

tranSpeed[®]

TSU 200

**Long Distance Reader
Wiring and Installation
Instructions**

Regulatory Notices

Europe

Hereby, deister electronic GmbH declares that this equipment - if used according to the instructions - is in compliance with the essential requirements and other relevant provisions of the RTTE Directive 1999/5/EC.

A full declaration of conformity can be requested at:

info@deister-gmbh.de



Approved for use in all European countries.

FCC Digital Device Limitations Radio and Television Interference

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense. This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and television reception.

Caution! Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

FCC Notice

To comply with FCC Part 15 rules in the United States, the system must be professionally installed to ensure compliance with the Part 15 certification. It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in the United States. The use of the system in any other combination (such as co-located antennas transmitting the same information) is expressly forbidden.

FCC Radiation Exposure Statement

This equipment complies with the FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and the human body.

Industry Canada

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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Disclaimer

deister electronic GmbH is not able to supervise the observance of the instructions given in this manual as well as the conditions and methods used during installation, operation and maintenance of the electronic devices and components respectively. Therefore we disclaim liability and reject responsibility for any losses, damages or costs that are caused by misapplication, installation, handling errors or faulty operation or related to the above in any other way. All our products are subject to current advancement, therefore we reserve the right for modifications without prior notice.

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1. Technical Data

Dimensions:

mm (inch) W x H x D 200 x 175 x 60 (7.87 x 6.89 x 2.36)

Weight

kg (lbs) 1.2 (2.6)

Housing Material:

ABS/PC, Al (powder-coated)

Protection Class:

IP67

Operating Temperature:

°C (°F) -20 ... 50 (-4 ... 122)

Relative Humidity:

% 5...95, non-condensing

Power Requirement:

12...28 +20 % VDC / max. 1 A

Frequencies:

MHz 865 – 868 (EU)
902 – 928 (US)

Transmit Power:

E.R.P. max. 1 W (configurable)

Antennas with

Beam width/Polarization: 90° circular

Transponder Protocols:

ISO18000-6 C (EPC Class1 Gen2)

Reading Distance:

m (ft.) up to 7 (23)

Writing Distance:

m (ft.) up to 50% of reading distance, depending on transponder, antenna configuration and environmental conditions

Interface:

RS485 (deBus Protokoll)

Electrical Connection:

M12-Connector with 4 Pins

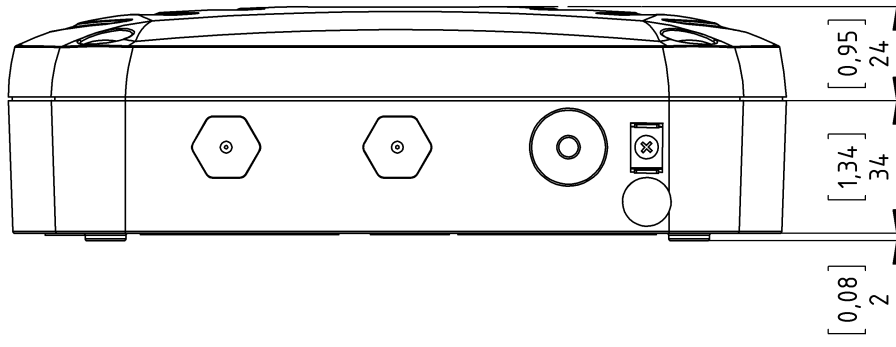
Conformity:

Air Interface (EU) EN 50346
EN 301489
EN 302208 (DRM)

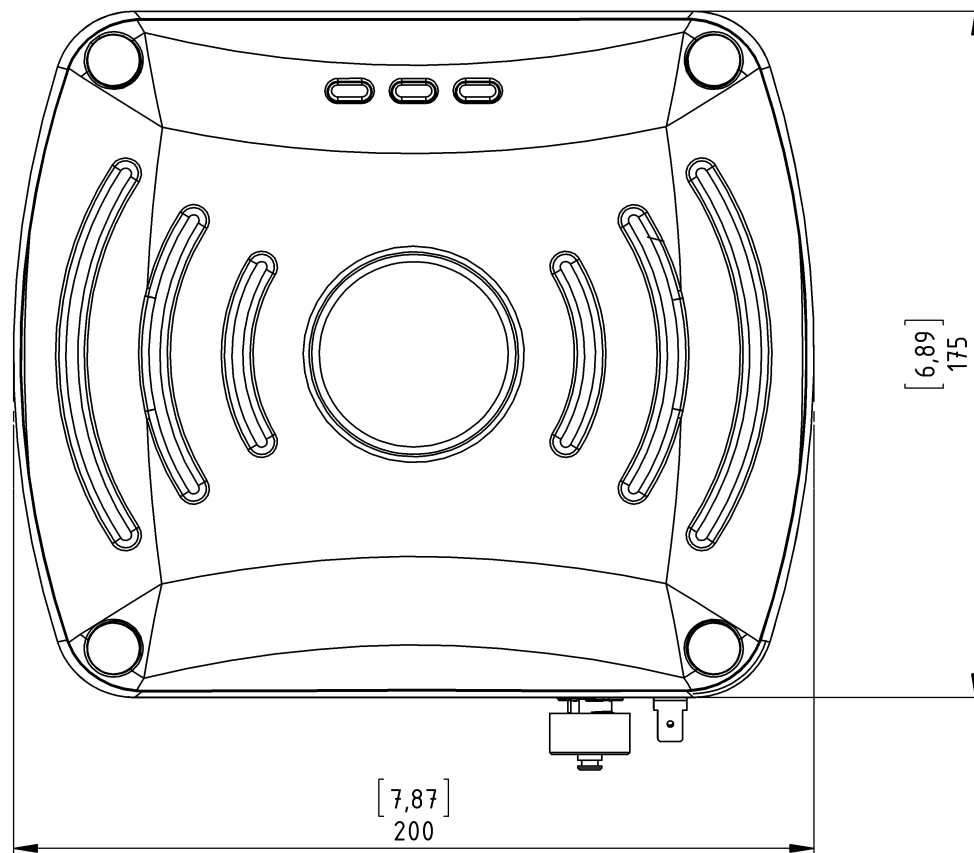
2. Mechanical Dimensions

All Dimensions in mm (inch)

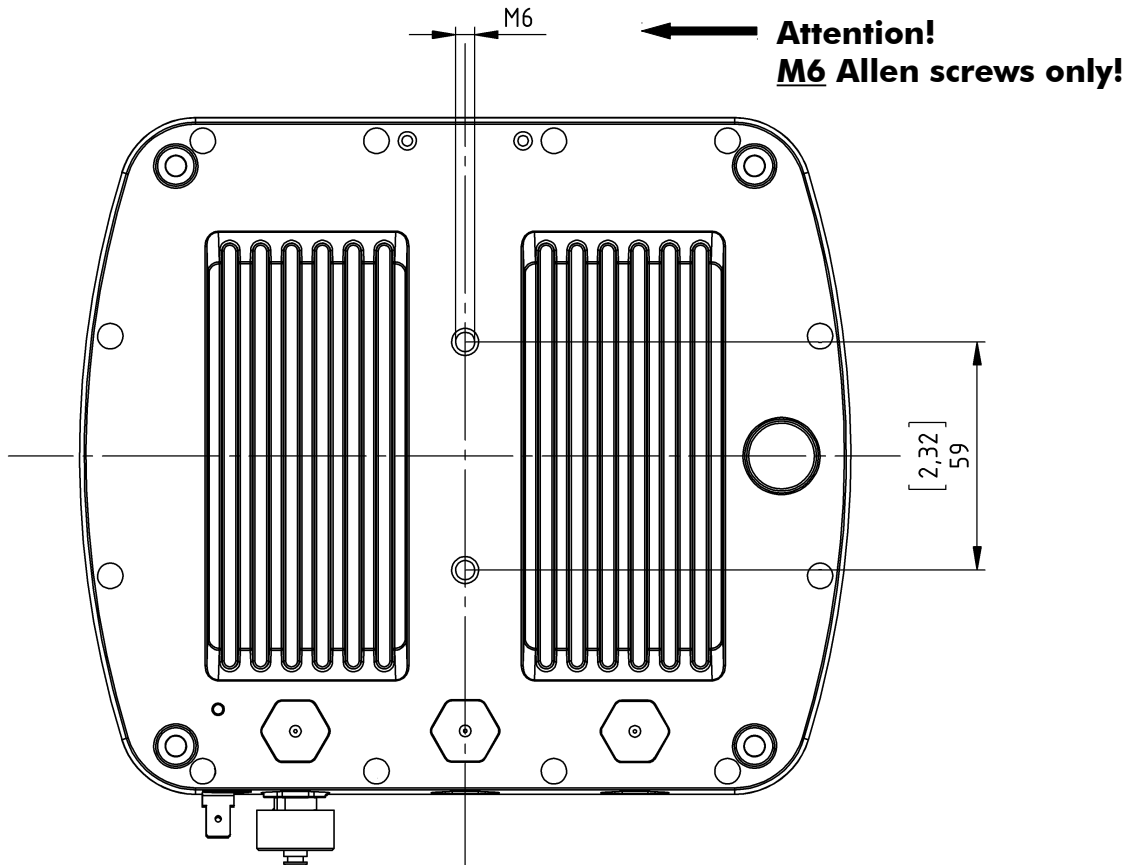
2.1 Side View



2.2 Front View



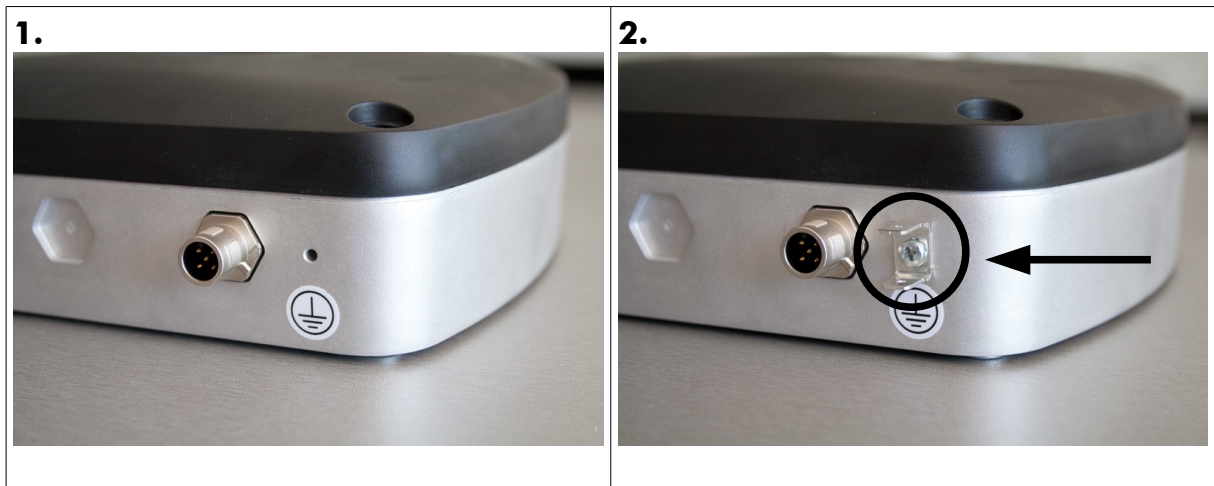
2.3 Rear View



3. Wiring

3.1 Installation Notes

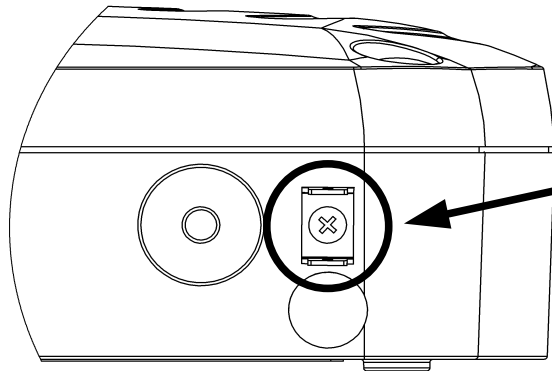
1) Installing the earth terminal:



The earth terminal is supplied with the unit and can be installed at the prepared location when needed, for example when the unit is installed outdoors.

2) Attention:

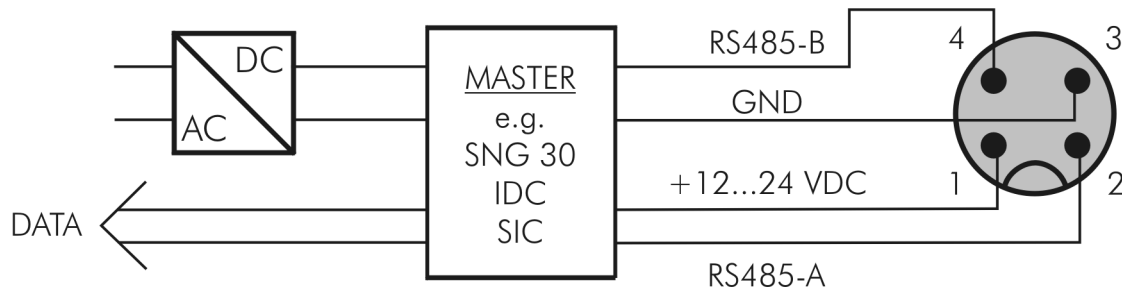
When installing the reader, make sure the tab connector (as shown) is professionally grounded with a flexible line with at least 0.75 mm² (0.11 inch²) (18 gauge) cross section.



Connect the earth cable here after installing the earth terminal provided.

3.2 Pin Assignment

The TSU 200 has an M12 connector (male) with 4 pins. Pin assignment is as follows:



| PIN | Description |
|-----|-------------|
| 1 | +Vcc |
| 2 | RS485-A |
| 3 | GND |
| 4 | RS485-B |

Because of the line resistance, certain cable lengths should not be exceeded. The data wires 485-A and 485-B should be twisted together, particularly when using long cables (twisted pair cable). See examples on next page.

Examples:

| Power Supply Voltage | Wire Diameter | Maximum Cable Length |
|----------------------|------------------------------|----------------------|
| 12V | AWG24 (0,22mm ²) | 5 m (16.4 ft.) |
| 24V | AWG24 (0,22mm ²) | 50 m (164 ft.) |
| 12V | AWG20 (0,5mm ²) | 10 m (32.8 ft) |
| 24V | AWG20 (0,5mm ²) | 100 m (328 ft.) |

4. LEDs and Beeper

The standard settings for the LEDs and the beeper are as follows:

| LED/beeper | Action | Visualisation | Status of TSU 200 |
|------------|--------------------------------------|---------------|----------------------------|
| Yellow LED | Short blinks (3 s off, 100 ms on) | ●○○○●○○● | Field switched off |
| | Blinks (300 ms off, 500 ms on) | ●○●○●○●○● | Reader not interrogated |
| | Constant on | ●●●●●●●● | Field switched on |
| | Off for short periods(200 ms off) | ●●●●○●●● | Tag read |
| Green LED | User-defined | | User-defined |
| Red LED | User-defined | | Malfunction / user-defined |
| Beeper | User-defined | | User-defined |

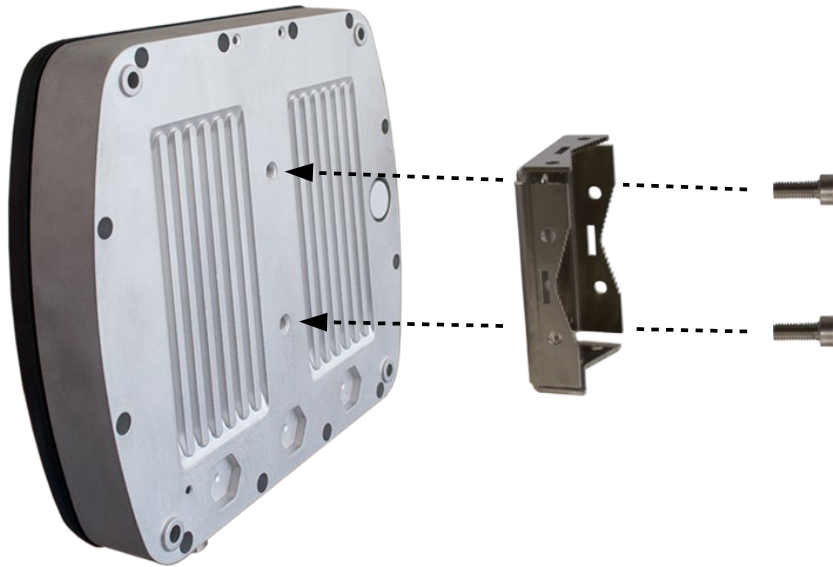
○ = LED off / ● = LED on

5. Mounting

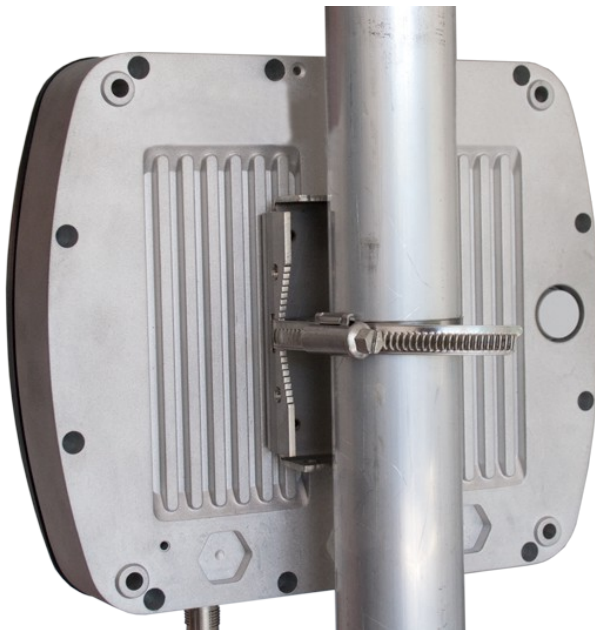
5.1 Mounting on poles and pipes

For installation on a mast or tube, the baseplate LRM3 (included in scope of supply, see Section 5.1.1) must be mounted on the rear of the TSU 200, so that it can be adjusted vertically or horizontally. The serrated rear face of the LRM3 ensures that the reader can be securely mounted and adjusted through 360°. For greater flexibility of installation and adjustment of the TSU 200 on masts or tubes, we recommend use of the ball-joint mounting LRM1 (optional, see Section 5.2.1).

5.1.1 Mounting the base plate for mast mounting LRM3



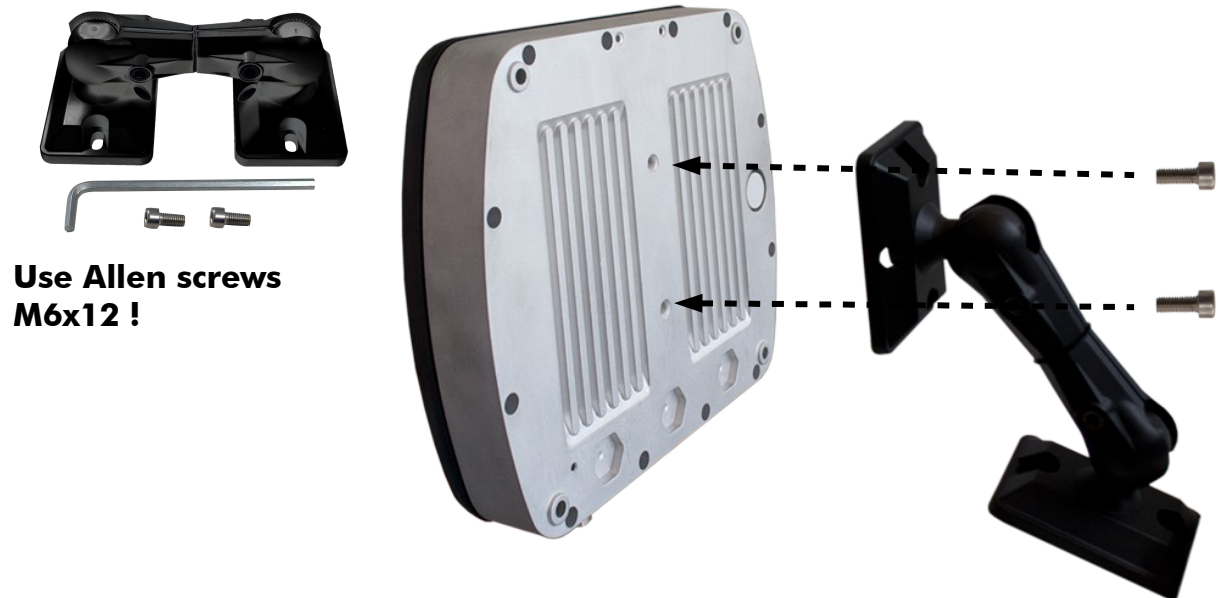
Use Allen screws M6x8 !



5.2 Montage on walls and ceilings

For mounting on walls or ceilings the ball joint bracket LRM1 (optional, see chapter 5.2.1) can be mounted directly onto the back of the reader. This mounting aid allows to adjust the reader in any desired position. Both ends of the ball joint bracket are ball-bearing and connected via a rotatable axis. The desired position can be fixed with the included 3/8" Allen wrench.

5.2.1 Mounting with ball joint bracket LRM1



5.2.2 Direct Mounting



To mount the unit directly use the holes provided in the front face of the unit.

5.3 Function Principle and Environmental Influences

The reader sends a high-frequency carrier signal. The transponder that is located within the area of this transmitted carrier transmits the signal back with its own transponder data in a modulated way. This very weak signal is being analyzed by the reader.

Because of the particular small-bandwidth and the high carrier frequency this system is almost fail-safe. Nevertheless the range of the reader can be negatively influenced. The following list shows what to pay attention to:

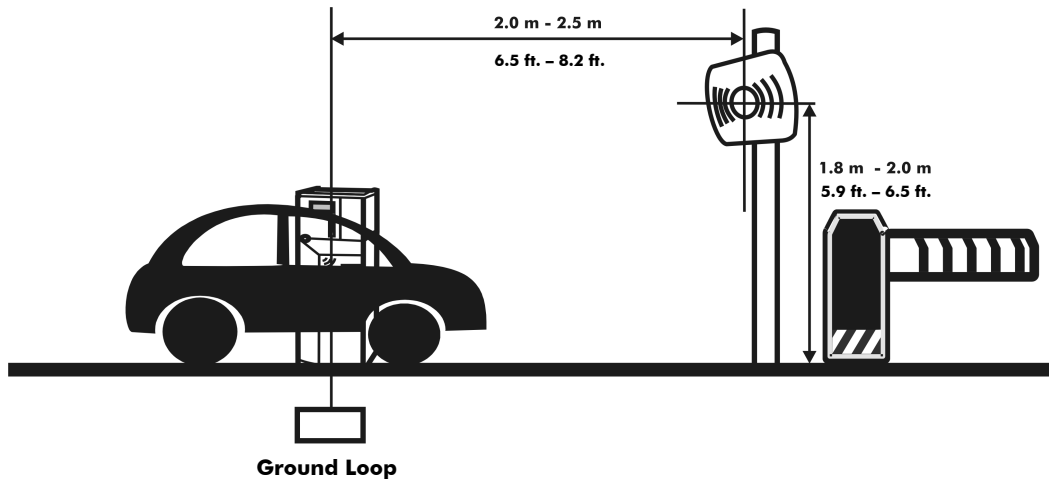
1. The reader must have visual contact to the transponder. **There must not be any walls or other devices between reader and transponder**. Reading through plastic film, card board, papers or glass windows may be possible, but will reduce the reading range depending on the condition of the material.
2. **Water, ice and snow will absorb the carrier signal**. Therefore the installer has to make sure that the front of the reader and the transponder is not covered with water, ice or snow.
3. Reflections within the surroundings of the reader can influence the reading result in a negative way. Therefore the reader should be mounted as free-standing as possible. **We strictly discourage from sunk-in installations**.
4. In Multi-Reader Environment (EU only), you must assign different channels to the readers. To accomplish this, the parameter "preferred channel" should be adjusted accordingly and you have to choose the highest possible channel spacing! When using UHF readers that are installed close together (e.g. entrance and exit lane) it is recommended to pair channels such as Channel 4, 10 and channel 7, 13 etc.

6. Installation Notes

For a standard installation in a passenger-car car park, a TSU 200 can be installed either beside the roadway, or above it.

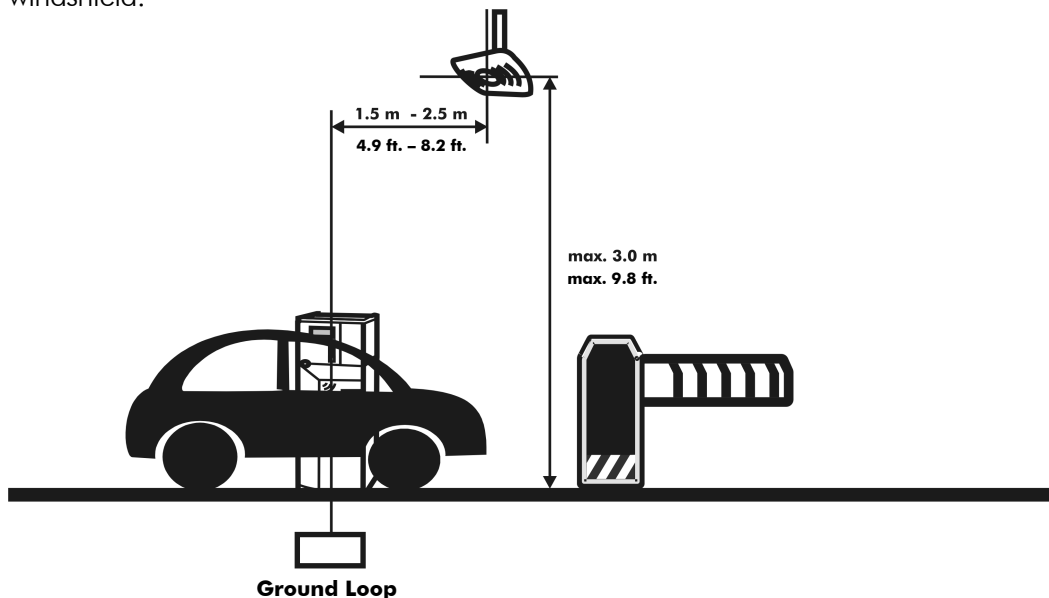
6.1 Installation on the side of the road:

The reader is mounted on a pole on the driver's side next to the road at a height of 1.8 m – 2.0 m (5.9 – 6.5 ft.). Then the reader is aligned towards the transponder/car windshield. When a ground loop is present, it should be used to trigger the reader. The distance from the reader to the ground loop should be in the range of 2.0 m - 2.5 m (6.5 – 8.2 ft.).



6.2 Installation above the road

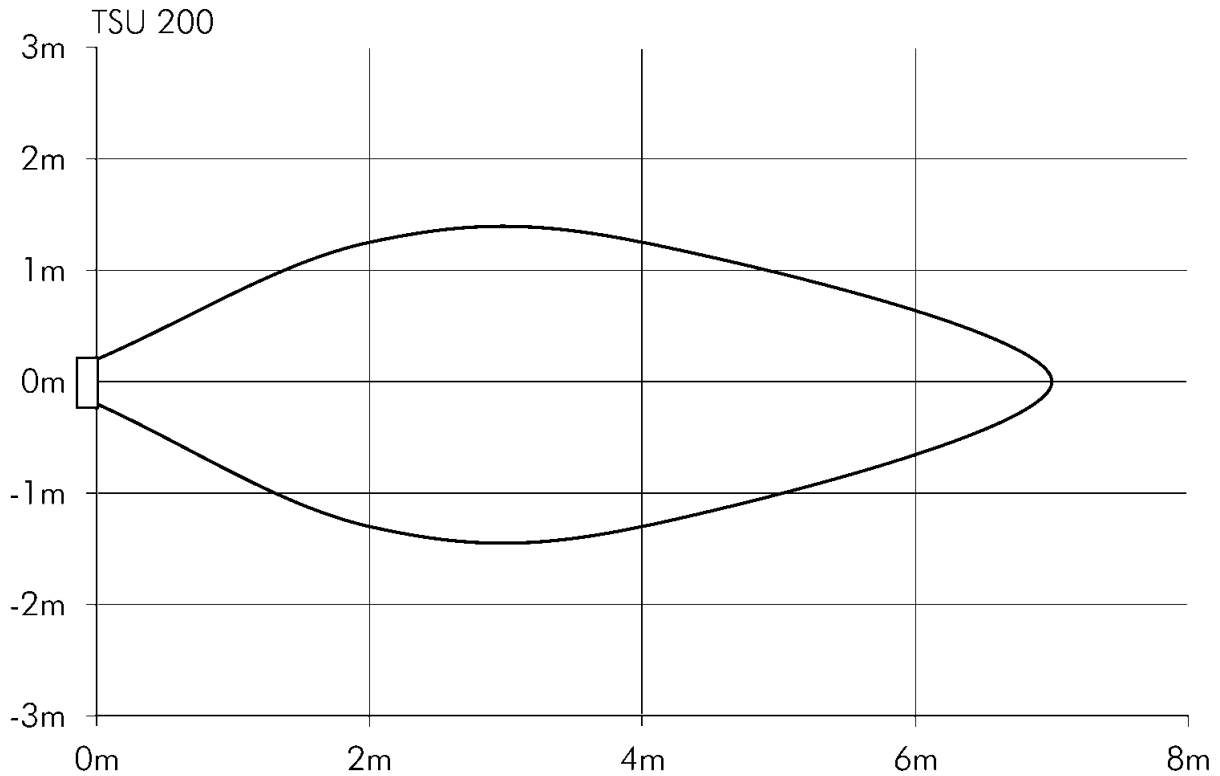
The reader should not be installed higher than 3.0 m (9.8 ft.) above the road. The distance from the reader to the groundloop should be in the range of 1.5 m - 2.5 m (4.9 – 8.2 ft.). The reader is slightly tilted towards the vehicle windshield, so that the reader is almost vertically aligned with the windshield.



Note: The antenna beam of the reader shall in no case be restricted by objects above or below the reader. Flush mounting is not recommended! If other types of vehicles (trucks, small cars etc) need to be identified, the reader must be installed and aligned individually.

6.3 Reading Distance

Given the condition that the transponder is aligned towards the reader, a detection range as shown in the figure below is the result when the reader is operated detached. The reading range varies due to environmental influences. For example, reflections on the ground can increase the maximum reading range. Walls, which are next to a reader, and a different transponder orientation will lead to a deformation of the reading field. It is therefore recommended to check the reading range after installation of the reader. See Chapter 7 "Test Mode".



Note: The values were determined with the "TPU 3080/3090" transponder.



Figure: TPU 3080 / 3090 Transponder

7. Test Mode

The TSU 200 has an integrated test mode for checking the performance of UHF transponders, and to automatically adapt the unit's antenna to local environmental conditions. This simplifies alignment of the unit and its adaptation to specific local circumstances of the application. The test mode can be activated with the test transponder TPU 3080T (Art. No. 1388.000) within 30 seconds after the unit is switched on. After activation the antenna is first automatically adjusted. During this adjustment there must not be any object directly in front of the antenna. Following this, for a period of five minutes, each transponder in the field will be signalled by the three LEDs and the beeper. Using the deister test transponder, the specified reading distance in an installed system can be checked at any time.



| Notification | Status TSU 200 |
|---|-------------------------------|
| Yellow LED on for 30 seconds after switching on | Waiting for test transponder |
| Red, green, yellow LED light sequence | Test mode |
| All LEDs blink, beeper | Transponder read in test mode |

8. Configuration of WebConfig Software

8.1 Preparations

A virtual serial COM port is set up via the USB port. The driver installation is described in the manual of the SNG 3.

8.2 SNG 3 Interface Converter



The interface converter SNG3 (optional, see 9. "Accessories") can be used for connecting a reader to a host/PC via USB. Powering of the reader is carried out by the SNG3 as long as it is connected to a power supply unit itself. To do so, a special wall power supply is available (optional, also see 9. "Accessories"). The drivers needed can be found on the CD within delivery.

| SNG 3 | Description | Function | TSU 200 |
|-------|------------------|---|---------|
| Pin 1 | +V _{CC} | supply voltage for TSU 200 (12...24 V/DC) | Pin 1 |
| Pin 2 | GND | ground | Pin 3 |
| Pin 3 | RS485 - A | RS485 interface, data line A | Pin 2 |
| Pin 4 | RS485 - B | RS485 interface, data line B | Pin 4 |

Connect as follows:



8.3 Starting WebConfig

After the successful installation of the virtual COM port driver, run the WebConfig software. Copy the file "WebConfig.exe" from the supplied CD into a suitable directory on your local hard disk and open it by double-clicking.

The configuration of the "TSU 200" must be carried out as follows:

| Step | Configuration Software "WebConfig." | Reader TSU 200 |
|------|--|---|
| 1 | | connect reader to SNG3 (see table page 16), connect SNG3 to PC via USB cable, connect wall power supply to SNG3 |
| 2 | Start configuration software "WebConfig" | |
| 3 | Select USB Serial Port | |
| 4 | Click on „Device“ – „Search addresses“ | |
| 5 | Software searches for the reader which is connected to the selected COM Port | |
| 6 | After successful search the reader found will be indicated | |
| 7 | Current reader configuration will be read | |
| 8 | Configuration menu will open | |
| 9 | Configuration can be modified by user | |
| 10 | Transfer changed configuration to the reader by clicking on "Apply Changes" | |
| 11 | | Reader will store the new configuration within its internal non-volatile memory |
| 12 | End connection by clicking on "Offline" | |
| 13 | Program will be closed by „File“ - „Exit“ | |

8.3.1 Summary

This menu shows a summary of the current reader configuration.

The screenshot shows a web-based configuration interface for the TSU 200 reader. It has three tabs: 'Summary', 'basic setup', and 'frequency setup'. The 'Summary' tab is active and displays the following information:

| | |
|----------------------------|-------------------|
| Device Info TSU 200 | |
| Serial number | 4294967295 |
| Device | 0x2185 |
| Version | v1.36 SW v2.01 HW |
| Region | EUROPE |
| hardware configuration | 25051 |

The 'basic setup' tab is also visible and contains the following settings:

| | |
|-----------------------------|---|
| enable RS485 termination | <input checked="" type="checkbox"/> |
| transponder reading options | anti collision read mode 1 tag timeout / ms |
| RF power / dBm | 30 |

The 'frequency setup' tab is also visible and contains the following setting:

| | |
|----------------|---|
| channel to use | 4 |
|----------------|---|

Device Info

Serial number: Serial number of device
Device: Identification code of device
Version: Firmware version (SW) and hardware version (HW) of device
Region: Region the device is authorized for
Hardware configuration: Hardware configuration code of device

Note:

The picture shows the frequency settings for a European unit. In countries such as e.g. the United States the frequency setup may vary. See Fehler: Referenz nicht gefunden "Fehler: Referenz nicht gefunden".

8.3.2 Basic Setup

Summary basic setup frequency setup

enable RS485 termination

transponder reading options anti collision read mode 1 tag timeout / ms

RF power / dBm 30

Apply Changes

Enable RS485 termination

If this check box is selected, the internal RS485 termination of the reader is switched on. **This function is permanently activated in the TSU 200!**

read mode

This parameter defines, if the reader expects only one tag in the antenna field or if there may be more tags within the antenna field. In case there are more tags, the reader has to execute an anti collision algorithm. It is also possible to configure the reader to "single shot" mode in which the read signaling for the same transponder is only done once or after a timeout defined by parameter "tag timeout".

Anti collision: Operating mode in case there is more than one tag in the field

single shot: Operating mode for reading tag data, in case there is only one tag in the field. The tag data will be transmitted again after the time specified in "tag timeout".

Beim TSU 200 bleibt anti collision aktiviert!

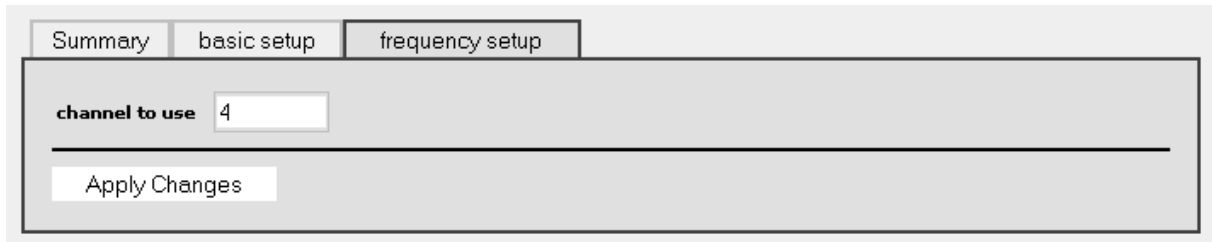
tag timeout / ms (for read mode "single shot" only)

This value defines the interval (timeout) in milliseconds between transmissions of a tag in "single shot" mode. After expiration of this interval it is signaled that the tag will be read again. **In the TSU 200 this value remains set to 65535.**

RF power / dBm

This value defines the radiated power of the antenna in dBm. The maximum output power of the antenna is 32 dBm.

8.3.3 Frequency Setup



Preferred channel

This value defines the preferred channel number before the reader uses another channel. In a multi-reader environment (EU only), use different channels for the readers. Use the “Preferred channel” parameter to make this setting. Select the greatest possible separation!

Channel mask

This mask defines the channels to be used by the readers. Each activated checkbox enables use of the appropriate channel (for further information, see also the section Fehler: Referenz nicht gefunden “Fehler: Referenz nicht gefunden”).

Recommendation for configuration of UHF readers (EU only):

If several readers are installed close together (e.g. entry and exit lanes), then channel pairs should be set up for them, for example, channels 4 and 10, and channels 7 and 13.

8.3.4 Frequencies

| ETSI 302 208 v1.2 | | |
|-------------------|-----------|----------|
| Channel No. | Frequency | E.R.P. |
| 4 | 865.7 MHz | ≤ 2.00 W |
| 7 | 866.3 MHz | ≤ 2.00 W |
| 10 | 866.9 MHz | ≤ 2.00 W |
| 13 | 867.5 MHz | ≤ 2.00 W |

| FCC Part 15 (US) | | |
|------------------|------------|----------|
| Channel No. | Frequency | E.I.R.P. |
| 1 | 902.75 MHz | ≤ 4.00 W |
| 2 | 903.25 MHz | ≤ 4.00 W |
| 3 | 903.75 MHz | ≤ 4.00 W |
| 4 | 904.25 MHz | ≤ 4.00 W |
| ... | ... | ... |
| 47 | 925.75 MHz | ≤ 4.00 W |
| 48 | 926.25 MHz | ≤ 4.00 W |
| 49 | 926.75 MHz | ≤ 4.00 W |
| 50 | 927.25 MHz | ≤ 4.00 W |

| Korea | | |
|--------------------|------------------|-----------------|
| Channel No. | Frequency | E.I.R.P. |
| 2 | 917.1 MHz | ≤ 4.00 W |
| 5 | 917.7 MHz | ≤ 4.00 W |
| 8 | 918.3 MHz | ≤ 4.00 W |
| 11 | 918.9 MHz | ≤ 4.00 W |
| 14 | 919.5 MHz | ≤ 4.00 W |
| 17 | 920.1 MHz | ≤ 4.00 W |

| Japan | | |
|--------------------|------------------|-----------------|
| Channel No. | Frequency | E.I.R.P. |
| 1 | 952.4 MHz | ≤ 4.00 W |
| 2 | 952.6 MHz | ≤ 4.00 W |
| 3 | 952.8 MHz | ≤ 4.00 W |
| 4 | 953.0 MHz | ≤ 4.00 W |
| 5 | 953.2 MHz | ≤ 4.00 W |
| 6 | 953.4 MHz | ≤ 4.00 W |
| 7 | 953.6 MHz | ≤ 4.00 W |

| Singapore | | |
|--------------------|------------------|---------------|
| Channel No. | Frequency | E.R.P. |
| 1 | 920.25 MHz | ≤ 2.00 W |
| 2 | 920.75 MHz | ≤ 2.00 W |
| 3 | 921.25 MHz | ≤ 2.00 W |
| 4 | 921.75 MHz | ≤ 2.00 W |
| 5 | 922.25 MHz | ≤ 2.00 W |
| 6 | 922.75 MHz | ≤ 2.00 W |
| 7 | 923.25 MHz | ≤ 2.00 W |
| 8 | 923.75 MHz | ≤ 2.00 W |
| 9 | 924.25 MHz | ≤ 2.00 W |
| 10 | 924.75 MHz | ≤ 2.00 W |

| Brazil | | |
|--------------------|------------------|---------------|
| Channel No. | Frequency | E.R.P. |
| 1 | 915.25 MHz | ≤ 2.00 W |
| 2 | 915.50 MHz | ≤ 2.00 W |
| 3 | 915.75 MHz | ≤ 2.00 W |
| 4 | 916.00 MHz | ≤ 2.00 W |
| ... | | ≤ 2.00 W |
| 47 | 926.75 MHz | ≤ 2.00 W |
| 48 | 927.00 MHz | ≤ 2.00 W |
| 49 | 927.25 MHz | ≤ 2.00 W |
| 50 | 927.50 MHz | ≤ 2.00 W |

| China | | |
|--------------------|------------------|---------------|
| Channel No. | Frequency | E.R.P. |
| 1 | 920,625 | ≤ 2.00 W |
| 2 | 920,875 | ≤ 2.00 W |
| 3 | 921,125 | ≤ 2.00 W |
| 4 | 921,375 | ≤ 2.00 W |
| 5 | 921,625 | ≤ 2.00 W |
| 6 | 921,875 | ≤ 2.00 W |
| 7 | 922,125 | ≤ 2.00 W |
| 8 | 922,375 | ≤ 2.00 W |
| 9 | 922,625 | ≤ 2.00 W |
| 10 | 922,875 | ≤ 2.00 W |
| 11 | 923,125 | ≤ 2.00 W |
| 12 | 923,375 | ≤ 2.00 W |
| 13 | 923,625 | ≤ 2.00 W |
| 14 | 923,875 | ≤ 2.00 W |
| 15 | 924,125 | ≤ 2.00 W |
| 16 | 924,375 | ≤ 2.00 W |

9. Accessories

| Article | Description | Article No. |
|----------------------------------|---|-------------|
| TPU3080T | Windshield test transponder. Fixcoded, protected, with deister logo | 01388.000 |
| CC2 | Connection cable, grey, 3 m, M12 female connector, straight, 4-pin | 09287.101 |
| CC4 | Connection cable, grey, 3 m, M12 female connector, straight, 4-pin to 4-pin Phoenix connector | 09287.301 |
| CC4 | Connection cable, grey, 10 m, M12 female connector, straight, 4-pin to 4-pin Phoenix connector | 06236.000 |
| LRM1 | Ball joint bracket | 06103.000 |
| LRM3 | Base plate for mast mounting | 06106.000 |
| AC/DC power supply Euro | Power supply for expansion module, input voltage 230 VAC, output voltage 12 VDC (1 A), Friwo® plug | 08812.000 |
| AC/DC power supply International | Power supply, input voltage 100-230 VAC, incl. adapter for USA/Japan and United Kingdom, output voltage 12 VDC (1.25 A), Friwo® plug | 06757.000 |
| AC/DC Power Supply | Power supply for c-rail mounting, input voltage 90-260 VAC, 50-60 Hz output voltage 24 VDC (2.5 A) | 06756.000 |
| SNG3 Smart Network Gateway | Interface converter USB-to-RS485, incl. USB interface cable, Friwo® plug (Power supply required) | 08782.000 |
| DBC | deBus Converter, Interface converter for deBus components, power supply 10-30 VDC | 06232.000 |
| IDC | Controller for the connection to deBus-readers power supply 10-30 VDC | 06230.000 |
| SIC1 | Serial Interface Converter from RS485/deBus protocol to Open Collector/Wiegand, Dataclock, Magstripe protocol, power supply 10-30 VDC | 06233.000 |
| SIC2 | Serial Interface Converter from RS485/deBus protocol to RS485/customized protocol, power supply 10-30 VDC | 06234.000 |
| SIC3 | Serial Interface Converter from RS485/deBus protocol to RS232, power supply 10-30 VDC | 06235.000 |

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