NEW

ORCA®-Halo

sCMOS camera C17440-20U

New options for routine models

A new routine model equipped with a back-illuminated sCMOS sensor has been added to the lineup. This model boasts high performance and is suitable for advanced microscope observation.

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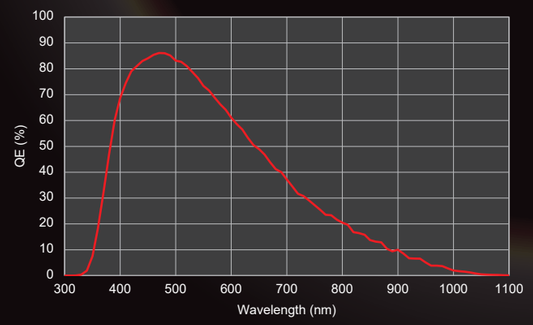
ORCA-Halo

High QE

By adopting a back-illuminated sensor, we have achieved a high quantum efficiency of 86 % (Peak QE). This contributes to the improvement of the S/N ratio.

Spectral response



Low readout noise

ORCA-Halo offers a wide range of settings to adjust readout noise according to the sample.

(For details, please refer to the specifications on page 4.)

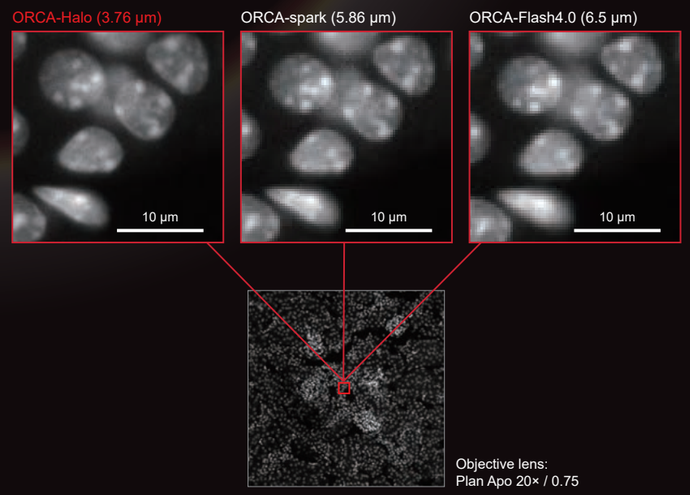
Typical readout noise

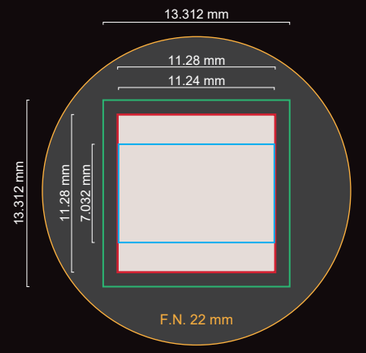
Camara setting	RMS [electrons]	Median [electrons]
16 bit standard / Analog gain ×1*1	1.6	1.2
16 bit standard / Analog gain ×8	1.3	0.9

*1 Factory settings

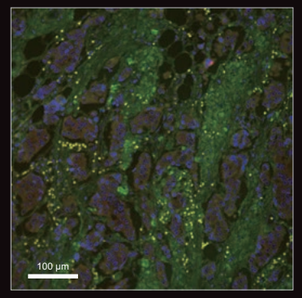
High resolution & wide field of view

ORCA-Halo features a sensor with a pixel size of 3.76 µm, which is one of the smallest pixel sizes among our sCMOS cameras. Additionally, it has a high resolution of 3000 pixels × 3000 pixels, allowing it to capture wider and clearer images compared to ORCA-spark.



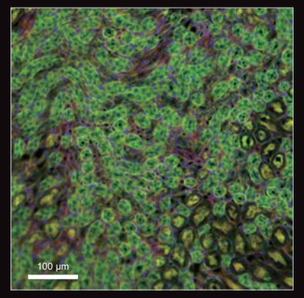


Measurement Examples (Overlay images)



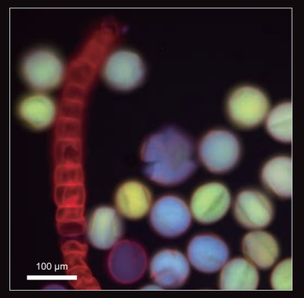
Imaging condition

Sample	Mammary gland
Objective lens	Plan Apo 20× / 0.75
Analog gain	×1
Exposure time	COL1 Alexa 488: 10 ms CK Alexa 594: 10 ms Iba1 Alexa 647: 10 ms



Imaging condition

Sample	FluoCellsTM Prepared slide #3 mouse kidney section
Objective lens	Plan Apo 20× / 0.75
Analog gain	×1
Exposure time	DAPI: 10 ms AF 488 WGA: 10 ms AF 568 phalloidin: 100 ms



Imaging condition

Sample	Autofluorescence of loofah pollen
Objective lens	Plan Apo 20× / 0.75
Analog gain	×1
Exposure time	B: 10 ms G: 10 ms R: 10 ms

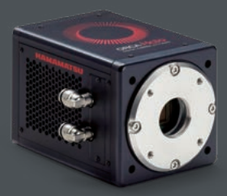
Flexibility through Combination with Relay Lenses

By combining the ORCA-Halo with a demagnifying relay lens, it is possible to expand the field of view.

In the ORCA-Halo: magnification of various relay lenses, pixel size at the primary image plane, and corresponding field of view

Relay lens (magnification)	Pixel Size (µm)	Field of view size (mm) *1	Field of view size (mm) *2
1.00	3.76 × 3.76	11.28 × 11.28	15.95
0.70	5.37 × 5.37	16.11 × 16.11	22.79
0.63	5.97 × 5.97	17.90 × 17.90	25.32
0.60	6.27 × 6.27	18.80 × 18.80	26.59
0.50	7.52 × 7.52	22.56 × 22.56	31.90

*1 Horizontal, vertical
*2 Diagonal



Forced-air and water cooling functions, low dark current

ORCA-Halo is equipped with both forced-air cooling and water cooling, allowing you to choose the cooling method according to your needs. Additionally, its low dark current enables the acquisition of high S/N ratio images even during long exposure fluorescence imaging.

Equipped with Lightsheet Readout Mode (patented)

Lightsheet Readout Mode is a readout method for sCMOS cameras that improves the S/N ratio of Lightsheet microscopes. In beam scanning type Lightsheet microscopes, synchronizing the readout timing with the movement of the excitation light reduces the impact of scattered light, enabling the acquisition of high S/N ratio images.

Please refer to the website for details.

ORCA-Halo

Specifications

Product number		C17440-20U
Imaging device		Scientific CMOS sensor
Effective number of pixels		3000 (H) × 3000 (V)
Pixel size		3.76 µm × 3.76 µm
Effective area		11.280 mm × 11.280 mm
Quantum efficiency (Typ.)		86 % (peak QE)
Analog gain		×1, ×8
Full well capacity (Typ.)	16 bit high / Analog gain ×1	49 100 electrons
	16 bit standard / Analog gain ×1*1	16 000 electrons
	16 bit standard / Analog gain ×8	1950 electrons
Read out noise (Typ.)	16 bit high / Analog gain ×1	4.1 electrons (rms), 3.4 electrons (median)
	16 bit standard / Analog gain ×1*1	1.6 electrons (rms), 1.2 electrons (median)
	16 bit standard / Analog gain ×8	1.3 electrons (rms), 0.9 electrons (median)
	12 bit high / Analog gain ×1	7.4 electrons (rms), 7.2 electrons (median)
	12 bit standard / Analog gain ×1	2.6 electrons (rms), 2.4 electrons (median)
	12 bit standard / Analog gain ×8	1.6 electrons (rms), 1.2 electrons (median)
Dynamic range (Typ.)*2	16 bit high / Analog gain ×1	12 000:1 (rms), 14 000:1 (median)
	16 bit standard / Analog gain ×1*1	10 000:1 (rms), 13 000:1 (median)
	16 bit standard / Analog gain ×8	1500:1 (rms), 2200:1 (median)
Linearity error		0.2 %
Sensor mode		Area readout / Lightsheet readout

Cooling method (Peltier cooling)	Sensor temperature	Dark current (Typ.)
Forced-air cooled (Ambient temperature: +25 ºC)	+10 ºC	0.03 electrons/pixels/s
Water cooled (Ambient temperature, Water temperature: +25 ºC)	+10 ºC	0.03 electrons/pixels/s

Readout speed	
16 bit	18.2 frame/s
12 bit	24.3 frame/s

Area readout	
Exposure time	16 bit: 170.7 µs to 10 s
	12 bit: 41.3 µs to 10 s
Readout mode	Full resolution / Digital binning (2×2, 4×4) / Sub-array

Lightsheet readout	
Exposure time	16 bit: 170.7 µs to 960 ms
	12 bit: 41.3 µs to 960 ms
Line interval (1 H) changeable	16 bit: 12.19 µs to 320 µs
	12 bit: 5.167 µs to 320 µs
Readout direction	Forward readout / Backward readout / Bidirectional readout / Reverse bidirectional readout

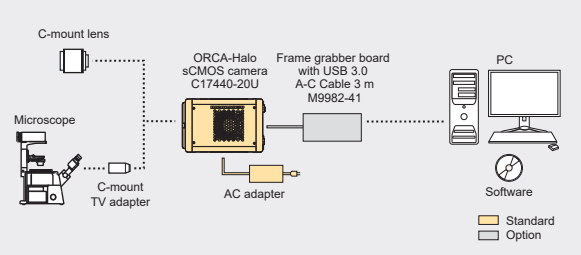
Digital output		16 bit, 12 bit
Interface		USB 3.1 Gen1
Lens mount		C-mount
Master pulse	Pulse mode	Internal Synchronization / Start trigger / Burst
	Pulse interval	5 µs to 10 s (1 µs step)
	Burst count	1 to 65 535
Image processing function		Dark offset correction (always ON), Pixel gain correction (always ON), Defect pixel correction (ON or OFF, Hot pixel correction 3 steps)
Power supply		AC 100 V to AC 240 V 50 Hz/60 Hz 2.5 A
Power consumption		74 VA
Ambient operating temperature		0 ºC to + 40 ºC
Ambient operating humidity		30 % to 80 % (With no condensation)
Ambient storage temperature		-10 ºC to + 50 ºC
Ambient storage humidity		90 % (With no condensation)

Trigger input		
External trigger function	Area readout mode	Edge trigger / Global reset edge trigger / Level trigger / Global reset level trigger / Sync readout trigger / Start trigger
	Lightsheet readout mode	Edge trigger / Start trigger
Software trigger function	Area readout mode	Edge trigger / Global reset edge trigger / Start trigger
	Lightsheet readout mode	Edge trigger / Start trigger
External trigger signal		External input (SMA)
External trigger level		TTL / 3.3 V LVCMOS level
External trigger delay function		0 µs to 10 s (1 µs step)

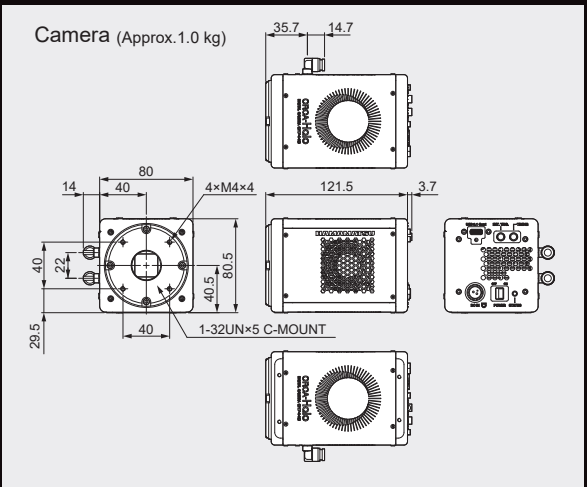
Trigger output	
External output signal	Global exposure timing output / Any-row exposure timing output / Trigger ready output / Programmable timing output / High output / Low output
External output level	3.3 V LVCMOS level

*1 Factory settings *2 Calculated from the ratio of the full well capacity and readout noise

System configuration



Dimensional outlines (Unit: mm)



Readout speed (frame/s)

Area readout mode (1×1)

Number of pixels (pixels)		Readout speed (frame/s)	
X	Y	16 bit	12 bit
3000	3000	18.2	24.3
3000	2304	23.7	31.6
3000	2048	26.6	35.5
3000	1024	53.2	71.1
3000	512	106	142
3000	256	212	283
3000	128	423	563
3000	8	1780	4840
3000	4	1950	5380

Options

Product number	Product name
A17657-01	Base plate for ORCA-Halo
A12106-05	External trigger cable SMA-BNC 5 m
A12107-05	External trigger cable SMA-SMA 5 m
C3142-11	Water circulator
A10788-04	Hose set without joint

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