# araid® 5000 / T5000

A Non-Stop SATA III RAID Subsystem For 3.5" Hard Drives

▶ User's Manual
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**ACCORDANCE SYSTEMS INC.**

# araid® *5000 / T5000* User's Manual V1.4

## Table of Contents

**Thank you for purchasing our product.**
· Before using, please read this user's manual carefully in order to set up correct and safe operation.
· This user's manual at an accessible location for easy reference whenever required.
· The specifications and the appearance of this product may change subject to improvements without prior notice.

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**Accordance Systems Inc.**

www.accordancesystems.com    www.accordance.com.tw

## Tables

## Figures

# I.Safety and Cautions

## ✳ Introduction of RAID 0 and RAID 1

(1) RAID 0: Using two hard disks, the usable capacity is two hard disks. However, there's no backup mechanism, it would be impossible to retrieve the data once it is lost or damaged.

(2) RAID 1: Using two hard disks, the usable capacity is one hard disk with backup mechanism. If one of the hard disks is damaged, then the other one immediately takes over operation.

＊Distinction of RAID 0 and RAID 1 (two 8TB hard disks as an example)

| RAID Level | Available Capacity | Backup Hard Disk Function |
|---|---|---|
| 0 | 16TB | No |
| 1 | 8TB | Yes |

Table 1: RAID 0 vs RAID 1

## ✳ Directions of Use

(1) It is suggested that same type of new hard disk (same brand, same model, same capacity, same origin and same firmware version) should be used for working with this product.You may use the ARAID EYE PLUS software included on the CD to check the quality of the hard disks. However, it is suggested that you should prepare several of the same and new hard disks



Fig. 1: Checking the Hard Disk Quality with ARAID EYE PLUS software

for backup. If the same hard disk is not available, you may use a larger-capacity hard disk of the same brand.

(2) When using the ARAID, you are not required to process the new hard disk with FDISK and FORMAT steps in advance, and you will be able to execute the backup of hard disk directly with the automatic rebuilding function.

(3) Before using, be sure to confirm that the power equipment is properly connected and stabilized to ensure the product will operate smoothly.

(4) If smoke or abnormal odor is emitted from ARAID, disconnect the power immediately.

(5) Do not place the ARAID on an uneven surface.

(6) If in RAID 0 mode do not change the front panel switch to the "Single" position as this may lead to a permanent loss of the data stored in the hard disk.

# II. Product Content and Accessories

(1) Upon receiving, please check the items contained in the box. If any loss or damage is found, contact your dealer or sales representative immediately.
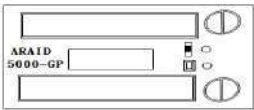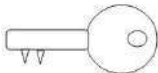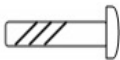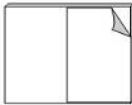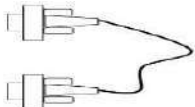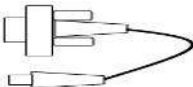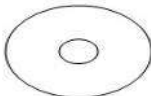
| | | |
|---|---|---|
| ARAID 5000 x 1 | 3.5" Hard Disk Tray x 2 | Key for Tray x 4 |
| M3x5mm Screw (for ARAID) x 8 | M6x4mm Screw (for Tray) x 8 | User's Manual x 1 |
| RS232 External Cable x 1 | RS232 to USB Cable x 1 | Management Programs CD x 1: |
| RS232 Internal Cable x 1 | | · **Monitoring Program**: ARAID SMART, ARAID EYE PLUS<br>· **Network Management**: SNMP Agent for Windows<br>· **Firmware Upgrade Software**: ARAID Utility<br>· **Drivers**: USB to Virtual Serial port (Windows & Linux) |

*Table 2: Product Content and Accessories*

(2) Optional Tray: If you want to use the same tray on both ARAID 5000 and ARAID 3500, please purchase this optional tray to use. Also refer below for the installation of hard disk.

**For ARAID 5000**. Lock with hard disk facing toward the **FRONT END** of the tray.

**For ARAID 3500**. Lock with hard disk facing toward the **REAR END** of the tray.

*Fig. 2: Installing Hard Disk for the Optional Tray*

# III. Introduction of the Product

**✱ 1. Product Features**

### Safety:
(1) When using RAID 1 mode, the content of both hard disks will maintain synchronous status.

(2) A 6cm silent and cooling fan.

(3) Safety lock and key for the drive trays

(4) If ARAID uses with two hard disks, it can provide an off-line hard disk anti-virus function under Single Disk Mode. (refer Page 18, Q2 of FAQ)

### Convenience:
(1) When setting at RAID 0 Mode, it provides maximum drive performance.

(2) Supports most of the PC operating systems without the need of installing additional drivers.

(3) Connects with SATA port of PC directly without going through a converter card.

(4) Support AHCI Mode and S.M.A.R.T.

(5) Works with most hard disk brands.

(6) Supports hard disk Hot-Swap and Hot-Plug.

### Man-Machine Interface:
(1) The LCD displays system, hard disk, fan, and temperature status.

(2) The LED displays read/write activity.

(3) Includes an audible alarm (buzz) to alert of hard disk failure and abnormal status of the fan and temperature.

### Monitoring Interface:
(1) Provides real-time or simulated RS-232 port and dedicated communication protocol through a connection with a COM or USB port.

(2) Provides SNMP function for standard network management support.

## ✱ 2. Product Specifications

| Dimensions | 195mm (D) / 146mm (W) / 86mm (H) |
|---|---|
| Weight (w/o hard drives) | Approx. 0.7kg |
| Temperature | Operating temperature: 0°C~65°C |
| | Storage temperature: -20°C~70°C |
| Power Required | +5V, +12V |
| Power Consumption (w/o hard disk) | Approx. 2.84W |

*Table 3: ARAID 5000 Specifications*

## ✱ 3. System Requirements

(1) Computer Interface: Connect the ARAID to a SATA III (6Gbps) port for maximum performance. Backwards compatible with SATA II (3 Gbps) and SATA I (1.5 Gbps) ports.

(2) Hard Disk Interface: The SATA III (6Gbps) hard disk is suggested to demonstrate the optimal efficiency. Backwards compatible with SATA II (3 Gbps) drives.

(3) Supported operating system (requires no additional drivers): Windows *(XP only supports AHCI Mode)*, Linux, SCO UNIX, FreeBSD, NetWare, Solaris, MAC OS and QNX, etc.

## ✹ 4. Description of Components
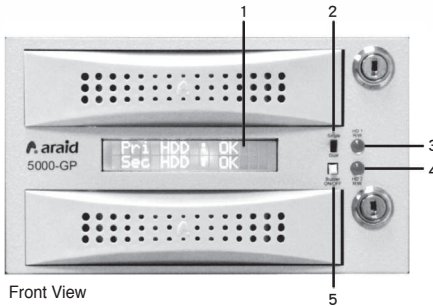


Front View

*Fig3: Front View of ARAID 5000*

**Front View**

1. LCD Display: Displays the information relating to hard disk, fan and temperature status.
2. Mode Selector Switch (Single/Dual): Select Single or Dual mode.
3. Upper Hard Disk LED (HD1 R/W): LED flashes when upper hard disk is reading or writing the information.
4. Lower Hard Disk LED (HD2 R/W): LED flashes when lower hard disk is reading or writing the information.
5. Audible alarm (Buzzer On/Off): Press this switch to temporarily disable the alarm and press again to re-enable the alarm.
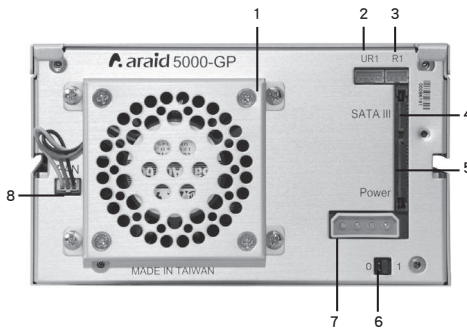


*Fig4:Rear View of ARAID 5000*

**Rear View and description of Jumper settings**

1. 6cm silent and cooling fan.
2. UR1:RS232 port (for USB).
3. R1:RS232 port (for COM Port)
4. SATA III data connector:Connects to the SATA port of the computer.
5. SATA power connector:Connects to the computer's SATA power supply.
6. Jumper Setting:

| Mode | 0 | 1 |
|---|---|---|
| RAID 0 | Close | Open |
| RAID 1 | Open | Close |

7. Power Connector (4-pin power connector):Connects to computer's 4-pin power supply.
8. Fan Power Connector

# IV. ARAID Setup

✱ **1. Hardware installation**

(1) Disconnect the computer power source.

(2) Connect with physical RS-232 Port:

Connect the 3-pin RS232 Internal Cable to R1 of ARAID 5000 and attach to the COM port of RS232 internal cable to the rear panel of the computer housing. Next, connect the COM port and ARAID COM port of the computer with the included RS232 External Cable.

> ⚠ **Caution**: If your COM port is built-in to the motherboard, please purchase your own COM port cable
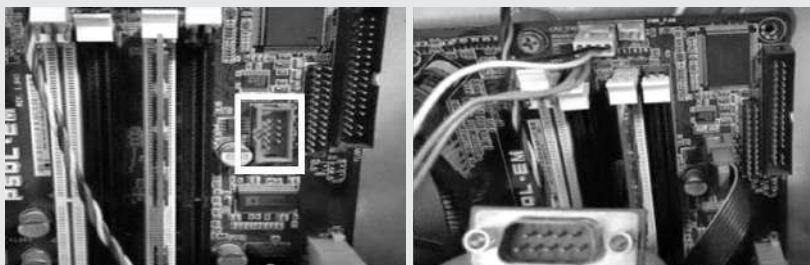


(3) Connect the simulated RS-232 through a USB port
*(ignore this step if you completed step 2 above.)*

1. If your computer has no RS-232 port, connect the 4-pin RS232 Internal Cable to UR1 of ARAID 5000 and attach the COM port of the RS232 internal cable to the rear panel of the computer housing. Next, connect the COM port and ARAID COM port of the computer with RS232 to USB cable.
2. Install the provided USB-to-RS232 driver. After installing the provided driver program, you may use the RS-232 simulation function provided by USB Port (normally set as following the COM3)

(4) Set the ARAID 5000 into the computer's open drive bays with the provided screws and connect power cable and signal cable, and then replace the computer cover.

*Table 4: Hardware Installation Steps*

RS232 Internal Cable

RS232 External Cable

SATA Cable(provide by user)

USB External Cable via RS232

**ARAID 5000-GP**

UR1    R1

SATA III

Power

4-pin power connector

0 1

Power Supply

ARAID 5000

COM port

Mother Board

SATA port

USB port
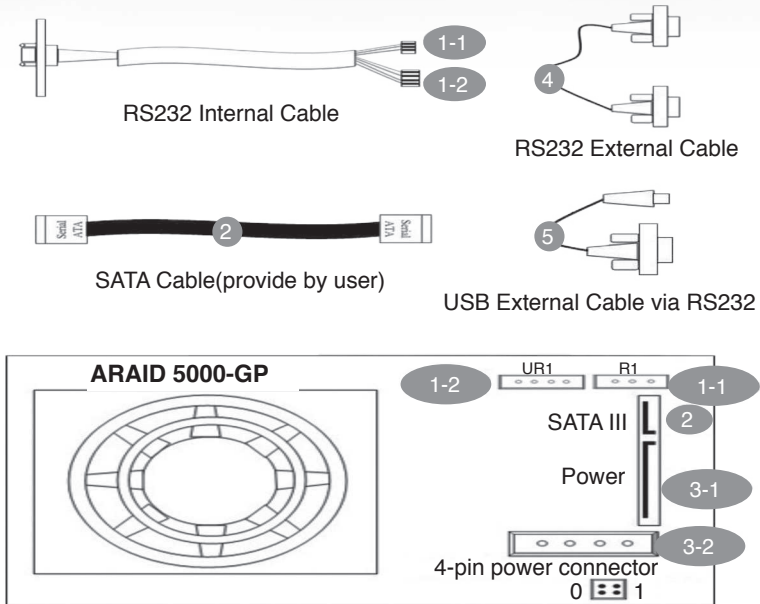
*Fig. 5: Hardware Installation Steps*

**✱ 2. Starting and Operation (for RAID 1 Mode only)**

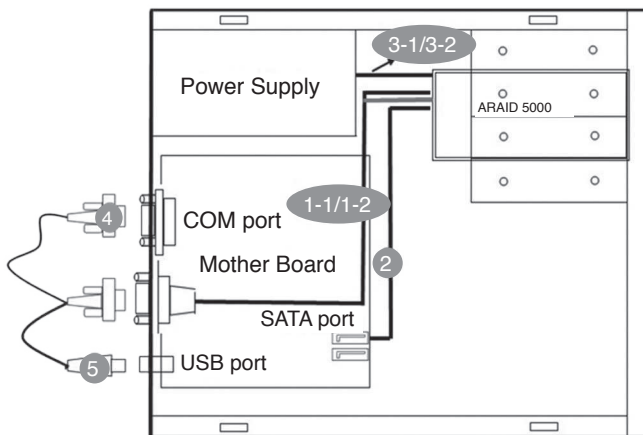| Switch Mode | Hard Disk | ARAID 5000 |
|---|---|---|
| Single | Single | If the hard disk is inserted into the upper bay, the reading and writing can be executed on the first disk only.<br><br>`Pri HDD : OK`<br>`Sec HDD : OFF` |
| | | If the hard disk is inserted into the lower bay, the computer cannot be started.<br><br>`Pri HDD : OFF`<br>`Sec HDD : OFF` |
| | Dual | Even if the upper and lower bays are inserted with hard disk, the reading and writing will be allowed on the upper-bay disk only; at this time, the power of the lower-bay disk is disconnected.<br><br>`Pri HDD : OK`<br>`Sec HDD : OFF` |
| Single ➜ Dual | Dual | If the upper and lower bays are inserted with a hard disk, the computer will execute the rebuilding function when shifting the switch of the panel to Dual Mode.<br><br>`Rebuilding ...`<br>`Pri ➜ Sec 02%`<br><br>⚠ **Warning**: Do not remove the Primary disk before completing the rebuilding of the hard disk to avoid system failure, information loss or system garbling that the computer cannot be restarted and even leading to hard disk failure. |
| Dual | Single | If using one hard disk, the system can be started whether the hard disk is inserted in upper bay or lower bay; however, it is strongly suggested that you should set the hard disk at "Pri" position of upper bay for using.<br><br>`Pri HDD : OK`<br>`Sec HDD : OFF` |

| Switch Mode | Hard Disk | ARAID 5000 |
|---|---|---|
| Dual | Dual | Placing two new hard disks that have never been used by ARAID.<br><br>Pri HDD : OK<br>Sec HDD : OK<br><br>⚠ **Caution**: When operating under RAID 1 Mode and the switch is set at "Dual" position, where two new hard disks never been used by ARAID are inserted, it is required to run the Partition or the Format of the hard disk in order to synchronize the content of these two hard disks. After that, it can be used as the system disk or the data disk.<br><br>⚠ **Caution**: When using two hard disk, ARAID 5000 would start from the Primary HDD as preset and the system would start with the Secondary HDD unless the Primary HDD cannot be started. |
| Dual | Dual | Rebuilding process (from upper bay to lower bay)<br>(1) Insert the hard disk into the upper bay to start the computer.<br><br>Pri HDD : OK<br>Sec HDD : OFF<br><br>(2) The rebuilding function will be started after inserting the Secondary HDD.<br><br>Rebuilding ...<br>Pri ➡ Sec  02%<br><br>(3) Rebuilding completed.<br><br>Pri HDD : OK<br>Sec HDD : OK<br><hr>Rebuilding process (from lower bay to upper bay):<br>(1) Insert the hard disk into the lower bay to start the computer.<br><br>Pri HDD : OFF<br>Sec HDD : OK<br><br>(2) The rebuilding function will be started after inserting the Secondary HDD.<br><br>Rebuilding ...<br>Sec ➡ Pri  02%<br><br>(3) Rebuilding completed.<br><br>Pri HDD : OK<br>Sec HDD : OK<br><hr>⚠ **Warning**: When the switch is at "Dual" mode position and two hard disks are processing rebuilding function, do not switch to Single position. Otherwise, the power of Secondary HDD will be disconnected and cannot execute the rebuilding in time. In this case, the system will execute the reading and writing action on Primary HDD only. |

*Table 5: Starting and Operation*

ARAID EYE PLUS is the management program allowing the user to monitor the current health status of the hard disks (bad sectors) and to control the real-time status of ARAID as well as to learn about the hard disk, and temperature related information. If an error warning is displayed, it can also send out a notification through e-mail.



*Fig. 6: ARAID EYE PLUS*

**✳ 4. Network Management (Linux version is for optional purpose)**

The "SNMP Agent" provides the enterprise-specific MIB, MIB II and Traps and it can be run under Windows 2000 / Server 2003 / XP Pro. / Win 7 or later, or Redhat / SUSE Linux. It allows the medium-large sized network administrator to manage dozens or even thousands of ARAID disk arrays. It can also be used with HP OpenView, IBM NetView and OpManager network software to do the central management in order to control the hard disk, fan and temperature status for all arrays.



*Fig. 7: Network Management System*

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✱ **5. Checking for ARAID 5000 compatible drives**

To check the suitable hard disks for ARAID, please visit our website as follows:
*http://www.accordance.com.tw/web_search2/cus/index.php*

※ Compatibility with Western Digital hard disk:
· If selecting Western Digital drives, we suggest that the customer should use the WD Enterprise class or RAID series and specifically not use the Caviar series (Blue/ Green/Black label).

· Western Digital warns against using Caviar series drives in a RAID array. (*http://wdc.custhelp.com/app/answers/detail/a_id/1397*)

# V. ARAID T5000 (External model)

✳ **1. Description of Component**



1. Power ON/OFF switch.
2. AC110~220V power socket.
3. RS232 Connector (COM port)

*Fig. 8: Front View and Rear View of ARAID T5000*

**Product specifications**

| Dimensions | 240mm (D) /183.2mm (W)/156.15mm (H) |
|---|---|
| Weight (w/o hard disk) | Approx. 2.68 kg. |
| Power Supply Unit | 63W Standalone PSU |
| Power Consumption (w/o hard disk) | Approx. 5.14W~7.32W (varied depending on the model) |

*Table 6: Specifications of ARAID T5000*

✱ **2. Types (Host Interface) of ARAID T5000**

| Type of Interface | Cable | Description |
|---|---|---|
|  |  | **1. SATA connector** |

*Table7: Types of ARAID T5000 External Model*

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## VI. ARAID LCD Message Comparison Table
### (for RAID 1 User)

| Status | Description | Action |
|---|---|---|
| Pri HDD : OK<br>Sec HDD : OK | Both hard disks are running normally. | |
| Pri HDD : OK<br>Sec HDD : Fail | Upper bay hard disk is normal, but lower bay hard disk is failed or abnormal. | Replace lower bay hard disk. |
| Pri HDD : Fail<br>Sec HDD : OK | Lower bay hard disk is normal, but upper bay hard disk is failed or abnormal. | Replace upper bay hard disk. |
| Pri HDD : Fail<br>Sec HDD : Fail | Upper bay and lower bay hard disks are faulty or abnormal. | Replace both hard disks. |
| Pri HDD : OK F<br>Sec HDD : OK | Fan is abnormal | Check if the fan power plug is loose. |
| Pri HDD : OK<br>Sec HDD : OK T | Overheat warning<br>(preset value is 65°C / 149°F) | Check if the fan is working normally and if the storage temperature is over 65°C. |
| Wrong Capecity<br>Pri > Sec | The capacity of the Target HDD is less than the Source HDD | Replace the Target HDD with a drive of capacity not less than Source HDD. |
| Wrong Capecity<br>Sec > Pri | The capacity of the Target HDD is less than the Source HDD | Replace the Target HDD and its capacity shall not be less than Source HDD. |
| Source Fail<br>Pri > Sec | Source HDD failed during automatic rebuilding. | Replace it with a healthy Source HDD. |
| Source Fail<br>Sec > Pri | Source HDD failed during automatic rebuilding. | Replace it with a healthy Source HDD. |
| R1: System fail<br>Pri:S Sec:S | Both hard disks are used as Source HDD in ARAID. | Insert the designated Source HDD to start the computer. If starting is succeed, insert Target HDD. |
| R1: System fail<br>Pri:T Sec:T | Both hard disks are used as Target HDD in ARAID. | Insert the designated Source HDD to start the computer. If starting is succeed, insert Target HDD. |

| Status | Description | Action |
|---|---|---|
| R1: System fail<br>Code : 0F | RAID configuration of the two hard disks do not match. | Insert the designated Source HDD and start the computer. Once the startup is successfully completed, insert the Target HDD. |
| R1: System fail<br>Code : 00 | Hard disks undetected. | Check if the inserted hard disks are functioning normally. Then, re-insert the designated Source HDD and start the computer. Once the startup is successfully completed, insert the Target HDD. |
| R1: System fail<br>Code : 04 | Unable to find RAID configuration information in hard disks. | Insert the designated Source HDD and start the computer. Once the startup is successfully completed, insert the Target HDD. |

*Table8 : ARAID LCD Message Comparison Table*

※ If the hard disk fails during the rebuild, ARAID 5000 will skip the bad sectors and then complete the rebuild.
※ Do not use the hard disk which has been determined failed by ARAID 5000, otherwise it may lead to system damage.
※ The meaning of LCD Display : Pri = Upper bay ; Sec = Lower bay.

# VII. FAQ (for RAID 1 Users)

### 1. Power failure while hard disk rebuilding is in progress

**Q:** What should I do if the power fails while auto-rebuild is in progress and I don't have UPS equipment?

**A:** Simply turn on the computer again and the Automatic Reset Function (ARF) will continue the rebuilding progress from the interrupted point by itself. Whether rebuilding progress was from Pri. to Sec. (upper bay to lower bay) or from Sec. to Pri. (lower bay to upper bay), when resuming the power, the computer will boot from the source drive by itself and continue the rebuilding automatically (in this case, the Panel Switch should be continue to be set at "Dual Mode").

### 2. Using ARAID-specific Mirror-On-Demand anti-virus function.

**Q:** How to prevent the hard disk from getting infected by a virus?

**A:** (1) If one of the hard disks in the ARAID is infected, both of them will be infected at the same time. Therefore, ARAID has been specially designed to set single disk operation directly on the front panel in order to the limit reading and writing on the computer to a single hard disk. After confirming the input data is accurate, the user can proceed the rebuilding steps for achieving synchronized content of both hard disks.

(2) Through our experiences in dealing business with customers in Japan, Taiwan Power Plant Company, Chunghwa Telecom and Taiwan Philips as well as that possessed by our MIS personnel, to accomplish the optimal anti-virus effect, it is strongly suggested that the user should purchase one to several trays and several hard disks for doing the off-line backup regularly. In the event the hard disk is infected, the user may select a suitable backup hard disk and restart the uninfected system and information within the shortest period of time (i.e. executing the father-son-grandson multi-generation rebuilding function described in our catalogue).

### 3. Replacement or upgrading of hard disks.

**Q:** What is the procedure when a hard drive fails?

**A:** (1) If you need to replace the hard disk or pull out the disk for other reasons, to protect the completeness of the data, please pull out the hard disk after shutting down the equipment as much as possible. If it is not allowed to shut down the equipment, execute such work during the period when the ARAID reading and writing is least frequent (when the LED indicator is not flashing). Because if you pull out the hard disk without shutting down the equipment, the correction message may appear under Windows when using such hard disk later on; further, there's a risk that the data contains in the hard disk may get lost once you decide to execute the correction.

**A:** (2) If the hard disk to be replaced is the same series and brand but with bigger capacity, please insert the original disk into the upper bay and then use it to start the computer. After power-on is completed, insert the new disk into the lower bay and the hard disk automatic rebuilding function will begin (if the rebuilding isn't executed, shift the Panel Switch from "Single" to "Dual" and the HDD TYPE under BIOS should still set at "AUTO").

> ⚠ **Caution**: Be sure to insert the smaller capacity hard disk into the upper bay and the bigger capacity hard disk into the lower bay, and they should not be wrongly inserted.

> ⚠ **Caution**: Do not mix SATA 1 (1.5 Gbps), SATA II (3 Gbps) and SATA III (6.0 Gbps) hard disks in the ARAID to avoid affecting the efficiency.

> ⚠ **Caution**: We recommend tag a sticker on the panel of the tray for ease of identifying the brand, capacity and model number of the hard disk.

## 4. Incompatibility of the ARAID with my existing equipment/operating system:

**Q:** What is the procedure if an incompatibility exists with my equipment or operating system when using an ARAID product?

**A:** If the customer encounters any incompatible scenario, please contact us and we will help you solve the problem.

## 5. Hot swap target HDD out of ARAID during the rebuilding.

**Q:** What can I do if the computer hang up after hot swap a target HDD out of ARAID during the rebuilding?

**A:** Hot swapping ARAID 5000's traget HDD during rebuilding, the system will hang up 60 seconds to process SATA data transmission. The exact processing time will be varied based on the environment.

# VIII. Product Warranty
## and After-Service

**1. Duration of product warranty:**

One year warranty starting from the purchase date.

**2. In the event the ARAID does not operate as expected, please refer to the ARAID LCD Message Comparison Table and solution (p.16) as well as FAQ (p.18).**

**3. If the product has failed under normal operation status, where the error has been diagnosed by Accordance as not having been caused by unauthorized action and the product is still within its Warranty Period, then Accordance shall provide the maintenance services as free of charge.**

**4. If any of the followings happens during the Warranty Period, Accordance shall charge reasonable maintenance fees:**

(1) Where the warranty label has been destroyed or becomes incomplete or where the unauthorized disassembly is obvious.

(2) Where the failure is caused due to improper storage location, falling, moving or transportation.

(3) Where the damage is caused by unstable voltage such as fire, earthquake, flood, lightning strike or other natural disasters.

(4) Where the failure or the damage is due to use under the conditions beyond that stated in the User's Manual.

**5. The maintenance services will be still be available if over its Warranty Period, however, Accordance will charge reasonable maintenance fees and parts cost.**

# IX.Contact Us

Should you have any questions or other suggestions on the use of the product, please fill out the following customer/distributor PQR Table and then send it back to us. Your opinions will be the momentum spurring our growth. Your feedback will be valuable for us. Thank you for your attention!

No. _____  Date: _____/_____/_____

Company Name: _____  Your name: _____

| Product Information | |
|---|---|
| Product Name / Model | |
| Serial Number | |
| ARAID Firmware Revision | |
| Manufactured/Purchase Date | |
| Equipment & Environment (**) Required | |
| PC or Motherboard Brand & Model (**) | |
| BIOS (**) Phoenix or Award or AMI | |
| Chipset (**) | |
| HDD 1(**) Brand/Model/Series number | |
| HDD 2(**) Brand/Model/Series number | |
| CPU | |
| RAM | |
| OS (**) Version of Windows or Linux or… | |
| Benchmark / Application if available | |
| Test Procedure & Error Messages | |
| 1 | |
| 2 | |
| 3 | |
| Symptom (please outline the content) | |
| 1 | |
| 2 | |
| 3 | |

*Table 9: PQR Product Error Report Sheet*

Service Line: +886-2-2726-3239 (service time: Monday~Friday, AM9:00-PM6:00 Taiwan time)
Fax: +886-2-2728-1322
Customer Service E-mail: sales@accordance.com.tw
Contact Address: 10F., No. 258, Nanyang Street, Xizhi District, New Taipei City 22154, Taiwan

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**SATA III RAID 1 Disk Array Subsystem**

▶ User's Manual
▶ マニュアル
▶ 中文使用手冊
▶ 사용설명서

**ACCORDANCE SYSTEMS INC.**