

# On-site Materialographic Preparation and Examination





MoviPol-5



## Battery-powered, portable materialographic equipment

Grinder/polisher Electropolisher Microscopes with digital camera option

## Fast, perfect replication

Replica foils for any surface Replica compound for 3D replicas

## **Non-destructive testing**

Many applications demand a materialographic preparation and examination without damaging the subject of inspection. This is where non-destructive testing, NDT, is employed.

The usual NDT preparation steps such as grinding, polishing and etching are performed on the part to be examined in a limited area where no damage can be done, for subsequent analysis of the surface.

Non-destructive preparation enables the necessary inspection to be carried out on site, and is particularly suitable for quality checks in power stations, oil platforms, bridges, aircraft etc.

Electrolytic preparation is a particularly fast and efficient method of non-destructive metallographic preparation. It can be applied directly to critical surfaces and is widely used for metal safety inspection, especially for critical parts of larger units, e.g. welds and other joints. The method effectively reveals changes in the microstructure of the metal and so prevents possible damage because of cracks and leaks.

Struers manufactures a complete range of consumables and portable equipment for materialographic non-destructive preparation: from grinding through mechanical and electrolytic polishing/etching and microscopes for inspecting the result.

These tools are supplemented by a wide range of replication products.

**The entire** range of Struers non-destructive preparation products have been designed for field work. The equipment is thus as compact and as light as possible.

It is easy to transport and can be used literally under any conditions.

**Replica** methods make it possible to perform the microscopic examination in the laboratory - under perfect working conditions.





### **TransPol-5**



#### Portable grinding and polishing equipment for rugged use

TransPol-5 is a portable, metallographic grinding/ polishing machine built to withstand rugged field conditions.

Access to inspection sites is often restricted. The very compact 32 mm grinding and polishing discs of the Struers grinding/polishing machine, means that e.g. welds in even the most inaccessible places can be dealt with.

#### High performance motor

The powerful motor ensures sufficient power working even with the coarsest paper.

The motor has variable speed (0-20,000 rpm) for optimum results.

#### **Battery or mains powered**

An exchangeable battery pack offers up to 1½ hours of continuous battery operation. The battery pack is shared with the MoviPol-5 electropolisher.

Battery pack and charger are included.

#### All accessories included

All necessary accessories are included, and are easily stored in the hold of the carrying case. Here, there is also plenty of storage space for all consumables needed for the preparation.

The portable grinder/polisher comes with both an angled and a straight handle, and exchangeable rubber discs, for support of the grinding paper and polishing cloth discs.



#### **Consumables**

A wide range of grinding and polishing consumables are available for TransPol-5; grinding and polishing discs as well as flapper wheels (see back of brochure for details).



## **MoviPol-5**

#### Electrolytic polishing and etching in the field

MoviPol-5 is a portable electrolytic metal polishing and etching machine. It is compact and robust and can be used anywhere.

### **Ultrafast results**

In less than one minute, a surface is obtained, which is ready for analysis, either on-site or by means of replica for laboratory examination.

#### Automatic polishing and etching

Activating the polishing pistol starts an electrolytic reaction. After completion of the polishing step, MoviPol-5 automatically proceeds to the etching process.

#### **Complete Freedom**

MoviPol-5 is equipped with a rechargeable battery pack offering up to 1½ hours of uninterrupted battery operation. This makes MoviPol-5 ideal for field work. For extended hours in the field, both battery pack and electrolyte cartridge are replaced in seconds.

For lab work, MoviPol-5 can be connected to the mains via the battery charger (included).

The high-performance battery pack is shared with TransPol-5.\*

#### **Built-in process light**

Frequently, electropolishing is carried out in poorly lit environments. The built-in LED light ensures optimum visual control of the polishing/etching process.

#### Method database

MoviPol comes with a method database for popular materials. This means that the customer does not have to start from scratch, but has something to start on. The method database ensures uniform results and repeatability. Totally, up to 20 methods can be stored in the database.

#### Electrolyte cartridge system

Refilling of electrolyte can be a messy affair. This is why we have introduced the exchangeable electrolyte cartridge. Instead of refilling a container, the entire cartridge is replaced in seconds — without spilling a drop. In this fashion, refilling can be done in the comfort of the lab, without wasting any precious field time.







### Peristaltic pump for work in any position

Movipol-5's peristaltic pump ensures a steady flow of electrolyte even when working e.g. under up.

#### Safety features

A non-return valve ensures that the electrolyte flows only during actual operation.

A tilt-sensor warns the operator if the Movipol-5 is tilted more than 45 degrees, meaning risk of spilling electrolyte. MoviPol-5 is made in compliance with the international safety standard EN60204.

<sup>\*</sup> Battery pack must be inserted for mains usage.

# **PSM-5 / PSM-10** Microscopes for field inspection of prepared surfaces and replicas PSM-5 PSM-10

PSM-5/-10 and the digital camera are all supplied in transport cases

#### Portable field microscopes

The PSM-5 and PSM-10 are compact and portable microscopes for use in the field.

PSM-5 provides up to 400x magnification, and PSM-10 up to 600x.

Both are ideal for examination of prepared surfaces provided by TransPol-5 and Movipol-5.

A replica is recommended for a more detailed analysis in the lab. The microscopes are used for preliminary examination of the replica.

#### **Battery-powered LED light**

The powerful LED light is battery-fuelled and so has no need for external power supply.

Both models are supplied with a 10x eyepiece and a 10x objective lens, combined providing a 100x magnification.

#### **Objective lenses**

20x and 40x objective lenses are available for both microscopes. Extreme magnification is achieved with a 60x objective lens, available exclusively for the PSM-10.

#### Digital camera

To capture results in the field, a high-quality digital camera option is available. The camera lets you choose between three power sources and includes all accessories.

#### Measuring eyepiece and Plate micrometer

For calibrated measurements, a Measuring eveniece and a Plate micrometer are optionally available.

#### **Magnetic Cross table**

The magnetic cross table option is ideal for inspection of tubes and other convex surfaces. Activating the magnetic clamp, the microscope is easily attached to any ferrous workpiece. This option is available for PSM-10 only.

#### Tripod base for curved surfaces

The standard, low tripod base of PSM-10 can be replaced by a tall tripod base, when the microscope is used on curved surfaces.

#### **Round base**

Round base for PSM-10. For use on flat surfaces.

#### Aluminium transport case

Both microscopes and Camera option are supplied in aluminium transport cases.





Camera with adapter





## **Transcopy**



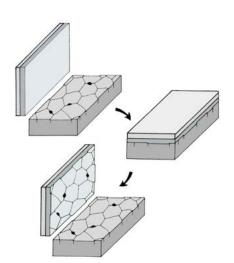
#### Transcopy Replica Foil

Transcopy Replica Foil is used to make a replica of any polished and etched surface. The foil is particularly useful when micrographs of an on-site prepared structure is required, or analysis using a portable microscope is insufficient.

Transcopy Replica Foil creates a permanent replication of microstructures, cracks and defects for future analysis and comparison in the laboratory.

#### **Function**

Transcopy Replica Foil consists of reflecting plastic film with a self-adhesive back. A replica is made by applying Transcopy fluid to the film and pressing it firmly onto the prepared and etched surface. A slightly overetched structure results in a higher contrast of the replica. After 4-5 minutes the foil is removed from the surface. By removing the cover paper, the replica can be adhered to a plain plate and then examined under an optical microscope.



## **RepliSet**

#### 3D replication compound

The RepliSet system is designed to produce an exact 3D copy of a surface. It is used for NDT and field applications allowing the structure or irregularities on critical components to be examined and measured under laboratory conditions.

RepliSet is a specially formulated, fast curing two-part silicone rubber with a good releasing ability for flex-

ible high-resolution 3D replicas, which behave like a metallic surface when examined in an optical microscope.

RepliSet compounds are supplied in cartridges and are dispensed using a handoperated dispensing gun. The application system offers superior and fast results, regardless of the conditions.

RepliFix can be used separately for moulding of surface shapes for low tech applications, or as support for a Repliset replica. A backing slide bonds to the RepliSet or RepliFix replica, and serves to maintain the original profile and a flat back to the replica.

A replica can be taken from all metallic materials and most other solid materials like ceramics, plastics and glass. There are no size, shape or thickness limitations on the replicas that can be made and it is even possible to take replicas from othervise inaccessible surfaces. The RepliSet system can produce replicas, which at the same time are dimensionally correct, with ultra fine detail reproduction and with a flat back.

Further to examination by optical microscopes, 3D examination can be carried out using non-contact measuring instruments such as laser measuring equipment or measuring projectors with 2D or 3D facilities. A replica of a cavity, for instance inner holes, can be examined using measurement and profile projectors. The replicas are suitable for 3D examination by SEM.

For field use of the 50 ml RepliSet system, an aluminium transport case is optionally available.





Pure copper. Sample etched with cupric chloride and ammonia. Magnification 100x.



Replica

## Replication means 100% accurate copies for analysis in the lab



#### TransPol-5

#### **Technical Data**

 Voltages
 30V or 100-240V / 50-60Hz

 Speed
 0-20,000 rpm

 Dimensions (without shoulder strap)
 Width Heigh
 358 mm / 14" and 14" and

Depth 240 mm / 9.4" 6.8 kg / 15 lbs

Total weight excl. accessories, excl. charger

**Specifications** Cat. no. TransPol-5, portable, metallographic grinding/polishing machine with 3 m connection cable. Battery or mains operation, 30V or 100-240V / 50-60Hz. Complete with shoulder strap, rechargeable battery pack, battery charger, reduction gear unit, straight handle, right angle handle, 4 rubber discs. TransPol-5, 30V or 100-240V / 50-60Hz 05976104 TransPol-5 Battery Charger Battery charger for TransPol-5 / MoviPol-5 05976117 TransPol-5 Battery Pack Rechargeable battery pack for TransPol-5 / MoviPol-5 05966204 SiC grinding papers, adhesive, dia. 32 mm, bundle of 100 40400049 Grit 60 Grit 120 40400129 40400130 Grit 240 40400131 Grit 500 DP cloths, adhesive, dia. 32 mm, bundle of 25 DP-Dur 40500040 DP-Dac 40500145 DP-Mol 40500041 DP-Nap 40500042 OP-Felt 40500043 Flapper wheel, 80 grit, 40 mm dia. x 10 mm 40800053 DP-Lubricant Blue, 1 I 40700005 DP-Lubricant, Red, 1 I 40700025

#### MoviPol-5

#### **Technical Data**

Voltage supply to transformer 100-240V / 50-60 Hz Voltage supply from transformer 30V DC

Thermal overload protection

Weight, including battery pack and electrolyte cartridge Weight, battery pack Volume, electrolyte 8.5 kg / 18.7 lbs 0.98 kg / 2 lbs 0.75 l / 1.3 lbs

#### Specifications

MoviPol-5, Portable electrolytic polishing and etching apparatus.

05966104

Battery or mains operation, 30V or 100-240V / 50-60 Hz.

Complete with electrolyte cartridge, external magnetic anode, shoulder strap, rechargeable battery pack and battery charger. Including 10 pcs polishing chambers.

Polishing Chambers for MoviPol-5, Flexible type, 50 pcs.	03926904
MoviPol-5 Battery Charger	
Battery charger for MoviPol-5 / TransPol-5	05976117
MoviPol-5 Battery Pack	
Rechargeable battery pack for MoviPol-5 / TransPol-5	05966204
Electrolyte cartridge for MoviPol-5	
Removable electrolyte container for MoviPol-5	05966030
External etching kit for MoviPol-5	
For external etching	05966903
Anode clamping kit for MoviPol-5	
For fixation of anode on non-magnetic materials	05966902

#### **PSM-5 / PSM-10**

#### Technical data

 PSM-5
 PSM-10

 Power
 Battery, 3V (CR2025)
 Battery, 3V (CR2025)

 Height incl. eyepiece
 210 mm / 8.2"
 220 mm / 8.7"

 Diameters
 25-63 mm / 0.98-2.5"
 25-70 mm / 0.98-2.8"

 Weight excl. objective lens
 473 g / 1 lbs
 1100 g / 2.4 lbs

Specifications	Cat. no
Portable microscope PSM-5 Portable microscope with battery-powered LED illumination. Complete with 10x eyepiece and 10x objective lens. Camera option, Camera connection kit, 20x/40x objective lenses,	
Measuring eyepiece and Plate micrometer are ordered separately.	04286102
Portable microscope PSM-10 Portable microscope with battery-powered LED illumination. Complete with 10x eyepiece and 10x objective lens. Camera option, Camera connection kit, 20x/40x/60x objective lenses, Magnetic cross table, Measuring eyepiece and Plate micrometer are ordered separately.	04286103
Objective lens 20x, for PSM-5/-10 Objective lens, 20x magnification. For use with PSM-5/-10.	04286910
Objective lens 40x, for PSM-5/-10 Objective lens, 40x magnification. For use with PSM-5/-10.	04286911
Objective lens 60x, for PSM-10 Objective lens, 60x magnification. For use with PSM-10.	04286912
Magnetic cross table, for PSM-10 XY-table with magnetic clamping for PSM-10. Suitable for inspection of ferrous tubes.	04286913
Measuring eyepiece, for PSM-5/-10 Measuring eyepiece with micrometer scale for PSM-5/-10. Plate micrometer (04286915) is used for initial calibration.	04286914
Plate micrometer, for PSM-5/-10 Plate micrometer with micrometer scale for PSM-5/-10. Used with Measuring eyepiece (04286914) for initial calibration.	04286915
Tripod base, for PSM-10. For curved surfaces.	04286918
Digital camera with C-mount, for use with PSM-2/-5/-10, Includes adapter for 23 mm eyepiece, adapter for MoviPol battery pack, AC-adapter,	
12V battery pack, 2 GB SD-card, remote shutter and transport case.	04286919
Round base, for PSM-10. For use on flat surfaces.	04286920

#### Transcopy

#### Transcopy Kit

Resolution of cured replica: Better than 1 µm Shrinkage: Negligible Temperature range of the surface to be examined: 10-60°C.

Set consisting of 40 ml Transcopy Liquid, 50 replica foils 20 x 30 mm (0.8" x 1.2"), 1 pipette, spray nozzle and 50 microscope slides 25 x 75 mm (1" x 3") 40900090

Transcopy Replica Foils, 50 pcs. 40900091

Transcopy Liquid, 40 ml 40900092

RepliSet

#### **Technical Data**

 $\begin{tabular}{lll} Resolution of cured replica & Down to 0.1 micron Shrinkage & Negligible \\ Tear Strength & 15-20 kN/m^2 \\ Temperature range for the surface to be examined & -10°C to +180°C \\ \end{tabular}$ 

Life span of the finished replicas is practically indefinite provided they are stored according to the instructions.

Content in static-mixing nozzle 1.1 ml in nozzle for 50 ml cartridge 9.3 ml in nozzle for 265 ml cartridge

#### **Specifications**

Replication system for non-destructive testing of a microstructure or a 3D structure. Fast curing two-part silicon rubber compound for flexible high-resolution 3D replicas. For the 50 ml system, the hand-operated dispensing gun (40900066) and the static mixing nozzles (40900088) are used in combination with the 50 ml cartridges. For the 265 ml system, the hand-operated dispensing gun (40900065) and the static-mixing nozzles (40900056) are used in combination with the 265 ml cartridges

Specifications RepliSet-F1 Particularly useful for replicating horizontal or sloping surfaces in low temperature conditions or where rapid results are required. Fluid rapid curing compound with working life of 0.5-1 min, and curing time of 4 min, at 25°C 1 cartridge of 50 ml 40900069 40900047 5 cartridges of 50 ml 40900051 2 cartridges of 265 ml RepliSet-F5 General purpose material. Particularly useful for replicating horizontal or sloping surfaces in normal or high temperature conditions. Fluid fast curing compound with working life of 5 min. and curing time of 18 min. at 25°C 1 cartridge of 50 ml 40900068 5 cartridges of 50 ml 40900046 2 cartridges of 265 ml 40900050 RepliSet-T1 Particularly useful for replicating vertical or overhead surfaces in low temperature conditions or where rapid results are required. Thixotropic rapid curing compound with working life of 0.5-1 min. and curing time of 4 min. at 25°C

RepliSet-T3

1 cartridge of 50 ml

5 cartridges of 50 ml

2 cartridges of 265 ml

General purpose material. Particularly useful for replicating vertical or overhead surfaces in normal or high temperature conditions. Thixotropic fast curing compound with working life of 3 min. and curing time of 10 min. at 25° C 40900070 1 cartridge of 50 ml 5 cartridges of 50 ml 40900048 2 cartridges of 265 ml 40900052

Replication system especially for comparatory macroscopy and metrology. Particularly useful for replicating horizontal or sloping surfaces and filling holes. Fluid rapid curing compound with working life of 0.5 - 1 min. and curing time of 4 min. at 25°C

1 cartridge of 50 ml 40900078 5 cartridges of 50 ml 40900076

RepliSet-GT1

Replication system especially for comparator macroscopy and metrology. Particularly useful for replicating vertical or overhead surfaces. Thixotropic rapid curing compound with working life of 0.5 - 1 min. and curing time

cartridge of 50 ml 40900079 5 cartridges of 50 ml 40900077

#### RepliFix

Specially formulated hand mixed fast curing two-part silicone rubber. Bonds to RepliSet. Particularly useful in combination with RepliSet for producing a rigid backing. It can be used directly for moulding of surface shape for profile measurement

For low temperature conditions or where rapid results are required. Working life of 2-3 min. and curing time of 10 min. at 25°C. Net 500 g

40900084

RenliFix-20

For high temperature conditions or for taking replicas of complicated geometry or large areas Working life of 20 min. and curing time of 60 min. at 25°C. Net 500 g 40900086

#### Accessories

Hand-operated dispensing gun

For 50 ml cartridges of RepliSet 40900066 For 265 ml cartridges of RepliSet 40900065

Static-mixing nozzles

For 50 ml cartridges. 35 pcs. 40900088 40900056 For 265 ml cartridges. 10 pcs

For replicating flat surfaces. Fishtail spreaders, 10 mm width To be mounted on 50 ml static mixing nozzle (40900088). 30 pcs 40900089

For replicating small holes. Luer needle, 1 mm dia., 30 mm long. To be mounted on 50 ml static-mixing nozzle (40900088). 10 pcs. 40900060

For replicating larger holes. Flexible hose, 6 mm dia., 100 mm long. To be mounted on 50 ml static-mixing nozzle (40900088) 10 pcs.

A flexible plastic slide, which bonds to the replica and ensures a flat back to the replica. For levelling of replicas to assist microscopic examination, as dimensional support for metrology and for wellordered labelling, transport and storage of RepliSet replicas 26 x 76 x 1 mm, 50 pcs

40900087

40900067

40900061

For RepliSet replication system. Bonds to the replica and facilitates labelling, handling and the levelling of replicas to assist microscopic examination. 60 x 70 mm. 100 pcs. 40900062 A4 (210 x 297 mm), for cutting up to the required size. 10 pcs. 40900063

Case for RepliSet 50 ml system

Aluminium case with room for all necessities for field applications The contents of the RepliSet Case is ordered separately

Struers' products are subject to constant product development.

Therefore, we reserve the right to introduce changes in our products without notice.



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