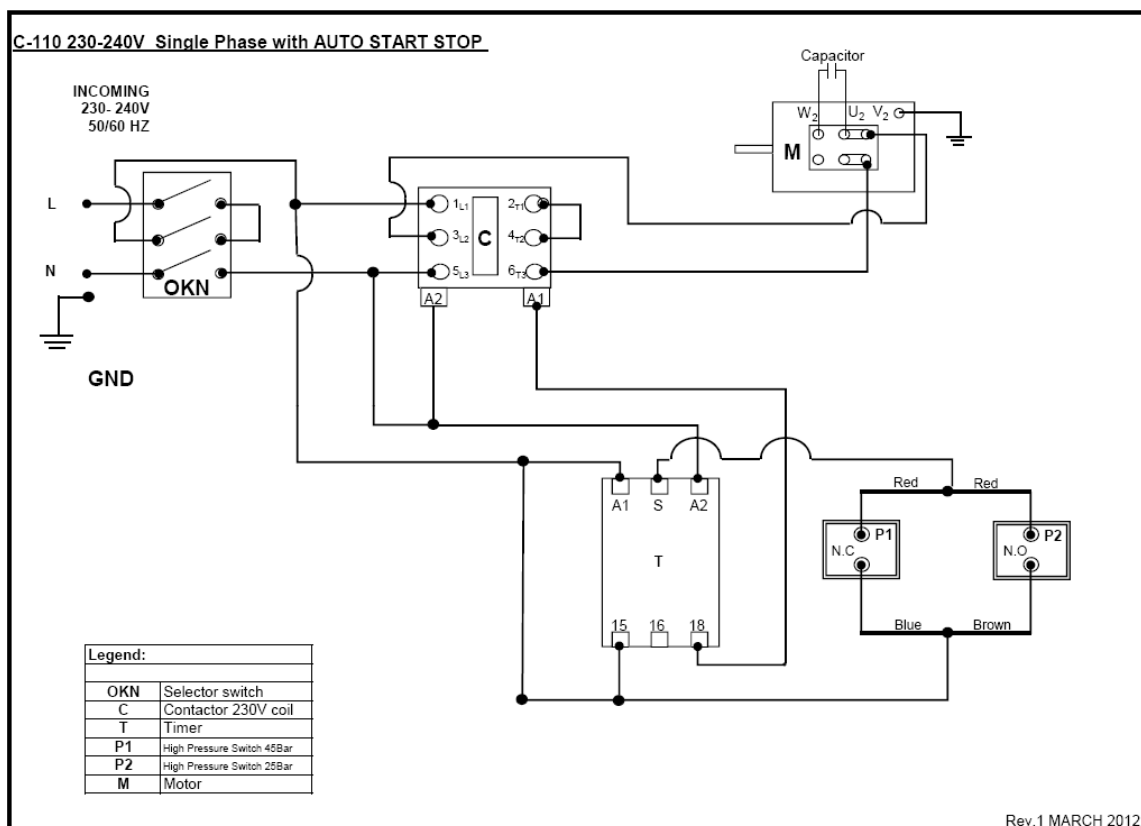
Pos:	Part no.:	Qty.:	Description:
A	700530005	1	On/Off Switch w/ Overload Relay 230V
A	700530115	1	On/Off Switch w/ Overload Relay 110V

C-170E C-200E standard



Pos:	Part no.:	Qty.:	Description:
A	700530005	1	On/Off Switch w/ Overload Relay 380-415-440V
A	700530096	1	On/Off Switch w/ Overload Relay 230V

Wiring diagrams (Auto Start Stop Single phase)

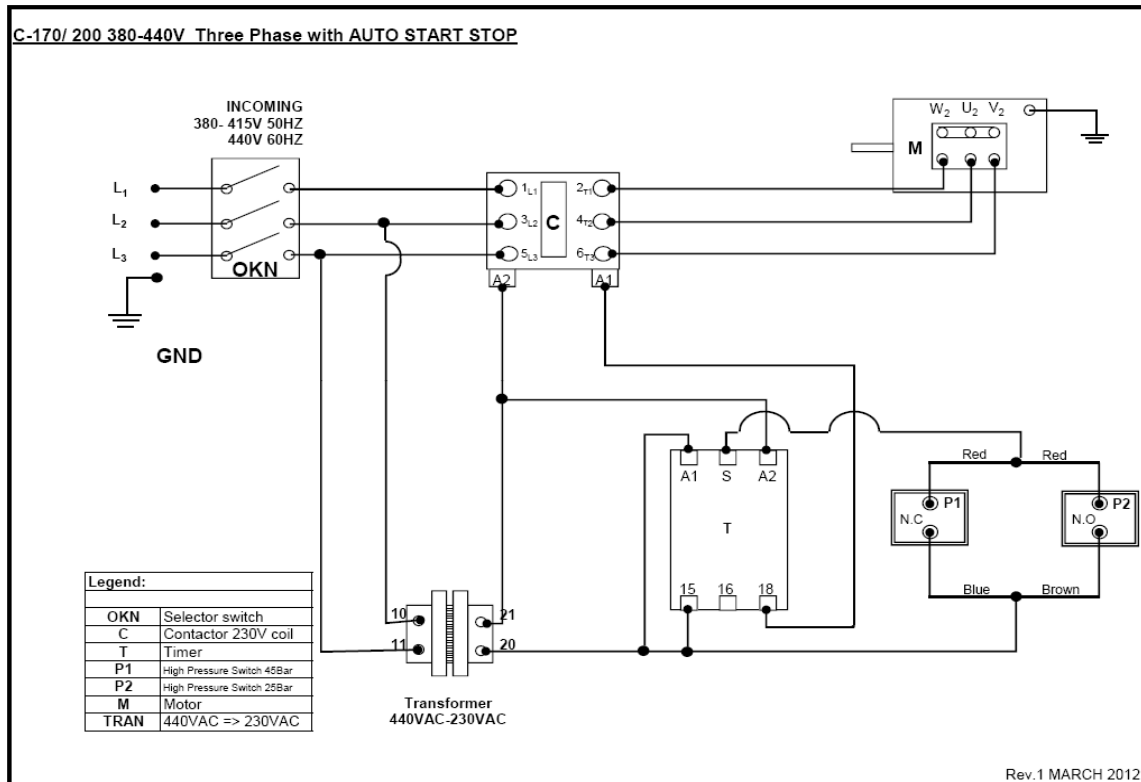


Kit Auto Start Stop

Pos:	Part no.:	Qty.:	Description:
A1	700530005	1	On/Off Switch w/ Overload Relay
B1	700530610	1	CONTACTOR LC1-D25/COIL 220V-23
C1	700530695	1	TIMER
D1	700530154	1	PRESSURE SWITCH 3/8"
E1	700530155	1	PRESSURE SWITCH 1/4"
F1*	700530613	1	EL-BOX
-	-	-	-
-	-	-	-
I1*	700540114	1	T JOINT 3/8" BSP M-F 1/4" BSP
J1*	700540117	1	T JOINT 3/8" BSP M-F-F BRASS
K1*	700540113	1	NIPPLE 3/8" BSPP M-M ZN
L1*	700530624	1	SELECTOR SWITCH 230V-500V
M1*	700520688	1	MOTOR TERMINAL SPACER 20mm
N1*	700510228	4	SCREW M5X35 PAN HD ZN
O1*	700550004	2	DOWTY SEAL 3/8"
B1-O1	700530642	1	Kit Auto Start Stop

*Not Shown

Wiring diagrams (Auto Start Stop 3 phase)



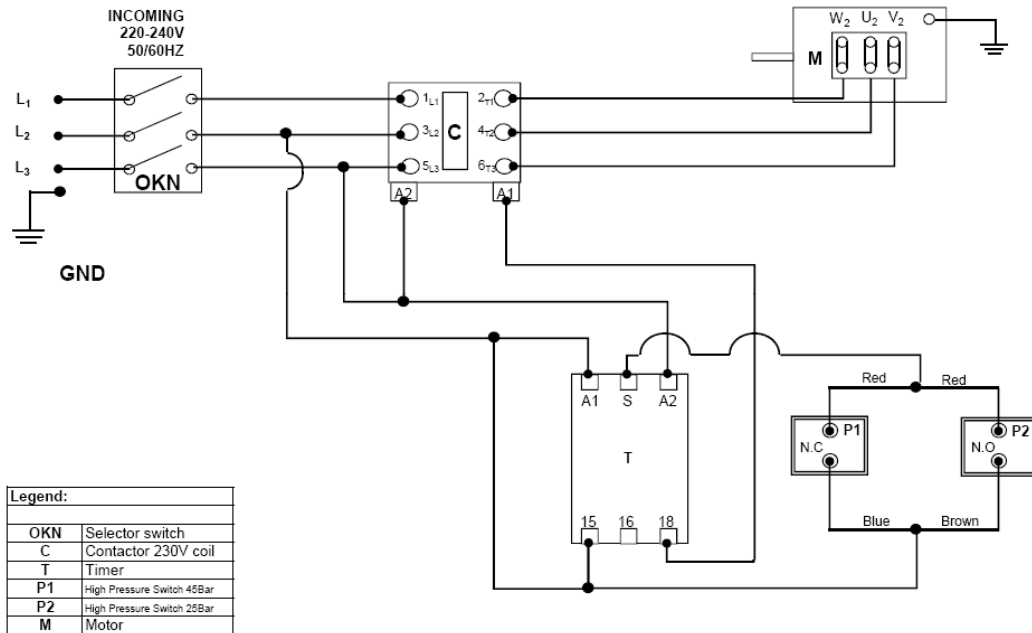
Kit Auto Start Stop

Pos:	Part no.:	Qty.:	Description:
A2	700530005	1	On/Off Switch w/ Overload Relay
B2	700530610	1	Contractor LC1-D25/Coil 220V-230V
C2	700530614	1	Transformer 415V/230V
D2	700530695	1	Timer
E2	700530154	1	Pressure Switch 3/8"
F2	700530155	1	Pressure Switch 1/4"
G2*	700530613	1	Electrical Box
H2*	700530624	1	SELECTOR SWITCH 230V-500V
-	-	-	-
-	-	-	-
K2*	700540114	1	T JOINT 3/8` BSP M-F 1/4` BSP
L2*	700540117	1	T JOINT 3/8` BSP M-F-F BRASS
M2*	700540113	1	NIPPLE 3/8` BSPP M-M ZN
N2*	700520563	1	ON/OFF SWITCH MOUNTING
O2*	700510178	2	SCREW M6X3/8"
P2*	700510061	2	BOLT M5 X 20 ALLEN BLACK
Q2*	700510051	1	Bolt M6 X 18 HEX
R2*	700510007	1	Locknut M6
S2*	700540317	1	Dowty Seal M6
T2*	700540186	2	ELBOW 3/8` BSP F-M
U2*	700510136	6	CONTRA NUT 3/8` BSPP BRASS
B2-U2	700530649	1	Kit Auto Start Stop

*Not Shown

Wiring diagrams (Auto Start Stop 3 phase 220V)

C-170/ 200 220-240V Three Phase with AUTO START STOP



Rev.1 MARCH 2012

Kit Auto Start Stop

Pos:	Part no.:	Qty.:	Description:
A2	700530005	1	On/Off Switch w/ Overload Relay
B2	700530610	1	Contractor LC1-D25/Coil 220V-230V
D2	700530695	1	Timer
E2	700530154	1	Pressure Switch 3/8"
F2	700530155	1	Pressure Switch 1/4"
G2*	700530613	1	Electrical Box
H2*	700530624	1	SELECTOR SWITCH 230V-500V
-	-	-	-
J2*	700540113	1	NIPPLE 3/8` BSPP M-M ZN
K2*	700520563	1	ON/OFF SWITCH MOUNTING
-	-	-	-
M2*	700510061	2	BOLT M5 X 20 ALLEN BLACK
N2*	700510051	1	Bolt M6 X 18 HEX
O2*	700510007	1	Locknut M6
P2*	700540317	1	Dowty Seal M6
Q2*	700540186	2	ELBOW 3/8` BSP F-M
R2*	700510136	6	CONTRA NUT 3/8` BSPP BRASS
B2-R2	700530643	1	Kit Auto Start Stop

*Not Shown

6. Warranty

DEN-SIN warrants all equipment of its manufacture furnished under this agreement to be free from defect in workmanship and material for a period of one year from the date of invoice of the equipment. This warranty does not cover normal wear and tear, consumable items, or part failures caused by (i) accident, (ii) abuse, or (iii) failure to maintain the DEN-SIN system containing the affected parts in accordance with DEN-SIN technical specification. All labour is the responsibility, and the expense of the Buyer. The liability of Seller under this warranty is limited, at Seller's option, solely to repair or replacement with equivalent articles. This warranty is condition upon:

- (a) Seller being notified in writing by Buyer within one week after discovery of defects;
- (b) the return of defective articles to Seller, transportation charges prepaid by Buyer;
- (c) Seller's examination of such article disclosing to its satisfaction that such defects were not caused by negligence, misuse, improper maintenance, improper installation, accident, or unauthorized repair or alteration.

Accessories or equipment furnished by DEN-SIN but manufactured by others, shall carry the warranty that its manufacturer has conveyed to DEN-SIN, and which may be passed on to the purchaser. The original warranty period of any article, which has been repaired or replaced by DEN-SIN, shall not thereby be extended.