

USER MANUAL

for A6D Aerial



HASSELBLAD
CREATE TO INSPIRE

Medium format photography is about professionalism. Camera systems, their handling and captures have to be professional in quality.

Hasselblad understands this and always strives to deliver it; professionals know that too. The Hasselblad series of cameras consists of building new developments on the shoulders of the previous generation. In this way all the previous work-experience based and segment-demanding features are automatically included. So, just when you think things can't get much better, they do. And the A6D is that model - all the good things from before and then some!

The A6D heralds a step up that is noticeably greater than before. There are changes and many are 'from the ground up'. The A6D provides a reliable connection to the fleeting environment of digital imaging technology so when the wind changes direction, the A6D remains as the safeguarding companion to provide support.

Today's aerial photography is more demanding than ever and Hasselblad continues to rise to the occasion, introducing more and more advanced products and applications for this exciting segment. This is especially true of the Hasselblad A6D, the latest evolution of Hasselblad aerial cameras designed for these specialist applications.

The new camera has been developed to deliver the image quality and reliability required by our surveying and mapping customers. Listening to their feedback we have developed a camera to encompass these needs and much more.

Hasselblad's best kept secret is knowing that every link in the chain that leads to the clients finished image has to reach a certain standard; it is that simple. That's why Hasselblad puts so much time and energy into checking those almost endless behind-the-scenes details and standards because we understand this simple concept.

There is no magical formula to Hasselblad's success other than an understanding of what is required to produce the best results available in the world today, and an acceptance that there are no short cuts in this process. Hasselblad does its best to produce the best; there is no other way to achieve the Hasselblad star quality.

The A6D has been designed to incorporate the latest technology available. The heart of the system is the 53.4 x 40.0 mm 100MP CMOS sensor delivering up to a staggering 15stops dynamic range and 16bit colour data. The system boasts an ISO range from 64 to 12800 and coupled with the top shutter speed of 1/4000th second allows the A6D huge flexibility to adapt to changing conditions whilst still delivering the image quality required.

Designed from the outset to be used in flexible configurations the A6D can be used as a stand alone single capture device or in grouped configurations for pod based survey needs. Up to 8 cameras can be triggered within 20 microseconds of each other to allow accurate image alignment with minimal overlap required.



Completing the impressive specification, media storage is to CFast 2.0 or SDXC cards. Tethered capture is available via the USB 3.0 Type C port. To complete the family, the A6D is also available in NIR version, allowing both NIR and CIR photography.

CAMERA USER INTERFACE

For general operation of the user interface using the touch screen, please refer to the full H6D user manual which can be downloaded from www.Hasselblad.com

FIRMWARE UPDATES

If you have registered your camera you should automatically receive e-mail informing you of the latest developments. Otherwise you are advised to make regular checks regarding firmware updates to the camera.

The aim is to ensure you have the latest firmware updates for camera, which naturally ensures the optimum in performance. When updating you should also study the accompanying 'Release Notes' or 'Read Me' files where you will find details about improvements, developments and changes.

DISPOSAL

This product must be put in municipal waste. Check local regulations for disposal.

Register your camera for regular news about the latest developments, updates, news, tips, and much else!

– www.hasselblad.com –

RESTRICTIONS AND RECOMMENDATIONS

Caution!

Be careful when you use the camera. The camera is a precision instrument. This will help prevent damage to the camera.

Caution!

Use protective covers as much as possible. The protective covers will help prevent damage to the equipment.

Caution!

Use a protective case or camera bag when you transport the equipment. This will help prevent damage to the equipment.

Caution!

Protect the equipment from oil fumes, steam, humid conditions and dust. This will help prevent damage to the equipment.

Caution!

Seal all equipment in a plastic bag or similar if you enter damp and humid condition from dry and cold condition. Wait until the equipment has acclimatized to the new temperature before you remove the equipment from bag. This will help prevent damage to the equipment.

Caution!

Avoid frequent and high temperature changes. This can cause damage to the equipment.

Caution!

Keep camera and equipment away from moisture. If your camera becomes wet, disconnect from electric power and let camera dry before further use. This will help prevent damage to the equipment.

Caution!

Store the equipment in a dry environment. This will help prevent damage to the equipment.

Caution!

Be careful when you attach/detach the components to/from the camera. This will help prevent damage to the data bus connections.

Caution!

Do not insert fingers into the camera body. This can cause damage to the equipment.

Caution!

Do not touch the CMOS Sensor with your fingers. The protective filter is very sensitive. This can cause damage to the equipment.

Caution!

Keep all equipment out of reach of small children. This will prevent damage to the equipment.

Caution!

Do not open the sensor unit. This can cause damage to the sensor unit.

Caution!

Do not try to remove the glass IR filter from the front of the CMOS (due to dust or similar). This can cause damage to the equipment. Always contact your local Hasselblad Authorized Service Centre.

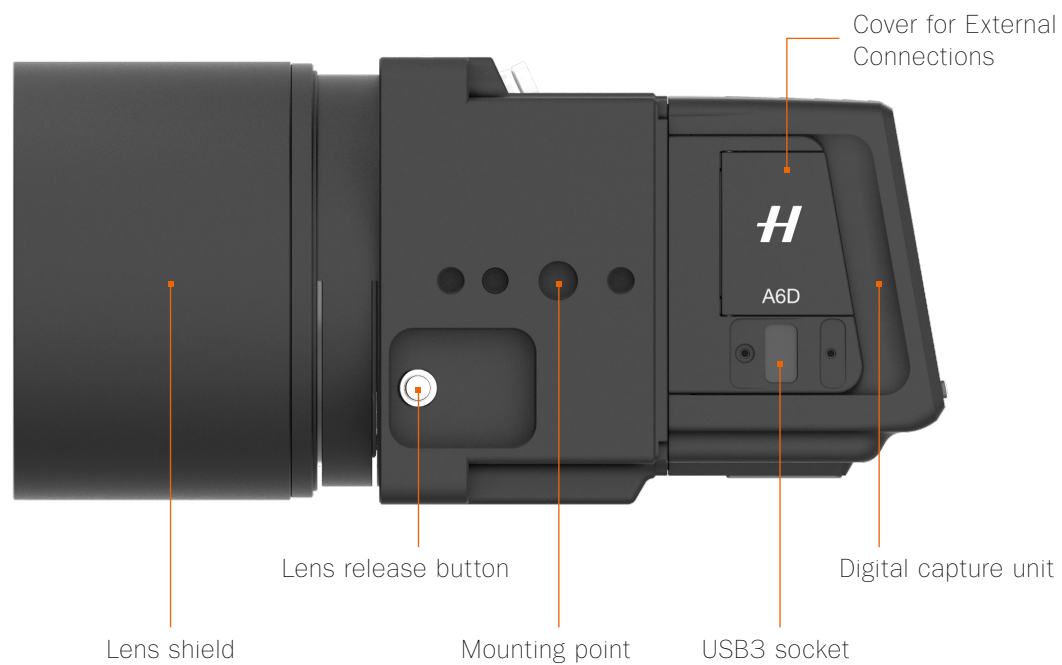
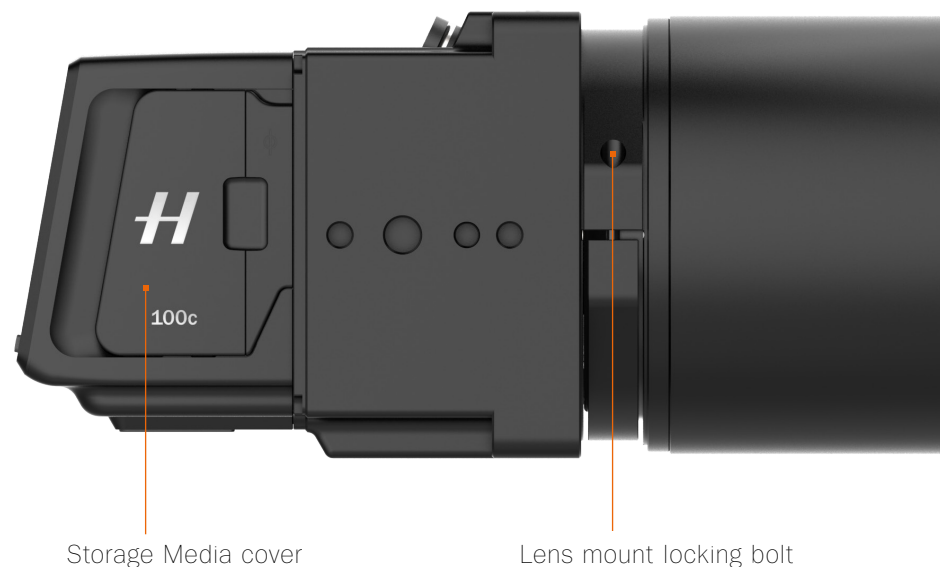
Caution!

If you use canned compressed air to clean the glass of IR filter, be very carefully before use. This will help prevent damage to the filter.

CONTENTS

■ INTRODUCTION	2	■ CAMERA MAINTENANCE	14
Camera User Interface.....	4	Cleaning Sensor Unit & IR Glass.....	15
Firmware Updates	4		
Disposal	4	■ TECHNICAL APPENDIX	16
Restrictions and Recommendations	5	A6D-100c Technical Specifications	17
		Lemo connector Signal Information.....	18
■ GENERAL OVERVIEW.....	7	Electrical Timings	20
Parts and Components – overview	8	Coverage	22
A6D Lens Range.....	9	Coverage vs altitude	22
		GSD vs altitude	22
■ GETTING STARTED	10	Physical Dimensions.....	23
Mounting the lens	11	Accessories	27
Attaching the lens shield.....	11	FCC Class A Notice for A6D-100c	28
Attaching the adapter plate	12	Battery Warning.....	28
Power Connection.....	12	Index.....	29
Synchronous connections	12		
USB & link to Phocus or SDK based application	12		
Saving images to a memory card	12		
Attaching the USB cable Lock.....	13		

PARTS AND COMPONENTS – OVERVIEW



A6D LENS RANGE

All 9 focal lengths below are available in aerial versions with secure locking mounts to minimise vibration, flexing and ensuring the image plane and sensor stay parallel at all times. These units ship with focus fixed at infinity and firmware to close the shutter and aperture to their working positions when power is applied to the camera.

Lenses	Angle of View (Diagonal)	Angle of View long side	Angle of View short side	Equivalent 35mm focal length	Dimensions Length x Diameter	Weight	Filter Thread	Item Number
HCD 4,8/24mm	104 Degrees	96 Degrees	80 Degrees	16mm	99mm x 100mm	810g	95mm	3014601
HCD 4/28mm	95 Degrees	87 Degrees	71 Degrees	19mm	102mm x 100mm	850g	95mm	3014602
HC 3,5/35mm	89 Degrees	75 Degrees	60 Degrees	24mm	124mm x 100mm	975g	95mm	3014603
HC 3,5/50mm-II	70 Degrees	56 Degrees	44 Degrees	34mm	116mm x 85mm	975g	77mm	3014604
HC 2,8/80mm	46 Degrees	37 Degrees	28 Degrees	55mm	70mm x 84mm	475g	67mm	3014605
HC 2,2/100mm	38 Degrees	30 Degrees	23 Degrees	67mm	80.5mm x 87.5mm	780g	77mm	3014606
HC 3,2/150N mm	26 Degrees	20 Degrees	15 Degrees	101mm	124mm x 86mm	970g	77mm	3014607
HC 4/210mm	19 Degrees	14 Degrees	11 Degrees	142mm	165mm x 85mm	1320g	77mm	3014608
HC 4,5/300mm	13 Degrees	10 Degrees	8 Degrees	196mm	198mm x 100mm	2120g	95mm	3014609



GETTING STARTED

MOUNTING THE LENS

- 1 The A6D lens mount contains a locking mechanism that securely holds the lens in place with an even pressure all around the barrel.



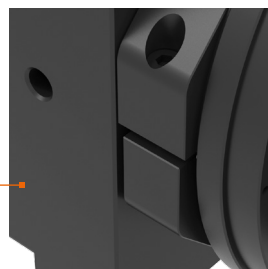
Before mounting a lens ensure the plastic collar is in position and the joint is aligned with the location lug.

- 2 To mount a lens, locate the red dot on the rear lens mount and ensure it is facing upwards. Insert the lens into the camera body and rotate clockwise until a click is heard.



To detach the lens, press the lens release button on the side of the camera and turn the lens anti-clockwise.

- 3 Locate the lens mount locking bolt.



- 4 Insert the supplied 2.5mm Allen key into the bolt and rotate clockwise half a turn to engage the lens mount lock.



NB: Do not overtighten as damage to the lens mount may occur

ATTACHING THE LENS SHIELD

There are three lens shields available depending on the lens in use. To mount the shield for the 50, 80 or 100mm lens, simply offer up the shield to the outer lens mount and rotate the shield clockwise until the shield locks.



To mount the shield for the 35mm lens it is first necessary to mount the adaptor ring to the existing outer lens mount. This adaptor ring is held in place with 4 screws.

Once this has been mounted, you can attach the lens and then mount the shield and secure it with a turn in the clockwise direction.

ATTACHING THE ADAPTER PLATE

- 1 To attach the A6D camera unit to an existing OEM camera mount point you will need the adapter plate (P1). This plate is attached to the camera body with 4 bolts. You must ensure that the plate is correctly oriented – please see the image below and align the plate correctly.

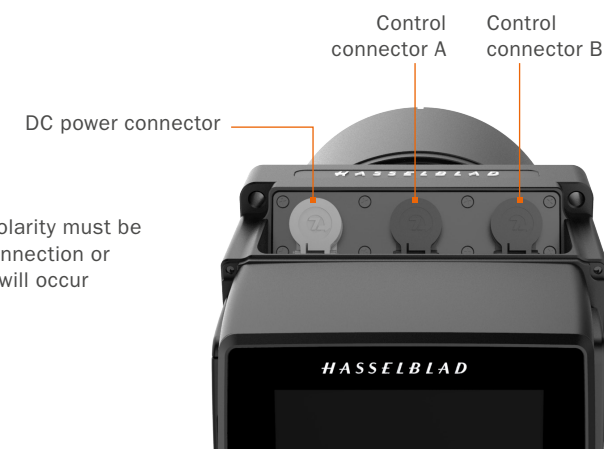


- 2 Secure the plate with the 4 supplied bolts, ensuring that you tighten them one turn at a time to provide even pressure. Once the plate is secure you can mount the lens. Attach the lens shield and the unit is now ready to mount in the camera pod using the existing P1 bolt layout.



POWER CONNECTION

The A6D camera unit is equipped with three LEMO connectors. The grey connector is the DC power connector. The unit requires a power source of 12-28 VDC to operate. This will normally be supplied via the aircraft power system.



NB: Correct voltage **AND** polarity must be applied to the power connection or damage to the camera will occur

SYNCHRONOUS CONNECTIONS

The remaining two connectors are used to synchronise additional daisy chained camera units so that all exposures take place within 20 microseconds of each other. The centre connector is the signal input and the right hand connector is the signal output for the next unit.

USB & LINK TO PHOCUS OR SDK BASED APPLICATION

Located on the left-hand side of the camera you will find the USB socket. Using the supplied cable and the cable lock ensures the connection will be securely locked. Once the connector is locked in place and the other end of the cable attached to your computer system, the camera should show as connected and camera controls should be configurable via Hasselblad Phocus software or your own application designed from the SDK.

SAVING IMAGES TO A MEMORY CARD

If you do not wish to transfer the captured images to a remote computer, the CFast or SD card slots are available to allow in camera storage.

ATTACHING THE USB CABLE LOCK

- 1 Insert the cable through the lock part and insert the cable into to the USB port.



- 2 Attach the lock part and tighten the screws using the supplied 1.5mm Allen key. Note that it needs to be oriented correctly to fit.



CAMERA MAINTENANCE

CLEANING SENSOR UNIT & IR GLASS

If you see dark or colored spots or lines in your images, then you may need to clean the outer surface of the sensor unit's infrared (IR) filter. In most cases, the careful use of compressed air will be adequate though if you use canned compressed air, read the instructions very carefully before use to avoid spraying impurities or even ice on the filter! Sometimes, however, small particles will get stuck to the surface of the IR filter, requiring for a more thorough cleaning, involving either fluid or swab wipes.

- 1 If compressed air did not remove all the problems on the filter, then use a long-handled swab style wipe (swab style wipes are recommended due to the distance from the lens mount to the sensor surface).
- 2 Ensure that the swab matches the width of the IR filter (if possible).
- 3 Apply firm pressure at the edge of the swab to ensure an even, firm contact with filter surface. Wipe the surface in one unbroken motion.
- 4 Finally check if the IR filter has been properly cleaned either by visual inspection by making a test capture. If further cleaning is needed, repeat cleaning procedure.



TECHNICAL APPENDIX

A6D-100C TECHNICAL SPECIFICATIONS

Sensor Type	CMOS, 100 mega pixels (11600 × 8700 pixels, 4.6 × 4.6 μm)
Sensor Dimensions	53.4 × 40.0mm
Image Size	Stills: RAW 3FR capture 211MB on average. TIFF 8 bit: 289MB; Video: HD (1920 x 1080p), UHD (3840 x 2160p)
File Format	Stills: Hasselblad 3FR, JPEG (12.5 MPixel) Video: Hasselblad RAW (UHD, 25 fps), H.264 Compressed (HD, 25 fps)
Shooting Mode	Single shot stills, Video
Colour Definition	16 bit. Dynamic range up to 15 stops
ISO Speed Range	ISO: 64, 100, 200, 400, 800, 1600, 3200, 6400, 12800
Colour Management	Hasselblad Natural Colour Solution, HNCS
Lenses	Any H System lens. Focus locked at infinity on request.
Focusing	Manual or Focus locked at infinity
Storage Options	CFast 2.0 card, SD card (UHS-I) or tethered to Mac or PC
Capture Rate (Based on SanDisk Extreme PRO CFAST 2.0 Memory Card)	60 Captures per minute.
Storage Capacity	128GB card holds 576 images on average
IR Filter	Mounted in front of sensor. NIR Option on request, CIR prepared.
Software	Phocus for Mac and Windows. Phocus SDK for Windows available on request.
Platform Support	Macintosh: macOS version 10.11 or later; PC: Windows 7 / 8 / 10 or later (64 bit)
Host Connection Type	USB 3.0 (5 Gbit/s) Type-C connector
Additional Connections	LEMO type connectors for power and camera control. Mini HDMI, Audio In/Out, Flash sync In/Out
Tethered Operation	Supported in Phocus and Phocus SDK
Shutter Speed Range	0.5 sec to 1/4000 sec
Exposure Metering	None
Power Supply	12-28 VDC required via LEMO connector
Operating Temperature	-10 - 45 °C / 14 - 113 °F
Dimensions	100 x 100 x 151mm [W x H x D] Complete camera with HC80mm lens
Weight (Body and sensor unit only)	1360g
Approval	FCC (Class A), CE, RoHS, DO-160 section 8 - 15 - 20 and 21, CE, RoHS

LEMO CONNECTOR SIGNAL INFORMATION

POWER CONNECTOR

Voltage Limit

Characteristics	Symbol	Value	Unit (DC)
Maximum input voltage	VSOH	28	V
Minimum input voltage	VSOH	12	V

CURRENT LIMIT

The Power + signal will conform to the following current requirements:

Characteristics	Symbol	Value	Unit (DC)
Typically average current consumption for Power +	ICCA	1000	mA
Typically peak current consumption for Power +	ICCP	2500	mA
Typically peak power consumption for Power +	ICCP	25	Watt

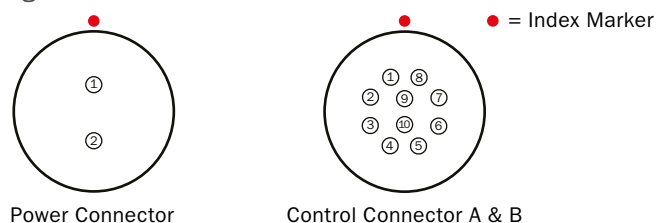
It is recommended to use a Class II double insulated power supply, or a power limited external battery. The source should always be limited to a output power of no more than 100 watts in total.

CONNECT OR PIN NVO.

Signal Name	Power cable wire colour	Signal description
1 GND	White	Power GND (-)
2 VCC	Brown	Main power (+)

MALE PLUG PIN-OUT

The below illustration shows the connectors pin-out seen from the solder side of the male plug.



CONTROL CONNECTOR A & B

The below table shows the connectors pin numbers, signal names and signal direction in the control connector.

Connect or pin no.	Control cable	Signal name	Signal description	Direction	Type
1	White	CL	Reserved for future use	InOut	I/O
2	Brown	CH	Reserved for future use	InOut	I/O
3	Green	Vsys -	0 VDC Logic Supply	-	POWER
4	Yellow	Vsys +	+ 5 VDC Logic Supply	-	POWER
5	Grey	RX	Serial channel, RX signal	Input	CMOS
6	Pink	TRIG	Trig Camera	Input	CMOS
7	Blue	- BUSY	Camera Busy	Output	OC
8	Red	INTERNAL	Reserved	InOut	-
9	Black	- EXPOSE	Shutter Open	Output	OC
10	Purple	TX	Serial channel, TX signal	Output	CMOS
Shield	GROUND	GROUND	Chassis ground	Camera↔External flash	-

SYSTEM LOGIC SUPPLY SIGNALS

The VSYS+ power is always supplied to the control connector from the Camera housing.

SYSTEM STARTUP

During system startup (when the main power is applied into the Camera housing) the following requirements will apply for the System Logic supply signal +VSYS:

Characteristics	Symbol	Value	Unit (AC)
Maximum +VSYS voltage rise time	TRVS	40	ms

The total capacitive load between +VSYS and -VSYS should not exceed the following limit:

Characteristics	Symbol	Value	Unit
Maximum capacitive load on VSYS	CLVS	150	µf

VOLTAGE LIMIT

The VSYS+ signal will conform to the following voltage requirements:

Characteristics	Symbol	Value	Unit (AC)
Maximum output voltage	VSOH	5.25	V
Minimum output voltage	VSOL	4.75	V

CURRENT LIMIT

The VSYS+ signal will conform to the following current requirements:

Characteristics	Symbol	Value	Unit (AC)
Peak current consumption for VSYS+	ICC	40	mA

VOLTAGE LIMIT

The electrical definition of signal type “CMOS” will be according to the limits specified below:

Characteristics	Symbol	Value	Unit (DC)
H level output voltage (min)	VOH	4.0	V
L level output voltage (max @ IOL)	VOL	0.4	V
L level output current	IOL	4.0	mA
H level input voltage (min)	VIH	3.5	V
L level input voltage (max)	VIH	1.5	V

The electrical definition of signal type “OC” will be according to the limits specified below:

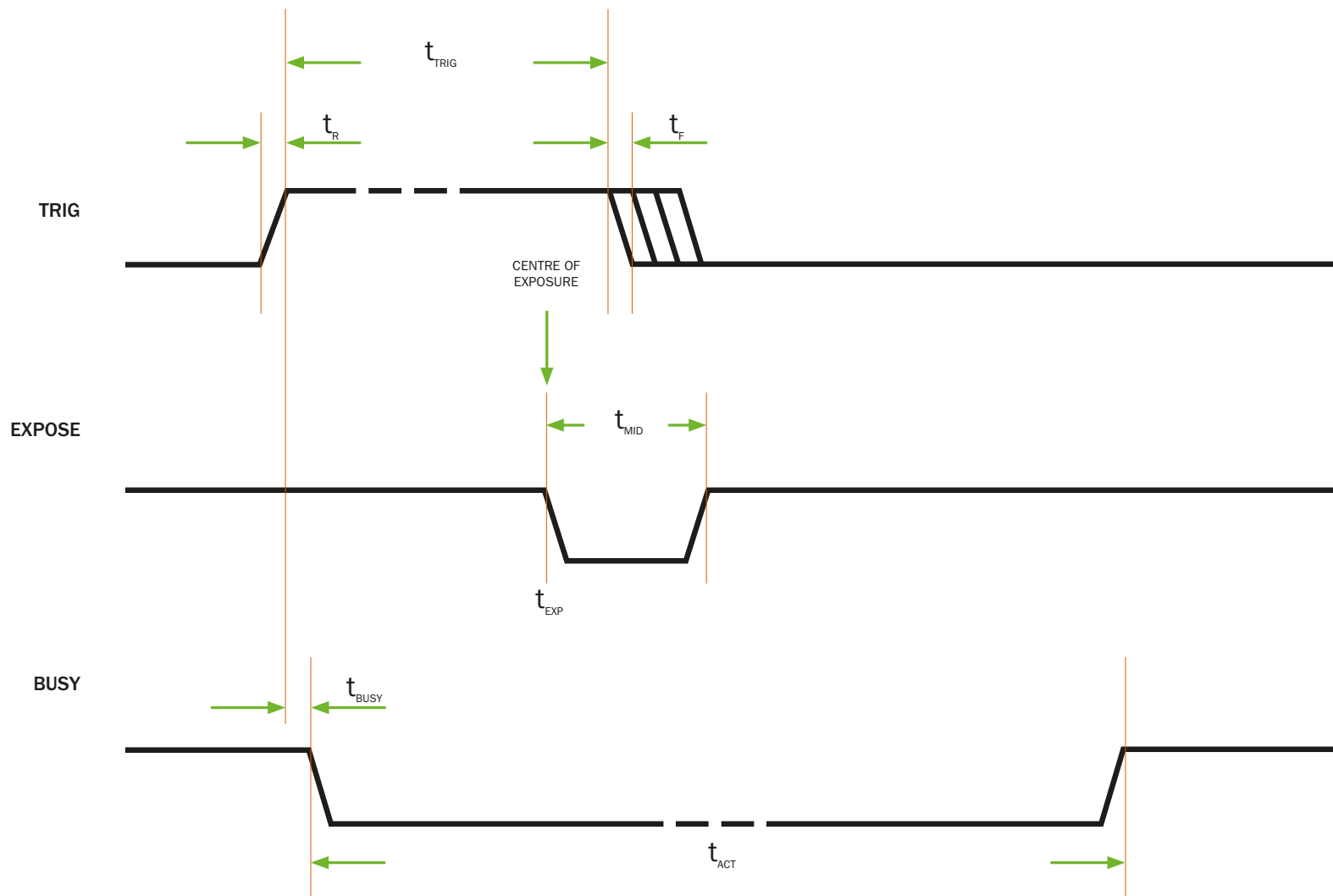
Characteristics	Symbol	Value	Unit (DC)
H level output voltage (max)	VOH	VSYS +	V
Pull-up impedance	R	10	Kohm
L level output voltage (max @ IOL)	VOL	0.4	V
L level output current	IOL	20.0	mA

TRIG, -EXP and -BUSY timing relationship

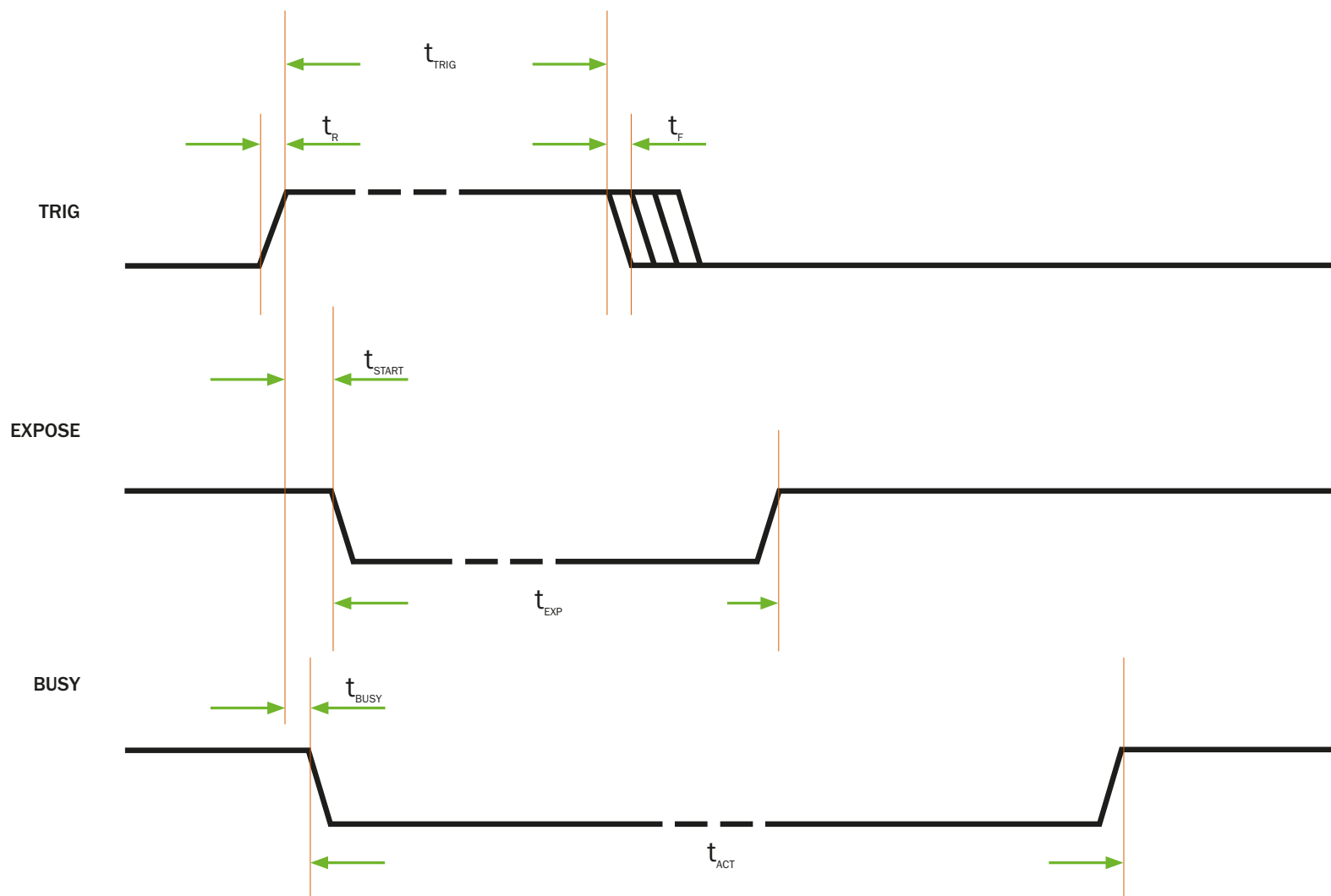
Characteristics	Symbol	Value	Unit (AC)
Rise time (max)	tR	1.0	µs
Fall time (max)	tF	1.0	µs
TRIG pulse width (min)	tTRIG	1.0	ms
Expose start (min)	tSTART	100	µs
Expose start (max)	tSTART	1	ms
BUSY start (min)	tBUSY	0	ms
BUSY start (max)	tBUSY	200	ms
ACTIVE time (min)	tACT	1000	ms
ACTIVE time (max)	tACT	∞	s
Mid expose pulse width (typ)	tMID	100	us

ELECTRICAL TIMINGS

The electrical timing when using **EXPOSE** signal as mid exposure indicator:



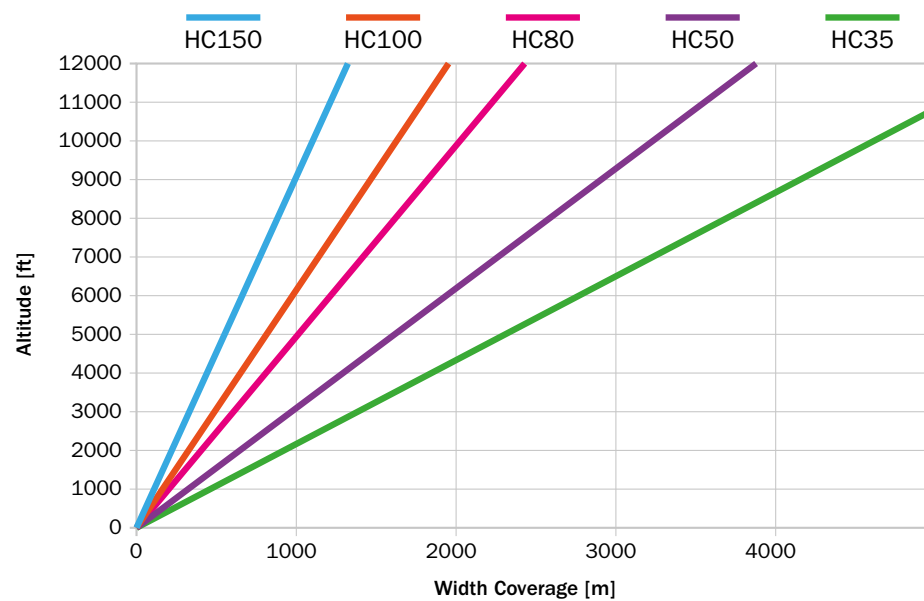
The electrical timing when using **EXPOSE** signal as full indicator:



COVERAGE

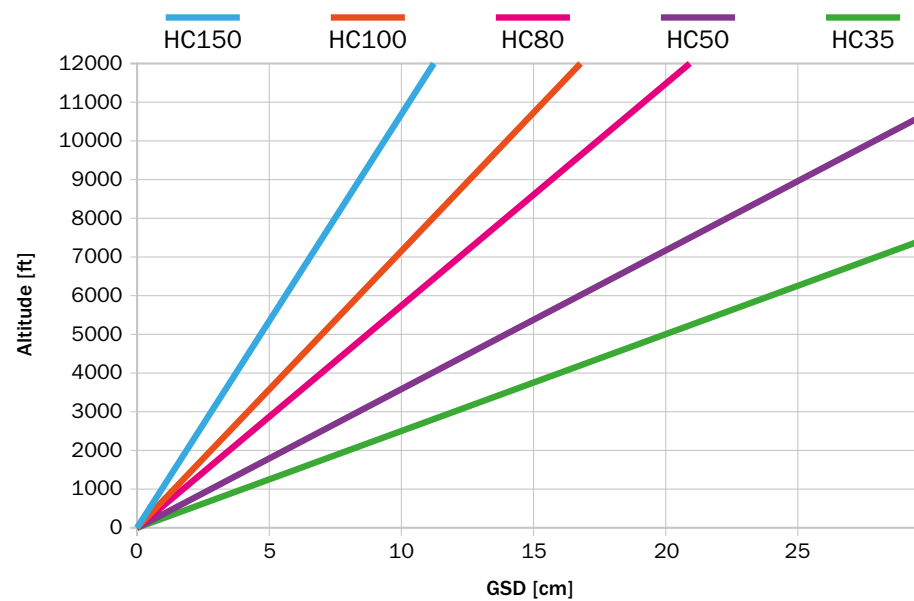
COVERAGE VS ALTITUDE

The diagram below shows the ground coverage for the width of the image as a function of altitude.

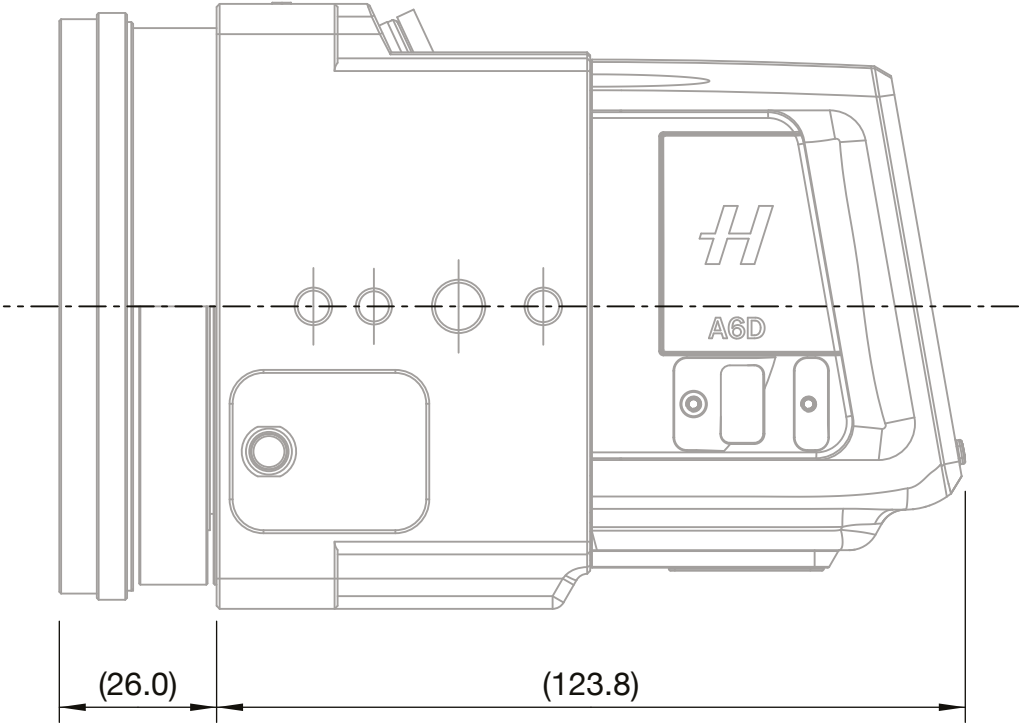


GSD VS ALTITUDE

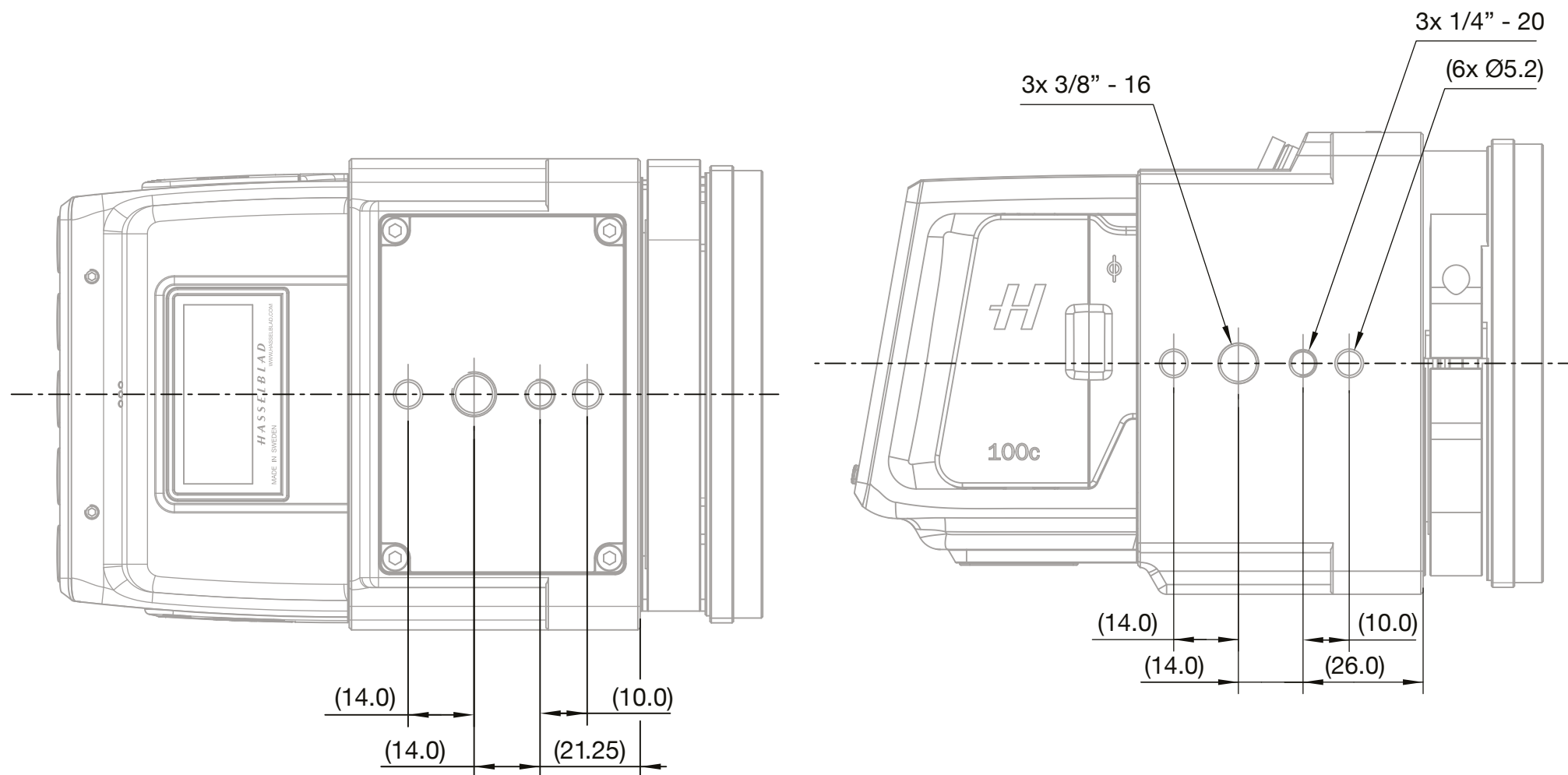
The diagram below shows the Ground Sample Distance as a function of altitude.



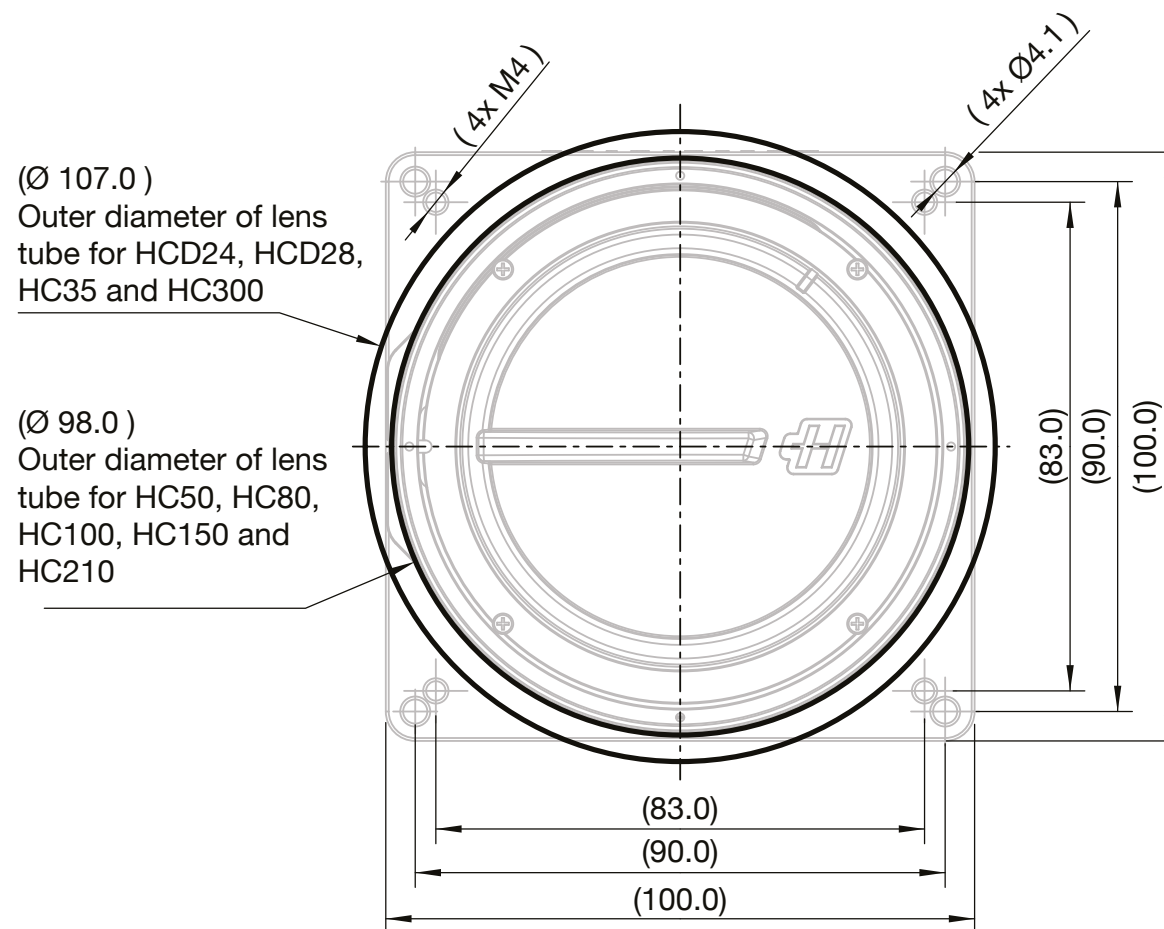
PHYSICAL DIMENSIONS



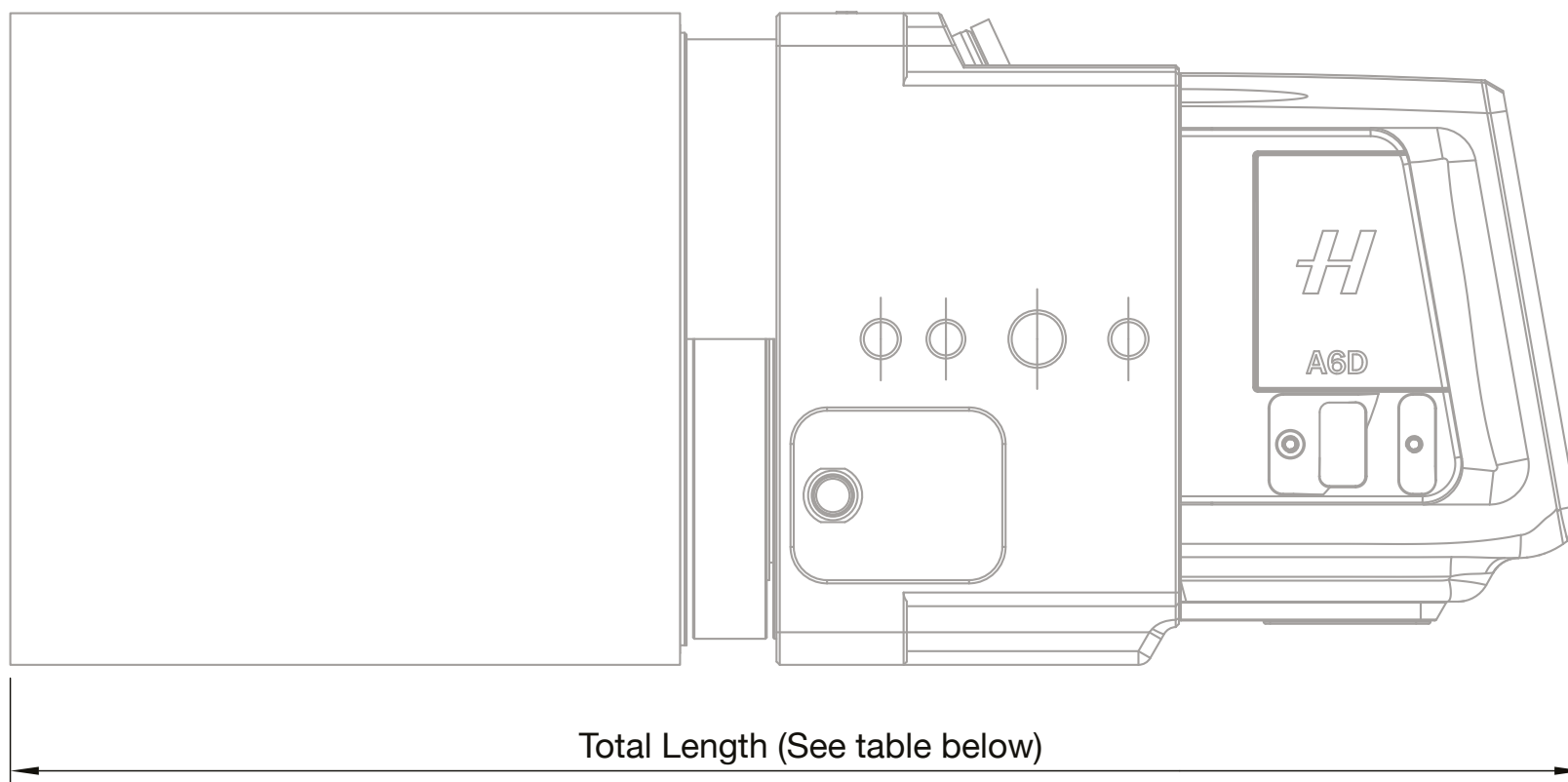
PHYSICAL DIMENSIONS



PHYSICAL DIMENSIONS



PHYSICAL DIMENSIONS



Total Length (See table below)

Lens	Tube Diameter	Total Length	Requires Adapter
HCD24	107 mm	221.0 mm	Yes
HCD28	107 mm	221.0 mm	Yes
HC35	107 mm	247.5 mm	Yes
HC50-II	98 mm	248.0 mm	No
HC80	98 mm	205.0 mm	No
HC100	98 mm	205.0 mm	No
HC150	98 mm	248.0 mm	No
HC210	98 mm	293.0 mm	No
HC300	107 mm	322.5 mm	Yes

ACCESSORIES

The following accessories are available for the A6D:

Item Description	Item Number
Control Cable	3014532
Power Cable	3014525
Multi Sync Cable	3014533
Hand Release Cable	3014534
USB3 Cable, Type C - Type A, 2 m	3054177
Lens Protection Tube for 24mm Lens	3014506
Lens Protection Tube for 28mm Lens	3014506
Lens Protection Tube for 35mm Lens	3014521
Lens Protection Tube for 50mm Lens	3014522
Lens Protection Tube for 80 & 100mm Lens	3014523
Lens Protection Tube for 150mm Lens	3014522
Lens Protection Tube for 210mm Lens	3014507
Lens Protection Tube for 300mm Lens	3014508
Adaptor Plate (P1)	3014520
Hardcase	3014631
Hasselblad Warranty Options	Item Number
Additional 1 Year Full Warranty	3014635
Additional 1 Year Warranty including loan Unit	3014636
Loan Unit Only	3014640

FCC NOTICE

FCC CLASS A NOTICE FOR A6D-100C

This A6D-100c has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

BATTERY WARNING

Caution - There is danger of explosion if batteries are mishandled or incorrectly replaced. On systems with replaceable batteries, replace only with the same manufacturer and type or equivalent type recommended by the manufacturer per the instructions provided in the product service manual. Do not disassemble batteries or attempt to recharge them outside the system. Do not dispose of batteries in fire. Dispose of batteries properly in accordance with the manufacturer's instructions and local regulations. Note that there are lithium batteries soldered on A6D internal boards. These batteries are not customer replaceable parts.

INDEX

A		F		P		T	
Accessories	28	FCC Class A Notice for A6D-100c	28	Parts and Components	8	Technical Specification.....	17
Adapter plate	12	File Format	17	Physical Dimensions.....	23, 24, 25, 26	Tethered Operation	17
Approval	17	Firmware Updates	4	Platform Support.....	17	Total Length	26
B		Focal lengths	9	Plug Pin-out.....	18	Tube Diameter.....	26
Battery Warning.....	28	Focusing.....	17	Power Connection.....	12	U	
Browse button.....	8	G		Power Connector	18	USB3 socket.....	8
C		GSD vs altitude	22	Power Supply	17	V	
Cable Lock.....	13	H		R		Register your camera.....	4
Camera User Interface.....	4	Host Connection Type	17	Restrictions and Recommendations...	5	Voltage limit.....	19
Capture Rate	17	I		S		W	
Cleaning	15	Image Size.....	17	Saving images to a memory card	12	Weight.....	17
Colour Definition	17	IR Filter	17	SDK	12		
Colour Management	17	ISO Speed Range	17	Select button	8		
Control connector A	8	L		Sensor Dimensions	17		
Control Connector A & B	18	Lemo connector	18	Sensor Type	17		
Control connector B.....	8	Lenses	9, 17	Shooting Mode.....	17		
Coverage vs altitude	22	Lens mount locking bol.....	8	Shutter Speed Range	17		
Cover for External		Lens release button	8	Soft button	8		
Connections	8	Lens shield.....	8, 11	Software	17		
Current limit.....	19	M		Storage Capacity	17		
D		Menu button	8	Storage Media cover.....	8		
DC Power connector	8	Mid exposure	20	Storage Options	17		
Digital capture unit	8	Mounting point.....	8	Synchronous connections	12		
Dimensions	17	Mounting the lens	11	System Logic Supply Signals.....	18		
Display button.....	8	O		System startup	18		
Disposal	4	Operating Temperature	17				
E							
Electrical Timings	20						
Exposure Metering	17						

HASSELBLAD
CREATE TO INSPIRE