

# Frequently Asked Questions

*This document provides a non-exhaustive collection of some of the questions frequently asked by our customers.*

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## What is your system's wireless range?

Wireless system range is generally specified as a line-of-sight measurement, that is, without physical obstacles. OCEASOFT systems offer a line-of-sight range of around 800 meters. Using repeaters, this range can be extended to around 3 km (line-of-sight). In a closed environment (i.e. indoors) range can reach from 25-100 meters without a repeater, and 100-400 meters using up to three repeaters. Variations in range are due to obstacles in the environment.

### Radio wave propagation

In order to setup wireless network architecture, it is useful to have at least a little background on Hertz wave propagation, particularly when setting up repeaters to achieve optimal range. The propagation speed for waves in a vacuum is  $3.10^8$  m/s. In all other environments, signals are attenuated by:

- Reflection
- Refraction
- Diffraction
- Absorption

### Radio wave absorption

When a radio wave encounters an obstacle, part of its energy is absorbed and transformed into *lost energy*, part continues to propagate in an attenuated manner, and part may be reflected. Signal attenuation during transmission is referred to as *power loss*. Attenuation increases with distance. In addition, when radio waves collide with obstacles, the attenuation value depends largely on the obstacle's composition. Metallic obstacles generally reflect radio waves strongly, while water absorbs the signal.



**Environment properties**

The weakening of wireless signals is largely due to the properties of the environment crossed by the radio waves. This table shows some sample attenuation properties for various materials:

Materials	Attenuation	Examples
Air	None	Open space, interior courtyards
Wood	Low	Doors, floors, walls
Plastic	Low	Barriers
Glass	Low	Non-tinted glass
Tinted glass	Medium	Tinted glass
Water	Medium	Aquariums, fountains
Living beings	Medium	Crowds, animals, people, plants
Brick	Medium	Walls
Plaster	Medium	Dividing walls
Ceramic	High	Tile
Paper	High	Rolls or reams of paper
Concrete	High	Heavy walls, floors, pillars
Safety glass	High	Bulletproof windows
Metal	Very high	Reinforced concrete, mirrors, metal cabinets, elevator shafts

**What are the risks of interference with other electronic devices, such as mobile phones?**

Cobalt products use the license-free ISM band (Industrial Scientific Medical). This frequency is reserved for remote monitoring-type applications, which is different from that used for cellular telephones and DECT phones. There is therefore no risk of frequency interference or disturbance with these types of devices. The wireless system used in Cobalt products complies with current international standards in each country, and radio emissions are 80 times weaker than a cell phone. Our wireless modules are compatible with all CE-labeled equipment.

**How many modules can be managed by a single wireless receiver?**

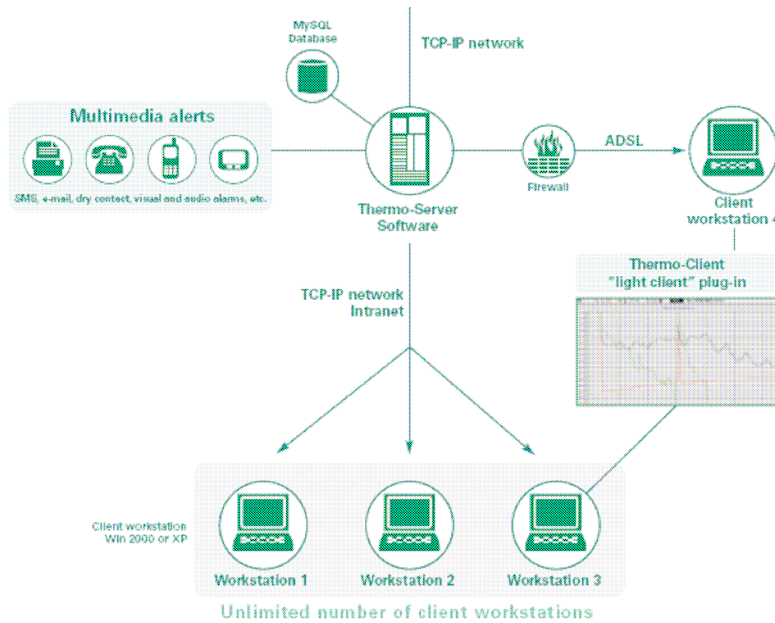
There is no theoretical limit to the number of modules. In practice, computer performance is the biggest factor in determining the number of wireless modules that can be managed.

	Average number generally handled	Maximum capacity
Pentium IV, 2 GHz, PC, non-dedicated machine, 512 MB RAM	10	15
Pentium IV, 2 GHz, PC, dedicated machine, 1 GB RAM	25	50
Pentium IV, 3 GHz, PC, dedicated machine, 1 GB	40	60
Pentium IV, 3 GHz, PC, dedicated machine, 2 GB RAM	50	100
Pentium Dual Core, server, 2 GB RAM	100	150
XEON Server, 4 GB RAM	200	350
	Above 350 end-points, add one server per additional 350 end-points	

	per additional 350 end-points	
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### Is the software network-ready?

Yes, Thermo-Server runs on a networked computer. User workstations run the Thermo-Client application, which you can install simply by copying the executable file into a folder on the hard disk or a USB key. The solution uses TCP/IP networks. Thermo-Client is a client application that connects to the Thermo-Server server application, enabling users to view, change, and setup the software and sensors. User access rights can be configured in order to control access to the system and avoid unauthorized use.



### How long do the batteries last?

Battery life depends exclusively on the frequency of radio transmission, which is not the same thing as the measurement frequency. For example, you could use memory in the wireless modules to store readings every 10 minutes, and transmit them back to the PC every 2 hours. You can conserve battery power by using on-board storage and sending data at relatively large intervals. Modules are equipped with an SAE (Spontaneous Alarm Emission) mechanism that overrides the programmed transmission period in order to inform you of incidents immediately.

Alerts are therefore received within one minute of an observed, non-compliant measurement. The following table shows the average battery life for various quantities of modules connected to a single receiver, operating at a temperature of 25°C.

Transmission period (minutes)	Density (no. modules)	Battery life (months)
15	10	6
30	10	12
45	10	18
60	10	24
120	10	48
180	10	60
240	10	72
>240	10	72

Transmission period (minutes)	Density (no. modules)	Battery life (months)
15	20	4
30	20	7
45	20	11
60	20	14
120	20	28
180	20	35
240	20	42
>240	20	42

Transmission period (minutes)	Density (no. modules)	Battery life (months)
15	40	2
30	40	4
45	40	6
60	40	8
120	40	17
180	40	21
240	40	25
>240	40	25

Transmission period (minutes)	Density (no. modules)	Battery life (months)
15	80	1
30	80	2
45	80	4
60	80	5
120	80	10
180	80	12
240	80	15
>240	80	15

Transmission period (minutes)	Density (no. modules)	Battery life (months)
15	100	1
30	100	2
45	100	3
60	100	4
120	100	8
180	100	10
240	100	12
>240	100	12

Estimated values. Slight differences may be observed depending on the ambient temperature and programmed measurement periods.



### **Can I change batteries myself?**

Yes, all you need is a Philips-head screwdriver to open the casing in order to change the battery. Special batteries are used, but they are readily available on the market.

### **What is the temperature range that can be measured by the sensors?**

All you have to do is define the device to be monitored. Each device has a wireless system and probe. Measurement ranges from  $-200^{\circ}\text{C}$  to  $+1600^{\circ}\text{C}$  as standard. Support for other temperatures is available on request.

### **How are probes placed inside enclosures?**

Probes are generally placed inside enclosures, and wireless modules are generally placed outside enclosures. Cobalt can use an 8 mm opening if one is available (3 mm for nitrogen tanks and products in the  $-80^{\circ}\text{C}$  range). Otherwise, we can use a capillary cable that enables you to maintain water/air-tightness without damaging the door joint. For  $-80^{\circ}\text{C}$  products and nitrogen tanks, a specifically designed opening is required, as capillary cables do not support temperatures below  $-50^{\circ}\text{C}$ .

For measuring ambient temperatures, you can place the wireless module and probe inside the enclosure to be monitored. For example, this is the case for large, constant-temperature rooms, medicine storage and positive cold rooms larger than  $20\text{ m}^3$ .

### **How is calibration handled? How can I make measurements during calibration?**

Calibration of digital probes (those covering temperature ranges from  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ ) is handled by standard exchange. That is, old probes are removed and replaced by new ones that are calibrated.

For  $-80^{\circ}\text{C}$  freezers, probes are harder to remove. In that case, it is necessary to perform calibration on-site by comparing the probe to a reference probe in a homogeneous environment. Nonetheless, it is still possible to exchange probes for  $-80^{\circ}\text{C}$  freezers by replacing both the wireless module and the probe.

Standard probe exchange is a fast and simple. There is no absence of measurements during this period.

### **How can I get the calibration certificate for my probe?**

Modern communication techniques, notably the Internet, have made it possible for us to place calibration certificates conveniently on-line. Simply enter a certificate number on our Web site to download the certificate corresponding to your probe automatically.

### **Do I need to calibrate the entire measurement chain, including the probe, module and receiver?**

For a digital Digital probe (for temperatures ranging from  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ ) only the probe needs to be calibrated. Therefore, the wireless module and receiver are not part of the measurement chain.



For a temperature/hygrometry probe only the probe needs to be calibrated. The wireless module and receiver are not part of the measurement chain.

For analog probes covering -200°C to -50°C and 125°C to +160°C, it is necessary to calibrate both the probe and the wireless module. The receiver is not part of the measurement chain.

### **What happens if measurement takes place while the enclosure door is open?**

Thermo-Server software and Cobalt modules offer an alarm buffer mechanism, which avoids sending an alarm in case the enclosure door is opened at the same time a measurement is made. For example, you can define an upper threshold of 8°C with a time buffer of 30 minutes. The system will trigger an alarm if the temperature does not descend below 8°C in the 30 minutes following the door opening.

### **Does the solution require a dedicated PC?**

A dedicated PC is necessary when your system includes more than 10 – 15 measurement end-points. Make sure that the PC meets system requirements to handle the actual number of end-points in your network.

### **Will I need help from my information services department?**

For small projects involving 10 – 15 end-points, just make sure that the user has access rights to install the software on the computer. This user should have administrator rights. If he or she is not the administrator, then the software cannot be installed without the help of authorized computer support staff.

For large projects, such as those in hospital environments, the computer support department will need to be involved in order to give *local administrator* rights to the technician installing the software, and at performance qualification time to organize data backups.

### **How much disk space does data occupy?**

Temperature data does not take up much disk space. For 10 measurement points, over a period of 1 year, taking measurements every 10 minutes, data will represent a total of around 16 MB. If you take alarms and an audit trail into account, the total is around 32 MB. Generally speaking, you should therefore count on around 3.2 MB per probe per year.

### **What happens if the PC is turned off?**

Wireless modules have internal memory that can store information from 2,000 - 3,000 measurement end-points, depending on the model. If the PC is turned off, it will not be able to collect measurement data, which is therefore stored in receiver memory. When the PC is turned back on, it will automatically download all the data stored on the receiver.

Attention: a PC cannot generate alarms if it is not running! Therefore, we recommend using a backup power supply and surge protector.

### **How will I be notified in case of power failure?**

The simplest solution is to order an electric repeater and add it to the installation as a measurement point (i.e. for measuring ambient temperature). Remember, electric repeaters perform three functions: repeating wireless signals to increase range, measuring ambient temperature, and sending spontaneous alarms in case of power failure.



By plugging in an electric repeater in a specific room, you can receive immediate notification in case of a power failure.

### **Can a laptop computer be my system's main computer?**

Laptop computers can be used for small sites. For larger sites, we do not recommend using a laptop computer because they are generally less reliable than desktop PCs and servers, which also tend to offer a better price/performance ratio.

### **How is your software tested? What about site reception and quality control?**

Every aspect of our software is thoroughly tested in order to avoid the risk of bugs to the greatest extent possible. We run the software through over 900 different tests for robustness, communication, reliability, etc.

We carry out validation tests on-site as well, first to qualify installation and overall functionality, then to qualify performance and ensure proper operation in the system's real environment. Reports for these test procedures, as well as assistance, are available.