

## VISOR® object sensor V20 Advanced

from Page 64

*Vision sensors for object detection and classification*

- Highly accurate evaluation via 1.3 megapixel chip
- 255 inspection tasks available, 255 evaluations can be used for each inspection task



## VISOR® Color

from Page 80

*Improved object detection through additional colour information*

- Highly accurate evaluation via 1.3 megapixel colour chip
- Powerful colour detection, even with the smallest of colour nuances or self-illuminating components
- 255 inspection tasks available, 255 evaluations can be used for each inspection task



## Eyesight vision system V20 Advanced

from Page 108

*Complete image-processing package with robust and flexible smart camera*

- Highly accurate evaluation via 1.3 megapixel (colour) chip
- No limitation of inspection tasks (40 MB)



## F 10 – sub-miniature sensors as LED variant

*For installation in the smallest of spaces and in moving machine parts*

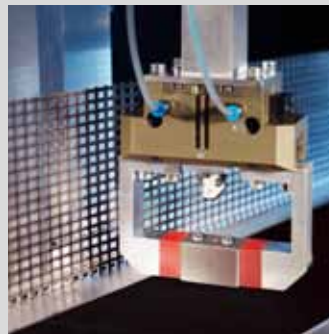
- High performance – small dimensions
- Special variant for detection of dark blue objects



Determining coil thickness – FT 55  
Time-of-flight sensors



Correctly positioned? – VISOR® vision sensors



Fits into a robot arm – F 10 sub-miniature sensors



Reliable colour detection in a miniature housing – FT 25-C



All LEDs in the right place? – VISOR® Color



Dancer roll regulation – FT 25-RA

**FT 25-RA – sub-miniature distance sensor**
**from Page 148**
*For control tasks such as dancer roll regulation on automatic winding machines thanks to high repeatability*

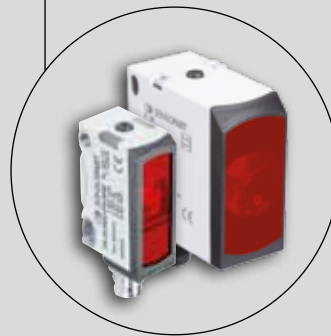
- Operating range (scanning distance) from 20 mm to 200 mm
- Simple integration thanks to small housings
- Analogue output 0 ... 10 V


**FT 25 C – miniature RGB colour sensor**
**from Page 190**
*Smallest RGB colour sensor with a high switching frequency of  $\leq 10$  kHz for rapid applications*

- Reliable detection of "non-colours", e. g. black, white and grey
- Very small and precise light spot for the detection of the smallest of marks


**FR 25/55-RLO – autocollimation photoelectric sensors**
**from Page 266/300**
*The specialists for small-part and front-edge detection*

- Detection possible from range zero
- High switching accuracy and positioning accuracy on lateral object approach


**F 55 – time-of-flight sensors**
**from Page 166**
*Compact sensors for distance measurement and object detection*

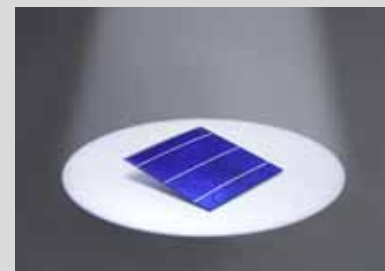
- For measurement, regulatory and detection tasks on all object surfaces at large distances
- Reliable object detection even with bright, highly reflective or shiny backgrounds



made in Germany

Product news		
	Special features	Page
VISOR® Object sensor V20 Advanced	Vision sensor for object detection and classification with 1.3 mega pixel resolution	64
VISOR® Color	Improved object detection through additional colour information	80
Eyesight Vision-System V20 Advanced	Complete image-processing package with robust and flexible Smart Camera	108
F 10 – sub-miniature distance sensors with LED	For installation in the smallest of places and in moving machine parts	226
FT 25-RA – miniature distance sensor	For control tasks such as dancer roll regulation on automatic winding machines thanks to high repeatability	148
FT 25 C – miniature RGB colour sensor	Smallest RGB colour sensor with a high switching frequency of $\leq 10$ kHz for rapid applications	190
FR 25/55-RLO – autocollimation photoelectric sensors	The specialists for small-part and front-edge detection	266/300
F 55 – time-of-flight sensors	Compact sensors for distance measurement and object detection at long distances	166

# Product overview – vision sensors and systems



Features/sensors	VISOR® Object Sensor		VISOR® Color		VISOR® Solar Sensor	
	V10 Standard	V10/V20 Advanced	V10C Standard	V10C/V20C Advanced	V10 Standard	V10 Advanced
<b>Highlights</b>	Object detection and classification		Improved object detection through additional colour information		Positioning and inspecting solar cells	
			Colour area – –	Colour area Colour list Colour value	Wafer position and breakouts –	Wafer position and breakouts Busbar position and number
<b>Functions</b>						
Resolution in pixels V10	736 x 480 Mono	736 x 480 Mono	736 x 480 Colour	736 x 480 Colour	736 x 480 Mono	736 x 480 Mono
Resolution in pixels V20	–	1280 x 1024 Mono	–	1280 x 1024 Colour	–	–
Image rate per second V10   V20	50   –	50   40	40   –	40   20	50   –	50   –
Number of jobs   detectors	2   32	max. 255   max. 255	8   32	max. 255   max. 255	2   32	max. 255   max. 255
Position tracking	–	✓	✓	✓	–	✓
Contour matching (X-,Y-translation, rotation)	✓	✓	✓	✓	–	–
Pattern comparison (X-,Y-translation)	✓	✓	–	✓	–	✓
Grey threshold	✓	✓	–	✓	✓	✓
Contrast	✓	✓	✓	✓	✓	✓
Brightness	✓	✓	–	✓	✓	✓
Freeform tool	Contour only	✓	–	✓	–	✓
<b>Interfaces</b>						
Inputs   outputs	2   4	2   4	2   4	2   4	2   4	2   4
Freely definable switching outputs/inputs, PNP or NPN	2	4	2	4	2	4
Encoder input	–	✓	–	✓	–	✓
I/O expansion	–	✓	–	✓	–	✓
RS 422   RS 232	–   –	✓   ✓	–   –	✓   ✓	–   –	✓   ✓
Ethernet	✓	✓	✓	✓	✓	✓
EtherNet/IP	✓	✓	✓	✓	✓	✓
<b>Lens</b>						
V10 integrated, 6 mm   12 mm   25 mm	✓   ✓   –	✓   ✓   ✓	✓   ✓   –	✓   ✓   ✓	✓   –   –	✓   ✓   –
V20 integrated, 12 mm	–	✓	–	✓	–	–
C-mount	–	✓	–	✓	–	✓































































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









































































VISOR® Code Reader		
V10 Standard	V10/V20 Advanced	V20 Professional (OCR)
<b>Code reading</b>		
Data code	Data code	Data code
Bar code	Bar code	Bar code
–	–	Optical character recognition (OCR)
736 x 480 Mono	736 x 480 Mono	–
–	1280 x 1024 Mono	1280 x 1024 Mono
50   –	50   40	–   40
8   1	max. 255   max. 255	max. 255   max. 255
–	✓	✓
–	–	–
–	✓	✓
–	✓	✓
–	✓	✓
–	✓ (not with data codes and bar codes)	✓ (not with data codes, bar codes and OCR)
2   4	2   4	2   4
2	4	4
–	✓	✓
✓	✓	✓
✓   ✓	✓   ✓	✓   ✓
✓	✓	✓
✓	✓	✓
✓   ✓   –	✓   ✓   ✓	–
–	✓	✓
–	✓	✓

Features/system	Eyesight Vision System	
	V10/V20	V10C/V20C (Colour)
<b>Functions</b>		
Resolution in pixels V10	736 x 480 Mono	736 x 480 Colour
Resolution in pixels V20	1280 x 1024 Mono	1280 x 1024 Colour
Image rate per second V10   V20	50   40	40   20
Number of inspection programs	max. 40 Mbyte	max. 40 Mbyte
<b>Commands</b>		
Image/camera	Image capture, camera settings	
Colours	Select colour channel, colour inspection, colour filter (V10C/V20C)	
Pre-processing	Calibration and position tracking, correct brightness, remove background, filter functions	
Inputs/outputs	Test input, set output, access INI file, text, data transfer – serial, data transfer – LAN	
Visualisation	Image transfer	
Measurement	Image information, area test, list of points, determine points, determine lines, calculate circle, calculate distance, line distance, calculate cross-section, measure gap width, calipers, calculate angle, determine warpage point	
Program control	Stop watch, control of sequence and loop options, subprogram, access variable, evaluation	
Pattern/contour comparison	Count objects, inspect contour, track contour, correlation	
Scanning	Scan points, circular scanner, edge counter, find edges (projected), search ring for counting	
Access to libraries	Script interpreter	
<b>Interfaces</b>		
Inputs   outputs	2   4	2   4
Freely definable switching outputs/inputs	4	4
I/O expansion	✓	✓
RS422   RS232	✓   ✓	✓   ✓
Ethernet	✓	✓
<b>Lens</b>		
V10 integrated, 6 mm   12 mm	✓	✓
V20 integrated, 12 mm	✓   ✓	✓   ✓
C-mount	✓	✓




# Product overview – optical sensors

Product family Dimensions (H x W x D)		Distance sensors (Analogue sensors)	Colour (C), contrast (K) and luminescence sensors (UV)	Proximity switches
<b>F 10</b> 21,1 x 14,6 x 8 mm <sup>3</sup>				
<b>F 25</b> 34 x 20 x 12 mm <sup>3</sup>		FT 25-RA   20 – 80 mm 	FT 25-RL   250 mm   K  	FT 25-RL   250 mm  
		FT 25-RA   30 – 200 mm 	FT 25-W   12 mm   K 	FT 25-R   800 mm 
			FT 25-RGB   12 mm   K 	
			FT 25-C   12 mm   C 	
<b>F 55</b> 50 x 50 x 23 mm <sup>3</sup>		FT 55-RLAP   5 m  		FT 55-RL2   1.200 mm  
				FT 55-R   2.000 mm 
	Stainless steel			FT 55-RM   1.750 mm 
<b>F 20</b> 32 x 20 x 12 mm <sup>3</sup>		FT 20-RA   20 – 80 mm 		FT 20-RL   150 mm  
				FT 20-R   300 mm 
				FT 23-R   300 mm
<b>F 50</b> 50 x 50 x 17 mm <sup>3</sup>		FT 50-RLA-20   40 – 60 mm 	FT 50-C   32 mm   C  	
		FT 50-RLA-40   45 – 85 mm 	FT 50-CUV   50 mm   UV 	
		FT 50-RLA-70   30 – 100 mm   		
		FT 50-RLA-100   70 – 170 mm   		
		FT 50-RLA-220   80 – 300 mm   		
<b>Cylindrical sensors</b> Ø 4/5 mm Ø 12 mm Ø 18 mm Ø 30 mm				FM 04/05   50 mm
				FT 12-R   300 mm
				FT 18-2-R   400 mm
				FMS 18-B   400 mm
				FT 18-2-IR   800 mm
				FMS 30-B   1.000 mm
<b>FL 70</b> 84 x 35 x 10 mm <sup>3</sup>				
<b>F 80</b> 83 x 65 x 25 mm <sup>3</sup> <b>F 90</b> 95 x 93 x 42 mm <sup>3</sup>		FT 80-RLA-500   250 – 750 mm   		
		FT 91/92-ILA   6 m    		
		FR 91/92-ILA   10 m    		
		FR 91/92-ILA   50 m    		
		FR 90-ILA   250 m    		
<b>FG   FGL</b>				
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Proximity switches with background suppression	Photoelectric reflex switches	Through-beam photoelectric switches	Fibre-optic sensors	Page
FT 10-RLH   60 mm  	FR 10-RL   2 m  	FS/FE 10-RL   3 m  		226
FT 10-B-RLF   15/30 mm 	FR 10-R   1,6 m 			
FT 10-RH   70 mm 				
FT 10-RF   15/30/50 mm				
FT 10-BF   30 mm (Bluelight)				
FT 25-RLH   120 mm  	FR 25-RL   13 m  	FS/FE 25-RL   18 m  		148 206 250
FT 25-RH   200 mm 	FR 25-R   6 m 	FS/FE 25-R   13 m 		
FT 25-RHD   400 mm 	FR 25-RF   3 m	FS/FE 25-RF   4 m		
FT 25-RF   60/80 mm	FR 25-RGO   2 m  			
	FR 25-RLO   4 m  			
FT 55-RLH   800 mm  	FR 55-RL   12 m  	FS/FE 55-RL   25 m  		166 250
FT 55-RL2H   1.000 mm 	FR 55-R   12 m 	FS/FE 55-R   20 m 		
FT 55-B-RH   800 mm 	FR 55-RLO   20 m  			
FT 55-RH   1.200 mm 				
FT 55-RLHP   5 m  				
FT 55-RHM   550 mm 	FR 55-RM   11 m 	FS/FE 55-RM   15 m 		150 316 436
FT 20-RLH   60 mm  	FR 20-RL   3 m  	FS/FE 20-R   8 m 	FL 20-R   Proximity switch 100 mm  P/E switch 1.000 mm	
FT 20-RLHD   110 mm  	FR 20-R   2,5 m 	FS/FE 23-R   4 m		
FT 20-RH   100 mm 	FR 20-RD   3,5 m 			
FT 23-RF   60 mm	FR 23-R   2,5 m			
FT 20-IH   150 mm 	FR 20-RG/RG 1   0,5 m  			
	FR 20-RLO   4 m  			
FT 50-RLH   150 mm  	FR 50-RL   20 m  	FS/FE 50-I   15 m 		154 196 352
FT 50-RLHD   300 mm  	FR 50 R   5,5 m 			
FT 50-RH   300 mm 				
FT 50-IH   600 mm 				
FT 12-RH   60 mm 	FR 12-R   1,5 m	FS/FE 12-RL   5 m 		392
FT 12-RF   24 mm		FS/FE 12-R   4 m		
FMH 18   120 mm		FS/FE 18-RL   50 m 	FMS 18-U   Proximity switch 160 mm P/E switch 700 mm	
	FR 18-2-R   3 m	FS/FE 18-R   20 m	FMS 30-U   Proximity switch 800 mm P/E switch 4.800 mm	
	FR 18-2-IR   3,6 m	FLS/FLE 18-W   50 m 	FAV 30   500 mm	
		FSE 18-2-I   10 m		
			FL 70-R   Proximity switch 310 mm  P/E switch 810 mm	440
			FL 70-R-XD   Proximity switch 310 mm   P/E switch 810 mm	
FT 92-IL  				162 168 170
		FGL-RK   30–120 mm 		534
		FGL-IK   30–120 mm 		
		FGL   5–220 mm 		
		FG   40–120 x 80 mm <sup>2</sup> 		
218	218	218	430	

# Product overview – ultrasonic, inductive and capacitive sensors, Smart

## Ultrasonic Sensors

Products	Adjustment	Scanning distances	Special features	Page
UT 20	Teach-in 	140 mm / 150 mm / 240 mm / 700 mm	Ultrasonic sensors with soundpipe, PNP, NPN, analogue output	548
UT 12	Via control input	400 mm	PNP, NPN, analogue output	564
UT/UM 18	Via control input	250 mm / 300 mm / 800 mm	Variants with stainless steel housings, PNP, NPN, analogue output	568
UMT 30	Teach-in or display  	350 mm / 1300 mm / 3400 mm / 6000 mm	Display, PNP, 2 x PNP or analogue output	578

## Inductive Sensors

Products	Design	Switching distance	Special features	Page
IT 8 / 10 / 12 / 40 IS 455 / 588	Cubic 	0.8 mm / 1.5 mm / 3 mm / 4 mm / 8 mm / 15 mm / 20 mm / 35 mm	Miniature housing, AC/DC variants	600
IS 33	Cylindrical Ø 3 mm 	0.6 mm	PNP, NPN	608
ISN 44-20 IS 34 IT 4	Cylindrical Ø 4 mm 	0.8 mm	PNP, NPN, NAMUR, stainless steel housing	609
IMT 5	Cylindrical Ø 5 mm 	0.8 mm	PNP, NPN, stainless steel housing	612
ISZ 46 IS 46 / 56 IDT 6	Cylindrical Ø 6,5 mm 	1.5 mm / 2 mm / 3 mm	PNP, NPN	613
IS 48 / 58 IMT 8	Cylindrical Ø 8 mm 	1.5 mm / 2 mm / 3 mm / 6 mm	PNP, NPN	617
IMT 12 IT 12 IS 512	Cylindrical Ø 12 mm 	2 mm / 4 mm / 6 mm / 10 mm	PNP, NPN	624
IS 514	Cylindrical Ø 14 mm 	3 mm	PNP, stainless steel housing	631
IMT 18 IS 518 IT 18	Cylindrical Ø 18 mm 	5 mm / 8 mm / 10 mm / 12 mm / 20 mm	PNP, NPN, stainless steel housing	632
IMT 30 IS 530 IT 30	Cylindrical Ø 30 mm 	10 mm / 15 mm / 20 mm / 22 mm / 40 mm	PNP, NPN, stainless steel housing	639
IS 512 / 518	Cylindrical Ø 12 mm / 18 mm analogue 	6 mm / 10 mm	Analogue output	629

## Capacitive Sensors

Products		Installation	Adjustment	Switching distance	Page
KD/KL 06		Flush / non-flush	Potentiometer	0.1 ... 1.5 / 0.1 ... 3 mm	654
KD/KL 08		Flush / non-flush	Potentiometer	0.1 ... 1.5 / 0.1 ... 3 mm	656
KD/KL 12		Flush / non-flush	Potentiometer	1 ... 4 / 1 ... 8 mm	658
KD/KL 18		Flush / non-flush	Potentiometer	2 ... 8 / 2 ... 15 mm	660
KD/KL 30		Flush / non-flush	Potentiometer	1 ... 20 / 1 ... 30 mm	662

## SmartPlug

Products	Special features	Page
MFI (Inverter)	<p>Inverts NPN to PNP or PNP to NPN devices, N.C./N.O. also adjustable</p> <p>Adjustable counter (pulses or intervals) between 1 ... 65535 ms</p> <p>Adjustable on-delay or drop-out delay between 1 ... 65535 ms</p> <p>Adjustable frequency monitoring between 15 ... 1000 Hz</p> <p>Adjustable wipe function for falling or rising edges; time range 1 ... 65535 ms</p> <p>All-in multifunctional switching device programmable via USB</p>	668
MFC (Counter)		670
MFT (Timer)		672
MFF (Frequency)		674
MFW (Wipe Function)		676
MFU (Universal)		678

## Accessories

Products	Description	Page
Mechanical accessories	Brackets for sensors	A-4
	Mountings for VISOR® and illumination	A-12
Optical accessories	Reflectors and reflective tape	A-16
	Lenses and protective casings	A-23
	Illumination	A-25
Electrical accessories	Cables	A-32
	Converters	A-36
	Power supply units and switching devices	A-37