

DEMON 500 STORM

Declaration of Conformity (E.H.S.R)

We, Demon International Limited of Abbots Close, Lee Mill Industrial Estate, Ivybridge, Devon, PL21 9GA Declare this machine must be operated in accordance with the operation and safety instructions as supplied with this machine. This machine is manufactured in accordance with the following standards.

HSE PVB PM - BS415 Part 1 - BS5415 Section 2.4 1986

This instruction manual is relevant only to the following machine and will not be kept updated unless specifically requested by the customer. However any changes to the operating procedure or changes which might affect the safety of this machine will be notified to the registered owner of this machine only.

Machine Type	
Serial Number	
Voltage	
Working Pressure	
Date of Supply	

Technical Specifications

Storm 500

Pump	ARHSHP15.50	Motor	N/a
Pump pressure	500 bar 7250 psi	Motor Output	15Kw
Flow rate	15 lpm 3.3 gpm	Motor Input	18Kw
Max by pass setting	510 bar 7450psi	Max current	25 amps/phase
H.P. Nozzle	1503	Voltage	415v + or - 15v
Pump Oil	10W40	Insulation	Class F
Unloader valve	VB16	Duty Cycle	100%
Safety Valve	V5500	Protection	IP54
Noise	85 DbA		

	Valve Kit	Piston Kit	Oil Seal Kit	Water Seal Kit
STORM 500	KIT2185	KIT2872	KIT2873	KIT2874

Common Part Numbers	
Inlet QR Coupling	MTM73001 (To Tap) 3/4 Female (Nito)
Inlet QR Coupling	MTM73020 (To Tap) 3/4 Male (Nito)
Electrical Box	DEM101111

General Safety

- There is a serious risk of personal injury if you do not follow all instructions laid down in this guide.
- Ensure that any company risk assessments have been completed prior to the use of this equipment as determined in your own health & safety policies.
- This equipment should only be used by an operator who has been deemed competent to do so by his/her employer.
- This equipment should be used by an able bodied, competent adult who has read and understood these instructions. Anyone with either a temporary or permanent disability, should seek expert advice before using it.
- Keep children, animals and bystanders away from the work area. Cordon off a NO GO area using either cones, barrier or tapes.
- NEVER use this equipment if you are ill, feeling tired, or under the influence of alcohol and drugs.



Safety goggles MUST be worn by everyone in the work area. Recommended Grade 1 goggles to EN166. Less hazardous work; grade 2 spectacles.



This equipment generates potentially harmful noise levels. To comply with health & safety at work regulations, ear defenders must be worn by everyone in the vicinity.



Wear practical, waterproof protective clothing INCLUDING hard hat, gloves and footwear. Avoid loose garments and jewellery that could get in the way of the work, tie back long hair.



Never carry, lift or pull the equipment by its hoses. This equipment is heavy, never attempt to lift it.

- Ensure the work area is well lit and ventilated.
- Do not work near flammable gases or liquids, petrol or paint thinner fumes for example. Keep combustible materials at a safe distance – at least 5m.
- Make sure you know how to switch this machine OFF before you switch it ON. Read on for further information.
- Never leave the unit running and unattended.
- Pressure Washing Equipment can cause serious injury, so take care. Never point the lance at anyone.
- Never direct the spray at or near anything electrical.
- Take care where you lay hoses. Avoid running them where there is a risk of someone tripping over them.
- Always switch the motor off and wait for moving parts to come to a rest before making adjustments.
- Make sure everyone in the vicinity is warned of what you are doing before you begin.
- Check the condition of the equipment before use. If it shows signs of damage or excessive wear contact Demon technical on 01752 690690.

Equipment Care

- Never push the equipment beyond its design limits. If it will not do what you want with reasonable ease or within the time required, assume you have the wrong size or type of washer for the job.
- Keep the equipment clean. You will find this less of a chore if you clean the machine regularly.
- Handle hoses with care. Never run them over sharp edges or anywhere else that exposes them to the risk of damage.

Step by Step Operating Manual Demon Storm 500

How to start the Storm 500



1



Check the pump oil by the visual inspection guide.

2



Check filter is clear – if not wash and replace.

3



Check there are no nicks/tears or damage to electrical cable.

4

Visually inspect over the entire machine. If there is any damage identified to electrical cable or box then do not use. Contact the Technical Department on 01752 690690

5



Attach water supply to QR female nitro coupling and fill with water.

6



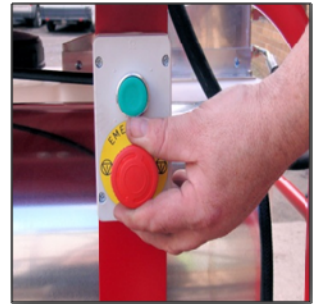
Unpin hose reel and roll out desired length. Reposition pin and lock.

7



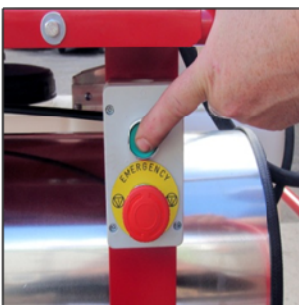
Plug in cable to correct electrical supply.

8



Twist and release stop button..

9



Press green start button and start using.

10



To stop push red button

11



Release pressure from hose by pulling trigger.

Step by Step Operating Manual Demon Storm 500

12



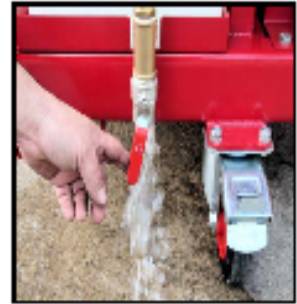
Unplug and wind up electrical cable.

13



Rewind the hose reel.

14



To drain excess water turn drain handle to downward position.

PREPARATION

Water Supply:

- a. Ensure there is an adequate water supply either from the mains or a reservoir.
- b. Attach water supply hoses to suitable tap.

NOTE: ONLY CLEAN FILTERED WATER SHOULD BE USED.

Hoses:

- a. Attach the high pressure hose to the pump connection.
- b. Attach the spray gun to opposite end of the high pressure hose.

NOTE: The high pressure water will cause the gun to 'kick'. Make sure you have a firm grip of the gun and lance.

OPERATION

(Check that electric motor is switched '**OFF**')

- a. Plug into a suitable electrical source. (Not an extension lead)
- b. Turn on water supply.
- c. Ensure that the trigger is '**OPEN**' to vent air from the pump.
- d. Switch '**ON**' electric motor.
- e. Open regulator nozzle slightly and direct lance on surface to be cleaned. Press operating trigger.
- f. Adjust pressure regulator as required to obtain working pressure.
- g. NOTE: The high pressure water will cause the gun to 'kick'. Make sure you have a firm grip of the gun and lance.
- h. On completion of the operation switch '**OFF**' electric motor and unplug from power supply.
- i. Turn '**OFF**' water supply.
- j. Release residual pressure in gun and lance by operating trigger.

OPERATING HINTS

- a. During very cold weather it is most important to protect the machine against freezing. DO NOT operate machine should it become frozen. Move it to a warm area and allow to thaw naturally.
- b. Check all hoses and couplings for leaks, tighten where necessary.

SERVICING

The Storm range require little maintenance apart from checking the oil level at least every week and changing the oil should it turn white or it is six months old. If the oil turns white it is due only to water entering the pump via the dipstick, which has a breather hole drilled through. The design of the pump does not allow water from the pump to gain access to the gearbox drive.

Should the performance be reduced to a level where the jet is ineffective contact the service department to ascertain the correct remedial repair work.

OPERATING INSTRUCTIONS

SAFETY

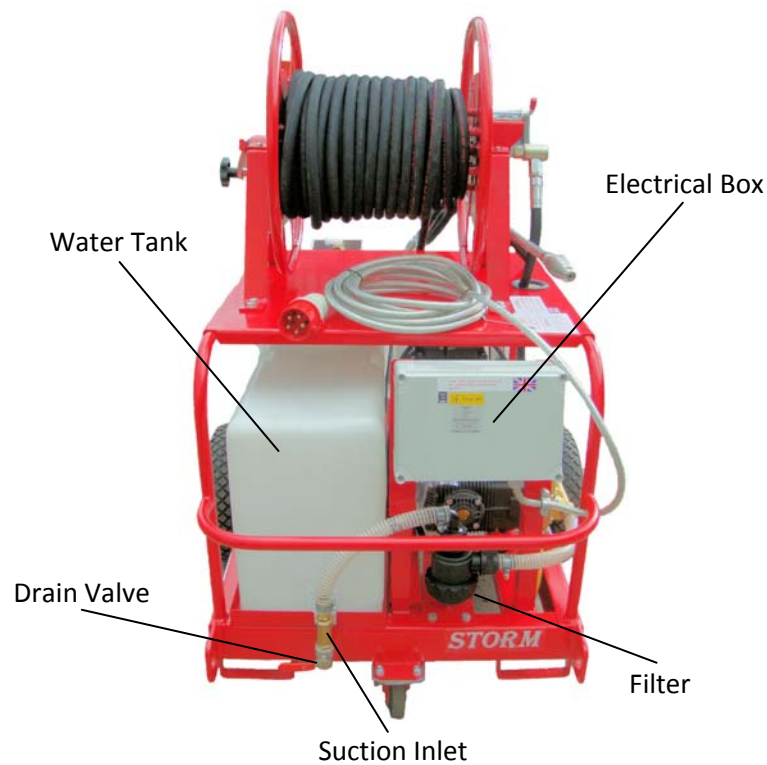
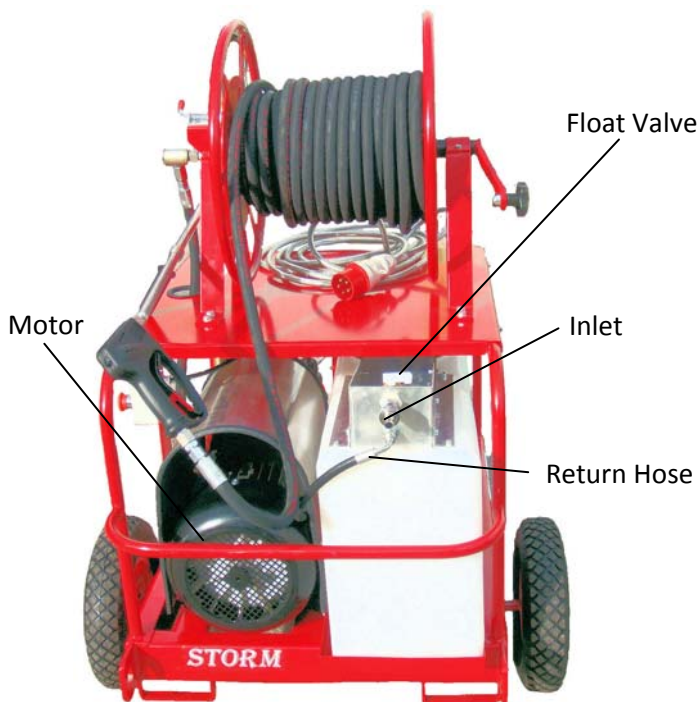
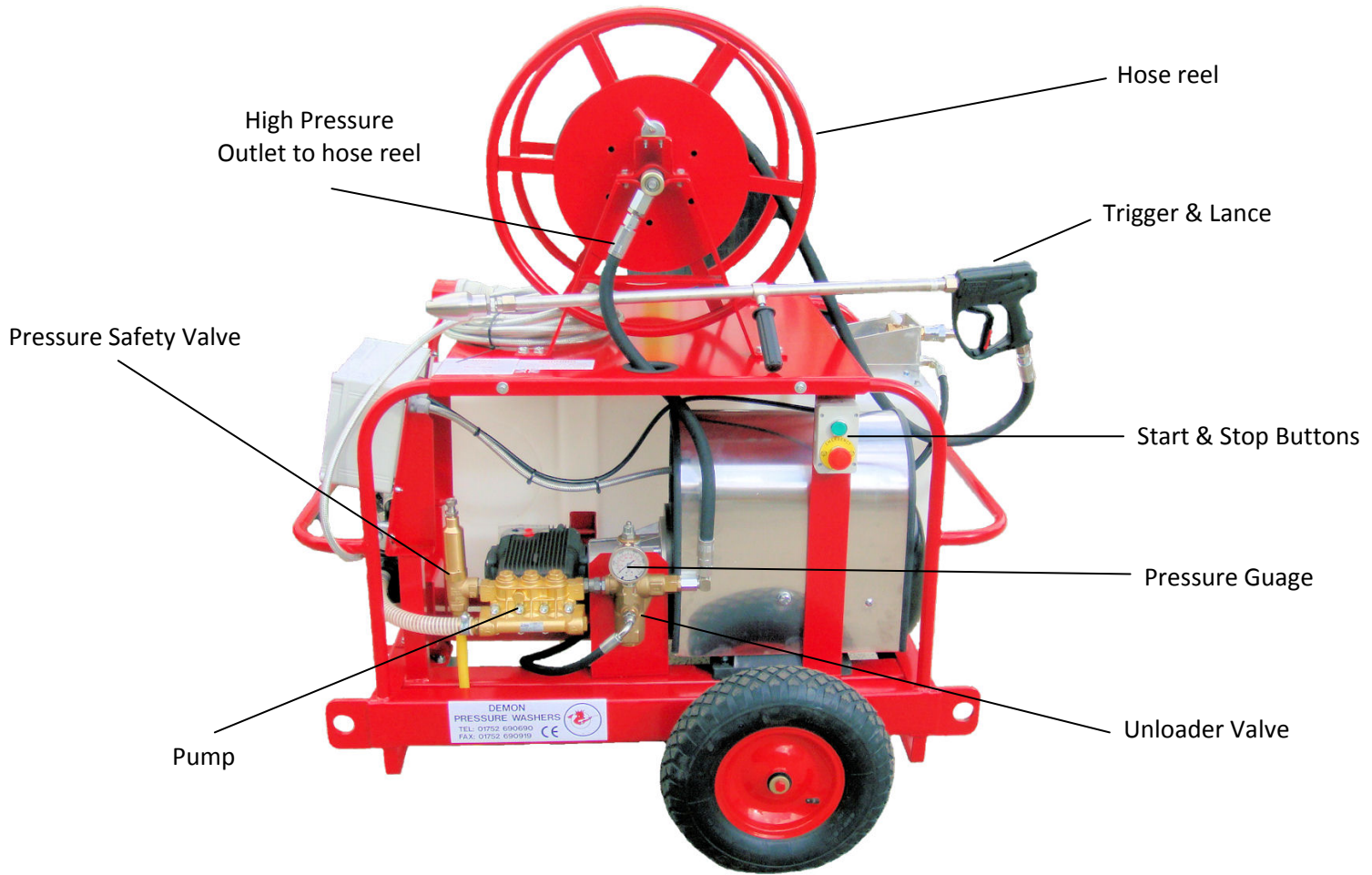
Water at high pressure is dangerous and can cause serious injury. This machine is to be used with great caution.

- a. **NEVER** point the high pressure spray jet at any person, animal, glass or any other material which may shatter.
- b. **PREVENT** any over-spray from injuring other people or damaging property.
- c. **DO NOT** even try to use a pressure washer on machinery or electrical equipment that is connected in any way to the mains supply. (all switches in the off position, pull out all plugs and if possible remove fuses). Cover or seal electric motors and fittings to prevent entry of water.
- d. **ALWAYS** when using machine:-
 - wear safety goggles and helmet or helmet with a visor.
 - wear waterproof clothing and gloves.
 - take particular care with detergents and chemicals.
- e. **NEVER** attempt to disconnect any hose with pressure in it or allow the hose to be flattened or kinked.
- f. **DO NOT** use a high pressure hose from a ladder. Use a platform tower or proper scaffolding.
- g. **CHECK** that your supply voltage agrees with that shown on the machine.
- h. If an extension lead is used unwind all cable off the drum to stop overheating. The right size of extension lead must be used, failure to do so will result in switch failure or motor damage. Demon strongly recommend the use of extension hoses opposed to extension leads. Warranty claims for damaged switches and motors used on extension leads will not be allowed. Ask the service department if in doubt.
- i. **DO ALL** you can to keep plugs and sockets in a dry place or covered to prevent entry of water.
- j. Where a cable is found to be damaged, the power must be switched off and the plug removed before attempting to remove the equipment.

FAULT FINDER

FAULT	CAUSE	REMEDY
Machine stops suddenly Or will not start.	Blown fuse.	Check mains power supply, replace fuse. Wait until unit cools down before resetting switch.
Sudden pressure loss.	Water supply failed.	Check water supply.
Low pressure	HP nozzle worn or unloader set Incorrectly.	Replace HP nozzle. Set unloader to correct setting.
Low pressure with noise and vibration.	Valves worn or blocked. Piston seals worn. Pump sucking air.	Clean/replace as required. Replace. Check water supply pipe and unions.
Pump will not by-pass.	Non return valve dirty or jammed.	Clean or replace.
Water drips from pump box.	Pump seals worn.	Replace.
Oil drips from pump bottom.	Oil seal worn.	Replace.
Oil is milky in colour.	Water ingress through oil filter plug.	Rinse pump out and replace oil.
IF IN DOUBT ASK—OUR ADVICE IS FREE AND CAN SAVE YOU MONEY		

Demon Storm 500 —General Arrangement



WARRANTY

This warranty covers the cost of all replacement parts and labour charges incurred. It does not cover the cost of transport or carriage. It is the owners responsibility to return the machine to a service depot or pay the travelling expenses of a service engineer to attend. Demon International's decision in warranty matters is final and binding.

Demon International Ltd undertake to repair or replace, any component which may fail due to a manufacturing fault within a period of 12 months from the date of purchase, provided that any fault or damage was not sustained by;

- A. Lack of regular and proper maintenance, user negligence, misuse, or damage caused by ice and frost.
- B. The effects of contaminated fuel or water, the use of non-approved chemicals or an insufficient or unsuitable electrical supply.
- C. The effects of un-authorised modification and use.
- D. Compression damage to high pressure hose.(HOSES WARRANTED FOR 1 MONTH ONLY)
- E. Worn out items considered fair wear and tear.

Parts which may or may not wear out during the first year and which are considered service items which will need replacing from time to time: High pressure nozzle, lance, trigger, hoses, fuel nozzle, fuel filter, piston seals, valves, unloader seats and seals, water filter, non-return valve, chemical barbs, chemical pipes and pump oil seals.

It is the owners responsibility to ensure the Pressure Washer is kept in a safe and suitable environment and any faults reported by operatives to be rectified at the earliest possible date.

It is the operators responsibility to check the Pressure Washer for any faults and report them immediately. The Pressure Washer must be used in accordance with the manufacturers specifications and guidelines.

Demon International Ltd undertake to use the highest quality components available during manufacture, but cannot be held responsible for any undue consequence arising from the use of there Pressure Washer.

This warranty is given to the original purchaser only and is not transferable without the fully authorised and written consent of Demon International Ltd.

Warranty Procedure

End Users

If your machine develops a problem:

1. Phone Demon for advice with the model and serial number to hand.
2. Describe fully the problem as best you can.
3. If the problem cannot be resolved over the phone then the machine can be booked in for repair and if the faults are covered by the warranty the repair will be carried out free of charge.
4. If you cannot bring the machine in for repair then we will despatch an engineer. If the fault is covered by the warranty then we will not charge for labour or spares used, however the transport charge will be payable whether or not the repair is warranty.

Hire Centres and Dealers

If your machine develops a problem:

1. Phone Demon for advice with the model and serial number to hand.
2. Describe fully the problem.
3. We will advise you on the best course of action, however if parts are required you must raise a purchase order number to cover the parts. When the parts are fitted they must be returned for examination before a credit note is issued.
4. If you are unable to repair the machine then we will despatch an engineer to carry out the repair. We will need a purchase order to cover the cost of transport to and from the site and for parts and labour if the repair is not covered under the warranty.
5. If required Demon will arrange for a carrier to collect a damaged machine, if the warranty claim is valid we will pay this cost, if not it will be charged to the customer.
6. For parts warranty ring Demon and request a warranty claim form faxed to you. This form must accompany any returned parts.

Notes:

You will not invalidate the warranty by investigating faults and repairing them yourself providing you follow our advice. Hire Centres and Dealers are expected to carry out all repairs themselves with Demon crediting faulty parts upon receipt and inspection.

Spare parts fitted to machines are guaranteed for 1 month only or the remainder of the warranty period whichever is longer.



I can't get the pressure to where it used to be – where do I start?



Well by now you should know to check the nozzle - assuming that is correct and you still have no or low pressure the golden rule is to connect the pump to the mains water supply - whichever machine you are testing start with a good mains feed.

1. With the gun and lance connected turn the tap on - can you see a leak? If so there is your problem, if water can leak out air can get in and the pump won't produce pressure - simple as that. (Leaks from underneath the pump are either worn seals or a cracked piston - strip to find out which.)

Remedy: Fix leak or replace seals or piston.

2. Check enough flow of water can get into the pump. Make sure all the filters are clean. The new Tempest hot water machines have a fine filter which will remove most solids. All Demon machines are now double filtered. Have you checked both of them?

Remedy: Strip and inspect filters.

3. There are no leak's what next? With the pump switched off pull the trigger, water will spray out. Keeping the trigger pulled switch the pump on, if the water spray does not improve the valves are the fault. Either worn out or dirty. Strip and inspect. (The high pressure hose will also vibrate on the ground.)

Remedy: Replace or clean valves.

4. The valves are OK there are no leaks but it still won't get up to pressure – what next? The unloader valve piston and seat are damaged or worn allowing some of the water to circulate around the cylinder head - strip and inspect, you will see any damage.

Remedy: Strip unloader and inspect - replace damaged parts.

5. My cold water pressure washer does not feel as powerful as it used to be but the pressure gauge shows the correct pressure. What causes this? The chemical pick-up has a nozzle of 1.8mm or 2.0mm size and can get partially blocked. This will allow some but not all of the water to flow to the lance.

Remedy: Strip and remove the blockage.

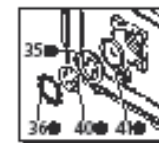
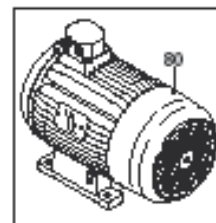
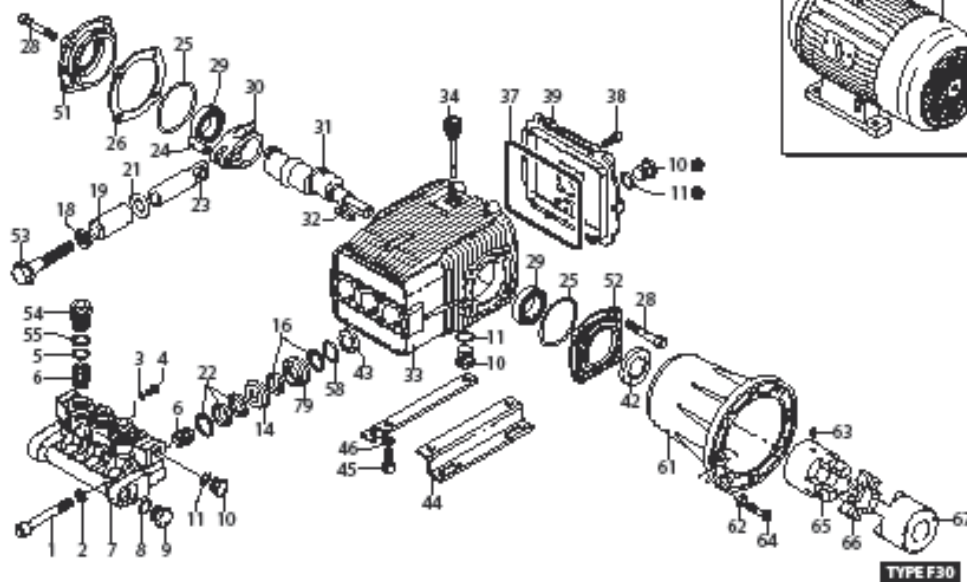
6. The pressure remains high even when I let go of the trigger and the engine or motor is struggling or stalling. The non- return valve in the unloader is damaged or jammed.

Remedy: Strip and clean or replace.

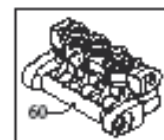
Demon Technical Support 01752 - 690690

HSHP

1450_{rpm}

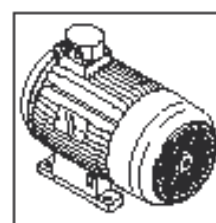
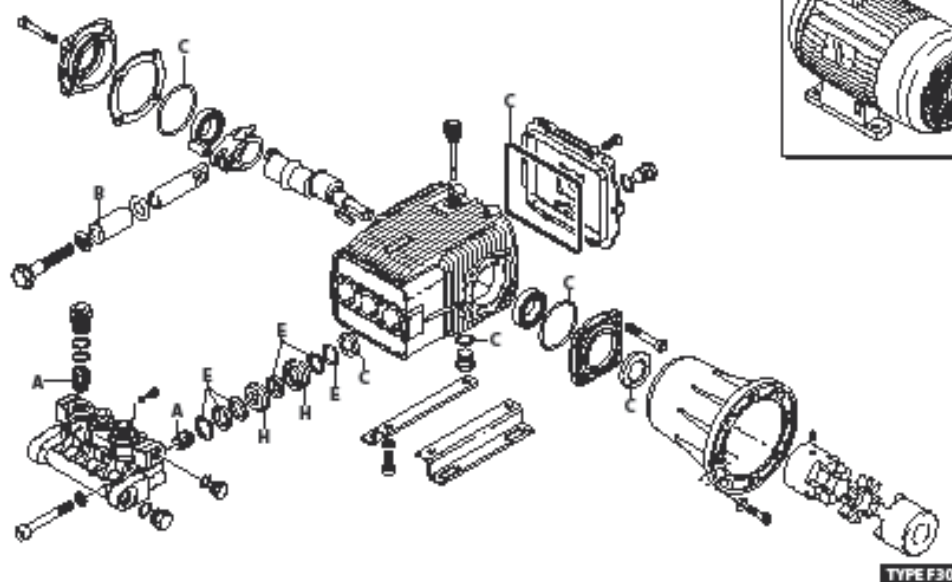


TYPE F30



UN002243-AV

KIT RICAMBI / PART KITS



TYPE F30

UN002244-AV



Pos.	Cod. Part n°	Denominazione	Description	Q.tà Q.ty	Nota Vodi / Sae	Pos.	Cod. Part n°	Denominazione	Description	Q.tà Q.ty	Nota Vodi / Sae
1	850260	Vite TCEI M 10x90	Screw	8	⊗ 58 Nm	46	200231	Rosetta	Washer	4	Optional
2	650530	Rosetta	Washer	8		51	1949011	Coperchio lat. compl.	Comp. side cover	1	
3	2460810	Vite TE M 6x12	Screw	3		52	1941240	Supporto aperto	Open bearing sup.	1	
4	1982570	Rondella Ø 6,3	Washer	3		53	1941640	Vite fiss. pistone	Piston-fixing screw	3	⊗ 7 Nm
5	880830	OR Ø 15,5x2,62	O-Ring	3		54	1940940	Tappo valvola	Plug	3	⊗ 60 Nm
6	1949052	Valvola completa	Complete valve	6		55	1941070	Anello antistriscione	Ring	3	
7	1942190	Testa pompa	Pump head	1		58	820490	OR Ø 34,65x1,78	O-Ring	3	
8	180101	OR Ø 17,5x2	O-Ring	1		60	1949215	Prem. testa	Head pre-assembly	1	
9	820361	Tappo 1/2" G	Plug	1		61	1383080	Flangia motor B3/B14	El. motor flange	1	B3/B14
10	1980740	Tappo 3/8" G	Plug	3	⊗	62	390311	Rondella Ø 8,5	Washer	4	
11	740290	OR Ø 14x1,78	O-Ring	3	⊗	63	1380180	Grano M 6x10	Grub screw	1	
14	1942470	Guida pistone ant.	Front piston guide	3		64	620610	Vite TCEIM Øx30	Screw	4	
16	1942690	Guarnizione	Gasket	3		65	1942890	Semigiunto pompa	Pump coupling	1	
18	1340600	Rondella	Washer	3		66	1942900	Anello elastico	Ring	1	
19	1941020	Pistone	Piston	3		67	1942910	Semigiunto motore	Motor coupling	1	
21	1383190	Disco separatore	Spacer	3		75	1941270	Livello olio	Oil indicator	1	⊗
22	1942700	Guarnizione	Plug	3		76	100410	OR Ø 34,6x2,62	O-Ring	1	⊗
23	1940960	Pistone di guida	Guiding piston	3		77	1941260	Disco di contrasto	Disc	1	⊗
24	1940060	Spinotto	Con rod pin	3		78	1941290	Anello elastico	Snap ring	1	⊗
25	1941380	OR Ø 66,34x2,62	O-Ring	2		79	1942480	Guida pistone post.	Rear piston guide	3	
26	1941390	Spessore 0,05 mm	0,05 mm shim	1		80	44037	Motore elettrico	Electric motor	1	
	1941400	Spessore 0,10 mm	0,10 mm shim	1							
	1941410	Spessore 0,19 mm	0,19 mm shim	1							
	1941420	Spessore 0,25 mm	0,25 mm shim	1							
28	850370	Vite TCEI M 6x16	Screw	8	⊗ 24,5 Nm						
29	1140410	Cuscinetto	Bearing	2							
30	1940050	Biella	Conrod	3							
31	1940980	Albero eccentrico	Crank shaft	1							
32	650250	Linguetta Øx7x40	Key	1							
33	1941330	Corpo pompa	Pump housing	1							
34	1140370	Tappo olio	Plug	1							
35	1260250	Livello olio	Oil indicator	1	⊗						
36	1260430	Anello elastico	Snap ring	1	⊗						
37	1940410	OR Ø 132x8	O-Ring	1							
38	1200430	Vite TCEI M 6x16	Screw	6							
39	1949010	Coperchio post. compl.	Complete cover	1							
40	1780690	Disco di contrasto	Disc	1	⊗						
41	1140450	OR Ø 20,24x2,62	O-Ring	1	⊗						
42	820680	Anello tenuta	Seal	1							
43	1940560	Anello tenuta	Seal	3							
44	1940370	Piede pompa	Base	2	Optional						
45	1940380	Vite TCEI M 10x18	Screw	4	Optional						

KIT RICAMBI - PART KITS

A=KIT 2185 valvole valves		B=KIT 2872 pistoni pistons		C=KIT 2873 tenute olio oil seals		E=KIT 2874 tenute acqua water seals	
Pos.	Q.ty	Pos.	Q.ty	Pos.	Q.ty	Pos.	Q.ty
6	6	19	3	25	2	16	3
				37	1	22	3
				42	1	58	3
				43	3		

H=KIT 42120 guida pistoni pistons guide							
Pos.	Q.ty	Pos.	Q.ty	Pos.	Q.ty	Pos.	Q.ty
14	3						
79	3						

SIMBOLOGIA - SYMBOLS

⊗ Compreso nel cod. 1949010 / Part of part n° 1949010

⊗ Compreso nel cod. 1949011 / Part of part n° 1949011

⊗ = Coppia serraggio (Tolleranza +0 / -10% Nm)

⊗ = Torque wrench (Allowance +0 / -10% Nm)

VB 16 - Unloader Valve (discharging)

Technical manual: E 234

Pressure regulating unloader valve with discharge control pressure with very low readings.
At gun-lance closure, the water flow is bypassed at reduced pressure

DN 15



• 60.8000.00 VB 16

G1/2 FF

- Sturdy steel and brass construction.
- By-pass control actuated at very low pressure values with reduced pressure in the delivery line when gun is shut.
- Quick start at gun opening assures gradual pressure reset, essential for use on endothermic engines.
- Specially designed check valve prevents jamming and vibrations even in presence of sand and scales
- Working typology protected by registered patent.

Technical specifications

Max. flow rate: 80 l/min. Max temperature: 90°C (1)

Max. flow rate: 80 l/min.											
Max temperature: 90°C (1)											
Part number	Rated pressure	Permissible pressure	Minimum adjustable pressure	Pressure remainder at circuit closure			(2) Pressure drop to reset bypass			Inlet outlet bypass	Weight
				bar			bar				
				300	400	500					
				MPa	MPa	MPa	300	400	500		
				(30)	(40)	(50)	(30)	(40)	(50)		
	bar - MPa	bar - MPa	bar - MPa								g
60.8000.00	500 -50	560 -56	100 - 10	140	165	190	65	90	110	G1/2 FF	3450
				(14)	(16.5)	(19)	(6.5)	(9)	(11)		

(1) The valve has been designed for a continuous use at a water temperature of 60°C. It can resist for short periods at a maximum temperature of 90°C.

(2) This is the pressure reduction necessary in comparison to the set up, in order that the valve brings back pressure in the circuit.

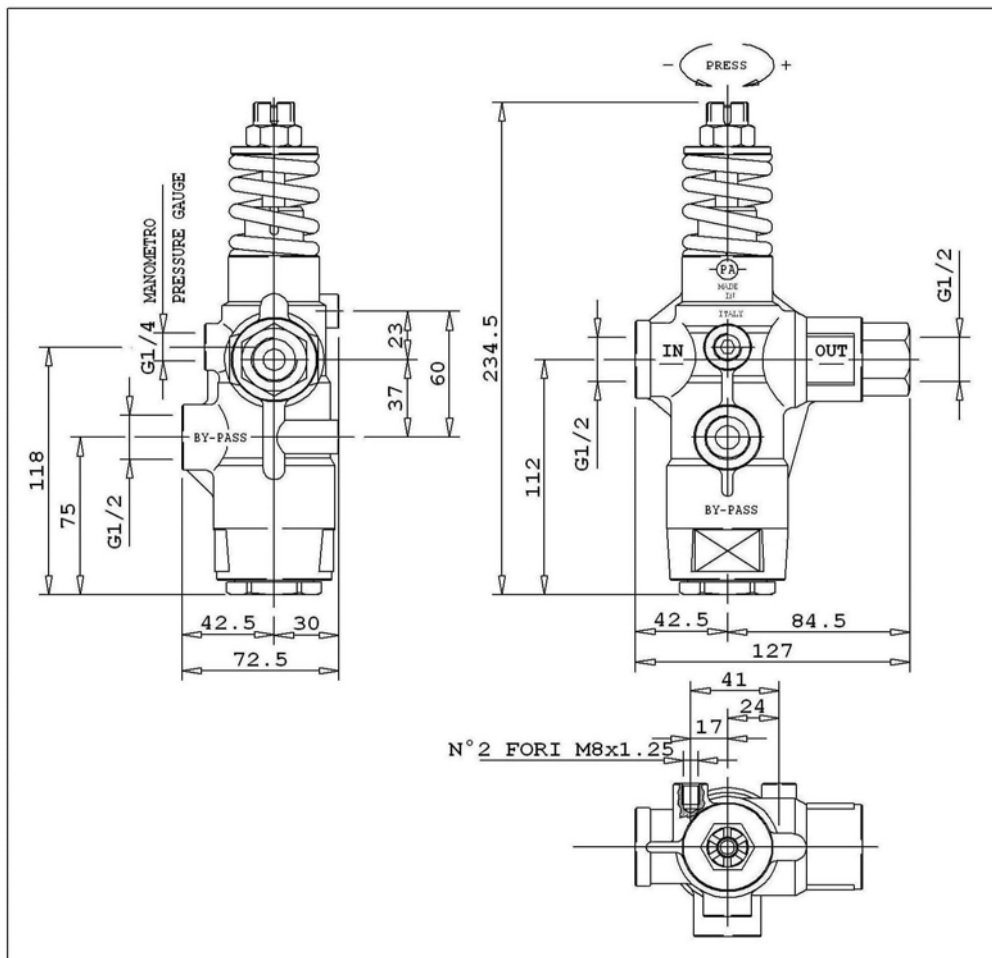
Instruction manual, maintenance, installation, spare parts.

n. 12.9234.00

For a correct utilization, follow the directions of this manual

Re-print them on the Use and Maintenance booklet of the machine.

DIMENSIONAL DRAWING



INSTRUCTIONS

SELECTION

This product is to be utilized with clean fresh water, even slightly additivated with normal detergents. For use involving different or corrosive liquids, contact the PA Technical department. Appropriate filtration should be installed when using unclean liquids. Choose the valve in line with the data of nominal running (system rated pressure, max flow and max temperature). In any case, the pressure of the machine should not exceed the permissible pressure rate imprinted on the valve.

INSTALLATION

This accessory, on a system that produces hot water, **must be fitted upstream the heat generator**. This product is bound to be incorporated on a finished machine. On a system that generates hot water, anticipate the fitting of accessories that limit the accidental increase of fluid temperature.

Always install a safety valve that protects the pressurized inlet channel.

Choose a correct nozzle size, which allows a regular discharge on bypass, at least 5% of the total flow of the system in order to achieve a constant pressure value and avoid troublesome pressure spikes at closure. If the nozzle wears out, the pressure drops. On installation of a new nozzle, re-adjust the system to the original pressure setting.

OPERATIONS

The valve regulates the the max pressure of the system through a piston, which acts on a ball correctly positioned, that closes the bypass opening. A check valve cuts out the delivery section, the pressure of which controls the drive of the piston. Each regulation should be made when the system is operational and the nozzle open.

ATTENTION: In order not to overstep the max pressure, the nut (pos 36) must be fastened and never removed otherwise a mechanical safety feature would lack that limits the max pressure avoiding serious damage to persons and machine. Mark the position with a drop of paint in order to prevent possible slackening and tampering.

The balanced conformation of the valve allows a renewed pressure at very low readings giving a longer function in bypass and a progressive restart, without unpleasant pressure spikes, useful with endothermic engines.

DISCHARGE SYSTEM AND WATER ADDUCTION

The bypass line should be returned into a tank with deflectors. By using a direct pump recycle, with elevated pressure intake, it is necessary to install a pressure reducer in order to have an even flow supply and to protect the circuit intake.

When long bypass conditions occur, direct to the pump intake, it is advisable to fit a thermal protector valve (VT3 or VT6) in order to eliminate excessive temperature build up.

SYSTEM (Technical notes)

Due to the high pressure and flow valves used, always install an adequate pressure dampener in order to balance delivery flows. Connection between pump and valve must be made through a flexible hose, at least 1,5m. long, in order to avoid transmission of vibrations to the valve, especially when using endothermic engines. Valve must be properly installed by using the threaded holes on the valve body.

PROBLEMS AND SOLUTIONS

PROBLEMS	PROBABLE CAUSES	SOLUTIONS
Frequent unloader recycles	Damaged seat or cone Leaking connections Restricted bypass	Replace Check and renew Clean or adapt
Unloader does not reach pressure	Unloader not properly sized Piston O rings worn out Material matter between seat and shutter Worn out nozzle Damaged safety valve	Change spring or type of valve Replace Clean the seat Replace Replace
Pressure peaks	There is not a min of 5% of total flow in bypass Excessive flow in bypass Spring totally compressed	Reset Change type of valve or adjust passages Loosen knob and change nozzle
Unloader does not bypass at low pressure	Jammed check valve Check valve O ring worn out Material matter on check valve	Clean or replace Replace Clean

REGULATIONS : ***see norm manual***

The accessory hereby described bears the CE marking in accordance with the Norms and Directives applied on the Declaration of conformity.

For a correct utilization, follow the directions described in this manual and re-print them on the Use and maintenance manual of the machine.

Make sure that you are given the **Original Conformity Declaration** for the accessory chosen. The present manual is valid for all unloader valves named **VB 16**.

MAINTENANCE

Maintenance has to be carried out by **Specialized Technicians**.

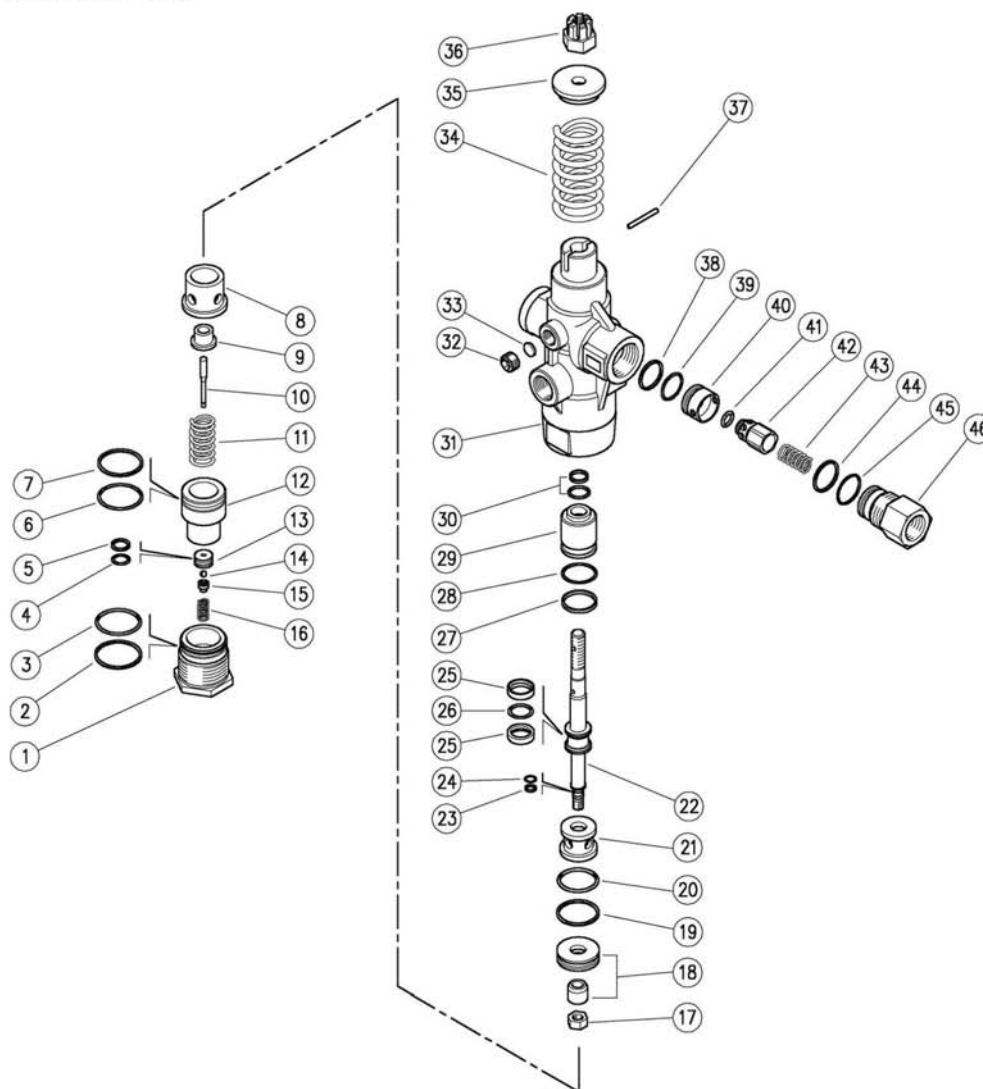
STANDARD: every 400 working hours (circa 10,000 cycles), check and lubricate the seals with water resistant grease.

SPECIAL: every 800 working hours(circa 20,000 cycles), control the wear of the seals and internal parts and if necessary, replace with original PA parts taking care during installation and to lubricate with water resistant grease.

ATTENTION: reassemble the valve in the correct manner paying special attention to the Nut (pos 31) which must always be in place.

The manufacturer is not to be considered responsible for damage as a result from incorrect fitting and maintenance

Technical data, descriptions and illustrations are indicative and liable to modification without notice.



Pos.	P/N	Description	Q.ty	K1	K2	K3	K4	Pos.	P/N	Description	Q.ty	K1	K2	K3	K4
1	60.8003.31	Plug, M38x1 brass	1					3	24	10.3018.08	O-ring, 1,5x6 mm Ni 85	1	•		10
2	10.4089.00	Back-up ring, 32,7x35,5x1,5 mm	1	•				5	25	10.4094.00	Back-up ring, 15,5x20x5 mm	2	•		5
3	10.3078.08	O-ring, 1,78x31,45 mm Ni 85	1	•				10	26	10.3180.08	O-ring, 2,62x15,08 mm Ni 85	1	•		10
4	10.3058.02	O-ring, 1,78x10,82 mm Ni 85	1	•				10	27	10.4087.00	Back-up ring, 23,5x26,5x2,5 mm	1	•		5
5	10.4090.00	Back-up ring, 11,2x14x1,5 mm	1	•				10	28	10.3073.08	O-ring, 1,78x23,52 mm Ni 85	1	•		10
6	10.3077.28	O-ring, 1,78x29,87 mm Ni 85	1	•				10	29	60.8010.51	Spacer ring, 12,2x26,5x33,5 mm Sst.	1			3
7	10.4088.00	Back-up ring, 31,2x34x1,5 mm	1	•				5	30	10.2012.00	Stem seal, 12x19x2,8 mm +O-ring	1	•		5
8	60.8012.51	Spacer ring, 14,5x34x27,5 mm Sst.	1					3	31	60.8001.35	Housing -VB16, 1/2F Bsp brass	1			1
9	60.8016.31	Spacer ring, 5,2x19x12,5 mm brass	1					3	32	60.0022.31	Grub screw, brass 1/4 Bsp	1			5
10	60.8022.51	Piston, 5x43,8 mm Sst.	1					3	33	11.6500.09	Plate, 10,9x1,5 mm Cu	1			5
11	60.8004.51	Spring, 3,5x17,5x29 mm Sst.	1					3	34	60.8005.61	Spring, 7x42,5x48 mm z.pl.	1			3
12	60.8013.31	Seat holding spacer, brass	1					3	35	60.8017.31	Spring guiding washer, brass	1			3
13	60.8015.51	Seat, 3x14x7,5 mm Sst.	1	•				5	36	60.8018.61	Valve regulating nut, M10 z.pl.	1			3
14	14.7418.71	Ball, 5/32"	1	•				5	37	15.1042.00	Roll pin, 3x26 mm Sst.	1			10
15	60.8014.51	Ball holding piston, Sst.	1					5	38	10.4091.00	Back-up ring, 21,2x24x1,5 mm	1	•		5
16	60.8006.51	Spring, 1x7,2x14 mm Sst.	1					3	39	10.3072.01	O-ring, 1,78x20,35 mm Ni 85	1	•		10
17	11.4574.11	Hex. nut, M8, Sst.	1					10	40	60.8019.51	Shutter seat, Sst.	1			3
18	60.8023.24	Seat, 14mm Sst. + shutter pin, Sst.	1	•				1	41	10.3292.08	O-ring, 4x8 mm Ni 85	1	•		10
19	10.4085.00	Back-up ring, 29,2x32 mm	1	•				5	42	60.8020.51	Pin, hex.17 Sst	1			3
20	10.3077.08	O-ring, 1,78x28,3 mm Ni 85	1	•				10	43	60.8007.51	Spring, 0,8x12,2x27 mm Sst.	1			3
21	60.8011.31	Spacer ring,	1					3	44	10.3072.60	O-ring, 1,78x21,95 mm Ni 85	1	•		10
22	60.8002.51	Piston, M8-M10 Sst.	1					3	45	10.4092.00	Back-up ring, 22,7x25,5x1,5 mm	1	•		5
23	10.4086.00	Back-up ring, 6,3x8,5x1,5 mm	1	•				5	46	60.8021.31	Shutter coupl., 1/2F Bsp brass	1			3
Kit	P/N	Description													
K1	60.8025.24	Spares kit -VB16, 24x1pcs.						1							

VS500 - Safety and pressure regulating valve

Technical manual: **E 235**

Compensated pressure regulating valve.

Regulates the bypass of the fluid with a minimum variation of the pressure.

Suitable to be utilized as a safety valve.

DN 15



- **60.5200.00** VS500 G1/2 F 500 bar – 50 Mpa
- **60.5212.00** VS500 G1/2 F 500 bar – 50 Mpa
(Possibility to seal calibration)

- Central body and fittings in brass.
- Internal components in Sst.
- Moving parts totally protected.

AS A SAFETY VALVE

- Secure intervention discharging all the flow.
- Prompt and effective damping against pressure spikes.

AS A PRESSURE REGULATING VALVE

- High balancing to guarantee slight variations of the rated pressure when the flow varies in bypass.

TECHNICAL SPECIFICATIONS

Max.flow rate 80 l/min - Max. temperature 90°C (1)

Part number	Rated pressure	Permissible pressure	Minimum adjustable pressure	(2) Pressure increase as a VS – as a VRP	Inlet	Bypass	Weight g
	bar - MPa	bar - MPa	bar - MPa	bar - MPa - bar - MPa			
60.5200.00	500 - 50	560 - 56	50 - 5	53 – 5.3 - 38 – 3.8	G1/2 F	G3/8 F	1420
60.5212.00	500 - 50	560 - 56	50 - 5	53 – 5.3 - 38 – 3.8	G1/2 F	G3/8 F	1420

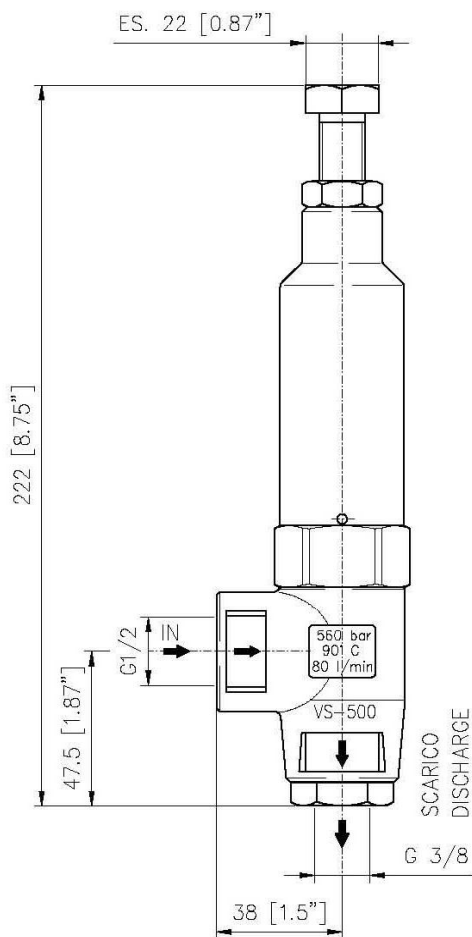
(1) The valve has been designed for a continuous use at a water temperature of 60°C. It can resist for short periods at a maximum temperature of 90°C.

(2) **Pressure increase** = is the increase of pressure needed into the valve for discharging the max. flow when utilized at max. pressure setting.

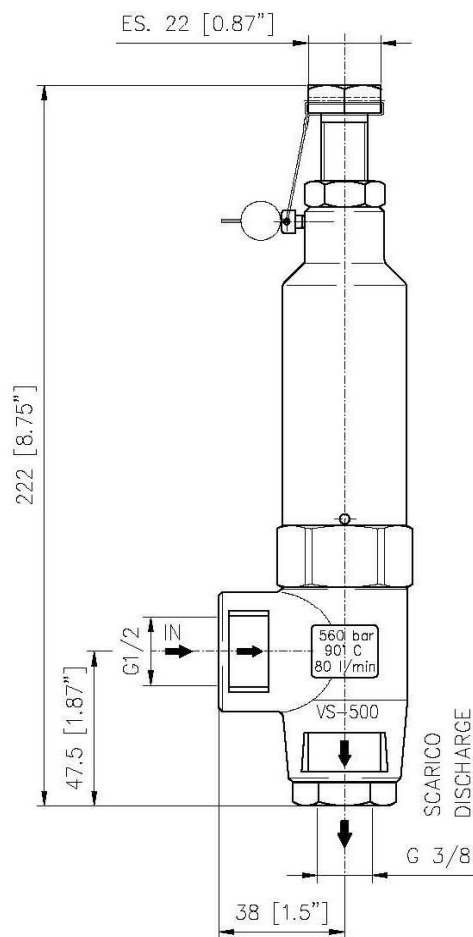
Instruction manual, maintenance, installation, spare parts.
For a correct utilization, follow the directions of this manual
Re-print them on the use and maintenance booklet of the machine.

n. 12.9235.00

DIMENSIONAL DRAWING



COD. 60.5200.00 – VS500



60.5212.00 – VS500 (possibilità di blocco della taratura – Possibility to seal calibration)

INSTRUCTIONS

SELECTION

This product is to be utilized with clean fresh water, even slightly additivated with normal detergents. For use involving different or corrosive liquids, contact the PA Technical department. Choose the valve in line with the data of nominal running (system rated pressure, max flow and max temperature). In any case, the pressure of the machine should not exceed the permissible pressure rate imprinted on the valve. When in use as pressure regulator, adopt a nozzle that allows a bypass of at least 5% of the total flow, bearing in mind that a worn out nozzle causes pressure loss. The valve, assembled in line with these indications, avoids pressure spikes whilst the machine is in operation.

INSTALLATION

This accessory, on a system that produces hot water, must be fitted **upstream of the heat generator**.

As a **SAFETY VALVE**: in the case when frequently combined with unloader valves and low pressure in the pump, it has to be fitted in the section that remains pressurized when the gun is shut off.

As a **PRESSURE REGULATOR**: maintains the pressure in the system steady during flow changes. **Always** install in combination with a suitable Safety Valve. In case of discharge in the tank or directly into the pump, it is necessary to provide devices capable to prevent damaging turbulence to the liquid flow..

OPERATIONS

The valve inlet is on the side, the discharge is opposite the adjustment knob (pos 16). The discharge should be returned to a baffled tank. If, on the contrary, the pump is fed directly from the water mains, it is advisable to install a pressure reducing valve, before the pump, to avoid dangerous pressure spikes which could badly damage manifolds and suction valves. In case of extended conditions of bypass directed to the suction side of the pump, it is recommended to install a thermal valve (VT3 or VT6) to avoid dangerous water temperature build-up.

PRESSURE ADJUSTMENT/SETTING

As a **SAFETY VALVE**: the adjustment has to be made in such a way that the pressure setting is not superior to the system working pressure and its accessories; this prevents the arisal of numerous pressure increases in hot water systems and static pressure (gun shut off).

As a **PRESSURE REGULATOR**: adjust the valve when the system is pressurized and the gun open. The operation will be easy and smooth if the proper nozzle is chosen. When rotating the adjustment knob, it has to correspond to a consequent pressure increase;

should the pressure stop increasing before reaching the desired value, **do not insist**, but check the correct nozzle size in relation to flow and pressure. On reaching the desired pressure, tighten the nut (pos 15) against the knob (pos 12) touching them with a drop of paint in order to emphasize any tampering or slackness.

HOW TO SEAL ADJUSTMENT SETTING (ONLY ON VS500 - PN 60.5212.00)

The safety valve is adjusted by client to pressure level requested by end user.

It is then possible to seal adjustment by passing a wire through the hole in the valve knob (#17) and through the hole in screw (#18) positioned on ring nut (#15). Seal then wire with lead.

PLEASE NOTE: wire and lead are not included

PROBLEMS AND SOLUTIONS

PROBLEMS	PROBABLE CAUSES	SOLUTIONS
Valve cycles	<ul style="list-style-type: none"> - Air inside the system - Worn out seals - Clogged circuit 	<ul style="list-style-type: none"> - Flush out - Replace - Clean or widen passages
The valve does not reach pressure	<ul style="list-style-type: none"> - Unproper nozzle size - Seat/shutter/ball worn out - Damaged nozzle - Impurities 	<ul style="list-style-type: none"> - Modify - Replace - Replace - Clean
Pressure drop	<ul style="list-style-type: none"> - Worn out nozzle - Pump gaskets worn out - Valve seat worn out - Air inside the system 	<ul style="list-style-type: none"> - Replace - Replace - Replace - Flush out
Pressure spikes	<ul style="list-style-type: none"> - There is not a min.5% of total flow in bypass - Clogged nozzle 	<ul style="list-style-type: none"> - Re-adjust - Clean - Repeat adjustment and replace nozzle
Water leakage from bypass Valve pounding	<ul style="list-style-type: none"> - O-ring seat damaged - Damaged seat - Impurities or worn out valve pumps 	<ul style="list-style-type: none"> - Replace - Replace - Clean - Replace

REGULATIONS : see norm manual

The accessory hereby described bears the **CE** marking in accordance with the Norms and Directives applied on the Declaration of conformity.

For a correct utilization, follow the directions described in this manual and re-print them on the Use and maintenance manual of the machine.

Make sure that you are given the **Original Conformity Declaration** for the accessory chosen. The present manual is valid for all unloader valves named **VS500**.

MAINTENANCE

Maintenance has to be carried out by **Specialized Technicians**.

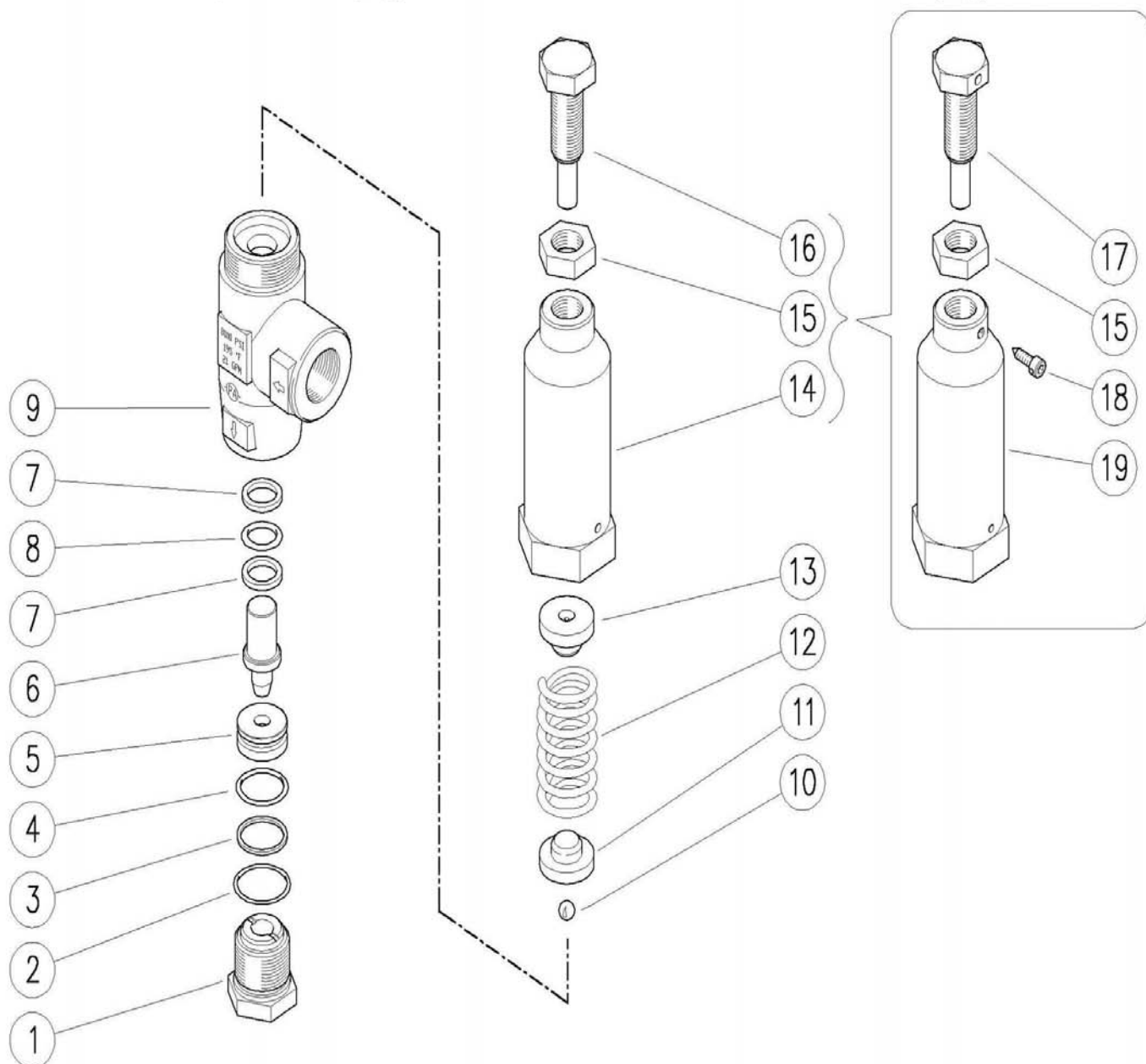
STANDARD: every 400 working hours (circa 10,000 cycles), check and lubricate the seals with water resistant grease.

SPECIAL: every 800 working hours(circa 20,000 cycles), control the wear of the seals and internal parts and if necessary, replace with original PA parts taking care during installation and to lubricate with water resistant grease.

ATTENTION: reassemble the valve in the correct manner paying special attention how to set the valve as described in the paragraph **PRESSURE ADJUSTMENT/SETTING**.

The manufacturer is not to be considered responsible for damage as a result from incorrect fitting and maintenance

Technical data, descriptions and illustrations are indicative and liable to modification without notice.



Pos.	P/N	Description	Q.ty	K1	K2	K3	K4	
1	60.5204.31	Coupl., M24x1M-3/8F Bsp brass	1					3
2	10.3072.60	O-ring, 1,78x21,95 mm Ni 85	1	•				10
3	10.4030.00	Back-up ring, 19,2x22x1,5 mm	1	•				10
4	10.3070.02	O-ring, 1,78x18,77 mm Ni 85	1	•				10
5	60.5203.51	Seat, 7x22x10 mm Sst.	1	•				5
6	60.5202.51	Piston, 16,5x37 mm Sst.	1	•				3
7	10.4031.00	Back-up ring, 13x17,5x2,5 mm	2	•				10
8	10.3178.01	O-ring, 2,62x13,1 mm Ni 85	1	•				10
9	60.5201.35	Housing - VS500, 1/2" Bsp brass	1					1
10	14.7421.50	Ball, 1/4" Sst.	1					10

Pos.	P/N	Description	Q.ty	K1	K2	K3	K4	
11	60.5205.31	Spring rest pin, brass	1					3
12	60.5206.61	Spring, 7x28,5x70 mm z.pl.	1					3
13	60.5207.31	Spring guide spacer, brass	1					3
14	60.5208.31	Spring holder, brass	1					3
15	11.4760.00	Hex. nut, M14	1					10
16	60.5209.51	Valve regulating screw, M14x58 Sst.	1					3
17	60.5216.51	Screw M14x2 +block. hole, SS (1)	1					3
18	60.1417.51	Special screw, M4 Sst. (1)	1					25
19	60.5217.31	Knob + block. hole, brass (1)	1					3

Kit	P/N	Description	
K1	60.5210.24	Spares kit -VS500, 7x1pcs.	1

(1) 60.5212.00

Gun suitable for use with 500 bar – 50 MPa rated pressure pumps.

DN15



- **30.5400.00** RL84 G1/2 FF
- **30.5000.40** Extension 400 G1/2 1/4Npt FF
- **30.5000.80** Extension 800 G1/2 1/4Npt FF
- **30.5000.92** Extension 1250 G1/2 1/4Npt FF

- Covered by shockproof plastic semi-housings
- Sturdy construction of Sst & brass with dynamic teflon seals
- Assembly on hoses equipped with G 1/2" fittings
- Entirely built of Sst & body in brass
- Ergonomic construction
- Minimum fatigue for trigger opening
- Minimum load loss (see chart)

TECHNICAL SPECIFICATIONS

P/N	RATED PRESSURE bar - MPa	PERMISSIBLE PRESSURE bar - MPa	MAX FLOW RATE l/min	(1) MAX TEMPERATURE °C	INLET OUTLET	WEIGHT gr
30.5400.00	500 - 50	560 - 56	80	100	G1/2 F-F	1417
30.5000.40	500 - 50	560 - 56	80	100	G1/2 1/4Npt FF	865
30.5000.80	500 - 50	560 - 56	80	100	G1/2 1/4Npt FF	1480
30.5000.92	500 - 50	560 - 56	80	100	G1/2 1/4Npt FF	2150

(1) The gun has been designed for continuous use, at a water temperature of 60°C (140°F). It can resist at the max temperature of 100°C (210°F) for short periods only, as, when the gun shuts off, the heater continues to transmit the heat to the water, thus increasing both temperature and pressure up to high, dangerous values.

Using the gun at a water temperature higher than 60°C involves for the operator the use of adequate safety devices, such as gloves, etc.

Attention !!!

In order to prevent any risk of INSTABILITY of the gun due to pressure spikes, CHECK in the enclosed CHART (fig. 3) the use of safety devices (SHOULDER REST) in function of the Pressure / Flow Rate parameters.

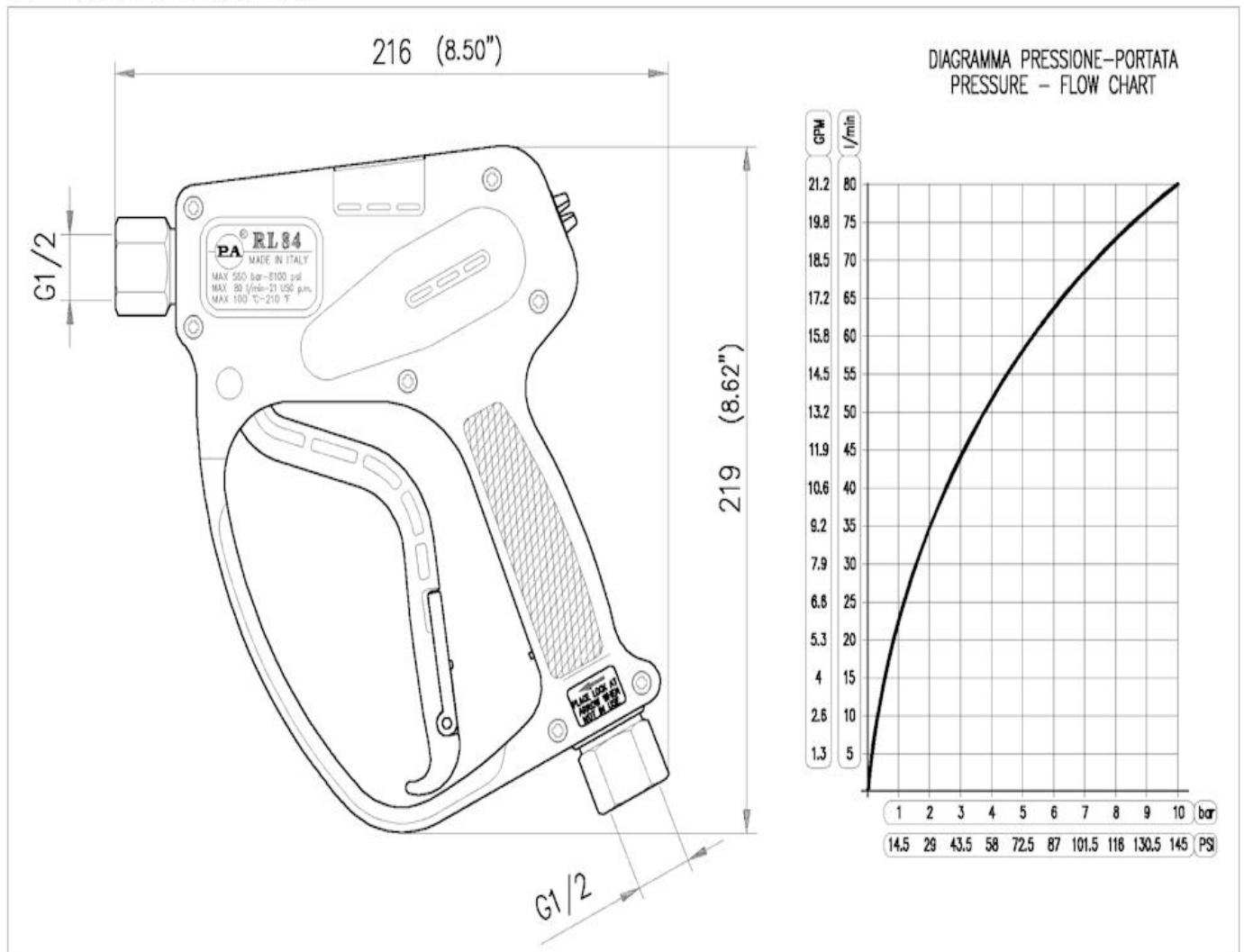
Instruction manual, maintenance, installation, spare parts.

For a correct utilization, follow the directions of this manual

Re-print them on the Use and Maintenance booklet of the machine.

n. 12.9130.00

DIMENSIONAL DRAWING



INSTRUCTIONS

This product is to be utilized with clean fresh water, even slightly additivated with normal detergents. For use involving different or corrosive liquids, contact the PA Technical department. Appropriate filtration should be installed when using unclean liquids. Choose the gun in line with the data of nominal running (system rated pressure, max flow and max temperature). In any case, the pressure of the machine should not exceed the permissible pressure rate imprinted on the gun.

INSTALLATION

This gun was designed to operate with **hot water**

_____ (in compliance with the technical specs). Provide the plant generating **hot water** with an equipment limiting the incidental increase of the fluid temperature.

Always fit a safety valve to protect the delivery conduct when the latter is under pressure.

Choose a suitable nozzle and adjust the valve mounted in the front of the gun, thus obtaining a constant supply and avoiding unpleasant pressure spike when closing the system.

If the nozzle wears out, the pressure falls. When you install a new nozzle, adjust the system back to the original pressure.

OPERATIONS

The gun opens and closes a high pressure conduct by means of a piston acting on a seat; the return is controlled by a spring which releases the trigger.

WATER HOSE FEED

By high or very unsteady pressure values on delivery, it is necessary to mount a pressure reducer, both to level the flow rate on delivery and to protect the system components.

REGULATIONS

The project and construction of our guns comply with: the essential safety requirements presented in Enclosure 1 of NORM 97/23/CE (PED) dated 29 May 1997; norm CEI EN 60335-2-79 first edition, published in 1999-03; the regulating project prEN1829. **REMARK:** The conformity of the gun to the safety requirements is shown by the "CE 0409" marking applied on the gun itself.

They bear the markings provided for by the law.

Read this manual before starting the assembly.

For a correct utilization, follow the directions described in this manual and re-print them on the Use and maintenance manual of the machine.

Make sure that you are given the **Original Conformity Declaration** for the accessory chosen. The present manual is valid for all the guns named **RL 84**.

HOW TO RECOGNIZE IT

Printed on the valve body: Technical specs PA Logo Name of the product CE marking

SPARES

Use original PA spares only in order to get both a correct operation and a long lasting, reliable product.

MAINTENANCE

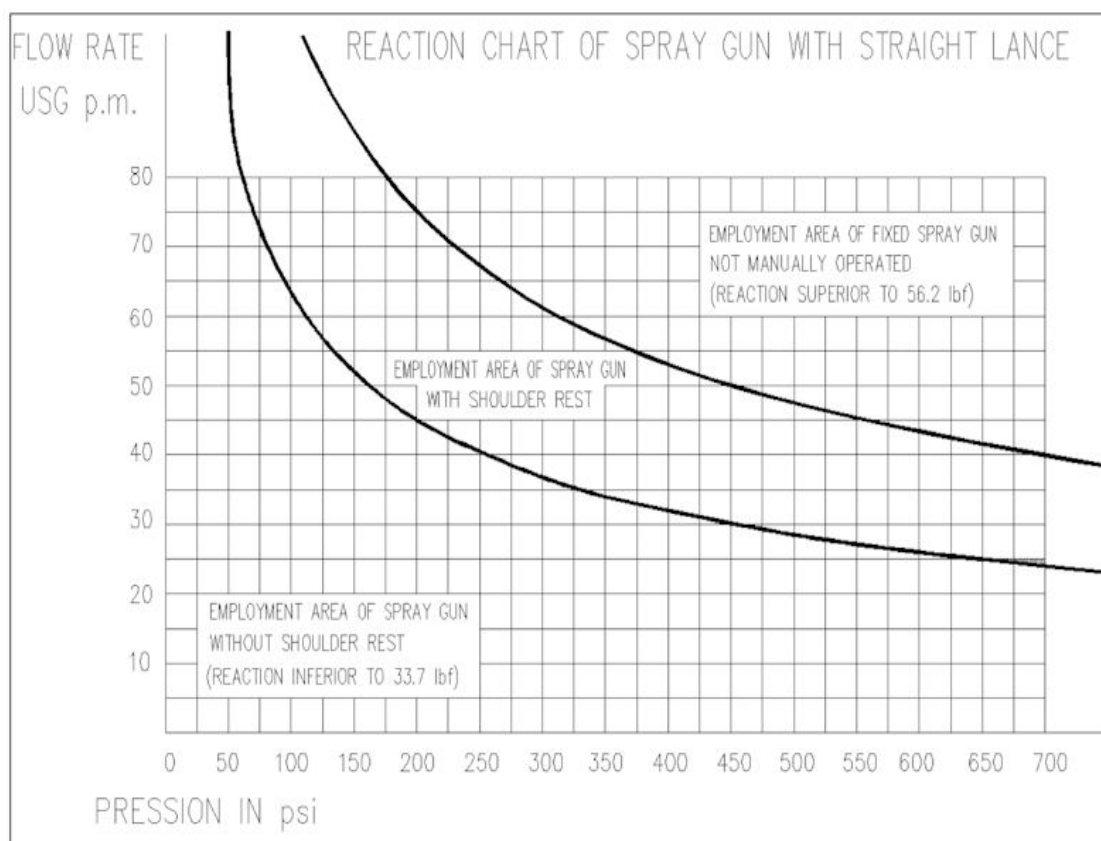
Maintenance has to be carried out by **Specialized Technicians**.

STANDARD: every 400 working hours (circa 10,000 cycles), check and lubricate the seals with water resistant grease.

SPECIAL: every 800 working hours (circa 20,000 cycles), check the wear of the seals and internal parts and if necessary, replace with original PA parts, taking care during installation to lubricate with water resistant grease.

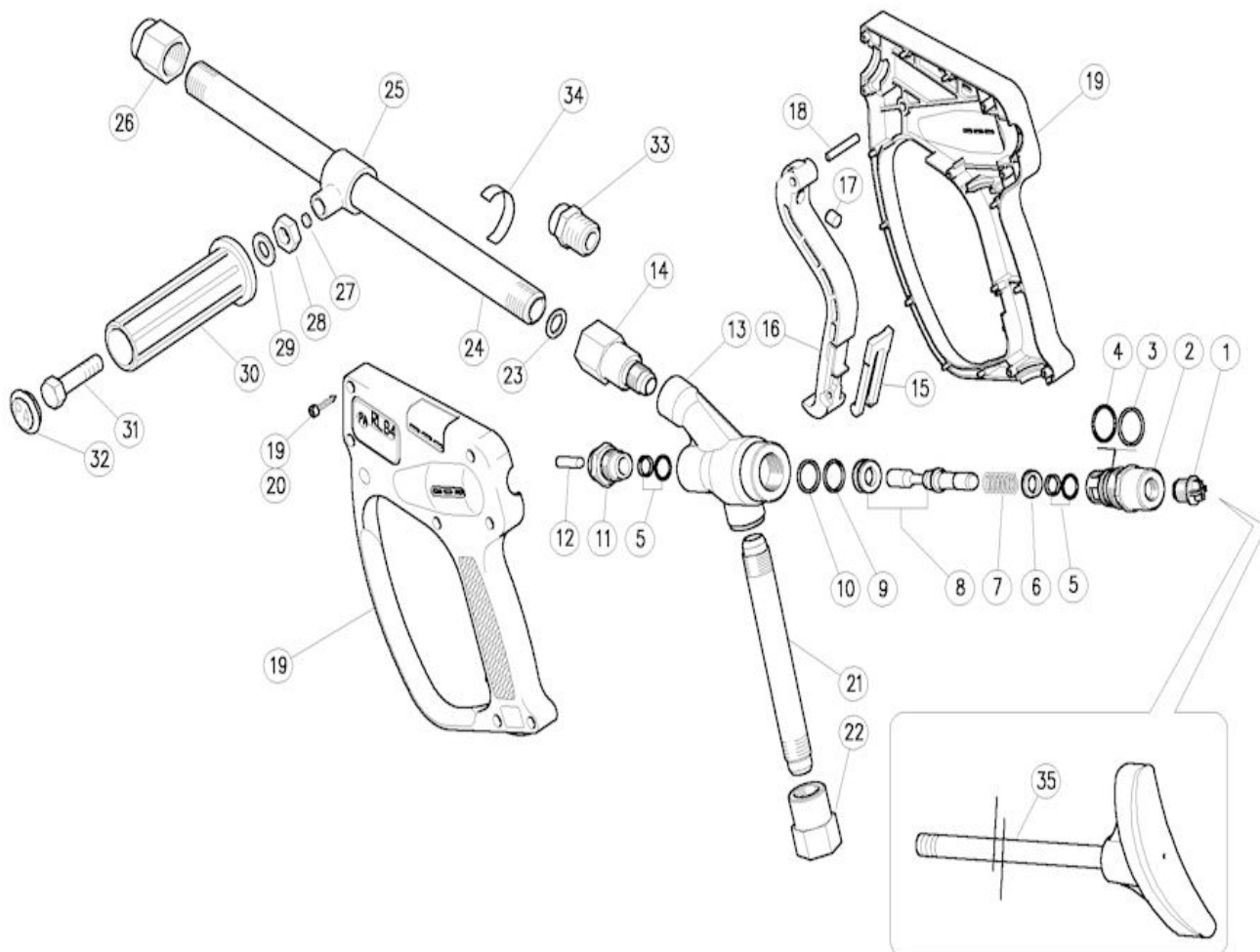
CAUTION: re-assemble the gun restoring the original conditions.

The manufacturer is not to be considered responsible for damage as a result from incorrect fitting and maintenance-



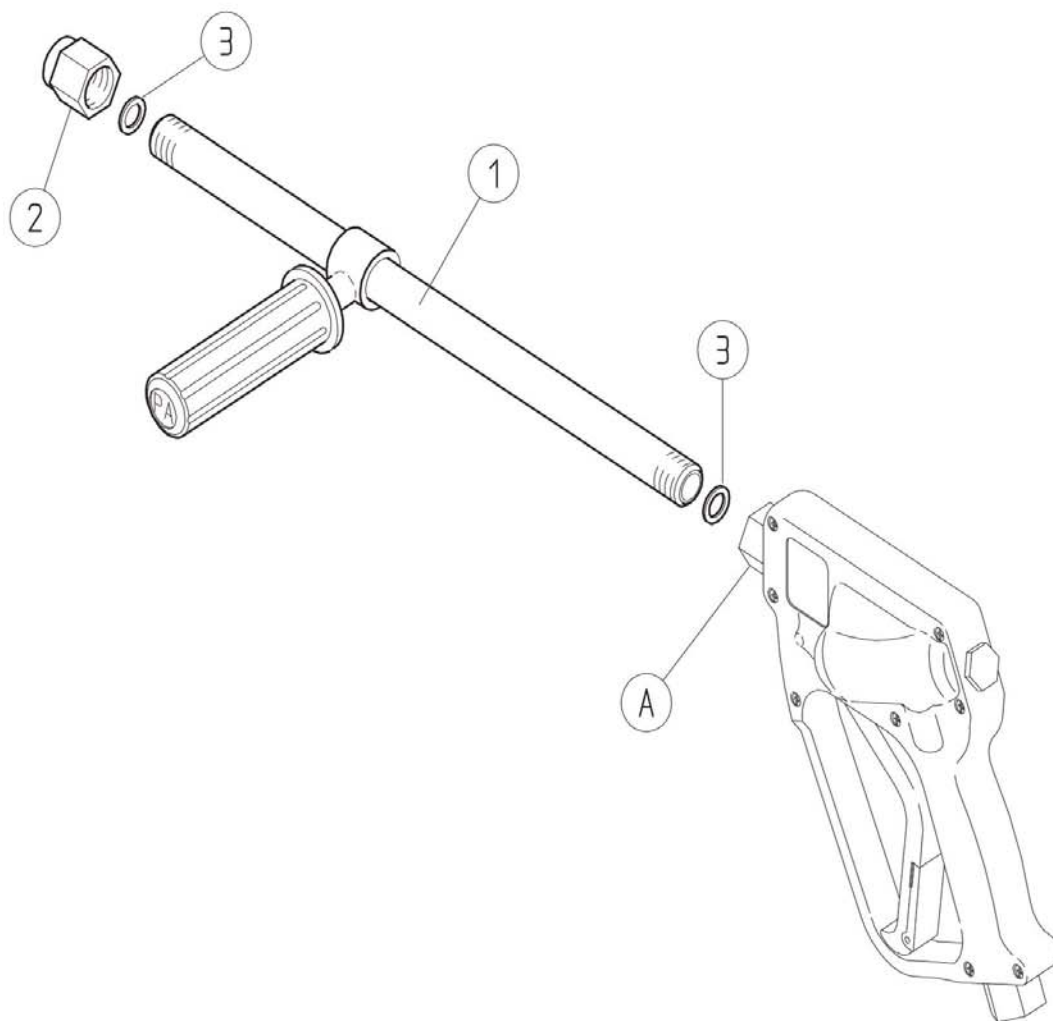
(fig. 3)

Technical data, descriptions and illustrations are indicative and liable to modification without notice



Pos.	P/N	Description	Qty	K1	K2	K3	K4		Pos.	P/N	Description	Qty	K1	K2	K3	K4	
1	30.5815.84		1					10	20	16.3075.51		7					10
2	30.5408.31		1					5	21	30.5407.56		1					5
3	10.4041.00		1	•				10	22	30.5406.51		1					3
4	10.3070.02		1	•				10	23	14.3802.00		2					10
5	10.2027.00		2	•				4	24	30.5016.56		1					1
6	30.4040.31		1					3	24	30.5026.56		1					1
7	30.4042.51		1	•				10	24	30.5037.56		1					1
8	30.5411.24		1	•				1	25	30.5017.35		1	•				5
9	10.3066.01		1	•				10	26	30.5015.51		1					3
10	10.4042.00		1	•				10	27	13.5305.00		2	•				10
11	30.4038.31		1					10	28	11.4627.00		1	•	•			10
12	30.4041.31		1					3	29	14.3799.00		1	•	•			10
13	30.5405.35		1					1	30	41.0409.84		1	•	•			5
14	30.5403.51		1					3	31	16.2035.00		1	•	•			10
15	30.1510.84		1					10	32	41.0411.84		1	•	•			5
16	30.5303.84		1					5	33	30.5018.51		1					1
17	30.0675.51		1					10	34	15.3815.00		1					1
18	30.2517.31		1					10	35	30.5060.00		1					1
19	30.5412.24		1					1									

Kit	P/N	Description	
K1	30.5414.24		1
K2	30.5038.24		1
K3	30.4019.24		5



(GB)

ASSEMBLY INSTRUCTIONS

First apply Loctite 270 on the threads and insert the washer (pos.3), then manually tighten the tube (pos.1) on the gun outlet connection (pos.A).

Following the same procedure, screw down the fitting (pos.2) on the tube (pos.1) and complete the assembly, with a torque of 60N/m.

During this operation, it is very important to keep steady the gun outlet fitting (pos.A) with a wrench—size 27.

The assembly is to be carried out quickly not to affect the action of the Loctite.

Turbo Nozzle

MODEL TN-500

Max Water Temperature 212°F

Max Pressure 7250 PSI

Max Flow Rate 13.4 GPM

Available Nozzles Sizes 030 - 12

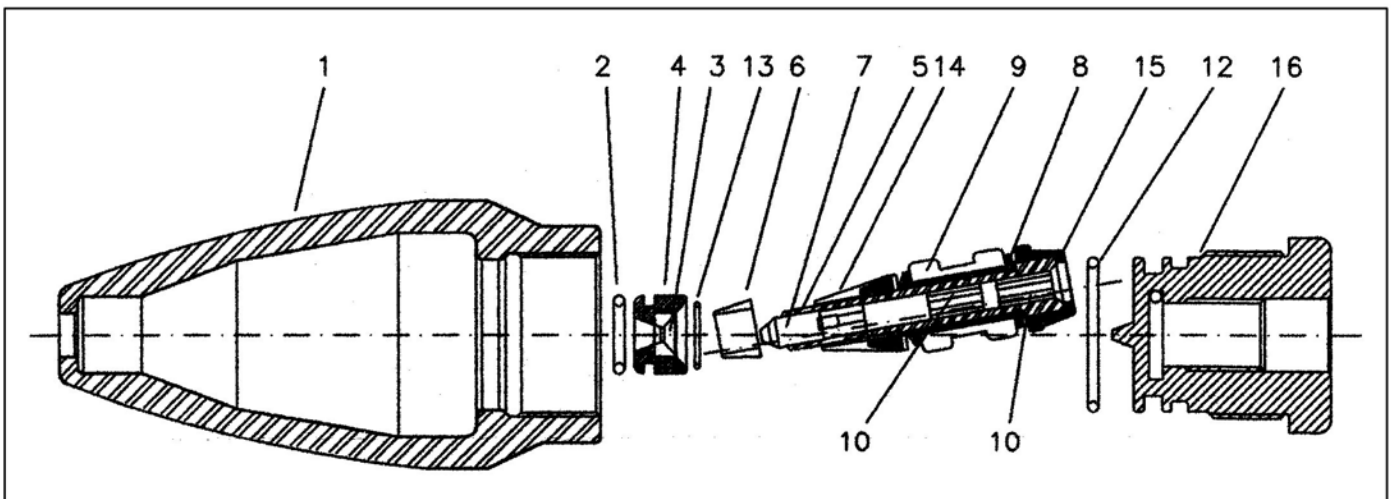
When ordering please state model and nozzle size e.g. TN500-030.

Threaded Connection G1/4

Spare Parts

Item No.	Code No.	Description
1	13.2698	Discharge Casing
2	•	O-Ring 10.0x2.0
3	•	Hard Metal Bearing
4	•	Bearing Retainer
5	•	Rotor Sleeve
6	•	Sleeve
7	•	Hard Metal Nozzle
8	•	Rotor
9	•	Rotor
10	•	Rectifier c/w 4 Tubes
12	•	O-Ring 24.0x2.0
13	•	O-Ring 9.0x1.5
14	•	Retainer Ring big
15	•	Retainer Ring small
16	13.2699	Drive Plug
	•	Nozzle Repair Kit (Items 2 – 15)

• When ordering spare parts and repair kits please state model and nozzle size.
Positions 2-15 are only available as a repair kit.



Warning:

Never put your hand into the rotating water blast. Wear protective. Never aim the blast at people or animals.
Never aim the blast at live electrical appliances.

EC DECLARATION OF CONFORMITY

We Demon International Ltd
Of Abbots Close, Lee Mill Industrial Estate, Ivybridge, Devon PL21 9GA

Declare that:

Equipment High Pressure Water Jet machines

Model name/number

Serial number

Conforms to the relevant safety and health related requirements of the appropriate EC Directives. This declaration shall cease to be valid if modifications are made to the machine without our approval.

In accordance with the following EU Directives:

73/23/EEC The Low Voltage Directive – and its amending directives
89/336/EEC The Electromagnetic Compatibility Directive – and its amending directives
98/37/EEC The Machinery Directive – and its amending directives
2000/14/EC Noise Directive

Harmonised Standards Applied:

EN 292-1 & EN292-2 (now ISO:12100), EN 60335-2-79, EN55014-1, EN55014-2, EN 61000-3-2

Applied national standards and technical specifications:

DS EN 60335-2-79

Applied conformity evaluation method

Appendix V

Sound power level dB(A):

	Storm 1	Storm 2	Storm WM1	Storm WM4	Storm FS1	Storm FS4	Storm 500
Measured	80	75	80	84	80	84	85
Guaranteed	81	76	81	85	81	85	86

HAV – All triggers and lances have vibration levels below 2.5 m/s/s²

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all essential requirements of the Directives.

Signed:



Martyn Walke

Authority: Technical Director

Date:

Technical Documentation Address: Abbots Close, Lee Mill Industrial Estate, Ivybridge, Devon PL21 9GA