



## Makes a Sensor IoT Cloud Connected

### Overview

The revolutionary Aspen™10 Internet of Things (IoT) Edge Device allows users to easily connect their environmental sensor to the cloud. It is rugged and durable and may be mounted outdoors without the need for a second enclosure. It has an integrated solar panel and internal rechargeable battery, making the Aspen 10 a truly self-sustaining device.

The Aspen 10 is also small and compact, which makes it easy to install in a variety of locations without disturbing the environment it is monitoring. An integrated IoT cellular modem allows the Aspen 10 to transmit data to the cloud,

and a global positioning system (GPS) receiver provides automated installation location.

Setting up the Aspen 10 to read your sensor is quick and easy thanks to a new sensor interface technology, AQwire, that allows automatic identification of any sensor with an SDI-12 or one-wire identification. The Aspen 10 publishes this ID to the cloud, in return receiving a customized measurement configuration and program for your specific sensor and application. You can then monitor your data from anywhere.

### Benefits and Features

- › IoT device using local cellular networks as the low-power wide-area network (LPWAN)
- › Cellular CAT M1 for worldwide roaming
- › Geolocation to automatically determine the edge device's location
- › Solar charging to keep the IoT device operational indefinitely using just a few hours of daily sunlight
- › Internal rechargeable LiFePO4 battery with reserve power for more than one month's operation without charge for all supported sensors
- › Smart sensor detection and identification (AQwire)
- › Smart sensor power automatic optimization for the attached sensor
- › Simple zip tie system for mounting to almost anything
- › IP67 rating for installation in any environment
- › On/off switch for simple operation
- › Status LED for operation without a smartphone
- › Near Field Communication (NFC)/Bluetooth for operation with a smartphone to allow on-site analysis through the CampbellGo App
- › Optimal security using Message Query Telemetry Transport (MQTT) with Transport Layer Security (TLS) mutual authentication



## Technical Description

The Aspen 10 is a multipurpose, compact, entry-level edge device with a simple plug-and-play interface. Supported sensors measure hydrological, meteorological, environmental, and industrial phenomena. The Aspen 10 is part of the IoT and makes sensor data accessible anywhere via the Aspen 10's compatibility with the MQTT protocol and its integration with CampbellCloud. The Aspen 10 provides maintenance-free sensor power and automates cellular connectivity, data storage, and data forwarding to CampbellCloud, where users can both visualize their data and manage API access.

The Aspen 10 is similar to a full Campbell Scientific system and comprises a data logger, wiring terminals, enclosure, solar panel, charge regulator, battery, modem, and antenna—all in one small package.

Compatible sensors are cabled using the AQwire standard. A detect pin lets the Aspen 10 know that it has connected to a sensor with either an SDI-12 or one-wire capability of self-identification. After identifying the sensor, the Aspen 10 connects to CampbellCloud to retrieve the appropriate configuration and program for that sensor, which enable the edge device to power the sensor appropriately and make accurate analog or digital measurements.

A free app, CampbellGo, enables secure NFC/Bluetooth pairing between a phone and the Aspen 10. This greatly simplifies the installation process with real-time sensor readings, diagnostic tools, and data-to-cloud delivery information while you are on-site. This gives you confidence that everything is working from end to end before leaving the installation site.

All of this allows you to collect data from the selected sensor in the location you need from practically anywhere on the globe.

## Specifications

Processor	32-bit arm cortex (CPU)
Memory	› 640 KB SRAM › 2 MB flash
Program Execution Period	1 s to 1 day; 1 s increments
Real-Time Clock Resolution	±1 s
Real-Time Clock Accuracy	Synchronized with CampbellCloud once per day
Case Material	High-impact-resistant and UV-resistant ASA, recycle code 7
Analog Measurements	<i>Four single-ended (SE) or two differential (DIFF) terminals are individually configurable for voltage, current loop, ratiometric, and period average measurements using a 12-bit ADC. One channel is measured at a time.</i>
Pulse Measurements	<i>Terminals are individually configurable for switch closure, high-frequency pulse, or low-level AC measurements.</i>
Digital I/O	<i>Terminals are configurable for digital input and output (I/O) including status high/low, pulse width modulation, external interrupt, edge timing, switch closure pulse counting, high-frequency pulse counting, UART, RS-232, RS-422, RS-485, SDI-12, I2C, and SPI function. Terminals are configurable in pairs for 5 V or 3.2 V logic for some functions.</i>

Dimensions	16.2 x 8.0 x 5.8 cm (6.4 x 3.2 x 2.3 in.)
Weight	› 395 g (0.9 lb) for -ST option › 352 g (0.8 lb) for -XT option

### Power

Battery	<i>Note: Charge and discharge characteristics are controlled internally according to battery type.</i>
Battery for -40° to +60°C (-ST) Option	3.2 Vdc, 7.2 Ah, Li-Po PHD26650
Battery for -40° to +85°C (-XT) Option	3.65 Vdc, 5.6 Ah, Li-ion Saft MP176065 xtd
Average Current Drain	› 30 mA for 12 Vdc sensor power supply › 14.3 mA for 8 Vdc sensor power supply › 5 mA for 5 Vdc sensor power supply › 10 uA (ultra-low power) for 5 Vdc sensor power supply › 80 mA typical (active, analog) › 20 to 40 mA (active, digital) › <0.35 uA (deep sleep) › <1 mA (idle)

### Power Output

-NOTE-	Regulated 5, 8, or 12 Vdc
5 Vdc Current Limit	› 210 mA › 30 mA (ultra-low power)
8 Vdc Current Limit	210 mA



12 Vdc Current Limit      210 mA (disabled when battery capacity <0.5 Ah)

## Communications

Protocols	Modbus, SDI-12
Internet Protocols	HTTP(S), MQTT
Near Field Communication (NFC)	Target device compatible with CampbellGo
Bluetooth Low Energy (BLE)	› Maximum distance of 50 m (165 ft) › Compatible with CampbellGo

SDI-12	One SDI-12 compliant terminal meets SDI-12 Standard v 1.4.
RS-232 COMU1/U2	One independent TX/RX pairs on U1 and U2 port of M12 connector; either TTL (0 to 5 Vdc) or RS-232 levels ( $\pm 7$ Vdc) UART.
RS-232 Baud Rate	Selectable from 300 bps to 115.2 kbps
RS-232 Default Format	8 data bits; 1 stop bit; no parity
RS-232 Optional Formats	7 data bits; 2 stop bits; odd, even parity

For comprehensive details, visit: [www.campbellsci.eu/asp10](http://www.campbellsci.eu/asp10) 



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