PRAESENSA Public Address and Voice Alarm System

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BOSCH
Invented for life

▶ Networked system devices using a secure IP-infrastructure

▶ Multi-channel amplifiers with effective power utilization

▶ Fail-safe redundancy for highest system availability

▶ Call station with touch screen for optimized user experience

▶ Scalable and flexible system for small to large applications

With PRAESENSA, Bosch has set a new standard in Public Address and Voice Alarm systems. With all system elements being IP-connected and using state-of-the-art technologies, this system combines cost efficiency and audio quality with ease of installation, integration and use. IP-connectivity and amplifier power partitioning enable new levels of scalability and adaptability, and combined with local backup power facilities this makes PRAESENSA equally suited to both centralized and decentralized topologies. PRAESENSA uses only a few different but very flexible system devices, each with unique capabilities, to create sound systems of all sizes for an extremely wide range of applications. PRAESENSA fits to an office with background music in the reception area and some occasional calls, as well as to an international airport with many simultaneous (automated) announcements for flight information, and carefully selected music programs in lounges, restaurants and bars. In all cases, it can be installed to operate also as a certified voice alarm system for mass notification and evacuation. System functions are defined and configured in software and system capabilities can be enhanced via software upgrades. PRAESENSA: one system, endless options.

System overview

PRAESENSA is comprised of the following products. More products will be added to this range; visit www.boschsecurity.com for an up to date overview.

System controller (PRA-SCL)

The system controller manages all system related functions in a PRAESENSA Public Address and Voice Alarm system. It routes all audio connections between network-connected PRAESENSA audio sources and destinations. It supervises and plays back messages and tones, stored on its flash memory, either scheduled or manually started from a call station or PC. It manages the routing of background music streams, along with business calls and emergency

calls, all based on priority level and zone occupancy. It collects all status information of connected system devices, manages the event logs and reports faults. The system controller is network-connected via OMNEO and DC-powered from a multifunction power supply with integrated battery backup, accommodating both centralized and decentralized system topologies. Connections to other devices in the system are made using the built-in 5-port switch, supporting RSTP. The built-in web server allows for system configuration using a browser.

Features
- Full control of PRAESENSA devices and audio routing
- Built-in supervised storage for messages and tone files
- Support for Dante audio input and output streams
- Open interface to third party applications
- IP-networked on OMNEO for audio and control

Multi-channel 600 W amplifiers (PRA-AD604 and PRA-AD608)

PRA-AD604 with 4 channels

PRA-AD608 with 8 channels

This is a flexible and compact multi-channel power amplifier for 100 V or 70 V loudspeaker systems in Public Address and Voice Alarm applications. It fits in centralized system topologies, but also supports decentralized system topologies because of its OMNEO IP-network connection, combined with DC-power from a multifunction power supply. The output power of each amplifier channel adapts to the connected loudspeaker load, only limited by the total power budget of the whole amplifier. This

flexibility, and the integration of a spare amplifier channel, makes it possible to utilize the available power effectively and use less amplifiers for the same loudspeaker load, compared to using traditional amplifiers.
Digital sound processing and control, adjusted to the acoustics and requirements of each zone, allow for better sound quality and speech intelligibility.

Features
- Flexible power partitioning across all channels
- Low power consumption and heat loss
- Full supervision with integrated fail-safe redundancy
- Digital signal processing per channel
- IP-networked on OMNEO for audio and control

End-of-line device (PRA-EOL)
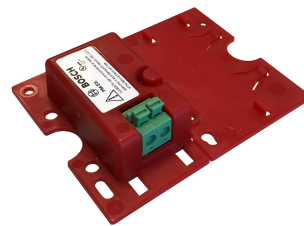
This end-of-line device is a reliable solution for loudspeaker line integrity supervision, which is a requirement for emergency sound systems.
It is connected at the end of a loudspeaker line, after the last loudspeaker of a series of looped-through loudspeakers.
It communicates with the PRAESENSA amplifier channel driving that loudspeaker line, to confirm the integrity of the line.
Where impedance measurements may not detect a disconnected loudspeaker, depending on the number of connected loudspeakers and cable type, or report false faults, the end-of-line device provides a superior solution to report the correct status of the loudspeaker line.
The enclosure size is compatible with the mounting provisions in most Bosch loudspeakers for supervision boards or devices. It can also be reduced in size to fit most cable junction boxes.

Features
- Compact device for loudspeaker end-of-line supervision
- Reliable solution for (long) loudspeaker lines
- Fault detection in amplifier without additional wiring
- Low level, high frequency pilot tone
- Flexible mounting options

Multifunction power supply (PRA-MPS3)

This compact device combines multiple support functions to power and serve other PRAESENSA system devices.

It can be used in a centralized system, but it is an enabler for decentralized system topologies with several smaller racks or cabinets located across the premises, to reduce loudspeaker cabling costs significantly.

It provides DC-power supply to connected amplifiers and peripherals from the mains, with a standards compliant charger for a single 12 V backup battery, saving on installation and battery maintenance costs.

The integrated 6-port Ethernet switch, with glass fiber support, facilitates easy interconnection of decentralized clusters of devices.

Configurable, supervised control inputs and voltage-free control outputs are available as interface to external equipment. Its OMNEO interface for control and fault reporting also provides an analog audio backup lifeline for the connected amplifiers.

Features
- Fully supervised DC-power supply with integrated fail-safe redundancy
- Unique single 12 V battery backup solution
- Integrated 6-port Ethernet switch on RJ45 and SFP
- General purpose control inputs and outputs
- Backup lifeline for connected amplifiers

Desktop and wall mount call station (PRA-CSLD and PRA-CSLW)

PRA-CSLD with gooseneck microphone

PRA-CSLW with hand-held microphone

This call station for use in PRAESENSA Public Address and Voice Alarm systems is easy to install and intuitive to operate because of its touch screen LCD, providing clear user feedback about setting up a call and monitoring its progress, or controlling back ground music.

The call station allows for positioning without much effort, because it only requires a connection to an OMNEO IP-network with Power over Ethernet (PoE) for communication and power supply combined.

It can be configured for use as business call station, but also as emergency call station.

The stylish design incorporates a supervised microphone, an internal monitor loudspeaker and a socket to insert a local audio source for background music.

The 4.3" high-resolution full-color capacitive touch screen gives the operator optimum control and feedback at all times.

Every call station must have at least one PRA-CSE call station extension for zone selection, with a maximum of four extensions.

Features
- Housing fits surface-mounting or flush-mounting
- 4.3" full-color capacitive touch screen
- Graphical user interface for optimum user guidance and feedback
- Status and fault indicators for voice alarm purposes
- Dual OMNEO IP-network connection and redundant Power over Ethernet

Call station extension (PRA-CSE)

This keypad extension is used in combination with PRAESENSA call stations to make selections for business and alarm calls.

One device adds twelve configurable buttons with light ring. Each button has two additional indicators for user feedback, related to the configured functionality of that button.

Features
- Extension keypad for desktop PRA-CSLD and wall-mount PRA-CSLW call station
- Twelve buttons with tactile feedback and configurable functionality
- Light ring around each button for selection confirmation
- Multi-color zone status indicators for buttons configured for zone selection
- Ergonomic button layout with removable front cover for access to button labels

Power supply module 24V (PRA-PSM24 and PRA-PSM48)

The PRA-PSM24 and PRA-PSM48 are compact DIN-rail mounted power supplies. The PRA-PSM24 delivers 24 V at up to 10 A continuously, while the PRA-PSM48 delivers 48 V at up to 5 A continuously. These power supplies are OEM power supplies, made for Bosch by Delta Power Supply, as a cost effective alternative to the PRAESENSA multifunction power supply PRA-MPS3 in case the additional functions and characteristics of the multifunction power supply are not needed. Also, the PRA-PSM24 and PRA-PSM48 are not certified for EN 54-4 and similar standards.

The PRA-PSM24 can be used to power a PRAESENSA system controller or other devices and utilities that need 24 V.

Because of its ability to deliver high peak currents, the PRA-PSM48 can supply sufficient power to a single fully loaded PRAESENSA 600 W power amplifier. The PRA-PSM48 can also power a PRA-ES8P2S Ethernet switch with all its PoE outputs loaded.

Features
- Universal mains input voltage
- Power factor correction
- Protection with automatic recovery
- Approved to power PRAESENSA system devices
- Compact and DIN-rail mountable

Ethernet switch, 8xPoE, 2xSFP (PRA-ES8P2S)

The PRA-ES8P2S is a compact DIN-rail mounted Ethernet switch with eight Gigabit copper ports, supporting Power over Ethernet (PoE) and two Gigabit SFP combo ports. This Ethernet switch is an OEM switch, made for Bosch by Advantech for use in Bosch Public Address and Voice Alarm systems. It is a preconfigured version of the EKI-7710G-2CPI-AE switch, optimized for PRAESENSA. The PRA-ES8P2S is certified for EN 54-16 in combination with PRAESENSA systems. It can be used in addition to the switch ports of the PRAESENSA system controller and multifunction power supply. This is especially convenient in large systems where more SFP ports are needed for long distance interconnections on glass fiber or more PoE-enabled ports are needed to power PRAESENSA call stations.

Features
- 8 x Gigabit ports with PoE
- 2 x Gigabit combo ports with SFP sockets for glass fiber transceivers
- Network redundancy via STP/MSTP/RSTP
- Dual power supply connections
- Fault relay

Fiber transceiver, multimode (PRA-SFPSX and PRA-SFPLX)

The PRA-SFPSX and PRA-SFPLX are compact SFP fiber transceivers. The PRA-SFPSX is for use with multi-mode fibers, covering distances up to 550 m. The PRA-SFPLX is for use with single mode fibers,

covering distances up to 10 km. These are OEM transceivers, made for Bosch by Advantech for use in Bosch Public Address and Voice Alarm systems. An SFP transceiver locks into the SFP socket of the PRAESENSA multifunction power supply and Ethernet switch. It is compliant with IEEE 802.3z Gigabit Ethernet standards for maximum performance, reliability and flexibility. Both transceivers are certified for EN 54-16 in combination with PRAESENSA systems.

Features
- Industry standard small form-factor pluggable (SFP)
- Immovable lock design
- Hot pluggable
- Duplex LC connector
- Full duplex speed support

Functions

Secure IP-infrastructure
- PRAESENSA is a networked sound system in which all system elements are connected to OMNEO. Built upon multiple technologies, including IP and open public standards, OMNEO supports AES67 and Audinate's Dante for audio communication and AES70 for system control, with additional network security implemented using AES128 and TLS, offering real-time authentication and audio encryption on IP as protection against malicious attacks.
- OMNEO offers a mature, professional-grade media networking solution that provides interoperability, unique features for easier installation, better performance, and greater scalability than any other IP offering on the market.

Effective power utilization
- PRAESENSA multi-channel power amplifiers have the unique capability of power partitioning, the total power budget of the amplifier can be freely shared across the output channels.
- The class-D amplifier channels operate at high power supply voltages for direct drive 70 V or 100 V outputs without the need for output transformers that would limit the maximum output power of a channel. This also improves efficiency and audio performance and lowers the weight and size of the amplifier. Galvanic isolation of the amplifier outputs, as required by EN 54-16 and other emergency sound standards, is provided by isolated DC/DC converters and the isolated Ethernet connections. The amplifier channels have a load independent, flat frequency response that accept loudspeaker loads between zero and full load. Each channel serves a separate zone or part of a zone.
- The total amount of output power is defined by the redundant power supply and the heatsink, and because both are shared between the amplifier channels, it doesn't matter how many loudspeakers are connected to each channel, as long as the total combined load does not exceed the maximum of 600 W for the whole amplifier and a load > 300 W is not connected to any other channel than channel 1. A spare amplifier channel is also included to take over a

failing channel, a very cost- and space-effective redundancy measure because this spare channel uses the same redundant power supply and heatsink too.
- The flexibility of variable output power for each channel makes it possible to utilize most of the available amplifier power. Traditional multi-channel amplifiers have a fixed maximum output power per channel. If a channel is not fully loaded, or even not used, the remaining power capability of that channel cannot be claimed by one of the other channels. PRAESENSA systems typically only need half the amount of amplifier power compared to systems with traditional fixed maximum power amplifiers, saving on space, energy and cost.

Highest system availability
- PRAESENSA offers the highest system availability due to conservative derating of all components, supervision of all critical signal paths and functions, and built-in redundancy of all critical system elements.
  PRAESENSA devices have high margins for safety and temperature stability. This is illustrated by the fact that PRAESENSA devices are quite unique in that they may be operated at altitudes of up to 5000 m (16404 ft), an important requirement in Peru, Chile, India, China and other countries. At this altitude the air is less dense and the cooling capacity of air is decreased, making heat removal less effective. Also, the dielectric properties of air change with altitude, decreasing its insulator capabilities. PRAESENSA uses effective heat sinking and significantly increased creepage and clearance distances to maintain safety ratings.
- All system devices use dual Ethernet ports, supporting RSTP, to recover automatically from a broken network link.
- The multifunction power supply offers battery backup facilities to be insensitive to mains failures.
- Amplifiers have an integrated spare amplifier channel to take over from a failing channel automatically. They also have double power supplies built in, working in tandem to minimize stress on components, while each one is capable of supplying full power to the amplifier if one section would fail.
- The amplifiers have two loudspeaker outputs per channel, group A and B, separately supervised and protected, to support connection of interleaving loudspeaker strings in the same zone, so a shorted or interrupted loudspeaker line will not mute that zone completely.

Optimized user experience
- The PRAESENSA call stations provide a combination of a large touch screen LCD with mechanical buttons and LED indicators. Access to system functions and areas can be configured per call station, to provide exactly the functions the operator needs, not more, not less. The user interface has been developed in cooperation with real users and addresses their needs, but also their discomforts when making calls to zones they can't see or hear, or adjusting the volume of background music in these areas.

- Functions are easily selected from the touch screen, and zones are easily selected via keypad keys with LEDs giving immediate feedback on the actual status of that zone. After starting a call, the screen shows the operator the progress of the call, indicating when to speak after a start tone or automatic introduction message has finished, and showing whether the call was successfully completed in all destinations.

Fully-featured as standard

- PRAESENSA is an advanced system for Public Address and Voice Alarm purposes. The system consists of a limited range of hardware devices in combination with software to create the required functions. Because the hardware devices are very complete and flexible to use, only a few different devices are sufficient to create a system. For instance, all call stations and amplifiers have a built-in DSP for sound processing, the amplifiers have flexible output power per channel and a built-in spare channel, the power supply has a built-in battery charger, and so on. No need for separate add-ons.
- System functions are software based and regularly updates become available to extend the set of capabilities.

Scalable and flexible

- PRAESENSA is an extremely scalable and flexible system. All devices are network connected and offer loop-through connectivity for easy system expansion and RSTP to create a fail-safe network loop. System devices can be decentralized and their redundant loop wiring often allows for cheap non fire-resistant network cables to be used.
- PRAESENSA uses dynamic channel allocation. Because devices do not use static routing, amplifiers and call stations do not have a permanent audio connection to the system controller. That approach would limit the number of devices, since an 8-channel amplifier would at least need 8 connections, 100 amplifiers would need 800 connections to be independent. Instead, PRAESENSA uses dynamic OMNEO connections that are generated on the fly when needed and freed up after use. Dynamic streams occupy the least bandwidth; if there is no audio transport going on, the channels are simply not there. Furthermore, this is a scalable solution compared to static channels, which are limited to the number of interconnections that can be handled by the device that contains the audio matrix. All OMNEO audio streams are set up as multicast, directly from the source (the transmitting device, such as a call station) to the destinations (the receiving devices, such as amplifier channels). This connection is setup by the system controller using OCA (AES70). The audio matrix is in the network itself, not in a single unit. In this way, there is no real limitation on the number of source and destination devices. The only limitation is on the number of simultaneous (different) audio streams, which is above 100 and more than enough for even the busiest applications.
- Multifunction power supplies have an integrated battery charger for single 12 V battery based backup power, facilitating easy system decentralization.

Amplifiers can be placed closer to the loudspeakers, reducing loudspeaker cabling costs, which is especially advantageous in case of expensive fire-resistant loudspeaker cables.
- DSP power is available in all call stations and amplifiers, so DSP power grows with every device added to the system.
- Every zone has its own amplifier channel for dedicated audio content. Users can make personal music and volume selections, while announcement levels are not affected and loudspeaker line supervision is not impaired. The amplifier's built-in DSP allows the sound in each zone to be adjusted to the needs and taste of the audience in that area.
- The complexities of traditional system planning make little room for error or last-minute changes. With PRAESENSA however, flexibility is built-in, allowing for an agile and adaptive approach to planning. PRAESENSA allows for future changes to the areas covered by the system, with minimal or no equipment changes. Thus, initial planning is less sensitive to later small changes, which could impact profitability.

Architects' and Engineers' Specifications - PRAESENSA system

The Public Address and Voice Alarm System shall be fully IP-network based. All system devices such as system controller, amplifiers and call stations shall communicate via IP, using an Audio over IP (AoIP) protocol that supports AES67 for audio and using AES70 for control, with encryption and authentication to prevent unauthorized access, misuse and modification of data. The audio part shall support Layer 3 connections via routers between subnets with latency of less than 10 ms and synchronized outputs. The control data part shall be guaranteed by Transmission Control Protocol (TCP) Layer 4. The system shall support >100 simultaneous channels for music routing and making calls, using an uncompressed, high-definition digital audio format with 24-bit sample size and 48 kHz sample rate. A system based on a single system controller shall support at least 200 system devices and 500 zones. System functionality shall be defined in software, allowing for regular updates for functional and/or security improvements. The system software shall run on the system controller with additional firmware on other system devices for device-related functions. Upload and installation of new firmware into the system devices shall be secure. System configuration shall be possible using a standard web browser, connected to the embedded webserver in the system controller, using HTTPS (HTTP Secure) communication. It shall support multiple access levels with associated access rights. After completion of the system configuration, no connection to a PC shall be required for operation. The system software shall support the discovery and assignment of all system devices in a system and the individual configuration of each device. The system software shall support configurable call definitions for user calls and related

actions that can be assigned to virtual and/or real control inputs and call station buttons. A call definition shall define the following: priority, start and end tones with volume setting, an audio input for live speech insertion with volume setting, a message or sequence of messages with a number of repetitions and volume setting, maximum call duration and optional automatic scheduling with duration and interval. The system software shall permit uploading of individual wav-files for messages and tones to the system controller, with integrity supervision of stored wav-files. It shall support zone definition and zone grouping with amplifier channel to zone assignment. The system software shall configure and control all device inputs and outputs in the system, including audio processing functions, operation modes, assigned functions and connections and the supervision thereof. The system shall include diagnosis and logging software, supporting different modes of inquiry, including call events and fault events. It shall be possible to view fault events, collected by the system controller, on a call station screen, including the fault status of connected third party equipment. It shall be possible to acknowledge and reset faults and alarm states, and to log these actions.

The system devices shall be certified for EN 54 and ISO 7240, marked for CE and be compliant with the RoHS directive. Warranty shall be three years minimum. The system shall be a Bosch PRAESENSA system.

Certifications and approvals

Emergency standard certifications

Europe	EN 54-16
International	ISO 7240-16

Regulatory areas

Safety	EN/IEC/CSA/UL 62368-1
Immunity	EN 55024 EN 55103-2 (E1, E2, E3) EN 50130-4
Emissions	EN 55032 EN 61000-6-3 ICES-003 ANSI C63.4 FCC-47 part 15B class A

Conformity declarations

Europe	CE/CPR
Environment	RoHS

Technical specifications

Electrical

Control

Audio routing (dynamic) OMNEO channels	Unlimited
Tone/message playback (dynamic) OMNEO channels	8
Audio inputs (static) Dante or AES67 channels	120
Audio outputs (static) Dante channels	8

Network interface

Ethernet	100BASE-TX, 1000BASE-T
Protocol	TCP/IP
Redundancy	RSTP
Audio/control protocol	OMNEO
Network audio latency	10 ms
Audio data encryption	AES128
Control data security	TLS

Environmental

Climatic conditions

Temperature Operating	-5 to +50 ℃ (23 to 122 ℉)
Storage and transport	-30 to +70 ℃ (-22 to 158 ℉)
Humidity (non condensing)	5 to 95 %
Air pressure (operating)	560 to 1070 hPa
Altitude (operating)	-500 to +5000 m (-1640 to 16404 ft)

Vibration (operating)
    Amplitude
    Acceleration
	< 0.7 mm
	< 2 G

Bump (transport)	< 10 G

> **i** **Notice**
>
> See technical specifications of individual system devices for additional device specific data.

Ordering information

PRA-SCL System controller, large
Network-connected, DC-powered, system controller and message manager for Public Address and Voice Alarm applications.
Order number **PRA-SCL**

PRA-AD604 Amplifier, 600W 4-channel
Network connected, DC powered, 4-channel, 600 W power amplifier with integrated spare channel and DSP functions.
Order number **PRA-AD604**

PRA-AD608 Amplifier, 600W 8-channel
Network-connected, DC-powered, 8-channel, 600 W power amplifier with integrated spare channel and DSP functions.
Order number **PRA-AD608**

PRA-EOL End-of-line device
Device for loudspeaker line integrity supervision in Public Address and Voice Alarm applications.
Order number **PRA-EOL**

PRA-MPS3 Multifunction power supply, large
Power supply with battery charger for up to three amplifiers and a controller, with integrated network switch and control inputs and outputs.
Order number **PRA-MPS3**

PRA-CSLD Desktop LCD call station
Network-connected, PoE powered, touch screen call station with gooseneck microphone.
Order number **PRA-CSLD**

PRA-CSLW Wallmount LCD call station
Network-connected, PoE powered, touch screen call station with hand-held microphone.
Order number **PRA-CSLW**

PRA-CSE Call station extension
Button key extension for a PRAESENSA call station (PRA-CSLD or PRA-CSLW), twelve configurable buttons with status indicators.
Order number **PRA-CSE**

PRA-PSM24 Power supply module 24V
24 V DIN-rail mountable power supply, full aluminum body
Order number **PRA-PSM24**

PRA-PSM48 Power supply module 48V
48 V DIN-rail mountable power supply, full aluminum body
Order number **PRA-PSM48**

PRA-ES8P2S Ethernet switch, 8xPoE, 2xSFP
Managed 10-port Ethernet switch with PoE and SFP.
Order number **PRA-ES8P2S**

PRA-SFPSX Fiber transceiver, multimode
1000BASE-SX SFP module for multi-mode fiber (550 m)
Order number **PRA-SFPSX**

PRA-SFPLX Fiber transceiver, single mode
1000BASE-LX SFP module for single mode fiber (10 km).
Order number **PRA-SFPLX**