

# **DA-660A Series Hardware User's Manual**

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# DA-660A Series Hardware User's Manual

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## Introduction

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The DA-660A Series embedded computers come with 8 to 16 software selectable RS-232/422/485 serial ports, making them suitable for a variety of industrial applications. Models with 4 10/100 Mbps Ethernet ports are also available. The DA-660A also comes with CF and USB ports to make it easy to add additional storage space. The computers are designed with a standard 19-inch, rugged 1U rackmount case, and are embedded with a 100-240 VAC power input. This combination of features gives users a robust and reliable ready-to-run solution for applications such as data acquisition and power substations.

The following topics are covered in this chapter:

- ❑ **Overview**
- ❑ **Package Checklist**
- ❑ **Product Features**
- ❑ **Hardware Specifications**

# Overview

The DA-660A Series computers are RISC-based, ready-to-run embedded computers designed for industrial data acquisition applications. The models have either 8 or 16 RS-232/422/485 serial ports, and 2 USB hosts based on the Moxa Macro 500 MHz communication processor. The DA-660A has 4 Ethernet ports. The casing is a standard 1U, 19-inch-wide rack-mounted rugged enclosure. The robust, rack-mountable design provides the hardened protection needed for industrial environment applications and makes it easy for users to install the DA-660A on a standard 19-inch rack. The DA-660A Series computers are ideal for applications that require a distributed embedded technology, such as SCADA systems, plant floor automation, and power electricity monitoring applications.

The DA-660A Series computers are suitable for IT control room applications, the critical assets used in the control and automation system of industrial plant floors, and in electric power utility substations. The computers can accept a wide range of power inputs (from 100 to 240V), which means that they can be connected to AC power lines. Because of the no-hard-disk, fanless, and energy-efficient design, the computers minimize heat generation, can operate around the clock, year in and year out, in heavy duty, harsh industrial environments, delivering the kind of reliable computing power expected of a multifunctional controller.

You can choose DA-660A Series models that come preinstalled with the open-standard Linux OS. The built-in SDK makes program development easy by allowing you to follow the common programming procedures used on a standard PC. The software you develop for your own applications can be stored in the onboard Flash memory. The DA-660A Series embedded computers are ideal for creating control systems with distributed architecture that are based on embedded technologies. Typical applications include SCADA systems, plant floor automation, and power electricity monitoring.

## Package Checklist

Before installing the DA-660A Series, verify that the package contains the following items:

- 1 DA-660A Series embedded computer
- 6 jumper caps
- 19-inch Rackmount Kit with 2 L-shaped metal plates and 8 screws
- Ethernet Cable: RJ45-to-RJ45 cross-over cable, 100 cm
- CBL-RJ45M9-150: RJ45-to-DB9 male serial port cable, 150 cm
- CBL-RJ45F9-150: RJ45-to-DB9 female console port cable, 150 cm
- Quick installation guide
- Warranty card

**NOTE:** *Notify your sales representative if any of the above items are missing or damaged.*

## Product Features

- Moxa Macro 500 MHz Processor
- On-board 128 MB RAM, 32 MB Flash ROM
- 8 to 16 RS-232/422/485 serial ports
- 4 10/100 Mbps Ethernet
- Standard 19-inch rack-mount installation, 1U height
- Wide range of power input voltages from 100 to 240VAC
- LCD screen and push buttons for Human-Machine Interface (HMI)
- Ready-to-run Linux platform
- Robust, fanless design

# Hardware Specifications

**NOTE** The latest specifications for Moxa's products can be found at <https://www.moxa.com>.

# Hardware Introduction

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The DA-660A Series hardware is compact, well-designed, and built for rugged industrial applications. LED indicators help you monitor the performance and identify trouble spots. Multiple ports allow the connection of different devices for wireless operation. With the reliable and stable hardware platform that is provided, you can devote your attention to the development of your application. In this chapter, learn the basics about the embedded computer hardware and its different parts.

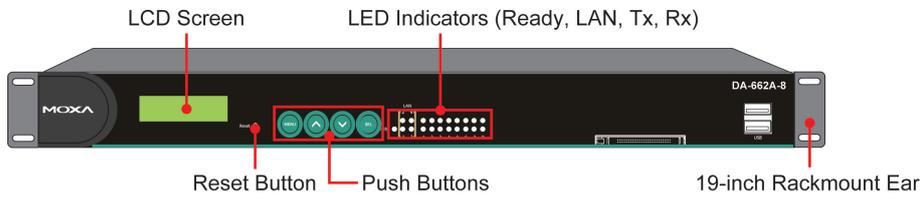
The following topics are covered in this chapter:

- ❑ **Appearance**
  - DA-662A-8 Models
  - DA-662A-16 Models
- ❑ **Dimensions**
- ❑ **Hardware Block Diagram**
  - DA-662A-8 Models
  - DA-662A-16 Models
- ❑ **LED Indicators**
- ❑ **Reset Button**
- ❑ **LCD Screen**
- ❑ **Push Buttons**
- ❑ **Real-time Clock**

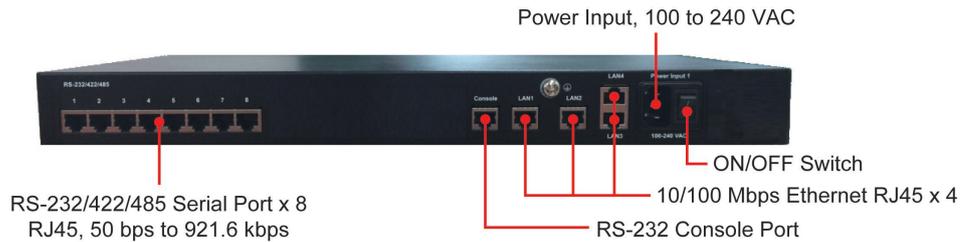
# Appearance

## DA-662A-8 Models

### Front View

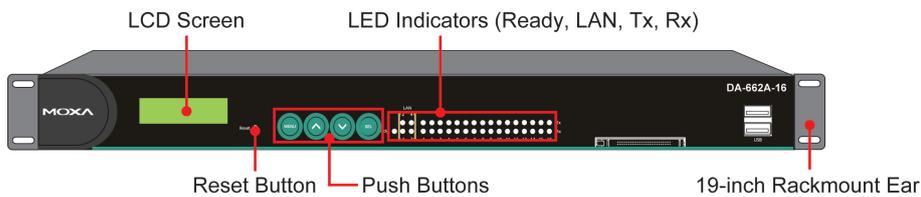


### Rear View

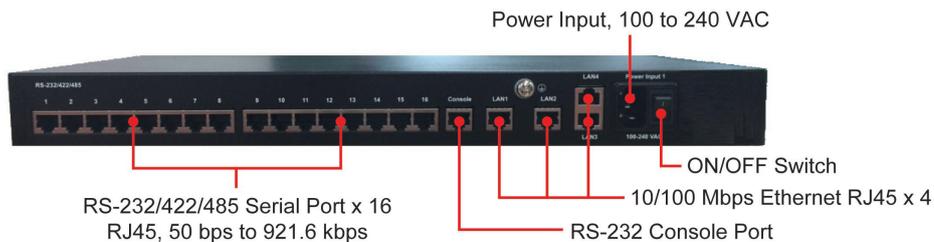


## DA-662A-16 Models

### Front View

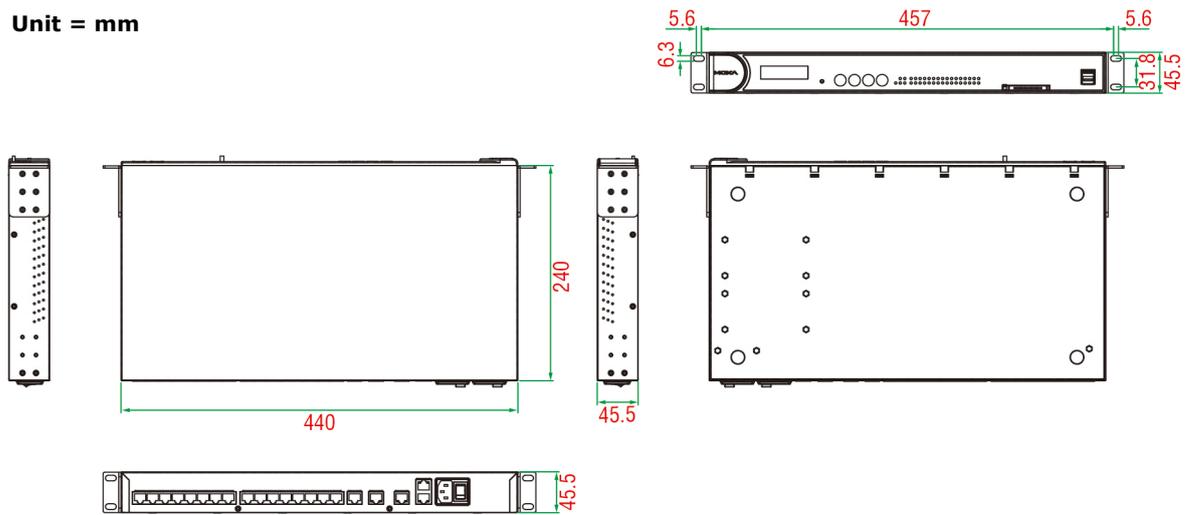


### Rear View



# Dimensions

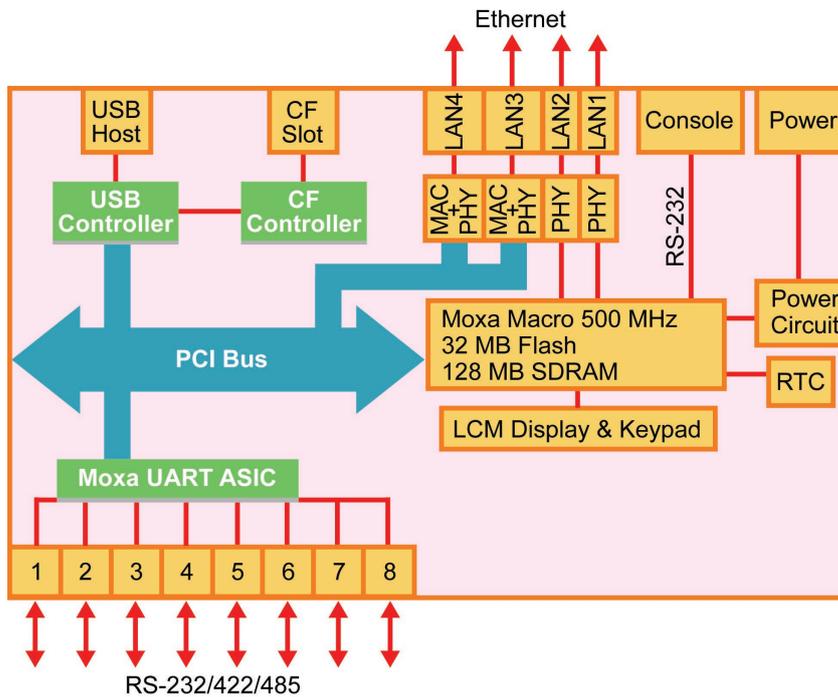
Unit = mm



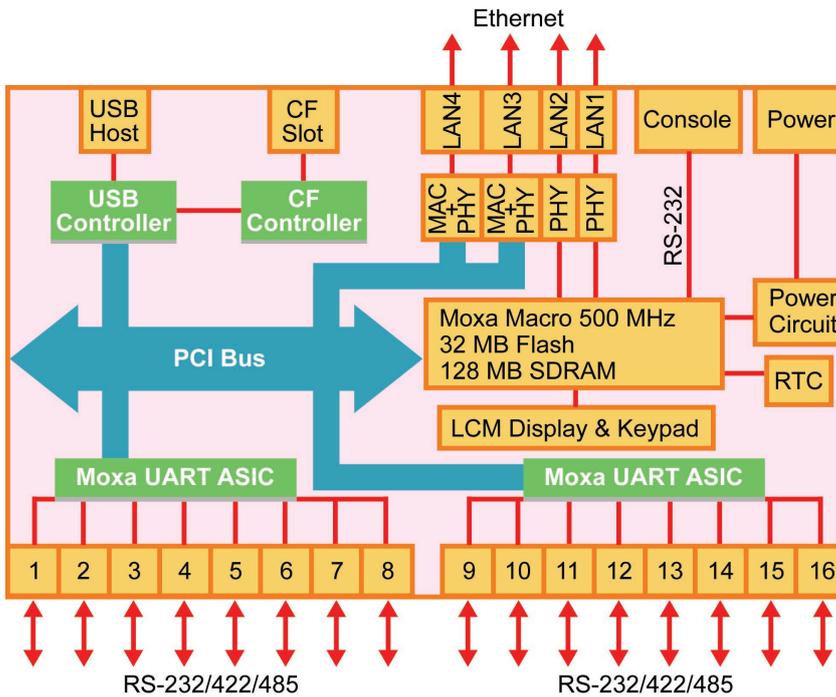
# Hardware Block Diagram

The following block diagrams show the layout of the internal components of the DA-660A Series.

## DA-662A-8 Models



## DA-662A-16 Models



## LED Indicators

LED indicators are located on the front panel of the DA-660A Series.

LED Name	LED Color	LED Function
Ready	Red	Power is On, and system is ready (after booting up)
LAN1, LAN2, LAN3, LAN4	Orange	10 Mbps Ethernet connection
	Green	100 Mbps Ethernet connection
P1-P16 (Rx)	Orange	Serial port is receiving RX data from the serial device
	Off	Serial port is not receiving RX data from the serial device
P1-P16 (Tx)	Green	Serial port is transmitting TX data to the serial device
	Off	Serial port is transmitting TX data to the serial device

## Reset Button

Press the **Reset** button on the front panel continuously for at least 5 seconds to load the **factory default configuration**. After the factory default configuration has been loaded, the system will reboot automatically. The **Ready** LED will blink on and off for the first 5 seconds, and then maintain a steady glow once the system has rebooted.

We recommend that you only use this function if the software is not working properly, and you want to load factory default settings. To reset an embedded Linux system, always use the software reboot command `/>reboot` to protect the integrity of data being transmitted or processed. The Reset button is not designed to hard reboot the DA-660A Series.



### ATTENTION

Pressing the Reset button will only load the configuration file. All files in the `/etc` directory will revert to their factory defaults, and *all user data in the Flash ROM will be deleted*.

## LCD Screen

The DA-660A Series has an LCD screen on the front panel. The LCD screen can display 16 columns and 2 rows of text. After the computer boots up, the LCD screen will display the model name and firmware version as indicated in the table below:

**D      A      -      6      6      2      A      -      1      6**  
**V      E      R      .      1      .      0**

## Push Buttons

There are four push buttons located on the front panel. The buttons are used to enter text onto the LCD screen. The buttons are MENU, ^ (up cursor), v (down cursor), and SEL:

Button	Action
MENU	Displays the main menu.
^	Scrolls up through a list of items shown on the LCD screen's second line.
v	Scrolls down through a list of items shown on the LCD screen's second line.
SEL	Selects the option listed on the LCD screen.

## Real-time Clock

The real time clock is powered by a lithium battery. We strongly recommend that you do not replace the lithium battery without help from a qualified Moxa support engineer. If you need to change the battery, contact the Moxa RMA service team.



### WARNING

There is a risk of explosion if the battery is replaced by an incorrect type.

# Hardware Connection Description

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The following topics are covered in this chapter:

□ **Placement Options**

- Rack Mounting

□ **Connecting the Hardware**

- Wiring Requirements
- Connecting the Power
- Connecting to the Network
- Connecting to a Serial Device
- Configurable Pull High/Low Resistors for the RS-485 Port
- Connecting to the Console Port
- USB Host
- CompactFlash

# Placement Options

## Rack Mounting

The DA-660A Series is designed to be mounted on a standard 19-inch rack. Two L-shaped metal plates are included as standard accessories with the computer. Use the enclosed pair of L-shaped metal plates and screws to fasten your computer to the rack cabinet. Two placement options are available. You can either lock the front or the rear panel of the computer to the front of the rack. Each L-shaped plate has 6 holes, leaving two outer or inner holes open for your convenience.

## Connecting the Hardware

This section describes how to connect the DA-660A Series to serial devices. The topics covered in this section are: **Wiring Requirements**, **Connecting the Power**, **Connecting to the Network**, **Connecting to a Serial Device**, and **Connecting to the Console Port**.

## Wiring Requirements



### ATTENTION

#### Safety First!

Be sure to disconnect the power cord before installing and/or wiring your DA-660A Series.

#### Wiring Caution!

Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.

If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

#### Temperature Caution!

Be careful when handling the DA-660A Series. When plugged in, the DA-660A series' internal components generate heat, and consequently the outer casing may feel hot to the touch.

You should observe the following common wiring rules:

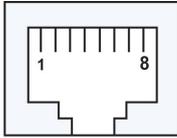
- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.  
**NOTE:** Do not run signal or communication wiring and power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.
- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separate.
- Where necessary, it is strongly advised that you label wiring to all devices in the system.

## Connecting the Power

To power on the DA-660A Series, use a power cord to connect the power line to the AC power connector on the computer. The power connector is located on the right side of the rear panel. Next, turn on the power switch. The DA-660A takes about 30 seconds to boot up. Once the device is ready, the Ready LED on the front panel will light up, and model name and firmware version will appear on the LCD screen.

## Connecting to the Network

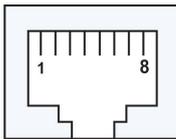
Connect one end of the Ethernet cable to one of the 10/100M Ethernet ports (8-pin RJ45) on the computer and the other end of the cable to the Ethernet network. If the cable is properly connected, the computer will indicate a valid connection to the Ethernet in the following ways:



Pin	Signal
1	ETx+
2	ETx-
3	ERx+
4	-
5	-
6	ERx-
7	-
8	-

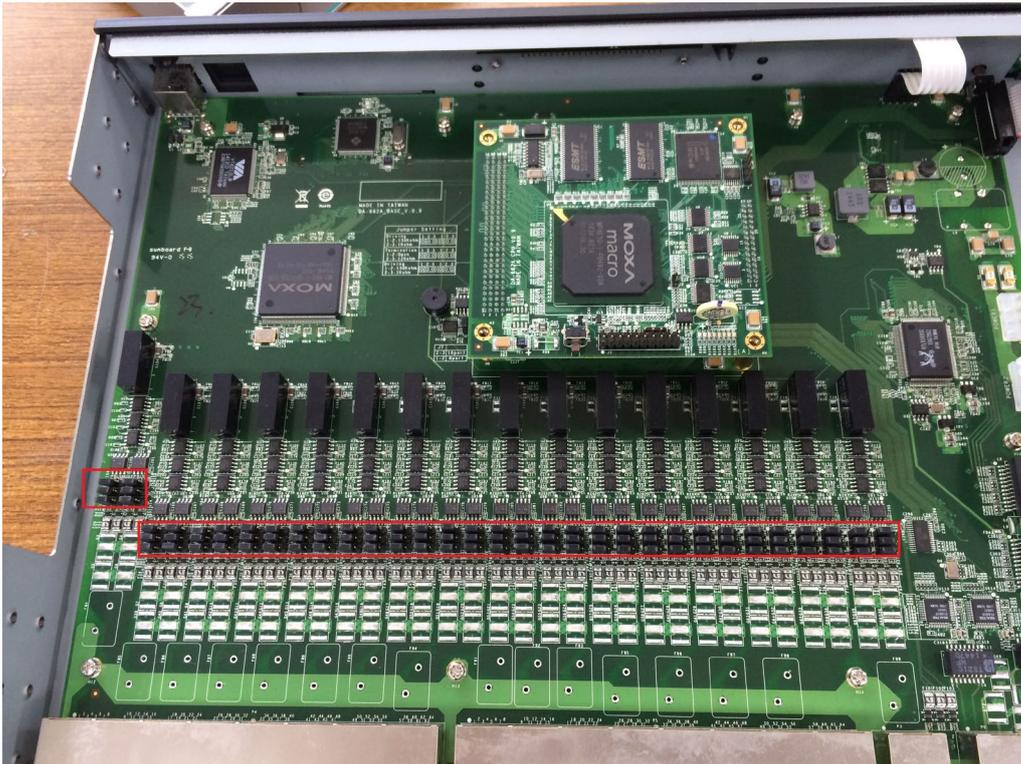
## Connecting to a Serial Device

Use properly wired serial cables to connect the DA-660A to serial devices. The serial ports (P1 to P16) on the DA-660A use 8-pin RJ45 connectors. The ports can be configured by software for RS-232, RS-422, or 2-wire RS-485. The pin assignments are shown in the following table:



Pin	RS-232	RS-232 (DA-660A-I-8/16-LX only)	RS-422/ RS-482-4w	RS-485-2w
1	DSR	-	-	-
2	RTS	RTS	TXD+	-
3	GND	GND	GND	GND
4	TXD	TXD	TXD-	-
5	RXD	RXD	RXD+	Data+
6	DCD	-	RXD-	Data-
7	CTS	CTS	-	-
8	DTR	-	-	-

## Configurable Pull High/Low Resistors for the RS-485 Port



In some critical environments, you may need to add termination resistors to prevent the reflection of serial signals. When using termination resistors, it is important to set the pull high/low resistors correctly so that the electrical signal is not corrupted. The DA-660A uses jumper settings to set the termination resistors and pull high/low resistor values for each serial port.

To configure the termination and pull high/low resistors for the serial connections, you first need to open the chassis of the computer. You will see 3 rows of jumper caps (as shown in the accompanying figure). The first row is for setting pull high resistors, the second row is for setting termination resistors, and the third row is for setting pull low resistors.

Each serial port has 6 jumper caps for configuring the resistors. The pin assignments are shown in the following table:

Jumper setting		
	RS485 Data +	RS485 Data -
Pull High resistors 1-2: 150 kΩ 2-3: 1 kΩ	1 2 3 	1 2 3 
Termination 1-2: Open 2-3: 120 Ω	1 2 3 	1 2 3 
Pull Low resistors 1-2: 150 kΩ 2-3: 1 kΩ	1 2 3 	1 2 3 

To set the termination resistors to 120 Ω, make sure that PIN 2 and PIN 3 assigned to the serial port are shorted by jumper caps.

To set the pull high/low resistors to 150 kΩ, make sure that PIN 1 and PIN 2 assigned to the serial port are shorted by jumper caps. This is the default setting.

To set the pull high/low resistors to 1 kΩ, make sure that PIN 2 and PIN 3 assigned to the serial port are shorted by jumper caps.

**ATTENTION**

Do not use the 1 K $\Omega$  setting on the DA-660A when using the RS-232 interface. Doing so will degrade the RS-232 signals, shorten the maximum allowed communication distance, and the Rx LED may light up.

## Connecting to the Console Port

The console port on the DA-660A is an 8-pin RJ45 RS-232 port. The pin definition is the same as for the serial ports (P1 to P16).

## USB Host

The DA-660A offers 2 USB 2.0 hosts, allowing you to connect with a USB storage device. The first USB mass storage device to be connected will be mounted automatically to **/mnt/sdc** and the second device will be mounted to **/mnt/sdd** using the **mount** command. The storage device will be un-mounted automatically with the **umount** command when it is disconnected.

## CompactFlash

The DA-660A Series computers have a built-in CompactFlash socket. The CompactFlash socket allows users to add additional memory by inserting a CompactFlash memory card, without any risk to the computer.

Follow the instructions below to insert a CompactFlash card:

1. Turn off the DA-660A.
2. Insert the CompactFlash card into the socket.
3. Turn on the DA-660A.

**ATTENTION**

The DA-660A Series computers do not support CompactFlash hot swap and PnP (Plug and Play) function. You **MUST** turn off the DA-660A before inserting or removing the CompactFlash card.