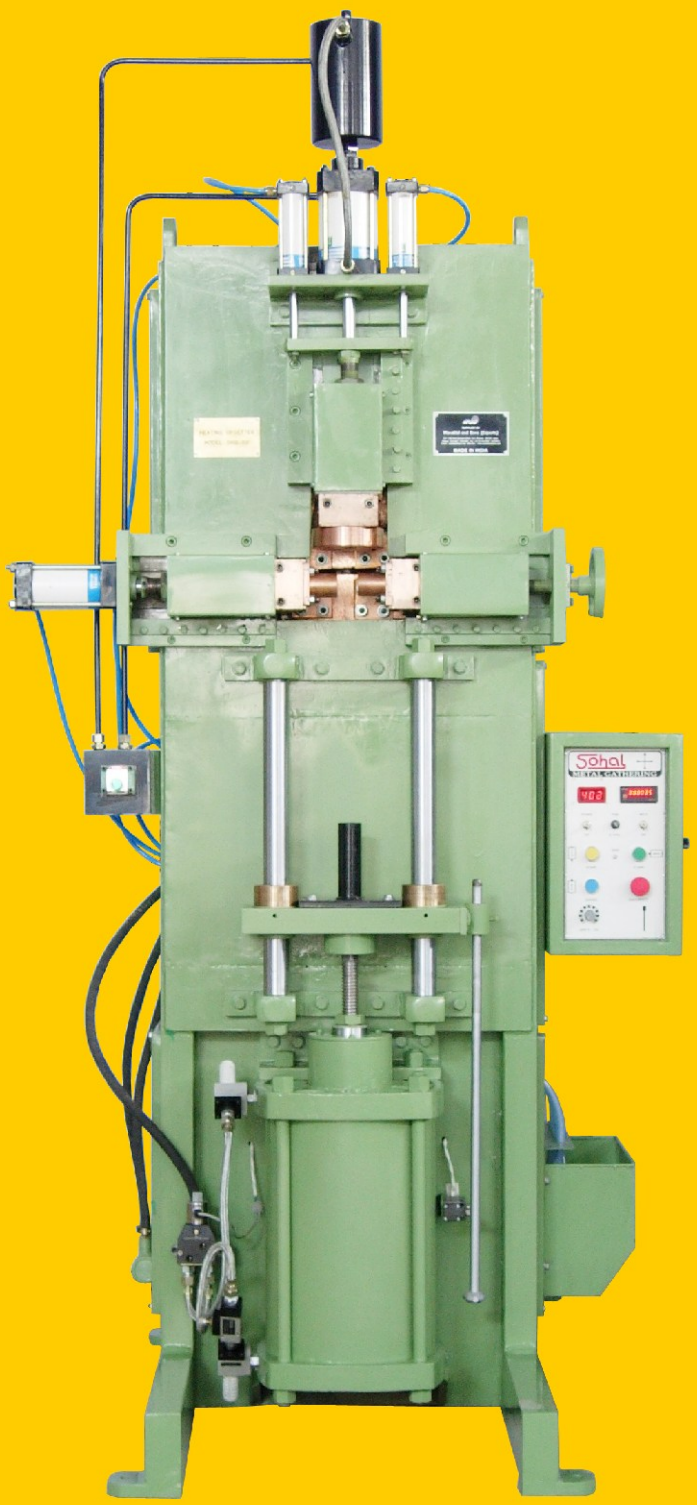
2007

Sohal

METAL GATHERING



MANUAL

INDEX:-

BASIC THEORY OF METAL GATHERING

Heat the metal to its plastic state then apply a force to gather it.

HOW ELECTRICAL METAL GATHERING WORKS

Electric power metal gathering heats the iron road on the principle of $E = IR^2$. Where E is energy (need to heat the work piece), I is supplied current and R is resistance of workpiece measured between electrodes.

The transformer in the machine converts the input electric supply to low volts and high current source, which is suitable for heating the rod. When a high current follows through rod the it will heat up. Simultaneously the rod is pushed from another side to the direction of heating zone . By the combination of heating and pushing it gets a shape of gathered bulb.

POSITIONING & MOUNTING

Mount the machine straight. The machines is designed to work only in vertical position. Keep a minimum of 1.5 feet free space around the machine, It helps in cooling, maintenance and daily check the devices attached outside the machine. Position the machine inside to prevent it from rain, moisture, sun-heat etc. Never fix Power ON-OFF switch on the machine, it's dangerous. Place the power switch on wall or on a stand near the machine to give ease to operator to switch off the power when machine malfunction. Proper electrically ground the machine. Never mount it near grinder, buffing machine etc. Because these produces metal dust that gear reduction in machine's life and sometimes make short circuit in switches and even in machine results in damage of machine.

INSTALLATION

Connecting Water :

First, connect the water supply at input barrel and connect a drain pipe to water output tank. Open the water valve, wait for a minute and watch all the water outlets fixed above water out tank , if water falls from all out-lets then it means water circulation is correct. There should be no leakage of water, check gathering electrodes, if leakage
found stop the leakage by tighten bolts or electrodes. You should be careful about to not use any type of thread, solution or compound to resist leakage, they resists the current following that results in malfunction of machine.
After testing water connection & circulation close the water valve.

Connecting Air :
Connect compressed air to the air input. The connected pressure must not increase (10 Kg/mm square) . The required input pressure should be near 6 to 8 Kg/cm square.

There are two FRL units fixed above air input socket. Adjust air pressure between 3 to 6 Kg/cm square as required on each FRL. 4 Kg/mm square is Idle. Shut the air valve, release all the air in FRL and then add a lubricant oil (hydraulic oil preferred) in lubricator bowl up to maximum mark. Adjust the lubricator so that all the added oil consumed with in month, when the machine is scheduled for 8 hours working.

FRL means :

F = Filter , It remove dust, emulsion, water & hazard particles from air and supply clean air. The removed impurities stored in filter bowl. There is a button at the bottom of filter bowl, Press the button in daily routine to remove the impurities stored in the filter boul.
R = Regulates the air pressure to supply the air at a constant pressure that can be set by the user by rotating knob above it.
L = Lubricator, It mixes the lubricator oil in air according to a adjustable proportion that is stored in lubricator bowl. There is a knob provided on the lubricator to adjust how much oil mixed in air to lubricate pneumatic devices. Oil mixing can be seen in a indicator near the knob, when air moves the oil drops falling in indicator shows how much oil is mixing in air.

Note: FRL is combination of three different devices. In the past these three devices comes separately and combined with sockets, Now these comes in form of two devices, First is filter-Regulator (one piece) joined with another is lubricator (one piece).
After setting air pressure close the air valve.

Connecting Supply :

Connect Electric supply from electric source at the back of machine. Don't forget to connect ground the machine, if grounding bolt has not provided, then open any window bolt near the bottom of machine , Scratch paint around it and tighten the ground wire down the bolt.

Input : 415 - Volts +- 10%, 50-Hz.

Recommended things :

Cable = 35mm2, 2-Core.

Switch = 200 Amp. with 200 Amp. Fuses or 150 Ampere MCCB.

Effects of supply:

Voltage : We give no guarantee of machine to work at lower voltages, But the machine is capable to work from 350 volts with some loss in output KVA.

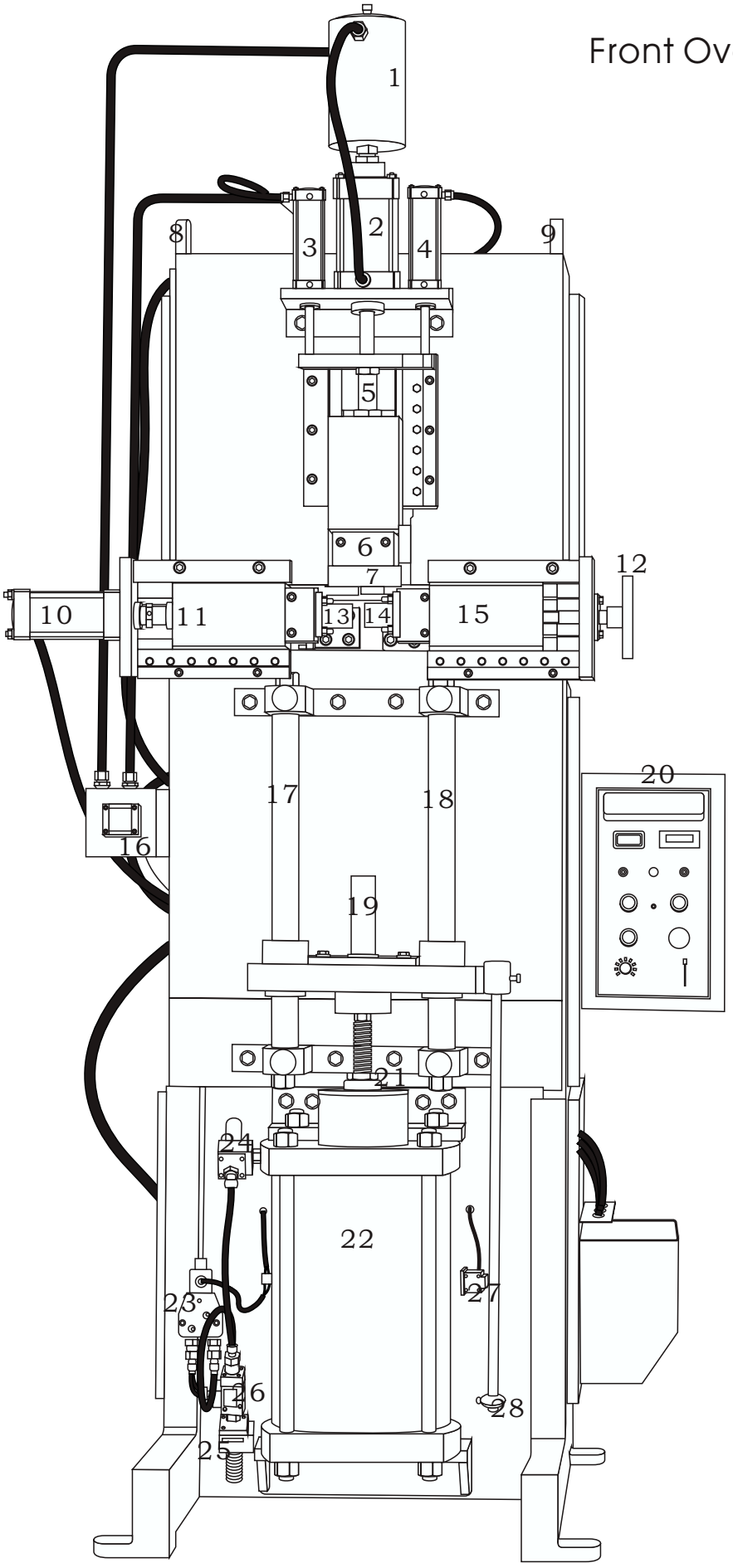
Frequency : The machine is designed to give is optimum performance at 50-Hz supply. In case if you connect it to a 60-Hz source, it will work without any problem but shows some change in current (heat) setting, that is its minimum and maximum current will be little lower.

Press the power on switch on the control panel, be sure heat-on switch is on off position. An indicator if mounted or a voltmeter and a counter indicates the power is connected.

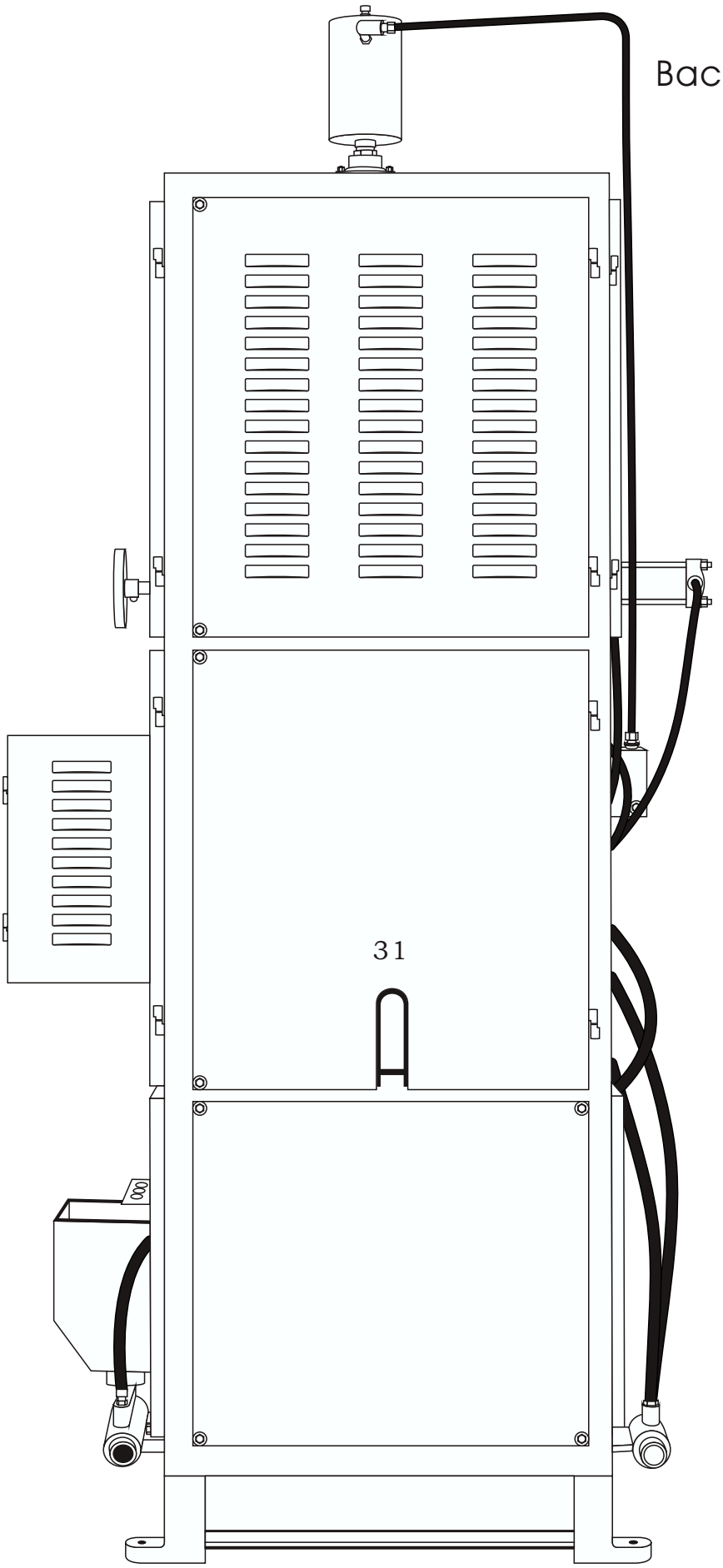
Switch off control panel then switch off the power switch. The power testing is done.

BRIEF DESCRIPTION OF ALL PARTS:

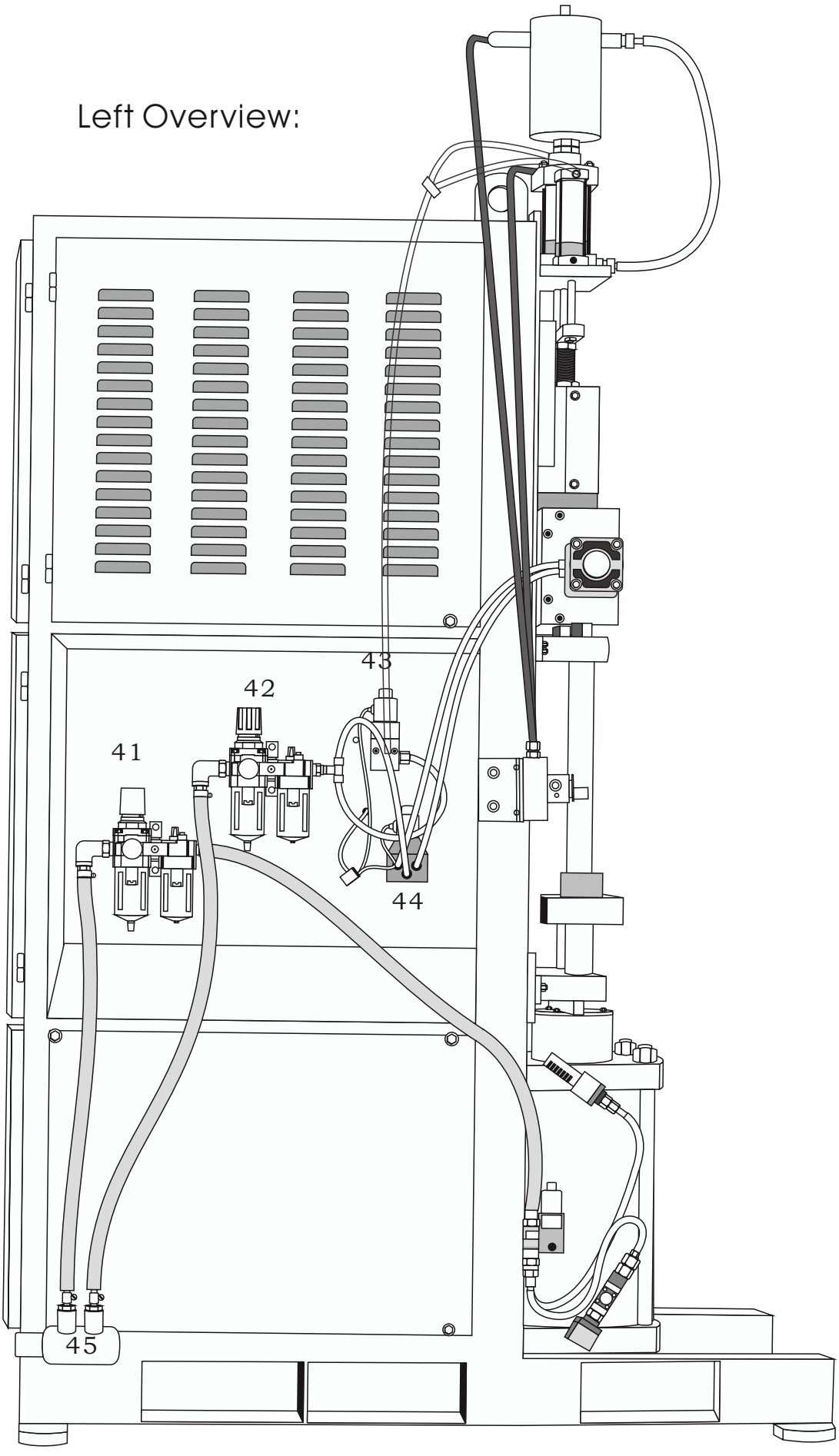
Front Overview:



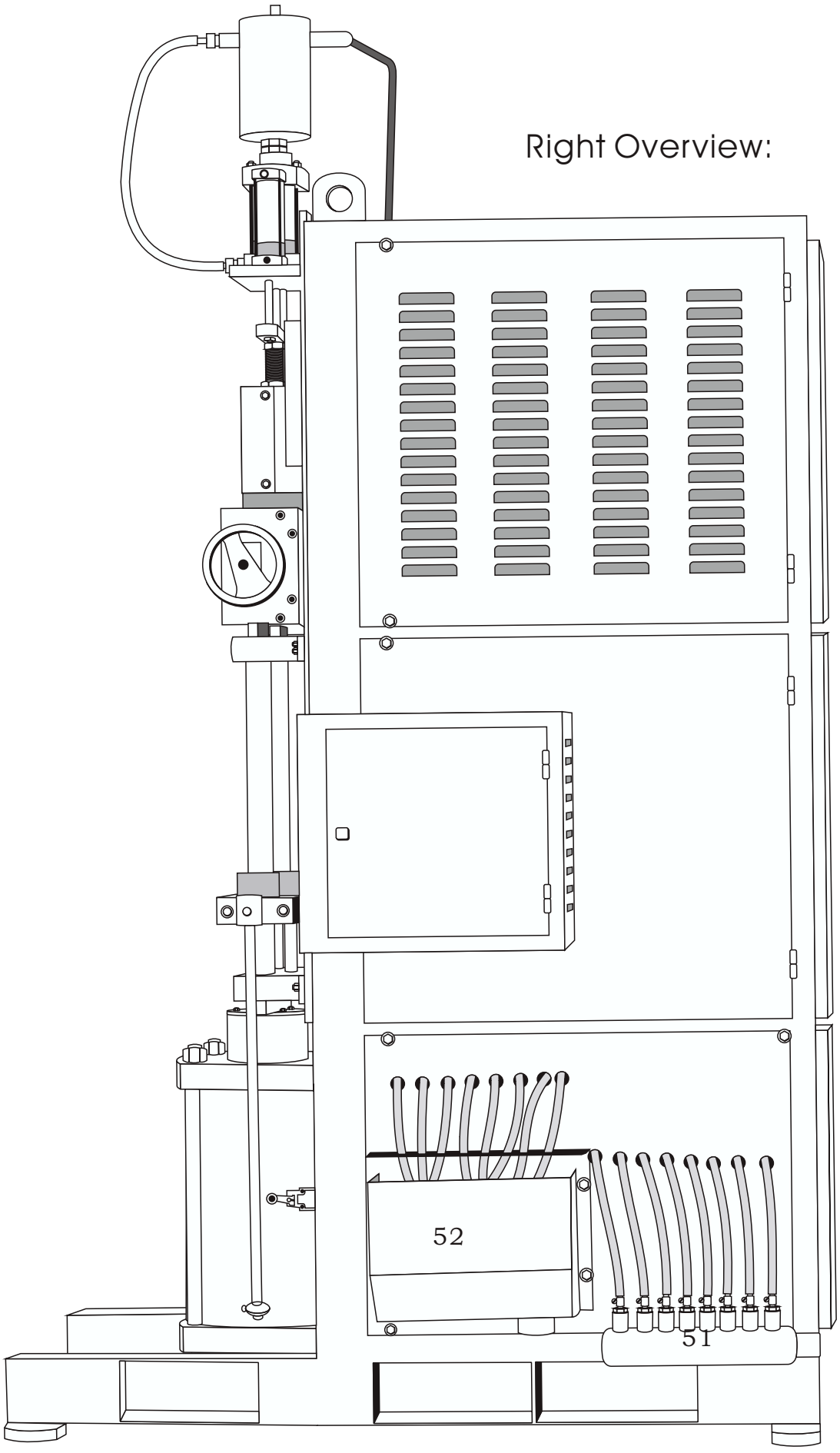
Back Overview:



Left Overview:



Right Overview:



1. Oil Reservoir: It contains Hydraulic Oil that goes in top cylinder (Item2) by pressing down button from control panel. When gathering cylinder (ITEM 22) push top cylinder back the check valve between tank and cylinder block the oil flow then oil returned to reservoir tank throw Flow Controller (ITEM 16). By controlling oil flow by rotating flow controller Knob the speed of cylinder should be controlled.

2. Hydraulic Cylinder: see @ 1.

3. 4. Pneumatic Cylinders: When Direction valve will on these cylinders push the Top Electrode downwards near side electrode s.

5. Adjuster: This is screw and two nuts used to set the gap between upper and side electrodes. Be careful do not short circuit upper electrode with side electrodes. Maintain a minimum of 10mm gape between upper and side electrodes.

6. Flow Control: Controls Hydraulic Oil flow from cylinder (Item 2) to tank. Results in speed control of Upper Electrode.

7. Upper electrode: It holds the work piece from top and supplies current to workpiece. When machine is in production after some time a dump is produced in electrode, if needed rotate the electrode. When electrode would worn replace it with new one.

8. 9. Lifting Hooks: Machine is balanced on these hooks, use these to lift the machine.

10. Side Cylinder: It clamps the workpiece.

11. Adjuster: Use this adjustment to set the gap between workpiece and left side electrode.

12. Center Adjuster: Use this adjustment to place or clamp workpiece vertically straight.

13. 14. Side Electrodes: These both make a second electrode against top electrode (Item 2) and used for supply current to workpiece.

15. Lock Nut: After adjusting Item12. This nut is used for lock the adjuster.

16. Flow Controller: It controls the backward movement of upper electrode. Lower the speed wider the resultant gathered head, Increase

in speed results in longer gathered head.

17. 18. Shafts: Guide the workpiece holder.

19. Workpiece Holder: It holds the work piece. If the workpiece is thin assume 8mm and it bends during operation, use a long holder to support it.

20. Control Panel: All electrical controls are placed on it.

21. Adjuster: Set the workpiece holder height according to length of workpiece.

22. Gathering Cylinder: It is high bore 10 or 12inch Pneumatic Cylinder apply necessary force on workpiece to gather it.

23. Direction Valve: This valve is used for gathering cylinder to move it up & down.

24. 25. Quick Exhaust: These are for quicky exhaust the air stored in cylinder when direction valve changes the direction of cylinder. Because of it is big cylinder. The machine can operate without these valves with a significant reduction in backward speed of cylinder.

26. Flow Control: Control the upward speed of gathering cylinder. It is used to correct the error of workpiece bending.

27. Limit Switch: When this switch triggers gathering operation stops and workpiece will be free to remove from machine.

28. Limit Switch Trigger: By this trigger set how much length of workpiece you want to gather.

31. Supply Cover: A connection plate and Insulators placed below this cover for connecting Power Supply. Please Note, Behind connection plate SCR are placed whether on cooling fills or a Water Cooled SCR assembly booth these components carry supply voltage and are bare without any safety insulation.

41. FRL 1st: It cleans regulate and lubricate air supply for directional valve (Item 23) and gathering cylinder. Note: FRL is a set of three components Air Filter, Regulator and Lubricator. There is a rotating,

pushing or another type of knob according to company placed on bottom of filter operating this daily clean waste stored in filter, if you don't do this direction valve may malfunction or permanently disabled.

42. FRL 2nd : It cleans regulate and lubricate air supply for gathering cylinder. Note is same as for Item 41.

43. Direction Valve: It operates cylinders (Item 3. 4.). It is one way valve and only moves cylinders down.

44. Direction Valve: It operates clamping cylinders (item 10.).

45. Air Distributer: This is used to split the air supply in two parts and supply to FRL 1st and 2nd.

51. Water Inlet: Connect cooling water at Inlet.

52. Water Outlet: The water out from all pipes fall in this tank. A plug is provided at bottom of it to connect drain pipe. Note: Check daily that water comes out from all pipes. If water is not coming from some pipes the input water pressure or flow of water is low. Correct the water supply. A quarterly cleaning (de-scaling) of water pipes is necessary by sulfamic acid (H3NO3S) or approved de-scaling chemical in your country. Please make contact with a service provider that provide cleaning service for dyeing plants for de-scaling machine pipes. De-scaling is necessary otherwise you may use distilled water.

Start operating Machine

Open the cooling water.
Open the compressed air..
Switch on the mains.
Switch on the power on switch on the control panel.
A indicator or a meter lights shows power is on.
Check Heat On should be off.

Command
Push the down button.

Action
The upper electrode moves down.

Put a rod on stay plate, the gap between rod and upper electrode should be in-between 0 to 5 mm, so according to rod length adjust the stay plate up or down.

Command
Push the clamp button.

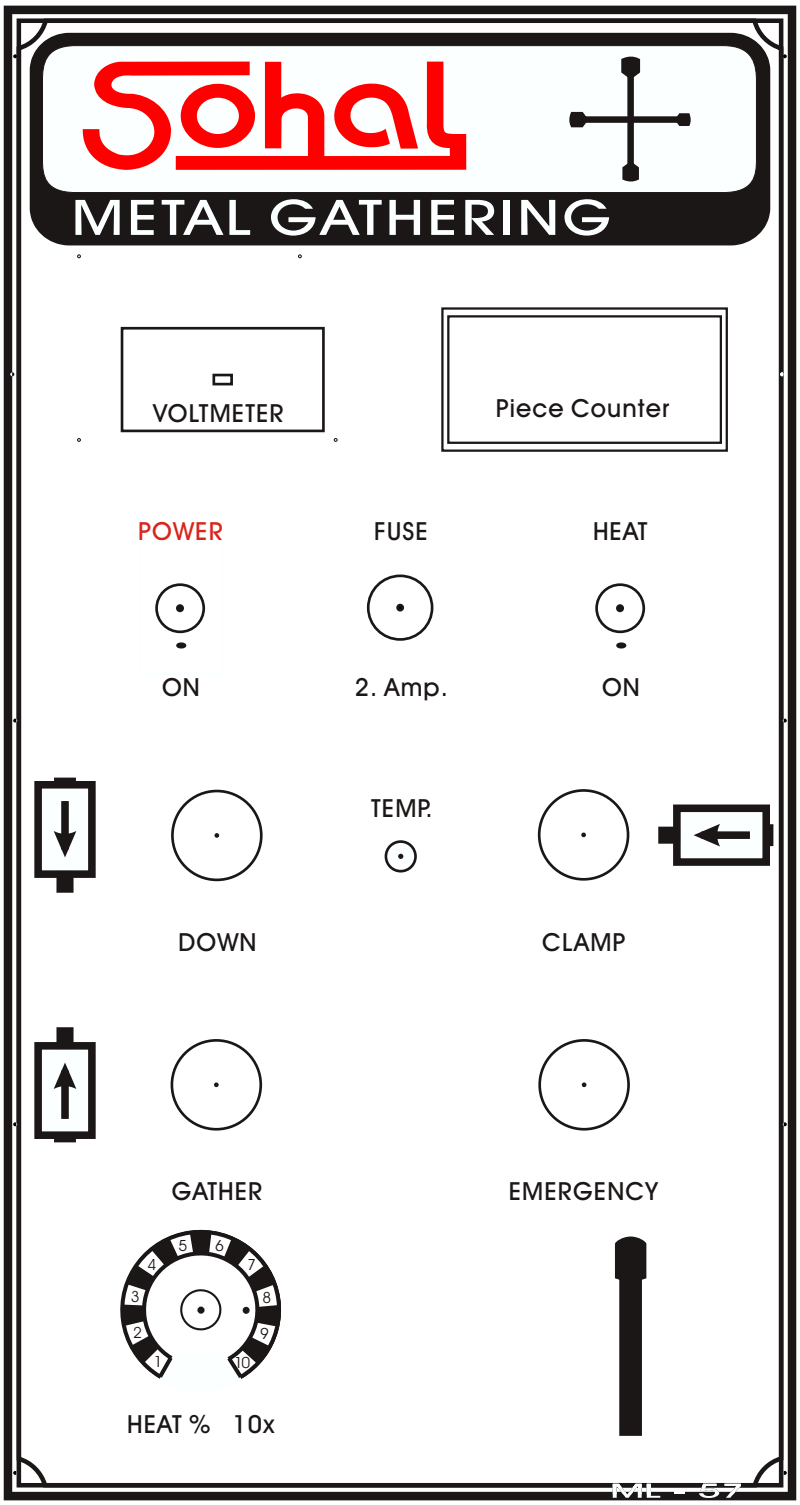
Action
The rod is clamped

Command
Push up button

The lower cylinder starts pushing rod upwards. After 2 to 5 seconds the current flows and supply the heat to rod (work piece). The upper electrode moves up-ward with a speed set by hydraulic flow control. Faster movement less wide but long gathered bulb made, lesser the speed wider the bulb but short length bulb produced. How much rod to be gathered is adjusted from stopper near lower (gathering) cylinder. When stopper press the limit switch machine stops gathering and release the rod for next operation.

Note:
Press EMERGENCY button any time in-between gathering process to stop gathering.

LAYOUT OF CONTROL PANEL



ADJUSTMENTS

Air Pressure : Idle between 4 to 6 Kg/cm square.

Pneumatic Flow control : It controls the lower cylinder speed. Operator can set it to maximum speed, if rod will not be bent by lower cylinder's excessive force. Please note cylinder speed can only be seen, if you operate the machine with-out rod (work piece).Much lower set speed stops the up-wards movement of rod hence stops gathering process and a little blast can be happened between upper and clamping electrodes.
But it has no bad effect or damage to machine.

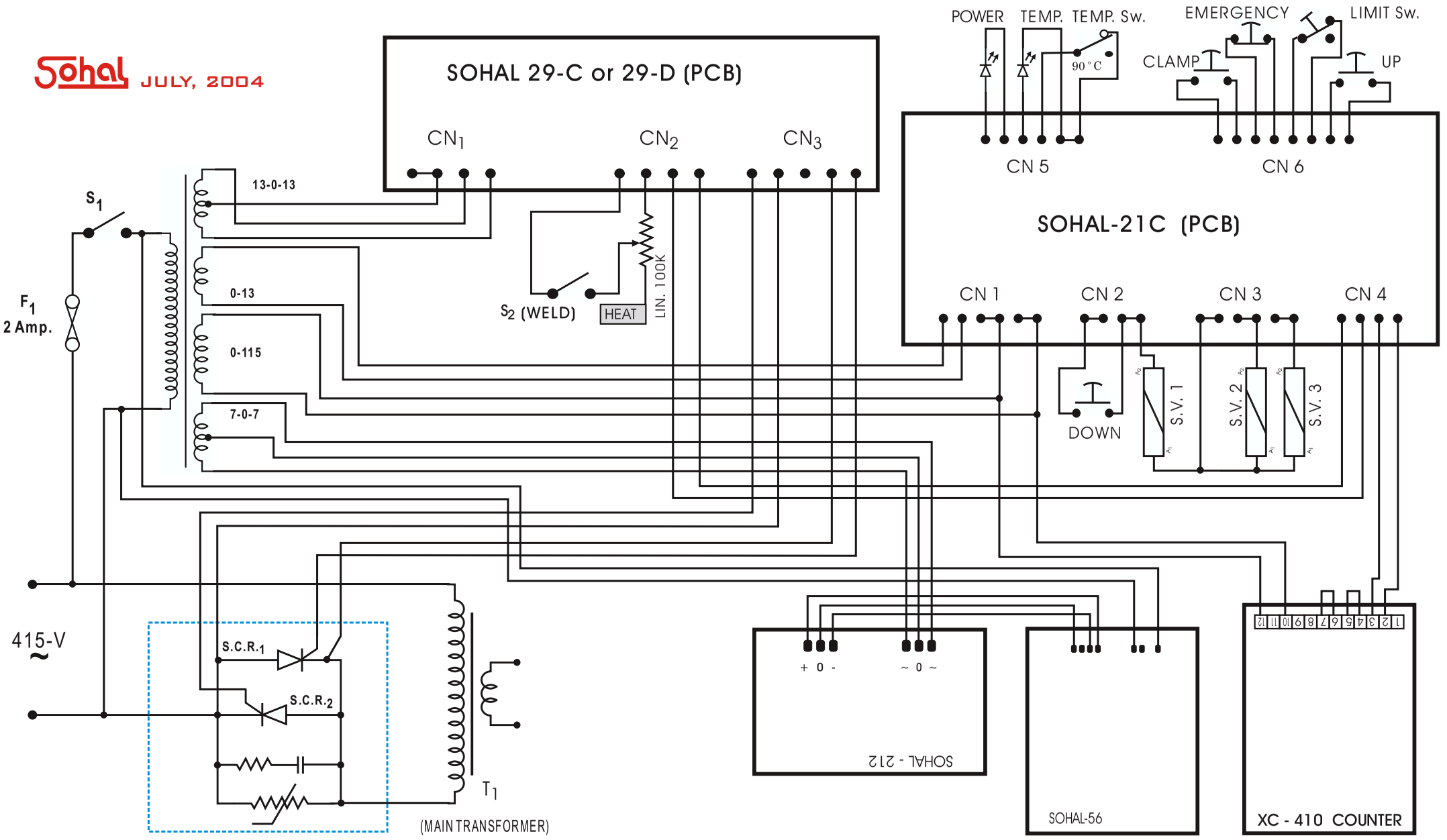
Hydraulic flow control : Set the speed of upper electrode, so that it moves back (up-side) slower or fast when pushed by rod.
(lower cylinder pushes the rod).

Heat (Current) : Maximum the heat maximum the gathering speed and maximum load on electric supply.
Lower current setting stops the gathering process or much lower gathering speed and insufficient heat for forging.
Excessive current put the material out from rod and over heats the rod.
Adjust the speed so the rod will gather with in 15 to 45 seconds. As suitable for your job.

CONNECTION DIAGRAM OF METAL GATHERING MACHINE (MODEL - SMG XX_ML57)

* Temp. Switch Mounted On SCR Assembly

Sohal JULY, 2004



APPENDIX A

Forging Temperature for Iron = 1230 degree Celsius.

Supply Formulas for (1 or 2 phase load) :

$$KVA = \frac{\text{Supply Volts X Current}}{1000}$$

KW = KVA X P.F.

If P.F. can not measured assume it 0.8, because it is average power factor of good quality machines.

Calculation of electricity cost :

Cost = KW X Machine load Time (in hours) X cost per unit

Note 1 : load lime is the time for which machine actually consume electricity, when machine is On but not gathering work piece that time can not be included in load time.

Note 2 : 10 minute = .166 hours
30 minute = 0.5 hours

APPENDIX B

Cracking: If a crack or flaw is seen after forging or in finished product. There is no role of machine, these cracks was in your raw workpiece (rod). Use another testing method to find cracks in rod without gathering it.