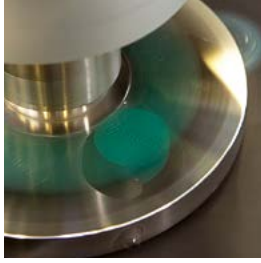
Struers

Tegramin



The powerful preparation system

for high quality specimen preparation

- Sturdy and durable design
- Intuitive user interface
- Easy cleaning with removable bowl liner and bowl flush
- Cover for improved safety

Expect more from your preparation equipment

The Tegramin preparation system elegantly combines ease of use with advanced functionality. Innovative solutions improve preparation results and help you deal with a variety of specimens or materials, or high specimen volume.

Tegramin in three different disc sizes:

Tegramin-30 / 300 mm

Tegramin-25 / 250 mm

Tegramin-20 / 200 mm

Superior design features for maximum preparation quality

All the features of Tegramin have been developed in close cooperation with experienced metallographers to make specimen preparation easier and more reliable.

Dual column construction
On the massive, cast aluminium base, a sturdy construction carrying the specimen mover head is fixed. The up/down movement is based on two strong columns making the entire systems as solid as possible. This has a very positive effect on specimen planeness and noise during preparation.

Precise force control
It is possible to grind and polish with a force as low as 5 N per specimen. This is used for small or sensitive specimens to avoid damage during preparation.

Automatic locking of specimen mover plates
After the specimen mover plate has been moved into the correct position over the preparation surface, the coupling is locked inside the specimen mover head. The possible small movements of the specimen mover plate are now avoided completely, and the result is a tremendous improvement in specimen planeness. On Tegramin-20 the specimen mover plate is locked in place with a single screw.

Soft start and stop
Both the start and stop sequence of a preparation step are controlled precisely. The force is increased and decreased gradually, and the speed of both preparation disc and specimen mover plate is ramped up and down at predefined "angles" to get the best possible preparation result without the risk of damaging the specimen because of preferential grinding.

Direction of preparation head
The rotational direction of the head can be set to either clockwise or to counter-clockwise. Normal preparation is always carried out using the counter-clockwise movement, i.e. same as the disc movement for the best possible dynamic relations. For special applications and for polishing with oxide polishing suspensions, the rotation is changed to clockwise to keep the suspension better on the disc.

Slow rotation while pre-dosing
When a preparation step is started, the first few seconds are normally used for pre-dosing. During this time the disc is turning slowly for a more equal distribution of the suspension or lubricant and to avoid the liquid to be thrown off the disc.

Removal measurement on specimen holders
A built-in removal sensor allows for the measurement of material removal in the range from 50 - 5,000 µm. Instead of relying on preparation time, especially when grinding various numbers of specimens, the necessary amount of material to be removed can be specified. This guarantees the shortest possible grinding time while ensuring that sufficient material has been removed.

Preparation of individual specimens and specimen holders
Tegramin-30 and -25 are designed for preparation of both individual specimens and specimens clamped in holders.
Simply switch between the two possibilities and insert either a specimen holder or a specimen mover plate to run the required method. Thus all options are covered. Tegramin-20 is for preparation of individual specimens only.

Specimen mover head stopping again at start position
The specimen mover head is always stopping at the exact same position it was started at. This makes it easier to insert and remove the specimen holder or specimen mover disc as the release button always is in the same position. It also makes it easier to identify individual specimens as they start and stop exactly in the same position.

Easy insertion and removal of specimens
Tegramin is equipped with a specific key to rotate the specimen mover plate. One touch of the key rotates the plate 180° and facilitates insertion and removal of the specimens.

Advanced dosing functions for maximum reproducibility

As precise dosing of diamond suspension and lubricant are key to the perfect preparation result, special attention was paid to these functions.

Increase reproducibility

Automatic dosing of consumables ensures that a controlled amount is applied every time. This greatly increases reproducibility and keeps consumables consumption under control.

Different dosing modules available

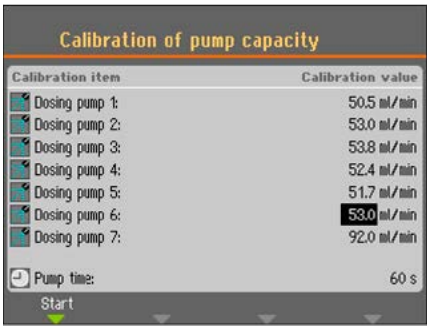
Three different dosing modules are available for Tegramin: A module with one pump for DP-Suspension or lubricant, a module with two pumps for DP-Suspensions or lubricants, and one module with two pumps for DP-Suspensions or lubricants and one pump with water connection for OP-Suspensions. These modules can be combined in various ways, opening for many different combination possibilities and up to 7 pumps in total.

Manual preparation with automatic dosing and timer function

It is possible to select manual preparation. In this menu it is possible to display the preparation surface to be used and to program the lubricant and/or suspension to be used together with the dosing level and the preparation time. After pressing start, dosing will start automatically and the disc will stop as soon as the preset time has expired. This allows e.g. for a controlled, short manual re-polishing of specimens after etching.

Automatic level calculation

It can be difficult to see the level in all bottles when they are placed in the bottle tray. Tegramin has an automatic level calculation so when a lubricant or suspension is filled into a bottle, the volume that is in the bottle can be specified in the bottle configuration.

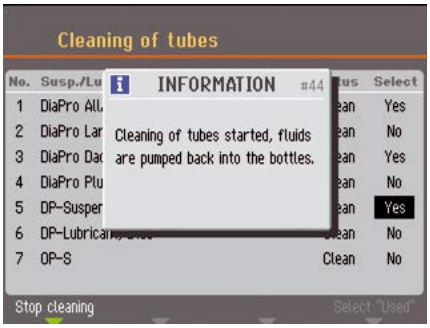


Built-in pump calibration

Tegramin is equipped with a calibration function that ensures constant dosing levels throughout the entire lifetime of the machine. At regular intervals a calibration routine can be carried out, and the actual pump capacity is measured. After the measurement the individual pump values are entered into the software, and the correct dosing levels are calculated based on these values. Thus any method will always produce the same preparation result.

Sniff function when dosing DP-Suspensions and lubricants

At the end of every preparation step the pump(s) used during that step reverse slightly to retract the suspension or lubricant from the dosing nozzle. This eliminates the risk of contamination at a later step from coarse abrasive on a finer grain size step.



Cleaning function for all tubes

The software contains a built-in cleaning routine for cleaning all the tubes for suspensions and lubricants. Tegramin monitors which suspensions and thus which pumps/tubes have been used and offers the possibility to clean just the tubes with the status "Used". It is also possible to select any tube for cleaning independently. Messages on the display tell exactly what to do and at the end of the operation the selected tubes are clean and ready for e.g. a change to a different grain size.

Automatic tube cleaning after OP polishing

At the end of the OP-polishing step the force is reduced to the lowest possible value, the rotation changed from counter- to co-rotation and a water valve is opened directly after the peristaltic pump. That means that the tube is flushed completely, all OP-Suspension is removed and at the same time both polishing cloth and specimens are cleaned as well. Therefore no chemical attack will take place after the OP-step is finished.

No clogging of dosing tubes

At the end of the process, water is pumped back to replace the OP-Suspension with water, between pump and bottle. This limits the risk of clogged tubes but does not eliminate it completely, as the part of the tube inside the bottle does not get flushed. To overcome this problem, Struers offers OP-S and OP-U NonDry. These colloidal silica suspensions provide excellent polishing results and always stay in liquid format.

It is the small things that improve the daily operation of Tegramin

With Tegramin, not only the preparation quality, but also the operation of the machine is optimised as much as possible.

MD-Disc with cone

It is very easy to remove the MD-Disc and it allows therefore the fast exchange of the bowl liner. It has a higher mass than the traditional MD-Disc so it also keeps the temperature of the preparation surface lower and can easier be cooled down using the disc cooling function.

Easy cleaning with removable bowl liner

A bowl liner that fits precisely into the bowl collects all debris that is not washed down the drain. When the machine has to be cleaned, the bowl liner can easily be removed. It can then either be cleaned or discarded.

Bowl flushing

To further facilitate cleaning, Tegramin-30 and -25 are equipped with a bowl flush function. While the disc is rotating, disc cooling is activated. The water that is sprayed on the bottom of the MD-Disc is distributed to the walls of the bowl, washing away loose debris.

Spin function for cleaning and drying

By holding the disc key down the disc will spin up to maximum speed and thus all excess water after cleaning will be removed from the MD-Disc or the preparation surface.

Motorized horizontal positioning of specimen mover head on Tegramin-30 and Tegramin-25

It is possible to adjust the specimen mover head position relatively to the preparation disc. The centre lines of both discs are identical, so depending on the diameter of the specimen holder or mover plate it can be moved left or right for the best possible utilization of the preparation surface. On Tegramin-20 the position is adjusted manually.

Possibility to connect a recirculation cooling unit

One of Struers' recirculation cooling systems can be connected to Tegramin. This is especially useful to collect grinding debris and to avoid blocking the draining system in the lab. It is also very useful when water is scarce or when there simply is no water connection nearby.

Shift valve to use both recirculation and tap water

For the first time with a table top machine it is possible to connect both tap water and a recirculation cooling system at the same time. Water from the recirculation system can be used for grinding; for the OP-polishing step, where absolutely clean water is a must, tap water is used. The shift valve is activated automatically to direct the waste water in the correct direction to avoid overfilling or emptying of the recirculation cooling unit.

Cover to encase the preparation area

As an option a transparent cover that encloses the entire preparation area is available. The cover offers several advantages: when alcohol-based consumables are used, all the fumes are contained within the cover. The cover can be connected to an exhaust and all fumes can be removed without any personal exposure. When the cover is closed, the user cannot get in contact with any rotating parts and personal safety is improved. When the cover is mounted, the Tegramin cannot be started when the cover is open (unless manual preparation has been selected). The machine will also stop if the cover is opened while a preparation step is running.

Getting the same results every time

It is not one good preparation that is important; it is the same perfect preparation result every time.

Increase reproducibility

Consistent preparation procedures are required to ensure repeatability and reproducibility. Tegramin includes a method database able to store as many as 200 preparation methods.

Start right away

Tegramin includes 10 Struers Metalog Guide methods which cover all major material groups. They are developed for maximum performance of the Tegramin and allow you to get started right away. They also provide an excellent starting point for development of your own methods.

Different user-levels

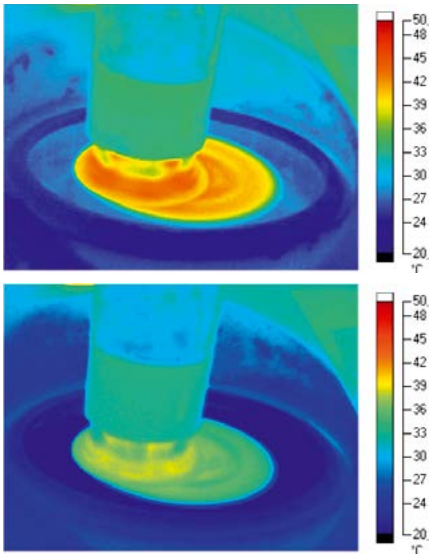
Three different user-levels can be set: Production, Development and Configuration. This allows for the lab manager to configure the machine and develop preparation methods. When the user level then is changed to Production, only a few necessary parameters can be changed while the rest is locked to avoid changes to the preparation result.

Automatic combination of preparation steps with same surface and suspension/lubricant

In some cases, it can be an advantage to divide a preparation step into two or three sub-steps with e.g. different force or dosing levels for even more reliable and fast specimen preparation. Tegramin automatically recognises steps as sub-steps when the same preparation surface and lubricant/suspension are used. It will therefore run these steps in succession, without any user-intervention. This function can be un-selected when SiC Papers are used, as here often several steps are created to allow the change of worn papers.

Disc cooling on Tegramin-30 and Tegramin-25

Underneath the MD-Disc, a nozzle can apply water to the backside of the disc and thus reduce the temperature increase that can occur during preparation, by up to 20°C. With the disc cooling function the temperature of the preparation surface is kept low.



This is particular relevant for high volume preparation and will not only improve preparation quality, but also keep consumption of suspensions and/or lubricants down.

Different systems for different requirements

Depending on the number and size of specimens to be prepared different system sizes are available.

Three system sizes

Tegramin is available for three different disc sizes: Tegramin-30 for 300 mm discs, Tegramin-25 for 250 mm discs and Tegramin-20 for 200 mm discs.

High preparation capacity

On Tegramin-30: up to 6 individual specimens of 50 mm dia. and specimen holders size 160 mm or 200 mm dia.
On Tegramin-25: up to 6 individual specimens of 40 mm dia. or 3 individual specimens of 50 mm dia. and specimen holders size 140 mm or 160 mm dia.
On Tegramin-20: up to 4 individual specimens of 40 mm dia.

Variable speed of disc and specimen mover head

Tegramin is equipped with variable disc speed of 40-600 rpm and variable specimen mover head speed of 50-150 rpm. This allows for preparation of very sensitive materials at low speed, as well as fast preparation with high material removal at higher speeds.

Sturdy and du

Cover*
a transparent cover that encloses the entire preparation area

Dosing module*
3 different dosing modules for automatic dosing of consumables

MD-Disc with cone*
easy to remove the MD-Disc and for fast exchange of the bowl liner

Removable bowl liner*
easy cleaning with a bowl liner that collects all debris that is not washed down the drain

**to be ordered separately*

rable design

LED light
illuminates the entire preparation area and makes it easy to follow the preparation process

Emergency stop
for immediate stopping of all moving parts in case of an emergency

Large colour display
showing all parameters of preparation steps in an easy-to-read-way and user-friendly

Turn/push knob
facilitates and speeds up the entire machine operation and programming

Technical data		Tegramin-20	Tegramin-25	Tegramin-30
Disc	Diameter	200 mm / 8"	250 mm / 10"	300 mm / 12"
	Speed	40-600 rpm, variable in steps of 10		
	Rotational direction	Counter-clockwise		
	Motor power continuous / max	370 / 555 W / 0.5 / 0.75 HP	750 / 1125 W / 1.0 / 1.5 HP	
	Torque at disc Cont. at <300 rpm Cont. at 600 rpm Max.	 11.8 Nm / 8.7 ft-lbf 5.9 Nm / 4.4 ft-lbf > 18 Nm / 13.3 ft-lbf	 23.8 Nm / 17.6 ft-lbf 11.9 Nm / 8.8 ft-lbf > 40 Nm / 29.6 ft-lbf	
Head	Speed	50-150 rpm, variable in steps of 10		
	Rotational direction	Clockwise, counter-clockwise		
	Force	Individual specimens: 5-50 N	Specimen holder: 30-300 N Individual specimens: 5-50 N	Specimen holder: 30-400 N Individual specimens: 5-65 N
	Motor	120 W		160 W
	Torque	7.5 Nm / 5.6 ft-lbf		10.2 Nm / 7.6 ft-lbf
Software and electronics	Controls	Touch pad and turn/push knob		
	Memory	FLASH-ROM / RAM / NV-RAM		
	LC Display	TFT-colour 320x240 dots with LED back light		
Safety		Please refer to the Declaration of Conformity		
Stop Mechanisms Designed to comply with:	Emergency stop	EN60204-1, Stop Category 0 EN954-1, Category 2		
	Cover	EN60204-1, Stop Category 2 EN954-1, Category B		
Noise level	At idle running, at a distance 1.0 m / 39.4" from the machine	47 dBA		
	During preparation	Polishing 54 dBA, Grinding 56 dBA		
Surrounding temperature		5-40°C / 41-104°F		
Humidity	Non condensing	0-95% RH		
Supply	Voltage / frequency	200-240 V / 50-60 Hz		
	Power inlet	1-phase (N+L1+PE) or 2-phase (L1+L2+PE) The electrical installation must comply with “Installation Category II”.		
	Power, nominal load Power, idle	680 W 9 W	1060 W 13 W	
	Current, nom.	3.4 A	5.3 A	
	Current, max.	6.3 A	10 A	
	Pressure for tap water	1-10 bar / 14.5-145 psi		
	Water inlet	¾"		
	Water outlet	ø30 mm / 1¼"	ø40 mm / 1½"	
	Air inlet	ø6 mm		
	Air pressure	6-10 bar / 86-145 psi		
	Air quality	The air supplied must be of Class-3 or better, as specified in ISO 8573-1.		
“Exhaust” **(with Cover only)**	Dimension	ø50 mm / 2" Recommended capacity for exhaust system: 50 m^3/h / 1750 ft^3/h at 0 mm water gauge.		
Dimensions and weight (without Cover)	Width	60 cm / 23.6"	67.5 cm / 26.6"	
	Depth	65 cm / 25.6"	75 cm / 29.5"	
	Height	48 cm / 18.9"	56 cm / 22"	
	Weight	52.5 kg /116 lbs	90 kg / 198 lb	
Dimensions and weight (with Cover)	Width	60 cm / 23.6"	67.5 cm / 26.6"	
	Depth	65 cm / 25.6"	75 cm / 29.5"	
	Height (cover closed/open)	50 cm / 19.7" / 85 cm / 33.5"	58.2 cm / 22.9" / 90 cm / 35.4"	
	Weight	58 kg / 128 lbs	98 kg / 216 lb	

Struers' equipment is in conformity with the provisions of the applicable International Directives and their appurtenant Standards (please contact you local supplier for details).

Struers' products are subject to constant product development. Therefore, we reserve the right to introduce changes in our products without notice.

SPECIFICATIONS

	Cat.no
Tegramin-30 Automatic, microprocessor controlled machine for grinding and polishing of specimens on 300 mm MD-Disc with cone. Dosing modules, MD-Disc with cone and specimen holders are ordered separately.	06036127
Tegramin-30 with cover Automatic, microprocessor controlled machine for grinding and polishing of specimens on 300 mm MD-Disc with cone. With transparent cover. Dosing modules, MD-Disc with cone and specimen holders are ordered separately.	06036227
Tegramin-25 Automatic, microprocessor controlled machine for grinding and polishing of specimens on 250 mm MD-Disc with cone. Dosing modules, MD-Disc with cone and specimen holders are ordered separately.	06026127
Tegramin-25 with cover Automatic, microprocessor controlled machine for grinding and polishing of specimens on 250 mm MD-Disc with cone. With transparent cover. Dosing modules, MD-Disc with cone and specimen holders are ordered separately.	06026227
Tegramin-20 Automatic, microprocessor- controlled machine for grinding and polishing of specimens on 200 mm MD-Disc with cone. Dosing modules, MD-Disc with cone and specimen holder's are ordered separately.	06016127
Tegramin-20 with cover Automatic, microprocessor- controlled machine for grinding and polishing of specimens on 200 mm MD-Disc with cone. With transparent cover. Dosing modules, MD-Disc with cone and specimen holder's are ordered separately.	06016227
Tegramin Dosing Module with 1 DP pump To be installed on Tegramin-30 / -25 or -20. With one pump for diamond suspensions or lubricants.	06036900
Tegramin Dosing Module with 2 DP pumps To be installed on Tegramin-30 / -25 or -20. With two pumps for diamond suspensions or lubricants.	06036901
Tegramin Dosing Module with 2 DP and 1 OP pump To be installed on Tegramin-30 / -25 or -20. With two pumps for diamond suspensions or lubricants and one pump for OP suspensions.	06036902
Lavamin Specimen cleaning unit for cleaning of specimen holders up to 160 mm dia. and for individual specimens in specimen mover plates for Tegramin-25, -30, TegraForce-5 and RotoForce-4.	06236133
Bottle tray for Tegramin. With space for six ½ l bottles and one 1l bottle. To be used with Tegramin-30 / -25 or -20.	06036910

Preparation Discs	MD-Disc with cone for Tegramin-30, 300 mm dia.	06086403
	MD-Disc with cone for Tegramin-25, 250 mm dia.	06086402
	MD-Disc with cone for Tegramin-20, 200 mm dia	06086401
Cover	Transparent cover for Tegramin-25/-30	06036903
	Transparent cover for Tegramin-20	06016903
Lid	For Tegramin-25 and Tegramin-30	06036906
	For Tegramin-20	06016906
Splash guard for manual preparation	For Tegramin-30	06036905
	For Tegramin-25	06026905
	For Tegramin-20	06016905
Disposable bowl liner	For Tegramin-25 / -30. 5 pcs.	49900052
	For Tegramin-20. 5 pcs.	49900056
Shift valve for Tegramin	For recirculation cooling unit (05766xxx) or drain.	06036904

Struers Cooling Unit, System 3. With 50 l tank, small pump, Cooli-1, 50 l static filter with filter paper.	
1 x 100 V / 50 Hz	05766516
1 x 220-240 V / 50 Hz	05766522
1 x 100-120 V / 60 Hz	05766523
1 x 220-240 V / 60 Hz	05766524
1 x 100-120 V / 50-60 Hz CSA	05766616
Levelling device. For levelling of specimens in specimen holders (ø 140 mm)	05256903
Levelling device, Uniforce. For levelling of specimens in specimen holders ø 140, 160 and 200 mm.	04886101
With pressure foot for positioning of specimens	04886102

Coupling	For Tegramin-30 and Tegramin-25 specimen mover plates.	06086901
	For Tegramin-20 specimen mover plates.	06086900

Specimen mover plates, for individual specimens

	For Tegramin-25	For Tegramin-30
Without holes	06086906	06086936
For 6 specimens 25 mm dia.	06086902	06086932
For 6 specimens 1" dia.	06086909	06086939
For 6 specimens 30 mm dia.	06086903	06086933
For 6 specimens 1¼" dia.	06086910	06086940
For 6 specimens 1½" dia.	06086911	06086941
For 6 specimens 40 mm dia.	06086904	06086934
For 3 specimens 50 mm dia.	06086905	-
For 3 specimens 2" dia.	06086943	-
For 6 specimens 50 mm dia.	-	06086935
For 6 specimens 2" dia.		06086942
For 6 specimens 20 x 30 mm	-	06086944
For Accustop 30	06086907	06086937
For Accustop 40 + TYNDS	-	06086938

Specimen mover plates for Tegramin-20, for individual specimens

Without holdes	06086918
For 4 x 25 mm dia.	06086912
For 4 x 30 mm dia.	06086913
For 4 x 40 mm dia	06086914
For 4 x 1" dia.	06086915
For 4 x 1¼" dia.	06086916
For 4 x 1½" dia.	06086917

Lavamin - Fully automatic cleaning unit

You save time with a faster cleaning process and the opportunity to change the preparation surface while the specimens are being cleaned. Automated cleaning perfection every time and avoid replacement of preparation surfaces due to accidental contamination. In addition to saving you time and costs, Lavamin eliminates chemical cleaning agents and leaves no environmental footprint.

A wide range of specimen mover plates are available for Tegramin.

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ISO 9001 BUREAU VERITAS Certification

ISO 14001 BUREAU VERITAS Certification

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About Struers

Struers is the world leader in materialographic innovation. We develop, manufacture and distribute quality materialographic preparation solutions to help our customers realize maximum productivity and performance in laboratories and production facilities around the world. Struers is based in Copenhagen, Denmark with affiliates in 23 countries. Struers' employees, including experienced metallographers and qualified service personnel, work from strategically positioned global offices, supported by a worldwide network of dealers.

Learn more

Contact a Struers sales representative today or visit www.tegramin.com

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