

# Citadel Panoramic

Situation awareness camera for armoured vehicles

Datasheet



## Features

- Panoramic 170° horizontal Field of View
- Distortion-free, no fish-eye effect
- Real-time for drivers
- Wide temperature range, -40°C to +70°C
- Day/Extended Night Mode operation
- Fog penetration
- Digital Noise Reduction, DNR
- Heated protective window

## Description

By mounting an array of cameras on armoured vehicles, an unobstructed 360° view over the near surroundings of the vehicle can be maintained with the hatches closed, providing safety for the entire vehicle crew and assets.

The Citadel CI-P170 is a panoramic camera system that combines images from two 85.5° FOV cameras to a complete seamless 170° FOV viewing system for mounting on a wide variety of vehicles, such as armoured personnel carriers (APCs), light armour vehicles (LAVs) tanks and other wheeled or tracked vehicles.

It is designed to deliver high-performance images, even under the harshest conditions, in temperatures ranging from -40°C to +70°C.

image, without fish-eye effect, under a wide range of viewing conditions.

The camera design provides several viewing modes:

1. Full 170° Field of View, both cameras stitched together
2. Separate 85.5° Field of View from left or right side camera
3. 85.5° Field of View from the centre of both cameras

## Ready for tough action

The CI-P170 is encased in a rugged IP-65 housing, designed to withstand vibration in accordance with MIL STD 810F (metal track vehicles). It is also sturdy enough to easily withstand the impact of soldiers' boots treading on the housing. Furthermore, with its low profile (78 mm), it is a difficult target for enemy snipers.

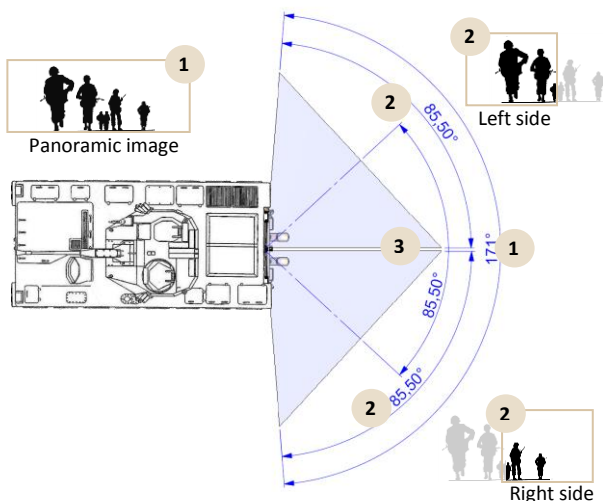
The camera protection windows are heated for condensation-free operation. In case of damage by scratching or cracking, a replacement window can easily be fitted in the field.

## Graphic overlays

The Citadel CI-P170 allows configuration of several graphic overlays in the form of distance markers and text strings.



Panoramic image with example of distance marker overlays



## Distortion-free images

The CI-P170 is designed around the latest generation 1/3" CCD image sensors and custom designed optics to provide a seamless, distortion-free panoramic 170° horizontal FOV

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## Conductive cooling

The Citadel CI-P170 uses conductive cooling to remove heat from the CCD sensors. This reduces random noise in the CCD sensors, resulting in improved image quality, particularly in low-light conditions.

## Expanded Hi-Dynamic Range (XDR)

XDR is useful in conditions where there are large variations in brightness in the picture, i.e. when there are very dark and very bright areas in the picture. XDR amplifies the signal level in dark areas and reduces it in very bright areas thereby improving the visibility in the picture.

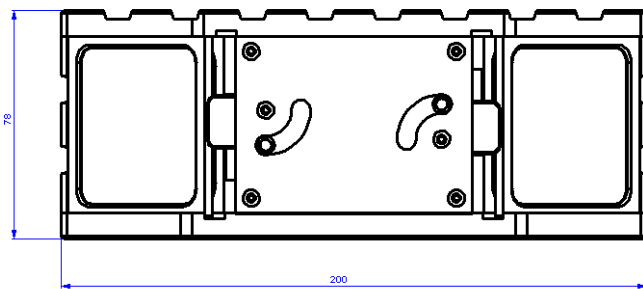
## Fog penetration

The fog penetration function is designed to automatically increase visibility under conditions such as fog, haze and fire smoke. The camera continuously analyses the picture and once it detects a low-contrast condition, it will automatically enhance the contrast.

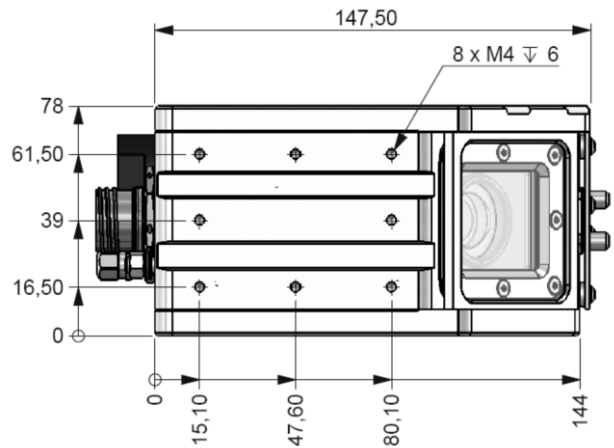
## Digital Noise Reduction (DNR)

The Digital Noise Reduction in the CI-P170 camera is a function which analyses the video image and reduces the noise, particularly in low-light conditions. The analysis is based on a 3-dimensional algorithm.

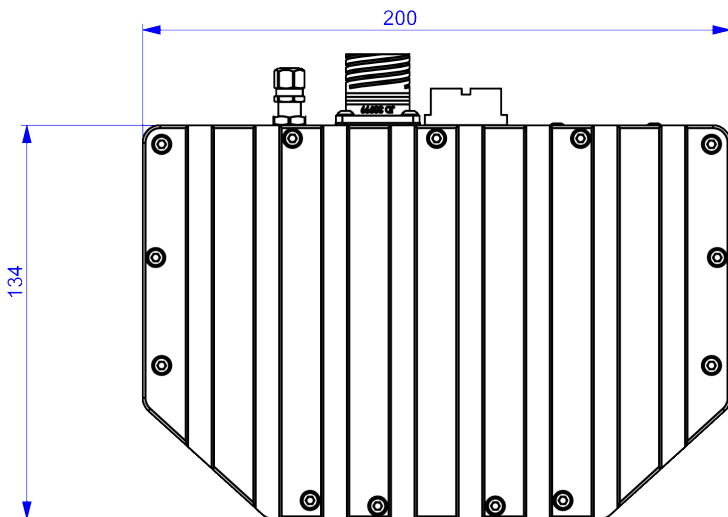
## Mechanical outline and dimensions



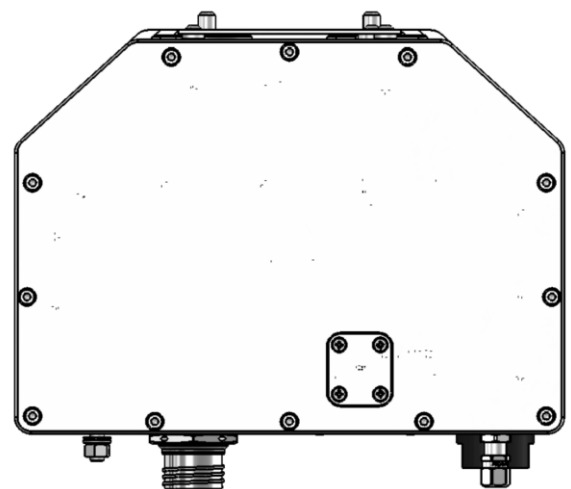
Front view



Side view (left side)



Top view



Bottom view

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## Specifications

	PAL	NTSC
<b>Image system</b>		
Sensor	(2x) high sensitivity 1/3" colour CCD sensor with complementary mosaic	
Lens	(2x) Focal length 2.6 mm, f/1.6, <1% distortion	
Effective pixels (H x V), per camera	976 x 582	976 x 494
Horizontal FOV	170° (two images with each 85.5° stitched together with minor overlap)	
Vertical FOV	70°	
Scanning system	2:1 Interlace	
Horizontal frequency	15.625 kHz	15.734 kHz
Vertical frequency	50 Hz	59.94 Hz
<b>Electrical specifications and functions</b>		
Video output	Composite VBS, 1 Vpp, 75 ohm	
Output formats (user selectable)	Panoramic 170° FOV fitting 16:9 monitor, Panoramic 170° FOV horizontally compressed to fit 4:3 monitor, Left, right side image and central portion of panoramic image fitting 4:3 monitor	
Horizontal resolution	left & right separate image: 425 TVL; Stitched panoramic image: 240 TVL	
Sensitivity	0,007 lx, 25% video @ f/1.6, AGC on	
Spectral response	Visible (IR blocked)	
Signal to noise ratio	> 52 dB, AGC Off	
Electronic shutter, fixed	1/50 to 1/10,000 sec.	1/60 to 1/10,000 sec.
Gamma correction	0.45 / 1.0	
Automatic Gain Control. range	0 to +36 dB 6 DB DGC	
Frame integration	Extended night mode, 4x	
Day/Extended night mode switching	Via serial RS-422 interface	
Fog penetration	Image contrast enhancement 3 Levels	
White balance	Auto Tracking White Balance (ATW)	
Noise reduction	2D and 3D Digital Noise Reduction 3 Levels	
Graphical overlays	Distance markers, 5-character text strings	
Configuration, serial interface	CST Control Panel Applet and serial RS-422 (CAN-BUS optional)	
<b>Mechanical</b>		
Overall dimensions (W x H x L)	200 x 78 x 134 mm (not incl. connectors)	
Net weight	<2100 g	
Housing material	Aluminium with corrosion protection coating	
Protective housing integrity	IP-65 (NEMA 4) rating, back-filled with dry nitrogen	
Camera windows	Chemically strengthened, AR-coated BK7 glass. ( optional Heated )	
Connector (power, data, control)	22-pin circular - In accordance with MIL 38999 (optional bottom mounting)	
<b>Environmental</b>		
Operating voltage	18 to 36VDC (1275B protection filter)	
Current consumption	Camera system: 12W, ( optional Defroster: 12W (thermostat controlled))	
Operating temperature	-40°C to +70°C	
Storage temperature	-40°C to +70°C	
Vibration/shock	MIL STD 810F, tracked vehicle 5.7G-rms, 3 hours each direction MIL STD 810F, method 514.5, procedure 6	
EMC	Tested in accordance with MIL STD 461F	
MTBF	30 000 hours	

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## About Us

CST - Copenhagen Sensor Technology A/S is a privately held Danish company specialising in the design and manufacture of high-performance electro-optical solutions for demanding battlefield and surveillance applications.

Founded in 2001, CST has rapidly grown to a mature organisation, capable of serving a global customer base. In modern facilities on the outskirts of Copenhagen, Denmark, CST houses R&D, production, QA and sales and marketing functions. With a collective experience in CCD camera, optics, electronics and software development, the highly skilled staff at CST is committed to creating rugged, durable and innovative electro-optical solutions.

CST is certified to ISO 9001:2008, which applies to the whole process flow of design, development, manufacturing and testing. Furthermore, design and development activities operate in accordance with the ISO 10007:2003 configuration management standard. CST products are not restricted by ITAR.

## Customer and OEM solutions

**CST has a long tradition of working closely with its customers, identifying unmet needs and creating solutions with sustainable value for the users.**

With a strong R&D base at the headquarters in Denmark, CST is able to provide mechanical, optical, software and hardware customisations while meeting the toughest requirements for military, homeland security and high-end surveillance applications. Whether the need calls for a ruggedized high-precision zoom lens or a highly sensitive CCD camera, or a complete system comprising lens, camera and advanced video processing, CST can offer a fast-track design process. Contact us to discuss your specific requirements. Together we can create a solution that provides the best price and performance ratio.

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