

WidePIX

DYNAMIC Industry



Datasheet

General features

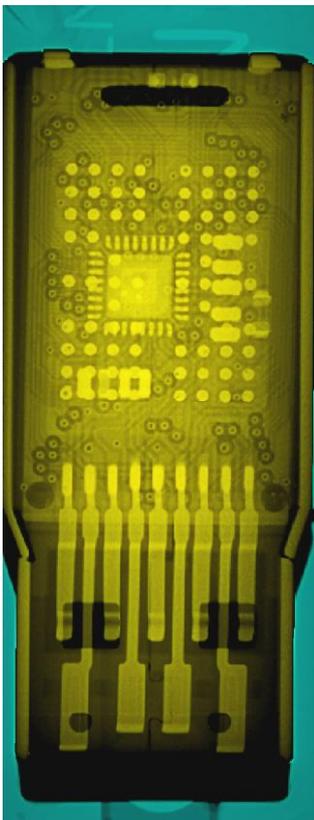


Illustration of “color” radiographs, different materials are identified and imaged in different colors

The large-area imaging detector **WidePIX DYNAMIC Industry** offering a resolution of **256 × 1280 pixels**. It is composed of **Timepix2** hybrid detector electronics tiles. Each tile, 256 × 256 pixels with a 55 μm pitch, is bonded to a single **monolithic 500 μm-thick silicon** sensor. The tiling architecture ensures that the entire detector surface is fully sensitive, with no gaps between sensor tiles, providing seamless imaging over the full active area.

The system supports **single-particle counting** as well as **tracking of high-energy particles**. Its energy-sensitive architecture adds a new dimension to radiographic imaging. Users can select different counter depths depending on the measurement mode, enabling optimization either for higher frame rates or improved resolution.

WidePIX DYNAMIC uses **Power over Ethernet (PoE)**, requiring only a single Ethernet cable for both power and data transfer. It supports high-speed readout of up to **350 frames per second**, and its signal-to-noise ratio above **1000** ensures exceptionally clear, low-noise X-ray images.

The device is well suited for **CT scanners**, which benefit from the large, gap-free sensitive area.

Each pixel includes two sets of integrated **10 and 4-bit digital counters**. These counters store the number of detected particles, typically X-ray photons, with energies above a defined threshold or their energies. The particle-counting principle eliminates additional noise originating from the sensor or readout electronics, enabling X-ray imaging with **very high contrast** and a **wide dynamic range**. Even low-contrast structures, such as plastics or soft tissues, become easily distinguishable in the resulting images.

Main Features

- Readout chip type..... Timepix2
- Pixel size¹..... 55 × 55 μm²
- Sensor resolution..... 256 × 1280 pixels
- Sensor area 14,1 × 70,5 mm²
- Counter bit depth² 14/10/4 bits
- Dark current..... none
- Sensor material..... 500 μm Si
- Interface 1 Gb/s Ethernet with PoE
- Maximum frame rate²..... up to 350 fps
- Dimensions 228,5 × 92 × 42,5 mm
- Weight..... 1700 g

¹ 55 × 110 μm² at the edges and 110 × 110 μm² at the corners

² Depends on operation mode.

Device parameters

Operation conditions

Symbol	Parameter	Value	Units	Comment
T_a	Operating ambient temperature range ¹	10-55	°C	
ϕ	Humidity	< 80	%	Not condensing
IP	IP rating	IP50		

¹ With temperature stabilization – see the paragraph below.

Water cooling interface

Temperature stabilization of the device is required when in operation. **WidePIX DYNAMIC Industry** uses water connectors that allow for quick disconnection/reconnection. Mating connector is included as standard accessories and must be attached to 4x6 mm plastic hose.



Temperature of the cooling water must be within range 21 ± 4 °C.
 Max. pressure in the water-cooling system: 1,2 bar.
 The device will automatically shut down after chip or CPU temperature exceeds 55 °C.
 Intended for dust free indoor use.

Electrical specification

$T_a = 22$ °C

Symbol	Parameter	WidePIX DYNAMIC Industry	Units	Comment
V_{CC}	Supply voltage DC	48	V	
I_{CC}	Supply current	0,4/0,8	A	Typ/Max
P	Power consumption	20/40	W	Typ/Max

Chip parameters

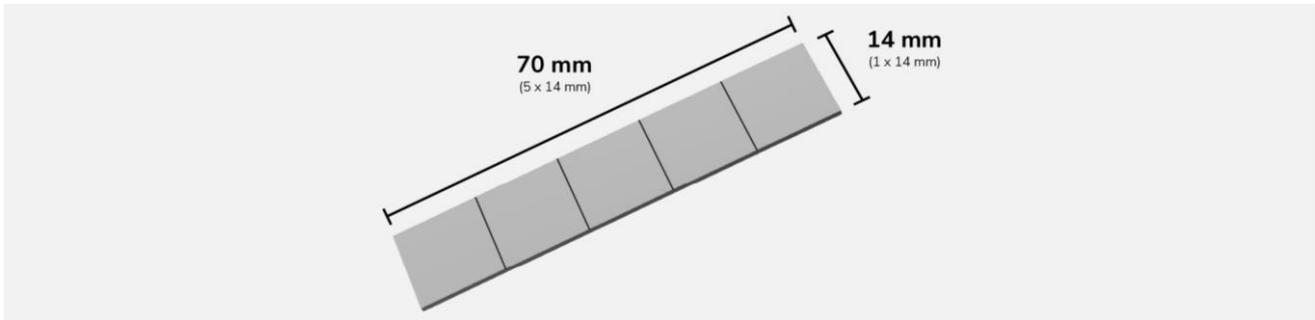
$T_{dev} = 22$ °C

Symbol	Parameter	WidePIX DYNAMIC Industry 5	Units	Comment
	Pixel size	55 × 55	μm^2	
	Detector resolution	1280 × 256	Pixels	
A	Sensitive area	70,5 × 14,1	mm^2	

Chip layout

The detector is built from configurable arrays of 14 × 14 mm readout chips bump-bonded to the sensor layer: Silicon sensor is monolithic 70 × 14 mm, which ensures a continuous, gapless detection area.

Single row



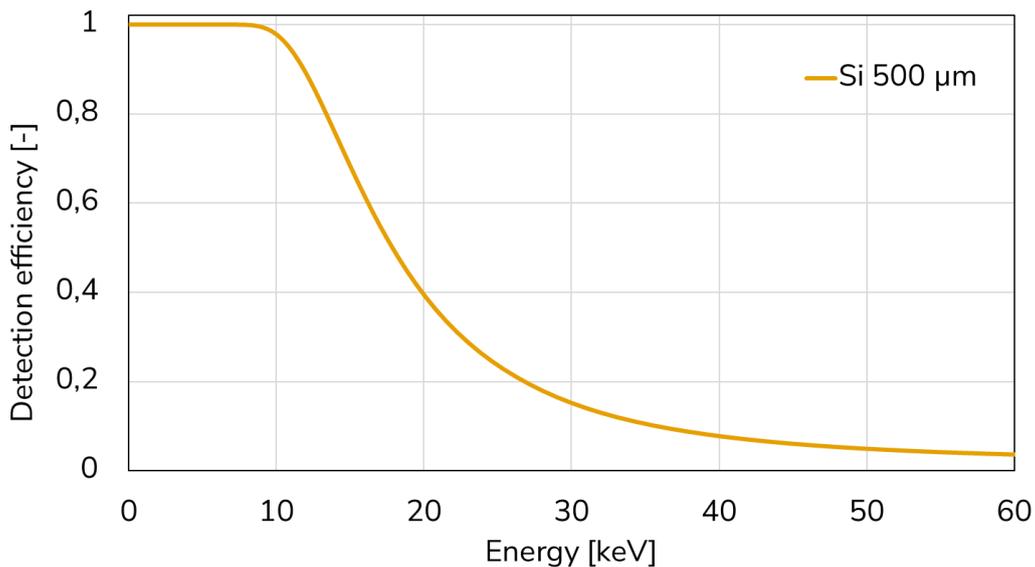
WidePIX DYNAMIC Industry 5

Sensor parameters

$T_{dev} = 22\text{ °C}$

Symbol	Parameter	Si	Units	Comment
	Sensor thickness	500	μm	
V_{BIAS}	Bias voltage	150	V	
	Minimum energy threshold	3,5	keV	
σ	Energy resolution of energy discrimination threshold	0,4	keV	
σ	Energy resolution in full spectral mode (σ @ 8 keV)	0,9	keV	
σ	Energy resolution in full spectral mode (σ @ 23 keV)	1,3	keV	
σ	Energy resolution in full spectral mode (σ @ 60 keV)	2,0	keV	
	Typical detectable energy range for X-rays	3,5 to 60	keV	See chart below

Detector efficiency



Modes and types of readout chip operation

The detector is frame-based, i.e. the data from all the pixels are read out after the acquisition time is over.

Continuous mode and Dead time

The device supports Continuous mode operation, which eliminates Dead time (During Readout time or Dead time, no charge is collected from the sensor). During acquisition, one counter performs the measurement while the second counter is being read out. Continuous mode is set automatically, under the condition that the acquisition time is set long enough so that the second counter can be read out. An overview of these times, which correspond to the Dead time, is provided in the table below. Otherwise only one counter is used in case of very short acquisition times.

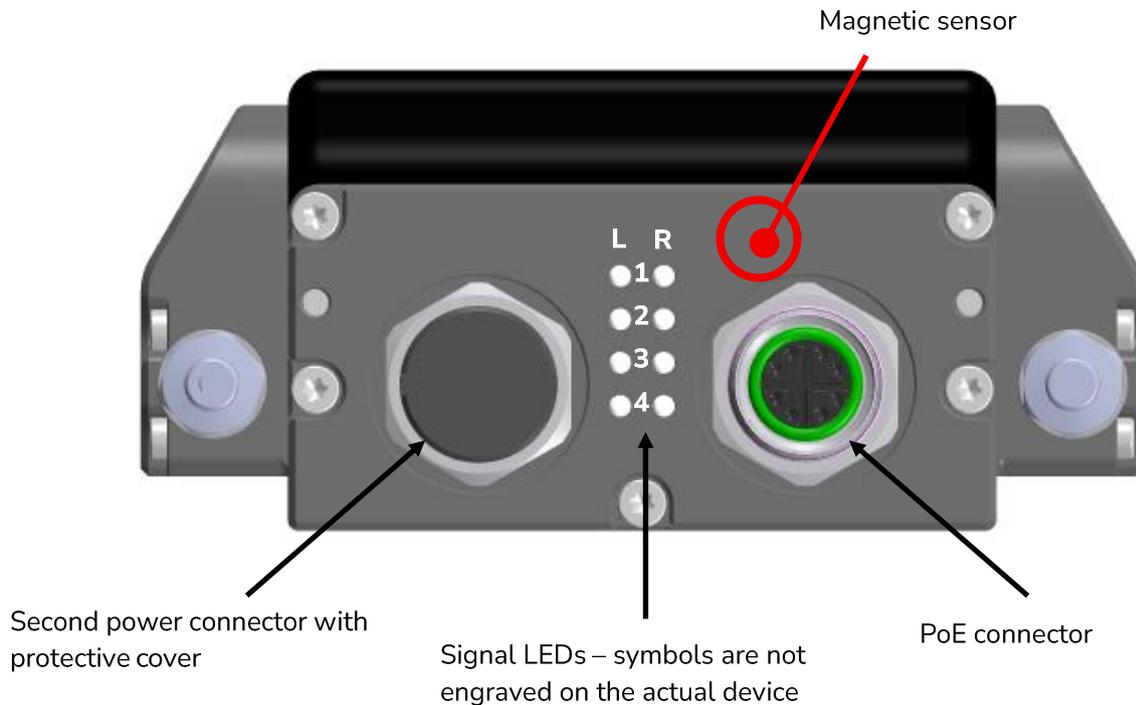
Counter bit depth

Different counter depths can be chosen for certain measurement modes. This enables tailoring performance for higher frame rates, or better resolution. An overview of operation modes together with maximum achievable frame rates is presented in the table below. Actual frame rate might decrease due to detected particle flux, software or processing being run simultaneously with the measurement, saving the data during the measurement and performance of the computer itself.

Mode	Counter depth	Maximum frame rate	Readout time
Counts	14 bits	150 fps	6,7 ms
	10 bits	210 fps	4,8 ms
	4 bits ¹	350 fps	2,0 ms
Energy (iToT)	14 bits	150 fps	6,7 ms
Counts + Energy (iToT) ¹	4 + 10 bits	150 fps	6,7 ms

¹ on demand

Device description



PoE connector

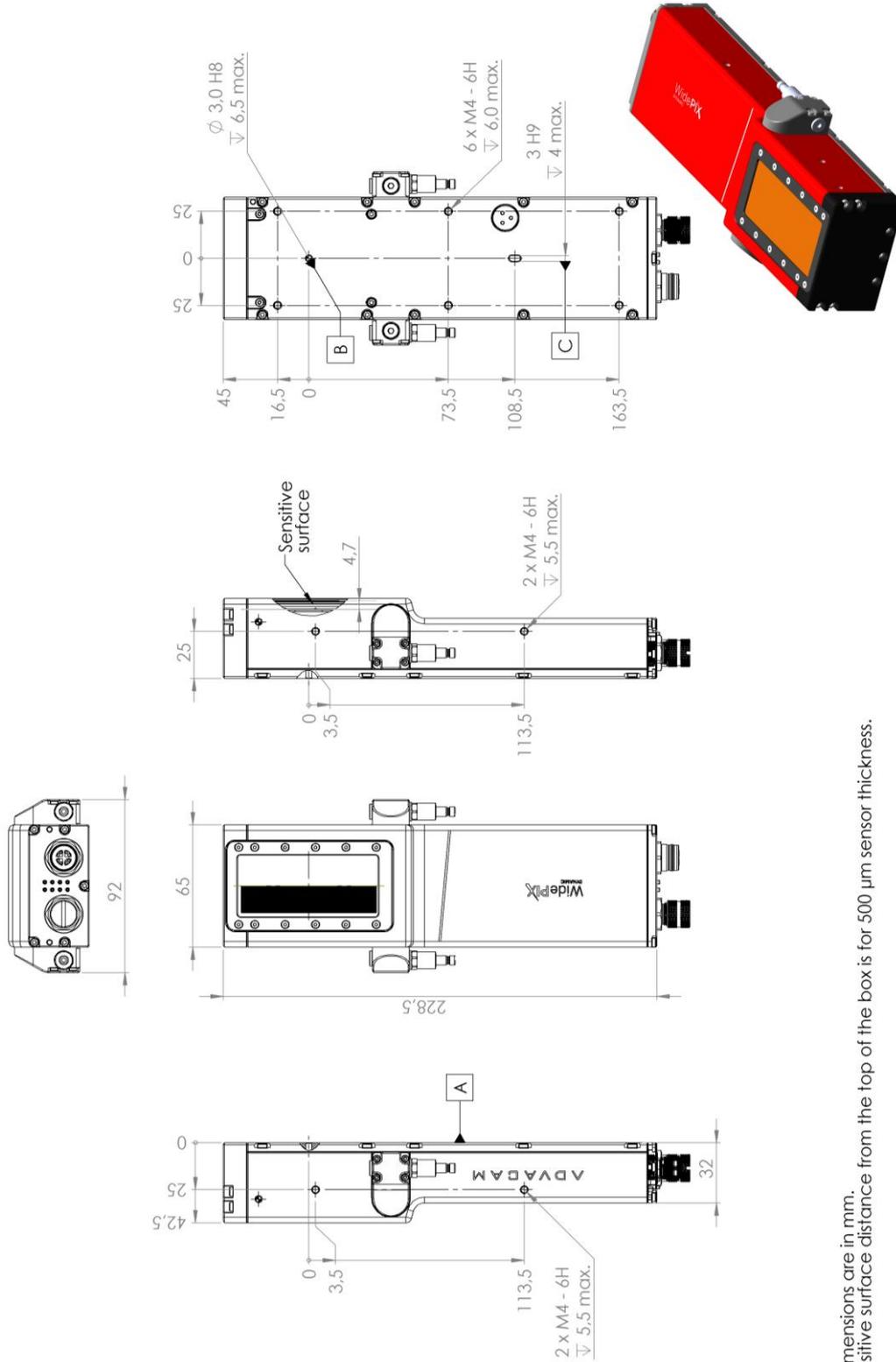
An Ethernet cable supporting Power over Ethernet (PoE), with an M12 X-coded connector on one end and an RJ45 modular connector on the other, is included as a standard accessory. Ethernet cable is connected to an external PoE injector or PoE-enabled switch. The injector or switch must support IEEE 802.3bt Type 3 (PoE++) and deliver at least 60 W of power. Both the power delivery and the data transfer are provided by the Ethernet cable.

Second power connector: +48 V DC connector – without PoE

Alternative power supply via standard M12 connector. +48V DC power adapter is connected to the device's power connector. In this configuration, the Ethernet cable is used only for data transfer and should be connected directly to your computer. **Warning:** Do **NOT** combine PoE with the power adapter. For more information see WidePIX CHROMATIC Industry manual.

Mechanical dimensions WidePIX DYNAMIC Industry

The following drawings illustrate the standard connection setup.



All dimensions are in mm.
* Sensitive surface distance from the top of the box is for 500 μm sensor thickness.

Instructions for safe use



Do not touch sensor surface!

To avoid malfunction or damage to your **WidePIX DYNAMIC Industry** please obey the following:

- Do not expose to water or moisture **WidePIX DYNAMIC Industry** is dust protected only.
- Do not open **WidePIX DYNAMIC Industry** case. Detector wire-bonding connections may be irreversibly damaged.
- Do not operate detector when not properly water cooled. Otherwise, detector temperature may rise above the specified range. Recommended temperature is 22 °C.
- The protection provided by this product may be impaired if it is used in a manner not described in this document.

Disposal



Do not dispose these instruments as unsorted municipal waste. Please use separate collection facility or contact the supplier from which the instrument was purchased. Please make sure discarded electrical waste is properly recycled to reduce environmental impact.

Release history

Date (YY/MM/DD)	Changes	Changed by
26/02/23	Preliminary version v2	S. Valtera

ADVACAM s.r.o.

U Pergamenky 12

Prague 170 00

Czech Republic

Tel.: +420 608 605 533

Email: sales@advacam.com

www.advacam.com

