

## COLORLINE-1728

### Colinear CCD Color Line Scanning Camera

#### General



The COLORLINE-1728 image recorder consists of a CCD color line scanning camera which is distinguished by outstanding sensitivity, linearity and color stability. The color pixels in the utilized sensor chip are not arranged in three staggered, side-by-side sensor lines, but rather in a single line with a pixel sequence of R(ed), G(reen), B(lue) resulting in the following line configuration: RGBRGBR etc. As opposed to three-line technology, this single line array is often advantageous in industrial applications. The object to be scanned is seldom moved at a constant speed. This means that colour line scanning cameras which utilize three sensor lines (RGB) arranged one next to the other require external synchronization logic in order to match up the lines. In the event

of irregular speeds, this problem is quite difficult, or impossible to solve (e.g. sorting free-falling objects).

Process trigger signals can be directly connected to the COLORLINE-1728, for example from an incremental encoder used to indicate the beginning of the line, or a frame start initiator. These devices are supplied with suitable electrical power directly from the camera. This results in extremely simplified system wiring because, as a rule, all of the components are installed at the production line anyway. The camera is furnished with a single-supply 12 V mains power pack, because all required operating voltages can be generated by means of a DC-DC converter inside the camera. Some frame grabbers provide 12 V DC auxiliary power at the computer side via their interface plugs. In this way, supply power can also be fed to the camera via the data / interface cable. If the frame grabber is not equipped with auxiliary power, the 4-pin power socket at the back of the camera is used.

#### Special Features

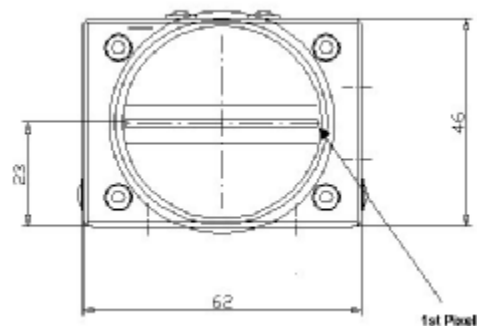
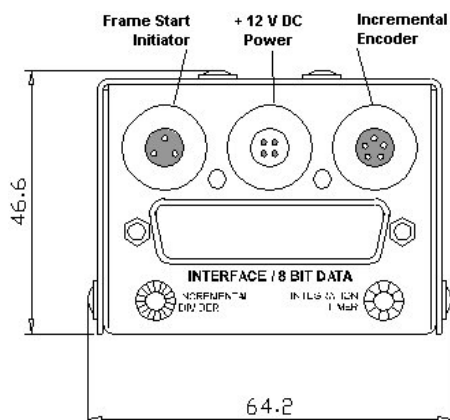
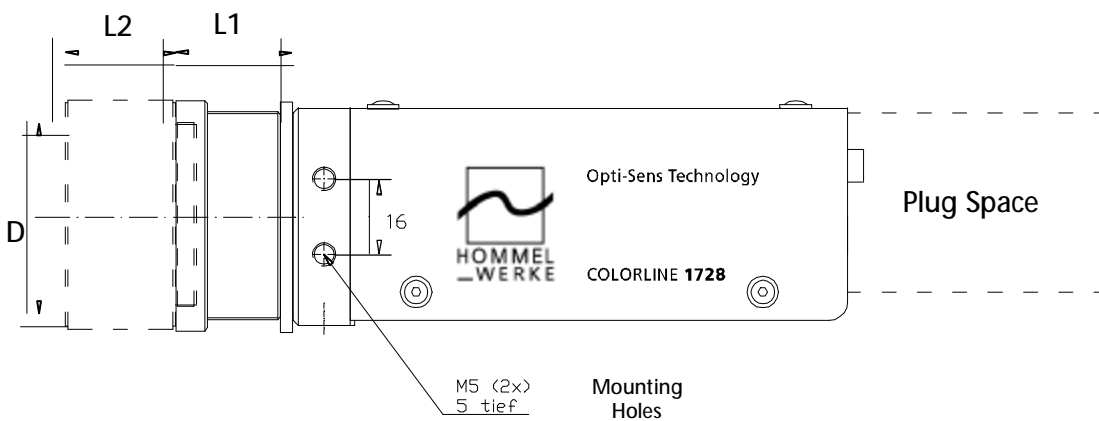
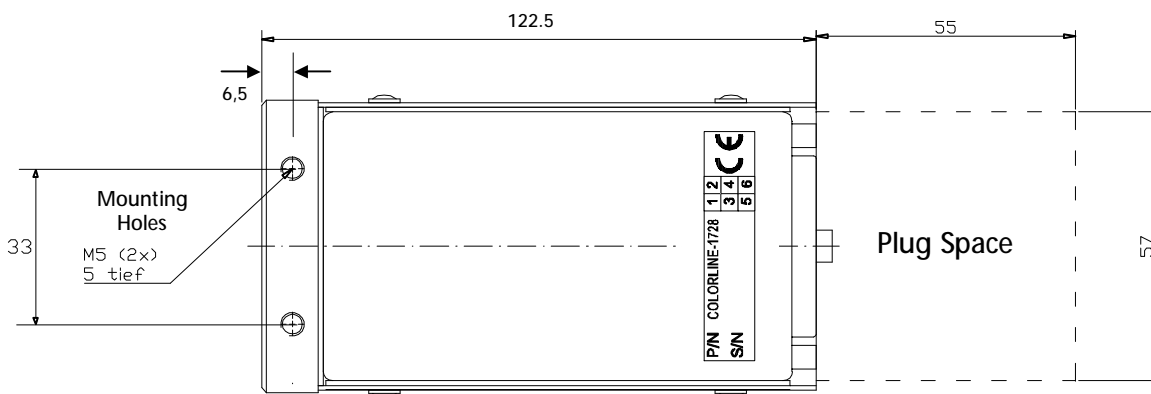
- Single line pixel array: RGBRGBR ...
- Watchdog in the camera:  
If the production line comes to a standstill, the camera continues to run on its own at 38 Hz. Valid lines are transmitted once again, immediately after production is resumed.
- Trigger sources for line and image import can be connected directly to the camera, and power is supplied from the camera.
- Adjustable exposure time in free-running and encoder controlled operating modes
- Adjustable prescaler for line trigger signals from the incremental encoder
- Camera can be operated in free-running mode
- Single operating voltage: +12 V DC
- Internal or external master clock
- Exposure time control
- Highly sensitive:  
R 3.7, G 5.5, B 2.2 V / (lx\*s)
- Gain can be programmed with control bits
- All trigger and control functions are implemented via the frame grabber.

## Technical Data

Sensor		Timing	
Pixel size	7 x 14 $\mu\text{m}$	Pixel frequency	max. 10 MHz
Number of pixels	5184 (3 x 1728)	Free-running line frequency	max. 4.70 KHz
Active sensor line length	36.288 mm	External starting frequency	max 4.60 KHz.
Sensitivity	R 3.7 V / (lx*s)	G 5.5 V / (lx*s)	B 2.2 V / (lx*s)
Electronics			
Inputs	Selection: MCLK INT / EXT	RS 644 LVDS	
HD SUB 44	Static low corresponds to	Grabber master clock active	
	Static high corresponds to	Camera master clock active	
	External master clock (MCLK)	RS 644 LVDS	
	External line start (EXSYNC) including shutter function	RS 644 LVDS	
	Falling edge triggers	Line start	
	Low state corresponds to	Integration time	
Optional	Shutter (integration control)	RS 644 LVDS	
	High	Integration time	
	Low	Pixel reset	
Inputs	Frame start	Low ~ 0.5V – high ~ +12 V	
3-pin initiator socket	PNP or NPN initiators 10 to 30 V DC devices		
5-pin incremental encoder socket	Line start via incremental encoder + 5 V supplied to encoder	RS 644 or RS 422	
4-pin power socket	Operating voltage / current	+ 12 V DC $\pm$ 10%, ~ 350 mA	
Outputs	PIXEL VALID (PVAL)	RS 644 LVDS	
HD SUB 44	LINE VALID (LVAL)	RS 644 LVDS	
	VIDEO DATA (8 BIT)	RS 644 LVDS	
	FRAME START	RS 644 LVDS	
Power consumption	Including operating current for incremental encoder and initiator	4.2 W	
Operating temperature		0 to 50° C	
Max. relative humidity	No condensation	90%	
Camera weight	Without lens	430 g	
Lens	Lens mount	Nikon bayonet	

## Camera Dimensions and Installation

The camera must be mounted in an electrically isolated fashion, i.e. electrically conductive connections between the camera housing and the machine must be precluded. The camera is earthed via the connector cable which runs from the grabber (PC) to the camera. This prevents interfering ground loops, which may significantly impair signal quality.

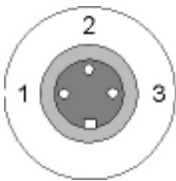

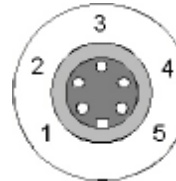


## Connector Pin Assignments

HD 44 interface, female – signals listed in pairs

Pin	Signal	Pin	Signal
40	+ D0	20	OVD
39	- D0	36	+ frame trigger
12	+ D1	35	- frame trigger
11	- D1	34	- MCLK
27	+ D2	33	+ MCLK
26	- D2	4	+ MCLK mode, int / ext
42	+ D3	3	- MCLK mode, int / ext
41	- D3	19	+ EXSYNC
14	+ D4	18	- EXSYNC
13	- D4	2	+ future use, in
29	+ D5	1	- future use, in
28	- D5	21	gain bit: 0 TTL
44	+ D6	32	gain bit: 1 TTL
43	- D6	17	NC
15	+ D7	16	NC
30	- D7	37	NC
10	+ Lval	38	NC
9	- Lval	31	NC
25	+ Pval	8	+ 12 V in, power
24	- Pval	23	+ 12 V in, power
6	VD	7	0 V in, power
5	OVD	22	0 V in, power

## Frame Start, Power and Incremental Encoder Socket Connectors

Socket Connector for Frame Start Initiator			Socket Connector for Operating Voltage			Socket Connector for Incremental Encoder		
								
Pin	Signal	IN / OUT	Pin	Signal	IN / OUT	Pin	Signal	IN / OUT
1	0V	O	1	+12 V	I	1	+5 V	O
2	Encoder Signal	I	2	+12 V	I	2	-Ua1	I
3	+12 V	O	3	0 V	I	3	+Ua1	I
			4	0 V	I	4	Set_Inc	I
						5	0 V	O