

# **PAVIRO Controller**

PVA-4CR12



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# 1 Important product information

## 1.1 Safety information

1. Read and keep these safety instructions. Follow all instructions and heed all warnings.
2. Download the latest version of the applicable installation manual from [www.boschsecurity.com](http://www.boschsecurity.com) for installation instructions.



### Information

Refer to the Installation Manual for instructions.

3. 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.

4. System installation and servicing by qualified personnel only, in accordance with applicable local codes. No user-serviceable parts inside.
5. System installation for emergency sound (except for call stations and call station extensions) in a Restricted Access Area only. Children may not get access to the system.
6. For rack-mounting of system devices, make sure that the equipment rack is of suitable quality to support the weight of the devices. Use caution when moving a rack to avoid injury from tip over.
7. The apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the apparatus.



**Warning!** To reduce the risk of fire and electric shock, do not expose this apparatus to rain or moisture.

8. Mains powered equipment shall be connected to a mains power outlet socket with a protective earthing connection. An external, readily operable, mains plug or all-pole mains switch shall be installed.
9. Only replace the mains fuse of an apparatus with a fuse of the same type.
10. The protective ground connection of an apparatus shall be connected to protective ground before the apparatus is connected to a power supply.
11. Amplifier outputs marked with  may carry audio output voltages up to 120 V<sub>RMS</sub>. Touching uninsulated terminals or wiring may result in an unpleasant sensation. Amplifier outputs marked with  or  may carry audio output voltages above 120 V<sub>RMS</sub>. It requires a skilled person to strip and connect the loudspeaker wires in such a way that the naked conductors are inaccessible.
12. The system may receive power from multiple mains power outlet sockets and backup batteries.



**Warning!** To prevent a shock hazard disconnect all power sources prior to system installation.

13. Only use recommended batteries and observe polarity. Risk of explosion if an incorrect type of battery is used.

14. Fiber optical converters use invisible laser radiation. To prevent injury, avoid eye exposure to the beam.
15. Devices for vertical (wall) mounting supporting a user interface for operation shall only be mounted below 2 m height.
16. Devices installed above 2 m height may cause injury when falling down. Preventive measures must be taken.
17. To prevent hearing damage do not listen at high volume levels for long periods.
18. An apparatus may use a lithium coin battery. Keep away from children. If ingested, high risk of chemical burn hazard. Seek medical attention immediately.

## 1.2 Disposal instructions



### **Old electrical and electronic appliances.**

Electrical or electronic devices that are no longer serviceable must be collected separately and sent for environmentally compatible recycling (in accordance with the European Waste Electrical and Electronic Equipment Directive).

To dispose of old electrical or electronic devices, you should use the return and collection systems put in place in the country concerned.

## 1.3 FCC statement



**Warning!** Changes or modifications not expressly approved by Bosch could void the user's authority to operate the equipment.



### **Notice!**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV/communications equipment technician.

## 2 Short information

The PVA-4CR12 controller is the central paging manager for the PAVIRO system. Eight local audio inputs can be switched to four audio outputs. A two channel message manager is integrated. The controller provides all the audio processing, supervision and control functions for a complete PAVIRO system. A single controller supports up to 16 call stations and 492 paging zones. The controller is equipped with 12 zones, 18 GPIs and 19 GPOs. One controller can handle up to 2000 W loudspeaker load. Additional zones and power can be added by using up to 20 external routers and 40 amplifiers with each 2 × 500 W. The zone indicator lights on the front indicate the current status of every zone:

- Green: Zone in use for non emergency purpose
- Red: Zone in use for emergency purpose
- Yellow: Zone fault detected
- Off: Zone in idle condition

## 3 System overview

This chapter explains the basic features of the PAVIRO system and its most important functions.

### General overview

The PVA-4CR12 is the controller of the PAVIRO system. The controller contains all necessary audio functions and is responsible for controlling and monitoring the complete PAVIRO system. The type and number of connected audio sources, amplifiers, and relays are extremely variable, and can be adjusted to individual requirements. A single controller can manage up to 16 call stations and up to 492 loudspeaker zones. Control inputs and outputs can be used for controlling and monitoring functions. Both logic level and the analog level signals can be processed. Configuration is performed on a PC using the IRIS-Net software, which also provides access to system documentation and the required user interface. A configuration can be changed at any time, and adjusted to new circumstances without having to modify the system installation. A PC is required only for loading or changing the configuration; it does not need to be connected during live operation. In many cases, however, a permanently connected PC is helpful; for example, to provide detailed status displays and log reports, real-time loudspeaker and sound control, or for remote diagnosis and maintenance via the network. The user interface can be individually tailored, and up to 32 password levels can be assigned.

### Audio routing

A digital audio matrix is integrated into the controller. Up to 8 local audio inputs, 2 message playback channels, and 4 internal generators are available. The 4 audio output channels are connected to the amplifiers via a 4-channel audio bus. The amplifiers include an audio input router where the correct input signal is selected automatically. Each loudspeaker circuit can be connected with amplifier outputs via a relay matrix, which allows for 492 loudspeaker zones. The controller manages the audio signals, and distributes them according to priority. In addition to the call stations, other audio sources can also be connected to the audio inputs such as microphones, mixing desks, CD players, MP3 players, tuners, and so on. A number of different connections are available for optimum adjustment.

### Audio processing

The controller provides separate volume controls with a mute function for each audio input and audio output. Each audio input has a 3-band equalizer and a compressor for optimal sound adjustment of the audio sources. All outputs are fitted with a 5-band equalizer and a limiter. For the equalizers, the operator can select from five different filter types for each band filter (peak, low-shelving, high-shelving, high pass, low pass). Volume levels, filter parameters, and so on are set on the PC during configuration. However, these can also be changed in real-time during operation using the graphical user interface, the special keys for the call stations, or external operating controls.

### Signal generators

The controller provides four signal generators: Two independent generators for generating alarm signals and two independent generators for generating chime signals. Operators can choose between 24 alarm types and six chime types that are available ex-works.

### Message manager

The integrated message manager is for EVAC messages and alarm signals, as well as commercial messages and chime/pre-chime signals. The message manager allows easy configuration of EVAC and commercial messages, and other customized audio signals by using the IRIS-Net software.

### Call stations

The call stations are used mainly for announcements, but are also used for manual control of the PAVIRO system. Possible call station functions include zone/group selection, announcements, program allocation, triggering chime and alarm signals, and message playback. However, special commands such as volume control, light control, function displays, and much more are also possible. The call stations can therefore also be configured for general control tasks. If an announcement is to be routed through a loudspeaker zone that is already occupied, the system issues an occupied notification (i.e., the talk button indicator light flashes). If the call station concerned has a higher priority, it can interrupt the lower-priority call from the other call station/signals. The system is configured to indicate the conditions: The user is notified that the system is occupied when selecting the zone/group (before the interruption) by the flashing talk button indicator light. The user can now decide whether to interrupt the signal immediately, or whether to wait until the end of the active announcement. Each zone selection key has two indicator lights: A green indicator light shows the current selection, and a red indicator light shows if the zone is occupied with an emergency signal. System information or error messages can be displayed on the call station's illuminated graphic display.

### Control inputs and outputs

The PAVIRO system has analog and logic control inputs and logic control outputs. The control inputs allow a connection to be established to fire alarm systems, intruder alarm systems, or a control desk. However, it is also possible to connect external switches, controllers, or rotary potentiometers, or triggers from external equipment (power supply, power amplifiers, and so on). The control outputs allow the user to activate/deactivate external devices, trigger signals and events, remotely control doors, gates, and roller blinds, and much more.

### Automatic control

The controller contains a quartz-controlled real-time clock that can be switched to DCF77 radio clock operation via an optional antenna. The system clock automatically recognizes leap years; in DCF77 mode, it also automatically switches to daylight-saving time. Up to 80 external slave clocks (max. 1 A) can be controlled by the system clock. A special output for polarity switching pulse, which is protected against short circuits, is integrated in the controller for this purpose. Slave clocks are automatically adjusted if a time difference between the slave clocks and the system clock is detected, for example after a power failure or in the event of manual input. Together with the calendar function, the system clock can be used to execute functions such as a break chime, music, gate control, light control, and so on. These functions can be programmed for specific days, but can also be implemented on an hourly, daily, weekly, monthly, and annual basis. Up to 500 time-controlled events can be entered. Functions and parameters can be connected in an internal sequence. The TaskEngine in the controller GUI provides a graphic way to combine processes individually. One example would be a chime signal to be transmitted at a certain volume and with a specific priority in specific call groups, and which simultaneously activates a control output. In this case, the process consists of the "chime" and "analog output" function blocks combined with the parameters of chime type, volume, priority number, call group number, as well as the type and number of the control output. The processes can be triggered via special function keys on the call stations or via control inputs, but can also be linked to clock or calendar dates.

### Interfaces

In addition to the control inputs and outputs, the PAVIRO system also includes other interfaces:

- The call stations are connected to the controller via the CST bus (CAN bus standard). Up to four call stations can be connected via one CST bus.

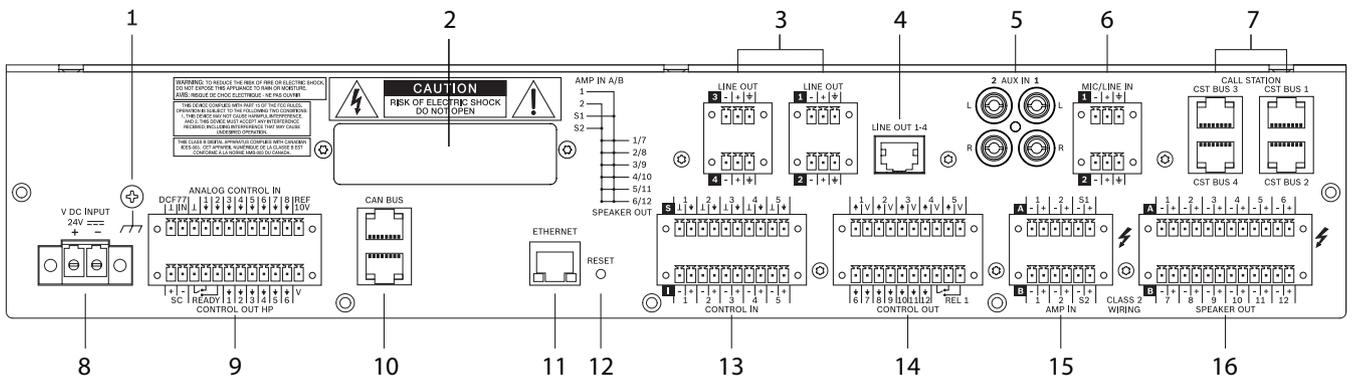
- The power amplifiers and the routers are controlled and monitored by the controller via an additional, independent CAN bus interface.
- The connection to a PC is established via an Ethernet interface.
- An optional OM-1 Module can be installed at the rear of the device.

The OM-1 is a compact interface module which is prepared for a connection to an OMNEO network. It can send and receive Dante audio to and from up to four other PAVIRO controllers with an OM-1 Interface Module.

**Monitoring**

The controller monitors all internal functions itself, and the connected call stations, routers and power amplifiers including their connection lines are also monitored by polling and pilot tone. Loudspeaker lines can be monitored by impedance measurement or end-of-line modules installed at the last speaker. The PAVIRO system also supports emergency power operation - in the event of a power failure, the controller can assume all power management functions, that is, all unnecessary internal and external consumers switch to standby mode, or are deactivated and only reactivated again when required. This greatly reduces power consumption, and ensures maximum operating time on battery power. Error messages can be displayed on the call station displays in plain text. The status of the “combined fault” is available via the floating READY contact on the controller.

**3.1 Rear**

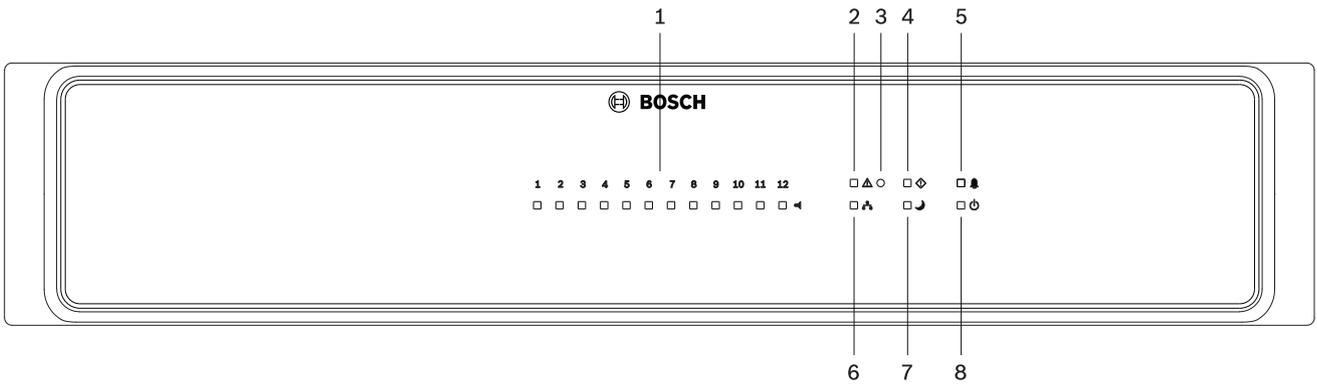


Number	Element	Description
1	Grounding screw	Ground connection
2	Blind cover for optional OM-1 Module	Blind cover with slot for installing OM-1 Module.
3	LINE OUT 1-4 ports (Euroblock)	Balanced line level audio outputs for channel 1 to 4 (parallel to RJ-45 port).
4	LINE OUT 1-4 port (RJ-45)	Balanced line level audio output for channel 1 to 4 (parallel to Euroblock port).
5	AUX IN 1/2 ports (RCA)	Stereo audio input for line level signals.
6	MIC/LINE IN 1/2 ports (Euroblock)	Audio input for microphone or line level signals.
7	CST BUS 1-4 ports (RJ-45)	Ports for connecting call stations.
8	DC power input	

Number	Element	Description
9	CONTROL IN/OUT port	Control port with analog/logic inputs, high power outputs and pins for DCF77 or slave clocks.
10	CAN BUS port	Port for connecting power amplifiers or routers.
11	ETHERNET port with status indicator lights	Port for connecting to a PC or other network devices.
12	Reset button	Reset of the device: Briefly press this button to reset the device.*
13	CONTROL IN port	Control port with isolated or supervised inputs.
14	CONTROL OUT port	Control port with open collector outputs.
15	AMP IN port	Input for 100 V (or 70 V) audio signal from power amplifier.
16	SPEAKER OUT port	Output for speaker zones.

\* If the reset button is pressed too long (e.g. > 4 seconds), the device enters the service mode. Press the reset button again to exit the service mode.

### 3.2 Front



Number	Symbol	Element	Description
1	▲	Zone status indicator light	Indicates the status of the zone: <ul style="list-style-type: none"> <li>– Green = Zone is in use for non-emergency purpose</li> <li>– Yellow = Zone fault detected (Note: The indication of this status has the highest priority)</li> <li>– Red = Zone is in use for emergency purpose</li> <li>– Off = Zone in idle condition</li> </ul>
2	▲	Combined fault warning indicator light	This indicator lights yellow if a fault in the system is detected. The indicator is coupled with the READY contact (see section <i>Ready relay, page 27</i> ) on the rear of the device, which allows any faulty system behavior to be reported externally. Note: The fault types to be indicated via this indicator can be configured.
3		Recessed button	The button is protected to prevent it from being pressed accidentally. Use a pointed object (such as a ballpoint pen) to press the button. This button has the following functions: <ul style="list-style-type: none"> <li>– Silencing of the buzzer: If the buzzer is active, press the button briefly to deactivate the warning tone.</li> <li>– Find function: If the find function of the device is activated, press this button to deactivate the indicators.</li> <li>– Displaying the CAN baud rate: Press this button for at least one second. Please refer to section <i>Displaying the CAN baud rate, page 34</i></li> </ul>

Number	Symbol	Element	Description
			<ul style="list-style-type: none"> <li>Indicator test: Press this button for at least three seconds to activate all indicators. All indicators (LEDs) at the front panel light up as long as the button is pressed (“LED test”) and the internal buzzer is activated.</li> </ul>
4		System fault indicator light	This indicator lights yellow if a system fault according EN 54-16 was detected.
5		Voice alarm indicator light	This indicator lights red if the controller is in voice alarm state according EN 54-16.
6		Network indicator light	<p>Indicates the Ethernet network status:</p> <ul style="list-style-type: none"> <li>Illuminated green: Successful data communication to all configured Ethernet devices has been established.</li> <li>Flashing green: Ethernet connection to at least one Ethernet device lost.</li> <li>Off: No Ethernet connection.</li> </ul>
7		Standby indicator light	This indicator lights up green when the device is in standby mode.
8		Power indicator light	This indicator lights up green when the power supply is OK.

## 4 Parts included

Quantity	Component
1	PVA-4CR12 Controller
1	Set of connectors
1	Set of feet
1	Installation manual
1	Important safety instructions

## 5 Installation

This device has been developed for horizontal installation in a conventional 19" rack cabinet. As a rule, the device must be mounted in such a way that the ventilation slots are not blocked on either side.

When installing the device in the housing and rack cabinet, ensure there is a free channel of air between the sides of the device and the side walls of the cabinet/rack up to the level of the upper rack or cabinet vent so that the devices are sufficiently ventilated. There should be free space of at least 100 mm above the cabinet for ventilation.

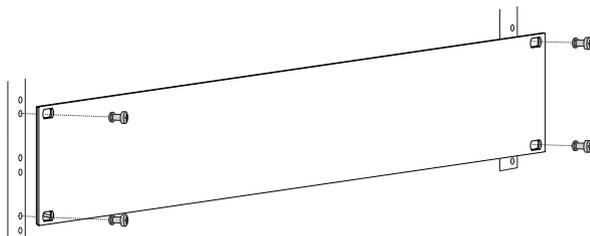


### Warning!

The maximum ambient temperature of +45 °C should not be exceeded.

### Front attachment of the device

Refer to the following illustration to attach the front of the device, using four screws and washers. Because of painted surfaces the connection of the grounding screw at the rear panel of the device is recommended.

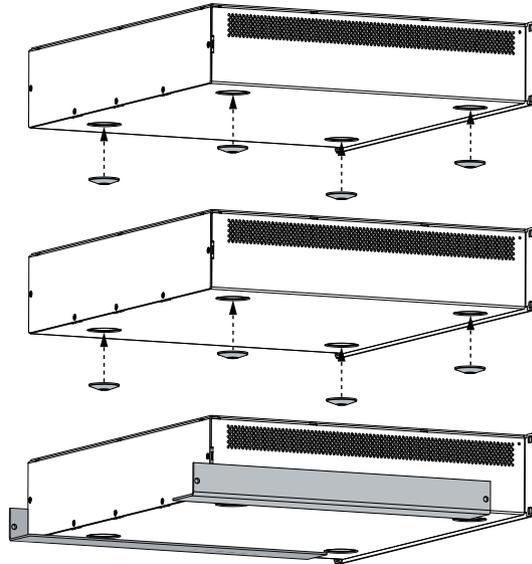


**Figure 5.1:** Installation of the device into a 19" rack



### Caution!

The use of rack mount rails is recommended when installing the device in a rack shelf or rack cabinet to prevent the front panel from twisting or warping. If devices should be stacked in the rack (e.g. using the self-adhesive foot stands supplied) the maximum permissible load of the mount rails must be considered. Please refer to the technical specifications provided by the rack rail manufacturer.



**Figure 5.2:** Stacking of devices using the supplied foot stands (example with 3 devices, rack mount rails are used for the bottom device only)

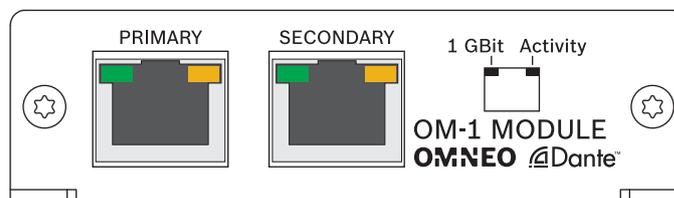
The device must be protected from:

- Dripping water or spray
- Direct sunlight
- High ambient temperatures or immediate sources of heat
- High humidity
- Large dust deposits
- Strong vibrations

If these requirements cannot be guaranteed, the device must be regularly serviced to prevent any outages that could occur as a result of negative ambient conditions. If a solid object or fluid enters the housing, immediately disconnect the device from the voltage supply, and have it serviced by an authorized technician before it is recommissioned.

## 5.1 OM-1 Module installation

The optional OM-1 module can be installed at the rear of the device. See item 2 in *Rear*, page 9.



**Figure 5.3:** Rear view of the OM-1 module

For information on how to install the OM-1 Module, refer to the OMNEO Module manual.

### Refer to

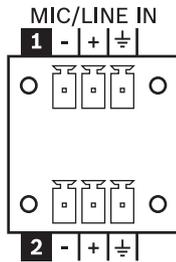
- *Rear*, page 9

## 6 Connection

### 6.1 Audio input

#### 6.1.1 Line level signal

##### MIC/LINE IN



This Euroblock inputs allow the connection of low impedance microphones or line level audio sources.

The audio inputs are electronically balanced. You must always use a balanced audio signal at the input of the device where this is possible. The scope of delivery for the device includes a 3-pin connector. Conductor cross-sections of 0.14 mm<sup>2</sup> (AWG26) to 1.5 mm<sup>2</sup> (AWG16) can be used.

Recommended connecting cable: balanced cable with shielded twisted-pair 0.14 mm<sup>2</sup>.

##### Balanced cabling

The following illustration shows the balanced cabling of an audio input (or output) on the device.

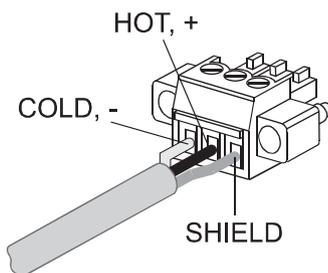


Figure 6.1: Balanced cabling

##### Unbalanced cabling

If the connecting cable(s) is/are very short and no interference signals are to be expected in the environment of the device, then an unbalanced signal can also be connected. In this case, it is imperative that a bridge in the connector between the shield and the inverting pin is switched (see diagram below), otherwise the level can drop by 6 dB. However, for reasons of immunity to external interference sources such as dimmers, mains supplies, HF control lines etc., balanced cabling is always preferable.

##### JUMPER FROM COLD TO SHIELD

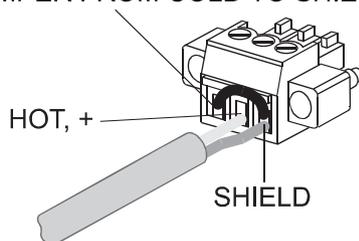
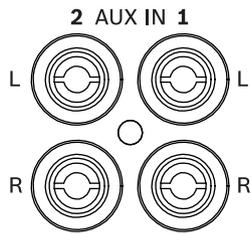


Figure 6.2: Unbalanced cabling

**AUX IN**

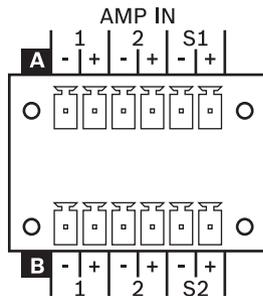


The RCA inputs AUX IN 1/2 allow connecting stereo line level sources. The stereo signal is internally summed.

Recommended connecting cable: Standard AUX cable.

**6.1.2**

**Amplifier inputs**



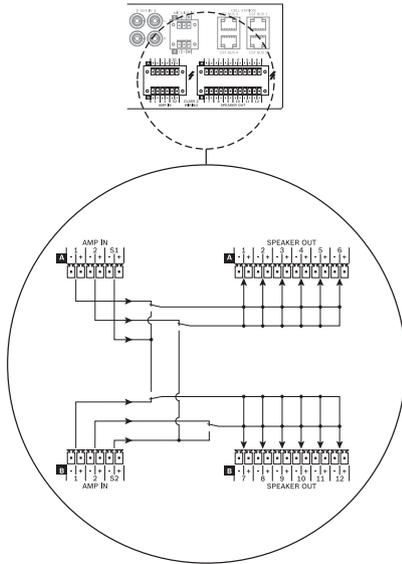
The AMP IN audio inputs allow to connect the 100 V (or 70 V) output signals of two 2-channel power amplifiers (up to four power amplifier channels) to the integrated 2-in-6 router blocks A or B. Additionally there are two input channels for spare amplifiers.

The delivery includes 6-pin connectors. Conductor cross-sections of 0.14 mm<sup>2</sup> (AWG26) to 1.5 mm<sup>2</sup> (AWG16) can be used.

Recommended connecting cable: stranded wire, LiY, 0.75 mm<sup>2</sup>.

**Routing**

Following illustration gives an overview of possible routings between the AMP IN audio inputs and the SPEAKER OUT audio outputs using the internal relays of the device. The PVA-4CR12 includes two 2-in-6 routing blocks A or B. Each routing block provides 2 regular inputs, 1 spare amplifier input and 6 outputs. Spare amplifier input S1 is for replacing the amplifiers connected to inputs 1 of routing block A and B. Spare amplifier input S2 is for replacing the amplifiers connected to the inputs 2 of routing blocks A and B.



## 6.2 Audio output

### 6.2.1 Line level signal

The four audio output channels of the controller can be connected via Euroblock or RJ-45. Using the RJ-45 socket is recommended for connecting PAVIRO power amplifiers. The internal connections of the outputs are given in following table.

Euroblock		Function	RJ-45
Number	Pin		
LINE OUT 1	1	- (Cold)	7
	2	+ (Hot)	8
	3	Shield	Plug
LINE OUT 2	1	- (Cold)	5
	2	+ (Hot)	4
	3	Shield	Plug
LINE OUT 3	1	- (Cold)	3
	2	+ (Hot)	6
	3	Shield	Plug
LINE OUT 4	1	- (Cold)	1
	2	+ (Hot)	2
	3	Shield	Plug

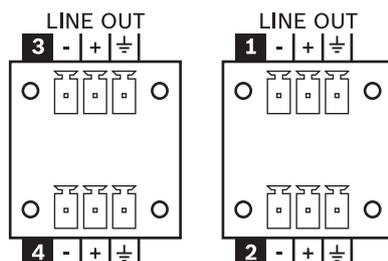
**Table 6.1:** Internal connection of line level audio outputs



#### Notice!

The maximum overall cable length between controller and amplifiers is 1000 m.

#### Euroblock

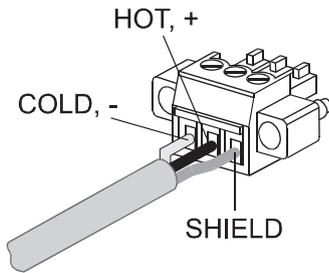


The audio outputs are electronically balanced. You must always use a balanced audio signal at the output of the device where this is possible. The scope of delivery for the device includes 3-pin connectors. Conductor cross-sections of 0.14 mm<sup>2</sup> (AWG26) to 1.5 mm<sup>2</sup> (AWG16) can be used.

Recommended connecting cable: balanced cable with shielded twisted-pair 0.14 mm<sup>2</sup>.

**Balanced cabling**

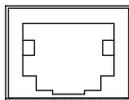
The following illustration shows the balanced cabling of an audio input (or output) on the device.



**Figure 6.3:** Balanced cabling

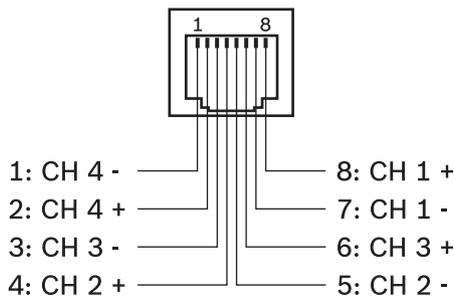
**RJ-45**

LINE OUT 1-4



The pin assignment of the LINE OUT 1-4 audio output sockets allows to connect the controller to the RJ-45 audio input socket of the PAVIRO power amplifier using standard RJ-45 patch cables.

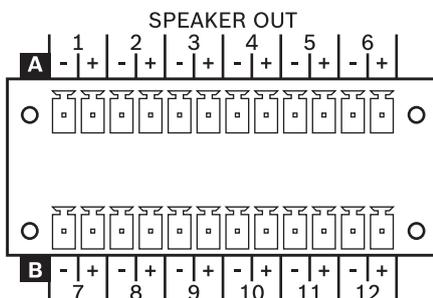
Recommended connecting cable: shielded twisted-pair, CAT5, 100 / 120 Ω.



**Figure 6.4:** Pin assignment of the LINE OUT 1-4 socket

**6.2.2**

**Loudspeaker output**



100 V or 70 V loudspeakers can be connected on each speaker output with the 2 (two) 12-pin connectors that are delivered with the device. Loudspeaker cables with a cross sectional area from 0.14 mm<sup>2</sup> (AWG26) up to 1.5 mm<sup>2</sup> can be used.

Recommended connecting cable: stranded wire, LiY, 0.75 mm<sup>2</sup> (h/w 03/00 and higher).

### About the cable diameter

The voltage drop over cables should not exceed 10 %.

Cables with a higher voltage drop lead to a high proportional cable attenuation at the loudspeakers. This is particularly noticeable at higher volume levels, for example alarm signals. A high voltage drop can also cause communication problems with the EOL modules.

The following table gives an overview of the maximum cable lengths for different speaker loads depending on the cable diameters.

Cross-section [mm <sup>2</sup> ]	Diameter [mm]	10 W [m]	20 W [m]	100 W [m]	200 W [m]	300 W [m]	400 W [m]	500 W [m]
0.5	0.8	1000	800	160	80	53	40	32
0.75	1.0	1000	1000	240	120	80	60	48
1.0	1.1	1000	1000	320	160	107	80	64
1.5	1.4	1000	1000	480	240	160	120	96
2.5	1.8	1000	1000	800	400	267	200	100
4.0	2.3	1000	1000	1000	640	427	320	256

### Maximum loudspeaker load

The maximum rated power should not exceed 500 W per amplifier channel and/or controller/router output (see chapter 6.1.2.). The internal 2-in-6 router output block offers the possibility to distribute the 500 W amplifier power to 6 zones. If two 500-watt amplifier channels are used within a router cluster of 6 zones, up to 1000 W can be distributed to these 6 zones. The maximum rated power of 500 W at a single speaker output must not be exceeded.



### Danger!

It is possible that during operation shock hazard voltages (> 140 V peak value) may be present at the outputs. Therefore, the connected loudspeaker zones have to be installed in accordance with applicable safety regulations. When installing and operating 100 V loudspeaker networks, compliance with the VDE regulation DIN VDE 0800 is mandatory. Especially, when 100 V loudspeaker networks in alarm system applications are concerned, all safety precautions have to be in accordance with the safety class 2 wiring.

**Note:** The breakdown voltage on the loudspeaker output from a controller/router (HW: 2.00) is 120 V between the loudspeaker cable pairs and 60 V between a loudspeaker cable pole and ground.

### Wiring faults

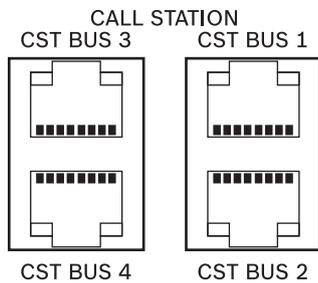
Loudspeaker cables, which typically run through the entire building, are more sensitive to wiring faults.

There are different types of wiring faults as mentioned below:

- Ground fault: A ground fault is detected by the ground fault detection. If the resistance between ground and speaker wire is < 50kΩ, a ground fault is indicated.
- Short circuit or open line: A cable that is short-circuited or open is detected by the built-in impedance measurement, if the reference values are set correctly.

- Swapped zones: Swapped zones cannot be found/detected by impedance measurement, if they have approximately the same load.
- Single pole connections between two zones: Single-pole connections lead to increased crosstalk when one of the zones becomes active and/or when both zones distribute a different signal. This results in incorrect impedance values being measured. This fault cannot be detected by the ground fault detection and/or impedance measurement.
- Parallel connection of two or more zones: In this case two amplifier channels with different signals or one amplifier channel and the impedance measurement can be connected in parallel. This fault cannot be detected by the ground fault supervision and/or impedance measurement, as the impedance reference values may already have been set incorrectly.
- Crossed zones: A wire from a certain zone has been swapped with a wire from another zone. This fault cannot be detected by the ground fault detection and/or impedance measurement, as the impedance reference values may already have been set incorrectly.

### 6.3 Call station

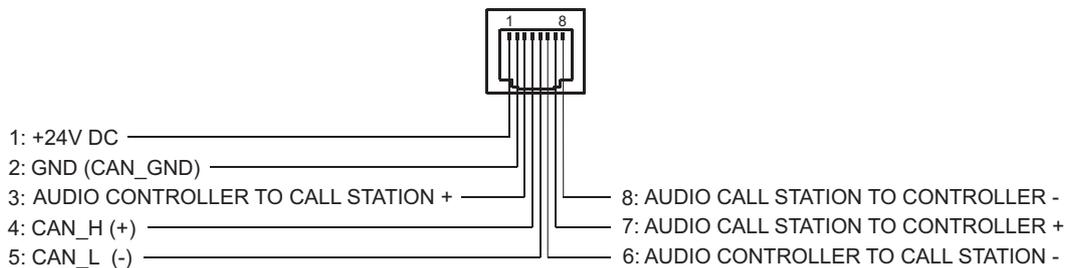


The four **Call STation (CST) BUS** ports connect call stations with the controller. This are 8-pole RJ-45 ports that integrate the power supply, control interface (CAN bus), and audio interface. Every CST BUS supports up to 4 call stations. In total 16 call stations can be connected to one controller.



**Notice!**

It is mandatory to use shielded twisted pair cables for connecting: CAN (4, 5), AUDIO CONTROLLER TO CALL STATION (3, 6) and AUDIO CALL STATION TO CONTROLLER (7, 8).



**Figure 6.5:** Pin assignment of CST BUS port

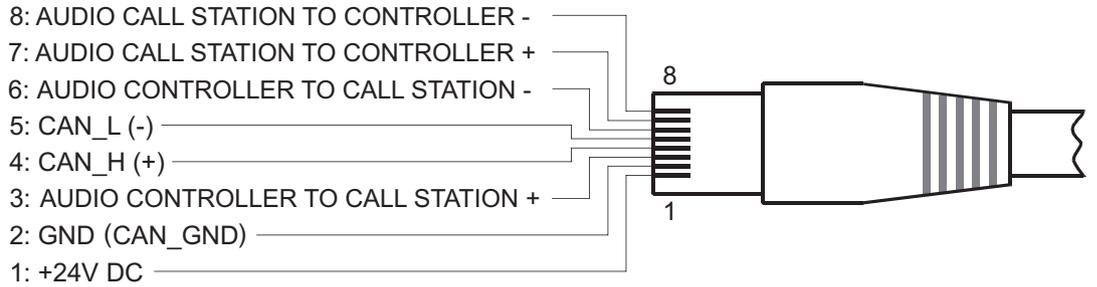


Figure 6.6: Pin assignment of CST BUS connector

For the CST BUS, the same requirements apply for the used line (length, cross section, etc.) as for the CAN bus interface (see section CAN BUS). As the CST BUS includes the power supply for all connected call stations or call station extensions, the power consumption must be considered when selecting cable length or cross section. Please refer to the call station manual for details about power consumption.

Recommended connecting cable: shielded twisted-pair, CAT5, 100 / 120 Ω.



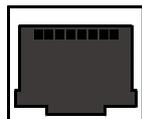
**Notice!**

The terminating of the CST BUS in the controller is configured via IRIS-Net during system configuration.

6.4

**Ethernet**

**ETHERNET**



Connecting the controller via the Ethernet interface allows the controller to communicate with a PC. This not only allows simple configuration of the controller using the IRIS-Net software, but it also allows you to operate and monitor the entire system.

Recommended connecting cable: shielded twisted-pair, CAT5, 100 / 120 Ω.

**LED status lights**

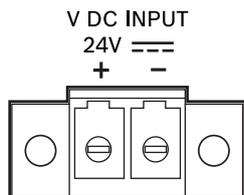
The Ethernet interface of the controller has an orange and a green LED to display the status of the Ethernet connection. If no network cable is connected, both LEDs remain unlit. The orange connectivity LED on the left side of the Ethernet interface illuminates once the controller has established an Ethernet connection with another device (e.g. an Ethernet switch). The green network traffic LED on the right side of the Ethernet interface briefly illuminates each time Ethernet data is transferred.

**Crossover cable**

When using a crossover cable to connect a controller with a PC directly, wire-pair 2 must be swapped with wire-pair 3. This creates the necessary switch of sending and receiving lines; with a hub/switch, this exchange is performed internally.

6.5

**Supply voltage**



Connect a 24-volt DC source to the DC power input. The delivery includes a 2-pin connector. Conductor cross-sections of 0.2 mm<sup>2</sup> (AWG24) to 6 mm<sup>2</sup> (AWG10) can be used. Recommended connecting cable: flexible stranded wire, LiY, 1.5 mm<sup>2</sup>. The DC input is protected against incorrect polarity and overload. The associated fuse is located on the inside of the device and is not accessible from outside of the device.

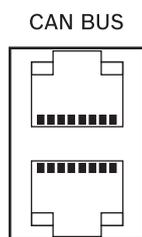


### Warning!

Never connect the positive terminal + with ground.

## 6.6

### CAN BUS



This section contains information about the connection of the device to the CAN BUS and the correct setting of the CAN address.

#### Connection

The device has two RJ-45 jacks for the CAN BUS. The jacks are connected in parallel, and act as an input and for daisy chaining the network. The CAN bus allows different data rates to be used, where the data rate is indirectly proportional to the bus length. If the network is small, data rates of up to 500 kbit/s are possible. In larger networks, the data rate must be decreased (down to the minimum data rate of 10 kbit/s), please refer to section Configuring the CAN baud rate.



### Notice!

The data rate is preset to 10 kbit/s in the factory.

The following table explains the relationship between data rates and bus lengths/network size. Bus lengths of over 1,000 m must be implemented only with CAN repeaters.

Data rate (in kbit/s)	Bus length (in meters)
500	100
250	250
125	500
62.5	1000

**Table 6.2:** Data rate and bus length of the CAN BUS

The following diagrams show the assignment of the CAN port/CAN connector.

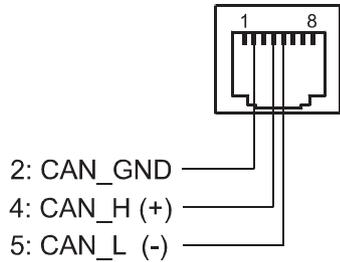


Figure 6.7: Assignment of the CAN port

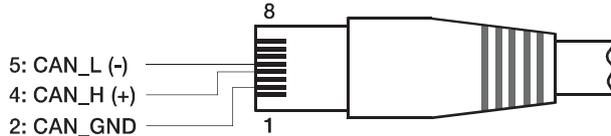


Figure 6.8: Assignment of the CAN connector

Pin	Designation	Cable color	
		T568A	T568B
2	CAN_GND	Green	Orange
4	CAN_H (+)	Blue	
5	CAN_L (-)	Blue stripes	

Table 6.3: Assignment of the CAN BUS interface

**Cable specification**

In accordance with the ISO 11898-2 standard, shielded twisted-pair cables with an impedance of 120 ohms must be used as the data transfer cable for the CAN bus. A terminating resistance of 120 ohms must be provided at both ends as the cable terminator. The maximum bus length depends on the data transmission rate, the type of data transmission cable, and the number of bus participants.

Recommended connecting cable: shielded twisted-pair, CAT5, 100 / 120 Ω.

Bus length (in m)	Data transmission cable		Termination (in Ω)	Maximum data transmission rate
	Resistance per unit (in mΩ/m)	Cable cross-section		
0 to 40	< 70	0.25 to 0.34 mm <sup>2</sup> AWG23, AWG22	124	1000 kbit/s at 40 m
40 to 300	< 60	0.34 to 0.6 mm <sup>2</sup> AWG22, AWG20	127	500 kbit/s at 100 m
300 to 600	< 40	0.5 to 0.6 mm <sup>2</sup> AWG20	150 to 300	100 kbit/s at 500 m
600 to 1000	< 26	0.75 to 0.8 mm <sup>2</sup> AWG18	150 to 300	62.5 kbit/s at 1000 m

Table 6.4: Relationships for CAN networks with up to 64 participants

If there are long cables and several devices on the CAN bus, terminating resistors with ohm ratings higher than the specified 120 ohms are recommended in order to reduce the resistive load for the interface drivers, which in turn reduces the voltage loss from one cable end to another.

The following table allows initial estimates for the required cable cross-section for different bus lengths and various numbers of bus participants.

Bus length (in m)	Number of devices on the CAN Bus		
	32	64	100
100	0.25 mm <sup>2</sup> or AWG24	0.34 mm <sup>2</sup> or AWG22	0.34 mm <sup>2</sup> or AWG22
250	0.34 mm <sup>2</sup> or AWG22	0.5 mm <sup>2</sup> or AWG20	0.5 mm <sup>2</sup> or AWG20
500	0.75 mm <sup>2</sup> or AWG18	0.75 mm <sup>2</sup> or AWG18	1.0 mm <sup>2</sup> or AWG17

**Table 6.5:** CAN BUS cable cross-section

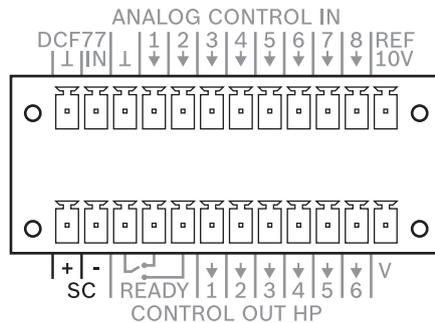
If a participant cannot be directly connected to the CAN bus, a stub line (branch line) must be used. Since there must always be precisely two terminating resistors on a CAN bus, a stub line cannot be terminated. This creates reflections, which impair the rest of the bus system. To minimize these reflections, these stub lines must not exceed a maximum individual length of 2 m at data transmission rates of up to 125 kbit/s, or a maximum length of 0.3 m at higher bit rates. The overall length of all branch lines must not exceed 30 m.

The following applies:

- In terms of rack wiring, standard RJ-45 patch cables with 100-ohm impedance (AWG 24/ AWG 26) can be used for short distances (up to 10 m).
- The guidelines specified above for the network cabling must be used when wiring the racks with each other and for the building installation.

## 6.7

### Slave clocks



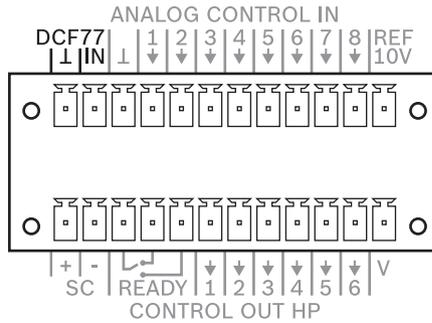
The lower half of the control port has a special, short-circuit-proof output for polarity switch impulses. Slave clocks connected here are automatically adjusted if a time difference is detected between the slave clocks and the system clock, for example after a power failure or in the event of manual input. Ensure that all slave clocks are connected with the same polarity. Recommended connecting cable: shielded flexible stranded wire, LiY, 0.5 mm<sup>2</sup>.



**Notice!**

The maximum permissible number of slave clocks on the SC output depends on the power consumption of the slave clock type used. Example: When using a slave clocks type with a power consumption of 12 mA up to 80 slave clocks can be connected.

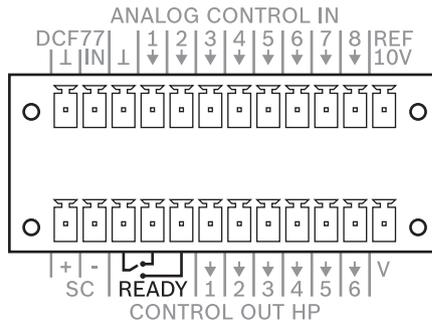
## 6.8 DCF77



The top half of the control port has an input for the radio receiver of the DCF77 signal. Observe the delivered documentation when connecting a 3<sup>rd</sup> party DCF receiver to the controller.

Recommended connecting cable: shielded flexible stranded wire, LiY, 0.5 mm<sup>2</sup>.

## 6.9 Ready relay



The lower half of the control port has a potential-free READY changeover contact. This changeover contact signals to other devices that the controller is ready for operation or indicates faults in the system. The following table shows the possible statuses of the ready contact.

Recommended connecting cable: shielded flexible stranded wire, LiY, 0.5 mm<sup>2</sup>.

Status	Switch position	Description
Ready for operation (= ready)		The voltage supply is functioning, the boot process of the device has completed, and there are no faults in the system. The relay has been activated.
Not ready		The voltage supply is off/interrupted or the boot process of the device has not yet completed, or there is a fault in the system. The relay has dropped/is without power.

**Table 6.6:** READY contact

The changeover contact position for the status “not ready” is displayed on the device. The IRIS-Net software allows the user to configure the fault types for which the changeover contact should switch over and signal the status “not ready”. To integrate the controller into the hazard alert systems, a normally-closed contact (standby current principle) is recommended, i.e., the left and right pin.

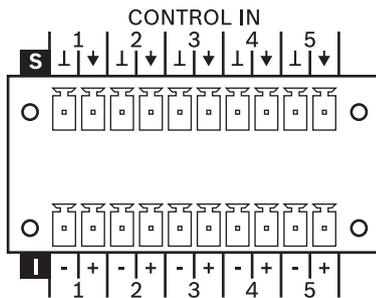


**Caution!**

The maximum load of the ready contact is 32 V/1 A.

**6.10 Control input**

**6.10.1 CONTROL IN**



The CONTROL IN port is split into two halves:

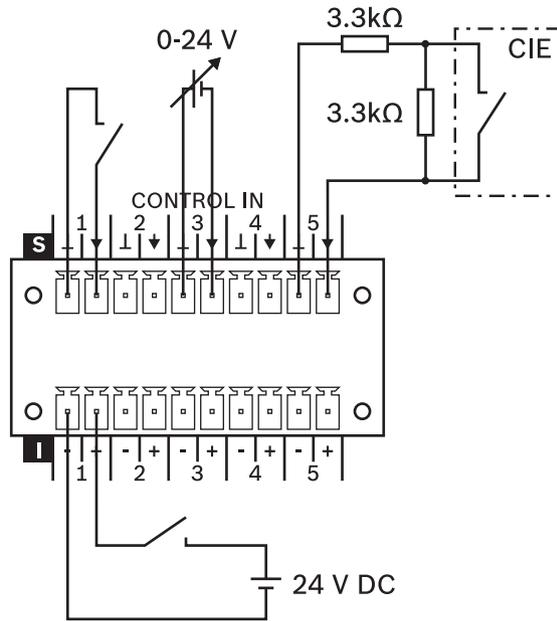
- The upper half has five freely configurable **supervised**, not isolated control inputs.
- The lower half has five freely configurable **isolated** control inputs.

The delivery includes 10-pole connectors. Conductor cross-sections of 0.14 mm<sup>2</sup> (AWG26) to 1.5 mm<sup>2</sup> (AWG16) can be used. Recommended connecting cable: shielded flexible stranded wire, LiY, 0.5 mm<sup>2</sup>. The control port is configured in IRIS-Net.



**Caution!**

The maximum permissible voltage on a control input is 32 V.



**Figure 6.9:** Using supervised or isolated inputs of the CONTROL IN port

**Supervised control inputs**

The supervised control inputs can be used as

- normal logical (high/low) input (with low  $\leq 5$  V or high  $\geq 10$  V),
- analog input (0-24 V) or
- supervised input with states active, not active, open circuit or short circuit.

When using a supervised input (e.g. for connecting a CIE) add two resistors as illustrated above (if not already included in the outputs of the connected device).



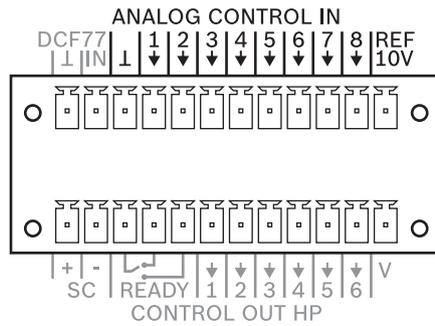
**Notice!**

The supervised inputs are internally equipped with 8.2 kΩ pull up resistors. The ground pins are equipped with a common self resettable 140 mA fuse.

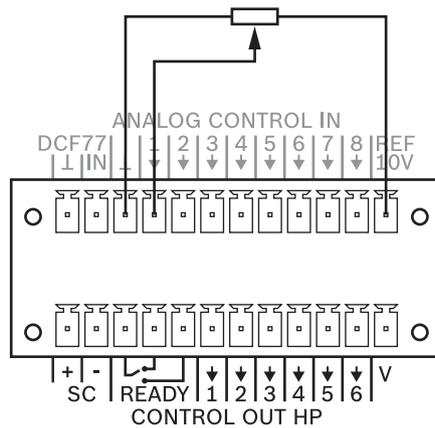
**Isolated control inputs**

The isolated control inputs can be used as normal logical (high/low) input (with low  $\leq 5$  V or high  $\geq 10$  V) only. This inputs comply with VDE 0833-4.

### 6.10.2 ANALOG CONTROL IN



The upper half of the control port has eight freely programmable control inputs for voltages of between 0 volts and 10 volts. The inputs are numbered 1 through 8. The controller provides its own voltage supply for externally connected control elements, e.g., a potentiometer. The voltage supply is available at the control port connections for 10V REF and ground; see the following diagram.



**Figure 6.10:** Sample application of a control input and use of an analog input signal

The control inputs can also be used as digital control inputs. Internally, the control inputs are connected to ground via a resistor. If an input is connected to the 10 V REF pin or another, external voltage, the input switches to the active status (On).



**Caution!**

The maximum permissible voltage on a control input is 32 V.

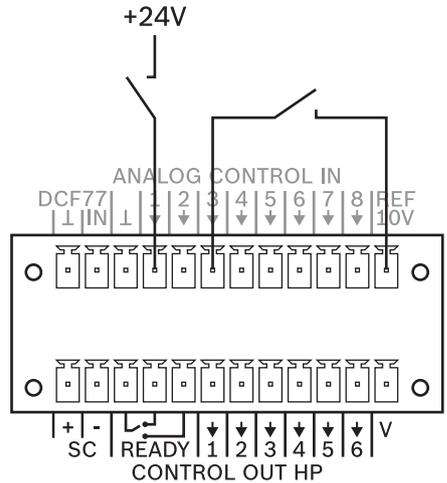
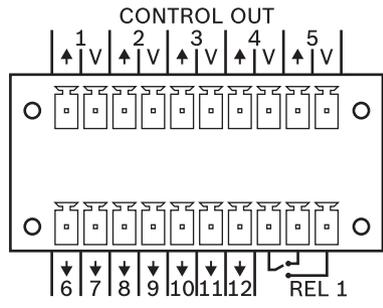


Figure 6.11: Sample application of a control input and use of 2 digital input signals

## 6.11 Control output

### 6.11.1 CONTROL OUT



#### Control outputs

The freely programmable control outputs are designed as open collector outputs that have a high resistance (open) when not active (OFF/inactive). When active (ON/active), the outputs are closed to ground.

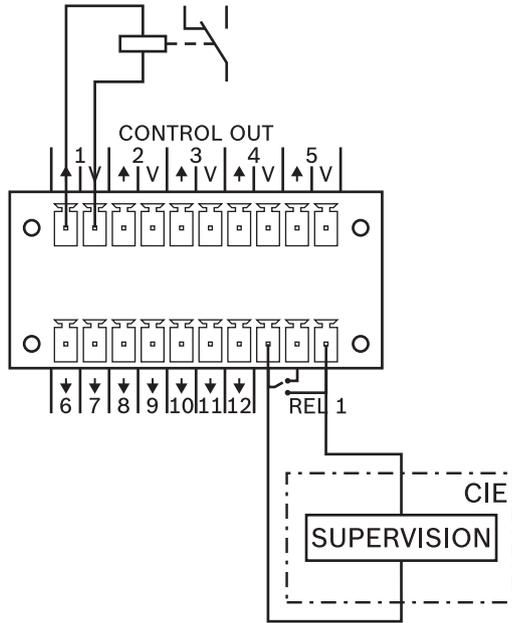
Recommended connecting cable: shielded flexible stranded wire, LiY, 0.5 mm<sup>2</sup>.



#### Caution!

The maximum permissible current per output is 40 mA. The maximum permissible voltage is 32 V.

To operate externally connected elements, a voltage source is available on the connection V (the voltage at connection V is identical to the device input voltage); see also the following illustration. The ground pin is equipped with a common self resettable 750 mA fuse.



**Figure 6.12:** Connecting a relay and the supervision contacts of a CIE to the CONTROL OUT port

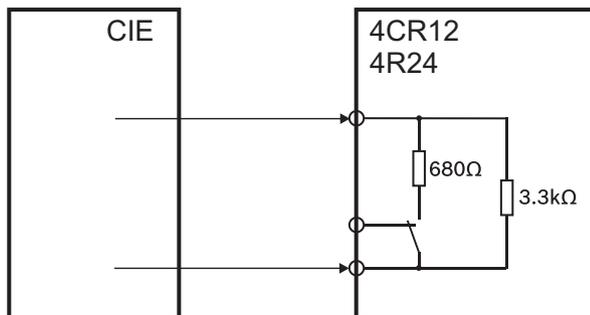
**Control relay**

The control relay REL (changeover contact) can be used as VDE 0833-4 compliant output. The IRIS-Net software allows the user to configure the parameters or fault types for which the changeover contact should switch over. To integrate the device into the hazard alert systems, a normally-closed contact (standby current principle) is recommended.



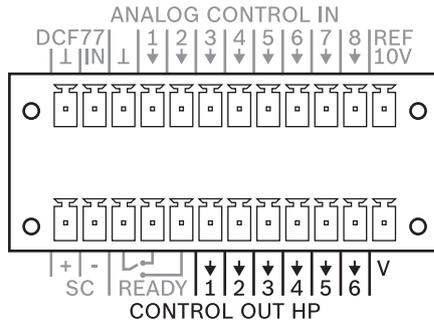
**Caution!**

The maximum load of the control relay is 32 V/1 A.



**Figure 6.13:** Internal configuration of the REL contact (VDE 0833-4)

### 6.11.2 CONTROL OUT HP



The lower half of the control port has six freely programmable **high power** (HP) control outputs numbered 1 through 6. In inactive mode (Off), these control outputs are open, while in active mode (On), they are closed to ground. To operate the externally connected elements, a voltage source is available on the connection V; see also the following diagram.



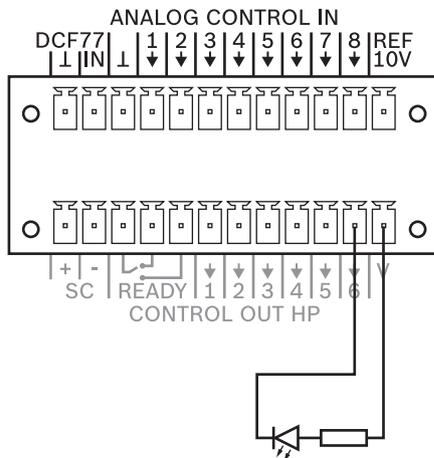
**Notice!**

The voltage value used as the supply voltage for the controller is always present on the V output.



**Caution!**

The maximum permissible power on the V output is 200 mW.



**Figure 6.14:** Sample application of a high power control output (LED with series resistor)

## 7 Configuration

### IRIS-Net

IRIS-Net PC software is used to configure and operate the PAVIRO system. It enables the overall configuration of the controller and connected devices to be performed off-line using a PC (i.e., without establishing a connection between the PC and controller). The configuration can then be transferred by establishing a connection between the PC and controller via Ethernet. In addition to configurations, IRIS-Net can also be used for comprehensive checking and monitoring of a system. For more information about installing IRIS-Net on your PC, see the file "iris\_readme.pdf". During the installation, the IRIS-Net user manual is automatically copied to the PC.

### 7.1 Network configuration

The controller can be connected to a TCP/IP network via the Ethernet interface on the rear panel. The controller has the following network configuration by default:

Parameter	Value
IP address	192.168.1.100
Subnet mask	255.255.255.0
Gateway	192.168.1.1
DHCP	Disabled

**Table 7.7:** Factory setting for Ethernet interface

An IP address must be unique, i.e., it must only be assigned to one device (host) in a network. If a new Ethernet is established for operating the controller, we recommend retaining the default network ID and subnet mask. When integrating the controller into an existing Ethernet, the network configuration of the controller must be adjusted. The default IP address of the controller can be retained if

- only one single controller is connected with the default network configuration via Ethernet, and
- the network ID 192.168.1 can be retained, and
- no other device has the host ID 100.

If at least one of these three conditions is not met, the default IP address of the controller must be changed.

### 7.2 Displaying the CAN baud rate

To display the CAN baud rate, press the Recessed button and keep the button pressed down for at least one second. Three front panel indicator lights then display the set baud rate for two seconds. Please refer to the following table for details.

Baud rate (in kbit/s)	Zone status indicator light of zone 11	Zone status indicator light of zone 12	Network indicator light
10	Off	Off	On
20	Off	On	Off
62.5	Off	On	On
125	On	Off	Off
250	On	Off	On

---

Baud rate (in kbit/s)	Zone status indicator light of zone 11	Zone status indicator light of zone 12	Network indicator light
500	On	On	Off

**Table 7.8:** Displaying the CAN baud rate via indicator lights on the front panel



**Notice!**

Edit CAN baud rate

Use the IRIS-Net software to edit the CAN baud rate.

## 8 Operation

In accordance with the specified and technical details for this product, the controller can be used to control and monitor a PAVIRO public address and voice alarm systems within the building installation.

The controller is not a stand-alone device. The following are the minimum requirements for operation:

1. A mains adapter (24 V) sufficiently configured for the system's power demands.
2. If the device is to be operated with call stations: The required number of call stations (max. 16) and the corresponding connecting cables.
3. If the audio element of the device is to be used: Power amplifier incl. cabling and loudspeaker with cabling.
4. If the internal real-time clock is to be synchronized to the DCF77 time signal: An active DCF77 reception antenna incl. cabling. (This feature can be used only in regions in which the DCF77 signal can be received with sufficient strength, or if converters from different time information to DCF77 are used.)
5. If slave clocks are to be controlled: The required number of slave clocks incl. cabling
6. If additional line relays and/or control inputs or outputs are to be used: A router and the corresponding connecting cables.

### 8.1 Line supervision

For loudspeaker line supervision three different options are available. They differ in performance, cost, and suitability for various applications and situations.

In general the device can detect open circuit and short circuit. In case of an open circuit only a fault message will be generated. In case of a short circuit a fault message will be generated and the loudspeaker line will be automatically deactivated to avoid influence to other loudspeaker lines.

#### 8.1.1 Impedance measurement

The PVA-4CR12 controller provides a function to measure the loudspeaker cable impedance. This function puts a sinus signal on the loudspeaker cable connection and measures the effective current and voltage. The impedance value of the loudspeaker cable (= cable and loudspeaker) is calculated based on the measurement results. Impedance measurement can only be done in non-active loudspeaker cable outputs.

To detect impedance deviations in the loudspeaker cable, caused by an open or shorted cable connection, a failure-free loudspeaker cable reference value must have been measured and stored beforehand. All future impedance measurements are only compared against the impedance reference value. When an impedance value exceeds the accepted and configured tolerance, a failure is reported.

The calibration of impedance measurement circuits is not necessary because the system only notices impedance tolerances. In this way, absolute failures of values are mathematically eliminated.

The measuring frequency and voltage can vary within given borders and can be adapted to the local conditions, like used loudspeaker types and cables or mains power. In general, it is recommended not to deviate from given default values. If the frequency is too high, the measurement signal might be audible. If the frequency is too low, the measured impedance value may be outside the specified range as lower frequency decreases the impedance of the loudspeaker's transformer.

**Notice!**

Starting with the controller/router version HW: 02/00 (see product label), the measuring generator has a protective circuit with high-impedance resistors to protect against external voltages. Therefore, the measurement voltage at the outputs of the configured loudspeaker cable may vary depending on the impedance of the loudspeaker cable.

**Loudspeaker cable impedance**

The impedance of the loudspeaker cable can be affected by several negative factors:

- **Ambient temperature:**

The loudspeaker cables, the transformers and the loudspeaker coils are usually made of copper. Copper has a temperature coefficient of  $\alpha = 3.9 \text{ 1/K}$ .

In other words, the resistance changes by about 4% with a temperature change of 10 °C.

Example:

In a parking garage, the impedance of the loudspeaker cable can change by a factor of about 16% between winter (-10 °C) and summer (+30 °C).

- **Measuring frequency:**

A defective loudspeaker might not be detected if long loudspeaker cables with a higher measuring frequency are used, due to the fact that the cable impedance (or cable capacitance) might become dominant compared with the loudspeaker impedance.

Example:

The impedance value for 20 kHz for a cable with a capacitance value of 100 nF/km and a length of 200 m is about 400  $\Omega$ . A 5 W loudspeaker has an impedance of about 2000  $\Omega$ . The impedance of the cable including the loudspeakers is about 330  $\Omega$ . If the cable is broken near the loudspeaker, the impedance difference is 70  $\Omega$ , which is about 21%.

- **Loudspeaker impedance:**

The impedance of the loudspeaker depends on the frequency. The transformers in the loudspeakers have a low impedance value at low frequencies. It is important to ensure that the measurement limits (see Table 8.9) for the specific measurement frequencies are not exceeded, especially for high-power loudspeakers.

Example:

The Sx300PIX loudspeaker has an impedance value of about 110  $\Omega$  at 1 kHz, but an impedance value of 50  $\Omega$  at 30 Hz.

- **Ground fault:**

A ground fault of the loudspeaker cable can affect the impedance measurement of the loudspeaker cable. If a ground fault and an impedance error are displayed simultaneously, the cable ground fault must be corrected first.

Parameter	Value
Impedance range	20-10000 $\Omega$ (corresponds to 500 W to 1 W)
Impedance tolerance	6% $\pm$ 2 $\Omega$
Frequency range	20-4000 Hz
Voltage range	0.1-1.0 V

**Table 8.9:** Impedance measurement specification

**Notice!**

The total impedance connected at the output on the amplifier (loudspeakers and cabling) must be within the specified impedance range in terms of the test frequency (see the table entitled "Impedance measuring specification").



**Notice!**

To detect a line interruption to a single speaker, or the failure of a single speaker, the following instructions must be observed: Do not connect more than five speakers to one speaker line. All speakers on the speaker line must have the same impedance.

**8.1.2**

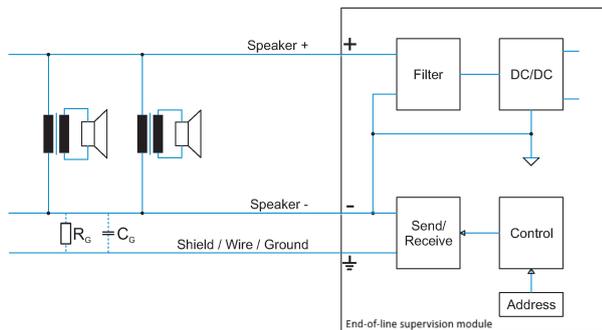
**EOL slave module**

End-of-line (EOL) technology enables the loudspeaker lines to be monitored for short-circuit and interruptions. The EOL modules can be used for permanent supervision on not active and active speaker lines, e.g. for speaker lines with permanent background music or if passive volume controls are used.

**Method of operation**

An EOL slave module PVA-1WEOL is installed at the end of the speaker line. The speaker line is used for both the power supply of the module (via the non-audible pilot tone) and for bi-directional communication between the EOL master in the output stage and the EOL slave module (using very low-frequency signals). If a communication error occurs – for example, if the EOL master does not receive a response from the slave – then an error message is generated. The unique addressing of the slave modules means that multiple slave modules can be connected to one speaker line.

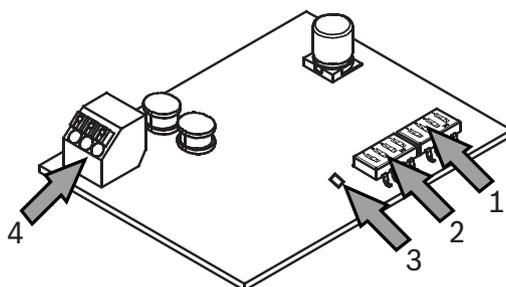
For communication between the master and the slave modules, the EOL slave modules must be connected to ground. The shielding on the speaker cable, a free wire in the speaker cable, or any other available ground point – such as the safety ground of the power supply system – can be used for this purpose. The resistance  $R_G$  between an output line of the amplifier and ground must be at least 1.5 MΩ. The capacity  $C_G$  between an output line of the device and the ground must not be greater than 400 nF.



**Figure 8.1:** Circuit diagram ( $R_G$  and  $C_G$  are caused by the loudspeaker installation, e.g. wire type, length)

**EOL monitoring function setup**

Connect the EOL slave modules to the end of the speaker line. Set the desired address at the DIP switches  $\square$ . For details please refer to the installation note of the PVA-1WEOL.



### 8.1.3

#### Plena EOL

The Plena end-of-line boards can be used for permanent supervision on not active and active speaker lines. The PLN-1EOL module can be used e.g. for speaker lines with permanent background music or if passive volume controls are used.

Plena end-of-line boards PLN-1EOL monitor the presence of a pilot tone on a loudspeaker line. The board connects at the end of a loudspeaker line and detects the pilot tone signal. This signal is always present on the line: when back ground music (BGM) is playing, when a call is in progress, and when no signal is present. The pilot tone is inaudible and at a very low level (e.g. -20 dB). When the pilot tone signal is present, an LED lights up, and a contact on the board is closed. When the pilot tone fails, the contact opens, and the LED goes off. If mounted at the end of the loudspeaker line, this applies to the integrity of the whole line. Presence of the pilot tone signal does not depend on the number of loudspeakers on the line, the load on the line, or the line capacitance. The contact can be used to detect and report faults on a loudspeaker line.

Several EOL boards can be daisy-chained to a single fault input. This allows a loudspeaker line with several branches to be monitored. Since the background music also includes a pilot tone signal, there is no need to interrupt background music.

Please refer to the system manual for details about installation and configuration.

## 8.2

### Pilot tone

This device includes an internal, configurable pilot tone generator and signal amplifier, which can be switched to the speaker zones. The pilot tone generator is configured using the IRIS-Net software.

Parameter	Value/Range
Generator status	On/Off
Signal frequency	18000-21500 Hz
Signal amplitude (depends on load)	1-10 V



#### Notice!

Under certain conditions (e.g. high signal level or loudspeakers with high sensitivity in the high frequency range) it may be possible that people can hear the pilot tone. In this case, increase the frequency of the pilot tone.

## 8.3 Amplifier input supervision

Each 100 V input (AMP IN) is equipped with level/pilot tone monitoring. This allows the connected amplifier and associated wiring to be supervised.

Parameter	Value/Range
Frequency	1000 - 25000 Hz
Voltage	> 3 V <sub>eff</sub>
Test cycle	< 10 seconds

The supervision can be switched on/off with the IRIS-Net software.

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## 9 Maintenance

### Firmware update

IRIS-Net can be used to update the firmware of the controller, please refer to the IRIS-Net documentation.



### Warning!

Risk of explosion if battery is not replaced correctly. Must be replaced only with the same or equivalent type of battery.

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## 10 Technical data

### Electrical

Audio	8 audio inputs, 4 audio outputs
Safety/redundancy	Internal supervision, system monitoring, watchdog, fault output
PC configuration and control software	<ul style="list-style-type: none"> <li>– Configuration Wizard: Easy system configuration.</li> <li>– IRIS-Net: Integration of controller, amplifiers, call stations, routers and peripheral control; configuration, control, and supervision for complete audio systems; programmable user control panels and access levels.</li> <li>– Hot Swapper (included in IRIS-Net package): Easy updating of messages during runtime.</li> </ul>
Frequency response (ref. 1 kHz)	20 Hz to 20 kHz (-0.5 dB)
Signal-to-noise ratio (A-weighted)	Line in to line out: 106 dB typical
THD+N	< 0.05%
Crosstalk (line level)	Line in to line out (0 dB gain): < 100 dB at 1 kHz
Sample rate	48 kHz
DSP processing resolution	24-bit linear A/D and D/A conversion, 48-bit processing
Audio inputs (microphone/line level)	MIC/LINE: 2 x 3-pin port, electronically symmetric AUX: 2 x Stereo RCA
– Input level (nominal)	MIC/LINE: 15 dBu AUX: 9 dBu
– Input level (max. before clip)	MIC/LINE: 18 dBu AUX: 12 dBu
– Input impedances	MIC/LINE: 2.2 kΩ AUX: 8 kΩ
– Common mode rejection	MIC/LINE: > 50 dB
– Phantom power, switchable	MIC/LINE: 48 V DC
– A/D conversion	24 Bit, Sigma-Delta, 128 times oversampling
Audio inputs (100 V)	AMP IN: 2 x 6-pin port
– Max. voltage	120 V
– Max. current	7.2 A
– Max. power	500 W

- Signal detection	$\geq 3$ V
Audio outputs (line level)	LINE OUT: 1 x RJ-45, 4 x 3-pin port
- Output level (nominal)	6 dBu
- Output level (max. before clip)	9 dBu
- Output impedance	$< 50 \Omega$
- Min. load impedance	400 $\Omega$
- D/A conversion	24 Bit, Sigma-Delta, 128 times oversampling
Audio outputs (100 V)	SPEAKER OUT: 2 x 12-pin port
- Max. voltage	120 Veff
- Max. current	7.2 A
- Max. power	500 W
- Crosstalk (100 V)	AMP IN to SPEAKER OUT: $< 100$ dB at 1 kHz with 1 k $\Omega$ load
- Breakdown voltage	Pole - Pole: 120 Veff, Pole - Ground: 60 Veff
Call station bus (CST)	4 x integrated power+CAN+audio interface, RJ-45
- Power	+24 V DC, electronic fuse
- CAN	10, 20 or 62.5 kbit/s
- Audio	electronically symmetric
- Max. length	1000 m
ANALOG CONTROL IN	1 x 12-pin port
- Control inputs	- 8 (analog 0-10 V/logic control; low: $U \leq 5$ V DC; high: $U \geq 10$ V DC; $U_{\max} = 32$ V DC)
- Reference outputs	- +10 V, 100 mA - GND
- Time sync input	1 (DCF-77 receiver)
CONTROL OUT HP	1 x 12-pin port
- Control outputs	- 6 High Power outputs (open collector, $U_{\max} = 32$ V, $I_{\max} = 1$ A)
- Reference output V	- +24 V, $I_{\max} = 200$ mA
- Ready/fault output	1 (NO/NC relay contacts, $U_{\max} = 32$ V, $I_{\max} = 1$ A)
- Slave clock output	1 (24 V DC, max. 1 A)
CONTROL IN	2 x 10-pin port
- Control inputs	- 5 supervised inputs (0-24 V, $U_{\max} = 32$ V)

	– 5 isolated inputs (low: $U \leq 5$ V DC; high: $U \geq 10$ V DC; $U_{\max} = 32$ V)
CONTROL OUT	2 x 10-pin port
– Control outputs	12 Low Power outputs (open collector, $U_{\max} = 32$ V, $I_{\max} = 40$ mA)
– Control relay	1 (NO/NC relay contacts, $U_{\max} = 32$ V, $I_{\max} = 1$ A)
Interfaces	
– Ethernet	1 x RJ-45, 10/100 MB (for PC connection)
– CAN BUS port	2 x RJ-45, 10 to 500 kbit/s (for amplifier, router connection)
– OM-1 interface Module (optional)	Ethernet connectors (Primary/Secondary) 100/1000 Mbit/s, RJ-45, integrated transformer isolation
– RTC clock accuracy	$\pm 4$ minutes/month
DC power input	21 to 32 V DC
Power consumption	10 to 250 W
Maximum supply current (24V)	
– Standby	< 600mA + external load
– Idle/announcement/alert	< 800mA + external load

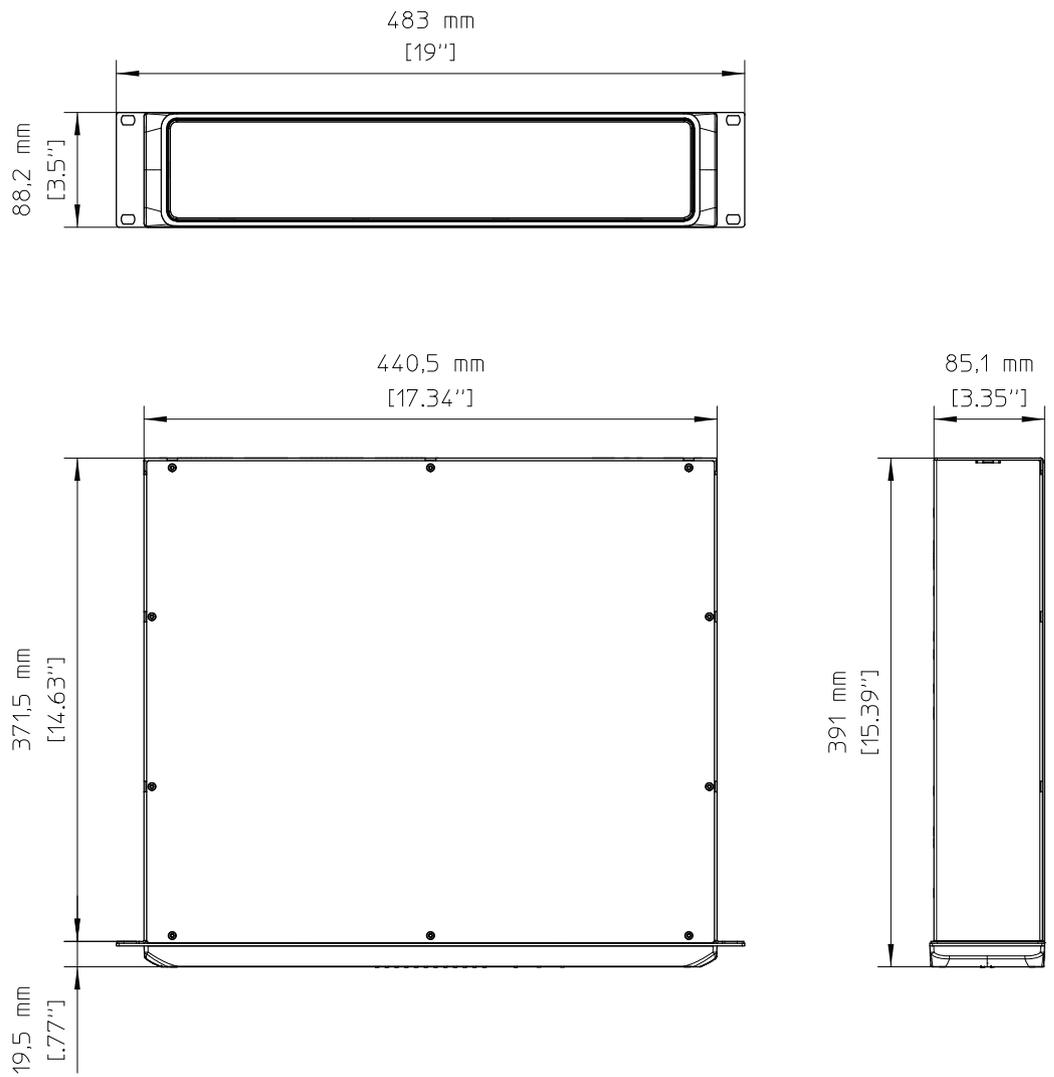
### Environmental

Operating temperature	-5 °C to +45 °C (+23 °F to +113 °F)
Storage temperature	-40 °C to +70 °C (-40 °F to +158 °F)
Humidity (non-condensing)	5% to 90%
Altitude	Up to 2000 m

### Mechanical

Dimensions (HxWxD)	88 mm x 483 mm x 391 mm (2 RU)
Weight (net)	8.0 kg
Mounting	Standalone; 19 in. rack
Color	Black with silver

### 10.1 Dimensions







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