

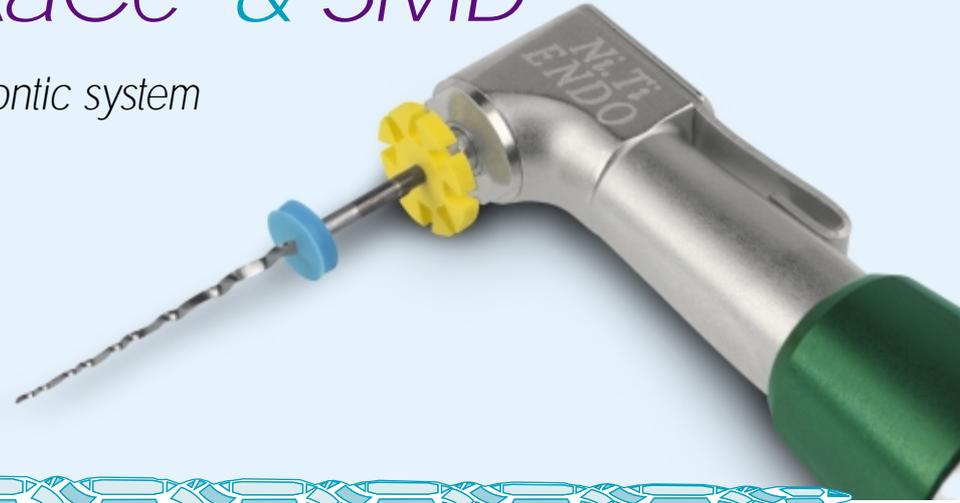


FKG DENTAIRE

Swiss Dental Products

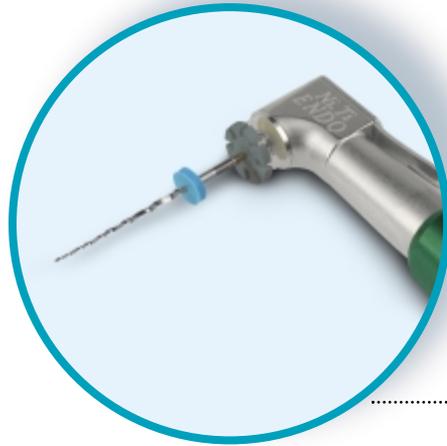
# FKG RaCe™ & SMD™ \*

Rotary endodontic system



\* Safety MemoDisc™

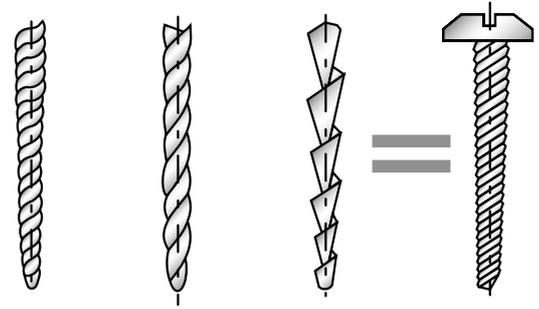
The safest, simplest and most efficient continuous rotation endodontic instruments.



## Rupture in continuous rotation

According to manufacturer's statistics, more than 90% of the cases of ruptured NiTi instruments, could be avoided by either:

- respecting the instructions for proper use
- mastering metal fatigue (provoked by the rapid succession of compressions and extensions of the instrument in a curved canal)



## Continuous rotation

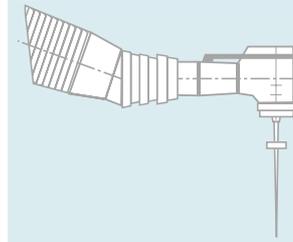
Avoid 9 ruptures out of 10

### From Stainless steel to NiTi

**W**ith the appearance of nickel-titanium alloys a few years ago, the domain of endodontic instrument production discovered a material which is flexible, extremely elastic, resistant and bio-compatible. Working in continuous rotation became possible, through which a simplicity of use and incomparable time savings were achieved.



Have a light hand!



300 - 600 rpm



The Safety MemoDisc™ (SMD™) offers perfect control over metal fatigue. With the FKG RaCe™ and the Safety MemoDisc™, FKG offers two unprecedented solutions, innovative and high-performance, which allow one to avoid 9 out of 10 ruptures.

### Screwing on/blocking in continuous rotation

**M**ost conventional reaming instruments (in stainless steel) are **designed like screws**, having one or more cutting helixes. Meant to be used for filing down (a longitudinal, back and forth movement), they all have **sharp edges**, which make them **very efficient for cutting**. When used in continuous rotation, one main inconvenience appears: the increased risk of **screwing on/blocking**, which inevitably ends up in the instrument fracturing.

In order to avoid the screwing on phenomenon, rotary endodontic instrument manufacturers have come up with two types of solutions:

1. a more or less important biting off of the cutting angles of the edges (**a+b**)
2. the introduction of a concentric indicator (radial side face) on the cutting edges (**c+d**)

These modifications have often proven themselves to be useless, even without taking into

consideration that they bring with them a **reduction of the cutting efficiency** and an **increase in the working couple** (which leads to the risk of rupture).



a



b



c



d

FKG RaCe™ distinguishes itself by having the lowest working torque on the market (attested to on trial runs), which permits one to use the entire working length of the instrument and to **avoid complications resulting from different conic alternations.**

Another advantage to this low working torque: FKG RaCe™ **does not require a limitation of the couple** proposed by certain motors. The operational protocol is therefore extremely simplified and the number of instruments necessary for reaming the canal is greatly reduced. From this, we obtain a certain security in using these instruments, comfortable working conditions as well as a precious saving of time.

The FKG RaCe™ instrumentation also gives **excellent results in the case of subsequent endodontic treatments.**

# FKG RaCe™

Ease in spite of difficulty



## The alternative

**FKG** opens up a new way with RACE (Reamer with Alternating Cutting Edges), a totally innovative system, safe and easy, developed to mitigate the limits which are imposed by continuous rotation.

Combining a triangular section with sharp edges and alternating cutting edges, the FKG RaCe™ instruments combine all of the determining ad-

vantages of endodontic practice:

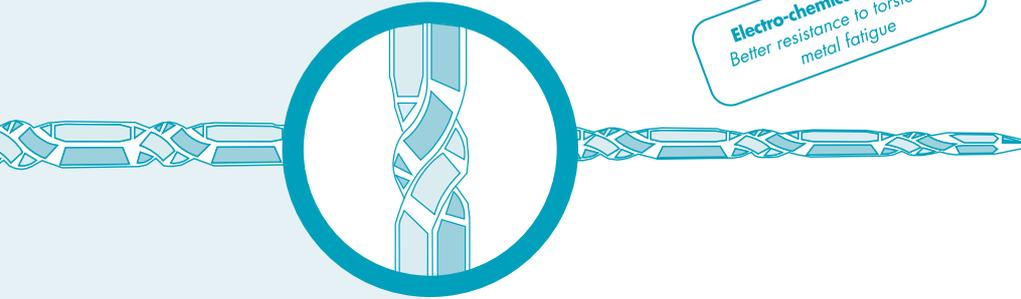
- The alternating cutting edges eliminate the screwing on/blocking and only leads to a weak working torque
- The sharp edges guarantee optimum cutting efficiency;
- The combination of a triangular section and alternating cutting edges ensures efficient evacuation of chips

and cutting debris

- The system is available in 2% taper (ISO standard) or 4, 6, 8 or 10%.
- The FKG safety tip ensures sure guidance/centering in the canal
- The reduction of the number of instruments necessary for the preparation of the canal provides comfort and saves time



Sharp Cutting Edges



Alternating Cutting Edges

**Electro-chemical treatment**  
Better resistance to torsion and metal fatigue



Magnification:

10 x



40 x



60 x



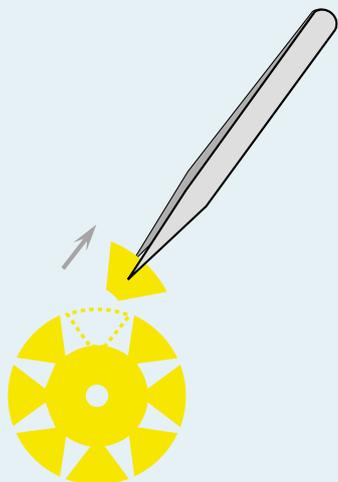
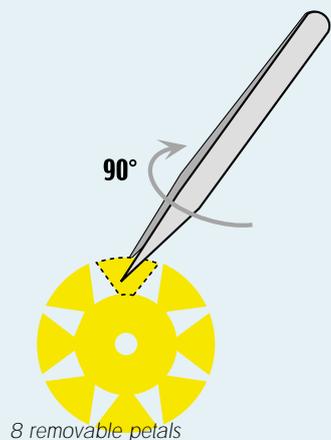
- The maintenance of a maximum dentine thickness increases the chances of long term success
- The trajectory of the original canal is respected thanks to the flexibility of NiTi to the 2% taper, to the design of the FKG *RaCe*™ instruments as well as to the safety tip guide
- Most instrument ruptures are

- avoided thanks to the Safety MemoDisc™ (SMD™)
  - The innovative design guarantees being able to work gently and maintains tactile sense
- FKG *RaCe*™ and FKG SMD™ are protected by international patents.

FKG Safety Tip



From now on, the practitioner is the master of his instruments... and not the opposite!



# SafetyMemoDisc™

Shape... and use memory

## Solutions for NiTi fatigue

In order to prevent metal fatigue, the most reliable method consists of **only using each instrument once**. This measure is not well adapted, since the fatigue suffered is different, depending upon the curve of the canal... Without taking into consideration the parameters which are inherent to the instrument itself: size, taper, working torque and rotation speed.

With the SMD™ (Safety Memo Disc), FKG proposes a pragmatic solution, reliable, efficient and extremely simple, in

order to prevent ruptures due to metal fatigue.

Taking into account all of the factors which intervene in endodontics, FKG has established a table according to the values obtained in the laboratory following fatigue tests.

Starting from a **maximum of 8 uses of an instrument n° 025 (conicity 2%) in a simple canal** (straight or very slightly curved), this table indicates the number of security points to deduct at each treatment in function with diverse parameters which influence metal fatigue (size and

taper of the instrument, complexity of the canal). The number which is obtained corresponds to the number of petals to pull off of the SMD™ which, fixed under the sleeve, accompanies the instrument until it is discarded.

# Mastering NiTi fatigue

## Putting into practice the SMD™ system

### 1. Preliminaries

Based on X-rays, determine the working length (WL).

### 2. Complexity of the canal

By superimposing the SMD™ gauge and the X-ray, look for the smallest radius in the canal. Based upon the obtained value, the canal will be classified in one of the three following categories:

Radius greater than 25 mm	= Simple canal
Radius between 11 mm and 25 mm	= Medium canal
Radius between 8 mm and 11 mm	= Difficult canal

### 3. SMD™ flange

Depending upon the chosen method of treatment and the degree of difficulty of the canal (simple, medium or difficult), the SMD™ decrementation table will indicate the number of petals required for carrying out the treatment.

1st case: the SMD™ flange has a sufficient number of petals and the treatment may be carried out

2nd case: the number or remaining petals is insufficient. The concerned instrument must be set aside for a simpler treatment, or discarded once all of the petals have been used. Either a new instrument or one with a sufficient number or petals must be chosen to treat the canal.



## What you must know

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- The flexibility of a NiTi instrument decreases in proportion to the increase of its conicity (an instrument n° 025 with an ISO conicity of 2% is more flexible than the same instrument with 4% conicity).
- The cutting effort (and therefore the working torque) increases in proportion to the increase in conicity.
- The NiTi alloy is very well tolerated by the human body. The nickel and titanium atoms are very solidly joined together by covalent links which impede the nickel from passing into the organism. In comparison, stainless steel has a greater quantity of free nickel atoms than the NiTi alloys.
- The smaller the curvature ray of the canal, the greater the increase in metal fatigue.
- The instrument's rotation speed does not have any influence on the metal fatigue, but does influence the rupture limit (this is reached 2 x faster at a rotation speed of 1000 rpm than at 500 rpm).



(Under study)

## What method to use?

### "Crown-down"? ... "Step-back"?... or another?

**M**ost continuous rotation endodontic systems currently available on the market are only adapted to the "crown-down" technique (this is in order to reduce the risk of screwing on/blocking/rupture).

On the contrary, the intrinsic qualities of the FKG RaCe™ instruments (previously described in this brochure) leave the prac-

itioner entirely free to choose the technique to use for each treatment, in function with the morphology of each canal and the desired working comfort.

With this in mind, FKG has put a complete set of RaCe™ instruments at the practitioner's disposal (generally 3 to 5 instruments suffice for the treatment of a canal).

## Golden rule! never force the way!

# FKG RaCe™ & SMD™ ... the 7 keys to success

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### 1. Working speeds *300 to 600 rpm*

Use a motor/contra-angle ensemble with the possibility to adjust the working speed. Otherwise have your apparatus calibrated. Modern motors offer more and more often the possibility to also adjust the working torque. This is an added security against certain kinds of manipulation errors. However, since the FKG RaCe™ instruments do not have the screwing on problem, a conventional apparatus is perfectly adequate.

### 2. Apical pressure *Extremely gentle*

In order to give a better idea of the recommended pressure, take into your hand an FKG instrument, for example RaCe.02 n° 025 (red ring), put the point into contact with a smooth surface, and form an angle of approximately 45° between the contact point and the instrument, then press just until the instrument begins to bend. The force used for this operation corresponds to the ideal apical pressure.

### 3. Noise *Overload warning*

A clacking of the instrument warns the practitioner that he or she is using too much apical pressure. Let the instrument work at its own speed.

### 4. Movement *Brief and quick back and forth movements*

Avoid all prolonged stationary rotation in a curved canal. Sooner or later, the phenomenon of metal fatigue will provoke the rupture of an instrument.

### 5. Progression *Never force the way!*

Avoid all forced passages. The safety tip ensures perfect guiding and centering of the instrument in the canal. If the instrument no longer advances, do not insist. Pull it out of the canal, recapitulate manually with the help of an ERGOFLEX™ H NiTi n° 10, then pick up the mechanical work again with the last FKG RaCe™ instrument used. The instruments FKG RaCe™ n° 015 and 020 can be very useful in narrow and complex canals.

### 6. Working time *5 to 10 seconds per instrument*

FKG RaCe™ instruments are characterized by their optimum cutting efficiency. This quality essentially allows one to shorten the working time and to therefore reduce metal fatigue.

### 7. Metal fatigue *FKG SMD™ method*

Thanks to the SMD™ decrementation discs, FKG is the sole company to offer a method of controlling metal fatigue that is at the same time simple and efficient. After having determined the level of complexity of the canal to be treated, the SMD™ allows one to simultaneously record the "life" of the instrument as well as to save this information (even when the instrument is mixed up with other tools) until it is finally discarded.

## Apprenticeship

FKG recommends that practitioners practice on blocks of resin which simulate a root of average complexity, and "in vitro" on teeth which have been extracted and x-rayed. By sacrificing a few instruments, the practitioner will come to know the rupture limits as well as certain movements to be avoided. These experiences will be very beneficial for future work "in vivo".

# RaCe™ & SMD™

Security in practice

## Preparation

**A**fter opening the pulpal chamber and localizing all of the canals (for example, with the help of FKG F-SEARCH instruments), the reaming of the canal may begin.

After determining the working length and estimating the morphology of the canal, the straight coronal part of the canal (first third/till first half, depending upon the case) will be splayed as much as possible in the direction of the apex, with the help of the FKG PRE-RaCe™.

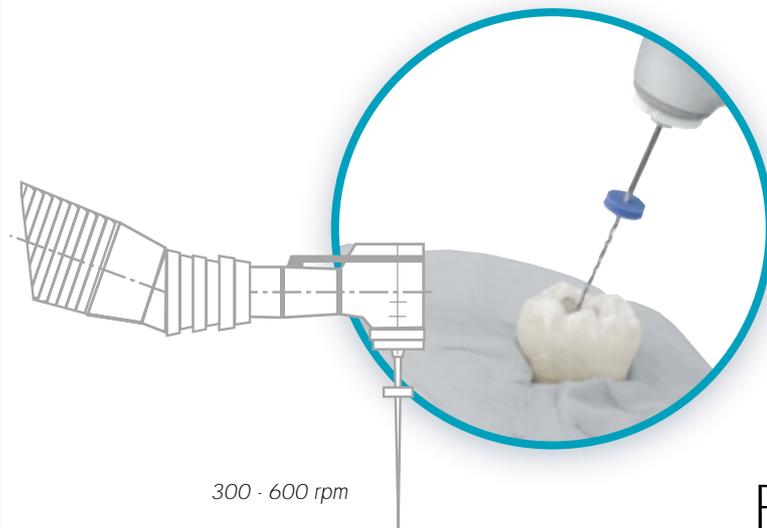
## Reaming

**T**he working length which has been previously determined will be transferred to the first FKG RaCe™, which will be conducted as quickly as possible to the desired position by **brief and very light pressure in a back and forth movement**. In every case, the ideal rotation speed is situated between 300 and 600 rpm.

The work time for each instrument is not to exceed 5 to 10 seconds. Never leave an instrument in stationary rotation in a curved canal but **always**

## Calcified or very narrow canals

For these very difficult cases, FKG recommends two RaCe™ instruments, the n° 015 and 020 in taper 2%. Thanks to square cross section, they offer increased resistance and allow one to successfully treat most difficult canals.



300 - 600 rpm



Have a light hand!

## Filling

**give it a back and forth movement.**

In the case where progress is difficult, **the practitioner must not try to force the passage.** A manual recapitulation with an FKG ERGOFLEX™ (H type, NiTi) will allow one to arrive at the end of the obstacle. The sequence may then pick up at the place where it was interrupted. The sequence will be continued until the desired ream is obtained. In most cases, complete execution of the canal reaming will require no

more than 2 to 5 instruments. Use of the SMD™ will ensure optimal security throughout the sequence.

**T**he preparation of the canal obtained with the continuous rotation (step back or crown-down) suits all standard types of filling. Be sure to use the "gutta-percha" cones with the same number as the final apical preparation.



(Under study)

Options:  
 Standard handle 15 mm = GM  
 Short handle 12 mm = CM  
 Instr. length 21 or 25 mm

	References	No ISO	Tapers	Cross-section	Instr. length/ working part (mm)	Metal	Available sequences		
							Step-back .06/.02	Step-back .06/.04	Crown-down .10-.04/.02
Pre-RaCe	01.710.19.040 GM	40	0.10	▲	19/9	NiTi			1 <sup>st</sup>
	01.790.19.040 GM	40	0.10	▲	19/9	AC			
	01.708.19.035 GM	35	0.08	▲	19/9	NiTi			2 <sup>nd</sup>
	01.788.19.035 GM	35	0.08	▲	19/9	AC			
	01.706.19.030 GM	30	0.06	▲	19/10	NiTi	1 <sup>st</sup>	1 <sup>st</sup>	3 <sup>rd</sup>
RaCe	01.706.19.040 GM	40	0.06	▲	19/10	NiTi		2 <sup>nd</sup>	
	01.706.25.020.GM	20	0.06	▲	19/10	NiTi			
	01.706.25.025.GM	25	0.06	▲	19/10	NiTi			
	01.706.25.030.GM	30	0.06	▲	19/10	NiTi			
	01.704.25.025 GM	25	0.04	▲	25/16	NiTi		3 <sup>rd</sup>	4 <sup>th</sup>
	01.704.25.030 GM	30	0.04	▲	25/16	NiTi		4 <sup>th</sup>	
	01.704.25.035 GM	35	0.04	▲	25/16	NiTi		5 <sup>th</sup>	
	01.702.25.015 GM	15	0.02	■	25/16	NiTi			
	01.702.25.020 GM	20	0.02	■	25/16	NiTi			
	01.702.25.025 GM	25	0.02	▲	25/16	NiTi	2 <sup>nd</sup>		5 <sup>th</sup>
	01.702.25.030 GM	30	0.02	▲	25/16	NiTi	3 <sup>rd</sup>		
	01.702.25.035 GM	35	0.02	▲	25/16	NiTi	4 <sup>th</sup>		
	01.702.25.040 GM	40	0.02	▲	25/16	NiTi	5 <sup>th</sup>		
	01.702.25.050 GM	50	0.02	▲	25/16	NiTi			
	01.702.25.060 GM	60	0.02	▲	25/16	NiTi	Total 5 instr.	Total 5 instr.	Total 5 instr.

## Sequences

RaCe.06/.02	01.720.25.S25 GM	30/25/30/35/40	.06/.02/.02/.02/.02
RaCe.06/.04	01.721.25.S25 GM	30/40/25/30/35	.06/.06/.04/.04/.04
RaCe.10-.04/.02	01.722.25.S40 GM	40/35/30/25/25	.10/.08/.06/.04/.02
RaCe.10-.04/.02	01.723.25.S40 GM	40/35/30/25/25	.10/.08/.06/.04/.02

NiTi  
 NiTi  
 NiTi  
 AC/NiTi

# Accessories, training supports and kits

## Accessories

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Catheterization: ERGOFLEX™ H NiTi n° 010 or K NiTi n° 015

Application of the filling paste: automatic disengaging paste packer SENSIPAST

Filling: Gutta Percha points normalized for FKG *RaCe*™ .02 (the FKG *RaCe*™ .04 and .06 require an adapted taper)\*

Research of the canal orifice(s): F-SEARCH

Work sequence support: *RaCe*™ & SMD™ support\*

Decrementation flange: Safety *MemoDisc*™ (color code of the tapers)

Delimitation of the working length: endodontic stops (color code indicating the length of the instrument)

Distribution/adaptation of the endo-stops to the working length: STOP DISPENSER/STOP CARTRIDGE

Determination of the canal's curve rayon: SMD™ rayon gauges

Estimation of the instrument's fatigue level: SMD™ decrement table

Checking/calibrating the rotation speed of the counter-angle:\*

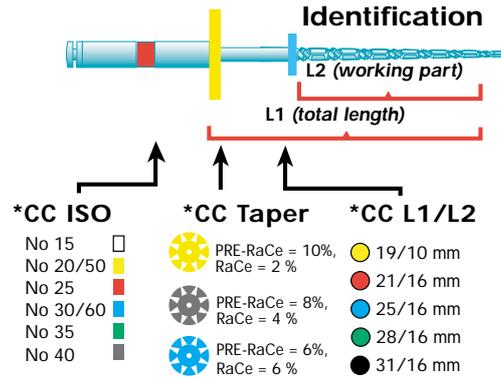
\* under study

## A pioneer of mechanized canal reaming

**FKG** figures today among the pioneers of mechanized canal treatment thanks to many years of experience in this domain. FKG collaborated in the fine tuning of stainless steel instruments used in most oscillating movement systems such as Canal Finder or Canal Leader 2000.

**T**he practical knowledge and the technological advances accumulated by FKG over the years have been determining factors for approaching the new era in endodontics: continuous rotation treatment.

# PRE-RaCe™ and RaCe™ instruments

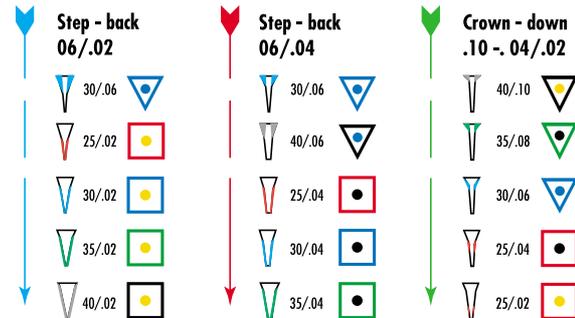


## Synoptical table

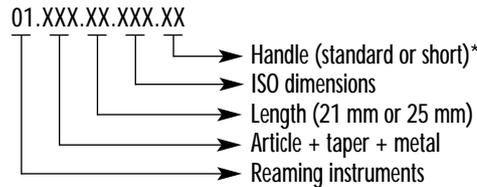
ISO

Taper	15	20	25	30	35	40	50	60
PRE-RaCe™ & SMD™					▲	▲		
				▲	▲	▲		
RaCe™ & SMD™	●	●	●	●	●	●	●	●
	●	●	●	●	●	●	●	●
	●	●	●	●	●	●	●	●

## Available sequences



## References

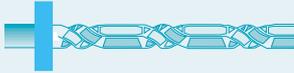


\* standard: 15 mm (ref. GM)  
short: 12 mm (ref. CM)

# FKG *RaCe*<sup>™</sup> & SMD<sup>™</sup>

## Exclusively FKG

*RaCe*<sup>™</sup> = Reamer with Alternated Cutting Edges



Resolves all of the screwing on/blocking problems  
One of the lowest working couples  
Cutting efficiency maintained at 100%  
Maximum reduction of the number of instruments  
Excellent debris evacuation  
Respects the morphology of the canal thanks to the "step-back" method  
Maximum flexibility (weak taper of instruments: 2%)  
Applicability of the "crown-down" method  
Treatment of calcified or narrow canals (ISO dimensions n° 015 and 020 with 2% taper)

SMD<sup>™</sup> = **S**afety **M**emo **D**isc  
(sterilizable SMD<sup>™</sup> decrement flange)



Mastering of NiTi fatigue by using a radius gauge, as well as a decrementation table and flange  
Optimal use of instruments by checking the parameters which influence NiTi fatigue  
Presence of the SMD flange on the instrument right up until its final destruction.  
Preservation of the instrument's past history even when mixed up with other tools.  
Indication of the taper of the instrument via color codes.

FKG safety tip



Excellent centering-guiding in the canal  
Decreased risk of perforation and deviation

Endodontic stops



Presented in factory series  
Color codes of the instrument's length and its active part

FKG finish  
(NiTi surface condition)

Reduction of starting points of ruptures due to grinding  
Elimination of manufacturing residue (burrs)  
Improved instrument appearance

## A story of teeth... and gears

**E**stablished in the heart of the Jura mountains, a region with a long tradition of precision and micro-technical expertise, FKG was founded in 1931 by the association of a dental technician and a precision mechanic who had been working in the watch making industry.

**F**rom its early beginnings, the enterprise chose to develop in two realms which seem to have nothing in common – other than perhaps a certain taste for

precision- the watch making sector (watch face applications) and dentistry (instruments and other products).

With time, FKG specialized in instruments for preparing the canal, as well as in various products such as matrices and endodontic implants. Several interesting inventions came along to crown all these years of research and development, giving FKG its current international status.



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... safer!  
... easier!  
... more efficient!



FKG *RaCe*<sup>TM</sup> & *SMD*<sup>TM</sup>

*Rotary endodontic system*