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013-02-0095-005/-006

E3 System Controllers

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E3 System Controllers

Confidentiality Notice

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General Information

The Model 013-02-0095-005 and 013-02-0095-006 E3 System Controllers are central components in *Elemec3* PAGA (public address and general alarm) systems. They are for use where failsafe operation is imperative but are also suitable for a wide variety of other communication and control applications.

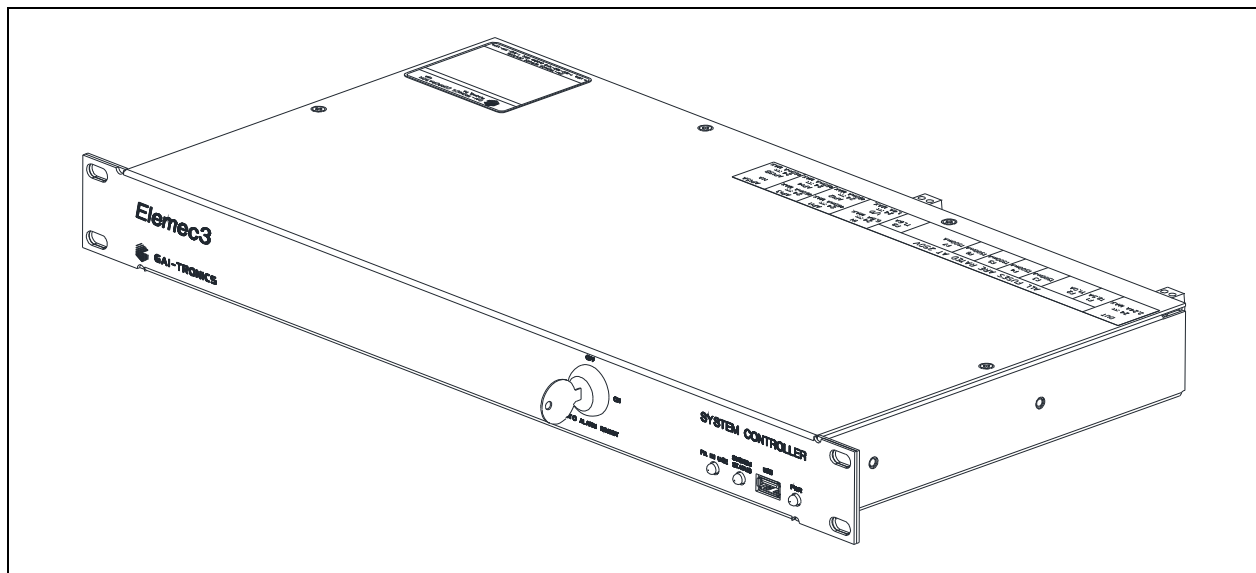


Figure 1. *Elemec3* System Controller

E3 system controllers are data acquisition, audio signal processing, and control devices. An E3 system controller continuously monitors the integrity of its *Elemec3* system and immediately reports changes in activity or system health. The controller sends and receives data and test signals to and from connected equipment to provide a reliable, high integrity system. The system monitors access panels, *Elemec* power amplifiers, audio paths, alarm inputs, beacon outputs, and other system components.

The Model 013-02-0095-005 System Controller includes an analog telephone interface PCBA and a SIP telephone interface, making it capable of receiving incoming calls from either analog or IP telephone

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systems. The Model 013-02-0095-006 includes only the SIP telephone interface for connection to an IP telephone system.

The E3 system controller's Ethernet interface provides a SIP telephone interface, enabling reception of VoIP telephone calls by the E3 controller. This provides programmable access to the PA system (usually at the lowest priority level). Allocate a dedicated IP-PBX extension for this service.

Configure an *Elemec3* system controller in the following ways to provide the required level of system redundancy: 1) Single system (standalone), 2) Hot standby system (N+1), and 3) Duplicate system (A/B) (see the System Types section).

Use the *Elemec3* Console application to configure the E3 system, via a TCP/IP network connection.

Use the *Elemec3* Portal software application to monitor system status, including current audio activity, faults, inputs, outputs, and amplifier states via a TCP/IP network connection. The system controller contains an internal clock to enable a time stamp on event logs when the status of the system changes, such as an alarm event.

To eliminate the possibility of acoustic feedback, configure the system to replay digitally recorded audio from access panels, PABX systems, Page/Party systems, and VoIP telephones.

Individually program up to 256 inputs and 256 outputs. Connect up to 16 wired access panels for speech broadcasts and manual alarm/emergency message activation. Additional audio inputs/outputs are available to accommodate connections to/from ancillary equipment.

The system has two audio paths to enable two simultaneous broadcasts.

Install the controllers in a standard 19-inch rack for ease of installation and maintenance. All connections to the controller are a plug/socket type.

System Types

Configure the *Elemec3* system controller in one of three ways: 1) Single System (Standalone), 2) Hot Standby System (N+1), or 3) Duplicate System (A/B). Refer to the system manual included with the *Elemec3* system for detailed information on that system's configuration.

Single System (Standalone)

In a single type system, a single *Elemec3* system controller controls the system's amplifiers, access panels, and I/O devices.

Hot Standby (N+1) System

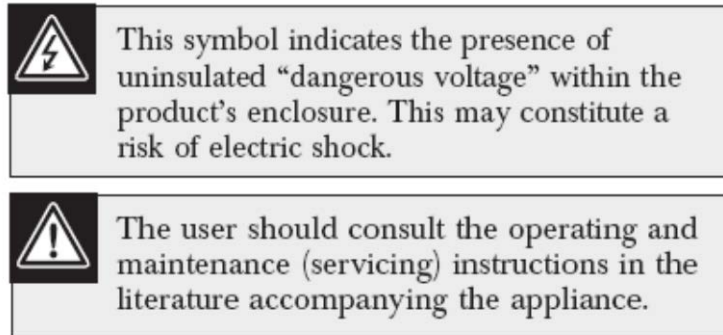
In a redundant N+1 system, two controllers, designated as primary and secondary, control a single set of amplifiers. Duplicate access panels and I/O devices have connections to both controllers.

Automatic switchover (*hot standby*) amplifier control automatically connects spare amplifiers to the loudspeaker network of failed amplifiers.

Duplicate (A/B) System

In a *duplicated* or redundant system, two *Elemec3* system controllers, designated as **A** and **B**, control two sets of amplifiers (also designated as A and B) with two speaker lines run in different routes. Duplicate access panels and I/O devices have connections to both the A and B controllers. Locate duplicate systems together or at two separate locations, each housing either the A or B system.

Important Safety Instructions



- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this equipment near water.
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
- Only use attachments/accessories specified by the manufacturer.
- Refer all servicing to qualified service personnel. Servicing is required when the equipment has been damaged in any way. This includes, but is not limited to; power-supply cord or plug damage, exposure to rain, moisture, or liquid intrusion into the equipment, the equipment has been dropped or has sustained a severe shock, or fails to operate normally for any reason.

Front Panel Indicators & Control

The E3 system controller front panel has an *auto alarm inhibit* key switch, three LED indicators, and a USB port (*the USB port is not functional in this product*). When the *auto alarm inhibit* key switch is in the ON position, it prevents activation of alarm events from configured I/O module inputs. The LEDs indicate if the system is in use, if power is present, and if the system is operating normally or has a fault condition.

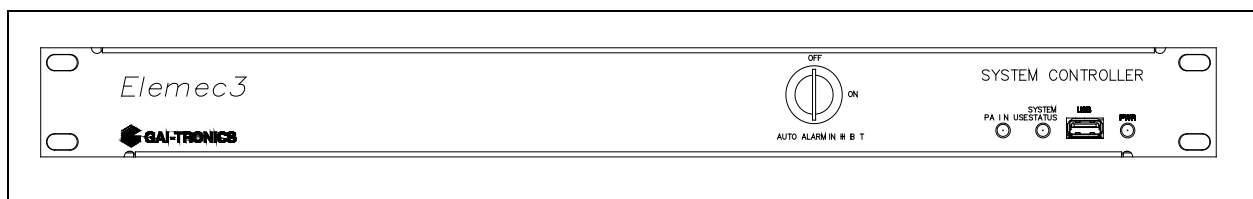


Figure 2. *Elemec3* System Controller—Front View

Rear Panel Connections

Make all system connections at the rear of the E3 system controller (see Figure 3).

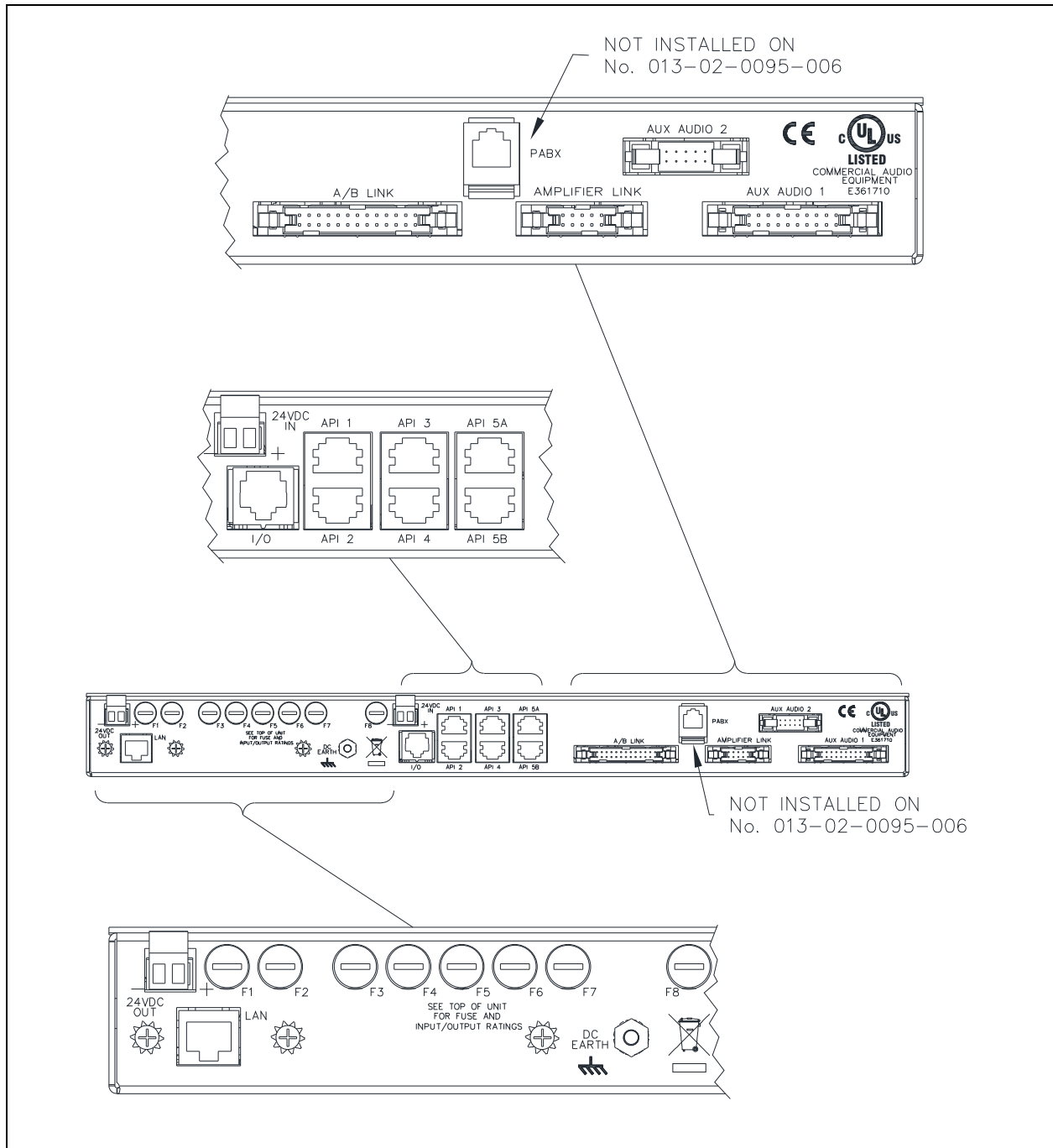


Figure 3. E3 System Controller—Rear View

Internal Connections

All internal connections are plug and socket connections. The following figures show the internal components of the two controller models.

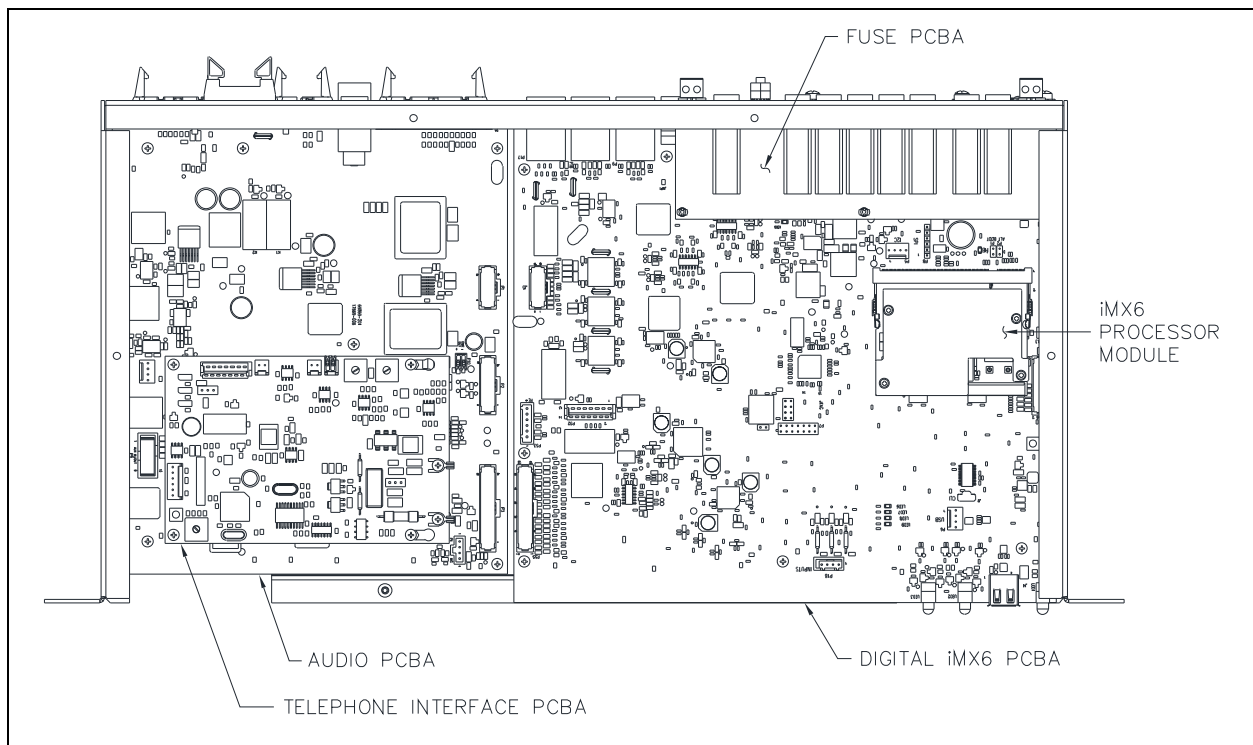


Figure 4. Model 013-02-0095-005 System Controller—Internal Components—Top View

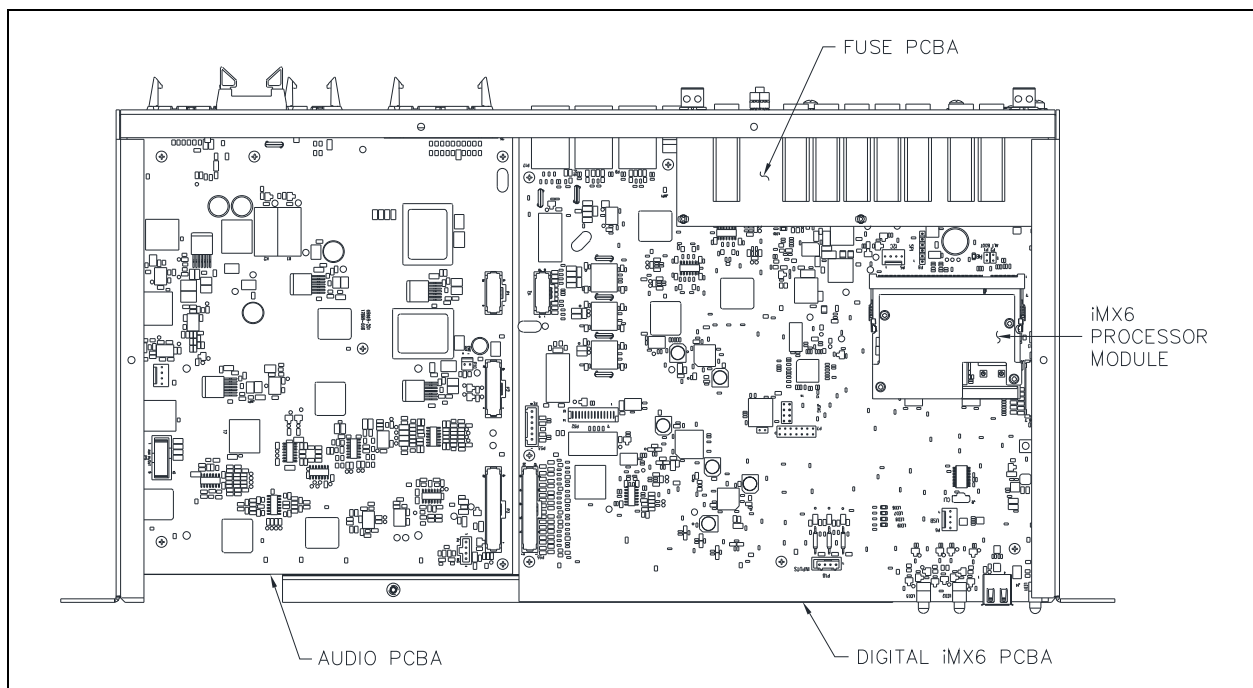


Figure 5. Model 013-02-0095-006 System Controller—Internal Components—Top View

Table 1. *Elemec3* System Controller—Internal Components

Component	Description
Digital PCBA	Central processing unit, digital communications, speech recording, and play-back to eliminate feedback
Analog PCBA	Audio amplification and routing
Telephone Interface PCBA (-005 version only)	Interface from the <i>Elemec3</i> system controller to the telephone system
<i>Elemec3</i> Fuse PCBA	Protection for the system controller, access panel interfaces, and I/O modules

Installation

Safety Guidelines

Please adhere to all warnings, safety, and operating instructions on the unit and in the installation manual.



- Disconnect power before servicing—Do not disconnect the equipment while the circuit is energized.
- Avoid servicing the unit during electrical storms.
- Do not touch uninsulated wires.

Installation Guidelines

- Notify plant personnel of a system shutdown prior to servicing the unit.
- Disconnect power before installing or removing the system controller.

Mounting

Mount the *Elemec3* system controller in the 19-inch rack using the supplied hardware. Each controller is 1.75 inches tall/1 U of rack height.

Field Connections

Input Power

The controller requires a 24 V dc power source capable of delivering 6.4 amps minimum.

1. Remove the two-position plug from the 24VDC IN header (see [Figure 3](#)).
2. Screw the dc power cable to the plug.
Observe the polarity marking on the rear of the unit.
3. Install the plug into the 24VDC IN header.

Power applied to the 24VDC IN connector also powers the access panel interfaces, access panels, and the I/O modules.

Fuses

The *E3* system controller includes a fuse for each device that receives power from the controller (see [Table 2](#)). Use only IEC time-delayed fuses with the appropriate ratings.

Table 2. Fuse Information and Ratings

Fuse	Description	Output	Rating
F1	Auxiliary Power Output	24 V DC OUT	T2.5A 250V
F2	System Controller	N/A	T1A 250V
F3	Access Panel Interface—Group 1	API 1	T500mA 250V
F4	Access Panel Interface—Group 2	API 2	T500mA 250V
F5	Access Panel Interface—Group 3	API 3	T500mA 250V
F6	Access Panel Interface—Group 4	API 4	T500mA 250V
F7	Access Panel Interface—Group 5A & 5B	API 5A/B	T500mA 250V
F8	Input / Output Modules	I/O	T1.6A 250V

NOTE: Each access panel interface has T100mA 250V fuses to limit the current to each access panel.

Earth

Install an appropriately sized green-yellow sheathed conductor between the DC EARTH terminal on the rear of the unit and the telecoms earth bar inside the cabinet (see [Figure 3](#)).

Power Out

Supply power to additional devices via the 24VDC OUT connector (see [Figure 3](#)).

1. Remove the two-position plug from the 24VDC OUT header.
2. Screw the dc power cable to the plug.
observe polarity (marked on the rear of the unit).
3. Install the plug back into the 24VDC OUT header (See F1 in [Table 2](#)).

Amplifiers

Elemec3 system controllers connect to *Elemec3* power amplifiers via a 10-conductor IDC ribbon cable, installed between the AMPLIFIER LINK connector on the controller and the AMP CONTROL connector on the power amplifier(s). The *Elemec3* system controller is compatible with the following *Elemec3* power amplifiers:

- D300i
- D550i
- D600i

Refer to the amplifier manual included with the *Elemec3* system for installation, operation, and maintenance information of the installed amplifiers (see [Figure 6](#) for a typical system controller to power amplifier connection).



WARNING

The generic amplifier interface does not contain monitoring and/or fault status reporting of the generic power amplifiers. **DO NOT USE** power amplifiers connected to a generic amplifier interface for critical communications requiring amplifier supervision.

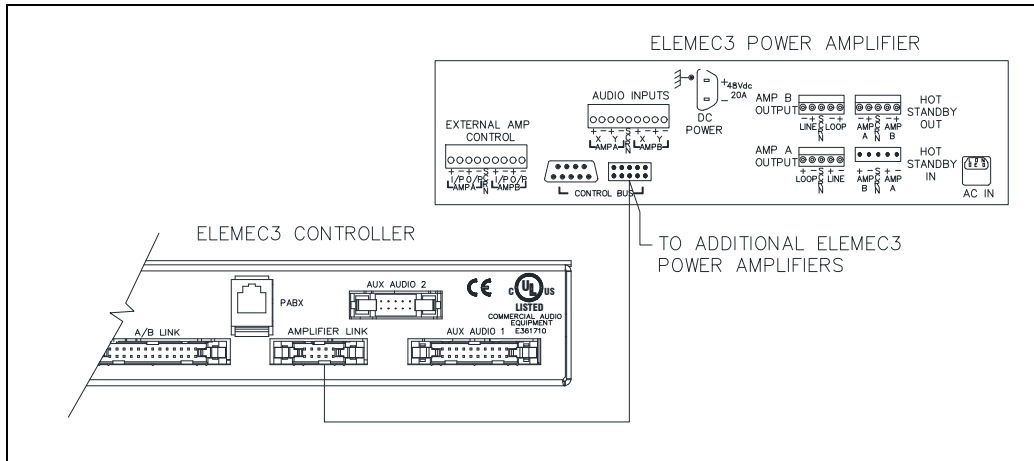


Figure 6. Elemec3 Power Amplifier Connection

Generic Amplifier Interface (GAI)

Connect one to 16 generic amplifier interfaces to an *E3* system controller. The GAI allows connection of alternate amplifiers not specified above for use in the *Elemec3* system. Install a 10-conductor IDC ribbon cable between the amplifier link header of the controller and the CI header on the generic amplifier interface(s) (see Figure 7). Refer to the generic amplifier interface manual included with the *Elemec3* system for installation, operation, and maintenance information of installed generic amplifier interfaces.

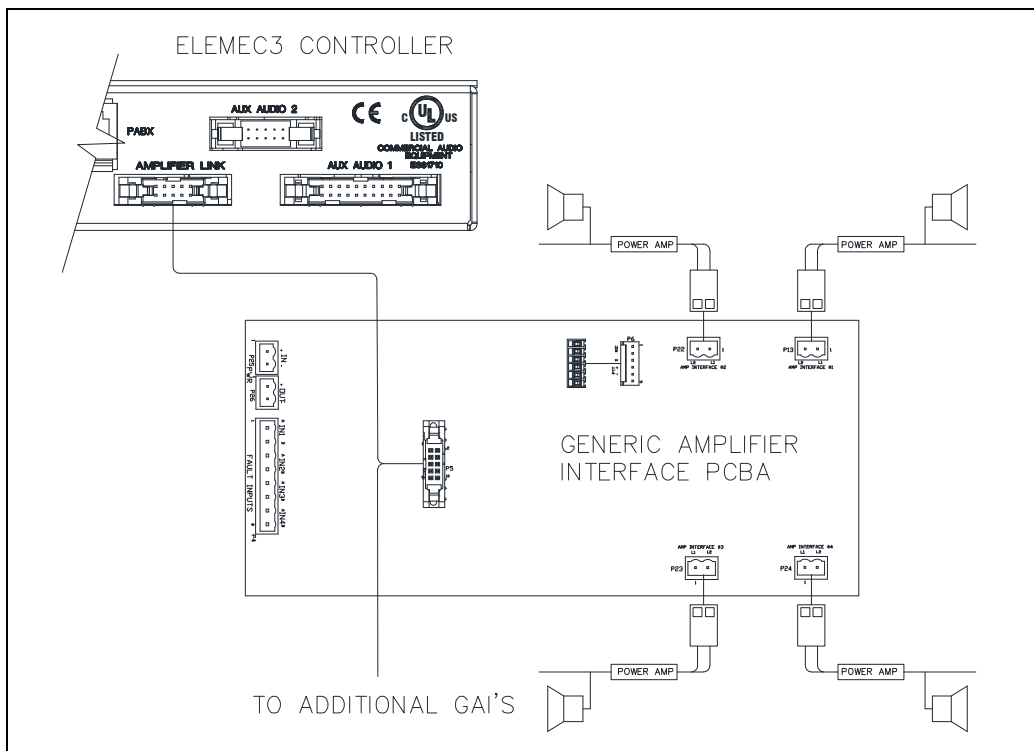




Figure 7. Generic Amplifier Interface Connection

Network

Connect the E3 system controller to a LAN to download the system configuration from the E3 Console and send status information to the E3 Portal.

Connect the local area network cable to the RJ45 jack labeled LAN on the controller (see [Figure 3](#)). The LAN RJ45 jack has two LEDs on the connector:

- Green—indicates link status
- Yellow—indicates activity.

 **WARNING**  —Improper connection of the network cable may lead to equipment damage. **DO NOT** connect the network cable to any other RJ45 jacks on the controller (i.e., API 1–4, API 5A/5B, or the I/O port).

Analog PABX Connection *(Model 013-02-0095-005 only)*

Connect the analog telephone cable to the RJ11 jack labeled PABX on the rear panel of the controller (see [Figure 3](#)).

API (Access Panel Interface)

APIs connect access panels to an *Elemec3* system controller. Install the following types of access panel interfaces with these controllers:

- Type I *Elemec3* 1-Line Access Panel Interface
- Type II *Elemec3* 4-Line Access Panel Interface

Both Type I and Type II APIs permit the connection of up to four access panels each. Type I cards have a single audio channel shared by the connected access panels. Only one access panel has access to the audio channel at a time. When more than one access panel requests access to the audio channel, the panel with the highest assigned priority takes precedence. Type II API cards provide four audio channels; assign each connected access panel a separate audio channel.

Category 5e cable assemblies connect the access panel interfaces to the *Elemec3* system controller for audio, data, and power.

NOTE: The Cat5e cables are **NOT** Ethernet cables. Do **NOT** connect them to a LAN.

For Type I access panel interfaces, install a Cat5e cable between one of the RJ45 jacks; API 1, 2, 3, or 4 on the controller and the RJ45 jack J1 on the Type I access panel interface.

A single Type II access panel interface requires two Cat5e cable assemblies, connected to the RJ45 jacks API 5A & 5B only.

1. Install one Cat5e cable between the RJ45 jack API 5A and the RJ45 jack J3, on the Type II access panel interface.
2. Install the second Cat5e cable between the RJ45 jack API 5B and the RJ45 jack J1, on the Type II access panel interface.

Configure multiple type II (up to four) APIs (see [Figure 8](#)). In this scenario, all four audio channels are programmatically available to the attached access panels (up to 16). Refer to the system manual and drawings supplied with the *Elemec3* system for details regarding the physically installed APIs and their wiring.

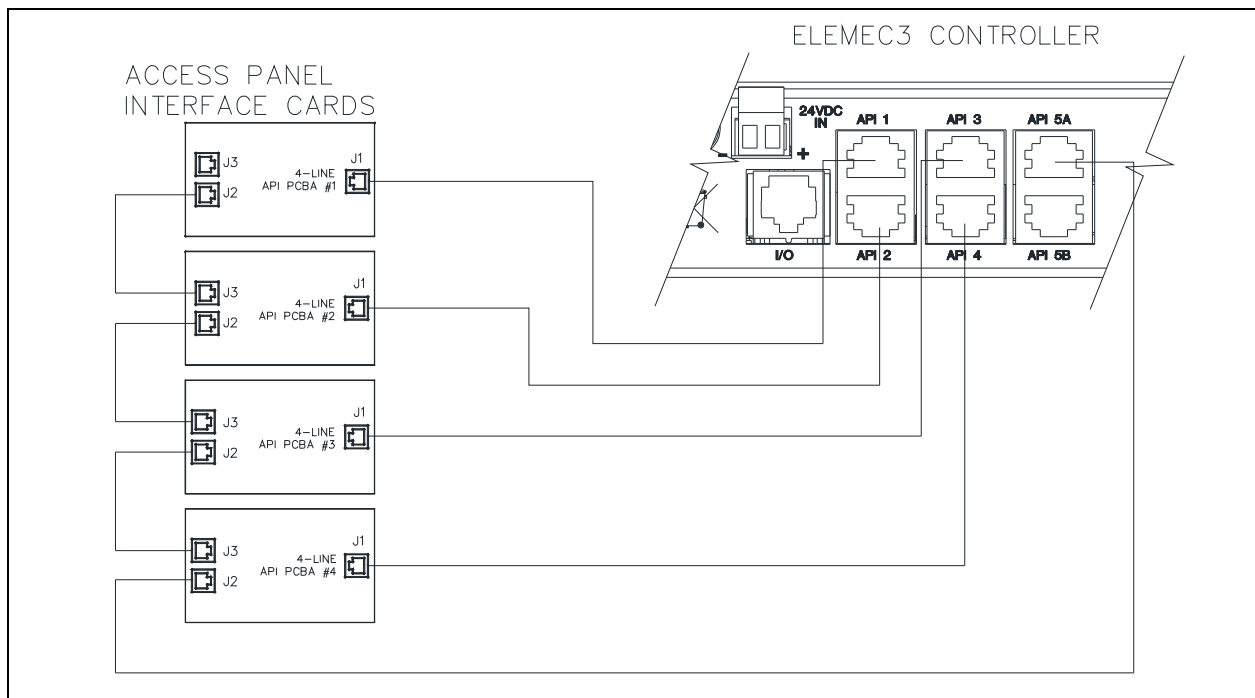


Figure 8. Typical Access Panel Interface Connections

A/B Link

In duplicate (A/B) and hot standby (N+1) type systems, connect the A controller and the B controller via the A/B LINK module per the drawing below (see Figure 9).

1. Install the IDC ribbon cable between the A/B LINK header of the A controller and header CONA of the No. 999-02-3003-00X A/B link interface PCBA.
2. Install a second IDC ribbon cable between the A/B LINK header of the B controller and header CONB of the No. 999-02-3003-00X A/B link interface PCBA (see Figure 9).

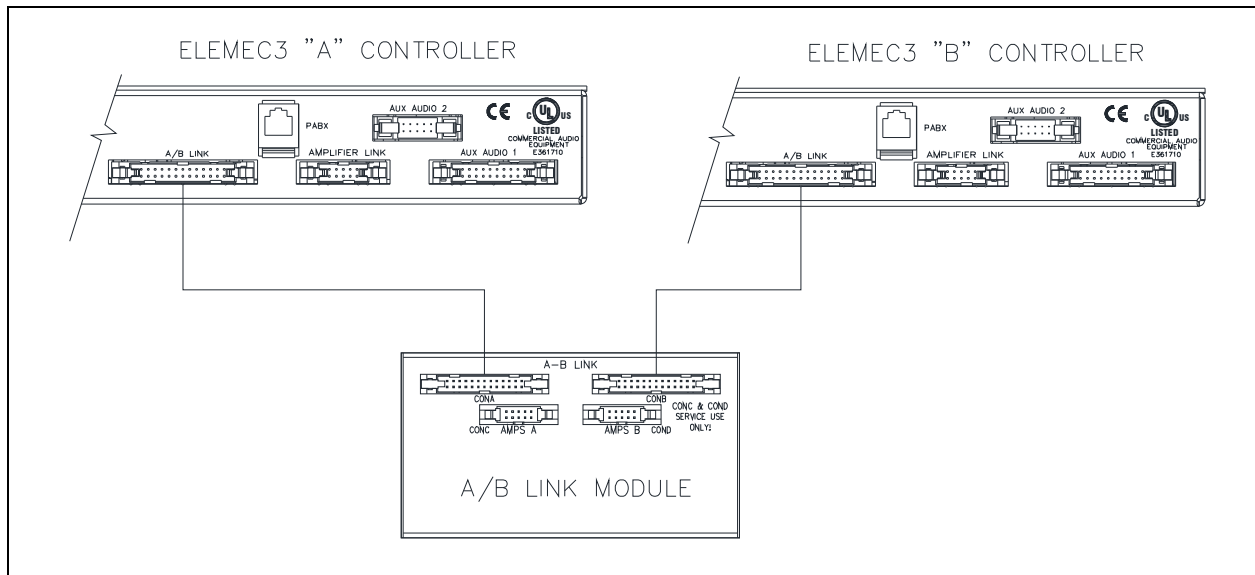


Figure 9. System Controllers to A/B Link Connections

Input/Output Modules

Each I/O module connects to the *Elemec3* system controller with a Cat5e cable assembly. Each I/O module contains an input and output RJ45 jack to enable daisy chaining additional I/O modules.

NOTE: The Cat5e cables are not Ethernet cables. Do **NOT** connect these cables to a LAN.

An *E3* system controller can supply up to 1.4 amperes to the connected I/O modules. The installer must create a power budget that lists each I/O module and its maximum current draw. Do not exceed the 1.4-ampere current limit. Upon reaching the maximum current draw, add additional modules by providing local 24 V dc power to the I/O Module. Refer to the I/O modules manual for local power connection information.

NOTE: See the Specifications section for the power requirements of each I/O board.

Install any of the following types of I/O modules with this controller:

Table 3. Input/Output Modules

Model	Description	Inputs / Outputs
030-02-0095-000	<i>Elemec3</i> Generic I/O	16 Inputs / 0 Outputs
030-02-0095-004	<i>Elemec3</i> Generic I/O & Relay × 1	16 Inputs / 4 Outputs
030-02-0095-008	<i>Elemec3</i> Generic I/O & Relay × 2	16 Inputs / 8 Outputs
030-02-0095-00C	<i>Elemec3</i> Generic I/O & Relay × 3	16 Inputs / 12 Outputs
030-02-0095-00G	<i>Elemec3</i> Generic I/O & Relay × 4	16 Inputs / 16 Outputs
030-02-0095-014	<i>Elemec3</i> Generic I/O & Reverse Relay × 1	16 Inputs / 4 Outputs
030-02-0095-018	<i>Elemec3</i> Generic I/O & Reverse Relay × 2	16 Inputs / 8 Outputs
030-02-0095-01C	<i>Elemec3</i> Generic I/O & Reverse Relay × 3	16 Inputs / 12 Outputs
030-02-0095-01G	<i>Elemec3</i> Generic I/O & Reverse Relay × 4	16 Inputs / 16 Outputs
030-02-0096-001	<i>Elemec3</i> Monitored Input Module (MIM)	8 Monitored Inputs
030-02-0097-004	<i>Elemec3</i> Four Output Monitored Relay Modules (MRM)	4 Monitored Outputs / Standard Mount
030-02-0097-008	<i>Elemec3</i> Eight Output Monitored Relay Modules (MRM)	8 Monitored Outputs / Standard Mount
030-02-0097-014	<i>Elemec3</i> Four Output Monitored Relay Modules (MRM)	4 Monitored Outputs / Reverse Mount
030-02-0097-018	<i>Elemec3</i> Eight Output Monitored Relay Modules (MRM)	8 Monitored Outputs / Reverse Mount

The following figure shows a typical connection to a generic I/O module. Connections to MIMs and MRMs are similar:

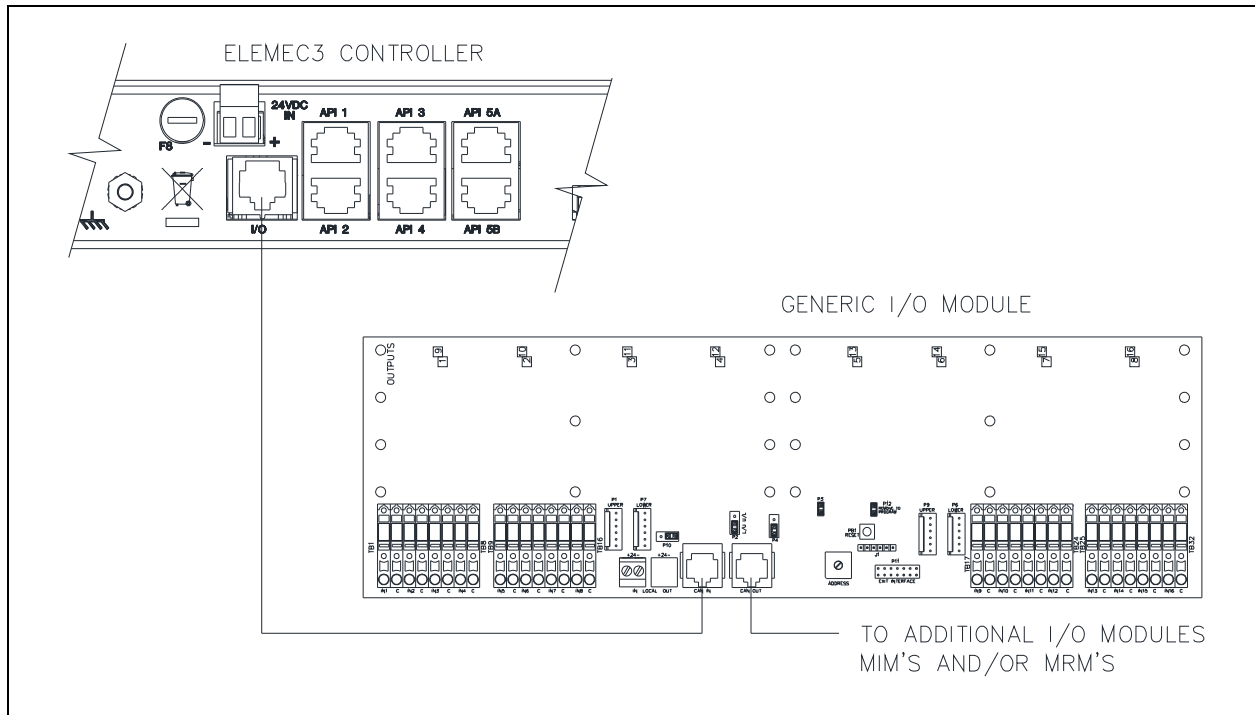


Figure 10. Generic I/O Module, MIM, and MRM Connections

Aux Audio 1

The AUX AUDIO 1 port provides termination for auxiliary audio input one, auxiliary input control, event recorder output A, event recorder output B, monitor output, and the Page/Party system interface. Install a 20-conductor IDC ribbon cable between the AUX AUDIO 1 port on the controller (see Figure 3) and the 20-conductor IDC interface PCBA (see Table 4 for the termination pin-out information).

Table 4. Auxiliary Audio One Interface Pin-out

Conductor	Description	Conductor	Description
1	Chassis GND	11	Page/Party Page Line (L2)
2	Event Record Audio Out A (+)	12	Page/Party Page Line (L1)
3	Event Record Audio Out A (-)	13	NC
4	Chassis GND	14	NC
5	Monitor Audio Out (L1)	15	Chassis GND
6	Monitor Audio Out (L2)	16	Aux Audio Input #1 (+)
7	Chassis GND	17	Aux Audio Input #1 (-)
8	Event Record Audio Out B (+)	18	Chassis GND
9	Event Record Audio Out B (-)	19	Aux Input Control (+)
10	Chassis GND	20	Aux Input Control (-)

Aux Audio 2

AUX AUDIO 2 provides termination for auxiliary audio input two, auxiliary audio input three, and the auxiliary audio output. Install a 10-conductor IDC ribbon cable between the AUX AUDIO 2 port on the controller (see [Figure 3](#)) and the 10-conductor IDC interface PCBA. Refer to the table below for the termination points:

Table 5. Auxiliary Audio Two Interface Pin-out

Description	Conductor
Aux Audio Input #2 (+)	1
Aux Audio Input #2 (-)	2
Chassis GND	3
Aux Audio Input #3 (+)	4
Aux Audio Input #3 (-)	5
Chassis GND	6
Aux Audio Out (L1)	7
Aux Audio Out (L2)	8
Chassis GND	9
NC	10

Operation

Each E3 system controller receives a custom configuration for its specific application via the *Elemec3* Console and *Elemec3* Portal applications. Please refer to the *Elemec3* system manual included with each system for information on an individual system's operation.

The E3 system controller's front panel contains a rotary key switch, three LEDs and a USB port (*USB port not functional in this product*).

The E3 system controller requires an *Elemec3* Console database version 2.0 or later. Upgrade existing databases when opening them in newer versions of the *Elemec3* Console application. Refer to Publication 42004-550, *Elemec3* Console Manual—Version 3.0 for additional details (see the [Reference Documentation](#) section).

The *auto alarm inhibit* key switch prevents the activation of previously configured inputs.

Status LEDs

The three front panel LEDs operate according to the following table:

Table 6. Front Panel LED Indicators

LED	Indication
PA IN USE	Green —Indicates the PA system is in use. Off—Not in use
SYSTEM STATUS	Green —Normal operation Red—Fault condition—Utilize the <i>Elemec3</i> Portal application for detailed status information. Blinking Red—Fault acknowledged Amber—Non-critical fault
PWR	Blue —Power is on. Off—No power

The *Elemec3* system controller displays system status via the *Elemec3* Portal over an IP-based data network; either locally or remotely. Loss of connection to the data network constitutes a fault condition, indicated by the **SYSTEM STATUS** LED, on the front of the controller. An E3 system controller must have a network connection for monitored operation.

Telephone Access

- To make a broadcast over the PA system:
- Dial the IP-PBX or analog extension (Model 095-02-0095-005 only) for the *Elemec3* telephone interface.

The system transmits a confidence tone to the caller.

- Make the page announcement.
 - The page announcement is either live page or digitally stored and played back after hang-up.
 - Live page or record/playback is a software selectable function of the E3 controller.
 - The page zone is a software selectable function of the E3 controller.
 - Program the controller to allow the caller to select the page zone using the keypad.

Reference Documentation

Elemec3 Console Manual—Version 3.0.....	42004-550
Elemec3 Portal System-Administration Utility—Version 3.1.....	42004-485

Specifications

Electrical

Power supply requirements.....	24 V dc +/-10%
Total current consumed.....	6.5 A (maximum)
Controller.....	0.8 A (maximum)
Access Panel Interface (Type I) Groups 1–4, 5B (Type II).....	1.84 A (maximum)
	0.46 A per interface (four maximum)
Input /Output Modules	1.4 A (maximum)
	0.28 A per module (five maximum)

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MIM Modules.....	0.14 A (maximum)
MRM Modules	1.4 A (maximum)
	0.30 A per module (four maximum)
24 V dc power output.....	2.4 A (maximum)

System Limitations (Maximums)

Access Panel Interfaces per system	4
Access Panels per system.....	16
I/O Modules per system (I/O Modules, MIMs, or MRMs).....	16
Inputs per system	256
Outputs per system.....	256
Generic Amplifier Interfaces (GAI).....	16**
Elemec plus Power Amplifiers	64**

**Total number of GAIs and Elemec *plus* Power Amplifiers must not exceed 64.

PABX Telephone Interface PCBA (Model 013-02-0095-005 only)	1
Page/Party Interface	1
A/B Controller Link.....	1
USB Port	not functional

Power Amplifier Audio Outputs

Isolation	500 V _{RMS}
Output Level	0.775 V rms at 1 kHz (17 Ω maximum load)
Bandwidth	200 Hz to 20 kHz +0/-3 dB ref. 1 kHz
THD	<1%

A/B Interlink

Output level.....	0.775 V _{RMS} at 1 kHz (600 Ω)
Input level	0.775 V _{RMS}
Input impedance.....	>50 kΩ at 1 kHz
Bandwidth	200 Hz to 20 kHz +0/-3 dB ref. 1 kHz
Isolation	1,000 V _{RMS}

Audio Outputs (Event Record A/B, Monitor Out, Aux Out)

Output level.....	0.775 V _{RMS} at 1 kHz (600 Ω)
Bandwidth	200 Hz to 20 kHz +0/-3 dB ref. 1 kHz
Isolation	500 V _{RMS}

Page/Party Interface

Output level.....	1.5 V _{RMS} at 1 kHz (33 Ω)
Bandwidth	200 Hz to 8 kHz +0/-3 dB ref. 1 kHz
Isolation	500 V _{RMS}

Auxiliary Audio Input 1-3

Input level	0.775 V _{RMS}
Input impedance.....	>50 kΩ at 1 kHz
Bandwidth	200 Hz to 20 kHz +0/-3 dB ref. 1 kHz
Isolation	500 V _{RMS}

Data Communications

Access Panel Interface & I/O Modules

Type CAN
 Operating speed 100 kbps

A/B Link

Type isolated RS-485 full duplex
 Isolation 2,500 V_{RMS}
 Operating speed 57.6 kbps

Amplifier Data Links

Type isolated RS-485 semi-duplex
 Isolation 2,500 V_{RMS}
 Operating speed 57.6 kbps

Control Input—Aux 1

Input type NO maintained
 Open circuit voltage 3.3 V dc (typical)
 Short circuit current 300 μ A +/-100 μ A
 Status LEDs..... Power, PA In Use, System Status

Terminals

Power in (24 V dc in) / Power out (24 V dc out)two-pin plug with screw terminals
 Minimum conductor size, with ferrule.....0.25 mm²
 Ethernet (LAN) RJ45 jack
 USB Host Port (USB) USB Type A Receptacle
 Access Panel Interfaces (AP1-4 & AP5A & 5B)..... RJ45 jack
 I/O Card Interface (I/O) RJ45 jack
 Telephone (PABX) (Model 013-02-0095-005 only) RJ11 jack
 Power Amplifiers (Amplifier)..... two-row, 10-position (2.54 mm) IDC header
 A/B Controller Link (A/B Link) two-row, 26-position (2.54 mm) IDC header
 Auxiliary Audio One (Aux Audio 1) two-row, 20-position (2.54 mm) IDC header
 Auxiliary Audio Two (Aux Audio 2) two-row, 10-position (2.54 mm) IDC header

Environmental

Operating temperature range..... -4 °F to +140 °F (-20 °C to +60 °C)
 Relative humidity..... 95%

Mechanical

Unit dimensions 1.72 H \times 19.0 W \times 8.91 D in (43.7 \times 482.6 \times 226.3 mm)
 Unit weight..... 5.2 lb (2.4 kg)

Approvals

UL/CSA 62368
 CE Mark

Warranty

Equipment. GAI-Tronics warrants for a period of one (1) year from the date of shipment, that any GAI-Tronics equipment supplied hereunder shall be free of defects in material and workmanship, shall comply with the then-current product specifications and product literature, and if applicable, shall be fit for the purpose specified in the agreed-upon quotation or proposal document. If (a) Seller's goods prove to be defective in workmanship and/or material under normal and proper usage, or unfit for the purpose specified and agreed upon, and (b) Buyer's claim is made within the warranty period set forth above, Buyer may return such goods to GAI-Tronics' nearest depot repair facility, freight prepaid, at which time they will be repaired or replaced, at Seller's option, without charge to Buyer. Repair or replacement shall be Buyer's sole and exclusive remedy. The warranty period on any repaired or replacement equipment shall be the greater of the ninety (90) day repair warranty or one (1) year from the date the original equipment was shipped. In no event shall GAI-Tronics warranty obligations with respect to equipment exceed 100% of the total cost of the equipment supplied hereunder. Buyer may also be entitled to the manufacturer's warranty on any third-party goods supplied by GAI-Tronics hereunder. The applicability of any such third-party warranty will be determined by GAI-Tronics.

Services. Any services GAI-Tronics provides hereunder, whether directly or through subcontractors, shall be performed in accordance with the standard of care with which such services are normally provided in the industry. If the services fail to meet the applicable industry standard, GAI-Tronics will re-perform such services at no cost to buyer to correct said deficiency to Company's satisfaction provided any and all issues are identified prior to the demobilization of the Contractor's personnel from the work site. Re-performance of services shall be Buyer's sole and exclusive remedy, and in no event shall GAI-Tronics warranty obligations with respect to services exceed 100% of the total cost of the services provided hereunder.

Warranty Periods. Every claim by Buyer alleging a defect in the goods and/or services provided hereunder shall be deemed waived unless such claim is made in writing within the applicable warranty periods as set forth above. Provided, however, that if the defect complained of is latent and not discoverable within the above warranty periods, every claim arising on account of such latent defect shall be deemed waived unless it is made in writing within a reasonable time after such latent defect is or should have been discovered by Buyer.

Limitations / Exclusions. The warranties herein shall not apply to, and GAI-Tronics shall not be responsible for, any damage to the goods or failure of the services supplied hereunder, to the extent caused by Buyer's neglect, failure to follow operational and maintenance procedures provided with the equipment, or the use of technicians not specifically authorized by GAI-Tronics to maintain or service the equipment. **THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE IN LIEU OF AND EXCLUDE ALL OTHER WARRANTIES AND REMEDIES, WHETHER EXPRESS OR IMPLIED BY OPERATION OF LAW OR OTHERWISE, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

Return Policy

If the equipment requires service, contact your Regional Service Center for a return authorization number (RA#). Equipment should be shipped prepaid to GAI-Tronics with a return authorization number and a purchase order number. If the equipment is under warranty, repairs or a replacement will be made in accordance with the warranty policy set forth above. Please include a written explanation of all defects to assist our technicians in their troubleshooting efforts.

Call 800-492-1212 (inside the USA) or 610-777-1374 (outside the USA) for help identifying the Regional Service Center closest to you.