ADVACAM
Imaging the Unseen

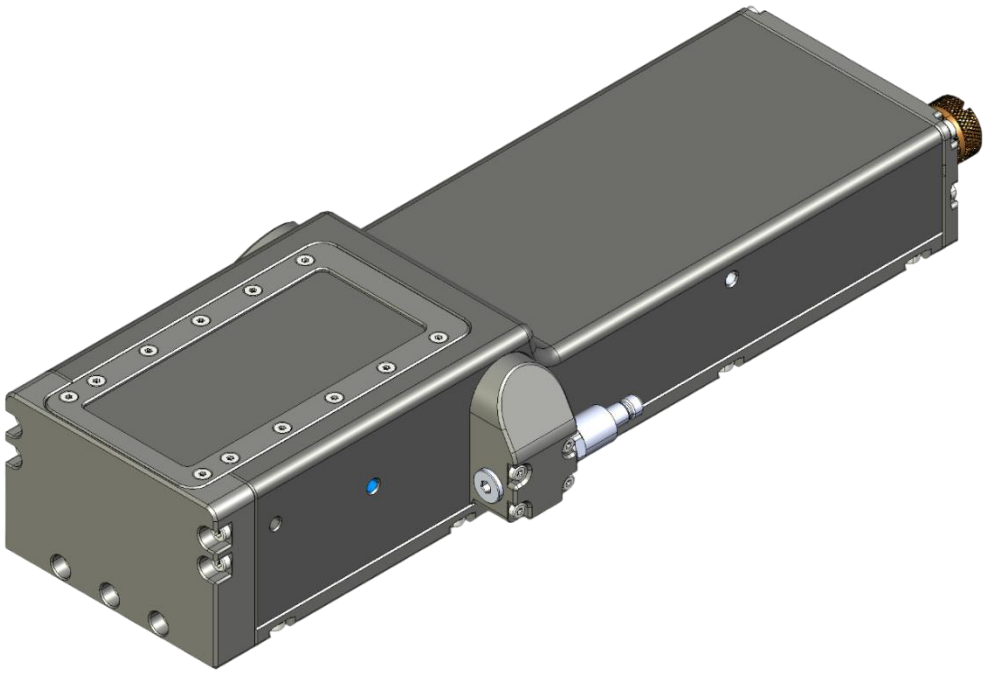
WIDEPIX® PoE G2

2(1)x5 – MPX3

2(1)x5 – MPX3 SENSE EDGE

Datasheet

Model No.: W1PM3F-Xxx, W2PM3F-Xxx
W1PM3S-Xxx, W2PM3S-Xxx
W1PM3E-Xxx



WXPM3S-Xxx

General features

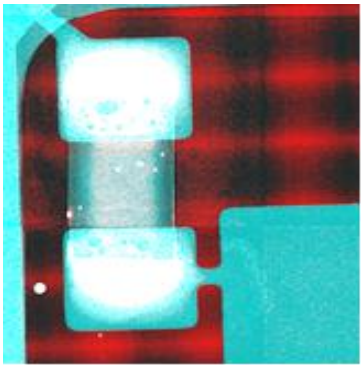


Illustration of multichannel "color" radiographs where different materials are identified and imaged in different colors.

The large area imaging detector **WIDEPIX PoE G2** *2(1)x5 - MPX3* with resolution of 512 (256) x 1280 pixels i.e. 0.64 (0.32) Mpixels is composed of Medipix3 hybrid detector electronics tiles. Each tile (256 x 256 pixels) is attached to a silicon or CdTe sensor. Therefore, the whole area of the **WIDEPIX PoE G2** *2(1)x5 - MPX3* device is fully sensitive and there are no gaps between sensor tiles. Each pixel has two integrated 12-bit digital counters and two energy discrimination thresholds. The counters store number of registered particles, e.g. X-ray photons, with energy above the appropriate threshold. Both counters can be joined to a single 24-bit counter providing enhanced dynamic range. The particle counting principle eliminates any additional noise generated by the sensor or electronic readout. It allows acquiring X-ray images with very high contrast and wide dynamic range. Therefore, even low contrast structures such as plastic or soft tissue are easily detectable in X-ray images.

Both devices are suitable for CT scanners, which can take advantage of large sensitive area without any gaps. The **WIDEPIX PoE G2** *1x5 - MPX3* variant moreover supports a hardware-based Time-Delayed-Integration mode for online (continuous) scanning applications.

The energy discrimination thresholds of Medipix3 technology allow spectral X-ray imaging. Different materials in an inspected sample could be then identified based on their spectral X-ray attenuation properties.

The Charge Summing Mode implemented in the pixel electronics provides hardware-based correction of signal cross talk between pixels. This further considerably improves the detector spectral response and therefore also quality of spectra measured in individual pixels.

The camera is connected to a computer via an Ethernet cable. The device also supports Power over Ethernet (according to PoE++ standard).

Main Features

- Readout chip type Medipix3
- Pixel size ..... 55 x 55 µm*
- Sensor resolution ..... 512 (256) x 1280 pixels
- Dynamic range in one frame ..... 12-bit / 24-bit**
- Dark current ..... none
- Interface ..... 1x 1Gbit/s Ethernet
- Maximum frame rate ..... 90 (170) fps***
- Dimensions ..... 249.5 x 75 x 61 mm
- Weight ..... 910 g

* 55 x 110 µm at the edges and 110 x 110 µm at the corners.
** Depends on operation mode. Higher dynamic range can be achieved by summing multiple images.
*** Depends on operation mode and chip configuration.

Device parameters

Operating conditions

Symbol	Parameter	Value	Units	Comment
T_A	Operating temperature range *	10-55	°C	
Φ	Humidity	< 80	%	Not condensing
IP	IP rating	IP50		

* The device shall be thermally stabilized during operation. The device will automatically shut down after exceeding 55°C.

Family parameters

T_A = 25°C

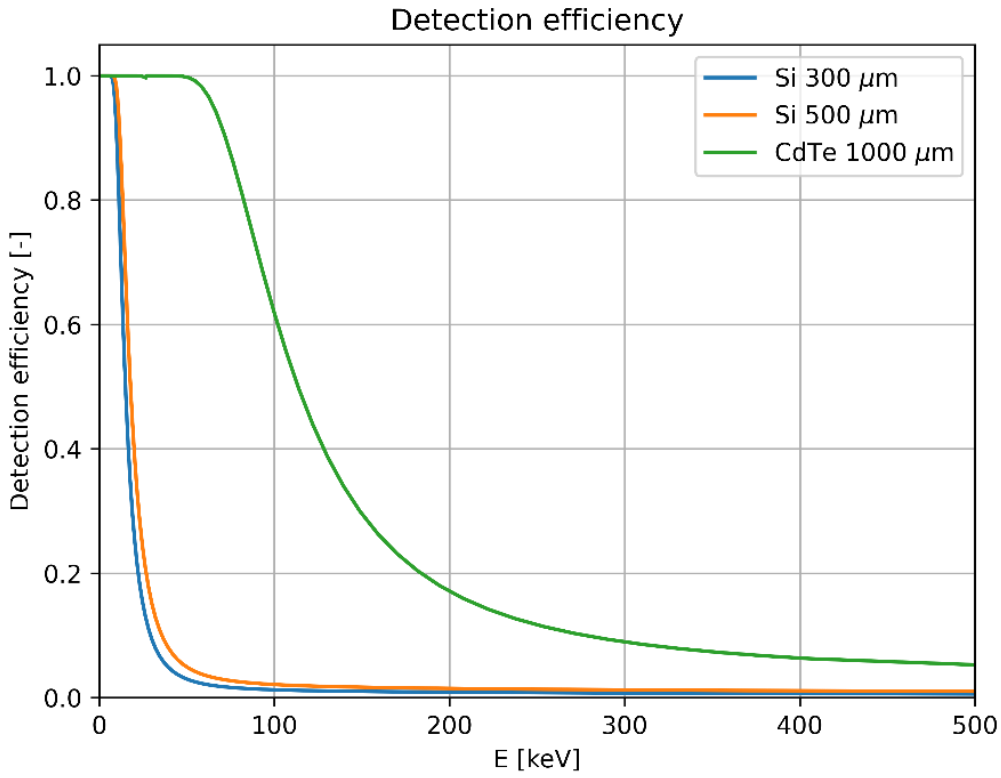
Symbol	Parameter	WidePIX PoE G2 1x5 - MPX3	WidePIX PoE G2 2x5 - MPX3	Units	Comment
P	Power consumption	20/40	25/ 50	W	Typ/Max
A	Sensor area	70.5 x 14.1	70.5 x 28.2	mm	
	Detector resolution	1280 x 256	1280 x 512	Pixels	
f	Frame rate *	170	90	fps	
T_{READ}	Readout time **		11	ms	
m	Weight	905	910	g	Approx., depends on model

* Operating parameters: shutter time 1 ms, SPM-1CH or CSM 12 bit.
** During readout time (dead time), no charge is collected from the sensor.

Sensor parameters

Symbol	Parameter	Si		CdTe	Units	Comment
	Thickness	300	500	1000	µm	
V_{BIAS}	Bias voltage	150	150	-450	V	Max
	Minimum energy threshold	6.0		8.0	keV	Typical, T_A = 22°C
	Typical detectable energy range for X-rays *	up to 60		up to 600	keV	See chart below
	Pixel size	55 x 55 **			μm^2	

* To get the true response of the detector, the quantum efficiency of the sensor chip combined with the energy range of the readout chip must be considered.
** Pixels on tile borders are 2.5 times larger in one direction. The corner tile pixels are 2.5 times larger in both directions.

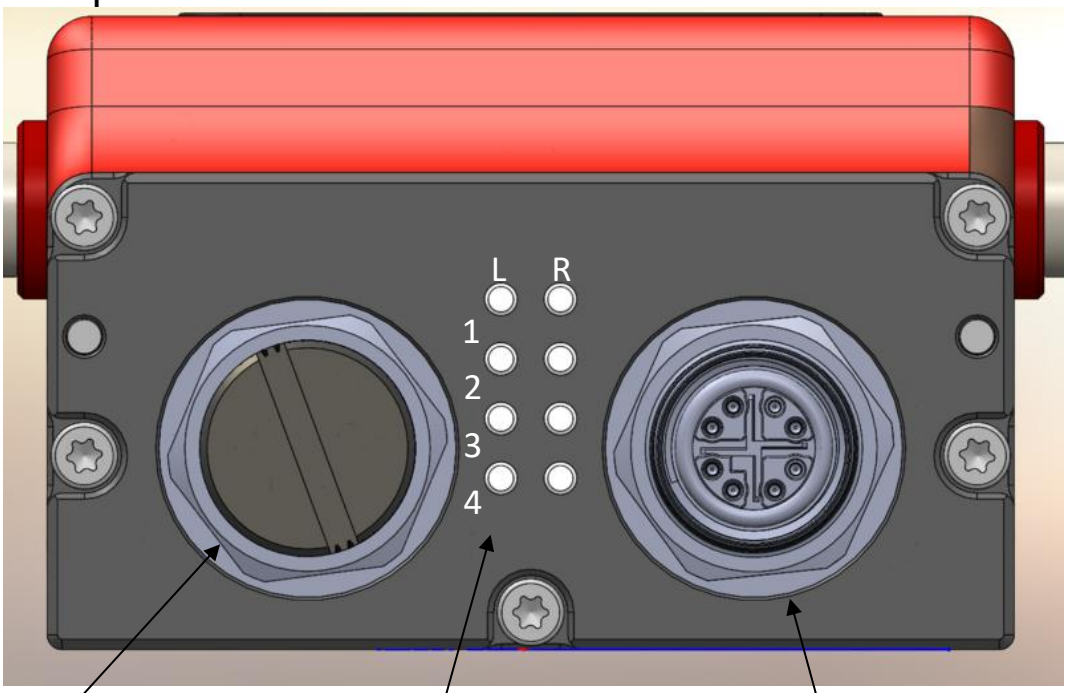


Modes of readout chip operation

Type	Operation mode	Bit depth	Description
Frame (reading all pixels)	SPM-1CH	12/24 bit per frame	Single Pixel Mode using one counter: Every pixel works independently of its neighbors. One energy threshold (energy channel) is available. 1 output image: Number of events per pixel
	SPM-2CH	12 bit per frame	Single Pixel Mode using both counters: Every pixel works independently of its neighbors. Two energy thresholds (energy channels) are available. 2 output images: Number of events per pixel
	CSM	12/24 bit per frame	Charge Summing Mode: The charge from 4 adjacent pixels is summed and is assigned to the pixel with the largest charge deposition. The event is counted only if the sum of signals exceeds the second energy threshold. 1 output image: Number of events per pixel

In addition, all modes can be operated at three ranges: **Broad** / **Narrow** / **Super Narrow** (except CSM mode and silicon sensor, where Super Narrow range is not available). This feature determines the range for setting the energy threshold. By default, the detector is calibrated for the Narrow range mode. Calibration of other range modes can be added upon request.

Device description



Secondary power connector with protective cover

Signal LEDs – symbols L, R, 1-4 are not engraved on the actual device

PoE connector

Power connector (+48V DC)

M12 A-coded, 2pin - pin 1 GND, pin 3 VDD (input is reverse polarity protected)
This connector might be removed in future versions.

Ethernet connector

M12 X-coded (Ethernet cable with an M12 X-coded connector in one end and a modular connector RJ45 in the other is included in the delivery as a standard accessory)

Power supply options

There are two possibilities for power delivery:

- **Power supply adapter**
  The power supply adapter must be connected to the +24V DC connector. In this case the Ethernet cable serves only for data transfer and connects the detector directly with the computer.
- **Power over Ethernet (PoE)**
  No power supply adapter is needed. Both the power delivery and the data transfer are provided by the Ethernet cable. **The cable must be connected to an external PoE injector supporting IEEE 802.3bt Type 3 (PoE++) standard, which delivers maximum power of 60 W. The device cannot be operated using lower port power.**

IPv4 address

By default, the IP address is static and is set to 192.168.1.100.

The address reconfiguration or reset can be initiated within a short window after turning on the device using magnetic field. A magnet is delivered together with the **WIDEPIX PoE G2** $_{2(1)x5 - MPX3}$ detector. There are three possibilities for IP address assignment listed in the table below. The configuration can be changed by following these steps:

- After the device init (**R1** is Orange, changes to Red and turns off), attach the magnet to magnetic sensor. When the magnetic field is recognized, **R1** turns Blue.
- When the change mode is enabled, **R1** changes to one of the colours indicating the actual settings (listed below).
- Use magnet for select the preferred settings.

More information on IP address change and a short video guide can be found on our wiki:
https://wiki.advacam.cz/wiki/WidePix_POE_v2_Quick_Start_Guide

Configuration	Diode indicator R1	Usage
Static	Yellow	Persistent address - default after reset: 192.168.1.100 - address can be set by user
Auto IP (APIPA)	Red	Address autoconfiguration (when DHCP is not available) - 169.254.x.y, where x and y are any two numbers between 0 and 255
DHCP	Green	Dynamic address assigned by network

Water cooling interface

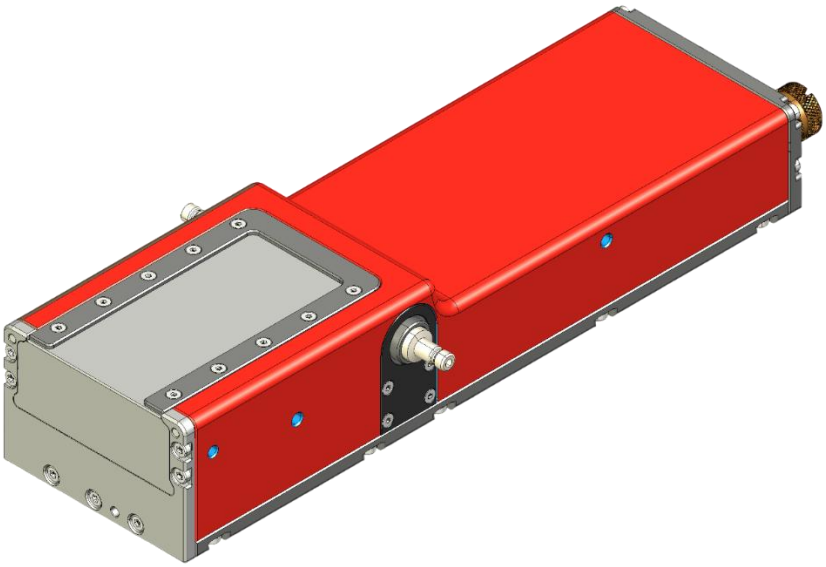
It is **mandatory** to cool down the detector when in operation. **WIDEPIX PoE G2** $_{2(1)x5 - MPX3}$ uses water connectors that allow for quick disconnection/reconnection. Mating connectors are included as a standard accessory and are intended for attachment to a 4x6 mm plastic hose.

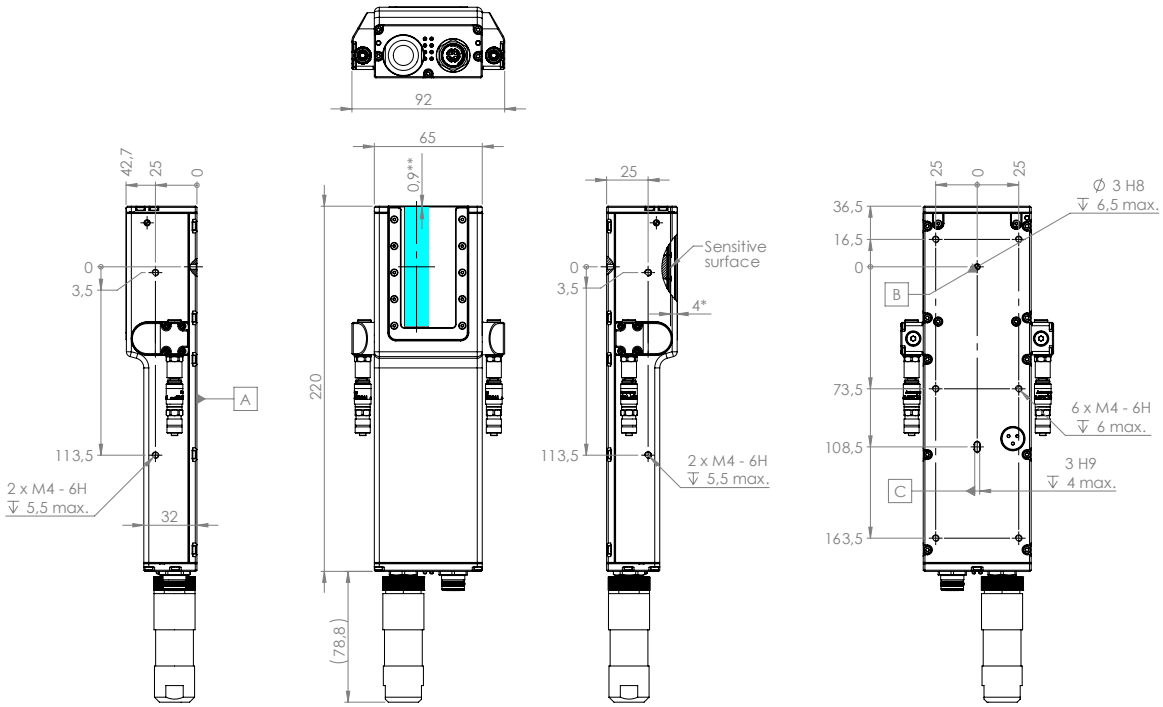
Firmware flash

It is possible to remotely update the firmware of the device. For more information, please contact our technical support at support@advacam.cz

Mechanical dimensions

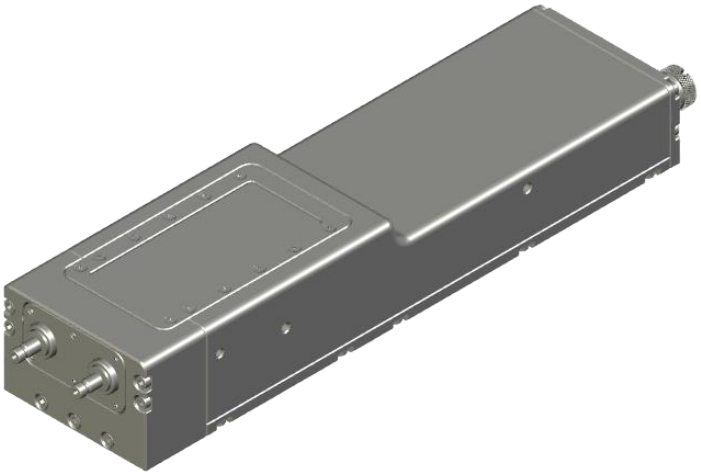
M3E –Medipix3, Sense Edge

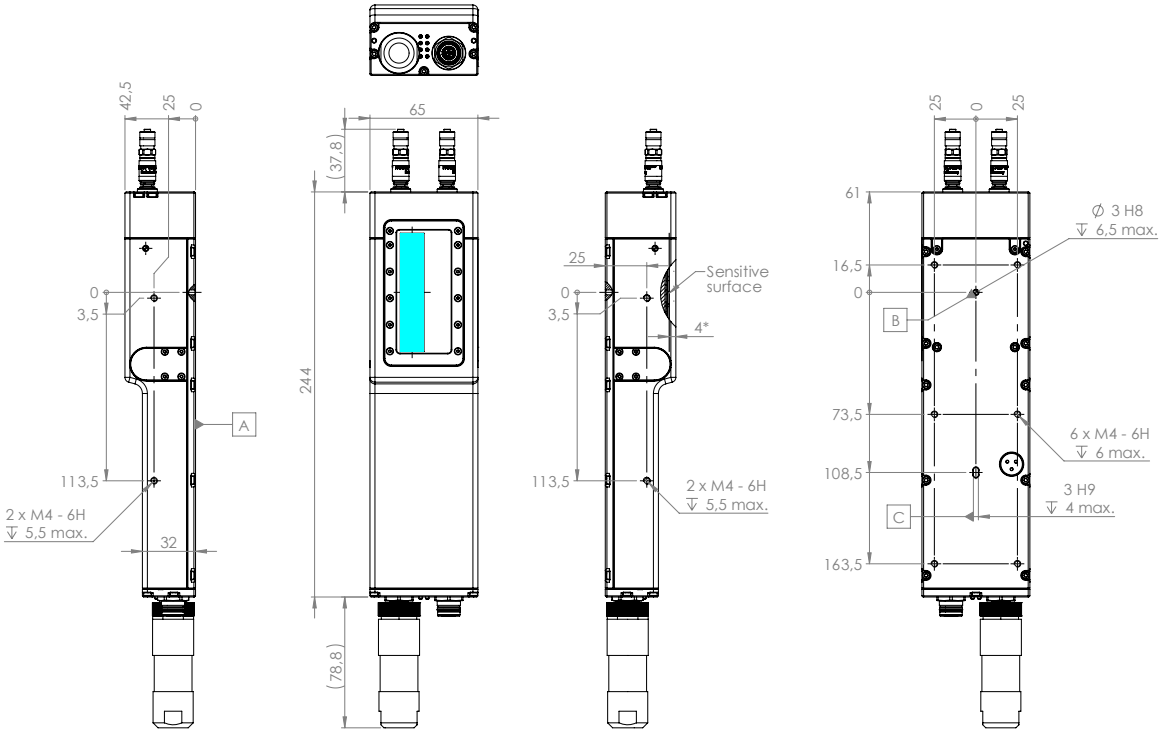




All dimensions are in mm.
* Sensitive surface distance from the top of the box is for 1000 µm sensor thickness.
** Edge sensor distance from the front of the box.

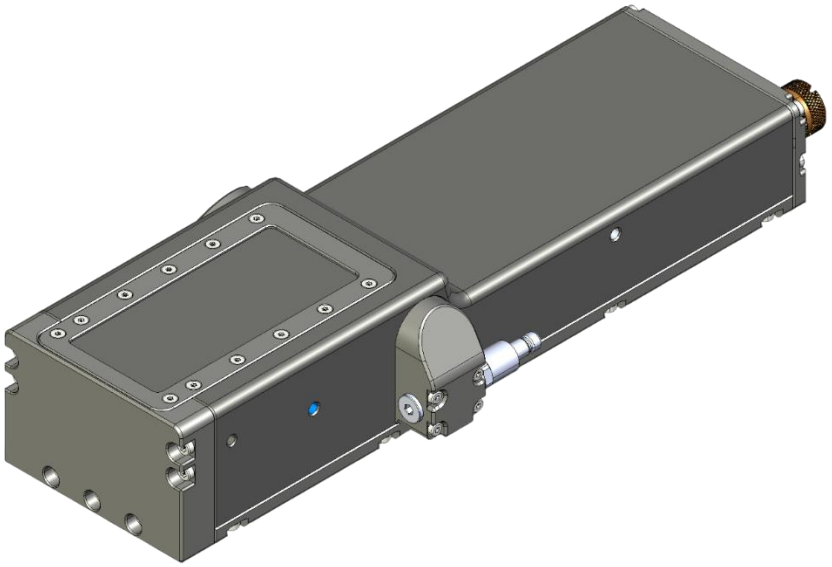
M3F –Medipix3, Front Outlet

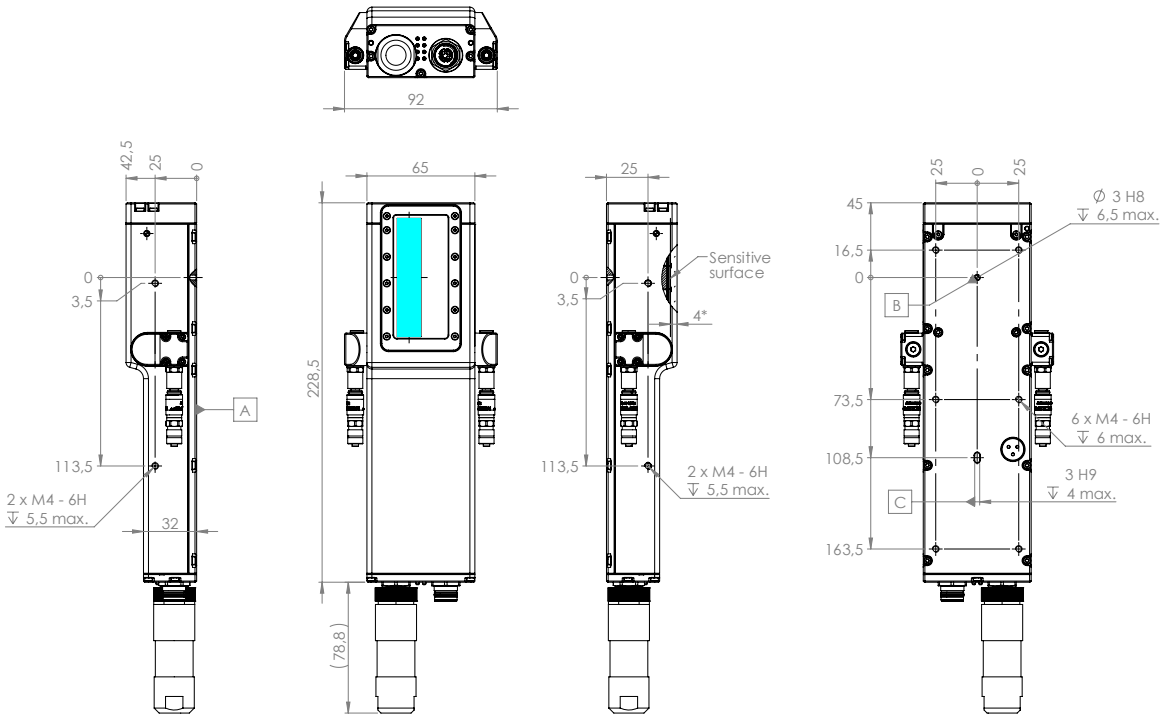




All dimensions are in mm.
* Sensitive surface distance from the top of the box is for 1000 µm sensor thickness.

M3S –Medipix3, Standard

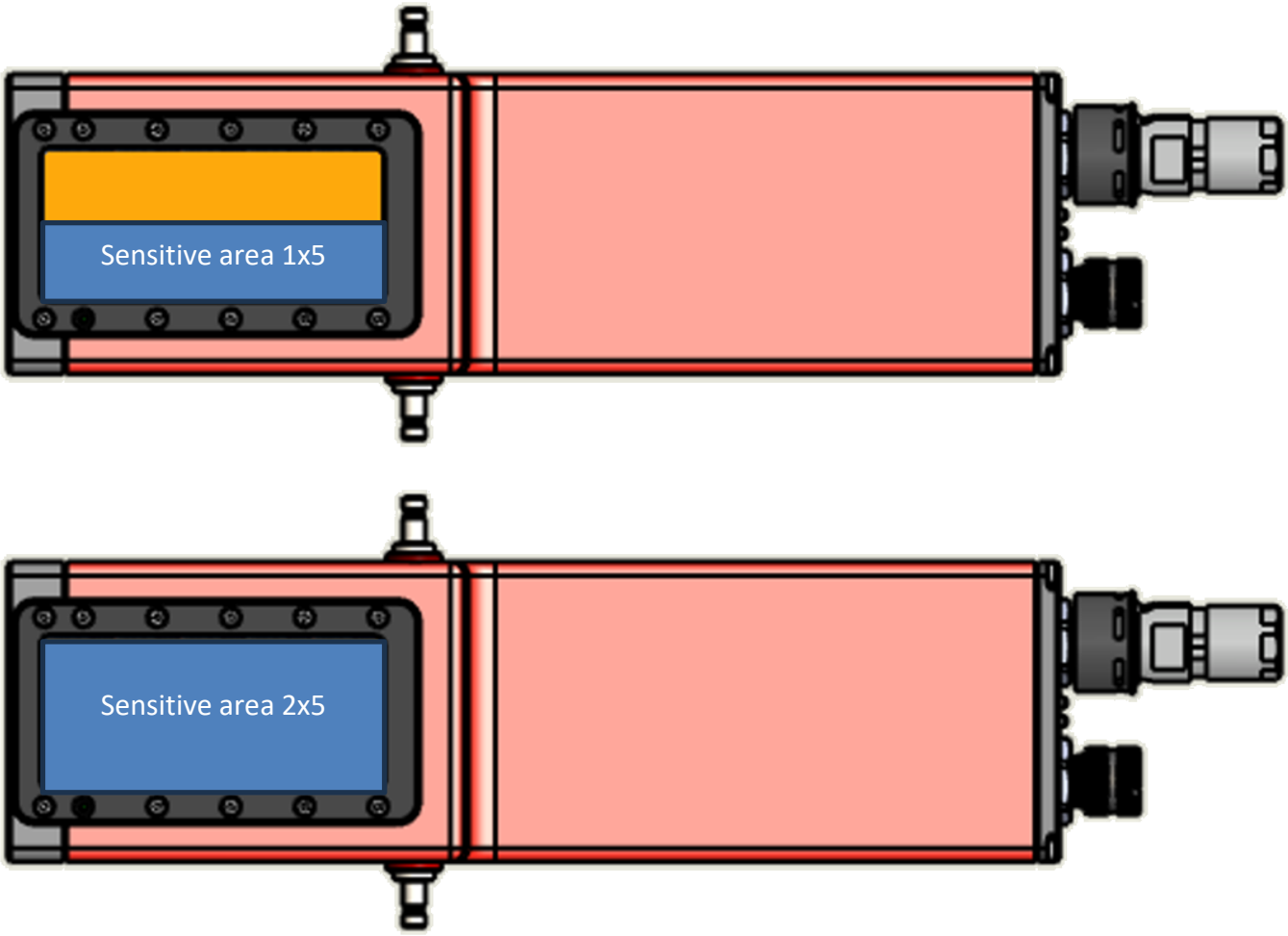




All dimensions are in mm.
* Sensitive surface distance from the top of the box is for 1000 µm sensor thickness.

Sensitive area

The location of the sensitive area in the **WIDEPIX PoE G2** $_{1x5 - MPX3}$ and **WIDEPIX PoE G2** $_{2x5 - MPX3}$ devices is indicated in the picture below.



Model Number Codes

Example: **W1P M3S - X C A 24100045**

Device name:

W1P – WidePIX PoE G2 1x5
W2P – WidePIX PoE G2 2x5

Device modification:

M3E –Medipix3, Sense Edge
M3F –Medipix3, Front Outlet
M3S –Medipix3, Standard

Sensor type:

M – Silicon Monolithic
C – CdTe

Sensor thickness:

3 – 300 µm
5 – 500 µm
A – 1000 µm

Device build version:

XXXXXXXX

Instructions for safe use

Warning

Do not touch sensor surface!

To avoid malfunction or damage to your **WIDEPIX PoE G2** *2(1)x5 - MPX3* please obey the following:

- Do not expose to water or moisture, **WIDEPIX PoE G2** *2(1)x5 - MPX3* is dust protected only.
- Do not open **WIDEPIX PoE G2** *2(1)x5 - MPX3* case. Detector wire-bonding connections may be irreversibly damaged.
- Do not operate the detector when not properly water cooled. Otherwise, detector temperature may rise above the specified range.

Disposal

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

Copyright

ADVACAM s.r.o.
U Pergamenky 1145/12
170 00 Praha
Czech Republic

Tel: +420 603 444 112
Email:
info@advacam.com
www.advacam.com

Release history

Date (YY/MM/DD)	Changes	Changed by
25/01/17	Preliminary datasheet (W1PM3S-Xxx)	D. Doubravová, J. Baborák
25/08/01	Release	J. Baborák
25/09/15	Version update	J. Baborák