

BAINPOL VT

8"/10"/12(Disc Size)

Instruction Manual



Variable Speed Single Disc

Table Top Polisher

Chennai Metco

Intended usage

This Bainpol VT polishing machine is used in metallurgical lab for the purpose of polishing to get superior surface finish so that, it can be used for viewing the microstructure or for any process/test such as Micro Vickers' hardness test that require a smooth surface finish. Excellent surfaces finishes are obtained through proper selection of the abrasive papers, polishing cloth and polishing paste or suspensions.

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Take a Moment to familiarize yourself with the location and names of the Bainpol VT components.



1.Coolant Jet 2. Coolant Valve 3. Feather Touch panel 4. FRB Cover 5. Polishing Disc 6. Water Splash Guard 7. Emergency Stop

Feather Touch Board (Front Panel)

a.RPM/Time Increment, b.RPM/Time Decrement, c.Disc Forward/Reverse

d.Disc Stop/Run, e.Power On/Off, f. Digital Display

1. SAFETY

1 Safety

1.1 Proper Use

1.1.1 Principle

The **Bainpol polishing machines** are designed in accordance with recognized technical research and experience and safety regulation. Failure or ignorance to properly install, operate and maintain the machine/system may result in a high risk of serious or fatal injury to users or third parties or result in unnecessary damage of the flow of process or the system or other equipment.

1.1.2 Permissible Operation

The machine/system is a technical working appliance, designed exclusively to grind/polish sectioned and mounted (sometimes non-mounted) materials for metallographic purposes. The machine/system is a technical means of achieving, exclusively, low volume grinding/polishing of materials. Any other usage is regarded improper. Any liability on the part of the user for damages resulting from an improper machine usage is excluded. The risk has to be borne entirely by the user. The following are some examples of the machine/system misuse:

- Using on other industry or application.
- Using other than recommended lubrication oil on the machine.
- Untrained personnel operated this machine/system

Proper usage also includes compliance with operating, servicing and maintenance requirement specified by the manufacturer.

1.1.3 Safe operation of machine

The machine must only be used in a technically error – free condition and according to proper operating practice in a safe and risk conscious manner while observing and heeding all caution or danger tags attached to the machine or included in this manual. Malfunction that can impair safety must be remedied immediately.

1.2 Level of hazard

Symbols are used to call attention to hazards or unsafe practices which could result in an injury or property damage. The signal words, defined below, indicate the level of the hazards. The message after the signal word provides information for preventing or avoiding the hazards. While reading your manual pay close attention to areas labeled the signal words.

DANGER!



Indicates an imminently hazardous situation, if not avoided, will result in death or serious injury.

WARNING!



Indicates a potentially hazardous situation, if not avoided, could result in death or serious injury.

CAUTION!



Indicates a potentially hazardous, if not avoided, might result in minor or moderate injury. It can also indicate possible loss of materials or damage to the equipment.

1.3 Safety information

Read and understand all the instruction and safety information in this manual. Everyone who works on or around this equipment including, but not limited to, operator, maintenance personnel, and supervisory personnel must read and understand the information in this chapter prior to commencing work on or around this equipment. Failure to conform to the information in this chapter could lead to property damage or serious personal injury including possible loss of body parts or death. This chapter only describes proper safety procedures to follow when working with this equipment. Please refer to the instruction manuals delivered together with the installation of your equipment. Please ensure that all work described in this manual is carried out in a good environment / workshop using proper tools and equipment.

1.4 Protection for Installation, Operation and Maintenance Personnel

In addition to the safety information included in this section, always observe all specific safety information included with the instructions in balance of this manual. As manufactured this equipment has been equipped with safety devices which correspond to current technology standard in accordance with the prescribed applications of this equipment. However, residual risks remain to which attention is drawn individually within this machine manual.

Instruction obligation: The operating company must verify that:

- Personnel have the necessary technical, equipment-specific, and safety knowledge or that is achieved by means of relevant training before the equipment is installed, operated, or maintained.
- Personnel have the necessary competence to be able to work on accordance with the regulations and instruction.

- Before initial startup, personnel have to read and understand all instructions contained within the supplied documentation.

Equipment obligation: The operating company is required to equip personnel with the necessary protective clothing as follows:

- Safety shoes
- Safety gloves
- Safety goggles

1.5 Protection for Third parties

The operating company must also make persons who are not charged with the operating or maintenance of the equipment aware of the dangers.

1.6 Common Sense of safety

Accidents frequently occur due to carelessness or lack of knowledge. To avoid potential problems, review the information in the section before attempting to install, setup, operate, or maintain this equipment. Think safety at all the times. Do not let familiarity with the equipment lead to unsafe short cuts. The following common sense safety practices must be observed at all times.

1. Follow all procedures and precautions in the manual carefully and completely.
2. Only attempt repair or adjustments for which proper training has been completed.
3. Always observe all safety warnings and notices on the machine and in the manual.
4. Do not remove or otherwise alter any guards or panel unless the machine is completely shut down and has been made inoperable. Be sure to replace these items before restarting the machine.
5. Never operate the equipment without guards and safety mechanisms in place and functional.
6. Do not allow foreign object to fall into machine.
7. Always use the proper tools for performance of any operation on the machine. Whenever feasible, use voltage-isolated tools.
8. Do not touch any parts of the machine which may have become hot during operation.
9. Do not wear neck ties, jewelry, loose clothing, and long hair.
10. Wear or use gloves, goggles, safety shields, ear protection, and other employer recommended safety equipment. Wear protective clothing to prevent burns.
11. Disconnect power and lock out all switches before attempting to adjust or manipulate any moving parts or mechanism on the equipment.
12. Be aware that there are high voltages in this device when power is connected. Power must be disconnected when the device is being repaired. However, because there are certain checks and adjustment that can be made only with any power connected, it is imperative that only trained personnel, aware of the safety hazards involved and familiar with this type of work and necessary safety precautions, be permitted to perform this work.
13. Maintain good housekeeping practices to prevent slips, falls, cuts, burns, and other possible accidents. Keep the area all necessary items properly organized.

14. Even though the plant may be equipped with automatic sprinklers or other means of the fire protection, portable fire extinguishers should be available to the machine operator. To be effective, portable extinguishers must be reliable, the proper type for each class of fire that may occur in the area, in sufficient quantity to protect against the exposure in the area, located where they are readily accessible for immediate use, and maintained in perfect operating condition. They must be inspected frequently, checked against tampering, recharged as required, and operable by are personnel who are trained to use them effectively and promptly.

1.7 Hazard Warning Label

WARNING!



Personnel are requested to confirm the location of, read and thoroughly understand contents of all of hazard warning labels applied to this machine prior to work.

Hazard warning labels are applied on the machine where potential hazards are potential hazards are potentially present during operation and maintenance activities.

Hazard warning labels are in appropriate sizes and colors that catch attention of personnel's eyes and have symbols that show hazard types, in addition to descriptions of warning contents.

1.7.1 Types of Hazards Warning Label

The following safety warning labels appear on the system.



"Warning of Dangerous Electric Voltage"

1.7.2 Location of Hazard Warning Label



Users are **NOT** allowed to change the location of hazard warning labels. Make sure to apply new labels upon replacement of the peeled off or worn out labels



- **Electrical Control**

This warning label is labeled on the “**Electrical Control Board**” which contains voltage sections that can physically damage inside.

Electric system inside the **Electrical Control Panels** contains highly hazardous high voltage sections.

Turn off the system **Main Switch** before maintenance, to prevent electric shock accidents due to contact with such high voltage section.

1.8 Safety devices

1.8.1 Main Switch



The system is provided with a main power switch to interruption of power supply. The system must be switched off via the **Main Switch**. **To be safe, the main switch is to be switched off when the following works are carried out:**

- Cleaning
- Maintenance
- Repair



The Main switch is located on the rear side of the machine. ‘ON’ or ‘OFF’ is mentioned over the switch and a light is provided to indicate if the main switch is on.

1.9 Turning off the machine

1.9.1 Main Switch turn-off

DANGER!



Anyone who carries out servicing of this machine is requested to recognize the importance of switching off the main switch before any service.

WARNING!



When more than one person performs service at the same time, appoint a "supervisor" who supervises all the persons.

Supervisor is requested to be aware of working status all the time, and to carry out the service procedure.

The purpose of turning off the main-switch is to prevent unexpected startup and release of accumulated energy in order to protect any personnel during maintenance and inspection process. The main-switch is placed at the back so that the machine wouldn't start by mis-pressing buttons in the front when the main-switch is turned off.

1.10 Disposing Individual Component

CAUTION!



Reusable raw material and problem material.
Environmental pollution.

- Protect the environment by correctly disposing of a recycling raw materials and problem materials

WARNING!



Be careful while handling waste fluid, which may corrode skin and clothing upon contact.

- Machine frame and all mechanical machine components are made of steel, light metal and plastics. These materials are recyclable.
- Take non-reusable difficult waste, lubricant and batteries, to the appropriate waste disposal point.

- Seal any used parts possibly exposed to toxic or corrosive material prior, in inside of vinyl bags. Apply certain marking to all of the disposal bags to identify possible contamination.
- Drained water or suspensions during working must be collected in the proper way and disposed to the correct waste point.

2. Transport

2.1 Unpacking and Inspection

Inspect equipment and shipping crate immediately upon receipt. Check the packing slip carefully and make sure all the materials have been received as indicated on the packing ticket. If any damage apparent, you should both report it to the trucking delivery person and contact the transportation company immediately. When submitting a claim for shipping damage, request that the carrier inspect the shipping container and equipment.

2.2 Unpacking Location Environment /Cautions

CAUTION!



Interrupt the unpacking procedure and contact the responsible forwarder once any obvious abnormality such as abnormal noise/odor is found during unpacking.

Do not unpack in a location where any of the following conditions apply.

- Unbalanced
- Location with direct humidity (including rain and fog) intrusion
- Location with possible acute temperature change
- Location with strong vibration; also, do not place any product on such location
- Dusty

2.3 Transporting Machine with Box/Crate

DANGER!



Risk of death or severe crushing of limbs

- Pallet jack or lift manually using hands according to the total weight to be transported
- Do not stand in front of the transport item during transport
- Proper size of pallet shall be used for transportation

DANGER!



Before lifting and placing on the table, care should be taken so that the equipment with the

Equipment and tools to be used:

Pallet Jack



The forklift or lift truck employed must fulfill the following minimum requirements:

- Carrying capacity according to the total weight (machine/system and transport packing), see shipping papers.
- Length of the forks should be at least 920 mm
- The distance between forks should be such that the mass of equipment is rested on a stable manner over them.

- i. Insert the pallet jack carefully under the box so that, the entire area of the box rests over the fork stem.
- ii. Lift it to a safe level so that, the box can be moved with ease.

2.4 Unload Distribution Box

DANGER!



Risk of death or severe crushing of limbs

- Pallet jack or lift manually using hands according to the total weight to be transported
- Do not stand in front of the transport item during transport
- Proper size of pallet shall be use or transportation

DANGER!



Before lifting and placing on the table, care should be taken so that the equipment with the box lays flat parallel to the floor

Equipment and tools to be used:

Pallet Jack



The pallet jack employed must fulfill the following minimum requirements:

- Carrying capacity according to the total weight (machine/system and transport packing), see shipping papers.
- Length of the forks should be at least 920 mm
- The distance between forks should be such that the mass of equipment is rested on a stable manner over them.

Note: The centre of gravity of Distribution Box is not in the center and depends on the outfitting of the unit.

- Place the Distribution Box into proper size of empty pallet.
- Place the pallet jack insertion position on the pallet.
- Move the pallet jack and transport to the installation site.
- Place Distribution Box according to installation plan.

2.5 Unload the Bainpol Polishing Machines

DANGER!



Risk of death or severe crushing of limbs

- Pallet jack or lift manually using hands according to the total weight to be transported
- Do not stand in front of the transport item during transport
- Proper size of pallet shall be use or transportation

DANGER!



Before lifting and placing on the table, care should be taken so that the equipment with the box lays flat parallel to the floor

With proper man power(requires two or three humans), depending on the weight of the machine, the machine is lifted and placed on the table.

- i. Two/ three people should insert their hands below the base of the polishing machine.
In case if the machine is too big to handle and is to be placed on the floor, the machine is carefully lifted from the pallet trolley and placed on the spot.
- ii. Lift the machine in a coordinated manner so that, the machine stays flat while lifting
- iii. Place the machine over the desired spot and then retract hands.

2.6 Relocating the polishing Machine

2.6.1 Preparing for repositioning

- Turn off the Main Switch of Electrical Control Panel and remove attachment of the main power supply to system.
- Remove the connecting pipe between Oil Tank and Distribution Box.
- Secure all the parts on the polishing machine

2.6.2 Repositioning of unit

- Repeat the step on Section 2.4

3. System Features and Principles of Operation

3 Machine Features and Principle of Operation

3.1 Introduction

The **Bainpol polishing machines** are exclusively designed for polishing materials for metallographic analysis. Polishing, in one or more final steps, in specimen preparation is to get mirror finished surface. This process is necessary to get a clear view of the microstructure in the specimen. Depending on the type/model, the machine offers that, the polishing programs can be programmed through a **Programmable Logic Unit (PLC)** for polishing sections efficiently. For this reason, the user can increase the quality and quantity of the surface finish obtained during polishing. In primitive models of polishing machines, graphical display board is used to display the parameters of polishing.

3.2 Machine Description

Bainpol polishing machines are exclusively designed for the metallurgical sample polishing. The machine consists of a motor that rotates the disc(s) through a belt drive mechanism. Depending on the requirement, the machine comes with or without a stand.

The range of machine consists of Manual, semi-automatic or fully automatic types depending upon the degree of automation required. The automated movement offers precision and reproducibility. The manual polishing machines is designed to offer maximum user friendliness and safe polishing action. The advanced touch screen option in select models allows the user to enter and store the polishing parameters for easy storage and retrieval of polishing data.

3.3 Machine Content

The Bainpol Machines consists of the following assemblies

- Electrical Control Panel assembly
- Lubricant assembly
- Mechanical Assembly

3.3.1 Electrical Control Assembly

The electrical assembly consists of rotation start, rotation stop, lubricant/coolant on and off and rotation-direction-swap. In automated machines there is a separate head that can apply a controlled force on to the specimen during polishing. This requires a compressor to derive pneumatic pressure. The force, speed of rotation of head (in which the specimens are held), speed of rotation of the disc on which the abrasive disc is attached to can be adjusted through the PLC. In semi-automatic polishing machines, a separate motor powers the head and there is no requirement of compressor since there is no application of pneumatic forces. The safety

feature in electrical assembly includes disc rotation starts only when the main switch is on. The coolant/lubricant on/off is used to control the lubrication action during polishing.

3.3.2 Coolant/Lubrication assembly

There is an opening for water supply through which water for cooling/lubrication is input. A pipe provision is given to feed out the used water that has abrasives and debris. For safe operation, the outlet should be fixed to a proper sewage system and the incoming input water should be of proper quality. A tap is provided to control the flow of water.

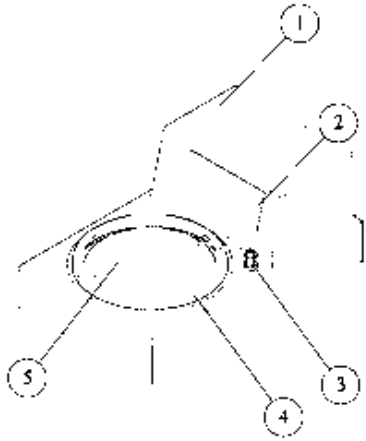
3.3.2 Mechanical Assembly

The mechanical assembly consists of the motor with belt drive to drive aluminum discs on which the abrasive discs are fixed. The sample to be polished comes in contact with the abrasive disc that is already in motion as a result of which material removal occurs. The mechanical assembly ensures vibration and chatter free polishing operation.

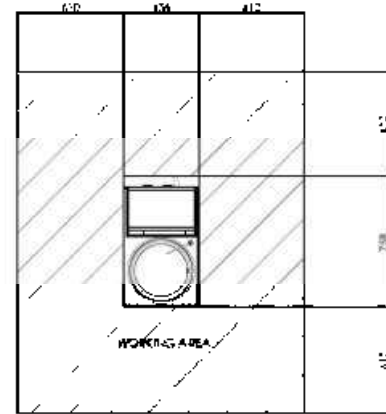
3.4 Working principle of the Bainpol Polishing Machines

Initially the system electric motor operates continuously after the electricity connected and the **Main Switch** is activated on the Electrical Control panel. Once the parameters have been set and the rotation start button is pressed, the discs start rotating. The rotation-direction-swap button is pressed to change the direction of rotation of the wheel. The Motor starts rotating and so the disc starts rotating. The '+' and '-' buttons are used to increase and decrease the speed of rotation of the disc respectively. The change in speed can be made during the rotation itself. The lubricant flow is turned on or off using the 'lubricant' button. All changes are done through PLC touch screen control in automatic polishing machines. Once the polishing is finished, the lubricant supply is stopped and the Main switch is turned off.

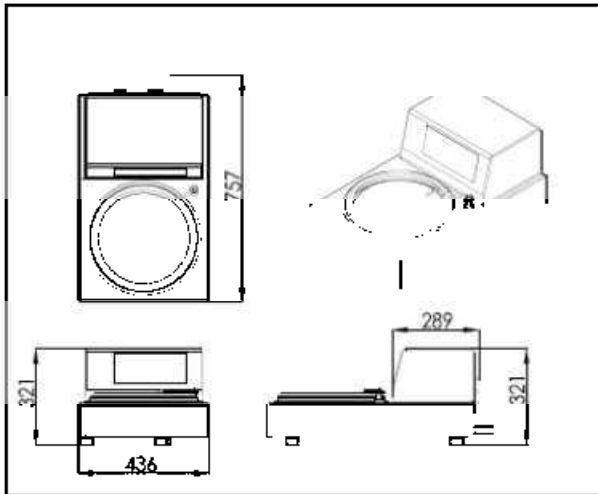
4. Machine Layout



- 1. FRP
- 2. FEATHER TOUCH BOARD
- 3. COOLANT JET
- 4. SPLASH GUARD
- 5. DISC



Foot Print



- 1. DISC
- 2. BACK UP PLATE
- 3. BALL BEARING
- 4. BALL BEARING
- 5. SPINDLE
- 6. SPINDLE HOUSING
- 7. LOCK NUT

5. Installation

5.1 Installation Environment

WARNING!



Do not install the unit at the location at potentially flammable and/or explosive atmosphere

WARNING!



Do not install the unit in a corrosive environment. A corrosive environment may lead to poor performance and deterioration of unit.

Temperature : 5 to 40°C

Humidity : 20 to 80% RH (no condensation)

5.2 Installation Space

Machine external dimensions (refer to Section 10.9) + working space (900 mm) of footprint space

Machine height (refer to Section 10.9) + working space of height wise (500 mm) space is necessary

5.3 Environment and Operating Conditions

WARNING!



The system is not designed to be used at the location as potentially flammable and /or explosive atmosphere

Ambient Temperature: 2 to 40° C when system is operational

Ambient humidity: 10 to 80% RH (no condensation) when system is operational.

Vibration: 2m/s or less at 10 to 50 Hz

Air cleanliness: An air dust volume of 0.2 mg/m³ or less is preferred.

In addition, there should be very little corrosive matter such as hydrogen sulfide, zincate gas and chloride. In addition, user should aware of following operating condition and environment for the system:

- The unit should be installed in an area where there is a good ventilation. Do not locate unit in area of wide ambient temperature variation, such as near vent or outdoor entrances.
- Do not place the unit near combustible material or hazardous fumes or vapor.
- Make sure the unit is leveled when operation.
- Do not position the unit in a manner that would make it difficult to operate the Main Switch and Emergency Stop button (at Electrical Control Panel).

5.4 Making pipe connection

5.4.1 Connecting water supply Machine

WARNING!



Do not loosen fitting to arrive at proper position or leak may occur.

Over tightening may cause piper fitting to deform and damage to the joining fitting

WARNING!



Remove all foreign matter from inside the piping

PU6 tubes are used to input water into the polishing machine. A pipe whose diameter is 50 mm fits with the outlet valve of the polishing machine that is used to take out the used water.

5.5 Making Wiring connection

DANGER!



Working on the electrical equipment must be entrusted only to a trained and qualified electrician. The work has to be carried out according to the rules for electrical engineering

- The connection data can be seen from the wiring diagrams (the wiring diagrams are supplied with machine)
- The electrical connections require a plug to supply single phase current
- Check the main voltage present against the voltage identified on the name plate to see if they match
- Check the phase sequence (Pole – compliant connection)
- User must connect the incoming power supply to the terminal block as shown.

6. Operation

6.1 Machine Start up

6.1.1 Preliminary work before start – up system

- The coolant/lubricant (water) in the tank is to be filled.
- The Emergency stop push button is turned and pulled out.
- Ensure the Bainpol polishing machine is set up before operation to be run.

6.1.2 Start up

WARNING!



Ensure main power supply is turned off during interchange phase cable of incoming supply port

The following steps must be obeyed and aware during start – up:

Step 1: Clean the aluminum disc and place a magnetic carrier disc over it. Over the set up, place the metal backed abrasive disc or a metal carrier plate to which PSA backed emery papers has been stuck on.

Step 2: Turn On the **Main Switch** of the **Electrical Control Panel**

Step 3: Turn On the **Coolant/lubricant switch**.

Step 4: Set the parameters for polishing.

Step 5: Press the **rotation start/stop** to start the rotation of the base plate.

Step 6: If it is a manual machine, place the specimen in a flat manner over the abrasive disc. If it is an automated polisher, bring the head down and place the specimen in appropriate cavities. If the cavities are big for the mounted specimen, use appropriate metal-reducers. In fully automatic input the polishing parameters through PLC touch screen.

Step 7: After the polishing is over, press the rotation start/stop to stop the rotation.

Step 9: Once the polishing is over, retract the specimen(s).

7. Maintenance and Inspection

WARNING!



It is not allowed to carry out any repair or maintenance during use.

WARNING!



Only qualified service personnel should ever be permitted to perform any service related to this machine

CAUTION!



The coolant flow should be clean and free of liquids, dust or foreign material, which could damage various mechanisms on the machine

7.1 Preventive Maintenance

Frequency of preventive maintenance procedures depends upon how the machine/system is used and other upon circumstances. Because of this, a hard and fast schedule of maintenance operation is difficult to present. Indeed, an inflexible schedule might be suitable to one user, but completely adequate for another. Therefore, we have provided periodic figure when to perform maintenance procedures, based on the average machine/system use. The following periodic maintenance or inspection steps are suggested:

- Inspect the pipe line to make sure they are working properly without coolant water leaking.
Inspection Period: 30 Days
- Inspect the coolant water for colour and odour.
Inspection Period: Daily
- Inspect the bowl of the polishing machine
Inspection Period: Weekly
- Ensure to clean the machine after use

8. Troubleshooting

PROBLEM	ROOT CAUSE	CORRECTIVE ACTION
Machine does not get ON.	Machine is dis-connected or loose connection from main electrical power supply.	Connect main power cable properly
	Main power switch damaged or burnt out.	Have the switch replaced at our firm and check the incoming voltage for 230V.
Fuse burnt.	Due to power fluctuation	Insert new glass fuse
	Ac drive or control PCB board shorted due to power Fluctuation	Check the incoming power supply if 220v ac and change PCB board or AC drive
Machine is ON with no message on display.	FRC cable removed/loosen.	Fix the cable between display and feather touch board & between display and PCB board.
	Tracks breaks in feather touch board	Replace Feather touch board.
	FRC cable fault from control board to display board	Change the new FRC cable.
Motor does not run.	Motor has not connected with drive.	Connect the motor U,V,W terminals with drive U,V,W properly .
	Drive displays an alarm: F1 – Over current.	Motor cable and motor must have no short circuits or earth faults.

		Motor must not be obstructed or overloaded.
	F2 – over voltage	Supply voltage must lie within limits indicated on rating plate (220V).
	F3- under voltage	Check supply voltage 220 V.
	F4 – inverter over temperature	Load or load cycle too high Fan must turn when inverter is running
	A501- Current limit	Motor cable and motor must have no short circuits or earth faults. Motor must not be obstructed or overloaded.
	A502- over voltage	If this warning is displayed permanently, check inverter input voltage.
	A503- Under voltage limit	Check main supply voltage.
Water does not flow.	Clogged in water inlet hose. (OR) In coolant jet.	Remove the inlet, outlet hose and clean the coolant water tank.
Squealing noise.	Loose drive belt.	Tighten the drive belt.
Abnormal noise while running.	Foreign particle between disc and backup plate.	Clean the backup plate top and bottom side of disc.
	“O” ring of the dwell pin worn out.	Replace the “O” ring.
Scratches in the sample.	Polishing cloth tear off. Or Dust /small stone in cloth.	Change the polishing cloth.
Disc running at 1000 RPM but display showing less than OR greater than 1000 RPM.	Wrong setting in PCB board potmeter (VR1).	Set correct RPM by varying the RPM – Potmeter (VR1) in PCB board.
Display malfunctioning.	Loose connection of FRC cable from display to FT board.	Connect properly the FRC cable.
To set 1000 RPM or 600	-	In feather touch board, at a

RPM in display.		<p>time press the power ON /OFF button & RPM INCREMENT (+) button & On the ROCKER SWITCH then Slowly release the hand from the power button, display will show the max RPM and then press the (+) or (-) button to increase or decrease the RPM.</p> <p>After setting the RPM press the disc stop button in feather touch board to finalize the RPM.</p> <p>TO KNOW ABOUT THE FEATHER TOUCH BOARD BUTTON NAMES (See pg No.7).</p>
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9. Dismantling

WARNING!



No dismantling can be done while the machine is activated/running

WARNING!



Ensure the power supply to the machine is turned off and locked out until the wiring job is finished

CAUTION!



Ensure the grounding wire is connected

To dismantle or disconnect the machine, proceed as follows:

- i. Clean the machine
- ii. Disconnect the cable of incoming power supply.
- iii. Disconnect the piping to the coolant water tank

10. Technical Specification

10.2 Ambient Temperature

- 2 to 50° C

10.3 Ambient Humidity

- 10 to 80%

10.4 Operating Altitude

- At an altitude up to 1000 meter above means sea level

10.7 Transportation and Storage Temperature

- -20 to 60° C

10.8 Electrical Supply

10.8.1 Phase

- Single-Phase: L +N +PE

10.8.2 Volt

- 230 V \pm 10%

10.8.3 Frequency

- 50/60 Hz

10.8.4 Full Load Rating

2.6 amps

10.8.5 Incoming Supply Cable

Industrial power cord 1.5 Sqmm X 3.

11. Electrical Circuit

12. Warranty certificate

This machine is guaranteed against defective material and workmanship for a period of **one year from the date of shipment**. Warranty is void if inspection shows any abuse or unauthorized repair. Warranty covers only replacement of defective materials.

If for any reason this unit must be returned to our plant, please inform us in advance with shipping details, Invoice Number, Date and reason for returning.

Warranty certificate

Sl.No:

Ref: D.C Cum Invoice No..... Dated

Purchase Order No:

For CHENNAI METCO PVT LTD

Authorized Signatory.

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