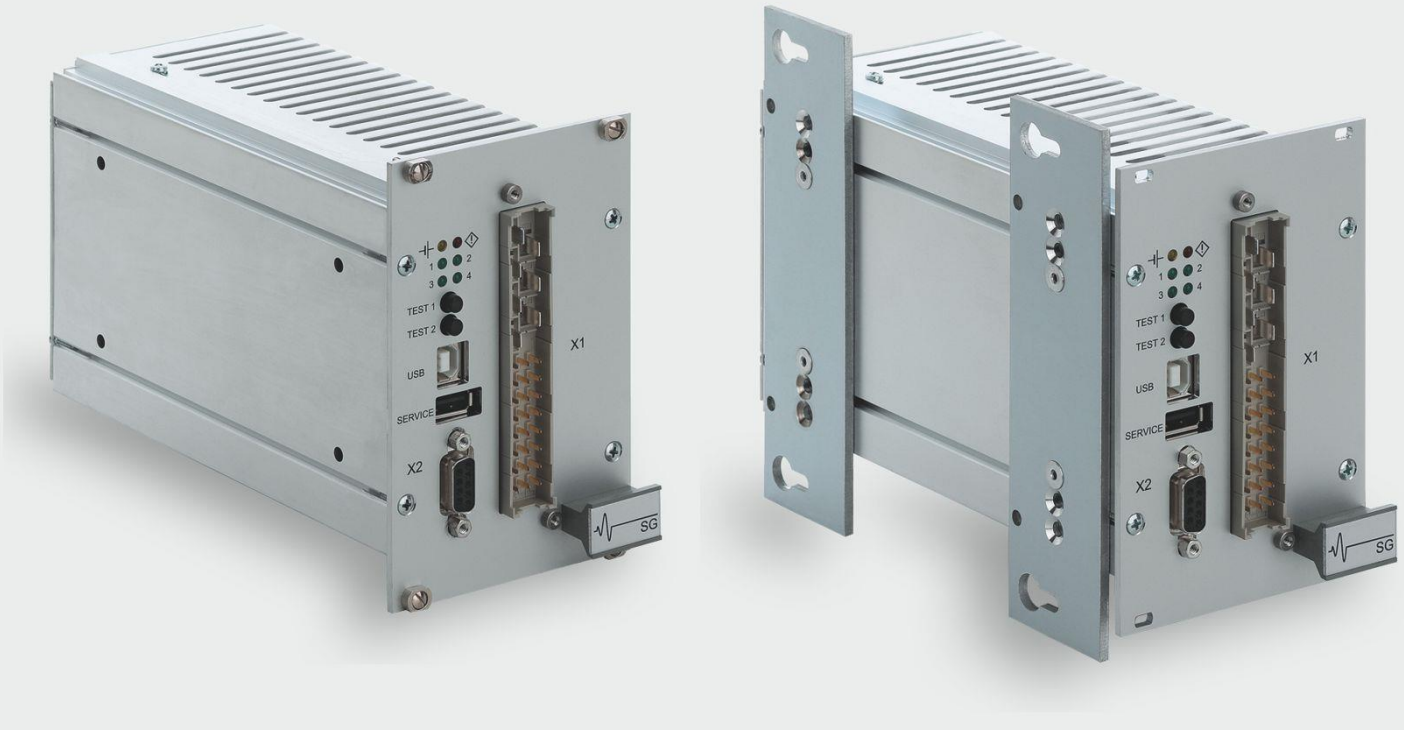

Operating Instructions

Digital Signal Generator SG-200

827000
827001
827002

Version 07

LÜTZE TRANSPORTATION
powered by Amphenol

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Contents

1 Introduction

This SG-200 Operating instructions are part of the SG-200 digital signal generator.

Art.-Nr. **827000**, Type **SG-200 16TE PI (Plug In)**
Art.-Nr. **827001**, Type **SG-200 16TE FM (Flange Mounting)**
Art.-Nr. **827002**, Type **SG-200 16TE FM (Flange Mounting)**

It contains important information about the handling and safety of the product throughout its entire product life cycle, from delivery to disposal.

Read and understand this SG-200 Operating instructions before installing, operating, or maintaining the product.

This applies to every person who is getting in touch with the product. Trained employees and experts, especially qualified persons who have worked with similar products before have to read and understand the SG-200 Operating instructions as well.

CAUTION

Risk of injury and damage to property due to failure to read and observe the SG-200 Operating instructions.
Always read these **SG-200 Operating instructions** before planning the system to avoid or reduce risks and damage.

NOTICE

This operating instruction contains important information on safety, commissioning, operation, maintenance and disposal of the product.
Always keep the **SG-200 Operating instructions** at hand. This applies until the product is disposed of. Pass on the **SG-200 Operating instructions** if the product is sold, distributed or loaned.

You can also find the **SG-200 Operating instructions** at
***www.luetze-transportation.com*.**
In the search field, enter either the product name or the product number.

Further documents apply in addition to this SG-200 Operating instructions.
If you have any suggestions for improving this document, please contact Lütze Transportation GmbH.

2 General Information

2.1 Symbol Description

2.1.1 Safety Message

The SG-200 Operating instructions contain safety information. which is characterized by a signal word in combination with a certain color to indicate the four warning levels. The safety messages point out hazardous situations and give information on how to avoid these.

DANGER	**Indicates a hazardous situation that could result in death or serious injury.**
WARNING	**Indicates a hazardous situation that could result in death or serious injury.**
CAUTION	**Indicates a hazardous situation that could result in minor or moderate injury.**
NOTICE	**Indicates a situation that could damage the product or the environment. This notice does not apply to personal injuries.**

2.1.2 Handling Notes

Additionally, the following symbols can be found. These refer to important technical information and instructions:

	**Refers to important technical information. This indicates to the user a specific action that must be performed to operate the product safely.**
	**Refers to the use of different tools.**

2.2 Copyright

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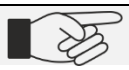
2.3 Disclaim of Liability

The content is accurate at the time of publication. Errors and omissions excepted. Applicable changes and additional information will be in the next version of this document.
The Friedrich Lütze GmbH does not assume liability for any damages and accidents of the following reasons:

- Failure to read and observe the SG-200 Operating instructions
- Untrained and unqualified personnel
- Nonconventional use of the product
- Unapproved reconstructions and functional modifications of the product
- Using non original or aftermarket parts or equipment

2.4 Standards and regulations

The product is state of technology and complies with the applicable safety regulations and the corresponding harmonized European standards (DIN EN, ISO, IEC/IEEE).

NOTICE	**The current versions of the standards and further information on the product can be found in the corresponding data sheets which are valid with this document.**
	**See also the standards in the respective data sheets.**

2.4.1 Observer further applicable documents

When using the product, observe all other documents supplied with the product.

NOTICE	Always keep this **SG-200 Operating instructions** and the other applicable documents (e.g. data sheets, package inserts, declarations of conformity, etc.) at hand so that they are available when required. This applies until the product is disposed of. Hand over all documents in case of sale, distribution or rental of the product**.**

Should you require further information or encounter special problems that are not dealt with in sufficient detail in the operating instructions, you can request the necessary information about service from Lütze Transportation GmbH. *(See also chapter "Service")*

2.5 Labeling

Mind the adhesive labels.

- **Keep them readable.**
- **In case of malfunction, the part number and the serial number might be needed.**

The identification label contains the following information:

1. Part number
2. Assembly designation / module description
3. Module Description
4. Version number / Firmware Version (SW) (Empty in the example)
5. Hardware Revision (HW)
6. Serial number (X) / place of manufacture (YYY) / batch identification (Z)
7. Company address / place of production (YYY: "LUT" for Weinstadt and "EQQ"
8. for Czech Republic)
9. Block diagram
10. Company name / web address
11. Approvals / declarations of conformity (e.g. CE marking, UL, etc.)
12. 2D-barcode with product information

2.5.1 QR-Code – Product Information

The QR code will lead you to additional product information from the online catalog on the Lütze Transportation website. To obtain this information, follow these instructions:

1. Scan the QR-code with a smart phone or other devices that can read QR-codes.
2. The standard browser will open with the linked page.

3. Choose a language.
4. The product will be displayed. Under *Downloads* you can download further technical documentation.

3 Safety

3.1 Related Documents

NOTICE **When using the product, observe all other documents supplied with the product.**

3.2 Safety Notes

3.2.1 Content of the operating instructions

NOTICE **These instructions must be read and understood before the device is installed, operated, or maintained.**

The operating instructions must be read and complied with before any work carried out on or with the device. This applies to all persons who come into contact with the device. Trained personnel and professionals, especially electricians who have already worked with similar equipment, should also have read and understood the instructions.

3.2.2 Intended Use

The intended use includes the procedure according to the operating instructions. The devices may only be used for the cases specified in the technical documentation and only in connection with the third-party equipment and components recommended or approved by us. The proper and safe operation of the product requires proper transport, storage, installation and assembly, as well as careful operation and maintenance.

3.2.3 Addressees

This operation instructions are intended for planners, project managers and programmers as well as for employees who are authorized to commission, operate and maintain the devices and systems. With regard to the operating personnel, different levels of qualification are distinguished.

3.2.3.1 Operating Personnel

WARNING

Risk of injury by deploying insufficiently qualified operating personnel.

- Misuse by unqualified personnel or insufficiently qualified personnel can cause property damages and personal injuries.
- Tasks which apply special procedures should be done by trained and qualified employees or experts, especially electricians.

(according to EN 60204-1)

The operating instructions are directed at the operator and the personnel with the following areas of competence:

Work area	Competence
Installation, Transport and Storage	Experts / Transport personnel
Commissioning, Decomissioning	Experts
Operation	Trained staff / Users
Maintenance and Servicing	Experts / Service personnel
Cleaning	Experts / Service personnel
Troubleshooting	Experts

Trained staff

The staff was instructed by the operator about the tasks assigned and the potential dangers arising from them. No professional knowledge required.

Experts

The staff has professional training, knowledge and/or experience in the respective field and is therefore able to carry out certain work on and with the equipment.

Qualified Electricians

The staff has professional training and is therefore able to carry out special work on and with the device. *According to the European standard EN 50110-1:2008-09-01 Section 3.2.3*

NOTICE The different sections of this operating instruction refer to the different qualification levels of the operating personnel.

3.2.4 Responsibility of the operators

NOTICE **The customer is subject to a feedback obligation if safety-related errors are detected.**

Since the device is operated in the commercial sector, the operator of the device is responsible for compliance with the instructions on occupational safety:

- The operator of the device is obliged to instruct the operating personnel and to inform them about the industrial safety regulations.
- The operator must ensure safety conditions, prevent accidents and comply with environmental protection requirements.
- The operator must carry out an appropriate safety assessment at the workplace in order to rule out or warn of possible hazards.
- The operating instructions must be kept in close proximity to the device.
- The information / instructions in the operating instructions must be followed.
- The device may only be operated in technically perfect condition.

3.2.5 Protective Clothing and Equipment

⚠ CAUTION	**Crushing, cutting and impact injuries in case of non-compliance with the safety regulations for transport and assembly**. Failure to comply with the regulations for proper transport and assembly may result in bruising, cutting or impact injuries. Observe all applicable standards and regulations. Transport and assembly may only be carried out by qualified operating personnel.

Use appropriate work clothes, work gloves, safety goggles and ESD safety shoes.

3.2.6 Reconstruction and Modification of the Product

⚠ WARNING	**Modifications and conversions lead to personal injury and property damage.** Unauthorized modifications to the product may result in electric shock or injury and destroy the product. ▪ Do not make any changes or modifications to the product. ▪ If a modification or change cannot be avoided, have the modification approved in writing by Friedrich Lütze GmbH.

Do not make any changes or modifications to the equipment that have not previously been expressly approved in writing by Friedrich Lütze GmbH.

3.2.7 Further Safety Notes

NOTICE	Follow the ESD guidelines.
NOTICE	Use only certified components. Only then can reliable functioning be guaranteed.
NOTICE	Observe the applicable safety regulations and general regulations on technical standards.
NOTICE	The device is designed for indoor use and installation in vehicles.

4 Product Overview

4.1 Product Description

The digital **S**ignal-**G**enerator SG-200 is a fully configurable dual channel Signal Generator for warning signals on vehicles for public transport. It consists of a dual channel signal processing unit which is controlled by 12/15 control inputs and a digital class D high power amplifier with 200 W for exterior warning as well as a second digital power amplifier providing 25 W audio power for interior warning or acoustical fault indication. The unit can provide up to 16 different warning signals and also speech announcements. The memory size is enough to store up to 512 different signals or speech sequences, out of which 16 can be assigned to the control inputs in the configuration table. The device is widely adjustable. The signals emitted and the parameter table can be loaded with a USB stick through the front sided USB-A port. The sound files are stored in the standard MP3 format and therefore processible on any PC. Adjustment is done with a text file that contains easily interpretable definitions. The SG-200 can be configured on-site through the service interfaces, RS232 or USB. 6 LED's provide information about the operating status of the device. Important signals can be emitted directly by means of 2 test buttons located at the front of the module. Signal volume reduction (e. g. at nighttime) can be controlled via an optional real time clock or by a control signal received from another vehicle device.
The SG-200 is built as a 19"plug-in module with dimensions of 3 HU and 16 HP. There is also a flange mount version available. All connections of the device are disposable through a front-sided composite connector F24/H7 according to DIN 41612.
The module is designed for a standard supply voltage of 24 VDC (16,8 – 47V). Optionally, devices with 72 VDC or 110 VDC supply voltage can be served.

Applications and highlights

- Two simultaneous channels for exterior and interior alert
- 12 or 15 different warning signals controlled by status state or transition triggering
- High power warning signal generator for exterior alert withuser-defined signals
- Interior alert to driver or passengers with warning tones or speech messages
- Internal speaker relay for use of a single signal generator in a bi- directional vehicle
- Error indication output
- 3 configurable control outputs (when using 12 control inputs only)
- Serial interface for control and synchronization of the internal real-time clock; alternatively, RS 232, RS 422/485 or IBIS.
- Use as driver's warning system with different alert signals from different vehicle systems. Output also in plain text.
- Combination of different warning equipment in one device possible.
  Configurable control output to switch the driver's speaker
- Time or signal-controlled and adjustable volume reduction for selected signals (volume reduction at night).
- Download of signal files and parameter table via USB
- Service interface for online adjustment via USB or optionally RS232
- Simple signal definition using standard mpeg3 encoding
- Light-weight and compact 19"plug-in module by use of digital amplifier technology
- Applicable for all established vehicle power supplies (24 V; 28 V; 37,5 V; 72 V; 110 V)

5 Function

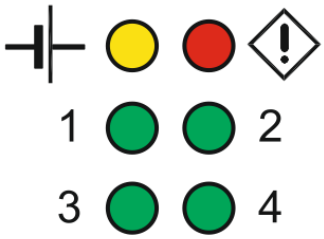
The SG-200 consists of 2 printed circuit boards. Power supply and the digital Class-D amplifiers are located on the performance board PA-200. The controller/sound generator board contains the micro-controller, memory, the MP3-decoder (signal generating) and the galvanically separated I/O interface.
The internal voltage conversion is realized as a push-pull converter. Through this push-pull converter, a symmetrical supply voltage (+29 V, -29 V, 0V) is generated from the asymmetrical supply voltage (+UE, 0V) for the power amplifier. The high-performance power amplifier is a Class-D bridge circuit and serves as a supply for horn speakers for warning signal generator on the front of the vehicle. Another Class-D power amplifier with 25 W can provide warning signals to the interior area of the vehicle (e.g. vehicle system alert for the driver or warning signals or messages to the passengers). Status or control signals for other vehicle systems can be emitted through 3 confugurable relay outputs (e.g. signal message to event recorder). Another output provides an error summary signal.
The input control signals are opto-isolated and are evaluated by the micro-controller. According to the adjusted trigger type and the file assignment, the corresponding signal file is selected and communicated to the MP3 decoder. This picks up the data from the SD memory and converts it to an audio signal which is transmitted to one of the power amplifiers. With the two-channel design of the MP3 decoder, two signals can be processed simultaneously and can be emitted through either one of the power amplifiers of the PA-200 board.

See basic configuration of the device in the block diagram of section

There is an optionally available battery-buffered real time clock, synchronizable via the serial interface (e.g. IBIS) which allows a volume reduction at night for each input

5.1 Indicators / LED Status

There are 6 LEDs for status messages at the front panel of the SG-200:



LED color	Status	Description
LED yellow +/	**ON**	**Power Supply OK**
	flashing	Low Battery (for RTC)
LED red (ERROR)	**ON**	**fatal Error, unit not operational**
	flashing	Parameter table missing or faulty
LED green (Status 1…4)	**ON**	**Input and/or signal output active, hex-coded**

Additional signalization is described in the section „*Update functions*“.

5.2 Control inputs and triggering

The device can store up to 512 signal and message files. The signals/messages are identified with the file name of the signal. Each of the 12/15 inputs can activate a signal or a message. The inputs are gathered in groups of 8 + 4 + 3. The inputs 1 - 8 have a common reference (IN1-8_REF), the differtial inputs 9 - 12 are available at the connector. Three more I/O signals can be used by hardware configuration as inputs or outputs. They get a common reference again when using them as inputs (IO1_3_Ref). Each input can be assigned to one of the two power amplifiers for signal emission [INn_dest].

For each input signal, one of the three following trigger modes can be adjusted:

- Single trigger positive transition [single_pos]:
  The signal emission is activated if the control signal of the corresponding input changes from passive to active state.
- Single trigger negative transition [single_neg]:
  The signal emission is activated if the control signal of the corresponding input changes from active to passive state.
- Continuously [cont]:
  The signal is emitted as long as the corresponding input signal is active.
  The signal is automatically repeated if the sound file is shorter than the activation time.
- Each input can be adjusted with an activation delay. The delay time is adjustable from 0 to 12,8 s in 100 ms steps

5.3 Control outputs

With a corresponding hardware configuration 4 relay contacts are available as control outputs. A control output can be assigned to each of the control inputs IO1 to IO3.The output is active as long as the audio signal is emitted and/or the control input is active.
The control output, for example, can be used to switch speakers.
This implies that IO1 to IO3 are configured as an output.

Parameter OUT*n*	defines which output is set with what inputs/signals
Parameter OUT*n_set*	defines the switch-on time coupled to input, audio signal or both
Control output OUT4	is reserved for emission of an error indication

5.4 Level adjustment

The level can be adjusted individually for any signal (Level*n*).
Additionally, a level reduction (e.g. for volume reduction at night) can be defined for each signal (In*n*_LVL_reduct). The level reduction can be done either via a control line or with the implemented real time clock (optional).
LVL_reduct_on_time
LVL_reduct_off_time

5.5 Stack function

If several inputs are activated at the same time or if a further input is activated during emission of a signal, the input signals can be buffered and then emitted in an order according to the priority settings.
Stack (ON/OFF)
Stack_Select
The maximum number of stackable inputs is 8.

5.6 Service function

5.6.1 Service connection

Software versions can be read-out through the service port (USB-B device interface).

- Firmware version
- Signal data version
- Parameter table version
  The real time clock can also be adjusted via the service interface.
  It is possible to process the parameter data on-line through this interface.

5.6.2 Test buttons

The SG-200 is equipped with 2 test buttons (Test 1, Test 2).
With the parameter table, signals can be assigned to these buttons (Parameter Test1, Test2).

5.6.3 Setting of the real time clock

The clock time is delivered with the current UTC time settings.
Through the service port, the UTC can be set by means of the SG-200 configuration software
Moreover, it can be synchronized via the serial interface (e. g. IBIS).

5.7 Error messages

5.7.1 Error indication

The device disposes of several error indication possibilities:

- Error LED (red) at the front panel
- Error indication output OUT4 (X1/16z)
  Switch signal, is switched to the potential IO1-4_ref (X1/12z)
- Error emission to the serial interface
  The device provides detailed error messages in a status telegram
  The output is based on the IBIS convention. The device responds to a status request with a 1 Byte answer.
  0 = Device OK
  1 = no data (signal memory failure or not programmed)
  2 = Amplifier 1 or speaker circuit 1.1 failure
  3 = Amplifier 1 or speaker circuit 1.2 failure
  4 = Amplifier 2 or speaker circuit 2 failure

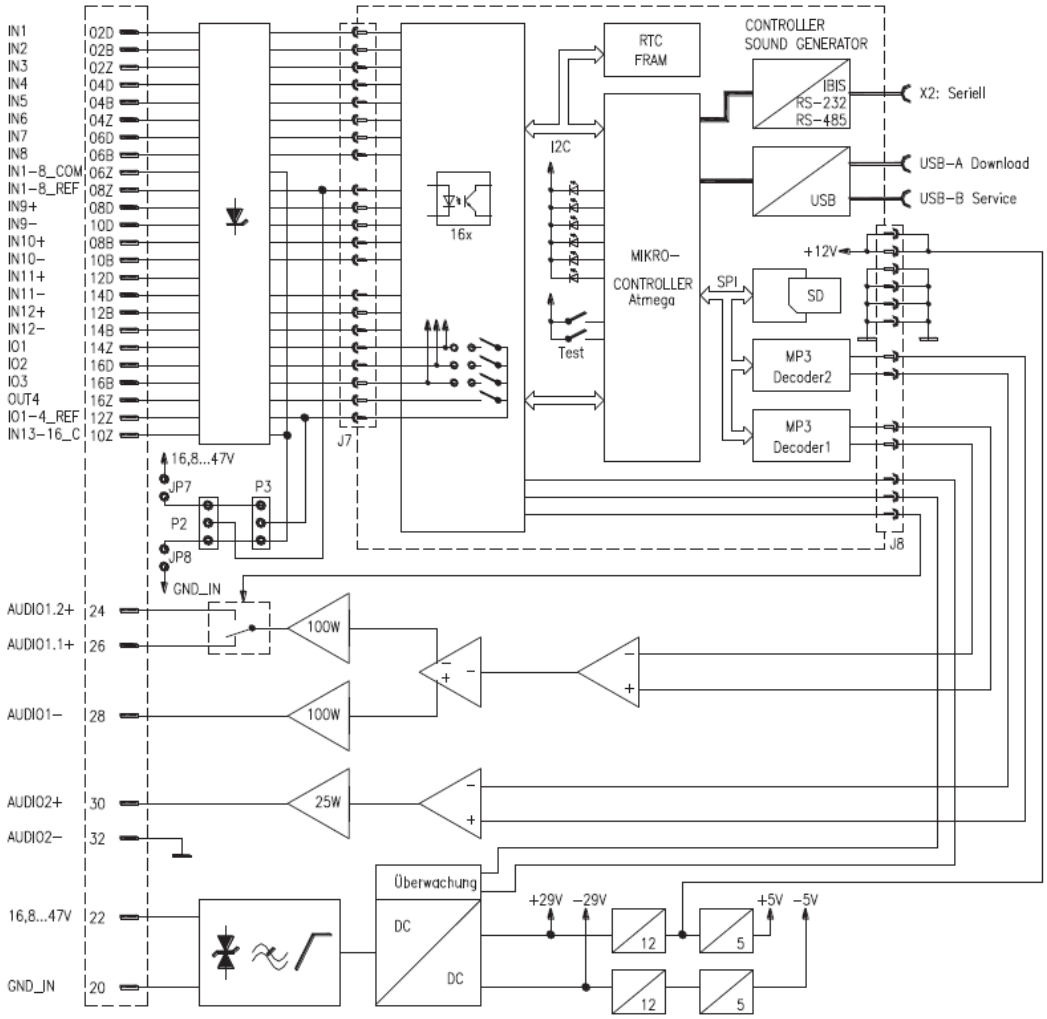
5.7.2 Error identification

When switching on, the device is in error state which means the error LED and the error output OUT4 are activated. This status remains until completion of initialization (approx. 300 ms). At the end of the initialization and successful self test, the error messages are reset unless there is an internal failure (e.g. no signal data in memory, missing configuration file, no access to the internal memory card).
With regard to the audio part, the power supply unit, the amplifier and the speaker circuit are tested. The speaker circuits are cyclically fed with a low level pulse test signal beyond the the audibility frequency range (20 kHz) and the current consumption of the corresponding amplifier is measured. Evaluation of the results enables detection of a faulty amplifier, open or shorted speaker line.

5.8 Setup of signal and announcement files

The signal and announcement files are stored on the internal microSD card in mp3 format and can be created and edited with standard audio processing software (e. g. Adobe Audition®) on any PC. Lütze Transportation also offer the service for signal and speech processing.

5.9 Block diagram

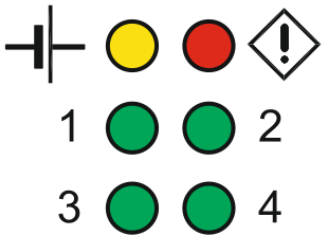


6 Update functions

6.1 Sound and parameter files

Signal- and announcement files can be loaded into the device through the USB-A Port with a USB stick. Also, the text file of the parameters data can be loaded this way. The USB stick is recognized automatically, and the download is initiated. All data is now copied into the internal SD card. Files with the same name are overwritten if the file date on the download stick is newer than the ones on the internal SD card.

6.1.1 Display of the download process / LED status



LED color	Status	Description
LED red (ERROR)	**ON**	**download error**
	flashing	memory overflow SD-Card
LED 1: green (= Status 1)	**flashing**	**download is active**
LED 1: green (= Status 1)	**OFF**	download finished

6.2 Firmware

The firmware can only be updated via the SG-200 service tool by means of a Service PC.

7 Parameter setting

7.1 Parameters

The function of the SG-200 can be defined by various parameters. The parameter file can be set online by means of a service PC using the SG-200 configuration software or loaded via the USB-stick.
The following parameter settings are available fort he SG-200. The values for the factory setting are shown in bold mode. These values are loaded into the unit, if no customer configuration is available.

Parameter	Description	Value	Basic Value
IN1_file : IN16_file	Assignment of the signal files to the inputs. If the entry is left blank, there will be no signal activated using this input	File name #1…#64	= No. of the input
IN1_LVL : IN16_LVL	Signal level for signal activated by input *n*	0 … 100%	**60**
IN1_LVL_reduct	Level reduction for signal activated by input *n*, when level reduction control is active or time for level reduction is true	0 … 100%	**30**
IN1_dest : IN16_dest	Destination for signal output activated by input *n*	AUDIO1/AUDIO2	**AUDIO1**
IN1_trigger : IN16_trigger	Trigger condition for signal activation by input *n*	single_pos/ cont/ single neg	**single_pos**
IN1_delay : IN16_delay	Delay for signal activation after activation of the input	0 … 12,8 s Step 50 ms	**0**
IN1_priority : IN16_priority	Priority of the control inputs	1…16 1= highest priority	**1**
IO_cfg	Quantity of inputs / outputs 12 inputs / 4 outputs 16 inputs / no output	12/16	**12**
OUT1_set : OUT4_set	Output activation dependant on ...	input / signal / both	**Signal**
OUT1 : OUT4	Assignment of the outputs related to the input *n*	1; …; 12; …; 16 List 1…16 separated by ";"	
Stack	Stack function	ON/OFF	**OFF**
Stack_select	Selection of inputs that are concerned by the stack function	1; …; 12; …; 16 Value list 1…16 separated with;	
Test1	Signal for Test 1	File name	
Test2	Signal for Test 2	File name	
Test1_LVL	Level for test signal 1	0 … 100%	**40**
Test2_LVL	Level for test signal 2	0 … 100%	**40**
Test3_LVL	Level for test signal 3	0 … 100%	**40**
Daytime_date1	Begin daytime change	mmddyy; hhmm	
Daytime_date2	End daytime change	mmddyy; hhmm	
LVL_reduct_CTL	Control criteria for level reduction	IN*n* / RTC	
LVL_reduct_on_time	Start time of level reduction	hhmm	**2200**

7.2 Serial interface

The device can be configured alternatively using one of the following interfaces:
IBIS slave interface
RS 232 interface
RS 485 interface

7.2.1 IBIS interface

Serial IBIS vehicle bus interface according to VDV 300
Processible telegrams:

DS 005	u4Z	time	4Z =hhmm
DS 190	u6Z	time	6Z =hhmmss
DS 006	d5Z	date	5Z =DDMMY
DS 191	d6Z	date	5Z =DDMMYY
DS xxx	sS	status query	
DS xxx	sZ	status response	Z = 0…9
DS xxx	sV	version query	
DS xxx	sV16C	current version	8C =SG_FvvrrSG_Pvvrr F = firmware, P = parameter vv = version, rr = revision
DS xxx	sP6Z	signal triggering	Z1…3 = file number Z4…6 = level Z7…8 = duration in ZZx100ms, 0 = single triggering
DS xxx	sP0	signal cutoff	

7.2.2 RS 232 interface

tbd

7.2.3 RS 485 interface

tbd

8 Connection and mechanical interfacing

8.1 Connection

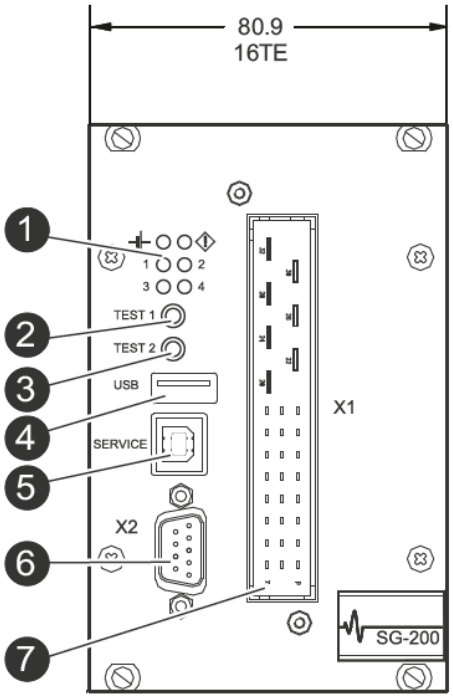
The SG-200 is connected through a H7/F24 male connector acc. DIN 41612 at the front of the unit. The connector screw lock is prepared for the Harting D20 connector housing.
The following table shows the connector pin assignment:

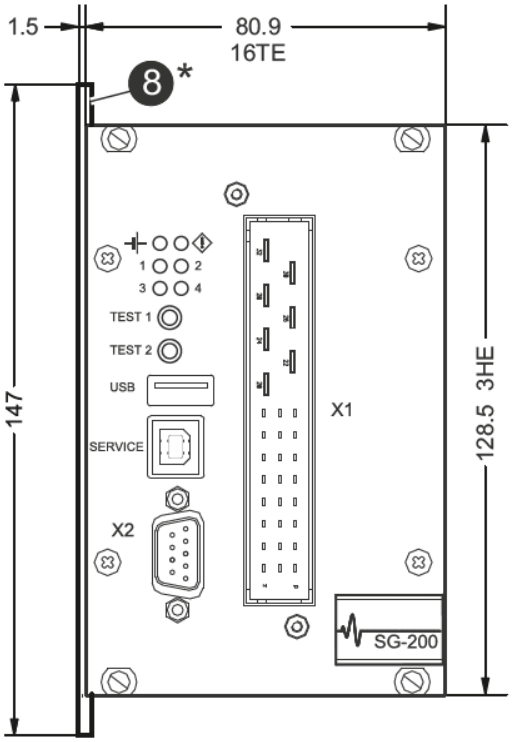
SG-200 / Connector Pin Assignment				X1: F24/H7 Male	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
02d	IN1	02b	IN2	02z	IN3
04d	IN4	04b	IN5	04z	IN6
06d	IN7	06b	IN8	06z	IN1-8_COM
08d	IN9+	08b	IN10+	08z	IN1-8_REF
10d	IN9-	10b	IN10-	10z	IN13-16_COM
12d	IN11+	12b	IN12+	12z	IO1-4_REF
14d	IN11-	14b	IN12-	14z	IO1 (IN13/OUT1)
16d	IO2 (IN14/OUT2)	16b	IO3 (IN15/OUT3)	16z	OUT4
20	GND Supply				
22	V+ Supply				
24	NC				
26	AMP1_OUT+				
28	AMP1_OUT-				
30	AMP2_OUT+				
32	AMP2_OUT-				

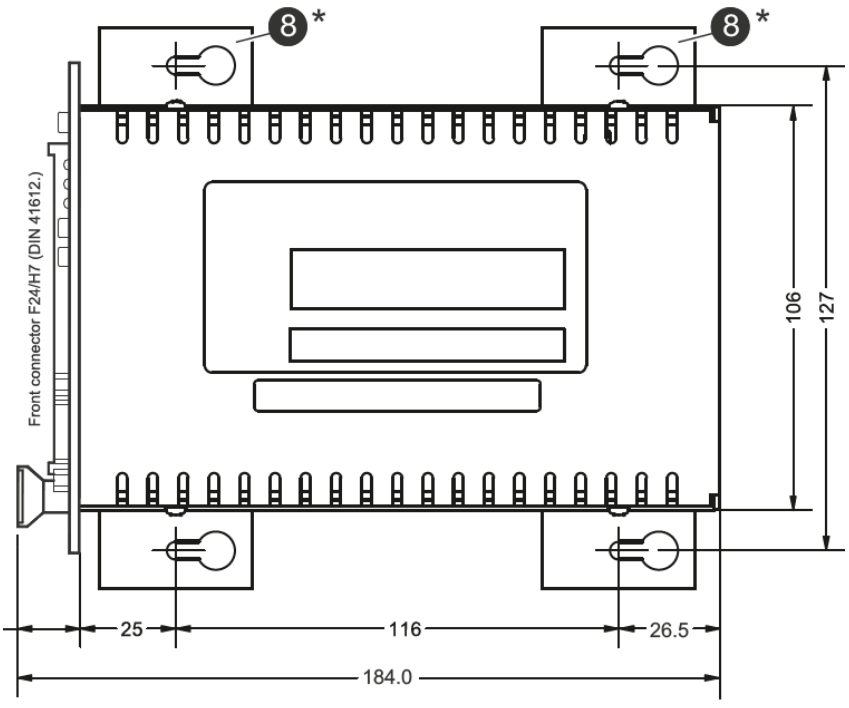
8.2 Serial interface

SG-200 / Connector Pin Assignment			X2: DSub 9 poles Male
Pin	Signal RS 232	Signal RS 485	Signal IBIS
1		RS 485A	
2		RS 485B	
3	TXD		
4	RXD		
5			WBSD
6			WBSM
7			WBEM
8			WBED
9	GND	GND	

8.3 Views and dimensions







No.	Component	Description
1	LED status	1x yellow POWER ON, 1x red ERROR, 4x green STATUS
2	Parameter test button	Test 1
3	Parameter test button	Test 2
4	USB	USB 2.0/A host interface (USB A)
5	Service	USB 2.0/B device interface (USB B)
6	Serial port	X2: SUB-D 9-pin connector (serial interface)
7	Inputs / outputs	X1: Connector plug 24/H7 (type F, DIN 41612)
8	Rack / Flange	There are 2 versions available: 827000 Rack version 827001/2 Flange version with base plates

9 Device versions

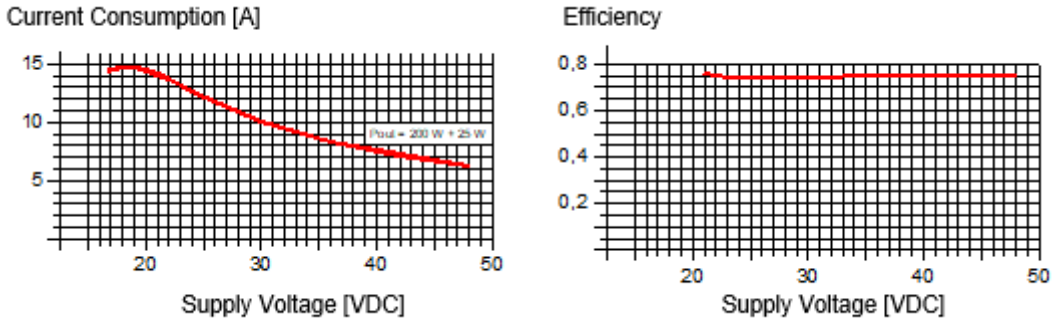
19“ (Rack) Plug In module	Service interface USB-B Power output 4 Ω /8 Ω	827000
Device for flange mounting	Service interface USB-B Power output 4 Ω /8 Ω	827001/827002

10 Technical data

All technical data refer are based on a supply voltage of 24 VDC unless otherwise noted.

10.1 Power supply

Operating voltage	16,8 ... 47 VDC
Optional supply voltages	72 VDC -25/+30 % 110 VDC -25/+30 %
Current consumption	Standby < 300 mA Max. 12 A
Efficiency	> 74 %



10.2 Control inputs and outputs

Control inputs	**12 / 15, opto-isolated bipolar**
IN1 … IN8	common reference
IN9 … IN12	differential
IO1 … IO4	common reference
Input voltage range	16 … 45 V 10mA min. / 30 mA max.
Control outputs	**4 relay outputs, NO**
I01…IO3	Configured as output common reference
Max. switching voltage	45 VDC
Max. switching current	0,5 A
Output OUT4	Firmly configured as error message output

10.3 Audio decoding

MPEG II Layer 3	
Max. sample rate	128 Kbit/s, mono

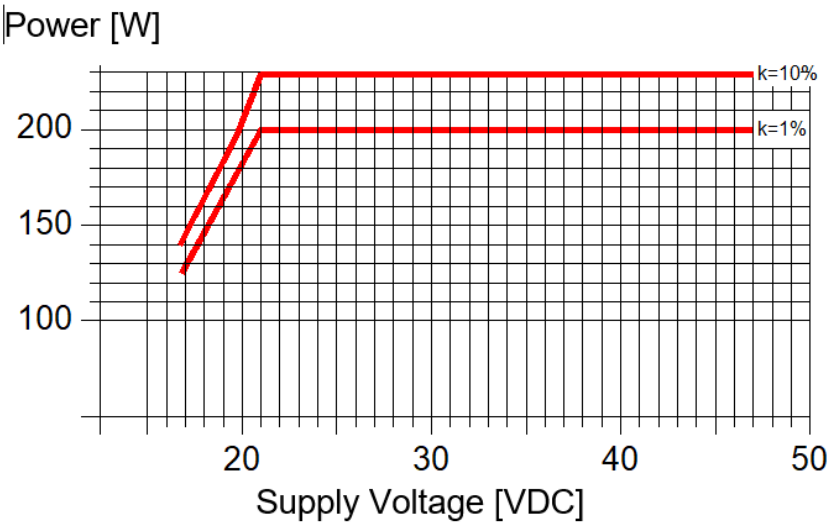
10.4 Memory

Memory	
Type	MicroSD card
Size	1GByte min.
Maximum number of sound files	512

10.5 Digital interfaces

Digital interfaces	
Download interface	USB 2.0/A host interface (USB A)
Service interface	USB 2.0/B device interface (USB B)
Serial interface	optionally IBIS, RS 232, RS 485 through hardware configuration

Power output 1:	Short circuit and overload protected
Impedance (2 versions)	4 Ω / 8 Ω
Power at nominal load	200 W
Frequency response (-3 dB)	250 Hz…6500 Hz / - 3 dB
Distortion (THD)	At full load < 10 %
S/N ratio	> 60 dB
Max. allowed signal duration	At full load < 1 mi



Power output 2:	Short circuit and overload protected
Impedance (2 versions)	4 Ω
Power at nominal load	25 W
Frequency response (-3 dB)	50 Hz…15 Khz / - 3 dB
Distortion (THD)	At full load < 1 %
S/N ratio	> 65 dB
Crosstalk Audio 1-Audio 2	< -62 dB
Signal delay	Parameter Delay = 0 < 100 ms input activation to audio signal output

10.6 EMC

According to EN 50121-3-2

10.7 Mechanical data

Housing		
19’’ plug-in unit	optional	With mounting brackets or For stand alone mounting
Dimensions	Width	16 HP (80.6 mm)
	Height	3 HU (128,4 mm)
	Depth	172,5 mm
Weight		Approx. 0.8 kg

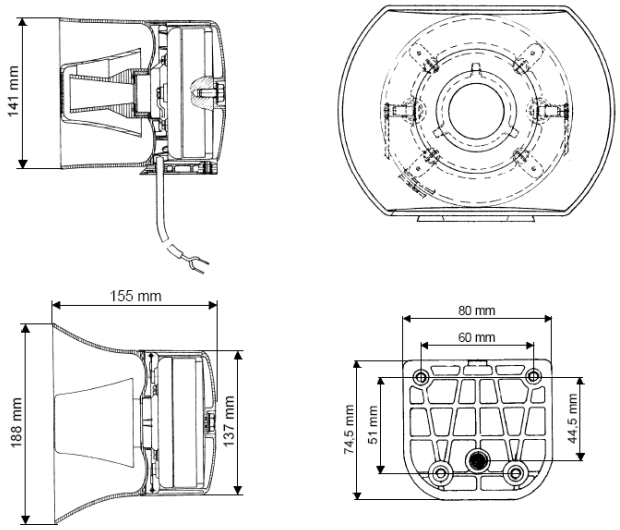
11 Accessories

11.1 Horn loudspeaker HS-51 - 6065.1000.0051

The horn loudspeaker HS-51 is designed for use in pairs with the SG-200.
The overall SPL increases by 6 dB.

Technical data		
Nominal power		60 W
Impedance		13 Ω
SPL	3,5 m / 600 Hz	112 dB(A)
Frequency range- 3 dB		330 Hz – 6 kHz
Angle of sound emission horizontal / vertical		80° / 95°
Temperature range	operation	-25°C … +60°C
	storage	-40°C … +80°C
Housing material		Ultramid PA6B3K
Color		traffic white RAL 9001
Dimensions	width x height x depth	188 x 147 x 155 mm
Weight		2,9 kg

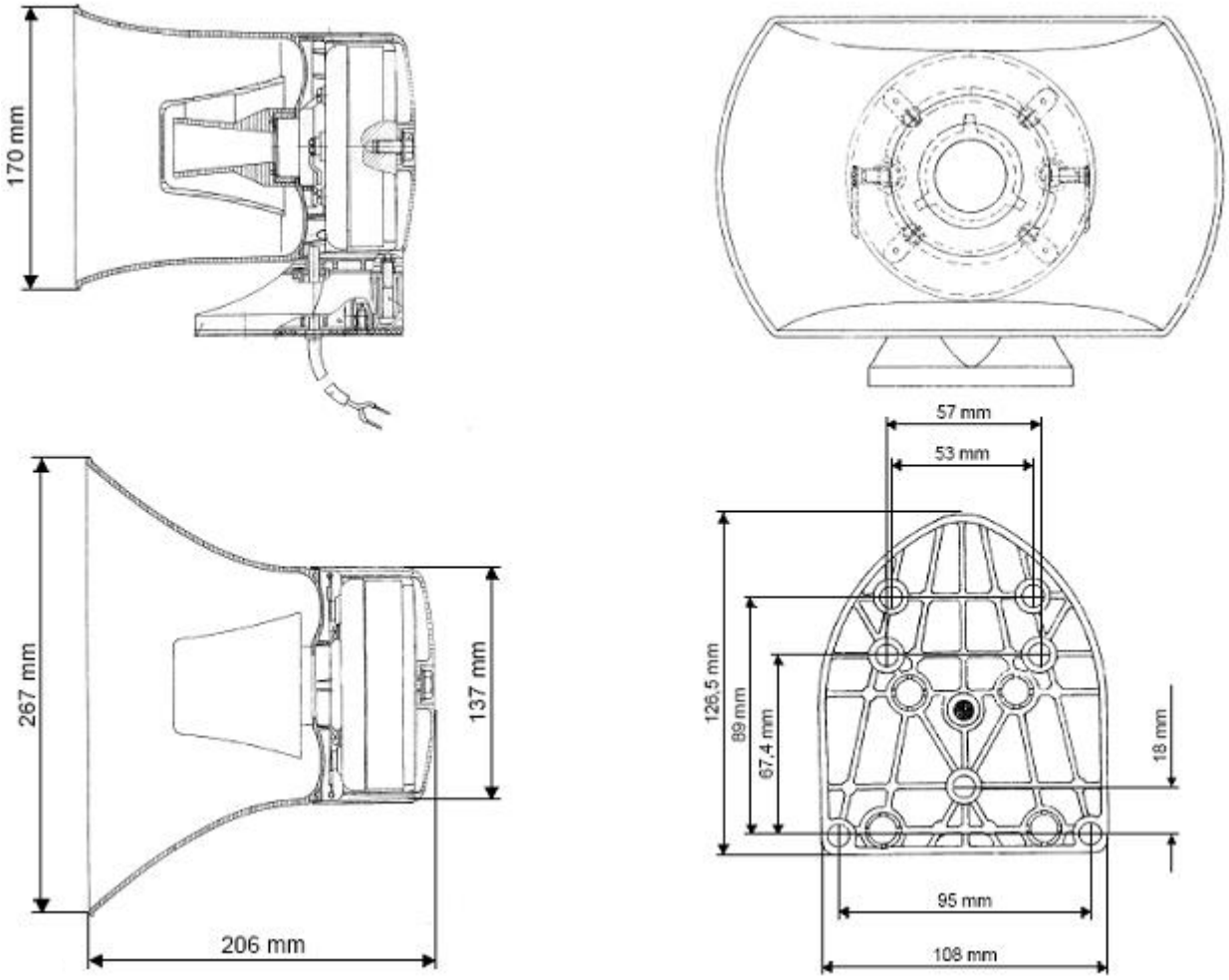
Dimensional drawing



11.2 Horn loudspeaker HS-71 - 6065.1000.0071

The horn loudspeaker HS-71 is designed for use in pairs with the SG-200.
The overall SPL increases by 6 dB.

Technical data		
Nominal power		60 W
Impedance		13 Ω
SPL	3,5 m / 600 Hz	114 dB(A)
Frequency range- 3 dB		330 Hz – 6 kHz
Angle of sound emission horizontal / vertical		65° / 90°
Temperature range	operation	-25°C … +60°C
	storage	-40°C … +80°C
Housing material		Ultramid PA6B3K
Color		traffic white RAL 9001
Dimensions	width x height x depth	267 x 196 x 206 mm
Weight		3,4 kg

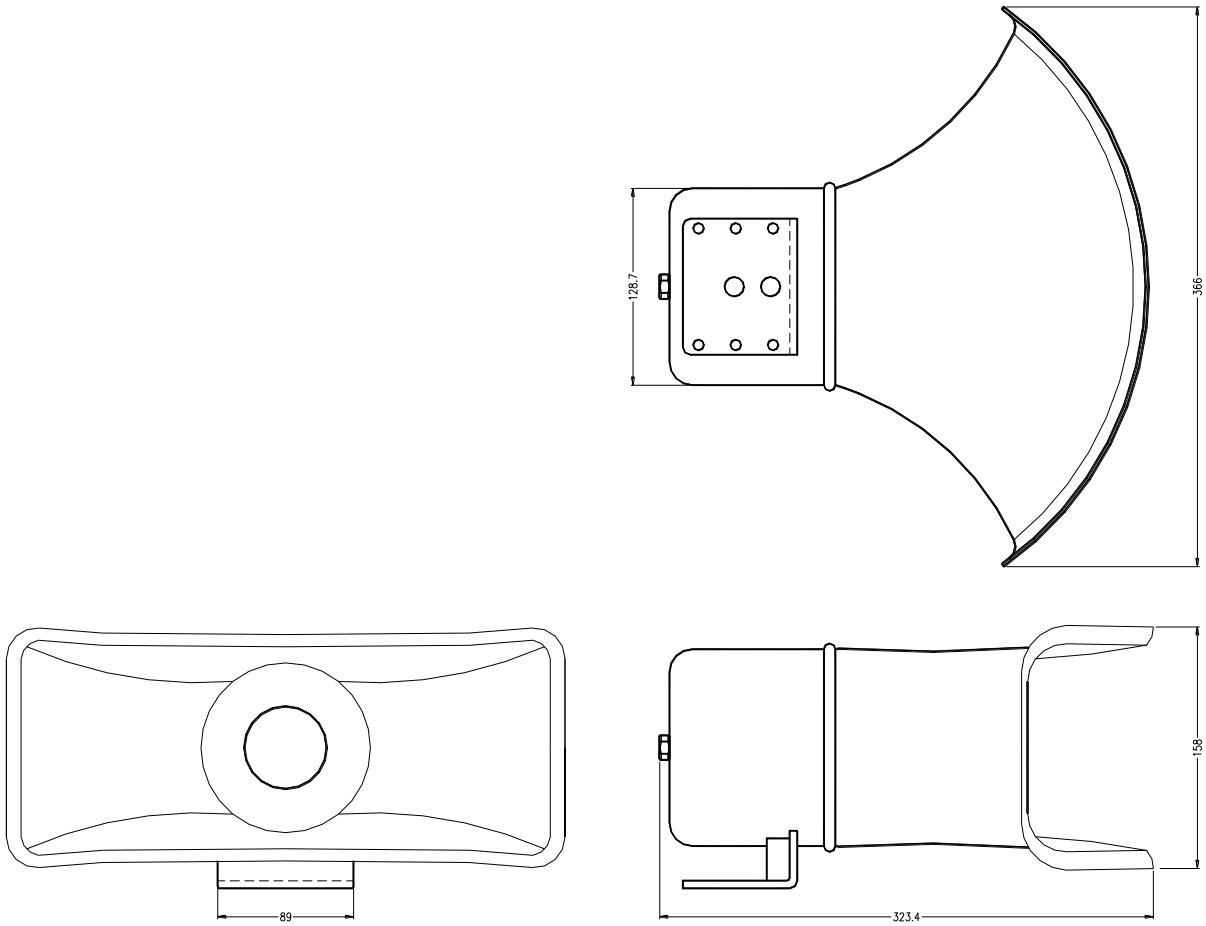


11.3 Horn loudspeaker HS-100 - 6065.1000.00100

The horn loudspeaker HS-100 is designed for use in pairs with the SG-200.
The overall SPL increases by 6 dB.

Technical data		
Nominal power		100 W
Impedance		11 Ω
SPL	1 W / 1 m	111 dB(A)
	100 W / 3 m	118 dB(A)
Frequency range ±6 dB		475 Hz – 6 kHz
Angle of sound emission horizontal / vertical		65° / 90°
Temperature range	operation	-25°C … +60°C
	storage	-40°C … +80°C
Housing material		LEXAN
Color		gray
Dimensions	width x height x depth	267 x 196 x 206 mm
Weight		5,9 kg

Dimensional drawing



11.4 USB stick

For the download any USB stick can be used. The only restriction is, that there is no self-initialising U3 software on the stick or any other kind of operating system software.

11.5 SG-200 Configuration software

By means of the configuration software the SG-200 can be configured through the service port. The service software also supports the download of new firmware as well as the setting of the real time clock.
Part-No. 7130.0088.0100

11.6 Mating connector

Mating connector H7/F24 with contacts and Harting D20 metal housing.
Part-No. 5545.2407.0000

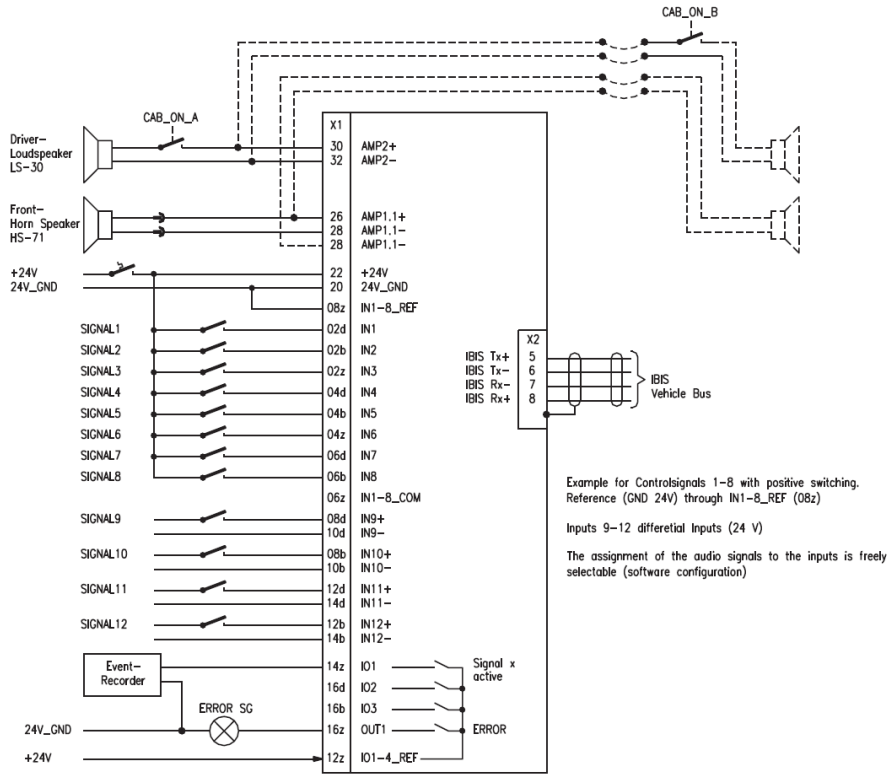
11.7 Support / Mounting accessories

Lütze Transportation can offer the mechanical design of all kind of vehicle or customer dependant mounting solutions for the SG-200 as well as for the various loudspeakers.
Upon request Lütze Transportation can also provide the vehicle installation, test and test report.

12 Vehicle wiring

12.1 Wiring example

The following diagram shows a possible wiring of the SG-200. The wring can be carried out respectively with the dashed wiring when using the device in a bi-directional vehicle



12.2 Loudspeaker wiring

Care must be taken on the loudspeaker lines. It should be low loss lines (low resistance) especially for lines to the far end of the vehicle. The following table shows the necessary wire gauge for a loss of max. 5 %.

Minimum wire gauge dependant on the cable length for 5% loss							
Loudspeaker	100 W / 16 Ω			200 W / 8 Ω			
Cable length [m]	37	62	100	19	31	50	75
Wire gauge [mm²]	1,5	2,5	4	1,5	2,5	4	6

13 Acoustical advices

13.1 General

The possible sound pressure levels depend mainly on the horn speakers which are used. The loudspeaker impedance should match the SG-200 output impedance. If loudspeakers are used which do not meet the impedance of the SG-200 either overload shutdown or low power may result.
Please contact factory.

⚠ CAUTION	Working and operating the SG-200 with connected loudspeakers may generate very high sound pressure level. Use of ear protectors is strongly recommended or the loudspeakers must be housed in sound absorbing box. **In case of non observance of this advice auditory defects may occur.**

13.2 Acoustical dependences

13.2.1 SPL vs speaker distance

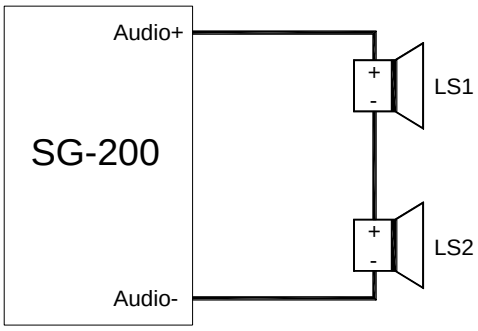
Decrease of SPL vs. Distance related to 1 m								
Distance [m]	1	2	3	5	10	20	30	50
SPL-decrease [dB]	0	6	9,5	14	20	26	29,5	34

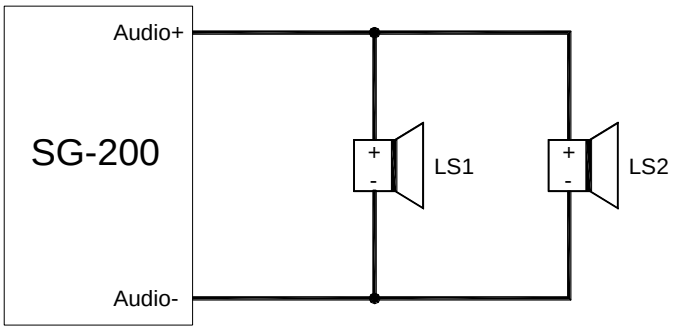
13.2.2 SPL vs. outdoor power

SPL increase vs. feeding power related to 1 W								
Power [W]	1	2	5	10	20	50	100	200
SPL-increase [dB]	0	3	7	10	13	17	20	23

13.2.3 Number of loudspeakers

If more than one loudspeaker is used, always bear in mind that:
- only identical speakers are used
- the loudspeakers are connected in phase
- the overall loudspeaker impedance matches the SG-200 output impedance





Series Connection:	
Power:	$P = 2 \times P_{LS}$
Impedance:	$Z_{ges} = 2 \times Z_{LS}$
SPL:	$SPL = 2 \times SPL_{LS}$
	$SPL = SPL_{LS} + 6\ dB$

Parallel Connection:	
Power:	$P_{ges} = 2 \times P_{LS}$
Impedance:	$Z_{ges} = Z_{LS}/2$
SPL:	$SPL = 2 \times SPL_{LS}$
	$SPL = SPL_{LS} + 6\ dB$

The relations stated above will apply only, if the overall impedance of the speakers match the output impedance of the SG-200.
Upon request device versions with different output impedance can be provided.

14 Service

The system and its individual assemblies do not require preventive maintenance.
For questions about the product or repair requests, please contact:

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Bruckwiesenstraße 17-19
71384 Weinstadt

Germany

Phone: +49 (0) 7151 6053-545

E-Mail: Sales.Transportation@luetze.de

Internet: www.luetze-transportation.com

You can also find the technical documentation on our website.

Enter the article number 827000 in the search field, for example, or use the QR code below.
Select the product in the displayed search result.

At the bottom of the respective product page, you will find the documents relating to the product.

15 Shutdown and disposal

Observe the valid environmental regulations of your country for the final shutdown and disposal.

Disassemble the device and completely dismantle it before disposal.

Dispose of electric parts in line with the regulation for Waste of Electrical and Electronic Equipment (WEEE DE 65543672). You assume the obligation to properly dispose of the delivered goods after termination of use at your own expense in accordance with the statutory provisions and release Friedrich Lütze GmbH from the obligations under § 19 section 3 ElektroG (obligation of manufacturers of electrical and electronic equipment to take back electrical and electronic equipment) and related claims of third parties.

If you have handled the device to a commercial third party without any contractual acceptance of the disposal, you must take it back after the final shutdown at your own cost and risk of legal liability.

The claim of Friedrich Lütze GmbH for takeover or indemnification by the customer shall not become time-barred before the expiration of two years after the final termination of the use of the equipment. The two-year period of suspension of expiry shall commence at the earliest upon receipt by Friedrich Lütze GmbH of a written notification on its part of the termination of use.

16 Documentation history

NOTICE **Technical data are subject to change.**

Revision	Author	Date	Change	Remark
00	K. Patz	2009-02-26	New document	
01	K. Patz	2009-06-18	Additions Chapter 7 added Chapter 9 added Vehicle wiring included	
02	K. Patz	2009-11-05	Correction of Block Diagram	
03	K. Patz	2010-02-11	Redesign complete device Serial interfaces Loudspeaker shifting	
04	K. Patz	2011-02-11	USB service interface New device version	
	M. Castaño K. Patz	2012-11-30	English version	
05	L. Szewczyk	2020-02-27	Lütze version	
06	A. Berk D. Briem	2020-11-17 2021-12-03	Former Lütze version *(Datasheet_SG-200_R6 Lütze.doc)* - Revise: Renamed in operating instructions	
07	D. Briem	2025-05-08	Product image edited, new logo, fax no. removed, disposal instructions and service address added	