

# FactFile

## X-Smart® Pro+ Endo Motor with Integrated Apex Locator

This Fact File focusses on the **X-Smart® Pro+ Endo Motor with Integrated Apex Locator** as a new and enhanced endodontic motor.

### X-Smart® Pro+ Endo Motor with Integrated Apex Locator

X-Smart® Pro+ is the latest motor in the Dentsply Sirona endo motor family, offering numerous technical and clinical improvements. It can run the most demanding NiTi endodontics instruments, delivering up to 7.5 N.cm torque and 100 to 3,000 rpm rotation speed. It offers classical reciprocating and rotary motions, with a preset instrument library for WaveOne® Gold, ProTaper Ultimate™ and TruNatomy® solutions, but also other customizable instruments sequences, and is compatible with future Dentsply Sirona instrument sequences. Its patented Dynamic Accuracy™ Technology allows a 360° speed and torque feedback, enabling (i) quicker reaction time for stable file settings, and (ii) a precise working length determination while actively shaping, without the need of a file clip, thanks to its integrated apex locator. In terms of ergonomics, an easy navigation with gloved hand is possible thanks to its large touchscreen and streamline workflow. The miniature contra angle head with integrated LED improves visibility for easier location of canal entries. Moreover, the handpiece sheath and contra-angle are fully autoclavable, not requiring anymore single-use sleeves. Its battery can support a full day of work and, if needed, can be recharged in less than 1,5 h, even during a treatment.

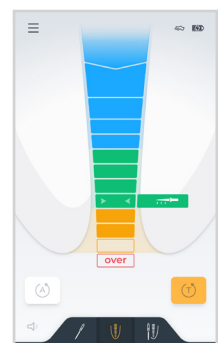
Figure 1



Figure 1: X-Smart® Pro+ Endo Motor with Integrated Apex Locator and X-Smart® Pro without integrated apex locator.

Figure 2: Display of the root canal depth, the **blue region** corresponds to the coronal/medial section, the **green region** corresponds to the apical region (before the mid-apical region), the **orange section** corresponds to the apical region (beyond the mid-apical region). The last orange level, before the red, corresponds to the apical foramen. **"OVER" in red**, is beyond the apex.

Figure 2



## In vitro data

### Movement stability

When shaping a canal, mechanized NiTi instruments encounter mechanical resistance, which can be further increased due to canal complex morphology, pulp stones, etc. that can affect their performance, limiting their optimal speed and predictability. Thus, the stabilization time of 8 endodontics motors, including X-Smart® Pro+, was compared in continuous rotation up to 400 rpm and 5 Ncm torque, using a bench test with a brake system [1]. When brake jumps of 1 Ncm, 3 Ncm and 5 Ncm were applied (mimicking mechanical resistance encountered in canals), X-Smart® Pro+ was able to recover its initial rotation speed in less than 0.04 s, in average, compared to other motors already on the market requiring more time.

### Stabilization Time for Optimal Settings

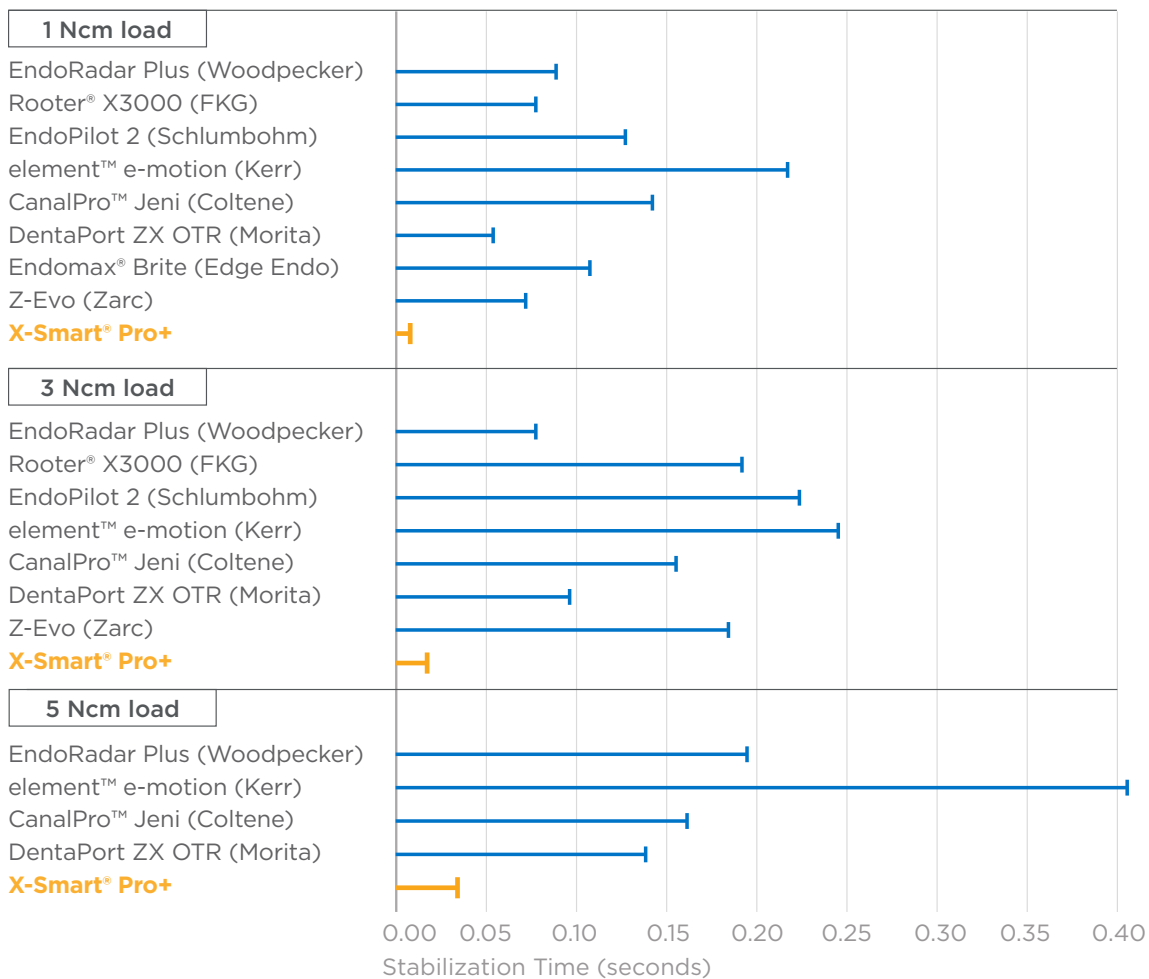


Figure 3: Stabilization time of motors after a brake jump of 1 N.cm, 3 N.cm and 5 N.cm, at 400 rpm. Note: In the test, X-SmartPro+ showed the smallest average values for speed recovery. EndoRadar Plus (Woodpecker), Rooter® X3000 (FKG), EndoPilot 2 (Schlumbohm), element e-motion (Kerr), CanalPro™ Jeni (Coltene), DentaPort ZX OTR (Morita), Endomax® Brite (Edge Endo), and Z-Evo (Zarc) are not registered trademarks of Dentsply Sirona Inc.

## Time to working length [2]

Time to working length was determined, in vitro on plastic endoblocks, in both rotary and reciprocating motions using ProTaper Ultimate™ F1 and WaveOne® Gold Primary instruments, respectively. In the test, X-Smart Pro+ showed the smallest average values for time to apex, with less than 9 s on average to shape a canal to the apical foramen in rotary motion, and less than 13 s on average recorded in reciprocating motion (see figures 4 and 5 below). Moreover, when used with X-Smart® Pro+ endo motor, none of the shaped endoblocks showed any signs of canal transportation, defect creation, and none of the used instruments broke or unwinded.

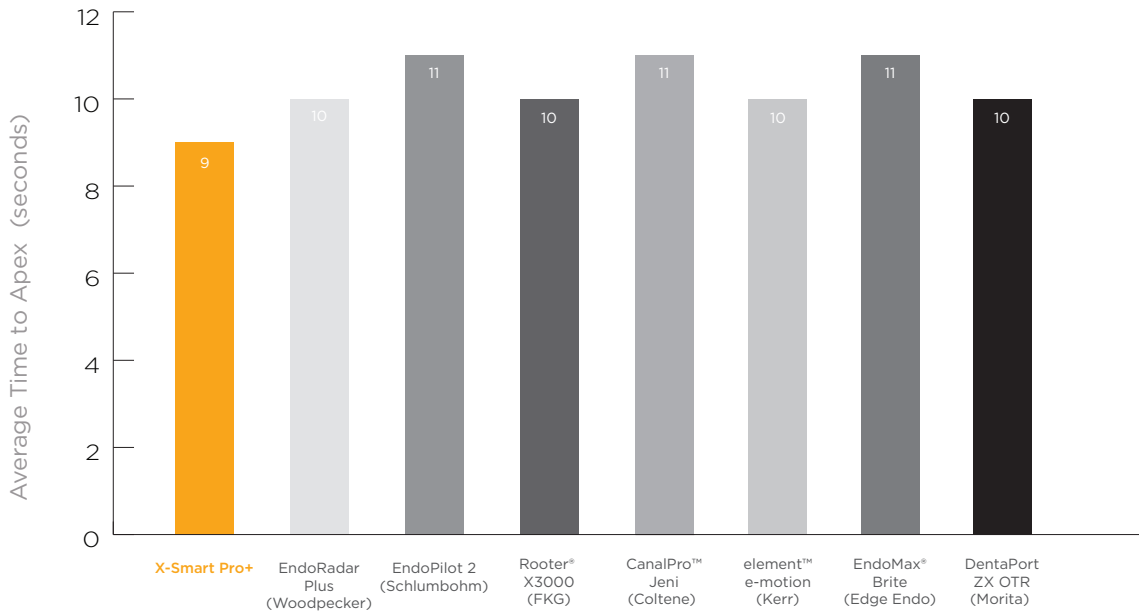


Figure 4: Shaping time in J endoblocks, for all evaluated motors, in rotary motion (400 rpm), with F1 ProTaper Ultimate™ instrument (n = 5). EndoRadar Plus (Woodpecker), EndoPilot 2 (Schlumbohm), Router® X3000 (FKG), CanalPro™ Jeni (Coltene), element e-motion (Kerr), Endomax® Brite (Edge Endo), and DentaPort ZX OTR (Morita) are not registered trademarks of Dentsply Sirona Inc.

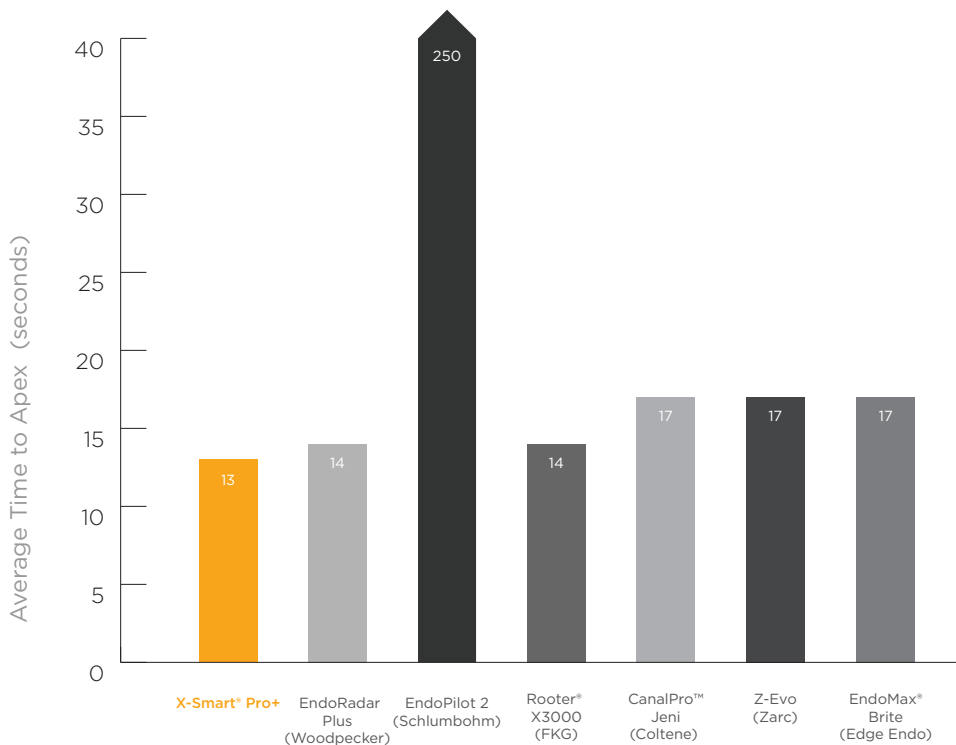


Figure 5: Shaping time in J endoblocks, for all evaluated motors, in reciprocating motion, with WaveOne® Gold Primary instrument (n = 10). EndoRadar Plus (Woodpecker), EndoPilot 2 (Schlumbohm), Router® X3000 (FKG), CanalPro™ Jeni (Coltene), Z-Evo (Zarc), and Endomax® Brite (Edge Endo) are not registered trademarks of Dentsply Sirona Inc.

## Apex locator performance

The working length tends to shorten with canal preparation, as the enlarged canal provides a more straight path to the apical foramen [3]. Thus, endodontic motors with integrated apex locator, such as X-Smart® Pro+ endo motor, make the treatment more efficient as they can continuously monitor the apical limit during the shaping of the canals [4].

Apex location accuracy of X-Smart® Pro+ endo motor was tested in vitro in both rotary and reciprocation motions, using an endo-training block immersed in a 0.9% saline solution. Its performance was compared to a standard manual K-file (with a file clip) and with other motors already available in the market. WaveOne® Gold instrument, considered as a worse case with its plastic ABS ring on the shank which could disrupt the electrical contact, was selected for the shaping in reciprocating motion [5].

X-Smart® Pro+ endo motor showed a very consistent and precise apex location, compared to other evaluated motors, with only 1% location difference ( $\pm 0.02$  mm difference) compared to a manual K-file reading, in either rotary or reciprocating motions. Thus, the motions of X-Smart® Pro+ endo motor and the presence of an ABS ring on the shank of WaveOne® Gold instruments, do not affect its apex location accuracy.



Figure 6: Bench test for the evaluation of the integrated apex location (without file clip).

## Clinical Experience

A user study was conducted with 8 dentists who treated in total more than 250 patients, in their daily practices, with the X-Smart® Pro+ tabletop motor.<sup>6</sup>

100% of the participants perceived the X-Smart® Pro+ endo motor as having the most comprehensive range of speed and torque compared to other endodontic motors. Clinical factors and design features such as an intuitive interface, a 360° rotating contra-angle, and an integrated LED were identified as key benefits. All dentists strongly agreed that the Dynamic Accuracy® Technology gives confidence for working length determination while shaping. Moreover, they all assent that molars can be easily accessed and that the treatment is easier with patients with limited mouth opening thanks to the mini contra-angle head and the LED.

## Conclusion

**X-Smart® Pro+ Endo Motor with Integrated Apex Locator** could be your motor of choice to ensure a thorough root canal preparation, thanks to its highly stable motion, easy maintenance, better ergonomics and Dynamic Accuracy™ Technology allowing accurate direct length determination while shaping in either rotary or reciprocating motions.

### References:

1. Data on file: test lab: 1000-TF\_6\_TR\_001192[0] D3778 Hippo Test Report Motor Stability
2. Data on file: test lab: 1000-TF\_6\_TR\_001193[0] D3778 Hippo Test Report Safety and efficiency
3. Vasconcelos BC, Bastos LM, Oliveira AS, Bernardes RA, Duarte MAH, Vivacqua-Gomes N, et al. Changes in root canal length determined during mechanical preparation stages and their relationship with the accuracy of root ZX II. J Endod. 2016;42:1683-6.
4. Cruz ATG, Wichnieski C, Carneiro E, da Silva Neto UX, Gambarini G, Piasecki L. Accuracy of 2 endodontic rotary motors with integrated apex locator. J Endod. 2017;43:1716-9.
5. Data on file: test lab: 1000-TF\_6\_TR\_001194[0] D3778 Hippo Test Report Apex Locator
6. Data on file: User evaluation



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