COAST Series

COAST-52-45°

- Recommended measurement distance: 52 mm \pm 2 mm
- Big dynamic range due to focused white-light operation
- Two controllers in one sensor (color and gloss+structure)
- Up to 31 surfaces/vectors (48 in group mode) can be stored
- RS232 interface (USB or Ethernet adapter is available)
- 2 ring light illuminations with each 9 super-bright white-light LEDs, focused (AC-/DC-operation, can be switched)
- Evaluation of the forward and backward scattering (alternating)
- Color detection, gloss detection, contrast detection, gray scale detection as well as structure evaluation
- Insensitive to outside light (in AC-operation)
- Several TEACH functions (via PC, PLC, or push button)
- Evaluation according to the "Minimal Distance Principle"
- Switching state display by means of 5 yellow LEDs
- Parameterizable via Windows® software, scope function
 Temperature compensated
- 3-color filter detector (true color detector: "human color perception") and line detector (512 pixel)





M Instruments



Technical Data

Model	COAST-52-45°					
Voltage supply	+24VDC (± 10%), reverse polarity protected, overcurrent protected					
Current consumption	< 500 mA					
Max. switching current	100 mA, short circuit proof					
Switching state indication (5x LED)	5 yellow LED visualize the physical state of the outputs OUT0 OUT4					
Input digital (1x)	Teach-in of new surfaces (vectors), can be activated via PC software					
Outputs digital (5x)	OUT0OUT4 (Pin 48): digital (0V/+24V), pn-/pnp-able (bright-/dark-switching, can be switched)					
Interface (2x)	Color sensor: RS232 Structure sensor: RS232					
Pulse lengthening	0 100 ms (adjustable via PC software)					
Averaging	max. 32768 values (adjustable via PC software)					
Scan frequency (alternating light operation)LED operation, can be switched via PC software: Color sensor in AC operation: max. 15 kHz (depends on parameterization) Color sensor in DC operation: max. 35 kHz (depends on parameterization) 						
Angle of incidence	Optical axes of the two ring lights are inclined each at an angle of 45° from the normal (vertical)					
Measuring distance	typ. 52 mm ± 2 mm					
Transmitter (light source) 2 optics with each 9 super-bright white-light LED, focused						
Transmitter control	Can be switched via PC software: AC operation (LED MODE-AC), DC operation (LED MODE-DC					
Receiver	Color sensor: 3-color filter detector (TRUE COLOR, "human color perception"), color filter curves acc. to CIE 1931 structure sensor: line detector, 512 pixel					
Receiver gain setting respectively exposure time Color sensor: 8 steps (AMP1 AMP8), adjustable via PC software + INTEGRAL (software implemented addition of consecutive value: Structure sensor: software implemented adjustment of exposure time (EXPOSURE TIME)						
Ambient light	max. 5000 Lux					
Detection range	e typ. Ø 20 mm at a distance of 52 mm					
Reproducibility Color sensor: in the X, Y color range each 1 digit at 12-bit A/D conversion Structure sensor: typ. ± 20mm/256 pixels						
Temperature drift X,Y	emperature drift X,Y $\Delta X/\Delta T$; $\Delta Y/\Delta T$ typ. 0.2 digits/°C (< 0.01% / °C)					
Resolution	Color sensor: $\Delta E >= 0.5$ Structure sensor: typ. 20mm/256 pixels					
Color space (color sensor)	siM (Lab)					
Memory capacity	Non-volatile EEPROM with parameter sets for max. 48 vectors					
Housing dimensions	LxWxH approx. 150 mm x 94.8 mm x 36 mm (without connectors)					
Housing material	Aluminum, anodized in black					
Enclosure rating	IP64					
Connecting cables	1x to PLC: cab-las8/SPS or cab-las8/SPS-w 2x to PC/RS232 interface: cab-las4/PC or cab-las4/PC-w (each 1x for color sensor and for structure sensor) alternatively: 2x to PC/USB-interface: cab-4/USB or cab-4/USB-w alternatively: 2x to PC/Ethernet-interface: cab-4/ETH					
Type of connector	Connection to PLC: 8-pole fem. connector (Binder 712), connection to PC: 4-pole fem. connector (Binder 707)					
Temperature ranges	Operating temperature range: -20°C +55°C, storage temperature range: -20°C +85°C					
EMC test acc. to DIN EN 60947-5-2						

Sensor N

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All dimensions in mm





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Measuring Principle

Measuring principle of the sensors of COAST Series:

The sensors of the COAST series (COlor And STructure) are hybrid sensors consisting of a color sensor and a structure sensor.

The color sensor detects the color of the object to be controlled.

The structure sensor records data about the surface condition of the object. It then passes these on to the color sensor via an internal interface. The color sensor then evaluates the color data along with the data it receives from the structure sensor. It also serves the digital inputs and outputs and controls the communication with the PC interface COAST-Scope.

The interface is a PLC interface, an RS232 interface is available for each the color sensor as well as the structure sensor. The structure sensor is set at the factory so that it only has to be parameterized in exceptional cases. There is also a separate software COAST-STRUCT-Scope.

The COAST sensor provides highly flexible signal acquisition. For example, the sensor can be operated in alternating-light mode (AC mode), which makes the sensor insensitive to extraneous light. It also can be set to constant-light mode (DC mode), which makes the sensor extremely fast and allows a scan-frequency of up to 35 kHz. With the stepless adjustment of the integrated light source as well as the selectable gain of the receiver signal and an INTEGRAL function the sensor can be set to almost any surface.

The sensor detects the emission reflected back diffusely at the measurement object. Two white LED ring lights with adjustable transmitter power are used as light sources on the COAST sensor. An integrated 3-fold receiver for the red, green, and blue content of the light that is reflected from the object, is used as a receiver. The surface texture (structure) of the measurement object is imaged on a line sensor via an optical aperture system.

The sensors of the COAST series can be taught up to 31 surfaces, hereinafter referred to as **"teach vectors"** or **"vectors"**, that are provided directly at the outputs, and up to 64 vectors that are output by means of grouping. The vector is output which deviates the least from the current surface (minimum distance).

The respective detected vector either is provided as a binary code at the 5 digital outputs or can be sent directly to the outputs, if only up to 5 vectors are to be detected. At the same time the detected vector is visualised by means of 5 LEDs at the housing of the COAST sensor.

With a TEACH button at the sensor housing the color sensor can be taught up to 31 vectors (max. 64 vectors in group mode). For this purpose the corresponding evaluation mode must be set with the software. The TEACH button is connected in parallel to the input IN0 (green wire at cable cab-las8/SPS).

Parameters and measurement values can be exchanged between a PC and the COAST sensor through the serial RS232 interface. All the parameters can be saved to the non-volatile EEPROM of the COAST sensor through this serial RS232 interface. When parameterisation is finished, the sensor continues to operate with the current parameters in STAND-ALONE mode without a PC.





Measuring principle of the sensors of COAST Series:

The ring light is automatically switched over (forward scattering light / backward scattering light)

Backward reflection is used (viewed from the color sensor)



Backward reflection is used (viewed from the structure sensor)







Forward reflection is used (viewed from the color sensor)



Forward reflection is used (viewed from the structure sensor)





is LO and the other four are HI. If no color was detected,

COAST Series • Sensors for detection of COlor And STructure

			D Display
<u>ED display:</u>			
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	30	Fehler bzw. "nicht erkannt"	

Visualization of the teach vectors via LED display:

By means of 5 yellow LEDs, the detected vector is visualized on the housing of the COAST sensor. The vector displayed on the LED display is additionally output at the digital outputs OUT0 ... OUT4 of the 8-pin PLC fem. connector.

The output is determined by means of the parameter OUTMODE (in the example on the right, OUTMODE = BINARY HI):

With OUTMODE = BINARY HI or BINARY LO, a maximum of 31 vectors or vector groups can be taught. These are then output in <u>binary</u> form at the outputs.

With OUTMODE = DIRECT HI or DIRECT LO, a maximum of 5 vectors or vector groups can be taught. These are output directly at the outputs.

If COLOR GROUPS = ON, the sensor can be taught up to 48 vectors. However, only 31 groups can be formed with OUTMODE = BINARY, and only 5 groups can be formed with DIRECT.

Detail:







Windows® user interface:

(The current software version is available for download on our website.)

Software COAST-Scope

The COAST sensor is parameterized under Windows® with the COAST-Scope software. The Windows® user interface facilitates the teach-in process at the color sensor and supports the operator in the task of adjustment and commissioning of the COAST sensor.

			COAS	ST	Sco	pe \	/1.0)											
TEACH CONNECT	REC GEN	SCOPE PARA2	L D		GRN 0	BL	UE	0		-	M	ľ	LEN 0	DA	MM D	AREA	EX	рт	DPS 0
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The RS232 interface (tab PARA1 or PARA2) is used for setting sensor parameters such as e.g.:

Used for setting the gain of the color receiver (AMP1 ... AMP8)

- POWER MODE: Light power of the LED
- LED MODE: Triggering of the internal light source (AC, DC)
- GAIN:
- AVERAGE:
- INTEGRAL:
- MAXVEC-No.: Number of surfaces (vectors) to be controlled
- OUTMODE: Control of the digital outputs
- INTLIM:
- EXTEACH:

Minimum intensity required for evaluation It is possible to teach a vector externally via IN0 or via the button on the sensor housing

The structure sensor is set at the factory so that it only has to be parameterized in exceptional cases. There is also an own software "COAST-STRUCT-Scope".

The integral function allows even extremely weak signals to be reliably detected

Sensor

Number of measurement values over which the raw signal measured at the color receiver is averaged

Number of measurement values over which the raw signal measured at the color receiver is added up.



Software COAST-Scope: TEACH-TABLE



TEACH-TABLE:

The sensors of the COAST series can be taught up to 31 surfaces, hereinafter referred to as teach vectors or vectors, that are provided directly at the outputs, and up to 64 vectors that are output by means of grouping.

The vector is output which deviates the least from the current surface (minimum distance).



Firmware update by means of the software "FirmwareLoader":

🗶 FIRMWARE LOADER V1.1							
ESTABLISH CO	DNNECTION						
SELECT COMPORT [1256]	TRY TO CONNECT						
FIRMWARE UPDATE							
READ FIRMWARE FROM DISK	CLEAR WINDOW						
ARM FIRMWARE LOADER	DISARM FIRMWARE LOADER						
IT IS STRONGLY RECOMMENDED TO UPDATE THE FIRMWARE ACCORDING TO THE MANUAL!							
SPECTRO3 V4.0 RT May 09 2012							
READ EEPROM DATA FROM SENSOR	SAVE EEPROM DATA TO SENSOR						
EEPROM TRANSFER FILE d:\BackupFiles\EEPROM_Backup 1131.dat							

The software "Firmware Loader" allows the user to perform an automatic firmware update. The update will be carried out through the RS232 interface.

An initialisation file (xxx.ini) and a firmware file (xxx.elf.S) are required for performing a firmware update. These files can be obtained from your supplier. In some cases an additional firmware file for the program memory (xxx.elf.p.S) is also needed, and this file will be automatically provided together with the other two files.





Software COAST-STRUCT-Scope

The COAST-STRUCT-Scope software is used to parameterise the control unit for the control/evaluation of the COAST (STRUCT) sensor. The PC software visualises the measurement values that are provided by the sensor. It can therefore, among others, be used to select a suitable evaluation algorithm and to set tolerance limits for the inspection of the measurement object.

Data exchange between the PC user interface and the sensor system is effected through a standard RS232 interface. For this purpose the sensor is connected to the PC with the serial interface cable cab-las-4/PC or with the USB cable cab-4/USB. When parameterisation is finished, the setting values can be permanently saved in an EEPROM memory of the COAST (STRUCT) control unit. The COAST (STRUCT) sensor then continues to operate in "STAND-ALONE" mode without the PC.



The COAST-STRUCT-Scope CONTROL-PANEL provides a large variety of functions:

- Visualisation of measurement data in numeric and graphic output fields.
- Setting of the light source/exposure-time.
- Selection of a suitable evaluation mode.
- Saving of parameters in the RAM / EEPROM memory of the control unit or in a configuration file on the PC's hard disk.

