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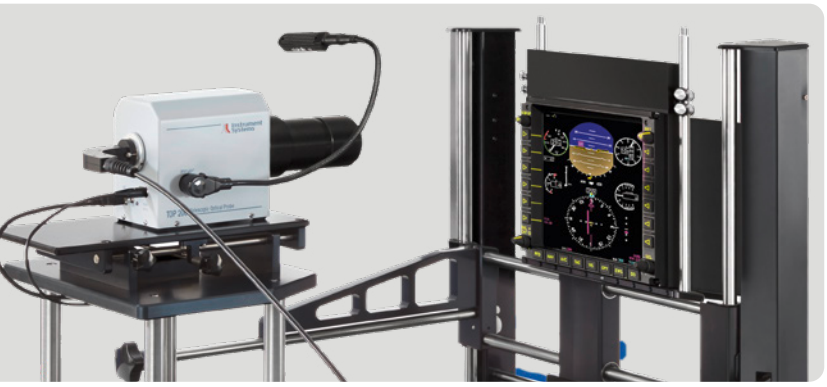
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SYSTEMS & SOLUTIONS

NVIS Measurement Solutions for Military and Civil Aviation





NVIS Testing
Compliant with
MIL-L-85762A
MIL-STD-3009
SAE AS 5452B

Instrument Systems
KONICA MINOLTA Group

01 \\ NVIS Testing: Safety and Standards

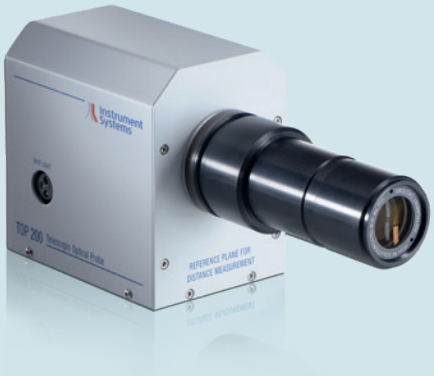
Any light source used with night vision goggles must be designed and – where applicable – certified to ensure safe night-time operation. In NVIS (Night Vision Imaging System) applications, incompatible lighting can degrade image quality, reduce contrast, or impair the operator's situational awareness.

Compliance with the military standards **MIL-L-85762A** and **MIL-STD-3009**, as well as the civil standard **SAE AS 5452B**, ensures compatibility with night vision goggles and prevents glare or image degradation.

Originally developed for military and search-and-rescue aviation, NVIS-certified lighting is now widely used in civil aviation and maritime applications. Typical use cases include police operations, medical evacuations (medevac), and specialized cargo missions – any scenario where reliable night-time visibility is crucial.



02 \\ Our Turnkey Solution: NVIS Testing System



TOP optical probe

- Perfectly round, sharp measurement spot using an optimized Pritchard-style optical system
- Convenient focusing via internal view-finder camera
- Wide selection of lenses for a broad range of measuring-spot sizes and working distances
- Software selectable measuring-spot sizes
- Flexible fiber connection with patented mode mixer for accurate measurements

The TOP 150 and TOP 200 optical probes are calibrated using a spectroradiometer. The TOP 200 features a motorized aperture wheel with six selectable apertures for radiance and luminance measurements on a device under test (DUT). A range of interchangeable lenses supports different DUT geometries and fields of view.

An integrated viewfinder camera enables precise positioning of the measurement spot on the DUT, such as a display. When the aperture is closed, a reticle and a transparent spot are projected onto the sample to assist with alignment. Once an aperture is selected, the exact measurement spot is visible in the viewfinder.

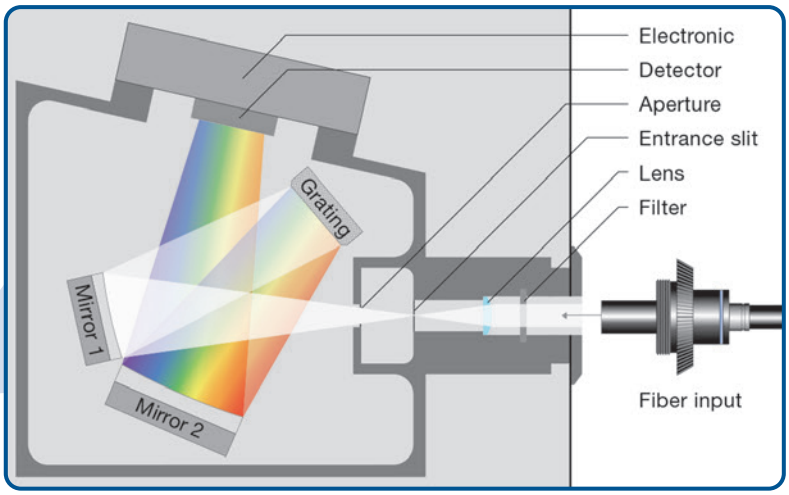
The mode mixing fiber, which connects the TOP 200 optical probe to the spectroradiometer, homogenizes the modal distribution within the measurement spot, making the measurement largely insensitive to fiber positioning. With the mode mixer, measurement error remains below 1 %; without it, errors can reach up to 20 %.

CAS 140D NVIS spectroradiometer

The CAS 140D NVIS spectroradiometer measures the radiation spectrum from 380 to 1040 nm, including the near-infrared (NIR) range. Its dedicated NVIS band pass filters allow to measure over 6.5 orders of magnitude optical dynamic range to fulfill the MIL requirements.

For irradiance measurements of dual-mode exterior lighting on rotorcraft, fixed-wing aircraft, and ground vehicles in accordance with SAE ARP5825A, dedicated incoupling optics such as the EOP-120 can be used.





CAS 140D spectroradiometer with optimized crossed Czerny-Turner spectrograph.

Positioning systems

Instrument Systems offers a wide range of positioning systems for applications where the device under test (DUT) needs to be evaluated under multiple viewing angles. These goniometers and positioners allow the fast and precise measurement of all relevant photometric, colorimetric and radiometric results. Different DUT size and weight ranges are covered.



LGS 650 goniometer with controller

Intuitive software for reliable and standards-compliant NVIS testing



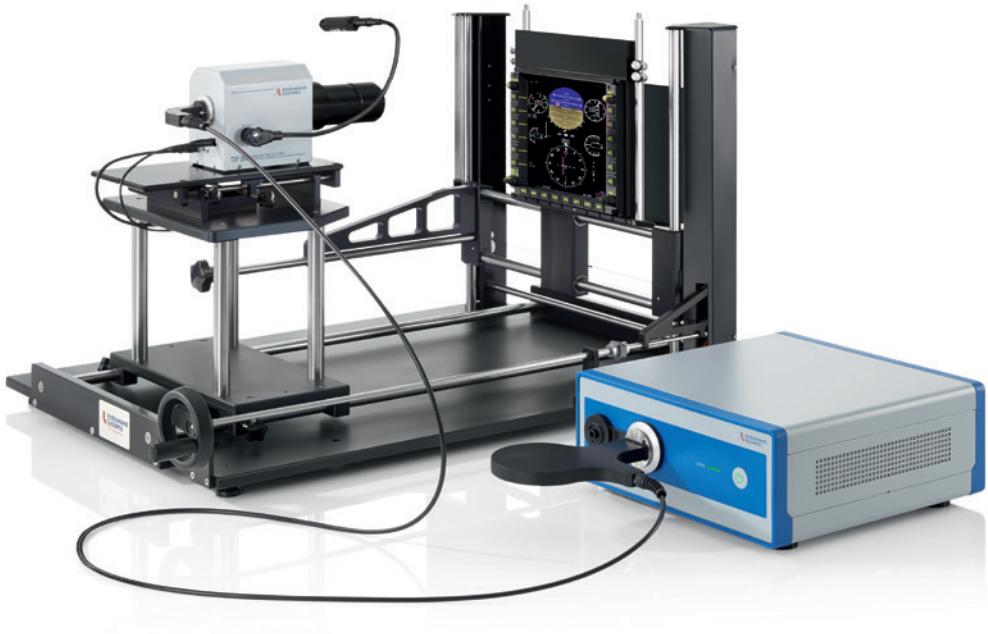
The SpecWin Pro software has an NVIS measuring mode with functions such as live image display and automatic pass/fail testing

- NVIS plug-ins available for Instrument Systems **SpecWin Pro software** and **CAS software development kit (SDK)**
- Seamless integration into automated test environments
- Clear **pass/fail assessment** according to military and civil NVIS standards (MIL-L-85762A / MIL-STD-3009)
- Standard **colorimetric and spectroradiometric results** with push-button measurement, data export, and report generation
- Control of peripheral hardware, including **positioning systems** and the **TOP 200 optical probe** with integrated viewfinder camera

Certified calibration and traceability

Our ISO 17025-accredited test laboratory guarantees independent, reliable, and comparable measurement results for every instrument delivered. All measurements are directly traceable to the reference standards of the National Metrological Institutes **PTB** (Germany) and **NIST** (USA). This traceability enables direct comparison of measurement results across different metrological setups, locations and production lines.

The **DTS 140D NVIS Display Testing Systems** are delivered fully calibrated and include a MIL test certificate compliant with MIL-L-85762A / MIL-STD-3009. Audit and calibration light sources in accordance with MIL requirements are also available.



DTS 140D NVIS – turnkey solution designed to measure night vision compatible displays and panel graphics

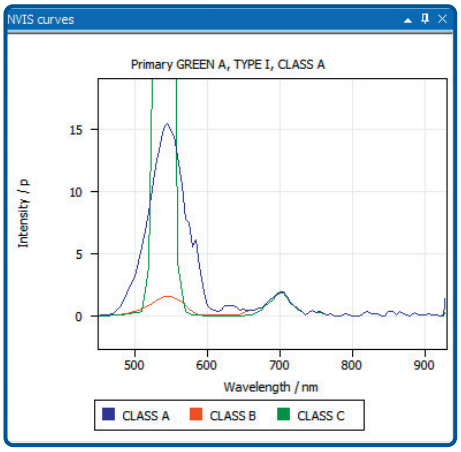
03 \\ The Application: NVIS Radiance Measurement and Evaluation

In night-vision goggles, optical radiation in the spectral range from approximately 590 nm to 850 nm is amplified by roughly five orders of magnitude and converted into visible green light. Therefore, light sources in the vicinity must emit only minimal radiance within this spectral region. Otherwise, amplified light will impair night-vision performance.

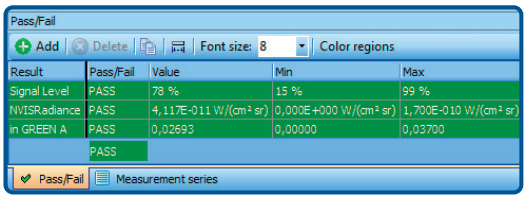
NVIS radiance readings must be scaled to the reference luminance of the sample, so precise luminance measurement is equally essential.

The **CAS 140D NVIS spectroradiometer** fulfills the MIL standard requirements by acquiring the radiation spectrum from 380 nm to 930 nm in special cluster mode. Luminance and NVIS radiance are calculated from the spectral data, enabling correct ratio determination and scaling. Different integration functions can be implemented in the software to match specific evaluation criteria.

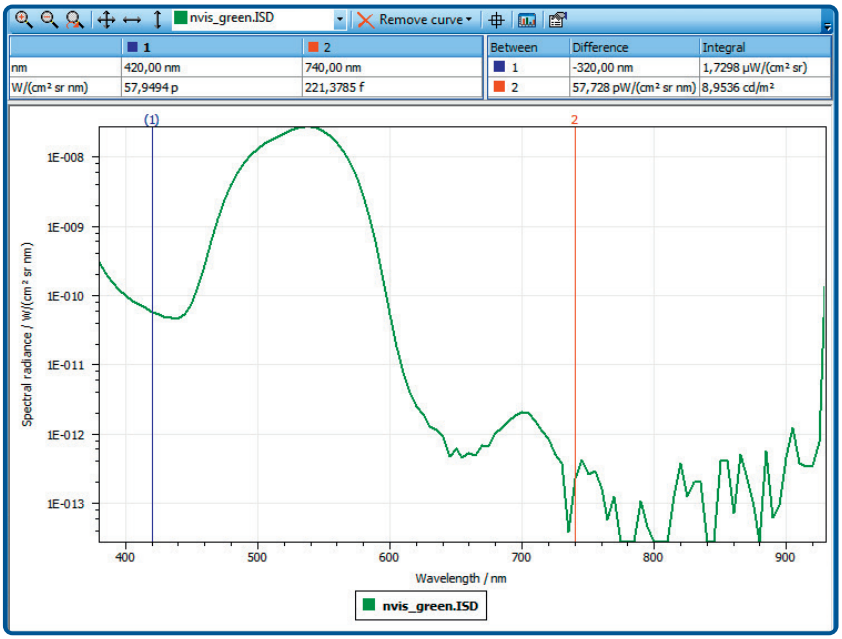
NVIS radiance evaluation



Pass/fail assessment



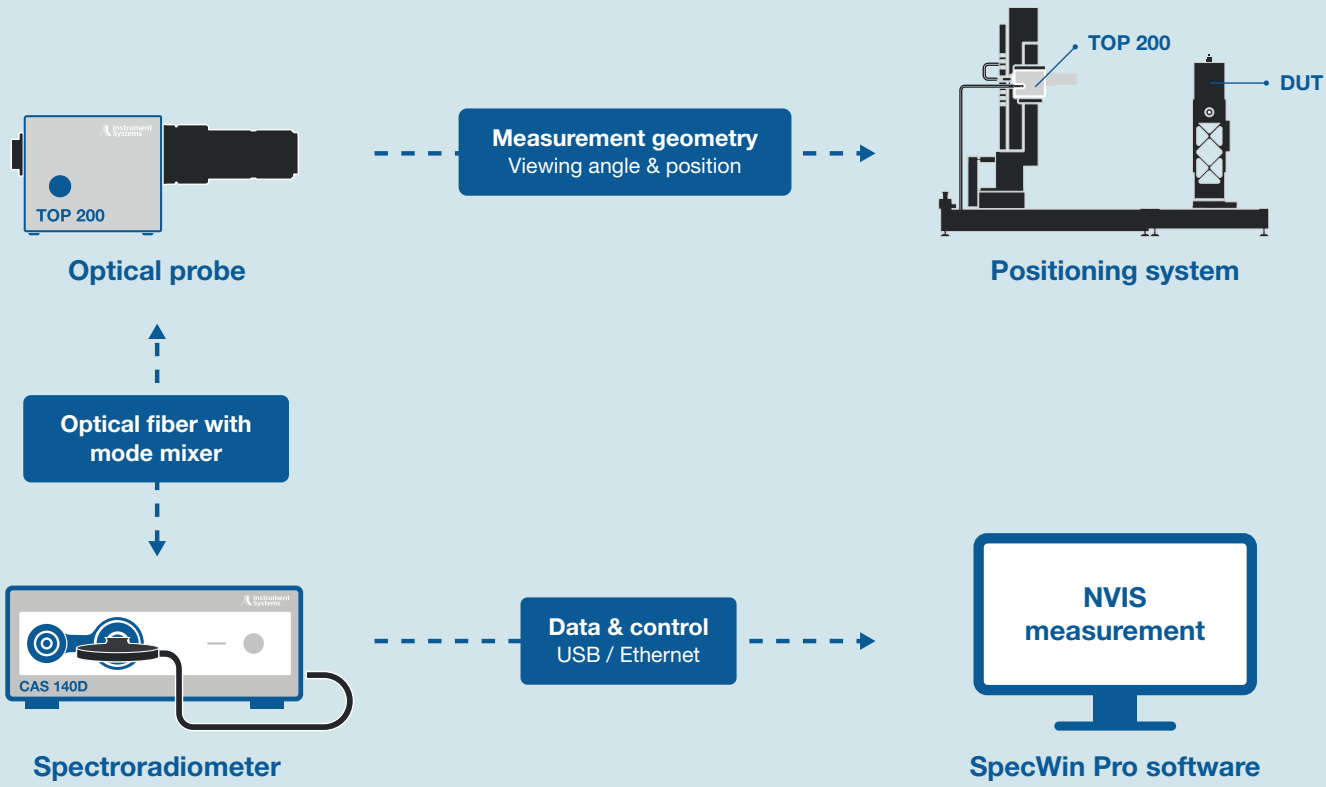
Spectral measurement (MIL standard range: 380 – 930 nm)



04 \\ Typical Setup of the DTS 140D NVIS Display Testing System

DTS 140D NVIS System

- **TOP 200 optical probe** – Objective lens matched to sample geometry
- **Mode mixer** – High repeatability and reduced measurement error
- **CAS 140D spectroradiometer** – Accurate and repeatable NVIS measurements
- **Positioning system** – Angle / position-dependent measurements
- **Device Under Test (DUT)** – NVIS-relevant displays or light sources
- **SpecWin Pro software** – NVIS measurement control and evaluation



All measurements comply with applicable NVIS standards and regular instrument calibration requirements.

Learn more in the application note:
NVIS Measurement of Displays and Panel Graphics

05 \\ Ordering Information

Order number	Description & Technical data				
Optical probes with viewfinder, objective lens, and mode mixer					
Optical probe					
TOP200-100-3	Basic unit with Pritchard-style optics, including motorized aperture wheel with 6 selectable measurement spot sizes; USB interface. Resolution of view finder camera: 2560 x 1920 pixel				
Objective lens	**Focal length**	**Spectral range**	**Measuring spot sizes**	**FOV of view finder camera**	**Working distance**
TOP100-317-2	50 mm	370 – 1100 nm	0.44 – 2.84 mm (@23 cm) 2.35 – 13.94 mm (@1 m)	20.2 x 12.9 mm (@23 cm) 116 x 74 mm (@1m)	23 – 100 cm
TOP100-319	90 mm		75 / 150 / 300 / 600 µm	3.7 x 2.3 mm	230 mm
Mode mixer					
TOP200-203	Fiber guide with integrated mode mixing (D50, 90° version) and PLG adapter. Fiber length: 2.3 m; wavelength range: 300 – 2200 nm; supports accessory recognition with CAS 140D.				
Accessories					
TOP100-400	Tripod stand with tilting head for TOP 200				

Optical probes without view finder	
Optical probe	
EOP-120	Medium light throughput and cosine correction in the spectral range from 190 to 1700 nm; adapter for fiber bundle
Fiber bundle, adapter	
OFG-414	Fiber bundle with 1.5 mm diam., 2 m long; spectral range 380 to 1600 nm
PLG-411	Fiber bundle adapter; optimized for VIS; spectral range 360 to 2200 nm, supports accessory recognition with CAS 140D

Spectrometer	
CAS140D153U3I	VIS–NIR spectrometer for NVIS applications; wavelength range: 380 – 1040 nm; spectral resolution: 6.7 nm; integrated NVIS filter wheel; USB interface

Positioning systems			
Goniometer		**Sample size**	**Max. weight**
DTS500-115	2-axis goniometer (horizontal and vertical) with stepper motor control; ±100° rotation at 0.01° resolution	550 x 440 mm (with clamp) 590 x 490 mm (without clamp)	25 kg
LGS350-100	Type C 2-axis goniometer for small and medium sized modules with stable rack incl. LGS controller	740 mm diameter	8 kg
LGS650-100	Type C 2-axis goniometer for medium sized modules with stable rack incl. LGS controller	1340 mm diameter	10 kg
X-Y-positioning system		**Travel range xyz**	**Max. weight**
DTS500-105	XYZ positioner with stepper motor control, ±0.02 mm reproducibility	610 x 480 x 610 mm	6 kg
DTS400-110	Manual XYZ-positioning system for measuring displays; includes mounting plate for TOP 200	x: ±162 mm y: -167 mm, +510 mm	25 kg
Accessories			
LGS-410	Stand with mount for a stray light tube for LGS 350		
LGS-415	Stand for LGS 650 with mount for a stray light tube; height of the optical axis variable from 1600 – 1800 mm		
LGS-440	Stray light tube with ±4.5° field of view; for measuring luminous intensity distribution in the far field; for optical probe EOP-120		

Calibration	
CAL-135	Factory calibration of NVIS DTS system to spectral radiance, wavelength range VIS/NIR. With final test in conformity with CIE 250:2022, DIN EN 13032-1:2012 and ISO/CIE 23539:2023 and test certificate according to DIN EN ISO 17025. Incl. performance test according to MIL-L-85762A resp. MIL-STD-3009
CAL-195	Creation of stray light correction matrix for CAS 140D; accessory calibration separately

Software	
SW-130	SpecWin Pro spectral software for Windows 10 / Windows 11, including all modules and measurement modes. Support of all spectrometers, goniometers and positioning systems of Instrument Systems
SW-137	SpecWin Pro NVIS software module for evaluation of night-vision devices. Requires SW-130 (SpecWin Pro)
SW-231	DLL driver program for CAS140D incl. colorimetric and photometric calculations; for Windows 10 and Windows 11. Professional skills in a modern programming language are required
SW-237	NVIS companion SDK for CAS SDK for Night Vision Display measurements - resampling of measurement data with CAS.dll - NVIS evaluation of the spectrum (pass/fail evaluation of radiance and chromaticity) according to NVIS standards MIL-L-85762A / MIL-STD-3009 - requires SW-231 (CAS SDK) version 5.0 or higher

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