Technical Data Sheet
Severn Sensor System

Preliminary specifications
Not for public release
March 2022

Wireless water leak and presence sensor for use with sensing strips and pads based on LoRa technology

General description

Severn is a combination of printed electronics and hardware to create resistive sensors that can detect small amounts of liquid, wirelessly transmitting this data to LAIIER's Surface to Cloud™ online platform. Typical use cases are general purpose water leak sensing.

Severn sensors are available in multiple designs and configurations. Sensors are constructed from a Polyethylene terephthalate (PET) substrate printed with conductive inks. Printed designs determine system sensitivity. Sensors have up to 12 individual electrodes which report to LAIIER's Surface to Cloud™ online platform.

Example use cases

Severn is designed to be a general purpose water leak and presence sensing device and as such can be used across a range of use cases including:

- Water leaks under equipment such a hot water heaters, dishwashers, etc.
- Direct placement on pipes and flanges to detect leaks
- Sensitive equipment or item protection, server racks, fine art
- Roof leaks
- Exterior door thresholds to detect water ingress
- Flood notification

Features of LAIIER sensors

LAIIER's products share a common set of features which Severn takes advantage of including:

- Physically thin sensor format
- Self-adhesive mounting available
- Conformable to compound surface geometries
- Modular system works with multiple LAIIER sensors
- Custom sensor designs available
- Physically robust and chemically resistant
- Easy installation with very limited training
- Multi-year battery life
- LoRaWAN connectivity
- LAIIER's Surface to Cloud™ platform, displaying sensor data on easy to use and configure dashboards (API in planning)

Operating Modes

Severn is designed as a multi-purpose water presence and leak sensing device. The primary use case is to detect the presence of a leak.

A leak event is defined as three adjacent sensor electrodes reporting a change past a pre-defined threshold within a one minute period. The leak event then triggers a transmission on LoRaWAN PORT 99.

During normal operation Severn devices report the value of all twelve sensor electrodes at approximately one hour intervals on LoRaWAN Port 0. Additional operating modes include notification of sensor damage, or dislocation from the mounting surface (detected via the onboard three-axis accelerometer).
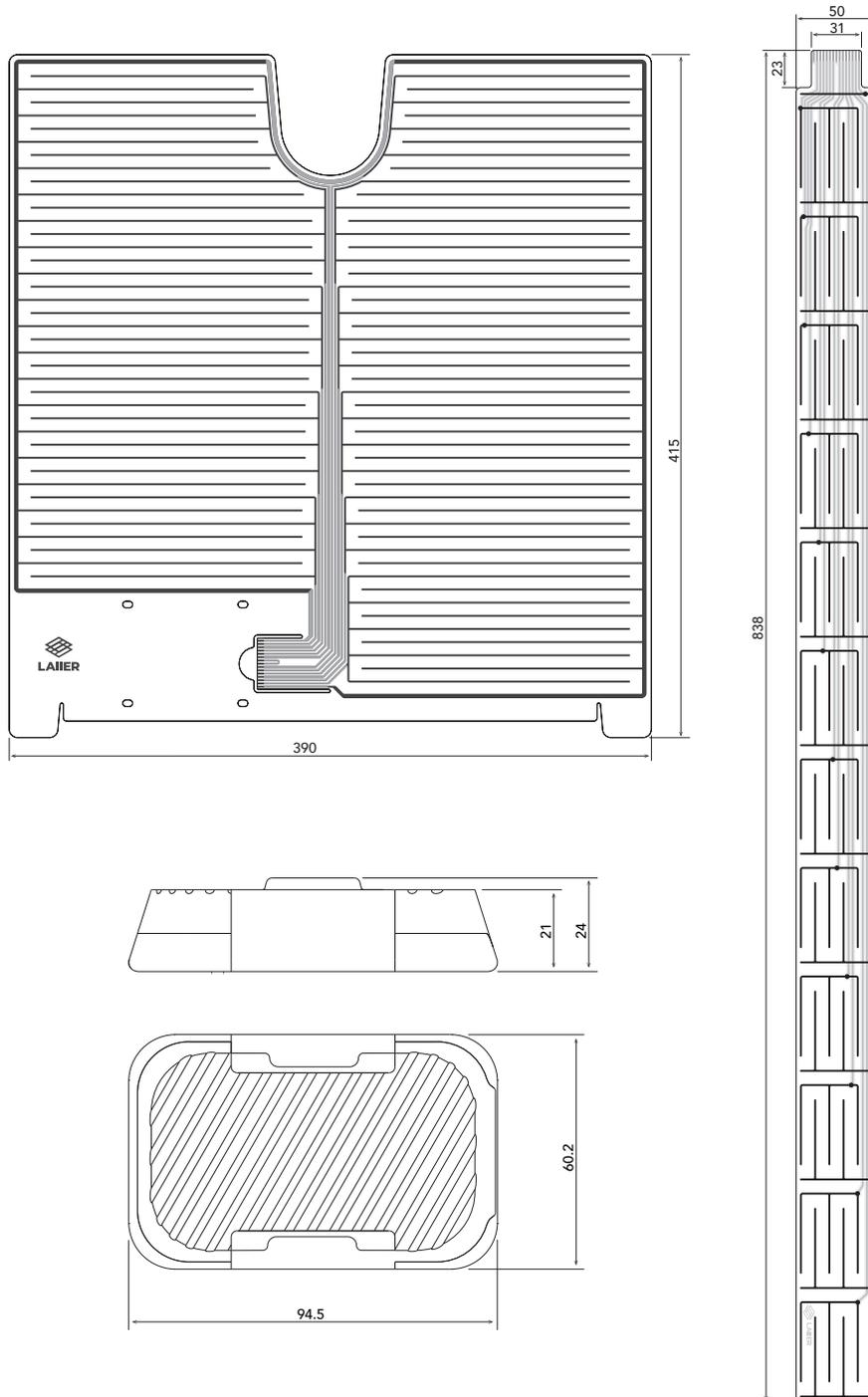
Product photos

Enclosure and sensor strip pictured below.

Product dimensions

Pictured below is the Severn enclosure and two print types. Dimensions in mm.

Technical Summary

Technical Summary	
Hardware and Enclosure Dimensions	95 × 60 × 24 mm
Sensor Dimensions	Vary by type, see included drawings
Hardware and Enclosure Weight	80g
Operating Temperature Range	-20°C - 55°C
Operating Humidity Range	<90%RH
Sensitivity	Dependent on sensor design, maximum resolution of 0.1 ml of water
Resolution	Up to 12 electrodes per sensor with theoretical range of 0-1023
Activation Method	Magnet
Wireless Communication Protocol	LoRaWAN
Read Range	10 km (line-of-sight, actual transmission distance depends on sensor placement and environment)
Antenna Type	Built-in antenna
Available frequency	US915 AU915 EU868 (configured before shipment)
Battery Type	AA Li-SOCl$_2$ cell
Operating Voltage	3.6V
Active Battery Lifetime	18 months
Housing	Nylon, not currently IP rated
Mounting	Self-adhesive, screw mounts available on enclosure
Sensor Connector	FFC
Certification and Compliance (EU)	In progress
Certification and Compliance (US)	In progress