

Gilson Testing Screen TS-4



Rev: 05/2023

Table of Contents

Safety

Important Safety Instructions	3
General Safety Warnings	3
Testing Screen Safety Warnings	3
Electrical Safety	4

Specifications

TS-4 Specifications	4
---------------------------	---

Uncrating

Uncrating Procedure	4
Site Considerations	5
Anchoring to Concrete Floors	5
Weight Load	5
Machine Elevation	5
Space Allocation	5
Physical Environment	5
Electrical Installation	5

Installation

Anchor bolt mounting	6
Level the Vibrating Unit Assembly	7
Hydraulic System Check	7
Verify Power Requirements	7

Operation

Component Location	8
Power Switch	8
Timer Controls	8
Load the Screen Trays	9

Sample Capacity

Coarse Aggregates	9
Fine Aggregates	10

Maintenance

Lubrication	10
Removal of Top and Side/Back Covers	11
Drive Assembly	11
Adjust or Replace the V-belt	11
Connecting Rod Assembly	12
Hydraulic Clamping System	12

Hydraulic Pump

Hydraulic Clamp Rod Assembly	17
Wire Cloth and Screen Trays	17
Screen Trays	17

Troubleshooting

Noisy Operation	18
Testing Screen Shuts Off	18
Shifting of Materials	18
Sluggish Start-Up or Operation	18

Parts

Clamp Rod Assembly	20
Hydraulic Hoses and Fittings	20
Hydraulic Pump	21
Corner Spring Assembly	23
Driving Parts	24
Frame, Covers, and Motor	25

Schematics

Wiring Diagram	26
----------------------	----

SAFETY

Important Safety Instructions

The buyer is responsible for ensuring that users are properly trained, that they are aware of all the information and instructions in this document, and that they are aware of the potential risks of operating the machine. The manufacturer will not be held responsible for any damage to people and/or property caused by non-compliance with any instructions in this manual.

⚠ WARNING: Read all safety warning and instructions. Failure to follow the warnings and instructions may result in electric shock, fire, and/or serious injury. Keep these instructions for later use.

The purpose of safety symbols is to attract your attention to possible dangers. The safety symbols, and their explanations, deserve your careful attention and understanding. The safety warnings DO NOT by themselves eliminate any danger. The instructions or warnings they give are not substitutes for proper accident prevention measures.

⚠ DANGER: Signals an EXTREME hazard. Failure to obey a safety DANGER symbol WILL result in serious injury or death to yourself or to others.

⚠ WARNING: Signals a SERIOUS hazard. Failure to obey a safety WARNING symbol CAN result in serious injury to yourself or to others.

⚠ CAUTION: Signals a MODERATE hazard. Failure to obey a safety CAUTION symbol MAY result in property damage or injury to yourself or to others.

Note: Advises you of information or instructions vital to the operation or maintenance of the equipment.

General Safety Warnings

⚠ WARNING: Do not perform tasks on the machine other than those for which it was designed. Only use the machine in the manner in which it was intended, as described in this instruction manual.

- Keep work area clean and well lit.
- Keep children and bystanders away while operating the machine.

Testing Screen Safety Warnings

⚠ DANGER: The Testing Screen is NOT explosion-proof or approved for operation in hazardous locations. Only operate the testing screen in a properly ventilated area. DO NOT operate in explosive or hazardous atmospheres, such as in the presence of flammable liquids, gases or dust.

- The Testing Screen is NOT counterbalanced. It must be adequately mounted to a substantial, rigid foundation to prevent excessive vibration. A poured concrete floor is recommended.
- Level the Testing Screen before operation.

During Operation

- Dress properly. DO NOT wear loose clothing or jewelry. Keep your hair, clothing and gloves away from moving parts. Secure hair above shoulder level. Loose clothes, jewelry or long hair can be caught in moving parts.
- DO NOT operate the machine without all guards and covers in place.
- Keep all body parts away from moving parts of the machine while it is in operation.
- Wear approved NIOSH/ MSHA respirator as required by the sample to prevent inhaling any dust which may be considered hazardous.
- Wear safety glasses or goggles that meet current ANSI / ISEA Z87.1 standards and are marked as such.
- Wear ear/hearing protection when operating this machine.
- If the machine starts to vibrate abnormally, stop the machine immediately. Inspect the machine for the cause of the vibration.

Electrical Safety

⚠ DANGER: Electric Shock Hazard. Touching some of the internal components can cause serious personal injury or death. Disconnect the power supply before removing covers or performing maintenance on the machine.

⚠ WARNING: Electric Shock Hazard. Improper use of the grounding can result in electric shock. Do not plug the machine into an outlet until it is properly installed and grounded.

⚠ WARNING: The supply voltage must correspond to that stated on the identification plate and in the technical specifications. NEVER use any other type of power supply.

⚠ WARNING: Remove plug from the mains immediately if the cable is damaged or cut.

- This machine must be grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This machine is equipped with a cord having a grounding wire with a grounding plug. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.
- Do not modify the plug provided with the machine: if it will not fit the outlet, have a proper outlet installed by a qualified electrician.
- Consult a qualified electrician or service technician if the grounding instructions are not completely understood, or if doubt exists as to whether the machine is properly grounded.
- If it is necessary to use an extension cord, use only a 3-wire extension cord that has a 3-blade grounded plug, and 3-slot receptacle that will accept the plug on the machine. The marked rating of the extension cord shall be equal to or greater than the electrical rating of the machine.
- Make sure that the power cord does not come into contact with hot objects, wet or oiled surfaces, and/or sharp edges.
- The power cord should be checked regularly and before each use to check for signs of damage or wear. If the power cord is worn or damaged, replace the cord.
- Do not use the power cord to remove the plug from the socket or move the machine.

SAVE THESE INSTRUCTIONS

SPECIFICATIONS

TS-4 Specifications

Electrical	115V/60Hz/9.2A
Electrical (F Model).....	230V/50Hz/4.7A
Motor type.....	Universal Motor
No load speed	1725 RPM
Max. ambient operating temperature.....	104° F (40°C)
Hydraulic oil	Shell Tellus 25 or Mobil AW 32
Estimated Shipping Weight	520lb (235kg)

UNCRATING

Uncrating Procedure

IMPORTANT: Save all packing materials until inspection is complete.

Check the Testing Screen for damage immediately upon receipt. Examine the shipping carton before uncrating, then inspect the machine and trays before removal from the skid.

Pay particular attention to the covers on top of the Testing Screen. If any damage is noted, STOP HERE and notify the freight carrier to request an inspection. This inspection must include a check for internal damage to motor, drive, and clamping mechanisms. Follow the procedures in Maintenance section on to remove and reinstall the covers.

⚠ DANGER: You must use lifting equipment to lift and install this machine. Inspect all lifting equipment to make sure it is in working order and rated for the load before attempting to lift. Ignoring this warning may lead to serious personal injury or death.

1. Lift the carton off the Testing Screen. Set it aside in case you need to return the machine because of shipping damage.
2. Locate the voltage label on the back of the Testing Screen. Make sure that the machine is wired as ordered.
3. Remove the five screws that secure the external pump cover to the top (Fig. 3). Lift the cover off and look for oil leaks. Report any leaks found to Gilson. If none, reinstall the cover and proceed.
4. Using proper lifting equipment, lift the machine about 6in off the floor. Securely block up the machine so that the skid can be safely removed. Remove the skid, then set the machine in place on the floor.
5. Inspect the machine to make sure all fasteners are tightened securely.

Site Considerations

The Gilson Testing Screen is a ruggedly-constructed machine that will provide years of service if installed correctly and maintained properly. Most cases of poor operation are caused by faulty installation. Problems can be avoided by careful planning before placing the machine into service.

Anchoring to Concrete Floors

Gilson recommends using lag shield anchors with lag screws to anchor the machine to a poured concrete floor (Fig. 1). However, anytime local codes apply, you **MUST** follow the anchoring methodology specified by the code.

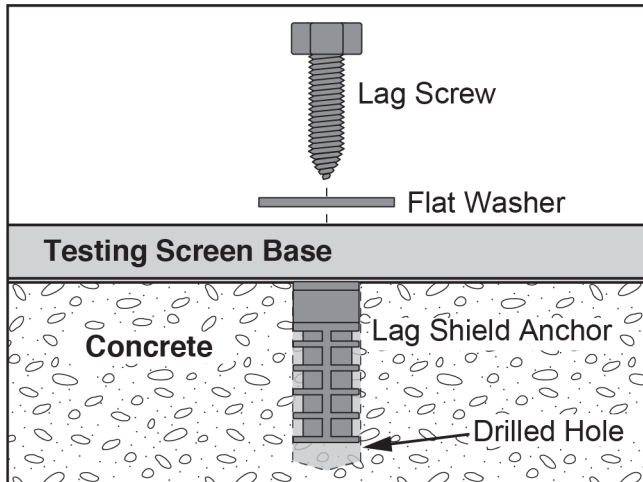


Figure 1: Concrete anchoring

Weight Load

Note: Install the machine on a level, rigid foundation.

Gilson recommends a poured concrete floor.

Make sure that the surface where the machine is placed will bear the weight of the machine and the weight of the testing materials. Additionally, consider the weight of the operator and any dynamic loading that may occur when operating the machine.

Machine Elevation

An elevated foundation for the machine allows for easier tray handling. However, this also elevates the loading area.

Space Allocation

Provide enough space around the machine for adequate operator material handling, the installation/removal of the screen trays, and maintenance on the machine.

Physical Environment

The physical environment where the machine is operated is important for safe operation and longevity of machine components. For best results, operate this machine in a dry environment that is free from excessive moisture, hazardous or explosive atmospheres, or extreme conditions. Consider the noise and dust created by the machine and ensure that there is adequate ventilation for safe operation.

Extreme conditions for this type of machinery are generally those where the ambient temperature range exceeds 104°F (40°C) or the relative humidity range exceeds 20%–95% (non-condensing).

Electrical Installation

Place this machine near an existing power source. Make sure all power cords are protected from traffic, material handling, moisture, chemicals, or other hazards. Make sure to leave enough space around machine to disconnect the power supply or apply a lockout/tagout device, if required.

INSTALLATION

⚠ WARNING: Read all safety warning and instructions before installation. Failure to follow the warnings and instructions may result in electric shock, fire, and/or serious injury.

⚠ CAUTION: DO NOT connect the Testing Screen to an electrical power source until you have mounted the machine to its intended foundation, verified that the machine is wired as ordered and is appropriate for your power source.

⚠ DANGER: You must use lifting equipment to lift and install this machine. Inspect all lifting equipment to make sure it is in working order and rated for the load before attempting to lift. Ignoring this warning may lead to serious personal injury or death.

Note: 230V/50Hz models are shipped without a power plug.

Lag screw mounting

Mounting hardware is not provided. These additional items are required for proper lag screw installation on a poured concrete floor:

Hardware	Quantity
0.5in lag screws	4
0.5in lag shield anchor	4
Metal shims	Varies

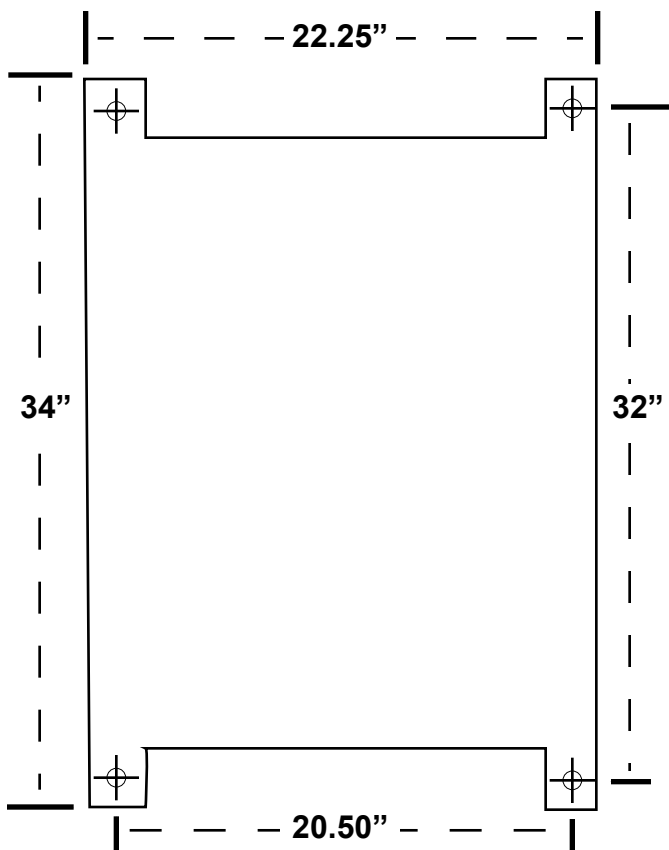


Figure 2: Mounting template

Procedure

1. Place the unit in the desired location. Mark the floor in the center of the mounting feet.
2. Using lifting equipment, move the unit.
3. Confirm marked mounting location matches the mounting template (Fig. 2).
4. Install the lag screw shield anchors in the marked locations.
5. Using lifting equipment, return the unit to the mounting location.
6. Place a flat washer on the lag bolts and install the lag screws in the mounting anchors. Do not fully tighten the screws.
7. Initially level the units' outer case, both front-to-back and side-to-side. Do this by placing and/or removing metal shims under the feet until the top of the unit is level along all four edges.

Note: The Testing Screen must be level for proper test results and best operation of the machine.

8. Tighten the lag bolts equally on all four mounting feet, making sure the unit's case remains level.

Anchor bolt mounting

Mounting hardware is not provided. These additional items are required for proper anchor bolt installation on a poured concrete floor:

Hardware	Quantity
0.5in anchor bolts	4
0.5in lock nuts	4
Metal shims	Varies

Procedure

1. Place the unit in the desired location. Mark the floor in the center of the mounting feet.
2. Using lifting equipment, move the unit.
3. Confirm marked mounting location matches the mounting template (Fig. 2).
4. Install the anchor bolts in the marked locations, leaving 1.5in of thread exposed to allow for the mounting feet, shims, and nuts.
5. Using lifting equipment, place the unit on the anchor bolts, so that the threads extend through the holes in the mounting feet.

Place mounting nuts on the anchor bolts to protect the threads while leveling. Use lock nuts or other appropriate locking fastener.

Initially level the units' outer case, both front-to-back and side-to-side. Do this by placing and/or removing metal shims under the feet until the top of the unit is level along all four edges.

The Testing Screen must be level for proper test results and best operation of the machine.

Tighten the mounting nuts equally on all four mounting feet, making sure the unit's case remains level.

Level the Vibrating Unit Assembly

1. Release the clamping force by pulling the handle on the hydraulic pump all the way toward the front of the machine to release hydraulic clamping force. Remove the screen trays if present.
2. Insert a screen tray into the third screen tray position from the top of Vibrating Unit Assembly, leaving 1/3 of its length extended out of the front of the machine.
3. Apply clamping force to hold the screen tray that extends from the front of the Testing Screen by applying short strokes to the hydraulic pump handle.
4. Place a level on the protruding screen tray then re-level the Testing Screen by adding or removing shims until the Vibrating Unit Assembly and screen tray are level side-to-side and front-to-back. Give mounting nuts a final tightening.
5. Release clamping pressure and put desired screen trays into the machine.

Hydraulic System Check

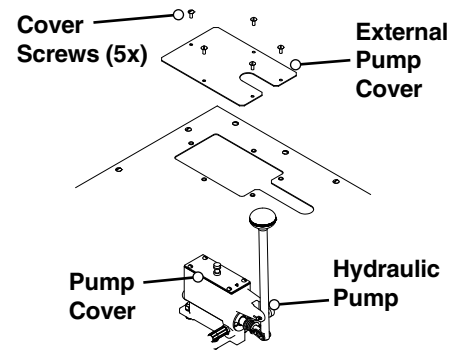


Figure 3: Hydraulic pump access

1. Remove the five screws that secure the external pump cover to the top, then lift the cover off (Fig. 3).
2. Observe the position of the internal pump cover before you remove it. Its vent is slightly closer to the front (handle) end of the pump than to the back. Gilson recommends using a marker or other means to mark the operator side of the cover to ensure correct orientation during reassembly.
3. Check the oil level in the pump. It should be 1/4in from the top of the reservoir. If not, refer Draining/Refilling the Hydraulic System. Reinstall the external pump cover.

Verify Power Requirements

Verify that the Testing Screen is wired as ordered and appropriate for your power source.

Standard Testing Screens are driven by a 115V/60Hz, 1/2hp electric motor requiring 12-15 amps to operate. A dedicated 20 amp circuit is recommended. Machines with model numbers ending in "F" are configured to operate on 230V/50Hz.

- Locate the voltage label on the back of the Testing Screen, and check to be sure that the machine is wired as ordered.
- Make sure your electrical power source is of a like configuration.
- Make sure the Testing Screen and your electrical power source are properly grounded.

OPERATION

⚠ WARNING: Read and understand **ALL** of the safety and operating instructions and sample capacity information in this manual before operating the Testing Screen.

These instructions cover operation of the Testing Screen, not the performance of any test.

Component Location

The TS-4 features a fully-enclosed, sound-damped structure and digital LED timer (Fig. 4). The lid and door seals prevent operation dust from escaping the unit. The lid has integrated magnets on both sides to ensure a seal during the screening process and prevent closure while loading.



Figure 4: Component location

Power Switch

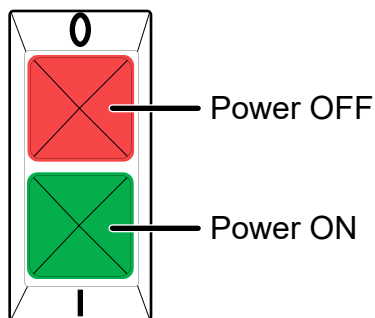


Figure 5: Power Switch

The Testing Screen power switch is located on the right, vertical surface of the top cover (Fig. 5). Turn the machine ON by pushing the green Power ON button. Turn the machine OFF by pushing the red Power OFF button.

Circuit Breaker Reset

If the Testing Screen or the motor is overloaded, a circuit breaker in the power switch could disconnect the power. If the machine stops in the middle of a test, check the switch. If the red Power OFF button is halfway out, the circuit breaker has tripped. Determine the cause of the overload and correct it. To restart, push the red Power OFF button all the way in, and then push the green Power ON button.

Timer Controls

The digital timer determines testing duration and is used to start and stop machine operation.

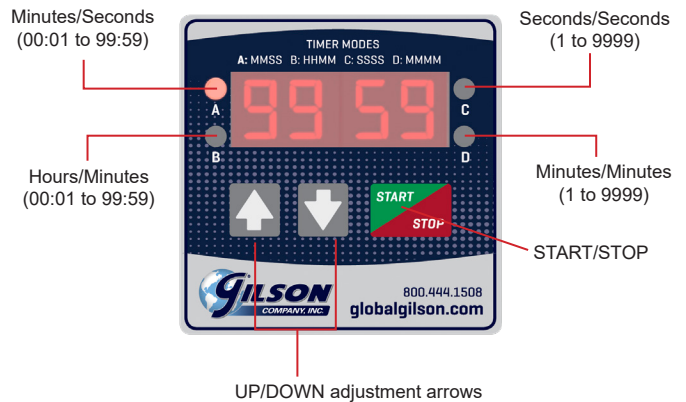


Figure 6: Timer controls

Set Timer Mode

Connect the TS-4 to a properly grounded power source and push the green Power ON button. Push and hold both UP/DOWN arrows until a timer mode is displayed (Fig. 6). Push the UP or DOWN arrow until the desired mode is selected. Push the START/STOP button to accept.

Set Run Time

Push the UP or DOWN arrow. The first digit will flash. Push the UP or DOWN arrow to adjust. Push the START/STOP button to accept and move to the next digit. Repeat until all four digits have been set. Push the START/STOP button to accept.

The timer will reset to the last programmed run time when the power is shut off.

Load the Screen Trays

⚠ WARNING: DO NOT wear loose clothing which can get caught on the clamp rods.

⚠ WARNING: Make sure that the Power is OFF by pushing the red Power OFF button.

1. Release the clamping force of the Vibrating Unit Assembly by pulling the hydraulic pump handle all the way toward the front of the machine.
2. Open the front door. Load your desired sequence of screen trays into your Testing Screen, being careful not to pinch your fingers with already inserted screen trays. Apply clamping force on the trays by applying short strokes to the hydraulic pump handle. The hydraulic system will apply tension on both sides of the Vibrating Unit Assembly.
3. Close the front door. Make sure the latch is firmly in place.

Load the Sample

Open the lid until the magnets secure it to the top cover. Fully close the lid after loading the sample.

Run the Test

1. Plug the three-pronged plug into a properly-grounded power source or otherwise properly ground your Testing Screen.
2. Push the green Power ON button.
3. Set the desired timer mode and run time.
4. Push the START/STOP button on the timer to start the test. The machine will stop after the programmed time has elapsed.

Note: While in operation, push the START/STOP button to pause the test.

5. Upon completion of the test, turn off the Testing Screen by pushing the red Power OFF button. Unload the various screen trays and dust pan.

Note: Loaded screen trays are not as light as they may appear. Use common sense and proper equipment.

6. Unless you plan to continue operating the Testing Screen, unplug or disconnect it to eliminate a tripping hazard and reduce electrical hazards.

SAMPLE CAPACITY

Coarse Aggregates

The quantity of sample to be loaded is established by test specifications and depends greatly on the type of material and its particle size range.

The ASTM C 136 specification for "Sieve or Screen Analysis of Fine and Coarse Aggregates" calls for maximum screen loadings for 14-3/4 x 22-3/4in (375x578mm) clear screen areas as follows:

ASTM C136 SAMPLE SIZES

Nominal Max. Size of Particle, in (mm)		Max. Screen Loadings, lb (kg)	
No.4	(4.75mm)	5.7	(2.6)
3/8in	(9.5 mm)	11.2	(5.1)
1/2in	(12.5 mm)	14.8	(6.7)
3/4in	(19.0 mm)	22.5	(10.2)
1.0in	(25.0 mm)	29.8	(13.5)
1.5in	(37.5 mm)	44.5	(20.2)
2.0in	(50.0 mm)	59.5	(27.0)
2.5in	(63.0 mm)	75.0	(34.0)
3.0in	(75.0 mm)	89.3	(40.5)
3.5in	(90.0 mm)	106.9	(48.5)
4.0in	(100.0 mm)	118.8	(53.9)
5.0in	(125.0 mm)	148.6	(67.4)

Maximum screen loading for materials denser than limestone aggregates should be adjusted accordingly. Samples can be run in two or more batches if necessary. The capacity of the screen for a given sample is determined by the sample in the tray with the maximum load. A coarse series size tray at completion of sieving should carry a load limit equal to the amount of material needed for one layer of particles over the wire cloth area.

If all tray slots are required for a test, an intermediate tray may be used to relieve loading on a critical tray and allow the use of a larger test sample. Capacity is a function of volume. Materials such as lightweight aggregate or coal must be tested in somewhat larger amounts by weight.

Many light materials are also soft. Their test times should be limited to avoid degradation of the sample. If you get poor separation or loss of material from the trays should first check the amount of sample on the individual screen tray and adjust the sample size accordingly. Diagnosis should then proceed to checking for proper leveling and looking for worn, broken or out-of-adjustment components as described in the Maintenance section on page 10.

Remember that the ASTM minimum sample weights are for representative samples. Initial sampling should always be done by taking a much larger amount from several areas in a storage bin or stockpile, then combining and reducing the amount to a manageable size by splitting. Gilson Sample Splitters are ideal for this purpose.

Fine Aggregates

The Testing Screen is designed primarily for operation in the coarse size range of 4in to No.4. Separation of finer materials is less efficient and fine particles may become trapped behind side liners of trays causing test errors.

For separations of fine aggregates from No.8 through No.200, loading at completion of sieving should be limited to the ASTM C 136 level of 4g per square inch of sieving surface, assuming a material about the density of sand. This is equivalent to loading 1,350g (3lb) per tray and will result in machine capacity in the fine aggregate range of under 20lb per test unless sizes are evenly distributed among the trays.

Somewhat larger amounts of material may be loaded if the Testing Screen is used for mass separation rather than for testing. Sharpness of separation will decrease as loading is increased, and overloads can cause damage to valuable wire cloth.

For applications where test materials are limited to fine series sizes, or where special screening problems exist because of softness or density, the Testing Screen may be factory-equipped with a Speed Variation Accessory.

A low-amplitude eccentric shaft is also available and recommended when working exclusively with friable materials.

The capacity of the Gilson Testing Screen is suitable for most laboratory test sizing work. For field laboratories where mobility is important, Gilson offers a Porta-Screen®.

For large-scale mass separation jobs involving hundreds of pounds of material, and for automated testing, use the Gilso-Matic® Screening Assemblies. See the Gilson Catalog for further information.

MAINTENANCE

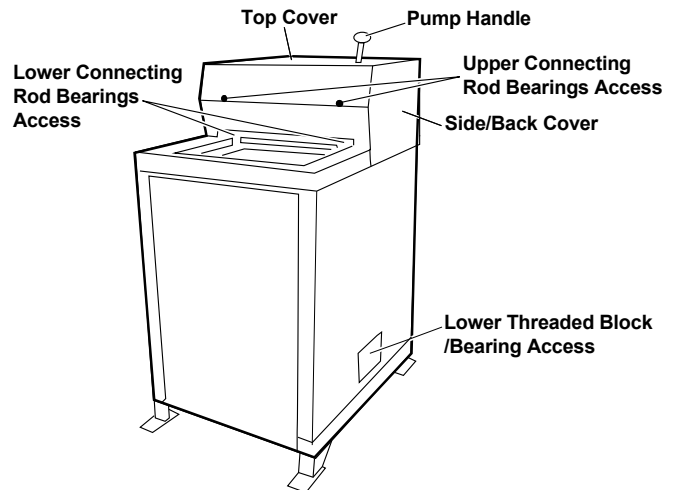


Figure 7: Lubrication access

Note: The person performing maintenance and/or repairs on the Testing Screen is responsible for safety and is required to read and understand the safety instructions in this manual before performing work.

All shields, guards and other safety devices must be properly replaced and secured upon completion of work. Only parts supplied and/or approved by Gilson are acceptable for use on the machine.

Lubrication

▲ WARNING: Disconnect power supply before servicing or cleaning.

Most sample dusts are abrasive by nature. Daily lubrication and cleaning of the Testing Screen takes only a few minutes, and will greatly extend its service life and reduce down time.

Each Testing Screen is fully lubricated and test-run by the manufacturer before it is shipped. However, periodic lubrication is required.

Use a high-quality grease to lubricate the parts listed below. Wipe away excess grease and dirt from around parts after lubrication.

Wrist Pin Assemblies

At least daily, lubricate the wrist pin assemblies at the lower ends of the connecting rods (Fig. 7).

Access: Slot under front of top cover.

Lubricate the following parts on a regular basis, but not as often as the wrist pin assemblies:

Upper Connecting Rod Bearings

Access: Holes in front of top cover.

Removal of Top and Side/Back Covers

⚠ WARNING: Disconnect power supply before servicing or cleaning.

⚠ WARNING: DO NOT plug in or operate the Testing Screen without all covers installed.

Unscrew the knob on the pump handle. Remove the thirteen screws that secure the top cover, then remove the cover. Reinstall the knob.

Loosen or remove the five screws that secure the side/back cover. Pivot the cover toward the back of the machine, allowing it to be supported by the motor wire.

Drive Assembly

⚠ WARNING: Disconnect power supply before servicing or cleaning.

⚠ WARNING: DO NOT plug in or operate the Testing Screen without all covers installed.

V-belt

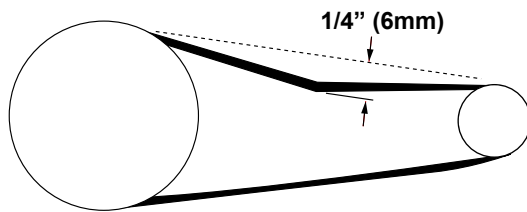


Figure 8: Correct V-belt deflection

Periodically check the motor V-belt for wear, tension, and alignment. The belt should be snug, neither too tight nor too loose. It should deflect about 1/4in (6mm) at the center point between the pulleys (Fig. 8).

A worn, loose, tight, or misaligned V-belt can adversely affect the operation of the Testing Screen. A good fit assures longer life, less bearing wear, and quieter operation than a belt which is too tight. A loose belt may cause the machine to run too slowly or to slip.

Adjust or Replace the V-belt

⚠ WARNING: Disconnect power supply before servicing or cleaning.

⚠ WARNING: DO NOT plug in or operate the Testing Screen without all covers installed.

1. Remove the top and side/back covers.
2. Loosen the motor mounting bolts.
3. Verify that the pulleys are aligned and adjust if necessary. Move the motor until the correct belt tension is obtained (Fig. 8).
4. Tighten the motor mounting bolts then re-verify the belt tension.

V-belt Replacement

1. Loosen the motor mounting bolts and move the motor toward the front of the machine until the belt disengages from the motor pulley.
2. Insert a pry bar under the front of the case top and over the top of the Vibrating Unit Assembly. Shift the Vibrating Unit Assembly until the holes in the Vibrating Unit Assembly and in connecting rod align. Remove the shoulder bolt.
3. Rotate connecting rod upward until you can remove the belt.
4. Install the new V-belt around the connecting rod.
5. Replace the shoulder bolt then place the V-belt around the pulleys. Make sure that the pulleys are aligned.
6. Move the motor toward the rear of machine until the correct belt tension is obtained (Fig. 5). Tighten the motor mounting bolts then re-verify the belt tension.

Connecting Rod Assembly

⚠ WARNING: Disconnect power supply before servicing or cleaning.

⚠ WARNING: DO NOT plug in or operate the Testing Screen without all covers installed.

Gilson recommends replacing the connecting rods as complete assemblies to avoid fit and tolerance problems during installation. Use the following procedure:

1. Unplug or otherwise disconnect the Testing Screen from its power source, and lock out the connection. Remove the top and side/back covers.
2. Remove the hydraulic cylinder. See Hydraulic Cylinder Inspection and Repair.
3. Insert a pry bar under the front of the case top and on top of the Vibrating Unit Assembly front and shift the Vibrating Unit Assembly until the holes in the Vibrating Unit Assembly and in connecting rod align.
4. Remove the wrist pin shoulder bolt, and remove the connecting rod.
5. Install the assembly in the reverse order of removal.

⚠ CAUTION: DO NOT take apart or remove the main shaft housing assembly. It is installed using factory fixtures. If this assembly is moved out of its position, the Testing Screen's internal vibrating assembly will go out of level and correct test results will NOT be obtained. The main shaft bearings are sealed and do not require lubrication.

Hydraulic Clamping System

⚠ WARNING: Disconnect the machine from its power source and lock out the connection prior to performing maintenance and/or repairs.

The TS-4 hydraulic clamping systems consist of a low-pressure hydraulic pump, two hydraulic cylinders, and two hydraulic clamp rod assemblies.

The systems use a medium-viscosity hydraulic oil such as Shell Tellus 25 or Mobil AW 32.

Checking the Oil

⚠ WARNING: Disconnect power supply before servicing or cleaning.

⚠ WARNING: DO NOT plug in or operate the Testing Screen without all covers installed.

To determine the level and quality of the hydraulic oil:

1. Unplug or otherwise disconnect the Testing Screen from its power source, and lock out the connection.
2. Release the pressure in the system by pulling the pump handle all the way toward the front of the machine.
3. Observe the position of the internal pump cover before you remove it. Its vent is slightly closer to the front (handle) end of the pump than to the back. Gilson recommends using a marker or other means to mark the operator side of the cover to ensure correct orientation during reassembly.
4. Remove the five screws that secure the external pump cover to the top, and lift the cover off (Fig. 3).
5. The reservoir should be filled to a 1/4in from the top, and the oil should appear clean.
6. If oil is clean but low, fill tank to correct level and reassemble.
7. If oil appears dirty, first replace the internal pump cover. Then drain and refill the system.

Draining/Refilling the Hydraulic System

⚠ WARNING: Disconnect power supply before servicing or cleaning.

⚠ WARNING: DO NOT plug in or operate the Testing Screen without all covers installed.

1. Unplug or otherwise disconnect the Testing Screen from its power source, and lock out the connection.
2. Clean the top of the machine to prevent foreign materials from contaminating the oil.
3. Release the system pressure by pulling the pump handle all the way toward the front of the machine. (If continuing from checking the oil and have removed the external pump cover, leave it off.)
4. Remove the top and side/back covers. See Removal of Top and Side/Back Covers.
5. Disconnect the hose from one of the hydraulic cylinders, leaving the other end of the hose connected to the pump. Place the free end of the hose into a clean container at a level that will allow gravity to empty the system. Pump the handle carefully to drain the hydraulic oil from the system.
6. Observe the position of the internal pump cover before removal. Its vent is slightly closer to the front (handle) end of the pump than to the back. Gilson recommends using a marker or other means to mark the operator (front) side of the cover to ensure correct orientation during reassembly.
7. If there is sludge in the bottom of the pump reservoir, remove the pump from the machine and clean it out with solvent before refilling with oil.
8. If repairs are to be made, continue disassembly as described in Hydraulic Pump. If you are only replacing hydraulic oil, continue to the next step.
9. Reconnect the hose to the cylinder.
10. Fill the pump reservoir to within 1/4in of the top.
Replace the pump cover in the same orientation before removal. Pump up pressure with short strokes on the pump handle. Release pressure by pulling the handle all the way toward the front of the machine.
11. Remove the pump cover again and add hydraulic oil to fill pump reservoir to within 1/4in of the top.
12. Replace the cover again in the proper orientation and tighten down the mounting screws.
13. Bleed the air out of the hydraulic system:
 - a. Loosen the connections between the hoses and the cylinders by partially unscrewing the swivel connections.
 - b. Pump up the hydraulic system until oil begins to appear at the loosened connections.
 - c. Re-tighten the swivel connections.
14. If the fittings leak, use hydraulic joint compound to create a seal between each leaky fitting and the pump or cylinder to which it is attached.
15. Reinstall the covers.

HYDRAULIC PUMP

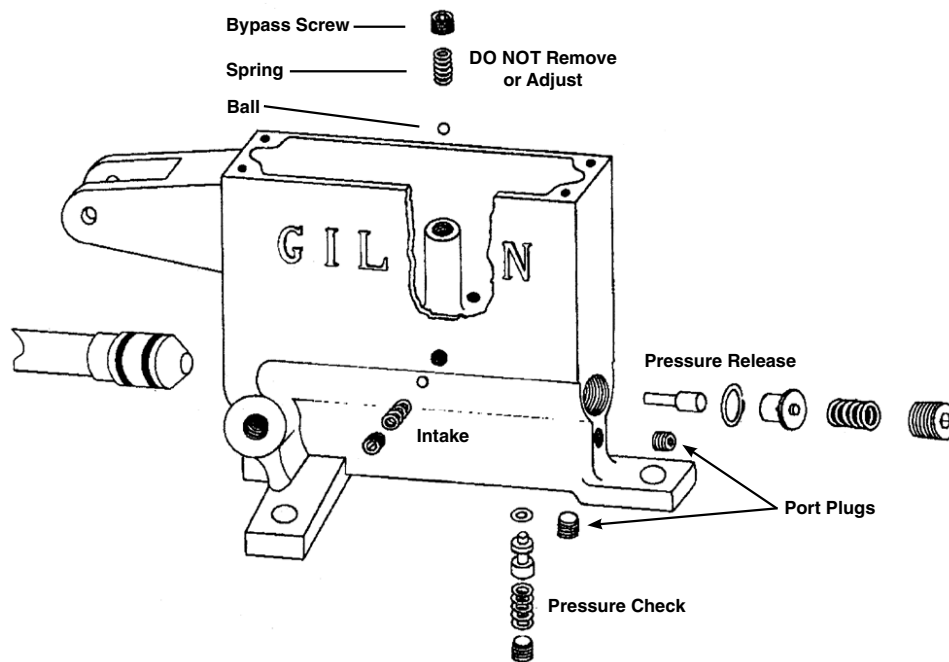


Figure 9: Hydraulic pump assembly

The hydraulic pump is a low-pressure pump with a cast aluminum body (Fig. 9). If your pump leaks or malfunctions, especially if the machine is old or heavily-used, we strongly recommend that you return it to the factory for repair (a three to five day process), or purchase a new pump. Call 800-444-1508 for instructions.

It is sometimes possible to repair pumps in the field by replacing parts. We **DO NOT** recommend field repair unless you have experience in working with hydraulics.

See the Hydraulic Pump exploded diagram. The various springs in the pump are **NOT** interchangeable.

3. Remove parts carefully to not damage the pump casting or any parts to be reinstalled. Balls must **NOT** be nicked or scratched. Clean pump and parts, and dry thoroughly before reassembly.

4. To reinstall balls, tap them gently into their seated positions with a soft-metal, blunt-ended rod.

⚠ CAUTION: DO NOT remove or adjust the bypass assembly. These parts are assembled and preset at the factory. Any change in the bypass pressure can damage the vibrating assembly.

General Hydraulic Pump Repair

⚠ WARNING: Disconnect power supply before servicing or cleaning.

⚠ CAUTION: When working with the hydraulic pump, take care **NOT** to score surfaces where seals must be maintained.

1. Unplug or otherwise disconnect the Testing Screen from its power source, and lock out the connection.
2. Drain the pump. See Draining and Refilling the Hydraulic System.

Note: ALWAYS observe the position of the internal pump cover before you remove it. Its vent is slightly closer to the front (handle) end of the pump than to the back. Gilson recommends using a marker or other means to mark the operator (front) side of the cover to ensure correct orientation during reassembly.

Hydraulic Pump Troubleshooting

If the system fails to maintain clamping pressure, and no oil is leaking from the cylinder, the failure may be caused by foreign material or dirt in the hydraulic pump (there are often aluminum flecks in the hydraulic oil from the pump casting. These are normally of little consequence in pump malfunctions).

To diagnose problems in the pump, remove the internal pump cover then reduce the level of hydraulic oil. Place a piece of clear plexiglas completely over the reservoir opening and screw it in place. Pump up the clamping pressure and observe where the oil is returning to the reservoir.

Here are four possibilities to look for when diagnosing hydraulic pump problems:

- Observe the holes on either side of the base of the center post. If the oil is returning here, there is a bypass problem. **DO NOT** attempt to adjust or repair the pump in the field. Return it to Gilson for repair or replacement.
- View the pump from above and at the plunger end to see the intake hole (located on a raised shelf on the bottom left side of the reservoir). Oil is taken in here when the pump plunger is pulled outward from the pump casting. If oil leaks from this intake hole when the pump plunger moves back into the pump casting, then the intake check ball is not seating properly. Remove the intake check ball. Clean it and its seat in the pump casting. Check the ball for nicks or other damage, and replace it if necessary.
- If the pump handle creeps back toward the pump casting after oil has been pumped into the cylinders, oil is probably leaking back into the pump through the pressure check thrust pin and O-ring assembly. Dirt or other foreign material can prevent the O-ring from seating properly. Remove and clean the thrust pin, O-ring, and cavity in the pump to remove foreign matter. Also check the O-ring for nicks or other damage, and replace the O-ring if necessary. If the pump handle actually flies toward the pump casting, then O-ring is usually torn, and the assembly should be replaced.
- The pressure release hole is in the bottom of the well, directly behind the center post. Oil normally returns to the reservoir through this hole when the handle is pulled all the way back to release clamping pressure. If oil returns through this hole during pump-up, the problem is with the pressure release pin or the pressure release thrust pin and O-ring. If the Plunger O-rings have been allowed to wear excessively, the hard steel plunger may have scored the cast aluminum plunger bore. This wear condition can not be repaired, and the pump must be replaced.

To remove the plunger and replace O-rings:

- Remove the pump handle retainer pin and the two plunger guide screws.
- Pull and remove the plunger and O-ring assembly.
- Replace the O-rings. Dip the O-ring end of the plunger in hydraulic oil and reinsert it into pump body.

Reassemble the Testing Screen in the reverse order of disassembly. Reinstall all covers. **DO NOT** plug in or try to operate the Testing Screen without all covers installed.

Hydraulic Cylinder Inspection and Repair

The hydraulic cylinders apply force to the clamp rods, which draw the Vibrating Unit Assembly parts together. If the machine loses clamping pressure during operation, and/or if hydraulic oil must be frequently added, inspect the hydraulic cylinders for wear.

⚠ WARNING: Disconnect power supply before servicing or cleaning.

⚠ WARNING: DO NOT plug in or operate the Testing Screen without all covers installed.

⚠ CAUTION: When working with the hydraulic cylinders, take care NOT to score surfaces where seals must be maintained.

To inspect a hydraulic cylinder for wear:

1. Unplug or otherwise disconnect the Testing Screen from its power source, and lock out the connection.
2. Drain the hydraulic system. See Draining and Refilling the Hydraulic System.
3. Remove the three screws securing the cylinder cap (Fig. 10). The spring is compressed inside the cylinder by the cap, so caution is required. **Keep pressure on the cap with your hand as you remove the three screws.**
4. Release the pressure on the cap slowly so that the compressed spring does not eject suddenly. Remove the cap and spring.
5. Remove the side access panel near the machine's base.
6. Grasp the lower section of hydraulic clamp rod with vice grips and hold it steady while unscrewing the clamp rod hex jam nut.
7. Pull the rest of the cylinder up and off the clamp rod.
8. Examine the piston and the two quad rings: One fits in a groove on the piston flange, and the other fits inside the piston. Replace the quad rings if you find hydraulic oil above the flange on the piston.

Note: It should **NOT** be necessary to disassemble the cylinder from its base. Cylinder O-rings rarely need to be replaced.

9. If cylinder O-ring replacement is necessary, use a 3/16in drift punch to drive each of the roll pins through to the center hole until they fall out. Remove the old O-ring. Apply a small amount of hydraulic oil to the new O-ring, and install it. Reassemble.

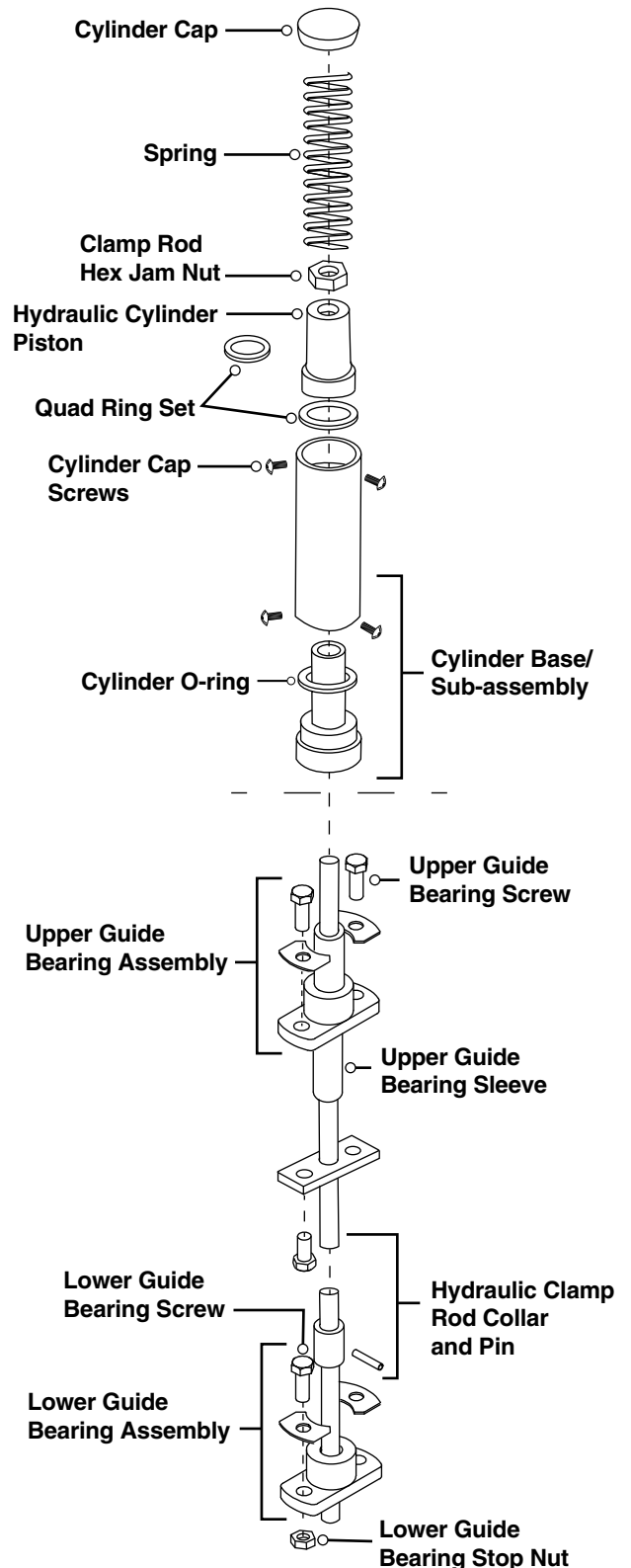


Figure 10: Hydraulic cylinder

If maintenance is planned on the hydraulic clamp rod assembly, do so now, using the instructions in the next section.

To reassemble the hydraulic cylinder:

1. Slide the cylinder and base assembly onto the upper end of the hydraulic clamp rod.
2. Dip the piston in hydraulic oil to lubricate the quad rings, then insert the piston into the cylinder.
3. Install the jam nut and tighten it.
4. Insert the spring. Place the cap on the spring and apply downward pressure on the cap.
5. Insert and tighten the screws.
6. Reattach hoses then refill the hydraulic pump. See Draining and Refilling the Hydraulic System.
7. Reinstall covers. **DO NOT** plug in or try to operate the Testing Screen without all covers installed.

Hydraulic Clamp Rod Assembly

⚠ WARNING: Disconnect power supply before servicing or cleaning.

⚠ WARNING: DO NOT plug in or operate the Testing Screen without all covers installed.

Hydraulic clamp rods fit through a series of guide bearings and draw the Vibrating Unit Assembly parts together to clamp trays in place for operation.

To check for wear in the guide bearings, apply pressure to the hydraulic cylinders with your hand, front to back and side to side.

If you have removed a cylinder, perform this test on the upper end of the hydraulic clamp rod. If a cylinder (or clamp rod) can be moved more than 1/32in in any direction, you should replace parts in the hydraulic clamp rod assembly.

To replace hydraulic clamp rods and parts:

1. Unplug or otherwise disconnect the Testing Screen from its power source, and lock out the connection.
2. If you have not done so, drain the system, then disassemble and remove the cylinder. See Hydraulic Cylinder Inspection and Repair.
3. Working through the access hole near the base of the machine, drive the roll pin out of the clamp rod collar (Fig. 10). Slide the clamp rod collar down to rest on the lower guide bearing.
4. Loosen the upper and lower guide bearing screws.
5. Pull the clamp rod up and out of the Vibrating Unit Assembly.
6. Replace the worn parts as needed.

7. To reassemble, reverse the procedure, except **DO NOT** re-tighten the guide bearing screws. Follow hydraulic cylinder reassembly instructions.
8. Finger-tighten the upper and lower guide bearing screws, then give each an additional 360° tightening with a wrench. Front and rear screws on each bearing need to be equally tight. If screws repeatedly loosen during operation, use a small amount of medium-strength (blue) Loctite.
9. After fully reassembling the unit with covers installed, run the machine empty for a few minutes. It should run freely and quietly.

Wire Cloth and Screen Trays

Check condition of wire cloth and screen trays both before and after each operation.

Wire Cloth

Testing grade wire cloth is a precision-made material and should be treated with care. The ASTM E11 specification permits only very slight variations in average opening and wire diameter of testing grade wire cloth. Abrasion due to normal use and/or improper cleaning and handling can cause the wire cloth to be out of specification to a considerable degree before it appears so. Check the wire cloth periodically for conformance to specifications.

Wire cloth may eventually sag, reducing its effective screening area. Wire with 1/4in and coarser openings is rigid and self-supporting. No.5 and finer sizes have hooked edges which interlock with the tray's side clamps to provide tension adjustment. Trays with No.16 and finer wire cloth have wire cloth support strips to minimize wear and distortion. Backup wire cloth can be furnished as an option at extra cost, if additional support is desired. Tray side clamps for hooked edge wire and flat wire are NOT interchangeable.

Screen Trays

The life of your screen trays can be prolonged by establishing good procedures for handling and storing trays. Avoid bumping or bending the corners of the tray flanges.

Bent flanges "work" during operation of the machine and will eventually break.

TROUBLESHOOTING

⚠ WARNING: Disconnect power supply before servicing or cleaning.

⚠ WARNING: DO NOT plug in or operate the Testing Screen without all covers installed.

Noisy Operation

Loud knocking during operation often indicates worn connecting rods, rod bearings, or the wrist pin assembly. See Drive Assembly.

Testing Screen Shuts Off

If either the Testing Screen or its motor is overloaded, a circuit breaker in the switch could disconnect. If the machine stops during a test, check the switch. If the red button extends halfway out, the circuit breaker has tripped. Check to see that you have sufficient voltage to the machine. If so, check to see if your sample is too large.

To reset, push the red button all the way in, then push the green button to restart.

Shifting of Materials

An imbalance or out-of-level vibration can cause shifting of material to the sides or corners of trays, decreasing screening efficiency. Such shifting is likely to be intermittent, especially on a new screen. Run the machine empty for half an hour before making drastic changes — the problem may disappear of its own accord. If shifting persists, check the foundation to be sure that all mounting bolts are equally tight. Check also the bottom-to-case bolts.

Tighten mounting bolts on the side to which material is moving. Loosen the opposite side slightly.

Look for bent tray edges and material trapped between vibrating sections. Worn guide bearings, wrist pins, and/or connecting rods also cause shifting of material. Refer to sections on the maintenance of those parts.

Sample material will also shift if the unit is not properly leveled. The internal vibrating assembly will not work properly in a machine that is out of level. If the case is seriously out of level compared to the vibrating assembly, look for worn or misaligned parts.

Sluggish Start-Up or Operation

Check loads on sample trays and total sample weights. See Sample Capacity.

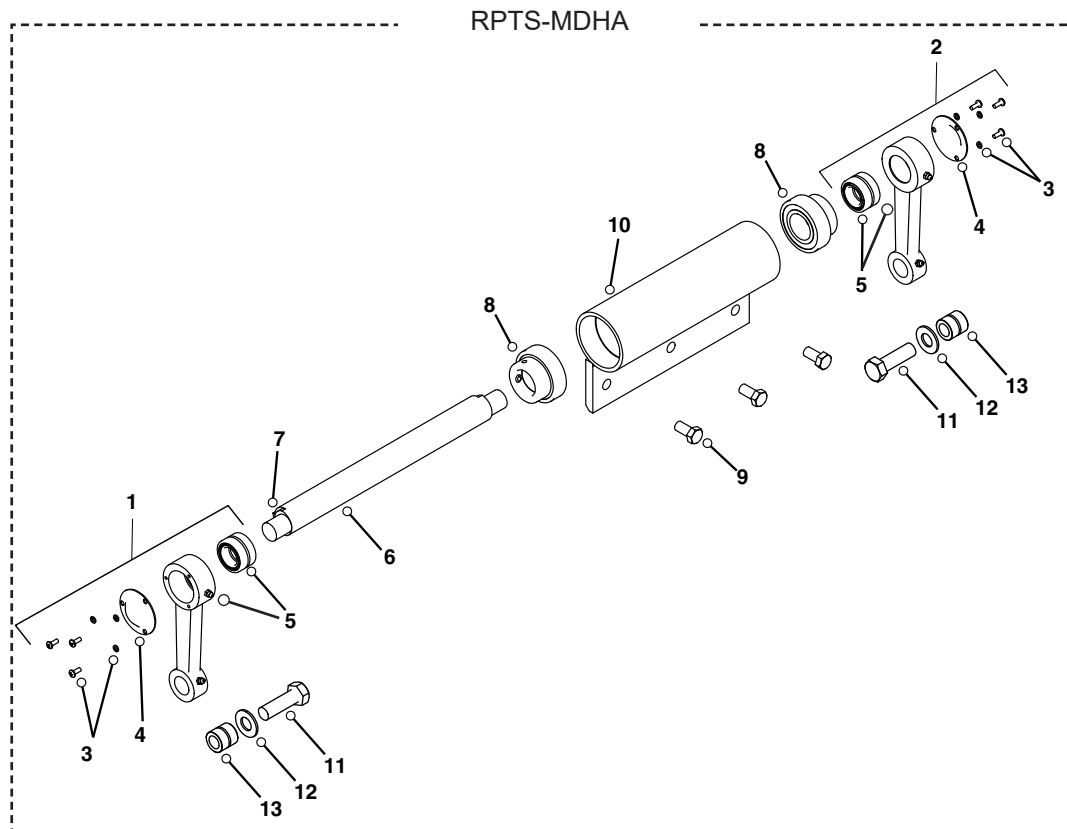
Inspect V-belts for wear, tension and alignment. Check pulleys for alignment. See Drive Assembly.

PARTS

Note: Parts sold individually unless included with an assembly or kit.

Note: TS-4-door, lid, and timer components will be included in a future manual revision. Contact Gilson regarding components or parts not shown.

Main Drive/Connecting Rod Assemblies



	Description	Part Number	# Req.
	Main Drive Housing Assembly	RPTS-MDHA	1
1	Connecting Rod Assembly, Left (Complete)	RPTS-MDHA8L ¹	1
2	Connecting Rod Assembly, Right (Complete)	RPTS-MDHA8R ¹	1

CONNECTING ROD & MAIN SHAFT PARTS

3	Bearing Cap Screws and Lock Washers (Pkg. of 3 each)	RPTS-MDHA11	1
4	Connecting Rod Bearing Cap	RPTS-MDHA10	2
5	Connecting Rod Bearing with Inner Race		2
6	Main Shaft	RPTS-MDHA3	1
—	Main Shaft (Special Low Amp)	TSA-200	1
7	Main Shaft Key	RPTS-MDHA5	1
8	Main Shaft Bearing (through serial # 6832) Main Shaft Bearing (serial # 6833 and after)	RPTS-MDHA6 RPTS-MDHA7	2
9	Housing Bracket Bolts, 0.5x1in	RPTS-MDHA2	3
10	Main Shaft Housing	RPTS-MDHA1	1
—	Wrist Pin with Cap Screw (through serial # 1839)	RPTS-MDHA12	1
—	Wrist Pin Set Screw	RPTS-MDHA13	1
11	Wrist Pin Shoulder Bolt, 5/8x2in	RPTS-MDHA14	2
12	Wrist Pin Sleeve Retaining Washer (serial #1840 and after)	RPTS-MDHA15	2
13	Wrist Pin Sleeve	RPTS-MDHA16	2

¹ Left/Right Connecting Rod Assembly (Complete) includes parts labeled 3, 4, and 5

Clamp Rod Assembly

	Description	Part Number	# Req.
1	Hydraulic Cylinder Assembly	RPTS-1HCA ¹	2
2	Hydraulic Cylinder Cap	RPTS-1KEY1	1
3	Hydraulic Cylinder Spring	RPTS-1KEY2	
4	Clamp Rod Hex Jam Nut	RPTS-1KEY3	
5	Hydraulic Cylinder Piston	RPTS-1KEY4	
6	Hydraulic Cylinder Quad Ring Set	RPTS-1KEY5	2
7	Cylinder Cap Screw	RPTS-1KEY6	
8	Cylinder and Base Sub-Assembly	RPTS-1KEY7	1
9	Cylinder O-Ring	RPTS-1KEY7-1	

	Description	Part Number	# Req.
2	TS-4 Hydraulic Clamp Rod Assembly (Complete)	RPTS-3HCRA ²	2
10	Hydraulic Upper Guide Bearing Assembly	RPTS-1KEY9	1
11	Hydraulic Upper Guide Bearing Screw	RPTS-1KEY8	2
12	Hydraulic Upper Guide Bearing Sleeve	RPTS-1KEY10	1
15	Hydraulic Lower Guide Bearing Assembly	RPTS-1KEY14	
16	Hydraulic Lower Guide Bearing Screw	RPTS-1KEY15-1	2
17	Hydraulic Lower Guide Bearing Screw Stop Nut, 3/8in	RPTS-1KEY8-1	
—	Hydraulic Lower Guide Bearing Lock Washer	RPTS-1KEY15-2	

¹ Hydraulic Cylinder Assembly (2 Required per Testing Screen)

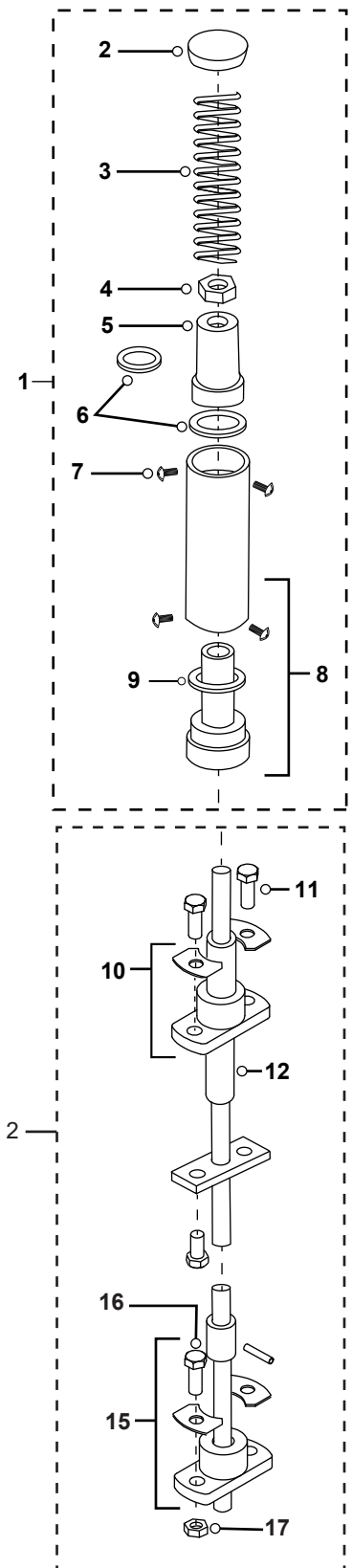
² Hydraulic Clamp Rod Assembly (Complete) (2 required per Testing Screen)

Hydraulic Hoses and Fittings

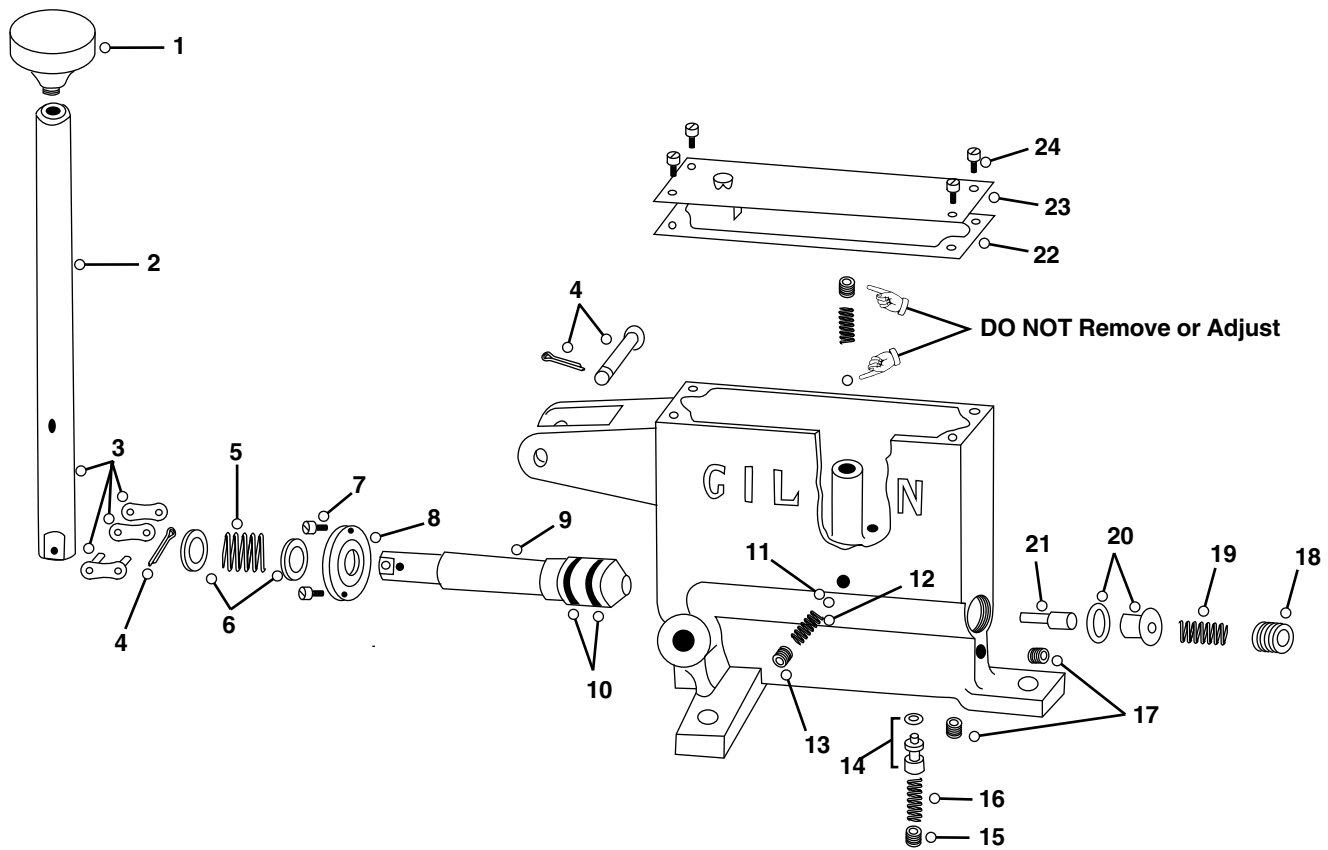
Note: Hoses and fittings are serial number-specific. Specify unit serial number when ordering.

Description	Part Number	# Req.
Hydraulic Hose, 20in (Qty 2), Hose Clip, Screw, Fitting	RPTS-1HOSE	1

Hydraulic Hose, 20in	RPTS-1HOSE1	1
Hose Clip and Screw	RPTS-1HOSE3	1
Hose Fitting Only	RPTS-1HOSE4	1



Hydraulic Pump



Description	Part Number
— Hydraulic Pump Assembly (Complete)	RPTS-PUMP ¹

HYDRAULIC PUMP PARTS

1	Pump Handle Knob	RPTS-1KEY17	13	Intake Check Plug, 1/8in (in pump body)	RPTS-1KEY42
2	Pump Handle	RPTS-1KEY18	14	Pressure Check Thrust Pin with O-ring	RPTS-1KEY45
3	Pump Handle Connecting Link	RPTS-1KEY19	15	Pressure Check Plug, 1/8in (in pump body)	RPTS-1KEY40
4	Pump Handle Spring Retaining Pin	—	16	Pressure Check Spring	RPTS-1KEY41
5	Stroke Limiting Spring	RPTS-1KEY20	17	Port Plug, 1/8in (in pump body)	RPTS-1KEY39
6	Stroke Limiting Washer	RPTS-1KEY21	18	Pressure Relief Plug, 3/8in	RPTS-1KEY35
7	Plunger Guide Screw	—	19	Pressure Relief Spring	RPTS-1KEY36
8	Plunger Guide and Seal Plunger Seal Only	RPTS-1KEY22 RPTS-1KEY22-1	20	Pressure Relief Thrust Pin with O-ring	RPTS-1KEY37
9	Plunger	RPTS-1KEY24	21	Pressure Relief Pin	RPTS-1KEY38
10	Plunger O-ring	RPTS-1KEY25	22	Pump Cover Gasket	RPTS-1KEY30
11	Intake Check Ball	RPTS-1KEY44	23	Pump Cover Assembly	RPTS-1KEY28
12	Intake Check Spring	RPTS-1KEY43	24	Pump Cover Screw	RPTS-1KEY29

¹ Assembly (Complete) includes all listed Hydraulic Pump parts

Hydraulic Pump Repair Kit No. 1 (RPTS-KIT#1)

Repair kit No. 1 includes the following parts:

Description	
10	Plunger O-ring
13	Intake Check Plug, 1/8in (in pump body)
14	Pressure Check Thrust Pin with O-ring
15	Pressure Check Plug, 1/8in (in pump body)
17	Port Plug, 1/8in (in pump body)
20	Pressure Relief Thrust Pin with O-ring

Hydraulic Pump Repair Kit No. 2 (RPTS-KIT#2)

Repair kit No. 2 includes all parts in Pump Repair Kit #1 and the following parts:

Description	
8	Plunger Guide and Seal
11	Intake Check Ball
12	Intake Check Spring
16	Pressure Check Spring
18	Pressure Relief Plug, 3/8in
19	Pressure Relief Spring
21	Pressure Relief Pin

Included from Kit No. 1

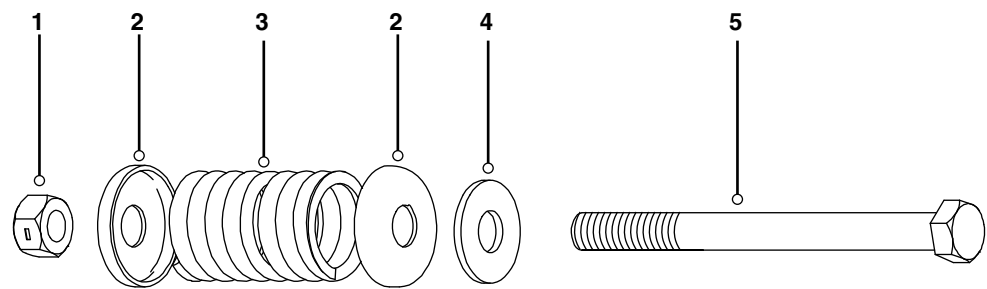
10	Plunger O-ring
13	Intake Check Plug, 1/8in (in pump body)
14	Pressure Check Thrust Pin with O-ring
15	Pressure Check Plug, 1/8in (in pump body)
17	Port Plug, 1/8in (in pump body)
20	Pressure Relief Thrust Pin with O-ring

Additional Items Available

Description	Part Number
Hydraulic Oil, 1/2 Pint Can	RPTS-OIL
Pump Mounting Screw with Nut and Washer	RPTS-1KEY45-2

Corner Spring Assembly

Note: Corner Spring Assembly (4 required per Testing Screen) is interchangeable on TS-1, TS-2, TS-3, and TS-4.

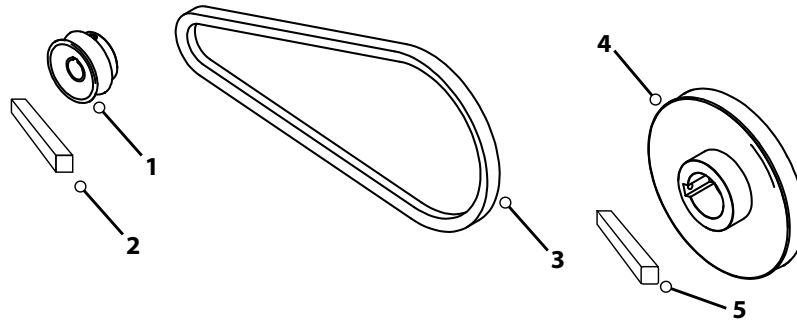


Description		Part Number
—	Corner Spring Assembly (Complete) ¹	RPTS-CSA
CORNER SPRING PARTS		
1	Corner Spring Stop Nut, 0.5in	RPTS-CSA3
2	Corner Spring Cup Washer	RPTS-CSA5
3	Corner Spring	RPTS-CSA1
4	Corner Spring Flat Washer	RPTS-CSA4
5	Corner Spring Bolt, 1/2x6.5in	RPTS-CSA2

¹ Assembly (Complete) includes all listed Corner Spring parts

Driving Parts

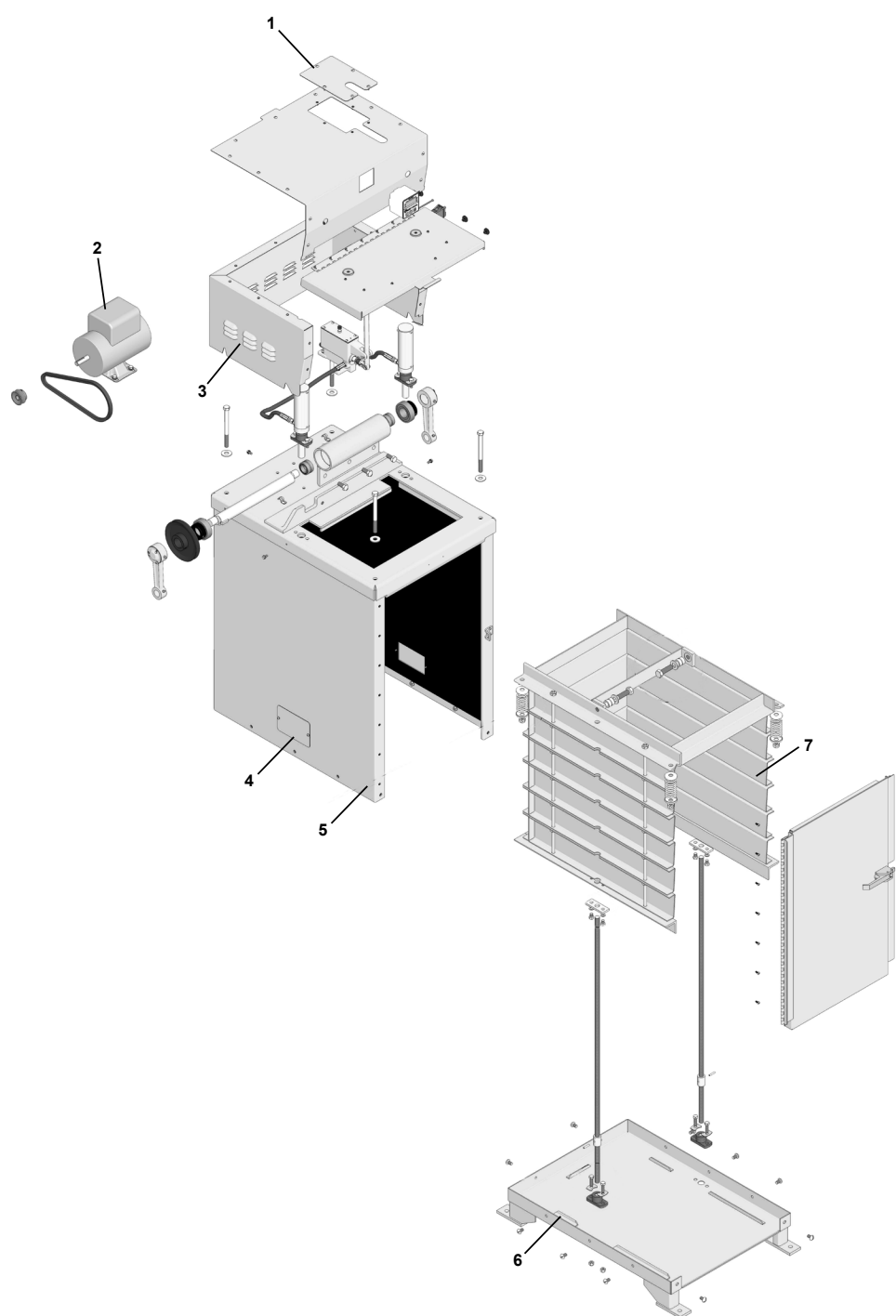
Note: Specify serial number when ordering.



- 1 – Motor Pulley
- 2 – Key, Motor Pulley
- 3 – V-belt
- 4 – Drive Pulley
- 5 – Key, Drive Pulley

Description	Part Number
Drive Pulley, 5 3/4in OD	RPTS-DP1
Drive Pulley, 6in OD, 1–7/16in ID (50Hz)	RPTS-DP4
Key, Drive Pulley	RPTS-DP1-1
Motor Pulley, 2in OD	RPTS-DP5
Motor Pulley, 2.5in OD, 5/8in ID (50Hz)	RPTS-DP6
Grease Fitting	RPTS-DPGF1
Key, Motor Pulley	RPTS-1DP5-1
V-belt, 30in	RPTS-DP7
V-belt, 31in (50Hz)	RPTS-DP10
On/Off Switch with Overload	RPTS-NDP1-Gold
Box for Switch	RPTS-NDP1-1
Cord with Plug	RPTS-NDP4
Motor, 1/2 HP, 115V/60Hz, 1-Phase	RPTS-DP12
Motor, 1/2 HP, 230V/50Hz	RPTS-NM230
Motor, 1/2 HP, 230V/60Hz, 3-Phase	RPTS-DP14
Motor Mounting Bolt and Washer (4 required)	RPTS-MOTOR BOLT

Frame, Covers, and Motor

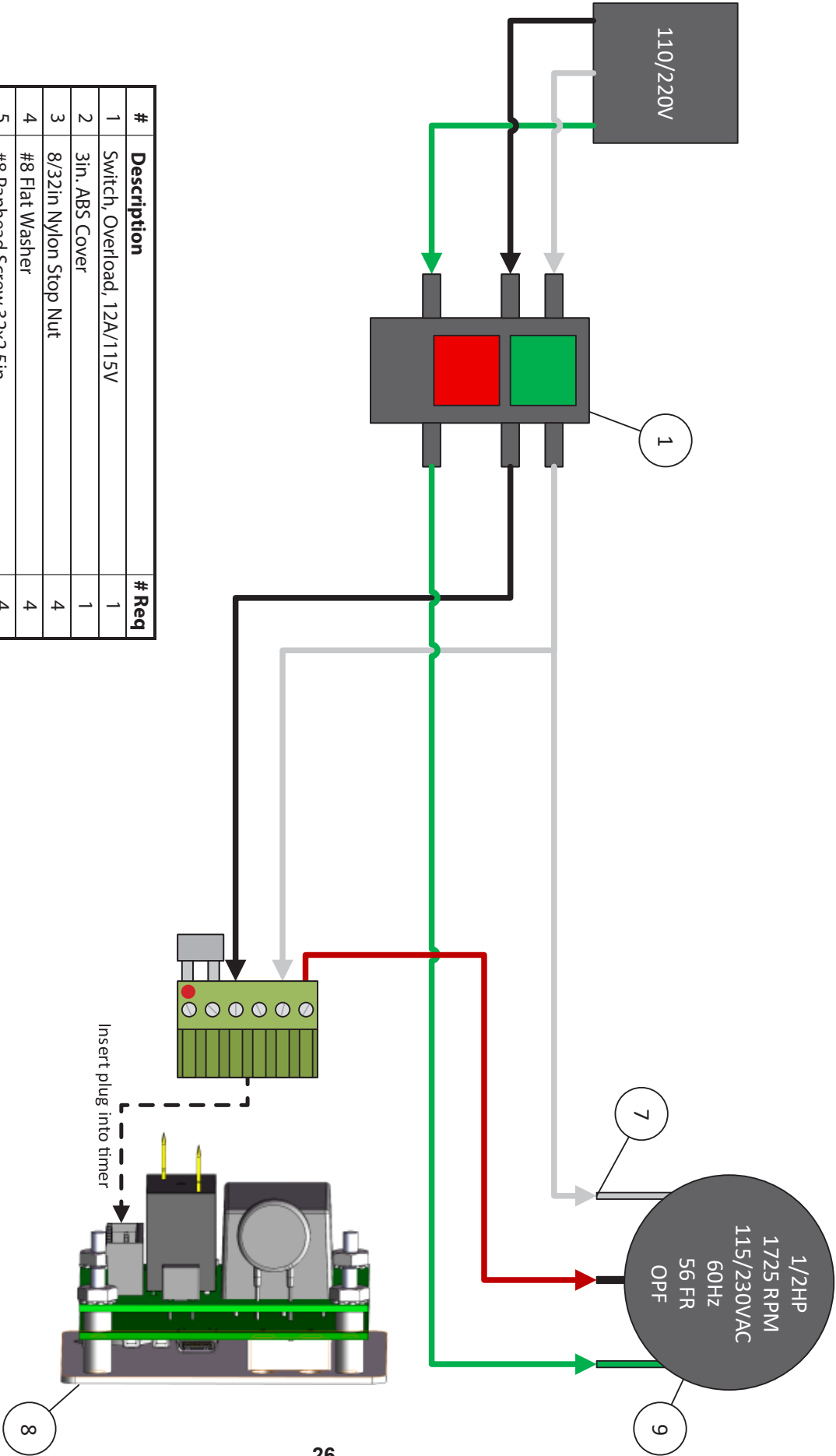


Description		Part Number
1	External Pump Cover	RPTS-PC
2	Motor, 1/2HP/115V/60Hz/1-Phase	RPTS-DP12
	Motor, 1/2HP 230V/50Hz	RPTS-NM230
	Motor, 1/2HP 230V/60Hz	RPTS-DP14
3	Motor Case Sides/Back	RPTS-3CASE&TOP
4	Side Hole Cover with Screws	RPTS-SHC

Description		Part Number
5	Case and Case Top	RPTS-3CRVRS&B
6	Bottom with Feet	RPTS-CASE
7	Separator Assembly	RPTS-3VUA

SCHEMATICS

Wiring Diagram



#	Description	# Req
1	Switch, Overload, 12A/115V	1
2	3in. ABS Cover	1
3	8/32in Nylon Stop Nut	4
4	#8 Flat Washer	4
5	#8 Panhead Screw 32x2.5in	4
6	Non-metallic Strain Relief Cord Grip and Lock Nut	2
7	Insulated Crimped Connector	4
8	Timer	1
9	Motor, 1/2HP	1
10	Cord with Molded Plug*	1
11	90 deg. Insulated Connector*	4
12	Corded Pigtail 28.75in*	1

*Not shown