DIPROFIL®

# Low vibration Diprofil Mini Polishing/ Filing Machines

## Type FMR, FMV and HFP

SKU: 8501922-3-4 5102264-5-6 5102861

*Original Safety and Operation Guide*

**⚠ WARNING:**

**Give this guide to the operator of the machine. To reduce the risk of injury the operator must read and fully understand the Instructions in the Safety and Operation Guide before using or repairing these machines.**

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# Low vibration Diprofil Mini Polishing/Filing Machines Type FMR, FMV and HFP

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# INTRODUCTION

**Congratulations on the purchase of your low vibrating Mini Polishing/Filing machine. The machines are designed for polishing and finishing applications of moulds and dies, but may also be used for other fine mechanical work such as de-burring and filing.**

**The following safety and operation guidelines are intended for your safety and to get the maximum value from your machine in terms of efficiency, lifetime and ergonomics. The technical data are divided into separate sections depending on the drive source of the specific machine.**
**To reduce the risk of injury the operator must before using and repairing the machine for the first time read and fully understand the instructions in this Safety and Operation Guide.**

## THERE ARE THREE DIFFERENT TYPES OF MINI POLISHING/FILING MACHINES: FMR, FMV AND HFP.

**1. DIPROFIL RECIPROCATING MINI POLISHING/FILING MACHINE, Type FMR**
Especially developed to ensure the maximum performance from its compact and easy to handle design. It is ideal for work in narrow spaces and where precise control is required. Under normal load conditions a speed of 5000 strokes/min up to 11.000 strokes/min is recommended and is depending on the stroke length and the type and weight of the used tool. For more information see technical data.

**2. DIPROFIL TRANSVERSE MINI POLISHING/FILING MACHINE, Type FMV**
Operates with a side to side motion crosswise the longitudinal axis of the machine. The machine has been developed to ensure very high performance with small dimensions, making the machine easy to handle and especially suited for work in hard-to-reach areas, e.g. in cavities, on narrow shoulders or wherever a precise control is needed. **The stroke length is adjustable from 0 to 4 mm, measured 60 mm from the front of the machine housing. The stroke length also depends on the length of the tool. Longer tools result in increased stroke length.** The speed should, however, be adapted to the stroke length and the type and weight of the used tool.
For more information see technical data.

**3. AIR-DRIVEN RECIPROCATING HIGH FREQUENCY POLISHING MACHINE, Type HFP**
The DIPROFIL high frequency polishing machine with its compact and easy to handle design is especially developed to ensure good performance and good ergonomic working environment. It is ideal for work in narrow spaces and where precise control is required.
The stroke is generated by two unbalanced weights, being synchronized in order to give the tool holder its axial movement, whereas they crosswise the machine balances each other out, avoiding undesired vibrations. During operation the machine is practically free from vibrations, as no forces of reaction are absorbed in the machine housing, not even when working the tool against a shoulder. For more information see technical data.

# SAFETY INSTRUCTIONS

**WARNING** = Indicates a potentially hazardous situation which, if not avoided, may result in a serious injury.

**CAUTION** = Indicates a potentially hazardous situation which, if not avoided, may result in a minor or moderate injury.

## MACHINE AND TOOL HAZARDS

**CAUTION**
Starting the machine, when changing tool or stroke length, may cause personal injury.

**CAUTION**
An incorrectly inserted tool may result in the tool slipping out during operation and cause personal injury. Before inserting the tool make sure that the shank dimension is correct. Because of the multi-functional tool holder it is important that the chosen tool is tightened properly and that the speed chosen is not too high. Try to avoid using heavier tools and longer stroke length than necessary for the specific application.

**CAUTION**
Unintentional start of the machine may cause injury.

## PROJECTILE HAZARD

**CAUTION**
During lapping or filing, particles from the working material or tools can become projectiles and cause injuries to eyes or skin. Use approved personal protective equipment, including safety glasses.

## NOISE HAZARD FOR FMR AND FMV

**CAUTION**
Noise ≤ 68 to 75 dB(A) at 9000 - 12000 strokes/min. (according to ISO15744).
For lengthy use ear protections is recommended.

## NOISE HAZARD FOR HFP

**CAUTION**
Noise ≤ 80 dB(A) at 20 000 strokes/min. (according to ISO15744).
For lengthy use ear protections is recommended.

# VIBRATION HAZARD

## WARNING

**Normal and proper use of the machine exposes the operator to vibration.**
**Regular and frequent exposure to vibration may cause, contribute to, or aggravate injury or disorders of the operator's fingers, hands, wrists, arms, shoulders and/or permanent injuries or disorders that may develop gradually over periods of weeks, months or years. Such injury or disorder may include damage to the blood circulatory system, damage to the nervous system, damage to joints and possibly damage to other body structures.**

**If numbness, tingling, pain, clumsiness, weakened grip, whitening of the skin or other symptoms occur at any time, when operating or not operating the machine, do not resume operation of the machine, but seek medical attention. Continued use of the machine after the occurrence of any such symptom may increase the risk of symptoms becoming more severe and/or permanent.**

## WARNING

**Never hold hand or fingers on moving machine parts or tools. Moving tools or parts of the tool holder have, when touched, very high levels of vibration.**

**These vibrations values have been measured and we have obtained the following results: Note! On the moving tool and at recommended speed: 6.000-11.000 strokes/min the vibration values are very high. At stroke length 0,5 mm, approx. 12-25 m/s$^2$, at stroke length 1,0 mm approx. 20-45 m/s$^2$ and at stroke length 1,5 mm at speed 6.000-9.000 strokes/min approx. 32-70 m/s$^2$.**

## CAUTION

**To keep the vibrations as low as possible it is also of utmost importance to work as parallel as possible in reference to the surface on which the machine and tool will be used. Flexible tools as Ceramic-fibre Stones or articulated tools as Ball-rods together with Lapping Bits and similar generate less vibration than hard tools (not flexible tools) as Polishing Stones, Diamond files, etc. For more information we refer to our website: www.diprofil.se**

**Let the tool do the job. Use minimum possible hand grip consistently with proper control for safe operation.**

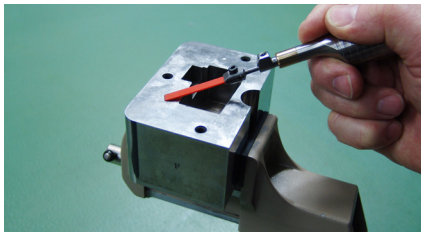
**Note! For information about vibrations and the responsibilities of the manufacturer, the employer and the operator respectively please see the Vibration Declaration Statement and additional vibration information on page 25-36.**
**Here you will also find references to different websites with information on vibrations/ working environment as well as standards and demands from institutions and authorities in certain countries. We recommend reviewing these websites to get more important information on the subject.**

## ADDITIONAL SAFETY INSTRUCTIONS

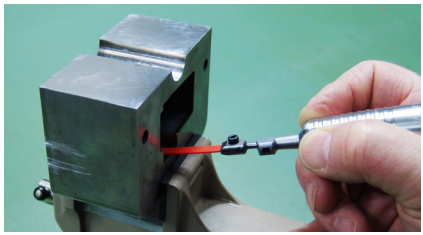
- **Machines and accessories must only be used for their intended purpose.**
- **Only qualified and trained persons may operate or maintain the machine.**
- **The maximum permissible machine using data must not be exceeded.**

## OPERATOR WORKING POSITION - EXAMPLES

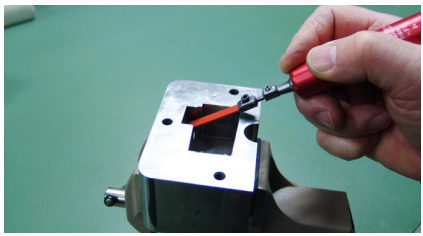
**FMR**
Operator working position for Diprofil FMR machines. FMR machines are available with three different stroke lengths: 0,5 mm, 1,0 mm and 1,5 mm. See more data on page 1 and 7-9.



**FMV**
Operator working position for Diprofil FMV machines. FMV machines with transverse action have adjustable stroke length between: 0 – 4 mm. See more data on page 1 and 9-10.



**HFP**
Operator working position for Diprofil HFP air driven machines. HFP machines have a stroke length of approx. 0,25 mm at approx. 20 000 strokes/min. See more data on page 1 and 11.

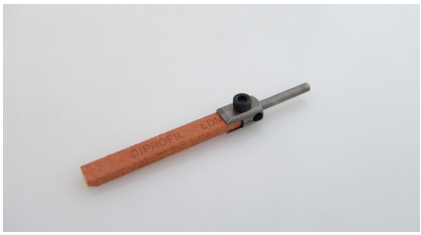


# DIPROFIL TOOL HOLDERS WITH LIGHT WEIGHT

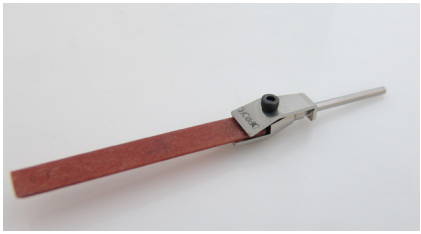
**To keep vibrations as low as possible we recommend using the following dedicated tool-holders from Diprofil.**

**THFS-1**
Item No: THFS-1, is a light weight tool holder (approx 4,3 gram) for fiber stones with 1 mm thickness and widths of up to 10 mm. For use in all types of Diprofil Polishing/filing machines.
Low weight tools = Reduced vibrations

**THPS-1**
Item No: THPS-3, is a light weight tool holder (approx 4 gram) for polishing stones, polishing tools and other tools with 3 mm thickness and widths of up to 13 mm. For use in all types of Diprofil Polishing/filing machines.
Low weight tools = Reduced vibrations



**FMR/VH**
Item No: FMR/VH, is a universal middle light weight tool holder (approx 13,2 gram) for polishing stones, polishing tools and other tools with 1 to 6 mm thickness and widths of up to 13 mm. For HFP and FMR machines with stroke length 0,5 mm and Diprofil Classic and Di-Pro machines.



# DIPROFIL MINI POLISHING/FILING MACHINES WITH TOOL HOLDER Ø 3,6 MM

**A. FMR – MACHINES WITH MICRO MOTOR CONNECTION**

**B. FMR – FLEXIBLE SHAFT-DRIVEN MACHINES**

**C. FMV – MACHINES WITH MICRO MOTOR CONNECTION**

**D. FMV – FLEXIBLE SHAFT-DRIVEN MACHINES**

**E. HFP – AIR-DRIVEN MACHINE**

**A+B. FMR PACKAGE INCLUDES:**
**1 x Mini polishing/filing machine**
**1 x Bottle of lubrication oil type FNA-K**
**1 x 2 mm hexagon-key**

**C+D. FMV PACKAGE INCLUDES:**
**1 x Transverse Mini polishing/filing machine**
**1 x Bottle of lubrication oil type FNA-K**
**1 x 2 mm hexagon-key**

**E. HFP PACKAGE INCLUDES:**
**1 x Mini polishing machine**
**1 x Bottle of lubrication oil type FNA-K**
**1 x 2 mm hexagon-key FNB-6**
**1 x Tool-holder FMR/VH**
**1 x Silencer HFP-14**
**1 x Plunge coupling QSM-1/8-4. M5 (48029)**
**1 x Plastic tube HFP-12**

# TECHNICAL DATA DIPROFIL MINI POLISHING/FILING MACHINES

## A+B. FMR RECIPROCATING MINI POLISHING/FILING MACHINES

### Type FMR/D (for Diprofil), FMR/G (for Argofile, Gesswein and Uhandy), FMR/E (for Eneska 4-1 and NSK ESPERT) and FMR/N (for Eneska 3-1, Eneska 3-2 and NSK EMAX Evolution)

**TECHNICAL DATA**

**Driving:** These models should be driven by motors with low strokes/min and high torque only. Exceptions can be made for motors with high torque from very low strokes/min, as e.g. Diprofil HPM-B1, brush motor for Diprofil Power Unit DPU-3 or TPU-20. Corresponding Micro Motors and Power Units can be used.
**Output: DC 0-32V. (The needed voltage at a certain rpm = strokes/min is depending on the micro motor and the power unit.)**

### 1A. FMR/D5, FMR/G5, FMR/E5 and FMR/N5 MACHINES WITH 0,5 mm STROKE LENGTH

**Speed (maximum):** 11.000 strokes/min
**Speed (recommended):** **6.000 – 10.000 strokes/min (depending on the weight of the used tool). For tool weights more than 10 g a speed of max. 9.000 strokes/min is recommended.**
**Stroke length:** **0,5 mm**
**Tool holder:** Ø 3,6 mm
**Weight of inserted tool:** **Maximum: 15 g. Recommended: 1 to 15 g**
**Applied feed force:** **4N ± 2N. (Depending on inserted tool type and dimension).**
**Machine weight:** Approx. 120 g (+ weight of the used micro motor).
**Noise level:** Not exceeding 70 dB(A) at 12.000 strokes/min
**Vibration levels:** **Approx. 1,5 – 2,5 m/s²**, when the machine is operated according to this operation guide. **Please also see the diagram on page 26 for measured vibration levels at certain speeds and tool weights.**

**Warning:** Frequency weighed hand/arm vibration principally in accordance with EN ISO 28927-8. Part 8: Polishing and filing machines with reciprocating action.

### 2A. FMR/D10, FMR/G10, FMR/E10 and FMR/N10 MACHINES WITH 1,0 mm STROKE LENGTH

**Speed (maximum):** 10.000 strokes/min
**Speed (recommended):** **5.000 – 9.000 strokes/min. For tool weights more than 8 g a speed of max. 8.000 strokes/min is recommended.**
**Stroke length:** **1,0 mm**
**Tool holder:** Ø 3,6 mm
**Weight of inserted tool:** **Maximum: 10 g. Recommended: 1 to 10 g**
**Applied feed force:** **4N ± 2N. (Depending on inserted tool type and dimension).**
**Machine weight:** Approx. 120 g (+ weight of the used micro motor).
**Noise level:** Not exceeding 75 dB(A) at 11.000 strokes/min
**Vibration levels:** **Approx. 1,5 – 2,5 m/s²**, when the machine is operated according to this operation guide. **Please also see the diagram on page 26 for measured vibration levels at certain speeds and tool weights.**

**Warning:** Frequency weighed hand/arm vibration principally in accordance with EN ISO 28927-8. Part 8: Polishing and filing machines with reciprocating action.

### 3A. FMR/D15, FMR/G15, FMR/E15 and FMR/N15 MACHINES WITH 1,5 mm STROKE LENGTH

| | |
|---|---|
| **Speed (maximum):** | 8.000 strokes/min |
| **Speed (recommended):** | **5.000 – 7.000 strokes/min. For tool weights more than 6 g a speed of max. 7.000 strokes/min is recommended.** |
| **Stroke length:** | **1,5 mm** |
| **Tool holder:** | Ø 3,6 mm |
| **Weight of inserted tool:** | **Maximum: 10 g. Recommended: 1 to 8 g** |
| **Applied feed force:** | **4N ± 2N. (Depending on inserted tool type and dimension).** |
| **Machine weight:** | Approx. 120 g (+ weight of the used micro motor). |
| **Noise level:** | Not exceeding 70 dB(A) at 9.000 strokes/min |
| **Vibration levels:** | **Approx. 2,0 – 3,5 m/s²**, when the machine is operated according to this operation guide. **Please also see the diagram on page 28 for measured vibration levels at certain speeds and tool weights.** |
| **Warning:** | Frequency weighed hand/arm vibration principally in accordance with EN ISO 28927-8. Part 8: Polishing and filing machines with reciprocating action. |

## B. FMR MACHINES WITH FLEXIBLE SHAFT CONNECTION TYPE SLIP JOINT AND BALL JOINT

### FMR/S5, FMR/S10 and FMR/S15 (Slip joint) FMR/B5, FMR/B10 and FMR/B15 (Ball joint)

**TECHNICAL DATA**

**Driving:** These models are driven by an electrical motor with speed control and a flexible shaft with slip-joint (European standard) or ball-joint connection (US standard) e.g. Diprofil type DSE-47. Corresponding motors of other brands may also be used.

### 1B. FMR/S5 and FMR/B5 MACHINES WITH 0,5 mm STROKE LENGTH

| | |
|---|---|
| **Speed (maximum):** | 11.000 strokes/min |
| **Speed (recommended):** | **6.000 – 10.000 strokes/min (depending on the weight of the used tool). For tool weights more than 10 g a speed of max. 9.000 strokes/min is recommended.** |
| **Stroke length:** | **0,5 mm** |
| **Tool holder:** | Ø 3,6 mm |
| **Weight of inserted tool:** | **Maximum: 15 g. Recommended: 1 to 15 g** |
| **Applied feed force:** | **4N ± 2N. (Depending on inserted tool type and dimension).** |
| **Machine weight:** | Approx. 120 g |
| **Noise level:** | Not exceeding 70 dB(A) at 12.000 strokes/min |
| **Vibration levels:** | **Approx. 1,5 – 2,5 m/s²**, when the machine is operated according to this operation guide. **Please also see the diagram on page 26 for measured vibration levels at certain speeds and tool weights.** |
| **Warning:** | Frequency weighed hand/arm vibration principally in accordance with EN ISO 28927-8. Part 8: Polishing and filing machines with reciprocating action. |

### 2B. FMR/S10 and FMR/B10 MACHINES WITH 1,0 mm STROKE LENGTH

**Speed (maximum):** 10.000 strokes/min
**Speed (recommended):** **5.000 – 9.000 strokes/min. For tool weights more than 8 g a speed of max. 8.000 strokes/min is recommended.**
**Stroke length:** **1,0 mm**
**Tool holder:** Ø 3,6 mm
**Weight of inserted tool:** **Maximum: 10 g. Recommended: 1 to 10 g**
**Applied feed force:** **4N ± 2N. (Depending on inserted tool type and dimension).**
**Machine weight:** Approx. 120 g
**Noise level:** Not exceeding 75 dB(A) at 11.000 strokes/min
**Vibration levels:** **Approx. 1,5 – 2,5 m/s²**, when the machine is operated according to this operation guide. **Please also see the diagram on page 27 for measured vibration levels at certain speeds and tool weights.**

⚠ **Warning:** Frequency weighed hand/arm vibration principally in accordance with EN ISO 28927-8. Part 8: Polishing and filing machines with reciprocating action.

### 3B. FMR/S15 and FMR/B15 MACHINES WITH 1,5 mm STROKE LENGTH

**Speed (maximum):** 8.000 strokes/min
**Speed (recommended):** **5.000 – 7.000 strokes/min. For tool weights more than 6 g a speed of max. 7.000 strokes/min is recommended.**
**Stroke length:** **1,5 mm**
**Tool holder:** Ø 3,6 mm
**Weight of inserted tool:** **Maximum: 10 g. Recommended: 1 to 8 g**
**Applied feed force:** **4N ± 2N. (Depending on inserted tool type and dimension).**
**Machine weight:** Approx. 120 g
**Noise level:** Not exceeding 70 dB(A) at 9.000 strokes/min
**Vibration levels:** **Approx. 2,0 – 3,5 m/s²**, when the machine is operated according to this operation guide. **Please also see the diagram on page 28 for measured vibration levels at certain speeds and tool weights.**

⚠ **Warning:** Frequency weighed hand/arm vibration principally in accordance with EN ISO 28927-8. Part 8: Polishing and filing machines with reciprocating action.

## C+D. FMV MINI POLISHING/FILING MACHINES WITH TRANSVERSE ACTION AND VARIABLE STROKE

## C. FMV MACHINES WITH MICRO MOTOR CONNECTION

### Type FMV/D (for Diprofil), FMV/G (for Argofile, Gesswein and Uhandy), FMV/E (for Eneska 4-1 and NSK ESPERT) and FMV/N (for Eneska 3-1, Eneska 3-2 and NSK EMax Evolution). Machines with 0 mm to max 4,0 mm stroke length.

**TECHNICAL DATA**

**Driving:** These models should be driven by motors with low strokes/min and high torque only. Exceptions can be made for motors with high torque from very low strokes/min, as e.g. Diprofil motor HPM-B1, brush motor for Diprofil Power Unit DPU-3 or Power Unit TPU-20. Corresponding Micro Motors and Power Units can be used.
**Output: DC 0-32V. (The needed voltage at a certain strokes/min is depending on the micro motor and the power unit.)**

| | |
|---|---|
| **Speed (maximum):** | 10.000 strokes/min |
| **Speed (recommended):** | **5.000 – 9.000 strokes/min. For tool weights more than 5 g a speed of max. 8.000 strokes/min is recommended.** |
| **Stroke length:** | **0-4 mm (60 mm from the machine housing, see page 17), for tool weights 1-5 g. For tool weights 5-7 g, stroke length 0-3mm and for tool weights 7-8 g, stroke length 0-2 mm.** |
| **Tool holder:** | Ø 3,6 mm |
| **Weight of inserted tool:** | **Maximum 8 g. Recommended: 1 to 6 g. Maximum recommended tool length is approx. 70 mm.** |
| **Applied feed force:** | **4N ± 2N. (Depending on inserted tool type and dimension).** |
| **Machine weight:** | Approx. 200 g (+ weight of the used micro motor). |
| **Noise level:** | Not exceeding 75 dB(A) at 11.000 strokes/min |
| **Vibration levels:** | **Approx. 1,5 – 3,5 m/s²**, when the machine is operated according to this operation guide. **Please also see the diagram on page 29 for measured vibration levels at certain speeds and tool weights.** |
| ⚠ **Warning:** | Frequency weighed hand/arm vibration principally in accordance with EN ISO 28927-8. Part 8: Polishing and filing machines with reciprocating and transverse action. |

# D. FMV MACHINES WITH FLEXIBLE SHAFT CONNECTION TYPE SLIP JOINT AND BALL JOINT

## Type FMV/S (Slip joint) and FMV/B (Ball joint). Machines with 0 mm to max 4,0 mm stroke length.

**TECHNICAL DATA**

| | |
|---|---|
| **Driving:** | These models are driven by an electrical motor with speed control and a flexible shaft with slip-joint (European standard) or ball-joint connection (US standard) e.g. Diprofil type DSE-47. Corresponding motors of other brands may also be used. |
| **Speed (maximum):** | 10.000 strokes/min |
| **Speed (recommended):** | **5.000 – 9.000 strokes/min. For tool weights more than 5 g a speed of max. 8.000 strokes/min is recommended.** |
| **Stroke length:** | **0-4 mm (60 mm from the machine housing, see page 17), for tool weights 1-5 g. For tool weights 5-6 g, stroke length 0-3mm and for tool weights 6-8 g, stroke length 0-2 mm.** |
| **Tool holder:** | Ø 3,6 mm |
| **Weight of inserted tool:** | **Maximum 8 g. Recommended: 1 to 6 g. Maximum recommended tool length is approx. 70 mm.** |
| **Applied feed force:** | **4N ± 2N. (Depending on inserted tool type and dimension).** |
| **Machine weight:** | Approx. 200 g. (+ weight of the used micro motor) |
| **Noise level:** | Not exceeding 75 dB(A) at 11.000 strokes/min |
| **Vibration levels:** | **Approx. 1,5 – 3,5 m/s²**, when the machine is operated according to this operation guide. **Please also see the diagram on page 29 for measured vibration levels at certain speeds and tool weights.** |
| ⚠ **Warning:** | Frequency weighed hand/arm vibration principally in accordance with EN ISO 28927-8. Part 8: Polishing and filing machines with reciprocating and transverse action. |

# E. HFP AIR DRIVEN RECIPROCATING MINI POLISHING MACHINE

**TECHNICAL DATA**

| | |
|---|---|
| **Driving:** | This model is driven by compressed and oil mist lubricated air. **PLEASE NOTE! The built-in air-motor may be damaged, if operated with un-lubricated air.** |
| **Connection:** | Oil mixed lubricated air and fog lubrication unit MFB should be used for connection to your compressed air system. **PLEASE NOTE! Protect the air inlet from dust and dirt, when not in operation.** |
| **Oil consuption:** | Minimum 30mm³/min. at maximum speed (about 2 drops/min.) |
| **Air pressure:** | **4 bar (58 psi) to max. 6 bar (87psi)** |
| **Air consuption:** | Approx. 120 l/min. at 4 Bar |
| **Speed (maximum):** | Approx.20.000 Strokes/min. |
| **Stroke length:** | **Approx. 0,25 mm** |
| **Tool holder:** | Ø 3,6 mm |
| **Weight of inserted tool:** | **Maximum 18 g. Recommended: 1 to 15 g.** |
| **Applied feed force:** | **4N ± 2N. (Depending on inserted tool type and dimension).** |
| **Machine weight:** | Approx. 190 g |
| **Noise level:** | Not exceeding 80 dB(A) at 20.000 strokes/min. |
| **Vibration levels:** | **Approx. 1,5 -2,5 m/s²,** when the machine is operated according to this operation guide. **Please also see the table on page 29 for measured vibration levels at certain speeds and tool weights.** |
| **Warning:** | Frequency weighed hand/arm vibration principally in accordance with EN ISO 28927-8. Part 8: Polishing and filing machines with reciprocating action. |

# A+B. OPERATION GUIDE FOR FMR RECIPROCATING POLISHING/FILING MACHINES

## GENERAL OPERATING INSTRUCTIONS

### INTRODUCTION:

**The DIPROFIL MINI POLISHING-/FILING MACHINE Type FMR** has been especially developed to ensure the maximum performance from its compact and easy to handle design. It is ideal for work in narrow spaces and where precise control is required. Under normal load conditions a speed from 5.000 up to 7.000 or 10.000 strokes/min is recommended (depending on the stroke length and the weight of the used tool). (For more information please see the corresponding technical data for each specific model).

**NOTE! All types of polishing/filing machines wear out faster if they are used at high strokes/min and with heavy tools. The applied feed force and dirt entering the machine also affects the lifetime.**

### Filing

High speeds give the best results. For diamond coated files we recommend to work with the highest recommended stroke/min for the weight of the diamond file. The machines with 1.0 or 1,5mm stroke length are recommended.

### Honing, Polishing and Lapping

All equipment with a shaft diameter less than 3,6 mm should be mounted directly into the Mini Filing Machine.
**We recommend working with small and low weight tool holders like the Diprofil type: THFS-1 (Weight approx. 4 g) for Ceramic fiber Stones (thickness 1 mm, width 2 – 10 mm and a length of 20 – 75 mm) and THPS-3 (Weight approx. 4 g) for Polishing Stones (thickness 3 mm, width 6 mm or 13 mm and a length of approx. 20 to 50 mm). The Diprofil Polishing stones are easy to break into desired lengths. Other tools such as Wood lapping ribs with a thickness of 3 mm may also be used.**
Polishing stones and other tools up to 8 mm of thickness or diameter are easily mounted in **the universal tool holder type FMR/VH (only recommended for the FMR machine with stroke length 0,5 mm).** In order to keep vibrations as low as possible, it is, however important to use tools not heavier than required for the specific application. Speed and contact pressure should be adapted to each application.

**FIXATION OF TOOLS:**
Place the tool in the tool-holder (maximum shank Ø 3,6 mm) locking it with the screw (42038).
**See Fig 1.**

**FIG 1**

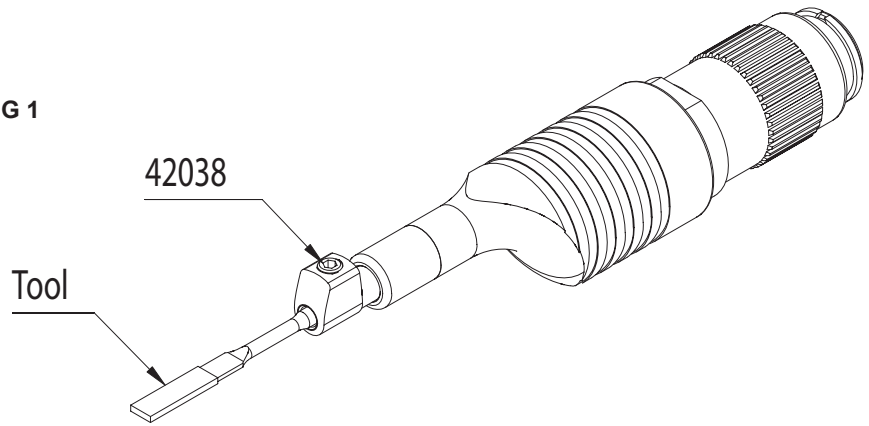
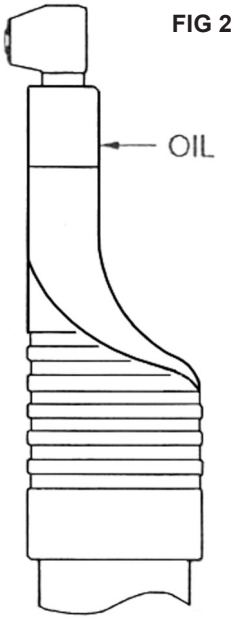



**FIG 2**




**SERVICE AND MAINTENANCE:**
The ball bearings of the machine are permanently lubricated and enclosed, why no special attendance is needed. **The rod on the tool holder should be lubricated with a few drops of the DIPROFIL FNA-K lubricating oil for every 2 to 3 hours operation. Oil is to be applied through the hole at the front part of the machine.**
**See Fig 2.**

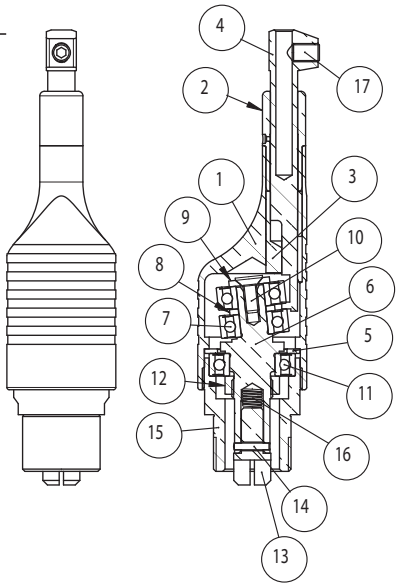
To extend the lifetime it is recommended to clean the moving parts, i.e. tool-holder (FMR-3) and guide steering (FMR-2/P) every 200 hours of operation or more frequently if necessary.

**See our service instruction for FMR machines at: www.diprofil.se**

# A+B. PARTS DRAWING – FMR MACHINES

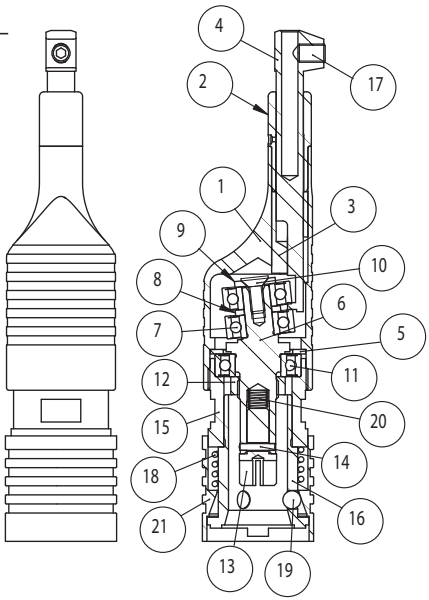
**FMR/D**

| POS. | PCS. | ITEM NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 1 | FMR-1 | Housing |
| 2+3 | 1 | FMR-2/P | Guide steering |
| *(Note! POS 2+3: FMR-2/P = FMR-73 and FMR 74, as one item)* | | | |
| 4 | 1 | FMR-3 | Tool-holder |
| 5 | 1 | FMR-9 | Washer |
| 6 | 1 | FMR-45/46/50* | Main spindle |
| 7 | 2 | 44024 | Ball bearing |
| 8 | 1 | FMR-8 | Spacer |
| 9 | 1 | FMR-7 | Bearing washer |
| 10 | 1 | 42039 | Screw |
| 11 | 1 | 44022 | Ball bearing |
| 12 | 1 | FMR-54 | Nut for main spindle |
| 13 | 1 | FMR-71 | Spindle drive mounting |
| 14 | 1 | 43016 | Pin |
| 15 | 1 | FMR-5 | Back piece |
| 16 | 1 | 41009 | Spring |
| 17 | 1 | 42038 | Locking Screw |




**FMR/G**

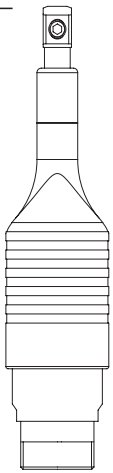
| POS. | PCS. | ITEM NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 1 | FMR-1 | Housing |
| 2+3 | 1 | FMR-2/P | Guide steering |
| *(Note! POS 2+3: FMR-2/P = FMR-73 and FMR 74, as one item)* | | | |
| 4 | 1 | FMR-3 | Tool-holder |
| 5 | 1 | FMR-9 | Washer |
| 6 | 1 | FMR-45/46/50* | Main spindle |
| 7 | 2 | 44024 | Ball bearing |
| 8 | 1 | FMR-8 | Spacer |
| 9 | 1 | FMR-7 | Bearing washer |
| 10 | 1 | 42039 | Screw |
| 11 | 1 | 44022 | Ball bearing |
| 12 | 1 | FMR-54 | Nut for main spindle |
| 13 | 1 | FMR-18 | Spindle drive mounting |
| 14 | 1 | 43016 | Pin |
| 15 | 1 | FMR-60 | Back piece |
| 16 | 1 | FMR-62 | Inner Sleeve |
| 17 | 1 | 42038 | Locking Screw |
| 18 | 1 | FMR-63 | Spring |
| 19 | 3 | 44025 | Steel Ball |
| 20 | 1 | 41009 | Spring |
| 21 | 1 | FMR-61 | Outer Sleeve |

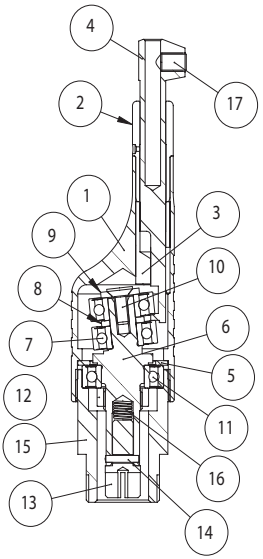



*FMR-45 for Mini polishing/filing machine FMR/D5 and FMR/G5 (stroke length 0,5 mm).
*FMR-50 for Mini polishing/filing machine FMR/D10 and FMR/G10 (stroke length 1,0 mm).
*FMR-46 for Mini polishing/filing machine FMR/D15 and FMR/G15 (stroke length 1,5 mm).

## FMR/E

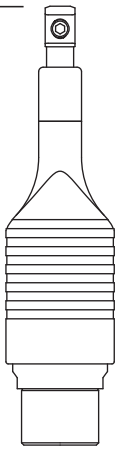
| POS. | PCS. | ITEM NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 1 | FMR-1 | Housing |
| 2+3 | 1 | FMR-2/P | Guide steering |
| *(Note! POS 2+3: FMR-2/P = FMR-73 and FMR 74, as one item)* | | | |
| 4 | 1 | FMR-3 | Tool-holder |
| 5 | 1 | FMR-9 | Washer |
| 6 | 1 | FMR-45/46/50* | Main spindle |
| 7 | 2 | 44024 | Ball bearing |
| 8 | 1 | FMR-8 | Spacer |
| 9 | 1 | FMR-7 | Bearing washer |
| 10 | 1 | 42039 | Screw |
| 11 | 1 | 44022 | Ball bearing |
| 12 | 1 | FMR-54 | Nut for main spindle |
| 13 | 1 | FMR-18 | Spindle drive mounting |
| 14 | 1 | 43016 | Pin |
| 15 | 1 | FMR-38 | Back piece |
| 16 | 1 | 41009 | Spring |
| 17 | 1 | 42038 | Locking screw |

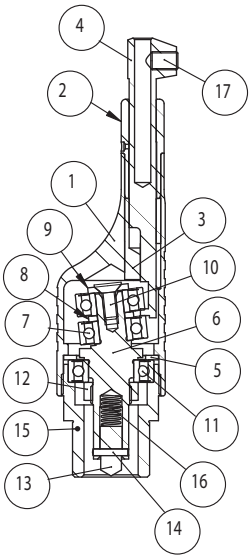





## FMR/N

| POS. | PCS. | ITEM NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 1 | FMR-1 | Housing |
| 2+3 | 1 | FMR-2/P | Guide steering |
| *(Note! POS 2+3: FMR-2/P = FMR-73 and FMR 74, as one item)* | | | |
| 4 | 1 | FMR-3 | Tool-holder |
| 5 | 1 | FMR-9 | Washer |
| 6 | 1 | FMR-45/46/50* | Main spindle |
| 7 | 2 | 44024 | Ball bearing |
| 8 | 1 | FMR-8 | Spacer |
| 9 | 1 | FMR-7 | Bearing washer |
| 10 | 1 | 42039 | Screw |
| 11 | 1 | 44022 | Ball bearing |
| 12 | 1 | FMR-54 | Nut for main spindle |
| 13 | 1 | FMR-6 | Spindle drive mounting |
| 14 | 1 | 43016 | Pin |
| 15 | 1 | FMR-5 | Back piece |
| 16 | 1 | 41009 | Spring |
| 17 | 1 | 42038 | Locking Screw |

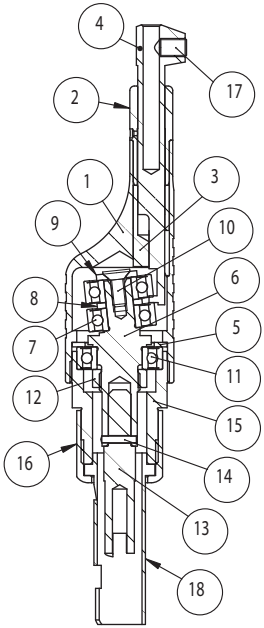





*FMR-45 for Mini polishing/filing machine FMR/E5 and FMR/N5 (stroke length 0,5 mm).
*FMR-50 for Mini polishing/filing machine FMR/E10 and FMR/N10 (stroke length 1,0 mm).
*FMR-46 for Mini polishing/filing machine FMR/E15 and FMR/N15 (stroke length 1,5 mm).

## FMR/S

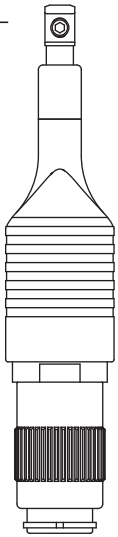
| POS. | PCS. | ITEM NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 1 | FMR-1 | Housing |
| 2+3 | 1 | FMR-2/P | Guide steering |
| *(Note! POS 2+3: FMR-2/P = FMR-73 and FMR 74, as one item)* | | | |
| 4 | 1 | FMR-3 | Tool-holder |
| 5 | 1 | FMR-9 | Washer |
| 6 | 1 | FMR-45/46/50* | Main spindle |
| 7 | 2 | 44024 | Ball bearing |
| 8 | 1 | FMR-8 | Spacer |
| 9 | 1 | FMR-7 | Bearing washer |
| 10 | 1 | 42039 | Screw |
| 11 | 1 | 44022 | Ball bearing |
| 12 | 1 | FMR-54 | Nut for main spindle |
| 13 | 1 | FMR-12 | Spindle drive mounting |
| 14 | 1 | 43016 | Pin |
| 15 | 1 | FMR-5 | Back piece |
| 16 | 1 | FMR-14 | Spindel end cover |
| 17 | 1 | 42038 | Locking Screw |
| 18 | 1 | FMR-13 | Connecting Sleeve |

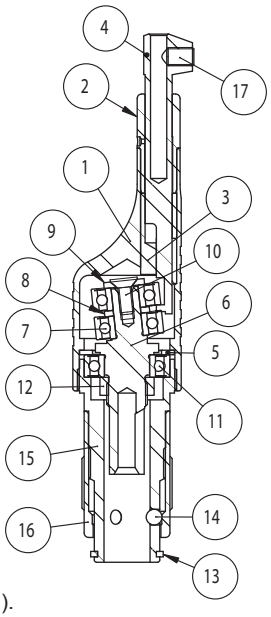



*FMR-45 for Mini polishing/filing machine FMR/S5 (stroke length 0,5 mm).
*FMR-50 for Mini polishing/filing machine FMR/S10 (stroke length 1,0 mm).
*FMR-46 for Mini polishing/filing machine FMR/S15 (stroke length 1,5 mm).

## FMR/B

| POS. | PCS. | ITEM NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 1 | FMR-1 | Housing |
| 2+3 | 1 | FMR-2/P | Guide steering |
| *(Note! POS 2+3: FMR-2/P = FMR-73 and FMR 74, as one item)* | | | |
| 4 | 1 | FMR-3 | Tool-holder |
| 5 | 1 | FMR-9 | Washer |
| 6 | 1 | FMR-51/52/57* | Main spindle |
| 7 | 2 | 44024 | Ball bearing |
| 8 | 1 | FMR-8 | Spacer |
| 9 | 1 | FMR-7 | Bearing washer |
| 10 | 1 | 42039 | Screw |
| 11 | 1 | 44022 | Ball bearing |
| 12 | 1 | FMR-54 | Nut for main spindle |
| 13 | 1 | 46014 | Circlip |
| 14 | 3 | 44026 | Steel Ball |
| 15 | 1 | FMR-31 | Back piece |
| 16 | 1 | FMR-32 | Locking nut |
| 17 | 1 | 42038 | Locking Screw |






*FMR-51 for Mini polishing/filing machine FMR/B5 (stroke length 0,5 mm).
*FMR-57 for Mini polishing/filing machine FMR/B10 (stroke length 1,0 mm).
*FMR-52 for Mini polishing/filing machine FMR/B15 (stroke length 1,5 mm).

# C+D. OPERATION GUIDE FOR FMV TRANSVERSE MINI POLISHING/FILING MACHINES WITH VARIABLE STROKE

## GENERAL OPERATING INSTRUCTIONS

### INTRODUCTION:

**The DIPROFIL TRANSVERSE MINI FILING MACHINE, type FMV,** operates with a side to side motion crosswise the longitudinal axis of the machine. The machine has been developed to ensure very high performance with small dimensions, making the machine easy to handle and especially suited for work in hard-to-reach areas, e.g. in cavities, on narrow shoulders or wherever a precise control is required.
The stroke length is adjustable from 0 to 4 mm, measured 60 mm from the front of the machine housing. The stroke length also depends on the length of the tool. Longer tools result in increased stroke length whereas the stroke length should not be more than 4 mm. **The speed should always be adapted to the stroke length and the tool used. Using tools longer than 70 mm and heavier than 8 g is not recommended.**

**NOTE! All types of polishing/filing machines wear out faster if they are used at high strokes/min and with heavy tools. The applied feed force and dirt entering the machine also affects the lifetime.**

### Filing

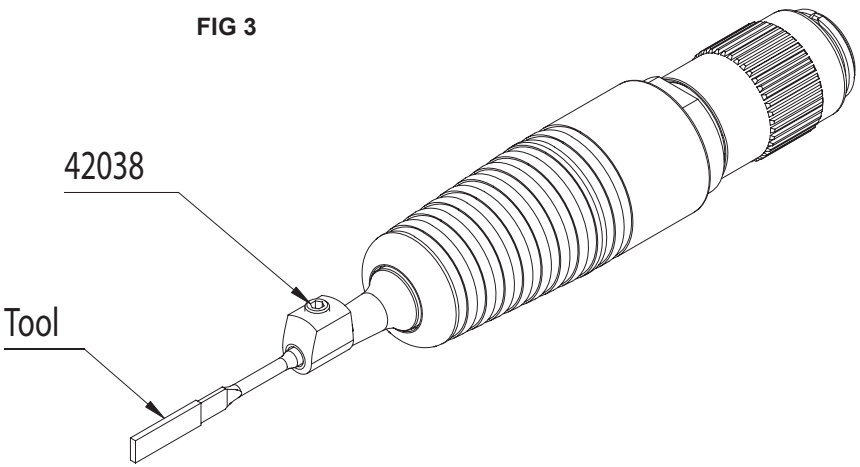
High speed gives the best result and lowest vibration when filing. For diamond coated files we recommend a speed of 6000-9000 strokes/min. (And a stroke length of 1-3 mm). FMV is mainly dimensioned and balanced for use together with the DIPROFIL diamond files, type DLA, DLT and LTA. However, other suitable files of up to 5 grams and a max. length of 60 mm may be used as well.

### Honing, Polishing and Lapping

All equipment with a shaft diameter less than 3,6 mm should be mounted directly into the Mini Filing Machine.
**We recommend working with small and low weight tool holders like the Diprofil type: THFS-1 (Weight approx. 4 g) for Fiber Stones (thickness 1 mm, width 2 – 10 mm and a length of 20 – 50 mm) and THPS-3 (Weight approx. 4 g) for Polishing Stones (thickness 3 mm, width 6 mm or 13 mm and a length of 20-50 mm). The Diprofil Polishing stones are easy to break into desired lengths. Other tools such as Wood lapping ribs with a thickness of 3 mm may also be used in THPS-3. Lapping and Honing tools as well as Felt Polishing Sticks and similar tools with weights of 2-8 gram and shaft ⌀ of up to 3,6 mm can be used.**
In order to keep vibrations as low as possible, it is, however important to not use tools heavier than required for the specific application.
Speed and contact pressure should be adapted to each application. In general, however, the speed should be lower compared to when filing.

**FIXATION OF TOOLS:**
Place the tool in the tool-holder (maximum shank Ø 3,6 mm) locking it with the screw (42038).
**See Fig 3.**

**FIG 3**




**STROKE LENGTH ADJUSTMENT:**
**To adjust the stroke length, loosen the micro motor or flexible shaft and move the spindle drive mounting until the main shaft turns into the right position for the stroke adjusting screw to be accessible (for the hexagon key) through the hole in the machine housing. Place the 2 mm hexagon key in the hole to make the desired adjustment.**
**To increase the stroke, turn the key clockwise and vice versa. See Fig 4.**

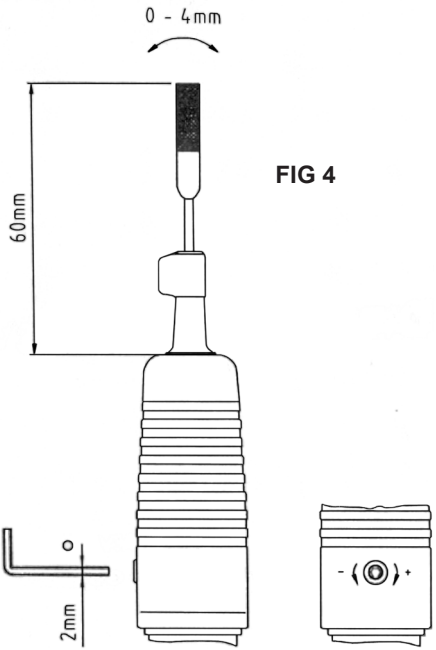


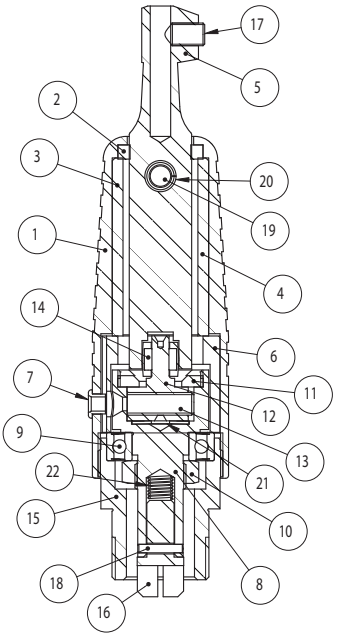

**FIG 4**

**SERVICE AND MAINTENANCE:**
The ball bearings of the machine are permanently lubricated and enclosed, why no special attendance is needed. Remaining movable parts should be inspected and lubricated approx. every 100 working hours (or at least 2 times/year) by yourself or preferably by your supplier. For more information about your nearest service center or to get more information, please visit: **www.diprofil.se**

# C+D. PARTS DRAWING – FMV MACHINES

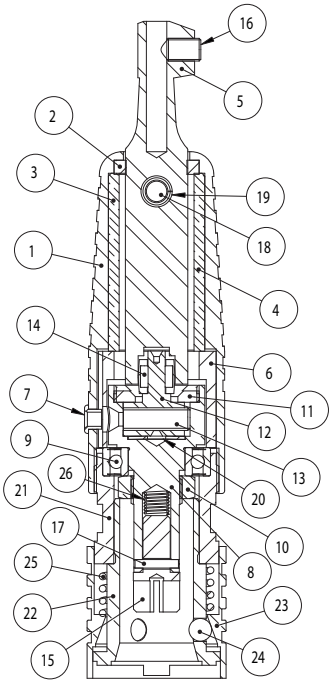
**FMV/D**

| POS. | PCS. | ITEM NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 1 | FMV-1 | Housing |
| 2 | 1 | FMT-8 | Lubricating Felt |
| 3 | 1 | FMT-5 | Upper guide steering |
| 4 | 1 | FMT-6 | Lower guide steering |
| 5 | 1 | FMT-1 | Tool Holder |
| 6 | 1 | FMV-5 | Spacer |
| 7 | 1 | FMV-7 | Bushing |
| 8 | 1 | FMV-2 | Main spindle |
| 9 | 1 | 44022 | Ball bearing |
| 10 | 1 | FMR-54 | Nut for main spindle |
| 11 | 1 | FMV-4 | Eye nut |
| 12 | 1 | FMV-3 | Crank pin |
| 13 | 1 | FMV-6 | Adjusting screw |
| 14 | 1 | FMT-7 | Crank bearing |
| 15 | 1 | FMR-5 | Back piece |
| 16 | 1 | FMR-71 | Spindle drive mounting |
| 17 | 1 | 42038 | Locking screw |
| 18 | 1 | 43016 | Pin |
| 19 | 1 | 43021 | Pin |
| 20 | 1 | 44028 | Bushing |
| 21 | 1 | 41013 | Cup spring |
| 22 | 1 | 41009 | Spring |



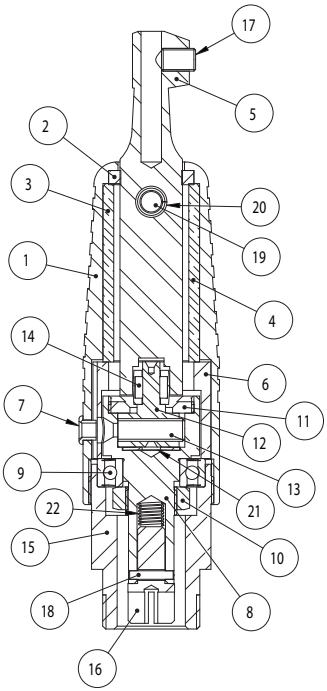

**FMV/G**

| POS. | PCS. | ITEM NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 1 | FMV-1 | Housing |
| 2 | 1 | FMT-8 | Lubricating Felt |
| 3 | 1 | FMT-5 | Upper guide steering |
| 4 | 1 | FMT-6 | Lower guide steering |
| 5 | 1 | FMT-1 | Tool Holder |
| 6 | 1 | FMV-5 | Spacer |
| 7 | 1 | FMV-7 | Bushing |
| 8 | 1 | FMV-2 | Main spindle |
| 9 | 1 | 44022 | Ball bearing |
| 10 | 1 | FMR-54 | Nut for main spindle |
| 11 | 1 | FMV-4 | Eye nut |
| 12 | 1 | FMV-3 | Crank pin |
| 13 | 1 | FMV-6 | Adjusting screw |
| 14 | 1 | FMT-7 | Crank bearing |
| 15 | 1 | FMR-18 | Spindle drive mounting |
| 16 | 1 | 42038 | Locking screw |
| 17 | 1 | 43016 | Pin |
| 18 | 1 | 43021 | Pin |
| 19 | 1 | 44028 | Bushing |
| 20 | 1 | 41013 | Cup spring |
| 21 | 1 | FMR-60 | Back piece |
| 22 | 1 | FMR-62 | Inner sleeve |
| 23 | 1 | FMR-61 | Outer sleeve |
| 24 | 3 | 44025 | Steel ball |
| 25 | 1 | FMR-63 | Spring |
| 26 | 1 | 41009 | Spring |



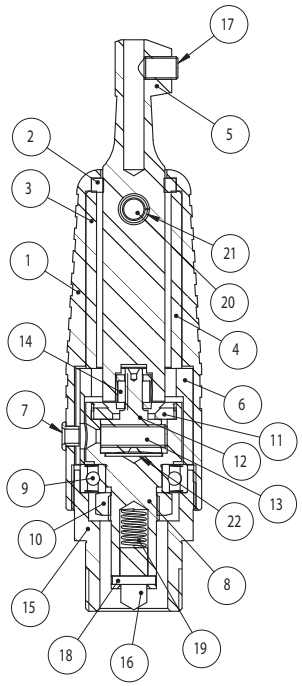
## FMV/E

| POS. | PCS. | ITEM NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 1 | FMV-1 | Housing |
| 2 | 1 | FMT-8 | Lubricating Felt |
| 3 | 1 | FMT-5 | Upper guide steering |
| 4 | 1 | FMT-6 | Lower guide steering |
| 5 | 1 | FMT-1 | Tool Holder |
| 6 | 1 | FMV-5 | Spacer |
| 7 | 1 | FMV-7 | Bushing |
| 8 | 1 | FMV-2 | Main spindle |
| 9 | 1 | 44022 | Ball bearing |
| 10 | 1 | FMR-54 | Nut for main spindle |
| 11 | 1 | FMV-4 | Eye nut |
| 12 | 1 | FMV-3 | Crank pin |
| 13 | 1 | FMV-6 | Adjusting screw |
| 14 | 1 | FMT-7 | Crank bearing |
| 15 | 1 | FMR-38 | Back piece |
| 16 | 1 | FMR-18 | Spindle drive mounting |
| 17 | 1 | 42038 | Locking screw |
| 18 | 1 | 43016 | Pin |
| 19 | 1 | 43021 | Pin |
| 20 | 1 | 44028 | Bushing |
| 21 | 1 | 41013 | Cup spring |
| 22 | 1 | 41009 | Spring |



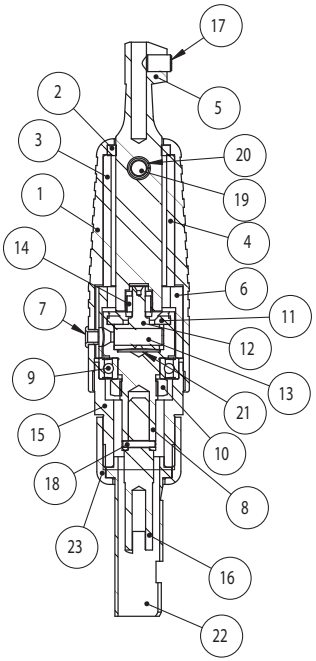

## FMV/N

| POS. | PCS. | ITEM NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 1 | FMV-1 | Housing |
| 2 | 1 | FMT-8 | Lubricating Felt |
| 3 | 1 | FMT-5 | Upper guide steering |
| 4 | 1 | FMT-6 | Lower guide steering |
| 5 | 1 | FMT-1 | Tool Holder |
| 6 | 1 | FMV-5 | Spacer |
| 7 | 1 | FMV-7 | Bushing |
| 8 | 1 | FMV-2 | Main spindle |
| 9 | 1 | 44022 | Ball bearing |
| 10 | 1 | FMR-54 | Nut for main spindle |
| 11 | 1 | FMV-4 | Eye nut |
| 12 | 1 | FMV-3 | Crank pin |
| 13 | 1 | FMV-6 | Adjusting screw |
| 14 | 1 | FMT-7 | Crank bearing |
| 15 | 1 | FMR-5 | Back piece |
| 16 | 1 | FMR-6 | Spindle drive mounting |
| 17 | 1 | 42038 | Locking screw |
| 18 | 1 | 43016 | Pin |
| 19 | 1 | 41009 | Spring |
| 20 | 1 | 43021 | Pin |
| 21 | 1 | 44028 | Bushing |
| 22 | 1 | 41013 | Cup spring |



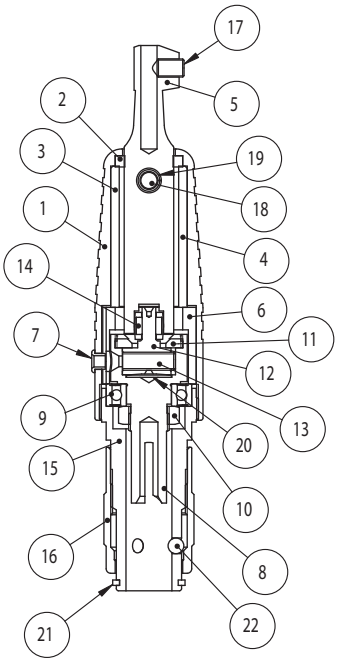
**FMV/S**

| POS. | PCS. | ITEM NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 1 | FMV-1 | Housing |
| 2 | 1 | FMT-8 | Lubricating Felt |
| 3 | 1 | FMT-5 | Upper guide steering |
| 4 | 1 | FMT-6 | Lower guide steering |
| 5 | 1 | FMT-1 | Tool Holder |
| 6 | 1 | FMV-5 | Spacer |
| 7 | 1 | FMV-7 | Bushing |
| 8 | 1 | FMV-2 | Main spindle |
| 9 | 1 | 44022 | Ball bearing |
| 10 | 1 | FMR-54 | Nut for main spindle |
| 11 | 1 | FMV-4 | Eye nut |
| 12 | 1 | FMV-3 | Crank pin |
| 13 | 1 | FMV-6 | Adjusting screw |
| 14 | 1 | FMT-7 | Crank bearing |
| 15 | 1 | FMR-5 | Back piece |
| 16 | 1 | FMR-12 | Spindle drive mounting |
| 17 | 1 | 42038 | Locking screw |
| 18 | 1 | 43016 | Pin |
| 19 | 1 | 43021 | Pin |
| 20 | 1 | 44028 | Bushing |
| 21 | 1 | 41013 | Cup spring |
| 22 | 1 | FMR-13 | Connecting sleeve |
| 23 | 1 | FMR-14 | Spindle end cover |




**FMV/B**

| POS. | PCS. | ITEM NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 1 | FMV-1 | Housing |
| 2 | 1 | FMT-8 | Lubricating Felt |
| 3 | 1 | FMT-5 | Upper guide steering |
| 4 | 1 | FMT-6 | Lower guide steering |
| 5 | 1 | FMT-1 | Tool Holder |
| 6 | 1 | FMV-5 | Spacer |
| 7 | 1 | FMV-7 | Bushing |
| 8 | 1 | FMV-8 | Main spindle |
| 9 | 1 | 44022 | Ball bearing |
| 10 | 1 | FMR-54 | Nut for main spindle |
| 11 | 1 | FMV-4 | Eye nut |
| 12 | 1 | FMV-3 | Crank pin |
| 13 | 1 | FMV-6 | Adjusting screw |
| 14 | 1 | FMT-7 | Crank bearing |
| 15 | 1 | FMR-31 | Back piece |
| 16 | 1 | FMR-32 | Locking nut |
| 17 | 1 | 42038 | Locking screw |
| 18 | 1 | 43021 | Pin |
| 19 | 1 | 44028 | Bushing |
| 20 | 1 | 41013 | Cup spring |
| 21 | 1 | 46014 | Circlip |
| 22 | 3 | 44026 | Steel ball |



# E. OPERATION GUIDE FOR HFP AIR DRIVEN RECIPROCATING MINI POLISHING MACHINE

## GENERAL OPERATING INSTRUCTIONS

### INTRODUCTION:

**The DIPROFIL high frequency polishing machine** with its compact and easy to handle design is especially developed to ensure good performance and good working environment. It is ideal for work in narrow spaces and where precise control is required.

### OPERATION:

**The air should be clean, filtered and oil mist lubricated and the working pressure minimum 4 Bar and maximum 6 Bar*.** The compressed air tube HFP-12 should be threaded into the hole of the silencer HFP-14 and then inserted into the coupling 48028, where after the silencer is screwed into place.
When disassembling the air tube, unscrew the silencer and push the flange of the insert coupling with a suitable tool at the same time pulling out the tube.

**NOTE! All types of polishing machines wear out faster if they are used at high strokes/min and with heavy tools. The applied feed force and dirt entering the machine also affects the lifetime.**

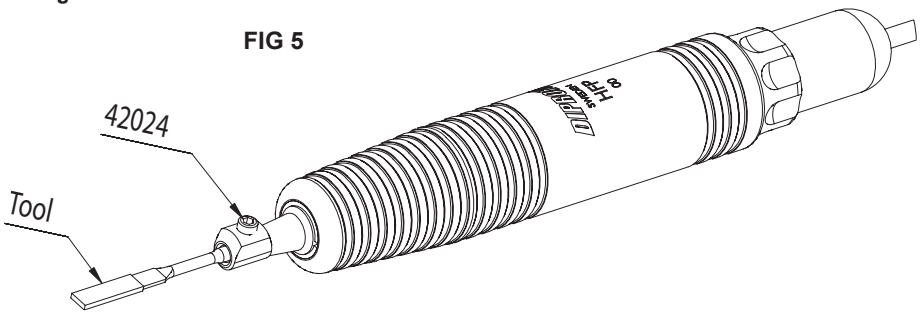
** We recommend using Diprofil lubrication unit type Dipro-fog MFB.*

### Honing, Polishing and Lapping

All equipment with a shaft diameter less than 3,6 mm should be mounted directly into the Mini Filing Machine.
**We recommend working with small and low weight tool holders like the Diprofil type: THFS-1 (Weight approx. 4 g) for Fiber Stones (thickness 1 mm, width 2 – 10 mm and a length of 20 – 75 mm) and THPS-3 (Weight approx. 4 g) for Polishing Stones (thickness 3 mm, width 6 mm or 13 mm and a length of 20-50 mm). The Diprofil Polishing stones are easy to break into desired lengths. Other tools such as Wood lapping ribs, etc. with a thickness of 3 mm may also be used. Also our Lapping and Honing tools as well as Felt Polishing Sticks and similar tools with weight of 1-15 gram and shaft up to 3,6 mm can be used.**
Polishing stones and other tools up to 8 mm of thickness or diameter are easily mounted in the universal tool holder type FMR/VH. In order to keep vibrations as low as possible, it is, however important not to use tools heavier than required for the specific application. Speed and contact pressure should be adapted to each application.

**FIXATION OF TOOLS:**
Place the tool in the tool-holder (maximum shank Ø 3,6 mm) locking it with the screw (42024).
**See Fig 5**.

**FIG 5**




**DISASSEMBLY OF THE HFP MACHINE:**

Unscrew and pull out the valve cone HFP-13. Unscrew the locking nut 42024 from the guide steering with tool holder HFP-2. Fix the tool holder in a jaw vice with a light tightening over the flat areas. Unscrew the machine house manually clockwise. Thereafter hold the machine vertically with the nose
up wards, fully unscrewing the tool holder clockwise until the interior can be pushed out.
Be careful not to lose the compression spring HFP-10.

Assembly is made in the opposite way.

**INFORMATION ABOUT THE GEAR WHEELS AND OTHER PARTS:**

The gear wheels are delivered as HFP-A (Gear wheel and needle bearing, 44033, are assembled, each 2pcs/machine). Both the HFP-A gear wheels with needle bearings have to be exchanged at the same time.

The bearing spindle (44032, Ø 3mm) and the spacer HPF-9 have to be replaced if they are worn out or
damaged.

If part no HFP-2 also is worn out, as well we recommend you to exchange the complete part HFP-B (pos 1 to 5, see page 24). HFP-B can be bought as a sub-assembly.

Please, also check the other parts.

**DISASSEMBLING AND ASSEMBLY OF THE GEAR WHEELS, HFP-A:**

Press out the spindle (44032) with a steel pin Ø 2,5 – 2,8 mm so the spindle comes loose from the needle bearing. Replace with new HFP-A (x2) the milled surfaces on both gear wheels should be assembled in the same position and if necessary also replace the spindle, 44032 and the spacer, HFP-9.

**FIG 6 (HFP-B)**

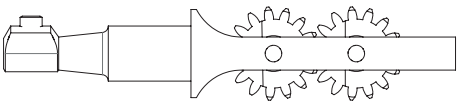
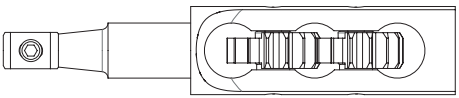
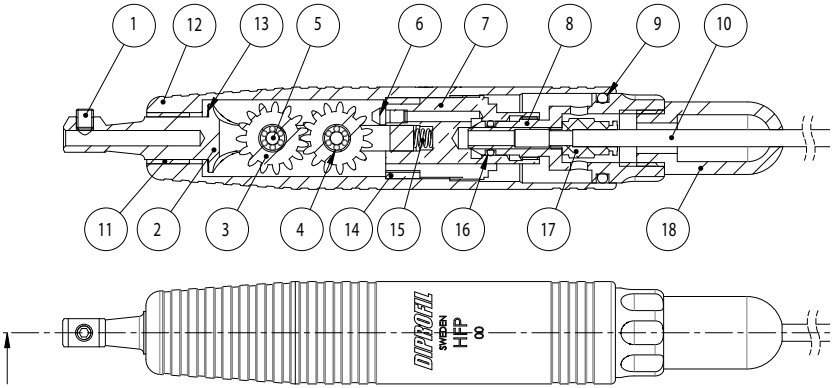


**FIG 7 (HFP-B)**



# E. PARTS DRAWING – HFP MACHINES




**HFP**

| Pos. | Pcs. | Item No. | Description | Sub.assy.No. |
|---|---|---|---|---|
| 1 | 1 | 42024 | Locking screw | |
| 2 | 1 | HFP-2 | Guide steering with tool-holder | |
| 3 | 2 | HFP-A | Gear wheel with needle bearing | HFP-B |
| 4 | 2 | HFP-9 | Spacer | |
| 5 | 2 | 44032 | Bearing spindle | |
| 6 | 1 | HFP-7 | Nozzle | |
| 7 | 1 | HFP-3 | Valve housing | |
| 8 | 1 | HFP-13 | Valve cone | |
| 9 | 1 | 60508 | O-ring | |
| 10 | 1 | HFP-12 | Plastic tube / air-hose | |
| 11 | 1 | 44031 | Plain bearing | |
| 12 | 1 | HFP-1 | Housing | |
| 13 | 1 | HFP-11 | Wawe shaped elastic washer | |
| 14 | 1 | HFP-6 | Ring | |
| 15 | 1 | HFP-10 | Compression spring | |
| 16 | 1 | 60504 | O-ring | |
| 17 | 1 | 48028 | Plunge coupling | |
| 18 | 1 | HFP-14 | Silencer | |
| - | 1 | 48029 | Plunge coupling QSM-1/8¨x4. (included for plastic tube HFP-12) | |

# VIBRATION DECLARATION STATEMENT

## GENERAL INFORMATION:

Reciprocating machines like the Diprofil Mini Polishing-/Filing machines or similar all generate potentially harmful vibrations to different extents. The Diprofil Mini machines have however been designed to reduce the vibrations as much as possible.

**Note! The size and weight of the used tool affects the vibrations very much. Therefore it´s important to use as small and lightweight tools as possible.**

The following factors all affect the level of unwanted and potentially harmful vibrations transmitted to the hand of the operator.

1. **The speed (number of strokes / minute).** This is the factor that has the most affect on the vibration levels and when operating the machine it should not be used at speed levels higher than required.

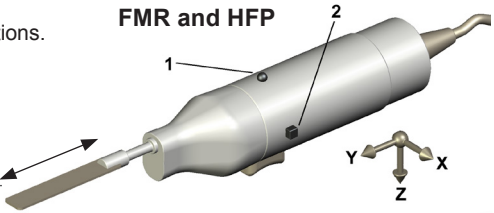
2. **The stroke length.** The stroke length should be kept as short as possible and adapted to the application.

3. **The weight of the used inserted tool. The heavier the tool the higher levels of unwanted vibrations.** Using a heavier tool normally means that the speed and the stroke length must be reduced.

4. **The angle in which the machine (working tool) is held against the working surface and the tool type:** To keep the vibrations as low as possible it is also of utmost importance to work as parallel as possible in reference to the surface on which the machine and tool will be used. Flexible tools as Fibre Stones or articulated tools as Ball-rods together with Lapping Bits and similar generate less vibration than hard tools (not flexible tools) as Polishing Stones, Diamond files, etc. Also see page 3.

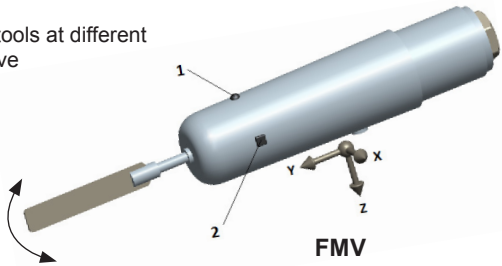
5. **Never hold hands or fingers on moving machine parts or tools (see page 3).**

6. Worn out moving parts, generate vibrations. (Replace worn out parts).




## VIBRATION MEASUREMENTS:

Please, find diagrams on the following pages, showing measured vibration levels using certain tools at different speeds and stroke lengths. All measurements have been made in accordance with ISO 28927-8. Part 8: Saws and polishing and filing machines with reciprocating and transverse action and small saws with oscillating or rotating action.



Our tests have been performed with machines and different tools using certain variable data (results – see the 4 different diagrams and one table for HFP). We have as far as possible tried to imitate normal polishing and filing situations.
The declared values were obtained by laboratory type testing in accordance with the stated directive and standards and are suitable for comparison with the declared values of other tools, tested in accordance with the same directive or standards.
Location of measurement: 1 is prescribed location and 2 is second location.
The declared values are not adequate for use in risk assessments and values measured in individual work places may be higher. The actual exposure values and risk of harm experienced by an individual user are unique and depend upon the user's way of working, in what material the machine is used as well as upon the exposure time, the physical condition of the user and the condition of the machine.

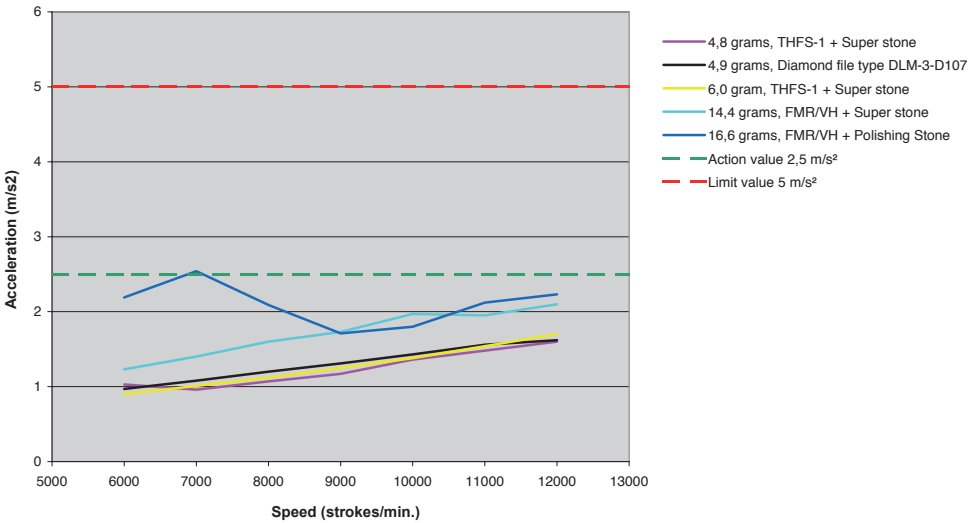
Diamantprodukter AB, cannot be held responsible for the consequences of using the declared values instead of values reflecting the actual exposure in an individual risk assessment and in a work place situation, which is out of our control.

## DIPROFIL MINI POLISHING-/FILING MACHINES TYPE FMR/D5, FMR/G5, FMR/E5, FMR/N5, FMR/S5 AND FMR/B5 WITH 0,5 MM STROKE LENGTH

The uncertainty value, K, represents the uncertainty of the declared vibration emission value, ahd, and is intended to compensate for different batches, production variations etc. It is expressed in $m/s^2$.

For the Mini Polishing-/Filing Machines with 0,5 mm stroke length the K-value is 0,65.

**Vibrations diagram Mini Polishing/Filing machine type FMR, 0,5 mm stroke length**

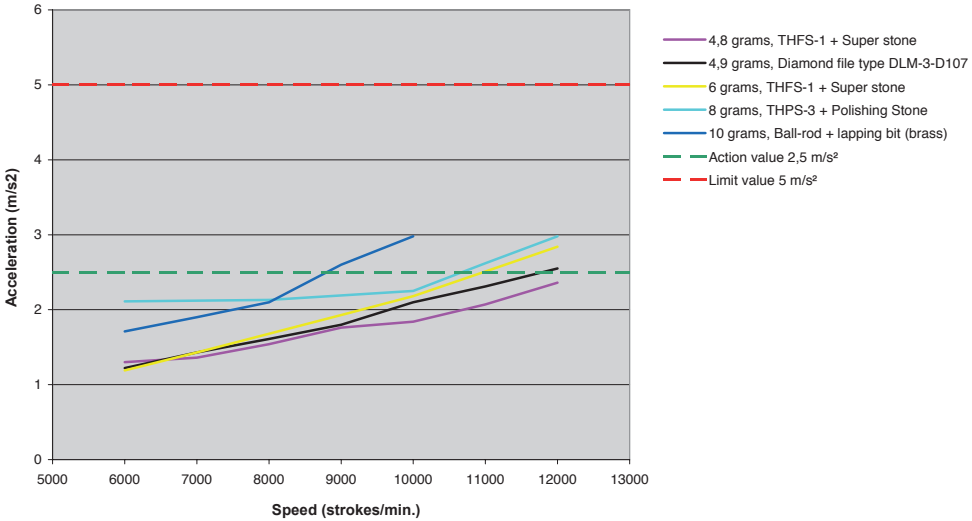


## DIPROFIL MINI POLISHING-/FILING MACHINES TYPE FMR/D10, FMR/G10, FMR/E10, FMR/N10, FMR/S10 AND FMR/B10 WITH 1,0 MM STROKE LENGTH

The uncertainty value, K, represents the uncertainty of the declared vibration emission value, ahd, and is intended to compensate for different batches, production variations etc. It is expressed in $m/s^2$.

For the Mini Polishing-/Filing Machines with 1,0 mm stroke length the K-value is 0,70.

### Vibrations diagram Mini Polishing/Filing machine type FMR, 1,0 mm stroke length

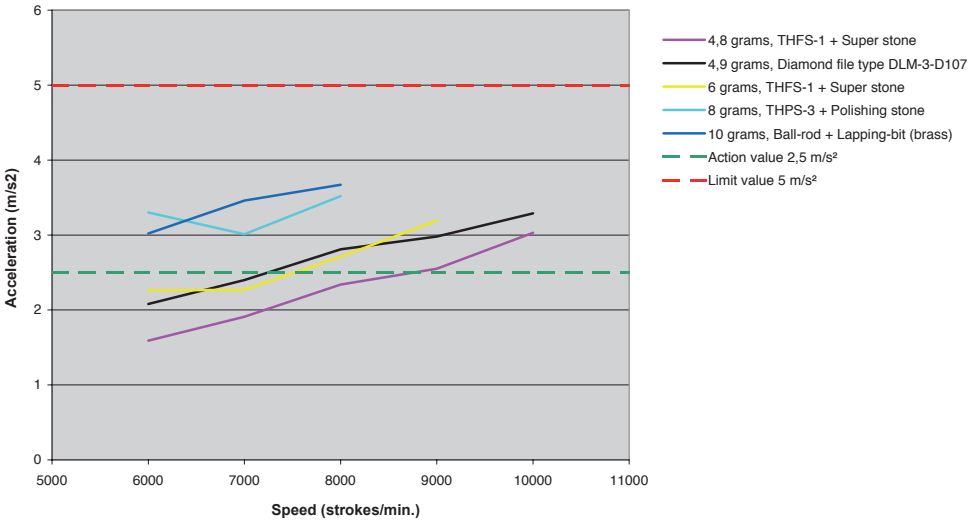


## DIPROFIL MINI POLISHING-/FILING MACHINES TYPE FMR/D15, FMR/G15, FMR/E15, FMR/N15, FMR/S15 AND FMR/B15 WITH 1,5 MM STROKE LENGTH

The uncertainty value, K, represents the uncertainty of the declared vibration emission value, ahd, and is intended to compensate for different batches, production variations etc. It is expressed in $m/s^2$.

For the Mini Polishing-/Filing Machines with 1,5 mm stroke length the K-value is 0,79.

### Vibrations diagram Mini Polishing/Filing machine type FMR, 1,5 mm stroke length

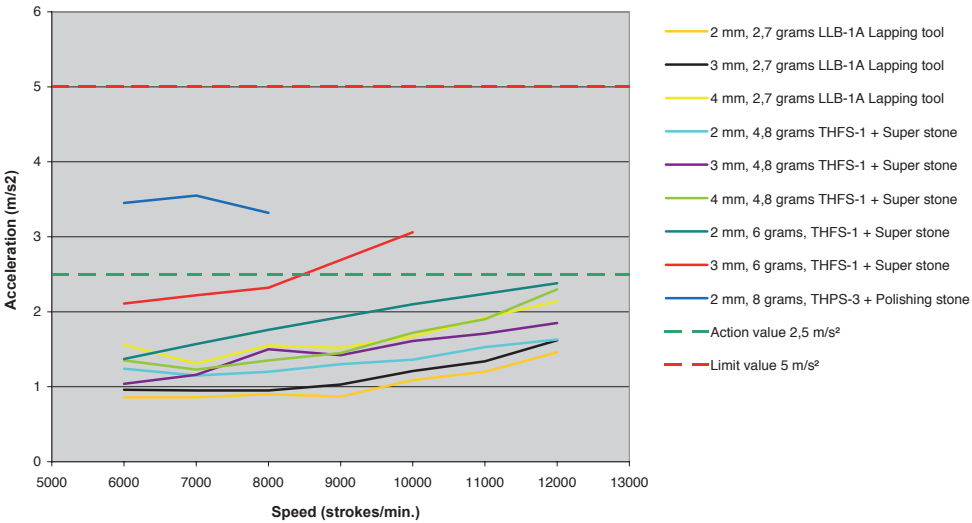


## DIPROFIL TRANSVERSE MINI POLISHING-/FILING MACHINES TYPE FMV/D, FMV/G, FMV/E, FMV/N, FMV/S AND FMV/B

The uncertainty value, K, represents the uncertainty of the declared vibration emission value, ahd, and is intended to compensate for different batches, production variations etc. It is expressed in m/s².

For the Transverse Mini Polishing-/Filing Machines the K-value is 0,68.

**Vibrations diagram Transverse Mini Polishing-/Filing machine type FMV (stroke length 2, 3 and 4 mm)**




## DIPROFIL AIR-DRIVEN HIGH FREQUENCY MINI POLISHING MACHINE TYPE HFP

The uncertainty value, K, represents the uncertainty of the declared vibration emission value, ahd, and is intended to compensate for different batches, production variations etc. It is expressed in m/s².

For the air-driven Mini Polishing Machine type HFP the K-value is 0.68.

| Tool | Vibration value |
|---|---|
| 1,7 grams, DLA-4x1-D151 Diamond file | 1,73 m/s² |
| 2,7 grams, LLC-2A3 Honing tool | 1,38 m/s² |
| 2,8 grams, LLB-1A Lapping tool | 1,47 m/s² |
| 4,5 grams, THPS-3 + Hard wood lapping rib 3x6x35mm | 1,41 m/s² |
| 4,8 grams, THFS-1 + Super stone | 1,39 m/s² |
| 5,0 grams, THPS-3 + Polishing stone 3x6x35mm | 1,83 m/s² |
| 6,0 grams, THFS-1 + Super stone 1x10x70 mm | 1,75 m/s² |
| 8,0 grams, THPS-3 + Polishing stone 3x13x50 mm | 1,96 m/s² |
| 15,0 grams, FMR/VH + Polishing stone 3x13x36mm | 1,27 m/s² |

# ADDITIONAL VIBRATION INFORMATION

This power tool may cause hand-arm vibration syndrome, if not adequately used.
This additional vibration information may be of assistance to employers in meeting their obligations e.g. under national law or regulations based on the EU directive 2002/44/EC, to assess the risks to their workers arising from hand-arm vibration exposure associated with the use of this machine.

## VIBRATIONS AND THE ISSUE OF HAVS (HAND ARM VIBRATION SYNDROME)

- The EU directive (2002/44/EC),concerning vibration exposure, was approved by the member states and EU parliament in July 6, 2002 and should have been introduced into national laws not later than by July 6, 2005.
- Minimizing the vibration exposure is the responsibility of the manufacturer, the vendor, the employer and the operator respectively.
- When using machines resulting in an exposure exceeding 2,5 $m/s^2$ it is the responsibility of the employer to make an action plan on how to minimize the vibration exposure for the operators. This also includes regular scheduled health inspections.
- Vibrations emission exceeding 2,5 $m/s^2$ limits the time of operation.

## CLASSIFICATION OF INJURY RISKS (ACCORDING TO SWEDISH INSTITUTE OF INDUSTRIAL RESEARCH)

| MAXIMUM DAILY EXPOSURE | PROCESS VIBRATIONS IN $m/s^2$ |
|---|---|
| 8 HOURS (FULL WORKING DAY) | BELOW 2,5 |
| 4 HOURS | 2,6-3,5 |
| 2 HOURS | 3,6-4,9 |
| 1 HOUR | 5,0-7,0 |
| 30 MINUTES | 7,1-9,9 |
| 15 MINUTES | 10,0-14,0 |
| 7,5 MINUTES | 14,1-19,8 |
| BELOW 7,5 MINUTES | ABOVE 19,9 |

The risk for injuries such as “white fingers” is estimated to be less than 14%, if the stated recommendations are followed. This is presuming that the total time of exposure, in regular use and for the specific individual, is max. 10 years. If the exposure continues over a longer period of time, the risk of injuries increases, i.e. after 15 years of daily exposure the risk for injuries is estimated to be max. 30%, if the recommendations are followed.

**We recommend a programme of health surveillance to detect early symptoms, which may be related to vibration exposure, making it possible to modify management procedures in order to prevent significant disability.**

**If you require longer stroke length (0-6 mm) and bigger/heavier tools (1-34 grams), we recommend the low-vibrating Diprofil Di-PRO machines:**

## Di·PRO MAXIMUM EFFICIENCY – MINIMAL VIBRATIONS

If vibrations and working hours exceed the table above we recommend that you use Diprofil's Di-Pro machines with low vibrations. If these machines are used according to the recommendations in the operation guide they normally have vibration levels below 2,5 $m/s^2$. This means that an operator may work up to 8-hours a day with a minimized risk of sustaining vibration generated injuries.

**For further information, we recommend you to visit our website www.diprofil.se , consult us by phone or e-mail or contact your local supplier.**

# THE NEW MACHINERY DIRECTIVE 2006/42/EC, VALID IN THE EU AS OF 2009-12-29

## A SUMMARY

The directive was approved by the member states and the EU and the EU parliament on May 17, 2006. This directive must be active as a national law no later than December 29, 2009.

**On December 29, 2009 the new Machinery Directive, 2006/42/EC replaced the old directive 98/37/EC. From December 29, 2009, vibration emission must be declared as total values out of 3-axis values (x-y-z) in order to address the essential requirement 2.2.1.1 in Annex1 of the new Machinery Directive, 2006/42/EC.** The new values should be measured according to revised or new vibration emission standards and they will differ from, and normally be higher than, the values given with reference to the previous standards.
According to the new Machinery Directive vibration values must be declared when they are higher than 2.5 m/s². For machines with emission values lower than 2.5 m/s² it is sufficient enough to state < 2.5 m/s², but lower values can be given voluntarily.

We, Diamantprodukter AB, think it is important to give as much information as possible and have decided to quote also vibration values below 2.5 m/s². In this way we are able to show how the values vary depending on stroke length, strokes/min, tool weight etc.

Emission values below 2.5 m/s² imply a low risk of vibration injury resulting from normal use of the tool. It is important to realize that there can be other ergonomic factors that are more important to consider. It has been found that under real working conditions, the influences of the operator and the process can be particularly important at low magnitudes. For these reasons, it is stated in the new ISO 28927-series vibration measurement standards that it is not recommended that emission values below 2.5 m/s² be used for estimating the vibration magnitude under real working conditions. In such cases it is recommended that a vibration magnitude of 2.5 m/s² is used to estimate the machine vibration.

In the Operation Guide / Product Information vibration and noise emission values should always be given according to: ISO 28927 or EN 60745 published 2006 or later. The calculated uncertainty (K) should always be stated as well.

### CHARACTERIZATION OF VIBRATIONS

**Direction and location of measurements.**
**The vibration transmitted to the hand shall be measured and reported for three different directions (3-axis values: x-y-z).**
Measurements shall be made at the gripping zones, where the operator normally holds the machine and applies the feed force. For machines intended for one-handed operation, it is only necessary to measure at a single point. All our measurements, the equipment used and the calibration of the instruments have also been carried out according to ISO 20643:2005.
The frequency weighing filter is in accordance with ISO 5349.

**The measurement equipment from Brüel & Kjær that we have used fulfills:**
ISO 5349.1:2001, Mechanical vibration. Measurement and evaluation of human exposure to hand-transmitted vibration. Part 1: General requirements and ISO 8041:2005. Human response to vibration. Measuring instrumentation.

ISO5349. 2:2001: Mechanical Vibration. Measurement and Evaluation of Human Exposure to Hand-transmitted Vibration.
Part 2: Practical Guidance for Measurement at the Workplace.

For field calibration a vibration calibrator type 4294 which is accredited and calibrated has been used. The vibration analyzer type 4447 and transducer 4524 (or4520) are calibrated and traceable.
For more information about measurement equipment for hand/arm and human vibrations see www.bksv.com

**All the declared vibration values have been measured in accordance with ISO 28927-8.**

*"The text hereunder is taken from ISO 28927-8. Hand-held portable power tools. Test methods for evaluation of vibration emission - Part 8: Saws, polishing and filing machines with reciprocating action and small saws with oscillating or rotating action, is reproduced with permission of the International Organization, ISO. This standard can be obtained from any ISO member and from Web site of ISO Central Secretariat at the following address: www.iso.org Copyright remains with ISO"*

**TESTING AND OPERATION CONDITIONS OF MACHINERY**

**Reciprocating and Transverse polishing/filing machines.**

1. The work piece shall be a mild steel plate mounted horizontally on a stable foundation. The dimensions of the steel plate shall be at least: 100 mm × 100 mm × 25 mm or with another dimension with at least a total weight of 2 kg.
2. The surface of the plate to which the machine is to be applied shall have a finish, Ra, less than or equal to 8,0 µm.
3. The mounted work piece shall have no resonances within the frequency range for the hand–arm vibration that could influence the test results.
4. The feed force used shall be from 4 to10 ±2 N.
5. Tools of good condition shall be used (polishing tools and/or files) as specified for polishing or filing mild steel.
6. The duration of measurement time shall be at least 10 s.

**A. Reciprocating polishing/filing machines**

Tests shall be made with maximum recommended total weight of inserted tool (tool + tool holder if not integrated in the machine). **If adjustable speed and/or stroke length tests shall be made at maximum recommended settings and at maximum recommended total weight of the tool. All used data should be reported.**
Machine types recommended to be used with different tool types shall be tested with the recommended tool types and recommended data that shall be used. **The highest value should be reported.**

**B. Transverse polishing/filing machines**

Tests shall be made with maximum recommended total weight of inserted tool (tool + tool holder if not integrated in the machine). **If adjustable speed and/or stroke length tests shall be made at maximum recommended settings and at maximum recommended total weight. Stroke length shall be measured from the outer "turn points".** The length from the front part of the machine housing to the tip of the tool shall be measured and reported. **All used data should be reported.**

Machine types recommended to be used with different tool types shall be tested with the recommended tool types and recommended data that shall be used. The highest value should be reported.

*We have measured all our Diprofil Mini Polishing/Filing machines according to this principle.*

We, Diamantprodukter AB, have decided to declare more vibrations values than necessary. This means that for all the different Diprofil Machines we can recommend tool using data in terms of speed, stroke length, tool weight and feed force etc.
**Diprofil Polishing/Filing machines are only intended for fine precision: polishing, grinding and filing applications.**

## THE PHYSICAL AGENTS (VIBRATION) DIRECTIVE (VALID IN EU): A SUMMARY

**The vibration directive was published on July 6, 2002. This directive must be active as national law not later than July 6, 2005.**
In the directive there are both an action value and a limit value defined. These values refer to the "daily exposure". Daily exposure means the quantity of mechanical vibration to which an operator is exposed during a working day. The daily exposure is denoted A (8). It takes into account both the magnitude and duration of the vibration.

**NOTE! The action value is 2.5 m/s$^2$ averaged over an 8-hour working day. For employees exposed to vibrations higher than the action value an action plan must be initiated to reduce the vibration exposure. A health surveillance program also has to be incorporated in the action plan. The action value is active from the day the national laws took effect.**

**The limit value is 5 m/s$^2$ averaged over an 8-hour working day. It will not be allowed to expose an operator to vibrations exceeding the limit value.**

**In the directive a transition period of maximum 5 years is introduced for the limit value. Member states are allowed to use this transition period in their national law. However, it is not permissible to exceed the limit of 5 m/s$^2$ as soon as it is possible by technical or organizational measures to reduce the exposure to below 5 m/s$^2$. The transitional period can only be used for equipment given to operators before 6 July 2007, i.e. for work involving new equipment the limit value is active from July 6, 2007 without any exceptions.**

### VIBRATIONS CALCULATOR

There is a Vibrations exposure calculator available at the Diprofil website. It is used for calculating the vibration exposure and you will be able to calculate the time before an operator average up to 2.5 m/s$^2$ or 5 m/s$^2$ over an 8-hour working day.

## PRESENT STANDARDS AND DIRECTIVES RELATED TO HAND-ARM VIBRATION.

There are three parties involved. The Manufacturer, the Employer and the Operator.

## THE RESPONSIBILITY OF THE MANUFACTURER

**The responsibility of the manufacturer is regulated according to the Machinery Directive (2006/42/EC). This directive deals with essential health and safety requirements of machinery.**

**The Machinery Directive requires the manufacturer to declare the vibration emission from his machines. The values shall be declared in accordance with the appropriate test code. Air-driven machines are declared according to the EN ISO 28927-series of standards. We Diamantprodukter AB have declared the vibration emission according to EN ISO 28927-series.**

The vibration tests for electric hand-held machines are specified in parts of EN 60745 standards, or in those parts of EN 50144 standards that are still valid. Declarations according to parts of EN 60745 published prior to 2006, or to EN 50144 are all based on single-axis values EN 60745-1:2006 (and subsequent editions of EN 60745-2-x which refer to it) produce vibration total values.

Declared vibration values are based on measurements made under laboratory conditions. The power tool is often run under artificial conditions. The aim is repeatable and reproducible results.

## THE RESPONSIBILITY OF THE EMPLOYER

**The employer is responsible for the safety of his employees.**
**The employer must follow the national law regarding health and safety for his operators. All employers are responsible for the safety and health of his operators and must themselves be aware of the laws. With the new directive the law is basically the same in all countries in the European Union. The employer must keep the vibration exposure to a minimum level and perform vibration exposure assessments according to the Physical Agents (Vibration) Directive 2002/44/EC. (We recommend all parties involved to obtain this directive).**
**Once the action value 2.5 m/s2 is exceeded the employer shall establish and implement a programme of technical and/or organizational measures intended to reduce to a minimum exposure to mechanical vibration and attendant risks, taking into account in particular:**

a) **The choice of appropriate work equipment with ergonomic design producing the least possible vibration (like Diprofil low vibration Di-PRO machines and most of the Diprofil Mini Polishing/Filing machines).**
b) **Other working methods that require less exposure to mechanical vibration**
c) **We recommend a program of health surveillance to detect early symptoms which may relate to vibration exposure, so the management procedures can be modified to help prevent future impairment.**
d) **There are also a lot of other improvements that can be made to reduce the vibrations and thereof the risk of injury.**

## THE RESPONSIBILITY OF THE OPERATOR

**The operator is responsible for using the power tools according to given instructions and to react when he or she has reason to believe that vibrations are unusually high.**
**The operator is also the person exposed to vibrations and therefore the one to be protected from unnecessary vibration exposure.**

# FURTHER INFORMATION ABOUT VIBRATIONS/WORKING ENVIRONMENT, STANDARDS ETC.

1) For further information about all ISO (Standards Institute) member states in the world: http://www.iso.org/iso/iso_members
Just click on: Acronym to get information about e-mail addresses and/or the web-site to the different organizations.

2) Swedish Working Environment Organizations, link to the co-operative network in Europe and Scandinavia in English and Swedish: http://www.av.se/lankar_samarbetpartners/

3) An EU guide to managing hand-arm vibration can be found at: http://www.humanvibration.com

4) The enforcing authority in the UK is the Health and Safety Executive (HSE) British Standards Institution.The HSE has very good information on the risks of vibration exposure and how to control those risks. You can find this information at: http://www.hse.gov.uk/vibration/hav/

5) Deutschland:
Berufsgenossenschaft: www.bg-vibrationen.de and www.vbg.de
Technicher Überwachungsverein: www.tuv.com
Deutsches Institut für Normung: www.din.de

6) Denmark: ”Danish Working Environment Authority”, and Arbejdstilsynets guides about vibrations. http://www.at.dk/

7) American standard: BSR/CAGI B186.1- 200x
Safety Code for Portable Air Tools (DRAFT STANDARD)
Applies to the safety related aspects of the design, construction, installation, operation and maintenance of portable, hand-held, industrial air tools of the types used generally throughout industry for fabricating, assembly disassembly and material working.
Website: www.ansi.org
This organization may give information on what is valid in the USA.

8) Canada: in English and French
www.cchst.ca/oshanswers/phys_agents/vibration/vibration_effects.html

9) Vibrations calculator
It is used for calculating the vibration exposure and you will be able to calculate the time before an operator average up to 2.5 $m/s^2$ or 5 $m/s^2$ using different hand tools over an 8-hour working day. Available in English or Swedish at:
http://www.vibration.db.umu.se

10) The released Machine Directive 2006/42/EC, of the European Parliament and of the Council is active from December 29, 2009. For more information please see:
http://ec.europa.eu.enterprise/sectors/mechanical/machinery/

11) The Machine Directive 2006/42/EC. The Directive can be found in many different languages. Please choose your preferred language at the top right hand corner and thereafter click under headline: search result on pdf at:
http://eur-lex.europa.eu/Result.do?aaaa=2006&mm=&jj=&type=l&nnn=157&pppp=24&RechType=RECH_reference_pub&Submit=S%C3%B6k
Or visit Diprofils website.

**For the latest available information please visit: www.diprofil.se**

## Notes

## Notes

# Contact Us

## We’re Here to Help

For any product questions, troubleshooting, or assistance, please reach out to our customer service team. We’ll make sure you get the support you need.

### Customer Support

Email: info@gesswein.com
Phone: 203.366.5400

### Support Hours

Mon - Fri | 8:30AM - 5PM EST

Gesswein®
201 Hancock Avenue
Bridgeport, CT 06605
USA

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