



metkon[®]
Technology behind Specimen



MODULAR GRINDING & POLISHING FORCIPOL Series

The FORCIPOL Series grinding and polishing machines offer practical and economical solutions to your metallographic sample preparation needs...



MODULAR CONFIGURATION GRINDING & POLISHING MACHINE

VERSATILE & DURABLE

All materials testing laboratories in the industry, research or educational field have a demand for sample preparation. Whether your requirements call for individual components or basic sample preparation, FORCIPOL family of instruments will meet your needs. FORCIPOL Series of instruments are available as Single wheel (FORCIPOL 102) and Dual wheel (FORCIPOL 202) Units.

Both single and double wheel versions are suitable with $\varnothing 200$, $\varnothing 250$ and $\varnothing 300$ mm wheels. The working wheel is powered by a high torque 1.0 HP electric motor with both clockwise and counterclockwise wheel rotation possibility. The state of the art frequency converter allows smooth speed variation (50-600 rpm) of the grinding wheel with soft start and soft stop. Both. This allows the setting of the optimum speed for each individual preparation process. It is perfect choice for laboratories preparing a wide range of different materials from very small to very large.



FORCIPOL 102 with Control Unit



Retractable water hose for easy cleaning



FORCIPOL 102/202

FORCIMAT 52/102

The FORCIPOL Series grinding and polishing machines offer practical and economical solutions to your metallographic sample preparation needs...

The FORCIMAT Series automatic heads are designed to be used with FORCIPOL grinder/ polishers. It is ideal for medium size laboratories where consistent results are desired.



Splash Guard



Simple exchange of working discs

The stylish and functional housing is corrosion free and easy to clean. Molded wheel bowls and drains eliminate leaks and the build-up of residue is prevented by constant flushing of the bowl. The drive elements are fixed on heavy duty aluminium alloy casting. The wheels are mounted on ball bearings allowing the application of high pressures to prepare even large specimens. Ball bearings used provide quite and vibration free operation. Water inlet and flexible water outlets with control valves for wet grinding are standard features. FORCIPOL instruments can be used for grinding, lapping and polishing with magnetic backed discs and cloths or by quick and simple exchange of wheels.

ENVIRO Recirculating Filtering System

Enviro Filter Unit is a closed loop recirculating filter system which is optionally available. It has a 20 lts. reservoir capacity with 1 micron filter entering the grinder / polisher intake. Enviro can also be coupled with line water and 80 micron filtering system for disposal.



FORCIMAT 52 {Individual Force}

The FORCIMAT 52 Automatic Head is mounted on a rigid hardened post which is fixed to the base of the FORCIPOL grinder/polisher. It can be adapted to all FORCIPOL series grinder/polishers and is easily and rapidly positioned by means of a quick-locking clamping mechanism.

The sample holder can prepare 6 samples simultaneously and it is driven by a 100 Watt DC motor at 50-150 RPM. The pneumatically applied individual force is adjustable between 5 N (1.1 lb.) and 60 N (13.5 lb.) from the front panel and is displayed on a gauge. The housing is made of ABS with a touchpad front panel.

AUTOMATIC OPERATION

When the number of specimens to be prepared increases, FORCIPOL instruments can be fitted with one of FORCIMAT automatic heads [FORCIMAT 52 or FORCIMAT 102] for automation. FORCIMAT automatic heads provide high rate sample preparation and frees the operator from the grinding and polishing procedures.

FORCIMAT series of Automatic Heads are available as two types: FORCIMAT 52 and FORCIMAT 102



FORCIPOL 102 with Forcimat 52

A choice of easily exchangeable sample holders with set of rings from 25 to 50 mm and 1" to 2" diameter are available for use on the FORCIMAT 52. The samples (1 to 6) are placed in the sample holder. Thanks to quick replacement mechanism, all individual force specimen holders can be removed and inserted on the equipment within seconds.

Modern touch pad controls with ergonomic turn knob allows fast and easy setting of parameters and increases productivity. Sample force, wheel speed, sample holder speed, operation time, motor on/off and water on/off functions can be set in seconds. When the start button is depressed, both the FORCIMAT 52 and FORCIPOL start operating simultaneously. Cooling water is automatically activated and deactivated at the beginning and end of operation. The actual wheel/head speed and operation time are digitally displayed. All parameters can be changed during operation. The last parameter settings are always retained in the memory. Upon completion of the cycle, both instrument stop and an audio signal notifies the operator.

Automatic Disc Cleaning & Drying function can be activated with a single button to obtain perfectly cleaned disc surfaces in seconds. Smart Water Saving feature allows tons of water saving over the years.

When needed, FORCIMAT 52 can work in manual mode to allow prepare specimens by hand.



MANUAL OPERATION

FORCIPOL instruments are designed to modular configuration for manual, semi-automatic and programmable automatic equipment.

When only manual preparation is required, FORCIPOL Control Unit can be fitted on the FORCIPOL grinder / polisher. If automatic operation is required in the future, one of the FORCIMAT automatic heads can be installed at any time.



FORCIPOL 202 with Control Unit



Simple Fast Control

FORCIPOL Control Unit

The FORCIPOL Control Unit is ergonomically placed on the equipment. Modern touch pad controls with ergonomic turn knob allows fast and easy setting of parameters and increases productivity. Wheel speed, operation time, motor on/off and water on/off functions can be set in seconds. Cooling water is automatically activated and deactivated at the beginning and end of operation. The actual wheel speed and operation time are digitally displayed. All parameters can be changed during operation. The last parameter settings are always retained in the memory. An audible signal notifies the operator when the process is completed.

Automatic Disc Cleaning & Drying function can be activated with a single button to obtain perfectly cleaned disc surfaces in seconds. Smart Water Saving feature allows tons of water saving over the years.



FORCIPOL 102 with FORCIMAT 102

FORCIMAT 102

(Individual Force + Central Force + Programmable)

FORCIMAT 102 Programmable Automatic Head is coloured HMI touch screen controlled and with the Base Unit, thus creating automatic preparation system. It is used to prepare high volumes of metallographic, ceramic and mineralogical specimens with consistent reproducible quality. The Automatic Head can apply both "Central" and /or "Individual" forces. It can accommodate single samples as well as multi - sample holders thus offering a perfect solution for all levels of sample throughput requirements. The Automatic Head is mounted to a hardened steel post which is affixed to the cast base of the FORCIPOL grinder/polisher. It can be adapted to all FORCIPOL series grinder/polishers and is easily and rapidly positioned by means of a quick-locking clamping mechanism.

The force on the specimen "individual" or "central" is pneumatically controlled by a pressure transducer. The system is enclosed in an ABS housing with touch screen LCD. The FORCIMAT 102 Automatic Head is rapidly positioned via a quick-locking clamping lever.

Material Removal Measurement

Optional encoder allows you to measure the amount of material removed from the surface. The desired grinding depth can be set to grind different type of samples and also for applications that need special accuracy.



Single Force



The "soft start and stop" feature automatically starts the sequence with a low initial force which is then increased to the preset. Towards the end of the cycle, the force is automatically reduced to 75 % of the setting to prevent scratching. A variety of sample holders for individual or central force applications are available for different sample sizes. Both individual and central force specimen holders can be removed and inserted easily with the help of quick release chuck. By holding the head button on the software, the specimen holder will rotate for easy insertion and removal of the specimens.

All preparation parameters can be stored in memory under a specific program number. Each program can be saved for a material specific name such as "Cast Iron, Bronze, Al-Si Alloy, etc." The parameters which can be saved are; Force, Cycle time, Wheel speed and direction, Mode of operation (individual or central pressure). Dispensing frequency can also be saved when DOSIMAT peristaltic dispenser is available. These parameters are entered and stored in memory and displayed on the LCD screen as preset values. All the operator needs to do is to select the mode of operation (individual or central pressure), call up a specific program and press the "Start" key.

Upon completion of the cycle, an acoustic signal lets the operator know that the cycle is over and the samples are ready for the next step. When required, it is also possible to intervene in the program and change the parameters without stopping the instrument.

Automatic Disc Cleaning & Drying

Function can be activated with a single button to obtain perfectly cleaned disc surfaces in seconds. Smart Water Saving feature allows tons of water saving over the years.

When needed, FORCIPOL 202 can work in manual mode to allow prepare specimens by hand.



FORCIPOL 202 with FORCIMAT 102 & DOSIMAT 102

DOSIMAT 12 (With 1 Peristaltic Pump)

DOSIMAT 12 has one peristaltic and non-misting pump for diamond suspensions, alumina suspensions, lubricant or 2 in 1 suspensions and can be matched with Forcimat 52 and Forcimat 102 Automatic Heads.

Modern touch pad controls with ergonomic turn knob allows fast and easy setting of dispensing parameters like; frequency, dosing time, etc. parameters and increases productivity. The last parameter settings are always retained in the memory.

DOSIMAT 52 (With 6 Peristaltic Pump)

DOSIMAT 52 has 5 peristaltic pumps for diamond suspensions / lubricant and 1 pump for aluminium oxide suspension or 2 in 1 suspensions and can be matched with Forcimat 52 Automatic Head.

Modern touch pad controls with ergonomic turn knob allows fast and easy setting of dispensing parameters like; frequency, dosing time, etc. parameters and increases productivity. The last parameter settings are always retained in the memory.

DOSIMAT

DOSIMAT Peristaltic Dispenser is an optional accessory for the FORCIMAT 52 and FORCIMAT 102 systems. It is an automatic fluid dispensing instrument used in combination to obtain consistent specimens and to save time and consumables. DOSIMAT can feed both diamond suspensions / lubricants and aluminium oxide suspensions.

Automatic dosing of consumables is applied precisely for perfect sample surfaces. Efficiency is further increased with high quality peristaltic pumps that guarantee exactly the same dosing every time for automation and control of consumable consumption. The liquid is dosed exactly to where the operator wants it on the polishing cloth. No vaporization or spray mist occurs.

It is possible to clean all the tubes with a single button at the end of preparation steps to eliminate the risk of clogged tubes.

Three different DOSIMAT Peristaltic Fluid Dispensers are available for FORCIMAT 52 and FORCIMAT 102:



FORCIPOL 202 + FORCIMAT 52 + DOSIMAT 12 + DOSIMAT 52

DOSIMAT 102 (With 6 Peristaltic Pump)

DOSIMAT 102 has 5 peristaltic pumps for diamond suspensions / lubricant and 1 pump for aluminium oxide suspension or 2 in 1 suspensions and can be matched with Forcimat 102 Automatic Head.

Dispensing parameters like; frequency, dosing time, fluid selection etc. are controlled through the LCD screen of the FORCIMAT 102 Automatic Head and can be stored in memory.

MOST VERSATILE MODULAR CONFIGURATION POSSIBILITY!

Possible to make manual, semi-automatic or programmable automatic configuration possibility for both single and dual wheel grinder / polisher. Optional dosing units with 1 or 6 bottles for both automatic heads for maximum automation. The Forcipol Series can be upgraded afterwards with a Forcimat Automatic Head and Dosimat Dosing Units.

BASE UNITS

Single Wheel: FORCIPOL 102 (Ø200/250/300 mm)

Dual Wheel: FORCIPOL 202 (Ø200/250/300 mm)

HEAD UNITS

FORCIPOL Control Unit: For Manual Operation

FORCIMAT 52: For Semi Automatic Individual Force Operation

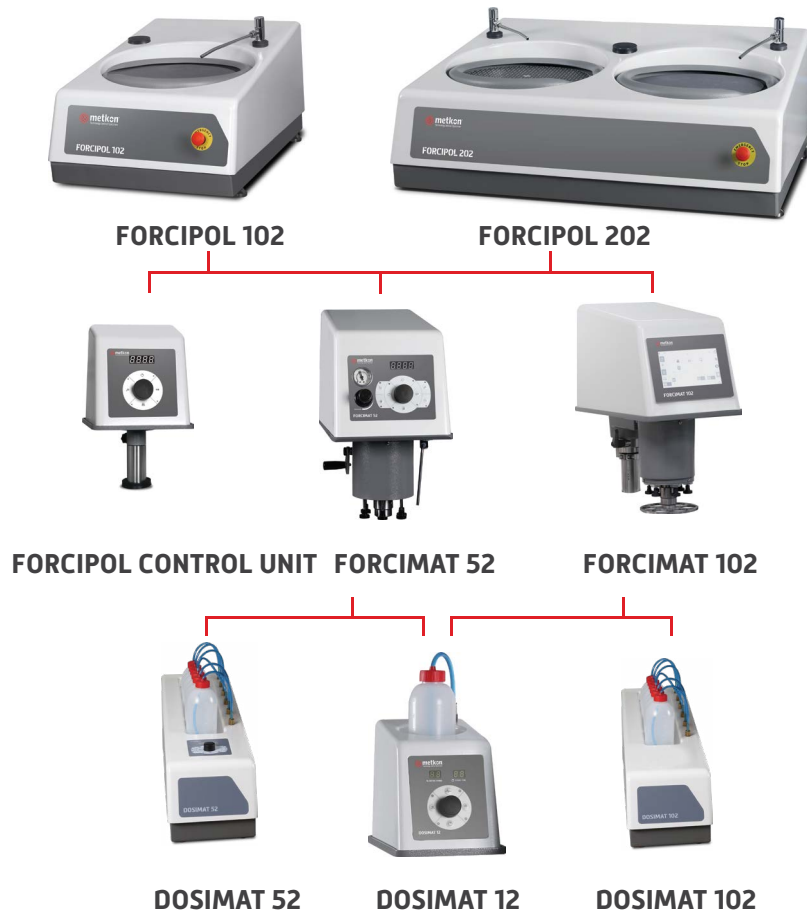
FORCIMAT 102: For Programmable Automatic Individual and Central Force Operation

DOSING UNITS

DOSIMAT 12: With 1 for FORCIMAT 52/102

DOSIMAT 52: With 6 for FORCIMAT 52

DOSIMAT 102: Programmable with 6 Peristaltic Pump for FORCIMAT 102



SPECIFICATIONS

36 21-200 – FORCIPOL 102

Grinding and Polishing Machine

Single wheel, suitable for 200, 250 and 300 mm wheel size, 0.75 kW motor with overload protection, variable speed between 50–600 rpm, clockwise or counterclockwise rotation, soft start and stop function, vibration-free and robust construction, ergonomic design, quiet operation, standard interface for all head units (FORCIPOL Control Unit and FORCIMAT 52/102/TS), retractable water hose, including water supply and drain tubes. (One of the Head Units is required to operate the equipment) 230 V, 1-phase, 50/60 Hz.

Includes a standard set of grinding & polishing consumables;

- An assortment of 100 grinding papers (various grits), 200 mm dia.
- An assortment of 5 polishing cloths with 200 mm dia.
- Diamond suspensions, one of each of 6 mic. and 1 mic., plus lubricant

36 21-250 – FORCIPOL 102

As above, but consumables kit for 250 mm dia. application.

36 21-300 – FORCIPOL 102

As above, but consumables kit for 300 mm dia. application.

36 22-200 – FORCIPOL 202

Grinding and Polishing Machine Double wheel, suitable for 200, 250 and 300 mm wheel size, 0.75 kW motor with overload protection, variable speed between 50–600 rpm, clockwise or counterclockwise rotation, soft start and stop function, vibration-free and robust construction, ergonomic design, quiet operation, standard interface for all head units (FORCIPOL Control Unit and FORCIMAT 52/102/TS), retractable water hose, including water supply and drain tubes. (One of the Head Units is required to operate the equipment) 230 V, 1-phase, 50/60 Hz. Includes working kit "250 mm Aluminum wheel and splash guard",

Includes a standard set of grinding & polishing consumables;

- An assortment of 100 grinding papers (various grits), 200 mm dia.
- An assortment of 5 polishing cloths with 200 mm dia.
- Diamond suspensions, one of each of 6 mic. and 1 mic., plus lubricant

36 22-250 – FORCIPOL 202

As above, but consumables kit for 250 mm dia. application.

36 22-300 – FORCIPOL 202

As above, but consumables kit for 300 mm dia. application.

30 12 – FORCIPOL Control Unit

For controlling of disc speed, operation time, water on/off and start/stop operation of FORCIPOL 102/202/TS. With touch pad front panel controls and digital display, with ergonomic turn knob for fast and easy setting of parameters, last parameter settings retained in the memory, automatic disc cleaning & drying function with single button, Smart Water Saving feature. Communication capability with FORCIPOL 102/202/TS machines. Complete and ready for operation.

30 12 – FORCIMAT 52 (Individual Force)

Automatic Specimen Mover Microprocessor controlled, pneumatically adjustable individual force loading system, up to 6 specimens, quick specimen holder replacement system, 100 Watt DC motor, variable rotational speed between 50–150 rpm, with robust steel mounting column, front panel with touch-pad controls and digital display, with ergonomic turn knob for fast and easy setting of parameters, last parameter settings retained in the memory, automatic disc cleaning & drying function with single button, Smart Water Saving feature, audible warning signal. Communication capability with FORCIPOL 102 and FORCIPOL 202 machines. With air supply tubes, complete and ready for operation.

30 14 – FORCIMAT 102

{Individual Force + Central Force + Programmable}

Programmable Automatic Specimen Mover Programmable with colored 7" HMI touch screen control, pneumatically adjustable central and/or individual force loading system, quick replacement system for both central and individual specimen holders, 100 Watt DC motor, variable rotational speed between 50–150 rpm, with robust steel mounting column, audible warning signal, automatic disc cleaning & drying function with single button, Communication capability with FORCIPOL 102 and FORCIPOL 202 machines. With air supply tubes, complete and ready for operation.

40 06 – DOSIMAT 12 Peristaltic Fluid Dispenser {with 1 bottle for FORCIMAT 52/102/TS}

Microprocessor controlled, with peristaltic and non-misting pump for diamond suspensions, alumina suspensions, lubricant or 2 in 1 suspensions, front panel with touch-pad controls and digital display, with ergonomic turn knob for fast and easy setting of parameters, programmable dosing time and dosing period, purge and retract function, last parameter settings retained in the memory, with interface to be connected to all FORCIMAT 52/102/TS Automatic Heads. Complete and ready for operation.

40 07 – DOSIMAT 52 Peristaltic Fluid Dispenser {with 6 bottles for FORCIMAT 52}

Microprocessor controlled, with 6 peristaltic and non-misting pumps (5 for diamond suspensions/lubricant and 1 for alumina suspensions), front panel with touch-pad controls and digital display, with ergonomic turn knob for fast and easy setting of parameters, programmable dosing time and dosing period, purge and retract function, last parameter settings retained in the memory, with interface to be connected to FORCIMAT 52 and FORCIMAT-TS Automatic Heads, complete and ready for operation.

40 08 – DOSIMAT 102 Programmable Peristaltic Fluid Dispenser {with 6 bottles for FORCIMAT 102}

Programmable and controllable from touch screen of FORCIMAT 102, with pre-dosing function, with 6 peristaltic and non-misting pumps (5 for diamond suspensions/lubricant and 1 for alumina suspensions), with interface to be connected to FORCIMAT 102 Automatic Head, complete and ready for operation.

SPECIFICATIONS

Operational Accessories for FORCIPOL Grinder/Polishers: 200 mm application

31 01 - PVC wheel, 200 mm

31 02 - Aluminum wheel, 200 mm

31 55 - Splash guard, 200 mm

31 04 - Paper ring, 200 mm

31 05 - Cover

31 13 - Special Plexiglas Protection Unit, to be used with FORCIPOL 102/TS (To be ordered simultaneously together with the machine order)

250 mm application

31 21 - PVC wheel, 250 mm

31 42 - Aluminum wheel, 250 mm

31 65 - Splash guard, 250 mm

31 24 - Paper ring, 250 mm

31 05 - Cover

31 13 - Special Plexiglas Protection Unit, to be used with FORCIPOL 102/TS (To be ordered simultaneously together with the machine order)

300 mm application

31 31 - PVC wheel, 300 mm

31 52 - Aluminum wheel, 300 mm

31 75 - Splash guard, 300 mm

31 34 - Paper ring, 300 mm

31 05 - Cover

31 13 - Special Plexiglas Protection Unit, to be used with FORCIPOL 102/TS (To be ordered simultaneously together with the machine order)

Accessories for FORCIPOL Grinder/Polishers

GR 1397-00 - Water Filtering and Pressure Regulator System for city water inlet. Keeps the water pressure at the appropriate level and protects from sudden pressure spikes. Filtering out impurities in the water and prevents calcification.

YM 3824-00 - Spare Siliphos Cartridge Filter (for Water Filtering and Pressure Regulator System (GR 1397-00))

Accessories for FORCIMAT 52/102 Automatic Heads

GR 0872 - Z-axis material removal with depth control, for FORCIMAT 102 (To be ordered simultaneously together with the machine order)

GR 0440 - Air filtering and lubricating unit

Specimen Holders for Individual Force Application (for FORCIMAT 52/102/TS, ACCURA 102)

33 31 - Individual force specimen holder, Ø145mm, for 6 x Ø25 mm specimens.

33 32 - Individual force specimen holder, Ø145mm, for 6 x Ø30 mm specimens.

33 36 - Individual force specimen holder, Ø145mm, for 6 x Ø1 1/4" specimens.

33 37 - Individual force specimen holder, Ø145mm, for 6 x Ø1 1/2" specimens.

33 38 - Individual force specimen holder, Ø155mm, for 3 x Ø2" specimens.

33 39 - Individual force specimen holder, Ø145mm, Blank.

33 02 - Set of insert rings for Ø30 mm (to be used with 33 33)

33 03 - Set of insert rings for Ø25 mm or Ø1" (to be used with 33 33)

33 04 - Set of insert rings for Ø1 1/4" (to be used with 33 33)

33 05 - Set of insert rings for Ø1 1/2" (to be used with 33 33)

Specimen Holders for Central Force Application (for FORCIMAT 102, ACCURA 102, FORCIPLAN 102)

46 88 - Teardrop specimen holder, Ø130 mm, 6 specimens with 10 - 32 mm.

46 89 - Teardrop specimen holder, Ø130 mm, 4 specimens with 10 - 42 mm.

46 44 - Clamp type specimen holder, Ø 130 mm, 4 rectangular specimens with 25 X 35 mm.

46 45 - Clamp type specimen holder, Ø 160 mm, 3 rectangular specimens with 40 x 70 mm.

46 71 - Teardrop specimen holder, Ø160 mm, 6 specimens with 40 - 25 mm diameter

46 72 - Teardrop specimen holder, Ø160 mm, 4 specimens with 52 - 25 mm diameter

46 77 - Universal specimen holder for large and irregular shaped specimens, Ø160 mm with 6 clamping fixture

46 39 - Clamp type specimen holder, Ø220 mm, 3 specimens for irregular shaped samples (Including loading plate)

(Specimen holders with Ø160mm can only be used with 300 mm wheels)

Accessories for Specimen Loading

45 60 - LEVOMAT

Specimen Loading Fixture, to level the specimens within the central force specimen holders, without specimen loading plate.

Specimen Loading Plates

45 10 - Specimen Loading Plate Ø130 mm

45 50 - Specimen Loading Plate Ø160 mm

ENVIRO Recirculating Filtering System for FORCIPOL's & ACCURA 102 & VELOX 102

GR 0865 - ENVIRO Recirculating Filtering System, Closed loop 1 micron filtering system with 20 lt. recirculating water tank, suitable to operate with line water on 80 micron filter as well. Requires 4 bar compressed air. Ready for operation with all Metkon Grinder/Polishers

YM 6214-00 - Filter, 10 inches 1 Micron

Spare Part Kit for FORCIPOL/FORCIMAT/DOSIMAT

GR 1991 - Recommended Set of Spare Parts, FORCIPOL 102/202/TS

GR 1992 - Recommended Set of Spare Parts, FORCIMAT 52/TS

GR 1993 - Recommended Set of Spare Parts, FORCIMAT 102

GR 1994 - Recommended Set of Spare Parts, DOSIMAT 12/52/102

* Other voltages and frequencies available upon request. Please state when ordering. All specifications are subject to change without notice.

SPECIFICATIONS

ORDER NO	36 21-200/250/300	36 22-200/250/300
MODEL NO	FORCIPOL 102	FORCIPOL 202
Number of Wheels	1	2
Wheel Diameter	Ø200/250/300 mm	Ø200/250/300 mm
Base Motor Power	1 HP	1 HP
Wheel Speed	50-600 RPM	50-600 RPM
Wheel Rotation Direction	CW/CCW	CW/CCW
Dimensions, WxDxH, [cm]	45 x 74 x 34	87 x 74 x 34
Weight, kgs	50	55
Mains	230 V, 50/60 Hz, 1-Phase	230 V, 50/60 Hz, 1-Phase

ORDER NO	40 06	40 07	40 08
MODEL NO	DOSIMAT 12	DOSIMAT 52	DOSIMAT 102
Number of Pumps (Bottles)	1	6	6
Control Panel	Touch Pad Controls	Touch Pad Controls	Controllable from LCD Screen of FORCIMAT 102
Program Memory	Last Parameters Retained in Memory	Last Parameters Retained in Memory	30 Programs
Retract Function	Yes	Yes	Yes
Pre-Dosing Function	No	No	Yes
Compatible Instruments	FORCIMAT 52/102	FORCIMAT 52	FORCIMAT 102
Dimensions, WxDxH, [cm]	14 x 21x 16	20 x 74 x 30	20 x 74 x 30
Weight, kgs	5	15	15

SPECIFICATIONS

ORDER NO	30 11	30 12	30 14
MODEL NO	FORCIPOL Control Unit	FORCIMAT 52	FORCIMAT 102
Operation	Manual	Semi Automatic	Programmable Automatic
Application of Force	-	Individual	Individual + Central
Control Panel	Touch Pad Controls	Touch Pad Controls	7" HMI Touch Screen
Program Memory	Last Parameters Retained in Memory	Last Parameters Retained in Memory	30 Programs
Manual Operation Mode	Yes	Yes	Yes
Head Motor Power	-	100 W	100 W
Sample Holder Rotation Direction	-	CW	CW
Sample Holder Speed	-	50-150 RPM	50-150 RPM
Individual Force	-	5-60 N	5-60 N
Central Force	-	-	30-500 N
Grinding Depth Measurement	-	-	Optional
Grinding Depth Measurement Accuracy	-	-	10 µm
Disc Cleaning & Drying Feature	Yes	Yes	Yes
Smart Water Saving Feature	Yes	Yes	Yes
Compatible Instruments	FORCIPOL 102/202	FORCIPOL 102/202	FORCIPOL 102/202
Compressed Air Requirement	-	6 Bars	6 Bars
Dimensions, WxDxH, [cm]	20 x 20x 39 (above FORCIPOL working disc)	26 x 46 x 54 (above FORCIPOL working disc)	26 x 46 x 54 (above FORCIPOL working disc)
Weight, kgs	5	16	16



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