The Advantages of LightLink™ Detection Technology for Integrators

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Abstract

The new LightLink™ detection technology offers significant advantages when used on robots or integrated into arrays. It stands out for its contamination detection performance and light weight, making it an ideal candidate for the design of robotic systems used in dismantling.

Mirion's range of LightLink™ surface contamination detectors covers areas from 100 cm² to 579 cm². These detectors are smart, requiring only simple serial communication to collect an already processed measurement. Thanks to Lightlink™, they are also lightweight. For example, a 579 cm² detector weighs just 620 g. Their performance is state-of-the-art, especially when it comes to detection homogeneity. The absence of a photomultiplier makes them highly resistant and completely insensitive to magnetic fields. Their cost is also very competitive.

By integrating LightLink™ into arrays, it becomes possible to create networks of interconnected sensors capable of detecting contamination over very large areas, while retaining the ability to pinpoint the exact location of contamination.

In conclusion, LightLink™ detection technology revolutionizes the way in which surface contamination detectors can be integrated into robotic systems for dismantling purposes.

Lightlink™

Lightlink™ is an innovative solution developed to replace traditional photomultipliers with solid state photosensors in radiation detectors. In this context, Mirion's innovation efforts have been focused to build an innovative solution that solves the challenge of extreme low light collection to improve the performances of traditional contamination detectors while ensuring the same performances over the specified temperature range.

Compared to other solutions, Lightlink™ is rugged, lightweight, not sensitive to magnetic field and compact.

Lightlink™ is directly operational after Mylar replacement. Thanks to solid state photosensors to avoid the need of waiting for photocathode stabilization.

Lightlink™ 579cm² Beta Detector

LL579cm² Beta is a detector made to detect Beta contamination. It can also detect alpha but cannot perform any discrimination between alpha and beta. Detection homogeneity is better than +-15% while typical 2pi efficiencies with stainless still thin mesh:

- C-14 8%
- Co-60 30%
- Cl-36 41%
- Sr-90 + Yr-90 46%
- Pu-239 29%

The detector active area is 18x36cm. It is made of 2 individual 9x36cm cells, that can be used individually for a better MDA and a more accurate localization of the contamination.

It is a smart detector that embeds a digital acquisition board that manages:

- Detector biasing
- Signal processing
- Communication
- Self-test
- Parameters

A daisy chain of up to 50 detectors can be built to make a giant detector of 2.9m² with 100 individual measurement channels.

Communication protocol is RS422. Measurements are synchronized by a broadcast command and readout takes 1ms per detector. Meaning that for a daisy chain of 10 detectors, the sampling rate is 100Hz (1/10ms). It's a crucial aspect to take in consideration on a moving detector.

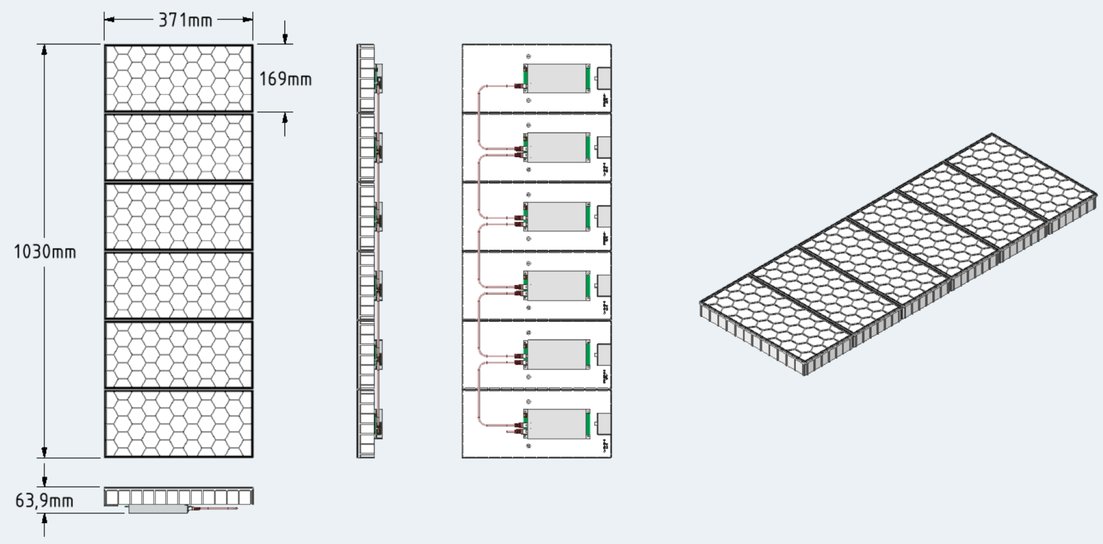
Thanks to self-addressing system to make the detector exchangeable removing the need of setting the address.

Host system based on RS422 can be developed to communicate with the detectors but due to the time constraints we recommend using our dedicated USB to RS422 interface. It guarantees the synchronisation and the stability of the integration time between measurements.

Comparison Matrix

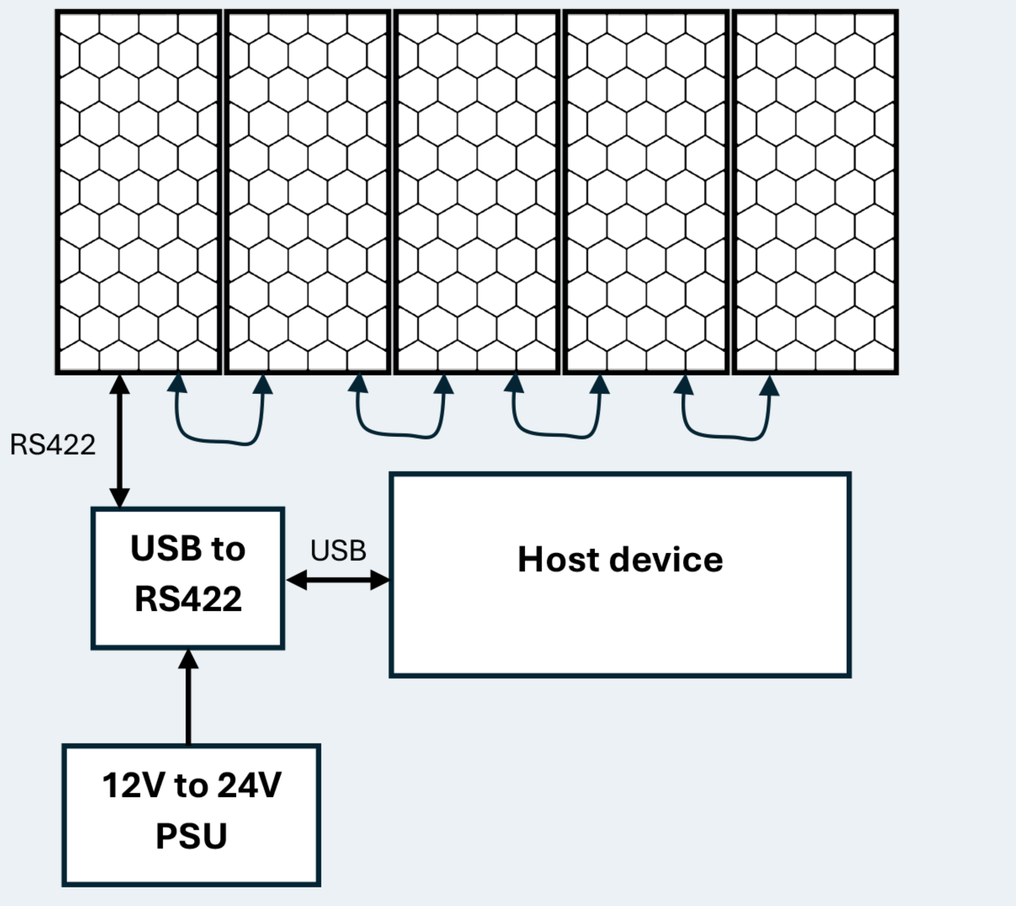
Feature	Lightlink™ LL579-B	Legacy PB579
Form factor	=	=
Number of channels	2 (9x36 cm)	1 (18x36 cm)
Weight	620 g	3200 g
Ruggedness	++	
Communication interface	RS422	Proprietary
Parameters	In detector memory	Volatile
Addressing	Automatic	Manual
Magnetic field	Not sensitive	Sensitive

Assembly of 6 LL579-B detectors, 1 meter width assembly:



LIGHT**Link**™

System architecture:



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