MAGNETIC PARTICLE INSPECTION MACHINE

MOVABLE WAGON MODEL

MODEL: APP – 2000C

Figure 1.0

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1. General Safety Instruction

- Only trained personnel should operate this machine.
- Read this entire manual before operating this machine.
- Wear safety glasses and hand gloves while using this machine.
- Do not wear loose clothing or jewelry while operating this machine.
- Keep all unauthorized personnel away from the machine operating area.
- Inspect the machine daily, replace any worn or broken parts.
- Do not use a machine if you have pacemaker.
- When you are finished operating the machine, turn off all power.

2. Introduction

This is an industrial magnetic particle inspection machine, which can rapidly, easily, and accurately inspect, locate, evaluate, and diagnose surface and subsurface defect in only ferromagnetic material without any destruction. The machine can be widely used in any field that need defect inspection, quality controlling, safety inspection and service-life evaluation e.g., manufacturing industry, iron & steel metallurgical industries, metalworking, chemical industry, aerospace, and railway transportation etc.

This manual provides information for APP-2000C machine. The user guide has been designed so that people with good knowledge of basic magnetic particle inspection may understand how to install, operate, and maintain the APP-1000S inspection machine.

2.1. Package Content

The APP-2000C Comes standards with several key accessories

1. Prod Machine
2. Instrument transport case.
3. 120 sq.mm cable (Prod)
4. Trigger cable

2.2. Technical Parameters

Sr.no.	Designation	Technical Data
1.	Input Voltage	415 Volt, 50 Hz AC
2.	Phase	1- Phase, 1 Neutral
3.	Output Voltage	8 Volt AC
4.	Current Type	AC and HWDC
5.	Current Range	0 -2000 Amps In AC 0-2000 Amps In HWDC
6.	Duty Cycle	1 Sec On, 1 Sec Off
7.	Current Control	SCR step controlled

Table. 1

2.3. Performance Features

- Output current up to 2000 Amp for HWDC and 2000 Amp for AC.
- Auto Demagnetization
- Thyristor current control.
- Movable to wagon.
- Shot on indication.

2.4. Machine Overview

- The APP-2000C is movable wagon type manually operated machine. As it is movable type of machine with sturdy castor wheels, it can be easily carried on any working place.
- The machine is SCR / step less Control based Current variation and has analog meter to indicate Current passing. The machine is capable of detecting surface & Sub Surface cracks in any type of jobs.
- The APP-2000C front panel features a combination of selector switches, push buttons, connectors, and adjustable knob to optimize usability of the instrument in any mode. The output current levels are governed by current control knobs.
- The meter box is on the main control panel. The analog meters are provided to indicate Magnetizing Currents and shot on indicator indicates the ongoing process/ operation.
- The APP-2000C back panels have MCB of 40 Amp provides safety to the user.
- The equipment is provided with high current cables with lugs and prod assembly with trigger by which you can pass current through the job to be inspected. The job can be magnetized either by prod method or by cable wrap method whichever is suitable to job geometry and weight.
- The APP-2000C is provided with inbuilt auto demagnetization facility to facilitate demagnetization of job very conveniently.

3. Installation

This section contains information required for unpacking and setting up the magnetic particle inspection unit.

3.1. Location of Unit

Consider the following requirements before selecting a permanent location for the inspection unit:

1. A power source of the proper voltage, frequency, and phase (as per nameplate) capable of providing desirable current.
2. A minimum of two feet is required at both ends and the rear of the inspection unit to ensure adequate space for servicing and ventilation.
3. A firm, reasonably level floor capable of supporting the inspection unit and the materials awaiting inspection.
4. Adequate space to accommodate a black light inspection hood material storage, material movement and access to the materials.

3.2. Unpacking

1. No special unpacking process is necessary. Observe normal precautions to prevent damage to inspection unit and adhere to standard practices for the removal of crating material, protective barrier materials and preservatives.
2. Visually inspect the machine and optional accessories for any apparent shipping damage, and to ascertain that all accessories ordered have been received.
3. If shipping damage is found, please contact the courier company to report the damage before contacting Arora technologies customer support.

3.3. Connections

1. The inspection unit as supplied is internally wired for operation from a power source. When connecting the unit all local codes should be followed. External wiring directions for operation on the designated voltage are as follows:
2. Open the power box located on back side panel. Connect the external power cables to the MCB (2-phase and 1-neutral). Make sure the external power supply should be off while connecting the wires.
3. Connect the trigger cable to the Amphenol connector provided on front panel (see figure 4.1)
4. Connect the prod cable to the bus bar. Make sure there should be no loose connection between prod cable and bus bar. (See Figure 3.1)

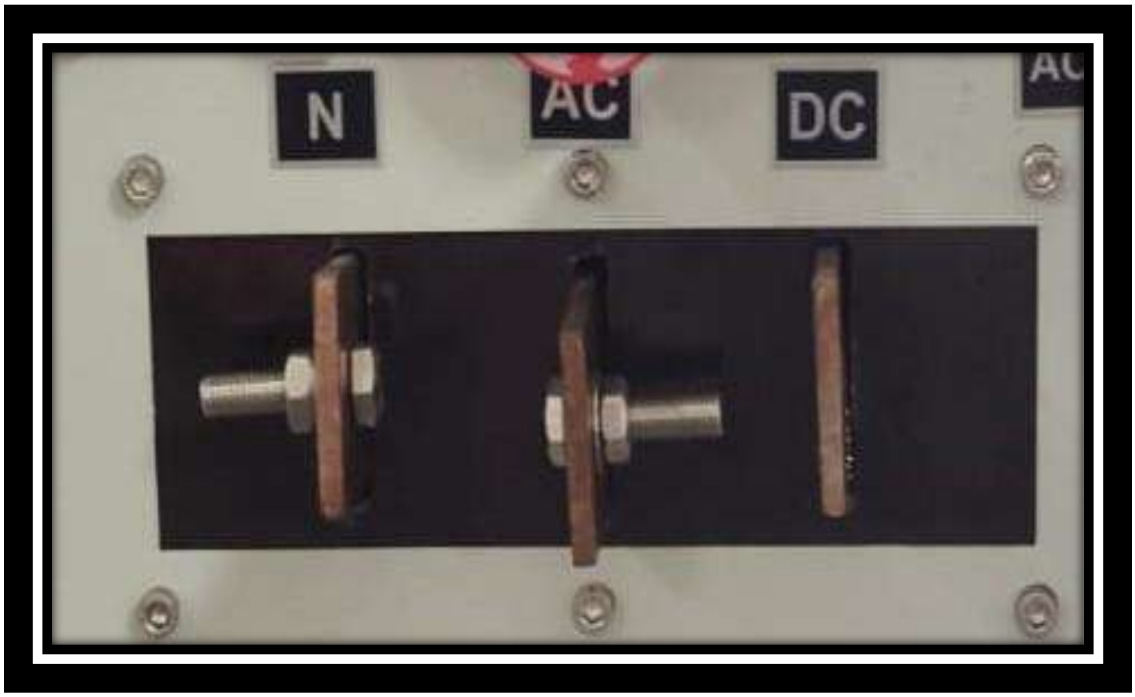

Figure 3.1

4. Operating Instruction

This section contains information required for operating, inspecting, and setting up the magnetic particle inspection unit.

4.1. Front Panel Layout

Figure 4.1

1. **Mains Indicators**: Single Mains Indicator indicating Phase Line Current are provided on top of Panel. Once the Machine is ON, the indicators glows.
2. **Magnetization and Demagnetization** can perform by selector switching.
3. **Shot On Indicator:** The shot on indicator indicates on going operation.
4. **Digital Meter**: Digital Ammeter Meter indicates the current in AC as well as HWDC mode
5. **Magnetizing Current Control switch**: A Current control knob which facilitates increase/decrease of output current (clockwise increase) in step less Control Way.
6. **AC / HWDC Mode:** Selector switch (AC For Demagnetization is mandatory).
7. **TRIGGER Socket**: for trigger switch (trigger switch is fitted on a prod handle).
8. **Emergency OFF:** The mushroom push button (Kill Switch) is provided to OFF the machine in case of any Emergency & specially given for safety purpose.
9. **Below Control Panel:** Three Copper Bus Bar Terminals are provided for fitting High Current Cables to pass AC/HWDC, and COM Current.
10. **Magnetization And Demagnetization time** setting can be adjusted by individual timer provided in left side in control panel.
11. **Temperature indication** provided right side top of panel for inside transformer temperature.

4.2. Starting the machine

Before switching on the machine check the following things:

1. Phase is connected.
2. Neutral is provided.
3. Prod Cable should be connected.
4. Trigger cable is connected.
5. The current Control knobs are at minimum position.

4.2.1. Magnetization

Step 1: Plug Both end of the high current cables to two terminals (bus bar). Connect trigger cable plug to trigger socket.

Step 2: Switch on the supply.

Step 3: Choose the current type i.e., AC and DC by using selector switch provided on main control panel.

Step 4: Set the current control knob according to your requirements.

Step 5: Place the prod on the job and make sure there should be no air gap present between job and prod.

Step 6: Now trigger the button provided on prod and check the output current on ammeter. If current is not up to the desired current range adjust the knob accordingly.

4.2.2. Demagnetization

Step 1: For Demagnetization of job AC selection is mandatory.

Step 2: Demagnetization can be done by coil in AC selection.

Step 3: Select switch in demagnetization position.

Step 4: select manual switch in coil mode position.

Step 5: Now trigger the switch. Demagnetization will achieve by tapering effect due to current flowing through cable.

4.2.3. Emergency Shutdown

To shut off the machine in an emergency, disconnect the power by pushing the emergency button on the front panel (see figure 4.1)

4.3. Some Magnetization Techniques

1. **Circular Magnetization**

   Circular magnetization is achieved by passing direct current with the help of prods through the test object. Circular magnetic field is produced right angle to flow of current.

   By circular magnetization cracks/defects in longitudinal directions (in the direction of current flow) are seen.

2. **Longitudinal Magnetization**

   With the help of coil we can pass HWDC or AC current . Longitudinal magnetic field is produced in the test part, which is used for detecting defects/cracks in transverse directions.

3. **Application of magnetic bath & Inspection of Job:**

   During magnetization, the flow of current and the application of magnetic bath should be simultaneous. This is referred to as Continuous wet technique.

   If daylight visible black magnetic Ink is used, the cracks can be viewed in daylight. Application of fast drying White Contrast Paint shall help in revealing the cracks more clearly.

   If fluorescent magnetic medium is used, the cracks must be viewed under UV black light. Black light assembly (UV) complete with lampshade, mains supply cable etc. or UV LED lamp can be used for viewing cracks.

5. GUIDELINES FOR THE OPERATOR

1. Keep the current control knob at minimum position while switching on the machine.
2. Check the concentration of the powder in the bath with the help of centrifuge tube, depending upon the contamination rate. Concentration should be as per manufacturer's recommendation.
3. Do not operate any switch once the cycle start, till the magnetization cycle is complete.
4. Keep the Residual Field Indicator/ Gauss Meter away from the strong magnetic field (Demagnetizer). To check the magnetization of the job hold it away and slowly bring it toward the job and stop as soon as needle shows full deflection.
5. Check the pie-gauge indications every day / for every new job to ensure the correctness of the current applied, Powder Concentration & UV light Intensity etc.
6. Keep the circulation system (tray, tank etc.) clean. Otherwise, the magnetic bath will get contaminated in short time. Always Clean Rusty, Oily jobs before inspection.
7. Keep OFF the machine and UV LED lamp when it is not in use, It saves Energy as well as rise the life of both.

5.1. PREPARATION FOR STORAGE

When the inspection unit will not be used for a period up to 30 days, it should be serviced as follows:

1. Clean the unit.
2. Disconnect power from the inspection unit by placing the external disconnect switch in the off position. Disconnect the cable from the terminal block.
3. Disconnect the trigger cable. Pack and store in a plastic bag or carton on the grilles.
4. Cover the machine with paper, cardboard, or plastic to prevent the accumulation of dust, dirt or other contaminants.

Appendix

1. For any product from our company, since the date the user purchases it, if it has any fault in term of quality (except for non-warranty parts), please contact the customer support of Arora technologies for repairing, replacing, or returning by using the copy of invoice issued when purchasing the product. During the warranty period, if one has no way to show the copy of invoice, we will count the warranty period based on the shipping date, and the period is one year.
2. If any product of our company has fault after the warranty period, the service, repairing, and maintenance charges are applicable.
3. Our company will not warranty any product which is damaged because the user has disassembled by himself, due to improper transportation and storage or incorrect operation not following the operation instruction, as well as for one has no purchasing proof, etc.