SIEMENS

SIMATIC IPC647D/847D Hardware RAID Configuration

Compact Operating Instructions

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Preface

These Compact Operating Instructions describe the special functions of a SIMATIC IPC647D and IPC847D as a Hardware RAID system based on a PCIe hardware RAID adapter card with SAS interface for hard disks.

They are intended both for programming and testing personnel who commission the device itself and connect it to other units (automation systems, programming devices) as well as for service and maintenance personnel who replace the add-on card or perform troubleshooting.

Validity of the Operating Instructions

These Compact Operating Instructions apply to the SIMATIC IPC647D and IPC847D standard devices. They describe the technical differences between the standard device and a standard device that is equipped with a Hardware RAID adapter card and hard disks with SAS interface.

Observe all safety information in the basic SIMATIC IPC647D and IPC847D Operating Instructions. The information in these Compact Operating Instructions takes precedence over statements in the basic Operating Instructions, the release notes, and online help.

Conventions

The acronyms "IPC", "PC" and the term "device" are also used in place of the product designation of the SIMATIC IPC in these Compact Operating Instructions.

History

The following versions of these Compact Operating Instructions have been published previously:

Version	Comments
08/2014	First edition

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Overview

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1.1 Product description

SIMATIC IPC with Hardware RAID

For the D series of the SIMATIC IPC647D/847D, a new Hardware RAID adapter card has been introduced in connection with SAS hard disks.

The new features and modifications of a device that is equipped with Hardware RAID adapter card and SAS hard disks are listed below:

- New Hardware RAID system equipment with "Hot Spare Drives", optional in the IPC847D.

- The following drives can be installed in the front drive cage for RAID operation:
  - Up to 2 removable drive bays for IPC647D
  - Up to 4 removable drive bays for IPC847D

- The drives in the front drive cage are actively cooled by a central fan.

  Notes:
  - Observe the installation instructions for the device.
  - The fan is monitored, and the speed is controlled as a function of the device's internal temperature.
  - The fan is mounted on the front drive cage with vibration damping.
  - The housing cover must be opened to replace the fan.

- Removable drive bay with improved access protection

Hardware RAID adapter card

The Hardware RAID adapter card with ASR8405 controller offers performance and data security for systems with maximum availability requirements:

1.1.1 Scope of application

The SIMATIC IPC offers system integrators, cabinet designers, system engineers and machine designers a 19" rack PC platform for high-performance applications and IT applications on the control and cell level for:

● Process and visualization applications

● Industrial image processing

● Quality assurance and monitoring tasks

● Measurement, control and rule-based tasks

● Data acquisition and management

The SIMATIC IPC has CE certification for use in the industrial sector as well as in residential and commercial areas and small businesses. In addition to the industrial applications, therefore, it can also be used in building automation or in public facilities.

1.1.2 Highlights

More performance for the most demanding applications

- Reduced load on the main processor during the rebuild

- Fast 1 TByte SAS hard disks for maximum speed when reading and writing data

More system availability and service-friendly arrangement

- Auto-Rebuild for change of hard disk

- "Zero-Maintenance Cache Protection" protects the data in the controller cache without battery backup in the event of a power failure

Highly compatible to industrial standards:

- High service friendliness

- Distinct diagnostic features

High investment security:

- High continuity of the components/design

- Guaranteed spare parts availability for at least 5 years

High system availability:

- SIMATIC IPC DiagMonitor – PC diagnostics/message software by way of OPC/SNMP/LAN

- RAID based on SAS hard disks through an intelligent expansion module

- RAID1 – redundant data storage on two hard disks, also "hot swap" in connection with removable drive bays

  IPC847D: Configuration hot-spare drive available for order.

- IPC847D: RAID5 – striping with parity on three hard disks, "hot swap" in connection with removable drive bays

  Configuration hot-spare drive available for order.

1.1.3 Function

- Integrated monitoring functions via SIMATIC IPC DiagBase

- Enhanced diagnostic/messaging by way of Ethernet, e-mail, text, and for direct input in SIMATIC software by way of OPC (optional using SIMATIC PC DiagMonitor):

  – Hard disk status, hot spare drives of a RAID system are not displayed

  – Automatic logging of all messages to a log file

  – Option of remote monitoring of networked SIMATIC IPCs

- RAID1 (mirroring):

  For automatic data mirroring on two hard disks. Configurations with hot-spare drive available for order.

- RAID5 (striping with parity):

  For increased memory capacity and improved data security on three hard disks. Configurations with hot-spare drive available for order.

1.1.4 Features

General features	
Design	• PCIe x8 expansion module The adjacent slot must remain free. • Intelligent PCIe x8 RAID controller Type: PMC Sierra ASR-8405 for max. 4 SAS drives • With CPU, cache memory (thus, negligible effect on the system) • With battery backup for data reliability in the event of power failures
Mounting locations for IPC647D drives	• Front: – Maximum 2 × slimline removable drive bays
Mounting locations for IPC847D drives	• Front: – Maximum 4 × slimline removable drive bays

Drives	
Hard disks	Maximum 4 × 3.5" SAS hard disks in the removable drive bay The quantity depends on the IPC type
Hard disks 3.5" (SAS) IPC647D	Installation in the front drive cage of the removable drive bay • RAID1 1000 GB (2 × 1000 GB, SAS)
Hard disks 3.5" (SAS) IPC847D	Installation in the front drive cage of the removable drive bay • RAID1 * 1000 GB (2 × 1000 GB, SAS) • RAID5 * 2000 GB (3 × 1000 GB, SAS) * Additional hot-spare drive can be ordered as an option

1.2 Status displays of an IPC with Hardware RAID adapter card

The following statements apply if the drive equipment of the device has not been changed from the delivery state.

IPC647D

Front status displays			
HDD	Access to hard disk	OFF [1]	-
HDD0 ALARM HDD1 ALARM	Hard disk alarm of the HDDs integrated in RAID in connection with monitoring software	OFF	RAID is OK
		One RED	HDD0 or HDD1 is not OK
		All RED	RAID is not OK [2]
		All flashing	RAID is synchronizing

[1]   The RAID hard disk activity is indicated via the LEDs of the removable drive bay.

[2]   See section "RAID System" in the Operating Instructions of the IPC for localization of the hard disk involved.

IPC847D

Front status displays			
HDD0 ALARM HDD1 ALARM HDD2 ALARM	Hard disk alarm of the HDDs integrated in RAID in connection with monitoring software [3]	OFF	RAID is OK
		One RED	HDD0, HDD1 or HDD2 is not OK
		All RED	RAID is not OK [1]
		All flashing	RAID is synchronizing
HDD | HDD3 ALARM [2]	Hard disk activity [2]	OFF	RAID is OK
	Hard disk alarm of the HDDs integrated in RAID in connection with monitoring software [3]	OFF	RAID is OK
		RED	HDD3 is not OK
		All RED	RAID is not OK [1]
		All flashing	RAID is synchronizing

[1]   See section "RAID System" in the Operating Instructions of the IPC for localization of the hard disk involved.

[2]   The HDD | HDD3 ALARM LED does not indicate hard disk activity for Hardware RAID. The Hardware RAID hard disk activity is indicated via the LEDs of the removable drive bay.

[3]   A hot-spare drive of a RAID system is not displayed.

Safety information 2

2.1 Ambient and environmental conditions

> ⚠ **WARNING**
>
> **Observe environmental conditions**
>
> If the following conditions for system installation are not observed, approvals in accordance with UL 60950-1 and EN 60950-1 are rendered void and there is a risk of overheating and personal injury.

When you plan your project, you should make allowances for:

- Climatic and mechanical environmental conditions defined in the "General technical data" chapter of the operating instructions.
- Avoid extreme ambient conditions as far as possible. Protect your device against dust, moisture and heat.
- This device was designed for use in a normal industrial environment. SIMATIC Rack PCs may not be operated in severe environments which are subject to caustic vapors or gases without taking additional protective measures (such as the provision of clean air.)
- Do not expose the device to direct sunlight.
- Install the device in such a way that it poses no danger, for example, by falling over.
- Ensure that the installation opening for the device is splash-proof in areas which may be subject to splash water.
- Ensure there is sufficient volume for air circulation and heat transport so that the device is adequately ventilated.
- Do not cover the ventilation slots of the enclosure. A clearance of at least 5 cm must be maintained at the back of the device, depending on the cabling.
- Do not allow the maximum air intake temperature directly in front of the air intake opening to exceed 35° C. The maximum air intake temperature must be taken into consideration in particular when sizing enclosed control cabinets.
- The device meets requirements for fire protection housings to EN 60950-1 and can be installed without additional fire protection enclosure.
- The connected or built-in peripherals should not introduce a counter emf in excess of 0.5 V into the device.

See also

General specifications (Page 35)

2.2 Access protection

⚠ CAUTION
Protection against access by unauthorized persons
An unauthorized user can operate the device incorrectly and bypass logon by restarting the device.
Operator actions by unauthorized persons jeopardize operational reliability.
Take the following safety precautions:
• Lock the front door and the removable drive bay.
• Do not use keyboards with an on/off button (Power button).
• If the device has a on/off button, assign the parameters of the function of the on/off button to meet your requirements under Windows. You can find the settings in the "Power Options" menu.

Commissioning the device

3

3.1 Information on commissioning

General information on commissioning can be found in section 4 "Commissioning the device" of the Operating Instructions for the devices.

Requirements for Adaptec Storage Manager software

The following requirements must be met before you use the software for the first time during commissioning:

- 4 GB main memory

- The operating system is restarted.

- The operating system is password-protected.

- Login and password of the operating system and Storage Manager software are the same.

3.2 RAID system

SAS Hardware RAID adapter card with own CPU and cache memory:

- For applications with stringent requirements regarding negligible system effects of the RAID system.

- With maintenance-free battery backup for high data reliability.

- The RAID controller with PCIe x8 interface occupies one PCIe x16 expansion slot of the device.
  The adjacent slot must remain free, and a perforated slot bracket must be mounted to ensure cooling.

3.3 SAS Hardware RAID system

The system is configured as RAID1 or RAID5 (only for IPC 847D). The data backup takes place on two or three SAS hard disks. As a result, the system is able to continue operation in the event of a defective hard disk or port connection problems, thereby achieving high availability. An optionally available hot-spare drive (only for IPC847D) can further increase the availability of the system.
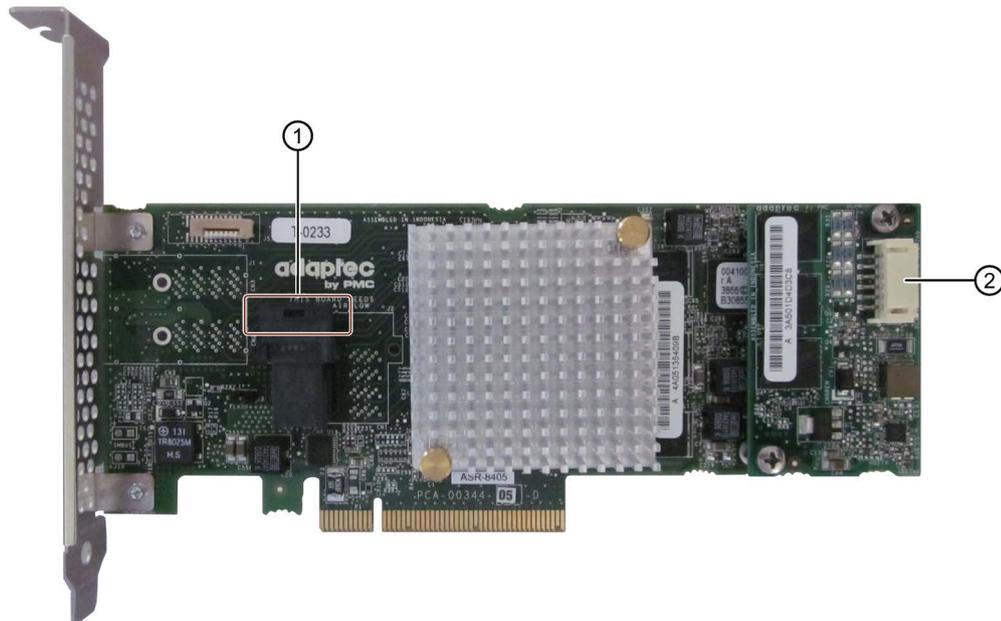
①	Connection for the SAS data cable
②	Connection for Zero Maintenance Module (ZMM)

The figure below shows the SAS data cable.
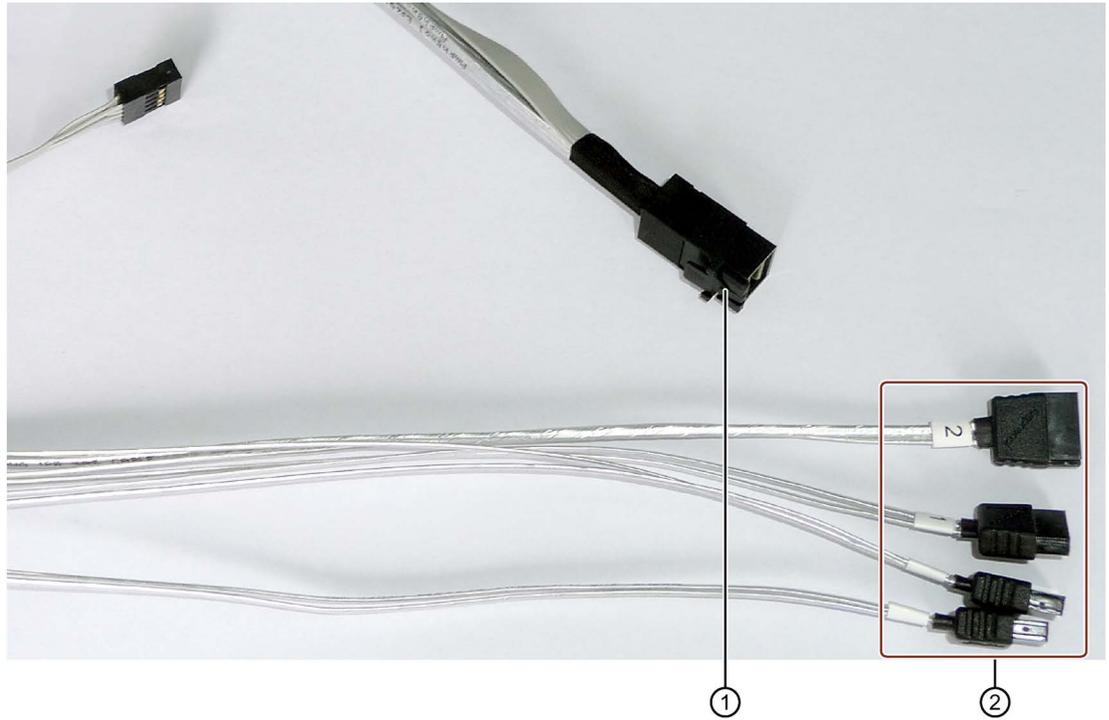
①		Connection for the Hardware RAID adapter card
②		Hard disk connections 0-3 (for the removable rack

The installed RAID controller for the "Adaptec RAID ASR8405" module is displayed as follows in the BIOS:

```
Adaptec RAID BIOS V7.5-0 [Build 32033]
(c) 1998-2014 PMC-Sierra, Inc. All Rights Reserved.

◄◄◄ Press <Ctrl><A> for Adaptec RAID Configuration Utility! ►►►

Controller #00 found at PCI Slot:00, Bus:02, Dev:00, Func:00
Controller Model: ASR8405
Firmware Version: 7.5-0[32033]
Memory Size    : 1024 MB
Serial Number  : 4A05135406D
SAS WWN        : 50000D11079B6200
AFM700 Status  : Ready
Controller State: Normal

Dev#0 - RAID-5    119.99 GB      Optimal
1 Array(s) Found

BIOS Installed Successfully!
```

Additional software and documentation

The following software documentation can be found in the "Drivers\RAID\Adaptec" directory of the "Documentation and Drivers" DVD that ships with the product:

- Adaptec RAID Controller Quick Start Guide
  The PDF file describes how you install the RAID controller and create a bootable RAID1 or RAID5 array. It also describes how you install the operating system and the controller driver on the array.

- Adaptec RAID Controller Installation and User Manual
  The PDF file contains comprehensive information on installation and configuration of the RAID adapter card and the connected devices.

- Adaptec maxView Storage Manager User Manual
  The PDF file contains comprehensive information on installation and use of Adaptec maxView Storage Manager.

- Command Line Utility User Guide
  The PDF file contains the user manual for the command line utility program and comprehensive information on the use of ARCCONF.

RAID system management functions

The RAID system is fully set up ex works. The installed SIMATIC diagnostic software is used to display the status of the RAID system. Additional software is not required.

However, if necessary, you can install additional software from the supplied Documentation and Drivers DVD, which also contains the associated software description. In order to use the software, the operating system must be password-protected. The password must be assigned before the software is installed. In a correct installation, the operating system password and RAID software password are the same.

Note

The status of the RAID system is indicated by the SIMATIC diagnostic software.

A hard disk can be synchronized at operating system level if a fault is detected. It may take a very long time to synchronize a new hard disk in the background, depending on the size of the hard disk and on the system load. It may take several hours or even days in the case of extremely high hard disk load. Guide value for the duration: < 3 h with 90% HDD system load and RAID5 with HDD 1 TB.

The safe system states RAID Level 1 or 5 are only reached once synchronization has been successfully completed. In addition, system performance may be limited in the case of a manually started Fix & Verify operation until completion of the verify phase.

Note

Management of the RAID system

When setting up the RAID system, set the write cache of the RAID controller as follows (see the additional documentation of Adaptec):

- Write Caching - Enable with Backup Unit
- create RAID via: Build/Verify

Password protection for Hardware RAID setup

In order to prevent access to the Adaptec Option ROM, follow these steps:

- Set the supervisor password in the BIOS setup, "Security > Set Supervisor Password" menu.
- Disable the keyboard operation during the BIOS self test (POST) in the BIOS setup, "Security > Option ROM keyboard" menu.

Comments about faults

Note

The data is synchronized in the case of a hard disk failure. The system response may be delayed depending on the processor and hard disk loads. In extreme cases, the execution of keyboard, mouse or touch screen commands may be briefly delayed.

The result may be faulty operations of the machine or plant.

- Do not operate any safety-relevant functions during a hard disk failure.
- Always replace the defective drive with a new one of the same type and capacity.

Replacing a faulty RAID system drive

Replace the faulty drive with a new drive of the same type and capacity to return to the safe RAID1 or RAID5 state after a fault.

The diagnostic software indicates the following:

- A defective drive
- Details of the functioning hard disk

The defective hard disk is displayed with port number.

Note

Deviating figures

The following figures and notes apply only to the delivery state of the device without any changes or expansions.

The figure below shows the drives in the removable drive bay using the example of RAID5 with hot-spare drive.

①	Removable drive bay 0
②	Removable drive bay 1
③	Removable drive bay 2
④	Removable drive bay 3
⑤	"Power" LED; power supply present
⑥	"HDD" LED, access to hard disk

Assigned LED [1]	RAID BIOS	RAID software	Cable connection	Installation location	Enclosure labeling
HDD0 ALARM	Port 0	Device 0	0	Removable drive bay	SAS HDD0
HDD1 ALARM	Port 1	Device 1	1	Removable drive bay	SAS HDD1
HDD2 ALARM	Port 2	Device 2	2	Removable drive bay *	SAS HDD2
HDD3 ALARM	Port 3	Device 3	3	Removable drive bay *	SAS HDD3
* IPC847D only					
The removable drive bays are installed in the front drive cage.					

[1]   If the hard disk is defective and the SIMATIC monitoring software is installed, the ALARM LEDs light up individually or simultaneously on the front.

Integrating a new hard disk

A hard disk is integrated automatically into the RAID if it fulfills one of the following requirements:
- The hard disk is brand new.
- The hard disk is set up as a global spare drive.
- The hard disk is set up as a specific dedicated spare drive.

Expanding the device and assigning the device parameters

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4

</div>

This section describes the permitted mounting variants of an IPC with Hardware RAID adapter card and SAS drives and the resulting permitted operating conditions. Hard disks with SAS interface can only be installed in the removable drive bay.

4.1 Retrofitting instructions for IPC647D

Temperature range 0 °C to 35 °C

The maximum permissible power loss of the expansion cards amounts to 75 W.

Distribution to the slots without exceeding the total power:

- Maximum of 25 W for the expansion cards in slots 1 to 4

Maximum permitted configuration
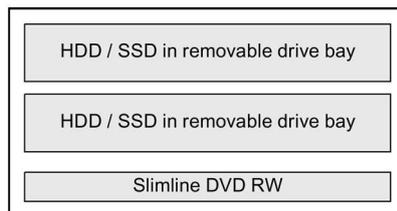
HDD / SSD in removable drive bay
HDD / SSD in removable drive bay
Slimline DVD RW

Note

The hard disks mounted in the removable drive bay must not be exposed to mechanical loads during operation (see technical specifications). This limitation does not apply to the use of SSDs.

4.2   Retrofitting instructions for IPC847D

Temperature range 0 °C to 35 °C

The maximum permitted power loss of expansion cards is 80 W.

[1] Hard disk in the removable drive bay

⚠ CAUTION

Risk of malfunctions resulting from second RAID configuration

Two RAID configurations interfere with one another. The device no longer functions properly. Machine or system errors may result.

- Do not install an additional second RAID configuration in the case of devices with RAID.
- Remove HDD or SSD that have been taken from an earlier RAID system. They also count as a second RAID configuration.
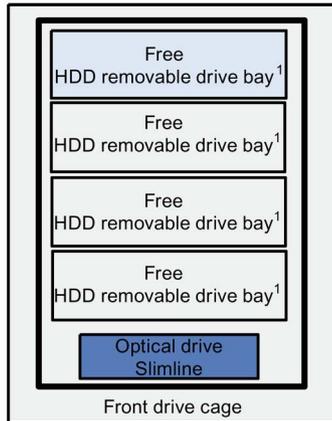

Note

The hard disks mounted in the removable drive bay must not be exposed to mechanical loads during operation (see technical specifications). This limitation does not apply to the use of SSDs.

Maintaining and repairing the device

5

> ### ⚠ CAUTION
>
> **Device expansion by qualified personnel**
>
> Work on the open device may only be carried out by qualified personnel. Within the warranty period, you may only expand the hardware with memory and expansion cards.

> ### ⚠ CAUTION
>
> **Electrostatic-sensitive devices**
>
> The device contains electronic components which are destroyed by electrostatic charges. This causes malfunctions and damage to the machine or plant.
>
> Make sure you take precautionary measures even when you open the device, for example, when opening device doors, device covers or the enclosure cover. Additional information is available in the (ESD) guidelines for handling electrostatic-sensitive devices.

5.1   Removing and installing the Hardware RAID adapter card

Requirement

For installation of the Hardware RAID adapter card, you require the following:

- A T10 screwdriver
- The Hardware RAID adapter card with connection for the SAS data cable ① and connection for the capacitor block of the ZMM ②

- A capacitor block of a maintenance-free battery backup module (ZMM)
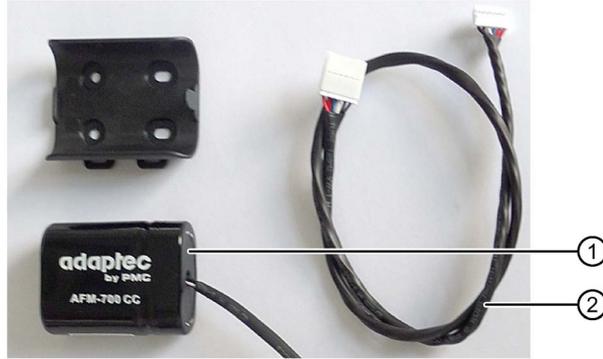
①	Capacitor block
②	Extension, only needed for IPC847D

- An adapter cable for connection of the hard disk drive ① to the RAID module

Observe the numbering of the connections ②.

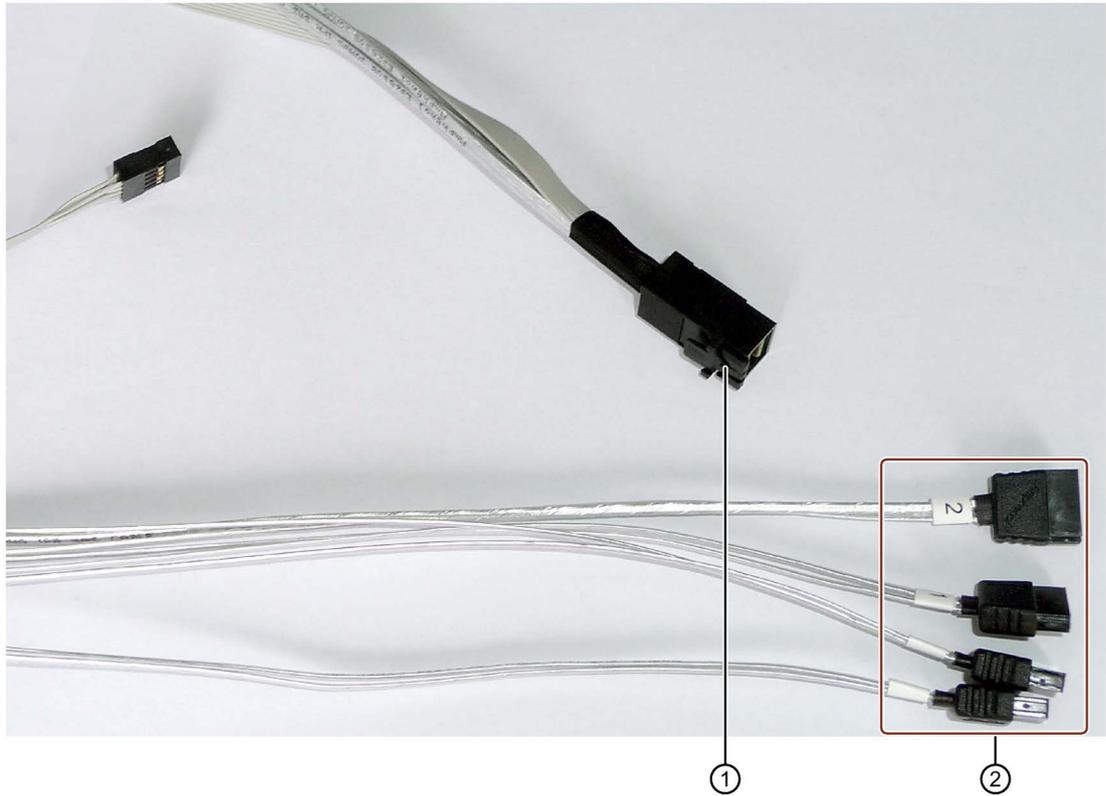| NOTICE |
| --- |
| **Capacitor block must be discharged** |
| When you remove or install a charged capacitor block, the components of the RAID adapter card may be damaged, resulting in data loss. |
| Remove or install a capacitor block only in completely discharged condition. The Siemens genuine spare part is supplied with discharged capacitor block. |
| Discharge an installed capacitor block as follows:
1. Shut down the operating system properly.
2. Disconnect the device from the supply system.
3. Wait at least 10 minutes.
   If the capacitor is not discharged, a yellow LED close to the connector lights up.
4. Only remove the connector when the yellow LED is extinguished. |

Procedure for IPC647D

This section describes the installation of the Hardware RAID adapter card with capacitor block for the SIMATIC IPC647D.

1. Disconnect the device from the supply system.
2. Remove the bus frame.
3. Connect the adapter cable to the appropriate existing drives. Loosen the screws for the power unit if necessary.

   - Plug in the adapter cable as follows:
     – Connector 0 in drive 0
     – Connector 1 in drive 1
   - Make sure that the connector latch engages.
   - Run the adapter cable S-shaped to the front and from there to the expansion card.

     The cable is laid in the front area under the bus frame in the final assembled state.
   - First plug the adapter cable into the RAID module, if the bus frame is mounted.

     The HDD cables are not attached to the drive rack in this case.

4. Secure the capacitor block to the bus frame with two cable ties.

    Make sure that the locks of the cable tie, as indicated, are installed in the plug-in direction in relation to the motherboard.

    Ensure that the cable is not damaged during installation.
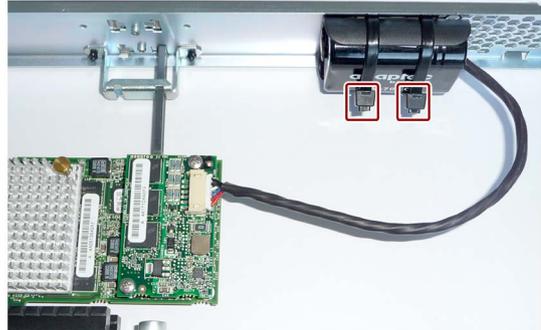
5. Install the RAID adapter card in slot 1. The adjacent slot must be free. The free slot is sealed with a perforated slot bracket to ensure cooling.

6. Secure the RAID adapter card with the holder.

7. Insert the capacitor block cable connector at the marked position.

    The connector snaps into place.

8. Install the bus frame in the housing. Ensure that no cables are crimped when inserting.

9. Make the connection between the RAID adapter card and adapter cable as follows:

    Insert the adapter cable at the marked position (viewed from below).

    Make sure that the connector latch audibly engages.

For removal, follow the steps in reverse order.

Procedure for IPC847D

1. Disconnect the device from the supply system.

2. Attach the holder ① for the capacitor block to the module bracket ③ with two screw ②.

   Press the capacitor block ④ into the holder, and secure the capacitor block with a cable tie ⑤.

3. Re-install the module bracket ③ in the device.

4. Install the RAID adapter card in the following slot:
   - Bus board variant 1 with 7 PCI slots: Slot 7

     Notes:
     – Slot 6 must be free and is sealed with the supplied perforated slot bracket to ensure cooling.
     – Slot 8 may contain an expansion card with a maximum power consumption of 10 W.

   - Bus board variant 2 with 8 PCI slots: Slot 6

     Notes:
     – Slot 5 must be free and is sealed with the supplied perforated slot bracket to ensure cooling.

5. Secure the RAID adapter card with the holder.

6. Insert the capacitor block cable connector at the marked position.

7. Insert the adapter cable at the marked position.
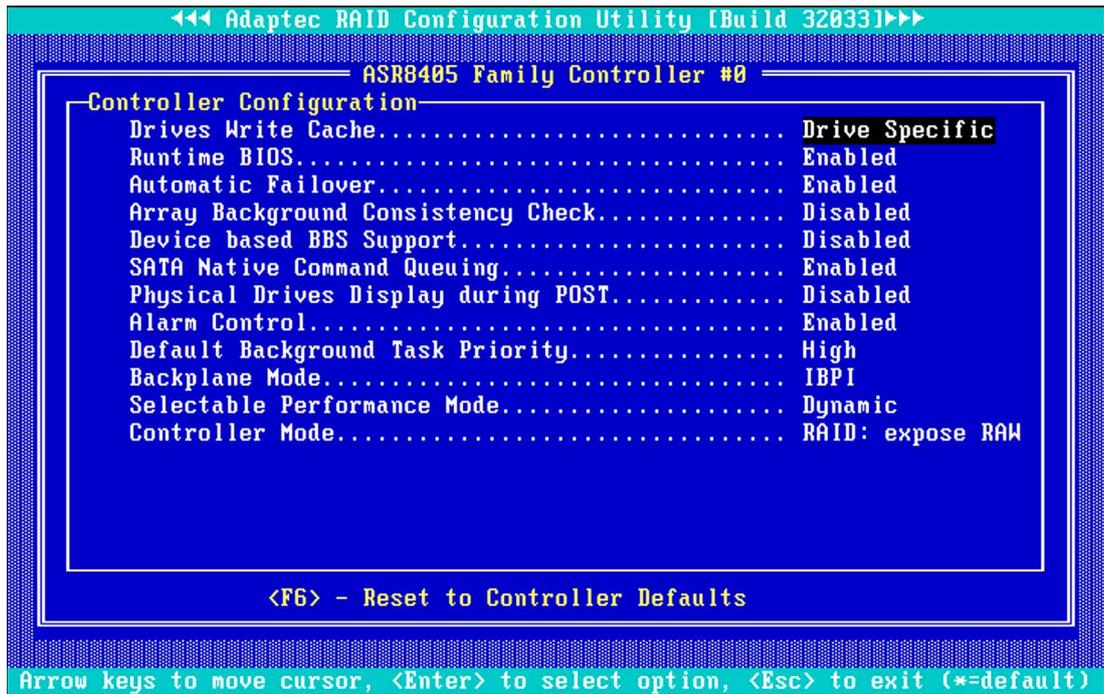
   Make sure that the connector latch engages.

8. Connect the adapter cable to the required drives.

For removal, follow the steps in reverse order.

5.1.1 Configuring the RAID adapter card

After replacement of the RAID adapter card, configure it in the BIOS setup as follows:

1. Switch on the device.

2. During the boot phase, press the key combination <CTRL+A>.

3. Assign the parameters under "Controller Configuration" as follows:

```
◀◀◀ Adaptec RAID Configuration Utility [Build 32033]▶▶▶

══════════════ ASR8405 Family Controller #0 ══════════════
┌Controller Configuration─────────────────────────────────
│ Drives Write Cache............................ Drive Specific
│ Runtime BIOS.................................. Enabled
│ Automatic Failover............................ Enabled
│ Array Background Consistency Check............ Disabled
│ Device based BBS Support...................... Disabled
│ SATA Native Command Queuing................... Enabled
│ Physical Drives Display during POST........... Disabled
│ Alarm Control................................. Enabled
│ Default Background Task Priority.............. High
│ Backplane Mode................................ IBPI
│ Selectable Performance Mode................... Dynamic
│ Controller Mode............................... RAID: expose RAW




           <F6> - Reset to Controller Defaults



Arrow keys to move cursor, <Enter> to select option, <Esc> to exit (*=default)
```

Note

The settings shown correspond to the default setting in the delivery state of the device.

Difference in the parameters compared to the default setting of the Hardware RAID adapter card after replacement:

- "Drives Write Cache = Disabled", which means the write cache of the hard disk is switched off.

- "Alarm Control = Disabled", which means the acoustic alarm in case of a fault is switched off

5.2 Replacing a hard disk

The hard disks in the removable drive bay can be replaced during operation in connection with RAID ("Hot Swap").

⚠ CAUTION

Remove replaceable hard disks only in inactive state

The removal of the removable drive bay for replacing the hard disk is only permitted for an inactive hard disk if the hard disk status display of the removable drive bay is not flashing. Observe the ESD guidelines.

Note

The hard disk tray in the removable drive bay must be locked to ensure reliable operation of a device with removable drive bay.

Additional information on identifying the faulty drive can be found in "Replacing a faulty RAID system drive" in section "SAS Hardware RAID system (Page 16)". For additional information, refer to the Operating Instructions for the IPC.

Requirement

- A hard disk of identical interface type:

  Only drives with SAS interface type are permitted for operation with Hardware RAID.

- A hard disk of identical capacity.

  Replace a defective hard disk with a hard disk of the same type and capacity.

- A key for the removable drive bay lock

5.3 Reinstalling the software

5.3.1 Sources for installation of the operating system

If the operating system is faulty, you can reinstall it with one of these DVDs:

- From the Restore DVD

  The Restore DVD is included in the scope of delivery when you have ordered a device with operating system. The DVD contains an image file with the following software:

  – Operating system with installed hardware drivers

  – Monitoring software, e.g., DiagBase.

- With the recovery DVD and "Documentation and Drivers" DVD

  The recovery DVD is included in the scope of delivery when you have ordered a device with operating system. The recovery DVD includes:

  – The installation program for installing the operating system with the supported languages

  – The tools for setting up the drives

  The basic language of the installed operating system is English. If additional languages are required, install these from the recovery DVD.

- The "Documentation and Drivers" DVD contains the documentation and the hardware drivers.

5.3.2 Restoring the delivery state

You can restore the original software using the Restore DVD. The DVD contains the necessary images and tools for transferring the software to the hard disk drive or SSD of your device.

The following options are available for restoring the delivery state:

- Restore the entire hard disk/SSD with drives C and D

- Restore drive C

  This means data stored on drive D are retained.

Back-up authorization or license key

- Check whether you can back-up your authorization or license key from the drive and perform this procedure if possible.

- If backup is not possible, please contact Customer Support. There you can obtain information necessary for corresponding software authorization.

NOTICE

Risk of data loss

If "Restore system partition only" is set all data on drive C: (system partition) will be deleted. All data, user settings and all authorizations or license keys on drive C: are lost! All data on drive C: will be completely deleted, reformatted and overwritten with the original factory software.

If "Restore entire drive" is set ALL data, user settings, authorizations or license keys will be lost on the entire drive.

Procedure

1. If your device has no DVD drive, connect an external USB DVD drive to a USB port.

2. Insert the recovery DVD into the DVD drive.

3. Reboot the device.

4. Press the <Esc> key when the device boots and keep it pressed.

   The BIOS selection menu is displayed when initialization is completed.

5. Click the "Boot Manager" button.

6. In the boot menu, select the optical drive using the cursor keys.

   It is identified by a "P" in front of the SATA port number.

   Example:

   ```
   P5: DV-W28S-A
   ```

7. Follow the instructions on the screen.

Note

All existing data, programs, user settings, authorizations and license keys on the drives are deleted.

5.3.3   Installing drivers and software

Requirement

You need the "Documentation and Drivers" DVD included in the scope of delivery to install Windows drivers.

Procedure

Installing drivers

NOTICE
Setting the MUI operating system to English (US)
In the case of multilingual operating systems (MUI versions), you must set the menus and dialogs and the default language to English (US) in the country settings before new drivers and operating system updates are installed.

1. If your device has no DVD drive, connect an external USB DVD drive to a USB port.
2. Insert the supplied "Documentation and Drivers" DVD.
3. Start the "Start" program.
4. Select "Drivers" from the index.
5. Select the device and operating system.
6. Select the required driver.
7. Open the folder with the driver data. Click on the link next to "driver path".
8. Start the setup program in this folder.

Note

The driver for the chipset has to be installed before all other drivers with a new installation of Windows Server 2008 R2 or Windows 7. Then you can install the drivers of all other devices.

Installing the software

- You can find information about installing SIMATIC software packages in the corresponding documentation.
- You can obtain information about driver updates and installing application programs from the respective manufacturers.

5.3.4 Installing the RAID controller software

Note

Observe the "Information on commissioning (Page 15)" in section "Commissioning the device". Additional information is available in section "Installing drivers and software (Page 32)".

If you have installed the Adaptec HW RAID adapter, change the sampling rate of the Simatic diagnostic software in the registry of the operating system as follows:

- For 32-bit Windows systems:

  [HKEY_LOCAL_MACHINE\SOFTWARE\Siemens\SIMATIC\PC\DiagnosticManagement\ DEService]

  "RAIDUpdateFactor"=dword:00000003

- For 64-bit Windows systems:

  [HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Siemens\SIMATIC\PC\Diagnosti cManagement\DEService]

  "RAIDUpdateFactor"=dword:00000003

5.3.5 Data backup and subsequent changing of partitions

Note

SIMATIC IPC Image & Partition Creator supports the device hardware as of version 3.3.3. Older versions do not support the device hardware.

For devices with a Hardware RAID adapter card, the device driver must be downloaded subsequently. A function is available for this in the SIMATIC IPC Image & Partition Creator. For information on SIMATIC IPC Image & Partition Creator, refer to the corresponding product documentation.

Technical specifications

<div style="text-align: right; font-size: 2em;">6</div>

6.1 General specifications

Note

The following technical specifications override the technical specifications in the Operating Instructions and apply under the following conditions:

- The device is being used as intended and is in proper condition.
- The fan cover and filter mat are installed.
- The front door is closed.

Otherwise, the technical specifications of the device described in the Operating Instructions apply.

General specifications	
Order number	See the order documents
Climatic conditions	
Temperature	Tested to: IEC 60068-2-2, IEC 60068-2-1, IEC 60068-2-14
- During operation	• 0 °C to +35 °C • Gradient: Max. 10 °C/h, no condensation
- Storage/transport	• - 20°C to + 60°C • Gradient: Max. 20 °C/h, no condensation
Relative humidity	Tested to IEC 60068-2-78, IEC 60068-2-30
Atmospheric pressure	
- During operation	1080 to 795 hPa (corresponds to an altitude of -1000 to 2000 m)
- Storage / transport	1080 to 660 hPa (corresponds to an altitude of -1000 to 3500 m)
Mech. ambient conditions	
Vibration - Operation [1] - Storage/transport	Tested to IEC 60068-2-6, 10 cycles 5 to 9 Hz: 3.5 mm, 9 to 500 Hz: 9.8 m/s^2
Resistance to shock - Operation [1] - Storage/transport	Tested to IEC 60068-2-27, IEC 60068-2-29 Half-sine: 250 m/s^2, 6 ms, 1000 shocks per axis
Special features	
Quality assurance	to ISO 9001
Drives (for configuration details, refer to the order documentation)	
Hard disk drive	3.5" SAS 6 Gbps, size: 1000 GB NCQ (Native Command Queuing) is supported.

[1] Restrictions when HDDs are mounted in removable drive bays:
     mechanical stress must be safely excluded.

> **Note**
>
> **Hardware RAID adapter card and dual head graphic card for IPC847D**
>
> The Hardware RAID adapter card and the dual head graphic card each occupy one PCIe x16 expansion slot in the IPC847D. In the IPC equipment with expansion card variant 1 with seven PCI slots, there is only one PCIe x16 slot. Consequently, a Hardware RAID adapter card and dual head graphic card cannot be used together.
>
> **Hardware RAID adapter card for the IPC647D**
>
> The Hardware RAID adapter card may only be installed in slot 1.

6.2   Power requirements of components (maximum values)

Base system

Component	Voltage					
	+5 V	**+3.3 V**	**+12 V**	**-5 V**	**-12 V**	**5 Vaux**
HDD [1] SATA and SAS (typical values)	0.5 A		0.7 A			
SAS Hardware RAID controller		0.4 A	1.2 A			
[1] Depends on the selected device equipment						

Typical power values

Component	Current consumption (AC PS, U=230 V)	Power consumption
Base device	0.6 A	130 W
Hard disk drive 1 x 3.5"	0.06 A	13.6 W
Hard disk drives 2 x 3.5"	0.12 A	27.2 W
Hard disk drives 3 x 3.5" [1]	0.18 A	40.9 W
Hard disk drives 4 x 3.5" [1]	0.24 A	54.4 W
DVD burner drive	0.05 A	12.7 W

[1]   Only in the IPC847D

Technical support $\qquad$ A

A.1 Service and support

You can find additional information and support for the products described on the Internet at the following addresses:

- Technical support (http://www.siemens.de/automation/csi_en_WW)
- Support request form (http://www.siemens.com/automation/support-request)
- After Sales Information System SIMATIC IPC/PG (http://www.siemens.com/asis)
- SIMATIC Documentation Collection (http://www.siemens.com/simatic-tech-doku-portal)
- Your local representative (http://www.automation.siemens.com/mcms/aspa-db/en/Pages/default.aspx)
- Training center (http://sitrain.automation.siemens.com/sitrainworld/?AppLang=en)
- Industry Mall (https://mall.industry.siemens.com)

When contacting your local representative or Technical Support, please have the following information at hand:

- MLFB of the device
- BIOS version for industrial PC or image version for HMI device
- Other installed hardware
- Other installed software

Tools & downloads

Please check regularly if updates and hotfixes are available for download to your device. The download area is available on the Internet at the following link:

After Sales Information System SIMATIC IPC/PG (http://www.siemens.com/asis)

A.2 Troubleshooting

Error displays on the front panel

Front LED	Possible cause	Details about the error display
HDD0 ALARM LED lights up red	RAID signals that hard disk 0 is defective	See section "Maintaining and repairing the device" in the Operating Instructions for the IPC.
HDD1 ALARM LED lights up red	RAID signals that hard disk 1 is defective	
HDD2 ALARM LED lights up red	RAID signals that hard disk 2 is defective	
HDD3 ALARM lights up red	RAID signals that hard disk 3 is defective	
HDD0, HDD1, HDD2, and HDD3 ALARM LEDs flash red	RAID is in the "rebuild" state	
HDD0, HDD1, HDD2, and HDD3 ALARM LEDs light up red	RAID system is not ready for operation:	The affected drive must be identified using the RAID software. See section "Maintaining and repairing the device" in the Operating Instructions for the IPC.
PN I MPI/DP lights up red	A fault has occurred on the CPU 1616 onboard interface	See section "Communication Processor CP 1616 onboard" in the Operating Instructions for the IPC.
All front-panel LEDs are constantly lit	Error in early BIOS-POST	Contact Technical Support.

A.3 RAID troubleshooting

Problem	Possible cause	Possible remedy
After changing the hard disk, the system does not boot from the RAID system	RAID system does not have highest boot priority	BIOS setup, boot menu: • Permit RAID system in the boot priority • Set the RAID system to be first in the boot priority order.
Computer does not boot or "Boot device not found" is displayed	• The boot device is not permitted • The boot device is not in first place of the boot priority in the BIOS setup • The boot data carrier is set up with GPT and UEFI boot is deactivated in the BIOS setup	• In the BIOS setup, "Boot" menu, permit the boot device in the boot priority • In the BIOS setup, "Boot" menu, change the boot priority of the boot device • Activate UEFI boot in the BIOS setup.
RAID software cannot be started	• No Windows password • The Windows password was set up subsequently • Main memory capacity < 4 GB	• Uninstall and then reinstall RAID software • Increase main memory capacity to at least 4 GB.
RAID software displays no details of the RAID system	• No Windows password • The Windows password was set up subsequently	• Uninstall and then reinstall RAID application
Monitoring software signals implausible states	Sampling rate of the SIMATIC monitoring software not reduced	Increase "RaidUpdateFactor" via registry key. For details, see "Installing the RAID controller software (Page 33)".
Adaptec Storage Manager software cannot be started	Certificate error	Change address in the link to the Adaptec Storage Manager software to "localhost". Requirement: The certificate is stored in the "Trusted Root Certification Authorities" certificate store and is not expired.

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