Guidance Antenna for Inductive Power Transmission

– Analog Signal / all Variants –

HG 19331-A

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1 Introduction

Guidance antenna HG 19331-A was especially developed for FTS facilities, which use inductive power transmission in such a way that the available ground installation is also used for track guiding vehicles.

1.1 Version Overview

The antenna HG 19331-A xists in several versions that are differentiated by the second to last character of the type identifier, e.g. HG 19331**H**A. You can detect the variant of a given antenna by looking for the type identifier on the label. These versions are available:

Vers.	Nominal reading height above loop (approx.)	Loop frequency	Loop distance	Loop current	Casing	Working area
OA	35 mm	20 kHz	80 mm	75 A	Big (s. Figure 3 on page 5)	±30 mm
HA	35 mm	25 khz	140 mm	85 A	Big (s. Figure 4 on page 5)	±50 mm

Table 1 Variant overview

1.2 Functional Principle

The guidance antenna consists of three systems with one cross-coil antenna each. Each of these systems generates one “Detect” signal and two output values for the measured sum and difference signal that are proportional to the horizontal or vertical components of the magnetic field. In addition to this in **a working area of max. ±30 mm/±50 mm at nominal reading height** (depending on the version, s. Table 1 on page 3) the two values for sum and difference voltage are used to calculate and output the actual offset (in millimeters) from the nominal track.

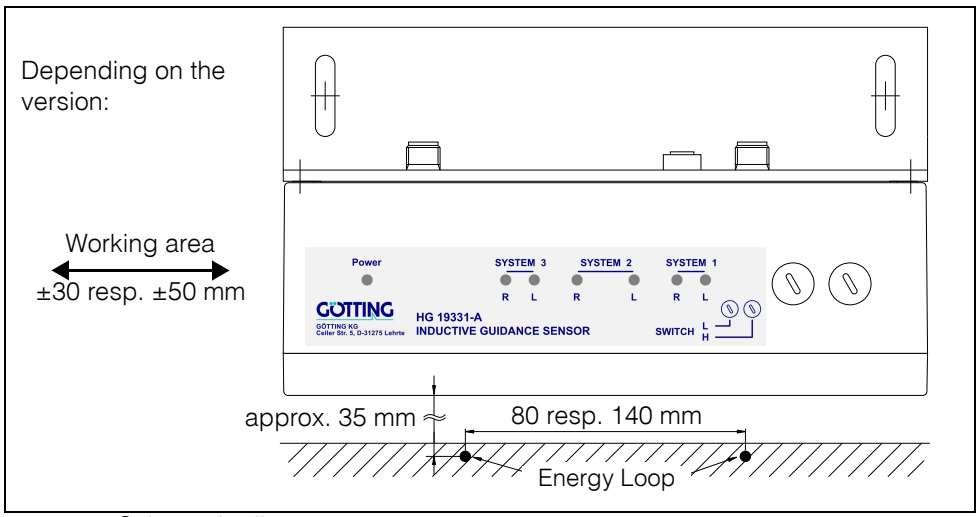

Figure 1 Schematic diagram

Example

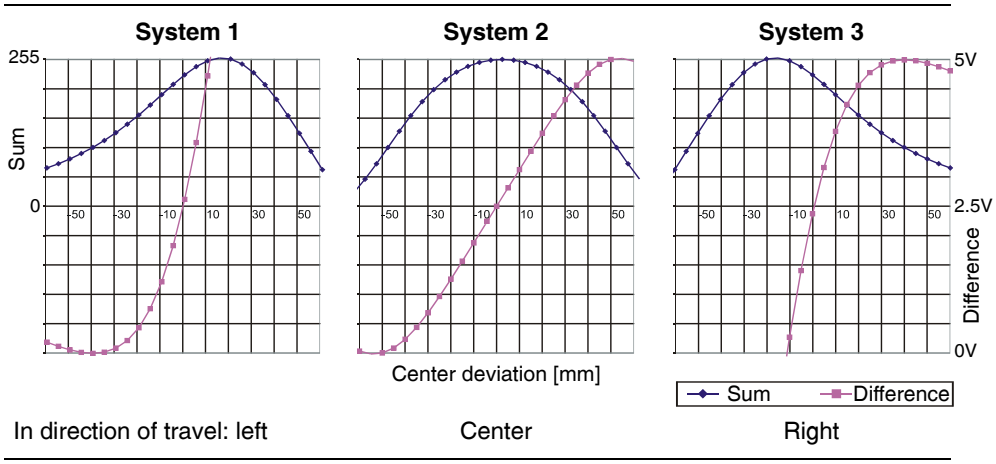

Figure 2 Diagram: Voltage curve of the three antenna systems (example)

By using three antenna systems, branching from the main course is made possible. The three antenna systems work synchronously and their measured values are permanently cyclically transmitted via Profibus and via the serial interface. The decision which of the signals is to be evaluated at a particular time is carried out by the vehicle controller.

2 Device Description

2.1 Casing Dimensions of the different Versions including the Mounting Angle

2.1.1 HG 19331OA

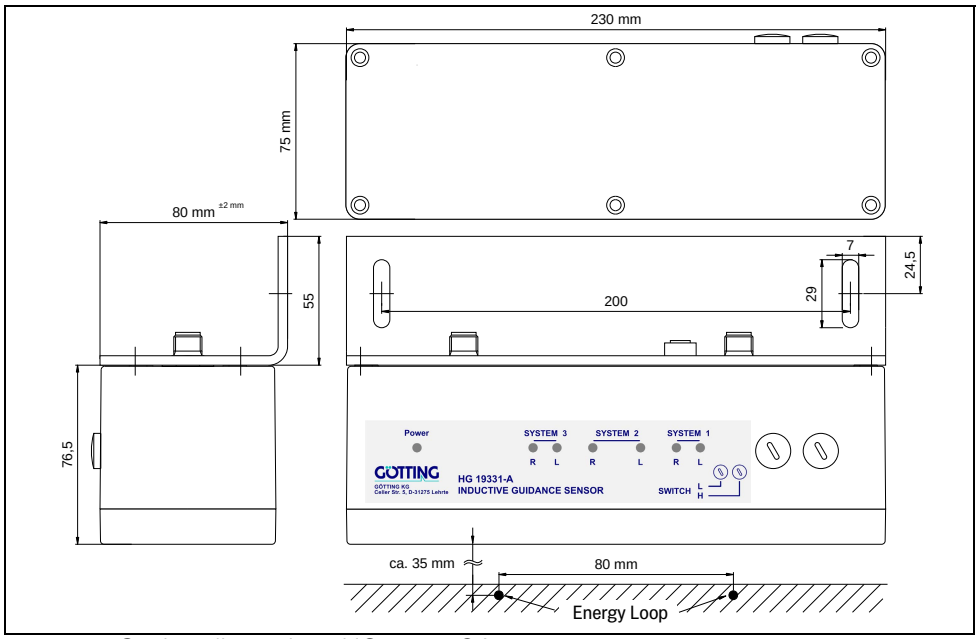

Figure 3 Casing dimensions HG 19331OA

2.1.2 HG 19331HA

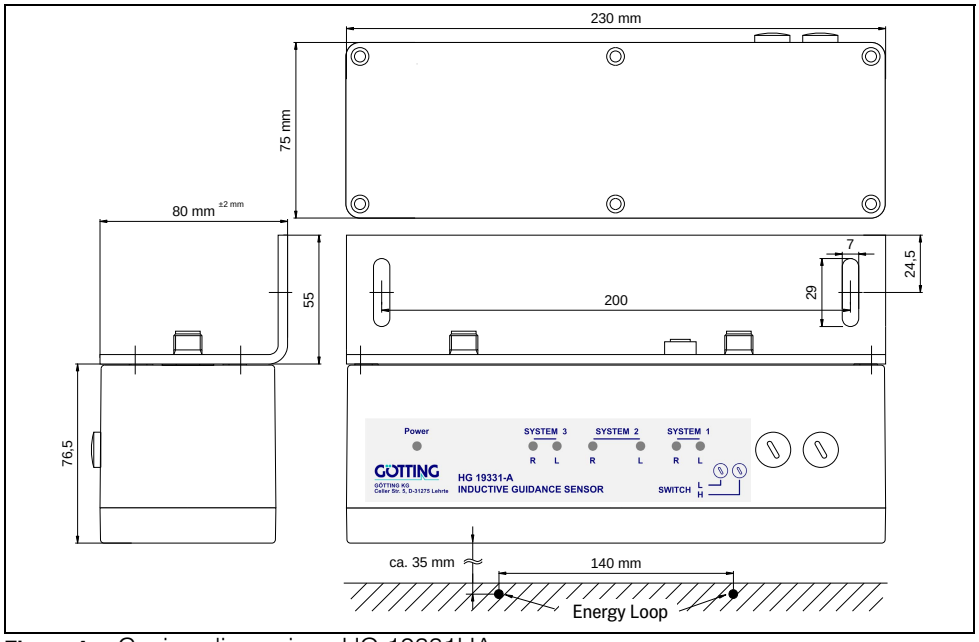

Figure 4 Casing dimensions HG 19331HA

2.2 Mounting Guideline

The guidance antenna HG 19331-A is calibrated for a fixed height of 35 mm above the energy loop. The guidance antenna should be mounted on the vehicle in such a way, that the monitor mode shows values of approx. 0 digits for all three systems in the middle of the track (see markers in Figure 9 on page 10). Also you should make sure that there are **no metal parts** in an area of 50 mm around the mounting place of the guidance antenna!

NOTE! Make sure that there are **no closed metal frames** around the guidance antenna!

If, due to construction needs, you can't avoid closed metal frames close to the guidance antenna those metal frames should be sliced with a cut that then is re-screwed using nonconductive material. **Pickup coils** also distort the electrical field during load cycles and should not be mounted close to the guidance antenna.

In general all metal parts distort the magnetic field, which means that there's no uniform magnetic field around the guidance antenna. In those cases the guidance antenna should be mounted somewhere else or the offsets have to be adjusted (see section 3.3 on page 10)!

2.3 LEDs on the Front Plate

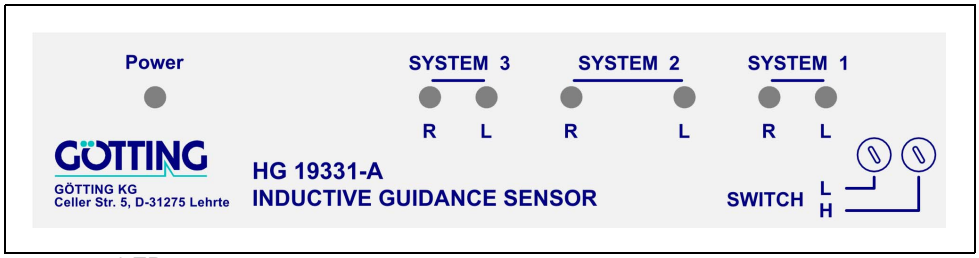

Figure 5 LEDs

On the front plate you can find two LEDs per antenna system (red + green) that indicate the zero crossing point of the difference signal (both LEDs are lit at once). In addition to those you can find one LED that indicates sufficient power supply (Power).

2.4 Pin Allocations

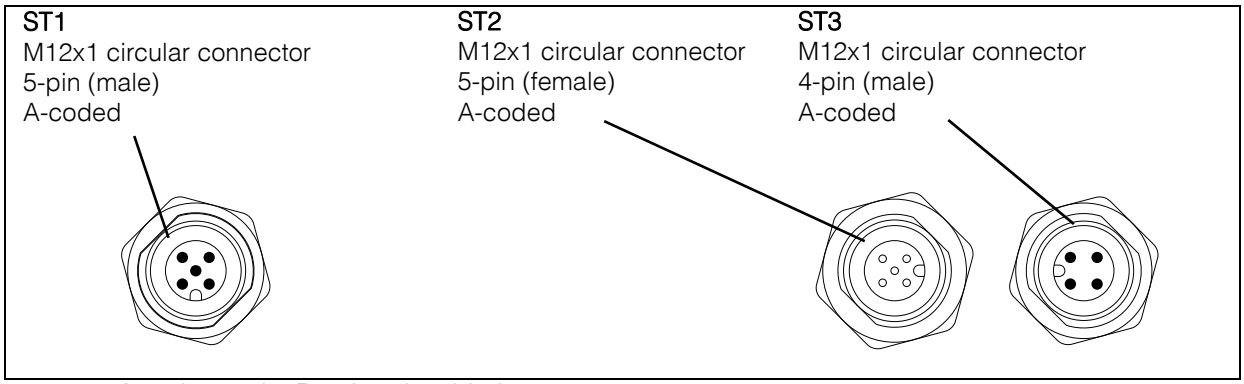

Figure 6 Anordnung der Rundsteckverbinder

Stecker	Pin	Belegung
ST1 (Stift) A-codiert	1	+UB
	2	-
	3	TxD (RS 232)
	4	RxD (RS 232)
	5	GND
ST2 (Buchse) A-codiert	1	Detect Left
	2	Detect Right
	3	Analog Output Left
	4	Analog Output Right
	5	GND
ST3 (Stift) A-codiert	1	+UB
	2	Detect Center
	3	GND
	4	Analog Output Center

Table 2 Pin allocations ST1, ST2 und ST3

2.5 Analog Outputs (left, center, right)

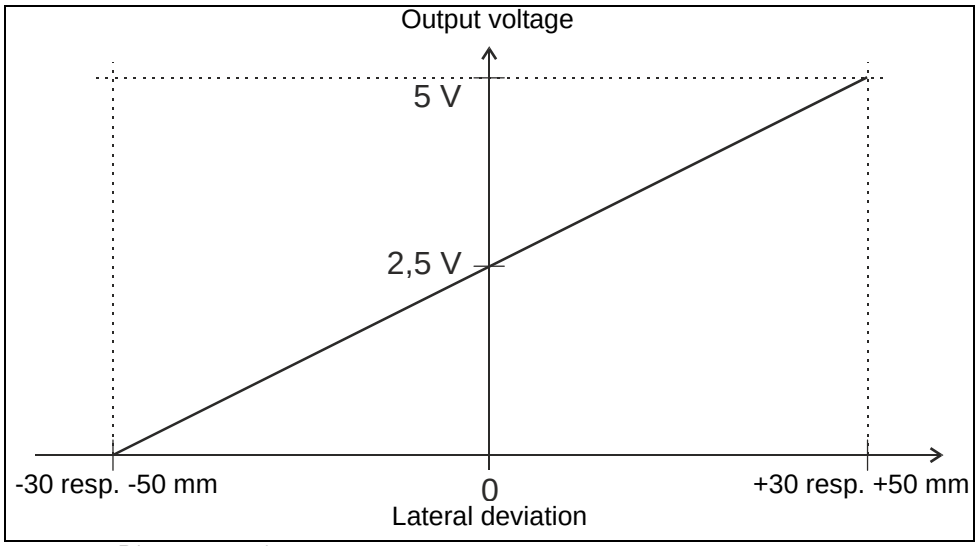

Figure 7 Diagram analog outputs

2.6 Detect Outputs

- No loop track detected: 0 V
- Loop track detected: 5 V

2.7 Serial Communication via RS-232

Independently from the Profibus-DP interface the communication can be carried out through the built-in RS-232 interface. In order to do so a terminal program (e.g. Hyper-Terminal on MS Windows) using the following parameters is needed.

Interface parameters: Baud rate 38400 bits/second
8 Data bits, parity even, 1 stop bit
Protocol: Xon/Xoff

Terminal parameters: ANSI emulation

By default raw data is output when the device is turned on respectively the monitor mode is turned off. The update rate is 6 ms (the same as the output on the Profibus interface). The serial telegrams have the following configuration:

Output byte	Data
1	Start character STX (ASCII 2)
2	Sum left system (1) high nibble
3	Sum left system (1) low nibble
4	Difference left system (1) high nibble
5	Difference left system (1) low nibble

Table 3 Configuration of the serial telegrams (part 1 of 2)

Output byte	Data
6	Sum center system (2) high nibble
7	Sum center system (2) low nibble
8	Difference center system (2) high nibble
9	Difference center system (2) low nibble
10	Sum right system (3) high nibble
11	Sum right system (3) low nibble
12	Difference right system (3) high nibble
13	Difference right system (3) low nibble
14	Detect signals and error message high nibble (see Table 4)
15	Detect signals and error message low nibble (see Table 4)
16	Deviation left system high nibble
17	Deviation left system low nibble
18	Deviation center system high nibble
19	Deviation center system low nibble
20	Deviation right system high nibble
21	Deviation right system low nibble
22	Check sum

Table 3 Configuration of the serial telegrams (part 2 of 2)

Check sum: Nibble-wise addition of the output bytes 2 to 21 with final negation

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Error		System 1 Left	System 1 Right	System 2 Left	System 2 Right	System 3 Left	System 3 Right

Table 4 Detect signals and error messages

Example of a serial telegram

Start char. STX	Sum left		Difference left		Sum center		Difference center		Sum right		Difference right		Detect + error		Deviation left		Deviation center		Deviation right		Check sum
2	B	3	0	D	D	E	0	A	B	5	1	2	1	5	0	E	0	A	1	0	D

Table 5 Example of a serial telegram

Hexadecimal coding of the telegram content: 2B30DDE0AB512150E0A10D

Calculation of the check sum:

Nibble-wise addition of the output bytes 2 to 21:

B + 3 + 0 + D + D + E + 0 + A + B + 5 + 1 + 2 + 1 + 5 + 0 + E + 0 + A + 1 + 0 = 72

Negation: 72 ---> 8D

Check sum = **D**

3 Monitor Mode

The monitor mode is available via the serial interface. The Götting Adapter HG 01933ZA may be used to connect the guidance antenna to a PC. Alternatively you can use a self-made adapter (pin assignment of the serial interface: s. Table 2 on page 7 / interface parameters: 2.7 on page 8). Then start the terminal program on the PC.

3.1 Switching to Monitor Mode

In order to switch to the monitor mode please follow the cycle shown below:

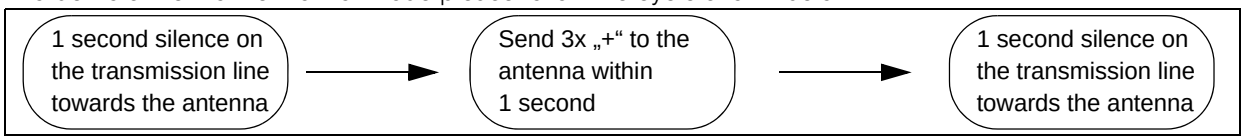

Figure 8 Cycle for starting the monitor mode

3.2 Terminal Program Display in Monitor Mode

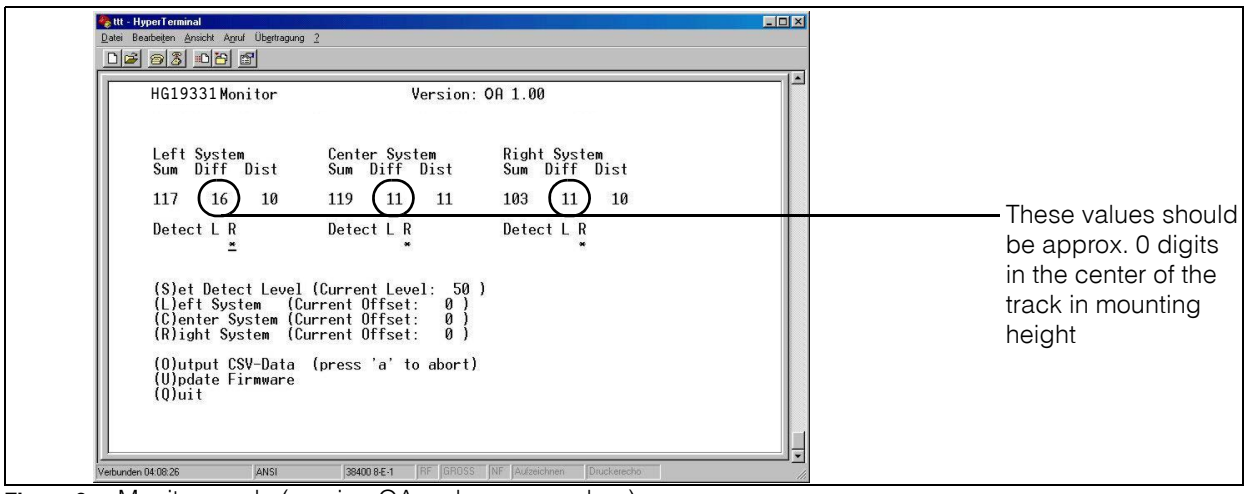

Figure 9 Monitor mode (version OA, values exemplary)

3.3 Commands in Monitor Mode

(S)et Detect Level — Set threshold for „Detect“.

(L)eft System
(C)enter System
(R)ight System
— Define individual offsets for each system.

(O)utput CSV-Data — Comma separated serial data output.

CAUTION! (U)pdate Firmware: **Flash memory is deleted!** New hex file has to be sent to the antenna as a text file.

(Q)uit — Quit monitor mode.

4 Technical Data

Guidance antenna HG 19331-A	
Casing	Glass-fibre reinforced (GRP) 4 mm aluminium mounting angle
Dimensions	See section 2.1 on page 5
Weight	approx. 750 g
Protection class	IP 65
Operating voltage range	18 to 30 V
Current consumption	130 mA
Interfaces	M12 circular plug-in connector 4/5-pin
Relative humidity at 25° C	95 % (without condensation)
Operating temperature range	0 to +50° C
Storage temperature range	-20 to +70° C
Mounting height	approx. 35 mm above the energy loop

Table 6 Technical Data Guidance antenna HG 19331-A

4.1 Prerequisites of the Ground Installation

The stationary part of the inductive energy transmission has to match the following prerequisites:

Prerequisites	Version	
	OA	**HA**
Operating frequency of the inductive energy transmission	20 kHz	25 kHz
Distance of the twin conductor	80 mm	140 mm
Conductor current of the inductive energy transmission	75 A	85 A

Table 7 Prerequisites of the Ground Installation

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7 Handbook Specifications

At the time this manual was printed, the following symbols and marks were used in all Götting KG documentations:

- For security advices, the following symbols stand for different degrees of danger and importance:

NOTE!

ATTENTION!

WARNING!

- Further information or advices are indicated as follows:

TIP!

- Program texts and variables are indicated through the use of the `Script Courier`.
- Whenever the pressing of letter keys is required for program entries, the required Letter Keys are indicated as such (for any programs of Götting KG small and capital letters are equally valid).
- Sections, drawings and tables are subsequential numbers throughout the complete document. In addition, each documents includes a list of contents showing the page numbers following the front. If a document exceeds 10 pages, it also has a drawings list and a list of tables on the last few pages. If required, in case a document is correspondingly long and complex, a index is added in the back.
- Each document shows a small table including meta information, such as deveopler, author, revision and date of issue, on the front page. The information regarding revision and date of issue are also included in the bottom line on each page of the document. This way it is possible to clear identify the source document for each bit of information.
- Online version (PDF) and printed handbook are always generated from the same source. Due to the consequent use of Adobe FrameMaker for these documentations, it is possible to use the cross hints and content entries (including page numbers of the index) of the PDF file for automatical transfer to the corresponding content.

8 Copyright and Terms of Liability

8.1 Copyright

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8.2 Exclusion of Liability

Any information given is to be understood as system description only, but is not to be taken as guaranteed features. Any values are reference values. The product characteristics are only valid if the systems are used according to the description.

This instruction manual has been drawn up to the best of our knowledge. Installation, setup and operation of the device will be on the customer's own risk. Liability for consequential defects is excluded. We reserve the right for changes encouraging technical improvements. We also reserve the right to change the contents of this manual without having to give notice to any third party.

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