



EFKON AG
Andritzer Reichsstrasse 66, 8045 GRAZ, Austria
Tel.: 0316 / 695675
Fax: 0316 / 695675 – 9



User Manual

On Board Unit -IS[®] OBU L10

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- **Limited Warranty**

EFKON AG warrants that for a period of 2 (two) years from the date of purchase, as evidenced by a copy of the receipt, that the product will comply with the specifications set forth herein and will be free from defects in material and workmanship under normal use. The expression "normal use" herein shall exclusively mean the use of the product according to the terms set forth in this manual.

Except for the foregoing, the product is provided "AS IS". Your exclusive remedy and EFKON AG's entire liability under this limited warranty will be at EFKON AG's option to replace the product or refund the fee paid for the product.

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- Changing or opening of the product itself,
- Mechanical damages, caused by transport/transit,
- Mishandling (e.g. mechanical destroy, external power supply > 9V, reversed 9V power supply > 5 seconds)
- Consequences due to any failure or to improper installation or misuse or damages resp. malfunctions, that occur in consequence of installation,
- Defects caused by accident, abuse, neglect, alteration or insufficient repair of the product.

Please note, that the battery is not included in the warranty.

When purchasing the product, let your dealer sign and stamp the warranty coupon. For making a guarantee claim, please return the product together with the guarantee card and a copy of the receipt to your dealer.

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To the extent not prohibited by law, EFKON AG will in no event be liable for any lost revenue, profit or data or for a special indirect, consequential, incidental or punitive damages, arising out of or related to the use or inability to use or an improper installation of the product, even if EFKON has been advised of the possibility of such damages.

In no event EFKON AG will be liable to you, whether in contract, tort (including negligence), or otherwise, exceed the amount paid by you for the product. The foregoing limitations will apply even if the above stated warranty fails of its essential purpose.

**For Your Safety**

- Protect the On Board Unit and accessories from humidity.
- Do not remove any parts of the On Board Unit body.
There are no user-serviceable parts inside.
Refer servicing to qualified service personnel.
- Do not put the On Board Unit or the battery into fire!

Caution

To prevent any malfunction, only use recommended accessories.



Protect the Environment!
Do not discard used batteries
with your household rubbish!

Please return them to the dealer or bring them to a collecting point for special substances.



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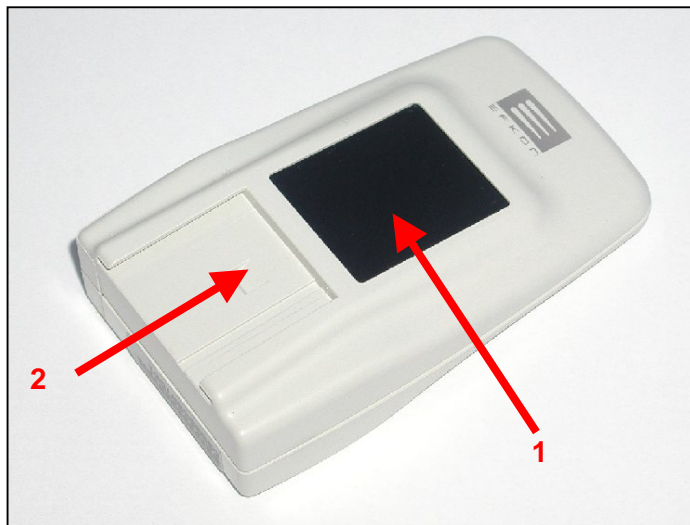


1 Introduction

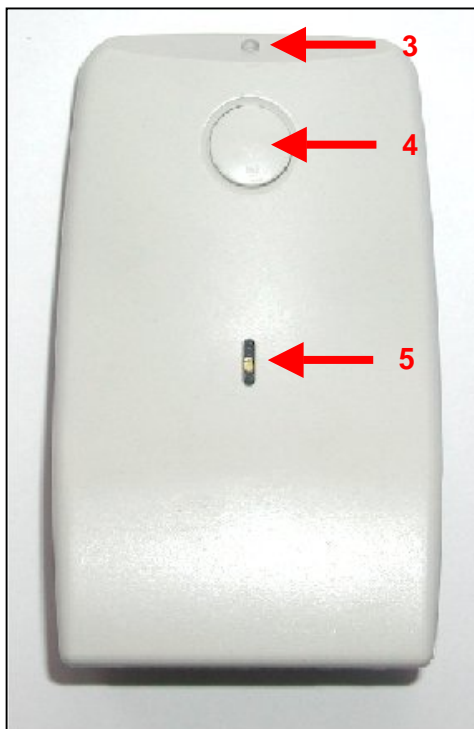
The On Board Unit IS[®] OBU L10 is an electronic device that serves for electronic fare payment operations in suitable system environments. The device is located just behind the vehicle's windscreen. The appropriate toll payments are carried out automatically without the necessity of any user (driver) interaction. This helps to maintain driver security.

2 Getting Started

2.1 Identifying the Parts



- 1... infrared window
(communication interface)
- 2... slot for mounting socket



- 3... LED
(optical interface)
- 4... operation and battery check button
- 5... buzzer (acoustic interface)

Figure 2-2: IS[®] OBU L 10 back view



6... battery compartment

7... mounting hinge

Figure 2-3. IS[®] OBU L 10 with mounting socket

2.2 Battery Installation

For operation, the IS[®] OBU L 10 is powered by a 9V block battery, which has to be installed in the following way:

1. Open the battery compartment (see Figure 2-4).



Figure 2-4: Battery installation

2. Connect the 9V block battery to the connector cable underneath (there is only one position possible).
3. Put the battery (including cable) into the battery compartment and
4. Close the battery compartment

This procedure has to be repeated when the battery must be exchanged.

The necessity of changing the battery is indicated to the user in an acoustic way (for details see chapter 3.1.4).

Note: After insertion of the battery, the On Board Unit IS[®] OBU L10 is in regular operational state. The On Board Unit operates in a special low power “sleep mode”!



2.3 Checking the Function

The operational readiness of the IS® OBU L 10 On Board Unit can be easily checked by pressing the operation button (see Figure 2-2).

The following information is indicated by optical signals (LED) and acoustic signals (buzzer):

- Basic IS® OBU L 10 function
- Battery power state

For details concerning the optical and acoustic signals please see chapter 3.1.4 [Acoustic buzzer signals](#) and 3.1.5 [Optical LED signals](#).



2.4 Installing the On Board Unit into the Vehicle

The On Board Unit (1) shall be mounted in the lower horizontal centre of the vehicle's windscreen (1).



Figure 2-5: IS® OBU L 10 Mounting position

The OBU has to be mounted within the wiping area to avoid any disturbance of the Transceiver transmission. It is also very important to attach the OBU to the horizontal centre of the windscreen to ensure correct function.

Note: In order to ensure the proper function of the On Board Unit, the infrared interface must not be covered by sun blocking foils, labels or similar material possibly mounted or glued to the windscreen.

Please follow the steps below to install the OBU into the vehicle:

Step 1. Cleaning the Windscreen

- a) **Clean the surface of the mounting area on the windscreen** (picture Step A)
To obtain optimum adhesion, the bonding surfaces must be clean, dry and well unified. Typical surface cleaning solvents are isopropyl alcohol/water mixture or heptane. Be sure to follow solvent manufacturer's directions for use and precautionary warnings when using solvents.



Figure 2-6 Solvent Wipe and Wipe dry



Note: Do not use conventional glass cleaners, petrol or strong or aggressive solvents.

b) Wipe dry the area (see Figure 2-6, Step B)

Note:

Always use two pieces of cloth for cleaning the surface of the windscreen. One cloth is used for cleaning and the other for drying the glass only. Depending on the degree of contamination, exchange the cloth for cleaning regularly. This avoids smearing the dirt on the surface.

Never use contaminated, oily or linty pieces of cloth.

Thick layers (e.g. labels) or dirt have to be removed very thoroughly. Do not scratch the windscreen when cleaning / removing.

Step 2. Preparing the Mounting Socket

Be sure that the two snap rivets of the mounting socket are loosened to enable easy adjustment of the required mounting angle of OBU (see next figure).

Figure 2-7 shows the supported mounting socket which holds the On Board Unit in its position inside the vehicle.

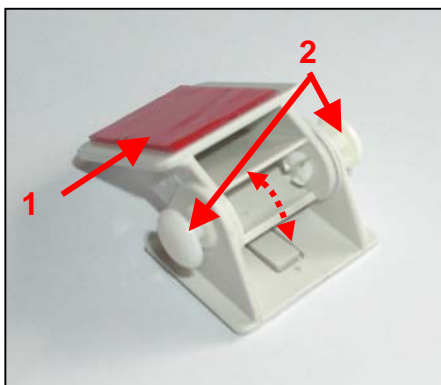


Figure 2-7: Mounting hinge

- 1 ...glue foil (double sided)
- 2 ...snap rivets (two pieces each)
- 3 ...snap rivet in position for adjustment
- 4 ...snap rivet in fixed position

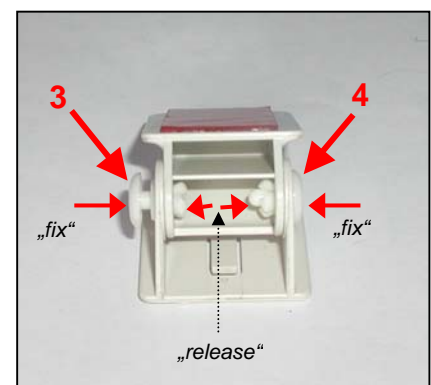


Figure 2-8. Adjustment

The mounting socket is constructed in a way that its angle can be varied in order to adjust the On Board Unit to the optimal position independently from the actual windscreen inclination.

For angle adjustment see Figure 2-8.

- release (pull) **both** snap rivets a few millimetres (~3 mm),
- adjust the angle until the desired setting is achieved,
- push the snap rivets back into their original position to fix the actual setting.

Note: The rivets can be pulled out and pushed in two or three times. After this the rivets have to be replaced with new ones.



Step 3. Assembling the Mounting Socket and the On Board Unit

The figure below shows how to slide the mounting socket onto the On Board Unit. The socket has to be slid upward towards the fixing point.



Figure 2-9 Mounting the Bracket onto the OBU

Step 4. Mounting the OBU to the Windscreen

If the glass of the mounting area is clean, remove the top layer of the adhesive foil and attach the OBU to its final position (horizontal centre) behind the windscreen.

Note – recommended mounting instructions for the taped socket:

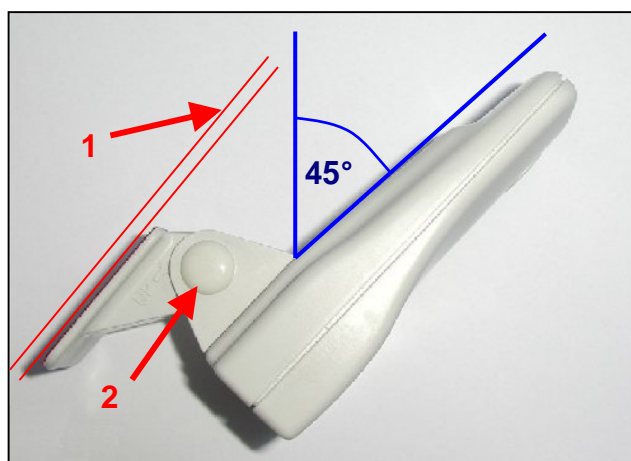
Press the socket to the windscreen as firmly as possible to ensure maximum bond strength.

When mounting the socket the recommended temperature should be above room temperature (> 20°C).

Make sure that the bottom edge of the mounting socket of the OBU is always higher and pretty close to the wiper to ensure that the communication zone is clear.

Step 5. Adjusting the OBU's Final Inclination Manually

For optimal adjustment observe the following figure thoroughly!



1 ... vehicle windscreen

2 ... mounting hinge
(assembled to IS® OBU
L 10 and fixed to
windscreen)

Figure 2-10: IS® OBU L 10 installation inside the vehicle



Step 6. Fixing the OBU

Fix the final position of the OBU by means of the 2 snap rivets (refer to page 10).

Step 7. Pressing the Operation Button

This action serves to check the proper function (see chapter 2.3 “Checking the Function” on page 8).



3 On Board Unit (IS® OBU L 10) - Operation

After proper installation of the On Board Unit inside the vehicle the device operates automatically without any need for user operation. As soon as the vehicle provided with an IS® OBU L 10 passes a toll station the IS® OBU L 10 ID and the contract number will automatically be sent to the IS® CU 300 via IS® TR 300. An acoustic signal confirms this operation for the driver.

3.1 Operational Features

3.1.1 Low Power Feature

The On Board Unit operates in a special low power “sleep” mode while not communicating outside any toll station area. As soon as the IS® OBU L 10 enters a communication zone at a toll station it “wakes up” automatically and performs the data transfer procedure. After completion it re-enters the low power mode again.

3.1.2 Jam Program

In case of a traffic jam at a toll station, it may happen that the On Board Unit resides within the communication area for a very long time. In this situation the OBU continuously switches to low power sleep mode and “wakes up” approx. every 1.5 seconds to check if it is still within the communication zone.

3.1.3 Time lock

After a completed data transfer operation the On Board Unit will be locked for operation at this specific toll station in order to avoid double deductions. This lock time value depends on the system configuration (normally it is set to approx. 5 minutes).

Note: The features “Jam program” and “Time lock” ensure that the IS® OBU L 10 data are sent only once!



3.1.4 Acoustic Buzzer Signals

Through a set of acoustic signals the On Board Unit informs the user of the operation state.

Signal 1: This signal indicates a correctly carried out data transfer operation at a toll station.
→ one short low tone followed by one high tone

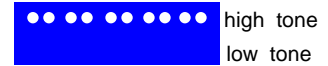


Signal 2: The signal indicates an error during data transfer operation
→ three long interval tones



For possible reasons see document
“ETC Host communication standard_NED_1.1.doc

Signal 3: Low battery condition
→ two short high tones, repeated five times



Note: In case of signal 3 (low battery), the battery should be replaced as soon as possible to ensure proper function. If the battery is not replaced, a further operation of more than a few payments cannot be ensured.



3.1.5 Optical LED Signals

Whenever the IS[®] OBU L 10 enters the communication zone of a transceiver (IS[®] TR 300) it wakes up from its low power “sleep mode”. This is indicated by the LED that is continuously on. After transaction is finished the LED goes off.



Figure 3-1: Wake Up indication LED



3.2 Data Transfer Operation

Electronic data transfer transactions take place at dedicated toll stations and are carried out automatically when entering the appropriate area. During the communication process the IS[®] OBU L 10 ID and the contract number are sent to the IS[®] CU 100 via IS[®] TR 100.

The completion of the debiting process is acoustically confirmed in the following manner:

- **Signal 1** for correctly terminated data transfer.
- A situation where communication is not terminated completely, is indicated by the On Board Unit with **signal 2**. The operation is repeated automatically in order to complete the transaction and the now correctly terminated operation is indicated with **signal 1**.
- The described acoustic signals may be followed by **signal 3**, if necessary for battery low power state indication.

In case of an erroneous termination of the data transfer operation, the On Board Unit should be checked for the reason of error. This can be done following the procedure described in chapter 2.4 – *Checking the Function* (see also the note below).

If the reason of failure cannot be evaluated, a service point must be visited for further checks of your On Board Unit.

Note: The electronic data transfer system also recognises all erroneous situations. In case of any further problems after observing the last paragraph, the driver is requested to forward the relevant information to the clearing instance. Thus there is no need of immediately stopping the vehicle to check the function of the On Board Unit.



4 Specifications

4.1 Mechanical Specifications

Data transmission media incoherent infrared light at 850 nm

**IS® OBU L 10 –
Device dimensions** 100 x 60 x 12 mm (H/W/D) (excl. mounting hinge)

Weight approx. 60 g (without battery and mounting hinge)

4.2 Electrical Specifications

Power requirements 9V DC block battery

Power consumption ~ 14uA in standby mode

4.3 Environmental

Operating temperature -20 °C ... +85 °C

Storage temperature -30 °C ... +100 °C

Humidity 0% ... 95%, non condensing (completely sealed case)

5 Labeling



Figure 5-1 IS OBU L10 with label



6 Declaration of Conformity

The manufacturer EFKON AG
 Andritzer Reichsstrasse 66
 A-8045 Graz

declares that the IS® OBU L 10 complies with the following standards:

Eye Safety

IEC/EN 60825-1:2001 radiation safety of laser products,
 Equipment classification, requirements

Electromagnetic compatibility

Automotive EMC directive
 95/54/EC:1995 small- and broad- band radiated emission and radiated
 susceptibility immunity tests

Standard EMC directive
 89/336/EC:1995 EMC for telecommunication technologies equipment

EN 55022, Class A
 (CISPR 22) emission requirements for information technology
 equipment (ITE)

IEC/EN 61000-6-2:2001 electromagnetic immunity in industrial environment
 IEC/EN 61000-6-4:2001 electromagnetic emissions in industrial environment
 IEC/EN 61000-4-2 electrostatic discharge

Electrical Safety

IEC/EN 60950-1:2001 Safety Standard for Information Technology Equipment
 → not applicable

Mechanical and climate conditions

IEC/EN 60721-3-5 Environmental classification for ground vehicular use
 IEC/EN 60068-2-1 Basic environmental testing procedures – Part 2: Cold
 IEC/EN 60068-2-2 Basic environmental testing procedures – Part 2: Dry heat
 IEC/EN 60068-2-6 Basic environmental testing procedures – vibration (sinusoidal)
 IEC/EN 60068-2-27 Basic environmental testing procedures – shock
 IEC/EN 60068-2-29 Basic environmental testing procedures – bump
 IEC/EN 60068-2-38 Basic environmental testing procedures –
 Part 2 – Composite temperature/humidity, cyclic test



7 Appendix A – IS® OBU L 10 Performance Letter

- The On Board Unit IS® OBU L 10 is a universal infrared product, which performs its capabilities in any EFKON infrared ETC/EFC¹ communication system. This includes single lane Stop-and-Go system installations as well as *Free Flow* systems.
- The On Board Unit has the capability to extend its features to support further features (e.g. emergency warning, traffic information, etc.).
- The available infrared technology complies to international standards in terms of eye safety which makes the On Board Unit harmless for humans eye.

This product complies to standard EN 60 825-1:2001, Class 1.

It is completely eye - safe, even together with use of magnifying glasses and lenses.

- The available technology that guarantees high reliability is maintained throughout any system implementation where the On Board Unit (IS® OBU L 10) can be integrated without restrictions.
- Functional compatibility is maintained with already existing system components as well as with future functional system improvements.
- Uniqueness and authenticity of the On Board Unit is guaranteed due to the programming of unique serial number and OBU-identifier as well as a secure OBU certificate during the production and initialisation process.
- The IS® OBU L 10 comes in an ergonomic design which makes installation and handling of the device very comfortable. It works independently from any customer interaction while operation, which subsequently does not influence driving security in any manner.

¹ ... ETC...Electronic Toll Collection, EFC...Electronic Fee Collection



8 Appendix B

8.1 Revision Control

Version	release Date	Name	Remarks
1.0	30.01.02	pLac	Initial issue
1.1	06.02.02	pLac	Introduction of performance letter and preface
1.2	13.05.04	pWul, kRau	Revised version

8.2 Check and Authorisation

	Version	Department	Date	Name	Remark
check + authorisation	1.2	S & P	25.05.04	hFin	
	1.2	HW	25.05.04	pWul	
	1.2				