CompactSpec® EMB CNIRS: NIR Spectrometer System with MEMS Technology and Embedded Electronics for Process Control

The CompactSpec® EMB CNIRS is an IP protected spectrometer system series for the NIR spectral range, capable of withstanding the harsh conditions in industrial production environment. It combines maintenance-free miniaturized NIRONE™ sensor modules from Spectral Engines with long lifetime light sources for compact size and unmatched cost efficiency. Using the tecSaaS® embedded technology, no separate PC is needed for standard operation. The data collected by the spectral sensor is processed in real-time by the system and the required results are sent to the process interface. The package can be customized and offers the possibility to add various optical measurement heads and probes via light guides and SMA connectors.

[Applications]

Autonomous miniaturized NIR spectrometer for

- Quantitative & Qualitative Analysis
- Process Control
- Reaction monitoring

of liquids, solids and gases.

tecSaaS®

[CompactSpec® EMB CNIRS]

[Advantages]

- Robust, stand-alone system for operation on-site, in production and integrated in machinery
- Integrated IT security concept
- Maintenance-free, extremly stable spectrometer modules without moving parts
- Measurement ranges between 1100 and 2450 nm
- Intelligent, highly available and autonomous **[no external [Win] PC needed]**
- Protection against dust and water splashes in accordance to IP65 or higher
- 24 V power supply [12 or 230 V available upon request]

SPECTRAL ENGINES

[NIRONE™ NIR spectral sensor]

[tecSaaS® – Embedded Platform]

tecSaaS® is a modular embedded platform. High performance is reached by a lean real-time operating system [RTOS] combined with optimized firmware for fast data processing and dedicated timing. No separate [Windows] PC is needed for normal operation; all the well-known disadvantages such as IT insecurity, instability, downtime, as well as maintenance and update costs are not an issue any more. Systems based on our new tecSaaS® platform are smart, networked process sensors. This technology follows today's most frequently demanded requirements of the NAMUR recommendation NE 153 "Automation Security Agenda 2010" and of the Industry 4.0 initiative.

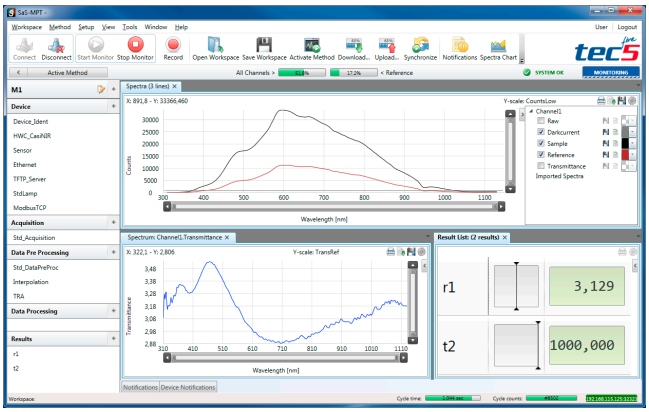
[NIRONE™ Fabry-Perot type MEMS NIR spectral sensor]

The NIRONE™ sensors are manufactured by Spectral Engines in a Fabry-Perot setup with the main parts in silicon micromachining technology. This MEMS type spectral sensor and miniaturized system components are used to build embedded NIR spectrometer systems offering new dimensions in terms of compact shape and cost effectiveness. Combined with the tecSaaS® embedded spectroscopy platform, compact NIR sensors become available for industrial or field applications.

Product Information [CompactSpec® EMB CNIRS]

[Parameterization]

For startup, deployment, parameter setting or monitoring purposes, the unit can be connected to a PC over an Ethernet connection. tec5 provides a PC software [tecSaaS®-MPT] as online monitoring and parameterization tool to access the sensor, retrieve the current instrument status, spectra and process results. It is an easy-to-use Windows tool, which allows workspace and method administration in a similar way as our PC based spectroscopy software MultiSpec® Pro II.



[tecSaaS®-MPT - Monitoring & Parameterization tool via Ethernet]

[Onboard [Result Engine]]

tecSaaS® offers customized mathematical processing using an integrated formula parser as well as complex algorithms such as chemometrics [e.g. created by SensoLogic Calibration Wizard] and FFT. The calculation of concentration values can also use a linear regression model, which may include additional calculation steps, also taking external variables such as temperature and pressure into account.
Advanced data pre-processing steps are available to compensate for instabilities due to bubbles or particles in the process stream.

[Process Communication]

The system supports the Modbus/TCP protocol for the transfer of results and status messages.
Other bus systems [e.g. EtherCat, PROFINET, CAN] and analog interfaces [4-20mA] on request

The following functions are available:

- Checks system info and system status [e.g. error messages and operating hours]
- Retrieve and switch methods
- Spectral information and process values to be transferred
- Run commands [e.g. start DC or reference acquisition]

[Technical Data]

System	
"Embedded" Version for the direct data transfer to an SPS or PCS via standard process interfaces	
Data Connection	Modbus/TCP [Ethernet for MPT Parameterization Tool]
Housing Material	Stainless Steel V4A or Aluminum*
Environmental Protection Rating	IP 65 to 67*
Spectral Range	within 1100 – 2450 nm
Lamp	Long-life process halogen lamp with 10.000 hrs run-time
Measurement Rate	> 1 measurement/s*
Dimension [L x B x H] mm	200 x 150 x 80 - incl. connectors*
Operating Temperature	min. 10°C – 30°C* [add. cooling options available]
Power Supply	24 V*
Weight	1,75kg*

* Depends on systems type.

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tec5 five
Technology for Spectroscopy

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