



# OPERATOR'S MANUAL

Metal Working



## MANUAL COLD SAW MODEL: CS-315EU

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## THANK YOU & WARRANTY

Thank you for your purchase of a machine from Baileigh Industrial Holdings LLC. We hope that you find it productive and useful to you for a long time to come.

**Inspection & Acceptance.** Buyer shall inspect all Goods within ten (10) days after receipt thereof. Buyer's payment shall constitute final acceptance of the Goods and shall act as a waiver of the Buyer's rights to inspect or reject the goods unless otherwise agreed. If Buyer rejects any merchandise, Buyer must first obtain a Returned Goods Authorization ("RGA") number before returning any goods to Seller. Goods returned without an RGA will be refused. Seller will not be responsible for any freight costs, damages to goods, or any other costs or liabilities pertaining to goods returned without a RGA. Seller shall have the right to substitute a conforming tender. Buyer will be responsible for all freight costs to and from Buyer and repackaging costs, if any, if Buyer refuses to accept shipment. If Goods are returned in unsalable condition, Buyer shall be responsible for full value of the Goods. Buyer may not return any special-order Goods. Any Goods returned hereunder shall be subject to a restocking fee equal to 30% of the invoice price.

**Specifications.** Seller may, at its option, make changes in the designs, specifications or components of the Goods to improve the safety of such Goods, or if in Seller's judgment, such changes will be beneficial to their operation or use. Buyer may not make any changes in the specifications for the Goods unless Seller approves of such changes in writing, in which event Seller may impose additional charges to implement such changes.

**Limited Warranty.** Seller warrants to the original end-user that the Goods manufactured or provided by Seller under this Agreement shall be free of defects in material or workmanship for a period of twelve (12) months from the date of purchase, provided that the Goods are installed, used, and maintained in accordance with any instruction manual or technical guidelines provided by the Seller or supplied with the Goods, if applicable. The original end-user must give written notice to Seller of any suspected defect in the Goods prior to the expiration of the warranty period. The original end-user must also obtain a RGA from Seller prior to returning any Goods to Seller for warranty service under this paragraph. Seller will not accept any responsibility for Goods returned without a RGA. The original end-user shall be responsible for all costs and expenses associated with returning the Goods to Seller for warranty service. In the event of a defect, Seller, at its sole option, shall repair or replace the defective Goods or refund to the original end-user the purchase price for such defective Goods. Goods are not eligible for replacement or return after a period of 10 days from date of receipt. The foregoing warranty is Seller's sole obligation, and the original end-user's exclusive remedy, with regard to any defective Goods. This limited warranty does not apply to: (a) die sets, tooling, and saw blades; (b) periodic or routine maintenance and setup, (c) repair or replacement of the Goods due to normal wear and tear, (d) defects or damage to the Goods resulting from misuse, abuse, neglect, or accidents, (e) defects or damage to the Goods resulting from improper or unauthorized alterations, modifications, or changes; and (f) any Goods that has not been installed and/or maintained in accordance with the instruction manual or technical guidelines provided by Seller.

**EXCLUSION OF OTHER WARRANTIES.** THE FOREGOING LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. ANY AND ALL OTHER EXPRESS, STATUTORY OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED. NO WARRANTY IS MADE WHICH EXTENDS BEYOND THAT WHICH IS EXPRESSLY CONTAINED HEREIN.

**Limitation of Liability.** IN NO EVENT SHALL SELLER BE LIABLE TO BUYER OR ANY OTHER PARTY FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR DOWN TIME) ARISING FROM OR IN MANNER CONNECTED WITH THE GOODS, ANY BREACH BY SELLER OR ITS AGENTS OF THIS AGREEMENT, OR ANY OTHER CAUSE WHATSOEVER, WHETHER BASED ON CONTRACT, TORT OR ANY OTHER THEORY OF LIABILITY. BUYER'S REMEDY WITH RESPECT TO ANY CLAIM ARISING UNDER THIS AGREEMENT IS STRICTLY LIMITED TO NO MORE THAN THE AMOUNT PAID BY THE BUYER FOR THE GOODS.



**Force Majeure.** Seller shall not be responsible for any delay in the delivery of, or failure to deliver, Goods due to causes beyond Seller's reasonable control including, without limitation, acts of God, acts of war or terrorism, enemy actions, hostilities, strikes, labor difficulties, embargoes, non-delivery or late delivery of materials, parts and equipment or transportation delays not caused by the fault of Seller, delays caused by civil authorities, governmental regulations or orders, fire, lightening, natural disasters or any other cause beyond Seller's reasonable control. In the event of any such delay, performance will be postponed by such length of time as may be reasonably necessary to compensate for the delay.

**Installation.** If Buyer purchases any Goods that require installation, Buyer shall, at its expense, make all arrangements and connections necessary to install and operate the Goods. Buyer shall install the Goods in accordance with any Seller instructions and shall indemnify Seller against any and all damages, demands, suits, causes of action, claims and expenses (including actual attorneys' fees and costs) arising directly or indirectly out of Buyer's failure to properly install the Goods.

**Work By Others; Safety Devices.** Unless agreed to in writing by Seller, Seller has no responsibility for labor or work performed by Buyer or others, of any nature, relating to design, manufacture, fabrication, use, installation or provision of Goods. Buyer is solely responsible for furnishing and requiring its employees and customers to use all safety devices, guards and safe operating procedures required by law and/or as set forth in manuals and instruction sheets furnished by Seller. Buyer is responsible for consulting all operator manuals, ANSI or comparable safety standards, OSHA regulations and other sources of safety standards and regulations applicable to the use and operation of the Goods.

**Remedies.** Each of the rights and remedies of Seller under this Agreement is cumulative and in addition to any other or further remedies provided under this Agreement or at law or equity.

**Attorney's Fees.** In the event legal action is necessary to recover monies due from Buyer or to enforce any provision of this Agreement, Buyer shall be liable to Seller for all costs and expenses associated therewith, including Seller's actual attorney fees and costs.

**Governing Law/Venue.** This Agreement shall be construed and governed under the laws of the State of Wisconsin, without application of conflict of law principles. Each party agrees that all actions or proceedings arising out of or in connection with this Agreement shall be commenced, tried, and litigated only in the state courts sitting in Manitowoc County, Wisconsin or the U.S. Federal Court for the Eastern District of Wisconsin. Each party waives any right it may have to assert the doctrine of "forum non conveniens" or to object to venue to the extent that any proceeding is brought in accordance with this section. Each party consents to and waives any objection to the exercise of personal jurisdiction over it by courts described in this section. Each party waives to the fullest extent permitted by applicable law the right to a trial by jury.

**Summary of Return Policy.**

- 10 Day acceptance period from date of delivery. Damage claims and order discrepancies will not be accepted after this time.
- You must obtain a Baileigh issued RGA number PRIOR to returning any materials.
- Returned materials must be received at Baileigh in new condition and in original packaging.
- Altered items are not eligible for return.
- Buyer is responsible for all shipping charges.
- A 30% re-stocking fee applies to all returns.

Baileigh Industrial Holdings LLC makes every effort to ensure that our posted specifications, images, pricing and product availability are as correct and timely as possible. We apologize for any discrepancies that may occur. Baileigh Industrial Holdings LLC reserves the right to make any and all changes deemed necessary in the course of business including but not limited to pricing, product specifications, quantities, and product availability.

**For Customer Service & Technical Support:**

Please contact one of our knowledgeable Sales and Service team members at:  
(920) 684-4990 or e-mail us at [sales@baileigh.com](mailto:sales@baileigh.com)



## **INTRODUCTION**

*The quality and reliability of the components assembled on a Baileigh Industrial Holdings LLC machine guarantee near perfect functioning, free from problems, even under the most demanding working conditions. However, if a situation arises, refer to the manual first. If a solution cannot be found, contact the distributor where you purchased our product. Make sure you have the serial number and production year of the machine (stamped on the nameplate). For replacement parts refer to the assembly numbers on the parts list drawings.*

*Our technical staff will do their best to help you get your machine back in working order.*

### **In this manual you will find: (when applicable)**

- Safety procedures
- Correct installation guidelines
- Description of the functional parts of the machine
- Capacity charts
- Setup and start-up instructions
- Machine operation
- Scheduled maintenance
- Parts lists

## **GENERAL NOTES**

After receiving your equipment remove the protective container. Do a complete visual inspection, and if damage is noted, **photograph it for insurance claims** and contact your carrier at once, requesting inspection. Also contact Baileigh Industrial Holdings LLC and inform them of the unexpected occurrence. Temporarily suspend installation.

Take necessary precautions while loading / unloading or moving the machine to avoid any injuries.

Your machine is designed and manufactured to work smoothly and efficiently. Following proper maintenance instructions will help ensure this. Try and use original spare parts, whenever possible, and most importantly; **DO NOT** overload the machine or make any modifications.



**Note:** This symbol refers to useful information throughout the manual.



## IMPORTANT

### PLEASE READ THIS OPERATORS MANUAL CAREFULLY

It contains important safety information, instructions, and necessary operating procedures. The continual observance of these procedures will help increase your production and extend the life of the equipment.



## SAFETY INSTRUCTIONS

### LEARN TO RECOGNIZE SAFETY INFORMATION

This is the safety alert symbol. When you see this symbol on your machine or in this manual, **BE ALERT TO THE POTENTIAL FOR PERSONAL INJURY!**



Follow recommended precautions and safe operating practices.

### UNDERSTAND SIGNAL WORDS

A signal word – **DANGER**, **WARNING**, or **CAUTION** – is used with the safety alert symbol. **NOTICE**, which is not related to personal injury, is used without a symbol.

**DANGER:** Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

**WARNING:** Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION:** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

**NOTICE:** Indicates a situation which, if not avoided, could result in property damage.

**DANGER**

**WARNING**

**CAUTION**

**NOTICE**

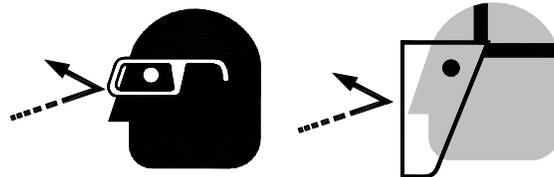


**SAVE THESE INSTRUCTIONS.**  
**Refer to them often and use them to instruct others.**



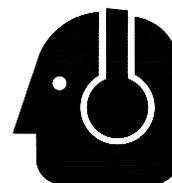
**PROTECT EYES**

Wear safety glasses or suitable eye protection when working on or around machinery.



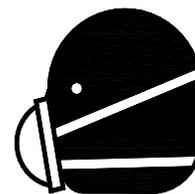
**PROTECT AGAINST NOISE**

Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear suitable hearing protective devices such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.



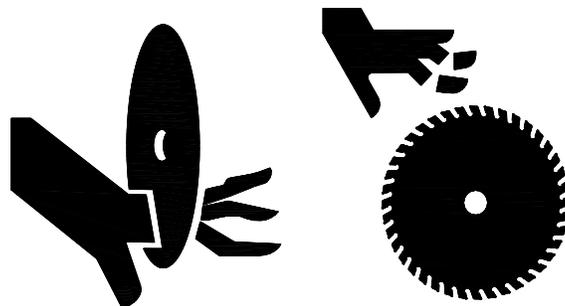
**DUST HAZARD**

Wear appropriate dust mask. Dust created while using machinery can cause cancer, birth defects, and long-term respiratory damage. Be aware of the dust hazards associated with all types of materials.



**ROTATING BLADE HAZARD**

Moving saw blade may result in loss of fingers or limb. **DO NOT** operate with guard removed. **Follow lockout/tagout procedures before servicing.**



**EMERGENCY STOP BUTTON**

In the event of incorrect operation or dangerous conditions, the machine can be stopped immediately by pressing the **E-STOP** button. Twist the emergency stop button clockwise (cw) to reset. Note: Resetting the E-Stop will not start the machine.





### **CALIFORNIA PROPOSITION 65**

WARNING: Cancer and Reproductive Harm.  
[www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)



### **SAFETY PRECAUTIONS**



Metal working can be dangerous if safe and proper operating procedures are not followed. As with all machinery, there are certain hazards involved with the operation of the product. Using the machine with respect and caution will considerably lessen the possibility of personal injury. However, if normal safety precautions are overlooked or ignored, personal injury to the operator may result.

Safety equipment such as guards, hold-downs, safety glasses, dust masks and hearing protection can reduce your potential for injury. But even the best guard will not make up for poor judgment, carelessness or inattention. **Always use common sense** and exercise **caution** in the workshop. If a procedure feels dangerous, don't try it.

**REMEMBER: Your personal safety is your responsibility.**



**WARNING: FAILURE TO FOLLOW THESE RULES MAY RESULT IN SERIOUS PERSONAL INJURY**

### **Dear Valued Customer:**

- All Baileigh machines should be used only for their intended use.
- Baileigh does not recommend or endorse making any modifications or alterations to a Baileigh machine. Modifications or alterations to a machine may pose a substantial risk of injury to the operator or others and may do substantial damage to the machine.
- Any modifications or alterations to a Baileigh machine will invalidate the machine's warranty.

**PLEASE ENJOY YOUR BAILEIGH MACHINE! ....PLEASE ENJOY IT SAFELY!**

1. **FOR YOUR OWN SAFETY, READ INSTRUCTION MANUAL BEFORE OPERATING THE MACHINE.** Learn the machine's application and limitations as well as the specific hazards.
2. **Only trained and qualified personnel can operate this machine.**
3. **Make sure guards are in place and in proper working order before operating machinery.**



4. **Remove any adjusting tools.** Before operating the machine, make sure any adjusting tools have been removed.
5. **Keep work area clean.** Cluttered areas invite injuries.
6. **Overloading machine.** By overloading the machine you may cause injury from flying parts. **DO NOT** exceed the specified machine capacities.
7. **Dressing material edges.** Always chamfer and deburr all sharp edges.
8. **Do not force tool.** Your machine will do a better and safer job if used as intended. **DO NOT** use inappropriate attachments in an attempt to exceed the machines rated capacity.
9. **Use the right tool for the job. DO NOT** attempt to force a small tool or attachment to do the work of a large industrial tool. **DO NOT** use a tool for a purpose for which it was not intended.
10. **Dress appropriate. DO NOT** wear loose fitting clothing or jewelry as they can be caught in moving machine parts. Protective clothing and steel toe shoes are recommended when using machinery. Wear a restrictive hair covering to contain long hair.
11. **Use eye and ear protection.** Always wear ISO approved impact safety goggles. Wear a full-face shield if you are producing metal filings.
12. **Do not overreach.** Maintain proper footing and balance at all times. **DO NOT** reach over or across a running machine.
13. **Stay alert.** Watch what you are doing and use common sense. **DO NOT** operate any tool or machine when you are tired.
14. **Check for damaged parts.** Before using any tool or machine, carefully check any part that appears damaged. Check for alignment and binding of moving parts that may affect proper machine operation.
15. **Observe work area conditions. DO NOT** use machines or power tools in damp or wet locations. Do not expose to rain. Keep work area well lighted. **DO NOT** use electrically powered tools in the presence of flammable gases or liquids.
16. **Blade adjustments and maintenance.** Always keep blades sharp and properly adjusted for optimum performance.
17. Keep visitors a safe distance from the work area.
18. **Keep children away.** Children must never be allowed in the work area. **DO NOT** let them handle machines, tools, or extension cords.
19. **Store idle equipment.** When not in use, tools must be stored in a dry location to inhibit rust. Always lock up tools and keep them out of reach of children.
20. **DO NOT operate machine if under the influence of alcohol or drugs.** Read warning labels on prescriptions. If there is any doubt, **DO NOT** operate the machine.
21. **Do not** cut where the atmosphere might contain flammable dust, gas, or liquid vapors such as from gasoline.



22. **DO NOT** touch live electrical components or parts.
23. **Turn off** power before checking, cleaning, or replacing any parts.
24. Be sure **all** equipment is properly installed and grounded according to national, state, and local codes.
25. Keep **all** cords dry, free from grease and oil, and protected from sparks and hot metal.
26. Inspect power and control cables periodically. Replace if damaged or bare wires are exposed. **Bare wiring can kill!**
27. **DO NOT** bypass or defeat any safety interlock systems.
28. Always check that the work piece is securely clamped and that long pieces are properly supported.
29. **DO NOT** use a saw blade size that is outside the limits of the machines specifications.
30. Immediately release the start / run trigger button if the saw blade should get stuck in a cut. Press the red power off switch and remove the yellow lock key before raising the machine head. Then open the vise and remove the work piece. Check the blade teeth for damage. If any of the teeth are broken or missing replace the saw blade.
31. The operator should stand in front of the machine using a single hand to grip the feed handle.
32. A proper break-in period for the cold saw is recommended. Intervals of 30 minutes to be repeated two or three times, after which the cold saw may be used continuously.



## **TECHNICAL SUPPORT**

Our technical support department can be reached at 920.684.4990 and asking for the support desk for purchased machines. Tech Support handles questions on machine setup, schematics, warranty issues, and individual parts needs: (other than die sets and blades).

For specific application needs or future machine purchases contact the Sales Department at: [sales@baileigh.com](mailto:sales@baileigh.com), Phone: 920.684.4990, or Fax: 920.684.3944.



**Note:** *The photos and illustrations used in this manual are representative only and may not depict the actual color, labeling or accessories and may be intended to illustrate technique only.*



**Note:** *The specifications and dimensions presented here are subject to change without prior notice due to improvements of our products.*



## TECHNICAL SPECIFICATIONS

Blade Size (Customer Supplied, must match work material)	Ø12.4" (315mm) x T0.10" (2.5mm)
Arbor Size	1.26" (32mm)
Blade Speed	52rpm
Head Style	Pivot
Operation	Manual
Head Miter	45° Left / 45° Right
Vise Style	Single Action with Cam Lock
Maximum Vise Opening	4.72" (120mm)
Slotting Ability	Yes
Material Stop Length	30" (762mm)
Vise Table Height from Floor	38" (965.2mm)
Power	220V, 1ph, 60hz
Main Motor	2.5hp (1.86kw), 220V, 1ph, 4P, 60hz, 16A
Coolant Pump	1/8hp (93w), 220, 1ph, 50/60hz, 0.5A, L140
Coolant Tank	1.5gal (5.7L)
Net Weight with Stand	390lbs (177kg)
Shipping Weight	500lbs (228kg)
Overall Dimensions (LxWxH)	40" x 39" x 72" (1016x991x1829mm)
Base Footprint	23" x 24" (584 x 610mm)
Shipping Dimensions (LxWxH)	60" x 44" x 48" (1524 x 1118 x 1220mm)

### **Cutting Capacities:**

Angle	Solid Bars			Tubing		
						
90°	3.5" (88.9mm)	3.2" x 3.2" (81.3x81.3mm)	4" x 3.2" (101.6x81.3mm)	3.5" (88.9mm)	3.2" x 3.2" (81.3x81.3mm)	4" x 3.2" (101.6x81.3mm)
45°	3.5" (88.9mm)	2.6" x 2.6" (66x66mm)	3.2" x 2.6" (81.3 x 66mm)	3.5" (88.9mm)	2.6" x 2.6" (66x66mm)	3.2" x 2.6" (81.3 x 66mm)



## UNPACKING AND CHECKING CONTENTS

Your Baileigh machine is shipped complete in two boxes on one pallet. Separate all parts from the packing material and check each item carefully. Make certain all items are accounted for before discarding any packing material.

**⚠ WARNING: SUFFOCATION HAZARD!** Immediately discard any plastic bags and packing materials to eliminate choking and suffocation hazards to children and animals.  
If any parts are missing, **DO NOT** place the machine into service until the missing parts are obtained and installed correctly.

### Cleaning

**⚠ WARNING: DO NOT USE** gasoline or other petroleum products to clean the machine. They have low flash points and can explode or cause fire.

**⚠ CAUTION:** When using cleaning solvents work in a well-ventilated area. Many cleaning solvents are toxic if inhaled.

Your machine may be shipped with a rustproof waxy coating and/or grease on the exposed unpainted metal surfaces. Fully and completely remove this protective coating using a degreaser or solvent cleaner. Moving items will need to be moved along their travel path to allow for cleaning the entire surface. For a more thorough cleaning, some parts will occasionally have to be removed. **DO NOT USE** acetone or brake cleaner as they may damage painted surfaces.

Follow manufacturer's label instructions when using any type of cleaning product. After cleaning, wipe unpainted metal surfaces with a light coating of quality oil or grease for protection.



**Important:** This waxy coating is **NOT** a lubricant and will cause the machine to stick and lose performance as the coating continues to dry.





Two Person Lift. Use an assistant or lifting devise (preferred) to support the weight of the saw body. Do not lift alone.

Stand



Tank



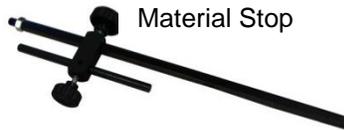
Cover Plate



Head Assembly



Material Stop



Rear Plate

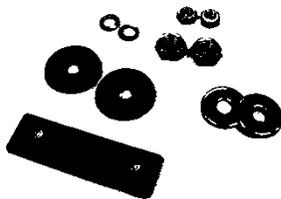


Hardware #1



Support Roller

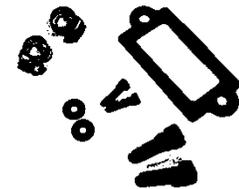
Tank Platform



Hardware #2



Feed Handle



Hardware #3



Front Splash Plate

Coolant Hose



Drain Hose



Pump



## **TRANSPORTING AND LIFTING**

**NOTICE:** *Lifting and carrying operations should be carried out by skilled workers, such as a truck operator, crane operator, etc. If a crane is used to lift the machine, attach the lifting chain carefully, making sure the machine is well balanced.*

### **Follow these guidelines when lifting with truck or trolley:**

- The lift truck must be able to lift at least 1.5 – 2 times the machines gross weight.
- Make sure the machine is balanced. While transporting, avoid rough or jerky motion, and maintain a safe clearance zone around the transport area.
- Use a forklift with sufficient lifting capacity and forks that are long enough to reach the complete width of the machine.
- Remove the securing bolts that attach the machine to the pallet.
- Approaching the machine from the side, lift the machine on the frame taking care that there are no cables or pipes in the area of the forks.
- Move the machine to the required position and lower gently to the floor.
- Level the machine so that all the supporting feet are taking the weight of the machine and no rocking is taking place.



## **INSTALLATION**

### **IMPORTANT:**

Consider the following when looking for a suitable location to place the machine:

- Overall weight of the machine.
- Weight of material being processed.
- Sizes of material to be processed through the machine.
- Space needed for auxiliary stands, worktables, or other machinery.
- Clearance from walls and other obstacles.
- Maintain an adequate working area around the machine for safety.
- Have the work area well illuminated with proper lighting.
- Keep the floor free of oil and make sure it is not slippery.

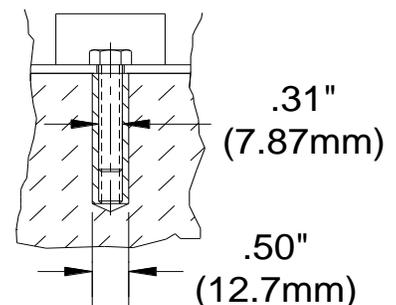


- Remove scrap and waste materials regularly, and make sure the work area is free from obstructing objects.
- If long lengths of material are to be fed into the machine, make sure that they will not extend into any aisles.
- **LEVELING:** The machine should be sited on a level, concrete floor. Provisions for securing it should be in position prior to placing the machine. The accuracy of any machine depends on the precise placement of it to the mounting surface.
- **FLOOR:** This machine distributes a large amount of weight over a small area. Make certain that the floor is capable of supporting the weight of the machine, work stock, and the operator. The floor should also be a level surface. If the unit wobbles or rocks once in place, be sure to eliminate by using shims.
- **WORKING CLEARANCES:** Take into consideration the size of the material to be processed. Make sure that you allow enough space for you to operate the machine freely.
- **POWER SUPPLY PLACEMENT:** The power supply should be located close enough to the machine so that the power cord is not in an area where it would cause a tripping hazard. Be sure to observe all electrical codes if installing new circuits and/or outlets.

### Anchoring the Machine

This saw can be operated as free standing if; all of the installation points are followed and the saw is solid and will not tip, rock, or move, with or without material loaded or during operation. If it does not meet these criteria, then the saw should be anchored as follows.

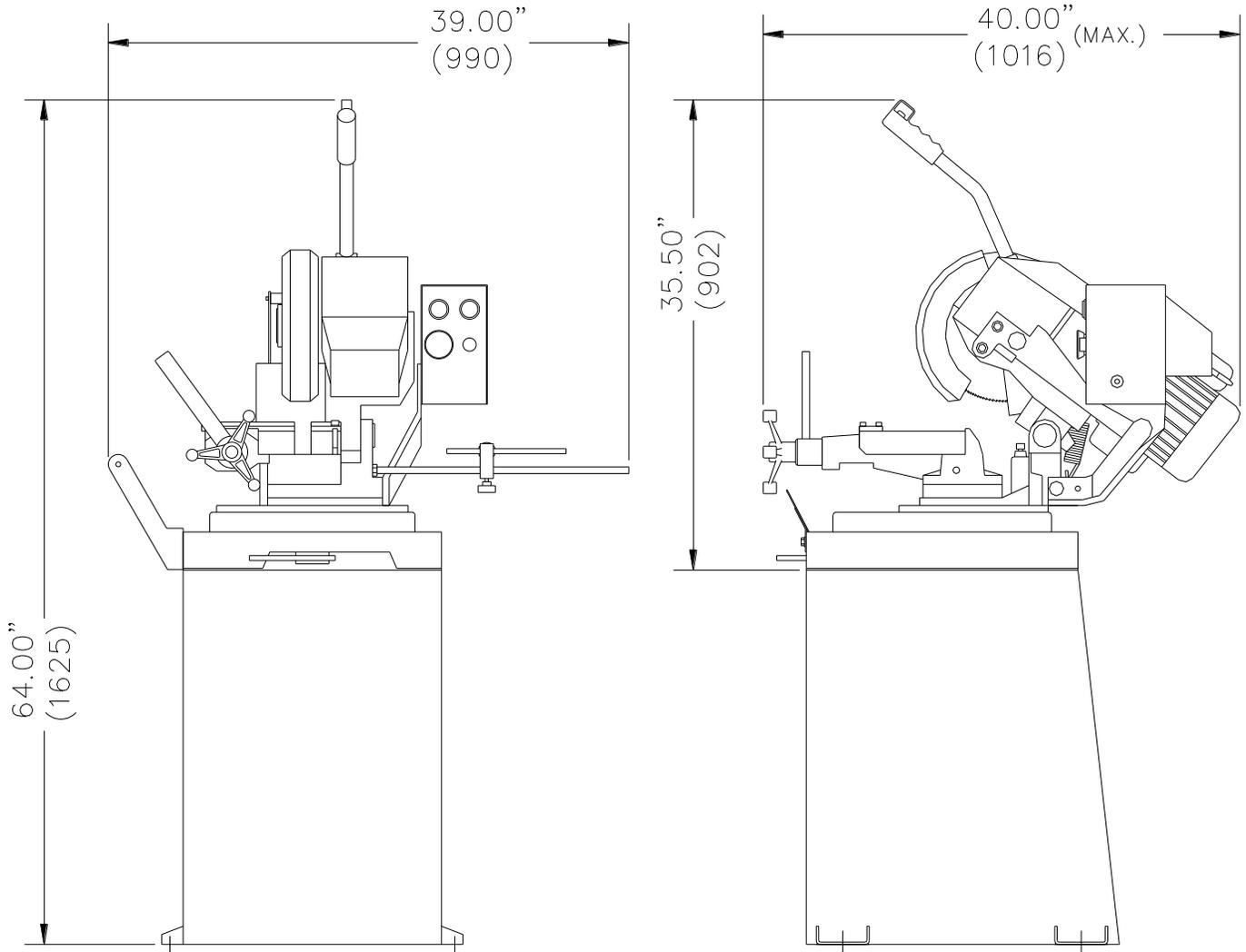
- Once positioned, anchor the machine to the floor, as shown in the diagram. Use bolts and expansion plugs or sunken tie rods that connect through and are sized for the holes in the base of the stand.
- This machine requires a solid floor such as concrete at a minimum of 4" (102mm) thick. 6" (153mm) minimum is preferred.





## OVERALL DIMENSIONS

Machine Dimensions  
(when assembled)





## **GETTING TO KNOW YOUR MACHINE**

### **Saw Blade Head Assembly**

The section of the machine composed of the saw motor, gear case, blade and blade guard, and feed handle and trigger switch.

### **Feed Handle**

A long angled tube with a grip for raising and lowering the disk head and a trigger switch to start and stop the saw motor.

### **Gear Case**

The central part of the assembly, housing the gear system. The motor mounts to the back and the output to the blade is to the left side.

### **Blade Guard**

The Blade guard has a stationary cover which mounts to the left side of the gear case and a movable part which has linkage connect to it to cause the guard to open and expose the lower part of the blade as the feed handle is pulled downward.

### **Saw Blade**

The saw blade is mounted onto the end of the arbor shaft and positioned to be centered within the guard assembly.

### **Electrical Box**

The electrical box is mounted to the right of the saw blade head assembly and house the electrical control system except for the trigger switch. The function of the switches will be discussed later.

### **Machine Base**

A heavy cast iron structure that supports the miter system, vise system, head assembly, and holds the coolant system.





## **Vise**

A clamping system that provides the basic support and grip for the work material. A handwheel opens and closes the vise jaws.

From the operators position in front of the saw, the left side of the vise has the jaws to clamp the material.

The right side bar provides support to reduce and prevent the material from kicking out at the end of the cut.

## **Material Stop**

The material stop to the right side of the vise may be used to set the cut length of the material. This is especially useful for multiple cuts of the same length.



## **Support Roller**

The support roller to the left or infeed side of the vise will assist in holding the material on plane with the vise table as well as assist in feeding the material through the vise.





### **Stand**

Support structure for the machine head assembly, machine base, vise system, and coolant pump system.



### **Coolant Pump**

Located in the back of the machine stand, the self contained coolant system includes a tank, coolant pump, filter, and hoses.



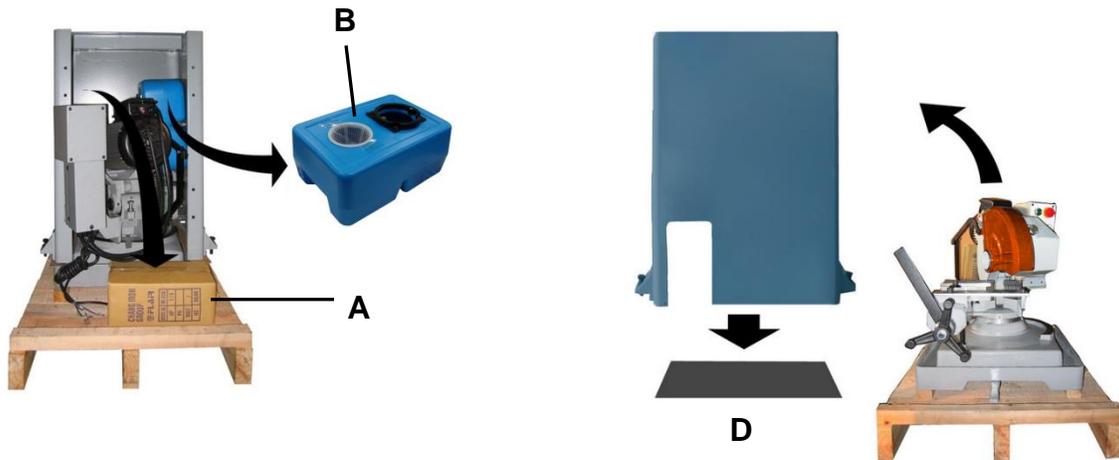


## ASSEMBLY AND SET UP

**⚠ WARNING:** For your own safety, **DO NOT** connect the machine to the power source until the machine is completely assembled and you read and understand the entire instruction manual.

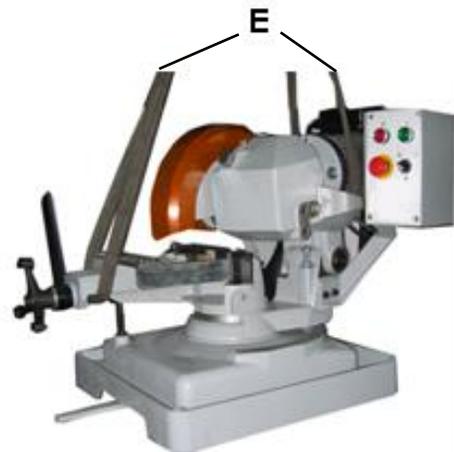
Take out the accessories box (A) and the coolant tank (B) from inside of the stand and set aside for later use.

Lift off the stand (C) and place into the intended working location (D).



### Prepare the machine for hoisting

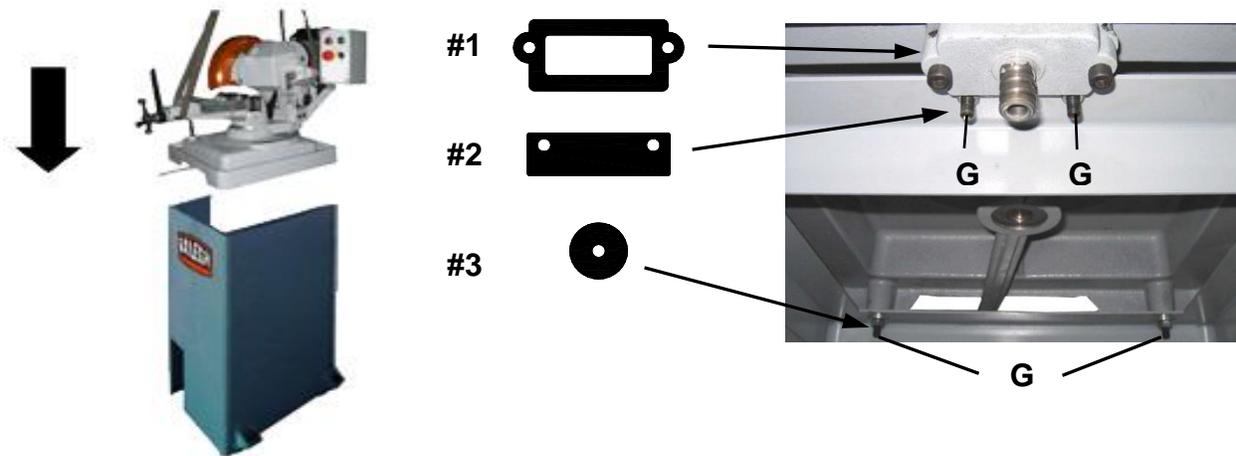
- Method 1: Using a sling (E), carefully wrap it around the collar of the moveable jaw and motor mount.





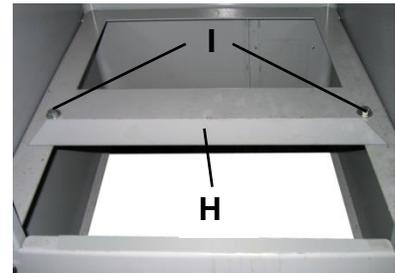
Place the machine on the top of the stand.

- Using an overhead hoist, lift the machine head.
- Align and insert the four setscrews (**G**) on the underside of the machine base into the #2 & #3 gaskets, while lowering the head onto the stand.
- Secure the machine onto the stand using nuts on the underside of the stand holes.
- Attach the #1 gasket and drain flange to the head with (2) socket head bolts.



Attach the coolant tank platform.

- Insert platform (**H**) into the interior of the machine stand.
- Align the platform holes (**I**) to the screw holes on the machine stand.
- Apply an M8 washer to each M8X12 screw and secure the platform (**H**) to the stand.



Remove the oil fill transport plug from gear transfer case.

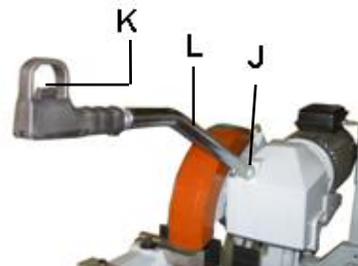
- Use a wrench to unscrew an M20x40 hex screw from the oil fill hole (**J**).





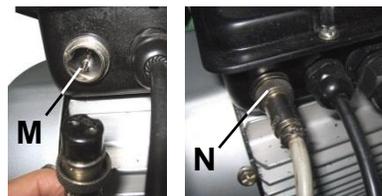
Attach the feed handle to the head assembly.

- Insert the threaded end of the feed handle (**L**) into the gear oil fill hole (**J**).
- Turn the handle clockwise (**cw**) until tight so that the trigger switch (**K**) points up.
- Tighten jam nut clockwise (**cw**).



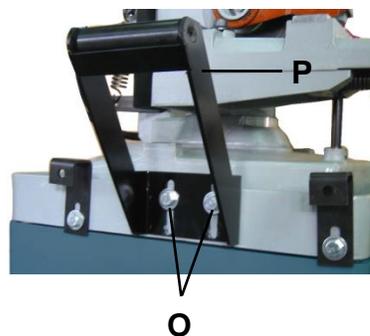
Connect feed handle cable to motor box.

- Locate the open socket (**M**) at the side of the electrical box on the motor.
- Plug the feed handle cable connector into socket (**M**).
- Use a wrench to tighten the connector nut (**N**).



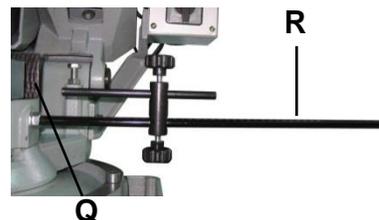
Attach the support roller to the left side of the base.

- Place the support roller (**P**) up to the machine base and align the 2 slots (**O**) with the screw holes in the base.
- Using (2) M10 washers and (2) M10x25 hex bolts, attach the support roller to the base.
- (**DO NOT** Tighten).
- Place a level across the mouth of the vise and the top of the roller. Raise or lower roller (**P**) until level, then secure by tightening bolts.



Attach the bar stop to the vise.

- Insert the threaded end of the long rod (**R**) into the side of the vise.
- Turn clockwise (**cw**) until snug making sure graduated scale can be easily read.
- Using a wrench, turn hex jam nut (**Q**) clockwise (**cw**) until tight.



Attach the cover plate to machine stand.

- Place plate (**S**) next to the hole at the base of the machine stand.
- Align the mounting holes and secure with (4) M5x6 screws.





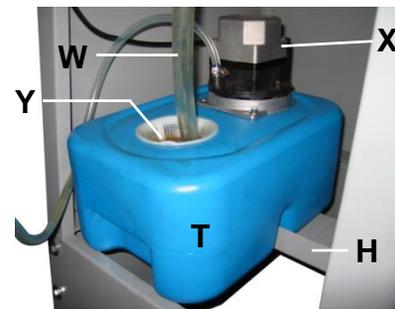
Assemble the coolant tank.

- Insert the coolant pump (X) into the coolant tank (T).
- Using (2) M6 washers and (2) M6x20 bolts, secure pump to tank.
- Place the hose clamp (U) onto the 0.375" flow tube (V) and connect tube to hose connector. Tighten the hose clamp.



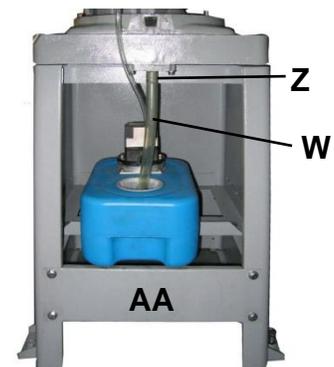
Install the coolant tank.

- Place the coolant pump (X) towards the rear opening of the machine stand.
- Place the coolant tank (T) onto the coolant platform (H). The trough of the tank fits over the vertical lip of the platform.
- Insert one end of the 0.50" drain hose (W) onto the hose connector (Z) on the underside of the machine base.
- Place the other end into the insert (Y) of the coolant tank.



Attach the rear plate to the back of the stand.

- Place rear plate (AA) across the back of the machine stand.
- Align the plate holes and secure the plate with (4) M8 washers and (4) M8x25 screws.



Install the splash plate.

- Insert the splash plate (AB) onto the front sidewall of machine base.
- Align the 2 slots (AC) and attach plate with (2) M8 washers and (2) M8x20 hex screws.
- Adjust the plate to its proper position and tighten bolts.





## ELECTRICAL

 **CAUTION:** HAVE ELECTRICAL UTILITIES CONNECTED TO MACHINE BY A CERTIFIED ELECTRICIAN!  
Check if the available power supply is the same as listed on the machine nameplate.

 **WARNING:** Make sure the grounding wire (green) is properly connected to avoid electric shock. DO NOT switch the position of the green grounding wire if any electrical plug wires are switched during hookup.

### Power Specifications

Your machine is wired for 110 volts, 60hz alternating current. Before connecting the machine to the power source, make sure the power source is OFF.

Before switching on the power, you must check the voltage and frequency of the power to see if they meet with the requirement, the allowed range for the voltage is  $\pm 5\%$ , and for the frequency is  $\pm 1\%$ .

### Considerations

- Observe local electrical codes when connecting the machine.
- The circuit should be protected with a time delay fuse or circuit breaker with an amperage rating slightly higher than the full load current of machine.
- A separate electrical circuit should be used for your machines. Before connecting the motor to the power line, make sure the switch is in the "OFF" position and be sure that the electric current is of the same characteristics as indicated on the machine.
- All line connections should make good contact. Running on low voltage will damage the motor.
- In the event of a malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This machine is equipped with an electric cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into a matching outlet that is properly installed and grounded in accordance with all local codes and ordinances.

 **WARNING:** In all cases, make certain the receptacle in question is properly grounded. If you are not sure, have a qualified electrician check the receptacle.



- Improper connection of the equipment-grounding conductor can result in risk of electric shock. The conductor with insulation having an outer surface that is green with or without yellow stripes is the equipment-grounding conductor. If repair or replacement of the electric cord or plug is necessary, do not connect the equipment-grounding conductor to a live terminal.
- Check with qualified electrician or service personnel if the grounding instructions are not completely understood, or if in doubt as to whether the machine is properly grounded.
- Repair or replace damaged or worn cord immediately.

### **Extension Cord Safety**

Extension cord should be in good condition and meet the minimum wire gauge requirements listed below:

AMP RATING	LENGTH		
	25ft	50ft	100ft
1-12	16	16	14
13-16	14	12	12
17-20	12	12	10
21-30	10	10	No
WIRE GAUGE			

An undersized cord decreases line voltage, causing loss of power and overheating. All cords should use a ground wire and plug pin. Replace any damaged cords immediately.

### **Power cord connection:**

1. Turn the main disconnect switch on the control panel to the OFF position.
1. Unwrap the power cord and route the cord away from the table toward the power supply.
  - a. Route the power cord so that it will NOT become entangled in the saw, saw blade, or counterbalance assembly in any way.
  - b. Route the cord to the power supply is a way that does NOT create a trip hazard.
2. Connect the power cord to the power supply and check that the power cord has not been damaged during installation.
3. When the saw blade is clear of any obstruction and raised to the up position, the saw turned ON to test operation. Turn the saw OFF and press the E-Stop button when the saw is not in operation.



## OPERATION

**⚠ CAUTION:** Always wear proper eye protection with side shields, safety footwear, and leather gloves to protect from burrs and sharp edges. When handling large heavy material make sure they are properly supported.

### Miter Angle

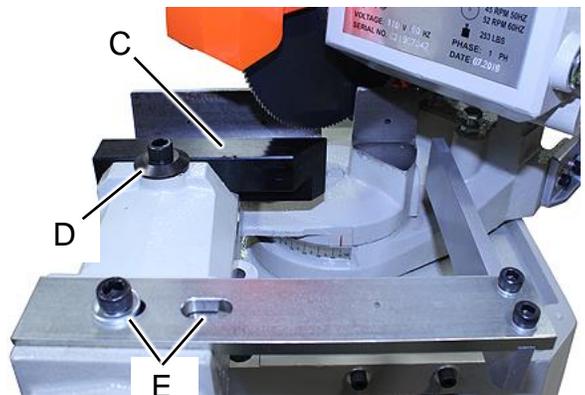
**⚠ CAUTION:** Check that the cutting blade clears all parts of the vise assembly before cutting. The blade can strike parts of the assembly (especially during miter cuts) if not properly adjusted.

1. Push the miter lock lever (A) to the left to release the disk head assembly.
2. Rotate the disk head assembly to the desired miter angle.
3. Use the indicator scale (B) to set the desired cut angle. (Fine tune the angle as needed to get the exact angle.)
4. Pull the miter lock lever (A) back to the right to lock in the angle. **ALWAYS LOCK THE LEVER BEFORE CUTTING.**
5. Adjust the vise clamping jaw (C) to allow for the blade to clear the vise without contacting the jaw.



**Important:** Never allow the saw to cut into the vise jaws.

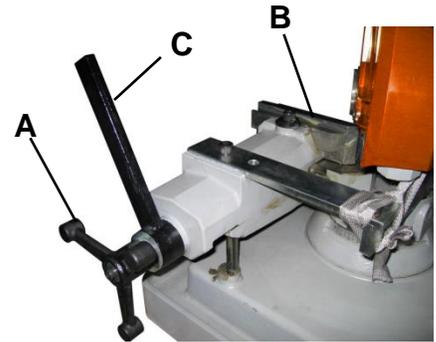
6. Loosen the clamping bolt (D) and slide the jaw left or right as needed to clear the saw blade. The jaw should be between 0.25" and 0.5" (6 – 13mm) with out contacting the saw blade.
7. Adjust the clamping support to the right side of the blade by loosening and the mounting bolt and sliding the support within the slots (E) or when needed, changing the slots. If absolutely necessary, the clamping support may be removed.





### Vise Operation

1. Use the hand wheel (A) to open and close the vise jaw (B) for pieces that vary in width.
  - a. Counter clockwise (ccw) to open jaws
  - b. Clockwise (cw) to close jaws
2. Use the vise release lever (Z) to quickly clamp and unclamp pieces of the same width. The release lever is a 1/2 turn lever, from straight up (loosen) to straight down (clamped).
  - a. Clockwise (cw) to clamp the piece
  - b. Counter clockwise (ccw) to unclamp the piece



### Loading the Piece Part

1. Use the vise hand-wheel to open the jaws wider than the width of the piece.
2. Measure and mark off the length of material to be cut.
3. Place the piece on the flat surface in between the vise jaws.
4. Slide the piece through the jaws so the scribed length mark lines up with the blade or disk.
5. Push the piece up against the back vise jaw.
6. Turn the hand-wheel clockwise (cw) to clamp the piece.

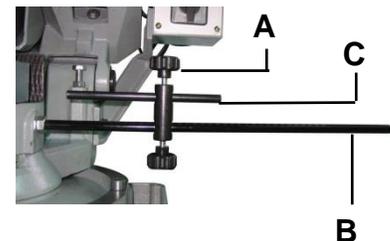
### If repetitive cuts are required for material of the same width:

1. Turn the vise hand-wheel clockwise (**cw**) to approach the piece part, leaving approximately 3/16" (5mm) gap between front jaw and the piece part.
2. Then use the vise lock lever to clamp and unclamp the piece.

### Setting Cut Length

Setting the cut length eliminates measuring duplicate pieces.

1. Measure and mark the length of material to be cut off.
2. Load the piece part.
3. Line up the cut.
4. Clamp the piece part.
5. Loosen the hex nut at the base of the bar riser (A).
6. Slide the bar riser (A) along the long rod (B) so that the tip of stop bar (C) touches the end of the piece part.
7. Tighten the hex nut at the base of the bar riser (A).



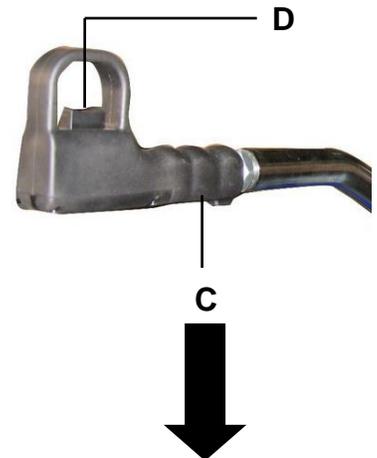
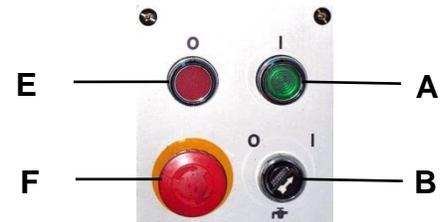


### Using the stop bar

1. Cut off the first length from the clamped piece part.
2. Unclamp the piece part.
3. Slide the piece part forward until it reaches the tip of the stop bar (C).
4. Clamp the piece part.
5. Proceed with the cutting cycle.

### Cutting Operation Cycle

1. Set the miter cut angle.
2. Open the vise jaws.
3. Load and clamp the piece part.
4. Adjust the bar stop for cutting length.
5. Press button (A) to turn power on to the saw. (Green light will be lit).
6. Set the coolant switch (B) to on.
7. Grasp the feed handle (C).
8. Press the trigger switch (D) to start blade motor.
9. Pull down the feed handle (C) applying a steady and constant pressure.
10. After cut-off, raise feed handle slowly.
11. Release the trigger switch (D) to stop the blade motor.
12. Use vise lever to open the jaws.
13. Remove or advance the piece part forward for next cut.
14. To turn off machine power press the stop button (E)
15. To stop machine in an emergency situation, press the EMERGENCY STOP button (F).
16. Before restarting machine, emergency stop button must be reset with a clockwise (cw) twist.



**NOTICE:** Do not allow the saw to slam back up to the start position. Doing so will cause damage to the pivot block and the weight of the motor will cause damage to the gear case adaptor over time.



### **Metal Chip Indicators**

Chips are the best indicator of correct material feed force. Monitor chip information and adjust feed accordingly.

- Thin or Powdered Chips – increase feed rate or reduce saw speed
- Burned Chips – reduce feed rate and / or saw speed
- Curly Silvery and Warm Chips – optimum feed rate and saw speed

The Baileigh cold saw is now ready to start work. For quality cutting and machine performance always use the correct type of blade or disk and recommended cutting speeds. To extend the life of a new blade or disk, the first two or three cuts must be made while exerting a slight pressure on the piece part. This will double the normal cutting time.

### **CHOOSING A SAW BLADE**



**Note:** *The saw blade included with this cold saw is a general-purpose blade. It is considered a starter blade and is intended to allow for the saw to make cut as soon as it is safely set up and ready for operation.*

*While this blade will cut many material profiles, the best cutting results will be achieved using a blade which is chosen to match the material to be cut.*

To achieve a quality, economical, and efficient saw cut, the following points must be taken into consideration:

- Type of material being cut (ferrous or non-ferrous)
- Material hardness and physical dimensions
- Blade descent rate
- Rotational speed of blade
- Blade tooth profile

Choose a tooth pitch that is suitable for the workpiece. Thin walled profiles, including tubes and pipes require close toothing. At least 3-6 teeth should be in contact with the material while cutting. Large solid or transverse sections require widely spaced toothing to allow for greater volume of chips and better tooth penetration. Soft materials such as plastics, light alloys, mild bronze, Teflon, wood, etc., require widely spaced toothing to avoid clogging.



## General Characteristics

Fine Tooth Pitch – used for thin wall materials such as sheet steel, tubes and profiles.

Coarse Tooth Pitch – used for large cross-sections, and for soft materials (aluminum alloys and soft alloys in general).

## Determining Proper Tooth Pitch

Proper tooth pitch depends on:

The size of the section.

The hardness of the material.

Wall thickness.

Solid sections call for blades with a coarse tooth pitch, while small cross-sections require blades with finer teeth.

When cutting walls of small cross-section 0.039” – 0.275” (1–7mm) profiles, it is important that the number of teeth actually making the cut should be at least 3 teeth. Otherwise the effect obtained will be one of tearing rather than of chip removal, leading to a large increase in shearing stress.

When cutting thick materials or solid sections using an excessively fine tooth pitch, the chip collects as a spiral inside the gullet, and since fine tooth pitches have small gullets, the accumulated chip will exceed the gullet capacity and press against the walls of the workpieces, resulting in poor cutting (same situation with soft materials), greater shearing stress and hence breakage of the blade.

A larger pitch should be chosen when the shape of the piece to be cut has a cross-section at any given point which exceeds the average cross-section.



Choice of tooth pitch T as a function of cross-section to be cut for light alloy solid pieces and profiles

 S		 S	
		 sp	
S in mm.	Pitch T	S and sp in mm.	Pitch T
10	6	10 sp=0.5	3-4
30	8	30 sp=1.5	4-5
50	10	50 sp=2.5	6-7
70	12	70 sp=3.5	8-9
90	14	90 sp=4.5	8-9
130	18	130 sp=6.5	10

KEY:

s = diameter or width of the solid piece to be cut in mm.

sp = thickness of the wall to be cut in mm.

T = tooth pitch in mm.

## Cutting and Feeding Speed

The cutting speed and the head feeding speed are limited by the amount of heat generated near to the points of the teeth. If the head feeding speed is too high, the cut will not be straight in either the vertical or the horizontal plane.

The cutting speed depends on the strength (kg/mm<sup>2</sup>) and hardness (HRC) of the material and the dimensions of the thickest section.

The feeding speed depends on the cross-section of the material. Solid or thick-walled materials (thickness > 5mm) can therefore be cut at high speed providing there is sufficient swarf removal by the blade, while thin-walled materials such as tubes or thin profiles must be cut with a low feeding speed.



## Breaking in a Saw Blade



**Important:** A new blade requires a break- in period, during which time about half the normal feeding speed should be used.

Sharp cutting edges with extremely small edge radii are required for high cutting capacity. To achieve the optimal tool life we recommend breaking-in the blade accordingly. The correct cutting speed is determined by the material being cut and its dimensions. It is very important that the new blade is first used with only 50% of the determined feed rate. This will avoid micro-breakages of the blade because of too large chip thicknesses. New saw blades may tend toward vibrations and vibration sounds. In this case a slight reduction of the cutting speed (feed rate if the saw is a single rpm machine) is helpful. With small workpiece dimensions approximately 300cm<sup>2</sup> of the material should be cut for breaking-in. If large work piece dimensions are to be cut we recommend a breaking-in period of about 15 minutes. After breaking-in you may slowly increase the feed rate up to the determined value.

## Coolant

The cooling fluid ensures that the blade teeth and material in the area of the cut do not overheat. The fluid must be an excellent lubricant so as to prevent abrasion of the teeth and welding of the chips to the teeth (seizing).

## Blade structure

For non-ferrous metals, it is common to use circular saws with a brazed hard metal HM cutting edge, consisting of a disc made of alloy tool steel (71Cr1) on which the shape of the teeth and the seats for the cutting edges are made of Widia K10. These saws have shown excellent wear resistance but low resistance to impact, which is in any case a minor problem with non-ferrous materials.

### CHEMICAL COMPOSITION:

Blade body	C	Cr	Mn	Mo	V	Co	HRC
<b>steel type</b>	0,71	0,20	0,40	-	-	-	
<b>71Cr1</b>	÷ 0,78	÷ 0,30	÷ 0,70	÷ -	÷ -	÷ -	43+/-1

### KEY:

C = Carbon                      Co = Cobalt                      Cr = Chromium  
 Mo = Molybdenum            Mn = Manganese              V = Vanadium  
 The numbers in the columns indicate the % of the element present in the steel.

## Types of blades

In addition to the size and pitch of the teeth, the blades also have different geometric characteristics in accordance with their particular use:

tooth cutting angle – may be negative or positive

tooth sharpening – may be BW with an alternate raked tooth or C with a roughing tooth raked on both sides and a non-raked finishing tooth

tooth pitch – the distance between the crest of one tooth and the crest of the next tooth (tooth pitch = T)

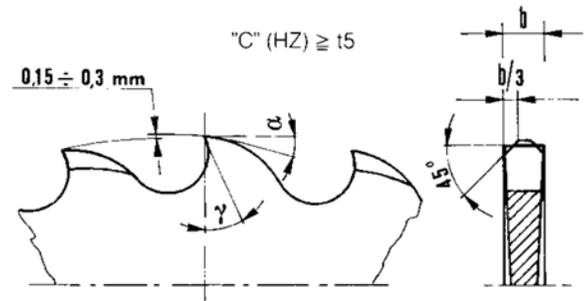


## Teeth shape

### "C" TYPE SHARPENING (HZ)

Coarse toothing with roughing tooth raked on both sides and non-raked finishing tooth. The roughing tooth is about 0.3 mm higher.

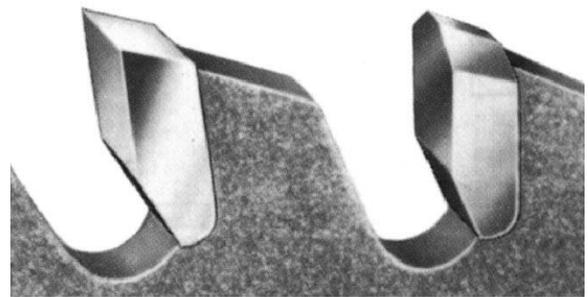
Coarse toothing with roughing tooth and finishing tooth. Used in saws with pitch greater than or equal to 5 mm for cutting ferrous and non-ferrous materials with solid or solid-profiled sections.



### "BW" TYPE SHARPENING DIN 1838--UNI 4014

Coarse toothing with teeth alternately raked to the right and left.

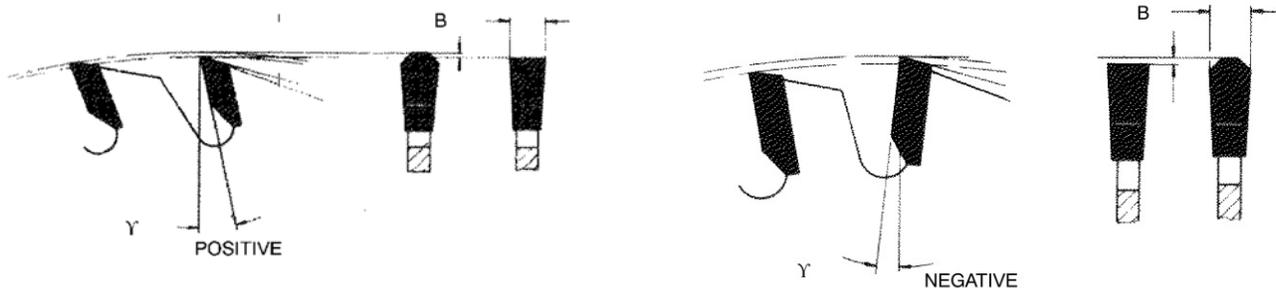
Toothing generally used on cut-off machines for cutting ferrous and alloy materials with tubular and profiled sections.



## POSITIVE AND NEGATIVE CUTTING ANGLES

The cutting angle may vary from positive to negative depending on the cutting speed, the profile and the type of material to be cut.

A positive angle determines better penetration of the tool and hence lower shear stress and greater ease of sliding for the swarf over the cutting edge. On the other hand, the cutting edge has lower mechanical resistance, so that as the breaking load of the material to be cut increases, the cutting angle decreases from positive until it becomes negative, thus offering a cutting edge with a larger resistant section.



Short swarf material such as brass, bronze, aluminum and hard cast iron require smaller cutting angles because the swarf becomes crushed immediately and the rake angle has little effect during the cutting stage.



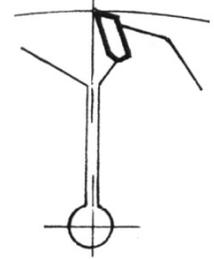
The cold saws use discs with positive cutting angles for cutting solid materials and with negative cutting angles for cutting hollow profiles. This is because, as a result of the high cutting speeds, even with non-ferrous materials the tool “strikes” against the wall of the profile to be cut several times, thus requiring a cutting edge with a larger resistant section.

Circular saws can also be characterized by other parameters such as the whine reduction feature, which cuts down noise at high speeds, or expansion, which compensates for the pushing of chips inside the cutting edge, thus reducing the thrust on the walls of the material to be cut.

*Whine reduction feature*



*Expansion cut*



Use the chart on the following page to help select the saw blade suitable for your application. Baileigh Industrial offers a wide selection of tooth styles for various cutting applications. Please phone Baileigh Industrial at (920.684.4990) to have one of our technicians assist you in selecting the proper cold saw blades for your cutting applications.



## BLADE SELECTION CHART

Tube Diameter	Wall Thickness	Blade Diameter- Metric (Normal Inch)						
		225 (9")	250 (10")	275 (10-3/4")	300 (12")	315 (12-1/2")	350 (14")	401.0 (16")
1/2"	.030"-.090"	220BW	240BW	280BW	300BW	300BW	320BW	340BW
1/2"	.090"-.150"	200BW	220BW	240BW	280BW	280BW	300BW	320BW
1"	.030"-.060"	220BW	240BW	280BW	300BW	300BW	320BW	340BW
1"	.060"-.090"	220BW	220BW	240BW	280BW	280BW	300BW	320BW
1"	.090"-.150"	180BW	220BW	220BW	240BW	240BW	280BW	300BW
1-1/2"	.030"-.060"	220BW	240BW	260BW	300BW	300BW	320BW	340BW
1-1/2"	.060"-.090"	200BW	220BW	240BW	280BW	280BW	300BW	320BW
1-1/2"	.090"-.150"	180BW	200BW	220BW	240BW	240BW	280BW	300BW
1-1/2"	.150"-.250"	140C	160C	180C	200C	220C	220C	240BW
2"	.030"-.060"	240BW	260BW	280BW	300BW	300BW	320BW	340BW
2"	.060"-.090"	180BW	200BW	220BW	240BW	240BW	280BW	320BW
2"	.090"-.180"	140C	160C	180C	220C	220C	220C	300BW
2"	.180"-.300"	120C	140C	160C	180C	180C	200C	240BW
2"	.300"-.500"	100C	110C	120C	140C	140C	160C	180C
2-1/2"	.030"-.060"	240BW	260BW	280BW	300BW	300BW	320BW	340BW
2-1/2"	.060"-.090"	200BW	220BW	240BW	260BW	260BW	280BW	300BW
2-1/2"	.090"-.150"	180BW	180C	180C	200C	200C	220C	240BW
2-1/2"	.150"-.250"	120C	140C	160C	180C	180C	200C	220C
2-1/2"	.250"-.400"	100C	110C	120C	140C	140C	160C	180C
2-1/2"	.400"-.500"	90C	100C	110C	120C	120C	140C	160C
3"	.030"-.060"			280BW	300BW	300BW	320BW	340BW
3"	.060"-.090"			240BW	260BW	260BW	280BW	300BW
3"	.090"-.150"			180C	200C	200C	220C	240BW
3"	.150"-.250"			160C	180C	180C	200C	220C
3"	.250"-.400"			120C	140C	140C	160C	180C
3"	.400"-.500"			100C	120C	120C	140C	160C
3-1/2"	.030"-.060"				300BW	300BW	320BW	340BW
3-1/2"	.060"-.090"				260BW	260BW	280BW	300BW
3-1/2"	.090"-.150"				200C	200C	220C	240BW
3-1/2"	.150"-.250"				180C	180C	200C	220C
3-1/2"	.250"-.400"				140C	140C	160C	180C
3-1/2"	.400"-.500"				120C	120C	140C	160C

**For Stainless Steel: Recommended Teeth X 1.2 approx.**

**For Non-Ferrous Materials: Recommended Teeth X .75 Approx**

SOLID Diameter	Blade Diameter- Metric (Normal Inch)						
	225 (9")	250 (10")	275 (10-3/4")	300 (12")	315 (12-1/2")	350 (14")	401.0 (16")
1/4"-3/4"	180BW	180C	200C	220BW	220BW	280BW	320BW
3/4"-1-1/4"	120C	120C	140C	180C	180C	220BW	240BW
1-1/4"-1-3/4"	100C	100C	120C	140C	140C	180C	200C
1-3/4"-2-1/4"	80C	80C	100C	120C	120C	120C	140C
2-1/4"-2-3/4"	60C	60C	70C	80C	80C	80C	90C
2-3/4"-3-1/2"				60C	60C	60C	80C



## MACHINE ADJUSTMENTS

**⚠ WARNING:** BEFORE PERFORMING THE FOLLOWING OPERATIONS, THE ELECTRIC POWER SUPPLY AND THE POWER CABLE MUST BE COMPLETELY DISCONNECTED.

### Adjustment of Saw Blade Head

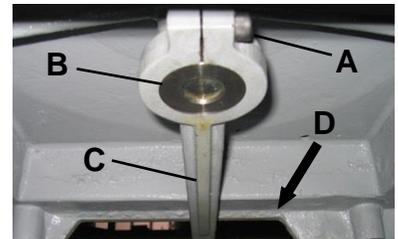
If excessive axial play is found on the pivot hinge, it will be necessary to tighten the screws.



**NOTE:** *Do not overtighten.*

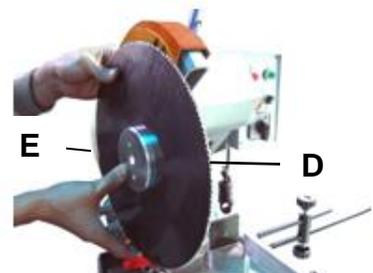
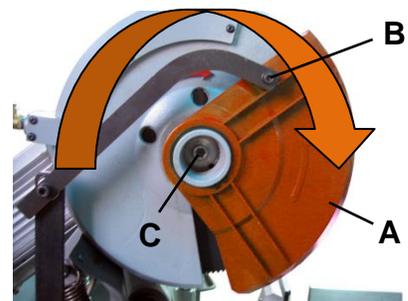
### Adjusting the Mitering Lock Lever

1. The lock lever may require adjustment when the lever contacts the machine base and fails to lock the machine head at required angle. To re-adjust lever:
2. Loosen bolt (A).
3. Support the bushing (B) so that it does not drop.
4. Pivot lever (C) to unlock side (D) to allow more range of motion.
5. Re-tighten bolt (A).



### Changing the Saw Blade

1. To change the saw blade:
2. Release and pivot the mobile guard (A) by removing the hex socket screw (B).
3. Place a block of wood into the vise.
4. Lower the machine head to rest the saw blade on the block of wood.
5. Using a hex wrench, remove the lock bolt (C) in a clockwise (cw) direction. (It has a left handed thread).
6. Remove the blade (D) and blade washer (E) from the spindle.
7. Remove the blade washer from the saw blade (D).
8. Place washer (E) onto the replacement blade and follow above procedure in reverse.
9. Check for proper blade rotation.

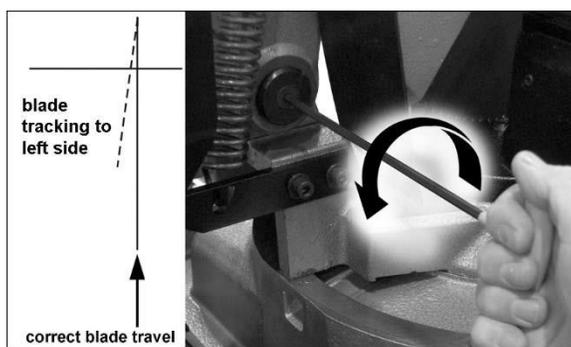
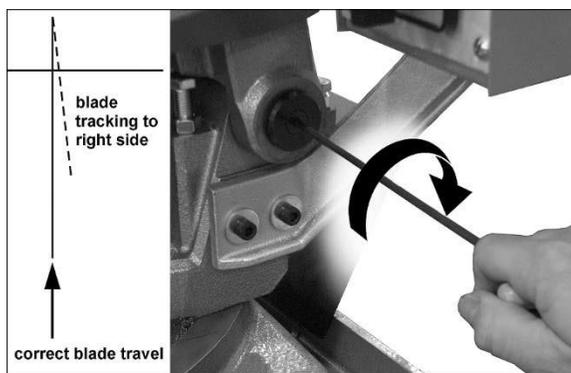
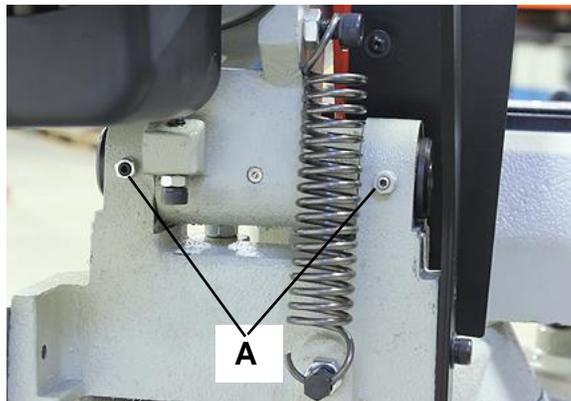




## **Blade tracking adjustment**

The head pivot shaft is supported by eccentric bushings. If blade tracks off center resulting in crooked cuts, adjust as follows.

1. Loosen two set screws (A) from rear of head pivot with 4mm hex wrench.
2. If blade tracks to right side (viewed from front of machine), rotate right socket screw (under the electrical box) clockwise with 5mm hex wrench.
3. If blade tracks to left side, rotate left socket screw counterclockwise.
4. Tighten set screws (A) and operate saw to verify correctness of adjustment.





## LUBRICATION AND MAINTENANCE

**⚠ WARNING:** Make sure the electrical disconnect is OFF before working on the machine.  
Maintenance should be performed on a regular basis by qualified personnel.  
Always follow proper safety precautions when working on or around any machinery.

### Daily Maintenance

- Check daily for any unsafe conditions and fix immediately.
- Check that all nuts and bolts are properly tightened.
- Do a general cleaning by removing dust and metal chips from the machine.
- Top off the coolant tank. (80% of full tank capacity)
- Inspect the disk/saw blade for wear.
- Check that the blade guard, shields, and emergency stops are in good working order.
- When through using machine, raise the head to reduce stress on the return spring.

### Weekly Maintenance

- Clean the machine including the coolant tank and the area around it.
- Lubricate threaded components and sliding devices.
- Clean and grease the vise screw and sliding surfaces.
- Clean the guard housing for the disk/saw blade.
- Apply rust inhibitive lubricant to all non-painted surfaces.
- Sharpen the saw teeth.

### Monthly Maintenance

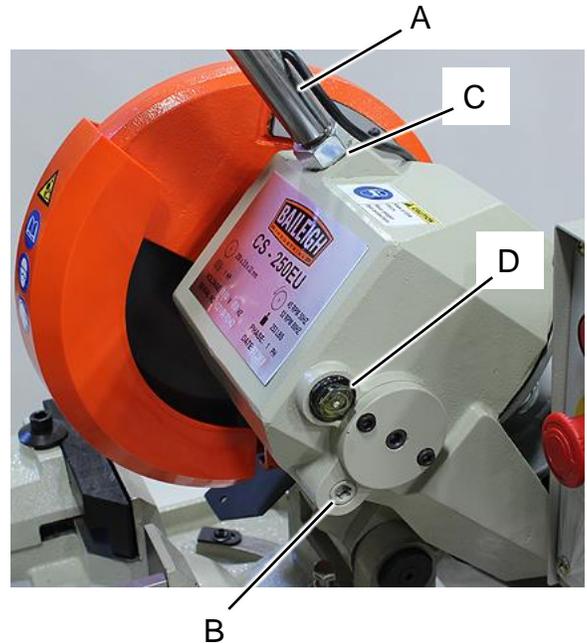
- Thoroughly clean the machine including the coolant tank.
- Check that all screws on the motor, the pump, the vise jaws, and the guard are tight and secure.
- Check that the saw guard is operating properly.
- Use an EP90 or similar oil to lubricate the saw head pivot and the saw miter pivot.



### **Yearly Maintenance**

Change the oil in the gear case as follows:

1. Lower the saw head to the horizontal (down) position.
2. Disconnect the trigger cord from the electrical box and unscrew the feed handle (A) from the gear case.
3. Place a container under the drain hole (B) and remove the drain plug allowing the oil to drain.
4. Install the drain plug.
5. Raise the head to the up position.
6. Fill the gear case with oil through the feed handle mounting hole (C) to the top of the sight gauge (D).
7. Install the feed handle and connect the trigger cord to the electrical box connector.

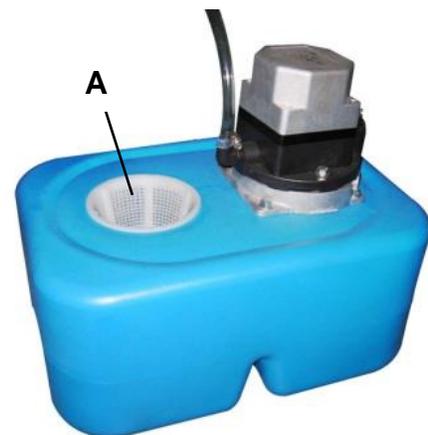


### **Oil Disposal**

- Used oil products must be disposed of in a proper manner following local regulations.

### **Accessing and Cleaning the Coolant System**

1. Remove the drain hose from the return screen.
2. Lift the tank and pump assembly off of the retaining tray and slide the assembly out of the stand.
3. Remove and clean the filter (A). Replace if needed.
4. Pour out the coolant from the tray.
5. Wash out the dirt and debris.
6. Replace the filter and install the pump and tank assembly so that the V-notch is over the retaining flange.
7. Fill the tank with coolant solution by pouring coolant through the chip strainer (A).





### Oils for Lubricating Coolant

Any 10:1 (water to coolant) solution will work, however we recommend Baileigh B-Cool 20:1 (water to coolant) biodegradable metal cutting fluid. It has excellent cooling and heat transfer characteristics, is non-flammable, and extends blade and machine life. Each gallon of concentrate makes 21 gallons of coolant.

### Storing Machine for Extended Period of Time

If the Cold Saw is to be inactive for a long period of time, prepare the machine as follows:

- Detach the plug from the electrical supply panel.
- Release the head return spring.
- Empty and clean the coolant tank.
- Clean and grease the machine.
- Cover the machine



**Note:** *Proper maintenance can increase the life expectancy of your machine.*

### Cleaning Coolant Path

Once a year or if the coolant flow is reduced, remove the channel covers and clean the coolant flow paths.

1. Disconnect power to the saw.
1. To change the saw blade:
  2. Release and pivot the mobile guard (A) by removing the hex socket screw (B).
  3. Remove the screws, covers, and gaskets from each side of the saw guard.
  4. Clean the coolant path (C) to remove all debris.
  5. Install the gasket and cover and secure with the screws. If the gasket has been damaged, an RTV type seal may be used, however do not allow sealant to get into the coolant flow path.
  6. When complete, connect the mobile guard pivot arm.





### **LUBRICATION OIL TABLE 1**

**Above 82°F (Select from the products listed below)**

Brand	Hydraulic Tank Oil	Gear Oil	Slideway Oil
Mobil	DTE XL 68, DTE 16M	Mobilgear 634, SHC 460	Mobil Vactra Oil No. 4
Shell	Shell Tellus Oil 68	Shell Omala Oil 460	Shell Tonna Oil T220
Exxon	Nuto H 68	Spartan EP 460	Febis K220

Brand	Hydraulic Cylinder Oil	Air Lube System	Grease Fittings
Mobil	DTE 21	DTE 21	Mobil UX2 EPO
Shell	Shell Carnea Oil 10	Shell Carnea Oil 10	Aluania Greaser 1
Exxon	Spinesso 10	Spinesso 10	Ronex MP Beacon 2

### **LUBRICATION OIL TABLE 2**

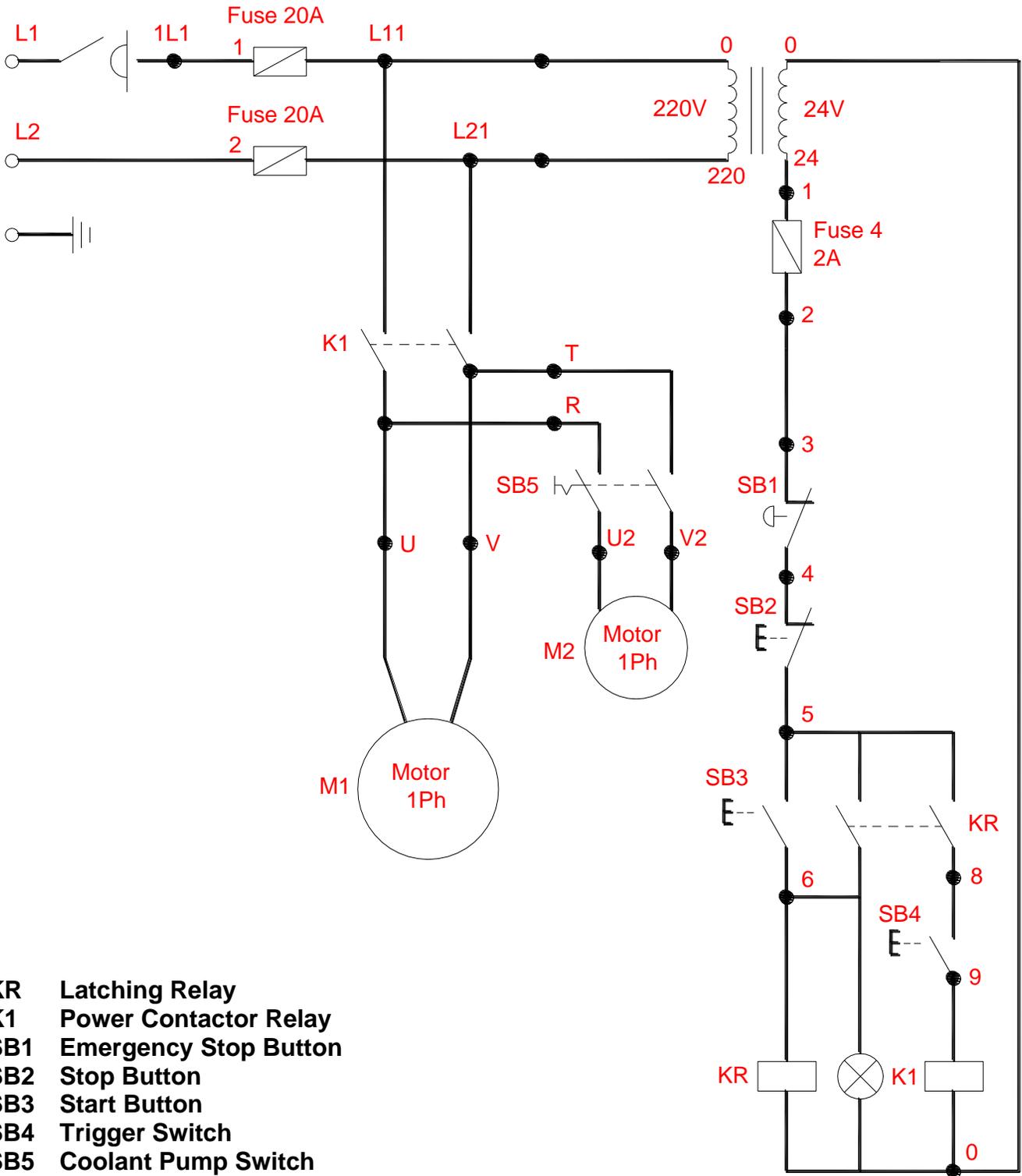
**Below 82°F (Select from the products listed below)**

Brand	Hydraulic Tank Oil	Gear Oil	Slideway Oil
Mobil	DTE XL 46, SHC 525	Mobilgear 630, SHC 220	Mobil Vactra Oil No. 4
Shell	Shell Tellus Oil 46	Shell Omala Oil 220	Shell Tonna Oil T220
Exxon	Nuto H 46	Spartan EP 220	Febis K220

Brand	Hydraulic Cylinder Oil	Air Lube System	Grease Fittings
Mobil	DTE 21	DTE 21	Mobil UX2 EPO
Shell	Shell Carnea Oil 10	Shell Carnea Oil 10	Aluania Greaser 1
Exxon	Spinesso 10	Spinesso 10	Ronex MP Beacon 2



## ELECTRICAL SCHEMATIC



- KR Latching Relay
- K1 Power Contactor Relay
- SB1 Emergency Stop Button
- SB2 Stop Button
- SB3 Start Button
- SB4 Trigger Switch
- SB5 Coolant Pump Switch

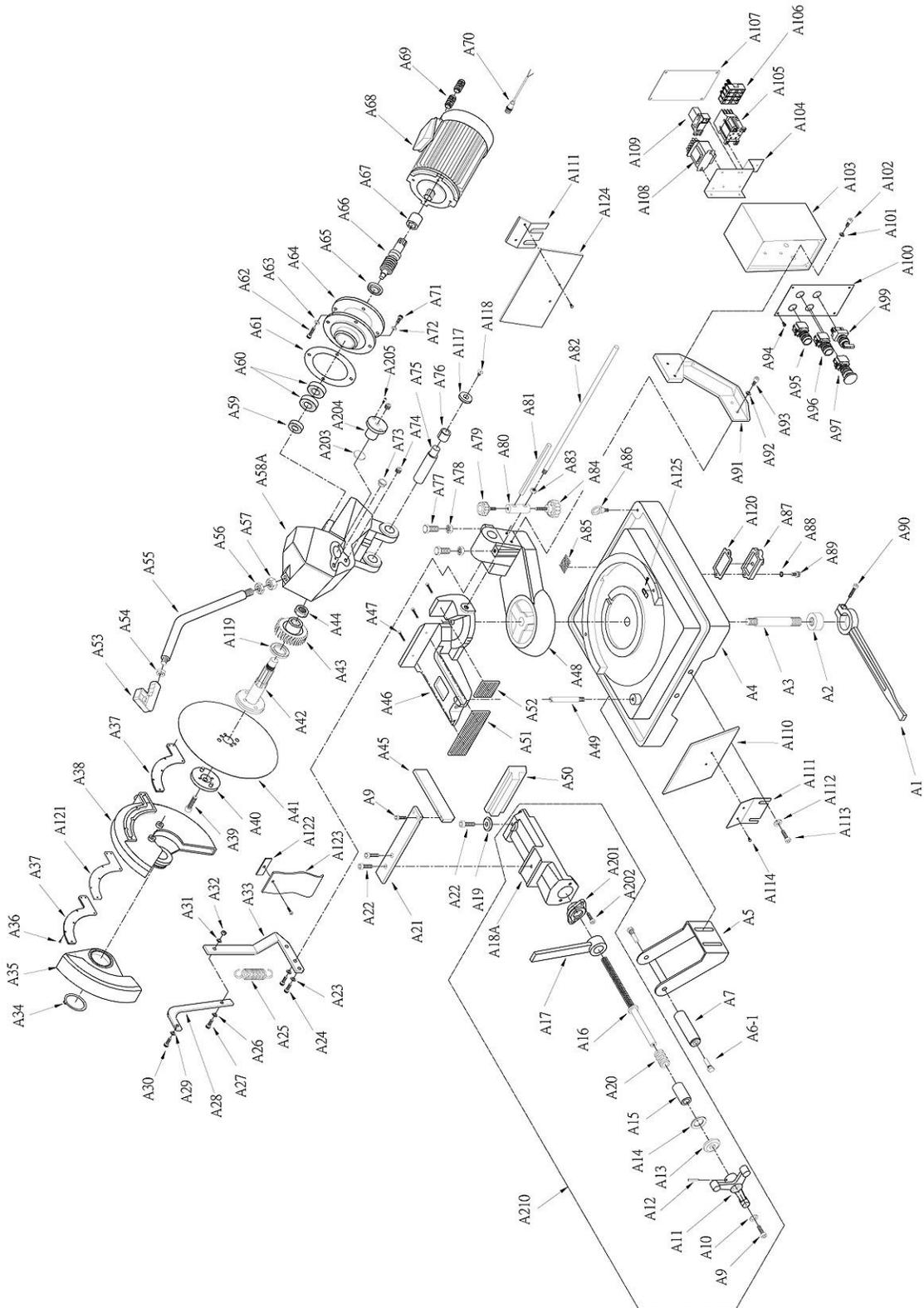


### Electrical Parts List

Item	Description and Function	Technical Data	Qty.
FU1 FU2 FU4	Fuses	20A, 10x38 100KA 20A, 10x38 100KA 2A Gg 10.3x38	1 1 1
	Fuse Base	32A 10 x 38 2P 32A 10 x 38 1P	1 1
K1	Contactor	Coil 24V, It = 25A, 220V 2.2kw, 400V 4.0kw, NHD C-09D	1
KR	Relay	250 VAC, 5A, MY-2N AC 24V	1
TC	Transformer	35VA / 220 / 24V	1
SB1	Emergency Stop	250V 6A, KEDU HY57B	1
SB2 SB3	Off Button Start Button	250V 6A 2a ABF-22Φ1b ABLFS-22Φ1a 30V	1 1
SB4	Trigger Switch	15A 1/2HP 125/250VAC 0.6A 125VDC 0.3A 250VDC V-15-1A5	1
SB5	Pump Switch	250V GIKOKA OSS-22Φ	1
MB	Circuit Breaker	30A, 250V	1
M1	Motor	220V / 2-1/2HP / 1Ø / 4Pole	1
M2	Coolant Pump	220V / 1/8HP / 1Ø / 4 Pole	1



# PARTS IDENTIFICATION DRAWING A





## Parts List A

Item	Part No.	Description	Size	Qty.
A1	CS315EU-A1	Miter Lock Handle		1
A2	CS315EU-A2	Lock Nut		1
A3	CS315EU-A3	Miter Pivot Shaft		1
A4	CS315EU-A4	Machine Base		1
A5	CS315EU-A5	Roller Bracket		1
A6-1	CS315EU-A6-1	Roller Shaft		2
A7	CS315EU-A7	Roller		1
A9	CS315EU-A9	Hex Socket Cap Screw	M8x20	3
A10	CS315EU-A10	Washer	M8	1
A11	CS315EU-A11	Handle Wheel		1
A12	CS315EU-A12	Roll Pin		1
A13	CS315EU-A13	Bearing Bushing		1
A14	CS315EU-A14	Bearing		1
A15	CS315EU-A15	Bushing		1
A16	CS315EU-A16	Leading Screw		1
A17	CS315EU-A17	Lock Handle		1
A18A	CS315EU-A18A	Sliding Vise		1
A19	CS315EU-A19	Washer		1
A20	CS315EU-A20	Spring		1
A21	CS315EU-A21	Plate		1
A22	CS315EU-A22	Hex Socket Cap Screw	M12x25	3
A23	CS315EU-A23	Washer	5/16"	2
A24	CS315EU-A24	Hex Socket Cap Screw	M8x20	2
A25	CS315EU-A25	Spring		1
A26	CS315EU-A26	Washer	5/16"	1
A27	CS315EU-A27	Hex Socket Cap Screw	M8x20	1
A28	CS315EU-A28	Switching Handle		1
A29	CS315EU-A29	Washer	1/4"	1
A30	CS315EU-A30	Hex Socket Cap Screw	M6x12	1
A31	CS315EU-A31	Washer	1/4"	1
A32	CS315EU-A32	Nut	M8	1
A33	CS315EU-A33	Switching Plate		1
A34	CS315EU-A34	C-Clip		1



Item	Part No.	Description	Size	Qty.
A35	CS315EU-A35	Blade Shield		1
A36	CS315EU-A36	Screw	M5x10	7
A37	CS315EU-A37	Plate		2
A38	CS315EU-A38	Blade Cover		1
A39	CS315EU-A39	Hex Socket Cap Screw	M12x35	1
A40	CS315EU-A40	Blade Clamping Washer		1
A41	CS315EU-A41	Saw Blade (Specific to each application)		
A42	CS315EU-A42	Spindle Shaft		1
A43	CS315EU-A43	Worm Gear		1
A44	CS315EU-A44	Lock Nut		1
A45	CS315EU-A45	Stopper		1
A46	CS315EU-A46	Vise Bench		1
A47	CS315EU-A47	Hex Socket Cap Screw	M5x25	3
A48	CS315EU-A48	Swing Arm (Base)		1
A49	CS315EU-A49	Support Rod		1
A50	CS315EU-A50	Vise Clamp Jaw		1
A51	CS315EU-A51	Groove Jaw		1
A52	CS315EU-A52	Small Groove Jaw		1
A53	CS315EU-A53	Trigger Switch SB4 with Handle		1
A54	CS315EU-A54	Nut	M16	1
A55	CS315EU-A55	Feed Handle Rod		1
A56	CS315EU-A56	Nut	M20	1
A57	CS315EU-A57	Nut	M20	1
A58A	CS315EU-A58A	Machine Head		1
A59	CS315EU-A59	Ball Bearing	6205ZZ	1
A60	CS315EU-A60	Ball Bearing	6301ZZ	2
A61	CS315EU-A61	Gasket, Rubber Sheet		1
A62	CS315EU-A62	Hex Cap Screw	M8x20	4
A63	CS315EU-A63	Washer	5/16"	4
A64	CS315EU-A64	Flange		1
A65	CS315EU-A65	Oil Seal		1
A66	CS315EU-A66	Worm Shaft		1
A67	CS315EU-A67	Coupling		1
A68	CS315EU-A68	M1 Motor		1
A69	CS315EU-A69	Wire Terminal Clamp		4



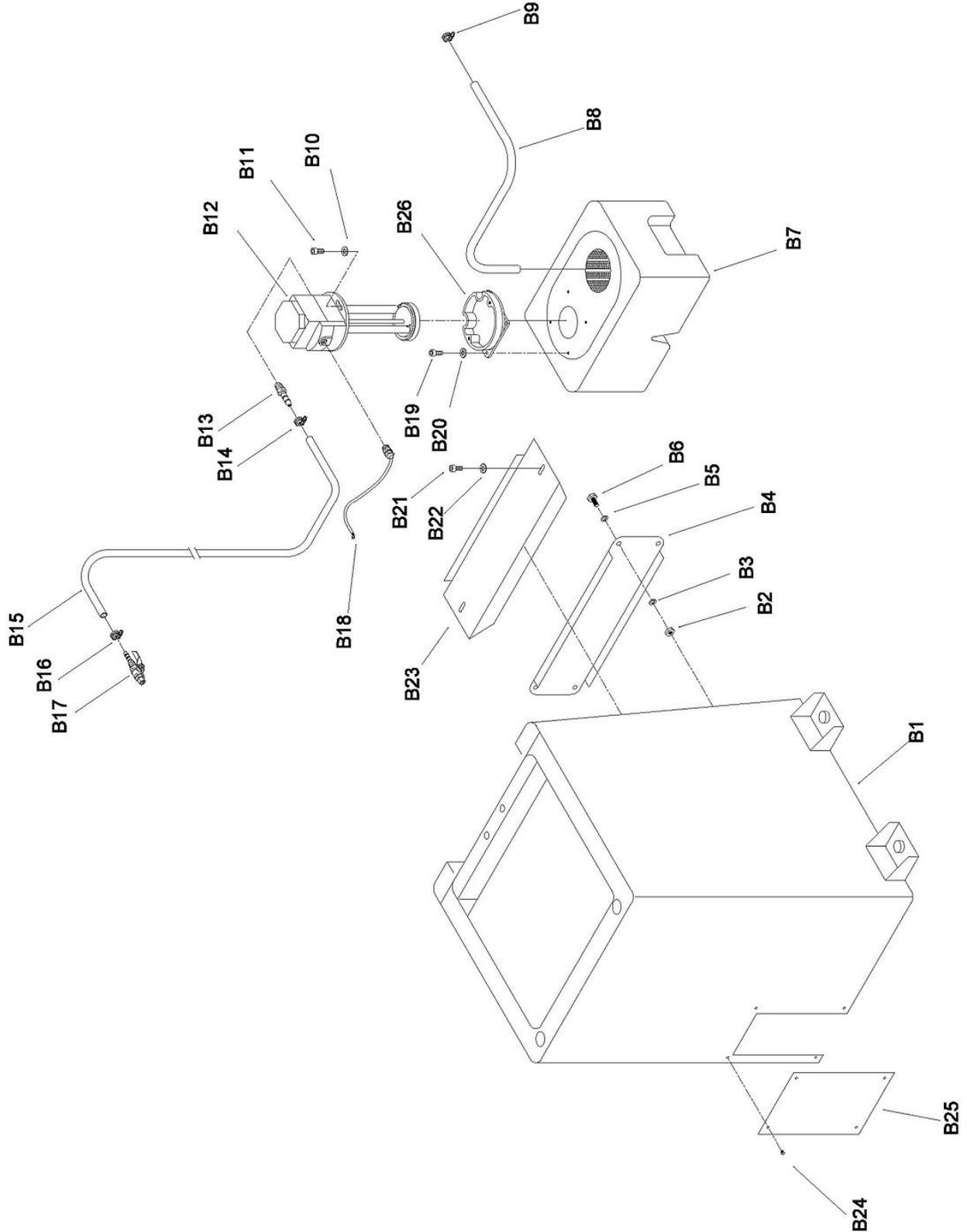
Item	Part No.	Description	Size	Qty.
A70	CS315EU-A70	Control Wire		1
A71	CS315EU-A71	Hex Cap Screw	M8x20	4
A72	CS315EU-A72	Washer	5/16"	4
A73	CS315EU-A73	Oil Pilot	PT1/2"	1
A74	CS315EU-A74	Set Screw	PT1/4"	2
A75	CS315EU-A75	Shaft		1
A76	CS315EU-A76	Bushing		1
A77	CS315EU-A77	Hex Cap Screw	M12x55	2
A78	CS315EU-A78	Nut	M12	2
A79	CS315EU-A79	Lock Bolt with Knob		1
A80	CS315EU-A80	Length Setting Rods Bracket		1
A81	CS315EU-A81	Upper Length Setting Rod		1
A82	CS315EU-A82	Lower Length Setting Rod		1
A83	CS315EU-A83	Nut		1
A84	CS315EU-A84	Lock Bolt with Knob		1
A85	CS315EU-A85	Filter Plate		1
A86	CS315EU-A86	Lift Ring		3
A87	CS315EU-A87	Drainage		1
A88	CS315EU-A88	Washer	5/16"	2
A89	CS315EU-A89	Hex Socket Cap Screw	M8x25	2
A90	CS315EU-A90	Hex Socket Cap Screw		1
A91	CS315EU-A91	Support Bracket		1
A92	CS315EU-A92	Washer	5/16"	2
A93	CS315EU-A93	Hex Cap Screw	M8x20	2
A94	CS315EU-A94	Screw	M5	4
A95	CS315EU-A95	SB2 Stop Button		1
A96	CS315EU-A96	SB3 Start Button, Illuminated		1
A97	CS315EU-A97	SB1 Emergency Switch		1
A99	CS315EU-A99	SB5 Pump Selection Switch, On/Off		1
A100	CS315EU-A100	Control Box Panel		1
A101	CS315EU-A101	Washer	5/16"	2
A102	CS315EU-A102	Hex Socket Cap Screw	M8x20	2
A103	CS315EU-A103	Electric Control Box		1
A104	CS315EU-A104	Control Box Button Plate		1
A105	CS315EU-A105	K1 Magnetic Connector		1



Item	Part No.	Description	Size	Qty.
A106	CS315EU-A106	Fuse Set		1
A107	CS315EU-A107	Cover Plate		1
A108	CS315EU-A108	TC Transformer		1
A109	CS315EU-A109	KR Relay		1
A110	CS315EU-A110	Front Splash Plate		1
A111	CS315EU-A111	Support Plate		2
A112	CS315EU-A112	Washer	5/16"	2
A113	CS315EU-A113	Hex Socket Cap Screw	M8x16	2
A114	CS315EU-A114	Screw	M5	2
A117	CS315EU-A117	Retaining Cover Washer		1
A118	CS315EU-A118	Screw FHSCS M8-1.25	X12	1
A119	CS315EU-A119	Shaft Oil Seal		1
A120	CS315EU-A120	Rubber Gasket (Drainage)		1
A121	CS315EU-A121	Rubber Gasket		1
A122	CS315EU-A122	Holder Plate		1
A123	CS315EU-A123	Anti-Dust Plate		1
A124	CS315EU-A124	Rear Splash Plate		1
A125	CS315EU-A125	Pivot Stop Plate		1
A201	CS315EU-A201	Vise Leadscrew Nut / Quick Clamp Wedge		1
A202	CS315EU-A202	Hex Socket Cap Screw		2
A203	CS315EU-A203	O-Ring		1
A204	CS315EU-A204	Bearing Cup		1
A205	CS315EU-A205	Screw		2
A210	CS315EU-A210	Sliding Vise Assembly		



# PARTS IDENTIFICATION DRAWING B





**Parts List B**

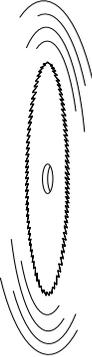
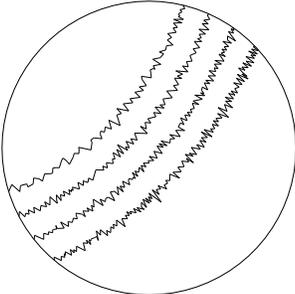
Item	Part No.	Description	Size	Qty.
B1	CS315EU-B1	Stand		1
B2	CS315EU-B2	Nut	M6	4
B3	CS315EU-B3	Washer	1/4"	4
B4	CS315EU-B4	Support plate		1
B5	CS315EU-B5	Washer	1/4"	4
B6	CS315EU-B6	Hex cap screw	M6x15	4
B7	CS315EU-B7	Coolant tank		1
B8	CS315EU-B8	Hose		1
B9	CS315EU-B9	Hose clamp		1
B10	CS315EU-B10	Washer	1/4"	2
B11	CS315EU-B11	Hex socket cap screw	M6x16	2
B12	CS315EU-B12	M2 Coolant Pump, 1/8hp, 220, 1ph, 50/60hz, L140, 2 Bolt, 3-13/16" w/4 Bolt Adapter		1
B13	CS315EU-B13	Connecting bolt		1
B14	CS315EU-B14	Hose clamp		1
B15	CS315EU-B15	Hose		1
B16	CS315EU-B16	Hose clamp		1
B17	CS315EU-B17	Valve		1
B18	CS315EU-B18	Wire		1
B19	CS315EU-B19	Hex cap screw	M6x15	4
B20	CS315EU-B20	Washer	1/4"	4
B21	CS315EU-B21	Hex cap screw	M6x15	2
B22	CS315EU-B22	Washer	1/4"	2
B23	CS315EU-B23	Support plate		1
B24	CS315EU-B24	Screw	M5x6	4
B25	CS315EU-B25	Cover plate		1



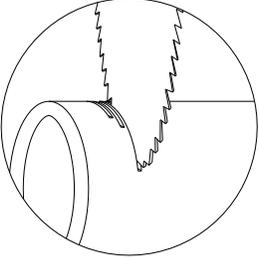
## TROUBLESHOOTING

**⚠ WARNING:** Make sure the electrical disconnect is **OFF** before working on the machine.

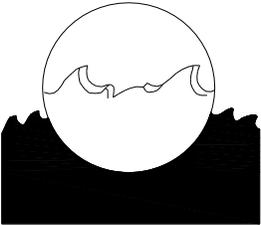
### Blade and Cut Diagnosis

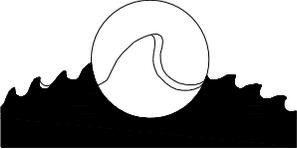
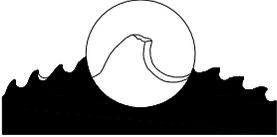
FAULT	PROBABLE CAUSE	REMEDY
<p>DISK VIBRATION</p> 	<p>Wrong tooth pitch.</p> <p>Unsuitable tooth profile.</p> <p>Ineffective gripping of the part in the vise.</p> <p>Dimensions of the solid section too large with respect to the maximum admissible cutting dimensions.</p> <p>Disk diameter incorrect and/or too large.</p>	<p>Choose a suitable disk.</p> <p>Choose a suitable disk.</p> <p>Check the gripping of the part.</p> <p>Abide by the instructions.</p> <p>Decrease the disk diameter, adapting it to the dimensions of the part to be cut.</p>
<p>RIDGES ON THE CUTTING SURFACE</p> 	<p>Ineffective gripping of the part in the vise.</p> <p>Too fast advance.</p> <p>Disk teeth are worn.</p> <p>Insufficient lubricating coolant.</p> <p>Teeth do not unload shavings well.</p>	<p>Check the gripping of the part.</p> <p>Decrease advance, exerting less cutting pressure.</p> <p>Sharpen the tool.</p> <p>Check the level of the liquid in the tank.</p> <p>Increase the flow of lubricating coolant, checking that the hole and the liquid outlet pipe are not blocked.</p> <p>Choose a blade with a larger tooth pitch that allows better unloading of shavings and that holds more lubricating coolant.</p>



FAULT	PROBABLE CAUSE	REMEDY
<p data-bbox="151 436 362 506">CUT OFF THE STRAIGHT</p> 	<p data-bbox="532 390 789 422">Too fast advance.</p> <p data-bbox="532 495 995 564">Ineffective gripping of the part in the vise.</p> <p data-bbox="532 638 898 669">Disk head off the straight.</p> <p data-bbox="532 716 829 785">Disk sides differently sharpened.</p> <p data-bbox="532 827 914 858">Dirt on the gripping device.</p>	<p data-bbox="1011 390 1409 459">Decrease advance, exerting less cutting pressure.</p> <p data-bbox="1011 495 1471 564">Check the gripping of the part which may be moving sideways.</p> <p data-bbox="1011 638 1243 669">Adjust the head.</p> <p data-bbox="1011 716 1471 785">Choose proper tool quality, type, and construction characteristics.</p> <p data-bbox="1011 827 1433 896">Carefully clean the laying and contact surfaces.</p>
<p data-bbox="151 1098 492 1167">BLADE STICKS IN THE CUT</p> 	<p data-bbox="532 905 789 936">Too fast advance.</p> <p data-bbox="532 1010 800 1041">Low cutting speed.</p> <p data-bbox="532 1083 794 1115">Wrong tooth pitch.</p> <p data-bbox="532 1157 979 1226">Sticky accumulation of material on the disk.</p> <p data-bbox="532 1304 842 1373">Insufficient lubricating refrigerant.</p>	<p data-bbox="1011 905 1409 974">Decrease advance, exerting less cutting pressure.</p> <p data-bbox="1011 1010 1239 1041">Increase speed.</p> <p data-bbox="1011 1083 1341 1115">Choose a suitable disk.</p> <p data-bbox="1011 1157 1433 1262">Check the blend of lubricating coolant and choose a better-quality disk.</p> <p data-bbox="1011 1304 1438 1373">Check the level of the liquid in the tank.</p> <p data-bbox="1011 1377 1471 1514">Increase the flow of lubricating coolant, checking that the hole and the liquid outlet pipe are not blocked.</p>



FAULT	PROBABLE CAUSE	REMEDY
<p data-bbox="149 772 448 806">TOOTH BREAKAGE</p> 	<p data-bbox="535 388 781 422">Too fast advance</p> <p data-bbox="535 493 829 527">Wrong cutting speed</p> <p data-bbox="535 598 786 632">Wrong tooth pitch</p> <p data-bbox="535 674 764 707">Low quality disk</p> <p data-bbox="535 749 987 821">Ineffective gripping of the part in the vise.</p> <p data-bbox="535 863 954 934">Previously broken tooth left in the cut.</p> <p data-bbox="535 1005 948 1077">Cutting resumed on a groove made previously.</p> <p data-bbox="535 1148 992 1220">Insufficient lubricating coolant or wrong coolant.</p> <p data-bbox="535 1409 976 1480">Sticky accumulation of material on the disk.</p>	<p data-bbox="1010 388 1409 459">Decrease advance, exerting less cutting pressure.</p> <p data-bbox="1010 493 1386 564">Change disk speed and/or diameter.</p> <p data-bbox="1010 598 1341 632">Choose a suitable disk.</p> <p data-bbox="1010 674 1362 707">Use a better-quality disk.</p> <p data-bbox="1010 749 1438 783">Check the gripping of the part.</p> <p data-bbox="1010 863 1451 934">Accurately remove all the parts left in.</p> <p data-bbox="1010 1005 1466 1077">Make the cut elsewhere, turning the part.</p> <p data-bbox="1010 1148 1471 1367">Check the level of the liquid in the tank. Increase the flow of lubricating coolant, checking that the hole and the liquid outlet pipe are not blocked.</p> <p data-bbox="1010 1409 1433 1514">Check the blend of lubricating coolant and choose a better-quality disk.</p>

FAULT	PROBABLE CAUSE	REMEDY
<p data-bbox="149 621 435 688">PREMATURE DISK WEAR</p> 	<p data-bbox="535 390 938 422">Wrong running in of the disk.</p> <p data-bbox="535 604 834 636">Wrong cutting speed.</p> <p data-bbox="535 716 867 747">Unsuitable tooth profile.</p> <p data-bbox="535 789 792 821">Wrong tooth pitch.</p> <p data-bbox="535 863 769 894">Low quality disk.</p> <p data-bbox="535 936 841 1003">Insufficient lubricating refrigerant.</p>	<p data-bbox="1013 390 1458 562">When cutting for the first time run in the tool, making a series of cuts at a low advance speed, spraying the cutting area with lubricating coolant.</p> <p data-bbox="1013 604 1403 672">Change disk speed and / or diameter.</p> <p data-bbox="1013 714 1338 745">Choose a suitable disk.</p> <p data-bbox="1013 787 1338 819">Choose a suitable disk.</p> <p data-bbox="1013 861 1360 892">Use a better-quality disk.</p> <p data-bbox="1013 934 1469 1146">Check the level of the liquid in the tank. Increase the flow of lubricating coolant, checking that the hole and the liquid outlet pipe are not blocked.</p>
<p data-bbox="149 1356 376 1388">CHIPPED DISK</p> 	<p data-bbox="535 1163 980 1230">Hardness, shape or flaws in the material</p> <p data-bbox="535 1272 834 1304">Wrong cutting speed.</p> <p data-bbox="535 1377 792 1409">Wrong tooth pitch.</p> <p data-bbox="535 1451 678 1482">Vibrations</p> <p data-bbox="535 1524 915 1556">Disk incorrectly sharpened.</p> <p data-bbox="535 1671 769 1703">Low quality disk.</p> <p data-bbox="535 1745 883 1812">Incorrect emulsion of the lubricating coolant.</p>	<p data-bbox="1013 1163 1409 1230">Reduce the cutting pressure and/or the advance.</p> <p data-bbox="1013 1272 1386 1339">Change disk speed and/or diameter.</p> <p data-bbox="1013 1377 1338 1409">Choose a suitable disk.</p> <p data-bbox="1013 1451 1386 1482">Check gripping of the part.</p> <p data-bbox="1013 1524 1469 1629">Replace the disk with one that is more suitable and correctly sharpened.</p> <p data-bbox="1013 1671 1360 1703">Use a better-quality disk.</p> <p data-bbox="1013 1745 1451 1812">Check the percentage of water and oil in the emulsion.</p>



NOTES



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