

Digital Video Storage Array

Cooling Module Failure Recovery on the 2U Chassis



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Preface

This document provides detailed procedures dealing with a failed or malfunctioning cooling module. This document covers the following topics:

- Answers to the following questions:
 - How Do I Know a Cooling Module Has Failed?
 - What Does the Error Message Mean?
 - Is It Possible a Cooling Fan Has Not Actually Failed?
 - How to Locate a Failed Cooling Module?
 - How to Replace a Failed Cooling Module?
- The procedures to recover from cooling fan failure.
- Notices and working theories behind the recovery operation.

Document Conventions

Convention	Meaning
Bold	Denotes a part, item, or assembly.
<i>Italic</i>	Denotes a reference to another paragraph, figure or table.
<u>Underline</u>	Used to emphasize a point.
courier	Denotes the actual name of an object, the exact code that should be typed or a message returned from a system.

Symbols

You may encounter these symbols within the document. Explanatory text accompanies each symbol, which provides additional information detailing the operation or highlighting safety information.



NOTICE! Notices inform you of essential but non-critical information. Read these messages carefully as any directions or instructions contained therein can help you avoid making mistakes.



CAUTION! Cautionary messages provide critical information that help you reduce the chance of losing data or damaging the system. Please heed these messages.



WARNING! Warnings highlight information, that if overlooked may cause damage to the system or result in personal injury. Take warnings seriously.



DANGER! Danger messages denote the presence of electrical equipment that may cause electric shock or electrocution. Take care when you see this symbol to avoid serious injury or death.

Related Publications

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1 Identifying a Cooling Module Failure

1.1 How Do I Know a Cooling Module Has Failed?

There are various ways to be notified of the events occurring on a RAID subsystem, including:

1. Events displayed on the LCD keypad panel
2. LED indicators on the cooling module(s)
3. Audible alarm
4. Event notification via the RAIDWatch Server or NPC sub-modules through the following methods: Email, SNMP traps, Fax, LAN broadcast, MSN, ICQ, and SMS messaging
5. The graphical representation of enclosure elements in the Bosch RAIDWatch graphical user interface
6. Event prompts on the RS-232C terminal screen
 - Before replacing a cooling module, perform the following steps to ensure that you can identify the exact failed module for removal.



NOTICE! Before attempting to replace a cooling module, make sure the rest of the subsystem components are operating normally. All external factors affecting normal subsystem operation should be corrected before handling a module failure.

1.1.1

LCD Screen Message

If a cooling fan fails or malfunctions, the LCD panel on the front side of the subsystem will:

1. Light the third LED (ATTEN) "red." The indicator is located on the lower left of your subsystem's keypad panel.
2. Display a cooling fan "failure," "absent," or "low rotation speed" message on the LCD screen.

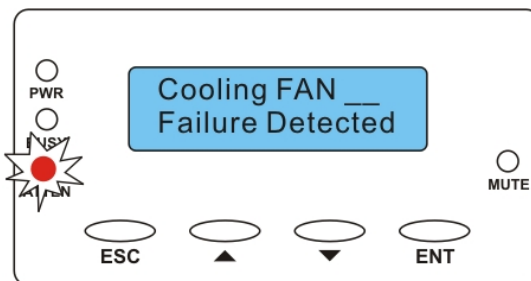


Fig. 1.1 LCD Key Panel

What to Do?

1. Write down the pre-assigned "slot number" of a failed cooling module. You may refer to Section 1.4 for details on how to locate a cooling fan module. The numbers are crucial for finding the exact failed cooling module.
2. Press the ESC button to clear the currently displayed message and to return to the configuration menu screen. The alarm will not stop until being manually turned off.



NOTICE! The event log will be saved in the subsystem's NVRAM even if you press the [Esc] key to clear the message. To access an existing event log, please refer to the Generic Operation Manual in the Product Utility CD that came with your subsystem.

3. Refer to Section 1.2 for the cooling module failure rectification procedures.

1.1.2 Cooling Module LEDs

All 2U subsystem cooling modules have one (1) red LED on the back. Each LED corresponds to a cooling fan in the cooling module. (See Figure 2) If any of the cooling module's LED lights up, the cooling module may have failed or is considered faulty.

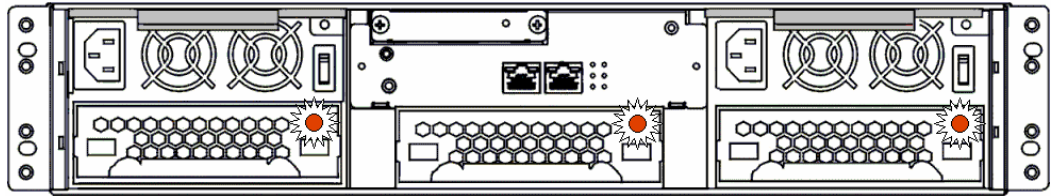


Fig. 1.2 Cooling Module LEDs and Cooling Fan Locations

1.1.3 Audible Alarm

The RAID subsystem is equipped with an audible alarm. If any of the subsystem components has failed, the audible alarm will automatically be triggered. If the system manager is onsite and hears an alarm, the manager should immediately check for error messages that are simultaneously displayed on the LCD screen, a management terminal, or the RAIDWatch GUI to determine what has triggered the alarm. If a cooling fan failure is detected, please follow the below steps to take appropriate actions and rectify the problem.

What to Do?

1. Check the LCD panel messages or cooling module LEDs to verify the failed cooling module location. Refer to Section 1.4 for details.
2. Press the MUTE button on the LCD panel to turn the alarm off temporarily for the current event. You may also mute the alarm through the firmware configuration utility.

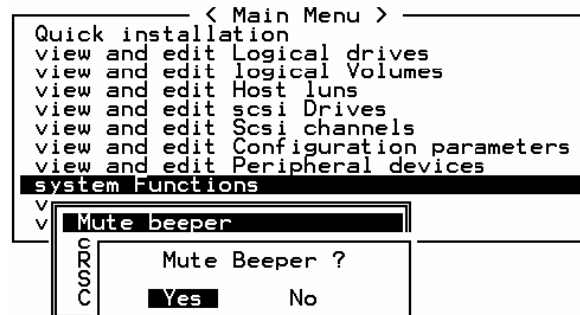


Fig. 1.3 Mute Beeper

3. Select from the main menu, "System Functions," and then press [ENTER] on "Mute beeper." Choose "Yes" and press [ENTER] in the next dialog box to turn the beeper off temporarily for the current event. The beeper will still be activated on the next event. The same function can also be accessed through the LCD keypad panel and RAIDWatch GUI.
4. Refer to Section 1.2 for the cooling module failure event description and the rectification procedures.

1.1.4

Terminal

You will be prompted with an event message if a cooling fan failure occurred. You may also manually examine the operating status of cooling fans.

A cooling fan message should be similar to Figure 1.4 on the terminal screen.

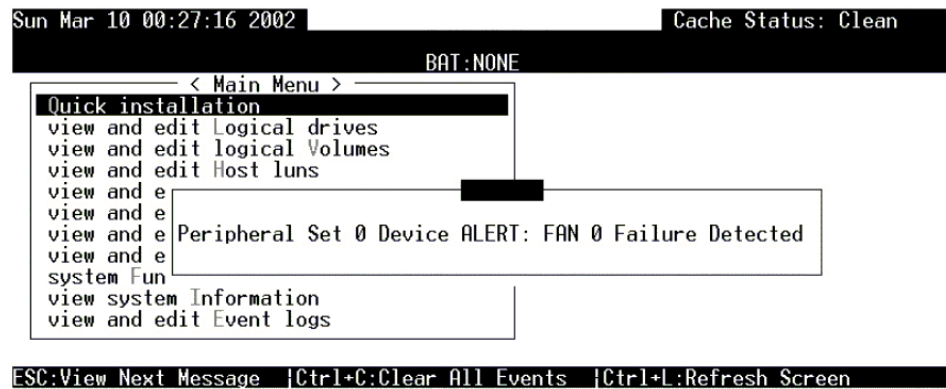


Fig. 1.4 Alert Message on the RS-232C Terminal Screen

To check the operating status of the cooling modules, follow these steps:

1. Use the arrow keys to move the cursor bar through the menu items on the terminal screen, and then press [ENTER] to choose an item, or [ESC] to return to the previous menu/screen.
2. In the Main Menu screen, select "View and Edit Peripheral Devices."
3. Press [ENTER] on "View Peripheral Device Status."
4. Select "I2C Peripheral Device" by pressing [ENTER].
5. A list of device set will prompt, select the device set that you want to view.
6. Select "Cooling Fan."

A cooling fan status list will appear. See an example in Figure 1.5.

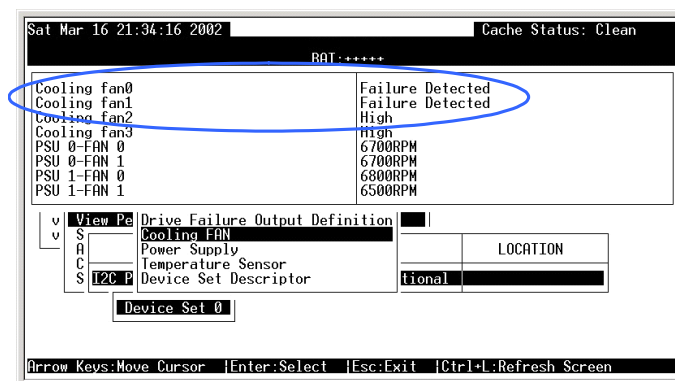


Fig. 1.5 Cooling Fan Status in the Terminal Screen

Look for the cooling module "Status" column. The status may be indicated as one of the followings:

Status	Description
Failure Detected	The cooling fan has failed
FAN High Speed	The cooling fan is operating at a high speed that exceeds the pre-set threshold
FAN Low Speed	A cooling fan is operating at a low speed that fell below the pre-set threshold
Absent	The cooling fan is absent or incorrectly installed.
Miss	A cooling fan could not be detected; a missing cooling module could result from insecure installation

What to Do?

1. If you see any faults listed above, be sure to write down the number of the malfunctioning cooling fan. Refer to Section 1.4 for details on locating the cooling fan. The cooling fan number is crucial for finding the exact failed cooling module.
2. Press [ESC] several times to return to the terminal main screen.



NOTICE! The event log will be saved in the subsystem's NVRAM even if you press the [Esc] key to clear the message. To access an existing event log, please refer to the Generic Operation Manual in the Product Utility CD that came with your subsystem.

3. Refer to *Section 2: Cooling Module Replacement Procedures* on page 10 to rectify a cooling module failure.

1.1.5

Bosch RaidWatch Server

RAIDWatch Server is a sub-module of Bosch RAIDWatch that is used to manage and deliver system events. If you have properly configured and started this sub-module utility, you will be notified of system events regardless of RAID subsystem locations via Email, SNMP traps, fax, LAN broadcast, MSN, ICQ, or SMS messaging. For a cooling fan failure happening to a standard enclosure, the message may look like the following:

"Name: ID xxxxxxxx, Peripheral Set 0 Device ALERT: FAN __ Failure Detected

Refer to *Section 1.2: What Does the Error Message Mean?* on page 6 for interpretations of event messages.

1.1.6

Bosch RAIDWatch

The Bosch RAIDWatch software provides easy access to component status through its visualized representations of enclosure elements. RAIDWatch recognizes each subsystem by its board serial number, and displays an exact replica of it in its panel view. Although cooling module problems can only be solved onsite, an administrator can use the RAIDWatch GUI manager to remotely identify a problem and then contact the engineer nearest the installation site.

To view the cooling module information in the RAIDWatch Enclosure View window, select either the Enclosure icon from the navigation tree or select the Enclosure View from the Action menu. The command allows you to access the graphical display of the enclosure's front and rear view window.

Fig. 1.6 Opening RAIDWatch Enclosure View Window

If multiple enclosures have been cascaded, you can select a different enclosure by clicking its tabbed icons as displayed in the figure below.

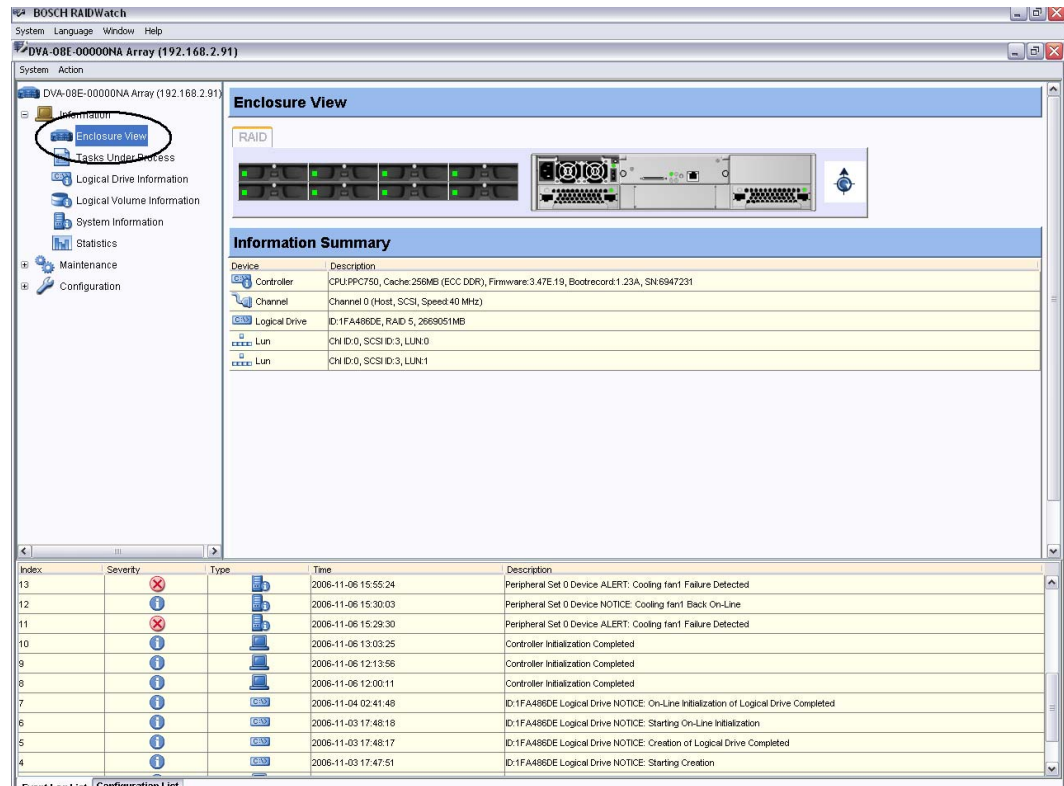


Fig. 1.7 Enclosure Tabbed Panel

Select an enclosure and start viewing device status in the Enclosure View window.

The LED icons shown on the enclosure view reflect the real working status as those LEDs on the subsystem's rear panel. See Figure 1.8 below.

When a cooling fan fails, the Bosch RAIDWatch will notify you by the following:

1. On the Enclosure View page, the correspondent cooling fan LED(s) on the subsystem rear panel will turn red.
2. If a LED corresponding to a failed cooling module is lit red, let your mouse cursor stay on the enclosure rear panel for a second, a summary of the enclosure status (including the fan failure information) will display.

- The cooling module failure messages will appear on the event log list at the lower half of the GUI screen.

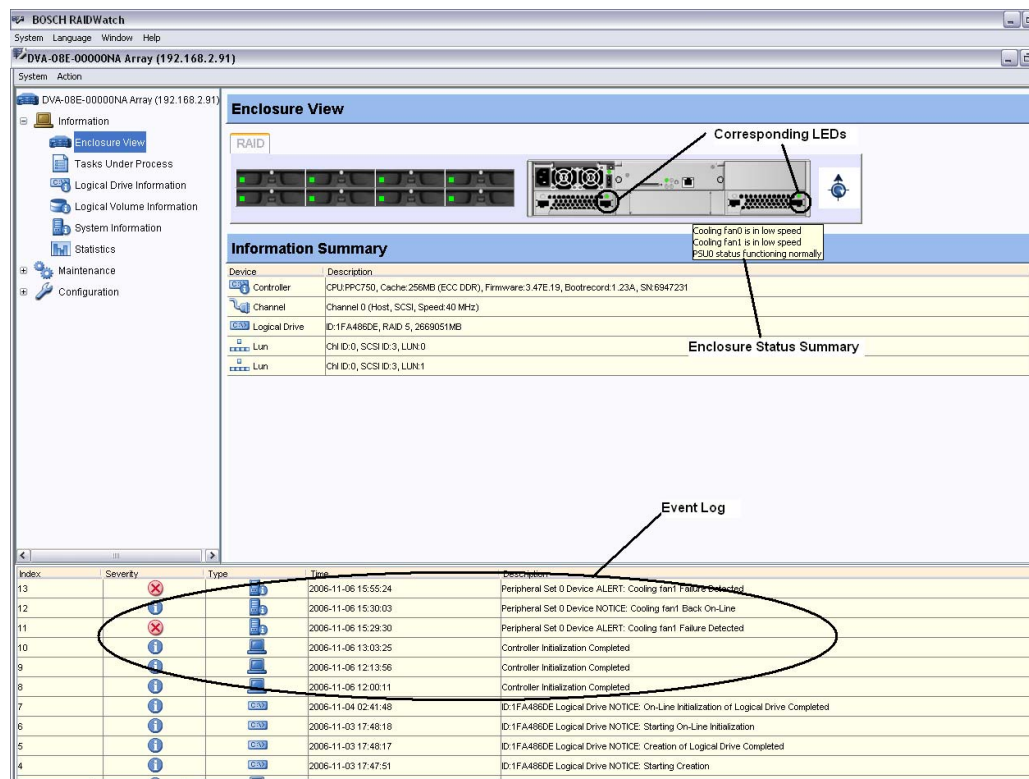


Fig. 1.8 RAIDWatch Graphical User Interface

If the corresponding cooling module LED is lit or an event log is shown on the GUI screen, refer to Section 1.2 to rectify the problem.

1.2

What Does the Error Message Mean?

You may receive cooling module failure messages through terminal screen, LCD screen, or RAIDWatch GUI; and the message may look like one of the following:

```
"SAF-TE Device (__) ALERT: Cooling Fan Not Installed (__)"
"SAF-TE Device (__) ALERT: Cooling Fan Failure Detected (__)"
"Peripheral Set __ Device ALERT: FAN __ Failure Detected"
"Peripheral Set __ Device ALERT: FAN __ Not Present"
"Peripheral Set __ Device ALERT: Low FAN__ Speed Detected (__)"
"SES (C0 I0) Cooling Fan __: Device Not Supported!"
```

1.2.1

Event Description

Event Message	Description
Cooling Fan Not Installed	A cooling fan could have been removed or the connection/installation of the cooling module is incorrect; could also indicate a failed cooling module
Cooling Fan __ Failure Detected	A cooling module is considered as failed
Controller FAN __ High Speed Detected (__ RPM)	A cooling fan is operating at a high speed that exceeds the pre-set threshold
Controller FAN __ Low Speed Detected (__ RPM)	A cooling fan is operating at a low speed that fell below the pre-set threshold
FAN __ Not Present	A cooling fan is missing; could be caused by a failed component in the cooling module
Cooling Fan Not Supported	A cooling fan that is not supported by the subsystem model was inserted

1.3

Is It Possible a Cooling Fan Has Not Actually Failed?

When you have received any of the alert messages, or determined a cooling module LED is lit red on the Bosch RAIDWatch GUI screen, follow the steps below to rectify the problem.

1. Be sure to write down the failed cooling fan number and device number. Use the numbers to identify the location of the failed cooling module. Refer to Section 1.4 for details locating the cooling fan. The numbers are crucial for finding the exact failed cooling module.
2. A malfunctioning cooling module in a subsystem may simply be the result of improper handling, for example, when a cooling module is not properly installed. Check carefully that all the cooling modules are firmly seated in the module slots.
3. Reinstall the cooling module showing problems.
4. If the cooling module is still not functioning properly, it should be replaced. Please refer to Chapter 2 for the cooling module replacement procedure.

1.4

How to Locate a Failed Cooling Module?

Using the figure below to locate the failed cooling module:

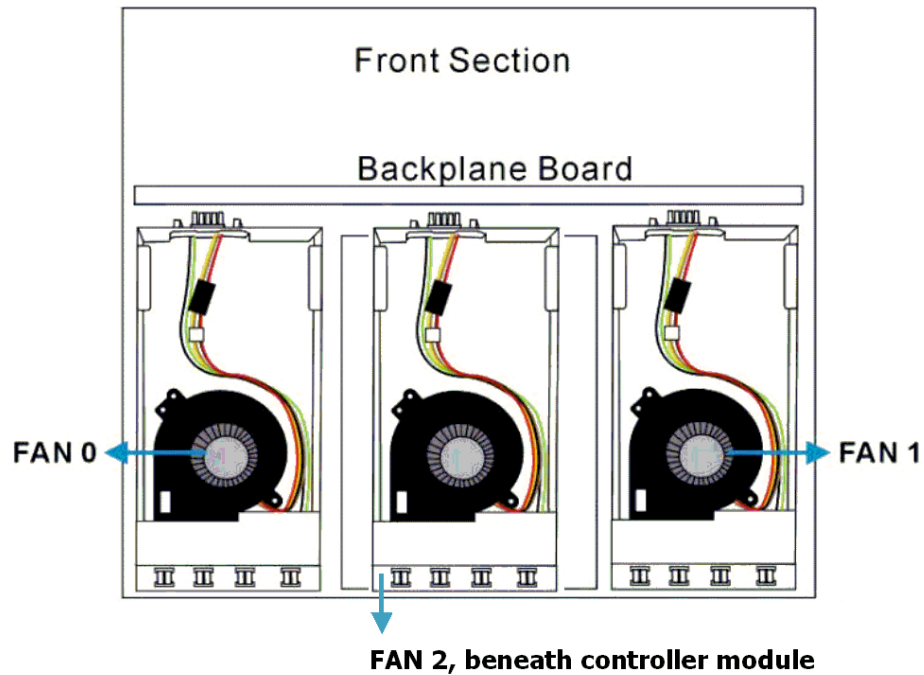


Fig. 1.9 Cooling Module and Cooling Fan Locations: Overview of a 12-bay Model

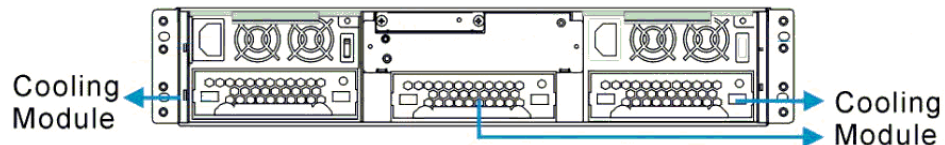


Fig. 1.10 Cooling Module and Cooling Fan Locations: Rear View of a 12-bay Model

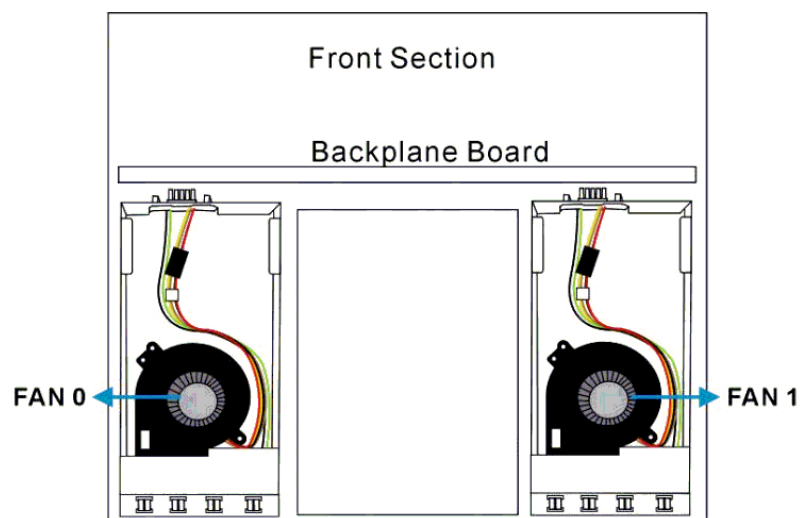


Fig. 1.11 Cooling Module and Cooling Fan Locations: Overview of an 8-bay Model

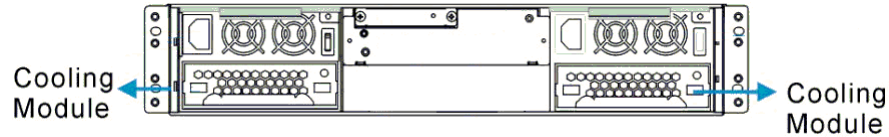


Fig. 1.12 Cooling Module and Cooling Fan Locations: Rear View of an 8-bay Model

For all 8-bay or 12-bay, 2U-profile models, each cooling module houses a single cooling fan. The 12-bay models have 3 cooling fans, while the 8-bay models have two. See the diagrams above for device numbers and fan locations.

For today's mission-critical applications, subsystem downtime is not allowed. A failed module should immediately be replaced with a new one. The cooling module should be replaced as a whole causing minimum interference to system operation. Please refer to Chapter 2 for the procedures of replacing a cooling module.

2 Cooling Module Replacement Procedures

2.1 How to Replace a Failed Cooling Module?

Once you are notified of fan failure and located a failed cooling module, it should be replaced as soon as possible.

A failed cooling module may simply be the result of improper handling. For example, when a cooling module is not properly installed. Check carefully that all the cooling modules are firmly seated in the subsystem.

If replacing a failed cooling module is necessary, the faulty cooling module should only be removed from the subsystem when you have a replacement immediately available that can be installed as soon as the failed cooling module has been removed.



NOTICE! Although the cooling modules are fully redundant, it is not advisable to run the Bosch subsystem with a single cooling module for an extended period of time. If the remaining cooling module(s) fail, the system may overheat and is at the risk of sustaining irreparable damage.

Keep a failed module in its enclosure bay until a replacement unit is in hand.

The cooling modules are secured to the chassis with the two (2) black latches located on the rear surface of the module itself. To replace the cooling module, please follow these steps:

1. To remove the cooling module, squeeze both side latches toward the center of the cooling module. Withdraw the cooling module from the subsystem by gently pulling on the silver handle at the bottom of the module. (See Figure 2.1)



WARNING! The latches at the back of the cooling module secure the cooling module in the module slot. If these latches are broken, the warranty on the cooling module will be void.

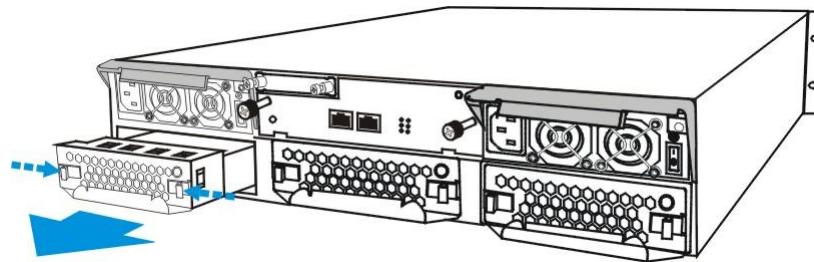


Fig. 2.1 Removing the Cooling Module

2. Install the new cooling module by aligning the module with the cooling module slot on the lower section of the PSU module and gently sliding it in. Do not slam the module into place. Doing so may damage the back-end connector on the module. When properly inserted, the latches will hold the module in place. (See Figure 2.2)

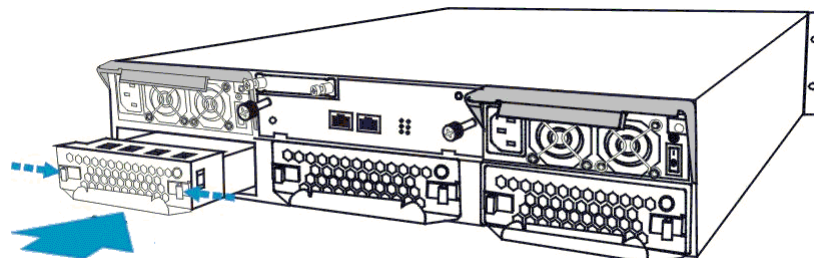


Fig. 2.2 Installing the new Cooling Module

3. Once you have inserted a new cooling module into the subsystem, the cooling module should be automatically detected by a RAID subsystem.
4. You will notice the normal operation by the following:
 - a. A cooling module notification message will prompt on the user interface sessions whether it is LCD, RS-232C terminal, or the GUI screen.
 - b. The LED on the cooling module, the ATTEN LED on the LCD panel and the LED on the Bosch RAIDWatch enclosure rear view should all go off.

Americas:

Bosch Security Systems
130 Perinton Parkway
Fairport, New York, 14450
USA
Phone +1 800 289 0096
Fax +1 585 223 9180
www.boschsecurity.us

Europe, Middle East, Asia:

Bosch Security Systems B.V.
Postbus 80002
5600 JB Eindhoven
Phone: +31 40 2577 200
Fax: +31 40 2577 202
nl.securitysystems@bosch.com
www.boschsecurity.nl
www.boschsecurity.com

www.boschsecurity.com**Asia-Pacific:**

Bosch Security Systems Pte Ltd.
38C Jalan Pemimpin
Singapore 577180
Phone +65 6319 3450
Fax +65 63139 3499
www.boschsecurity.com