"ARIES"
MANUAL PVC PROFILE BENDING MACHINE

OPERATING AND MAINTENANCE MANUAL

ATech Machine, Inc.
309 Ridgemont Ave., Rockville, MD 20850 – USA
Ph.: +1-240-505-1967 * Fax: +1-301-560-6627
info@ATechMachinery.com * www.ATechMachinery.com

CONTENTS

1. IMPOORTANT SAFETY INSTRUCTIONS

- Before putting machine into operation read the Operating and Maintenance Manual carefully.

- Produce multiple copies from the Operating and Maintenance Manual and give it to the operators for reference to keep it in their possesions anytime they need to refer.

- If you notice any abnormal situation on the machine, immediately inform the safety responsible of your plant.

- Since the temperature of the heating liquid in the heater is 120 ^{0}C, protective gloves or wet towels MUST be used while putting the profiles into or removing from the heater

- The heating fluid is technic glycerine and is not harmful to health

- Do not move the heater with the hot heating fluid in. The hot heating fluid may splash out of the heater and may cause harm to the operator others

- The main electrical connections and repairs MUST ONLY BE MADE BY AUTHORIZED ELECTRICIANS. In case of any problem consult to your authorized electrician.

- Do not work on the machine that does not have earthing connection. Do not hold buttons of control panels with your hands wet.

- Be careful not to subject the control buttons and control panel to water while cleaning.

ATECH MACHINE CANNOT BE HELD RESPONSIBLE FOR ALTERATIONS, MODIFICATIONS MADE ON THE MACHINE OR ON SAFETY DEVICES OF THE MACHINE WITHOUT GETTING WRITTEN APPROVAL OF AUTHORIZED PERSONNEL OF ATECH MACHINE, MUST BEAR AUTHORIZED SIGNATURE AND STAMP OF THE COMPANY.

2. TECHNICAL SPECIFICATIONS

MODEL AND TYPE		ARIES
Dimensions of work table	mm	800 x 2850 x 3000
Height of work table from ground level	mm	900 / 35”
Weight of work table	kg / (lb)	548 / 1,206
Left/right movement allowance of work table	mm / (inch)	300 / 12”
No. of mould holders mounted on work table	pcs	31
HEATER		
Heater volume	m3	0.155
No of heater	pcs	2
Heating capacity	kW	2 x 10
No. of hold down weights and its weight	pcs x kg	3 x 1,5
Heating fluid		Glycerine
No of ventilation fan	pc	1
Ventilation fan capacity	m³/h	1400 rpm da 1650 2800 rpm da 2800
Ventilation fan motor power	kW	0.85
Ventilation fan output power	Pa	40mmss - 1400 rpm 80mmss - 2800 rpm
No of ventilation fan connection	pc	1
Ventilation fan connection size	inch	4"
Heater discharge valve size	inch	½”
POWER SUPPLY		
Total power consumption	kW	23.05
Electric power	V, Hz, Ph	EU: 380, 50, 3 / USA: 220/440, 60, 3
GENERAL PROPERTIES		
General dimensions (length x width x height)	mm /(inch)	8350 x 3000 x 865 / (329” x 118” x 34”)
Weight (total)	kg	1200 / 2,640

“ARIES” type manual Profile Bending Machine is desiged and constructed in accordance with following European Directives and European Standards

98/37/ EC Machinery Directive 22.06.1998

73 / 23/EEC Low Voltage Directive 19.02.1973 and amendments

EN 292-2 Safety of Machinery- Technical principles and specifications

EN 294 Safety of Machinery- Safety distances to prevent danger zones being reached by the upper limbs

EN 349 Safety of Machinery- Minimum gaps to avoid crushing of parts of the human body

EN 563 Safety of Machinery- Temperature of touchable surfaces

EN 418 Safety of Machinery – Emegency stop equipment

EN 60204-1 Electrical Equipment of Machines- General Requirements

3. DESCRIPTION OF THE MACHINE

"ARIES" type Manual PVC Profile Bending Machine is used every kind of PVC window profiles to a desired form. The machine is composed of following main parts.

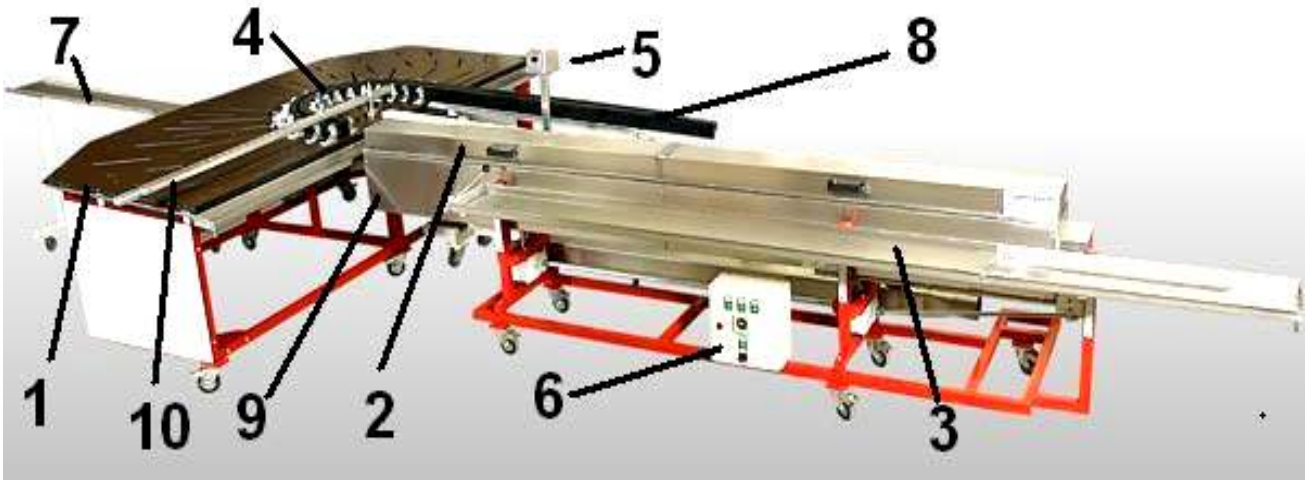


Figure 1. Main parts of the machine

POS NO	NAME OF PART	POS NO	NAME OF PART
1	Work table	6	Heater electric panel
2	Profile heater	7	Rear support table
3	Heater side pan	8	Front support table
4	Moulds	9	Profile lifting arm
5	Temperature indicators	10	Drawing arm

The PVC profiles heated upto a temperature of 120^0C is bent by drawing the profiles through the moulds manually.

The manual profile bending machine is composed of following main components;

- Heater
- Work table
- Front and rear support tables

The machine is equipped with a ventilation fan to discharge the vapor of heating fluid out from the operating room. The vapor should be carried away with a suitable duct system.

In certain conditions, upon request of the client, the achine can be delivered without fan but, the machine is delivered complete with all necessary accessories (connection to electric panel, switch for the change of rpm etc…).

4. LOADING , TRANSPORTATION , UNPACKING AND DISMANTLING INSTRUCTIONS

The machine is shipped on 5 seperate wooden pallets as packed and covered on all sides with nylon cover supported with ertical and diagonal supports and suitable with overseas transportation. Every wooden pallet contains information label about the contents.

WHATEVER THE TYPE OF LOADING/UNLOADING DO NOT STAY UNDER THE MACHINE DURING HANDLING.

Molds are packed in a fully closed wooden box.

While removing wooden supports remove the nails with a suitable lever. Do not use any parts of the machine as a support to a lever. Do not leave the nails on the wooden poles unattended to cause danger.
The nails either has to be removed from the wood or has to be bent sideways and tips must be burried into wood by means of a hammer..

During opening of the packing first remove the protective wooden poles and then remove the support poles.

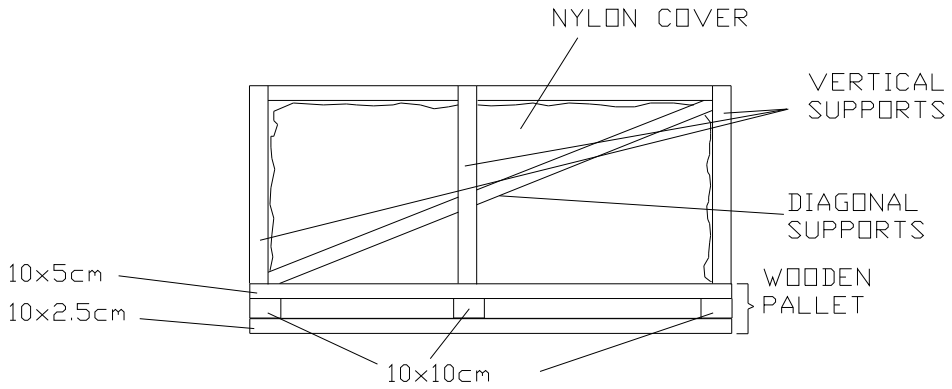


Figure 2. Typical packing

If the machine will be lifted with fork lift or with a crane use wide lifting belts. Do not used steel wire ropes. It may damage the machine structure.
Every machine part is marked clearly with respect to center of gravity to show proper locations for safe lifting with forklift or with lifting belt

Lift the machine from these marked points.

Forklift must be used to lift the machine when in packed condition. For this, use forklift with long forks having 1.5 tons capacity

The locations where the forks to be inserted is indicated with red color on the packing.
The size and weight of 5 packings belonging to machine are shown in below table.

PACKING NO	PACKİNG CONTENT	WIDTH (CM/INCH)	LENGTH (CM/INCH)	HEİGHT (CM/INCH)	NET WEIGHT (KG/LBS)	GROSS WEIGHT (KG/LBS)
1	Work Table	125/49''	300/118''	100/39''	548/1206	638/1404
2	Heater	70/28''	550/216''	100/39''	445/979	505/1111
3	Heating liquid	60/24''	60/24''	100/39''	250/550	270/594
4	Molds	20/8''	310/122''	24/9''	102/224	134/295
5	Guides and inner linings	20/8''	410/161''	24/9''	50/110	68/150

PACKINGS AND THEIR CONTENTS

PACKING NO: 1

NAME OF PART	QTY
Work Table	1
Support Table	2
Washing pan	1
Drying pan	2
Heater liquid collection pan	1
Aluminium mold holders	31
Panel key	1
Plier	1
Drawing pin	2

NAME OF PART	QTY
Profile movement arm	1
Imbus bolt M8x35	81
Stainless washer	81
Canal pieces	31
Stainless bolt M12x20	1
Stainless nut M12	2
Stainless washer M12	2
Compass center piece	1
Compass head	1

NAME OF PART	QTY
Drive apparatus center piece	1
Drive apparatus nut	1
Weights	3
M6 Allen wrench	2
Spanner 19-22	1
Control Thermometer	1
Bucket with funnel	1
Raising/lowering arm	1
Nylon rope 5m	1

PACKING NO: 2

NAME OF PART	QTY
Heater	1
Drive appartus arm	1

NAME OF PART	QTY
Compass ruler	3
Compass extention	1

PACKING NO: 3

NAME OF PART	QTY
Heating Fluid	1

PACKING NO: 4

NAME OF PART	QTY
Complete bending molds (3000)	3
Hole mandrel	3

NAME OF PART	QTY
Distance pieces	3
Distance blocks	3

PACKING NO: 5

NAME OF PART	QTY
Drawing guides	3
4000mm internal linings	3

NAME OF PART	QTY
Glazing bead	1

DISMANTLING INSTRUCTIONS OF THE MACHINE

1-At first, the machine should be washed and dried completely.
2-The machine can be dismantled by applying the reverse of the procedure used for assembling. For this see item 5 "Assembling of the machine and its connections".

If the dismantled machine will be packed the followings should be made in below given sequence.

RE-PACKING OF THE MACHINE

A-HEATER

1-Discharge the heating liquid in the heater via the drain valve at the bottom of the heater and filter it. Store the drained heating liquid in barrels for future use.
2-Wash and dry inside of the heater.
3-Remove the side pan from the heater.
4-Remove the side pan holders.

Pay attention not to damage the steel sheet parts/body of the machine. If transportation is necessary, then a supporting wood structure (like the original packing of the machine) must be used. The wooden poles must support the machine at the bottom of chassis

STORING CONDITIONS OF THE MACHINE (FOR FUTURE USE)

If the machine will not be used for a long time, the machine parts dismantled as explained above , should be placed side by side to occupy minimum place as much as possible and should be stored in a dry warehouse enviroment.

The machine which is dismantled above for future use, **THE WORK TABLE MUST BE VERY CAREFULLY CLEANED AND DRIED .** (See section 11 Maintenace and Trouble Shooting)

To protect from dust cover the parts with a suitable cover

5. ASSEMBLY OF THE MACHINE AND MAKING ITS CONNECTIONS

The machine does not require a special foundation.

The ground for which the machine will be placed on should be flat and must not be slippery when the water is on, should not retain the water on it and should be made of material like glazed tile or similiar. The slippery ground when get wet with water or heating liquid may cause the operator or the other personnel to slip and fall down.

The strength of the ground should be sufficient to support the machine weight of 1200 kg and other equipments around.

The place where the machine is to be located has to have discharge opening on the ground for discharging the waste water or other liquids. For this reason the ground has sufficient slope towards the discharge point to prevent collection of the water and other liquid.

The location where the machine will be placed must have water and pressurized air supply mains.

Water supply: The water tap is required to wash and clean the machine or to remove the heating liquid from the bent profiles. For this, a connection to ordinary city water is sufficient.

Air supply: After cleaning of the machine, air is required to dry / remove the water/heating liquid from the parts of the machine which may probably be left on the work table or in the canals of the work table. For this purpose a pressurized air of 5 barg will be sufficient.

The advisable height of the ceiling of the room where the machine will be located is 4 meters.

For the machine operators to walk around the machine freely and for maintenance purpoases a space of minimum 2 meters must be left. Minimum clearances around the machine for proper operation is shown on Figure 3 below.

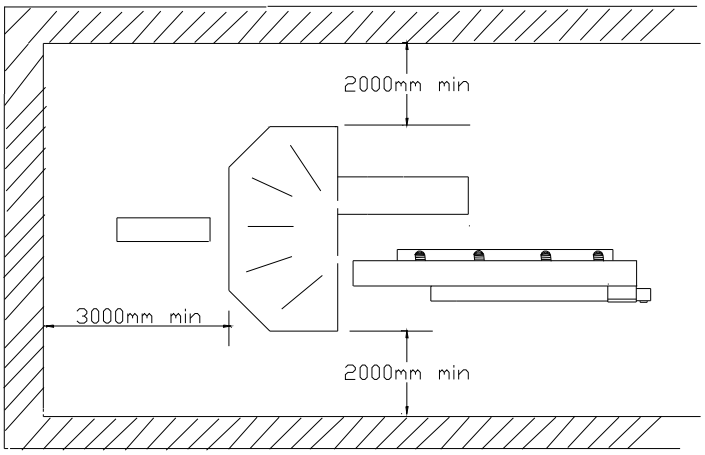


Figure 3. Minimum clearances around the machine.

Together with the machine a ventilating fan is also given to discharge the heating liquid vapour from the working area. But an additional ventilation unit is recommended to be installed on one of the side walls of the operating room to discharge the air in the room.

For comfortable working of the operator minimum room dimensions of 7 x 12 m or close to these dimensions is recommended. This should also include a space for the washing pan and drying pan with profile preparation area.

Sufficient illumination is required in the working area. For this, a standard plant illumination level of 800 lux provides necessary illumination level.

Attention must be paid to keep the temperature of the working environment around 18 – 20^0 C. This temperature must not go below 15^0C. The heated profile must be taken into the molds before cooling down. For this reason, the machine must preferably be placed in a closed room. The temperature of the environment is very important regarding the quality of bending to be obtained.

The machine parts removed from the packing must be installed at the following sequence. See figure 4.

1- Place the heater (2) (See Figure 4/1) to its predetermined place in the room.
2- Move the work table on its wheels towards the heater till it touches the heater. There is no mechanical connection between heater and work table.
3- Place the rear support table (7) behind the Work Table in line with the Heater
4- Place the front support table (8) parallel to the heater as shown on the drawing.
5- Open the heater cover and raise the profile lifting pan to the level of the work table by using the lever. In this position the level of the pan must be at the same level with work table. If the lifting pan stays above or below the level of work table, then by using the heater height adjustment arm located at the back of the heater, adjust the height of the heater such that the level of the pan to be in the same level with work table.
6- After completion of the height adjustment fix the wheel brakes of the heater(2)
7- Make the connection of digital thermometer (5).

8- Make the electric connection of heater panel (6).
9- Fill the heating liquid (Technic Glycerine) given with the machine into the heater. Before putting the heating liquid into the heater check that the drain valve located at the bottom of the heater is closed. Fill the heater till the liquid level to be 2 cm above the profile upper surface. There is no use to fill more than this level. But, lower liquid level causes the upper part of the profile to become colder and therefore harder than other parts and this in turn causes surface defects and waviness of the profile.

1-Place the heater in the room to required place

2- Move the work table towards the heater.

3- Place the rear and front support tables.

Figure 4. Assembly sequence of machine

No special tool is requested for the assembling of the machine.

In future,when it is required to change position of the machine, the wheel brakes can be loosened, its position is adjusted and then re-tightened again.

Figure 5. Fixing of the brakes

Put the drain hoses to drain sockets located on various places of the machine and place the collector buckets below. Machine has totally 5 pieces 16mm diameter drain sockets and 1 piece ½'' heating fluid drain valve located at the bottom of the heater. The drain points are indicated on below figure.

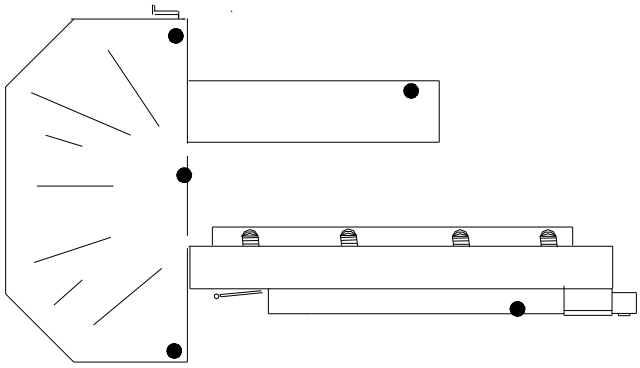


Figure 6. Drain points on the machine

The electric connections of the machine MUST be made by an authorized electrician.
Earthed connection MUST be used.
The electric diagrams of the machine is attached.
Electric connection must be made to an electric source in accordance with the specifications indicated on the name plate. These connections must also be made in accordance with the electric diagram given.

The electric connection to heater panel must be made with 5 x 4mm^2 cable.
The electric power to the machine should reach from the top with a flexible, rubber cable.
The machine has one (1) electric panel and used for heater and ventilating fan.

Figure 7. Fan switch

There is a switch near the heater cover which controls the rpm of the ventilating fan. Normally (when the heater cover is closed) fan rotates at 1400 rpm. When the heater cover is opened to remove the heated profile for bending, via this switch the fan starts to rotate at 2800 rpm which increases the suction capacity of the fan. This prevents more heating liquid vapor to fill working room.

The connection of ventilating fan outlet should be made towards the rear of the heater. This connection either should be taken out from the ceiling or should be discharged outside from one of the sidewalls at above the man level (approx. 2meters above).

Figure 8. Ventilation fan outlet connection

IMPORTANT NOTE !!!

THE MACHINE IS MOUNTED TO A DESIRED LOCATION, OPERATED AND THE OPERATORS OF THE CLIENT ARE TRAINED BY OUR SUPERVISORS.

6. OPERATING INSTRUCTIONS OF THE MACHINE

Adjust the profile lifting pan (when raised to position to take the profile out) such that it comes to the same level with the work table. For this, use the '' profile lifting pan adjustment arm'' located at the back of the heater (See Figure 11). Adjust the lifting pan upper dead point to be at the same level with work table and fix it. When this arm is removed the level of the pan does not change.

OPERATION OF THE MACHINE

1-Turn on the main switch (QM) on heater panel.
a-Lamp H1 turns on indiacting the presence of power.
b-Timer N1 will start to operate.
2-Turn on the fan motor switch (QM3) açınız.
a- If the cover of the heater is closed then the fan motor (MFAN) runs at low rpm and lamp H2 turns on.
b-If the cover of the heater is open then the fan motor (MFAN) runs at higher rpm and lamp H2 turns on.
3-Turn on the heater switch (KHT1) on heater panel.

When KHT1 switch turned on, the thermostat MS1 is energized. Enter the desired temperature to thermostat. If the heater liquid temperature is lower than the set value the KHT1 relay activated and lamp H1 turns on. If the heater liquid temperature is higher than the set value the lamp H1 turns off.

4- Adjust the timer (N1) according to local time. (In case of power failure, the timer keeps memory for 100hours).

ADUSTMENT OF TIMER

1- First, set the timer according to your local time. This is made by moving the hour and minute arm with your fingers.
2- Move the pins such that the hours corresponding the working hours which you wish the heater to work. These pins are the ones shown with number 4 on below figure.
Example : If you want the timer work at 08:00 and stop at 09:00 in the morning and again start to work at 15:00 and stop at 15:30 in the afternoon.
Based on this ;
- Move the six(6) blue pins out between 8 and 9
- Move the three (3) blue pins out after 15
3-To start the timer to work switch the manual button to ◷ (operate) position.

ATTENTION!
FOR THE TIMER TO WORK AUTOMATICALLY AFTER BEING ADJUSTED, THE HEATER SWITCH ON THE HEATER ELECTRİC PANEL MUST BE ON.

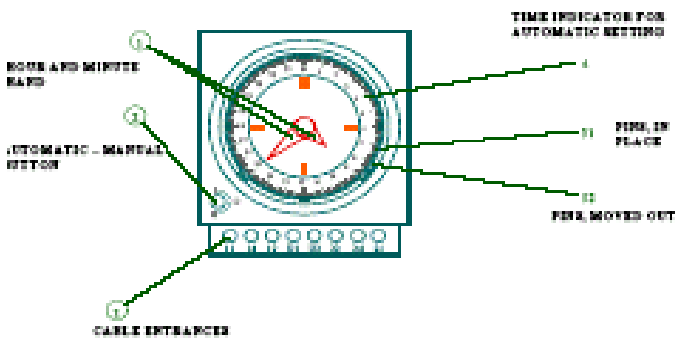
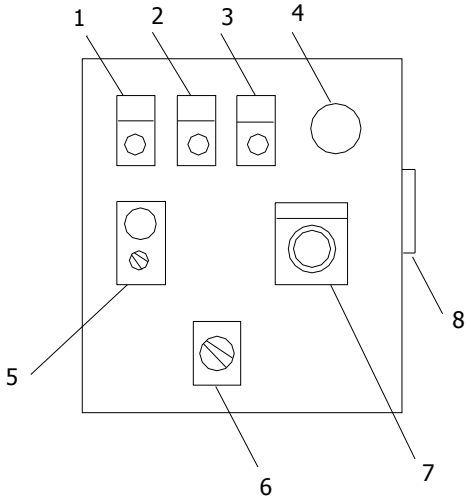


Figure 9. Timer

5- Set the digital thermometer to 120^0 C .
When digital thermometer is energized the preset temperature value is displayed. If the temperature is suitable there is no need to make re-setting and the heaters works at this temperature value. If this setting is required to be changed then by pressing up or down the buttons new temperature value is set. Then the heater will continue to work with the newly set value. (Turning the thermometer on/off does not change the setting)

HEATER CONTROL PANEL HAVE THE FOLLOWING COMPONENTS ON COVERS.



HEATER PANEL	
1,2,3	Phase Lamps
4	Emergency stop button
5	Heater on/off buton
6	Fan on/off button
7	Timer
8	Main switch

Figure 10. Heater panel

Preperation of heater
Fill the heater (2) with heating liquid. Be carefull to fill the heating liquid to be 2cm over the profile surface.
Adjust the level of the profile lifting pan and the working tablet to be at the same level. For this, when the cover of the heater is open turn the arm of profile lifting pan (See arm 9, Figure 1)(See figure 13). In this position, adjust the level of the heater by means of '' heater level adjustment arm'' (See Figure 12). This arm may be removed if required. The heater remains fixed at the adjusted height.

Figure 11. Profile lifting arm

Figure 12. Height adjustment arm

Figure 13. Profile lifting pan

Adjustment of mold holders

To prepare the work table (Figure 1) to bending work, first it is necessary to determine the bending radius. Calculate the bending radius with the below given formula and add 20mm (outer thickness

of the bending mold) to the figure from this formula to obtain the final bending radius. Make the adjustment of molder holder compas given together with the machine. If you forgot to add this 20mm then the diameter of the bent profile becomes 40mm less than the required diameter.

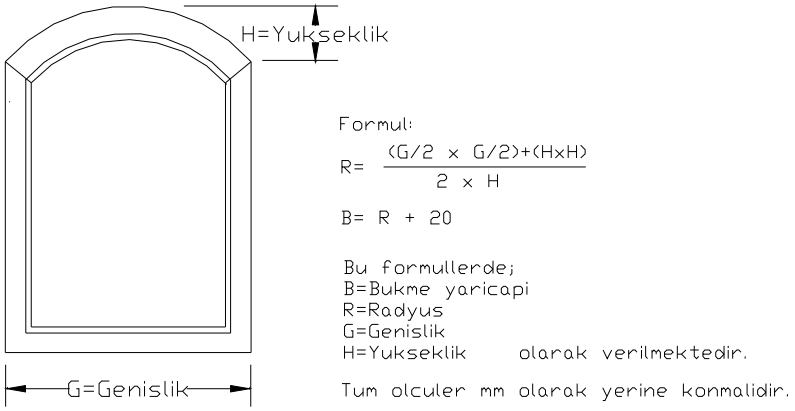


Figure 14. Profile dimensions

Get the square of half of the width and multiply this with the square of half of the height and add these 2 figures and divide by 2 times of height and obtain the radius. Then add 20mm to this figure to get the bending radius.

Sample calculation:

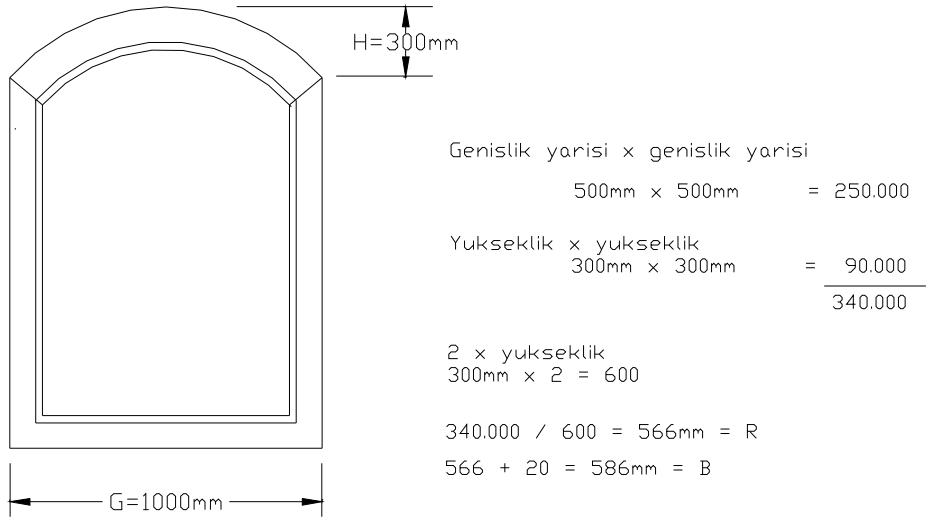


Figure 15. Calculation metod

Fix the compass holder piece to the mold holder adjustment compass. Adjust the center piece to a pre-determined radius (B).

Mount the canal pieces (Figure 16) onto the work table.
Screw the center of the mold holder adjustment compass (connection part), to the center piece at the middle of the work table. Fix the outer mold holders by holding them against outer surface of mold holder adjustment compass (See Figure 17).

Figure 16. Canal pieces

Figure 17. Adjustment of outer mold holders

Adjust the first and last mould holders by using the compass given with the machine. Then remove the compass from its place. Following this, fix the inner mold holders with the help of distance block as seen on Figure 18. The adjustment with distance blocks will be made with outer mold holders. See figure 19.

Figure 18. Use of distance blocks

Sekil 19. Outer mold holders

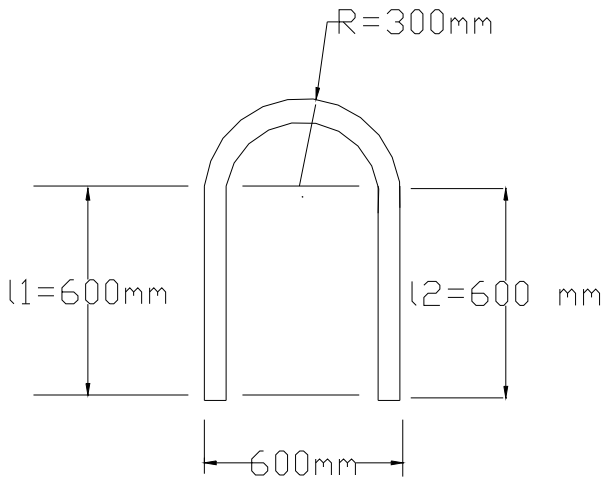
While securing the bending molds with the mold holders attention must be paid that the shoes of the mold holders fit on the projecting part of the mold. In addition, the joint s of bending moulds should be at the middle of the mould holders.

Set the heater thermostat to 120^0C . A tolerance of ± 3 degrees is allowable.

Preperation of the profile
Cut the profile to a suitable length. This length can be calculated as follows;.;

L= 2 x π x R + l1 + l2 + 200mm

Here,
L = Length of profile to be bent (mm).
l1 ve l2 = straight part of the profile after bending(mm)
R= Bending radius (mm)
π = 3.14
200mm = Additonal part to be cut after bending



L=3.14R + l1 + l2 + 200
L=3.14×300+600+600+200
L=942+600+600+200
L=2342mm İstenen toplam profil boyu

Figure 20. Calculation for profile cutting

(When the bending operation is completed, cut the profile from both end to bring it down to required size.)
After the profile is cut to desired lenght, smooth the end s of the profile to be inserted into moulds either by a suitable file or by grinding(Figure 21). This provides easy inserting of the profile into mould and its easy travel in the mould With the use of hole gauge given with the machine, make a 7mm hole through the profile. Insert the inner linings into the profile starting from painted ends and with the painted side looking upwards.
If the inner linings cannot be inserted into the profile when the profile is cold, immerse the profile into the heater for approximately 1 minute and then try again.
(While inserting the heted profile into moulds always use heat resistant protective gloves. The heated profile is at 120^0C).
The hole on the inner lining must coincide with the hole drilled on the profile When both holes coincide, insert the drawing pin through the hole. Check and ensure that the drawing pin is inserted fully into the hole on profile.(otherwise the profile may tear and the bending work cannot be completed)

Figure 21. Grinding of ends

Figure 22. Drawing pin

This way, the profile is made ready for the bending work.

Insertion of drawing apparatus

Draw the heated profile into he moulds by means of drawing apparatus. Screw the drawing apparatus into the center piece on the work table by the connection piece. Screw the pin holder which the drawing pin will be inserted to one of the holes on the lever of drawing apparatus according to the diameter of bending required. While performing this, the centering piece must be adjusted such that it comes to the middle part on the drawing apparatus. After completion of this work, you may now perform the bending.

Figure 23. Drawing of profile with drawing apparatus.

Bending of the profile

Check the temperature of the heating liquid in th heater by using control thermometer.
Immerse the profile into the heater (2) by means of profile lifting pan mounted into the hearter (See Figure 13). NEVER IMMERSE WITH YOUR HAND ! While immersing the profile into the heater immerse gradually. Otherwise hot liquid may splash onto the operator.

WHILE IMMERSING THE PROFILE INTO THE HEATER ALWAYS USE PROTECTIVE GLOVES.

To prevent the floating of PVC profiles (having lighter weight than the liquid) in the heating liquid place the immersion weights on the profiles to keep them immersed into the liquid. Before starting the drawing of the profile and while the profile is still in the heater pour some heating liquid from the heater by means of a cup over the bending moulds to heat the moulds. This helps both lubricate the mould and also provides the temperature equalization betweem profile and mould which provides a smooth surface.

Kepp the profile in the heater for approximately 3 minutes the open the cover of the heater and with the help of the arm (arm 9 Figure 1) lift the profie on the lifting pan to bring the profile inline with the moulds. (Move the lifting arm to the end point of its travel. Otherwise, this arm may move backwards and may cause the splashing of the heating liquid onto the operator).

**WHILE REMOVING THE PROFILE FROM THE HEATER ,
YOU MUST USE PROTECTIVE GLOVES TO HANDLE THE PROFILE.**

After inserting the profile into the mold, remove the drawing pin from the profile. Coincide the hole on the drawing apparatus with the hole on the profile and again insert the drawing pin through this hole. The drawing pin must pass fully through the hole.(The drawing pin not inserted fully may tear the profile during drawing operation). After inserting the drawing pin into its place on the drawing apparatus, draw the heated profile into the mold. Continue to draw the profile till you reach to the other side of the table to complete one full half arc.

After this, try to move the drawing apparatus 3-4 cm back and forth in the mold few times. This prevents the development of mold-marks on the profile caused by the marks on the molds

After approximately 3 minutes of the completion of drawing work, remove the the bent profile from the mould. For this, release the eccentric arms of the mold holders first and then remove the profile.With the help of a plier, remove all inner linings from the profile. Place these iner linings on the heater pan neatly. Since the profile will be still warm, lay the profile on a flat surface and wait to cool down and then wash with clean water.

Upto this point the U bending is described. At the same time it is possible to bend manually into C form, arc form and S form.

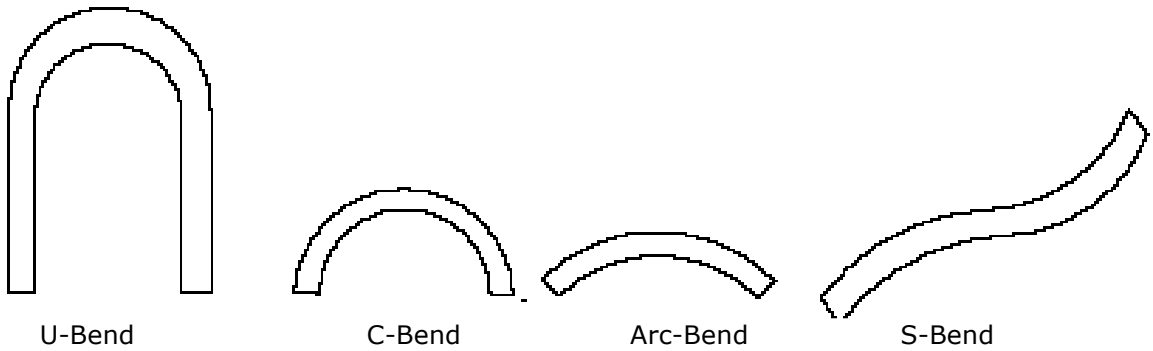


Figure 24. Various types of bends possible

Figure 25. Special form bending

Place the specially prepared template onto the work table in a best suitable position and rest the mold holders to the template and fix. Then insert the mold into the mold holders. The molds are to be adjusted such that they are inline with profile lifting pan for inserting the profile easily. When making bending according to a template the drawing apparatus may not always be used. In this case remove the hub of the drawing apparatus and only use the drawing pin socket and the body in which the pin socket is screwed.

After inserting the heated profile into the bending mold, inserted the drawing pin into its hole and to the hole on the profile. Then pull the drawing apparatus with help of two people from both ends to draw the heated profile into the molds. This has to be done by pressing the drawing apparatus on the bending molds and by holding it level. Otherwise, the drawing pin may tear the heated profile. This way, the profile is bent according to the template. The rest of the operation is as the same as in ''C'' bending or arc bending.

IMPORTANT POINTS !

1- THE HEATER TEMPERATURE MUST ALWAYS BE 120^{0}C . A ± 3^0 C TOLERANCE IS ALLOWABLE.

2- THE TEMPERATURE OF 120^{0}C IS DANGEROUS FOR THE OPERATOR. PROTECTIVE GLOVES MUST BE USED WHILE IMMERSING OR REMOVING THE PROFILE TO/FROM THE HEATER AND INSERTING INTO THE MOULD.

3- NEVER INTERFERE WITH THE ELECTRIC SYSTEM OF THE MACHINE EXCEPT AUTHORIZED ELECTRICIAN. IN CASE OF ANY PROBLEM CONSULT TO YOUR AUTHORIZED ELECTRICIAN.

4- HEATER MUST BE GROUNDED. DO NOT WORK ON THE MACHINE WHICH GROUNDING IS NOT MADE YET.

5- HEATING LIQUID IN THE HEATER DECREASES IN TIME. HEATING LIQUID LEVEL MUST BE 2CM ABOVE THE PROFILE. THE AMOUNT OF DECREASED HEATING LIQUID MUST BE ADDED TO THE HEATER WITH THE SAME TYPE AND QUALITY OF HEATING LIQUID ALREADY PRESENT IN THE HEATER. (NEVER USE WATER).

7. ELECTRICAL EQUIPMENTS OF THE MACHINE

Against short circuit and overloading, the system is equipped with fuses and thermal-magnetic relays.

In case of electric power failure and re-supply , the heater starts to work..

ELEKTRICAL COMPONENTS LIST

ITEM	CODE NO	QTY	TYPE OF MATERIAL
1	QM	1	Main switch, 500V, 3x63A
2	QHT1	1	Thermic relay 500V, 3x25A (for heater)
3	KHT1	1	Heater switch
4	HT1	1	Heater, 380V, 6KW
5	L1,L2,L3	3	Phase indicator lamps, 220V
6	N1	1	TIMER (220/220V)
7	KFBS	1	Speed adjsutment switch, 500V, 3x16A
8	KFF	1	Fan rpm switch, 500V, 3x16A
9	QM1	1	Thermic relay, 500V, 2,4-3,8A (Motor)
10	KFB	1	Fan rpm switch, 500V, 3x16A
11	M-FAN	1	Fan electric motor 220/380V , 736 W
12	QM2	1	Thermic relay, 500V, 2,4-3,8A (Motor)
13	QFC	1	250V, 6A.V switch

14	BES1	1	Motor stop buton
15	TC1	1	Thermocouple
16	BHTI	1	Termostat switch
17	H1	1	Heater Lamp
18	MS1	1	Thermostat
19	H2	1	Fan lamp
20	SW2	1	Motor start switch
21	BFAN	1	Fan motor switch
22	-XH	15	∅4mm terminal
23	QM3	1	Fan main Thermic relay , 500V 3x10A
24	-XH	10	∅6mm. Terminal .

8. LUBRICATION AND LUBRICATION POINTS

The points indicated on the Lubrication Schema (See Figure 27) must be lubricated with grease and machine oil at an intervals as shown on the below given Table

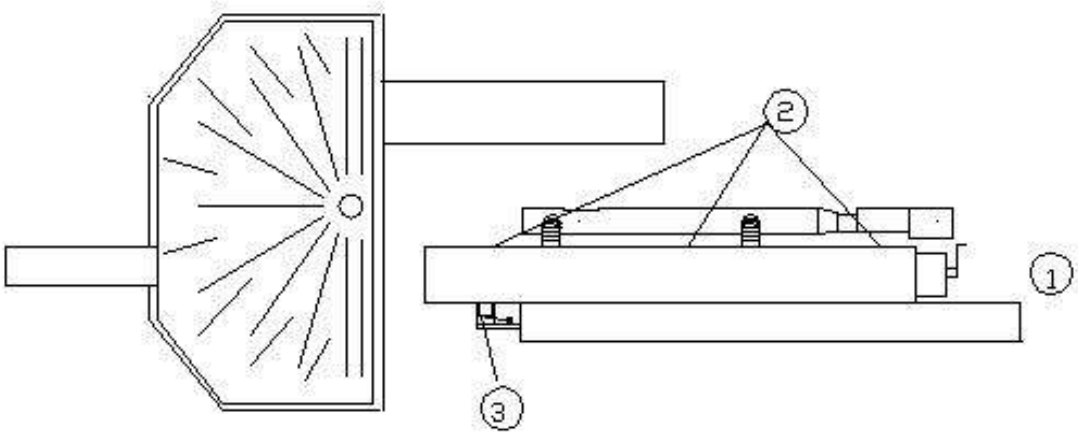


Figure 27. Lubrication points on the machine

LUBRICATION POINTS AND INTERVALS

LUBRICATION POINTS	PART TO BE LUBRICATED	OIL TYPE	PERIOD	QUANTITY (CM^3)
1	Shaft bearins	30 viscosity oil	Once every 2 weeks	0.5
2	gearbox	Grease	Once every 2 weeks	0.5
3	Heater pan lever bearing	30 viscosity oil	Once every 2 weeks	0.5

9. MAINTENANCE AND TROUBLE SHOOTING

MAINTENANCE

If you follow the below given maintenance and cleaning rules, this machine can serve you for long years.

.

1- Clean the work plate (pos 1 Figure 1) and especially the canals from the heating liquid at the end of every work day.For this cleaning work use warm water, detergent and a brush.The hardness of the brush to be used for this purpose must be such that it will not scratch the work table.
2- While washing the surface of the work plate place a bucket under the drainage hoses. This prevents the spread of water to working area
3- After the completion of washing, dry the work table and the canals completely first with cotton and then with a pressurized air.
4- If there is heating liquid left any where on the other parts of the machine clean these parts also..
5- Wash the bending molds and inner linings with the water or with a pressurized water. Then dry with pressurized air.
6- Wash the mold holders with water and dry with air.

NOTE- 1: The work table and canals not cleaned at the end of each working day, the work table and the canals will absorb the heating fluid in a short time and could cause deformations on the work table and in the canals. These deformations causes undesired traces on the profiles.

NOTE -2: The canal pieces which are removed during cleaning of the work table or for any other reason must be placed back into their place exactly in the same order as you have removed. Since canal pieces are specially made to fit each canal, the change in their order may cause deformations or traces on the bottom of profiles(See figure 28).

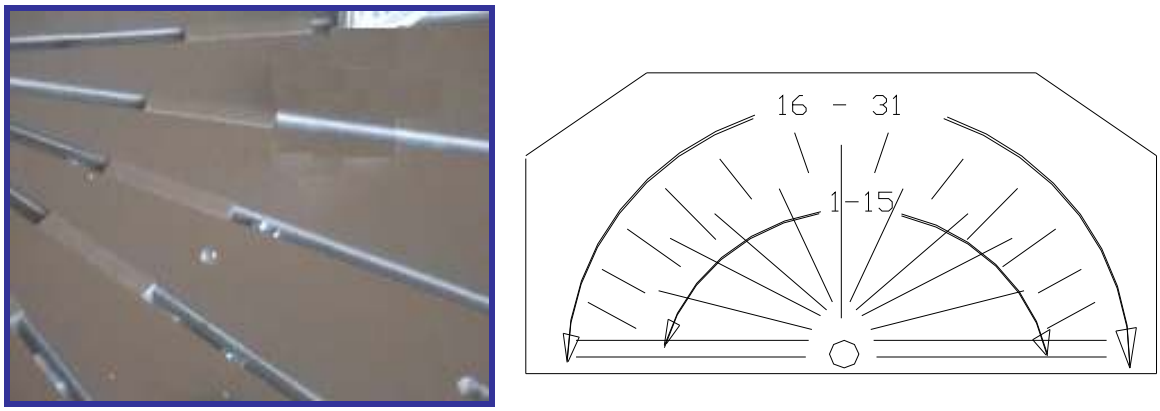


Figure 28. Canal pieces and their placement on work table

If the machine will not be operated for more than 24 hours, in addition to the above cleaning procedure, the mold holders must also be removed, cleaned and dryed completely.

TROUBLE SHOOTING

PROBLEM	PROBABLE CAUSE	SOLUTION
Heater does not work	- Main switch may be off	-Turn on the main switch.
	- Heater switch may be off	- Turn on the heater switch
	- Thermo-element may be broken	- Check and replace if necessary
	- Thermostat may not be working	- Check and replace if necessary.
	- Timer may be off	- Check and turn ON if it is off
	- Fuses may blown out	- Check the fuses in the control panel. Replace if necessary.
	- Heater cable may be broken off	- Check and replace if necessary.
	- Resistances may be faulty	- Check and replace if necessary.
Fan motor does not work	- Main switch may be off	- Turn on the main switch.
	- Motor switch may be off	- Turn on the motor switch.
	- The plug to fan not in place.	- Check and insert the plug.
	- Termal switch may be blown off	- Set the switch again.

If you are still unable to identify the problem or cannot be solved by above measures, please consult to your supplier of this machine.

WARNING !
IN CASE OF ANY ELECTRIC PROBLEM ON THE MACHINE, THE MACHINE OPERATOR MUST NOT ATTEMPT TO INTERFERE WITH THE ELECTRIC SYSTEM OF THE MACHINE. CONSULT TO YOUR AUTHORIZED ELECTRICIAN

10. ORDERING SPARE PARTS

THE PARTS POSSIBLE TO WEAR AND THE PARTS NEED TO BE REPLACED ARE GIVEN IN THE BELOW SPARE PARTS LIST

Aluminum Mold Holders	once every 3 years
Work Plate	once every 5 years

IMPORTANT NOTE !
THIS BOOKLET WILL GUIDE YOU SUFFICIENTLY DURING THE USE OF THIS BENDING MACHINE. IT IS A FACT BY EXPERIENCE THAT EVEN WITH A MOST DETAILED WRITTEN EXPLANATION OF BENDİNG PROCESS MAY NOT GIVE YOU NECESSRAY INFORMATION TO START FOR BENDING. FOR THIS REASON, WE ADVISE THAT OUR SUPERVISOR SHOULD ASSIST AND TRAIN YOUR OPERATORS DURING INITIAL USE OF THE MACHINE.

SPARE PARTS LIST

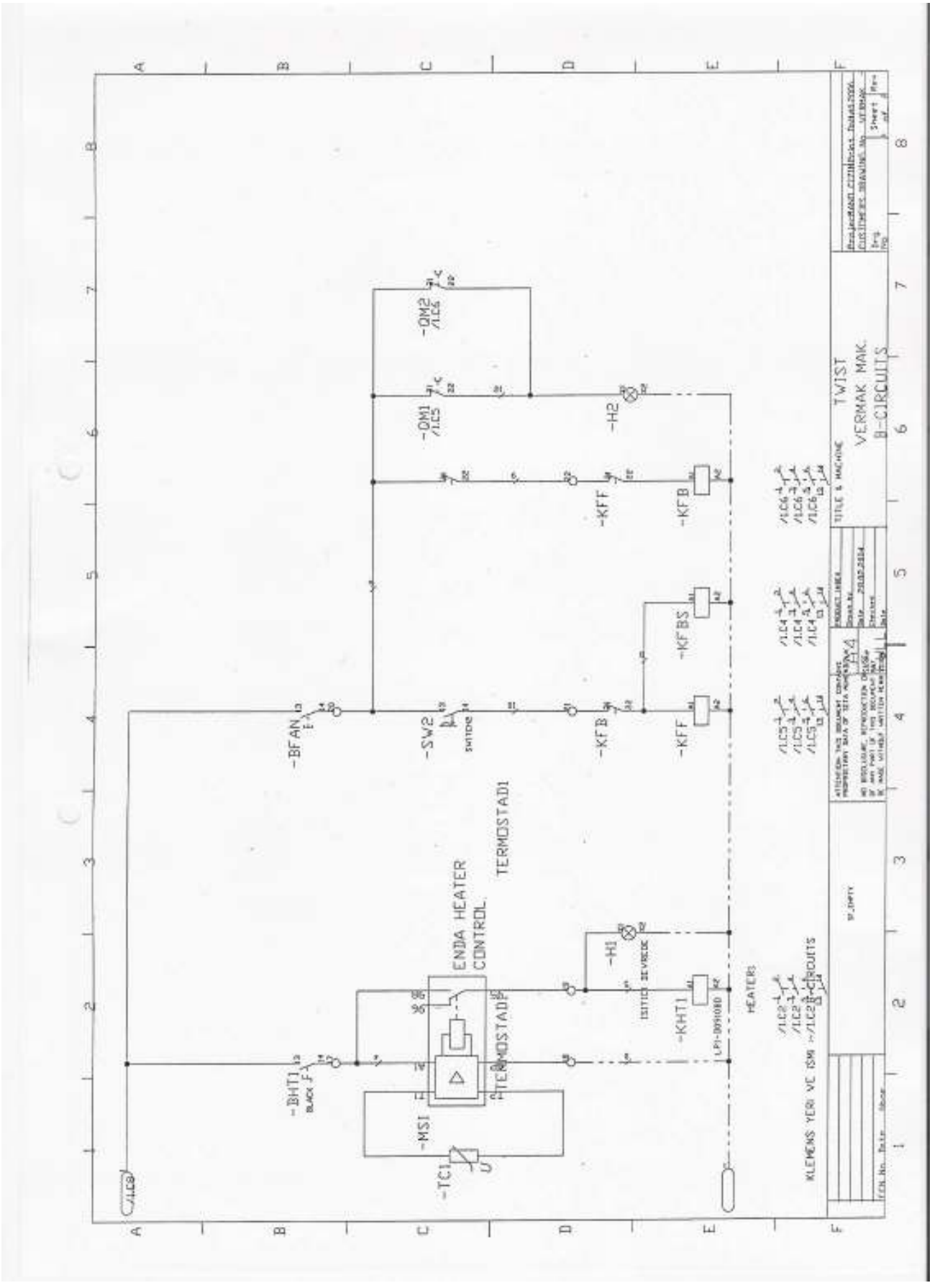
No	Name of Part	Dwg no	Qty
1	Work table (Rezopal)	1-0203-08a	1
2	Center piece (flat)	1-0203-09	1
3	Center piece (cut)	1-0203-10	1
4	Canal pieces	1-0203-15	31
5	Bearing group	1-0202-04	1
6	Movement arm	1-0202-05	1
7	Compass group	1-03	1
8	Adjustment piece	1-0301	1
9	Compass arm	1-0302	1
10	Bearing	1-0303	1
11	Shaft	1-0304	1
12	Upper cover	1-0305	1
13	Butterfly screw	1-0306	1
14	Square washer	1-0307	1
15	Drawing apparatus	1-04	1
16	Pin bearing	1-0402	1
17	Drawing arm	1-0403	1
18	Drawing apparatus shaft	1-0404	1
19	Drawing apparatus	1-0405	1
20	Mold holder group	1-05	32

11. DISPOSAL OF MANUAL PVC PROFILE BENDING MACHINE

Make **SURE** to take necessary measures before disposing the Profile Bending Machine.

- Cut all electric cables as close as possible to the unit.
- Remove the fan electric motors and detach the electric cables,
- Remove all electric components (i.e. contactors, switches, etc...) make a separate packages and inform electrical material scrap collector for collection.
- Drain the glycerine to a separate tank.
- Do not leave any parts with sharp edges.

ATTENTION !
BEFORE GOING INTO ABOVE WORK, READ ALL THE RELEATED REGULATIONS OF THE COUNTRY THE MACHINE WILL BE WORKING OR APPLY TO RELATED INSTITUTES FOR HELP AND CONSULTING.


TWIST
VERMAK MAK.
B-CIRCUITS
ENDA HEATER
CONTROL
TERMOSTAD1
HEATERS
-BFAN
-SW2
-KFB
-KFF
-KFBS
-H1
-H2
-QM1
-QM2
-KHT1
-BHT1
-MS1
-TC1