

# Monitoring system for operating theatres

Magelis OptiPC touch screen panel  
Operating theatre management system  
Remote access for maintenance

User Guide  
2012



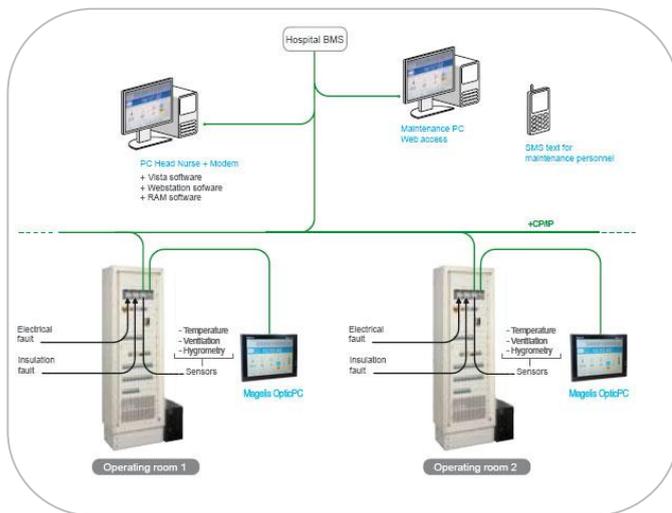
## A monitoring system...

Reliable information are needed to manage the satisfactory operation of operating theatres. The monitoring system informs in real time and allows taking the appropriate decisions in case of unexpected events.

This guide allows different users: nurse, supervision personnel and maintenance personnel to understand and to use:

- the control panel in the operating theatre
- the medical supervision system inside the room of head nurse's or service responsible
- the remote access for maintenance (via Web) to each operating theatre with the Webstation

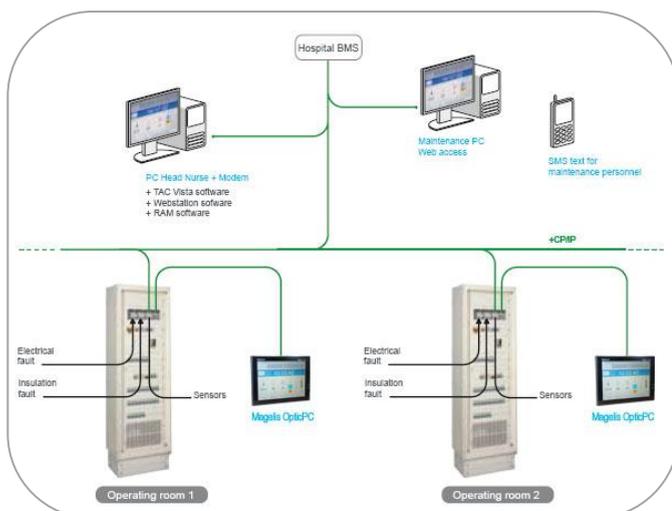
## > Monitoring system for the “Full Energy Efficiency” solution



This monitoring system makes it possible:

- with the Magelis OptiPC touch screen panel in the operating room, to have information concerning alarms generated by the electrical installation and concerning the operating room environment,
- with the monitoring system softwares, to have real-time access to all information concerning operation of the operating rooms and to ensure event traceability.

## > Monitoring system for the “Advanced” solution



The monitoring system makes it possible:

- with the Magelis OptiPC touch screen panel in the operating room, to have information concerning alarms generated by the electrical installation and concerning the operating room environment,
- with Internet Explorer, to have real-time access to all information concerning the operation of each operating room.

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## Two levels of information

Solution Full EE Advanced

### Functions performed by the control and signalling panel in operating theatre

Type of Control and signalling panel in operating room	Magelis OptiPC	Magelis OptiPC
Visual and audible alarms on electrical and insulation faults	●	●
Audible alarm stoppage	●	●
Tests of the insulation monitoring system	●	●
Fault handling information	●	●
Time display, chronometer and timer	●	●
Display of operating room temperature, relative humidity	●	●
Display of operating room differential pressure		●
Display of medical gas states (O2, N2O, vacuum)	●	●
Generation of an event report	●	●
UPS information	●	●
Ventilation control	●	
Hardwired connection with BMS control modules	●	

### Functions performed by the monitoring system

Access to functions by supervision personnel	●	●
Access to functions by maintenance personnel	●	●

### Simultaneous display of all operating rooms data

temperature, relative humidity	●	●
differential pressure		●
ventilation monitoring and control	●	
medical gas states	●	●
electrical and insulation fault alarms	●	●

### Display of each room data

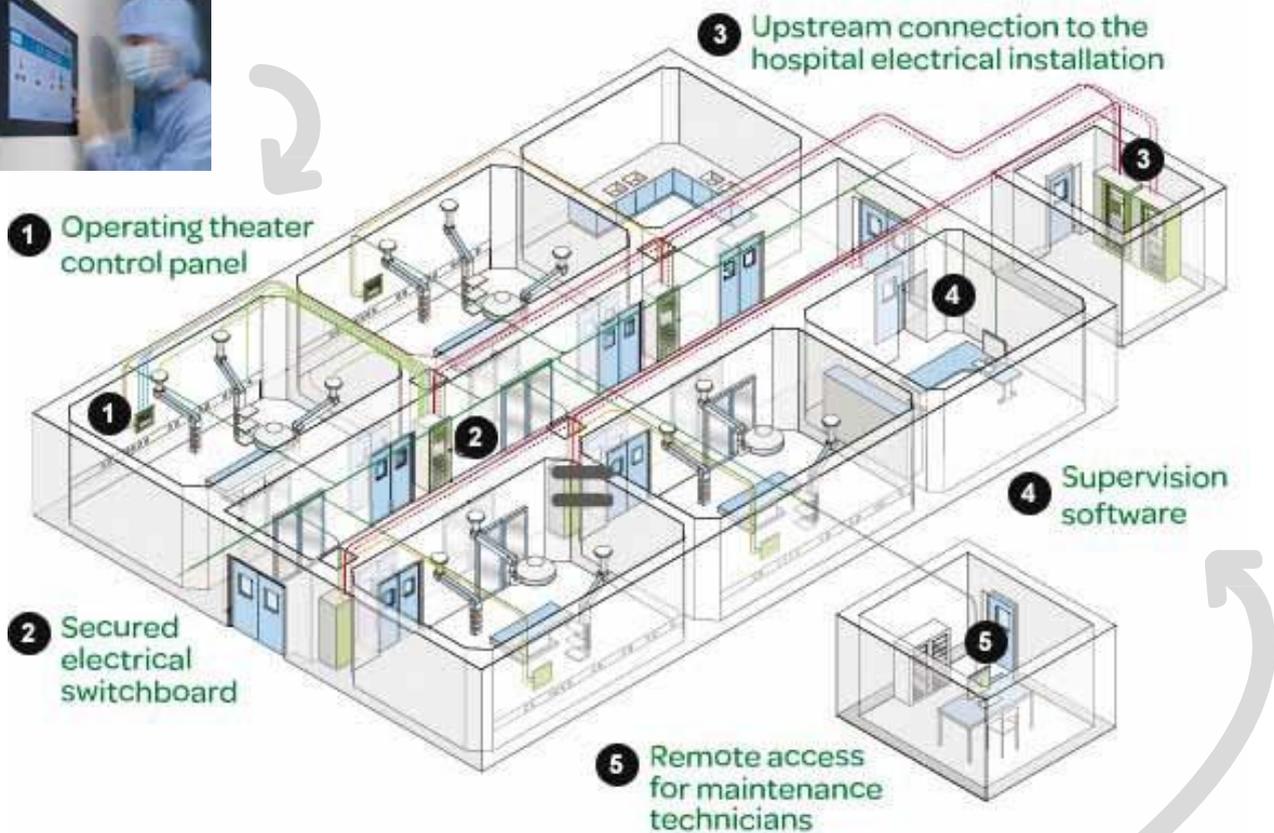
temperature, relative humidity	●	●
differential pressure		●
ventilation monitoring and control	●	
medical gas states	●	●
electrical and insulation fault alarms	●	●
list of events with dates	●	●
display of current alarms	●	●
min and max threshold alarms for temperature and relative humidity settings	●	●
display of temperature and relative humidity curves	●	●
event report edition (Excel file export can be possible)	●	●
UPS information	●	●

Sending of an SMS to maintenance personnel in the event of installation fault (operating room number + type of alarm)	●	●
"Fault handling" information from the maintenance personnel	●	●

# Introduction

## The nurse

- Tests the insulation monitoring system at start-up of the operating room.
- Is warned of an electrical fault or insulation fault.
- Uses the Magelis OptiPC touch screen panel to monitor environmental parameters.
- Is notified of the time remaining power available for the battery power.
- Is notified of any work performed by maintenance personnel.
- Generates an insulation test.



## The maintenance personnel

- Is notified by SMS message of the presence of an electrical fault in an operating room.
- Consults via its PC the electrical state of each operating room.
- Performs servicing on the cabinet indicated as at fault.
- Can indicate its handling of the fault and confirming its reparation.

## The supervision personnel

- Views the states of each operating room on its PC.
- Generates event reports.
- Sets alarm thresholds for the temperature, hygrometry and ventilation of the operating rooms.

# Control panel touch screen

## Full Energy Efficiency solution

### Advanced solution



The control panel (monitoring and signalling) is a touch screen which is located inside the operating room.

At the beginning the main menu appears with information of Environment, Electrical status, medical gases and time.

### Details of visualization and commands

#### Main screen

The following information is provided:

- **electrical state**, with 3 exclusive states (normal, minor fault, major fault) + Alarm label (ex: fault in socket number XX).

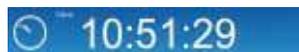
	OK	
	Minor alarm	Audible alarm = buzzer
	Major alarm	Audible alarm = buzzer
	Major alarm	Audible alarm = buzzer

- **Insulation state** indicator: signal lamps with 2 exclusive states.

	Insulation OK	
	Insulation default	Audible alarm = buzzer

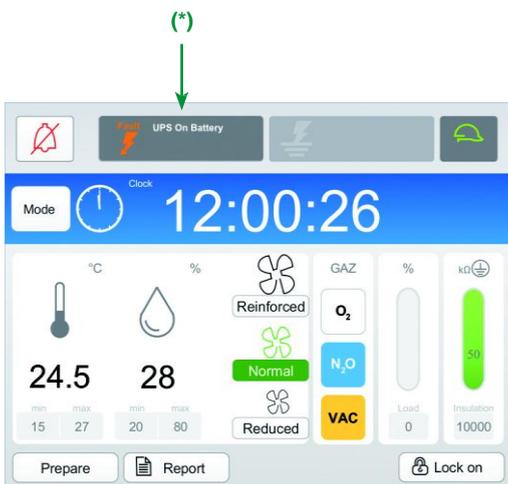
On the left, the picture of the screen when an electrical and insulation defaults occur.

- **Time display**: continuous HH/MM/SS



- **Fault acknowledgement** by maintenance personnel, the picture has 3 different states:

	There is no fault in theatre X
	Default in theatre X sent to maintenance operator but not yet acknowledged
	Default in theatre X addressed by the maintenance operator and being resolved. Acknowledge done.



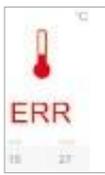
(\*) Optional in case of local UPS.

# Control panel touch screen

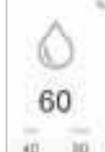
## Full Energy Efficiency solution

### Advanced solution

#### ■ Temperature: Digital display with 2 decimals + fault

	Temperature OK
	Default Temperature high
	Default Temperature low
	Temperature Sensor default

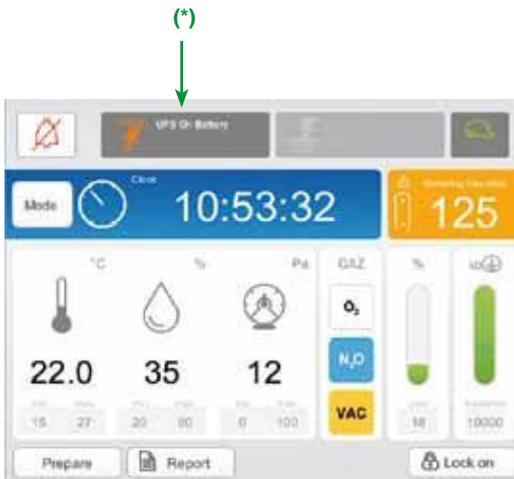
#### ■ Digital display Hygrometry

	Hygrometry OK
	Default Hygrometry high
	Default Hygrometry low
	Hygrometry Sensor default

# Control panel touch screen

Full Energy Efficiency solution

Advanced solution



## Advanced solution

■ Differential pressure: Digital display with 2 decimals + fault

	Pressure OK
	Default Pressure high
	Default Pressure low
	Pressure Sensor default

## Full energy efficiency solution

■ Differential ventilation degrees: Display + fault



	Ventilation reinforced state
	Normal state Running normal state when there is someone in the operating room.
	Reduced ventilation state : Works when there is no one exits in the operating room.
	Ventilation low volume Fault case with the reduced state

(\*) Optional in case of local UPS.

# Control panel touch screen

## Full Energy Efficiency solution

### Advanced solution

- Oxygen Operation gas(O<sub>2</sub>): indicator with 2 states
- Nitrous oxide Operation gas(N<sub>2</sub>O): indicator with 2 states
- Vacuum Operation gas(VAC): indicator with 2 states

GAZ   		O <sub>2</sub> OK
		O <sub>2</sub> Defaults
		N <sub>2</sub> O OK
		N <sub>2</sub> O Default
		Vacuum OK
		Vacuum



When a default occurs, there is an audible alarm and the buzzer picture becomes red.  
 To stop the buzzer, you have to push on this picture on the top left of the main screen.

# Control panel touch screen

## Full Energy Efficiency solution

### Advanced solution



#### Control

The following controls will be accessible:

##### ■ Lock on: 2-state button

	Command from Control panel	Screen is locked when you press this button and the unlock button appears
	Command from Control panel	You have to press 3 times this button to unlock the screen

##### ■ Mode: button to access to the timer menu

	Command from Control panel	Access to the timer menu
--	----------------------------	--------------------------

##### ■ Prepare: button to access to an other configuration screen

	Command from Control panel	Access to an other menu
--	----------------------------	-------------------------

##### ■ Report: allows the event report generation (for full energy efficiency solution )

	Command from Control panel	Generate a report
--	----------------------------	-------------------



#### Prepare

By pushing the prepare button, a new panel with several options appears. The **system test** menu makes an insulation system checking of the solution. The **Timer** menu allows setting time options like countdown, timer or clock time. The **comfort** menu is to set environment options such as temperature, control panel light brightness, air conditioning rate...

To go back to the main screen you have to click on

#### System test

Before starting an operation, the test button needs to be pushed that allows the user to be sure that there is any insulation fault of the system:

	Command from Control panel	Check the insulation alarm system
--	----------------------------	-----------------------------------

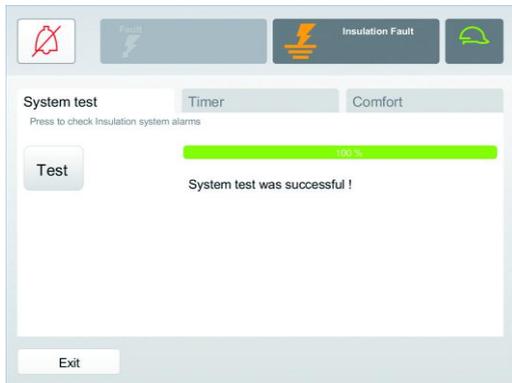


An insulation fault is generated, and identified.

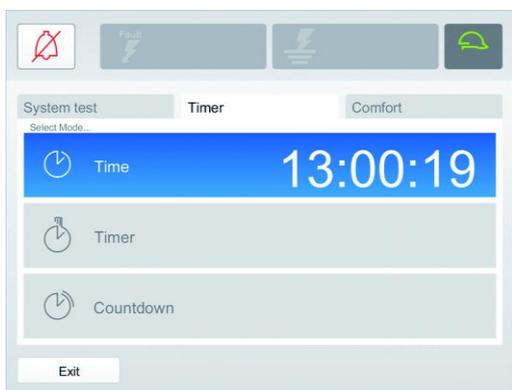
# Control panel touch screen

## Full Energy Efficiency solution

### Advanced solution



If everything is ok, the sentence "system test was successful" appears.



#### Timer Menu

By choosing the timer menu, the operator can set time options. To choose the right mode you have to click on it.

Timer:



Countdown:



By using the + and – button it is possible to set hour, minute and seconds.

Once these settings done, the countdown or the timer appears on the main screen. To launch it the operator has to push on the start button.

Start	Command from Control panel	Start the countdown
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When the countdown/Timer is launched, the operator can stop it by pushing on the stop button.

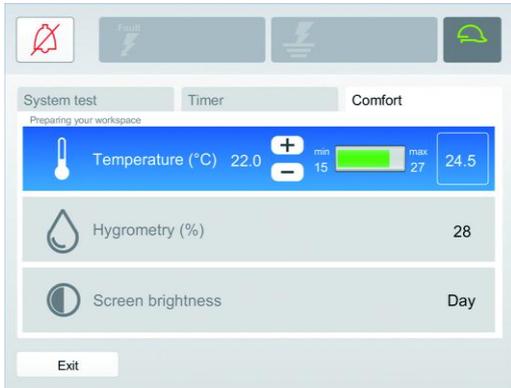
At any time you can choose the time mode (Time, Timer, Countdown) by pushing on the mode button.

Mode	Command from Control panel	Change time mode
------	----------------------------	------------------

# Control panel touch screen

## Full Energy Efficiency solution

### Advanced solution

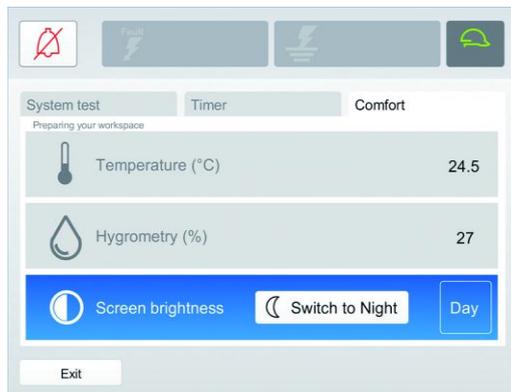
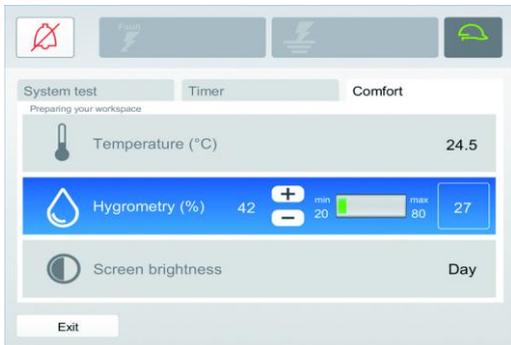


#### Comfort Menu

By choosing the comfort menu you can set environmental parameters to improve the comfort of the Operation Theatre such as temperature, hygrometry and screen brightness.

	Command from Control panel	Environmental setting menu
--	----------------------------	----------------------------

If the system is interfaced with the air conditioning system (HVAC), the operator can raise or reduce the temperature and hygrometry of the operation theatre. All the environment settings are controlled like that (hygrometry).



Through the screen brightness mode, you can choose the day or night mode by pushing on the switch to day/night button.

	Command from Control panel	Screen iday mode
	Command from Control panel	Screen night mode

This is a view of the night mode.



And on the left, a view of the main screen in night mode.

# Control panel touch screen

## Full Energy Efficiency solution



### Report

At any time, the operator can generate an event report by pushing the report button

on the main screen.

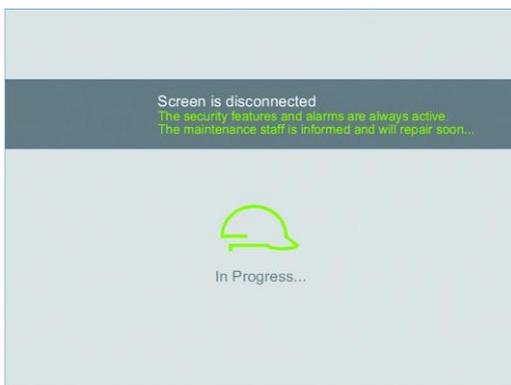


This report is a document that shows the later 200 events that occur in the operating room. There is a report for each room.

After that, there is a **pop up** message which asks if you really want to generate a Report then click on yes.



And then, there is another **pop up** to indicate the location of the report on the head nurse monitoring PC (OTMS).



At any time, if the communication is interrupted, this screen appears which gives a message about a disconnection between the Magelis Optipc and the controllers.



# Operating theatre management system (OTMS)

## Full Energy Efficiency solution

Object ID	Property	Value	Unit
SI0202100001	OT Room 1 (OT Room 01) Room Temperature	True	1,23
SI0202100002	OT Room 1 (OT Room 01) Room Humidity	True	1,23
SI0202100003	OT Room 1 (OT Room 01) Room Ventilation	True	1,23
SI0202100004	OT Room 1 (OT Room 01) Room UPS Remaining Time	True	1,23
SI0202100005	OT Room 1 (OT Room 01) Room Inoccupation Min Time	True	1,23
SI0202100006	OT Room 1 (OT Room 01) Room Temperature	True	1,23
SI0202100007	OT Room 1 (OT Room 01) Room Humidity	True	1,23
SI0202100008	OT Room 1 (OT Room 01) Room Ventilation	True	1,23
SI0202100009	OT Room 1 (OT Room 01) Room UPS Remaining Time	True	1,23
SI0202100010	OT Room 1 (OT Room 01) Room Inoccupation Min Time	True	1,23
SI0202100011	OT Room 1 (OT Room 01) Room Temperature	True	1,23
SI0202100012	OT Room 1 (OT Room 01) Room Humidity	True	1,23
SI0202100013	OT Room 1 (OT Room 01) Room Ventilation	True	1,23
SI0202100014	OT Room 1 (OT Room 01) Room UPS Remaining Time	True	1,23
SI0202100015	OT Room 1 (OT Room 01) Room Inoccupation Min Time	True	1,23
SI0202100016	OT Room 1 (OT Room 01) Room Temperature	True	1,23
SI0202100017	OT Room 1 (OT Room 01) Room Humidity	True	1,23
SI0202100018	OT Room 1 (OT Room 01) Room Ventilation	True	1,23
SI0202100019	OT Room 1 (OT Room 01) Room UPS Remaining Time	True	1,23
SI0202100020	OT Room 1 (OT Room 01) Room Inoccupation Min Time	True	1,23
SI0202100021	OT Room 1 (OT Room 01) Room Temperature	True	1,23
SI0202100022	OT Room 1 (OT Room 01) Room Humidity	True	1,23
SI0202100023	OT Room 1 (OT Room 01) Room Ventilation	True	1,23
SI0202100024	OT Room 1 (OT Room 01) Room UPS Remaining Time	True	1,23
SI0202100025	OT Room 1 (OT Room 01) Room Inoccupation Min Time	True	1,23
SI0202100026	OT Room 1 (OT Room 01) Room Temperature	True	1,23
SI0202100027	OT Room 1 (OT Room 01) Room Humidity	True	1,23
SI0202100028	OT Room 1 (OT Room 01) Room Ventilation	True	1,23
SI0202100029	OT Room 1 (OT Room 01) Room UPS Remaining Time	True	1,23
SI0202100030	OT Room 1 (OT Room 01) Room Inoccupation Min Time	True	1,23
SI0202100031	OT Room 1 (OT Room 01) Room Temperature	True	1,23
SI0202100032	OT Room 1 (OT Room 01) Room Humidity	True	1,23
SI0202100033	OT Room 1 (OT Room 01) Room Ventilation	True	1,23
SI0202100034	OT Room 1 (OT Room 01) Room UPS Remaining Time	True	1,23
SI0202100035	OT Room 1 (OT Room 01) Room Inoccupation Min Time	True	1,23
SI0202100036	OT Room 1 (OT Room 01) Room Temperature	True	1,23
SI0202100037	OT Room 1 (OT Room 01) Room Humidity	True	1,23
SI0202100038	OT Room 1 (OT Room 01) Room Ventilation	True	1,23
SI0202100039	OT Room 1 (OT Room 01) Room UPS Remaining Time	True	1,23
SI0202100040	OT Room 1 (OT Room 01) Room Inoccupation Min Time	True	1,23
SI0202100041	OT Room 1 (OT Room 01) Room Temperature	True	1,23
SI0202100042	OT Room 1 (OT Room 01) Room Humidity	True	1,23
SI0202100043	OT Room 1 (OT Room 01) Room Ventilation	True	1,23
SI0202100044	OT Room 1 (OT Room 01) Room UPS Remaining Time	True	1,23
SI0202100045	OT Room 1 (OT Room 01) Room Inoccupation Min Time	True	1,23
SI0202100046	OT Room 1 (OT Room 01) Room Temperature	True	1,23
SI0202100047	OT Room 1 (OT Room 01) Room Humidity	True	1,23
SI0202100048	OT Room 1 (OT Room 01) Room Ventilation	True	1,23
SI0202100049	OT Room 1 (OT Room 01) Room UPS Remaining Time	True	1,23
SI0202100050	OT Room 1 (OT Room 01) Room Inoccupation Min Time	True	1,23

Events view

### Configuration view

By accessing to this view, the supervisor can set the MIN and the MAX of the following environmental Variables: pressure, temperature and hygrometry. Those values are used to set the limits under or over which there is a fault. For example if the temperature T is under the Tmin, there is an alarm "temperature low".

The configuration view displays several environmental variables with their current values and adjustable thresholds:

- Temperature:** Current value 23.3 °C. Max threshold 27 °C, Min threshold 15 °C.
- Hygrometry:** Current value 20 %. Max threshold 80 %, Min threshold 20 %.
- Ventilation:** Start 7 hrs, Stop 18 hrs.
- UPS Remaining Time:** Current value 0 min. Min threshold 3 min.
- Inoccupation min time:** 1000 s.

Remaining time: below this value, the system sends an alarm if no voltage is detected on the emergency incomer.

# Operating theatre management system (OTMS)

## Full Energy Efficiency solution

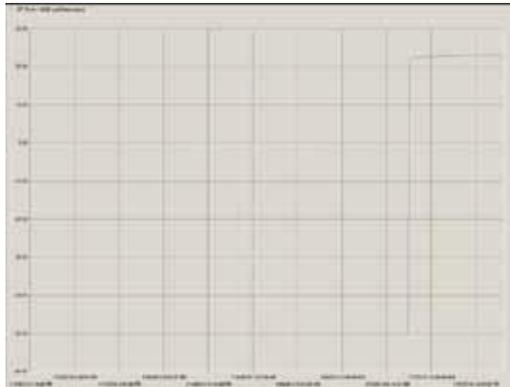
### Logs view

In this view, the user can access to the graphics of all environment parameters that allows seeing the evolution of those parameters. This may be helpful to detect the air conditioning default for example.

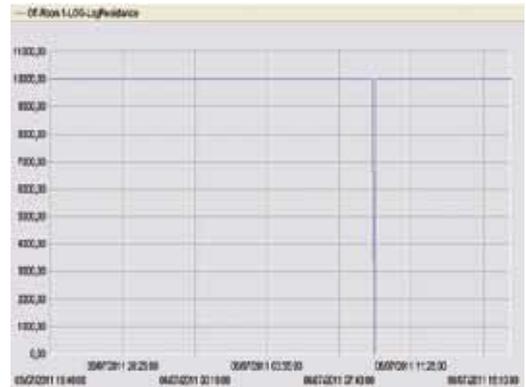
■ Here are some logs:



□ Temperature log.



□ Resistance.



□ Hygrometry log.



□ Log-Load Current.



# Remote access for maintenance

## Advanced solution

## Full Energy Efficiency solution

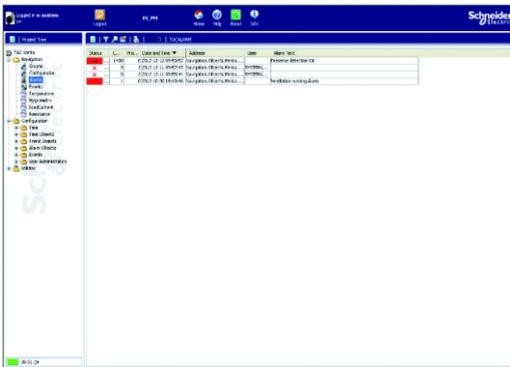
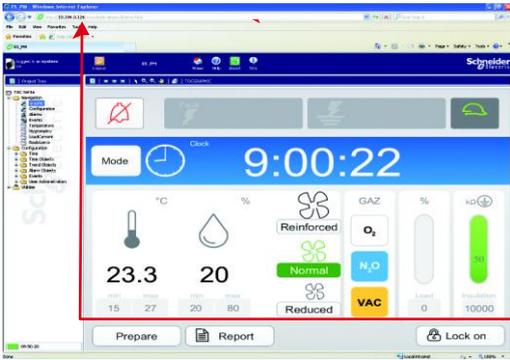
### Remote access

In this package, the remote access is configured according to the solution version

#### Advanced Solution

The remote access is ensured by:

- A simple PC or laptop with internet.
- The maintenance operator can access to the supervision webpage. To access to the webpage, the operator has to launch Internet explorer with the ip address of the Xenta communication module **i.e. http://ip\_address**. A specific password is necessary.



The general view is the same as on the touchscreen in the operating room.

The maintenance operator can also access to:

- the alarm list located in the Navigation folder where he can acknowledge the defaults and have information to correct them
- the configuration menu where he can sets the MIN and MAX thresholds for temperature, ventilation, hygrometry.

#### Full Energy Efficiency Solution

In the full energy efficiency solution, the remote access is handled by a software included in the TAC package.

##### ■ RAM software

The TAC Remote Alarm Manager is software which monitors Building Management Systems and networks. It takes or generates alarms and sends them, interactively, as messages to a variety of remote locations. In the application, it sends an SMS <sup>(1)</sup> to the maintenance once an alarm is detected by the TAC Vista.

The SMS sent must include the alarm number, the alarm text with the operating room number. The maintenance operator can acknowledge the fault by responding to the short message. The operator should response to the SMS received only with the **number of the alarm**. The alarm is automatically acknowledged and appears in green on the OTMS and a confirmation is sent to it. At the same time in the operating room, the picture "on progress" appears on the Control touchscreen to inform the operating team that the maintenance is going to solve the problem.



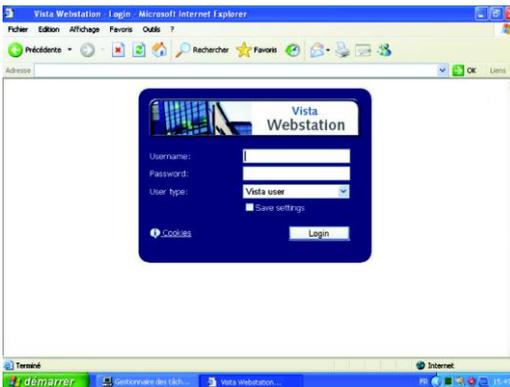
##### ■ Webstation

**Before launching webstation, ensure that the OTMS computer is on and that the application is launched.**

The maintenance operator can also have details of the problem by accessing to the webpage. At any time the maintenance can log on the web station system with any computer. To access to the webstation, the operator has to launch Internet Explorer with the OTMS computer ip address (i.e http://otmsip/webstation), and to login by using a specified login and password. By default, the login is: system and the password is: system. The password can be changed by the user.

In the main screen appears a menu where the maintenance can access to the alarm list, the event list with the main toolbar.

In the home page of the web station, the maintenance operator has an overview of all operating rooms, and he can select the room where there is alarm. All functions are the same as on the OTMS.





**Schneider Electric Industries SAS**

35, rue Joseph Monier  
CS 30323  
F- 92506 Rueil Malmaison Cedex

RCS Nanterre 954 503 4 39  
Capital social 896 313 776 €  
[www.schneider-electric.com](http://www.schneider-electric.com)

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