Manual

CR100 and CR100-FO

Version 2.5

ASTECH
Angewandte Sensortechnik

Notes

The information contained in this manual has been thoroughly researched and prepared. Nevertheless, we cannot assume liability for omissions or errors of any nature whatsoever. We would, however, be grateful for your comments or suggestions.

We shall not accept any claims for damages, except for those resulting from intent or gross negligence.

As this product is available in several designs, there might be deviations between the descriptions and instructions in hand and the product supplied.

We reserve the right to make technical changes, which serve to improve the product, without prior notification. Thus, it cannot be assumed that subsequent versions of a product will have the same features as those described here.

Registered trademarks are the property of their manufacturers.

CR100 and CR100-FO - Manual V2.5

Revision history

Manual version	Date	Changes
2.5	02.03.2015	New design

The instruments are not to be used for safety applications, in particular applications in which safety of persons depends on proper operation of the instruments.
These instruments shall exclusively be used by qualified personnel.
Repair only by ASTECH.

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1 Technical Data

Table 1 : General technical data

Sensing channels	1 Sensing channel, 1 Internal stabilization channel
Drift stabilization	CROMLASTAB®, Can be switched off
Receiving detector	Three range photo diode
Sensitivity	Adjustable by user
Sensitivity steps	8 (1x, 4x, 20x, 40x, 80x, 200x, 400x, 800x)
Receiving signal resolution	3 x 4096 Stufen
Object illumination	Power white light LED Adjustable (4096 Steps) Can be switched off
Ambient light compensation	Can be switched off
Standard interfaces	4 Switching outputs 2 Control inputs Serial (RS-232)
Optional field bus interfaces	Not available
Displays	9 LEDs for outputs and status
Buttons	3 Buttons for Teach-In
Color resolution (L*a*b*)	$\Delta E_{Lab} \leq 1$
Response time	≥ 50 µs (limited functionality)
Off-Delay (channel specific)	0 ms ... 65535 ms
On-Delay	0 ms ... 65535 ms
Hysteresis	0 % ... 255 %
Color value memory cells	350
Color output channels	4 (up to 15 at binary encoding)
Protection standard	IP54
Power supply	18 ... 28 VDC, max. 500 mA
Case temperature for operation	-10 °C ... 55 °C
Coupling in signal path	CR100: Via optical fiber CR100-FO: Fixed optics
Optical fiber adaption CR100	M18x1
Working distance CR100-FO	30 mm ... 60 mm
Spot size CR100-FO	5 mm ... 10 mm
Housing material	Aluminum, anodized
Housing size	50 mm × 50 mm × 21 mm
Weight	Ca. 80 g

Table 2 : Operational functionality

Color space modes	Non-self-shining objects XYZ, XyY, u'v'L*, L*a*b*, xyl Self-shining objects XYZ, xyY, u'v'L*, xyl
Color recognition modes	Check spherical tolerance Check cylindrical tolerance Minimal distance
Operating modes	External triggering Color grouping Color sequence recognition
Parameterization	Elaborately via PC Software Limited via 3 buttons

2 Specification electrical interfaces

Figure 1 shows the electrical connectors (type M9) of the sensor.

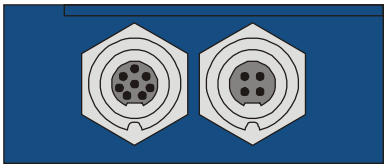

Figure 1 : Electrical interfaces

The counting order of round connectors is shown in Figure 2.

Figure 2 : Counting order of the round connectors

Table 3 : Signal description sensor connector AB1

Pin (color)	Name	Description
1 (white)	OUT1	Sensor output 1
2 (brown)	OUT2	Sensor output 2
3 (green)	TRG1	Input for external triggered Teach-In in mode "Ext. Teach"
4 (yellow)	TRG0	Input for updating the sensor outputs in mode "Extern Trig." Input for trigger controlled color sequence in mode "Trig. Sequ."
5 (grey)	OUT3	Sensor output 3
6 (pink)	OUT4	Sensor output 4
7 (blue)	GND	Ground
8 (red)	$+U_B$	Power supply
Shield	SH	Device shield (earth)

Table 4 : Electrical specification sensor connector AB1

Pin	Specification
1 (OUT1)	Push-Pull LOW: 0 V; HIGHT: $+U_B$ - 1 V; max. 100 mA
2 (OUT2)	Push-Pull LOW: 0 V; HIGHT: $+U_B$ - 1 V; max. 100 mA
3 (TRG1)	LOW: 0 V ... 3 V; HIGH: 18 V ... 28 V
4 (TRG0)	LOW: 0 V ... 3 V; HIGH: 18 V ... 28 V
5 (OUT3)	Push-Pull LOW: 0 V; HIGHT: $+U_B$ - 1 V; max. 100 mA
6 (OUT4)	Push-Pull LOW: 0 V; HIGHT: $+U_B$ - 1 V; max. 100 mA
7 (GND)	0 V
8 ($+U_B$)	18 ... 28 VDC, max. 500 mA (optional 9 ... 28 VDC)

Table 5 : RS-232

Pin	Description	Specification
1 (GND)	GND	0 V
2 (TXD)	Send	-5 V ... +5 V
3 (RXD)	Receive	-5 V ... +5 V
4 (+U_B)	Optional voltage output	18 ... 28 VDC
Shield	Device shield (earth)	Earth

Table 6 : RS-232 Parameters

Parameter	Value
Baud rate	9.600 ... 115.200
Data bits	8
Parity	no
Stop bits	1
Flow control	No

The baud rate of the RS-232 interface is pre-set to 28800.

Make sure that the respective shield wires of the used sensor cables are properly connected to earth!

3 Drawings

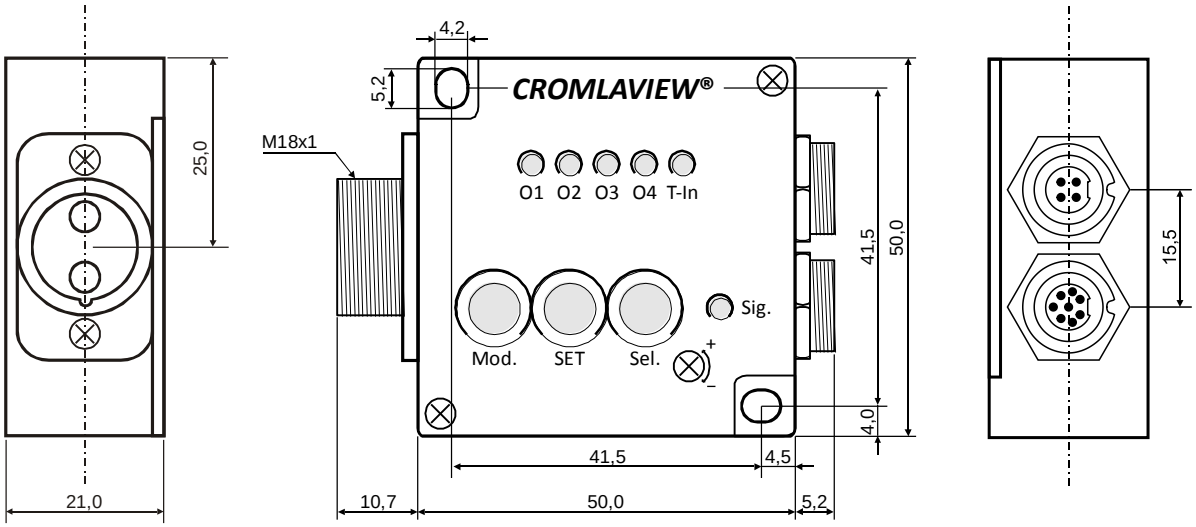

Figure 3 : Drawings CR100

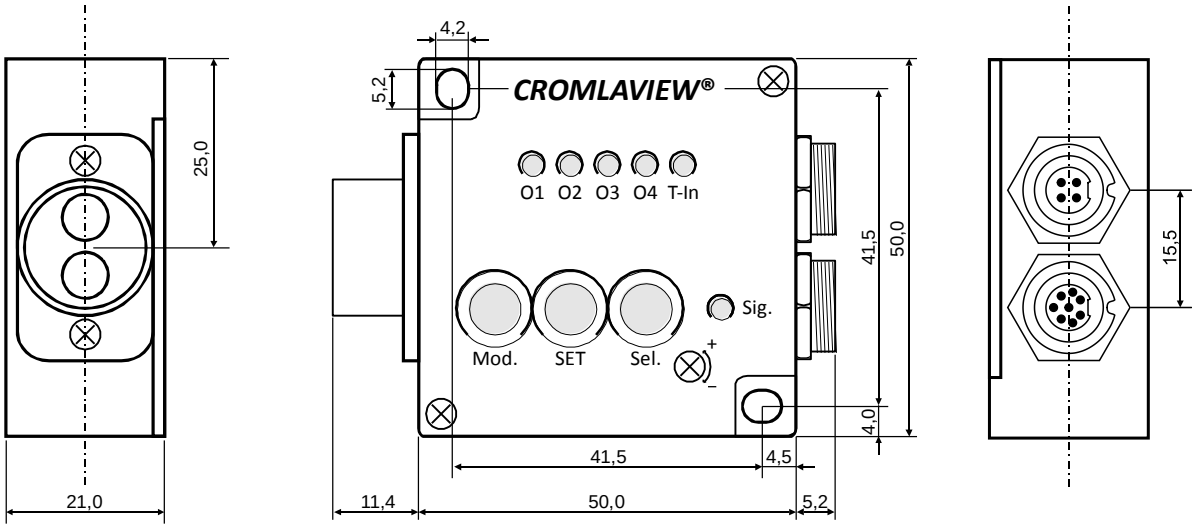

Figure 4 : Drawings CR100-FO (fixed optics)

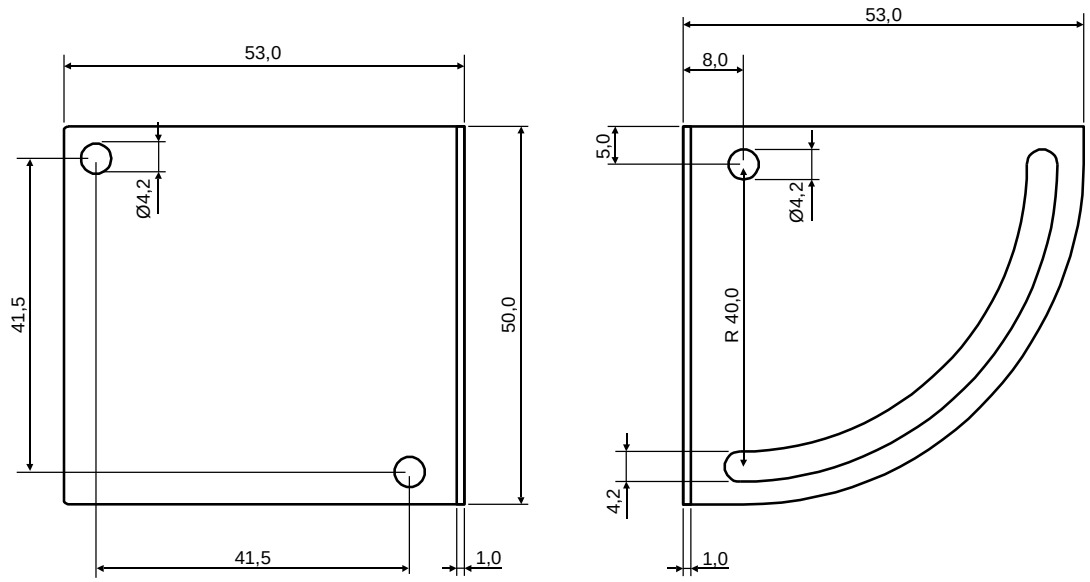

Figure 5 : Mounting bracket CR50-FO and CR100-FO

4 Thermal specifications

The sensor is stabilized against thermal drift. With setting of very high power of LED light in connection with a high scanning frequency the temperature will increase and thus drift phenomena may occur. To ensure a safe color recognition, the sensor should be screwed to a heat sink with a heat resistance small than 0.5 K / W. For example this can be a standard aluminum heat sink with the size of 200 mm x 200mm with a gill height of 50mm. Large parts of machines also can be used.

The sensor can be very hot without using a heat sink. The use of a heat sink is strongly recommended to avoid injury.

5 Displays

Table 7 : LED meaning

LED	Meaning
O1	State output 1
O2	State output 2
O3	State output 3
O4	State output 4
T-In	Teach-In mode active
Sig.	Signal mode active
Sel.	Sensing channel 2 active
SET	Tolerance

Table 8 : Assignment of flash impulses to tolerance values

Flash impulses	Tolerance	Tolerance value
1	Very small	3
2	Small	6
3	Medium	9
4	Large	15
5	Very large	20

If the sensor signal is clipping the LEDs are flashing alternately.

6 Button operation

Automatic signal adjustment

- Position sensor to object
- Press "Mode" button shortly until "Sig." mode is active
- Press "SET" button for at least 2 seconds
- To store parameters press "Mode" button for at least 2 seconds

Sample stabilization reference value

- Press "Mode" button shortly until "Sig." mode active
- Press "Sel." Button shortly to select stabilization channel
- Adjust signal level for stabilization channel mechanically (adjusting screw)
- Press "SET" button for at least 2 seconds
- To store parameters press "Mode" button for at least 2 seconds

Teaching in colors

- Position sensor to object
- Press "Mode" button shortly until "Teach-In" mode active
- Press "Sel." button to select table entry
- Press "SET" button for at least 2 seconds
- To store parameters press "Mode" button for at least 2 seconds

Adjust tolerance

- Press "Mode" button shortly until "Teach-In" mode active
- Press "SET" button shortly to select tolerance
- To store parameters press "Mode" button for at least 2 seconds

Clear color table

- Press "Mode" button shortly until "Teach-In" mode active
- Press "Sel." button for at least 2 seconds
- To store parameters press "Mode" button for at least 2 seconds

7 Part numbers

Part	Part number
CR100 color sensor	10-3000-00
CR50-FO color sensor	10-3000-02
Fiber optical cables	See catalogue (18-0003-00)
Connection cable, 8-pin., M9 / open, 2 m	15-3000-00
RS-232 cable, 4-pin., M9 / D-SUB9, 2 m	15-3001-00
M9 protection cap	15-3010-00
Mounting bracket CR50-FO / CR100-FO	12-3000-00

Surge protection

To use the sensor in systems where the supply voltage line > 3 meters, it is recommenced to use a filter module to protect against surges. A suitable 24 V DC filter module (surge) is available from the company WAGO under order number 750-626.

8 Declaration of Conformity

Manufacturer	**ASTECH Angewandte Sensortechnik GmbH**
Address	18057 Rostock
	Schonenfahrerstr. 5
	Deutschland
Product name	CR100/ CR100-FO
Device description	Color sensor

EG Declaration of Conformity

In accordance with the Directive of Electromagnetic compatibility 2004/108/EG

Conforming to the following standards

Radio disturbance characteristics:	EN 61000-6-3:2007
EMC immunity	EN 61000-6-2:2005

In addition the following standard is passed:

EN 61326-1:2006;	Electrical equipment for measurement, control and laboratory use – EMC requirements; Classification: Class B (emission); Industrial equipment (immunity)
Place	Rostock
Date	Januar 2010

ASTECH Angewandte Sensortechnik GmbH

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