

# ACU2 Technical User Guide



Product Name: ACU2

ACU2 Technical User Guide

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# Revision history

Date	Revision	Version	Comments
12/8/2017	L	1	Converted original content to XML and edit for grammar and accuracy.
6/13/2018	L	2	Added fourth status indicator LED light to "Status indicator lights."
8/29/2018	L	3	Removed polarity signs from "Digital output" image and add "Digital Out/Digital Out Return" label.
4/26/2019	L	4	Updated PSL-UM-001 part number to PS-A-R-01.
12/6/2019	L	5	Fixed minor grammar error in "Power daisy chain." Updated table styles throughout document.
1/27/2021	M	0	Added "Rackmount ACU2s."
8/11/2021	M	1	Updated ACU2 length (i.e., depth) measurements with bezels.
1/31/2022	M	2	Added the input gain, output gain, and microphone power default values to "Audio input" and "Audio output."
3/9/2022	M	3	Specified the RJ-45 Ethernet port speed/duplex requirements in "RJ-45 ACENet connection."
3/21/2022	M	4	Further clarified the RJ-45 Ethernet port and cabling requirements.
3/30/2022	M	5	Removed the solid green light from "Status indicator lights."
4/26/2022	N	0	In "Memory devices," added <b>User Modifiable</b> , <b>Function</b> , and <b>Process to Clear</b> columns to the table.
4/4/2022	O	0	Initial baseline version.
4/26/2022	O	1	In "Memory devices," added <b>User Modifiable</b> , <b>Function</b> , and <b>Process to Clear</b> columns to the table.
6/14/2022	O	2	Updated specifications in "Audio input" and "Audio output."
7/8/2022	O	3	Added note that bottom mounting holes are no longer included in devices labeled ACU2-04-03 and higher.
3/1/2023	O	4	Removed the middle screws depicted in "Dimensions" and "Rackmount ACU2s."

Date	Revision	Version	Comments
3/24/2023	O	5	Removed a reference to the top-middle screw in "Rackmount ACU2s." Added a note stating that CE no longer requires the top-middle screw in "Dimensions."
2/21/2024	P	0	Combined the formerly separate ACU2 and ACU2 (v2) user guides. Changed all "ACU2(v2)" references back to "ACU2" and labeled any differences with part numbers. Added "Part and model numbers." Updated deprecated Telestra terminology (i.e., "Remote Management System," "Target," "ACE") and corresponding links. Combined "ACU2 with bezels" and "ACU2 without bezels" into one section called "Dimensions."
3/11/2024	P	1	Added "hours" label to ACU2-04-02 MTBF rates in "Reliability."
9/13/2024	Q	0	Removed bottom mounting plate diagram. Replaced "Mounting diagram" with "Mounting hole customization." In "Part and model numbers," clarified that the ACU2-04-03 model is form, fit, and function interchangeable with the ACU2-04-02 model's final production run.
10/29/2024	R	0	Added a potentiometer description, diagram, and important note to "Control input used as analog input." In "Control input," changed 5VDC to 3.3 VDC in "Control input timing diagram."
1/28/2025	R	1	Removed a redundant paragraph and diagram from "Control input."
6/9/2025	R	2	Removed outdated C7/C8 power connections from "Power requirements."

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# 1.0 Introduction

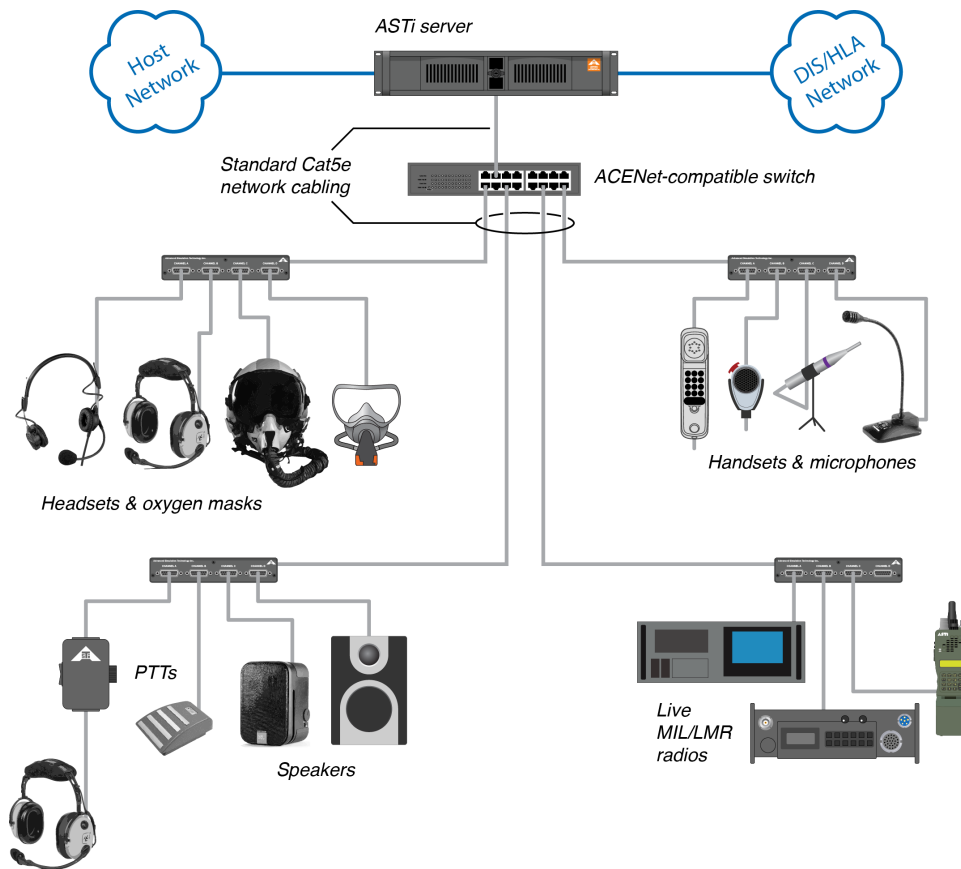
The ACU2 is a compact, 48 kHz digital and audio distribution module that connects remotely located operator stations and live radios to the ACENet network. The ACU2 provides low noise, analog-to-digital conversion, and low-latency audio distribution.

The ACU2 integrates press-to-talk (PTT) units, volume controls, simulated communication panels, handheld terminals (HHTs), and live radios into the simulated communications environment.

The ACU2 supports the following features:

- *Stereo support*: stereo operation (i.e., independent left and right output) is supported on a single DB-15 connector, which reduces cabling complexity and installation footprint for applications requiring stereo operators.
- *Compact footprint*: each device supports four configurable mono or stereo operator positions in a single compact unit, which fits easily on a desktop. Alternatively, rackmount two devices side by side in 1U 19" rack space.
- *High-fidelity audio*: 48 kHz digital audio and balanced pro-audio interfaces.
- *Software-based configuration*: software-adjustable amplifier or preamplifier gains and microphone power for easy, direct connection to military and commercial headsets and a wide variety of audio and communication systems and peripherals.
- *Serial data ports*: control interface for ASTi handheld terminals (HHTs), simulated panels, and live radio control.
- *Integrated I/O*: configurable digital and analog input/output (I/O) for direct connection of PTT units, volume control, switch detection, radio PTT activation, and other control applications.

Figure 1, "ACU2 hardware configuration" below shows an example of an ACU2 hardware configuration:



*Figure 1: ACU2 hardware configuration*

## 2.0 Part and model numbers

Table 1, "ACU2 part and model numbers" below lists the ACU2's part number, model numbers, corresponding firmware versions, and product compatibility:

Part Number	Model Number	Firmware Version
ACU2-04	ACU2-04-03	3.X
	ACU2-04-02	2.X

***Table 1: ACU2 part and model numbers***

ASTi's current production standard is the ACU2-04-03 model, which is form, fit, and function interchangeable with the ACU2-04-02's last production run, as described in Section 10.2, "Mounting hole customization" on page 28. For more information about ACU2 firmware, go to Section 9.0, "Update ACU2 firmware" on page 23.

## 3.0 Physical description

This chapter provides a physical description of the ACU2:

- Dimensions
- Weight
- Diagrams
- Front and rear panels
- Pinouts

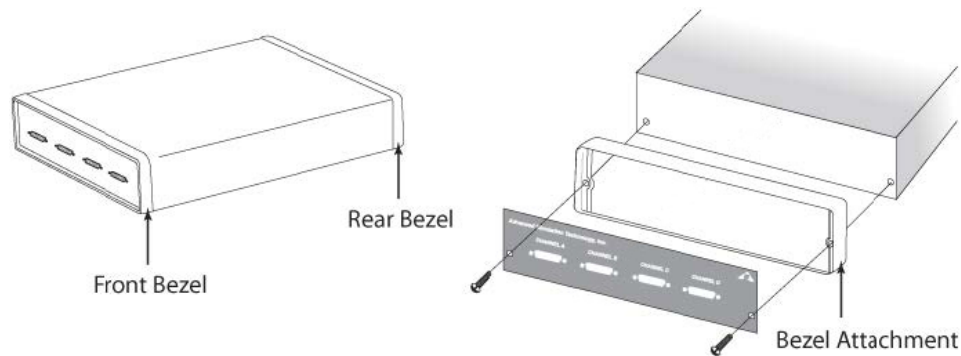
### 3.1 Dimensions

The ACU2 has two bezels, encompassing the front and rear panels. The ACU2 is Conformité Européenne (CE)/Restriction of Hazardous Substances (RoHS) certified. Removing the bezels voids the CE certification.



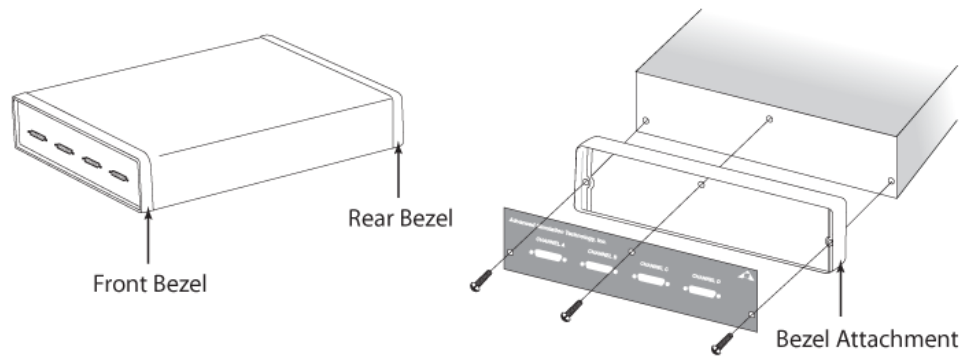
**Caution:** This equipment is not suitable for use in locations where children are likely to be present.

The ACU2-04-03 model includes a front and rear bezel with two screws:



*Figure 2: ACU2 bezel*

The ACU2-04-02 model includes a front and rear bezel with three screws:

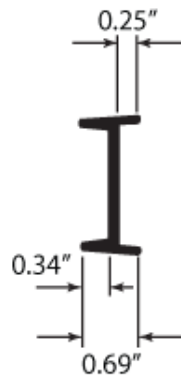


*Figure 3: ACU2-04-02 bezels*



**Note:** CE testing no longer requires a center screw supporting the stiffening rod; as a result, ASTi removed this screw from ACU2-04-03 models and later.

Figure 4, "ACU2 bezel side dimensions" below shows ACU2 bezel side dimensions:



*Figure 4: ACU2 bezel side dimensions*

Table 2, "Dimensions for ACU2s with bezels" below shows the length, width, and height of the ACU2:

Specification	Measurement
Length (i.e., depth)	7.9"
Width	7.489"
Height	1.724"

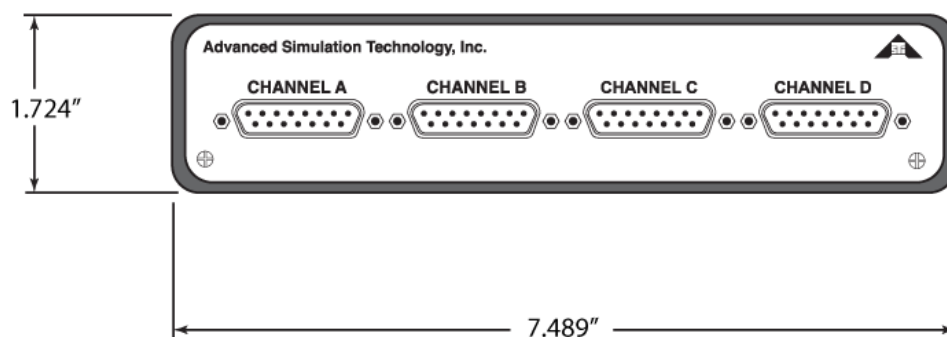
**Table 2: Dimensions for ACU2s with bezels**

Some older versions of the ACU2 do not have bezels. Table 3, "Dimensions for ACU2s without bezels" below shows the dimensions for older ACU2s:

Specification	Description
Length (i.e., depth)	7.5"
Width	7.375"
Height	1.5"

**Table 3: Dimensions for ACU2s without bezels**

Figure 5, "ACU2 dimensions" below shows ACU2 height and width dimensions:



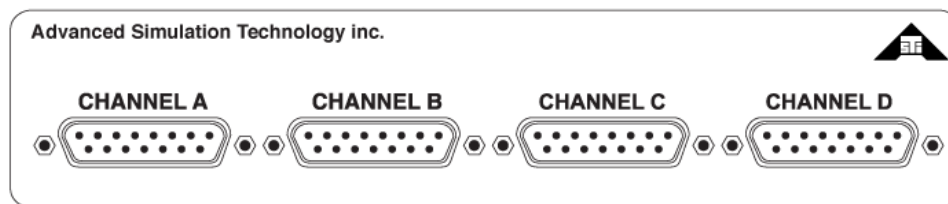
**Figure 5: ACU2 dimensions**

## 3.2 Weight

A packaged ACU2 weighs 2 lbs. The power supply included with the ACU2 weighs 0.5 lbs.

## 3.3 Front panel

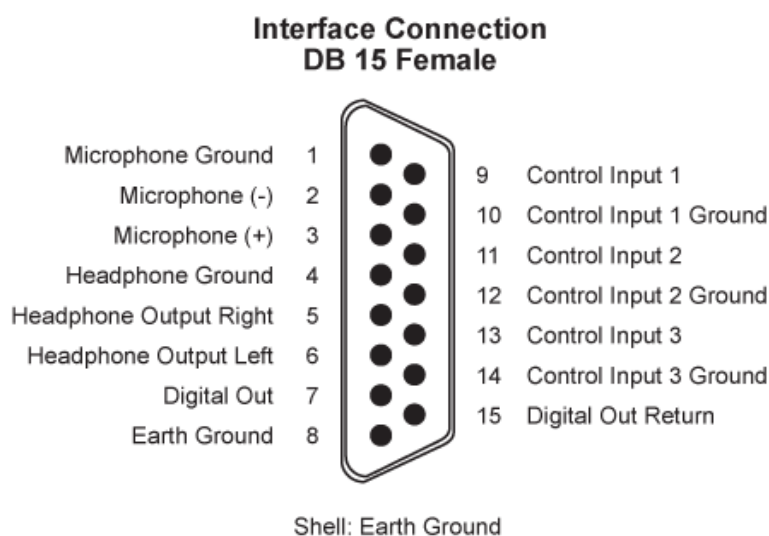
The front panel features four DB-15 connectors that are compatible with a variety of audio and press-to-talk (PTT) devices:



*Figure 6: Front panel of ACU2 without bezel*

### 3.3.1 Audio interface: DB-15 pinout

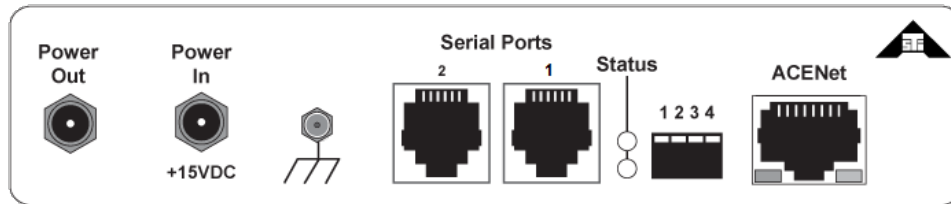
Figure 7, "Interface connection DB-15 female" below shows a DB-15 pinout for the ACU2 audio interface:



*Figure 7: Interface connection DB-15 female*

## 3.4 Rear panel

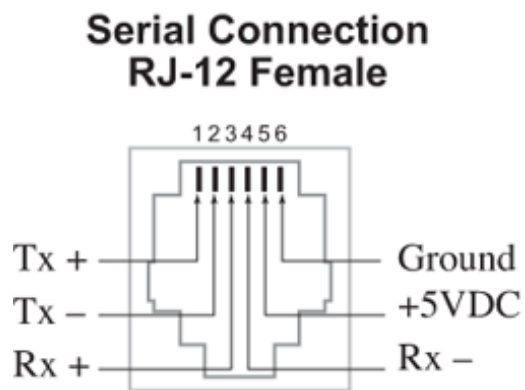
Figure 8, "Rear panel of ACU2 without bezels" below shows the ACU2 rear panel:



*Figure 8: Rear panel of ACU2 without bezels*

### 3.4.1 Serial ports

The ACU2 has two serial ports that provide a control interface for ASTi handheld terminals (HHTs), simulated panels, and live radio control. Figure 9, "RJ-12 pin out: RS-422 mode" below shows an RJ-12 female serial connection in RS-422 mode:



*Figure 9: RJ-12 pin out: RS-422 mode*



Figure 10, "RJ-12 pin out: RS-232 mode" below shows an RJ-12 female serial connection in RS-232 mode:

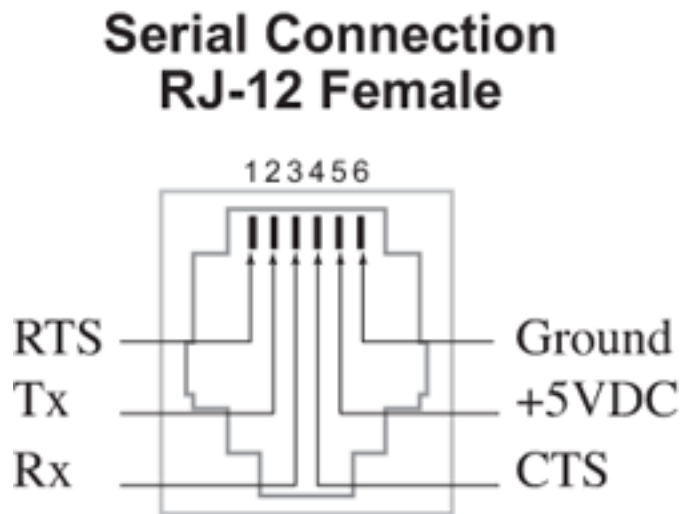


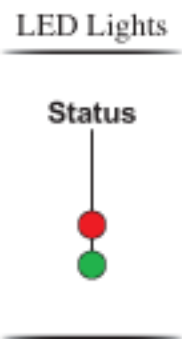
Figure 10: RJ-12 pin out: RS-232 mode

3.4.2 Status indicator lights

The ACU2 LED indicator lights display the ACU2's status:

LED Lights	Location	Status
Flashing green	Bottom	Normal operation.
Red	Top	Internal board failure.
One red flash + three green flashes	N/A	No LAN link.

Table 4: ACU2 status indicator lights



### 3.4.3 DIP switch positions

Dual in-line package (DIP) switches toggle between normal operation mode and firmware update mode. For additional guidance, go to Section 9.0, "Update ACU2 firmware" on page 23.

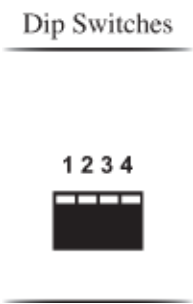


Table 5, "DIP switch positions" below shows DIP switch positions:



Position	Status
	Position 1 down allows for firmware updates.
	Default position for normal operation.

Table 5: DIP switch positions

### 3.4.4 ACENet connection

The ACU2's ACENet port connects to an ACENet-compatible switch via a Category 5e (CAT5e) cable or better.

Device	Cable Length
ACU2	100 meters (328 feet)
Server	100 meters (328 feet)

Table 6: Maximum cable length to ACENet switch

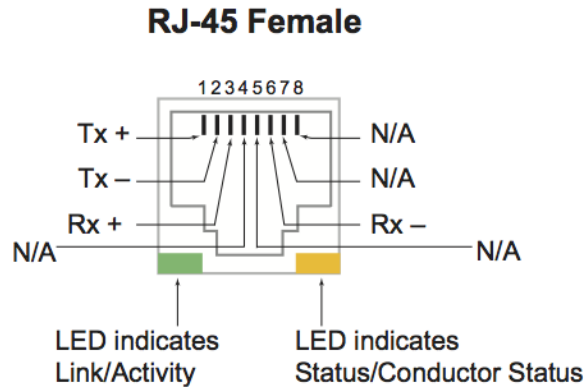


**Important:** Customer-made cables are the primary reason for product failure. ASTi recommends high-quality, manufactured CAT5e cables.

Alternatively, the ACU2 can connect directly to the Telestra server or Voisus server using a crossover cable.

### 3.4.4.1 RJ-45 ACENet connection

Figure 11, "RJ-45 ACENet connection pin out" below shows an RJ-45 ACENet connection pinout:



*Figure 11: RJ-45 ACENet connection pin out*

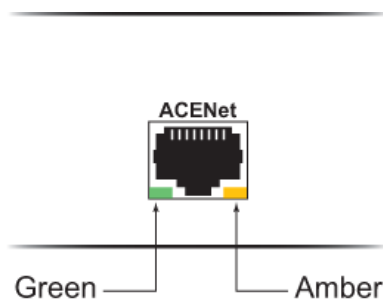
The ACU2's RJ-45 Ethernet port speed/duplex requirements are 100 megabits per second (Mbps), full duplex.

### 3.4.4.2 ACENet indicator lights

The ACENet LED indicator lights display the port status:

LED Light	Status
Solid green	Network link.
Flashing green	Network activity.
Solid or flashing amber	One ACENet device per network functions as the ACENet master and is identified with a flashing amber light. All other ACENet devices should report a solid amber light.

*Table 7: ACENet indicator lights*



## 4.0 Audio input and output

The chapter discusses ACU2 audio input and output specifications.

### 4.1 Audio input

Table 8, "Audio input characteristics" below shows ACU2 audio input characteristics and values:

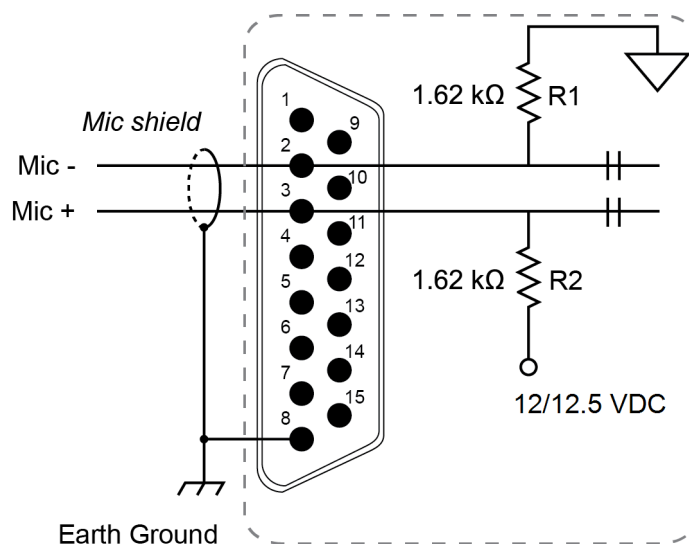
<b>Input Impedance</b>	4.6 K (ACU2-04-02) 830 $\Omega$ single-ended, 1.6K $\Omega$ differential (ACU2-04-03)
<b>Max Input Level</b>	6.5 V <sub>pp</sub>
<b>Input Gain</b>	-8 dB, +2 dB to +57 dB; default value of 40 dB; software configurable  <i><b>Note:</b> The ACU2 gain covers a total range of 65 dB. Between +2 dB and +57 dB, the gain can be set in 1 dB steps. A value of -8 dB is available for input signals greater than line level. The range -8 dB to +2 dB cannot be selected as a function of design.</i>
<b>Microphone Power</b>	+12 VDC (ACU2-04-03), off by default; software-enabled +12.5 VDC (ACU2-04-02), off by default; software-enabled
<b>Frequency Response</b>	20 Hz to 20 kHz, +/- 1.5 dB

*Table 8: Audio input characteristics*

#### 4.1.1 Microphone power

In Telestra systems, microphone power is set in the Telestra web interface. Input levels can be adjusted in the Telestra web interface to accommodate line level signals as well as microphone level signals. R1 and R2 connections are only active when power mode is enabled in the software.

Figure 12, "Microphone power" below displays the ACU2's microphone power diagram:



**Figure 12: Microphone power**



**Note:** The ACU2-04-03 model has a microphone power of 12 VDC, while the ACU2-04-02 model has a microphone power of 12.5 VDC.



**Caution:** Do not connect a microphone requiring phantom power to an ACU2 device, as this will damage the microphone. If you are unsure of the difference between microphone power and phantom power, contact the microphone manufacturer or ASTi before connecting equipment. Most military headsets use microphone power.

### 4.1.2 Input frequency response

Figure 13, "ACU2 input frequency response" below shows an ACU2's input frequency response:

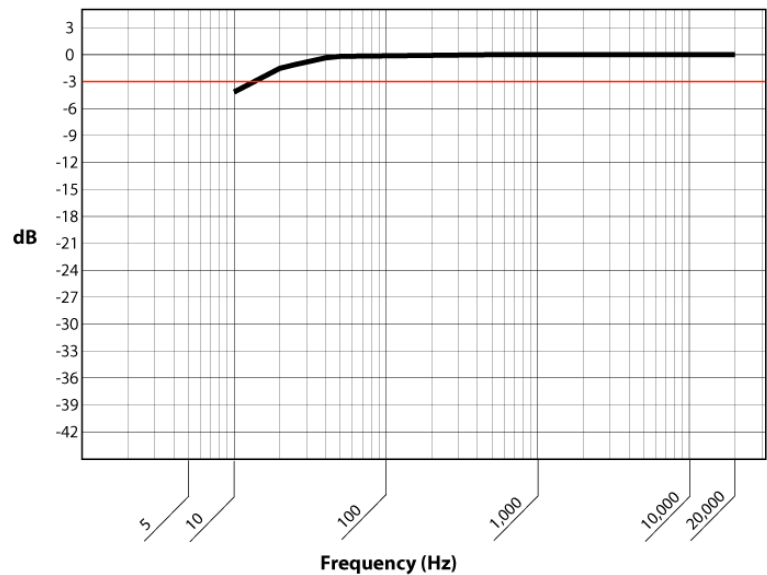


Figure 13: ACU2 input frequency response

### 4.2 Audio output

Table 9, "ACU2 audio output" below shows an ACU2's audio output:

Output Impedance	10 $\Omega$
Output Current	.015 A
Output Gain	-25 dB to +10 dB; default value of 10 dB
Output Level	2.2 V <sub>pp</sub> (1.68 VAC RMS) into 8 $\Omega$
Output Power	0.08 W at 8 $\Omega$
Frequency Response	20 Hz to 20 kHz
Max Output Signal	5 V <sub>pp</sub>

Table 9: ACU2 audio output

### 4.2.1 Audio isolation characteristics

Table 10, "Audio isolation characteristics" below shows audio isolation characteristics:

Between	Isolation	Frequency
Ch. 1 left to Ch. 1 right output channels	-81 dB at +4 dBu	20 Hz to 20 kHz
Ch. 1 to Ch. 2 output channels	-90 dB at +4 dBu (ACU2-04-03), -77 db at +4 dBu (ACU2-04-02)	
Ch. 1 output to Ch. 1 input	-110 db at +4 dBu (ACU2-04-03),	
Ch. 1 output to Ch. 2 input	> -100 dB at +4 dBu (ACU2-04-02)	
Ch. 1 input to Ch. 2 input		

Table 10: Audio isolation characteristics

### 4.2.2 Output frequency response

Figure 14, "ACU2-04-03 output frequency response" below shows the output frequency response of an ACU2-04-03 model:

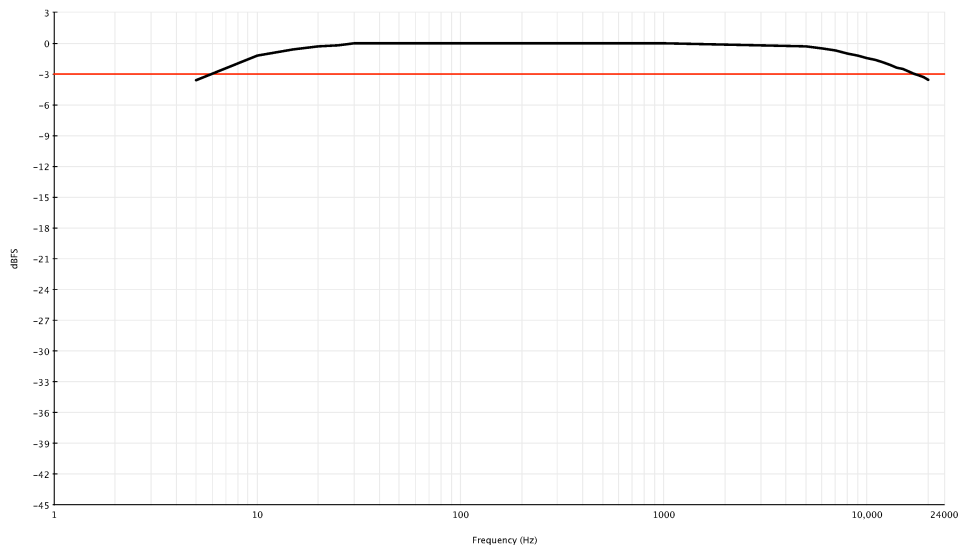
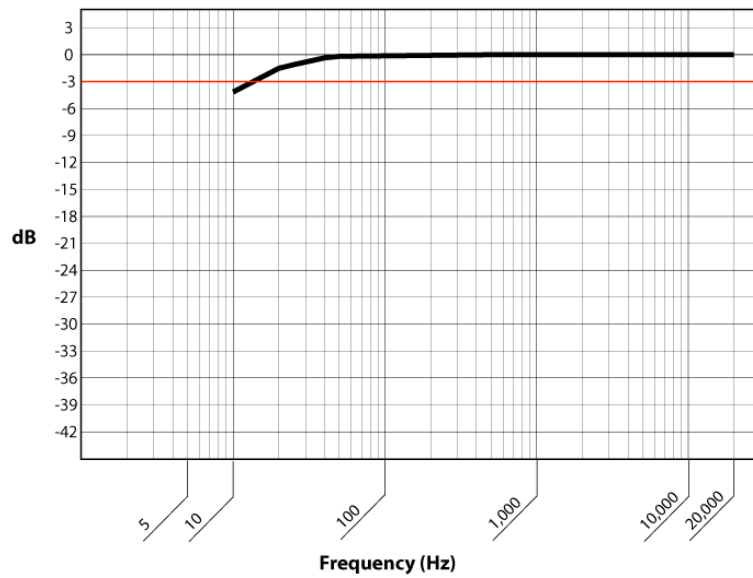


Figure 14: ACU2-04-03 output frequency response

Figure 15, "ACU2-04-02 output frequency response" below shows the output frequency response of an ACU2-04-02 model:



*Figure 15: ACU2-04-02 output frequency response*



## 5.0 Control input and output

The following sections describe ACU2 control input and output specifications.

### 5.1 Control input

The control inputs are contact sensing; no voltage is required. Connect the control input and control input ground lines together using a switch or other suitable device, such as a press-to-talk (PTT) device. The control input can function as a digital input or an analog input. In both cases, the ACU2 component in the model will be able to read the control input value and use this value as required for the application.

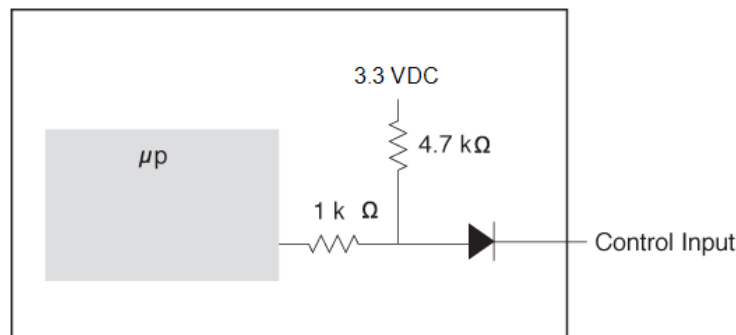


Figure 16: Control input timing diagram

#### 5.1.1 Control input used as a digital input

To use the control input as a digital input, short or open the required pins. For example, if you short pins 9 and 10, Control Input 1 is true. If the pins are open, Control Input 1 is false. In Figure 17, "Digital In" below, the control input acts like an on/off switch.

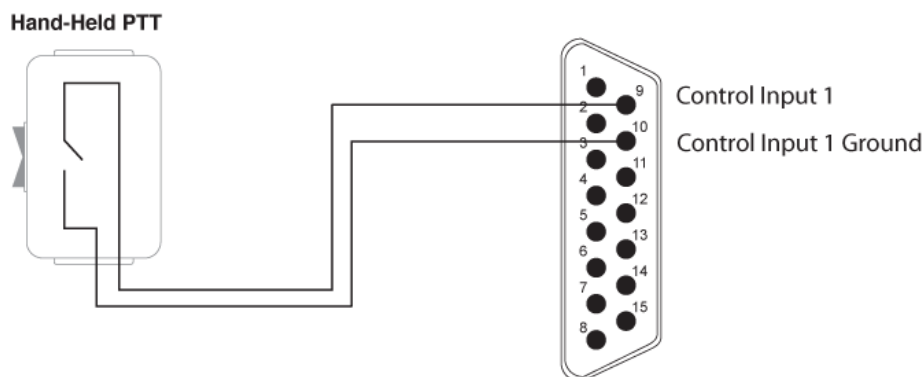


Figure 17: Digital In

## 5.1.2 Control input used as analog input

To use the control input as an analog input, insert a resistance between the control input and control input ground pins. With this configuration, the ACU2 component in the model maps the voltage to an uint8 value that you can use to model your application. The four-channel selector knob, for example, contains a switch that changes the resistance between the control input and control input ground pins. The uint8 number that the ACU2's software component reads will vary by a given percentage based on the tolerances of all of the components involved.

Four-channel selector knob

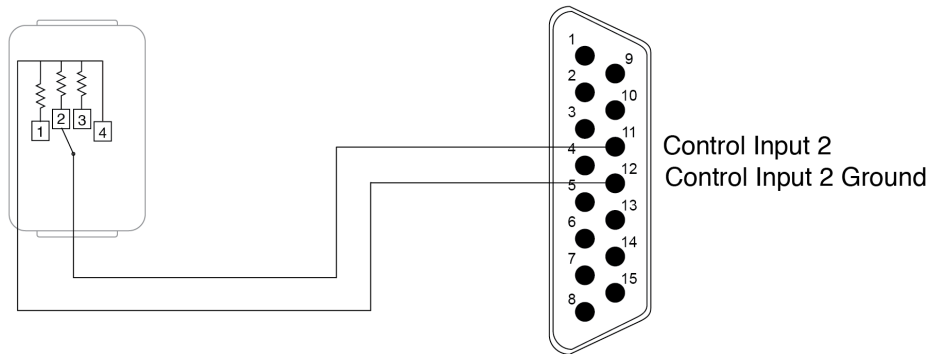


Figure 18: Analog In

You can also connect the ACU2 to a potentiometer for various control applications. Connect the wiper to the control input and the low side to the corresponding ground pin, as shown in Figure 19, "Potentiometer connection to the ACU2" below.

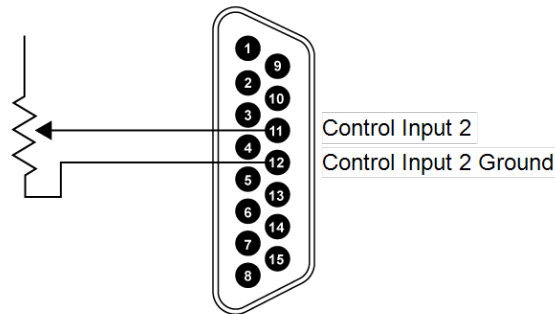


Figure 19: Potentiometer connection to the ACU2



**Important:** Do not connect the potentiometer to an external voltage source, which may cause incorrect readings. The ACU2 already includes internal BIAS voltage.

## 5.2 Digital output

The digital output circuitry consists of an opto-isolated, solid-state relay for switching power to external loads.

Type	Opto-isolated Field-Effect Transistor (FET)
Maximum continuous current rating	120 mA
Maximum power dissipation	180 mW
Maximum frequency responses	500 Hz

Table 11: Digital output Opto-isolated FET values

### 5.2.1 Digital output circuitry

Figure 20, "Digital output circuitry" below shows digital output circuitry:

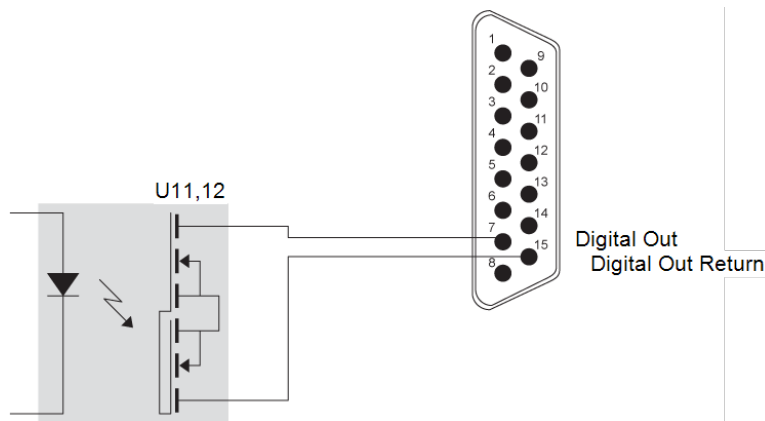


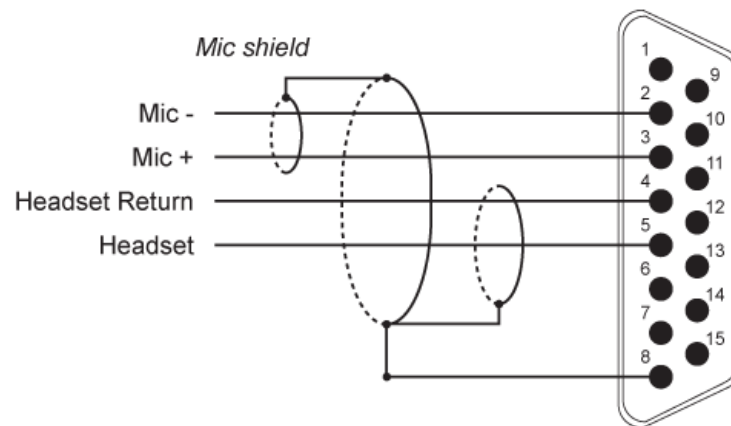
Figure 20: Digital output circuitry

## 6.0 Typical headset connections

The following sections show diagrams for mono and stereo headset connections.

### 6.1 Mono headset connection

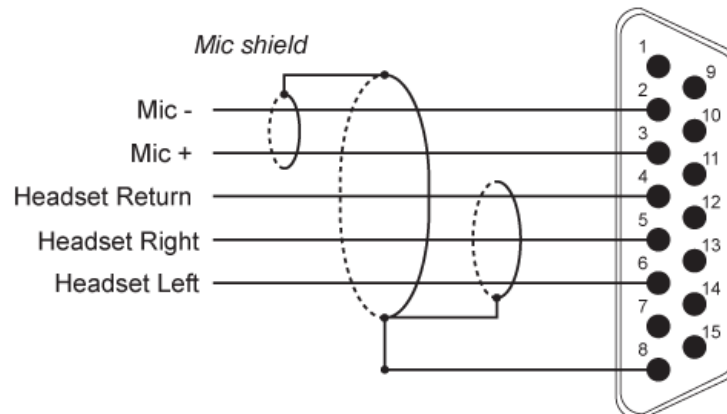
Figure 21, "Mono headset connection" below shows a mono headset connection:



*Figure 21: Mono headset connection*

### 6.2 Stereo headset connection

Figure 22, "Stereo headset connection" below shows a stereo headset connection:



*Figure 22: Stereo headset connection*

## 7.0 Software configuration

For software configuration instructions, go to the following:

Name	Description
Telestra	Go to the <i>Telestra Web Interface User Guide</i> : <a href="https://support.asti-usa.com/telestra/index.html">support.asti-usa.com/telestra/index.html</a> .
Voisus	Go to "Manage hardware devices" in the <i>Voisus Client User Guide</i> : <a href="https://support.asti-usa.com/voisus/index.html">support.asti-usa.-com/voisus/index.html</a> .

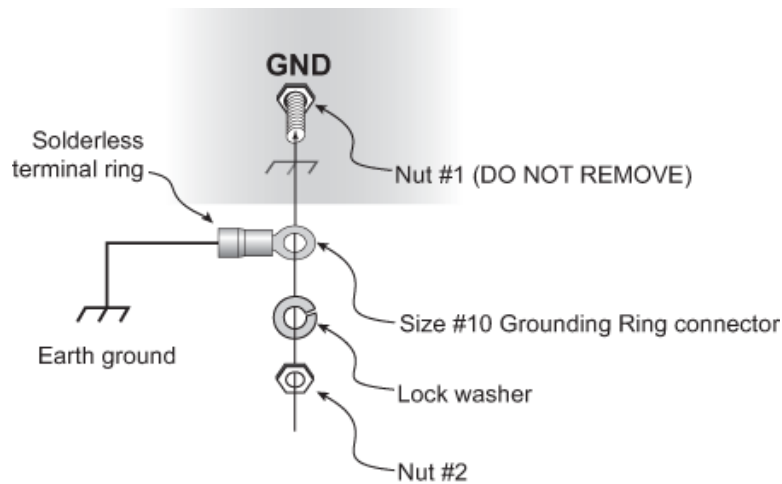
*Table 12: Software configuration*

## 8.0 Earth-ground the ACU2

ASTi does not require the ACU2 to be grounded. However, it was designed to accommodate customers with strict grounding policies and requirements. To reduce resistance, keep your grounding wire as short as possible. This practice effectively dissipates an unwanted electrical charge.

The following equipment is required:

- #10 grounding ring connector
- Ground wire (i.e., stranded, braided, or strap wire; 18 gauge American wire gauge (AWG) minimum)



**Figure 23: Grounding**



**Important:** Do not remove nut #1 from the screw as it will cause the screw to fall inside the ACU2 chassis.

To ground the ACU2, follow these steps:

1. Remove nut #2.
2. Slip the grounding ring connector onto the threaded end of the jackscrew.
3. Insert nut #2 onto the threaded end of the jack screw. Take care not to cross thread or over-tighten the nut when reattaching.

## 9.0 Update ACU2 firmware

The ACU2-04-03 model uses 3.X firmware, whereas the ACU2-04-02 model uses 2.X firmware. Devices with different firmware versions are compatible in the same installation. You cannot flash one version onto the other.

Table 13, "Software firmware updates" below provides ACU2 firmware update instructions for Telestra and Voisus software:

Update	Instructions
Telestra	To update ACU2 firmware, go to the <i>Telestra Web Interface User Guide</i> : <a href="http://support.asti-usa.com/telestra/index.html">support.asti-usa.com/telestra/index.html</a>
Voisus	<p>To update ACU2 firmware for Voisus, follow these steps:</p> <ol style="list-style-type: none"><li>1. In the Voisus web interface, from the top-right navigation bar, go to <b>Manage &gt; Hardware Devices</b>.</li><li>2. Go to the ACU2 tab. A message displays if any connected ACU2s need a firmware update.</li><li>3. To complete the procedure, follow the instructions on the screen.</li></ol>

*Table 13: Software firmware updates*

## 10.0 Rackmount ACU2s

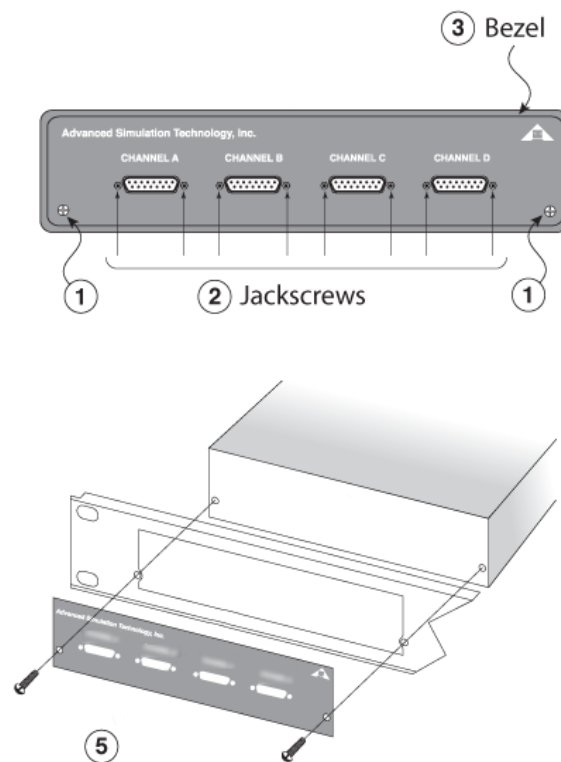
The available rackmounting bracket accommodates two ACU2s side by side and measures 1U high and 19" wide. To rackmount the ACU2, follow these steps:

1. Remove the two bottom corner screws and the top middle screw on the front of the ACU2.
2. Use a nut driver (3/16") to remove the two jackscrews from each side of the four connectors.
3. Remove the faceplate with the white lettering and the bezel. Save the bezel for when you remove the ACU2 from the rackmount.
4. Place the ACU2 into the backside of the rackmount. The rackmount fits in place of the bezel.
5. Place the faceplate on the front side of the rackmount, and do one of the following:
  - *ACU2-04-03*: install the two black screws.
  - *ACU2-04-02*: install the three black screws, starting with the top middle screw for proper alignment.



6. Install the jackscrews on each side of the four connectors.

The following figure shows rackmount installation for the ACU2-04-03 model:



**Figure 24: ACU2-04-03 rackmount installation**

The following figure shows rackmount installation for the ACU2-04-02 model:

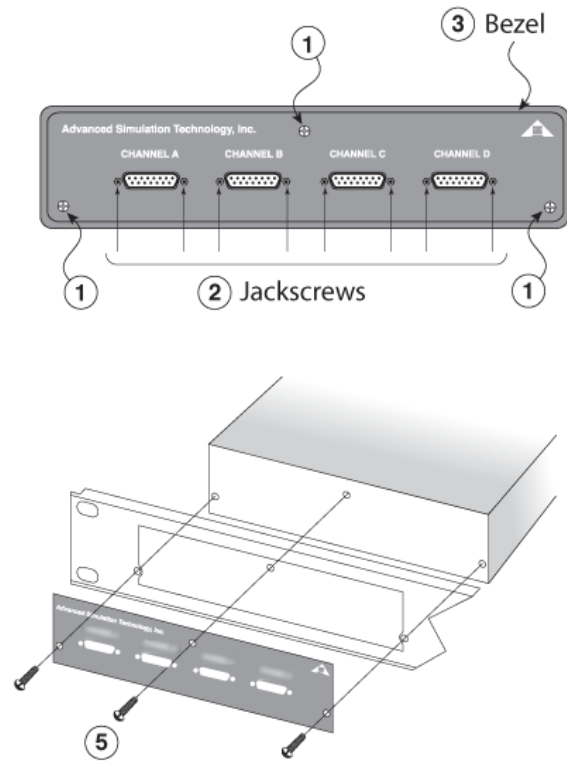


Figure 25: ACU2-04-02 rackmount installation



***Note:** The included rackmount kits are compatible with a variety of ASTi distribution devices. As a result, you can mount different device types next to each other in the same rack. Go to the original manufacturer's documentation for more information about rackmount installation.*

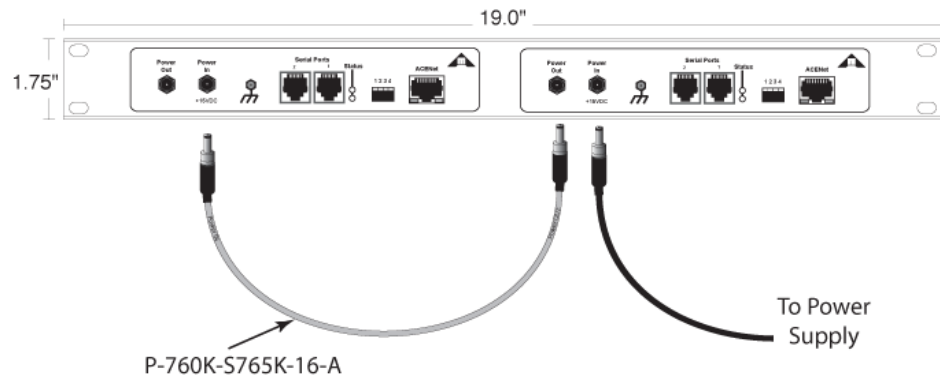
# 10.1 Power daisy chain

Power daisy chaining enables operation of two rack-mounted ACU2 units from a single-power supply. Daisy chaining ACU2 power requires an upgraded power supply (model number TR7 A15 from CINCON Electronic Co. LTD). Contact ASTi for details. The daisy chain cable (P-760K-S765K-16-A) is included with the upgraded power supply.

Name	Model/Part No.
Power In Connector (Black)	Switchcraft 760K
Power Out Connector (Black)	Switchcraft S765K

Table 14: Power daisy chain connections

Figure 26, "Power daisy chain connectors" below shows power daisy chain connectors:



*Figure 26: Power daisy chain connectors*

## 10.2 Mounting hole customization

ASTi modified the ACU2-04-02's design during its final production run, eliminating mounting holes on the bottom of the device. As a result, certain ACU2-04-02 and all ACU2-04-03 devices do not include mounting holes. This change occurred because multiple customers drilled screws into the board without consulting the documentation on correct screw lengths, permanently damaging their devices.

ASTi can still quote mounting holes as an optional feature upon request, though this custom modification will extend delivery time. If your configuration requires mounting holes, contact [support.asti-usa.com](mailto:support.asti-usa.com) to discuss options.

## 11.0 Specifications

This chapter describes the following ACU2 specifications:

- Power requirements
- Memory devices
- Temperature and humidity ranges
- Reliability

### 11.1 Power requirements

The ACU2 is shipped with a standard power supply, which provides power to one ACU2. The power supply should only be connected to a grounded outlet. To rackmount the ACU2, you may need to purchase an upgraded power daisy chain. For more information about the power daisy chain, go to Section 10.1, "Power daisy chain" on page 26.

The power adapter inlet connector is an IEC 320 type C14, requiring a matching cord set equipped with an IEC 320 C13 connector. Country-specific power connectors must be acquired separately for international use.

<b>Input to PS-A-R-01</b>	100–240 VAC, 50–60 Hz, 1.5 A <sub>RMS</sub> , (120 VAC), 0.75 A <sub>RMS</sub> (240 VAC)	
<b>Power In Connector</b>	Inside Diameter 0.100", Outside Diameter 0.218", locking, center positive	
	Connector P/N:	Switchcraft 712RA supplied with P2439 Hex Nut (5/16–32) and P2441 Washer
	Mating Connector P/N:	Switchcraft 760k
<b>Power Out Connector</b>	Inside Diameter 0.080", Outside Diameter 0.218", locking, center positive	
	Connector P/N:	Switchcraft 722RA supplied with P2439 Hex Nut (5/16–32) and P2441 Washer
	Mating Connector P/N:	Switchcraft S765k
<b>Power Consumption</b>	+15 VDC, 2A (add-on AC/DC converter supplied with each unit)	

## 11.2 Memory devices

Table 15, "ACU2-04-03 memory devices" below summarizes the ACU2-04-03 model's memory device specifications:

Type	Size	User Modifiable	Function	Process to Clear
<b>Volatile memory</b>				
MCU Internal	512 kB	<b>No</b>	Used as RAM for an internal MCU	Remove power Count to 30 Restore power
<b>Nonvolatile memory</b>				
MCU Internal	2 MB	<b>Yes</b>	Firmware	None
EEPROM	32 KB	<b>Yes</b>	Device-specific settings	None

*Table 15: ACU2-04-03 memory devices*

Table 16, "ACU2-04-02 memory devices" below summarizes the ACU2-04-02 model's memory device specifications:

Type	Size	User Modifiable	Function	Process to Clear
<b>Volatile memory</b>				
MCU Internal SRAM	69 kB	<b>No</b>	Used as RAM for an internal MCU	Remove power Count to 30 Restore power
<b>Nonvolatile memory</b>				
MCU Internal	256 kB	<b>Yes</b>	Firmware	None
Flash	8 MB	<b>Yes</b>	Firmware	None

*Table 16: ACU2-04-02 memory devices*

The ACU2 does not contain media storage capability (e.g., removable or non-removable hard drives, tape drives, memory cards).

## 11.3 Temperature and humidity ranges

Table 17, "Temperature and humidity ranges" below shows ACU2 temperature and humidity ranges:

Type	Suggested Range
Operating Temperature Range	+10°C to 32°C (50°F to 90°F)
Operating Max. Temperature Gradient	20°C (68°F) per hour
Operating Humidity Range	10% to 70% non-condensing
Storage Temperature Range	0°C to 55°C (32°F to 135°F)
Storage Max. Temperature Gradient	30°C (86°F) per hour
Storage Humidity Range	5% to 95%

*Table 17: Temperature and humidity ranges*

## 11.4 Reliability

The following table shows an ACU2's typical Mean Time Between Failure (MTBF) rate for commercial off-the-shelf (COTS) and military (MIL) systems:

Category	MTBF Rate
<b>ACU2-04-03</b>	
COTS	1,405,667 hours
MIL	309,154 hours
<b>ACU2-04-02</b>	
COTS	108,100.75 hours
MIL	48,390.23 hours

*Table 18: ACU2 MTBF rates*

## Appendix A: Warranty information

To view ASTi's warranty, go to “Standard Terms and Conditions” at [www.asti-usa.com/legal/terms.html](http://www.asti-usa.com/legal/terms.html).



**Important:** *This device does not contain any user-serviceable components. Opening the ASTi Server chassis voids the warranty. ASTi does not support board-level repair; therefore fuses in the device are not user replaceable.*

### A-1 Repairs and returns

To return equipment to ASTi, observe the following procedures:

1. Request a Return Material Authorization (RMA) number through the form on the RMA User Account at [rma.asti-usa.com/rma](http://rma.asti-usa.com/rma). ASTi's Production department cannot receive a repair without an RMA number. The shipping label must also include the RMA number. Any items received from customers without RMA numbers or appropriate contact information will not be tested. After 60 days, ASTi reserves the right to scrap all hardware received in this condition.
2. When packaging the equipment in question, make sure it is well-protected. Failure to properly package the equipment during shipping could void the warranty.
  - Always double-box the device.
  - The inner container should employ some semi-rigid, contour-fitting foam, while the exterior container should use a more pliant, shock-absorbing material, such as styro-foam peanuts.
  - To prevent possible Electrostatic Discharge (ESD) damage, properly enclose the device in an antistatic bag.
3. Do not send accessory pieces, such as rack mount kits, power supplies, or software. Only include items that do not work.
4. Describe the problem, noting the following information:
  - Serial number for the unit in question
  - Point of contact information (i.e., name, telephone number, and equipment return address)

Failure to include this information could extensively delay the return of equipment.

5. If you are an international customer, include the correct product value on all shipping documents. For proper harmonized tariff codes, contact ASTi. The customer is responsible for duties, taxes, and fees incurred during shipment.



ASTi evaluates equipment free of charge and will not start work without prior customer approval.

You are responsible for shipping charges to ASTi for warranty and non-warranty repairs. If equipment is not under warranty, a purchase order is required to cover any repairs. ASTi will provide a quote for all nonwarranty items, including return shipping. The customer is responsible for return shipping charges on nonwarranty equipment. ASTi ships equipment still under warranty back to the customer via FedEx, unless otherwise directed. ASTi is responsible for return shipping charges on domestic items under warranty.

If ASTi does not receive the equipment 30 days after the RMA was issued, ASTi closes the RMA and designates it as unused.