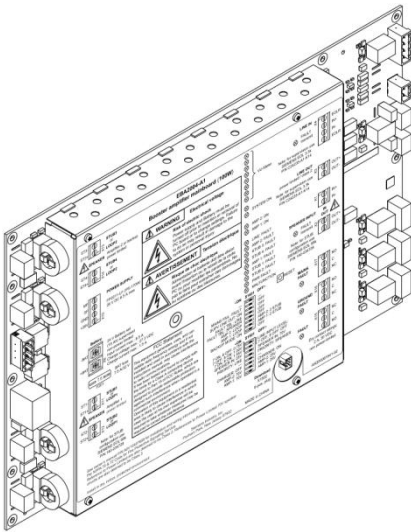


SIEMENS



EBA2004-A1

Booster amplifier mainboard (100 W)

Mounting

Installation

Legal notice

Technical specifications and availability subject to change without notice.

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1 About this document

Goal and purpose

This document describes how to install the booster amplifier mainboard (100 W) EBA2004 and also contains instructions on planning, commissioning and maintenance. Additional information can be found in the corresponding documents, see chapter 'Applicable documents'.

The document 'System Description' contains an overview of the structure and functions of the Fire detection and voice evacuation system and the structure of the documentation.

Scope

Regional or country-specific variations/availability are identified with square brackets, as follows:

- [UL]: Valid for UL-regulated region
- [ULC]: Valid for Canada

Target groups

The information in this document is intended for the following target groups:

Target group	Activity	Recommended qualification
Product Manager	<ul style="list-style-type: none"> • Is responsible for information passing between the manufacturer and regional company. • Coordinates the flow of information between the individual groups of people involved in a project. 	<ul style="list-style-type: none"> • Has obtained suitable specialist training for the function and for the products. • Has attended the training courses for Product Managers.
Project Manager	<ul style="list-style-type: none"> • Coordinates the use of all persons and resources involved in the project according to the schedule. • Provides the information required to run the project. 	<ul style="list-style-type: none"> • Has obtained suitable specialist training for the function and for the products. • Has attended the training courses for Project Managers.
Installation personnel	<ul style="list-style-type: none"> • Assembles and installs the product components at the place of installation. • Carries out a performance check following installation. 	<ul style="list-style-type: none"> • Has received specialist training in the area of building installation technology or electrical installations.
Commissioning personnel	<ul style="list-style-type: none"> • Configures the product at the place of installation according to customer-specific requirements. • Checks the product operability and releases the product for use by the operator. • Searches for and corrects malfunctions. 	<ul style="list-style-type: none"> • Has obtained suitable specialist training for the function and for the products. • Has attended the training courses for commissioning personnel.
Maintenance personnel	<ul style="list-style-type: none"> • Carries out all maintenance work. • Checks that the products are in perfect working order. • Searches for and corrects malfunctions. 	<ul style="list-style-type: none"> • Has obtained suitable specialist training for the function and for the products.

Document identification

The document ID is structured as follows:

ID_ModificationIndex_Language_COUNTRY

Example: A6V10315023_a_en_US

Date format

The date format in the document corresponds to the recommendations of the international standard ISO 8601 (format: YYYY-MM-DD).

Conventions for text marking

Markups

Special markups are shown in this document as follows:

▷	Requirement for a behavior instruction
1. 2.	Instruction with at least two operating steps
–	Intermediate step of an instruction
⇒	Intermediate result of a behavior instruction
⇒	End result of a behavior instruction
•	Lists and behavior instructions with one operating step
[→ X]	Reference to a page number
'Text'	Quotation, reproduced identically
<Key>	Identification of keys
>	Relation symbol, also used between the individual steps of a sequence, e.g. 'Menu bar' > 'Help' > 'Help topics'
↑ Text	Identifies a glossary entry

Supplementary information and tips



The 'i' symbol identifies supplementary information and tips for an easier way of working.

1.1 Applicable documents

Document ID	Title
A6V10437426	FH2016 housing (EBA2001), Mounting / Installation
A6V10437428	FHA2044-U1 battery bracket (EBA2001), Mounting / Installation
A6V10437430	FHA2045-U1 shield connec. kit (EBA2001), Mounting / Installation
A6V10590197	FHA2054-U1 audio transformer kit, Mounting / Installation
315-050222	FP2011-U1 6.5 amp power supply module, Installation instructions
A6V10492915	EBA2001 Booster amplifier (100 W), Battery & wire calculation
A6V10430024	FX2040 FW update tool, Commissioning / Maintenance / Troubleshooting
A6V10330473	PAD-4-FDT Firmware diagnostic tool kit, Installation instructions
A6V10315009	FS20 fire detection and voice evacuation system, System Description
A6V10333401	FS920 fire detection and voice evacuation system, System Description
A6V10333530	Desigo compatible notification appliances, List of devices
A6V10333532	CerberusPRO compatible notification appliances, List of devices

1.2 Revision history

The following table shows this document's revision history:

Version	Edition date	Brief description
c	2015-08-06	Adaptations for the UL/ULC approval of the low-level audio input with the FHA2054 audio transformer kit
b	2015-03-10	Adaptations for the UL/ULC approval
a	2014-10-02	First edition

2 Description

The booster amplifier mainboard (100 W) EBA2004 is a line expander for analog speaker circuits in large buildings. It also has an integrated battery charger. The EBA2004 has two supervised 50 W audio amplifiers, which can be configured as two class A or four class B lines. The second audio amplifier can also be configured as a backup amplifier. In this backup mode, the EBA2004 supports two class B or one class A line with a total output of 50 W. The various system states are indicated using several LEDs. The EBA2004 is built into the boost amplifier station EBA2001 in the housing FH2016 along with the power supply and batteries. The booster amplifier station EBA2001 is used for voice evacuation and mass notification.

Using the booster amplifier station EBA2001 in conjunction with Siemens High-Fidelity speakers meets the requirements for low frequency signals as described in the chapter with the heading 'Determination of low frequency signal format' in standard UL 464 'Audible Signal Appliance', and is suitable for use during sleeping hours in accordance with the requirement of NFPA 72, chapter 18.4.5 (2013 edition). You will find further information about compatible speakers in document A6V10333530.

Properties

- Integrated battery charger
- 100 W maximum output rating
- Backup mode of both amplifiers in parallel operation
- Class D amplifier
- Selectable output voltage of 25 Vrms and 70 Vrms
- Supervision of audio inputs and outputs for short-circuit and open circuit
- Ground fault supervision
- Low-level audio input* and audio output
- Configurable via DIP switch
- Automatic activation of the audio outputs when there is an incoming audio signal
- Supports Siemens UL listed emergency voice evacuation speakers
- FW upgrade on site is possible with FX2040 FW update tool
- Power-saving function in standby mode
- Settable audio input priorities

3 Installation of EBA2004-A1 in the FH2016 housing

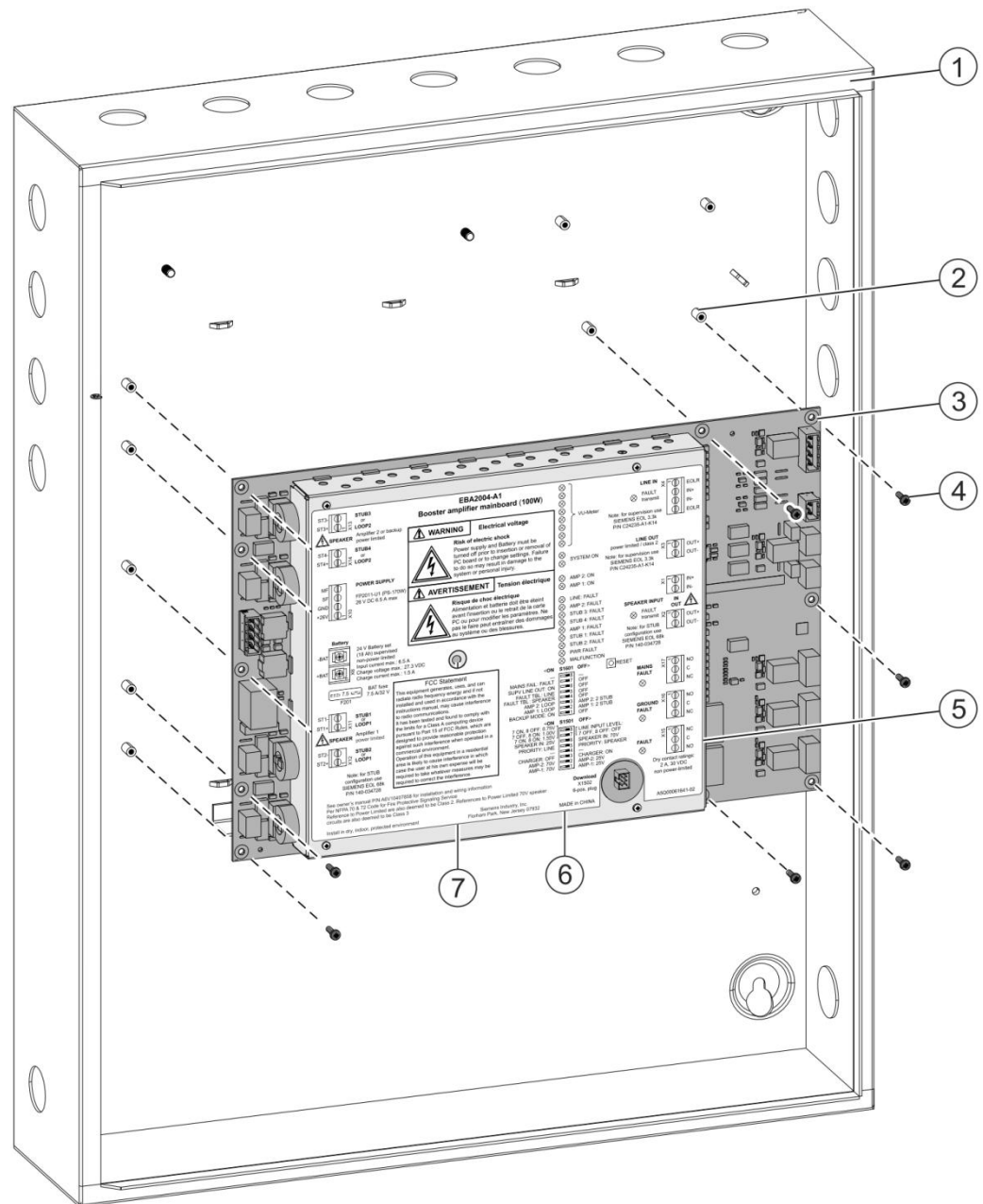


Figure 1: Installation of the booster amplifier mainboard (100 W) in the FH2016 housing

- 1 FH2016 housing (EBA2001)
- 2 Threaded standoff on back box
- 3 10x fixing holes in the EBA2004
- 4 10x screws, type #4-40 1/4"
- 5 EBA2004 booster amplifier mainboard (100 W)
- 6 1x screw, type #6-32 1 1/4"
- 7 Fixing hole in the shield plate of the EBA2004

▷ Cable entry knockouts are available.

▷ The batteries are not installed or connected.

1. Install the booster amplifier mainboard (100 W) (5) using 10x fixing screws (4) to the threaded standoffs (2) at the back box (1).
2. Insert the long fixing screw (6) through the shield plate (7) and firmly tighten the screw.

4 View

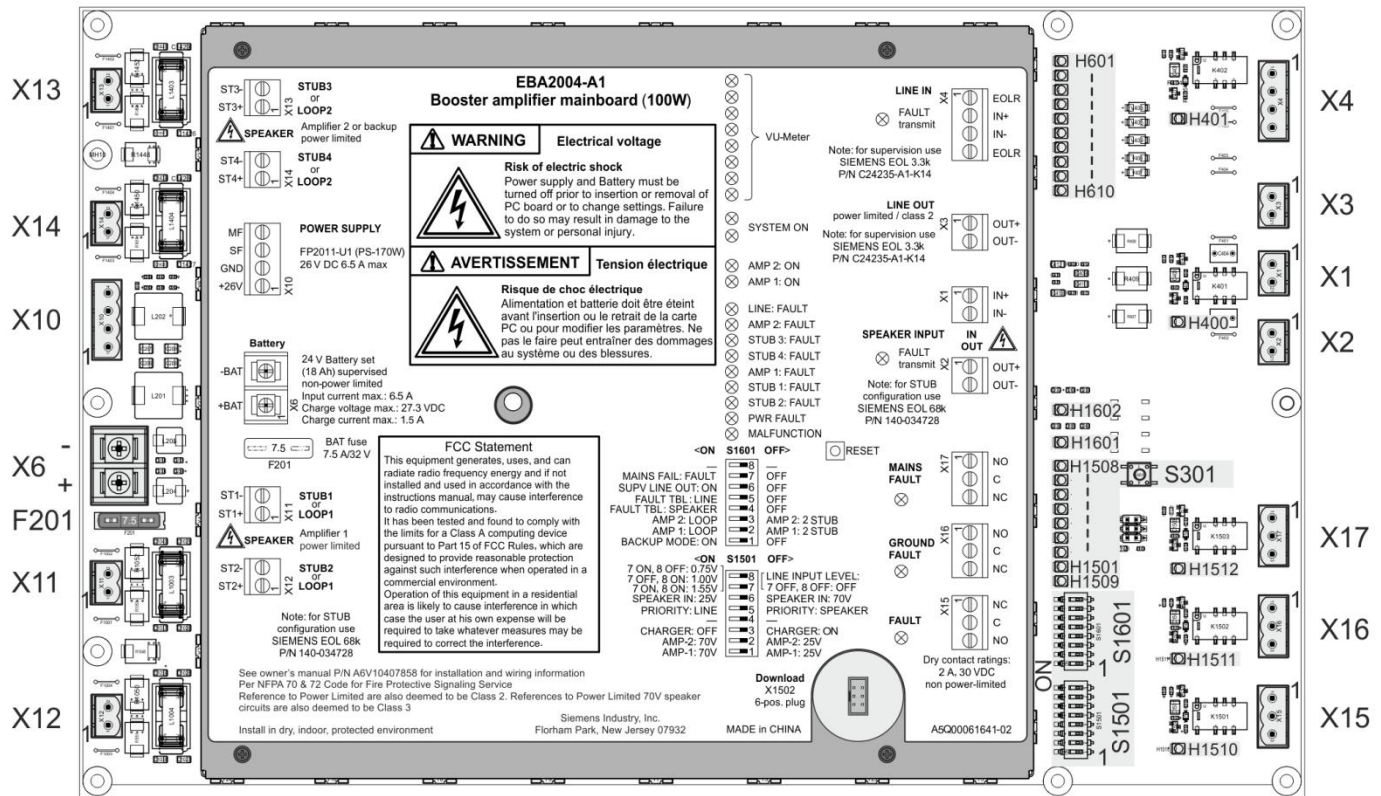


Figure 2: Equipment overview of the booster amplifier mainboard (100 W) EBA2004

Element	Des.	Function
Connector	X1	SPEAKER_IN, audio input
	X2	SPEAKER_OUT, audio output or EOL resistor
	X3	LINE_OUT, voice-line output (low-level) monitored
	X4	LINE_IN, voice-line input and EOL resistor (low level)
	X6	BATTERY, battery connection
	X10	EXT_SUPPLY, power supply input
	X11	AMPLIFIER1_STUB_1, line output class B circuit 1/class A circuit1
	X12	AMPLIFIER1_STUB_2, line output class B circuit 2/class A circuit1
	X13	AMPLIFIER2_STUB_3, line output class B circuit 3/class A circuit2
	X14	AMPLIFIER2_STUB_4, line output class B circuit 4/class A circuit2
	X15	FAULT, general fault output
	X16	EARTHFAULT, earth fault output
	X17	MAINS_FAULT, output fault at mains input
	X1502	MONITOR, 6-pin connector for firmware download
Backup	F201	Battery fuse 7.5 A

Element	Des.	Function
Switch, keys	S301	Reset key
	S1501	DIP switch, configuration of booster amplifier mainboard (100 W)
	S1601	DIP switch, configuration of booster amplifier mainboard (100 W)
LEDs	H400	FAULT TBL SPEAKER indicator
	H401	FAULT TBL LINE indicator
	H601-H608	GAIN LED, modulation indicator
	H609, H610	SYSTEM_ON, both LEDs are connected in parallel
	H1501	PWR-FAULT indication
	H1502-H1508	Status LEDs of the amplifiers
	H1509	MALFUNCTION, microprocessor malfunction
	H1510	FAULT indicator
	H1511	GROUND FAULT indicator
	H1512	MAINS FAULT indicator
	H1601	AMP-1_ON, amplifier 1 is switched on
	H1602	AMP-2_ON, amplifier 2 is switched on

You will find more information about LED functions in chapter 'Indicators [→ 35]'.

5 Wiring overview EBA2004 in the FH2016 housing

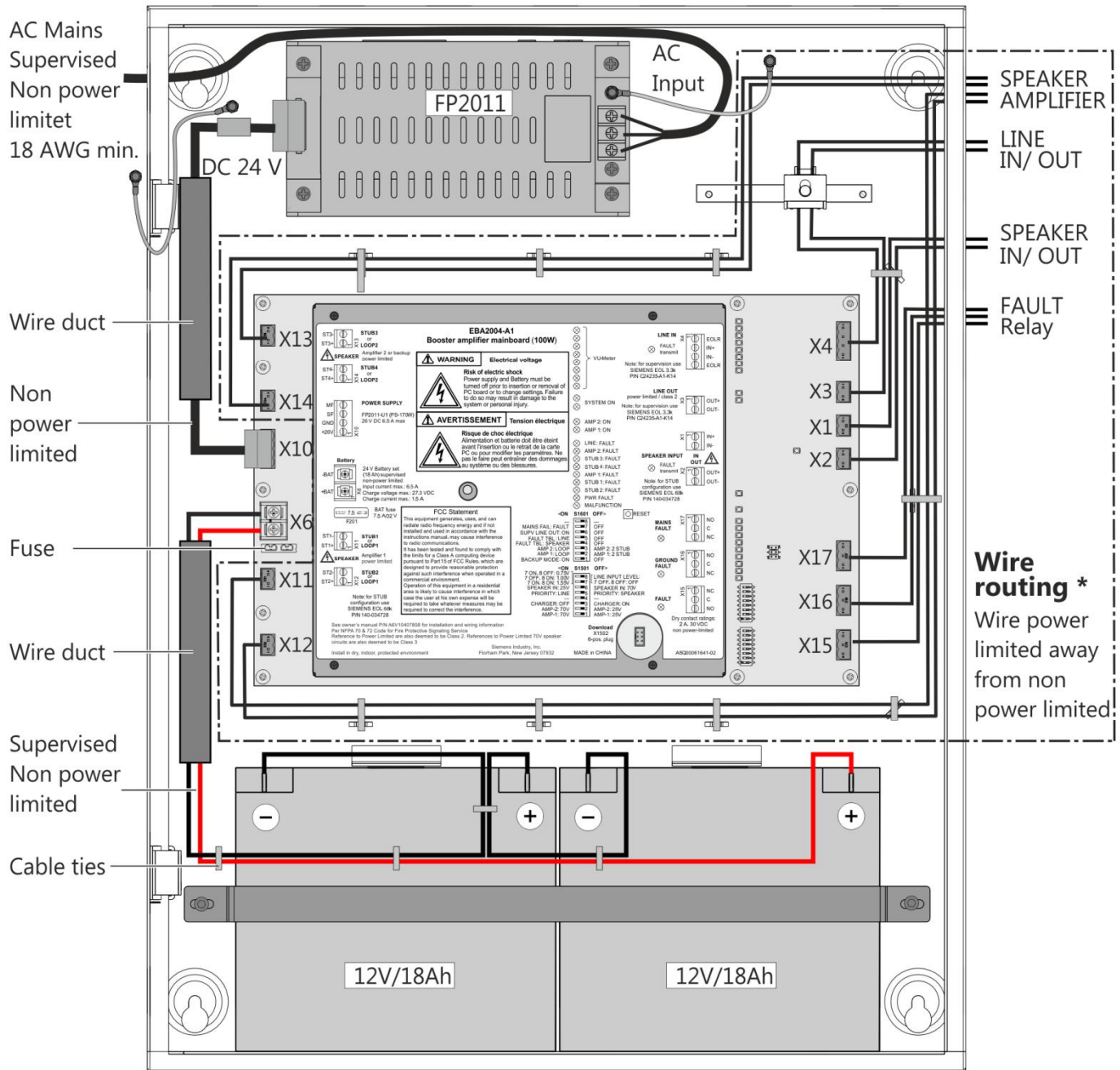


Figure 3: Wiring overview of the booster amplifier mainboard (100 W) EBA2004 installed in the housing FH2016

* Wire routing

A 6.4 mm / ¼" separation must be maintained between high voltage/non-power limited wiring and must run in separate knockout openings. To avoid induced noise (transfer of electrical energy from one wire to another), keep input wiring isolated from high current output and power limited wiring. Improper wiring installation may cause improper operation. It should not cross the printed circuit board where it could induce noise into the sensitive microelectronics or pick up unwanted RF noise from the switching power supply circuit. Refer to the wiring overview for recommended wire routing.

The wiring method shall be in accordance with CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, Part I, Section 32 and NFPA 70, National Electric Code.

Supply

The FP2011 power supply (170 W) is pre-assembled with the cable to connect to the power input of the EBA2004 booster amplifier mainboard (100 W). A wire duct must be used with the connecting cable to ensure proper separation with non-power limited wiring.

Battery connection

The connecting cables for the batteries are pre-assembled with the EBA2004 booster amplifier mainboard (100 W). A wire duct must be used with the battery cable to ensure proper separation with non-power limited wiring.

!	NOTICE
	Apply AC main to the power supply connected to EBA2004 prior to connecting the battery cable to the batteries.

Knockouts in the housing

Power-limited and non-power-limited cables must not be routed together through the same knockout.

See also

📄 Mains connection, supply X10 and battery X6 [→ 16]

6 Pin assignments

6.1 Mains connection, supply X10 and battery X6

Connection of the mains cable and ground cable to the FP2011 power supply

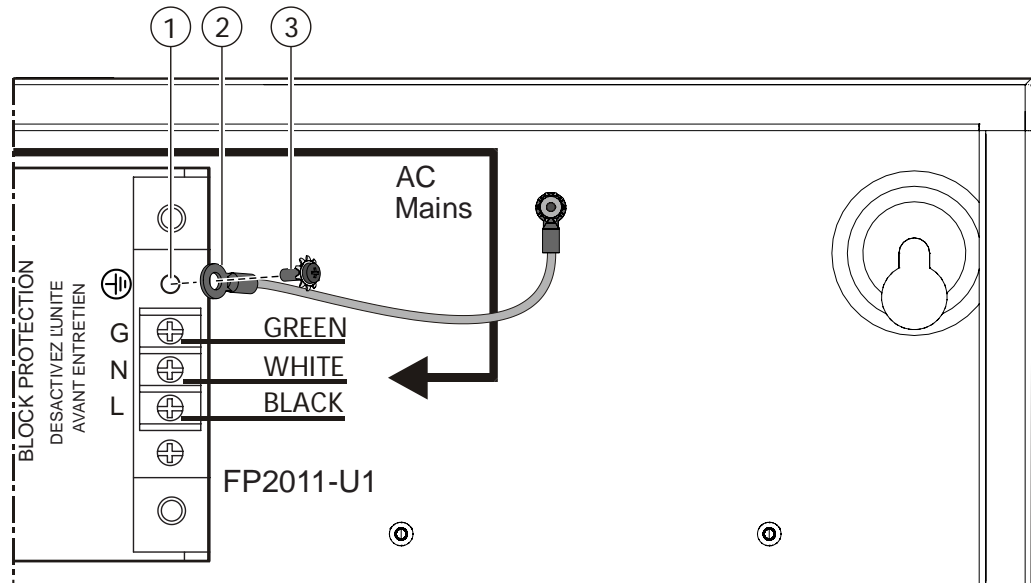


Figure 4: Wiring mains connection and ground cable

- 1 Connection for ground cable to the FP2011 power supply
- 2 Cable lug of ground cable from the housing
- 3 Fixing screw with lock washer to secure the ground cable
- G Mains connection 'Earth Ground', green cable
- N Mains connection 'Neutral', white cable
- L Mains connection 'Live', black cable



NOTICE

The branch circuit must be dedicated and protected by a 15 A overcurrent device.



NOTICE

Install plastic guard on AC mains (L, N, G) terminal of the FP2011 power supply.

Power supply connection X10 and FP2011 power supply

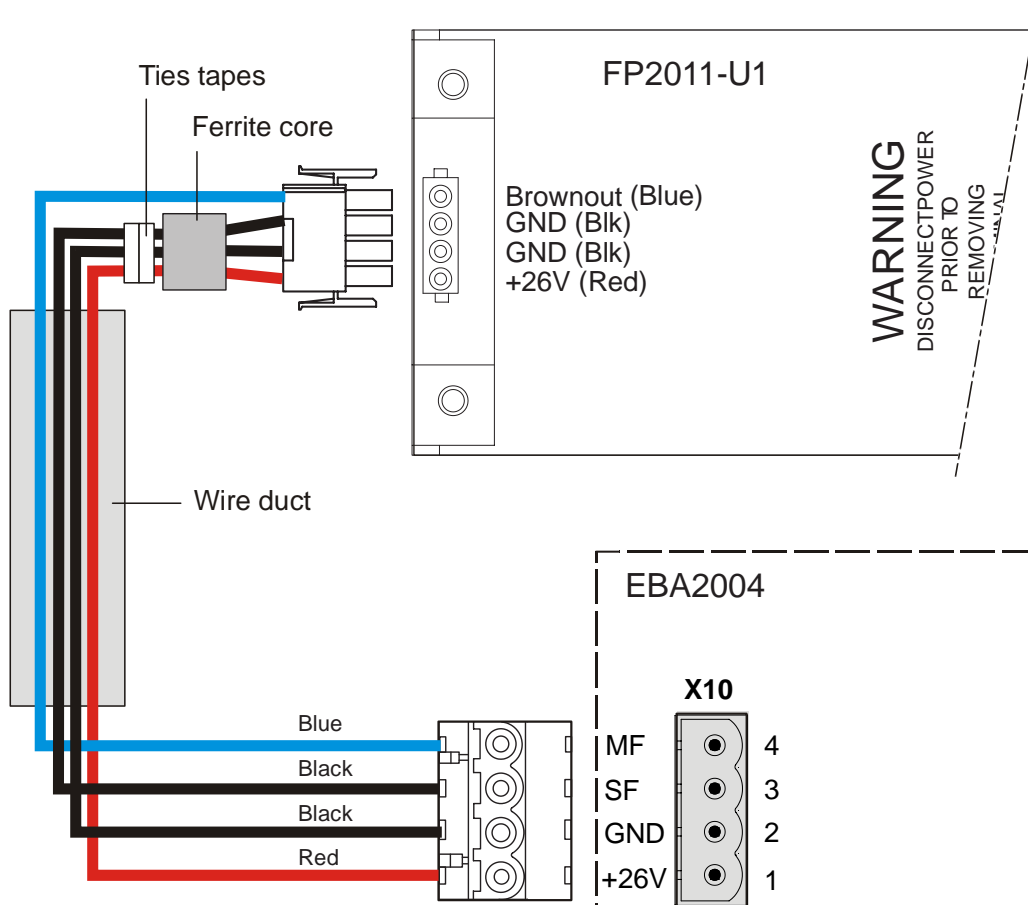


Figure 5: Connection of the power supply FP2011 to X10 using the pre-assembled cable

Pin	Designation	Description
4	MF	[MAINS_FAIL] AC low signal (blue)
3	SF	[SUPPLY_FAIL] Power supply status (black)
2	GND	Return, ground (black)
1	+26 V	DC +24 V system supply (red)

Admissible cable cross-section: 1 x 12...18 AWG or 2 x 16...18 AWG

Further information is available in document 315-050222 'FP2011-U1 Installation Instructions'.

Battery connection X6, battery

The cable harness supplied must be used to connect the batteries to the EBA2004. The battery cables must be routed in the pre-mounted wire duct as shown. The '+BAT' battery output on the booster amplifier printed circuit board is protected by the F201 fuse rated at 7.5 A.



NOTICE

The battery connection cable (1) between the PLUS and MINUS connection of the two batteries must only be applied once the whole system has been configured via jumpers and modules, and after AC has been applied.

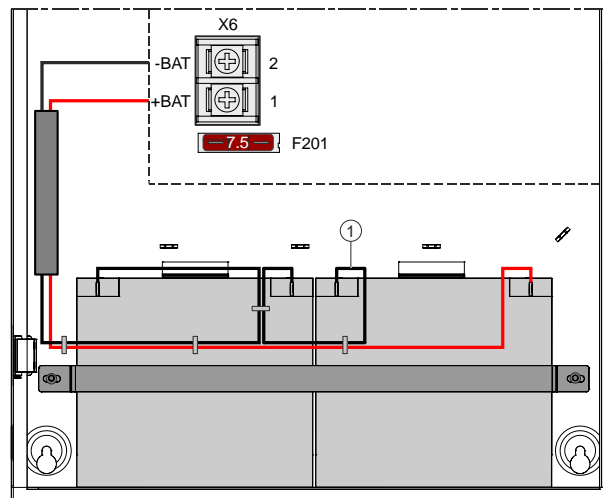


Figure 6: Connection of the batteries to X6 using the pre-assembled cables

Item	Designation	Description
X6/2	-BAT	Return (Ground) feed for battery (black wire)
X6/1	+BAT	DC 24 V supply to battery (red wire)
F201	BAT fuse	Plug fuse of the battery charging connection '+BAT', 7.5 A / 32 V
1	Battery connection cable	Cable for connection in series of batteries (in scope of supply of EBA2004)

Admissible cable cross-section: 1 x 12...18 AWG or 2 x 16...18 AWG

Battery fuse replacement information for fuse location 'F201'

The battery fuse must be replaced with a blade type fuse 7.5 A @ 32 V:

- LITTELFUSE P/N 028707.5

See also

📄 Battery size [→ 43]

6.2 Common fault relay outputs X15, X16, X17

The booster amplifier mainboard (100 W) has three independent, dry Form C contact fault outputs indicating the following faults when activated:

- X17 for AC failure indicator
- X16 for ground faults
- X15 for general system faults (fail safe)

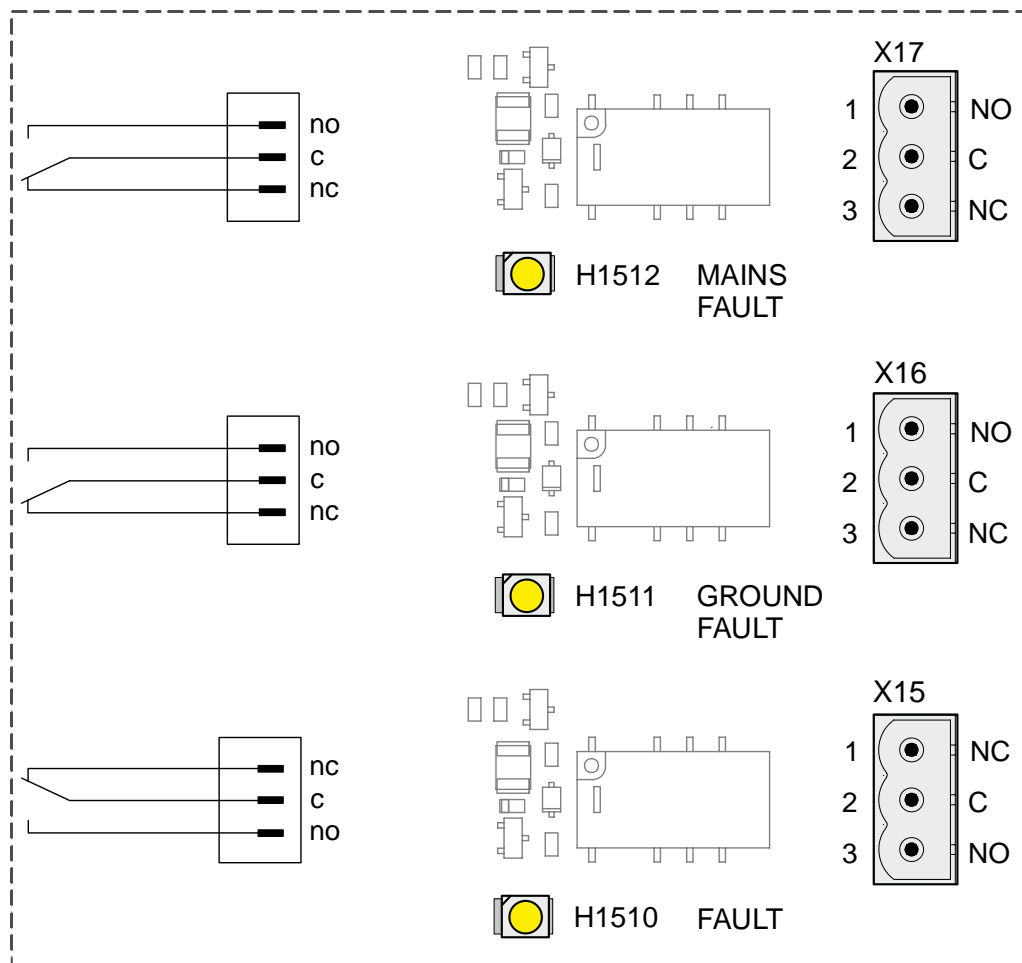


Figure 7: Plug assignment and circuit of the fault relay in the normal state

The FAULT indicators belonging to the corresponding faults or fault outputs light up when the appropriate relay is activated.

Wiring example for fault transmission via I/O module FDCIO422

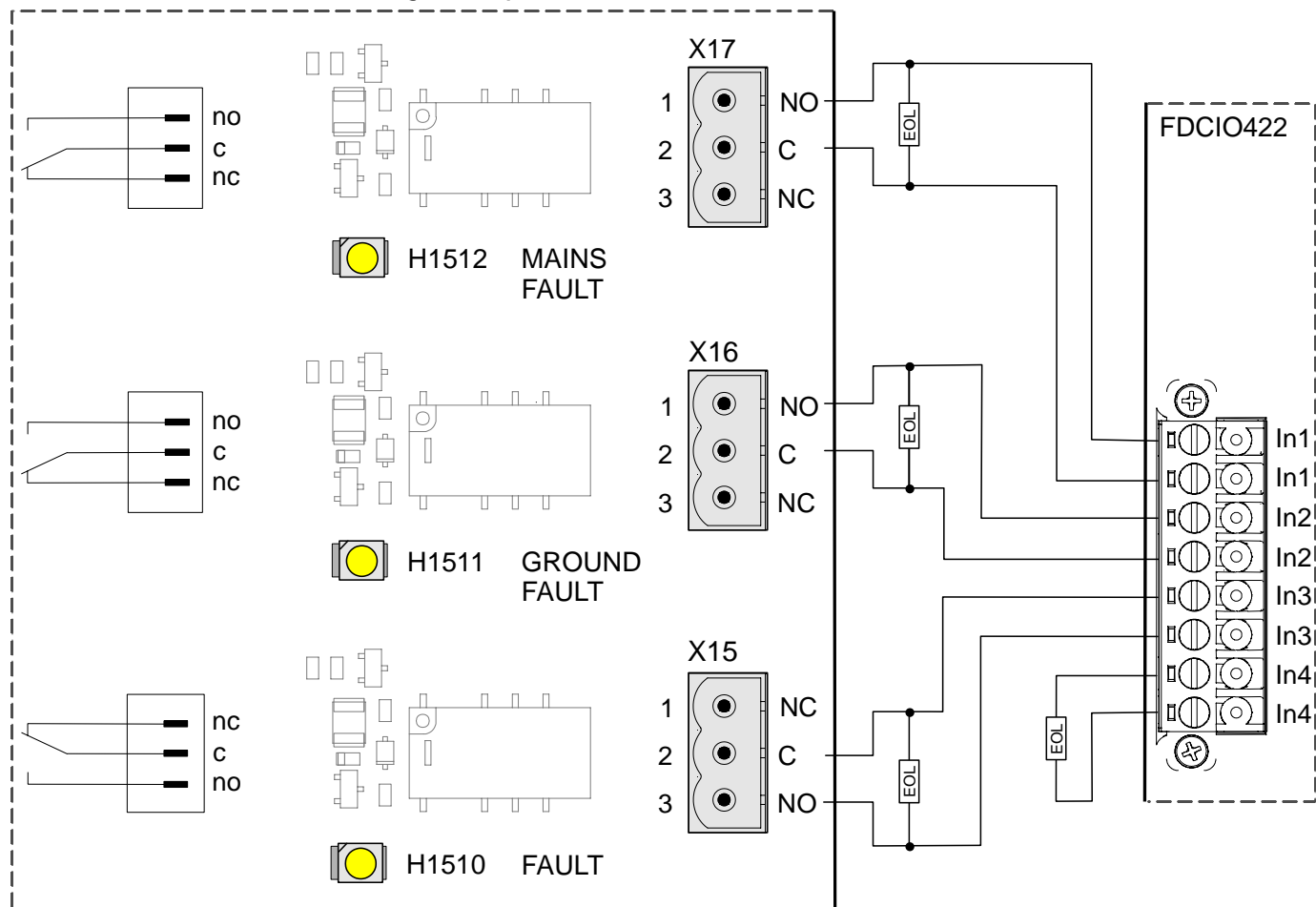


Figure 8: Circuit for I/O module FDCIO422

EOL = 470 Ω

Wiring example for fault transmission via I/O module HTRI-D

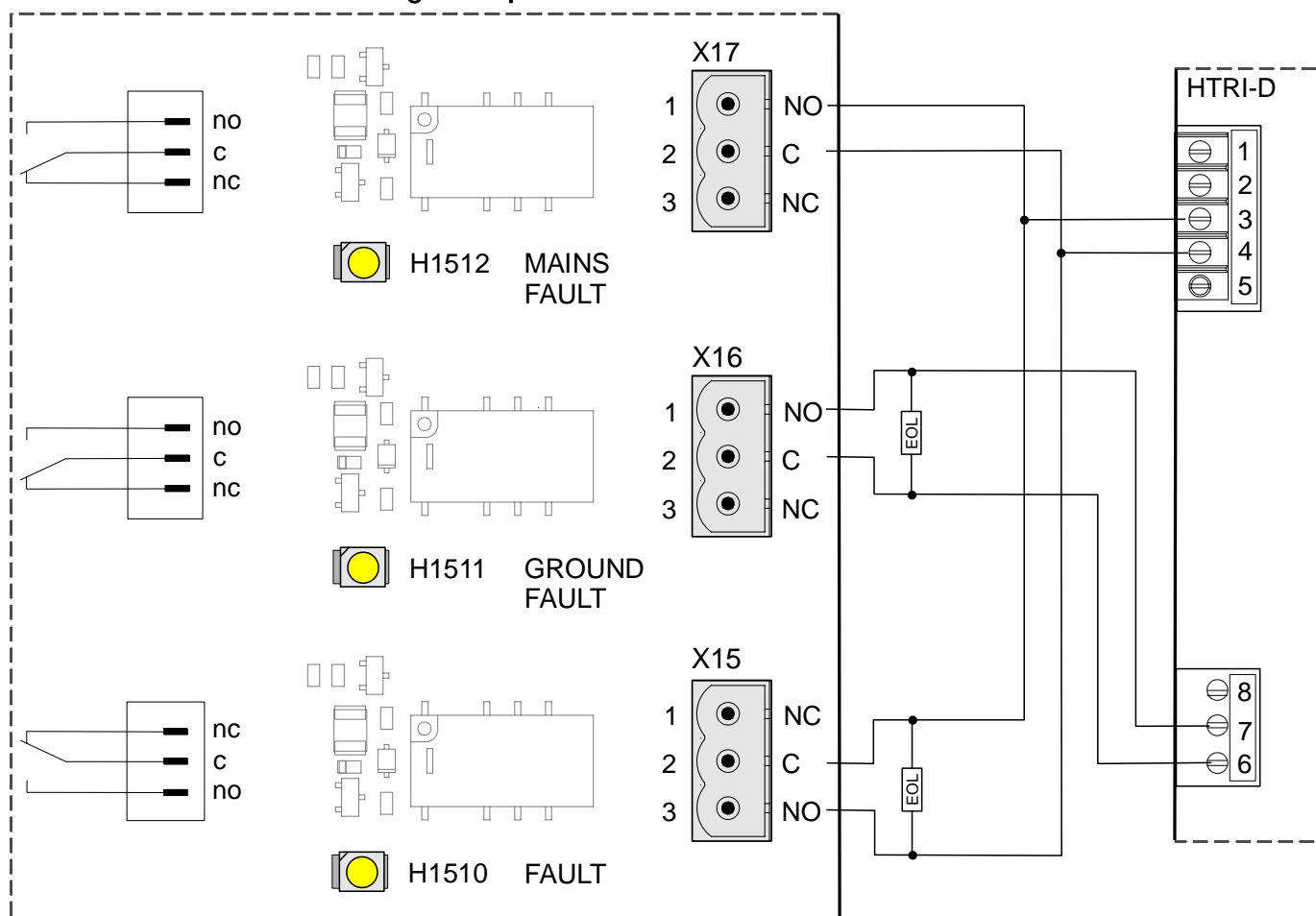


Figure 9: Circuit for I/O module HTRI-D

EOL = 470 Ω

X17 Mains fault, X16 Ground fault

Pin	Designation	Description
1	NO	Switching contact, normally open
2	C	Common contact
3	NC	Switching contact, normally closed

Normal operation, normally closed

Admissible cable cross-section: 1 x 12...18 AWG or 2 x 16...18 AWG

X15 common faults

Pin	Designation	Description
1	NC	Switching contact, normally closed
2	C	Common contact
3	NO	Switching contact, normally open

Normal operation, normally closed

Admissible cable cross-section: 1 x 12...18 AWG or 2 x 16...18 AWG

See also

- ▣ Cable lengths for cascading [→ 47]
- ▣ Speaker input X1, speaker output X2 [→ 22]

6.3 Speaker input X1, speaker output X2

The speaker circuit from the audio source that is extended with the booster amplifier mainboard (100 W) EBA2004 is the control line and must not be connected to the speakers.

For fault transmit, the DIP switch S1601-4 'FAULT TBL: SPEAKER', must be set to ON. A fault transmit is signaled by the 'H400' LED on the booster amplifier mainboard (100 W).

The following DIP switches must be configured, see DIP switch S1501/S1601, configuration [→ 40]:

- S1501-6 'SPEAKER IN:25 V/70 V'
- S1501-5 'PRIORITY: LINE/SPEAKER'

Depending on the cross-section and length of the line, up to 100 booster amplifier mainboards (100 W) can be cascaded.

Wiring for class B speaker circuit with one booster amplifier mainboard (100 W)

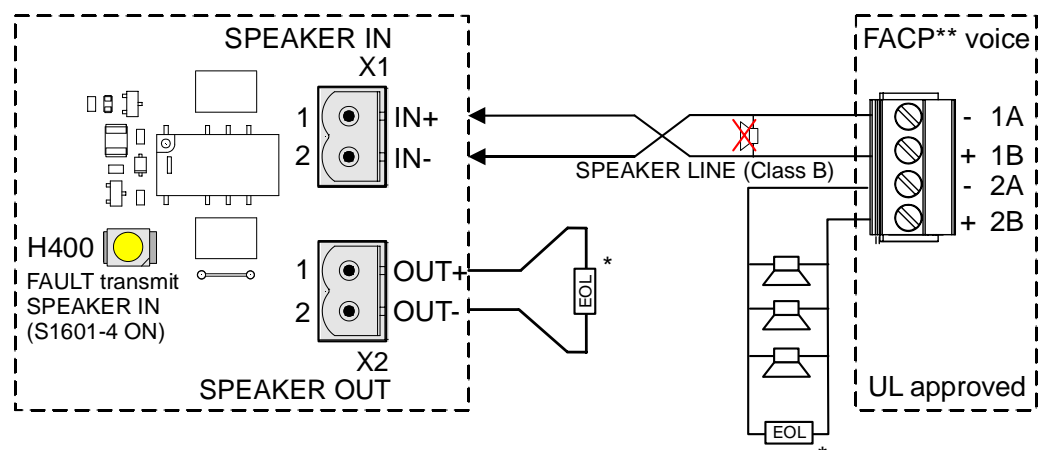


Figure 10: Class B speaker circuit wiring

* EOL resistor of FACP amplifier output

** FACP = Fire alarm control panel

Wiring for class A speaker circuit with one booster amplifier mainboard (100 W)

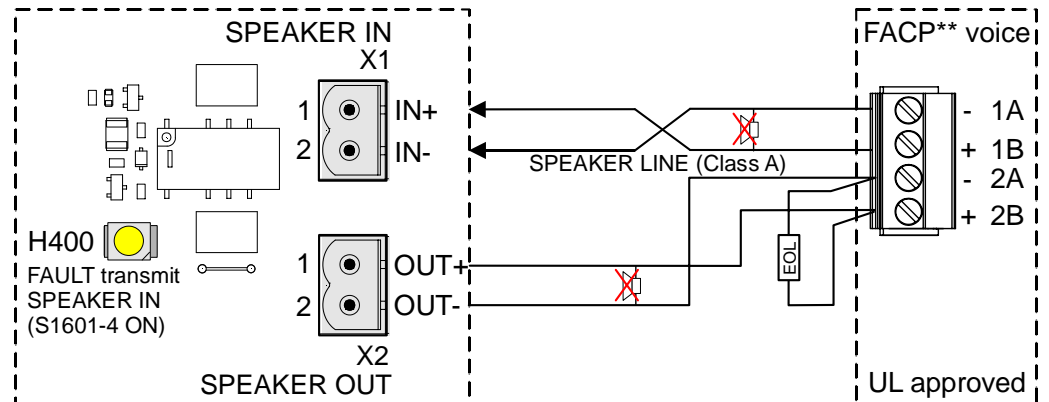


Figure 11: Class A speaker circuit wiring

** FACP = Fire alarm control panel

The class A circuit is terminated on the panel side (EOL resistor).

Wiring for class B speaker circuit with several booster amplifier mainboards (100 W)

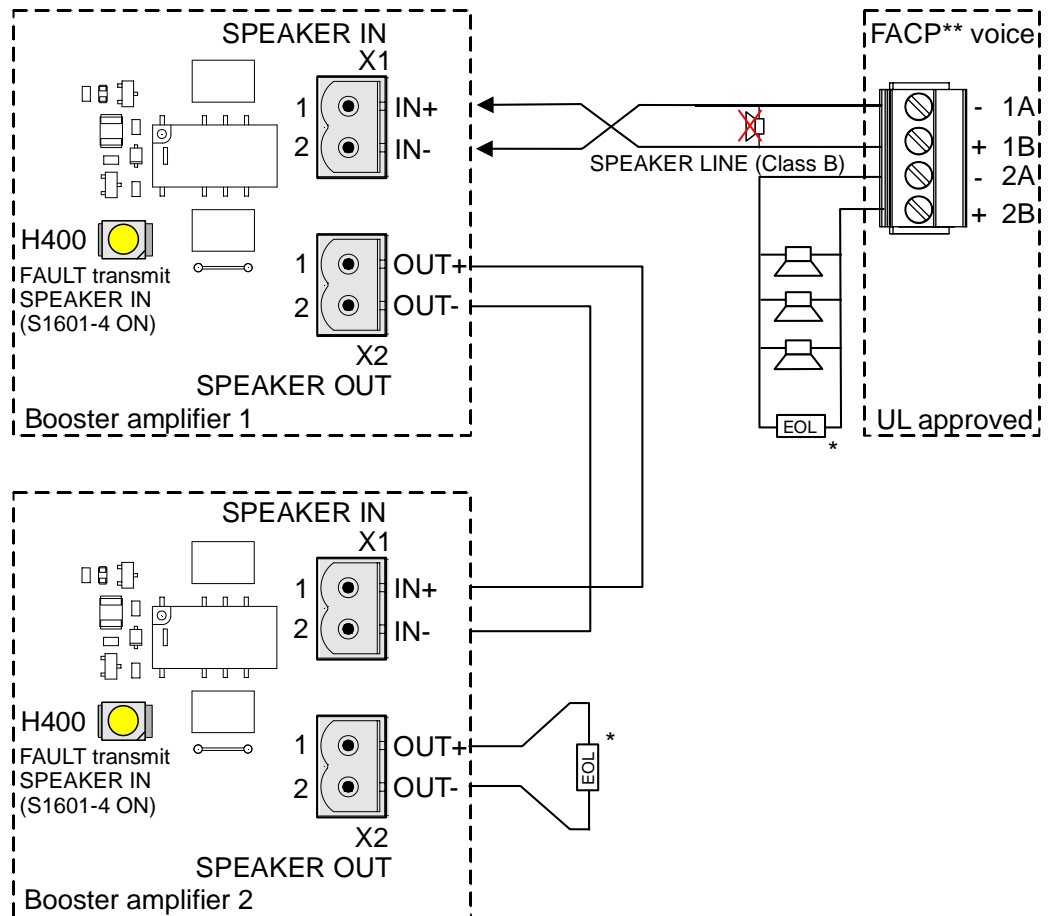


Figure 12: Class B speaker circuit wiring at several booster amplifier mainboards (100 W)

* EOL resistor of FACP amplifier output

** FACP = Fire alarm control panel

Wiring for class A speaker circuit with several booster amplifier mainboards (100 W)

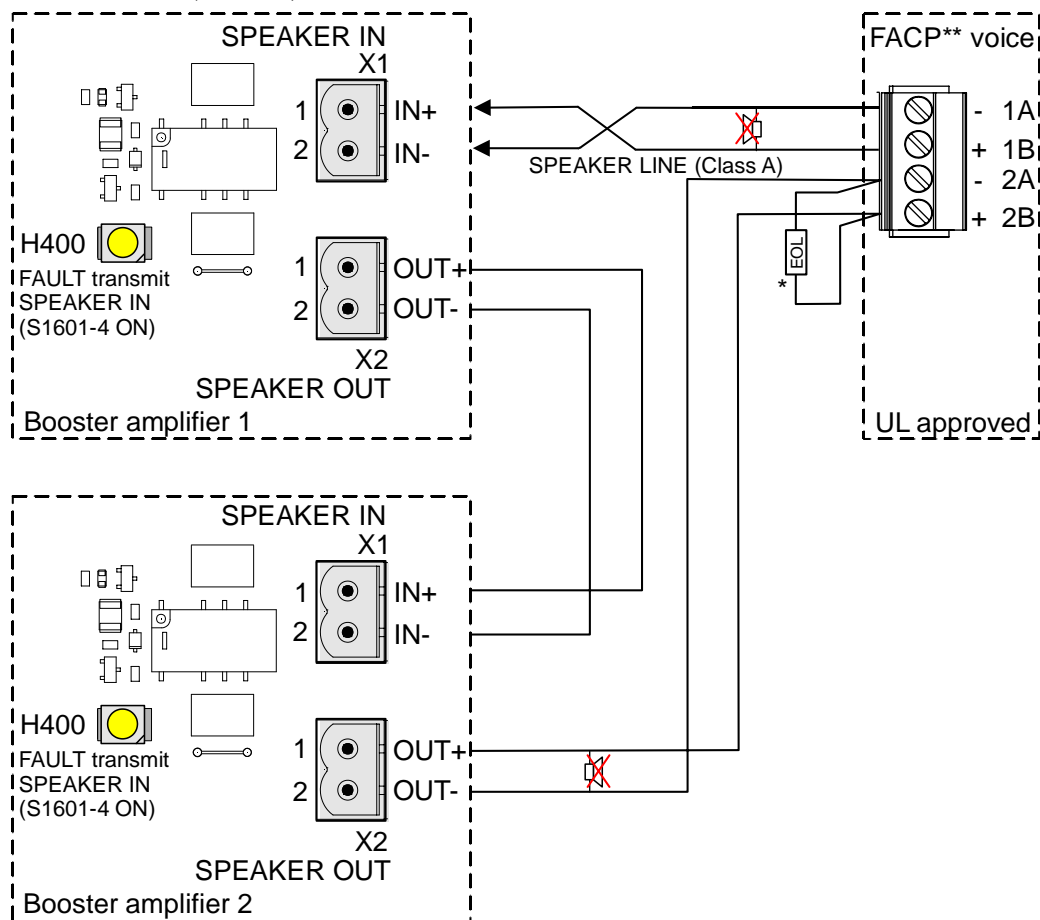


Figure 13: Class A speaker circuit wiring at several booster amplifier mainboards (100 W)

* EOL resistor of FACP amplifier output

** FACP = Fire alarm control panel

Wiring for class B speaker circuit with several booster amplifier mainboards (100 W) without fault transmission

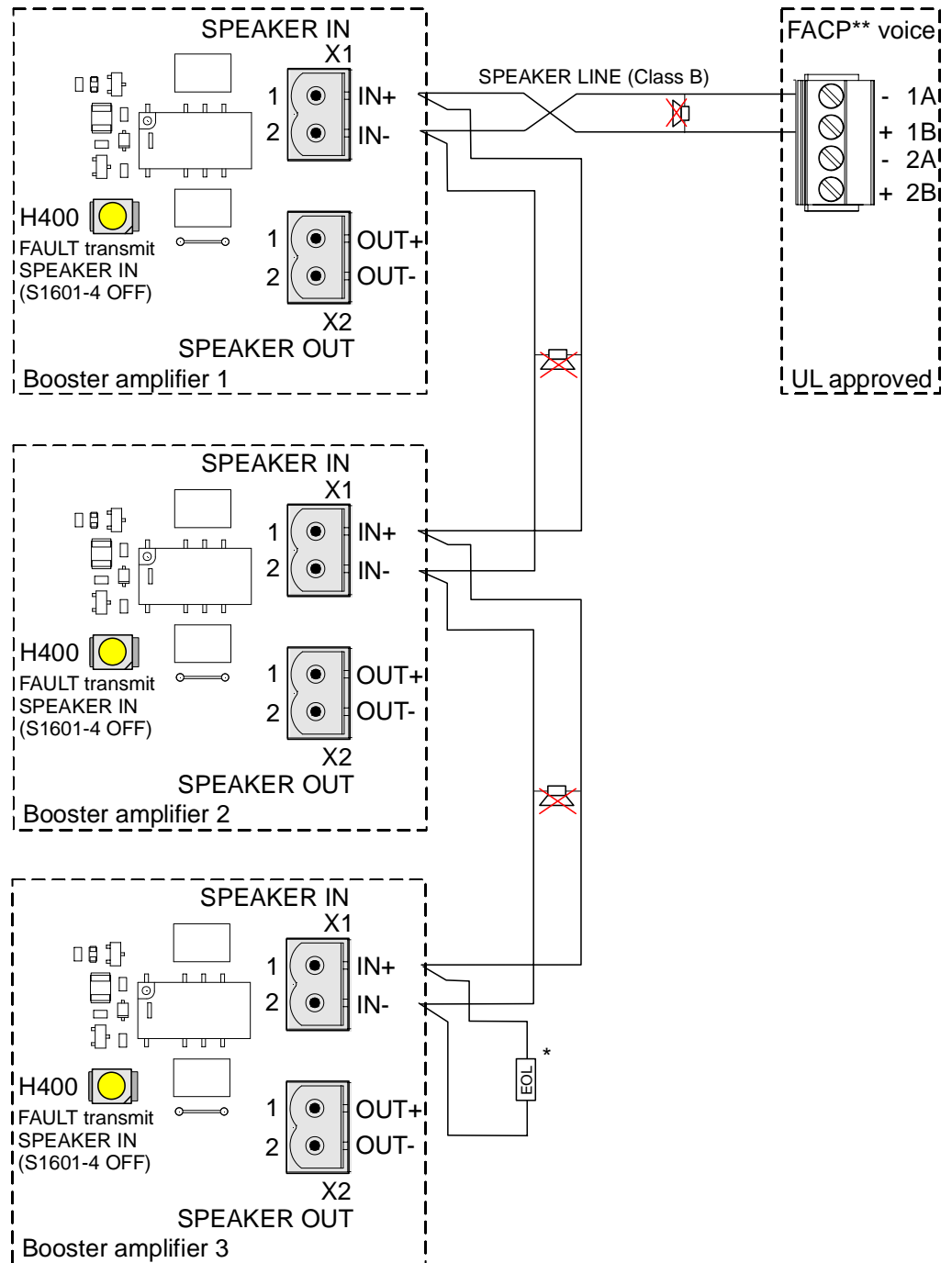


Figure 14: Class B speaker circuit wiring at several booster amplifier mainboards (100 W) without fault transmission

* EOL resistor of FACP amplifier output

** FACP = Fire alarm control panel

The fault transmit from the booster amplifier mainboard (100 W) to the FACP must take place via an I/O module from relays X15, X16 and X17 (FDCIO422 or HTRI-D). You will find more information about this in the chapter 'Common fault relay outputs X15, X16, X17 [→ 19]'.

Wiring for class A speaker circuit with several booster amplifier mainboards (100 W) without fault transmission

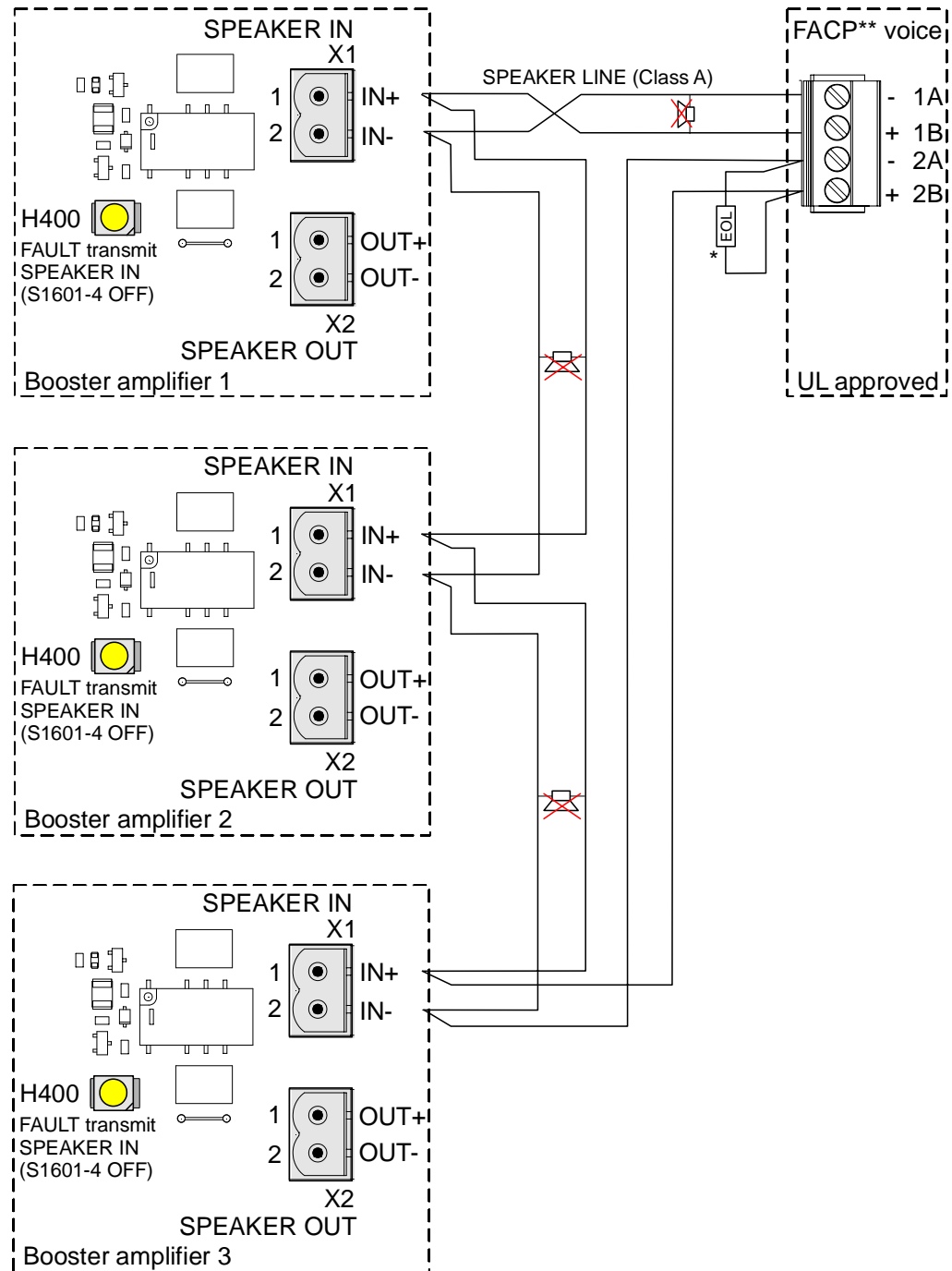


Figure 15: Class A speaker circuit wiring at several booster amplifier mainboards (100 W) without fault transmission

* EOL resistor of FACP amplifier output

** FACP = Fire alarm control panel

The fault transmit from the booster amplifier mainboard (100 W) to the FACP must take place via an I/O module from relays X15, X16 and X17 (FDCIO422 or HTRI-D). You will find more information about this in the chapter 'Common fault relay outputs X15, X16, X17 [→ 19]'.



You will find more information on connecting the speaker circuit to the FACP in the System Description document of the corresponding system, e.g. FS20: Document A6V10315009 / FS920: Document A6V10333401.

Plug connection X1, SPEAKER IN

Pin	Designation	Description
1	IN+	Input + of the speaker circuit of the Voice Panel
2	IN-	Input - of the speaker circuit of the Voice Panel

Admissible cable cross-section: 1 x 12...18 AWG or 2 x 16...18 AWG

Plug connection X2, SPEAKER OUT

Pin	Designation	Circuit class B (stub)	Circuit class A (loop)
1	OUT+	EOL resistor connection	Line output +
2	OUT-	EOL resistor connection	Line output -

Admissible cable cross-section: 1 x 12...18 AWG or 2 x 16...18 AWG

See also

- 📄 DIP switch S1501/S1601, configuration [→ 40]
- 📄 Cable lengths for cascading [→ 47]
- 📄 Common fault relay outputs X15, X16, X17 [→ 19]

6.4 Line out X3

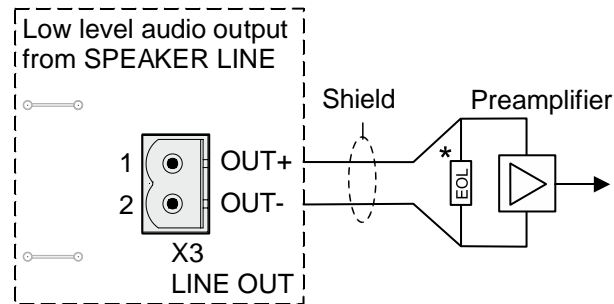


Figure 16: Plug connection wiring of the low-level audio output

* The active monitoring of the audio output can be activated by S1601-6 'SUPV LINE OUT'. The line at the speaker must be terminated with an EOL resistor of 3.3 k Ω , Siemens part no. C24235-A1-K14.

Plug connection X3, LINE OUT

The LINE-OUT connection -has the same transmission as the amplifier line.

Pin	Designation	Description
1	OUT+	Low-level audio output + to a preamplifier
2	OUT-	Low-level audio output - to a preamplifier

Permissible cable cross-section for all plug connections: 1 x 12...18 AWG or 2 x 16...18 AWG

Recommended cables: shielded double cable, shielding grounded only on one side.

The shield connection kit (EBA2001) FHA2045 is required to connect the shielding. You will find more information in the A6V10437430 mounting instructions.

6.5 Line in X4

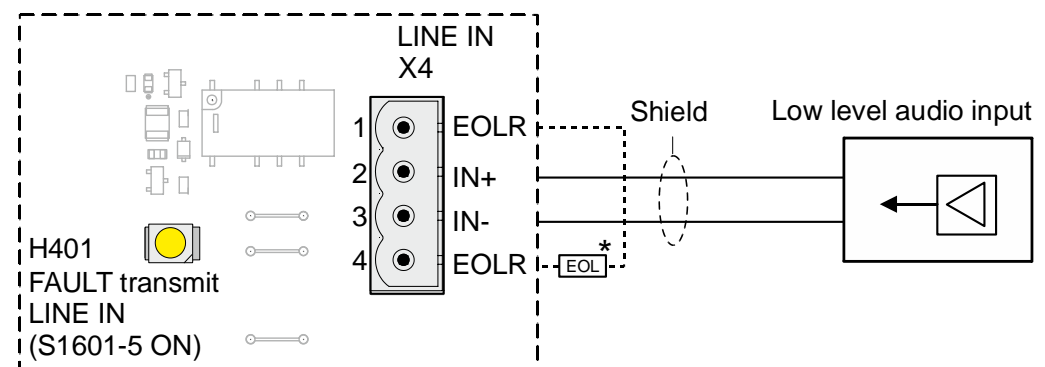


Figure 17: Plug connection wiring of the low-level audio input

* The audio line can be monitored by connecting an EOL resistor of 3.3 k Ω , Siemens part no. C24235-A1-K14. The supervision and the appropriate EOLR value are determined by the 'External source'.

For fault transmit, the DIP switch S1601-5 'FAULT TBL: LINE', must be set to ON. A fault transmit is signaled by the 'H401' LED on the booster amplifier mainboard (100 W).

The following DIP switches must be configured, see DIP switch S1501/S1601, configuration [→ 40]:

- S1501-5 'PRIORITY: LINE/SPEAKER'
- S1501-7 and S1501-8 'LINE INPUT LEVEL'

Plug connection X4, LINE IN


Pin	Designation	Description
1	EOLR	EOL resistor connection, with activated supervision
2	IN+	Low-level audio input +
3	IN-	Low-level audio input -
4	EOLR	EOL resistor connection, with activated supervision

Permissible cable cross-section for all plug connections: 1 x 12...18 AWG or 2 x 16...18 AWG

Recommended cables: Shielded double cable, shielding grounded only on one side.

For the connection to the low-level audio input of the booster amplifier panel, the FHA2054 audio transformer kit is required to isolate the audio signal and to connect the shielding. You will find more information in the document A6V10590197 'FHA2054-U1 Mounting / Installation'.

See also

 DIP switch S1501/S1601, configuration [→ 40]

6.6 Amplifier outputs X11, X12, X13, X14

The amplifier outputs are connected corresponding to the input connections (SPEAKER_IN X1 and SPEAKER_OUT X2) as class A or class B lines. In each type of connection, the amplifier 2 can be connected in parallel to amplifier 1 as a backup amplifier configuration.

The following DIP switches must be configured, see DIP switch S1501/S1601, configuration [→ 40]:

- S1501-1 'AMP-1: 25 V/70 V'
- S1501-2 'AMP-2: 25 V/70 V'
- S1601-1 'BACKUP MODE: ON/OFF'
- S1601-2 'AMP 1: CLASS A CIRCUIT/2 STUB'
- S1601-3 'AMP 2: CLASS A CIRCUIT/2 STUB'



You will find more information about field wiring in chapter 'Cable lengths for speaker circuits [→ 45]'.

Wiring example of booster amplifier mainboard (100 W) with three class B lines

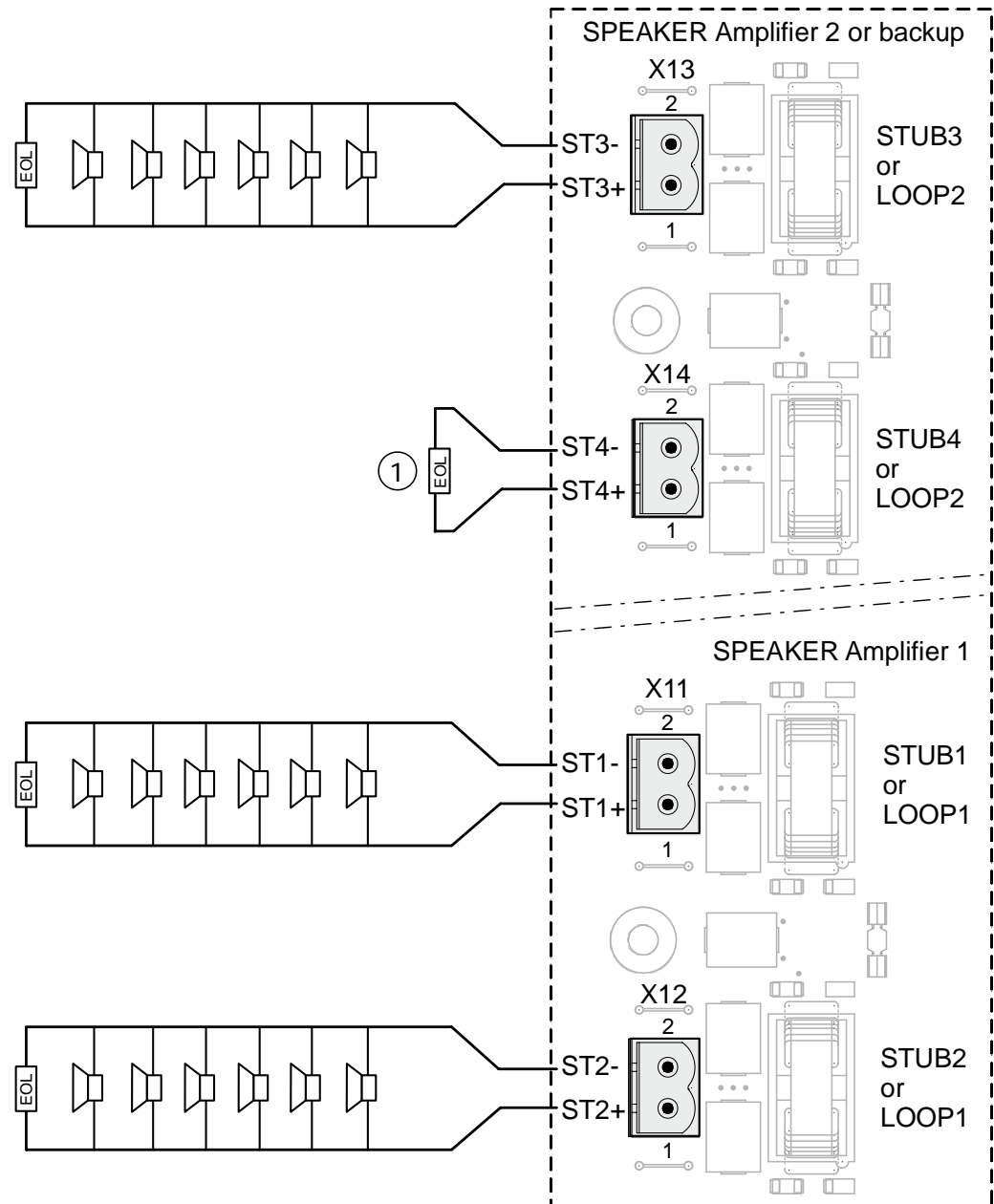


Figure 18: Wiring example of booster amplifier mainboard (100 W) with three class B lines

EOL EOL resistor 68 k Ω , Siemens part no. 140-034728

1 Non-connected class B circuits must also be terminated with an EOL resistor.

Wiring example of booster amplifier mainboard (100 W) with two class A lines

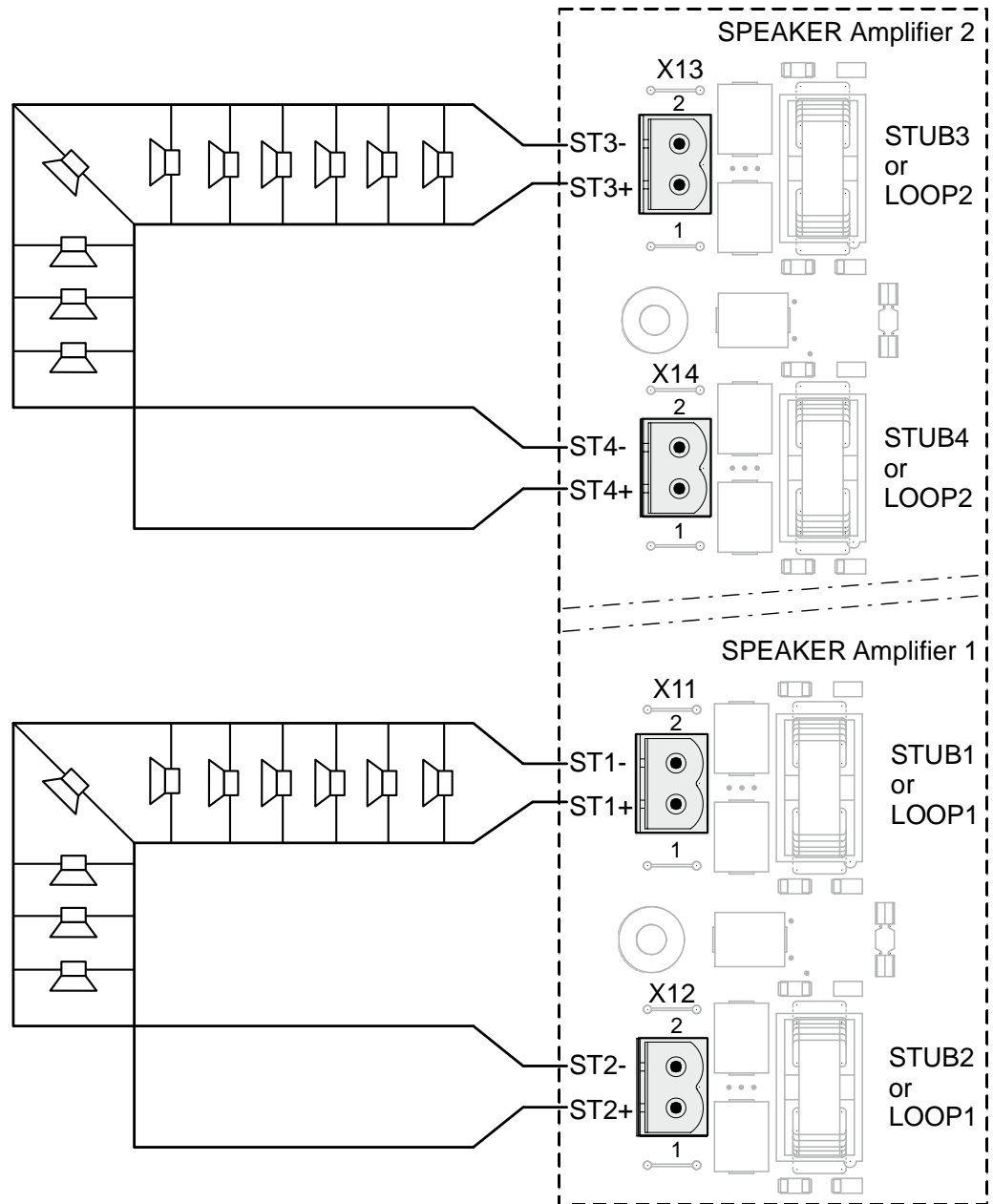


Figure 19: Wiring example of booster amplifier mainboard (100 W) with two class A lines
No EOL resistor required.

Wiring example of booster amplifier mainboard (100 W) with one class A line with backup mode

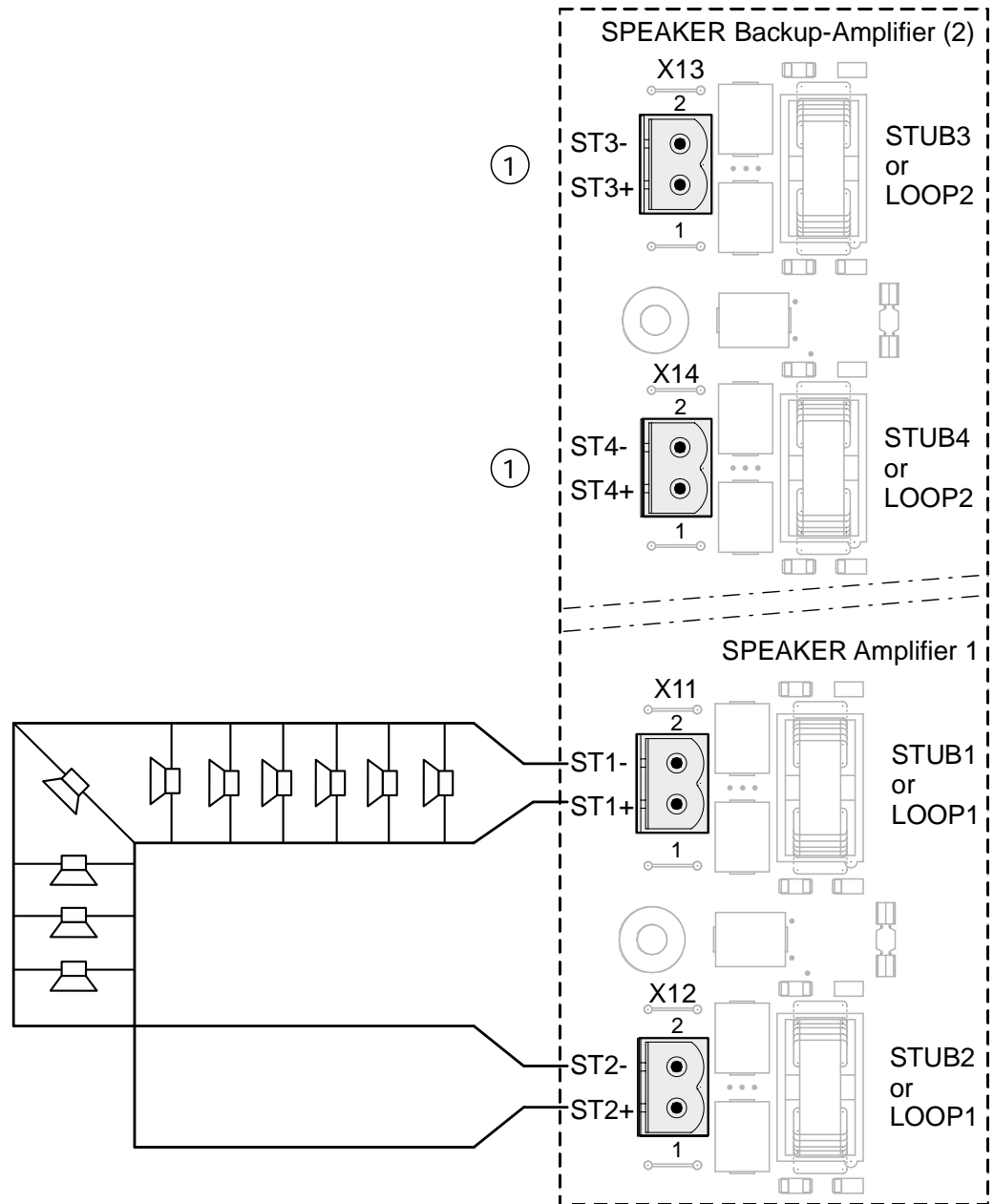


Figure 20: Wiring example of booster amplifier mainboard (100 W) with one class A line with backup mode

1 Amplifier 2 not connected in backup mode

No EOL resistor required.

Plug connection X11, amplifier 1

Pin	Designation	Description
2	ST1-	Speaker output 1-, class B circuit 1 or class A circuit 1
1	ST1+	Speaker output 1+, class B circuit 1 or class A circuit 1

Plug connection X12, amplifier 1

Pin	Designation	Description
2	ST2-	Speaker output 2-, class B circuit 2 or class A circuit 1
1	ST2+	Speaker output 2+, class B circuit 2 or class A circuit 1

Plug connection X13, amplifier 2

Pin	Designation	Description
2	ST3-	Speaker output 3-, class B circuit 3 or class A circuit 2
1	ST3+	Speaker output 3+, class B circuit 3 or class A circuit 2

Plug connection X14, amplifier 2

Pin	Designation	Description
2	ST4-	Speaker output 4-, class B circuit 4 or class A circuit 2
1	ST4+	Speaker output 4+, class B circuit 4 or class A circuit 2

Permissible cable cross-section for all plug connections: 1 x 12...18 AWG or 2 x 16...18 AWG



Compatible devices

You will find further information in the following documents:

Desigo Compatible Notification Appliances, List of devices A6V10333530

Cerberus PRO Compatible Notification Appliances, List of devices A6V10333532

See also

DIP switch S1501/S1601, configuration [→ 40]

6.7 Download plug connection X1502

The plug connector is behind the round opening in the shield plate at the bottom right.

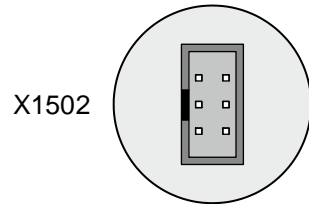


Figure 21: Download plug connection X1502

The 6-pin plug connector X1502 is for connection of the USB serial converter cable, in order to enable a direct PC connection. This allows a firmware update to be performed.

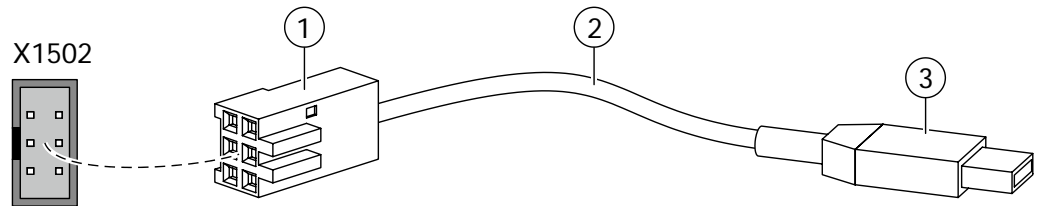


Figure 22: View of PAD-4 LUA USB serial converter cable

- | | |
|-------|---|
| X1502 | 6-pin plug connector on booster amplifier mainboard |
| 1 | Plug for X1502 |
| 2 | PAD-4 LUA, USB serial converter cable |
| 3 | USB plug for PC |

You will find more information on firmware updates in the documents related to the FW Update Tool:

- A6V10330473 Installation Instructions PAD-4-FDT Firmware Diagnostic Tool Kit
- A6V10430024 FW Update Tool

7 Indicators

LED indicators for system status and VU meter

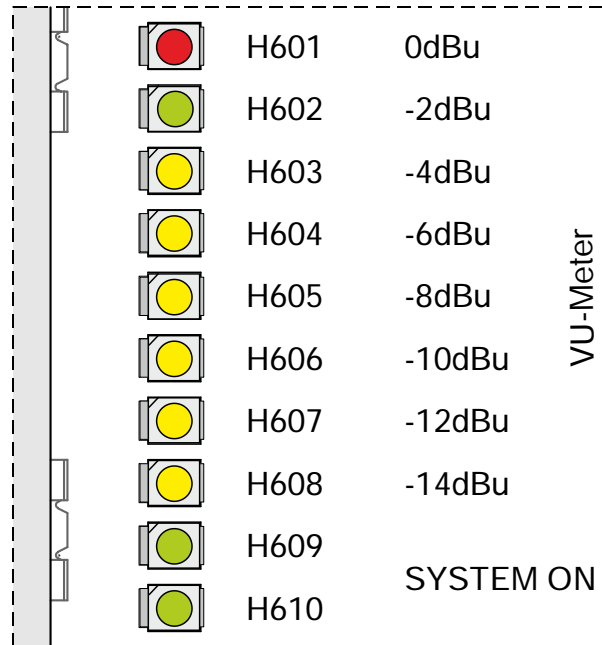


Figure 23: Arrangement and function of the system status display and of the VU meter

LED	Color	Designation	Condition	Meaning
H601	Red	VU meter	ON	Modulation indicator of the amplifier: <ul style="list-style-type: none"> • 0 dBu (100%): Red • -2 dBu: Green • -4...-14 dBu: Yellow
H602	Green			
H603 to H608	Yellow			
H609	Green	SYSTEM ON	ON (both LEDs)	• System switched on and ready for operation
H610			OFF (both LEDs)	• System switched off

LED indicators for SPEAKER FAULT and LINE FAULT transmit

The DIP switch S1501 must be correspondingly set for fault transmit at the LINE_IN and SPEAKER_IN connections.

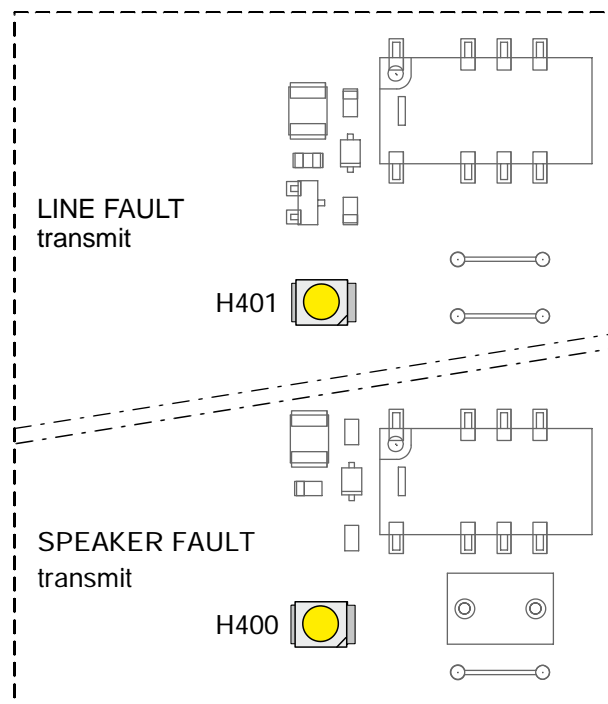


Figure 24: Arrangement and function of the SPEAKER FAULT and LINE FAULT indicators

LED	Color	Designation	Condition	Meaning
H401	Yellow	LINE IN: FAULT transmit	ON	<ul style="list-style-type: none"> General fault (DIP switch S1501_5 must be at the ON position)
			OFF	<ul style="list-style-type: none"> Normal operation
H400	Yellow	SPEAKER IN: FAULT transmit	ON	<ul style="list-style-type: none"> General fault (DIP switch S1501_4 must be at the ON position)
			OFF	<ul style="list-style-type: none"> Normal operation

Amplifier status LED indicators

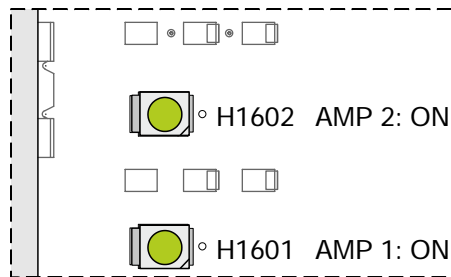


Figure 25: Arrangement and function of the amplifier status indicators

LED	Color	Designation	Condition	Meaning
H1602	Green	AMP 2: ON	ON	• Amplifier 2 is switched on
			OFF	• Amplifier 2 is switched off
H1601	Green	AMP 1: ON	ON	• Amplifier 1 is switched on
			OFF	• Amplifier 1 is switched off

LED indicators for system and amplifier faults

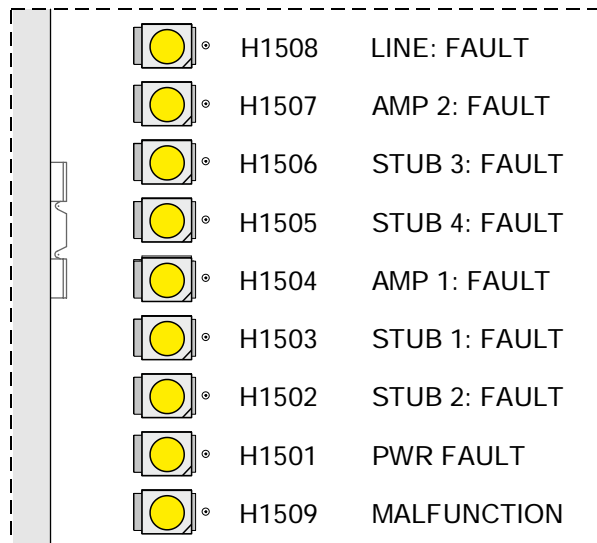


Figure 26: Arrangement and function of the fault LEDs H1501...H1509

LED	Color	Designation	Condition	Meaning
H1508	Yellow	LINE	OFF	• Normal operation
			Slow flashing	• Open circuit LINE OUT
			Fast flashing	• Short-circuit LINE OUT
			Pulsating	• Fault on LINE internal • Fault on LINE IN

LED	Color	Designation	Condition	Meaning
H1507	Yellow	AMP 2	OFF	• Normal operation
			Slow flashing	• Fault in the amplifier power supply unit
			Fast flashing	• Fault at the amplifier line
			Pulsating	• Amplifier protection
H1506	Yellow	STUB 3 or class A circuit 2	OFF	• Normal operation
			Slow flashing	• Open circuit
			Fast flashing	• Short circuit
H1505	Yellow	STUB 4	OFF	• Normal operation
			Slow flashing	• Open circuit
			Fast flashing	• Short circuit
H1504	Yellow	AMP 1	OFF	• Normal operation
			Slow flashing	• Fault in the amplifier power supply unit
			Fast flashing	• Fault at the amplifier line
			Pulsating	• Amplifier protection
H1503	Yellow	STUB 1 or class A circuit 1	OFF	• Normal operation
			Slow flashing	• Open circuit
			Fast flashing	• Short circuit
H1502	Yellow	STUB 2	OFF	• Normal operation
			Slow flashing	• Open circuit
			Fast flashing	• Short circuit
H1501	Yellow	PWR FAULT	OFF	• Normal operation
			Slow flashing	• Operating voltage too high/too low
			Fast flashing	• Battery voltage too high/too low
			Pulsating	• Mains failure (supply from battery)
			ON	• Fault when charging the battery
H1509	Yellow	MALFUNCTION	OFF	• Normal operation
			ON	• Functional fault

Definition of the LED flashing modes

- Slow flashing: on: 1.25 s, off: 0.75 s
- Fast flashing: on: 0.25 s, off: 0.25 s
- Pulsating: on: 0.25 s, off: 1.75 s

FAULT indicators

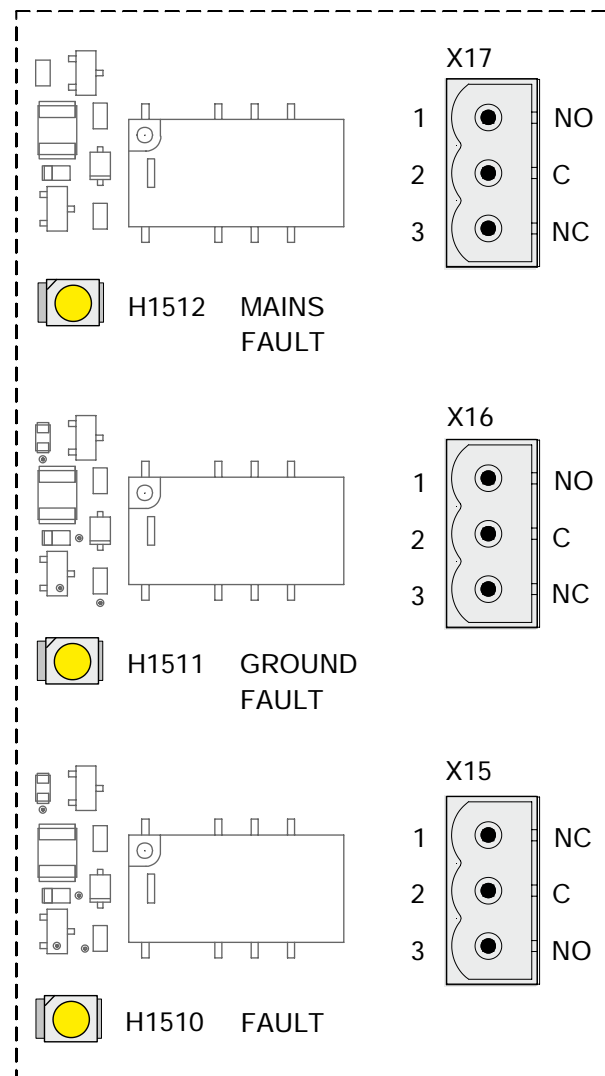


Figure 27: Arrangement and function of the fault LEDs H1510...H1512

LED	Color	Designation	Condition	Meaning
H1512	Yellow	MAINS FAULT	ON	• 'MAINS FAULT' relay activated
			OFF	• 'MAINS FAULT' relay deactivated
H1511	Yellow	GROUND FAULT	ON	• 'GROUND FAULT' relay activated
			OFF	• 'GROUND FAULT' relay deactivated
H1510	Yellow	FAULT (common fault)	ON	• 'FAULT' relay activated
			OFF	• 'FAULT' relay deactivated









8 Adjustment elements

8.1 DIP switch S1501/S1601, configuration

The booster amplifier mainboard (100 W) is configured using both DIP switches S1501 and S1601. The tables below indicate the settings options and the factory settings.

DIP switch S1501

S1501

	8	LINE INPUT LEVEL
	7	LINE INPUT LEVEL
	6	SPEAKER IN: 25V
	5	PRIORITY: LINE
	4	Not used
	3	CHARGER: OFF
	2	AMP-2: 70V
	1	AMP-1: 70V

Switch	Designation	Default	ON	OFF	Function
8	LINE INPUT LEVEL	OFF	x	x	See table below for detailed settings
7	LINE INPUT LEVEL	OFF	x	x	
6	SPEAKER IN: 25 V	OFF	25 V	70 V	Setting the standard input voltage for the speaker input
5	PRIO: LINE	OFF	Priority LINE_IN	Priority SPEAKER_IN	Setting the LINE_IN/SPEAKER_IN priority
4	Not used				
3	CHARGER: OFF	OFF	Battery charging OFF	Battery charging ON	Configuring the battery charging connection
2	AMP-2_70 V	OFF	70 Veff	25 Veff	Setting the standard output voltage for amplifier 2 *
1	AMP-1_70 V	OFF	70 Veff	25 Veff	Setting the standard output voltage for amplifier 1









* No influence when S1601-1: 'BACKUP MODE: ON'

Detailed settings for LINE INPUT LEVEL S1501-7/S1501-8

S1501-7	S1501-8	LEVEL	Function
ON	ON	1V55	Not permitted
OFF	ON	1V00	Not permitted
ON	OFF	0V75	Not permitted
OFF	OFF	OFF	LINE IN Audio input OFF

DIP switch S1601

S1601

	Not used
	MAINS FAIL: FAULT
	SUPV LINE OUT
	FAULT TBL: LINE
	FAULT TBL: SPEAKER
	AMP 2: LOOP
	AMP 1: LOOP
	BACKUP MODE

Switch	Designation	Default	ON	OFF	Function
8	Not used	–	–	–	–
7	MAINS FAIL: FAULT	OFF	Yes	No	A fault at an external supply should be signaled as a general fault
6	SUPV LINE OUT	OFF	With supervision	Without supervision	Setting of supervision on LINE_OUT, X3
5	FAULT TBL: LINE	OFF	With transmission	Without transmission	Setting of transmission 'General fault' on LINE_IN, X4
4	FAULT TBL: SPEAKER	OFF	With transmission	Without transmission	Setting of transmission 'General fault' on SPEAKER circuit, X1
3	AMP 2: Class A circuit	OFF	1x class A circuit	2x class B circuit	Setting the line operating mode for amplifier 2. No influence when switch 1 = ON
2	AMP 1: Class A circuit	OFF	1x class A circuit	2x class B circuit	Setting the line operating mode for amplifier 1.
1	BACKUP MODE	OFF	Backup mode AMP1=active AMP2=backup	AMP1=active AMP2=active	Setting the amplifier operating mode

8.2 Reset button S301

A brief press on the reset button S301 restarts the processor of the booster amplifier mainboard (100 W).

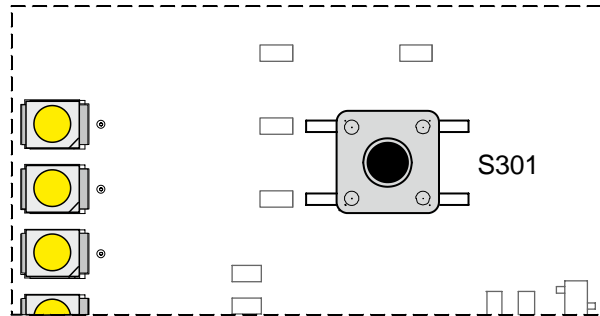


Figure 28: View of reset button S301

9 Calculations

To calculate the battery size and the field wiring, you have the following options:

- Automatic calculation using the 'EBA2001 Battery & Wire calculation sheet' A6V10492915
- Manual calculation using the tables in chapters 'Battery size [→ 43]' and 'Cable lengths for speaker circuits [→ 45]'

9.1 Battery size

Siemens Voice (Audio boosters)

Line	A Device	B Quantity of Amp	C Standby current [Amp]	D Active current [Amp] (table x1)	E Total active current (B x D) [Amp]
1	EBA2001 2 x 50 W @ 25 Vrms		0.120		
2	EBA2001 2 x 50 W @ 70 Vrms		0.120		
3	EBA2001 50 W backup @ 25 Vrms	1	0.120		
4	EBA2001 50 W backup @ 70 Vrms	1	0.120		
Total standby calculations					
a	Total standby current, column C		0.120	[Amp]	
b	Total standby hours (4 / 24 / 60 / 72 / 90)			[hour]	
7	Total standby capacity Ah (Amp Hours) (a x b)			[Ah]	
Alarm current calculations					
8	Total alarm current. Add column E			[Amp]	
9	Multiply by 0.083 for 5 min, 0.5 for 30 min, 1 hour or 2 hours of alarm active			[hour]	
10	Total alarm current Ah (Amp hours)			[Ah]	
Battery backup requirements					
c	Subtotal, add line 7 + 10			[Ah]	
d	Enter derating safety factor (1.10, 1.20, 1.25, 1.30, 1.40)				
13	Total Ah (Amp hours) required (c x d)			[Ah]	
14	Ah rounded up [Ah]				



The EBA2001 provides only for 24 VDC, 18 Ah battery space.
The EBA2001 can charge up to 1.5 amps per hour.

Table x1 input power rating

Power [W]	25 Vrms 24 V input current	70 Vrms 24 V input current
10	0.62	0.95
20	1.10	1.50
30	1.65	2.05
40	2.13	2.50
50	2.47	2.80

Table 1: Active current draw from battery at 24 V nominal

Details for ordering recommended batteries:

Capacity	Battery (12 V, 18 Ah)
Size	7.13 x 3.03 x 6.6" / 181 x 77 x 168 mm
Manufacturer order number	WERKER WKA12-18NB
	POWER-SONIC PS-12180 NB
	YUASA NP-18-12B

See also

 Mains connection, supply X10 and battery X6 [→ 16]

9.2 Cable lengths for speaker circuits

The installation of all wiring, cables, and equipment must be in accordance with NFPA 70, National Electrical Code.

The following tables illustrate the cable lengths for specific wire gauges for speaker loads based on power, and assuming a 1.5 dB power line loss due to power drop is acceptable.



- For each speaker zone, select the total power for each amplifier.
- Calculations are based on assuming that all speakers are lumped at the end (worst case condition).
- Wire gauge resistance is based on solid copper at 75 °C / 167 °F.

Maximum cable length (class A or B) in feet for 1.5 dB power loss at 25 Vrms

Speaker load	22 AWG	20 AWG	18 AWG	16 AWG	14 AWG	12 AWG	
	20.52	12.76	8.08	5.08	3.19	2.01	[Ω/1000 ft]
10 W	292	470	743	1181	1881	2985	[ft]
20 W	144	231	365	581	925	1468	[ft]
25 W	115	184	291	463	737	1169	[ft]
30 W	95	153	241	384	611	970	[ft]
40 W	71	114	179	285	455	721	[ft]
50 W	58	94	149	236	376	597	[ft]

Table 2: Maximum cable length (class A or B) in feet for 1.5 dB power loss at 25 Vrms

Maximum cable length (class A or B) in feet for 1.5 dB power loss at 70 Vrms

Speaker load	22 AWG	20 AWG	18 AWG	16 AWG	14 AWG	12 AWG	
	20.52	12.76	8.08	5.08	3.19	2.01	[Ω/1000 ft]
10 W	2242	3605	5693	9055	14420	22886	[ft]
20 W	1121	1803	2847	4528	7210	11443	[ft]
25 W	877	1411	2228	3543	5643	8955	[ft]
30 W	731	1176	1856	2953	4702	7463	[ft]
40 W	560	901	1423	2264	3605	5721	[ft]
50 W	439	705	1114	1772	2821	4478	[ft]

Table 3: Maximum cable length (class A or B) in feet for 1.5 dB power loss at 70 Vrms

Maximum cable length (class A or B) in meters for 1.5 dB power loss at 25 Vrms

Speaker load	22 AWG	20 AWG	18 AWG	16 AWG	14 AWG	12 AWG	
	67.32	41.86	26.50	16.70	10.40	6.57	[Ω/km]
10 W	89	143	226	359	577	913	[m]
20 W	44	70	111	177	284	449	[m]
25 W	35	56	89	141	226	358	[m]
30 W	29	47	74	117	188	297	[m]
40 W	22	35	55	87	139	221	[m]
50 W	18	29	45	72	115	183	[m]

Table 4: Maximum cable length (class A or B) in meters for 1.5 dB power loss at 25 Vrms

Maximum cable length (class A or B) in meters for 1.5 dB power loss at 70 Vrms

Speaker load	22 AWG	20 AWG	18 AWG	16 AWG	14 AWG	12 AWG	
	67.32	41.86	26.50	16.70	10.40	6.57	[Ω/km]
10 W	683	1099	1736	2754	4423	7002	[m]
20 W	342	549	868	1377	2212	3501	[m]
25 W	267	430	679	1078	1731	2740	[m]
30 W	223	358	566	898	1442	2283	[m]
40 W	171	275	434	689	1106	1750	[m]
50 W	134	215	340	539	865	1370	[m]

Table 5: Maximum cable length (class A or B) in meters for 1.5 dB power loss at 70 Vrms

See also

📄 Amplifier outputs X11, X12, X13, X14 [→ 29]

9.3 Cable lengths for cascading

The quantity of booster amplifier panels than can be cascaded depends on the output capability of the audio source and wiring size/length consideration.

The tables below illustrate the typical cable lengths for specific wire gauges for cascading booster amplifier loads based on power, and assuming a 1.5 dB power line loss due to power drop is acceptable.



- The values are independent of the speaker operating voltage from 25 Vrms or 70 Vrms.
- Calculations are based on assuming that all booster amplifier panels are lumped at the end (worst case condition).
- Wire gauge resistance is based on solid copper at 75 °C / 167 °F.
- Contact resistors not taken into consideration.

Maximum cable length (class A or B) in feet based on a 1.5 dB power drop

Cascaded booster amplifiers	22 AWG	20 AWG	18 AWG	16 AWG	
	20.52	12.76	8.08	5.08	[Ω/1000 ft]
10	39042	62785	99150	157704	[ft]
20	19521	31392	49575	78852	[ft]
100	3904	6278	9915	15770	[ft]

Table 6: Maximum cable length (class A or B) in feet based on a 1.5 dB power drop

Maximum cable length (class A or B) in meters based on a 1.5 dB power drop

Cascaded booster amplifiers	22 AWG	20 AWG	18 AWG	16 AWG	
	67.32	41.86	26.50	16.70	[Ω/1000 ft]
10	11900	19137	30231	47972	[m]
20	5950	9568	15116	23986	[m]
100	1190	1914	3023	4797	[m]

Table 7: Maximum cable length (class A or B) in meters based on a 1.5 dB power drop

See also

- Speaker input X1, speaker output X2 [→ 22]

10 Maintenance

10.1 Testing



Inspection, testing, and maintenance of the fire alarm system should be performed in accordance with NFPA 72, The National Fire Alarm Code and authorities having jurisdiction (AHJ).

- If the system is connected to the fire department etc., or actuates an internal system, disarm the appropriate outputs before servicing to prevent actuation.
- Notify the fire department and personnel at your facility that a system test is being performed.
- Notify the fire department before resetting the system.

As per ULC-S527, section 7.5, the installation wiring drawings shall cover the following:

- A wiring method which shall be in accordance with CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, part I, section 32.

10.2 Battery maintenance



Perform the following tests at the recommended interval.



Replace the battery set every four years or if any of the test criteria are not met.

Initiation / reacceptance

- Charger test: With the batteries fully charged and connected to the charger, measure the voltage across the battery set. It must read 27.3 V +/- 0.3 V.
- Discharge test: With full system alarm load, the voltage on a fully charged battery must not fall below 20.4 V after 30 min.
- Load voltage test: With full system alarm load, the voltage on a fully charged battery must not fall below 24.6 V after one minute.

Testing interval

- Semiannually: Perform the load voltage test.
- Annually: Perform the charger test and discharge test.

You will find details and references for testing and maintenance in the following document:

- ULC-S527, sec. 7.3 'D All test and maintenance instruction codes and software necessary to provide test and inspection requirements of CAN/ULC-S536, Standard for the Inspection and Testing of Fire Alarm Systems'

11 Technical data

Booster amplifier	EBA2004-A1 Booster amplifier mainboard (100 W)	2 x 50 W
Power supply (170W)	AC input	AC 115/230 V, 60/50 Hz , @ 2 A max.
	DC output	DC 26 V/6.5 A
Supply input [X10]	Voltage	DC +26 V
	Current, max	6.5 A
Battery [X6]	Voltage, nominal	DC +24 V
	Output current, max	6.5 A
	Charge voltage, max	DC +27.3 V
	Charge current, max	1.5 A
Audio line input [X4]	Frequency range	UL: 450 Hz-3 kHz \pm 3 dB ULC: 375 Hz-7 kHz \pm 3 dB
	Input level, max	1.55/1.0/0.75 Vrms or OFF, selectable
	Impedance	60 k Ω @ 1 kHz
Audio line output [X3]	Frequency range	UL: 450 Hz-3 kHz \pm 3 dB ULC: 375 Hz-7 kHz \pm 3 dB
	Harmonic distortion	1 %
	Crossover distortion	1 %
	Output level, max	1.55 Vrms
	Impedance	220 Ω @ 1 kHz
	Supervision voltage	DC 4 V
	Supervision EOL	3.3 k Ω if selected
	Line fault resistor detection	0.1 Ω wire to wire
Audio speaker input [X1]	Frequency range	350 Hz...7 kHz \pm 3 dB
	Input level, max	25 Vrms or 70 Vrms
	Impedance	85 k Ω @ 1 kHz
	Input load	8 mW @ 25 Vrms 60 mW @ 70 Vrms
Audio speaker outputs [X11, X12, X13, X14]	Frequency range	UL: 450 Hz-3 kHz \pm 3 dB ULC: 375 Hz-7 kHz \pm 3 dB
	Output voltage	25 Vrms or 70 Vrms
	Output wattage, max	2 x 50 W or 1 x 50 W in backup mode
	Impedance	1 Ω @ 1 kHz
	Supervision voltage	DC 5.2 V
	Supervision EOL	68 k Ω (stub configuration)

Dry contacts [X15, X16, X17]	Contact rating	2.0 A, DC 30 V maximum resistive, non supervised
	Common trouble	Form C contact (energized in normal operation)
	Ground fault	Form C contact
	Mains fault	Form C contact
Ground fault	Supervised wires	Audio-line output, Audio-speaker outputs
	Resistor detection levels	<ul style="list-style-type: none"> • Ground fault: 0.1 Ω • Ground fault: <1 kΩ for positive audio circuits
Mechanical data	Dimensions (W x H x D)	8.66" x 1.69" x 13.39"
		220 mm x 43 mm x 340 mm
	Weight	2.6 lb/1.2 kg

**NOTICE****Power limiting**

The AC power and the battery wiring are not power limited. All other circuits leaving the amplifier panel are power limited. Reference to power limited is deemed Class 2. Reference to power limited 70 V speaker circuits is deemed Class 3.

12 FCC Statement



⚠ WARNING

Installation and usage of equipment is not in accordance with instructions manual

Radiation of radio frequency energy

Interference to radio communications

- Install and use equipment in accordance with instructions manual.
- Read the following information.

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications.

It has been tested and found to comply with the limits for a Class A computing device pursuant to Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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