On-Board Unit
Sitraffic Sensus Unit

Covers every yard. With any tolling technology.
Sitraffic Sensus Unit: The compact on-board unit that works with any tolling technology

In Europe alone there are currently twelve different toll collection systems. Besides satellite-based GNSS, the responsible authorities use microwave-based DSRC communication to identify the vehicles on tolled road sections and collect all data needed for toll enforcement. This makes it easy to recognize those vehicles that are regularly using tolled roads in several European countries. Their windshield is equipped with a whole range of on-board units, each with a specific user interface that the drivers must know how to operate.

The use of Sitraffic® Sensus Unit as an on-board unit (OBU) makes things a lot more manageable for operators and users alike, because it has been designed for use with all tolling technologies and supports the CEN standard suite for DSRC – and Uni-DSRC as an option – as well as the ISO / CEN standard suite for autonomous tolling systems. It goes without saying that our Sensus Unit meets the European EETS standard.

So instead of several OBUs with a variety of interfaces, the driver needs only one: Sitraffic Sensus Unit.

Different countries, different road classes – only one OBU

Sitraffic Sensus Unit facilitates not only cross-border tolling, but the technology supports also hybrid tolling schemes that use different tolling technologies for different classes of road. In France, for example, microwave DSRC is already in use on a number of expressway sections, but current plans call for the introduction of satellite-based GNSS on other roads and road sections (expressways as well as national roads). To collect the data relevant for toll calculation, Sitraffic Sensus Unit automatically uses the technology installed on the currently traveled road section. No manual intervention is required so that the driver can focus fully on the current traffic situation.

Communicates with three satellite systems – because every yard counts

GPS, GLONASS and GALILEO – Sitraffic Sensus Unit is able to calculate the vehicle’s position using all and any of the three. This enables the unit to provide reliable positioning data even in areas with limited signal quality. Test drives through Vienna’s historic city center confirmed that a combination of GPS/GLONASS delivers significantly more accurate data than purely GPS-based positioning. As a result, the system reliably distinguishes between closely-spaced neighboring streets, and very rarely encounters problems with signal reception even in areas where high-rise buildings obscure the satellite signals.

Compact, easy, effortless

Handling our Sitraffic Sensus Unit is easy – in every respect:

• To install the unit, the integrated mounting bracket is fixed to the windshield using adhesive tabs or suction cups. So installation is a matter of seconds because the Sensus Units doesn’t need to be connected to an odometer or tachograph.

• For power supply, the OBU simply slots into the cigarette lighter. As an alternative it can be connected to the automotive power supply (12 V or 24 V).

• Updates are transmitted “over the air” (OTA) via GSM without interrupting the toll collection process. This convenient update function allows changing the scope of the tolled road network and the tariff structure – or even the software application in the OBUs to support value-added services.

Reliable tolling data collection – under all conditions

Sitraffic Sensus Unit is synonymous for reliable tolling data collection under all conditions.

• High-quality sensors electronically monitor the integrity of the unit’s housing.

• A back-up battery allows gapless collection of accurate data even when the external power supply is interrupted.
Electronic tolling systems in Europe

1. Germany
   Toll Collect / GNSS

2. Switzerland
   LSVIA/GNSS

3. Slovakia
   MYTO/GNSS

4. France
   Tis-PL, Ecotaxe/Hybrid

5. Hungary
   HU-GO/GNSS

6. Italy
   Telepass/DSRC

7. Austria
   Go-Box/DSRC

8. Poland
   ViaToll/DSRC

9. Portugal
   Via Verde/DSRC

10. Scandinavia
    Easy Go/DSRC

11. Spain
    Via-T/DSRC

12. Czech Republic
    MYTO Cz/DSRC

The satellite-based Sitraffic Sensus tolling system

<table>
<thead>
<tr>
<th>System Type</th>
<th>Description</th>
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<tbody>
<tr>
<td>GNSS</td>
<td>GPS, GLONASS, GALILEO</td>
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<tr>
<td>DSRC</td>
<td>Microwave</td>
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Sitraffic Sensus by Siemens is the ideal tolling system for today’s needs. Its deployment does not require any roadside infrastructure; the system is suitable for any class of road, from expressways down to the smallest country road; and the scope of the tolled road network can be adapted or extended easily and quickly per software update. Our Sitraffic Sensus portfolio covers the entire front-end for a tolling solution: an easy-to-use on-board unit (Sitraffic Sensus Unit), a universal back-office system (Sitraffic Sensus Server), and an intelligent enforcement solution (Sitraffic Sensus Monitor).

About a dozen different toll collection systems are currently deployed on Europe’s roads. Besides satellite-based GNSS systems, the responsible authorities use microwave-based DSRC communication to identify the vehicles on tolled road sections and collect all data needed for toll enforcement. Sitraffic Sensus is compliant with the European EETS standard. Sitraffic Sensus Unit, the system’s OBU, can be used as a universal receiver in a large number of countries.
### GNSS subsystem
- **Positioning accuracy** typ. ±2.5 m
- **Time to first fix (TTFF):**
  - Hot start, open sky typ. = < 1 s
  - Warm start, open sky typ. = < 30 s
  - Cold start, open sky typ. = < 30 s
- Supported satellite-based augmentation systems (SBAS):
  - EGNOS (European Geostationary Navigation Overlay Service)
  - WAAS (Wide Area Augmentation System, USA)
  - MSAS (Multi-functional Satellite Augmentation System, Japan)
  - GAGAN (GPS Aided Geo Augmented Navigation, India)
- Enabling of GALILEO is possible via GSM firmware update.

### GSM subsystem
- Sitraffic Sensus Unit is equipped with a GPRS-capable quad-band GSM module (multi-slot class 10). In the standard version, an internal antenna is used; as an option an external antenna can be connected to Sitraffic Sensus Unit.

### DSRC communication
- Sitraffic Sensus Unit is equipped with a microwave DSRC module with an integrated antenna.
- **The DSRC interface is compliant with CEN/TC 278 DSRC.**
  - Physical layer according to EN 12253
  - Data link layer according to EN 12795
  - Application layer according to EN 12834
  - Profiles according to EN 13372
  - Application Interface according to ISO 14906
  - Options: Uni-DSRC according to ETS ES 200 674-1

### Power supply
- Operating power supply 8–32 V DC
- Internal back-up battery for autonomous operation
- Internal buffer battery for data integrity

### Housing
- **Housing**
  - IP42 according to IEC 60529
- **Weight**
  - 300 g (excluding windscreen mounting bracket)
- **Dimensions**
  - 145 × 97 × 39 mm (excluding windscreen mounting bracket)
- **Color**
  - black

### Installation
- Mounting bracket fixed on windscreen using adhesive tabs or suction cups

### Temperature range
- Ambient storage temperature: –40 °C to +85 °C acc. to ISO 16750-4:2006-8
- General ambient operating temperature: –40 °C to +85 °C acc. to ISO 16750-4:2006-8, except SAM module

### Vibration
- Random 1 m²/s² 10–200 Hz, 0.3 m²/s² 200–500 Hz acc. to IEC 60721-3-5, class 5M2
- Shock
  - 300 m/s², half-sine, 6 ms acc. to IEC 60721-3-5, class SM2

### Failure rate
- MTBF: >370,000 h for continuous operation at 40 °C, prediction acc. to Siemens standard SN 29500

### Type approval
- Sitraffic Sensus Unit is compliant with the following European directives:
  - R&TTE 1999/5/EC
  - EMC
  - 2004/108/EC
  - 2004/104/EC, 95/54/EC (72/245/EC)
  - 2006/95/EG
  - RoHS 2002/95/EC
  - WEEE 2002/96/EC

### Labeling
- CE mark
- EC type-approval mark (e-mark 72 / 245 / EC)
- CARDME tag labeling

### Security
- Security access module ID-000 card
  - ISO 7810
  - ISO 7816-3

### Note:
This specification cannot claim to cover all details of Sitraffic Sensus Unit or possible product variants. Subject to change without prior notice.
Sitraffic Sensus Unit: Key benefits

- EETS compliance enables use in a large number of countries
- Reliable data collection even in areas with limited signal quality
- Integrated GPS antenna and receiver
- GSM / GPRS module for satellite-based tolling systems
- DSRC / microwave module for microwave-based tolling systems
- Display for easy operation
- User-installable: plug&play
- No connection to odometer or tachograph required
- SAM module for encrypted communication
- Supports thin- and thick-client approach
- Supports GPS, GLONASS and GALILEO
- Robust design, meets automotive requirements

DSRC: Dedicated Short Range Communication
EETS: European Electronic Toll Service
GALILEO: Satellite system of the European Union
GLONASS: Global Navigation Satellite System (Russia)
GNSS: Global Navigation Satellite Systems
GPS: Global Positioning System (USA)
GSM: Global System for Mobile Communication
OBU: On-Board Unit
The information in this document contains general descriptions of the technical options available, which do not always have to be present in individual cases. The required features should therefore be specified in each individual case at the time of closing the contract.