Model Number

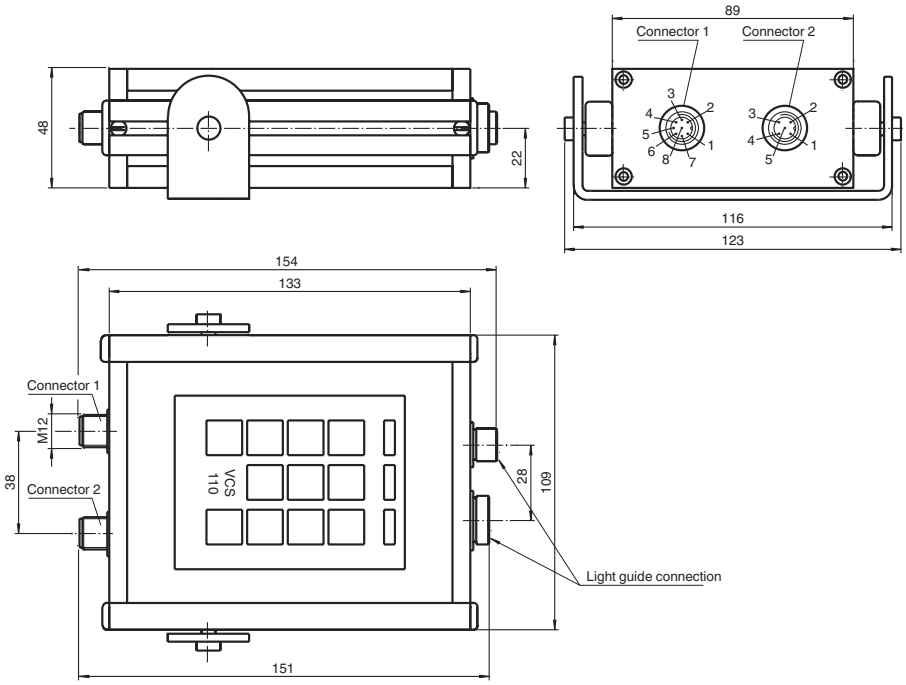
VCS110-10K

Color sensor
with two M12 x 1 connectors

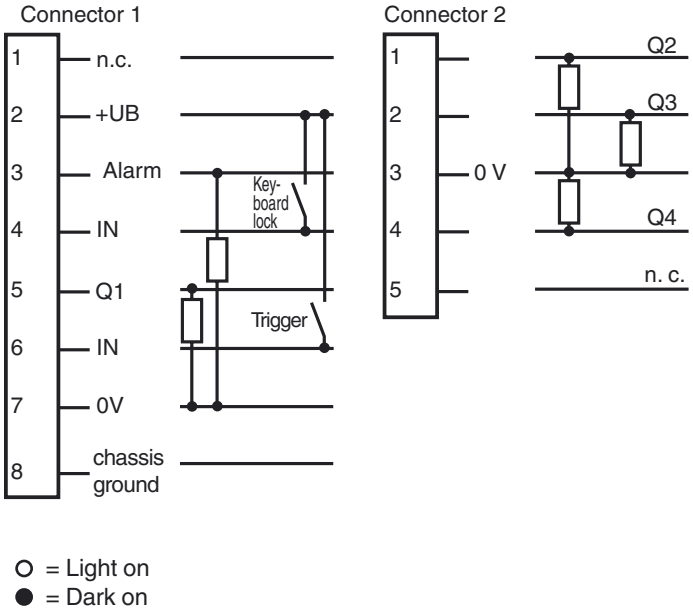
Features

- Color saving by TEACH-IN key
- Programmable up to 10 channels
- Color tolerances memorizable
- Light source white-light LED
- Signal outputs direct or binary coded
- For glass fiber optics or for plastic fiber optics

Dimensions



Electrical connection



○ = Light on
● = Dark on

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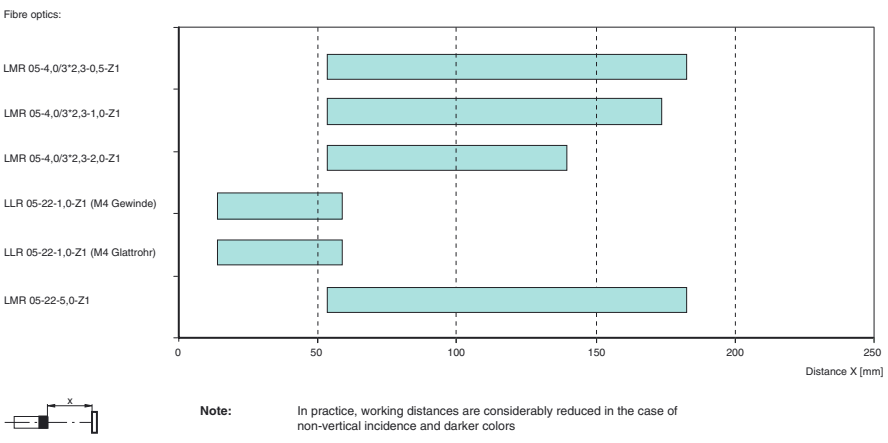
Technical data

General specifications		
Sensor range		max. 100 mm
Light source		LED
Light type		modulated white light
Light spot representation		approx. 5 mm ... 60 mm (depends on sensor range and fiberoptic cable)
Indicators/operating means		
Operation indicator		LED for power on
Function indicator		one yellow LED each per colour channel lights up if colour detected, three LEDs as adjustment accessories
Control elements		membrane keys
Electrical specifications		
Operating voltage	U_B	18 ... 30 V DC
Ripple		10 %
No-load supply current	I_0	max. 100 mA
Input		
Function input		Trigger, keyboard disable
Output		
Pre-fault indication output		PNP, active in TEACH-IN mode or if all value memory slots are empty
Switching type		according to $+U_B$ switching, if color detected
Signal output		4 PNP, short-circuit proof, binary coded, assigned to the value memory slots
Switching voltage		max. 30 V DC
Switching current		max. 200 mA per output
Switching frequency	f	40 Hz
Response time		4 ms
De-energized delay	t_{off}	20 ms
Standard conformity		
Standards		EN 60947-5-2
Ambient conditions		
Ambient temperature		-10 ... 50 °C (14 ... 122 °F)
Storage temperature		-20 ... 75 °C (-4 ... 167 °F)
Mechanical specifications		
Protection degree		IP65
Connection		M12 connector, 8-pin and M12 connector, 5 pin
Material		
Housing		aluminum
Optical face		Fiberoptics
Mass		300 g
Approvals and certificates		
CCC approval		CCC approval / marking not required for products rated ≤36 V
Approvals		CE, UL

Detection ranges VCS110



Note: In practice, working distances are considerably reduced in the case of non-vertical incidence and darker colors

Accessories

V15-G-2M-PUR
Female cordset, M12, 5-pin, PUR cable

V17-G-2M-PUR
Female cordset, M12, 8-pin, shielded, PUR cable

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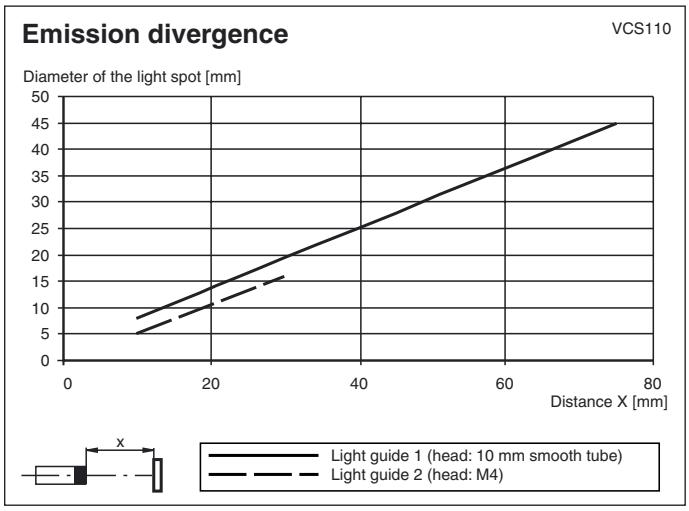
Curves/Diagrams



Function

The VCS is a colour sensor which is used to distinguish up to 10 colours. The colours can be programmed using 10 channels with the TEACH-IN key on the evaluation and control unit. A long-life white-light LED with greater light intensity is used for lighting.
The light reflected by the test object returns to the head of the fibre optic, which forwards it to the three-channel receiver.There the spectral portions of red, green and blue (RGB) are evaluated, digitised and processed in the microprocessor of the control interface.
To achieve contiguous colour detection, colour filters are used in the three-range procedure for red, green and blue.
On the output side, a model is available (VCS110- 5K) with five direct outputs for five different colours that can be selected from 10 saved colours, and a design (VCS110-10K) is also available with binary-coded outputs for up to 10 different colours.

Colour spectrum

The frequency range or the colour spectrum of the VCS110 is designed so that the evaluation takes place in the visible range of the spectrum. The wave range from 400 nm to about 700 nm is covered without any gaps.

TEACH-IN

The distance between the light wave guide end-piece and the test object must be adjusted so that the LED lights up with "OK". Depending on the type of light wave guide, the detection ranges are between 10 mm and 100 mm.
To put the device in TEACH-IN mode, press the INP key. The LED of the INP key flashes. Press the desired memory key. The corresponding LED flashes and the sampled colour undergoes TEACH-IN.

Relearning and adjusting of the tolerance ranges
Relearning is recommended for variations of the colour and for detection range. To do this, repeat the procedure described in the previous section (Teach-in). A tolerance field is automatically assigned to the teach-in colour template. Performing Teach-in twice for the same colour in a single memory slot at different distances results in Teach-in for the entire distance range.

Complete the Teach-in process:
In order to complete the Teach-in process, press the INP key again. The corresponding LED stops flashing and the device is in evaluation mode. As long as the device is in Teach-in mode, the alarm output is set.

Evaluation

VCS110-10K:
All 10 memory slots can be used separately and 10 different colours can be evaluated. The outputs are coded in binary in the following manner.

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Memory slots	Output (Q)
	4 3 2 1
1	0 0 0 1
2	0 0 1 0
3	0 0 1 1
4	0 1 0 0
5	0 1 0 1
6	0 1 1 0
7	0 1 1 1
8	1 0 0 0
9	1 0 0 1
10	1 0 1 0

VCS110-5K:
Teach-in can be performed for colours on all 10 channels. Two channels are assigned to each output, but only one channel can be activated. Press the desired memory key. The LED flashes and the output assigned to the memory slot is active. Then the output of the not selected memory cell is blocked.

Channel	Output (Q)
1+6	1
2+7	2
3+8	3
4+9	4
5+10	5

Alarm output:
If the device is in TEACH-IN mode or all memory slots in the channel are empty, the alarm output is set.

Delete memory

Delete the memory content of all memory slots:
The VCS110 is placed in the evaluation mode. Continue pressing the INP key until all LEDs are lit and have gone out again. The memory slots are deleted and the device is back in evaluation mode. If the INP key is released while the LEDs are lit, all memory slots are deleted, the device is back in TEACH-IN mode and the alarm output is set.

Delete the memory content of a memory slot:
Do not press the INP key, the device remains in evaluation mode. Continue pressing the memory key of the memory slot to be deleted until the LED changes from flashing to being lit up continuously.

Adjusting and Aligning

If the VCS110 is receiving a power supply 18 V ... 30 V, the distance between the colour mark to be detected and the output of the fibre optic is elected until the LED lights up with ''OK''. For glossy surfaces, you should select a detection angle of about 30° ... 60°.

Keyboard disable

The keyboard disable can be activated by applying $+U_{ST}$ to connector 1/pin4. No more keys can be pressed, but it is possible to continue the evaluation.

Ground:
The housing of the VCS110 can be grounded via connector 1, pin 8.

System accessories

Model number	Length	Description
V17-G-2M-PUR		connection cable 2m, 8-pin
V15-G-2M-PUR		connection cable 2m, 5-pin
LMR 05-22-5,0-Z1 VCS110[1)]	5 m	
LMR 05-22-10.0-Z1 VCS110[1)]	10 m	
LMR 01-4.0/3*2.3-0.5-Z1 VCS110[2)]	0.5 m	
LMR 01-4.0/3*2.3-1.0-Z1 VCS110[2)]	1.0 m	
LMR 01-4./3*2.-2.-Z1 VCS110[2)]	2. m	

1) Plastic light guide, reflex with rust-free flexible radiation coating; end sleeve: 85 mm long, diameter: 10 mm on 40 mm length

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2) Plastic light guide, reflex with rust-free flexible radiation coating; end sleeve: 50 mm long, diameter: 10 mm

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