EVK
DI Kerschhaggl GmbH
Elektronisch Visualisieren Klassifizieren

FEATURES

- Variable working width and spatial resolution.

- Variable working distance

- Integrated 12-bit data processing chain from object detection to direct control of the ejecting system

- Scan rate up to 1 kHz (with limited spectral range and/or local resolution)

- Possibility to teach up to 32 spectra

- Serial interface to the MMI – Computer (Gigabit Ethernet interface)

- Direct connection of up to 512 digital inputs and 512 digital outputs (interface to the EVK SIO System)

- Combined operation with EVK metal sensors possible

HELIOS COMPLETE NIR [in the NIR range up to 2.5 µm]

HELIOS COMPLETE is an integrated opto-electronic measuring and classification system, incorporating the complete hyperspectral processing chain that can sort different materials and products using parallel recorded NIR (up to 1.7µm) spectral data.
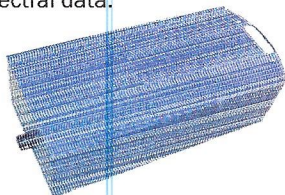
It consists of an optical assembly with lenses and spectroscope for spatial and spectral resolution of the scanned line, a 2D-NIR sensor and a proprietary FPGA and DSP (FPGA – Field Programmable Gate Array; DSP

– Digital Signal Processors) based computing unit for fast processing and reduction of data and subsequent in-line classification of materials. The generated information can directly control pressurized air nozzle banks or can be handed over to a computer system.

> "HELIOS Complete is designed for classifying and sorting bulk material.."

HELIOS COMPLETE is a stand-alone system that requires only a PC for teaching, parameterization and visualization of sorting statistics

Fields of Application

- Sorting of waste streams
- Food Processing
- Mining Industries
- Pharmaceutical Industries
- In-line quality control
- Diverse monitoring tasks
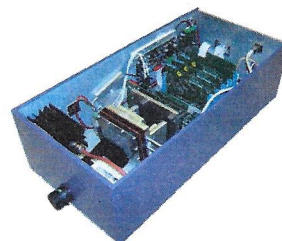
## EXAMPLE OF SORTING RESOLUTION

1 HELIOS; 1m sorting width 2.5 m/s conveyor speed	Classifications per second	Supported spectral points for classification	Size of the measuring grid based on 240 spatial pixels
HELIOS Complete; 120 Hz	31.000	316 (full spectrum)	4,2 x 20,8 mm
HELIOS Complete; 240 Hz	61.500	316 (full spectrum)	4,2 x 10,4 mm

Parallelising two or more Systems, spatial resolution orthogonal to the flow direction can be increased. Further spatial resolution in the flow direction can be increased by either decreasing conveyor speed or spectral range. Thus HELIOS Complete can flexibly fit demands for numerous applications.

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EXAMPLE FOR THE WORKING DISTANCE (mm) BASED ON WORKING WIDTH AND FOCUS LENGTH

Working width (mm)	F=5mm	F=8mm	F=12mm	Spatial Resolution (mm)
500	350	530	790	2
1000	650	1050	1570	4
1500	980	1570	2350	6
2000	1300	2090	3130	8
2500	1630	2610	3910	10

Deflection Unit
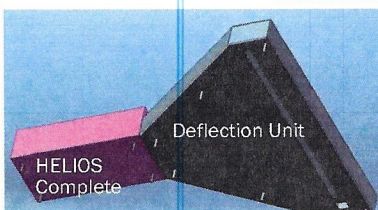
HELIOS Complete

Note: The distance between the conveyor belt and the HELIOS Complete can be reduced to adequate values by using a deflection unit with integrated mirror.

	VIS/NIR (preliminary)	NIR	SWIR (preliminary)
Hardware			
Dimensions (without fore optic)	590 x 260 x 155 mm	590 x 260 x 155 mm	595 x 300 x 155 mm
System of protection	IP55	IP55	IP55
Case material	Aluminium		
Overall weight	Approx. 14.2 kg	Approx. 14.2 kg	Approx. 18.0 kg
Electronic Data			
Voltage	+24V DC +/-15%; up to 3000V protection from fast transient / burst		
Current consumption	1.5 A	2.5 A	7 A
Interfaces	Gigabit Ethernet		
System			
Sensor	CMOS	InGaAs	HgCdTe
Cooling	Peltier, natural convection		
Pixel rate (sensor)	40 MHz	40 MHz	20 MHz
Pixels (sensor)	320 (spectral) x 256(spatial)		
Size of pixels	7x7 µm	30x30 µm	30 x 30 µm
Data depth	10 bits	12 bits	12 bits
Spectral range	0.4 - 1.0 µm	1.1 - 1.7 µm / 0.9 - 1.7 µm	1.5 - 2.5 µm / 1.3 - 2.3 µm
Spectral resolution	9 nm (FWHM @ 30 µm slit)		
Spectral sampling	-	1.9 / 2.5 nm	3.2 nm
Slit	30, 50, 80, 100 µm		
Lens	F=5mm; F=8mm; F=12mm; Standard C-Mount, optional fiber optic mounting		
Keystone	Corrected (less than 1 pixel)		
Smile	Corrected (less than 1 pixel)		
Spectral operations	Onboard smile correction, spectral calibration, optional ROI setting and binning		
Spatial operations	Onboard keystone correction, optional ROI setting and binning		
Intensity operations	Non uniform intensity correction, bad-pixel correction		
Processing options	Intensity; 1st or 2nd derivative; Fixed zero or floating zero (max/min) normalizing		
Working temperature	0 - 40 °C	0 - 40 °C	0 - 40 °C
Storage temperature	-25 °C to +75 °C		
Relative atmospheric humidity	8 - 80 %		
Background detection	Yes; undercut between background and taught spectra or rather not-taught spectra		
Parallel loaded reference spectra	32 (can be associated to 8 spectra groups)		
Max. No. of classifiers	8		
Classification configuration	Selecting spectral details and weighting		
Frame rate: HELIOS Basic HELIOS Standard	120 Hz full frame 240 Hz full frame		60 Hz full frame 120 Hz full frame
	(By decreasing the spectral range and spatial resolution (overall ROI) the scan rate can be increased up to 1 kHz)		
Clock rate of data processing	Optionally 1ms / 2ms / 5ms		
Sorting phases	2-way system or 3-way system		
Valves for each sorting phase	8, 16, 32, 64, 128		