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Daily Use Manual

DRAFT

Orion EMS

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FCC and IC statements

FCC statements

Changes or modifications to the equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Industry Canada statements

These devices comply with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) these devices may not cause interference, and
(2) these devices must accept any interference, including interference that may cause undesired operation of the devices.

Les présents appareils sont conformes aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

(1) les appareils ne doivent pas produire de brouillage, et
(2) l'utilisateur des appareils doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The term "IC" before the equipment certification number only signifies that the IndustryCanada technical specifications were met.

Le terme "IC" devant le numéro de certification signifie seulement que les specifications techniques Industrie Canada ont été respectées.

CAN ICES-3(B) - This Class B digital apparatus complies with Canadian ICES-003.

NMB-3 (B) - CET appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

1. Introduction

Energy is a large cost for hotels, and EMS (*Energy Management System*) is a way of achieving energy savings in guest rooms. With the Orion EMS software option to VISIONLINE it is possible to

- view the Orion EMS status of different rooms
- modify the configurable parameters for a room (or group of rooms/ the entire property)
- provide alarm conditions
- provide energy savings reports
- provide preventative maintenance reports

Note: For mounting of Orion EMS devices, installation of the software option etc, see *Installation manual Orion EMS*.

A main task for Orion EMS is to determine whether or not a guest room is physically occupied. When a room is not occupied, Orion EMS controls the HVAC (*Heating Ventilation and Air Conditioning*) systems based on the configurable settings of the system.

Note: In the rest of this document, the following applies unless something else is stated:

- the term 'thermostat' includes *thermostat* as well as *thermostat controller*
- the information is common for both *Orion Thermostat-Zen-HV* and *Orion Thermostat-Original-LV*

Note: For information about what firmware to use in different Orion EMS configurations, see the document *Upgrading an RFID lock for an Orion EMS offline scenario*.

Note: The best conditions for Orion EMS are obtained if also the locks are online and commissioned to the same ZigBee network as the thermostat and the motion sensor.

Certain Orion EMS operations cause alarms; see chapter Energy management summary and Alarm list for details. Occupancy status is included in all alarms. This allows the staff to fix the problem that caused the alarm without bothering the guest.

1.1 Orion EMS devices

The devices used together with Orion EMS are:

- digital thermostat (two variants: *Orion Thermostat-Zen-HV* and *Orion Thermostat-Original-LV*)
  Note: Depending on installation conditions, also a thermostat controller is used or not (only applicable for *Orion Thermostat-Original-LV*). If it is used, the thermostat controller is the master of the system while a battery operated thermostat transmits the guest settings to the thermostat controller for processing and decision making.
- motion sensor
- door monitoring device; lock, RF door switch
  Note: It is also possible to use a wired door switch without radio, but this manual mainly describes the RF door switch. For more information about wired door switches, see *Installation manual Orion EMS*.
- gateway (the same as is used for online doors; requires the *Online option*)
  Note: The gateway is not used in offline scenarios.

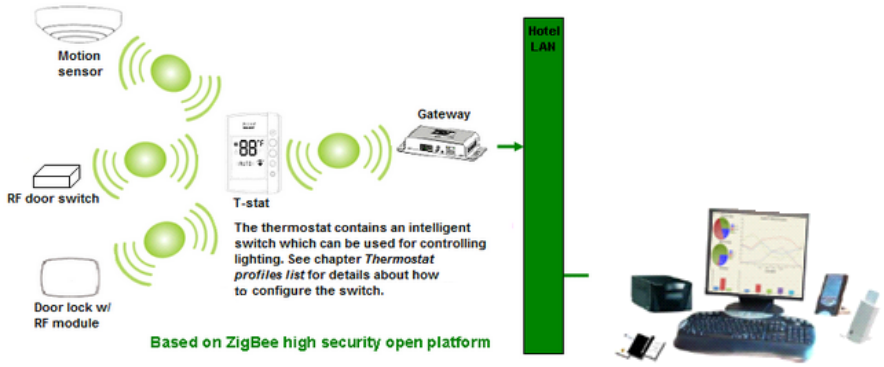


Figure 1: Orion EMS example configuration; the thermostat shown in the picture is of Orion Thermostat-Original-LV type.

The thermostat has a built-in ZigBee router via which it communicates to the software and the devices within the room. The thermostat stores all parameters needed for Orion EMS; if the thermostat controller is used as well, the parameters (with a few exceptions; see *Installation manual Orion EMS* for details) are instead stored in the thermostat controller. The parameters are either transferred online from the software or from the *Orion Service* software; see *Quick reference guide Orion Service* for more information about the latter.

Note: For each room number, it is possible to have either

- one wired thermostat
- up to five motion sensors
- up to five door switches

OR

- one thermostat controller
- up to five battery thermostats
- up to five motion sensors
- up to five door switches

1.2 Terminology

Deadband	The range the temperature is allowed to drift before the heat or air conditioner is turned on
Default setpoint	*Default setpoint* is the temperature which the thermostat is set to until a guest changes the temperature. The thermostat will also return to the *default setpoint* after guest check-out.
Dynamic setback	The *dynamic setback* temperatures are configured as a set number of degrees above or below the guest setting. For example, if the guest setting is 68 ºF (20 ºC) and the unoccupied setback is configured to 7 ºF (4 ºC) above the guest setting, the system will allow the temperature to drift to 75 ºF (24 ºC) when the room is unoccupied.
EMS	Energy Management System
Exterior door timeout	The time that will pass before the HVAC is turned off after an exterior door is left open
FCU	Fan Coil Unit
Freeze guard	If the temperature in any room with a thermostat goes below 39 ºF (4 ºC), there will be an alarm and the HVAC will start heating.
HVAC	Heating Ventilation and Air Conditioning
Intelligent switch	The intelligent switch is an output for lighting control which works according to the occupancy status. The available alternatives for intelligent switch are • disabled; default • use RV output • use G2 output If intelligent switch is applicable, normally 'Use RV output' should be marked unless the air handler is a heat pump. In the latter case, mark 'Use G2 output' instead.
Motion sensor	A device that detects a person's movement in an area
Occupied	Someone is physically in the room; see section Room occupied for more information
Occupied limits	Limits the *Set temperature* range, i.e. the temperature which the guest can set the thermostat to
PTAC (Package Terminal Air Conditioner)	A PTAC is a fully self contained system that is typically located on the exterior wall of a hotel room. These units come in standard control or heat pump models.
Pre-condition time	Number of hours the thermostat shall run at the default setpoint after check-in. If no entry has been done when this time expires, the unoccupied setback will be assumed. The *pre- condition time* can be 1-12 hours or 'disabled' (default is 2 hours).

Pulse length	The welcome scene can be set up to have a pulse length: • 0 = welcome scene always off • Chosen length in the interval 1-255 seconds
Refresh cycle	The Orion EMS system can, in setback control, run the A/C unit every 25 minutes for a period of 2 minutes to re-circulate the air in the room; the optional function is only for cooling mode.
Setback	The temperature the room is allowed to drift to when the room is unoccupied. Also see *dynamic setback* and *static setback*.
Setback override	The Orion EMS features can be overridden until the room is unsold again, or until a certain time. If desired, the time can be set far ahead so that the setback override is in practice until further notice.
Setpoint	The temperature which the guest has set on the thermostat.
Static setback	The static setback temperatures are configured in the system and do not change based on the guest settings. For example, if the unoccupied upper setback temperature is 79 ºF (26 ºC), the system will allow the temperature to drift to 79 ºF (26 ºC) when the room is unoccupied regardless of the thermostat setting (this example assumes that it is summertime) when the room becomes unoccupied. As soon as the guest returns to the room, the temperature is returned to the guest setting.
Unoccupied	No one is physically in the room although the room may be currently rented; see section Room unoccupied for more information.
Unsold	The room is not currently rented and no one is in the room. In this case, a deeper setback is implemented for greater energy savings. See section Room unsold for more information.
Welcome scene	If desired, it is possible to have a welcome scene which it is activated when the occupancy state for a room changes from unsold to unoccupied. The available alternatives for welcome scene are (default is 'disabled'): • disabled • use RV output • use G2 output • use solid state relay* *) Only applicable for *Orion Thermostat-Zen-HV*
	Table 1

1.3 General about Orion Service

A *service device* and the software Orion Service are used for

- initializing thermostats (setting room number and loading configurable parameters)
- commissioning the thermostat and the motion sensor in the network so the messages are routed correctly
- retrieving and displaying the event log from the thermostat
- upgrading module firmware in thermostat and motion sensor
- performing diagnostic operations, e.g.
    - simulating inputs - e.g. door switch, motion/temperature
    - reading out status of thermostat (the status of the motion sensor is also shown)
    - showing the output to the HVAC
    - making a functionality test including fast clock mode; the thermostat will raise the time one minute per second to test e.g. the *room not occupied timer*

See *Quick reference guide Orion Service* for more information about how the above operations are performed.

1.4 General about alarms

All Orion EMS alarms are shown in the dialog **Energy management summary**; see chapter 3 for more information. In addition, they are shown in the alarm list. Unless Orion EMS is installed as a separate client, the alarm list will also show other types of alarms not related to Orion EMS, e.g. *housekeeping failed*.

If the *Communication option* is set in the software, notifications about Orion EMS alarms can be sent via e-mail or SMS and reports can be sent by e-mail. The reports that can be sent concern e.g.

- energy savings
- preventative maintenance schedules
- occupancy (the report shows the number of occupied rooms each night; a room is regarded as occupied for the night if it is physically occupied and there is at least four hours of occupancy between 8 PM and 6 AM)
- occupancy trend (the report is combined with the energy savings report and shows occupancy during each time of the day; it is also possible to make as an average for a longer period)
- battery warnings
- events for a selected room
- offline rooms

These reports are sent via e-mail at the selected period to users that have been set up in the user notification list of the software to receive the reports; see *Installation instruction Communication option* for further information.

1.5 Events and commands

To the guest, the thermostat appears and operates as a standard digital thermostat; however, this device also receives entry and exit information from the door lock or switch as well as motion detected information from the motion sensor. This information is used to determine the occupancy status of the room and implement energy savings strategy based on this information.

In order for the locks to send door events to the thermostats, EMI events must be enabled. This is achieved by presenting an *Enable EMI events card* at each lock. The card is one of the ZigBee configuration cards that can be issued in VISIONLINE; see *Installation manual Orion EMS* for details. The following events are sent to the thermostat from the motion sensor:

- motion detected
- battery status

If the lock is online, the following events are sent to the thermostat from the lock:

- door open – staff card
- door open – guest card; includes check-out date/time, suite rooms and first time use
- door open from inside
- door closed
- deadbolt thrown/released

The thermostat stores the 75 latest events in a log. ***Note:*** In addition to the relevant events from the lock to the thermostat, additional events are sent from the lock to the hotel system.

There are also commands sent from the thermostat to the lock (if online) and the motion sensor:

- to the lock: the optional auto-DND, which functions as privacy; no staff cards will be able to open the door (only guest cards and emergency cards will open)
- to the motion sensor: to turn off the motion sensor when the room is occupied and the door is closed, and to turn on the motion sensor again when the door is opened

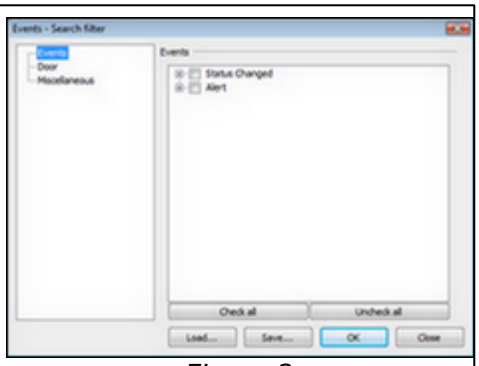
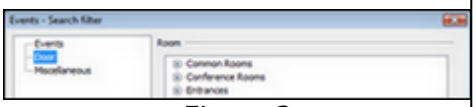
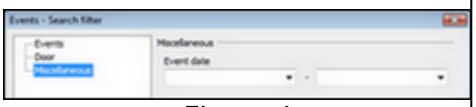
Note: The commands from the thermostat to lock and motion sensor are not logged as events.

1.5.1 Thermostat event report

The thermostat event report shows all events that have been sent online from the thermostats or been transferred to the server via Orion Service; see *Quick reference guide Orion Service* for details. The housekeeping function keeps the list size limited by removing events that are older than a user defined number of days (default 7 days).
To look at a thermostat event report:

1. Double click on **Thermostat events** under the **Reports** tab in the navigation window.
2. Enter the applicable search filter(s) under the tabs *Events*, *Door* or *Miscellaneous* (see more information below) before pressing the **Enter** key or clicking **OK**.
   Note: At least one of the following requirements must be met:
   - a room is selected
   - one or two event sub groups are selected
3. It is also possible to reload a previous search filter: click the **Load...** button in the **Events - Search filter** dialog, browse to the desired file, mark it and click **Open**. If you want to save a search filter for future searches: click the **Save...** button, browse to where you want to save the file, give it a name and click **Save**. If the filter should be shown under **Custom** in the **Reports** tab, it must be saved in any of the following locations:
   - the folder 'Custom Reports' in the software installation folder
   - the public documents folder
   - the documents folder

The search filters that can be applied on thermostat events are:

Events – with this filter you can pick out a specific event, or certain types of events. The main types are *Status Changed* and *Alert*. Within each main type, there are event sub groups which can be divided further into specific events. If needed, use the **Check all/Uncheck all** buttons at the bottom of the dialog.	 *Figure 2*
Door – with this filter you can pick out events for a certain room. Click the plus sign to expand a door area and mark the applicable door.	 *Figure 3*
Miscellaneous – with this filter you can pick out events from certain event dates.	 *Figure 4*

1.6 Basic EMS logic

The thermostat along with the motion sensor, lock and/or RF door switches, monitors the occupancy state of the room and operates based on this information. When the room is occupied, the guest is given control and can set the desired temperature. The thermostat will then heat or cool the room as necessary to meet the guest setting. When the room is not occupied, the thermostat will operate based on the configurable parameters of the system. The three occupancy states are *occupied*, *unoccupied* and *unsold*. The following events are considered as in-room events:

- motion
- deadbolt engaged
- thermostat key pressed

1.6.1 Room occupied

When the room is occupied, control of the HVAC system is given to the guest. The guest sets the desired temperature and the HVAC system will control the room based on this setting.

The Orion thermostat will enter the occupied state only when the door is closed and in-room events are detected (motion, deadbolt engaged, thermostat key pressed). At this point, the guest has full control of the room temperature.

Note: 'Occupied limits' may be used to restrict the guest setting limits.

1.6.2 Room unoccupied

When the room is not occupied, the energy management logic takes control of the room based on the configurable parameters of the system. The system will set back the temperature to the unoccupied setting. The system has both an *upper setback* and a *lower setback*. The unoccupied setbacks may be *static* or *dynamic*; for unsold rooms, only a static setback is used. See section Terminology for more information about static and dynamic setback.

The thermostat will enter the unoccupied state upon the door opening or closing. If no in-room event such as motion is detected, the thermostat will remain in the unoccupied mode. The thermostat will continue to operate at the guest setting for the duration of the configurable 'Room not occupied' timer, at which point it maintains the room temperature based on the unoccupied setback temperatures.

1.6.2.1 Door open in 'room unoccupied' mode

If the door is left open, the occupancy state will remain as unoccupied regardless of whether or not motion or another in-room event is detected. There is however also a run state in the thermostat which is based on the set-point/guest setting. The run state works differently depending on whether the open door is interior or exterior, see details below.

If the open door is configured as an *interior door* (i.e., opens to another air conditioned space), the thermostat will operate based on the guest setting as long as motion or another in-room event is detected. Each time an in-room event is detected, the 'Room not occupied' timer will restart. If the 'Room not occupied' timer elapses without motion or another in-room event being detected, the thermostat will maintain the room temperature based on the unoccupied setback temperatures.

If the open door is an *exterior door* (i.e., opens to a non-climate controlled space), the thermostat will turn off after the 'Room not occupied' timer expires regardless of whether or not motion is detected.

Note: If the exterior door timeout is set to 'Short', the thermostat will turn off the air handler after 20 seconds. See chapter *4 Thermostat profiles list*, section *Under the Timeout tab*, for details about setting the exterior door timeout.

1.6.3 Room unsold

When the room is not rented, the setback is – to achieve more energy savings – deeper than when the room is rented but unoccupied. The system will enter the unsold setting when the room has been unoccupied for the duration of the configurable 'Room not sold' timer. In the unsold mode, the temperature is based on the unsold setback temperatures.

Note: If using an online system, the room will immediately enter the unsold mode upon receiving a check-out command from the property management system (PMS) or at guest card expiration.

Note:The unsold mode gives the greatest potential for energy savings. For this reason, the online system allows for maximum energy savings as the room does not need to wait until the 'Room not sold' timer elapses to enter the deep setback mode.

1.6.3.1 Door open in 'room unsold' mode

Similar to the door open condition in the unoccupied state, the thermostat will control the temperature based on the guest setting when an *interior door* is open and motion (or any other in-room event) is detected for a period of time equal to the 'Room not occupied' timer. If the timer elapses with no further detection of in-room events, the thermostat will revert to maintaining the room temperature at the unsold setback.

If an *exterior door* is left open, the thermostat will turn the air handler off.

1.6.4 Staff entry

In order to maximize energy savings, certain considerations must be taken into account when staff members enter the room.

1.6.4.1 Door monitored by RF door switch

If the position of the door is monitored by an RF door switch, the staff member must leave the door open to avoid interrupting the 'Room not sold' timer. If the staff member allows the door to close, the room will enter the occupied state upon motion detection. As long as the door is left open, the 'Room not sold' timer will not be reset.

1.6.4.2 Door monitored by electronic lock

If the door position is monitored by the electronic lock and a staff key unlocks the door, the room will not enter the occupied state even if motion is detected while the door is closed. However, if a thermostat key is pressed or the deadbolt is engaged while the door is closed, the room will enter the occupied state.
Note: If a staff member lets a guest into a room with the door position monitored by an electronic lock, the room will remain unoccupied until the deadbolt is engaged or a button on the thermostat is pressed.

1.6.5 Operating states

The following series of tables shows the operation of the system in various scenarios.
Note: The scenarios consider that the unoccupied (or *exterior door open*) timers have expired if applicable.

1.6.5.1 One interior door

Door	**In-room Event (Motion/ Thermostat Key Pressed/ Deadbolt Engaged)**	**HVAC**	**State**
Closed	Yes	Per guest setting	Occupied
Open	Yes	Per guest setting if opened by guest. Setback if opened by staff. If no lock interface, per guest setting.	Unoccupied or Unsold
Closed	No	Setback	Unoccupied or Unsold
Open	No	Setback	Unoccupied or Unsold
			Table 2

1.6.5.2 One exterior door

Door	In-room Event (Motion/ Thermostat Key Pressed/ Deadbolt Engaged)	HVAC	State
Closed	Yes	Per guest setting	Occupied
Open	Yes	OFF (20 seconds or standard unoccupied time)	Unoccupied or Unsold
Closed	No	Setback	Unoccupied or Unsold
Open	No	OFF (20 seconds or standard unoccupied time)	Unoccupied or Unsold
			Table 3

1.6.5.3 One exterior and one interior door

Interior Door	Exterior Door	Motion	HVAC	State
Closed	Closed	Yes	Per guest setting	Occupied
Open	Closed	Yes	Per guest setting	Unoccupied or Unsold
Closed	Open	Yes	OFF	Unoccupied or unsold
Open	Open	Yes	OFF	Unoccupied or Unsold
Closed	Closed	No	Setback	Unoccupied or Unsold
Open	Closed	No	Setback	Unoccupied or Unsold
Closed	Open	No	OFF	Unoccupied or Unsold
Open	Open	No	OFF	Unoccupied or Unsold
				Table 4

1.6.6 Thermostat control chart

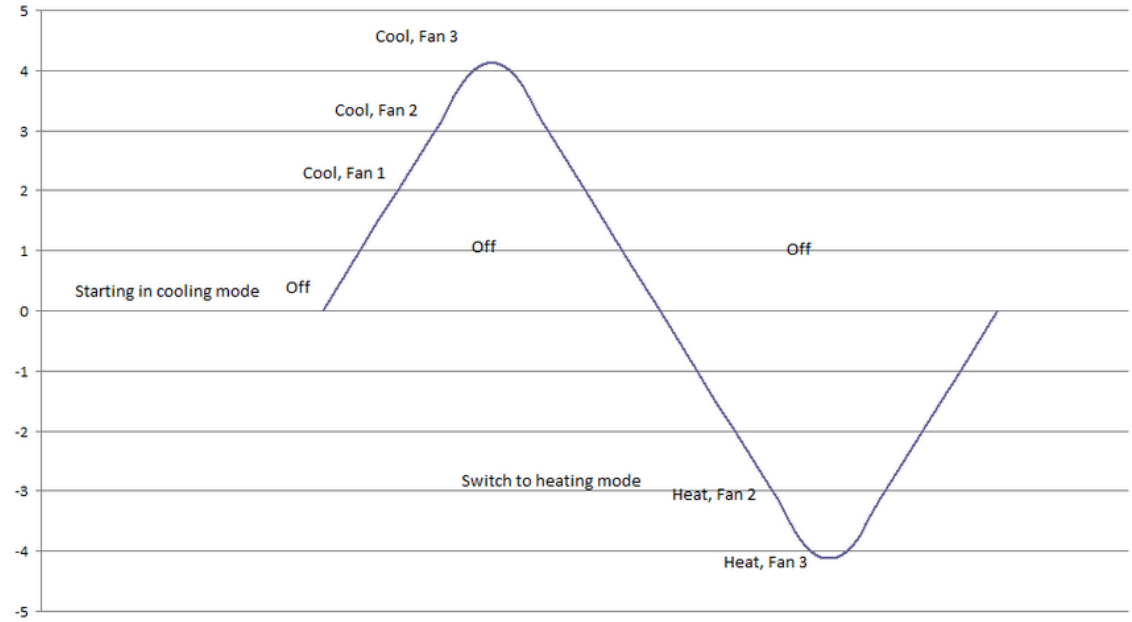


Figure 5

The thermostat control can be illustrated in a control chart, see example above.

- If the temperature drifts above the setpoint or setback (depending on occupancy mode), the HVAC starts in cooling mode.
- The thermostat deadband is in this case 2 ºF, so when the temperature is within 2 ºF from the setpoint the HVAC is off (from 0 to 2 in the picture).
- If the temperature continues to rise, the thermostat output for 'Fan 1/Low' is triggered, then the output for 'Fan 2/Medium' and finally the output for 'Fan 3/High'.
- If the temperature starts dropping, the HVAC then switches to heating mode. There is however a heat/cool switch deadband which in this example is 3 ºF, so the temperature is allowed to drift 3 ºF from the setpoint before the HVAC switches from cooling mode to heating mode. From 0 to -3 in the picture the HVAC is off; the output for 'Fan 1/Low' is therefore not triggered, since this would have been at -2.
- If the temperature continues to drop, first the output for 'Fan 2/Medium' is triggered and then the output for 'Fan 3/High'.

The Orion EMS devices strive towards different temperatures depending on if the room is occupied, unoccupied or unsold.

- For 'occupied mode' the goal is the setpoint, i.e. the temperature which the guest has set on the thermostat.
- For 'unoccupied mode' the temperature drifts to the unoccupied setback, which can be static or dynamic.
- For 'unsold mode' the temperature drifts to the unsold setback.

1.7 Orion EMS parameters

There is a number of Orion EMS parameters whose values can be modified in the software. Different operator templates can be given different authorities to modify the parameters. Some parameters are considered as basic and some as advanced.
Note: In the parameter column below, it is also stated in what software dialog the parameter is found.
Note: The parameter *dwell-off time* is a setting that will guard against short-cycling and its value is always 5 minutes. The parameter is not visible in the software and cannot be changed, not even by the distributor.

1.7.1 Basic parameters

Parameter	Description	Available choices	Default setting
• Fan control (**Thermostat profile details** dialog, **Fan** alternative)	The thermostat has a button which allows the user to select from up to three fan speeds, or to choose 'Automatic' (AUTO) if the thermostat should determine the appropriate fan setting. ***Note:*** The ability to control fan speeds depends on the capability of the air handler, as some systems do not have three fan speeds.	• Auto/manual • Max fan cool (low, mid, high) • Max fan heat (low, mid, high)	• Manual • High • High
• Fan on when satisfied (**Thermostat profile details** dialog, **Fan** alternative)	When enabled, the low fan speed will continue to run even when the setpoint has been reached. This only applies to an occupied room.	Enable/disable	Disable
• HVAC control (**Thermostat profile details** dialog, **HVAC/ Heating** and **Cooling** respectively)	See available choices to the right. 'Heat pump reversed valve (Type B)' means that the reversing valve output is on when heating. 'Heat pump reversed valve (Type O)' means that the reversing valve output is off when heating.	For 'HVAC heating' and 'HVAC cooling': • n/a • 4-pipe fan coil • 2-pipe fan coil • 2-pipe fan coil with automatic switching • Proportional* • Floating valve* For 'HVAC heating' only • Heat pump reversed valve (Type B) For 'HVAC cooling' only: • Heat pump reversed valve (Type O) *) Only applicable for *Orion Thermostat-Zen-HV*	n/a

• Unoccupied setbacks (**Thermostat profile details** dialog, **Limits** alternative)	The applicable number of degrees as upper limit and lower limit for setback if a room is unoccupied.	• Static/dynamic • Static upper (72-90 ºF) • Static lower (55-70 ºF) *If 'Dynamic' is chosen*: • Dynamic upper (2-8 ºF offset) • Dynamic lower (2-8 ºF offset)	• Static • 78 ºF • 68 ºF • 4 ºF • 4 ºF
• Unsold setback (**Thermostat profile details** dialog, **Limits** alternative)	The applicable number of degrees as upper limit and lower limit for setback if a room is unsold.	• Summer (74-90 ºF) • Winter (55-70 ºF)	• 84 ºF • 64 ºF
• Occupied limits (**Thermostat profile details** dialog, **Limits** alternative)	With this parameter, it is possible to limit the allowed temperature range when the room is occupied. If this is the case, mark the checkbox 'Use occupied limits' and enter the values for upper limit and lower limit.	• On/off • Upper limit (75-90 ºF) • Lower limit (62-72 ºF)	• Off • 84 ºF • 68 ºF
• Exterior door timeout (**Thermostat profile details** dialog, **Timeout** alternative)	If the exterior door is open and the default 'Normal' is used, the HVAC will - regardless of room occupancy status - turn off after the number of minutes entered at 'Room not occupied'. Defaul is 8 minutes; see *Room not occupied timer* in the advanced parameters table below. If the exterior door is open and 'Short' is used, the HVAC will turn off after 20 seconds.	Normal/short	Normal
• Freeze guard (**Thermostat profile details** dialog, **Misc** alternative)	There will be an alarm and the HVAC will start heating if the temperature in any room with thermostat goes below 39 ºF (4 ºC).	Enable/disable	Enable
• Refresh cycle (**Thermostat profile details** dialog, **Misc** alternative)	The Orion EMS system can in setback control run the A/C unit every 25 minutes for a period of 2 minutes to re-circulate the air in the room; this optional function is only for cooling mode.	Enable/disable	Disable
• Temperature display (**Thermostat profile details** dialog, **Misc** alternative)	The thermostat will show either the room temperature or the temperature that has been set by the guest.	Room temperature/ set temperature	Room temperature
			Table 5

1.7.2 Advanced parameters

Parameter	Description	Available choices	Default setting
• Room not occupied timer (**Thermostat profile details** dialog, **Timeout** alternative)	This is the amount of time the thermostat maintains the guest setting after the room has entered the unoccupied state.	1-30 minutes	8 minutes
• Room not sold timer (**Thermostat profile details** dialog, **Timeout** alternative)	When the room has been unoccupied for this number of hours, it will enter unsold mode.	12-24 hours	16 hours
• Thermostat deadband (**Thermostat profile details** dialog, **Deadband** alternative)	The range the temperature is allowed to drift from the setpoint before the heat or air conditioner is turned on	1-3 ºF	2 ºF
• Heat/cool switch deadband (**Thermostat profile details** dialog, **Deadband** alternative)	This parameter is only applicable if *auto switching* mode has been chosen under the **HVAC** tab in the **Thermostat profile details** dialog. The heat/cool switch deadband is the range the temperature is allowed to drift before switching from heat to cool or cool to heat.	2-4 ºF	3 ºF
• Max HVAC runtime (**Tools/Options** dialog, expand **Energy management** and choose **General**)	An alarm is triggered if a HVAC runs this long without turning off.	30-300 minutes	120 minutes
• Max setback override (**Tools/Options** dialog, expand **Energy management** and choose **General**)	The Orion EMS features may be overridden when needed, e.g. for VIP guests where no setbacks should apply; click here for details If a number of hours is entered at 'Max setback override', an alarm will be triggered if the setback override exceeds this number of hours. If the default 0 hours is used, no alarm will be triggered.	0-99 hours	0 hours
• Maintenance intervals (**Tools/Options** dialog, expand **Energy management** and choose **Maintenance**)	• Number of hours before the three different maintenance alarms should be triggered; the valid range is 0-65 535 hours. - *Maintenance counter 1* is for fan time/total		

	HVAC time - *Maintenance counter 2* is for 'cooling' - *Maintenance counter 3* is for 'cooling or heating' • Names for the three maintenance alarms.		
• Humidity control (**Thermostat profile details** dialog, **Misc** alternative)	When the humidity control option is checked, the thermostat will implement control measures if the humidity in the room gets too high. ***Note:*** The control measures will only be implemented when the room is unoccupied or unsold.	Enable/disable	Disable
• Intelligent switch (**Thermostat profile details** dialog, **Misc** alternative)	The intelligent switch is an output for lighting control which works according to the occupancy status.	Disabled/ Use RV output/ Use G2 output	Disabled
• Welcome scene	If desired, it is possible to have a welcome scene whic it is activated when the occupancy state for a room changes from unsold to unoccupied.	Disabled/ Use RV output/ Use G2 output/Use solid state relay***** *) Only applicable for *Orion Thermostat-Zen-HV*	Disabled
			Table 6

1.8 Operator templates

The operator templates decide the level of authority for different Orion EMS operations.

To change the authority for handling thermostat parameters:

1. Double click on **Operator templates** under the **Lists** tab in the navigation window.
2. In the **Operator templates** dialog, mark the applicable operator template and click **Properties**; or click **Add** if a new operator template should be added.
3. In the **Operator template details** dialog, choose the tab **Energy management** in the left part of the dialog. Make the desired changes regarding
   - overriding setback mode
   - setting the room temperature
   - changing advanced parameters
   - changing basic parameters

   Note: By default, all four items above are marked for system manager but unmarked for other operator templates.
4. If a new operator template was added, go through the other tabs in the left part of the **Operator template details** dialog and fill in the applicable information; see *Setup manual VISIONLINE* for detailed information.
5. Click **Update** (or **Save** if a new operator template was added) and **Close**.

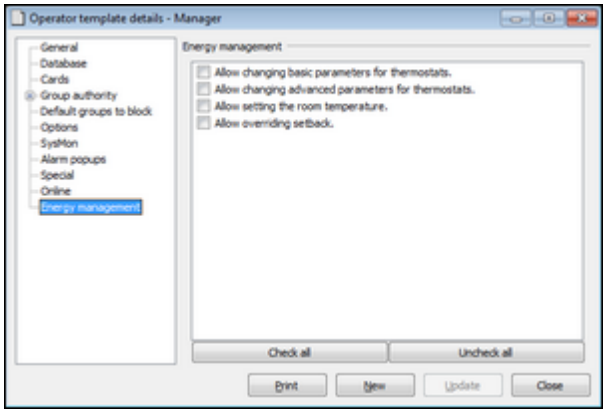


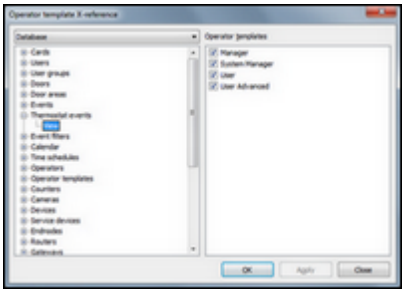
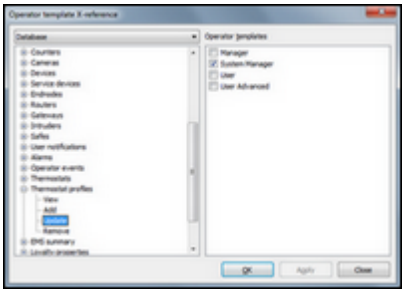
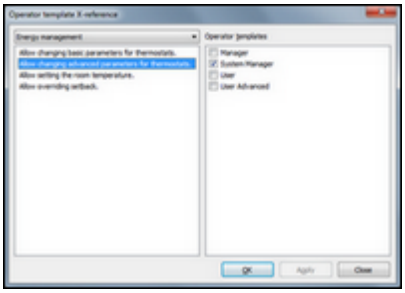
Figure 6

1.8.1 Operator template X-reference

At **Tools/Operator template X-reference**, it is possible to change the operator template authorities for thermostat events, thermostats, thermostat profiles and EMS summary. By default, all default operators (listed below) can view the concerned dialogs:

- manager
- system manager
- user
- user advanced

System manager can by default also add, update and remove thermostats and thermostat profiles. To change the authority for system manager, a distributor must be logged on. New operator templates (e.g. *Test Template* in the example screenshots below) will by default neither be able to view the concerned dialogs, nor add, update or remove items in the dialogs where this is applicable. To modify the authorities:

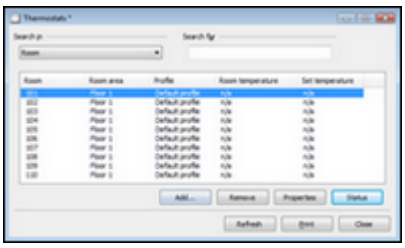
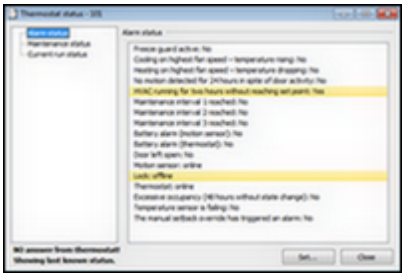
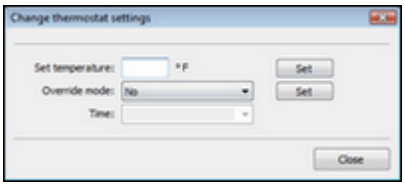
1. Go to **Tools/Operator template X-reference**.	 *Figure 7*
2. Under the **Database** alternative in the drop-down-menu, click the plus sign in front of the concerned item. For the items *Thermostat events* and *EMS summary*, the only available alternative is **View**. For the items *Thermostats* and *Thermostat profiles*, the alternatives **View**, **Add**, **Update** and**Remove** are available; see examples in the screenshots to the right. Mark the applicable alternative to the left and unmark/mark the concerned operator template(s) in the right part of the dialog.	 *Figure 8*
3. Under the **Energy management** alternative in the drop-down-menu, mark the applicable choice in the left part of the dialog. See sections 1.7.1 and 1.7.2 for information about what is considered as basic and advanced parameters respectively. The checkboxes to the right will reflect anything that has been saved in the **Operator template details** dialog; see section Operator templates for details. In the right part of the dialog, mark/unmark the applicable operator template(s). 4. If applicable, repeat step 3 with other alternatives in the left part of the dialog. 5. When all applicable changes according to steps 2-4 above have been performed, click **OK**.	 *Figure 9*

1.9 Setback override

The Orion EMS features may be overridden when needed, e.g. for VIP guests where no setbacks should apply. Setback override may be enabled until the room is unsold or until a certain time; if desired, until further notice.

Note: Override mode can also be set from Orion Service; see *Quick reference guide Orion Service* for details. If the override mode has been set from Orion Service, it must also be cleared from Orion Service. If the override mode has been set from the **Change thermostat settings** dialog as below in this section, it can however be cleared either from Orion Service or from the **Change thermostat settings** dialog.

To set up setback override for a thermostat:

1. Double click on **Thermostats** under the **Lists** tab in the navigation window. 2. Mark the applicable thermostat and click **Status**.	 *Figure 10*
3. In the **Thermostat status** dialog, click the **Set** button.	 *Figure 11*
4. In the **Change thermostat settings** dialog, change the **Override mode** to the applicable one of 'Manual (until unsold)' or 'Manual (until time)'. If the latter is chosen, enter the applicable **Time**. ***Note:*** If 'Manual (until time)' is chosen, the time is limited by the parameter 'Max setback override'; see section *10.1 General* for details. If 'Max setback override' is 0 (default), there is however no limitation in time and the Orion EMS features can be overridden until further notice. 5. Click the **Set** button next to the **Override mode** drop-down menu. The information will be transferred online to the thermostat. 6. Click **Close**.	 *Figure 12*

To set the room temperature:

1. Enter the desired temperature at **Set temperature** (see **Change thermostat settings** screenshot on the previous page) and click the **Set** button next to that field. The information will be transferred online to the thermostat.

2. Thermostat buttons and display

2.1 Orion Thermostat-Zen-HV

2.1.1 Thermostat buttons

Figure 13

Button		Description
1	On/Off	Toggles the thermostat power on and off. ***Note:*** Even when the unit is turned off, the energy management logic will take over when the room is unoccupied, to manage the temperature accordingly.
2	°C/°F	Controls the temperature display. Pressing this button will toggle the temperature display between Celsius and Fahrenheit.
3	Fan control	Allows the user to select from up to three fan speeds or choose 'Automatic' to let the thermostat determine the applicable fan setting. ***Note:*** The ability to control fan speeds depends on the capability of the air handler as some systems do not have three fan speeds.
4	Increase temperature	Used for increasing the temperature which is set on the thermostat. The thermostat will automatically choose between heat and cool, so there is no need for the guest to select the function. ***Note:*** Some systems are unable to switch between the heating and cooling functions. This does not change the way the guest uses the system, but the thermostat is programmed accordingly and will not call for a function that is not available.
5	Decrease temperature	Used for decreasing the temperature which is set on the thermostat. The thermostat will automatically choose between heat and cool, so there is no need for the guest to select the function. ***Note:*** Some systems are unable to switch between the heating and cooling functions. This does not change the way the guest uses the system, but the thermostat is programmed accordingly and will not call for a function that is not available.
		Table 7

2.1.2 Thermostat display

Figure 14

Note: After some seconds of inactivity of the thermostat buttons, the display will shut down. The first key press of any button will activate the display again, and then the buttons work as normal until the next inactivity timeout occurs.

Note: Some of the indicators are not yet implemented in the thermostat firmware and therefore not described in the below table.

Display indicator		Description
1	Temperature	The temperature display area shows the actual room temperature or the setpoint temperature as well as the indication of Fahrenheit or Celsius. What to display is configured when setting up the thermostat profile for the concerned thermostat; choose 'Set temperature' or 'Room temperature' under the **Misc** alternative in the **Thermostat profile details** dialog of VISIONLINE, see Figure 15. If 'Room temperature' is chosen, the thermostat will still display the *set temperature* for a few seconds when the guest uses the Increase/Decrease temperature buttons. The thermostat will then revert to show the *room temperature* again. When the displayed temperature is the guest setting and not the actual room temperature, the SET indicator is also displayed.
2	Heat/Cool	The thermostat displays universal icons for heating and cooling. The snow star is the symbol to indicate the unit is in cooling mode and the sun is the symbol to indicate heating mode.
3	Fan	The *Fan* indicator shows the fan speed of the unit. As the fan speed increases, additional segments or the indicator are displayed. When in AUTO fan mode, the word *AUTO* will appear at the *Miscellaneous* indicator, see below.
4	Miscellaneous	The *Miscellaneous* indicator is a multi-purpose indicator; it e.g. displays the word *AUTO* when the automatic fan mode is enabled.
5	Wrench	The *Wrench* indicator is displayed when maintenance is required on any of the Orion EMS devices in the room or on the HVAC unit. This icon is only displayed to hotel staff. To get the details of the maintenance needed, connect the service cable to the thermostat and choose the **Status** alternative in *Orion Service*.
6	Battery	The *Battery* indicator is displayed to hotel staff when the batteries are low (on battery powered units) and in need of replacement. ***Note:*** This is a low indicator only, not a segmented icon that displays the battery level. As soon as this indicator is displayed, the batteries need to be replaced. ***Note:*** If the lock is not used to monitor the door status, the service indicators will only be displayed when the service cable is connected to the thermostat and *Orion Service* is used.
		Table 8

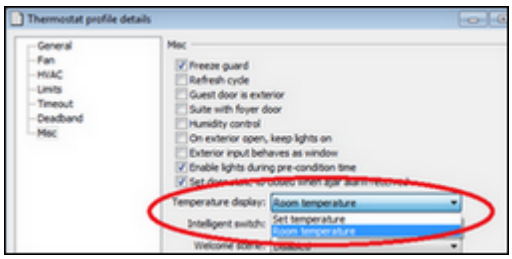


Figure 15

2.2 Orion Thermostat-Original-LV

2.2.1 Thermostat buttons

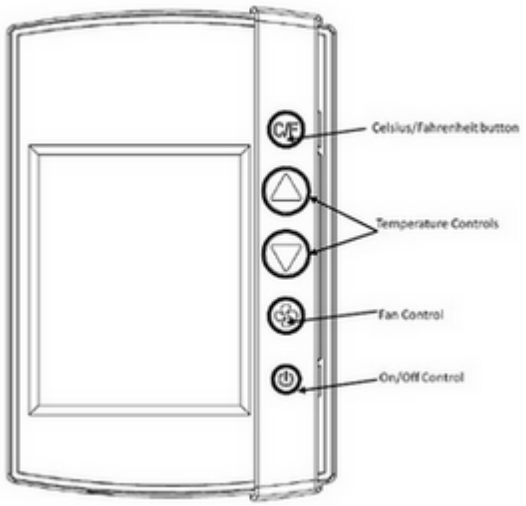


Figure 16

The hotel guest controls the thermostat using the five buttons shown on the right side of the unit in Figure 16.

- **C/F:** Controls the temperature display. Pressing this button will toggle the temperature display between Celsius and Fahrenheit.
- **Up and down arrows:** The up and down arrows are used to set the desired temperature. The thermostat will automatically choose between heat and cool so there is no need for the guest to select the function. ***Note:*** Some systems are unable to switch between the heating and cooling functions. This does not change the way the guest uses the system, but the thermostat is programmed accordingly and will not call for a function that is not available.

- **Fan control button:** The Fan control button allows the user to select from up to three fan speeds or choose 'Automatic' to let the thermostat determine the appropriate fan setting.
  Note: The ability to control fan speeds depends on the capability of the air handler as some systems do not have three fan speeds.
- **On/Off Button:** The On/Off button toggles the thermostat power on or off.
  Note: Even when the unit is turned off, the energy management logic will take over when the room is unoccupied to manage the temperature accordingly.

2.2.2 Thermostat display

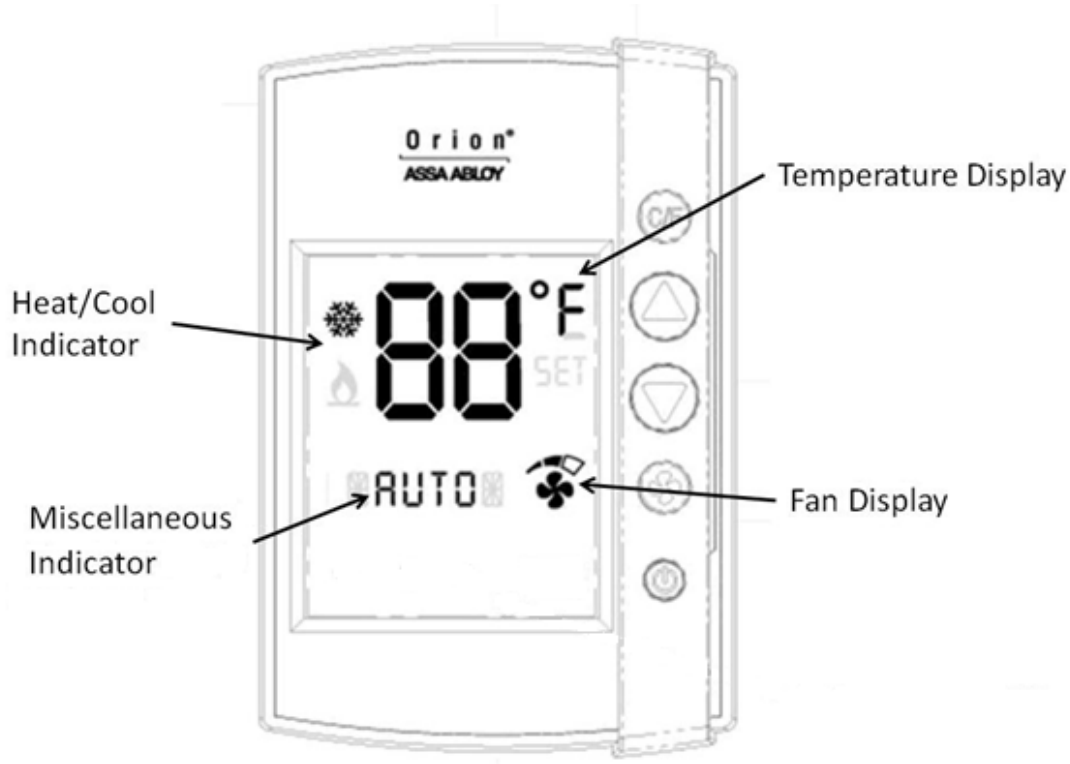


Figure 17

The thermostat displays settings and operation details to the guest, such as room temperature and heat/cool indications.

Display details:

- **Temperature Display:** The temperature display area shows the actual room temperature or the set temperature as well as the indication of Fahrenheit or Celsius. When the displayed temperature is the guest setting, not the actual room temperature, the SET indicator is also displayed.
  Note: Whenever a guest is changing the setting, the SET temperature will display.
- **Heat/Cool Indicator:** The thermostat displays universal icons for heating and cooling. The snow star is the symbol to indicate the unit is in cooling mode and the flame is the symbol to indicate heating mode.
- **Fan Display:** The fan display shows the fan speed of the unit. As the fan speed increases, additional segments or the indicator are displayed. When in AUTO fan mode, the word AUTO will appear in the middle of the display (at the *Miscellaneous Indicator*, see below).
- **Miscellaneous Indicator:** The indicator in the middle of the display is a multi-purpose indicator. It e.g. displays the word AUTO when the automatic fan mode is enabled and OFF when the unit is turned off.

- **Service indicators:**

  - *Wrench Icon*: The wrench icon is displayed when maintenance is required on any of the EMS devices in the room or the HVAC unit. This icon is only displayed to hotel staff. To get the details of the maintenance needed, connect the service terminal to the thermostat.

  - *Error (E) Indicator*: The error indicator is primarily used for the battery operated thermostat and will be displayed when communication between the thermostat and the thermostat controller is lost. When displayed, the thermostat will turn OFF. This indicator is displayed to guests as well as staff, as maintenance is required in order for the system to operate.

  - *Battery Icon*: The battery icon is displayed to hotel staff when the batteries are low (on battery powered units) and in need of replacement. ***Note:*** This is a low indicator only, not a segmented icon that displays the battery level. As soon as this indicator is displayed, the batteries need to be replaced.

3. Energy management summary and alarm list

An EMS overview is shown in the dialog **Energy management summary**. The dialog shows **Occupancy Status** and **HVAC Run Status** in circle diagrams, and **Runtime %**, **Maintenance** and **Current Alarms** in xy diagrams. The current alarms are also shown in the **Alarms** dialog, see section 3.2.

Note: It is also possible to get reports for occupancy (see chapter 6 for details) and for energy statistics (see chapter 7 for details).

3.1 Energy management summary

1. Double click on **EMS summary** in the **Lists** navigation window. A dialog as in the example below is shown.

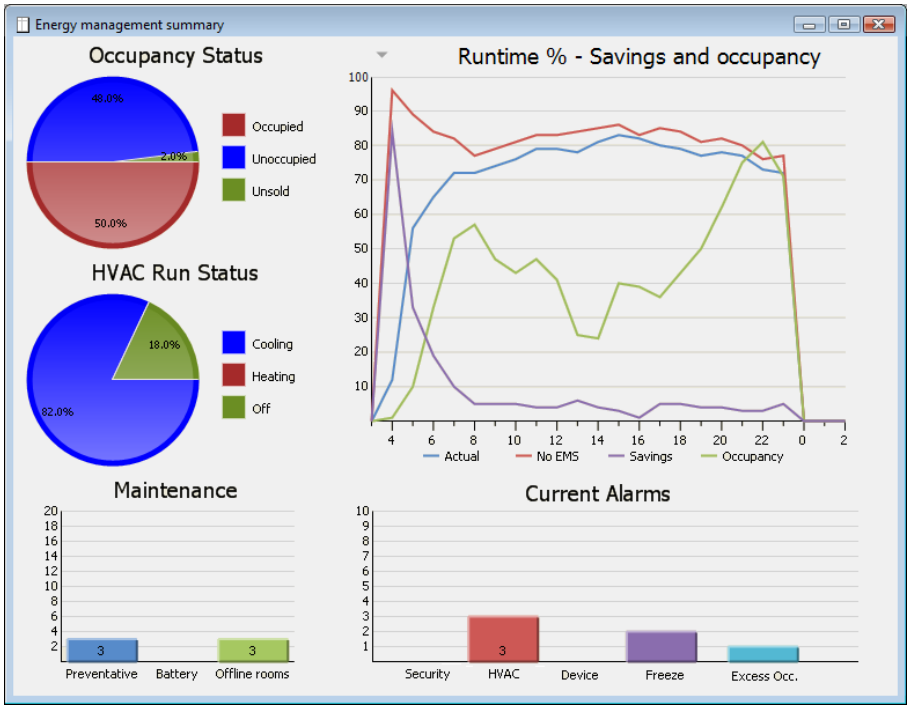


Figure 18

By clicking the arrow to the left of the heading 'Runtime % - Savings and occupancy', it is possible to choose that the diagram should instead show 'Lighting and Room control (kWh)'.

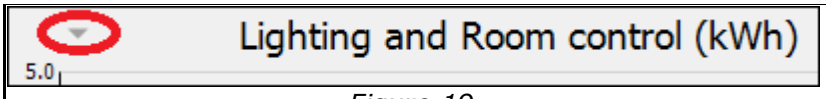


Figure 19

Note: By clicking on any of the pie charts **Occupancy Status** or **HVAC Run Status**, the corresponding **Real time room status** dialog will be shown. By clicking on any of the bars in the **Maintenance** or **Current Alarms** bar chart, more information about the alarms will be shown.

The **Occupancy Status** diagram shows how large share of the total number of guest rooms that are

- occupied
- unoccupied
- unsold

See section 1.1 Basic EMS logic for more information about the different states above.

The **HVAC Run Status** diagram shows how large share of the HVAC systems that are

- cooling
- heating
- off

The **Runtime %** diagram shows

- actual energy consumption in runtime
- energy consumption if no EMS had been used
- savings in energy consumption when EMS is used; **Actual** curve minus no **EMS** curve
- occupancy

The **Maintenance** diagram shows the number of

- preventative maintenance schedules; maintenance intervals 1-3
- battery alarms from motion sensor
- offline rooms (motion sensor/lock offline; thermostat offline)

The **Current Alarms** diagram shows the number of alarms related to

- security; door left open
- HVAC
  - thermostat cooling on highest fan speed – temperature rising
  - thermostat heating on highest fan speed – temperature dropping
  - HVAC running longer than maximum runtime (default 120 minutes) without reaching setpoint
  - too long duration of setback override
- device; no motion detected for 24 hours in spite of door activity
- freeze; the temperature in a room goes below 39 ºF = 4 ºC
- excessive occupancy; if a room has had occupancy without door movement for 48 hours

Note: When any of the alarms for maintenance 1-3 has been taken care of, the concerned maintenance counter must be reset from Orion Service; see section about configuring thermostat in *Quick reference guide Orion Service*.

3.2 Alarm list

The bar charts **Maintenance** and **Current Alarms** which are shown in the **Energy management summary** dialog are also shown in the **Alarms** dialog. The dialog contains two modes:

- 'Runtime' with callback data
- 'Filtered' with historical data

When an alarm is triggered, it first appears in a popup window down to the right on the screen. See *User manual VISIONLINE* for details about the different modes, e.g. more about alarm popups for the runtime mode and what filters that can be applied in the 'Filtered' mode.

To open the **Alarms** dialog:

1. Double click on **Alarms** under the **Lists** tab in the navigation window.

By default, the 'Runtime' mode of the **Alarms** dialog will be shown. By clicking on any of the alarm bars 'Preventative' etc in the bar chart, all non-completed alarms in the clicked alarm category will be shown in the alarm list.

Note: The **Alarms** dialog will also show alarms that are not related to Orion EMS; except for in the separate Orion EMS client, where only Orion EMS alarms are shown.

4. Real time room status

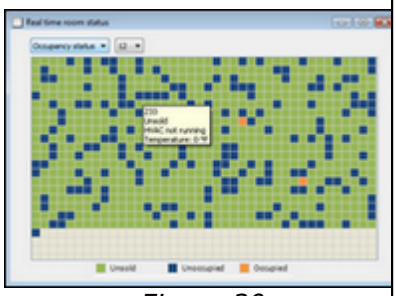
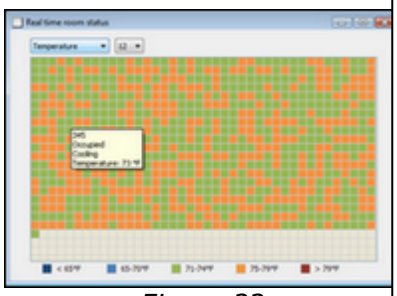
The dialog **Real time room status** shows occupancy status, HVAC status and temperature for Orion EMS rooms in real time. ***Note:*** It is also possible to get reports for occupancy (see chapter 6 for details) and for energy statistics (see chapter 7 for details).

To open the **Real time room status** dialog:

1. Double click on **Room status** in the **Lists** navigation window (or click on any of the circle diagrams in the **EMS summary** dialog, which is found by double clicking on **EMS summary** under the **Lists** tab).
2. The size of the squares can be changed in the combobox to the right; default is 12 pixels.

By hovering with the cursor over a room in any **Real time room status** graph, the tooltip will show

- occupancy status; unsold/unoccupied/occupied
- HVAC status; not running/cooling/heating
- room temperature
- triggered Orion EMS alarms, if any

 *Figure 20*	*Figure 21*	 *Figure 22*
If **Occupancy status** is chosen (default) in the drop-down menu in the upper left corner of the dialog, a screenshot as in the example to the right is shown.	If **HVAC status** is chosen in the drop-down-menu in the upper left corner of the dialog, a screenshot as in the example to the right is shown.	If **Temperature** is chosen in the drop-down menu in the upper left corner of the dialog, a screenshot as in the example to the right is shown.

5. Thermostats list

All digital thermostats are set up in the **Thermostats** list. When one or more new thermostat has been added, or if the properties of an existing thermostat has been modified, a * is shown in the **Thermostats** dialog caption.

Note: Some thermostat parameters are considered as basic and some as advanced; see sections 1.7.1 and 1.7.2 for more information about this and about what the different Orion EMS parameters mean.
Note: Different operator templates have got different authorities to handle thermostat parameters; see section Operator templates for more information.
Note: When an online thermostat is moved from one thermostat profile to another, parameters for the new profile are automatically sent to the thermostat. When one or more parameters of a thermostat profile are updated, these new parameters are automatically sent to all concerned thermostat.
Note: If several thermostats should be moved from one thermostat profile to another, mark the concerned thermostats in the **Thermostats** dialog and click **Properties**. Choose the applicable thermostat profile and click **Update**.
Note: If the room to which a thermostat belongs is removed from the system, the thermostat is automatically also removed from the system.

To add/modify a thermostat:

1. Double click on **Thermostats** under the **Lists** tab in the navigation window.
2. Click **Add** to add a new thermostat, or **Properties** to modify an existing thermostat.
3. At **Door**, enter the number of the guest room where the thermostat is located. If the same thermostat properties should be valid for thermostats in several rooms, add all concerned room numbers (e.g. 101-103). If the concerned rooms are not in sequence, separate them with commas (e.g. 101-103, 105, 108-109).
4. At **Profile**, choose the applicable thermostat profile in the combobox. If no applicable profile is available, click the + button to create a new one.
5. Click **Save** and **Close**, or **New** if the **Door** field should be emptied and a new thermostat be added.

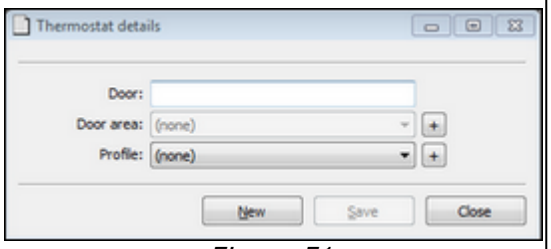


Figure 51

To check the status of a thermostat:

1. Double click on **Thermostats** under the **Lists** tab in the navigation window.
2. Mark the applicable thermostat and click **Status**.

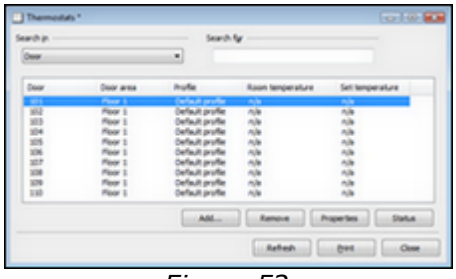


Figure 52

Under the **Alarm status** tab:

3. Any alarms that have been triggered for the concerned thermostat are marked with yellow.

Note: If the thermostat has not answered with its current alarm status, the last known status will be shown instead (if there is one).

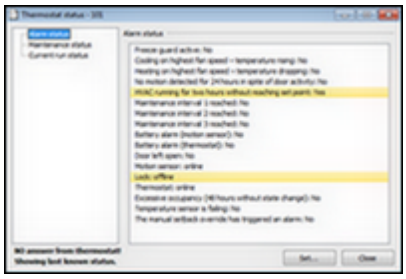


Figure 53

Under the **Maintenance status** tab:

4. At **Battery status**, the battery status of thermostat (if battery operated) and motion sensor is shown.
5. At **Maintenance counters**, the time left for maintenance counter 1, 2 and 3 respectively are shown. ***Note:*** The total numbers of hours before the three different maintenance alarms should be triggered are specified at **Tools/Options/ Energy management/Maintenance**.

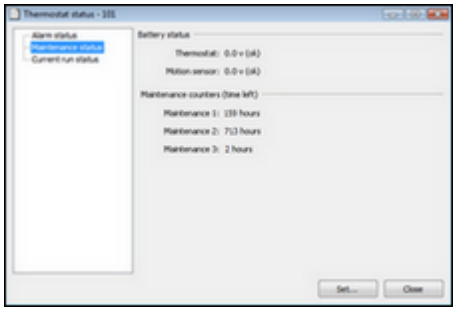


Figure 54

Under the **Current run status** tab:

6. At **Room temperature**, the current room temperature is shown.
7. At **Set temperature**, the temperature which the guest has set on the thermostat is shown.
8. At **Fan control**, it is shown whether the fan control is 'auto only' or 'manual'.
9. At **Fan speed**, the current fan speed (low, mid, high) is shown.
10. At **Occupancy**, the occupancy status is shown.
11. At **HVAC**, it is shown whether the HVAC is 'not running', 'cooling' or 'heating'.
12. At **Override mode**, it is shown whether the thermostat parameters are overridden.

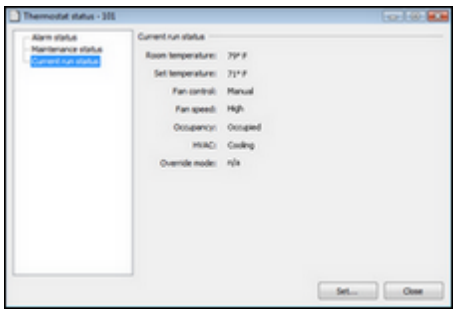


Figure 55

To notify users about room status:

If the *Communication option* is used, one or more users can be notified by e-mail and/or SMS when the status of a room switches to occupied, unoccupied or unsold.

1. Double click on **Thermostats** under the **Lists** tab in the navigation window.
2. Right click on one or more rooms in the thermostats list and choose the applicable one of
   - notify when room status switches to occupied
   - notify when room status switches to unoccupied
   - notify when room status switches to unsold

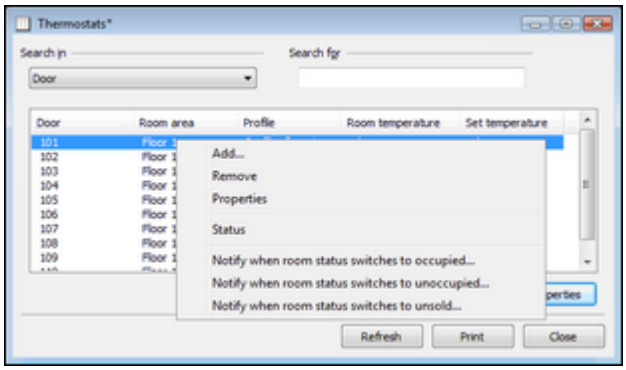


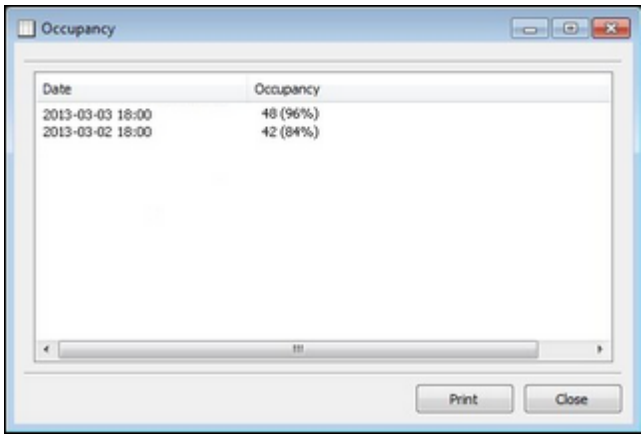
Figure 56

3. In the **Users <Thermostats>** dialog that is shown, mark a user and click **Select**. Only users which have been set up with e-mail address and/or cell phone number in the **User details** dialog will be shown in the **Users <Thermostats>** dialog. If the chosen user has been set up with both e-mail address and cell phone number, you will get a question about what media that should be used; e-mail, SMS or both.
4. If more users should be notified about the same room, repeat steps 2-3 for the room.

See *Installation instruction Communication option* for more information about the option.

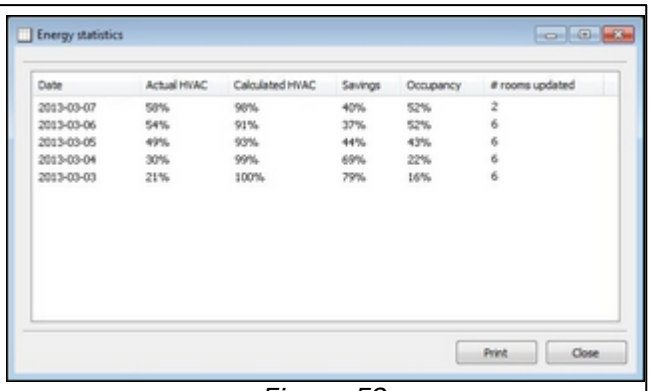
6. Occupancy report

The Occupancy report shows the number of rooms that are rented per day; as a number and also as a percentage of the total number of rooms.

1. Double click on **Ocupancy** under the **Reports** tab in the navigation window.	 *Figure 57*

7. Energy statistics report

The '# rooms updated' column shows how many rooms that have reported that they run HVAC (i.e. events with runtime are sent from the room).

1. Double click on **Energy statistics** under the **Reports** tab in the navigation window.	 *Figure 58*

8. Tools/Options

At **Tools/Options**, there is a tab for **Energy management**, in turn containing the tabs **General**, **Maintenance** and **Housekeeping**.

8.1 General

At **Tools/Options/Energy management/General**, the below parameters can be modified; enter the applicable value(s) and click **OK**:

1. *Enable energy management*: This checkbox is automatically marked when the Orion EMS option is set in the VISIONLINE software.
   If the Orion EMS option should temporarily be turned off, unmark 'Enable energy management' and click **OK**.

2. *Staff entry allow room occupancy change:* If this checkbox is marked, the room will go to occupied state when motion is triggered if staff is in the room, i.e. when a staff card has opened the room.

3. *Max HVAC runtime*: An alarm is triggered if a HVAC runs this long without reaching the set temperature, i.e. the temperature which the guest has set on the thermostat. Default is 120 minutes; the valid range is 30-300 minutes.

4. *Max setback override*: The setback override cannot exceed the number of hours specified here; the valid range for 'Max setback override' is 0-99 hours. If the default 0 hours is used, there is no limitation in time for the setback override and it can be set until further notice.

5. *Unit*: The temperature unit (Fahrenheit/Celsius); Fahrenheit is default. ***Note:*** Changes to the temperature unit will be broadcasted to all thermostats.

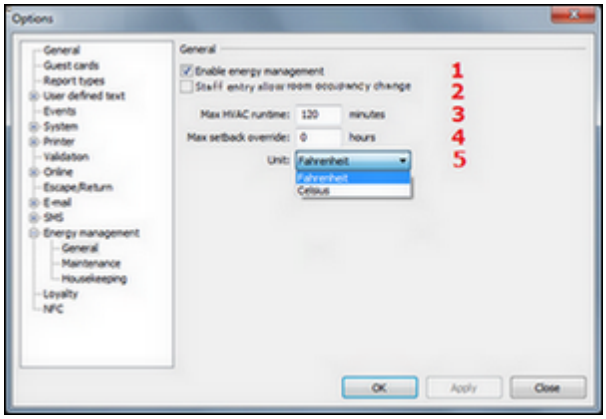


Figure 59

8.2 Maintenance

At **Tools/Options/Energy management/Maintenance**, it is possible to specify three different thermostat maintenance intervals in hours; 0-65 535 hours. This is the number of hours of runtime that should pass before an alarm is triggered. It is also possible to rename the three maintenance intervals.

- *Maintenance counter 1* is for fan time/total HVAC time
- *Maintenance counter 2* is for 'cooling'
- *Maintenance counter 3* is for 'cooling or heating'

1. Enter the applicable maintenance value(s) in hours.
2. If applicable, rename the three maintenance counters to your needs.
3. Click **OK**.

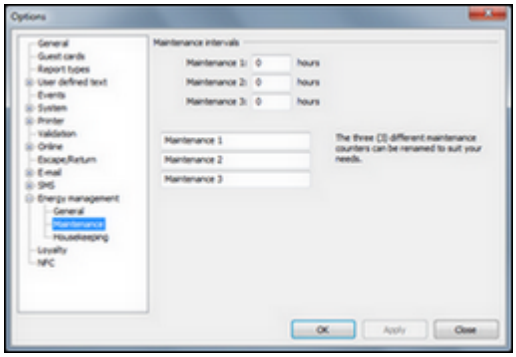


Figure 60

8.3 Housekeeping

At **Tools/Options/Energy management/Housekeeping**, it is possible to change the default values for

- number of days to keep events in the database (default 7; valid range 1-9999)
- number of days to keep runtime data in the database (default 365; valid range 1-9999)
- number of days to keep occupancy data in the database (default 365; valid range 1-9999)

Note: Events use a considerable amount of disk space, so the number of days to keep events should be kept low.

Note: In the separate Orion EMS client, the housekeeping items are found at **Tools/ Options/System/Housekeeping**.

1. Enter the applicable values and click **OK**.

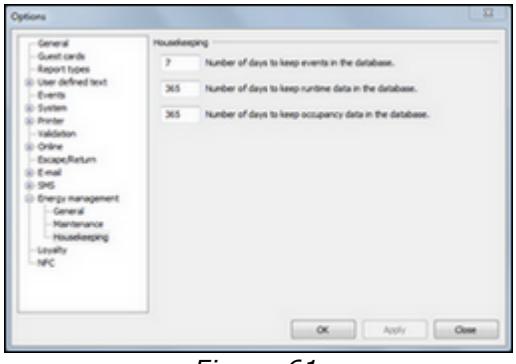


Figure 61

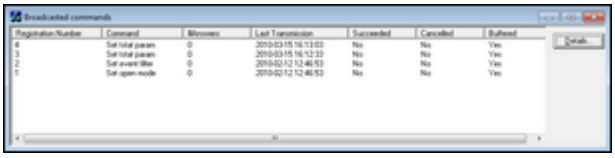
9. Orion EMS in SysMon

The maintenance software SysMon (*System Monitor*) is found in the VISIONLINE installation folder and also in the installation folder for the separate Orion EMS, if the latter is applicable. It contains several dialogs, of which the ones below are applicable for Orion EMS:

- thermostats
- online commands
- broadcasts
- room events

To open SysMon:

1. Double click on **SysMon.exe** in the installation folder.
   Tip: Make a shortcut to SysMon since this will be extensively used.
   Note: The Broadcasted commands dialog is not automatically updated; press **F5** to refresh it manually.

1. Go to **View/Broadcasts**. 2. To see details for a certain command, mark it in the list and click the **Details** button. 3. A **Broadcast Answers** dialog will be shown, with the concerned thermostats or locks (depending on command) and their answer time.	 *Figure 62*

Column	**Description**
Registration Number	Uniquely identifies the broadcasted command. The registration number will be shown in the events the command generates.
Command	
# Answers	The number of locks that have answered the command
Last Transmission	Timestamp when the command was last broadcasted; originally or due to a retry.
Succeeded	Yes if all locks answered
Cancelled	Yes if the command was cancelled by another broadcast; e.g. a new *Set-Time command* cancels any previous Set-Time command.
Buffered	Yes if the command has timed out. It has then been buffered as a single-cast command for all locks that have not answered.
	Table 9

9.1 Thermostats

The **Thermostats** dialog of SysMon gives a good overview of all thermostats; if there are any alarms, if any thermostats have been overridden etc.

To show a thermostat overview:

1. Go to **View/ Thermostats**.

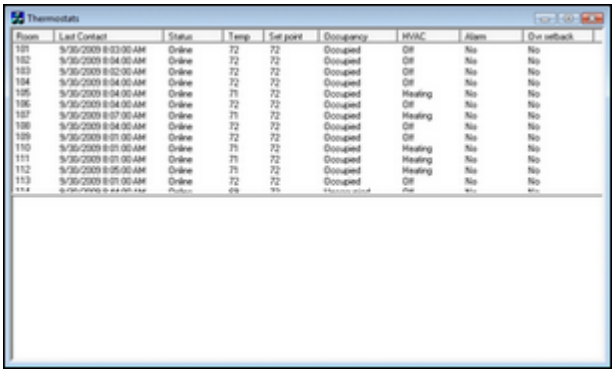


Figure 63

Column	**Description**
Room	Room number
Last contact	Time when last telegram was sent from the thermostat
Status	Online/Offline
Temp	Room temperature
Setpoint	The temperature which the guest has set on the thermostat
Occupancy	Unsold/Unoccupied/Occupied
HVAC	Off/Cooling/Heating
Alarm	Yes/No
Ovr setback	This column shows if the thermostat in the concerned room has been overridden; Yes/No
	Table 10

9.2 Online commands

The **Online Command Log** dialog of SysMon shows commands that have been sent to the thermostats. The online commands are listed in reverse chronological order.

1. Go to **View/ Online Commands**.

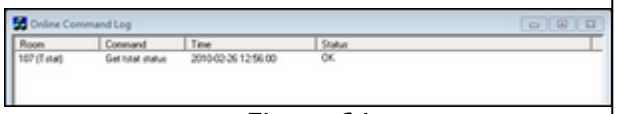


Figure 64

9.3 Broadcasts

The **Broadcasted commands** dialog shows all commands that have been broadcasted to the thermostats. The broadcast commands are listed in reverse chronological order.
Note: The **Broadcasted commands** dialog is not automatically updated; press **F5** to refresh it manually.

1. Go to **View/Broadcasts**.
2. To see details for a certain command, mark it in the list and click the **Details** button.
3. A **Broadcast answers** dialog will be shown, with the concerned thermostats or locks (depending on command) and their answer time.

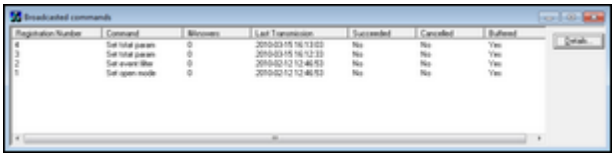


Figure 65

Column	Description
Registration Number	Uniquely identifies the broadcasted command. The registration number will be shown in the events the command generates.
Command	
# Answers	The number of locks that have answered to the command
Last Transmission	Timestamp when the command was last broadcasted; originally or due to a retry.
Succeeded	Yes if all locks answered
Cancelled	Yes if the command was cancelled by another broadcast; e.g. a new Set-Time command cancels any previous Set-Time command.
Buffered	Yes if the command has timed out. It has then been buffered as a single-cast command for all locks that have not answered.
	Table 11

9.4 Room events

The **Room Event list** dialog shows events related to the lock or to the in-room devices such as thermostat or motion sensor.

1. Go to **View/Room events**.
2. If large amounts of events are continuously presented, there is a possibility to "freeze" the presentation of events to be able to look closer at a certain event. In this case, click the **Hold** button.

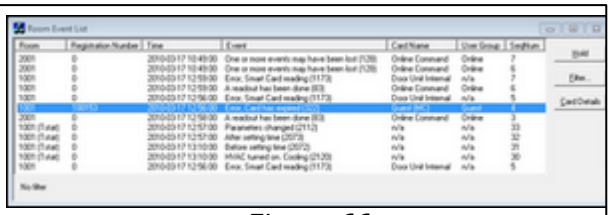


Figure 66

To filter the room events:

1. Click the **Filter** button in the **Room Event List** dialog; the dialog to the right will be shown.
2. Enter the applicable filtering information and click **OK**.
   The result is presented in a room event list.

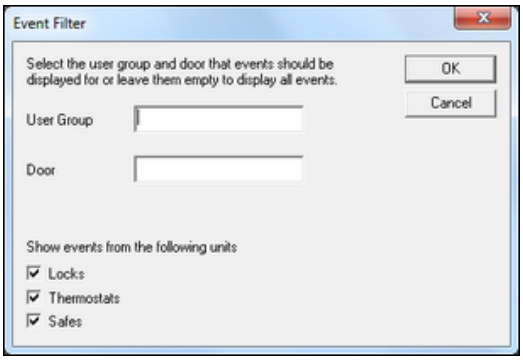


Figure 67

10. Maintenance

10.1 Thermostat (Orion Thermostat-Zen-HV)

10.1.1 To disassemble a thermostat

1. Use a flathead screw driver to loosen the thermostat; bend the locking arms and in the same time pull carefully.

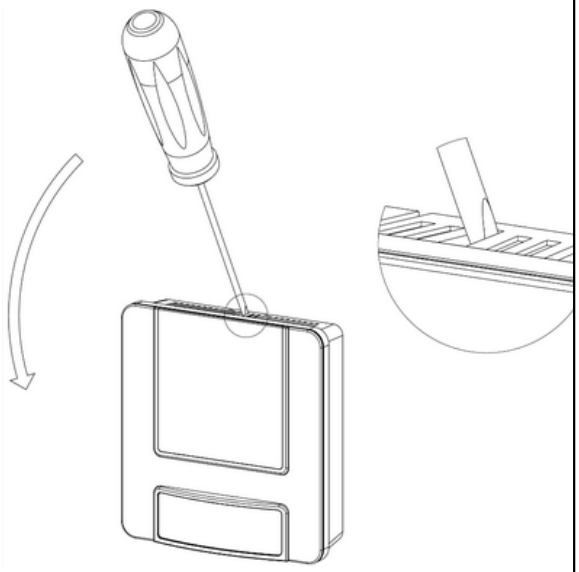


Figure 68

2. Use the flathead screw driver to bend the locking arm at the bottom of the thermostat; at the same time pull carefully.

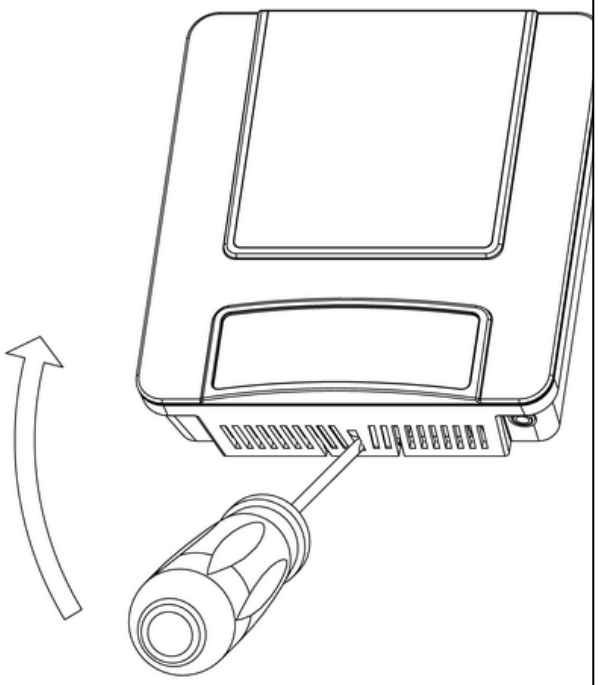


Figure 69

10.1.2 To replace a fuse

The thermostat has got two fuses which are located as in Figure 15.
Note: To replace a fuse, the thermostat must be disconnected from the wall plate.

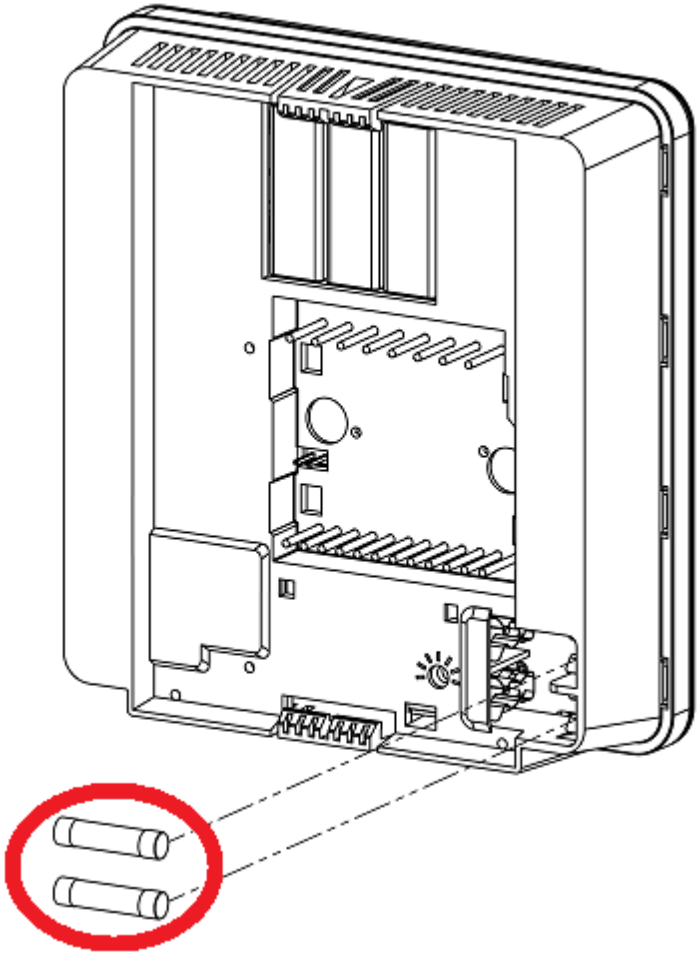


Figure 70

		How do I know if the fuse has blown?	What does the fuse protect?
Upper fuse	• 5x20mm • 2.0AF	The thermostat appears to be dead.	• Reversing valve output • Cool output • Heat output • Internal power supply of the thermostat
Lower fuse	• 5x20mm • 6.3AT	The fan outputs stop working.	The fan outputs
			Table 12

10.2 Thermostat (Orion Thermostat-Original-LV)

10.2.1 To dismount a thermostat

Press down on the top of the mounting bracket to release the snaps and pull the top of the thermostat away from the wall; then lift up to completely remove from the bracket.

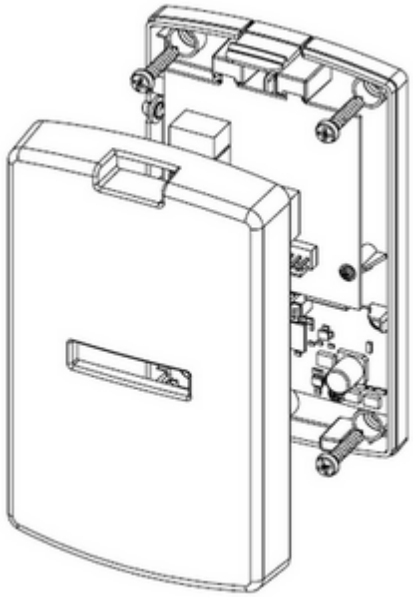


Figure 71

10.2.2 To exchange the batteries

To exchange the batteries in the thermostat, remove the thermostat according to here and exchange the batteries (3 AA) in the battery package.

Appendix A: Quick reference of technical data

Thermostat (common)

Note: The technical data in Table A1 are common for *Orion Thermostat-Zen-HV* and *Orion Thermostat-Original-LV*. For *Orion Thermostat-Zen-HV* specific data, see Table A2 and for *Orion Thermostat-Original-LV* specific data, see Table A3.

Temperature display	Configurable: *guest setting* or *room temperature*; default is *room temperature*
Temperature display range	2-digit display
Setpoint/operating temperature range	18-32 °F / 65-90 °C
Recommended operating temperature	50-122 °F / 10-70 °C
Temperature sensor	Integrated in thermostat
Service device	*Orion Service* software and *service cable RJ12 to 3.5mm stereo jack*
Radio (RF) signals	ZigBee 2006 **Lock to thermostat:** • Door open - staff card • Door open - guest card • Door open from inside • Door closed • Deadbolt thrown/released **Thermostat to lock:** • Room occupied **Motion sensor to thermostat:** • Motion detected • Battery status **Thermostat to motion sensor:** • Turn off when the room is occupied and door is closed • Turn on when the door is opened again
Thermostat deadband	Configurable 1-3 °F; default is 2 °F
Heat/cool switching deadband	Configurable 2-4 °F; default is 3 °F
Heat/cool switching	Configurable to allow or disallow auto changeover of heat/cool
Freeze guard	39 °F / 4 °C
Refresh cycle	Optional
Humidity	Optional
Intelligent switch	Configurable: Disabled/use RV output/use G2 output; default is disabled
Room not occupied timer	Configurable 1-30 minutes; default is 8 minutes
Room not sold timer	Configurable 12-24 hours; default is 16 hours
Compressor delay (dwell-off time)	5 minutes. The dwell-off time prevents short-cycling of the compressor; this parameter cannot be changed
	Table A1

Appendix A

Orion Thermostat-Zen-HV

Dimensions (WxHxD)	112 x 117 x 35 mm (4 13/32" x 4 19/32" x 1 3/8")
Input voltage	100-277VAC; 50/60 Hz
Switch input	Door switch - 1 exterior/1 interior
Multifunction input	Motion sensor/card switch/pipe temp sensor
High voltage outputs	- W/W2 (heating; max 0.5A - Y/W2 (cooling/compressor; max 0.5A) - RV (reversing valve; max 0.5A - G1 (Fan 1; max 3A) - G2 (Fan 2; max 3A) - G3 (Fan 3; max 3A)
Low voltage outputs	- Proportional 0-10V; heating - Proportional 0-10V; cooling - Relay output (max 30V AC/DC, max 100mA)
Temperature sensor	Integrated in thermostat
Material	ABS
Required VISIONLINE version	1.14.0 or higher
Required Orion Service version	1.2.5 or higher
	Table A2

Appendix A

Orion Thermostat-Original-LV

Dimensions (WxHxD)	87.5 x 132 x 36.3 mm (3 7/16 x 5 3/16" x 1 7/16")
Input voltage	12-24 V AC 15-24 V DC
V+ Output logic	Follows the input voltage (AC rectified) VDC relative to GND Input voltage level
Outputs	W/W2 – Heating Y/W2 – Cooling / compressor G1 – Fan 1 G2 – Fan 2 G3 – Fan 3 RV – Reversing valve
Inputs	Door switch – 1 exterior / 1 interior Motion sensor/card switch I/O Service connector (programming)
Temperature sensor (stored in the thermostat even the thermostat controller is used)	Integrated in thermostat *Option:* remote temperature sensor that connects directly to the thermostat controller integrated in thermostat
Refresh cycle	Optional
Humidity	Optional
Intelligent switch	Configurable: Disabled/use RV output/use G2 output; default is disabled
Recommended storage condition	Temperature range: 59-80 ºF / 15-27 ºC Humidity range: 30-60% relative humidity (RH)
	Table A3

Appendix A

Motion sensor

Dimensions	Ø: 120mm (4 23/32") H: 44.2 mm (1 3/4")
Input power	3 AA batteries (4.5 VDC)
Mounting	• Ceiling or wall surface mounting • Keyhole type for easy installation and battery replacement access
Range	360 degrees / 8 meters horizontal / 3 meters vertical
Messages transmitted	• Motion detected • Battery status
Diagnostics	Integrated LED only enabled for diagnostics
	Table A4

Appendix B: Troubleshooting

FCU = *fan coil unit*
PTAC = *Package Terminal Air Conditioner*

A/C Unit not blowing hot/cold air

A/C unit not blowing hot/cold air

1. Confirm at the thermostat that the heat or cool symbol is displayed.

    a. *If the symbol is on*, the call has been sent from the thermostat to the FCU/PTAC.

    b. *If the symbol is not on*, change the *set temperature* to be more than 2 degrees different from the actual temperature to engage the heat/cool call. ***Note:*** For cool, there is a 5 minute compressor delay after the unit is turned on, to prevent short-cycling.

2. Confirm that voltage is applied at the HVAC unit heat/cool inputs.

    a. If accurate voltage is applied to the correct inputs and outputs, additional troubleshooting must be done at the FCU/PTAC.

    b. If no voltage is applied to the correct inputs, a voltage drop has occurred between the thermostat and the FCU/PTAC. Check the wiring.

Note: See *Installation Manual Orion EMS* for information about the heat/cool relays used.

Fan speed not working

1. Confirm the configuration of the thermostat profile with fan speeds. Make sure that the wiring is in accordance with these settings. Change from *Auto* and test the individual fan speeds.

    a. If one of the fan speeds is not working, confirm that voltage is applied at the

    FCU/PTAC for that fan speed. If voltage is applied to the correct fan speed, additional troubleshooting must be done at the FCU/PTAC.

Thermostat has no power

1. Confirm that the thermostat has power applied to the correct wires, 24V DC or AC. If the correct power is applied, make sure that the thermostat is connected to the wire
   harness correctly and that no pins are visible. If the thermostat is plugged in incorrectly, it can be damaged and needs replacement.

Room is not going into Occupied state

1. Was a staff card used to open the door (for systems with locks monitoring the door)? If so, the room will not enter *occupied state* on motion. Press a key on the thermostat and check the occupied status again.
2. Check the online status of the lock and the motion sensor.
   a. If the door lock or the motion sensor is offline, use an *Orphan Join card* for the lock and recycle the power for the motion sensor.
   b. If the door is still offline, follow the necessary steps to discover the lock back to the thermostat.
   c. If the motion sensor is still offline, replace the batteries.
   d. If the motion sensor is still offline after this, follow the necessary steps to discover the motion sensor back to the thermostat.
3. If the RF door switch is applicable, confirm that *door open* and *door closed* events are logged at the thermostat. Also use the **Diagnostics** feature in Orion Service to confirm that the door position is shown correctly; *Open* and *Closed*.
4. Make sure that the configuration settings at the thermostat are accurate, including correct relay configuration for *internal door switch* and *external door switch*. If neither is used, make sure that *Normally Closed* is selected.

A/C unit cooling when calling for heat (and vice versa)

1. *If the unit is a heat pump*, make sure that the thermostat is properly configured to control the heat pump. See *Daily Use Manual Orion EMS* for proper configuration of a heat pump.

2. *If the unit is not a heat pump*, or if the thermostat is correctly configured, check the outputs of the thermostat to ensure that it is calling for heat or cool properly.

    a. First check the outputs at the thermostat.

        i. If OK, check the outputs of the thermostat at the connection to the HVAC unit.
        It is possible that the wiring is crossed or somehow incorrect.

        ii. If all is OK, the property needs to have their HVAC technician check the unit.

    b. If the thermostat outputs are incorrect:

        i. First check the configuration of the thermostat by using Orion Service to read out the parameters of the thermostat; do not just rely on looking at the parameters in
        the VISIONLINE or Orion EMS software. If the parameters are incorrect, make the necessary changes.

        ii. Connect a new thermostat to see if the problem disappears. If it does, replace the thermostat. If the problem stays, there is a problem with the wiring or parameters that must be fixed.

Fan continues to run even when the thermostat is turned off

1. First, wait a couple of minutes to see if the fan does eventually turn off. Some air handlers have a built-in function that keeps the fan running for a time after the heating or cooling function is turned off.
2. Secondly, use Orion Service to check the parameters of the thermostat – ensure that the 'Fan on when satisfied' function is set to 'no'.

3. Finally, test the outputs of the thermostat to see which ones that are on. If a fan output is active and the thermostat is not calling for fan (use the **Diagnostics** feature of Orion Service to confirm that
the thermostat is not calling for fan), change the thermostat as it has a stuck relay. If no fan output is active, check all other outputs to find out if any are active. It is possibly a crossed or shorted wire.

Appendix C: Read more

Document name:	Document number:
Installation instruction Communication option	66 5013 026
Installation manual Orion EMS	66 8003 002
Quick setup guide Orion EMS in VISIONLINE	66 8003 004
Quick setup guide Orion EMS software	66 8003 003
Upgrading an RFID lock for an Orion EMS offline scenario	66 8003 009

Revision history

Date	Change	By
August 19, 2010	Initial version	KG
November 15, 2010	'Initialize module' and 'Configure device' in Orion Service modified	KG
July 5, 2011	• Information about thermostat controller added • Information about alarm list modified; now two modes, 'Runtime' and 'Filtered' • Information about 'Configure device – Coordinator' addec	KG
October 6, 2011	Logotypes changed	KG
February 16, 2012	• Added reference to *Upgrading an RFID lock for an Orion EMS offline scenario* for information about what firmware to use in different configurations • Added reference to *Installation manual Orion EMS* regarding upgrade of locks for offline scenarios • Added appendix with troubleshooting information	KG
June 5, 2012	• Updated to match Orion Service 1.2.0	KG
July 5, 2012	• Info added to chapter *1 General* about the number of Orion EMS devices that each room number can have • **Alarm status** tab of the **Thermostat status** dialog updated • Information about the reports **Occupancy** and **Energy statistics** added	KG
March 22, 2013	• Updated to match VISIONLINE 1.13.0 and Orion Service 1.2.1	KG
June 27, 2014	• Added information about *Orion Thermostat-Zen-HV*	KG

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