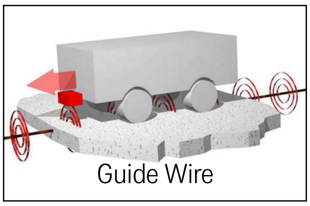
Device Description HG G-98820ZB/ZC/YC



RFID Localization Sensor

HG G-98820ZB/ZC/YC

Position detection and identification | mounting lengthwise/ crosswise | serial | CAN/PROFINET®

English, Revision 12	Date: 14.12.2023	Dev. by: LF	Author(s): RAD / TN / LF

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Main Features

• RFID localization sensor for automation applications (s. section 3.4 on page 13) • Direction of travel adjustable crosswise or lengthwise depending on application (s. section 3.3 on page 13) • Indoor & Outdoor, IP 65 • Mounting side may be mounted directly on metal • Reading distance depending on the transponder type in use 20 to 160 mm • Max. crossing speed depending on the mounting direction 4 m/s (crosswise) respectively 6 m/s (lengthwise)	• Bus interface depending on variant CAN/CANopen® or PROFINET® • PosiPulse when crossing the center axis in driving direction • Serial interface serves as service interface for configuration (also for updating the localization sensor software) or data interface (configurable telegram contents) • Programming of transponders

Contents

1 About this Document

1.1 Validity

This device description applies to the RFID localization sensor HG G-98820ZB/ZC/YC. It contains information on correct mounting, electrical installation, commissioning, operation, maintenance and fault rectification.

This device description refers to devices – depending on the variant – with firmware 98820YC_1.00 / 98820ZC_1.00 / 98820ZB_1.05 or higher (visible in the main menu as shown in Figure 17 on page 44).

1.1.1 Target Group

This device description is intended for developers, manufacturers or operators of systems or facilities that want to track guide Automated Guided Vehicles (AGV). It is also intended for qualified personnel who

- wants to integrate the localization sensor into a vehicle.
- wants to carry out the initial commissioning of the system.
- want to configure the system.

1.1.2 Other Applicable Documents

This device description does not include information on the operation of the higher-level system, e.g. an automated guided vehicle (AGV), into which the evaluator is integrated.

▶ Do not put the RFID localization sensor into operation until you have received the operating instructions from the manufacturer or the system operator and have read and understood them.

Supplementary documents for devices from Götting are available on request or directly via our Internet pages. The adjacent QR code will lead you to our homepage www.goetting-agv.com. The following links refer to specific product pages.

- Disc Transponder HW DEV00095/HW DEV00098
  https://www.goetting-agv.com/components/00095
- Glass Transponder HG G-70633
  https://www.goetting-agv.com/components/70633
- Puck Transponder HG G-70652/HG G-70653
  https://www.goetting-agv.com/components/70652
  https://www.goetting-agv.com/components/70653
- Rod Transponder HG G-71325
  https://www.goetting-agv.com/components/71325

1.2 Declaration of Conformity

The product HG G-98820ZB/ZC/YC complies with the relevant harmonisation legislation of the European Union. The relevant harmonized European standards and directives mentioned in the Declaration of Conformity were used to assess conformity.

You can request the EU declaration of conformity from Götting KG or download it from the following address:

https://www.goetting-agv.com/components/98820

1.3 Presentation of Information

For you to be able to use your product simply and safely this device description uses consistent warning notices, symbols, terms and abbreviations. Those are described in the following sections.

1.3.1 Warning Notices

In this device description warning notices appear before sequences of actions that may lead to damage to persons or property. The listed actions for the danger prevention have to be observed.

Warning notices have the following structure:

⚠ SIGNAL WORD

Kind or source of the danger

Consequences

▶ Danger prevention

- The **warning symbol** (warning triangle) indicates danger to life or risk of injury.
- The **signal word** indicates the severity of the danger.
- The paragraph **kind or source of the danger** names the kind or source of the danger.
- The paragraph **consequences** describes the consequences of not observing the warning notice.
- The paragraphs for **danger prevention** explain, how to avoid the danger.

The signal words have the following meanings:

Table 1 *Hazard classification according to ANSI Z535.6-2006*

Warning Symbol, Signal Word	Meaning
⚠ DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	NOTICE indicates property damage: The product or the environment could be damaged.

1.3.2 Symbols

In this device description the following symbols and formatting are used:

If this information is ignored the product may not be operated in an optimal way.

Indicates one or more links to the Internet.

– www.goetting.de/xxx
– www.goetting.de/yyy

Indicates tips for easier operation of the product.

✓ The check mark lists a requirement.

▶ The arrow shows an action step.

The indentation shows the result of an action or an action sequence.

- Program texts and variables are indicated through the use of `a fixed width font`.
- Menu items and parameters are shown in *cursive characters*.
- Whenever the pressing of letter keys is required for program entries, the required L etter K eys are indicated as such (for any programs of Götting KG small and capital letters are equally working).

2 Safety Instructions

Our product has been designed and manufactured in accordance with the generally recognized rules of technology. Nevertheless, there is a risk of personal injury and damage to property if you do not observe this chapter and the safety instructions in this documentation.

- Read this documentation thoroughly and completely before working with the product.
- Ensure that the documentation is kept in such a way that it is accessible to all users at all times.
- Always pass the product on to third-parties together with the relevant documentation.

2.1 Intended Use

The localization sensor HG G-98820ZB/ZC/YC is designed to calculate the relative position of matching RFID tags (transponders) and to output it to a higher-level control system. Either the transponders or the localization sensor must be in a fixed position. Possible fields of application are listed in section 3.4 „Application Examples“ on page 13.

The localization sensor HG G-98820ZB/ZC/YC may only be used by qualified personnel at the place of installation (e.g. vehicle) where it has been installed and commissioned for the first time by qualified personnel in accordance with these operating instructions. The operating conditions specified in this device description must be observed.

The localization sensor HG G-98820ZB/ZC/YC does not contain any safety equipment and may therefore only be used in applications where the manufacturer or the system operator has ensured that sufficient measures are implemented for the protection of persons and the safe detection of obstacles.

2.2 Improper Use

Any use other than that described in the intended use is not in accordance with the intended use and is therefore not permitted.

Götting accepts no liability for damage resulting from improper use. The risks associated with improper use lie solely with the user.

The improper use of the product includes:

- The use of the localization sensor in vehicles that are not equipped with safety devices for the protection of persons and the safe detection of obstacles.
- Leaving the track or the appearance of a person or an obstacle in the danger area must be safely detected at all times and immediate stopping of moving parts (e.g. vehicles) must be ensured in order to exclude damage to property or personal injury.

2.3 User Qualification

The operations described in this document require basic knowledge of mechanics and electrics as well as knowledge of the associated technical terms. To ensure safe use, these activities may therefore only be performed by an appropriate specialist or an instructed person under the direction of a specialist.

A specialist is someone who, on the basis of his technical training, knowledge and experience as well as his knowledge of the relevant regulations, is able to assess the work assigned to him, recognize possible hazards and take suitable safety measures. A specialist must comply with the relevant technical rules.

The personnel designated for the assembly, commissioning and configuration of the localization sensor

- has received this device description.
- is familiar with the operation of the higher-level system (e.g. a vehicle).
- is competent to perform his activities and is sufficiently trained in the installation and configuration of the localization sensor, if this is part of their activities.
- is – in case the CAN bus interface is to be used – familiar with the commissioning of and telegram exchange via CAN bus connections.
- is – in case the PROFINET® interface is to be used – familiar with the commissioning of and telegram exchange via PROFINET® connections.
- knows – in the event that the localization sensor is to be used for position detection of automated vehicles – the dangers emanating from an automated guided vehicle (AGV) and has been sufficiently instructed in the handling of the vehicle and any necessary safety precautions to assess the safe working condition of the system.
- knows – in case other devices or systems with moving parts are used – the risks arising from the application and is sufficiently instructed in the safety precautions that may be necessary to assess the safe working condition of the system.

2.4 General Safety Instructions

- Ensure that the localization sensor HG G-98820ZB/ZC/YC is used only in applications,
  - where sufficient measures for personal protection and safe detection of obstacles are implemented and
  - where it is reliably detected if the vehicle leaves the track or a person or obstacle appear in the danger zone at any time and all moving parts (e.g. vehicles) are immediately stopped.
- Ensure that interference does not impair the detection of transponders. Strategies for detecting and avoiding interference can be found in chapter 7 on page 25.
- Mount the localization sensor so firmly on the vehicle that its position cannot change during normal operation. Otherwise, the position data will be incorrectly evaluated by the higher-level system and the vehicle may drive off track.
- Although dirt does not affect the position detection itself, the localization sensor should be protected from dirt and moisture (e.g. splash water from the wheels of the vehicle) and cleaned regularly, otherwise wear and tear on the localization sensor will increase.

2.5 Obligations of the Operator

When using the localization sensor, the operator must ensure that

- all persons within the area of influence of an automated system (e.g. automated guided vehicle (AGV)) are informed about the type of application and the associated hazards,
- the operating conditions specified in this device description are observed,
- the localization sensor is in a technically perfect condition.

The operator must not modify or alter the localization sensor without authorization. Otherwise, the operating permit will become invalid.

3 Introduction

3.1 Variants

The RFID localization sensor is available in three variants.

Table 2 *Varianten-Übersicht*

Bestell-Nr.		Ausstattung
HG G-98820	ZB	Bus interface: CAN Basic / CAN Extended / CANopen®
	ZC	– Bus interface: CAN Basic / CAN Extended / CANopen® – Stainless steel connectors
	YC	– Bus interface: PROFINET® – Stainless steel connectors

3.2 Functional Description

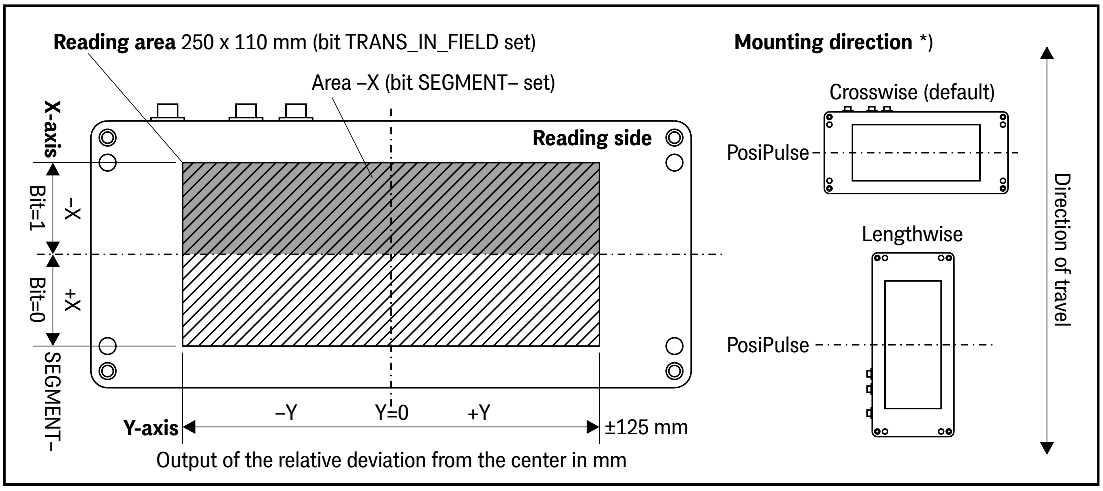
The RFID localization sensor HG G-98820ZB/ZC/YC exclusively measures the position of a passive RFID tag (transponder) relative to the center of the sensor along the Y-axis. Depending on the application (see table below), the sensor is mounted crosswise or lengthwise to the direction of travel; the mounting direction can be configured in the sensor software. The sensor and transponder are largely insensitive to dirt and moisture and can also be used in harsh environments.

As long as a transponder is in the reading range of the sensor, the relative position information of the transponder is continuously output. Its code is also output so that it can be identified. If the absolute position of the identified transponder is known, the absolute position of the sensor can be calculated from the relative measurement. When crossing the center axis in the direction of travel (see illustration below), a high-precision positioning pulse (PosiPulse) is also output.

3.3 Definitions

The signs and coordinate definitions of the localization sensor specified in this device description are defined according to the following figure:

Figure 1 *Definitions / coordinate system / mounting direction*



*) Depending on the application (s. section 3.4 on page 13), the localization sensor can be operated crosswise or lengthwise. The mounting direction can be configured in the sensor software, see parameter `Direction` in section 9.3.2.3 on page 47.

3.4 Application Examples

Figure 2 *Examples of AGVs using RFID systems*

- *Localization of AGV*
  In these applications, the sensor is installed **crosswise** to the direction of travel. The PosiPulse is triggered when the long center axis (Y-axis) is crossed.
  To navigate AGVs, the current position of the AGV is determined by the lateral deviation at the location of the transponder. If the sensor crosses the transponder with its long center axis, the PosiPulse is triggered and a two-dimensional position is available at this point. The field of the transponder is rotationally symmetrical, which is why no orientation/direction of travel can be measured. Orientation/direction of travel can be calculated using dead reckoning between transponders from the results of at least two measurements on different transponders.

- *Localization of rail vehicles (ASC, RMG)*
  In these applications, the sensor is installed **lengthwise** to the direction of travel. The PosiPulse is triggered when the short center axis (X-axis) is crossed. For rail vehicles, the position along the rail is to be determined. If the transponder is in the active area of the sensor, the longitudinal position of the transponder is measured along the long axis relative to the center of the sensor. If the absolute position of the transponder is known, the absolute position of the rail vehicle can be determined from this. When the sensor crosses the transponder with its short central axis, the PosiPulse is triggered, which in addition to the continuous measured value represents the measured value zero in the longitudinal position with high precision.
- *Contact-free measurement of the displacement of workpieces*
  Due to the high reproducible measuring accuracy and measuring rate, contact-free length measurements can be carried out between moving or displaceable workpieces **lengthwise** to the direction of movement.

4 Scope of Delivery

The scope of supply includes:

- one RFID localization sensor HG G-98820ZB/ZC/YC
- this device description, available in electronic form at the following address:

www.goetting-agv.com/components/98820

4.1 Required Accessories

The localization sensor alone is not sufficient for position detection of vehicles with transponders. In order to operate a driverless transport system you also need:

- connection cables for connecting the localization sensor to the vehicle electronics,
- several transponders in the ground.

The connection cables can be assembled by the customer (see section 6.2 on page 19) or ordered from Götting (see below).

▶ Refer to Table 3 for the order numbers of the required accessories.

Table 3 *Required accessories / Transponder reading distances (part 1 of 2)*

Order No.	Description
HW CAB00001	Power: cable PUR, 5 m with M12 elbow socket, 5-pol., A-coded
HW CON00055	CAN 1: CAN terminating resistor (Terminator), M12 Plug 5-pol., A-coded
HW CAB00064	CAN 2: cable CAN-Bus, 10 m, with shielding, M12 socket 5-pol. straight, A-coded, open end
– HW DEV00095 – HW DEV00098 pre-programmed	Disc Transponder Usually mounted on the roadway Reading distance: 20 – 50 mm 
HG G-70633ZB	Glass Transponder Usually mounted in the ground Reading distance: 50 – 120 mm 

Table 3 *Required accessories / Transponder reading distances (part 2 of 2)*

Order No.	Description
HG G-70652ZC	Puck Transponder Usually mounted on the roadway Reading distance: 50 – 160 mm 
HG G-70653ZA	Puck Transponder Usually mounted on the roadway Reading distance: 50 – 160 mm 
HG G-71325XA	Rod Transponder Usually mounted in the ground Reading distance: 20 – 80 mm 

4.2 Optional Accessories

▶ Refer to Table 4 for the order numbers of the optional accessories.

Table 4 *Optional accessories*

Order No.	Description
HG G-06150-A	Serial/parallel Interface converts a serial RS232 data stream into a parallel output. https://www.goetting-agv.com/components/06150
HG G-73650ZD	Navigation controller (control unit) for calculating the courses of the vehicle https://www.goetting-agv.com/components/73650
HG G-81840ZA	Transponder programming device for reading and programming of transponder codes https://www.goetting-agv.com/components/81840 The transponders can also be programmed via the localization sensor, but this is more complicated when installed, as it usually requires driving the vehicle over the transponder to be programmed.

5 Storage

NOTICE

Danger due to improper storage

The device can be damaged

- Observe the storage conditions.

The storage temperature is -25 °C to +50 °C.

- Store the device in closed rooms only.
- Make sure that the storage room is sufficiently ventilated and dry.
- Protect the device from damage caused by dirt, dust or moisture.

6 Mounting

NOTICE

Malfunction or detuning of the localization sensor

If you do not comply with the operating conditions, the position detection may be faulty or the RFID localization sensor may fail completely.

- Always comply with the operating conditions specified in section 6.3 on page 20, in particular regarding metal-free areas and the routing of live cables around the localization sensor.

We recommend the following procedure for mounting the localization sensor:

- First prepare the connection cables (see section 6.2 on page 19).
- Lay the connection cables in the vehicle.
- Then mount the localization sensor at the desired position (see section 6.3 on page 20).
- Close unused connectors with closing caps.

6.1 Mounting the Transponders

6.1.1 Operating Conditions for Transponders

For all transponders, the maximum reading distance can be achieved if they are positioned away from metallic surfaces. Practical tests should be carried out to clarify the configuration!

Mounting options for the transponders:

- On the road surface.
- Flush in the roadway with grouting.

i The reading distance is the distance between the reading side of the localization sensor and the top edge of the transponder.

Transponders may not be permanently mounted in standing water. The plastic can absorb water over a longer period of time and weaken the transponder signal.

Reinforcements laid tightly under the road surface can interfere not only with the transponders but also with the localization sensor and thus falsify the position detection. The influence on positioning accuracy and range depends on the size and distance of metal parts.

- Observe the minimum distances specified in the associated data sheets (see section 1.1.2 on page 6).
- Observe the recommended minimum distances in the metal-free space (section 6.3.4.2 on page 22). The influence on the position accuracy and range also depends on the size and distance of the metal parts.
- A minimum clearance of 240 mm is required between two transponders.

- Only one transponder may be in the reading range of the localization sensor at any time.
- Mount the transponders as horizontally (disc transponders) or vertically (rod transponders) as possible.

6.2 Preparation of Connection Cables

The localization sensor has three connectors, these differ depending on the variant. The pin assignments can be found in the tables below.

i

Connection cables are not part of the scope of delivery. Suitable cable types for some of the connectors are available from Götting (see 4.1 on page 15). Compatible cables are also available from many manufacturers. Cables must be used that are suitable in terms of impedance and have a shield.

6.2.1 All Variants: Connecting Power

Voltage Supply, Serial Interface and Positioning Pulse. 5-pin M12 connector male. The positioning pulse output is fed from +Ub and limited to 20 mA.

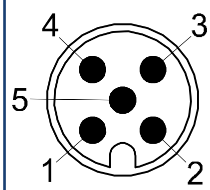
NOTICE

Risk of damage to the device or other devices on the CAN bus

The PWR and CAN2 connectors are mechanically identical. There is therefore a risk of interchanging the associated connectors.

- When using variants of the localization sensor with a CAN interface pay special attention to the correct placement of the PWR and CAN2 connectors.

Table 5 *Power Interface*

Power	Pin	Signal	Annotation
 M12 5-pin male	1	+Ub	Power supply
	2	Posi	Positioning pulse output 20 mA current limited
	3	TxD	RS232 data output
	4	RxD	RS232 data input
	5	GND	Ground (supply)

6.2.2 Variants HG G-98820ZB/ZC – Connecting the CAN Bus

The CAN bus is connected to the device with two 5-pin M12 connectors male/female. They are named CAN1 and CAN2 and are allocated as follows:

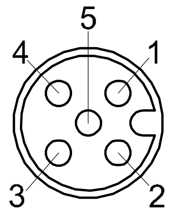
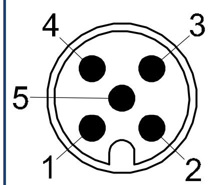
NOTICE

Damage to the RFID localization sensor or other devices on the CAN bus

If the voltage on the bus lines is too high, the bus driver in the localization sensor and possibly even other devices connected to the bus may be damaged.

- Pin 4 or 5 must not be connected to voltages > 24 V!

Table 6 *Pin allocations CAN1 and CAN2*

CAN1	CAN2	Pin	Signal
 M12 5-pin female	 M12 5-pin male	1	not used
		2	+Ub
		3	Ground supply
		4	CAN_H
		5	CAN_L

> **i** The connectors of the inputs CAN1/CAN2 are connected in parallel, i.e. there is no input or output.

If the localization sensor is connected at the end of the bus:

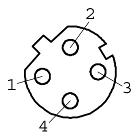
▶ Install a CAN terminator.

> **i** These terminators can be obtained from various manufacturers and are available in versions for many sockets and connectors. A terminator for the connector CAN 1 is also offered by Götting (see section 4.1 on page 15).

6.2.3 Variant HG G-71915YA – Connecting PROFINET®

PROFINET® is connected to the localization sensor via the two connectors Bus 1 and Bus 2. Bus 1 and Bus 2 are connected internally via a switch, they therefore have an identical pin assignment.

Table 7 *PROFINET®: Pin assignments Bus 1 & Bus 2*

Bus 1 & Bus 2	Pin	Signal
 M12, 4-Pin, D coded, female	1	TX+
	2	RX+
	3	TX-
	4	RX-

6.3 All Variants: Mounting the Localization Sensor

6.3.1 Operating Conditions of the Localization Sensor

The RFID localization sensor HG G-98820ZB/ZC/YC is approved for indoor and outdoor use. It may be used in a temperature range from -25 to +50° C.

The localization sensor must be mounted firmly on the vehicle so that its position cannot change during normal operation. Otherwise, the position data will be incorrectly evaluated by the higher-level system and the vehicle may e.g. drive off-track.

No interference signals from clocked motors etc. may be present in the frequency range 64 ±4 kHz. This also includes interference frequencies that lie on the metal body of the vehicle.

▶ Eliminate any interfering signals that may be present.

The localization sensor must be mounted on the vehicle in such a way that the housing ventilation is not obstructed.

- Make sure that the air can circulate unhindered through the housing ventilation.

6.3.2 Minimum Distance Between Localization Sensor and Transponder

The reading distance between the localization sensor and the transponder is 20 to 160 mm depending on the transponder type (see Table 3 on page 15).

There must be no metal between the localization sensor and the transponder.

> i Non-conductive and non-shielding dirt on the road as well as water, fog, snow and ice have no influence on the accuracy of the position detection.

6.3.3 Minimum Distance Between Identical Localization Sensors

Two or more localization sensors operating at the frequencies 128/64 kHz must maintain a minimum distance from each other in order not to interfere with each other. The minimum distance between two HG G-98820ZB/ZC/YC localization sensors is 200 mm.

If you suspect that magnetic fields are transmitted via the chassis construction:

- If in doubt, carry out tests before assembly.

6.3.4 Metal-free Areas Around Transponder and Localization Sensor

Metal in the vicinity of the transponder and localization sensor affects the accuracy and range of the reading system. A distinction is made between:

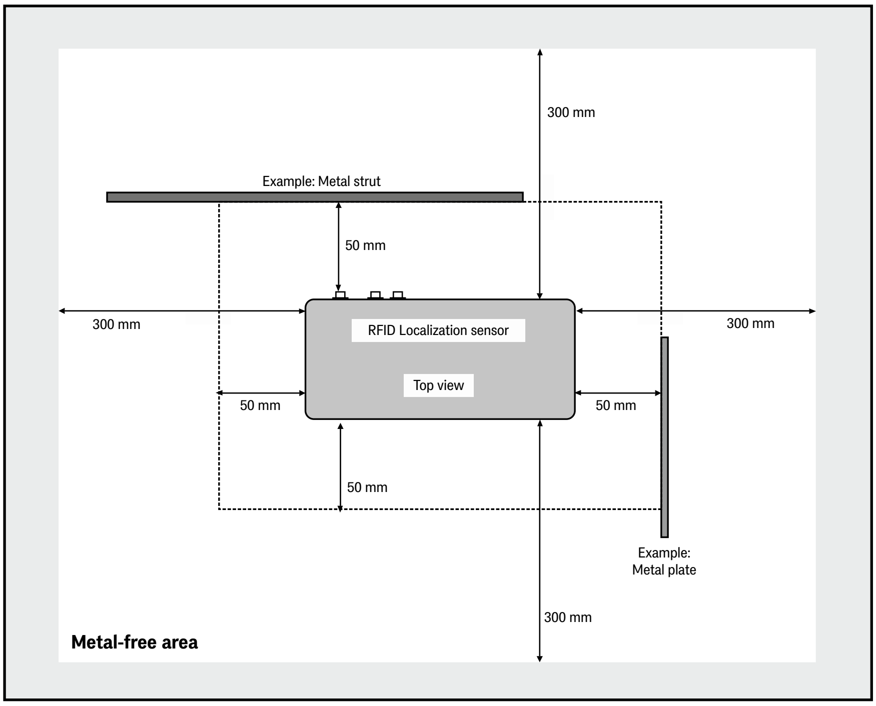
1. Smaller metallic structures that do not form a loop.
2. Closed metallic structures or smaller metallic structures that form loops.

The following minimum distances apply.

6.3.4.1 Smaller Metallic Structures that do not Form a Loop

Around the localization sensor, smaller metallic structures that do not form loops may violate the metal-free space. They must have a minimum distance of 50 mm.

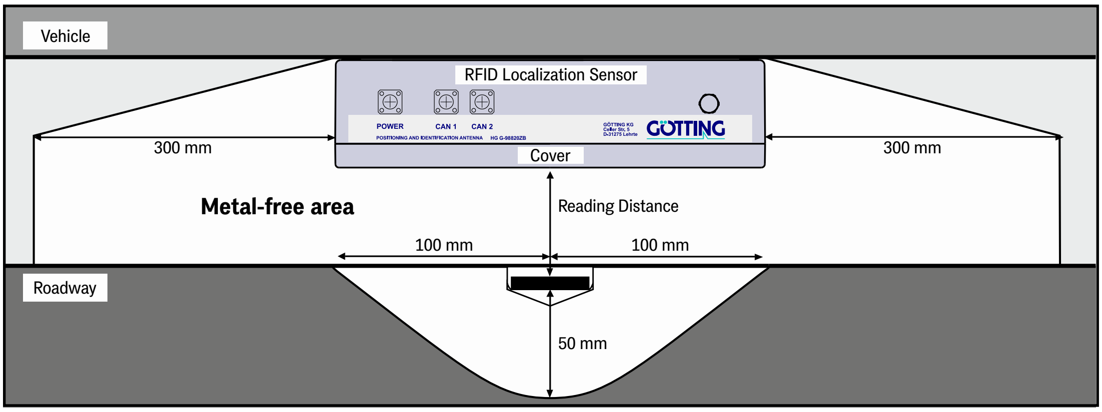
Figure 3 *Metal-free space around the localization sensor with smaller metallic structures, top view*



6.3.4.2 Closed Metallic or Electrically Conductive Structures

The localization sensor can be mounted with the mounting side directly on metal. From the cover on the reading side, the following minimum distances apply: No closed loop within 300 mm around the localization sensor, especially around the cover.

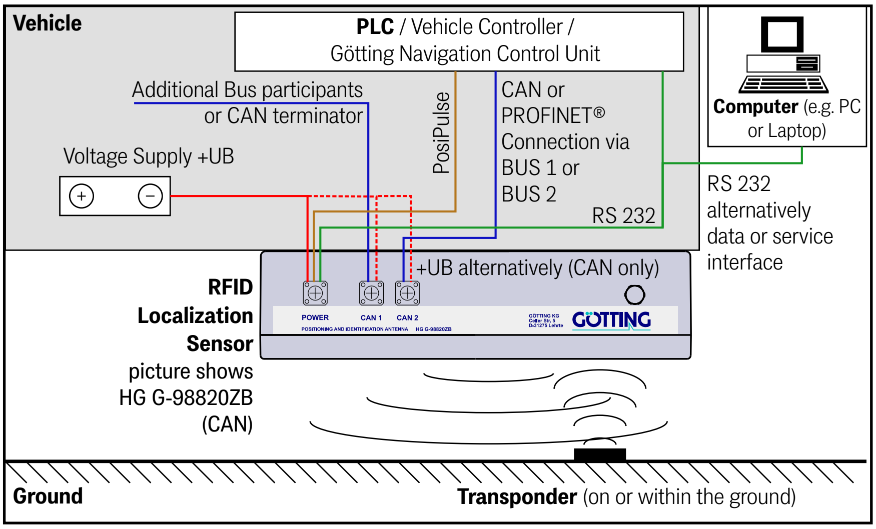
Figure 4 *Metal-free space around localization sensor and transponder with closed metallic structures or loops, side view (in the example: transponder in the roadway)*



Power lines (e.g. for charging stations) must not be laid in this area around the transponders, as any pulses could make the code readings more difficult or the code could be falsified! The only exception to this rule is the connection cable of the localization sensor itself.

6.3.5 Connection Example

Bild 5 *Sketch: Connection example*



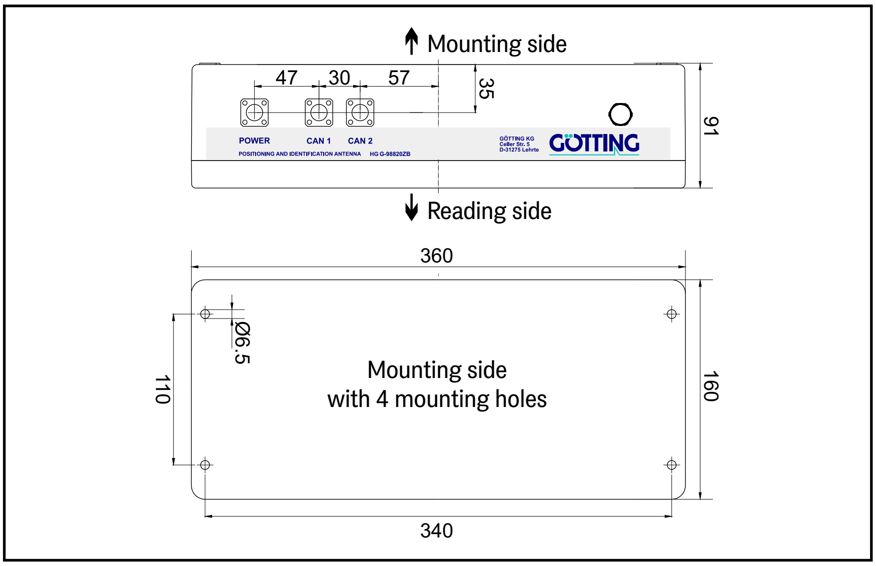
6.3.6 Mounting the Localization Sensor on the Vehicle

The localization sensor can be mounted with the mounting side directly on metal. On the reading side of the localization sensor, the clearances mentioned in section 6.3.4 on page 21 apply.

To be able to mount the localization sensor, you have to unscrew the cover on the reading side. Then you will find the preparations for four M6 screws in the housing, see Figure 6.

Observe the orientation of the localization sensor when installing it!

Figure 6 *Mounting options for the localization sensor*



To ensure that the system characteristics are not impaired:

- ✓ Keep the mounting space around the localization sensor "metal-free", see section 6.3.4 on page 21.

- ✓ Do not operate the localization sensor with the reading side on metallic surfaces.
- ✓ For trouble-free operation of the transponder system it is very important that there are no interfering signals from clocked motors etc. in the frequency range 64 ±4 kHz!

6.3.7 Localization Sensor Switch-On

After applying the operating voltage, the localization sensor switches on and is ready for operation after approx. 3 seconds.

7 Commissioning

⚠ WARNING

Danger due to lack of safety measures

The RFID localization sensor HG G-98820ZB/ZC/YC does not contain any safety devices.

▶ Only use this localization sensor in applications where sufficient measures for personal protection and safe detection of obstacles have been implemented.

Requirements:

✓ The localization sensor has to be mounted and wired correctly.

✓ The localization sensor must be connected to the voltage supply.

✓ Shielded cables should be used to protect the connection cables against interference.

✓ Observe the notes in section 6.3.4 „Metal-free Areas Around Transponder and Localization Sensor“ on page 21.

The purpose of commissioning is to parameterize the localization sensor for a specific application:

Commissioning consists of several steps

- Connection of the serial interface of a computer (e.g. laptop) to the USB interface of the localization sensor (see chapter 9 on page 41)
- Starting the terminal program on the computer (see section 9.2 on page 41)
- Parameterization of the localization sensor using the localization sensor's internal monitor program (see 9.3 on page 43)
- Saving the values and restarting the system (see section7.2 on page 29).

7.1 Configuring the Localization Sensor (Service Interface)

7.1.1 Set Parameters

Start the Monitor Program as describes in section 9.3 on page 43.

Default Values As standard setting, the system uses the `Monitor only` setting at 38400 baud. However, please pay attention to the fact that these may have been altered by another user!

▶ Move a transponder into reception range.
The voltage `S` shown in the monitor program's status bar should increase considerably. The code must be detected immediately and the number of readings must be continuously counted up to 255.

▶ Remove the transponder from the reception range.
While no transponder is located within the field of the localization sensor, the voltage `S` must decrease to a very small value. The display of the code and the number of readings, if applicable, remains identical. If this is not the case, interferences in the frequency range of 64 kHz are being induced.

If there are no interferences, switch to section 7.2 on page 29

7.1.2 Minimizing Interferences

7.1.2.1 Setting the Positioning Thresholds

The causes for the interferences should be eliminated as far as possible. If this is not possible it might be possible to avoid the critical frequency area by changing the side band (see section 9.3.2.4 on page 48).

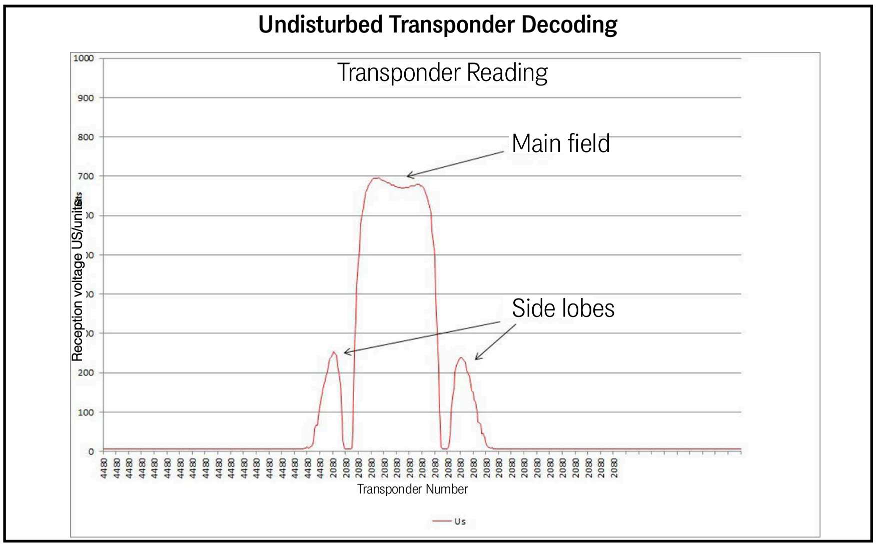
In order to adjust the localization sensor to environmental influences it must be recalibrated, alternatively activate the function `Auto-Tune` (refer to section 9.3.2.4 on page 48). For the correct adjustment of the positioning thresholds the vehicle has to be operated in its final operation environment or in a test site that very closely resembles it.

In order to set the positioning thresholds:

- Position the vehicle over a transponder that is mounted in the track.
- Initially set the positioning thresholds so that a signal that is 50 % weaker than the one received from the transponder still would trigger the generation of a positioning pulse (see section 9.3.2.3 on page 47).
- Record a complete test run over the set track. For this function the localization sensor HG G-98820ZB/ZC/YC offers the use of the serial interface (refer to section 8.2 on page 31), the CAN bus message object 3 (see Table 14 on page 35) or the PROFINET® telegrams (refer to section 8.4 on page 38).
- Set the positioning thresholds on the basis of the recorded data so that safe positioning is possible, but so that there is no incorrect triggering due to side lobes (see below).

shows a corresponding driving situation, for readings like this a reasonable threshold for the decoding and the positioning pulse would be between 400 and 600 units.

Figure 7 *Side lobes during a transponder reading*



If during the first driving tests a proper track guidance is not possible try changing the positioning thresholds accordingly.

The separately adjustable thresholds are explained in chapter 9 on page 41. In order to explain those thresholds and how to find a proper set-up the process of a transponder crossing is described below.

7.1.2.2 Sequence of a Transponder Crossing

Each millisecond a check is performed whether the sum voltage exceeds the value „Threshold for Decoding". If that is the case the bit `TRANS_IN_FIELD` is set and the `NOISE` counter is incremented. Every 8 ms it is attempted to read a code. If a code is read the `NOISE` counter is reset and afterwards the code is re-read until the `Number of equal Codes` is reached. If this is successful the bit `CODE_OK` is set.

As soon as the `NOISE` counter exceeds the threshold `Level to Noise Error` the bit `RX_NOISE` is set.

The bit `CODE_OK` is held until either the sum voltage falls below the value `Threshold for Decoding` or the bit `RX_NOISE` is set.

A new transponder code can only be read when the bit `CODE_OK` is reset.

This means that if there are high interference voltages in the 64 kHz area the localization sensor will not read a new transponder code after leaving the reception range of a transponder for the period of 2 ms `* Level to Noise Error`. In case a new transponder enters the reception range during this period the `NOISE` counter is reset but the old code is held.

The following diagrams show examples of recorded data:

Figure 8 *Undisturbed decoding across two transponders*

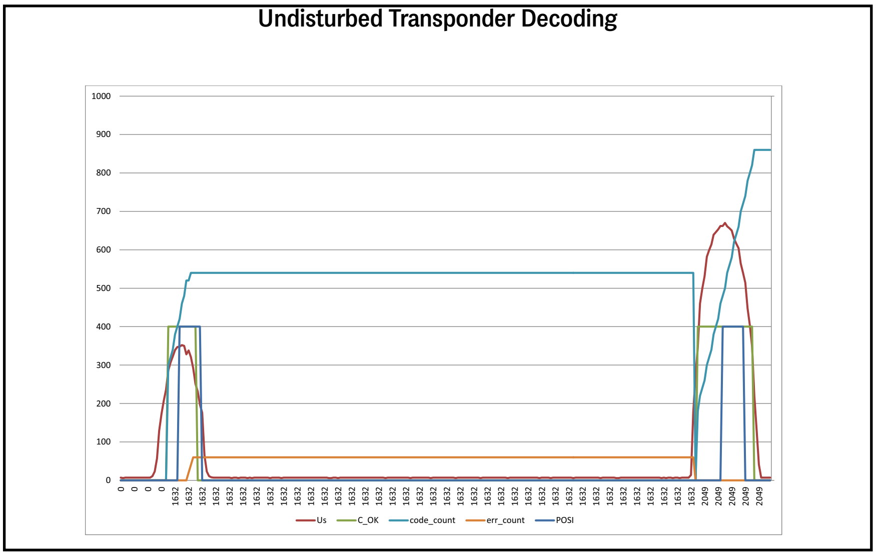


Figure 9 *The same driving situations as shown in Figure 8 only with localization sensor with wrong calibration*

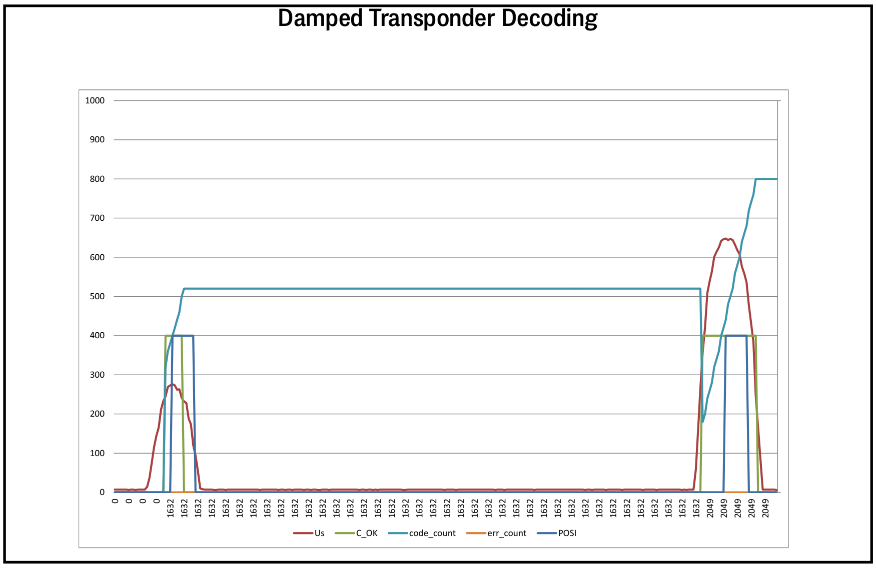
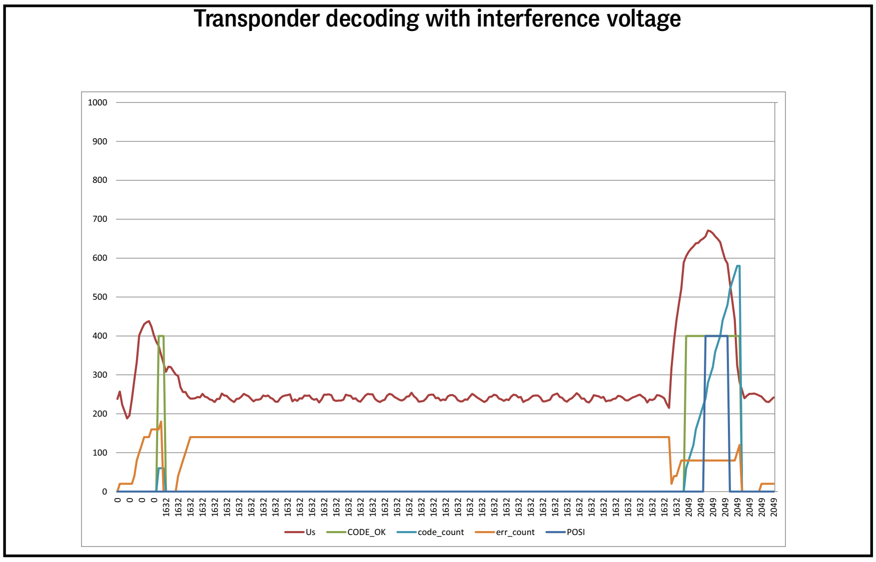


Figure 10 *The same driving situation as shown in Figure 8, this time with high noise level*



When comparing the diagrams one can see that the wrong calibration shown in Figure 9 on page 28 makes the sum voltage drop and thus the reception periods for `Code_OK` and `POSI` decrease. This can lead to decoding problems for higher crossing speeds.

In Figure 10 on page 28 the code of the weaker transponder is read correctly however the position measuring can no longer be performed correctly.

i Although sum and difference are called voltages those two values are in fact no voltages but logarithmic derivations of the actual voltages.

For the test runs two transponders with different signal strengths have been crossed shortly one after the other. The settings were:

Table 8 *Reference values for the commissioning runs*

Variable	Set value
Level to Noise Error	250
Number of equal Codes	2
Threshold for Decoding	256
Level for Positioning/Calculation	256

7.2 Complete Commissioning

If no errors have occurred or interferences have been sufficiently minimized:

- Save the changed values (see section 9.3.2.11 on page 52).

You must restart the system for the changes to become active.

- Disconnect the localization sensor from the operating voltage for a short time and reconnect it.

  The RFID localization sensor is now properly commissioned.

8 Interfaces

8.1 All Variants: PosiPulse (Positioning Pulse)

After crossing the center of the localization sensor, a 20 mA current limited output is switched to +Ub, available at pin 2 of the POWER connector. The duration of the PosiPulse can be set via the service interface (see section 9.2.2 on page 36).

It is possible to ’freeze’ the value of „deviation“ in the serial telegrams at the time of the positioning pulse for an adjustable number of telegrams (refer to section 9.3.2.2 "(S)erial Output“ on page 46 and 9.3.2.5 "Basic C(A)N-Parameters“ on page 49).

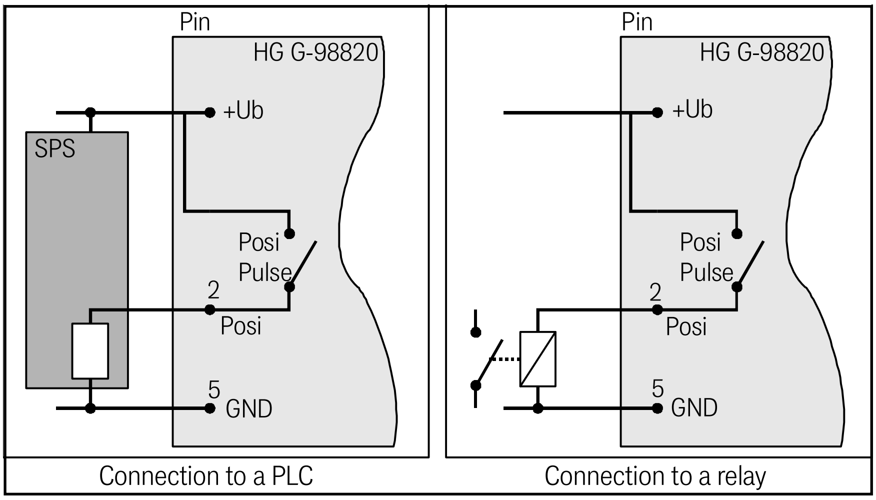
The following applies to the PosiPulse:

- ✓ A positioning pulse is generated only after prior decoding of a transponder.
- How often a PosiPulse is triggered when a transponder is crossed can be set in the sensor software.

> **i** The PosiPuls is transmitted alternatively to the way described here in the status of the CAN or PROFINET® telegram. However, the latency time of the data output period must be taken into account.

The positioning pulse output is internally connected to +Ub (no potential separation). For safety reasons, a 20 mA current limit is implemented in the localization sensor for this output. If, for example, a +Ub voltage output is required, pin 2 can be connected to GND via a resistor of 1 kOhm as shown in the following figure.

Figure 11 *Connection options positioning pulse*



8.2 All Variants: Serial (RS 232)

The serial output may be configured in various ways. The transmission rate is adjustable at 19200, 38400 and 115200 Bd, the output protocol may be chosen as either „Monitor only“ or „transparent“, the content of the output telegrams is configurable for transparent. From a parameter list the required parameters may be selected.

8.2.1 List of the system data which can be output

One Telegram consists of max. 21 user bytes. The minimum update rate at 19200 Bd is then calculated as follows:

Figure 12 *Formula: minimum update rate*

$$21\frac{\text{Byte}}{\text{Telegram}} \times 11\frac{\text{Bit}}{\text{Byte}} \;/\; 19200\frac{\text{Bit}}{\text{s}} = 12\frac{\text{ms}}{\text{Telegram}}$$

All multiple-byte variables are output either with HighByte first or LowByte first (adjustable)!

The 8 bit check sum is only output when using the transparent protocol and includes the start pulse. The start pulse, as well as the check sum (protocol transparent), cannot be removed from the data block.

Table of the data words of a telegram with 21 byte length.

Table 9 *Data words in a telegram with 21 byte length*

Byte #	Length	Value	Type	Description
1	1 Byte	0x.0001	ASCII-061: „=“	Start sync (Default: „=“)
2,3	2 Byte	0x.0002	signed int	Y-Position: Y [mm] within the range of -125 .. 0 .. +125 In case of an invalid value (no Transponder detected) = 32767
4,5	2 Byte	0x.0004	signed int	Voltage generated by the transponder in the positioning coil in [units] (Udif)
6,7,8,9	4 Byte	0x.0008	unsigned long	20 bit of the Transponder code (R/W Transponder)
10,11	2 Byte	0x.0010	unsigned int	voltage generated by the Transponder in the reference coil in [units] (Usum)
12	1 Byte	0x.0020	unsigned char	reserved for future use / compatibility
13	1 Byte	0x.0040	unsigned char	power consumption [10 mA]
14	1 Byte	0x.0080	signed char	reserved for future use / compatibility
15	1 Byte	0x.0100	unsigned char	number of code readings during the latest Transponder crossing
16,17	2 Byte	0x.0200	unsigned int	reserved for future use / compatibility
18,19	2 Byte	0x.0400	unsigned int	reserved for future use / compatibility
20,21	2 Byte	0x.0800	unsigned int	system status in binary encoding, see Table 11 on page 33
(22)	1 Byte		unsigned char	check sum, only in transparent protocol!

In the following table you will find a list of the binary codes used to describe the system status (for byte # 20 and 21 in Table 9):

Table 10 *Possible system status messages*

Value	Name	Description
0x0001	DEC_HW_ERROR	code decoder hardware error
0x0002	CODE_PAR_ERR	reception of transponder code with parity error or Hi-Nibble received
0x0004	RX_NOISE	Set whenever TRANS_IN_FIELD was set but no codes were received
0x0008		
0x0010	EEPROM_ERROR	parameter E^2Prom not addressable
0x0020	PARAM_CRC_ER	parameter block not safe
0x0040	–	reserved for future use
0x0080	–	reserved for future use
0x0100	ESTIMATE	If the exact Transponder Position cannot be determined due to wrong reading distances or e. g. steel reinforcements in the ground, an estimated value with the accuracy of ±10 mm is determined and this bit is set
0x0200	TRANS_IN_FIELD	transponder is being detected *)
0x0400	CODE_OK	Code decoded without errors *)
0x0800	SEGMENT	The transponder is located within the area marked -X in Figure 1 on page 13 *)
0x1000	POSIPULS	Transponder has crossed the center of the localization sensor
0x2000		
0x4000		
0x8000		
*) These bits are deleted as soon as the Transponder leaves the localization sensor’s reception range.		

Example: System status `0x0014` means EEPROM_ERROR and RX_NOISE.

This status message `0x0002` may also occur during an ordinary transponder crossing, if the code transmission is aborted due to decreasing output level.

8.2.2 List of commands

A command telegram always consists of four bytes, including the actual command and the parameters. When using the procedure „transparent“ it is, in addition, necessary to transfer one start character and a check sum (XOR operation of all bytes including the start character).

There are 21 predefined commands:

i The table below is valid for 'High Byte First'-transmission. For 'Low Byte First'-transmission the order of command and parameter bytes has to be changed.
The duration of 'Tune Localization Sensor Once'-command is maximal 10 seconds for 16 tuning steps.
The monitor mode should not be used during normal operation (e. g. from a PLC), as the following signal output is not according to a ’transparent’ protocol but only suitable for output on a terminal and used for the manual alteration of parameters.

Table 11 *List of the system commands – procedure “transparent” (part 1 of 2)*

No.	Format	Start	Command Bytes	Parameter Bytes	Check Sum *)	Description
1	HEX	$3D_{16}$	$4D_{16}4F_{16}$	$4E_{16}49_{16}$	38_{16}	Switch to monitor mode (see 9.3 on page 43)
	ASCII	=	MO	NI	8	
2	HEX	$3D_{16}$	$54_{16}55_{16}$	$4E_{16}45_{16}$	37_{16}	Tune localization sensor once
	ASCII	=	TU	NE	7	
3	HEX	$3D_{16}$	$53_{16}54_{16}$	$30_{16}31_{16}$	38_{16}	Set tuning value to 1
	ASCII	=	ST	01	8	
4	HEX	$3D_{16}$	$53_{16}54_{16}$	$30_{16}32_{16}$	$3B_{16}$	Set tuning value to 2
	ASCII	=	ST	02	;	
5	HEX	$3D_{16}$	$53_{16}54_{16}$	$30_{16}33_{16}$	39_{16}	Set tuning value to 3
	ASCII	=	ST	03	9	
6	HEX	$3D_{16}$	$53_{16}54_{16}$	$30_{16}34_{16}$	$3E_{16}$	Set tuning value to 4
	ASCII	=	ST	04	>	
7	HEX	$3D_{16}$	$53_{16}54_{16}$	$30_{16}35_{16}$	$3F_{16}$	Set tuning value to 5
	ASCII	=	ST	05	?	
8	HEX	$3D_{16}$	$53_{16}54_{16}$	$30_{16}36_{16}$	$3C_{16}$	Set tuning value to 6
	ASCII	=	ST	06	<	
9	HEX	$3D_{16}$	$53_{16}54_{16}$	$30_{16}37_{16}$	$3D_{16}$	Set tuning value to 7
	ASCII	=	ST	07	=	
10	HEX	$3D_{16}$	$53_{16}54_{16}$	$30_{16}38_{16}$	32_{16}	Set tuning value to 8
	ASCII	=	ST	08	2	
11	HEX	$3D_{16}$	$53_{16}54_{16}$	$30_{16}39_{16}$	33_{16}	Set tuning value to 9
	ASCII	=	ST	09	3	
12	HEX	$3D_{16}$	$53_{16}54_{16}$	$31_{16}30_{16}$	$3B_{16}$	Set tuning value to 10
	ASCII	=	ST	10	;	
13	HEX	$3D_{16}$	$53_{16}54_{16}$	$31_{16}31_{16}$	$3A_{16}$	Set tuning value to 11
	ASCII	=	ST	11	:	
14	HEX	$3D_{16}$	$53_{16}54_{16}$	$31_{16}32_{16}$	39_{16}	Set tuning value to 12
	ASCII	=	ST	12	9	
15	HEX	$3D_{16}$	$53_{16}54_{16}$	$31_{16}33_{16}$	38_{16}	Set tuning value to 13
	ASCII	=	ST	13	8	
16	HEX	$3D_{16}$	$53_{16}54_{16}$	$31_{16}34_{16}$	$3F_{16}$	Set tuning value to 14
	ASCII	=	ST	14	?	
17	HEX	$3D_{16}$	$53_{16}54_{16}$	$31_{16}35_{16}$	$3E_{16}$	Set tuning value to 15
	ASCII	=	ST	15	>	
18	HEX	$3D_{16}$	$53_{16}54_{16}$	$31_{16}36_{16}$	$3D_{16}$	Set tuning value to 16
	ASCII	=	ST	16	=	
19	HEX	$3D_{16}$	$53_{16}50_{16}$	0 … $3E8_{16}$	***)	Set postioning level (0 <= level < 1024)
	ASCII	=	SP	**)	**)	

Table 11 *List of the system commands – procedure “transparent” (part 2 of 2)*

No.	Format	Start	Command Bytes	Parameter Bytes	Check Sum *)	Description
20	HEX	$3D_{16}$	$50_{16}4C_{16}$	Code in the format $tt_{16}tt_{16}$ For code „1234“ e.g. $12_{16}34_{16}$	07_{16}	Supply of the 16 programmable lower bits of the transponder code
	ASCII	=	PL			
21	HEX	$3D_{16}$	$50_{16}48_{16}$	Code in the format $tt_{16}tt_{16}$ For code „1234“ e.g. $12_{16}34_{16}$	03_{16}	Supply of the programmable higher bits of the transponder code and start of the programming procedure
	ASCII	=	PH			

*) XOR operation of all bytes including the start character. Depending on the parameters used.

**) No ASCII-coded values

***) Check sum depending on the parameters used. Examples:

- Level should be set to 1000 ($3E8_{16}$)
  The transparent telegram is: $3D_{16}53_{16}50_{16}03_{16}E8_{16}$**$D5_{16}$**
- Level should be set to 300 ($12C_{16}$)
  The transparent telegram is: $3D_{16}53_{16}50_{16}01_{16}2C_{16}$**$13_{16}$**

8.3 Variants HG G-98820ZB/ZC: CAN

8.3.1 Basic CAN

8.3.1.1 Description

The internal CAN module is based on the CAN specifications V2.0 part B. Standard or Extended frames are transmitted (configurable). It is also possible to configure the bit timing as well as the identifier within the system monitor (refer to section 9.3 on page 43).

Different CAN message objects can be output. In addition it is configurable whether telegrams are to be output permanently at the set update rate or only as long as a Transponder is within range. Remote operation is also possible. Objects are activated within the CAN menu, through the input of an address unequal 0 (refer to section 9.3.2.5 on page 49).

Message Object 3 is used for the analysis of the system behavior.

8.3.1.2 CAN Message Object 1 (Transmission Object)

Table 12 *Structure of the CAN Message Object 1*

Byte #	Length	Type	Description
1,2	2 Byte	unsigned int	System status information according to Table 10 on page 32
3,4,5,6	4 Byte	unsigned long	20 Bit Transponder code (R/W Transponder)
7,8	2 Byte	signed int	Deviation Y [mm]

8.3.1.3 CAN Message Object 2 (Transmission Object)

Table 13 *Structure of the CAN Message Object 2*

Byte #	Length	Type	Description
1,2	2 Byte	unsigned int	Voltage within the sum coil generated by the Transponder
3,4	2 Byte	signed int	Voltage within the difference coil generated by the Transponder
5	1 Byte	unsigned char	Number of code readings during the last valid Transponder crossing
6	1 Byte	unsigned char	Reserved for future use / compatibility
7	1 Byte	unsigned char	Operating current (refer to Telegram description in Table 9 on page 31)
8	1 Byte	signed char	Reserved for future use / compatibility

8.3.1.4 CAN Message Object 3 (Transmission Object)

Table 14 *Structure of the CAN Message Object 3*

Byte #	Length	Type	Description
1,2	2 Byte	unsigned int	System status information according to Table 10 on page 32
3,4	2 Byte	unsigned int	the lower 16 Bit of the Transponder code
5,6	2 Byte	unsigned int	Voltage in the sum coil generated by the Transponder [in units]
7	1 Byte	unsigned char	Number of code readings during the last valid Transponder crossing
8	1 Byte	unsigned char	Number of code reading errors during the last valid Transponder crossing

8.3.1.5 CAN Message Object 4 (Reception Object)

It is possible to send commands to the localization sensor via Message Object 4. It has the same ID as Message Object 1 and a length of 6 bytes.

Table 15 *Structure of the CAN Message Object 4*

Byte #	Length	Type	Description
1,2	2 Byte	Unsigned int	Command (see Table 16 below)
3,4,5,6	4 Byte	Unsigned long	Parameter (see Table 16 below)

Table 16 *Coding of the commands of CAN Message Object 4*

Command	Meaning	Parameter
0000_{16}	No command	–
0001_{16}	Tune localization sensor once	–

Table 16 *Coding of the commands of CAN Message Object 4*

Command	Meaning	Parameter
0002_{16}	Set tuning value	Tuning value 0000.0001_{16} to 0000.0010_{16}
0004_{16}	Set positioning level	Positioning level 0000.0000_{16} to $0000.03E8_{16}$
0008_{16}	Program transponder	Transponder code in the range $0x0000.0000_{16}$ to $0x000F.FFFF_{16}$

The programming is started by sending 0008_{16} in the command bytes of CAN Message Object 4. The code to be programmed has to be sent in the 4 parameter bytes. All those bytes should be reset after 8 to 100 ms.

The one-time programming process takes 100 to max. 200 ms. Afterwards the new code can be read immediately via the corresponding Message Object.

If the programming process fails it is to be repeated. A new programming is only triggered whenever the command byte is switched from 0000_{16} to 0008_{16}.

8.3.2 CANopen®

The node ID and the transmission rate have to be selected either according to the above described serial monitor or the corresponding SDOs. The measured values of the system are transmitted via so-called TxPDOs. SDOs are used for parameter setting. The CAN identifiers are derived from the node address (1..127).

8.3.2.1 Description of the Process Data Objects (PDO)

Fixed places are allocated within the PDO for the measured values. Dynamical mapping is not possible. It is possible to operate the PDO mode either cyclic, synchronous or asynchronous. In order to avoid excessive bus usage due to frequent changes during asynchronous non-cyclic transmission (Event-Time = 0), it is possible to set the so-called `Inhibit time` within the CAN menu of the serial monitor. It is, however, possible to transmit a PDO cyclically. In this case, it is necessary to select the Event Time accordingly and also set the Inhibit Time = 0.

It is possible to permanently deactivate a TxPDO by selecting the asynchronous mode (255) with Inhibt Time = 0, Event time = 0 and storing the parameters. In addition, it is possible to temporarily deactivate/activate the TxPDO by setting/deleting the highest ranking bit within the corresponding PDO COB Identifier.

PDO_1 is transmitted with identifier 0x180 + node address. It contains 8 bytes, which include, amongst others, the status indicated in serial monitor. The transmission sequence is status, transponder code and deviation of the transponder position.

Table 17 *Variables of PDO_1*

Value	Variable	Value range	Comment
Status	unsigned 16	0..0xffff	Status bits according to Table 10 on page 32
Code	unsigned 32	0...ffff.ffff	20 bit transponder code (R/W Transponder)
Deviation	signed 16	0xff83...0x007d	Y-deviation, ±125 mm In case of an invalid value (e.g. no transponder detected) = 32767

PDO_2 is transmitted with identifier 0x280 + node address. It contains 8 bytes according to the following table.

Table 18 *Variables of PDO_2*

Value	Variable	Value range	Comment
Sum Voltage	unsigned 16	0...1023	Voltage of the reference coil
Dif Voltage	signed 16	0...±1023	Voltage of the positioning coil
Codes read	unsigned 8	0...255	Number of code readings
Reserved	unsigned 8	0...255	Reserved for future use / compatibility
Power	unsigned 8	0...255	Power consumption of the localization sensor [10 mA]
Reserved	signed 8	-23...61	Reserved for future use / compatibility

The synchronous identifier is 0x80. It is possible to read out this parameter under index [1005,00], but it is not possible to change it.

8.3.2.2 Heartbeat

The heartbeat mode is supported. Whenever a heartbeat time > 0 is set in the CAN menu, the device status is transmitted under identifier (0x700 + node address) each time the heartbeat timer has expired. The guard time is set to 0 afterwards.

Table 19 *Coding of the Node status*

Node status	Code
stopped	0x04
preoperational	0x7f
operational	0x05

8.3.2.3 Node Guarding

Whenever the Heartbeat time is set to 0, the device replies to a Remote Transmission Request of the Identifier (0x700 + Node address) with the device status (refer to Table 19 above), while the highest bit changes. The device does not monitor the timely reception of RTR Frames.

8.3.2.4 Description of the Service Data Objects (SDOs)

The service data opject is used to access to the object index. An SDO is always transmitted with a confirmation, i. e. each reception of the message is acknowledged. The identifiers for read and write access are:

Table 20 *Identifiers for read and write access*

Read access	0x600 + Node address
Write access	0x580 + Node address

The SDO telegrams are described in the CiA standard DS-301. The error codes in case of faulty communication are listed in the following table:

Table 21 *Error codes*

Name	Number	Description
SDO_ABORT_UNSUPPORTED	0x06010000	non-supported access to an object
SDO_ABORT_READONLY	0x06010001	write access to a read-only object
SDO_ABORT_NOT_EXISTS	0x06020000	object not implemented

Table 21 *Error codes*

Name	Number	Description
SDO_ABORT_PARA_VALUE	0x06090030	Parameter value range exceeded
SDO_ABORT_PARA_TO_HIGH	0x06090031	Parameter value too high
SDO_ABORT_SIGNATURE	0x08000020	The signature 'load' or 'save' was not used for loading or saving parameters.

8.3.2.5 Object Directory

All objects relevant for the device are included in the CANopen Object Directory. Each entry is indicated by a 16 bit index. Sub-components are indicated by a 8 bits subindex. RO indicates only readable entries. The complete object directory is listed in appendix 14.2 on page 58.

8.3.2.6 EDS Configuration File

Electronic Data Sheet: The so-called EDS-File is available via our website at the following address. The file name is `98820ZA.EDS`.

http://www.goetting-agv.com/components/98820

8.4 Variant HG G-98820YC: PROFINET®

The PROFINET® interface is configured using the GSDML file (see section 8.4.3 on page 40).

8.4.1 Input Bytes

22 Input Bytes according to the following table.

Table 22 *Structure of the PROFINET® Input Bytes*

Byte	Length	Type	Meaning
1,2	2 Byte	uint16_t	Status according to Table 10 on page 32
3,4,5,6	4 Byte	uint32_t	Code
7,8	2 Byte	int16_t	Reserved for future applications
9,10	2 Byte	int16_t	Position deviation in mm
11,12	2 Byte	uint16_t	Sum (level)
13,14	2 Byte	int16_t	Difference (level)
15	1 Byte	uint8_t	Current consumption in 10 mA
16	1 Byte	uint16_t	Number of code readings
17	1 Byte	uint8_t	CMD (mirroring, the receiving CMD is transmitted back here)
18	1 Byte	uint8_t	Address (mirroring, the receiving address is transmitted back here)
19,20,21,22	4 Byte	int32_t	RX Value (for the result of read commands, see below)

8.4.2 Output Bytes

6 Output Bytes according to the following table.

Table 23 *Structure of the PROFINET® Output Bytes*

Byte	Länge	Typ	Bedeutung
1	1 Byte	uint8_t	CMD, read resp. write command, see below
2	1 Byte	uint8_t	Address, see Table 24 below
3,4,5,6	4 Byte	Int13_t	TX_Value

The most significant bit of byte *CMD* (0x80) determines whether it is a write or read command:

- If bit (0x80) is set, it is a write command.
- If bit (0x80) is not set, it is a read command.

The second byte *Address* determines the address (see Table 24 below) to which writing or reading takes place. Write commands are only possible to the addresses marked RW in the table. Read commands are possible to all addresses. With read commands, the content of the corresponding address is read, written to RX_Value and output via the input bytes (see Table 22 above).

Table 24 *Addresses for the PROFINET® read/write command*

Address	Meaning	Values/Range	Type *)
0x00	Life counter	0 to 2^32-1	RO
0x01	Level for Positioning	0 to 1023	RW
0x02	Threshold for Decoding	0 to 1023	RW
0x03	PosiPulse Config	0 to 255	RW
0x04	PosiPulse Time	0 to 1023	RW
0x05	Number of equal codes	0 to 15	RW
0x06	Transmitter	– 0: switched off – 1: switched on	RW
0x07	Tune	0 to 15	RW
0x08	Autotune once	0 / 1	RW
0x10	– Write command: Transponder is programmed with the code contained in TX_Value – Read command: The last programmed code is output.	0 to 2^20-1	RW
*) RO = Read-Only / RW = Read/Write			

Example 1 A write command:
- CMD = 0x80
- Address = 0x10 (program transponder)
- Tx_Value = transponder code to be programmed
The localization sensor programs a transponder in the reading area with the value transferred in TX_Value. The one-time programming process triggered by this takes 100 to a maximum of 200 ms. The new code can then be read out via the input bytes.

Example 2 A read command:
- CMD = 0x00 (example, everything except 0x80 is possible)
- Address = 0x02 (read value for *Threshold for Decoding*)
- Tx_Value is not evaluated for read commands

The localization sensor reads the currently defined value for *Threshold for Decoding* and writes it to the Rx_Value of the input bytes.

8.4.3 GSDML File

You can download the latest version of the GSDML file for the PROFINET® configuration from our Internet server.

http://www.goetting-agv.com/components/98820

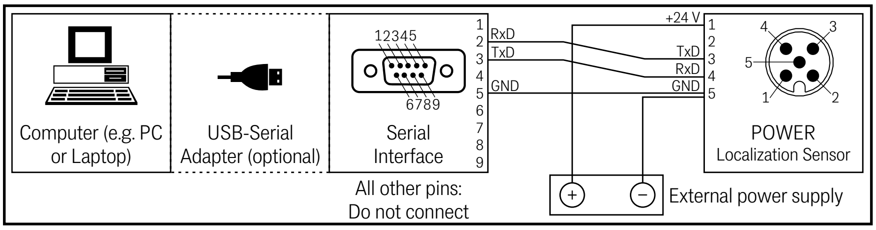
9 Software

The system can be configured via an internal software in the RFID localization sensor. To enter the program, you have to connect the serial interface of an ordinary PC to the serial interface of the localization sensor. Once all the connections have been set up, start a terminal program on the PC.

9.1 Connection to a PC

For the connection to be established the serial interface of the PC has to be connected to the serial interface of the localization sensor. The serial interface of the localization sensor is integrated into its power interface. The user needs to tailor cables for connecting the localization sensor pins listed below to the PC and a power supply.

Figure 13 *Connection example RS 232: Connection with the serial interface of a PC*



9.2 Terminal Program

Any compatible terminal program can be used. We refer to TeraTerm® in the following. TeraTerm is an open source terminal emulator and can be downloaded free of charge at the following address:

https://ttssh2.osdn.jp/

However, you can use any other terminal program that can handle the VT100 emulation. If you use another terminal program:

- ✓ Please refer to the documentation supplied with the terminal program.
- ✓ Set the values listed in Table 25 below in the terminal program.

Table 25 *Terminal settings for the monitor program (part 1 of 2)*

Terminal settings monitor program	
baud rate	19200, 38400 or 115200 Bd depending on the system configuration, default 38400 Bd
terminal emulation	VT100
parity	even
data bits	8
stop bits	1

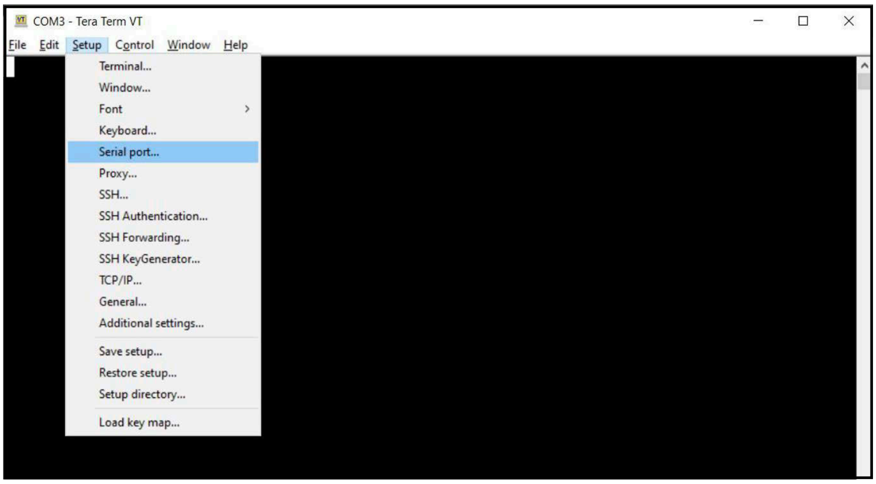
Table 25 *Terminal settings for the monitor program (part 2 of 2)*

Terminal settings monitor program	
character delay	1 ms
line delay	0 ms
PC interface (port)	COM1 can vary depending on the PC (see below)

In TeraTerm you set up the parameters as follows:

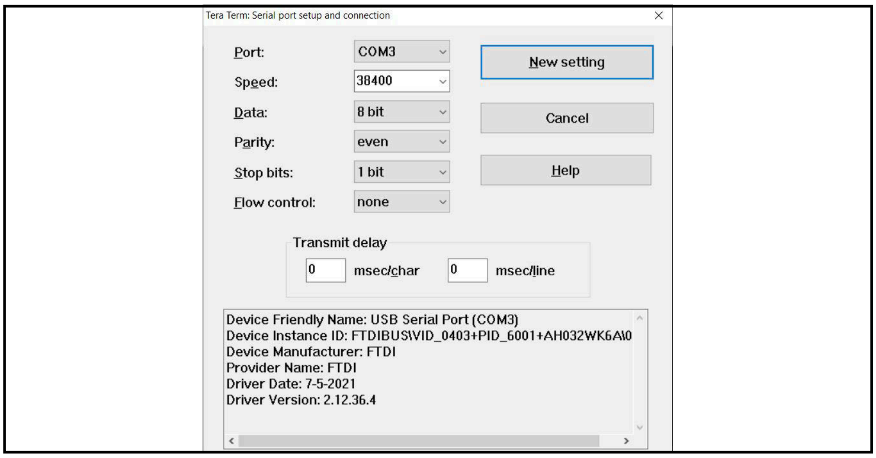
- Start TeraTerm and go to *Setup –> Serial Port*.

Figure 14 *Screenshot: Tera Term*



- The following dialog opens:

Figure 15 *Screenshot: Tera Term –> Setup –> Serial Port*



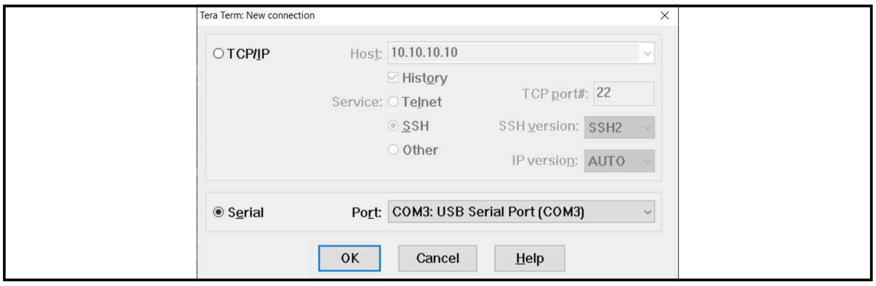
- Select the COM port to which the localization sensor is connected and make the settings from Table 25 above. Pay attention to whether changes have been made to the settings in the localization sensor; if so, the baud rate, for example, may differ.
- Confirm the dialog with the button *New Setting* and save the settings permanently via *Setup –> Save Setup*.

  TeraTerm is now configured for establishing a connection with the localization sensor.

To establish the connection to the localization sensor, proceed as follows:

- ▶ Select *File –> New Connection*, the following dialog opens.

Figure 16 *Screenshot: Tera Term –> File –> New Connection*



- ▶ Select *Serial* and click *OK*.

  The connection to the localization sensor is established.

9.3 System Monitor

In **monitor mode** the system can be configured using the corresponding menu. To use the monitor mode you need to know which protocol is set in your localization sensor.

The possible communication procedures are:

Table 26 *Monitor modes*

Modus	Description
Monitor only	Default mode, see section 9.3.2 on page 44
Transparent	For direct PLC communication, see annex 14.1 on page 58

For changes to the modes and data rates see section 9.3.2.2 on page 46.

9.3.1 How to start the monitor program

Depending on the currently active procedure, the monitor program is started differently.

9.3.1.1 Procedure Monitor only (Default)

If the localization sensor is set to the procedure „Monitor only“, the monitor mode is started 10 s after switch on. In this case no files have to be transmitted and you can switch to section 9.3.2 on page 44.

9.3.1.2 Procedure transparent

The command to switch to monitor mode should be entered directly via a PC. To do so, start your terminal program. For the startup, a set of configuration files is necessary (small text files). These files can be downloaded from our internet server at the following address.

---

http://www.goetting-agv.com/components/transponderconf

Start your terminal program. If necessary, adapt the COM-port (see section9.2 on page 41).

Following the switching on and a minimum period of 10 (respectively 26 when autotune is activated) seconds, you may transfer the required *.txt file using the terminal program. The following two files are applicable:

1. `Montrans.txt`
   Transfer if the system is adjusted to procedure **Transparent** with "**HighByte first**". The file contains the characters in hexa-decimal notation:
   `0x3D 0x4D 0x4F 0x4E 0x49 0x38`
2. `Transmon.txt`
   Transfer if the system is adjusted to procedure **Transparent** with "**LowByte first**". The file contains the characters in hexa-decimal notation:
   `0x3D 0x4F 0x4D 0x49 0x4E 0x38`

Use the function File -> Send File in TeraTerm to transfer the appropriate file to the localization sensor. If the file is selected correctly, the monitor program is started. The menus then appear directly in the TaraTerm window. You will first see the basic menu from Figure 17 below.

9.3.2 How to work with the monitor program

Any change to the interface parameters will be only activated after a system reset (turn localization sensor off and on). Afterwards for procedure transparent it may be necessary to use a different file from the *.txt documents mentioned above to start the monitor!

The monitor program starts with the main menu. If it does not, you have either based your settings on a wrong system configuration, or you are using a different terminal emulation and did not adjust the character delay to 1 ms, or you did not wait at least 10 s (resp. 26 s) after activating the localization sensor.

9.3.2.1 Main menu

Figure 17 *Main menu of the monitor program*

```
S:0017  D:+0000  D_Y:+32767   Code:        0  Read:   0 N:   0
U[/V]: 24  I[/mA]: 310       E: 0x0000  Noise:    0

    (S)erial Output
    (T)ime & Code
    (F)requency & Antenna tuning
    Basic C(A)N-Parameters
    CA(N)-Open-Parameters

    (D)isplay Systemstatus
    Cs(v) [Code,Sum,Dif,Y,Status,ReadCnt,ErrCnt](abort with <a>)
    (Y) display Histogram
    (W)rite Transponder
    [L]oad Userparameters to EEProm
    [U]pdate Firmware
    P(r)int Parameters
    (1) Import User Parameter from Host to Antenna
    (2) Export User Parameter from Antenna to Host
    (3) Service Menu
    R(e)set

    Software Version 98820B_0.17 / Sep 28 2021 Serial Number: 155055
```

Each of the monitor menu windows contains important system variables in the upper four lines (also refer to Table 27), as they also appear in the output telegram (described in section 8.2.1 on page 31). The bottom line of the screen contains possible status messages, e. g. if allowed values ranges were not obeyed during input.

Table 27 *Description of system variables (monitor program)*

Description of the system variables	
S	Measured voltage of the sum coil in units (max. 1023)
D	Measured voltage of the positioning coil in units (max. 1023)
D_Y [mm]	Transponder position rectangular to the direction of travel in millimeters (max. ±125, 32767 when position invalid)
Code	The data bits of the Transponder in hexa decimal coding. The code is recorded as soon as voltage `S` exceeds the `Threshold for Decoding` (refer to Figure 20 on page 47)
Read	The number of code readings per Transponder crossing (max. 255). This value is being stored until a new Transponder code has been detected. May be deleted by noise
N	Number of reading errors per Transponder crossing. This value is stored until a new Transponder has been detected
I [mA]	Current consumption of the positioning unit measured with an accuracy of 10 mA
E	Hexa decimal system status. The description of the individual bits is included in Table 10 on page 32
Noise	Output of a counter: – Whenever the sum voltage S exceeds the `Threshold for Decoding` the counter is increase every 8 ms until it reaches the value of `Level to Noise Error`. – Whenever S falls under this threshold, the counter counts backwards towards 0. When a code is decoded, the counter is immediately set to 0. This mechanism checks whether a Transponder or a foreign signal is received. Every time this counter exceeds an adjustable value (refer to section 9.3.2.3 „(T)ime & Code“ auf Seite 47), the system status bit RX_NOISE is set.

Further menus are activated via input of the (characters in brackets). Before altered values are transferred into the permanent memory, they have to saved as described in section 9.3.2.11 on page 52. This prevents unwanted alterations of values. With [L] the values are saved after alteration and input of the password.

Input of [Q] will exit each menu.

The following sections describe the sub menus:

- ([S])erial Output (section 9.3.2.2 on page 46)
- ([T])ime & code (section 9.3.2.3 on page 47)
- ([F])requency & Antenna tuning (section 9.3.2.4 on page 48)
- Basic C([A])N Parameters (section 9.3.2.5 on page 49)
- CA([N])-Open-Parameters (section 9.3.2.6 on page 50)
- ([D])isplay Systemstatus (9.3.2.7 on page 51)
- Cs([V]) [Code,Sum,Dif,Y,Status,ReadCnt,ErrCnt](abort with <a>) (section 9.3.2.8 on page 51)
- ([Y]) display Histogram (section 9.3.2.9 on page 51)
- ([W])rite transponder (section 9.3.2.10 on page 52)
- [[L]]oad Userparameters to EEProm (section 9.3.2.11 on page 52)
- [[U]]pdate Firmware (section 9.3.2.12 on page 52)

- P(R)int Parameters (section 9.3.2.13 on page 53)
- (1) User Parameter from Host to Antenna / (2) Export User Parameter from Antenna to Host (section 9.3.2.14 on page 53)
- (3) Service Menu (section 9.3.2.15 on page 53)
- R(E)set (section 9.3.2.16 on page 53)

9.3.2.2 (S)erial Output

Any changes within this sub menu are activated only after a system reset (switching the localization sensor off and on again). Depending on the alterations made, it may become necessary to use a different baud rate / different text document for the startup of the monitor (section 9.3.1 on page 43).

Figure 18 *Menu: (S)erial Output*

```
S:0016  D:+0000  D_Y:+32767   Code:        0  Read:   0 N:   0
U[/V]: 24  I[/mA]: 313       E: 0x0000  Noise:    0

    (B)audrate:                                      38400
    (P)rocedure                                Monitor only
    (O)rder of Data Transfer (0= HiByte first):          0
    (T)elegram Content Mask     [0..1FFF]:          0x100f
    (D)isplay Telegram Content
    Co(n)tinous Telegrams                                1
    (S)erial Data Period        [4.500mS]:               8
    (F)reeze Values for n Telegrams [0..10]:             0

    (Q)uit Menu
```

Pressing B switches between 19200, 38400 or 115200 Bd.

Pressing P generates the selection of the corresponding telegram procedure – transparent or monitor only.

Pressing O selects between high byte first and high byte last. When using this system together with a Siemens PLC it is essential, that this parameter is 0 (High Byte first).

T enables influencing the structure of the output telegram. The telegram length is changed automatically.

According to the values given in Table 9 „Data words in a telegram with 21 byte length“ auf Seite 31, it is possible to set the customized contents of the telegram T using hexadecimal addition. The parameter sequence cannot be influenced. It is always the same sequence as shown in the table!

Example Only the `Lateral Displacement Y`, the `Code` and the `System Status` are to be output.
Add, according to the table the values 0x0000.0001, 0x0000.0002, 0x0000.0008 and 0x0000.0800. The result is 0x080b. Therefore the input for the “(T)elegram Content Mask“ is 0x080b.

Using “(D)isplay Telegram Content“ it is possible to review the generated telegram (see Figure 19 below). The shown case has a mask value of 0x0000.0fff and the telegram length is 21. Pressing any key generates the return to menu `Serial Output`.

Figure 19 *Menu: „(D)isplay Telegram Content“*

```
S:0007  D:-007       D_Y:+32767   Code: 00000000  Read:   0: N:   0
I[/mA]:2550      E: 0002  Noise    0


    STX         1 Bytes from Position: 1
    Delta_Y     2 Bytes from Position: 2
    Udif        2 Bytes from Position: 4
    CODE        4 Bytes from Position: 6
    Usum        2 Bytes from Position: 10
    Vcc         1 Bytes from Position: 12
    Current     1 Bytes from Position: 13
    Temp.       1 Bytes from Position: 14
    CodesRd     1 Bytes from Position: 15
    Rx-Freq     2 Bytes from Position: 16
    Tx-Freq     2 Bytes from Position: 18
    STATUS      2 Bytes from Position: 20


    (Q)uit Menue
```

N enables choosing between the permanent output according to the set S`erial Data Period` (`1`), or output only whenever a Transponder is decoded within the reading range (`0`).

9.3.2.3 (T)ime & Code

This menu enables setting the values for the Transponder decoding, the position calculation and the positioning pulse.

Figure 20 *Menu: (T)ime & Code*

```
S:0300  D:-0040  D_Y:    +4   Code: 0x00012345  Read: 255 N:   0
U[/V]: 24  I[/mA]: 394       E: 0x0600  Noise:    0

    (B)Level to Noise Error             [0..1000]:   1000
    (N)umber of equal Codes               [0..15]:      1
    (T)hreshold for Decoding            [1..1023]:     80
    PosiPulse (a)fter Decoding                          0
    (L)evel for Positioning/Calculation [1..1023]:     80
    (P)osi-Pulse Time                     [n*1ms]:    100
    (O)ne Positioning Pulse per Crossing                0
    (X) Timed Positioning Pulse                         1
    (C)CODE_OK -> POSI_OUT                              1
    (D)irection                                         0
    (Q)uit Menu
```

B enables setting the threshold for generating the bit RX_NOISE of the system status word as described in Table 27 on page 45 under ’Noise’.

With N, the number of codes to be compared can be selected between 0 and 15. This can make code transmission more reliable, as the Trovan technology secures the code transmission only via a simple parity check. If 0 is entered, every code received is output immediately. If 1 is entered, a received code is compared with the code received just before it, and so on. Please note that this procedure reduces the maximum possible crossing speed, as the necessary transmission time increases with (n+1) x 8 ms.

With T it is possible to determine the voltage threshold `S` at which the decoding and position calculation is started, in order to suppress decoding cycles with a too weak signal.

For the determination of he thresholds see chapter on page 25.

A releases the output of a positioning pulse only after the decoding of a Transponder. In an interference laden environment this will avoid false positioning pulses. This filter function reduces the maximum crossing speed, since the preset number of codes has to be read in time before the localization sensor's center is reached.

L enables setting the voltage value `S` which is the threshold for releasing the positioning pulse output in order to eliminate false calculations due to side lobes (see Figure 7 on page 26).

The duration of the positioning pulse is adjustable by pressing P within a 1 ms pattern. With O it is possible to set whether with each crossing of the center axis of the localization sensor, a positioning pulse is to be generated (e. g. during a back-and-forth movement directly above a Transponder). If not, only one pulse per Transponder crossing is output. In order to release this again the voltage `S` would then have to fall under the `Threshold for Calculation-Positioning` (refer to section 9.3.2.2 on page 46).

With X it can be chosen whether the Posipulse and the corresponding bit in the system status are turned off after the preset time P or after the sinking of voltage `S` below the threshold determined with L.

C is used to define the behavior of the Posipulse output. With 1 the positioning pulse is switched to the output, with 0 the bit CODE_OK is switched to the output.

The mounting direction is defined with D, see section 3.3 on page 13. The following options are available:

- Direction = 0 – Crosswise (default)
- Direction = 1 – Lengthwise

9.3.2.4 (F)requency & Antenna Tuning

Figure 21 *Menu: (F)requency & Antenna Tuning*

```
S:0008  D:-006  D_Y:+32767   Code: 00000000  Read:   0: N:   1
I[/mA]: 530     E: 0002  Noise    0


    A(u)to-Tune                      0
    (A)ntenna-Tuning [0..15,+,-]:    4
    switch (T)ransmitter:            1






    (Q)uit Menue
```

U enables activating auto tuning. Following each system switch on, the transmitter cycle is retuned. This procedure takes approx. 16 sec. After that, every 10 sec. the tuning is checked (as long as there is no transponder within the field) and re-tuned if necessary. For correct operation the localization sensor has to be re-started after activating this function.

With A or with the + or - keys you may tune the transmitting antenna by switching the power consumption to max. (resulting in the largest reception range). T enables switching the transmitter on (`1`) or off (`0`) for control reasons. T is automatically set to `1` upon leaving the monitor.

9.3.2.5 Basic C(A)N-Parameters

This menu enables setting the various CAN Bus parameters. In order to be able to use the CAN bus interface it is necessary to activate it by pressing [C].

Figure 22 *Menu: Basic C(A)N-Parameters*

```
S:0007  D:-007       D_Y:+32767   Code: 0000affe  Read:   7: N:   0
I[/mA]: 270      E: 0802  Noise    0

SR = 08:        NO ERROR    / TXOK /      /      /

    (C)AN active                                  YES
    E(X)tended CAN                          STANDARD
    (I)dentifier:    TX  [0..2047]:               0
    (A)-Identifier:  TX  [0..2047]:               0
    (D)-Identifier:  TX  [0..2047]:               0
    CAN-(B)aud [20,50,125,250,500,1000 kB]:  500.0
    (P)eriod                     [4.500mS]:       8
    Co(n)tinous Telegrams                         1
    CAN on Re(m)ote Request                       0
    (F)reeze Values for n Telegrams [0..20]:      0
    (O)rder of Data Transfer (0= HiByte first):  1
    (Q)uit Menue
```

Entering [X] enables the generation of telegrams either as standard frames according to CAN2.0A or as extended frames according to CAN2.0B. Correspondingly it is possible to either set the Identifier [I] (CAN address) as 11 bit value (0-2047) or as 29 bit value (0-536870911).

The identifier selectable under [I] corresponds to the transmitted frames for the Message Object 1 (Table 12 on page 34). The identifier selectable under [A] refers to the Message Object 2 (Table 13 on page 35), [D] refers to the Message Object 3 (Table 14 on page 35). Input of 0 deactivates the corresponding Message Object.

CAN [B]audrate: You can select a predefined data rate.

[N] switches between a permanent output according to the `Clock for Sampling` [P] with (`1`) and only generating the output whenever a Transponder is decoded within the field (`0`).

[M] activates the remote operation. In this case (independent of the settings of `Continuos Telegrams`) telegrams are no longer generated, but only remote frames with the corresponding address are answered.

[F] allows to 'freeze' the output for 0 to 20 telegrams, i. e. the values at the time of the positioning pulse output are preserved.

[O] allows to switch the byte order of multibyte values.

The CAN status register is displayed in the uppermost line of the menu. This information may be used for simple diagnosis.

9.3.2.6 CA(N)-Open-Parameters

Figure 23 *Screenshot: CA(N)-Open-Parameters menu*

```
S:0007  D:-007       D_Y:+32767   Code: 00000000  Read:   0: N:   0
I[/mA]:2550      E: 0000  Noise    0

CAN offline   :                  / int.Status: ffff

    (C)ANopen active                                  0
    (N)ode ID:                        [1..127]:       1
    CAN-(B)aud   [20,50,125,250,500,1000 kB]:   125.0

    (1) TPDO 1 mode               [1..240,255]:     255
    (2) TPDO 1 Event time      [0,8..32000 ms]:       8
    (3) TPDO 1 Inhibit time    [0,8..32000 ms]:       0
    (4) TPDO 2 mode               [1..240,255]:     255
    (5) TPDO 2 Event time      [0,8..32000 ms]:       8
    (6) TPDO 2 Inhibit time    [0,8..32000 ms]:       0

    (H)eartbeat time          [0,10..32000 ms]:    1000
    (A)utostart                                       1
    (F)reeze Values for n Telegrams     [0..20]:      0
    (O)rder of Data Transfer (0= HiByte first):       0
    (Q)uit Menue
```

In addition to the status line described in the previous section, the state of the CAN bus is displayed: `Bus online` changes to `Bus offline` if e.g. the CAN bus is unplugged or because of a lacking terminator. Besides that the `CAN open Node` states `stopped`, `preoperational` or `operational` are displayed.

i

Before being able to use the CANopen® interface it must be activated by pressing C. The basic CAN will automatically be disabled.

The following keys have a specific function:

- with N the node address in a range from 1 to 127 can be chosen.
- by pressing B the listed baudrates can be chosen, the function autobaud is not implemented. Deviating baudrates and sample points can be configured via the basic CAN menu (see 9.3.2.5 on page 49).
- by using key 1 the `PDO_1` operational mode can be selected. Choosing a value between 1 and 240 the synchronous, cyclical mode can be picked. By selecting 255 the asynchronous mode is set. The two following modes are only available in the asynchronous mode:
  - 2 is the cycle time of the `PDO_1` transmission. If both values are 0, `PDO_1` will no be transmitted.
  - 3 is the inhibit time of `PDO_1.` In `PDO_1` the system status and the calculated distances are transmitted. The inhibt time is the shortest time period between two periods that can be achieved.

- by pressing 4 the operational mode of PDO_2 is selected. Choosing a value between 1 and 240 the synchronous, cyclical mode can be chosen. By selecting 255 the asynchronous mode is set. The two following modes are only available in the asynchronous mode:
  - 5 is the time of the cycle of the `PDO_2` transmission. If both values are 0, `PDO_2` will no be transmitted.
  - 6 is the inhibit time of `PDO_2`. In `PDO_2` the four analog voltages are transmitted. The inhibt time is the shortest time period between two periods that can be achieved.

- [H] changes the so called `Heartbeat time`. A control message is sent. If the time equals 0 no message is sent and the node guarding is active (see 8.3.2.3 on page 37).
- with [A] the autostart is (de)activated.
  - if autostart is deactivated only the `Heartbeat` message (if activated) is sent after turning on the device. The device is in `preoperational` state.
  - if autostart is activated the `Heartbeat` message (if activated) and the `PDOs` are sent immediately after turning on the device. The device is in `operational` state.

- [F] offers the option to 'freeze' the output of the Y deviation for 0 to 20 telegrams, so that e.g. the value at the time of the positioning pulse output is preserved.
- by pressing [O] the order of the bytes within the `PDOs` is changed: by choosing `Lowbyte first = 1` the low order byte of a 16 bit word is transmitted first.

9.3.2.7 (D)isplay Systemstatus

Here the status bit is output (see. Table 10 on page 32). All status values that are set are shown. As soon as a value is reset it is immediately removed from the output.

9.3.2.8 Cs(v) [Code,Sum,Dif,Y,Status,ReadCnt,ErrCnt](abort with <a>)

For diagnosis, it is possible to start the output of the values `Code`, U_{Sum}, U_{Dif}, `Y position`, the states `Transponder in field`, `Code OK`, `SEGMENT-`, `Positioning pulse` (also refer to Table 10 on page 32), number of code readings (`Read`), number of code reading failures (`N`) and in addition a telegram counter in **CSV format** (Comma Separated Values; especially for processing text files with programs for table calculation). Data output is carried out with 38.400 Bd, 8 bit and even parity, until it is terminated by pressing the [A] key, after which the localization sensor is reset to its original condition (not monitor mode) with the saved parameters.

The CSV output could e. g. be saved using the program HyperTerminal® (also refer to section 9.2 on page 41). To do so, use the function `Log` of menu `File` and insert a file name (this file name should have the ending `.csv`, in order to enable the table calculation program to automatically detect this file later). Once the file has been recorded and closed under TeraTerm, it may be loaded into a spreadsheet program (e. g. Microsoft® Excel®, OpenOffice® Calc®, ...).

When opening the file, the spreadsheet program prompts various options. Select the option that indicates that this file consists of comma separated values. Then the data may be processed as diagrams or recorded as native spreadsheet file.

9.3.2.9 (Y) display Histogram

This menu displays the voltages induced by a Transponder into the individual scan coils.

Figure 24 *Menu: (Y) display Histogram*

```
Y_Histogram, press any key to return



    > 1400................................
    > 1300................................
    > 1200................................
    > 1100................................
    > 1000................................
    > 900:................................
    > 800:..............o.................
    > 700:............o.OOoooO............
    > 600:..........O.OOOOOOOOo...........
    > 500:........oOOOOOOOOOOOO...........
    > 400:........OOOOOOOOOOOOOO.O........
    > 300:......OoOOOOOOOOOOOOOOOOo......
    > 200:Oo...oOOOOOOOOOOOOOOOOOOOO.o....
    > 100:OOo.OOOOOOOOOOOOOOOOOOOOOOOO.Ooo
                 <<<<<<<M>>>>>>>>
   -10      -4       8
    18
```

Each column represents one coil. A voltage value is represented by a row of Os. These values were already converted using the correction values.

Directly underneath the histogram, the values used for the respective position calculation are marked as `<<<<M>>>>`.

Below this row, the calculated position with minimum, actual, and maximum values is displayed. Pressing any key returns to the main menu.

9.3.2.10 (W)rite Transponder

Transponder within the localization sensor's field can not only be programmed using the corresponding system command (see Table 11 on page 33 (serial) / Table 16 on page 35 (CAN) / Table 23 on page 39 (PROFINET®)) but also by entering W. Therefore, enter a max. 5 digit code as hex number. Then put a RW transponder in reading distance in the field and run the programming with Enter.

9.3.2.11 [L]oad User parameters to EEProm

This submenu enables saving the parameters within a non-volatile memory once the corresponding password `815` has been entered. This is necessary in order to store changes as permanent settings.

9.3.2.12 [U]pdate Firmware

The software of the localization sensor can be updated via this menu item.

- Start the firmware update with U.
- Enter the password *0815* when prompted.

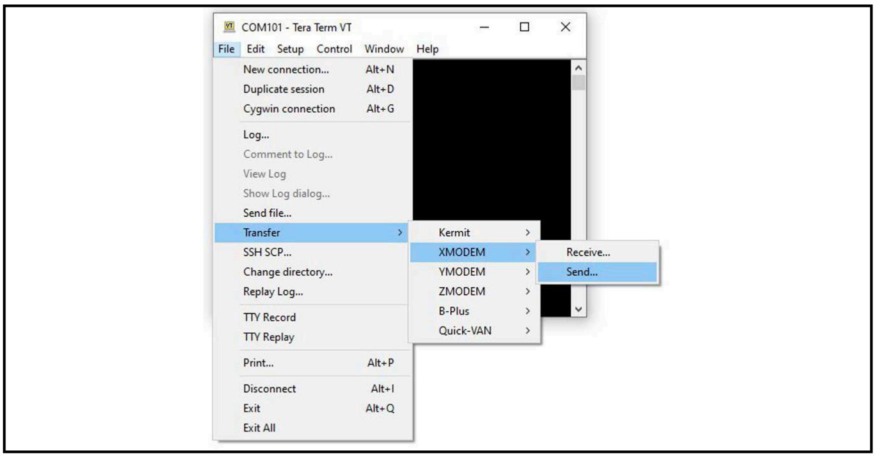
  The localization sensor starts in bootloader mode. The following menu is shown:

Figure 25 *Screenshot: Bootloader menu*

```
Bootloader
1: Upload FW via XMODEM
2: Jump to Application
```

- Select [1] (Upload FW via XMODEM).
- Go to the following function in TeraTerm:

Figure 26 *Screenshot: Tera Term –> Transfer –> XMODEM –> SEND*



- Select the .bin file with the new firmware.

  The file is transferred and the new firmware is loaded into the localization sensor. During the transmission Tara Term shows a progress indicator.

- After the transfer, the localization sensor starts with the monitor program. In case the bootloader is displayed again, start the monitor program with [2] (Jump to Application). Check in the main menu that the new firmware version is displayed in the status line.

  The firmware update is completed.

9.3.2.13 P(r)int Parameters

Enables writing the system parameters into a file with the terminal program.

9.3.2.14 (1) Import User Parameter from Host to Localization Sensor / (2) Export User Parameter from Localization Sensor to Host

It is possible to store or load all user parameters on or from a host PC via XMODEM file transfer protocol:

- With [1] you can import a parameter file from a host. After pressing that key you should start an XMODEM file transfer within 50 seconds. When using Tara Term go to *File* > *Transfer* > *XMODEM* > *Send* ... If the message `Success` is displayed the file has been checked and loaded into the parameter RAM. To preserve the loaded values you should transfer them into the EEPROM (see 9.3.2.11 on page 52).
- With [2] you can export user parameters to a host. After pressing that key you should start an XMODEM file transfer. When using Tara Term go to *File* > *Transfer* > *XMODEM* > *Receive* ... and then specify a file name. The file is transferred and the message `Success` should be displayed.

9.3.2.15 (3) Service Menu

This menu is only relevant for employees of Götting KG and password protected.

9.3.2.16 R(e)set

After activating this menu item with [E], the localization sensor performs a reset and restarts.

10 Maintenance

The system is largely maintenance free. Any maintenance is limited to:

- visual examination of the localization sensor (ensuring all screws, cables and plugs are correctly fastened).

Regularly document the power consumption and power supply of each localization sensor. These values can be obtained from any menu in the monitor program.

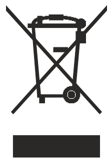
If necessary, effect an update of the system software as described in section 9.3.2.12 on page 52. Date and version of the current localization sensor software can be obtained from the main menu (see section 9.3.2.1 on page 44).

11 Disposal

- Dispose of the RFID localization sensor in accordance with the legal requirements of your country.

For EU countries only:

- Do not dispose of the localization sensor in household waste. Collect used electrical equipment separately in compliance with European Directive 2012/19/EU on Waste Electrical and Electronic Equipment and recycle it in an environmentally friendly manner via a local recycling company



12 Trouble Shooting

The following table contains a list of errors that might occur. For each error, a symptom description is given. In the third column you will find a description of how to locate and possibly correct the error.

If you should not be able to correct an occurring error, please use the table to locate the source of the error as exactly as possible (nature of malfunction, at which point of time did the error occur, etc.) before consulting us.

Table 28 *Trouble shooting*

Error	Possible cause	Diagnosis/Correction
No system function Even though a transponder is located within reception range, all outputs remain inactive	Power supply is not sufficient	Measure the voltage at the respectively labeled clamps ideally close to the M12 plugs.
No contact is possible, only unintelligible characters are sent.	1. Wrong setting of transfer parameters 2. Wrong procedure.	1. Check the connections 2. Connect signal ground 3. Choose only 19200 or 38400 Bd, 8 bit, even parity. 4. Choose the correct procedure with the PC and the system monitor.
Output values are not reproducible, lack of accuracy	Radio interference	Check value for S in the monitor mode. If these are over approx. 50, there could be interferences in the range of 64 kHz.
Transponders are detected unreliably / no reliable positioning pulses	1. Interfering frequencies 2. The corresponding thresholds (refer to Figure 20 on page 47) are not correctly set 3. Tuning not carried out.	1. See one point up 2. Carry out the commissioning as described in chapter 7 on page 25 3. See 2.
Set values not used after localization sensor reset	Changed values have not been stored permanently	Save all values as described in section 9.3.2.11 on page 52

13 Technical Data

Table 29 *Technical Data Localization Sensor HG G-98820ZB/ZC/YC*

Localization Sensor HG G-98820ZB/ZC/YC	
Operational safety	According to the German norm BGV B11 Area 1
Dimensions	see Figure 28 on page 69
Casing	Plastic
Weight	approx. 3.2 kg
Reading area	250 x 110 mm (function range positioning)
Voltage supply +Ub	18 to 36 V
Current consumption	– approx. 370 mA @ 24 V – 1 A peak while programming transponders
Temperature ranges	Operation & storage: -25 to +50 °C
Protection class	IP 65
Signal processing time	– Positioning: 1 ms – Code reading: 8 ms
Measuring resolution	1mm
Max. pass-over speed depending on the mounting direction	– Crosswise: 4 m/s – Lengthwise: 6 m/s
Reading distance (distance transponder - underside reading localization sensor)	See Table 3 on page 15
Metal and interference free area	See section 6.3.4 on page 21
Static positioning accuracy	±1 mm @ a height of 40 mm along the Y-axis
Connectors	– All Variants: 1x M12 5-Pin A-coded: Power (male) – HG G-98820ZB/ZC: 2x M12 5-Pin A-coded: CAN 1 (female) | CAN 2 (male) – HG G-98820YC: 2x M12 4-Pin D-coded: PROFINET 1 & 2 (female)

Inerfaces	– RS 232: Output with 19200, 38400 (standard) or 115200 Bd. The telegram content is configurable. Protocol “transparent”
	– PosiPulse: 24 V, 20 mA power source, not electrically isolated
	– CAN (HG G-98820ZB/ZC): Not electrically isolated, terminating resistor not integrated, Full CAN
	  – Basic CAN: According to ISO/DIS 11898, identifier, data rate, standard/extended frames; adjustable via serial interface
	  – CANopen®: Device Profile DS 401, Node ID and data rate adjustable via serial interface or SDOs
	– PROFINET® (HG G-98820YC): With integrated switch

14 Annex

14.1 Procedure „transparent“

For the interconnection localization sensor <–> PLC a transparent protocol can be used. The following settings have to be observed for the data transmission:

- 1 start bit, 8 data bit, parity even, 1 stop bit, Baudrate 38400 Bd (default) or 19200 Bd.

14.1.1 Data Direction Localization Sensor -> PLC

In this direction, cyclical localization sensor data is transmitted. The duration is parameterizeable, it should ideally last an integer part of the transponder code transmission or a plural thereof. The minimum cycle duration depends upon the telegram duration and thus is defined by the baud rate and the chosen telegram content.

The data sentence always starts with an „=“-character (hex 0x3d). Then the parameters chosen from the respective menu follow. The telegram is to be finished with an 8 bit check sum over all characters including the start character. For the check sum XOR is performed over all characters. The characters are sent without delay.

14.1.2 Data Direction PLC -> Localization Sensor

Commands are transmitted into this direction if necessary. Each command must start with a „=“-character (hex 0x3d). The format of the commands is described in 8.2.2 on page 32. The telegram is to be finished with a 8 bit check sum over all characters. The characters have be received within the parameterizeable character delaytime. Otherwise the telegram will be rejected.

14.2 Overview of the CANopen® Directory

All objects of the localization sensor are included in the CANopen Object Index. Each entry is indicated by a 16 bit index. Sub-components are indicated by a 8 bits subindex. RO indicates read only entries.

- Communication parameters are indicated by a C in the corresponding tables.
- Manufacture parameters are indicated by a M in the corresponding tables.

The object index is subdivided into the following areas:

14.2.1 Communication specific Entries within the Range of 0x1000 to 0x1FFF

Table 30 *Overview object index I (part 1 of 2)*

Index	Subindex	Access	Content	EEProm
0x1000	0	RO	Device Type	
0x1001	0	RO	Error Register	
0x1005	0	RO	COB ID Sync Message	
0x1008	0	RO	Device Name	
0x1009	0	RO	Hardware Version	

Table 30 *Overview object index I (part 2 of 2)*

Index	Subindex	Access	Content	EEProm
0x100A	0	RO	Software Version	
0x1010	0	RO	Number of entries of Store Parameter	
	1	RW	Save all	
0x1011	0	RO	Number of entries of Restore Default Parameter	
	1	RW	Restore Default all	
	2	RW	Restore Default Communication Parameter	
	3	RW	Restore Default Manufacture Parameter	
0x1017	0	RW	Producer Heartbeat Time	C
0x1018	0	RO	Number of entries of Identity Object	
	1	RO	Vendor ID	
	2	RO	Product Code	
	3	RO	Revision	
	4	RO	Serial Number	
0x1800	0	RO	Number of entries of Transmit PDO_1	
	1	RW*	COB-ID	
	2	RW	Transmission Type	C
	3	RW	Inhibit Time	C
	5	RW	Event Time	C
0x1801	0	RO	Number of entries of Transmit PDO_2	
	1	RW*	COB-ID	
	2	RW	Transmission Type	C
	3	RW	Inhibit Time	C
	5	RW	Event Time	C
0x1A00	0	RO	Number of Objects mapped to Transmit PDO_1	
	1	RO	Specification of Appl. Object 1	
	2	RO	Specification of Appl. Object 2	
	3	RO	Specification of Appl. Object 3	
0x1A01	0	RO	Number of Objects mapped to Transmit PDO_2	
	1	RO	Specification of Appl. Object 1	
	2	RO	Specification of Appl. Object 2	
	3	RO	Specification of Appl. Object 3	
	4	RO	Specification of Appl. Object 4	
	5	RO	Specification of Appl. Object 5	
	6	RO	Specification of Appl. Object 6	
*) Only the highest bit may be altered, in order to (de)activate the PDO temporarily.				

14.2.2 Manufacturer specific Entries starting at 0x2000

Table 31 *Overview object index II*

Index	Subindex	Access	Content	EEProm	Refer to
0x2000	0	RO	Number of parameters		
	1	RW	Prog Transponder	M	
	2	RW	Threshold for decoding	M	9.3.2.3 page 47
	3	RW	Threshold for positioning	M	9.3.2.3 page 47
	4	RW	Posipulse time	M	9.3.2.3 page 47
	5	RW	High nibble of RW code	M	9.3.2.3 page 47
	6	RW	Number of equal codes	M	9.3.2.3 page 47
	7	RW	Level to noise error	M	9.3.2.3 page 47
	8	RW	Rx frequency	M	9.3.2.4 page 48
	9	RW	Antenna tuning	M	9.3.2.4 page 48
	a	RW	Freeze values for n telegrams	M	9.3.2.6 page 50
	b	RW	Threshold max detection Y	M	9.3.2.3 page 47
	c	RW	Config	M	Table 48 page 66
0x2001	0	RO	Number of Parameter		
	1	RW	Node Baudrate	C	
	2	RW	Node ID	C	

14.2.3 Standardized Device Profile higher than 0x6000

Table 32 *Overview object index III*

Index	Subindex	Access	Content	EEProm
0x6000	0	RO	Number of 8 Bit Digital Inputs	Refer to
	1	RO	Number of codes read	Table 27 page 45
0x6100	0	RO	Number of 16 Bit Digital Inputs	
	1	RO	System Status	Table 27 page 45
0x6120	0	RO	Number of 32 Bit Digital Inputs	
	1	RO	Code	Table 27 page 45
0x6400	0	RO	Number of 8 Bit analog Inputs	
	1	RO	Supply voltage	Table 27 page 45
	2	RO	Supply current	Table 27 page 45
	3	RO	Board Temperature	Table 27 page 45
0x6401	0	RO	Number of 16 Bit analog Inputs	
	1	RO	Y deviation	Table 27 page 45
	2	RO	Sum voltage	Table 27 page 45
	3	RO	Dif voltage	Table 27 page 45

14.3 Details of the CANopen® Directory

14.3.1 Device Type

Table 33 *CANopen® Directory: Device Type*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x1000	00	Device Type	Unsigned 32	RO	No	0x00050191	Digital/analog Inputs - DS 401

14.3.2 Error Register

Table 34 *CANopen® Directory: Error Register*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x1001	00	Error Register	Unsigned 8	RO	No	0x00	Error Register

The error register is not used, thus the value 0 is transmitted.

14.3.3 COB-ID SYNC message

Table 35 *CANopen® Directory: COB-ID SYNC message*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x1005	00	COB-ID SYNC	Unsigned 32	RO	No	0x80000080	Sync Consumer, Sync ID = 0x80

14.3.4 Device Name

Table 36 *CANopen® Directory: Device Name*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x1008	00	Device Name	Visible string	RO	No	„9882“	Device name: „G98820ZA“

14.3.5 Hardware Version

Table 37 *CANopen® Directory: Hardware Version*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x1009	00	Hardware Version	Visible_String	R0	No	„0ZA2“	Version number

14.3.6 Software Version

Table 38 *CANopen® Directory: Software Version*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x100A	00	Software Version	Visible_String	R0	No	„1.00“	Version number

14.3.7 Save Parameters

Table 39 *CANopen® Directory: Save Parameters*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x1010	00	Save Parameter	Unsigned 8	RO	No	0x01	number of sub indexes
	01	Save All	Unsigned 32	RW	No	0x00000001	Save All is possible

By writing the signature 'save' in ASCII Code (hex-Code: 0x65766173) onto subindex 1, the currently set parameters are permanently saved. A successful recording procedure is acknowledged by a TxSDO (1. Byte = 0x60). The saving process is performed after that acknowledgment.

14.3.8 Restore Default Parameter

Table 40 *CANopen® Directory: Restore Default Parameter*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x1011	00	Restore Parameter	Unsigned 8	RO	No	0x03	Number of sub indexes
	01	Restore All Parameter	Unsigned 32	RW	No	0x00000001	Restore All is possible
	02	Restore Com. Parameter	Unsigned 32	RW	No	0x00000001	Restore Communication is possible
	03	Restore Manufacture Parameter	Unsigned 32	RW	No	0x00000001	Restore Manufacture is possible

By writing the signature 'load' in ASCII Code (hex-Code: 0x64616F6C) onto subindex 1, 2 or 3, the corresponding default parameters are loaded. A reset should be carried out afterwards.

With 'Restore All', the Node ID is also set to 1 and the baud rate to 125 Kbaud.

14.3.9 Producer Heartbeat Time

Table 41 *CANopen® Directory: Producer Heartbeat Time*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x1017	00	Producer Heartbeat Time	Unsigned 16	RW	No	1000	Heartbeat time in ms (approx.)

With 0 this function is deactivated.

14.3.10 Identity Object

Table 42 *CANopen® Directory: Identity Object*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x1018	00	Identity Object	Unsigned 8	RO	No	0x04	Number of sub indexes
	01	Vendor ID	Unsigned 32	RO	No	0x00000202	Manufacturer number given by CiA
	02	Product Code	Unsigned 32	RO	No	0x00098820	HG Number 98820
	03	Revision	Unsigned 32	RO	No	0x00000100	Version 1.00
	04	Serial Number	Unsigned 32	RO	No	9999999	Serial number

14.3.11 Transmit PDO_1 Parameter

Table 43 *CANopen® Directory: Transmit PDO_1 Parameter*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x1800	00	TxPDO_1 Parameter	Unsigned 8	RO	No	0x05	Number of sub indexes
	01	COB ID	Unsigned 32	RW	No	0x40000180 + Node-ID	PDO_1 valid, ID = 0x180 + Node ID
	02	Transmission Type	Unsigned 8	RW	No	255	Asynchronous event-driven
	03	Inhibit Time	Unsigned 16	RW	No	100	shortest time between transmissions [µs]
	05	Event Time	Unsigned 16	RW	No	10	Cycle time [ms]

14.3.12 Transmit PDO_2 Parameter

Table 44 *CANopen® Directory: Transmit PDO_2 Parameter*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x1801	00	TxPDO_2 Parameter	Unsigned 8	RO	No	0x05	Number of sub indexes
	01	COB ID	Unsigned 32	RW	No	0x40000181 + Node-ID	PDO_2 valid, ID = 0x181 + Node ID
	02	Transmission Type	Unsigned 8	RW	No	255	Asynchronous event-driven
	03	Inhibit Time	Unsigned 16	RW	No	100	shortest time between transmissions [µs]
	05	Event Time	Unsigned 16	RW	No	10	Cycle time [ms]

14.3.13 Mapping TPDO_1

Table 45 *CANopen® Directory: Mapping TPDO_1*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
1A00	00	Number of mapped objects	Unsigned 8	RO	No	0x03	Number of sub indexes
	01	1st mapped object	Unsigned 32	RO	No	0x61000110	mapped on index 0x6100,01 with 16 bit length (status)
	02	2nd mapped object	Unsigned 32	RO	No	0x61200120	mapped on index 0x6102,01 with 32 bit length (Code)
	03	3rd mapped object	Unsigned 32	RO	No	0x64010110	mapped on index 0x6401,01 with 16 bit length (Y deviation)

14.3.14 Mapping TPDO_2

Table 46 *CANopen® Directory: Mapping TPDO_2*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
1A01	00	Number of mapped objects	Unsigned 8	RO	No	0x06	Number of sub indexes
	01	1st mapped object	Unsigned 32	RO	No	0x64010210	mapped on index 0x6401,02 with 16 bit length (SUM voltage)
	02	2nd mapped object	Unsigned 32	RO	No	0x64010310	mapped on index 0x6401,03 with 16 bit length (DIF voltage)
	03	3rd mapped object	Unsigned 32	RO	No	0x60000108	mapped on index 0x6000,01 with 8 bit length (Codes read)
	04	4th mapped object	Unsigned 32	RO	No	0x64000108	mapped on index 0x6400,01 with 8 bit length (Supply voltage)
	05	5th mapped object	Unsigned 32	RO	No	0x64000208	mapped on index 0x6400,02 with 8 bit length (Supply current)
	06	6th mapped object	Unsigned 32	RO	No	0x64000308	mapped on index 0x6400,03 with 8 bit length (Board temperature)

14.3.15 Device Parameter

Table 47 *CANopen® Directory: Device Parameter*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
2000	00	Number of parameters	Unsigned 8	RO	No	12	Number of sub indexes
	01	Prog trans-ponder code	Unsigned 32	RW	No		Write transponder *)
	02	Threshold for decoding	Unsigned 16	RW	No	256	9.3.2.3 page 47
	03	Level for position-ing	Unsigned 16	RW	No	256	9.3.2.3 page 47
	04	Poispulse time	Unsigned 16	RW	No	100	9.3.2.3 page 47
	05	High nibble of RW code	Unsigned 8	RW	No	16	9.3.2.3 page 47
	06	Number of equal codes	Unsigned 8	RW	No	1	9.3.2.3 page 47
	07	Level to noise error	Unsigned 16	RW	No	1000	9.3.2.3 page 47
	08	Rx frequency	Unsigned 32	RW	No	1553000	9.3.2.4 page 48
	09	Antenna tuning	Unsigned 8	RW	No		9.3.2.4 page 48
	10	Freeze values	Unsigned 8	RW	No	0	9.3.2.6 page 50
	11	Threshold max detection Y	Unsigned 16	RW	No	400	9.3.2.3 page 47
	12	Config	Unsigned 32	RW	No		Table 48 page 66

*) To program a transponder, position it in the normal reading range and write the 20 bit code to index 0x2000,01.

14.3.16 Codes for System Configuration

Table 48 *CANopen® Directory: Codes for System Configuration*

Value	Name	Description
0x0001	HILOW	Change order of bytes within multi-byte values
0x0002	CODE_SELECT	Select code channel, see 9.3.2.3 on page 47
0x0004		
0x0008		
0x0010	POSI_TIMED	Timed or level driven positioning pulse, see 9.3.2.3 on page 47
0x0020		
0x0040		
0x0080		
0x0100		
0x0200	POSI_MASK	One positioning pulse per crossing, see 9.3.2.3 on page 47
0x0400	AUTO_TUNE	see 9.3.2.4 on page 48
0x0800		
0x1000		
0x2000	POSI_TRNSP	Posi pulse after decoding, see 9.3.2.3 on page 47
0x4000		
0x8000		
0x10000	AUTOSTART	If set the node is starting in operational state see 9.3.2.6 on page 50

14.3.17 Manufacture Parameter - Node Parameter

Table 49 *CANopen® Directory: Manufacture Parameter - Node Parameter*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x2001	00	number of parameter	Unsigned 8	RO	No	0x02	number of sub indexes
	01	Node Baudrate	Unsigned 8	RW	No	0x04	125 kbaud according to Table 50 below *)
	02	Node ID	Unsigned 8	RW	No	0x01	Node address 1 *)
*) After changing these values, they have to be saved with <save all> and a node reset has to be proceeded							

Table 50 *CANopen® Directory: Manufacture Parameter - Node Parameter / Coding of baud rates (part 1 of 2)*

Input / Output Value	Baud rate / kBaud
7	20
6	50
4 (Default)	125

Table 50 *CANopen® Directory: Manufacture Parameter - Node Parameter / Coding of baud rates (part 2 of 2)*

Input / Output Value	Baud rate / kBaud
3	250
2	500
0	1000

14.3.18 8 Bit Digital Input (transmission in TPDO_2)

Table 51 *CANopen® Directory: 8 Bit Digital Input (transmission in TPDO_2)*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x6000	00	number of 8 bit inputs	Unsigned 8	RO	No	0x01	number of 8 Bit inputs
	01	Codes read	Unsigned 8	RO	Yes	./.	Amount of read codes, see Table 27 on page 45

14.3.19 16 Bit Status (transmission in TPDO_1)

Table 52 *CANopen® Directory: 16 Bit Status (transmission in TPDO_1)*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x6100	00	number of 16 bit inputs	Unsigned 8	RO	No	0x01	number of 16 bit inputs
	01	16 bit digital input	Unsigned 16	RO	Yes	./.	System status / TxPDO_1 accord. to Table 10 on page 32

14.3.20 32 Bit Transponder Code

Table 53 *CANopen® Directory: 32 Bit Transponder Code*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x6120	00	number of 8 bit inputs	Unsigned 8	RO	No	0x01	number of 32 Bit inputs
	01	Transponder code	Unsigned 32	RO	Yes	./.	32 bit transponder code

14.3.21 8 Bit Analog Inputs

Table 54 *CANopen® Directory: 8 Bit Analog Inputs*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x6400	00	number of 16 bit analog inputs	Unsigned 8	RO	No	0x03	number of the analog 8 bit inputs
	01	Supply voltage	Unsigned 8	RO	Yes	./.	Voltage [100 mV]
	02	Supply current	Unsigned 8	RO	Yes	./.	Current [10 mA]
	03	Board temperature	Integer 8	RO	Yes	./.	Temperature [^{o} C]

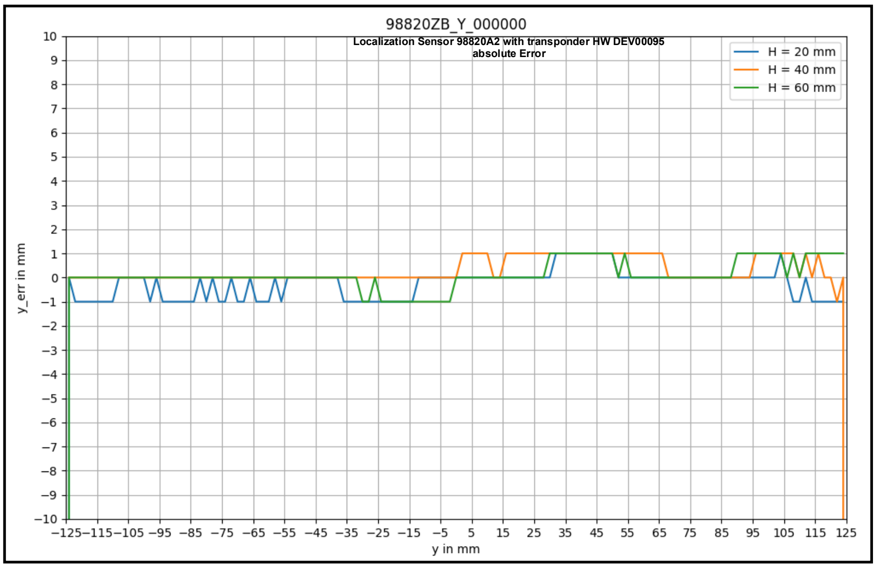
14.3.22 16 Bit Analog Inputs

Table 55 *CANopen® Directory: 16 Bit Analog Inputs*

Index	Sub Index	Name	Type	Attr.	Map	Default	Description
0x6401	00	number of 16 bit analog inputs	Unsigned 8	RO	No	0x03	number of the analog 16 bit inputs
	01	Y deviation	Integer 16	RO	Yes	./.	Y deviation [mm]
	02	Sum voltage	Unsigned 16	RO	Yes	./.	Sum voltage [units]
	03	Dif voltage	Integer 16	RO	Yes	./.	Dif voltage [units]

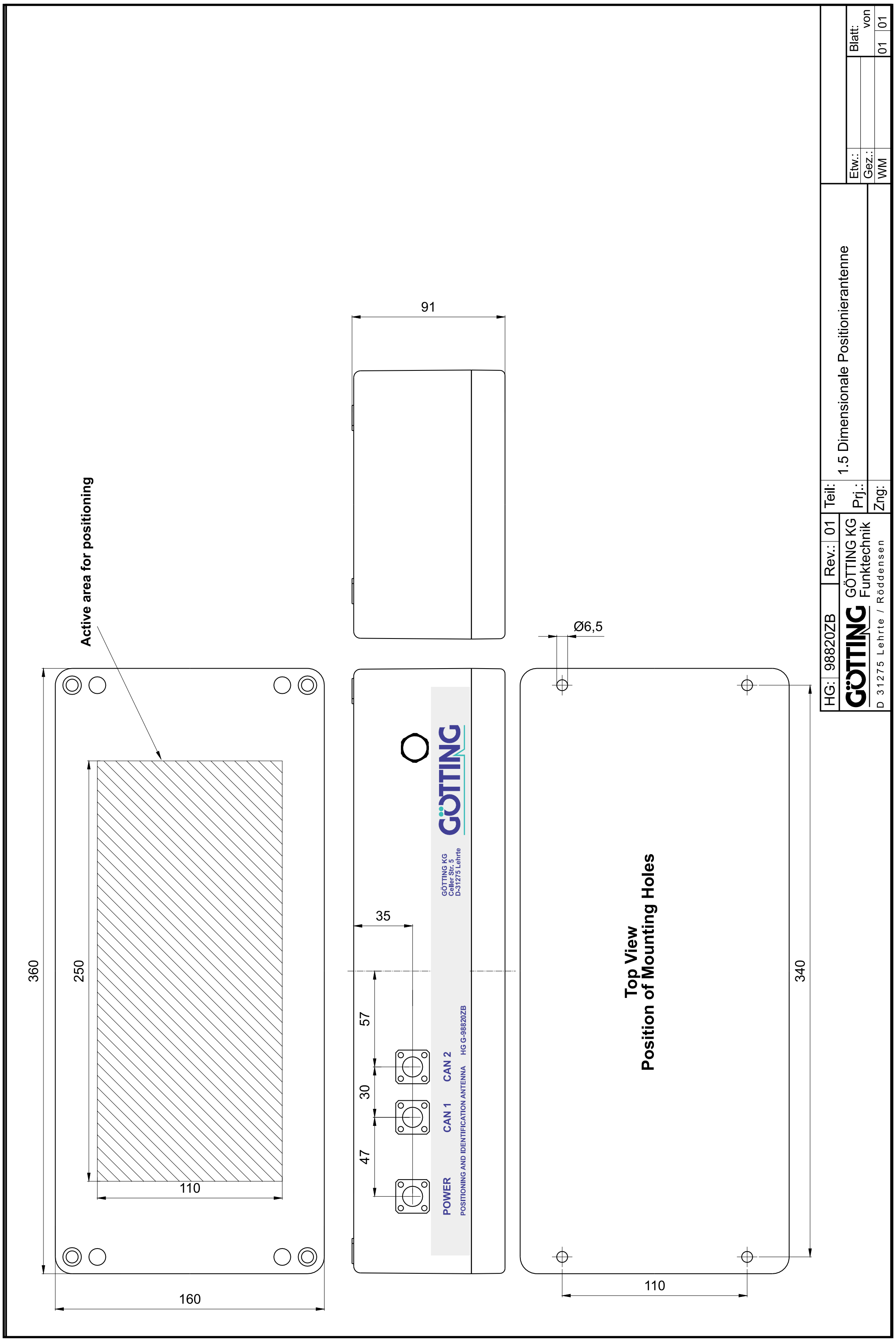
14.4 Accuracy of the deviation calculation

Figure 27 *Typical accuracy of the calculation of the deviation with transponder HW DEV00095*



14.5 Mechanical Drawing with Localization Sensor Dimensions

Figure 28 *Mechanical Drawing with Localization Sensor Dimensions*



15 Document Changelog

The following table lists the revisions of this device description that have been published so far with the most important changes in each case.

Table 56 *Document changelog*

Revision	Edited by	Description of changes
01 Date: 10.05.2010	RAD / WM	First version of the device description
02 Date: 19.05.2014	RAD / WM	– Fixed error in Table 2 – Make the difference between connectors CAN 1 (plug) and CAN 2 (socket) clearer
03 Date: 19.11.2014	RAD	– Rename to 98820ZA – Adjust texts for metal free area and technical data to match German revision 02 – Use new title photo from German revision 02 – Make download links match new links on goetting-agv.com
04 Date: 21.01.2015	RAD / WM	– Fix 20 instead of 32 bit transponder code – Replace HW DEV00090/00030 with HW DEV00095/00098 – Change Pin 4 from output to input – Add 1A current consumption while programming transponders
05 Date: 15.11.2015	RAD	Match German revision 05
06 Date: 24.11.2015	RAD	Match German revision 06
07 Date: 25.11.2016	RAD	Change transponder 71325 from ZA to XA
08 Date: 28.11.2016	RAD	Update menus CAN and Time and Code
09 Date: 13.12.2016	RAD	Match German revision 09
10 Date: 12.05.2022	RAD	Match German revision 10
11 Date: 25.10.2022	RAD / LF	– Update for new version 98820ZB – Apply current A design layout
12 Date: 14.12.2023	RAD / LF / TN	– Adaptation to version ZC – Extension for version YC with Profinet® – Adaptation to firmware version 1.05 (ZB)/1.0 (ZC/YC) with setting for the mounting direction: crosswise/lengthwise – Application examples added – Revision of the graphic for the definitions – Added this chapter document changelog.

16 List of Figures

17 List of Tables

18 Index

19 Copyright and Terms of Liability

19.1 Copyright

19.2 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.

19.3 Trade Marks and Company Names

Unless stated otherwise, the herein mentioned logos and product names are legally protected trade marks of Götting KG. All third party product or company names may be trade marks or registered trade marks of the corresponding companies.

Innovation through Guidance

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