



OWNERS MANUAL

Rev: 4: 07/22

NOTE: This manual is an integral part of the pump package and MUST be read before operating the unit. This manual must be kept and regularly referred to throughout the lifetime of the equipment. Failure to do so could result in injury and damage to the equipment. Please ensure that any amendment received is incorporated in the text and that this manual is passed on to any subsequent holder or user of the equipment.

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Quality Management System Certification
ISO 9001:2015



Environmental Management System Certification
ISO 14001:2015



Occupational Health and Safety Management System Certification
ISO 45001:2018

Health and safety

WHEN ENGINE IS RUNNING DO NOT:

1. Run with any guard removed.
2. Attempt any work in the guarded area.
3. Attempt to move the unit.
4. Refill the fuel tank (without removing it from the frame into a safe area first)
5. Remove the pressure cap from the expansion tank (wait until the engine has cooled.)
6. Place hands inside the volute housing.
7. Place any part of body near suction inlet. (If running with no suction hose connected, always connect the end cap.)

WHEN ENGINE IS RUNNING DO:

8. Run the unit on level ground wherever possible. Inclination must never exceed 45°.
9. Check all couplings are secure before increasing pressure.
10. Wear ear protection when working near a running pump. It is also advised that eye protection is used. Loose fitting clothing should not be worn whilst operating the pump.

WARNING: The gas priming exhaust reaches extreme temperatures.

WARNING: This pump weighs 122Kg (dry with 2 X Batteries)

WARNING: The pump should not be run in underground or poorly ventilated spaces.

WARNING: The guards on the exhaust side of the engine can become hot after prolonged running at high speed.

WARNING: This pump can emit Noise levels over 85dB and ear protectors should be worn at all times when running the pump.

WHEN ENGINE IS NOT RUNNING:

1. Do not place any heavy or loose items on the unit.
2. Do not drop the unit from any height.

MAINTENANCE

1. Allow the unit to cool before attempting to remove any part.
2. Before starting any maintenance ensure the ignition switch is off and disconnect one battery lead or remove the battery.
3. Use only authorised spare parts supplied by Phoenix Firepumps or Lombardini / Kohler

WARNING

The pump body, when delivering water under pressure, is a pressure vessel. Failure to assemble the pump body correctly can lead to leaks or in extreme cases failure of the pump body. Ensure that the body is correctly positioned and that all bolts are tightened using a spanner of the correct size and length.

DISPOSAL OF DIESEL FUEL AND OIL

Always dispose of surplus diesel and oil from the engine in a safe and environmentally safe way. Only use receptacles specifically provided for diesel and oil.
Only dispose of surplus diesel and oil at authorised sites.

TO THE OPERATORS OF THE D600 PORTABLE FIRE PUMP

Your new Phoenix D600 fire pump will deliver years of efficient and trouble free service if given reasonable care and properly operated.

A study of the following pages should enable you to overcome any difficulties, which might arise in the operation of this equipment. We request that you read this manual carefully before placing this fire pump into service.

Several pages of useful data are contained herein to help you answer many of the questions that may arise relative to the hydraulics of fire fighting.

PLEASE RETAIN THIS MANUAL FOR FUTURE REFERENCE

WARRANTY

Phoenix Firepumps unconditionally guarantees to replace, for a period of two years, any defective part or parts in the D600 pump.

Every new D600 pump is guaranteed to deliver performance as specified in our sales brochure.

This warranty does not obligate us to bear costs of labour or transportation charges incurred in the replacement of parts.

We shall not be responsible, under the terms of this warranty, for the cost of repairs or alterations not authorised by us.

We shall not be responsible for damages or contingent liabilities resulting from failures of any Phoenix pump.

We make no warranty of any trade accessories incorporated in the assembly or employed in conjunction with any phoenix pump.

Excessive overloading of this pump beyond our recommended limits of capacity and pressure shall void this warranty.

OPERATION OF D600 FIRE PUMPS

SUMMARY OF WHAT TO REMEMBER

1. Close delivery valves and drain valves, before attempting to prime pump.
2. Always keep primer shut off valve closed when working from hydrants or relay pumping.
3. Open primer-operating valve fully with 1/4 throttle to re-prime or eliminate trapped air from suction line.
4. Never run pump without water in it except during priming.
5. Accelerate and retard speed of engine gradually.
6. Watch gauges periodically to ensure pump is operating normally.
7. Keep good gaskets in suction hose, and handle carefully to avoid damage to coupling threads.
8. Air leakage into suction line is the most frequent source of trouble when pumping from a suction lift.
9. Always use a suction strainer when pumping from open water.
10. Foreign matter in impellers is a result of failure to use adequate strainers and a common source of trouble.
11. Drain pump immediately after each run.
12. Check oil level in motor after each pumping run.
13. Do not run a pump long with discharge completely shut off.
14. Do not close a "shutoff" type nozzle when pumping with throttle wide open.

Engine Operation

General information.

D600 Diesel series pumps use Lombardini / Kohler diesel engines. This is a two cylinder, overhead valve, air-cooled engine. All drilled/tapped holes and fasteners on this engine are ISO metric. However, where the pump attaches to the engine SAE standards apply.

This engine will operate satisfactorily at any angle at which the operator and pump can function safely but not exceeding a maximum inclination of 35 degrees

Engine power will decrease 1% for each 100 metres above sea level and 2 % for each 5 degrees above 20 degrees Celsius. However, the pump unit has been design so, as no perceptible loss of pumping will be noticed up to 1500 metres.

Important Information Running in:

During the first 50 hours of operation do not exceed 70% of the maximum rated output.

Starting and Stopping

Before starting engine

- Use the correct oil for the starting temperature expected.
- Check the engine oil level. If the oil level is under the minimum, fill up.
- Unscrew the fuel cap and visually inspect the fuel level.
- If the fuel has been drained use the manual pump on the fuel pump to prime the injector pump.
- A warm battery has more starting capacity than a cold battery.
- Set speed control at half throttle position
- Ensure the "Stop" control is fully closed.
- Turn key to start.
- Once engine has started release the key so it returns to the on position, and throttle back to idle position.
- If the fuel circuit has been emptied or in harsh weather, several attempts may be necessary before the engine starts. In such cases, alternate a 15 second attempt with a 15 second pause to avoid overheating the starter motor.

Note:

This D600 pump is fitted with two REC 22 batteries wired in parallel. This gives a built in redundancy should one battery fail.

Charge batteries fully before trying to start engine fitted with electric starting.

Stopping the engine

Move the throttle control to the SLOW position wait for a few seconds, and then turn the key to the OFF position and pull the stop control fully out to stop the engine. (See Fig: 1 Below)

Fig: 1



Pull up to stop engine

Starting The Engine If The Electric Start Will Not Turn The Engine Over:

Starting the engine with the recoil starter can be difficult if not practiced as the compression ratio of a diesel engine is high. However with practice and the right technique the engine will start with the recoil starter by following the recommended steps below.

1. Turn the key to the "On" position. Ensure the stop control is fully in the closed position.
2. Pull the rope starter until the engine comes up to compression.
3. Pull the decompression lever fully forward.
4. Using 2 hands on the starter handle and 1 foot firmly placed on the bottom of the pump frame.
5. Give one hard pull (you need to be strong enough to get it to roll over the compression stroke to fire)
6. Remember the compression ratio of a diesel engine is 19:1 so you really need to pull hard with two hands or if the person is small or weak have two people pull on the starter rope with one person holding down the pump.



1: Pull the rope starter until the engine comes up to compression.



2: Pull decompression levers over. The starting position is correct only if the levers remain engaged.



3: Let the starter cord recoil back into position, then pull starter cord hard.

Priming the LD600 Pump

Operating the primer

The D600 primer should typically develop up to minus 0.6 bar in an airtight pumping system.

The primer is an exhaust-eject type, extremely reliable and requires only minimal maintenance.

The primer is activated by a combination spring return, on-off valve connected to the exhaust system and a one-way valve situated at the pump inlet. Pulling the valve closes off the exhaust outlet redirecting the gases through the primer. The velocity of the passing exhaust gases causes a vacuum at the primer, which lifts the one-way valve off its seat and evacuates the air in the pump and suction line.

A ball valve is located immediately after the one-way valve and should only be closed if the pump inlet is under pressure, i.e. when pumping in closed circuit relays or from a hydrant supply.

Before the pump can be primed, delivery valves, drain valves, and other openings to the pump must be closed and absolutely air tight.

When operating from draft, suction hose connections must be tight and free of air leaks.

Make certain the suction hose strainer is properly submerged and free from foreign material.

Pull the primer valve all the way out and open throttle up to 50% revs to start priming.

Hold the valve open until water discharges from the primer exhaust port and a positive reading shows on the delivery gauge. Crack open delivery valve to flow water. Push valve all the way in to shut off primer and throttle back.

If water does not discharge from primer exhaust within about 40 seconds, stop priming and check for air leaks.

The primer should achieve a 1-metre lift within 10 seconds and a 3-metre lift within 30 seconds using 4" (100mm) suction hose.

When pumping from hydrants, the primer is not needed and must be kept closed.

PUMP OPERATION

Source of water supply

Water may be drafted from a pond, lake, stream, cistern, stock tank, or well but, whatever the source, the static lift must not exceed 5 metres (16 ft) from the center of the pump to the surface of the water, and a lift not exceeding 3 metres (10 ft) is recommended. The source of supply should be reasonably clear and free from foreign matter. It is recommended that all water holes, which may be needed for fire protection, be deepened if necessary and kept free from weeds and refuse. In many fire protection areas, cisterns or reservoirs are built and allowed to fill up with rainwater to allow them to be used in emergencies.

Pumping in cold weather

The first insurance against cold weather trouble is to keep fire apparatus stored in heated quarters. All water must be eliminated from pump casing and primer line between periods of operation.

When setting up for pumping, unnecessary delays should be avoided by having thoroughly trained pump operators. Be sure that the primer and hose lines are kept closed until ready for use. Have hose lines ready so that the pump may be started as soon as it has become primed. Do not stop flow of water through the pump until ready to drain and return to station.

When finished pumping

Drain water out of pump casing immediately. (Drain valve is located at lowest point in pump casing).

Do not forget to close the drain valve after all water has been drained out. Trouble in priming will follow on the next run if this is forgotten.

Pumps not often used for fire service should be inspected and run periodically to ensure that they will be in readiness for an emergency.

Pumping salt water

The pump should be flushed out with fresh water immediately after pumping salt water to prevent excessive corrosion.

A centrifugal pump will show 2½ % higher pressure and require 2½ % more power when handling seawater than when handling fresh water, if operated at the same speed and capacity.

Use of pump for emergency practices

It frequently happens that operators of a portable fire pump, who are not thoroughly familiar with its operation, become confused under the stress of an emergency and neglect some small detail that may cause trouble or delay in getting the equipment into operation. Therefore, we strongly urge that practice tests be conducted repeatedly until operators are thoroughly trained. More than one person in the brigade should be a competent operator.

Practice should include pumping from low lifts, high lift with short and long suction lines, with suction line elevated to form an air trap, and from hydrants, at large and small capacities.

It is well, also, to note the effects of air leaks in hose, insufficient submergence and restriction of suction line (suction line can be restricted by placing a can or strong closure around the suction strainer).

NEVER BREAK OR RESTRICT SUCTION OR ADMIT AIR INTO SUCTION LINE WHILE MOTOR IS OPERATING WITH THROTTLE OPEN. This will release the load and could allow the motor to over speed.

PUMP TESTING

Measurement of pump performance

Pump performance is measured by the quantity of water it can deliver per minute against a certain pressure called "Total Head", or "Net Pump Pressure" as it is usually termed in fire pump testing.

The Net Pump Pressure is the sum of the pump discharge pressure as shown on the pressure gauge with which the pump is equipped, and the total suction lift converted to equivalent kPa. If a pump is operating from a hydrant, the Net Pump Pressure is the discharge pressure less the incoming pressure from the hydrant measured at the suction entrance to the pump.

Capacity of a fire pump is measured in litres per minute. The usual method of measurement is to determine the pressure of the jet of water leaving a given size nozzle by means of a "Pitot Gauge" from which the capacity is computed mathematically.

A Pitot Gauge consists of a small tube adapted so as to point directly into the nozzle from the center of the issuing stream, the other end of the tube being connected to an accurate pressure gauge.

The nozzle jet drives straight into the Pitot tube and converts the velocity of the jet into pressure, which is an accurate measure of the velocity of the water as it leaves the nozzle. The tip of the Pitot tube should be one-half the diameter of the nozzle away from the nozzle tip while taking readings.

If a Pitot Gauge is not available, approximate pump capacities can be determined by reference to the following chart.

		Flow rate (Liters/minute)							
Pump Pressure (KPa)	Nozzle Size (mm)	13	16	19	22	23	25	28	32
100		111.5	169	238	319	349	412	517	676
200		157	239	337	451	493	583	731	955
300		193	292	412	553	605	714	896	1170
400		223	338	476	638	698	825	1035	1351
500		249	378	532	714	780	922	1157	1511
600		273	414	583	782	855	1010	1267	1655
700		295	446	630	844	923	1091	1368	1787
800		315	477	673	903	987	1166	1463	1911

Oil and Fuel Recommendations



Check oil level regularly. See oil chart, capacity, checking and filling procedures. Always refer to engine manufacturers handbook

Maintain correct oil level. Check daily before starting engine.

Change Oil

Change oil after the first 50 hours of operation. Drain oil while engine is warm.

Note: Change oil there after every 50 hours of operation or yearly.

Lubricants

Use diesel engine lubricants which meet APICC 2104B specifications. A multigrade oil such as AGIP SUPER DIESEL MULTIGRADE 15W/40 can be used.

If the engine is used in places with temperatures under –15 degrees celcius, use SAE 5W/30 oil.

Oil Capacity.

Approximately 1.8 Litres

Fuel Recommendations

- Fuel vapours are highly toxic. Only carry out refueling operations outdoors or in a well-ventilated area.
- When refueling it is advisable to use a funnel to prevent fuel from spilling out. The fuel should also be filtered to prevent dust or dirt from entering the tank.
- Use the same type of diesel fuel as used in cars or trucks. The use of other types of fuels could damage the engine.
- The Cetane rating of the fuel must be higher than 45 to prevent difficult starting.
- Do not use dirty diesel fuel or mixtures of fuel and water this will cause serious engine faults.
- Do not fill the fuel tank completely, but just up to 1cm from the top of the tank, to provide space for fuel movement. Wipe any fuel spillage from engine before starting.

Service, Storage & Specifications

For engine service.

See an Authorized Kohler / Lombardini Service Dealer. Each one carries a stock of Genuine Kohler / Lombardini Parts and is equipped with special service tools. Trained mechanics assure expert repair service.

Only dealers advertising as "Authorized Kohler or Lombardini Dealer" are required to meet Kohler / Lombardini standards.

Pump Service.

Most Authorized Kohler / Lombardini dealers are capable of performing minor repairs and adjustments to the pump components. Any major repairs or overhauls should be returned to the factory or referred back to the importer to assure expert repair service.

Storage Instructions.

The engine components may rust over time, especially if left inactive, prejudicing the efficiency and performance of the machine. A number of precautions are set out below, which may prove useful if the engine is left unused for long periods.

Storage up to 6 months

- Run the engine without load and at low speed for about 15 minutes and then switch off.
- Change the fuel filter.
- Disconnect Batteries.
- Pour a mixture of diesel and AGIP RUSTIA 81 (10%) into the fuel tank;
- Run the engine for about 10 minutes at a speed of between $\frac{1}{2}$ and $\frac{3}{4}$ nominal RPM, so that the tubes, injector pump and filters are filled with the protective mixture, then switch off.
- Spray AGIP RUSTIA C SAE 30 into the exhaust and intake ducts and manually turn with starting recoil.
- Thoroughly clean the fins and external parts of the engine and protect the unpainted external surfaces with AGIP RUSTIA C 30.
- Seal the silencer and air filter with adhesive tape.
- Wrap the engine in a plastic sheet.

Storage for more than 6 months

In addition to the above operations, do the following:

- Change or wash the oil filter
- Replace the engine oil with AGIP RUSTIA C SAE 30.
- Periodically inspect the engine and check that there are no traces of rust or corrosion, if present, consult a Kohler assistance center.

Re-commissioning

- Remove the protective covers.
- Remove the external protective product with solvent or a degreasing agent.
- Check the setting of the injectors, the clearances of the valves and the tightness of the heads and filters.
- Carry out the normal preliminary checks prior to starting the engine.
- If protective oil such as AGIP RUSTIA C SAE 30 has been used, change it after not more than 100 hours of work.

Tune-up specifications: refer to engine manufacturer's handbook for additional information.

Valve clearance cold intake and exhaust .006 in (0.15 mm).

Electrical

Batteries: Two X Yuasa 12 Volt REC 22

- Check battery Condition using a voltmeter, voltage should not be below 12 volts. If voltage is below 12 volts recharge the battery by connecting battery charger through the 12-volt accessory socket on the dash.
- Clean battery terminals from time to time.
- Always maintain battery in good charged condition
- Battery should be Charged once a month when not in use

Battery Charging.

The engine has a built in alternator with an output of 16 amps

TROUBLESHOOTING

Refer to engine manufacturer's handbook for additional information.

DEFECT	CAUSE
<ul style="list-style-type: none">• Fails to start.• Starts and stops• Lack of power• Light Blue smoke.• Black smoke.• Knocking in head area.• High oil consumption.• Leaks oil.• Oil comes out of exhaust.• Overheats.• Misfires.• No increase in rpm.	<p>Incorrect fuel. Air in fuel. Fuel tank empty. Air filter clogged. Air in fuel. Diesel filter clogged. Air filter clogged. Diesel filter clogged. Too much oil in crankcase. Excessive load. Incorrect fuel. Too much oil in crankcase. Vent tube bent. Engine running in. Head and cyl fins clogged. Excessive load. Incorrect fuel. Air in fuel. Engine cold. Tank vent. Incorrect fuel. Air in fuel. Tank Vent clogged.</p>

The above troubleshooting guide is a general outline of the main causes of defects, which the operator can easily remedy. In the case of more serious problems it is advisable to contact a Kohler / Lombardini service center.

D600 FIRE PUMPS DATA SUMMARY

1. General Description.

The pump set consists of two cylinder air-cooled diesel that is coupled to a single stage centrifugal pump.

The Pump set consists of the following main components:

- A: Kohler KD 425-2 diesel engine
- B: Phoenix Centrifugal pump end
- C: Exhaust ejector primer
- D: Stainless Steel Carry Frame.

2. Manufacturers Data

The Manufacturers details are:

Vortex Holdings Ltd	
31 Murchison Street	
Tikokino 4273	
New Zealand	
Tel	+64 (6) 21 435811
Email	admin@firepumps.co.nz
Web site	www.firepumps.co.nz

3. Physical Data

Dimensions and mass:

- | | | |
|----|--------|------------------------------|
| A: | Length | 760mm |
| B: | Width | 530mm |
| C: | Height | 550mm |
| D: | Weight | 122 kg (With Twin Batteries) |

DATA SHEET CONT.

4. Engine

A:	Make	Kohler / Lombardini
B:	Model	KD 425
C:	Type	4 stroke, overhead valve, air-cooled, diesel engine
D:	Bore & Stroke	85X 75mm
E	No of cylinders	2
F:	Displacement	851 cc
G:	Fuel Tank capacity	4 litres
H:	Fuel Type	Diesel
I:	Lubrication	Forced with lobe pump
J:	Starting System	Recoil or electric if fitted
K:	Battery	12 Volt

5. PUMP

A:	Make	Phoenix Maxflo
B:	Type	Centrifugal
C:	Discharge Rate model M	600 Litres/min @ 700 kPa
D:	Discharge Port size	50 mm
E:	Primer Type	Exhaust Eject
F:	Maximum draft height	7.5 metres
G:	Discharge Valve	2 X Globe valves 50mm BSP

6. Couplings

A:	Suction	100mm round thread
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END