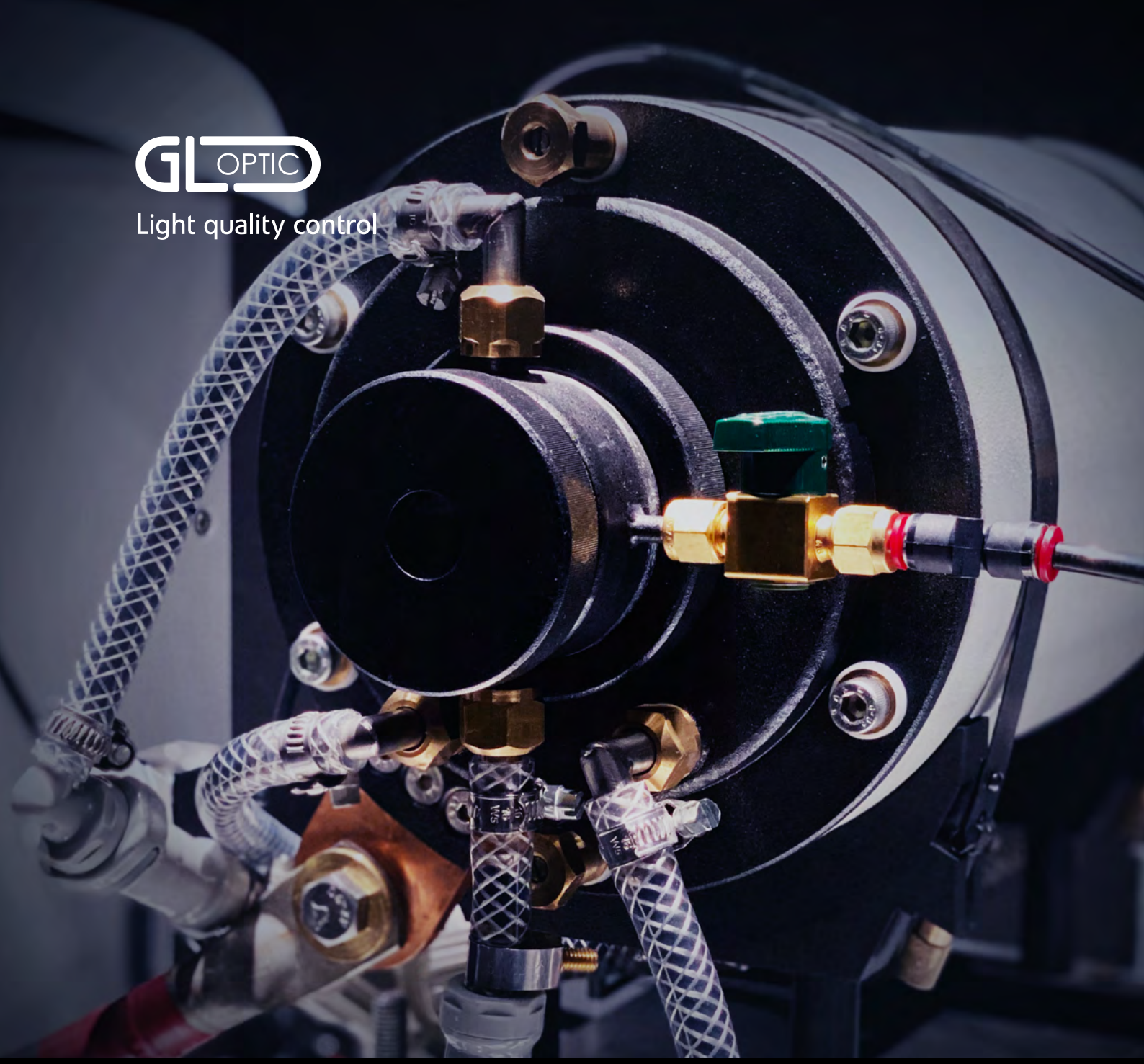


Calibration and Research Laboratory of Optical Radiation (CARLO)

Andrzej Rybczynski
Software Developer

GL OPTIC

office@gloptic.com
www.gloptic.com

The need for metrology services

Instrument calibration is one of the primary processes used to maintain measuring device accuracy. As defined by the International Bureau of Weights and Measures (BIMP), calibration establishes a relation between the quantity values of the standard and the corresponding indications of the calibrated instrument or secondary standard. Both sides of this relation are characterized by associated uncertainties.

In optical measurements metrology calibration is used to compare the values delivered by a device under test with those of a calibration standard of known accuracy. A calibration standard may be replaced with another measurement device of known accuracy or a light source emitting known quantities of optical radiation under measurement. To improve the quality of calibration and have the results accepted by outside organizations it is desirable for the calibration and subsequent measurements to be "traceable" to the internationally defined measurement units.

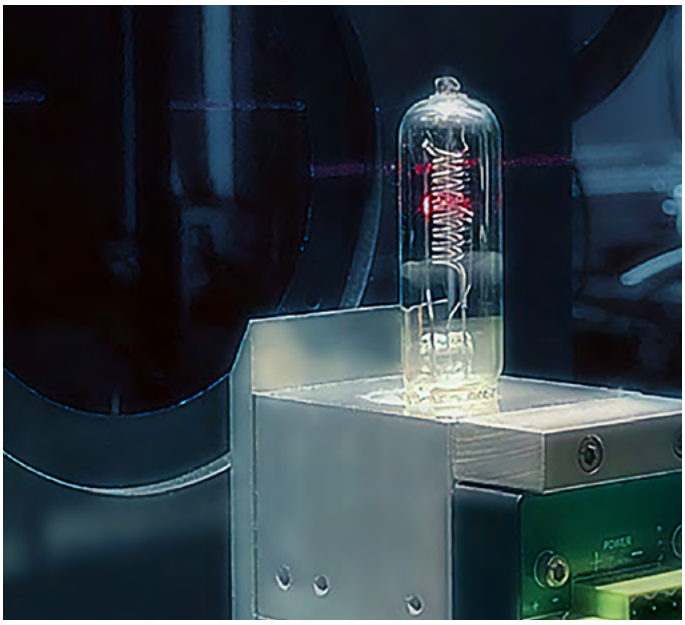
National laboratories are a response to the increased need for known accuracy and uncertainty of measurements, and the need to have consistent and comparable standards . Many countries have National Metrology Institutes (NMI) which maintain primary standards of measurement. Establishing traceability to these standards is accomplished by a formal comparison to a standard which is directly or indirectly related to the primary standard. These services may be offered by the national standards laboratories operated by the government or by private firms offering metrology services.

GL CALIBRATION STAND

Calibration may be required for the following reasons:

- a new instrument is put on the market
- an instrument has been repaired or modified and needs to be calibrated
- a specified time of valid calibration has elapsed
- when the operation time (operating hours) specified by the manufacturer has elapsed
- before and/or after a critical measurement
- after an event, for example after an instrument has been exposed to a shock, vibration, or physical damage, which might potentially have compromised the integrity of its calibration
- whenever observations appear questionable or instrument indications do not match the output of surrogate instruments
- as specified by requirements, e.g., customer specification and/or instrument manufacturer recommendation.

"Through the mutual recognition of National Standards (to which measurements are traceable) and of the accreditation bodies within different countries, customers are able to make an informed decision when comparing products and services even when they come from different countries"



GL OPTIC REFERENCE STANDARD

The most important factor which determines the quality of metrology services offered by a laboratory is uncertainty of the calibration standard used. The calibration standards are organized in the following hierarchy.

- Primary standards – according to ISO/Guide 30:2015 a primary standard is a standard that is designated or widely acknowledged as having the highest metrological qualities and whose value is accepted without reference to other standards of the same quantity,
- Secondary reference standards – a measurement standard whose property value is assigned by comparison with a primary measurement standard of the same property or quantity. These standards are very close approximations of primary reference standards.
- Working standards – standards and certified reference materials used in commerce and industry, which can be characterized by a traceable relationship to the secondary and primary standards.

The organizations maintaining primary standards provide scientific and industrial laboratories with calibration services and with working standards and/or certification so they can provide certified traceability to national standards.

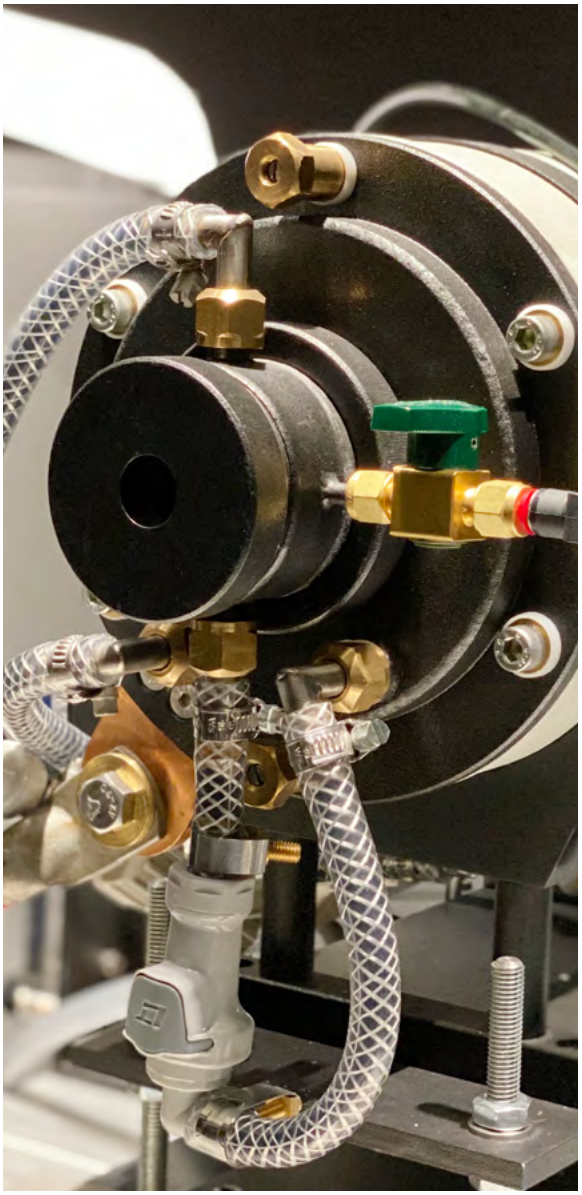
Calibration and Research Laboratory of Optical Radiation (CARLO)

The main idea behind the establishment of a new optical calibration laboratory by GL Optic is to increase precision and reduce uncertainty of both manufactured instruments and standards, and to offer the highest level of metrological services to the industry and other laboratories. To achieve this level of excellence, it is necessary to base the calibration process on the highest quality optical radiation standard, with the lowest possible uncertainty. The heart of new spectral calibration facility is the high temperature blackbody model working in the temperature range of 2500-3200 K. The use of the same primary optical radiation standard as is used by the leading national metrology institutes (NIST, PTB, NPL, KRISS and others) opens the way to provide calibration consistent with that provided by these institutions, while at the same time allowing for the maximum reduction of the comparison chain and improvement of achieved uncertainty. GL Optic is the first private company in the world which can perform calibrations based on this type of primary standard of optical radiation.

The laboratory is equipped with installations allowing measurements and calibration of all important aspects.

Calibration is performed on specialized stands:

- A wavelength calibration stand – calibration is performed with the help of Hg-Ar low pressure lamp producing Mercury and Argon lines from 253-1700 nm.
- A detector linearity calibration stand based on 7 m long optical bench. The stand allows for verification of detector response in a wide dynamic range.
- Spectroradiometer straylight can be measured and compensation profile calculated with the dedicated stand based on the set of narrow bandpass filters.
- Spectral calibrations of secondary reference standards and working standards are made on the optical comparator, where high temperature black body is used as primary standard. The comparison is performed by means of high quality double monochromator.



The calibration procedures performed on these stands address all important elements which can affect the uncertainty of manufactured devices, such as the proper wavelength mapping, detector linearity , straylight compensation and absolute calibration based on highest grade reference standards. The declared uncertainty of manufactured spectroradiometers is expected to be at the level of 2%. Improved straylight compensation and detector linearity calibration will lead to improved evaluation of low signals, especially in the ultraviolet part of the spectrum. It will contribute to the development of new instruments with improved specifications.

The metrological services offered by the laboratory will improve the availability of high quality optical radiation standards on the market and will help improve the quality of measurements performed in industry laboratories.

Contact us:

POLAND

GL OPTIC Polska Sp. z o.o. Sp.k
ul. Poznańska 70, 62-040 Puszczykowo
Poland

Phone: +48 61 819 40 03
E-mail: office@gloptic.com
www.gloptic.com

See more