

Guide: How to find the right monitoring solution

There are numerous metrological solutions available for monitoring and storing quality-relevant environmental parameters. Ranging from thermohygrometers to stand-alone data loggers or even fully automated measurement data monitoring systems, almost anything is possible. There is no single ultimate product – each requirement calls for a different solution. To help you find the optimal measuring technology to cope with the challenges you face, we have compiled the key questions and aspects that you need to consider in this checklist. We would also be happy to offer you personal assistance: [Go to the contact form.](#)



1. What are your basic functional requirements?

In order to find an appropriate measurement solution, the first thing to do is to define the framework conditions in which the measuring technology is going to be used. These include the facilities to be monitored, the applicable regulations and the prevailing temperature ranges.

Which premises or facilities need to be monitored?

- | | |
|---|--|
| ☐ Cold storage cells | ☐ Stability chambers |
| ☐ Refrigerators | ☐ Cleanrooms |
| ☐ Ultra-low-temperature freezers | ☐ Incubators |
| ☐ Cryogenic tanks / liquid nitrogen tanks | ☐ Laboratory equipment |
| ☐ Indoor environment | ☐ Other |

Which environmental parameters need to be recorded?

- | | |
|---|--|
| ☐ Temperature | ☐ Atmospheric pressure |
| ☐ Relative humidity | ☐ CO ₂ |
| ☐ Differential pressure | ☐ Other |

Which temperature ranges need to be monitored?

- | | | | |
|--|--------------|--|--------------|
| ☐ Liquid nitrogen: | From -196 °C | ☐ Cool: | 8 to 15 °C |
| ☐ Deep-frozen: | From -80 °C | ☐ Ambient temperature: | 15 to 25 °C |
| ☐ Frozen: | From -20 °C | ☐ Water baths: | 5 to 99.9 °C |

At what intervals do the environmental parameters need to be recorded?

- | | | |
|---------------------------------|---|--|
| ☐ <1 minute | ☐ Several times a day | ☐ Weekly |
| ☐ <1 hour | ☐ Daily | ☐ On an individual basis |

How many measuring points need to be monitored?

- | | |
|---|--|
| ☐ 1 – 10 measuring points | ☐ 100 – 300 measuring points |
| ☐ 10 – 100 measuring points | ☐ More than 300 measuring points |

Which legal and regulatory requirements must be met?

- | | |
|--|--|
| ☐ FDA 21 CFR Part 11 <ul style="list-style-type: none">• A detailed audit trail that records the activities of the users and the actions within the system, as well as electronic signatures for the actions performed in the system (Electronic Records and Electronic Signatures (ERES))• A software audit trail & ERES that can be validated according to GAMP5 (user authentication, inspection and time stamps, unalterable data) | ☐ WHO - Annex 2 |
| | ☐ EU GMP Guidelines - Annex 11 |
| | ☐ International GxP standards (GLP, GMP, GDP, etc.) |
| | ☐ Other region-specific or country-specific requirements |

Where and how should the measurement data be recorded, stored and archived?

- ☐ Manual recording (paper or digital) with individual, user-selected storage location
- ☐ Automated recording and storage in a cloud
- ☐ Automated recording and storage in a local database (on-premises)



2. What are you looking for in terms of data security and integrity?

The data generated at your measuring points is a highly sensitive asset. The corresponding security-related aspects, which must be considered extensively, are therefore all the more important. This is the only way to ensure that you meet any regulations, not to mention your own standards.

Should all employees have equal access to measurement data and system configuration?

- ☐ Yes, all employees have the same permission levels
- ☐ No, I need configurable user permissions with individual rights

Is it important for you to have data recovery and continuous recording even if there is power failure or loss of communication?

- ☐ Yes, the documentation of the measurement data must be complete and without any gaps
- ☐ No, minor gaps in the measurement data are acceptable

Is it important to you that the data is encrypted and cannot be tampered with?

- ☐ Yes, the integrity of the data must be guaranteed by security measures
- ☐ No, unsecured recording and documentation is sufficient



3. What are your requirements for the configuration of the system?

A monitoring solution can only support you adequately if crucial functions with respect to operation and configuration are guaranteed. This way, the measuring technology used can be optimally tailored to your needs and those of your organization, making subsequent use significantly easier.

What kind of data do you need?

- ☐ Graphical display of measurement data
- ☐ Tabular display of measurement data
- ☐ Trend data
- ☐ System data
- ☐ Alarm overview

Would you like a user-defined interface for visualizing the measuring points?

- ☐ Yes, I would like to have all measuring points including alarms visualized on an individual floor plan
- ☐ No, I do not require visualization of the measuring points

Would you like to be able to access the measurement data at any time?

- ☐ Yes, I would like to be able to access the measurement data at any time from a PC, smartphone or tablet
- ☐ No, on-site access is sufficient for me



4. What are your requirements for the alerting options?

One of the most important functions of a monitoring system is its alert system in the event of limit value violations or system-critical incidents. In these cases, you want to be informed immediately so that you can take countermeasures in good time, not when it's too late.

Would you like to be alerted to specific events?

☐

Yes

☐

No

Which events would you like to be alerted to?

☐

When predefined limit values are violated

☐

When the violation of predefined limit values is imminent (warning)

☐

When the battery level of the measuring instrument is low or when there is a power failure

☐

In the event of disconnections or communication problems (only applies to fully automated systems)

How would you like to be alerted?

☐

LED indication on the measuring instrument

☐

Notification in associated software

☐

Notification via an automatically generated e-mail

☐

Notification via an automatically generated SMS

Should different persons and employees be alerted to different events?

☐

Yes

☐

No

Is it necessary to acknowledge alarms with a message?

☐

Yes

☐

No



5. What are your requirements for reporting and documentation?

All data collected by a monitoring system must be stored and documented appropriately.

This serves to inform stakeholders, to meet internal standards and to comply with legal regulations.

Are reports required?

☐

Yes, compiled manually

☐

Yes, compiled automatically

☐

No

Would you like a user-defined interface for visualizing the measuring points?

☐

Measurement data (in tabular & graphical format)

☐

General system information

☐

Audit trail

☐

Statistics and trend data

Should different employees receive different information with the reports?

☐

Yes

☐

No

How often do reports need to be generated?

☐

Daily

☐

Quarterly

☐

Weekly

☐

Annually



6. What services do you require with respect to environmental monitoring?

There are many tasks involved in the installation, commissioning and maintenance of an environmental monitoring system, and a partner can provide professional support with these. Here, you will find a selection of the most relevant services.

Only in combination with fully automated solutions:

☐

Qualification (IQ, OQ, DG, PQ)

☐

Extensive project management

☐

Hardware and software validation as well as revalidation services

☐

Assistance with and implementation of installation and commissioning

☐

Preparation of thermal and seasonal mappings to determine worst-case scenarios for your facility

☐

Implementation of site acceptance tests

☐

Calibration services by an accredited ISO:17025 laboratory

☐

Software upgrades and hardware backups

☐

A plan for ongoing sensor recalibration

☐

Extensive training and education services

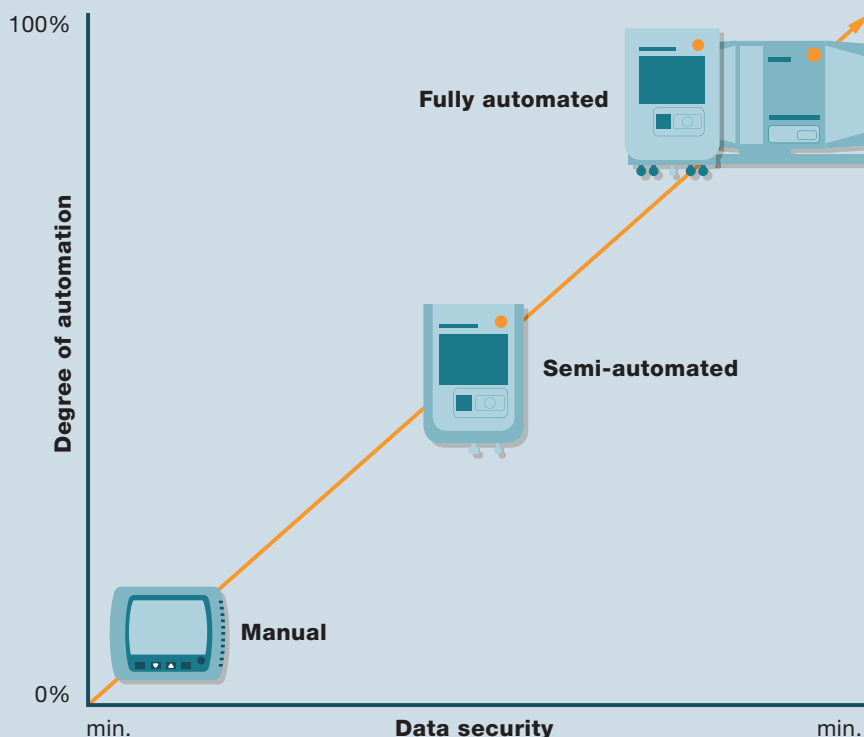
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Individual service and maintenance packages



Conclusion: It all comes down to this.

The more complex and stringent the requirements of your measurement application and the larger the project or the more measuring points to be monitored, the higher degree of automation you should be looking for when it comes to recording and documenting your readings.



You can find more information about our solutions for environmental monitoring here:

Thermohygrometers compared



Data loggers compared



Monitoring systems compared



We would be happy to advise you personally and, on the basis of your results, work with you to identify the very best solution for your environmental monitoring. Contact us here on our [website: www.testo.com](http://www.testo.com)