



SINCE 1872

401XL Crusher

Machine Manual

Installation, Operation, Maintenance

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Notice of suitability.

Holmes Bros. Technologies, LLC strives to build the most robust equipment that suits our customers. If at any time a piece of equipment isn't capable to meet the needs of the industry, we want to know about it and determine the correct course of action. Our goal is to be a partner with our customers and understand their processes and environments.

In today's global marketplace, there are many standards and acceptable practices. Our machines will operate in a variety of them. Unfortunately we won't be fluent in them all. Therefore, although we can recommend a machine that will work in a given application, we cannot guarantee the suitability of our machines beyond the designed function.

During the purchase of your machine from one of our distributors, you should have been asked to supply your input power and application. Please take special consideration at this time to make sure the equipment you received is suitable for your application before use. Verify that the machine is configured for your power supply and has the correct screen plates. Please inform us of any discrepancy so that we may discuss it with our distributor.

Welcome to the HBLLC family.

Thank you for choosing Holmes Bros. Technologies, LLC. If this is your first piece of Holmes equipment, we're pleased to be chosen as a supplier that can meet your needs. We know that in today's market the choices seem endless and it is hard to tell the difference between the real thing and the imitators. Since 1872, Holmes has survived the test of time by producing quality equipment for the mining and laboratory industry to be used in the harshest environments. The equipment has changed over time to stay competitive, but is built as durable today as ever. You will know our machines are the real thing when they are put to the test.

At Holmes Brothers Technologies, LLC, we're committed to working with you to understand your goals and how we can best assist you to meet them. In this packet is a Product Registration Card. Please take the time to fill out this card and return it to the address printed on the back. We enter this information and any other comments you may have into our database. This way, we can always know what equipment you have and maintain the history on it as time goes by. Many of our machines run for decades and we are happy to record the details so we can be ready to assist you. Please retain the information provided for replacement parts and maintenance or troubleshooting your equipment. In the event that you need us, our customer service group will be happy to answer any questions about our products. Please ask about our automatic maintenance reminder program.

Thank you again for choosing Holmes Brothers Technologies, LLC. Please contact your distributor for pricing and availability on any of our products or parts. If you have any requests or suggestions regarding our products, please send them to the address listed on the last page of this manual. We will give your opinions our sincere consideration. We realize that our continued success depends largely on your success. Thank you and best of luck.

Machine Installation

The 401XL has been designed to meet your needs with a minimum of installation work. However, due to the wide range of environments that our machines go into, here are a few tasks before turning on the machine.

1. Inspect the packaging and/or skid the machine arrived on for damage during transit. Photograph any signs of damage.
2. Remove the box/packaging and discard. The machine is held to the skid via screws and one or more tie down straps. These can be removed easily with no more than a screwdriver.
3. Place the machine in the location where it will operate. Report any sign of damage immediately to your sales representative. Remove the hopper cover and sample container. Open the crusher and inspect for particles or debris that could interfere with the hammers. Check to make sure that the screen plates fit properly and are the size that was requested.
4. The machine is now ready to be wired.

Note: A qualified electrician should wire the machine to meet the electrical codes that govern your site. Holmes Bros. Technologies, LLC will not take responsibility for errors made during this step. A wiring diagram has been supplied as a guide only. Be sure that the machine wiring is consistent with the input power that you specified at the time of order.

5. Due to the wide range on international, regional, local, and intercompany wiring practices, the machine is supplied with only the power cord. Please refer to your specific regulations to safely wire the machine for your site.

Other considerations regarding this machine include the health, safety, and ergonomic requirements of the operator.

1. The machine should be placed in an environment that allows the operator fresh air free of suspended dust. The fresh air should flow from the operator to the machine.

2. The machine should be placed in an environment that is free of trip/fall hazards or wet conditions.
3. The machine should be placed so that the operator can work with the machine without excessive bending, reaching, or in tight spaces.
4. All regulations regarding appropriate PPE should be strictly adhered to.
5. Operators should be well trained on the proper use of the machine and the hazards present. This training should be documented and periodically updated.
6. The machine should be set and operated on a surface that is suitable to hold the weight and vibration of the machine.
7. The machine must be kept dry and not exposed to ambient temperatures above 100 °F.
8. The machine must be dusted off to prevent combustible layers from building that could potentially create a fire hazard.

Machine Operation

The 401XL is a simple machine to operate. It has a simple ON/OFF operation and reset feature in the event that the latch is opened while running or thermal overloads trip. However, as with all machines there are other things to consider before operating.

1. The inside of the machine is free of paint in order to prevent ongoing contamination of samples. However, there is a light coating of rust preventative present. Initial samples will wear this coating off and leave a bare metal surface that will not affect your sample.
2. Refer to your lab policies on the number of discard samples that should be run before using the machine for test readings.

During operation.

1. Ensure that the crusher housing is shut and latched.
2. Remove the hopper cover and pour the sample into the hopper.
3. Replace the hopper cover.
4. Start the machine by pressing the START button.
5. If the machine needs to be reset, press the RESET button firmly.
6. The sample is moved into the crusher manually.
7. Slowly raise the lever on the side of the hopper to allow the sample to fall past the gate.
8. Once the sample sounds as though it is done, press the STOP button.
9. Remove the hopper cover and inspect to see if the sample has been moved into the crusher.
10. Open the crusher to ensure that the sample has been processed.
11. If so, clean the crusher for the next sample run.

Basic Machine Maintenance

Congratulations on your purchase. The 401XL is a relatively maintenance free machine. All bearings are easily greased with premium high temperature bearing grease. Perishable and wear parts are made from quality certified steels and coatings to provide long life. OEM parts are available through your distributor and are easy to replace using the correct tools. Below are some common tasks that can be performed by a novice mechanic using relatively few tools.

Note: All hazards and sources of energy must be neutralized before maintenance steps are performed.

Note: A liquid penetrant may be required if fasteners are ceased. Do not force the fasteners to move. This may ruin the fastener and/or the main part.

Maintenance frequency chart

Part	Description	Frequency (hrs of use)
4B3	Hopper Cover Seal	2000
4B8	Sample Container Seal	2000
401-33	V-Belt	2000
4B9	Hammer Housing Seal	2000
401-9	Felt Washer	2000
4A32	Hammer Shaft Bearing	6000
4A27	Hammer Assembly	As needed.

Periodic lubrication

There are two features on the 401XL that need lubricated periodically.

1. Every 40 hours of operation, apply 2-3 drops of SAE 30 to the felt seals.
2. Every 2000 hours of operation, grease the hammer shaft bearings.

Belt replacement

The belt tension is maintained by the motor weight. Over time, the belt may stretch beyond the motor travel. It is recommended that the belt be replaced at that time rather than adjust the position of the motor.

1. Remove the hammer shaft pulley guard.
2. Open the crusher. This will relieve some tension on the belt.
3. Slip the belt off the pulley and pull out through the back by the motor.
4. Assemble in reverse order.

Replace the screen plate.

1. Remove the single locknut on the back of the crusher that holds the screen.
2. Open the crusher.
3. Remove the two locknuts on each side of the crusher located near the front.
4. Remove the bolts.
5. Remove the screen and replace.
6. Assemble in reverse order.
7. Check to make sure screen is properly seated.

The 401XL is designed to operate for many years. The bulk of the castings and structure allow for several rebuilds and updates. Therefore, over time you will come across more detailed maintenance tasks in order to keep your machine operating at peak efficiency. These tasks include teardown and rebuild of core components. Direct part replacement with OEM parts is recommended.

Note: These tasks are for skilled mechanics and will require a larger number of tools.

The hammer assembly and bearings are designed to be rotated end for end so that both sides of the hammer are used for maximum part life. Replacing hammers individually is not possible.

1. Remove the hammer flywheel and pulley guards.
2. Open the crusher.
3. Remove the belt.
4. Close the crusher.
5. Remove the bolts holding the hammer shaft in the top half of the crusher.
6. Open the crusher again. The hammer assembly and bearings should now be sitting on the felt washers in the bottom casting.
7. Remove the hammer assembly, bearings, pulley and flywheel as a single unit and place on a bench top for easier access.
8. Remove the flywheel and pulley by loosening the set screws.

Note: Inspect them for damage and replace if necessary.

9. Remove the hammer shaft bearings from the shaft by loosening the set screws on the bearing flange.
10. Assemble in reverse order.

11. Some helpful tips.

- a. Use the felt washers to locate the hammer shaft in the housing.
- b. Tighten the set screws on the bearings, pulley, and flywheel last. These can be tightened last after the hammers are set.
- c. Set the hammers in the center of the housing. Rotate by hand to make sure there is no interference.

Felt washer installation

1. The old felt and glue must be removed completely.
2. Slide the washers on first and then the bearings.
3. Apply glue to the top housing surface where the felt sits.
4. Assemble the hammers and to hold the washers in place.
5. Cut the felt flush with the upper housing.
6. Glue the remaining piece into the bottom housing.
7. Shut and latch the crusher until the glue is dried.
8. Once dry, place three to four drops of SAE30 oil to the inside diameter of bottom felt washer. This will lubricate both washers as the shaft rotates.

Seal replacement.

1. Remove the old seals and sand the surface clean.
2. Place the new seal in location to make sure the pieces fit.
3. One piece at a time, glue the seal and the surface.
4. Set the seal in place.
5. Maintain pressure against the seal and do not disturb for 4 hours.
6. **Some helpful tips.**
 - a. The hopper cover can be set back on the hopper and left to dry.
 - b. The crusher can be closed against the seals to maintain pressure.
 - c. The sample container seal can be held in place by setting a 1/4 inch thick piece of paneling or thin piece of sheet metal on top of the sample container while it is in position.

Troubleshooting

1. Machine does not run.
 - a. Verify that incoming power is on and correct.
 - b. Verify that crusher is closed and latched.
 - c. Verify that thermal overloads are not tripped.
 - d. Verify that the proximity switch is working.
2. Machine will not reset.
 - a. Verify that incoming power is on and correct.
 - b. Verify that crusher is closed and latched.
 - c. Verify that thermal overloads are not tripped.
 - d. Verify that the proximity switch is working.
 - e. Verify that RESET switch is set to manual.
3. Machine is louder than when new.
 - a. Guards may come loose and are shaking.
 - b. The bearings may need replaced.
 - c. The belt may need replaced.
 - d. The hammers are impacting the crusher.
4. The motor is hot when machine is running.
 - a. Verify that incoming power is correct.
 - b. Replace the starter.
 - c. Replace the motor.
5. The machine has a violent vibration.
 - a. The hammers or shaft may be bent and out of balance.
 - b. The belt may need replaced.
6. The crusher blows excessive dust out into the air.
 - a. The seals need replaced.
 - b. The felt washers need replaced.
 - c. The screen plate fasteners are missing.



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