signatrol

cadmus
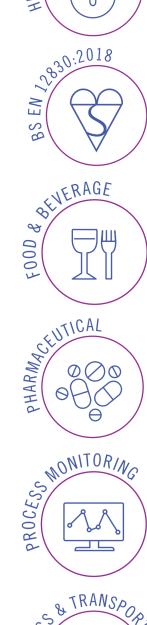
signatrol

A BUYER'S GUIDE TO DATA LOGGERS

WHAT TO LOOK FOR AND HOW TO CHOOSE THE BEST DATA LOGGER FOR YOUR APPLICATION

Contents

Data loggers play an important role in measuring temperature, humidity, and other environmental factors in various applications – and are used to protect and monitor a variety of sensitive products, from processed foods to medicines and vaccines.

There are a wide range of data logger types and models available for different applications. This guide provides an overview of the data logger market for new customers, explaining what data loggers are and what they do, how to choose the best device for your purpose, and what mistakes to avoid.

Signatrol Ltd are the UK's leading provider of specialist data logging devices. Signatrol has with over 20 years' experience serving customers in the food and beverage, electronics, healthcare, and pharmaceutical manufacturing industries. Our diverse customers range from large household names such as Cadbury, AstraZeneca, Pfizer, Kellogg's, and the NHS, down to smaller independent and family-owned businesses.

For every data requirement and scale of need, we have a data logging solution to meet your required outcomes and budget. So, please don't hesitate to get in touch to find out more.

What Are Data Loggers?

A data logger, or data acquisition system, is a device or series of devices that store data over time, so that it can be retrieved later. Data loggers are often combined with alarm or warning systems to provide immediate notice of an emerging issue – e.g. fridge temperature rises above the acceptable storage range for a certain product. This information is used to track the performance of applications and storage solutions, alert people to potential maintenance issues, and reduce the need for manual monitoring. Some data loggers have inbuilt alarm functions to alert the user in the event of the process starting to go out of bounds.

How Do Data Loggers Work?

Data loggers gather real-world information through one or more sensor inputs, and then sample and save the data at predetermined intervals. The sample rate and store rate – i.e. the frequency of data samples and uploads – vary between devices, and are often independent. For example, some sensitive products or fast-moving events require a quick sample and store rate so that changes are not missed. This delivers a high level of accuracy but may be at the expense of greater data storage requirements. Other applications may require frequent samples but only intermittent storage uploads, or a longer interval between both samples and storage – enabling users to save on memory capacity.

All data logging devices need a power source. For static units – e.g. walk-in freezers – data loggers are often powered through the mains electrical supply, but this can be problematic: If the power supply to the unit is interrupted, then the record at this critical time is lost. This issue can be eliminated if the data loggers are battery powered.

Where is the data stored?

How and where the data logger stores information varies from model to model:

- In early data logger devices, data was stored physically in the device itself, or in removable media (e.g. a separate hard disk or CD) attached to the device. To retrieve the data, the storage unit would need to be connected to a computer for upload and analysis. These devices are still used in applications that lack an Internet connection.

- Newer data loggers are often web-enabled, with data automatically uploaded to and stored in the cloud. This enables the data to be accessed and retrieved by any authorised person, using any internet browser on a laptop, smart phone, or tablet. Unlike earlier models, web-enabled data loggers allow access to up-to-date data on-demand, and the user does not necessarily have to be on site at the time. These data loggers can be configured to send multiple alarm messages to authorised persons through Internet or Bluetooth connection, or via SMS.

Applications: How Are Data Loggers Used?

Data loggers are used wherever there is a requirement to store data over a period of time. This covers a very broad spectrum of applications in a variety of industries. For example, ongoing data monitoring could be required to ensure compliance with various standards (e.g. BS EN12830, NHS Green Book, FDA CFR 21 Part 11 etc), to satisfy Health and Safety requirements, to improve product quality, or to analyse processes to ensure they are operating at the greatest efficiency.

Common Applications For Data Loggers

- Monitoring the temperature of sensitive goods in transit – e.g. chilled or frozen food deliveries
- Enabling quick and straightforward goods acceptance procedures
- Monitoring the storage temperature of sensitive medicines and vaccines on site and whilst in transit
- Monitoring the temperature range and humidity of built environments – e.g. to sustain test conditions in laboratories, or staff welfare standards in factories, warehouses, retail units etc.
- Multi-device networks to monitor refrigerated medical storage in hospitals, or across multiple healthcare and vaccination sites
- Monitoring safe manufacturing conditions – especially for temperature-sensitive products such as printed circuit boards, electronics etc.
- Confirming the validation of sterilisation processes – e.g. for water treatment, brewing, and dairy pasteurisation
- Monitoring the temperature of blood, organs, and biological samples to ensure that they remain safe and physically viable
- Satisfying the requirements of international standards for safe storage – e.g. BS EN12830, NHS Green Book, FDA CFR 21 Part 11

Benefits Of Using Data Loggers

As seen from the scope of applications for data loggers. An effective data logging system offers significant benefits to businesses. These range from the practicalities of passing audits and validating processes, to the real-world advantages of accurate continuous measurements – such as increased product quality and safety, reduced waste, and lower production costs.

- Provides a permanent record of environmental conditions or events – ideal for assessing your asset requirements for various applications (e.g. how many refrigeration units you need), and the optimal temperature, humidity, and flow rate for different processes.
- Data immediately available for validating processes, allowing for real-time adjustments, feedback, and improvement.
- Ease of auditing.
- Less requirement for manual data logging and record keeping, which improves accuracy and saves time.
- Inviolate confidential data records are saved to a secure cloud-based server, preventing unauthorised access.
- Your data bank has a quick search facility to help you identify faults and anomalies and provide evidence for process validation.
- Real time alarms alert key members of staff to anomalous data readings, preventing spoilage of products.
- Data can be accessed from anywhere in the world via an Internet-enabled device.
- Useful evidence to support insurance claims and litigation.
- Evidence to defend against third party health and safety claims and tribunals etc.

How To Choose The Right Data Logger

As the potential applications for data loggers are so diverse, there is, unfortunately, no quick and easy answer to the question of how to choose the right device. The following frequently asked questions will help you evaluate your needs and narrow down your choice, but we recommend contacting an experienced data logger supplier and manufacturer, such as Signatrol, who can help you match the correct model to your specific requirements.

1) What type of data logger do I need?

There are various types of data logger, and multiple versions within each device category, from single-use low-cost devices to complex multichannel monitoring systems. We supply a comprehensive selection of data logger types, details of which are available through our website. For temperature measurements, the most versatile solution are button data loggers, which are no bigger than a small coin and are configured for accurate measurements within a specific temperature range. For multi-channel data logging, our Wi-Fi-enabled CADMUS system provides concurrent readings over six channels, with an intuitive interface and customisable input configurations.

2) What sensors does my data logger need?

Data loggers are designed to measure specific real-world inputs, such as humidity, temperature, pressure or flow rate, so ensure that your data logger has the right sensors to satisfy your requirements.

3) How accurate does the data logger need to be?

Data loggers record measurements within a certain range, or tolerance. With some units this is predetermined, while in others the range can be configured by the user. Make sure the device has an accuracy level that meets the requirements of your application, and any standards that it is required to meet.

info@signatrol.com • 01684 299 399 • signatrol.com

4) How is the data logger calibrated?

All data loggers require calibration to gauge their level of accuracy and performance. Each new data logger will come with either a valid calibration certificate, or a certificate of performance, confirming that it meets or exceeds the stated accuracy. Some standards require a specific type of calibration certificate for compliance purposes (e.g. UKAS traceable). The unit will need recalibration at periodic intervals, so check the manufacturer's recommended recalibration frequency and ensure that a system is in place to flag up when recalibration is required, and that redundancy is in place to avoid interruption of service. If a device is not correctly calibrated, any data recorded after calibration expires will be inaccurate or useless.

5) How fast does the data logger need to be?

The speed of a data logger is determined by its sample rate and storage rate. Ensure that the intervals between measurements and uploads are suitable for your application.

6) What power source is required for the data logger?

Is a mains electricity connection available or does your data logger come with an inbuilt battery? For mains-powered data logging devices, what wiring system is required, and how do individual units network with other data logging and storage devices in the system? Most modern miniature and button data loggers are battery powered but check with the manufacturer to ensure that the battery life is relevant to your needs, and whether the battery is rechargeable or needs to be replaced at intervals. Also, check how storage affects battery life, and if there is an expiry date beyond which the device begins to lose power.

7) What memory/storage capacity is required?

The onboard memory size directly affects how much data can be stored, and the duration of the logging session for high-speed applications (regular sample and storage intervals). Some small data loggers have restricted memory size, which effectively limits the use of the device to short duration measurement runs. Check that the memory size is sufficient for your application, and when evaluating the sample rate, note that the memory capacity equates to a fixed number of data points – so sampling at a higher frequency will fill the available memory more quickly. When the memory capacity is reached, some loggers stop recording, some 'wrap around' – overwriting the earlier or oldest data, and some have the option of spilling over onto an external storage device or cloud-based service.

---

8) How large is the data logging device?

It is important that the device dimensions are suitable for its intended position. Small and miniature button dataloggers are available to fit small refrigerators or into pies during the cooking process, and even individual product packages. With a wired unit, make sure there is enough space for the electrical infrastructure and power supply.

9) Do I need real-time operation?

In general, a data logger provides a series of snapshots or data points at set intervals, which, over time, provide a composite picture of real-world conditions. This is different from real-time operation. However, the higher your sample rate the more data points are recorded and the more detailed the picture will be. With a greater storage frequency comes a more up-to-date picture of data conditions at any given time. This being said, some newer versions do have the ability to output genuinely real-time results. Look for this feature when it is important to access live data remotely.

10) Do the data loggers need to issue alarms or notifications?

Some Wi-Fi data loggers can generate real-time alarms or alerts by email or SMS. These can be configured to provide updates at specific intervals, or whenever readings fall outside a specified range. This facility is invaluable in many temperature-sensitive applications, e.g. for saving a particular product batch before it becomes ruined. Some data logging devices will not issue alarms on their own but need to be connected to an analysis and notification system to provide these updates.

11) Can the data logger provide an audit trail?

With an ongoing log of measurements over time, some data loggers can be set up to provide a quick and easy audit trail to speed up your audits. Look for a system or device with a quick search function and the ability to export data into convenient formats to generate reports.

12) How much do data loggers cost?

Data loggers range in cost from low cost single use units, often costing no more than a few pounds, to a large-scale cloud-based data logging and alarm system which can run into the thousands of pounds, and require ongoing software and hardware support. Please get in touch for an initial assessment of your needs, and we can provide you with a bespoke quote for your application.

Common Mistakes To Avoid When Choosing A Data Logger

We are often asked if there are any mistakes to avoid when selecting a data logging device and yes, unfortunately some people do run into trouble when choosing an inappropriate solution for their needs. Most mistakes arise when businesses fail to consider the evaluation questions given in the previous section in sufficient detail. This can lead to the following problems:

- Product spoilage due to an insufficient sample and storage rate
- Inaccurate data readings, leading to non-compliance with essential industry standards
- An inability to store sufficient data volumes
- Poor access to data, leading to problems monitoring, analysing, and reporting on data trends
- Power problems leading to sample or storage failure, and an incomplete data record for the measurement period
- An unintuitive software interface and user dashboard that restricts access to data on remote devices
- Manual readings may be required to calibrate or supplement automated samples

If you have noticed any of these problems with your current data logging system, it is worth reassessing your storage and monitoring needs. There may be a better data logging solution that is more suited to your project requirements.

Data Loggers From Signatrol

Signatrol Ltd are the UK's premier data logging equipment specialist, providing a range of data logging solutions for customers in the environmental, food & beverage processing, medical, pharmaceutical, agricultural and water monitoring sectors.

All our devices can be part of a Hazard Analysis and Critical Control Point (HACCP) system and are internationally recognised as reducing the risk of safety hazards in foods, drinks, and medical products. Our data loggers are used across the NHS and have recently been deployed to monitor the condition of Covid-19 test kits in transit, and in portable fridges used to store the various Covid-19 vaccines. We provide five main product groups:

1) SL50 miniature button temperature loggers:
These coin-sized data loggers are designed to be used in an infinite number of applications where a small standalone solution is required. You will find these data loggers used in many applications, from being placed inside a pork or apple pie during the baking process or being used to measure and validate the temperature during a washing cycle of an industrial washing machine in a hospital

2) SpYdaq wireless radio data monitoring, logging and alert system:
These advanced battery-powered transmitters & sensors provide accurate real-time data readings at a range of up to 500m, which can be extended with a single or chain of signal boosters. These systems are commonly used for environmental monitoring in warehousing, storage facilities, in offices, as well as for cold storage where there are multiple cold rooms, fridges and freezers on one site over a wide area, for example.

3) CADMUS wireless Wi-Fi data monitoring, logging and alert system:
Designed in collaboration with NHS hospitals and doctor's surgeries, CADMUS is a high spec, low-cost solution providing a similar solution to our SpYdaq system. However, there are no limits to the number of devices you can use or the number locations globally you can install them in whilst gaining access to the data on one easy-to-use software platform using any internet browser. Both the SpYdaq & Cadmus systems can also provide multiple users with automated or on-demand reports, as well as instantaneous data and system alarms & alert notifications as and when generated.

info@signatrol.com • **01684 299 399** • **signatrol.com**

4) tempmate-M1 & M2 multi-use temperature & humidity USB data loggers:
Simple to use, low cost and specially designed, but not limited to, for temperature monitoring during cold chain logistics. They are often used to measure and record temperature sensitive consignments. The PDF report created contains detailed information in graphical and tabular formats. With the optional free available tempbase software, you can easily achieve individual logger configuration and conduct detailed data analysis. In addition, they are exempt from IATAs Dangerous Goods Regulations and are therefore a perfect solution for use in air freight logistics. In addition, they are both GDP and BS EN 12830 compliant.

5) tempmate-S1 & S2 single-use USB temperature & humidity data loggers:
Low cost and simple to use, these are ideal for monitoring the temperature (and/or humidity) of cold supply chain shipments that are in transit. Recordings are started by simply pressing a start button. The data logger is then placed inside the carton or shipment and dispatched. At the receiving end, the temperature data logger is taken from the shipment and removed from the protective IP68 wrapper. It is then placed into the USB port on a computer and the PDF and/or .csv file is available as if it was on a memory stick. No interface cables or software are required. Compliant to BS EN 12830:2018, the tempmate-S1 temperature and humidity data loggers meet the requirements of IATA GDR for 2019 and therefore do not need to be shipped/marked as dangerous goods, making them the perfect solution for all your shipping requirements.

Next Steps

Further information about our individual products can be found on our website. To discuss your application or project requirements with one of our data logging specialists in person, please get in touch by phone or email, using the details below:

- Tel: 01684 218 528

- Email: Please use our online contact form

---

info@signatrol.com   ●   **01684 299 399**   ●   **signatrol.com**