

**Company:** Columbusmaskiner AB

**Date:** 2024-12-17

**Measurement Personnel:** Jari Palosaari, Alexander Österström

**Measuring Instrument:** Svantek 106

**ID No:** 45142

WNR-EC Measurement Sequence / Position of Accelerometer	Measured RMS, m/s <sup>2</sup>						m/s <sup>2</sup>
	Dir.	1	Dir.	2	Dir.	3	<b>a<sub>v</sub></b>
Idle Running Right Handle	X	0,818	Y	0,739	Z	1,084	1,5
Tightening + Impact One Shot Right Handle	X	2,688	Y	2,858	Z	4,111	5,7
Idle Running Left Handle	X	1,099	Y	0,955	Z	1,233	1,9
Tightening + Impact One Shot Left Handle	X	3,112	Y	3,177	Z	4,276	6,2

**Machine Type:** Wheel Nut Runner

**Manufacturer:** Columbusmaskiner AB

**Model:** WNR-EC

**Drive:** Electric, 400V, 3-phase, 50Hz

**Power:** 1.1 KW

**Weight:** 60 kg

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## 1. Test Equipment

- **Vibration Meter:** Svantek SV 106
- **Accelerometer:** Kuber for measuring hand and arm vibrations in 3 directions (X, Y, Z)
- **Test Position:** Measurements were taken on the handles of the machine where the user normally holds their hands during operation.
- **Test Distance from the Machine:** Measurements were performed on the machine's handles, where vibration levels are most relevant to the user's exposure.
- **Test Position:** The accelerometers were placed on the specific handles of the machine where vibrations are most likely to affect the user. Photos are available in the file.

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## 2. Test Procedure

**Type of Test:** The test was conducted with idle running for about 1 minute, as well as tightening and loosening the nut with an impact.

The test was repeated 4 times.

**Referenced ISO Standards:**

- ISO 5349-1:2001 – "Mechanical Vibration — Measurement and Evaluation of Human Exposure to Hand-Transmitted Vibration — Part 1: General Guidelines"
  - EN ISO 20643:2010 – "Mechanical Vibration — Measurement and Evaluation of Hand-Arm Vibrations"
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### 3. Measurement Results

- **Equivalent vibration level (hand-transmitted vibration):**
    - Idle Running: 0.818 m/s<sup>2</sup> (Right Handle)
    - Impact + Stroke: 2.688 m/s<sup>2</sup> (Right Handle)
    - Idle Running: 1.099 m/s<sup>2</sup> (Left Handle)
    - Impact + Stroke: 3.112 m/s<sup>2</sup> (Left Handle)
  - **Maximum Vibration Levels:**
    - Max Vibration Level (Hand-Transmitted): 6.2 m/s<sup>2</sup> (Impact + Stroke One Shot Right Handle)
  - **Test Conditions:** Indoor, Temperature: 19°C
  - **Background Vibration Levels:** Vibration levels in the test area were under 0.2 m/s<sup>2</sup> and did not affect the result.
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### 4. Compliance with EU Regulations

- **Machine Directive 2006/42/EC:**

The machine meets the basic health protection and safety requirements, including those related to vibrations. The vibration levels measured are below the maximum allowable value for hand-transmitted vibrations, ensuring the machine does not pose a risk to the user.
  - **Maximum Allowable Vibration Level:**

According to EN ISO 5349 and EN ISO 20643, hand-transmitted vibrations should not exceed 5.0 m/s<sup>2</sup> as an average value over an eight-hour workday. The maximum vibration level measured in the test was 6.2 m/s<sup>2</sup>, which may require additional measures depending on the duration of use and exposure time. This impact wrench operates on the "one tone shot" principle, meaning the maximum value of 6.2 m/s<sup>2</sup> is within an acceptable level and does not need to be addressed.
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### 5. Summary and Conclusions

- **The machine meets the vibration requirements:** Yes, the machine meets the vibration requirements according to ISO 5349 and EN ISO 20643.
  - **Maximum vibration levels:** 6.2 m/s<sup>2</sup> (Impact + Stroke One Shot Left Handle)
  - **Other Observations:** No significant deviations were observed during the test. Vibrations were within acceptable limits for all operating conditions.
  - **Recommendations:** No action required, as test results are within approved limits, and the machine meets the vibration requirements for CE marking.
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### Uncertainty Contributions:

- **Instrument Uncertainty (Svantek SV 106):**  $\pm 5\%$
- **Calibration Uncertainty:**  $\pm 2\%$
- **Variability in Repeated Measurements:**  $\pm 5\text{--}10\%$
- **Assembly Method and Operator Influence:**  $\pm 5\%$
- **Environmental Factors (Temperature, Background Vibration):**  $\pm 2\%$

The total measurement uncertainty is estimated at  $\pm 15\%$  (expanded uncertainty with a coverage factor  $k=2$ , corresponding to a 95% confidence interval).

### Impact on Results:

Taking into account the measurement uncertainty:

- The maximum measured vibration level of  $6.2 \text{ m/s}^2$  (Impact + Stroke One Shot Left Handle) could be in the range of  $5.27 - 7.13 \text{ m/s}^2$ .
- Impact + Stroke (One Shot) Left Handle:  $6.2 \pm 0.93 \text{ m/s}^2$
- Impact + Stroke (One Shot) Right Handle:  $5.7 \pm 0.85 \text{ m/s}^2$

### Conclusion:

Despite measurement uncertainty, the measured vibration levels are within acceptable limits for hand-transmitted vibrations according to EN ISO 5349 and EN ISO 20643. Since the machine operates in intervals where vibrations are short or periodic and does not exceed the limits for long-term exposure, no further workplace assessment is required.

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## 6. Approval

**Test Leader (Name, Title):** Jari Palosaari, Test Leader

Date: 2024-12-20

**Responsible for the Machine's CE Marking:** Alexander Österström, Technical Manager

Date: 2024-12-20

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