Hardware Manual
S-Series

Version 1.2

December 2023

SEEBURG
acoustic line

1 Contents

2 Foreword

The four-channel S-Series system amplifiers cover a wide range of applications with a total output of 2.5 to 20 kilowatts. They are able to drive high and low impedances and are therefore suitable for both live applications and fixed installations.

The amplifiers are equipped with a high-quality 64-bit double-precision 96kHz FIR DSP and a large, capacitive IPS touch display. The DSP contains a very extensive preset library for SEEBURG loudspeakers. The user can also create their own presets for third-party products.

The S-Series can be fully operated and monitored remotely via Ethernet. Thanks to the integrated network switch, the network connection can be passed on directly to the next device (daisy chain). Analogue and digital (AES3) signals can be fed in via the XLR inputs. Optionally, audio over Ethernet (AoE) signals can be processed via an AES67 interface (Dante™ compatible).

The wide-range switching power supplies allow operation on mains voltages from 90 to 265 volts. They have an active power factor correction (PFC) and thus relieve the mains supply considerably.

Thanks to the latest generation of Class D topology, the power amplifiers achieve very high levels of efficiency regardless of the load. They generate very little waste heat, which is dissipated to the rear by a temperature-controlled, quiet fan. The already low idle power consumption can be reduced to below 5W by a remotely switchable standby mode.

The amplifier channels can drive low-impedance loads down to 2 ohms, as well as high-impedance loads in 100V/70V/50V/35V lines. The advanced power management PCM™ provides the highest possible output power on the individual channels until the capacity of the power supply is exhausted.

3 Safety Instructions & Installation

ATTENTION!

The lightning symbol indicates the presence of possibly uninsulated, dangerous voltages!

Read this manual before using the device!

When the appliance is installed, the plug inserted into the socket outlet must be easily accessible.

The device must be earthed (via the mains plug).

Observe the professional association regulation BGV A2 – "Electrical systems and equipment" or the equivalent of this regulation valid in your country.

If necessary, observe any deviating regulations when using the device abroad.

The amplifier may only be connected to the loudspeakers by a specialist.

INSTALLATION NOTES

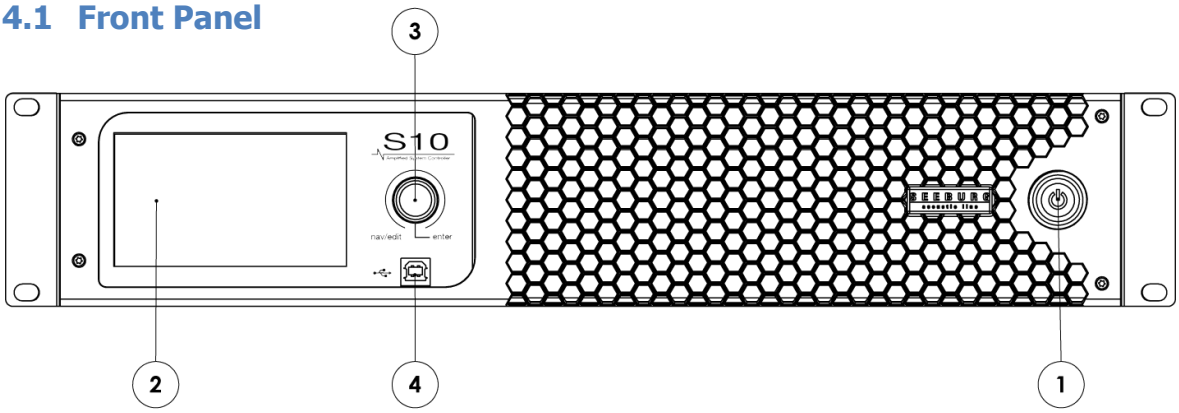
Note that the airflow to cool these devices is front-to-back.

Make sure that there are no objects on the front and back of the device that would impede the airflow and thus the correct functioning of the cooling system.

Objects to the right and left of the device should be at least 2 centimetres away.

4 Device Overview

4.1 Front Panel



(1) Illuminated operating mode button:

Lights up as soon as mains voltage is present. **Red**: Device in standby can be addressed via Ethernet. **Green**: device in operation.
To switch the operating mode, hold down the button for one second.

(2) Touch Screen:

Display information and enter settings. See the Operation section of this manual.

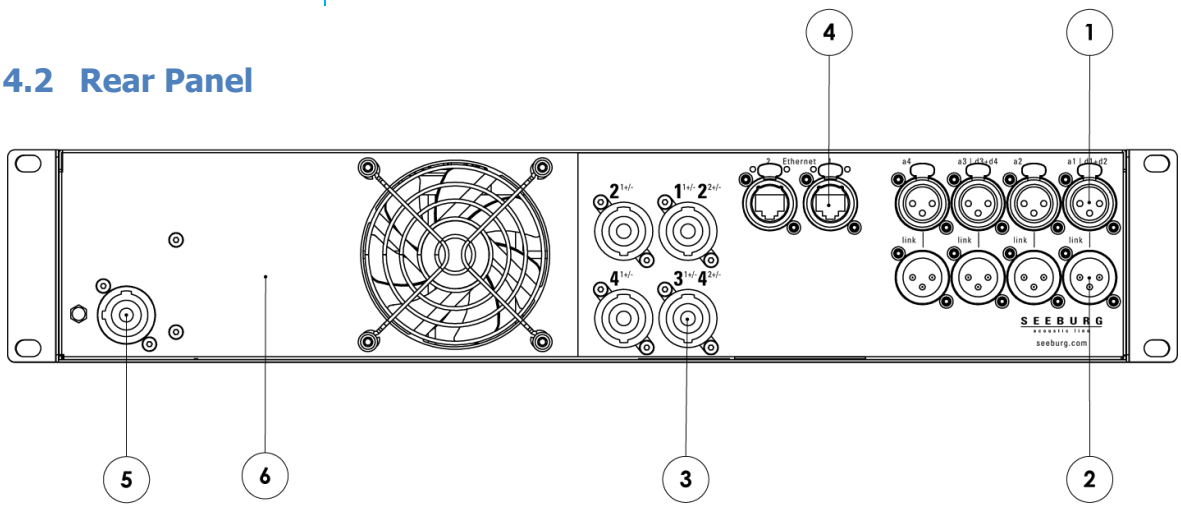
(3) Push Encoder:

Navigation across the display areas, changing and entering settings.

(4) USB Socket:

For firmware updates and device control without Ethernet.

4.2 Rear Panel



(1) Signal Input:
Neutrik® XLR sockets for analogue or digital (AES3) signals. Sockets 1 and 3 are used for the two-channel AES3 signals.

(2) Signal Link:
Parallel XLR outputs for daisy-chaining the signal to other amplifiers.

(3) Loudspeaker Connectors:
Neutrik® SpeakOn™ receptacles for connecting the loudspeakers.

(4) Ethernet Ports:
2x RJ45-compatible Neutrik® EtherCon™ sockets for connecting to a network. With switch for direct connection (daisy-chaining) to other amplifiers.

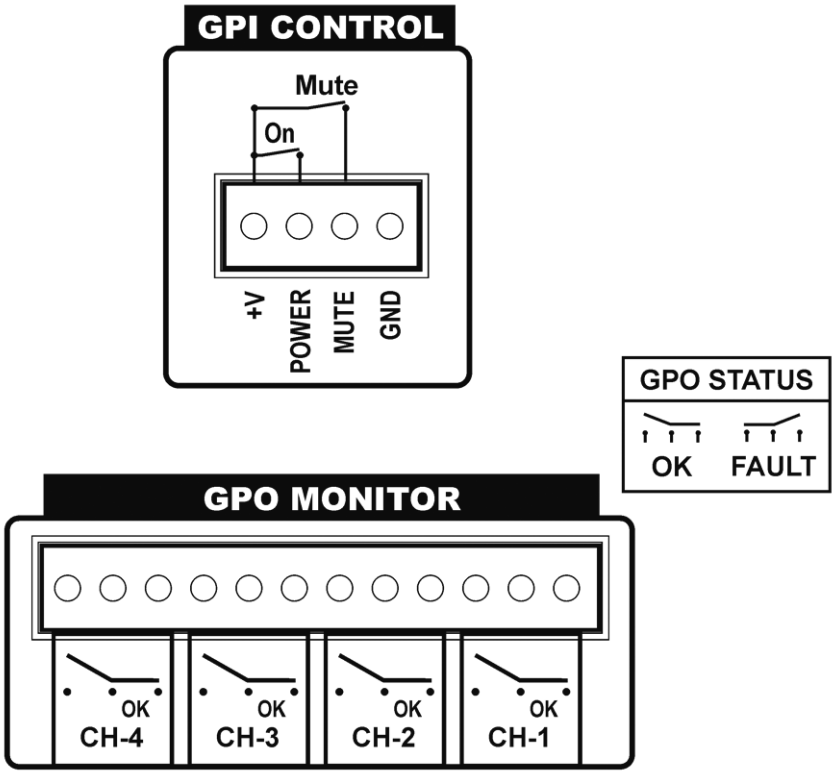
(5) Mains Connection:
Neutrik® PowerCon™ socket for connection of a 3-wire power cable according to local regulations. Socket can be switched under load and has the function of a mains switch.

(6) GPIO Ports (Option):
For remote switching and monitoring. See next chapter for details.

For fractions of a second, the amplifiers can draw peak currents far in excess of what is listed under “Rated Current Consumption” in the data table. We recommend operating the amplifiers on circuit breakers with C characteristics.

4.3 General Purpose Input / Output Ports (GPIO)

The S-series power amplifiers can be optionally equipped with GPIO interfaces. The GPI pins are used to switch the operating state (on/off) and a global mute. Error messages of the outputs can be output via the GPO pins.



GPI: 15V are output via the +V pin. Connecting this output to the "Power" pin switches the amplifier on, connecting it to the "Mute" pin mutes all outputs. Alternatively, switching can be done via an external voltage source between 3V and 24V (referenced to GND).

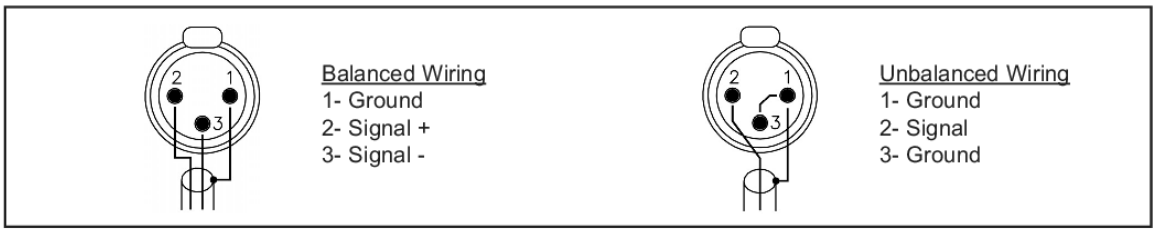
GPO: The status of each amplifier output is reported via three pins. For this purpose, relays close either between pins 1 and 2 (fault) or pins 2 and 3 (OK). By applying an external voltage, the status of the channels can be queried, depending on which pin combination has continuity. In normal operating mode, there is continuity between pins 2 and 3. If the amplifier is switched off, in standby or an error occurs in one of the channels, the respective (or all) relays switch pins 1 and 2 to continuity.

5 Operation

5.1 Connections

Connect the amplifier to a properly grounded AC 90-265V AC outlet.

The audio input signal can be either balanced or unbalanced.



Balanced signal: pin 1 ground, pin 2 positive signal (hot), pin 3 negative signal (cold).

Unbalanced signal: pin 1 ground, pin 2 signal, pin 3 ground.

ATTENTION: If you connect an unbalanced signal and pin 3 is not connected to the ground, this creates a loss of 6dB signal level at the output!

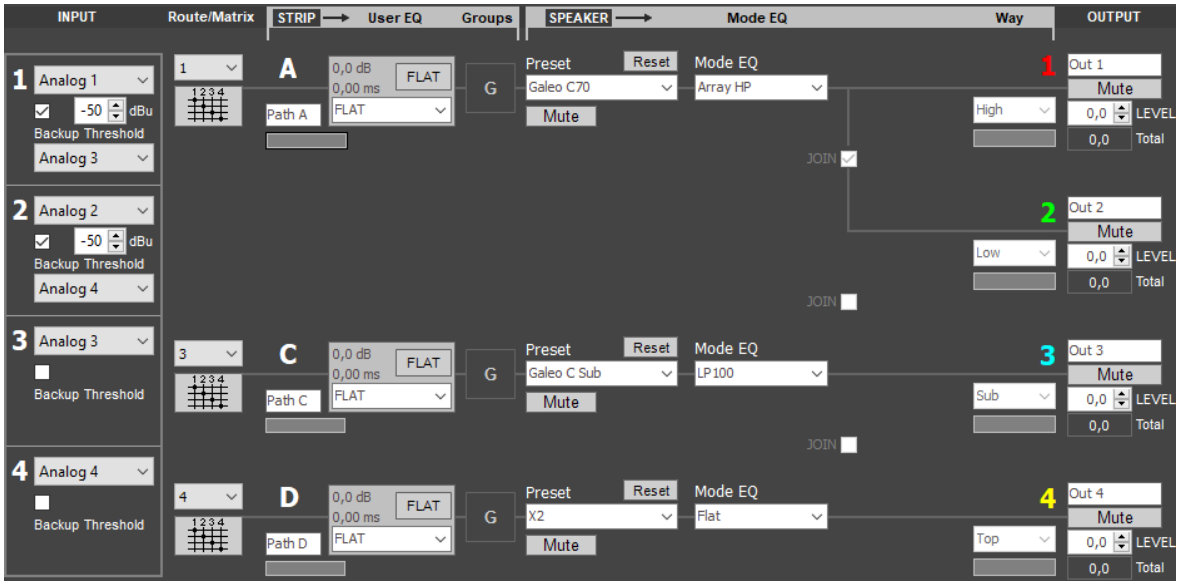
5.2 Start-up

As soon as the mains supply is restored, the amplifier restores the last operating state. If the power amplifier was previously in standby mode, this is restored - if the power amplifier was previously in operation, it switches on again and uses the last settings made. This includes all loaded speaker presets, level, mute, delay, EQ settings etc.

If the amplifier is in the standby state, it is switched on by pressing the operating mode button for at least one second. Booting up takes only a few seconds and the last set values are restored.

If the amplifier is in operation, pressing the operating mode button for at least one second puts it into standby mode. It can then only be addressed via Ethernet.

5.3 Signal Flow Basics



The figure shows a configuration example of the amplifiers and in it the basic structure of the signal flow from left (input) to right (output).

The physical hardware inputs (Analog 1…4, AES3 1…4) are assigned to the sources marked with the bold white numbers **1**, **2**, **3** and **4**. By setting the check mark at “Backup” the function for assignment of a secondary input is activated. If the signal of the primary input falls below the threshold value and a signal is present at the secondary input, the system automatically switches to the secondary input. If the signal returns at the primary input, it is automatically switched back to this input.

Next, a source is assigned to the input path, marked with the bold capital letters **A**, **B**, **C** and **D**. The four individual sources 1...4, the combinations 1+2 and 3+4, and the matrix mode are available for selection. In matrix mode, each source can be freely assigned to each input path and its level can be adjusted.

Each input path has a **User EQ** section. This provides six multimode filters, a high-pass filter, input delay, input gain, polarity reversal and mute. All settings made here can be saved as User EQ presets on the unit for later use via the PC software.

The following **Groups** section contains all the EQs, gains and delays added via the grouping function in the PC software.

Finally, a speaker system is assigned to the path. The **Speaker** preset contains all the basic cross-over and protection functions, the **Mode EQ** contains the specific settings for the respective type of use. The signal leaves the DSP to the amplifier channels **1**, **2**, **3** and **4**, which are highlighted in colour here. In the case of multi-way loudspeakers, the signal is output to the respective adjacent outputs.

5.4 Speaker and Modes

The loudspeaker library installed at the factory uses FIR filters for phase linearization. This ensures that the phase relationship of all SEEBURG loudspeakers is largely the same. In addition, a time alignment is integrated, whereby all SEEBURG tops (in HP mode) can be combined with all SEEBURG subwoofers. The reference plane is always the front of the speaker cabinet. For particularly time-critical applications, additional speaker presets with the name suffix "mon" are stored. For these, the FIR filters are deactivated for the shortest possible signal run-through time.

Selecting the **Mode EQ** assigns application-specific filtering and delay correction to the speaker.

5.4.1 Modes for tops / full-range loudspeakers

- **Flat**: Use of the entire frequency range that can be reproduced by the loudspeaker
- **HP**: Linear frequency response with high-pass filtering matching the loudspeaker model for maximum performance
- **LoBoost**: Full frequency range with additional bass boost for stand-alone use, maximum level may be limited
- Suffix “**soft**”: Lowering the mid-range for more pleasant listening at high volumes, especially for sound recording playback

5.4.2 Modes for subwoofers

- **LP xxx**: Low-pass filtering at the frequency indicated by the numerical value. The acoustic transfer function (consisting of loudspeaker and filters) is decisive
- Suffix “**CD**”: Cardioid mode. The rear-facing speakers in the configuration must be operated in this mode
- Suffix “**HCD**”: Hypercardioid mode (supercardioid). The rear-facing speakers in the configuration must be operated in this mode

5.4.3 Modes for fixed angle arrays

- **Sngl**, **Dbl**, **Trpl**: Basic equalizations for use with single speakers, dual or triple configurations

5.4.4 Modes for arrays with variable angulation (line arrays)

- **Single**: Equalisation for the use of a single cabinet, e.g. as front fill, under-balcony, etc.
- **Array x**: Basic equalization for use as an array. The higher the numerical value, the greater the reduction of the low-mids to compensate for the level increase due to array length

5.5 Using the User Interface

The power amplifiers are operated via a touch-sensitive colour display and an endless encoder with a push button function.

By touching the individual areas and "buttons" on the display, you can navigate directly to the respective function. The selection of a function or an input field is highlighted by a blue border around it.

If you touch a "mute button" it is selected and also switched simultaneously.

The encoder has two essential functions: navigation and value input. In the initial state it is in navigation mode. As the encoder is turned, each function and “button” on the display is cycled through in sequence, each highlighted by a blue border.

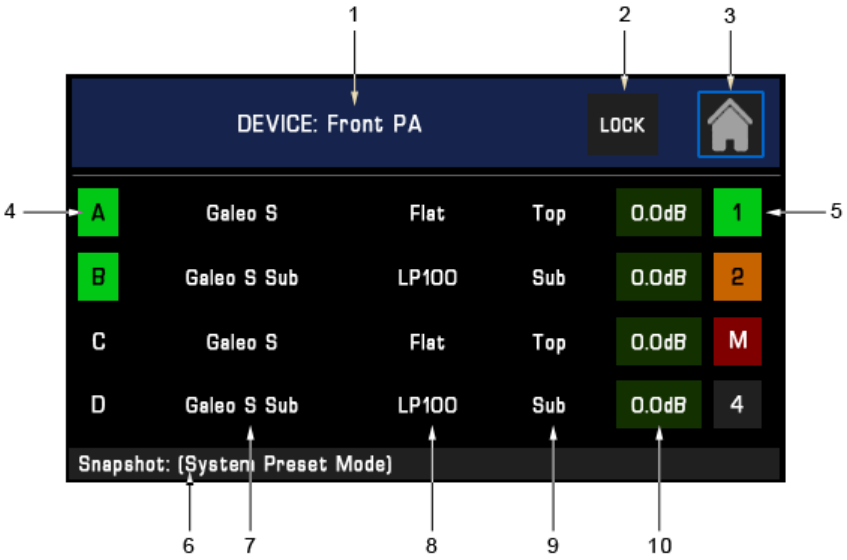
If the encoder is pressed (keyed), it switches to input mode (then the respective field is framed in red) - or activates the function of the button (e.g. mute). If an input field is selected, the value of the input field can be changed by turning the encoder. If a preset list is selected, it can be scrolled up and down. Pressing the encoder again then loads the selected preset.

If no values are entered with the encoder for a while, it automatically switches back to navigation mode.

5.6 Display Pages

All essential device settings and information are shown on six display pages: Overview page, Home page, DSP page, Tune page, EQ page and Utility page.

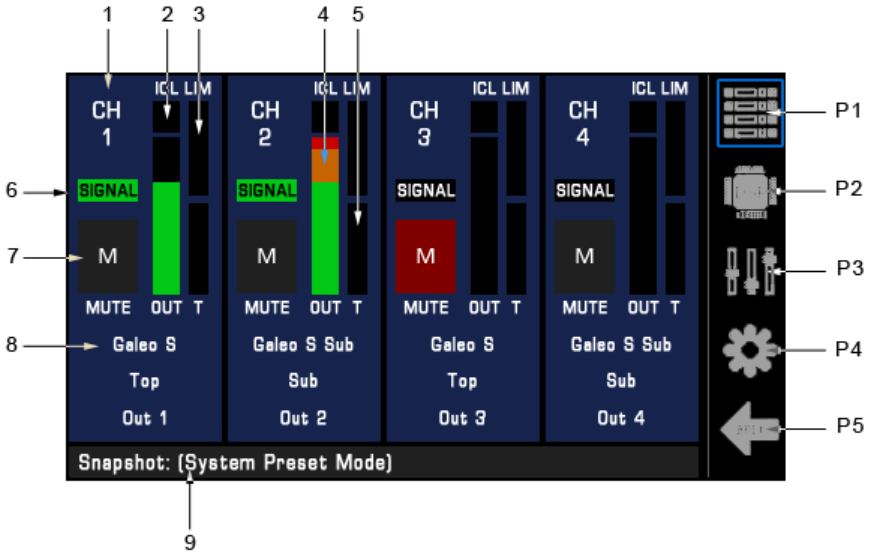
5.6.1 Overview Page



1 Device name, adjustable via the PC software
2 “Lock” button: To lock the control panel (display and encoder)
3 „Home“ button: To switch to the home screen
4 Input Signal Indicator: Lights up green when signal is present
5 Output Signal Indicator + “Mute” Button: Lights up green when signal is present, lights up orange when the limiter is active and red when there is overload; toggles between on and mute (M) when pressed
6 Snapshot: Shows the name of the currently loaded snapshot (device state)
7 Loaded speaker preset
8 Selected loudspeaker operating mode
9 Loudspeaker type or way
10 Display of the total set output signal levels

As soon as the power amplifier is controlled remotely from a PC via network or USB interface, the color of the header changes from dark blue to gray. The “Lock” button lights up **red** and show the inscription “**OCS**”. Whenever the amplifier is addressed via the software, this button flashes.

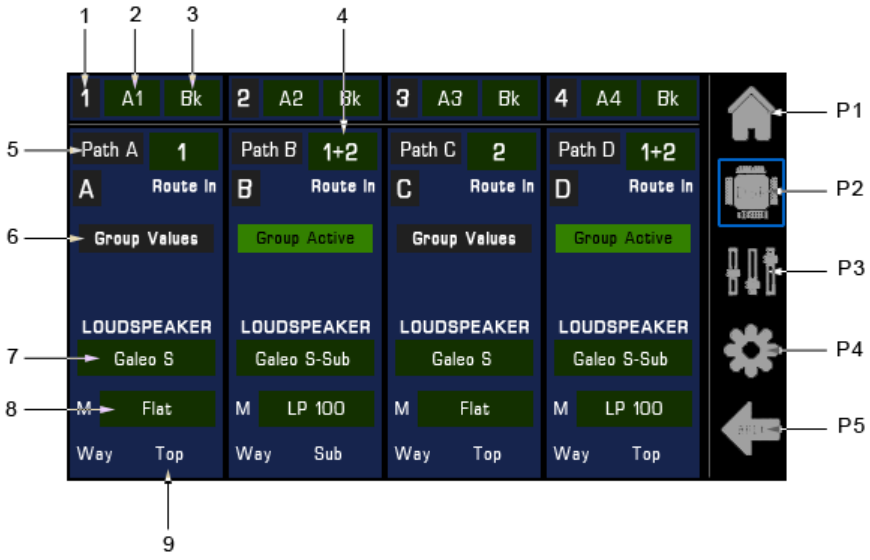
5.6.2 Home Page



1 Output channel of the amplifier
2 ICL indicator: Lights up when the amplifier channels protection system is working
3 LIM meter: Shows the extent of the limitation (gain reduction) of the RMS and peak limiters for the loaded loudspeaker
4 OUT meter: Indicates the output signal level relative to the full scale of the loaded loudspeaker
5 T-Meter: Shows the temperature of the amplifier channels as a percentage
6 Output Signal Indicator: Lights up green when signal is present
7 “Mute” button: Mutes the output channel
8 Information panel about loaded speakers, speaker type / way, output name
9 Snapshot: Shows the name of the currently loaded snapshot (device state)

P1 Go to Overview page
P2 Go to DSP page
P3 Go to Tune page
P4 Go to Utility page
P5 Cancel entries, go to Home page

5.6.3 DSP Page

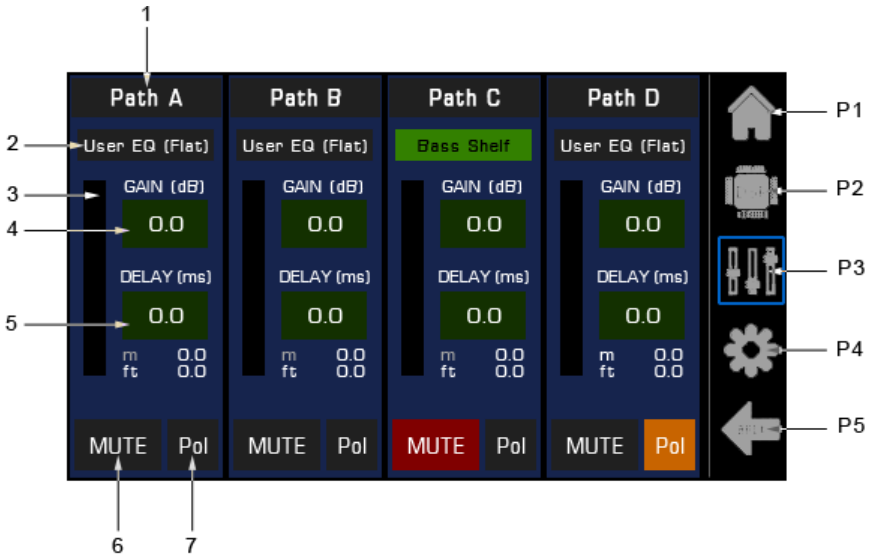


1 Input source designation
2 Primary device input: Selection menu (analogue: A1…4, digital: D1…4)
3 Secondary device input: Selection menu (A1...4, D1…4, OFF)
4 Route In: Input source assigned to the path. Selection menu (1, 2, 3, 4, 1+2, 3+4, matrix)
5 Name of the path: Editable via PC software
6 Group Values: Lights up green if group-wide parameters (EQ, Gain, Delay) are active; Pressing the button resets all group-wide settings on the respective path
7 Loudspeaker: Selection menu for loading a loudspeaker (preset) from the internal library; when loading multi-way loudspeakers, the amplifier channels on to the right are added to this path
8 M: Selection menu for the operating mode of the loaded speaker (e.g. Flat, HP, LP, Cardio, etc.)
9 Way: Shows the speaker type or speaker way (e.g. Top, Sub, High, Mid, Low, etc.)

With single-channel loudspeakers, the path output is directly at the respective amplifier channels: A=1, B=2, C=3, D=4. In the case of multi-way loudspeakers, the first path output is on the respective direct amplifier channel, the other loudspeaker ways are on the adjacent amplifier channels on the right-hand side.

P1 Go to Home page
P2 Go to DSP page
P3 Go to Tune page
P4 Go to Utility page
P5 Cancel entries, go to Home page

5.6.4 Tune Page



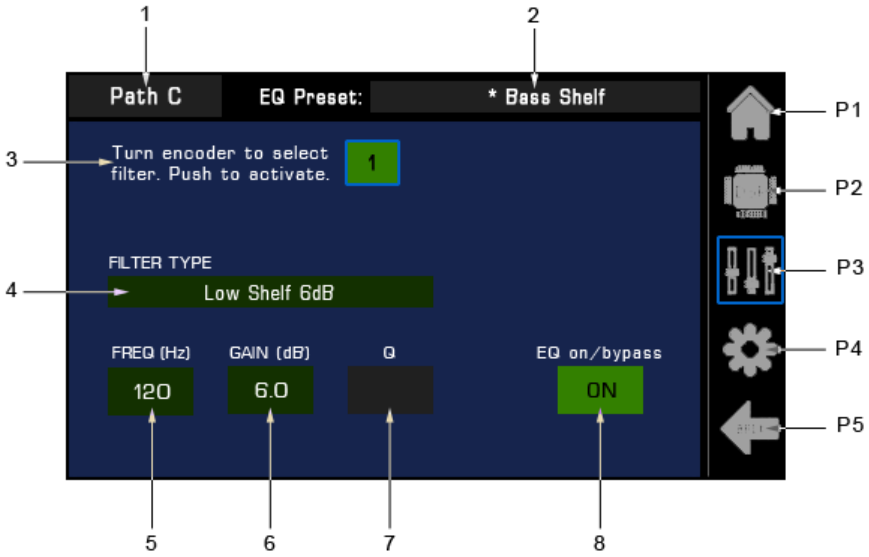
1 Input path name
2 User EQ: Lights green when the user equalizer is on; if a user EQ preset is loaded, the name of the preset will appear; pressing this button takes you to the EQ page
3 In meter: Displays in input signal level of the path
4 Gain: Input box for adjusting the input level of the path
5 Delay: Input box for adjusting the input delay of the path; the entry is made in milliseconds (ms); the automatically converted equivalent in meters and feet distance appears below
6 MUTE: Path muting button. Lights up red when mute is active
7 Pol: Button to activate the polarity reversal (“phase reversal”) of the path; lights up orange when the polarity is reversed

With single-channel loudspeakers, the path output is directly at the respective amplifier channels: A=1, B=2, C=3, D=4. In the case of multi-way loudspeakers, the direct amplifier channel is combined with the adjacent amplifier channels on the right-hand side. This path then only has one User EQ, one gain, one delay, etc.

In the first input path, up to 333 ms (approx. 115 metres) delay is available, in the remaining three up to 91 ms (approx. 31 metres) each.

P1 Go to Home page
P2 Go to DSP page
P3 Go to Tune page
P4 Go to Utility page
P5 Cancel entries, go to Home page

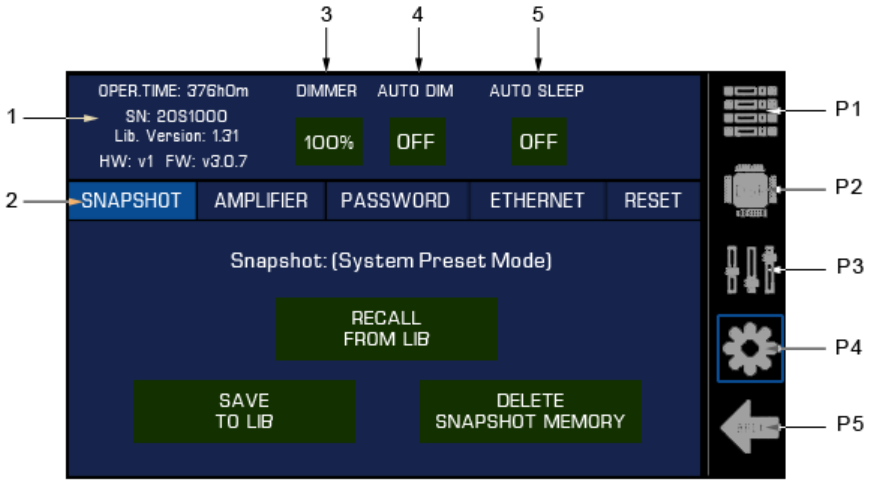
5.6.5 EQ Page



1 Input path name
2 User EQ preset name; the preset contains all settings for the seven equalizer filters as well as the set values for path gain and path delay; if the name is preceded by *, the values of the preset have been changed by the user
3 Filter selection: Displays the currently selected filter; Turning the encoder selects the filter to be edited; Pressing the encoder switches the filter on/off
4 Type: Selection menu for assigning a filter type (PEQ, Shelving, Bandpass, Notch, etc.)
5 Freq: Input box for setting the filter (center) frequency
6 Gain: Input box for filter gain boost/cut (if applicable)
7 Q: Input box for setting the filter quality (if applicable)
8 EQ on/bypass: Shows the operating status of the filter section; lights up green when the filter section is on, gray when it is bypassed

P1 Go to Home page
P2 Go to DSP page
P3 Go to Tune page
P4 Go to Utility page
P5 Cancel entries, go to Home page

5.6.6 Utility Page

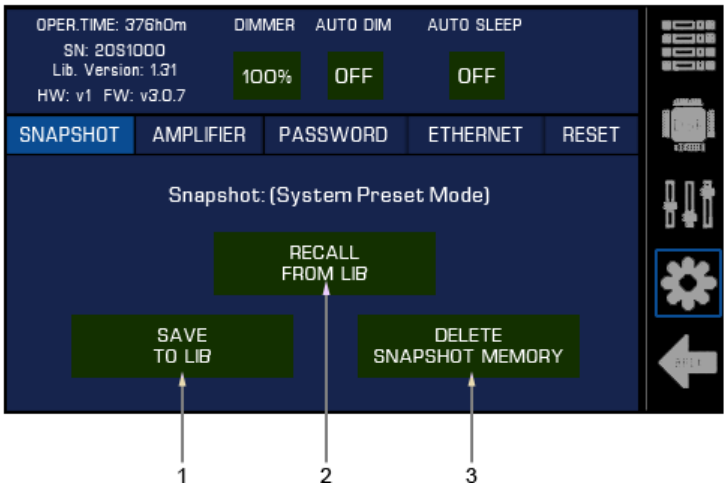


1 Information field about operating hours, serial number, loudspeaker library version, hardware and firmware* version; loudspeaker libraries with version numbers ending in a 1 (e.g. x.x1) contain phase linearization and time alignments; version numbers ending in a 0 (e.g. x.x0) do not include these features and are therefore compatible with HDLM8 and self-powered speaker systems; the latest versions can be found in the download area of the SEEBURG website
2 Menu bar for calling up the Snapshot, Amplifier, Password, Ethernet and Reset tabs
3 Dimmer: Setting the brightness of the display
4 AutoDIM: Setting the waiting time until the display is automatically dimmed; the amplifier remains in operation (operating mode button lights up green); as soon as the encoder is operated, the display is switched on again
5 AutoSLEEP: Setting the waiting time until the power amplifier automatically switches to sleep mode; in Sleep mode, the amplifier channels are disabled; the sleep mode is automatically ended within 10 milliseconds when an audio signal is present at the inputs

P1 Go to Home page
P2 Go to DSP page
P3 Go to Tune page
P4 Go to Utility page
P5 Cancel entries, go to Home page

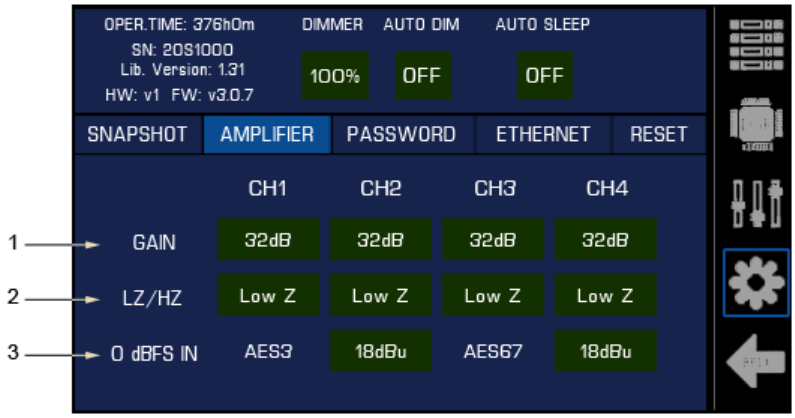
* Regarding updating the firmware, see software manual

5.6.6.1 Snapshot Tab



1 Save to Lib: Saves the current device state (i.e. all currently set parameters) to a snapshot slot on the device; this can be an empty one or one with an existing preset to be overwritten
2 Recall from Lib: Loads a snapshot previously saved on the device
3 Delete Snapshot Memory: Deletes all snapshots (empties all memory slots) on the device

5.6.6.2 Amplifier Tab



1 Gain: Allows adjustment of the nominal power amp gain in the range of 26dB to 44dB, the default value is 32dB; this setting has no effect on the limiter thresholds set in the speaker presets
2 LZ/HZ: Allows switching between low-impedance operation (“Low Z” is set by default) and operation on 35V, 50V, 70V and 100V lines
3 0 dBFS IN: Allows adjustment of the reference level of the digital audio inputs (AES3) or network audio inputs (AES67) if they are installed

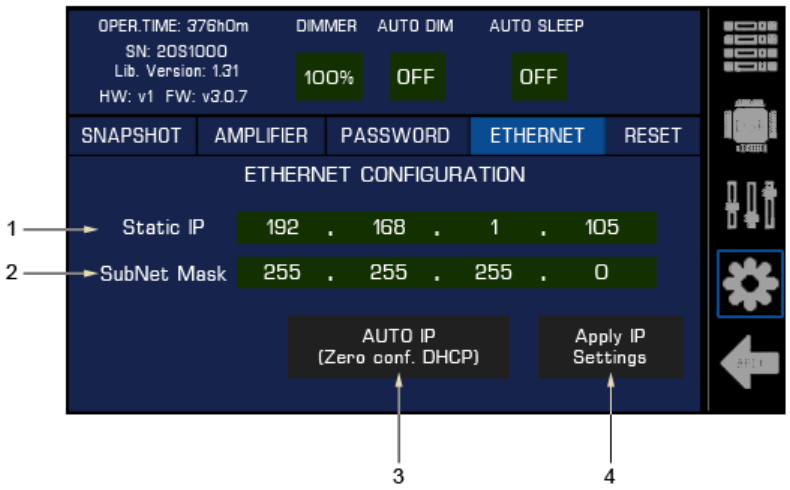
5.6.6.3 Password Tab

1 General Password: Activation requires entering and confirming a 4-digit number/letter combination; when protection is activated, access to the amplifier via the control panel and the PC software is restricted

If the password protection is activated, a request to enter the password appears when trying to operate the unit. When the correct password is entered, the lock is temporarily removed and the settings of the unit can be changed. If no operation is performed on the unit, the protection is automatically reactivated after one minute.

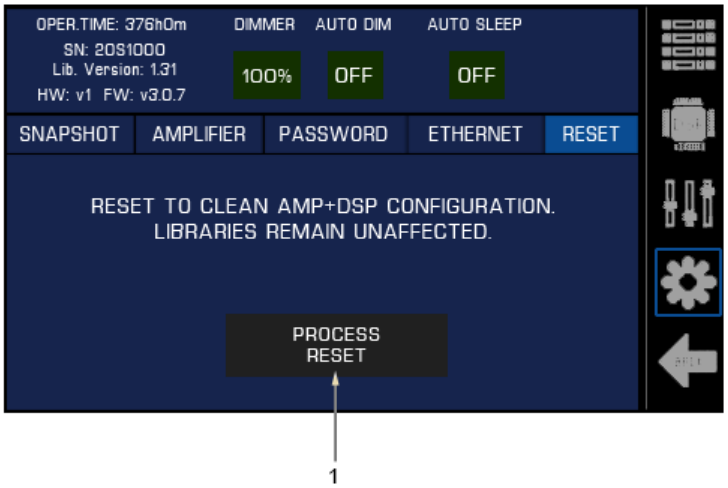
If the password is lost, please contact SEEBURG support. You will then receive a temporary password with which the amplifier can be unlocked and the password protection can be deactivated.

5.6.6.4 Ethernet Tab



1 Static IP Shows the currently set IP address of the device, editable in manual mode
2 SubNet Mask: Shows the currently set subnet mask of the device, editable in manual mode
3 "AUTO IP" button: Activates the automatic address assignment and then lights up red; if there is a DHCP server in the network, the address will be assigned by it; if no DHCP is available, the automatic self-assignment of an IP address takes place according to the Zero Configuration Networking Protocol (Zeroconf)
4 "Apply IP Settings" button: Applies the IP/subnet values set in manual mode

5.6.6.5 Reset Tab



1 “Process Reset" button resets all parameters and processing of the amplifier to their default state; all settings made and loaded presets are reset; the preset libraries, snapshots, EQ presets stored on the device are retained

5.7 Firmware Update

To update the firmware of an S-Series amplifier, please download the latest version of SEEBURG OCS from our website. Then run the installation program. This will not only update OCS, but also provide the latest SEEBURG Firmware Updater and the latest firmware version to the computer.

Search for the SEEBURG Firmware Updater via the Windows Start menu and start the application. Connect the power amplifier to be updated to the mains and carry out the following steps:

1. Switch the amplifier to standby mode (operating mode button lights up red).
2. Press and hold the encoder.
3. Press the operating mode button. The amplifier starts up in bootloader mode and shows this in the display. Release the encoder and the button.
4. Connect the computer to the amplifier via the USB port on the front panel.
5. Click on the "Connect" button in the SEEBURG Firmware Updater.
6. Click on the "Erase-Program-Verify" button. The update process starts and may take a few minutes. Make sure that the power supply to the amplifier and the computer is not interrupted during this time. After a successful update, the power amplifier restarts and is ready for operation again.

Note: Do not disturb the update process. Aborting the update in the middle of the process may destroy the firmware and render the amplifier unusable. In such a case, the only way is back to the factory.

6 Technical Specifications

Model		S3	S5	S10	S20
Description		4-Channel Amplified System Controller			
Total Power Supply Output		2,5 kW	5 kW	10 kW	20 kW
Power IEC*	8 Ω	4x 600 / 1x 1200	4x 1200 / 1x 1200	4x 1200 / 1x 1300	4x 2400 / 1x 3000
all channels driven / single channel (Watt)	4 Ω	4x 600 / 1x 600	4x 1200 / 1x 2400	4x 2400 / 1x 2500	4x 4800 / 1x 6000
*40Hz-5kHz, 12dB crest factor	2,7 Ω	4x 400 / 1x 400	4x 1200 / 1x 1700	4x 2400 / 1x 3300	4x 4800 / 1x 6700
	2 Ω	4x 300 / 1x 300	4x 1200 / 1x 1200	4x 2400 / 1x 2500	4x 4800 / 1x 5000
	100 V	4x 600 / 1x 1200	4x 1200 / 1x 2400	4x 2400 / 1x 2500	4x 4800 / 1x 5000
	70 V	4x 600 / 1x 900	4x 1200 / 1x 1800	4x 2400 / 1x 2500	4x 3500 / 1x 3500
Peak Output Voltage		150 V	150 V	150 V	235 V
Peak Output Current		18 A	36 A	50 A	71 A
Total Harmonic Distortions		< 0,05 %			
SMTPE		< 0,05 %			
Damping Factor (20-500 Hz @ 8 Ohm)		> 500			
Crosstalk (@ 1000 Hz)		> 70 dB (A)			
Signal to Noise Ratio (20 Hz - 20 kHz)		111 dB(A)			115 dB(A)
Max DSP Input Level (balanced)		+20 dBu			
Voltage Gain		26…44 dB in 1dB increments			
Cooling		front to rear airflow, temperature controlled fans			
User Interface		4.3" touch display + push-encoder			
Inputs		4 x XLR analogue - 2x switchable to AES3			
Outputs		4 x Speakon NL4 1+/-, 2+/-, 4x XLR loop thru			
Connectivity		1 x USB-B, 2 x RJ45 w/ ethernet switch			
Mains Connector		PowerCON®			PowerCON® 32
Operating Mains Voltage		90 - 265 V AC			
Current draw (@ 1/8 output power)		2,1 A	3,7 A	7,3 A	14 A
Power Consumption (idle/sleep/standby)		< 100 W (S20: <140W) / < 40 W / < 5 W			
Protections		soft start, turn-on/turn-off transients, turn-on mute, over-temp, DC, RF, short circuit, open/mismatched load, overload, clip limiter, mains breaker protection			
Dimensions height x width x depth (mm)		88 (2 HU) x 483 (19") x 330 (S20: 360)			
Weight		6,7 kg	6,8 kg	7 kg	9,5 kg
Order No.		**01823**	**01825**	**01827**	**01829**

The technical data sheet and further information about possible applications and accessories can be found on the Internet at www.seeburg.com.

7 Declaration of Conformity

EC Declaration of Conformity

For the products

S3

S5

S10

S20

it is hereby confirmed that they comply with the regulations of the following EU directives including any supplements:

- ✓ 2006/95/EG, Low Voltage
- ✓ 2004/108/EG, Electromagnetic Compatibility
- ✓ (References: Apendix 1, paragraph 1, a and b)

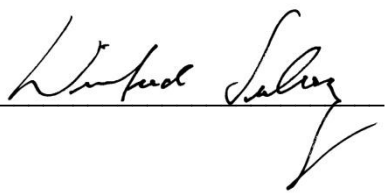
The following standards were applied:

- ✓ DIN EN 60065
- ✓ DIN EN 55103-1:1996, classes E1 to E4
- ✓ DIN EN 55103-2:1996, classes E1 to E4

Issuer of this declaration: Winfried Seeburg, SEEBURG acoustic line GmbH

Place, Date: Senden, 01.06.2022

Authorized signature: _____



The appendices are part of this declaration. This declaration certifies compliance with the guidelines mentioned, but does not include any guarantee of properties. The safety instructions in the supplied product documentation must be observed.

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User Manual

All specifications are current at the time of publishing but are subject to change. Subject to errors in the description.

All SEEBURG acoustic line products are intended for professional use only.

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