Always state Serial No and Voltage/frequency if you have technical questions or when ordering spare parts. You will find the Serial No. and Voltage on the type plate of the machine itself. We may also need the Date and Article No of the manual. This information is found on the front cover.

The following restrictions should be observed, as violation of the restrictions may cause cancellation of Struers legal obligations:

**Instruction Manuals:** Struers Instruction Manual may only be used in connection with Struers equipment covered by the Instruction Manual.

**Service Manuals:** Struers Service Manual may only be used by a trained technician authorised by Struers. The Service Manual may only be used in connection with Struers equipment covered by the Service Manual.

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Struers A/S
Pederstrupvej 84
DK-2750 Ballerup
Denmark
Telephone +45 44 600 800
Fax +45 44 600 801
LaboForce-1
Safety Precaution Sheet

To be read carefully before use

1. The operator should be fully aware of the use of the machine according to the Instruction Manual. The machine must be mounted securely on the grinding/polishing machine.

2. Be sure that the actual voltage corresponds to the voltage stated on the back of the machine. The machine must be earthed.

3. Blue lubricant: follow the current safety rules for handling, mixing, filling, emptying and disposal of the alcohol-based lubricant.

4. If you observe malfunctions or hear unusual noises - stop the machine and call technical service.

The equipment should only be used for its intended purpose and as detailed in the Instruction Manual.

The equipment is designed for use with consumables supplied by Struers. If subjected to misuse, improper installation, alteration, neglect, accident or improper repair, Struers will accept no responsibility for damage(s) to the user or the equipment.

Dismantling of any part of the equipment, during service or repair, should always be performed by a qualified technician (electromechanical, electronic, mechanical, pneumatic, etc.).
Disposal

Equipment marked with a WEEE symbol \[\text{\includegraphics[width=0.1\textwidth]{wEEE.png}}\] contain electrical and electronic components and must not be disposed of as general waste.
Please contact your local authorities for information on the correct method of disposal in accordance with national legislation.
# User's Guide

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</tr>
</tbody>
</table>
1. **Getting Started**

**Checking the Contents of Packing**

In the packing box you should find the following parts:
1. LaboForce-1
2. Allen-key 3 mm
3. Extra screws M4 for securing the specimen mover plate
4. Nut, M16
5. Washers, 1 mm for levelling of column height
6. Washer, 3 mm for levelling of column height
7. Set of Instruction Manuals

**Getting Acquainted with LaboForce-1**

Take a moment to familiarise yourself with the location and names of the LaboForce-1 components.
1. Handle
2. Distance adjustment screw
3. Force adjustment screw
4. Release button
5. Thrust pad
6. Specimen mover plate
**Setting up LaboForce-1**

LaboForce-1 is prepared to be mounted on Struers grinding/polishing machines, LaboPol-1, -2, -4, -5, -6, -21 or -25.

On LaboPol-1/-2/-4/-5

- Remove the plastic lid from the pre-punched hole for the LaboForce column. Turn the LaboPol machine onto its left-hand side.
- Lead the LaboForce-1 column through the hole. Mount and tighten the bottom nut using a 24 mm spanner.
- Raise the LaboPol machine to upright position.
- Go to paragraph Adjusting the Specimen Mover Position.

On LaboPol-21/-25

- Remove the plastic lid from the pre-punched hole for the LaboForce column. Move LaboPol to the left so that the part of the machine where LaboForce-1 is to be mounted is free of the table.
- Lead the LaboForce-1 column through the hole. Mount and tighten the bottom nut using a 24 mm spanner.
- Move LaboPol back onto the table.
- Go to paragraph Adjusting the Specimen Mover Position.

**Adjusting the Specimen Mover Position**

To ensure correct working conditions for LaboForce-1 you need to adjust the actual distance between the specimen mover plate and the preparation disc of your grinding/polishing machine.

*Distance to Preparation Disc*

- Place the specimen mover plate on the shaft and secure it with the screw.
- Remove the plastic cap on top of LaboForce-1, insert the Allen-key and turn it clockwise until LaboForce-1 is in top position.
- Mount a grinding or polishing disc on the LaboPol and swing LaboForce-1 into correct position over the disc.
- Press LaboForce-1 down and adjust the distance between grinding or polishing disc and specimen mover plate to about 1.5 - 2 mm by turning the Allen-key counter clockwise.
- If the distance is too small you must:
  - Remove LaboForce-1 from the grinding/polishing machine.
  - Attach 1 or more additional washers (1-3 mm). Grease the washers and fasten them under the column, using the grease as an adhesive.
  - Mount LaboForce-1 in its hole again and tighten the bottom nut.

Repeat the above procedure until the correct distance is achieved.

- Finally mount a counter nut to ensure that the column remains in the correct position.
Connecting LaboForce-1

Supplying Power

- Connect the power cable to the socket on the back of the LaboPol machine.

*IMPORTANT*
Check that the mains voltage corresponds to the voltage stated on the type plate on the back of the machine.

Communication

To let the LaboPol know that a LaboForce-1 is connected, the communications plug attached to the power cable has to be connected to the socket on the back of LaboPol.
Mounting a Drip Lubricator (Accessory)

A drip lubricator ① can be mounted on the LaboForce-1 to supply the necessary lubricant during the preparation process.

- Remove the drip lubricator from its box.
- Loosen the finger screw ② underneath LaboForce-1.
- Guide the bottom plate of the drip lubricator onto the finger screw and the positioning pin underneath the LaboForce-1, and re-tighten the finger screw.
- Hold the lubricant bottle with one hand and remove the lid.
- Fill the bottle with lubricant.
- Replace the lid and the drip lubricator is ready to use.

Mounting a LaboDoser Dosing Unit (Accessory)

Follow the Instructions for Use that are supplied with the Dosing Unit.
2. Operation

Inserting a Specimen
- Lift the thrust pad on the adjustment screw to make room for the specimen.
- Place the specimen in one of the holes of the specimen mover plate and lower the thrust pad.

**Tip**
For quick positioning of the adjustment screw (e.g. for specimens of differing heights), press the release button and move the screw up or down.

Adjusting the Force
- Adjust the force by turning the adjustment screw ①. The marks ⓪ on the spring loaded screw correspond to the actual force in Newton as stated below:

<table>
<thead>
<tr>
<th>Indication</th>
<th>Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 N</td>
</tr>
<tr>
<td>1</td>
<td>2.5 N</td>
</tr>
<tr>
<td>2</td>
<td>5 N</td>
</tr>
<tr>
<td>3</td>
<td>7.5 N</td>
</tr>
<tr>
<td>4</td>
<td>10 N</td>
</tr>
<tr>
<td>5</td>
<td>12.5 N</td>
</tr>
<tr>
<td>6</td>
<td>15 N</td>
</tr>
<tr>
<td>7</td>
<td>17.5 N</td>
</tr>
<tr>
<td>8</td>
<td>20 N</td>
</tr>
</tbody>
</table>

**WARNING**
If less than three specimens are prepared, ensure that the unused pressure feet do not touch the preparation surface.
Operating LaboForce-1

- Press LaboForce-1 down and turn it into the correct position over the grinding or polishing disc.

<table>
<thead>
<tr>
<th>Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>The specimens should run close to the edge of the grinding/polishing disc.</td>
</tr>
<tr>
<td>The distance should be about 2 mm.</td>
</tr>
</tbody>
</table>

- Secure LaboForce-1 in that position by locking the handle
- Place 1 to 3 specimens in the specimen mover plate.
- Adjust the force.
- Adjust the lubricant dosing level.
- Press START on LaboPol.
- Perform the method step and press STOP on LaboPol.
- Stop lubricant dosing:
  - Drip Lubricator: Close the valve on the drip lubricator
  - LaboDoser: Stops automatically after the pre-set time.

<table>
<thead>
<tr>
<th>Remember</th>
</tr>
</thead>
<tbody>
<tr>
<td>LaboForce-1 will start rotating as soon as LaboPol is switched on unless the switch “specimen mover” on the back of LaboPol has been switched off.</td>
</tr>
</tbody>
</table>

Replacing the Specimen Mover Plate

As specimens must fit the holes in the specimen mover plate quite accurately, the specimen mover plate has to be replaced when samples of another size have to be prepared.

- Unlock LaboForce-1 and let it move into top position.
- Turn LaboForce-1 to the left over the edge of the LaboPol.
- Unscrew the fastening screw of the specimen mover plate.
- Place the new specimen mover plate on the column and secure it with the screw.
- Lower LaboForce-1 again and lock the handle.
Operating a Drip Lubricator (Accessory)

- Position the dosing nozzle in the correct position over the preparation disc.
- Open the valve and adjust the lubricant dosing level.
- After completion of the preparation close the valve again to stop lubricant dosing.

Changing Lubricant

Drip Lubricant (Accessory)

- Remove the drip lubricator from LaboForce-1.
- Hold the lubricant bottle firmly and remove the top lid.
- Pour out the lubricant, and fill the bottle with a mild soap solution.
- Open the valve to clean the tube.
- Exchange the soap solution with clean water and repeat the above procedure.
- Empty the lubricator.
- Put the lubricator back on LaboForce-1 and tighten the finger screw.
- Refill with lubricant and mount the lid.

LaboDoser Dosing Unit (Accessory)

Follow the Instructions for Use that are supplied with the Dosing Unit.
# Reference Guide

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<tr>
<td>3. Maintenance</td>
<td>12</td>
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<tr>
<td>Every Day</td>
<td></td>
</tr>
<tr>
<td>Every Week</td>
<td></td>
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<td>4. Trouble-Shooting</td>
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<td>5. Technical Data</td>
<td>14</td>
</tr>
</tbody>
</table>
1. Accessories

Please refer to the *LaboForce brochure* for details of the range available.

<table>
<thead>
<tr>
<th>Remember...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Struers offers a comprehensive range of consumables for grinding and polishing. Please ask for separate leaflets.</td>
</tr>
</tbody>
</table>
2. Struers Metalog Guide™

LaboForce-1 is designed for preparation of most materials. In Struers Metalog Guide™ you will find a detailed description of grinding/polishing methods for automated mechanical specimen preparation.

Struers Metalog Guide™ offers preparation methods for the most common materials, based on a simple analysis of two key properties: hardness and ductility. Finding the right method is easy, including choice of consumables. Always consult Struers Metalog Guide™ on the Struers website for the correct preparation method for the actual specimens.

---

**Metalog Guide™**
A complete guide to materialographic specimen preparation.
3. Maintenance

**Every Day**

Clean the specimen holder plate with a damp cloth.

**Every Week**

Clean LaboForce-1 with a damp cloth.

**Cleaning a Drip Lubricator**

- Remove the drip lubricator from LaboForce-1.
- Hold the lubricant bottle firmly and remove the top lid.
- Pour out the lubricant, and fill the bottle with a mild soap solution.
- Open the valve to clean the tube.
- Exchange the soap solution with water and repeat the above procedure.
- Empty the lubricator.
- Put the lubricator back on LaboForce-1 and tighten the finger screw.
- Refill with lubricant and remount the lid.

**Cleaning a LaboDoser Dosing Unit**

Follow the Instructions for Use that are supplied with the Dosing Unit.
## 4. Trouble-Shooting

<table>
<thead>
<tr>
<th>Error</th>
<th>Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>The specimen mover plate on LaboForce-1 does not start turning.</td>
<td>The switch for the specimen mover on the back of LaboPol is set to “off”.</td>
<td>Set the switch to “on”.</td>
</tr>
<tr>
<td>The specimen mover plate runs unevenly or stops.</td>
<td>Force too high.</td>
<td>Reduce the force.</td>
</tr>
<tr>
<td>The column of LaboForce-1 starts turning.</td>
<td>Bottom nut of column is loose.</td>
<td><strong>Immediately tighten the nut</strong> at the base of column (See Section INSTALLATION).</td>
</tr>
</tbody>
</table>
5. Technical Data

<table>
<thead>
<tr>
<th>Subject</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor output</td>
<td>0.5 W</td>
</tr>
<tr>
<td>Torque at disc</td>
<td>Continuous 0.5 Nm</td>
</tr>
<tr>
<td>Amperage</td>
<td>16 mA/220-240 V</td>
</tr>
<tr>
<td></td>
<td>32 mA/100-120 V</td>
</tr>
<tr>
<td>Rotational speed</td>
<td>8/9.5 rpm at 50/60 Hz</td>
</tr>
<tr>
<td>Force per specimen</td>
<td>Min. approximately 2 N, max. approx. 20 N</td>
</tr>
<tr>
<td>Safety Standard</td>
<td>Please refer to the Declaration of Conformity</td>
</tr>
<tr>
<td>Noise Level</td>
<td>46 dB (A) at idle running, at a distance of 0.25m/10” from the machine</td>
</tr>
<tr>
<td>Power Supply</td>
<td>LaboForce-1 is connected directly to LaboPol</td>
</tr>
<tr>
<td>Dimensions and Weight</td>
<td>Width 190 mm/7.5” (including drip lubricator)</td>
</tr>
<tr>
<td></td>
<td>Depth 265 mm/10.5”</td>
</tr>
<tr>
<td></td>
<td>Height 295 mm/11.6” (above grinding/polishing disc)</td>
</tr>
<tr>
<td></td>
<td>Weight 5.9 kg/13 lbs</td>
</tr>
</tbody>
</table>
Quick Reference

Inserting a Specimen
- Lift the thrust pad to make room for the specimen.
- Place the specimen in the specimen holder plate hole and lower the thrust pad. Make sure that the specimen diameter fits the specimen holder plate hole.
- Adjust the force by turning the adjustment screw.

Replacing a Grinding/Polishing Disc
- Stop the grinding/polishing machine.
- Unlock the LaboForce-1 handle and let it move into top position.
- Change the disc on the turntable.
- Lower LaboForce-1 again and lock the handle.

Starting a Preparation Step
- Lower LaboForce-1 and lock the handle.
- Place 1 to 3 specimens in the specimen holder plate on the chosen surface.
- Adjust the lubricant dosing level.
- Press START on LaboPol.
- Perform the method step and press STOP on LaboPol.
- Stop lubricant dosing
  - Drip Lubricator: Close the valve on the drip lubricator
  - LaboDoser: Stops automatically after the pre-set time.
English

Declaration of Conformity

Manufacturer, responsible for Technical File
Struers ApS
Pederstrupvej 84
DK-2750 Ballerup, Denmark
Telephone +45 44 600 800

Herewith declares that

Product Name: LaboForce-1
Type No: 527
Machine Type: Specimen mover

is in conformity with the provisions of the following directives:

Safety of Machinery 2006/42/EC according to the following standard(s):

EMC-Directive 2014/30/EU according to the following standard(s):

RoHS 2011/65/EU according to the following standard(s):
EN 50581:2012.

Supplementary Information
The equipment complies with the American standards:
UL508.

The above has been declared according to the global method, module A

Date: 23.02.2016

Christian Skjold Heyde,
Vice President, R & D and Production, Struers ApS

Dansk

Overensstemmelseserklæring

Fabrikant, ansvarlig for Teknisk Dossier
Struers ApS
Pederstrupvej 84
DK-2750 Ballerup, Danmark
Telefon 44 600 800

erklærer herved, at

Produktnavn: LaboForce-1
Type nr.: 527
Maskintype: Prøvebevæger

er i overensstemmelse med følgende EU-direktiver:

Maskindirektivet 2006/42/EF efter følgende nom(er):

EMC-direktivet 2014/30/EU efter følgende nom(er):

RoHS 2011/65/EU efter følgende nom(er):
EN 50581:2012.

Supplerende oplysninger
Endvidere overholdes de amerikanske normer:
UL508

Ovenstående overensstemmelse(r) er erklæret iflg. den globale metode, modul A


Christian Skjold Heyde,
Vice President, Udvikling og Produktion, Struers ApS
Always state **Serial No** and **Voltage/frequency** if you have technical questions or when ordering spare parts.

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**Struers A/S**
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Denmark
Telephone +45 44 600 800
Spare Parts and Diagrams

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<tr>
<td>Illustration of LaboForce-1</td>
<td></td>
</tr>
<tr>
<td>Circuit diagram, LaboForce-1, 220-240V, 50/60Hz</td>
<td>15273125C</td>
</tr>
<tr>
<td>Circuit diagram, LaboForce-1, 100-120V, 50/60Hz</td>
<td>15273115A</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>LaboForce-3</th>
<th>Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spare Parts list for LaboForce-3</td>
<td></td>
</tr>
<tr>
<td>Illustration of LaboForce-3</td>
<td></td>
</tr>
<tr>
<td>Circuit diagram, LaboForce-3, 220-240V, 50/60Hz</td>
<td>15213100B</td>
</tr>
<tr>
<td>Circuit diagram, LaboForce-3, 100-120V, 50/60Hz</td>
<td>15213110A</td>
</tr>
</tbody>
</table>

| Lubricator for LaboForce-1/-3 | |
|-------------------------------| |
| Spare Parts list for Lubricator | |
| Illustration of Lubricator | |

Some of the drawings may contain position numbers not used in connection with this manual.
# LaboForce-1

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Spare Part</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-100</td>
<td>V-Ring VS-0030</td>
<td>2IV00030</td>
</tr>
<tr>
<td>01-160</td>
<td>ULS Screw M5x12</td>
<td>2TR80512</td>
</tr>
<tr>
<td>01-190</td>
<td>Knob</td>
<td>2GH00160</td>
</tr>
<tr>
<td>01-200</td>
<td>Nylon Clamp</td>
<td>2GK53304</td>
</tr>
<tr>
<td>01-210</td>
<td>Swage Form Screw</td>
<td>2TL90510</td>
</tr>
<tr>
<td>01-320</td>
<td>Steel Disc ø6.5x30x1</td>
<td>2ZC01630</td>
</tr>
<tr>
<td>01-330</td>
<td>MS-Counter Nut</td>
<td>2TD20102</td>
</tr>
</tbody>
</table>

**Specimen Mover**

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Spare Part</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-10</td>
<td>ULS Screw M5x8</td>
<td>2TR80508</td>
</tr>
<tr>
<td>20-50</td>
<td>Pressure Spring ø12.5 x ø1</td>
<td>2GF10124</td>
</tr>
</tbody>
</table>

**Various parts for LaboForce-1**

- Lubricator for LaboForce, complete: 15210051
- Counter Nut MFG16X1,5: 2TC60016
- Steel Disc ø16.5x30x3: 2ZC01633
- Steel Disc ø16.5x30x1: 2ZC01630
Illustration of LaboForce-1
CIRCUIT DIAGRAM

All wirings 0.75mm², except otherwise marked.

Power
From LaboPol

TERMINAL STRIP

C1
0.12µF/440VAC

XPE1 BOTTOM PLATE

XPE2 BOTTOM PLATE

ALL WIRINGS 0.75mm², EXCEPT OTHERWISE MARKED.

COLOR CODES:
BK = BLACK
BN = BROWN
RD = RED
OR = ORANGE
YE = YELLOW
GN = GREEN
BU = BLUE
VT = VIOLET
GY = GREY
WH = WHITE

REV. A:
C1 0.1µF -> 0.12µF
VT -> OR, OR -> VT

REV. B: (23-06-2003 FTH)
Supply voltage changed to 200-240V / 50-60Hz

REV. C: (05-01-2006 FTH)
W1, AWG size added

LaboForce-1
MAINS SUPPLY 200V - 240V 50/60Hz.
## LaboForce-3

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Spare Part</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>LaboForce-3</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lubricator for LaboForce</td>
<td>15210051</td>
</tr>
<tr>
<td>1-100</td>
<td>Knob</td>
<td>2GH00160</td>
</tr>
<tr>
<td></td>
<td><strong>Specimen Mover</strong></td>
<td></td>
</tr>
<tr>
<td>41-150</td>
<td>Gas Spring 350N</td>
<td>2YS00317</td>
</tr>
<tr>
<td>41-250</td>
<td>Release spring</td>
<td>14810024</td>
</tr>
<tr>
<td>41-340</td>
<td>Safety Switch</td>
<td>2SS35059</td>
</tr>
<tr>
<td>41-410</td>
<td>Lifting Spring</td>
<td>14810025</td>
</tr>
<tr>
<td>41-420</td>
<td>Buffer, Rubber</td>
<td>2GS00107</td>
</tr>
<tr>
<td></td>
<td><strong>Head</strong></td>
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<td>Handle and Threaded Pin</td>
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<td>21-50</td>
<td>Threaded Pin</td>
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<td>Pressure Part</td>
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<td>Friction pin</td>
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<td>21-80</td>
<td>MSP Screw with threaded closure</td>
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FROM LaboPol-x
CONTROL SIGN.
MOTOR RUN

LaboPol-x
THERMAL PROTECTION M2

TO LaboPol-x

ALL WIRINGS 1.1, EXCEPT OTHERWISE MARKED
COLOR CODES:
BK = BLACK
BN = BROWN
RD = RED
YE = YELLOW
GN = GREEN
BL = BLUE
GY = GREY
WH = WHITE

FROM LaboPol-x

CONTROL SIGN.
MOTOR RUN

TO LaboPol-x
THERMAL PROTECTION M2

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## Lubricator for LaboForce

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<td>O-ring 2.00-1.00</td>
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<td>51-70</td>
<td>Lid for Lupo</td>
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**Illustration of Lupo**

![Diagram of Lupo](image-url)