

# REFERENCE MANUAL

## **HURCO****Vac250** AFFORDABLE VACUUM EXCAVATION

### Reference Manual and User's Guide



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# Welcome

Thank you for purchasing Hurco's VAC250. Hurco is proud of this new addition to the family of products that Hurco offers for utility contractors and municipal utilities. The addition of vacuums to this family of products helps our customers who;

- Pot hole to expose buried utilities.
- Small excavations to repair shallow utilities like water main valve boxes.
- Clean out water main valve boxes for valve exercising programs.
- General clean up including small vaults and pits.

**Hurco Technologies, Inc.**, would like to take this opportunity to welcome you as a new customer and user of the VAC250 vacuum. You have just purchased the best vacuum system available. The VAC250 is simple to use and will provide you with years of service.

This manual will take you through the step by step procedures for using the VAC250. We use simple to understand instructions and photos to assist you in learning how to get the best results from your VAC250. Please follow each step completely to insure maximum performance from your VAC250.

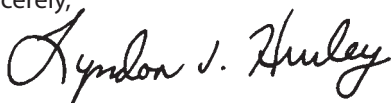
Your VAC250 will give you many years of service if you take care of it as you would any expensive piece of equipment. The VAC250 is rugged and built to last. It will withstand the demands of your jobsite; however, is not abuse proof! Be sure to assign the use of your VAC250 to a competent worker who will take care of it.

In this manual, we will be giving you suggestions on basic vacuuming activities. As a general rule, these suggestions are based on standard procedures used by cities and contractors throughout the United States and other countries. Do not ignore all safety requirements and recommendations when using your VAC250 system. Hurco Technologies, Inc. will not be responsible for the incorrect use of the VAC250 or for the failure to following all mandated safety requirements. Assign a competent worker with knowledge on proper use of vacuum systems and safety requirements for the jobsite. You can find a copy of the OSHA regulations on the OSHA website at <http://www.osha.gov>. SAFETY IS NO ACCIDENT!

**WARNING:** The VAC250 is not explosion proof. Do not start the VAC250 in the presence of volatile gases. Do not use the VAC250 in a confined space without proper ventilation and always follow the OSHA guidelines for all jobsite safety.

If you have any questions regarding this manual or the use of the VAC250, please call and ask for customer support at 1-800-888-1436.

Sincerely,



Lyndon J. Hurley  
President, Hurco Technologies, Inc.



**HURCO** **Vac250**  
**AFFORDABLE VACUUM**  
**EXCAVATION**



## Overview

### Vacuum Orientation

1. Front of unit faces tow vehicle
2. Left side of unit –Curb side – location of control panel
3. Rear of unit – Debris dump door
4. Right side of unit – Street side – location of hose reels

Refer to these descriptions when locating the components of your VAC250



### Location of Identification Numbers

- VIN Tag is located on front trailer tongue
- Skid Serial Number is located next to the control panel
- Component Serial Numbers are located on the component

|                          |  |
|--------------------------|--|
| Date of manufacture      |  |
| Date of purchase         |  |
| VAC250 serial number     |  |
| Trailer VIN number       |  |
| Engine serial number     |  |
| Blower serial number     |  |
| Water pump serial number |  |

## General Guideline

### Follow these guidelines before using your VAC250

- Read this operator's manual in its entirety before operating this equipment. Pay special attention to the Safety section of this manual.
- Read the owner's manuals for all supplied components.
- Review your jobsite and determine the type of equipment and safety requirements that will be needed to safely and efficiently perform your vacuuming activities. Refer to any local, national or international requirements for jobsite safety in your area.
- **WARNING!** ALWAYS call for utility locations prior to any excavation. Failure to do so can cause serious injury or death.
- Know who to call in an emergency and be sure to have phone numbers available.
- Mark the jobsite clearly and keep spectators away.
- Wear personal protective equipment at all times when on the jobsite.
- Do routine inspections of this equipment, prior to use, following the instructions in this manual.
- Replace any worn or damaged labels on the machine.
- Do not operate near volatile gasses.

### Intended Use

The VAC250 vacuum system can be used for vacuuming a variety of non-hazardous, non-flammable liquids and solid debris. It is designed for soft excavation of buried utilities for visual verification and/or potholing. The vacuum operating temperature range is 0 degrees F to 115 degrees F (-18 to 46C). **WARNING!** When using water with this vacuum or when vacuuming wet material below freezing temperatures, be aware of the dangers of equipment freeze up and potential damage to the vacuum and its components. Use in any other way is considered contrary to the intended use.

The VAC250 should only be operated, service or repaired by persons familiar with this machine and safe operation and repair practices.

### Defects or Failures

If you identify or suspect that there are defects or failures in the operation of this vacuum, discontinue its use immediately and contact your servicing dealer. You may also call Hurco Technologies, Inc. at 1-800-888-1436 and ask for the service department. Discontinue use of the vacuum until the defect or failure is properly repaired and tested.

## Safety First

In this section you will find important safety messages for your VAC250. Safety messages specific to a particular operation or procedure are located in the appropriate section of the manual.

It is important to familiarize yourself with each and every Warning, Danger and Caution message. These safety messages point out potentially hazardous conditions and should not be ignored. The messages will look similar to the samples below. Each of the samples below has a definition describing what the safety message means. Each message is associated with the colors displayed at the top.



On page 6 of this manual are samples of the safety labels that are used on your VAC250. Each label is identified with a part number. This reference sheet will help you identify the safety labels on your VAC250. If any of the labels on your VAC250 are damaged or unreadable, order replacement labels immediately. Refer to these parts numbers when ordering. Call Hurco at 1-800-888-1436 to order replacement labels.

# Safety Messages

## MODEL 250 VAC SAFETY & INSTRUCTION DECALS

2250-900



2250-901



2250-902



2250-903



2250-904



2250-905



2250-906



2250-907



2250-908



2250-909



2250-910



2250-911



2250-912



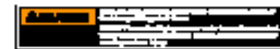
2250-913



2250-914



2250-916



2250-917



2250-918



2250-919



2250-920



2250-921



2250-922



2250-923



2250-924



2250-925





## Safety Messages

- **WARNING!** Read Owner's Manual and safety decals before operating this machine.
- **WARNING!** Check machine before operating. Machine must be in good operating condition and all safety equipment installed and functioning properly.
- **WARNING!** Wear personal protective Equipment. Dress properly. Refer to any local or national recommendations or laws for the type of work and hazards that may be encountered when using your VAC250.
- **WARNING!** Keep Spectators away.
- **WARNING!** Engine exhaust can asphyxiate. Operate machine outdoors. If work must be done in an enclosed environment, take all necessary precautions to ensure an adequate supply of fresh air. Protect respiratory tract using a suitable mask.
- **WARNING!** Use Shutdown Procedure before servicing, cleaning, repairing or transporting machine. Refer to "Shutdown Procedure" on page 17 of this manual.
- **WARNING!** Pressurized hydraulic fluid can penetrate body tissue and result in serious injury or death. Leaks can be invisible. Keep away from suspected leaks. Relieve pressure in the hydraulic system before searching for leaks, disconnecting hoses, or performing any other work on the system.

If you must pressurize the system to find a leak, use an object such as a piece of wood or cardboard rather than your hands. When loosening a fitting where some residual pressure may exist, slowly loosen the fitting until the fluid begins to leak. Wait for leaking to stop before disconnecting the fitting.

Fluid injected under the skin must be immediately removed by a surgeon familiar with this injury.

- **DANGER!** Confined space will cause suffocation. Do not enter collection tank for any reason.
- **WARNING!** Fuel and fumes can explode and burn resulting in serious injury or death.

Before refueling, shut engine OFF, extinguish flames, and do not smoke. Take precautions to eliminate static discharges.

## Safety Messages - continued

- **WARNING!** Battery fumes are flammable and can explode resulting in serious injury or death. Battery explosion and acid can blind and burn. Keep all burning materials away from battery. Tools and cable clamps can make sparks.

Do not smoke. Shield eyes and face. Read instructions.

- **WARNING!** Battery post, terminals and related accessories contain lead and lead compounds which are known to the state of California to cause cancer and reproductive harm.

Wash hands after handling.

- **WARNING!** Hot fluid under pressure can scald.

Allow engine to cool before opening radiator cap.

- **WARNING!** Exploding tire can cause serious injury or death. To prevent tire explosion, do the following:
  - Maintain proper tire pressure. Inflating tire above or below the recommended pressure can cause tire damage.
  - Replace any tire with cuts or bubbles. Replace any damaged rims.
  - Do not weld or heat wheel assembly. Heating increases tire pressure.
- **WARNING!** Avoid high pressure water. Pressurized water from any water tool can penetrate body tissue and result in serious injury or death. Do not point any high pressure water tool at yourself or bystanders.

Keep nozzles away from the body and do not use them to clean body parts or clothing. Water injected under the skin must be removed immediately by a surgeon familiar with this type of injury.

- **WARNING!** Electric shock can result in serious injury or death. Pressurized water from any high pressure water tool can damage electric cables. The water tool will conduct electricity from damaged electric cables. Contact with damaged cables can result in electric shock.

Always wear electrically insulated gloves and boots. Do not allow any part of your body to be in contact with the digging tool except for your insulated gloved hands.

- **WARNING!** Entanglement with power driven parts can result in serious injury or death. Keep hands, feet and clothing away from power driven parts. Keep shields in place and properly secured.

## Safety Messages - continued

- **WARNING!** A damaged electrical cable can cause electric shock and result in serious injury or death.

A ruptured gas line can cause an explosion and/or fire and result in serious injury or death.

Laser light emitting from a cut fiber optic can result in eye damage.

Locate utilities before digging. Call 1-888-258-0808 (U.S. or Canada), local utility companies or national regulating authority.

- **DANGER!** Vacuum can suffocate or damage vision or hearing. Keep vacuum hose away from face.
- **DANGER!** Confined space will cause suffocation. Use proper procedures for entering any confined space.
- **DANGER!** Pressurized collection tank can cause serious injury or death. If pressurized, dome trap lid and bag house lid can blow off when removing wing nuts. Also, spoil can be ejected rapidly from bag house drain valve or collection tank suction valve when opened.

Relieve collection tank pressure before opening lids and valves by using the pressure/vacuum selector valve. **DO NOT** use the bag house drain or collection tank suction valve to relieve collection tank pressure.

- **WARNING!** The weight of your vacuum can cause ground to give way. Vacuum can fall into excavation or tip over. Serious injury or death can result. Keep well away from edges of embankments or excavations.
- **WARNING!** Lose of steering or braking control can result in serious injury or death. Use a towing vehicle that is large enough for sufficient steering and braking control.
- **WARNING!** Failure to follow any of the proceeding safety instructions or those that follow within this manual could result in serious injury or death. This vacuum is to be used only for those purposes for which it was intended as explained in this Owner's Manual.

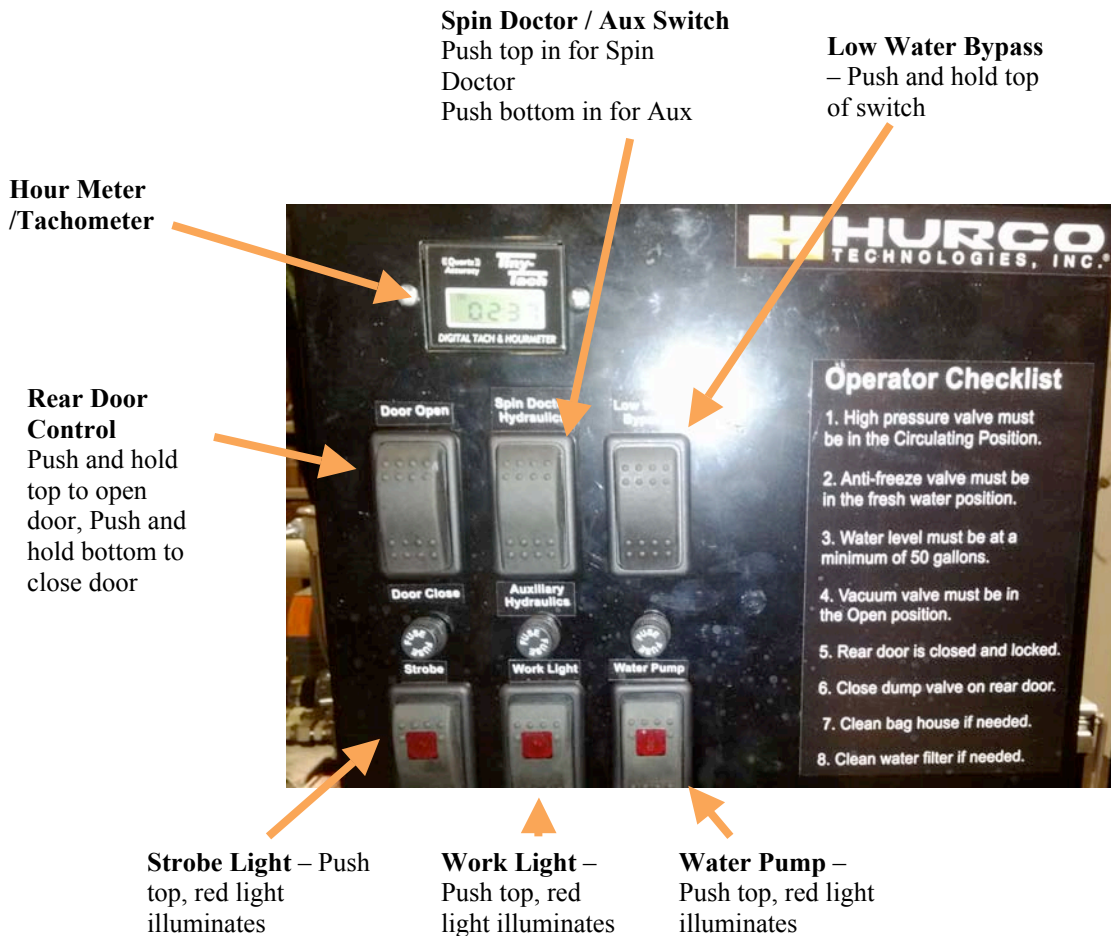
## Controls

### Engine

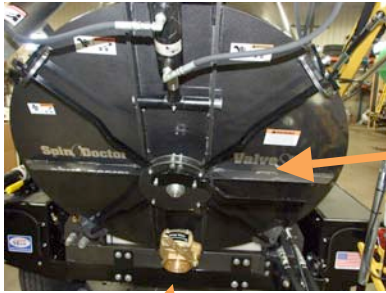
Your VAC250 G is equipped either with a Kohler CH940 gas engine or a CAT C1.6 diesel engine. The manuals for these engines are included with your documentation provided at delivery. The form number for the Owner's Manual for the Kohler engine is 62 590 04 issued 10/10. The form number for the Owner's Manual for the CAT engine is SEBU7605-04 issued 04/07. If you need a replacement manual for these engines, go to the Hurco Download Center at [www.gethurco.com](http://www.gethurco.com).

You must read your engine Owner's manual in its entirety prior to starting. Pay special attention to all warnings and cautions in these manuals. Pay special attention to Pre-Start Checklist for your engine. Your Kohler engine is equipped with the Optional Control Panel. You will find the instructions for this panel starting on page 6 of the Kohler manual. The control for the CAT engine is a LOFA – EP250 G1. The specification and operation documents are included with your CAT engine documents. See page 14 for the location of the LOFA control panel.

### Control Panel



## Controls – continued

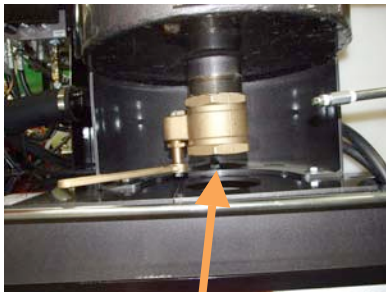


**Rear Door Lever**  
Lever up – unlatch  
Lever down - Latch

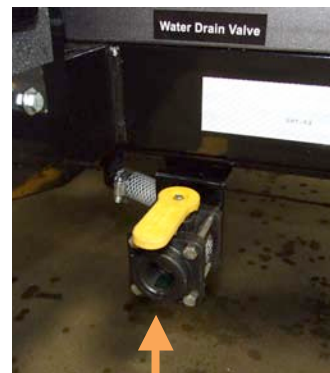


**Suction Valve**  
Lever up – Closed  
Lever down - Open

**Dump Valve**  
Lever up – Closed  
Lever down - Open



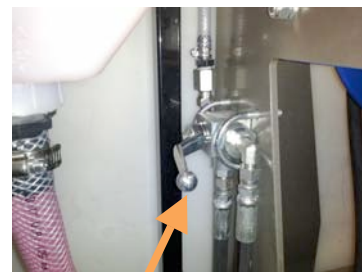
**Filter Bag House Drain Valve**  
Lever out – open



**System Drain Valve**  
Located curb side forward of axel



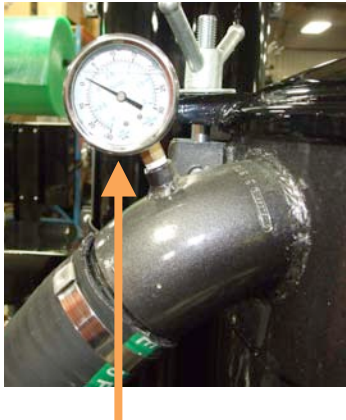
**Fluid Selector Valve**  
Curb side forward water tank.



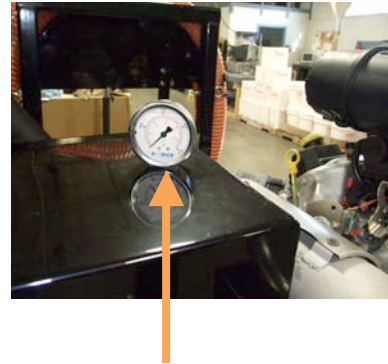
**Water Pressure Valve**  
Lever Vertical – Pressure  
Lever Horizontal – Circulate  
Located below hose reel



## Controls – continued



**Vacuum Gauge**  
Located on Filter Tank  
elbow near top of tank



**Hydraulic Pressure Gauge**  
Located between vacuum  
silencer and engine.



**Water Pressure Gauge**  
Located on top of the Giant  
Water Pump



**Temperature and Fill Level  
Gauge.** Located on hydraulic  
tank, curbside



**Hydraulic Filter  
Indicator Gauge –**  
Located on the hydraulic



**Hour Meter –** Located on  
control panel curbside

## Controls – continued



**Vacuum Relief Valve –**  
Located on Air Filter Tank.



**Primary Shutoff Lid**  
Located on top of  
debris tank



**Vacuum Pump Lubrication  
Valve –** Located on Air Filter  
Tank.



**Control Panel for Diesel Engine –**  
Refer to CAT Owners Manual for  
details and operation.

## Transporting

### Towing

**WARNING!** Before towing your VAC250 trailer, it is important to understand safe towing practices, tire safety and proper vehicle selection.

When your VAC250 trailer was delivered, it included a manual developed by the National Highway Transportation Safety Administration (NHTSA). This manual contains important information related to towing a trailer. It is important to read this manual completely and understand what is required to safely tow your VAC250. If you lose this manual, you can reprint it at this NHTSA link <http://www.nhtsa.gov/cars/problems/equipment/towing/towing.pdf> or visit the NHTSA site at [www.nhtsa.gov](http://www.nhtsa.gov).

Also included with this manual is a Tire Safety document created by the US Department of Transportation(USDOT) and the National Highway Transportation Safety Administration (NHTSA). It is important that you read this document in its entirety to insure tire safety when towing your VAC250. If you should lose this document, you can reprint it at this NHTSA link <http://www.nhtsa.gov/cars/rules/tiresafety/ridesonit/brochure.html> or visit the NHTSA site at [www.nhtsa.gov](http://www.nhtsa.gov).

Refer to the specifications section of this manual for important information regarding your VAC250 trailer. It is here that you will find trailer weights and tongue weight for properly selection the proper tow vehicle.

The VAC250 trailer is equipped with a “breakaway” brake system called “The Engager” by Hopkins Towing Solutions. Instructions on wiring, operation and maintenance are covered in the “The Engager” flyer included with your VAC250 when it was delivered. If you have lost this manual, you can reprint it from the Hurco Download Center at [www.gethurco.com](http://www.gethurco.com).



## Vacuum Use

**WARNING!** Before starting your VAC250, refer to the Safety sections of this manual. Check the machine over looking for loose, worn or damaged components. Repair or replace as necessary. Failure to properly maintain and service your VAC250 could result in injury or death and can cause damage to the machine. Refer to this manual for general service guidelines and refer to the Owner's Manuals for all OEM components such as the water pump, vacuum pump and engine.

**WARNING!** If you intend to use the VAC250 in freezing weather, especially when doing wet vacuuming, be aware of the dangers. You should not run your water pump or water system in temperatures below 45 degrees. Freezing parts can rupture or explode causing serious harm or death. Refer to the P300 Series Giant brand pump manual included with your vacuum on delivery. If you have lost this manual, you can reprint it from the Hurco Download Center at [www.gethurco.com](http://www.gethurco.com). Refer to page 18 for instructions to anti-freezing the water system.

**START UP** - Follow these steps;

1. Check all machine and fluid levels. Refer to component manuals included with our VAC250 when delivered. If you have lost any of these manufacturers manual, you can reprint them from the Hurco Download Center at [www.gethurco.com](http://www.gethurco.com).
2. Turn water pump switch off. This switch is located on the main control panel. See page 10 for the location of this switch.
3. Open Drain Valve located on bottom of Filter Bag Housing and drain as necessary, Close when done. See page 11 for the location of this valve.
4. Open the Suction Valve on Debris Tank. See page 11 for the location of this valve.
5. Open fuel shut off valve. This valve is located in the gas line between the gas tank and engine.
6. Start Engine following the engine manufacturer's guidelines. Refer to the engine manufacturers Owner's Manual included when your VAC250 was delivered. If you have lost your engine manufacturers manual, you can reprint it from the Hurco Download Center at [www.gethurco.com](http://www.gethurco.com). The engine controls are located on the front of the engine.
7. Let engine warm for about 5 minutes prior to use.

## Vacuum Use – continued

### Preparing to use your VAC250.

**WARNING!** Do not excavate hazardous, toxic or flammable materials.

**WARNING!** Sudden machine movement can result in serious injury or death. Your VAC250 must be parked on a stable, level surface with wheels blocked before detaching it from towing vehicle.

**WARNING!** Read Operator's Manual and safety decals before operating the VAC250

**WARNING!** Personal protective equipment is a requirement when operating your VAC250. Wear a hard hat, wraparound safety glasses and safety shoes or boots. Wear close fitting clothes to eliminate the risk of getting clothes entangled in moving parts. Do not wear jewelry such as rings, wristwatches, necklaces or bracelets. Confine long hair. When potholing, (excavating), wear electrically insulated gloves and boots. If working near traffic, wear reflective clothing.

**WARNING!** When working around buried utilities. A damaged electrical cable can cause electric shock and result in serious injury or death. A ruptured gas line can cause an explosion and/or fire and result in serious injury or death. Laser light emitting from a cut fiber optic can result in eye damage.

Before starting any excavation project, call the local One-Call system and any utility company that does not subscribe to the One-Call system. Have all buried utilities located on the jobsite. Not calling can result in accidents or injuries, interruption of services, damage to the environment or job delays.

**WARNING!** When striking any utility, immediately release excavation tools and do not touch any part of the VAC250 or the attached vehicle. Clear the area in case of explosion or emitting laser light. Immediately call the affected utility and have it turned off until repairs can be made.

### Empty Debris Tank and Clean-up – Follow these steps;

1. Remove and store suction hose and wand.
2. With engine running at full speed, close Suction Valve and immediately open Dump Valve. This will start pulling vacuum through the Dump Valve causing the debris in the tank to mix with water for easy dump. See page 11 for location of Dump Valve and Suction Valve.
3. With the Dump Valve open, open the Suction Valve; this will cause the debris slurry to rush out of the Dump Valve.

## Vacuum Use – continued

4. Repeat this process until no more debris comes out of the Dump Valve.
5. Close the Dump Valve.
6. Close the Suction Valve – With both valves closed, the vacuum will pull the rear door in tight allowing you to release the Rear Door Lever. See page 11 for location of Rear Door Lever.
7. Once the Rear Door Lever is released, open the Suction Valve.
8. Move to the control panel and use the Rear Door Control to open the rear door fully.  
**CAUTION!** Be sure no one is at the rear of the vacuum when opening the rear door. See page 10 for the Rear Door Control location.
9. Attach the high pressure water wash down wand to high pressure water hose.
10. Activate the Water Pump switch located on the control panel. See page 10 for the location of the Water Pump switch.
11. Wash down the inside of tank, inside of rear door and rubber seal.
12. Close the Suction Valve and be sure the Dump Valve is still closed.
13. Return to the control panel and use the Rear Door Control to close rear door.
14. As the rear door closes, vacuum will draw the door in tight so that the Rear Door Lever can be engaged to lock rear door.
15. Once the Rear Door Lever is locked, open the Suction Valve.
16. Follow Shut Down procedures below.

### **Shut Down** – Follow these steps;

1. Turn water pump switch off. See page 10 for the location of this switch.
2. **CAUTION!** Relieve any pressure in attached tools by pulling the trigger on the tool. Point tool away from people. High pressure water is dangerous and can cause serious injury.
3. Disconnect the water line from the tool and attach to quick connect nipple mounted on trailer below the hose reel.
4. Store tools and hoses

## Vacuum Use - continued

5. Open Suction Valve on debris tank to relieve pressure in debris tank.
6. Idle engine for about 5 minutes and shutdown. By idling the engine for this period of time will allow the engine and fluids to cool and it will help reduce condensation build up in the vacuum blower.
7. Turn engine switch to Off.
8. Open Filter Bag House Drain Valve to fully drain bag house and close valve.
9. Close Suction and Dump Valves.

### Anti-freezing the Water System

1. Turn Water Pressure Valve to Circulate. See page 11 for location of Water Pressure Valve
2. Turn Fluid Selector Valve to Antifreeze. See page 11 for location of Fluid Selector Valve.
3. Start engine and turn on the Water Pump switch. See page 10 for location of Water Pump switch.
4. Push and hold Low Water Bypass switch until antifreeze appears in the water tank. See page 10 for location of the Low Water Bypass switch.
5. Turn Water Pressure Valve to Pressure.
6. Uncoil enough water pressure hose to reach around the vacuum and reach the fill hole on the water tank.
7. Attach water wash down wand and stick the end of the wand in the water tank.
8. Press and hold the Low Water Bypass Switch until antifreeze appears in the water tank.
9. Repeat this process for each high pressure tool to ensure each has had antifreeze run through them to prevent freezing.
10. Release Low Water Bypass Switch
11. Turn Water Pressure Valve to Circulate and Fluid Selector Valve to Water.

## **Vacuum Use - continued**

12. Idle engine for about 5 minutes and shutdown. By idling the engine for this period of time will allow the engine and fluids to cool and it will help reduce condensation build up in the vacuum blower.
13. Turn engine switch to Off.

## Cleanup and Storage

1. Be sure to antifreeze the water system in climates where temperatures may drop below 45 degrees and as described on page 18 of this manual.
2. Rinse all equipment with water to remove dirt or debris. You can use the included water lance to perform this procedure. Thoroughly clean the inside of the debris tank and rear door seal. **DANGER!** Confined space will cause suffocation. Use proper procedures for entering any confined space. Only enter the debris tank when necessary for repairs and follow the U.S. Department of Labor guidelines for entering confined spaces.
3. Disconnect all tools and vacuum hose and store.
4. Connect the high pressure water hose to the quick disconnect nipple.
5. Follow recommendations of the vacuum pump manufacturer when storing your VAC250 for extended periods of time. Refer to the vacuum pump manual included with delivery of your VAC250. If you have lost this manual and need another copy, you can reprint it from the Hurco Download Center at [www.gethurco.com](http://www.gethurco.com). There is a Lubrication Valve located on the Air Filter Tank. See page 14 for location. Spraying a lubricant like WD40 into this valve while the vacuum pump is running will help prevent the vacuum pump from getting rusty and corroded when stored for prolonged periods of time.
6. Drain water from Filter Bag House by using the Filter Bag House drain located at the bottom of the Filter Bag House. Note: Filter Bag House should be drained daily or every 8 hours of use. Filter Tubes should be checked daily and cleaned or replaced as necessary.
7. Open the top of the Filter Bag House and remove the Filter Rack. Pressure wash or blow off filter tubes. Check for tears and replace filter tubes as necessary. NEVER replace the filter rack with a damaged filter tube as this may damage the vacuum pump. Replace the Filter Rack and close for storage. Note: if you wash the filter tubes, allow the tubes to dry before reassembling.
8. **WARNING!** When disconnecting the VAC250 from the towing vehicle, be sure that the trailer is on level ground and the wheels are properly blocked. Failure to do so could cause the trailer to roll causing serious injury or damage. Refer to the Towing A Trailer by the National Highway Traffic Safety Administration manual supplied with your VAC250. If you have lost this manual, you may print a new one by going to the Hurco Download Center at [www.gethurco.com](http://www.gethurco.com).

## Service

### EACH USE

1. Check battery connections for wear or corrosion. Service and repair as necessary. You may check with the battery manufactures recommendation for safely servicing the battery. The battery manufacture information is displayed on the battery.
2. Check for loose bolts or fittings and check that the hitch bolts are properly tightened. Hitch bolts should be torque to 271 ft. lbs
3. Check for loose or worn belts. Repair or replace as necessary. See page 24 for instruction to replace belts. To check:
  - a. Turn ignition to STOP and remove key.
  - b. Apply moderate thumb pressure to belt between pulleys.
  - c. Belt is properly tensioned when deflection is about 1/4 inch.
4. Check tire pressure and lug nuts for proper pressure and torque. Use a certified tire service shop if you are unsure of proper tire pressure or torque on lug nuts. Proper tire pressure is usually printed on the side of the tire and torque for lug nuts is 95 ft lbs. Refer to the National Highway Traffic Safety Administrations Tire Safety brochure that was supplied with your VAC250.
5. Check lights for operation and cleanliness
6. Check strobe or arrow board for operation and cleanliness
7. Drain water from Filter Bag House by using the Filter Bag House drain located at the bottom of the Filter Bag House. Note: Filter Bag House should be drained daily or every 8 hours of use. Filter Tubes should be checked daily and cleaned or replaced as necessary.
8. Open the top of the Filter Bag House and remove the Filter Rack. Pressure wash or blow off filter tubes. Check for tears and replace filter tubes as necessary. NEVER replace the filter rack with a damaged filter tube as this may damage the vacuum pump. Replace the Filter Rack and close. Note: if you wash the filter tubes, allow the tubes to dry before reassembling before storing.
9. Check Water Pump filter, clean or replace as necessary.
10. Check Water Pump Pressure Regulator. To check;
  - a. Ensure there is water in tank
  - b. Start engine
  - c. Connect water pressure hose to water lance
  - d. Move water pressure switch to on.

## Service – continued

### Check Water Pump Pressure Regulator - continued

- e. Squeeze water lance handle to bleed out any air in the system
  - f. Release handle.
  - g. Adjust pressure control by following the instructions in the Giant Industries manual. Set pressure using the pressure gauge located on the pump. Set pressure to the maximum as stated in the Giant Industries manual.
  - h. **DANGER!** Be sure to turn off engine, remove key and release pressure on the water system before doing any other service work.
11. Clean and replace pressure nozzles on your pressure tools as necessary.

### COMPONENTS

1. Owner's Manuals were supplied for each component used on your VAC250. It is important to read each of these manuals and service as required. The Available manuals index is located on Page 40 of this manual.

Some of these manuals may contain information on a series of different models. You will find the model information labeled on each of these components. Be sure to refer to the sections of these manuals that are appropriate for the component on your VAC250.

2. Trailer brakes, wheel bearing and related components should be check after the initial 300 miles of use and every 3000 miles afterwards for brakes and related components, and 12,000 miles for bearings. Trailer brakes, wheel bearings and relate components should only be done by a certified mechanic. Your VAC250 utilizes a Dexter axel. You may contact Dexter for a servicing dealer in your area. For more information on your Dexter axel to the Dexter website [www.dexteraxle.com/home](http://www.dexteraxle.com/home). You can find service and maintenance information here.
3. Your VAC250 was supplied with a Kunkle Model 215V vacuum relief valve. Refer to the Kunkle Manual supplied with your VAC250. The pressure setting is preset and locked. Removing the led seal to adjust the pressure will void all warranty. If you have lost this manual and need another copy, you can reprint it from the Hurco Download Center at [www.gethurco.com](http://www.gethurco.com).
4. Primary Shutoff Valve. Check and pressure clean as necessary. This should be checked each time the debris tank is emptied. The Primary Shutoff Valve can be removed from the top of the vacuum debris tank to service and clean as necessary. **DANGER!** Confined



## Service – continued

space will cause suffocation. Use proper procedures for entering any confined space. Only enter the debris tank when necessary for repairs and follow the U.S. Department of Labor guidelines for entering confined spaces.

5. Replacing the Giant Water Pump V-belt.
  - a. Stop engine and remove key before working on any vacuum parts including belts.

### Replacing the Giant Water Pump V-Belt - continued

- b. Remove bolts from belt guard and remove belt guard
- c. Loosen bolts on the base of the pump
- d. Pump will slide enough to remove the belt
- e. Install the new belt
- f. Apply firm pressure by hand; pull the pump towards yourself to put pressure on the belt. The Giant Water Pump does not require excessive belt tension to work properly.
- g. Tighten bolts on pump base
- h. Reinstall belt guard. **DANGER!** Failure to install the belt guard properly we leave belts exposed which can cause serious injury to the operator. Never run the VAC250 without all guards in place.

### 6. Replacing the Gardner Denver Vacuum Pump V-Belt

- a. Stop engine and remove key before working on any vacuum parts including belts.
- b. Remove bolts from belt guard and remove belt guard
- c. Loosen bolts on the base of the pump
- d. Loosen both belt tensioning screws located on the base of the pump
- e. Pump will slide enough to remove the belt
- f. Install the new belt
- g. Tighten both belt tensioning screws evenly until the proper tension is on the v-belt. To determine the proper tension on the v-belt, use your thumb and push down on the v-belt between the two pulleys. The belt should move about 1/4 inch.
- h. Tighten bolts on pump base
- i. Reinstall belt guard. **DANGER!** Failure to install the belt guard properly we leave belts exposed which can cause serious injury to the operator. Never run the VAC250 without all guards in place.

**For service support, contact your local Hurco dealer or call Hurco at 1-800-888-1436 or 605-743-2466.**

## Specifications

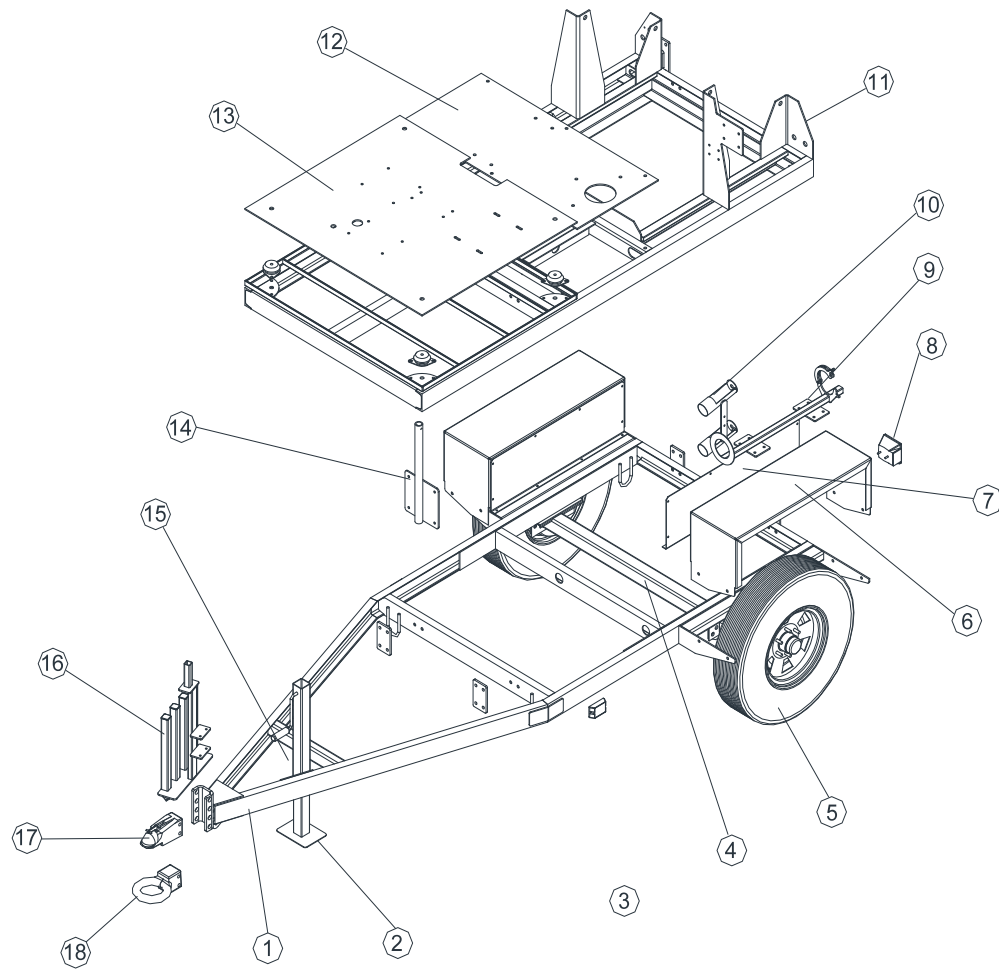
### **Standard Equipment**

- 34 HP V-Twin Kohler (Big Block) Gas Engine
- 450 CFM Gardner Denver Lobe Type Blower @ 14" Hg. Continuous
- 4.7 GPM @ 3000 PSI Water Flow – Giant High Pressure Water Pump
- Cat Pump Pressure Sensitive Regulating Unloader Valve
- Low Water Automatic Pressure Washer Pump Shutdown
- Y-Strainer Water Filter Element
- 95 Gallon Plastic Fresh Water Tank with 1-½" Drain Valve
- 5 Gallon Anti-Freeze Tank With 1" PVC 3-Way Valve
- Large Blower Silencer Muffler For Noise Abatement - 80 db.
- 250 Gallon Spoils Tank With 6" Full Spoils Tank Check Valve And 3" Inlet Gate Valve
- Hydraulic Full Opening Rear Door Cammed Hatch Dogging System and A 3" Drain Gate Valve
- 5 Micron Washable Bag Filtration, Wet Or Dry Vacuum Capability With 3" PVC Drain Valve
- 8 Gallon Fuel Cell (Meets 2012 EPA AND CARB Emissions standards)
- 6000# Torflex Rubber Torsion Axle With Electric Brakes
- (2) ST235/80 R16 Load Range E Tires
- Rear Curbside Aux. Hydraulics – 8 GPM @ 3000 PSI With 15 Gallon Oil Reservoir
- Hydraulic Oil Reservoir With Temperature and oil level gauge
- Lockable Hose Reel With 50' HP Hose & Flexible Spray Wand
- 2" Vacuum Relief Valve
- 2-½" Stainless Steel Vacuum Gauge
- 7000# Trailer Jack, Side Crank
- 12-Volt Battery
- Curbside Controls
- 2-5/16" Ball Hitch. Pintle Hitch Available Upon Request
- 3" X 25' Vac Hose With Ball And Socket Fittings
- Standard Valve Box Cleanout Tool

## Specifications – continued

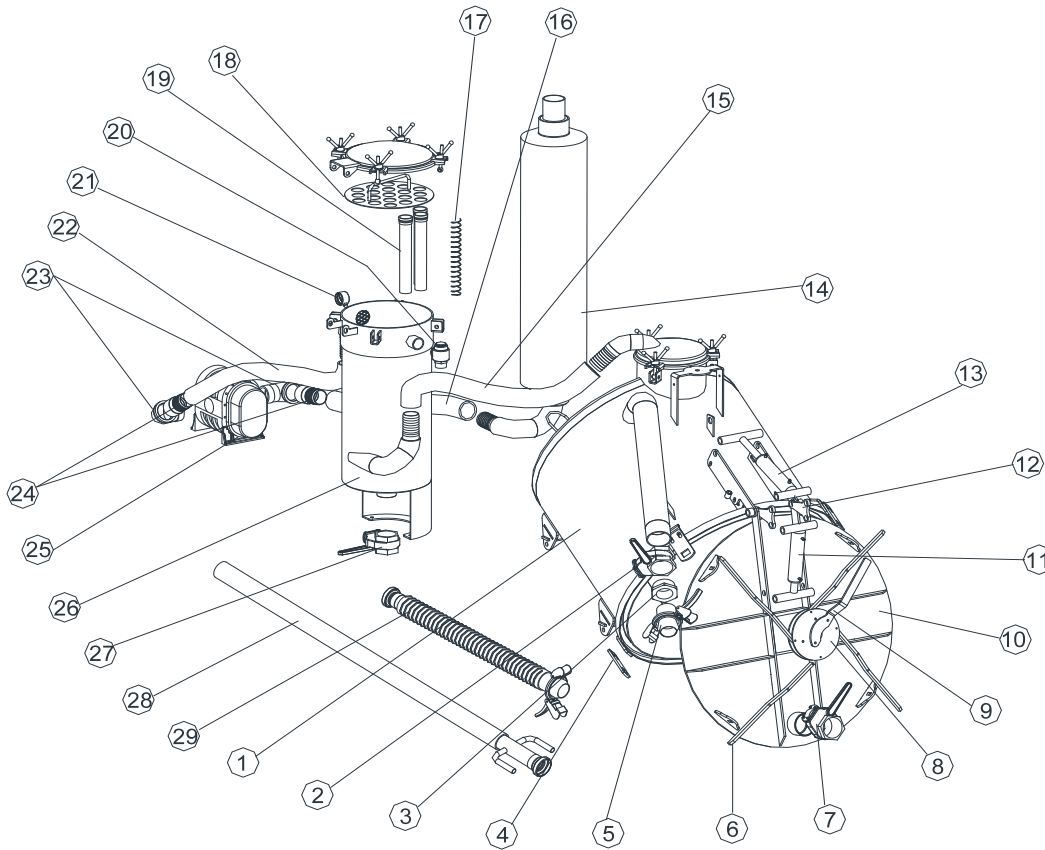
- Strobe & Dual Halogen Work Light Kit
- Skid Mount: Fits In 8' (96") Truck Bed
- Trailer Mount:
  - Width – 6'7" (79")
  - Length – 15' (180")
- Height – Approx. 7'2" (86") - Top of Strobe Light
- Strobe & Dual Halogen Work Light Kit
- Empty Weight - Approximately 3600 lbs
- Debris Tank and Water Tank full - Approximately 6800 lbs

## Trailer Components



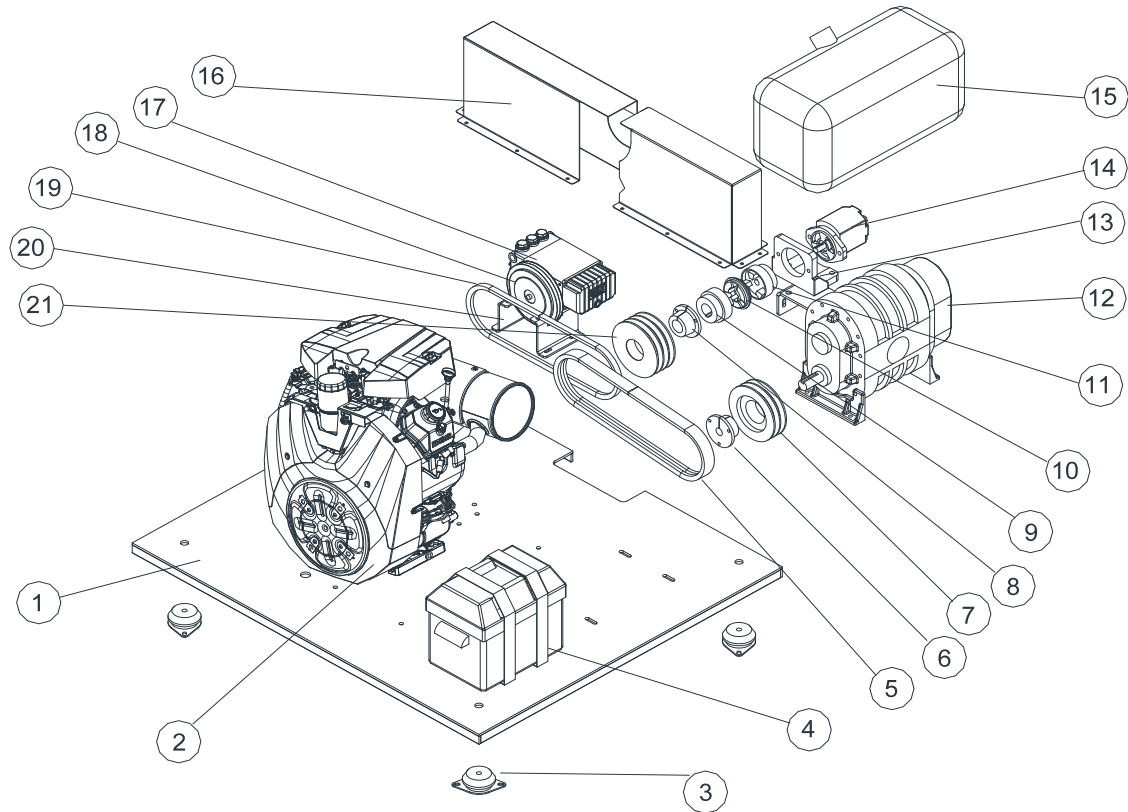
| ITEM | QTY | DESCRIPTION           | PART NO. | ITEM | QTY | DESCRIPTION             | PART NO.  |
|------|-----|-----------------------|----------|------|-----|-------------------------|-----------|
| 1    | 1   | TRAILER FRAME         | 2250-101 | 10   | 1   | SPRAY WAND HOLDER       | 2250-352  |
| 2    | 1   | TUBE JACK 7000#       | 2250-114 | 11   | 1   | SKID FRAME              | 2250-150  |
| 3    | 4   | CONNECTION PLATE      | 2250-151 | 12   | 1   | COMPONENT MNTG PLATE    | 2250-308  |
| 4    | 1   | AXLE 6000 LB          | 2250-111 | 13   | 1   | MOTOR PLATE, VAC250G    | 2250-301  |
| 5    | 2   | TIRE AND RIM R285/16  | 2250-112 | 14   | 1   | SPIN DOCTOR HEAD REST   | 2250-126  |
| 6    | 2   | FENDER                | 2250-102 | 15   | 1   | BREAKAWAY BRAKE CONTROL | 2250-115  |
| 7    | 2   | BACKING PLATE, FENDER | 2250-103 | 16   | 1   | TOOL HOLDER             | 2250-104  |
| 8    | 1   | SQUARE LED LIGHT KIT  | 2250-119 | 17   | 1   | 2 5/16" BALL HITCH      | 2250-113  |
| 9    | 1   | SUCTION WAND HOLDER   | 2250-125 | 18   | 1   | PINTLE HITCH (OPTIONAL) | 2250-113P |

## Vacuum System Components



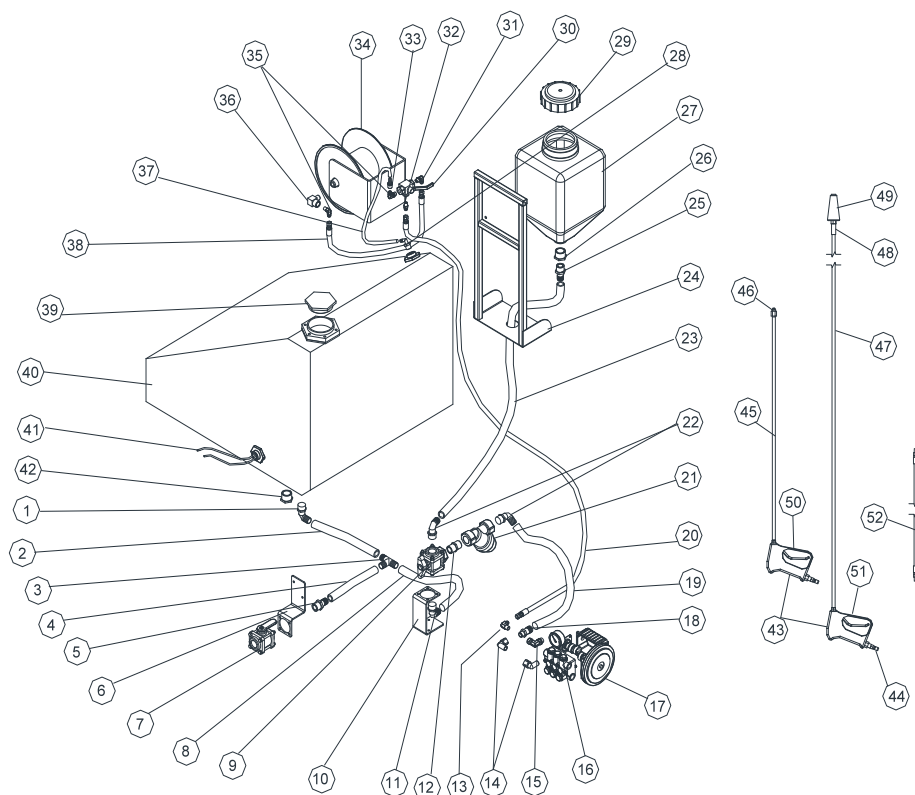
| ITEM | QTY | DESCRIPTION               | PART NO.    | ITEM | QTY | DESCRIPTION               | PART NO.    |
|------|-----|---------------------------|-------------|------|-----|---------------------------|-------------|
| 1    | 1   | DEBRIS TANK, VAC250G      | 2250-202    | 15   | 1   | 3" HD HOSE X 80"          | 2250-228-13 |
| 2    | 1   | 4" BRASS LEVER GATE VALVE | 2250-220    | 16   | 1   | 3" HD HOSE X 16"          | 2250-228-11 |
| 3    | 1   | 4" TO 3" REDUCER          | 2250-235    | 17   | 19  | SPRING, FILTER            | 2250-234    |
| 4    | 4   | DOG LATCH PLATE           | 2250-212    | 18   | 1   | FILTER PANEL, 19          | 2250-205-12 |
| 5    | 1   | 3" QUICK CONNECT W/HANDLE | 2250-229    | 19   | 19  | FILTER, 5 MICRON          | 2250-225    |
| 6    | 4   | LATCH DOG ARM             | 2250-208    | 20   | 1   | VACUUM RELIEF VALVE       | 2250-217    |
| 7    | 1   | 4" BRASS LEVER GATE VALVE | 2250-220    | 21   | 1   | 2 1/2" VACUUM GAUGE       | 2250-216    |
| 8    | 1   | DOG CAM ASSY              | 2250-207    | 22   | 1   | 3" HD HOSE X 45"          | 2250-228-12 |
| 9    | 1   | CAM ASSY HANDLE           | 2250-210    | 23   | 2   | 3" ST. EL.                | 2250-614    |
| 10   | 1   | DEBRIS DOOR               | 2250-201    | 24   | 2   | 3" KING NIP               | 2250-615    |
| 11   | 1   | DOOR CYLINDER             | 2250-510-12 | 25   | 1   | BLOWER                    | 2250-221    |
| 12   | 1   | HYD. CYL. PIVOT PLATE     | 2250-206    | 26   | 1   | FILTER HOUSING            | 2250-205    |
| 13   | 1   | TANK CYLINDER             | 2250-510-11 | 27   | 1   | 3" BRASS LEVER GATE VALVE | 2250-219    |
| 14   | 1   | SILENCER ASSY             | 2250-309    | 28   | 1   | SUCTION WAND ASSY         | 2250-218A   |
|      |     |                           |             | 29   | 1   | SUCTION HOSE ASSY         | 2250-227    |

## Motor Group Components



| ITEM | QTY | DESCRIPTION            | PART NO.    | ITEM | QTY | DESCRIPTION                 | PART NO.    |
|------|-----|------------------------|-------------|------|-----|-----------------------------|-------------|
| 1    | 1   | MOTOR PLATE, VAC250G-H | 2250-301    | 12   | 1   | BLOWER, VAC250G-H           | 2250-221    |
| 2    | 1   | KOHLER 34HP ENGINE     | 2250-311    | 13   | 1   | HYD PUMP MOUNT              | 2250-304-10 |
| 3    | 4   | ANTI-VIBRATION MOUNT   | 2250-326    | 14   | 1   | HYD PUMP                    | 2250-504    |
| 4    | 1   | BATTERY BOX            | 2250-316-11 | 15   | 1   | 8 GALLON FUEL TANK          | 2250-330    |
| 5    | 1   | 2/BX48 BELT, BLOWER    | 2250-324    | 16   | 1   | BELT SHIELD                 | 2250-302    |
| 6    | 1   | 7/8 Q BUSHING          | 2250-321    | 17   | 1   | GIANT PW PUMP               | 2250-361    |
| 7    | 1   | 2 GROOVE SHEAVE        | 2250-320    | 18   | 1   | ELEC. CLUTCH, GIANT PW PUMP | 2250-361-11 |
| 8    | 1   | 1 7/16" BUSHING        | 2250-323    | 19   | 1   | BX44 BELT                   | 2250-325    |
| 9    | 1   | COUPLER, KOHLER ENGINE | 2250-504-12 | 20   | 1   | PUMP MOUNTING BRACKET       | 2250-305    |
| 10   | 1   | COUPLER DAMPER         | 2250-504-13 | 21   | 1   | 3 GROOVE SHEAVE             | 2250-322    |
| 11   | 1   | COUPLER, HYD PUMP      | 2250-504-14 | 22   | 1   | BATTERY GR24 (NOT SHOWN)    | 2250-316    |

## Pressure Washer Circuit

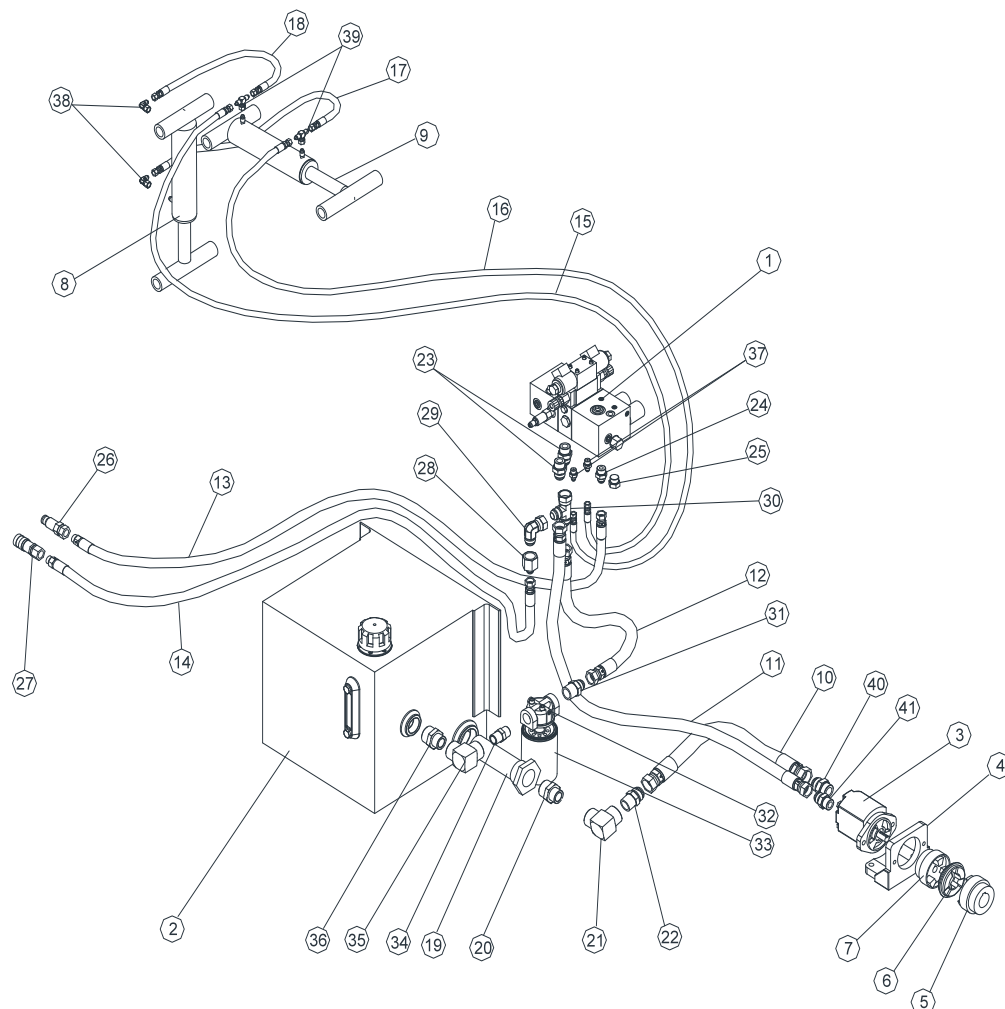


| ITEM | QTY | DESCRIPTION                | PART NO.     |  | ITEM | QTY | DESCRIPTION                     | PART NO.     |
|------|-----|----------------------------|--------------|--|------|-----|---------------------------------|--------------|
| 1    | 1   | ELBOW 16NPT-16NIP          | 2250-372     |  | 27   | 1   | ANTI-FREEZE TANK                | 2250-366     |
| 2    | 1   | HOSE 1" SUCTION X 15"      | 962-265      |  | 28   | 1   | ELBOW 8NPT-6NIP                 | 2250-380     |
| 3    | 1   | TEE 16NIP                  | 2250-373     |  | 29   | 1   | ANTI-FREEZE TANK CAP            | 2250-367     |
| 4    | 1   | HOSE 1" SUCTION X 17"      | 962-266      |  | 30   | 1   | 3-WAY DIVERTER VALVE            | 2250-368     |
| 5    | 1   | FITTING 16NPT-16NIP        | 2250-381     |  | 31   | 1   | FITTING                         | 961-6801-6-6 |
| 6    | 1   | BRACKET                    | 2250-355     |  | 32   | 1   | FITTING                         | 961-6400-6-6 |
| 7    | 1   | BALL VALVE                 | 2250-374     |  | 33   | 1   | FITTING 8NPT-6NIP               | 2250-380     |
| 8    | 1   | HOSE 1" SUCTION X 40"      | 962-264      |  | 34   | 1   | HOSE REEL                       | 2250-365     |
| 9    | 1   | 3-WAY VALVE                | 2250-375     |  | 35   | 2   | FITTING                         | 961-6801-6-6 |
| 10   | 1   | BRACKET                    | 2250-354     |  | 36   | 1   | FITTING ROTATING                | 2104-020-11  |
| 11   | 1   | ELBOW 16NPT-16NIP          | 2250-372     |  | 37   | 1   | HOSE 3/8 X 70" 6FJX-6FJX        | 962-267      |
| 12   | 1   | FITTING 16NPT-16NPT        | 2250-376     |  | 38   | 1   | HOSE 3/8 X 30" 6FJX-6FJX        | 962-257      |
| 13   | 1   | FITTING                    | 961-2501-6-6 |  | 39   | 1   | FILL CAP - 95 GALLON WATER TANK | 2250-364-15  |
| 14   | 2   | ELBOW 8FNPT-8MNPT          | 2250-378     |  | 40   | 1   | 95 GALLON WATER TANK            | 2250-364-11  |
| 15   | 1   | FITTING                    | 961-5502-6-6 |  | 41   | 1   | LOW WATER SENSOR                | 2250-364-11  |
| 16   | 1   | PRESSURE GAUGE             | 2250-363     |  | 42   | 1   | REDUCER 20NPT-16NPT             | 2250-371     |
| 17   | 1   | GIANT PW PUMP              | 2250-361     |  | 43   | 1   | GUN, 4000 PSI                   | 2104-030-14  |
| 18   | 1   | FITTING 8NPT-16NIP         | 2250-379     |  | 44   | 1   | MALE COUPLER                    | 2104-060-11  |
| 19   | 1   | HOSE 1" SUCTION X 14"      | 962-263      |  | 45   | 1   | 36" LANCE                       | 2104-030-12  |
| 20   | 1   | HOSE 3/8" X 100" 6FJX-6FJX | 962-256      |  | 46   | 1   | 1/4" MALE NOZZLE, 40 DEG        | 2104-030-16  |
| 21   | 1   | "Y" STRAINER               | 2250-377     |  | 47   | 1   | 80" LANCE                       | 2104-030-13  |

|    |   |                       |          |  |    |   |                         |             |
|----|---|-----------------------|----------|--|----|---|-------------------------|-------------|
| 22 | 2 | ELBOW 16NPT-16NIP     | 2250-372 |  | 48 | 1 | TURBO FILTER            | 2104-030-15 |
| 23 | 1 | HOSE 1" SUCTION X 96" | 962-262  |  | 49 | 1 | TURBO NOZZLE            | 2104-030-11 |
| 24 | 1 | ANTI-FREEZE MOUNT     | 2250-351 |  | 50 | 1 | 36" WAND COMPLETE       | 2104-030-36 |
| 25 | 1 | FITTING 16NPT-16NIP   | 2250-381 |  | 51 | 1 | 80" TURBO WAND COMPLETE | 2104-030    |
| 26 | 1 | REDUCER 20NPT-16NPT   | 2250-371 |  |    |   |                         |             |



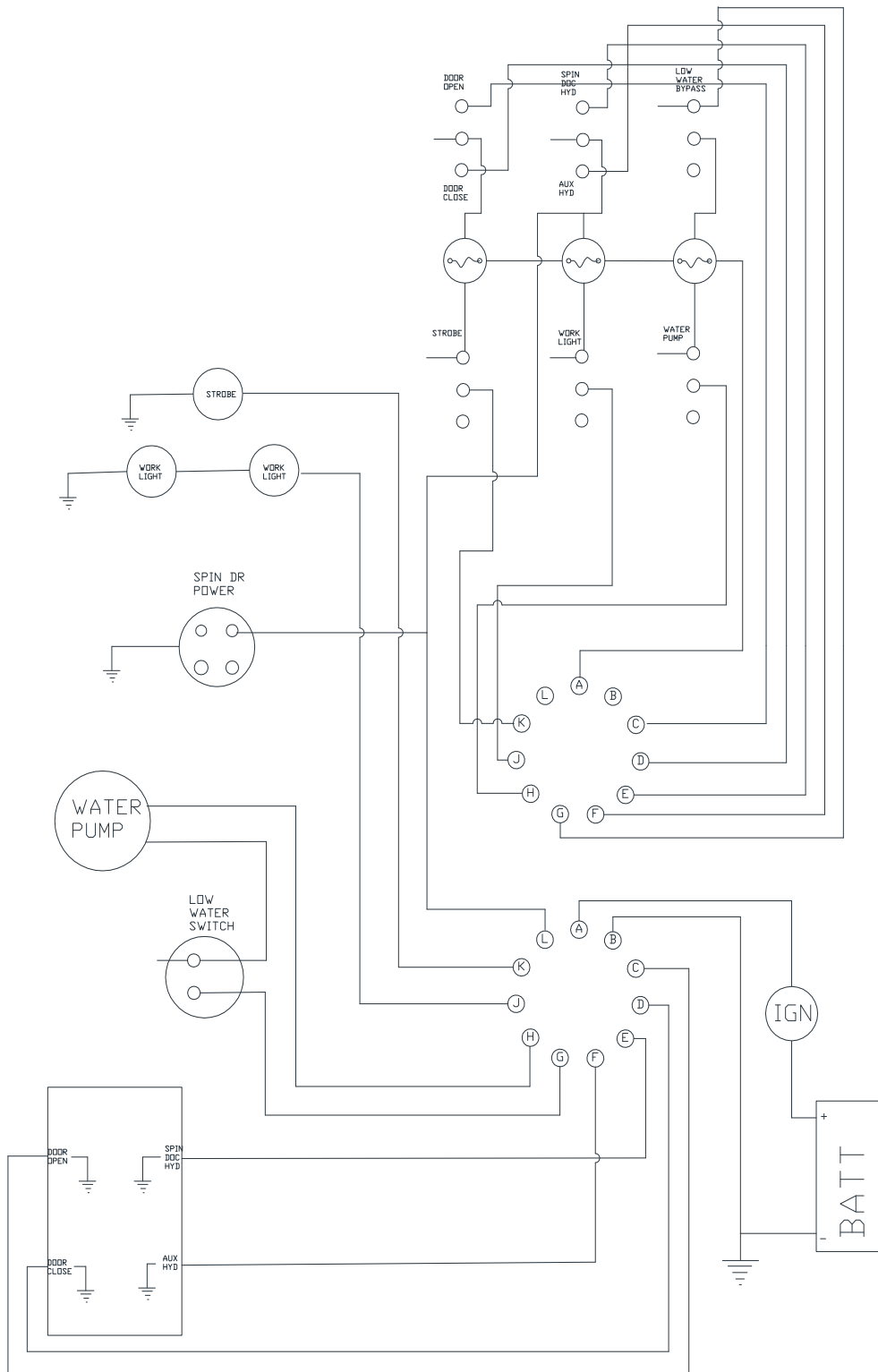
## Hydraulics Parts Breakdown



| ITEM | QTY | DESCRIPTION                       | PART NO.    | ITEM | QTY | DESCRIPTION               | PART NO.          |
|------|-----|-----------------------------------|-------------|------|-----|---------------------------|-------------------|
| 1    | 1   | HYDRAULIC VALVE BLOCK             | 2250-503    | 22   | 1   | FITTING 12MJ-16MP         | 961-2404-12-16    |
| 2    | 1   | HYDRAULIC TANK - 15 GAL.          | 2250-507    | 23   | 2   | FITTING 12MJ-12 MORB      | 961-6400-12-12    |
| 3    | 1   | HYDRAULIC PUMP                    | 2250-504    | 24   | 1   | FITTING 8MJ-10MORB        | 961-6400-8-10     |
| 4    | 1   | PUMP MOUNT BRACKET                | 2250-504-11 | 25   | 1   | PLUG 10MORB               | 961-6408-10       |
| 5    | 1   | COUPLER, MOTOR, 34 HP KOHLER      | 2250-504-12 | 26   | 1   | FLAT FACE COUPLER, MALE   | 961-FEM502-8FP    |
| 6    | 1   | COUPLER DAMPER                    | 2250-504-13 | 27   | 1   | FLAT FACE COUPLER, FEMALE | 961-FEM501-8FP    |
| 7    | 1   | COUPLER, PUMP                     | 2250-504-14 | 28   | 1   | REDUCER 12FJ-8MJ          | 961-2406-12-8     |
| 8    | 1   | DOOR CYLINDER                     | 2250-509    | 29   | 1   | FITTING 8MJ-8FJX-90       | 961-6500-8-8      |
| 9    | 1   | TANK CYLINDER                     | 2250-510    | 30   | 1   | TEE 12MJ-12FJX-12MJ       | 961-6602-12-12-12 |
| 10   | 1   | SUCTION HOSE - 19"                | 962-258     | 31   | 1   | FITTING 12MJ-16MP         | 961-2404-12-16    |
| 11   | 1   | PRESSURE HOSE - 17"               | 962-259     | 32   | 1   | IN-LINE FILTER HOUSING    | 2250-508-11       |
| 12   | 1   | RETURN HOSE - 15"                 | 962-260     | 33   | 1   | SPIN ON FILTER, 10 MICRON | 2250-508-12       |
| 13   | 1   | PRESSURE HOSE, SPIN DOCTOR - 105" | 962-253     | 34   | 1   | FITTING 16MP-16MP         | 961-5404-16-16    |
| 14   | 1   | RETURN HOSE, SPIN DOCTOR -        | 962-253     | 35   | 1   | FITTING 16FP-16FP-90      | 961-5504-16-16    |

|    |   |                                 |                |  |    |   |                                    |
|----|---|---------------------------------|----------------|--|----|---|------------------------------------|
|    |   | 105"                            |                |  |    |   |                                    |
| 15 | 1 | CYLINDER HOSE, BUTT END - 175"  | 962-254        |  | 36 | 1 | FITTING 20MP-16MP 961-5404-20-16   |
| 16 | 1 | CYLINDER HOSE, GLAND END - 175" | 962-254        |  | 37 | 2 | FITTING 4MJ-6MORB 961-6400-4-6     |
| 17 | 1 | CYLINDER HOSE - 30"             | 962-255        |  | 38 | 2 | FITTING 4MJ-6FJX 961-6500-4-6      |
| 18 | 1 | CYLINDER HOSE - 30"             | 962-255        |  | 39 | 2 | TEE 4MJ-4MJ-6FJX 961-6600-4-4-6    |
| 19 | 1 | SUCTION SCREEN                  | 2250-507-11    |  | 40 | 1 | FITTING 16MJ-16MORB 961-6400-16-16 |
| 20 | 1 | FITTING 20MP-16MP               | 961-5404-20-16 |  | 41 | 1 | FITTING 12MJ-16MORB 961-6400-12-16 |
| 21 | 1 | FITTING 16FP-16FP-90            | 961-5504-16-16 |  |    |   |                                    |

## Electrical Schematic



## Warranty

### Things Excluded From Warranty

Hurco is not responsible for claims related to the following:

- Defacing: scratches, dents, tears, chips and defacing any surface not caused by Hurco.
- Routine Maintenance.
- Damage from unauthorized repairs, abuse, misuse or neglect.
- Damage caused from improper hitch or tow vehicle hook-up.
- Damage caused by an accident.
- Damage due to unsuitable storage.
- Natural calamities
- Vandalism
- Installation of parts or alterations not approved by Hurco.
- Component parts covered by separate Supplier Warranty such as the warranties of:
  - Tires, axles, jacks, couplers, light fixtures, engine, battery, vacuum pump, water pressure pump and hydraulic components.
- Wear items such as:
  - Tires, brake pads, bearings, belts, bushings, clutches, clutch components, suction hose, suction wands, pressure hose, primary and scrubber filters, dry pre-filter element, vacuum relief valve, high pressure water pump, high pressure water guns, regulating un-loader valve, high pressure water nozzle, shut-off guns, oil filters, fuel filters, screens, ball valves and gauges.
- Any machines where identification numbers have been altered or tampered with or the hour meter has been altered or tampered with.
- Damage caused by improper use as outlined in the owner's manual.
- Any transportation costs not previously approved by Hurco.
- Any travel time to do repairs on the customer jobsite or facility unless the machine is incapable of being pulled to the servicing dealer.

### Hurco's Obligation – How to get warranty service

Hurco shall elect to remedy defects in materials and workmanship caused by repair, replacement or refund, if replacement or repair is not possible. All defective products shall be delivered to Hurco's address in Harrisburg, South Dakota unless prior written approval is obtained from Hurco. Hurco may, as its option, select another qualified location for the repair to be completed. Hurco will not be obligated, in any way, to pay for any repairs made without its specific approval. All costs incurred in shipping or delivering the products for warranty service shall be borne by the purchaser. Hurco shall remedy defect within a reasonable time, not to exceed sixty (60) days after delivery by purchaser.

### Purchaser's Obligations

Purchaser must notify Hurco, at their address in Harrisburg, South Dakota, of any defect within fifteen (15) days after it is, or should have been discovered.

## Warranty Information - continued

### Parts Warranty

Parts replaced in the warranty period will receive the balance of the first year warranty on that replaced part. For example, if you have 3 months left on your new equipment warranty, then you have 3 months warranty on the replaced part. Replacement parts after the original equipment warranty are warranted to be free from defects of material for thirty (30) days or the part will be repaired or replaced, without labor coverage for removal and installation. All parts warranty claims must be filed within ten (10) days of initial part failure or the warranty claim will be void.

### Exclusions of Warranties

**THERE IS NO OTHER EXPRESS WARRANTY OR IMPLIED WARRANTIES. THIS WARRANTY IS LIMITED TO A PERIOD OF ONE YEAR FROM THE DATE OF PURCHASE AND TO THE EXTENT PERMITTED BY APPLICABLE LAW, ANY AND ALL IMPLIED WARRANTIES, INCLUDING THOSE PERMITTED BY LAW. IN NO EVENT SHALL WARRANTOR BE LIABLE FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES RESULTING FROM ANY DEFECT IN THE GOODS, TO THE EXTENT SUCH AVOIDANCE IS PERMITTED BY APPLICABLE LAW.**

## Service Record

[illegible]

## Service Record

[illegible]

## Notes

[illegible]



## Available Manuals Index

### Component Manufacturers Manuals

### And National Highway Traffic Safety Administration Docs

The following manuals were included with your VAC250 on delivery. You may also obtain copies by downloading them at the Download Center at Hurco website. [www.gethurco.com](http://www.gethurco.com)  
Click on any manual below to download.

- 1. Kohler Command PRO Gas Engine CH940 – CH1000 – Owners Manual**
- 2. CAT Diesel Engine C1.6 – Owners Manual**
- 3. CAT Diesel Engine C1.6 - Specifications**
- 4. LOFA – EP250 G1 - Owners Manual**
- 5. LOFA – EP250 G1 - Specifications**
- 6. Gardner Denver Legend “R” – GACLDRA – Owners Manual**
- 7. Gardner Denver AEON Synthetic Lubricants – Technical Data Sheet**
- 8. Giant Industries P300 Series -Owners Manual**
- 9. Kunkle Model 215V – Owners Manual**
- 10. Kunkle Model 215V - Specifications**
- 11. Hopkins Towing Solutions “The Engager” – Information Sheet**
- 12. NHTSA “Towing a Trailer” – Information Sheet**
- 13. NHTSA “Tire Safety” – Information Sheet**



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