User Manual

Gesytec GmbH
Pascalstr. 6
52076 Aachen, Germany

Tel. +49 (0)24 08 / 9 44-0
FAX +49 (0) 24 08 / 9 44-100
Email: info@gesytec.de
www.gesytec.com

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Gesytec

Preliminary Notes

This manual describes the wireless sensor system GesySense® with respect to system structure, commissioning and operation and the system components. Thus it is structured into the following three parts:

- Part I
  Overview of the GesySense System – describes the individual system components and their interaction.

- Part II
  System Handling – describes installation and commissioning of a GesySense system on site including continuous maintenance, trouble shooting and remedy.

- Part III
  Technical Reference – describes all menus and windows of the GesySense Manager, the configuration software, and includes technical data of the hardware components.

Complementary Documents

The document „GesySense Modbus Communication" describes the protocol specification related to the communication between receiver and data logger.

The scope of delivery of the devices includes the corresponding installation instructions related to the individual system components.

Important Advice

The GesySense documentation comprehensively describes the intended use of the GesySense system and its components. Any other use and especially the connection of GesySense components to a PC that is not designated for configuration of the GesySense system accordance with the documentation are prohibited.

This documentation can be modified any time without prior notice. Gesytec doesn't take over any responsibilities related to errors or inaccuracies in this documentation and possible resulting outcome.

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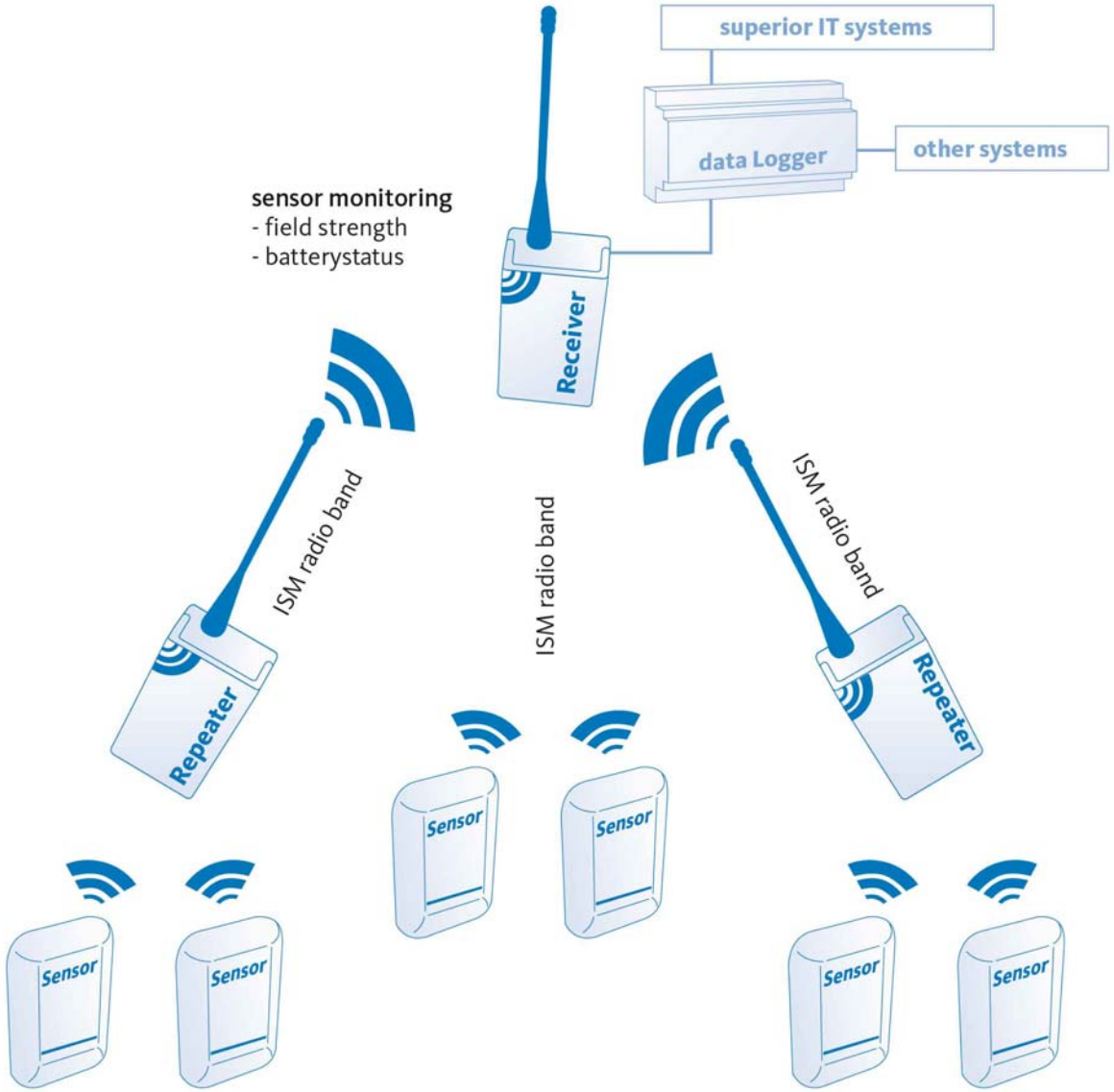
Part I
Overview of the GesySense System

1 GesySense System Overview

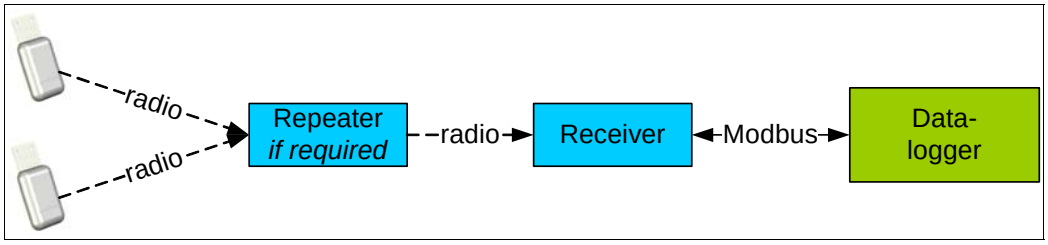
The wireless sensor system GesySense by Gesytec enables centralized collection of measuring data from distributed measuring spots. It is based on sensor modules transmitting their measuring data wireless to the GesySense Receiver.



Via a data logger, the GesySense can be connected to the building management system of a site. The data logger can also act as compact building management system center.

1.1 Communication within the System

During operation the communication within the system proceeds from the sensors to the receiver, which transfers the data to a data logger using the Modbus protocol[1]. The data logger realizes historiography and data concentration and ensures the communication with control systems via different ways (depending on the selected device type).



In case of updates and for time synchronization data traffic in the opposite direction to the repeaters is provided.

Each GesySense component is provided with an explicit, inalterable ID. This ID and a consecutive message number are integral part of each message. Further to this data and the measured values the message includes a checksum to secure the transmission.

The broadcast is realized via the radio channel set during commissioning with a short pulse within the set time interval. The actual broadcasting moment is determined by a random procedure in order to avoid collisions with transmissions from other sensors.

The signal is either directly recorded by the receiver or by a repeater located within the transmission path. They receive the signal on one channel and transmit it via the same one or another channel (adjustable). This transmission to the receiver can be realized via several repeaters.

The first recipient within the transmission chain (repeater or receiver) provides the message with additional information:

- Time stamp
- Received field strength
- Transmission quality
- Battery status
- Network identification of a possibly used repeater

The transmission quality makes a percentage statement related to the number of messages received within a specified period of time. Furthermore, the first receiving device calculates a classification value number for the battery status.

[1] For the Modbus connection specification cf. Gesytec Document: GesySense Modbus Communication

Repeaters continuously give notice about their transmission strength and the number of sensors they capture. The receiver additionally reports the repeaters received.

Finally, the message from a sensor on the receiver includes the following information:

- Sensor ID
- Measured value
- Time stamp
- Battery status
- Received field strength
- Transmission quality
- Route ID

This information is serially transmitted to a data logger where it is filed. The Modbus protocol is used for this communication.

1.2 Components and their Functionality

Currently the GesySense system includes the following components:

Thermo-Sensor
measuring the temperature at its particular installation location. Measurements are taken continuously at fixed time intervals; the values are transmitted wireless to the receiver (see below).

PT1000 Sensor
Temperature module with external PT1000 sensor. The value representation is equal to that of the Thermo-Sensor; the measuring range is between -50 und +300 °C. The sensor is calibrated upon delivery.

Status-Sensor
A digital sensor offering two inputs to monitor the status „on“ or “off“ of connected detectors. This component, for example, allows to monitor devices of the air conditioning system or chillers.

Counter-Sensor
Module for counting of pulses < 20 Hz. Two sensors can be connected, counter size is 32 Bit.

Analog-Sensor
Voltage input module processing signals from 0 to 10 V or 4 (0) to 20 mA.

Receiver
The receiver station of the GesySense system receives the messages from the wireless modules and either transmits them via cable to the data logger or saves them on an installed memory card[2].

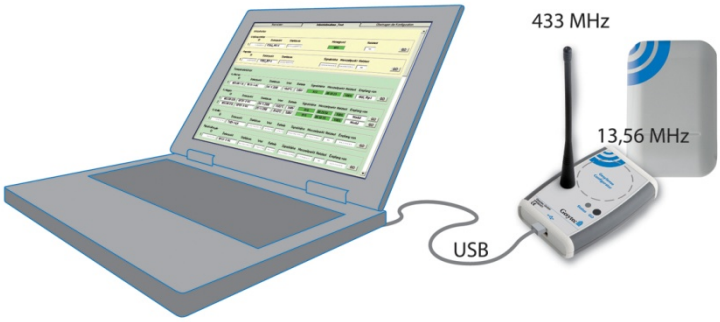
Repeater
Repeaters are available in case the wireless connection between sensors and receiver is not sufficiently reliable due to too large area distance or structural conditions such as intermediate walls etc.: They receive the radio signal of the sensors and transmit it amplified to the receiver.

Receiver and repeater are identical in construction and also use identical firmware. The different operating modes of such a module are set by the configuration software „GesySense Manager“.

One receiver is used per installed system (site). Up to 200 temperature sensors, digital sensors and analog sensors or repeaters can be installed in a system without reducing the performance.

[2] option

The configuration program „**GesySense Manager**“, running on a standard Windows PC, is used for configuration and maintenance of the system. Data connection between the computer and the components to be configured is realized via the „**GesySense Configurator“**, a wireless adapter for USB connection.



Part II
System Handling

2 Installation and Commissioning

The directions given in the following are related to larger system installations with numerous similar measuring spots which can be organized in groups related to their character. As a matter of fact, small installations can be realized much easier.
However, it is strongly recommended to go over the entire procedure in order to understand the underlying operational method of the configuration tools.

Installation and commissioning of a GesySense system includes the following steps:

- Preliminary steps:
  During a site inspection of the designated system location – shortly called site in the following – the requirements of system components and their installation spots will be determined and a precise schedule for the installation will be fixed. Furthermore, the structure of the identifiers related to the individual measuring data points to be captured has to be entered into the Excel spreadsheet belonging to the configuration program GesySense Manager.

- Defining the site configuration:
  The number of the designated GesySense components is set in the GesySense Manager.

- Mechanical installation of the system components

- Commissioning of the system components

- Test of the entire installation

- Transmission of the site configuration to the data logger or directly to the receiving station (receiver)

Supplementary information sheets with detailed directions for the mechanical installation are included in the delivery of the hardware components.

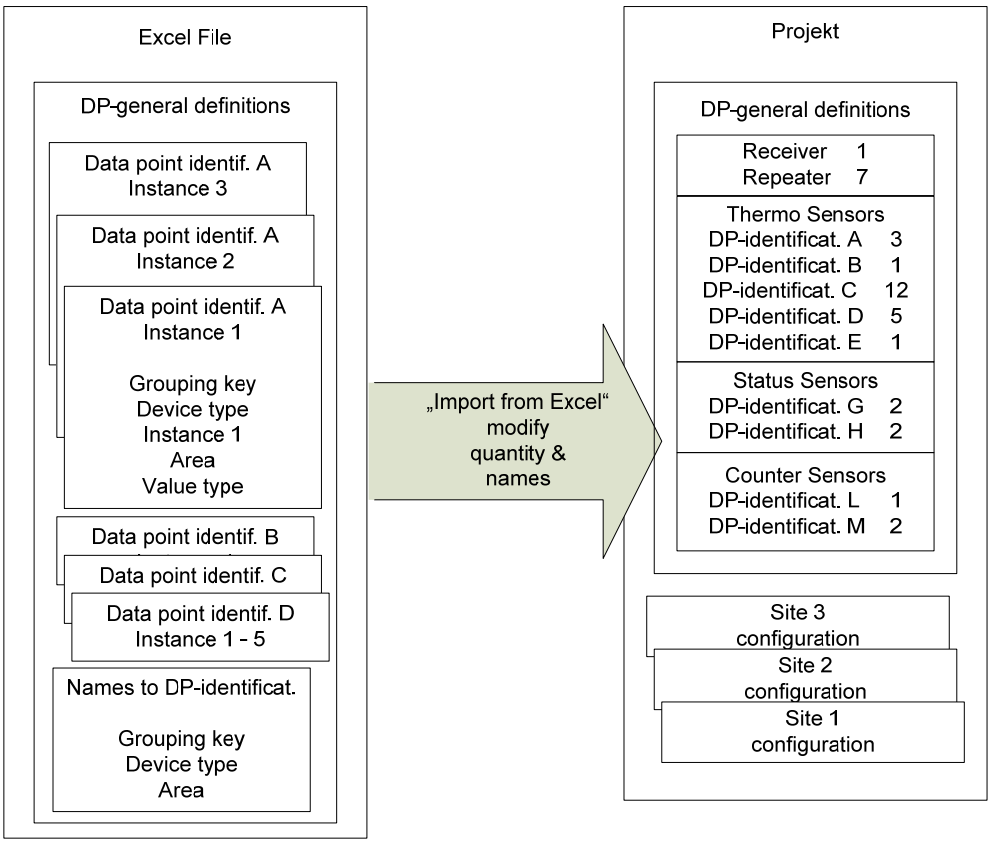
2.1 Organizational Structures in GesySense Manager

The GesySense Manager is project oriented. Within a project different installations, so called „sites" can be defined in the framework of the previously define project. This simplifies commissioning and management of several similar system installations. Each project with its site configurations is stored in an MS Access database. For the preparation of the project and as input for the GesySense Manager project an Excel spreadsheet is used. The respective database

(GMS_DP-ListeBasis.mdb) and Excel (GMS_DP-ListeBasis.xls)files are copied to the configuration PC during setup of the GesySense Manager. (cf. 5.2, Installing the GesySense Manager)

2.1.1 From Excel Spreadsheet to Project

In the Excel spreadsheet „Datenpunktkennung" much organizational information can be kept depending on the project requirements of the user. For the commissioning of the wireless sensor system only that information is relevant, which is described on the "explanations" register of the Excel file, i.e. the definition of the data point identification. Furthermore the register "GSM Import" offers the possibility to attach names to data point types which are later used in the GesySense Manager. Descriptive names can be assigned in 2 languages.



Project settings in Excel and import into the GesySense Manager project

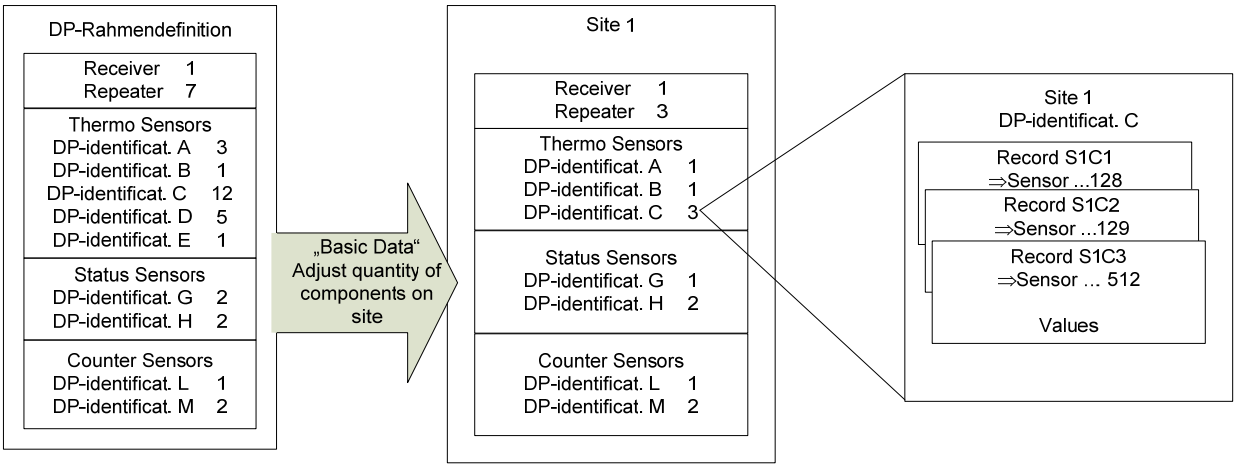
The definitions made in the Excel spreadsheet are finally imported from the GesySense Manager which creates a new project. This import process is the last moment to modify the quantity items for a data point type or the assigned names. Afterwards these are fixed for this project.

2.1.2 From Project to Installed Sensor

While these were organizational preparation until here, the "Load" command opening a project is the first step to the real installation: You will be prompted

for the name of the site. “Site” generally designates an installed GesySense wireless sensor system comprising one receiver and required number of wireless sensors. If necessary, repeaters are added. Several sites can be defined in one project.

For the sake of clarity the quantity of components really installed can be set, however, only to the maximum defined by the project frame. Then the activation of components and their assignment to the pre-defined and named data points will start. Now the world of data is connected to the real world.



Modify quantity for a site and have the installed components assigned.

With the commissioning procedure finished the site configuration comprises the allocation of identifiable components to defined data point. The configuration data completely describe the functionality and are used for system operation, data assessment and processing, and for future maintenance.

2.2 Preliminary Steps

Prior to the actual installation of the GesySense system, the number of the particular sensor types and the installation spots of the designated components should be determined and documented on occasion of a project planning and site inspection.

Furthermore it is recommended to preliminarily determine the installation procedure and commissioning in detail. The following section gives some advice.

2.2.1 Project Planning

Project planning includes the determination how the designation of each individual sensor has to be structured to fit into in the system of the operator or how the sensor installation spots should be marked. For instance, if a GesySense system is to be installed in a store of a supermarket chain, spots and designation will differ from an installation in an apartment or office building. This definition will be

realized by preparing a structured Excel spreadsheet. The setup of the GesySense Manager includes an applicable example of such a spreadsheet. Further information is provided in the chapters 5.4.1 and 5.4.2.

2.2.2 Demand Compilation and Definition and Documentation of the Installation Spots

The number and type as well as the mounting spots of the wireless sensors are specified by the operator and may differ from site to site. The operator determines the mounting spots and identifiers using the already mentioned Excel spreadsheet. Using this spreadsheet, the operator can define and name the measuring spots according to the target object (building, facility, and store) and integrate them out of the spreadsheet into the configuration software (see chapter 5.4.1, „Import Project from Excel").

In order to ensure a faultless **assignment of the sensors** related to the individual measuring or installation spots, the latter should be numbered consecutively during site inspection. Use individual ranges of numbers[3] as additional superior structure for different types of measuring spots. Thus a simple organization means is at hand later. .

The installation spot for the receiver is entered in the Excel spreadsheet as well, both encoded and as plain text.

If one or more **repeaters** are required at a site, can, of course, only be determined after all wireless sensors have been installed and put to operation(unless long transmission paths have been included in the system concept from the first). Independent of the number of repeaters, exactly one receiver is required for one installed system.

The documentation prepared during site inspection must include the number of required components and their installation locations. It absolutely may make sense to depict the installation spots by photos.

Furthermore, possible additional works such as power supply wiring for receiver or repeaters (both can be connected to the 230 V grid) or removal of a suspended ceiling in case a repeater shall be installed behind it, should be written down.

2.2.3 Implementation Planning for a Particular Site

Based on the layout plan prepared during site inspection, the components of the GesySense system for the site are defined in the Excel spreadsheet and then imported to the GesySense Manager.

[3] In Excel spreadsheet called „Grouping key"

The components of the GesySense systems usually are not yet activated upon delivery. This means that the radio transmitters of sensor modules and repeaters are not yet switched-on.

Two procedures are feasible for installation and commissioning the sensors:

1. „On-Site Commissioning“
   The bayonet mount is fixed at the designated spots, if necessary by means of an assembly plate. Then the components are put into operation using a mobile configuration PC (laptop). For this purpose either the sensor is snapped onto the bayonet mount and activated by means of the configuration PC or, the sensor is activated first close to the installation spot and then immediately snapped onto the bayonet mount.

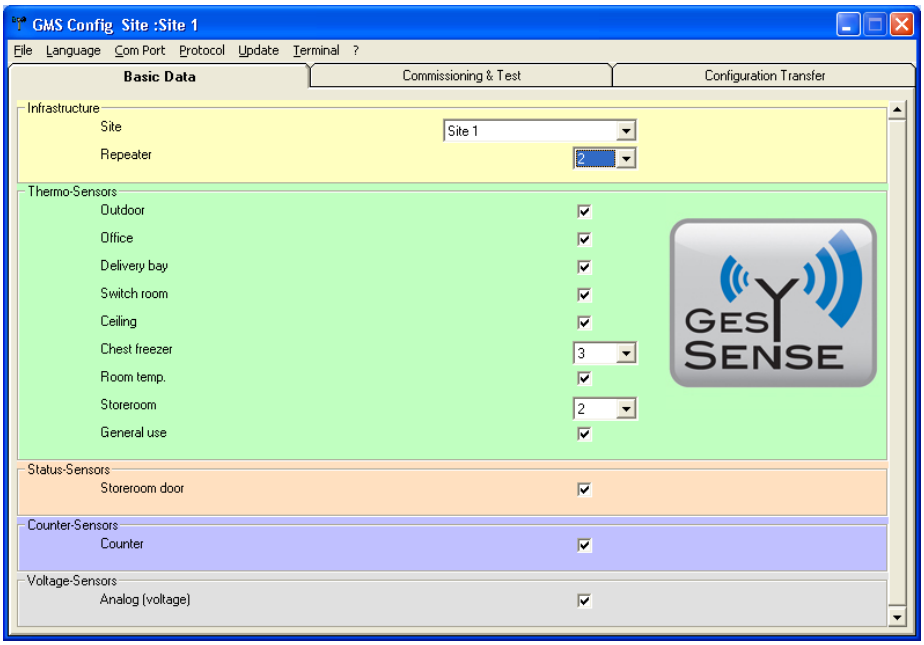
2. „Separate Commissioning“
   The bayonet mounts are fixed at the designated spots, if necessary by means of an assembly plate, however, not the GesySense components themselves. All modules to be applied are put into operation with the configuration PC at the same place which either may be at an on-site office or even far from the actual site at the system integrators place. After commissioning they are snapped onto the already installed bayonet mounts. In order to avoid mix-ups of module and installation spot, an accurate documentation is mandatory. The unique ID of the modules helps in this.

The final step, after a completion test of the installation, is the transmission of the site configuration – using the GesySense Manager – into the data logger on site, respectively its direct storage into the receiver.

2.3 Preparing a New Site Configuration

Note: In case the GesySense Manager has not yet been installed please read section 5.2 „Installing the GesySense Manager" first. The GesySense Configurator is not required to enter the configuration.

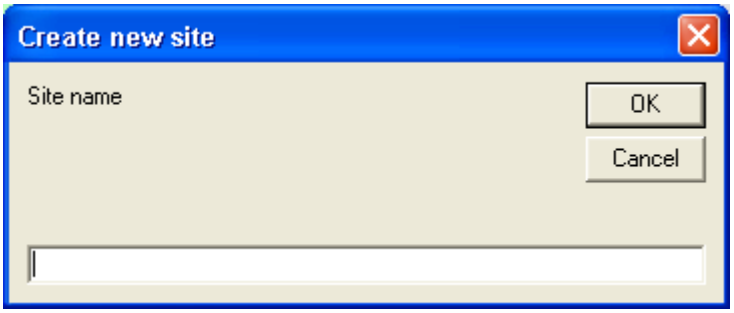
Launch the GesySense Manager via the Windows Start menu „Start > All Programs > Gesytec > GesySense > GS-Manager". The main window of the software appears and displays the register „Basic Data"showing the project and site data used last time. It is structured into individual sections, according to the individual components: „Infrastructure" (receiver, repeater) , „Thermo Sensors", „Status Sensors", „Counter Sensors", Voltage Sensors". A section is only displayed if it includes components defined within the project.



Note: The dimensions of this window can be modified by dragging the lower edge of the window. The width cannot be modified.

First of all, define with the Excel spreadsheet the data point structure you want to use in your project and how to identify the data points.

Select the menu entry „File > New site". The dialog box „Create new site" will appear.

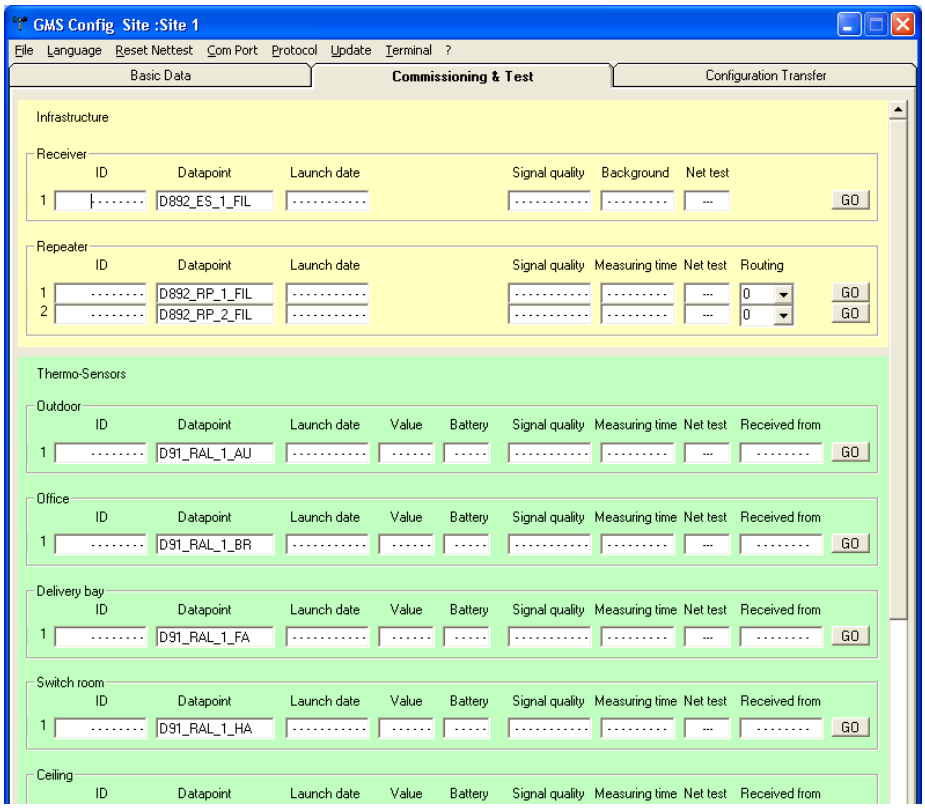


Enter a name for the new site to be created and click „OK”.

After having created the new sit in the GesySense Manager, it will appear in the drop down list in the section „Infrastructure”.

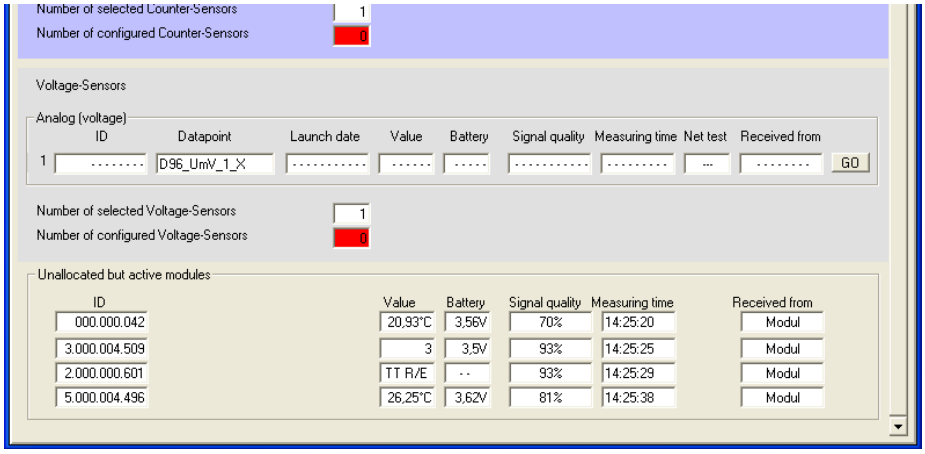
Now enter the basic data of the selected site: if, by the defined project, only a single module is specified for an individual section, aggregate or facility the selection is controlled via an option button (also called radio button). Otherwise select the number of repeaters or sensors from the drop down list.

After entering the basic data change to the register „Commissioning & Test”. Based on the configuration you entered, the GesySense Manager prepares a complete list of all components to be installed, also subdivided into individual sections corresponding to the components specified in the project.



Wireless sensors that already are activated (the radio transmitter is already switched-on), but are not yet assigned to a data point, are displayed at the lower

edge of the window. If after completed installation and commissioning of a GesySense system at a site there are entries in this list, it should be checked if there are redundant sensors or if the number of configured measuring spots matches the number of installed sensors.



The number of the wireless sensors specified in the basic data and of the already configured sensors is displayed as installation aid.

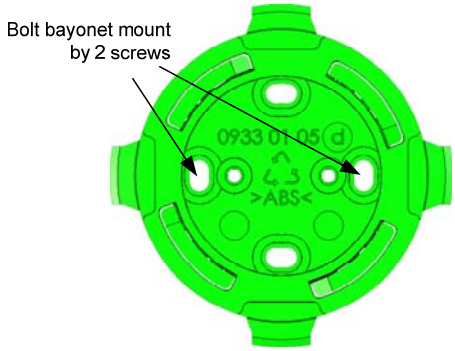
In the list of components each entry includes a unique ID (according to the serial number of the component), the data point related to the component and the date the component has been activated. The data points are generated automatically based on the data from the Excel spreadsheet.

In addition, depending on the type of module, further data are displayed which are described in detail in the chapter „Software Reference". According to the section „Implementation Planning for a Particular Site" the mechanical installation of the components follows subsequently followed by the commissioning of the components.

2.4 Installation of the Wireless Sensors

The installation of the wireless sensors is generally realized via an installation adapter with bayonet cap which is secured against unauthorized removal with a small locking bolt, thus allowing for secure fastening and for easy removal of the sensor, e.g. for battery change or exchange of the entire module.

2.4.1 „Direct" Installation of a Wireless Sensor

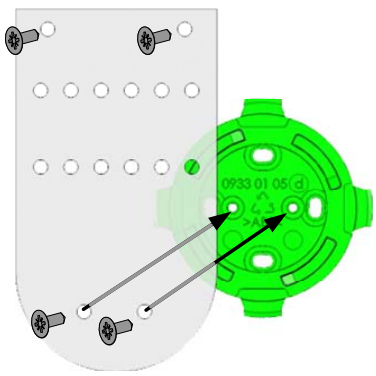


The bayonet mount is directly bolted to a wall or ceiling. A drill jig is available in order to facilitate the alignment of the bayonet mount.

The wireless sensor is attached by turning the bayonet cap until it snaps und locked by tightening the locking bolt.

2.4.2 Installation of a Wireless Sensor Using the Assembly Plate

The position of the sensor modules relative to the fixing point can be modified by means of the assembly plate. Thus, a Thermo-Sensor in a chest freezer for instance, can be fixed outside the cooling conducts but still in the relevant measuring range.



The bayonet mount is fixed by means of two screws on the assembly plate, which itself is fixed by means of two screws. If necessary, the assembly plate can be carefully bent at the punched bars.

The wireless sensor is attached as described above.

Note for mounting in chest freezers:

Data transmission between the GesySense Configurator and a wireless sensor is realized via an induction loop whose electromagnetic field can be strongly interfered by the metal of the freezer basket. Hence the sensor has to be positioned at a spot where only one bar of the grill comes across the sensor. The sensor *must not be* located within a grill cell. The *upper picture* shows an example of a *correct* installation while the *lower picture* shows an *inappropriate* installation position.

Correct mounting of a temperature sensor in a freezer: The fitting panel is bolted in the plastic bar at the upper edge of the freezer. The metal bar of the freezer basket is located across the middle of the sensor.

Wrong mounting: Please be aware that the sensor in this picture is inappropriately positioned as one field of the freezer basket is located like a frame over the sensor.

2.4.3 Installation of Receiver and Repeaters

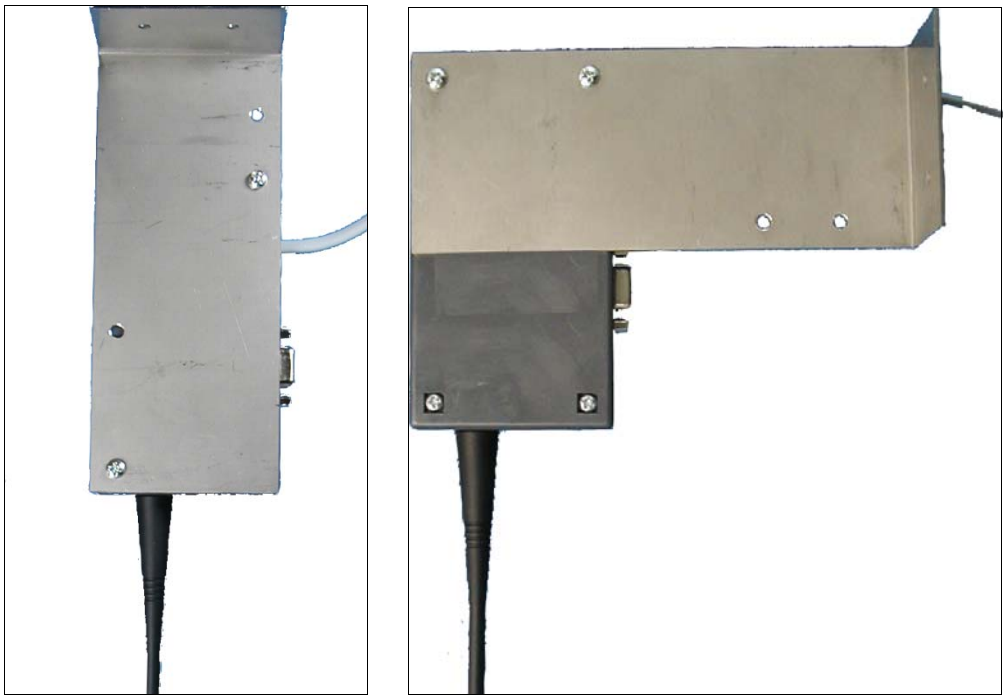
Repeaters and receiver are identical in construction and installed the same way by means of an assembly bracket. As both, repeaters and receiver need power supply, a 230 V supply (permanently available) must be available at the installation site.

While the receiver is installed close to the data logger, the locations for the repeaters have to be determined individually for each site by measurements of radio signal field strength using the GesySense Manager and the GesySense Configurator. Thus the location for the repeaters should only be determined after all sensors and the receiver have been commissioned.

Note: In case of demanding radio technical conditions it is recommended to determine the location of the receiver as well via a field strength measurement after all sensors have been commissioned.

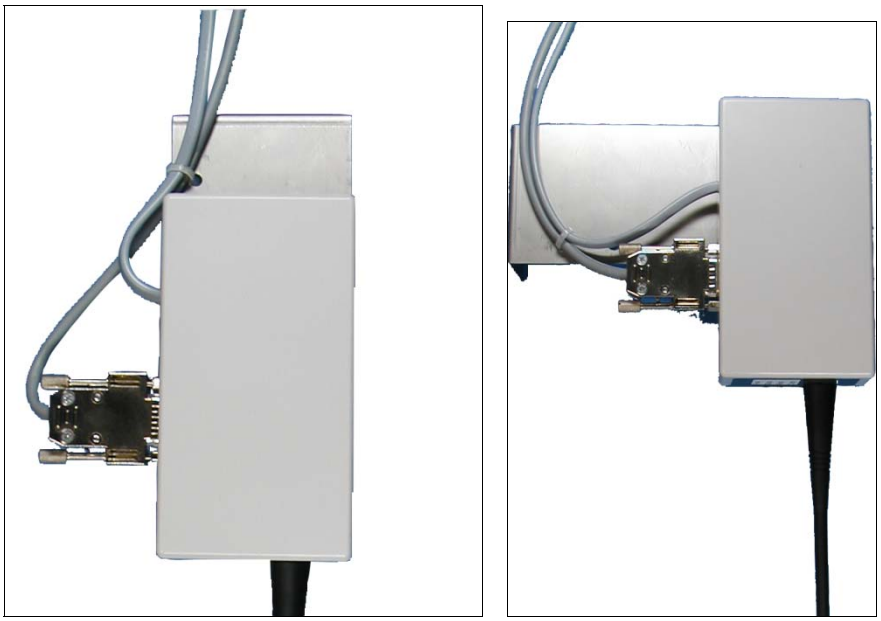
Attention: **The antenna must be perpendicular to the floor!**
The supplied assembly bracket can be aligned horizontally or vertically. However, it is important that the repeater/receiver is bolted with the assembly bracket, with the antenna perpendicular to the floor.

The repeater/receiver is bolted to the assembly bracket with two screws. Depending on the alignment on the assembly bracket, different boreholes in the sheet and in the housing of the component are used for this purpose. Thus, if applicable, screws in the housing have to be changed over.



Mounting variants for the repeater/receiver: The assembly bracket can be installed either horizontally or vertically; the required boreholes are already provided. It is important that the antenna is perpendicular to the floor.

The assembly bracket is either bolted to the wall or the ceiling. The mains cable is connected to the power supply. Furthermore the receiver is connected via an EIA-485 cable to the data logger. A cable strap is attached to the assembly bracket as strain relief for the mains cable, and for the receiver as well for the data cable.



Course of the cables for power supply and data (the latter only at the receiver): For strain relief the cables are attached to the assembly bracket by means of a cable strap.

If the location for a repeater is only determined after the installation of the other system components, this has to be added to the system documentation.

Note: If a repeater is mounted above a suspended ceiling, the location has to be documented and, if applicable, labeled on the ceiling.

2.5 Commissioning of the System Components

In this step the wireless modules are commissioned (if this has not already been done previously) and assigned to the data points previously defined in the GesySense Manager.

Start the GesySense Manager and connect, if not yet done, the GesySense Configurator via USB cable to the configuration PC. The LED at the Configurator should shine green.

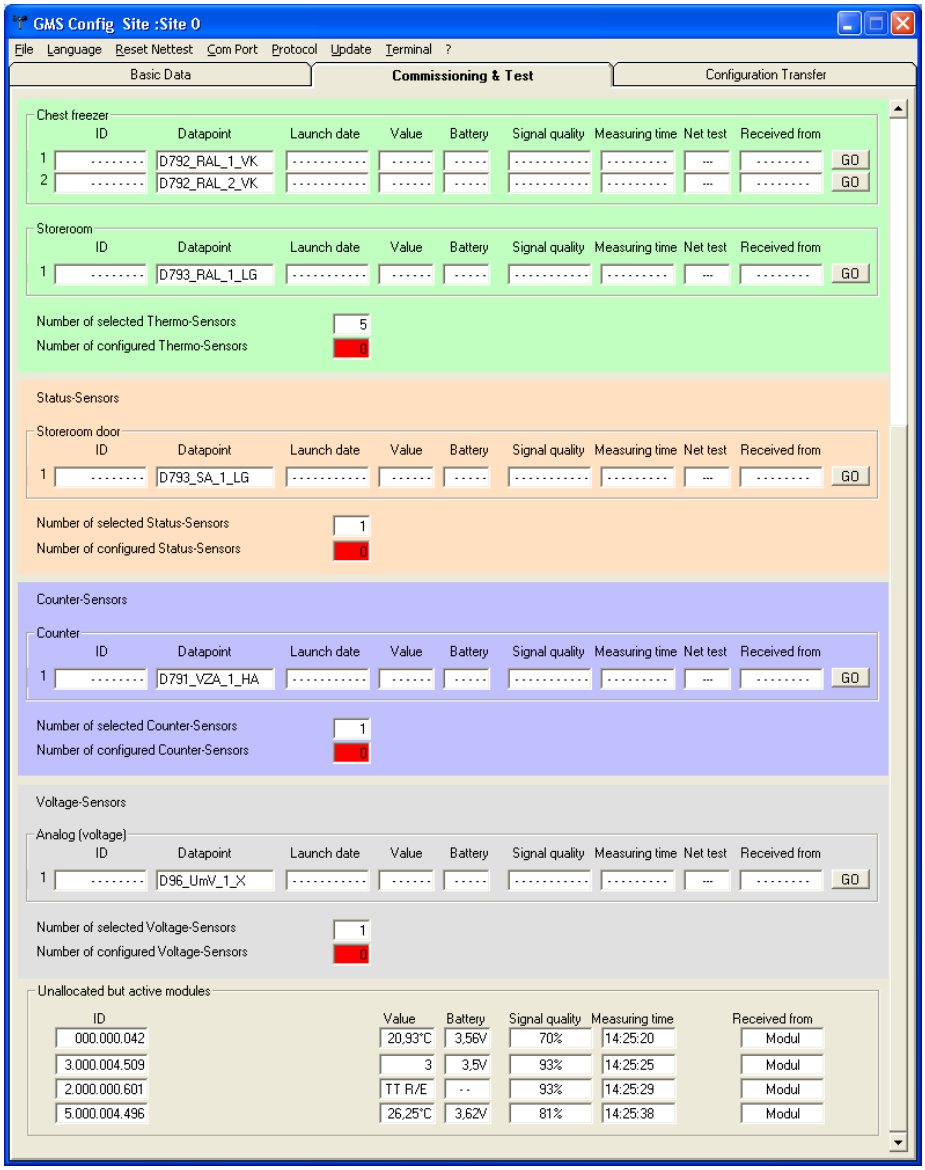
If the LED flashes, the Configurator is in fact ready for use, but cannot communicate with the software. In this case sequentially select in the software the entries from the „COM Port" menu until the LED of the Configurator changes from green flashing to constant green light. The constant light indicates that the software can communicate with the Configurator.

Note: If the LED of the Configurator doesn't change to constant light with any of the „COM Port" entries, disconnect the Configurator from the PC and subsequently reconnect it. Then restart the GesySense Manager and try again to select the appropriate COM port.

Note: In order to facilitate working with the Configurator while commissioning the sensors, you may unscrew its radio antenna temporarily.

The GesySense Manager stores the selected COM port; thus a new selection should not be necessary for future use of the Configurator.

Open the register „Commissioning & Test". The data fields on this register required for installation of the system are exemplified in the following installation instruction.

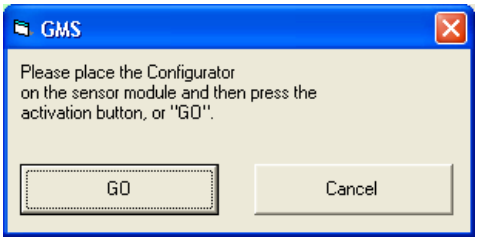


First of all, commission all wireless sensors by means of the configuration PC, followed by the receiver and finally, if applicable, available repeaters.

Note: Several site configurations can be stored in the configuration software. Therefore make sure, prior to commission any GesySense components, that you selected the correct site in the drop-down own list „sites" from the „basic data" register. If you should try to commission a component that has already been assigned to another site, the GesySense Manager displays an appropriate alert.

2.5.1 Commissioning of the Wireless Sensors

To commission a GesySense module, click on the „GO" button of the respective list entry in the register „Commissioning & Test" of the des GesySense Manager. The following dialog box appears:



Hold the GesySense Configurator to the sensor you want to commission. The induction loop of the Configurator, indicated by the circle on its housing, should be positioned as close as possible above the induction loop of the sensor. The position is marked in red in the following drawing. Furthermore, the distance between Configurator and sensor module must not exceed 5 cm.

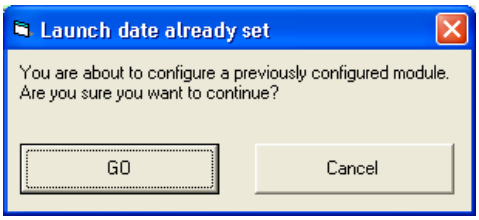
For data traffic with a sensor module the induction loop of the Configurator (gray circle on the Configurator) has to be positioned as shown above the induction loop of the sensor (red square in the drawing).

Then click on the „Go" button of the dialog box *or* activate the „Go" push button on the Configurator. A sound signal is emitted and the status LED of the Configurator starts to flash yellow. Thereupon the following may occur:

- In a brand-new module that has not yet been activated the wireless sensor is switched-on.
- If the type of the module doesn't match the selected data point, which means that this module is, e.g., a digital sensor but shall be assigned to the data point of temperature sensor, the procedure is aborted with the following error message:

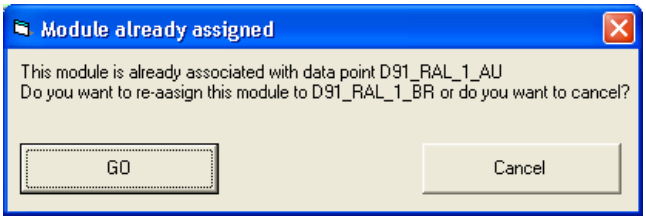
In the following the LED on the Configurator flashes red for thirty seconds and the note „failed" appears in the start date of the data point in the configuration software.

- If the module has already been activated but not yet assigned to a data point, the following note is displayed:



  Click on the „Go” button of the dialog box *or* activate the „Go” push button on the Configurator, to assign the module to the selected data point or on „Cancel” in case you don’t want to make any changes.

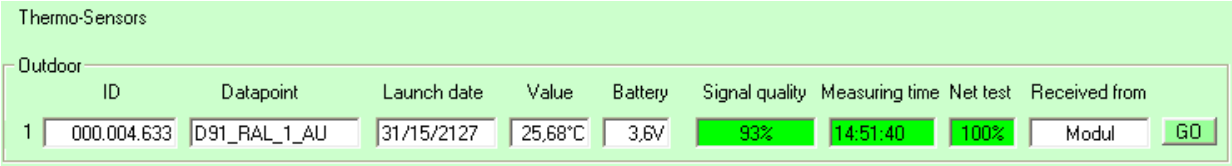
- The following message is displayed if the module has already been assigned to another data point:



- For a module that is already saved in another site configuration on the configuration PC an appropriate note appears. You then can decide whether to abort or to continue the commissioning of this module.

  Click on the „Go” button in the dialog box *or* activate the „Go” push-button on the Configurator in order to assign the module to the selected data point or „Cancel”, if you don’t want to make any changes.

A double acoustic signal is emitted after successful commissioning and the LED at the Configurator changes from yellow flashing to yellow constant light. The module is assigned to the data point selected in the GesySense Manager, the start date is set and a complete dataset is read out, consisting of measured value, battery voltage, quality of the radio signal, time of latest measurement, net test and indication of the transmission path (related details are included in the chapter “Software Reference”). These data should be displayed in the software approx. 10 seconds after commissioning.



Commissioning Mode

In the first three hours after commissioning the module emits a dataset once a minute (in this case the related „Go" button in the configuration software is displayed in green); after these three hours the emitting interval changes to 4.5 minutes. This applies to both, brand-new sensors activated for the first time and already activated sensor which are newly assigned.

Note: If during commissioning of temperature sensors mounted in chest freezers behind baskets no measuring values are displayed for the related data point in the configuration software after 30 seconds, repeat the commissioning process later on. If commissioning keeps failing, remove the sensor and commission it outside the freezer.

Note: If the following dataset within a range, e.g. „Temperature Sensor", is still empty after commissioning of a component, the „Go" button of this dataset is selected allowing to start the following component by simply pushing the enter button („Enter" or „Return").

2.5.2 Commissioning of Wireless Modules with External Connections

All wireless modules with the initially depicted housing are commissioned in principle as described in the previous section.

Unlike the Thermo-Sensors, one or two external sensor(s) have to be connected to modules with terminals, following the enclosed mounting instructions.

Status-Sensor

The Status-Sensor is provided with two inputs to each of which a contact can be connected: contact 1 between pins 1/2 and contact 2 between pins 3/4. Reed contacts with low threshold level or a dry contact can be connected to each input. Both inputs are provided with the same ground, connected to GND in the sensor.

Counter-Sensor

Two contacts can be connected to the counter modules: Contact 1 on pins 1/2 and contact 2 on pins 3/4.

PT1000-Sensor

In this case the PT1000 sensor is connected to pin 3 and pin 4.

The appropriate value fields are provided in the GesySense Manager form:

- The status of both inputs „on" and „off" in the sequence contact 1, contact 2 (open inputs display „off").

- Measuring values of the Counter-Sensors in the number of pulses (32 Bit counter: 0 to 65536).
- PT1000 as temperature with 2 decimal places like the Thermo-Sensor.

2.5.3 Reset of the Net Test

Once all the sensors have been commissioned –the figures for scheduled and installed sensors displayed in the GesySense Manager have to be identical– click on „Reset Net Test" in order to start a „refreshed" net test including all sensors installed.

Later on, the resulting measuring values will ease the selection of locations for possibly required repeaters.

2.5.4 Commissioning of the Receiver

Once the receiver has been connected to the mains supply, the device starts operating. The four LEDs close to the antenna indicate:

- „Power" (power supply): constant green light indicates „OK"
- „Status" (operating status): green flashing indicates „OK"
- „Radio" (wireless connection): green flickering indicates the exchange of data packets
- „Comm." (data exchange with the data logger): *yellow* flickering indicates data exchange; *green* flickering indicates that the data bus is active, but no data is exchanged. This may be caused by interchanged data cable wires or faulty set protocol parameters.

Click on the „GO" button of the receiver in the GesySense Manager. If several receivers/repeaters are active, a dialog appears stating the module IDs of the receivers/repeaters found. (The module ID of a component is printed on a label on its housing.)

Note: Receiver and repeaters are identical in construction and their functions are determined during the configuration. The current settings are displayed in brackets in the selection dialog. By selecting one of the devices from the dialog box, it will be newly configured as receiver.

Select the desired component and click „OK". An appropriate note appears when the component has already been activated. In this case click „OK" to configure the device as receiver or „Cancel" if you don't want to make any changes.

Now the module is registered as receiver in the software and its start date is set. Once the module has been successfully configured, a double acoustic signal is emitted and the LED at the Configurator changes from flashing yellow to constant yellow glowing.

Instead of the signal strength, a measurement of the „background" radio signal appears in the entry of a receiver. If the value exceeds 75%, there might be the high probability that a radio transmitter interferes with the operation of the GesySense system.

The connection to the data logger and the data communication with it are described in the section 2.6 "Transmission of the Configuration to the Data Logger".

2.5.5 Commissioning of the Repeaters

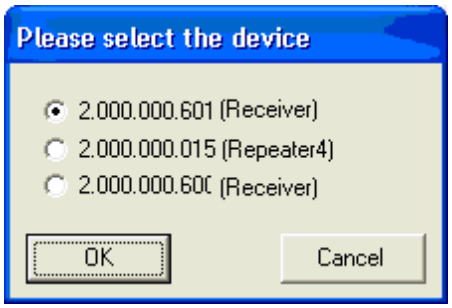
Based on the signal strength display of the individual modules in the GesySense Manager it can be determined, whether the use of repeaters is required. Does the receiver reliably pick up the signals of all sensors installed? If so, no R is required, otherwise it can be deduced from the signal strength of the sensors where to position the repeater.

It should be positioned between the receiver and those sensors whose direct reception is not sufficiently reliable. Sensors in closed rooms (such as a cold-store), on locations with a lot of people (such as check-out areas in super markets), or that simply are too far away from the Rare are particularly susceptible to reception interferences.

The repeater is installed at the determined location (see section „Installation of Receiver and Repeater") and the mains cable is connected to the power supply. The configuration with the GesySense Manager is realized analog to the receiver configuration.

Note: Receiver and repeater are identical in construction; their function is determined during the configuration. The current setting is displayed in brackets in the di-

alog box. By selecting one of the devices from the dialog box, it will be newly configured according to the repeater number selected in the register „Commissioning & Troubleshooting” as repeater 1…7.



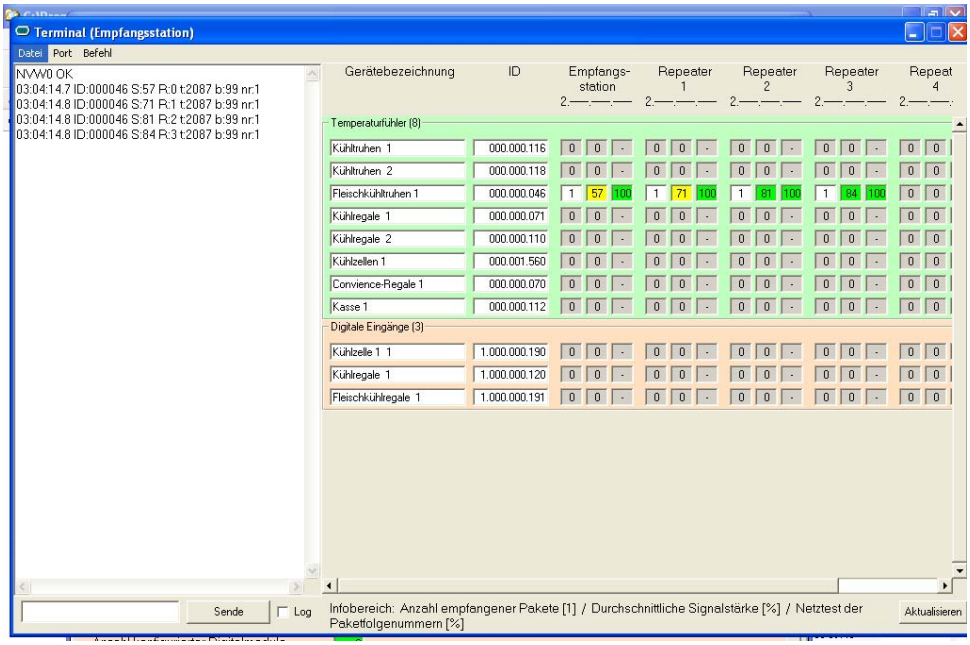
If several repeaters are available, it can take a couple of minutes until the first measuring dataset is displayed in the GesySense Manager. Standard value of the route field is 0. It is set when the firmware update via radio can only be realized via another repeater. In this case the respective repeater number is displayed (see chapter 3.1, Firmware Update for GesySense Components).

Note: If the following dataset within a range, e.g. „Temperature Sensor“, is still empty after commissioning of a component, the „Go“ button of this dataset is selected allowing to start the following component by simply pushing the enter button („Enter” or „Return”).

2.6 Test of the Entire Installation

Once the mechanical installation and the electronic commissioning of all components within a GesySense installation (sensor modules, receiver and repeaters) is completed, a final test of the system is recommended prior to the transmission of the configuration data to the data logger of the site.

Connect the receiver via a serial cable to the configuration PC and select the menu item „Terminal” in the GesySense Manager. From the „Port” menu select the COM-Port by which the PC is connected to the receiver. This will automatically launch the log function.



Now a net statistics is shown in the „Terminal” window where you can check if the radio signals of all sensors reliably and successfully reach the receiver.

The current values can be printed via the menu command „File > Print”. By checking the „Log” checkbox, the measuring values can be written into a text file.

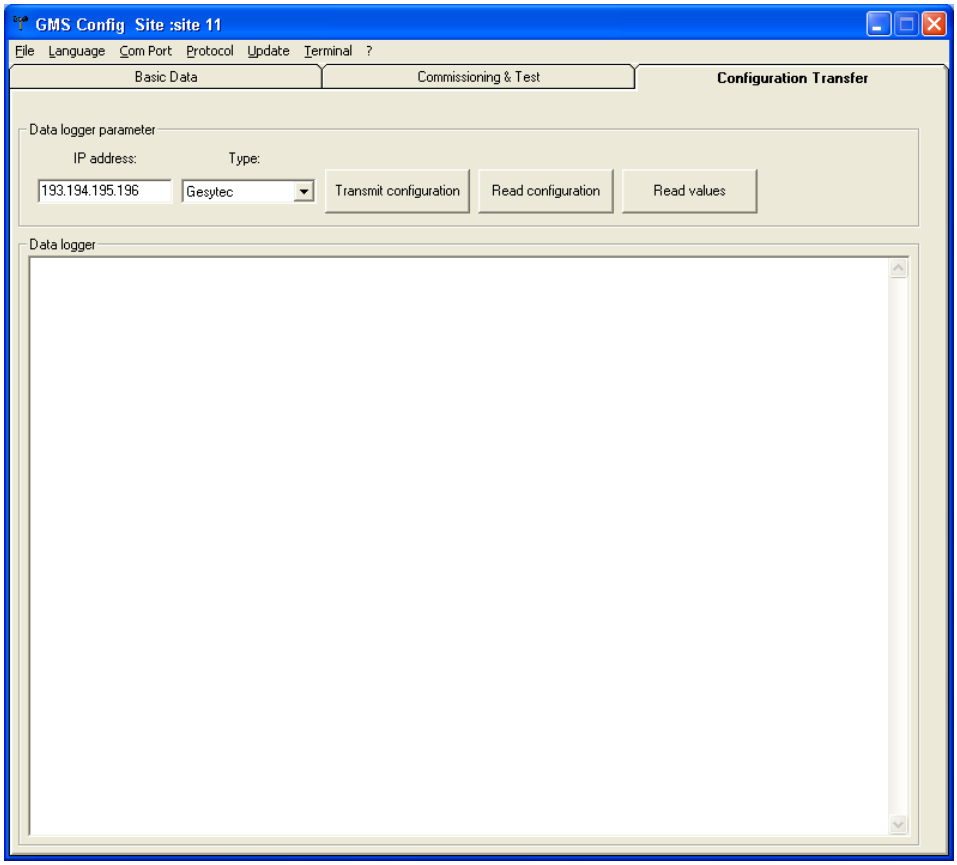
More detailed information related to this function can be found in section 5 “Software Reference”.

2.7 Transmission of the Configuration to the Data Logger

Note: The transmission of the configuration to the data logger can only be realized if the data logger is provided with the appropriate protocol software. Optionally the configuration can be directly transmitted to the receiver and saved there. For that, select the command „Transmit Configuration" under Terminal > Receiver.

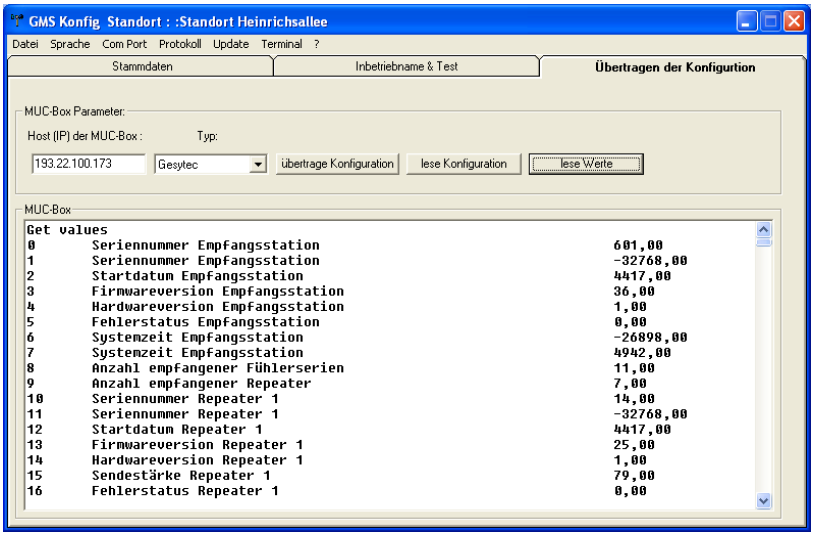
Once the test of the entire installation has been successfully completed, the configuration data can be finally transmitted from the configuration PC to the data logger, if available.

Connect the data logger via a cross over LAN cable to the configuration PC and select the register „Configuration Transfer" from the GesySense Manager.



Enter the IP address of the data logger, select its type and start the data transmission of the configuration by clicking on the button „Transmit Configuration".

The measuring values received from the data logger can be displayed via the button „Read Values":



Thus the configuration of the site is completed.

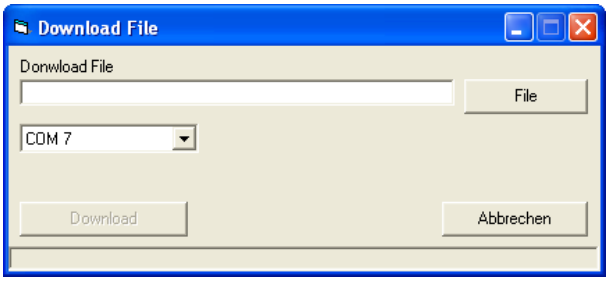
3 Maintenance of the System

Part of the system's maintenance are installation of updated software both, the configuration software GesySense Manager and the firmware of specific GesySense components as well as the exchange of batteries in the wireless modules.

3.1 Firmware Update for GesySense Components

If required, updated firmware versions for the GesySense Configurator and receiver/repeater are made available as files. The installation of these firmware updates is realized with the GesySense Manager from a PC that is connected to the particular component: a USB cable for the Configurator and a serial cable with D-type connector for repeater/receiver(cf. 6.3.2, Connector Pin Assignment).

Start the GesySense Manager, connect the device to be updated and select the entry „Firmware Receiver/Repeater" for repeater/receiver or „Firmware Configurator" for the Configurator from the „Update" menu. Click on „File" and select the firmware file to be installed.



The file type of all firmware files is a .hex file. The name of the firmware files for the GesySense Configurator includes the abbreviation „TTP" and „TTR" for repeater/receiver (repeater and receiver are identical in construction and use the same firmware).

Then, select the PC COM port the device to be updated is connected from the pop-up menu of the „Download File" dialog. If required, you can look up the required COM port in the Windows device manager.

Click on „Download" to start the firmware installation to the device. During the update the LED of the Configurator respectively the two outer LEDs of repeater/receiver constantly glow in red. In case an error occurs during transmission, an appropriate error message is generated.

Alternatively the receiver firmware can also be updated via the data logger if the respective Modbus function for file transmission is implemented on the device[4].

[4] cf. protocol specification „GesySense Modbus Communication"

If there are repeaters in the GesySense system, the firmware update loaded into the receiver is automatically forwarded to the repeaters via the implemented wireless protocol, provided the firmware version in the repeater is lower than that of the receiver.

Otherwise the update procedure to the repeaters can be controlled via specific commands to the receiver (see 5.4.6.1).

3.2 Configuration Software Update

A new version of the GesySense configuration software GesySense Manager can be automatically downloaded from the Gesytec FTP server.

For this you won't need to access the server yourself but can use the function under „Update". Select the menu command „Update > Software GMS_Config" .

If a new software version is available, the GesySense Manager will download the appropriate file.

The file name is GesySense_Manager-1.xx.yyy. As soon as the download of the file has been completed, the GesySense Manager automatically shuts down and runs the installation file with the new software.

It may be that the structure of the data base used by the GesySense Manager has to be adapted to the new version at the first launch of the program after a software update; this may cause an extension of the idle time from the start of the program until the display of the main window.

If the software is up-to-date, a corresponding message appears.

3.3 Replacing the Battery of a Wireless Sensor

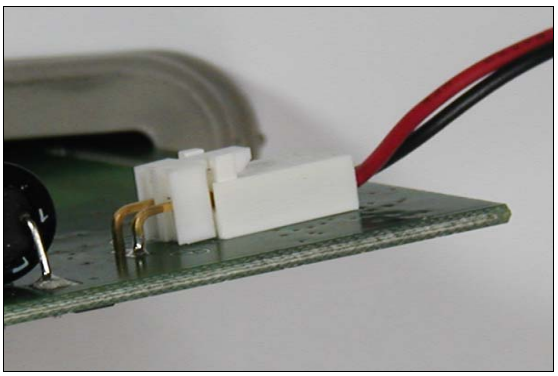
To provide a wireless sensor with a new battery, first remove the sensor from the bayonet mount by loosening the locking bolt, turning the sensor to the right and pulling it from the bayonet mount.

Note: Write down the ID number of the module, it is needed for documentation of the replacement.

Open the housing by carefully inserting a screwdriver into the gap between top and bottom part and detach the top from the bottom.

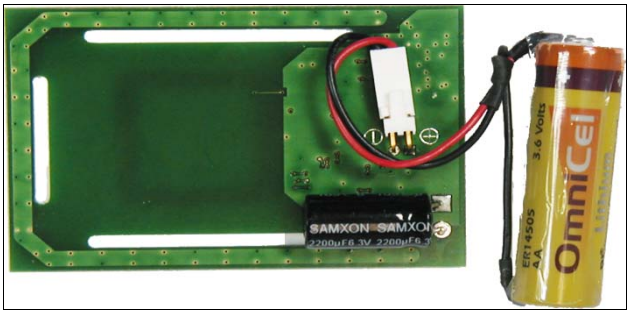
Position of board and battery inside the sensor housing

Lift board and battery from the housing and flip it over so you can see the battery socket at the back side of the board. Disconnect the plug of the old battery and connect the new battery to the board, making sure the plug is tight.

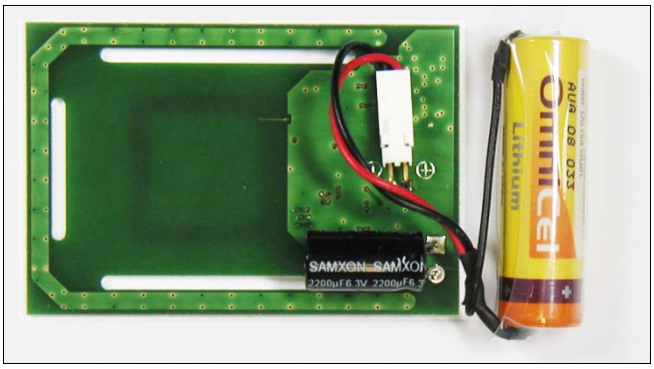


Connection of the battery plug to the board

Insert board and battery as shown on the picture above, observing the position of the battery cable:



Correct *fitting position of the battery and cable run*



Wrong *fitting position of the battery and cable run*

Close the housing by putting both housing parts above each other and pressing them together. Re-install the sensor at the bayonet mount and tighten the locking bolt.

Inform the system administrator about the battery change stating the module ID of the sensor and date; thus he can reset the battery monitoring for the respective module.

4 Trouble Shooting

4.1 Customer Support by Gesytec

Should errors occur you cannot find or repair with the methods mentioned in this manual, our customer support will be available for you. Technical inquiries can be sent by email to info@gesytec.de.

Upon publishing new versions of the configuration software or firmware, we will inform registered users by email. In addition, all software programs, updates and manuals are available for download from our FTP server at ftp.gesytec.de/pub/GesySense/....

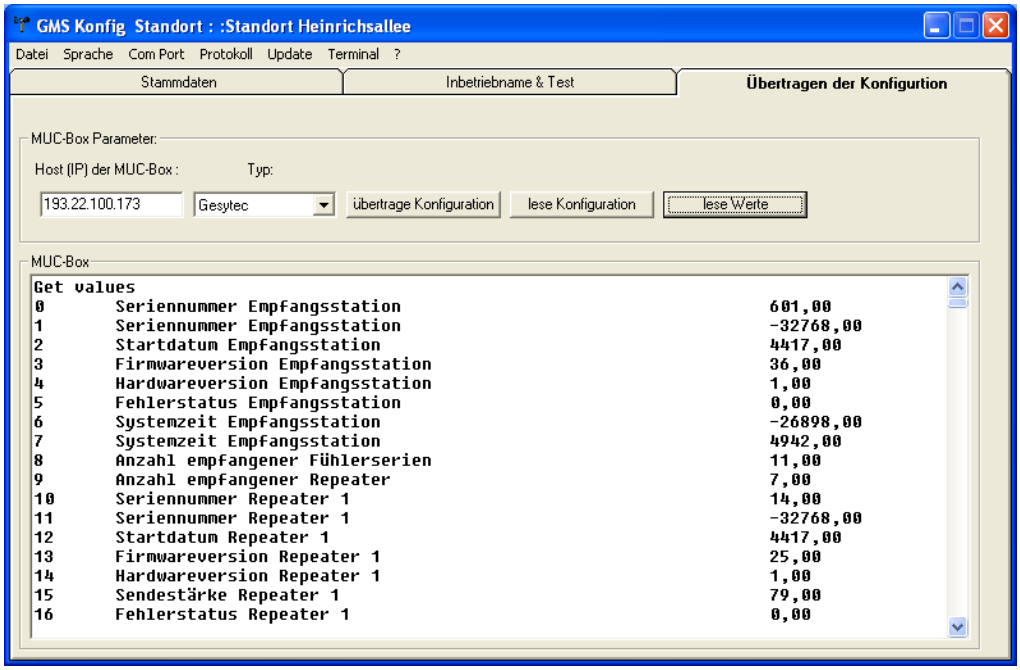
4.2 Read Configuration and Measured Values from the Data Logger

Note: The transmission of the configuration and the current measured values from the data logger can only be realized if the data logger operates with the appropriate protocol software. Otherwise the user can open the old project in order to have the modules installed displayed via log using „Terminal".

To analyze the GesySense installation at a site with the data logger provided, the configuration PC is connected via a cross over LAN cable to the data logger on-site. Start the GesySense Manager and select the register „Configuration Transfer".

By clicking on „Read Configuration" the configuration is transmitted from the data logger to the configuration PC, overwriting the current configuration.

Attention: Avoid possible data losses: It is mandatory to create a new, empty configuration via the menu command „File > New site", prior to download data from the data logger to the configuration PC by „Read Configuration"!



You also can read the current measured values stored in the data logger by clicking on the pushbutton „Read Values”.

4.3 Printing the Configuration Data

The data of all three GesySense Manager registers – ”Basic data”, „Commissioning & Test” and „ Configuration Transfer”– can be printed. Select the menu command „File > Print” . A preview of the documents to be printed can be accessed via „File > Print Preview”.

If you want to print the current data status later, you can save the current data of all three configuration software registers via the command „File > Record Snapshot” and print it out later via „File > Print Snapshot”.

4.4 Diagnosis Using Terminal

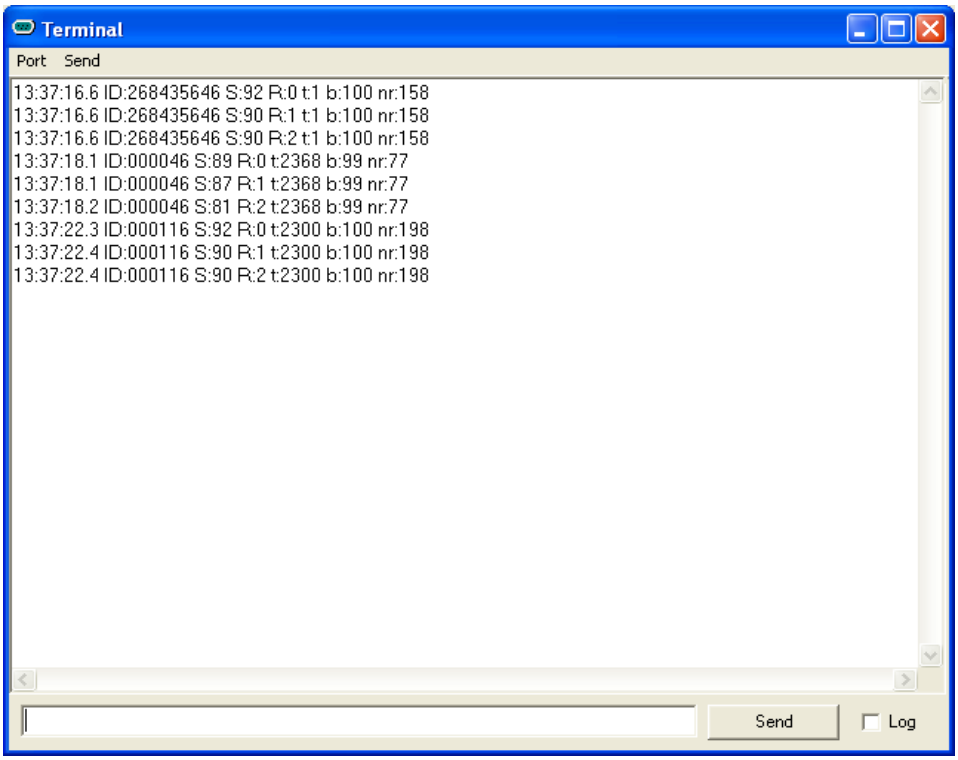
For error search within an existing GesySense System, the Configuration PC can be directly connected via a serial cable, each with a repeater or the receiver, in order to send commands to the module or read-out data from the module via Terminal.

The routing statistics are especially helpful allowing to read-out how reliable the measured values of the individual wireless sensors are received by the repeaters or the receiver.

Open the terminal window by clicking on the menu item „Terminal”. Select the COM port by which the PC is connected to the GesySense module from the „Port” menu.

As soon as the window is open (and the COM port is set), all data traffic between receiver or repeater and the wireless sensors is displayed in the Terminal window. You can pause this recording via the menu command „Send > Stop Debug" and continue with „Send > Start Debug". The other commands, made available by the „Send" menu, are explained in the software reference.

The following data fields are displayed: Time, module ID („ID"), signal field strength („S"; between 15 and 100), wireless routing („R"; R:0 → direct reception; R:1 .. R:5 → reception via the respective repeater), measured value („t"; temperature in hundredth degrees centigrade or a value between 0 and 3 for Status-Sensors), for Counters the first value and for Analog Sensors the measured value, battery status („b"; in %) and the sequence number of the data packet („nr").

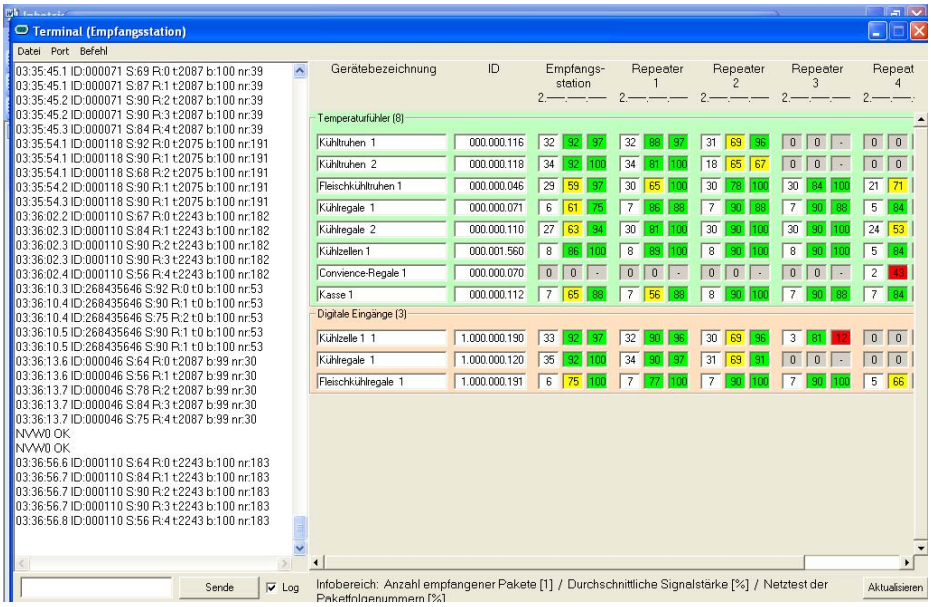


As the signal of a sensor can be received by several repeaters at a time, it may be that several entries appear related to the same sensor module, which means with the same module ID.

If you want to save the data logs displayed in the Terminal window to a file, click on the "Log" selection box down right in the window. A save dialog appears, from which the destination file for the log can be selected or generated.

Further to the list of the data packets, statistics related to the wireless routing are also generated, recording for each module or each module address, how many times a data packet of this module has been directly received from the receiver and how many times the detour via one or several repeaters has been made. Fur-

ther to the number („n”) of the data packets, the averaged signal field strength is also displayed in %.



This statistics can be printed via the „Print” menu.

4.5 Replacing a Wireless Sensor

To exchange a defective wireless sensor, commission the module and install it at the respective spot.

Inform the system administrator stating the module ID of the old and new wireless sensors and the date of exchange; thus he can realize the required modifications in the data logger.

4.6 Replacing a Repeater

The failure or the improper operation of a repeater is detected via the monitoring data on the data logger, e.g. a repeater doesn’t detect any modules any more over a longer period of time (> 15 minutes). In addition, it can be discovered via an improper LED (see 6.3.1) that the repeater is not operating properly.

In this case the fitter installs a spare device, usually set as receiver, in place of the defective repeater. The new repeater serial number is entered, according to the Modbus specification for the GesySense System, by the system administrator via the data logger into the respective Modbus address: e.g. if repeater 2 has been exchanged, only the Modbus address 1005 has to be modified and if the module serial number exceeds 65536 the Modbus address 1006 has to be modified as well. The receiver makes sure that this new repeater is assigned the correct repeater number.

If the problem has not been solved with this exchange, the overall wireless situation has to be checked via the configuration program.

4.7 Replacing a Receiver

If a failure of the receiver has been discovered, such as no more communication with the data logger or improper LED display (see 6.3.1), the receiver can be exchanged analog to the repeater. The proper configuration is communicated to the device either by the data logger or the GesySense Manager, independent from the installation spot.

Therefore the receiver is replaced on-site, the connection cable to the data logger is applied and the receiver is connected to the outlet. During start-up, the appropriate data are either read from the data logger or the receiver has already been pre-configured. Then the receiver returns to normal operation, to be verified by means of the LEDs.

Part III
Technical Reference

5 Software Reference

5.1 System Requirements to Use the Configuration Software

The configuration software GesySense Manager requires a standard PC running under Windows operating systems from Windows 2000 incl. Windows 7 (32 and 64-bit systems) and that is provided with an available USB port. A serial interface is required for connection to receiver/repeater.

5.2 Installing the GesySense Manager

To install the software on the PC insert the installation CD into the computer. If the installation program doesn't start automatically, double-click on the program „Setup.exe" on the CD. Please be aware that it is mandatory to run the installation in a user account with administrator rights. Follow the instructions of the installation software.

The standard installation path for the GesySense Manager is C:\Programs\Gesytec\GesySense\. The name of the file to run is GMS_Config.exe. You can find the software in the start menu under All Programs > Gesytec > GesySense > GS-Manager.

The included documentation is filed in C:\Programme\Gesytec\GesySense\Documentation, also accessible via the start menu: All Programs > Gesytec > GesySense > Dokumentation > Dokumentation.

The sample project database (GMS_DP-ListeBasis.mdb) and the Excel file (GMS_DP-ListeBasis.xls), also copied to the computer during installation, can be found in the directory \Documents and Settings\All Users\Application Data\Gesytec\ GesySense.

Once the installation of the GesySense Manager completed, connect the GesySense Configurator to the computer by USB cable. Green flashing of the Configurator 's LED shows that it is ready for operation.

Windows opens the „Assistant to search new hardware" and offers to set-up a connection with the „Windows Update" website. Select „No, not this time" and click „Continue". In the next window select „Install software automatically (recommended)" and click „Continue".

A note may appear stating that the „TTP Parameterization Tool" did not pass the Windows logo test; click on „Continue Installation". Close the assistant by clicking on „Finish" after installation of the driver.

Start the GesySense Manager and sequentially select the entries of the „COM Port” menu until the Configurator LED changes from green flashing to constant green. The continuous light indicates that the software can communicate with the Configurator.

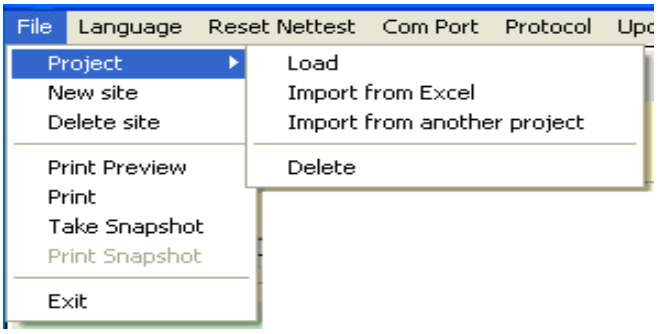
Thus the installation of the GesySense Manager and the driver of the GesySense Configurator are completed.

5.3 The Menus of the GesySense Manager

The following menus appear in the menu bar of the GesySense Manager: „ File”, „Language”, „Reset Net Test” (only while the window „Commissioning & Test” is displayed), „Com Port”, „Update”, „Terminal” and „?” („Help”). Those menus are described in detail in the following.

5.3.1 The „File” Menu

Via the „File” menu datasets for the individual sites can be created, deleted and recorded configuration data can be printed-out.



Note: With the functions under „Project” the data point structure is saved in a Microsoft Access data base. The structure has previously been defined in a selected Excel spreadsheet. The Excel spreadsheet states how the data point identifiers are structured and which types of data points are specified for the project.

- **Project**
  provides the possibility:
  - to load a new project or
  - using **a** to new, specific Excel spreadsheet, to first import a new project specification and later load it or
  - to take over the project structure from an already existing project.

  - **Load**
    The user can select an existing project (Access database .mdb).

- **Import from Excel**
  The user selects an Excel file – a sample Excel spreadsheet is provided with the setup of the configuration software. Modifications related to naming and number of the defined modules can still be made during the import.

- **Import from Another Project**
  The user is provided with the possibility to re-use an old project and adapt it to the new project structure. The command is only activated if such old projects are available.

- **New Site**
  Generates a new, empty dataset for a site. The selection of the site, whose dataset is edited in the main windows of the GesySense Manager is realized via the drop down list „Sites" in the „Infrastructure" section of the „Basic Data" register.

- **Delete Site**
  Deletes the data of the currently displayed site, which is selected via the drop down list „Sites" in the „Infrastructure" section of the „Basic Data" window.

Important Note:

Prior to deletion of the data a security query appears showing the name of the site to be deleted. If you confirm in this security query that you want to delete the data of this site it will be irrevocably deleted. Use this command very carefully!

- **Print Preview**
  Opens a preview of the printable data from the current register. Click into the preview window to close it.

- **Print**
  Prints the data seen from the currently displayed register.

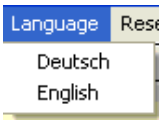
- **Take Snapshot**
  Saves the current data of the displayed register to print them out later.

- **Print Snapshot**
  Prints the data saved in the snapshot.

- **Exit**
  Terminate the program GesySense Manager.

5.3.2 The „Language" Menu

The language used in the GesySense Manager user interface is selected via the menu „Language".



- **German**
  Sets German as language for the GesySense Manager.

Attention: Please be aware that the language selection doesn't influence the commands available in the "Terminal" window (see below). They always have to be entered in English.

- **English**
  Sets English as language for the GesySense Manager.

5.3.3 The Menu „Reset Nettest"

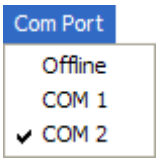
„Reset Nettest" is not a menu but works like a command.

"Reset Nettest" will start a new metering period for the net quality test by deleting all data continuously collected and averaged until that moment data for the net test.

As the net test data reflect the average of an entire metering period it is helpful to use the command „Reset Nettest" when an error occurs in a GesySense network. Then the data displayed are reflecting the current network status more precisely.

5.3.4 The „COM Port" Menu

The serial interface of the PC by which the GesySense Configurator is connected to the configuration PC is selected via the „COM Port" menu.

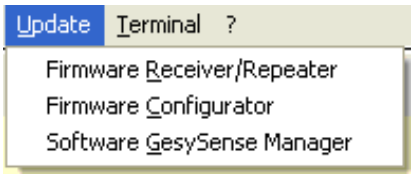


- **Offline**
  Interrupts the connection between GesySense Configurator and PC.

- **COM 1, COM2, ...**
  Establishes the connection between the GesySense Configurator and the PC via the appropriate serial connection.

5.3.5 The „Update" Menu

Updated firmware versions for repeater, receiver and the latest GesySense Manager can be installed via the „Update" menu.



- **Firmware Receiver/Repeater**
  Installs updated firmware on a repeater or receiver.

- **Firmware Configurator**
  Installs updated firmware on the GesySense Configurator.

By selecting one of these two commands a dialog box opens where you select the firmware file to be installed on the GesySense module currently connected to the configuration PC.

- **Software GMS_Config**
  Installs the latest version of the configuration software.

Note: This function requires an Internet connection!

If you select this command, the GesySense Manager checks if an updated version of the software is available on the Gesytec FTP-Server. If so, the updated version will be automatically downloaded. Once the download has been completed, GMS_Config closes down and the installation program for the newer version is launched. If no new version is available, a corresponding message is shown.

5.3.6 The „Terminal" Menu

„Terminal" is not a menu but a command. „Terminal" opens the Terminal window allowing sending configuration and test commands from the configuration PC to a repeater/receiver. Via „Receiver" the current configuration can be loaded into it or the configuration in the receiver can be deleted.

5.3.7 The „Help" Menu

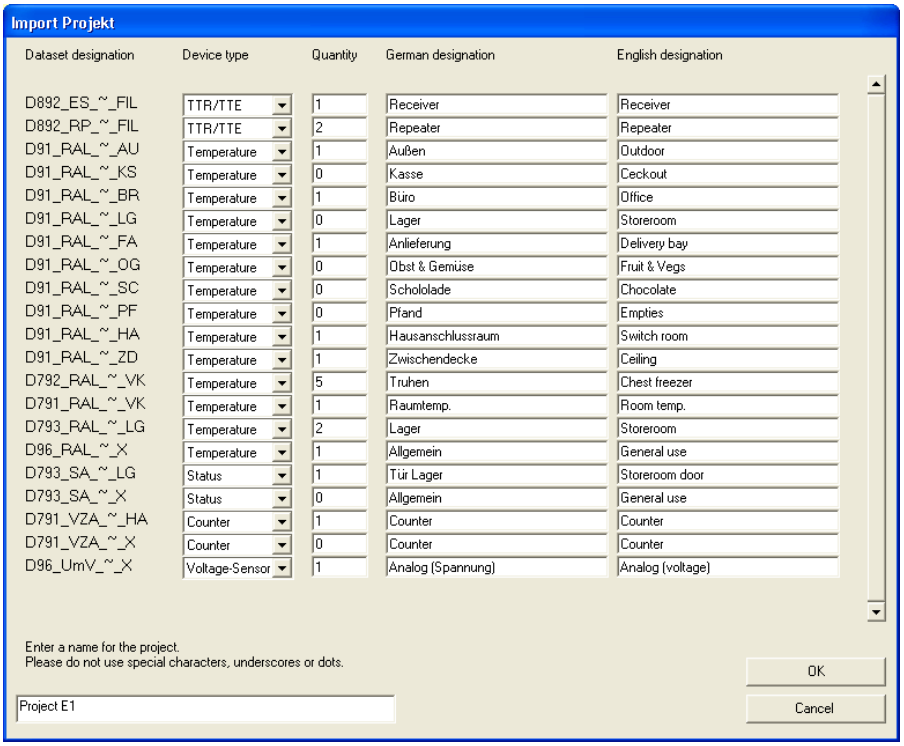
„Help" is not a menu a function. „Help" opens the information window of the GesySense Manager. It shows the version numbers of the GesySense Manager and of the GesySense Configurator firmware.

5.4 The GesySense Manager Windows

5.4.1 „Import Project from Excel”

Via the „Project” window an Excel spreadsheet can be imported in which designations of individual data points and the specified number of corresponding components for the planned project are defined.

Note: Modifications made to designations in the Import Project window will be stored in the original Excel file. If you want to keep the original version, make a copy before importing it.



Dataset designation	Device type	Quantity	German designation	English designation
D892_ES_~_FIL	TTR/TTE	1	Receiver	Receiver
D892_RP_~_FIL	TTR/TTE	2	Repeater	Repeater
D91_RAL_~_AU	Temperature	1	Außen	Outdoor
D91_RAL_~_KS	Temperature	0	Kasse	Ceckout
D91_RAL_~_BR	Temperature	1	Büro	Office
D91_RAL_~_LG	Temperature	0	Lager	Storeroom
D91_RAL_~_FA	Temperature	1	Anlieferung	Delivery bay
D91_RAL_~_OG	Temperature	0	Obst & Gemüse	Fruit & Vegs
D91_RAL_~_SC	Temperature	0	Schololade	Chocolate
D91_RAL_~_PF	Temperature	0	Pfand	Empties
D91_RAL_~_HA	Temperature	1	Hausanschlussraum	Switch room
D91_RAL_~_ZD	Temperature	1	Zwischendecke	Ceiling
D792_RAL_~_VK	Temperature	5	Truhen	Chest freezer
D791_RAL_~_VK	Temperature	1	Raumtemp.	Room temp.
D793_RAL_~_LG	Temperature	2	Lager	Storeroom
D96_RAL_~_X	Temperature	1	Allgemein	General use
D793_SA_~_LG	Status	1	Tür Lager	Storeroom door
D793_SA_~_X	Status	0	Allgemein	General use
D791_VZA_~_HA	Counter	1	Counter	Counter
D791_VZA_~_X	Counter	0	Counter	Counter
D96_UmV_~_X	Voltage-Sensor	1	Analog (Spannung)	Analog (voltage)

The designations of the listed datasets result from the columns of the Excel spreadsheet.

If the quantity is set to 0 for an item in this form, it will not appear in the project forma. If a “1” entered a checkbox will appear in the Basic Data register and for larger quantities a drop-down list.

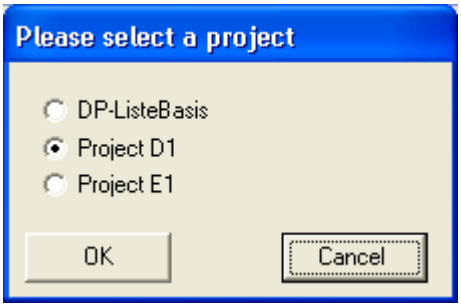
Furthermore names of measuring spot types can be changed in the columns German designation / English designation.

Note: Only in this import form you can define which and how many modules you want to use for the project maximally. In the separate site definitions you later can only reduce this number.
And this is the last moment before creating a new project database to modify names of module groups.

Specify a project name for the new project file and save with OK. Modified designations will be saved to the selected Excel file.

5.4.2 „Project/Load”

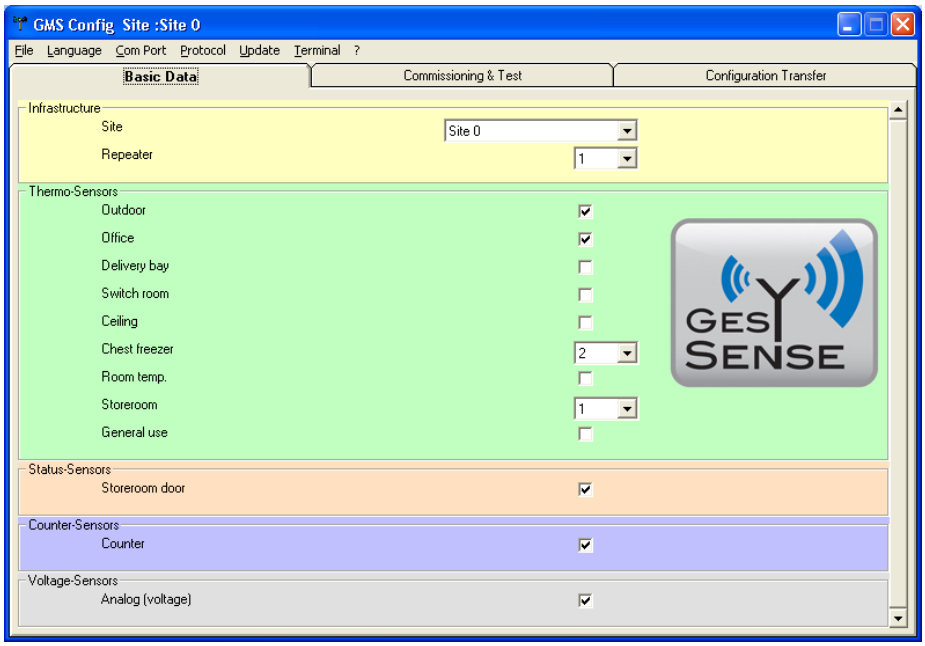
All created projects are shown in a survey. You can choose based on which project definitions a site shall be configured.



Select the desired project and its settings will be shown the related Basic Data register after clicking OK after a prompt for the site name.

5.4.3 „Basic Data”

In the „Basic Data” register the site to be configured is selected and the number of repeaters and wireless sensors is determined. The form is configured from the Excel spreadsheet previously imported and processed under „Project”.

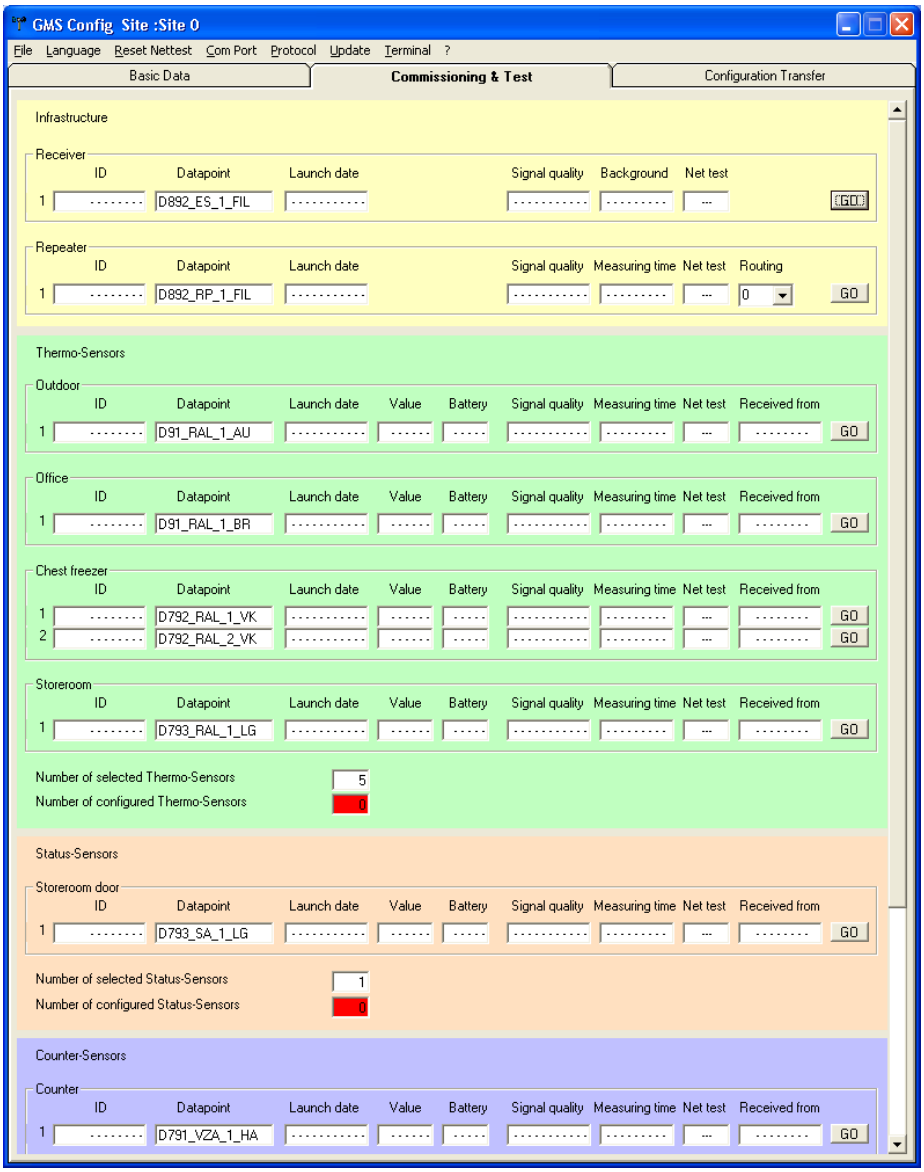


The register is subdivided into sections highlighted by colors. The defined measuring locations are listed in these sections. Following the section “Infrastructure” with receivers and repeaters, the sections are displayed according to the sensor types specified in the project. The section „Thermo Sensors“ also includes the PT1000 Sensors.

In this register it can be determined if or how many sensors of the particular type shall be installed at a specific site. If more than one sensor is allowed for a type of measuring spot, a drop-down list to select the number is shown for activation instead of the checkbox.

5.4.4 „Commissioning & Test"

A list of all GesySense components, planned or already commissioned for the selected site, is displayed including detailed information in the register „Commissioning & Test".



As for the Basic Data, the window is subdivided into sections. Furthermore there is a section „ Unallocated but active modules" listing the components already activated, i.e. sending out measuring data, but that are not yet assigned to a data point.

The following information is displayed for the modules, differing related to the type of module.

- **Module ID**
  The unique serial number of the module. By this number which is also printed on the module housing, a module can be clearly identified.

- **Data Point**
  The designation of the data point at the site the module is assigned to. The designation of the data points is specified by the selected project. Only one data point can be assigned to each module and one module to each data point.

- **Launch Date**
  The date the module has been „activated". Usually this is the date the module has been assigned to the data point.

- **Value** (Temperature, Status, Counter Value or Voltage Value)
  The last measuring value received from the sensor via radio. For temperature sensors this corresponds to the temperature in degrees Celsius. For status sensors the status of the two inputs is shown as „off" (switched-off) or „on" (switched-on), e.g. „on on"; for counters it is the number of pulses and for analog sensors the measured value in mV.

  If a repeater or receiver is detected that is already activated but has not yet been assigned, it appears like a sensor in the section „Unallocated but active modules". Then, instead of a measuring value, the text „TTR" or „TTE appears in the field „value".

- **Battery** (Only Applies to wireless sensors)
  The voltage of the battery in volt, allows to read off the charge status of the battery.

- **Signal quality**
  The signal strength of the radio signal sent out by the module. For the receiver the background radio noise is measured instead. If it exceeds 75 % there probably is a radio source that might interfere with the operation of the GesySense System.

- **Measuring Time** (Only Applies to wireless sensors and repeaters)
  The last time a data packet sent by the module has been accurately received.

- **Net test**
  The software monitors how many data packets are accurately received within an interval of 15 minutes. (During installation a data packet is sent every minute and the correct sequence of the packets is verified by a con-

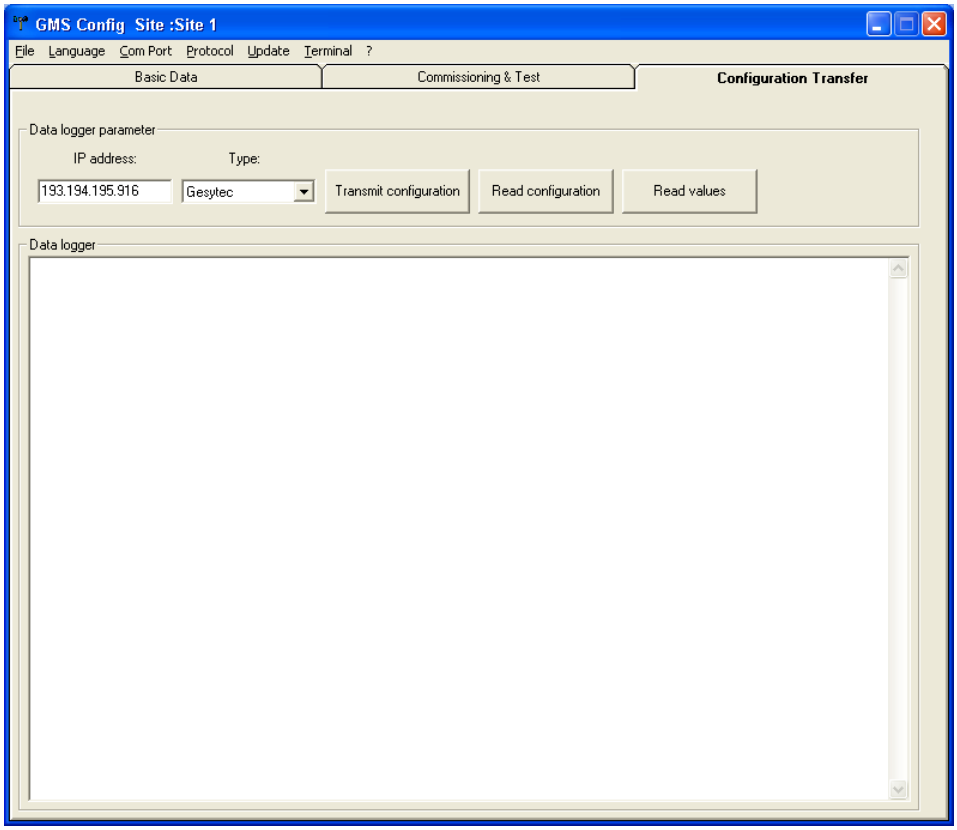
secutive serial number). If errors are detected this is reflected in the field net test. Generally this value should be better than 40% and the last measuring time should not date back more than five minutes.

- **Received from** (Only applies to wireless sensors and repeaters)
  The field „Received from" shows via which radio path the measuring data is transmitted to the receiver. The following variants are possible:
  - „Module": A direct wireless connection between wireless sensor and receiver,
  - „Router n": Reception via a Repeater (n = index number of the repeater from 1–7),
  - „Rtrn + Mdl": Simultaneous reception via a repeater and directly from the sensor. In this case the field „Signal quality" shows several values, namely in the same sequences as the radio path points of the field „ Received from".

In order to facilitate the recognition of system interferences, important measuring values are highlighted in colors: Green means „faultless operation", yellow labels tolerable but not good values and red indicates malfunctions.

5.4.5 "Configuration Transfer"

If the data logger is provided with the particular protocol, the configuration setup from the other two windows is transmitted to the data logger on site using the functions of register "Configuration Transfer".



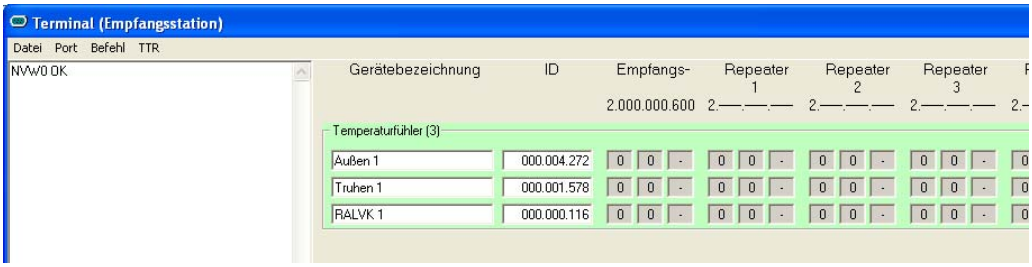
The window is subdivided into two sections:

- **Data logger parameter**
  IP address and data logger type are entered in this section; the communication with the data logger is controlled by clicking on the particular pushbutton.

- **Data logger**
  In this section data exchanged during the communication with the data logger are shown.

5.4.6 „Terminal”

The „Terminal” window provides the display and thus the evaluation of the radio traffic between the individual GesySense components and allows for direct transmission or deleting of the configuration in the receiver.



Routing statistics are available further to a list of the data packets.

Each line in this list corresponds to a data packet and the following information is displayed for each data packet:

Time

ID	Serial number of the component
S	Signal field strength, between 15 and 100
R	Radio routing, R = 0 → direct reception; R = 1...7 → Reception via the respective repeater
t	Measuring value, temperature in hundredth degrees or a value between 0 and 3 for digital sensors a value between 0 and 65536 for counters a value between 0 and 10000 mV for analog sensors.
b	Battery status in %
no	Sequence number of the data packet

The following commands are available within the terminal window. They can be accessed either via the „Command" menu or directly entered in the „Command" line at the bottom of the window.

Start Debug	Starts the logging of the data traffic processed by the module
Stop Debug	Logging of the data traffic processed by the module is stopped
Get NV	Read the module parameters
Get Version	Read the firmware version of the module
Version Receiver	Reads the firmware version of the wireless receiver module
Set as Receiver Station	The module is defined as receiver
Set as Repeater 1	The module is defined as repeater 1
Set as Repeater 2	The module is defined as repeater 2
	etc. to
Set as Repeater 7	The module is defined as repeater 7

Restart Restart of the module

from the command line at the bottom of the form special commands to the connected receiver/repeater can be sent via the „Send” pushbutton:

BLV Read the boot loader version

DBRxxxx Read Modbus address xxxx

NVW2,xxx Modbus address is set from 1 to xxx

NVW8,x Parameters for the Modbus communication are set:
x= 0 stands for N,8,1 (standard setting): Baud rate 19200
x = 10 stands for E,8,1 (Modbus standard): Even parity, Baud rate 19200;
x = 20 stands for O,8,1
x = 30 stands for N,8,2: Baud rate 38400.

The current configuration can be directly loaded into the receiver and also deleted using the commands from the „TTR” menu.

5.4.6.1 Special Modbus Commands via Terminal

Modbus addresses can be set via these special DBW command.

DBRxxxx Read-out the Modbus address xxxx

DBW72,1 Repeater 1 receives the firmware of the receiver via radio

DBW73,1 Repeater 2 receives the firmware of the receiver via radio

DBW74,1 Repeater 3 receives the firmware of the receiver via radio

etc. to

DBW78,1 Repeater 7 receives the firmware of the receiver via radio

DBR72 Status information related to the update: 0 means completed. If applicable, the error code is stated in the respective monitor address of the repeater.

6 Hardware Reference

6.1 The Thermo-Sensor

The GesySense Termo-Sensor measures the ambient temperature at its installation spot and transmits it via radio either directly or via a repeater to the receiver. The installation is realized via bayonet cap with locking bolt.

The measuring range is between -35 °C and + 70 °C. Within this range the wireless sensor adapts itself to the ambient conditions; thus no temperature related drifting of the emitter has to be feared. No calibration of the temperature measuring is required.

6.1.1 Technical Data

Thermo Sensor

Measuring range	-35 – +70 °C
Accuracy	0.3 °C
Resolution	0.1 °C

Wireless Data Transmission

Emitter	
European ISM band	433 MHz (433.05 – 434.79 MHz)
American ISM band	915 MHz
Channels	10
Transmission power	Low Power Radio System < 10 mW
Free field range	up to 250 m
Emitter ID	unique 10-digit ID
Measuring/transmission interval	adjustable from 15 to 3600 s, factory setting: 270 s

Parameterization

Receiver, inductive	ISM 13.56 MHz band
Range	< 10 cm

Power supply

Lithium battery	3.6 V, 2.4 Ah, size AA
Battery use	up to 5 years at a measuring interval of 270 s and operating temperature between -30 – +25 °C (deviant times and temperatures result in reduced operating periods)

Dimensions and Environmental Conditions

Weight	90 g	
Dimensions	77 x 110 x 18.5 [mm] 154 mm incl. adapter for distance mounting	
Housing material Color	ABS, 20% glass fiber reinforced light gray, RAL 7035	
Flammability	UL94 HB, self-extinguishing	
Temperature	operation storage	-35 – +70 °C 0 – +30 °C
Protection Class	IP 64 according to DIN EN 60 529	

Approvals & Tests

EMC	emission immunity	EN 55022 EN 61000-6-2
Radio	ETSI EN 300 220-1 DIN EN 50371	

6.2 Digital Sensors: Status and Counter

The GesySense **Status Sensor** is designated to monitor devices and system components. It captures the input from contacts suitable to switch low voltages (Reed or noble metal contacts). Contact 1 is connected to pins 1 and 2, contact 2 to pins 3 and 4.

The input status is shown in the GesySense Manager by „on" or „off". The detector status are captured as follows In data packets (this refers as well to the depiction in the „Terminal" window) the status is coded in a cipher:

Contact 1	Contact 2	Value
OFF	OFF	0
ON	OFF	1
OFF	ON	2
ON	ON	3

Within a determined interval of time the Status Sensor transmits the status of the connected contacts. In order to avoid misdirection by „jittering" contacts, a modified status must exist a minimum time to become valid.

The GesySense **Counter Sensor** meters pulses with a frequency of up to 20 Hz at its two digital inputs and saves them locally. Meter 1 is connected to pins 1/2,

meter 2 to pins 3/4. The counter resolution is 32 bit. The counter reading is transmitted in the set emitting interval.

6.2.1 Technical Data

Status-Sensor

Digital inputs	2 connections for Reed contacts with low threshold level or dry contacts
Switching voltage	3.3 V
Switching current	0.33 mA
Max. cable length	1.5 m
Connection	4-pin screw terminals 0.5 – 2.5 mm^2

Counter-Sensor

Digital inputs	2 pulse counters, 20 Hz max.
Resolution	32 Bits
Switching voltage	3.3 V
Switching current	0.33 mA
Max. cable length	1.5 m
Connection	4-pin screw terminals 0.5 – 2.5 mm^2

Wireless Data Transmission

Emitter	
European ISM band	433 MHz (433.05 – 434.79 MHz)
American ISM band	915 MHz
Channels	10
Transmission power	Low Power Radio System < 10 mW
Free field range	up to 250 m
Emitter ID	unique 10-digit ID
Measuring/transmission interval	adjustable from 15 to 3600 s, factory setting: 270 s

Parameterization

Receiver, inductive	ISM 13,56-MHz band
Coverage	< 10 cm

Power supply

Lithium battery	3.6 V, 2.4 Ah, size AA

Battery use	up to 5 years at a measuring interval of 270 s and operating temperature between -30 – +25 °C (deviant times and temperatures result in reduced operating periods)

Dimensions and Environmental Conditions

Weight	90 g	
Dimensions without terminal	77 x 110 x 18.5 [mm] 154 mm including adapter for distance installation	
Housing Material Color	ABS, 20% glass fiber reinforced light gray, RAL 7035	
Flammability	UL94 HB, self-extinguishing	
Temperature	operation storage	-35 – +70 °C 0 – +30 °C
Protection Class	IP 30 according to DIN EN 60 529	

Approvals & Tests

EMC	emission immunity	EN 55022 EN 61000-6-2
Radio	ETSI EN 300 220-1 DIN EN 50371	

6.3 Repeater/Receiver

GesySense repeaters and receiver are identical in construction and also use the same firmware. The operation of the component is configured during commissioning.

If used as repeater, the component receives the messages from the wireless sensors, amplifies and forwards them to the receiver. Up to seven repeaters can be used in a GesySense installation.

If the component is used as receiver, it receives the radio signals from the sensors either directly or via a repeater and forwards the included measuring values to the data logger. Exactly on receiver is required in a GesySense installation.

6.3.1 LED Signals

The operating status of the device is indicated by four multi-color LEDs.

- **Power:** green constant lighting indicates operational readiness,
- **Status:** green flashing indicates „OK",

- **Radio:** green flickering indicates radio data transfer,
- **Comm.:** yellow flickering indicates data transfer;
  green flickering indicates that the data connection is active but no data are exchanged.

6.3.2 Connector Pin Assignment

The D-type connector pins are used as follows:

Pin	Receiver/Repeater D-type socket/	
	Signal EIA-232	**Signals EIA-485**
1		In/Out: RxTx+
2	Out: TxD	
3	In: RxD	
4	nc	Nc
5	GND	GND
6		In/Out: RxTx-
7	In: /CTS	
8	Out: /RTS	
9		Out: +5V

The EIA-485 signals are assigned to pins at which the data logger has inputs. Thus there won't be any conflicts using a standard 1 to 1 cable.

If the data logger is also provided with a 9-pin D-type connector, a standard 1:1 cable (modem cable) can be used.

The EIA-485 interface is provided with a short circuit proof and EMC filtered +5V voltage output, where optionally a terminator can be fitted in the plug.

6.3.3 Technical Data

Wireless Data Transmission

Emitter

European ISM band	433 MHz (433.05 – 434.79 MHz)
American ISM band	915 MHz
Channels	10
Transmission power	Low Power Radio System < 10 mW
Free field range	up to 250 m
Emitter ID	unique 10-digit ID

Serial Interface

EIA-232	TxD, RxD, GND, CTS, RTS
EIA-485	RxTx, GND, RxTx, 5V
Connection	9-pin D-type socket

Power Supply

Supply voltage	230 V, 50 Hz 120 V, 60 Hz (US version)
Power consumption	5 W
Connection	internal, fixed, conduct length 1,5 m

Features

Optional real time clock	battery buffered
Monitoring	watchdog timer
LEDs	4: Power, Status, Radio, Comm.

Dimensions and Environmental Conditions

Weight	304 g, incl. mains cable	
Dimensions	without antenna	40 x 65 x 120 [mm]
	with antenna	40 x 65 x 285 [mm]
Housing material	Polystyrene	
Flammability	UL94 HB, self-extinguishing	
Temperature	operation	-5 – +45 °C
	storage	-5 – +35 °C
Protection class	IP 40 according to DIN EN 60 529	
Mounting	Wall mounting with assembly bracket	
Mounting position	Vertical	
Assembly bracket		
Weight	145 g	
Dimensions	40 x 65 x 160 [mm]	

Approvals & Tests

EMC	emission	EN 55022, residential area (B)
	immunity	EN 61000-6-2
Radio	ETSI EN 300 220-3 DIN EN 50371	

6.4 The GesySense Configurator

For configuration the wireless sensors and repeaters/receivers are connected to configuration PC via the GesySense Configurator.

The connection to the PC is realized via a USB cable, while the communication in the direction of a wireless sensor used inductive coupling and for the opposite direction and with repeater/receiver the usual radio frequency.

For easy commissioning of the components the Configurator is provided with a „Go" button on the housing. As soon as the data point to be assigned or the GesySense component to be configured has been select in the configuration software, the Configurator is „armed" and pressing the pushbutton launches the actual configuration process activating the component and assigning it to its particular data point.

6.4.1 LED Signaling

The status of this procedure can be read on a multicolor LED integrated into the housing..

- **Green Flashing:** Power supply is ok but there is no data communication between configuration PC and Configurator yet (e.g. because the GesySense Manager has not yet been started, the COM port has not yet been assigned or because an error has occurred),
- **Green Continuous Light:** Power supply is ok and the Configurator can communicate with the configuration PC,
- **Yellow Flashing**, accompanied by an acoustic signal: The Configurator is ready for data exchange with a GesySense component,
- **Yellow Continuous Light**, accompanied by two acoustic signals: The GesySense component has been successfully configured and activated,
- **Red Flashing:** An error has occurred during configuration or activation of the GesySense component.

6.4.2 Technical Data

Wireless Data Transmission

Emitter

European ISM band	433 MHz (433.05 – 434.79 MHz)
American ISM band	915 MHz
Channels	10
Transmission power	Low Power Radio System < 10 mW
Free field range	up to 250 m

Emitter ID	unique 10-digit ID

Parameterization

Emitter, inductive	ISM 13,56 MHz band
Coverage	< 10 cm

Interface

USB	2.0 full speed
Power supply	via USB adapter

Features

LED	1 three-colored: communication, configuration process
Pushbutton	1
Acoustic signal	configuration process

Dimensions and Environmental Conditions

Weight	135 g	
Dimensions	without antenna	79 x 117 x 24 [mm]
Antenna	165 mm	
Housing material	ABS, TPE	
Color	light-gray RAL 7035 basalt-gray RAL 7012	
Flammability	UL94 HB, self-extinguishing	
Temperature	operation	-30 – +70 °C
	storage	-5 – +35 °C
Protection class	IP 30 according to DIN EN 60 529	

Approvals & Tests

EMC	emission	EN 55022, residential area (B)
	immunity	EN 61000-6-2
Radio	ETSI EN 300 330-1 ETSI EN 300 220-3 DIN EN 50371	

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