The background of the page is filled with a pattern of concentric circles of varying sizes and orientations, creating a ripple effect. The circles are light gray and scattered across the white background.

biamp.

Vocia[®]

LSI-16 / LSI-16e
OPERATION MANUAL

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LSI-16 Product Description

The LSI-16 serves as an emergency interface between a Vocia system and emergency/fire alarm systems. While typically powered from a certified 24V DC source, it can also utilize Power over Ethernet (PoE).

The LSI-16e is an enhancement to the LSI-16 adding 16 additional control inputs. The LSI-16e serves as an enhanced emergency interface between a Vocia system and emergency/fire alarm systems. While typically powered from a certified 24V DC source, it can also utilize Power over Ethernet (PoE).

Setup and Use

The LSI-16 and LSI-16e govern the emergency functions of a Vocia system, monitoring and reporting faults and alarm conditions through indicators and the system software. Incorrect configuration, removal, or non-installation of some system elements may result in the LSI-16(e) reporting a fault or alarm condition. This is normal operation. For correct, fault-free operation, inputs and outputs must be connected to the LSI-16(e) as detailed in this manual. The Vocia software provides the intuitive interface for configuration, DSP equalization, and programming of the LSI-16 and LSI-16e. For details on software setup, please consult the Vocia Help File.

Installation

Install the unit away from heat sources, such as vents and radiators, and in rooms with adequate ventilation. Ensure that air can circulate freely behind, beside, and above the unit. Do not exceed the maximum ambient operating temperature of 18°-108° F (-8° - 42°C). Be aware of conditions in an enclosed rack that may cause the temperature to exceed ambient room conditions.

The unit requires one 1.75 inch (44.45 mm) high and 19 inch wide rack space with 10 inch (254 mm) depth. Mounting the unit using four screws with washers will prevent marring of the front panel. PVC or nylon washers are appropriate.



Front Panel

The LSI-16/LSI-16e features twenty-three LEDs on the front plate (from left to right).

Power

The first LED on the left will illuminate green if the unit is powered by main or PoE supplies.

General Alarm

This LED will illuminate red if the LSI-16/LSI-16e receives an alarm signal from an external emergency detection system (e.g. a fire alarm system) via the Alarm inputs to the LSI-16/LSI-16e. This LED indicates the general alarm state:

- Solid red - The LSI-16/LSI-16e has received an alarm signal from an external emergency detection system (e.g. fire alarm system).
- Flashing red - The LSI-16/LSI-16e has received a general alarm silence from an external emergency detection system (e.g. fire alarm system).

General Fault

This LED will illuminate yellow if there is a fault in the system that does not affect the delivery of a warning message.

Power Supply Fault

This LED will illuminate yellow if LSI-16/LSI-16e is operating on a PoE supply but the main 24V supply fails or an external power supply fault is signaled to the LSI-16/LSI-16e.

Protection Fault

This LED will illuminate yellow if a system amplifier channel fails and this failure does not prevent an emergency zone voice announcement. Note: failures that do affect emergency zone voice announcements will result in a system fault.

Path Fault

This LED will illuminate yellow if a fault in a transmission path is detected. The path integrity is tested from microphone capsule to end of loudspeaker lines if optional Vocola ELD-1 devices are fitted at the end of the loudspeaker lines.

System Fault

This LED indicates the integrity of the system:

- Flashing yellow - The unit has a fault that may prevent the reliable operation of life safety announcement functions.
- Not illuminated - The unit is operational without any faults that may prevent reliable operation of life safety announcement functions.

Because it indicates a potentially serious condition, the presence of a System Fault extinguishes indicators for PSU, Path and Protection faults so as to focus attention on the primary fault. However, individual PSU, Path and Protection faults are still shown in the system software and signaled to individual fault outputs as described below. The LSI-16/LSI-16e will always power up in the system fault

condition. Manual intervention is required to take the LSI-16/LSI-16e out of this condition. Note: this power up condition does not prevent emergency zone voice announcements provided that the system is operating reliably.

General Purpose LEDs (LEDs 8 - 23)

These LEDs indicate functionality of the general purpose inputs on the LSI-16e or of the LSI-16 that has been updated with an Interface Module 16 (IM-16). On an LSI-16 without an option board, these LEDs remain inactive.

- Solid Red: An Alarm is active on the associated input.
- Flashing Red: An Alarm in the system has been silenced.
- Solid Amber: A Fault is active on the associated input.
- Flashing Amber: An input configured as "high range - monitored" exhibits a monitoring fault.

Power

The LSI-16(e) accepts an external dual 24V DC power source, Power over Ethernet (PoE), or both methods for redundancy. Both power sources may be connected concurrently, however each must be capable of supporting the full 15 watt load of the unit. Loss or return of either power source will not result in an interruption to normal operation as long as one of these power sources remains functional. Monitoring of power sources is selectable via the Vocola Software.

Device ID

The rotary ID switches give the unit a unique Device ID. The switches are in hexadecimal format. All units of the same device type must have a unique Device ID to function properly within a Vocola Paging World. The Factory Default Device ID is 01. A Device ID of 00 is invalid and cannot be used.

To assign a Device ID of hex 07, leave the MSB switch on 0 and turn the LSB switch to 7. Device ID switches should be set using a 0.1 inch (2.5mm) to 0.12 inch (3.0mm) flat blade screwdriver.



NOTE	
Changes made to the Device ID while connected to the network require a power cycle of the device in order to take effect.	

Network Connections

All CobraNet routing and bundle assignments are processed by the Vocola devices locally. Vocola makes dynamic use of available bundles in CobraNet. A 100Base-T Ethernet switch (not repeater hub) is required when networking multiple units. CobraNet utilizes standard CAT5, CAT5e, CAT6, or CAT7 cabling, which has a specified maximum length of 328 feet (100 meters). Additional Ethernet switches, or switches which provide fiber-optic interface, can be used to extend the physical distance between units within a network. Please note that CobraNet limits network extensions to seven hops (one-way transmissions) within a network. The CobraNet network connection is configured with the primary connector on the left and the secondary (redundant) connector on the right. The primary and secondary CobraNet ports are provided to facilitate connection redundancy. Each connector provides two LEDs that indicate Ethernet link and network activity.

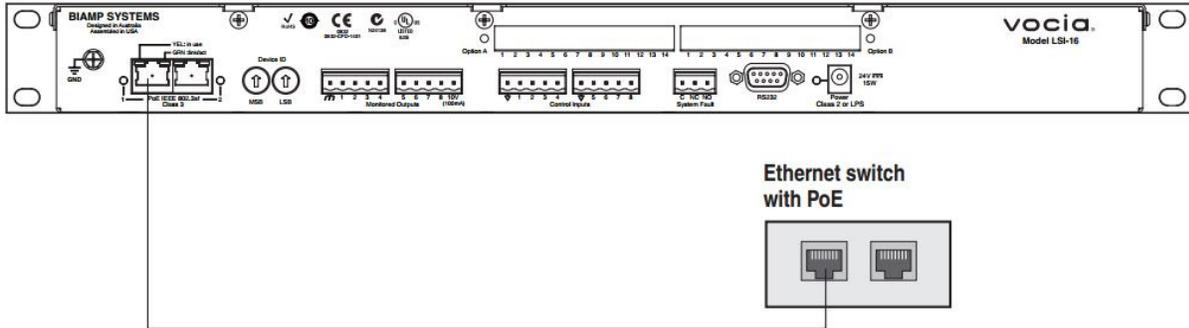
Left LED	Right LED	Description
None	None	No Data Connectivity or CobraNet activity
None	Green	Link established
Flashing yellow	Green	Link established and CobraNet activity detected; The unit is acting as a CobraNet Performer
Flashing yellow	Flashing green	Link established and CobraNet activity detected; The unit is acting as a CobraNet Conductor
Flashing yellow	None	CobraNet fault. Check cabling and configuration for errors

Using PoE Power

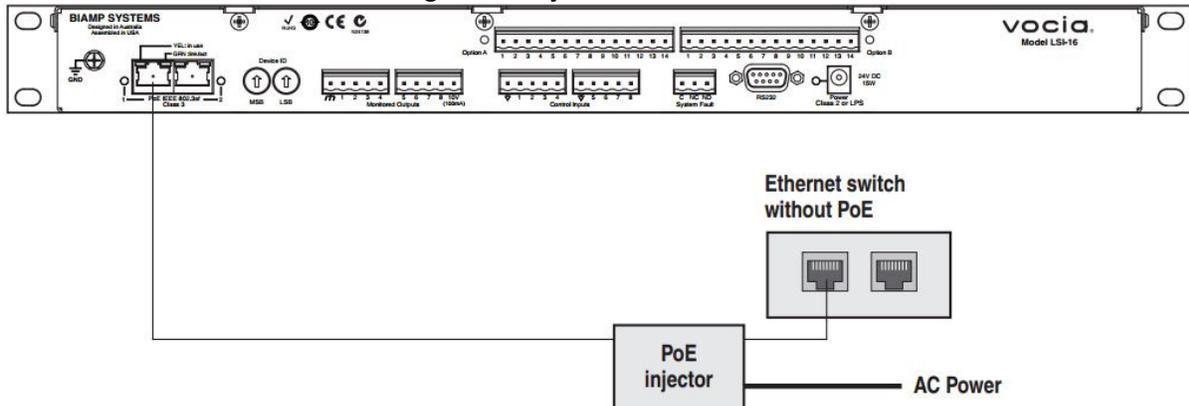
NOTE

The LSI-16 and LSI-16e have dual, monitored PoE capable Ethernet ports enabled by default. For fault tolerant or compliant systems both interfaces must be used.
Additional (Auxiliary) power is also provided via a dedicated 24V connection

LSI-16 Ethernet connection using a PoE switch:



LSI-16e Ethernet connection using a PoE injector:



Monitored I/O

Two black five-position connectors are located next to the rotary switches. These are predominantly used for monitored inputs and outputs (I/O) to external lamps or sounders. Individual connections are labeled 1 through 8. One connection is configured for use as both an input and an output (1) and one as an input (2) (see table below for connector assignments).

Marking	Function
	Ground
1	Sounder Output / Silence Input
2	System Fault Reset Input
3	Voice Alarm active
4	General Fault
5	PSU Fault
6	Protection Fault
7	Path Fault
8	External Supply Over-voltage Monitor
10V	10V Out

The inputs/outputs will sink current (pull low) when active (see the Specifications section of this document for more details). The desired load (lamp, LED, etc.) must be connected between the input/output terminal and a positive voltage reference.

It should be noted that external switches and a sounder connected to the first two inputs are typically mandatory for standards compliance. The location and physical attributes of these items may be required to conform with local norms.

For each of these inputs/outputs, a load must be connected between each output and the positive voltage source. If any output on terminals 1 through 8 is unused, the output must be connected through an external resistor to the positive side of the voltage source (either 10V Out or user-supplied external source). To ensure correct functionality, the value of each resistor should be 22k Ω . An internally derived 10V source is provided at the 10V Out terminal; however, the total current available from this pin is limited to 100mA. This voltage source may be used for external devices provided the total load is less than 100mA. For higher-current devices, a user-supplied external voltage source of up to 35V may be used, with the negative side connected to the pin. Due to monitoring constraints, it is impossible to use both the internal 10V source and an external source. For monitoring purposes, the positive side of the voltage source (either 10V Out or user-supplied external source) must be connected to the External Supply Over-voltage Monitor (terminal 8), as well as supplying voltage to external devices.

Sounder Output/Silence Input

This connection functions as a dual purpose alarm sounder output and silence input.

Sounder Output

This output connects to a local sounder for fault and alarm warnings. A sounder is typically required for standards compliance. Note: If an emergency microphone is located near the sounder, it may be configured in Vocia software to mute the sounder while making live announcements.

Silence Input

This input is used to silence the local sounder. The sounder will restart in response to any new Fault or Alarm.

System Fault Reset Input

This input is required to take the LSI-16/LSI-16e out of System Fault condition. Note: the LSI-16/LSI-16e will always power up in a system fault state.

Voice Alarm Active

This output is active when messages are playing in response to an alarm input. This output provides indication of when a message is playing or when a message has been muted.

Constant active output - indicates a message is playing in response to an alarm input.

Cyclic output (1.25Hz) - indicates the message has been muted.

General Fault, PSU Fault, Protection Fault and Path Fault

These outputs will be activated by the same alarm conditions as identically named LEDs on the front panel. Note however that these outputs will be activated by the faults listed above irrespective of whether a System Fault has been activated.

The Voice Alarm Active, General Fault, PSU Fault, Protection Fault and Path Fault outputs are monitored for open-circuit or short-circuit to ground or power supply and for over-voltage on the output pin (>35V DC). If incorrect conditions are detected a Fault is signaled. Output monitoring facilitates compliance with voice evacuation standards.

Control Inputs

Two five-position plug-in barrier strip connectors provide control input connections. Eight separate channels plus two ground pins are provided. Control Inputs are fully isolated from all connections in the LSI-16/LSI-16e.

Marking	Function
⚡	Ground
1	PSU Fault
2	Ethernet Fault
3	Voice Alarm Silence from CIE/Fire panel)
4	Voice Alarm Reset (from CIE/Fire panel)
⚡	Ground
5	Emergency Input 1
6	Emergency Input 2
7	Emergency Input 3
8	Emergency Input 4

Input Activation Conditions

Control Inputs 1 & 2

To activate an input it must be connected to an external circuit that returns to either of the two ground (⚡) pins. The resistance of this circuit must be less than 4kΩ.

Control Inputs 3 to 8

These inputs must be permanently connected to an external circuit that returns to either of the two ground (⚡) pins. The resistance of this circuit must be between 1kΩ and 4kΩ. To activate an input, pull the input to a voltage between 12 and 24V.

PSU Fault

This input may be derived from the primary 24V power supply to indicate to the LSI-16/LSI-16e if there is a fault in the power supply. This may be required for standards compliance.

Ethernet Fault

This input can be derived from an Ethernet switch to monitor the Ethernet network connection between the LSI-16/LSI-16e and amplifier. This may be required for standards compliance.

Voice Alarm Silence from CIE (fire alarm system)

This input is a signal from the CIE (fire alarm system) that will mute emergency messages in all emergency zones.

Voice Alarm Reset from CIE (fire alarm system)

This input is a signal from the CIE (fire alarm system) that will reset emergency messages in all emergency zones.

Emergency Inputs

These four inputs are used to connect to the fire alarm control and indicating equipment (CIE) and notify the LSI-16/LSI-16e that an alarm has occurred on a particular zone. Four such zone inputs may be connected; one emergency message or mute can be assigned per zone. Additional zone inputs are available with the IM-16. When an alarm is detected, the Vocia system will enter Emergency Mode as configured for that input. During Emergency Mode, some or all of the Vocia system will cease normal operation and operate as programmed for the emergency.

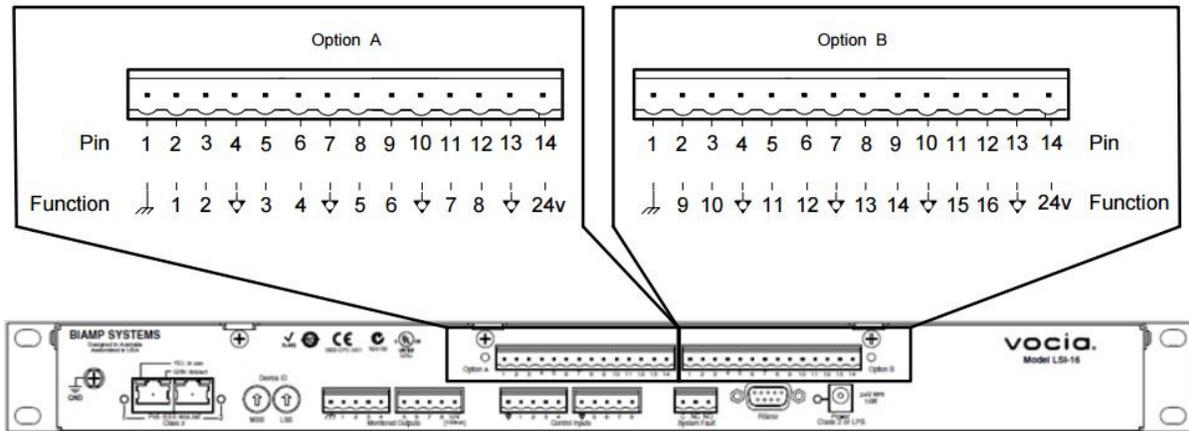
General Purpose Inputs

These connections provide functionality of the option inputs on the LSI-16e or of the LSI-16 that has been upgraded with an Interface Module (IM-16). On an LSI-16 without an option board, these connections will remain inactive.

Two connectors, labeled Option A and Option B, are located on the back of the LSI-16e. Each slot consists of 14 pins which are labeled 1 to 14. Each connector bank allows for the following connection:

- Chassis Ground: One connection per connector bank.
- Isolated Ground: Four connections per connector bank.
- Control Inputs: Eight connections per connector bank.

- 24 Volts DC - One output per connector. Internally sourced, this will allow up to 60mA to be shared over all general purpose inputs.



PIN	Option A Function	Option B Function
1	Chassis Ground	Chassis Ground
2	General Purpose Input 1	General Purpose Input 9
3	General Purpose Input 2	General Purpose Input 10
4	Isolated Ground	Isolated Ground
5	General Purpose Input 3	General Purpose Input 11
6	General Purpose Input 4	General Purpose Input 12
7	Isolated Ground	Isolated Ground
8	General Purpose Input 5	General Purpose Input 13
9	General Purpose Input 6	General Purpose Input 14
10	Isolated Ground	Isolated Ground
11	General Purpose Input 7	General Purpose Input 15
12	General Purpose Input 8	General Purpose Input 16
13	Isolated Ground	Isolated Ground
14	24V DC (60mA total across both Option A and B pins)	24V DC (60mA total across both Option A and B pins)

Connections and Input

Types External Connections Both Chassis Ground (\Uparrow) and Isolated Ground (\Downarrow) are available on the IM-16 connectors.

By default, all input circuits are isolated with respect to the LSI-16 ground. Any external input connections must be logic referenced to the Isolated Ground. This configuration allows external equipment to be interconnected to the LSI-16 without ground current interaction between devices.

The IM-16 ground appears on a single terminal (Pin 1) on each of the two connector banks ('Option A' and 'Option B'). This should only be used if circuit isolation is not required and should only be connected to the cable screen.

The two isolated grounds of the IM-16 board are connected internally. For ease of wiring each connector, every Control Input pair has an Isolated Ground connection adjacent to it.

Types of Input Circuit

The logic level of each input on the IM-16 may be independently determined in the Vocia software to operate one of four ways. These are;

- **TTL:** 2V to 5V logic sense. To enable a TTL input, apply a TTL logic high with respect to Isolated Ground. This can be configured in software to detect a low to high or high to low transition.
- **High Range:** To enable a High Range input, use a dry contact to switch the input to a voltage of 24V DC with respect to Isolated Ground. This can be configured in software to detect a low to high or high to low transition.
- **High Range – Monitored:** This circuit is implemented in the same way as the ‘High Range’ input. This option allows monitoring of each input for short to ground and open circuit. In order to sense open circuit, a terminating resistor must be fitted between each Control Input and Isolated Ground at the far end of the input circuit being sensed. The IM-16 will sense open circuits on the line between its input and the terminating resistor. Shorts to Isolated Ground are sensed across the entire line being monitored. A 6k8Ω resistor should be used for each input. If a monitoring fault is detected on any input the logic state or transitions on that input will be ignored until the fault is cleared. High Range – Monitored inputs require a low to high transition to enable the input (transition direction not configurable).
- **Contact Closure:** Uses a dry contact without the requirement to use the 24V DC with respect to Isolated Ground.

System Fault Relay Connection

This relay is activated when the LSI-16/LSI-16e is fully operational. It may be used for informing external devices about the LSI-16/LSI-16e’s operating conditions or sounding an alarm that indicates the LSI-16/LSI-16e is not functioning reliably.

RS232

The RS232 port can be used to send VTP commands to the LSI-16/LSI-16e and monitor Vocia system health. Please see the software Help File for details.

24V DC Connector and LED

This is the primary (main) power supply input for the LSI-16 and as such must be fed from a suitable source of 24V DC capable of 15 watts (625mA). The 24V DC supply has to be sourced separately. In typical installations, this supply will be provided from a power supply compliant with local norms and required standards (typically battery-backed). The adjacent LED indicates the presence of power.

Sourcing 24V DC for High Range Inputs

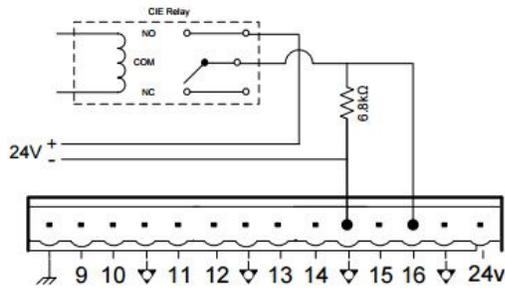
The High Range logic inputs should be driven from a contact closure (relay or switch) in connected equipment. The High Range inputs expect to sense a transition from low-state voltage (0-11V) to high-state voltage (12-30V). A 24V Logic High Reference output voltage is provided by the IM-16 for this purpose. Alternatively an external 24V reference may be used. If an external supply is used, the ground connection of the external supply must be wired to the IM-16 Isolated Ground.

IP30 Compliance

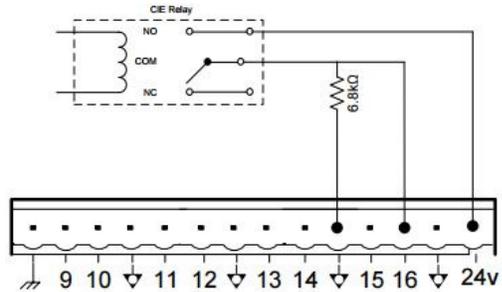
The LSI-16 is designed for ingress protection to the IP30 standard. In order to maintain this compliance, any unused terminal connectors on the back of the unit must be fitted with the supplied terminal blocks.

High Range Monitored

24V provided externally) Active State High

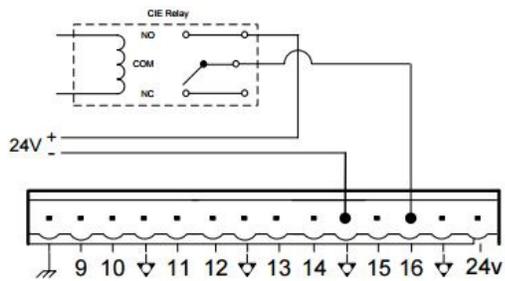


(24V provided by IM-16) Active State High

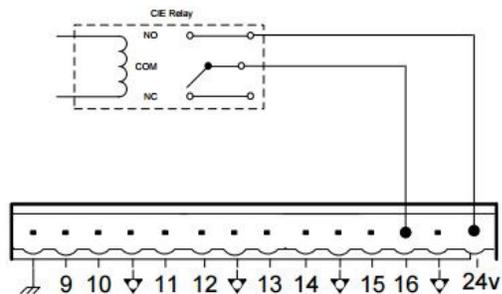


High Range Unmonitored

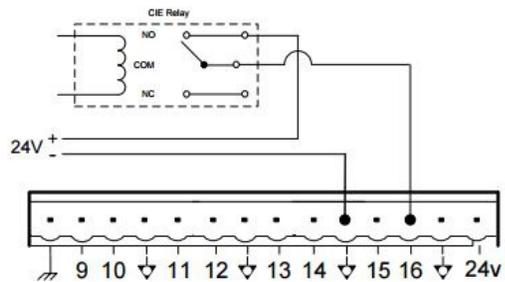
(24V provided externally) Active State: High



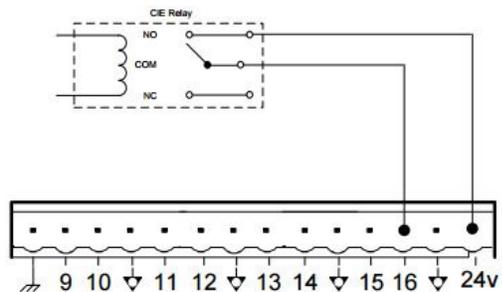
(24V provided by IM-16) Active State: High



24V (External/CIE Provided) Active State: Low



24V (IM-16 Provided) Active State: Low



5V TTL Logic

Active State: Voltage Dependant

