SILICANN
SYSTEMS GMBH

**Datasheet**

# Spektralwerk 15 Core NIR

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# 1 Overview

This datasheet describes the basic electrical, mechanical and functional properties of the Spektralwerk Core spectrometric NIR sensor.

## 1.1 Features

Spektralwerk Core is a compact, high-performance inline spectrometer designed for industrial sensing applications. Thanks to Power over Ethernet, both data transmission and power supply are provided through a single cable. With its compliant protocol implementation, it seamlessly integrates into switched network environments. Due to its excellent signal-to-noise performance, there is no need to compromise signal quality even at high sampling rates.

As a systems integrator, this offers you highly flexible deployment options. You can position any number of Spektralwerk Core units at various remote points within the manufacturing environment and automatically evaluate all spectral information on a single computer.

Spektralwerk Core utilizes the well-established SCPI protocol for both data transmission and configuration. Standard Commands for Programmable Instruments is a text-based bus-independent protocol with native support in many programming languages and chemometrics environments. In addition, Silicann Systems provides the spectrometry application spectrotron, as well as a python-based library for rapid development of custom applications.

Spectral information can either be triggered individually via SCPI command or trigger input, or be transmitted as a continuous data stream.

| Human Interfaces | |
|---|---|
| Indicators (LED) | 1 RGB |
| **Communication Interfaces** | |
| USB | Nein |
| Ethernet | Yes |
| **Optical Specification** | |
| Detector array | Hamamatsu G13913 |
| Wavelength Range | 900-1700 nm |
| Pixels | 256 |
| Sample Rate | up to 500 Hz (in streaming mode) |
| Spectral resolution (FWHM) | 3,9 nm (Hg line at 1014 nm<br>5 nm (Hg line at 1529,6 nm) |
| Integration time | 10 µs - 10 s |
| External Lighting | Optionally |
| Optical Channel | 1 |
| Fiber Connector | Yes |
| Signal to Noise Ratio | up to 1:10000 |
| Sensitivity (cts/(nW * ms)) | 186 @1200 nm<br>342 @1500 nm<br>60 @1700 nm |
| Entry slit | 60 µm x 300 µm |
| **Electrical Interfaces** | |
| Trigger inputs | 1 (standard TTL 0-5 V, max. 500 µA) |
| Trigger outputs | 1 (standard TTL 0-5 V, max. 500 µA) |

# 2 Technical Features

## 2.1 General Features

### Trigger input and output

The trigger input can be used, for example, to realize the automated acquisition of a spectrum by another step in the process. Trigger out allows e.g. for controlling an external light source.

The widely used and standardized M8 socket enables the use of commercially available cables to meet the special requirements of the respective operating environment. For example, drag-chain-compatible and oil-resistant cables from various manufacturers are readily available.

### Fiber connection

By using the standardized FC connector, optimal optical coupling and maximum light yield are achieved. Upon request, a variant with SMA905 is also available.

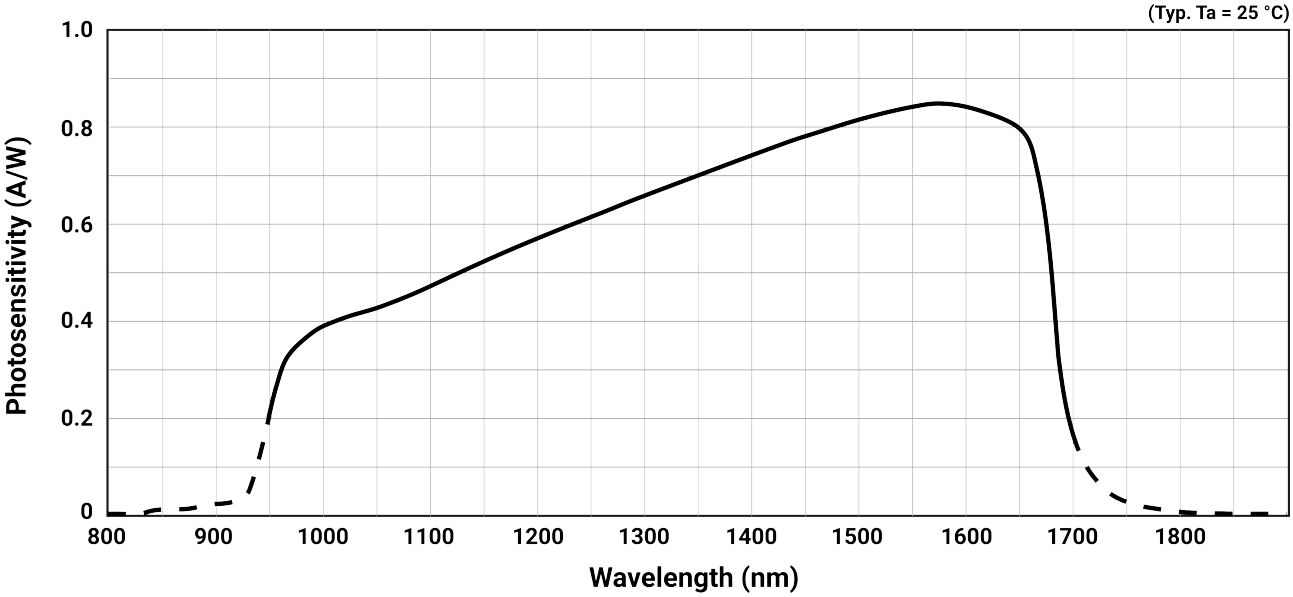
### Networking

The sensors offer network configuration using IPv4 and IPv6, both with static and dynamic configuration through DHCP. Thanks to SSDP support, the spectrometers can also be discovered automatically in the network environment of all common operating systems. With its full IPv6 support, Spektralwerk Core is already well prepared for the network infrastructures of the future.

| Feature | Specification |
|---|---|
| Protection rating | IP40 |
| Ambient temperature | -5 . . . +30 °C (without active cooling) |
| Electrical connectors | RJ45 (Ethernet & PoE)<br>M8 (trigger in & trigger out, 4 pins, type A) |
| Optical connector | FC<br>optionally SMA905 |
| Dimensions | 126x105 mm (excl. connectors and mounting brackets)<br>139x130 mm (incl. connectors and mounting brackets) |
| Material | AlMgSi anodized |
| Weight | approx. 640 g |
| Mounting | Mounting brackets |
| Power supply | Power over Ethernet (PoE+, IEEE 802.3at, 42,5-57 V, 600 mA) |

### 2.2 Spektrale Sensitivität

Averaged curves of wavelength-specific sensitivity. The devices are shipped with individually determined curves.




## 3 Range of Functions

### 3.1 General

- Control interfaces:
  - SCPI (over ethernet)
  - Trigger in
- Signalization and state indication via:
  - SCPI (over ethernet)
  - RGB LED
  - Trigger out

### 3.2 configuration options for spectral data

The following options are configurable:

- Integration time
- Dark spectrum
- Averaging: block-based moving average
- Intensity scaling using a scaling vector
- Continuous streaming of spectra over UDP
- Streaming a finite number of spectra over UDP or a serial interface

## 3.3 Power delivery

Spektralwerk Core uses Power over Ethernet (PoE+, IEEE802.3at) for power delivery.

If the device is not used within a network or the installed switches do not support PoE+, an off the shelf PoE injector can be used.

## 3.4 Control Interfaces

### 3.4.1 SCPIInterface über Ethernet

The following actions are possible via the SCPI interface:

- Configuring the device
- Retrieval of spectral information

### 3.4.2 Trigger In

The trigger inputs are usable for the external triggering of integration cycles. Configuration is carried out via the SCPI interface.

### 3.4.3 RGB LED

The RGB LED indicates important device states. Please refer to the manual for details.

| LED signal | | Meaning |
|---|---|---|
| constantly off |  | Device is off / has no power / external LED switched off via SCPI |
| yellow flashing |  | Device is booting |
| rapidly flashing yellow/lilac |  | Error during boot process |
| orange flashing |  | Network configuration in progress |
| orange, constantly lit |  | Device is running |
| green flashing, once |  | Received and processed correct SCPI instruction |
| lilac flashing, once |  | Received incorrect SCPI instruction |
| black flashing, once |  | Received trigger in signal |
| white flashing, once |  | Sent trigger out signal |

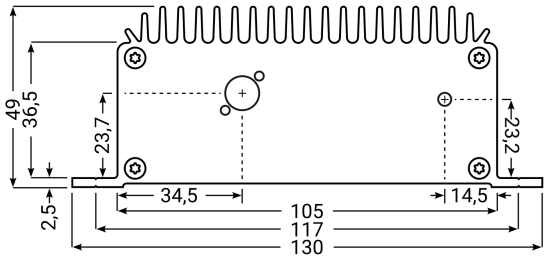
## 3.5 Reset to factory settings

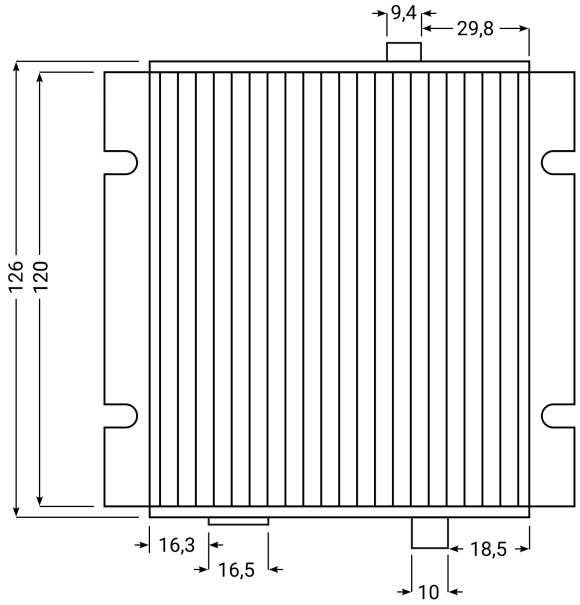
If the device can no longer be accessed via the network, it can be reset during the boot process using Spectrotron. For details, please refer to the device manual.

## 3.6 SCPIInterface

The spectrometer device supports a TCP-based SCPI interface. This interface allows the configuration of all device settings and the retrieval of samples. The complete API documentation ist available at en.silicann.com/swdocs.

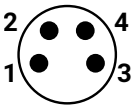
# 4 Dimensions and Connectors




126x105x49 mm (excl. connectors and mounting brackets)
139x130x49 mm (incl. connectors and mounting brackets)

### M8 pinout




1 = GND TRG IN
2 = TRG IN
3 = TRG OUT
4 = GND TRG OUT