Automation Control Unit

User Guide

Original Instructions

Mit deutscher Übersetzung der Sicherheits- und Installationsanweisungen

Agilent Technologies

Notices

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Safety Notices

⚠ A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

Contents

Preface

This preface contains the following topics:

About this guide

Who should read this guide

This guide is for people with the following job roles:

Job role	Responsibilities
Installer	Unpacks, installs, and tests the Agilent Automation Control Unit before it is used.
Integrator	Configures hardware and writes software.
Lab manager, administrator, or technician	• Manages the automation system that contains the Automation Control Unit • Develops the applications that are run on the system • Develops training materials and standard operating procedures for operators
Operator	Performs the daily production work on the system that contains the Automation Control Unit and solves routine problems.

Installers, integrators, lab managers, and administrators are users who must have technical expertise. In addition, lab managers and administrators are individuals or groups responsible for the use and maintenance of the Automation Control Unit and for ensuring that operators are adequately trained.

What this guide covers

This guide describes the following:

- Potential safety hazards of the Automation Control Unit and how to avoid them
- Specifications and requirements for the Automation Control Unit
- Mounting and connection instructions for the Automation Control Unit
- Software setup instructions
- Indicator light descriptions
- Troubleshooting procedures

Related guides

This guide should be used in conjunction with the following user documents:

- *BioCel System user documentation*. Explains the potential safety hazards and provides instructions for setting up and operating the BioCel System.
- *Robot user documentation*. Explains the potential safety hazards and provides instructions for setting up and operating the system robot.
- *BenchCel Microplate Handling Workstation User Guide*. Explains the potential safety hazards and provides instructions for setting up and operating the BenchCel Workstation.
- *Lab automation software user documentation*. Explains how to configure the Automation Control Unit and manage the I/O signals.
- *Agilent Technologies device user documentation*. Explains how to set up and use the Agilent Technologies devices.
- *Third-party device user documentation*. Explains how to set up and use the third-party devices.

Accessing Agilent Technologies Automation Solutions user guides

You can search the online knowledge base or download the latest version of any PDF file from the Agilent Technologies website at www.agilent.com/lifesciences/automation.

Safety information for the Agilent Technologies devices appears in the corresponding device safety guide or user guide. You can also search the knowledge base or the PDF files for safety information.

Related information

For information about...	See...
Reporting problems	“Reporting problems” on page viii
Safety precautions	“Sicherheitsinformationen” on page 1
Site requirements and robot specifications	“Specifications” on page 41
Installation instructions	“Installation der Automation Control Unit” on page 69

Reporting problems

Contacting Automation Solutions Technical Support

If you find a problem with the Automation Control Unit, contact Automation Solutions Technical Support. For contact information, see Notices on the back of the title page.

Reporting hardware problems

When contacting Agilent Technologies, make sure you have the serial number of the device ready.

Reporting software problems

When you contact Automation Solutions Technical Support, make sure you provide the following:

- Short description of the problem
- Relevant software version number (for example, automation control software, diagnostics software, ActiveX control software, and firmware)
- Error message text (or screen capture of the error message dialog box)
- Relevant files, such as log files

Reporting user guide problems

If you find a problem with this user guide or have suggestions for improvement, send your comments in an email to documentation.automation@agilent.com.

Related information

For information about...	See...
What this guide covers	“About this guide” on page vi
Safety precautions	“Sicherheitsinformationen” on page 1
Installation instructions	“Installation der Automation Control Unit” on page 69

1 Sicherheitsinformationen

Dieses Kapitel enthält folgende Themen:

Übersetzung der Originalanweisungen

Allgemeine Sicherheitsinformationen

Vor dem Einsatz der Agilent Automation Control Unit

Stellen Sie vor dem Einsatz der Automation Control Unit sicher, dass Sie sich der möglichen Gefahren bewusst sind und Sie verstehen, wie diese vermieden werden können. Sie müssen im korrekten und sicheren Umgang mit dem Gerät ordnungsgemäß geschult sein.

Die Automation Control Unit ist eine Komponente von Agilent Technologies-Laborautomatisierungssystemen wie beispielsweise dem BioCel-System, der BenchBot-Workstation oder der BenchCel-Workstation. Zum sicheren Betrieb des Systems oder der Workstation lesen Sie bitte die Benutzerdokumentation zum System oder zur Workstation durch.

Bestimmungsgemäße Verwendung des Produkts

WARNUNG **Entfernen Sie die äußeren Abdeckungen der Automation Control Unit nicht oder zerlegen Sie das Gerät nicht anderweitig. Andernfalls setzen Sie sich möglicherweise Gefahren aus, die schwere Verletzungen und Schäden am Automation Control Unit verursachen können.**

WARNUNG **Durch die Verwendung von Steuerelementen oder das Durchführen von Anpassungen oder Verfahren, die nicht im Benutzerhandbuch angegeben sind, können Sie gefährlichen Spannungen ausgesetzt werden.**

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Die Automation Control Unit wurde nicht für die Diagnose an Mensch oder Tier konzipiert oder genehmigt. Sie übernehmen die volle Verantwortung für das Erlangen von behördlichen Genehmigungen, die für eine solche Verwendung notwendig sind, und übernehmen jegliche daraus entstehende Haftung.

Sicherheitsetiketten

Die Warnungen in der Benutzerdokumentation oder auf dem Gerät müssen zu jeder Zeit des Betriebs, der Wartung und der Reparatur dieses Geräts befolgt werden. Eine Nichteinhaltung dieser Vorsorgemaßnahmen missachtet die konstruktiven Sicherheitsstandards und den Verwendungszweck des Produkts. Agilent Technologies übernimmt keine Haftung, wenn der Kunde diese Vorschriften nicht beachtet.

In der folgenden Tabelle sind die häufigsten Symbole aufgeführt, die Sie auf dem System oder dem Gerät finden. Das Symbol auf dem Etikett gibt das Gefahrenrisiko an. Eine Beschreibung der Warnung und Informationen zur einfacheren Vermeidung des Sicherheitsrisikos sind in diesem Handbuch beschrieben.

Symbol	Beschreibung
	Gibt an, dass Sie für weitere Informationen die zugehörigen Anweisungen (zum Beispiel das Sicherheitshandbuch) lesen müssen, bevor Sie fortfahren.
	Weist auf gefährliche Spannungen hin.
  	Weist auf die Gefahr des Einzwickens, Quetschens oder Schneidens hin.
	Weist auf die Gefahren durch Laser hin.
	Weist auf heiße Oberflächen hin.
	Weist auf eine Schutzleiterklemme hin, die mit leitenden Teilen eines Geräts zum Schutz vor elektrischen Schlägen im Falle eines Fehlers verbunden und für den Anschluss an ein externes Schutzleitersystem vorgesehen ist.
	Weist auf eine Rahmen- oder Gehäuseklemme hin, die zu Sicherheitszwecken mit leitenden Teilen eines Geräts verbunden ist.
	Weist darauf hin, dass Sie dieses Elektro(nik)gerät nicht im Hausmüll entsorgen dürfen.

Zugehörige Informationen

Informationen zu...	finden Sie unter...
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Melden von Problemen	“Reporting problems” auf Seite viii

Sicherheits- und behördliche Konformität

Die Automation Control Unit erfüllt die geltenden EU-Richtlinien. Details finden Sie je nach Anwendbarkeit in der Konformitätserklärung oder der Einbauerklärung. Die Automation Control Unit wurde so konzipiert, dass es die in der folgenden Tabelle aufgelisteten Standards erfüllt.

Regelkonformität	Standard
EMV	
Europäische Union	EMV-Richtlinie 2004/108/EG
	IEC 61326-1:2005 / DIN EN 61326-1:2006
Kanada	ICES/NMB-001:2004
Australien/Neuseeland	AS/NZS CISPR 11:2004
Sicherheit	
Europäische Union	Maschinenrichtlinie 2006/42/EG
	Niederspannungsrichtlinie 2006/95/EG
	IEC 61010-1:2001 / DIN EN 61010-1:2001
Kanada	CAN/CSA-C22.2 Nr. 61010-1-04
USA	ANSI/UL 61010-1:2004

Elektromagnetische Verträglichkeit

Falls die Automation Control Unit Störungen des Radio- oder Fernsehempfangs verursacht, welche durch Aus- und Einschalten des Geräts bestimmt werden können, versuchen Sie eine oder mehrere der folgenden Maßnahmen:

- Bringen Sie die Radio- oder Fernsehantenne an einem anderen Ort an.
- Bewegen Sie das Gerät vom Radio- oder Fernsehgerät weg.
- Stecken Sie das Gerät in eine andere Steckdose, so dass sich Gerät und Radio- oder Fernsehgerät in zwei separaten elektrischen Stromkreisen befinden.
- Stellen Sie sicher, dass alle Peripheriegeräte ebenso zertifiziert sind.
- Stellen Sie sicher, dass geeignete Kabel für den Anschluss des Geräts an Peripheriegeräte verwendet werden.
- Unterstützung erhalten Sie vom Händler Ihrer Geräte, Agilent Technologies oder einem qualifizierten Techniker.

Durch nicht ausdrücklich von Agilent Technologies genehmigte Änderungen oder Modifikationen wird eventuell die Genehmigung des Benutzer zum Betrieb der Geräte aufgehoben.

Erklärung zur Geräuschemission

Schalldruck: Lp < 70 dB gemäß DIN EN 27779:1991.

Schalldruckpegel: Lp < 70 dB gemäß DIN EN 27779:1991.

Zugehörige Informationen

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Informationen zum Not-Halt

Anhalten des Systems oder der Workstation im Notfall

Ein Not-Halt tritt ein, wenn Sie die Not-Halt-Taste des Systems oder der Workstation drücken. Komplette Anweisungen finden Sie in der Benutzerdokumentation des Systems oder der Workstation.

Hinweis: Der Not-Halt-Mechanismus wird durch die Stellung des INTERLOCK-Schlüsselschalters nicht beeinflusst. Das System hält an, auch wenn der INTERLOCK-Schlüsselschalter auf BYPASS steht.

Beim Not-Halt geschieht Folgendes:

- Alle Roboter und Geräte im System werden angehalten.
  - *Roboter und Geräte mit einem Not-Halt-Kreis, die mit den Anschlüssen mit der Aufschrift E-STOP DEVICES an der Automation Control Unit* verbunden sind. Der Strom wird verwendet, um die Bewegung der Roboter und Geräte zu unterbrechen, bevor die Motoren deaktiviert werden. Falls zutreffend, werden Bremsen der *Z*-Achse aktiviert, um ein Herabfallen des Roboterarms oder des Pipettenkopfes zu vermeiden. Beispiele für Roboter und Geräte sind der Systemroboter, der BenchCel Microplate Handler, Bravo Platform, die Vertical Pipetting Station und das Plate Hub Carousel.
  - *Geräte, die an die roten Wechsel- und Gleichstrom-Anschlüsse an der Automation Control Unit angeschlossen sind.* Die roten Wechsel- und Gleichstromanschlüsse befinden sich in einem Stromkreis nach dem Not-Halt; somit wird der Strom zu diesen Anschlüssen während eines Not-Halts unterbrochen. Zu den Geräten, die normalerweise an diesen Anschlüssen hängen, gehören die Luftverteilungskonsole, die Microplate Centrifuge, der Labware MiniHub und der PlateLoc Sealer.

  Hinweis: Geräte *ohne* Not-Halt-Stromkreis, die mit den blauen Wechsel- und Gleichstrom-Anschlüssen an der Automation Control Unit verbunden sind, befinden sich in einem Stromkreis vor dem Not-Halt und werden *nicht* vom Not-Halt unterbrochen.
- Schaltet die rote E-STOP-Leuchte an der Automation Control Unit an und erzeugt Roboter- und Gerätefehler.
- Die blau leuchtende RESET-Leuchte blinkt jetzt an der Automation Control Unit.

Ausgelöste Sperre – INTERLOCK-Schlüsselschalter steht auf NORMAL

Durch das Öffnen einer Systemtür oder das Unterbrechen des Lichtvorhang wird die Sicherheitssperre ausgelöst. Falls der INTERLOCK-Schlüsselschalter auf NORMAL steht, geschieht beim Auslösen der Sicherheitssperre Folgendes:

- Die Roboter und integrierten Geräte mit einem Not-Halt-Stromkreis werden angehalten.
- Die integrierten Geräte ohne Not-Halt-Stromkreis dürfen die aktuelle Aufgabe abschließen und werden dann unterbrochen. Beispiele solcher Geräte sind die Centrifuge, der Labware MiniHub, der PlateLoc Sealer und der Labware Stacker.
- Die rote DOORS-Leuchte oder die rote LIGHT CURTAIN-Leuchte an der Automation Control Unit leuchtet auf und erzeugt einen Roboterfehler.
- Die blau leuchtende RESET-Leuchte blinkt jetzt an der Automation Control Unit.

Alle über die 5 V und 24 V Gleichstromausgänge angesteuerten Geräte (einschließlich der Luftverteilungskonsole) sind von der ausgelösten Sperre nicht betroffen.

Eine Beschreibung der Stellung NORMAL des Sperrschlüsselschalters finden Sie unter “NORMAL setting” auf Seite 64. Anweisungen zur Wiederherstellung finden Sie unter “Wiederherstellen nach einem Not-Halt oder einer ausgelösten Sperre” auf Seite 8.

Ausgelöste Sperre – INTERLOCK-Schlüsselschalter steht auf BYPASS

WARNUNG **Der Zugriff auf und die Bestätigung des Sperrschlüsselschalters sollte kontrolliert werden. Um mögliche Verletzungen zu vermeiden, sollte die Stellung INTERLOCK BYPASS nur von Personal verwendet werden, das im Programmieren von Robotern und Geräten im System oder auf der Workstation geschult ist. Der Sperrschlüsselschalter sollte von der Automation Control Unit abgezogen werden, wenn der Schalter auf NORMAL steht und Sie die Roboter und Geräte nicht programmieren.**

Falls der INTERLOCK-Schlüsselschalter auf BYPASS steht, bewegen sich die Roboter und Geräte wesentlich langsamer. Das Öffnen einer Systemtür oder die Unterbrechung des Lichtvorhangs hat keine Auswirkung auf das System. Alle Roboter und Geräte bewegen sich und funktionieren weiterhin mit verringerter Geschwindigkeit.

Eine Beschreibung der Stellung BYPASS des Sperrschlüsselschalters finden Sie unter “BYPASS setting” auf Seite 66.

Wiederherstellen nach einem Not-Halt oder einer ausgelösten Sperre

Nach einem Not-Halt müssen Sie das System oder die Workstation wieder in den Normalbetrieb versetzen.

WICHTIG Sie können nicht immer einen Protokolllauf nach einem Not-Halt wiederherstellen. Sie müssen das Protokoll für den Normalbetrieb eventuell erneut ausführen, nachdem das System wiederhergestellt wurde.

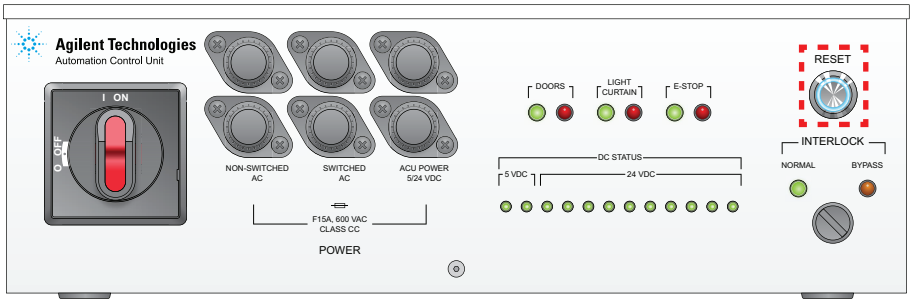
Bevor Sie das System wiederherstellen, stellen Sie sicher, dass Sie Laborgegenstände entfernen, die möglicherweise während Not-Halts fallengelassen wurden. Entfernen Sie auch Laborgegenstände an Programmierpunkten oder anderen Orten.

So stellen Sie die Automation Control Unit nach einem Not-Halt wieder her:

1 Führen Sie gegebenenfalls Folgendes durch:

- Setzen Sie die Not-Halt-Taste des Systems oder der Workstation zurück. Anweisungen finden Sie in der Benutzerdokumentation des Systems oder der Workstation.
- Schließen Sie die Systemtüren.
- Entfernen Sie Objekte, die den Lichtvorhang unterbrechen.

2 Drücken Sie an der Vorderseite der Automation Control Units die Taste **RESET**. Die Tastenleuchte blinkt nun nicht mehr, sondern leuchtet dauerhaft.



3 Anweisungen, wie die Roboter und Geräte auf Normalbetrieb zurückgesetzt werden, finden Sie in der Benutzerdokumentation für die Roboter, Geräte und die Systemautomatisierungssoftware.

Zugehörige Informationen

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Sicherheits- und behördliche Konformität	“Sicherheits- und behördliche Konformität” auf Seite 5
Anweisungen, wie das System oder die Workstation im Notfall angehalten wird	Sicherheitshandbuch des Systems oder der Workstation
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Elektrische Gefahren

In der Automation Control Unit befinden sich Elektronikteile mit gefährlich hoher Spannung. Unter normalen Betriebsbedingungen sind Sie vor diesen gefährlichen Spannungen geschützt.

WARNUNG **Versuchen Sie nicht, in die Automation Control Unit zu gelangen. Entfernen Sie unter keinen Umständen die Verkleidung. Durch eine Berührung der Elektronikteile im Inneren können schwere Verletzungen verursacht werden.**

WARNUNG **Stellen Sie sicher, dass die Netzkabel in einwandfreiem Zustand und nicht beschädigt sind. Durch die Verwendung von beschädigten Netzkabeln können Verletzungen hervorgerufen werden.**

ACHTUNG **Verwenden Sie immer die mitgelieferten Netzkabel und Brücken. Falsche Netzkabel und Brücken können Schäden an der Automation Control Unit hervorrufen.**

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Sicherheitssperre

Die Automation Control Unit ist mit Sicherheitssperrfunktionen ausgestattet, die Schutz vor Gefahren durch bewegliche Teile bieten sollen, während das System in Betrieb ist. Der Sicherheitssperrkreis muss geschlossen sein, damit das System betrieben werden kann.

Es gibt zwei Stellungen des Sperrschlüsselschalters:

- *NORMAL*. Die Sperre ist betriebsbereit. Durch das Öffnen einer Systemtür oder das Unterbrechen des Lichtvorhangs wird der Sperrstromkreis geöffnet, und die sich im Stromkreis befindlichen Roboter und Geräte werden angehalten. Geräte, welche sich nicht im Stromkreis befinden, beenden die aktuelle Aufgabe und werden danach angehalten. Unter normalen Betriebsbedingungen sollte der INTERLOCK-Schlüsselschalter auf NORMAL stehen.
- *BYPASS*. Die Sperre ist deaktiviert (oder umgangen). Roboter und Geräte bewegen sich nun wesentlich langsamer. Durch das Offnen einer Systemtür oder das Unterbrechen des Lichtvorhangs wird der Sicherheitssperrstromkreis nicht geöffnet, sodass sich die Roboter und Geräte weiterbewegen. Verwenden Sie die Schlüsselschalterstellung BYPASS, wenn Sie im Inneren des Systems oder der Workstation arbeiten müssen, während Sie Roboter und Geräte programmieren.

WARNUNG **Der Zugriff auf und die Bestätigung des Sperrschlüsselschalters sollte kontrolliert werden. Um mögliche Verletzungen zu vermeiden, sollte die Stellung INTERLOCK BYPASS nur von Personal verwendet werden, das im Programmieren von Robotern und Geräten im System oder auf der Workstation geschult ist. Der Sperrschlüsselschalter sollte von der Automation Control Unit abgezogen werden, wenn der Schalter auf NORMAL steht und Sie die Roboter und Geräte nicht programmieren.**

Eine detaillierte Beschreibung der beiden Sperrmodi finden Sie unter “Interlock key settings” auf Seite 61.

Zugehörige Informationen

Informationen zu...	finden Sie unter...
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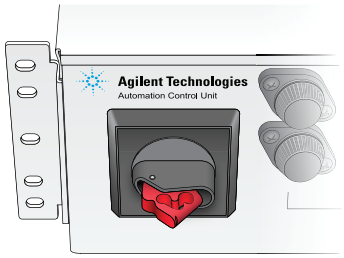
Netzschalter

WARNUNG **Über den Netzschalter wird der Ausgang der Automation Control Unit ausgeschaltet; er kann so konfiguriert werden, dass der Ausgang der unterbrechungsfreien Stromversorgung (USV) abgeschaltet wird. Gefährliche Energie bleibt aber immer im Inneren der USV bestehen.**

Der Netzschalter der Automation Control Unit ist mit einem Sperrmechanismus ausgestattet, so dass Ihr Unternehmen Verriegelungs- und Kennzeichnungsrichtlinien umsetzen kann. Durch Sperren und Anbringen eines Warnschildes am Netzschalter nach dem Herunterfahren können Sie eine unsichere Inbetriebnahme des Systems oder der Workstation verhindern, welche zu Verletzungen von Bedienern oder Wartungspersonal führen kann.

Abbildung Netzschalter der Automation Control Unit mit aktiviertem Sperrmechanismus



Beachten Sie die Sicherheitsstandards des Unternehmens und der Lokal-, Landes- und Staatsbehörden bei der Umsetzung der Verrigelungs-/ Kennzeichnungsrichtlinien in Ihrem Labor.

Zugehörige Informationen

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Melden von Problemen	“Reporting problems” auf Seite viii

1 Safety information

This chapter contains the following topics:

General safety information

Before using the Agilent Automation Control Unit

Before using the Automation Control Unit, make sure you are aware of the potential hazards and understand how to avoid being exposed to them. You must be properly trained in the correct and safe operation of the unit.

The Automation Control Unit is a component of Agilent Technologies laboratory automation systems such as the BioCel System, BenchBot Workstation, or BenchCel Workstation. For safe operation of the system or workstation, see the system or workstation user documentation.

Intended product use

WARNING **Do not remove the Automation Control Unit exterior covers or otherwise disassemble the unit. Doing so can expose you to hazards that could cause serious injury and damage the Automation Control Unit.**

WARNING **Using controls, making adjustments, or performing procedures other than those specified in the user guide can expose you to hazardous voltage.**

Agilent Technologies products must only be used in the manner described in the Agilent Technologies product user guides. Any other use may result in damage to the product or personal injury. Agilent Technologies is not responsible for any damages caused, in whole or in part, by improper use of the products, unauthorized alterations, adjustments or modifications to the products, failure to comply with procedures in Agilent Technologies product user guides, or use of the products in violation of applicable laws, rules or regulations. Except as otherwise expressly provided in Agilent Technologies product user guides, any alteration, adjustment, or modification to the products will void the product warranty.

The Automation Control Unit is not intended or approved for diagnosis of disease in humans or animals. You assume full responsibility for obtaining any regulatory approvals required for such use and assume all liability in connection therewith.

Safety labels

Warnings in the user documentation or on the device must be observed during all phases of operation, service, and repair of this device. Failure to comply with these precautions violates safety standards of design and the intended use of the product. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

The following table lists the common symbols you might find on the system or device. The symbol on the label indicates the risk of danger. A description of the warning and information that will help you avoid the safety hazard are provided in this guide.

Symbol	Description
	Indicates that you must read the accompanying instructions (for example, the safety guide) for more information before proceeding.
	Indicates hazardous voltages.
  	Indicates pinch, crush, or cut hazard.
	Indicates laser hazard.
	Indicates hot surface hazard.
	Indicates protective conductor terminal, which is bonded to conductive parts of an equipment for protection against electric shock in case of a fault and is intended to be connected to an external protective earthing system.
	Indicates frame or chassis terminal, which is bonded to conductive parts of an equipment for safety purposes.
	Indicates that you must not discard this electrical/ electronic product in domestic household waste.

Related information

For information about...	See...
Safety and regulatory certifications	“Safety and regulatory compliance” on page 17
How to stop the system or workstation in an emergency	System or workstation user documentation
Electrical hazards	“Electrical hazards” on page 22
Safety interlock	“Safety interlock” on page 23
Power switch with locking mechanism	“Power switch” on page 24
Reporting problems	“Reporting problems” on page viii

Safety and regulatory compliance

The Automation Control Unit complies with the applicable EU Directives. See the Declaration of Conformity or Declaration of Incorporation, as applicable, for details. The Automation Control Unit is designed to comply with the standards listed in the following table.

Regulatory Compliance	Standard
EMC	
European Union	EMC Directive 2004/108/EC
	IEC 61326-1:2005 / EN 61326-1:2006
Canada	ICES/NMB-001:2004
Australia/New Zealand	AS/NZS CISPR 11:2004
Safety	
European Union	Machinery Directive 2006/42/EC
	Low Voltage Directive 2006/95/EC
	IEC 61010-1:2001 / EN61010-1:2001
Canada	CAN/CSA-C22.2 No. 61010-1-04
USA	ANSI/UL 61010-1:2004

Electromagnetic compatibility

If the Automation Control Unit causes interference with radio or television reception, which can be determined by turning the device off and on, try one or more of the following measures:

- Relocate the radio or television antenna.
- Move the device away from the radio or television.
- Plug the device into a different electrical outlet, so that the device and the radio or television are on separate electrical circuits.
- Make sure that all peripheral devices are also certified.
- Make sure that appropriate cables are used to connect the device to peripheral equipment.
- Consult your equipment dealer, Agilent Technologies, or an experienced technician for assistance.

Changes or modifications not expressly approved by Agilent Technologies could void the user's authority to operate the equipment.

Sound emission declaration

Sound pressure: Lp < 70 dB according to EN 27779:1991.

Schalldruckpegel: Lp < 70 dB nach EN 27779:1991.

Related information

For information about...	See...
General safety information	“General safety information” on page 14
How to stop the system or workstation in an emergency	System or workstation user documentation
Electrical hazards	“Electrical hazards” on page 22
Safety interlock	“Safety interlock” on page 23
Power switch with locking mechanism	“Power switch” on page 24
Reporting problems	“Reporting problems” on page viii

About emergency stop

About stopping the system or workstation in an emergency

An emergency stop occurs when you press the system or workstation emergency-stop button. For full instructions, see the system or workstation user documentation.

Note: The emergency stop mechanism is not affected by the INTERLOCK key setting. The system will stop even if the INTERLOCK key is set at BYPASS.

The emergency stop does the following:

- Stops all robots and devices in the system.
  - *Robots and devices that have an emergency-stop circuit and are connected to the E-STOP DEVICES ports at the Automation Control Unit.* Power is used to stop the motion of the robots and devices before motors are disabled. *z*-axis brakes, if applicable, are engaged to prevent the robot arm or pipette head from falling. Examples of the robot and devices include the system robot, BenchCel Microplate Handler, Bravo Platform, Vertical Pipetting Station, and Plate Hub Carousel.
  - *Devices connected to the red AC and DC power output ports at the Automation Control Unit.* The red AC and DC power ports are on a post-emergency-stop circuit, and power to these ports are cut during an emergency stop. Devices that are typically connected to these ports include the air distribution panel, Microplate Centrifuge, Labware MiniHub, and PlateLoc Sealer.

  Note: Devices that do *not* have an emergency-stop circuit and are connected to the blue AC and DC power ports at the Automation Control Unit are on a pre-emergency-stop circuit and will *not* be stopped by the emergency stop.
- Turns on the red E-STOP light on the Automation Control Unit and generates robot and device errors.
- Changes the blue solid RESET light to a blinking RESET light on the Automation Control Unit.

Tripped interlock—INTERLOCK key is set at NORMAL

Opening a system door or interrupting the Light Curtain trips the safety interlock. If the INTERLOCK key is set at NORMAL, tripping the safety interlock does the following:

- Stops the robots and integrated devices that have an emergency-stop circuit.
- Allows the integrated devices that do not have an emergency-stop circuit to finish the current task, and then pauses the devices. Examples of these devices include the Centrifuge, Labware MiniHub, PlateLoc Sealer, and Labware Stacker.
- Turns on the red DOORS light or the red LIGHT CURTAIN light on the Automation Control Unit and generates a robot error.
- Changes the blue solid RESET light to a blinking RESET light on the Automation Control Unit.

All devices powered by 5 VDC and 24 VDC outputs (including the air distribution panel) are not affected by the tripped interlock.

For a description of the NORMAL interlock key setting, see “NORMAL setting” on page 64. For recovery instructions, see “Recovering from an emergency stop or tripped interlock” on page 20.

Tripped interlock—INTERLOCK key is set at BYPASS

WARNING **Access to and use of the interlock key should be controlled. To avoid possible injury, the INTERLOCK BYPASS setting should be used only by personnel trained to teach robots and devices in the system or workstation. The interlock key should be removed from the Automation Control Unit when the switch is set at NORMAL and you are not teaching the robots and devices.**

If the INTERLOCK key is set at BYPASS, the robots and devices move at a significantly slower speed. Opening a system door or interrupting the Light Curtain has no effect on the system. All robots and devices continue to move and operate at the reduced speed.

For a description of the BYPASS interlock key setting, see “BYPASS setting” on page 66.

Recovering from an emergency stop or tripped interlock

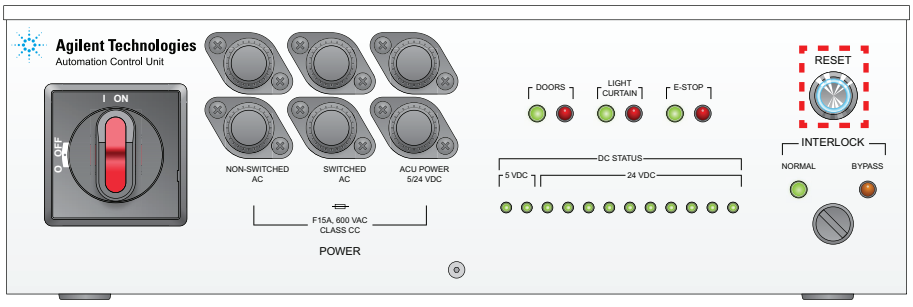
After an emergency stop, you must restore the system or workstation for normal operation.

IMPORTANT You cannot always resume or recover a protocol run after an emergency stop. You might need to rerun the protocol after restoring the system for normal operation.

Before you restore the system, make sure you remove labware that might have been dropped during the emergency stop. Also remove labware at teachpoints or other locations.

To restore the Automation Control Unit after an emergency stop:

1. Do the following as applicable:
   - Reset the system or workstation emergency stop button. See the system or workstation user documentation for instructions.
   - Close the system doors.
   - Remove objects that are interrupting the Light Curtain.
2. On the front of the Automation Control Unit, press the **RESET** button. The flashing light in the button becomes solid.



3 See the user documentation for the robots, devices, and system automation software to determine how to restore the robots and devices for normal operation.

Related information

For information about...	See...
General safety information	“General safety information” on page 14
Safety and regulatory compliance	“Safety and regulatory compliance” on page 17
How to stop the system or workstation in an emergency	System or workstation safety guide
Electrical hazards	“Electrical hazards” on page 22
Safety interlock	“Safety interlock” on page 23
Power switch with locking mechanism	“Power switch” on page 24
Reporting problems	“Reporting problems” on page viii

Electrical hazards

Hazardous-voltage electronics can be found within the Automation Control Unit. Under normal operating conditions, you are protected from exposure to the hazardous voltage.

WARNING **Do not try to gain access to the interior of the Automation Control Unit. Do not remove panels for any reason. Exposure to the interior electronics can cause severe injury.**

WARNING **Ensure that the power cords are in good condition and are not frayed. Use of frayed or damaged power cords can cause injury.**

CAUTION **Always use the supplied power cords and jumpers. Use of incorrect power cords and jumpers can cause damage to the Automation Control Unit.**

Related information

For information about...	See...
General safety information	“General safety information” on page 14
Safety and regulatory certifications	“Safety and regulatory compliance” on page 17
How to stop the system or workstation in an emergency	System or workstation user documentation
Safety interlock	“Safety interlock” on page 23
Power switch with locking mechanism	“Power switch” on page 24
Reporting problems	“Reporting problems” on page viii

Safety interlock

The Automation Control Unit is equipped with safety interlock features that are designed to protect you from moving-part hazards while the system is in operation. The safety interlock circuit must be closed for the system to operate.

Two interlock key settings are available:

- *NORMAL*. The interlock is armed. Opening a system door or interrupting the Light Curtain opens the interlock circuit, thus stopping the robots and devices that are on the circuit. Devices that are not on the circuit will finish the current task before pausing. Under normal operating conditions, the INTERLOCK key should be set at NORMAL.
- *BYPASS*. The interlock is muted (or bypassed). Robots and devices will move at a significantly reduced speed. Opening a system door or interrupting the Light Curtain does not open the safety interlock circuit, so the robots and devices will continue to move. Use the BYPASS key setting if you need to work inside of the system or workstation while teaching robots and devices.

WARNING **Access to and use of the interlock key should be controlled. To avoid possible injury, the Interlock Bypass setting should be used only by personnel trained to teach robots and devices in the system or workstation. The interlock key should be removed from the Automation Control Unit when the switch is set at Normal and you are not teaching the robots and devices.**

For a detailed description of the two interlock modes, see “Interlock key settings” on page 61.

Related information

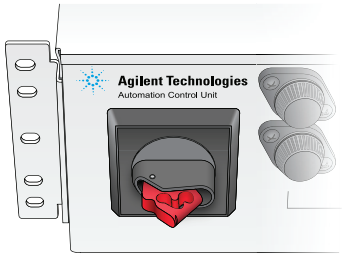
For information about...	See...
General safety information	“General safety information” on page 14
Safety and regulatory certifications	“Safety and regulatory compliance” on page 17
How to stop the system or workstation in an emergency	System or workstation user documentation
Electrical hazards	“Electrical hazards” on page 22
Power switch with locking mechanism	“Power switch” on page 24
Reporting problems	“Reporting problems” on page viii

Power switch

WARNING **The power switch turns off the Automation Control Unit output and can be configured to turn off uninterruptible power supply (UPS) output, but hazardous energy always remains present inside the UPS.**

The Automation Control Unit power switch is equipped with a locking mechanism so that your organization can implement lockout/tagout policies.
By locking and placing a warning tag on the power switch after a shutdown procedure, you can prevent unsafe startup of the system or workstation that could cause injuries to operators or service personnel.

Figure Automation Control Unit power switch with locking mechanism engaged



Follow the company, local, state, and federal safety standards for implementing lockout/tagout policies in your lab.

Related information

For information about...	See...
General safety information	“General safety information” on page 14
Safety and regulatory certifications	“Safety and regulatory compliance” on page 17
How to stop the system or workstation in an emergency	System or workstation user documentation
Electrical hazards	“Electrical hazards” on page 22
Safety interlock	“Safety interlock” on page 23
Turning on and turning off the Automation Control Unit	“Turning on and turning off the Automation Control Unit” on page 122
Reporting problems	“Reporting problems” on page viii

2 Introduction to the Automation Control Unit

This chapter contains the following topics:

About the Automation Control Unit

Description

The Automation Control Unit provides the following for Agilent Technologies laboratory automation systems:

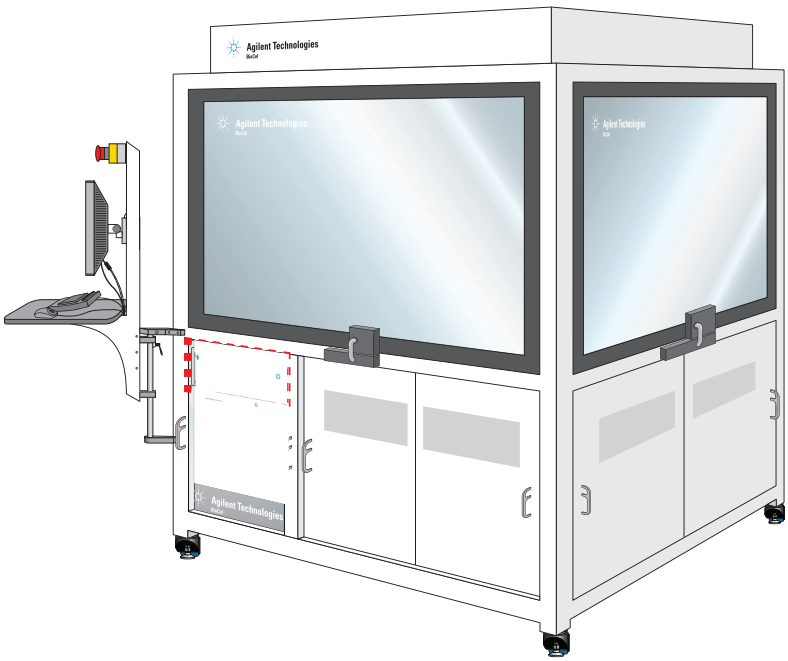
- AC power and power distribution
- Emergency-stop function
- Safety interlock features
  - Receives safety interlock circuit signals from system doors or the Light Curtain, and transmits the signals to the lab automation software to pause the system or workstation.
  - Mutes (or bypasses) the interlock circuit, placing robots and emergency-stop controlled Automation Solutions devices in the reduced-speed mode to allow access for tasks such as teaching.
- Detection sensor features

  Transmits signals from various sensors to the controlling computer so that the software can respond and turn on or off status lights, open or close doors, and change the state of other items.

Locations

In BioCel System models, the Automation Control Unit is typically located in a cabinet below the deck. You can access the power switch, interlock switch, and the RESET button without opening the cabinet door. For more information about the system, see the system user documentation.

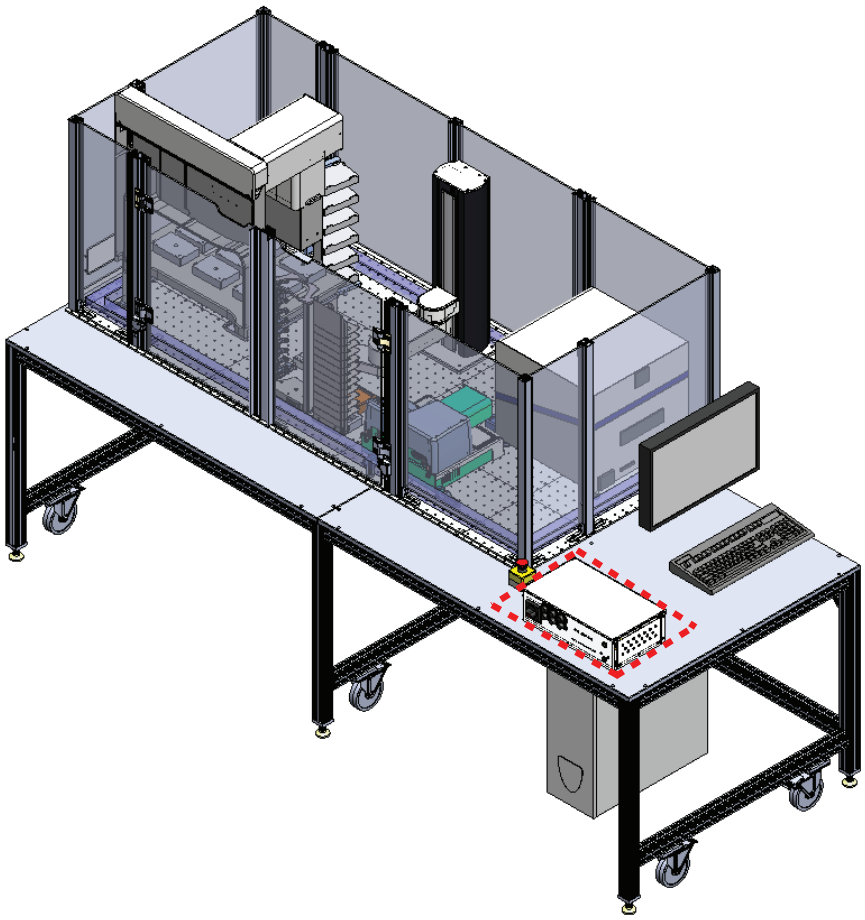
Figure The Automation Control Unit in a BioCel System



In benchtop workstations, the Automation Control Unit can be mounted in a rack under the workstation bench, or placed on a surface near the workstation. In the following example, the Automation Control Unit is placed on the workstation bench. For other placement options and requirements, contact Automation Solutions Technical Support.

Note: The workstation bench is not part of the workstation and is not provided.

Figure The Automation Control Unit on a workstation benchtop



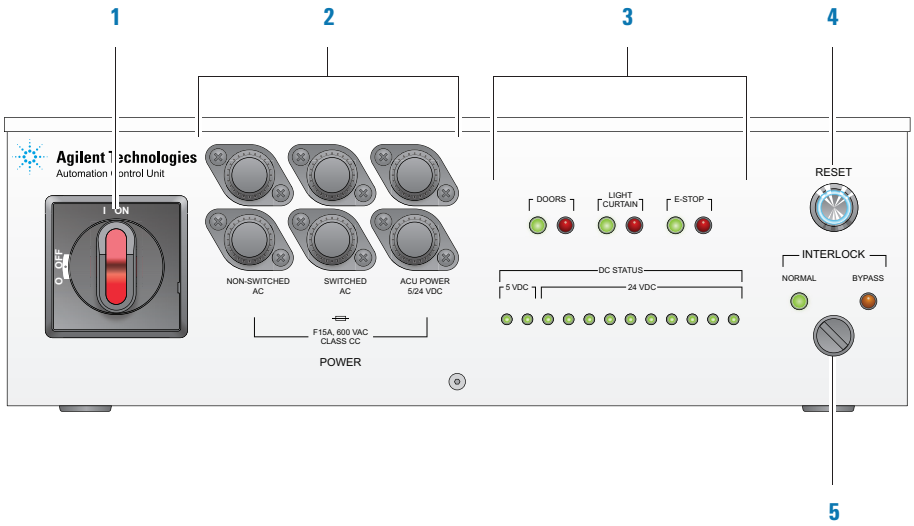
Related information

For information about...	See...
Automation Control Unit features	“Front panel” on page 28
Automation Control Unit specifications	“Specifications” on page 41
Software that controls the Automation Control Unit	“Software overview” on page 38
Safety information	“Safety information” on page 13

Front panel

Description

The front panel of the Automation Control Unit consists of the following:



Item	Name	Description
1	Power switch	Turns on or turns off AC and DC power to the Automation Control Unit. If the system or workstation uses compressed air, the power switch also turns on or turns off the air supply. *Note:* The power switch is equipped with a locking mechanism that allows you to enforce lockout/tagout policies in your organization. For more information, see "Turning on and turning off the Automation Control Unit" on page 122.
2	Fuse housings	Contains the fuses. For fuse ratings, see "Electrical requirements" on page 44.
3	Indicator lights	Indicates status of the system doors, Light Curtain, emergency-stop, and various devices connected to the 5 V and 24 V DC signal output ports. See "Viewing the indicator lights" on page 151.
4	RESET button	Resets the emergency stop relay to allow electrical current to flow to switched power outputs. For emergency stop recovery, see "About emergency stop" on page 19. For indicator light descriptions, see "Viewing the indicator lights" on page 151.
5	INTERLOCK key switch	Arms or bypasses the safety interlock. For a description of the interlock modes, see "Interlock key settings" on page 61.

WARNING **Access to and use of the interlock key should be controlled. To avoid possible injury, the INTERLOCK BYPASS setting should be used only by personnel trained to teach the robots and devices in the system. The interlock key should be removed from the Automation Control Unit when the switch is set at NORMAL and you are not teaching robots and devices.**

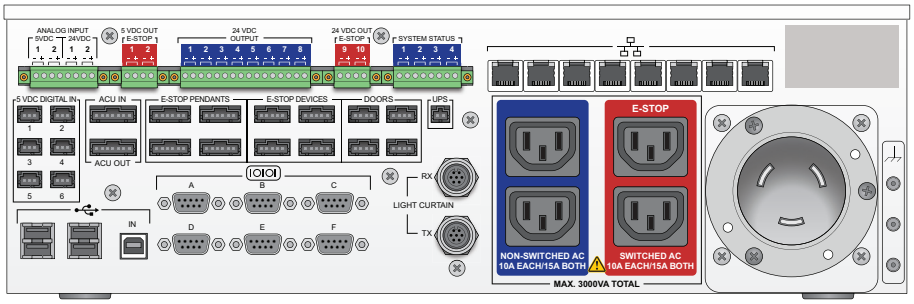
Related information

For information about...	See...
Automation Control Unit back panel features	“Back panel” on page 30
Automation Control Unit specifications	“Specifications” on page 41
Software that controls the Automation Control Unit	“Software overview” on page 38
Safety information	“Safety information” on page 13
Installation instructions	“Installing the Automation Control Unit” on page 95

Back panel

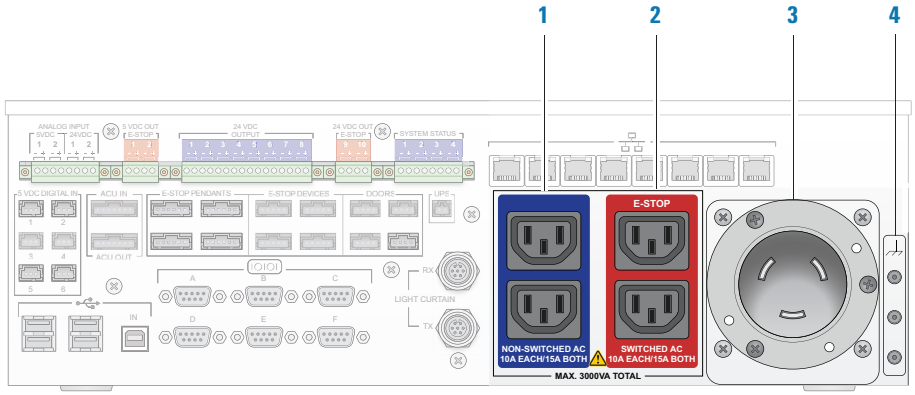
Description

The back of the Automation Control Unit consists of ports for the following:



- AC power
- UPS
- Safety equipment
- Ethernet communication
- USB communication
- RS-232 communication
- Analog signal input
- Digital signal input and DC output
- Additional Automation Control Units

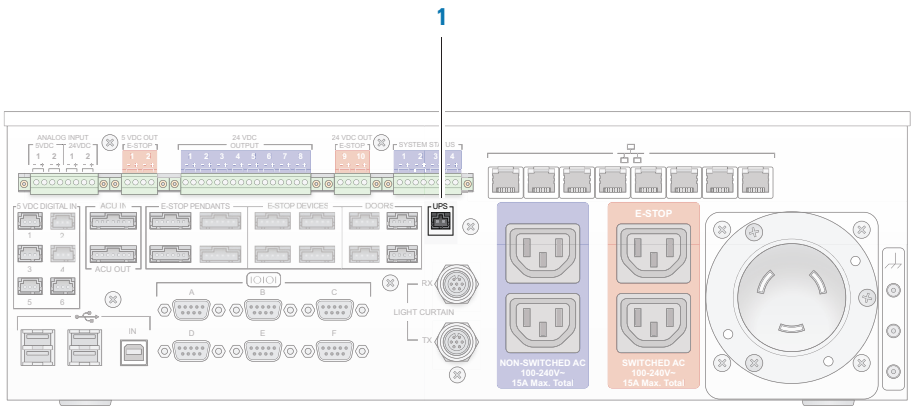
AC power



Item	Name	Description
1	NON-SWITCHED AC (2 ports)	Distributes power to devices that are: • Equipped with an emergency-stop circuit. Examples of such devices include the Direct Drive Robot, BenchBot Robot, Bravo Platform, and Plate Hub Carousel. • Not equipped with an emergency-stop circuit and have no moving parts. The NON-SWITCHED AC ports are on a pre-emergency-stop circuit. Therefore, devices that do not have an emergency-stop circuit are not affected by emergency stops and tripped interlock.
2	E-STOP SWITCHED AC (2 ports)	Distributes power to devices that are not equipped with an emergency-stop circuit but have moving parts. Examples of such devices include the Labware MiniHub, PlateLoc Sealer, and Labware Stacker. The SWITCHED AC ports are on a post-emergency-stop circuit. Power is cut from devices connected to these ports during an emergency stop.
3	AC input (1 port)	Delivers AC power to the Automation Control Unit.
4	Grounding terminals (3 terminals)	Bonds the system enclosure conductive parts to ground.

For more information, see “Electrical requirements” on page 44 and “Connecting the AC power and the UPS” on page 98.

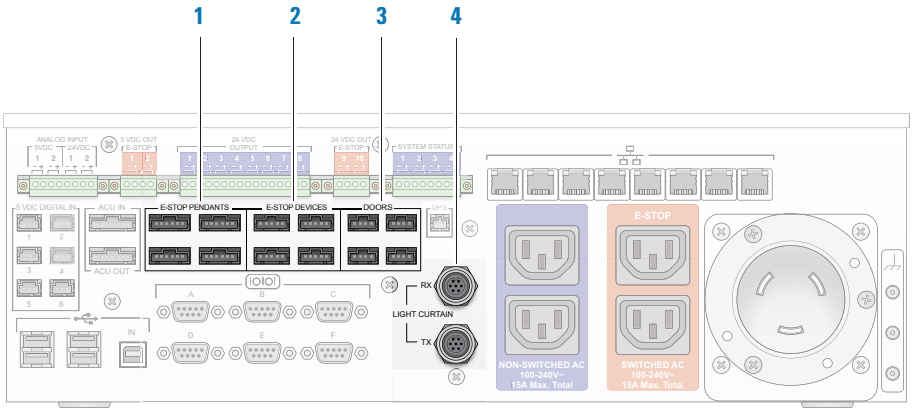
UPS



Item	Name	Description
1	UPS (1 port)	Optionally connects the uninterruptible power supply (UPS) emergency power off (EPO) circuit to the Automation Control Unit. The connection is only applicable in configurations where turning off the Automation Control Unit automatically turns off the UPS and any device connected directly to the UPS, such as the controlling computer. (By default, this connection is not used so that you can continue to operate the controlling computer for backing up files after turning off the Automation Control Unit.) *Note:* The UPS is included in the BioCel 1200 System and the BioCel 1800 System. It is optional in the BioCel 900 System and all workstations.

For more information, see "UPS port" on page 57 and "Connecting the AC power and the UPS" on page 98.

Safety equipment



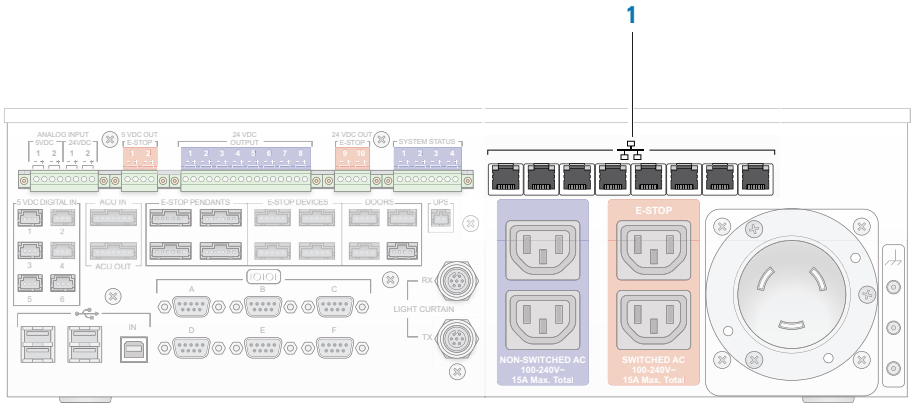
Item	Name	Description
1	E-STOP PENDANTS (4 ports)	Connects emergency-stop pendants to the Agilent Automation Control Unit.
2	E-STOP DEVICES (4 ports)	Connects device emergency-stop cables to the Automation Control Unit. The ports are only applicable to devices that are equipped with an emergency-stop circuit, such as the system robot, BenchCel Microplate Handler, Bravo Platform, Vertical Pipetting Station, and Plate Hub Carousel.
3	DOORS (4 ports)	Connects safety-interlocked doors to the Agilent Automation Control Unit. *Note:* If your workstation employs the Light Curtain, use the Light Curtain ports (4).

Item	Name	Description
4	LIGHT CURTAIN	Connects the Light Curtain to the Agilent Automation Control Unit. • *TX*. The transmitter cable connects to the TX port. • *RX*. The receiver cable connects to the RX port. *Note:* If your workstation employs a shield, use the Doors ports (3).

IMPORTANT Unused safety equipment ports must have the supplied jumpers installed.

For more information, see "Emergency-stop ports" on page 48, "Connecting signal-generating and miscellaneous devices" on page 113, and "Connecting the safety equipment" on page 104.

Ethernet communication

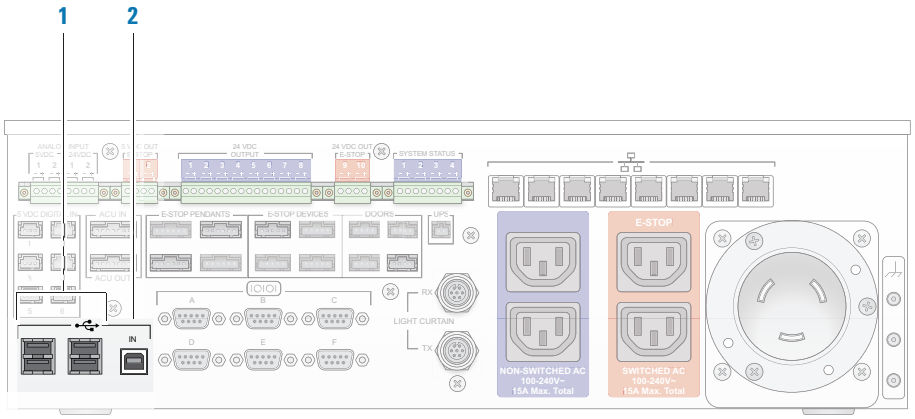


Item	Symbol	Description
1	 (8 ports)	Connects the controlling computer and devices that require Ethernet communication.

For more information, see "I/O ports" on page 51 and "Connecting the computer" on page 111.

USB communication

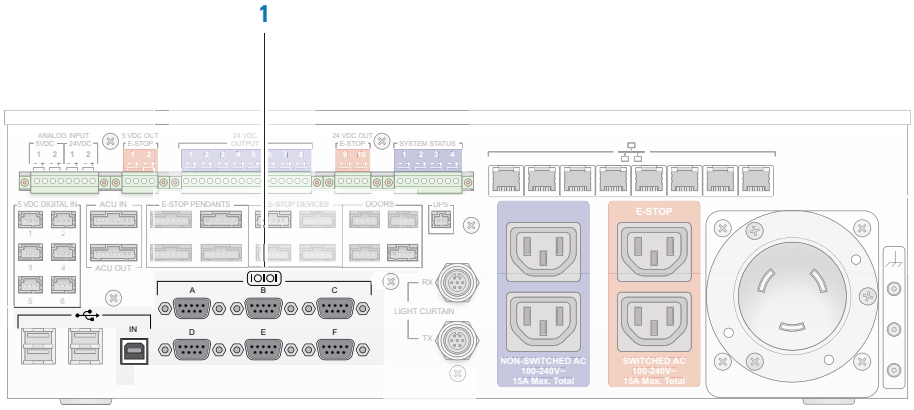
The USB ports are provided in case you have devices that require USB communication.



Item	Symbol	Description
1	(4 ports)	Connects up to four USB devices. *Note:* You can connect a USB hub to one of the ports to expand the number of available ports.
2	IN (1 port)	Connects to a USB port on the controlling computer. Use this port only if you require communication with devices that are connected to the USB and RS-232 ports.

For more information, see "I/O ports" on page 51 and "Connecting integrated devices" on page 108.

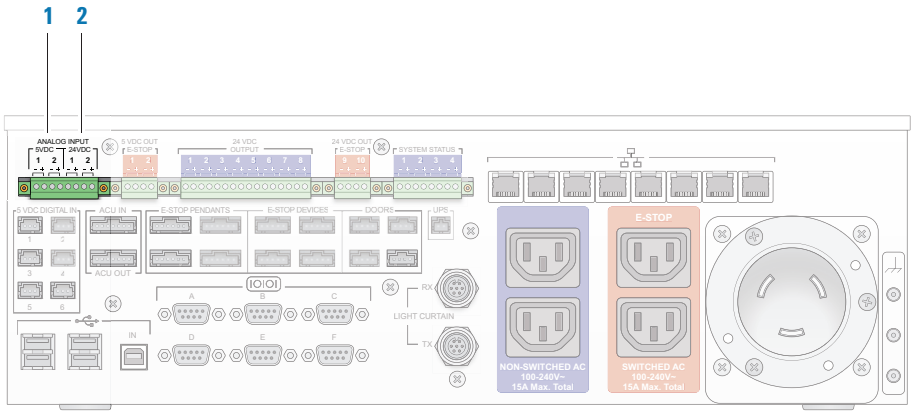
RS-232 communication



Item	Symbol	Description
1	 (6 ports)	Connects devices that require RS-232 communication. **IMPORTANT** To communicate with the RS-232 devices, you must connect the controlling computer to the USB IN port.

For more information, see "I/O ports" on page 51, and "Connecting integrated devices" on page 108.

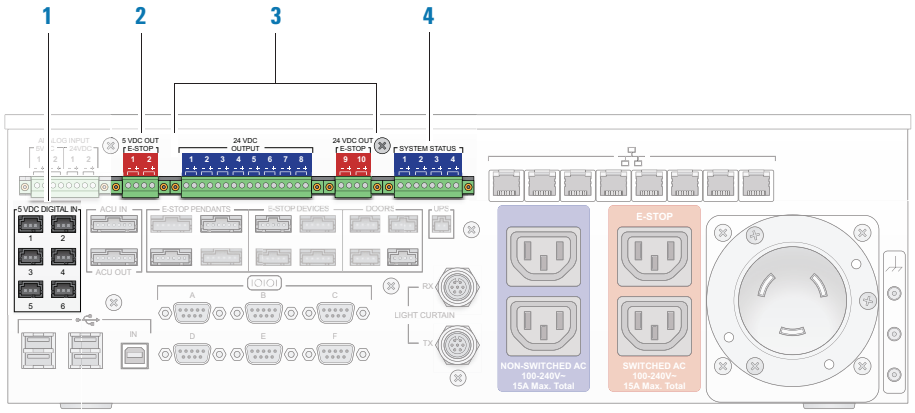
Analog signal input



Item	Name	Description
1	ANALOG INPUT 5 VDC (2 ports)	Accepts up to 5 VDC per port.
2	ANALOG INPUT 24 VDC (2 ports)	Accepts up to 24 VDC per port.

For more information, see "I/O ports" on page 51 and "Connecting signal-generating and miscellaneous devices" on page 113.

Digital signal input and DC output

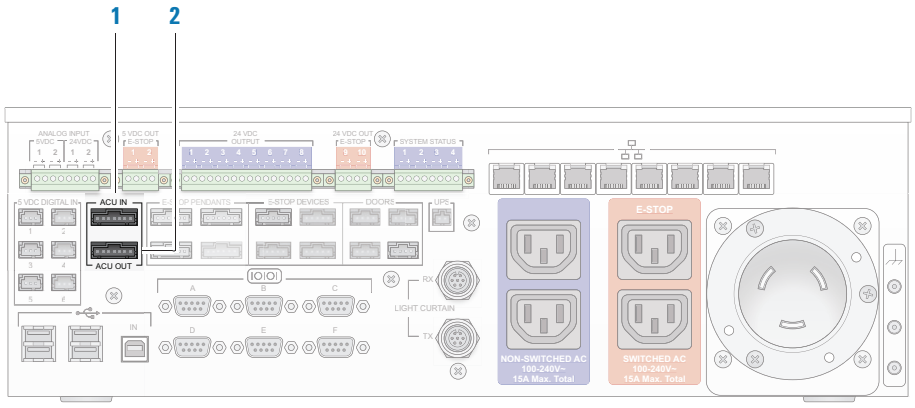


Item	Name	Description
1	5 VDC DIGITAL IN (6 ports)	Supplies up to 5 VDC per port and accepts TTL/ CMOS logic input signals.
2	5 VDC OUT E-STOP (2 ports)	Supplies up to 5 VDC per port. *Note:* The 5 VDC OUT E-STOP ports are on a post-emergency-stop circuit. Power is cut from devices connected to these ports during an emergency stop.
3	24 VDC OUTPUT (8 ports) and 24 VDC OUT E-STOP (2 ports)	Supplies up to 24 VDC per port. *Note:* Ports 1 through 8 are on a pre-emergency-stop circuit. Therefore, devices connected to these ports are not affected by emergency stops and tripped interlock. Ports 9 and 10 are on a post-emergency-stop circuit. Power is cut from devices connected to these ports during an emergency stop.
4	SYSTEM STATUS (4 ports)	Connects the multicolor or other status lights that require up to 24 VDC. Note: The SYSTEM STATUS ports are on a pre-emergency-stop circuit. Therefore, devices connected to these ports are not affected by emergency stops and tripped interlock.

For more information, see “I/O ports” on page 51 and “Connecting signal-generating and miscellaneous devices” on page 113.

Additional Automation Control Units

In a system where multiple BioCel units are connected and an Automation Control Unit is installed in each unit, use the ACU IN and ACU OUT connections on the back to connect the units in series.



Item	Name	Description
1	ACU IN	Connects to another Automation Control Unit.
2	ACU OUT	Connects to another Automation Control Unit.

Note: Only one computer is required to communicate with and control the connected units.

For more information, see “ACU ports” on page 58 and “Connecting an additional Automation Control Unit” on page 116.

Related information

For information about...	See...
Automation Control Unit front panel features	“Front panel” on page 28
Specifications	“Specifications” on page 41
Safety information	“Safety information” on page 13
Interlock key settings	“Interlock key settings” on page 61
Installation procedure	“Installing the Automation Control Unit” on page 95
Setup procedure	“Setting up the Automation Control Unit” on page 119
Fuse replacement procedure	“Replacing fuses” on page 174

Software overview

About this topic

You use the lab automation software to configure the Automation Control Unit and manage the I/O signals.

This topic provides an overview of the following VWorks software components:

- ACU Diagnostics
- IO Manager

This topic also explains Title 21 CFR Part 11 compliance.

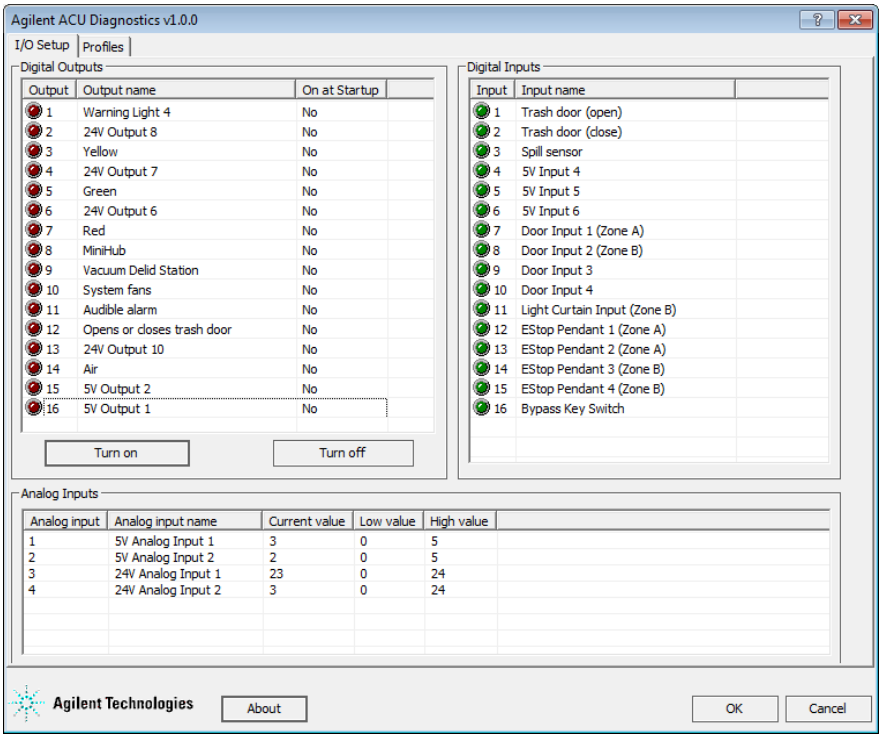
For information about other lab automation software, see the user documentation for the software.

ACU Diagnostics

You use the ACU Diagnostics software to:

- *Establish communication with the Automation Control Unit.* You create a profile to set up communication between the Automation Control Unit and the controlling computer.
- *Configure the I/O signal channels.* You can name the signal channels so that they are easily identifiable in the VWorks software IO Manager, protocol tasks, and when diagnosing problems. You can also specify whether a signaling device should be turned on at startup.

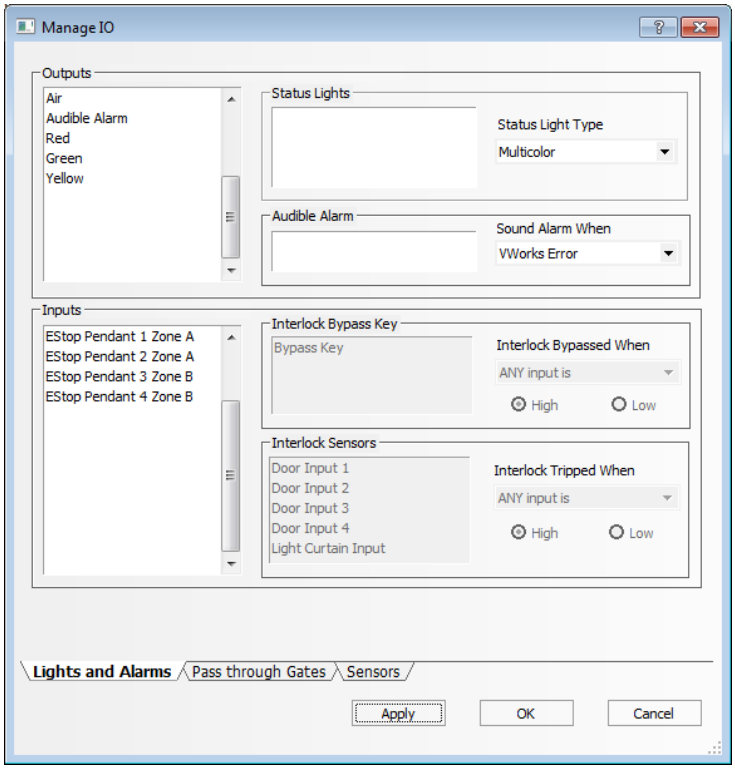
You can access ACU Diagnostics from within the VWorks software only. For instructions, see "Setting up the Automation Control Unit" on page 119.



IO Manager

After you configure the Automation Control Unit in ACU Diagnostics, you can use the VWorks software IO Manager to manage the I/O signals. For example, you can specify which channels to use for the multicolor status lights, pass-through gates, and spill-detection sensor.

For instructions on how to use the VWorks software I/O Manager, see the *VWorks Automation Control User Guide*.



Title 21 CFR Part 11 compliance

ACU Diagnostics has functions that enable it to meet the United States code of regulations Title 21 CFR Part 11. When integrated in a compliant system, such as the VWorks software, all operations performed in the system, including those on the Automation Control Unit, are written to a log. In addition, an authorized administrator has the ability to limit user access to the system and change-protected records.

Related information

For information about...	See...
VWorks software instructions	*VWorks Automation Control User Guide*
Other automation software instructions	Automation software user documentation
Automation Control Unit description	"About the Automation Control Unit" on page 26
Automation Control Unit specifications and requirements	"Software requirements" on page 59
Hardware components	• "Front panel" on page 28 • "Back panel" on page 30

3 Specifications

This chapter provides the specifications for the Automation Control Unit and contains the following topics:

For site preparation and installation requirements, see the site-specific documentation provided by Automation Solutions. The site-specific documents address different system or workstation configurations and requirements. If you have questions, contact Automation Solutions Technical Support.

Dimensions

Figure Automation Control Unit front view

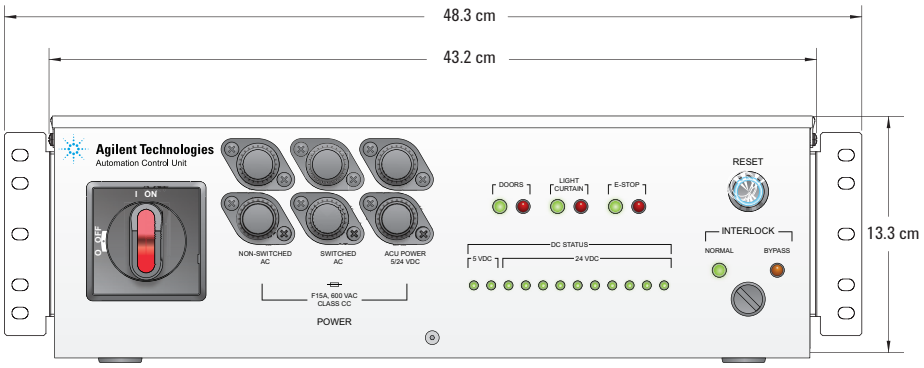
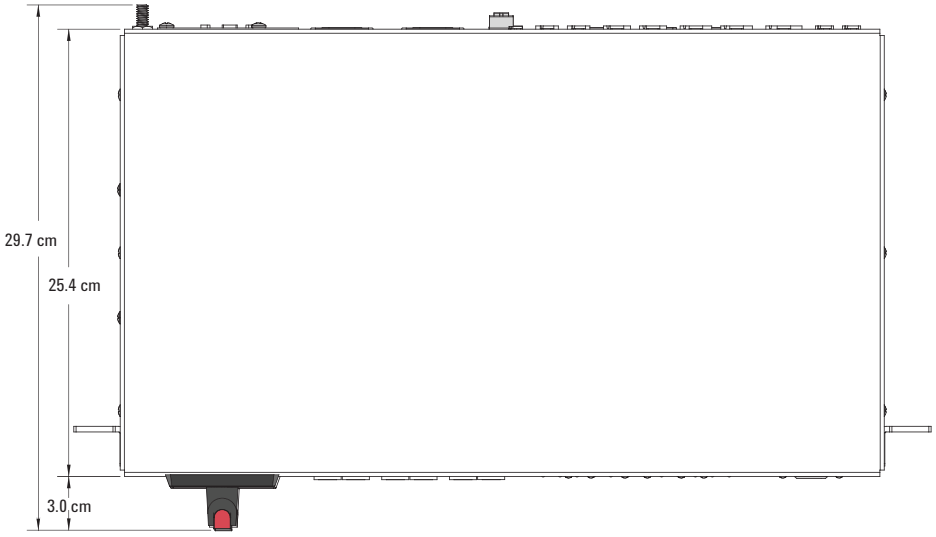


Figure Automation Control Unit top view



Dimension	Value
Width:	
Without mounting brackets	43.2 cm (17.0 in)
With mounting bracket	48.3 cm (19.0 in)
Depth	29.7 cm (11.7 in)
Height	13.3 cm (5.3 in)
Weight	4.5 kg (10.0 lb)

The Automation Control Unit has two mounting brackets that are 3 rack units (or 3 U) tall and permit the unit to be mounted in a standard 19-inch rack. Mounting screws and washers are provided.

IMPORTANT *Workstations*. To ensure adequate ventilation, provide at least 15 cm (6 in) of clearance on all sides of the Automation Control Unit.

Related information

For information about...	See...
Electrical requirements	“Electrical requirements” on page 44
Environmental requirements	“Environmental requirements” on page 47
Emergency-stop connections	“Emergency-stop ports” on page 48
Signaling device connections	“I/O ports” on page 51
UPS connection	“UPS port” on page 57
ACU connections	“ACU ports” on page 58
VWorks software requirements	“Software requirements” on page 59

Electrical requirements

About this topic

This topic presents the electrical requirements for the following:

AC mains input

IMPORTANT Do not use an extension cord to connect the Automation Control Unit to the wall receptacle.

Requirement	Value
Voltage	100–240 VAC
Frequency	50/60 Hz
Current (maximum)	
Systems	
100–127 V	30 A
200–240 V	16 A (20 A in the U.S. and Canada)
Workstations	
100–127 V	20 A
200–240 V	15 A (13 A in the U.K.)
Fuses	600 VAC, 15 A, class CC, time delay
Chassis input receptacle	
Systems	
100–127 V	NEMA L5-30P
200-240 V	IEC 60320 C20*
Workstations (all)	IEC 60320 C20*
Wall receptacle**	Single dedicated receptacle suitable for rated voltage and maximum current
Facility branch circuit breaker***	
Systems	
100–127 V	30 A, rated continuous use
200–240 V	16 A, rated continuous use (20 A, rated continuous use, in the U.S. and Canada)
Workstations	
100–127 V	20 A, rated continuous use
200–240 V	20 A (or 16 A, rated continuous use)

* 20 A rated cords will be supplied to labs in North America. For labs in other countries, the appropriate cords will be provided.

** The receptacle must be the only receptacle on a dedicated electrical circuit protected by the facility circuit breaker. The receptacle must be properly grounded.

*** The circuit breaker protects the electrical circuit from damage caused by overload or short circuit.

UPS

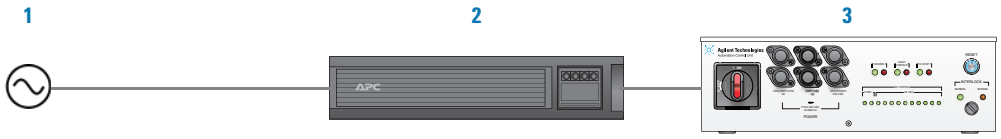
IMPORTANT The UPS must connect directly to the wall receptacle that is on a dedicated and grounded electrical circuit protected by the facility circuit breaker. Do not use an extension cord to connect the UPS to the dedicated circuit.

The UPS is supplied in the BioCel 1800 System and the BioCel 1200 System. The UPS is optional in the BioCel 900 System and workstations.

One of two types of UPS is installed with your system:

- *110–127 V UPS*. Has a permanently attached power cord with a NEMA L5-30P plug. Make sure your wall receptacle or junction box can accommodate this plug.
- *200–240 V UPS*. Has a detachable, country-specific power cord that is supplied with your system.

The following diagram shows the connection sequence when a UPS is installed with the Automation Control Unit.



Item	Name	Description
1	AC source	The wall receptacle in the lab. See "AC mains input" on page 44 for the wall receptacle and circuit breaker requirements.
2	UPS	The UPS that is supplied in the BioCel 1800 System and the BioCel 1200 System, and optionally installed in the BioCel 900 System and workstations.
3	Automation Control Unit	The Automation Control Unit that is installed in the system or workstation.

For detailed connection instructions, see "Connecting the AC power and the UPS" on page 98. For detailed site preparation and installation requirements, see the site-specific documentation provided by Automation Solutions. The site-specific documents address different system configurations and requirements. If you have questions, contact Automation Solutions Technical Support.

AC output to devices

The two AC outputs from the Automation Control Unit will always be the same voltage and frequency as the AC input from the UPS or from the AC mains wall receptacle. Each of the two outputs is rated as follows:

Requirement	Value
Voltage	100–240 VAC
Frequency	50/60 Hz
Current (maximum)	
Non-switched AC input	10 A (each receptacle), 15 A (total)
Switched AC input	10 A (each receptacle), 15 A (total)
Chassis output receptacle	IEC 60320 C13

CAUTION Check the electrical requirements of integrated devices before connecting them to the Automation Control Unit. Connecting incompatible devices might damage the Automation Control Unit and the devices.

DC output to devices

All DC outputs are rated as follows:

Requirement	Value
Voltage	5 VDC and 24 VDC
Current (maximum)	1.5 A
Fuses (self resetting)*	
Voltage (maximum)	33 V
Current (hold)	1.85 A at 23 °C
Current (trip)	3.70 A at 23 °C

* Not replaceable

Related information

For information about...	See...
Automation Control Unit dimensions	“Dimensions” on page 42
Environmental requirements	“Environmental requirements” on page 47
Emergency-stop connections	“Emergency-stop ports” on page 48

For information about...	See...
Signaling device connections	“I/O ports” on page 51
UPS connection	“UPS port” on page 57
ACU connections	“ACU ports” on page 58
VWorks software requirements	“Software requirements” on page 59

Environmental requirements

Ambient environment

IMPORTANT The Automation Control Unit must operate within the temperature and humidity specifications stated in the following table.

Operating	Recommended range
Temperature	5–40 °C
Humidity	10–95% RH, non-condensing
Storage (non-operating)	**Recommended range**
Temperature	-40–70 °C
Humidity	95% RH at 65 °C, non-condensing

Related information

For information about...	See...
Automation Control Unit dimensions	“Dimensions” on page 42
Electrical requirements	“Electrical requirements” on page 44
Emergency-stop connections	“Emergency-stop ports” on page 48
Signaling device connections	“I/O ports” on page 51
UPS connection	“UPS port” on page 57
ACU connections	“ACU ports” on page 58
VWorks software requirements	“Software requirements” on page 59

Emergency-stop ports

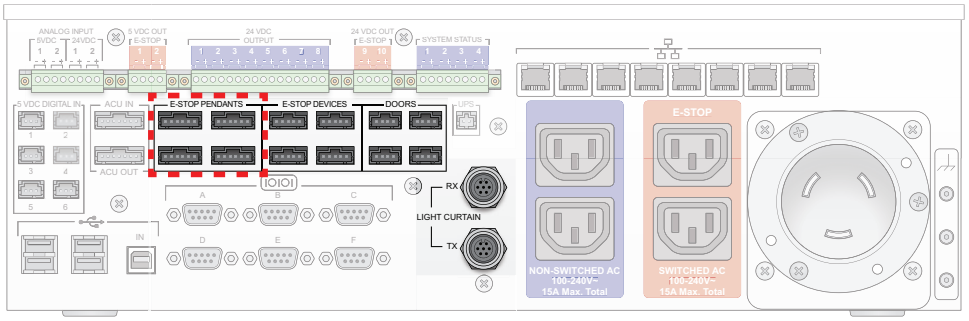
About this topic

This topic presents the specifications for the following ports:

Emergency-stop pendants

The **E-STOP PENDANTS** ports are 6-pin receptacles located on the left side of the back panel. The ports connect up to four emergency-stop pendants to the Automation Control Unit.

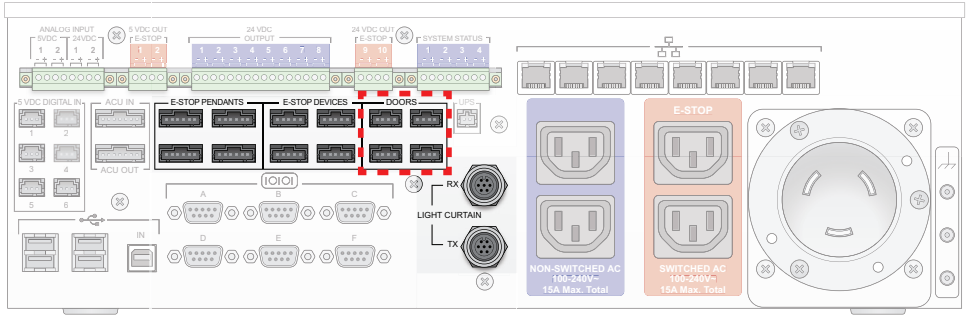
IMPORTANT Unused ports must have the supplied jumpers installed.



Doors

The **DOORS** ports are 4-pin receptacles located on the left side of the back panel. The ports connect up to four safety-interlocked doors to the Automation Control Unit.

IMPORTANT Unused ports must have the supplied jumpers installed.

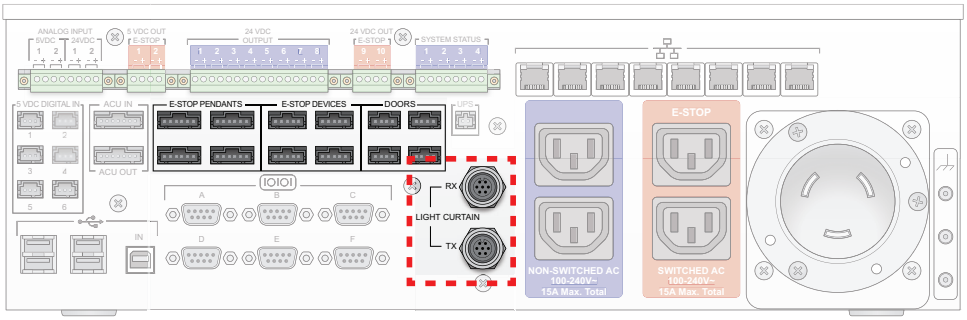


Light Curtain

The **LIGHT CURTAIN** ports are two M12 (8-pin circular) receptacles located on the left side of the back panel. The **RX** port connects the receiver post to the Automation Control Unit. The **TX** port connects the transmitter post to the Automation Control Unit.

IMPORTANT Unused ports must have the supplied jumper installed. The Light Curtain jumper must be installed in the RX port.

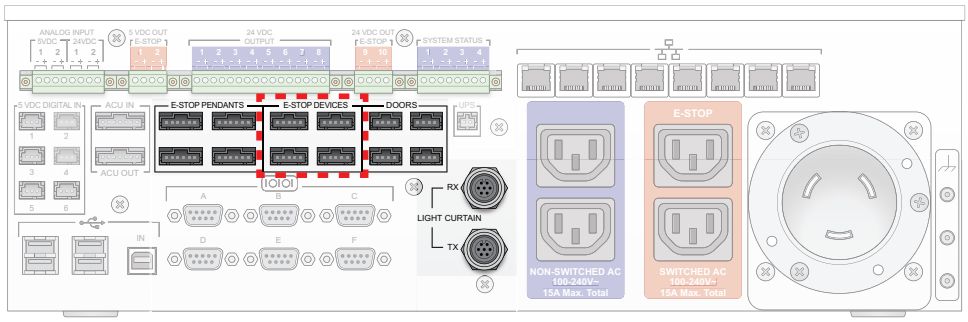
CAUTION Do not install the jumper at the TX port. Installing the supplied jumper at the TX port can disable the Light Curtain circuit and damage the Automation Control Unit.



E-Stop Devices

The **E-STOP DEVICES** ports are 5-pin receptacles located on the left side of the back panel. The ports connect up to four devices equipped with an emergency-stop circuit to the Automation Control Unit.

Note: Jumpers are not required for unused E-STOP DEVICES ports.



Contact Automation Solutions Technical Support if the number of devices equipped with an emergency-stop circuit exceeds the number of E-STOP DEVICES ports available.

Related information

For information about...	See...
Connecting the safety equipment to the Automation Control Unit	“Connecting the safety equipment” on page 104
Automation Control Unit dimensions	“Dimensions” on page 42
Electrical requirements	“Electrical requirements” on page 44
Environmental requirements	“Environmental requirements” on page 47
Signaling device connections	“I/O ports” on page 51
UPS connection	“UPS port” on page 57
ACU connections	“ACU ports” on page 58
VWorks software requirements	“Software requirements” on page 59

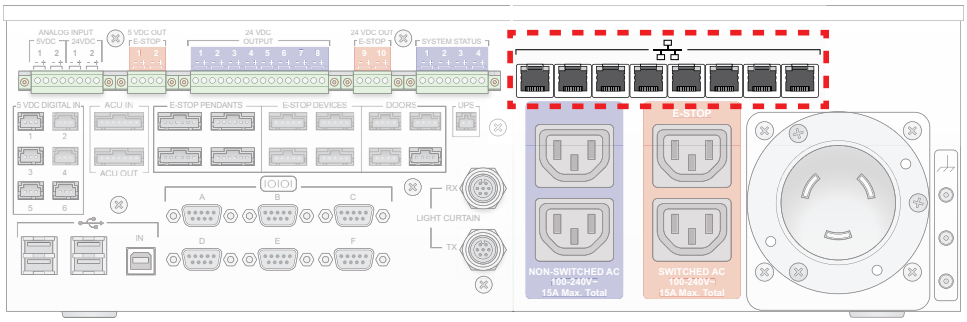
I/O ports

About this topic

This topic presents the specifications for the following ports:

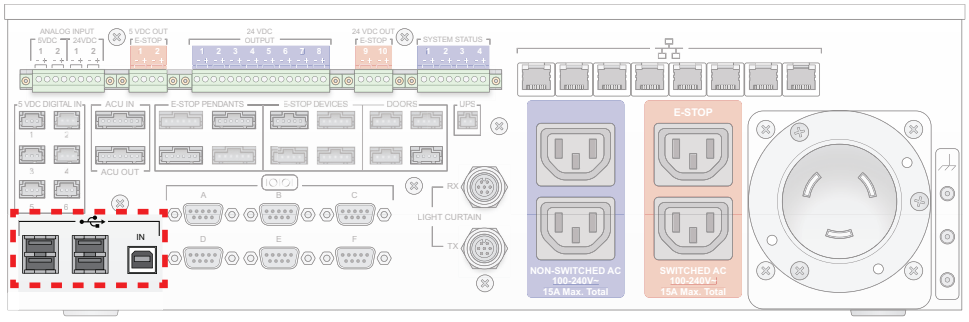
Ethernet

The Ethernet ( ) ports are RJ-45 receptacles located above the three power ports on the back panel. The Ethernet ports connect the controlling computer and up to seven devices that require Ethernet communication to the Automation Control Unit.



USB

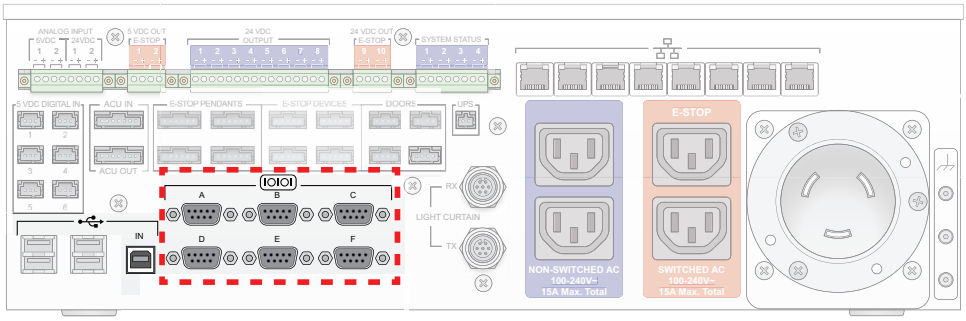
The USB ( ) ports are located on the lower left side of the back panel. The output ports accept up to four standard-sized type-A USB connectors. The input port accepts one type-B USB connector.



Serial

The serial ( ) ports are 9-pin male DE-9 receptacles located on the lower left side of the back panel. The serial ports connect up to six devices that require serial communication to the Automation Control Unit.

IMPORTANT To communicate with the serial communication devices, you must connect the controlling computer to the USB IN port.



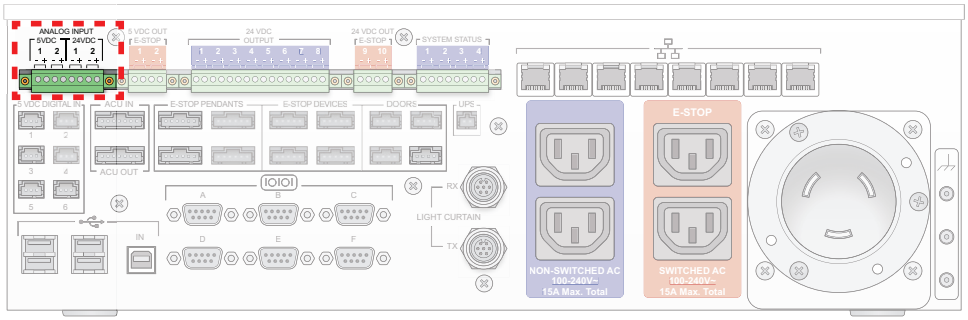
General I/O

The general I/O ports are:

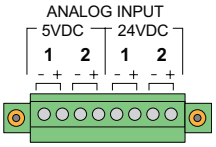
- “5 VDC and 24 VDC analog input” on page 52
- “5 VDC digital input” on page 53
- “5 VDC output” on page 54
- “24 VDC output” on page 54
- “24 VDC output to system status devices” on page 55

5 VDC and 24 VDC analog input

The **5 VDC** and **24 VDC ANALOG INPUT** ports are receptacles in an 8-pin fixed terminal block located on the upper left side of the back panel. Each of the two 5 VDC ports accepts an analog signal up to 5 VDC. Each of the two 24 VDC ports accepts an analog signal up to 24 VDC. The analog signals are processed by 12-bit analog-to-digital converters in the Automation Control Unit.



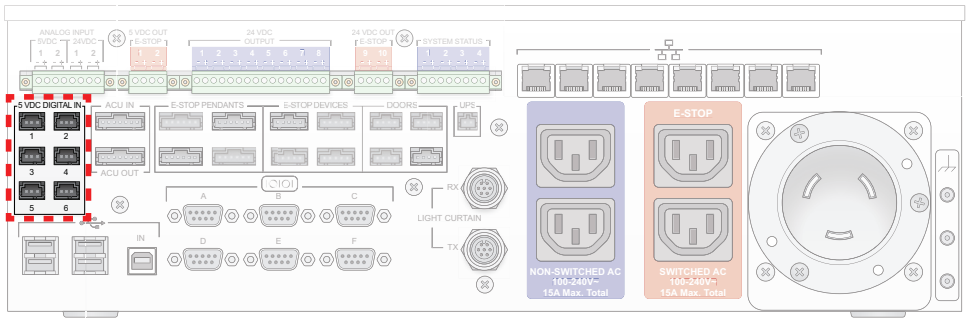
The following diagram shows the connector pinout.



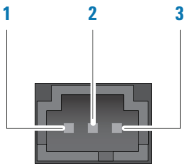
Pin	Assignment	Purpose
–	Reference terminal	Serves as the common return path for current in the circuit. **IMPORTANT** Make sure the reference terminal is connected to the chassis ground.
+	+5 VDC or +24 VDC ADC input	Accepts 5 or 24 VDC ADC signals.

5 VDC digital input

The **5 VDC DIGITAL IN** ports are 3-pin receptacles located on the far left side of the back panel. Each of the six ports is rated at 5 VDC and accepts TTL/CMOS logic signals.



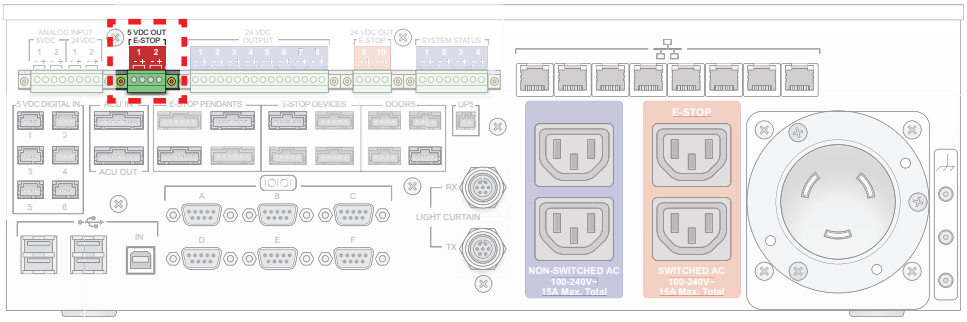
The following diagram shows the connector pinout.



Pin	Assignment	Purpose
1	Reference terminal	Serves as the common return path for current in the circuit.
2	Sensor input	Accepts TTL/CMOS logic signals from the connected device.
3	+5 VDC power terminal	Supplies 5 VDC to the connected device.

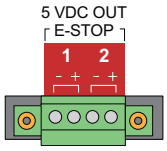
5 VDC output

The **5 VDC OUT E-STOP** ports are receptacles in a 4-pin fixed terminal block located on the upper left side of the back panel. Each of the two ports is connected to a pull-up power supply that is rated at 5 VDC and supplies up to 1.5 A to the connected device.



Note: The 5 VDC OUT ports are on a post-emergency-stop circuit. Therefore, devices connected to these ports are affected by emergency stops.

The following diagram shows the connector pinout.

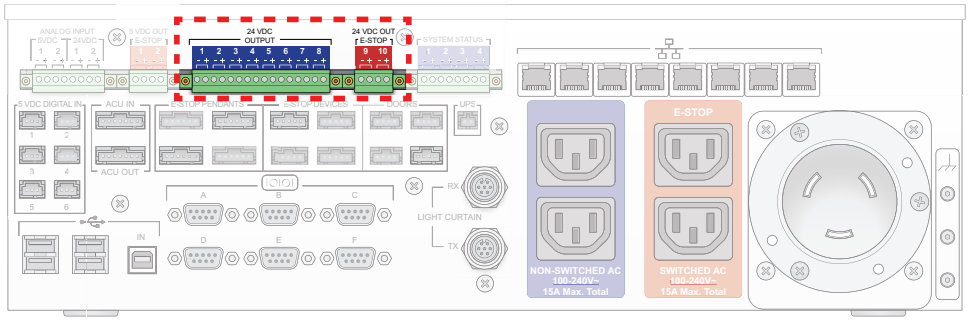


Pin	Assignment	Purpose
–	Reference terminal	Serves as the common return path for current in the circuit.
+	+5 VDC power terminal	Supplies 5 VDC switched output to the connected device.

24 VDC output

The **24 VDC OUTPUT** ports are receptacles in two fixed terminal blocks located on the upper left side of the back panel:

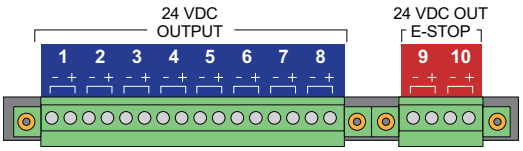
- 16-pin terminal block (ports 1 through 8)
- 4-pin terminal block (ports 9 and 10)



Each of the 10 ports is connected to a pull-up power supply that is rated at 24 VDC and supplies up to 1.5 A to the connected device.

Note: Ports 1 through 8 are on a pre-emergency-stop circuit. Therefore, devices connected to these ports are not affected by emergency stops. Ports 9 and 10 are on a post-emergency-stop circuit. Therefore, devices connected to these ports are affected by emergency stops.

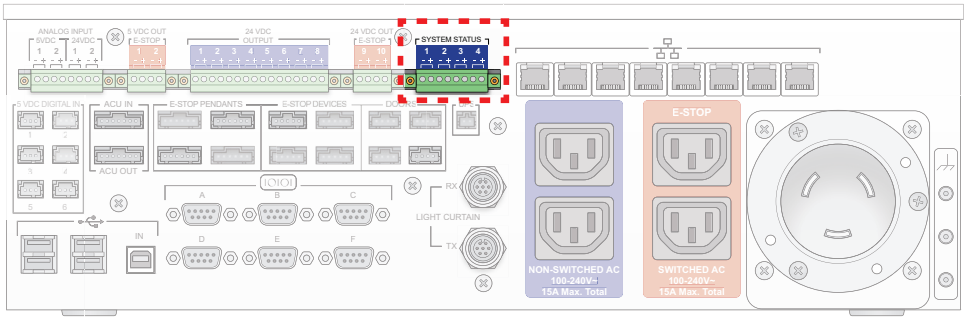
The following diagram shows the connector pinout.



Pin	Assignment	Purpose
–	Reference terminal	Serves as the common return path for current in the circuit.
+	+24 VDC power terminal	Supplies 24 VDC non-switched (blue ports) or switched (red ports) output to the connected device.

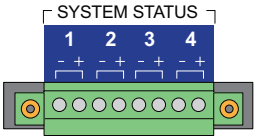
24 VDC output to system status devices

The **SYSTEM STATUS** ports are receptacles in an 8-pin fixed terminal block located at the top center of the back panel. Each of the four ports is connected to a pull-down power supply that is rated at 24 VDC and supplies up to 1.5 A to the connected status light device.



Note: The SYSTEM STATUS ports are on a pre-emergency-stop circuit. Therefore, devices connected to these ports are not affected by emergency stops.

The following diagram shows the connector pinout.



Pin	Assignment	Purpose
–	Reference terminal	Serves as the common return path for current in the circuit.
+	+24 VDC power terminal	Supplies 24 VDC non-switched output to the connected device.

Related information

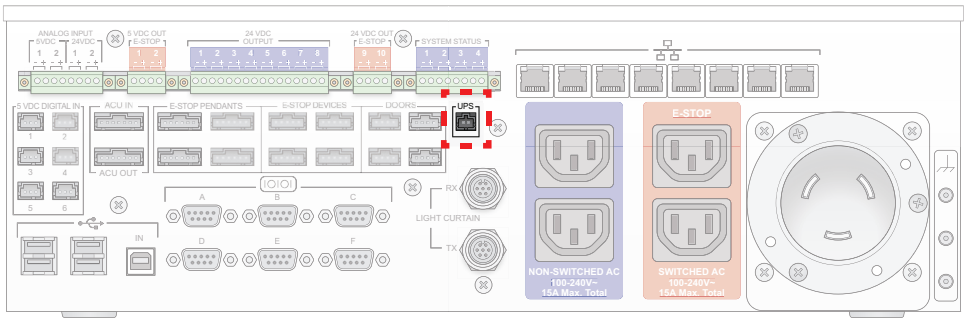
For information about...	See...
Connecting signal-generating and miscellaneous devices to the Automation Control Unit	“Connecting signal-generating and miscellaneous devices” on page 113
Automation Control Unit dimensions	“Dimensions” on page 42
Electrical requirements	“Electrical requirements” on page 44
Environmental requirements	“Environmental requirements” on page 47
Emergency-stop connections	“Emergency-stop ports” on page 48
UPS connection	“UPS port” on page 57
ACU connections	“ACU ports” on page 58
VWorks software requirements	“Software requirements” on page 59

UPS port

Description

The **UPS** port is a 2-pin receptacle located at the center of the back panel. The port connects the uninterruptible power supply (UPS) emergency power off (EPO) circuit to the Automation Control Unit.

IMPORTANT The UPS port has normally open (NO) contacts, and the EPO circuit should be normally open. Do not connect the UPS port to a normally closed (NC) circuit.



The UPS port connection is only applicable in configurations where turning off the Automation Control Unit automatically turns off the UPS and any device connected directly to the UPS, such as the controlling computer.

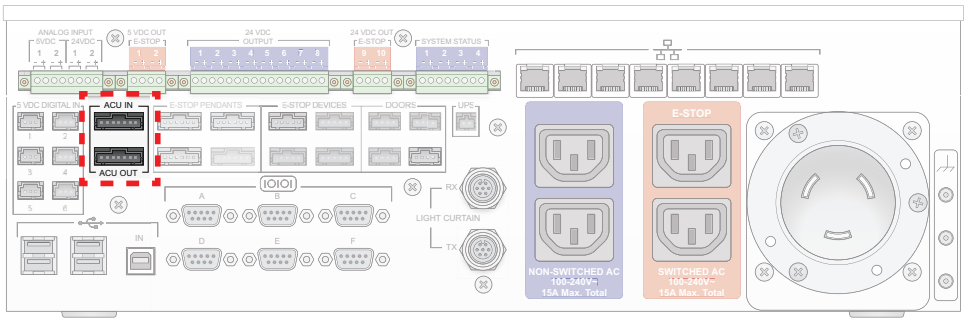
Related information

For information about...	See...
Connecting the UPS to the Automation Control Unit	“Connecting the AC power and the UPS” on page 98
Automation Control Unit dimensions	“Dimensions” on page 42
Electrical requirements	“Electrical requirements” on page 44
Environmental requirements	“Environmental requirements” on page 47
Emergency-stop connections	“Emergency-stop ports” on page 48
Signaling device connections	“I/O ports” on page 51
ACU connections	“ACU ports” on page 58
VWorks software requirements	“Software requirements” on page 59

ACU ports

Description

The **ACU IN** and **ACU OUT** ports are 7-pin receptacles located on the left side of the back panel. The ports permit you to connect multiple Automation Control Units in series.



Related information

For information about...	See...
Connecting multiple Automation Control Units together	“Connecting an additional Automation Control Unit” on page 116
Automation Control Unit dimensions	“Dimensions” on page 42
Electrical requirements	“Electrical requirements” on page 44
Environmental requirements	“Environmental requirements” on page 47
Emergency-stop connections	“Emergency-stop ports” on page 48
Signaling device connections	“I/O ports” on page 51
UPS connection	“UPS port” on page 57
VWorks software requirements	“Software requirements” on page 59

Software requirements

The Automation Control Unit works with the lab automation software. For the lab automation software requirements, see the software release notes or the Automation Solutions Knowledge Base at www.agilent.com/lifesciences/automation.

Related information

For information about...	See...
Automation Control Unit dimensions	“Dimensions” on page 42
Electrical requirements	“Electrical requirements” on page 44
Environmental requirements	“Environmental requirements” on page 47
Emergency-stop connections	“Emergency-stop ports” on page 48
Signaling device connections	“I/O ports” on page 51
UPS connection	“UPS port” on page 57
ACU connections	“ACU ports” on page 58

4 Interlock key settings

This chapter contains the following topics:

Overview

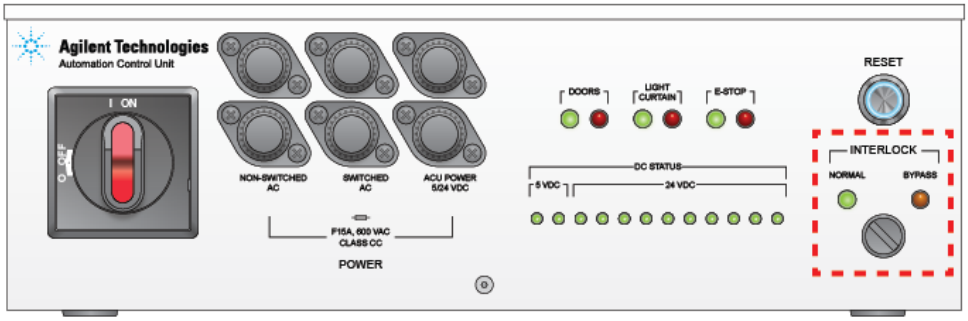
About the safety interlock

Designed to protect you from moving-part hazards while the system is in operation, the safety interlock circuit must be closed for the system to operate. Under normal operating conditions, opening a system door or interrupting the Light Curtain opens the safety interlock circuit, thus stopping the motion of the robots and devices that are on the circuit. If you bypass the safety interlock, the robots will continue to move at a reduced speed.

About the interlock switch key settings

WARNING **Access to and use of the interlock key should be controlled. To avoid possible injury, the INTERLOCK BYPASS setting should be used only by personnel trained to teach robots and devices in the system or workstation. The interlock key should be removed from the Automation Control Unit when the switch is set at NORMAL and you are not teaching the robots and devices.**

An interlock key switch at the front of the Automation Control Unit can be set at one of the following:



Key setting	Description
NORMAL	The interlock is armed. Opening a system door or interrupting the Light Curtain opens the interlock circuit, thus stopping the robots and devices that are on the circuit. Devices that are not on the circuit will finish the current task before pausing. Under normal operating conditions, the INTERLOCK key should be set at NORMAL.
BYPASS	The interlock is muted (or bypassed). Robots and devices will move at a significantly reduced speed. Opening a system door or interrupting the Light Curtain does not open the safety interlock circuit, so the robots and devices will continue to move. Use the BYPASS key setting if you need to work inside of the system or workstation while teaching robots and devices.

The remaining topics in this chapter describe the behavior of the system or workstation under each key setting.

Related information

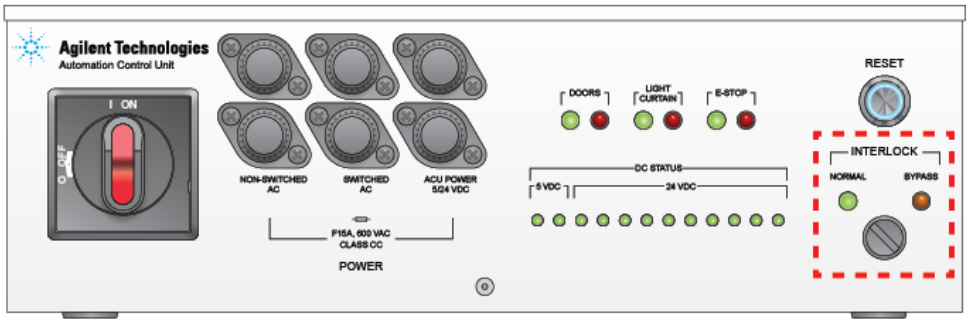
For information about...	See...
Safety information	"Safety information" on page 13
Automation Control Unit hardware overview	• "Front panel" on page 28 • "Back panel" on page 30
VWorks software instructions	*VWorks Automation Control User Guide*

NORMAL setting

Setting the INTERLOCK key at NORMAL

To set the INTERLOCK key at NORMAL:

At the front of the Automation Control Unit, turn the **INTERLOCK** key to **NORMAL**. The interlock is armed.



Responses to the NORMAL switch mode

The following table shows the robot and device responses to emergency stops and tripped interlock when the INTERLOCK key switch is at NORMAL.

The **Conditions** columns show the combined states of the emergency stop, Light Curtain, and system door. As a result of an emergency stop or tripped interlock, the blue light on the RESET button starts to blink. To reset the system, the operator must press the RESET button. The **Reset** column represents whether the button is pressed (1 = Pressed) or left as is (0 = As is).

The **Responses** columns show the responses of the robots, devices, and the overall system. **Interlock devices** are the robots and devices that have an emergency-stop circuit. **Switched AC/DC** are devices that do not have an emergency-stop circuit and are connected to the Switched AC, 5 VDC OUT E-STOP, or 24 VDC OUT E-STOP ports (red ports).

Note: Devices connected to the blue 24 VDC OUTPUT and SYSTEM STATUS ports are on a pre-emergency-stop circuit. Because these devices are not affected by emergency stops and tripped interlock, they are not represented in the table.

As a result of the combined conditions, the system can be either in the normal operating condition (System state is Normal) or paused (System state is Pause).

Table Normal interlock key setting—responses to emergency stops and tripped interlock

Conditions					Responses		
Interlock 0 = Normal 1 = Bypass	Emergency stop 0 = Normal 1 = Stopped	Light curtain 0 = Normal 1 = Tripped	Door 0 = Closed 1 = Open	Reset 0 = As is 1 = Pressed	Interlock devices 0 = Run 1 = Stopped	Switched AC/DC 0 = On 1 = Off	System state
0	0	0	0	0	0	0	Normal
0	0	0	0	1	0	0	Normal
0	0	0	1	0	1	0	Pause
0	0	0	1	1	1	0	Pause
0	0	1	0	0	1	0	Pause
0	0	1	0	1	1	0	Pause
0	0	1	1	0	1	0	Pause
0	0	1	1	1	1	0	Pause
0	1	0	0	0	1	1	Pause
0	1	0	0	1	1	1	Pause
0	1	0	1	0	1	1	Pause
0	1	0	1	1	1	1	Pause
0	1	1	0	0	1	1	Pause
0	1	1	0	1	1	1	Pause
0	1	1	1	0	1	1	Pause
0	1	1	1	1	1	1	Pause

Related information

For information about...	See...
Safety interlocks	“Overview” on page 62
Bypassing the interlock	“BYPASS setting” on page 66
Automation software instructions	Automation software user documentation
Automation Control Unit features	“Front panel” on page 28

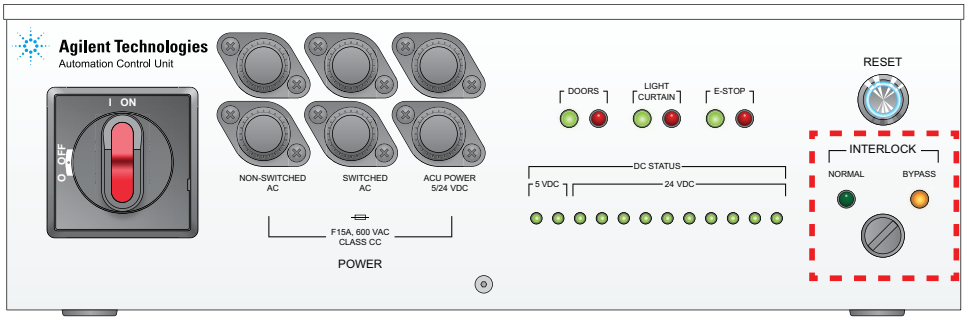
BYPASS setting

Setting the INTERLOCK key at BYPASS

WARNING **Only personnel trained to teach robots and devices in the system or workstation should have access to the interlock key or should be allowed to set the INTERLOCK key switch at BYPASS. Do not bypass the safety interlock under normal operating conditions.**

To set the INTERLOCK key switch at BYPASS:

At the front of the Automation Control Unit, turn the **INTERLOCK** key to **BYPASS**. The interlock is muted.



Responses to the BYPASS switch mode

The following table shows the robot and device responses to emergency stops and tripped interlock when the INTERLOCK key switch is at BYPASS.

The **Conditions** columns show the combined states of the emergency stop, Light Curtain, and system door. The **Reset** column represents whether the RESET button is pressed (1 = Pressed) or left as is (0 = As is).

Note: When the INTERLOCK key is set at BYPASS, opening the system door or interrupting the Light Curtain does not cause the blue light on the RESET button to blink.

The **Responses** columns show the responses of the robots, devices, and the overall system. **Interlock devices** are the robots and devices that have an emergency-stop circuit. **Switched AC/DC** are devices that do not have an emergency-stop circuit and are connected to the Switched AC, 5 VDC OUT E-STOP, or 24 VDC OUT E-STOP ports (red ports).

Note: Devices connected to the blue 24 VDC OUTPUT and SYSTEM STATUS ports are on a pre-emergency-stop circuit. Because these devices are not affected by emergency stops and tripped interlock, they are not represented in the table.

Notice that when the interlock key is set at BYPASS and the emergency-stop button is not pressed, the robots will disregard operator-specified speed settings and move at a reduced speed (System state is Reduced speed).

Table Bypass interlock key setting—responses to emergency stops and tripped interlock

Conditions					Responses		
Interlock 0 = Normal 1 = Bypass	Emergency stop 0 = Normal 1 = Stopped	Light curtain 0 = Normal 1 = Tripped	Door 0 = Closed 1 = Open	RESET 0 = As is 1 = Pressed	Interlock devices 0 = Run 1 = Stopped	Switched AC devices 0 = On 1 = Off	System state
1	0	0	0	0	0	0	Reduced speed
1	0	0	0	1	0	0	Reduced speed
1	0	0	1	0	0	0	Reduced speed
1	0	0	1	1	0	0	Reduced speed
1	0	1	0	0	0	0	Reduced speed
1	0	1	0	1	0	0	Reduced speed
1	0	1	1	0	0	0	Reduced speed
1	0	1	1	1	0	0	Reduced speed
1	1	0	0	0	1	1	Pause
1	1	0	0	1	1	1	Pause
1	1	0	1	0	1	1	Pause
1	1	0	1	1	1	1	Pause
1	1	1	0	0	1	1	Pause
1	1	1	0	1	1	1	Pause
1	1	1	1	0	1	1	Pause
1	1	1	1	1	1	1	Pause

Related information

For information about...	See...
Safety interlocks	“Overview” on page 62
Arming the interlock	“NORMAL setting” on page 64
Automation software instructions	Automation software user documentation
Automation Control Unit features	“Front panel” on page 28

5
Installation der Automation Control Unit

Das Agilent Laborautomatisierungssystem bzw. die Laborautomatisierungs-Workstation wird für Sie installiert. Sollte Sie Fragen zur Installation haben, wenden Sie sich an den Automation Solutions Technical Support.

WARNUNG **Durch eine Veränderung des installierten Systems oder der Workstation werden die Sicherheitsvorschriften eventuell nicht mehr eingehalten und es kann zu Verletzungen oder Geräteschäden kommen. In Europa wird durch jegliche Änderungen die Konformitätserklärung von Agilent für nichtig erklärt; die Person, die die Änderungen vornimmt, hat dann die Verantwortung als Hersteller des Systems oder der Workstation gemäß der Maschinenrichtlinie zu übernehmen.**

Dieses Kapitel gibt Allgemein Anweisungen zum Anschluss des Geräts, falls Probleme mit den Anschlüssen behoben werden müssen. Montageanweisungen werden ebenfalls gegeben.

WICHTIG Die Verbindungen können je nach System- oder Workstation-Konfiguration leicht variieren. Informationen dazu finden Sie in der von Automation Solutions bereitgestellten, systemspezifischen Verbindungsdokumentation. Sollten Sie Fragen haben, wenden Sie sich an den technischen Support von Automation Solutions.

Dieses Kapitel enthält folgende Themen:

Übersetzung der Originalanweisungen

Montage der Automation Control Unit in einem Standard-Rack

Informationen zu diesem Thema

Die Automation Control Unit kann in ein Standard-19-Zoll-Rack eingebaut werden. Bei allen BioCel System-Modellen wird die Automation Control Unit immer im Rack eingebaut. Bei anderen Systemen und Auftisch-Workstations kann die Automation Control Unit in ein Rack unter dem Workstation-Tisch eingebaut oder auf einer Fläche in der Nähe der Workstation platziert werden.

Dieses Thema erläutert Folgendes:

- Montage der Automation Control Unit in einem Standard-Rack
- Ausbau der Automation Control Unit aus dem Rack

Die Einbauspezifikationen finden Sie unter “Dimensions” auf Seite 42. Anforderungen zur Vorbereitung des Standorts und zum Einbau finden Sie in der standortspezifischen Dokumentation für das System oder die Workstation, die von Automation Solutions zur Verfügung gestellt wird. Die standortspezifischen Dokumente behandeln verschiedene Systemkonfigurationen und -anforderungen. Sollten Sie Fragen haben, wenden Sie sich an den Automation Solutions Technical Support.

Werkzeuge und Komponenten

Stellen Sie sicher, dass Folgendes bereit liegt:

- Automation Control Unit
- 18-8 SS Flachkopf-Kreuzschlitzschrauben (4)
- M5 Federringe (4)
- M5 Unterlegscheiben (4)
- #2 Kreuzschlitzschraubendreher (nicht im Lieferumfang enthalten)

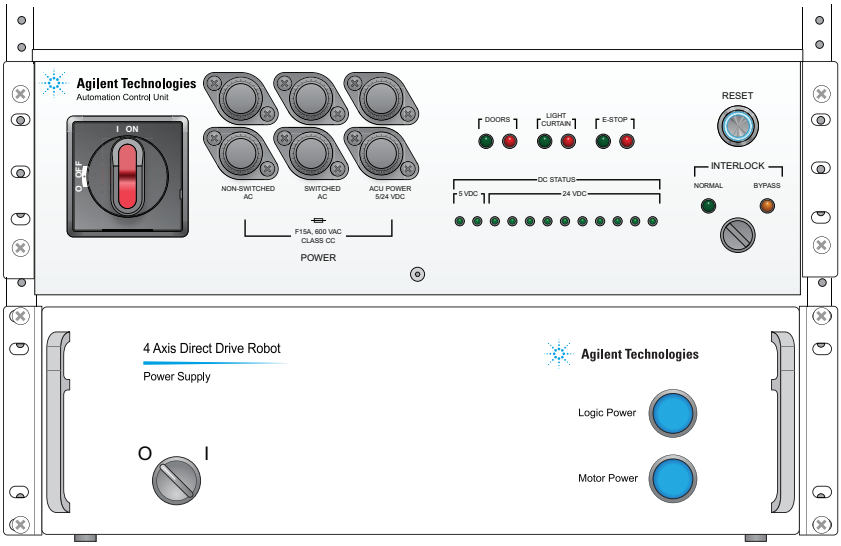
Bevor Sie beginnen

WARNUNG **Schalten Sie die Automation Control Unit vor allen Arbeiten immer ab und trennen Sie es von der Netzversorgung.**

WICHTIG Um den Ein- bzw. Ausbau zu erleichtern, ziehen Sie alle Kabel von der Rückseite ab.

Montage der Automation Control Unit in einem Standard-Rack

Die Automation Control Unit besitzt zwei Montagehalterungen für den Einbau in ein Standard-19-Zoll-Rack. Die Automation Control Unit sollte immer so eingebaut werden, dass sich der Hauptnetzschalter 0,6 bis 1,7 m über dem Boden befindet. Folgendes Diagramm zeigt ein Beispiel, wie die Automation Control Unit eingebaut werden kann.



So bauen Sie die Automation Control Unit in ein Standard-Montagerack ein:

1. Stecken Sie zunächst jede Flachkopf-Kreuzschlitzschraube durch einen Federring und dann durch eine Unterlegscheibe.
2. Fluchten Sie die beiden Löcher in jeder Montagehalterung mit den beiden Löchern im Rack.
3. Führen Sie die Schraube mit den Scheiben in jedes Loch und ziehen Sie sie mithilfe des Schraubendrehers an.

Ausbau der Automation Control Unit aus dem Rack

So bauen Sie die Automation Control Unit aus dem Rack aus:

Lösen Sie die mithilfe des Schraubendrehers die Schrauben der Automation Control Unit am Rack. Stellen Sie sicher, dass Sie das Gewicht der Automation Control Unit abfangen können, wenn Sie die Schraube lösen.

Zugehörige Informationen

Informationen zu...	finden Sie unter...
Spezifikationen zur Automation Control Unit	“Specifications” auf Seite 41
Hardware-Komponenten	• “Front panel” auf Seite 28 • “Back panel” auf Seite 30

Anschließen der Netzversorgung und der USV

Informationen zu diesem Thema

Die Automation Control Unit wird auf eine von zwei Weisen mit Strom versorgt:

- Direkt von der geerdeten Stromquelle (Steckdose) in Ihrem Labor
- Über die USV, die Ihr System mit Notstrom versorgt, wenn die Netzversorgung zusammenbricht, wie bei einem Stromausfall.

Ihr System kann mit oder ohne USV konfiguriert werden. Dieser Abschnitt enthält Anweisungen zum Anschluss für beide Konfigurationen.

Werkzeuge und Komponenten

Stellen Sie sicher, dass Folgendes bereit liegt:

- Netzkabel zur Automation Control Unit (im Lieferumfang enthalten)
- Blaue Steckerleisten für fest verbundenen Wechselspannungsausgang (bis zu zwei, im Lieferumfang enthalten)
- Blaue Stromkabel für fest verbundene Wechselstromsteckerleisten (im Lieferumfang enthalten)
- Rote Steckerleisten für geschalteten Wechselspannungsausgang (bis zu zwei, im Lieferumfang enthalten)
- Rote Stromkabel für geschaltete Wechselstromsteckerleisten (im Lieferumfang enthalten)
- Integriertes Gerätestromkabel (im Lieferumfang enthalten)

Falls Ihr System mit einer USV konfiguriert ist, stellen Sie sicher, dass Folgendes bereit liegt:

- USV (im Lieferumfang enthalten)
- Kabel für Notausschalter (auf Anforderung geliefert)
- Serielles Schnittstellenkabel (im Lieferumfang enthalten)
- USV-Netzkabel (im Lieferumfang enthalten oder an der USV befestigt)

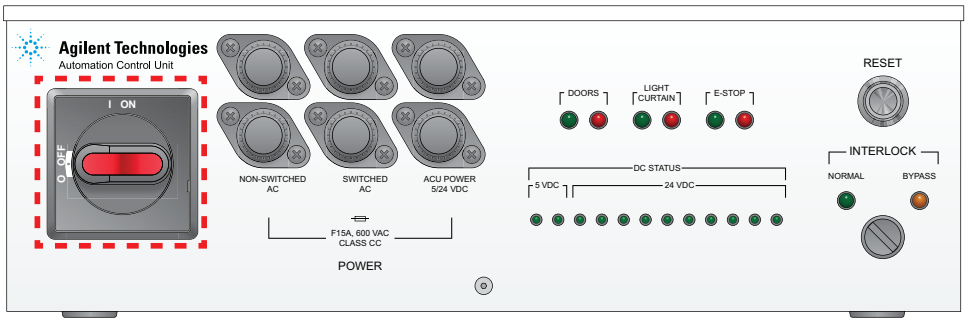
Hinweis: Das Kabel für den Notausschalter ist für Konfigurationen vorgesehen, in denen das Abschalten der Automation Control Unit automatisch auch die USV und alle direkt an die USV angeschlossenen Geräte, wie z. B. den Steuercomputer abschaltet. Standardmäßig wird dieser Anschluss nicht verwendet. Sie können also weiterhin den Steuercomputer für die Sicherung von Dateien nach dem Abschalten der Automation Control Unit benutzen.

Bevor Sie beginnen

Stellen Sie sicher, dass Ihr Standort die elektrischen Anforderungen erfüllt. Informationen finden Sie unter “Electrical requirements” auf Seite 44.

WARNUNG **Falls Ihr System mit einer USV konfiguriert ist, stellen Sie sicher, dass die USV abgeschaltet ist. Anweisungen finden Sie in der Benutzerdokumentation der USV.**

WARNUNG **Stellen Sie sicher, dass der Netzschalter an der Vorderseite der Automation Control Unit auf OFF (O) steht.**

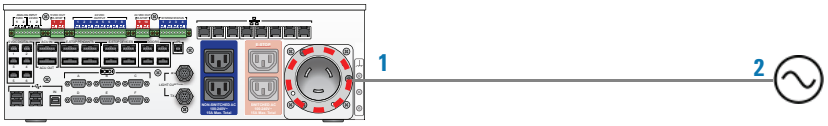


Arbeitsablauf

Schritt	Informationen zum...	finden Sie unter...
1	Anschließen der Automation Control Unit an die Wechselstromquelle	einer der folgenden Möglichkeiten: • "Anschluss der Automation Control Unit direkt an die Stromquelle (keine USV)" auf Seite 73 • "Anschluss der Automation Control Unit an die Stromquelle (mit USV)" auf Seite 74
2	Anschließen der integrierten Geräte an den Netzausgangsanschlüssen der Automation Control Unit	"Anschließen der integrierten Geräte an den Netzausgangsanschlüssen der Automation Control Unit" auf Seite 75

Anschluss der Automation Control Unit direkt an die Stromquelle (keine USV)

So schließen Sie die Automation Control Unit direkt an die Stromquelle an:



1 Verbinden Sie die Steckerbuchse des mitgelieferten Netzkabels der Automation Control Unit mit dem Netzanschluss an der Rückseite der Automation Control Unit (1).

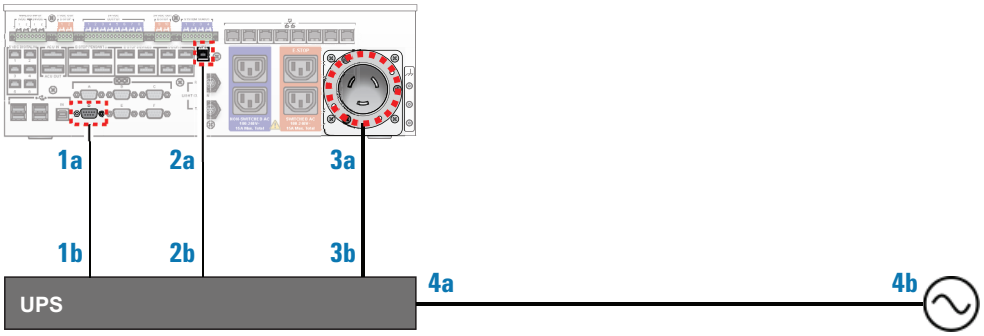
2 Stecken Sie den Stecker des Netzkabels in eine geeignete geerdete Steckdose (2).

WARNUNG **Die Netzsteckdose darf die einzige Steckdose in einem dedizierten Schaltkreis sein, der vom Leistungsschutzschalter der Einrichtung geschützt wird. Die Netzsteckdose muss ordnungsgemäß geerdert sein.**

WARNUNG **Die Netzsteckdose muss von einem Abzweigschutzschalter geschützt sein. Anforderungen an Leistungsschutzschalter finden Sie unter "Electrical requirements" auf Seite 44.**

Anschluss der Automation Control Unit an die Stromquelle (mit USV)

So schließen Sie die Automation Control Unit an die Stromquelle an:



1 Mit dem seriellen Schnittstellenkabel:

- **a** Stecken Sie ein Kabelende in den seriellen Anschluss ( ) an der Rückseite der Automation Control Unit (**1a**).
- **b** Stecken Sie das freie Kabelende in den seriellen Anschluss an der USV (**1b**). Details finden Sie in der Benutzerdokumentation der USV.

2 *Optional*: Mit dem Kabel für die Notausschaltung der USV:

- **a** Stecken Sie ein Kabelende des Notausschaltkabels in den **USV**-Anschluss an der Rückseite der Automation Control Unit (**2a**).
- **b** Stecken Sie das freie Kabelende des Notausschaltkabels in den Notausschalt-Anschluss an der USV (**2b**). Details finden Sie in der Benutzerdokumentation der USV.

WICHTIG Der USV-Anschluss hat Arbeitskontakte, und der Notausschalt-Stromkreis sollte ein Schließer sein. Schließen Sie den USV-Anschluss nicht an einen Öffner an.

Hinweis: Mit der Notausschalter werden durch Ausschalten der Automation Control Unit automatisch auch die USV und alle direkt an die USV angeschlossenen Geräte, wie z. B. der Steuercomputer, ausgeschaltet.

3 Mit dem mitgelieferten Netzkabel der Automation Control Unit:

- **a** Verbinden Sie die Steckerbuchse des Netzkabels mit dem Netzanschluss an der Rückseite der Automation Control Unit (**3a**).
- **b** Stecken Sie den Stecker des Netzkabels in eine Steckdose an der USV (**3b**). Details finden Sie in der Benutzerdokumentation der USV.

4 Mit dem USV-Netzkabel:

- **a** Verbinden Sie die Steckerbuchse des USV-Netzkabels mit dem Netzanschluss an der USV (**4a**).

  Hinweis: Dieser Schritt ist bei einigen USV-Geräten eventuell nicht notwendig, da das Netzkabel fest installiert ist.
- **b** Stecken Sie den Stecker des USV-Netzkabels in eine geeignete geerdete Steckdose (**4b**).

WARNUNG **Die Netzsteckdose darf die einzige Steckdose in einem dedizierten Schaltkreis sein, der vom Leistungsschutzschalter der Einrichtung geschützt wird. Die Netzsteckdose muss ordnungsgemäß geerdert sein.**

WARNUNG **Die Netzsteckdose muss von einem Abzweigschutzschalter geschützt sein. Anforderungen an Leistungsschutzschalter finden Sie unter "Electrical requirements" auf Seite 44.**

Anschließen der integrierten Geräte an den Netzausgangsanschlüssen der Automation Control Unit

Die Netzausgangsanschlüsse befinden sich an der Rückseite der Automation Control Unit.

Bevor Sie beginnen

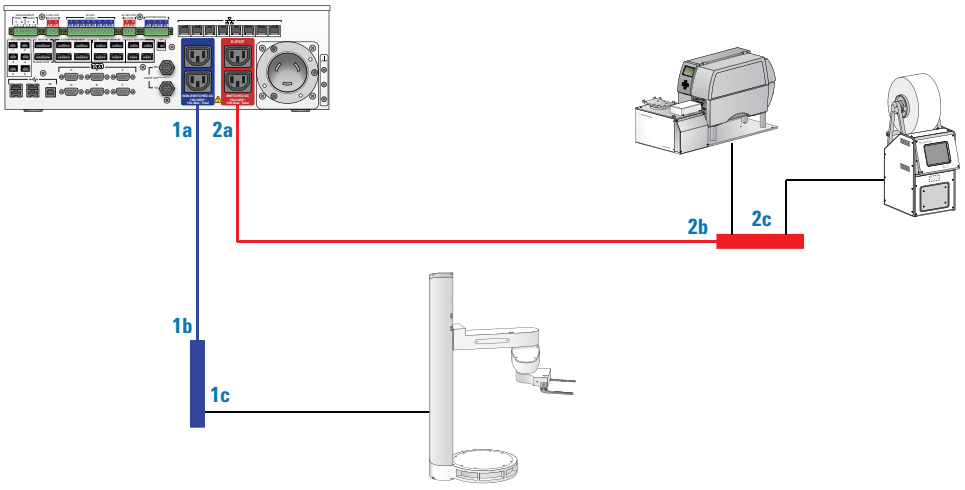
ACHTUNG Prüfen Sie die elektrischen Anforderungen der Geräte vor deren Anschluss an die Automation Control Unit. Ein Anschließen inkompatibler Geräte können die Automation Control Unit und die Geräte selbst beschädigen. Elektrische Anforderungen für die Automation Control Unit finden Sie unter "Electrical requirements" auf Seite 44.

Bevor Sie beginnen, teilen Sie die Geräte in folgende Kategorien auf:

- *Geräte mit einer Notausschaltung.* Beispiele sind der Systemroboter, der BenchCel Microplate Handler, Bravo Platform, das Plate Hub Carousel und die Vertical Pipetting Station. Sie schließen diese Geräte an den blauen Anschluss mit der Aufschrift NON-SWITCHED AC oder die blaue Steckerleiste an.
- *Geräte ohne Notausschaltung, aber mit beweglichen Teilen.* Beispiele sind der Labware MiniHub, PlateLoc Sealer und der Labware Stacker. Sie schließen diese Geräte an den roten Anschluss mit der Aufschrift SWITCHED AC oder die rote Steckerleiste an.
- *Geräte ohne bewegliche Teile, die unabhängig vom Zustand des Systems oder der Workstation angeschaltet bleiben sollen.* Beispiele sind der Steuercomputer, Haubenleuchten und Unterdeckleuchten. Der Computer und die Leuchten sollen eventuell eingeschaltet bleiben, selbst wenn das System oder die Workstation abgeschaltet wird. Diese Geräte werden direkt an die USV angeschlossen.

Ablauf

So schließen Sie die integrierten Geräte an:



1 Bei Netzversorgung für Geräte mit Notausschaltung oder ohne bewegliche Teile:

   a Stecken Sie den Stecker der blauen Netzausgangskabel für die fest verbundenen Netzsteckerleisten in die (blauen) Netzanschlüsse mit der Aufschrift **Non-Switched AC** an der Rückseite der Automation Control Unit (1a).

   b Verbinden Sie die Steckerbuchse der blauen Netzkabel mit der Buchse am Ende der Steckerleisten (4a).

   c Verbinden Sie die Netzkabel von den Geräten mit den Steckdosen der Steckerleiste (1c).

2 Bei Netzversorgung für Geräte ohne Notausschaltung und mit beweglichen Teilen:

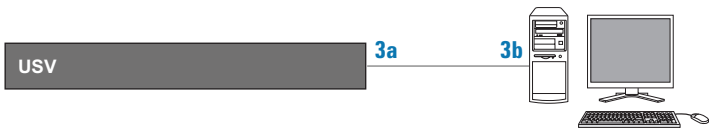
   a Stecken Sie den Stecker der roten Netzausgangskabel für die geschalteten Netzsteckerleisten in die (roten) Netzanschlüsse mit der Aufschrift **E-Stop Switched AC** an der Rückseite der Automation Control Unit (2a).

   b Verbinden Sie die Steckerbuchse der roten Netzkabel mit der Buchse am Ende der Steckerleisten (2b).

   c Verbinden Sie die Netzkabel von den Geräten mit den Steckdosen der Steckerleiste (2c).

3 So verbinden Sie den Steuercomputer, Leuchten und Geräte, die keine beweglichen Teile haben und unabhängig vom Systemzustand eingeschaltet bleiben sollen:

   Systeme mit USV:



   a Stecken Sie den Stecker der Netzkabel von Computer und Computer-Monitor in die verfügbaren Netzsteckdosen an der Rückseite der USV. Details finden Sie in der Benutzerdokumentation der USV.

   b Verbinden Sie die Steckerbuchse des Computer-Netzkabels mit dem Netzanschluss am Computer. Verbinden Sie die Steckerbuchse des Computer-Monitor-Netzkabels mit dem Netzanschluss am Computer-Monitor. Details finden Sie in der Benutzerdokumentation des Computers.

   c Schließen Sie die Leuchten und andere Geräte an die USV an.

   Systeme ohne USV:

   - Schließen Sie den Computer und den Computer-Monitor an eine externe Stromquelle an.
   - Schließen Sie die Leuchten und andere Geräte an die externe Stromquelle an.

Informationen zum Anschließen der Geräteschnittstellen- und Not-Halt-Kabel finden Sie unter “Anschließen von integrierten Geräten” auf Seite 82.

Zugehörige Informationen

Informationen zu...	finden Sie unter...
Hardware-Übersicht der Automation Control Unit	• “Front panel” auf Seite 28 • “Back panel” auf Seite 30
Elektrische Anforderungen	“Electrical requirements” auf Seite 44
Anschließen der Sicherheitsausrüstung	“Anschließen der Sicherheitsausrüstung” auf Seite 78
Anschließen des Computers	“Anschließen des Computers” auf Seite 86
Anschließen der integrierten Geräte	“Anschließen von integrierten Geräten” auf Seite 82
Anschließen der E/A-Signalgeräte	“Anschließen von signalerzeugenden und sonstigen Geräten” auf Seite 88
Anschließen zusätzlicher Automation Control Unit	“Anschließen zusätzlicher Automation Control Unit” auf Seite 92
Anschließen von USB-Geräten	“Anschließen von integrierten Geräten” auf Seite 82
Einbau der Automation Control Unit	“Montage der Automation Control Unit in einem Standard-Rack” auf Seite 70

Anschließen der Sicherheitsausrüstung

Informationen zu diesem Thema

Dieses Thema erläutert Folgendes:

- “Anschließen der Not-Halt-Hängeschalter” auf Seite 78
- “Anschließen der Sensorkabel für Systemtürverriegelungen” auf Seite 79
- “Anschließen der Kabel für den Lichtvorhang” auf Seite 80

Werkzeuge und Komponenten

Stellen Sie sicher, dass Folgendes bereit liegt:

- Not-Halt-Hängeschalter mit Kabeln (im Lieferumfang enthalten)
- Not-Halt-Brücken (im Lieferumfang enthalten)

Falls Ihr System mit Türen ausgerüstet ist, stellen Sie sicher, dass Folgendes bereit liegt:

- Sensorkabel für Systemtürverriegelung (im Lieferumfang enthalten)
- Türbrücken (im Lieferumfang enthalten)

Falls Ihr System oder Ihre Workstation mit dem Lichtvorhang ausgerüstet ist, stellen Sie sicher, dass Folgendes bereit liegt:

- Übertragungs- und Empfangskabel für den Lichtvorhang (im Lieferumfang enthalten)
- Lichtvorhang-Brücken (im Lieferumfang enthalten)

WARNUNG **Die Brücken sind nur für unbenutzte Sicherheitsgeräteanschlüsse. Um mögliche Verletzungen zu vermeiden, schließen Sie immer alle Sicherheitsgeräte wie angewiesen an.**

Bevor Sie beginnen

WARNUNG **Schalten Sie die Automation Control Unit vor allen Arbeiten immer ab und trennen Sie es von der Netzversorgung.**

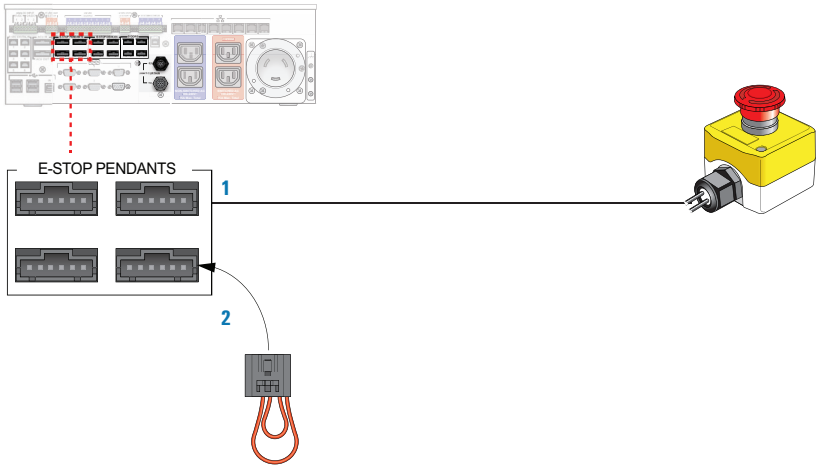
Stellen Sie Folgendes sicher:

- Jedes Sensorkabel für die Systemtürverriegelung ist mit dem Sensor am Türanschlag verbunden.
- Die Übertragungs- und Empfangskabel für den Lichtvorhang sind korrekt an den Pfosten für den Lichtvorhang angeschlossen.

Anschließen der Not-Halt-Hängeschalter

Die Anschlüsse für die Not-Halt-Hängeschalter befinden sich an der Rückseite der Automation Control Unit.

So schließen Sie Not-Halt-Hängeschalter an:



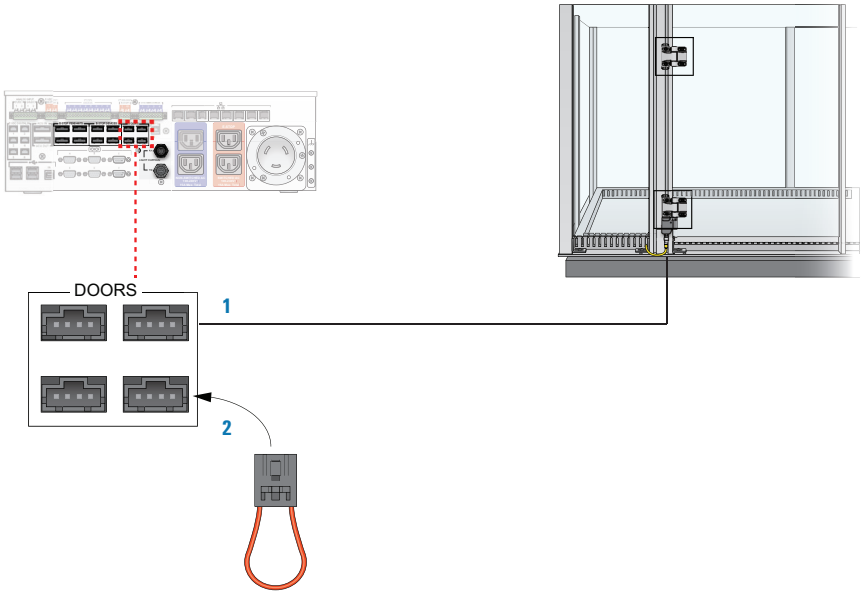
1. Schließen Sie das freie Ende der Hängeschalterkabel an verfügbare Anschlüsse mit der Aufschrift **E-STOP PENDANTS** an (1).
2. Setzen Sie die Not-Halt-Brücken in unbenutzte Anschlüsse mit der Aufschrift **E-STOP PENDANTS** ein (2).

Anschließen der Sensorkabel für Systemtürverriegelungen

Das Verfahren in diesem Abschnitt ist nur auf Systeme mit Türen anwendbar.

Die Anschlüsse für die Sensorkabel für Systemtürverriegelungen befinden sich an der Rückseite der Automation Control Unit.

So schließen Sie die Türen an:



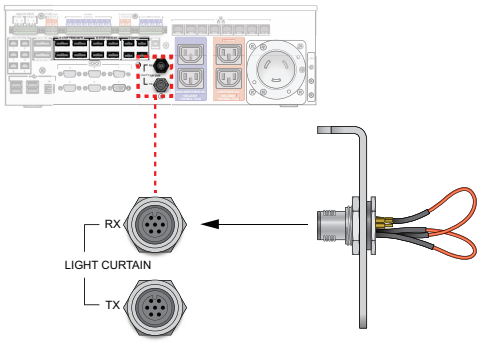
1. Verbinden Sie das freie Ende der Sensorkabel für die Verriegelung mit den verfügbaren Anschlüssen mit der Aufschrift **DOORS** an der Rückseite der Automation Control Unit (1).
2. Setzen Sie die Türbrücken in unbenutzte Anschlüsse mit der Aufschrift **DOORS** ein (2).

Anschließen der Kabel für den Lichtvorhang

Das Verfahren in diesem Abschnitt ist nur auf Systeme mit dem Lichtvorhang anwendbar.

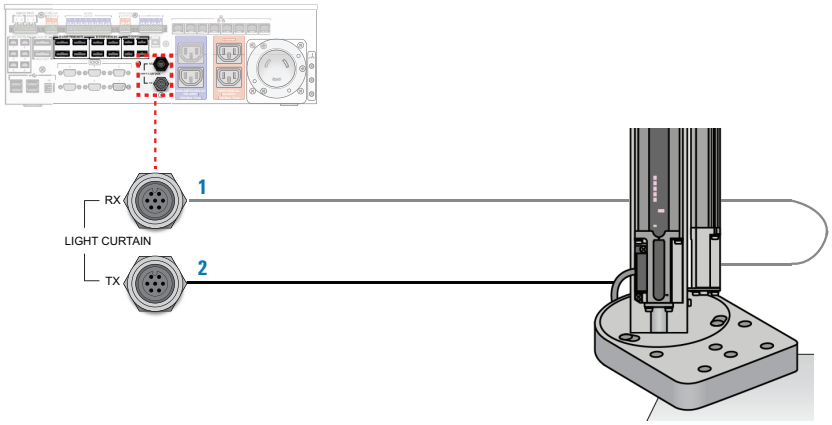
Die Anschlüsse für die Lichtvorhang-Kabel befinden sich an der Rückseite der Automation Control Unit.

WICHTIG Falls Ihr System oder Ihre Workstation über keinen Lichtvorhang verfügt, stellen Sie sicher, dass Sie die Brücke für den Lichtvorhang in den Anschluss **LIGHT CURTAIN RX** einsetzen.



ACHTUNG Setzen Sie die Brücke für den Lichtvorhang am Anschluss LIGHT CURTAIN TX ein. Andernfalls kann der Stromkreis für den Lichtvorhang unterbrochen werden und die Automation Control Unit beschädigen.

So schließen Sie den Lichtvorhang an:



1. Verbinden Sie das freie Ende des Empfängerkabels mit dem Anschluss mit der Aufschrift **LIGHT CURTAIN RX** (1).
2. Verbinden Sie das freie Ende des Übertragungskabels mit dem Anschluss mit der Aufschrift **LIGHT CURTAIN TX** an der Rückseite der Automation Control Unit (2).

Zugehörige Informationen

Informationen zu...	finden Sie unter...
Not-Halt-Anschlüsse	“Emergency-stop ports” auf Seite 48
Hardware-Übersicht der Automation Control Unit	• “Front panel” auf Seite 28 • “Back panel” auf Seite 30
Anschließen an die Wechselstromquelle	“Anschließen der Netzversorgung und der USV” auf Seite 72
Anschließen des Computers	“Anschließen des Computers” auf Seite 86
Anschließen der integrierten Geräte	“Anschließen von integrierten Geräten” auf Seite 82
Anschließen der E/A-Signalgeräte	“Anschließen von signalerzeugenden und sonstigen Geräten” auf Seite 88
Anschließen zusätzlicher Automation Control Units	“Anschließen zusätzlicher Automation Control Unit” auf Seite 92
Anschließen von USB-Geräten	“Anschließen von integrierten Geräten” auf Seite 82
Einbau der Automation Control Unit	“Montage der Automation Control Unit in einem Standard-Rack” auf Seite 70

Anschließen von integrierten Geräten

Informationen zu diesem Thema

Wie Sie die integrierten Geräte an der Automation Control Unit anschließen, hängt davon ab, ob das Gerät einen Not-Halt-Stromkreis besitzt. Dieses Thema gibt Anweisungen für Geräte mit und ohne Not-Halt-Stromkreis.

Werkzeuge und Komponenten

Stellen Sie sicher, dass Folgendes bereit liegt:

- Schnittstellenkabel des Geräts:
  - Ethernet-Kabel (im Lieferumfang enthalten)
  - Serielle Kabel (im Lieferumfang enthalten)
  - USB-Kabel
    - USB-Kabel des Typs A (für die Anschlüsse mit der Aufschrift USB OUT; im Lieferumfang enthalten)
    - USB-Kabel des Typs B (für den Anschluss mit der Aufschrift USB IN; im Lieferumfang enthalten)
- Not-Halt-Gerätekabel (für Geräte mit einem Not-Halt-Stromkreis; im Lieferumfang enthalten)

Bevor Sie beginnen

WARNUNG **Schalten Sie die Automation Control Unit vor allen Arbeiten immer ab und trennen Sie es von der Netzversorgung.**

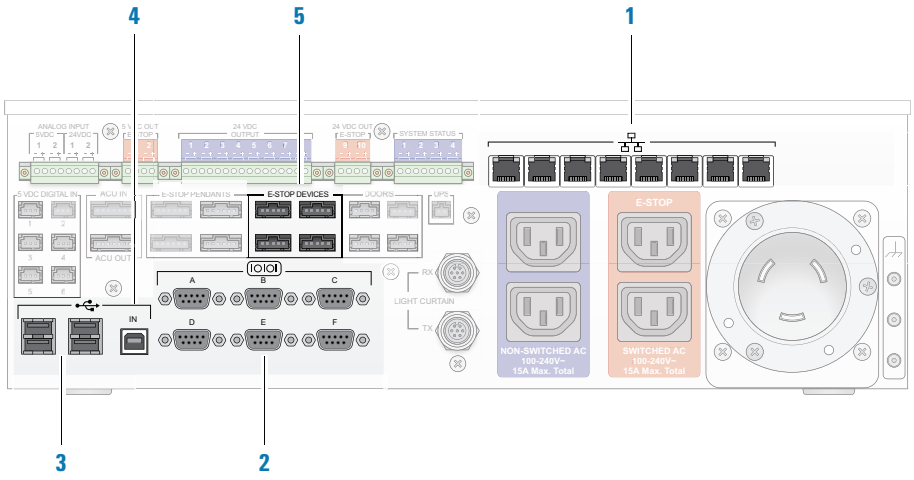
WARNUNG **Schalten Sie das Gerät vor allen Arbeiten immer ab.**

Stellen Sie sicher, dass die Geräte an den Netzausgangsanschlüssen der Automation Control Unit angeschlossen sind. Informationen finden Sie unter “Anschließen der integrierten Geräte an den Netzausgangsanschlüssen der Automation Control Unit” auf Seite 75.

Anschließen der integrierten Geräte an die Automation Control Unit

Die Schnittstellen- und Not-Halt-Anschlüsse für die integrierten Geräte befinden sich an der Rückseite der Automation Control Unit.

So schließen Sie integrierte Geräte an:



1 Bei Geräten mit Ethernet-Schnittstelle (einschließlich des seriellen Hubs oder COMTROL):

a Schließen Sie das Ethernet-Kabel an einen der verfügbaren Ethernetanschlüsse ( ) an der Rückseite der Automation Control Unit (1) an.

b Verbinden Sie das freie Ende des Ethernet-Kabels mit dem entsprechenden Anschluss am Gerät. Anweisungen finden Sie in der Benutzerdokumentation des Geräts.

2 Bei Geräten mit serieller Schnittstelle:

a Schließen Sie das serielle Kabel an einen der verfügbaren seriellen Anschlüsse ( ) an der Rückseite der Automation Control Unit (2) an.

b Verbinden Sie das freie Ende des seriellen Kabels mit dem entsprechenden Anschluss am Gerät. Anweisungen finden Sie in der Benutzerdokumentation des Geräts.

c Zeichnen Sie die Gerät-Anschluss-Verheiratung auf. Diese Informationen werden benötigt, wenn Sie den vom Gerät verwendeten COM-Anschluss festlegen und wenn das Gerät in der Laborautomatisierungssoftware konfiguriert wird. Informationen zum Festlegen des verwendeten COM-Anschlusses finden Sie unter “About configuring serial communication devices” auf Seite 147. Informationen zur Konfiguration des Geräts in der Laborautomatisierungssoftware finden Sie in der Benutzerdokumentation des Geräts.

3 Bei Geräten mit USB-Schnittstelle:

   a Schließen Sie das USB-Kabel des Typs A an einen der verfügbaren USB-Anschlüsse ( ) an der Rückseite der Automation Control Unit (3) an.

   b Verbinden Sie das freie Ende des USB-Kabels mit dem entsprechenden Anschluss am Gerät. Anweisungen finden Sie in der Benutzerdokumentation des Geräts.

4 Falls Sie serielle oder USB-Schnittstellengeräte besitzen:

   a Verbinden Sie das USB-Kabel des Typs B mit dem Anschluss mit der Aufschrift USB IN (**IN**) an der Rückseite der Automation Control Unit (4).

   b Verbinden Sie das freie Ende des USB-Kabels mit dem entsprechenden USB-Anschluss am Steuercomputer.

   WICHTIG Stellen Sie sicher, dass Sie die Geräte an die richtigen Anschlüsse am Computer anschließen. Alle Anschlüsse am Computer sind eindeutig gekennzeichnet.

5 Bei Geräten mit einer Not-Halt-Schaltung:

   a Verbinden Sie das Kabel des Not-Halt-Geräts mit einem verfügbaren Anschluss mit der Aufschrift **E-STOP DEVICES** an der Rückseite der Automation Control Unit (5).

   b Verbinden Sie das freie Ende des Kabels für das Not-Halt-Gerät mit dem Not-Halt- oder Hängeschalter-Anschluss am Gerät. Anweisungen finden Sie in der Benutzerdokumentation des Geräts.

Zugehörige Informationen

Informationen zu...	finden Sie unter...
Anschlüsse für integrierte Geräte	• “I/O ports” auf Seite 51 • “Emergency-stop ports” auf Seite 48
Hardware-Übersicht der Automation Control Unit	• “Front panel” auf Seite 28 • “Back panel” auf Seite 30
Anschließen an die Wechselstromquelle	“Anschließen der Netzversorgung und der USV” auf Seite 72
Anschließen der Sicherheitsausrüstung	“Anschließen der Sicherheitsausrüstung” auf Seite 78
Anschließen des Computers	“Anschließen des Computers” auf Seite 86
Anschließen der integrierten Geräte	“Anschließen von integrierten Geräten” auf Seite 82
Anschließen der E/A-Signalgeräte	“Anschließen von signalerzeugenden und sonstigen Geräten” auf Seite 88
Anschließen zusätzlicher Automation Control Units	“Anschließen zusätzlicher Automation Control Unit” auf Seite 92
Anschließen von USB-Geräten	“Anschließen von integrierten Geräten” auf Seite 82
Einbau der Automation Control Unit	“Montage der Automation Control Unit in einem Standard-Rack” auf Seite 70

Anschließen des Computers

Werkzeuge und Komponenten

Stellen Sie sicher, dass Folgendes bereit liegt:

- Computer (im Lieferumfang enthalten)
- Ethernet-Kabel (im Lieferumfang enthalten)

Bevor Sie beginnen

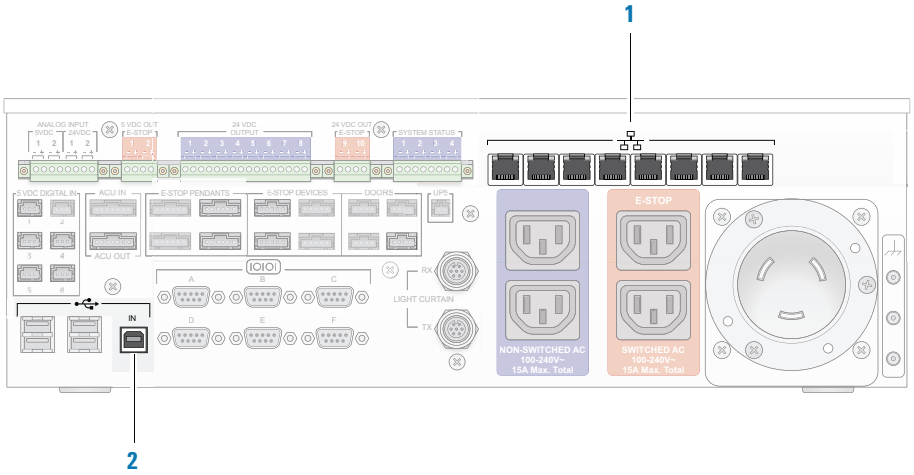
WARNUNG **Schalten Sie die Automation Control Unit vor allen Arbeiten immer ab und trennen Sie es von der Netzversorgung.**

Stellen Sie bei Systemen mit einer USV sicher, dass der Computer an die USV angeschlossen ist. Informationen finden Sie unter “Anschließen der integrierten Geräte an den Netzausgangsanschlüssen der Automation Control Unit” auf Seite 75.

Ablauf

Die Ethernet- und USB-Anschlüsse befinden sich an der Rückseite der Automation Control Unit.

So schließen Sie den Computer an:



1 Bei Kommunikation mit der Automation Control Unit:

a Schließen Sie ein Ende des Ethernet-Kabels an einen verfügbaren Ethernetanschluss () an der Rückseite der Automation Control Unit (1) an.

b Verbinden Sie das freie Ende des Ethernet-Kabels mit einem Ethernetanschluss am Computer. Details finden Sie in der Benutzerdokumentation des Computers.

2 Falls Sie Geräte mit serieller oder USB-Schnittstelle haben, stellen Sie sicher, dass Sie den Computer mit dem Anschluss mit der Aufschrift USB IN (**IN,** 2) verbinden. Erläuterungen dazu finden Sie unter “Anschließen von integrierten Geräten” auf Seite 82.

Zugehörige Informationen

Informationen zu...	finden Sie unter...
Ethernetanschlüsse	“I/O ports” auf Seite 51
Hardware-Übersicht der Automation Control Unit	“Front panel” auf Seite 28
Anschließen der Sicherheitsausrüstung	“Anschließen der Sicherheitsausrüstung” auf Seite 78
Anschließen an die Wechselstromquelle	“Anschließen der Netzversorgung und der USV” auf Seite 72
Anschließen der integrierten Geräte	“Anschließen von integrierten Geräten” auf Seite 82
Anschließen der E/A-Signalgeräte	“Anschließen von signalerzeugenden und sonstigen Geräten” auf Seite 88
Anschließen zusätzlicher Automation Control Units	“Anschließen zusätzlicher Automation Control Unit” auf Seite 92
Anschließen von USB-Geräten	“Anschließen von integrierten Geräten” auf Seite 82
Einbau der Automation Control Unit	“Anschließen der Netzversorgung und der USV” auf Seite 72

Anschließen von signalerzeugenden und sonstigen Geräten

Werkzeuge und Komponenten

Stellen Sie sicher, dass Folgendes bereit liegt:

- Signalerzeugendes oder sonstiges Gerät (z. B. Audio-Alarm, Systemstatusleuchten, Haubenleuchten, Weigh Pad, Ausschussklappe usw.)
- Netz- oder E/A-Kabel des Geräts

Bevor Sie beginnen

WARNUNG **Schalten Sie die Automation Control Unit vor allen Arbeiten immer ab und trennen Sie es von der Netzversorgung.**

WARNUNG **Schalten Sie das Gerät vor allen Arbeiten immer ab.**

Gehen Sie folgendermaßen vor:

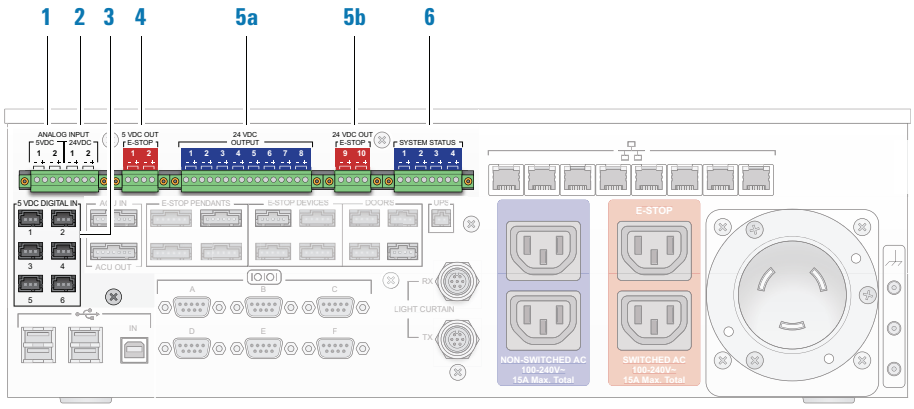
- Bei Geräten mit Strombedarf von der Agilent Automation Control Unit:
  - Legen Sie fest, ob das Gerät 5 oder 24 V Gleichstrom benötigt.
  - Legen Sie fest, ob das Gerät am Stromkreis vor oder nach dem Not-Halt hängen soll.
- Binden Sie ein Fremdgerät ein, überprüfen Sie die Anschlusskontaktbelegung. Weitere Informationen zur Kontaktbelegung finden Sie unter “I/O ports” auf Seite 51.

ACHTUNG Die Funktion des Kontakts im Anschluss muss mit der Funktion des Gegenkontakt im Stecker des Geräts übereinstimmen. Stimmen die Funktionen der Gegenkontakte nicht überein, kann es sein, dass das Gerät nicht funktioniert oder beschädigt wird.

Ablauf

Die Anschlüsse für Signal- und sonstige Geräte befinden sich an der Rückseite der Automation Control Unit.

So schließen Sie Signalgeräte an:



1 Bei analogen Signalgeräten mit 5 V Gleichstrom:

- **a** Schließen Sie ein Ende des Gerätekabels an einen verfügbaren Anschluss mit der Aufschrift **5 VDC ANALOG INPUT** an der Rückseite der Automation Control Unit (**1**) an.
- **b** Verbinden Sie das freie Ende des Kabels mit dem entsprechenden analogen Signalausgang am analogen Gerät mit 5 V Gleichstrom. Details finden Sie in der Benutzerdokumentation des Geräts.

2 Bei analogen Signalgeräten mit 24 V Gleichstrom:

- **a** Schließen Sie ein Ende des Gerätekabels an einen verfügbaren Anschluss mit der Aufschrift **24 VDC ANALOG INPUT** an der Rückseite der Automation Control Unit (**2**) an.
- **b** Verbinden Sie das freie Ende des Kabels mit dem entsprechenden analogen Signalausgang am analogen Signalgerät mit 24 V Gleichstrom. Details finden Sie in der Benutzerdokumentation des Geräts.

3 Bei Signalgeräten mit 5 V Gleichstrom, welche Signale an dar Automation Control Unit übertragen:

- **a** Schließen Sie ein Ende des Gerätekabels an einen verfügbaren Anschluss mit der Aufschrift **5 VDC DIGITAL IN** an der Rückseite der Automation Control Unit (**3**) an.
- **b** Verbinden Sie das freie Ende des Kabels mit dem entsprechenden digitalen Signalausgang am digitalen Gerät mit 5 V Gleichstrom. Details finden Sie in der Benutzerdokumentation des Geräts.

4 Bei Geräten mit einem Leistungsbedarf von bis zu 5 V Gleichstrom von der Automation Control Unit:

- **a** Schließen Sie ein Ende des Gerätekabels an einen verfügbaren Anschluss mit der Aufschrift **5 VDC OUT** an der Rückseite der Automation Control Unit (**4**) an.
- **b** Verbinden Sie das freie Ende des Kabels mit dem entsprechenden Netzversorgungsanschluss am Gerät mit 5 V Gleichstrom. Details finden Sie in der Benutzerdokumentation des Geräts.

5 Bei Geräten mit einem Leistungsbedarf von bis zu 24 V Gleichstrom von der Automation Control Unit:

   a *Geräte, die vor einem Not-Halt-Sromkreis angeschlossen sein sollten.* Schließen Sie ein Ende des Gerätekabels an einen verfügbaren blauen Anschluss mit der Aufschrift **24 VDC OUTPUT** an der Rückseite der Automation Control Unit (**5a**) an. Audio-Alarmgeräte sollten an einem dieser Anschlüsse angeschlossen werden.

   b *Geräte, die nach einem Not-Halt-Stromkreis angeschlossen sein sollten.* Schließen Sie ein Ende des Gerätekabels an einen verfügbaren roten Anschluss mit der Aufschrift **24 VDC OUT E-STOP** an der Rückseite der Automation Control Unit (**5b**) an.

   c Verbinden Sie das freie Ende des Kabels mit dem entsprechenden Netzversorgungsanschluss am Gerät mit 24 V Gleichstrom. Details finden Sie in der Benutzerdokumentation des Geräts.

6 Bei Systemstatusleuchten:

   a Schließen Sie ein Ende des Gerätekabels an einen verfügbaren Anschluss mit der Aufschrift **SYSTEM STATUS** an der Rückseite der Automation Control Unit (**6**) an.

   b Verbinden Sie das freie Ende des Kabels mit dem entsprechenden Eingangsanschluss an der Statusleuchte. Details finden Sie in der Benutzerdokumentation des Geräts.

Zugehörige Informationen

Informationen zu...	finden Sie unter...
E/A-Anschlüsse	“I/O ports” auf Seite 51
Hardware-Übersicht der Automation Control Unit	• “Front panel” auf Seite 28 • “Back panel” auf Seite 30
Anschließen der Sicherheitsausrüstung	“Anschließen der Sicherheitsausrüstung” auf Seite 78
Anschließen des Computers	“Anschließen des Computers” auf Seite 86
Anschließen der integrierten Geräte	“Anschließen von integrierten Geräten” auf Seite 82
Anschließen der E/A-Signalgeräte	“Anschließen von signalerzeugenden und sonstigen Geräten” auf Seite 88
Anschließen zusätzlicher Automation Control Units	“Anschließen zusätzlicher Automation Control Unit” auf Seite 92
Anschließen von USB-Geräten	“Anschließen von integrierten Geräten” auf Seite 82
Einbau der Automation Control Unit	“Montage der Automation Control Unit in einem Standard-Rack” auf Seite 70

Anschließen zusätzlicher Automation Control Unit

Informationen zu diesem Thema

Bei großen System können Sie eine zweite Automation Control Unit in Reihe schalten, so dass ein Not-Halt Auswirkung auf alle angeschlossenen Geräte hat.

Werkzeuge und Komponenten

Stellen Sie sicher, dass Folgendes bereit liegt:

- Anzuschließende zusätzliche Automation Control Unit
- ACU-Kabel (im Lieferumfang enthalten)

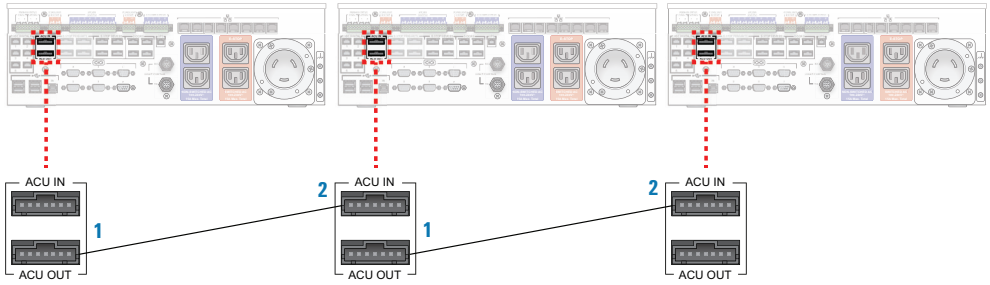
Bevor Sie beginnen

WARNUNG **Schalten Sie die Automation Control Unit vor allen Arbeiten immer ab und trennen Sie es von der Netzversorgung.**

Ablauf

Die Anschlüsse für die Automation Control Unit-Verbindungen befinden sich an der Rückseite der Automation Control Unit.

So schließen Sie zusätzliche Automation Control Unit an:



1. Verbinden Sie ein Ende des ACU-Kabels mit dem Anschluss mit der Aufschrift **ACU OUT** an der Rückseite einer Automation Control Unit (1).

   Hinweis: Das erste Gerät in der Reihe verwendet den Anschluss mit der Aufschrift ACU IN nicht.

2. Verbinden Sie das freie Ende des ACU-Kabels mit dem Anschluss mit der Aufschrift **ACU IN** an der Rückseite der nächsten Automation Control Unit (2).

   Hinweis: Das letzte Gerät in der Reihe verwendet den Anschluss mit der Aufschrift ACU OUT nicht.

3. Wiederholen Sie die Schritte 1 und 2 für weitere Geräte.

Zugehörige Informationen

Informationen zu...	finden Sie unter...
ACU-Anschlüsse	“ACU ports” auf Seite 58
Hardware-Übersicht der Automation Control Unit	• “Front panel” auf Seite 28 • “Back panel” auf Seite 30
Anschließen der Sicherheitsausrüstung	“Anschließen der Sicherheitsausrüstung” auf Seite 78
Anschließen des Computers	“Anschließen des Computers” auf Seite 86
Anschließen der integrierten Geräte	“Anschließen von integrierten Geräten” auf Seite 82
Anschließen der E/A-Signalgeräte	“Anschließen von signalerzeugenden und sonstigen Geräten” auf Seite 88
Anschließen zusätzlicher Automation Control Units	“Anschließen zusätzlicher Automation Control Unit” auf Seite 92
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Einbau der Automation Control Unit	“Montage der Automation Control Unit in einem Standard-Rack” auf Seite 70

5 Installing the Automation Control Unit

The Agilent lab automation system or workstation will be installed for you. If you have questions about the installation, contact Automation Solutions Technical Support.

WARNING **Changing the installed system or workstation might invalidate the safety compliance and lead to personal injury or equipment damage. In Europe, any changes might invalidate Agilent's Declaration of Conformity and require the person making the changes to assume responsibility as manufacturer of the system or workstation according to the Machinery Directive.**

This chapter provides general device connection instructions in case you need to troubleshoot connection problems. Mounting instructions are also provided.

IMPORTANT The connections can vary slightly by system or workstation configuration. See your system-specific connection documentation provided by Automation Solutions. If you have questions, contact Automation Solutions Technical Support.

This chapter contains the following topics:

Mounting the Automation Control Unit in a standard rack

About this topic

The Automation Control Unit can be mounted in a standard 19-inch rack. In all BioCel System models, the Automation Control Unit is always rack mounted. In other systems and benchtop workstations, the Automation Control Unit can be mounted in a rack under the workstation bench or placed on a surface near the workstation.

This topic explains how to do the following:

- Mounting the Automation Control Unit in a standard 19-in rack
- Removing the Automation Control Unit from its rack

For mounting specifications, see "Dimensions" on page 42. For site preparation and installation requirements, see the site-specific documentation for the system or workstation provided by Automation Solutions. The site-specific documents address different system configurations and requirements. If you have questions, contact Automation Solutions Technical Support.

Tools and components

Make sure you have the following:

- Automation Control Unit
- 18-8 SS pan-head Phillips machine screws (4)
- M05 split-lock washers (4)
- M05 flat washers (4)
- #2 cross-head screw driver (not supplied)

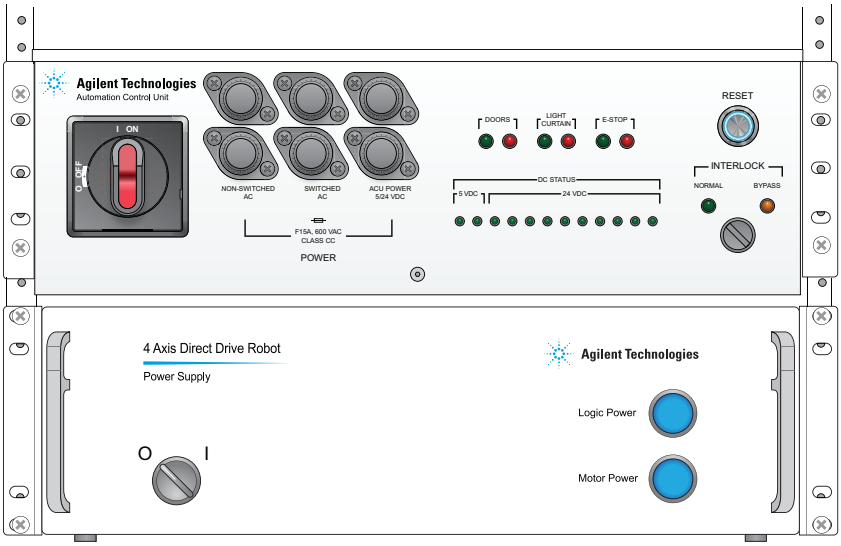
Before you start

WARNING **Always turn off the Automation Control Unit and disconnect it from the power source before performing any procedure.**

IMPORTANT To facilitate the mounting or removal procedure, disconnect all cables from the back panel.

Mounting the Automation Control Unit in a standard 19-in rack

The Automation Control Unit has two mounting brackets so that you can mount it on a standard 19-inch rack. The Automation Control Unit should always be mounted so that the main power switch is 0.6 m to 1.7 m above the floor. The following diagram shows an example of how you can mount the Automation Control Unit.



To mount the Automation Control Unit on a standard mounting rack:

1. Insert each pan-head screw through a split-lock washer first, and then through a flat washer.
2. Align two holes in each mounting bracket with two holes in the rack.
3. Insert the screw-washer assembly into each hole and tighten using the screwdriver.

Removing the Automation Control Unit from its rack

To remove the Automation Control Unit from its rack:

Using the screwdriver, loosen the screws that are holding the Automation Control Unit to the rack. Be sure to support the weight of the Automation Control Unit as you loosen the screws.

Related information

For information about...	See...
Automation Control Unit specifications	"Specifications" on page 41
Hardware components	• "Front panel" on page 28 • "Back panel" on page 30

Connecting the AC power and the UPS

About this topic

Power is supplied to the Automation Control Unit in one of two ways:

- Directly from the grounded power source (wall receptacle) in your lab.
- From the UPS that can provide backup power to your system when the main power source fails, such as during a power outage.

Your system can be configured with or without a UPS. This section provides connection instructions for both configurations.

Tools and components

Make sure you have the following:

- Automation Control Unit AC power input cord (supplied)
- Blue power strips for non-switched AC output (up to two, supplied)
- Blue power-output cords for the non-switched AC power strips (supplied)
- Red power strips for switched AC output (up to two, supplied)
- Red power-output cords for the switched AC power strips (supplied)
- Integrated device's AC power cord (supplied)

If your system is configured with a UPS, make sure you have the following:

- UPS (supplied)
- Emergency power-off (EPO) cable (supplied upon request)
- Serial communication cable (supplied)
- UPS power cord (supplied or attached to the UPS)

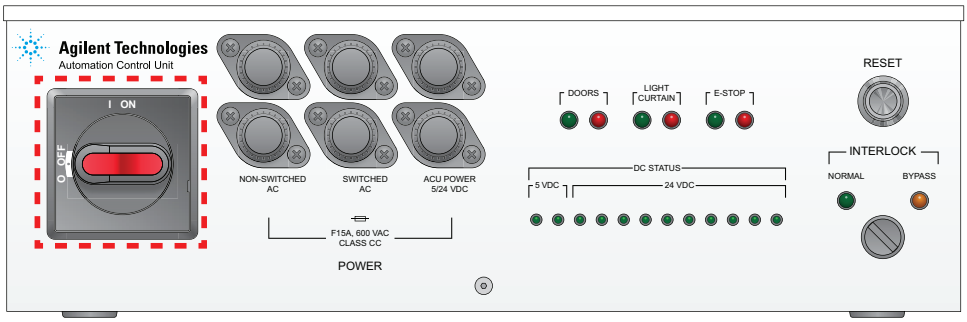
Note: The EPO cable is applicable in configurations where turning off the Automation Control Unit automatically turns off the UPS and any device that is connected directly to the UPS, such as the controlling computer. By default, this connection is not used so that you can continue to operate the controlling computer for backing up files after turning off the Automation Control Unit.

Before you start

Make sure your site meets the electrical requirements. See "Electrical requirements" on page 44.

WARNING **If your system is configured with a UPS, make sure the UPS is turned off. See the UPS user documentation for instructions.**

WARNING **Make sure the power switch on the front of the Automation Control Unit is set at OFF (O).**

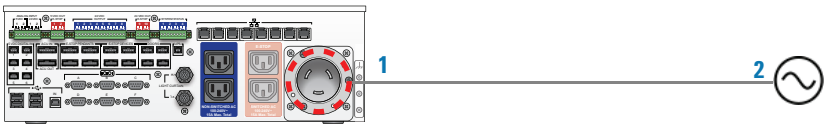


Workflow

Step	For this task...	See...
1	Connect the Automation Control Unit to the AC power source.	One of the following: • "Connecting the Automation Control Unit directly to the power source (no UPS)" on page 99 • "Connecting the Automation Control Unit to the power source (with UPS)" on page 100
2	Connect the integrated devices to the Automation Control Unit AC power output ports.	"Connecting the integrated devices to the Automation Control Unit AC power output ports" on page 101

Connecting the Automation Control Unit directly to the power source (no UPS)

To connect the Automation Control Unit directly to the power source:



1 Plug the female end of the supplied Automation Control Unit power cord into the AC power port on the back of the Automation Control Unit (1).

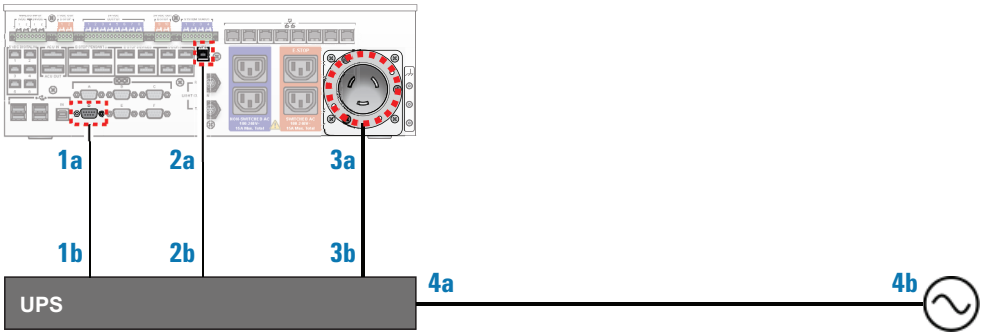
2 Plug the male end of the power cord into an appropriate, grounded wall receptacle (2).

WARNING The wall receptacle must be the only receptacle on a dedicated electrical circuit protected by the facility circuit breaker. The wall receptacle must be properly grounded.

WARNING The wall receptacle must be protected by a branch circuit breaker. For the circuit breaker requirements, see "Electrical requirements" on page 44

Connecting the Automation Control Unit to the power source (with UPS)

To connect the Automation Control Unit to the power source:



1. With the serial communication cable:
   a. Plug one end of the cable into the serial port ( ) on the back of the Automation Control Unit (1a).
   b. Plug the free end of the cable into the serial port at the UPS (1b). See the UPS user documentation for details.
2. *Optional.* With the UPS emergency power-off (EPO) cable:
   a. Plug one end of the EPO cable into the **UPS** port on the back of the Automation Control Unit (2a)
   b. Plug the free end of the EPO cable into the EPO port at the UPS (2b). See the UPS user documentation for details.

   IMPORTANT The UPS port has normally open (NO) contacts, and the EPO circuit should be normally open. Do not connect the UPS port to a normally closed (NC) circuit.

   Note: With the EPO connection, turning off the Automation Control Unit automatically turns off the UPS and any device connected directly to the UPS, such as the controlling computer.
3. With the supplied Automation Control Unit power cord:
   a. Plug the female end of the power cord into the AC power port on the back of the Automation Control Unit (3a).
   b. Plug the male end of the power cord into a power output receptacle at the UPS (3b). See the UPS user documentation for details.
4. With the UPS power cord:
   a. Plug the female end of the UPS power cord into the AC power inlet port at the UPS (4a).

      Note: This step might not be necessary for some UPS units, because the power cord is attached.
   b. Plug the male end of the UPS power cord into an appropriate, grounded wall receptacle (4b).

WARNING **The wall receptacle must be the only receptacle on a dedicated electrical circuit protected by the facility circuit breaker. The wall receptacle must be properly grounded.**

WARNING **The wall receptacle must be protected by a branch circuit breaker. For the circuit breaker requirements, see "Electrical requirements" on page 44.**

Connecting the integrated devices to the Automation Control Unit AC power output ports

The AC power output ports are located on the back of the Automation Control Unit.

Before you start

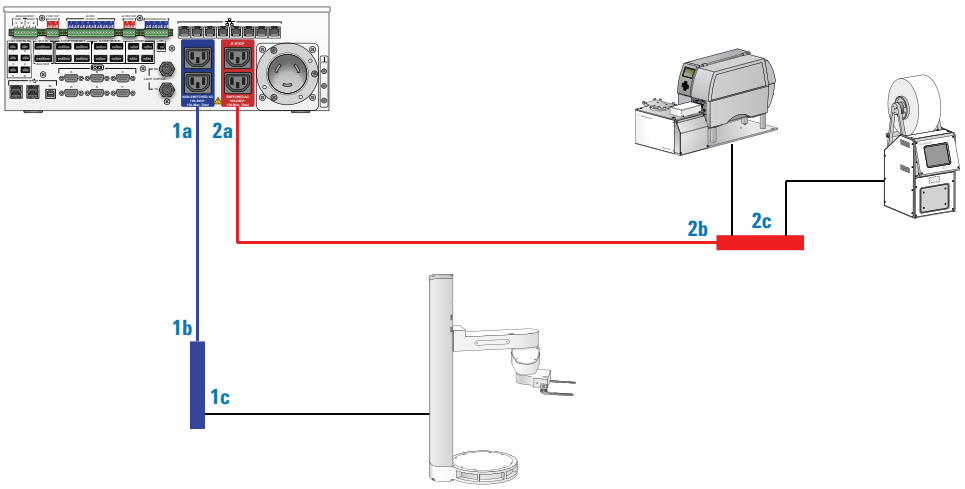
CAUTION Check the electrical requirements of the devices before connecting them to the Automation Control Unit. Connecting incompatible devices might damage the Automation Control Unit and the devices. For the Automation Control Unit electrical requirements, see "Electrical requirements" on page 44.

Before you start, group the devices into the following categories:

- *Devices that have an emergency-stop circuit.* Examples of these devices include the system robot, BenchCel Microplate Handler, Bravo Platform, Plate Hub Carousel, and Vertical Pipetting Station. You will connect these devices to the blue NON-SWITCHED AC port or blue power strip.
- *Devices that do not have an emergency stop circuit but have moving parts.* Examples of these devices include Labware MiniHub, PlateLoc Sealer, and Labware Stacker. You will connect these devices to the red SWITCHED AC port or red power strip.
- *Devices that do not have moving parts and should remain on regardless of the system or workstation state.* Examples of these devices include the controlling computer, the hood lights, and the under-deck lights. You might want the computer and lights to remain on even if the system or workstation is turned off. You will connect these devices directly to the UPS.

Procedure

To connect the integrated devices:



1 For AC power out to devices with an emergency-stop circuit or without moving parts:

   a Plug the male end of the blue power-output cords for the non-switched AC power strips into the **Non-Switched AC** (blue) power ports on the back of the Automation Control Unit (1a).

   b Plug the female end of the blue power cords into the inlet at the end of the power strips (1b).

   c Connect power cords from the devices to the power strip outlets (1c).

2 For AC power out to devices without an emergency-stop circuit and with moving parts:

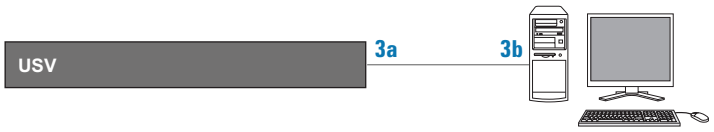
   a Plug the male end of the red power-output cords for the switched AC power strips into the **E-Stop Switched AC** (red) power ports on the back of the Automation Control Unit (2a).

   b Plug the female end of the red power cords into the inlet at the end of the power strips (2b).

   c Connect power cords from the devices to the power strip outlets (2c).

3 To connect the controlling computer, lights, and devices that do not have moving parts and should remain on regardless of the system state:

   Systems with UPS:

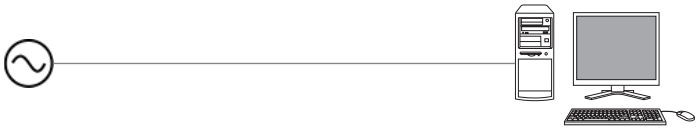


   a Plug the male end of the computer and computer monitor power cords into available power output ports on the back of the UPS. See the UPS user documentation for details.

   b Plug the female end of the computer power cord into the power inlet port at the computer. Plug the female end of the computer monitor power cord into the power inlet port at the computer monitor. See the computer user documentation for details.

   c Connect the lights and other devices to the UPS.

   Systems without UPS:



   - Connect the computer and computer monitor to an external power source.
   - Connect the lights and other devices to the external power source.

To connect the device communication and emergency-stop cables, see “Connecting integrated devices” on page 108.

Related information

For information about...	See...
Automation Control Unit hardware overview	• "Front panel" on page 28 • "Back panel" on page 30
Electrical requirements	"Electrical requirements" on page 44
Connecting the safety equipment	"Connecting the safety equipment" on page 104
Connecting the computer	"Connecting the computer" on page 111
Connecting the integrated devices	"Connecting integrated devices" on page 108
Connecting I/O signaling devices	"Connecting signal-generating and miscellaneous devices" on page 113
Connecting additional Automation Control Units	"Connecting an additional Automation Control Unit" on page 116
Connecting USB devices	"Connecting integrated devices" on page 108
Mounting the Automation Control Unit	"Mounting the Automation Control Unit in a standard rack" on page 96

Connecting the safety equipment

About this topic

This topic explains how to do the following:

- “Connecting the emergency-stop pendants” on page 104
- “Connecting the system door interlock-sensor cables” on page 105
- “Connecting the Light Curtain cables” on page 106

Tools and components

Make sure you have the following:

- Emergency-stop pendants with cables (supplied)
- E-Stop jumpers (supplied)

If your system is equipped with doors, make sure you have the following:

- System door interlock-sensor cables (supplied)
- Door jumpers (supplied)

If your system or workstation is equipped with the Light Curtain, make sure you have the following:

- Light Curtain transmission and receiver cables (supplied)
- Light Curtain jumpers (supplied)

WARNING **The jumpers are only for unused safety equipment ports. To avoid possible injury, always connect all the safety equipment as instructed.**

Before you start

WARNING **Always turn off the Automation Control Unit and disconnect it from the power source before performing any procedure.**

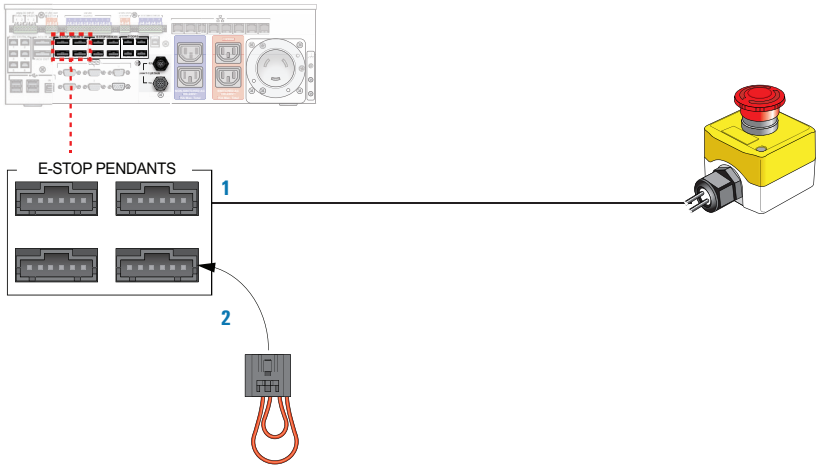
Make sure:

- Each system door interlock-sensor cable is connected to the sensor on the door hinge.
- The Light Curtain transmission and receiver cables are connected correctly to the Light Curtain posts.

Connecting the emergency-stop pendants

The ports for the emergency-stop pendants are located on the back of the Automation Control Unit.

To connect emergency-stop pendants:



1 Connect the free end of the pendant cables to available **E-STOP PENDANTS** ports (1).

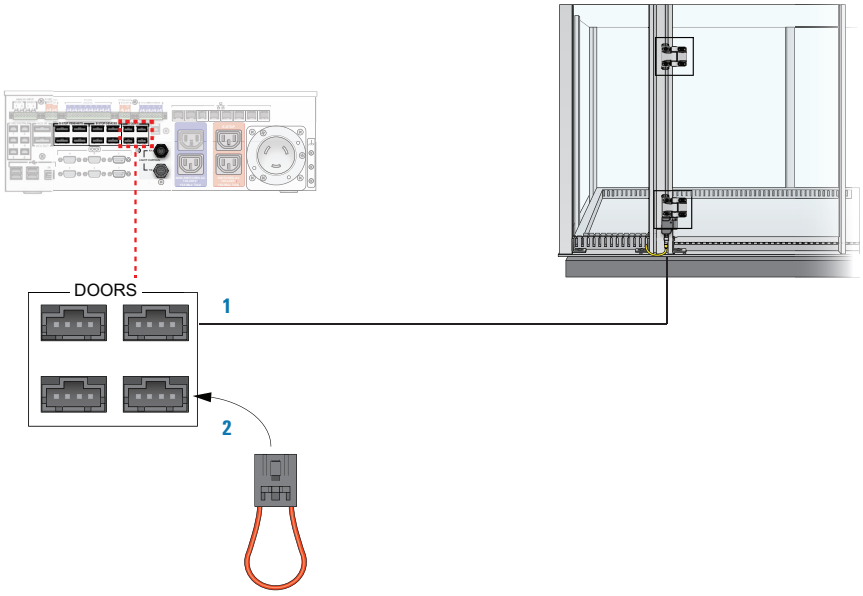
2 Install the E-Stop jumpers at unused **E-STOP PENDANTS** ports (2).

Connecting the system door interlock-sensor cables

The procedure in this section is only applicable for systems with doors.

The ports for the system door interlock-sensor cables are located on the back of the Automation Control Unit.

To connect the doors:



1 Connect the free end of the interlock-sensor cables to available **DOORS** ports on the back of the Automation Control Unit (1).

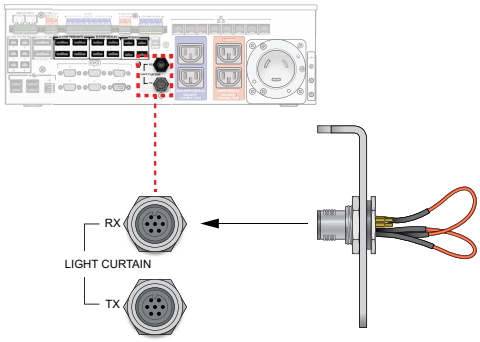
2 Install the Door jumpers at unused **DOORS** ports (2).

Connecting the Light Curtain cables

The procedure in this section is only applicable for systems with the Light Curtain.

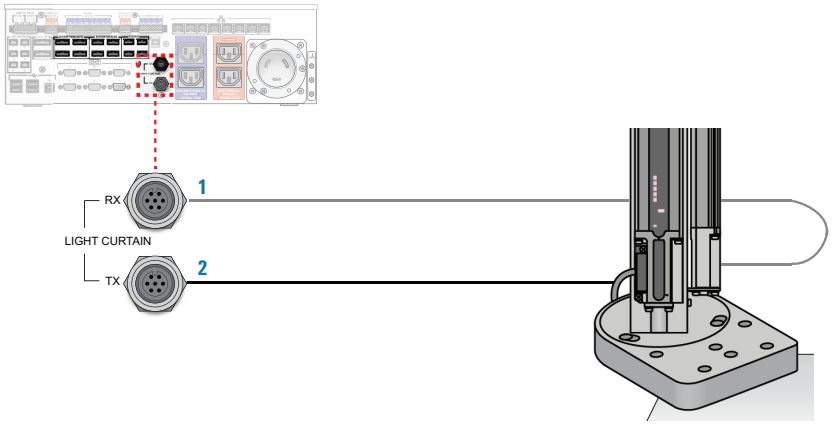
The ports for the Light Curtain cables are located on the back of the Automation Control Unit.

IMPORTANT If your system or workstation does not have a Light Curtain, be sure to install the Light Curtain jumper at the **LIGHT CURTAIN RX** port.



CAUTION Do not install the Light Curtain jumper at the LIGHT CURTAIN TX port. Doing so can disable the Light Curtain circuit and damage the Automation Control Unit.

To connect the Light Curtain:



1. Connect the free end of the receiver cable to the **LIGHT CURTAIN RX** port (1).
2. Connect the free end of the transmission cable to the **LIGHT CURTAIN TX** port on the back of the Automation Control Unit (2).

Related information

For information about...	See...
Emergency-stop ports	"Emergency-stop ports" on page 48
Automation Control Unit hardware overview	• "Front panel" on page 28 • "Back panel" on page 30
Connecting the AC power	"Connecting the AC power and the UPS" on page 98
Connecting the computer	"Connecting the computer" on page 111
Connecting the integrated devices	"Connecting integrated devices" on page 108
Connecting I/O signaling devices	"Connecting signal-generating and miscellaneous devices" on page 113
Connecting additional Automation Control Units	"Connecting an additional Automation Control Unit" on page 116
Connecting USB devices	"Connecting integrated devices" on page 108
Mounting the Automation Control Unit	"Mounting the Automation Control Unit in a standard rack" on page 96

Connecting integrated devices

About this topic

How you connect the integrated devices to the Automation Control Unit depends on whether the device has an emergency-stop circuit. This topic presents instructions for devices with and without an emergency-stop circuit.

Tools and components

Make sure you have the following:

- Device's communication cable:
  - Ethernet cables (supplied)
  - Serial cables (supplied)
  - USB cables
    - USB type A cables (for the USB OUT ports; supplied)
    - USB type B cable (for the USB IN port; supplied)
- E-Stop Device cables (for devices with an emergency-stop circuit; supplied)

Before you start

WARNING **Always turn off the Automation Control Unit and disconnect it from the power source before performing any procedure.**

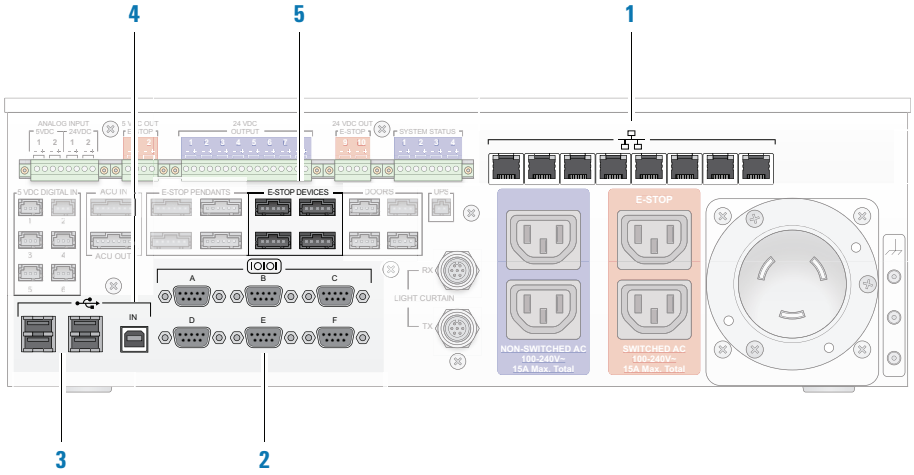
WARNING **Always turn off the device before performing any procedure.**

Make sure the devices are connected to the Automation Control Unit AC power-output ports. See "Connecting the integrated devices to the Automation Control Unit AC power output ports" on page 101.

Connecting integrated devices to the Automation Control Unit

The communication and emergency-stop ports for the integrated devices are located on the back of the Automation Control Unit.

To connect integrated devices:



1 For devices that require Ethernet communication (including the serial hub, or COMTROL):

- **a** Connect the Ethernet cable to one of the available Ethernet ( ) ports on the back of the Automation Control Unit (**1**).
- **b** Connect the free end of the Ethernet cable to the appropriate port at the device. See the device user documentation for instructions.

2 For devices that require serial communication:

- **a** Connect the serial cable to one of the available serial ports ( ) on the back of the Automation Control Unit (**2**).
- **b** Connect the free end of the serial cable to the appropriate port at the device. See the device user documentation for instructions.
- **c** Record the device-port pairings. You will use this information when you determine the COM port used by the device and when configuring the device in the lab automation software. To determine the COM port used, see “About configuring serial communication devices” on page 147. To configure the device in the lab automation software, see the device user documentation.

3 For devices that require USB communication:

- **a** Connect the USB type A cable to one of the available USB ports ( ) on the back of the Automation Control Unit (**3**).
- **b** Connect the free end of the USB cable to the appropriate port at the device. See the device user documentation for instructions.

4 If you have serial or USB communication devices:

- **a** Connect the USB type B cable to the USB IN port (**IN**) on the back of the Automation Control Unit (**4**).
- **b** Connect the free end of the USB cable to the correct USB port at the controlling computer.

IMPORTANT Make sure you connect the devices to the correct ports at the computer. All ports at the computer are clearly labeled.

5 For devices that have an emergency-stop circuit:

a Connect the E-Stop Device cable to an available **E-STOP DEVICES** port on the back of the Automation Control Unit (5).

b Connect the free end of the E-Stop Device cable to the emergency-stop or pendant port at the device. See the device user documentation for instructions.

Related information

For information about...	See...
Ports for integrated devices	• "I/O ports" on page 51 • "Emergency-stop ports" on page 48
Automation Control Unit hardware overview	• "Front panel" on page 28 • "Back panel" on page 30
Connecting the AC power	"Connecting the AC power and the UPS" on page 98
Connecting the safety equipment	"Connecting the safety equipment" on page 104
Connecting the computer	"Connecting the computer" on page 111
Connecting the integrated devices	"Connecting integrated devices" on page 108
Connecting I/O signaling devices	"Connecting signal-generating and miscellaneous devices" on page 113
Connecting additional Automation Control Units	"Connecting an additional Automation Control Unit" on page 116
Connecting USB devices	"Connecting integrated devices" on page 108
Mounting the Automation Control Unit	"Mounting the Automation Control Unit in a standard rack" on page 96

Connecting the computer

Tools and components

Make sure you have the following:

- Computer (supplied)
- Ethernet cable (supplied)

Before you start

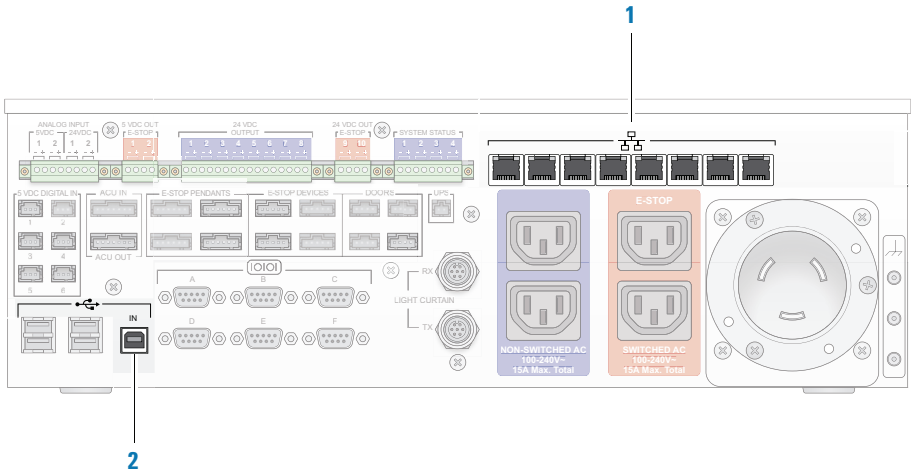
WARNING **Always turn off the Automation Control Unit and disconnect it from the power source before performing any procedure.**

In systems that have a UPS, make sure the computer is connected to the UPS. See "Connecting the integrated devices to the Automation Control Unit AC power output ports" on page 101.

Procedure

The Ethernet and USB ports are located on the back of the Automation Control Unit.

To connect the computer:



1 For communication with the Automation Control Unit:

a Connect one end of the Ethernet cable to an available Ethernet ( ) port on the back of the Automation Control Unit (**1**).

b Connect the free end of the Ethernet cable to an Ethernet port at the computer. See the computer user documentation for details.

2 If you have serial or USB communication devices, make sure you connect the computer to the USB IN port (**IN, 2**). For details, see "Connecting integrated devices" on page 108.

Related information

For information about...	See...
Ethernet ports	“I/O ports” on page 51
Automation Control Unit hardware overview	“Front panel” on page 28
Connecting the safety equipment	“Connecting the safety equipment” on page 104
Connecting the AC power	“Connecting the AC power and the UPS” on page 98
Connecting the integrated devices	“Connecting integrated devices” on page 108
Connecting I/O signaling devices	“Connecting signal-generating and miscellaneous devices” on page 113
Connecting additional Automation Control Units	“Connecting an additional Automation Control Unit” on page 116
Connecting USB devices	“Connecting integrated devices” on page 108
Mounting the Automation Control Unit	“Connecting the AC power and the UPS” on page 98

Connecting signal-generating and miscellaneous devices

Tools and components

Make sure you have the following:

- Signal-generating or other device (e.g. audio alarm, system status lights, hood lights, Weigh Pad, trash door, and so on)
- Device's power or I/O cable

Before you start

WARNING **Always turn off the Automation Control Unit and disconnect it from the power source before performing any procedure.**

WARNING **Always turn off the device before performing any procedure.**

Do the following:

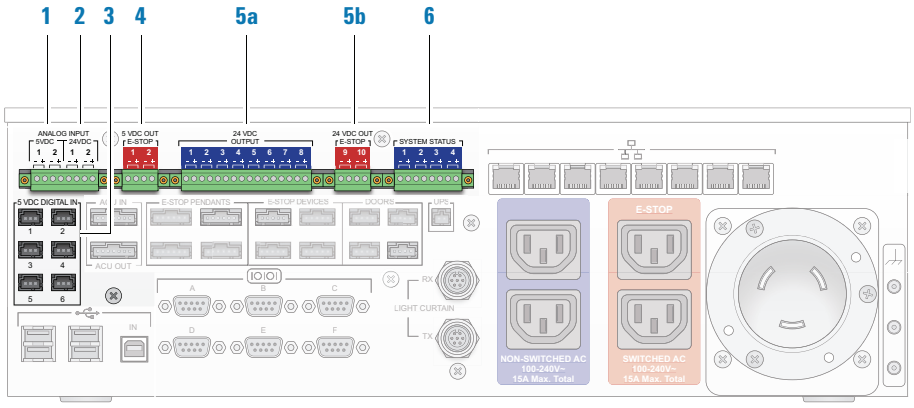
- For devices that require power from the Agilent Automation Control Unit:
  - Determine whether the device requires 5 VDC or 24 VDC.
  - Determine whether the device should be on pre- or post-emergency-stop circuit.
- If you are adding a third-party device, review the port pinouts. For pinout information, see "I/O ports" on page 51.

CAUTION The function of the pin in the port must match the function of the mating pin in the device's connector. If the functions of the mating pins do not match, the device might fail or become damaged.

Procedure

The ports for signaling and miscellaneous devices are located on the back of the Automation Control Unit.

To connect signaling devices:



1. For 5 VDC analog signal devices:
   a. Connect one end of the device cable to an available **5 VDC ANALOG INPUT** port on the back of the Automation Control Unit (1).
   b. Connect the free end of the cable to the appropriate analog signal output port on the 5 VDC analog device. See the device user documentation for details.
2. For 24 VDC analog signal devices:
   a. Connect one end of the device cable to an available **24 VDC ANALOG INPUT** port on the back of the Automation Control Unit (2).
   b. Connect the free end of the cable to the appropriate analog signal output port on the 24 VDC analog signal device. See the device user documentation for details.
3. For 5 VDC signal devices that will transmit signals to the Automation Control Unit:
   a. Connect one end of the device cable to an available **5 VDC DIGITAL IN** port on the back of the Automation Control Unit (3).
   b. Connect the free end of the cable to the appropriate digital signal output port on the 5 VDC digital signal device. See the device user documentation for details.
4. For devices that require up to 5 VDC from the Automation Control Unit:
   a. Connect one end of the device cable to an available **5 VDC OUT** port on the back of the Automation Control Unit (4).
   b. Connect the free end of the cable to the appropriate power supply port on the 5 VDC device. See the device user documentation for details.
5. For devices that require up to 24 VDC from the Automation Control Unit:
   a. *Devices that should be on pre-emergency-stop circuit*. Connect one end of the device cable to an available blue **24 VDC OUTPUT** port on the back of the Automation Control Unit (5a). Audio alarm devices should connect to one of these ports.
   b. *Devices that should be on post-emergency-stop circuit*. Connect one end of the device cable to an available red **24 VDC OUT E-STOP** port on the back of the Automation Control Unit (5b).
   c. Connect the free end of the cable to the appropriate power supply port on the 24 VDC device. See the device user documentation for details.
6. For system status light devices:
   a. Connect one end of the device cable to an available **SYSTEM STATUS** port on the back of the Automation Control Unit (6).
   b. Connect the free end of the cable to the appropriate input port on the status light device. See the device user documentation for details.

Related information

For information about...	See...
I/O ports	"I/O ports" on page 51
Automation Control Unit hardware overview	• "Front panel" on page 28 • "Back panel" on page 30
Connecting the safety equipment	"Connecting the safety equipment" on page 104
Connecting the computer	"Connecting the computer" on page 111
Connecting the integrated devices	"Connecting integrated devices" on page 108
Connecting I/O signaling devices	"Connecting signal-generating and miscellaneous devices" on page 113
Connecting additional Automation Control Units	"Connecting an additional Automation Control Unit" on page 116
Connecting USB devices	"Connecting integrated devices" on page 108
Mounting the Automation Control Unit	"Mounting the Automation Control Unit in a standard rack" on page 96

Connecting an additional Automation Control Unit

About this topic

In large systems, you can connect a second Automation Control Unit in series so that an emergency stop will affect all connected units.

Tools and components

Make sure you have the following:

- Additional Automation Control Unit that will be connected
- ACU cables (supplied)

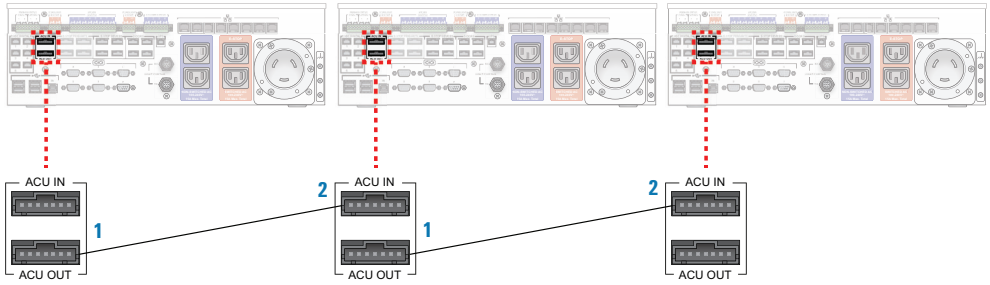
Before you start

WARNING **Always turn off the Automation Control Unit and disconnect it from the power source before performing any procedure.**

Procedure

The ports for the Automation Control Unit connections are located on the back of the Automation Control Unit.

To connect an additional Automation Control Unit:



1. Connect one end of the ACU cable to the **ACU OUT** port on the back of an Automation Control Unit (1).

   Note: The first unit in the series does not use the ACU IN port.

2. Connect the free end of the ACU cable to the **ACU IN** port on the back of the next Automation Control Unit (2).

   Note: The last unit in the series does not use the ACU OUT port.

3. Repeat steps 1 and 2 for additional units.

Related information

For information about...	See...
ACU ports	“ACU ports” on page 58
Automation Control Unit hardware overview	• “Front panel” on page 28 • “Back panel” on page 30
Connecting the safety equipment	“Connecting the safety equipment” on page 104
Connecting the computer	“Connecting the computer” on page 111
Connecting the integrated devices	“Connecting integrated devices” on page 108
Connecting I/O signaling devices	“Connecting signal-generating and miscellaneous devices” on page 113
Connecting additional Automation Control Units	“Connecting an additional Automation Control Unit” on page 116
Connecting USB devices	“Connecting integrated devices” on page 108
Mounting the Automation Control Unit	“Mounting the Automation Control Unit in a standard rack” on page 96

6 Setting up the Automation Control Unit

This chapter explains how to set up the Automation Control Unit using the VWorks software and ACU Diagnostics.

This chapter contains the following topics:

For instructions on setting up the Automation Control Unit using other automation software, see the user documentation for the software.

WARNING **Only administrators and trained personnel should perform the procedures in this chapter.**

Setup workflow

About this topic

This topic presents the workflow for setting up the Automation Control Unit using the VWorks software.

Workflow

The following table presents the steps for setting up the Automation Control Unit. After setting up the Automation Control Unit for the first time, you will not likely change any of the settings in the procedure. If you add a signal-generating device, you can edit the profile and proceed from step 9.

Step	For this task...	See...
1	Turn on the Automation Control Unit.	"Turning on and turning off the Automation Control Unit" on page 122
2	Turn on the controlling computer.	Computer user documentation
3	Add the Automation Control Unit in the VWorks software device file.	"Adding and deleting the Automation Control Unit in the VWorks software" on page 126.
4	Create a profile for the Automation Control Unit.	"Creating ACU profiles" on page 131
5	Set up communication with the Automation Control Unit.	"Setting up communication with the Automation Control Unit" on page 134
6	Save the profile.	"Saving the profile" on page 138
7	Initialize the profile.	"Initializing the profile" on page 139
8	Configure the signal channels.	"Configuring the signal channels" on page 141
9	Set the maximum current threshold.	"Setting the maximum current draw threshold" on page 145
10	Manage the signal channels in the IO Manager.	*VWorks Automation Control User Guide*

If you want to edit, delete, rename, or create a new profile using an existing profile, see "Editing and managing profiles" on page 137.

IMPORTANT After setting up the Automation Control Unit, you can configure the integrated devices in the system or workstation. Before configuring serial communication devices, review the information in "About configuring serial communication devices" on page 147.

Related information

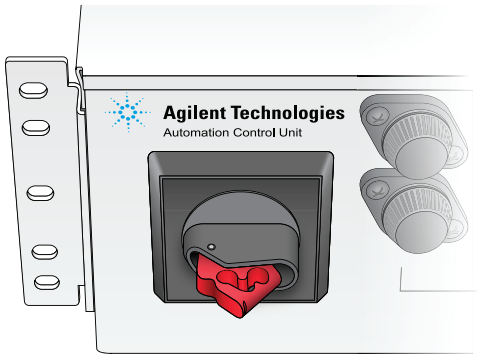
For information about...	See...
Installing the Automation Control Unit	"Installing the Automation Control Unit" on page 95
Viewing indicator lights	"Viewing the indicator lights" on page 151
Troubleshooting the Automation Control Unit	"Troubleshooting" on page 159
Managing signal channels	Lab automation software user documentation, such as the *VWorks Automation Control User Guide*
Setting up serial and USB devices in systems and workstations	• "About configuring serial communication devices" on page 147 • Device user documentation • Lab automation software user documentation

Turning on and turning off the Automation Control Unit

About the power switch

The Automation Control Unit power switch is equipped with a locking mechanism that prevents unsafe startup of the system or workstation.

Figure Automation Control Unit power switch with locking mechanism



If your lab has a lockout/tagout policy, be sure to refer to the policy before turning on or turning off the Automation Control Unit.

Turning on the Automation Control Unit

This section explains how to turn on the Automation Control Unit only. For the full system or workstation startup procedure, see the system or workstation user documentation.

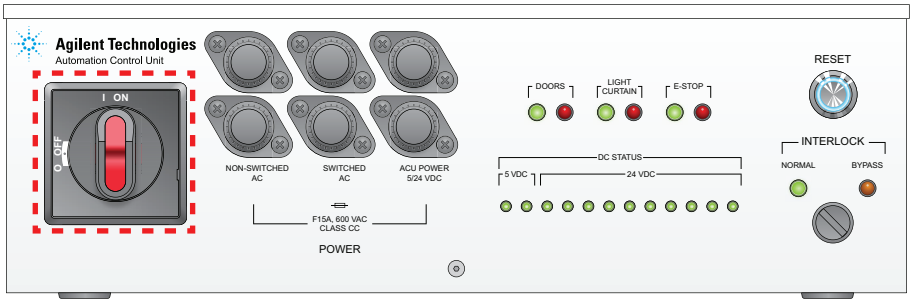
Turning on the Automation Control Unit initiates the system startup process. Robots and devices might move during startup.

WARNING **To prevent potential injuries, make sure no one is inside the system or workstation before you turn on the Automation Control Unit.**

WARNING **Follow your organization's lockout/tagout policy, if applicable.**

To turn on the Automation Control Unit:

1 At the front of the Automation Control Unit, turn the power switch clockwise to the **ON** (**I**) position.



2 Turn on the UPS, if applicable.

If the UPS emergency power-off (EPO) connection is used, you must first reset the UPS EPO, and then turn on the UPS. For instructions, see the UPS user documentation.

If the Automation Control Unit turns on successfully, you should hear the fan inside the unit turn on. After a few seconds, the indicator lights on the front panel turn on and show the current state of the system or workstation. See "Viewing the indicator lights" on page 151.

Note: If you have configured the air supply to turn on at startup, turning on the Automation Control Unit also turns on the air supply. For information about configuring the air supply at startup, see the "Configuring the signal channels" on page 141.

Turning off the Automation Control Unit

This section explains how to turn off the Automation Control Unit only. For the full system or workstation shutdown procedure, see the system or workstation user documentation.

Be aware that the system or workstation configuration can affect the shutdown procedure:

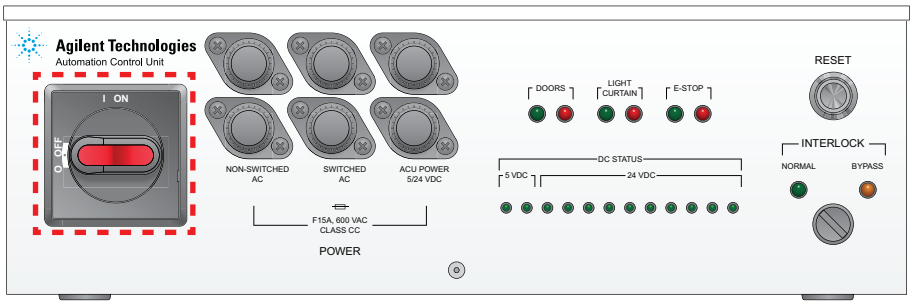
- If the system or workstation has a UPS, and the computer is connected directly to the UPS:
  - *If the UPS emergency power off (EPO) cable is not installed (default setup).* The computer will remain on after the system or workstation is shut down.
  - *If the UPS EPO cable is installed.* Turning off the Automation Control Unit will turn off the UPS and the computer. Make sure you properly shut down and turn off the computer before shutting down the system.
- If the system or workstation does not have a UPS, and the computer is connected directly to the Automation Control Unit:

  Turning off the system or workstation will automatically turn off the computer. Make sure you properly shut down and turn off the computer before shutting down the system or workstation.

WARNING **Follow your organization's lockout/tagout policy, if applicable.**

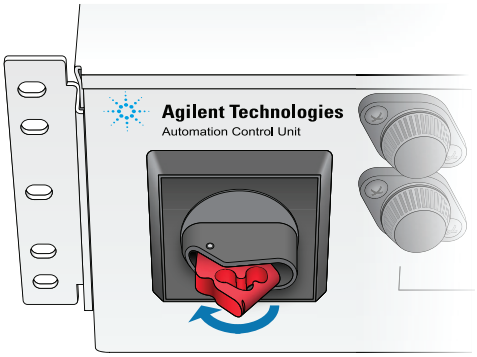
To turn off the Automation Control Unit:

1. At the front panel of the Automation Control Unit, turn the power switch counterclockwise to the **OFF** (**O**) position. The indicator lights on the front panel and the fan inside of the unit turn off.



Note: Turning off the Automation Control Unit turns off the air supply.

2. Turn off the UPS.
3. To lock the power switch, pull out the tab in the knob, and then insert your lock into one of the two holes in the tab.



Related information

For information about...	See...
Viewing indicator lights	"Viewing the indicator lights" on page 151
Interlock key settings	"Interlock key settings" on page 61
Adding the Automation Control Unit to a device file	"Adding and deleting the Automation Control Unit in the VWorks software" on page 126
Creating profiles for the Automation Control Unit	"Creating ACU profiles" on page 131
Naming signal channel	"Configuring the signal channels" on page 141
Setting the maximum current threshold	"Setting the maximum current draw threshold" on page 145

For information about...	See...
Managing the signal channels	Lab automation software user documentation, such as the *VWorks Automation Control User Guide*
Troubleshooting	"Troubleshooting" on page 159

Adding and deleting the Automation Control Unit in the VWorks software

About this topic

This topic explains how to add and delete the Automation Control Unit in the VWorks software device file.

For information about how to set up the Automation Control Unit using other lab automation software, see the user documentation for the software.

Devices and device file defined

What is a device?

A device is an item in your lab automation system that has an entry in the VWorks software device file. A device can be a robot, an instrument, or a location in the system that can hold a piece of labware. The following are some examples of devices:

- Automation Control Unit
- BenchBot Robot
- Labware MiniHub
- Platepad
- A third-party device

What is a device file?

To communicate with and to control the Automation Control Unit, robot, and integrated devices, the VWorks software uses a device file that contains the following information:

- List of devices the software will communicate with and control
- Profile of each device (communication method, unique device configuration information)
- Properties of each device

You provide the device information in the VWorks software. The device information is stored in a device (.dev) file that is located in a folder you specify when saving the file.

For detailed information about device files and associations with profiles, and other VWorks components, see the *VWorks Automation Control User Guide*.

Adding the Automation Control Unit in a device file

This section explains how to add an Automation Control Unit to an existing device file.

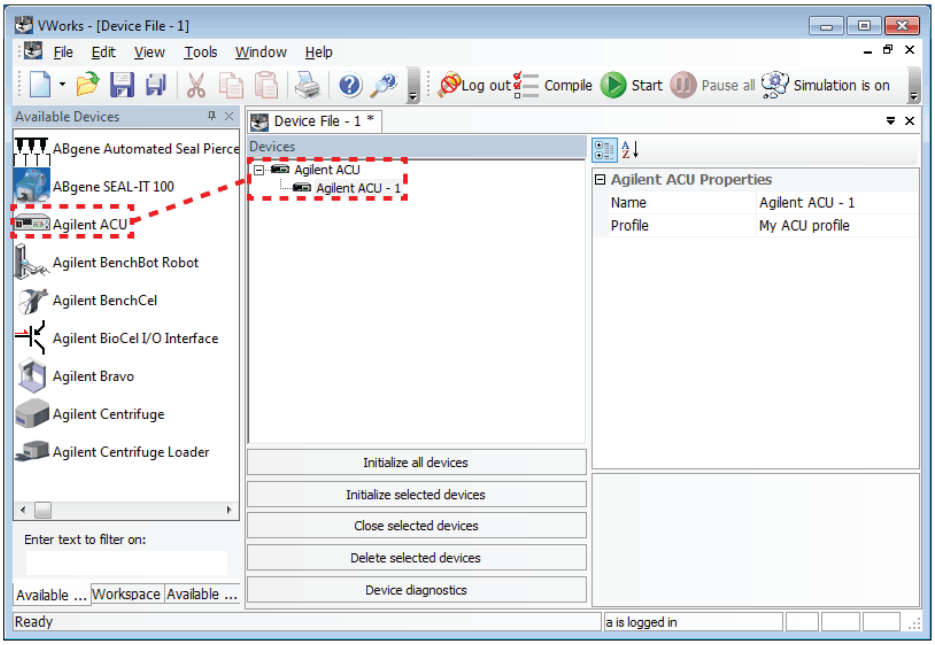
If you are setting up your automation system for the first time, you need to create a new device file, and then add the Automation Control Unit, robot, and integrated devices to this file. For instructions on creating a new device file, see the *VWorks Automation Control User Guide*.

Note: The Automation Control Unit is called ACU in the VWorks software.

To add an ACU to an existing device file:

1 In the **VWorks** window, open the device file.

2 In the **Available Devices** area, double-click the ACU device icon (Agilent ACU). Alternatively, you can drag the icon from the **Available Devices** area into the **Device File** area.



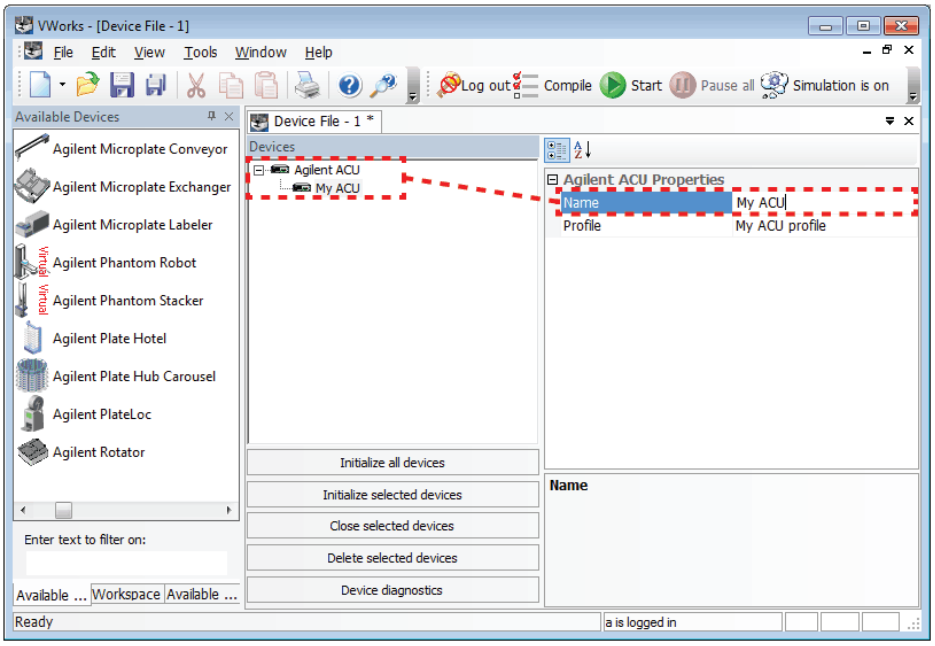
Notice that the first ACU device is labeled ACU-1. If you add another ACU, it will appear as ACU-2.

If you do not see ACU in the **Available Devices** list, check that the ACU plugin file (ACU.dll) is stored in the following folder:
...\Agilent Technologies\VWorks\Plugins folder.

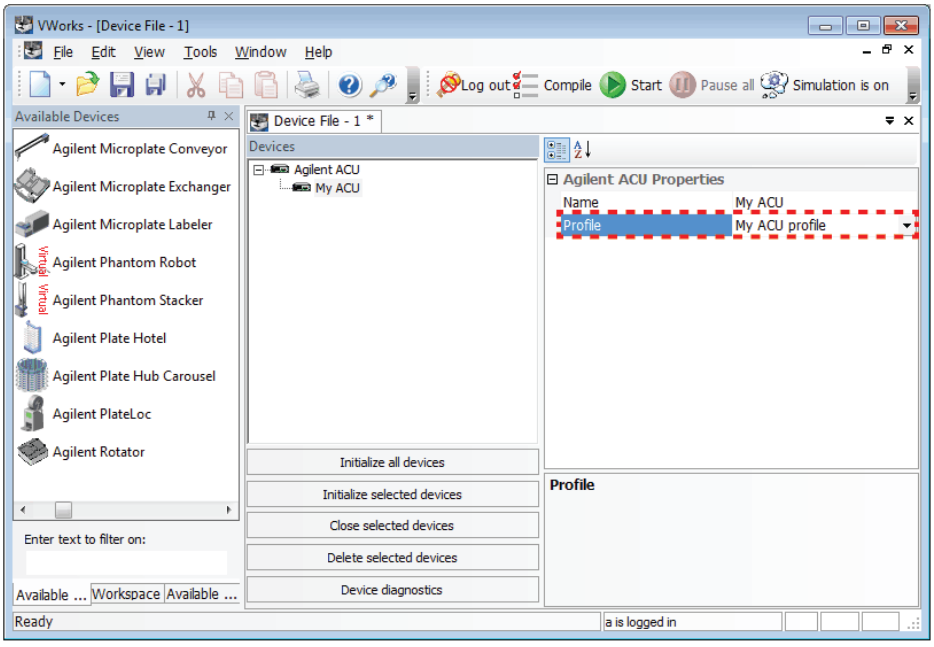
If you added the ACU plugin file in the Plugins folder and you have already started the VWorks software, be sure to reload the plugin. To do this, close any open device files and protocol files, and then select **Tools > Reload Plugins.**

3 In the device properties area, type a **Name** for the device.

In the following example, the name for the ACU is My ACU.



4 Select the **Profile**.



If the profile you want does not appear in the list, or if no profile appears in the list, you need to:

a Create a profile. See "Creating ACU profiles" on page 131.

b Set up communication with the Automation Control Unit. See "Setting up communication with the Automation Control Unit" on page 134.

c Save the profile. See "Saving the profile" on page 138.

d Return to this step to select the profile.

Without the profile, you will not be able to establish communication with the Automation Control Unit.

5 If you have more than one Automation Control Unit in the system, repeat steps 2 through 4 to add more ACUs.

6 Select **File > Save** to save the device file.

7 In the **Device File** area, select the ACU, and then click **Initialize selected devices** to establish communication with the Automation Control Unit.

If an initialization error message appears, see "Troubleshooting" on page 159 for instructions.

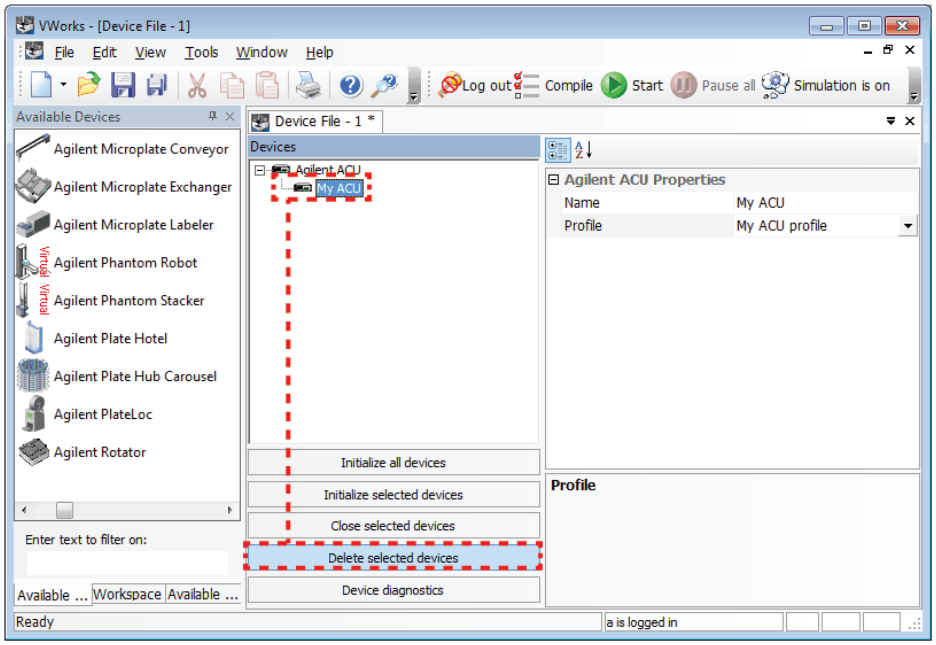
IMPORTANT Make sure the Automation Control Unit is turned on before you initialize the device. For instructions, see "Turning on and turning off the Automation Control Unit" on page 122.

Deleting an Automation Control Unit from the device file

To delete an ACU from the device file:

1 In the **VWorks** window, select the ACU device you want to delete in the **Devices** area.

2 Click **Delete selected devices.**



Related information

For information about...	See...
VWorks software	• *VWorks Automation Control Setup Guide* • *VWorks Automation Control User Guide*
Creating an Automation Control Unit profile	"Creating ACU profiles" on page 131
Saving the profile	"Editing and managing profiles" on page 137
Initializing the profile	"Initializing the profile" on page 139
Naming the signal channels	"Configuring the signal channels" on page 141
Editing and managing profiles	"Editing and managing profiles" on page 137
Checking the channel connections	"Installing the Automation Control Unit" on page 95

Creating ACU profiles

About this topic

This topic explains how to create a new profile for the Automation Control Unit. For instructions on how to create profiles for other Agilent Technologies devices, see the device user documentation. For instructions on how to create profiles for third-party devices, see the third-party device driver user guide.

About profiles

IMPORTANT Each device in the device file requires a unique profile.

A profile is a collection of settings, stored in the Windows registry, that manages how you connect to a device. A profile specifies the port or IP address used to establish communication between the device and the controlling computer.

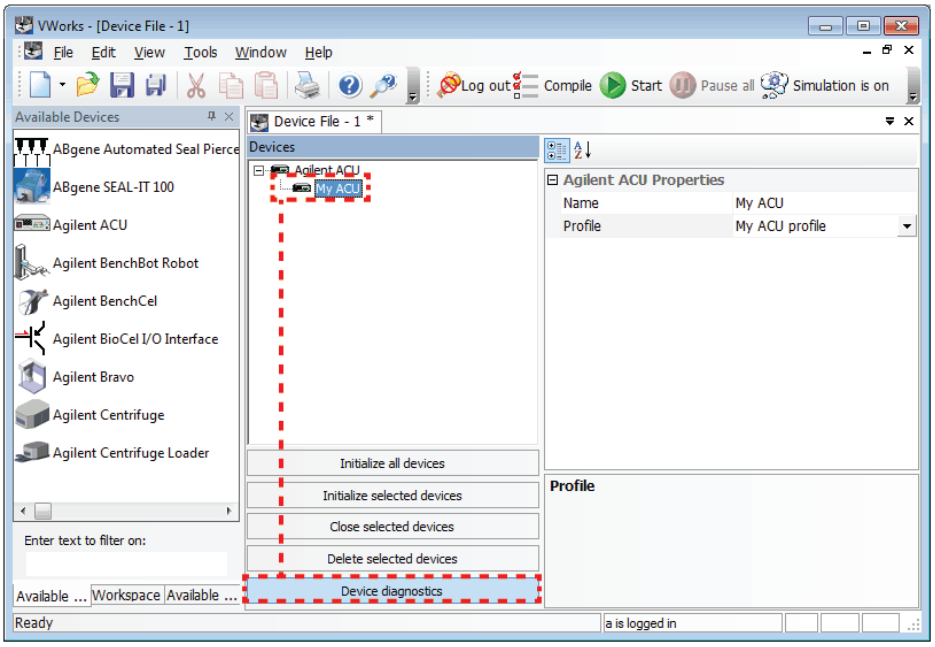
You use ACU Diagnostics to create and manage ACU profiles.

Note: The profile is referenced by a device file. For information about device files, see "What is a device file?" on page 126. For a detailed description of the relationships between the device file and profile, see the *VWorks Automation Control User Guide*.

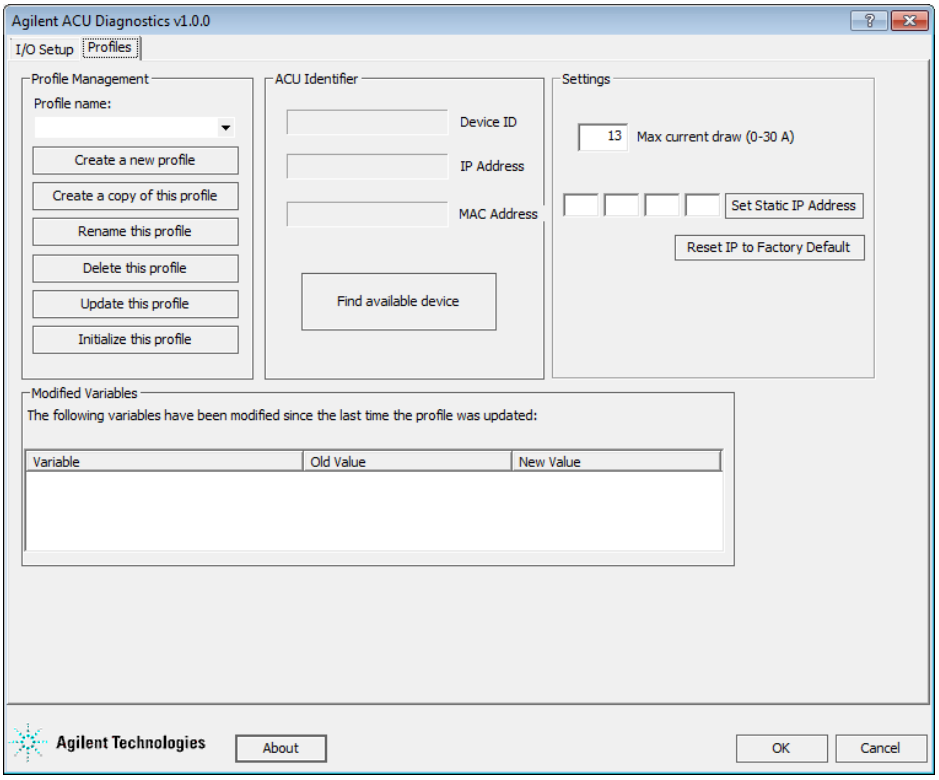
Creating an ACU profile

To create an ACU profile:

1 In the **Devices** area, select the ACU device, and then click **Device diagnostics.**



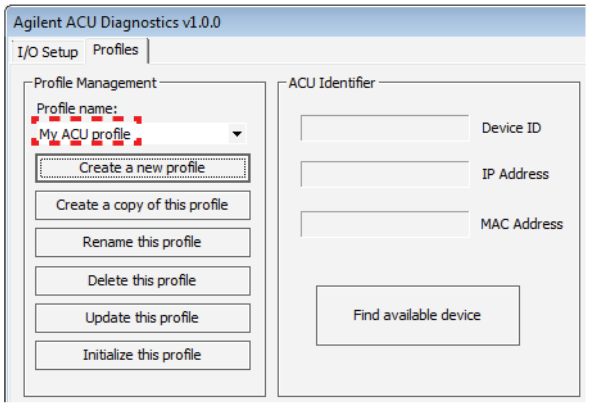
The ACU Diagnostics dialog box opens.



2 If it is not already displayed, click the **Profiles** tab.

3 In the **Profile Management** area, click **Create a new profile**. The Create Profile dialog box opens.

4 Type a name, and click **OK**. The name appears in the Profile Management area.



Related information

For information about...	See...
Adding the Automation Control Unit to a device file	"Adding and deleting the Automation Control Unit in the VWorks software" on page 126
Saving the profile	"Editing and managing profiles" on page 137
Initializing the profile	"Initializing the profile" on page 139
Editing and managing profiles	"Editing and managing profiles" on page 137
Naming the signal channels	"Configuring the signal channels" on page 141
Checking the channel connections	"Installing the Automation Control Unit" on page 95
Setting the maximum current threshold	"Setting the maximum current draw threshold" on page 145

Setting up communication with the Automation Control Unit

About this topic

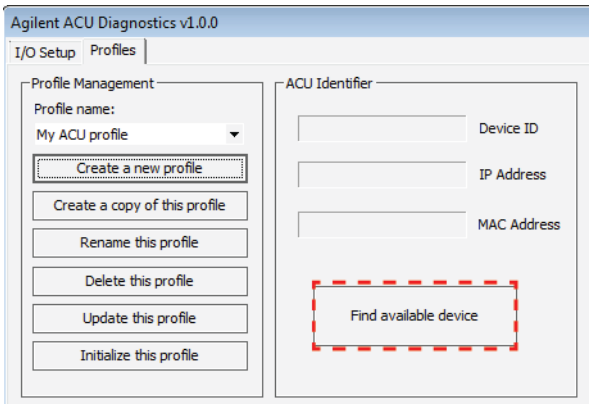
When you create a profile, you must also select the Automation Control Unit with which to establish communication. This topic explains how to locate the Automation Control Unit in the system or workstation network:

- "Setting up communication with a single Automation Control Unit" on page 134
- "Setting up communication with more than one Automation Control Unit" on page 135

Setting up communication with a single Automation Control Unit

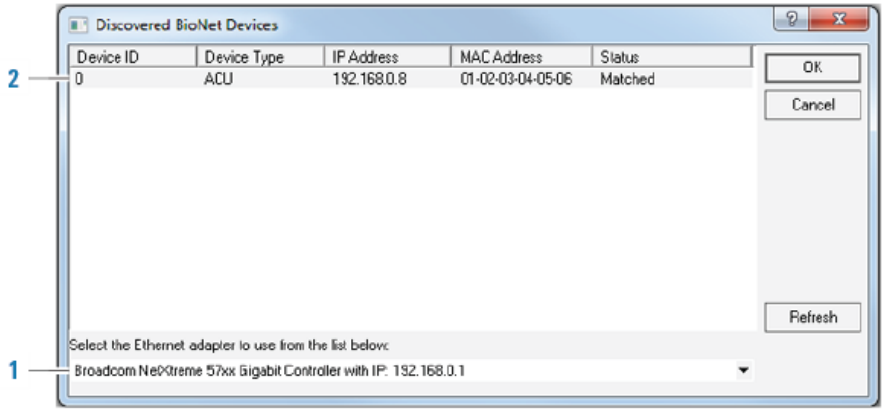
To set up communication with the Automation Control Unit:

1 In the **ACU Identifier** area, click **Find available device**.



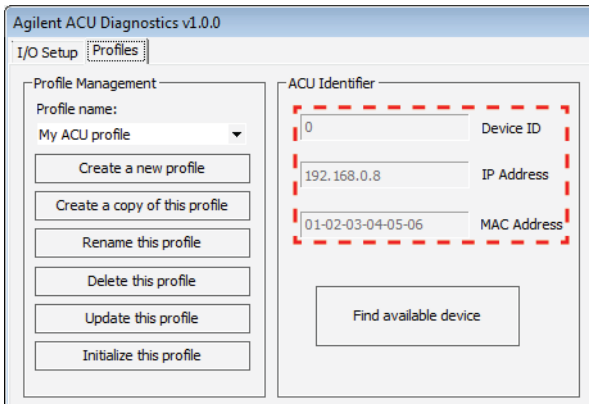
The Discovered BioNet Devices dialog box opens.

2 Select the ACU to which you want to connect:



Step	Instruction
1	In the Ethernet adaptors list, select the Ethernet card that is connected to the Automation Control Unit. A list of devices that are connected to the selected card appear in the dialog box.
2	Select the Automation Control Unit. You can use the MAC address or the IP address to identify the Automation Control Unit in the list. To correctly identify a Automation Control Unit by its MAC address, you might need to turn off all devices and, if you have more than one Automation Control Unit, all but one Automation Control Unit in the system.

3 When you are finished, click **OK** to return to the ACU Diagnostics dialog box. Notice that the device information is displayed.



Setting up communication with more than one Automation Control Unit

IMPORTANT Every device in the system or workstation must have a unique IP address for proper operation. Each Automation Control Unit is assigned the same IP address at the factory. Therefore, if you have more than one Automation Control Unit installed in the system or workstation, you must make sure each is assigned a unique IP address.

Workflow

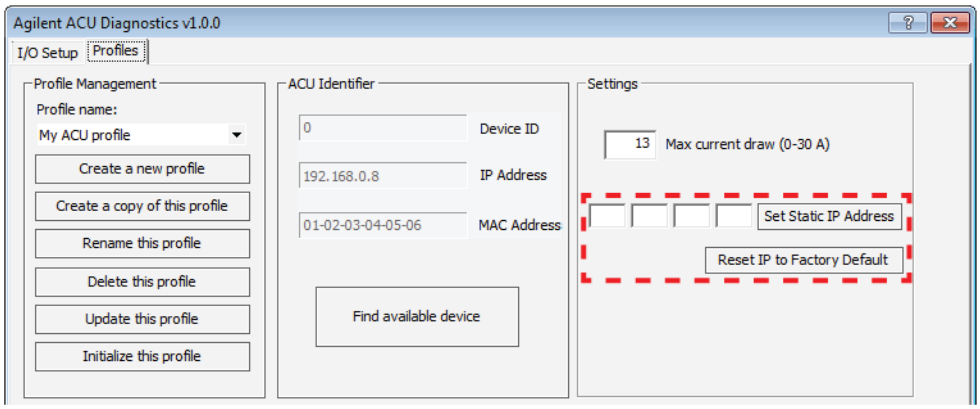
When setting up more than one Automation Control Unit, use the following workflow.

Step	For this task...	See...
1	Set up communication with an Automation Control Unit.	“Setting up communication with a single Automation Control Unit” on page 134
2	Change its IP address.	“Changing the IP address” on page 136
3	Repeat steps 1 and 2 for each additional Automation Control Unit.	Not applicable

Changing the IP address

To change the IP address:

In the **Settings** area, type the new IP address, and then click **Set Static IP Address**.



If you want to reset the IP address to the factory default (192.168.0.8), click **Reset IP to Factory Default**.

Related information

For information about...	See...
Creating profiles for the Automation Control Unit	“Creating ACU profiles” on page 131
Saving the profile	“Editing and managing profiles” on page 137
Editing and managing profiles	“Editing and managing profiles” on page 137
Initializing the profile	“Initializing the profile” on page 139
Naming the signal channels	“Configuring the signal channels” on page 141
Checking the channel connections	“Installing the Automation Control Unit” on page 95
Setting the maximum current threshold	“Setting the maximum current draw threshold” on page 145

Editing and managing profiles

Editing profiles

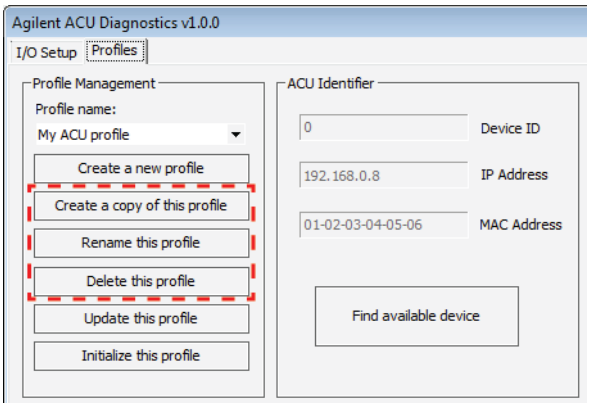
To edit a profile:

1. In the **ACU Diagnostics Profiles** tab, select the profile you want to edit in the **Profile Management** area.
2. Modify the profile information.

   Note: Changes you make in the profile are listed in the Modified Variables table below the Profile Management area.

Managing profiles

In the **ACU Diagnostics Profiles** tab, you can select an existing profile, and then rename, copy, or delete the profile.



Related information

For information about...	See...
Adding the Automation Control Unit to a device file	"Adding and deleting the Automation Control Unit in the VWorks software" on page 126
Creating profiles for the Automation Control Unit	"Creating ACU profiles" on page 131
Naming signal channel	"Configuring the signal channels" on page 141
Setting the maximum current threshold	"Setting the maximum current draw threshold" on page 145
Managing signals	Automation software user documentation
Troubleshooting	"Troubleshooting" on page 159

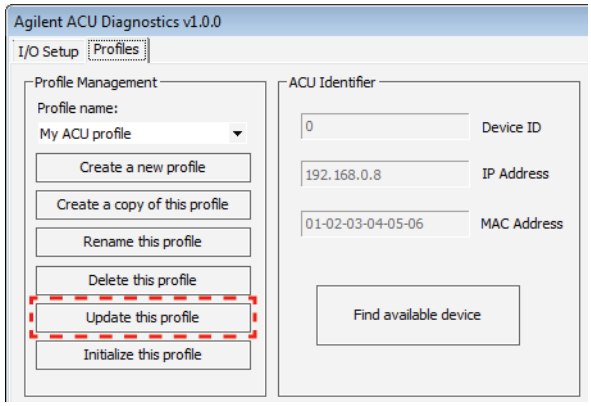
Saving the profile

Procedure

After you have finished setting up or editing the ACU profile, you can save the profile.

To save the profile:

Click **Update this profile** to save the changes. When the changes are saved, the log table clears.



Related information

For information about...	See...
Creating profiles for the Automation Control Unit	"Creating ACU profiles" on page 131
Setting up communication with the Automation Control Unit	"Setting up communication with the Automation Control Unit" on page 134
Initializing the profile	"Initializing the profile" on page 139
Naming the signal channels	"Configuring the signal channels" on page 141
Setting the maximum current threshold	"Setting the maximum current draw threshold" on page 145
Editing and managing profiles	"Editing and managing profiles" on page 137
Checking the channel connections	"Installing the Automation Control Unit" on page 95

Initializing the profile

About the initialization process

You initialize the profile to establish communication with the Automation Control Unit.

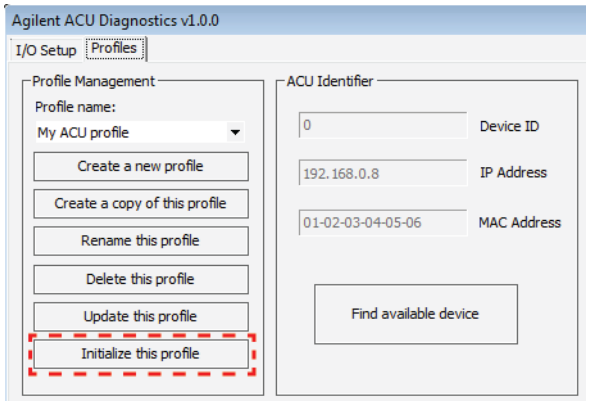
Note: Initializing the profile establishes communication with the Automation Control Unit while you are in ACU Diagnostics only. When you return to the device file, you will need to initialize the ACU device before using the system and running protocols.

Procedure

IMPORTANT Make sure the Automation Control Unit is turned on before you initialize the profile or the device.

To initialize the profile:

Click **Initialize this profile.** After a few seconds, a message lets you know that the initialization is successful.



To finish the device file setup, return to "Adding and deleting the Automation Control Unit in the VWorks software" on page 126 and continue from step 4. Alternatively, you can proceed to name the signal channels. See "Configuring the signal channels" on page 141.

Related information

For information about...	See...
Turning on the Automation Control Unit	"Turning on and turning off the Automation Control Unit" on page 122
Creating profiles for the Automation Control Unit	"Creating ACU profiles" on page 131
Setting up communication with the Automation Control Unit	"Setting up communication with the Automation Control Unit" on page 134

For information about...	See...
Saving the profile	“Saving the profile” on page 138
Naming the signal channels	“Configuring the signal channels” on page 141
Setting the maximum current threshold	“Setting the maximum current draw threshold” on page 145
Editing and managing profiles	“Editing and managing profiles” on page 137
Checking the channel connections	“Installing the Automation Control Unit” on page 95

Configuring the signal channels

About this topic

When you configure a signal channel, you are:

- Assigning the channel a name so that you can reference them in the IO Manager and in a protocol.

  The IO Manager allows you to specify which signals will be used to turn on lights, create sounds, open or close pass-through gates, and detect spills.

  When writing a protocol, you can add tasks to turn on or turn off a light, sound, or fan. You can also add tasks to wait for certain conditions to be met before continuing to the next task. For example, you can specify that a fan be turned on while a liquid-handling task is running. You can also specify that the temperature and humidity reach a certain level before the Main Protocol starts.
- Selecting channels that should always be turned on. For example, you might want the air supply to remain on.

IMPORTANT Only channels that have user-assigned names will appear in the IO Manager.

This section explains how to name signal channels and select channels that must always remain on. For instructions on how to use the IO Manager and for the description of protocol tasks, see the lab automation software, such as *VWorks Automation Control User Guide*.

Before you start

Make sure you have initialized the desired ACU profile. The signal channels will only display if you have successfully established communication with the Automation Control Unit. See "Initializing the profile" on page 139.

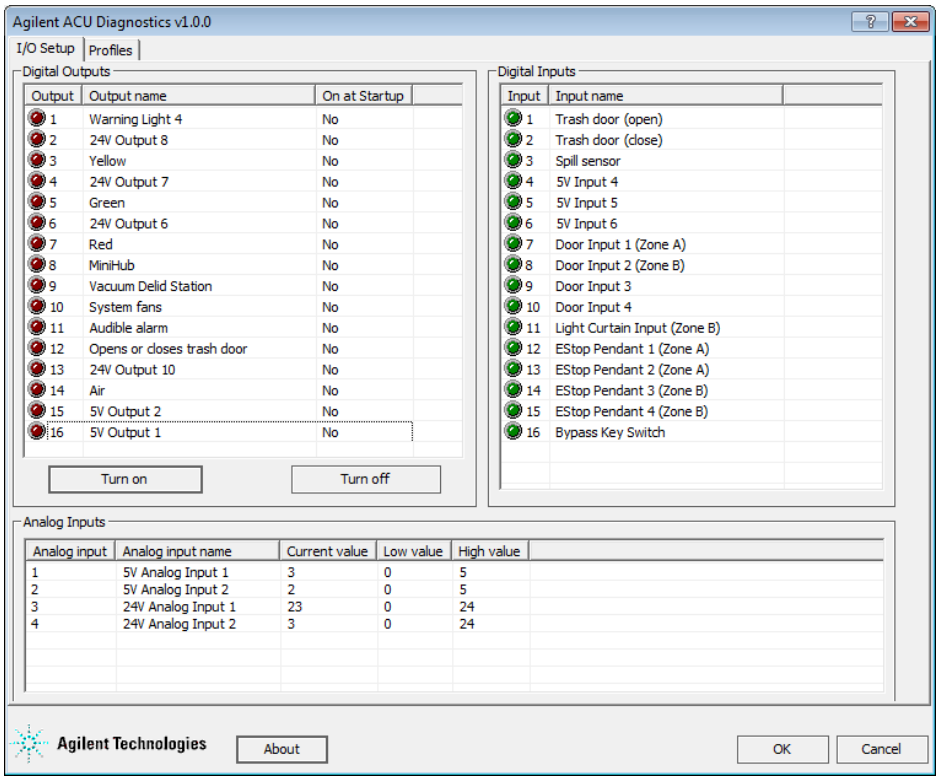
Procedure

To configure the signal channels:

1 In **ACU Diagnostics**, click the **I/O Setup** tab. Three tables appear:

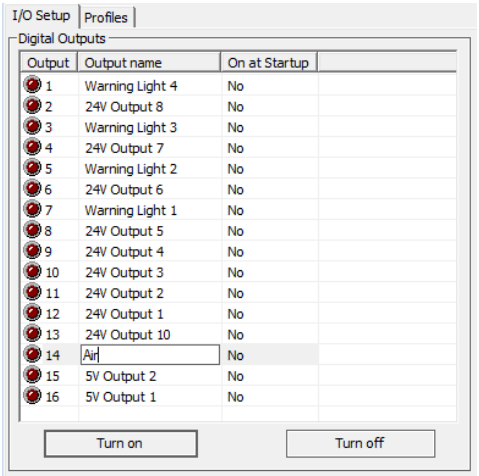
- *Digital Outputs*. Correspond to the 5 VDC OUT E-STOP, 24 VDC OUTPUT, and 24 VDC OUT E-STOP ports on the back of the Automation Control Unit.
- *Digital Inputs*. Correspond to the 5 VDC DIGITAL IN, DOORS, LIGHT CURTAIN, and E-STOP PENDANTS ports on the back of the Automation Control Unit.
- *Analog Inputs*. Correspond to the 5 VDC and 24 VDC ANALOG INPUT ports on the back of the Automation Control Unit.

Notice that the default names of the channels match the names of the I/O ports on the back of the Automation Control Unit.



2 To name a channel, double-click a name field, and then type the name you want to assign to that channel.

In the following example, the new name for **Output 14** (24V Output 9) is Air.

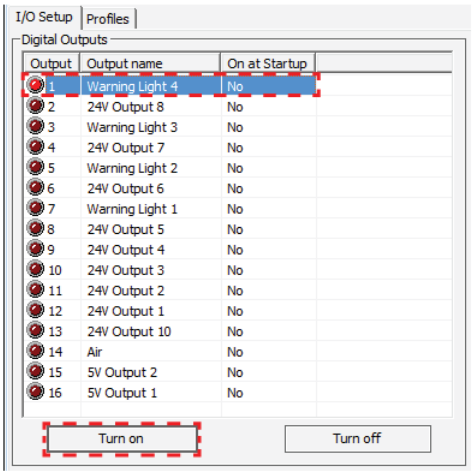


3 To verify the identity of the digital and analog input channel connections, you can change the physical state of the device and check its state in the I/O Setup tab.

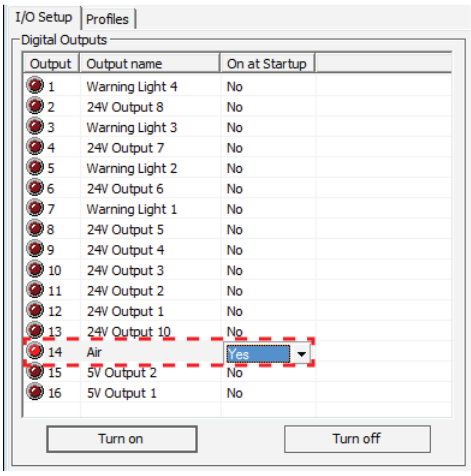
Examples:

- To verify the identity of an analog input channel used for a spill-detection sensor, you can add and remove liquid at the sensor and check the changing voltage value in the **Current value** column. Adding liquid changes the value to 0. A high value displays when you remove the liquid from the sensor.
- To verify the identity of a digital input channel used for a trash door sensor, you can open and close the door and check the indicator light in the Digital Inputs table. Opening the door turns on the light, and closing the door turns off the light.

4 To verify the identity of the digital output channel connections, select an output, and then click **Turn on**. The on state should turn on the alarm or light.



5 If you want the digital output channel to turn on during startup, select **Yes** in the **On at Startup** column. An example of a device that you want to turn on at startup is the air supply.



Select **No** if you want the channel to remain off at startup.

6 Repeat steps 2 through 5 to configure all signal channels that are in use.

7 When you are finished, click **OK** to save the changes to the profile.

Related information

For information about...	See...
Creating profiles for the Automation Control Unit	"Creating ACU profiles" on page 131
Setting up communication with the Automation Control Unit	"Setting up communication with the Automation Control Unit" on page 134
Saving the profile	"Saving the profile" on page 138
Editing and managing profiles	"Editing and managing profiles" on page 137
Checking the channel connections	"Installing the Automation Control Unit" on page 95
Setting the maximum current threshold	"Setting the maximum current draw threshold" on page 145

Setting the maximum current draw threshold

About the maximum current draw threshold

You can set the maximum electrical current draw threshold so that if the current draw reaches 90% of the specified threshold, a warning message is displayed. If the current draw exceeds 95%, the protocol run pauses and an error is displayed.

You set the threshold value in the ACU Diagnostics Profiles tab. By default, the **Max current draw** value is set at 13 A to accommodate the UK version of the Automation Control Unit. If your Automation Control Unit has a higher limit, you can reset the threshold value accordingly.

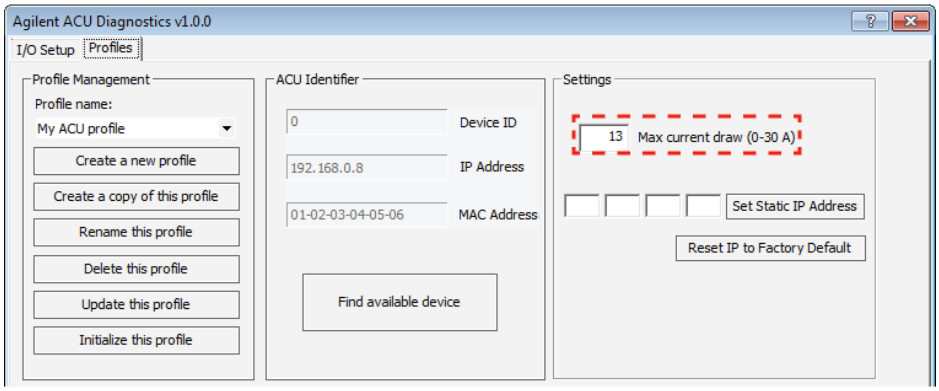
Before you set the maximum current draw value, check the rating of your Automation Control Unit and the accompanying power cord. For the maximum current information, see "Electrical requirements" on page 44.

CAUTION Make sure the **Max current draw** value does not exceed the maximum current specified for the Automation Control Unit and the supplied power cord. Drawing current that exceeds the maximum limit can damage the Automation Control Unit.

Procedure

To set the maximum current threshold:

1 In the **ACU Diagnostics Profiles** tab, type the maximum current value in the **Settings** area. The value you specify must be between 0 A and 30 A.



2 Click **Update this profile** to save the change.

3 To configure the audible alarm when the maximum current draw threshold is exceeded, see the lab automation software user documentation. For example, in the VWorks software, you can configure the audible alarm using the IO Manager.

Related information

For information about...	See...
Creating profiles for the Automation Control Unit	“Creating ACU profiles” on page 131
Setting up communication with the Automation Control Unit	“Setting up communication with the Automation Control Unit” on page 134
Saving the profile	“Saving the profile” on page 138
Editing and managing profiles	“Editing and managing profiles” on page 137
Checking the channel connections	“Installing the Automation Control Unit” on page 95

About configuring serial communication devices

About this topic

IMPORTANT Make sure you read this topic before configuring the serial communication devices in your system or workstation.

You use the lab automation software to configure the integrated devices in your system or workstation. During this process, you need to establish communication with the devices.

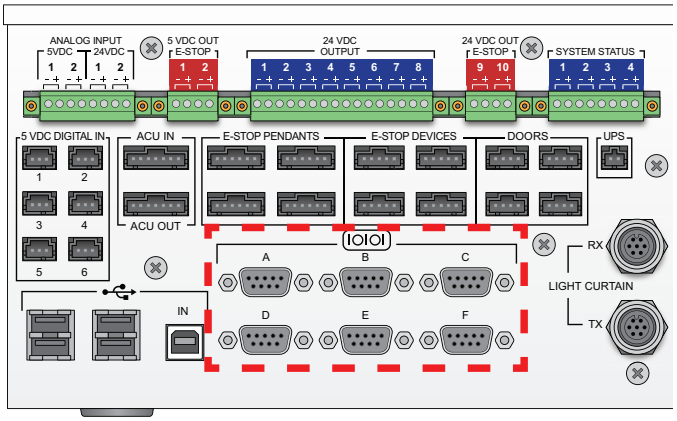
The controlling computer uses COM ports to communicate with serial communication devices. This topic explains the following:

- "COM ports and how they are used" on page 147
- "Default COM port assignments" on page 148
- "Viewing the COM port assignments" on page 149

COM ports and how they are used

On the back of the Automation Control Unit, six serial ports are available for devices that require serial communication. They are labeled A, B, C, D, E, and F.

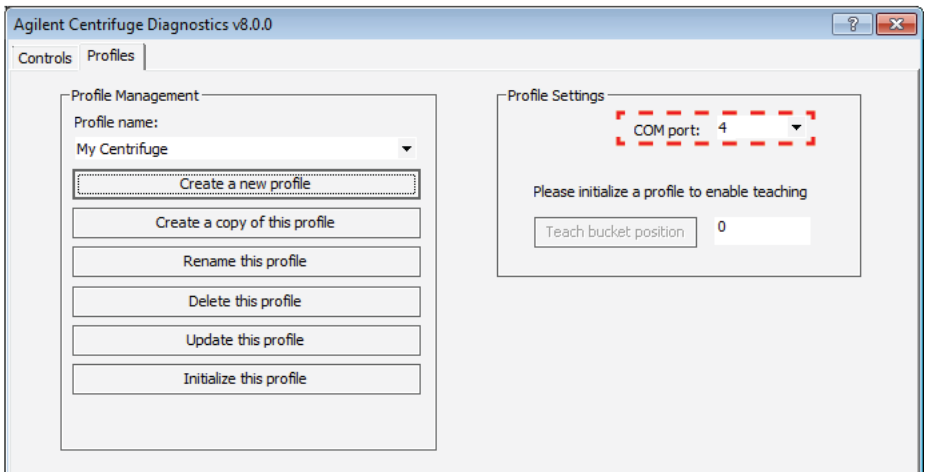
Figure Serial ports on the back of the Automation Control Unit



The controlling computer operating system assigns a COM port number to each serial port. The COM port numbers are used when you configure the devices in the lab automation software.

The following example shows the Centrifuge Diagnostics Profiles tab. In the example scenario, suppose the Centrifuge is physically connected to a serial port identified as COM4. Therefore, you should select 4 in the **COM port** list so that the controlling computer knows which port to use when it needs to communicate with the Centrifuge.

Figure Selecting the correct COM port when configuring a device



Default COM port assignments

Assuming no other serial communication or USB device is connected to the computer or the lab automation system, the default COM port assignments in the Automation Control Unit are as follows:

Table Default COM port assignments

Port A	B	C	Internal use 1
COM7	COM9	COM3	COM5
D	E	F	Internal use 2
COM8	COM10	COM4	COM6

Note: COM1 and COM2 are reserved for use by the computer only. Therefore, they are not available for the Automation Control Unit. Two of the ports, **Internal use 1** and **Internal use 2**, are for internal use by the Automation Control Unit only. They are not available for your system or workstation.

To ensure uniqueness, the Windows operating system will assign newly connected devices to the next available COM port. For example, if you connect a USB or serial communication device to the controlling computer before turning on the Automation Control Unit, the resulting COM port assignments at the Automation Control Unit will be as follows:

Table COM port assignments when COM3 is occupied

Port A	B	C	Internal use 1
COM8	COM10	COM4	COM6
D	E	F	Internal use 2
COM9	COM11	COM5	COM7

Agilent Technologies recommends that you do not connect USB or serial communication devices to the controlling computer before turning on the Automation Control Unit and the controlling computer.

Viewing the COM port assignments

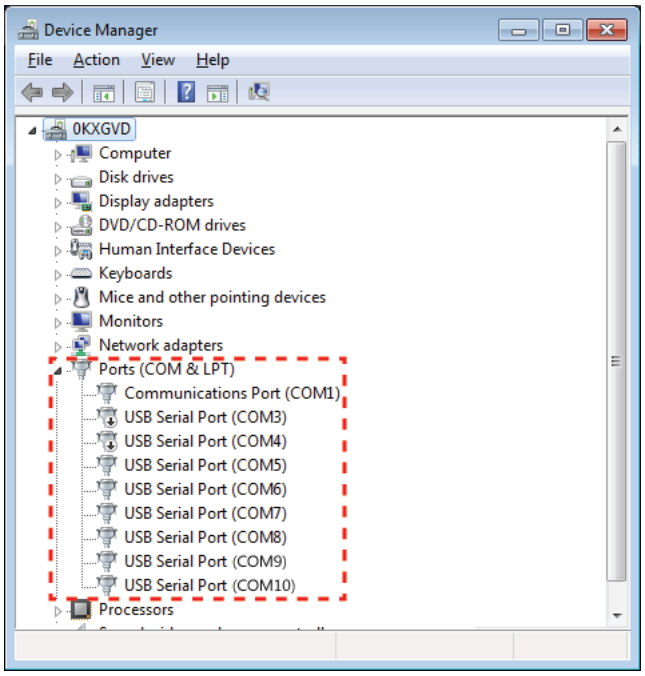
Before you configure the serial communication devices, you should determine or confirm the COM port assignments.

To view the COM port assignments:

1 From the **Windows** desktop, open the **Device Manager**. The Device Manager can be accessed from the Control Panel. For detailed instructions, see the Windows user documentation.

2 In the **Device Manager**, expand **Ports (COM & LPT)**. The list of COM ports appear.

If the COM port list appears as shown below, the default COM port assignments are in effect.



3 Cross-check the COM port assignments with the port-device pairing information you recorded in "Connecting integrated devices" on page 108. Use the information to configure the devices.

For example, during installation, a device is connected to serial port B. After checking the COM port assignments in the Device Manager, you confirm that the default COM port assignments are in effect. Based on the table in "Default COM port assignments" on page 148, you know that port B is assigned COM9. When you configure the device in the automation software, you should select COM9 for the device.

Related information

For information about...	See...
Configuring integrated devices	• Device user documentation • Automation software user documentation
Connecting integrated devices	"Connecting integrated devices" on page 108
Viewing indicator lights	"Viewing the indicator lights" on page 151
Interlock key settings	"Interlock key settings" on page 61
Adding the Automation Control Unit to a device file	"Adding and deleting the Automation Control Unit in the VWorks software" on page 126
Creating profiles for the Automation Control Unit	"Creating ACU profiles" on page 131
Naming signal channel	"Configuring the signal channels" on page 141
Setting the maximum current threshold	"Setting the maximum current draw threshold" on page 145
Configuring the signals	Automation software user documentation
Troubleshooting	"Troubleshooting" on page 159

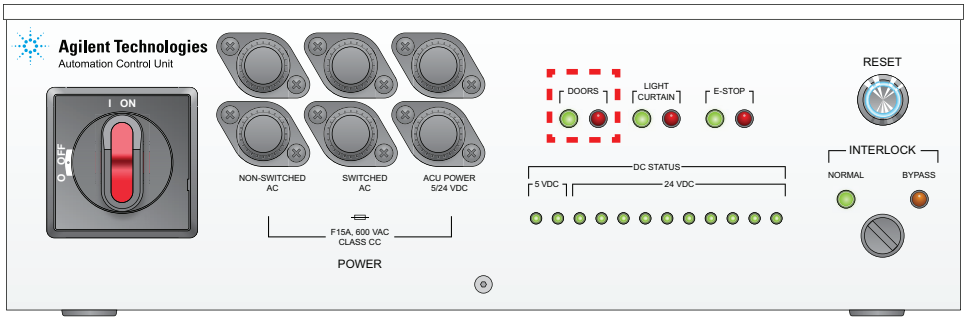
7 Viewing the indicator lights

This chapter contains the following topics:

DOORS

Description

Figure DOORS lights



The lights indicate the following status:

DOORS light	Description
Green	The doors are closed.
Red - solid	One of the doors is open in INTERLOCK NORMAL or BYPASS settings. Opening a system door trips the interlock under normal operating conditions. See "About emergency stop" on page 19 for the recovery instructions.
Red - blinking	A hardware connection error has occurred, or Door jumpers are not installed at unused DOORS ports. See "Troubleshooting" on page 159 for instructions.

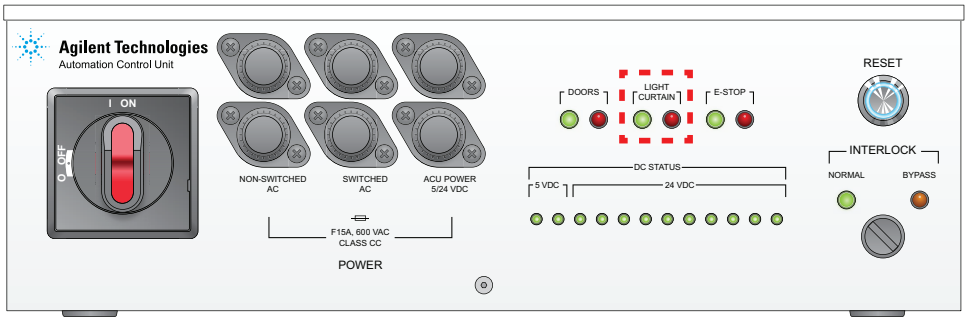
Related information

For information about...	See...
Automation Control Unit features	"Front panel" on page 28
Connecting the safety equipment to the Automation Control Unit	"Connecting the safety equipment" on page 104
Recovering from an emergency stop	"About emergency stop" on page 19
Troubleshooting problems	"Troubleshooting hardware problems" on page 165
Safety information	"Safety information" on page 13

LIGHT CURTAIN

Description

Figure LIGHT CURTAIN lights



The lights indicate the following status:

LIGHT CURTAIN light	Description
Green	Nothing is interrupting the Light Curtain.
Red - solid	An object is interrupting the Light Curtain in INTERLOCK NORMAL or BYPASS settings. Alternatively, the Light Curtain jumper is not installed at the unused RX port. Interrupting the Light Curtain trips the interlock under normal operating conditions. See “About emergency stop” on page 19 for the recovery instructions.
Red - blinking	A hardware connection error has occurred. See “Troubleshooting” on page 159 for instructions.

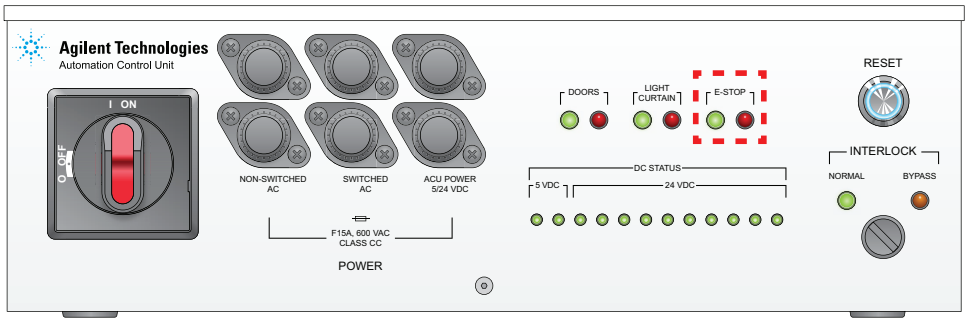
Related information

For information about...	See...
Automation Control Unit features	“Front panel” on page 28
Connecting the safety equipment to the Automation Control Unit	“Connecting the safety equipment” on page 104
Recovering from an emergency stop	“About emergency stop” on page 19
Troubleshooting problems	“Troubleshooting hardware problems” on page 165
Safety information	“Safety information” on page 13

E-STOP

Description

Figure E-STOP lights



The lights indicate the following status:

E-STOP light	Description
Green	The emergency-stop button is not pressed.
Red - solid	The emergency-stop button has been pressed in INTERLOCK NORMAL or BYPASS settings. Alternatively, E-Stop jumpers are not installed at unused E-STOP PENDANTS ports.
Red - blinking	A hardware connection error has occurred. See “Troubleshooting” on page 159 for instructions.

To recover from an emergency stop, see “About emergency stop” on page 19.

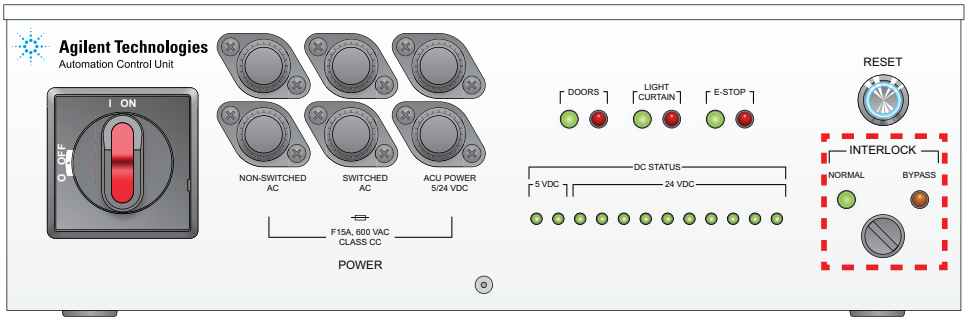
Related information

For information about...	See...
Automation Control Unit features	“Front panel” on page 28
Connecting the safety equipment to the Automation Control Unit	“Connecting the safety equipment” on page 104
Recovering from an emergency stop	“About emergency stop” on page 19
Troubleshooting problems	“Troubleshooting hardware problems” on page 165
Safety information	“Safety information” on page 13

INTERLOCK

Description

Figure INTERLOCK lights



The lights indicate the INTERLOCK key setting:

INTERLOCK light	Description
Green	The INTERLOCK key switch is set at NORMAL.
Yellow	The INTERLOCK key switch is set at BYPASS, or the operator has selected Bypass Interlock in the lab automation software during a paused run.

For a description of the settings, see “Interlock key settings” on page 61. For information about pausing a run and bypassing the interlock in the software, see the lab automation software user documentation.

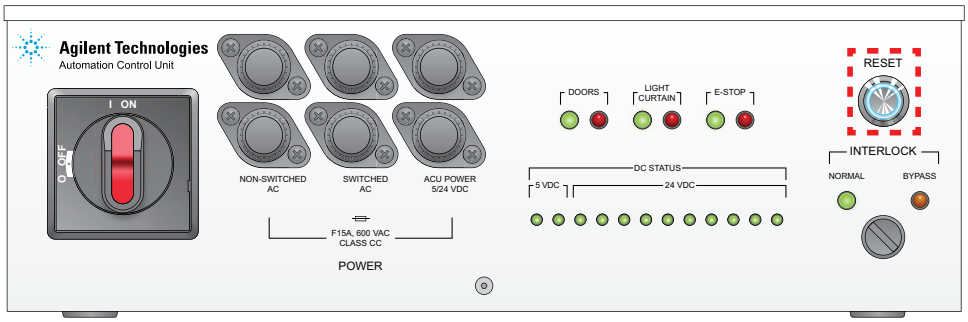
Related information

For information about...	See...
Automation Control Unit features	“Front panel” on page 28
Connecting the safety equipment to the Automation Control Unit	“Connecting the safety equipment” on page 104
Interlock key settings	“Interlock key settings” on page 61
Troubleshooting problems	“Troubleshooting hardware problems” on page 165
Safety information	“Safety information” on page 13

RESET

Description

Figure RESET button



The blue light on the RESET button indicates the following status:

RESET light	Description
Blue - solid	The emergency-stop button is not pressed, all of the system doors are closed, and nothing is interrupting the Light Curtain.
Blue - blinking	The interlock is tripped (the emergency-stop button is pressed, a system door is open, or the Light Curtain is interrupted). To recover from this state, see “About emergency stop” on page 19.

Related information

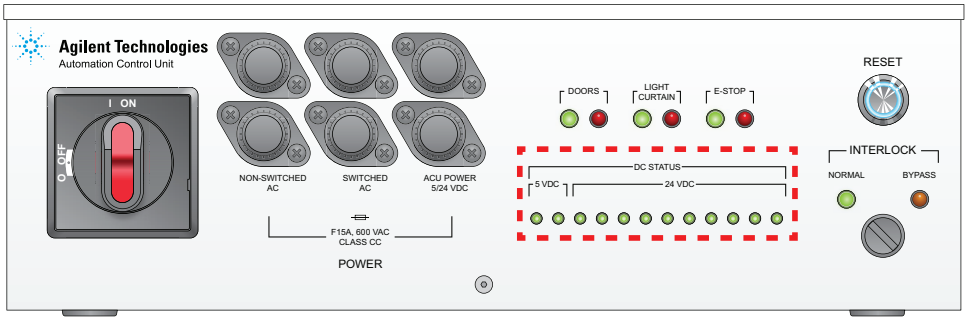
For information about...	See...
Automation Control Unit features	“Front panel” on page 28
Recovering from an emergency stop	“About emergency stop” on page 19
Troubleshooting problems	“Troubleshooting hardware problems” on page 165
Safety information	“Safety information” on page 13

DC STATUS

Description

The DC STATUS lights correspond to devices that are connected to the 5 VDC OUT and 24 VDC OUTPUT ports on the back of the Automation Control Unit.

Figure DC STATUS lights



The lights indicate the following status:

DC STATUS light	Description
Green - on	The device is in the on state.
Green - off	The device is in the off state.
Green - blinking	The device is turned on and is in the emergency-stop state (the emergency-stop button is pressed). This state is only applicable to devices that are connected to a post-emergency-stop circuit (red ports).

Note: The on or off state of these lights should match the on or off state of the digital output lights in the ACU Diagnostics I/O Setup tab. See "Troubleshooting I/O channels" on page 161.

Related information

For information about...	See...
Automation Control Unit features	"Front panel" on page 28
Connecting signaling devices to the Automation Control Unit	"Connecting signal-generating and miscellaneous devices" on page 113
Automation Control Unit specifications	"Electrical requirements" on page 44
Troubleshooting power problems	"Troubleshooting hardware problems" on page 165

For information about...	See...
Safety information	“Safety information” on page 13

8 Troubleshooting

This chapter section contains the following topics:

For emergency-stop recovery procedures, see "About emergency stop" on page 19.

WARNING **Only administrators and experienced personnel should perform the procedures in this chapter.**

Recovering from a power outage

During the power outage

During a power outage, the UPS starts to beep while providing power to the Automation Control Unit.

If the system is running a protocol when the power went out, the run will likely continue. If a running protocol is nearly finished, you might consider letting it continue until it is finished. If you started running a protocol and you anticipate a lengthy power outage, you might consider stopping the run.

When the power is restored

If the Automation Control Unit was not turned off during the power outage, the Automation Control Unit will receive and distribute power, and the UPS will recharge. The protocol (if running) will continue.

Related information

For information about...	See...
UPS operations	UPS user documentation
Shutting down the system	System user documentation
Turning off the Automation Control Unit	“Turning on and turning off the Automation Control Unit” on page 122
Safety	“Safety information” on page 13
Reporting problems	“Reporting problems” on page 177

Troubleshooting I/O channels

About this topic

You can use the lab automation software to troubleshoot the I/O channels. This topic explains how to use the VWorks ACU Diagnostics to troubleshoot the I/O channels.

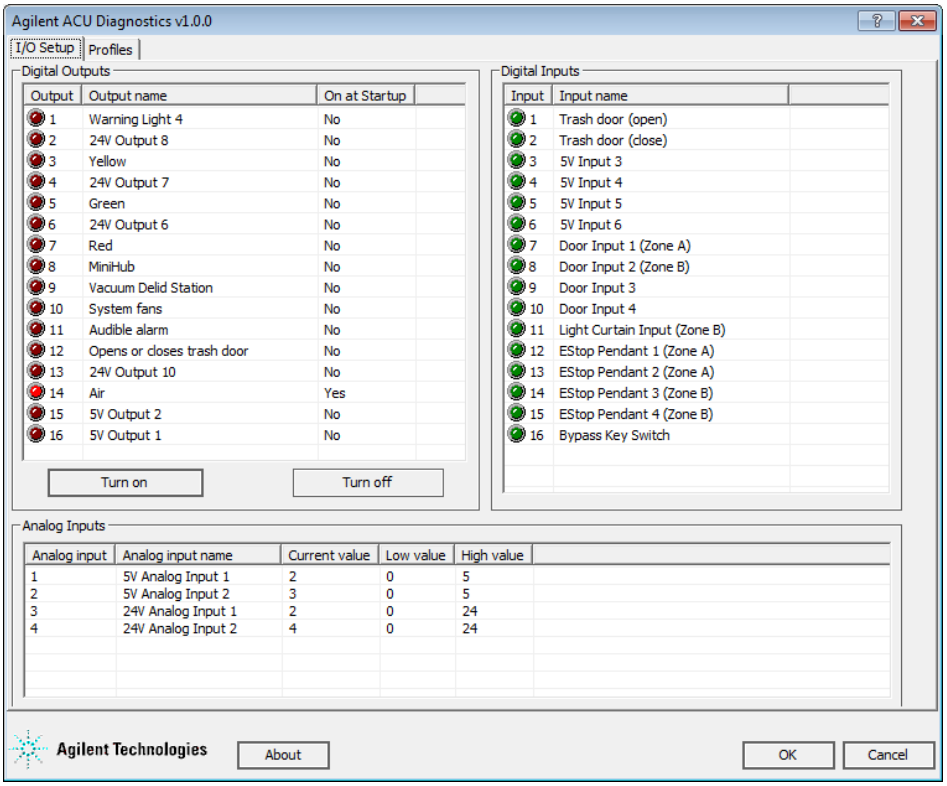
For information about other lab automation software, see the user documentation for the software.

Procedure

To troubleshoot the I/O channels:

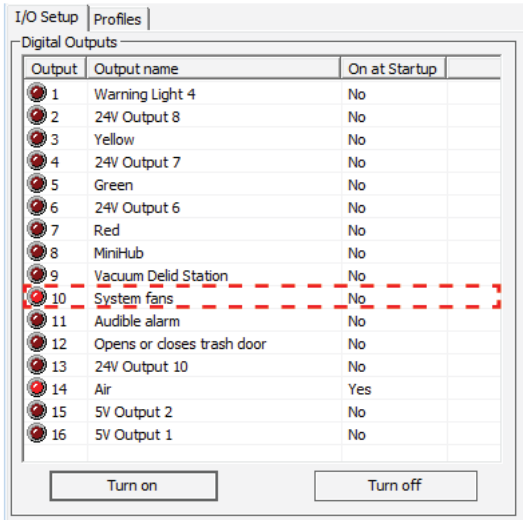
1 From within the VWorks software, open **ACU Diagnostics**.

2 Click the **I/O Setup** tab.

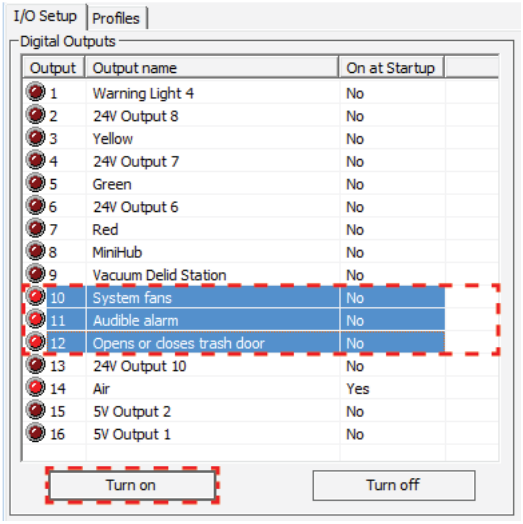


3 In the **Digital Outputs** area, do one of the following:

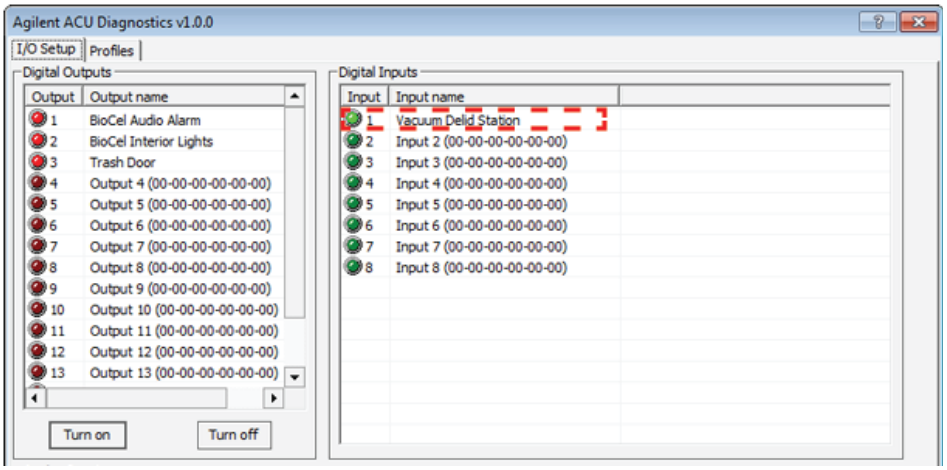
- Select the single output channel you want to check, and then click the status light next to it to turn it on or off.



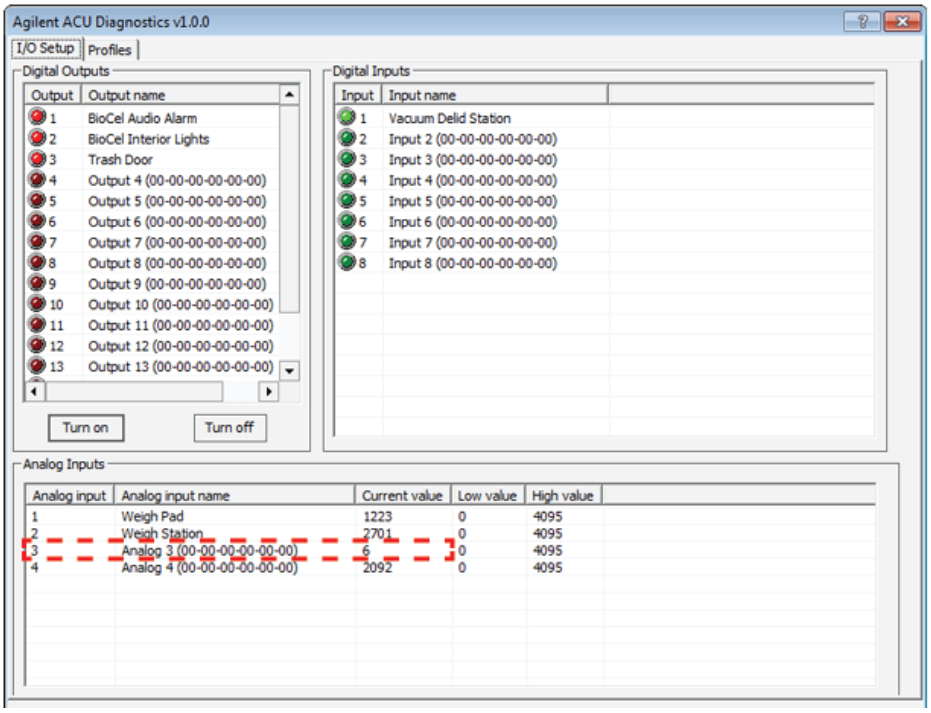
- SHIFT+click to select multiple contiguous or CTRL+click to select multiple non-contiguous output channels, and then click **Turn on** or **Turn off**. The lights adjacent to the selected channels turn on or off accordingly.



4 In the **Digital Inputs** area, check the indicator light next to the channel name to verify that the sensor is functioning correctly. For example, you can open or close the door under the Vacuum Delid Station, and then check the indicator light to see if it is turned on (door open) or off (door closed).



5 In the **Analog Inputs** area, check the **Current value** of the analog device. For example, to check an analog input channel used for a liquid-detection sensor, you can add and remove liquid at the sensor and check the changing voltage value in the **Current value** column. Adding liquid changes the value to 0. A high value displays when you remove the liquid from the sensor.



Related information

For information about...	See...
Naming signal channels	“Configuring the signal channels” on page 141
Configuring the signals	Automation software user documentation
Reporting problems	“Reporting problems” on page 177

Troubleshooting hardware problems

About this topic

This topic lists the following commonly encountered hardware problems, the causes of the problems, and ways to resolve the problems:

- Power problems
- Communication problems
- Safety equipment indicators

If you are still experiencing problems with the Automation Control Unit after trying the solutions, contact Automation Solutions Technical Support.

For system or workstation troubleshooting information, see the system or workstation user documentation.

Power problems

Problem	Cause	Solution
The Automation Control Unit does not turn on.	The electrical requirements are not met.	Make sure the electrical requirements are met. See "Electrical requirements" on page 44.
	The Automation Control Unit is not connected to the power source.	Check the power connection and make sure the Automation Control Unit is connected to the power source. See Connecting the AC power and the UPS.
	One or more of the fuses are blown.	Replace the ACU POWER 5/24 VDC fuses. See "Replacing fuses" on page 174. If the fuses are blown immediately after replacement, stop using the Automation Control Unit and contact Automation Solutions Technical Support.

Problem	Cause	Solution
The integrated devices do not turn on.	The Automation Control Unit is not connected to the power source.	Connect the Automation Control Unit to the power source.
	The integrated devices are not connected to the Automation Control Unit.	Check the power connections and make sure the devices are connected correctly to the Automation Control Unit. For connection instructions, see "Connecting the integrated devices to the Automation Control Unit AC power output ports" on page 101 and "Connecting signal-generating and miscellaneous devices" on page 113.
	If the devices connected to the NON-SWITCHED AC (blue) circuit do not turn on, the NON-SWITCHED AC fuses are blown.	Replace the NON-SWITCHED AC fuses. See "Replacing fuses" on page 174.
	If the devices connected to the SWITCHED AC (red) circuit do not turn on, the SWITCHED AC fuses are blown.	Replace the SWITCHED AC fuses. See "Replacing fuses" on page 174.
One of the integrated devices does not turn on.	The device is not connected to the Automation Control Unit.	Check the power connection and make sure the device is connected correctly to the Automation Control Unit. For connection instructions, see "Connecting the integrated devices to the Automation Control Unit AC power output ports" on page 101 and "Connecting signal-generating and miscellaneous devices" on page 113.
	The fuse in the device is blown.	Replace the fuse in the device. See the device user documentation for instructions.
	The device needs repair.	Contact the device manufacturer for service and repair.

Communication problems

Problem	Cause	Solution
The Automation Control Unit does not initialize.	The Automation Control Unit is turned off.	Turn on the Automation Control Unit.
	The Automation Control Unit is not connected to the controlling computer.	Check and secure the Ethernet connection.
	The incorrect device is selected in the Discovered BioNet Devices dialog box.	Open ACU diagnostics, open the Discovered BioNet Devices dialog box, and check the selected device. See see "Creating ACU profiles" on page 131.

Problem	Cause	Solution
The Automation Control Unit does not appear in the Discovered BioNet Devices dialog box.	Incorrect Ethernet adaptor was selected.	Select the correct Ethernet adaptor. For instructions, see "Creating ACU profiles" on page 131.
	The Automation Control Unit is not connected to the power source.	Connect the Automation Control Unit to the power source. For connection instructions, see "Connecting the AC power and the UPS" on page 98.
	The Automation Control Unit is not connected to the controlling computer.	Make sure the Automation Control Unit is connected to the controlling computer. For connection instructions, see "Connecting the integrated devices to the Automation Control Unit AC power output ports" on page 101 and "Connecting the computer" on page 111.
None of the signal channels appear in the ACU Diagnostics I/O Setup tab.	The Automation Control Unit has not been initialized.	In ACU Diagnostics, initialize the Automation Control Unit.
	The signaling devices are not connected to the Automation Control Unit.	Make sure the signaling devices are connected correctly to the Automation Control Unit. For connection instructions, see "Connecting signal-generating and miscellaneous devices" on page 113.

Safety equipment indicators

Problem	Cause	Solution
DOORS light is solid red.	One of the system doors is open.	Make sure obstacles are removed from the doorway, and then close the door.
DOORS light is blinking red.	A hardware connection error has occurred.	Make sure the system door interlock-sensor cable is connected to the sensor on the door hinge. Make sure the system door interlock-sensor cable is connected to the DOORS port on the back of the Automation Control Unit.
	Door jumpers are not installed at unused DOORS ports.	Install Door jumpers at unused DOORS ports.
	Door jumpers are not working.	Replace the Door jumpers.
LIGHT CURTAIN light is solid red.	An object is interrupting the Light Curtain.	Remove obstacles that are interrupting the Light Curtain.
	The Light Curtain jumper is not installed at the unused LIGHT CURTAIN RX port.	Install the Light Curtain jumper at the LIGHT CURTAIN RX port.
	The Light Curtain jumper is not working.	Replace the Light Curtain jumper.
LIGHT CURTAIN light is blinking red.	A hardware connection error has occurred.	Make sure the Light Curtain transmission and receiver cables are connected correctly to the Light Curtain posts. Make sure the transmission cable is connected to the LIGHT CURTAIN TX port on the back of the Automation Control Unit. Make sure the receiver cable is connected to the LIGHT CURTAIN RX port on the back of the Automation Control Unit.
E-STOP light is solid red.	The emergency-stop button has been pressed.	See “About emergency stop” on page 19 for recovery procedures.
	E-Stop jumpers are not installed at unused E-STOP PENDANTS ports.	Install E-Stop jumpers at unused E-STOP PENDANTS ports.
	E-Stop jumpers are not working.	Replace the E-Stop jumpers.
E-STOP light is blinking red.	A hardware connection error has occurred.	Make sure the emergency-stop pendant cable is connected to the E-STOP PENDANTS port on the back of the Automation Control Unit.
RESET light is blinking.	The interlock is tripped (the emergency-stop button is pressed, a system door is open, or the Light Curtain is interrupted).	See “About emergency stop” on page 19 for recovery procedures.

Problem	Cause	Solution
DC STATUS light is blinking.	The device is in the emergency-stop state.	See “About emergency stop” on page 19 for recovery procedures.

Related information

For information about...	See...
Automation Control Unit features	“Front panel” on page 28
Software error messages	“Troubleshooting error messages” on page 171
Safety	“Safety information” on page 13
Reporting problems	“Reporting problems” on page 177

Troubleshooting error messages

About this topic

This topic lists software error messages associated with the Automation Control Unit, the causes of the errors, and ways to resolve the errors. If you are still experiencing problems with the Automation Control Unit after trying the solutions, contact Automation Solutions Technical Support.

For protocol-related errors, see the automation software user documentation.

Error messages

ID	Error message	Cause	Solution
101	Failed to initialize the profile <profile name>. Attempt to send data on a non-connected socket.	The Automation Control Unit is not connected to the controlling computer.	Check the Ethernet connection between the Automation Control Unit and the controlling computer, restart the Automation Control Unit, and then reinitialize the Automation Control Unit.
		The Automation Control Unit is not turned on.	Turn on the Automation Control Unit.
		Communication was not set up correctly with the Automation Control Unit.	In the ACU Diagnostics Profiles tab, make sure you selected the correct Automation Control Unit in the Discovered BioNet Devices dialog box.
102	Failed to read input: <input name>	The lab automation software has lost communication with the Automation Control Unit.	Check the Ethernet connection between the Automation Control Unit and the controlling computer, restart the Automation Control Unit, and then reinitialize the Automation Control Unit.
103	Failed to set output: <output name>	The lab automation software has lost communication with the Automation Control Unit.	Check the Ethernet connection between the Automation Control Unit and the controlling computer, restart the Automation Control Unit, and then reinitialize the Automation Control Unit.

ID	Error message	Cause	Solution
104	Failed to read interlock states	The lab automation software has lost communication with the Automation Control Unit.	Check the Ethernet connection between the Automation Control Unit and the controlling computer, restart the Automation Control Unit, and then reinitialize the Automation Control Unit.
105	Failed to read Estop state	The lab automation software has lost communication with the Automation Control Unit.	Check the Ethernet connection between the Automation Control Unit and the controlling computer, restart the Automation Control Unit, and then reinitialize the Automation Control Unit.
106	Failed to read bypass key state	The lab automation software has lost communication with the Automation Control Unit.	Check the Ethernet connection between the Automation Control Unit and the controlling computer, restart the Automation Control Unit, and then reinitialize the Automation Control Unit.
107	Error communicating with Agilent ACU	The lab automation software has lost communication with the Automation Control Unit.	Check the Ethernet connection between the Automation Control Unit and the controlling computer, restart the Automation Control Unit, and then reinitialize the Automation Control Unit.
108	ACU is attempting to draw current beyond the threshold set at <current limit> A	The Automation Control Unit is attempting to draw current beyond the set threshold.	Check the rating of your Automation Control Unit and the accompanying power cord. Increase the current threshold in ACU Diagnostics to a value less than the maximum ratings. For the maximum current information, see “Electrical requirements” on page 44.
		The devices connected to the Automation Control Unit are drawing too much current.	Consider connecting high-current devices (such as incubators, water baths, and thermocyclers) to an external power source. Alternatively consider adding a second Automation Control Unit to increase the total power input to the system.

ID	Error message	Cause	Solution
109	There is a sudden current drop in Direct AC line possibly because of a blown fuse	One or both of the NON-SWITCHED AC fuses are blown.	Replace the blown fuses. See “Replacing fuses” on page 174.
110	There is a sudden current drop in switched AC line possibly because of a blown fuse	One or both of the SWITCHED AC fuses are blown.	Replace the blown fuses. See “Replacing fuses” on page 174.
111	There is a sudden current drop in DC line possibly because of a blown fuse	One or both of the 5/24 VDC fuses are blown.	Replace the blown fuses. See “Replacing fuses” on page 174.

Related information

For information about...	See...
Automation Control Unit features	“Front panel” on page 28
Troubleshooting hardware problems	“Troubleshooting hardware problems” on page 165
Recovering from emergency stops	“About emergency stop” on page 19
Safety	“Safety information” on page 13
Reporting problems to Agilent Technologies	“Reporting problems” on page 177

Replacing fuses

Warnings and precautions

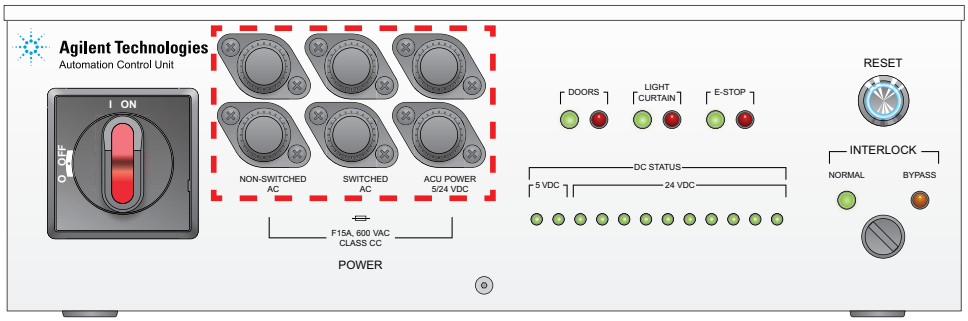
WARNING Only administrators and trained personnel should perform the maintenance procedures. Alternatively, contact Automation Solutions Technical Support for assistance.

WARNING Always turn off the Automation Control Unit before performing any maintenance procedure. See "Turning on and turning off the Automation Control Unit" on page 122.

WARNING Always disconnect the power cord from the Automation Control Unit before performing any maintenance procedure. See "Connecting the AC power and the UPS" on page 98.

Fuse location

The fuses for the NON-SWITCHED AC, SWITCHED AC, and ACU POWER 5/24 VDC are located at the front of the Automation Control Unit. Notice that each circuit has two fuses, one above the other.



All six fuses are rated as follows: 600 VAC, 15 A, class CC, time delay. Always replace both fuses on the circuit, even if only one opens.

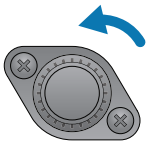
Tools and components

Make sure you have the replacement fuses. In systems, the replacement fuses are located on the air distribution panel. In workstations, the replacement fuses are located on the side of the Automation Control Unit.

Procedure

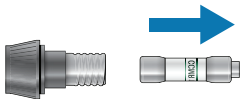
To replace the fuses:

1 Turn the fuse holder knob counterclockwise until the holder becomes detached from the Automation Control Unit.



2 Pull out and remove the fuse holder.

3 Pull out the spent fuse from the holder and insert the new fuse.



4 Insert the fuse holder back into the Automation Control Unit.

5 Turn the fuse holder knob clockwise until the holder is securely installed in the Automation Control Unit.

6 Repeat the procedure to replace the second fuse on the circuit.

CAUTION A blown fuse can indicate more serious problems. If the new fuse blows after replacement, contact Automation Solutions Technical Support.

Related information

For information about...	See...
Safety	“Safety information” on page 13
Troubleshooting the Automation Control Unit	“Troubleshooting” on page 159

Replacing the Automation Control Unit

About this topic

The Automation Control Unit can be replaced in a system or workstation if it becomes damaged or if there is component failure. This topic explains how to replace the Automation Control Unit.

Warnings and precautions

WARNING **Only administrators and trained personnel should perform the maintenance procedures. Alternatively, contact Automation Solutions Technical Support for assistance.**

WARNING **Always turn off the Automation Control Unit before performing any maintenance procedure. See "Turning on and turning off the Automation Control Unit" on page 122.**

WARNING **Always disconnect the power cord from the Automation Control Unit before performing any maintenance procedure. See "Connecting the AC power and the UPS" on page 98.**

Procedure

To replace the Automation Control Unit:

1. Disconnect all devices, including the safety equipment and UPS (if applicable), from the Automation Control Unit. Be sure to disconnect all cables.
2. If the Automation Control Unit is rack mounted, follow the instructions in "Mounting the Automation Control Unit in a standard rack" on page 96 to remove the existing Automation Control Unit from its mounting rack and mount the new Automation Control Unit.
3. Follow the instructions in "Installing the Automation Control Unit" on page 95 to connect the power, safety equipment, and devices to the Automation Control Unit.

Related information

For information about...	See...
Safety	"Safety information" on page 13
Troubleshooting the Automation Control Unit	"Troubleshooting" on page 159

Reporting problems

Contacting Automation Solutions Technical Support

If you find a problem with the Automation Control Unit, contact Automation Solutions Technical Support. For contact information, see Notices on the back of the title page.

Reporting hardware problems

When contacting Agilent Technologies, make sure you have the serial number of the device ready.

Reporting software problems

When you contact Automation Solutions Technical Support, make sure you provide the following:

- Short description of the problem
- Relevant software version number (for example, automation control software, diagnostics software, ActiveX control software, and firmware)
- Error message text (or screen capture of the error message dialog box)
- Relevant files, such as log files

Reporting user guide problems

If you find a problem with this user guide or have suggestions for improvement, send your comments in an email to documentation.automation@agilent.com.

Related information

For information about...	See...
Hardware problems	“Troubleshooting hardware problems” on page 165
Software error messages	“Troubleshooting error messages” on page 171
Recovering from emergency stops	“About emergency stop” on page 19
Safety	“Safety information” on page 13

Glossary

cassette The column of shelves or slots in a Labware MiniHub or the Plate Hub Carousel.

clamps (BenchCel) The components inside of the stacker head that close and open the stacker grippers during the loading, unloading, downstacking, and upstacking processes.

controlling computer The lab automation system computer that controls the devices in the system.

cycle See seal cycle.

deadlock An error that occurs when the number of locations available in the system is less than the number of microplates in the system. Because the microplates cannot move to the expected locations, the protocol pauses.

device An item on your lab automation system that can have an entry in the device file. A device can be a robot, an instrument, or a location on the lab automation system that can hold a piece of labware.

device file A file that contains the configuration information for a device. The device file has the .dev file name extension and is stored in the folder that you specify when saving the file.

downstack The process in which a microplate is moved out of the stack.

error handler The set of conditions that define a specific recovery response to an error.

home position The position where all robot axes are at the 0 position (the robot head is approximately at the center of the x-axis and at 0 of the z-axis, and the robot arms are perpendicular to the x-axis).

homing The process in which the robot is sent to the factory-defined home position for each axis of motion.

hot plate (PlateLoc) A heated metal plate inside the sealing chamber that descends and presses the seal onto the plate.

insert A pad placed under the plate to support the bottom of the wells for uniform sealing.

location group A list of labware that can be moved into or out of particular slots in a storage device.

plate group A list of specific labware that can be moved into or out of a storage device without regard for the slot locations.

plate instance A single labware in a labware group that is represented by the process plate icon.

plate stage The removable metal platform on which you load a plate.

plate-stage support (Centrifuge) The structure on which you load a plate stage. The plate-stage support extends when the door opens.

profile The Microsoft Windows registry entry that contains the communication settings required for communication between a device and the VWorks software.

process A sequence of tasks that are performed on a particular labware or a group of labware.

protocol A schedule of tasks to be performed by a standalone device, or devices in the lab automation system.

regrip station A location that enables the robot to change its grip orientation (landscape or portrait), or adjust its grip at the specified gripping height. Grip height adjustment might be necessary after a robot picks up a labware higher than the specified gripping height because of physical restrictions at a teachpoint.

robot grippers The components that the robot uses to hold labware.

run A process in which one or more microplates are processed. In a standalone device, the run consists of one cycle. In a lab automation system, a run can consist of multiple cycles that are automated.

safe zone The boundary within which the robot is allowed to move without colliding with external devices.

seal cycle The process in which a single plate is sealed on the PlateLoc Sealer.

seal entry slot The narrow entry on the back of the PlateLoc Sealer where the seal is inserted into the device.

seal-loading card A rectangular card that is used to facilitate the seal loading process on the PlateLoc Sealer.

seal-roll support The triangular structures at the top of the PlateLoc Sealer where a roll of seal is mounted.

sealing chamber The area inside of the PlateLoc Sealer where the seal is applied to a plate.

shelves (BenchCel) The components inside of the stacker head that provide leveling surfaces for the microplates, thus ensuring accurate robot gripping, during the downstacking process.

stacker grippers The padding at the bottom of the stacker racks that hold microplates when a microplate is loaded, downstacked, or upstacked.

subprocess A sequence of tasks performed as a subroutine within a protocol. Typically the subprocess is performed by a single device type, such as the Bravo device.

task An operation performed on one or more labware.

task parameters The parameters associated with each task in a protocol. For example, in a labeling task, the parameters include the label value.

teachpoint A set of coordinates that define where the robot can pick up or place labware and the location of a known object.

teachpoint file The XML file that contains the settings for one or more device teachpoints.

touch screen The interface on the front of the PlateLoc Sealer where sealing parameters are set, the seal cycle can be started or stopped, and the seal cycle can be monitored.

upstack The process in which a microplate is moved back into the stack.

waypoint A set of coordinates that define a location the robot passes through on its way to a teachpoint.

workspace The boundary within which the robot can move without limitations.

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User Guide

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