

Manual for all Rittenhouse Skid Mount & Trailer Sprayers



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Introduction

Congratulations on your choice of a high-quality Rittenhouse sprayer unit. Your sprayer is constructed of the finest materials available and with proper maintenance will give you years of trouble-free service.

To ensure the best possible use, establish a good maintenance and safety program. Knowing your spraying requirements and how this machine can meet them. Please read the following instructions carefully.

We strongly recommend that you contact your local government department or other competent authority with regard to the spray program that will best suit your requirements.

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The advanced design of the Rittenhouse spray unit facilitates ease of use and convenient maintenance procedures. The pumps direct drive configuration eliminates the need for many troublesome belts and pulleys.

The tanks are made of corrosion-free polyethylene. The pump/engine/hose reel frame are made out of heavy-duty steel plate, flat bar and box section steel (most are powder coated). Brass, nylon, stainless steel and epoxy-coated aluminum are used extensively throughout the spraying system in order to practically eliminate clogging due to corrosion.

Pressure is easily adjusted and gun nozzles (optional) may be easily changed to tailor your application rates to the chemical being applied and condition of the lawn being sprayed as well as to accommodate various environmental concerns.

The pump employed on some of these units is of the diaphragm pump family. Diaphragm pumps have a reputation for trouble free operation. Nearly all of the moving parts are sealed in oil and do not come into contact with the spray liquid. The only moving parts that are in contact with the spray liquid are the diaphragms and the stainless steel valve which are resistant to most chemicals. Built into the pump is an accumulator, which dampens any pulsations, produced by the pump.

Start up:

Before starting engine:

1. Check suction strainer between tank and pump and clean if necessary.
2. Make sure suction valve is in the open position.
3. Check oil level in pump, gearbox and engine.
4. Check nozzle in gun for wear and correct size. A worn nozzle can substantially increase chemical output of the sprayer and alter the evenness of the spray pattern.
5. Check oil level and condition in wet oil filter in engine.
6. Check to ensure that engine fuel tank contains unleaded fuel.

Starting:

1. Turn engine switch to ON position.
2. Turn gas petcock to ON position.
3. If engine is cold, place choke in ON position.
4. Move throttle lever to approximately $\frac{1}{4}$ throttle (off is all the way to the right)
5. Pull the starter grip lightly until resistance is felt, then pull briskly. Ease the starter handle gently back to the engine. Do not allow starter grip to snap back against engine.
6. As engine warms up, gradually open choke.
7. Set throttle at speed just high enough to maintain pump pressure when the gun is open. Over running the engine will shorten engine, pump and regulator life.
8. Run machine for 2 to 3 minutes at zero pressure to evacuate air from the pump.
9. Adjust relief valve to the desired pressure. Note that there will be a pressure drop when the gun is opened so you need to accommodate this.
10. Ensure chemicals are mixed according to manufacturer's instructions and that used containers are properly disposed of. Wear safety equipment to avoid inhalation and contact with the chemical while mixing and spraying.

Precautions

1. Check all fluid levels regularly.
2. Keep suction line clear and suction filter clean.
3. DO NOT RUN UNIT WITH SUCTION VALVE CLOSED.
4. If oil is milky white in sight glass on diaphragm pump, shut machine down immediately.
5. Keep air vent in tank lid operational.
6. Ensure no liquids other than anti-freeze are in the sprayer if there is a possibility of freezing temperatures. Perform winterizing steps explained further in this manual.

Shut Down

1. After each spray or when changing chemicals, flush out the pump, lines and gun by running the sprayer with clean water in the tank.
2. Open the drain valve and remove screen from the suction filter. Allow water to drain, then hose out the inside of the tank until clean. Clean strainer in suction filter and replace. Do not leave chemical mixture in the tank.
3. If there is a possibility of freezing temperatures, be sure to winterize sprayer.

Maintenance

Lubrication

There is a separate oil level for the engine, gearbox and pump. See lubrication chart for frequency and type of lubrication on the following page.

Suction Line & Strainer

1. Ensure suction hoses and fittings between the tank and pump are airtight.
2. The suction filter is removed by unscrewing the nylon bowl. Running clean water over the screen to clean it. While the filter bowl is removed, check the seal to ensure it is in good condition. Replace seal on bowl if it appears worn, cracked or misshapen. When re-installing filter bowl, take care not to cross thread on the bowl and only hand tighten.
3. If the tank has liquid in it when the filter needs to be inspected, shut off the valve leading to the strainer from the tank. This valve **MUST** always be **OPEN** when the pump is in operation or damage to the pump could occur.

Diaphragm Pump

1. Maintain oil level approximately half way up on the clear plastic oil reservoir on pump. Do not overfill. Room is needed for the oil to expand in hot weather. Use SAE30 motor oil in the pump NOT 10W30 oil.
2. There is a tire type air valve on the red pulsation damper on the pump. Fill with air at 10% of the working pressure or put in 30 psi then leave remaining air in pump. Checking with a tire gauge will let out too much air to allow any degree of accuracy. Do not check or fill pulsation damper while pump is in operation or while there is still pressure in the spray line.

Gearbox

1. Check oil level regularly.
2. Oil should be filled through the top plughole until it runs out of the petcock (on the D30 pump) Use 90 weight gear oil.

Centrifugal Pump

1. Check suction filter between tank and pump when filling tank or more often if using dirty water supply or chemical that tends to clog suction filter and clean if needed. If the tank has liquid in it when the filter needs to be inspected, shut off the valve leading to the strainer from the tank. Open valve after the strainer has been cleaned.
2. Never run the pump dry. If allowed to run dry, the seals in the pump will overheat and burn out.
3. When not in use, flush out pump with clean water and fill with automotive radiator antifreeze mixture to prevent rust and to protect against freezing in cold weather.

Nozzle

1. Check for wear on nozzle regularly. (See calibration section)
2. Clean nozzle regularly with a wooden toothpick, toothbrush or other soft device. Using something hard such as a piece of wire can damage the orifice shape which will alter your spray pattern and the flow rate.
3. Before reassembly, wash nozzle, cap and mating surfaces thoroughly to ensure parts seat properly and do not leak.

Winterizing

1. Flush out unit with clean water.
2. Run pump until it is completely dry. (Run for a couple of minutes after you think it is dry) DO NOT run pump with suction valve closed.
3. Close valves but do not close suction valve. Put antifreeze mixture in tank. Use automotive type antifreeze mixed as per instructions on container. DO NOT USE DIESEL FUEL.
4. Run machine until anti-freeze comes out of nozzle on gun. Anti-freeze may be left in the machine during storage.

NOTE: When sprayer is to be used again, open valves, run pump and drain all hoses of antifreeze into a container for future use. Flush unit with clean water.

Calibration Chart for TK Type Nozzles

Working Pressure in PSI – Flow rates are in US gallons/minute

Tip #	10 psi	20 psi	30 psi	40 psi
TK SS4	0.40	0.57	0.69	0.80
TK SS5	0.50	0.71	0.87	1.0
TK SS7.5	0.75	1.1	1.3	1.5
TK SS10	1.0	1.4	1.7	2.0
TK SS12	1.2	1.7	2.1	2.4
TK SS15	1.5	2.1	2.6	3.0
TK SS18	1.8	2.5	3.1	3.6
TK SS20	2.0	2.8	3.5	4.0
TK SS22	2.2	3.1	3.8	4.4
TK SS24	2.4	3.4	4.2	4.8
TK SS27	2.7	3.8	4.7	5.4
TK SS30	3.0	4.2	5.2	6.0
TK SS35	3.5	5.0	6.1	7.0
TK SS40	4.0	5.7	6.9	8.0
TK SS45	4.5	6.4	7.8	9.0
TK SS50	5.0	7.1	8.7	10.0

Working Pressure in kPa – Flow rates in are in litres/minute

Tip #	100 kPa	150 kPa	200 kPa	250 kPa
TK SS4	1.82	2.23	2.58	2.88
TK SS5	2.28	2.79	3.22	3.60
TK SS7.5	3.42	4.19	4.86	5.40
TK SS10	4.56	5.58	6.45	7.21
TK SS12	5.47	6.70	7.74	8.65
TK SS15	6.84	8.37	9.67	10.21
TK SS18	8.21	10.05	11.60	12.97
TK SS20	9.12	11.17	12.89	14.41
TK SS22	10.03	12.28	14.18	15.86
TK SS24	10.94	13.40	15.47	17.30
TK SS27	12.31	15.07	17.40	19.46
TK SS30	13.68	16.75	19.34	21.60
TK SS35	15.95	19.54	22.60	25.20
TK SS40	18.20	22.30	25.80	28.80
TK SS45	20.50	25.10	29.00	32.40
TK SS50	22.80	27.90	32.20	36.00

Lubrication Chart

Item	Operation	Frequency	Type
Engine	Change oil	Every 50 hours	10W30 oil
Diaphragm pump	Change oil	First 40 hours then every 500 hours or 3 months whatever comes first	SAE30 oil
gearbox	Change oil	Every 500 hours	90 gear oil

Steps to Calibrate Sprayer

1. Find out from your spray chemical supplier what volume of liquid you wish to apply per unit either measures in gallon/1000 square feet or liters/100 square meters. Call this "V"
2. Measure off an area of lawn that is exactly 1000 sq. ft. or 100 sq. meters. Use unit compatible with those obtained in step 1.
3. Measure the amount of time it takes to spray the area designated in step 2 in seconds. Call the number of seconds it takes "T"
4. Calculate the flow rate "F" required out of your gun using the following formula.

$$F = V \times (60/T)$$
5. Find F in chart above (for TK nozzles), which will give you the required nozzle and pressure to spray at with that nozzle. You will notice that two or more nozzles will often give the same flow rate at different pressures. Keep in mind that if a lower pressure is used, the resulting droplet size produced will be larger and therefore drift and evaporation will be reduced.
6. Obtain the actual flow rate for the nozzle by testing it using a nozzle pressure gauge and graduated cylinder in the following procedure.
 - Fill tank with clean water (10 to 20 gallons will do)
 - Install nozzle pressure gauge between nozzle and end of gun.
 - While the gun is open and spraying, adjust the pressure at the pressure regulator obtained from chart in step 5
 - Note that the pressure reading on the gauge located at the pressure regulator (this should be higher than the nozzle pressure) Maintain this pressure at the regulator between calibrations of the sprayer in order that the nozzle pressure may be in close approximation of the pressure required as indicated by the chart in step 5.
 - Measure the amount of time required to fill a graduated cylinder to the 1 litre mark to the nearest second giving "TF"
 - Use one of the following formulas to calculate the actual gallons/minute or litres/minute flowing from the nozzle.

$$\text{Liters/minute} = 60/TF$$

$$\text{Gallons/minute} = (60/TF) / 4.55$$

- Compare the flow figure calculated in (vi) with those indicated by the chart in step 5 (for TK nozzle). If the actual flow is higher than the theoretical flow as per the chart then the nozzle is likely to be worn. If the actual flow is lower than the theoretical flow, then there is likely to be a buildup of chemical residue or a mineral buildup from a hard water supply. In the case where a nozzle is worn it is necessary to replace the nozzle. In the latter case, the nozzle should be cleaned. Small variances between actual and theoretical flow rates can be accommodated for by a corresponding adjustment in pressure.

Useful Conversions

1 meter = 3.28 feet	1 foot = 0.3048 meters
1 liter = 0.22 imperial gallons	1 imperial gallon = 4.55 liters
1 hectare = 2.471 acres	1 acre = 0.4047 hectares
1 kPa = 0.145 psi	1 psi = 6.895 kPa

Troubleshooting

SYMPTON	PROBABLE CAUSE	CORRECTIVE ACTION
Pump does not draw water or no pressure	Suction line plugged, Drawing air	Examine suction line and clean strainer tighten fittings/ hose clamps
Pressure gauge fluctuates excessively/ improper accumulator pressure	Pump sucking in air	Examine suction line for leaks
Output/pressure drops and pump noisy	Oil level too low	Add oil to correct level
Oil comes out of discharge port or oil is white & milky	One or more diaphragms split	Dismantle heads remove old oil, fit with new diaphragm fill with oil
Excessive pulsation in pressure	Air chamber pressure incorrect	Set pressure in accumulator per pump manual
Pressure drops excessively when booms or gun are open	Nozzles are worn or leak in suction line, worn regulator	Check and replace nozzles if necessary or check suction line
Pressure drops suddenly	Broken valve spring or dirt stuck in valve or jet agitator nozzle worn, worn regulator	Replace or clean valves and replace jet agitator nozzle