# UC-7400 Plus Hardware User's Manual

**Fourth Edition, April 2009**

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# UC-7400 Plus Hardware User's Manual

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# 1

# Introduction

Thank you for purchasing the Moxa UC-7400 Plus RISC-based ready-to-run embedded computer.

The UC-7400 Plus includes 8 RS-232/422/485 serial ports, dual 10/100 Mbps Ethernet ports, 8 digital input channels and 8 digital output channels, a PCMCIA interface for wireless LAN communication, and CompactFlash and USB ports for mass storage disk expansion. All of these make the UC-7400 Plus ideal for your embedded applications.

This manual introduces the hardware for the UC-7400 Plus series of embedded computers. After a brief introduction of the hardware features, the manual focuses on installation and hardware configuration using device interfaces.

The following topics are covered in this chapter:

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

# Overview

The Moxa UC-7400 Plus Series (referred to as UC-7400 Plus) includes the UC-7402 Plus, UC-7408 Plus, UC-7410 Plus, and UC-7420 Plus. These RISC-based ready-to-run embedded computers are ideal for embedded applications. The UC-7400 Plus embedded computers feature 8 RS-232/422/485 serial ports, dual 10/100 Mbps Ethernet ports, a PCMCIA interface for wireless LAN communication, a CompactFlash slot for flash disk expansion, and USB ports for adding additional memory (such as a USB Flash disk).

The UC-7400 Plus uses an Intel XScale IXP425 533 MHz RISC CPU. Unlike the X86 CPU, which uses a CISC design, the IXP-425's RISC design architecture and modern semiconductor technology provide the UC-7400 Plus with a powerful computing engine and communication functions, but without generating a lot of heat. The built-in 32 MB NOR Flash ROM and 128 MB SDRAM give you enough memory to run your application software directly on the UC-7400 Plus. As the dual LAN ports are built right into the IXP425 CPU, the UC-7400 Plus makes an ideal communication platform for network security applications. If your application requires placing the UC-7400 Plus at a site that is not located near an Ethernet LAN connection, you can connect to a wireless network by attaching a wireless LAN card to the UC-7400 Plus's PCMCIA port.

# Package Checklist

All models of the UC-7400 Plus series are shipped with the following items:

- 1 UC-7400 Plus Series Embedded Computer
- Wall-Mounting Kit
- DIN-Rail Mounting Kit
- Quick Installation Guide
- Document & Software CD
- Cross-over Ethernet cable
- CBL-RJ45M9-150: 150 cm, 8-pin RJ45 to male DB9 serial port cable
  (NOTE: The UC-7402 Plus model does not come with this accessory.)
- CBL-RJ45F9-150: 150 cm, 8-pin RJ45 to female DB9 console port cable
- Universal Power Adaptor
- Product Warranty Statement

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

# Product Features

- Intel XScale IXP425 533 MHz Processor
- On-board 128 MB RAM, 32 MB Flash ROM
- 8 RS-232/422/485 serial ports (UC-7408 Plus/UC-7410 Plus/UC-7420 Plus only)
- Dual 10/100 Mbps Ethernet ports
- USB 2.0 host for connecting mass storage devices (UC-7408 Plus/UC-7420 Plus only)
- PCMCIA, wireless LAN expansion (supports 802.11b/802.11g)
- CompactFlash for storage expansion (UC-7402 Plus/UC-7408 Plus/UC-7420 Plus only)
- LCM display and keypad for HMI (UC-7410 Plus/UC-7420 Plus only)
- Ready-to-run Linux platform
- DIN-Rail or wall mounting installation
- Robust, fanless design

# Product Hardware Specifications

| | UC-7402 Plus | UC-7408 Plus | UC-7410 Plus | UC-7420 Plus |
|---|---|---|---|---|
| **CPU** | Intel XScale IXP425, 533 MHz | Intel Xscale IXP425, 533 MHz | Intel Xscale IXP425, 533 MHz | Intel Xscale IXP425, 533 MHz |
| **RAM** | 128 MB | 128 MB | 128 MB | 128 MB |
| **Flash** | 32 MB | 32 MB | 32 MB | 32 MB |
| **LAN** | Auto-sensing 10/100 Mbps x 2 with built-in 1.5 KV magnetic isolation protection RJ45 Connector | | | |
| **Serial Port** | N/A | RS-232/422/485 × 8 RJ45 Connector | RS-232/422/485 × 8 RJ45 Connector | RS-232/422/485 × 8 RJ45 Connector |
| **Serial Protection** | N/A | 15 KV ESD for all signals | | |
| **Data Bits** | N/A | 5, 6, 7, 8 | | |
| **Stop Bits** | N/A | 1, 1.5, 2 | | |
| **Parity** | N/A | None, even, odd, space, mark | | |
| **Flow Control** | N/A | RTC/CTS, XON/NOFF, RS-485 ADDC? | | |
| **Speed** | N/A | 50 bps to 921.6 Kbps | | |
| **Serial Console** | RS-232 × 1, RJ45 connector | RS-232 × 1, RJ45 connector | RS-232 × 1, RJ45 connector | RS-232 × 1, RJ45 connector |
| **Digital Input** | N/A | Channel: 8<br>Input Voltage:<br>Logio 0: 0-0.8v<br>Logio 1: 2-5.5v<br>Protection: Over current limit (-24Ma) | N/A | N/A |
| **Digital Output** | N/A | Channel: 8<br>Input Voltage:<br>Logio 0: 0-0.8v<br>Logio 1: 2-5.5v<br>Protection: Over current limit (-24Ma) | N/A | N/A |
| **USB 2.0 Hosts** | N/A | 2 | N/A | 2 |
| **USB 1.1 Client** | 1* | 1* | 1* | 1* |
| **PCMCIA** | Cardbus × 1 ** | Cardbus × 1 ** | N/A | Cardbus × 1 ** |
| **Storage Expansion** | CompactFlash × 1 *** | CompactFlash × 1 *** | N/A | CompactFlash × 1 *** |
| **LCM** | N/A | N/A | 128 x 64 dots | 128 × 64 dots |
| **Keypad** | N/A | N/A | 5 | 5 |
| **Real Time Clock** | Yes | Yes | Yes | Yes |
| **Buzzer** | Yes | Yes | Yes | Yes |
| **Rest Button** | HW Reset × 1, Reset to Default × 1 | HW Reset × 1, Reset to Default × 1 | HW Reset × 1, Reset to Default × 1 | HW Reset × 1, Reset to Default × 1 |
| **Power Input** | 12 to 48 VDC | 12 to 48 VDC | 12 to 48 VDC | 12 to 48 VDC |
| **Power Consumption** | 7W | 8W | 10W | 12W |

| | | | | |
|---|---|---|---|---|
| **Dimension (W × D × H)** | 197 × 125 × 44 mm | 197 × 125 × 44 mm | 197 × 125 × 44 mm | 197 × 125 × 44 mm |
| **Weights** | 830 g | 870 g | 810 g | 875 g |
| **Operating Temperature** | -10 to 60°C, (14 to140°F), 5 to 95 % RH | | | |
| **Storage temperature** | -20 to 80°C, (-4 to176°F), 5 to 95 % RH | | | |
| **Anti-Vibration** | N/A | 1 g @ IEC-68-2-6, sine wave (resonance search), 5-500 Hz, 1 Oct/min, 1 cycle, 13 mins 17 sec/axis | 1 g @ IEC-68-2-6, sine wave (resonance search), 5-500 Hz, 1 Oct/min, 1 cycle, 13 mins 17 sec/axis | |
| **Anti-Shock** | N/A | N/A | 5 g @ IEC-68-2-27, half sine wave, 30 ms | |
| **Regulatory approvals** | EMC: CE Class A, FCC Class A<br>Safety: UL, Cul. | | | |
| **Warranty** | 5 years | | | |

* USB Client function is reserved for future enhancement

** PCMCIA is designed for 802.11b/g wireless LAN card expansion

*** CompactFlash is designed for Flash memory card or Microdrive

# 2

# Hardware Introduction

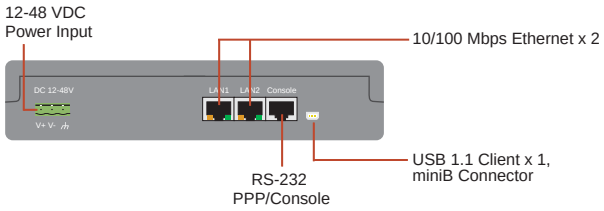
The following topics are covered in this chapter:

- **Appearance and Dimensions**
  - Appearance
  - Dimensions
- **Hardware Block Diagram**
- **LED Indicators**
- **Reset-type Buttons**
  - Reset Button
  - Reset to default Button
- **Real Time Clock**

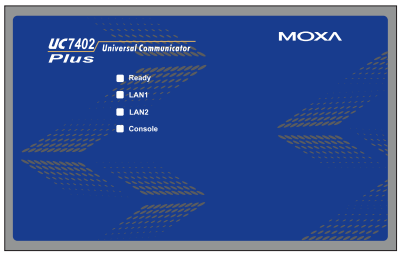
# Appearance and Dimensions

## Appearance

### UC-7402 Plus Rear View

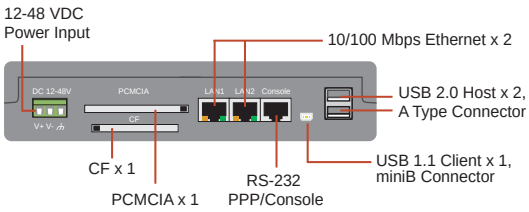



### UC-7402 Plus Top View

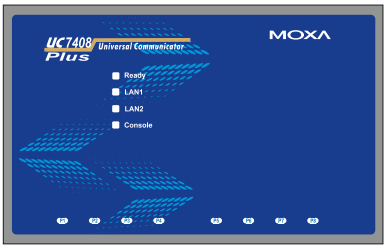



### UC-7402 Plus Front View

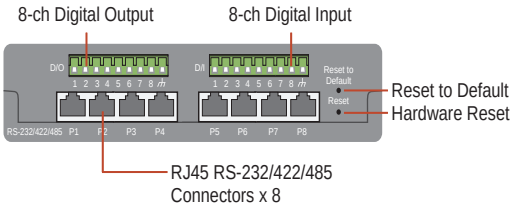
## UC-7408 Plus Rear View



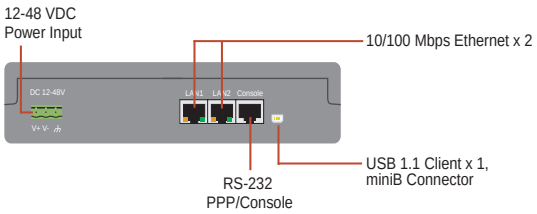

## UC-7408 Plus Top View



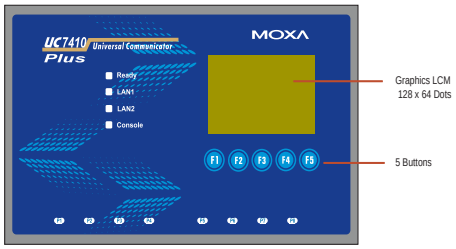

## UC-7408 Plus Front View



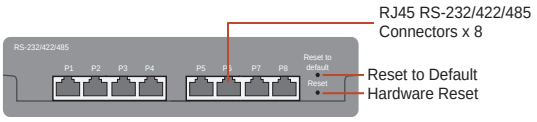
## UC-7410 Plus Rear View



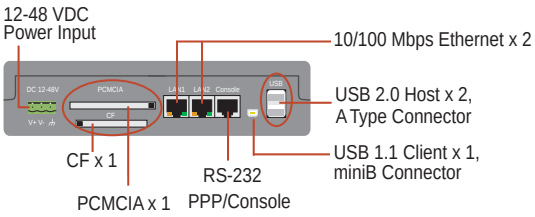

## UC-7410 Plus Top View



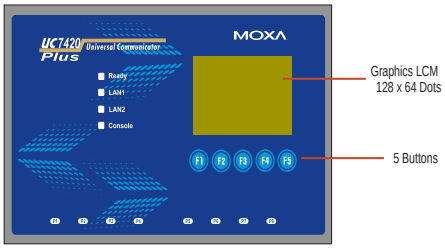

## UC-7410 Plus Front View



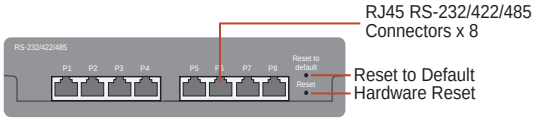
## UC-7420 Plus Rear View




## UC-7420 Plus Top View

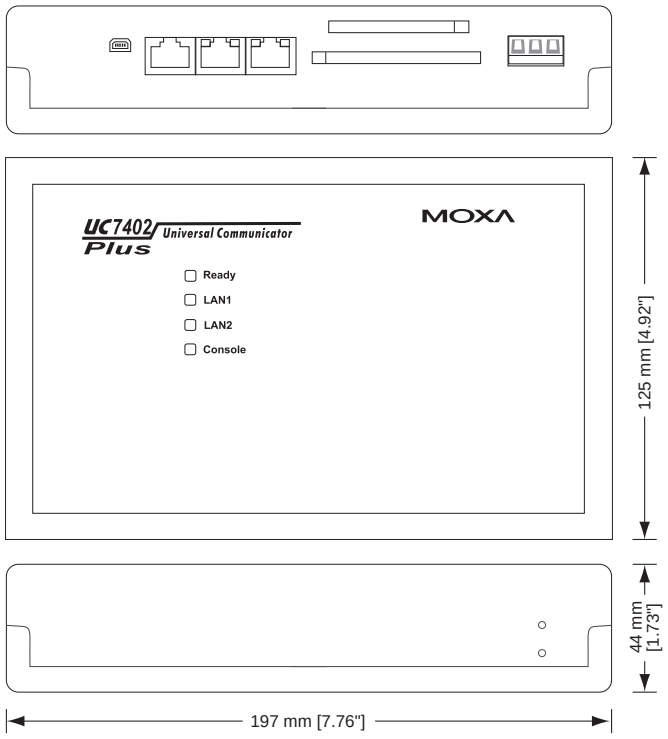



## UC-7420 Plus Front View

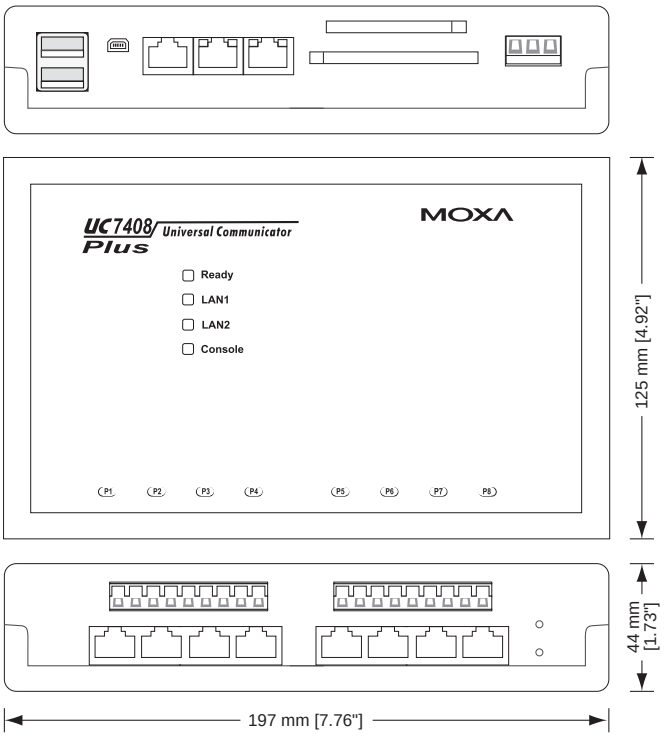


# Dimensions

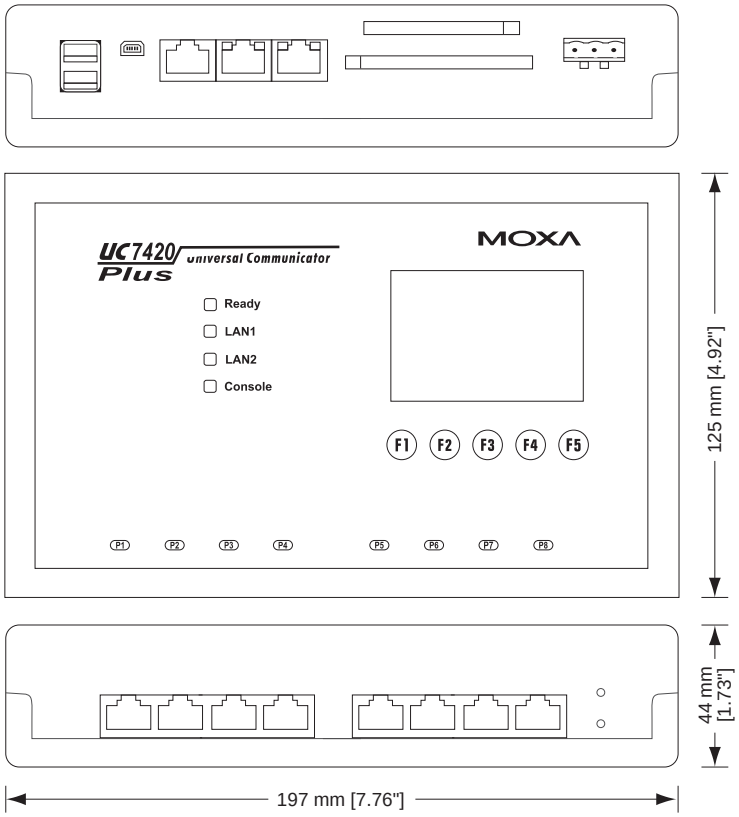
## UC-7402 Plus



## UC-7408 Plus

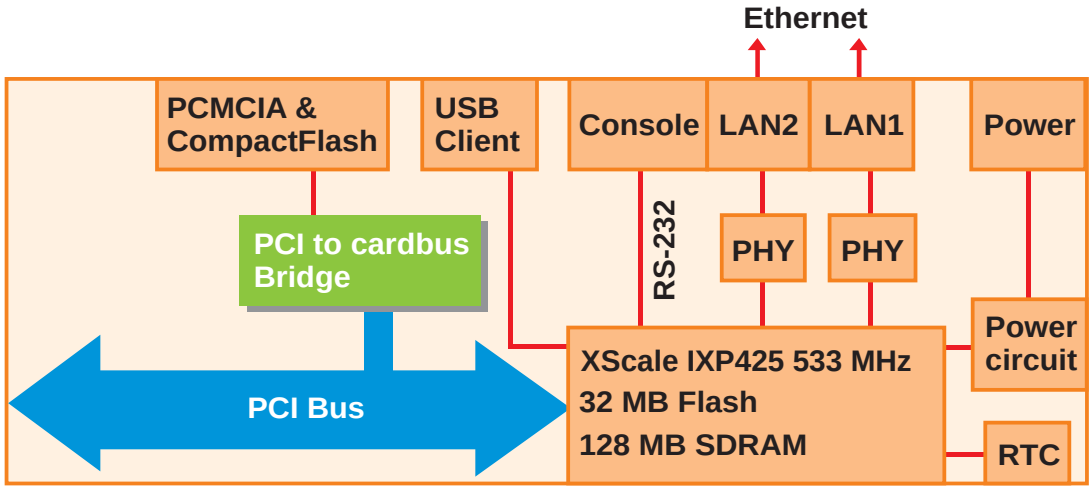

UC7408 Plus
Universal Communicator
MOXA
Ready
LAN1
LAN2
Console
P1
P2
P3
P4
P5
P6
P7
P8
125 mm [4.92"]
44 mm [1.73"]
197 mm [7.76"]

**UC-7410 Plus/UC-7420 Plus**

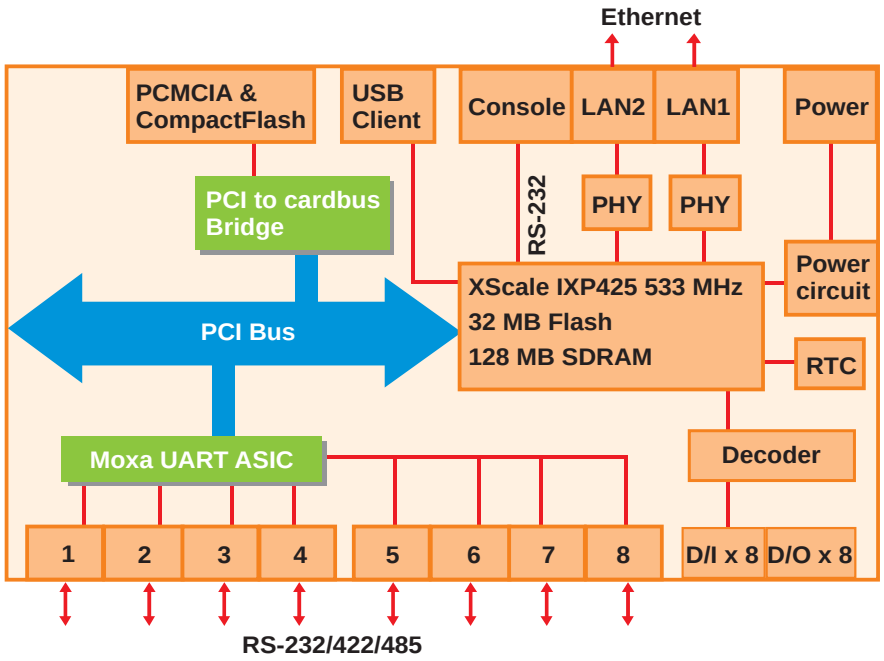



# Hardware Block Diagram

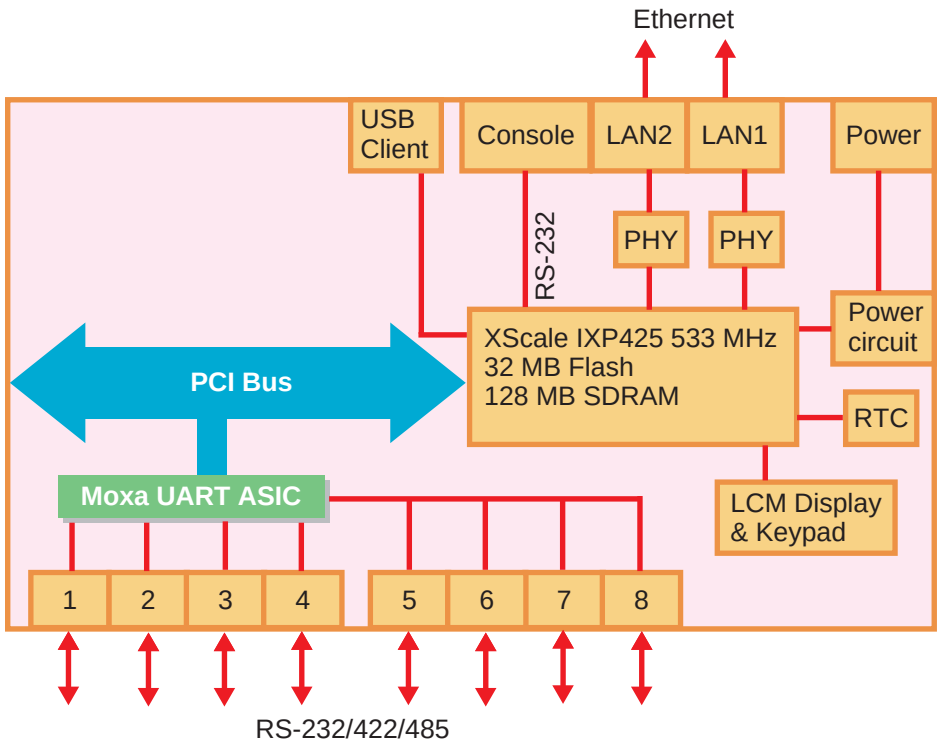
The following block diagram shows the layout of the UC-7402 Plus's internal components.



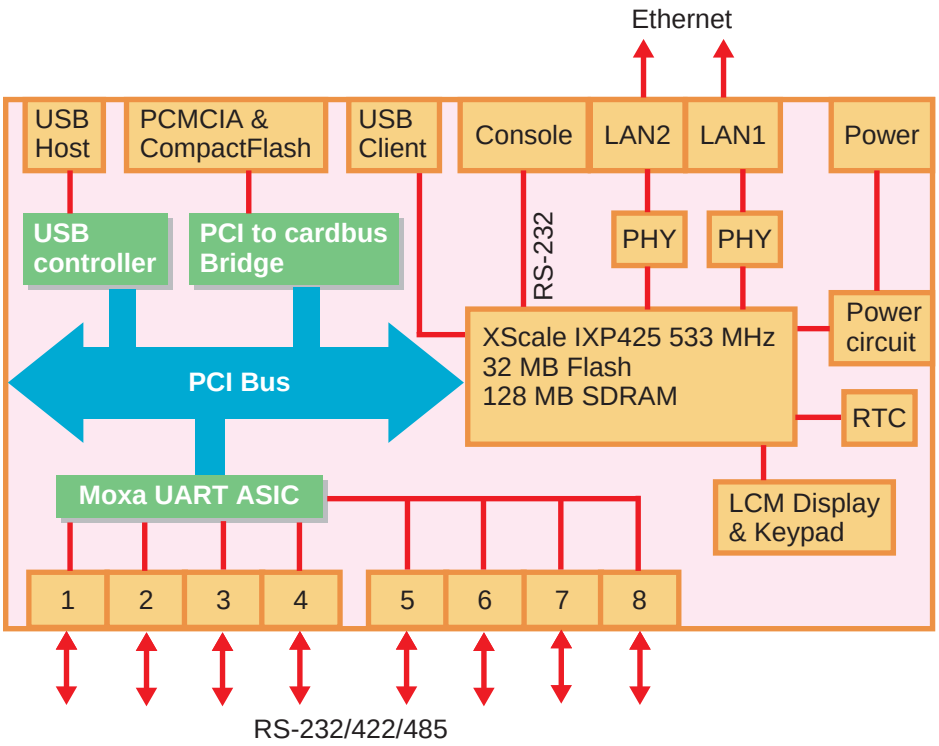
The following block diagram shows the layout of the UC-7408 Plus's internal components.




The following block diagram shows the layout of the UC-7410 Plus's internal components.



The following block diagram shows the layout of the UC-7420 Plus's internal components.




# LED Indicators

The UC-7408 Plus, UC-7410 Plus, and UC-7420 Plus have 12 LED indicators on the top panel. The UC-7402 Plus has only 4 LED indicators (since there are no serial port indicators) on the top panel. Refer to the following table for information about each LED.

| LED Name | Color | Meaning |
|---|---|---|
| Ready | Green | Power is ON, and system is ready (after booting up) |
| LAN1, LAN2 | Yellow | 10 Mbps Ethernet connection |
| | Green | 100 Mbps Ethernet connection |
| Console | Yellow | Console port is receiving RX data from the serial device. |
| | Green | Console port is transmitting TX data to the serial device. |
| P1, P2, P3, P4, P5, P6, P7, P8 | Yellow | Serial port is receiving RX data from the serial device. |
| | Green | Serial port is transmitting TX data to the serial device. |

# Reset-type Buttons

The UC-7400 Plus has two reset-type buttons. The button labeled **Reset** has the same effect as switching off the power and then switching the power back on. The button labeled **Reset to default** returns the UC-7400 Plus to the factory default parameter configuration.

## Reset Button

Press the **Reset** button to initiate a hardware reboot. The button plays the same role as a desktop PC's reset button.

In normal use, you should NOT use the **Reset** Button. You should only use this function if the software is not working properly. To reset an embedded Linux system, always use the software reboot command **#reboot** to protect the integrity of data being transmitted or processed.

## Reset to default Button

Press the **Reset to default** button 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 to default** button is not designed to hard reboot the UC-7400 Plus.

ATTENTION

**Reset to default preserves user's data**

The **Reset to default** button will NOT format the user directory and erase the user's data. Pressing the Reset to default button will only load the configuration file. All files in the **/etc** directory will revert to their factory defaults, but other User Data will still exist in the Flash ROM.

# Real Time Clock

The UC-7400 Plus's 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.

# 3

# Hardware Connection Description

The following topics are covered in this chapter:

- **Wall or Cabinet Mounting**
- **DIN-Rail Mounting**
- **Hardware Connection Description**
- **Wiring Requirements**
- **Connecting the Power**
- **Grounding the UC-7400 Plus**
- **Connecting to the Network**
- **Connecting to a Serial Device**
- **Connecting to the Console Port**
- **PCMCIA**
- **CompactFlash**
- **USB**
- **DI/DO**

# Wall or Cabinet Mounting

The two metal brackets that come standard with UC-7400 Plus are used to attach the embedded computer to a wall or the inside of a cabinet. First, use two screws per bracket to attach the brackets to the bottom of the UC-7400 Plus (Fig. A). Next, use two screws per bracket to attach the UC-7400 Plus to the wall or cabinet (Fig. B).

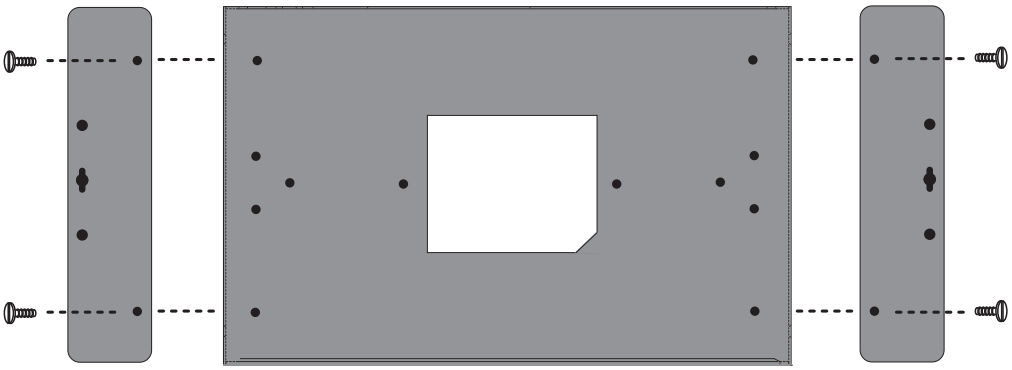


**Figure A: UC-7410 Plus/UC-7420 Plus Universal Communicator—Wall Mounting Brackets (bottom view)**

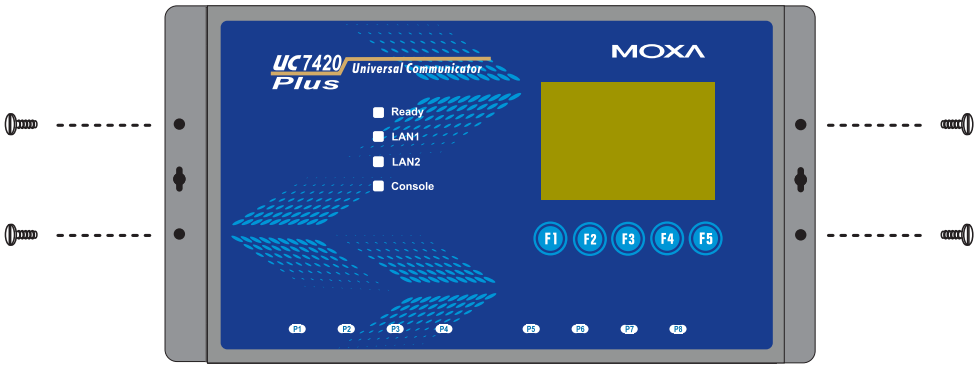
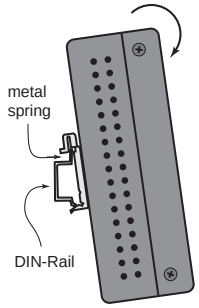



**Figure B: UC-7410 Plus/UC-7420 Plus Universal Communicator—Wall Mounting Brackets (top view)**

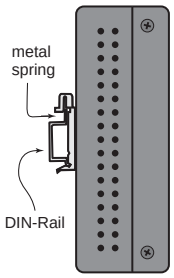
# DIN-Rail Mounting

The aluminum DIN-Rail attachment plate is included with the package. If you need to reattach the DIN-Rail attachment plate to the UC-7400 Plus, make sure the stiff metal spring is situated towards the top, as shown in the following figures.

**STEP1:** Insert the top of the DIN-Rail into the slot just below the stiff metal spring.




**STEP2:** The DIN-Rail attachment unit will snap into place as shown.




To remove the UC-7400 Plus from the DIN-Rail, simply reverse Steps 1 and 2.

# Hardware Connection Description

This section describes how to connect the UC-7410 Plus and 7420 Plus to serial devices for first time testing purposes. We cover **Wiring Requirements**, **Connecting the Power**, **Grounding the UC-7400 Plus**, **Connecting to the Network**, **Connecting to a Serial Device**, **Connecting to the Console Port**, **PCMCIA**, and **CompactFlash**, **USB**.

# Wiring Requirements

ATTENTION

**Safety First!**

Be sure to disconnect the power cord before installing and/or wiring your UC-7400 Plus.

**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 UC-7400 Plus. When plugged in, the UC-7400 Plus's internal components generate heat, and consequently the outer casing may feel hot to the touch.

You should also 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

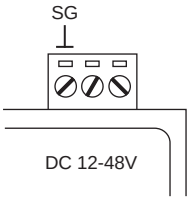
Connect the 12 to 48 VDC power line to the UC-7400 Plus's terminal block. If the power is properly supplied, the **Ready** LED will illuminate with a solid green color after 30 to 60 seconds have passed.

# Grounding the UC-7400 Plus

Grounding and wire routing helps limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screw to the grounding surface prior to connecting devices.

ATTENTION

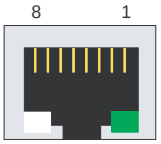
This product is intended to be mounted to a well-grounded mounting surface, such as a metal panel.



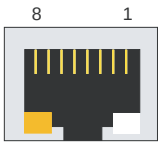

**SG:** The *Shielded Ground* (sometimes called *Protected Ground)* contact is the left most contact of the 3-pin power terminal block connector when viewed from the angle shown here. Connect the SG wire to an appropriate grounded metal surface.

# Connecting to the Network

Connect one end of the Ethernet cable to one of the UC-7400 Plus's 10/100M Ethernet ports (8-pin RJ45) and the other end of the cable to the Ethernet network. If the cable is properly connected, the UC-7400 Plus will indicate a valid connection to the Ethernet in the following ways:




The lower right corner LED indicator maintains a solid green color when the cable is properly connected to a 100 Mbps Ethernet network. The LED will flash on and off when Ethernet packets are being transmitted or received.

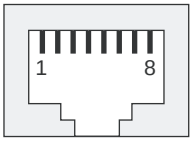



The lower left corner LED indicator maintains a solid orange color when the cable is properly connected to a 10 Mbps Ethernet network. The LED will flash on and off when Ethernet packets are being transmitted or received.

| 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 UC-7408 Plus, UC-7410 Plus, and UC-7420 Plus to serial devices. The UC-7408 Plus, UC-7410 Plus, and UC-7420 Plus's serial ports (P1 to P8) use 8-pin RJ45 connectors. The ports can be configured by software for RS-232, RS-422, or 2-wire RS-485. The precise pin assignments are shown in the following table:




| Pin | RS-232 | RS-422 | RS-485 |
|---|---|---|---|
| 1 | DSR | --- | --- |
| 2 | RTS | TXD+ | --- |
| 3 | GND | GND | GND |
| 4 | TXD | TXD- | --- |
| 5 | RXD | RXD+ | Data+ |
| 6 | DCD | RXD- | Data- |
| 7 | CTS | --- | --- |
| 8 | DTR | --- | --- |

# Connecting to the Console Port

The UC-7400 Plus's console port is an 8-pin RJ45 RS-232 port. The port can be used to connect to the console utility from a remote console through a V90 or GPRS modem with PPP protocol. The pin definition is the same as for the serial ports (P1 to P8). For normal data acquisition applications, you should connect to the UC-7400 Plus's serial ports (P1 to P8) through a V90 or GPRS modem. If you would like to use the console port for normal data acquisition applications, you can set the console port to start up with PPP protocol.

# PCMCIA

The PCMCIA slot supports the CardBus (Card-32) Card standard and 16-bit (PCMCIA 2.1/JEIDA 4.2) Card standard. It supports +3.3V, +5V, and +12V at a working voltage of 120 mA~1100 mA. The wireless LAN card expansion is optional. The wireless LAN card provided by Moxa lets you connect the UC-7400 Plus to a wireless LAN, with both 802.1b and 802.11g interfaces supported. If you need device drivers for other kinds of PCMCIA cards, contact Moxa for information on how to initiate a cooperative development project.

# CompactFlash

The UC-7402 Plus, UC-7408 Plus, and UC-7420 Plus provides one CompactFlash slot that supports CompactFlash type I/II card expansion. Currently, Moxa provides a CompactFlash disk for plug & play mass storage expansion. You may also use flash disks available from most computer supply outlets. The CompactFlash card is automatically mounted as a system partition on insertion.

If you need device drivers for other kinds of mass storage cards, contact Moxa for information on how to initiate a cooperative development project.

# USB

The UC-7408 Plus and UC-7420 Plus provides two USB 2.0 Hosts and one USB 1.1 Client, The USB Host now supports connecting mass storage devices for expanding the embedded computer's memory.

# DI/DO

The UC-7408 Plus supports 8-ch digital inputs and 8-ch digital outputs. The 8 digital input channels and 8 digital output channels use separate terminal blocks.