



GAI-TRONICS® CORPORATION
A HUBBELL COMPANY

Model 013-02-0095-003 *Elemec3* System Controller

Confidentiality Notice

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General Information

The Model 013-02-0095-003 *Elemec3* System Controller is the central component of an *Elemec3* Public Address and General Alarm (PA/GA) system. It has been designed for markets in which failsafe operation is imperative and is also suitable for a variety of other communication applications.

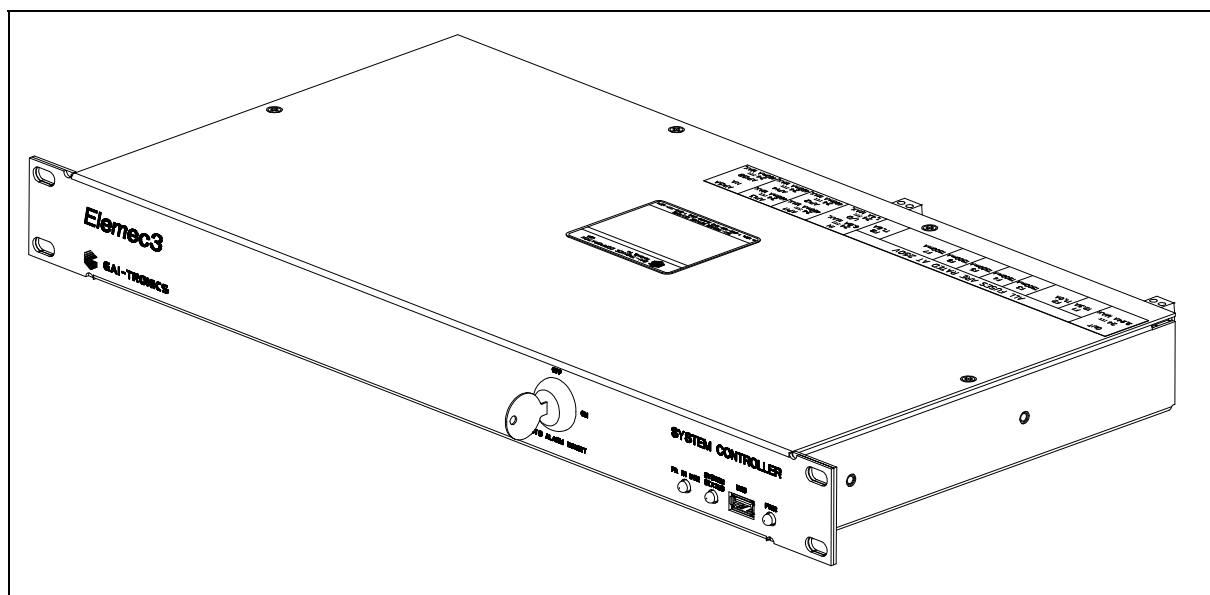


Figure 1. *Elemec3* System Controller

The *Elemec3* System Controller is a highly integrated data acquisition, audio signal processing, and control device. The Controller has been designed to continuously monitor the integrity of an *Elemec3* system and immediately report any changes in activity and system health. The Controller sends and receives data and test signals to and from connected equipment to provide a reliable, high integrity system. System monitoring includes, but is not limited to the following: Access Panels, *Elemec* Power

Amplifiers, **Elemec** Standby Power Amplifiers, **Elemec3** Standby Controllers, audio paths, alarm inputs, and beacon outputs.

The **Elemec3** System Controller can be configured in one of 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 “System Types” section.

Elemec3 software is designed to be as flexible as possible, and can easily be configured via a TCP/IP network connection using the **Elemec3** Console software application.

System status, including current audio activity, faults, input, output, and amplifier states are monitored via the TCP/IP network connection using the **Elemec3** Portal software application. The **Elemec3** System Controller contains an internal clock that contains a battery back-up to enable a time stamp on event logs when the status of the system changes, such as an alarm event.

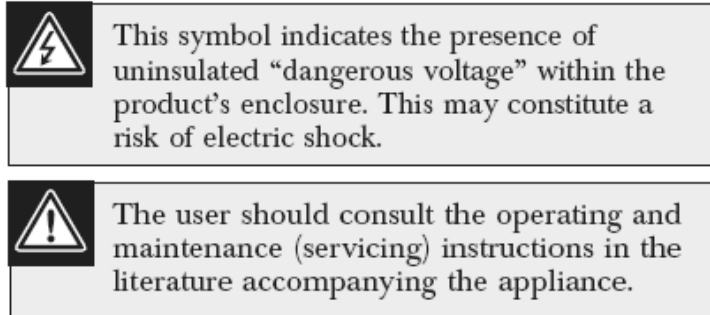
To eliminate the possibility of acoustic feedback the system can be configured to replay digitally recorded audio from access panels, PABX systems, Page/Party[®] systems, VoIP telephones, etc.

Up to 256 inputs and 256 relay outputs can be individually programmed to initiate alarms and messages and to control beacons. Up to 16 access panels can be connected for routine and emergency speech broadcasts and manual alarm/emergency message activation.

The system is equipped with two audio paths to enable two simultaneous broadcasts. For ease of installation and maintenance, the Controller is designed for installation in a standard (19-inch) rack and all connections to the Controller are a plug/socket type.

The **Elemec3** System Controller is exclusively designed for use in an **Elemec3** system and is not intended for use with other types of equipment. Additional audio inputs/outputs are available to accommodate connection to ancillary equipment.

Important Safety Instructions



1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
8. Only use attachments/accessories specified by the manufacturer.
9. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Front Panel Indicators & Control

The **Elemec3** System Controller front panel is equipped with an Auto Alarm Inhibit key switch, three LED indicators and a USB port (not functional in this product). The Auto Alarm key switch allows the operator to prevent the activation of previously configured inputs. The LEDs indicate whether the system is in use, power is applied to the unit, and the system is operating normally or has a fault condition.

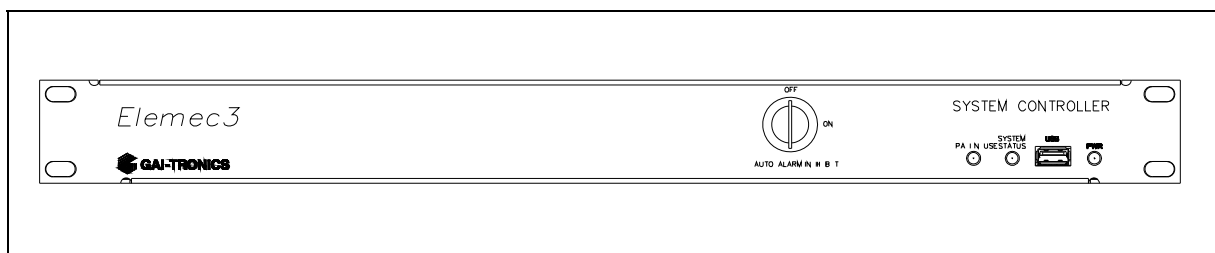


Figure 2. **Elemec3** System Controller – Front View

Rear Panel Connections

Refer to Figure 3. System connections are made to the rear of the **Elemec3** System Controller.

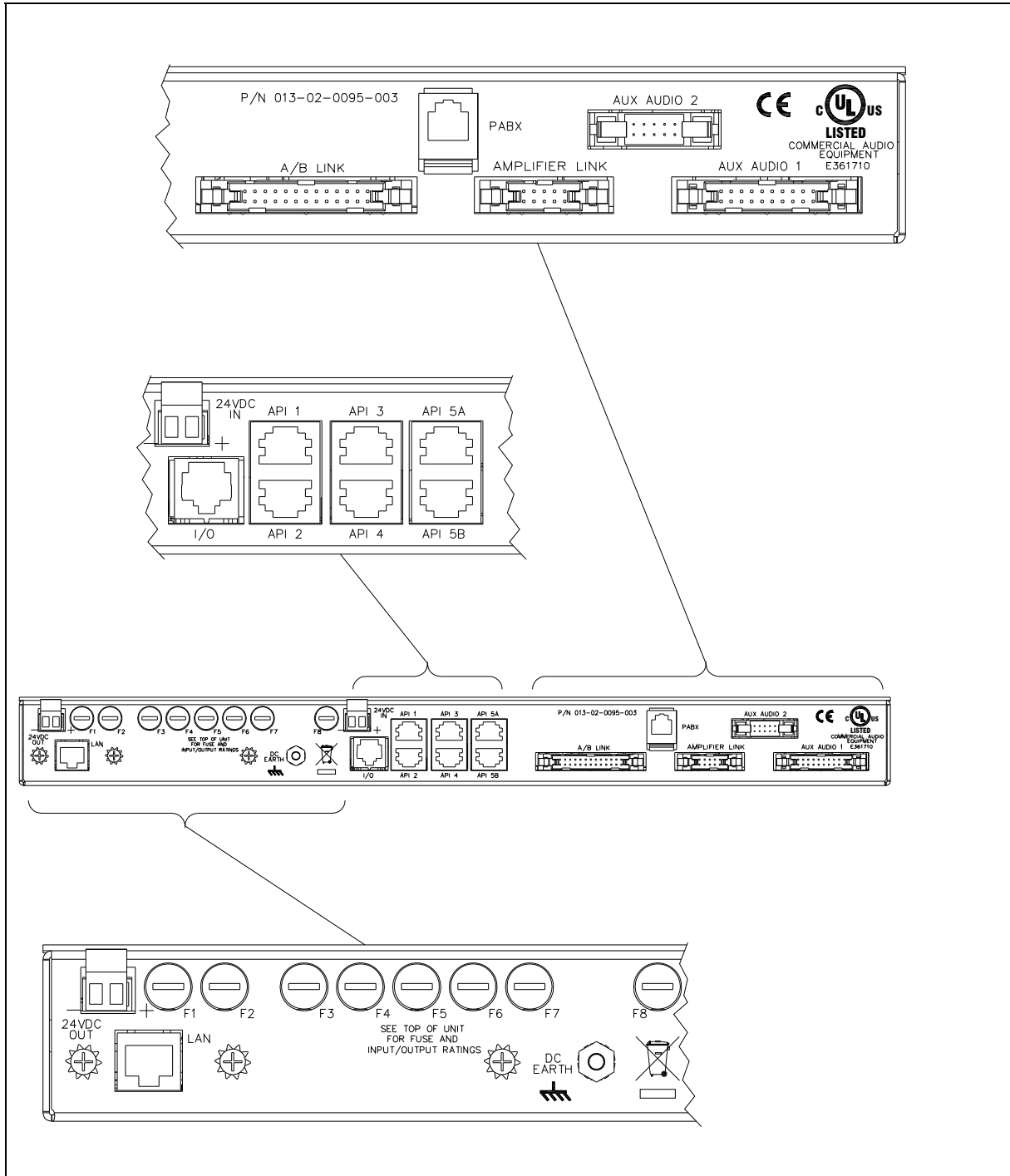


Figure 3. **Elemec3** System Controller – Rear View

Internal Connections

All internal connections are plug and socket connections.

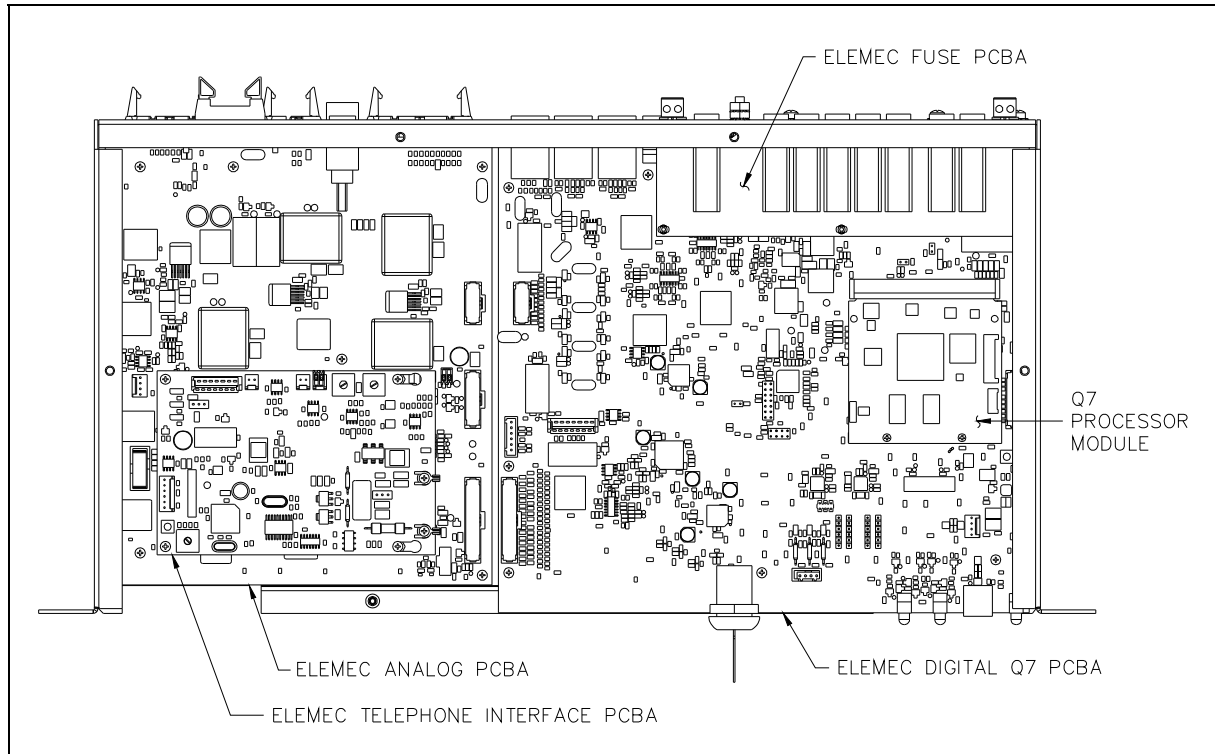


Figure 4. **Elemec3** System Controller – Internal Components – Top View

The main internal components are listed in Table 1 below:

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	Interface from Elemec3 System Controller to telephone system
Elemec3 Fuse PCBA	Protection for the System Controller, Access Panel Interfaces, and I/O Modules

Installation

Installation Safety Guidelines

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



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

Installation Guidelines

1. Notify plant personnel of a system shutdown prior to servicing the unit.
2. Disconnect power before installing or removing the System Controller.

Mounting

Mount the **Elemec3** System Controller in the 19-inch rack using the supplied hardware. It requires 1U (1.75 inches) of height.

System Types

The **Elemec3** System Controller can be configured in one of three ways: 1) Single System (Standalone), 2) Hot Standby System (N+1), and 3) Duplicate System (A/B). Refer to your system manual for detailed information on your system's configuration.

Single System (Standalone)

In a single type system, the **Elemec3** System Controller is in complete control of the amplifiers.

Hot Standby (N+1) System

In a different type of redundant system, referred to as a Hot Standby (N+1), two Controllers, designated as A and B, are located in the same cabinet and control a single set of amplifiers.

Hot standby amplifier control is provided so that a spare amplifier(s) is automatically connected to the loudspeaker network of the failed amplifier(s).

Duplicate (A/B) System

In a "duplicated" or redundant system, two **Elemec3** System Controllers are designated as A and B. In this type of system there are two sets of amplifiers (also designated as A and B) with the two speaker loops run in different routes.

Wiring

Power

Power IN

Remove the two-position plug from the 24VDC IN header and screw the dc power cable to the plug, observing the polarity marked on the rear of the unit. Install the plug back in 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

Fuses have been supplied for each device receiving power from the *Elemec3* System Controller. Use only IEC time-delayed fuses with the appropriate ratings. The fuses and their ratings are listed in the table below:

Table 2.

Fuse	Description	Output	Rating
F1	Auxiliary Power Output	24VDC 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: T100mA 250 V fuses are supplied on each Access Panel Interface, which limit current to each access panel.

Earth

Install a green-yellow conductor between the DC EARTH terminal on the rear of the unit to the Telecoms Earth Bar inside the cabinet.

Power OUT

Power to additional devices can be supplied via the 24VDC OUT connector. Remove the two-position plug from the 24VDC OUT header and screw the dc power cable to the plug, being sure to observe the polarity (marked on the rear of the unit). Install the plug back in the 24VDC OUT header (See F1 in Table 2).

Amplifiers

The *Elemec3* System Controller connects to the *Elemec* Power Amplifiers via a 10-conductor IDC ribbon cable between the controller (connector AMPLIFIER LINK) and the AMP CONTROL connector on the *Elemec* Power Amplifier(s). The *Elemec3* System Controller is compatible with the following *Elemec* Power Amplifiers: 1) D300i, 2) D550i, and 3) D600i.

Generic Amplifier Interfaces

The *Elemec3* System Controller can also connect up to 16 Generic Amplifier Interfaces. 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).

WARNING! - The Generic Amplifier Interface does not contain monitoring and/or fault status reporting of Generic Power Amplifiers. Power Amplifiers connected to the Generic Amplifier Interfaces **SHOULD NOT** be used for critical communications.

Network

The *Elemec3* System Controller may connect to a Local Area Network (LAN) connection to download the system configuration from the *Elemec* Console and send status information to the *Elemec* Portal. Connect the Local Area Network Cable to the female RJ45 jack labeled LAN on the Controller. The LAN RJ45 jack has two LEDs on the connector. The green LED indicates the LINK status and the yellow LED indicates ACTIVITY.

CAUTION!! Improper connection of the LAN may lead to equipment damage. DO NOT connect the Local Area Network Cable to any other RJ45 connectors on the Controller (i.e., API 1–4, API 5A/5B, or I/O).

PABX Connection

Connect the telephone cable to the female RJ11 jack labeled **PABX** on the rear panel of the Controller.

Access Panel Interfaces

The following types of Access Panel Interfaces can be installed with this Controller:

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

A Cat5e cable assembly is used to connect the **Elemec3** System Controller to each of the Access Panel Interfaces. The Cat5e cables are not Ethernet cables and should NOT be connected to the LAN.

For Type I Access Panel Interfaces, install a Cat5e cable between one of the jacks **API 1, 2, 3, or 4** (female RJ45) and jack **J1** (female RJ45) on the Type I Access Panel Interface.

The Type II Access Panel Interface requires two Cat5e cable assemblies and must be connected to the RJ45 jacks **API 5A & 5B** only. Install one Cat5e cable between jack **API 5A** (female RJ45) and the jack **J1** (female RJ45) on the Type II Access Panel Interface. Install the other Cat5e cable between jack **API 5B** (female RJ45) and jack **J3** (female RJ45) on the Type II Access Panel Interface.

A/B Link

In Duplicate (A/B) and Hot Standby (N+1) type systems, the A Controller and the B Controller must be connected via the A/B LINK. Install the 26-conductor IDC ribbon cable between the A/B LINK header of the A Controller and header CONA of the 999-02-3003-00X A/B Link Interface PCBA. Install a 26-conductor IDC ribbon cable between the A/B LINK header of the B Controller and header CONB of the 999-02-3003-00X A/B Link Interface PCBA.

Input/ Output Modules

A Cat5e cable assembly is used to connect the **Elemec3** System Controller to each of the Input/ Output Modules. Each I/O Module contains an input and output female RJ45 jack to enable additional I/O Modules to be daisy-chained. **NOTE:** The Cat5e cables are not Ethernet cables and should NOT be connected to the LAN.

Power supplied by the **Elemec3** System Controller to the I/O Modules is limited to 1.4 amperes. The installer must create a power budget which lists each type of I/O Module and their maximum current draw to ensure the 1.4 ampere limit is not exceeded. If the maximum current draw is reached, additional modules can be added by providing local power to the I/O Module. Refer to the I/O Modules manual for more information on connection of local power. **NOTE:** The power requirements for each I/O board are listed in the “Specifications” section.

The following types of Input/ Output Modules can be installed with this Controller:

Table 3.

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

Aux Audio 1

The Auxiliary Audio 1 interface provides termination for the Aux Audio Input #1, the Aux 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 header on the Controller and the 20-conductor IDC Interface PCBA. Refer to the table below for the termination points:

Table 4.

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

Aux Audio 2

The Auxiliary Audio 2 interface provides termination for the Aux Audio Input #2, Aux Audio Input #3, and the Aux Audio Output. Install a 10-conductor IDC ribbon cable between the AUX AUDIO 2 header on the Controller and the 10-conductor IDC Interface PCBA. Refer to the table below for the termination points:

Table 5.

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 **Elemec3** System Controller is custom-configured for a specific application via the **Elemec3** Console application. Please refer to your system manual for information on your systems operation.

The **Elemec3** System Controller front panel contains a rotary key switch, three LEDs and a USB port (not functional in this product).

The **Elemec3** System Controller requires an **Elemec3** Console database of 2.0 or later. An existing database may have to be upgraded. Please refer to the **Elemec3** Console manual for additional details.

The Auto Alarm Inhibit key switch provides the capability to prevent the activation of previously configured inputs.

The LEDs operate in accordance with the following table:

Table 6. Front Panel LED Indications

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 Elemec3 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 which will be indicated by the **SYSTEM STATUS** LED on the front of the Controller. For the monitored operation of the **Elemec3** System Controller it should be connected at all times to a network.

Specifications

Electrical

Power

Power supply requirements.....	24 V dc +/-10%
Total current consumed	6.24 A (maximum)
Controller	0.6 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)	
MRM Modules	1.4 A (maximum)
0.30 A per Module (Four maximum)	
Auxiliary power output	2.4 A (maximum)

System Limitations

Access Panel Interfaces per system.....	Four maximum*
*Four Type I; or one Type II; and three Type I Access Panel Interface cards	
Access panels per system	16 maximum
I/O Modules per system (16-In/Out I/O Modules, MIM, or MRM)	16 maximum
Inputs per system.....	256 maximum
Outputs per system.....	256 maximum
Generic Amplifier Interfaces (GAI).....	16 maximum**
Elemec <i>plus</i> Power Amplifiers.....	64 maximum**
**Total number of GAIs and Elemec <i>plus</i> Power Amplifiers must not exceed 64.	
PABX telephone access.....	One maximum
Page/Party® access	One maximum
A/B Controller Link	One maximum
USB	reserved for future use

Power Amp Audio Outputs

Isolation	500 Vrms
Output Level	0.775 Vrms at 1 kHz (17Ω maximum load)
Bandwidth.....	200 Hz–20 kHz +0/-3 dB ref. 1 kHz
THD.....	<1%

A/B Interlinks

Output level.....	0.775 Vrms at 1 kHz (600Ω)
Input level	0.775 Vrms
Input impedance.....	>50kΩ at 1 kHz
Bandwidth.....	200 Hz–20 kHz +0/-3 dB ref. 1 kHz
Isolation	1000 Vrms

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

Output level.....	0.775Vrms at 1 kHz (600Ω)
Bandwidth.....	200 Hz–20 kHz +0/-3 dB ref. 1 kHz

Isolation 500 Vrms

Page/Party® Interface

Output level..... 1.5 Vrms at 1 kHz (33Ω)

Bandwidth..... 200 Hz–8 kHz +0/–3 dB ref. 1 kHz

Isolation 500 Vrms

Auxiliary Audio Input 1-3

Input level 0.775 Vrms

Input impedance..... >50kΩ at 1 kHz

Bandwidth..... 200 Hz–20 kHz +0/–3 dB ref. 1kHz

Isolation 500 Vrms

Data Communications

Access Panel Interface & I/O Modules

Type..... CAN

Operating speed..... 100 kbps

A/B Link

Type..... Isolated RS-485 full duplex

Isolation 2500 Vrms

Operating speed..... 57.6 kbps

Amplifier Data Links

Type..... Isolated RS-485 semi-duplex

Isolation 2500 Vrms

Operating speed..... 57.6 kbps

Control Input - Aux 1

Input type Normally open maintained

Open circuit voltage 3.3 V dc (typical)

Short circuit current 300 μA +/-100 μA

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

 Maximum conductor size, with ferrule 2.50 mm²

Ethernet (LAN) Female RJ45 Jack

USB Host Port (USB)..... USB Type A Receptacle

Access Panel Interfaces (AP1-4 & AP5A & 5B)..... Female RJ45 Jack

I/O Card Interface (I/O)..... Female RJ45 Jack

Telephone (PABX)..... Female RJ11 Jack

Power Amplifiers (Amplifier)..... Two-Row, 10-Position (2.54mm) IDC Header

A/B Controller Link (A/B Link) Two-Row, 26-Position (2.54mm) IDC Header

Auxiliary Audio One (Aux Audio 1)..... Two-Row, 20-Position (2.54mm) IDC Header

Auxiliary Audio Two (Aux Audio 2)..... Two-Row, 10-Position (2.54mm) IDC Header

Environmental

Operating temperature range..... 0° C to +60° C

Relative humidity 95%

Mechanical

Unit dimensions 482.6 W × 43.7 H × 226.3 D mm (19.0 × 1.72 × 8.91 inches)

Unit weight 2.4 kg (5.2 lbs.)

Approval

CE Mark

NRTL..... UL/CSA 60065

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.