

SR4000 Data Sheet



MESA
IMAGING

1 Product Specifications

Standard Field of View Cameras (43° (h) x 34° (v)) and Wide Field of View Cameras (69° (h) x 56° (v))					
Product Number	00400001	00400002	00400006	00400009	Standard Field of View Cameras (43° (h) x 34° (v))
	00400014	00400011	00400015	00400013	Wide Field of View Cameras (69° (h) x 56° (v))
Communication interface	USB	Fast Ethernet	USB	Fast Ethernet	
Modulation Frequency	29/30/31 MHz		14.5/15/15.5 MHz		Frequency selectable, allows multiple cameras to operate simultaneously
Detection Range	0.1 - 5.0 m		0.1 - 10.0 m		Ranges are radial distances, not z distances
Calibrated Range	0.8 to 5.0 m		0.8 to 8.0 m		For 15 MHz: values from 8 - 10 m are extrapolated, not calibrated ¹
Absolute accuracy ⁽³⁾	+/-10 mm (typ.)		+/-15 mm (typ.)		At 99% target reflectivity, over calibrated range ^{1,2}
Drift with temperature (T)	$\leq 0.5 \text{ mm}/^{\circ}\text{C}$ (max) $\leq 1.5 \text{ mm}/^{\circ}\text{C}$ (max.)				For $20^{\circ}\text{C} \leq T \leq 30^{\circ}\text{C}$ For $10^{\circ}\text{C} \leq T \leq 50^{\circ}\text{C}$
Repeatability (1 σ) of central pixels ⁽²⁾	4 mm (typ.) 7 mm (max.)		6 mm (typ.) 9 mm (max.)		At 99% target reflectivity, 30 FPS, 2 m working distance. ^{1,4}
Repeatability (1 σ) in Region 1	$\sigma \leq 120\%$ of maximal value for central pixels				Measurement regions are defined in section 1.1
Repeatability (1 σ) in Region 2	$\sigma \leq 200\%$ of maximal value for central pixels				Measurement regions are defined in section 1.1

(1) All values are indicated for 30 MHz or 15 MHz respectively. Values at adjacent frequencies (14.5, 15.5 and 29, 31 MHz) will differ slightly

(2) For 11 x 11 central pixels of the camera

(3) Includes drift induced by changing integration times

(4) Typical: @ 25°C. Max: over complete temperature range (+10 °C to +50 °C)

1.1 Definition of measurement regions

Measurement regions: definition Region 1: Dark red Region 2: Bright red	Measurement regions: polar dimensions Region 1: $\pm 17^{\circ}$ Region 2: $\pm 27^{\circ}$
Measurement regions: representation over pixel field Standard field of view cameras (43° (h) x 34° (v))	Measurement regions: representation over pixel field Wide field of view cameras (69° (h) x 56° (v))

2 General Specifications (standard and wide field of view cameras)

Imager parameters (z)	Value	Comment
Illumination Wavelength	850 nm	Central wavelength
Optical filter	-	Bandpass / Glass substrate
Maximum Frame Rate	50 FPS	Camera setting dependent

Imager parameters (x,y)	Value	Comment
Pixel Array Size	176 (h) x 144 (v)	QCIF
Field of View	43.6° (h) x 34.6° (v) or 69° (h) x 56° (v)	Standard field of view cameras Wide field of view cameras
Pixel Pitch	40 µm	Horizontal and vertical
Angular Resolution	0.24° 0.39°	Standard field of view; central pixels Wide field of view; central pixels
Focus length / adjustment	10 mm 5.8 mm	Standard field of view cameras Wide field of view cameras Manually adjustable over operating range

Environmental	Value	Comment
External light disturbances	Designed for indoor use	Not to be used in direct sunlight
Operating Temperature	+10 °C to +50 °C (50 °F to 122 °F)	Housing temperature
Storage Temperature	-20 °C to +70 °C (-4 °F to 158 °F)	

Power Connections	Value	Comment
Electrical Power Requirements	12 V (-2%; +10%), maximum 1.0 A, (typical 0.8 A)	Power supply available from MESA
Trigger connector	Lumberg M8 Male 4-pin	Screw connector (on camera)
Power connector	Lumberg M8 Male 3-pin	Screw connector (on camera)

Software	Value	Comment
Software Drivers	Windows XP, Windows 7 (32-bit and 64-bit), Vista (32-bit and 64-bit), Linux 32-bit	
Software API	C, C++, Matlab	

Software features	Value	Comment
Modulation frequency selection	29/30/31 MHz or 14.5/15/15.5 MHz selectable	Depending on camera model
Acquisition mode	Continuous, Triggered	Trigger via Software or Hardware
Integration time	0.3 to 25.8 ms, steps of 0.1 ms	Selectable
Confidence Map	Measures quality of distance data, quality threshold to be set by user	

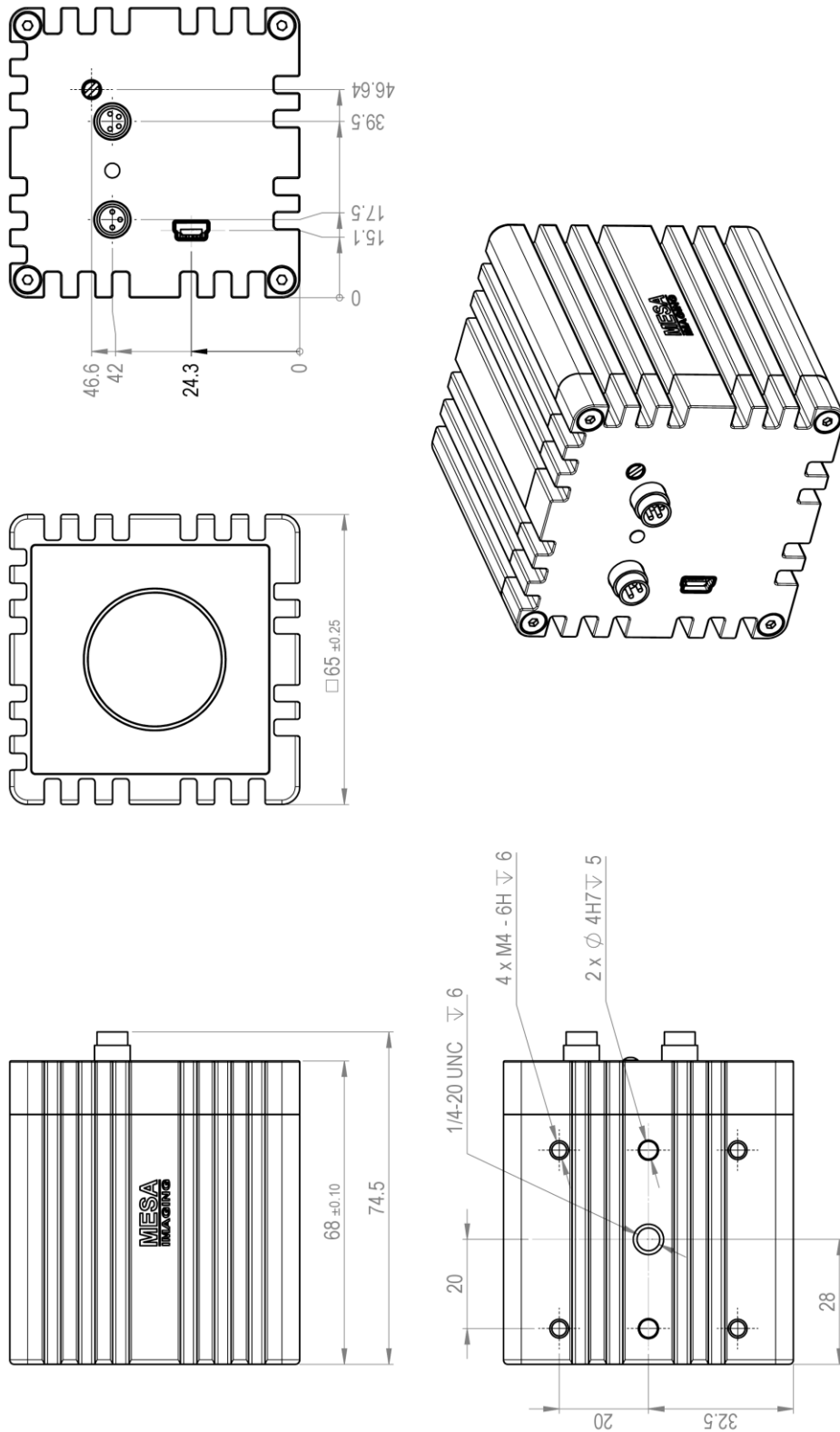
Data output	Value	Comment
Spherical distance (Range)	0-65535 (16 Bit) <--> 0-5 m 0-65535 (16 Bit) <--> 0-10 m	@ 30 MHz modulation @ 15 MHz modulation Data output from camera without Cartesian coordinate transfer
Cartesian XYZ coordinates	x, y, z (m)	Up to 5 m distance @ 30 MHz modulation Up to 10 m distance @ 15 MHz modulation
Signal amplitude	0-65535 (16 Bit)	Value above 32767 indicates saturation
Converted grayscale Image	0-65535 (16 Bit)	Value above 32767 indicates saturation
Confidence Map	0-65535 (16 Bit)	Quality threshold to be set by user

Ratings	Value	Comment
Enclosure rating	IP 40	
Eye safety	EN 60825-1: 2002: Class 1	
EMC	EN 55022 : Class A EN 61000 EN 55024	

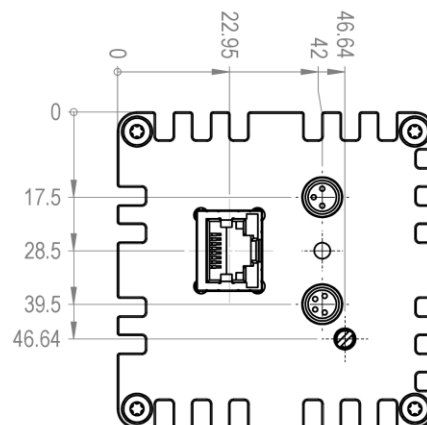
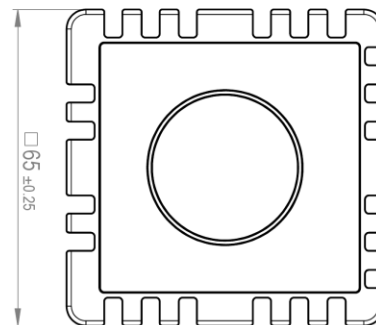
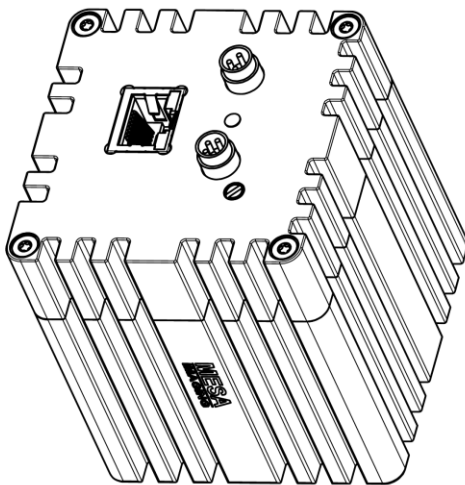
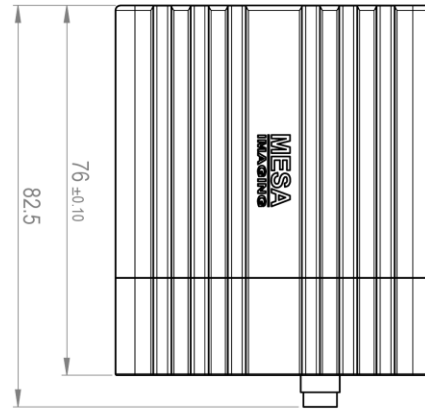
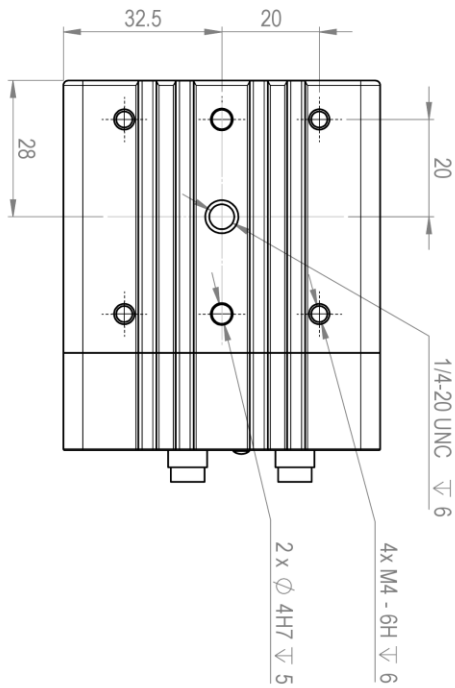
Mechanical	Value	Comment
Dimensions	65 x 65 x 68 mm 65 x 65 x 76 mm	For USB cameras For Ethernet cameras Excludes the connectors
Case Material	Anodized Aluminum	
Color front housing	Black	
Color back cover	Red	
Window Material	Polycarbonate	Illumination cover
	Borofloat glass	Objective cover
Mounting Holes	4 x M4; 2 x 4H7; 1 x 1/4"	
Weight	470 g 510 g	For USB cameras For Ethernet cameras
Cooling	Passive, no fan	Camera always to be connected to a heat sink

3 Mechanical

3.1 Camera Dimensions and Mounting - USB cameras (00400001, 006, 014 and 015)

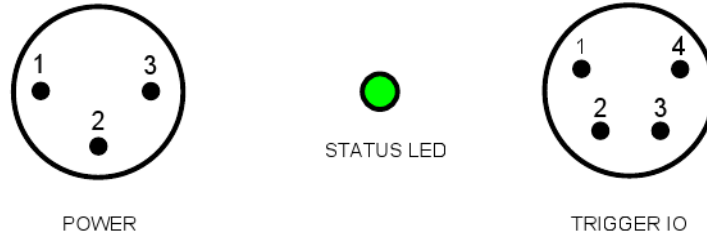


3.2 Camera Dimensions and Mounting - Ethernet cameras (00400002, 009, 011 and 013)



3.3 Camera power and trigger connectors

- Schematic view of the connectors on the backplane of the camera -



Detailed description on the pin's functions is given in the next two paragraphs.

The camera also includes a status LED. Regular pulsing of the status LED indicates that the camera is powered; fast pulsing of the status LED indicates data transfer between camera and computer.

3.3.1 Power requirements

- Power Connections -

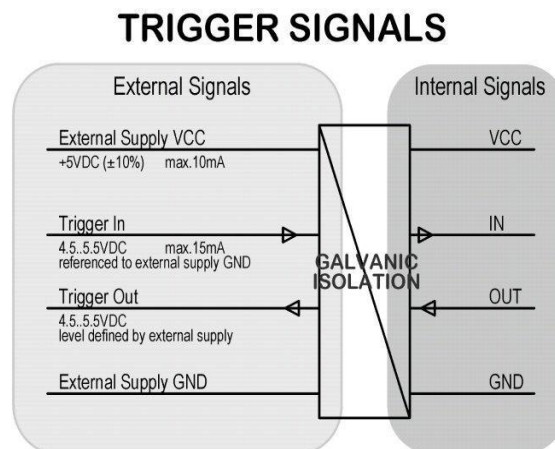
1	+12 VDC; min -2%; max +10%	Typ. 0.8 A @ 12 V, min 0.6 A , max 1.0 A
2	SHIELD	Connect to earth
3	GND	

3.3.2 Trigger requirements

- Trigger I/O Connections -

1	External Voltage	4.5 - 5.5 V / 10 mA - defines the logic level of the trigger output
2	Trigger In	4.5 - 5.5 V / 15 mA - Start acquisition frame
3	Trigger Out	4.5 - 5.5 V - Frame ready to fetch
4	External GND	In reference to External Voltage

- Schematic view of the hardware trigger logic -



3.4 Declaration of CE conformity

Declaration of CE conformity

The undersigned, representing the following manufacturer

MESA Imaging AG
Technoparkstrasse 1
8005 Zürich
Switzerland

Herewith declare that the products:

SR 00400001	Hardware version 2.0 and higher
SR 00400002	Hardware version 2.0 and higher
SR 00400006	Hardware version 2.0 and higher
SR 00400009	Hardware version 2.0 and higher
SR 00400011	Hardware version 2.0 and higher
SR 00400013	Hardware version 2.0 and higher
SR 00400014	Hardware version 2.0 and higher
SR 00400015	Hardware version 2.0 and higher

have been tested and are in conformity with the following CE directives for industrial environments:

Eye Safety	EN 60825-1: 2002	Class 1
EMC	EN 55022	Class A
EMC	EN 55024	
EMC	EN 61000-6-1	
EMC	EN 61000-6-2	
EMC	EN 61000-6-4	

Therefore the above mentioned products are in conformity with all CE directives relating to industrial environments.

Zürich

4th of June, 2010


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James Lewis
CEO


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Christian Waizenegger
Product Manager