

MICRO HYPERSPECTRAL RADIOMETER

mHR.2

Measures water colour near the surface for comparison with satellite data.

mHR.2 measures sunlight reaching and leaving the water with **one rotating optical head in a single housing**. It calculates remote-sensing reflectance (R_{rs}), a measure of water colour used to check satellite observations. At 0.9 kg, it can operate unattended on a monitoring station. It uses natural light and has no laser.



MHR.2 INSTALLED ABOVE THE WATER

1

HOUSING
ED, LS, LT, DARK

0.9 kg

MASS

10 W

PEAK POWER

288

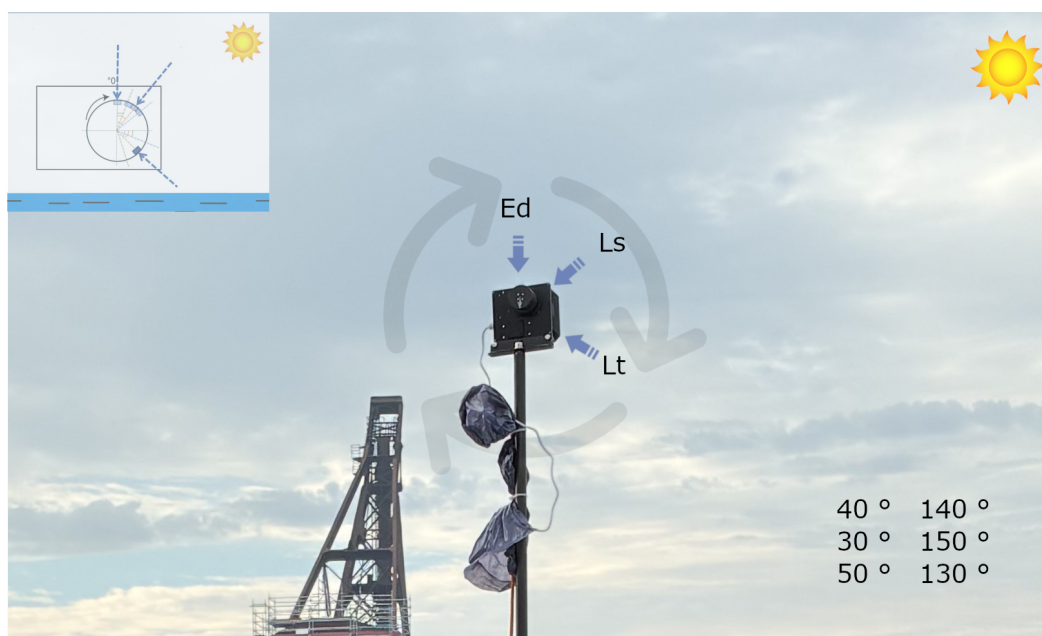
SPECTRAL BANDS
320 TO 880 NM

IP68

MARINE-GRADE

MEASUREMENT PRINCIPLE

To calculate reflectance, the instrument measures incoming sunlight (E_d), sky radiance (L_s) and radiance from the water surface (L_t). **One motorised head records all three in sequence**, then takes a dark reading to correct the detector background. The standard sky and water viewing angles help reduce sun glint. GPS records the location, an inertial measurement unit (IMU) records orientation, and a camera captures the scene during the sequence.



Field measurement geometry. E_d : incoming sunlight; L_s : sky radiance; L_t : water-surface radiance. Viewing angles are measured from the upward vertical and can be adjusted in software.



DATA OUTPUTS

R_{rs}

Remote-sensing
reflectance, sr^{-1}

E_d, L_s, L_t

Calibrated spectra,
every cycle

Location, orientation, image

GPS, pitch, roll and heading,
context image

HYPERSPSCTRAL 320 TO 880 NM, 288 BANDS, 12 NM FWHM

The main output is remote-sensing reflectance. Models can use it to estimate chlorophyll-a, turbidity and coloured dissolved organic matter; **the instrument does not measure these parameters directly**. For satellite validation, the comparison uses reflectance itself. Radiometric calibration is available.

SPECIFICATION

TYPE	Passive hyperspectral radiometer, no laser
WAVELENGTH RANGE	320 to 880 nm
SPECTRAL BANDS	288 px, 12 nm FWHM
DETECTOR	High-sensitivity CMOS linear image sensor
RADIANCE	L_s and L_t , FOV 1°
IRRADIANCE	E_d , PTFE diffuser
HEAD POSITIONS	0, 40, 140 and 180° from zenith, user-configurable
DARK CORRECTION	At 180° , every cycle
INTEGRATION TIME	270 to 1 000 000 μs , auto and manual
ADC	12-bit
COMMS	RS485, Wi-Fi, internal logging
AUXILIARY	GPS, IMU and context camera, sampled with the sequence
POWER	12 V DC, 10 W peak
OPERATING TEMP.	0 to $+30^\circ C$
STORAGE TEMP.	-20 to $+70^\circ C$
SIZE	132 × 125 × 106 mm
MASS	0.9 kg, IP68
OPTION	Sun-relative azimuth motor, under development

APPLICATIONS

- Satellite match-up and validation**
SENTINEL-2 AND -3, PACE, MODIS, VIIRS
- Local models linking reflectance to water quality**
RESEARCH INSTITUTES, SPACE AGENCIES
- Water-colour monitoring networks**
WATER-QUALITY CONTROL, COASTAL AND INLAND
- Reflectance monitoring at fixed stations**
BUOYS, JETTIES, COASTAL PLATFORMS

3 months

BUILD TIME

Head positions are configured for the deployment, and radiometric calibration is available. Once installed, the instrument can measure unattended and upload data automatically to cloud storage.

EXPLORE THE DATA

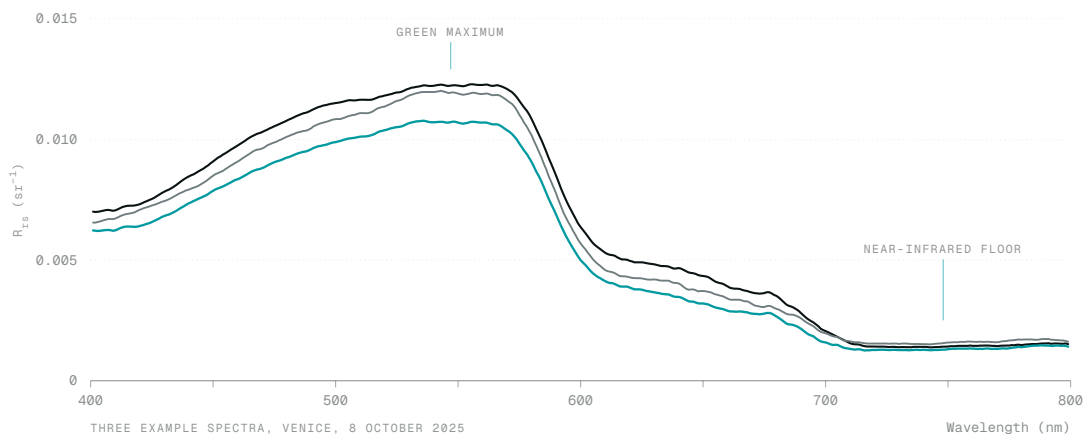
See data examples and how they support water-quality research at lifelidar.com.

Explore the measurements at viewer.lifelidar.com.

FIELD RESULTS: REFLECTANCE SPECTRA

Satellite signals include light scattered by the atmosphere as well as light leaving the water. Processing removes the atmospheric contribution to estimate water reflectance.

Measurements near the surface provide a reference for checking this estimate. A satellite match-up compares observations of the same location taken close in time.



Three example R_{rs} spectra from the ESA PHY2FLEX campaign in Venice, 8 October 2025, redrawn from measured data. Each was calculated from the E_d , L_s and L_t spectra of one cycle. All show a peak near 545 nm and low reflectance beyond 700 nm.

COMPLEMENTARY INSTRUMENTS



LIFL.11 ON SURVEY

LIFL.11 combines fluorescence, elastic scattering and Raman measurements for vessel or airborne surveys. It measures surface water, land and the near-surface atmosphere, and profiles water to 50 m at 532 nm. Each instrument uses 266 or 355 nm with 532 nm and 48 detection bands.



mFL.12 ON A MAST

mFL.12 monitors fixed sites with a single 405 nm laser, measuring the surface layer without entering the water. Its compact design and lower cost suit long-term installation on buoys, piers and monitoring stations.



mHR.2 DEPLOYED

mHR.2 calculates remote-sensing reflectance from sunlight reflected by the water. Install it beside mFL.12 to record reflectance for satellite comparisons and laser-induced fluorescence at the same location.

FIELD RECORD

ESA PHY2FLEX, Venice, October 2025, and the Var plume trial with LOV / IMEV, May 2026

STATUS

Field-tested and internally validated

PROGRAMME

OQOMETHI, with France 2030 and ADEME