



OPERATING and INSTRUCTIONS MANUAL

FORCIMAT

AUTOMATIC SPECIMEN MOVER

EC DECLARATION OF CONFORMITY

Manufacturer : **Metkon Instruments Inc.**

Address : **Demirtas Dumlupinar Organize Sanayi Bolgesi
Ali Osman Sonmez Cd. No:14 Bursa / TURKEY**



Herewith declares that;

Automatic Specimen Mover,

Model: FORCIMAT

- is in conformity with the provisions of the Machinery Directive (**directive 2006/42/EEC**), as amended, and with national implementing legislation;
- is in conformity with the provisions of the Low Voltage Directive (**directive 2006/95/EEC**), as amended, and with national implementing legislation;
- is in conformity with the provisions of the EMC Directive (**directive 2004/108/EEC**), as amended, and with national implementing legislation;

and furthermore declares that

- the following (parts/clauses of) standards have been applied

EN ISO 12100:2010, TS EN 60204-1, TS EN 61000-6-2, TS EN 61000-6-4

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Position: Manager of Research and Development Department

Year: 2014



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A. DESCRIPTION

1. Design

The FORCIMAT Automatic Head is mounted on a rigid, hardened column of which the other end is fixed to the base casting of the FORCIPOL grinder/polisher. FORCIMAT can be integrated to all FORCIPOL model grinder/polishers and is rapidly positioned via its quick-locking clamping mechanism.

The specimen holder is driven by a 100 Watt DC motor at 50-150 rpm. The force is set individually which is pneumatically adjustable between 5N and 60N from the front panel and can be seen on a direct reading gage. The system is enclosed in an ABS housing with touch-pad front panel.

An adjustable and exchangeable drip lubricator is a standard integrated part of FORCIMAT. The dosing level is adjusted by a flow valve for optimal use of lubricant to obtain consistent results.

A complete series of easily exchangeable specimen holders (6 specimens) from 25 to 40mm and from 1" to 1 ½" is available to be used with FORCIMAT.

DOSIONE is an optional lubricating accessory of FORCIMAT. Please press (I) button on the front panel of DOSIONE, when you put water and lubricant into the DOSIONE to first start. Please adjust the flow rate of lubricant to required rate by rotating the flow rate button.

When you are replacing the bottle of DOSIONE please pay special attention to mount the bottle to its place properly. If it does not fix properly, it can not perform the lubrication.

The specimens are (1 to 6) easily placed in the specimen holder. The dosing level of the drip lubricator is adjusted. The individual sample force is set from the front panel of the FORCIMAT. The cycle time, disc speed and disc rotational direction are set from the front panel of FORCIPOL grinder/polisher and Start button is depressed. Both instruments, FORCIMAT and FORCIPOL start operating simultaneously. Upon completion of the cycle, both instruments stop and an audio signal informs the operator.



Fig. 1 FORCIPOL 2V with FORCIMAT

2. Technical Data

| EQUIPMENT | Forcimat | Forcimat TS |
|---------------------------|------------|-------------|
| Application of Force | Individual | Individual |
| Force, (N) | 5 - 60 | 5-60 |
| Head Speed, (rpm) | 50 - 150 | 35 |
| Rotation Direction | CW / CCW | CW |
| Display | DP | DP |
| Automatic Drip Lubricator | Standard | Standard |
| Dimensions, WxDxH, (cm) | 23x43x25 | 23x43x25 |
| Weight, (kgs) | 16 | 16 |
| Motor Power, (W) | 100 W | 100W |
| Needed air supply | 6 Bar | 6 Bar |

3. Warranty

The FORCIMAT is guaranteed against defective material or workmanship for a period of 12 months from the date of receipt by the customer or latest 18 months after the shipping date. Warranty is not valid if inspection shows evidence of misuse or unauthorized repair. Warranty covers only replacement of defective materials. In case this unit must be returned to our factory for warranty service please ask for prior authorization and include the following details: Serial Number of the unit, Invoice number and date. Transport costs belong to the customer.

4. Safety Precautions

Read the below instructions carefully before use.

- Place the machine on a sturdy and safe table.
- The equipment must be installed in compliance with local safety regulations.
- Only use approved METKON accessories and consumables to achieve max. safety and lifetime.
- Follow the instructions and safety regulations when lifting and carrying the equipment.
- Keep your hands away from the specimen holder and the automatic head when lowering the Forcimat.
- Do not touch the rotating parts during operation.
- Use appropriate safety clothing. Long clothings, accessories and/or hair can be caught by rotating parts.
- If the Forcimat with Forcipol has to be moved to a new location, disassemble the Forcimat from the Forcipol.
- Disconnect the electrical connection before servicing the equipment.
- Follow the periodically maintenance.



The equipment is designed to be used with METKON accessories and consumables. In case of misuse of equipment, improper installation, alteration, use of different source parts, improper repair, METKON will accept NO responsibility for any damages to the operator or the equipment. Disassembling of any part should always be performed by a qualified technician.

B. INSTALLATION & SET UP

1. Unpacking & Checking Contents of Package

Carefully unpack and check contents of the package. If any components are missing or damaged, save the packing list and materials and advise the carrier and Metkon Instruments Inc. of the discrepancy.

Carefully unpack and check that the following items have been received:

- Power Cable, 1.8 mt, 1 piece
- Air Hose, 1.5 mt, 1 piece
- Hex Key, 1.5 mt, 1 piece



WARNING! The FORCIMAT weighs from 16 kgs. please be sure that there are enough people (at least 2) to safely lift the unit from the shipping carton. It is recommended to wear safety shoes during transportation.

Carefully remove outer packing material. Refer to the packing documents for a list of items supplied.

2. Installation and Set-Up



CAUTION! Follow approved procedures and take all necessary preventive safety measures when lifting and installing this equipment. Improper lifting can result equipment damage.

- FORCIMAT is an optional accessory of FORCIPOL series of Grinding & Polishing Machine.
- FORCIMAT is mounted on FORCIPOL. Please be sure that the platform is large enough and can stand it's weight.



- In order to work with equipment comfortably, it is recommended to leave at least 30 cm space from all side of the equipment.
- You can see the dimensions and weight of FORCIMAT and FORCIPOL as below:

| Equipment | Dimensions | | | |
|-----------------|------------|--------|--------|--------|
| | W | D | H | Weight |
| FORCIMAT | 230 mm | 430 mm | 250 mm | 16 kgs |
| FORCIPOL 1V | 380 mm | 690 mm | 340 mm | 30 kgs |
| FORCIPOL 300-1V | 380 mm | 690 mm | 340 mm | 30 kgs |
| FORCIPOL 2V | 700 mm | 690 mm | 340 mm | 40 kgs |

Place the FORCIMAT on FORCIPOL with convenient access to a 1-phase grounded power source, water supply and water drain. Make the connections of the air hose and the data cable between FORCIMAT Head and the FORCIPOL.

2.1 Mounting of Automatic Head

FORCIMAT Automatic Specimen Mover is used in combination with FORCIPOL Grinder and Polishers. Please follow up the following steps to combine FORCIMAT to FORCIPOL's.

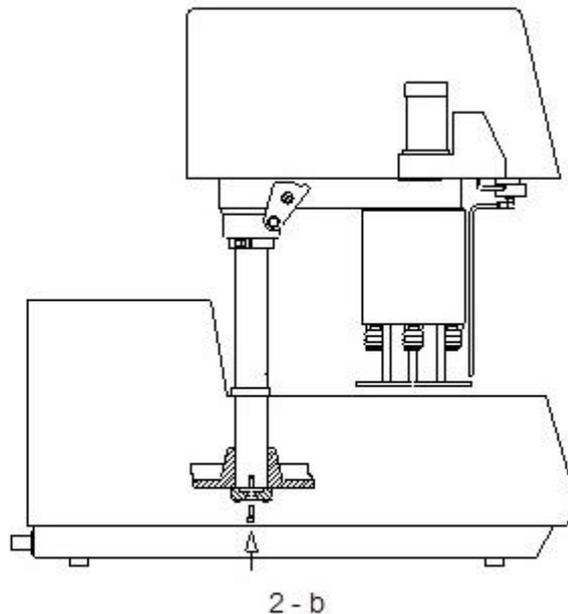


Fig. 2 Mounting of FORCIMAT

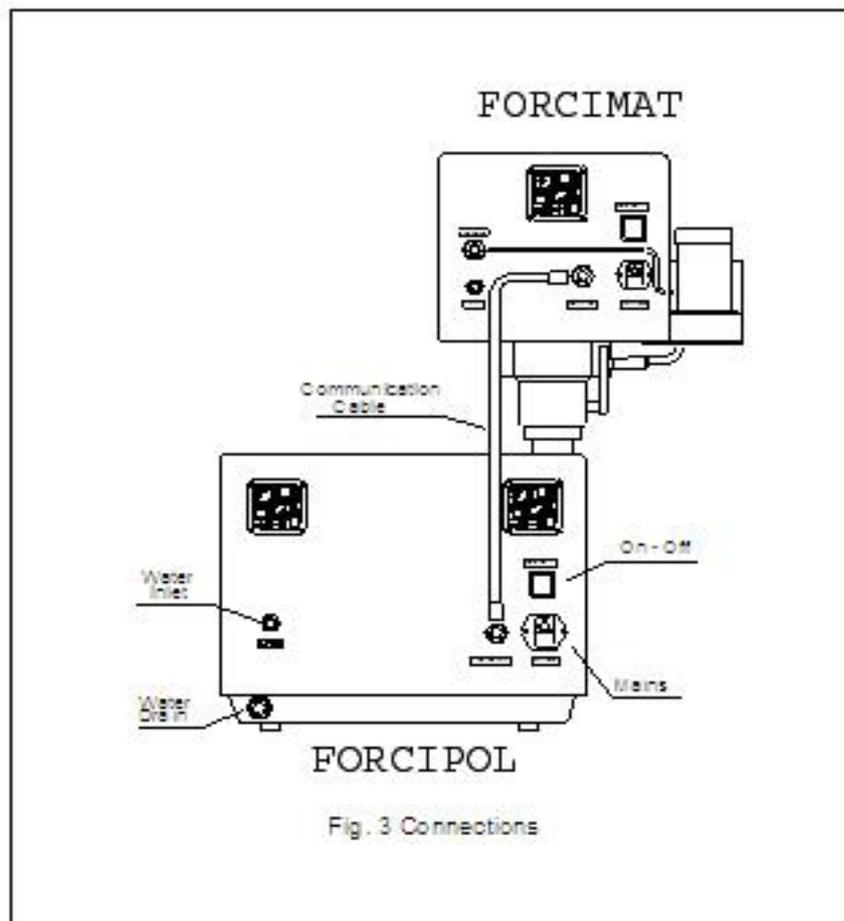
1. Pull off the plastic plug on the surface of FORCIPOL.
2. Place FORCIMAT with its column in the FORCIPOL and fix it from the bottom with the M8 screw. Be sure that the screw is tightened correctly.

2.2 Connections

- FORCIMAT requires air supply with 6 bars pressure.
- A compressor which can generate more than 6 bars and has 50 liters capacity is enough for only 1 equipment. If you have more equipment that use air supply, please consult your local compressor dealer to choose correct compressor.
- If there is a doubt about the quality and pressure of the air supply, make certain that a filtering and regulator unit for compressed air is connected to the air line before FORCIMAT.
- METKON can supply GR 0440 Air Filtering and Lubricating Unit which regulates air pressure to 6 bars.



- A pneumatic air hose with 6 mm outer diameter will be supplied with the equipment. (See: Installation Kit)
- Please be sure that you have suitable connection fittings to connect hose to the air line.



1. Connect the mains cable between FORCIMAT and mains.
2. Connect the supplied "Communication Cable" between FORCIMAT and FORCIPOL.
3. Connect the compressed air hose (supplied) to the air socket on the back of the instrument.
4. Connect the other end to the compressed air source which has to be 6 bars.

Note:

If there is a doubt about the quality of the air supply, make certain that a filter and regulator unit for compressed air is connected in the air line before FORCIMAT.

5. Please do not use teflon bant to the elbow and nipel connections.
6. Please connect the Lubomat connection cable to the back side socket of FORCIMAT GRP

2.3 Electrical Installation

Before making electrical connections, check that the voltage and frequency stated on the specification plate correspond to the local voltage and frequency. Check that the values for three-phase voltage, is compatible with the intended electrical supply before installation.



ATTENTION! Connect the unit to the grounded mains voltage.

WARNING! Electrical Shock Hazard. A qualified electrical technician should perform optional hard wiring and electrical maintenance.

- Disconnect the power supply before making any electrical adjustments.
- Make sure that the supply voltage and frequency is correct. Check the values from the back thin metal plate.

| Voltage / Frequency | Operational Power Range | Fuse Rating |
|------------------------|-------------------------|--------------|
| 230 V, 50/60 Hz. 1 ph. | 220 - 240 V | 6 A (C Type) |
| 115 V, 50/60 Hz. 1 ph. | 110 - 120 V | 6 A (C Type) |



- Connect the equipment to the grounded mains voltage. Power cord will be supplied with the equipment.
- Length of power cable is 1.8 meters.



- You can see suitable power sockets as below. If you have not suitable power socket, in this case you should supply a suitable power cord.



2.4 Adjusting the Height of the Forcimat Head

When you place the Forcimat on the FORCIPOL we strongly advise you to check the distance between the sample holder and the disk when the sample holder is at the bottom position. It should be 5 mm.(Fig.4.) If it is longer or shorter you need to adjust the height. For adjusting the length first hold the head up by using the handle (Fig.5.) and please loosen the set-screw of the adjusting collar. (Fig.6.)

If the length you measured at the beginning is shorter than 5 mm, please hold the collar upside and tighten the set-screw again. If it was longer than 5 mm. at the beginning, than you have to move the collar downwards and tighten the collar(Fig.7.). Than check the distance again when the sample holder is at the bottom position. If the distance is not OK again you have to do the steps one more time.



Fig.4. Distance between sample holder and disk

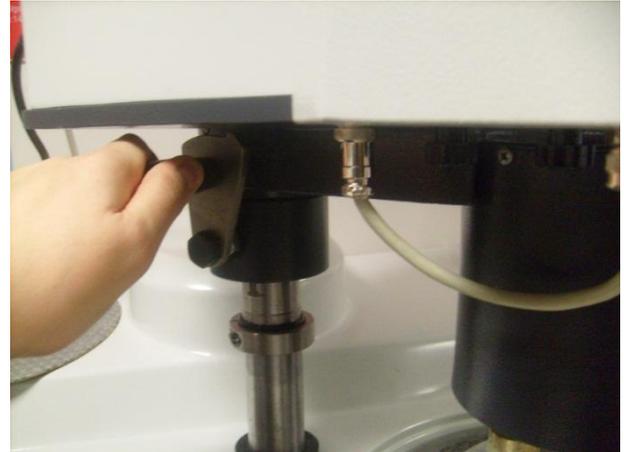


Fig.5. Head Position Handle



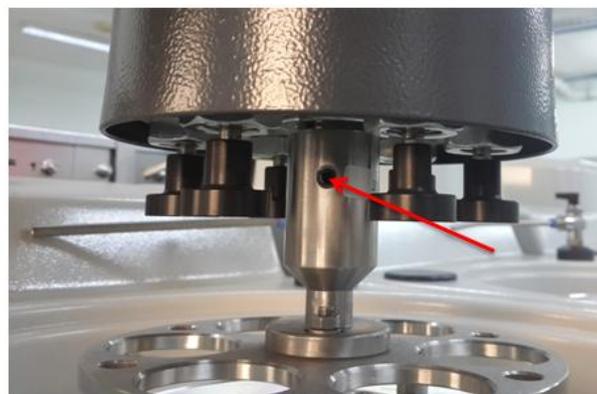
Fig.6



Fig.8

2.5 Mounting Sample Holder

- Place your sample holder on the spindle of the Forcimat.
- Tighten the 3 setscrews indicated on the below photo.
- To take the sample holder out, loosen the 3 setscrews and take out the sample holder.



2.6 Noise Level

Approx. 60 dBa is measured at idle running at a distance of 1m. from the machine

C. CONTROL PANEL

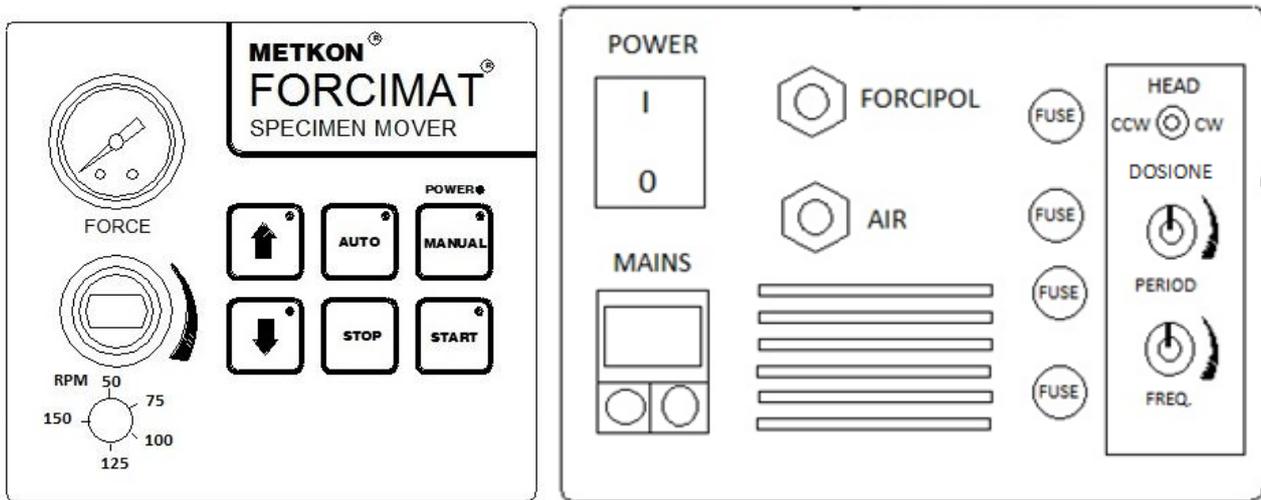


Fig.3. FORCIMAT CONTROL PANEL and BACK VIEW

1. Control Button Functions

Direct reading force gage: shows the individual force being applied on each sample. By using the regulator, the amount of force required is set.

RPM: Adjust the rotation speed of the Forcimat Head

STOP: Stop button is used to stop the unit when it is in operation.

START: This button is used to start the motor in clockwise direction.

UP & DOWN (↑ ↓): buttons activate the single force pistons on each sample.

“Auto” mode: FORCIMAT is activated from FORCIPOL grinder/polisher. When FORCIPOL starts, so does the FORCIMAT.

“Manual” mode: FORCIMAT can be operated independent of FORCIPOL.

HEAD (CCW-CW): Selection of the head rotation in Clock Wise or Counter Clock Wise.

PERIOD: Total time of dispencing

FREQUENCY: Standby time for dispencing

D. OPERATION

Turn ON/OFF switch is at the rear side of the equipment. FORCIMAT units have quite simple operation.

1. Manual Mode

- Depress “MANUAL”
- Turn the handle down to lower the unit. And turn the handle downwards to lock the head in its position.
- Place the specimens and depress ↓
- Select rotation direction from the rear side of the automatic head
- Adjust the Drip Lubricator, in manual or automatic mode. In Manual mode you have to press purge or retract button manually. In automatic mode the DOSIONE will also start automatically.
- Adjust frequency & period for DOSIONE Dispensing Unit
- Depress “START” from FORCIMAT Head as well as FORCIPOL.
- When the preparation is finished, depress “STOP”
- Depress ↑ to take the specimens.
- Turn the handle up to raise the unit in case the working wheel needs to be changed.

2. AUTO Mode

- Depress “AUTO”
- Turn the handle down to lower the unit.
- Place the specimens and depress ↓
- Select rotation direction from the rear side of the automatic head
- Adjust the Drip Lubricator, in manual or automatic mode. In Manual mode you have to press purge or retract button manually. In automatic mode the DOSIONE will also start automatically.
- Adjust frequency & period for DOSIONE Dispensing Unit
- Set the speed of FORCIPOL-V grinder/polisher.
- Set the cycle time from FORCIPOL-V.
- Adjust the Drip Lubricator.
- Start the FORCIPOL-V by depressing FWD or REV. (depending on the rotational direction you want)
- At the same time FORCIMAT will also be activated.
- At the end on the cycle time, FORCIPOL-V and FORCIMAT will stop automatically and the buzzer will start beeping.
- Depress ↑ to take the specimens.
- Turn the handle up to raise the unit to move to the next step.

E. SERVICE and MAINTENANCE

1. Maintenance

FORCIMAT Automatic head does not require periodic maintenance. In case of service required, do not disassemble or try to repair by unqualified personnel. Please contact your local representative.

2. Troubleshooting

| Fault | Cause | Action |
|---------------------------------------|---------------------------------|--|
| Automatic head moves during operation | The head is not locked | Lock Forcimat from the lock unit on the spindle. |
| Power lamp is not on | The main switch is OFF | Turn on the main switch. |
| | The fuses at the back are blown | Change the blown fuses |
| The pistons does not activate | No air connection | Check the air hose connections |
| | The air hose squeezed | Straighten the hose |

F. ACCESSORIES and CONSUMABLES

1. Accessories

| Accessories for FORCIMAT: | |
|----------------------------------|--|
| 31 82 | Special Splash Guard, 200 mm., to be used with automatic heads |
| 31 83 | Special Splash Guard, 250 mm., to be used with automatic heads |
| 31 93 | Special Splash Guard, 300 mm., to be used with automatic heads |
| GR 0440 | Air filtering and lubricating unit |

| Specimen Holders for FORCIMAT: | |
|---------------------------------------|---|
| 33 01 | Specimen holder, 6 x Ø40 mm specimen |
| 33 02 | Set of insert rings for 30 mm |
| 33 03 | Set of insert rings for 25 mm |
| 33 04 | Set of rings for 1 1/4" |
| 33 05 | Set of rings for 1 1/2" |
| 33 06 | Specimen holder, Blank |
| 33 07 | Specimen holder, 3 x Ø50 mm; 3 x Ø30 |
| 45 51 | Specimen holder, 6 x ø 25mm |
| 45 54 | Specimen holder, ø 145mm, 6xø 1" |
| 45 52 | Specimen holder, 6 x ø 30mm specimen. |
| 45 55 | Specimen holder, 6 x 1 1/4 inch specimen. |
| 45 56 | Specimen holder, 6 x 1 1/2 inch specimen. |
| 45 58 | Specimen holder, 3 x 2 inch specimen. |

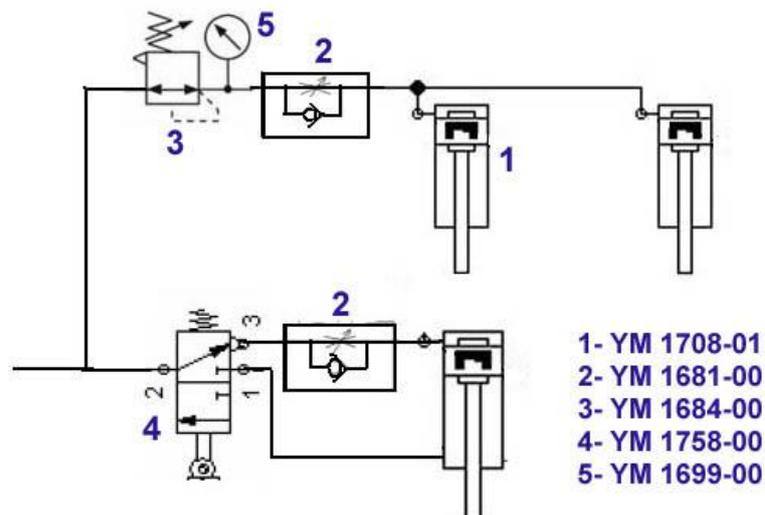
| DOSIONE Peristaltic Fluid Dispenser | |
|--|--|
| GR 0874 | Microprocessor controlled, with peristaltic and non-misting pump for diamond suspensions, lubricant or 2 in 1 suspensions, with interface to be connected to FORCIMAT/DIGIPREP's Automatic Head. |

G. TECHNICAL DOCUMENTATION

1. Recommended Spare Part List

| ORDER CODE | DESCRIPTION |
|------------|---|
| YM 0440-01 | Cable TTR 2X0.75, White |
| YM 0746-00 | Ventilator 80X80X25 220V, Cooling |
| YM 1188-01 | Motor 24VDC 90W 210RPM |
| YM 5480-00 | Loading foot, FRC |
| YM 1653-00 | TIHGTENING BUSHING, FORCIMAT |
| YM 1659-00 | ROTATING CONNECTOR 1/4 WITH BEARING KSL06-02S |
| YM 1661-00 | Mechanical valve YMV 320 |
| YM 1665-00 | Bearing 51106 URB |
| YM 5721-00 | power supply,SP 240-24V 10A |
| YM 5419-00 | Belt 3PJ 432 |
| YM 1684-01 | Pneumatic governor 01-R-2001/4, Shako |
| YM 1691-01 | Control board+Display Keyboard, FRC |
| YM 1696-00 | Connector MIC 225-2-M |
| YM 1697-00 | Connector MIC 25-2-F |
| YM 1699-00 | Manometer 40, 0-6 BAR |
| YM 1708-01 | SINGLE ACTING CYLINDER, USC 12 X 40-P |
| YM 1721-00 | Pneumatic elbow PL04-M5C |
| YM 1758-01 | Valve NV 5321 24V DC, Single |
| YM 1763-00 | Potentiometer, Relay, Forcimat |
| YM 1764-00 | Potentiometer Switch, Forcimat |
| YM 3751-00 | BEARING 6006 |
| YM 3779-01 | Pump, 24V SR 10/30 RETSCHLE, Forcimat |

2. Pneumatic Wiring Diagram



3. Customer Service

Our factory-trained assembly personal are at your disposal for customer service.
Please contact one of the following addresses:

METKON OFFICE ADDRESSES

Head Quarter

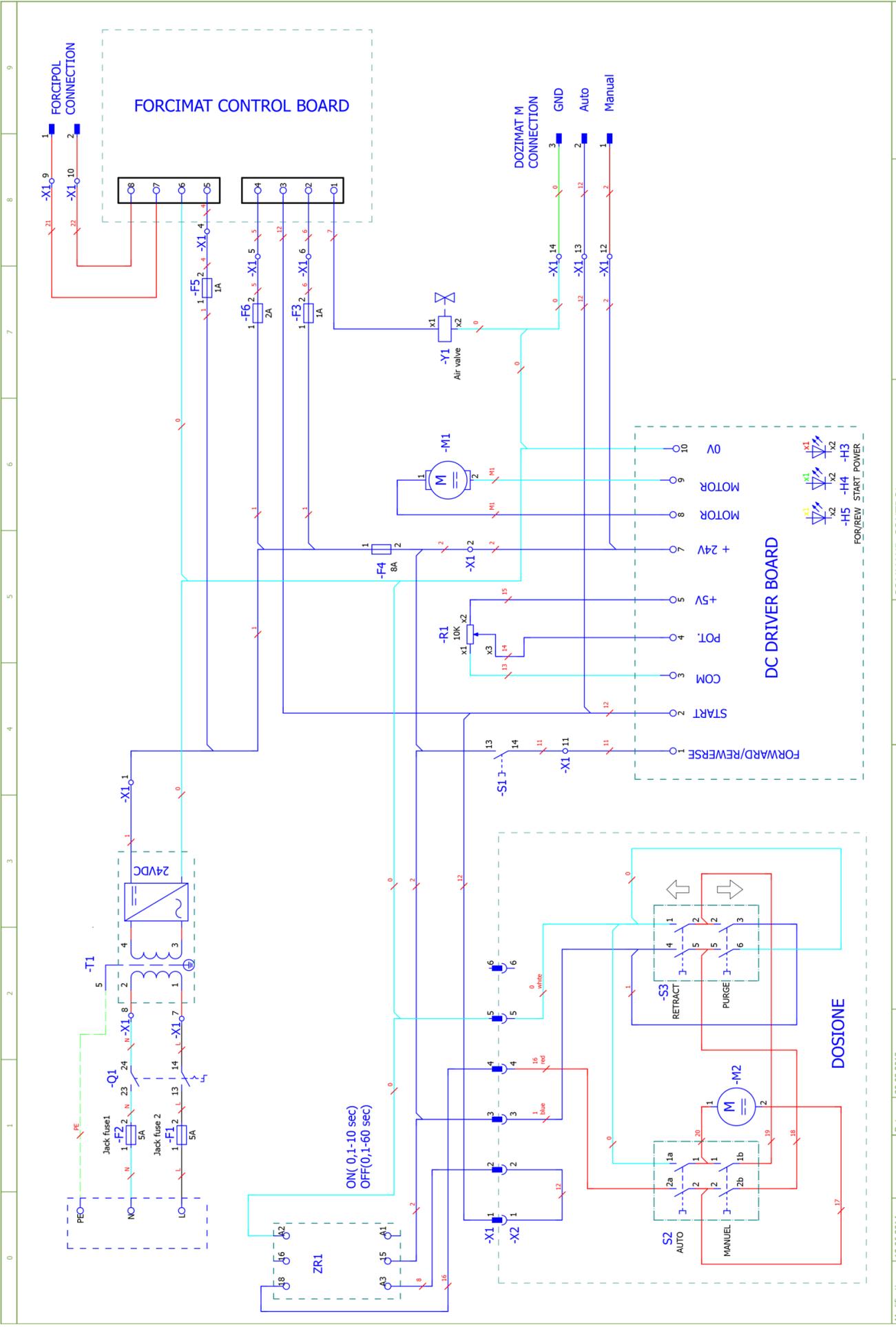
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4. Electrical Wiring Diagrams



0 1 2 3 4 5 6 7 8 9

| | | | | | | | |
|--------------|------------|------|----------------|----------------------|--|------|---|
| Modification | 18.06.2014 | Date | 28.05.2012 | COMMAND CONTROL | | Page | 1 |
| | | Ed. | SERVISCEINGIZ | metkon | | Page | 1 |
| | | Appr | | FORCIMAT-FORCIMAT TS | | Page | 1 |
| | | Name | Replacement of | GE_tpl001 | | | |



metkon[®]
Technology behind Specimen

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