OPERATOR'S MANUAL

HYDRAULIC PRESS BRAKE
MODEL: BP-22410/13CNC

Book 1of2

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THANK YOU & WARRANTY

Thank you for your purchase of a machine from Baileigh Industrial. 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 a 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 30 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, (f) 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 INCIDENTIAL, 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 Majuere. 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's 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 attorneys' 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 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 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@baileighindustrial.com

INTRODUCTION

The quality and reliability of the components assembled on a Baileigh Industrial 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
- Set-up 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 and inform them of the unexpected occurrence. Temporarily suspend installation.

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

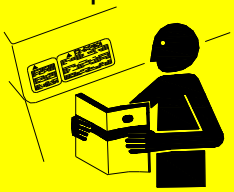
Your machine is designed and manufactured to work smoothly and efficiently. Following proper maintenance instructions will help ensure this. Try and use original spare parts, whenever possible, and most importantly; DO NOT overload the machine or make any unauthorized modifications.

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. **DANGER** identifies a hazard or unsafe practice that will result in severe Injury or Death.

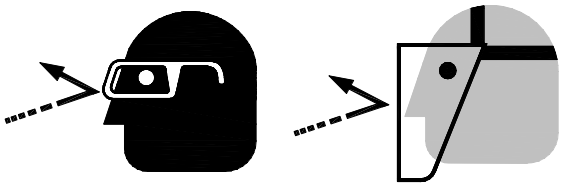
Safety signs with signal word **DANGER** or **WARNING** are typically near specific hazards.

General precautions are listed on **CAUTION** safety signs. **CAUTION** also calls attention to safety messages in this manual.

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

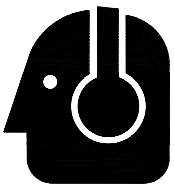
PROTECT EYES

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



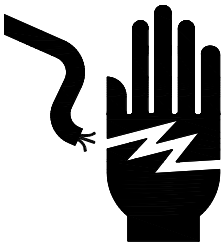
PROTECT AGAINST NOISE

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



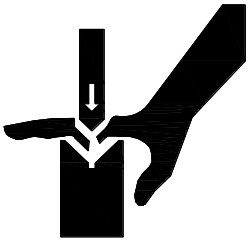
HIGH VOLTAGE

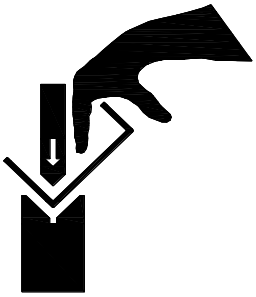
USE CAUTION IN HIGH VOLTAGE AREAS. DO NOT assume the power to be off.
FOLLOW PROPER LOCKOUT PROCEDURES.



BEWARE OF CRUSH HAZARD

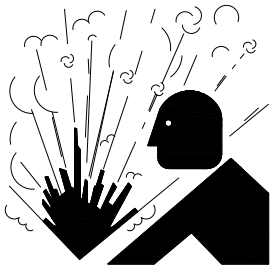
NEVER place your hands, fingers, or any part of your body in the die area of this machine.





HYDRAULIC HOSE FAILURE

Exercise **CAUTION** around hydraulic hoses in case of a hose or fitting failure.



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.

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 won't 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

1. **Only trained and qualified personnel can operate this machine.**
2. **Make sure guards are in place and in proper working order before operating machinery.**
3. **Remove any adjusting tools.** Before operating the machine, make sure any adjusting tools have been removed.
4. **Keep work area clean.** Cluttered areas invite injuries.
5. **Overloading machine.** By overloading the machine you may cause injury from flying parts. **DO NOT** exceed the specified machine capacities.
6. **Dressing material edges.** Before bending sheet metal, always chamfer and deburr all sharp edges.
7. **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.

8. **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.
9. **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.
10. **Use eye and ear protection**. Always wear ISO approved impact safety goggles. Wear a full-face shield if you are producing metal filings.
11. **Do not overreach**. Maintain proper footing and balance at all times. **DO NOT** reach over or across a running machine.
12. **Stay alert**. Watch what you are doing and use common sense. **DO NOT** operate any tool or machine when you are tired.
13. **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.
14. **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.
15. **Blade adjustments and maintenance**. Always keep blades sharp and properly adjusted for optimum performance.
16. **Keep children away**. Children must never be allowed in the work area. **DO NOT** let them handle machines, tools, or extension cords.
17. **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.
18. **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.
19. **DO NOT** touch live electrical components or parts.
20. Be sure all equipment is properly installed and grounded according to national, state, and local codes.
21. **DO NOT** bypass or defeat any safety interlock systems.
22. Keep visitors a safe distance from the work area.

TECHNICAL SPECIFICATIONS

	BP-22410CNC	BP-22413CNC
Table Length	125" (3175mm)	157" (3988mm)
Back Gauge Length	23.62" (600mm)	23.62" (600mm)
Return Speed	2.36"/sec. (60mm/sec.)	2.36"/sec. (60mm/sec.)
Maximum Pressure	224 tons	224 tons
Throat Depth	12.5" (317.5mm)	12.5" (317.5mm)
Stroke Distance	5.9" (150mm)	5.9" (150mm)
Approach Speed	3.9"/sec. (100mm/sec.)	3.9"/sec. (100mm/sec.)
Back Gauge Motor	1/2hp (.37kw) 1.9A	1/2hp (.37kw) 1.9A
Bending Speed	.236"/sec. (6mm/sec.)	.236"/sec. (6mm/sec.)
Main Motor	15hp (11.2kw) 33.5A	15hp (11.2kw) 33.5A
Distance Between Housings	100" (2540mm)	123" (3124mm)
Distance From Table To Ram	17.7" (450mm)	17.7" (450mm)
Power	220V / 3-phase	220V / 3-phase
Hydraulic Reservoir Capacity	33gal. (125L)	33gal. (125L)
Maximum Hydraulic Pressure	4500psi (31MPa)	4500psi (31MPa)
Shipping Weight	21280lbs. (9653kg)	24640lbs. (11177kg)
Shipping Dimensions	134"x64"x103" (3404x1626x2616mm)	166"x64"x103" (4617x1626x2616mm)

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@baileighindustrial.com, Phone: 920.684.4990, or Fax: 920.684.3944.

***Note**: The photos illustrations using 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.*

UNPACKING AND CHECKING CONTENTS

Your Baileigh machine is shipped complete. 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: If any parts are missing, do not plug in the power cable, or turn the power switch on until the missing parts are obtained and installed correctly.

Cleaning

Your machine may be shipped with a rustproof waxy oil coating and grease on the exposed unpainted metal surfaces. To remove this protective coating, use a degreaser or solvent cleaner. 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.

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

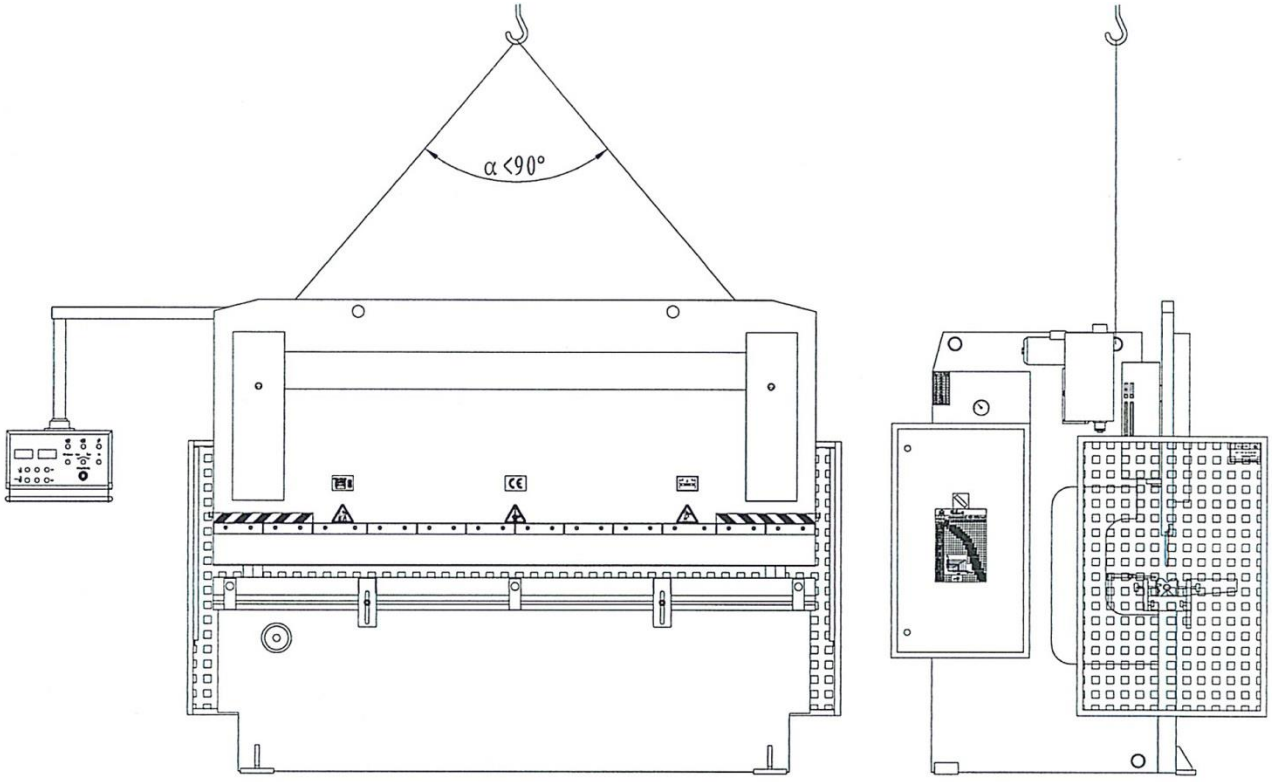
CAUTION: When using cleaning solvents work in a well-ventilated area. Many cleaning solvents are toxic if inhaled.

TRANSPORTING AND LIFTING

⚠ CAUTION: 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. Choose a location that will keep the machine free from vibration and dust from other machinery. Keep in mind that having a large clearance area around the machine is important for safe and efficient working conditions.

Follow these guidelines when lifting:

- Always lift and carry the machine with the lifting holes provided at the top of the machine.
- Use lift equipment such as straps, chains, capable of lifting 1.5 to 2 times the weight of the machine.
- Take proper precautions for handling and lifting.
- Check if the load is properly balanced by lifting it an inch or two.
- Lift the machine, avoiding sudden accelerations or quick changes of direction.
- Locate the machine where it is to be installed, and lower slowly until it touches the floor.



INSTALLATION

IMPORTANT:

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

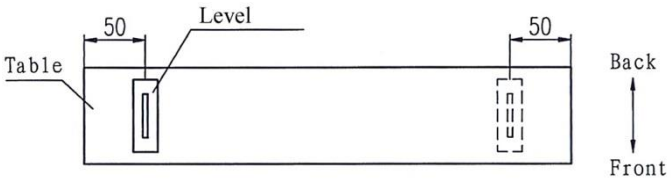
- Overall weight of the machine.
- Weight of material being processed.
- Sizes of material to be processed through the machine.
- Space needed for auxiliary stands, work tables, or other machinery.
- Clearance from walls and other obstacles.
- Maintain an adequate working area around the machine for 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.

Before beginning assembly, take note of the following precautions and suggestions.

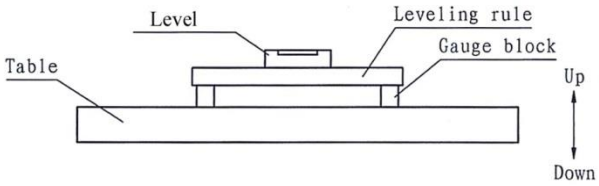
- Is the machine is bolted to the pallet? Before attempting any of the assembly procedures remove all of the loose parts and hardware and unbolt the machine from the pallet.
- LEVELING: The machine should be sited on a level, concrete floor. Provisions for securing it should be in position prior to placing the machine. The accuracy of any machine depends on the precise placement of it to the mounting surface.
- FLOOR: This tool 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.

Leveling

Horizontal Adjusting:
Placing the level at each point (the distance between ends and points is 50mm. Adjust the anchor bolt until the horizontal leveling accuracy is within 0.2/1000mm.

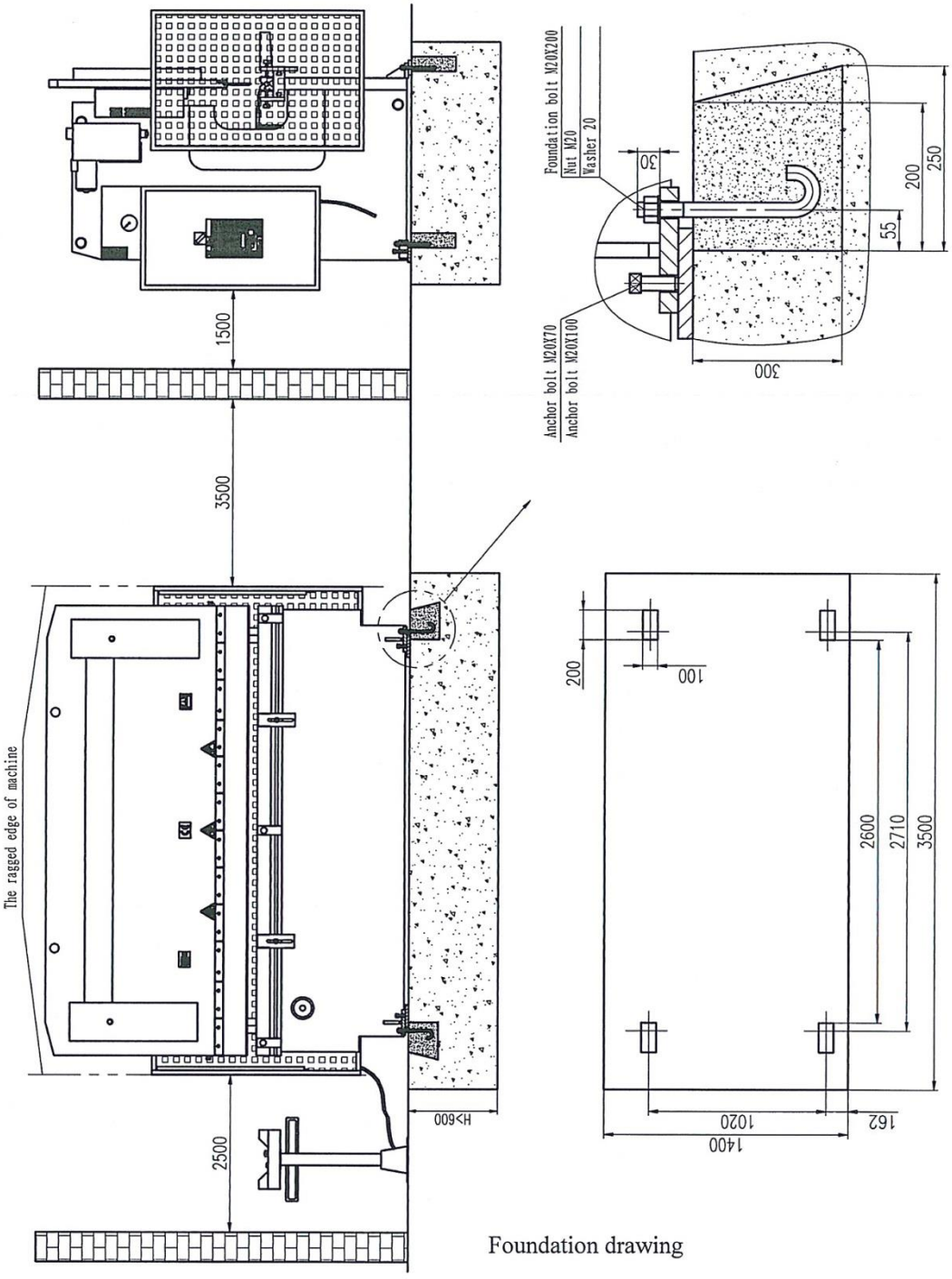


Vertical Adjusting:
For the vertical direction of table has crowning (a curve which treats the middle part as axis), you must place gauge block on the table. Then put the leveling rule on the gauge block; put the level on the leveling rule. Adjusting the anchor bolt until the vertical leveling accuracy is within 0.2/1000mm.



Anchoring the Machine

- Position the machine on a firm and level concrete floor and maintain a safe operating distance around the machine.
- Anchor the machine to the floor, as shown in the diagram, using bolts and expansion plugs or sunken tie rods that connect through holes in the base of the stand.

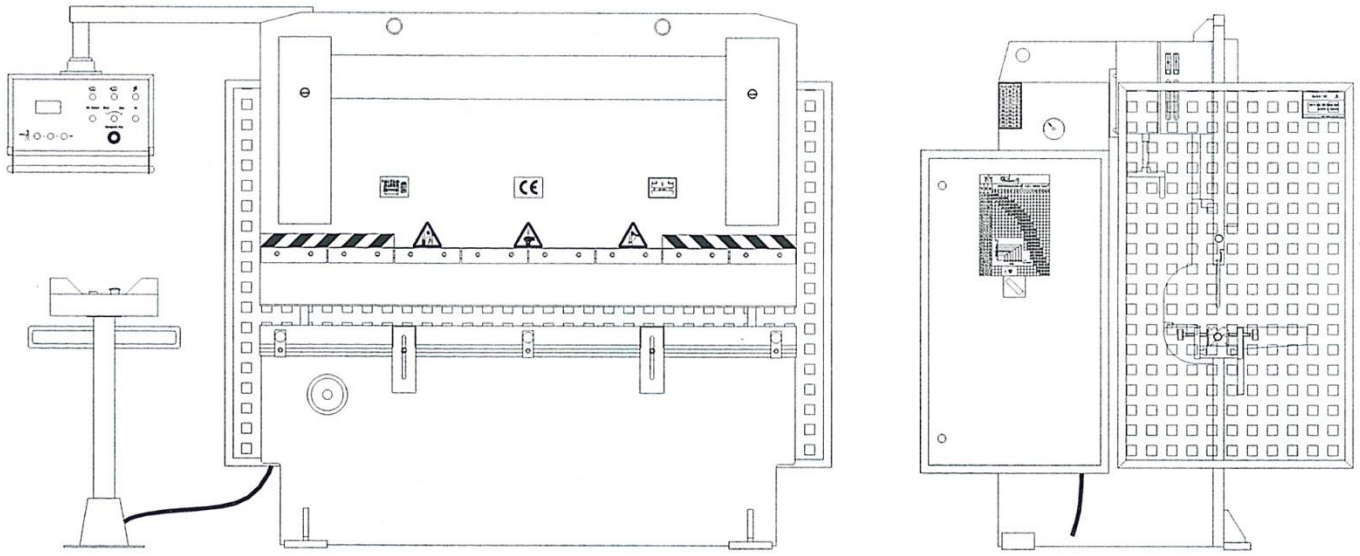


Foundation drawing

GETTING TO KNOW YOUR MACHINE

Hydraulic press brake is intended for bending and forming sheets metals. Normally, after one stroke of ram, the sheet can be bent into certain geometry sharp. If after several times bending, it can get complex sectional sharps. The machine can completely bend the full length of the sheet with high accuracy.

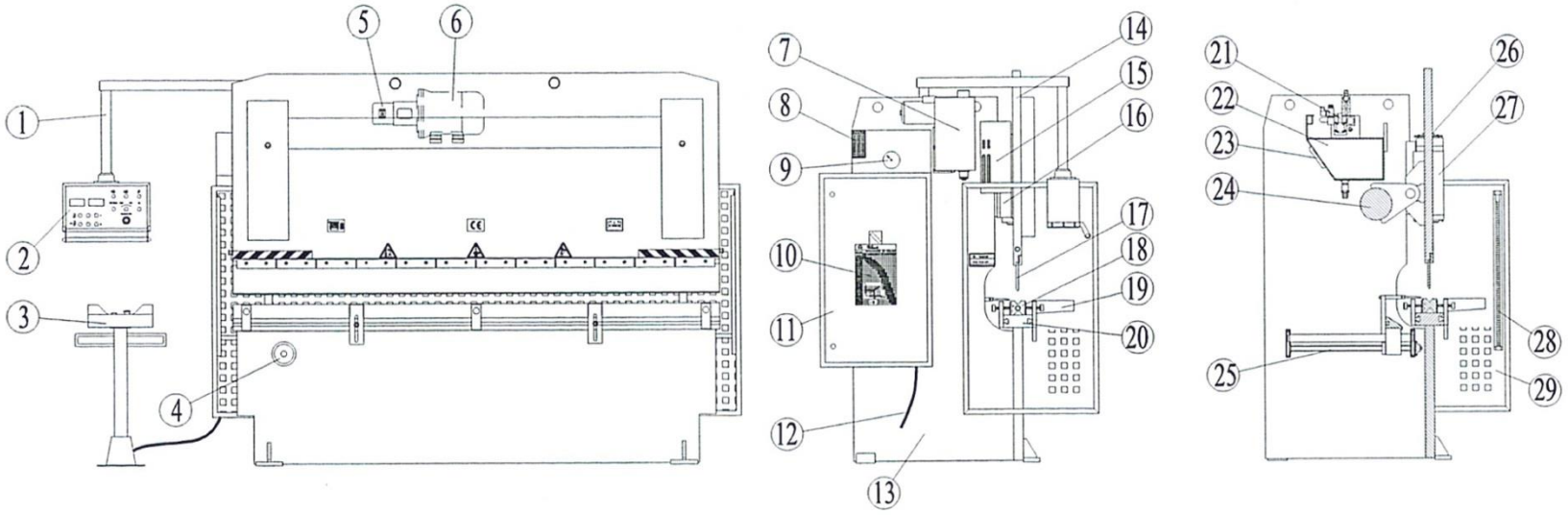
The machine uses hydraulic and electric control system. Top Die Position (T.D.P.) and Bend Speed Point (B.S.P.) use electric control. Proper position can be chosen quickly and easily based on the technique requirements of bended material.
The machine has pressure-returning function. It means that if bending pressure reaches maximum system pressure, the pressure gauge sends signal causing the ram to return.



Note: This drawing reflects the scheme of machine, only for referance.
practicality may be difference

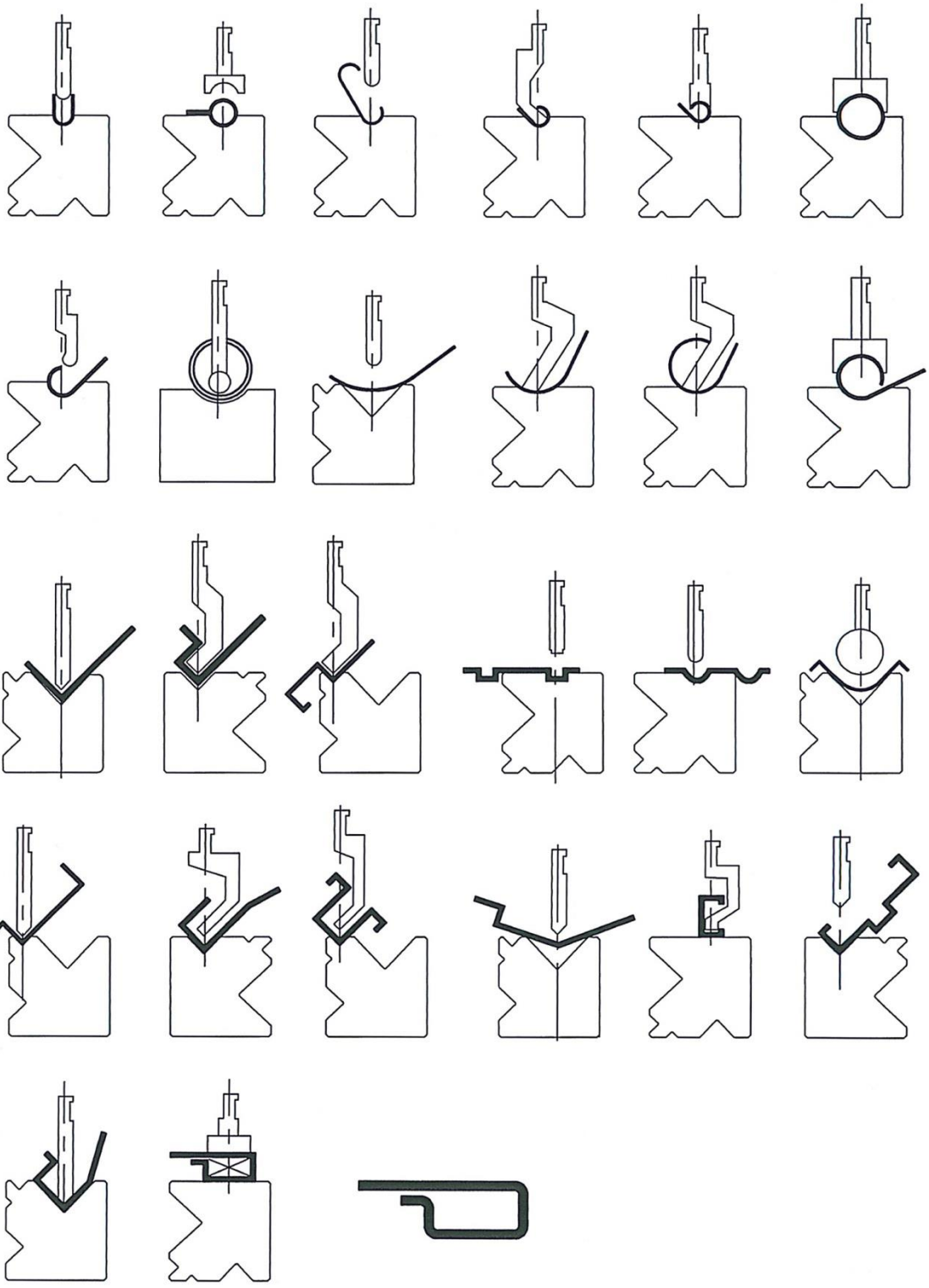
Terms:

1. Press brake - the machine which bending the plate or sheet by relative moving of the dies.
2. Hydraulic press brake - press brake which driving ram by hydraulic.
3. Frame - structure of machine.
4. Upright - side pillar of frame.
5. Ram -part which fixing the die, then moving up and down.
6. Die -tool which bending and forming the sheets.
7. Die clamp - the part which fixing the die on ram and table.
8. Hanger - the part which lifting the die.
9. Nominal pressure - Maximum working pressure allowed.
10. Maximum working length - determining width.
11. Distance between uprights - the distance between insides of two uprights.
12. Ram stroke - the distance that ram moves between TDC and BDC.
13. Stroke adjustment - possible adjusting distance of BDC's position.
14. Open height - Maximum distance between ram's bottom and table's top.
15. Gap - the dimension between punch center of C bending machine and notch bottom of frame.
16. Back gauge distance - the distance between Back gauge and punch center.
17. Signal stroke - each starting, ram moves forward and return.
18. Inch - regular and intermission movement
19. TDC - Maximum top position of movement
20. BSP - changing point between the unloading speed and working speed.
21. BDP - Maximum bottom position of movement.
22. Hydraulic drive - transiting movement and power by hydraulic.
23. Top drive - hydraulic system located on the table.
24. Down stroke - downward returning movement.



1. Hanger 2. Hanging control station 3. Handle control station 4. Wheel 5. Pump 6. Motor
7. Adjustment of machinery stop 8. Pressure conversion mark 9. Gauge 10. Bending chart
11. Electricity case 12. Wire 13. Frame 14. Ram 15. Adjustment of stroke 16. Guide bar
17. Punch 18.Die 19. Front support 20. Table 21. Valve block 22. Tank 23. Oil Gauge
24. Torsion shaft 25. Backgauge 26. Machinery stop 27. Cylinder 28. Curtain 29. Safety grid

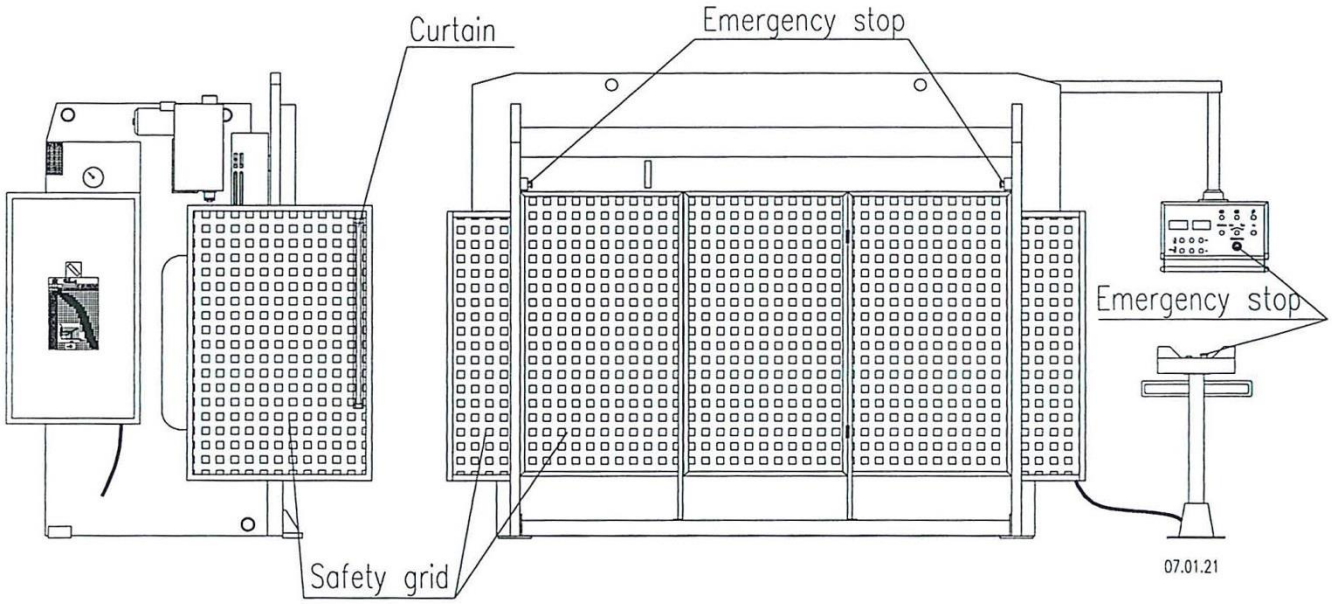
Note: This drawing reflects the scheme of machine,only for referance.
Practicality may be difference



***Note**: The bends and tooling used for those bends is for reference only. Custom tooling has individual lead times and pricing and is non-returnable.*

Safety Equipment

WARNING: This section describes the safety equipment installed on this machine so that the operator is aware of how it functions. Never remove, change, alter, disable, disconnect, etc. any of the safety equipment.



Light Curtain

There is a curtain mounted to the inside of the side guard on the front of the machine. If the operator interrupts the light curtain, the safety module will activate. The ram will not move downward. Remove the obstruction and reset the system to allow normal operation.

Safety Guards

There are safety guards at side and back of machine. This is to prevent personal or objects from entering these areas while the machine is in operation. These safety guards are connected electrical to the system by safety switch. If any of the safety switches is activated, the machine will not operate.

***Note**:* When the light of curtain is interrupted, or the safety guard switch is activated, you will need to push the reset button to enable the electrical system.

Emergency Stop

There are 4 emergency stop buttons on the machine located on the hanging control station, pedestal control station and inside of uprights at the back of the machine. 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.

ELECTRICAL

⚠ WARNING: Baileigh Industrial is not responsible for any damage caused by wiring up to an alternative 3-phase power source other than direct 3-phase. If you are using an alternate power source, consult a certified electrician or contact Baileigh Industrial prior to energizing the machine.

⚠ 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.

Motor Specifications

Your tool is wired for 220 volt, 60Hz alternating current. Before connecting the tool to the power source, make sure the machine is cut off from power source.

Considerations

Observe local electrical codes when connecting the machine.
The circuit should be protected with a time delay fuse or circuit breaker with a amperage rating slightly higher than the full load current of machine.

- A separate electrical circuit should be used for your tools. 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 tool.
- 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 tool 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 a qualified electrician or service personnel if the grounding instructions are not completely understood, or if in doubt as to whether the tool is properly grounded.
- Repair or replace damaged or worn cord immediately.

Power Supply

The three-phase system is adopted. The machine is supplied with power of 60HZ and AC 220V. The control transformer TC1 supplies the power of AC 24V and AC 220V to the control circuit. The solenoid valve is supplied with power of DC24V.

In order to avoid the cover high voltage drop caused by the current peak value, the section of the main supply cable must be selected correctly and connected reliably with the coil in of the machine power supply.

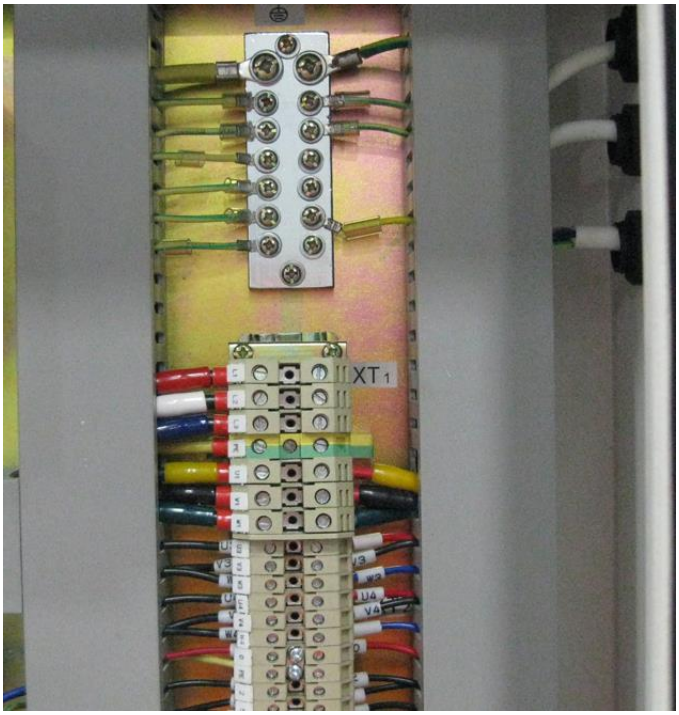
To guarantee the safety of you and you equipment, the machine must be connected with the earthen grid by the cable whose section is as same as that of the main supply cable. It is recommended to make an earth device especially for the machine.

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 change range for the voltage is +5%, and for the frequency is +1%.

Power Supply Environment

Ambient Temperature: 5--40°C
Ambient Humidity: 35-95%, no frost
Altitude: below 1000m
Illumination: 500 LUX
Installation environment: no poisonous air; no metal fragment.

Power cord connection:



1. Unlock and open the electrical enclosure door.
2. Insert a strain relief fitting into an open hole at the bottom of the electrical cabinet to grip the power cord (supplied by customer) and route a power cord into the cabinet to the top of the terminal strip at the upper right side of the cabinet (XT1).
3. Connect the three power wires terminals L1, L2, & L3. Connect the ground wire (typically green) to the PE terminal.
4. Check that the power cord is routed inside the cabinet so as to avoid contact with other components inside the cabinet.

Check for correct rotation of the motor

1. Close the electrical enclosure door.
2. With power connected and the main disconnect turned ON, the power light on the control panel will be lit.
3. Push the spindle forward start button to start the spindle. The spindle should rotate in a clockwise direction as looking down on the spindle from and overhead position.
4. If not, disconnect power to the machine, and switch the L1 and L3 wires. DO NOT move the ground wire.

ELECTRICAL SYSTEM OPERATION

⚠ CAUTION: Always wear proper eye protection with side shields, safety footwear, and leather gloves to protect from burrs and sharp edges.

⚠ CAUTION: Keep hands and fingers clear of the clamping beam. Stand off to the side of the machine to avoid getting hit with the bending apron as it comes up to bend. When handling large heavy materials make sure they are properly supported.

Main power switch

Turn-on the power switch QS locates on the side of cabinet, power indicator HL1 lights. It means the control circuit is energized

Motor start of main oil pump

Push the start button SB4 of main oil pump motor, the operation indicator HL2 lights. Main motor starts.

Motor stop of main oil pump

Push the stop button SB3 of main oil pump motor. Main motor stops, the operation indicator HL2 turns off.

System start light

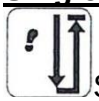
Check if the emergency stop switch of each parts of system has reset, and the safety-guarding grid on two sides and back has closed, the core of electromagnetic is in the normal position.

Determine the system start

After determination has ready, push the "system start" button (SB11). The indicator of system start OFF (HL3) lights, makes sure that preparation has ready, ram can run.

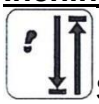
Operation Mode Select Switch (SA1)

Single-stroke operation mode



Steps on the footpad downward switch S1-2; the ram is in approach speed. It stops until it presses on the SSP switch SQB. Steps on the footpad downward switch S1-2. The ram is downward in working speed until it reaches the BDP point. The pressure increases to the limited value, and ram returns to the TDP point automatically and stops.

Inching operation mode



Steps on the footpad downward switch S1-2; the ram is in approach speed. It stops until it reaches the SSP switch SQB. Steps on the footpad downward switch S1-2. The ram is downward in working speed until it reaches the BDP point. Steps on the footpad downward switch S1-1, and ram returns to the TDP point automatically and stop.

YSD3000D numerical control system control

Rotate NC's knob on the panel to 1 from 0, the numerical control system power supply is put through. By pressing keys on the controller board, the backstop with ram adjusting may set to manual or automatic run to programmed work set points. More details are available in the YSD3000 operation section.

CONTROL PRINCIPLE OF ELECTRICAL SYSTEM

Control Principle of Emergency Stop

There sets the emergency stop button SB1, SB2, at button control station and handle stop footpad control station. If there happens any dangerous accidents, push these buttons immediately. The control circuit will stop the motor operation of main oil pump, and machine stops.

Control Principle Of Main Oil Pump

Turn on the power switch QS on the side of electrical box, the pilot lamp HL1 lights, and the control circuit is electrified. Push the main oil pump motor start button SB4, AC connectors KM1 are energized. (When for during 165T, KM1 and KM3 is energized the main oil pump electrical machinery start mode is started after a period delay KT1, KM3 is deenergized. KM2 is energized; the motor is changed over to the triangle operating, and the star triangle is started being accomplished.) The operation indicator HL2 lights, the main motor starts. The FR1 is protects thermorelay.

Control Principle of System Start

The machine tool control system is energized, and system start HL3 light, and the machine tool is waited for the system start affirming. Push the system start button SB11. the system start HL3 turns off .The system start is prepared accomplishing, and the ram is permitted down.

CONTROL PRINCIPLE OF OPERATION MODE

Control Mode of Single Stroke (Auto)

When the ram is at TDP position, switches the rotating switch to footpad switch single stroke (auto) point.
Steps on the footpad downward switch S1-2; Electromagnetic valve YA1, YA3 is energized, ram fast moves. During the fast movement, if loosen S1-2, YA1, YA3 is deenergized. YA2 is energized; ram returns to the TDP and stops.
If the ram is continue downward until it presses on the BSP stroke switch SQB, the YA1, YA3 is energized, ram fast movement stops.
Steps the footpad S1-2, electromagnetic valve YA1 is energized, the ram is in working speed. During working speed, if loosen the footpad S1-2, the working speed stops. Steps the footpad S1-2 again, the ram continue the working speed. When the pressure increases to the adjusting value at the BDP, after a period delay (time can adjust by the power delay end LA2-DTO), YA2 is energized, ram returns to the TDP and stops.

Control Mode of Handle Returning (Hand)

When the ram is at TDP position, switches the rotating switch to handle returning (hand) point.
Steps on the footpad downward switch S1-2; Electromagnetic valve YA1, YA3 is energized, ram fast moves. During the fast movement, if loosen S1-2, YA1, YA3 is deenergized, ram stops. If Steps the footpad S1-1, the ram will upward return.
If the ram is continue downward until it presses on the BSP stroke switch SQB, the YA1, YA3 is energized, ram fast movement stops. Steps the footpad S1-2, electromagnetic valve YA1 is energized, the ram is in working speed. During working speed, if loosen the footpad S1-2, the working speed stops. If Steps the footpad S1-1, the ram will upward return.
Loosen the footpad S1-2 when it reaches the BDP, ram stops any action. If continue steps on the footpad S1-2, the ram will in pressure-keeping statement. When Steps the footpad S1-1, the ram returns to TDP and stops.

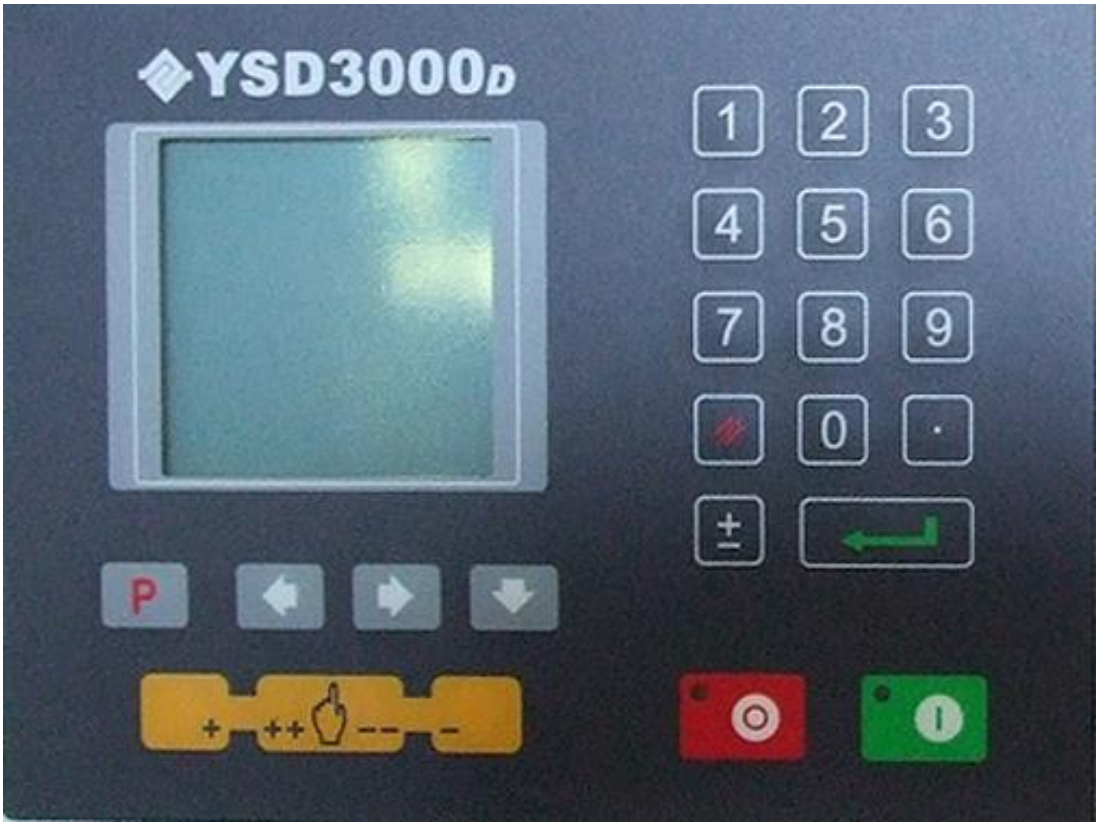
CONTROL PRINCIPLE OF YSD3000D

Controls of Mechanical Stop Adjust (Y-Axis) and Back Gauge (X-Axis)

[Only Machine Stops At Upper Die Point]

- The mechanical stop (Y-axis) and the back gauge (X-axis) are controlled by "YSD3000D" numerical control system, the operation is consulted by the manual for "YSD3000D".The motor of mechanical stop and the motor of back gauge are controlled by a transducer, the course for the action of two axis just like this:
- Y-axis goes to target value first the transducer supply's 50Hz frequency to the motors of Y-axis, at this time, the running of motor is full-speed. When Y-axis approaches target value, the transducer supply's 8-10HZ frequency to the motor, at this time, the running of motor is slow-speed. Because of slow-speed, the inertia is small; Y-axis can go to target value accurately.
- X-axis goes to target value in succession When Y-axis reaches the designated position, the transducer supply's 50Hz frequency to the motors of X-axis, at this time, the running of motor is full-speed. When X-axis approaches target value, the transducer supply's 5-10HZ frequency to the motor, at this time, the running of motor is slow-speed. Because of slow-speed, the inertia is small; X-axis can go to target value accurately.

OPERATION INSTRUCTION, YSD3000D



Keys

 Clear/Delete key, clear current numbers entered

 Enter: in programming interface, press this key to confirm the parameter entered and switch between X, Y, #, CHAIN parameters; in parameter interface, press this key to confirm the parameter entered.

 ---------Stop, Stops operation and the LED in the corner will illuminate.

 ---------Start, to let the controller operate in the automatic running interface. The LED in the corner will illuminate when running.

 Interface switching, mainly used to switch among parameter interface, programming interface and diagnose interface and to modify in program sequence.

Left Direction key, moves the cursor to the left or page back.

Right Direction key, moves the cursor right or page forward.

Cursor down, press this key to show next parameter.

Symbol Key. Press this key to switch the symbol of value in the input area between + (positive) and – (negative).

0 – 9 Digit Keys. The 10 digit key pad.

Decimal key. This key allows you to input decimal symbol.

Low speed forward moving key.

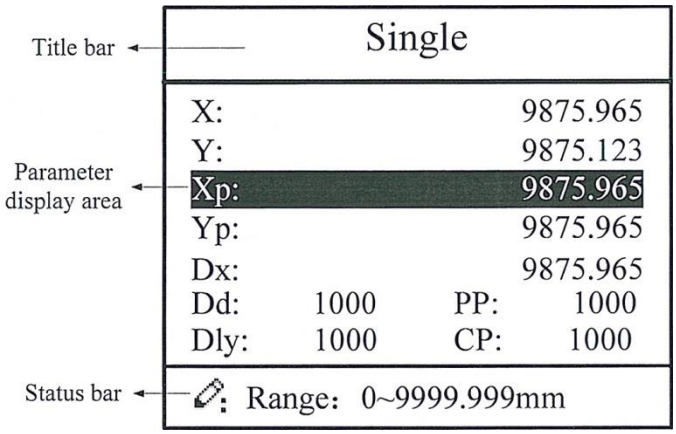
Low speed forward moving key.

High/low speed selection, press this key to output high speed and release to output low speed key.

Display Screen

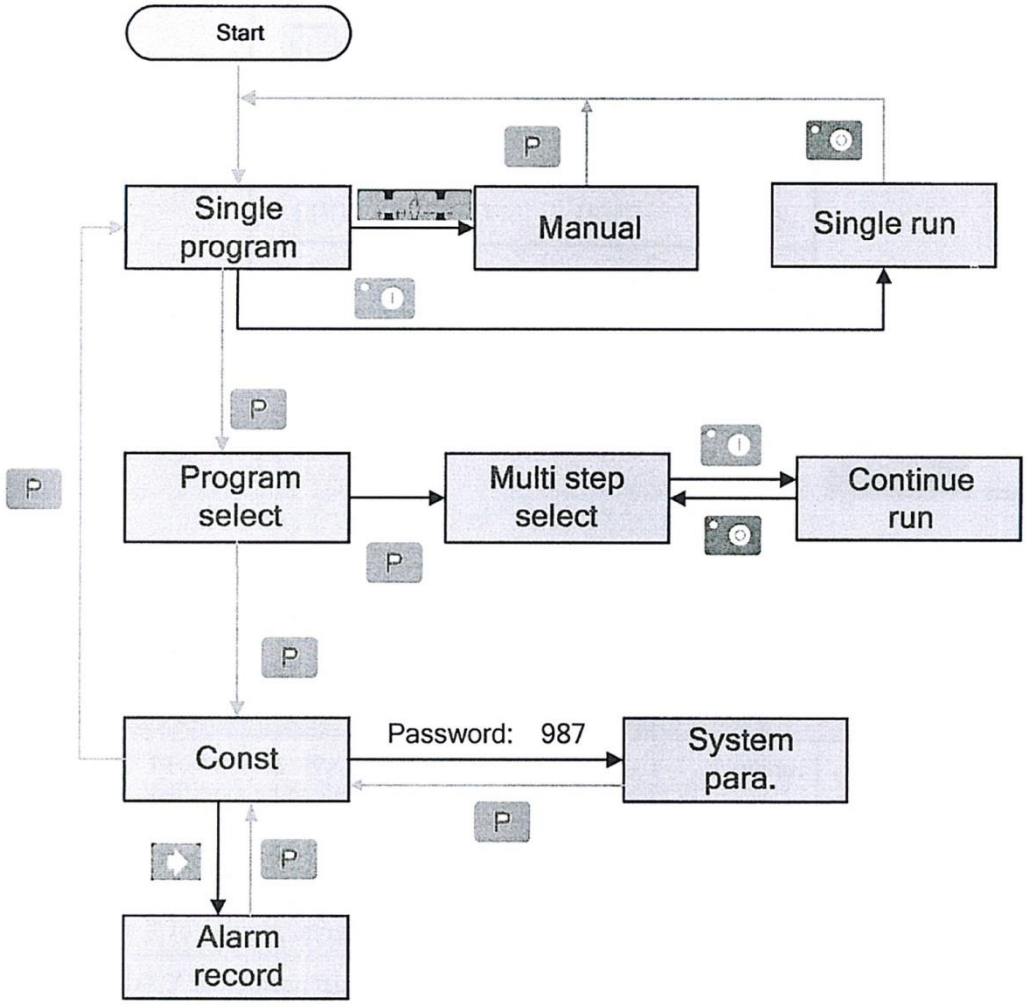
The display screen is a 160 x 160 dot matrix LCD display.

- Title bar: display relevant information of current page, such as its name, etc.
- Parameter display area: display parameter name, parameter value and system information.
- Status bar: display area of input information and prompt message, etc.



BASIC OPERATION FLOWCHART

The controller interface switches as the flowchart shows as follows:



PROGRAMMING

This device has two programming methods, which are single-step programming and multi-step programming. The user can set up programming according to actual demand.

Single-Step Programming

Single-step programming is generally used for processing single step to finish work piece processing. When controller is power on, it will automatically enter single-step program page.

Operation Steps

1. After starting up, the device will enter setting up page of single-step program automatically, as shown in Figure 2-2.

Single			
X:			9875.965
Y:			9875.123
Xp:			9875.965
Yp:			9875.965
Dx:			9875.965
Dd:	1000	PP:	1000
Dly:	1000	CP:	1000
: Range:	0 ~ 9999.999mm		

Figure 2-2 Single-step program setting page

2. Press the down arrow to select the parameter which needs to be set up. Press numerical key to input program value. Press the enter/return key to complete input.

Note: *Parameter can only be set when Stop indicator is on.*

Setting range of singe step parameter is shown in Table 2-1.

Table 2-1 set up range of single step parameter

Parameter	Unit	Set Up Range	Remarks
X	mm/inch	-	Current position of X axis, unable to be modified.
Y	mm/inch	-	Current position of Y axle, unable to be modified.
XP	mm/inch	0-9999.999mm	Program position of X axle.
YP	mm/inch	0-9999.999mm	Target position of Y axle.
DX	mm/inch	0-9999.999mm	Retract distance of X axle.
HT	ms	0-99999ms	The time between concession signal valid and end hold time output.
DLY	ms	0-99999ms	In case of single step, delay time for X axle concession.
PP	-	0-9999	Number of preset work piece.
CP	-	0-9999	Number of current work piece.

3. Press the start key. The system will execute according to this program, as shown in Figure 2-3.

Single	
X:	9875.965
Y:	9875.123
C:	0
PP: 0	mm

Figure 2-3 Single step operation page

Operation example

On single-step program page, program bending depth to 100.0mm, back gauge position to 80.00mm, retract distance to 50mm, concession waiting time to 200ms, holding time to 300ms, work piece to 10.

Operation steps are shown in Table 2-2.

Table 2-2 Operation steps of single step example

Operation Steps	Operation
Step 1	Press  down arrow to select “XP” parameter
Step 2	Input 80.00 using the numeric key pad
Step 3	Press the  enter button to confirm the entry
Step 4	Press  down arrow to select “YP” parameter
Step 5	Input 100.00 using the numeric key pad
Step 6	Press the  enter button to confirm the entry
Step 7	Press the  down arrow to select "DX" parameter, "DLY" parameter, "HT" parameter, "PP" parameter "CP" parameter respectively.
Step 8	Set up parameter to 50mm, 200ms, 300ms, 10, 0 by numerical key.
Step 9	Press the  start button and the system will execute according to this program.

Multi-Step Programming

Multi-step program is used for processing single work piece of different processing steps, realize consecutive implementation of multi-steps, and improve processing efficiency.

Operation Steps

1. Power on, the device displays the single-step parameter page automatically.
2. Press the P button to switch to program manage page, as shown in Figure 2-4.

PROGRAMS				0P
1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
: 1program				1ST

Figure 2-4 Program management page

3. Press either the , , or arrow keys to select the program serial number, or input program number directly, such as input "1".
4. Press the enter button to enter the multi-step program setting page as shown in Figure 2-5.

PROGRAM1	1/5ST
ST:	1
PP:	99
CP:	9
DLY:	100
ST:	1
: Range	0 ~ 25

Figure 2-5 Multi-step program setting page

5. Press the  arrow key to select multi-step programming parameter which requires set up, and input setting up value, and press the  enter button and the setup will take effect.

6. When the setup is complete, press the  right arrow key to enter the step parameter set page as shown in Figure 2-6.

PROGRAM1	1/5ST
X: Y:	5.000 12345.000
XP: YP: DX: RP:	9.000 5.000 25.00 54
: Range:	0 ~ 9999.999mm

Figure 2-6 Step parameter set page

7. Press the  arrow key to select step parameter that needs to be set up. Input program value and press the  enter button and the setup will take effect.

8. Press either the  , or  arrow to switch over between steps. If the current step is the first step, press the  arrow button to enter the last page of step parameter setting. If the current step is the last one, press the  arrow to enter the first page of step parameter setting.

Multi-step parameter setting range is shown in Table 2-3.

Table 2-3 Multi-step parameter setting range

Parameter Name	Unit	Setting Range	Remarks
Step number of program	-	0 ~ 25	Set up total processing step number of this program
Preset work piece number	-	0 ~ 99999	Number of work piece to be processed, decreasing piece when more than zero; negative increasing count.
Current work piece number	-	0 ~ 99999	Number of finished work piece
Concession delay	Ms	0 ~ 99999ms	Time between retract signal and concession execution.
Holding time delay	Ms	0 ~ 99999ms	Time between concession signal and end pressurize output
X	mm/inch	-	Current position of X axis, cannot be modified ;
Y	mm/inch	-	Current position of Y axle, cannot be modified;
X target position	mm/inch	0 ~ 9999.999mm	Program position of X axis
Y target position	mm/inch	0 ~ 9999.999mm	Program position of Y axis
Operation distance	mm/inch	0 ~ 9999.999mm	Distance of X axle concession
Repeat times	-	1 ~ 99	Repeat times required by this step.

9. Press the  start button and the system will execute according to this program as shown in Figure 2-7.

PROGRAM1	Rp: 1/54
X:	5.000
Y:	12345.000
C:	0
PP: 12345	St: 1/ 5

Figure 2-7 Multi-step programming operation page

Operation Example

One work piece requires processing 50 as shown below;
First bend: 50mm;
Second bend: 100mm;
Third bend: the other direction 300mm;

Analysis: according to work piece and technological conditions of machine tool:
First bend: X axle position is 50.0mm; Y axle position is 85.00mm, concession 50mm;
The second bend: X axle position is 100.0mm; Y axle position is 85.00mm, concession 50mm;
The third bend: X axle position is 300.0mm; Y axle position is 85.00mm, concession 50mm;
Edit processing program of this work piece on No.2 program.

Operation procedure is shown in Table 2-4.

Table 2-4 Operation steps of multi-step programming example

Operation Step	Operation
Step 1	On single step parameter setting page, press the P button to enter program selection page.
Step 2	Input “2” and press ↵ to enter multi-step general parameter setting page of program 2.
Step 3	Select "Program step", input "3", press ↵ and the setting takes effect.
Step 4	Select "number of preset work piece", input "50", press ↵ and the setup takes effect.
Step 5	Similar to step 3 and step 4, set "current work piece number", "concession delay" and "pressurize time" to 0, 400, and 200 respectively.
Step 6	Press the → arrow to enter first step setup page of step parameter.
Step 7	Select "X target position", input 50, press ↵ and the setup takes effect.
Step 8	Select "Y target position", input 85, press ↵ and the setup takes effect.
Step 9	Similar to step 7 and 8, set up "concession distance" and "repeat times" to 50 and 1 respectively.
Step 10	Press the → arrow to enter second step setup page of step parameter, the setup method is similar to that of step one.

Step 11	Press the arrow again to enter third step setup page of step parameter, the setup method is similar to that of step two.
Step 12	Press the arrow to return to the setup page of the first step.
Step 13	Press the start button and the system will execute according to this program.

Note:

- In completion of multi-step programming, return to start step before launching the system; otherwise the program will start position processing at the current step.
- Press left and right direction key to circulate page turning and browsing among all step parameters.
- Program can be called and revised again.
- In completion of processing all work pieces (50 in the example), system stops automatically. Restart directly will start another round of processing 50 work pieces.

Parameter Setting

User can setup all parameters required for normal operation of the system, including system parameter, X axle parameter and Y axle parameter.

Operation Steps

1. On program management page, press the P button to enter programming constant page, as shown in Figure 2-8. On this page, programming constant can be set.

CONST	
mm/inch:	0
中文/English:	1
X-tea.in:	1.000
Y-tea.in:	1.000
Release time:	23654
Version	V1.00
: Range:	0 ~ 9999.999mm

Figure 2-8 Programming constant page

Range of programming constant setup is shown in Table 2-5.

Table 2-5 Range of: programming constant setup

Parameter name	Unit	Setup range	Default	Remarks
X axle teach	Mm	0-9999.99mm	0	In teach enable, input current position of X axle
Y axle teach	mm	0-9999.99mm	0	In teach enable, input current position of Y axle
Metric/English system	-	0 or 1	0	0: metric, 1: English system
Chinese/English	-	0 or l	0	0: Chinese, 1: English
Decompression delay	ms	0-99999ms	0	Continue time of unloading output after starting the system.
Version number	-	-	-	Software version information, V refers to version. 1: indicates version number. 0: indicates version level.

2. Input password "1212", press  to enter system parameter setting page, as shown in Figure 2-9.

SYS PARA	1/1PG
X digits:	3
Y-digits:	3
X-safe:	1.000
Y-safe:	1.000
Step Delay:	3333
: Range:	0 ~ 3

Figure 2-9 System parameter setting page

Step up parameter, parameter setup range is shown in Table 2-6.

Table 2-6 system parameter setup range

Parameter range	Unit	Setup range	Default	Remarks
Decimal point of X axle	-	0-3	2	Decimal point displayed by X axle position parameter
Decimal point of Y axle	-	0-3	2	Decimal point displayed by y axle position parameter
Safe distance of X axle	Mm	0-9999.999nun	0	X axle keeps low speed in this range
Safe distance of Y axle	Mm	0-9999.999nun	0	Y axle keeps low speed in this range
Change step delay	ms	0-9999ms	0	Interval between valid change step signal and change step operation executed

3. Press the P button to return to programming constant page.

Manual Movement

In single-step mode, axle movement can be controlled by pressing key manually. This method helps user L
to adjust machine tool and work piece.

Operation Steps

1. On single step parameter setup page, press the + or − to enter manual page, as shown in Figure 2-10.

MANUAL	
X:	9875.965
Y:	9875.123
: X current pos.	

Figure 2-10 Manual page

2. Press the + button to operate at low speed in the increasing direction.
   Press the − button to operate at low speed in the decreasing direction.
   Press the ++ and −− and the + buttons at the same time to operate at high speed in the increasing direction.
   Press the ++ and −− and the − buttons at the same time to operate at high speed in the decreasing direction.
3. Press the P button to return to the single step parameter setting page.

ALARM

The device can detect internal or external abnormalities automatically and send out alarm prompt. The alarm message are available on alarm list.

Operation steps

1. On the programming management page, press the P button to enter programming constant page.
2. On the programming constant page, press the arrow button to enter "Alarm History" page to view all alarm history.

As shown in Figure 3-1, the latest 6 alarms, alarm number, and causes can be viewed on this page.

ALARM RECORD	
A.24	Mach. Not read

Figure 3-1 Alam1 history page

Alam1 history and message is shown in Table 3-1.

Table 3-1 Alarm number and alarm message

Alarm Number	Alarm Name	Alarm Description
A.01	Count reached prompt	Count reaches preset value
A.02	Minimum soft limit	Minimum soft limit
A.03	Maximum soft limit	Maximum soft limit
A.11	Count reached shut-down	When count reaches preset value, system shut down automatically.
A.12	Beam is not on upper dead point	1n single step and multistep mode, slider is not on upper dead center.
A.21	Oil pump not started	Oil pump signal loss
A.22	Encoder failure	Encoder voltage is too low.
A.41	Parameter storage error	-
A.42	Abnormal power failure	-
A.43	System self-checking error	-

Appendix Common Fault And Troubleshooting

Fault Symptom	Troubleshooting
When power on, the device will not display.	Check whether No. 1 (24V) and No.2 (OV) terminal is connected or not, or signal is reversed.
When X axle programming is operating, the back gauge motor does not move, but Y AXIS motor moves.	Two motors are reversed. Reconnect.
When program is operating, motor does not move.	Check whether mechanical part has been locked or slider returns to upper dead center.
Motor cannot switch from high speed to low speed.	Check whether high-low speed signal has been sent or motor power is too small.
When the device is in multi-step programming, the program cannot change step.	Check when slider is on upper dead center, No. 1 (START) tem1inal is connected to +24V or not.
When the device is in multi-step programming, the program cannot count.	Check when slider is on upper dead center, No. 5 (COUNT) tem1inal is connected to +24V or not.
When programming is operating, the device loses control.	Check whether encoder cable is connected or not.
When programming is operating, the device actual position will not display or change.	Check whether encoder wiring is correct or encoder cable is connected well.

HYDRAULIC SYSTEM INTRODUCTION

The machine uses hydraulic system (Hydraulic principle scheme); the parallel 2 cylinders drive the ram downward. The torsion shaft ensures synchronization of cylinders. Hydraulic system uses assembling block structure. All hydraulic valves are fixed on the assembling block (The explosion drawing of assembling block). It enhances reliability and security of the system, and easy for installation and maintenance.

System analysis:

When machine is in approach speed, electromagnets YA1, YA3 are energized. Valve 7 shifts to left working position and Valve 9 shift to right working position. Oil pump supplies pressure oil to upper part of two cylinders. Because YA3 is energized, the oil in the lower part of two cylinders flow through valve 9, valve 8 and valve 7 then back to the oil tank. The weight of ram makes the downward speed of piston faster than oil supplying speed of oil pump, negative pressure is created in upper part of cylinder. The hydraulic oil in the oil tank drops into the upper part of cylinder through the valve 13. The ram is in the approach speed.

When the ram reaches BSP (signal sent by stroke switch), YA3 is energized. Valve 9 shifts to left working position. The oil in the lower part of cylinder flows through valve 11 and creates 100 bar pressure. The negative pressure in the upper part of cylinder disappears. Valve 13 auto-closes. The hydraulic oil in the oil tank drops into the upper part of cylinder through the valve 7, 8. The ram is in the working speed.

When the ram reaches BDP (signal sent by pressure gauge), YA1 is de-energized, and YA2 is energized. Valve 7 shifts to right working position. Oil pump supplies pressure oil to lower part of two cylinders through valves 7, 8, and 9. The oil in the upper part of cylinder is back to tank through valve 13, and then ram returns. When the ram reaches TDP (signal sent by stroke switch), YA2 is de-energized. Valve 7 is back to the middle working position, ram stops at TDP.

Hydraulic Oil

The hydraulic oil is the primary medium for transmitting pressure and also must lubricate the running parts of the pump.

After installation of the machine and before machine startup, bring the oil level up to 90% of capacity. **A shortage of hydraulic oil can cause hydraulic system breakdown and damage to major mechanical parts due to overheating.**

- Use hydraulic oil SHELL BRAND 32AW or an equivalent with similar specifications.
- Keep hydraulic reservoir filled to 90% of capacity.
- **DO NOT** rely totally on the oil gauge as they can sometimes indicate an incorrect level reading. Do a visual inspection with the oil fill cap removed as well.

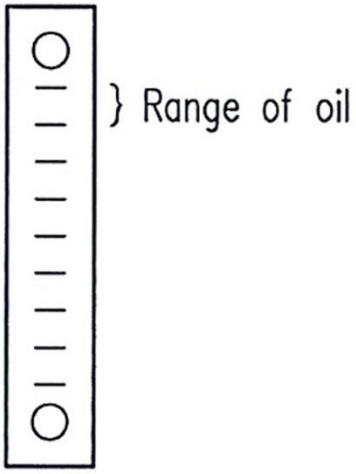
- A shortage of hydraulic oil will cause hydraulic system breakdown to major mechanical components due to overheating.
- Change the hydraulic oil every 6 months along with the oil filter.

Replacing Hydraulic Oil

The cleaning of the oil tank is very important. Proper hydraulic operation depends upon clean hydraulic oil and a clean hydraulic system.

***Important**: Used oil products must be disposed of in a proper manner following your local regulations.*

1. To drain the hydraulic tank, first make sure the drain valve is closed.
2. Remove the plug and connect a drain hose. Route the drain hose into an approved container for proper disposal.
3. Open the valve to drain the tank. Capacity of the oil tank is approximately 33 gallons (125 liters).
4. Clean the tank by removing the oil tank cover and using a link free cloth to wipe the inside of the oil tank.
5. When the tank is clean and dry, replace the tank cover.
6. Fill the tank to 90% full through the breather cap port.



Oil gauge

PRESSURE ADJUSTMENT

The working pressure of hydraulic system can adjust between zero and Maximum Pressure. First determine the bending pressure according to the bending condition, and then determine the needed pressure of hydraulic system.

Calculation Formula

The required bending force can be computed from the following formula:

$P= (1.42 \times L \times \sigma b \times S^2)/(1000 \times V)$

P: = Load (kN)
L: = Bending length (mrn)
σb: = Tensile Strength (N/mm^2)
S: = Sheet Thickness (mrn)
V: = Width of Opening (mrn)

1Kgf ≈ 10N 1t ≈ 10000N=10kN
1MPa ≈ 10Bar

Example 1:

Nominal Force Pf = 1350kN
Maximum Force Py = 33.5Mpa
Sheet Thickness S = 2mm
Sheet Length L = 3000mrn
Opening V = 8 x S = 8 x 2 = 16mrn
Tensile Strength σb = *$450N/mm^2$*

Needed bending force:
$F1 = (1.42 \times 3000 \times 450 \times 2^2)/(1000 \times 16)=480kN$

In practice this value must be increased by 10%.
F2 = F1 + F1 x 10% = 480 + 480 x 10% = 528kN

The needed force of hydraulic system:
P = (Py x F2) / Pf = (33.5 x 528) / 1350 ≈ 13MPa

Determine Bending Force with Bending Chart

For easy computing, we draw a chart with thickness, opening and bending force. When the value σb is 450N/mm^2, the bending force per meter, unit in kN, is equal with calculated value. When the value σb is not 450N/mm^2, search the relevant modulus C, then multiplied by the bending force that checked before, the result is the needed bending force.

Example 2:
Nominal Force Pf = 1350kN
Maximum Force Py = 33.5Mpa
Sheet Thickness S = 2mm
Sheet Length L = 3000mm = 3m
Opening V = 8 x S = 8 x 2 = 16mm
Tensile Strength σb = 600N/mm^2

Check the chart. When σb is 450N/mm^2, the thickness S = 2mm, opening V = 16mm, two volumes' crossing grid is the needed bending force per meter, F3 = 160kN.

Then check the function chart, when σb is 600N/mm^2, C = 1.35.
Needed bending force:
F1 = F3 x C x L= 160 x 1.35 x 3 = 648kN

In practice this value must be increased by 10%.
F2 = F1 + F1 x 10% = 648 + 648 x 10% ≈ 713kN

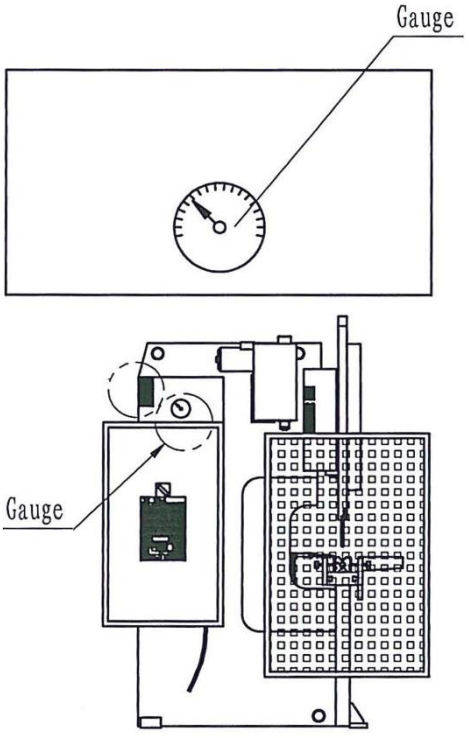
The needed force of hydraulic system:
P = (Py x F2) / Pf = (33.5 x 713) / 1350 ≈ 17.5MPa

(F1 - compute bending force; F2 - actual bending force; F3 - check bending force in the chart;
P - needed force of hydraulic system)

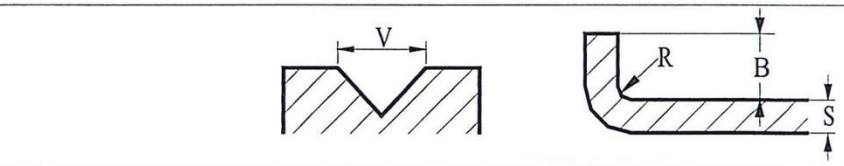
For easy computing, when you get bending force, you can check the needed force P from the pressure conversion mark. (e.g. F2 = 900kN, P = 225bar = 22.5MPa)

According to the calculated needed force, adjusting the switch on the pressure gauge, you can control the actual bending force.

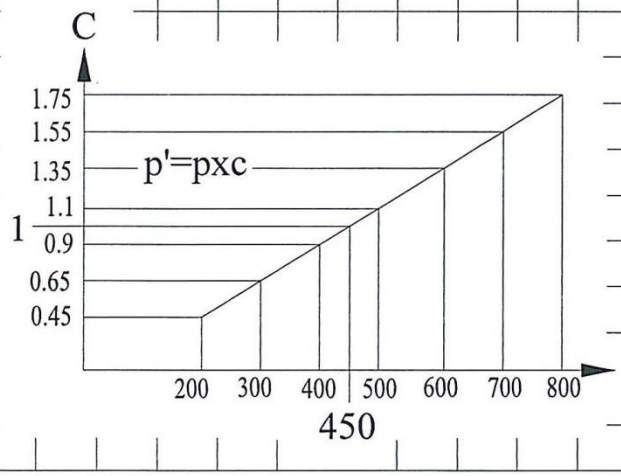
Bar	kN	TON (Pressure Conversion Mark)
45	130	13
75	230	23
105	320	32
135	410	41
165	500	50
195	600	60
225	690	69
255	780	78
285	870	87
315	1000	100



Adjust working force based on the calculation. If it is less than needed, you cannot bend. If bigger, it will waste the power and affect the using life of the parts.



V	R	B	S 0.5	0.8	1	1.2	1.5	1.8	2	2.5	3	4	5	6	8	10	12	15	20	25
4	0.7	2.6	40	105							T = 420—480 N/mm² （C=1）									
8	1.5	5.2	20	55	80	115	180							P (kN/m)						
10	1.7	6.5		41	65	95	145	210	260											
12	2	7.8			55	80	120	175	215											
16	2.7	10.4				60	90	130	160	250	360									
20	3.4	13					75	105	130	200	290	520								
25	4.2	16						85	105	160	230	410	640							
30	5	20								140	190	340	540	770						
35	6	23									170	300	460	660						
40	7	26									150	260	400	580	1030					
45	7.5	29										230	360	520	910					
50	8.5	32										210	320	460	820	1280				
55	9	36											300	420	750	1170				
60	10	39											270	390	690	1070				
65	10.8	42											250	360	630	990	1420			
70	11.7	45												330	590	920	1320			
75	12.5	49												310	550	860	1230			
80	13.5	52												290	520	800	1160	1800		
85	14	55													490	760	1090	1700		
90	15	58													460	710	1030	1600		
100	17	65													410	640	930	1440	2560	
110	18.5	71														590	840	1310	2330	
120	20	78														540	770	1200	2130	3330
140	24	91															660	1030	1830	2860
170	29	110															550	850	1510	2350
200	35	130																720	1280	2000



Note:The capacity of per length can not over the set value

BENDING ALLOWANCE

In order to bend sheet metal accurately, you will need to consider the total length of each bend. This is referred to as bend allowance. Subtract the bend allowance from the sum of the outside dimensions of the piece part to obtain the actual overall length or width of the piece. Because of differences in sheet metal hardness, and whether the bend is made with the grain or against it, exact allowances must sometimes be made by trial and error. However bend allowances for general use can be obtained from metal working books or from the Internet.

UNDERSTANDING SPRINGBACK

Springback, also known as elastic recovery, is the result of the metal wanting to return to its original shape after undergoing compression and stretch. After the bending leaf is removed from the metal and the load is released, the piece part relaxes, forcing the bent portion of the metal to return slightly to its original shape. The key to obtaining the correct bend angle is to over bend the metal a little and allow it to spring back to the desired angle. All metals exhibit a certain amount of spring back.

MATERIAL SELECTION

⚠ CAUTION: It must be determined by the customer that materials being processed through the machine are NOT potentially hazardous to operator or personnel working nearby.

When selecting materials keep these instructions in mind:

- Material must be clean and dry. (without oil)
- Material should have a smooth surface so it processes easily.
- Dimensional properties of material must be consistent and not exceed the machine capacity values.
- Chemical structure of material must be consistent.
- Buy certificated steel from the same vendor when possible.

NOTES

NOTES

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