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ENERGY CONSUMPTION OF SMALL ELECTRIC SCOTERS XIAOMI M365 PRO IN CITY CONDITIONS¹⁰

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***Abstract:** This report presents the results of a road test of the Xiaomi m365 Pro electric scooter for individual transport. During the experiment, results were obtained for distance traveled, average speed and energy consumption.*

***Keywords:** electric scooter, energy consumption, field experiment*

INTRODUCTION

Using an electric scooter for urban driving is gaining popularity. It can be considered as an option to switch from conventional road transport to using an individual electric vehicle. It makes it possible to avoid heavy traffic in cities where there are cycling infrastructure.

A sufficient amount of scientific information is needed to make a realistic assessment of the electricity consumption of scooters. So far, there are such studies that have been conducted in real traffic conditions in urban areas. But each has been conducted under different specific conditions and their results do not overlap, as urban traffic is quite intense – accompanied by many stop-and-go operations.

STATEMENT

Electric vehicles have not yet reached sufficient popularity among consumers. There is a lot of published research, but the results are not always clear-cut as they depend on many factors. Therefore, each experiment conducted afterwards adds to our idea of the actual energy consumption in specific conditions, and the results obtained give a rough idea of what is possible.

Object of study

Xiaomi m365 Pro electric scooter was chosen as the object of the study.

It has the following specifications:

- weight: 14,2 kg;
- maximum rider weight 100 kg, and height 120 to 200 cm
- maximum speed: 25 km/h;
- battery: 10 Ah;
- battery voltage: 42 V;
- battery charging time: 5 h;
- range per charge: up to 45 km;

¹⁰ The report was presented to the section "Natural, Mathematical, and Technical Sciences" at the 63rd Scientific Conference of the University of Ruse "Angel Kanchev" and the Union of Scientists in Ruse on October 18, 2024, with its original title in Bulgarian: КОНСУМАЦИЯ НА МАЛЪК ЕЛЕКТРИЧЕСКИ СКУТЕР ХИАОМИ М365 ПРО В ГРАДСКИ УСЛОВИЯ

- wheel diameter: 0,216 m;
- up to 15° of inclination;
- obstacle clearance up to 1 cm;
- Motor power: brushless, 300 W.

Figure 1 shows the general appearance of Xiaomi m365 Pro electric scooter.



Figure 1. General view of Xiaomi m365 Pro electric scooter

Experimental study conditions

Before conducting the experiment, the braking and lighting systems were checked for correctness. The electric battery was charged to 100 %. The driver was equipped with a reflective vest. During the experiment, the air temperature was 25°C and there was an easterly wind of 2 m/sec.

Study methodology

The test vehicle shall be located at the beginning of the measurement section of route. The driver drives off along the pre-set route, complying with the road traffic law – with lights on and giving the necessary signals when manoeuvring. At the end of the route, record the indications from the measuring equipment. The measurement is repeated three times.

Route description

The selected route is part of a cycle path in the Danube Park of the city of Silistra (Figure 2). It has a total route length of 0,95 km (in one direction).

The cycle path is two-way, separated by appropriate signage. As it is in the park recreation area for citizens, where many of the visitors are mothers with children, in order to ensure safe traffic, it must be at a safe speed.



Figure 2. Route with a total length of 0,95 km

Study results

Table 1 shows the experimental results of the Xiaomi m365 Pro electric scooter. The total time was 19 min. The average travel speed is about 18 km/h, and the electricity consumption for the whole distance (5700 m) is about 95,2 Wh, or about 16,7 Wh/km.

Table 1. Results of the energy consumption study

MEASUREMENT	E, Wh
1	33,4
2	30,6
3	31,2
TOTAL	95,2

If we compare the results obtained from a experiment of two similar electric scooters (iScooter E9 PRO – about 12 Wh/km and Xiaomi Essential Electric Scooter – about 13 Wh/km), it is clear that the energy consumption is significantly higher – by more than 20 %. Explanation of this is that during the experiment, the speed often changes due to other users on the cycle path as well as pedestrians crossing.

CONCLUSIONS

1. The distance covered on the route is 5,7 km in 19 min, average speed about 18 km/h.
2. The energy consumption of the electric battery is about 95,2 Wh for the whole distance, and about 16,7 Wh/km.
3. It is possible to drive approximately 25 km with one battery charge under similar driving conditions.

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