

PRAESENSA

Public Address and Voice Alarm System

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1 About

This Underwriter's Laboratory Listing Document (ULLD) describes the design and operation of the Bosch PRAESENSA Public Address and Voice Alarm system, including the individual PRAESENSA devices that may be used in standalone or networked configurations.

PRAESENSA provides the following main features:

- 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



Notice!

When PRAESENSA is installed according to this ULLD, PRAESENSA is compliant with the *Standards, page 10*.

1.1 Nomenclature

Throughout this manual, a term like "fault" is used. Instead, a similar meaning/description can be read.

Original description	Similar meaning/description
Fault	Trouble

1.2 System limitations

An automatic fire alarm system - typically made up of smoke detectors, heat detectors, manual pull stations, audible warning devices, and a fire alarm control panel (FACP) with remote notification capability - can provide early warning of a developing fire. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire.

An emergency communication system - typically made up of an automatic fire alarm system (as described above) and a life safety communication system that may include an autonomous control unit (ACU), local operating console (LOC), voice communication, and other various interoperable communication methods - can broadcast a mass notification message. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire or life safety event.

Audible warning devices such as bells, horns, strobes, speakers and displays may not alert people if these devices are located on the other side of closed or partly open doors or are located on another floor of a building. Any warning device may fail to alert people with a disability or those who have recently consumed drugs, alcohol, or medication. Please note that:

- An emergency communication system may take priority over a fire alarm system in the event of a life safety emergency.
- Voice messaging systems must be designed to meet intelligibility requirements as defined by NFPA, local codes, and Authorities Having Jurisdiction (AHJ).
- Language and instructional requirements must be clearly disseminated on any local displays.

- Strobes can, under certain circumstances, cause seizures in people with conditions such as epilepsy. To reduce this risk make sure strobes in the same visual area are synchronized.
- Studies have shown that certain people, even when they hear a fire alarm signal, do not respond to or comprehend the meaning of the signal. Audible devices, such as horns and bells, can have different tonal patterns and frequencies. It is the property owner's responsibility to conduct fire drills and other training exercises to make people aware of fire alarm signals and instruct them on the proper reaction to alarm signals.
- In rare instances, the sounding of a warning device can cause temporary or permanent hearing loss.

A life safety system will not operate without any electrical power. If AC power fails, the system will operate from standby batteries only for a specified time and only if the batteries have been properly maintained and replaced regularly.

Equipment used in the system may not be technically compatible with the PRAESENSA system. It is essential to use only equipment listed for service with your PRAESENSA system.

Telephone lines needed to transmit alarm signals from a premises to a central monitoring station may be out of service or temporarily disabled. For added protection against telephone line failure, backup radio transmission systems are recommended.

The most common cause of life safety system malfunction is inadequate maintenance. To keep the entire life safety system in excellent working order, ongoing maintenance is required per the manufacturer's recommendations, and UL and NFPA standards. At a minimum, the requirements of NFPA 72 shall be followed. Environments with large amounts of dust, dirt, or high air velocity require more frequent maintenance. A maintenance agreement should be arranged through the local manufacturer's representative. Maintenance should be scheduled as required by National and/or local fire codes and should be performed by authorized professional life safety system installers only. Adequate written records of all inspections should be kept.

1.3 Installation precautions

Adherence to the following will aid in problem-free installation with long-term reliability:

WARNING - Several different sources of power can be connected to the PRAESENSA system. Disconnect all sources of power before servicing. Control unit and associated equipment may be damaged by removing and/or inserting cards, modules, or interconnecting cables while the unit is energized. Do not attempt to install, service, or operate this unit until manuals are read and understood.

CAUTION - System Re-acceptance Test after Software Changes: To ensure proper system operation, this product must be tested in accordance with NFPA 72 after any programming operation or change in site-specific software. Re-acceptance testing is required after any change, addition or deletion of system components, or after any modification, repair or adjustment to system hardware or wiring. All components, circuits, system operations, or software functions known to be affected by a change must be 100 % tested. In addition, to

ensure that other operations are not inadvertently affected, at least 10% of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, must also be tested and proper system operation verified.

Verify that wire sizes are adequate for all initiating and indicating device loops. Most devices cannot tolerate more than a 10% I.R. drop from the specified device voltage.

Like all solid state electronic devices, this system may operate erratically or can be damaged when subjected to lightning induced transients. Although no system is completely immune from lightning transients and interference, proper grounding will reduce susceptibility.

Overhead or outside aerial wiring is not recommended, due to an increased susceptibility to nearby lightning strikes. Consult with the Technical Services Department if any problems are anticipated or encountered.

Disconnect AC power and batteries prior to removing or inserting circuit boards. Failure to do so can damage circuits.

Remove all electronic assemblies prior to any drilling, filing, reaming, or punching of the enclosure or rack. When possible, make all cable entries from the sides or rear. Before making modifications, verify that they will not interfere with battery, transformer, or printed circuit board location.

Do not tighten screw terminals more than 9 in-lbs. Over-tightening may damage threads, resulting in reduced terminal contact pressure and difficulty with screw terminal removal.

This system contains static-sensitive components. Always ground yourself with a proper wrist strap before handling any circuits so that static charges are removed from the body. Use static suppressive packaging to protect electronic assemblies removed from the unit.

Follow the instructions in the installation, operating, and programming manuals. These instructions must be followed to avoid damage to the PRAESENSA devices and associated equipment. FACP operation and reliability depend upon proper installation.

FCC Warning

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual may cause interference to radio communications. It has been tested and found to comply with the limits for class A computing devices pursuant to Subpart B of Part 15 of FCC Rules, which is designed to provide reasonable protection against such interference when devices are operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user will be required to correct the interference at his or her own expense.

Canadian Requirements

This digital apparatus does not exceed the Class A limits for radiation noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

1.4 Software downloads and installation

In order to supply the latest features and functionality in fire alarm and life safety technology to our customers, we make frequent upgrades to the embedded software in our products. To ensure that you are installing and programming the latest features, we strongly recommend that you download the most current version of software for each product prior to commissioning any system.

Contact Technical Support with any questions about software and the appropriate version for a specific application.

UL 2572 compliant software version(s)

Release date	Released version	Reason
2021-12	1.4x	Official release

1.5 Standards

PRAESENSA complies with the following standards:

Certification	Standard
Underwriters Laboratories (UL)	UL2572 for Mass Notification Installations
Standard for Control Units and Accessories for Fire Alarm Systems	UL864 10th Edition
FCC Part 15, Class A	

PRAESENSA is familiar with the following standards:

Certification	Standard
National Fire Alarm and Signaling Code	NFPA 72
National Electrical Code (NEC)	NFPA 70
Power Supplies for Fire Protective Signaling Systems	UL1481
Amplifiers for Fire Protective Systems	UL1711
Audible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories	UL 464
Occupational Safety and Health Administration	OSHA 1910.165
Americans with Disabilities Act	ADA

1.6 Supplemental documentation

The following table provides an overview of PRAESENSA supplemental documentation.

Product	Document	Description and location
All PRAESENSA products	PRAESENSA Installation manual	Detailed instructions for installation. www.boschsecurity.com > PRAESENSA product section.

Product	Document	Description and location
All PRAESENSA products	PRAESENSA Configuration manual	Detailed instructions for configuration/programming, diagnosis and operation. www.boschsecurity.com > PRAESENSA product section.

1.7 UL 2572 Compliance

The following PRAESENSA products have been certified to comply with the requirements in the UL 2572 standard for Mass Notification Installations:

Product	Description
PRA-SCL	System controller, large
PRA-SCM	System controller, medium
PRA-SCS	System controller, small
PRA-AD604	Amplifier, 600W 4-channel
PRA-AD608	Amplifier, 600W 8-channel
PRA-EOL-US	End-of-line device
PRA-MPS3	Multifunction power supply, large
PRA-CSLD	Desktop LCD call station
PRA-CSLW	Wallmount LCD call station
PRA-CSE	Call station extension
PRA-ES8P2S	Ethernet switch, 8xPoE, 2xSFP
PRA-SFSPX	Fiber transceiver, multimode
PRA-SFPLX	Fiber transceiver, single mode
PRA-FRP1-US	First responder panel for USA, 1-extension
PRA-FRP2-US	First responder panel for USA, 2-extensions
PRA-FRP3-US	First responder panel for USA, 3-extensions

1.8 Cautions and Warnings

1. Follow all installation instructions and observe the following alert signs:



Notice! Containing additional information. Usually, not observing a notice does not result in damage to the equipment or personal injuries.



Caution! The equipment or the property can be damaged, or persons can be injured if the alert is not observed.



Warning! Risk of electric shock.

1.9 Copyright notice

Unless otherwise indicated, this publication is the copyright of Bosch Security Systems B.V. All rights are reserved.

1.10 Trademarks

Throughout this document trademark names may have been used. Rather than put a trademark symbol in every occurrence of a trademark name, Bosch Security Systems states that the names are used only in an editorial fashion and to the benefit of the trademark owner with no intention of infringement of the trademark.

1.11 Notice of liability

While every effort has been taken to ensure the accuracy of this document, neither Bosch Security Systems nor any of its official representatives shall have any liability to any person or entity with respect to any liability, loss or damage caused or alleged to be caused directly or indirectly by the information contained in this document.







Bosch Security Systems reserves the right to make changes to features and specifications at any time without prior notification in the interest of ongoing product development and improvement.






1.12 Document history

Release date	Documentation version
2020-10	V0.08
2021-07	V0.11
2021-09	V0.12
2021-10	V.013
2021-12	V0.14 V0.15 V0.15a / V1.0
2024-02	V1.1

2 PRAESENSA product overview

The following table gives an overview of the available PRAESENSA products.

Order number	Product view	Product name	Main function
PRA-SCL PRA-SCM PRA-SCS		System controller, large System controller, medium System controller, small	Full control of PRAESENSA devices and audio routing. Built-in supervised storage for messages and tone files. Open interface to third party general signaling and BGM applications.
PRA-AD604		Amplifier, 600W 4-channel	Power partitioning across four channels. Supplying output power to loudspeakers channels.
PRA-AD608		Amplifier, 600W 8-channel	Power partitioning across eight channels. Supplying output power to loudspeakers channels.
PRA-EOL-US		End-of-line device	Loudspeaker end-of-line supervision. Fault detection in amplifier.
PRA-MPS3		Multifunction power supply, large	Powering of system controller and amplifiers. Backup lifeline for connected amplifiers. General purpose control inputs and outputs. 12 V battery backup.
PRA-CSLD		Desktop LCD call station	Producing live, and/or recorded messages, announcements/calls. Used in combination with at least one PRA-CSE for loudspeaker zone and actions selection.

Order number	Product view	Product name	Main function
PRA-CSLW		Wallmount LCD call station	Producing live, and/or recorded messages, announcements/calls. Used in combination with at least one PRA-CSE for loudspeaker zone and actions selection.
PRA-CSE		Call station extension	Loudspeaker zone and actions selection. Used in combination with PRA-CSLD and PRA-CSLW.
PRA-ES8P2S		Ethernet switch	10 port Ethernet switch with PoE and SFP.
PRA-SFPSX PRA-SFPLX		Fiber transceivers	(SX) For multi mode fibers, covering distances up to 550 m (LX) For single mode fibers, covering distances up to 10 km.
PRA-FRP1-US PRA-FRP2-US PRA-FRP3-US		First responder panel USA, 1-extension First responder panel USA, 2-extensions First responder panel USA, 3-extensions	For emergency control of live, and/or recorded messages, announcements/calls, loudspeaker zone and actions selection.

3 Installation wiring

3.1 Wiring procedures and instructions

**Caution!**

All work activities necessary for the installation, connection and commissioning are to be carried out by electrically skilled persons only.

**Notice!**

UL notifications

For proper supervision, do not loop wire under terminals. Break the wire run to provide supervision of connections.

3.1.1 Location of racks and enclosures

In order to ensure that the standards compliance of PRAESENSA is not compromised, the PRAESENSA devices, the interconnections to the Fire Detection System, network infrastructure, loudspeakers and loudspeaker wiring must be installed in accordance with the provisions of applicable standards and the directions provided in this Bosch PRAESENSA ULLD.

**Notice!**

The installation document of the fire product shall specify that all wiring, including that to the non-fire alarm equipment, shall be installed in accordance with the requirements of the National Fire Alarm and Signaling Code, NFPA 72.

Access level

- All PRAESENSA devices must be installed at a physical security level 1 according to the UL2572 by means of installation in a lockable rack as described in *Mounting the 19"-rack devices, page 16* or in the lockable housing of the first responder panel (see *First responder panel | PRA-FRPx-US, PRA-FRPx-USNY, page 108*).
- For PRAESENSA call stations configured for ancillary functionality and priority and not intended for emergency control, access level 0 suffices.

3.1.2 Equipment racks and cabinets

The following PRAESENSA 19" devices must be installed in a UL50-listed Lowell rack including a fully vented steel front and rear door, required for ventilation and Physical Access Control level 1. See *Mounting the 19"-rack devices, page 16*.

- PRA-SCx
- PRA-AD604
- PRA-AD608
- PRA-MPS3
- PRA-ES8P2S
- PRA-SFPSX
- PRA-SFPLX
- R1002ULADA
- RE2
- RE2R

When strobes are required an Altronix R1002ULADA - Rack Mountable NAC Power Extender and RE2 - Rack Mount Battery Enclosure can be installed in the same UL50-listed Lowell rack.

When a combination of clear strobes for Fire Alarm and amber strobes for MNS are required, at least two separate R1002ULADA must be installed.
See also *System Configuration, page 145*, Interconnection with fire system with amber and clear strobes.

First responder panel

The PRA-CSLD, PRA-CSLW and PRA-CSE with Physical Access Control level 0 can only be used for ancillary functionality.

For emergency control of the PRAESENSA system the First responder panel for USA (PRA-FRPx-US) can be used. The lockable door of this device ensures Physical Access Control level 1. See *First responder panel | PRA-FRPx-US, PRA-FRPx-USNY, page 108*.

End-of-Line board

The End-of-Line board (PRA-EOL-US) must be installed in an UL-listed junction box to ensure Physical Access level 1. See *Mounting, page 57*.

3.1.3

Mounting the 19"-rack devices

- Only use UL50-listed Lowell racks and make sure that each rack is of suitable quality to support the weight of the devices.
- Only UL-listed installation materials are allowed inside the UL50-listed Lowell rack.
- The PRAESENSA equipment must be installed in the following order inside the UL50-listed Lowell rack for UL864/UL2572 compliancy:
 - Amplifiers (top)
 - Multifunction power supplies
 - NAC extender
 - (redundant) System controller
 - Switch
 - Batteries (bottom)

Batteries can also be placed on the following listed shelves when more space for batteries is required:

Chatsworth

- 14072-119
- 14072-219
- 14072-719



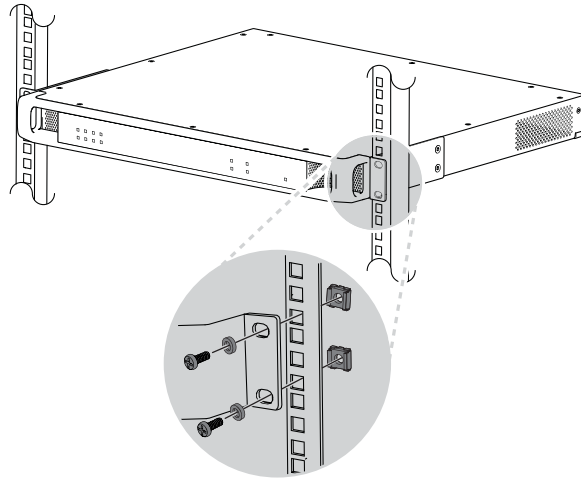
Caution!

For stability, secure rack in appropriate way.



- Mounting brackets are used to mount the device in 19"-equipment racks.

- Ventilation inlets should be kept free of obstacles and dust. Fans are controlling the airflow based on internal temperature. Airflow is from the front to the rear and sides.



The PRAESENSA 19"-devices are equipped with removable mounting brackets for mounting in a 19"-rack. Use four caged nuts, nylon cup washers and pan head bolts for mounting.



Caution!

The rack must be grounded to a safety ground. All PRAESENSA 19"-devices have a chassis ground screw on the rear panel, which must be used for a wire connection to the rack frame. Use a thick, multi-strand wire (>2.5 mm²) with wire eyelets and washers for a solid connection.

3.1.4

Field wire cable requirements

Prior to installation

Confirm the following:

- The cable selected is proper for the application, taking into account all applicable local, state, provincial, and national codes.
- The cable has not been damaged in transit or storage.

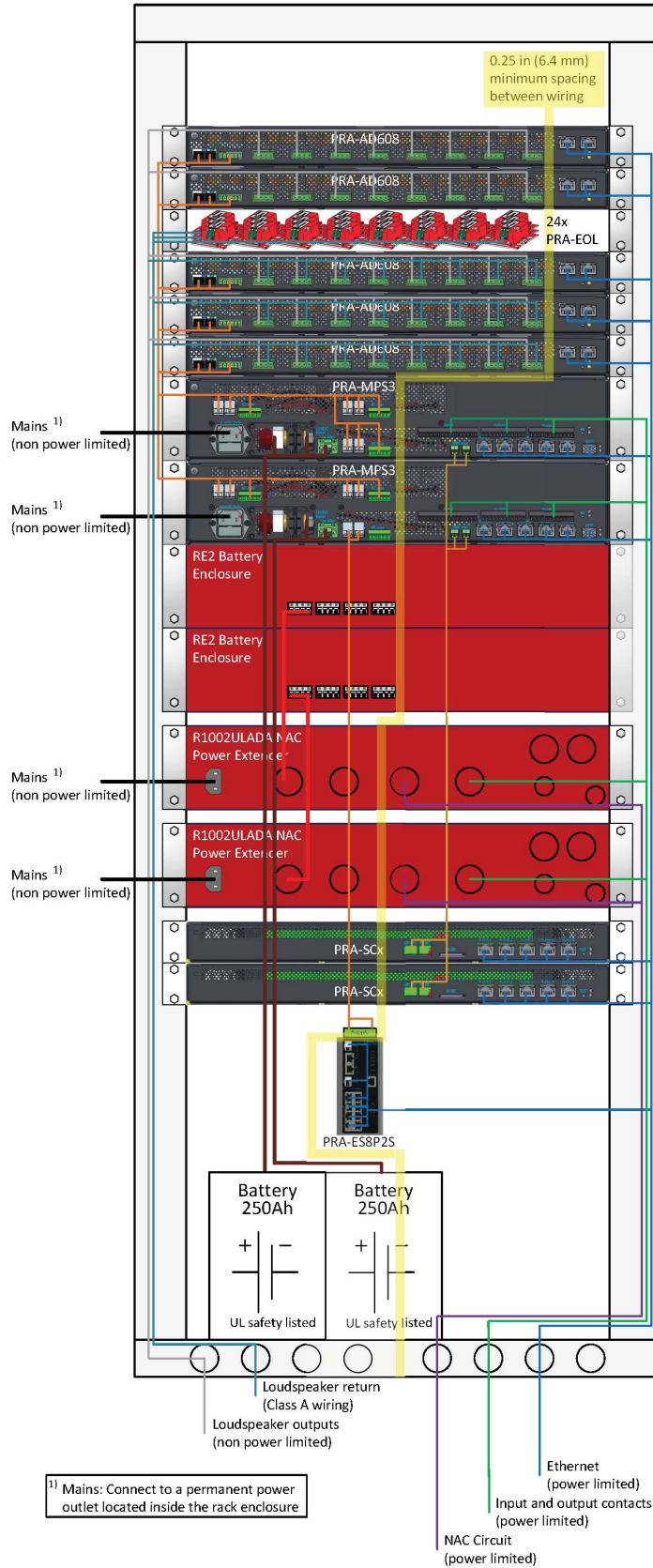
During cable installation

The following factors must be considered:

- Do not exceed the fill capacity of raceways and cable trays.
- Use grommets to protect cables when passing through metal studs or anything that can possibly cause damage.
- Obey bending rules of cables and maximum pull force.
- Be sure to firestop all cables that penetrate a firewall.
- Use plenum rated cable where it is mandated.
- Use fire resistant cable when it is mandated.

Separation of circuits

- Separate Class 1 wiring from other class wiring. A minimum distance of 6.4 mm between Class 1 and other classes must be obtained for the field installed wiring.
- Wiring routing inside a rack:
 - Left hand side type of wiring : Mains, 12 V+ NTC, 48 V, Lifeline, 70/100 V.
 - Right hand side type of wiring: Ethernet, 24 V, I/O contact.



Cable type recommendations

Mains cable

- Use the supplied mains cable that came with the multifunction power supply or an equivalent.
- Connect the mains cable of the rack with a fixed connection to the mains branch circuit.

Loudspeaker cable

- When selecting cables and wire gauge take into account the length and loudspeaker load to avoid excessive power loss. Make sure that the signal level at the end of the loudspeaker line has not dropped with more than 2 dB (this is approximately 20%), as this will also affect proper operation of the end-of-line device.

The table shows the required wire size for copper wires, to keep the loss at the end of the loudspeaker line below 2 dB, when all the load is at the end of the cable. In practice the load will be more distributed and then the attenuation will be less than 2 dB. Round up the actual load power and cable length to the next number in the table. Copper clad aluminum (CCA) wires are cheaper but have a higher resistance than copper for the same diameter. When using CCA cables, take the next bigger wire size from the table. **Examples:**

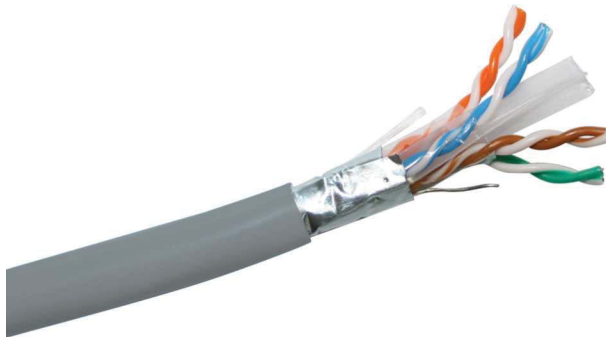
- A 150 W loudspeaker load on a loudspeaker line of 480 m in a 100 V system. Round up to table values 200 W and 500 m. This requires 1.5 mm² copper wires or 2.5 mm² CCA wires.
- A 150 W loudspeaker load on a 1200 ft loudspeaker line in a 70 V system. Round up to table values 150 W and 1312 ft. This requires AWG 14 copper wires or AWG 12 CCA wires.
- When selecting cables and wire gauge take into account the maximum loudspeaker cable capacitance specified for the amplifier.
- When end-of-line supervision is used, take into account the maximum loudspeaker cable capacitance specified for the end-of-line device.

Conversion									
mm ²	0.5	0.75	1	1.5	2.5	4	6	10	16
AWG	20	18	17	16	14	12	10	8	6

Cable length		Minimum wire cross section [mm ²]								
[m]	[ft]									
1000	3280	0.5	0.75	1.5	4	6	6	10	10	16
900	2952	0.5	0.75	1.5	2.5	4	6	10	10	10
800	2624	0.5	0.75	1.5	2.5	4	6	6	10	10
700	2296	0.5	0.5	1	2.5	4	4	6	6	10
600	1968	0.5	0.5	1	2.5	2.5	4	6	6	10
500	1640	0.5	0.5	0.75	1.5	2.5	4	4	6	6
400	1312	0.5	0.5	0.75	1.5	2.5	2.5	4	4	6
300	984	0.5	0.5	0.5	1	1.5	2.5	2.5	2.5	4
250	820	0.5	0.5	0.5	0.75	1.5	1.5	2.5	2.5	4

200	656		0.5	0.5	0.5	0.75	1	1.5	1.5	2.5	4
150	492		0.5	0.5	0.5	0.5	0.75	1	1.5	1.5	2.5
100	328		0.5	0.5	0.5	0.5	0.5	0.75	0.75	1	1.5
50	164		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.75
[W]	@100 V	20	50	100	200	300	400	500	600	600	-
[W]	@70 V	10	25	50	100	150	200	250	300	300	400
Loudspeaker power at end-of-line											

Ethernet copper cable



- All PRAESENSA devices are designed to be used with Gigabit transmission (1000BASE-T), so be sure to use CAT5e or higher network cables. You can use CAT6 and CAT7 cables as necessary. According to their specifications, CAT5e or higher cables can transmit data up to 100 m, but the actual potential transmission distance varies depending on factors such as the cable and termination quality and the environment in which the cable is used. In case of doubt use a cable checker to see whether the cable conforms to CAT5e (TIA/EIA-568-B).

Ethernet glass fiber cable

- Use single mode or multi-mode glass fiber that fits the SFP transceiver. Take the maximum cable length and attenuation into account.

Product	Glass fiber	Max. attenuation	Max. length
PRA-SFPLX	Single mode	10.5 dB	10 km
PRA-SFPSX	Multi mode	8.5 dB	550 m

Long range interconnections

Copper CAT-wiring for Ethernet is limited to a distance of 100 m between nodes. Longer distances can be covered by using Gigabit fiber interconnections with SFP transceivers. Some PRAESENSA devices have one or more SFP sockets for this purpose. But call stations need Power over Ethernet (PoE), which cannot be transported on fiber connections. For distances above 100 m there is the following alternative:

- It is possible to use special Ethernet cables that deliver 1 Gbps and PoE+ up to 196 m. See Gamechanger cables (<http://www.paigedatacom.com/>).

3.1.5

Security and data protection

- PRAESENSA is suitable for Communication Security level 1.
- PRAESENSA supports Access Security Level 2 when at least eight characters are used as passwords and when the configuration software - Automatic logout after inactivity of 30 minutes or less is configured under system options (*System options, page 135*).

3.2 Battery calculation

The PRAESENSA system includes multifunction power supplies, like the PRA-MPS3, to power other PRAESENSA devices from the mains, but also from a battery in case of mains failures. Each multifunction power supply uses its own battery.

3.2.1 Topology

Each PRA-MPS3 multifunction power supply has the capability to power up to three amplifiers via 48 VDC, one system controller (or other device) via 24 VDC and a Call station via PoE. A single 12 V battery is charged by the multifunction power supply to which it is connected. This battery serves as a backup power source during mains failures. The required capacity of each battery must be calculated separately for the PRA-MPS3 it is connected to, taking the load into account that is served by this specific PRA-MPS3. For the devices that are powered from a PRA-MPS3, it is important to notice that the power consumption of each device may vary depending on operation modes and how it is connected. When the power consumption has been calculated or measured, the corresponding battery current draw (in case of a mains failure) can be calculated or measured. The power taken from the battery will always be slightly higher than the power that is consumed by the device, because of additional losses in the DC/DC converters inside the PRA-MPS3 that convert the battery voltage to 48 VDC and 24 VDC.

3.2.2 Operating conditions

PRA-SCL

The power consumption of the controllers is relatively small, stable and hardly affected by system activities. The PRA-SCL is powered from the 24 VDC output of the PRA-MPS3. Only the number of active Ethernet ports increases the power consumption.

PRA-CSLD | PRA-CSLW | PRA-CSE

The power consumption of the PRA-CSLD and PRA-CSLW is the same. Again, the power consumption consists of a fixed part with an increment per active Ethernet port. Power is supplied via PoE to one or both ports. Power is taken from the port that has the highest PoE voltage. This means that if a call station is powered from two different PoE sources, like two different PRA-MPS3 power supplies for additional redundancy, because of tolerances all of the power may be taken from one of the power supplies. Only upon disconnection of that Ethernet cable, the call station will take power from the other power supply. Even if both PoE voltages are the same, using one short cable and one long cable may result in that most of the power is taken via the shortest cable because then the voltage drop across the wire resistance of each cable is equal.

Connecting PRA-CSE extensions to the call station will increase its power consumption slightly, the increment depends on the number of LEDs that are on, but on average that contribution is very limited because selections are only active during calls.

PRA-FRP3-US

The power consumption of the PRA-FRP3-US consists of a fixed part including two active Ethernet ports as the PRA-FRP3-US must be installed with both Ethernet and PoE ports connected. Power is taken from the port that has the highest PoE voltage. This means that if a first responder panel is powered from two different PoE sources, like two different PRA-MPS3 power supplies for additional redundancy, because of tolerances all of the power may be taken from one of the power supplies. Only upon disconnection of that Ethernet cable, the first responder panel will take power from the other power supply. Even if both PoE

voltages are the same, using one short cable and one long cable may result in that most of the power is taken via the shortest cable because then the voltage drop across the wire resistance of each cable is equal.

During a trouble condition, the sounder of the first responder panel is activated as an audible trouble alarm. The power consumption of the sounder during mains absent must then be taken into account because the fault may not be acknowledged resulting in an activated sounder during the standby time.

PRA-AD604 | PRA-AD608

The PRA-AD604 and PRA-AD608 amplifiers are designed for low power consumption, especially when powered from a battery, by incorporating different modes of operation. When the mains voltage on the PRA-MPS3 fails, it switches to the battery to take power from. The PRA-MPS3 notifies the amplifier of this and when the amplifier doesn't have to make announcements of high enough priority, it will go into sleep mode or snooze mode and notifies the PRA-MPS3 to switch off the 48 VDC power section to this amplifier. The amplifier then operates directly from the battery via the lifeline interconnection. In sleep mode the power consumption is lowest but there is no amplifier and loudspeaker line supervision active. When supervision has been enabled (as required for UL864 and UL2572 compliancy) for this amplifier, the amplifier will go into snooze mode, which is a combination of being in sleep mode for most of the time, but waking up into idle mode to perform a supervision cycle for a few seconds every 90 seconds. The average power consumption in snooze mode is somewhat larger than in sleep mode. When a call is being made or a tone played to one or more of the channels, the amplifier immediately requests the PRA-MPS3 to switch on the 48 VDC power supply again and the amplifier will operate from the normal supply voltage. The power consumption of the active amplifier will then vary between the value for low power (small signal audio or small loudspeaker load) and full power (audio in full load at maximum level).

In all modes, the power consumption of the active Ethernet ports must be taken into account.

Because the PRA-AD608 has nine amplifier channels, while the PRA-AD604 has five channels, the power consumption of the PRA-AD608 is slightly higher than of the PRA-AD604.

PRA-ES8P2S

This Ethernet switch has a dual 48 V DC-inputs.

The switch is powered by the PRA-MPS3 and the 48 V output that is powering the switch should not be used to also power an amplifier.

The lifeline that belongs to the powering 48 V output is not used. In case of mains failure the switch will be powered from the battery, connected to the multifunction power supply. The power consumption of the switch is highly dependent on the number of ports that are in use and whether these ports provide PoE power to connected devices. Next to the power consumption of the switch itself and the power consumption of the active ports, the PoE loads of all ports together (expressed in watt) multiplied by 0.1 gives the approximate additional load of the battery (expressed in ampere). Please note that a call station that is connected to this switch and powered via PoE from this switch will load the battery slightly more than when the same call station would have been directly powered from a PoE port of the PRA-MPS3, because the switch in between has some 20% additional losses.

PRA-MPS3

The power consumption of the PRA-MPS3 itself is mainly determined by its network interface and the number of active Ethernet ports (RJ45 or SFP). For the battery capacity calculation, the power loss of the DC/DC converters to supply power to all connected devices is already taken into account in the power taken from the battery by these devices. The power consumption of the relays of the control outputs is insignificant.

3.2.3

Power consumption

The following table gives an overview of the power demand of the PRAESENSA devices for the different operating conditions.

Device	Device elements	Power consumption [W]	Power from battery [W]	Current from battery [A]
PRA-SCL / PRA-SCM / PRA-SCS	System controller + per active RJ45 port	3.9 0.4	4.2 0.5	0.35 0.04
PRA-CSLD / PRA-CSLW	Call station + per active RJ45 port + per extension PRA-CSE + with alarm option	4.2 0.5 0.1 1.2	5.0 0.6 0.1 1.5	0.42 0.05 0.01 0.12
PRA-AD604	Amplifier (sleep) Amplifier (snooze) Amplifier (active, idle) Amplifier (active, low power) Amplifier (active, full power) + per active RJ45 port	6.0 7.5 36 50 222 0.4	6.0 8.0 43 60 244 0.4	0.50 0.67 3.58 5.00 20.33 0.03
PRA-AD608	Amplifier (sleep) Amplifier (snooze) Amplifier (active, idle) Amplifier (active, low power) Amplifier (active, full power) + per active RJ45 port	6.0 8.9 56 77 246 0.4	6.0 9.5 68 93 271 0.4	0.50 0.79 5.67 7.75 22.58 0.03
PRA-ES8P2S	Ethernet switch + per active RJ45 port + per active SFP port + PoE load	7.0 0.4 0.7 load	8.4 0.5 0.8 1.2 x load	0.70 0.04 0.07 0.1 x load
PRA-MPS3	Multifunction power supply + per active RJ45 port + per active SFP port	5.2 0.4 0.7	5.2 0.4 0.7	0.43 0.03 0.06
PRA-FRP3-US	First responder panel incl. 2 active RJ45 ports, 36 buttons and alarm option.	6.7	8.0	0.67

3.2.4 Accurate battery size calculation

The size or capacity of the battery for each cluster of devices, consisting of a PRA-MPS3, up to three amplifiers and optionally a system controller and a call station, can be calculated by using the current taken from the battery for each device element, as shown in the previous section.

Of importance is for how long the system must be able to operate on the battery. Most emergency sound systems are specified to run on battery for 24 hours in quiescent mode and then subsequently for 30 minutes doing (voice) alarms.

System example

Consider a voice alarm system that consists of the devices as shown in the next table.

Device	Device elements	Current taken from battery [A]	Time in quiescent mode [h]	Time in alarm mode [h]	Current x time [Ah]
PRA-SCL	System controller	0.35	24	0.5	8.58
	+ per active RJ45 port (2)	2 x 0.04	24	0.5	1.96
PRA-FRP3-UL	Fire responder panel	0.42	24	0.5	10.29
	+ per active RJ45 port (2)	2 x 0.05	24	0.5	2.45
	+ per extension PRA-CSE (3)	3 x 0.01	24	0.5	0.73
	+ with alarm option	0.12	24	0.5	2.94
PRA-AD604	Amplifier (sleep)	0.50	-	-	-
	Amplifier (snooze)	0.67	24	-	16.08
	Amplifier (active, idle)	3.83	-	-	-
	Amplifier (active, low power)	5.25	-	-	-
	Amplifier (active, full power)	20.33	-	0.5	10.17
	+ per active RJ45 port (2)	2 x 0.03	24	0.5	1.47
PRA-AD608	Amplifier (sleep)	0.50	-	-	-
	Amplifier (snooze)	0.79	24	-	18.96
	Amplifier (active, idle)	5.50	-	-	-
	Amplifier (active, low power)	7.50	-	-	-
	Amplifier (active, full power)	22.58	-	0.5	11.29
	+ per active RJ45 port (2)	2 x 0.03	24	0.5	1.47
PRA-AD608	Amplifier (sleep)	0.50	-	-	-
	Amplifier (snooze)	0.79	24	-	18.96
	Amplifier (active, idle)	5.50	-	-	-
	Amplifier (active, low power)	7.50	-	-	-
	Amplifier (active, full power)	22.58	-	0.5	11.29
	+ per active RJ45 port (2)	2 x 0.03	24	0.5	1.47
PRA-MPS3	Multifunction power supply	0.43	24	0.5	10.53
	+ per active RJ45 port (2)	2 x 0.03	24	0.5	1.47
	+ per active SFP port	0.06	-	-	-
Total calculated battery capacity [Ah]					130.11
Required battery capacity (30% oversized) [Ah]					170

3.3 System controller | PRA-SCL | PRA-SCM | PRA-SCS



3.3.1 Connections



Figure 3.1: Rear view connections

Rear panel connections

	Chassis ground		24 to 48 VDC input A-B	
	Memory card		Network port 1-5	

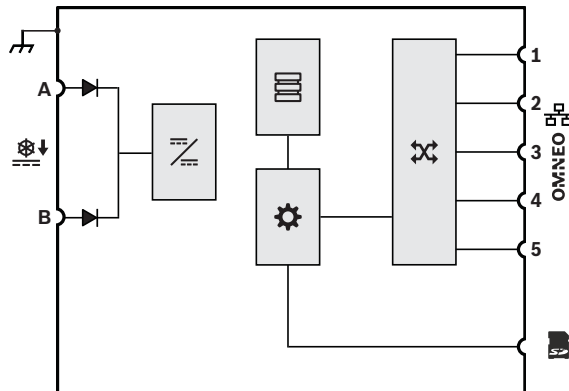
Field connections

Connection	Field wiring	Circuit class / <i>I</i> limited	<i>I</i> Max / minimum AWG	Remarks
Chassis ground	-	-	-	
24 to 48 VDC input A-B	NO*	Class 2 power limited		Wiring: 30-14 AWG.
Network port 1-5	NO*	Class 2 power limited		Class N






* Must stay within same room <20 ft and within metal conduit.

3.3.2 Functional diagram

Functional and connection diagram



Internal device functions

-  Diode
-  DC to DC converter
-  Message and tone storage
-  Controller
-  OMNEO network switch

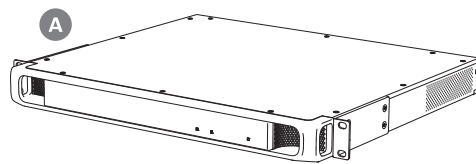
3.3.3 Parts included

The box contains the following parts:

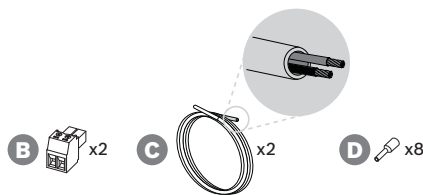
Quantity	Component
1	System controller
1	Set of 19"-rack mounting brackets (pre-mounted)
1	Set of screw connectors and cables
1	Quick Installation Guide
1	Safety and security information

No tools, SD-card or Ethernet cables are provided with the device.

Parts check and identification

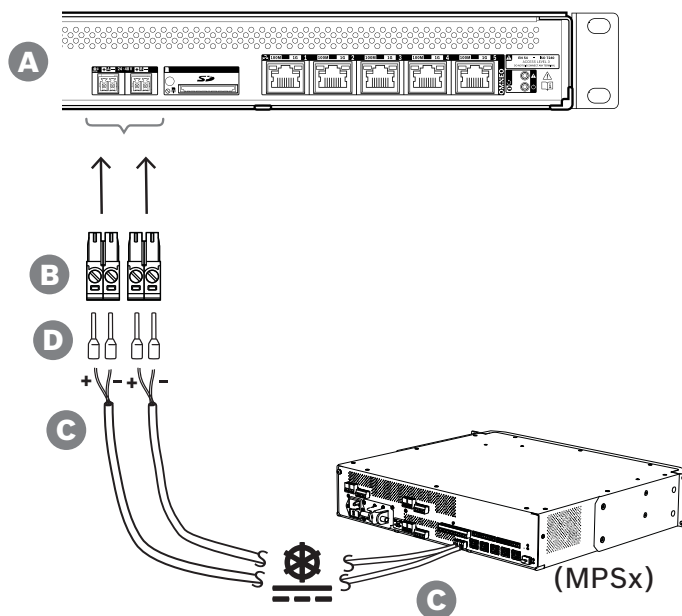


- A** System controller
- B** 2-pole screw plug (x2)
- C** 2-conductor cable (x2)
- D** Wire-end ferrules (x8)



3.3.4 Power supply

The system controller must be powered from the MPSx 24 V output. It is recommended to use double connections for fail-safe redundancy.

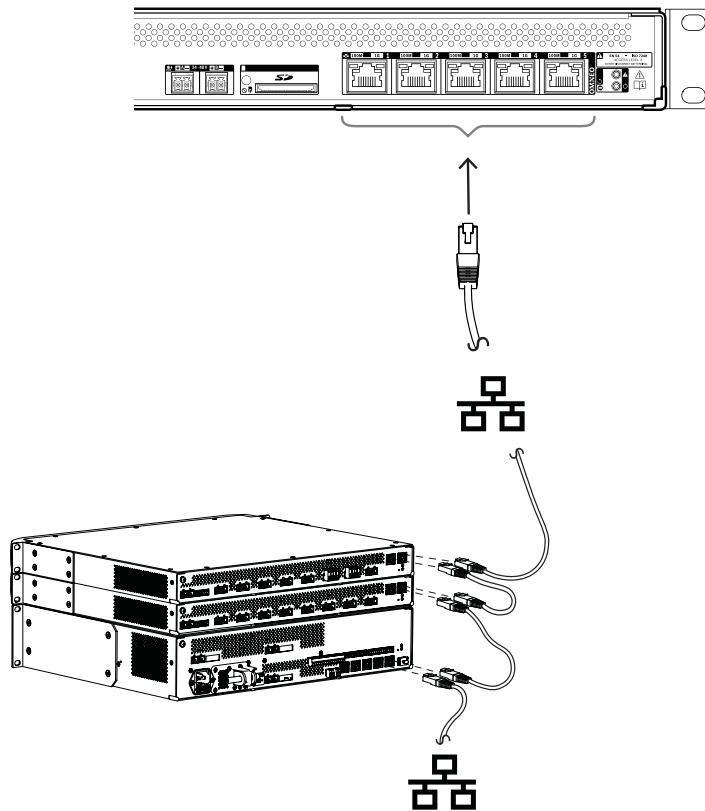


Follow the connection procedure below:

1. Crimp ferrules D onto the ends of the electrical wires of cable C to provide a solid and reliable electrical connection. Use a dedicated crimping tool.
2. Insert each wire into the appropriate slot of the connector B, observing polarity. Wiring color convention: red for + and black for -. Use a flat blade screwdriver to tighten each connection.
3. Insert the cable into the 24 to 48 V input A, cut the cable to length and mount the connector of the powering device to the other end of the cable, again observing polarity. Insert this connector into output A of the powering device (e.g. the 24 V output of the PRA-MPS3).
4. For redundancy, repeat these steps for a second cable to connect output B of the powering device to input B of the system controller.

3.3.5 Ethernet network

The system controller has five Ethernet connection ports with a built-in Ethernet switch, supporting RSTP for Class N pathway realization. Follow the procedure below to connect the system controller to a network and other system devices.



1. Use Gb-Ethernet cables with RJ45 connectors to connect the system controller to a network.
2. Connect to any of the five switch ports of the system controller.
 - The system controller supports Rapid Spanning Tree Protocol (RSTP) for Class N pathway realization to enable the use of multiple connections simultaneously for cable redundancy, e.g. to daisy-chain devices in a loop, with a maximum of **21** devices in a loop.
3. Port assignments:
 - For general purpose Public Address systems all ports 1-5 can be used.
 - The PRAESENSA system controller can be set up to work on two completely separate networks simultaneously for fail-over redundancy, supporting Dante glitch-free audio switching between both networks for continuous and uninterrupted audio distribution in case of a network failure of one of the networks. In this mode, use ports 1-4 for the primary network (with RSTP) and port 5 for the secondary network. All PRAESENSA devices are on the primary network, the secondary network is only for network redundancy of Dante devices. Dante glitch-free audio can only be used for ancillary functionality.

3.3.6

Technical data**Electrical**

Control	
Audio routing (SCL / SCM / SCS) OMNEO channels	Unlimited / 32 / 4
Tone/message playback (SCL / SCM / SCS) OMNEO channels	8 / 8 / 4
External audio inputs and/or outputs (SCL / SCM / SCS) Dante or AES67 channels	120 / 8 / 4

Logging (internal storage)	
Call events	1000
Fault events	1000
General events	1000
Message/tone storage capacity Mono, uncompressed, 48 kHz, 16-bit	90 min
System size	
Networked devices	150 / System controller
Zones	500

Power transfer	
Power supply input A/B Input voltage range	24 VDC
Power consumption (24 V)	<300 mA

Network interface	
Ethernet	100BASE-TX, 1000BASE-T
Protocol	TCP/IP
Redundancy	RSTP
Ports	5

Environmental

This product is intended for dry indoor use only.

Climatic conditions	
Temperature	
Operating	-5 – 50 °C (23 – 122 °F)
Storage and transport	-30 – 70 °C (-22 – 158 °F)
Humidity (non-condensing)	5 – 95 %

Mechanical

Enclosure	
Dimensions (W x H x D) With mounting brackets Rack unit	483 x 44 x 400 mm (19 x 1.75 x 15.7 in) 19 in, 1U
Case Material Color	Steel RAL9017
Frame Material Color	Zamak RAL9022HR
Mounting position	Horizontal
Weight	5.8 kg (12.8 lb)

3.4 Amplifier, 600W 4-channel | PRA-AD604



3.4.1 Connections



Figure 3.2: Rear view connections

	Safety ground		48 VDC input A-B	
	Lifeline interface		Loudspeaker output A-B (1-4) End-of-line device	
	Network port 1-2			

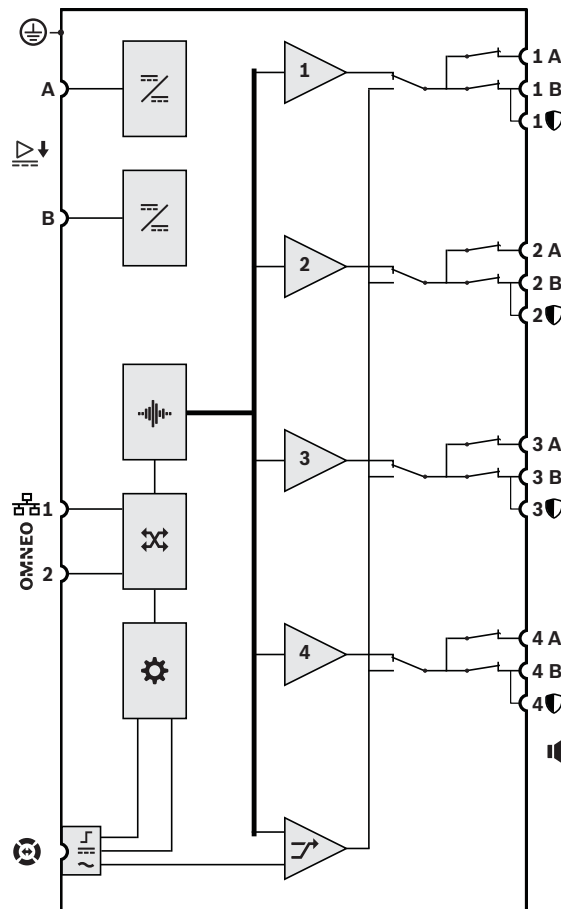
Field connections

Connection	Field wiring	Circuit class / <i>I</i> limited	<i>I</i> Max / minimum AWG	Remarks
Safety ground	-	-	-	
48 VDC input A-B (1-3)	NO*	Class 1 not power limited	7 A	Wiring max.: 28-12 AWG
Lifeline control/audio/supply interface (1-3, to amplifier 1-3)	NO*	Class 1 not power limited	-	
Loudspeaker output A-B (1-4)	YES	Class 1 not power limited	14 A	Wiring Class A or Class B Wiring max.: 28-12 AWG
End-of-line device	NO*	Class 1 not power limited	14 A	Intended for connection to a PRA-EOL-US in case of Class A wiring.
Network port 1-2	NO*	Class 2 power limited		Wiring Class N









* Must stay within same room <20 ft and within metal conduit.

3.4.2 Functional diagram

Functional and connection diagram



Internal device functions

-  DC to DC converter
-  Audio processing (DSP)
-  OMNEO network switch
-  Controller
-  Lifeline control interface
-  Lifeline supply input
-  Lifeline audio input
- 1-4** Amplifier channel
-  Spare channel

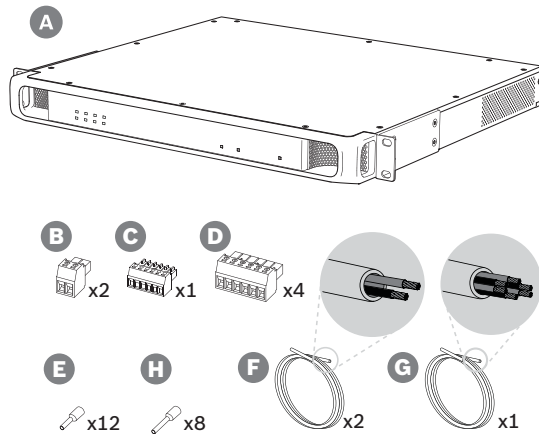
3.4.3 Parts included

The box contains the following parts:

Quantity	Component
1	Amplifier, 600W 4-channel
1	Set of 19"-rack mounting brackets (pre-mounted)
1	Set of screw connectors and cables
1	Quick Installation Guide
1	Safety information

No tools or Ethernet cables are provided with the device.

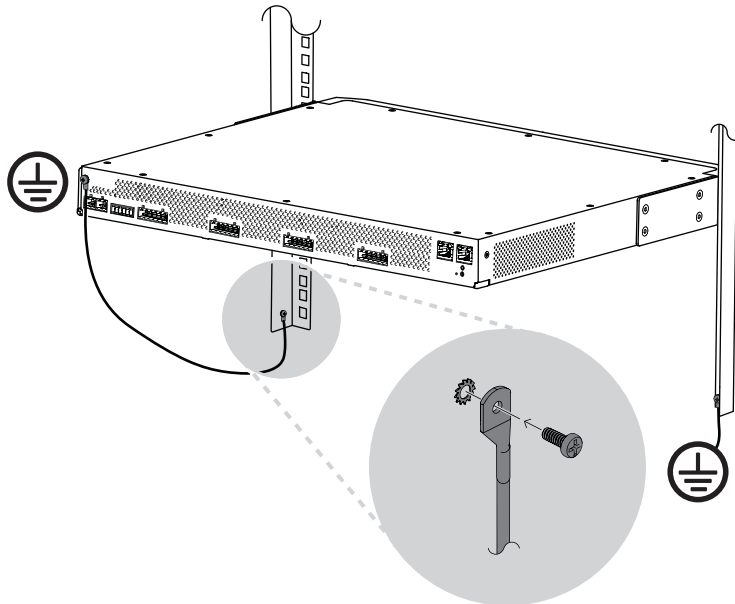
Parts check and identification



- A** Amplifier
- B** 2-pole screw plug (x2)
- C** 6-pole screw plug (small)
- D** 6-pole screw plug (large, x4)
- E** Wire-end ferrules (small, x12)
- F** 2-conductor cable (x2)
- G** 6-conductor cable
- H** Wire-end ferrules (large, x8)

3.4.4

Safety ground



Connecting the chassis ground screw to safety ground is mandatory for the PRAESENSA power amplifiers:

- The safety ground connection is needed for safety because of high internal voltages. All PRAESENSA 19"-devices have a chassis ground screw on the rear panel, which can be used for a wire connection to the rack frame. The rack frame must be grounded to safety ground. This is a conductive path to ground or earth that is designed to protect persons from electrical shock by shunting away any dangerous currents that might occur due to malfunction or accident. Use a thick, multi strand wire (>2.5 mm²) with wire eyelets and washers for a solid connection.
- The safety ground connection is needed as reference for the ground short detection circuit. Without this connection, the amplifier could be electrically floating and no ground shorts or leakage currents would be detected for loudspeaker lines that touch ground somewhere. The safety ground connection via the mains connection of the

multifunction power supply cannot be relied on for this, because the mains cable of this supply could be unplugged and then the amplifier continues to work on the backup battery.



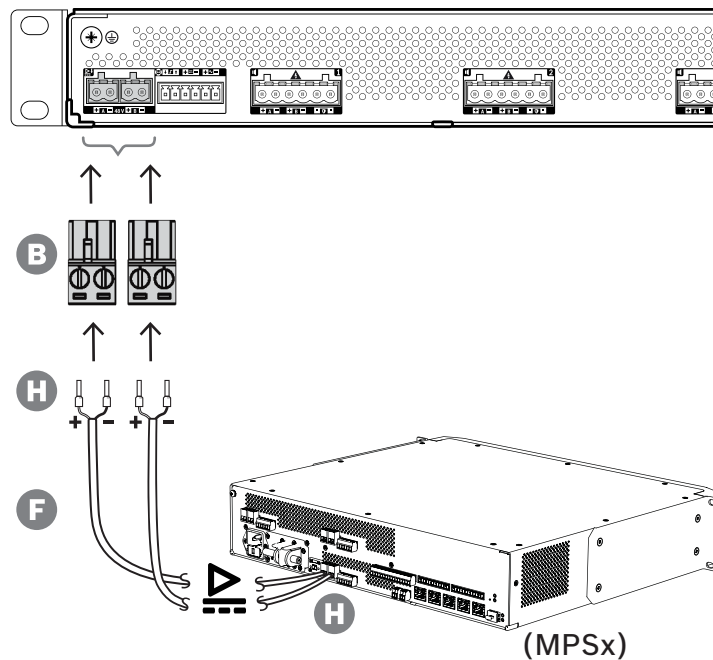
Caution!

The chassis ground screw of an amplifier must be connected to protective ground **before** the amplifier is connected to a power supply.

3.4.5

Power supply

The amplifier must be powered from a 48 V PRAESENSA multifunction power supply (MPSx). It is recommended to use double connections for fail-safe redundancy.



Follow the connection procedure below:

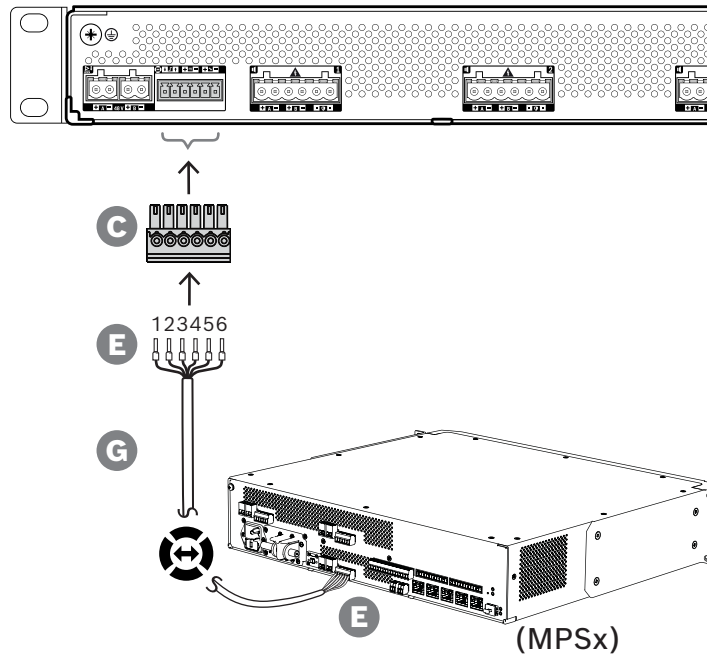
1. Crimp ferrules H onto the ends of the electrical wires of cable F to provide a solid and reliable electrical connection.
 - Use a dedicated crimping tool.
2. Insert each wire into the appropriate slot of the connector B, observing polarity. Wiring color convention: red for + and black for -.
 - Use a flat blade screwdriver to tighten each connection.
3. Insert the cable into the 48 V input A, cut the cable to length and mount the connector of the powering device to the other end of the cable, again observing polarity. Insert this connector into output A of the powering device.
4. For redundancy, repeat these steps for a second cable between output B of the powering device to input B of the amplifier
 - When no power supply redundancy is required, a single power supply can be used; in that case connect the 48 V inputs A and B in parallel to make use of the amplifier's internal dual power converters for fail safe redundancy and to avoid a supply supervision fault event.

3.4.6

Lifeline

The lifeline is required for UL2572 to meet the backup time requirements and is a cable connection between a PRAESENSA amplifier and a PRAESENSA multifunction power supply. This interconnection serves multiple functions:

- Lifeline audio routing (backup audio signal for the connected amplifier in case its network interface or both network links would fail).
 - Not required for UL2572. This backup audio signal is optional and allowed to be used in a UL2572 compliant system.
- Lower power consumption during mains absent.
 - Required for UL2572 compliancy.



To create a lifeline connection, follow the procedure below.

1. Crimp ferrules E onto the ends of the electrical wires of cable G to provide a solid and reliable electrical connection.
 - Use a dedicated crimping tool.
2. Insert each wire into the appropriate slot of the connector C. The wiring order is not critical, but use the same order for all lifeline cables in the system to minimize the risk of errors.
 - Use a flat blade screwdriver to tighten each connection.
3. Insert the cable connector into the amplifier's lifeline socket, cut the cable to length and mount a connector of the same type, delivered with the multifunction power supply to the other end of the cable, observing wiring order. Insert this connector into the lifeline socket of the multifunction power supply.

3.4.7

Amplifier outputs

The amplifier provides four output channels and a spare channel that substitutes a failing channel.

The channels have direct drive 70/100 V outputs for low distortion, low crosstalk and a wide audio bandwidth. There are no output transformers that would be a limiting factor for the output power of each channel. Every channel also has a load independent flat frequency response. This combination of features makes it possible to partition the available amplifier power across all channels and utilize that power effectively.

Every channel has a 6-pole connector socket, providing independently switched loudspeaker group A and group B outputs and a separate connection facility for an End-of-Line device for loudspeaker cable supervision. The two outputs can be used for single Class A, single Class B or dual Class B field wiring.

**Caution!**

Amplifier outputs may carry output voltages up to 100 VRMS. Touching uninsulated terminals or wiring may result in an unpleasant sensation.

**Notice!**

UL notifications

For proper supervision, do not loop wire under terminals. Break the wire run to provide supervision of connections.

Three different loudspeaker connection topologies are supported, configurable in the system configuration:

Single Class B wiring

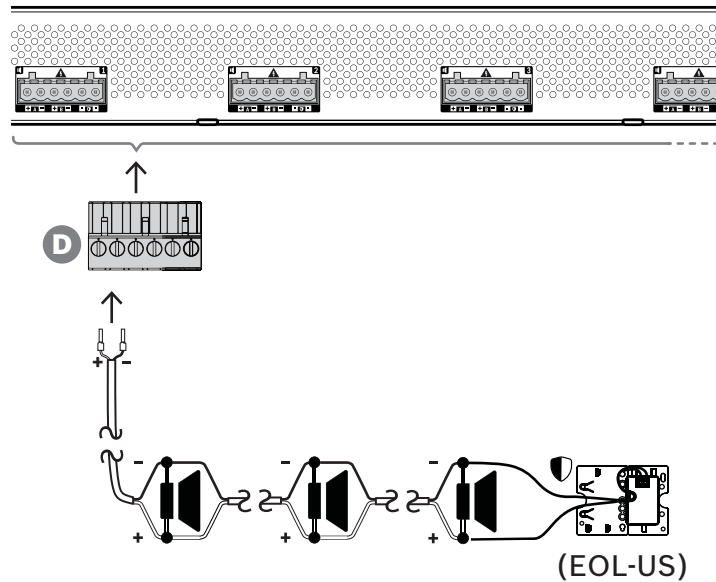


Figure 3.3: Single Class B wiring

If no loudspeaker line redundancy is needed for a zone, then follow the procedure below to connect the loudspeakers to output A only:

1. Connect all loudspeakers in parallel, observing proper polarity. Select the right wire gauge, taking into account the connected loudspeaker power, the length of cable and the maximum permissible attenuation of the acoustic sound level due to loudspeaker line losses. See also section *Field wire cable requirements*, page 18 for loudspeaker cable size recommendations.
2. Insert the near end wires of the loudspeaker cable into slots 1 and 2 of connector D, preferably using crimped on wire ferrules that fit to the wire gauge used. Observe polarity.
 - Use a flat blade screwdriver to tighten each connection.
3. For loudspeaker line supervision, make sure that all loudspeakers are connected in a loop-through fashion and that an end-of-line device is connected to the end of the loudspeaker line for supervision.
 - No cable spurs or branches are allowed, because they will not be supervised.

Dual Class B wiring (A + B)

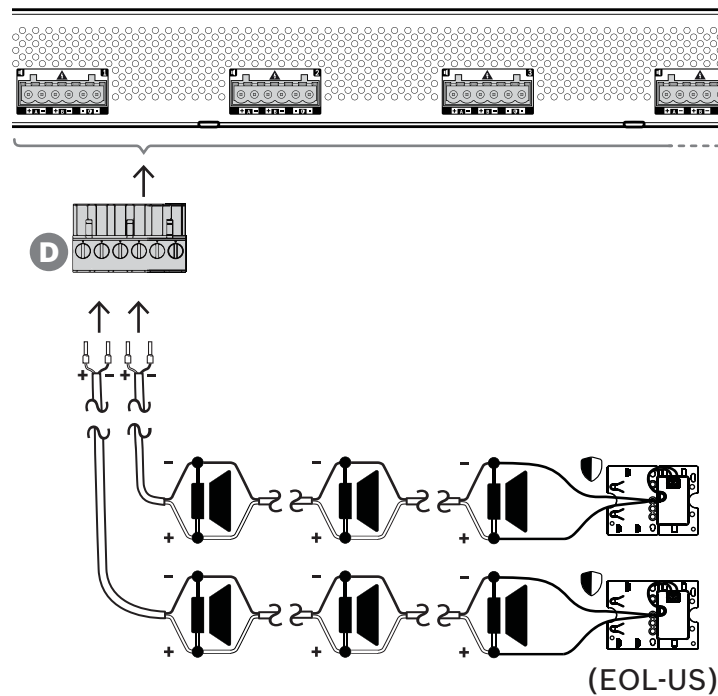


Figure 3.4: Dual Class B wiring

If loudspeaker line redundancy is needed, then follow the procedure below to connect two loudspeaker lines, one to output A and one to output B. Typically the loudspeakers are mounted alternating A, B, A, B, and so on, half the number connected to A, half the number connected to B.

1. Connect half of the loudspeakers in parallel in a loop-through fashion to output A. Observe polarity.
 - Follow the same wiring procedure as for using a single line.
2. Connect an end-of-line device to the end of loudspeaker line A.
3. Repeat this procedure for the other half of the loudspeakers and connect them to output B.
4. Connect an end-of-line device to the end of loudspeaker line B. Loudspeaker lines A and B must be separately supervised, each with its own end-of-line device. In case of a short circuit in one of the loudspeaker lines, the amplifier will diagnose the overload condition to find the affected loudspeaker line and switch-off that line, so the other loudspeaker line can continue operation.

Single Class A wiring (A to B)

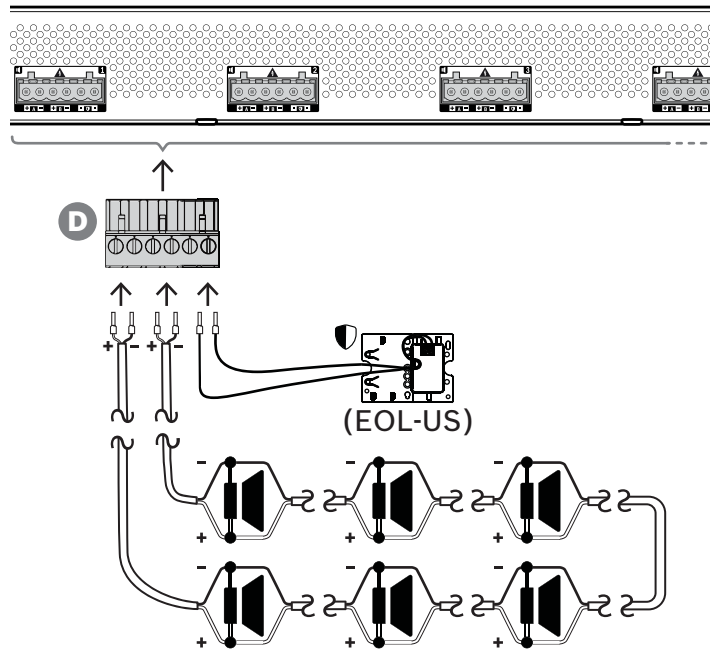


Figure 3.5: Single Class A wiring

A third loudspeaker connection topology is the so-called Class-A loop, where the loudspeakers are connected in a loop, starting at output A and ending at output B, with the end of the loop being supervised with an end-of-line device.

Follow the procedure below to connect the loudspeakers according to this scheme.

1. Connect all loudspeaker in parallel in a loop-through fashion. Observe equal polarity for all loudspeakers. Connect one side of the loudspeaker cable to output A, observing polarity.
2. Connect the other side of the loudspeaker cable to output B. In this case maintaining the correct polarity is especially important, as reversal on one end will short circuit the amplifier channel, not immediately, but when output B is activated in case of interruption of one conductor.
3. Connect an end-of-line device to the end-of-line connection terminals. These terminals are connected in parallel to output B, internally in the amplifier, to include supervision of the output B connection.

Output fault detection

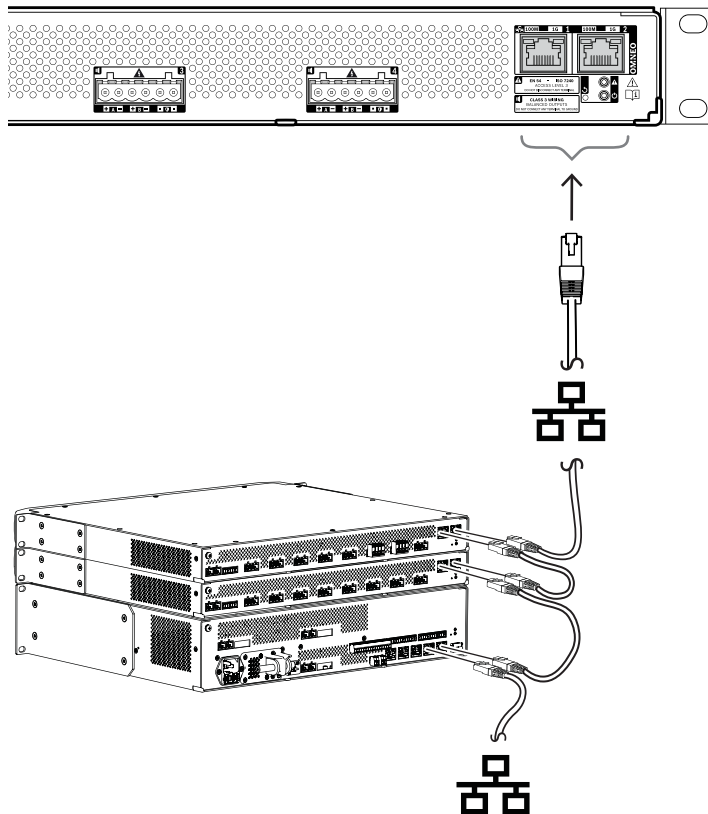
Output fault detection can be tested with the following means:

- **Ground short detection:** Connect between one of the output conductors, of one of the loudspeaker outputs and safety ground, a 50 kohm resistor.
- **Short circuit:** Connect a ≤ 500 mohm resistor between the plus and minus of output A or output B, of one of the loudspeaker outputs.
- **Open circuit:** Unplug one of the loudspeaker output connectors.

Refer to

- *Field wire cable requirements, page 18*

3.4.8 Ethernet network



For Class N pathway realization, the amplifier has two Ethernet connection ports with a built-in Ethernet switch, supporting RSTP. Follow the procedure below to connect the amplifier to a network. The network must be set up in such a way that the amplifier can be discovered and reached by the system controller.

1. Use Gb-Ethernet cables with RJ45 connectors to connect the amplifier to the network.
2. Connect one end of the cable to one port of the amplifier.
3. Connect the other side of the cable to another network port in the network. This can be one port of the system controller, a port of a separate switch in the network, but also a port of another PRAESENSA device in the same rack.
4. The second port of the amplifier can be connected to a subsequent PRAESENSA device. The built-in Ethernet switch allows for a loopthrough interconnection between system devices, with a maximum of 21 devices in series.
5. For redundancy a looped through network connection must be connected at both sides to create a loop. RSTP must be enabled in the system.

3.4.9

Technical data**Electrical**

Amplifier outputs	
Rated output voltage 100 V mode, 1 kHz, THD <1 %, no load 70 V mode, 1 kHz, THD <1 %, no load	100 VRMS 70 VRMS
Maximum continuous audio power during Alarm and normal standby condition: All channels combined 100 V mode, load 66.7 ohm 70 V mode, load 33.3 ohm Channel 1 100 V mode, load 66.7 ohm 70 V mode, load 46.7 ohm Other channels 100 V mode, load 133.3 ohm 70 V mode, load 66.7 ohm	150 W 150 W 150 W 105 W 75 W 75 W
Power transfer	
Power supply input A/B Input voltage	48 VDC
Maximum current consumption	7 A
Supervision	
End-of-Line detection mode	Pilot tone 25.5 kHz, 3 VRMS
Power supply input A/B	Undervoltage
Ground short detection (loudspeaker lines)	< 50 kohm
Amplifier channel redundancy switching	Internal spare channel
Amplifier short circuit	≤ 500 mohm
Loudspeaker field wire class	Class A, Class B, Dual Class B
Network interface	
Ethernet Protocol Redundancy	100BASE-TX, 1000BASE-T TCP/IP RSTP Class N
Ports	2

Environmental

This product is intended for dry indoor use only.

Climatic conditions	
Temperature	
Operating	-5 – 50 °C (23 – 122 °F)
Storage and transport	-30 – 70 °C (-22 – 158 °F)
Humidity (non-condensing)	5 – 95 %

Airflow	
Fan airflow	Front to sides/rear

Mechanical

Enclosure	
Dimensions (W x H x D)	
With mounting brackets	483 x 44 x 400 mm (19 x 1.75 x 15.7 in)
Rack unit	19 in, 1U
Case	
Material	Steel
Color	RAL9017
Frame	
Material	Zamak
Color	RAL9022HR
Mounting position	Horizontal
Weight	8.1 kg (17.9 lb)

3.5 Amplifier, 600W 8-channel | PRA-AD608



3.5.1 Connections

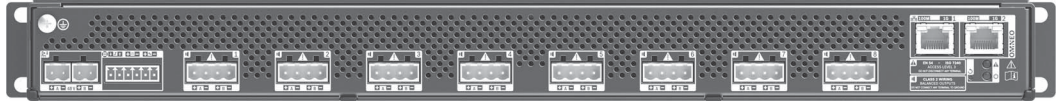


Figure 3.6: Rear view connections

	Safety ground			48 VDC input A-B	
	Lifeline interface			Loudspeaker output A-B (1-8)	
	Network port 1-2				

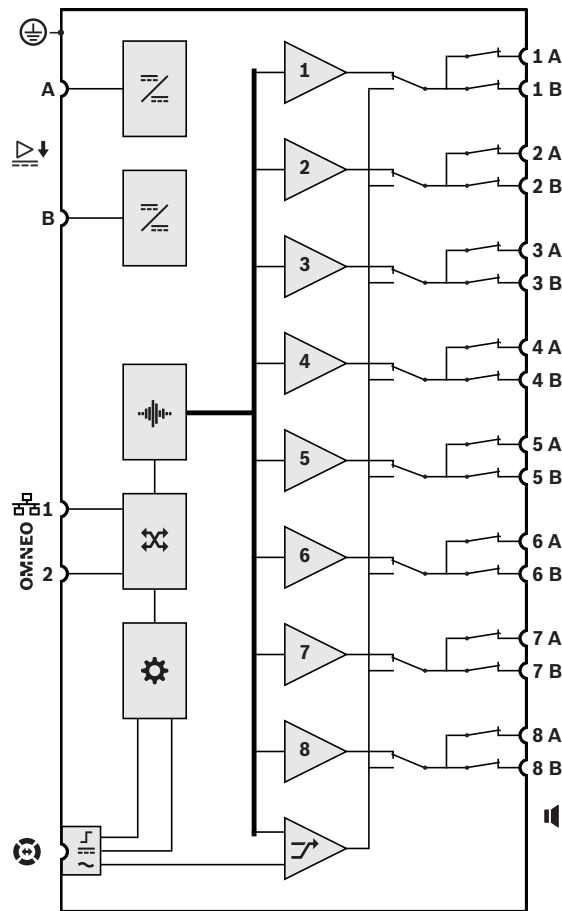
Field connections

Connection	Field wiring	Circuit class / ^l limited	I _{Max} / minimum AWG	Remarks
Safety ground	-	-	-	
48 VDC input A-B (1-3)	NO*	Class 1 not power limited	7 A	Wiring max.: 28-12 AWG
Lifeline control/audio/supply interface (1-3, to amplifier 1-3)	NO*	Class 1 not power limited	-	
Loudspeaker output A-B (1-8)	YES	Class 1 not power limited	14 A	Wiring Class A or Class B Wiring max.: 28-12 AWG
Network port 1-2	NO*	Class 2 power limited		Wiring Class N

* Must stay within same room <20 ft and within metal conduit.

3.5.2 Functional diagram

Functional and connection diagram



Internal device functions

- DC to DC converter
- Audio processing (DSP)
- OMNEO network switch
- Controller
- Lifeline control interface
- Lifeline supply input
- Lifeline audio input
- 1-8** Amplifier channel
- Spare channel

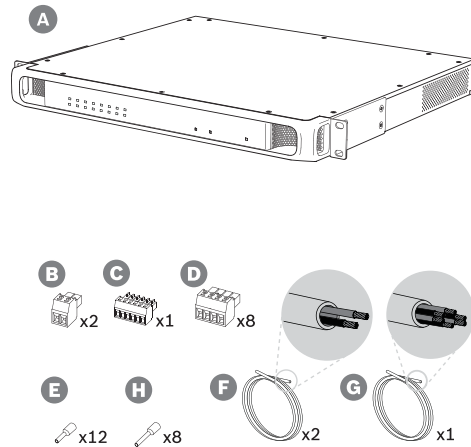
3.5.3 Parts included

The box contains the following parts:

Quantity	Component
1	Amplifier, 600W 8-channel
1	Set of 19"-rack mounting brackets (pre-mounted)
1	Set of screw connectors and cables
1	Quick Installation Guide
1	Safety information

No tools or Ethernet cables are provided with the device.

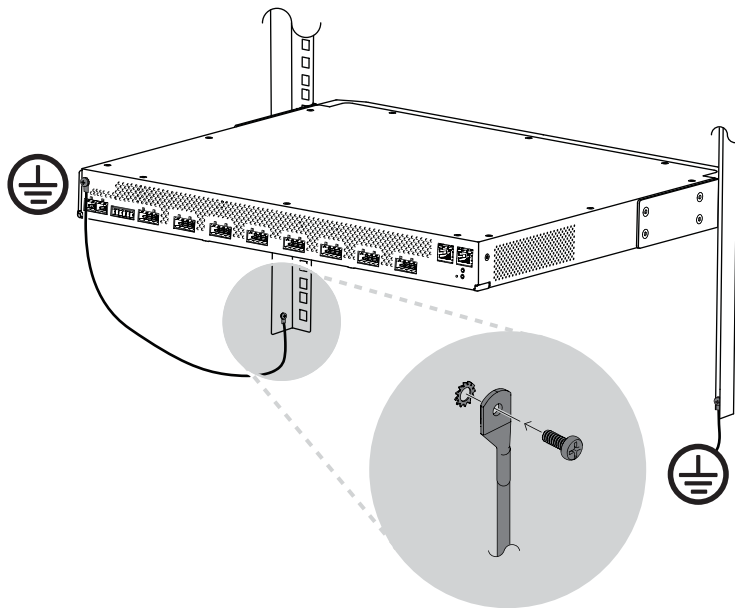
Parts check and identification



- A** Amplifier
- B** 2-pole screw plug (x2)
- C** 6-pole screw plug (small)
- D** 4-pole screw plug (large, x8)
- E** Wire-end ferrules (small, x12)
- F** 2-conductor cable (x2)
- G** 6-conductor cable
- H** Wire-end ferrules (large, x8)

3.5.4

Safety ground



Connecting the chassis ground screw to safety ground is mandatory for the PRAESENSA power amplifiers:

- The safety ground connection is needed for safety because of high internal voltages. All PRAESENSA 19"-devices have a chassis ground screw on the rear panel, which can be used for a wire connection to the rack frame. The rack frame must be grounded to safety ground. This is a conductive path to ground or earth that is designed to protect persons from electrical shock by shunting away any dangerous currents that might occur due to malfunction or accident. Use a thick, multi strand wire (>2.5 mm²) with wire eyelets and washers for a solid connection.
- The safety ground connection is needed as reference for the ground short detection circuit. Without this connection, the amplifier could be electrically floating and no ground shorts or leakage currents would be detected for loudspeaker lines that touch ground somewhere. The safety ground connection via the mains connection of the

multifunction power supply cannot be relied on for this, because the mains cable of this supply could be unplugged and then the amplifier continues to work on the backup battery.



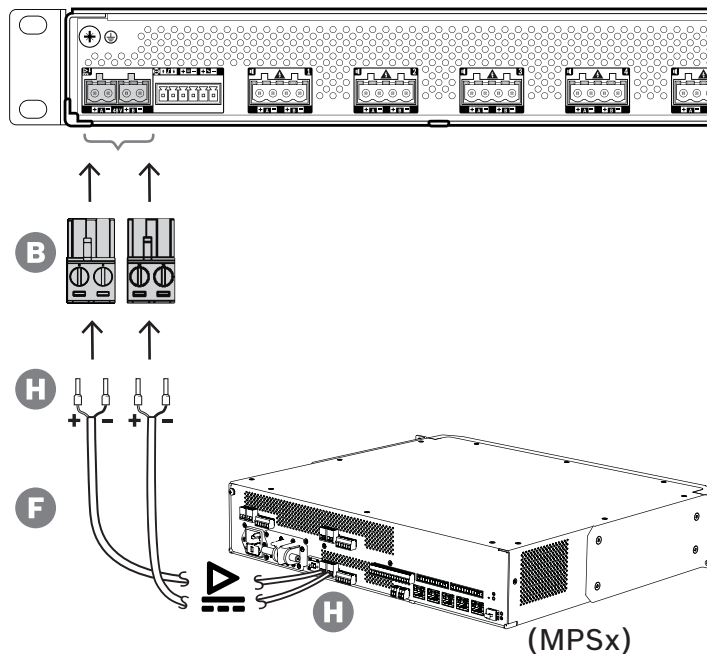
Caution!

The chassis ground screw of an amplifier must be connected to protective ground **before** the amplifier is connected to a power supply.

3.5.5

Power supply

The amplifier must be powered from a 48 V PRAESENSA multifunction power supply (MPSx). It is recommended to use double connections for fail-safe redundancy.



Follow the connection procedure below:

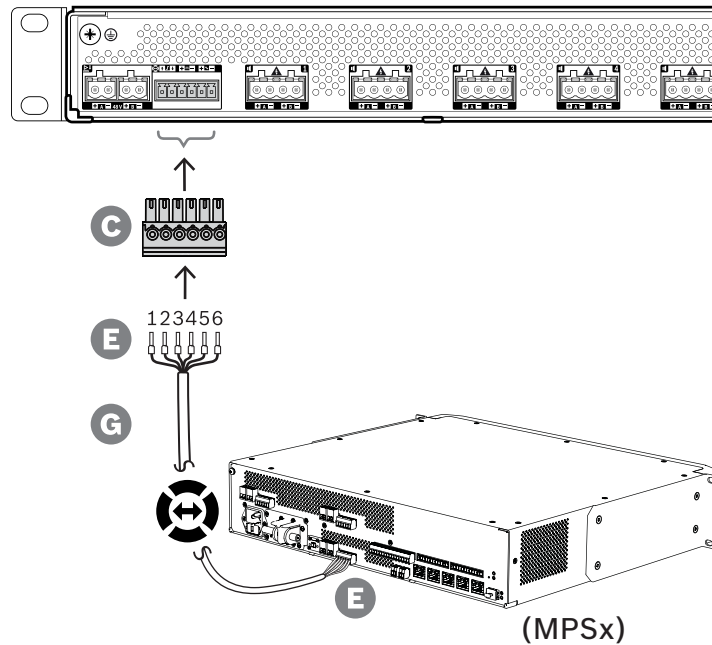
1. Crimp ferrules H onto the ends of the electrical wires of cable F to provide a solid and reliable electrical connection.
 - Use a dedicated crimping tool.
2. Insert each wire into the appropriate slot of the connector B, observing polarity. Wiring color convention: red for + and black for -.
 - Use a flat blade screwdriver to tighten each connection.
3. Insert the cable into the 48 V input A, cut the cable to length and mount the connector of the powering device to the other end of the cable, again observing polarity. Insert this connector into output A of the powering device.
4. For redundancy, repeat these steps for a second cable between output B of the powering device to input B of the amplifier
 - When no power supply redundancy is required, a single power supply can be used; in that case connect the 48 V inputs A and B in parallel to make use of the amplifier's internal dual power converters for fail safe redundancy and to avoid a supply supervision fault event.

3.5.6

Lifeline

The lifeline is required for UL2572 to meet the backup time requirements and is a cable connection between a PRAESENSA amplifier and a PRAESENSA multifunction power supply. This interconnection serves multiple functions:

- Lifeline audio routing (backup audio signal for the connected amplifier in case its network interface or both network links would fail).
 - Not required for UL2572. This backup audio signal is optional and allowed to be used in a UL2572 compliant system.
- Lower power consumption during mains absent.
 - Required for UL2572 compliancy.



To create a lifeline connection, follow the procedure below.

1. Crimp ferrules E onto the ends of the electrical wires of cable G to provide a solid and reliable electrical connection.
 - Use a dedicated crimping tool.
2. Insert each wire into the appropriate slot of the connector C. The wiring order is not critical, but use the same order for all lifeline cables in the system to minimize the risk of errors.
 - Use a flat blade screwdriver to tighten each connection.
3. Insert the cable connector into the amplifier's lifeline socket, cut the cable to length and mount a connector of the same type, delivered with the multifunction power supply to the other end of the cable, observing wiring order. Insert this connector into the lifeline socket of the multifunction power supply.

3.5.7 Amplifier outputs

The amplifier provides eight output channels and a spare channel that substitutes a failing channel.

The channels have direct drive 70/100 V outputs for low distortion, low crosstalk and a wide audio bandwidth. There are no output transformers that would be a limiting factor for the output power of each channel. Every channel also has a load independent flat frequency response. This combination of features makes it possible to partition the available amplifier power across all channels and utilize that power effectively.

Every channel has a 4-pole connector socket, providing independently switched loudspeaker group A and group B outputs. The two outputs can be used for single Class A, single Class B or dual Class B field wiring.



Caution!

Amplifier outputs may carry output voltages up to 100 VRMS. Touching uninsulated terminals or wiring may result in an unpleasant sensation.



Notice!

UL notifications

For proper supervision, do not loop wire under terminals. Break the wire run to provide supervision of connections.

Three different loudspeaker connection topologies are supported, configurable in the system configuration:

Single Class B wiring

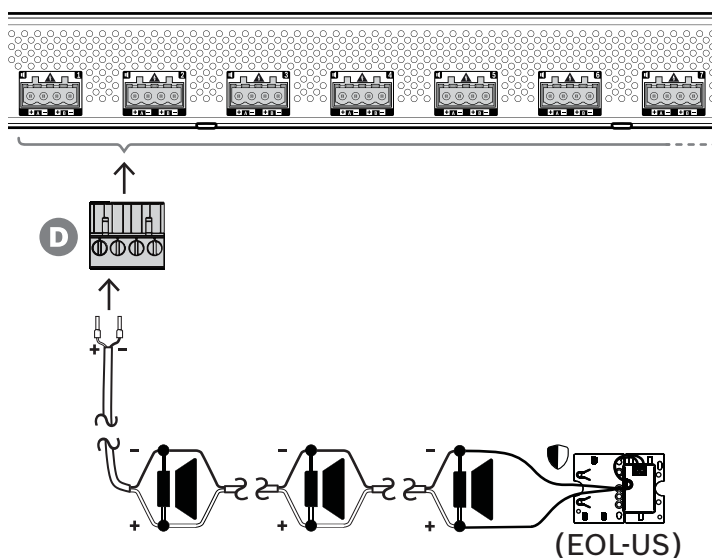


Figure 3.7: Single Class B wiring

If no loudspeaker line redundancy is needed for a zone, then follow the procedure below to connect the loudspeakers to output A only:

1. Connect all loudspeakers in parallel, observing proper polarity. Select the right wire gauge, taking into account the connected loudspeaker power, the length of cable and the maximum permissible attenuation of the acoustic sound level due to loudspeaker line losses. See also section *Field wire cable requirements*, page 18 for loudspeaker cable size recommendations.
2. Insert the near end wires of the loudspeaker cable into slots 1 and 2 of connector D, preferably using crimped on wire ferrules that fit to the wire gauge used. Observe polarity.
 - Use a flat blade screwdriver to tighten each connection.
3. For loudspeaker line supervision, make sure that all loudspeakers are connected in a loop-through fashion and that an end-of-line device is connected to the end of the loudspeaker line for supervision.
 - No cable spurs or branches are allowed, because they will not be supervised.

Dual Class B wiring (A + B)

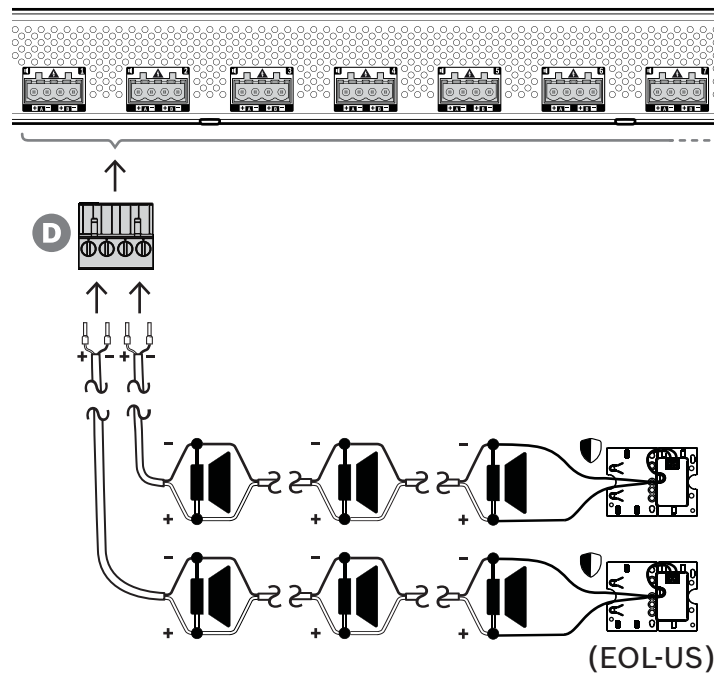


Figure 3.8: Dual Class B wiring

If loudspeaker line redundancy is needed, then follow the procedure below to connect two loudspeaker lines, one to output A and one to output B. Typically the loudspeakers are mounted alternating A, B, A, B, and so on, half the number connected to A, half the number connected to B.

1. Connect half of the loudspeakers in parallel in a loop-through fashion to output A. Observe polarity.
 - Follow the same wiring procedure as for using a single line.
2. Connect an end-of-line device to the end of loudspeaker line A.
3. Repeat this procedure for the other half of the loudspeakers and connect them to output B.

4. Connect an end-of-line device to the end of loudspeaker line B. Loudspeaker lines A and B must be separately supervised, each with its own end-of-line device. In case of a short circuit in one of the loudspeaker lines, the amplifier will diagnose the overload condition to find the affected loudspeaker line and switch-off that line, so the other loudspeaker line can continue operation.

Single Class A wiring (A to B)

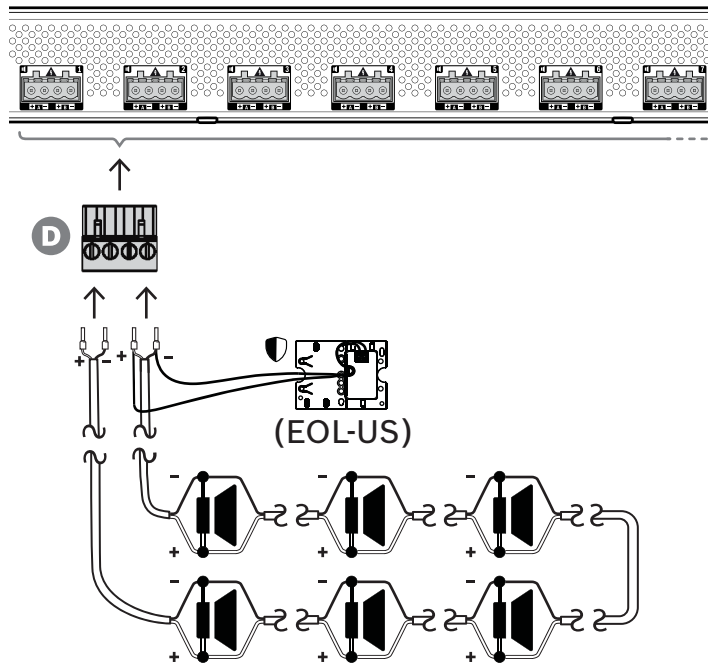


Figure 3.9: Single Class A wiring

A third loudspeaker connection topology is the so-called Class-A loop, where the loudspeakers are connected in a loop, starting at output A and ending at output B, with the end of the loop being supervised with an end-of-line device.

Follow the procedure below to connect the loudspeakers according to this scheme:

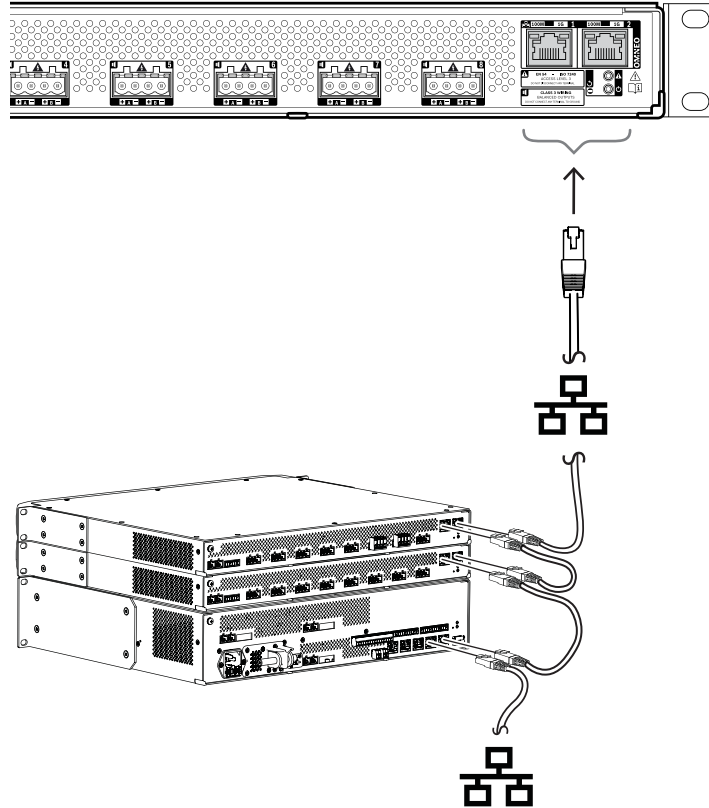
1. Connect all loudspeaker in parallel in a loop-through fashion. Observe equal polarity for all loudspeakers. Connect one side of the loudspeaker cable to output A, observing polarity.
2. Connect the other side of the loudspeaker cable to output B. In this case maintaining the correct polarity is especially important, as reversal on one end will short circuit the amplifier channel, not immediately, but when output B is activated in case of interruption of one conductor.
3. Connect an end-of-line device to output B, in parallel with the loudspeaker cable.

Output fault detection

Output fault detection can be tested with the following means:

- **Ground short detection:** Connect between one of the output conductors, of one of the loudspeaker outputs and safety ground, a 50 kohm resistor.
- **Short circuit:** Connect a ≤ 500 mohm resistor between the plus and minus of output A or output B, of one of the loudspeaker outputs.
- **Open circuit:** Unplug one of the loudspeaker output connectors.

3.5.8 Ethernet network



For Class N pathway realization, the amplifier has two Ethernet connection ports with a built-in Ethernet switch, supporting RSTP. Follow the procedure below to connect the amplifier to a network. The network must be set up in such a way that the amplifier can be discovered and reached by the system controller.

1. Use Gb-Ethernet cables with RJ45 connectors to connect the amplifier to the network.
2. Connect one end of the cable to one port of the amplifier.
3. Connect the other side of the cable to another network port in the network. This can be one port of the system controller, a port of a separate switch in the network, but also a port of another PRAESENSA device in the same rack.
4. The second port of the amplifier can be connected to a subsequent PRAESENSA device. The built-in Ethernet switch allows for a loopthrough interconnection between system devices, with a maximum of 21 devices in series.
5. For redundancy a looped through network connection must be connected at both sides to create a loop. RSTP must be enabled in the system.

3.5.9

Technical data**Electrical**

Amplifier outputs	
Rated output voltage 100 V mode, 1 kHz, THD <1 %, no load 70 V mode, 1 kHz, THD <1 %, no load	100 VRMS 70 VRMS
Maximum continuous audio power during Alarm and normal standby condition: All channels combined 100 V mode, load 66.7 ohm 70 V mode, load 33.3 ohm Channel 1 100 V mode, load 66.7 ohm 70 V mode, load 46.7 ohm Other channels 100 V mode, load 133.3 ohm 70 V mode, load 66.7 ohm	150 W 150 W 150 W 105 W 75 W 75 W
Power transfer	
Power supply input A/B Input voltage	48 VDC
Maximum current consumption	7 A
Supervision	
End-of-Line detection mode	Pilot tone 25.5 kHz, 3 VRMS
Power supply input A/B	Undervoltage
Ground short detection (loudspeaker lines)	< 50 kohm
Amplifier channel redundancy switching	Internal spare channel
Amplifier short circuit	≤ 500 mohm
Loudspeaker field wire class	Class A, Class B, Dual Class B
Network interface	
Ethernet Protocol Redundancy	100BASE-TX, 1000BASE-T TCP/IP RSTP Class N
Ports	2

Environmental

This product is intended for dry indoor use only.

Climatic conditions	
Temperature	
Operating	-5 – 50 °C (23 – 122 °F)
Storage and transport	-30 – 70 °C (-22 – 158 °F)
Humidity (non-condensing)	5 – 95 %

Airflow	
Fan airflow	Front to sides/rear

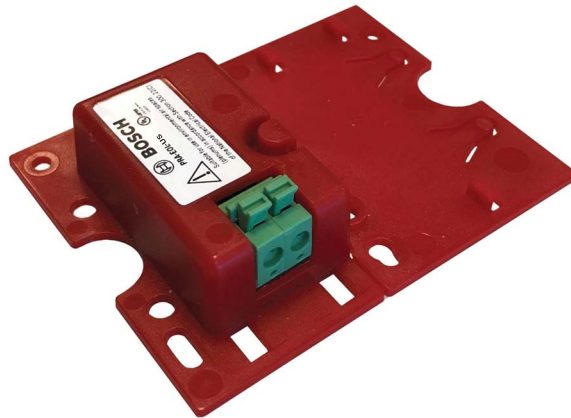
Mechanical

Enclosure	
Dimensions (HxWxD)	
With mounting brackets	44 x 483 x 400 mm (1.75 x 19 x 15.7 in)
Rack unit	19 in, 1U
Ingress protection	IP30
Case	
Material	Steel
Color	RAL9017
Frame	
Material	Zamak
Color	RAL9022HR
Weight	8.8 kg (19.4 lb)

3.6 End-of-line device | PRA-EOL-US



3.6.1 Connections



Device connections

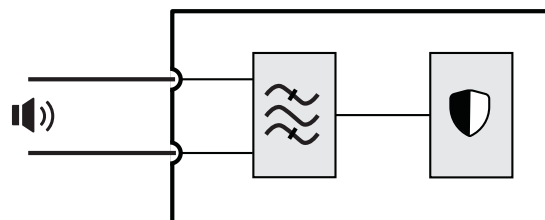
	Loudspeaker line	
---	------------------	---

Field connections




Connection	Field wiring	Circuit class / <i>I</i> limited	<i>I</i> Max / minimum AWG	Remarks
Loudspeaker line	YES	Class 1 Not power limited	14 A	Wiring Class A and Class B Wiring max.: 26-14 AWG

3.6.2 Functional diagram

Functional and connection diagram



Internal device functions

-  Loudspeaker line
-  Bandpass filter
-  Supervision receiver/transmitter

3.6.3

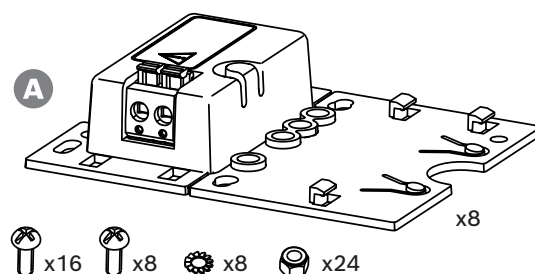
Parts included

The box contains the following parts:

Quantity	Component
8	End of line device
8	Screw (Pozi Drive M4, 12 mm)
24	Nut (M4)
8	Lock washer
16	Screw (M4, 10 mm)
1	Safety information

No tools are provided with the device.

Parts check and identification



- A** End-of-line device
- 8** Screw (M4, 12 mm). For junction box.
- 16** Screw (M4, 10 mm) For shelf
- 8** Lock washer For junction box.
- 24** Nut (M4)

3.6.4

Mounting

The PRA-EOL-US must be mounted in a UL-listed junctions box with a minimum size of 4" x 4", or in the Lowell 19"-rack when connected for Class A wiring close to the PRA-AD60x amplifier.

Notice!



When selecting cables and wire gauge for loudspeaker connections, take into account the length and loudspeaker load to avoid excessive power loss. Make sure that the signal level at the end of the loudspeaker line has not dropped with more than 2 dB (this is approximately 20%), as this will also affect proper operation of the end-of-line device. Also see section Cable type recommendations.

Mounting the PRA-EOL-US in the junctions box

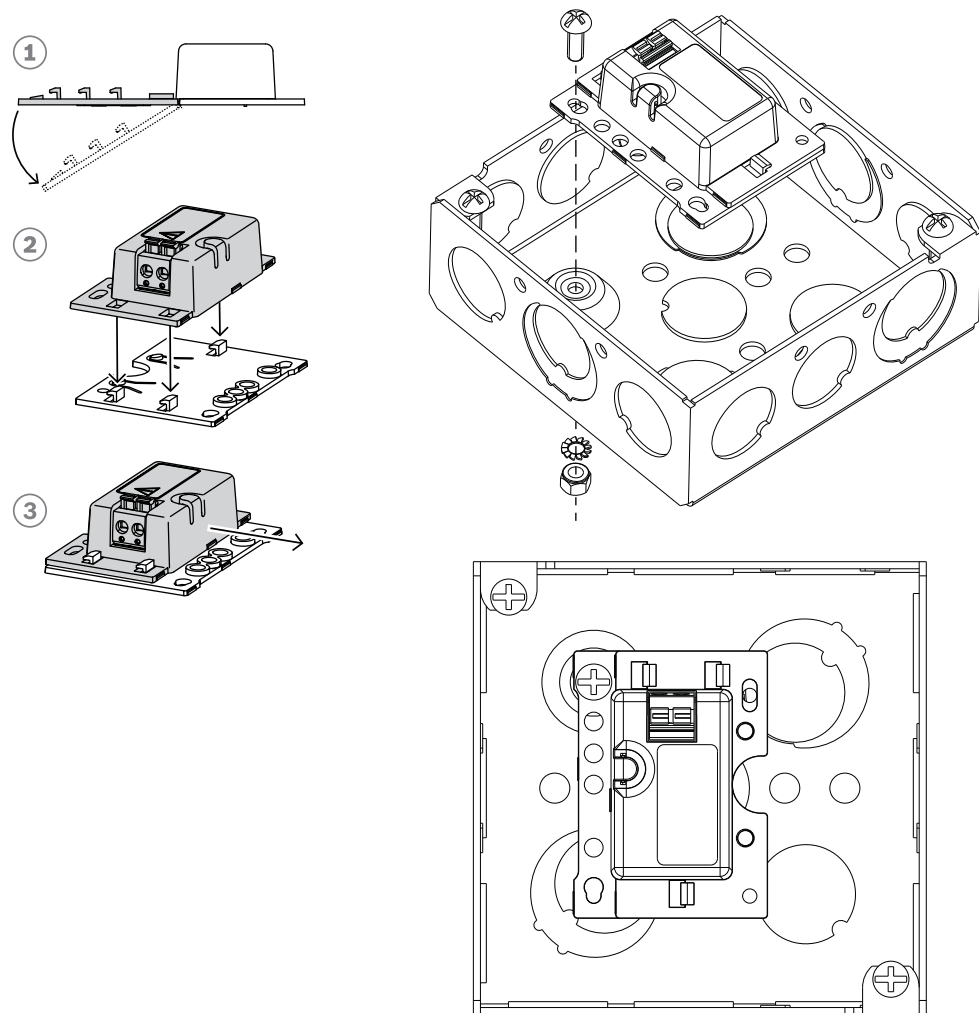


Notice!

E.g., the TP404 junction box of the firm ETAN is UL-certified and supports the required mounting procedure.

To do so:

1. Part of the mounting plate of the end-of-line device can be broken off (1) and snapped in place as bottom plate (2+3).



Mounting example with a TP404 ETAN
UL-certified junctions box

2. Put the mounting screw through the EOL board and junctions box mounting hole, as indicated.
3. Add the washer and nut to the bottom side of the screw and junctions box:
 - Tighten the nut with a maximum force of 0.7 Nm, until the EOL device fits correctly in place (**WARNING:** tighten with too much force could damage the EOL board!).
4. Pull wiring cables into junctions box through the selected knockout location.
 - Secure conduit, wiring cable, etc., to junctions box per NFPA 70 codes.
5. Connect the wiring to the EOL device. See *Wiring*, page 61.
6. Mount the junctions box to the desired position and close it with the junctions box cover, if required.

Mounting on the shelf

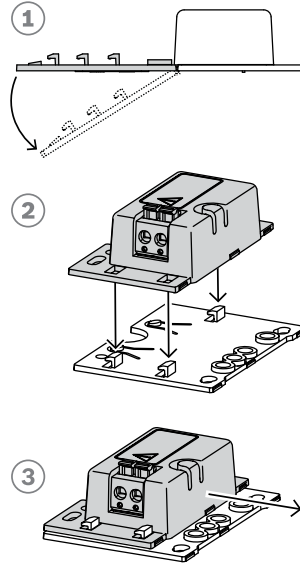


Notice!

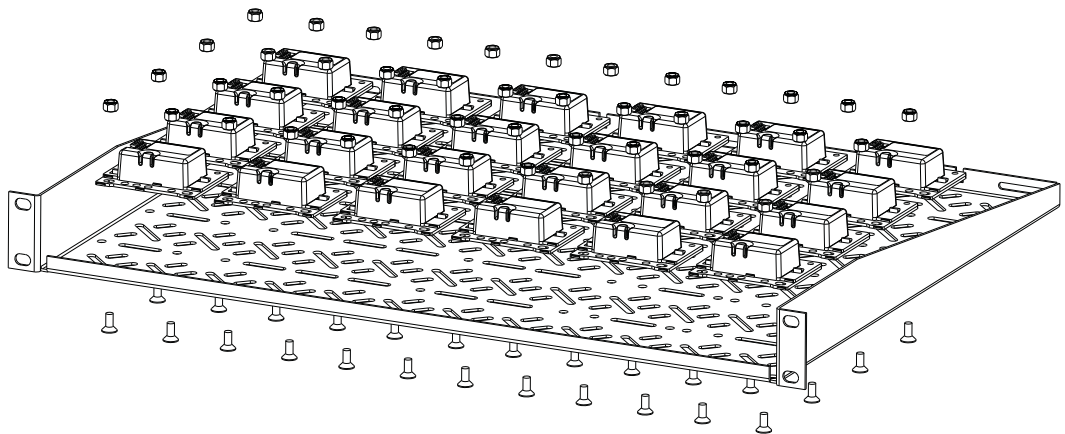
The USMG-114 utility shelf of the firm Lowell is UL-certified and supports the required mounting procedure.

To do so:

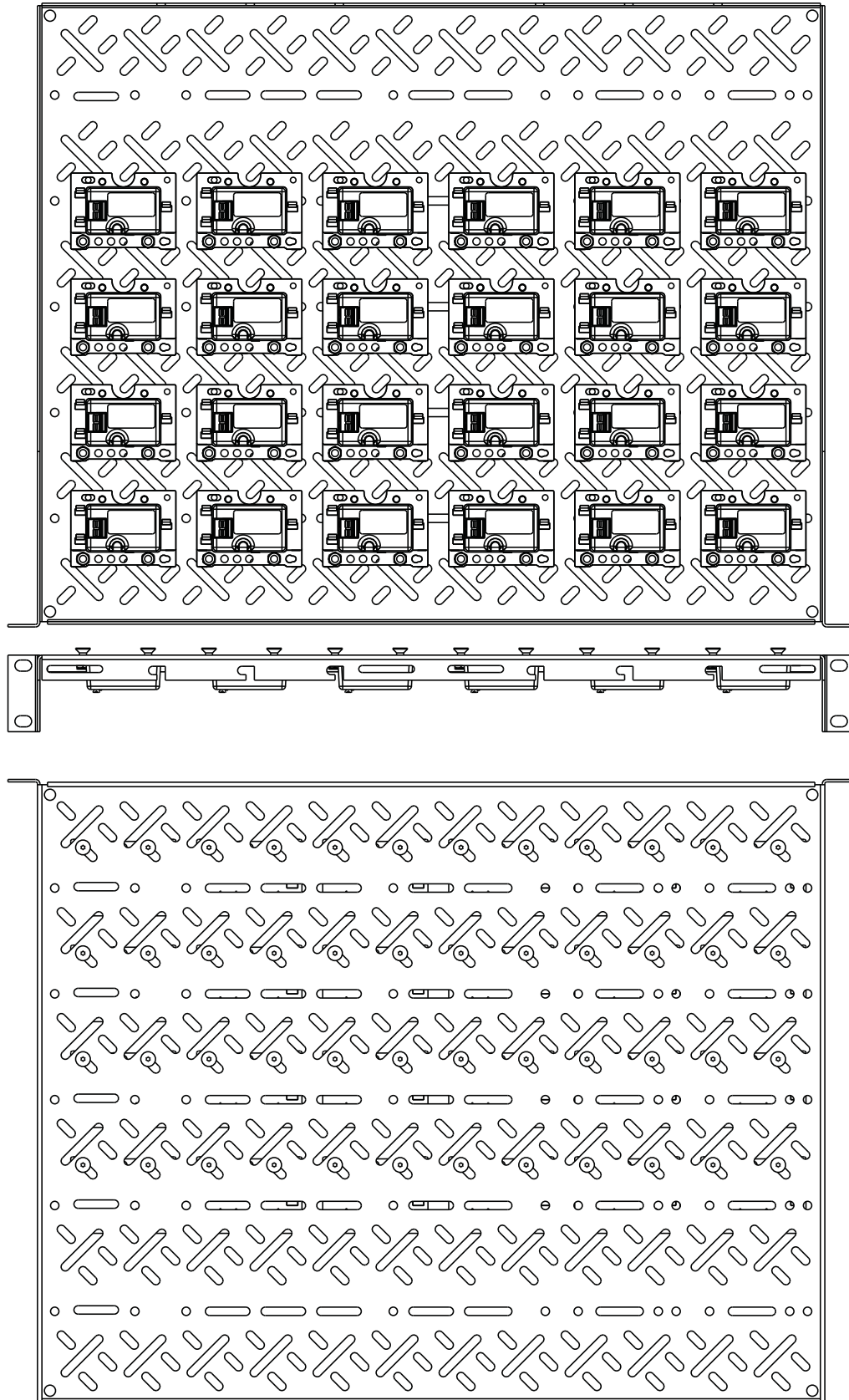
1. Part of the mounting plate of the end-of-line device can be broken off (1) and snapped in place as bottom plate (2+3).



2. From the bottom-side of the shelf, put two mounting screws through the shelf mounting holes and the EOL board holes, as indicated.



3. Add two nuts to the top-side of the screws and EOL board, and tighten:
 - Tighten the nuts with a maximum force of 0.7 Nm, until the EOL device fits correctly in place (**WARNING:** tighten with too much force could damage the EOL board!).
4. Repeat previous steps for all EOL devices to install.



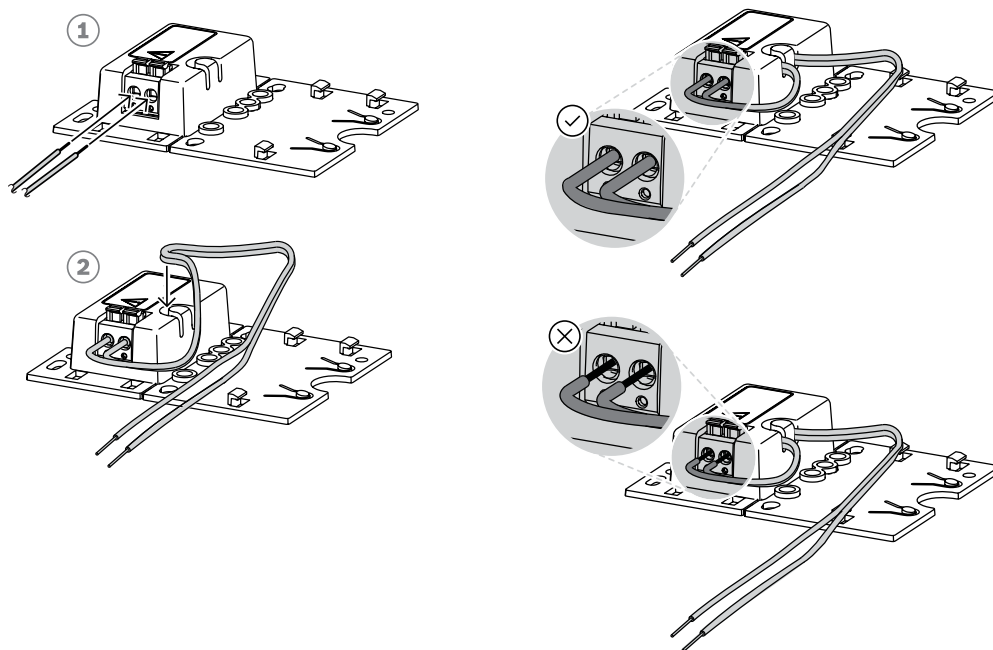
5. Connect the wiring to the EOL devices, and route the wiring to the amplifier(s). See *Wiring*, page 61.

- Secure conduit, wiring cable, etc., to the Lowell shelf per NFPA 70 codes.
6. Mount the shelf to the desired position in the Lowell 19"-rack:
- **IMPORTANT:** When connected for Class A wiring, close to the PRA-AD60x amplifier.

3.6.5

Wiring

The end-of-line device must be connected to the end of a loudspeaker line, to monitor the full length of the line. All loudspeakers connected to that line must be wired in a loop-through arrangement, without branches. The end-of-line device is then connected to the last loudspeaker using the supplied connection wire.



To do so:

1. Cut the wires (1) to the required length for connection to the end-of-line device, feeding the wires through the strain relief slot (2) in the housing:
 - The end-of-line device uses a 2-pole push wire connector.
 - The stripped wire ends must be inserted into the connector completely, up to the insulation, to prevent that the wires can be touched.
 - The polarity is not important for the end-of-line device.
2. Connect the other side of the two wires to the 100 V or 70 V loop-through connection of the loudspeaker:
 - This is the primary side of the loudspeaker transformer.

See also the sections: *Mounting*, page 57, *Amplifier outputs*, page 38 and *Amplifier outputs*, page 50.

3.6.6

Technical data**Electrical**

Control	
Amplifier load	< 100 mW
Loudspeaker cable	
Maximum length	1000 m
Maximum capacitance	80 nF
Operating temperature	-20 – 50 °C (-4 – 122 °F)
Maximum input voltage	100 VRMS

Environmental

This product is intended for dry indoor use only.

Climatic conditions	
Temperature	
Operating	-5 – 50 °C (23 – 122 °F)
Storage and transport	-30 – 70 °C (-22 – 158 °F)
Humidity (non-condensing)	5 – 95 %

Mechanical

Enclosure	
Dimensions (W x H x D)	
Board shape	78 x 60 x 16 mm (3.1 x 2.4 x 0.6 in)
Box shape	45 x 60 x 18 mm (1.8 x 2.4 x 0.7 in)
Case	
Material	Plastic
Color	RAL3000
Weight	25 g (0.055 lb)
Mounting position	Any

3.7 Multifunction power supply, large | PRA-MPS3



3.7.1 Connections

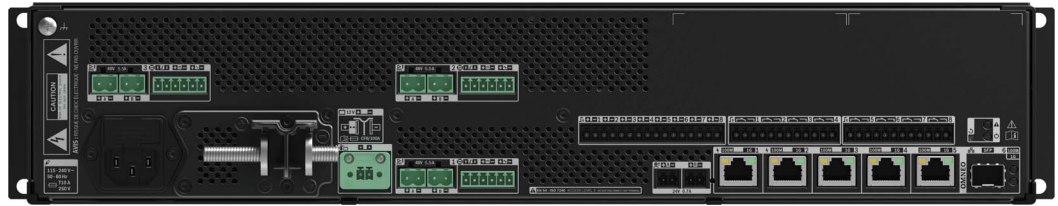


Figure 3.10: Rear view connections

	Chassis ground			Mains input with fuse	
	Battery 12 VDC (==)			Battery temperature sensor	
	48 VDC output A-B (1-3, to amplifier 1-3)			Lifeline control/audio/supply interface (1-3, to amplifier 1-3)	
	24 VDC output A-B (to system controller)				
	Control input 1-8			Control output 1-8	
	Network port 1-5 (port 1 and 2 with PoE)			Network port 6 (SFP)	

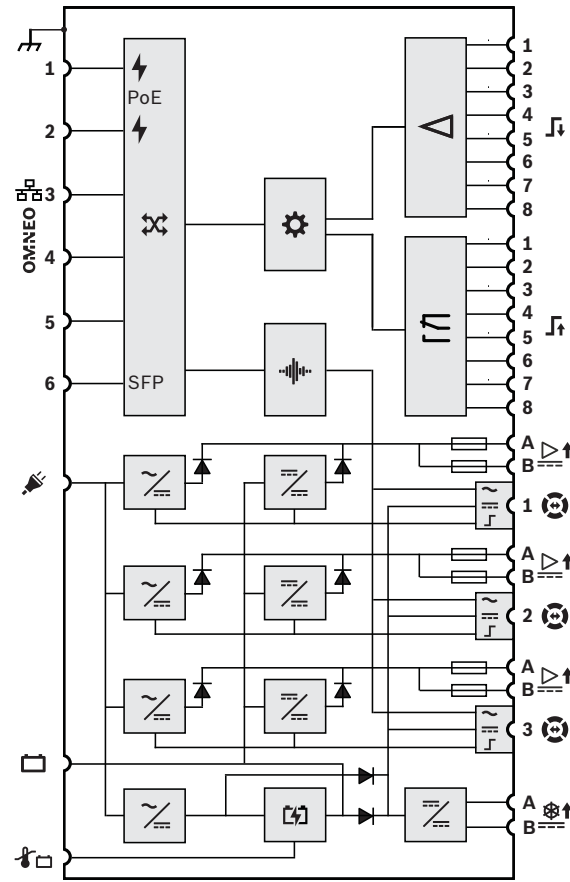
Field connections

Connection	Field wiring	Circuit class / L_{limited}	I_{Max} / Minimum AWG	Remark
Chassis ground	-	-	-	
Mains input with fuse	YES	Class 1 not power limited	10 A	
Battery 12 VDC (===)	NO*	Class 1 not power limited	100 A	
Battery temperature sensor	NO*	Class 1 not power limited		
48 VDC output A/B (1-3, to amplifier 1-3)	NO*	Class 1 not power limited	7 A	Wiring: 28-12 AWG
Lifeline control/audio/supply interface (1-3, to amplifier 1-3)	NO*	Class 1 not power limited	-	
24 VDC output A-B (to system controller)	NO*	Class 2 power limited		Wiring: 30-14 AWG
Control input 1-8	NO*	Class 2 power limited		
Control output 1-8	NO*	Class 2 power limited		
Network port 1-2 (with PoE)	YES	Class 2 power limited		Wiring Class N
Network port 3-5	NO*	Class 2 power limited		Wiring Class N
Network port 6 (SFP)	YES	N.A.		Wiring Class N

* Must stay within same room <20 ft and within metal conduit.

3.7.2 Functional diagram

Functional and connection diagram



Internal device functions

- Power over Ethernet power source
- OMNEO network switch
- SFP Socket for SFP module
- Controller
- Audio processing (DSP)
- Mains to DC converter
- DC to DC converter
- Battery charger
- Control input processor
- Control output relay
- Lifeline audio output
- Lifeline supply output
- Lifeline control interface
- Diode
- Fuse

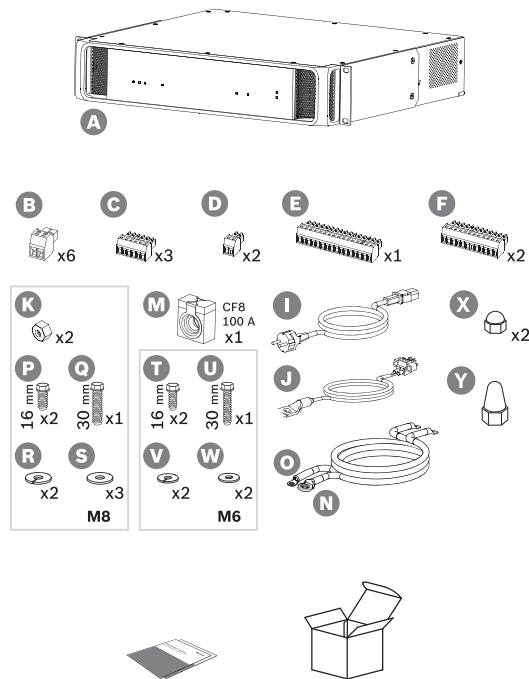
3.7.3 Parts included

The box contains the following parts:

Quantity	Component
1	Multifunction power supply
1	Set of 19"-rack mounting brackets (pre-mounted)
1	Set of screw connectors
1	Battery connection set (wiring, fuse, temperature sensor, nut caps)
1	EU power cord CEE 7/7 to IEC C13
1	US power cord NEMA 5-15 to IEC C13
1	Quick Installation Guide
1	Safety information

No tools or Ethernet cables are provided with the device.

Parts check and identification



- A** Multifunction power supply
- B** 2-pole screw plug (x6)
- C** 6-pole screw plug (small, x3)
- D** 2-pole screw plug (small, x2)
- E** 16-pole screw plug (small)
- F** 12-pole screw plug (small, x2)
- I** Mains power cord
- J** Temperature sensor assembly
- K** Nut M8 (x2)
- M** Battery fuse CF8 100 A
- N** Positive battery cable (red)
- O** Negative battery cable (black)
- P** Bolt M8 (short, x2)
- Q** Bolt M8 (long)
- R** Spring washer M8 (x2)
- S** Washer M8 (x3)
- T** Bolt M6 (short, x2)
- U** Bolt M6 (long)
- V** Spring washer M6 (x2)
- W** Washer M6 (x2)
- X** Nut cap M8 (short, 2x)
- Y** Nut cap M8 (long, 1x)

3.7.4

Battery and fuse

The multifunction power supply needs an external 12 V VRLA (Valve Regulated Lead Acid) battery as backup power source. A 100 A fuse (model CF8) (M) must be used in series with the positive (red) cable (N) of the battery. It is recommended to mount the fuse at the battery side (see chapter below), immediately at the positive battery terminal. Alternatively the fuse can be mounted at the power supply side (see chapter below), when local standards require so. Never use two fuses, one on each side, because this would increase the series resistance of the cable assembly and the high peak currents of a system in emergency mode would result in voltage dips that could limit the maximum available output power to the loudspeakers. The connected battery must have a capacity of 100 to 230 Ah.

The actual required capacity depends on many variables, see Battery calculation for calculation guidelines. The device is delivered with cables with crimp eyelet terminals (N + O). These battery cables must be used to connect the battery.

The temperature sensing assembly (J) is used to sense the temperature of the battery for best performance. The temperature of the negative battery terminal is a good representation of the internal battery temperature. Temperature sensing is an important requirement to set the correct charging threshold voltages to fully charge the battery without overcharging. When the temperature sensor is not mounted correctly, the battery lifetime may be considerably reduced. When the sensor is not connected, the battery charger will be switched off. Only use the temperature sensor assembly that is delivered with the device.

Notice!

The battery must be an UL-listed battery with a maximum capacity of 230 Ah. See also *Battery calculation, page 23*. The battery shall:

- be rechargeable;
- be suitable to be maintained in a fully charged state;
- be constructed for stationary use;
- be marked with the type designation and date of manufacture;
- be of the sealed type;
- be mounted in accordance with the manufacturer's data.



A properly marked and mounted VRLA (Valve Regulated Lead Acid) battery of 12 V fulfils these requirements. SLA (Sealed Lead Acid) and VRLA are different acronyms for the same battery. This battery type is maintenance-free, leak-proof and position insensitive. Batteries of this kind have a safety vent to release gas in case of excessive internal pressure build up. AGM (Absorbed Glass Mat) refers to a specific type of SLA or VRLA and can be used also.

Caution!



1. The battery must be electrically floating. Never connect any battery terminal to ground. The battery terminals must be wired individually to the battery connection terminals of the PRA-MPS3.
2. A battery may not be connected to more than one PRA-MPS3, this means that it cannot be shared by multiple power supplies.

Notice!



1. To prevent damage to the battery always check the depth of the threaded insert of the terminals before tightening the bolts. If needed, use shorter bolts.
2. Make sure that all connections are tightened with the correct torque. Not only to prevent damage, but also to keep the contact resistances as low as possible. It is good practice to keep the red and black battery cables together and aligned for most of their length, using cable ties or heat shrink sleeves.
3. It is not allowed to connect any external load to the battery directly, as this will disturb the charging process.

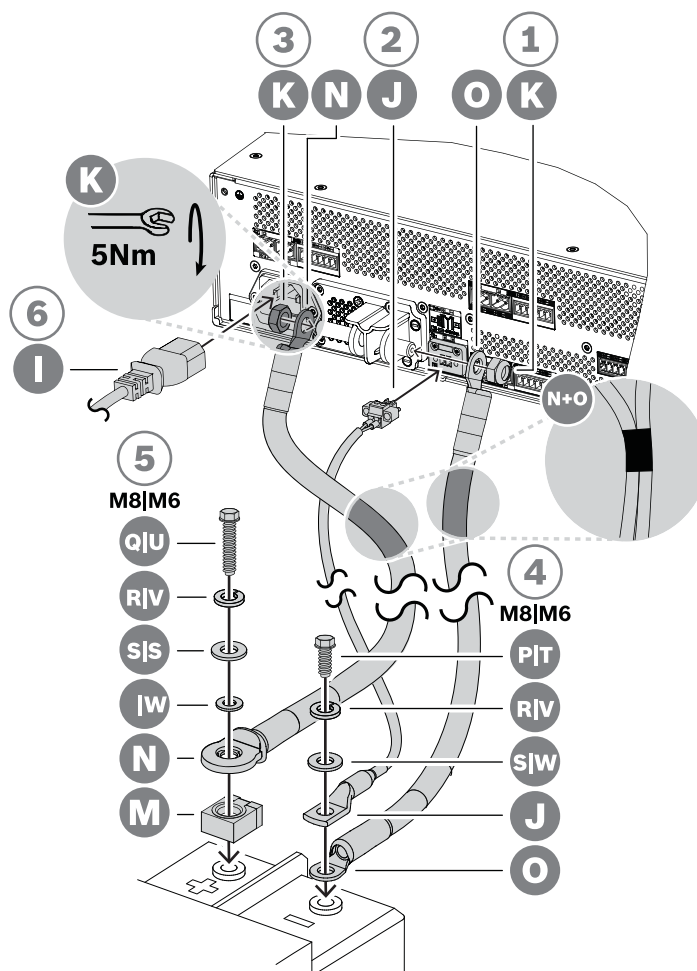
Battery fault reporting

The battery is monitored continuously to prevent damage to the battery and to make sure that it is available in good state as a backup power source to the system in case of mains power failures.

Make sure that this battery can handle a charging current of 8.8 A and the maximum current draw of the load, see section Accurate battery size calculation.

Fuse at battery side

Putting the fuse (M) at the positive battery terminal, follow the connection procedure below.

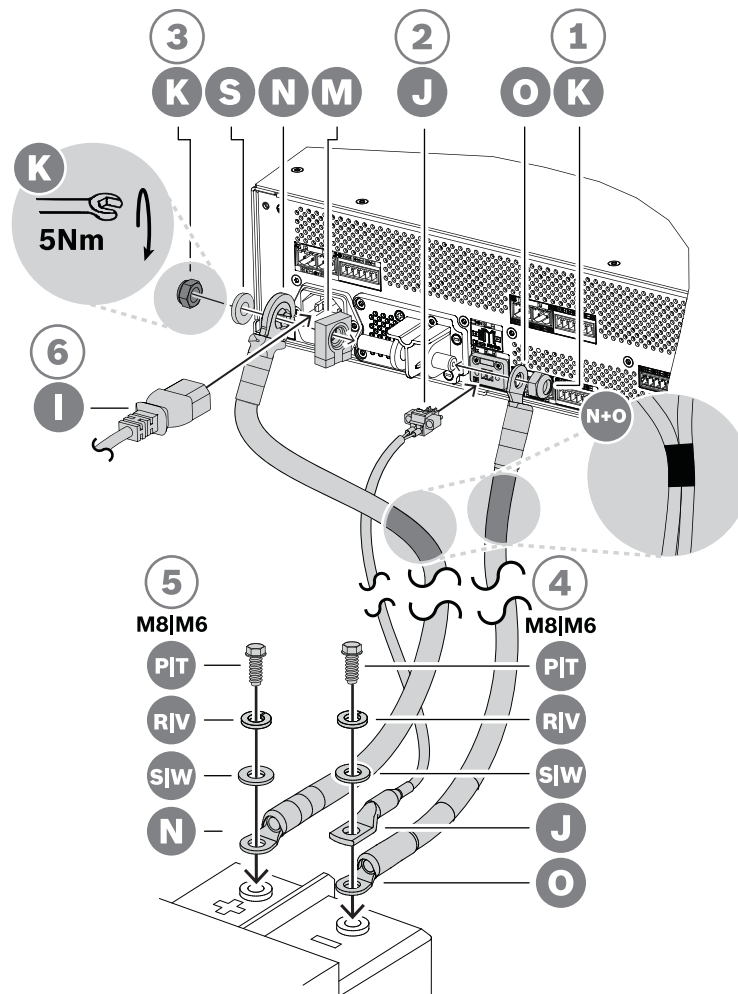


1. Take the black battery cable (O) and fix one side to the short negative battery connection terminal of the power supply, using an M8 self-locking nut (K). Tighten with torque 5 Nm.
 - When the black (O) and red (N) battery cables are fixed to each other, make sure that the isolated fuse eyelet on the red cable (N) is at the **battery side**, otherwise reverse the complete cable set.
2. Take the red battery cable (N) and fix the non-isolated eyelet to the long positive battery connection terminal, using the other M8 self-locking nut (K). Tighten with torque 5 Nm.
3. Push one of the short nut caps (X) on the nut of the negative connection terminal.
4. Push the long nut cap (Y) on the nut of the positive connection terminal.
 - The nut plastic caps provide additional protection against the short circuiting of the battery, to prevent the battery fuse from accidentally blowing.
5. Connect the open end of the black cable (O) to the negative battery terminal, with the eyelet of the temperature sensor (J) on top.
 - Depending on the type of battery and its terminals, use a short M8 bolt (P), spring washer (R) and washer (S), or short M6 bolt (T), spring washer (V) and washer (W).

- M8 and M6 are the most common screw terminal types for VRLA batteries in PA/VA applications. Check the battery specification for the optimum tightening torque.
6. Put the fuse (M) on top of the positive battery terminal, then put the open end of the red cable (N) with the metal side of the isolated eyelet on top of the fuse and fix this set to the battery terminal with a long bolt, spring washer and washer (M8: Q, R, S / M6: U, V, W).
- Tighten with the correct torque, according to the battery specification. The eyelet isolation of cable (N) is needed to prevent that the fuse is being shorted by the bolt (Q or U).

Fuse at power supply side

Putting the fuse (M) at the positive battery terminal of the power supply, follow the connection procedure below.



1. Take the black battery cable (O) and fix one side to the short negative battery connection terminal of the power supply, using an M8 self-locking nut (K). Tighten with torque 5 Nm.
 - When the black (O) and red (N) battery cables are fixed to each other, make sure that the isolated fuse eyelet on the red cable (N) is at the **power supply** side, otherwise reverse the complete cable set.

2. Put the fuse (M) on the long positive battery connection terminal of the power supply, followed by the isolated eyelet of the red cable (N), with the metal side of the eyelet against the fuse, then followed by a washer (S). Fix this set using the other M8 self-locking nut (K). Tighten with torque 5 Nm.
 - The eyelet isolation of cable (N) is needed to prevent that the fuse (M) is being shorted by the threaded end terminal.
3. Push the two short nut caps (X) on the nuts of the negative connection terminal and the positive connection terminal.
 - The nut plastic caps provide additional protection against the short circuiting of the battery, to prevent the battery fuse from accidentally blowing.
4. Insert the connector of the battery temperature sensor assembly (J) into the temperature sensor connector socket of the power supply.
5. Connect the open end of the black cable (O) to the negative battery terminal, with the eyelet of the temperature sensor (J) on top. Depending on the type of battery and its terminals, use a short M8 bolt (P), spring washer (R) and washer (S), or short M6 bolt (T), spring washer (V) and washer (W).
 - M8 and M6 are the most common screw terminal types for VRLA batteries in PA/VA applications. Check the battery specification for the optimum tightening torque.
6. Connect the open end of the red cable (N) to the positive battery terminal using a short bolt, spring washer and washer (M8: P, R, S / M6: T, V, W). Tighten with the correct torque, according to the battery specification.

Battery cables

Battery cables are packed with the PRA-MPS3. These are heavy duty red (N) and black (O) cables of 120 cm length, with a cross section of 35 mm² (approximately AWG 2) and with crimp eyelet terminals attached.

3.7.5

Mains power connection

1. Check that the mains (AC) power supply meets the nominal input rating of the PRA-MPS3.
2. Use the supplied power cord (I) to connect to the mains line.
 - The PRA-MPS3 has no power switch.
 - Plug unit into a permanent power outlet inside the rack enclosure.



Notice!

The power cord with a plug can be used to disconnect the PRA-MPS3 from the mains. Connect the plug to an easily accessible power outlet so that the plug can be removed from the outlet at any time. Be sure to allow enough space around the power outlet.

3. The mains inlet has a built-in fuse T10AH 250V.
 - The T-characteristic of this 10 A fuse refers to how rapidly it responds to various current overloads. This is a slow-acting fuse (Time-lag) that has additional thermal inertia, designed to tolerate normal initial or start-up overload pulses.
 - The H-characteristic of this 10 A fuse refers to being a High breaking fuse type.
 - Because the fuse is only connected in line with one of the mains conductors (L or N), never use the fuse as a means to interrupt the mains in case of service. Pull out the C13-connector of the power cord to disconnect the mains.

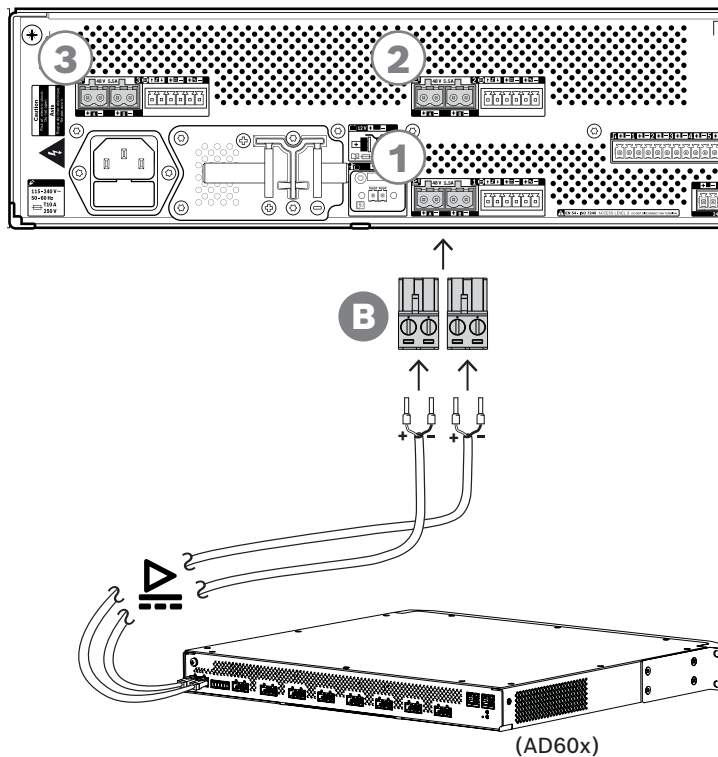


Caution!

Only replace with a fuse of the same type, certified for UL 248.

3.7.6 Amplifier power supply

The multifunction power supply has three independent 48 VDC outputs to supply power to three PRAESENSA power amplifiers. Each output has dual A/B connectors for connection and cable redundancy. It is recommended to always use both connections.



Connection procedure

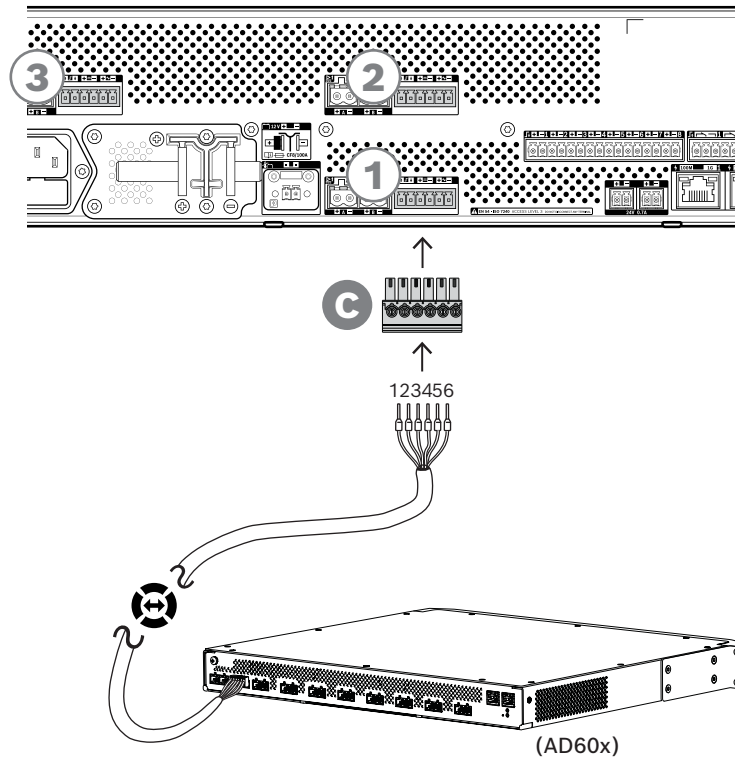
1. The power supply interconnection wiring and ferrules are delivered with the amplifier.
 - The power supply terminal plugs (B) are delivered with the multifunction power supply.
2. Follow the power supply cable assembly instructions as provided for the amplifiers.
 - Observe polarity.
3. Insert the power supply terminal plugs of the interconnection cables into the A/B sockets of one of the three 48 VDC outputs.
 - It is good practice to connect output A of the power supply to input A of the amplifier and the same for B. Cross coupling is allowed, but may be confusing in case of fault finding.

3.7.7

Lifeline

The lifeline is required for UL2572 to meet the backup time requirements and is a cable connection between a PRAESENSA amplifier and a PRAESENSA multifunction power supply. This interconnection serves multiple functions:

- Lifeline audio routing (backup audio signal for the connected amplifier in case its network interface or both network links would fail).
 - Not required for UL2572. This backup audio signal is optional and allowed to be used in a UL2572 compliant system.
- Lower power consumption during mains absent.
 - Required for UL2572 compliancy.



To complete the lifeline interconnection follow the procedure below:

1. The 6-pole cable and connector for the amplifier are delivered with the amplifier. For lifeline assembly instructions, refer to the following amplifier sections: *Lifeline*, page 37 and/or *Lifeline*, page 49.
2. The 6-pole connector (C) for the multifunction power supply is delivered with the power supply.
3. Mount the connector (C) to the cable, following the same wire order as for the amplifier side, the cable should be reversible.
4. Insert the connector (C) into the lifeline socket of the multifunction power supply, using the socket next to the 48 V outputs that go to the same amplifier.

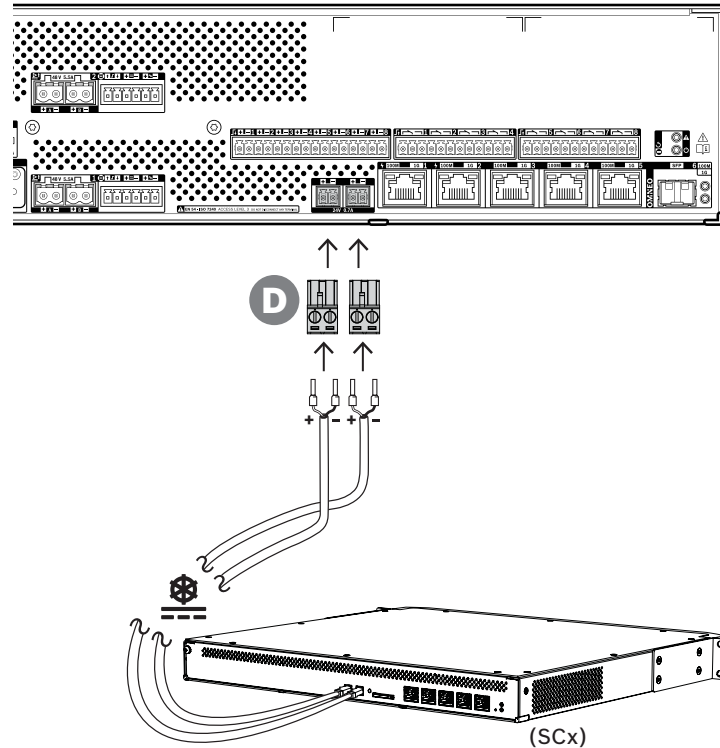


Notice!

Each pair of 48 V outputs A/B and the lifeline next to it belong to each other and are always connected to the same amplifier. Keep the cables together to avoid errors that could result in no sound in case of emergencies.

3.7.8 System controller power supply

The multifunction power supply has one 24 VDC output to supply power to a PRAESENSA system controller or to power an auxiliary device like an Ethernet switch. The output has dual A/B connectors for connection and cable redundancy. It is recommended to always use both connections.



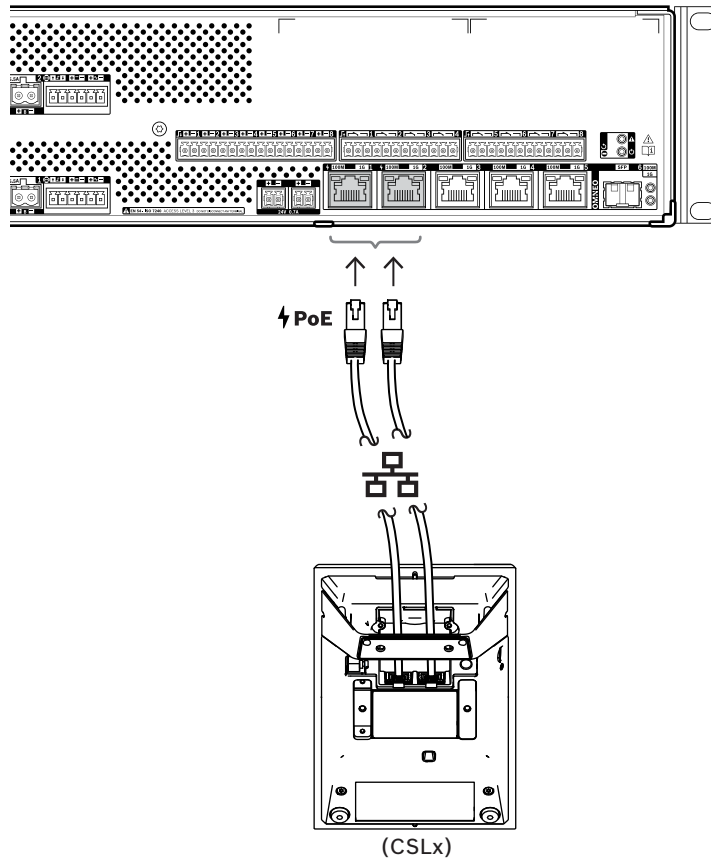
Connection procedure:

1. The power supply interconnection wiring and ferrules are delivered with the system controller. The power supply terminal plugs (D) are delivered with the multifunction power supply.
2. Follow the power supply cable assembly instructions as provided for the system controller.
 - Observe polarity.
3. Insert the power supply terminal plugs (D) of the interconnection cables into the A/B sockets of the 24 VDC output.
 - It is good practice to connect output A of the power supply to input A of the amplifier and the same for B. Cross coupling is allowed, but may be confusing in case of fault finding.

3.7.9

Power over Ethernet

The multifunction power supply has an integrated Ethernet switch with 6 external ports. Ports 1 and 2 provide Power over Ethernet (PoE), next to OMNEO and other Ethernet data, present on the network. These ports can be used to connect one or two call stations. Each port is capable of providing enough power for a call station with four extensions, which is the maximum. A PRAESENSA call station has two Ethernet ports and can be connected with two cables for fail safe cable redundancy. It is also possible to connect a call station to two separate multifunction power supplies for additional protection against failure of its Ethernet switch. Ports 3 to 5 cannot be used for PoE powering.



PoE devices can simply be connected using Gb-Ethernet cables with RJ45 connectors. All PRAESENSA devices support Rapid Spanning Tree Protocol (RSTP) to enable the use of multiple connections simultaneously for cable redundancy, e.g. to daisy-chain devices in a loop, with a maximum of 21 devices in a loop.



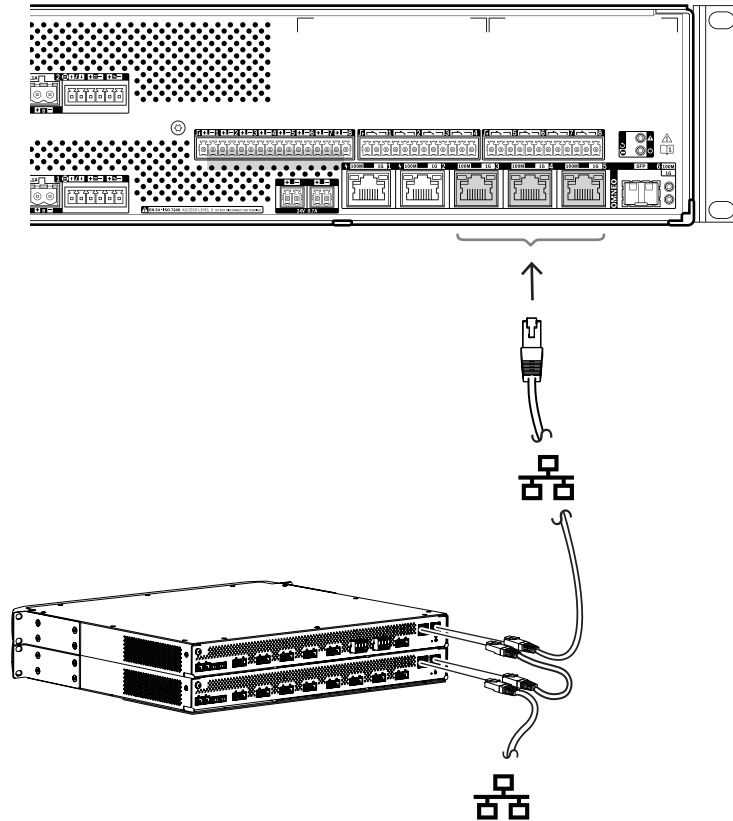
Notice!

For long range interconnections, see *Field wire cable requirements, page 18* > Long range interconnections.

3.7.10 Ethernet network

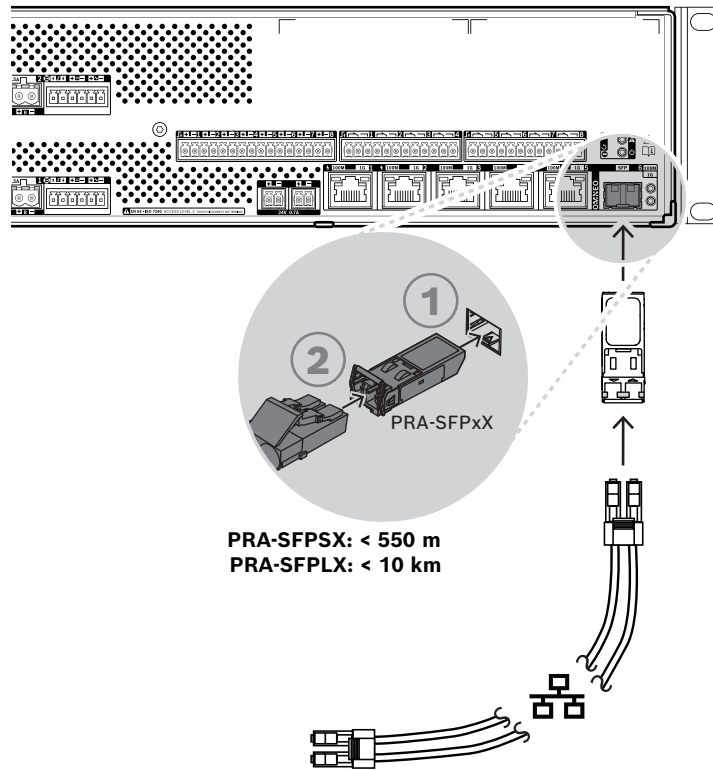
The multifunction power supply has six Ethernet connection ports with a built-in Ethernet switch, supporting RSTP for Class N pathway realization. Follow the procedure below to connect the device to a network and other system devices.

The network must be set up in such a way that the multifunction power supply can be discovered and reached by the system controller.



1. Connect at least one of the ports to the network, so that it can be discovered by the system controller to make it part of the system.
2. The other ports can be used for a loop-through connection to a next device. Devices can just be daisy-chained or be connected in a loop, in which case the system can recover from a broken link.
3. The availability of a multi-port switch makes the multifunction power supply an ideal device for decentralized system clusters that are interconnected to create a large system. One or more of these multifunction power supplies in cluster can be easily interconnected to other clusters, while the remaining ports are used to connect loops of other devices in that cluster.

Port 6 is an SFP socket for a Small Form-factor Pluggable module. This allows for a long distance connection as field wiring between 19"-racks using glass fiber.

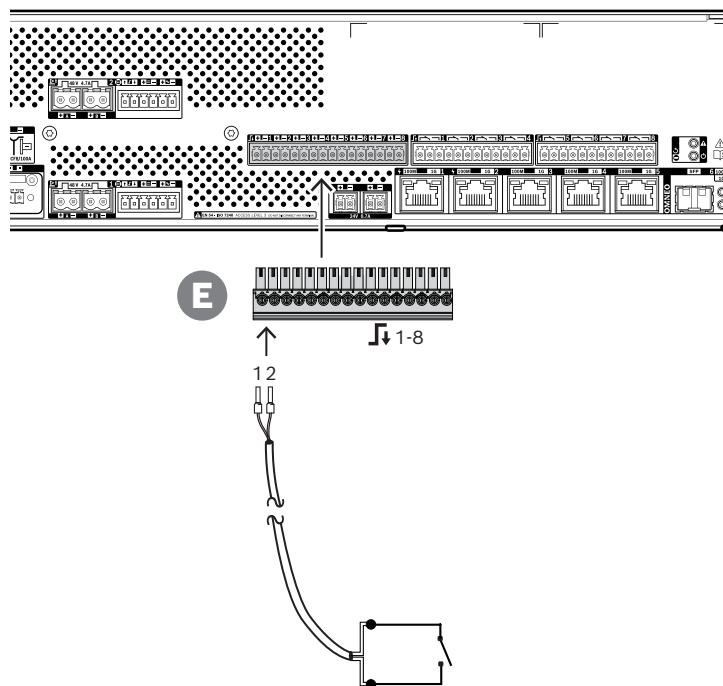
**Caution!**

Risk of eye injury. When inspecting a connector, ensure that light sources are off. The light source in fiber optic cables may cause eye injury. SX and LX fiber connections use invisible IR light.

3.7.11

Control inputs

The multifunction power supply provides eight control inputs on a 16-pole connector. In case no interconnection supervision is configured, just use a switch or a relay output from another system for activation.



Connection procedure

1. Use a 2-wire cable, proper for the installation, and the 16-pole terminal plug (E) delivered with the device.
2. Insert the near end wires of the cable into the appropriate slots of terminal plug (E), preferably using crimped on wire ferrules that fit to the wire gauge used.
 - Use a flat blade screw driver to tighten each connection.
3. Connect the other side of the cable to the activation switch or voltage free relay contact.

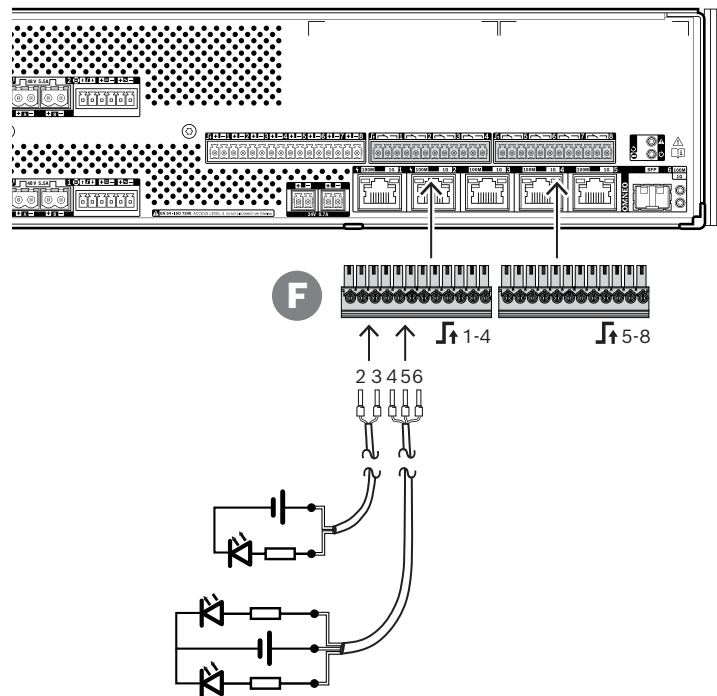


Notice!

Do not use any terminal in common with other control input terminals.

3.7.12 Control outputs

The multifunction power supply provides eight control outputs on two 12-pole connectors. The control outputs use an SPDT (Single Pole Double Throw) relay for each output, providing an NC (Normally Closed) and an NO (Normally Open) contact. The control outputs can be configured independently for various actions. Make sure not to exceed the maximum contact rating.



Connection procedure

1. Use a 2-wire or 3-wire cable, proper for the installation and application, and one of the 12-pole terminal plugs delivered with the device.
2. Insert the near end wires of the cable into the appropriate slots of terminal plug (F), preferably using crimped on wire ferrules that fit to the wire gauge used.
 - Use a flat blade screw driver to tighten each connection.
3. Connect the other side of the cable to the application to be activated.

3.7.13**Technical data****Electrical**

Power transfer	
Mains power supply input	
Rated input voltage range	120 VRMS
Frequency range	60 Hz
Maximum input current	10 A
Battery power supply input	
Nominal DC input voltage	12 V
Maximum current	90 A
Under-voltage protection	< 9 V
Battery charger	
Nominal charging current	8.7 A
Maximum charging current	8.8 A
Nominal float voltage	13.7 V
Regulated 24 VDC output	
Nominal DC output voltage	24 V
Maximum continuous current	0.7 A
Maximum peak current	0.9 A
Power over Ethernet (PoE 1-2)	
Nominal DC output voltage	48 V
Standard	IEE 802.3af (mode B)
Maximum PD load	12.95 W
Power consumption	
Mains powered	
Active mode, all outputs loaded	<1000 W
Battery powered	
Active mode, all outputs loaded	<1000 W
Control interface	
Control input contacts (1-8)	
Principle	Contact closure
Galvanic isolation	No
Minimum hold time	100 ms
Maximum voltage to ground	24 V
Control output contacts (1-8)	
Principle	Contact switch over (Relay SPDT)
Galvanic isolation	Yes
Maximum contact voltage	24 V
Maximum contact current	1 A
Maximum voltage to ground	500 V

Supervision	
Battery	Disconnect Short circuit Charging state Impedance
Power supplies	Converter voltages Output voltages
Lifeline connection	Impedance
Network interface	
Ethernet Protocol Redundancy	100BASE-TX, 1000BASE-T TCP/IP RSTP Class N
Ports RJ45 SFP	5 (2 with PoE) 1

Environmental

This product is intended for dry indoor use only.

Climatic conditions	
Temperature Operating Storage and transport	-5 – 50 °C (23 – 122 °F) -30 – 70 °C (-22 – 158 °F)
Humidity (non-condensing)	5 – 95 %
Airflow	
Fan airflow	Front to sides/rear

Mechanical

Enclosure	
Dimensions (W x H x D) With mounting brackets Rack unit	483 x 88 x 400 mm (19 x 3.5 x 15.7 in) 19 in, 2U
Case Material Color	Steel RAL9017
Frame Material Color	Zamak RAL9022HR
Weight	11.8 kg (26 lb)

Enclosure	
Mounting position	Horizontal

3.8 LCD call station | PRA-CSLD, PRA-CSLW (ancillary)




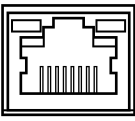



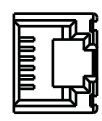
PRA-CSLD

PRA-CSLW

3.8.1 Connections



Figure 3.11: Bottom view wiring connections

	Network port 1-2 (PoE PD)			Local source audio line input	
	PRA-CSE interconnection				

Field connections

Connection	Field wiring	Circuit class / <small>I_{limited}</small>	<small>I_{Max}</small> / minimum AWG	Remarks
Network port 1-2	YES	Class 2 power limited		Wiring Class N
Local source audio line input	NO*	Class 2 power limited		
PRA-CSE interconnection	NO*	Class 2 power limited		
Enclosure	-	-	-	
Microphone connection	NO*	Class 2 power limited		

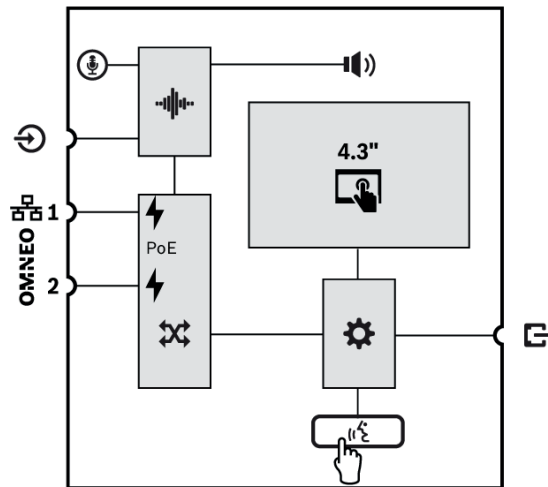
* Must stay within same room <20 ft and within metal conduit.

3.8.2 Functional diagram

Functional and connection diagram

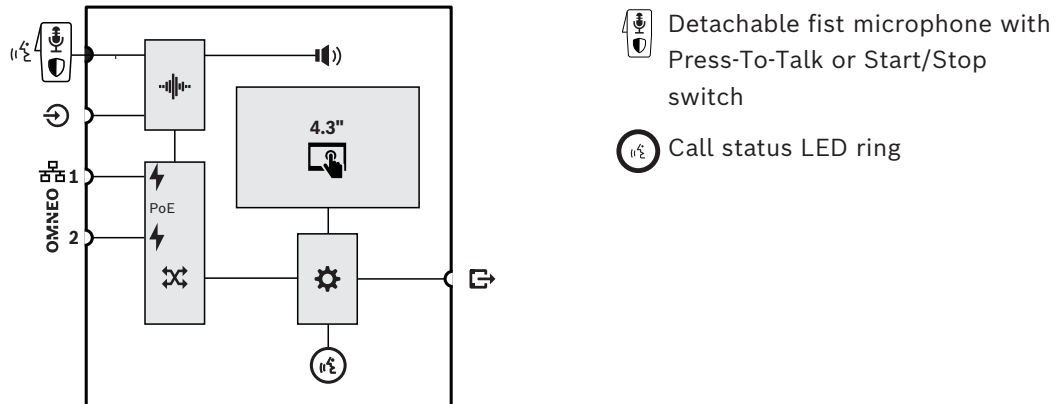
Internal device functions

PRA-CSLD



- Fixed microphone on a flexible stem
- Internal monitor loudspeaker
- Audio processing (DSP)
- Power over Ethernet
- OMNEO network switch
- Controller
- Press-To-Talk button

PRA-CSLW



3.8.3

Parts included

The box contains the following parts:

PRA-CSLD

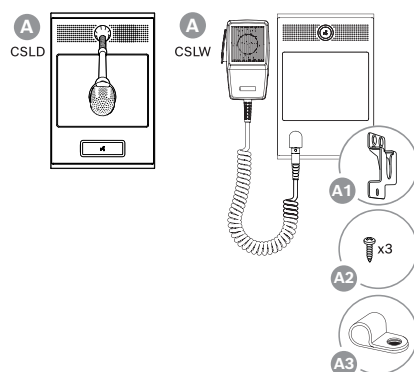
Quantity	Component
1	Desktop LCD call station
1	Bracket (attached to bottom)
1	Connector cover (attached to bottom)
1	Quick installation guide
1	Safety information

PRA-CSLW

Quantity	Component
1	Wallmount LCD call station
1	Bracket (attached to bottom)
1	Connector cover (attached to bottom)
1	Microphone with coiled cable and connector
1	Microphone bracket
1	P-clip for microphone cable
1	Quick installation guide
1	Safety information

No tools or Ethernet cables are provided with the device.

Parts check and identification



- A** Desktop/wallmount LCD call station
- A1** Microphone holder
- A2** Microphone screws for holder
- A3** P-clip for microphone cable

3.8.4 Interconnection call station / extension

Add up to four PRA-CSE call station extensions for zone selection and other functions. Without extensions the call station can only be used with a pre-configured zone selection. A call station (A) will automatically assign a connected extension (B) to itself and number the extensions in succession. Manual addressing is not needed and not possible. The system will supervise that a configured extension remains connected to its call station. Refer to: *Extension connected to a call station, page 92.*

3.8.5 Power over Ethernet

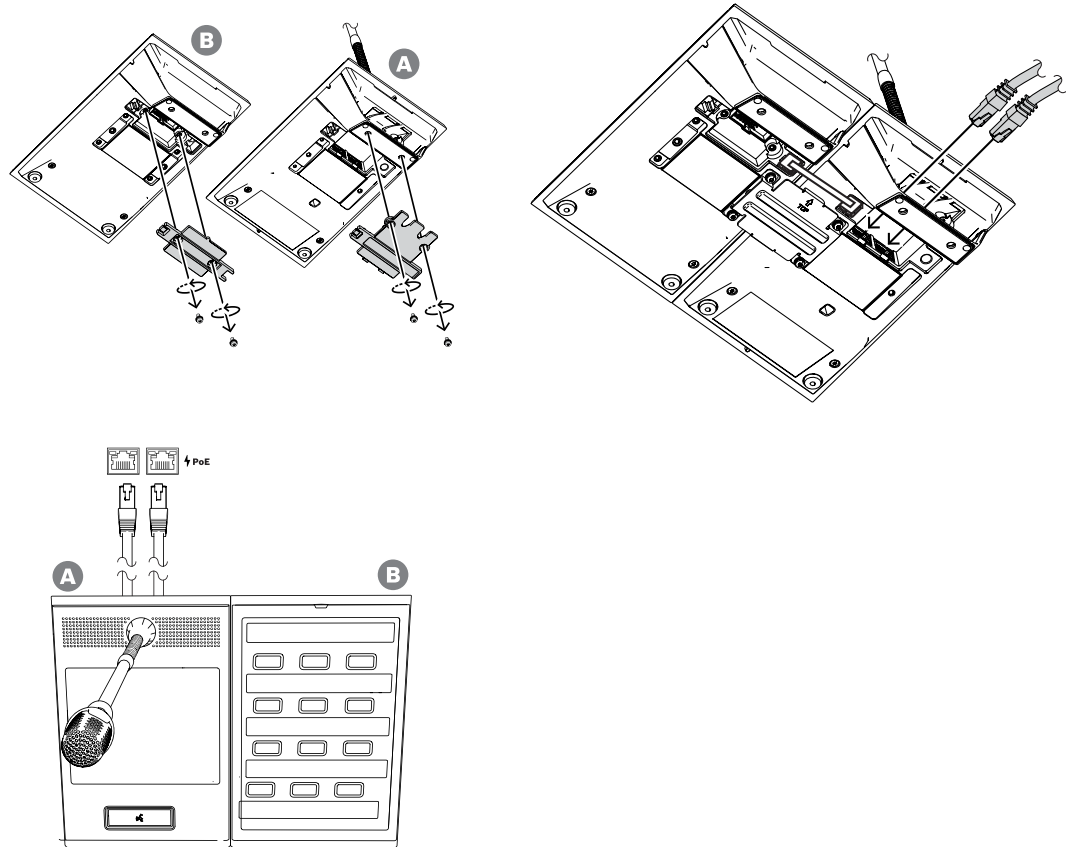
The call station has two Ethernet connection ports with a built-in Ethernet switch, supporting RSTP for Class N pathway realization. The call station is an PoE Powered Device (PD). It provides the correct signature and classification to power sourcing equipment (PSE), so that a PSE sources the right amount of power to a PD over the Ethernet cables. Although it is sufficient to provide PoE power to only one port, both Ethernet ports take PoE power for cable redundancy and supply redundancy. For best availability it is advised to connect each port to a different, independent PSE, such as a PRA-MPS3 multifunction power supply (ports 1 and 2) or a PRA-ES8P2S Ethernet switch (ports 1-8). In case one of the connections fail, or one of the PSE sources fail, the operation of the call station is not affected. With both connections to the same PSE, there is still connection redundancy but no PSE redundancy.

The ports of the call station can be looped through to another PRAESENSA device, but at least one port must be connected to a PSE to power the call station and its extensions. With only one port connected to a PSE, there is no connection redundancy.

The call station ports cannot source PoE power to subsequent devices, such as another call station.

To connect the call station, follow the procedure below:

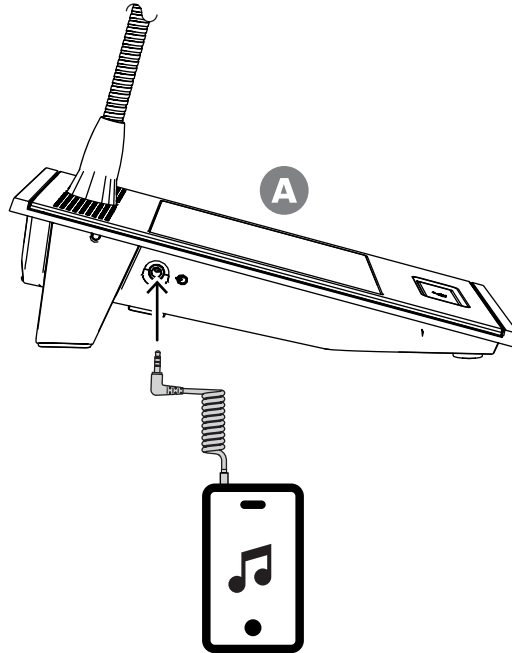
1. Remove the cable cover at the bottom of the call station using a TX10 screwdriver.
 - Get access to the two screws via the holes in the table stand bracket.
2. Use one or two Gb-Ethernet cables with RJ45 connectors to connect the call station to a PSE port, with PoE enabled.
3. Put back the cable cover with the two TX10 screws.



3.8.6

Line input

On the left side of the call station is a 3.5 mm stereo socket. This is an input for a background music source, such as a dedicated audio player, smartphone or PC. The connected audio player, smartphone or PC must always be located in the same room. The stereo signal is converted to mono for further distribution in the system. This input is not supervised, unplugging the cable to the audio player will not be reported as a fault.



Notice!

When music is played from a PC that is connected to a grounded mains supply, there is a risk of hum being inserted into the music input of the call station. This is caused by unequal ground potentials of the different mains supplies. Use a cable with integrated transformers for ground loop isolation to prevent such hum. See picture below of an example ground loop isolator cable.



3.8.7

Technical data

Electrical

Microphone (PRA-CSLD)	
Nominal acoustic input level (configurable)	80 – 100 dBSPL
Maximum acoustic input level	120 dBSPL
Signal to Noise Ratio (SNR)	> 70 dBA
Directivity	Unidirectional
Frequency range (+3 / -6 dB)	100 Hz – 14 kHz
Microphone (PRA-CSLW)	
Nominal acoustic input level (configurable)	89 – 109 dBSPL
Maximum acoustic input level	120 dBSPL
Signal to Noise Ratio (SNR)	> 73 dBA

Microphone (PRA-CSLW)	
Directivity	Omnidirectional
Frequency range (+3 / -6 dB)	500 Hz – 8 kHz (noise cancelling)

Display	
Size	4.3"
Touch screen	Capacitive
Color depth	24-bit
Resolution	480 x 272 px
Brightness	300 cd/m ²
Monitor loudspeaker	
Maximum sound pressure level, at 1 m	75 dBSPL
Volume control	Mute, -40 dB – 0 dB

Power transfer	
Power over Ethernet (PoE 1-2) Nominal DC input voltage Standard	48 V IEEE 802.3af (mode B)
Maximum input current	350 mA (IEEE802.3af), with 0 to 4 PRA-CSE connected.
Rated voltage	48 V

Line input	
Signal to Noise Ratio (SNR)	> 96 dBA
Total Harmonic Distortion + Noise (THD+N)	< 0.1 %

Supervision (PRA-CSLD)	
Supervision Microphone Audio path Controller continuity PoE (1-2)	Current Pilot tone Watchdog Voltage

Supervision (PRA-CSLW)	
Supervision Microphone Audio path Press-to-talk switch Controller continuity PoE (1-2)	Impedance Pilot tone Impedance Watchdog Voltage

Network interface	
Ethernet	100BASE-TX, 1000BASE-T
Protocol	TCP/IP
Redundancy	RSTP
Ports	2

Environmental

This product is intended for dry indoor use only.

Climatic conditions	
Temperature	
Operating	-5 – 50 °C (23 – 122 °F)
Storage and transport	-30 – 70 °C (-22 – 158 °F)
Humidity (non-condensing)	5 – 95 %

Mechanical

Enclosure (PRA-CSLD)	
Dimensions (HxWxD) Excluding microphone	62 x 130 x 189 mm (2.44 x 5.12 x 7.44 in)
Ingress protection	IP30
Base	
Material	Zamak
Color	RAL9017
Panel	
Material	Plastic
Color	RAL9017 RAL9022HR
Weight	0.9 kg (1.98 lb)

Enclosure (PRA-CSLW)	
Dimensions (HxWxD)	62 x 130 x 189 mm (2.44 x 5.12 x 7.44 in)
Ingress protection	IP30
Base	
Material	Zamak
Color	RAL9017
Panel	
Material	Plastic
Color	RAL9017 RAL9022HR

Enclosure (PRA-CSLW)	
Weight	1.0 kg (2.21 lb)
Mounting position	In any angle from horizontal to vertical, with the display facing up or forward


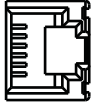

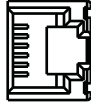
3.9 Call station extension | PRA-CSE



3.9.1 Connections



Figure 3.12: Bottom view wiring connections

	Connection to next extension (RJ12)			Connection to call station or previous extension (RJ12)	
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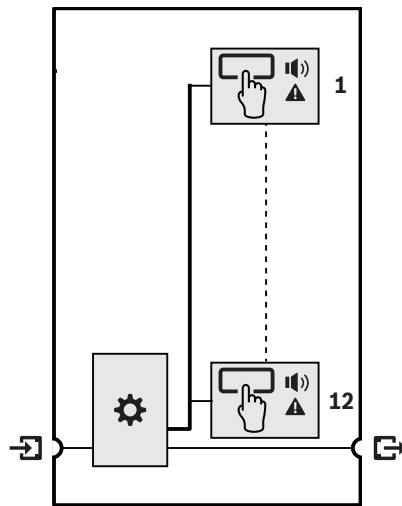
Field connections

Connection	Field wiring	Circuit class / <i>limited</i>	<i>I</i> _{max} / minimum AWG	Remarks
Interconnection (RJ12)	NO*	Class 2 power limited		
Enclosure	-	-	-	




* Must stay within same room <20 ft and within metal conduit.

3.9.2 Functional diagram

Functional and connection diagram



Internal device functions

-  Controller
-  Zone status indicator
-  Zone fault indicator

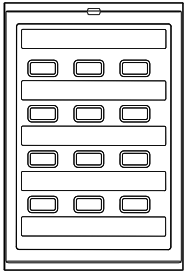
3.9.3 Parts included

The box contains the following parts:

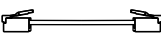
Quantity	Component
1	Call station extension
1	Bracket (attached to bottom)
1	Metal coupling plate + 4 screws
1	RJ12 interconnection cable
1	Button cap (x3)
1	Quick Installation Guide
1	Safety information

No tools or Ethernet cables are provided with the device.

Parts check and identification




B CSE




B1

B Call station extension




B2

B1 Patch cable




B3 x4

B2 Coupling plate




B4 x3

B3 Screw torx TX10 (x4)



B5 x3

B4 Button light ring (x3)



B5 x3

B5 Button cap (x3)

3.9.4 Extension connected to a call station

Add up to four PRA-CSE call station extensions for zone selection and other functions.

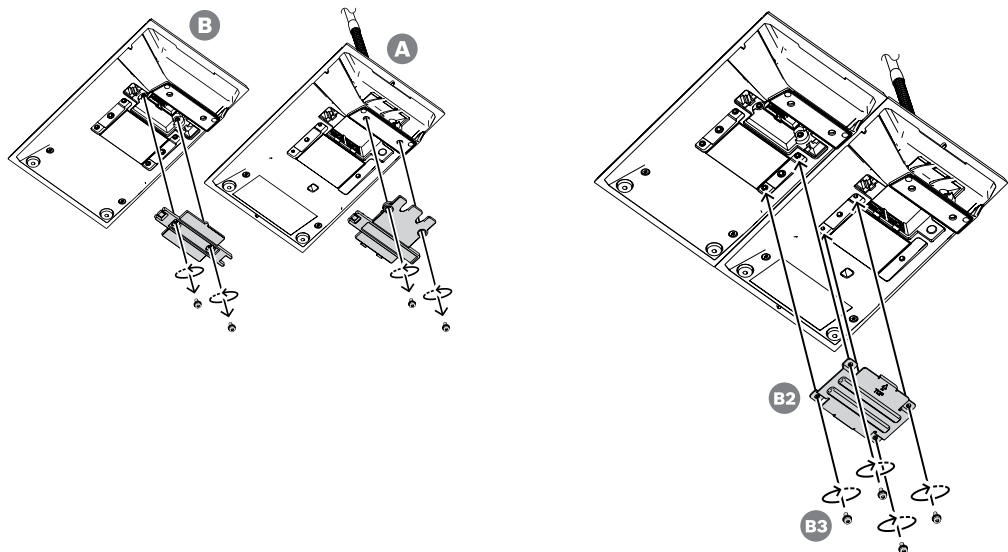
Without extensions the call station can only be used with a pre-configured zone selection.

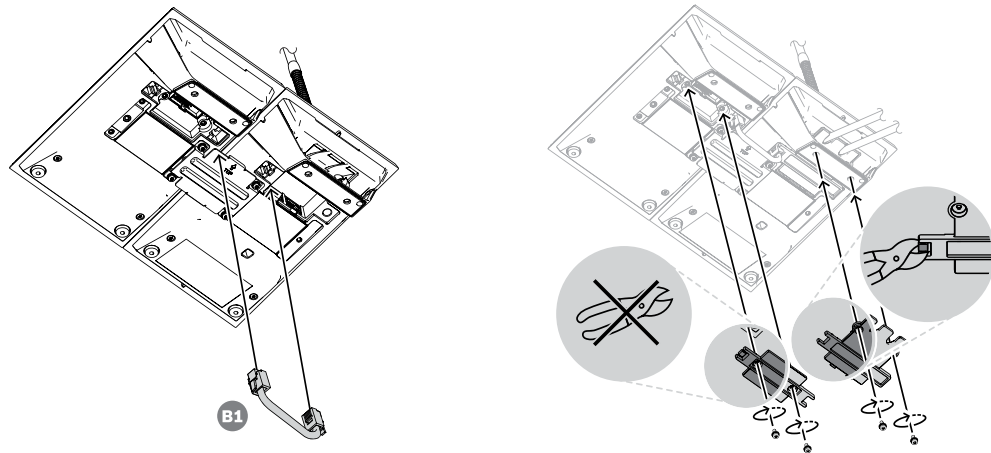
A call station (A) will automatically assign a connected extension (B) to itself and number the extensions in succession. Manual addressing is not needed and not possible. The system will supervise that a configured extension remains connected to its call station. The extension that is mounted immediately next to the call station is the first extension in the configuration. All extensions communicate with their call station via a short loop-through cable with RJ12-connectors. The same connection provides power to the extensions. Extensions cannot be used without call station.

To mount and connect a call station extension, follow the procedure below:

1. Remove the cable covers at the bottom of the call station and the extension using a TX10 screwdriver.
 - For the call station, get access to the two screws via the holes in the table stand bracket.
2. Mount the coupling plate between the call station and the first extension, using four M3 screws with TX10 head.
 - Mounting plate and screws are included with the extension.
 - An extension can only be mounted to a call station on its right hand side (looking from above).
3. Connect the short RJ12-cable between the call station and the (first) extension.
 - This cable reversible and can be used in either direction. The RJ12-cable is included with the extension.
4. While the call station is not yet connected to the network, use one or two Gb-Ethernet cables, preferably CAT6A F/UTP, with RJ45 connectors to connect the call station to a PSE port, with PoE enabled.
5. Cut off the small break-off part of the cable cover of the call station to make space for the RJ12-cable to pass through.
 - This break-off part covered the RJ12-socket when it was not used.
6. Put back both cable covers, each with its two TX10 screws.
 - The cable covers prevent that the RJ12-cable can be pulled out. For the call station, the cable cover also prevents access to the Reset switch.

Follow the same procedure for mounting an additional extension to an already mounted extension.





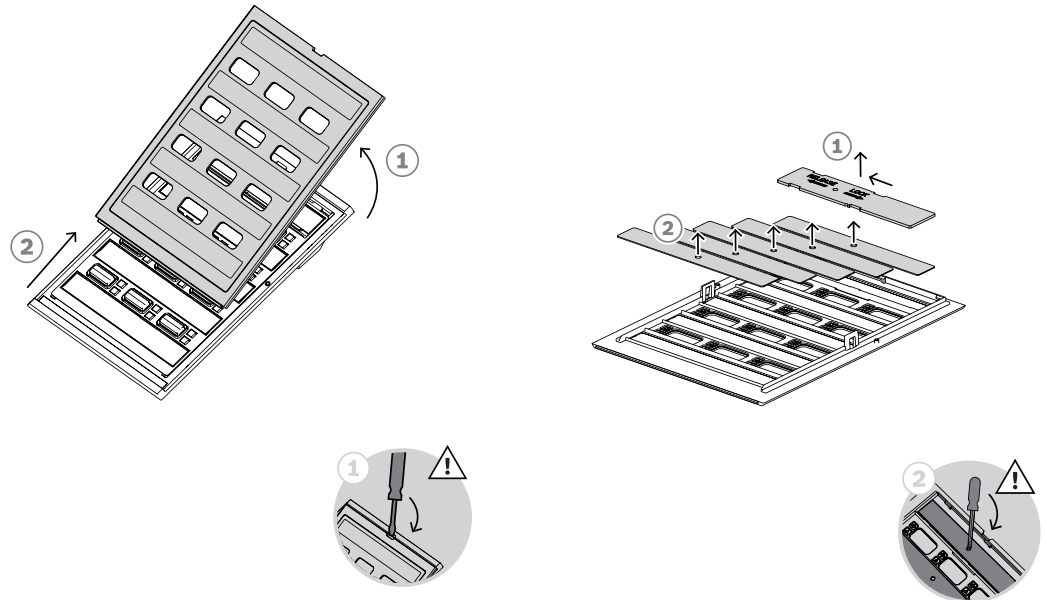
3.9.5

Labeling

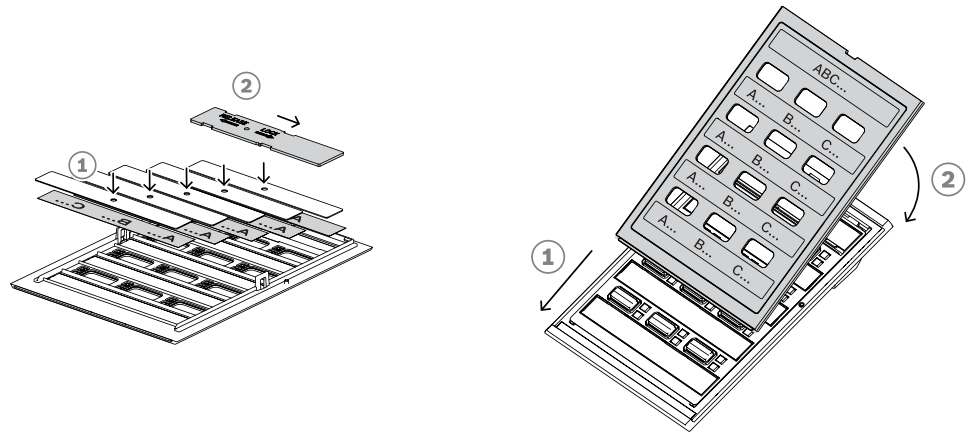
The call station extension has provisions to label the keys with custom texts and/or symbols, but also the extension itself can be labeled.

To add or change labels follow the procedure below:

1. The extension top cover is fixed in place with magnets. Use a screwdriver or tweezers in the slot of the extension cover plate to lift up the top cover.
2. Slide the cover upwards to remove it.
3. Turn the cover upside down. Gently push a screwdriver or tweezers into the hole in the metal top side label holder. Slide the label holder to the left to unlock and then up to remove.
 - This label holder is for the title label of the extension. It is made of metal and is also used to fix the top cover magnetically to the body of the enclosure.
4. Gently push a screwdriver or tweezers into the holes of the plastic label holders for the keys and lift them up to remove.
5. Type in the texts for the title label and the key labels using the available template. Then print on paper and cut to size.



6. Place the labels upside down in the label slots and put the label holders back in place. Slide the metal top side label holder to the right to lock it in place.
7. Mount the cover back on the extension body by first sliding the bottom side into the body, then tilt down until it snaps into place.



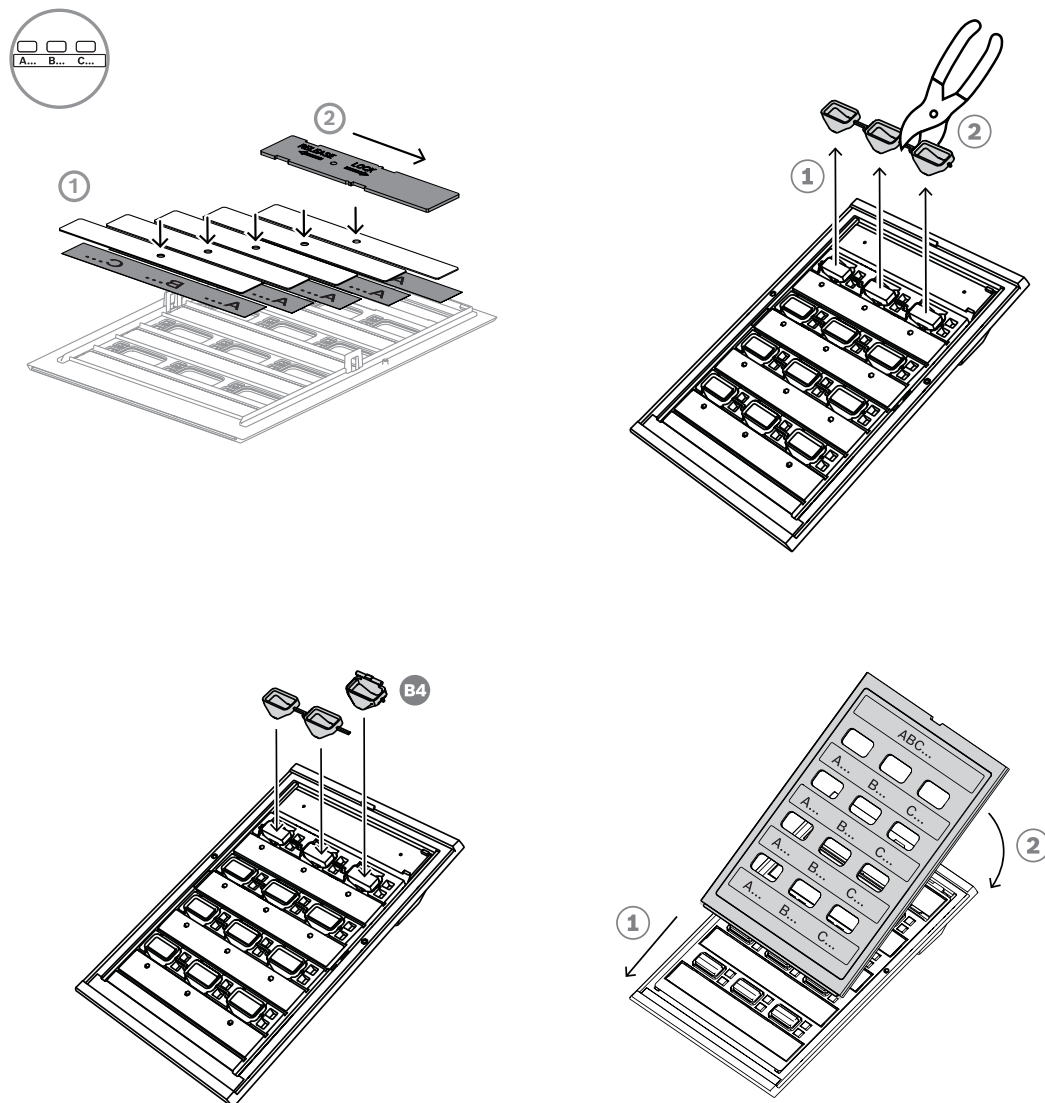
3.9.6

Mounting a button cap

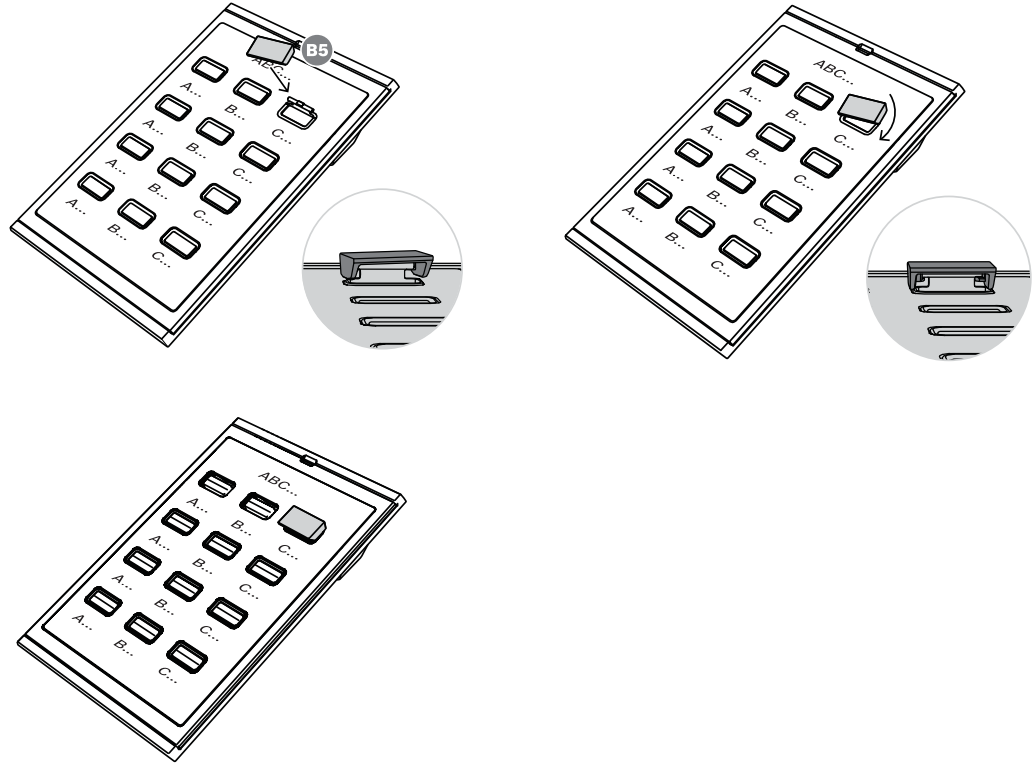
The call station extension has provisions to add a cap over one or more buttons, as a safeguard against accidental activation. Each PRA-CSE is delivered with a set of three caps, each consisting of a white light ring with pivot pins and a red cap with a hinge.

To mount a button cap, follow the procedure below:

1. The extension top cover is fixed in place with magnets. Use a screwdriver or tweezers in the slot of the extension cover plate to lift up the top cover.
2. Slide the cover upwards to remove it and get access to the buttons.
3. Translucent light rings are placed in rows of three around the buttons. Use tweezers to lift and remove the row for the button that should get a cap.
4. Remove the original light ring by cutting the plastic bridges to the adjacent light rings. Leave part of the plastic bridges in place around each light ring for better orientation when it is put back in place.
5. Insert one of the new light rings with pivot pins in the slot around the button that should get a cap. The pivot pins must be on top.
6. Then place the original light rings back around the remaining buttons.
7. Mount the cover back on the extension body by first sliding the bottom side into the body, then tilt down until it snaps into place.



8. The red cap has a hole on one side of the hinge for the left pivot pin, and a slot on the other side of the hinge for the right pivot pin. Rotate the cap 10 degrees, counterclockwise, and slide to the right over the button, so the left pivot pin goes into the hole of the hinge. Then push the right side of the cap down until the right pivot pin snaps into the slot of the hinge. This requires some force.
9. After the cap has snapped into place, the hinge has two stable positions and the cap can be flipped into the open or closed position.



3.9.7

Technical data**Electrical**

Power transfer	
Power supply input	From PRA-CSLx
Supervision	
Interconnection	Link presence
Processor	Watchdog

Environmental

This product is intended for dry indoor use only.

Climatic conditions	
Temperature	
Operating	-5 – 50 °C (23 – 122 °F)
Storage and transport	-30 – 70 °C (-22 – 158 °F)
Humidity (non-condensing)	5 – 95 %

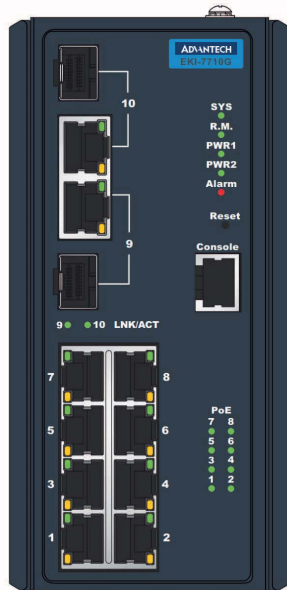
Mechanical

Enclosure	
Dimensions (HxWxD)	62 x 130 x 189 mm (2.44 x 5.12 x 7.44 in)
Ingress protection	IP30
Base	
Material	Zamak
Color	RAL9017
Panel	
Material	Plastic
Color	RAL9017 RAL9022HR
Weight	0.4 kg (0.88 lb)
Mounting position	Besides the PRA-CSLD or PRA-CSLW

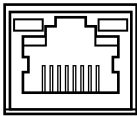
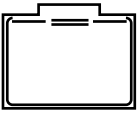
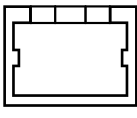
3.10 Ethernet switch | PRA-ES8P2S

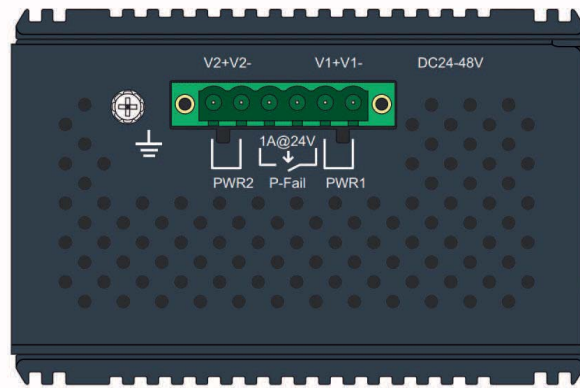


3.10.1 Connections



Front panel connections

Port 1-8	Network port 1-8 with PoE		Port 9-10	Network combo port 9-10	
Console	Console serial RS232 cable COM port				



Top panel connections

	Chassis ground		PWR1	48 VDC input 1	
	PWR2		P-Fail	Fault relay	

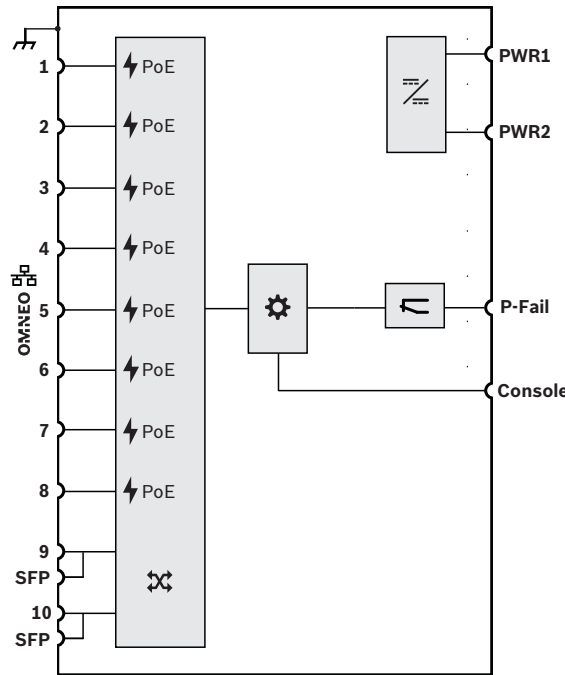
Field connections

Connection	Field wiring	Circuit class / <small>limited</small>	<small>I</small> _{Max} / minimum AWG	Remarks
Chassis ground	-	-	-	-
Network port 1 8 with PoE	YES	Class 2 power limited		Class N
Network combo port 9 10	YES	Class 2 power limited		Class N Can only be used for SPF modules for UL864/UL2572
Console serial RS232 cable COM port	NO			Can not be used for UL864/UL2572
48 VDC input 1 and 2	NO*	Class 1 not power limited		Max. xx-xx AWG.
Fault relay	N.C.	-	-	Can not be used for UL864/UL2572

* Must stay within same room <20 ft and within metal conduit.

3.10.2 Functional diagram

Functional and connection diagram



Internal device functions

- Power over Ethernet power source
- OMNEO network switch
- SFP Socket for SFP module
- Controller
- DC to DC converter
- Fault relay

3.10.3 Parts included

The box contains the following parts:

Quantity	Component
1	10-port industrial Ethernet switch
1	Screw connector
2	Wall-mounting bracket
1	DIN-rail mounting bracket and screws
1	Startup manual

No tools or Ethernet cables are provided with the device.

3.10.4 Power supply connection

This Ethernet switch has a dual 48 VDC-input and must be powered from the PRA-MPS3 to one of the 48 V outputs, normally intended for the amplifiers. Use both A and B outputs for connection redundancy.

The 48 V output that is powering the switch should not be used to also power an amplifier. The lifeline that belongs to the powering 48 V output is not used.

In case of mains failure the switch will be powered from the battery, connected to the multifunction power supply.

3.10.5 Fault relay connection

The fault relay connection can not be used for UL864/UL2572 systems.

3.10.6

Technical data**Electrical**

Power transfer	
Power supply input PWR1-2 Rated input voltage	48 VDC
Power consumption (48 V)	< 3 A
Power over Ethernet Standard Output power, all ports together Output power, per port (1-8)	IEEE 802.3 af/at < 120 W < 30 W
Network interface	
Ethernet Speed Ports 1-8 Ports 9-10	100BASE-TX 1000BASE-T RJ45 RJ45/SFP combo. Only SFP is allowed

Environmental

This product is intended for dry indoor use only.

Climatic conditions	
Temperature Operating Storage and transport	-5 – 50 °C (23 – 122 °F) -40 – 85 °C (-40 – 185 °F)
Humidity (non-condensing)	5 – 95%

Functional

Switching	
MAC-address table size	8 k

Management	
DHCP	Client, Server

Mechanical

Enclosure	
Dimensions (HxWxD)	152 x 74 x 105 mm (6.0 x 2.9 x 4.1 in)
Ingress protection	IP30

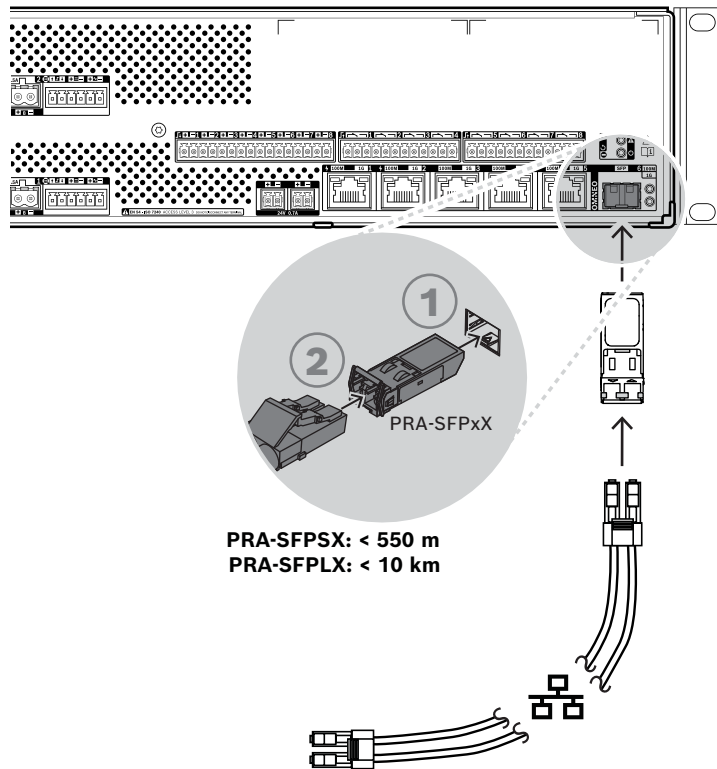
Enclosure	
Mounting	TS35 DIN Rail (EN 60715), Wall-mounting
Case	Aluminum
Weight	1.3 kg (2.7 lb)
Mounting position	Horizontal (power at the top)

3.11 Fiber transceiver | PRA-SFPLX, PRA-SFPSX



3.11.1 Connections

The fiber transceiver fits and locks into the SFP socket of the PRA-MPSx and PRA-ES8P2S. The transceiver receives power from the host device.



Caution!

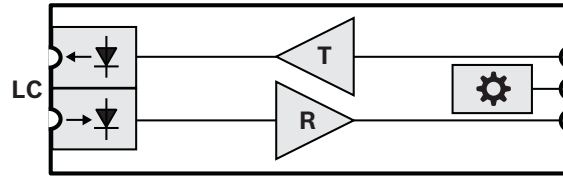
Risk of eye injury. When inspecting a connector, ensure that light sources are off. The light source in fiber optic cables may cause eye injury. SX and LX fiber connections use invisible IR light.

Field connections


Connection	Field wiring	Circuit class / <small>limited</small>	I _{Max} / minimum AWG	Remarks
Fiber	Yes			Wiring Class N

3.11.2 Functional diagram

Functional and connection diagram



Internal device functions

- LC** Dual lockable transmitter and receiver connector
- T** Transmitter
- R** Receiver
-  Controller

3.11.3 Parts included

The box contains the following parts:

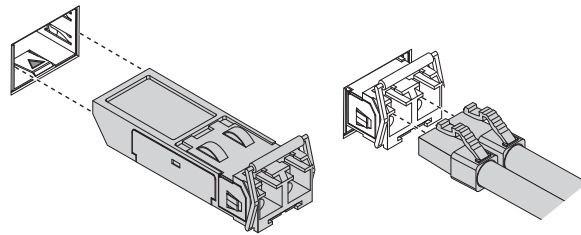
Quantity	Component
1	SFP fiber transceiver

No tools or Ethernet cables are provided with the device.

3.11.4 Transceiver

To install an SFP transceiver, follow the procedure below:

1. An SFP transceiver can be damaged by static electricity. Be sure to observe all standard electrostatic discharge (ESD) precautions, such as wearing an antistatic wrist strap, to avoid damaging the transceiver.
2. Remove the transceiver from its packaging.
3. Position the SFP transceiver with the label facing up. The transceiver can be hot-swapped; there is no need to power-off the host device to install a transceiver.
4. With the handle on the transceiver oriented towards the host device, slide the transceiver into the SFP socket and push until it clicks into place.
5. Verify that the handle on the transceiver is in the position that secures the transceiver and prevents it from being dislodged from the socket.



3.11.5 Fiber cable

To insert a fiber cable with LC connector, follow the procedure below:

1. Verify that the type of cable is appropriate for the SFP transceiver that is installed.
2. The SFP transceiver has two connectors. Each connector connects to a separate fiber strand. One is for receiving data and the other is for transmitting data. When connecting a fiber optic cable to the SFP module, be sure that the receive fiber connector is connected to the transmitter connector on the remote end-node device, and the transmit fiber connector is connected to the receiver connector on the remote node.
3. Remove the dust plugs from the LC fiber cable and save the dust plugs for future use. Then inspect and clean the cable end-face.

4. Remove the dust plugs from the SFP transceiver optical bores. Immediately attach the LC fiber cable to the SFP transceiver.

3.11.6

Technical data

PRA-SFPSX

Electrical

Interface	
Supply voltage	From host device (PRA-MPSx or PRA-ES8P2S)
Power consumption	0.5 W
Speed	IEEE 802.3z 1000BASE-SX
Connection	Hot swappable, Locking

Optical

Interface	
Connector type	Dual LC
Wave length	850 nm
Fiber length 50 µm core	< 550 m (1.804 ft)
Optical fiber	Multi-mode
Core size	50 µm

PRA-SFPLX

Electrical

Interface	
Supply voltage	From host device (PRA-MPSx or PRA-ES8P2S)
Speed	IEEE 802.3z 1000BASE-LX
Connection	Hot swappable, Locking

Optical

Interface	
Connector type	Dual LC
Wave length	1310 nm
Fiber length	< 10 km (32,821 ft)
Optical fiber	Single-mode
Core size	ITU-T G.652 SMF

PRA-SFPSX and PRA-SFPLX**Environmental**

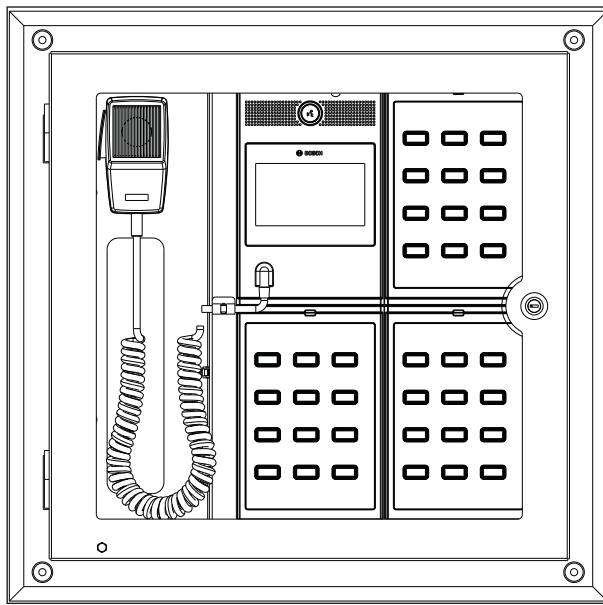
This product is intended for dry indoor use only.

Climatic conditions	
Temperature	
Operating	-5 – 50 °C (-23 – 122 °F)
Storage and transport	-40 – 85 °C (-40 – 185 °F)
Humidity (non-condensing)	5 – 95%
Mounting position	Inside the Host (PRA-MPS3 or PRA-ES8P2S)

Mechanical

Enclosure	
Dimensions (HxWxD)	13.4 x 8.5 x 56.5 mm (0.53 x 0.33 x 2.2 in)
Weight	75 g (0.17 lbs)

3.12 First responder panel | PRA-FRPx-US, PRA-FRPx-USNY



- The PRA-FRP1-US comes standard with one LCD call station and one call station extension.
- The PRA-FRP2-US comes standard with one LCD call station and two call station extensions.
- The PRA-FRP3-US comes standard with one LCD call station (PRA-CSLW), and three call station extensions (PRA-CSE).
- In case of loss, a key (code 1358) for the PRA-FRPx-US can be ordered at Bosch with ordering code D102.

There are three New York versions of the First responder panels that have a specific lock on the door.

- The versions are PRA-FRP1-USNY, PRA-FRP2-USNY, and PRA-FRP3-USNY.
 - In case of loss, a key for the PRA-FRPx-USNY can be ordered at a local distributor with code 2642 NYC fire key.

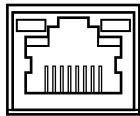
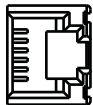
Please note that the use of red colored enclosures may be mandated by the local codes/AHJ.

See *LCD call station | PRA-CSLD, PRA-CSLW (ancillary), page 82* and *Call station extension | PRA-CSE, page 91* for more detailed information.

3.12.1 Connections



Figure 3.13: Rear view of PRA-CSLW: Network port (1-2) connection. Interconnection to PRA-CSE (3)

OMNEO	Network port (1-2) (PoE PD)		➔ PRA-CSE interconnection (3)	
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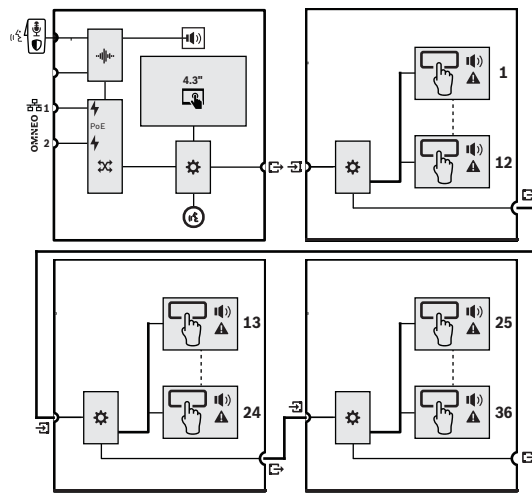
Field connections

Connection	Field wiring	Circuit class / _{limited}	I _{Max} / minimum AWG	Remarks
Network port (1-2) (located on PRA-CSLW)	YES	Class 2 power limited		Wiring Class N
PRA-CSE interconnection (3)	NO*	Class 2 power limited		Internal connections to the PRA-CSLW and other PRA-CSE on the First responder panel are prewired at the factory.
Enclosure	-	-	-	
Microphone connection	NO*	Class 2 power limited		

* Must stay within same room <20 ft and within metal conduit.

3.12.2 Functional diagram

Functional and connection diagram



Internal device functions

- Detachable fist microphone with Press-To-Talk or Start/Stop switch
- Press-To-Talk button
- Call status LED ring
- Internal monitor loudspeaker (sounder)
- Audio processing (DSP)
- Power over Ethernet
- OMNEO network switch
- Controller
- Zone status indicator
- Zone trouble indicator

3.12.3 Parts included

The box contains the following parts:

Quantity	Component
1	First responder panel USA, x-extensions
2	Key
4	Screws with screw covers
1	Semi-flush mounting trim ring
1	Operating instructions
1	Safety information

3.12.4 Installation instructions

The First responder panel is designed to be either surface or semi-flush mounted. See *Surface mount instructions, page 112* or *Semi-Flush mount instructions, page 115*. See figure below for detailed dimensions.

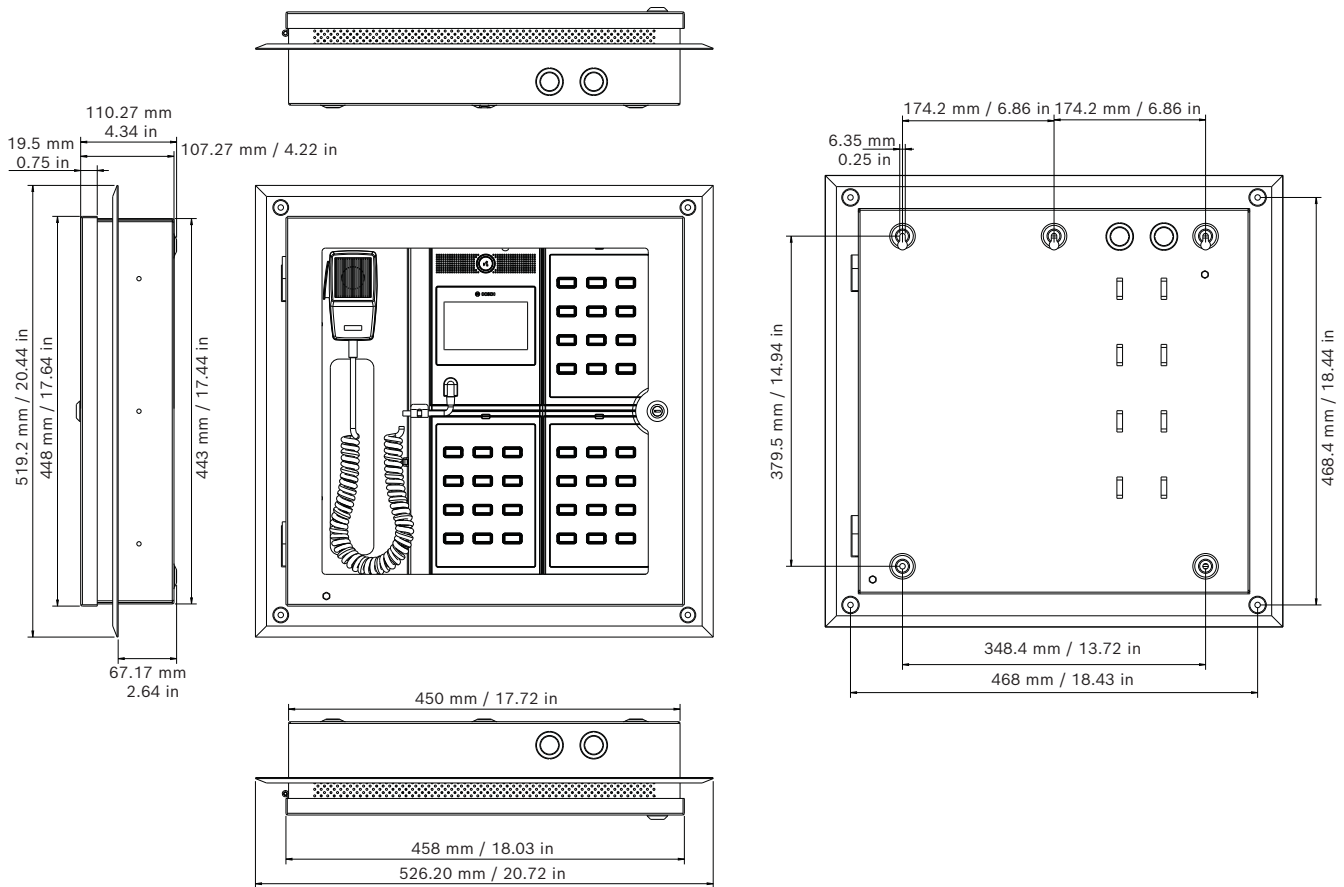


Figure 3.14: Dimensions

Unpack

Carefully unpack the First responder panel and check for shipping damage. Be certain to mount the panel in a clean, dry, vibration free, indoor area with operating temperature range between 23 to 122 degrees F, and humidity range between 5 to 95%. The area should be readily accessible with sufficient room to easily install, operate and maintain the panel.

Location

Locate the top of the enclosure approximately 5 feet above the floor with the hinge located on the left. Precise mounting location is subject to emergency response plan and local AHJ approval. Knockouts are provided at the top, back and bottom of the enclosure for wiring convenience.

Conductors

Determine the number of conductors required to be installed. Select and remove the appropriate knockouts prior to mounting the enclosure to the wall. Pull the conductors into the enclosure and connect to appropriate connector. For added conductor security, provide additional strain relief via tie wraps or equivalent. All wiring and wiring protection should be in accordance with National and/or Local codes for fire alarm systems.

Caution!

STATIC SENSITIVE COMPONENTS

THE FIRST RESPONDER PANEL CONTAINS STATIC SENSITIVE COMPONENTS. BE SURE TO GROUND YOURSELF WITH A PROPER WRIST STRAP BEFORE HANDLING ANY INTERNAL COMPONENTS INCLUDING CIRCUIT BOARDS SO THAT STATIC CHARGES ARE REMOVED FROM YOUR BODY. USE STATIC SUPPRESSIVE PACKAGING TO PROTECT ELECTRONIC ASSEMBLIES.



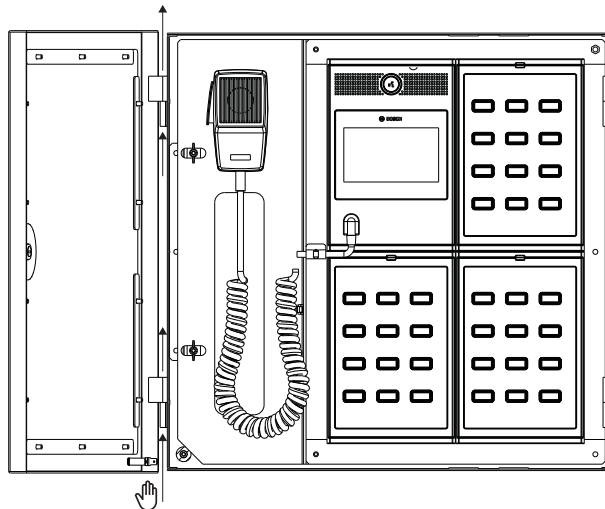
Refer to

- *Surface mount instructions, page 112*
- *Semi-Flush mount instructions, page 115*

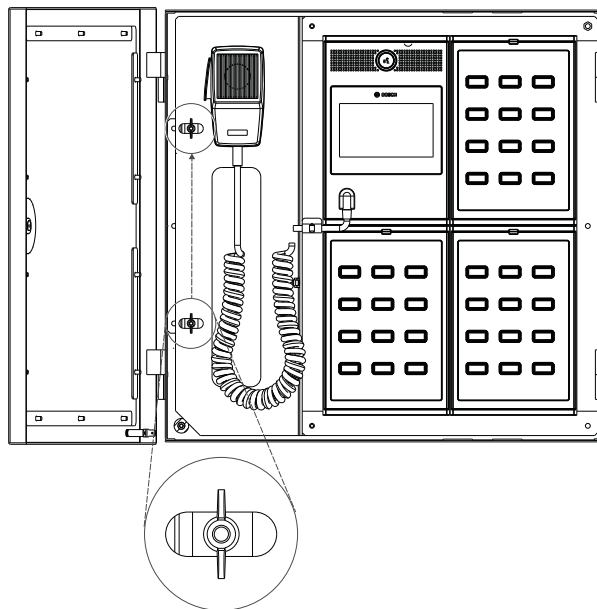
3.12.5**Surface mount instructions**

The following installation instructions apply to surface mounting:

1. Carefully unpack the First responder panel and check for shipping damage.
2. To prevent damage to the First responder panel electronics and microphone, and to facilitate backbox mounting, the outer plexiglass door and the chassis with electronics and microphone should be removed.
3. Turn keylock key clockwise to unlock the outer plexiglass door:
 - Open door about 180 degrees.
 - Disconnect the ground strap cable at one end with terminal lug.
 - Remove the outer plexiglass glass door from the enclosure by gently lifting it upwards.

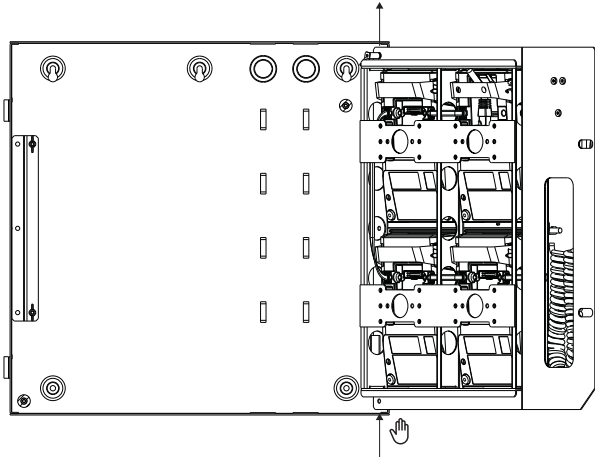


4. Remove the two wingnuts that secure the chassis to the backbox.

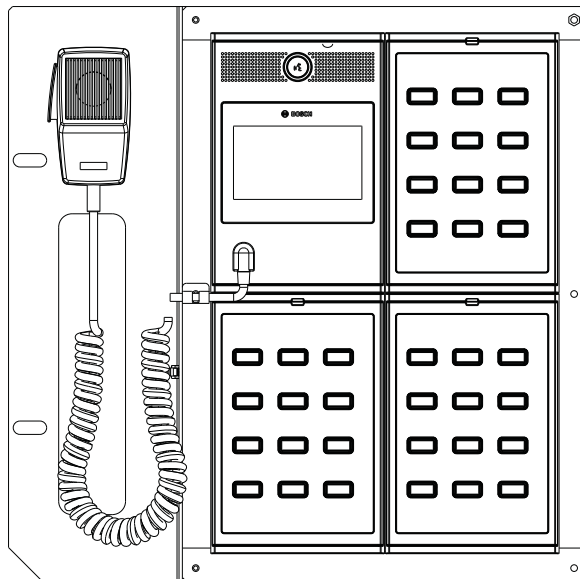


5. Swing chassis open:
 - Disconnect the ground strap cable at one end with terminal lug.

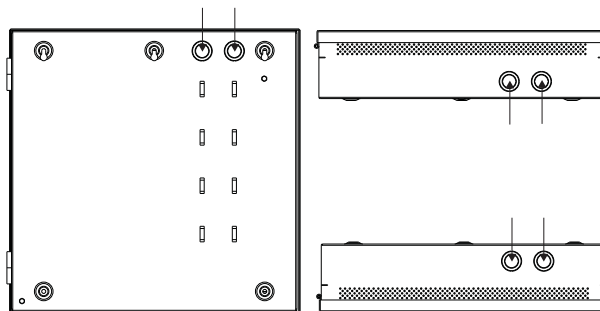
- Then slide the chassis upwards to free it from the backbox.
- Place the chassis assembly into a protective anti-static bag in a safe location until it can be reinstalled in the backbox.



6. Swing chassis open, disconnect ground cable, then slide upward to remove.

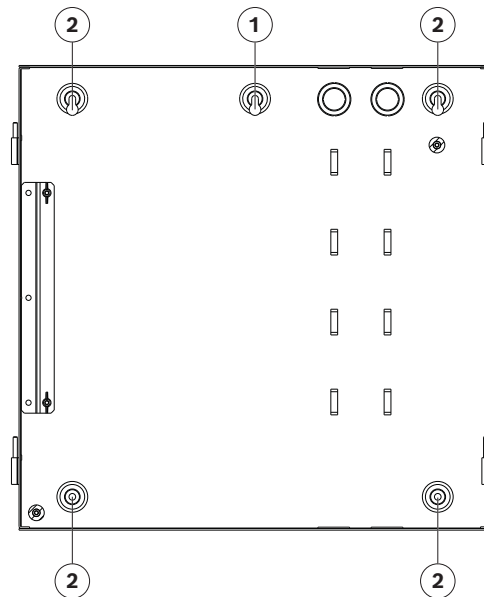


- 7. Place chassis assembly into a protective anti-static bag and set aside.
- 8. Remove desired knockout(s) (top, bottom, back) before mounting backbox to wall.

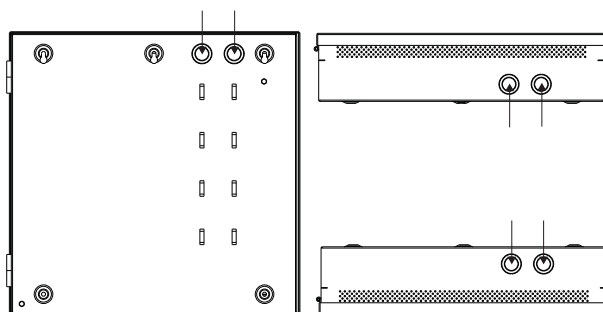


- 9. Place the backbox onto desired mounting location against the wall:
 - Mark the upper center installation keyhole ((1) located inside the enclosure at top center) on the wall.
 - Drill a hole in the wall of sufficient diameter and depth to properly accommodate mounting hardware.

- **IMPORTANT:** Depending on the mounting surface (i.e. wood studs, brick, dry wall) the correct mounting material suitable for the mounting surface and weight of the product should be used to ensure a safe and correct surface mounting.



- Secure the backbox to the wall using one screw:
 - Level the cabinet to the correct horizontal position and tighten screw.
- Mark 4 additional mounting holes (2); 1 keyhole to the right and 1 keyhole to the left of the center keyhole, and 2 holes located at the bottom of the enclosure.
 - Remove screw and remove the backbox from the wall.
 - Drill 4 additional holes in the wall where marked.
 - Install additional mounting hardware in 4 holes.
 - Hang backbox on center screw, install 4 remaining screws and tighten all.
 - **IMPORTANT:** Depending on the mounting surface, the correct mounting material (i.e. screws) should be used to ensure a safe and correct surface mounting.
- Pull wiring cables into backbox through selected knockout locations (top, bottom, back). Secure conduit, ground cable, MC cable, etc., to backbox per NFPA 70 codes:
 - **IMPORTANT:** The metal housing needs to be grounded. Connect an external ground strap cable at one end with terminal lug to the ground point of the backbox. Tighten the nut with a maximum force of 0.9 Nm.
 - Allow sufficient cable length for connection to the PRA-CSLW (when the chassis is in the open position).
 - See *Power over Ethernet connections*, page 119.



- Re-attach the chassis assembly to the backbox:

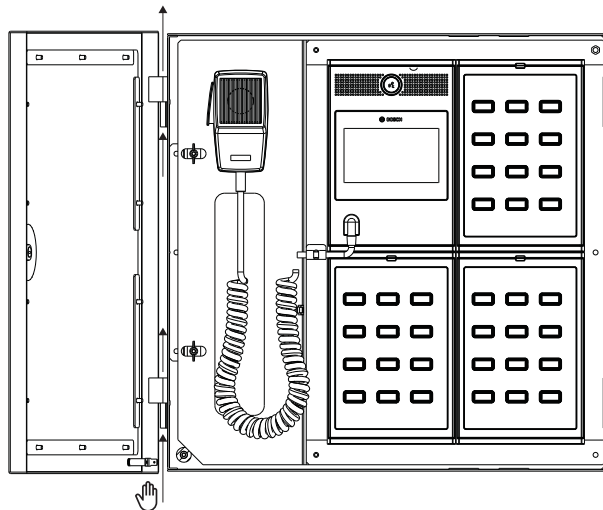
- If labels and/or button caps need to be installed, it is possible easier to do before re-attach the chassis to the backbox. See *Labeling, page 94* and/or *Mounting a button cap*.
 - Slide chassis assembly over mounting pins in backbox.
 - Connect two network cables to the PRA-CSLW. See *Power over Ethernet connections, page 119*.
 - Provide strain relief of network cables using cable ties secured to the back of the backbox.
 - **IMPORTANT:** Re-install the ground cable.
14. Secure chassis assembly to backbox using two wingnuts removed in step 4.
 15. Replace and secure outer plexiglass door:
 - Slide outer plexiglass door over hinges on left side of the backbox.
 - **IMPORTANT:** Re-install the ground cable.
 - Close door, lock by turning key counter clockwise 90 degrees.
 - Remove key.

3.12.6

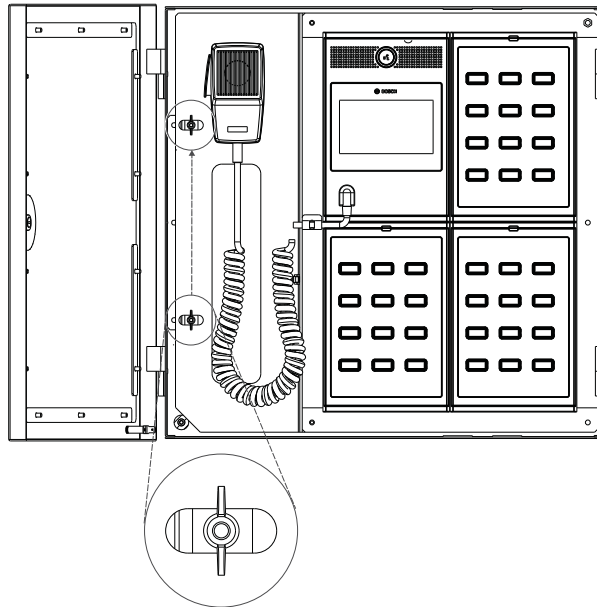
Semi-Flush mount instructions

The following installation instructions apply to semi-flush mounting:

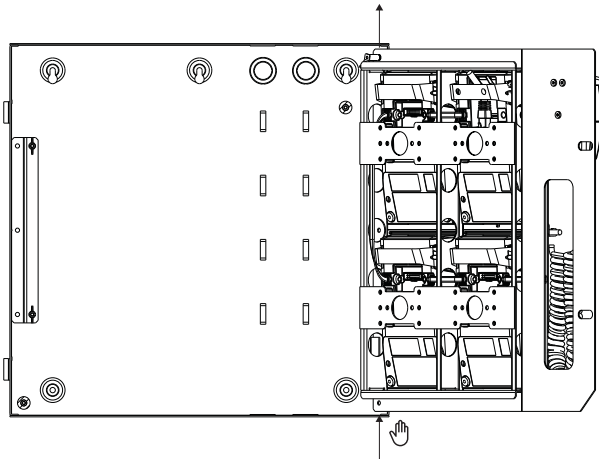
1. Carefully unpack the First responder panel and check for shipping damage.
2. To prevent damage to the First responder panel electronics and microphone, and to facilitate backbox mounting, the outer plexiglass door and the chassis with electronics and microphone should be removed.
3. Turn keylock key clockwise to unlock the outer plexiglass door:
 - Open door about 180 degrees.
 - Disconnect the ground strap cable at one end with terminal lug.
 - Remove the outer plexiglass glass door from the enclosure by gently lifting it upwards.



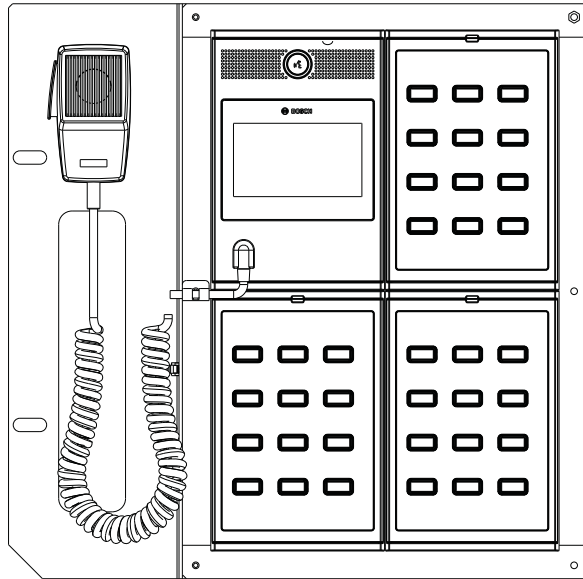
4. Remove the two wingnuts that secure the chassis to the backbox.



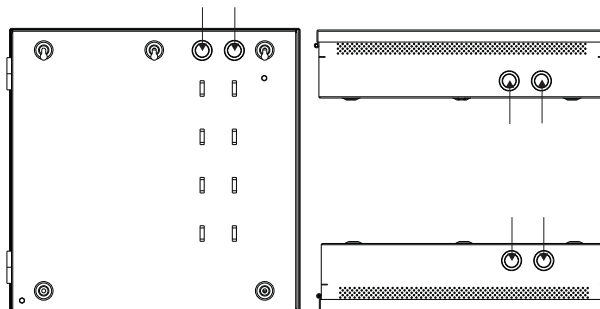
5. Swing chassis open:
- Disconnect the ground strap cable at one end with terminal lug.
 - Then slide the chassis upwards to free it from the backbox.
 - Place the chassis assembly into a protective anti-static bag in a safe location until it can be reinstalled in the backbox.



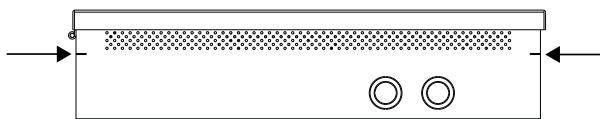
6. Swing chassis open, disconnect ground cable, then slide upward to remove.



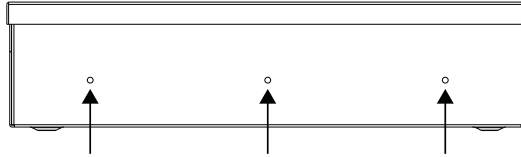
7. Place chassis assembly into a protective anti-static bag and set aside.
8. **New applications:** referring to the outer backbox dimensions shown in *Installation instructions, page 110*:
 - Create a 4-sided frame support structure inside the wall that will be used to attach and support the First responder panel enclosure.
 - Once wall is finished, to mount and install the First responder panel, follow steps following below.
9. **Retrofit applications:** Place the backbox onto desired mounting location against the wall:
 - Confirm location of internal wall studs before cutting hole in wall.
 - Determine which stud, left or right side, that will not be cut and will be used to secure one side of the enclosure to.
10. Cut hole in wall of sufficient size that will allow insertion of the enclosure into the wall:
 - Cut support stud that is blocking enclosure entry.
 - Modify adjacent stud by adding “shim” materials of appropriate dimensions to support attachment of the enclosure.
11. Determine which knockouts (top, bottom, back) are to be removed and remove them.



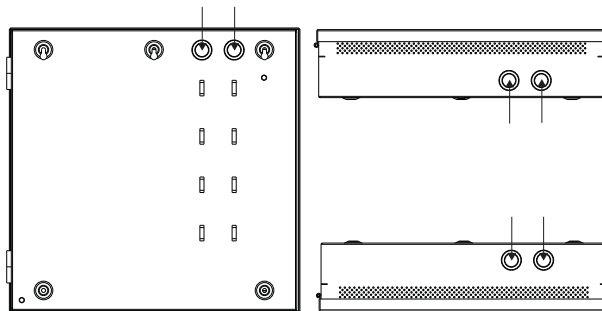
12. Insert backbox into wall:
 - Make sure the cabinet is not mounted deeper into the wall than indicated by the depth indicators on the backbox.



13. Secure backbox to studs via 3 mounting holes located on the right and left side of the backbox.

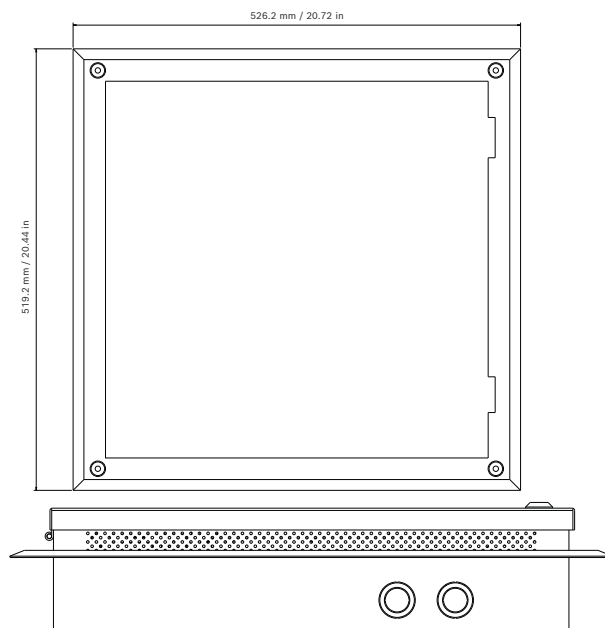
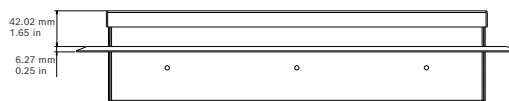


14. Pull wiring cables into backbox through selected knockout locations (top, bottom, back). Secure conduit, ground cable, MC cable, etc., to backbox per NFPA 70 codes:
- **IMPORTANT:** The metal housing needs to be grounded. Connect an external ground strap cable at one end with terminal lug to the ground point of the backbox. Tighten the nut with a maximum force of 0.9 Nm.
 - Allow sufficient cable length for connection to the PRA-CSLW (when the chassis is in the open position).
 - See *Power over Ethernet connections*, page 119.



15. Add Trim Kit:

- Place Trim Kit onto wall.
- Secure to wall in 4 corners using supplied mounting hardware.



16. Re-attach the chassis assembly to the backbox:

- If labels and/or button caps need to be installed, it is possible easier to do before re-attach the chassis to the backbox. See *Labeling, page 94* and/or *Mounting a button cap*.
 - Slide chassis assembly over mounting pins in backbox.
 - Connect two network cables to the PRA-CSLW. See *Power over Ethernet connections, page 119*.
 - Provide strain relief of network cables using cable ties secured to the back of the backbox.
 - **IMPORTANT:** Re-install the ground cable.
17. Secure chassis assembly to backbox using two wingnuts removed in step 4.
 18. Replace and secure outer plexiglass door:
 - Slide outer plexiglass door over hinges on left side of the backbox.
 - **IMPORTANT:** Re-install the ground cable.
 - Close door, lock by turning key counter clockwise 90 degrees.
 - Remove key.

3.12.7

Power over Ethernet connections

The First responder panel has two Ethernet connection ports with a built-in Ethernet switch, supporting RSTP for Class N pathway realization. The First responder panel is a PoE Powered Device (PD). It provides the correct signature and classification to power sourcing equipment (PSE), so that a PSE sources the right amount of power to a PD over the Ethernet cables. Although it is sufficient to provide PoE power to only one port, both Ethernet ports take PoE power for cable redundancy and supply redundancy. For maximum protection it is advised to connect each port to a different, independent PSE, such as a PRA-MPS3 multifunction power supply (ports 1 and 2) or a PRA-ES8P2S Ethernet switch (ports 1-8). In case one of the connections fail, or one of the PSE sources fail, the operation of the First response panel is not affected. With both connections to the same PSE, there is still connection redundancy but no PSE redundancy.

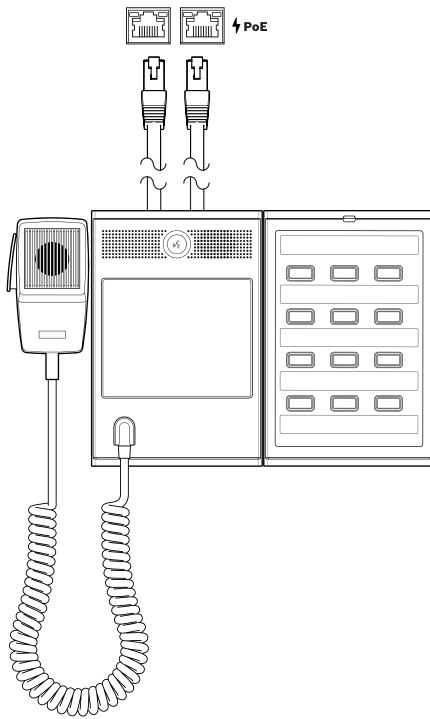
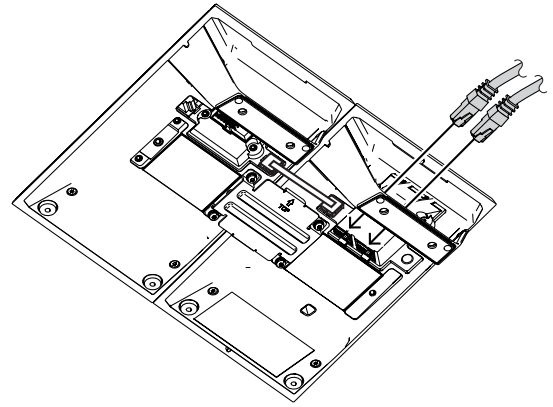
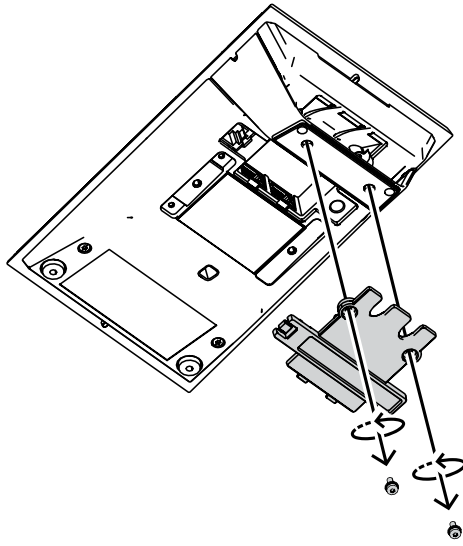
See also *Multifunction power supply, large | PRA-MPS3, page 63* and *Ethernet switch | PRA-ES8P2S, page 99*.

The ports of the First responder panel can be looped through to another PRAESENSA device, but at least one port must be connected to a PSE to power the First responder panel (PRA-CSLW) and its extensions (PRA-CSE). With only one port connected to a PSE, there is no connection redundancy.

The First responder panel (PRA-CSLW) ports cannot source PoE power to subsequent devices, such as another First responder panel.

To connect the First responder panel, follow the procedure below:

1. Remove the cable cover at the bottom of the call station (PRA-CSLW) using a TX10 screwdriver.
 - If required, get access to the two screws via the holes in the table stand bracket.
2. Use one or two Gb-Ethernet cables with RJ45 connectors to connect the call station to a PSE port, with PoE enabled.
3. Put back the cable cover with the two TX10 screws.



3.12.8

Technical data

- The PRA-FRP1-US comes standard with one LCD call station and one call station extension.
- The PRA-FRP2-US comes standard with one LCD call station and two call station extensions.
- The PRA-FRP3-US comes standard with one LCD call station (PRA-CSLW), and three call station extensions (PRA-CSE).
- In case of loss, a key (code 1358) for the PRA-FRPx-US can be ordered at Bosch with ordering code D102.

There are three New York versions of the First responder panels that have a specific lock on the door.

- The versions are PRA-FRP1-USNY, PRA-FRP2-USNY, and PRA-FRP3-USNY.
 - In case of loss, a key for the PRA-FRPx-USNY can be ordered at a local distributor with code 2642 NYC fire key.

Electrical

Microphone	
Nominal acoustic input level (configurable)	89 – 109 dBSPL
Maximum acoustic input level	120 dBSPL
Signal to Noise Ratio (SNR)	> 73 dBA
Directivity	Omnidirectional
Frequency range (+3 / -6 dB)	500 Hz – 8 kHz (noise cancelling)

Display	
Size	4.3"
Touch screen	Capacitive
Color depth	24-bit
Resolution	480 x 272 px
Brightness	300 cd/m ²
Monitor loudspeaker	
Maximum sound pressure level, at 1 m	75 dBSPL
Volume control	Mute, -40 dB – 0 dB

Power transfer	
Power over Ethernet (PoE 1-2) Nominal DC input voltage Standard	48 V IEEE 802.3af (mode B)
Maximum input current	350 mA (IEEE802.3af), with 0 to 4 PRA-CSE connected.
Rated voltage	48 V

Supervision (PRA-CSLW)	
Supervision	
Microphone	Impedance
Audio path	Pilot tone
Press-to-talk switch	Impedance
Controller continuity	Watchdog
PoE (1-2)	Voltage

Network interface	
Ethernet	100BASE-TX, 1000BASE-T
Protocol	TCP/IP
Redundancy	RSTP

Environmental

This product is intended for dry indoor use only.

Climatic conditions	
Temperature	
Operating	-5 – 50 °C (23 – 122 °F)
Storage and transport	-30 – 70 °C (-22 – 158 °F)
Humidity (non-condensing)	5 – 95%

Mechanical

Enclosure	
Dimensions (W x H x D)	458 x 448 x 110 mm (18 x 17.6 x 4.33 in)
Ingress protection	IP30
Base	
Material	Steel
Color	Red > RAL3002
Door panel	
Material	Steel
Color	Red > RAL3002
Door panel plexiglass (W x H x D)	375 x 375 x 3 mm
Weight	11.4 kg (25.1 lb)
Mounting position	Surface wall mount Semi-flush mount

Refer to

- *Technical data, page 87*
- *Technical data, page 98*

4 Operation

Local

- Emergency relocation (paging)
 - Live
 - Pre-recorded

Refer to

- *Operating instructions, page 160*

5 Functionality

This section addresses the intended function of each PRAESENSA product individually. See also the sections: *Operation*, page 123 and *Programming settings*, page 131.

5.1 System controller | PRA-SCL

5.1.1 Functions

System control and audio routing

- Capability to control a system with up to 150 devices, serving more than 500 zones.
- Native support for switched single-subnet networks, with add-on support for routed multi-subnet topologies.
- Dynamic allocation of multiple and simultaneous audio channels to save on network bandwidth; audio connections are created when a call or a message is broadcast, and freed up immediately afterwards.
- Secure interconnections using Advanced Encryption Standard (AES128) for audio data and Transport Layer Security (TLS) for control data.
- Receiver for Dante or AES67 audio channels from external sources, with dynamic re-routing to open or secure OMNEO channels.
- Internal storage capacity for messages and tones; up to eight messages can be played back simultaneously.
- Recording facility on SD-card for emergency audio logging and call stacking. The integrated call stacker automatically forwards recorded calls to previously occupied zones.*
- Internal real time clock for scheduled events and event time stamping; support for Network Time Protocol (NTP) with automatic adjustment for Daylight Saving Time (DST).
- Internal system event and fault event log.
- Networked control interface for third party applications.
- Built-in webserver for configuration and file management using a browser.

Supervision

- Supervision of stored messages and tones.
- Supervision of data integrity of site specific data.
- Internal watchdog timers to detect and recover from processing errors.
- Faults or problems of all system devices are collected, reported and logged.

Fault tolerance

- Two system controllers can be configured as a redundant pair.
- Five OMNEO network connection ports, supporting redundant network connections.
- Dual DC-inputs with polarity reversal protection.

* Availability to be announced.

5.2 Amplifier, 600W 4/8-channel | PRA-AD604 | PRA-AD608

5.2.1 Functions

Efficient 4/8-channel power amplifier

- Transformerless, galvanically isolated, 70/100 V outputs.
- Flexible partitioning of the available output power across all amplifier channels.

Flexibility in loudspeaker topologies

- Two outputs on every amplifier channel to support redundant loudspeaker wiring topologies.
- Class A, single or dual Class B wiring possible for loudspeaker outputs.

Sound quality

- Digital signal processing on all amplifier channels, including equalization, limiting and delay.

Supervision

- Supervision of amplifier operation and all of its connections; faults are reported to the system controller and logged.
- Loudspeaker line integrity supervision without interruption of audio, using end-of-line devices (separately available).
- Network link supervision.

Fault tolerance

- Dual OMNEO network connections, for loop-through connections to adjacent devices.
- Dual 48 VDC inputs with polarity reversal protection, operating in tandem for redundancy.
- Fully independent amplifier channels; the integrated spare channel automatically replaces a failing channel, with due regard of the actual sound processing settings.
- All amplifier channels support two independent loudspeaker groups, A and B, enabling redundant loudspeaker wiring topologies.
- Backup analog audio lifeline input driving the spare amplifier channel to serve all connected loudspeaker zones in case both network connections, or the amplifier network interface, would fail.

5.3 End-of-line device | PRA-EOL-US

5.3.1 Functions

Supervision

- Reliable supervision of a single loudspeaker line, using loudspeakers connected in a loop-through fashion.
- Operation is based on pilot tone detection from the amplifier with feedback to the amplifier using the loudspeaker line itself. No additional wiring is needed for fault or status reporting.

5.4 Multifunction power supply, large | PRA-MPS3

5.4.1 Functions

Independent mains power supplies

- Three fully independent 48 VDC power supplies for up to three amplifiers.
- One 24 VDC output for a system controller or auxiliary device.
- All power supply outputs have double connectors for A/B redundant wiring to the connected loads.
- A fault condition on one of the outputs does not affect any of the other outputs.
- Universal mains input with power factor correction to maximize the amount of power that can be taken from a single phase power distribution network.

Backup battery solution

- Integrated charger for a 12 V VRLA (Valve Regulated Lead-Acid) battery, with a capacity up to 230 Ah for standards compliant charging and energy storage.

- Three fully independent battery to 48 VDC power converters for up to three amplifiers.
- Accurate battery impedance measurement to monitor aging of the battery and supervision of battery connections.

Ethernet switch

- Six OMNEO network ports, for loop-through connections to adjacent devices:
 - Five ports are for copper connection on RJ45, two of them provide Power over Ethernet (PoE) to supply power to connected call stations or other devices.
 - One port provides an SFP-cage for Small Form-factor Pluggable transceivers for single or multi-mode glass fiber connections.

General purpose control inputs and outputs

- Eight control inputs to receive signals from external systems.
- Eight voltage free single pole, double throw (SPDT) relay contacts to activate external devices.
- Control input and output functions are software configurable.

Fault tolerance and supervision

- Supervision of mains, battery and device operation and all connections; faults are reported to the system controller and logged.
- Automatic battery backup takeover from mains in case of mains failures.
- Multiple OMNEO network connection ports, supporting redundant network connections.
- Supervised audio lifeline to connected amplifiers, as backup for a failing amplifier network interface.

5.5

LCD call station | PRA-CSLD, PRA-CSLW (ancillary)

5.5.1

Functions

IP-network connection

- Direct connection to the IP-network.
- For redundant network and power connection, a second Network cable should be connected.

Business operation

- Full color 4.3" capacitive touch screen with intuitive function menu navigation provides guidance and feedback during the process of live announcements, pre-recorded messages and music control. Successful broadcast of announcements/messages and changes to the background music settings are clearly indicated.
- Built-in monitor loudspeaker with volume control.
- Local audio line input (with stereo to mono conversion) for connecting an external audio source.
- Connection of up to four PRA-CSE extensions, each with twelve buttons. The buttons can be configured for various functions, but they are especially useful for zone selection, giving a clear overview of accessible zones and the LED indicators for each button show the status of the respective zone (like being selected, occupied or at fault).
- If the call station is not used for a while, it will switch to sleep mode to save energy. It will immediately wake up when the screen, or a button, is touched.

Only valid for the PRA-CSLD

- Press-to-talk button gives tactile feedback and is recessed to prevent accidental use.

Only valid for the PRA-CSLW

- Press-to-talk switch on hand-held microphone.

Supervision

- Supervision of all critical elements; the audio path is supervised, as well as the communication to the network.

Fault tolerance

- Each of the two RJ45 network connectors accept PoE to power the call station. This provides fail-safe network connection redundancy, as one connection is sufficient for full operation.

5.6 Call station extension | PRA-CSE

5.6.1 Functions

Business operation

- Connection of up to four PRA-CSE extensions, each with twelve buttons. The buttons can be configured for various functions, but they are especially useful for zone selection, giving a clear overview of accessible zones and the LED indicators for each button show the status of the respective zone (like being selected, occupied or at fault).
- For UL864 and UL2572 a PRA-FRPx-US must be used for emergency operation. PRA-CSLx are only allowed to be used for non-emergency operation.
- All critical alarm functions are accessible via buttons for operators wearing gloves.
- All indicators of the extension take part in the indicator test function of the connected call station.

Connection

- Reliable, locked, single cable interconnection between call station and extension and between extensions.
- Robust metal coupling plate.
- All extensions are automatically addressed, from left to right.
- All assembling can be done with one standard Torx TX10 screwdriver.

Labeling

- Removable front cover for easy labeling with space for three lines of text per button.

Button cap

- Three button caps are included to prevent unintended activation of critical buttons.

5.7 Ethernet switch | PRA-ES8P2S

5.7.1 Functions

Intended for PA/VA systems

- Managed industrial Gigabit Ethernet switch with convection cooling and DIN-rail mounting, designed for long term continuous operation.
- Redundant wide range DC power input.
- PoE outputs protected against overloads and short circuits.
- Comes with pre-installed and pre-configured firmware for quick installation and optimum performance.

Advanced features

- Managed switch, configurable via web browser, with eight Gigabit copper ports with PoE and two SFP ports for PRA-SFPLX single mode and/or PRA-SFPSX multimode fiber transceiver modules.

- Deactivated Energy Efficient Ethernet (EEE) mode on all ports to avoid problems in combination with audio clock synchronization (IEEE 1588) in combination with OMNEO, Dante and AES67.
- Wire speed switching in hardware to avoid variable latency that may cause audio streaming problems.
- Full Quality of Service (QoS) through differentiated services (DiffServ) on all ports, compatible with OMNEO Docent diagnostic tool.
- Support for Rapid Spanning Tree Protocol (RSTP) according to IEEE 802.1d to create redundant loops for class N circuit.
- All copper ports provide PoE (IEEE 802.3 af/at) to power PRAESENSA call stations or other devices.

Fault tolerance

- Multiple network connection ports, supporting redundant network connections.
- Dual 48 V DC-inputs.

5.8 Fiber transceiver | PRA-SFPLX, PRA-SFPSX

5.8.1 Functions

- Features a duplex LC connector; one connection for transmit and the other for receive.
- Fits and locks into the SFP socket of the PRA-MPSx and PRA-ES8P2S.
- The PRA-SFPSX supports multi-mode fiber for distances up to 550 m.
- The PRA-SFPLX supports single-mode fiber for distances up to 10 km.
- Wide temperature range for maximum reliability.

5.9 First responder panel | PRA-FRPx-US

5.9.1 Functions

IP-network connection

- Direct connection to the IP-network.
- For redundant network and power connection, a second Ethernet cable should be connected.

Emergency operation

- Press-to-talk switch on detachable fist microphone.
- Full color 4.3" capacitive touch screen with intuitive interface
- Built-in monitor loudspeaker with volume control.
- 36 buttons can be configured for various functions, but they are especially useful for zone selection, giving a clear overview of accessible zones and the LED indicators for each button show the status of the respective zone (like being selected, occupied or at fault).
- Buttons can be used for transfer of control between multiple First Responder Panels.
- If the First responder panel is not used for a while, it will switch to sleep mode to save energy. It will immediately wake up when the screen, or a button, is touched.
- All critical alarm functions are accessible via buttons for operators wearing gloves.
- All indicators of the First responder panel take part in the indicator test function when configured under one of the 36 buttons.

Labeling

Removable front cover for easy labeling with space for three lines of text per button.

Button cap

Nine optional button caps are included to prevent unintended activation of critical buttons.

Housing

- Reliable housing with lockable glass door to ensure Physical Access level 1.
- Suitable for on-wall mount and semi-flush wall mount

Supervision

- Supervision of all critical elements; the audio path is supervised, as well as the communication to the network.

Fault tolerance

- Each of the two RJ45 network connectors accept PoE to power the call station. This provides fail-safe network connection redundancy, as one connection is sufficient for full operation.

6 Programming options

PRAESENSA products incorporate field-programmable software. In order for the products to comply with the requirements in the Standard for Control Units and Accessories for Mass Notification systems, UL2572, certain programming features or options must be limited to specific values or not used at all as indicated in chapter *Programming settings*, page 131.

6.1 Check/upload device firmware

The system controller is delivered with UL 2572-compliant operational firmware. Check for newer, UL 2572-compliant firmware and upgrade when available.

All other new PRAESENSA network devices are delivered with firmware. Initially, the network devices are delivered with factory firmware and need to be upgraded. Upgrade to the latest available online version.

The device firmware is incorporated in the *.zip file.



Notice!

Devices should only be upgraded when the system is not in use.

6.2 RSTP settings

The PRAESENSA system supports redundant network cabling when Rapid Spanning Tree Protocol (RSTP) is **enabled**. **By default** RSTP is **enabled** because a PRAESENSA system is, for UL864 and UL2572 compliance, mandatory installed in a redundant network.

IMPORTANT: When having RSTP **disabled**, and a redundant network installed, **the system will not function**. See the PRAESENSA installation manual.



Notice!

How to set up PRAESENSA in an Ethernet network is outside the scope of this manual. To prevent network failures in both PRAESENSA and in a Ethernet network where RSTP is not supported or allowed, contact your local IT representative in case PRAESENSA needs to be part of the external/building Ethernet network.

6.3 Logon the application

After the (mandatory) software has been installed on the configuration computer, it must establish a secured data connection with the PRAESENSA system (controller) to be able to transfer system data to and from the system (controller) and other network devices in the PRAESENSA system.



Notice!

The logon and configuration time-out is about 10 minutes. Submit your changes before the time-out exceeds, otherwise your changes are lost.

-
1. An *Initial (administrator) setup* logon screen appears with the device *Hostname* and *Device name* of the system controller requesting a (*New*) *administrator username* and *password*.
 - **Notice** that the *Initial (administrator) setup* login screen is only visible at logon the system for the first time as *administrator* **or** when the saved configuration file of the system controller has been erased.

2. **Enter** the (existing) *administrator username* (minimum **5** and maximum **64** characters) and (existing) *password* (minimum **8** and maximum **64** characters):
 - An initial user account automatically gets the **secured** configuration *administrator* rights.
 - Deleting the *Initial (administrator) setup* user account can only be done by adding a new user account with *administrator* rights and then delete the initial one.
3. **Only at 1st / initial logon** > a OMNEO *security username* and OMNEO *passphrase* is **automatically generated** by the system controller:
 - You need this *security username* and *passphrase* for a *secure firmware upload* and for the Network configurator.
 - PRAESENSA is default set for using a **secured connection** between the system controller and other network devices.
4. **Click** the *Create* button > A web browser page appears, **showing** the following elements:
 - **On top** of the web browser page, from left to right: the *name of the device* (system controller), **your username** and the *software release* number. See Mandatory software.
 - **The name of**, and link to, **the system controller**.
 - **Configure** - A button that opens the *configuration* items selection.
 - **Diagnose** - A button that opens the *diagnostics* items selection.
 - **Security** - A button that opens the system *Security* and *Open Interface* item selection (e.g. download certificate).
 - **Print configuration** - A button that opens the configuration printing utility.
 - **About** - A button that opens the *Open source licenses*.
 - **Main frame** - A frame that displays the selected PRAESENSA web browser page.
 - **Home** - A button that returns to the *Home* web browser page where you could select:
 - The (new) *language* and the *continue* button.
 - **Logout** - A button which returns you to the *logon* webpage. You have to logon the configuration again, if required.
5. **Click** the *Home* button to select the English (UL 2572) *language* for the webserver GUI and web browser pages and **click** the *continue* button to access the web browser pages in the selected language.
6. Click the **Submit** button:
 - Notice that the changes are not permanent until the configuration is saved.

Next step:

Programming settings, page 131

6.4 Programming settings

NOTICE TO USERS, INSTALLERS, AUTHORITIES HAVING JURISDICTION, AND OTHER INVOLVED PARTIES:

This product incorporates field-programmable software. In order for the product to comply with the requirements in the Standard for Control and Communication Units for Mass Notification Systems, UL2572, certain programming features or options must be limited to specific values or not used at all as indicated in the following chapters.

The order of the configure topics listed on the start screen is the preferred programming sequence. See the following chapters.

6.4.1 User accounts

To access the configuration web pages of the webserver, the Open Interface and the Logging server, an account is needed. An account consists of a **User name**, a **Group** and a **Password**. The **Group** defines the access level to the different configuration software sections. Initially, the account created belongs to the Administrator group. Refer to *Logon the application*, page 130.

The webserver provides the following groups:

- **Administrators:** Administrators have access to all sections of the webserver including the *User accounts* part.
- **Installers:** With the exception of the *User accounts* and *Backup and restore* sections, installers have access to all sections of the webserver.
- **Operators:** Operators have access to the *Diagnose > version* and *About* sections of the webserver.

Topic Configure / programming	Feature or option	Permitted in UL2572 (Y/N/ required)	Possible settings	Value	Settings permitted in UL2572
User accounts (The user accounts that provide access to the PRAESENSA webserver can be managed.)	Add (user account)	Required	User name	Enter characters (5-16)	5-16 characters
		Yes	Authorization level	Selection: Administrator/ Installer/operator	Administrato r for user management, Installer for configuration , operator for normal operation
		Required	Password	Enter characters: Administrator (8-64) Installer and operator (4-64)	8-64 characters

6.4.2 System composition

On the *System composition* page you will add (or remove) network devices one by one. This is a mandatory configuration step.

6.4.3 Device options

Each network device that has been added to the *System composition* can be functional configured by using its own *Device options* page. A connected network device is automatically recognized by its *device hostname* and added to the *Device type* category where it belongs to (e.g. Amplifier). The *Device type* category is manufacturer pre-defined and cannot be changed.

System controller

Topic Configure / programming	Feature or option	Permitted in UL2572 (Y/N/required)	Possible settings	Value	Settings permitted in UL2572
Device options	System controller	Yes	Supervision Power supply input A Power supply input B	Enable/disable	Set to enable
		Yes	Network redundancy	Selection: Single network (ports 1-5)/ Dual network (primary: ports 1-4 / secondary: port 5)	Set to single network
		Yes	Emergency relevant	Enable/disable	Default set to enable

Amplifier

Topic Configure / programming	Feature or option	Permitted in UL2572 (Y/N/required)	Possible settings	Value	Settings permitted in UL2572
Device options	Amplifier				
	General	Yes	Power supply supervision	Enable/disable	Set to enable
		Yes	Ground leakage supervision	Enable/disable	Set to enable
		Yes	Lifeline supply input supervision	Enable/disable	Set to enable
		Yes	Emergency relevant	Enable/disable	Set to enable
	Audio outputs (Outputs per amplifier channel)	Yes	Amplifier channel	Enable/disable	Set to enable for used amplifier channels
		Yes	Amplifier channel supervision	Enable/disable	Set to enable
		Yes	Loudspeaker line supervision	Enable/disable	Set to enable
		Yes	Overload supervision	Enable/disable	Set to enable
	* Single = Class B; Dual is dual Class B; Loop = Class A				

Multifunction power supply

Topic Configure / programming	Feature or option	Permitted in UL2572 (Y/N/required)	Possible settings	Value	Settings permitted in UL2572
Device options	Multifunction power supply				
	General	Yes	AC power supervision	Enable/disable	Set to enable
		Yes	Battery supervision	Enable/disable	Set to enable
		Yes	Emergency relevant	Enable/disable	Set to enable
	Control inputs				
		Yes	Local BGM source	Selection	Ancillary function
		Yes	Local BGM on/off	Selection	Ancillary function
		Yes	Local BGM volume control	Selection	Ancillary function

Call station

Topic Configure / programming	Feature or option	Permitted in UL2572 (Y/N/required)	Possible settings	Value	Settings permitted in UL2572
Device options	Call station				
	Settings > General	Yes	Class	Normal Emergency Mass notification	Select "Mass notification" for ACU/LOC
		Yes	Expected PoE inputs	Selection (0-2)	Select 2 for ACU/LOC
		Yes	Emergency relevant	Enable/disable	Set to enable
	Settings > Functions (Normal)	Yes	Alert messages	Enable/disable	Set to disable
		Yes	Trouble log	Enable/disable	Set to disable
	Settings > Audio inputs	Yes	Microphone	Enable/disable	Set to enable for ACU/LOC
		Yes	Supervision	Enable/disable	Set to enable for ACU/LOC

Topic Configure / programming	Feature or option	Permitted in UL2572 (Y/N/required)	Possible settings	Value	Settings permitted in UL2572
		Yes	Input gain	Selection (-10 to 10 dB)	Make sure speech intelligibility is sufficient
Settings > Extension					
	Function	Yes	Make announcement	Selection	Allowed *)
		Yes	Make announcement with zone selection	Selection	Allowed *)
		Yes	Transfer of control	Selection	Select for ACU/LOC
		*) Not allowed in combination with live speech announcements when multiple PRA-FRP are employed in the system.			
	Emergency group	Yes	Group	Selection	Select for ACU/LOC
		Yes	Overrule control request	Selection	Select for ACU/LOC
		Yes	Group name	Enter / rename name	Enter for ACU/LOC
		Yes	Default in control	Selection	Select for ACU/LOC
		Yes	Grant control timeout	Selection (1-90 seconds)	Select for ACU/LOC (default 30 sec.)

6.4.4

System options

On the *System options* pages, a number of general, system wide settings can be configured, such as:

- Recorded messages
- System settings
- Time settings
- Network supervision

Topic Configure / programming	Feature or option	Permitted in UL2572 (Y/N/ required)	Possible settings	Value	Settings permitted in UL2572
System options (Configuring of system wide settings.)	Recorded messages	Yes	Wav files uploaded with required audio	.WAV	Wav files containing messages and tones complying to UL2572
	System settings				
	General	Yes	Rapid Spanning Tree Protocol (RSTP)	Enable/disable	Set to enable
		Yes	Call station operator language	Selection of language	Set to English (UL 2572)
		Yes	UL amplifier mode	Enable / Disable	Set to enable
	Emergency mode	Yes	Disable calls below priority level	Selection (prio. 0-224)	Set to 224
	Backup power mode	Yes	Disable calls below priority level	Selection (prio. 0-255)	Ancillary function
		Yes	Report mains supply fault	Enable/disable	Set to enable
	AC power supply trouble	Yes	Grace time to report mains fault on control outputs	Selection: Off / 1 h-8 h	1 h-8 h
	Alarm sounder	Yes	Reactivate silenced trouble and emergency alarm sounder	Selection: Off / 1 h-24 h	1 h-24 h
	Configuration software	Yes	Automatic logout after inactivity of	Selection (5-30 min.)	Set to 30 min.
	Time settings	Yes	Set time automatically (NTP)	Enable/disable	Set to disable
	Network supervision	Yes	Network supervision	Enable/disable	Set to enable and make a snapshot

6.4.5 Zone definitions

On the *Zone definitions* pages, the amplifier output channels and zone routing can be defined. It is possible to configure:

- Zone options
- Zone grouping
- BGM routing

6.4.6 Call definitions

Using the *Call definition* page, *call definitions* can be defined.

Call definitions are used to make announcements, are custom made, and could contain several characteristics as shown in the table following. To do so:

Topic Configure / programming	Feature or option	Permitted in UL2572 (Y/N/required)	Possible settings	Value	Settings permitted in UL2572
Call definitions (Configuring / definition of announcements / calls.)	Call definitions	Yes	Priority	Selection: 32-255	> 224 for emergency use. Other values for Ancillary function
		Required	Alarm	Selection: None / Emergency	Set for Emergency in case priority is > 224
		Yes	Start tone	Selection	A start tone fit for the intended purpose
		Yes	Attenuation of start tone	Selection: 0 dB-20 dB	Make sure speech intelligibility is sufficient
		Yes	Messages	Selection	One or more messages or tones fit for the intended purpose
		Yes	Attenuation of message	Selection: 0 dB-20 dB	Make sure speech intelligibility is sufficient
		Yes	Repetitions	Selection: 0-10/ Infinite	The number of repetitions fit for the intended purpose. Only Infinite is allowed for alarm tones

Topic Configure / programming	Feature or option	Permitted in UL2572 (Y/N/ required)	Possible settings	Value	Settings permitted in UL2572
		Yes	Live speech	Selection: Yes/No	Yes for use for live speech pages
		Yes	Attenuation live speech	Selection: 0 dB-20 dB	Make sure speech intelligibility is sufficient
		Yes	End tone	Selection	An end tone fit for the intended purpose
		Yes	Attenuation of end tone	Selection: 0 dB-20 dB	Make sure speech intelligibility is sufficient
		Yes	Continue call	Selection: No/After interruption	Set to “After interruption” for emergency use
		Yes	Audio input	Selection: <Default>/ input	An audio input for the intended source. Select <Default> for ACU/LOC use

6.4.7

Action definitions

On the *Action definitions* pages specific device functionality can be configured, e.g. the *buttons* of the call station (extension), *control inputs* of the *multifunction power supply* and the *virtual control inputs* of the *system controller*.

System controller

On the *Action definitions* page of the *system controller*, the *virtual control inputs* could be defined, which could be used by the Open Interface.

Multifunction power supply

On the *Action definitions* page of the *Multifunction power supply* the *Control inputs* and *control outputs* could be defined.

Call station

On the *Action definitions* page of the *call station*, *call station* and *call station extension* actions could be defined.

Topic Configure / programming	Feature or option	Permitted in UL2572 (Y/N/ required)	Possible settings	Value	Settings permitted in UL2572
Action definitions (Configuring / definition of buttons)	Call station				
	Function:				
	Press-to-Talk (PTT)	Yes	Operation	Momentary - finish on release Toggle - finish on switch off	Set to momentary for ACU/ LOC
	Extension				
	Acknowledge and/ or reset	Yes	Operation Type Ack/reset	Do once Trouble Emergency Trouble and Emergency Acknowledge Reset Ack and Reset	See *
<p>* Select an operation, type and Ackn/reset fitting to the intended use For Types Emergency and Emergency and Trouble, the option Reset aborts active emergency appears with No as the only option. This Ack and Reset of the Emergency state and trouble signals is only allowed on the FRP. It is not allowed on the CSE connected to a CSLx.</p>					

6.4.8**Audio processing****Amplifier**

On the *Audio processing* page of the *Amplifier*, the audio processing parameters of the selected amplifier *outputs* can be set.

Call station

On the *Audio processing* page of the *call station*, the audio processing parameters of the selected *call station input* can be set.

6.4.9**Security**

Below the *Security* page, secured system connections can be viewed and/or defined.

Topic Configure / programming	Feature or option	Permitted in UL2572 (Y/N/ required)	Possible settings	Value	Settings permitted in UL2572
Security	System security	Required	User name	Enter characters (5-32)	5-32 characters
		Required	Passphrase	Enter characters (8-64)	8-64 characters

7 Testing/Maintenance

Maintenance shall be performed per NFPA 72.

Besides the NFPA 72 maintenance requirements, see the following sections to keep the system in good condition.

7.1 Preventive maintenance

Wipe clean only with a dry or damp cloth.

Depending on the pollution degree in the operating environment, check at regular intervals that the air inlets for ventilation on the front side of the rack mount devices are not obstructed by dust. Use a dry cloth or a vacuum cleaner to remove dust.

Regularly (e.g. twice per year, or following local legislation) check the correct operation of the complete system, especially when the system is used as voice alarm system only without regular announcements or background music in the zones.

- Check for changes in room occupation, requiring different sound settings or loudspeaker positioning.
- Check for changes of the environmental conditions and update the system if needed.
- Use the Diagnose section of the configuration webpages to:
 - Check the amplifier load conditions for any changes compared to the previous measurement. A new load measurement will result in audible test tones in the zones under test. Preferably do the measurement when the zones are not occupied or announce upcoming tests to the occupants.
 - Check the battery impedance of all connected batteries for any change compared to the previous measurement. This allows for timely detection of battery aging.
- Replace the battery when the battery impedance is too high, every 3 to 5 years or according replacement recommendation of the battery manufacturer.
 - Replace with a properly marked and mounted VRLA (Valve Regulated Lead Acid) battery of 12 V. SLA (Sealed Lead Acid) and VRLA are different acronyms for the same battery.
 - AGM (Absorbed Glass Mat) refers to a specific type of SLA or VRLA and can be used also.
- Regularly check whether there is a new version of the software that provides additional benefits. Information and software downloads are available on the Bosch PRAESENSA product pages on the internet (www.boschsecurity.com).



Notice!

Do not use alcohol, ammonia or petroleum solvents or abrasive cleaners to clean the devices.

7.2 Corrective maintenance

In case of fault reports, a qualified technician should perform:

- Fault analysis;
- Elimination of the part that causes the failure;
- Replacement of the part;
- Test of the associated functions.

Fuse replacement

The following fuse in the PRA-MPS3 can be replaced during maintenance by a qualified technician:

- Mains inlet: T10 AH 250 V 5x20 mm.
- 12 V battery connector: Little fuse CF 58V/100A.
- Supply and charger board F200: 250 V / 5 A 5x20 mm
- MPS3 charger board 18 V to control board F100/F101: 125 V / 5 A SMD Slo-Blo
- MPS3 charger board to charger circuit F700: 250 V / 12,5 A 5x20 mm
- MPS3 supply board 48 V output F100/F101: 125 V/ 8 A SMD Fast-Acting

8 Compatibilities

This section addresses (non) Bosch branded devices that can be connected from the PRAESENSA system to meet the intended application.

8.1 NAC Appliances

Model	Manufacturer	UL864	UL2572
R1002ULADA (Auxiliary output is not allowed to be used)	Altronix	X	X
RE2 battery box	Altronix	X	X
RE2R battery box red version	Altronix	X	X



Notice!

Where NAC circuits needs to be synchronized, these NACs must be installed in the same or adjacent racks.

8.2 Loudspeakers

Model	Manufacturer	UL864	UL2572
LC1-UM06E8 with LC1-MFD	Bosch	X	X
LC1-UM12E8 with LC1-MFD	Bosch	X	X
LHM0606/00-US with LBC3080/01	Bosch	X	X
LC4-UC06E with LC4-MFD	Bosch	X	X
LC4-UC12E with LC4-MFD	Bosch	X	X
LC4-UC24E with LC4-MFD	Bosch	X	X
LB20-PC60EW-5	Bosch	X	X
EVID-S5.2X	Electro-voice	X	X
EVID-P6.2U	Electro-voice	X	X

The LC1-UM12E8 can be used for sounding a 520 Hz low frequency signaling as pre-alert signal for sleeping occupants.

8.3 FACP and Annunciators

Model	Manufacturer	UL864	UL2572
B8512G + B926M	Bosch	X	X
B9512G + B926M	Bosch	X	X
B8512G + B926F	Bosch	X	
B9512G + B926F	Bosch	X	
FPD-7024	Bosch	X	

Notification appliances cannot be connected to the B8512G, B9512G or FPD-7024.
Compatible NAC appliances need to be used to connect notification appliances.

9 System Configuration

For Mass Notification Systems (UL2572) and Fire Evacuation Systems (UL864) the following minimum and optional configurations are allowed.

This section covers the configurations needed to meet the intended applications. The minimum (M) and optional (O) required products are included.

Order number	Product name	Mandatory / Optional	Minimum quantity	Maximum per system / product
PRA-SCL	System controller, large	M	1	Per system: 3
PRA-AD604	Amplifier, 600W 4-channel	O* (or PRA-AD608)	O*	Per system: 150 - # of PRA-SCL and PRA-FRPx-US
PRA-AD608	Amplifier, 600W 8-channel	O* (or PRA-AD604)	O*	
PRA-MPS3	Multifunction power supply, large	M	1	Per system: 150 - # of PRA-SCL and PRA-FRPx-US
PRA-CSLD	Desktop LCD call station	O	0	
PRA-CSLW	Wallmount LCD call station	O	0	
PRA-FRPx-US	First responder panel USA, 3-extensions	M	1	Per system: 20
PRA-EOL-US	End-of-line device	M	1	Per amplifier output A: 1 Per amplifier output B: 1
PRA-CSE	Call station extension	M	1	Per PRA-CSLx: 4
PRA-ES8P2S	Ethernet switch	O	0	Per PRA-MPS3: 3
PRA-SFPLX	Fiber transceiver single mode	O	0	Per PRA-MPS3: 1 Per PRA-ES8P2S: 2
PRA-SFPSX	Fiber transceiver multi-mode	O	0	

- O*: Non, or at least one of the (and/or) described product is required.

Refer to

- *Interconnection with B9512G or B8512G panel, page 153*














9.1 System with ACU

The following PRAESENSA devices are used:

Quantity	Device type	Device name	Main function of device	Link to wiring section of device
1	PRA-FRP3-US	First responder panel for USA, 3-extensions	Make emergency announcement/call. Selection of zones and actions.	<i>First responder panel PRA-FRPx-US, PRA-FRPx-USNY, page 108</i>
1	PRA-AD608	Amplifier, 600W 8-channel	Provides audio signals up to 8 loudspeaker channels/zones.	<i>Amplifier, 600W 8-channel PRA-AD608, page 45</i>
1	PRA-MPS3	Multifunction power supply, large	Main power supply source for the PRAESENSA system devices	<i>Multifunction power supply, large PRA-MPS3, page 63</i>
1	PRA-SCL	System controller, large	Controlling the system and functions.	<i>System controller PRA-SCL PRA-SCM PRA-SCS, page 27</i>



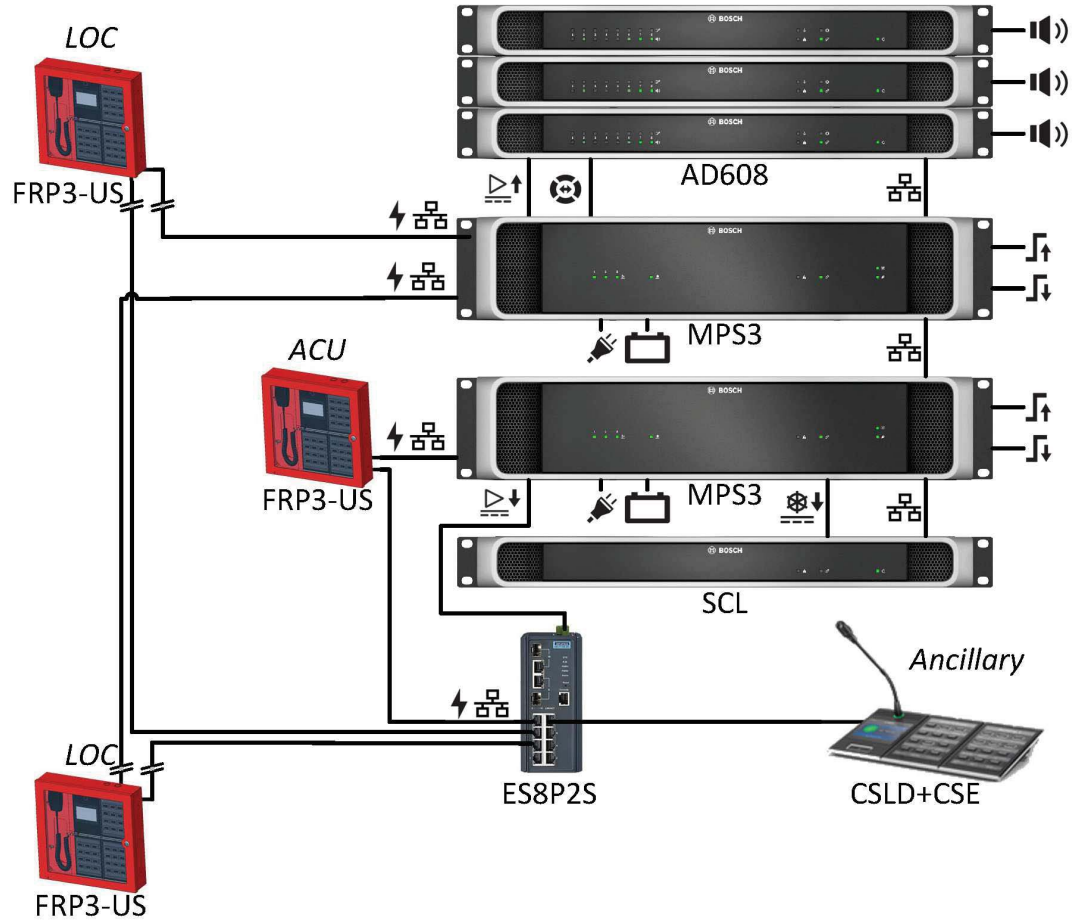
Legend device interconnections

Icon	Description	Link to wiring section
 	MPS3 Network port 1-2 with PoE	<i>Power over Ethernet, page 74</i>
 	48 VDC output A-B (1-3, to amplifier 1-3)	<i>Amplifier power supply, page 71</i> <i>Power supply, page 48</i>
	Lifeline interface (1-3, to amplifier 1-3)	<i>Lifeline, page 72</i> <i>Lifeline, page 49</i>
	General network port	<i>Ethernet network, page 53</i> <i>Ethernet network, page 75</i> <i>Ethernet network, page 30</i>
	Loudspeaker output	<i>Amplifier outputs, page 50</i>
	Mains input	<i>Mains power connection, page 70</i>
	Battery 12 VDC	<i>Battery and fuse, page 66</i>
 	24 VDC output A-B (to system controller)	<i>System controller power supply, page 73</i> <i>Power supply, page 29</i>
	Control input 1-8	<i>Control inputs, page 77</i>
	Control output 1-8	<i>Control outputs, page 78</i>

9.2 System with ACU and LOC




The following PRAESENSA devices are used:

Quantity	Device type	Device name	Main function of device	Link to wiring section of device
3	PRA-FRP3-US	First responder panel for USA, 3-extensions	Make emergency announcement/call. Selection of zones and actions.	<i>First responder panel PRA-FRPx-US, PRA-FRPx-USNY, page 108</i>
3	PRA-AD608	Amplifier, 600W 8-channel	Can provide audio signals up to 8 loudspeaker channels/zones.	<i>Amplifier, 600W 8-channel PRA-AD608, page 45</i>
2	PRA-MPS3	Multifunction power supply, large	Main power supply source for the PRAESENSA system devices	<i>Multifunction power supply, large PRA-MPS3, page 63</i>
1	PRA-SCL	System controller, large	Controlling the system and functions.	<i>System controller PRA-SCL PRA-SCM PRA-SCS, page 27</i>
1	PRA-ES8P2S	Ethernet switch		<i>Ethernet switch PRA-ES8P2S, page 99</i>
1	PRA-CSLD	LCD call station	Make business announcement/call.	<i>LCD call station PRA-CSLD, PRA-CSLW (ancillary), page 82</i>
2	PRA-CSE	Call station extension	Selection of zones and actions.	<i>Call station extension PRA-CSE, page 91</i>



Legend device interconnections

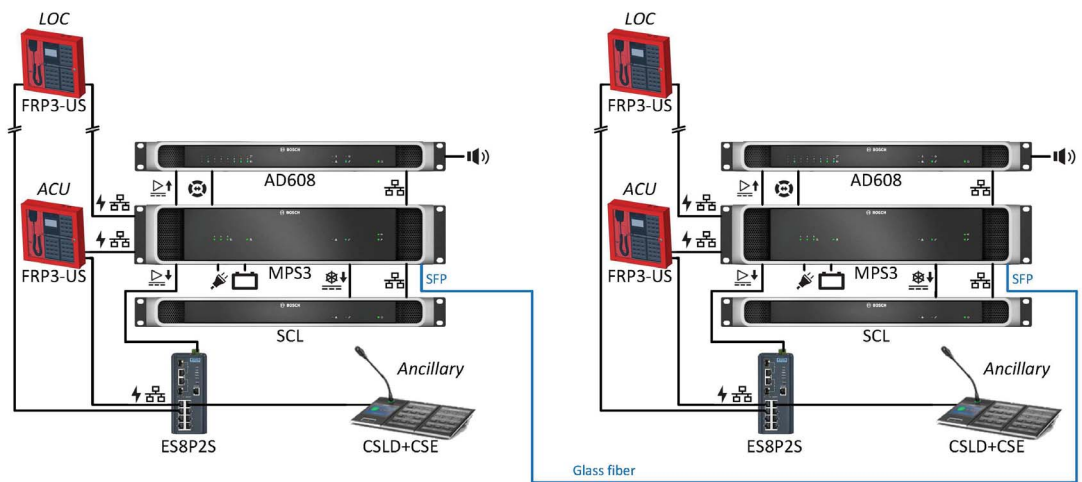
Icon	Description	Link to wiring section
	MPS3 Network port 1-2 with PoE	<i>Power over Ethernet, page 74</i>
	48 VDC output A-B (1-3, to amplifier 1-3)	<i>Amplifier power supply, page 71</i> <i>Power supply, page 48</i>
	Lifeline interface (1-3, to amplifier 1-3)	<i>Lifeline, page 72</i> <i>Lifeline, page 49</i>
	General network port	<i>Ethernet network, page 53</i> <i>Ethernet network, page 75</i> <i>Ethernet network, page 30</i>
	Loudspeaker output	<i>Amplifier outputs, page 50</i>
	Mains input	<i>Mains power connection, page 70</i>
	Battery 12 VDC	<i>Battery and fuse, page 66</i>

Icon	Description	Link to wiring section
	24 VDC output A-B (to system controller)	<i>System controller power supply, page 73</i> <i>Power supply, page 29</i>
	Control input 1-8	<i>Control inputs, page 77</i>
	Control output 1-8	<i>Control outputs, page 78</i>











9.3 Multi building system

The following PRAESENSA devices are used:

Quantity	Device type	Device name	Main function of device	Link to wiring section of device
4	PRA-FRP3-US	First responder panel for USA, 3-extensions	Make emergency announcement/call. Selection of zones and actions.	<i>First responder panel PRA-FRPx-US, PRA-FRPx-USNY, page 108</i>
4	PRA-AD608	Amplifier, 600W 8-channel	Can provide audio signals up to 8 loudspeaker channels/zones.	<i>Amplifier, 600W 8-channel PRA-AD608, page 45</i>
2	PRA-MPS3	Multifunction power supply, large	Main power supply source for the PRAESENSA system devices	<i>Multifunction power supply, large PRA-MPS3, page 63</i>
2	PRA-SCL	System controller, large	Controlling the system and functions.	<i>System controller PRA-SCL PRA-SCM PRA-SCS, page 27</i>
2	PRA-ES8P2S	Ethernet switch		<i>Ethernet switch PRA-ES8P2S, page 99</i>
2	PRA-SFPSX or PRA-SFPLX	Fiber tranceiver	Long distance glass fiber connection between devices.	<i>Fiber tranceiver PRA-SFPLX, PRA-SFPSX, page 104</i>
2	PRA-CSLD	LCD call station	Make business announcement/call.	<i>LCD call station PRA-CSLD, PRA-CSLW (ancillary), page 82</i>
4	PRA-CSE	Call station extension	Selection of zones and actions.	<i>Call station extension PRA-CSE, page 91</i>

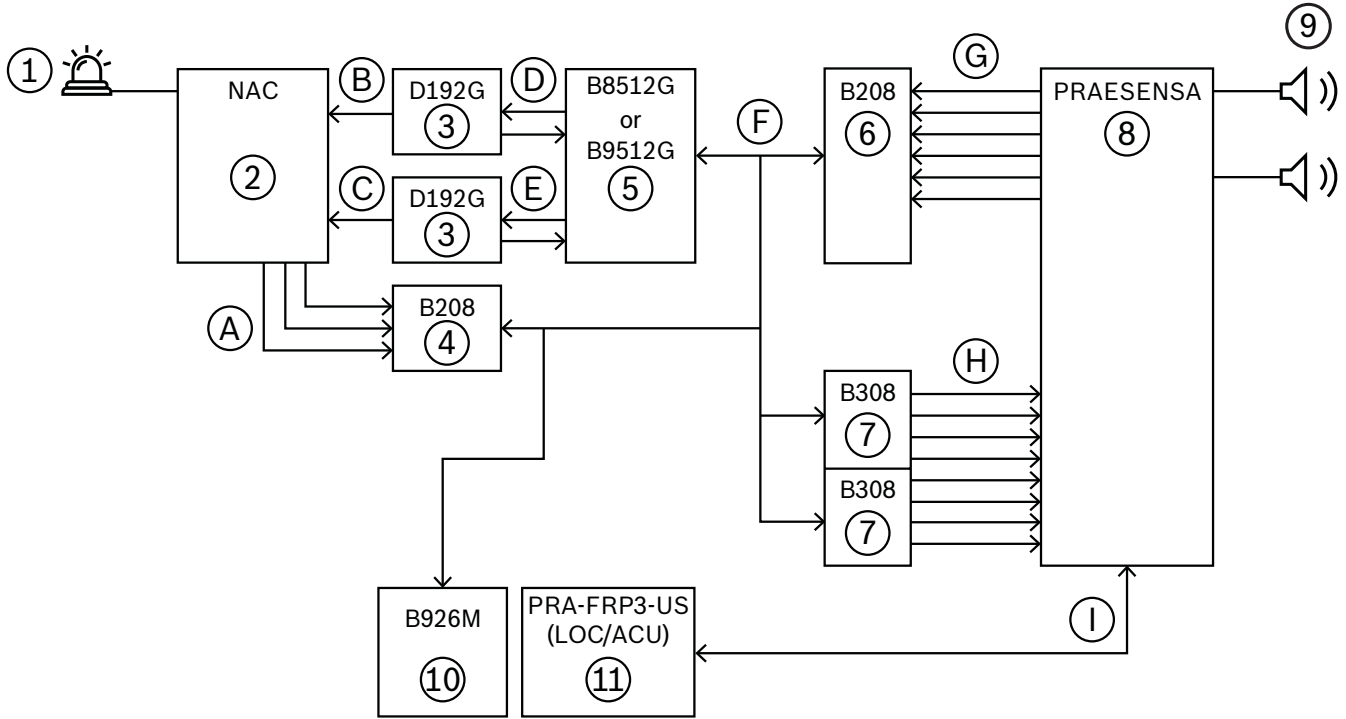


Legend device interconnections

Icon	Description	Link to wiring section
	MPS3 Network port 1-2 with PoE	<i>Power over Ethernet, page 74</i>
	48 VDC output A-B (1-3, to amplifier 1-3)	<i>Amplifier power supply, page 71</i> <i>Power supply, page 48</i>
	Lifeline interface (1-3, to amplifier 1-3)	<i>Lifeline, page 72</i> <i>Lifeline, page 49</i>
	General network port	<i>Ethernet network, page 53</i> <i>Ethernet network, page 75</i> <i>Ethernet network, page 30</i>
	Loudspeaker output	<i>Amplifier outputs, page 50</i>
	Mains input	<i>Mains power connection, page 70</i>
	Battery 12 VDC	<i>Battery and fuse, page 66</i>
	24 VDC output A-B (to system controller)	<i>System controller power supply, page 73</i> <i>Power supply, page 29</i>
	Control input 1-8	<i>Control inputs, page 77</i>
	Control output 1-8	<i>Control outputs, page 78</i>

9.4 Interconnection with B9512G or B8512G panel

Scenario: B9512G or B8512G + PRA + 1 Strobe



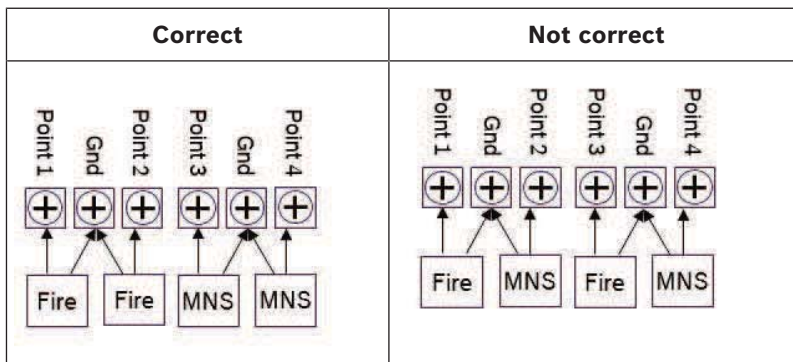
1	Clear strobe	A	Output signals from NAC (AC local, battery and trouble)
2	NAC rack for strobes (R1002ULADA)	B	Notification output signal wiring for clear strobe
3	Notification appliance module (D192G)	C	Also for clear strobe, but can be used for second strobe zone
4	8-input Expansion Module (B208)	D	Notification input- and output-signal wiring for clear strobe
5	Control panel (B9512G or B8512G)	E	Also for clear strobe, but can be used for second strobe zone
6	8-input Expansion Module (B208)	F	SDI2 class b wiring
7	Octo-output module (B308)	G	Connect the following output contact triggers from the PRAESENSA output contacts to the B208 panel: - Alarm Triggers and Trouble Signals from PRAESENSA to B9512G or B8512G panel - Transfer of Control Signals See <i>Control outputs</i> , page 78.
8	PRAESENSA system See i.e. <i>PRAESENSA product overview</i> , page 13	H	Connect the following output contact triggers from the B308 panel to the PRAESENSA input contacts: - Alarm Triggers to start the MNS and Fire audio messages in PRAESENSA

			<ul style="list-style-type: none"> - Silence Triggers to silence MNS and Fire audio messages <p>See <i>Control inputs</i>, page 77.</p>
9	Loudspeaker / zones See <i>Amplifier outputs</i> , page 38 and <i>Amplifier outputs</i> , page 50.	I	Ethernet PoE (Class N) wiring See <i>First responder panel PRA-FRPx-US, PRA-FRPx-USNY</i> , page 108.
10	Remote Annunciator (B926M)		
11	LOC / ACU First responder panel (PRA-FP3-US) See <i>First responder panel PRA-FRPx-US, PRA-FRPx-USNY</i> , page 108. Note: Mount the Remote Annunciator (10) and the First responder panel (11) side by side, possibly at multiple locations.		



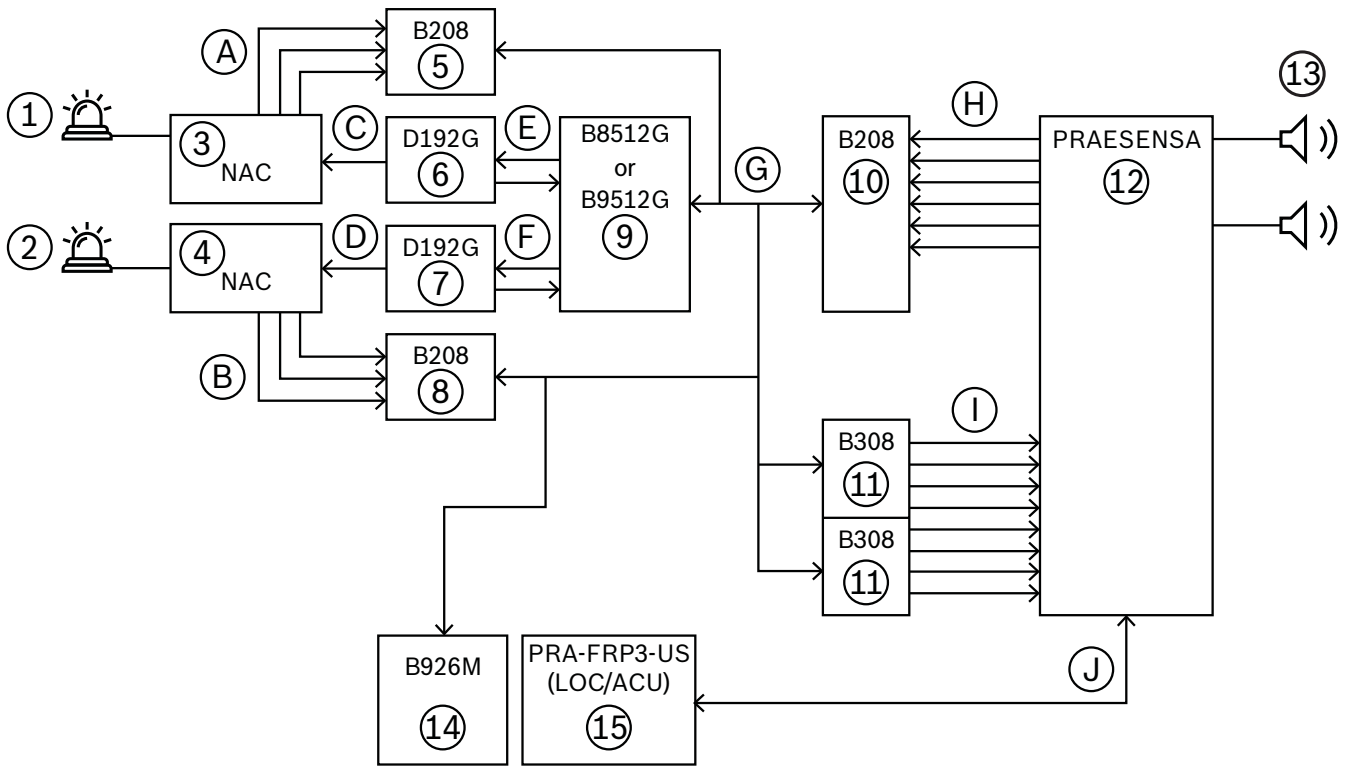
Notice!

When connecting input notification devices to the B9512G or B8512G panel, it is important NOT to use a shared ground for different notification types, MNS versus Fire.



9.5 Interconnection with B9512G or B8512G panel with amber and clear strobes

Scenario: B9512G or B8512G + PRA + 2 strobe



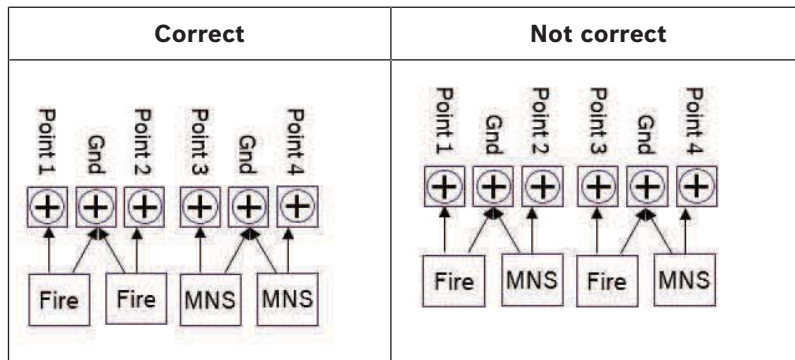
1	Clear fire strobes	A	A is for Fire related trouble signals
		B	B is for MNS related trouble signals
2	Amber MNS strobes	C	Notification output wiring for fire strobe
3	NAC rack for fire strobes (R1002ULADA)	D	Notification output signal wiring for MNS strobe
4	NAC rack for MNS strobes (R1002ULADA)	E	Notification input- and output-signal wiring for fire strobe
5	8 input Expansion Module (B208)	F	Notification input- and output-signal wiring for MNS strobe
6	Notification appliance module (D192G)	G	SDI2 class b wiring
7			
8	8 input Expansion Module (B208)	H	Connect the following output contact triggers from the PRAESENSA output contacts to the B208 panel: - Alarm Triggers and Trouble Signals from PRAESENSA to B9512G or B8512G panel - Transfer of Control Signals See <i>Control outputs</i> , page 78.
9	Control panel (B9512G or B8512G)	I	Connect the following output contact triggers from the B308 panel to the PRAESENSA input contacts:

			<ul style="list-style-type: none"> - Alarm Triggers to start the MNS and Fire audio messages in PRAESENSA - Silence Triggers to silence MNS and Fire audio messages <p>See <i>Control inputs</i>, page 77.</p>
10	8 input Expansion Module (B208)	J	Ethernet PoE (Class N) wiring See <i>First responder panel PRA-FRPx-US, PRA-FRPx-USNY</i> , page 108.
11	Octo output module (B308)		
12	PRAESENSA system See i.e. <i>PRAESENSA product overview</i> , page 13.		
13	Loudspeaker / zones See i.e. <i>Amplifier outputs</i> , page 38 and <i>Amplifier outputs</i> , page 50		
14	Remote Annunciator		
15	LOC / ACU First responder panel (PRA-FRP3-US) See <i>First responder panel PRA-FRPx-US, PRA-FRPx-USNY</i> , page 108. Note: Mount the Remote Annunciator (14) and the First responder panel (15) side by side.		



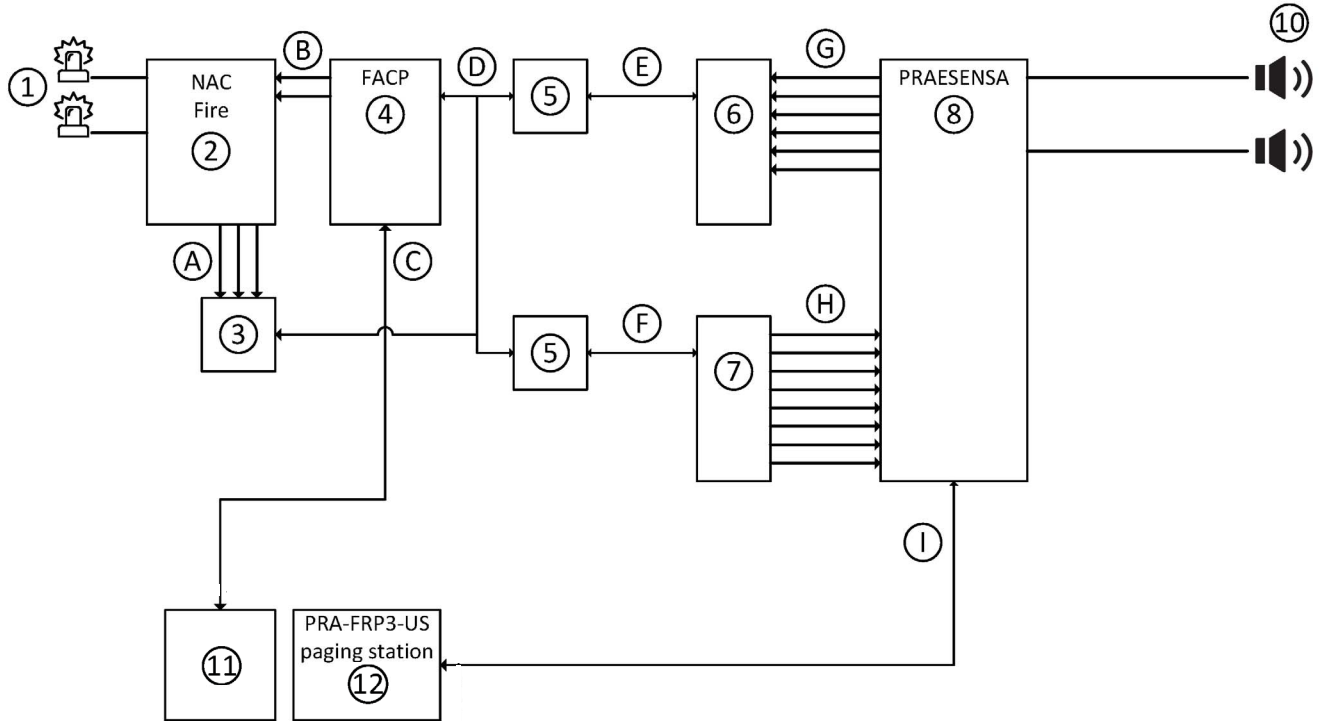
Notice!

When connecting input notification devices to the B9512G or B8512G panel, it is important NOT to use a shared ground for different notification types, MNS versus Fire.



9.6 Generic interfacing with fire panel

Scenario: PRAESENSA with FACP (fire only) #



Remark: Multiple FRP panels are allowed, provided they are mounted adjacent to either the fire panel or a fire annunciator that has control (Silence / Reset) buttons.

1	Clear fire strobes	A	Output signals from NAC (AC local, battery and trouble)
2	NAC rack for fire strobes	B	Notification output wiring for fire strobe
3	FACP input contact module (addressable)	C	Interconnection wiring
4	FACP (Fire Alarm Control Panel)	D	Class b SLC wiring
5	Isolator (if required)	E	Class b SLC wiring
6	FACP input contact module (addressable)	F	Class b SLC wiring
7	FACP output contact module (addressable relays)	G	(Max. 8) Input contact wiring (e.g. Fire system, fire trigger, trouble, battery, AC, etc.) See <i>Control outputs</i> , page 78
8	PRAESENSA system See i.e. <i>PRAESENSA product overview</i> , page 13	H	(Max. 8) Output contact wiring (e.g. Fire alarm, CO alarm, etc.) See <i>Control inputs</i> , page 77
10	Loudspeaker / zones See i.e. <i>Amplifier outputs</i> , page 38 and <i>Amplifier outputs</i> , page 50	I	Ethernet PoE (Class N) wiring See <i>First responder panel PRA-FRPx-US, PRA-FRPx-USNY</i> , page 108
11	Remote Annunciator		

12	Paging station - First responder panel (PRA-FRP3-US) See <i>First responder panel PRA-FRPx-US, PRA-FRPx-USNY, page 108</i> Note: Mount the Remote Annunciator (11) and the First responder panel (12) side by side.		
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**Notice!**

Items 4 and 13 must be mounted next to each other if no fire annunciator is available or if the control of the fire system is available on the FACP or if there are no control buttons (Silence / Reset) on the fire annunciator.

**Notice!**

The FACP (item 4) and NAC (item 2) need to be able to support 15 minutes Alarm after 24 h of standby. This is required for new and retrofit applications.

10

System Power/Size**Electrical**

Control	
Audio routing (dynamic) OMNEO channels	Unlimited
Tone/message playback (dynamic) OMNEO channels	8
Audio inputs (static) Dante or AES67 channels	120 (PRA-SCL)
Audio outputs (static) Dante channels	8
Frequency range	100 Hz to 20 kHz

Control	
Maximum number of PRAESENSA devices	150
Maximum number of zones	500
Maximum Ethernet subnets	1
Ethernet Loop size	21

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

11 Operating instructions

The following instructions appear on a separate sheet. These instructions are to be framed and placed adjacent to the First responder panel for ready reference.

Local Service Representative
Name:
Address:
Phone:

This First responder panel interface is a full-function LOC or ACU. The First responder panel has a display and a sounder that emits distinct condition tones to alert you to alarm or trouble events as they occur. In conjunction with the display and sounder, status indicators provide the following system status information as described next.

Overview



1. **Microphone + key:**
 - Live speech microphone: Active when the speak indicator (3) is steady on and by pressing the microphone key.
 - To activate the call: First make a zone / zone group (5) selection before pressing the key.
2. **Indicator:**
 - Trouble indicator: Yellow is trouble.
 - Mains availability: Green is available/ok.
 - Battery status: Green is ok.
3. **Speak indicator:**
 - Flashing: Please wait to speak.
 - Steady on: Speak now.
4. **Sounder:** Generates (alarm) sounds/tones.
5. **Zone / Zone group buttons:** Selection to start live announcement/paging.
6. **Zone status indicators:**
 - Loudspeaker icon Red: Alarm message playing in zone.
 - Loudspeaker icon Blue: Low priority call playing in zone.
 - Warning triangle Yellow: Trouble exist in this zone.
7. **Transfer of Control:** Control indicator:
 - White button ring lit: The First responder panel is in control.
 - White button ring off: Control must be requested first, before First responder panel can be operated.
 - To Request Control: Press Request Control.
 - To Deny Control: Press blinking Deny Control button.
 - To Grant Control: Press blinking Grant Control button.
 - At ACU: Control can be forced by pressing and holding the button related to the Control Indicator for two seconds.
8. **Unlock Annunciator** (press and hold): Within five seconds of pressing the button, the annunciator will be unlocked.
9. **Trouble Acknowledge:** Silences the Trouble buzzers of the PRAESENSA First responder panels.
Trouble Reset: Reset a Trouble indication after a Trouble condition has been resolved.
10. **Emergency Acknowledge:** Silences the Emergency buzzer of the PRAESENSA First responder panels. It does not silence the audio zones.
Emergency Reset: Sets the system to Normal operation. The alarms and troubles must be resolved, and reset FACP first.
11. **Start and stop of alarm messages:**
 - Loudspeaker icon Red on: Alarm message active.
 - Loudspeaker icon Red blinking: Alarm message active, but possibly not reaching all zones.
 - White button ring lit: Alarm started from FRP.
12. **Control locations button:** Shows all control locations, and which location is currently in control of the system.
13. **Trouble log button:** Access to detailed trouble log.

Operation

Normal operation

When in normal operation, the First responder panel LOC / ACU shows idle text "All Systems Normal".

Fire / MNS (emergency) alarm operation

When a fire or MNS alarm occurs, and the First responder panel emits a continuous tone: the tone sounds until the silence buzzer button is pressed. The First responder panel will indicate in which zones the automated message is playing. The FACP will indicate the source and type of alarm. Acknowledging and silencing the alarm must also be done through the FACP.

Trouble Operation

When a trouble condition occurs (such as wiring for a Loudspeaker line is cut or AC power fails), the First responder panel sounder activates briefly approximately every 5 seconds. The Trouble indicator lights on the display the trouble log shows the active troubles. Press Silence buzzer to acknowledge the trouble or navigate in to the trouble log to acknowledge the troubles.

Silence and Reset

To silence the alarm, use the FACP.

To reset the system; first reset the FACP and then reset the PRAESENSA system using the reset PA button on the First responder panel.

Operating instructions: F.01U.403.259, V1.0

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