User Guide

Emerald™

Data logger & wireless sensor

Temperature monitoring

DICKSON
Environmental Monitoring + Compliance Experts

Notices and safety

Disclaimer and limitation of liability

Dickson assumes no liability for any loss or claims by third parties which may arise through the use of this product. Users must not use the product in any manner not specifically indicated by Dickson.

Dickson shall not be held liable for improper use of this product.

This document is non-contractual and subject to change without notice.

Safety instructions

The latest safety instructions document is available for download from the Dickson website. Flash this QR code to access the document:

https://docs.oceaview.com/dickson_safety.pdf

Certifications and compliance

Caution: Any changes or modifications made to this product not expressly approved in writing by Dickson could void the user's authority to operate the equipment.

FCC statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation: FCC Part 15 §107 - §109 - §207 - §247 (Ed 2008).

FCC RF Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

IC statement

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

CE - Conformity with European regulations

This device is compliant with the essential requirements and other relevant requirements of the following directives.

- 2014/53/EU Radio Equipment Directive (RED)
- 2014/30/EU EMC Directive

- 2014/35/EU Low Voltage Directive
- 2011/65/EU Restriction of Hazardous Substances Directive

상호명: (주)테솔

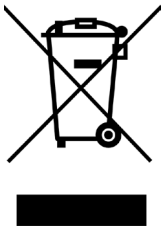
기자재명칭(모델명): Emerald Data Logger

제조자: DICKSON

인증번호: R-R-TES-Emerald

WEEE compliance

This device complies with the essential requirements and other relevant provisions of the Waste Electrical and Electronic Equipment Directive 2002/96/EC (WEEE Directive).



Environmental protection

Please respect local regulations concerning disposal of packaging, unused wireless devices, and their accessories, and promote their recycling.

RoHS compliance

This device is compliant with the restriction of the use of certain hazardous substances in electrical and electronic equipment Directive 2002/95/EC (RoHS Directive). Do not dispose of this product with household trash. Dickson recycles this product under certain conditions. Please contact us for more information.

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1 Introduction

Congratulations and thank you for choosing the Dickson Emerald wireless data logger.

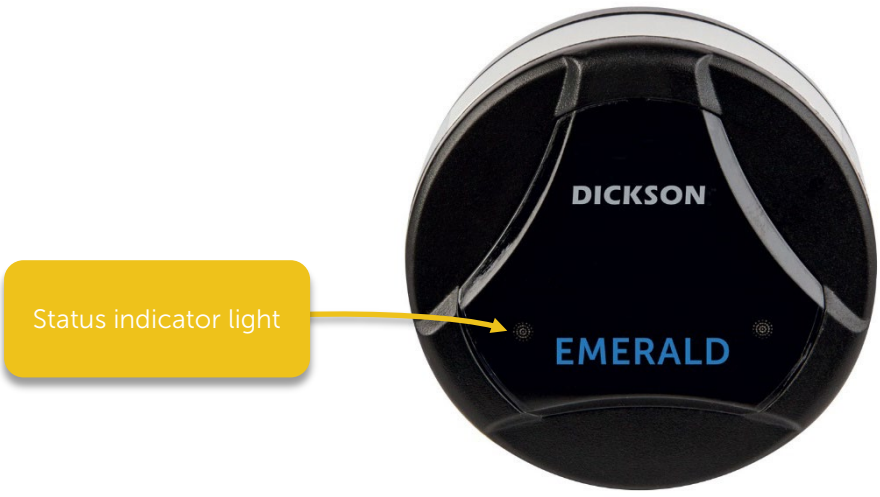
1.1 Summary

Emerald is a Bluetooth-enabled wireless data logger designed for monitoring temperature sensitive assets during shipping and storage. This data logger is available with either an integrated temperature sensor or an external Pt100 temperature sensor. Either model may also be used as a remote wireless sensor, paired with Cobalt X data loggers and connected via Bluetooth.

With its small size and magnetic mount, Emerald can be placed easily inside many types of product packaging and containers where it tracks temperature according to parameters that you can define for your specific needs.

Emerald records ambient temperature at regular intervals and stores the information in its memory. The data logger's battery is user-replaceable.

Emerald gives you the benefit of a flexible temperature monitoring solution that adapts to many usage scenarios, from low to high-volume needs. With this wireless solution, you can keep track of critical temperature conditions without having to open containers in transit.



Emerald data logger (front view)

Emerald data logger with external Pt100 sensor

1.2 Package contents

- 1 Emerald data logger with either:
  - Internal temperature sensor, or
  - External sensor with connector cable
- 1 replaceable Lithium battery
- 1 mounting kit with magnet / screw

1.3 Companion products

The Emerald datalogger is designed to work with several different types of companion products from Dickson, in particular, depending on the volume of data loggers you intend to use, and whether or not you wish to use the OCEAView Cloud or On-premises monitoring platform.

> The Emerald datalogger may only be used with companion products approved and recommended by Dickson.

1.3.1 OCEAView Mobile

Program data loggers and read sensor data on your smartphone

The OCEAView Mobile application for iOS® and Android® offers many data logging features (described in detail in the OCEAView Mobile application user documentation). Notably, OCEAView Mobile enables you to:

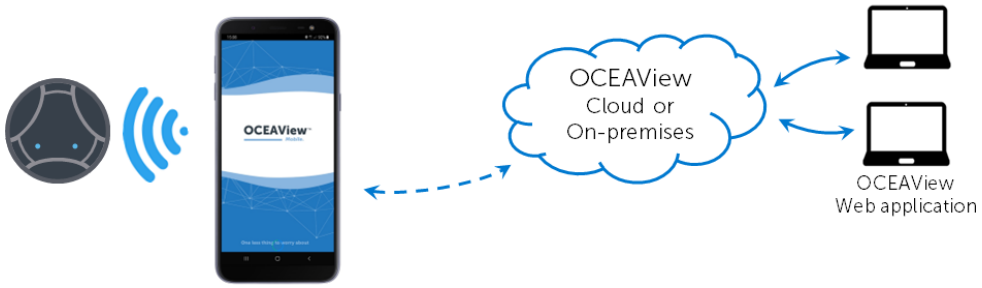
- Program all data logging settings on Emerald data loggers reading interval, target range, and alarm limits
- Read data and geolocate data logger reading points upon collection

Read and program Emerald with OCEAView Mobile in a standalone scenario

1.3.2 OCEAView Cloud or On-premises

Use OCEAView Mobile to push data to your OCEAView monitoring platform

OCEAView Cloud or On-premises is a complete web platform that allows you to access Emerald data (notably sensor readings, alarm details, and events) that is pushed manually by users with smartphones running the OCEAView Mobile application.



Read and program Emerald with OCEAView Mobile, synchronize with OCEAView Cloud or On-premises solution

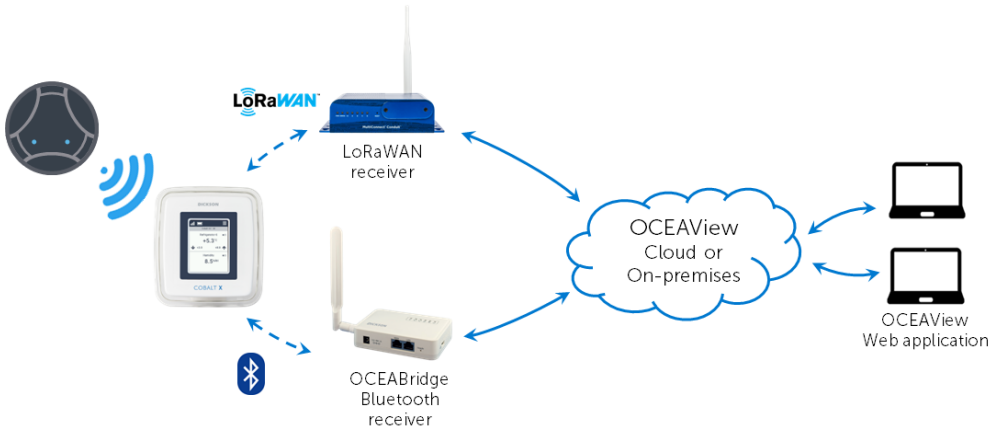
1.3.3 OCEAView Legacy

Access data pushed via OCEABridge (v2)

The OCEAView Legacy web application may be used with the OCEABridge Bluetooth-enabled gateway to automatically collect and transfer sensor readings from Emerald data loggers within wireless range.

1.3.4 Using Emerald as a remote wireless sensor with Cobalt X

Emerald can be used as a wireless sensor with Dickson's Cobalt X data loggers. In this scenario, the Emerald device does not store sensor readings, but rather transmits them to a paired Cobalt X data logger. This provides the Cobalt X with identical functionality as wired sensors but with the convenience of wireless connectivity to avoid cabling constraints.



Emerald paired as wireless sensor for Cobalt X, connected to OCEAView Cloud or On-premises solution via LoRaWAN or Bluetooth

1.4 Placing your Emerald data logger

Emerald is designed to be placed directly inside product packaging or at a convenient location in your storage facility.

Depending on the situation, you may choose to use the provided magnet to fix the datalogger to the side of the container or metallic shelf or leave it loose inside a product box.

Emerald can be placed easily in a location that is convenient for your monitoring needs

2 Emerald features

2.1.1 Wireless technologies

- Bluetooth® Low Energy for reading and transmitting data.

  Range: Up to about 50 meters (160 ft.) in line-of-sight

  Frequency (worldwide): 2.4 GHz

  Max output: 4 dBm
- Activatable sleep mode to stop wireless activity automatically during airplane take-off and landing (RTCA DO-160 compliant)

2.1.2 Monitoring

- Internal temperature sensor: -40 °C to + 85 °C (-40 °F to +185 °F)
- Resolution: 0.0625 °C • Expanded uncertainty after calibration: ± 0.3 °C to 0.5 °C
- Pt100 sensors: -200 °C to + 200 °C (-328°F to +392°F)
- Configurable high/low alarm limits, delays, alerts, transmission interval
- Read interval from 1 minute to 12 hours
- Data storage:
  - Unlimited data storage on OCEAView Cloud or On-premises solution
  - 16,000 readings stored in internal memory (about 4 months of data with reading interval of 10 minutes)
- LED indicator for alarm status & communication
- Customizable data logger name

2.1.3 Casing & dimensions

- IP44 (IP40 with external sensor)
- ABS / Aluminum casing
- Unique serial number for every data logger
- Dimensions
  Diameter: 50 mm (2 in.)

  D: 22 mm (0.87 in.)
- Weight: 57 g (2.0 oz.)
- Magnet / screw mount

2.1.4 Operating and storage conditions

- Indoor use only
- Designed for altitudes up to 6,500 feet (2,000 meters)

- Operating conditions: -40 °C to +85 °C (-40 °F to +185 °F); 0 to 90% RH (non-condensing)
- Storage conditions: -40 °C to +85 °C (-40 °F to +185 °F); 0 to 90% RH (non-condensing)

  Note: Optimal storage around 25 °C (77 °F)

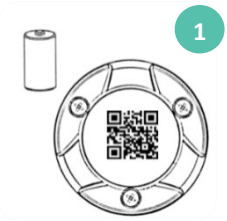
2.1.5 Battery

- User-replaceable Lithium battery
- Battery life up to 12 months
- The shelf life (before first use) depends mainly on the storage temperature. To benefit from a full year of operation we recommend storing Emerald data loggers at around 25°C (77°F)

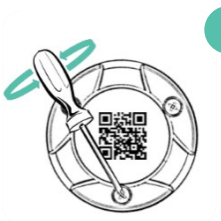
  See *Appendix 1 – Emerald battery life* p. *18*, for estimated operating and storage times

3 Inserting the battery

Emerald data loggers feature a replaceable battery. You must start by inserting the battery as described here.

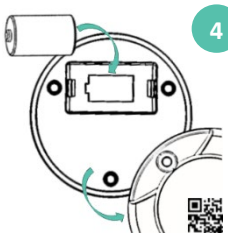


1 The Lithium battery is provided in the product box.



2 Unscrew the three screws on the back of the data logger (turn counter-clockwise).

3 Remove the screws.



4 Place the battery in the slot, making sure to respect polarity.

5 Replace screws (turning them clockwise). Ensure that the rubber seal is well seated.

6 Your data logger is now ready to use.

Inserting the battery in your Emerald data logger

4 Using your Emerald data logger

Generally speaking, most of the useful features provided by Emerald are activated or accessed through the companion software and hardware tools. The data logger itself is quite simple, with just the magnet and the LED light.

4.1 Using the Emerald magnet

Emerald includes a magnet that can be used both for mounting the data logger onto a magnetic surface or to trigger actions (disabling auto-off mode, checking data logging status).

You may fix the magnet to a metallic wall or insert a screw to fix it onto other types of surfaces.

The provided magnet has a “weak” and a “strong” side. The metal ring in the hole is close to the edge on the “weak” side of the magnet. The deeper recess on the other side indicates “stronger” side.

4.1.1 Mounting Emerald with the magnet

Simply place the data logger onto the magnet as shown here, with the strong side facing the data logger.

Place Emerald on magnet

4.2 Programming your data logger with OCEAView Mobile

Inserting the battery into your data logger enables Bluetooth connectivity. The LED blinks blue for one minute and the Emerald may be discovered by OCEAView Mobile. To reactivate Bluetooth, place the magnet on the data logger until the LED blinks blue.

When within wireless range, you will see the device listed in the OCEAView Mobile display, at which point you may connect to it to configure a mission. Please see the user manual provided with OCEAView Mobile for details on that step.

4.2.1 Using the LED to check data logger status

The color LED on the front of the Emerald data logger indicates data logger status. The LED on Emerald data loggers is activated by passing the magnet in front of the data logger, offering different patterns based on status, as shown below:

General (● = short flash)	
Bluetooth is activated for 1 minute if the data logger is in one of these states: a) Flight Mode b) Battery Low	● ● ● (Blinks blue once every 10 seconds for 1 minute)
Data logger currently connected via Bluetooth	●● ●● ●● (Blinks blue twice every 6 seconds for one minute)

Data logging status (● = short flash, ⬤ fixed for 3 seconds)				
	Not programmed	Programmed and waiting to start	Started	Stopped
Everything OK	●●●●●●	●●●●●●	⬤	●●●●●●
Alarm in progress	n/a	n/a	⬤	●●●●●●
Alarm occurred	n/a	n/a	●●●●●●	●●●●●●

This same behavior is obtained using the OCEAView Mobile application, with the **Blink LED to identify data logger** function, as described in the user guide.

5 Maintaining your data loggers

5.1 Cleaning Instructions

You occasionally may need to clean your Emerald data loggers depending on site or environmental conditions.

Here are some recommendations and guidelines for cleaning your data loggers:

- Clean using a soft cloth with water, a detergent or isopropanol.
- Do not use any aggressive cleaning agents or scratching cleansers that might cause damage to your datalogger.

6 Appendix 1 – Emerald battery life

Many factors have an influence on Emerald battery life, both during use and in storage before being used. Here are the main considerations to take into account when evaluating product battery life:

- **Ambient temperature**: battery capacity is diminished when subject to very cold operating and/or storage conditions.
- **Wireless communications**: Bluetooth connections, from the OCEAView software to the Emerald data logger, consume battery power. Logically, the more you connect, the more you use the battery.

Note: The reading interval does not have significant impact on battery life. Because of the product's optimized electrical architecture and circuitry, there is no significant difference, in terms of battery life, if the sensor reads and stores data once every ten minutes or once every minute.

6.1 Battery details

- Type: User-replaceable battery
- Model: ER ½ AA
- CEI designation: 14250
- System: Primary Li-Thionyl / Chloride / LiSOCl2

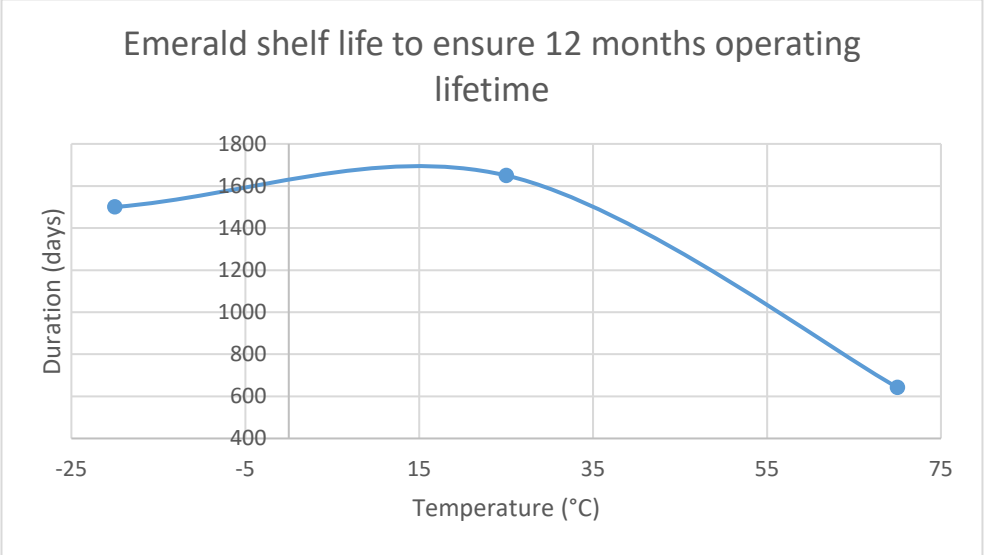
6.2 Estimated operating lifetime

The chart below shows estimated battery life (in weeks) at various temperatures, with the temperature representing the data logger's operating (ambient) temperature.

This information is based on:

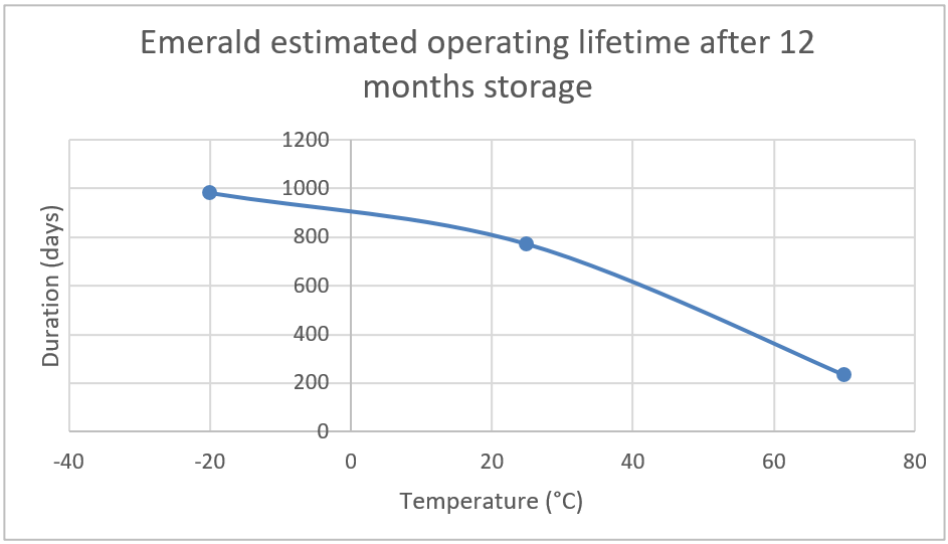
- Storage for 1 year before first use
- 1 reading per minute

6.2.1 Emerald -200°C to +200°C data loggers (w/ext. Pt100 sensor)



Battery life estimation for -200°C to +200°C data logger with external Pt100 sensor

6.2.2 Emerald -40°C to +85°C data loggers



Battery life estimation for -40°C to +85°C data logger

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