OIML Member State Czech Republic	**OIML Certificate No.** R134/2006-A-CZ1-2023.01

OIML CERTIFICATE ISSUED UNDER SCHEME A

OIML Issuing Authority

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Czech Republic
Person responsible: Jan Kalandra

Applicant

Name: CAMEA Technology, a.s.
Address: Karásek 2290/1m
621 00 Brno
Czech Republic

Manufacturer

Name: CAMEA, spol. s r.o.
Address: Karásek 2290/1m
621 00 Brno
Czech Republic

Identification of the certified type *(the detailed characteristics will be defined in the additional pages)*

Automatic instruments for weighing road vehicles in motion and measuring axle loads
type: CAMEA WIM System UnicamWIM

Designation of the module *(not applicable)*

This OIML Certificate attests the conformity of the above identified type (represented by the sample(s) identified in the OIML type evaluation report) with the requirements of the following Recommendation of the International Organization of Legal Metrology (OIML):

OIML R 134, Edition: 2006

This OIML Certificate relates only to metrological and technical characteristics of the type of measuring instrument covered by the relevant OIML Recommendation identified above.

This OIML Certificate does not bestow any form of legal international approval.

The conformity was established by the results of tests and examinations provided in the associated reports:

- OIML type evaluation report No. 0511-ER-W016-23 dated May 15, 2023 that includes 8 pages
- Test report No. 6052-PT-Z0004-23 dated May 15,2023 that includes 89 pages including annexes.

The technical documentation relating to the identified type is contained in documentation file:

0511-UL-W016-23

OIML Certificate History

Revision No.	Date	Description of the modification
-	17 May 2023	Issuing of Certificate

The OIML Issuing Authority
RNDr. Pavel Klenovský
Head of Certification Body

Date: 17 May 2023

Important note: Apart from the mention of the Certificate's reference number and the name of the OIML Member State in which the Certificate is issued, partial quotation of the Certificate and of the associated OIML type evaluation report(s) is not permitted, although either may be reproduced in full.

1 Characteristics of the instrument

Automatic weighing instrument having a load receptor carried out by sensors and aprons that determines the vehicle mass parameters.

2 Main metrological characteristics

Accuracy Class for Vehicle Mass	10
Accuracy Class for Axle Load	F
Scale Interval, d	100 kg
Maximum Capacity Axle Load, Max	30.000 kg
Maximum Capacity Vehicle Mass	100.000 kg
Minimum Capacity Axle Load, Min	500 kg
Minimum Capacity Vehicle Mass	1000 kg
Minimum Operating Speed	20 km/h 5 km/h [1])
Maximum Operating Speed	120 km/h 140 km/h [2])
Temperature Range	-40 to 80 °C (road sensors) -40 to 70 °C (datalogger) [3])
Number of Sensor Rows	3, 4 [4])

[1]) In-motion tests (initial verification, subsequent verification, in-service inspection) must cover a speed range of 5 to 20 km/h.
[2]) In-motion tests (initial verification, subsequent verification, in-service inspection) must cover a speed range of 120 to 140 km/h.
[3]) The temperature range may be extended if datalogger installed in airconditioned cabinet.
[4]) 3 rows of transverse sensors or 2 rows of transverse sensors combined with 1 row of tilted sensors, 4 rows of transverse sensors or 3 rows of transverse sensors combined with 1 row of tilted sensors.

3 Composition of the instrument - measuring system

- Measurement unit for data collection, digitalization and processing,
- vehicle presence detector (inductive loops or an external detector),
- load (weighing) sensors installed in the road,
- tilted sensors for vehicle position measurement which can be also used for weighing,
- interfaces for auxiliary devices and additional road sensors,
- evaluation unit (computer, external or integrated inside the measurement unit) with installed software and recording equipment.

The system enables integration with additional vehicle identification equipment such as ANPR/LPR cameras, overview cameras, video systems and others. The system also enables integration with additional auxiliary devices and systems such as external vehicle detectors, dimension measurement systems, informative variable message signs, surveillance systems and others.

3.1 Load/Weighing sensors

Piezoelectric load sensors from manufacturer Kistler of type series LINEAS or sensors from manufacturer CAMEA of type series US-PQ are used within the measuring system.

Model	Type	Manufacturer
LINEAS	9195…	KISTLER Instrumente AG, Eulachstrasse 22, Postfach, CH−8408 Winterthur
US-PQ	US-PQ…	CAMEA, spol. s r. o., Karásek 2290/1m, 621 00 Brno-Řečkovice, Czech Republic

3.2 Measurement unit UC-ZPU - data collection, processing and digitization

The UC-ZPU unit is of modular design and allows the use of different types of input and output boards and thus the connection of different combinations and types of sensors and devices. The number and type of inputs of this unit is variable.

Basic types of input and output boards:
- UB-DIO - IO signal board.
- UB-IND - inductive loop input board.
- UB-PRS - charge input board.
- UB-LCS - strain gauge input board.

During the measurement, the system detects the presence of the vehicle, measures the dynamic forces on the tires as a function of time and calculates the values of the total weight and the load on the axle or group of axles. The data from the measurement unit is processed and evaluated by the installed software.

The principle of measuring the weight on the quartz crystal sensors is the conversion of the load on the sensor into a charge Q. The area of the generated charge pulse is directly proportional to the measured weight at a given vehicle speed.

3.3 Software equipment

3.3.1 General software equipment security

The software equipment under metrological control complies with the following general characteristics:

a) Access is allowed only to an authorized person using codes (keyword) that are changeable.
b) All interventions of the operator or the superior control system are automatically stored in the memory (intervention/audit log), stating the date and time of the intervention, identification of the authorized person performing the intervention and the type of intervention.
c) When the memory capacity for storing intervention records is exhausted, no stored records are deleted automatically.
d) The relevant intervention records may be retrieved in full.
e) Deletion of intervention records is not permitted to any person other than the authorized person.
f) Downloading software under metrological control is only possible via an appropriate protected interface.
g) The software version identification number is attached to the software and changes in the event of any change in the software.
h) Functions that are performed or initiated via the software interface meet the requirements and conditions of the OIML R134-1 (2006).

3.3.2 Wimer application

The Wimer application is the software performing vehicle identification and separation, speed and weight measurement. The software is divided into two parts. The separate legally relevant part and the remaining legally irrelevant parts of the application which may be subject to changes (updates).

The software is identified as follows: Wimer 2.xxx.081. The first part is a number (2) indicates the main version of the software, the second part consists of three digits (xxx) that identify the legally irrelevant version that may be subject to change and the third part consists of three digits (081) that identify the version of the legally relevant part. Identification of the legally relevant part of the application is shown in the following table:

Version	Binary File	Checksum (MD5)
081	WIMCore.dll	710185a9a5b6c300b4df0ac58eeb3b55

The software is unambiguously identifiable by the version listed in the header of the GUI window. Any change in the software will result in a change in the version number. The change of the legal part is reflected in the last three digits, while the change of the other parts in the previous three digits.

The system performs checksum checks at startup. The checksums are performed separately on the binary file of the legally relevant part and separately on the binary file of the legally irrelevant parts of the application. Identification of both parts of the application and both checksums are listed in the application GUI.

The state of the installed software instance (main binaries, settings file, the audit log and users) is protected against accidental or intentional changes using a HMAC SHA256 checksum. Any change in the checksums of the legally relevant part or of the legally irrelevant parts of the application is recorded in the intervention records (audit log). Any unauthorized change causes the application to block the measurement operation.

The software can be additionally equipped with an electronic seal in order to prevent changes during the verification validity period. The electronic seal is implemented using a HW security token. If the software cannot find the token, i.e., the token is not present, user login is not possible. The token provides a form of a two-factor authentication.

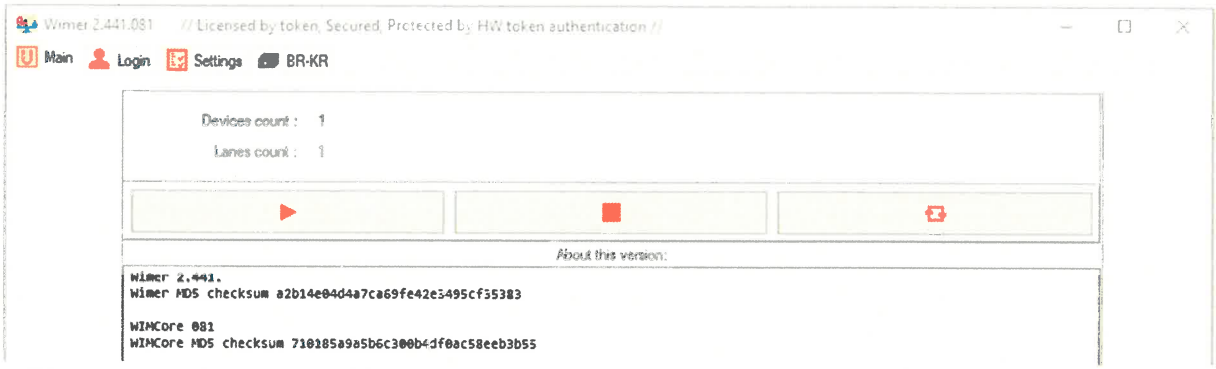

Figure 1 - Software identification and checksums available from the Wimer application GUI

The software is equipped with measurement result validation. The software measures each passing vehicle and then validates the signal and measurement results. The validation result is a part of the measurement result. Invalid records cannot be used for legally relevant purposes.

3.3.3 VIOLATOR software module

The VIOLATOR software module provides functions needed for creating an electronic output document. The software combines visual data with the measurement results and compiles sequentially numbered electronic documents in a proprietary .offence format. The electronic documents are signed by a private key using the RSA2048 SHA256 method.

The software module also provides a function for exporting the electronic documents in .offence format to the .xml format, which is then signed using the xmldsig RSA2048 SHA256 method and a private key. These exported electronic documents can be moved to the storage and processing location using various interfaces (based on the configuration).

The VIOLATOR software module is hosted by modular hosting application. The hosting application provides interaction with systems for visual identification and additional auxiliary devices and systems. Both the hosting application and the VIOLATOR software module are secured by the Authenticode method (digital signature codesigning by a certificate with a checksum of the signed data using an SHA256 algorithm). The configuration is protected by the HMAC SHA256 hash.