

## Intuitive, safe, gentle

DentaPort Set OTR: New function “Optimum Torque Reverse” offers treatment safety for all patients

**Modern mechanical preparation systems offer a high degree of safety in endodontic procedures. What’s new on the market is the OTR function (Optimum Torque Reverse) that Morita has integrated in their measuring and preparation system DentaPort ZX. This function ensures additional safety and reduces file breakage to a minimum. At the same time, it offers advantages as regards efficiency and time needed for the preparation. Bearing these points in mind, the working principle of OTR is explained in the following report.**

The modular endodontic system DentaPort ZX has been successful on the market for more than ten years. The third generation of one of the accessory components – the root canal preparation motor DentaPort TriAuto ZX – has been available since IDS 2015. For one, the new module DentaPort TriAuto OTR already looks different than its predecessor: for example, the contra angle (smaller head for better access to the molars) has been improved and it has been equipped with an internal file electrode that allows more working length and, like the contra angle, ensures a better view of the area being treated. For another, DentaPort ZX Set OTR – as suggested by the product name – distinguishes itself by the integrated OTR function (Optimum Torque Reverse) (Fig. 1).

### **OTR – a new generation of safety functions**

In order to understand how canal enlargement works with OTR, we would like to look at the principle of today’s preparation methods: during mechanical preparation, the endodontic motor ensures constant speed and a defined torque, which means that the torque acting on the file during the procedure is limited. This is important because the files are subject to considerable mechanical stress: This stress arises because mechanical influences – as, for example, the friction

resistance – constantly act on the file while it is rotating in the canal. Since this resistance acts in opposition to the drive torque of the endodontic motor, the file becomes twisted and may break.

Reciprocal preparation technique reduces the risk of potential file breakage in modern endodontics – with this method the file is moved alternately clockwise and counter-clockwise at specified angles [1] instead of one complete rotation. State-of-the-art endodontic motors operate below critical torque values, amongst others with such safety functions as Auto Torque Reverse, which were realized for the first time worldwide in Morita's TriAuto ZX root-canal treatment system: the file automatically reverses and rotates counter-clockwise when too much pressure is applied (torque-provoked reversal of rotation); thus, the risk of instrument fracture is reduced. This mode of operation is based on the principle that the torque acting on the file is measured, in other words, only the actual pressure being applied on the file is important – contrary to the simple periodic movements of the permanent reciprocal method. The new OTR function developed by Morita is based on a similar principle, yet it is an absolute innovation in the field of mechanical preparation: in contrast to the devices available up to now, OTR only requires a very small angular rotation of the file to measure the actual pressure. Therefore, the dentist can work with optimal angles of rotation – both in the cutting direction and in the reverse direction of the file. This ensures high cutting effectiveness because the file rotates continuously in the cutting direction and only changes to "Torque Reverse" when the preset torque is reached. In this way, a half rotation (180°) in the cutting direction and a quarter rotation (90°) in the non-cutting direction are possible with nickel-titanium files without risking torsion or fracture.

### **Canal enlargement with OTR: This is how it works**

In practice, dentists set the required torque in the "Torque Settings" before the treatment. Afterwards they insert the file mounted in the contra angle into the root canal and the motor starts rotating the file automatically in the cutting direction by means of the automatic "Start/Stop" function (as soon as the file is withdrawn the rotation is stopped automatically again by the "Start/Stop" function). When the file is inserted and "started" in the root canal it rotates 180° until it reaches the torque set in the "Torque Setting". Up until then it rotates continuously and progresses at optimal speed. When the preset torque is reached, the "Torque Reverse" is

activated: In order to relieve the pressure being applied, the file reverses rotation by 90° before rotating in the cutting direction again and continuing to rotate 180°. This is one special feature of OTR because, depending on the preset torque value, the file can go into “Torque Reverse” after 180° rotation.

Stated concisely: When low pressure is being applied, the file automatically rotates in the cutting direction (in rotations of 180°). However, as soon as the preset torque value is reached, the file changes its direction of rotation – then the file reverses rotation by 90° to disengage itself (Fig. 2). Another special feature of the OTR function is that the torque is automatically measured during the 90° reverse rotation. If the torque measured in this instance still is too high, the file continues the reverse rotation once beyond 90 degrees in the non-cutting direction until it is in a safe condition – only then will it automatically continue to rotate in the cutting direction again.

According to studies conducted by the manufacturer, about 70% of the canal preparation can be undertaken with a continuously rotating file with the OTR function, with the file rotating alternately for only about 30% of the preparation. Therefore, the OTR function also optimizes the time needed for the procedure, since the file predominantly is driven in the cutting direction and debris is hauled out in a coronal direction. The well-known irrigation protocol also is retained with OTR: it goes without saying that disinfection has been a central element of root-canal treatment since Schilder published his concept of the triad for endodontic therapy [2]. In view of the high cutting effectiveness, OTR requires only comparably moderate speeds (between 100 and 500 rpm) and very low drive torque; and this, in turn, reduces the pressure applied on and wear of the files. In the reciprocal method, a torque value of about 400 gcm is assumed, with Auto Torque Reverse this value is about 100 gcm and with the OTR function it is about 20 to 40 gcm. This affects how the file works in strongly curved canals: experience has shown that the friction resistance increases only negligibly at the beginning of curvatures during root-canal preparation. Nonetheless, with the OTR function, this already causes a reversal of rotation since the tip of the file comes into intensive contact with the canal wall as it enters a curve and OTR works with very low torque values. After the pressure on the file is relieved by reverse rotation, the file continues to cut

cyclically. This results in a gentle up-and-down motion of the file as well as a good shape of the canal – and, moreover, it reduces undesired zipping.

### Conclusion

As discussed above, the new OTR function offers more safety in endodontic treatments: the file rotates continuously until the torque value defined at the beginning of the treatment is reached. However, as soon as the pressure on the file continuously exceeds the preset value, the “Torque Reverse” is activated – and the file reverses rotation by 90°. The risk of file breakage is minimized by this permanent control of the torque. In addition, the duration of the treatment is shortened since fewer file changes are necessary, the files predominantly rotate in the cutting direction, and the debris is removed in a coronal direction. So, OTR effectively optimizes any existing safety functions, and helps dentists complete successful endodontic procedures.

### References:

1. Yared G.: Canal preparation using only one Ni-Ti rotary instrument: preliminary observations. *Int Endod J.* 2008 Apr;41(4): 339-344
2. Schilder H.: Cleaning and shaping the root canal. *Dent. Clin. North Am* 1974 Apr; 18(2): 269-296



Fig. 1: DentaPort ZX Set with OTR function (Source: Morita)

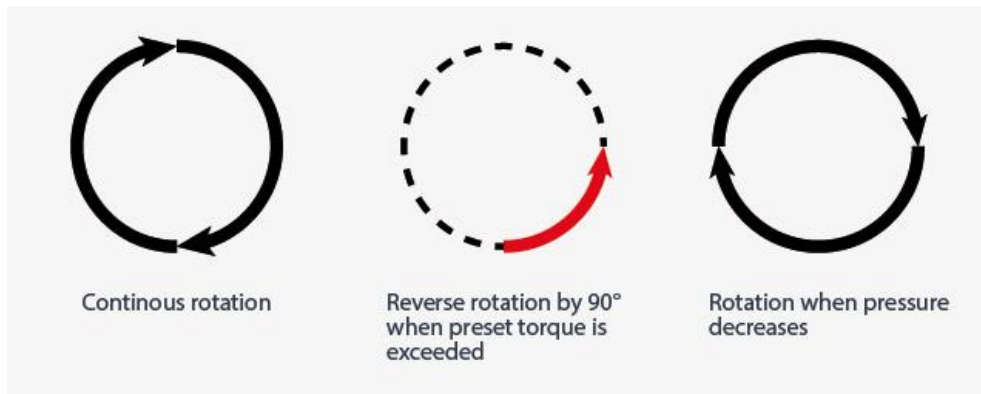


Fig. 2 Safe root canal preparation with the new OTR function (Source: Morita)