

## H A S S E L B L A D **HTS 1.5**

The revolutionary HTS 1.5 is a tilt and shift adapter that can provide a pivotal step-up for many Hasselblad photographers. Designed for the HCD24mm, HCD28mm, HC35mm, HC50mm, HC80mm and the HC100mm lenses it, in effect, adds six different “tilt and shift lenses” to the range. With the extension tubes, H13, H26 or H52, the HTS 1.5 can also be used for close-up work. Especially in combination with the Macro Adapter that improves the close range performance with the HC 50-II lens.

This simple device solves not only technical challenges, but also provides exciting opportunities for creative solutions as well. The combination of well-known optical principles combined with the latest in digital image control, provides a powerful package that will expand photographic expression to new levels.



“Shift” is the moving of a lens, up and down or to the sides, from its central position while retaining its perpendicular orientation to the film plane. Simply put, the adapter expands the diameter of the projected image circle at the film plane. This allows for much greater freedom in “placing” the image area within the now much broader circle before vignetting takes effect. And most importantly, all this happens without moving the orientation of the camera in relation to the subject. So if verticals, for example, are acceptable in the viewfinder, they will remain so whatever the amount of shift to include the “hidden” parts of the image. Simple but ingenious.

“Tilt” differs from shift in that the normal perpendicular orientation of the lens to the film plane is changed resulting in a change in the plane of focus. This means that at any given aperture/focus setting, the depth of field in the subject will not remain as simply the space between two measured points from the camera as is normally the case, but increased or decreased. This amount is user controlled. Once again, simple but ingenious.

By combining these two laws of physics, the doors of creative solutions are thrown wide open. The list of situations that could advantageously exploit tilt and shift is probably longer than it might first appear to be. For some professional photographers it could rapidly become an essential item for all work.

But the story doesn't end there. Large-format users have been using tilt and shift for many years, partly because they could, but partly because they had to. Some photographic solutions unfortunately, have also created problems, lens edge performance, for example, being one of them. The dilemma that arose forced

photographers to find a compromise, between the “illness” and the “cure”. Hasselblad has now eradicated this dilemma.

With the introduction of Digital Lens Corrections where images processed in Phocus are automatically corrected regardless of HTS adapter setting, significant improvements strike the viewer immediately. All calculations and adjustments take place in the background monitored and governed by sensors in the adapter. The sharpness at the edge of the frame, despite the fact that the lens is pushed to its limits, remains stunning.

On the creative front, it has long been standard practice for photographers to break the rules in order to produce images that show something just a little different. Large-format users were well-acquainted with the imaginative possibilities that arose from making the “wrong” camera or lens movements. And now Hasselblad users can enjoy this stimulating freedom as well. Fascinating and captivating images are easily conjured up and controlled with just a few slight movements. The combination of large sensors and razor sharp lenses – and now tilt and shift possibilities – Hasselblad has brought some of the creative aspect of former large-format world to the digital medium format.

Take a look at this revolutionary accessory at your nearest Hasselblad dealer. Try it yourself out to see how this new product could rapidly become an essential part of your photography toolkit. The powerful combination of tilt, shift and Digital Lens Corrections can bring new perspectives to your photographic vision and provide a marked change in both the technical and creative aspects of your work.

# TILT AND SHIFT ADAPTER

## HASSELBLAD **HTS**1.5



Front view



Rear view

# TILT AND SHIFT ADAPTER

## H A S S E L B L A D **HTS1.5**

### GENERAL LENS DATA:

Focal length conversion factor	1.5x
Aperture reduction	-1.3 stops
Width/Height/Depth	140 mm / 146 mm / 77 mm
Weight	750 g

### LENS DESIGN

6 elements in 5 groups

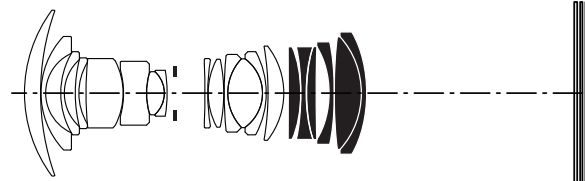
### ENTRANCE PUPIL POSITION

W. HCD 24mm:	176 mm
W. HCD 28mm:	175 mm
W. HC 35mm:	192 mm
W. HC 50 mm:	177 mm
W. HC 80mm:	119 mm
W. HC 100mm:	109 mm

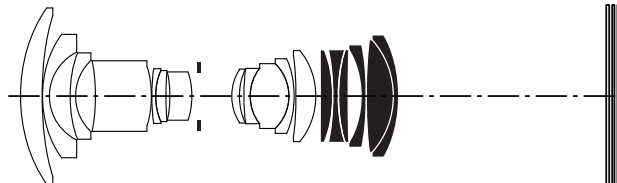
In front of the image plane  
(at infinity focus setting)

The entrance pupil position  
is the correct position of the  
axis of rotation when making a  
panorama image by combining  
individual images of a scene.

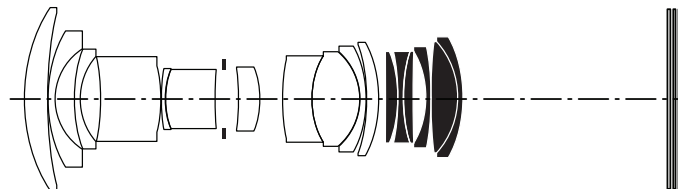
HCD24



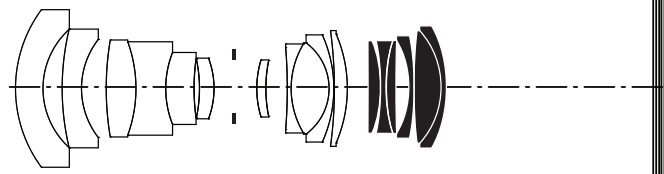
HCD28



HC 35



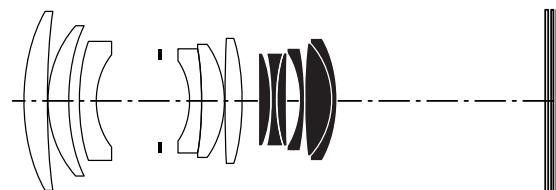
HC 50-II



HC 80



HC 100



# TILT AND SHIFT ADAPTER

## H A S S E L B L A D **HTS1.5**

### CLOSE FOCUS RANGE DATA

Lens	Minimum distance	Maximum image scale	Coverage	Exp.reduction
HCD 4,8/24 mm	0.42 m	1:6.3	31 cm × 23 cm	0 EV
HCD 4/28 mm	0.39 m	1:4.7	23 cm × 17 cm	0 EV
HC 3,5/35 mm	0.54 m	1:6.2	30 cm × 23 cm	0 EV
HC 3,5/50 mm	0.64 m	1:5.7	28 cm × 21 cm	0 EV
HC 2,8/80 mm	0.74 m	1:4.2	21 cm × 15 cm	0.3 EV
HC 2,2/100 mm	0.94 m	1:4.6	22 × 17 cm	0.5 EV

### COMPATIBILITY

The HTS 1.5 adapter is compatible with all H System cameras. Support for digital image corrections only with Hasselblad CF card based digital capture products. The HTS 1.5 adapter is optimally designed for the following lenses:

Lens	Equivalent lens with the HTS 1.5	Angle of view diag/hor/vert
HCD 4,8/24 mm	7,5/37 mm	81°/68°/53°
HCD 4/28 mm	6,3/45 mm	71°/59°/45°
HC 3,5/35 mm	5,6/55 mm	59°/49°/37°
HC 3,5/50-II mm	5,6/75 mm	44°/35°/27°
HC 2,8/80 mm	4,5/128 mm	27°/22°/16°
HC 2,2/100 mm	3,5/155 mm	23°/18°/14°

The HC 150, HC 150N, HC 210 and the HC 300 will fit onto the adapter but handling and performance can be compromised.

The HTS 1.5 is **not compatible** with:

The H1,7X converter
The CF lens adapter
HC 50-110
HCD 35-90
HC 120 and HC 120-II
Autofocus / focus confirmation (disabled)



# TILT AND SHIFT ADAPTER

## H A S S E L B L A D **HTS 1.5**

COMPATIBLE LENSES, EXTENSION TUBES AND MACRO CONVERTER

HCD24, HCD28, HC35, HC50-II, HC80 and HC100

Extension tube 13mm, 26mm and 52mm

Macro Converter



HC35 + HTS 1.5 at f/16, 5 degrees tilt

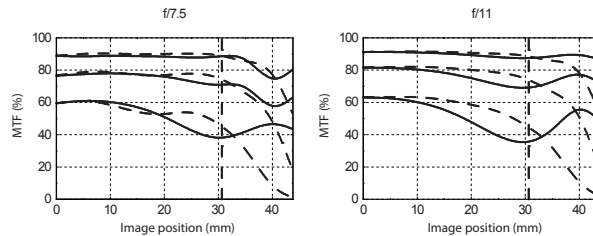
## HASSELBLAD HTS1.5

### MTF PERFORMANCE 10, 20 and 40 lp/mm

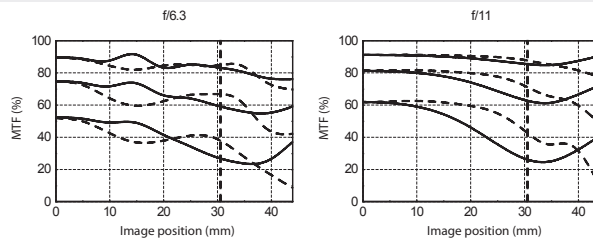
The diagram shows lens performance over the full enlarged image circle.

Vertical dashed line show the basic 50 Mpixel sensor format (37x49 mm). Dashed lines in the diagrams shows the tangential performance.

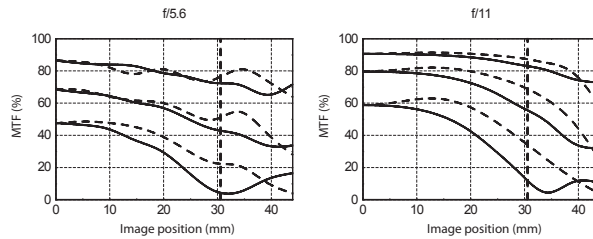
HCD 24mm  
@ infinity



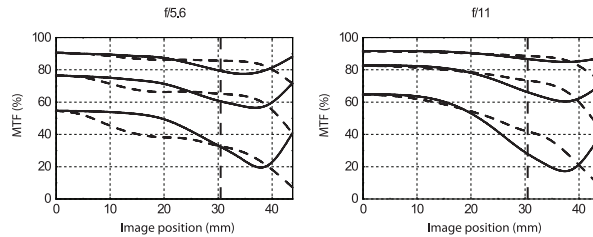
HCD 28mm  
@ infinity



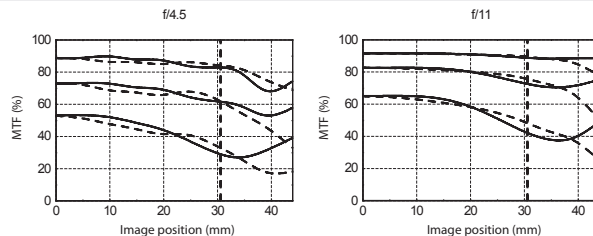
HC 35mm  
@ infinity



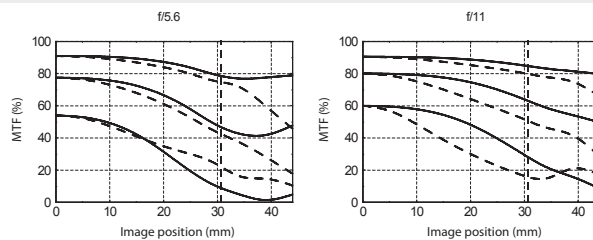
HC 50-II mm @  
infinity



HC 80mm  
@ 2m



HC 100mm  
@ 2m



# TILT AND SHIFT ADAPTER

## HASSELBLAD HTS 1.5

### MOVEMENTS

The lens can be shifted 18 mm, either upwards or downwards, and it can be tilted 10 degrees up or down. Tilt and shift can be combined according to the diagram.

<b>Exit</b>	
<b>Shift:</b>	<b>6.3 mm</b>
<b>Tilt:</b>	<b>-10.4 °</b>
<b>Rot:</b>	<b>0 °</b>
<b>HTS 1.5 Info</b>	

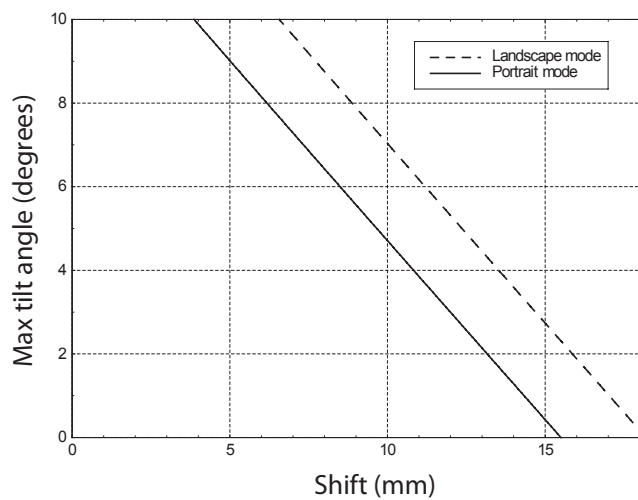
HTS settings are presented on camera grip LCD and are also embedded in the image file.



### MAXIMUM TILT

The graph shows the maximum amount of tilt that can be used without vignetting as a function of the amount of shift used.

Format 37×49mm.



# TILT AND SHIFT ADAPTER

## HASSELBLAD **HTS 1.5**

### MOVEMENTS - ROTATION

The HTS 1.5 adapter can be rotated 90 degrees to the left or right to enable free placement of sharpness plane and shift direction.





# TILT AND SHIFT ADAPTER

HASSELBLAD **HTS 1.5**



HC80 + HTS 1.5 at f/11, 10 degrees tilt

## HASSELBLAD HTS1.5

### USE OF SHIFT

For perfect parallel vertical lines in the image, the camera needs to be parallel to the subject. Tilting the whole camera would produce converging parallel lines. But by shifting the lens parallel to the image plane, you can raise or lower the view without tilting the camera. If the subject is a building as in this example, the camera should be placed level.



Camera positioned level. The roof of the building is outside the area projected onto the sensor (HC28 + HTS).



The complete camera tilted upwards to include the top of the building results in converging vertical lines in the image.



The camera positioned level again with an upward lens shift of 9 mm applied results in parallel verticals.



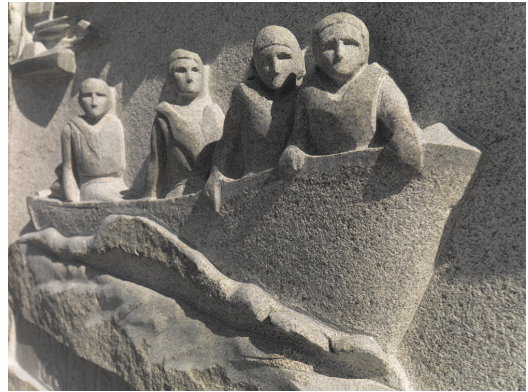


# TILT AND SHIFT ADAPTER

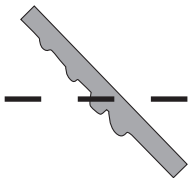
## HASSELBLAD **HTS1.5**

### USE OF TILT

By tilting the lens in relation to the image plane, you can effectively tilt the plane of sharpness in the subject. Depending on your idea of the final image you can either use tilt to enlarge the apparent depth of field or reduce it.

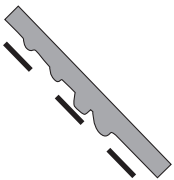


*The full image*

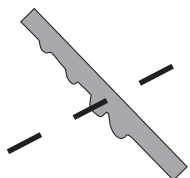


*HCD28 + HTS 1.5 at f/11*

*No lens tilt produces some lack of sharpness in the foreground and background due to insufficient depth of field.*



*Lens tilted a few degrees to the right produces an image with perfect sharpness from the foreground to the background.*



*Lens tilted a few degrees to the left produces an image with an apparent shallow depth of field.*



## H A S S E L B L A D **HTS 1.5**

### STITCHING

The HTS 1.5 lends itself extremely well to automatic stitching to create a panoramic image in super high quality. With most subjects it will be impossible to detect any dividing line between the separate images. The main reasons for this are:

- The lens is shifted sideways and therefore does not produce any distortion of the subject
- The DAC lens correction for distortion and vignetting ensures perfect images that can easily be stitched together

The resulting image can be created in any high-end stitching software, e.g. the "Photomerge" function in Adobe Photoshop CS3 or later.

### PROCEDURE

Place the camera on a tripod and aim it at a subject. Then set the HTS 1.5 in the normal position with no tilt or shift. Rotate the HTS 1.5 with the controls facing up to allow for sideways shift. Make the first exposure in the mid position. Shift to both end positions and make an exposure in each position. Develop the three images with DAC turned on. Import the images into the stitching software and follow the instructions.

In the case of Adobe Photoshop CS3, use the following procedure:

- open the three images
- Go to menu: "File - Automate - Photomerge"
- Click on "add open files" and check "interactive layout"
- Click OK
- In the preview that appears you can choose to modify the layout, but in most cases there will be no need for any manual interaction.
- Finally click OK and the final stiched image will be processed.

If the stitch is not perfect, you can modify the layer masks for each layer.



HCD28 and HTS 1.5 - The three images above have been merged into one image using Adobe Photoshop CS3 "Photomerge". Even at 100% it is almost impossible to see any stitch lines.