

USE OF RUNNING COMPUTER AND STRIDE SENSOR IN 12-HOUR HALL RUN COMPETITION.

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K-citymarket 12-hour running competition was held in February 11th, 2007 in Lohja, Finland. Measurements were done in 3 male runners before and during the race. The mean age (\pm SD) of the group was 46,0(6,1) years, body weight 66,4(4,6) kg, height 177,8(6,1) cm and body mass index 21,0(1,1) kg/m². The aim of this study was to investigate the feasibility and accuracy of Polar RS800sd Running Computer and WearLink® textile transmitter in long-lasting running competition and to validate Polar s3 stride sensor™ W.I.N.D. speed, running cadence (RC), stride length (SL) and distance measurements during the race.

The s3 sensor was calibrated before the race on 1000 meter distance. The running competition took place in an indoor parking hall on 200 meter long concrete covered track. During the race the runners did change their running direction every 2 hours. Temperature during the competition was 12 °C. Heart rate (HR), speed, RC, SL and distance measurements were evaluated at 2 hours intervals. Figure 1 Official and Polar s3 stride sensor measurements every 2 hour laps.

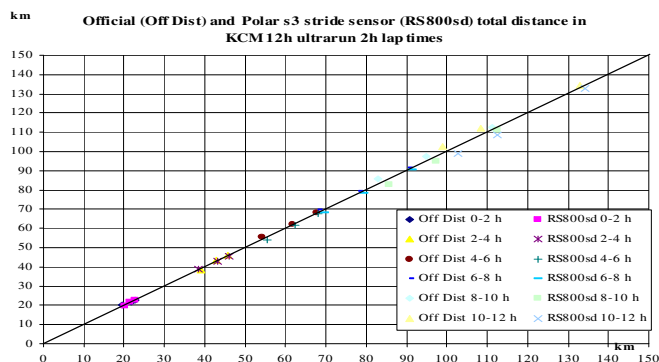


Fig 1 Scattering and line measurements of distance every 2 hour laps.

The group mean (\pm SD) of maximal oxygen uptake predicted with Polar Fitness Test with RS800sd before the race was 53,8 (7,8) ml/kg/min, the resting HR 58(6) bpm and the predicted maximum HR 174(4) bpm. The mean HR (% maximum HR) during the 12-hours race was 84,3 % (148 bpm). Both the HR as well as running velocity did decline during the race linearly from 89,4% (145bpm) to 81,6% (140bpm) and 10,5 km/h to 9,8 km/h, respectively. The mean speed did also decline from 5,18 min/km to 6,06 min/km.

Compared to the values taken at 0-2 h to those taken at 10-12 hours RC did decline -1,1 % (from 90 to 89 rpm) and SL did decline -9,4 % (from 102 cm to 93 cm).

The group mean of official distance achieved during the race was 113,440 km (range 98,991-132,876 km) and the distance measured by Polar s3 was 116,470km (range 102,717-134,344 km). The winner of the race did run 146,296 km. The mean difference in the distances was 2,7% (3,026 km). Statistically the distances did not differ ($r= 0,996$ $p< 0,001$). Figure 2 presents data of one male runner as an example.

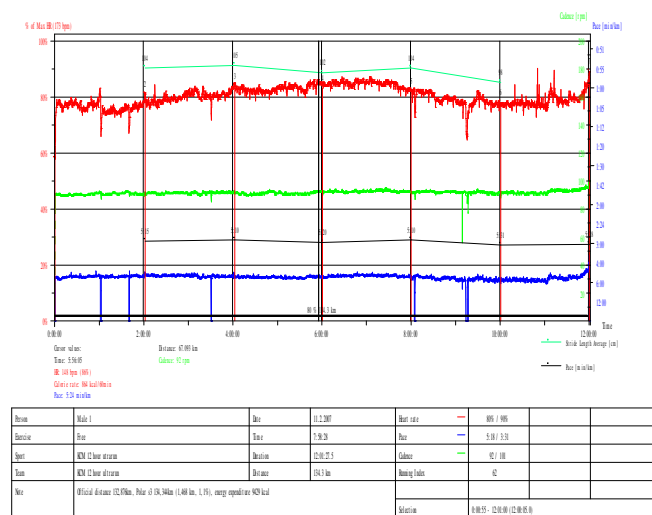


Fig 2 Heart rate, running cadence, stride length and speed during competition in one male runner.

In 2 hours lap times the mean error in the running distance measurement by Polar s3 compared to the official distance was 3,5% (range 0,7-5,6%) corresponding to 0,636km (0,149-0,990km) with high agreement ($r= 0,990$ $p< 0,01$).

Distances measured by Polar s3-sensor were longer than official running distances. This difference is explained by the fact that movements during the running brakes (e.g. eating and toilet-visit) are included into Polar distance figures.

According to the subjects the s3 sensor was easy to calibrate, unnoticeable to wear and did not disturb running. The transmitter was evaluated to be comfortable and it did not cause any skin abrasions.

Based on the study we conclude that the Polar RS800sd Running Computer and its s3 stride sensor™ W.I.N.D. accessory are feasible and valid to be used in ultra-long running performance.