

FlexMaster[®]

the rotary NiTi system
for every case

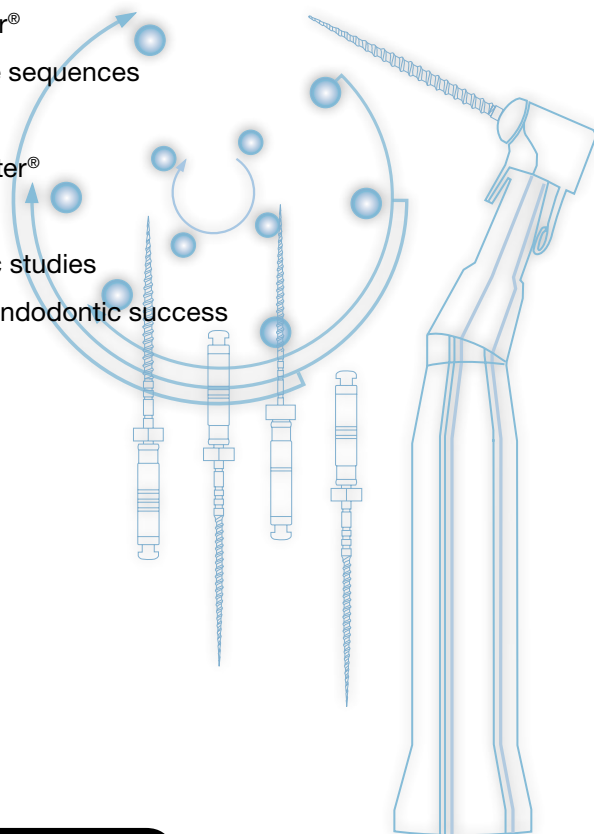


**Endo
Easy
Efficient[®]**



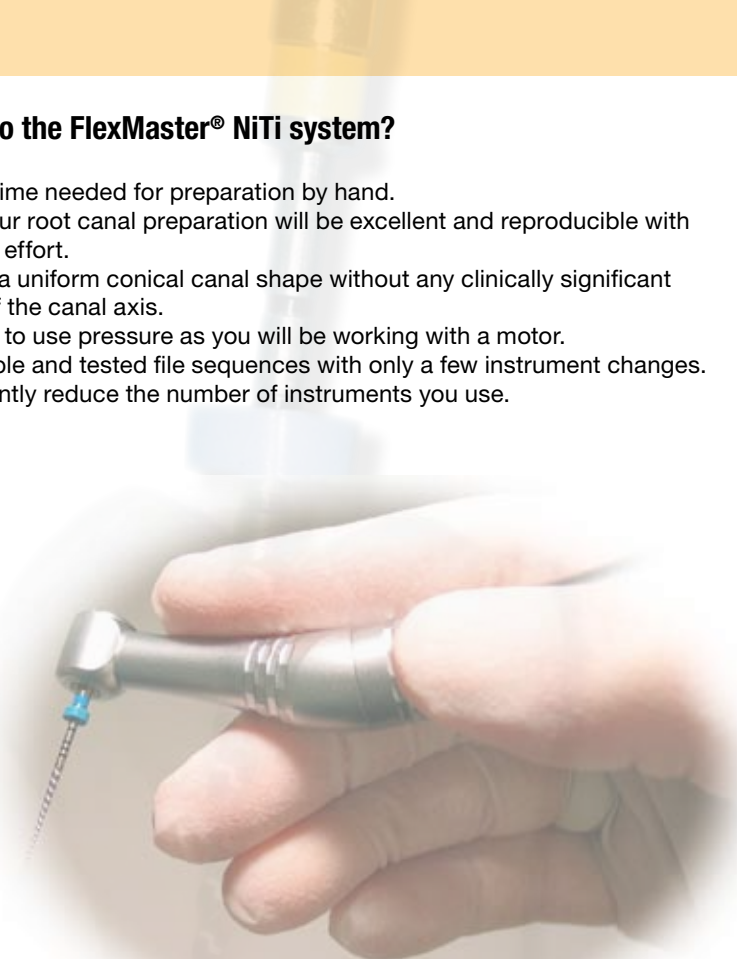
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1. Why change to the FlexMaster® NiTi system?

- It takes half the time needed for preparation by hand.
- The quality of your root canal preparation will be excellent and reproducible with significantly less effort.
- You will achieve a uniform conical canal shape without any clinically significant transportation of the canal axis.
- You do not need to use pressure as you will be working with a motor.
- You will use simple and tested file sequences with only a few instrument changes.
- You will significantly reduce the number of instruments you use.



2. Why nickel-titanium?

Because of its properties: Steel cannot be used with a rotary system in curved canals. Try bending the working part of a steel instrument to a 40° to 60° angle. You will now have a bent file. If you rotate this file around its axis and watch the radius of the file tip, you will see that this cannot work in the root canal. Transportation of the canal axis, zip and elbow effects as well as excessive dentin removal would be the result. Most importantly, the steel instrument would not be able to withstand the pressure in the canal and would fracture very quickly. For this reason, the giromatic principle of a 90° back and forth rotation was the limit for steel files.

Endodontists did discover that good results can be achieved with pre-bent steel files when preparing root canals by hand using the balanced force technique according to Roane. Nevertheless, this is a very time consuming and stressful procedure.

Nickel-titanium (NiTi) alloy behaves very differently. The material is extremely flexible and has a memory effect. If you bend a NiTi file to 40-60° you will immediately see the difference in flexibility. This exceptional flexibility is as important as the memory effect: If you release the bent NiTi file it will immediately resume its original position.

The combination of these two important factors makes nickel-titanium alloy the best material presently available in endodontics for rotary instrumentation.

3. How often can I use a NiTi file?

Dentin removal with a rotary system – the stress on the material increases with the degree of canal curvature.

Steel instruments will deform when they undergo too much stress, so they can be identified before they fracture. NiTi files, however, do not bend or unwind, they fracture without warning. In order to reduce the risk of fracture, NiTi files must be used with a low torque and torque control drive system.

FlexMaster® NiTi files can be used repeatedly. The special autoclavable labels for the lid of the **FlexMaster®** SystemBox allow you to record frequency of use with a permanent marker. We recommend file replacement after 8 markings at the latest as risk of fracture increases significantly with instrument wear. When a file has been used in a strongly curved canal, mark two or even three boxes on the control label, depending on the stress it was subjected to. This method has been successfully tried and tested.

FlexMaster® is economical because few instruments are needed per treatment. In most cases, 4 instrument sizes will suffice to reach the apex, and apical enlargement can be made with 2 to 4 instrument sizes.



4. What exactly is nickel-titanium (Nitinol)?

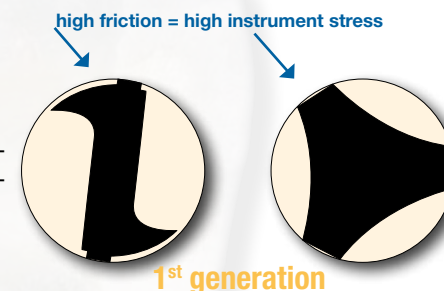
'Nitinol', as a combination of the elements Nickel and Titanium, was developed by the Naval Surface Warfare Center in USA (formerly Naval Ordnance Laboratory). The result is an intelligent material with "memory effect".

For the **FlexMaster®** instruments we use a special alloy consisting of 54% nickel and 46% titanium.

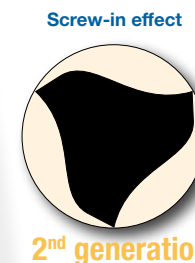
5. How important is instrument design?

Experience gained with first generation rotary NiTi instruments showed how important it is for the design of the file to be suitable for anatomical conditions in different root canal sections (from coronal to apical), taking the specifics of the material into account.

One characteristic of the first generation NiTi instrument design was large contact surfaces to the canal wall causing high friction and high stress on the instruments due to the high torsional forces. This also resulted in higher temperatures generated by friction and in increased smear layer formation.

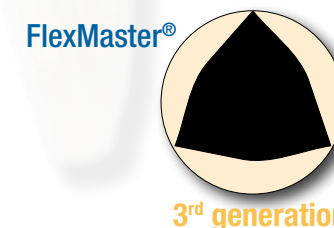


The second NiTi generation adopted the cutting blade geometry of traditional steel files. But this not only weakened the instrument core and reduced the memory effect of the material, it also favoured file deformation and made the instruments with this cross-section vulnerable to fracture. Furthermore, the angle of the cutting blades often caused instruments to screw into the canal, i.e. without any use of pressure the instrument screwed into the canal and was difficult for the practitioner to control.

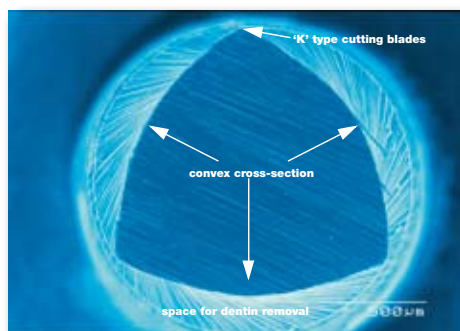


VDW took all this experience into account and developed an intelligent instrument design, **FlexMaster®**.

FlexMaster® uses the efficiency of traditional K-type cutting blades, i.e. a convex cross-section to stabilize the instrument core and a cutting blade angle suitable for rotary use.



6. The advantages of the FlexMaster® instrument design at a glance:



Cross-section of a FlexMaster® instrument (SEM, magnification 500x)



'K' type cutting blades

1. High cutting efficiency
2. Improved torsional resistance
3. Reduced friction
4. Large space for dentin removal
5. Reduced smear layer formation



Convex cross-section

1. Stable instrument core
2. High torsional resistance



Nickel-Titanium

1. Memory effect
2. No tendency for instrument deformation



Individual cutting angles for each instrument size

1. No undesired screw-in effect
2. Improved control of the file

Inactive instrument tip

1. Guides the instrument in the canal curvatures
2. Significantly reduces perforation risk

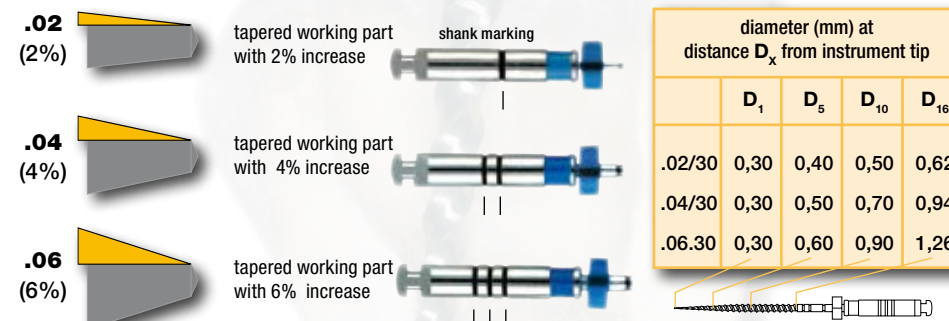
7. Taper – what does it mean?

Taper means gradual increase in diameter over the length (conical shape).

Traditional steel files have a 2 % taper in compliance with ISO no. 3630, i.e. taper .02.

The increase in cross-section diameter from the tip towards the end of the working part is 2 %, or 2/100 mm per 1 mm. A file of ISO size 20 with a 16mm working part measures 20/100mm at the tip and 52/100mm at the end of the working part: $(20 / 100) + (16 \times 2\%) = 0.52$.

Taper .04 has a cross-section diameter increase of 4 %, i.e. a strongly tapered instrument
Taper .06 means an increase of 6 % etc.



8. Why do I need instruments in different tapers?

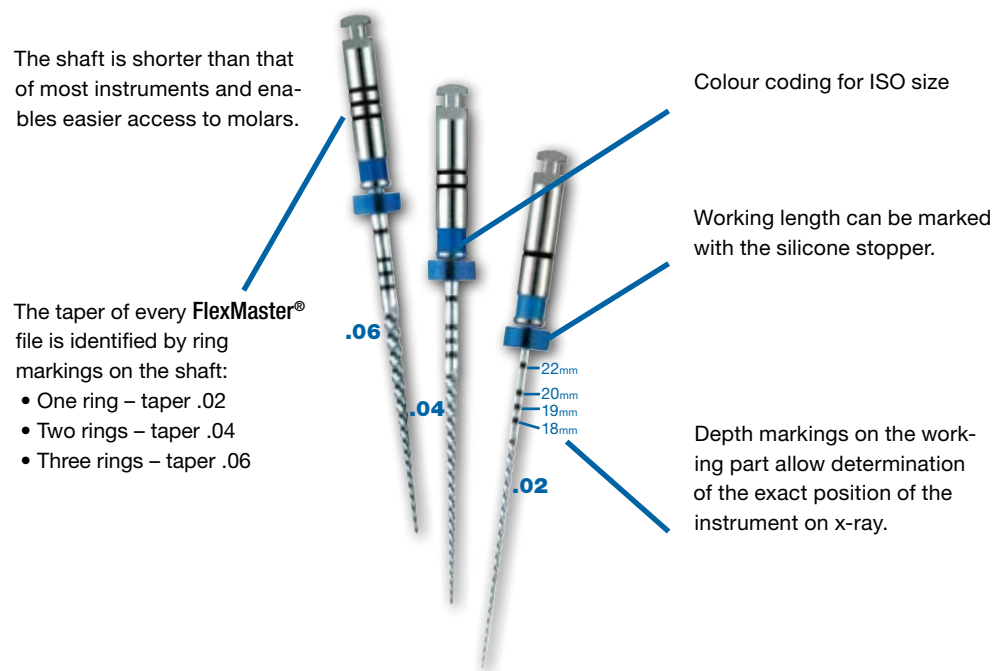
The goal of root canal preparation is to create optimal conditions for a tightly sealed and long-lasting root filling, which includes a uniformly tapered canal shape. A fast and safe way to achieve this goal is with intelligently coordinated instrument sequences of different tapers:

- large taper in the straight canal section
- medium taper in the curved canal section
- small taper for apical enlargement

Large and medium tapers allow speedy dentin removal. The number of instrument changes is reduced to a minimum. Small tapered files are used for better apical shaping and preservation of the original canal axis (centre line).

FlexMaster®: taper .02, .04, .06 and .11

1. .11 for the IntroFile, for conical enlargement of root canal orifice, replaces 2 or 3 Gates enlargers
2. .04 and .06 used for crown-down phase
3. .02 for safe apical enlargement



9. Why do I need a special motor for NiTi instruments?

Steel files unwind before they break. They can be checked prior to sterilization and damaged files discarded. Due to nickel-titanium's memory effect, NiTi files do not deform, they break without warning when submitted to excess stress or material fatigue. In order to take full advantage of the nickel-titanium material and effectiveness of the instrument design and in order to avoid the unpleasant consequences of instrument fracture, the file must be used in the canal with:

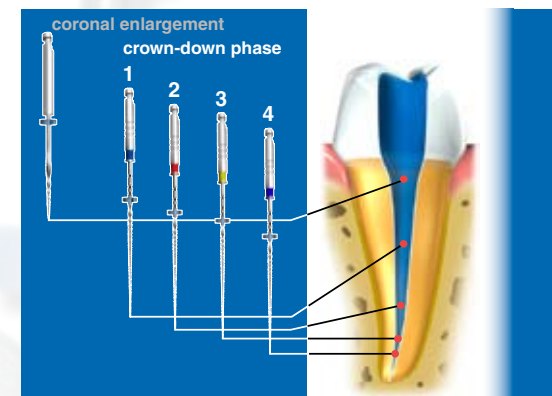
- a constant rotation of approximately 300 rpm and
- a constant force (torque) according to the size of the file



For these reasons, you need an intelligently programmed motor with torque and speed control, which monitors the speed and torque of each instrument precisely and safely according to its specific mechanical data. Additional functions such as Auto Stop Reverse (ASR), which automatically frees instruments blocked in the canal, increase safety and reduce stress for the practitioner. On pages 15-16 you will find an overview of motors recommended by VDW.

10. What is crown-down pressureless?

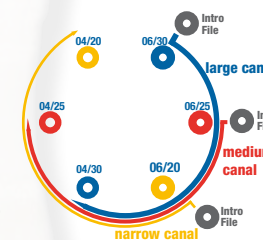
It means preparing a root canal with instruments in decreasing sizes step-by-step toward the apex without using pressure. To begin with, it is necessary to determine the approximate canal length with an initial x-ray. The exact working length will be determined when reaching approx. 2/3 of the estimated canal length. Using one of the new electronic length determination devices, e.g. Raypex®5, is more accurate and faster than x-ray imaging.



After this, the apex is enlarged with instruments in increasing sizes (each instrument to the full working length). The crown-down method for rotary root canal preparation has been widely tried and tested.

11. How to use FlexMaster®

1. Take an initial diagnostic x-ray to estimate working length
2. Introduce a VDW C-PILOT file (or a fine K-file) to determine the size of the canal (large, medium, narrow) and select the instrument sequence (diagram p. 10)
3. Create straight coronal access with the IntroFile and enlarge conically.
4. Crown-down phase
From the beginning of the preparation use a lubricant (FileCare® EDTA) and rinse regularly and thoroughly with NaOCl. Mark approx. 2/3 of estimated working length (WL) with a stopper.
 - At constant speed, between 250 and 350 rpm, introduce the first FlexMaster® file of the selected sequence
 - Use light pumping movements for approx. 5-10 sec. until the file's progress becomes more difficult. Do not exert any pressure.
 - Change to the next smaller instrument size and continue preparing step-by-step until you have reached approx. 2/3 of estimated WL.
5. Determination of the exact WL, e.g. with Raypex®5 or x-ray and complete crown-down preparation.
6. Apical enlargement: Use FlexMaster® files .02 (green circle) in increasing sizes on full WL up to max. ISO 070, depending on the root canal anatomy.



12. The advantages of the sequences:

- They have been developed and clinically tested by experienced endodontists
- They achieve best results in the shortest time
- The instrument sequences are easy to remember
- The sequences are printed on the BasicKit and on the SystemBox
- The sequences are pre-programmed in the VDW endo motors

Depending on the canal size three different sequences are available:

Large canals

IntroFile

.06/30

.06/25

.06/20

.04/30

.02/30

.02/35

WL determination

Medium canals

IntroFile

.06/25

.06/20

.04/30

.04/25

.02/25

.02/30

.02/35

WL determination

Narrow canals

IntroFile

.06/20

.04/30

.04/25

.04/20

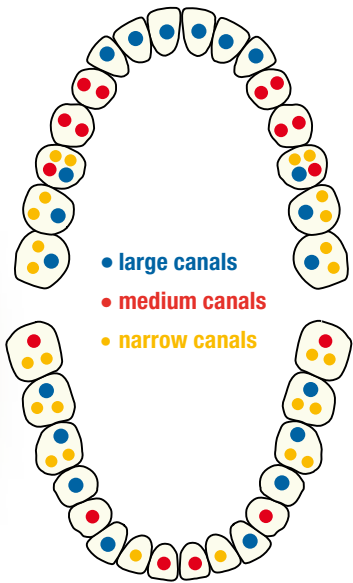
.02/20

.02/25

.02/30

.02/35










WL determination



FlexMaster® SystemBox

13. Instructions for Use

For safe and efficient operation of the FlexMaster® NiTi files the following instructions must be observed:

-  Always use the files in a rotating low-torque contra-angle. We recommend a torque controlled motor. VDW.SILVER® and VDW.GOLD® are endo motors programmed for FlexMaster® instruments (page 15).
-  Maintain a constant rotation between 250 and 350 rpm, from insertion of the file into the canal until removal. Do not start or stop instrument within the canal.
-  Clean and check the instrument for signs of damage before every use.
-  Exert only light pressure on the contra-angle. Allow the instrument to work with a filing action. Allow the instrument to work in the canal with 5-8 light up-and-down pumping motions for maximum 10 seconds.
-  Use a chelator and rinse the canal between instrument changes. The chelator (e.g. FileCare® EDTA) removes smear layer and improves the instrument's efficiency. Due to the foaming effect of FileCare® EDTA after contact with sodium hypochlorite, pulp tissue and dentin are actively flushed out of the canal.
-  FlexMaster® nickel-titanium instruments, just like every high quality instrument, can be sterilized in autoclave. Repeated sterilization does not affect the cutting efficiency or the physical properties of the instruments. The FlexMaster® SystemBox with perforated bottom is ideal for use in autoclave.
-  Prior to sterilization we recommend recording the use of each instrument according to the degree of canal curvature on the FlexMaster® Control Sticker. Use a permanent marker. In the case of complicated canal anatomy use a new instrument.
-  As with every new technique, practice with the FlexMaster® instruments in plastic blocks and extracted teeth to become familiar with them before using them on a patient.
-  The FlexMaster® technique allows root canal preparation in a very short time. The depth markings on the instrument shaft show the position of the instrument clearly on the x-ray, and you are able to identify the working length of the canal throughout the treatment.

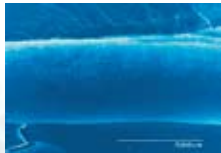
14. Resilience of FlexMaster®

FlexMaster® files have proven their torsional resistance and cutting efficiency in numerous tests. For example, fatigue resistance was measured according to ISO 3630-1, at 350 rpm, with a 5 mm deviation of the tip. Cutting efficiency was measured at five different working lengths at 350 rpm.

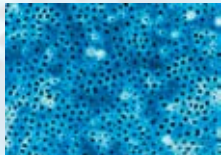
15. Clinical results

The FlexMaster® technique provides the best results in significantly less time.

SEM photographs by courtesy of Dr. Thomas Schwarze, Medical University Hannover, Germany



Coronal segment of root canal wall prepared with FlexMaster®
Magnification x60



Same segment, smear layer removed
Magnification x1000



Same segment, fragment of canal wall
Magnification x800



Canal wall, mid segment after preparation with FlexMaster®
Magnification x100



Apical segment of root canal wall prepared with FlexMaster® files, thin homogeneous smear layer
Magnification x500

16. References - scientific studies

“FlexMaster® is a promising, easy to use system, with clear, self-explanatory instrument sequences providing excellent clinical results.”

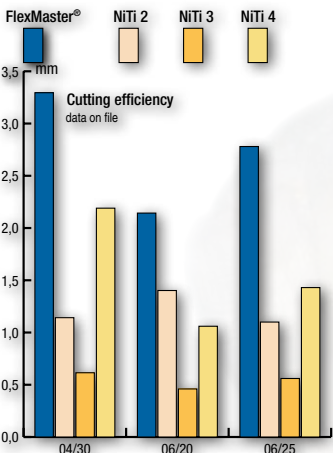
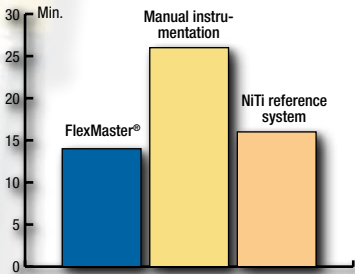
Prof. Michael Bauman, University of Cologne, Germany
Extract from Working with the FlexMaster® system, Endodontic Practice, June 2003



FlexMaster® and time saving

Weiger, University of Tübingen, 12/2000
Maschinelle Wurzelkanalaufbereitung mit vollrotierenden FlexMaster®-Instrumenten

Conclusion: Compared to a NiTi reference system and preparation with manual instruments FlexMaster® is the system that needs the least time for root canal preparation.



FlexMaster® shows the best cutting efficiency compared to other NiTi systems

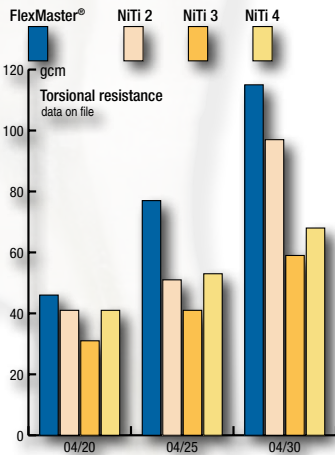
Schwarze/Ehrhardt, Med. School Hannover, 02/2001
Schneidleistung von FlexMaster® NiTi-Feilen im Vergleich zu anderen NiTi-Herstellern.

Conclusion: FlexMaster® instruments show best cutting efficiency compared to the other tested makes.

FlexMaster® shows the best torsional resistance compared to other NiTi-systems

Schwarze/Ehrhardt, Med. School Hannover, 02/2001
Bruchfestigkeit (Torsionsprüfung) von FlexMaster® NiTi-Feilen im Vergleich zu anderen NiTi-Herstellern.

Conclusion: FlexMaster® instruments show the best torsional resistance compared to other makes.



Further studies (excerpts)

Gressmann/Hülsmann, Universität Göttingen; Endodontie 10:227, 2001
Die maschinelle Aufbereitung mit FlexMaster®-Nickel-Titan-Instrumenten

Schäfer/Lohmann, Universität Münster; (1) Int Endod J 35:98 (2) Int Endod J 35:514, 2002
Efficiency of rotary nickel-titanium FlexMaster® instruments compared with stainless steel hand K-Flexofile.
Part 1: Shaping ability in simulated curved canals.
Part 2: Cleaning effectiveness and instrumentation results in severely curved root canals of extracted teeth.

Chanteaux/Baumann-Giedziella/Hellmich/Baumann, Köln; Int Endod J 35:99, 2001
Cleaning and shaping efficiency of FlexMaster® evaluated by SEM

17. All you need for your endodontic success



Sterile packed in blister cards of 6 pieces



Sterile packed in blister cards of 6 pieces

- Ref. 357 **FlexMaster® IntroFile** 19 mm, Taper .11, ISO 22
- Ref. 341 **FlexMaster® .02** instruments
ISO 15 (21, 25mm),
ISO 20, 25, 30, 35, 40, 45, 50, 60, 70 (21, 25, 31 mm)
Single sizes and assorted ISO 25-45
- Ref. 342 **FlexMaster® .04** instruments
ISO 15 (21, 25 mm),
ISO 20, 25, 30, (21, 25, 31 mm), single sizes
ISO 35, 40 (21, 25 mm), single sizes
- Ref. 343 **FlexMaster® .06** instruments
ISO 15, 20, 25, 30, 35, 40 (21, 25 mm), single sizes
- Ref. 344 **FlexMaster® .04 + .06** instruments
ISO 20, 25, 30 (21, 25 mm),
1 piece each taper .04 + .06 assorted



- Ref. 346 **BasicKit**
FlexMaster® instrument set 21 or 25 mm
+ IntroFile + fine K-file for probing



- Ref. 340 **FlexMaster® SystemBox**
for standard sequences
with transparent lid (autoclavable)



- Ref. 345 **FlexMaster® AccessoryBox**
for additional instrument sizes
with transparent lid (autoclavable)



- Ref. 445 **FlexMaster® CombiBox**
ideal for standard sequences and
additional instrument sizes
with black lid (autoclavable)



- Ref. 489 **FlexMaster® Control Stickers** for SystemBox

- Ref. 490 **FlexMaster® Control Stickers** for AccessoryBox



- Ref. 479 **LavEndo® Washbox**
for convenient disinfection of the
FlexMaster® instruments



- Ref. 1040 **FlexMaster® Starter Kit**
each 1 BasicKit 21 and 25 mm
1 SystemBox
2 x 3 ml FileCare®EDTA
3 plastic training blocks



- Ref. 1010 **FileCare®EDTA**
1010 000 002 pack with 2 x 3 ml
1010 000 005 pack with 5 x 3 ml



- Ref. 1103 **VDW.GOLD with small-head contra-angle 6:1**

Multifunctional endomotor with integrated apex locator and well-thought out functions. Individual settings for all major file systems are pre-programmed and can also be changed and saved, allowing the utmost flexibility.
Safety features such as torque control, acoustic signals and automatic stop / reverse etc. Additional programme for canals with difficult anatomy.
Battery operated, can even be used while charging.



- Ref. 1104 **VDW. GOLD + FlexMaster® StarterKit**
1 FlexMaster® BasicKit 21 and 25 mm
1 FlexMaster® SystemBox
3 plastic traing blocks
2 x 3 ml FileCare®EDTA
1 user manual



- Ref. 1079 **additional small-head contra-angle 6:1**



Ref. 1153 **VDW.SILVER® with small-head contra-angle 6:1**
Small, handy endo motor featuring an ergonomic life-style design. Excels in its intuitive menu navigation and its clearly structured menu. Operates with battery as well as with power supply. Torque and rotational speed values for both NiTi systems Mtwo® and FlexMaster® are preprogrammed. 'Doctor's choice' programme is able to memorize individual settings. Automatic reverse and acoustic warning signals when the device is in reverse rotation providing a safe feeling.



Ref. 1154 **VDW. SILVER® + FlexMaster® StarterKit**
1 FlexMaster® BasicKit 21 and 25 mm
1 FlexMaster® SystemBox
3 plastic traing blocks
2 x 3 ml FileCare® EDTA
1 user manual



Ref. 1079 **additional small-head contra-angle 6:1**



Ref. 0145 **Raypex®5 apex locator**
For precise and fast length determination. The true shape of curved canals often cannot be seen on a 2-dimensional X-ray. Raypex®5 gives the third dimension and shows the movement of the file in the entire root canal. The exact location of the apical constriction and the apical foramen are clearly indicated.

Information request

- | | |
|---|---|
| <input type="checkbox"/> Info VDW.GOLD® | <input type="checkbox"/> Info VDW.SILVER® |
| <input type="checkbox"/> Info Raypex®5 | <input type="checkbox"/> Info BeeFill® obturation devices |