



## HYDRAULIC PRESS BRAKE USER MANUAL



COMPANY NAME :  
MACHINE TYPE : JM-S 30200  
SERIAL NUMBER : 232420001  
MANUFACTURING YEAR : 2020  
DATE :

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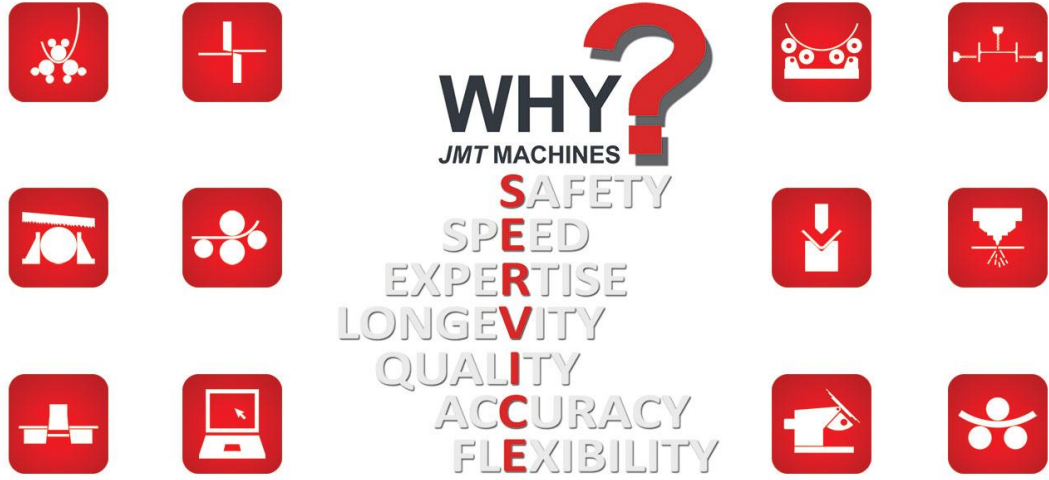


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## ABOUT JMT



JMT designs and sells quality metal fabrication machine tools for a wide range of sheet metal and structural steel working applications that include bending, cutting, drilling, positioning, punching, shearing and welding.

Led by Serhan Yazıcılar, JMT is supported by an ever expanding team of industry professionals, which include experienced product design engineers, sales consultants and veteran service engineers. JMT also has a resourceful parts and tooling department to keep your machines working at optimal performance.

The company has a 55,000 square foot showroom, warehouse and service center at its headquarters in Bursa, Turkey. Worldwide network of over 40 select dealers trained to sell and service JMT machines are strategically located to provide the fastest response times to our customers.

JMT machines are built to our stringent set of design and quality standards in state-of-the-art manufacturing facilities. Along with designing our own machines, JMT partners with manufacturers that have extensive experience building machine tools for some of the leading suppliers in the industry.

JMT product designs combine accuracy, speed, flexibility, durability, reliability and advanced technology to deliver machines with the highest performance-to-price ratio in the industry.

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## FOREWORD

This user manual has been tailored to our customers and includes necessary technical data to help your machine perform more efficiently and effectively. Our goal is to help you obtain maximum performance in particular operations of your machine to save you time and cost. Our machines are built with top quality materials, state-of-the-art technology and high level engineering services.

Our low operation-cost products will serve you for many years if you adhere to a regular machine maintenance schedule. We have an experienced service and sales team who would be happy to provide support or service on your machine. All staff operating the machine should read this manual at least once and keep a copy near the machine for reference and in order to avoid potential problems and/or misuse.

This user manual is the property of JMT USA Makine San. Ve Tic. Ltd. Sti. (JMT) and is shared directly with our customers who have purchased this machine. JMT does not allow this manual to be shared with any other person or entity, nor do we allow this manual to be copied, shared, or posted on any website or social media without express written consent from JMT. JMT reserves the right to protect its intellectual property to the fullest extent of the law. JMT® is a registered trademark of JMT USA Makine San. Ve Tic. Ltd. Şti.

### **WARNING:**

***THIS MANUAL CONTAINS IMPORTANT INFORMATION REGARDING SAFETY, OPERATION, MAINTENANCE AND STORAGE OF THIS PRODUCT. BEFORE USE, READ CAREFULLY AND UNDERSTAND ALL CAUTIONS, WARNINGS, INSTRUCTIONS AND PRODUCT LABELS. FAILURE TO DO SO COULD RESULT IN SERIOUS PERSONAL INJURY AND/OR PROPERTY DAMAGE. IF YOU SHOULD HAVE ANY QUESTIONS OR EXPERIENCE A PROBLEM WITH YOUR JMT PRODUCT, DO NOT RETURN THIS PRODUCT TO THE STORE. PLEASE CALL OUR CUSTOMER SERVICE DEPARTMENT AT +90 224 242 16 00. BEFORE YOU CALL, HAVE THE FOLLOWING INFORMATION AVAILABLE: MODEL No., DATE PURCHASED AND STORE LOCATION. AN JMT REPRESENTATIVE CAN RESOLVE YOUR PROBLEM OVER THE PHONE. IF YOU WOULD LIKE TO MAKE A SUGGESTION OR COMMENT, GIVE US A CALL OR EMAIL US AT: [jmt@jmt.com.tr](mailto:jmt@jmt.com.tr) YOUR FEEDBACK IS VITAL TO US.***



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## **WARRANTY**

- The firm guarantees the machine described hereby, designed in compliance with all regulations in force, in particular safety and health regulations; the machine has undergone successful testing.
- All the parts of the machine are under guarantee regarding to workmanship and material defaults.(Exclusion Of electricity materials).
- The warranty covers a period of 12 months. It doesn't cover electrical motors and tools.
- If any part changed during guarantee period,that part has also 1 year guarantee from changing time.
- There is no second warrant after sending spare parts for expired machine.
- The purchaser is entitled "replacement of faulty parts". Shipping and packing costs are at his expense.
- The warranty doesn't cover the parts damaged by falls or careless handling of the machine, incorrect operation, non-compliance with the maintenance rules. Any tampering with the machine, especially with the safety devices automatically expires the warranty and the manufacturer will be freed from any responsibility.
- Any kind of alteration on the machine ends the warranty and the manufacturer becomes free from every kind of responsibility.
- No claim for damages shall be accepted in case the machine lays idle for a long period of time.
- Machine is designed to be run indoors. It is not recommended to run the machine outdoors.

## **OUT OF WARRANTY**

- 1- To be operating the machine before making the installation adjustments.
- 2- If ,not fixing the machine to the ground with anchorage bolts.
- 3- To be feeding the machine with electricity voltage other than electricity voltage mentioned in User Manual.
- 4- If,not changing the parts that must be changed periodically such as oil and air filter.
- 5- Not lubricating the parts that are shown in the User Manual.
- 6- Operating the machine over maximum pressure mentioned in the User Manual.
- 7- Damages occurred from wrong bending operation.
- 8- Damages occurred from compulsions.
- 9- The machine is not under warranty if some part and parts weld to the machine.

The serial number on the machine is a "main reference for the warranty", user manual, after sale service and identify the machine in case of need.

 **Important:** Upon the delivery of the machine, the consumer must make himself sure that all the devices indicated in the paragraph of the safety manual are present and working correctly. Furthermore, he must mount in conformity with the instructions indicated those devices which are not mounted at the time of delivery to facilitate transport.

When ordering spare parts it is necessary to state:

1. Machine model
2. Serial number and year of production
3. Item reference number

**Warning:** *Without serial number no spare parts will be delivered.*

### **General Information:**

- The machines are manufactured in compliance with the accident prevention rules in force.
- Strictly comply with the instructions contained in this manual to obtain the best performance from the machine. Strict compliance with the rules contained herewith will ensure optimum results and avoid any inconvenience caused by the non-compliance of operation and maintenance instructions.
- Closely follow the instructions given below to avoid contacting the manufacturer for the problems which can be easily solved.
- If after having strictly compliance with the given instructions, the purchaser still needs the help of our technical assistance service, he must supply all the technical indications necessary to determine the type of problem and/or the parts which are not functioning correctly. This will enable our technical assistance service to intervene quickly and efficiently on the machine.

Copies of the instruction manual may be requested upon indication of the machine serial number.



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## GENERAL MACHINE INFORMATION

|   |                                  |                                                                                                                                                                               |
|---|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Registered trademark             | JMT®                                                                                                                                                                          |
| 2 | Machine type                     | JM-S 30200                                                                                                                                                                    |
| 3 | Serial number                    | 232420001                                                                                                                                                                     |
| 4 | Manufacturing year               | 2020                                                                                                                                                                          |
| 5 | Address of manufacturer          | JMT USA Mak. San. Ltd. Şti.Balat Mh.<br>Balat Mh. Yakamoz Sk.Endülüs Park<br>Rezidans A34<br>Nilüfer 16140/Bursa / TURKEY<br>P: +90 (224) 242 16 00<br>F: +90 (224) 242 16 26 |
| 6 | Address of the authorized dealer |                                                                                                                                                                               |



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## EC DECLARATION OF CONFORMITY

**MANUFACTURER**

**JMT USA MAKİNE SAN. VE TİC. LTD. ŞTİ.**

**ADDRESS**

Balat Mh. Yakamoz Sk. Endülüs Park Rezidans A34

Nilüfer 16140/Bursa/TURKEY

**Name and address of the person authorized to compile the technical file**

SERHAN YAZICILAR  
Balat Mh. Yakamoz Sk. Endülüs Park Rezidans A34  
Nilüfer 16140/Bursa/TURKEY

The undersigned Company certifies under its sole responsibility that the item of equipment specified below satisfies the requirements of the Machinery Directive 2006/42/EC which is apply to it.

The item of equipment identified below has been subject to internal manufacturing checks with monitoring of the final assessment by JMT.

The item of equipment identified below has been subject to EC Type Examination by SGS Supervise Gözetleme Etüd Kontrol Servisleri A.Ş. (Notified body number 2218), 10 K-1-2-3-4 34381 Şişli, İstanbul, Türkiye which has issued the certificate of conformity number 0476/IN-IST-15.

**PRODUCT**

HYDRAULIC PRESS BRAKE

**BRAND NAME**

JMT®

**MODEL / TYPE**

JM-S 30200

**SERIAL NO**

232420001

**YEAR OF MANUFACTURE**

2020

**DIRECTIVES:**

2006/42/EC MACHINERY DIRECTIVE

2006/95/EC ELECTRICAL EQUIPMENT DESIGNED FOR USE WITHIN CERTAIN VOLTAGE LIMITS

2004/108/EC ELECTROMAGNETIC COMPATIBILITY DIRECTIVE

**Regulations Applied acc. to HARMONIZE STANDARDS:**

EN 12622+A1:2013, EN ISO 12100:2010, EN ISO 13855:2010, EN ISO 13849-1:2008,

EN ISO 13857:2008, EN ISO 14119:2013, EN 953+A1:2009, EN 60204-1+A1:2009

**Place and date of issue**

Bursa, 21/12/2015

**Name and position of authorized person**

Serhan YAZICILAR  
President

**Signature of authorized person**



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## CHAPTER 1 – GENERAL SAFETY WARNINGS

### 1.1 – SAFETY INSTRUCTIONS :

Please read the user manual before operating the machine. Please contact JMT if you have any questions concerning the machine.

- 1 – Always pay attention to best safety practices and all warning labels on the machine.
- 2 – **! NEVER** put your fingers, hands or any part of the body into the tool section or any moving part of the machine.
- 3 – **! ALWAYS** be sure that the machine is **turned off**, before any service or maintenance operation.
- 4 – Do not allow anyone to perform maintenance except authorized and trained personnel.
- 5 – Do not wear long, or oversized clothes to avoid the possibility of clothing being caught in moving parts.
- 6 – Properly ground the machine with copper grounding cables.
- 7 – The machine is designed to be operated by one (1) operator.
- 8 – Never open the rear cover and protective side covers while the machine is running.
- 9 – For safety, do not change the adjustment of the hydraulic valves.
- 10 – Do not change the position of the limit switches.
- 11 – Never exceed the maximum pressure value that is given on the pressure label.
- 12 – Both cylinders should be covered while the machine is in operation to prevent hands or clothing from becoming caught in moving parts. Therefore, never work while the cover is opened.
- 13 – An emergency stop button is placed on the pedal and the bench, for the safety of the machine and the operator. The emergency stop button stops all potentially dangerous actions.
- 14 – Proper lighting should be used while operating this machine and the workspace should be free of any obstacles.
- 15 – Any person besides the operator should be kept away from the workspace.
- 16 – Whenever possible, tool rotating operations should be performed with chain assistance.
- 17 – Press brake tools are produced with special production techniques. The use of original tools in the machine is always recommended. Other tools may cause damage to the machine.
- 18 – Before using the machine, verify that all safety equipment is in proper working condition.
- 19 – Do not try to open the electric panel while machine is running. Shut down the machine's power before opening the electric panel.
- 20 – The operator should always wear steel-toed or protective footwear to avoid injury.
- 21 – Operator should always wear protective personal equipment. (Gloves, shoes etc.)
- 22 – Use protective eyewear while working on the machine.



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## 1.2 – UNAVOIDABLE RISKS :



Figure-1



Figure-2

- Keep your hands away from bending axis while bending. Keep in mind that the part that is being bent will be elevated up to the bending angle and that the bent part may fall. Do not change the machine's tool adjustments while bending and do not let the protective cover safety switches be disabled.
- Keep a safe distance and do not approach the moving parts of the machine while it is running.
- Never go inside the machine while it is bending.
- Sheet metal parts being bent may rise quickly and hit the operator.



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### 1.3 – DANGERS, RESPONSIBILITIES, WARNINGS AND PROHIBITIONS :

#### 1.3.1 – DANGERS :

The following descriptions define the dangers, warnings, responsibilities and prohibitions which the operator must follow in order to safely and correctly work on the machine:



Attention: Electric Shock Danger



Attention: General Danger



Attention: Temperature Danger



Attention: Danger of being crushed



Attention: Danger of being crushed



Attention: Danger of being crushed



Attention: Danger of being caught



Attention: Danger of breaking out and falling



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### 1.3.2 – RESPONSIBILITIES AND WARNINGS :

The following descriptions define the personal protective equipment requirements and warnings which the operator must follow in order to safely and correctly work on the machine:



Work shoe should be used.



Work dress should be used.



Gloves should be used.



Ear protection should be used.



The safety cages should not be removed.



Grounding should be realized.



The main switch should be locked in maintenance cases when the machine is not in use.



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### 1.3.3 – PROHIBITIONS :

The following descriptions define the dangers, warnings, responsibilities and prohibitions which the operator must follow in order to safely and correctly work on the machine:



Never perform maintenance while the machine is turned on.



Never open the safety cages while the machine is turned on.



Never touch the powered ends.



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## CHAPTER 2 – GENERAL DESCRIPTION OF THE MACHINE

### 2.1 – INTRODUCTION OF THE MACHINE :

- This machine is equipped with the latest technology and has very sensitive tolerances. Precision welding helps eliminate tension at all joints. All tension points are designed with large radius and possible weld cracks are eliminated.
- For minimum displacement, lower and ram heights are designed at optimum values.
- Ram is placed vertically; cylinder bearings, piston bearings and felts are designed in such a way that they can compensate for vertical loads.
- Hydraulic cylinders have a two sided design and are honed to 2 microns. By doing that, minimum abrasion resistance for the felts is obtained. Cylinder bodies are forged from SAE 1040 metal.
- Hydraulic cylinders are bound with bolts and wedges at the front sides of the feet, therefore a perfect level of bearing and load balancing is required.
- Piston head properties are equipped with Omegat type seals, wide bronze bearings and half angled bearing bands.
- Pistons are sensitively ground and coated with hardened chrome to provide low friction and abrasion resistance while the piston is moving towards the felts.
- Adjustable ram slideways are made of ulpolen material, which is suitable for low friction resistance which doesn't necessitate casting. In the displacement of ram towards right-left or rear-front, the bearings are organized for guidance.
- The hydraulic blocks is designed in to provide a decrease in heat. Furthermore, the necessity for hydraulic pipes and fittings is minimized. This guarantees that the hydraulic system is being used reliably and at a maximum level.
- Our hydraulic system is designed to have accessible valves and high quality safety and performance equipment.
- Our machines are capable of reaching very low pressure values by means of press and load sensing system via the hydraulics. This is achieved without unnecessary repetition. It reduces the risk of extraordinary equipment loads to 2% - 3% of pressure values for consist pressure.
- The hydraulic system is being constantly protected from extraordinary loads by means of pressure limits secured in the CNC program.
- The JMT hydraulic systems allow sensitive usage at all pressure values up to the maximum pressure value which allows for proper positioning of the cylinder, synchronization and repeatability.
- The hydraulic pipes are made of steel seamless pipe with St 35.4 quality according to DIN 2391 / CY.
- All electrical valves can be controlled with 24 dc voltage. For safety and endurance, all valves are equipped with indicators, which helps protect against possible hits.
- The electric system is based on PLC. PLC system replaces the mechanical relays and increases the reliability. It shortens the response time of critical devices such as motors, valves or servo valves.
- PLC enables the monitoring of hydraulic and electrical conditions. Input and output values can be followed easily. Diagnosed errors are illustrated on the screen as error messages.
- All valves, relays and limit switches have 24 V DC control voltage as a safety feature.
- All CNC control flows are controlled with DC servo movement units as closed circuit and optimal performance is provided with speed and the definable values clearly shown.
- The back gauge system is optionally customized to your conditions. The back gauge bearings are made for heavy conditions with double carriers and made by Star, Hiwin.
- The machine's outer surface is painted with 2 layers of paint which is 60 microns thick, to help protect against wear and tear.
- There are Y1, Y2, X, R standard axes. ESA S630 ,CYBELEC ModEva 10S or DELEM DA 66T control unit comes standard. The machine guarantee covers manufacture defects, but does not cover defects caused by misuse.



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### 2.1.1 – MACHINE OPERATION PRINCIPLES :

- The ram's parallelism is provided by linear encoders situated at Y1 and Y2 axes and every stroke position is done with servo valves that are being controlled by CNC control units and maintains sensitivity within 1% while in operation.
- Ram movement speed is optimized. There are three rotational movement speeds of ram: fast fall, bending speed, return speed. These speed values can be adjusted by the CNC programming.
- A bending program can be easily seen on the screen. In addition to this, 2D or 3D animation of the bending program can be viewed which allows the operator to see his work prior to actual bending and be more effective.
- Adjustments can be made faster with JM-S machines in comparison to conventional press brakes. For producing any part, in addition to fast programming, angle and bending parameters can be manually entered. With CNC press brakes, the bend operation's necessary tonnage, retraction, rear stop and bend rotation are adjusted automatically.
- When wrong parameter inputs or values exceeding limits are input, an error message prompts the operator to double check his values which decreases the possibility of making mistakes.
- The DNC control unit has an automatic inch or metric system convertor.
- While using the DNC control unit, different languages can be selected.



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### 2.1.2 – USED UNITS :

| UNIT               | EXPLANATION                                                                           |
|--------------------|---------------------------------------------------------------------------------------|
| %                  | Percent                                                                               |
| Ø                  | Diameter                                                                              |
| >                  | Greater than                                                                          |
| <                  | Smaller than                                                                          |
| π                  | Pi number: 3,14159                                                                    |
| l                  | Volume unit: Liter (1 lt = 1000 cm <sup>3</sup> )                                     |
| cm <sup>3</sup>    | Volume unit: Cubic centimeter                                                         |
| h                  | Time unit: Hour                                                                       |
| RPM                | Speed unit: revolution / min                                                          |
| m/min              | Speed unit: meter / minute                                                            |
| Kg                 | Weight unit: Kilogram (1000 Kg = 1 TONES)                                             |
| mm                 | Dimension unit: millimeter (1000 mm = 1 m)                                            |
| mm <sup>2</sup>    | Area Unit: millimeter square                                                          |
| °C                 | Temperature unit: Celsius or centigrade                                               |
| V                  | Electric voltage unit: Volt                                                           |
| Ω                  | Resistance unit: Ohm                                                                  |
| A                  | Electrical current unit: Ampere                                                       |
| Hz                 | Frequency unit: Hertz                                                                 |
| kW                 | Electrical power unit: Kilowatt (1kW = 1000 Watt)                                     |
| AC                 | Electric type = Alternative current                                                   |
| DC                 | Electric type = Direct current                                                        |
| BAR                | Pressure unit: BAR                                                                    |
| N/mm <sup>2</sup>  | Pressure unit: Newton over millimeter square                                          |
| Kg/cm <sup>2</sup> | Pressure unit: Kilogram over centimeter square (1.019716 Kg/cm <sup>2</sup> = 1 BAR ) |
| PSI                | Pressure unit: Pound inch square (14.50377 PSI = 1 BAR)                               |
| Db(A)              | Noise level: Decibel                                                                  |
| Mpa                | Pressure unit: Mega Pascal (1Mpa = 1 N/mm <sup>2</sup> )                              |
| q                  | Cable cross-section (mm <sup>2</sup> )                                                |

Table-1



## 2.2 – WARNING AND INTRODUCTION LABELS ON THE MACHINE :

| DESIGNATION PLATE  |                                                        |
|--------------------|--------------------------------------------------------|
| Manufacturer       | JMT USA Makine San. Ve Tic. Ltd. Sti.. Bursa / TÜRKİYE |
| Machine            | Hydraulic Press Brake                                  |
| Type               | JM-S/R                                                 |
| Model              |                                                        |
| Serial No          |                                                        |
| Capacity           | ton                                                    |
| Bending length     | mm                                                     |
| Main voltage       | V/Hz/Ph                                                |
| Motor Power        | kW                                                     |
| System Pressure    | bar                                                    |
| Min stroke         | mm                                                     |
| Max stroke         | mm                                                     |
| Machine weight     | kg                                                     |
| Top tool weight    | kg                                                     |
| Bottom tool weight | kg                                                     |
| Length             | mm                                                     |
| Width              | mm                                                     |
| Height             | mm                                                     |

DANGER

**TO REDUCE THE POSSIBILITY OF INJURY...**

**DO NOT** Place your hands in the die area.

---

**DO NOT** Position any part of your body where it may be struck or crushed by part movement.

---

**ALWAYS** Read and understand the Operation, Safety, and Maintenance Manual before installing dies, operating, or servicing the Press Brake.

DO NOT REMOVE THIS SIGN FROM THIS PRESS BRAKE 240008

Label - 1: Designation Plate

Label - 2: Danger Label

Don't place your hand between the upper and lower tools during the operation.

Protect yourself from the danger of being stuck between upper tool and work pieces as the piece to be bended will raise during the operation.



Label-3



Label-4



Label-5

Label - 3: Electricity Warning Label

Label - 4: Grounding Label

Label - 5: Motor Rotation Label



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Label – 6



Label – 7



Label – 8

Label – 6: Hydraulic system leakage warning label. High pressure lubricant might cause serious injuries. Reduce the pressure first before stopping leakage.

Label – 7: Warning. Hydraulic lubricant amount must be between the red line and the black line on the lubricant indicator. Our lubricant recommendation is ISO VG32-VG 46.

Label – 8: Hydraulic system warning label; do not touch or adjust the valves on the machine's hydraulic system.



Label – 9

Label – 9: Greasing label; this indicates the places to be lubricated.



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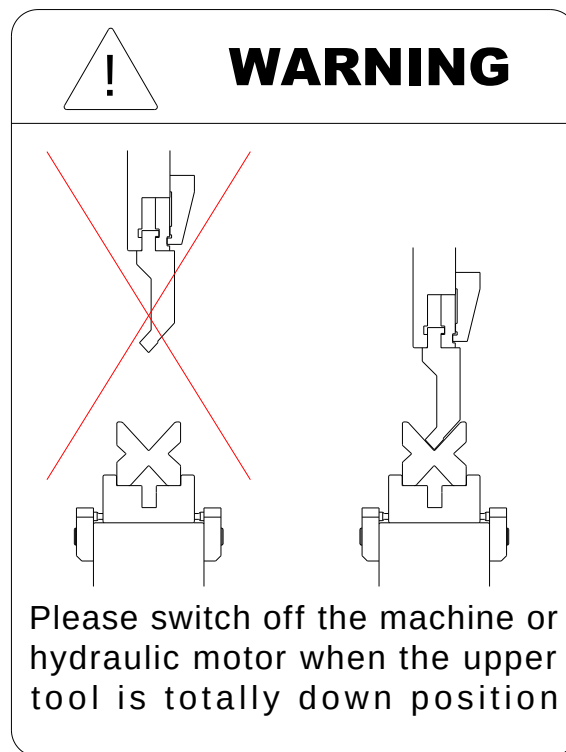


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|                                                                                                                                                                                                                                                                  |  |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----|
| Falling Time After Stopping<br>Nachlaufzeit - Tiempo de descenso despues de parar<br>Tempo discesa dopo lo stop - Temps ecoule apres arret<br>Doba k zastavení - Pysähdysaika<br>Czas zatrzymania belki - Foelgetid<br>Tidsfördröjning vid nödstopp - Nalooptijd |  | ms |
| Traversing Distance After Stopping<br>Nachlaufweg - Recorrido despues de parar<br>Movimento dopo lo stop - Distance parcourue apres arret<br>Dojezd po zastavení - Pysähdysmatka<br>Droga zatrzymania - Foelgevei<br>Fallrörelse vid nödstopp - Naloopweg        |  | mm |
| Safety Distance<br>Sicherheitsabstand - Distancia de seguridad<br>Distanza di sicurezza - Distance de securite<br>Vzdálenost nad plechem - Turvaetäisyys<br>Odległość bezpieczna - Sikkerhetsavstand<br>Säkerhetsavstånd - Veiligheidsafstand                    |  | mm |

Label - 10

Label – 10: Safety distance label; this indicates, when the light curtain is cut off, when and where the machine will stop, and the distance between safety barrier and danger area.



Label - 11

Label – 11: Place the ram to lower position, before shutting down the hydraulic motor and main switch.



### AIR BENDING FORCE CHART (Metric)

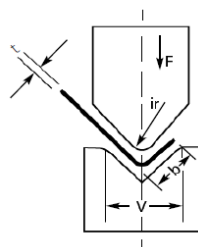
| t    | 4   | 5   | 6    | 8    | 10   | 12   | 16   | 20   | 26   | 30   | 40   | 50   | 60   | 70   | 80    | 90    | 100   | 110   | 120   | 130   | 150   | 180   | 200   | 250   | V mm  |
|------|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| mm   | 2.8 | 3.5 | 4.0  | 5.5  | 7.0  | 8.5  | 11.0 | 14.0 | 17.5 | 21.0 | 28.0 | 35.0 | 42.0 | 48.0 | 55.0  | 62.0  | 70.0  | 77.0  | 84.0  | 91.0  | 105.0 | 126.0 | 140.0 | 175.0 | b mm  |
|      | 0.7 | 0.8 | 1    | 1.2  | 1.6  | 2    | 2.5  | 3    | 4    | 4.5  | 6    | 8    | 9.5  | 11   | 12    | 14    | 15.5  | 17    | 19    | 21    | 23    | 28    | 32    | 40    | ir mm |
| 0.5  | 3.9 | 3.0 | 2.4  |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |
| 0.8  |     | 8.1 | 6.7  | 4.9  | 3.6  |      |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |
| 1    |     |     | 10.7 | 7.9  | 6.1  | 4.9  |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |
| 1.2  |     |     |      | 11.3 | 8.7  | 7.3  |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |
| 1.5  |     |     |      |      | 14.2 | 11.8 | 8.2  |      |      |      |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |
| 1.75 |     |     |      |      |      | 16.1 | 11.6 | 9.0  |      |      |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |
| 2    |     |     |      |      |      | 21.4 | 15.8 | 12.2 | 8.7  |      |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |
| 2.5  |     |     |      |      |      |      | 24.6 | 19.7 | 14.1 | 12.2 |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |
| 3    |     |     |      |      |      |      |      | 28.4 | 21.0 | 18.2 | 12.7 |      |      |      |       |       |       |       |       |       |       |       |       |       |       |
| 4    |     |     |      |      |      |      |      |      | 38.8 | 33.6 | 24.3 | 18.0 |      |      |       |       |       |       |       |       |       |       |       |       |       |
| 5    |     |     |      |      |      |      |      |      |      | 53.4 | 39.4 | 30.4 | 24.4 |      |       |       |       |       |       |       |       |       |       |       |       |
| 6    |     |     |      |      |      |      |      |      |      |      | 56.7 | 43.7 | 36.5 | 30.1 | 25.3  |       |       |       |       |       |       |       |       |       |       |
| 7    |     |     |      |      |      |      |      |      |      |      |      | 61.7 | 49.6 | 42.5 | 35.8  | 30.6  |       |       |       |       |       |       |       |       |       |
| 8    |     |     |      |      |      |      |      |      |      |      |      | 80.6 | 67.2 | 55.5 | 48.6  | 41.6  | 36.0  | 32.7  |       |       |       |       |       |       |       |
| 10   |     |     |      |      |      |      |      |      |      |      |      |      |      | 90.0 | 78.8  | 67.5  | 60.8  | 53.2  | 48.8  | 43.3  |       |       |       |       |       |
| 12   |     |     |      |      |      |      |      |      |      |      |      |      |      |      | 113.4 | 100.8 | 87.5  | 79.5  | 72.9  | 64.8  | 54.0  |       |       |       |       |
| 14   |     |     |      |      |      |      |      |      |      |      |      |      |      |      |       |       | 123.5 | 112.3 | 99.2  | 91.6  | 76.4  | 61.3  |       |       |       |
| 15   |     |     |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       | 128.9 | 118.1 | 105.1 | 91.1  | 73.1  | 63.3  |       |       |
| 16   |     |     |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       | 134.4 | 119.6 | 103.7 | 83.2  | 72.0  |       |       |
| 18   |     |     |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |       | 157.0 | 131.2 | 109.4 | 94.8  | 72.9  |       |
| 20   |     |     |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       | 135.0 | 121.5 | 90.0  |       |
| 25   |     |     |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       |       | 196.9 | 151.9 |       |

Force required per linear foot to bend mild steel with air bend dies. (Measured in tons.)

TONS/m

Label – 12

Label – 12: Bending Diagram



### Safety Instruction

Read the instruction manual and the warning plates on the machine before operating the machine and take them into consideration.

For the machine's safety and your safety :

- Do not wear loose clothes or ornaments , these cause accidents.
- Wear safety-shoes while working for your safety.
- Never adjust or repair when the machine is running. If not in use, disconnect the machine from the network.
- Work only with the tools appropriate to the machine.
- Use only the tools that are not damaged to the machine.
- Never use the parts that are not fitting to the machine.
- Never remove this warning plate from the machine -

Label – 13

Label – 13: Safety usage information.

**WARNING !**  
**THERE IS NO OIL IN THE TANK.**

Label – 14 : There is no oil in hydraulic tank. Do not operate the machine without filling it with enough lubricant.

Label – 14



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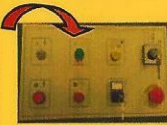
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## INSTRUCTIONS FOR RELEASE OF THE PERSON TRAPPED BETWEEN TOOLS

### 1. IN CASE OF NORMAL STOP

|   |                                               |                                                                                     |
|---|-----------------------------------------------|-------------------------------------------------------------------------------------|
| 6 | Open the Ram by pressing the UP Pedal deeply. |  |
|---|-----------------------------------------------|-------------------------------------------------------------------------------------|

### 2. IN CASE OF EMERGENCY STOP

|   |                                                                                                                            |                                                                                       |
|---|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1 | Keep the Main Disconnect Switch ON. Take necessary measures against the risk of falling of work piece.                     |    |
| 2 | Release the Emergency Stop Button by turning it clockwise then pulling it up.                                              |    |
| 3 | Take all the safety guards in their positions. Push Reset Button on foot pedal console.                                    |    |
| 4 | Push the Reset Button at the rear of the electric panel.                                                                   |    |
| 5 | Start the pump by pushing the Start Button on the electric panel. Also Start Button on the foot pedal console may be used. |   |
| 6 | Choose/Tap "Continue" on the CNC Control Unit                                                                              |  |
| 7 | Push "O" Button on the CNC Control Unit. The indicator led shall be OFF.                                                   |  |
| 8 | Open the Ram by pressing the UP Pedal deeply.                                                                              |  |

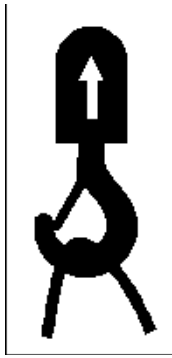
### 3. IN CASE OF ELECTRICITY CUT OFF

|   |                                                                     |                                                                                       |
|---|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1 | Apply upward external force to the machine ram in order to open it. |  |
|---|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|

Label – 15

Label – 15: Saving a person who is trapped between tools; if there is no power on the machine; grab the ram with forklift from the holes on the ram with a crane.





Label – 16

Label – 16 : The tag illustrating the lifting point on the machine is located next to the lifting lug.



Label – 17

Label – 17 : Before maintenance depressurized the hydraulic system. This is located on the hydraulic system.



Label – 18

Label – 18: Do not enter the rear danger area of machine while it is in operation as this may cause injury or even death. Located at rear of the machine.



Labe – 19

Label – 19 : 'Fixed guards must be in position before use.' Located on all the fixed guards of the machine.



Label – 20

Label – 20 : 'Trip hazard'. Located on back gauge system as x-axis movement may cause trip hazard.



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## 2.3 - PROHIBITED APPLICATIONS :

No connection except the electric scheme should be done and no material should be used except those indicated on the scheme.

- Main switch must be locked on the panel while the machine is in use. If the panel is open, the machine will not run. Never work on the machine when the panel cover is open.
- Do not bypass the lateral and rear protection cover switches.
- Never cancel the rear photocells.
- Do not change the adjustments of the pressure safety valves on the hydraulic system.
- Never bypass the frontal safety system on the machine.
- Do not change the speed adjustments and machine parameters.
- Do not leave the tool fixation screws loosened.
- Lower tool must be precisely aligned with the center of the upper tool.

**The press brake should not be used in the following circumstances:**

- If there is any foreign object or than approved materials inserted, extended, put or placed in the working area between top and bottom bending tools.
- For cutting, punching, slitting, breaking, crushing, drilling or imprinting processes.
- For bending operations involving non- flat metals i.e. rods, bars, tubes, pipes.
- The manufacturer or dealer is not responsible for personal safety and for damage to the machine when it is used improperly.



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## 2.4 – SAFETY SWITCHES AND GUARDS ON THE MACHINE :

The electrical and hydraulic circuits of your press brake are designed to allow operation with safety in mind. The following precautions are installed on the machine for enhanced safety. Emergency stop buttons are located on the pedal control stand and on the electrical cabinet cover. The cylinders are covered by fixed cover plates. (See Figure-3)

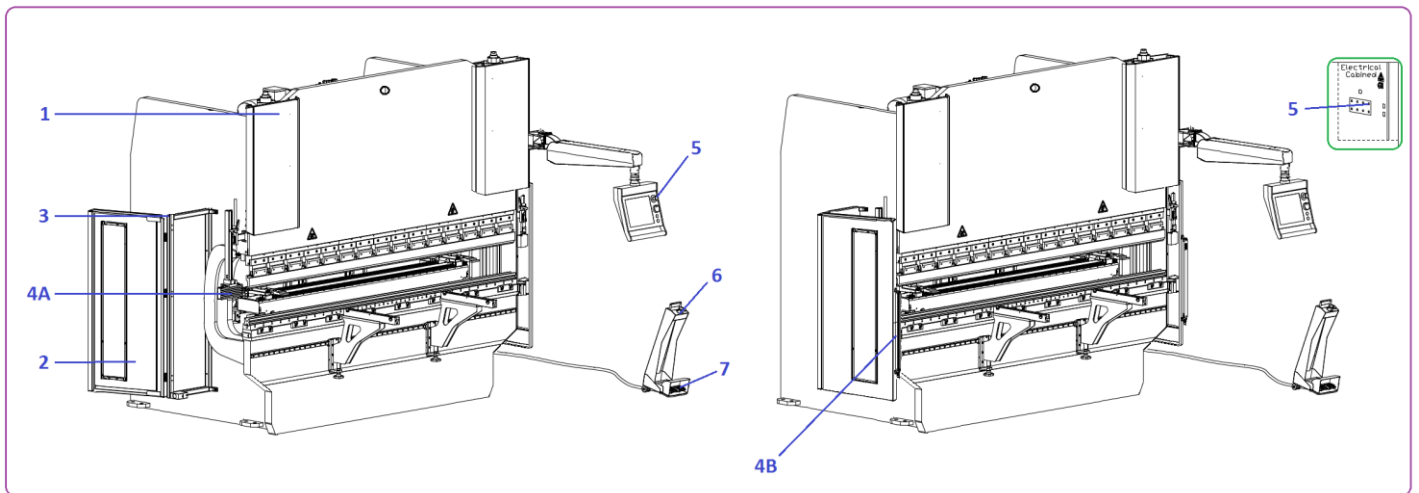


Figure-3

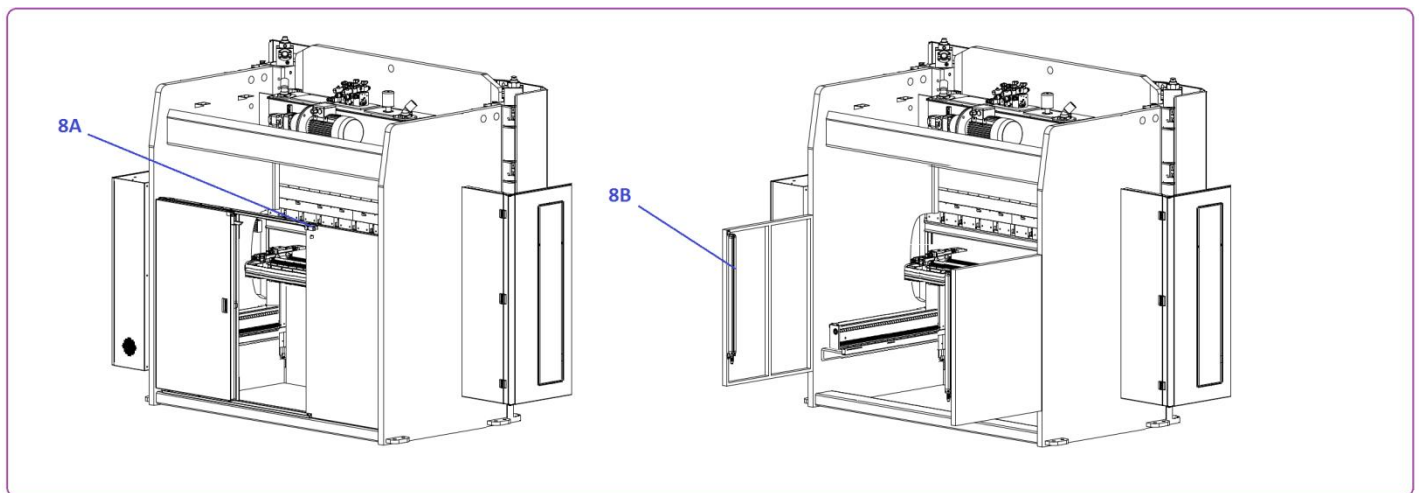


Figure-4

Safety switches are installed on the rear and side doors. If these doors remain open during operation the beam will retract automatically and the operating modes of the machine are rendered non-functional. (See Figure-4)

!

**Do not close the door behind you.**



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| Pos. Nr. | Safety Element                                                               | Qty | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------|------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1        | Hydraulic Cylinder Covers                                                    | 2   | This covers guard hydraulic cylinders movements.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 2        | Protective Side Doors                                                        | 2   | This doors guard ram movements.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 3        | Protective Side Doors Switches                                               | 2   | If one or the both side cages are open while the machine is running the ram will stay stationary at its position and hydraulic pump will stop. In this event press the EMERGENCY RESET-RESTART button to start the machine again. Then press the HYD. PUMP button.<br>(See: Figure-3)                                                                                                                                                                                                                                                                                                                                      |
| 4A       | Front Laser Guarding System                                                  | 2   | The Fiessler AKAS Laser guard mounted on the beam in front of the machine protects operator from accidental contact with tooling when the beam is in action. If anything remains in the access area between the two devices (transmitter and receiver) before the top beam reaches the muting point, the beam will stop and retract automatically.                                                                                                                                                                                                                                                                         |
| 4B       | Front Safety Light Curtain System                                            | 2   | The press brake Safety Light Curtain System SICK C 4000.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 5 / 6    | Emergency Stop Button on the Control Panel & Electrical cabinet & Foot Pedal | 3   | In case of emergency, press the emergency stop button and the main pump and other active components of machine will stop.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 7        | Foot switches with safety lock and manual release                            | 1   | <b>Press the pedal beyond the resistance of the pressure point in an emergency situation:</b><br>The contact is interrupted and locked, the work process is interrupted. In this phase the lock remains in the Off position even when the pedal is not pressed. This prevents uncontrolled restart of the machine or moving parts.<br><br><b>Release:</b><br>Once the hazardous situation has been remedied press the manual release pushbutton on the side of the enclosure. Then release the contacts again and the work process can be restarted by pressing the pedal as far as the pressure point.<br>(See: Figure-3) |
| 8A       | Protective Rear Door Switch                                                  | 1   | If rear side door is opened while the machine is running, the ram will stay stationary at its position and the hydraulic pump will stop. In this event press the EMERGENCY RESET-RESTART button to start the machine again. Then press the HYD. PUMP button. (See: Figure-4)                                                                                                                                                                                                                                                                                                                                               |
| 8B       | Rear Light Curtain Safety System                                             | 2   | If an object goes through the sensors, while the machine is running, the ram will stay stationary at its position and the hydraulic pump will stop. In this event press the EMERGENCY RESET-RESTART button to start the machine again. Then press the HYD. PUMP button.<br>(See: Figure-4)                                                                                                                                                                                                                                                                                                                                 |



## 2.5 – LIGHT BARRIER SAFETY CALCULATION :

According to TS EN 12622 Appendix-A;

$$S = (K \times T) + C$$

S: Safety distance (mm)

T: Stopping performance time of the whole system (s)

C: Additional distance

$$T = t_1 + t_2 + t_3 + \Delta t$$

$t_1$ =Response time of the hydraulic system in press brake

$t_2$ = Safety protection system's response time

$t_3$ = Rest of the calculable response times

$\Delta t$ =Uncertainty

K = 2000 mm/s is chosen. (According to TS EN 12622 Appendix - A.2)

$t_1$  = 68 ms (The measurement that we made by means of the testing device)

$t_2$  = 17 ms (SICK C4000 ADVANCED)

T = 68+17=85 ms = 0,085 s

C = Beam barrier sensing capability (According to TS EN 12622 Appendix-A.6 , C=0 found.)

$$S = (2000 \times 0,085) + 0$$

$$S=170 \text{ mm}$$

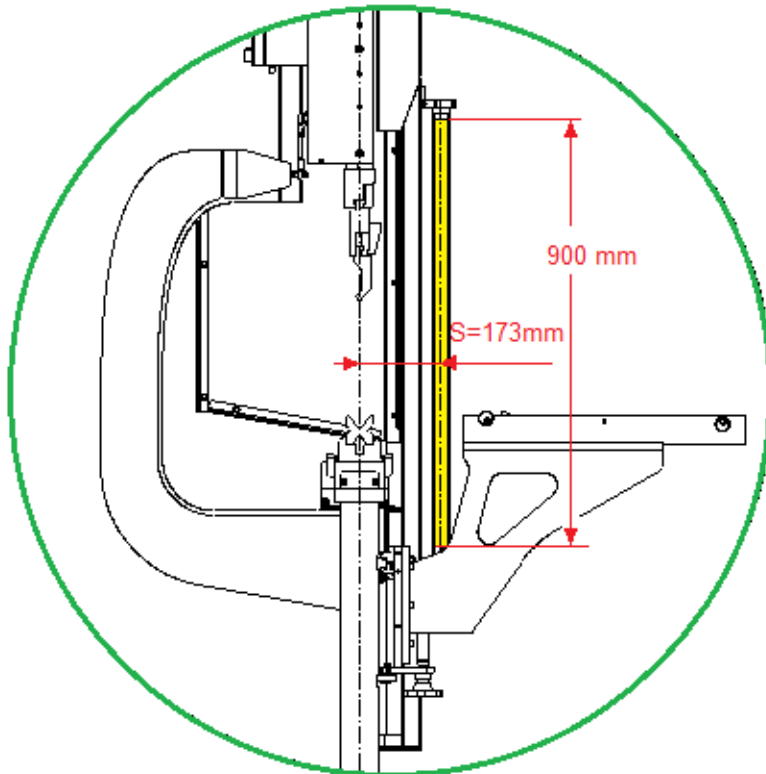


Figure-5



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PRESS BRAKES



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## 2.6 – PROTECTIVE SIDE CAGE DIMENSIONS :

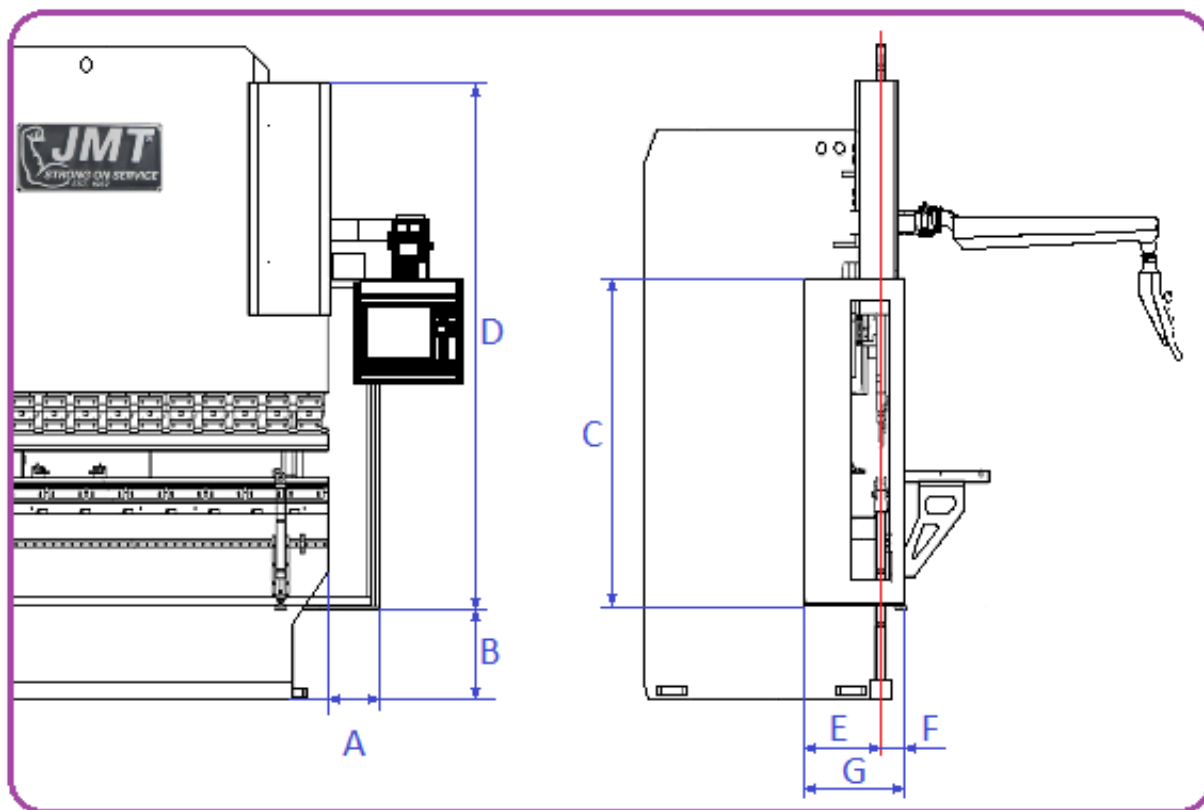


Figure-6

| Machine Tonnages | A (mm) | B (mm) | C (mm) | D (mm) | E (mm) | F (mm) | G (mm) | H (mm) |
|------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| 63 TON           | 335    | 290    | 1460   | 2060   | 620    | 100    | 630    |        |
| 100 TON          | 335    | 290    | 1550   | 2218   | 510    | 120    | 630    |        |
| 135 TON          | 350    | 290    | 1550   | 2400   | 510    | 130    | 650    |        |
| 200 TON          | 350    | 290    | 1550   | 2450   | 510    | 150    | 650    |        |
| 240 TON          | 408    | 290    | 1735   | 2622   | 600    | 170    | 770    |        |
| 320 TON          | 418    | 290    | 2002   | 2890   | 805    | 185    | 990    |        |
| 380 TON          | 405    | 290    | 2272   | 3160   | 785    | 205    | 990    |        |
| 450 TON          | 400    | 290    | 2532   | 3420   | 765    | 225    | 990    |        |

Table-2



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## 2.7 – SAFETY AREAS ON THE MACHINE :

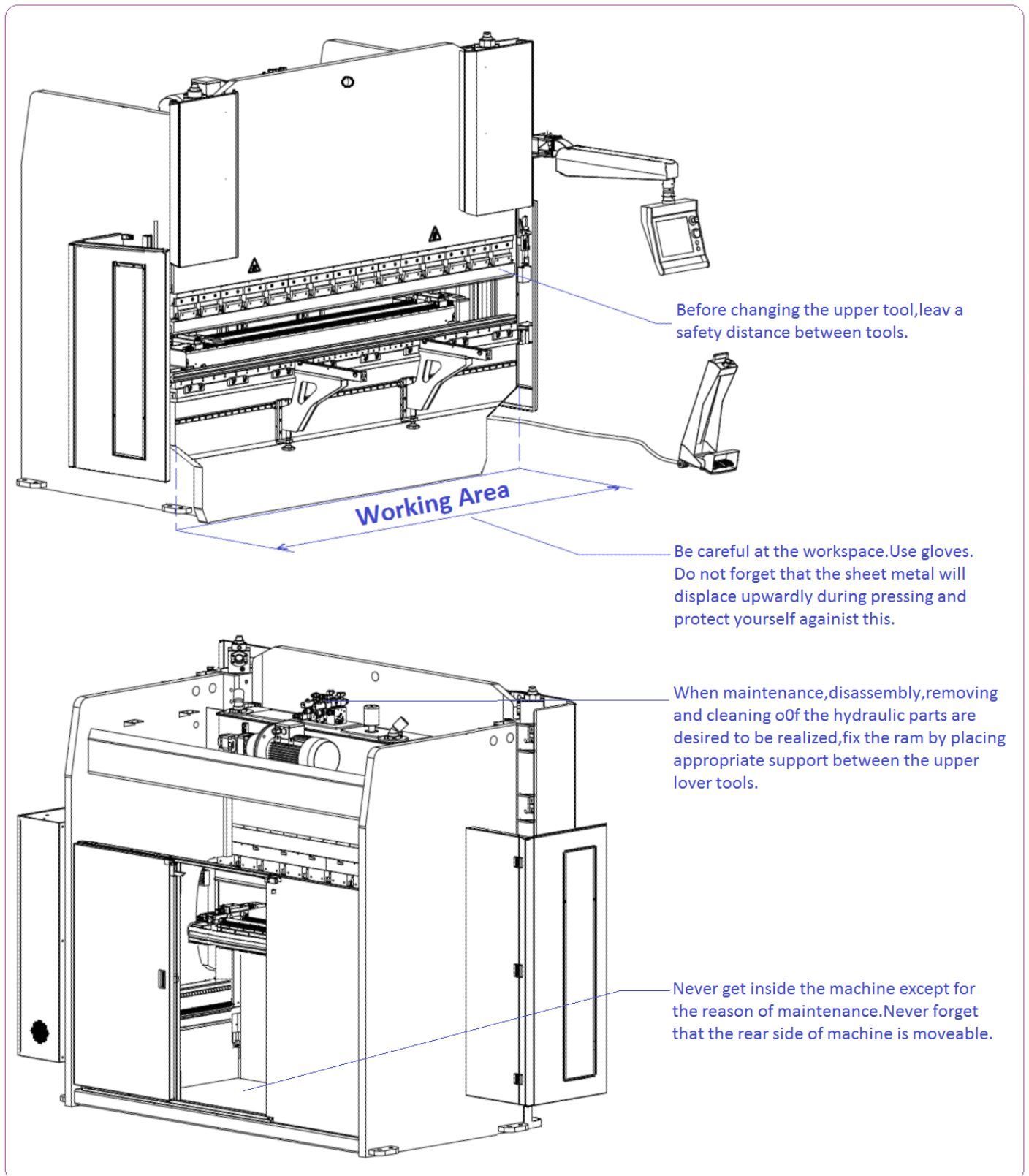


Figure-7



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## 2.8 –TECHNICAL DATA OF THE MACHINE :

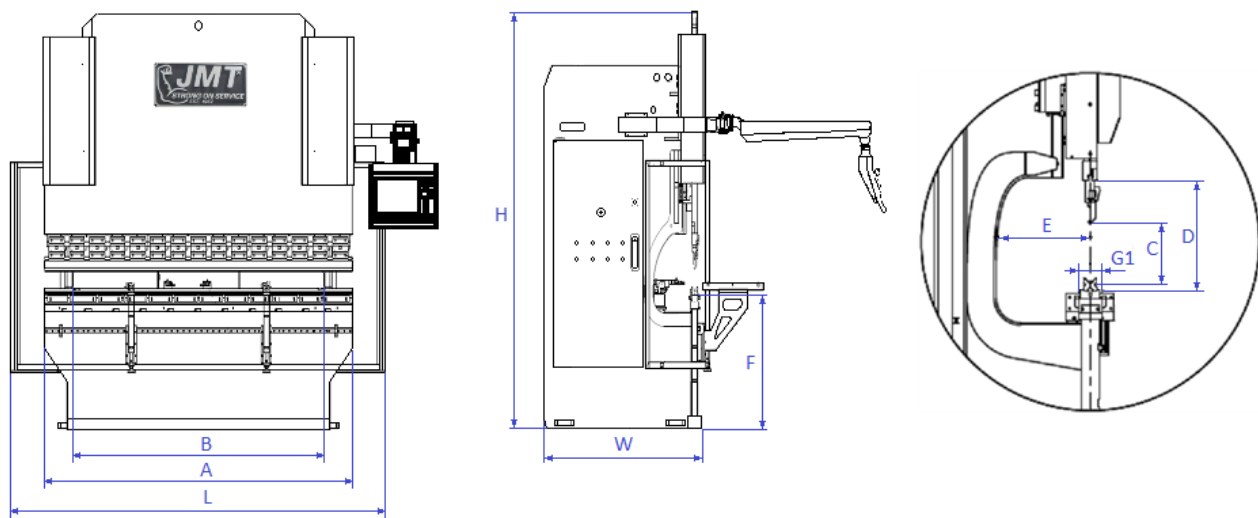


Figure-8

| SERIES     | Standard Machine Characteristics |                |                         |                      |          |              |            |                          |                          |             |                   | Ram Speeds Programmable |                                                 |                     | Machine Dimensions |       |        |                |
|------------|----------------------------------|----------------|-------------------------|----------------------|----------|--------------|------------|--------------------------|--------------------------|-------------|-------------------|-------------------------|-------------------------------------------------|---------------------|--------------------|-------|--------|----------------|
|            | Bending Force                    | Bending Length | Distance Between Frames | Length of Ram Stroke | Daylight | Throat Depth | Bed Height | Bed Cap Width (Standard) | Bed Cap Width (Optional) | Motor Power | Oil Tank Capacity | Y-Axis Approach Speed   | Y-Axis Forming Speed (+) Depends on Application | Y-Axis Return Speed | Length             | Width | Height | Approx. Weight |
|            | Metric                           | A              | B                       | C                    | D        | E            | F          | G1                       | G2                       |             |                   | Prog.                   | Prog.                                           | Prog.               | L                  | W     | H      |                |
|            | Tons                             | mm             | mm                      | mm                   | mm       | mm           | mm         | mm                       | mm                       | kW          | lt                | mm/s                    | mm/s                                            | mm/s                | mm                 | mm    | mm     | KG             |
| JM-S 2063  | 63                               | 2100           | 1700                    | 280                  | 530      | 420          | 905        | 104                      | 180                      | 7.5         | 140               | 200                     | 10                                              | 200                 | 3200               | 1200  | 2400   | 3550           |
| JM-S 25100 | 100                              | 2600           | 2050                    | 260                  | 540      | 410          | 905        | 60                       | 180                      | 11          | 140               | 150                     | 10                                              | 130                 | 3275               | 1580  | 2605   | 7100           |
| JM-S 30100 | 100                              | 3100           | 2600                    | 280                  | 530      | 420          | 905        | 104                      | 180                      | 11          | 140               | 200                     | 10                                              | 200                 | 3880               | 1680  | 2840   | 9750           |
| JM-S 30135 | 135                              | 3100           | 2600                    | 280                  | 530      | 420          | 905        | 104                      | 180                      | 15          | 210               | 200                     | 10                                              | 200                 | 3880               | 1740  | 2840   | 11150          |
| JM-S 30200 | 200                              | 3100           | 2550                    | 260                  | 530      | 410          | 880        | 90                       | 255                      | 18,5        | 210               | 150                     | 10                                              | 130                 | 3880               | 1710  | 2920   | 10000          |
| JM-S 37180 | 180                              | 3700           | 3200                    | 280                  | 530      | 420          | 905        | 104                      | 255                      | 22          | 210               | 180                     | 10                                              | 180                 | 4500               | 1710  | 2920   | 13500          |
| JM-S 40180 | 180                              | 4100           | 3600                    | 280                  | 530      | 420          | 905        | 104                      | 255                      | 22          | 210               | 180                     | 10                                              | 180                 | 4900               | 1710  | 2920   | 13600          |
| JM-S 43180 | 180                              | 4300           | 3800                    | 280                  | 530      | 420          | 905        | 104                      | 255                      | 22          | 210               | 180                     | 10                                              | 180                 | 5100               | 1710  | 2920   | 14200          |
| JM-S 30225 | 225                              | 3100           | 2600                    | 280                  | 530      | 420          | 905        | 104                      | 255                      | 30          | 280               | 160                     | 10                                              | 180                 | 3920               | 1710  | 2990   | 13000          |
| JM-S 37225 | 225                              | 3700           | 3200                    | 280                  | 530      | 420          | 905        | 104                      | 255                      | 30          | 280               | 160                     | 10                                              | 180                 | 4520               | 1710  | 2990   | 14900          |
| JM-S 40240 | 240                              | 4100           | 3550                    | 260                  | 530      | 410          | 880        | 90                       | 255                      | 22          | 210               | 150                     | 10                                              | 100                 | 4920               | 1710  | 2920   | 14000          |
| JM-S 43225 | 225                              | 4300           | 3800                    | 280                  | 530      | 420          | 905        | 104                      | 255                      | 30          | 280               | 160                     | 10                                              | 180                 | 5120               | 1710  | 2990   | 15800          |
| JM-S 60225 | 225                              | 6100           | 5100                    | 280                  | 530      | 420          | 1100       | 154                      | 305                      | 30          | 300               | 140                     | 10                                              | 180                 | 6920               | 1710  | 3290   | 21650          |
| JM-S 30320 | 320                              | 3100           | 2600                    | 385                  | 630      | 510          | 905        | 154                      | 305                      | 37          | 300               | 140                     | 10                                              | 160                 | 3950               | 2070  | 3220   | 18300          |
| JM-S 37320 | 320                              | 3700           | 3200                    | 385                  | 630      | 510          | 905        | 154                      | 305                      | 37          | 300               | 140                     | 10                                              | 160                 | 4550               | 2070  | 3220   | 20600          |
| JM-S 40320 | 320                              | 4100           | 3600                    | 385                  | 630      | 510          | 905        | 154                      | 305                      | 37          | 300               | 140                     | 10                                              | 160                 | 4950               | 2070  | 3220   | 21950          |
| JM-S 43320 | 320                              | 4300           | 3800                    | 385                  | 630      | 510          | 905        | 154                      | 305                      | 37          | 300               | 140                     | 10                                              | 160                 | 5150               | 2070  | 3220   | 22720          |
| JM-S 60320 | 320                              | 6100           | 5100                    | 385                  | 630      | 510          | 1100       | 154                      | 305                      | 37          | 300               | 120                     | 10                                              | 160                 | 6950               | 2070  | 3420   | 29850          |
| JM-S 37380 | 380                              | 3700           | 3050                    | 385                  | 630      | 510          | 1050       | 154                      | 305                      | 37          | 450               | 120                     | 9                                               | 150                 | 4600               | 2150  | 3550   | 25350          |
| JM-S 43380 | 380                              | 4300           | 3750                    | 385                  | 630      | 510          | 1050       | 154                      | 305                      | 37          | 450               | 120                     | 9                                               | 150                 | 5200               | 2150  | 3550   | 28150          |
| JM-S 40450 | 450                              | 4100           | 3500                    | 385                  | 630      | 510          | 1050       | 154                      | 305                      | 45          | 450               | 110                     | 9                                               | 140                 | 5150               | 2250  | 3700   | 28860          |
| JM-S 43450 | 450                              | 4300           | 3700                    | 385                  | 630      | 510          | 1050       | 154                      | 305                      | 45          | 450               | 110                     | 9                                               | 140                 | 5350               | 2250  | 3700   | 30000          |
| JM-S 60450 | 450                              | 6100           | 5000                    | 385                  | 630      | 510          | 1200       | 154                      | 305                      | 45          | 500               | 100                     | 9                                               | 140                 | 7200               | 2250  | 3850   | 40800          |

Table-3



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## 2.9 – STANDARD AND OPTIONAL ACCESSORIES OF THE MACHINE :

### 2.9.1 STANDARD ACCESSORIES

- 3 axis CNC:  
Y1, Y2 precision ram positioning  
X, precision servo-driven back gauge
- Z axis manual adjustable.
- Easy-to-use CNC system with complete bending computations and large tool library.
- Safety laser with manual F. AKAS II M -FPSC-B-C + safety covers with switch
- ESA S630 CNC control unit with 2D graphic editor for full data entry.
- Standard X-axis travel is 750 mm.
- Stable and fast AC servo motor-driven precision back gauge with linear guide and ball bearing system (X)
- Quick-set sliding front sheet support arms with full-length linear guide, tilting stop and T-slot (front gauge squaring, etc.)
- Protection covers (side and rear safety doors) electrically interlocked and/or light or laser guarded.
- Compactly-wired PLC electrics in ventilated cabinet.
- Euro-style top clamps with intermediaries and (available) quick-release clamping.
- Top tool :sectionalized gooseneck punch.
- Bottom tool :sectionalized 4-V die.
- Two front arms on linear rail.
- Dual footswitch console with emergency stop.
- World-class hydraulic and electronic components that are easily replaceable (parts stocked by us or available off-the-shelf from your local supplier):
- Hydraulic blocks and valves (Hoerbiger)
- Electronics system (Siemens, Schneider, Mitsubishi,Telemecanique,Merlin gerin,Schrak)
- Adjustable height suspension control unit arm
- High-yield plate construction
- Ability to accurately fade ram
- Stage bending
- Automatic bend sequence determination
- Automatic stretch length calculator for blank size determination

### 2.9.2 OPTIONAL ACCESSORIES

- Safety laser: Motorized F. AKAS III M
- Light curtain: SICK C 4000 for tandem/trio/quad machines
- Manual and CNC motorized wave crowning
- Adaptive bending sensors  
Up to 14+ axes available:  
Z1, Z2 axes  
X1, X2 axes  
R1, R2 axes  
X Prime (Delta X) axis, +/- 125 mm. stroke (250 mm. total)  
X Axis = 1000 mm. external travel – back protection with light barrier  
X1, X2 axes for light pole production
- Sheet follower with sliding guide – motorized height adjustment
- Front feeding system with supports
- Front feeding system with supports – pneumatic pushers
- Other CNC control units available:  
Delem DA-69T touch screen 2D/3D CNC control  
Cybelec ModEva 10S/12S/15S/15T 3D with PC 1200 3D SW,
- Clamping:  
Quick release clamping  
JMT hydraulic or mechanical clamping  
Wila or Wilson hydraulic or mechanical clamping
- Various tool options (JMT, Euro-American, Wila or Wilson)
- Extended back gauge stroke & back protection with light barrier
- Offline software (V-Bend, Radbend, Profile-W)
- Tooling packages
- Multiple brake configurations available:  
Tandem configuration  
Trio configuration  
Quad configuration  
High tonnage flush floor models
- Custom Colors



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## 2.10 – NOISE :

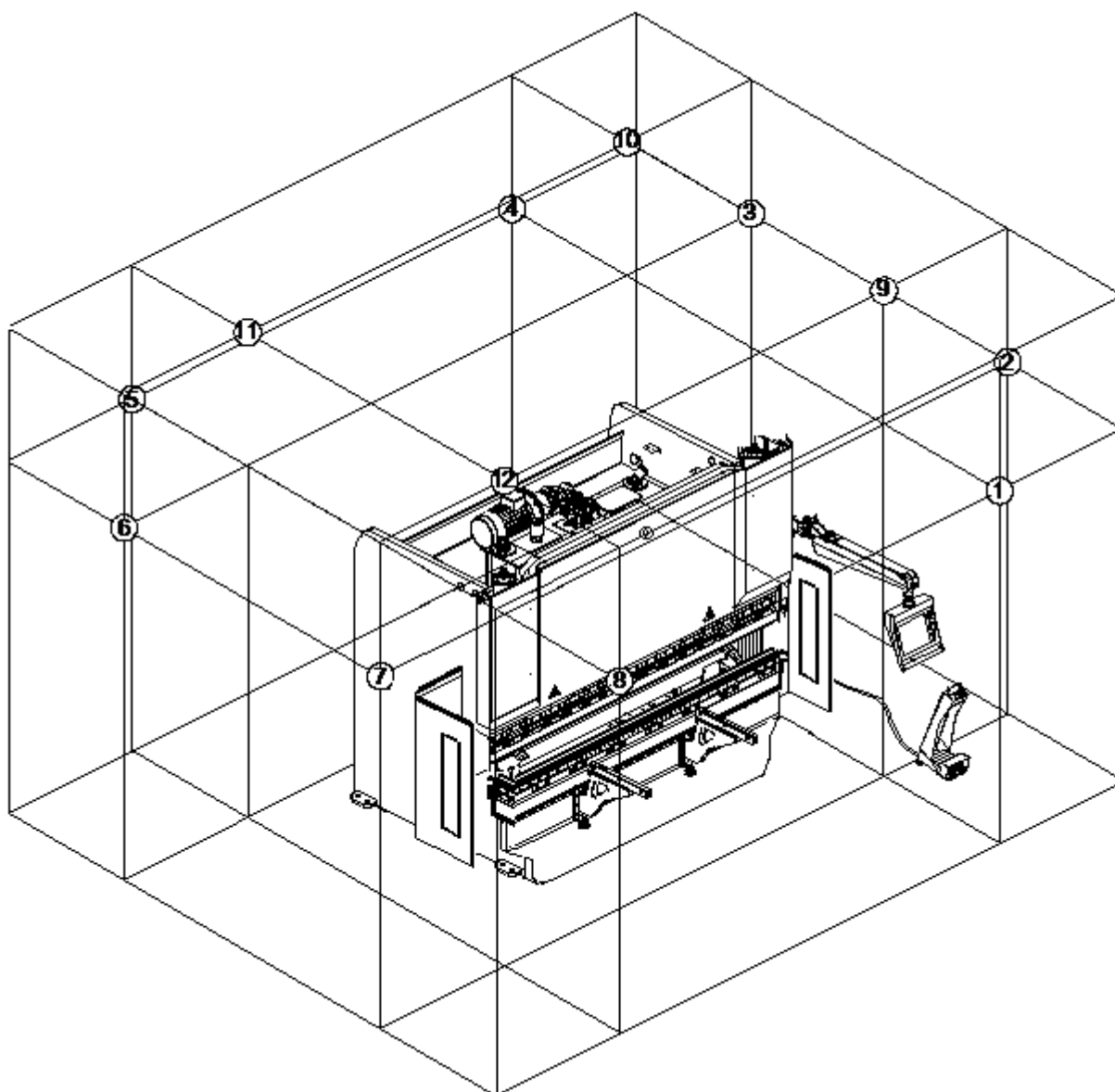


Figure-9

The machine has noise limiting features including:

- The quietest internal pump and geared pump on the market.
- Flexible hoses which are isolated from the manifold and the pump
- Height of the lateral body which helps reduce noise at ear level.
- Hydraulic circuit design is organized to prevent the noise that might be caused by the hydraulics.
- Couplings used between the motor and pump absorb vibration.



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### 2.10.1 – NOISE LEVEL MEASUREMENTS:

| MACHINE NAME | UNLOADED WORKING ( dBA ) |
|--------------|--------------------------|
| 63 TON       | 68                       |
| 100 TON      | 68                       |
| 135 TON      | 70                       |
| 200 TON      | 70                       |
| 240 TON      | 70                       |
| 320 TON      | 72                       |
| 450 TON      | 73                       |

Table-4

NOT: The measurements were made according to EN 12622 press brake standards and appropriate to EN ISO 11202 noise measuring standards.



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## 2.11 – STANDARDS USED IN THE DESIGN OF PRESS BRAKES :

| STANDARDS         | EXPLANATION                                                                                                                     |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------|
| EN 12622: 2005    | Safety of machine tools – Hydraulic press brakes – Safety                                                                       |
| EN 292-1:1992     | Safety of machinery – Basic concepts, general principles for design. Basic terminology, methodology                             |
| EN 292-2:1991     | Safety of machinery – Basic concepts, general principles for design. Technical principles and specifications                    |
| EN 294:1992       | Safety of machinery. Safety distances to prevent danger zones being reached by the upper limbs                                  |
| EN 349:1993       | Safety of machinery. Minimum gaps to avoid crushing of parts of the human body                                                  |
| EN 418:1992       | Safety of machinery. Emergency stop equipment, functional aspects. Principles for design                                        |
| EN 563:1994       | Safety of machinery. Temperatures of touchable surfaces. Ergonomics data to establish temperature limit values for hot surfaces |
| EN 574:1996       | Safety of machinery. Two-hand control devices. Functional aspects. Principles for design                                        |
| EN 614-1:1995     | Safety of machinery – Ergonomic design principles – Part 1: Terminology and general principles                                  |
| EN 894-2:1997     | Safety of machinery – Ergonomics requirements for the design of displays and control actuators Part 2: Displays                 |
| EN 894-3:2000     | Safety of machinery – Ergonomics requirements for the design of displays and control actuators – Part 3: Control actuators      |
| EN 953:1997       | Safety of machinery. Guards. General requirements for the design and construction of fixed and movable guards                   |
| EN 954-1:1996     | The requirements for safety-related parts of control systems – Chapter 1: General principles for design                         |
| EN 982:1996       | Safety of machinery. Safety requirements for fluid power systems and their components. Hydraulics                               |
| EN 983:1996       | Safety of machinery. Safety requirements for fluid power systems and their components. Pneumatic                                |
| EN 999:1998       | Safety of machinery. The positioning of protective equipment in respect of approach speeds of parts of the human body           |
| EN 1050:1993      | Safety of machinery – Principles for risk assessment                                                                            |
| EN 1088:1995      | Safety of machinery – Interlocking devices associated with guards – Principles for design and selection                         |
| EN 1837           | Integral lighting of machines                                                                                                   |
| EN 1921:1995      | Industrial Automation Systems – Safety of Integrated Manufacture Systems – Main Rules                                           |
| EN ISO 3746:1995  | Acoustics – Determination of sound power levels of noise sources using sound pressure                                           |
| EN ISO 4871:1996  | Acoustics – Declaration and verification of noise emission values of machinery and equipment                                    |
| ISO 11688-1 :1998 | Acoustics – Recommended practice for the design of low-noise machinery and equipment – Part 1: Planning                         |
| EN 14122-1 :2001  | Safety of machinery. Permanent means of access to machinery. Choice of a fixed means of access between two levels               |
| EN 14122-2 :2001  | Safety of machinery – Permanent means of access to machinery – Part 2: Working platforms and walkways                           |
| EN14122-3 :2001   | Safety of machinery. Permanent means of access to machinery. Stairways, stepladders and guard-rails                             |
| EN 60204-1:1997   | Safety of Machinery – Electrical Equipment of Machines – Part 1: General Requirements                                           |
| EN 60529:1991     | Specification for degrees of protection provided by enclosures (IP code)                                                        |
| EN 60825-1: 1994  | Safety of laser products. Equipment classification, requirements and user's guide                                               |
| EN 61496-1: 1997  | Safety of machinery. Electro-sensitive protective equipment. General requirements and tests                                     |

Table-5 : Standarts used in the design of the pressbrake.



## CHAPTER 3 – INSTRUCTIONS ABOUT THE TRANSPORTATION OF THE MACHINE

### 3.1 - DELIVERY OF THE MACHINE :

When the machine is delivered to you, please check the following items:

- Be sure that there has been no damage during transportation.
- Check if there are any missing parts.
- Be sure that the machine and every part of the machine is still functional.
- If the machine is required to be transported again with another vehicle, carefully load the machine considering vehicle balance and anchor the machine using wooden wedges to prevent the machine from sliding.

### 3.2 - TRANSPORTATION OF THE MACHINE :

- The machine is wrapped in order to minimize exposure from the environmental conditions during transportation and storing.
- When the machine arrives at its destination, tools like crane, hoist, lifter, etc. should be ready with the proper environmental conditions in place for optimal machine operation.
- The surface of the concrete where the machine will be installed should be flat and free from cracks or gaps.
- Before bringing the machine to its final position, check the anchor bolts and be sure they are in the correct place. Balancing bolts should be lubricated and should be placed on the ground across the entire length.
- There are two lifting points, right and left from the upper points of the lateral bodies (Please see Figure-10).
- The weight center is in the center of the machine along the X axis and it is variable in the Y axis depending on the rear stop position. Make sure this is taken into consideration when lifting the machine.

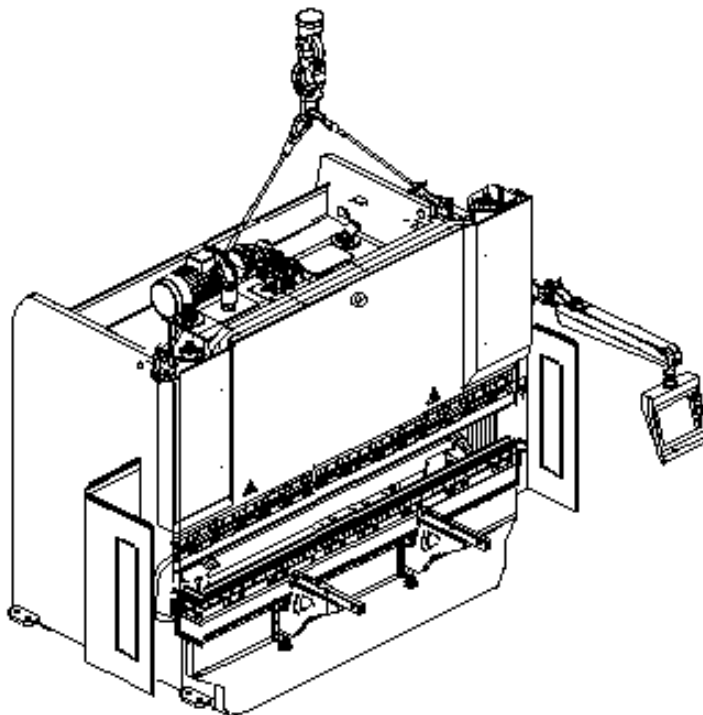


Figure-10



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**Please consider during transportation: (See Figure-11)**

- The lifting apparatus and the connection bridge should be compliant with the loading capacities and correct specifications.
- While lifting the machine, the correct lifting method should be used and the chain or the steel ropes must be strong enough to handle the load.
- While transporting the machine from the first unloading region (store, warehouse, etc.) to the region where it is to be used, the weight of the machine should be taken into consideration.
- Do not ever try to lift the machine using the lubricant tank, back basing or the cylinder group. Always use the lifting points.
- Shackles should be used when lifting the machine. Appropriate shackles are shown in ( Table-6).(See Figure-12).

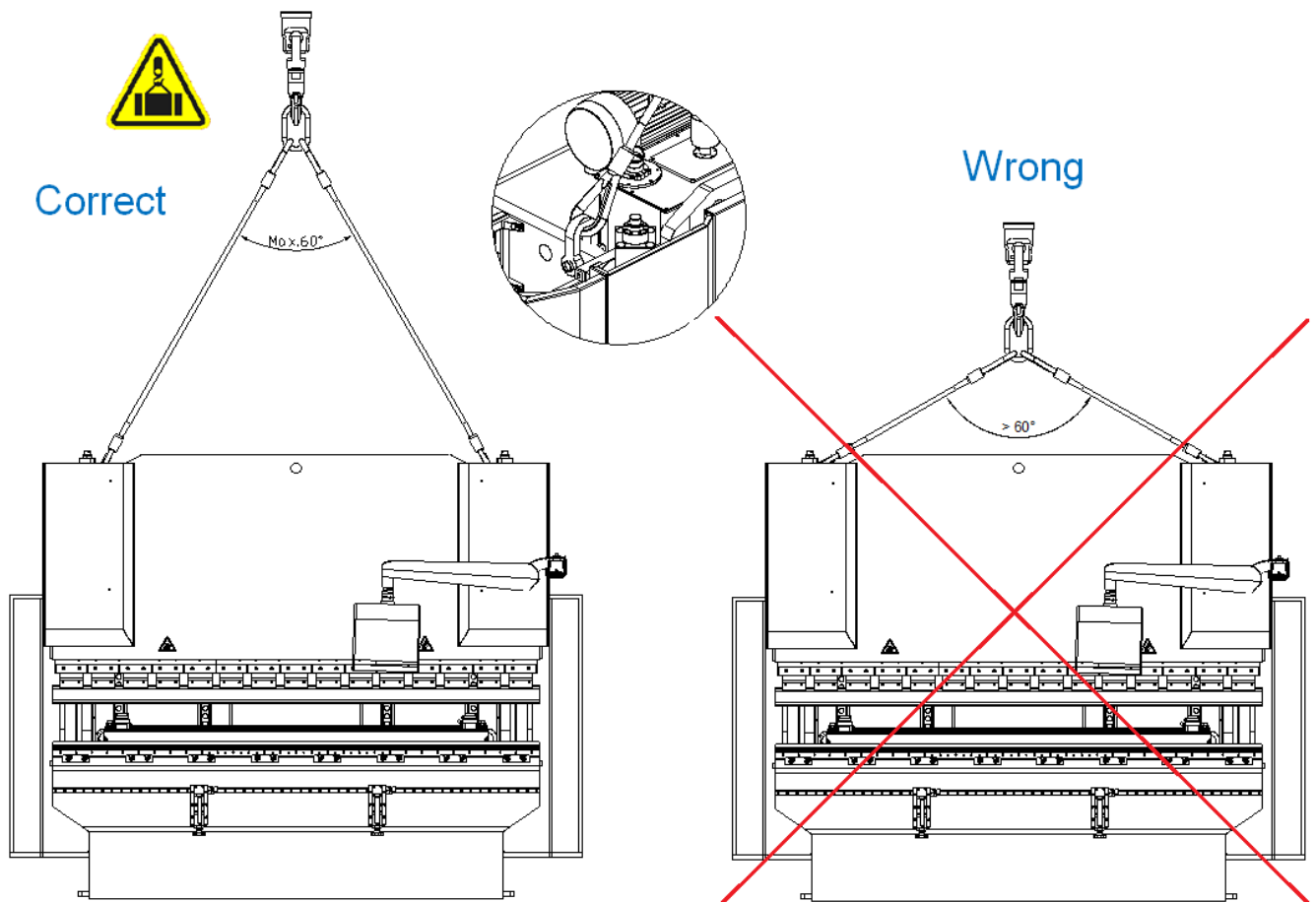


Figure-11



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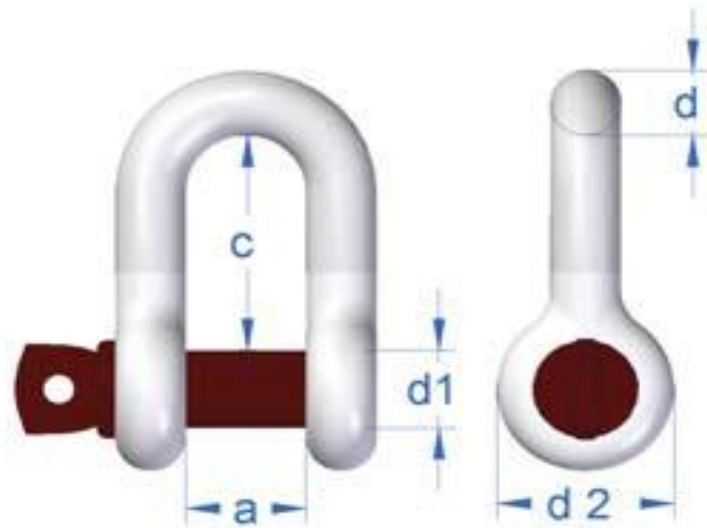


Figure -12

**! Standart : U.S.Fed.Spec. RR-C-271 – EN 13889**

|  | 40-135 TON           | 200-240 TON          | 320-380 TON          | 450 TON              |
|-------------------------------------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|
|                                                                                     | PRESS BRAKES         | PRESS BRAKE          | PRESS BRAKE          | PRESS BRAKE          |
|                                                                                     | (Max. 3100 mm Width) | (Max. 4300 mm Width) | (Max. 4300 mm Width) | (Max. 4300 mm Width) |
| NOMINAL DIAMETER (INCH)                                                             | 1 ½ "                | 2 "                  | 2 ½ "                | 3 "                  |
| SCREW DIAMETER (d1)                                                                 | Ø40                  | Ø55                  | Ø70                  | Ø80                  |
| INSIDE WIDTH (a)                                                                    | 60.5 mm              | 82.5 mm              | 105 mm               | 127 mm               |
| WORKING LOAD LIMIT (TON)                                                            | 17                   | 35                   | 55                   | 85                   |

Table 6: Dee shackle with screw collar pin values.

### 3.3 - REMOVING THE PACKAGE :

The machine and the parts thereof are delivered to the customer in packaged form to protect them during transportation. After the delivery of the machine, remove the packages carefully without damaging the machine.



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## CHAPTER 4 - STORAGE CONDITIONS

Protecting the machine is paramount during transportation and delivery. If the machine is to be stored for more than one month, the following items should be taken into consideration:

- During transportation, the upper tool of the machine is seated onto the V channel of the lower tool and should remain there.
- If the machine is to be stored in a humid environment, dehumidifying materials should be placed on the electrical panel and the hydraulic control block, the electrical equipment should be protected from the humidity.
- Protective lubricant should be used in order to prevent rusting of the lower and the upper tools.
- The machine should be protected from excessive sunlight.
- Storing in open area (in rainy environment) should be avoided. The valve sockets may be damaged or the electrical system may be harmed.



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## CHAPTER 5 – MACHINE INSTALLATION INSTRUCTIONS

### 5.1 – GENERAL INFORMATION :

Our company's founding principal is customer satisfaction. This is achieved by making machines of superb strength and quality while still making them affordable.

This information is to be used for the careful and efficient transportation of the machines to prevent against damage during loading and unloading.

JMT is not responsible for any damage incurred during loading or unloading, or from carelessness.

Your machine should be installed by experts. Unless otherwise noted on the order, JMT will handle the installation and setup of your machine.

### 5.2 - THE WORKING AREA OF THE MACHINE:

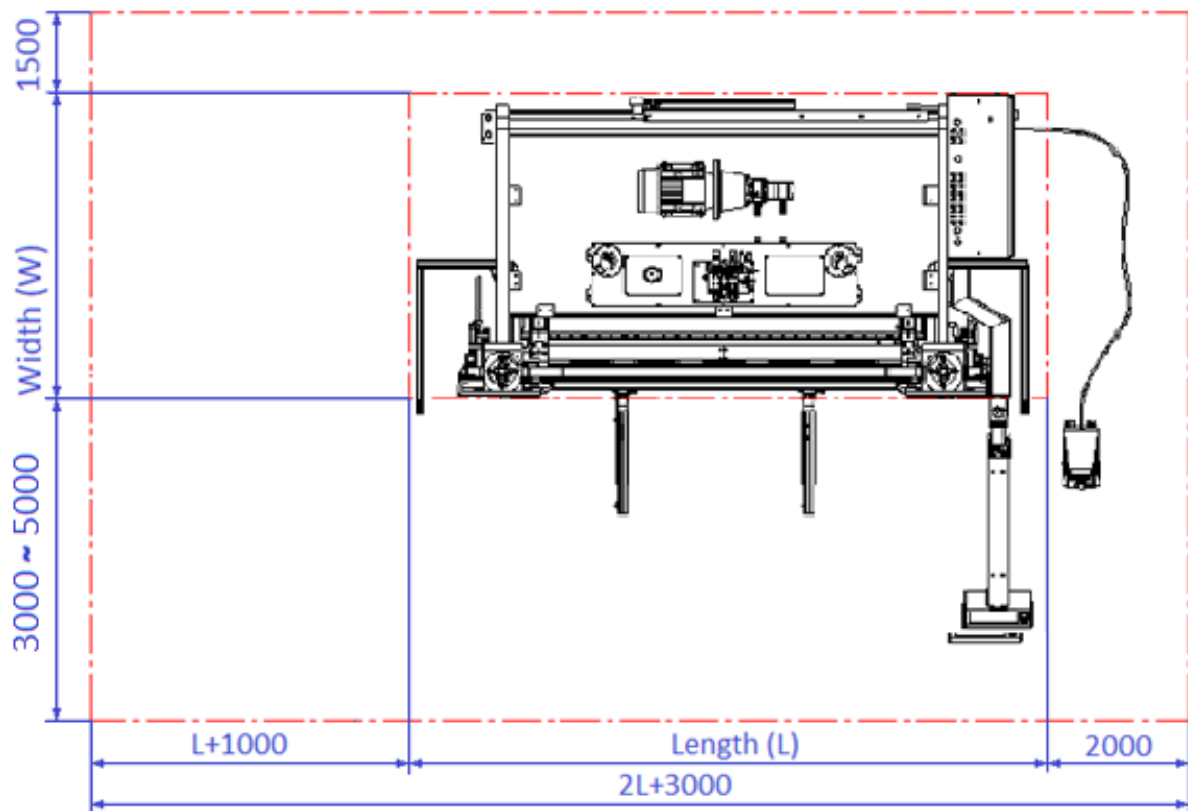


Figure-13



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### 5.3 – MACHINE INSTALLATION :

If machines are to perform well over extended periods, optimal alignment and correct mounting are equally vital. Correct installation not only means good product quality, but often reduced energy consumption as well.

Machine installation and commissioning is a key part of putting the machine into service. If installation and commissioning is carried out carefully using the correct procedures, it is an investment in the machine's serviceability and reliability for its entire service life.

**Protective cleaning on the device:** A special protectant against rusting is applied to the stoned surfaces of the tools. The protectant can be easily cleaned with a suitable cleaning substance.

**Cleaning process:** After wiping the tools with a damp non-abrasive cloth, wait for 10 minutes and then wipe dry with a clean cloth. Petrol or Tri lubricant solvent should be used.

Your machine should be fixed to the ground by anchorage bolts and metal support pieces. Before the fixation process, the concrete should be level to prevent damage to the machine. Additionally the correct size and number of bolts should also be used to secure the machine. The machine should then be checked with a sensitive balance apparatus (water balance). The advised balance points are the center and the two ends of the table and can be achieved by the correct placement of the balance apparatus onto the center of the table and by balancing on both sides of the table longitudinally, the front-back adjustment and the length adjustment of the machine are realized and the machine is balanced. The balance of the machine is adjusted by the tightening and loosening of the bolts which are placed separately in each leg. **THE BODY OF THE MACHINE SHOULD NOT BE SUBJECTED TO BE TWISTED IN ANY CASE.** In order to provide correct parallelism, the body should not be twisted. Non-parallelism should be eliminated from the support pieces which support the machine and which are parallel to each other (right and left).

#### 5.3.1 LOCATING THE MACHINE :

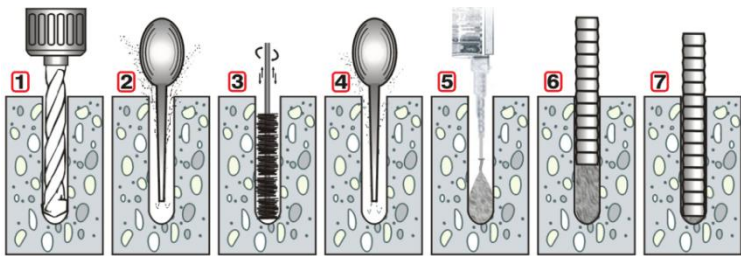
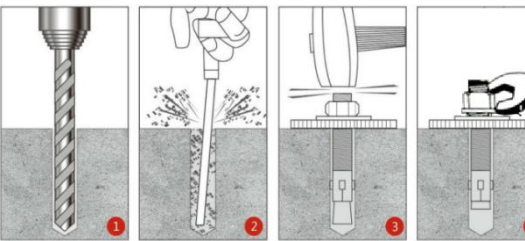
Before choosing the place of machine, be careful about the machine dimensions mentioned in **User Manual**. Prepare the anchorage holes on foundation. When the foundation is ready, locate the machine on the foundation. Put on the adjustment plates, foundation bolts and nuts to their places. Fill the anchorage holes with concrete. After drying concrete, locate a precise water scale on to the bottom to the bottom tool table. Adjust the machine precisely with water scale and **(A)** adjustment bolts, after adjusting tighten the **(B)** adjusting nuts. When finished adjusting level of the machine tighten the **(C)** fixing bolts (See Figure:14).

 The machine has to be fixed to the ground perfectly.

NOTICE:

- 1- The concrete thickness should be minimum 350-400 mm.
- 2- The concrete should be reinforced with steel cage. It is recommended 'Double Layer Matting Q257'
- 3- Use cautions not to have the concrete cracked.
- 4- Concrete Features; Concrete quality should be 'BS 25'. The maintain bending accuracy, install the machine on a flat concrete that is strong enough to carry the weight of the machine and is not likely to subside.
- 5- Placement of the machine are completed after that the steel pads are welded to the anchor plates. (See Figure 14 Detail X).

**Drill and anchorage the machine to the concrete floor as shown below:**

| Epoxy anchor (Chemical fixings)                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Expansion anchor                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <ol style="list-style-type: none"> <li>1. Drill the hole size and depth on concrete.</li> <li>2. Blow out dust.</li> <li>3. Clean the hole with brush.</li> <li>4. Blow out remaining dust.</li> <li>5. Inject adhesive from the bottom.</li> <li>6. Insert stud/bolt/anchor/rebar/threaded rods into the hole.</li> <li>7. Wait for few minutes. The steel and concrete will bond very firmly.</li> </ol> |  <ol style="list-style-type: none"> <li>1. Drilling a hole referring to the diameter of anchor.</li> <li>2. Removing the debris, cleaning the hole.</li> <li>3. Striking the anchor into the hole.</li> <li>4. Tightening the bolt with a wrench.</li> </ol> |



### 5.3.2 –THE MACHINE FOUNDATION :

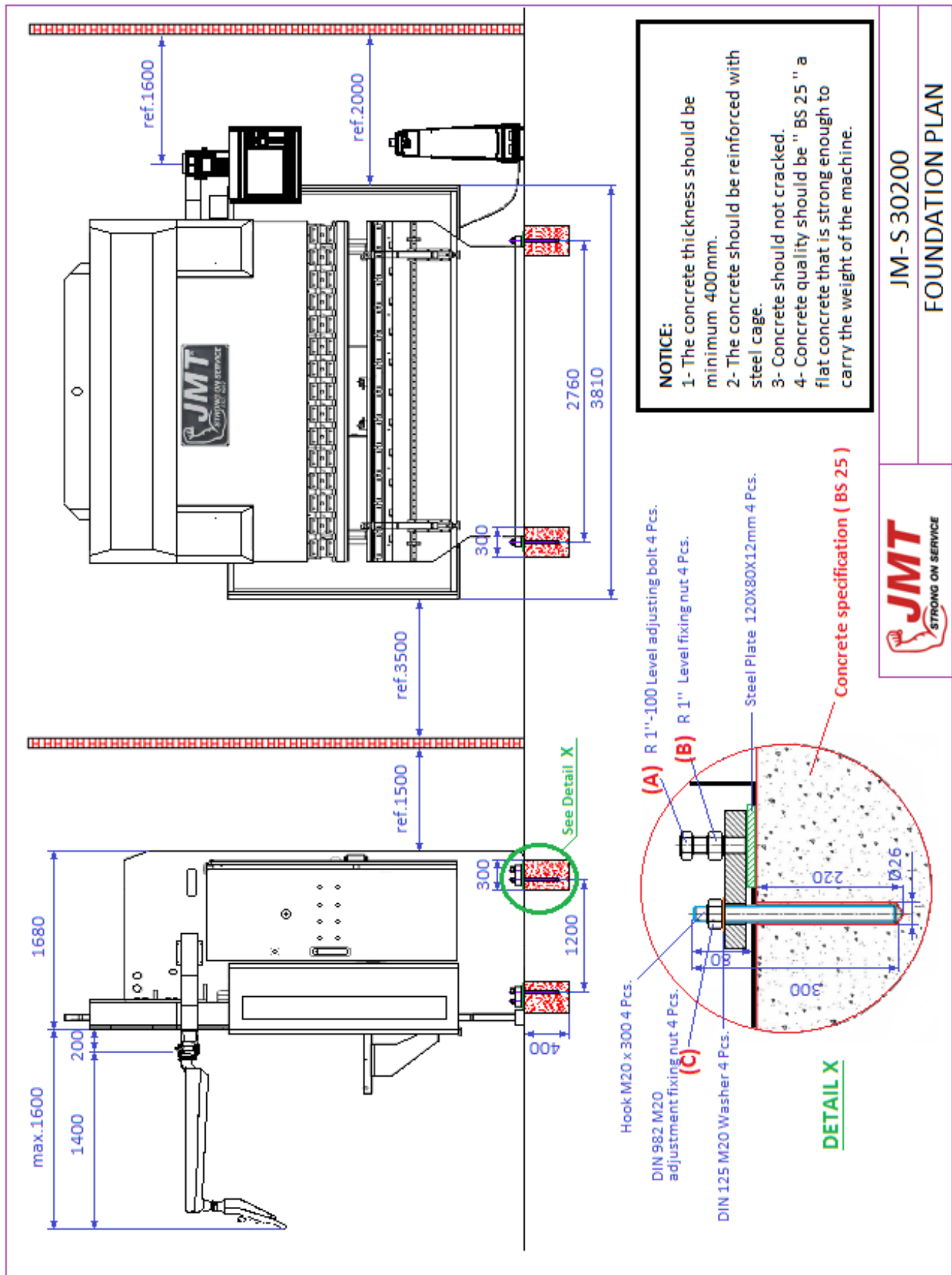


Figure-14



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## 5.4 - ELECTRICAL CONNECTIONS :

Connect the machine to the main supply by means of standard electrical cables. Use the appropriate power cable cross section. Please note that the power cable cross section should change as the cable length increases. The electrical connections of the machine should be done by qualified personnel. The machine is arranged with 3 phase main voltage. The cable input is found under the electrical panel, the connections to the terminal are found in the electrical drawing. Neutral is not used in the powering of the machine. (See Figure-15).

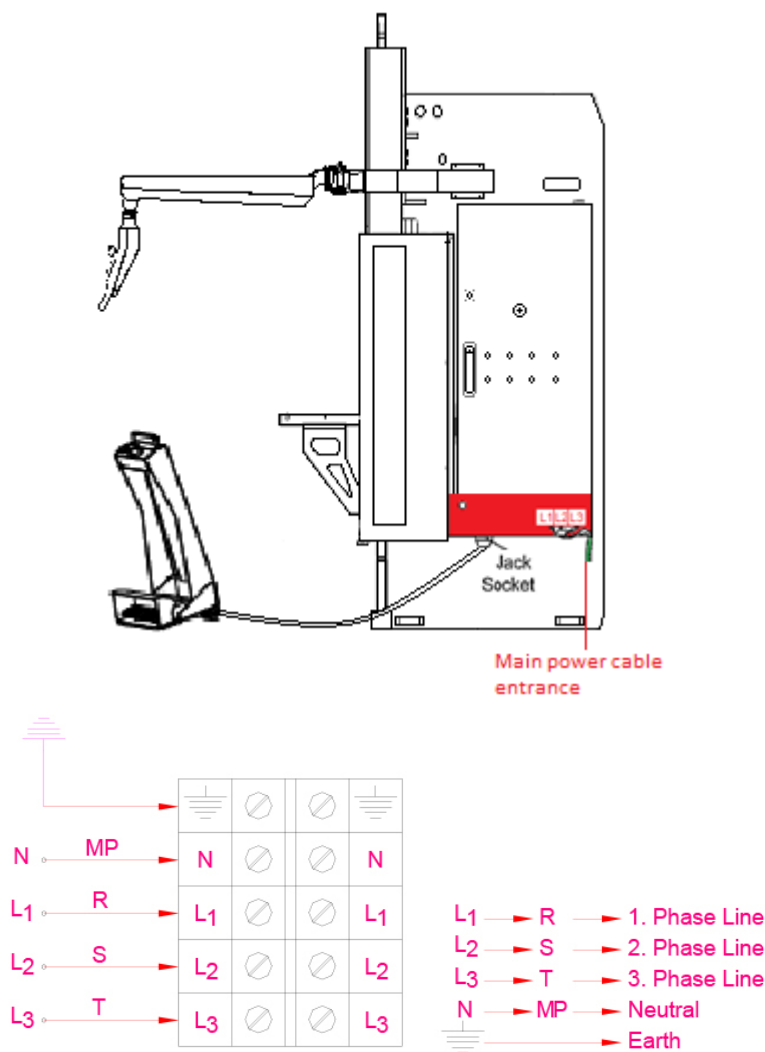


Figure-15

- If the light is on, on the phase control relay it means electrical connections are made correctly. If no phase change the place of two phase cables.

**WARNING:** The main supply cable dimensions and the input dimensions should have the values mentioned in the table. These are minimum values and they can be bigger dimensions depending on the cable length. (Please see Table-7).

Local (coming to the machine) voltage should be checked by assessing the transformer and the main motor voltage. Connect the suitable powering cable to the machine and power the machine after the checking process.



#### 5.4.1 - MOTOR DIRECTION :

The motor direction is from the flange to the pump as directed by the arrow. The direction of the motor facing the fan should be checked. In order to determine the motor rotation direction, it should be operated for a short time by means of the Hyd. Pump Start button and afterwards, the motor should be stopped using the Hyd. Pump Stop button. If the rotation direction is wrong, it should be stopped immediately.

Please read all machine labels and manuals prior to changing the order of the rotation direction of the motor. The machine should be **COMPLETELY ISOLATED** and the phase coming to the machine should be stopped. This process should be completed by an experienced person.

#### 5.4.2 - MOTOR POWER SPECIFICATIONS :

| kW<br>HP   | 220-240 V (50Hz/60Hz)                                                               |                                                                                     |                      | 380-400 V (50Hz/60Hz)                                                               |                                                                                     |                      | 415 V (50Hz/60Hz)                                                                   |                                                                                     |                      | 440 V (50Hz/60Hz)                                                                     |                                                                                       |                      | 575 V (50Hz/60Hz)                                                                     |                                                                                       |                      |
|------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------|
|            |  A |  A | q<br>mm <sup>2</sup> |  A |  A | q<br>mm <sup>2</sup> |  A |  A | q<br>mm <sup>2</sup> |  A |  A | q<br>mm <sup>2</sup> |  A |  A | q<br>mm <sup>2</sup> |
| 3<br>4     | 16                                                                                  | 11.5                                                                                | 1.5                  | 10                                                                                  | 7                                                                                   | 1.5                  | 10                                                                                  | 6.5                                                                                 | 1.5                  | 10                                                                                    | 6                                                                                     | 1.5                  | 6                                                                                     | 3.5                                                                                   | 1.5                  |
| 4<br>5.5   | 25                                                                                  | 14.5                                                                                | 1.5                  | 16                                                                                  | 8.5                                                                                 | 1.5                  | 16                                                                                  | 8                                                                                   | 1.5                  | 16                                                                                    | 8                                                                                     | 1.5                  | 10                                                                                    | 5                                                                                     | 1.5                  |
| 5.5<br>7.5 | 25                                                                                  | 20                                                                                  | 4                    | 16                                                                                  | 11.5                                                                                | 2.5                  | 16                                                                                  | 11                                                                                  | 2.5                  | 16                                                                                    | 10                                                                                    | 2.5                  | 16                                                                                    | 8                                                                                     | 2.5                  |
| 7.5<br>10  | 32                                                                                  | 27                                                                                  | 6                    | 25                                                                                  | 15.5                                                                                | 2.5                  | 25                                                                                  | 14                                                                                  | 2.5                  | 20                                                                                    | 14                                                                                    | 2.5                  | 16                                                                                    | 10                                                                                    | 2.5                  |
| 11<br>15   | 50                                                                                  | 39                                                                                  | 10                   | 32                                                                                  | 22                                                                                  | 4                    | 32                                                                                  | 21                                                                                  | 4                    | 32                                                                                    | 20                                                                                    | 4                    | 25                                                                                    | 15                                                                                    | 2.5                  |
| 15<br>20   | 63                                                                                  | 52                                                                                  | 16                   | 40                                                                                  | 30                                                                                  | 6                    | 40                                                                                  | 28                                                                                  | 6                    | 32                                                                                    | 26.5                                                                                  | 6                    | 25                                                                                    | 20                                                                                    | 4                    |
| 18.5<br>25 | 80                                                                                  | 64                                                                                  | 25                   | 50                                                                                  | 35                                                                                  | 10                   | 50                                                                                  | 35                                                                                  | 10                   | 40                                                                                    | 33                                                                                    | 10                   | 40                                                                                    | 25                                                                                    | 6                    |
| 22<br>30   | 80                                                                                  | 75                                                                                  | 25                   | 63                                                                                  | 41                                                                                  | 10                   | 50                                                                                  | 40                                                                                  | 10                   | 50                                                                                    | 39                                                                                    | 10                   | 40                                                                                    | 29                                                                                    | 6                    |
| 30<br>40   | 125                                                                                 | 100                                                                                 | 35                   | 80                                                                                  | 55                                                                                  | 16                   | 63                                                                                  | 55                                                                                  | 16                   | 63                                                                                    | 51.5                                                                                  | 16                   | 50                                                                                    | 38                                                                                    | 10                   |
| 37<br>50   | 150                                                                                 | 120                                                                                 | 50                   | 100                                                                                 | 66                                                                                  | 25                   | 80                                                                                  | 66                                                                                  | 25                   | 80                                                                                    | 64                                                                                    | 25                   | 63                                                                                    | 46                                                                                    | 16                   |
| 45<br>60   | 160                                                                                 | 145                                                                                 | 70                   | 100                                                                                 | 80                                                                                  | 25                   | 100                                                                                 | 80                                                                                  | 25                   | 100                                                                                   | 75                                                                                    | 25                   | 80                                                                                    | 56                                                                                    | 16                   |
| 55<br>75   | 200                                                                                 | 176                                                                                 | 95                   | 125                                                                                 | 97                                                                                  | 35                   | 125                                                                                 | 100                                                                                 | 35                   | 100                                                                                   | 91                                                                                    | 35                   | 80                                                                                    | 67                                                                                    | 25                   |

Table-7



## 5. 5 - LUBRICANT INFORMATION :

### 5.5.1 HYDRAULIC LUBRICANT SELECTION :

Before the machine is installed, the required hydraulic lubricant should be filled until the levels reach the recommended levels as illustrated in the lubricant level display. (Please see Table-8 or Table-19 )

| HYDRAULIC LUBRICANT | IF ENVIRONMENT TEMPERATURE IS LOWER THAN 20°C | IF ENVIRONMENT TEMPERATURE IS BETWEEN 20°C – 40 °C | IF ENVIRONMENT TEMPERATURE IS HIGHER THAN 40°C |
|---------------------|-----------------------------------------------|----------------------------------------------------|------------------------------------------------|
| Standard norm       | Iso Vg 32                                     | Iso Vg 46                                          | Hydro Oil Hd 68                                |
| Aral                | Vitan Gf 32                                   | Vitan Gf 46                                        |                                                |
| B.P.                | Hlp-Hm 32                                     | Hlp-Hm 46                                          | Hlp-Hm 68                                      |
| Caltex-Texaco       | Rando Oil 32                                  | Rando Oil 46                                       |                                                |
| Esso                | Nuto H 32                                     | Nuto H 46                                          |                                                |
| Purfin France       | Hydran 32                                     | Hydran 46                                          |                                                |
| Huile Renault-Elf   | Olna 32                                       | Olna 46                                            |                                                |
| Shell               | Tellus 32                                     | Tellus 46                                          | Tellus 68                                      |
| Valvoline           | Ultramax 32                                   | Ultramax 46                                        |                                                |
| Veedol              | Andrain 32                                    | Andrain 46                                         |                                                |
| Yacco               | Transhyd 32                                   | Transhyd 46                                        |                                                |
| Gulf                | Harmony 32 Aw                                 | Harmony 46 AW                                      |                                                |
| Castrol             | Aws 32                                        | Aws 46                                             | Hyspin Aws 68                                  |
| Mobil               |                                               |                                                    | Dte 26                                         |

Table-8

No foam hydraulic oils are a blend of virgin base stocks which provide excellent natural seal swell characteristics. They possess anti-foaming and anti-rust properties. Excellent service is provided by these oils in light and medium duty hydraulic service.

### 5.5.2 GREASE LUBRICANT SELECTION FOR LOWER-UPPER SLEDGE :

For more detailed information, please refer to the maintenance section. (See Table-9). (For more information see section 7.9 Maintenance & Inspection).

| No | Pieces | Place on the machine  | Frequency       | Oil Type                |
|----|--------|-----------------------|-----------------|-------------------------|
| 1  | 2      | Guideway buffer       | One in a 3 days | BELGIN GRESOL LIT EP2   |
|    |        |                       |                 | MOBIL MOBILUX EP2 NLGI2 |
|    |        |                       |                 | SPEEDOL EPX-2           |
| 2  | 1      | Back gauge ball screw | One in a week   | MUSCLE PL-10            |
| 3  | 4      | Guideway buffer(2nd)  | One in a 3 days | BELGIN GRESOL LIT EP2   |
|    |        |                       |                 | MOBIL MOBILUX EP2 NLGI2 |
|    |        |                       |                 | SPEEDOL EPX-2           |
| 4  | 2      | Linear guideways      | One in a 3 days | BELGIN GRESOL LIT EP2   |
|    |        |                       |                 | MOBIL MOBILUX EP2 NLGI2 |
|    |        |                       |                 | SPEEDOL EPX-2           |

Table-9: Grease lubricant selection for lower and upper sledge.



## CHAPTER 6 – INSTRUCTIONS FOR USE

### 6.1 – BEND INFORMATION :

#### 6.1.1- AIR BENDING :

JMT Press Brakes are developed to shape metal sheets. Our presses allow precise air bending and bending with tool processes.

**Air Bending:** In this type of bending, there are three important points. These points are the two corners of the lower tool and the bending Tip of the upper tool. In this operation, the lower and the upper tools do not contact with each other. The process is realized as follows;

First of all, after the “ V ” Die is selected in the lower tool, the punch is Selected through the upper tool, the material thickness is defined, the type of material is selected (this defines the tensile and yield of the material selected) and the bending angle is defined (for example, 45° , 87° , 90° , ..... ) in the program.

The values which should be taken into consideration in the selected “V” die

For sheet thickness up to 3 mm:  $6-8 \times s$

For sheet thickness greater than 3 mm:  $8-12 \times s$

\*s: = sheet thickness to be bended.

From the bending chart on the following pages, the required force, inner radius and similar information can be found.

**For instance:** For a sheet of 3 mm thickness, the required V die opening is 25 mm, the narrowest width of the bend is 18 mm. The inner radius which can be formed is 4.2 mm and the required force for one meter is 21 tons.

For air bend, because of the tendency of the material to return to its original form (spring back), the following tolerance values should be taken into consideration.

- For bending with a punch with an small radius is sharp  $\pm 2^\circ$
- For bending with a punch with an standard radius  $\pm 3^\circ$
- For bending with a punch with an large radius  $\pm 5^\circ$

For air bending, difference in degree's result from the material hardness of the sheet.

An example regarding this is as follows.

**For instance:** If we desire to bend a sheet 2 mm thick at an angle 140°; the “V” die opening to be selected is equal to:

$$V = 8 \times s$$

$$V = 8 \times 2 \Rightarrow V = 16 \text{ mm.}$$

In the next chart, the “V” opening is equal to 16 mm. The value corresponding to the sheet thickness is equal to 2mm. The degree difference for the sheet whose hardness is different is equal to 1°.

If we assume that the hardness difference is equal to 10 % in the whole size of the material (in this case, 0.20 mm), the degree difference is equal to 2.5°.



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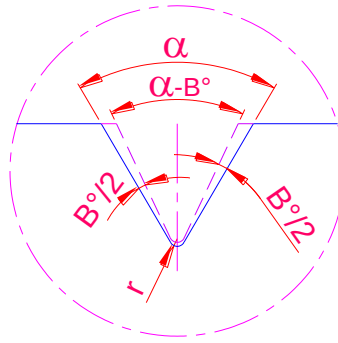


Figure-16

The values given can be calculated practically or theoretically as explained above. (Please see Figure 16)

#### 6.1.2 - ACCORDING TO DEHLER CHART :

| MATERIAL                                                                                                                          | SHEET THICKNESS<br>s ( mm ) | RADIUS<br>r ( mm ) | B° |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------|----|
| <b>Brass Plate<br/>+<br/>Aluminum<br/>+<br/>Copper</b><br><br><b>Rm = 22 daN/mm<sup>2</sup></b>                                   | 0.8                         | 1s                 | 4  |
|                                                                                                                                   |                             | 1s. . . 5s         | 5  |
|                                                                                                                                   |                             | 5s                 | 6  |
|                                                                                                                                   | 0.8 . . . 2                 | 1s                 | 2  |
|                                                                                                                                   |                             | 1s. . . 5s         | 3  |
|                                                                                                                                   |                             | 5s                 | 4  |
|                                                                                                                                   | 2                           | 1s                 | 0  |
|                                                                                                                                   |                             | 1s. . . 5s         | 1  |
|                                                                                                                                   |                             | 5s                 | 2  |
| <b>Mild Steel plate<br/>Rm = 40 daN/mm<sup>2</sup><br/>+<br/>Brass hard plate<br/>Rm = 35 daN/mm<sup>2</sup><br/>+<br/>Bronze</b> | 0.8                         | 1s                 | 5  |
|                                                                                                                                   |                             | 1s. . . 5s         | 6  |
|                                                                                                                                   |                             | 5s                 | 8  |
|                                                                                                                                   | 0.8 . . . 2                 | 1s                 | 2  |
|                                                                                                                                   |                             | 1s. . . 5s         | 3  |
|                                                                                                                                   |                             | 5s                 | 5  |
|                                                                                                                                   | 2                           | 1s                 | 0  |
|                                                                                                                                   |                             | 1s. . . 5s         | 1  |
|                                                                                                                                   |                             | 5s                 | 3  |
| <b>Mild Steel plate<br/>Rm = 60 daN/mm<sup>2</sup></b>                                                                            | 0.8                         | 1s                 | 7  |
|                                                                                                                                   |                             | 1s. . . 5s         | 9  |
|                                                                                                                                   |                             | 5s                 | 12 |
|                                                                                                                                   | 0.8 . . . 2                 | 1s                 | 4  |
|                                                                                                                                   |                             | 1s. . . 5s         | 5  |
|                                                                                                                                   |                             | 5s                 | 7  |
|                                                                                                                                   | 2                           | 1s                 | 2  |
|                                                                                                                                   |                             | 1s. . . 5s         | 3  |
|                                                                                                                                   |                             | 5s                 | 5  |

Table-10



### 6.1.3 - DIE PRESSING :

In order to maintain sensitive profiles, your tools should be precision ground. Here instead of bending in air, large amounts of tonnage is required.

**Bending with tool:** In this type of bending, the upper tool completes the pressing process by moving the end of the channel. Points to consider include:

- 1 – Requirement to use the complete tonnage power of the press,
- 2 – The opportunity to bend sheets with suitable thicknesses,
- 3 – Achieving various bends by means of the same upper blade.

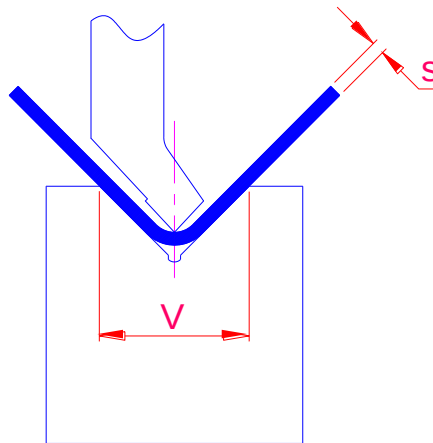
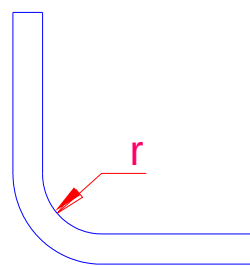


Figure -17

The radius of the sheet to be bended is dependent on the “V” opening profile, it is not related to the sheet thickness and dimensions. (Please see Figure-17).

Under these conditions, the radius is smaller than the radius of the “V” opening (Please see Figure-18).



$$r = 0.16 \times V$$

Figure-18



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#### 6.1.4- SPRING BACK PROPERTY :

Sheets may return to their old forms because of their flexibility.

This event depends on the following items:

- a – r /s proportion
- b – Capacity of the material
- c – Upper fiber property of the material
- d – The internal structure of the material

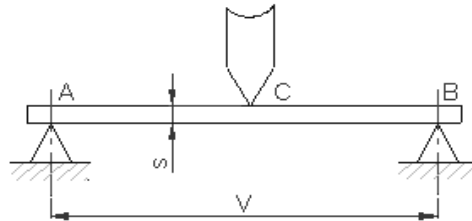


Figure-19

$$F = \frac{1,42 \times L \times Rm \times s^2}{1000 \times V}$$

F: Bending Force (ton)

L: Sheet Length (mm)

Rm: The shear strength of the Material (daN/mm<sup>2</sup>)

s: Sheet Thickness (mm)

V: opening Width (mm)

| V DIE OPENING DEPENDANT ON THE SHEET THICKNESS |           |           |            |                |
|------------------------------------------------|-----------|-----------|------------|----------------|
| Sheet Thickness (s)                            | 0,5 – 2,5 | 3,0 – 8,0 | 9,0 – 10,0 | 12,0 and upper |
| Opening Width ( V )                            | 6 x s     | 8 x s     | 10 x s     | 12 x s         |

Table - 11

| MINIMUM SIDE WIDTH TABLE ACCORDING TO THE ANGLE |          |          |          |          |       |          |          |
|-------------------------------------------------|----------|----------|----------|----------|-------|----------|----------|
| Angle ( α )                                     | 165 °    | 135 °    | 120 °    | 90 °     | 60 °  | 45 °     | 30 °     |
| Side Length (b)                                 | 0,51 x V | 0,55 x V | 0,58 x V | 0,71 x V | 1 x V | 1,31 x V | 1,94 x V |

Table-12



#### FOR INSTANCE:

Sheet length: 1000 mm.

Tensile strength of the material: 42 daN/mm<sup>2</sup>

If we choose "V" opening  $V=8 \times s$ , the value we obtain is as follows.

$$\text{If } F = \frac{1,42 \times 1000 \times 42 \times s^2}{1000 \times 8s} \text{ ise } F = \frac{1,42 \times 42 \times s^2}{8s} ; F = 8s.$$

By means of this formula, without the need for useless calculations, the force (tonnage) which is required for bending in air is calculated.

Length: 2500 mm

Sheet thickness: 2 mm

Hardness of the sheet: 45 daN/mm<sup>2</sup>

The required force  $2,5 \times 8 \times 2 = 40$  tones

As mentioned in the last example, for a sheet with hardness 40–45 kg/mm<sup>2</sup>, the required force to 2.5 mm is given.

If the press brake is used above its capacity, there may be damages to the tool and the sheet.

When sheets whose drawing strengths are over 40 kg/mm<sup>2</sup> are bent, a 10% value must be added to the practically calculated value. The cracks that may be formed may partially be prevented in this manner.

In harder sheets, this value is taken as 10 – 12 x s and thus the cracks which may be formed as a result of the hardness of the sheet may be prevented.

The following table defines the relationship between Y stroke values, bending angle and back spring. In order to prevent the back spring in the sheet, it must be bended more, where this bending angle increase is equal to  $\alpha$  angle. In order to prevent the back spring of the sheet to be bended, more bending must be realized according to the values in the table (Please see Table-11).

Degree differences which may be formed in a tool whose "V" opening is known.

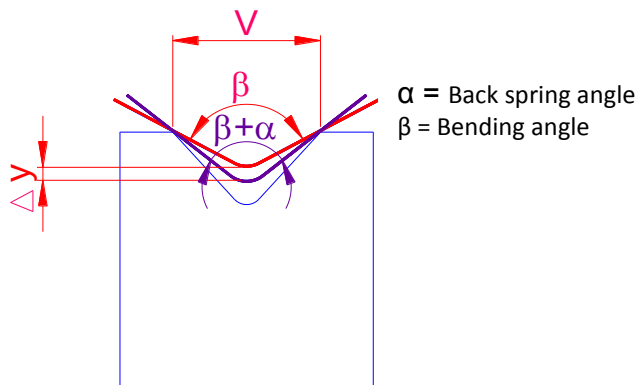


Figure-20



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| V (mm) | Back spring angle ( $\alpha$ ) |       |       |       |       |       |       |       |       | Y                               |
|--------|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|---------------------------------|
|        | 1 °                            | 1.5 ° | 2 °   | 2.5 ° | 3 °   | 3.5 ° | 4 °   | 4.5 ° | 5 °   |                                 |
| 6      | 0.031                          | 0.046 | 0.061 | 0.076 | 0.09  | 0.106 | 0.121 | 0.136 | 0.151 | Additional Y-axis stroke value. |
| 8      | 0.041                          | 0.061 | 0.081 | 0.101 | 0.121 | 0.141 | 0.161 | 0.181 | 0.201 |                                 |
| 9,5    | 0.048                          | 0.072 | 0.096 | 0.12  | 0.144 | 0.168 | 0.192 | 0.215 | 0.239 |                                 |
| 10     | 0.051                          | 0.076 | 0.101 | 0.127 | 0.152 | 0.177 | 0.202 | 0.226 | 0.251 |                                 |
| 12     | 0.061                          | 0.091 | 0.122 | 0.152 | 0.182 | 0.212 | 0.242 | 0.272 | 0.301 |                                 |
| 13     | 0.066                          | 0.1   | 0.132 | 0.165 | 0.197 | 0.230 | 0.262 | 0.294 | 0.327 |                                 |
| 15     | 0.076                          | 0.114 | 0.152 | 0.19  | 0.228 | 0.265 | 0.302 | 0.34  | 0.377 |                                 |
| 16     | 0.081                          | 0.122 | 0.162 | 0.203 | 0.243 | 0.283 | 0.323 | 0.362 | 0.402 |                                 |
| 19     | 0.097                          | 0.145 | 0.193 | 0.241 | 0.288 | 0.336 | 0.383 | 0.43  | 0.477 |                                 |
| 20     | 0.11                           | 0.152 | 0.203 | 0.253 | 0.304 | 0.354 | 0.403 | 0.453 | 0.502 |                                 |
| 24     | 0.122                          | 0.183 | 0.244 | 0.304 | 0.364 | 0.424 | 0.484 | 0.544 | 0.603 |                                 |
| 25     | 0.127                          | 0.19  | 0.254 | 0.317 | 0.379 | 0.442 | 0.504 | 0.566 | 0.628 |                                 |
| 30     | 0.153                          | 0.23  | 0.305 | 0.380 | 0.455 | 0.53  | 0.605 | 0.679 | 0.754 |                                 |
| 32     | 0.163                          | 0.244 | 0.325 | 0.405 | 0.486 | 0.566 | 0.645 | 0.725 | 0.804 |                                 |
| 35     | 0.178                          | 0.267 | 0.355 | 0.443 | 0.53  | 0.619 | 0.706 | 0.793 | 0.849 |                                 |
| 38     | 0.194                          | 0.299 | 0.386 | 0.481 | 0.577 | 0.672 | 0.766 | 0.861 | 0.955 |                                 |
| 40     | 0.204                          | 0.305 | 0.406 | 0.507 | 0.607 | 0.707 | 0.807 | 0.906 | 1.005 |                                 |
| 50     | 0.255                          | 0.381 | 0.508 | 0.633 | 0.759 | 0.884 | 1.01  | 1.132 | 1.256 |                                 |
| 52     | 0.265                          | 0.4   | 0.53  | 0.66  | 0.789 | 0.919 | 1.05  | 1.178 | 1.306 |                                 |
| 55     | 0.28                           | 0.42  | 0.56  | 0.7   | 0.835 | 0.972 | 1.109 | 1.246 | 1.382 |                                 |
| 60     | 0.306                          | 0.46  | 0.61  | 0.76  | 0.911 | 1.06  | 1.21  | 1.36  | 1.51  |                                 |
| 63     | 0.321                          | 0.48  | 0.64  | 0.8   | 0.96  | 1.11  | 1.27  | 1.43  | 1.58  |                                 |
| 70     | 0.357                          | 0.54  | 0.71  | 0.89  | 1.06  | 1.24  | 1.41  | 1.59  | 1.76  |                                 |
| 76     | 0.387                          | 0.58  | 0.77  | 0.96  | 1.15  | 1.34  | 1.53  | 1.72  | 1.91  |                                 |
| 80     | 0.41                           | 0.61  | 0.81  | 1.01  | 1.21  | 1.42  | 1.61  | 1.81  | 2.01  |                                 |
| 100    | 0.509                          | 0.76  | 1.0   | 1.27  | 1.52  | 1.77  | 2.02  | 2.26  | 2.51  |                                 |
| 125    | 0.637                          | 0.95  | 1.27  | 1.58  | 1.9   | 2.21  | 2.52  | 2.83  | 3.14  |                                 |
| 160    | 0.815                          | 1.22  | 1.62  | 2.03  | 2.43  | 2.83  | 3.23  | 3.62  | 4.02  |                                 |
| 200    | 1.02                           | 1.52  | 2.03  | 2.53  | 3.03  | 3.53  | 4.03  | 4.53  | 5.02  |                                 |
| 250    | 1.27                           | 1.9   | 2.53  | 3.17  | 3.8   | 4.42  | 5.04  | 5.66  | 6.28  |                                 |
| 320    | 1.63                           | 2.4   | 3.25  | 4.1   | 4.9   | 5.57  | 6.45  | 7.25  | 8.04  |                                 |
| 400    | 2.03                           | 3     | 4.01  | 5.1   | 6.1   | 7.1   | 8.1   | 9.1   | 10    |                                 |
| 500    | 2.55                           | 3.8   | 5.01  | 6.4   | 7.6   | 8.8   | 10.1  | 11.3  | 12.6  |                                 |
| 630    | 3.2                            | 4.8   | 6.4   | 8     | 9.6   | 11    | 12.7  | 14.3  | 15.8  |                                 |

Table-13 The relationship between Y stroke values, bending angle and back spring.



### 6.1.5 - AIR BENDING DIAGRAM :

Information chart for necessary tonnage for 1 meter bending width (L) for mild steel material:

| S mm | 0.7 | 0.8 | 1   | 1.3 | 1.6 | 2  | 2.7 | 3  | 3.3 | 4  | 5  | 5.5 | 6.5 | 7  | 8  | 10 | 11 | 13  | 14  | 17  | 22  | 24  | 28  | 31  | 35  | 42  | 90  | 56  | 70  | 80  | 90  | 100 | 105 | 110 | 130 | 140 | 170 | 200 | R |
|------|-----|-----|-----|-----|-----|----|-----|----|-----|----|----|-----|-----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|
|      | 2.8 | 3.5 | 4   | 6   | 7   | 9  | 11  | 13 | 14  | 17 | 22 | 24  | 28  | 31 | 35 | 42 | 90 | 56  | 70  | 80  | 90  | 100 | 105 | 110 | 130 | 140 | 170 | 200 | D   |     |     |     |     |     |     |     |     |     |   |
|      | 4   | 5   | 6   | 8   | 10  | 12 | 15  | 18 | 20  | 25 | 30 | 35  | 40  | 45 | 50 | 60 | 70 | 80  | 100 | 120 | 130 | 140 | 150 | 160 | 180 | 200 | 250 | 300 | V   |     |     |     |     |     |     |     |     |     |   |
| 0.5  | 4   | 3   | 2   | 2   |     |    |     |    |     |    |    |     |     |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 0.6  | 5   | 4   | 3.5 | 3   | 2   |    |     |    |     |    |    |     |     |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 0.8  |     | 8   | 7   | 5   | 4   | 2  |     |    |     |    |    |     |     |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 1.0  |     |     | 10  | 8   | 6   | 5  | 4   |    |     |    |    |     |     |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 1.2  |     |     |     | 10  | 9   | 7  | 6   | 5  |     |    |    |     |     |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 1.5  |     |     |     |     | 13  | 12 | 9   | 7  | 7   |    |    |     |     |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 1.8  |     |     |     |     |     | 16 | 13  | 11 | 10  | 8  |    |     |     |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 2.0  |     |     |     |     |     |    | 16  | 14 | 12  | 10 | 8  |     |     |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 2.5  |     |     |     |     |     |    |     | 21 | 20  | 15 | 12 | 11  |     |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 3.0  |     |     |     |     |     |    |     |    | 27  | 22 | 18 | 15  | 13  |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 3.5  |     |     |     |     |     |    |     |    |     | 29 | 24 | 21  | 18  | 16 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 4.0  |     |     |     |     |     |    |     |    |     |    | 32 | 27  | 24  | 21 | 19 |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 4.5  |     |     |     |     |     |    |     |    |     |    |    | 35  | 30  | 27 | 24 | 20 |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 5.0  |     |     |     |     |     |    |     |    |     |    |    |     | 37  | 33 | 30 | 25 | 21 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 6.0  |     |     |     |     |     |    |     |    |     |    |    |     |     | 48 | 43 | 36 | 31 | 27  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 7.0  |     |     |     |     |     |    |     |    |     |    |    |     |     |    | 58 | 49 | 42 | 37  | 29  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 8.0  |     |     |     |     |     |    |     |    |     |    |    |     |     |    |    | 64 | 55 | 48  | 42  | 32  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 10   |     |     |     |     |     |    |     |    |     |    |    |     |     |    |    |    | 85 | 75  | 60  | 50  | 46  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 12   |     |     |     |     |     |    |     |    |     |    |    |     |     |    |    |    |    | 107 | 86  | 72  | 66  | 61  |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 13   |     |     |     |     |     |    |     |    |     |    |    |     |     |    |    |    |    |     |     | 101 | 84  | 76  | 72  | 67  |     |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 14   |     |     |     |     |     |    |     |    |     |    |    |     |     |    |    |    |    |     |     |     | 98  | 90  | 84  | 78  | 73  |     |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 15   |     |     |     |     |     |    |     |    |     |    |    |     |     |    |    |    |    |     |     |     |     | 103 | 96  | 90  | 84  | 75  |     |     |     |     |     |     |     |     |     |     | F   |     |   |
| 16   |     |     |     |     |     |    |     |    |     |    |    |     |     |    |    |    |    |     |     |     |     |     | 109 | 102 | 95  | 85  | 76  |     |     |     |     |     |     |     |     |     | F   |     |   |
| 18   |     |     |     |     |     |    |     |    |     |    |    |     |     |    |    |    |    |     |     |     |     |     |     | 129 | 120 | 107 | 97  | 77  |     |     |     |     |     |     |     |     |     | F   |   |
| 20   |     |     |     |     |     |    |     |    |     |    |    |     |     |    |    |    |    |     |     |     |     |     |     |     |     | 149 | 132 | 119 | 95  | 80  |     |     |     |     |     |     |     | F   |   |
| 25   |     |     |     |     |     |    |     |    |     |    |    |     |     |    |    |    |    |     |     |     |     |     |     |     |     |     |     | 207 | 186 | 149 | 124 |     |     |     |     |     |     | F   |   |
| 30   |     |     |     |     |     |    |     |    |     |    |    |     |     |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | F   |   |

$$F = \frac{1,42 \cdot \sigma \cdot s^2 \cdot L}{1000 \cdot V}$$

$\sigma : 42 \text{Kg/mm}^2$

Table-14: Bending table.

F: Bending force (Ton)

L: Length (mm) (L = 1000 mm)

R: Inner radius(mm)

σ: Breaking off strength of the material ( Kg/mm<sup>2</sup> )

V: Width of bottom die opening to fit (mm)

D: Minimum sheet curling length (mm)

S: Sheet thickness (mm)



### 6.1.6 - IMPORTANT NOTICE FOR BENDING :

This is the figure illustrating the maximum tonnage allowed in determining the bending length. See Figure-21.

SL: Sheet length (total).

F : Tonnage.

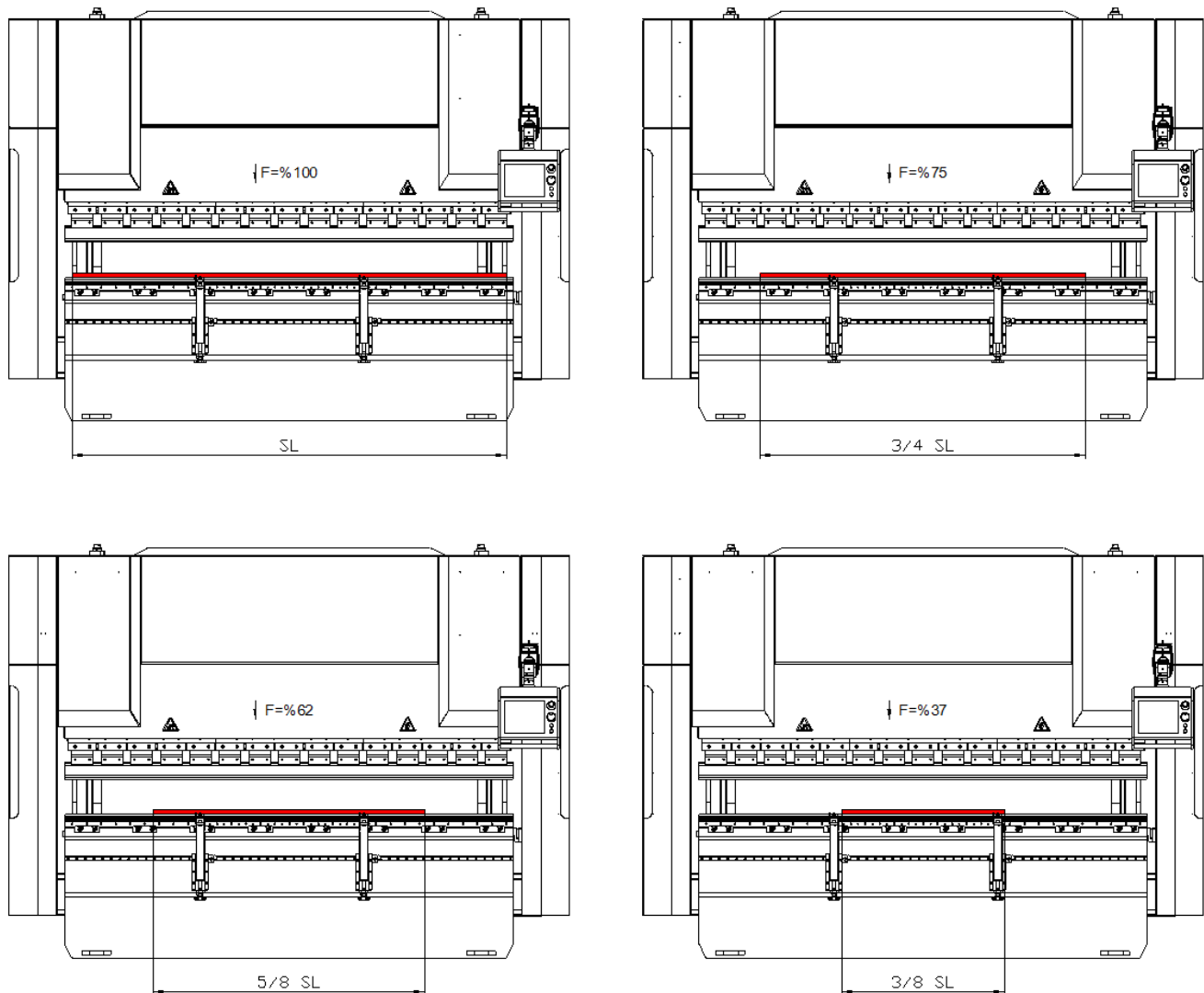


Figure-21

For achieving short bend, as illustrated below in Figure-22, bend pieces with equal lengths on both sides of the machine.

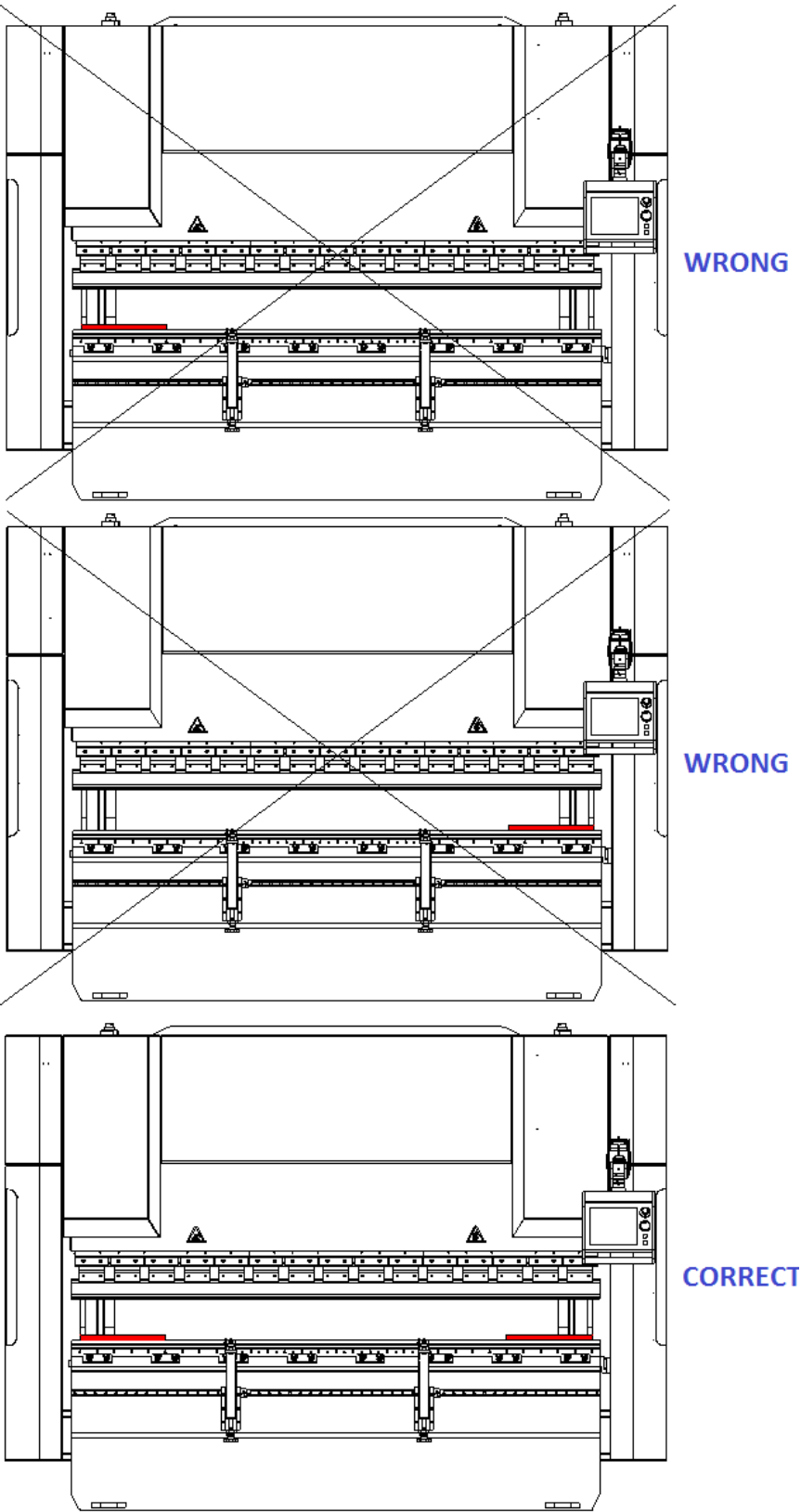


Figure-22: Symmetrical bending.

## 6.2 - OPERATING THE MACHINE :

### 6.2.0 - KNOWLEDGE ABOUT CNC PRESS BRAKE:

#### 6.2.0.1- CNC PRESS BRAKE MECHANISM AND COMPONENTS :

##### 6.2.0.1.1- CNC PRESS BRAKE OPERATION SYSTEM :

When the bottom beam is upper position it goes down by its heaviness. During that time a vacuum arises in the cylinder. Oil fills the cylinder from the oil tank. The pump with electrical motor drive and sends pressure oil to cylinders. By the power applied, the sheet between the tools bends. After the bending operation is finished, the direction valve in the hydraulic system changes its direction and pressurized oil is sent to the bottom of the cylinder. By pistons the beam goes up.

##### 6.2.0.1.1.2 - THE ASSISTANT COMPONENTS :

##### 6.2.0.1.2.1 - TOP & BOTTOM TOOLS :

These components that the sheet is bent. Depending on requirements, they can be in different shape and position.

##### 6.2.0.1.2.2 - THEN EMERGENCY COMPONENTS :

|                  |                         |
|------------------|-------------------------|
| Emergency stop 1 | At the electrical panel |
| Emergency stop 2 | At the foot pedal       |
| Photocell        | At the rear guards      |
| Light curtain    | At the right door       |
| Light curtain    | At the left door        |

If you press the emergency stops or if the protections are open, the top beam stops and goes up. When it reaches the top limit switch the machine stops.

##### 6.2.0.1.2.3 - BACKGUAGE SYSTEM :

Backgauge provides the sheet to be bent in required measurement. It is controlled by the digital display which is the command panel. It has two backgauge fingers and two limit switches.

##### 6.2.0.1.2.4 - FOOT CONTROL PANEL SYSTEM :

It has 6-8 components.

## 6.2.1 - ACCIDENT AND PRECAUTION :

**6.2.1.1- HAND PRESS BETWEEN TOOLS :** To prevent this safety guard has been fitted on the machine.

**6.2.1.2 - BENDING SHEET HAS STRIKE TO BODY OF OPERATOR :** Warning label on the front of machine.

**6.2.1.3 - HAND PRESS BETWEEN MOVING DRIVE SYSTEM :** Safety guard sheets have been fitted on the around of moving parts.

**6.2.1.4 - ELECTRIC SHOCK :** Grounding has been made on the machine and all cables have been taken in the cable canal, outside cables coated by spiral protection against crush.

**6.2.1.5 - BOTTOM TOOL CLAMPING :** Fixing the bottom tool by centering "V" canal as to top tool.

**6.2.1.6 - DESIGNING TOOL :** All tools production is in standard size, special product is possible for the operator requires in different sizes. Sheet thickness and canal size can be chosen from bending capacity table. This table is available on the machine and manual instruction book.

## 6.2.2 - PROHIBITED USES OF THE PRESS BRAKE :

Press brake should not be used in the following circumstances :

- If there is ANYTHING OTHER THAN THE WORKPIECE, inserted, extended, put or placed in the working area between top and bottom bending tools.
- When any of the protective devices or guardings of the machine are NOT mounted or NOT functioning.
- For operations involving : Cutting, punching, slitting, breaking, crushing, drilling, imprinting processes.
- For bending operations involving non- flat metals ( at origin ). e.g. rods, bars, tubes, pipes.
- The application which is not symmetric during the bending. (See Figure-22)



*The manufacturer is not responsible for personal safety and for damage to the machine when used in prohibited ways.*

### 6.2.3 - INCORRECT USES OF THE PRESS BRAKE :

During normal operation of the press brake, the following incorrect uses must be avoided. The likely consequences of such incorrect uses are also explained below :

**Incorrect use ( 1 ) :** Top tool not centered on the bottom tool " V ".

**Consequence ( 1 ) :**

- No bending at desired angle.
- Oil leakage in cylinder.
- Damage to tooling, breaking of tooling with possible injury to operator.
- Breaking of the bolts stud connecting piston to beam.

**Incorrect use ( 2 ) :** Bending flame-cut material.

**Consequence ( 2 ) :**

- Damage to tools, spread of chips from workpiece with possible injury to operator.

**Incorrect use ( 3 ) :** During machine operation or adjustment, foreign substances (e.g. nuts, bolts, wrenches and similar tools) lying in between bending tools.

**Consequence ( 3 ) :**

- Damage to bending tools, foreign substances breaking out with possible injury to operator.

**Incorrect use ( 4 ) :** If the adjustment between the tools is not made according to bending sheet's thickness :

**Consequence ( 4 ) :**

- a) If the gap between the tools is more than the thickness of the sheet;
  - Requested bending angle can not be achieved.
- b) If the gap between the tools is less than the thickness of the sheet;
  - Tools can be damaged during bending.
  - Bending angle can be lower than the requested angle value.

**Incorrect use ( 5 ) :** Bending a sheet which has been cut by gas cutter;

**Consequence ( 5 ) :**

- Top tool can be damaged during bending.
- Spreading parts may cause an accident

### 6.2.4 - USING THE PRESS BRAKE :

#### 6.2.4.1 - REQUIREMENTS FOR THE INITIAL TEST AND EXAMINATION :

- Check the machine visually against any transport damage.
- Clean the oil tank.
- Fill the oil tank up to the level indicator with one of the oil types recommended in the Lubrication Diagram (Table -8: Hydraulic lubricant selection. )
- Check that the side and rear guards are functioning properly.
- Check that the top tool is rigidly fixed in its place.
- Check that the bottom tool is properly aligned to the top tool.
- Make sure that no cables are damaged.
- Check the components and terminal connections inside the electrical cabinet against any loosening.
- Make sure that all switches and buttons are not damaged and working.
- Carry out the electrical connections according to section (5.4 Electrical connection) and then proceed according to guidelines and instructions of the CNC Operating Manual .
- Check performing a test-run that :
  - a. All switches and buttons are functioning.( in particular, emergency, buttons, safety and limit switches ).



b. There is no oil leakage in cylinders, valves, pipes and hoses.

- Prior to despatch the machine has been tested according to its capacity ; adjustments for parallelism have been made; and the bottom tool has been centered with respect to the top tool.
- So long as the original parallelism of the machine remains intact, bending operations can be carried out in the modes 1,2,3 by selecting the appropriate "V" groove on the bottom tool according to material thickness used



FIBER LASERS



PRESS BRAKES



PLATE ROLLS



ANGLE ROLLS



SHEARS



IRON WORKERS



BANDSAWS



DRILL LINES



TANK TURNING  
ROLLS



WELDING  
EQUIPMENT



AIRCRAFT ROLLS



SOFTWARE

#### 6.2.4.2 – FOOT PEDAL (ESA or DELEM+AKAS) :



Figure-23a

| Mark | Designation           | Description                                                                                                                                                                                                                                                                                   |
|------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (a)  | Left Pedal            | When left pedal is pressed, Beam goes downwards                                                                                                                                                                                                                                               |
| (b)  | Right Pedal           | When right pedal is pressed, Beam goes upwards                                                                                                                                                                                                                                                |
| (c)  | Emergency Stop Button | In case of emergency, when this button is pressed, the main pump and other active components of machine stop.                                                                                                                                                                                 |
| (d)  | Pump On               | It starts up the main pump and at that moment the lamp (H) in the button lights up.                                                                                                                                                                                                           |
| (e)  | Reset                 | In order to restart the machine after pressing any emergency stop button on the machine, the reset button must be pressed. This button initialize the emergency stop module.                                                                                                                  |
| (f)  | Pump Off              | It stops the main pump                                                                                                                                                                                                                                                                        |
| (g)  | Box Bending (Option)  | When bending box or box type products, this button must be pressed. Thus you activate the box bending function of the laser safety system and laser beams configuration between the transmitter and the receiver is changed. Finally laser beams will NOT be interrupted because of box sides |
| (h)  | Overrun ok            | overrun lamp lights machine is ready to overrun test                                                                                                                                                                                                                                          |



#### 6.2.4.3 – ELECTRICAL CABINET (ESA or DELEM+ AKAS) :

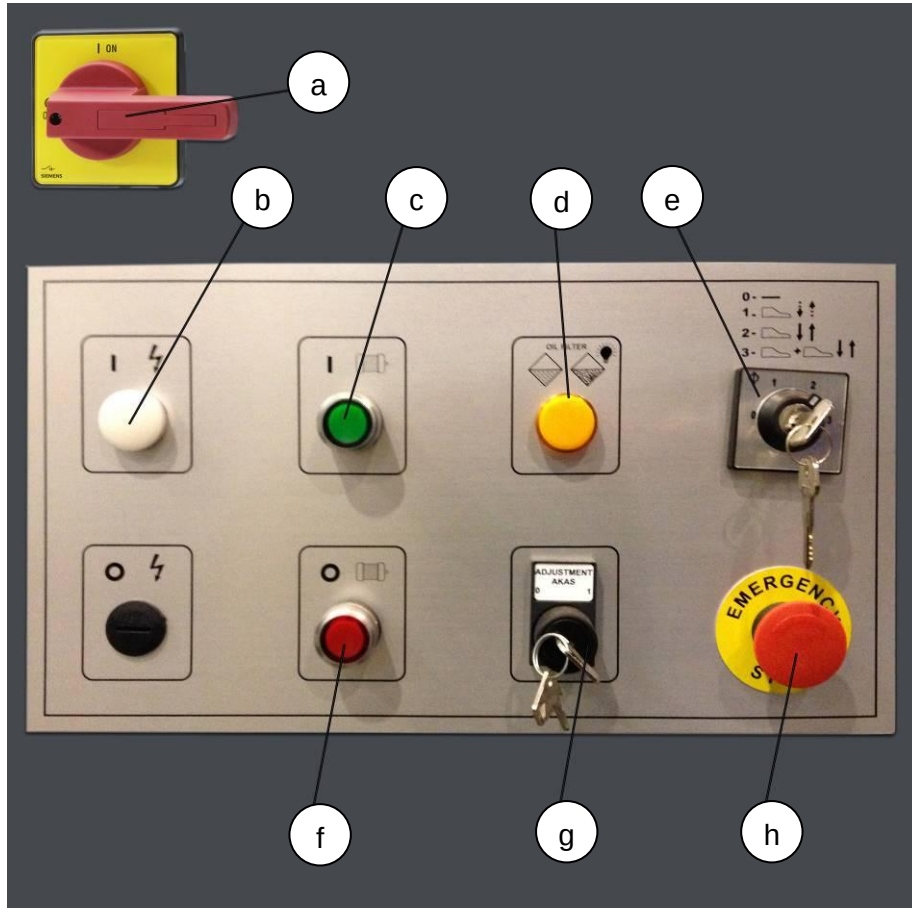


Figure-23b

| Mark | Designation                               | Description                                                                                                                                                                                                                                                                                                   |
|------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (a)  | Main Switch                               | Switches the machine on and off                                                                                                                                                                                                                                                                               |
| (b)  | Supply On (Lamp)                          | Main control ON/OFF                                                                                                                                                                                                                                                                                           |
| (c)  | Pump On Button with Lamp                  | It starts up the main pump and at that moment the lamp (HL305) in the button lights up.                                                                                                                                                                                                                       |
| (d)  | Oil Filter (Lamp)                         | When it lights up, the oil filter must be changed. It is an indicator for oil change.                                                                                                                                                                                                                         |
| (e)  | Mode Selection Switch                     | Machine working mode can be selected using this switch.<br>If your machine is equipped with laser safety system or light barrier, you don't need two hand pedal control. Thus only two working modes are available. <ul style="list-style-type: none"> <li>1. Inching Mode</li> <li>2. Pedal-Pedal</li> </ul> |
| (f)  | Pump Off Button with Lamp                 | It stops the main pump                                                                                                                                                                                                                                                                                        |
| (g)  | Light guard On/Off or Laser safety On/Off | It activates Light guard or Laser safety feature                                                                                                                                                                                                                                                              |
| (h)  | Emergency Stop Button                     | In case of emergency, when this button is pressed, all movements are stopped.                                                                                                                                                                                                                                 |



#### 6.2.4.4 – FOOT PEDAL (CYBELEC + SICK) :



Figure-24a

| Mark | Designation           | Description                                                                                                                                                                  |
|------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (a)  | Left Pedal            | When left pedal is pressed, Beam goes downwards                                                                                                                              |
| (b)  | Right Pedal           | When right pedal is pressed, Beam goes upwards                                                                                                                               |
| (c)  | Emergency Stop Button | In case of emergency, when this button is pressed, the main pump and other active components of machine stop.                                                                |
| (d)  | Pump On               | It starts up the main pump and at that moment the lamp (H) in the button lights up.                                                                                          |
| (e)  | Ram Up Button         | When you press this button Ram goes up to highest position.                                                                                                                  |
| (f)  | Pump Off              | It stops the main pump                                                                                                                                                       |
| (g)  | Reset                 | In order to restart the machine after pressing any emergency stop button on the machine, the reset button must be pressed. This button initialize the emergency stop module. |



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#### 6.2.4.5 – ELECTRICAL CABINET (CYBELEC + SICK) :

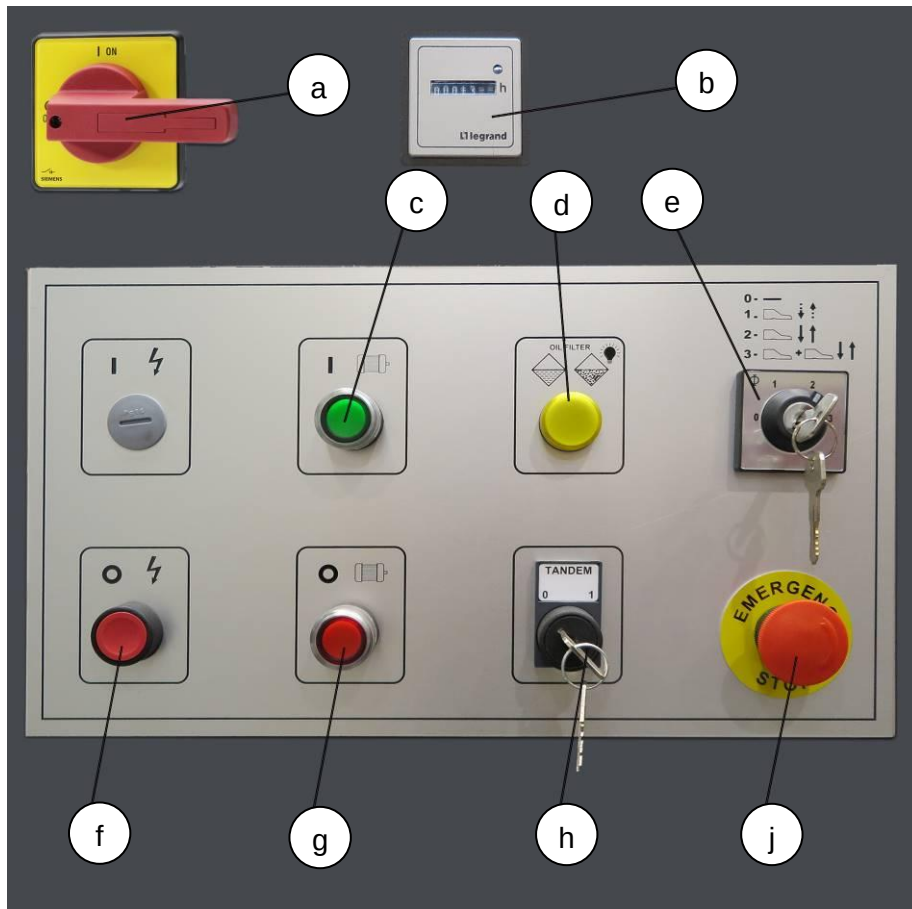


Figure-24b

| Mark | Designation               | Description                                                                                                                                                                                                                                              |
|------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (a)  | Main Switch               | Switches the machine on and off                                                                                                                                                                                                                          |
| (b)  | Counter                   | Shows working hours                                                                                                                                                                                                                                      |
| (c)  | Pump On Button with Lamp  | It starts up the main pump and at that moment the lamp (HL305) in the button lights up.                                                                                                                                                                  |
| (d)  | Oil Filter (Lamp)         | When it lights up, the oil filter must be changed. It is an indicator for oil change.                                                                                                                                                                    |
| (e)  | Mode Selection Switch     | Machine working mode can be selected using this switch.<br>If your machine is equipped with laser safety system or light barrier, you don't need two hand pedal control. Thus only two working modes are available.<br>3. Inching Mode<br>4. Pedal-Pedal |
| (f)  | Machine Stop Button       | When this button is pushed, machine stops. For start working again need to push Reset Button first then Pump On Button.                                                                                                                                  |
| (g)  | Pump Off Button with Lamp | It stops the main pump                                                                                                                                                                                                                                   |
| (h)  | Tandem Switch             | It activates Tandem feature                                                                                                                                                                                                                              |
| (j)  | Emergency Stop Button     | In case of emergency, when this button is pressed, all movements are stopped.                                                                                                                                                                            |



#### 6.2.4.6 – COMMAND PANEL :

Type: DELEM DA66T Touch : For more the using details ( See AUXILIARY DOCUMENTS files).



Figure-25

### CHAPTER 7 - MAINTENANCE, REPAIRMENT AND CLEANING INSTRUCTIONS :

#### 7.1 – SAFETY IN THE LOWER AND UPPER TOOL ADJUSTMENT :

- **! NEVER** place your fingers, hand or any part of your body between the tools.
- Be aware of the proximity of others when repairing, cleaning or maintaining your machine.
- Verify that the correct bending adjustments are made.
- Be sure that all of the equipment is operating correctly and precisely.



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## 7.2 - LOWER and UPPER TOOL ADJUSTMENT :

JMT styles many tooling system made for your business. JMT universal connection systems are easily adaptable to many styles of tooling. This means flexibility today and tomorrow with economic possibilities. Also hydraulic clamping systems can greatly increase your productivity.

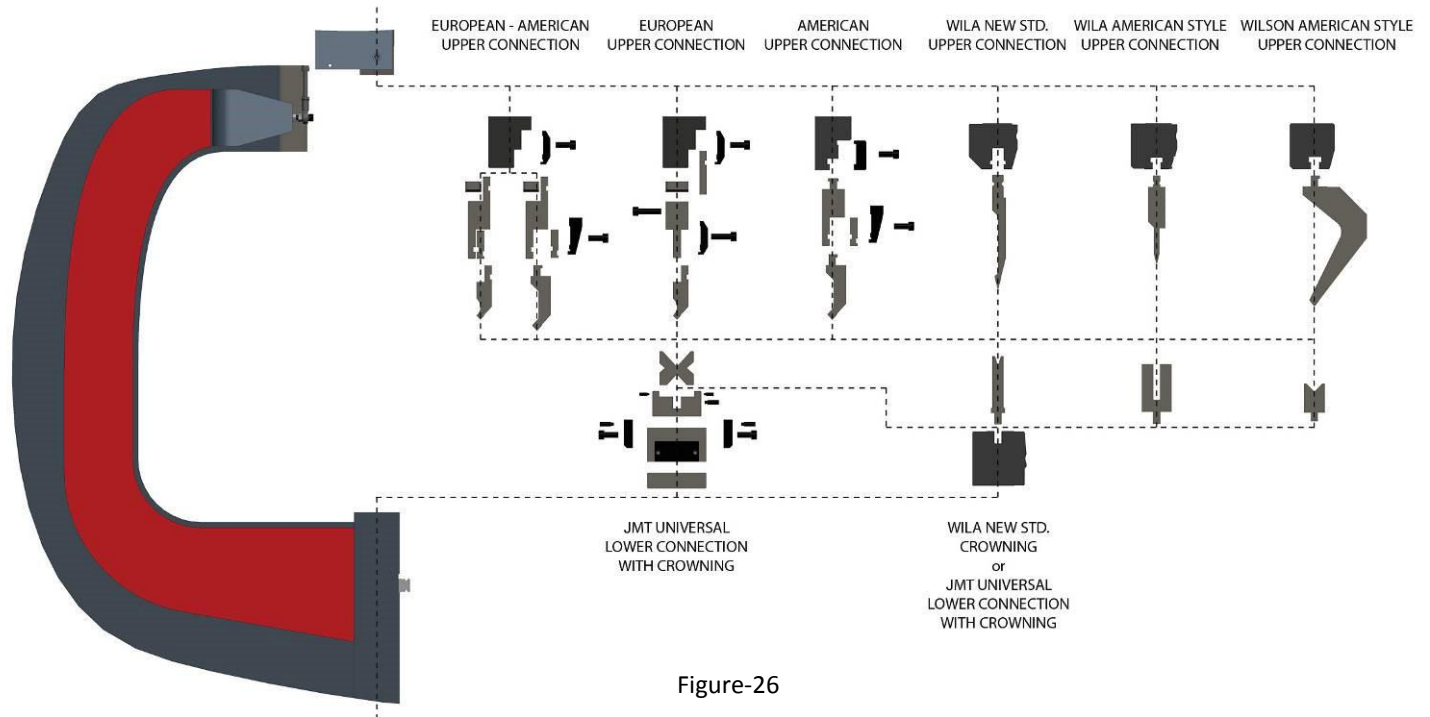


Figure-26

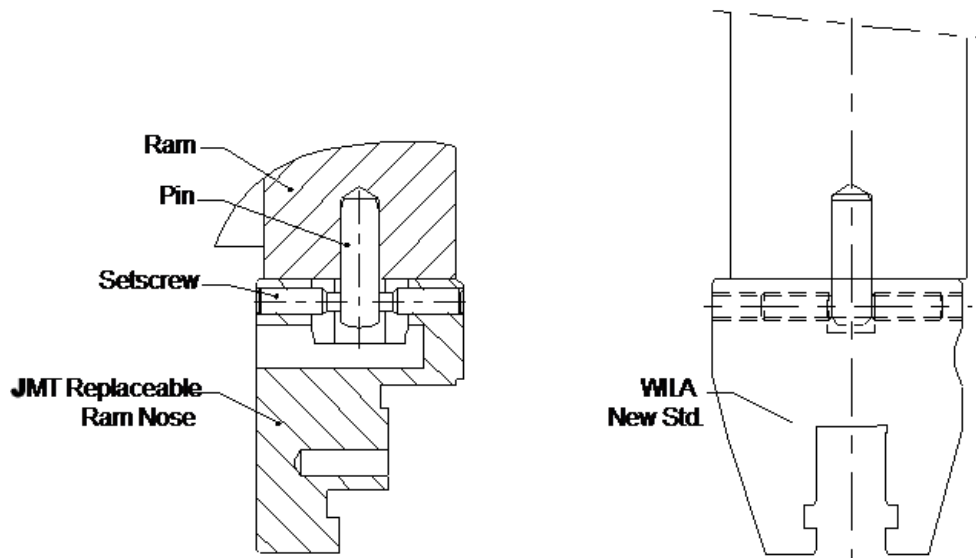


Figure-27



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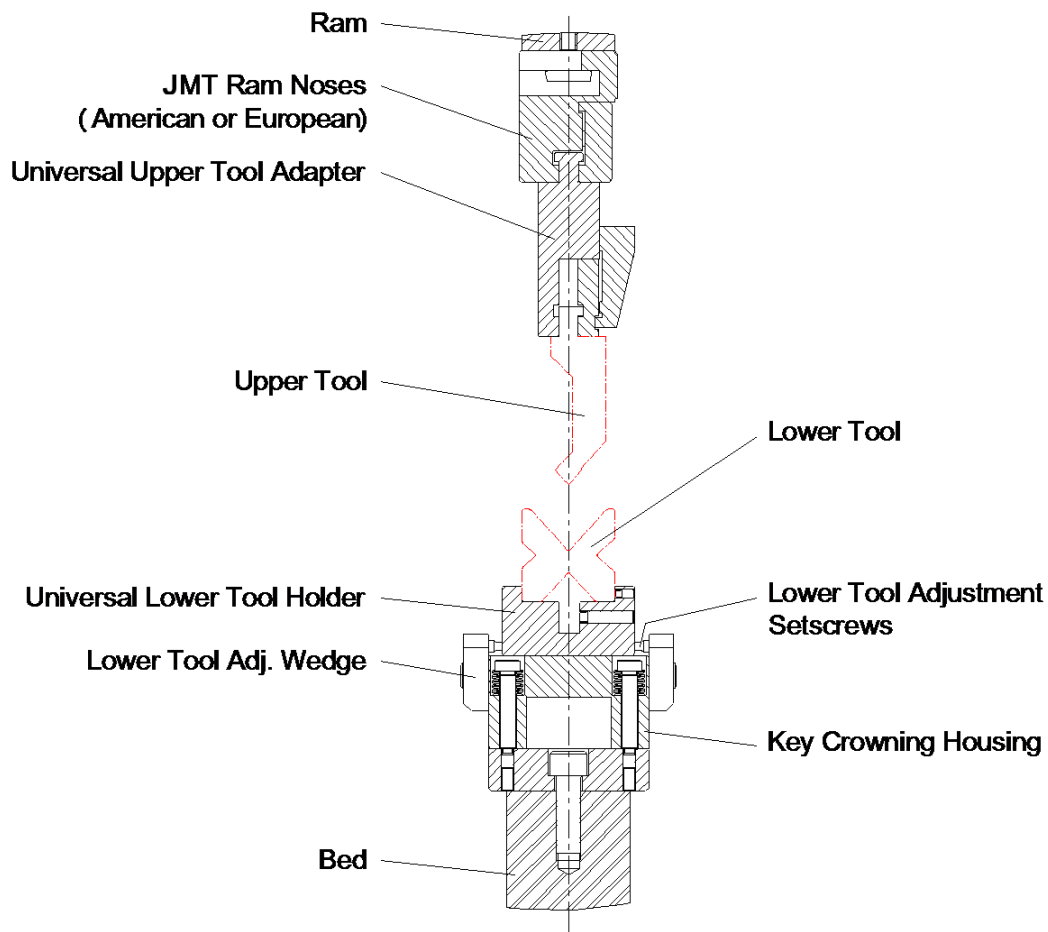


Figure-28

The most important factor in obtaining precise bending is that the lower and the upper tools be adjusted in the same axis. Adjustment is achieved as follows:

- The lower tool set screws must be completely loosened.
- The lower surface of the lower tool and the upper surface of the bed should be cleaned very well.
- The lower tool is seated in place (by means of tool lifting bolts and chain in the wide connection).
- The “V” channel where adjustment is attached and the end of the upper tool should be cleaned well.
- The upper tool (in manual mode) is seated into the “V” bearing of the lower tool in a balanced manner and its centering is provided (by means of a pressure of 10 tones).
- Lower tool adjustment set screws are to be slightly tightened.
- The upper tool is taken 5 – 6 mm upwards.
- Ensure that the X distance is equal everywhere by fully adjusting the tightening bolts by means of composing stick or feeler tool.
- The adjustment process must be done on both ends of the machine.

In CNC press brakes, three different tool clamping systems are used. These are;

1. Mechanical clamping
2. Hydraulic clamping
3. Pneumatic clamping



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## 7.2.1- MECHANICAL CLAMPING :

### 7.2.1.1- TYPE 1 :

#### 7.2.1.1.1.a - CHANGING THE TOP TOOL :

The top tool is fixed in its place as seen in (See Figure-29) below.

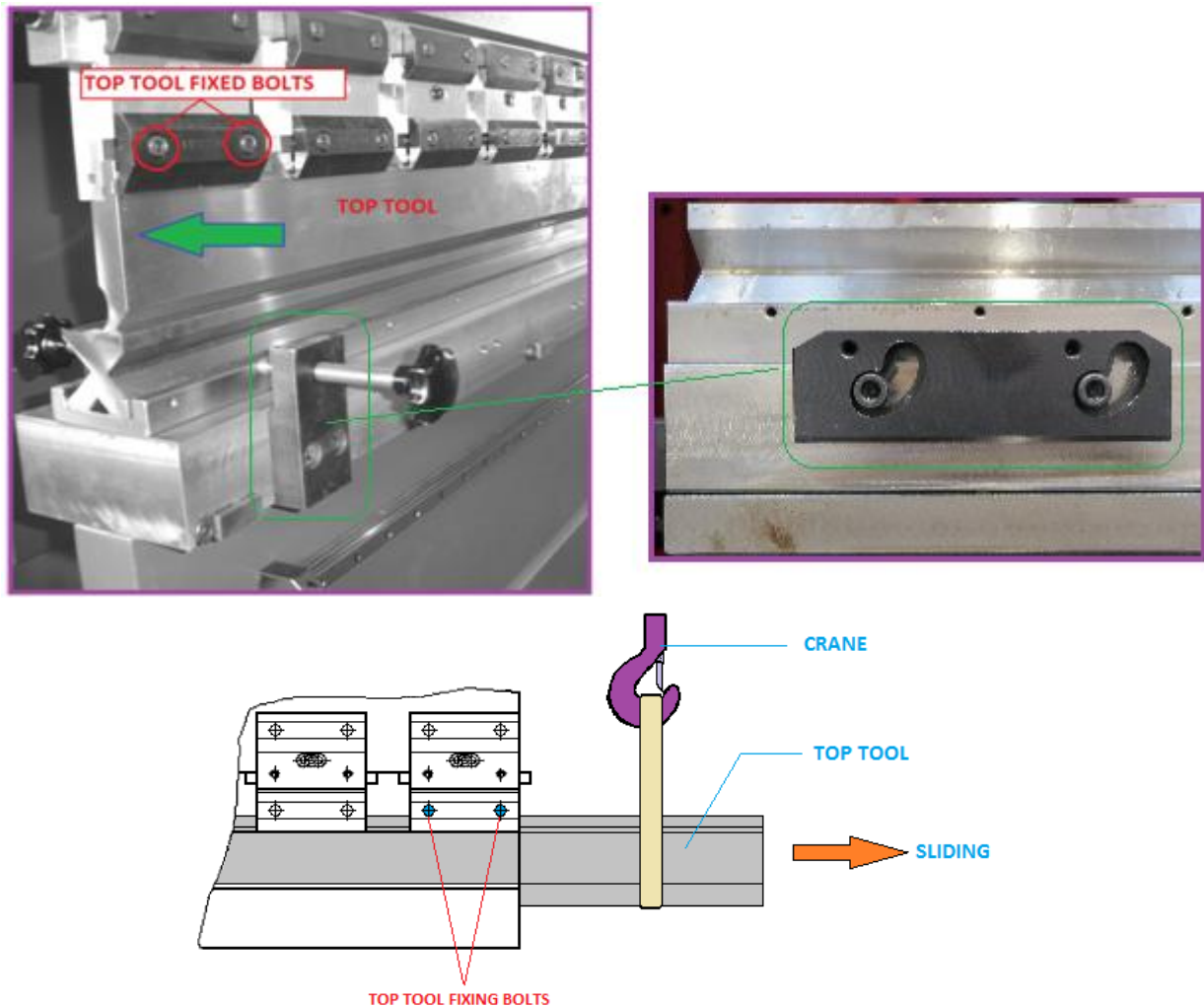


Figure-29: Changing the top tool 1.1. Type 1.

**⚠** There is danger of top tool falling free if the tool fixing bolts are let loose excessively and also danger of top tool and adaptors assembly falling free if the adaptors fixing bolts are let loose. CHECK the fixing bolts against any loosening periodically.

Turn the **position switch** to **position "1" (Foot Slow (Adjust) Mode)**.

1. Drop top beam on low pressure such that there is a clearance of approximately (1 mm) between top and bottom tools.
2. After stopping the main motor and switching off the main switch, let the top tool sit on the bottom tool " V " slowly by loosening up the fixing bolts (See Figure-29).
3. Pull out the top tool manually by the left side of the machine. Stock it using an appropriate lifting equipment.  
*NOTE :You should loosen the all bolts along the beam so that you can pull out the top tool.*
4. Place the new top tool from any side.
5. Tighten up all bolts to fix the top tool.



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#### 7.2.1.1.1.b - CHANGING THE BOTTOM TOOL :

To replace the existing bottom tool with a new one:

1. Loosen up the lower tool adjustment setscrews (See Figure-30) along the die holder.

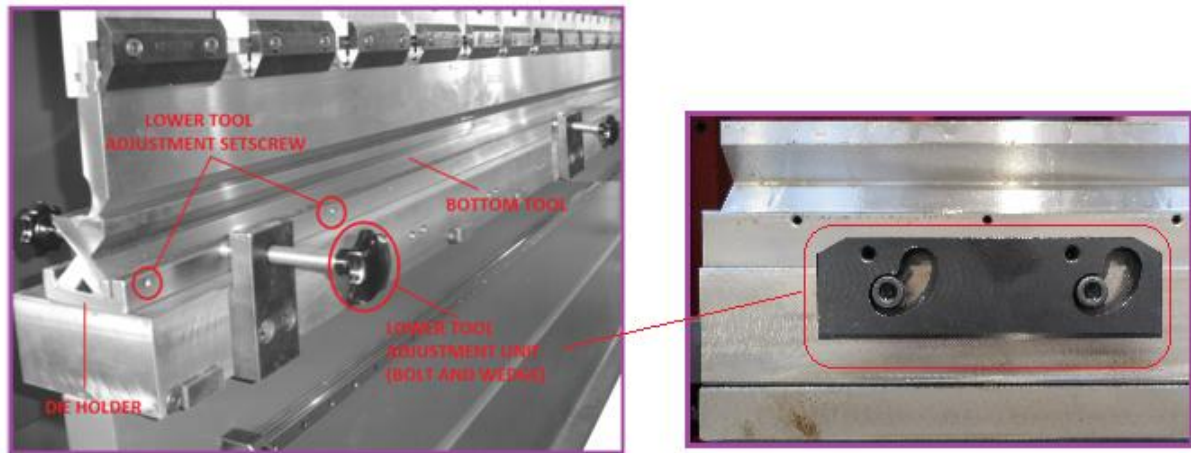


Figure-30: Lower tools adjustment parts.

2. If there is, Pull out the wedge (See Figure-31) from any side.

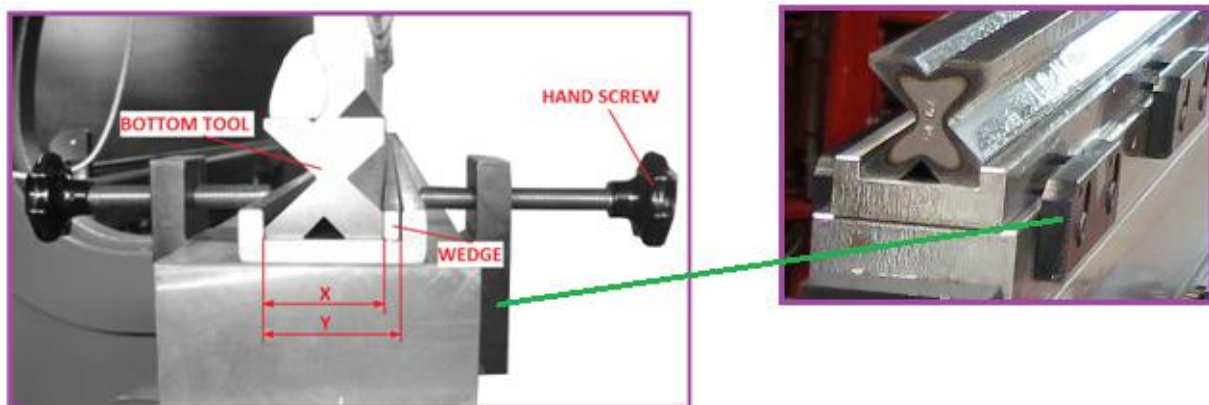


Figure-31: Changing the bottom tool1.1.b.

3. Pull out the tool from any side, and stock it by an appropriate lifting equipment.
4. Put on the new tool on die holder by means of a lifting equipment. Place the new bottom tool from any side.
5. Place the wedge in its place.  
**⚠** If the X value (width of the bottom tool) is larger than width of the removed tool, you should change the wedge also.
6. Tighten up the lower tool adjustment setscrews along the die holder.  
**⚠** If the X value (width of the bottom tool) is greater than width of the inner width (Y) of the die holder, you should change the die holder also.

#### In order to change the die holder;

After removing the bottom tool,

1. Loosen up the hand screws (lower tool adjustment unit bolt and wedge ) in both sides of the machine (See Figure-31).
2. Change the die holder with a new one.
3. Tighten up the hand screws(lower tool adjustment unit bolt and wedge ).



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### 7.2.1.2 - TYPE 2 :

#### 7.2.1.2.1.a - CHANGING THE TOP TOOL :

The top tool is fixed in its place as seen in (See Figure-32) below.

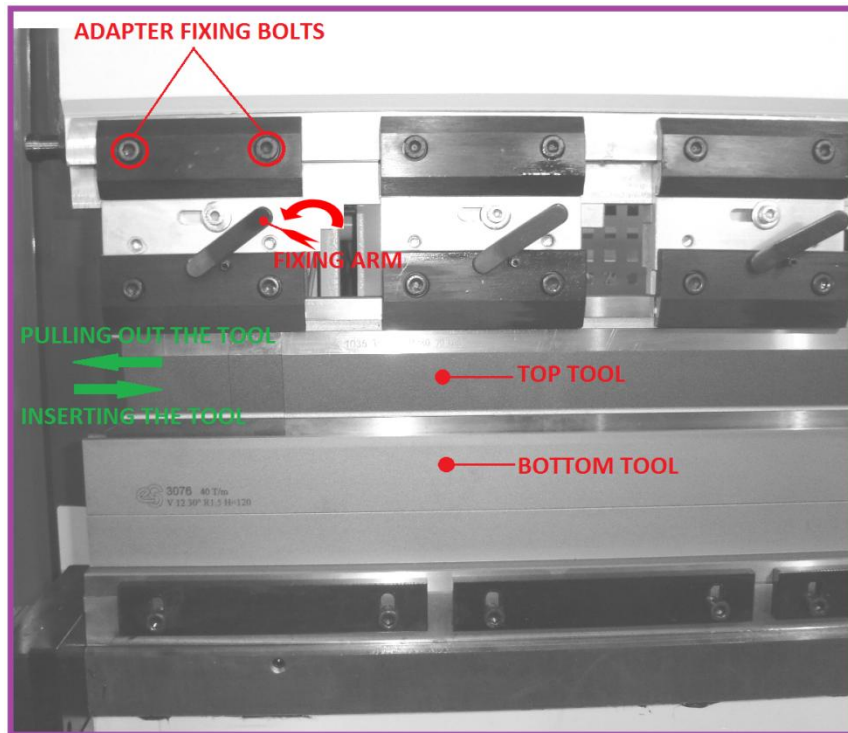


Figure-32: Changing the top tool 1.2. Type 2.

**⚠** *There is danger of top tool falling free if the tool fixing bolts are let loose excessively and also danger of top tool and adaptors assembly falling free if the adaptors fixing bolts are let loose. CHECK the bolts against any loosening periodically.*

1. Drop top beam on low pressure such that there is a clearance of approximately (1 mm) between top and bottom tools.
2. After stopping the main motor and switching off the main switch, let the top tool sit on the bottom tool "V" slowly by releasing the latch in the direction.
3. Pull out the top tool manually from the left side of the machine. Stock it using an appropriate lifting equipment. (If the tool is a sectional type, by hand)

**⚠** *You should release all latches along the beam so that you can pull out the top tool. (If the tool is not sectional type).*

4. Place the new top tool from any side.
5. Tighten up all fixing arms to fix the top tool.



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#### 7.2.1.2.1.b - CHANGING THE BOTTOM TOOL :

To replace the existing bottom tool with a new one :

1. Loosen up the fixing bolts (See Figure-33 and Figure-34) along the bed.

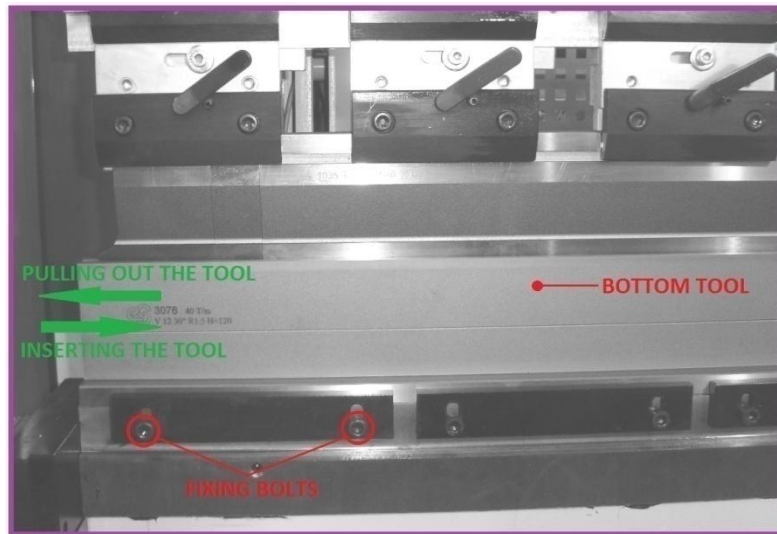


Figure-33: Changing the bottom tool 1.2.b.



Figure-34: Changing the bottom tool 1.2.b. fixing bolts on the bed.

2. Pull out the bottom tool (See Figure-33) from any side.
3. Put on the new tool on the bed by means of a lifting equipment (If you use pieced type of tools, by hand). Place the new bottom tool from any side.
4. Tighten up the fixing bolts along the bed.



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### 7.2.1.3 - TYPE 3 :

#### 7.2.1.3.1.a - CHANGING THE BOTTOM TOOL :

The bottom tool is fixed in its place as seen in (See Figure-35) below. In order to change the bottom tool, proceed the followings;

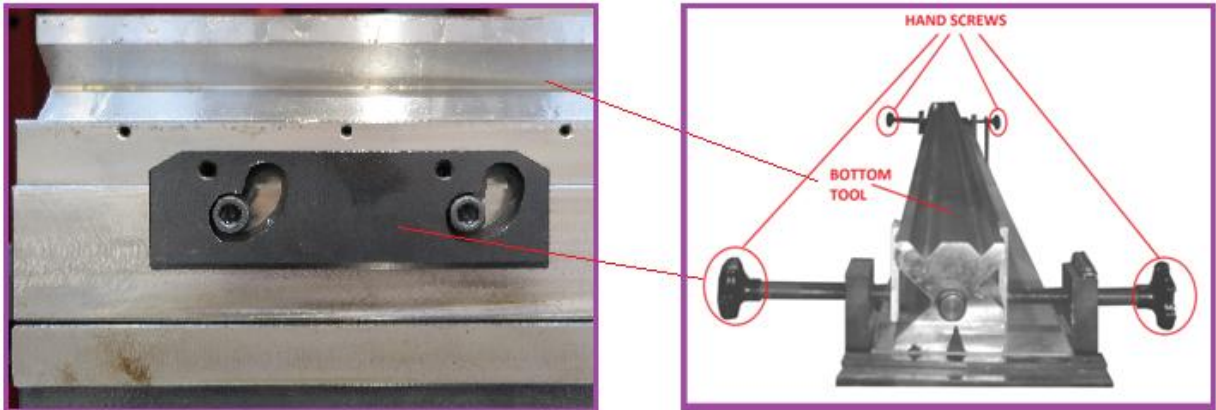


Figure-35: Changing the bottom tool1.3. Taype3.

1. Loosen up the hand screws in both sides of the machine (See Figure-35).
2. Remove the bottom tool using a lifting equipment.
3. Put on the new tool on the bed by means of a lifting equipment.
4. Tighten up the hand screws.

### 7.2.2 - HYDRAULIC CLAMPING :



### 7.2.3 – PNEUMATIC CLAMPING :



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#### 7.2.4 - TOP TOOL WEDGE ADJUSTMENT :

After long periods of usage it is natural that the top and bottom tools will be subject to some material deformation. Such deformations will make it difficult to obtain identical angles over the full bending length. If deformation is excessive, the tools require re-machining, in cases where deformation is not that serious, conical wedges in tile tooling system are utilised to offset angle differences.

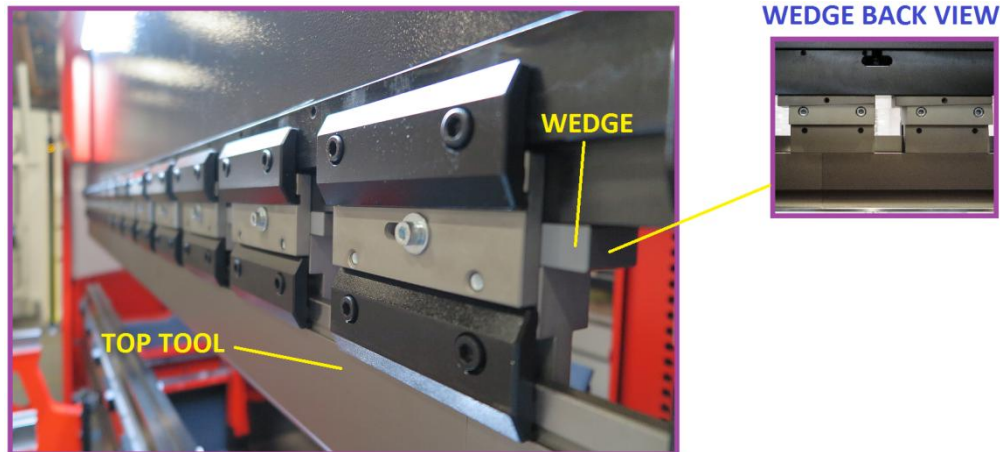


Figure-36: Top tool wedge adjustment view.

#### Wedges are adjusted as follows:

1. Identify the section on the top tool where bending angle shows a difference.

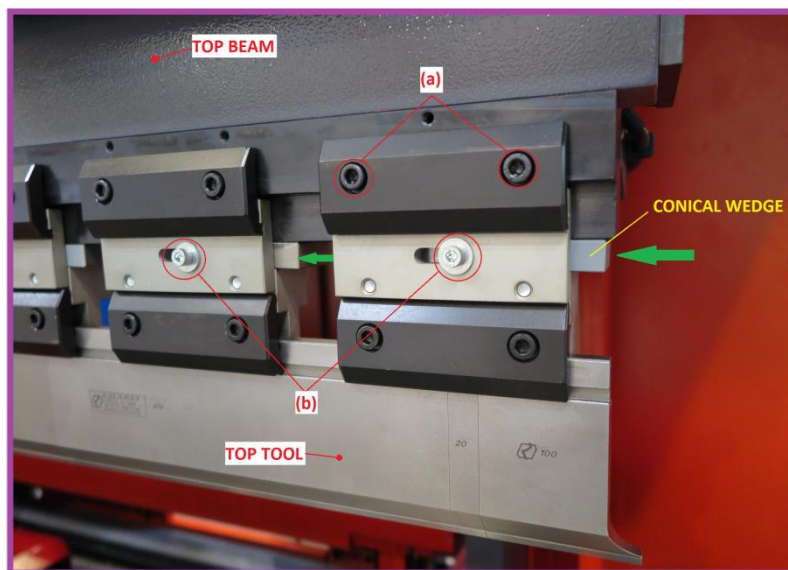


Figure-37: Top tool wedge adjustment parts.

2. Slightly loosen the cover plate(s) fixing bolts (See Figure-37 (a) and (b)) with approximate amount of  $y = 0.5$  mm.
3. Push the conical wedges in the direction of the green arrow to the extent of tool deformation. (See Figure-37).
4. Re-tighten the bolts (a) and (b) to fix the cover plate(s).
5. The same wedge adjustment should be carried out on the other sections of top tool where angle differences are noticed.



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### 7.3 - PRESSURE ADJUSTMENT :

The default value of valves limiting the pressure adjusted to be 110 % of the working pressure. The operator should not make any pressure adjustment on the distributor block in any case. The tonnage to be applied on the sheet is automatically calculated by the CNC controller as the thickness and the length of the sheet is entered to the CNC controller. **The operator should not make any pressure adjustments.**

### 7.4 - STROKE ADJUSTMENT :

The stroke is automatically adjusted by the machine according to the bending program.

### 7.5 - CENTERING THE BOTTOM TOOL :

Some tools may need to be centered after tool changing. A centering examples is explained below.

**⚠** Make sure that working mode selector position switch on command panel is in **Position " 1 " (Foot Slow (Adjust) Mode)** (Manual mode) during the following procedures.

Bottom tool is fixed on the top beam by means of holders and bolts. It can be reversed if necessary. To align top tool with appropriate " V " groove on the bottom tool, proceed as follows:

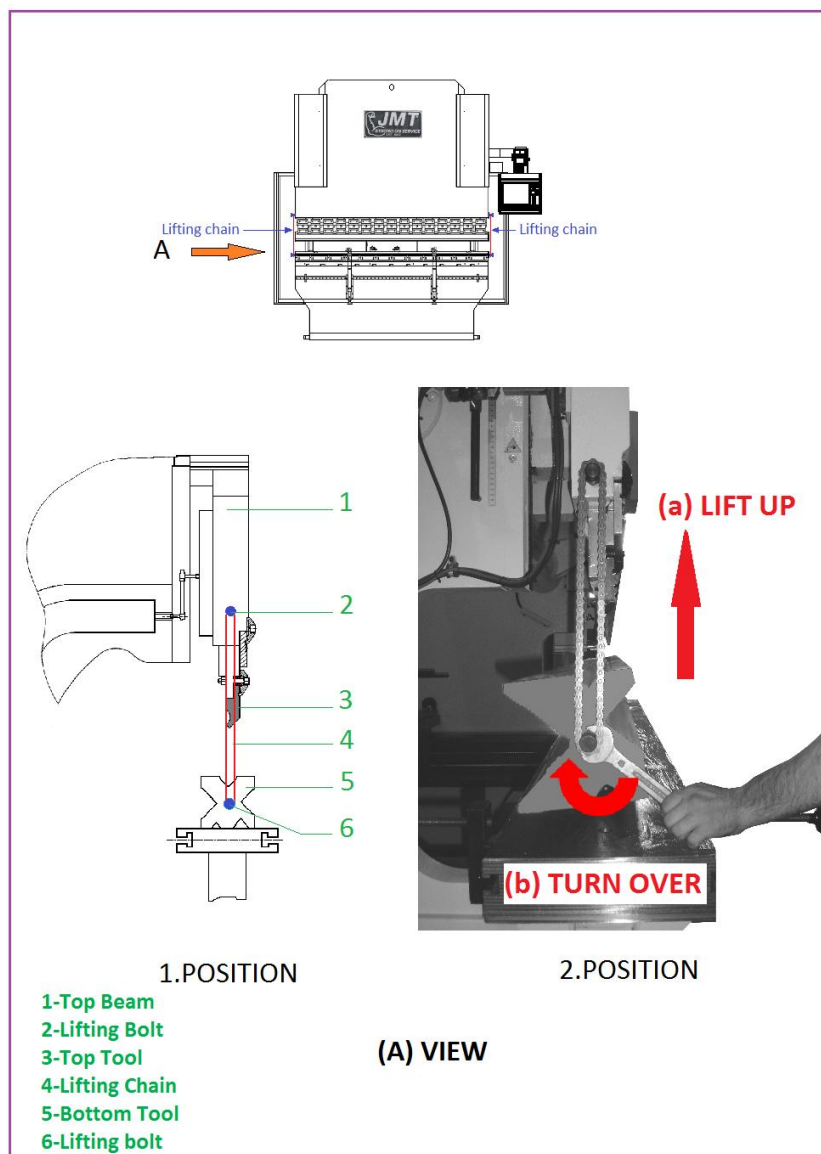


Figure-38: Centering the bottom tool.



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1. Lift up the bottom tool from the both sides by means of top beam power using the chains (See Figure-38) provided on both sides of the machine.
2. Select the desired vee by turning over the tool using wrench (See Figure-38 view A 2.position).
3. Place back the bottom tool by roughly centering it on the table (See Figure-39).

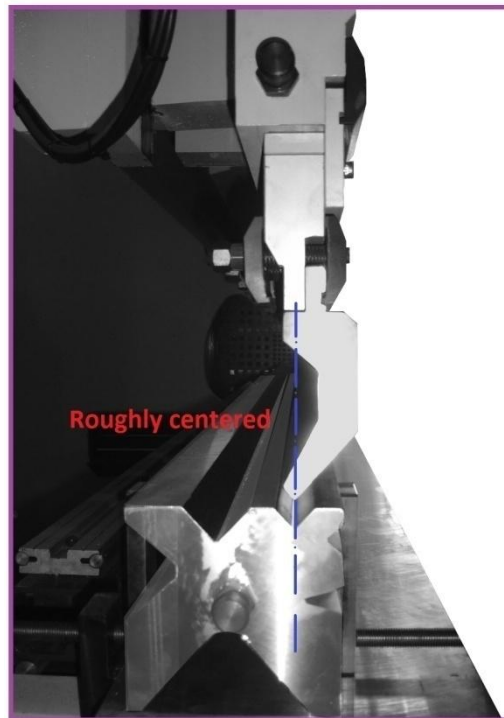


Figure-39: Roughly centered.

4. Descend the top beam, in position switch on command panel is in **Position " 1 " (Foot Slow (Adjust) Mode)** (Manual mode) using the right pedal.

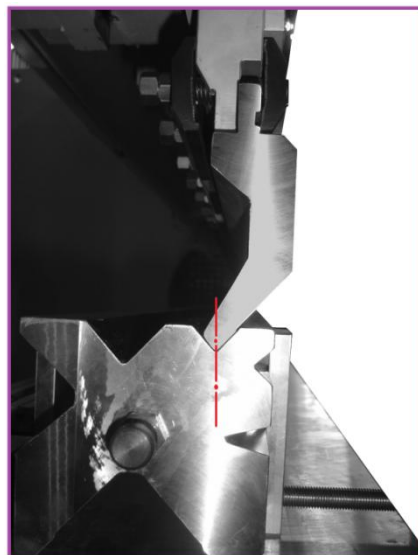


Figure-40.a

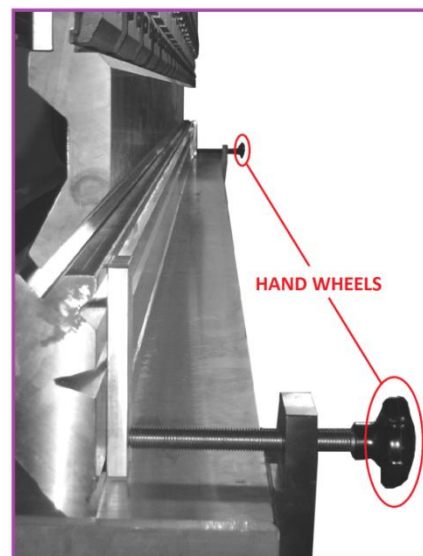


Figure-40.b

Figure-40: Centering and fixing bottom tool.

5. Stop the machine after alignment, and use the hand screw clamps to fix the bottom tool in this location.(See Figure-40).



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## 7.6 – BACKGAUGE ADJUSTMENT :

### 7.6.1- TWO AXES BACKGAUGE CONNECTIONS :

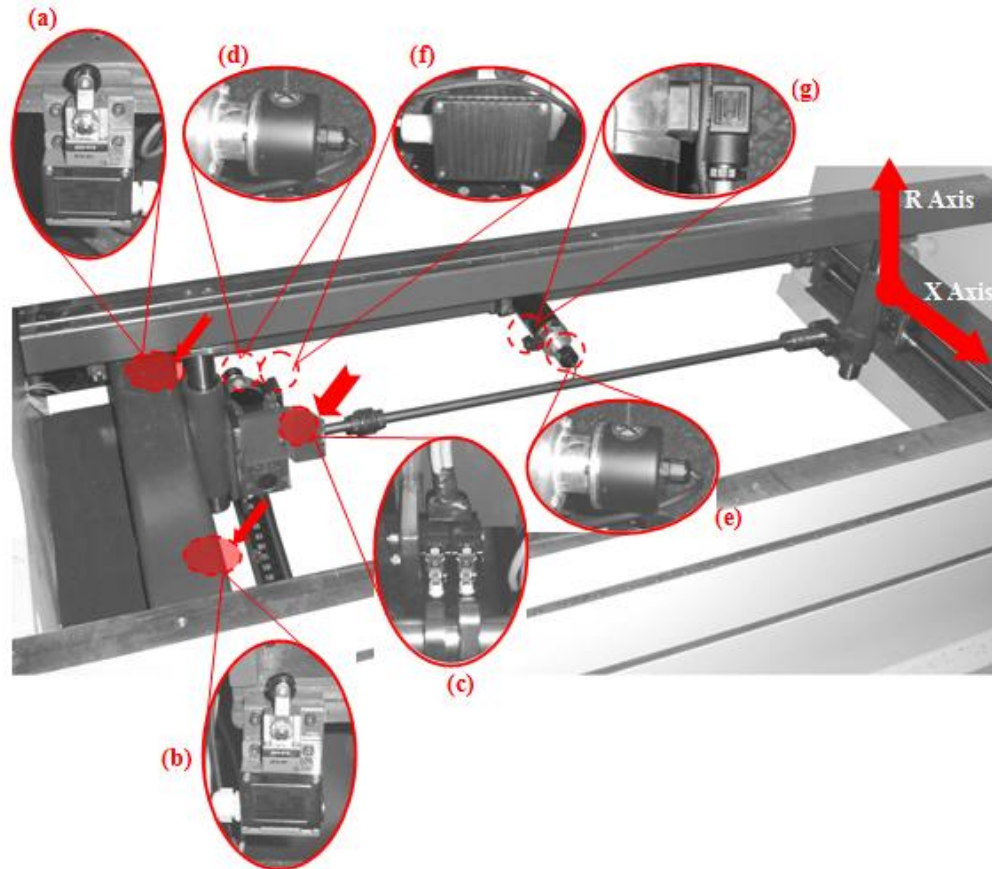


Figure-41

**NOTE -1.** All connections are covered by cover plates. When you need to see these connections, you should remove the plates.

**NOTE -2.** This picture was taken from the front of the machine.

| Mark | Label(Electr.Diag) | Designation        | Description                                                                                                                 |
|------|--------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------|
| (a)  | 4SX+               | Limit switch       | Limit position of X axis movement in the positive direction                                                                 |
| (b)  | 4SX-               | Limit switch       | Limit position of X axis movement in the negative direction and is also reference switch for X axis.                        |
| (c)  | 4SR+ and 4SR-      | Limit switches     | Limit positions of R axis movement and the switch (Right hand side in the picture) 4SR- is the reference switch for R axis. |
| (d)  | 12B1               | Encoder connection | R axis encoder connection. Encoder supplies feedback of the axis position                                                   |
| (e)  | 13B1               | Encoder connection | X axis encoder connection. Encoder supplies feedback of the axis position                                                   |
| (f)  | 13M1               | Power connection   | This is the motor power connection to drive R axis. R axis servo drivers is connected to motor power input (13M1)           |
| (g)  | 12M1               | Power connection   | This is the motor power connection to drive X axis. X axis servo drivers is connected to motor power input (13M1)           |



## 7.6.2- BACKGAUGE X,R,Z AXES ADJUSTMENT :

1) Backgauge X axis adjustment realize from CNC command panel. (See Figure-42).

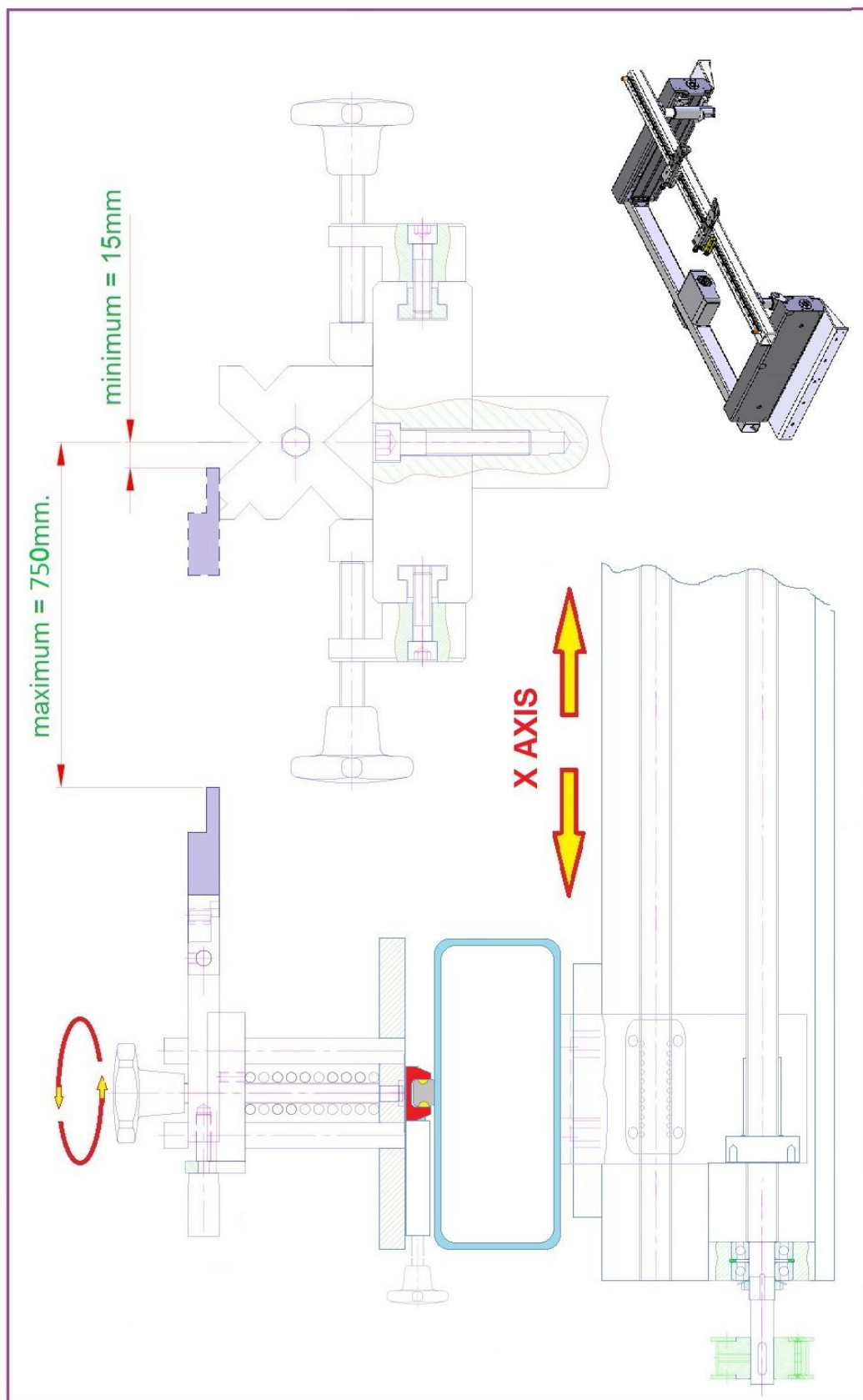


Figure-42: X Axis movement distance of backgauge fingers.



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**2) R axis adjustment** realize by manual. You can adjust the R axis level by turning the handwheel. (See Figure-43) .

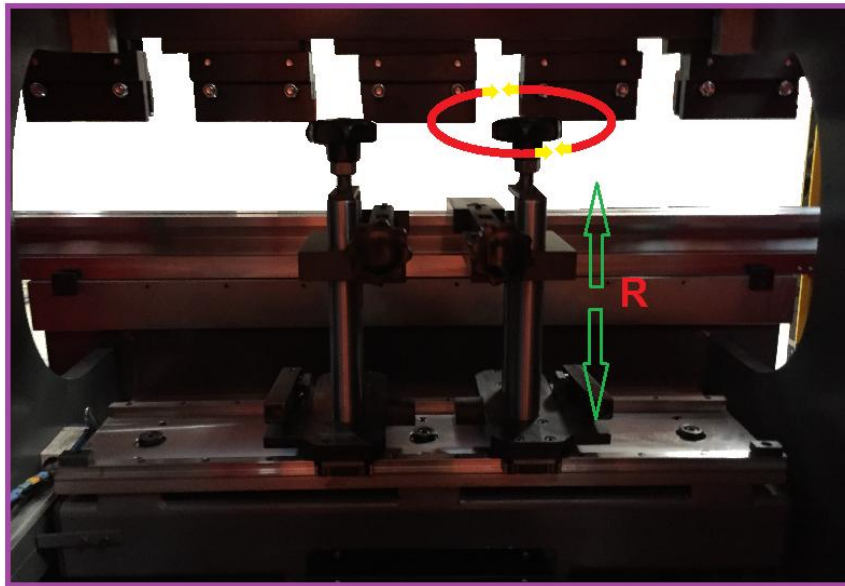


Figure-43: R axis adjustment realized by manual.

**3) Z axis adjustment** realized by manual. Insert the bar number 1 in the slot 2 as shown below and press the bar number 1 in the down direction to open the braking system. Adjust the Z axis by scrolling right and left while the lever is pressed down. When you have completed the adjustment process, lift the arm upwards and remove it from its place. Z axis will lock itself with spring force. (See Figure-44) .

**⚠ Warning:** This operation can be done from the front side of some of our machines and from the back side of some of our machines.

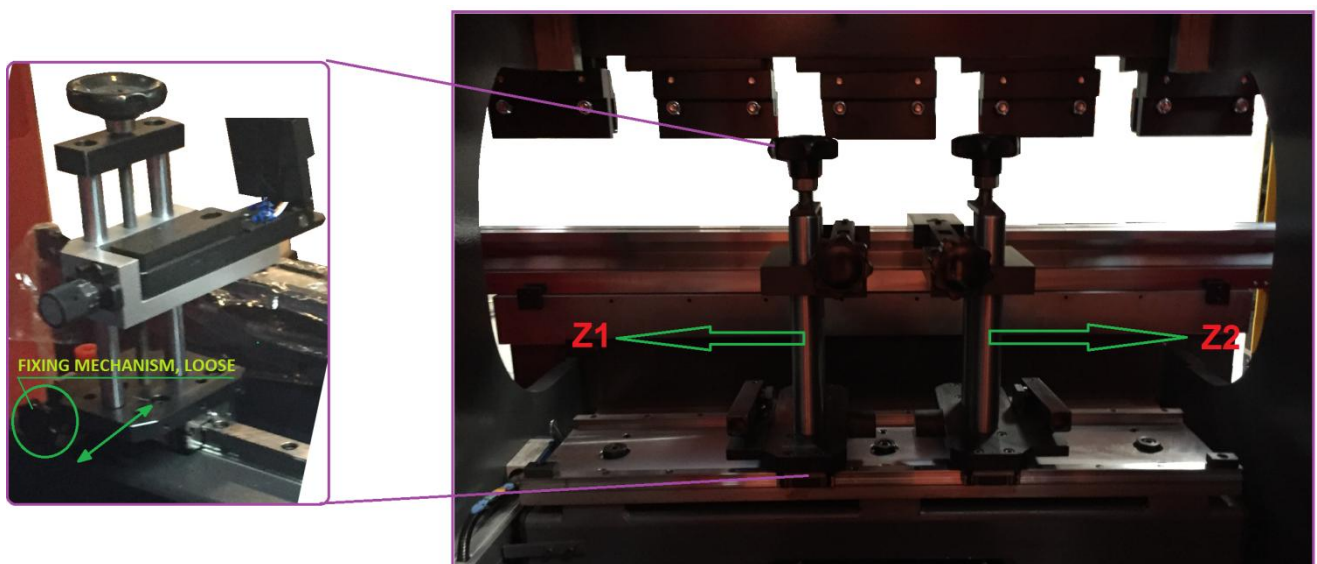


Figure-44: Z axis adjustment realized by manual.



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## 7.7 - Y1-Y2 CONNECTION CONTROL :

Y1-Y2 connection control is achieved when the ram is in the upper position. While this adjustment is being made, place a wedge between the lower and the ram.

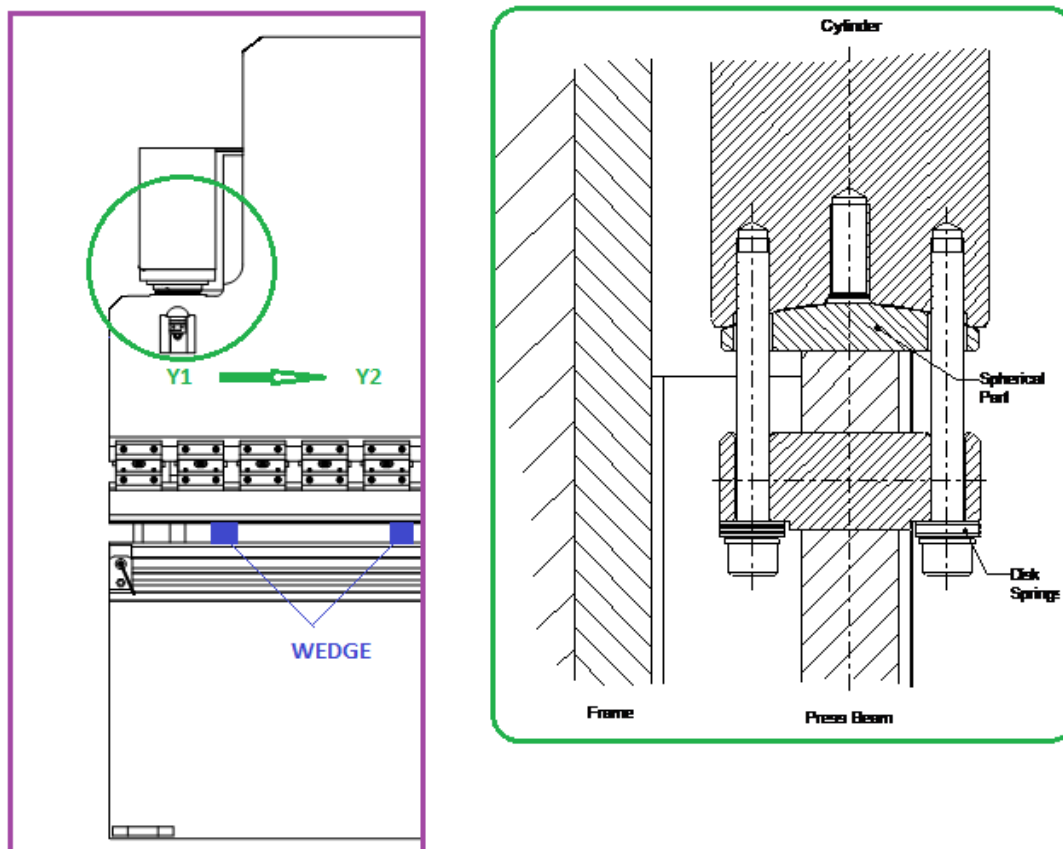


Figure-45

Monthly adjustments of the connections between the ram and cylinder may loosen due to high pressure and vibrations during operation.

Ram and cylinder connection must be made by following these process steps:

- When the ram is in the upper point, remove the right and left cylinder casing covers on the cylinder.
- Check if the cylinder connection flange (See Figure-45) is loose or tight.
- If it is loose, the ram is pressed inside the lower tool with a value equal to half of the maximum tonnage. Afterwards (see figure 35 #1) the space of the bolts must be eliminated and they must be tightened. Be sure that both of the cylinder connection bolts are tightened at equal values. Otherwise, the sledge adjustment and the adjustment of the tool axes will change.
- Test the hanger mechanism by displacing the ram.
- Put the covers back in place.
- Note: During the pressing of the ram, be sure that the crowning value is zero.



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## 7.8 – CENTRALLY ADJUSTABLE CROWNING SYSTEM (OPTIONAL) :

When the hydraulic cylinders of the press brake are mounted at either end, the centre is not supported. This leads to the curvature which a crowning table can even out.

A press brake deflects slightly during bending (concave sagging). This causes the top tool to penetrate less deeply into the lower tool in certain areas because the distance between the upper and lower beam of the press brake increase by elastic deformation (**See Figure- 46 as indicated by Y and Z in the diagram**). Without the correct amount of bed deflection compensation by crowning (convex correction to amount of sagging) it would mean that the upper and lower tools would not remain parallel during bending.

The result would be that the angle of the bent product would vary over the bending length as shown in the above drawing,  $\alpha_1$ ,  $\alpha_2$ ,  $\alpha_3$ .

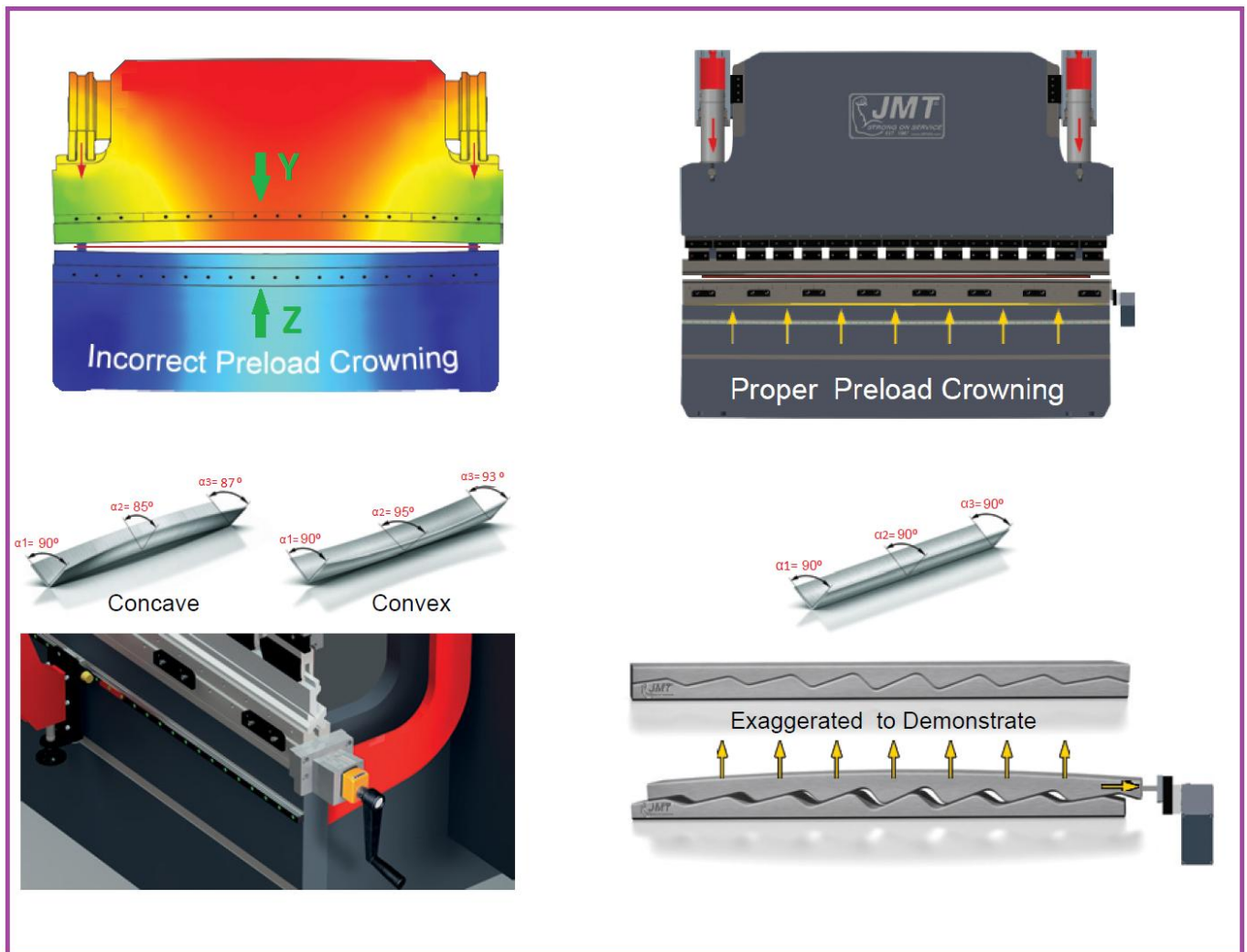


Figure-46: Centrally Adjustable Crowning System (Optional).



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**Common conventional crowning methods are:**

- Local shimming of the bottom tools with paper or brass strips to build up the bottom tool in those areas where there is concave sagging.
- Machining a convex crown into the lower beam, tool holder or tool.
- Making localized convex corrections by hand at various points throughout the upper or lower beam by adjustable holders.

These methods of crowning are, however, very labor-intensive, not very flexible, difficult to repeat, and result in a significant loss of production time.

The **CNC** or **Manuel Crowning** devices (See Figure-47) compensate the deflection of the press brake quickly and accurately.

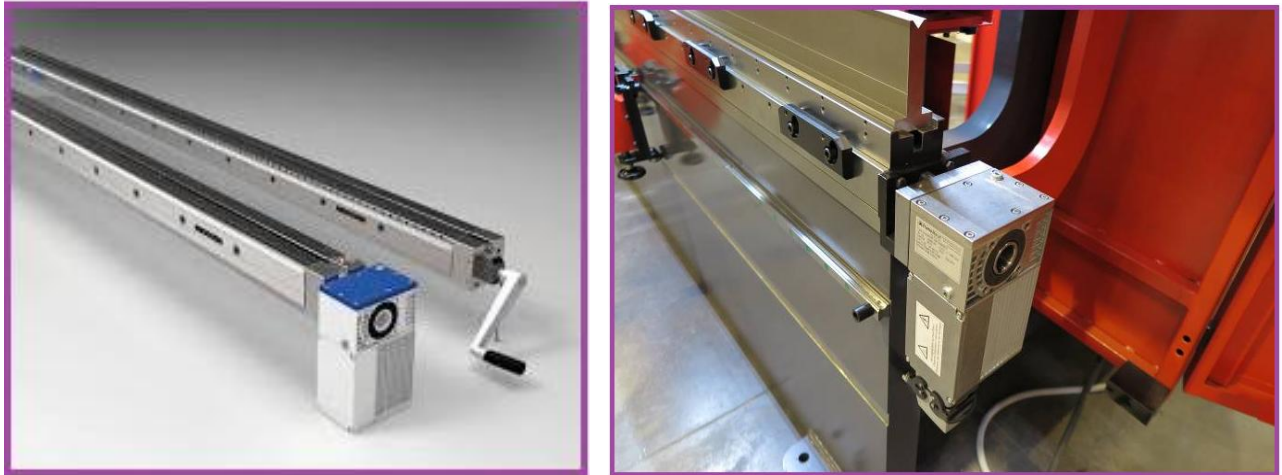


Figure-47: The CNC or Manuel crowning devices.

CNC crowning will automatically adjust the crowning parameters according to the material thickness and the tool elasticity on CNC unit. For detailed and technical information about cnc centrally adjustable crowning system, please see related manual in AUXILIARY DOCUMENTS Files.

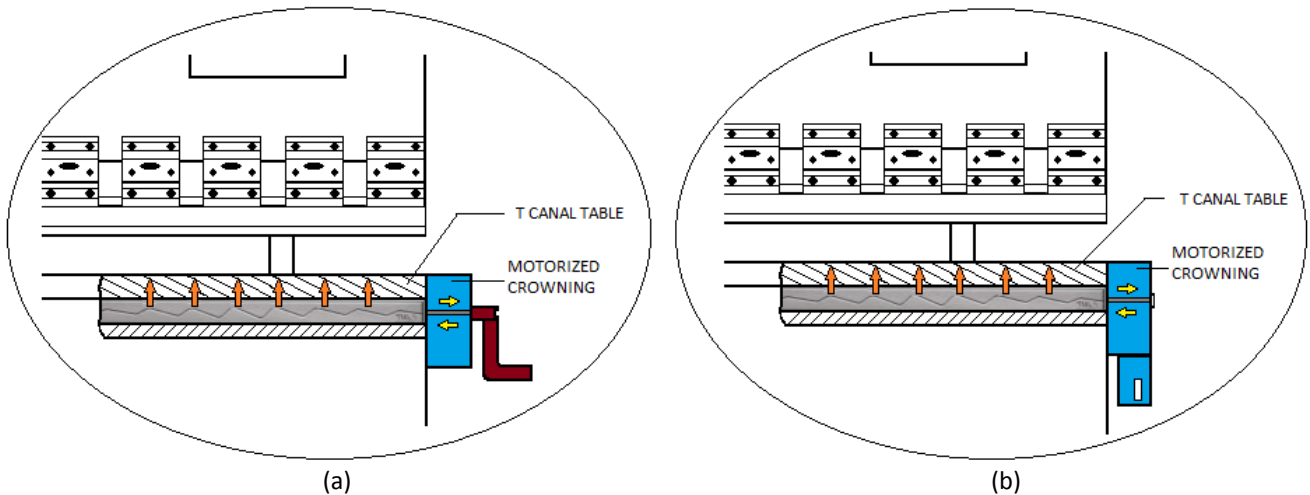


Figure 48: The CNC or Manuel crowning devices shown on the machine.

**⚠️ ANTI DEFLECTION SYSTEM: Motorized crowning system unit is driven by CNC control unit(a) .But manual crowning is done by turning a manual arm on manual system (b).**

### Manuel Crowning devices information:

The arm on the right of the machine in the crowning system is adjusted to 0 in our factory.

The ridge increases if the turning arm is rotated counter-clockwise (towards left). The ridge decreases if it is rotated clockwise (towards right).

The numarator must be operated between values 0 – 100. For the values between 0 – 100, in 0, a ridge of 0 mm and in 100 (for a length of 3 meters), a ridge of 3 mm is formed in the middle. With respect to various sheet thicknesses, the user must find the most suitable crowning value by applying it himself.

The dimension between the lower and the upper points of the crock springs in the connection bolts of the crowning system is as mentioned in the table. This value is adjusted according to the values between 0 – 100. The table values must be checked in periodical maintenances. (See Figure-49).

**⚠** During transportation, the turning arm is dismantled in order not to be damaged. When the machine is commissioned, the arm must be placed into its slot and the set screw must be aligned with the hole on the numerator spindle and it must be tightened. Thus, the arm is fixed.

While there is pressure in the machine, do not realize adjustment. This may lead to a breakage in the piece.

When the crowning is 0, the adjustment must be realized as follows;

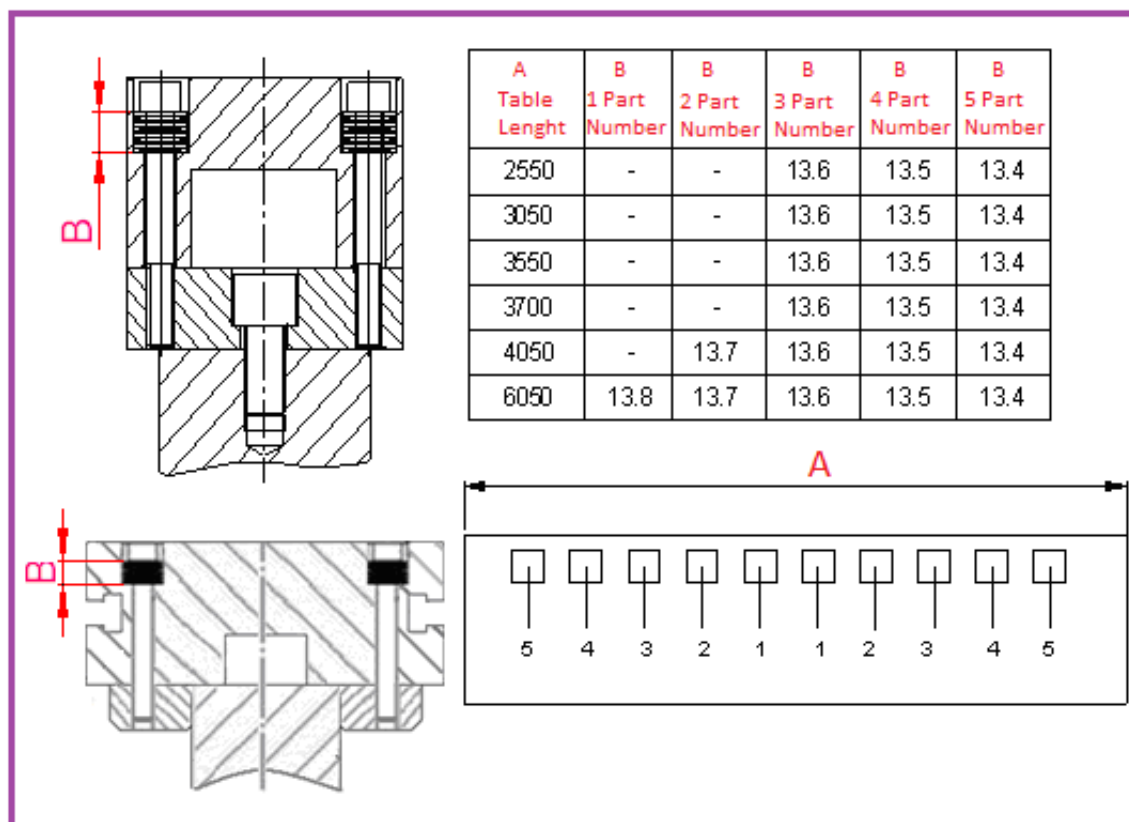


Figure-49: Dimensions of the crowning system.

**⚠ NOTE:** Do not intervene with the crowning. If there is a problem, consult the authorized service.



## 7.9 – MAINTENANCE & INSPECTIONS :



- Before maintenance depressurized the hydraulic system.
- All of the maintenance processes must be realized when the upper table is in the lower point.
- All of the electrical connections should be disconnected before all of the maintenance processes.
- The lubrication points (Figure-50....56 and Figure-57) should be lubricated at the frequencies illustrated in the lubrication (See Table 15/16/17) under normal operating conditions.
- If the machine is not to be operated for a long time, the surfaces which have tendency to be rusted should be lubricated with a protective lubricant.
- The oxidized burrs and the pieces which come out of the sheet during sheet bending may corrupt the tools by attaching the lower and the upper tools operating surfaces. Therefore, the burrs must be cleaned regularly.
- If there is the reducers in the rear stop system must be lubricated by means of the lubricant illustrated in (See Table-18) after 2000 working hours.
- The lubricant used in the hydraulic must be changed after the first 500 working hours and afterwards, after each 2000 working hours. (See Table -19).
- If the machine is not operated continuously, if it is not used for 3 or 5 months and then it is used again, in such a case, the waiting duration of the hydraulic lubricant is taken into consideration. And this leads to a difference according to the mark and type of the lubricant used. In this case, the company which provides the hydraulic lubricant should be contacted and the lubricant used in the machine should be tested. However, the sample lubricant that is to be taken for test from the machine should be taken after the machine is operated for at least 1 hour. The unit that realizes the test examines the standard lubricant characteristics and the sample lubricant values and according to the test result, the unit will declare that this lubricant is appropriate for usage or the unit will declare that the lubricant can not be used. As a result of the test, a 'NAS' contamination value is obtained. The NAS value of the lubricant used in the machine should be lower than 9. NAS 7 is a suitable value.
- The hydraulic flexible hoses lifetime about five years. The hydraulic flexible hoses should be changed regularly every five years.

### 7.9.1 - TYPE AND FREQUENCY OF INSPECTIONS :

As long as the machines are available, maintenance and inspections must be carried out in certain periods. Checks and maintenance should be carried out according to the following table. (See Table-16/17).

| Inspection                                          | Period                    | Responsibility |
|-----------------------------------------------------|---------------------------|----------------|
| Lubrication                                         | See : Lubrication Diagram | Operator       |
| Oil leakage in cylinders                            | Daily                     | Operator       |
| Lubrication of tooling                              | Daily                     | Operator       |
| Guards against any physical damage                  | Daily                     | Operator       |
| Oil leakage in pipes, hoses and hydraulic elements  | Weekly                    | Operator       |
| Hydraulic oil level in the hydraulic tank           | Weekly                    | Operator       |
| Cylinder connecting bolts against loosening         | Weekly                    | Operator       |
| Looseness of cylinder-foot connection bolts         | Weekly                    | Operator       |
| Safety & limit switches against loosening, damage   | Weekly                    | Operator       |
| Slide adjusting bolts                               | Weekly                    | Operator       |
| Top & bottom tool adjustment and fixing bolts       | Weekly                    | Operator       |
| Stop time control                                   | Every 6 months            | Operator       |
| Terminal connections of the electrical installation | Annually                  | Electrician    |

Table 15: Type and frequency of inspections.



7.9.2 -THE LUBRICATION AND LUBRICANT POINTS :

7.9.2.1 - THE LUBRICATION AND LUBRICANT POINTS SHOWN ON SCHEMA :

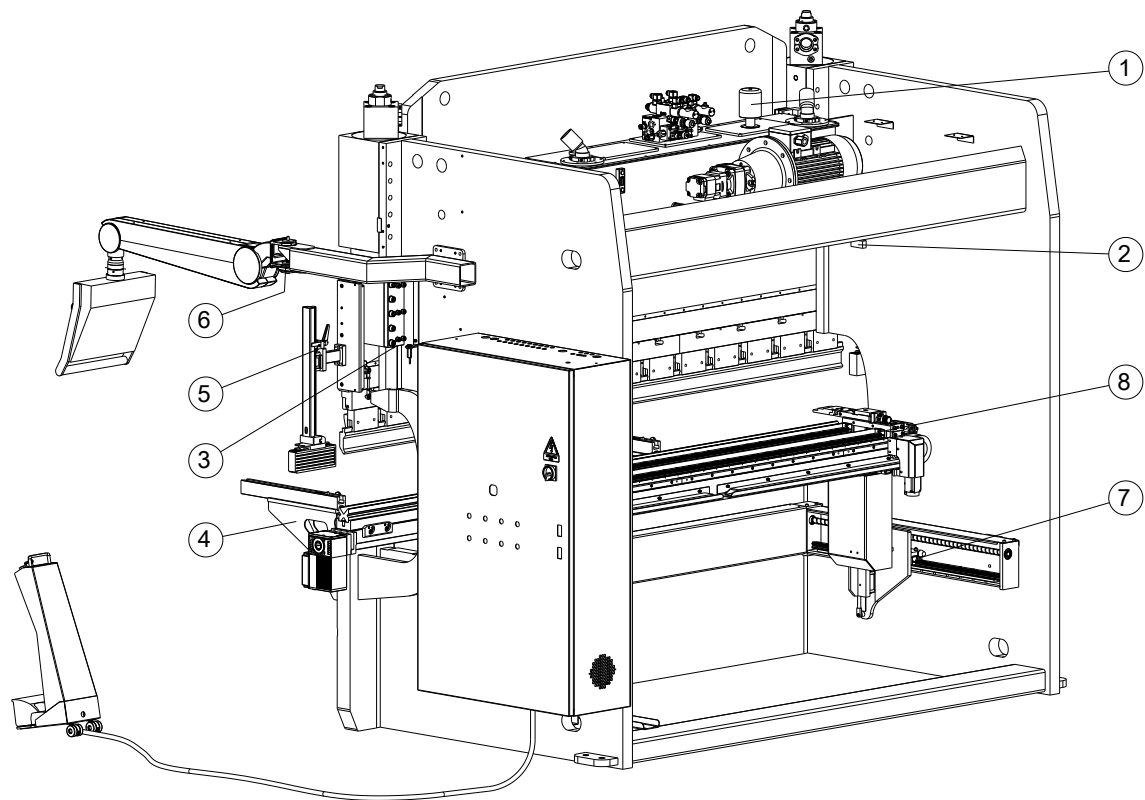


Figure-50

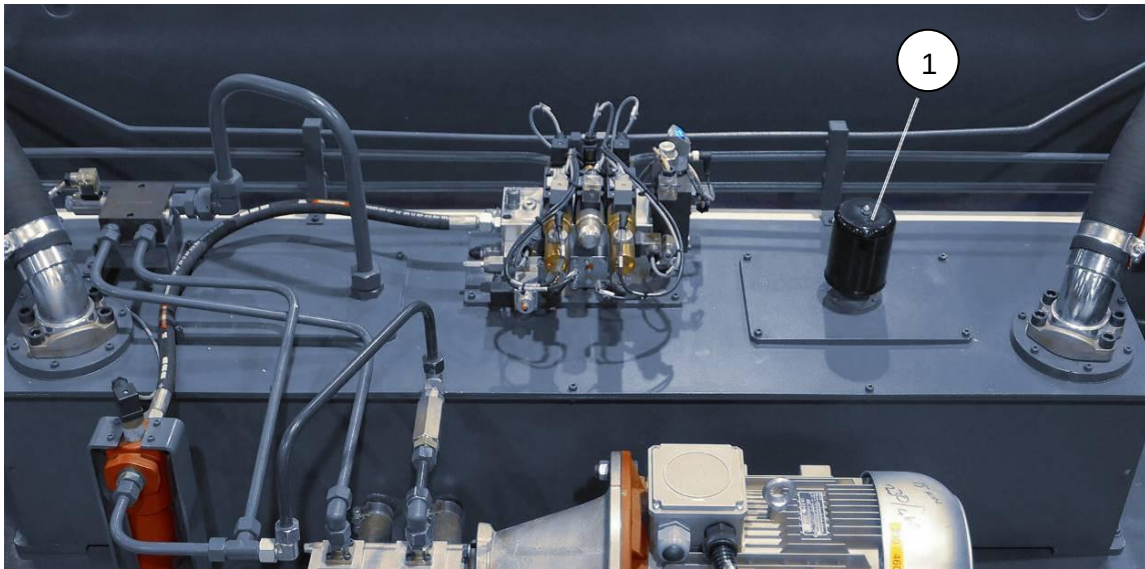


Figure-51

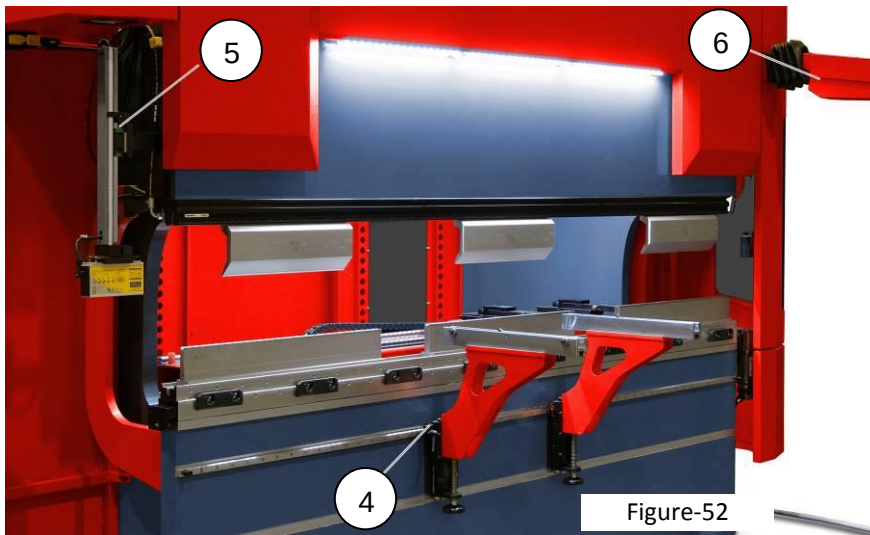


Figure-52

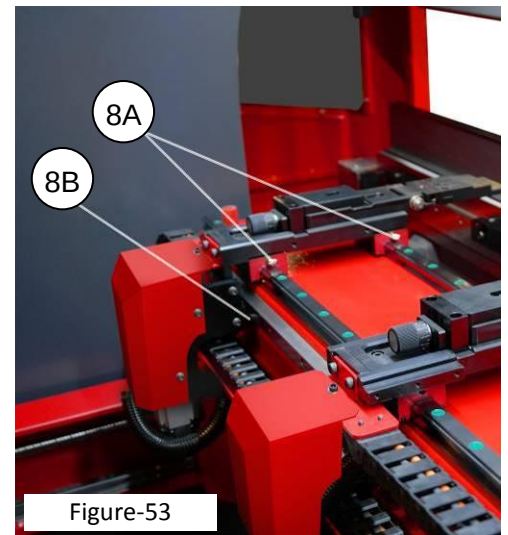


Figure-53

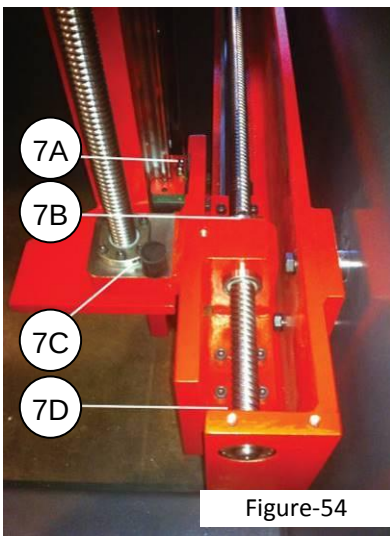


Figure-54

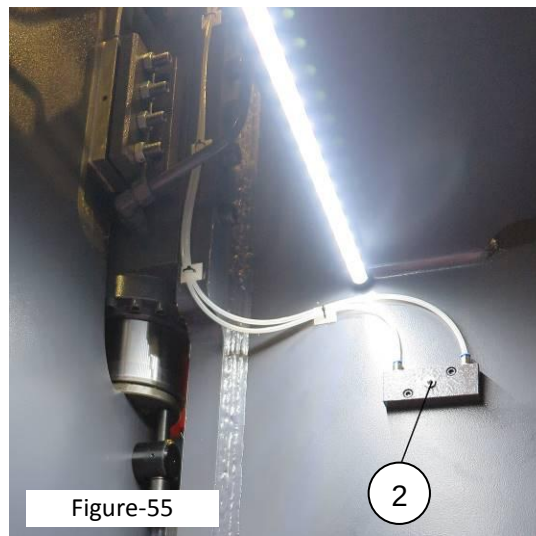


Figure-55

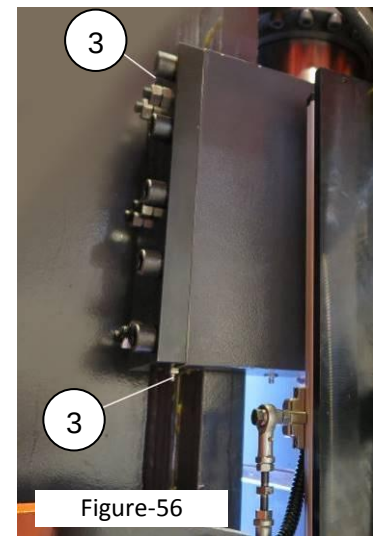


Figure-56

| NO | QTY | LOCATION IN THE MACHINE      | FREQUENCY             | LUBRICANT TYPE   |
|----|-----|------------------------------|-----------------------|------------------|
| 1  | 1   | Hydraulic Tank               | Change 2000 hrs/1 yr. | Iso Vg32 – Vg 46 |
| 2  | 2   | Y1-Y2 Upper Slideways        | Once in a week        | Speedol Epx-2    |
| 3  | 4   | Y1-Y2 Lower Slideways        | Once in a week        | Speedol Epx-2    |
| 4  | 2   | Front Arm Guide Block        | Once in a week        | Speedol Epx-2    |
| 5  | 2   | Safety Laser Arm Guide Block | Once in a week        | Speedol Epx-2    |
| 6  | 1   | Control Unit Arm             | Once in a week        | Speedol Epx-2    |
| 7A | 4   | R1-R2 Guide Block            | Once in a week        | Speedol Epx-2    |
| 7B | 2   | X1-X2 Ball Screw Nut         | Once in a week        | Speedol Epx-2    |
| 7C | 2   | R1-R2 Ball Screw Nut         | Once in a week        | Speedol Epx-2    |
| 7D | 4   | X1-X2 Guide Block            | Once in a week        | Speedol Epx-2    |
| 8A | 4   | Z1-Z2 Guide Block            | Once in a week        | Speedol Epx-2    |
| 8B | 1   | Z1-Z2 Rack Gear              | Once in a week        | Speedol Epx-2    |

Table-16



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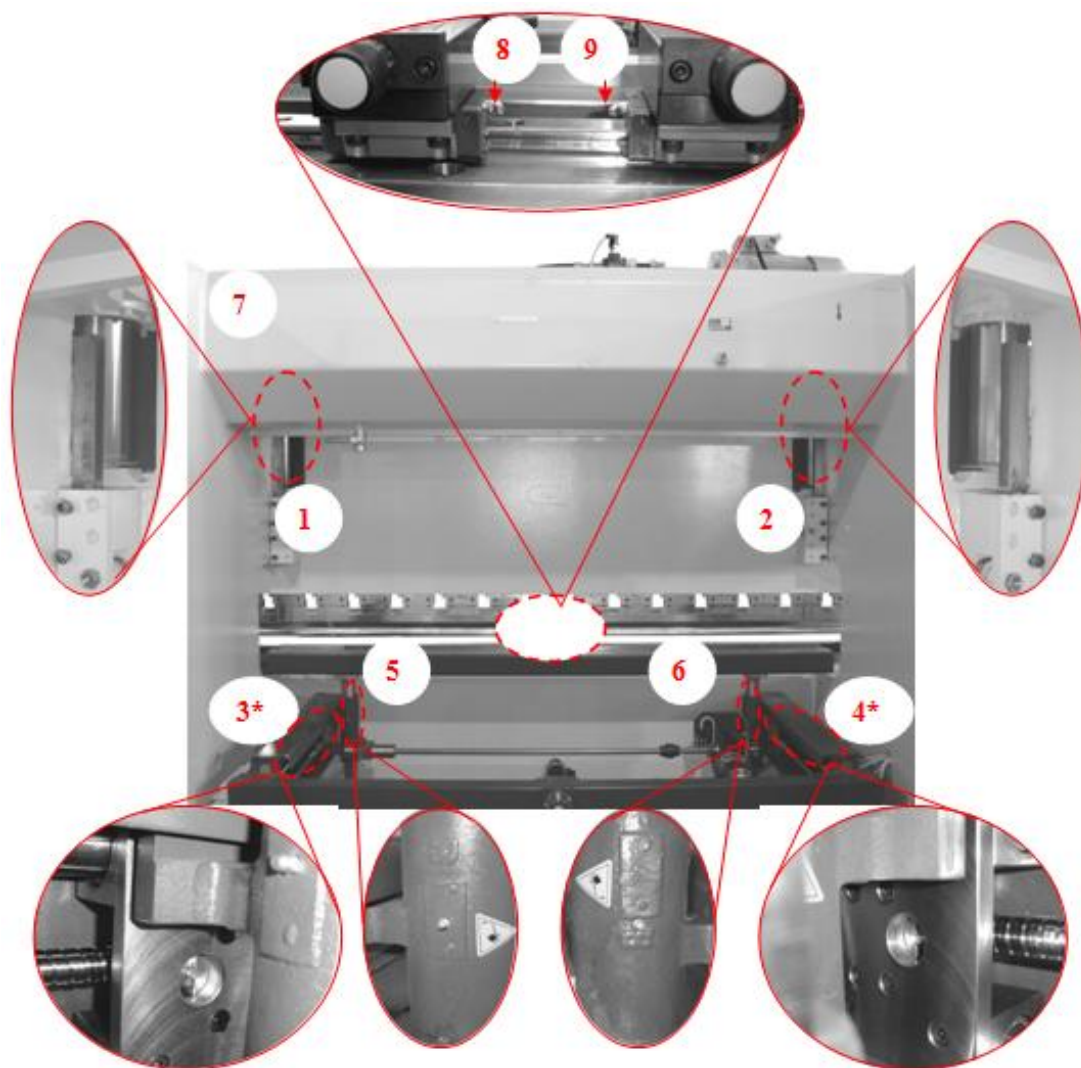


Figure-57

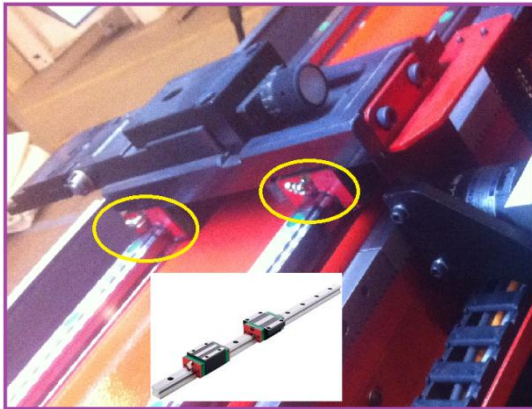
| PLACE OF LUBRICATION | NO                                                                  | NUMBER OF LUBRICATION SPOTS | OIL TYPE PREFILLED AT FACTORY | EQUIVALENT OIL TYPES | LUBRICATION PERIOD                                     |
|----------------------|---------------------------------------------------------------------|-----------------------------|-------------------------------|----------------------|--------------------------------------------------------|
| SLIDES               | 1,2                                                                 | 2                           | KAPGRES 2                     | -                    | 2 - 7 DAYS                                             |
| OIL TANK             | 7                                                                   | 1                           | $t < 10^\circ$ HLP 32         | RANDO OIL 32         | · MUST BE CHANGED AFTER FIRST <u>200</u> WORKING HOURS |
|                      |                                                                     |                             |                               | TELLUS 32            |                                                        |
|                      |                                                                     |                             | $t > 10^\circ$ HLP 46         | RANDO OIL 46         |                                                        |
|                      |                                                                     |                             |                               | TELLUS 46            |                                                        |
|                      |                                                                     |                             | $t < 10^\circ$ HLP 60         | RANDO OIL 68         | · NEXT CHANGE AFTE <u>1000</u> WORKING HOURS           |
|                      |                                                                     |                             |                               | TELLUS 68            |                                                        |
| BACK GAUGE           | 3,4,5,6,8,9                                                         | 6                           | GREASE NGL T2,265 / 295       | -                    | 100 working hour                                       |
| *                    | In order to lubricate points 3 and 4, remove the protection plates. |                             |                               |                      |                                                        |

Table-17

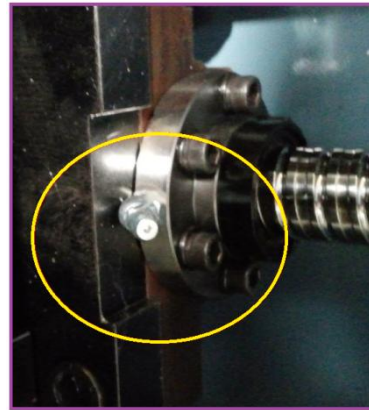


### 7.9.2.2 - GREASING APPLICATION POINTS :

Lubricate greasing areas according to below images a-b-c-d with proper oil.(See Table-16/17).



a) All linear guide bearings on the machine.



b) All axis ballscrew bearings on the machine.



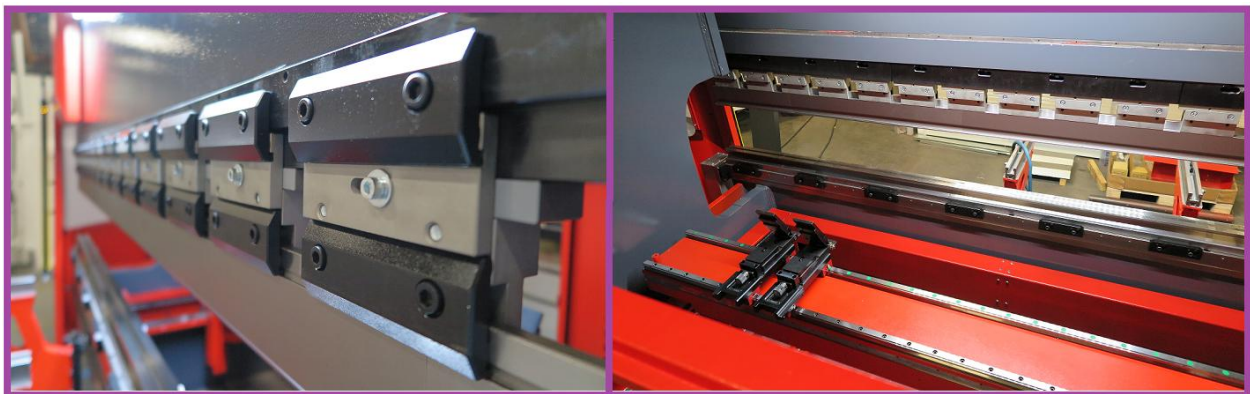
c) Bottom beam sledge on the machine.



d) Top beam sledge on the machine .

### 7.9.2.3 – PROTECTION LUBRICANT APPLICATION :

If the machine will stay offline in a long time, use protection oil for place that suitable to corrosion.(See image (e) ).



e)All metal surfaces on the machine that are not painted.



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### 7.9.3 - INFORMATION ABOUT THE LUBRICANT USED IN THE GEARBOXES :

You can choose the oil type ,the table below according to the ambient conditions for gear oil.(See Table-18).

| INDUSTRIAL PLANTS                                               |                            |                            |                                 |
|-----------------------------------------------------------------|----------------------------|----------------------------|---------------------------------|
| Type                                                            | ISO standart...EP grade    |                            |                                 |
| T <sub>a</sub>                                                  | -10° C / +30°              | -10° C / +45°              | -20° C / +60°                   |
|                                                                 | ISO VG 150                 | ISO VG 220                 | ISO VG 150-220                  |
| AGIP                                                            | BLASIA150                  | BLASIA220                  | BLASIA SX 220                   |
| ARAL                                                            | DEGOL BG 150               | DEGOL BG 220               | DEGOL PAS 150-220               |
| BP                                                              | ENERGOL GR XP 150          | ENERGOL GR XP 220          | EVERSYN EXP 150-200             |
| CASTROL                                                         | ALPHA SP 150               | ALPHA SP 220               | ALPHASYN 150-220                |
| CEPSA                                                           | ENGRANAJES HP 150          | ENGRANAJES HP 220          | ENGRANAJES HPX 150-220          |
| CHEVRON                                                         | N.L. GEAR COMPOUNDS EP 150 | N.L. GEAR COMPOUNDS EP 220 | TEGRA SYNTHETIC GEAR EP 150-220 |
| ESSO                                                            | SPARTAN EP 150             | SPARTAN EP 220             | SPARTAN S EP 150-220            |
| FUCHS                                                           | RENOLIN CKC 150            | RENOLIN CKC 220            | RENOLIN UNISYN CKC 150-220      |
| KLUBER                                                          | KLUBEROIL GEM 1-150        | KLUBEROIL GEM 1-220        | KLUBERSYNT EG 4-150 / 4-220     |
| Q8                                                              | GOYA 150                   | GOYA 220                   | EL GRECO 220                    |
| MOBIL                                                           | MOBILGEAR 600 XP 150       | MOBILGEAR 600 XP 220       | MOBILGEAR SCH XMP 150-220       |
| MOLYCOTE                                                        | L-0115                     | L-0122                     | L-2115 / L-2122                 |
| REPSOL                                                          | SUPER TAURO 150            | SUPER TAURO 220            | SUPER TAURO SINTETICO 150-220   |
| SHEEL                                                           | OMALA EP150                | OMALA EP220                | TIVELA OIL S                    |
| TOTAL                                                           | CARTER EP 1500             | CARTER EP 2200             | CARTER SH 150-220               |
| NOTE: Below -30° C and above +60°C,Special felt should be used. |                            |                            |                                 |

Table-18: Information about the lubricant used in the reducers.



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## 7.9.4 – HYDRAULIC SYSTEM :

Check the hydraulic oil level regularly. Clean the hydraulic circuit materials. During the control period, dust and dirt must not go through the hydraulic system. Change fuse, seals, damage and abrasion parts.

**⚠Warning:** On the hydraulic unit, the main pressure valve and secondary safety valve are adjusted to the maximum operating conditions in the factory. Do not change these adjustments by no means.

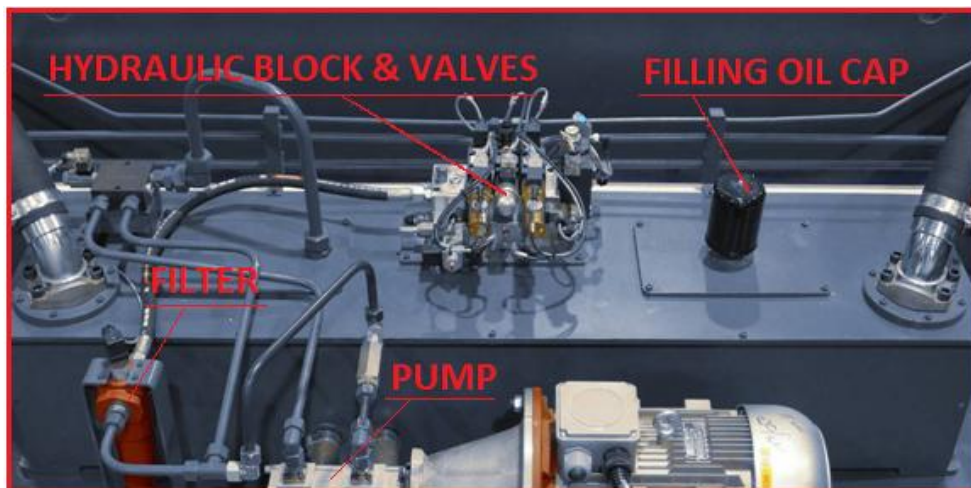


Figure-58: Hydraulic System .

### 7.9.4.1- SELECTION OF HYDRAULIC OIL TYPE :

You can choose the hydraulic oil type ,the table below according to the ambient conditions.(See Tabel-19).

| HYDRAULIC LUBRICANT | IF ENVIRONMENT TEMPERATURE IS LOWER THAN 20°C | IF ENVIRONMENT TEMPERATURE IS BETWEEN 20°C – 40 °C | IF ENVIRONMENT TEMPERATURE IS HIGHER THAN 40°C |
|---------------------|-----------------------------------------------|----------------------------------------------------|------------------------------------------------|
| Standard norm       | Iso Vg 32                                     | Iso Vg 46                                          | Hydro Oil Hd 68                                |
| Aral                | Vitan Gf 32                                   | Vitan Gf 46                                        |                                                |
| B.P.                | Hlp-Hm 32                                     | Hlp-Hm 46                                          | Hlp-Hm 68                                      |
| Caltex-Texaco       | Rando Oil 32                                  | Rando Oil 46                                       |                                                |
| Esso                | Nuto H 32                                     | Nuto H 46                                          |                                                |
| Purfin France       | Hydran 32                                     | Hydran 46                                          |                                                |
| Huile Renault-Elf   | Olna 32                                       | Olna 46                                            |                                                |
| Shell               | Tellus 32                                     | Tellus 46                                          | Tellus 68                                      |
| Valvoline           | Ultramax 32                                   | Ultramax 46                                        |                                                |
| Veedol              | Andrain 32                                    | Andrain 46                                         |                                                |
| Yacco               | Transhyd 32                                   | Transhyd 46                                        |                                                |
| Gulf                | Harmony 32 Aw                                 | Harmony 46 AW                                      |                                                |
| Castrol             | Aws 32                                        | Aws 46                                             | Hyspin Aws 68                                  |
| Mobil               |                                               |                                                    | Dte 26                                         |

Table-19: Hydraulic oil type selection.

No foam hydraulic oils are a blend of virgin base stocks which provide excellent natural seal swell characteristics. They possess anti-foaming and anti-rust properties. Excellent service is provided by these oils in light and medium duty hydraulic service.



#### 7.9.4.2 - CHANGING HYDRAULIC OIL :

The lubricant used in the hydraulic must be changed after the first 500 working hours and afterwards, after each 2000 working hours.

In time hydraulic oil may be dirty and worn out. In this condition, it has to be changed. Sedimentary, blurred oil has to be changed. Get the position switch to position "3". Go down the top beam. Place the top tool to bottom tool. Then cut the electricity current of the machine. To release the oil from the tank, locate a pot under the tank. Then by the help of a hose release the oil to the pot. To fasten the releasing, open one of the covers of the tank. Prevent the entrance of dust and dirt. After the releasing of the oil, clean the tank. Close the releasing the cover. Fill the quantity of the oil mentioned in the technical specifications of the machine into the tank (See Table-3).

Before the machine is installed, the required hydraulic lubricant should be filled until the levels reach the recommended levels as illustrated in the lubricant level display (See Figure-60).

##### Oil evacuate:

1. First remove the oil tank cap (Filling up point in Figure-59-a ).

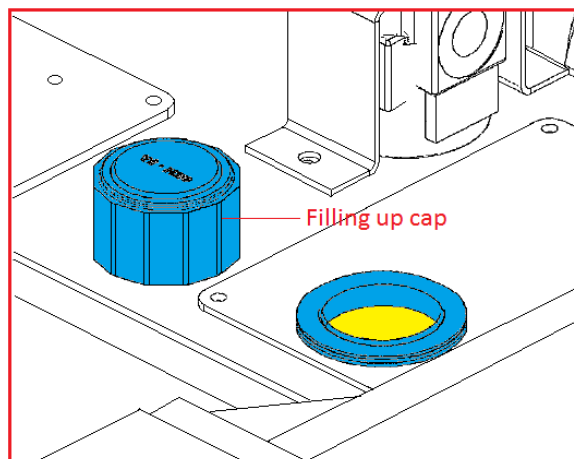


Figure-59-a:



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- Open the valve under the oil tank to drain out the old oil completely (Draining off point in Figure-59-b).  
Note: Insert a discharge hose to the valve cock to drain out old oil from oil tank to any tank.

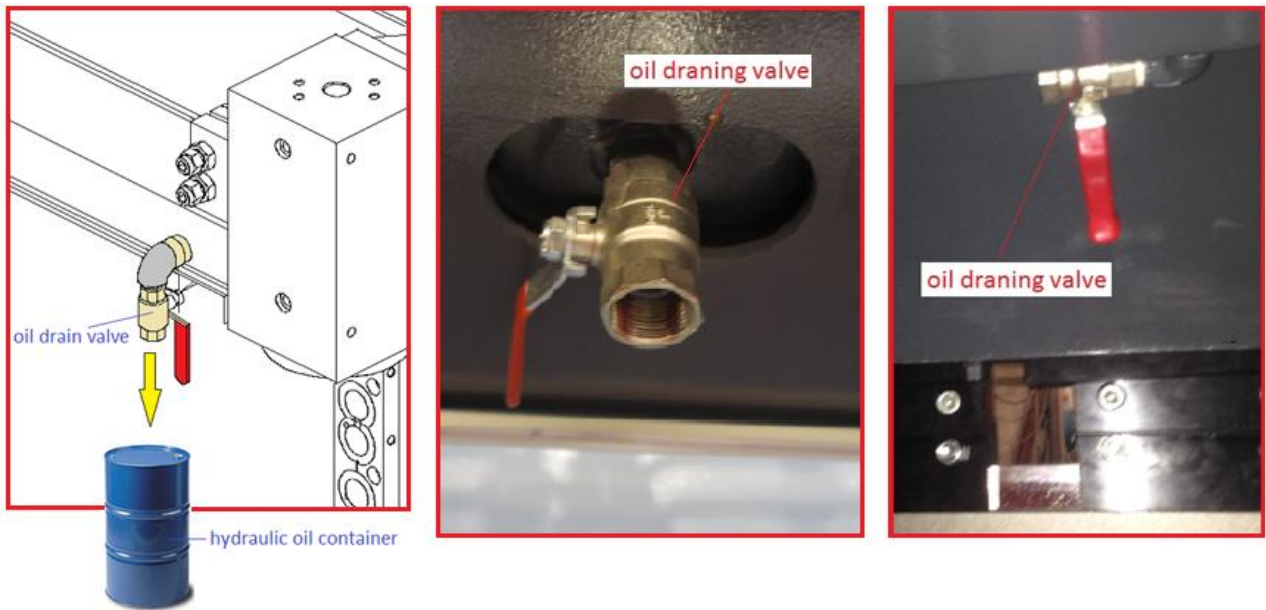


Figure 59-b:

Figure 59: Oil evacuate.

**⚠** When changing oil, keep the oil tank clean.

#### 7.9.4.3 - HYDRAULIC RESERVOIR LUBRICANT LEVEL DISPLAY :

##### 7.9.4.3.1- HYDRAULIC RESERVOIR LUBRICANT LEVEL DISPLAY(SATNDART) :

The hydraulic reservoir lubricant level display which is used at the same time as a thermometer should be filled with lubricant until the 100° C line. When the lubricant level falls below the 40° C line, lubricant addition to the hydraulic reservoir should certainly be realized.

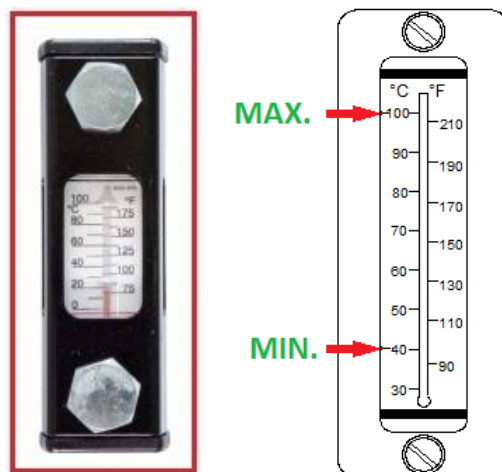


Figure 60: Oil level and temperature indicator standard.



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#### 7.9.4.3.2 - HYDRAULIC RESERVOIR LUBRICANT LEVEL DISPLAY WITH SWITCH (OPTIONAL) :

Hydraulic depot lubricant level display stops the system in case the lubricant level drops below 50 mm as in (Figure-61). In the operator panel it will show a Low Lubricant Level alarm. When this happens, lubricant should be added to the tank.

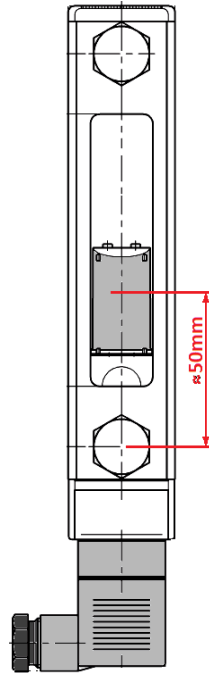


Figure-61: Oil level and temperature indicator with switch.

#### 7.9.4.4 - CHANGING THE OIL FILTER :

The pressure filter has a sensitivity of 10 microns and with time, it may be filled with the particles in the filter system. The pressure filter has mechanical dirt display if any (See Figure-62). Accordingly, when the display changes from green to red, it must be changed. For selecting the type of filter to use, See Table-20.

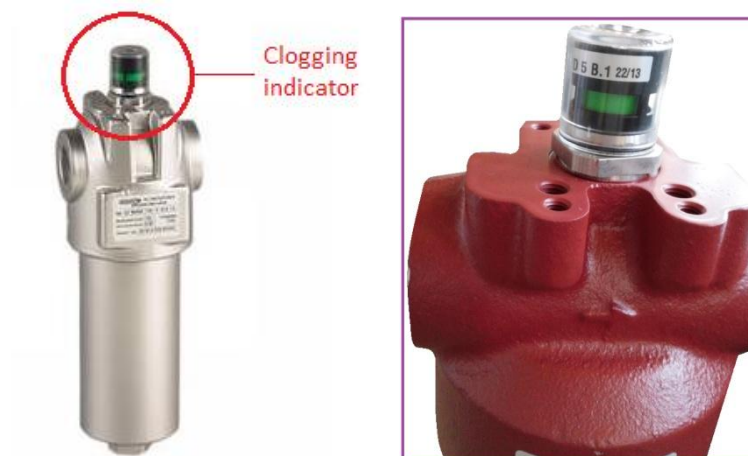


Figure-62: Oil filter with mechanic clogging indicator.



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The return filter element must be changed when the Oil Filter Lamp (optional) on the electrical panel cover lights up.( See Figure-62 )Return filter is at the top of the machine, between the hydraulic block and the main pump.

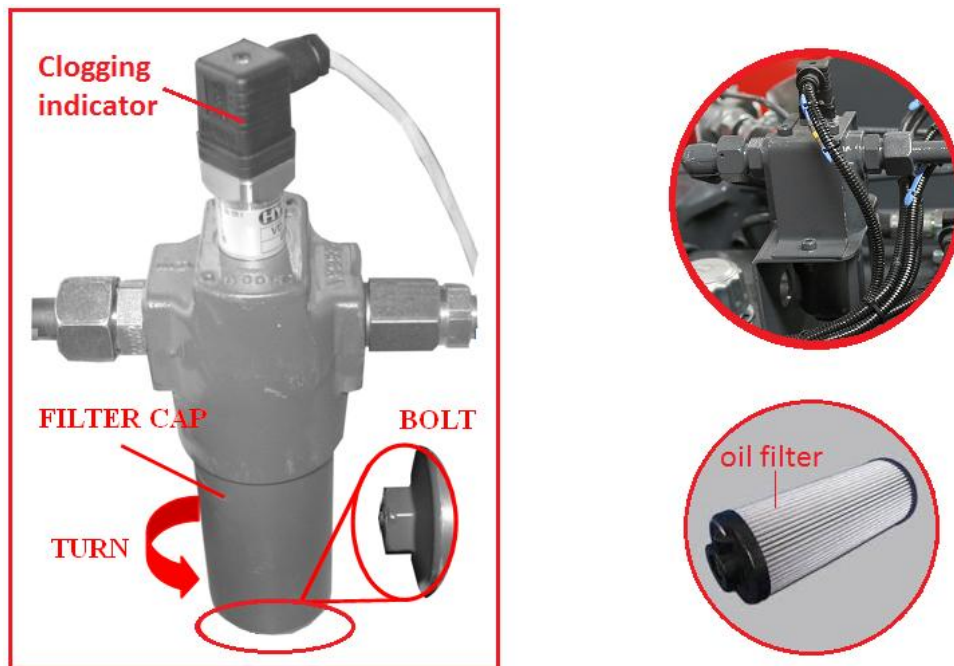


Figure-63: Oil filter with switch clogging indicator.

**⚠** Filter element is under the cap.

In order to change the filter element, first of all you must remove the filter cap.

1. Remove the filter cap by turning the bolt at the bottom using a proper tool. The bolt and the cap turn together because the bolt is mounted (or melted) on the cap.
2. Pull out the old filter element.
3. Place the new filter element.
4. Place the cap in its place and tighten the cap.

Recommended filter types are listed below:

| Machine Tonnages  | Filter Type      |                  |
|-------------------|------------------|------------------|
| Up to 63 TON      | 60 S3112219-000  | FILT DFBN-HC-60  |
| 100-135 TON       | 60 S3112219-000  | FILT DFBN-HC-110 |
| 180-320 TON       | 60 S3112217-000  | FILT DFBN-HC-160 |
| 380-800 TON       | 60 S3112217-000  | FILT DFBN/HC/240 |
| 1000 TON And Over | 60 S3112224C-000 | FILT DFBN/HC/330 |

Table-20:Filter types.



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#### 7.9.4.5 - HYDRAULIC OIL COOLANT UNIT (OPTIONAL) :

Hydraulic oil cooling unit gets a rise in temperature levels after the friction during cylinder movements and passing through pipes and blocks with high pressure. This temperature rise causes deformation of cylinders and reduction of oil viscosity. When the oil needs to be cooled, the cooling unit option is installed in the machine. The system is automatically activated according to the temperature increase and stops automatically when the lower temperature level is reached. (See Figure-64).

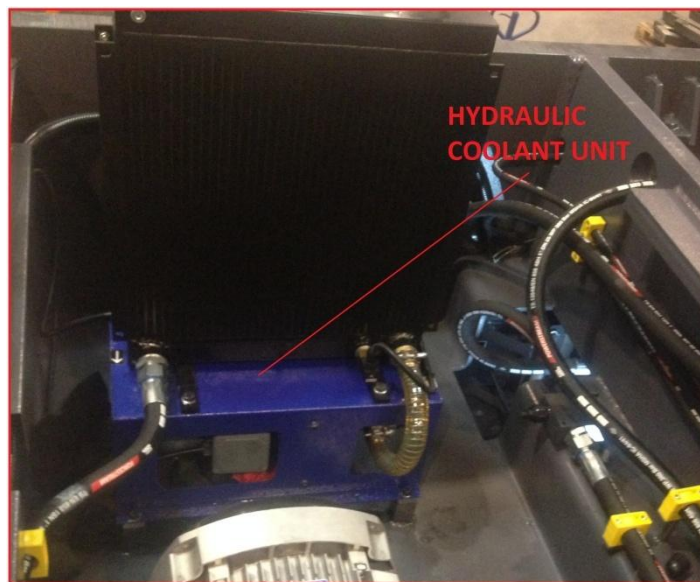


Figure-64: Hydraulic oil cooling unit (Optional).

*\*Depending on the machine type, the visual in the picture may change.*



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#### 7.9.4.6 - HYDRAULIC VALVES :

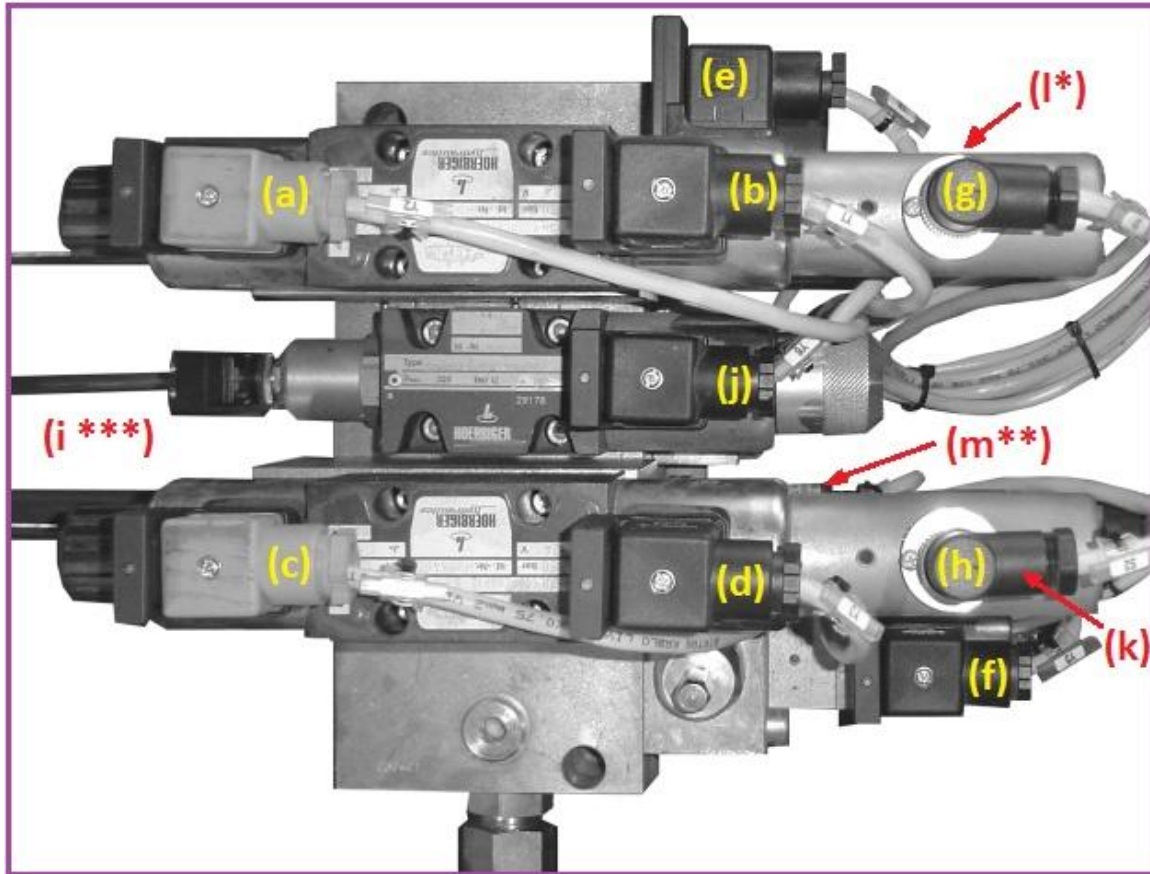


Figure-65: Hydraulic valves.

\* Under the valve (g) and not seen in the picture.

\*\* Under the valve (h) and not seen in the picture.

\*\*\* Only in machines equipped with AKAS laser safety system.

| Mark | Label<br>(Electr.Diag.) | Designation       | Description                                             |
|------|-------------------------|-------------------|---------------------------------------------------------|
| (a)  | SPR01                   | Directional Valve | Proportional closing valve for the left cylinder        |
| (b)  | SPR02                   | Directional Valve | Proportional opening valve for the left cylinder        |
| (c)  | SP01                    | Directional Valve | Proportional closing valve for the right cylinder       |
| (d)  | SP02                    | Directional Valve | Proportional opening valve for the right cylinder       |
| (e)  | S02                     | Fast closing      | Fast closing for the left cylinder                      |
| (f)  | SP03                    | Safety valve      | Pressure relief valve                                   |
| (g)  | E4                      | Sensor            | Directional valve control sensor for the left cylinder  |
| (h)  | E5                      | Sensor            | Directional valve control sensor for the right cylinder |
| (i)  | E3                      | Sensor            | Approaching control sensor                              |
| (j)  | S03                     | Approaching valve | -                                                       |
| (k)  | E2                      | Sensor            | Fast closing control sensor for right cylinder          |
| (l)  | E1                      | Sensor            | Fast closing control sensor for left cylinder           |
| (m)  | S01                     | Fast closing      | Fast closing for the right cylinder                     |

Table 21: Definition of hydraulic valves.



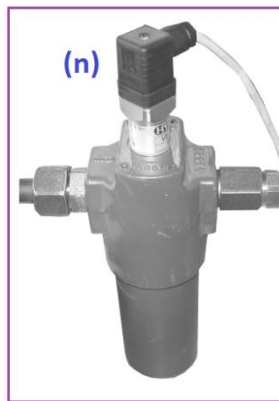


Figure-66: Hydraulic valves.

| Mark | Label<br>(Electr.Diag.) | Designation | Description                 |
|------|-------------------------|-------------|-----------------------------|
| (n)  | Filter                  | Sensor      | Dirty filter control sensor |

Table 22: Definition of hydraulic valves.

#### 7.10 - REAR LIGHT CURTAIN TEST :

The protective device must be checked daily or prior to starting the machine by using the correct test rod.

*Operate the machine if the power LED and guard LED are lit. If any other LED combinations appear during the test do not operate the machine.*

Installation of the multiple light beam safety device must be checked by authorized personnel. During operation the mod power and guard LED must be lit up. During the test if the pattern of the LEDs does not change or interrupts the multiple light beams, work must stop on the machine.

##### **This test must produce the following result:**

On the transceiver for the related multiple light beam safety device, only the power LED, break LED and upper LED are to be illuminated and no other LED combinations. The machine should not be allowed or able to function if the light beam is interrupted.

#### 7.11 - CHECK-LIST OF THE FINISHED PRODUCT :

Prior to despatch, your press brake has been checked with respect to the following safety and operational functions, and verified **O.K.** :

- ✓ Safety guards
- ✓ Electric circuit diagram
- ✓ Hydraulic circuit diagram
- ✓ Top beam speed
- ✓ Sound level
- ✓ Information and warning labels
- ✓ Rigid fixation of top tool
- ✓ Rigid fixation of bottom tool
- ✓ Oil leakage
- ✓ Switches and buttons
- ✓ Functional operation of machine
- ✓ Anti-rust lubrication
- ✓ Accuracy of bending angle
- ✓ Material bending at full-capacity



## 7.12 - CONDITIONS OF STORAGE, RE UTILISATION AND SCRAPPING :

### 7.12.1 - STORAGE :

Makinenin uzun süre kullanılmayacağı durumlarda, aşağıdaki önlemler alınmalıdır:

- Disconnect electrical supply to the machine, and write so on the electric panel as a reminder for future use.
- The storage place of the machine must be indoor with protection against humidity, dust, and danger of fire.
- Lubricate top and bottom tools by an anti-rust lubricant, and then seat the top tool in one of the " V " grooves on the bottom tool.
- Empty the oil the tank.
- Lubricate pistons and all metal surfaces by an anti-rust lubricant
- Lubricate plastic hoses against cracking.
- Lubricate pistons, slides, and all metal surfaces by an an anti-rust lubricant.
- Cover the machine by a nylon cover for protection against dust.

### 7.12.2- REUTILISATION AFTER STORAGE :

Take the following steps if the machine is to be reutilised after a long period of storage :

- To use the old machine oil, make sure that the physical and chemical properties of the liquid is intact. This should be verified by an expert body. Otherwise, fill the tank with new oil.
- All electrical components must be checked by a qualified electrician to make sure that all of them are properly functional. Replace the faulty components.
- The machine body and mechanical parts must be checked through by authorized and qualified personnel, and the machine must be prepared for operation according to the operating instructions.

### 7.12.3 - DISMANTING / DECOMMISSIONING THE MACHINE (SCRAPPING) :

For the machines which have completed its operating life, in the decommissioning process;

- Bring the upper table of the machine to the lowest position.
- After completely emptying the hydraulic lubricant in the machine, annihilate this lubricant according to the rules of the environment protection laws.
- Unfix the bolts of the machine which fixes the machine to the ground.
- Machine components can be classified as follows;
  - Electronic wastes (sensors, light curtains...),
  - Plastics,
  - Steel recycle,
  - Aluminum,
  - Materials except iron (felts, motor propellers, sledge ulpolens...),
  - Chemicals,



## CHAPTER 8 -TROUBLESHOOTING INFORMATION

### 8.1 - POSSIBLE FAILURES AND SOLUTIONS :

➤ **Problem: If one of the machine cylinders deflects downward;**

**For machines with HOERBIGER block:**

1. The places of the secondary safety valves (Please look at the Hydraulic circuit scheme) are changed. If the problem passes to the other axis, this shows that the problem is in the secondary safety valve whose place is changed.
2. After the place changing process, if the problem still continues, the places of the opposite pressure valves on the hydraulic block are changed. If the problem passes to the other axis, this shows that the problem is in the opposite pressure valve whose place is changed.
3. After the position changing of the opposite pressure valves, if the problem continues, the places of the direction valves are changed. If the problem passes to the other axis, this shows that the problem is in the direction valve whose position is changed.

➤ **Problem: When the pedal is pressed and the upper table is displacing downwardly, if one cylinder is displacing downwardly faster than the other cylinder;**

1. The machine is not balanced.
2. The sledge adjustment of the machine is realized.

➤ **Problem: When the pedal is pressed and the upper table is displacing downwardly, if one cylinder is displacing downwardly faster than the other cylinder;**

The arrow symbol on the linear ruler body must be at a lower position than the arrow symbol on the movable part. If the arrow symbol is not at a lower position, the bolts between the cylinders and the ram may loosen. These bolts must be tightened.

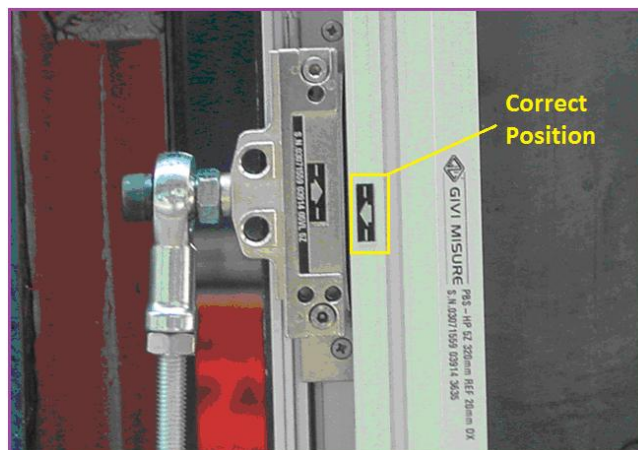


Figure-67: Display of linear ruler position.



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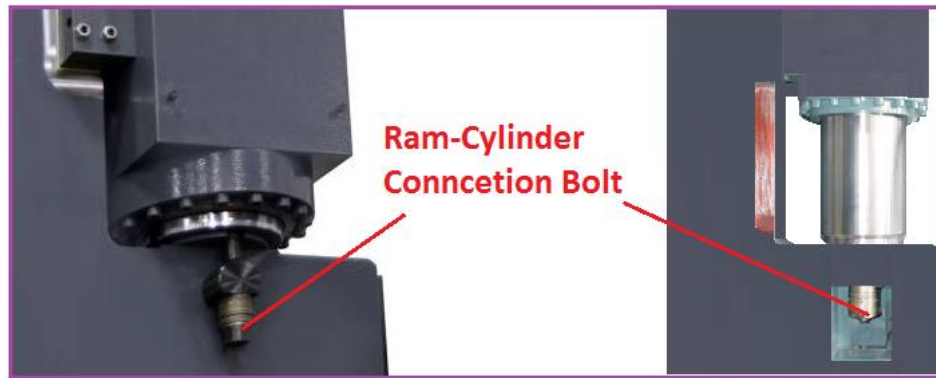


Figure-68: Ram-Cylinder Connection Bolt.

➤ **Problem: If there is no displacement on the upper table when the pedal is pressed;**

1. First of all, it is checked if the machine takes reference or not.
2. Afterwards, the energizing of the contacts are checked, in other words, when the pedal is pressed, it is checked if the contacts of the contacts in double hand circuit draw or not.
3. When the pedal is pressed whether the contacts of the contactor draw and whether power reaches to the servo valve, fast dropping valve and common valves are measured by means of a measurement device by examining the voltage level of the valves.

➤ **Problem: If there is no displacement in Y1 or Y2 axes when the pedal is pressed;**

1. It is checked if the position values of Y1 and Y2 in the control unit are equal or not.
2. It is checked if linear encoder operates or not.
3. The places of the direction valves are changed. If the fault passes to the other axis, this shows that the fault is in the direction valve.
4. If the problem continues, it is checked from the control unit that all of the axes are in the position or not.

➤ **Problem: If the machine does not pass to pressing mode;**

1. First of all, the upper table of the machine is taken to the upper point.
2. The cover of the hydraulic reservoir is opened. The control unit is prepared in manual operation mode and the pedal is pressed.
3. The inside of the hydraulic lubricant reservoir is checked by hand, if lubricant comes out of the thick pipes extending from the hydraulic reservoir towards the front filling valves, then this shows that the filling valve of that axis is faulty.

➤ **Problem: If the upper table of the machine have difficulty in the returning process in the end of pressing process;**

1. For the CYBELEC control unit, by means of the parameter numbered 33 from the machine parameters page, the lifting upwardly pressure values are increased.(See Cybelec manual user).
2. For the DELEM control unit, the parameter numbered 59 from the Y-axis parameters page is increased as percentile value. (See Delem manual user).
3. For other control units, refer to the corresponding chapter in the manual.



| PROBLEM                                                   | CAUSES                                    | SOLUTIONS                            |
|-----------------------------------------------------------|-------------------------------------------|--------------------------------------|
| Top tool could not go down and could not make the bending | * Electricity current is low              | * Inform the electrician             |
|                                                           | * Pump is defective                       | * Change the pump                    |
|                                                           | * Piston seals has abrasion               | * Change the seals                   |
|                                                           | * Oil leakage in filling valve            | * Change the valve                   |
|                                                           | * Congession on pressure adjustment valve | * Change the valve                   |
|                                                           | * Pressure adjustment valve is defective  | * Change the valve                   |
|                                                           | * Direction valve 87obin burn out         | * Change the winding                 |
| Top tool does not go up and down                          | * Oil leakage in hydraulic circuit        | * Check the connections tighten them |
|                                                           | * Cylinder seals have damages             | * Change the seals                   |
|                                                           | * Congession on pressure adjustment valve | * Change the valve                   |
|                                                           | * Pressure adjustment valve is defective  | * Change the valve                   |
|                                                           | * Direction valve is defective            | * Change the valve                   |
| Oil leakage from cylinders                                | * Direction valve winding burned out      | * Change the winding                 |
|                                                           | * Abrasion of cylinder seals              | * Change the seals                   |
| Oil leakage from connection places                        | * Abrasion of cylindercover O-rings       | * Change the O-rings                 |
|                                                           | * Nuts are loosen                         | * Tighten the nuts                   |
| Trembling of the machine when the beam goes up            | * Guides have no oil or adjustment        | * Adjust and lubricate the guides    |
|                                                           |                                           | * Unload the pump                    |
| Top beam goes down slowly                                 |                                           | * Check the guides                   |

Table-23: Possible failures and solutions.

## 8.2 - ADJUSTMENT OF Y1 & Y2 AXIS IN THE CNC PRESS BRAKE WITH THE CYBELEC-MODEVA 10S/12S/15S/15TEsa -ESA S630 - DNC 880S CONTROL UNIT:

This adjustment is realized in order to eliminate the difference between the two ends as a result of the bending obtained by the material which we realize most of the bending processes and by the tools used in the bending of this material and when we cannot obtain the value which we write in the DNC. For this:

1. A material which is equal in length to at least 2/3 of the machine length is bended 90° in the machine. By means of a setsquare with degrees, the angles in the direction of the Y1 and Y2 cylinders are measured.
2. In the DNC unit, the switch is turned to the "3" (while pressing the Alt button, press the 3 button) position. Then password "333" is entered.
3. Programming key is pressed. Program mode is selected.
4. Using the PgUp and PgDwn buttons in the parameters, the RAM (BEAM) page is selected.
5. On the RAM (BEAM) page, the 09. Index line is found.

### FOR INSTANCE:

```

.
.
07. Limits           Min. .... Max. ....
08. Ref.In pressure  Y1 .... Y2 ....
09. Index            Y1 ###,## mm Y2 ###,## mm
                     Y1 ###,## mm Y2 ###,## mm
10. ....
.

```



6. In the bending test realized, on the (Left) Y1 side, if we obtain 92° instead of 90°, in the 09. Index line, Y1 value is incremented. If we obtain 88° instead of 90°, in the 09. Index line, Y1 value is decreased. The same rule applies for the Y2 (Right) side.

NOTE: The amount in increasing and decreasing process is determined by finding the amount formed in Y1 and Y2 values when 1° Correction is given in DNC.

7. After the required arrangement is realized, in DNC, the switch is taken to the "0" (while pressing the down button, press The 0 button) position. The machine is normally turned off. Afterwards, it is turned on again and index is taken by the machine. The bending process is checked by achieving bending by the machine. Repeat if there is a difference until the optimum arrangement is achieved.

### 8.3 - ADJUSTMENT OF Y1 & Y2 AXIS IN THE CNC PRESS BRAKE WITH THE DELEM DA 66 CONTROL UNIT :

This adjustment is realized in order to eliminate the difference between the two ends as a result of the bending obtained by the material which we realize the most bending processes and by the tools used in the bending of this material and when we can not obtain the value which we write in the DNC. For this:

1. A material which is equal in length to at least 2/3 of the machine length is bended 90° in the machine. By means of a setsquare with degrees on it, the angles in the direction of the Y1 and Y2 cylinders are measured.
2. In the DNC unit, the menu button is pressed.
3. On the menu page, firstly code '19' is entered. Afterwards, the entrance code '32157' is entered.
4. In the menu that appears, 1 – Y and X axis machine parameters is selected and parameter page is entered.
5. In the parameters, 5 – lin. Scale Ref. Left and 6 – lin. Scale Ref. Right lines are found.
6. In the test bending realized, if we obtain on the Y1 (Left) side 90° instead of 92°, 5 – lin. Scale Ref. Left value is decreased. If we obtain 88° instead of 90°, 6 – lin. Scale Ref. Right value is increased. The same rule may be applied for Y2 ( Right ) side.

NOTE: The amount in increasing and decreasing process is determined by finding the amount formed in Y1 and Y2 values when 1° Correction is given in DNC.

7. After the required arrangement is realized, END button is pressed twice in DNC. The pump is closed. END button is pressed again and it is waited for 30 seconds. The pump is operated after the screen appears in DNC and indexes are taken by the machine. The bending process is checked by realizing bending by the machine. Again if there is a difference, with the same method, again an arrangement is realized.



## CHAPTER 9 - THE HEALTH AND THE SAFETY OF THE OPERATOR

### 9.1 - THE SPECIFICATION OF THE HYDRAULIC LUBRICANT USED :

- Blazing point ( °C ) and the method: 193° C closed reservoir
- Combustion temperature (°C): > 200
- Fast burning limit: 1.5 – 6
- The units formed as a result of burning: Essentially carbon-oxides, the organic compounds defined by water vapor
- Special burning / Dangerous explosions: On wide surface areas where air or oxygen are existing freely, the greasy wastes, papers may easily lead to combustion. These materials should be disposed after usage.
- Special extinguishing methods: The extinguishing stuff should come to the related region with equipment that provides breathing. Directly applying water to the stored containers is dangerous because of the boiling risk.
- Fire extinguishers: Foam, dry chemical powder, carbon dioxide.
- Appropriate materials / layers : All of the general metals
- Inappropriate materials / layers : It may melt some plastics
- Continuity : Permanent
- Reaction with water : No
- Dangerous reactions : No
- The materials that have to be kept away : The units that strongly oxidize other units
- The conditions that have to be kept away: High temperature
- Decomposition temperature ( °C ) : > 100
- Dangerous decomposed products : There is no composition of harmful decomposed products.
- Storing temperature ( °C ) : 0 - 40
- Storing precautions : There is no special requirement. The factor that has to be kept away is the increasing temperature.

#### Transportation:

- Technical precautions
  - Protection of the user: Provide appropriate ventilation in order to prevent the product being subject to the vapor or smoke thereof.
    - Avoid contact with used or dirty products.
    - Keep the machine away from the flammable materials.
    - Keep the machine away from comestibles.
  - Protection from fire and explosion: Empty tankers may comprise explosive gas and vapors. After the pouring of the product, the cloth, paper and other similar materials used in the collection of the product are flammable. These should not accumulated, and after being used, they should be disposed of safely and immediately.
  - Precautions: Avoid the static electrification of the product, provide connection with the ground. Realize the machine adjustments so that the product does not pour on the hot pieces or the electrical equipment. Prevent leakage to the circuit operating under pressure. The liquid which comes out as a result of the leakage to this circuit is distributed by spraying and it is flammable. In this case, the lubricant vapor reaches the burning lower point in the concentration of 45 g/m<sup>3</sup>. During usage, nothing should be eaten, nothing should be drunk and cigarette should not be smoked.
  - Transportation recommendations: Only reservoirs, gasket, pipe, etc resistant to hydro-carbon should be used.

#### Storing:

- Technical precautions: Realize the necessary arrangements and take all the necessary measures in order to prevent the product to mix into the water and the soil.

#### Storing conditions;



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- The appropriate method: Store in room temperature, keep away from water and humidity, keep away from flame sources.  
Keep the carriers closed when they are not used.
- The factors that need to be avoided: Do not store the materials that have been subject to the product (cloth, paper, etc.)
- Inappropriate products: It leads to a dangerous reaction with strong oxidants.  
The packaging of the product
- Recommended: Only reservoirs, gasket, pipe, etc resistant to hydro-carbon should be used.  
If possible keep it in its original carrier.  
Otherwise, place all the markings onto the new carrier according to the original carrier.

#### Identification of the dangers:

- Harmful for the human health: Under normal usage, it does not have any effect or danger.
- Environmental effects: Do not pour this product into the environment.
- Physical and chemical: Under normal usage, it does not have a special burning or explosion risk.

#### 9.2 -THE RECOMMENDED FIRST AID :

 **IN CA SE OF A SERIOUS DISTURBANCE, A DOCTOR SHOULD BE CALLED OR THE PERSON SHOULD GO TO A MEDICAL ESTABLISHMENT.**

- Respiration: When a person is subject to the vapor or the spray of the product in dense form, this may lead to a light irritation in the throat of the person.  
The person should be taken outside, he/she should have a rest in a warm environment.
- Contact with the skin: When the skin is subject to product spray in high pressure, the product may penetrate under the skin. The person who is subject to these conditions should be taken to the hospital even if there is no wound or visible sign on the skin.  
The clothes of the person which are subject to the product should be peeled off immediately.  
The part which is subject to the product should be washed with water and soap immediately and in a repeated manner.
- Contact with the eye: With the eyes open, they should be washed with plenty of water for 15 minutes immediately.
- Swallowing: There is a risk of vomiting and diarrhea.  
The person should not be vomited because of the risk of contact with the respiration system.  
Nothing should be drunk to the sick person.
- Suction: If the product is thought to go inside the lungs because of any reason (for instance because of vomiting), the person should be immediately taken to the emergency service of the hospital.

#### Control of the usage / individual protection :

- Engineering precautions: The product should only be used in well ventilated places.  
When using the product in closed areas, be sure that there is no dense vapor effect in the air or put on / fix the recommended equipment.
- Control parameters
- The limit to be subject to: lubricant vapor: 10 mg/m<sup>3</sup> for 15 minutes  
lubricant vapor: 5 mg/m<sup>3</sup> for 8 hours  
Individual protection equipment
- Hand protection: Water-proof gloves which are resistant to hydro-carbon.  
The recommended material: rubber.
- Eye protection: Eye-glasses against splashes.
- Skin and the body: When necessary, mask for face protection, clothes resistant to hydro-carbon, safety boots (when carried by means of barrel)

#### Toxic information :

**STRONG TOXIC / LOCAL EFFECTS**



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- **Respiration:** It does not have a risk in normal usage.  
In respiration, according to the concentration of the vapor, it may lead to a light irritation in the upper part of the respiration system.
- **Contact with the skin:** It does not have a risk in normal usage  
When the skin is subject to product spray in high pressure, the product may penetrate under the skin. The person who is subject to these conditions should be taken to the hospital even if there is no wound or visible sign on the skin.
- **Swallowing:** If it is swallowed in small amounts, there is no risk. In case that large amounts are swallowed, it may lead to an ache in the abdomen and to diarrhea.

**SENSITIVITY:** Under the light of the known information, the product does not lead to sensitivity.

#### **CHRONIC AND LONG-TERM TOXIC EFFECT**

- **Contact with the skin:** In case of long-term or continuous contact with the clothes where the product is smeared, characteristic skin wounds (oily pimples) may form.

#### **Annihilation information :**

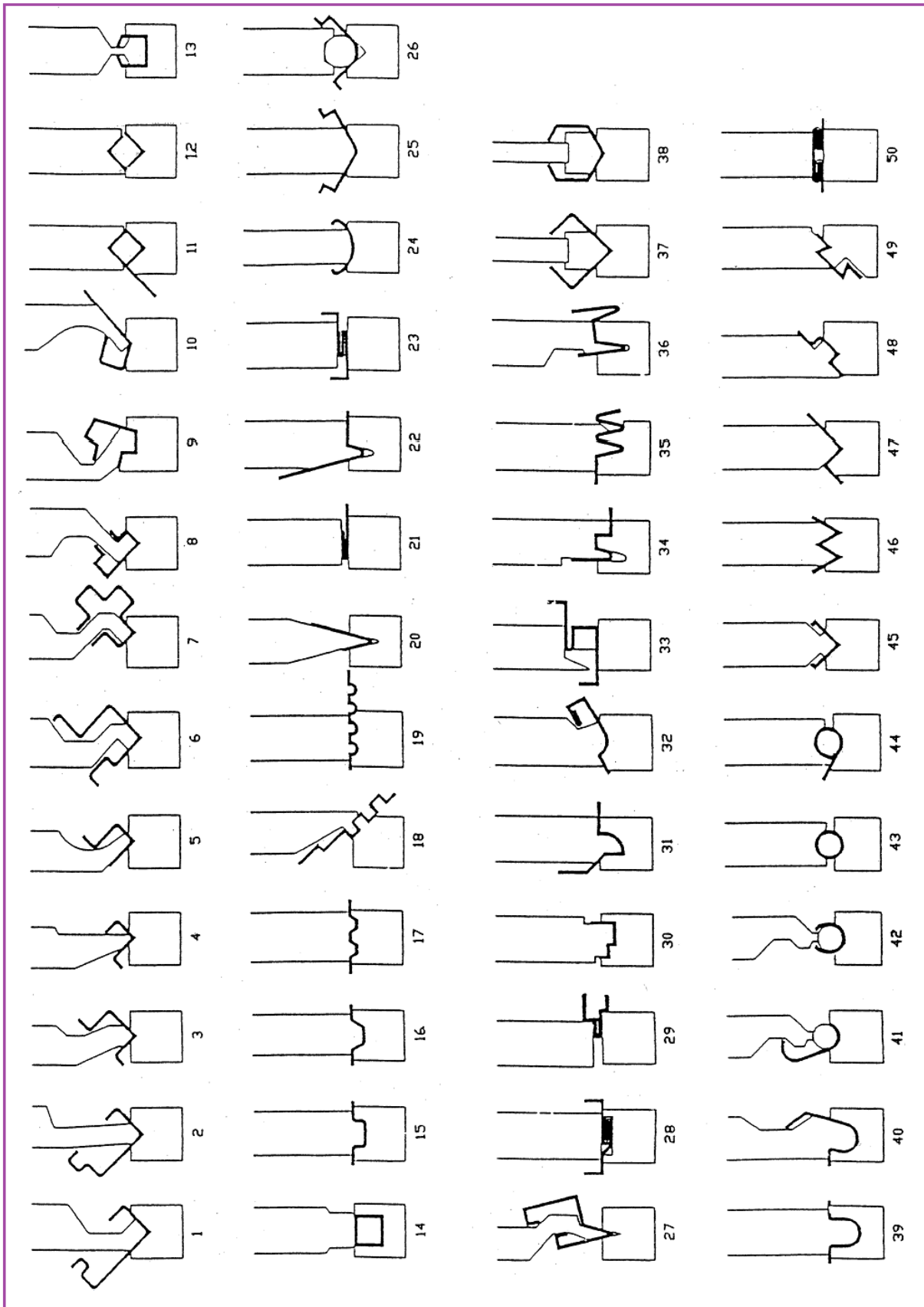
Annihilation of the wastes: Recycling and the re-using of the waste lubricants are essential. In cases where this is not possible, the waste lubricants should be annihilated without giving harm to human health and to environment. When the annihilation of the waste lubricates by burning is taken into consideration, the plants which took license according to Article 22 and Article 23 of the Regulations of Control of Dangerous Wastes will be used.

Annihilation of the packages: It should be assessed under the wastes annihilation.

Industrial waste EU number: 13-01-06 (hydraulic lubricants containing only mineral lubricant)

Local responsibilities: dated 27.08.1995 and numbered 22387 Official Gazette, Regulations of Control of Dangerous Wastes.





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## CHAPTER 11 - APPENDIX

### 11.1 - HYDRAULIC CIRCUIT SCHEMA

### 11.2 - ELECTRIC CIRCUIT SCHEMA

### 11.3 -SPARE PART LIST

### 11.4 - AUXILIARY DOCUMENTS

### 11.5 - GUARANTEE CERTIFICATE

### 11.6 - FOUNDATION PLAN



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