

Individual System Solutions in Public Transport

Everything from a single source. Swiss made.



**Extensive experience in Public Transport projects.
Development and production in Switzerland.
Managed by the owners.**



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Are you a rail operator and need a passenger information system?

We will develop a system solution for you that is tailored to the specific needs of your fleet.

Are you a bus operator looking for a ticketing system?

We will network our client-enabled backend for you, with point of sale systems and ticket vending machines from our portfolio.

Do you want to modernise your fleet?

We will draw up clever refit plans for you, matched precisely to each of your vehicle models and the entire fleet.

Do you want to improve your efficiency using Smart Mobility?

We will develop individual solution packages, including data analysis and reporting, with clear action recommendations for your use.

**FELA develops, produces and qualifies at its own site.
For highest quality. Swiss Made.**



More than fifty years of experience – Swiss Engineering

FELA Management AG, founded in 1967, is a leading Swiss company in the electrical engineering field. At our head office in Diessenhofen, Switzerland, we plan, develop and produce electronic components, complex traffic telematics systems for public transport (rail, bus and shipping), as well as innovative information and Smart Mobility solutions. Our subsidiary, FELA GmbH in Birkenfeld, Germany, forms the strategic bridge with Europe.

Our portfolio includes ticket sales and ticketing systems, controlled passenger information systems with audio system, internal and external displays, driver's cab equipment, CCTV monitoring, mixed traction solutions, FELA data hubs and Smart Mobility solutions.

After product implementation, we are available to our customers from the head office in Switzerland, as well as from the branch office in Germany at all times with high quality service and support facilities.

Inter alia, our references include the Swiss Post Office, Stadler Rail AG, Swiss Federal Rail SBB and the Arcobaleno/Tessin Transport Association.

FELA Management AG is a family-owned SME. As a sound and established company, it offers clients and employees alike considerable added value. This is dear to my heart.

Dr Jürg Uhlmann
Board of directors, chairman
FELA Management AG





FELA – Your competent project partner

Mobility is an important asset for everyone. Public Transport and, with it, transport operations ensure that this mobility is guaranteed. For this to succeed, transport operators need reliable, future-proof vehicle fleets and the corresponding infrastructure.

We can call on more than 50 years of experience in the development and networking of components and software for rail, bus, tram and logistics. The experience of our developers, engineers and constructors enables us to design ideal solutions for you for both rail and road.

Our claim is to offer you a combination of components and system architecture precisely matching your needs. To do this, we provide you with our expert knowledge in passenger information, ticketing, Smart Mobility and refit – so that your projects can be brought to a successful conclusion.

Our team looks forward to meeting you!

**Confidence in
a partnership is
fostered by dialogue.**

**Direct agreements and
a pragmatic approach
are very important to us.**

■ Development and construction

Technical expertise, sound knowledge of the business and many years of experience – these are the tools with which our hardware and software developers, plus our constructors, work on your specific solution. As specialists in the mechanical engineering, electrical engineering and IT sectors, you will benefit from wide-ranging expertise and experience relating to approvals, standards and customisation possibilities.

With our obsolescence management, we guarantee you that our systems, despite ever shorter innovation cycles, remain available during the agreed contractual term and promised lifespan. As a customer, you will profit from this – so that you get exactly the system that you need and expect.

IT security

Digitisation and networking allow new, flexible public transport services, better and faster information for passengers and simpler ticket purchase. At the same time, safe handling of sensitive information – the confidentiality, availability and integrity of customer data – assume great importance at FELA.

With ISO 27001, we contribute to reducing the risk of information security incidents.



Customised with state of the art technology – tailored to your requirements.

■ Software solutions

Server applications in the control centre, networked closely with control software for components in the vehicles – our system solutions take into account your company's requirements and conditions.

We will design your customised system. For this, we will analyse your project and define with you appropriate customisations: first hand, by our experienced developers.



■ Components

Components and software solutions – scaled to your company.

The latest technology, functionality, quality and long working life – it is precisely these properties that make the difference if we choose the ideal combination for your system solution. We are aware that only this way will you be able to use your system efficiently and economically.

So that this is successful, the requirements for your project will be recorded precisely. Our development and design team will then define the necessary customisations and implement them.





■ Service and Support

Our service technicians will support you with their expertise – on the telephone, online or directly onsite, from acceptance of your individual solution to commissioning in the vehicle all the way to product and system training and troubleshooting.

Test systems in our factory offer you the safety when installing system changes without interrupting ongoing operations. We will change the scope of our services constantly to match market requirements – so that you can focus on your core business.



Project Management and the Service Department will prepare the commissioning of your project configuration on the test system.



**FELA passenger information
– everything in a nutshell**

Passenger information systems

Public transport is all the vogue and combines the desire for sustainable mobility concurrently with more efficient use of our precious time. Passenger information systems in buses, on the railways or in trams help us, say, to have arrival times or connections at all times at a glance.

- Optimally readable TFT screens – different sizes, housings and shapes in the passenger compartment
- Front and side displays with LED dot-matrix technology
- Passenger intercoms for emergency and help call
- Driver's operating panel
- Video and audio system
- PAN telephone system
- On-board computer, switches and server

Our expertise in the area of passenger information:

- Control centre
- Real-time data
- Multi traction
- Mixed traction
- Vehicle network
- Interfaces
- VDV timetable data
- Data hub
- Customized constructions

Flexibly networked

At FELA, we network these components using our POIScentral and POISmobile software solutions to form an integrated system. With all components, we ensure compliance with the relevant standards, such as V580+ and EN 50155. Our passenger information system communicates with various standardised VDV [Association of German Transport Companies] interfaces, protocols and data formats and can be customised individually to your requirements.

Software data from data hubs is prepared in real time for announcements and displays on the screens in the passenger compartment.

Whether a new project or a refit, we want to make it as simple as possible for vehicle drivers, dispatchers and technicians: Whether it concerns confined spaces for installation, adverse weather and climatic conditions, particular geographic conditions on the route or a very diverse vehicle fleet, which operates in mixed and multi traction. Our passenger information system takes into account these features of your transport company.

So that you and your passengers reach their destination.



TFT monitor and passenger intercom

With the FELA passenger information system, we keep our customers up to date comprehensibly and promptly.

Pierino Guardiani, former Operations Director, Aargau Verkehr AG Operations Department AVA



FELA Ticketing – System versatility for all tickets



Complete ticketing solutions

Ticketing systems from FELA – these are point of sale systems and ticket vending machines, mobile and stationary, for all fare systems, networked with a client-enabled backend.

Rail, bus, tram, ship or cable car? One journey – one ticket.

If you want to incorporate your transport services into a regional or national fare association, we will support you with the expertise of our team. Benefit from our experience in electronic fare management and from connection of your transport company to billing systems such as DaX, ZPS-NOVA or VDV-KA.

Are you looking for a comprehensive ticketing solution that allows your passengers to choose how ticket purchases and payment will be made? Paper or online ticketing, cash or debit/credit cards, as well as contactless payment via RFID? We will put together a customised solution for you.

POISmobile: Reliable data transfer, in real time

Connecting the driver's ticket sales devices in the vehicle to passenger information makes our ticketing system so special: Fitted with GPS modules, the driver's ticket sales device can be connected with the passenger information system via our POISmobile control centre software. Here, the destination and line data are compared with that from the GPS module, changes processed and played back in real time on monitors and loudspeakers. This is how your passengers are kept constantly up to date on the progress of the journey, such as the next stop, arrival time and destination, even if there are traffic problems.

Combined ticketing and passenger information in real time – for satisfied passengers.

Our expertise in the ticketing area:

- E-ticketing
- Cashless | paperless
- Data hubs
- Ticketing and passenger information
- Backend and mobile system solution
- ZPS-NOVA



Ticketing solution from FELA for the Schweizerischen Schifffahrtsgesellschaft Untersee und Rhein

Our fleet runs with a ticketing system from FELA: Front- and backend, payment terminals, SwissPass and shop sales. Everything from a single source.

Diana Hundenborn, Operations Assistant,
Schweizerische Schifffahrtsgesellschaft
Untersee und Rhein AG



**Your refit project
in expert hands**



Modernisation projects in Public Transport

Has your vehicle fleet become obsolete, yet is still not written off? Are you planning a modernisation? For refit projects like this, experienced partners, who record the status quo and introduce the necessary planning steps, are important. We work closely with you to agree each individual step of the project and adapt processes and procedures continuously.

Refit in accordance with the FELA principle: Analysis, planning and attention to detail

We consider refit projects from your perspective and implement them economically and efficiently. For this, we record together with you all the requirements for the passenger information system and define the functions and components to be replaced. Their selection and determination of the quantities then follows. Essentially, it is in this phase that the exact position and the installation features must be decided.

This includes the planning of the connection of these components and the software modules to the existing system – in all its details. We agree the project plan and its milestones with you and plan the exact schedule and the necessary resources. A jointly defined statement of requirements finally acts as the basis for an ideally customised refit proposal.

Journeys in multi and/or mixed traction are no problem for your fleet; no matter which vehicle types, generations or passenger information systems are coupled to one another.

Refit by FELA – so that your fleet stays on track for a long time.

Our expertise in the Refit area:

- Planning and Conceptual Design
- Adaptation Mechanics, Electrics, Hardware, Software
- Migration with existing system
- Installation, Commissioning



Refit projects are technically demanding.

As your partner, FELA offers optimum solutions for your rolling stock.



FELA. Your team.

FELA – one family since 1967

FELA was founded by Ernst Uhlmann over 50 years ago. Even today, the company is 100%-owned by the Uhlmann family. Through FELA Beteiligungs AG, Dr Jürg Uhlmann and his father, Ernst Uhlmann, hold one hundred percent of the shares in FELA Management AG. This includes the subsidiary FELA Deutschland GmbH in Birkenfeld.

The FELA Group is a healthy and sound Swiss SME, which is established independently, sustainably and for the long term. As the majority shareholder, Dr Jürg Uhlmann is an active participant in the company, even today.

A pioneering spirit and the power of innovation are the common thread which has accompanied the company since its foundation, through its highs and lows. The company has again been on a growth path for a number of years. Typical family values such as reliability, commitment, a sense of community, appreciation and acceptance of responsibility are also demanded and exemplified by the management. This encourages and underpins the workforce, promotes team formation, inspires innovation and motivation and gives the entire company stability and the necessary presence in the market place. Our customers also benefit directly from this.

It is our belief that we will remain a strong family in the future, acting with care and foresight both internally and externally and fully assuming our responsibilities.



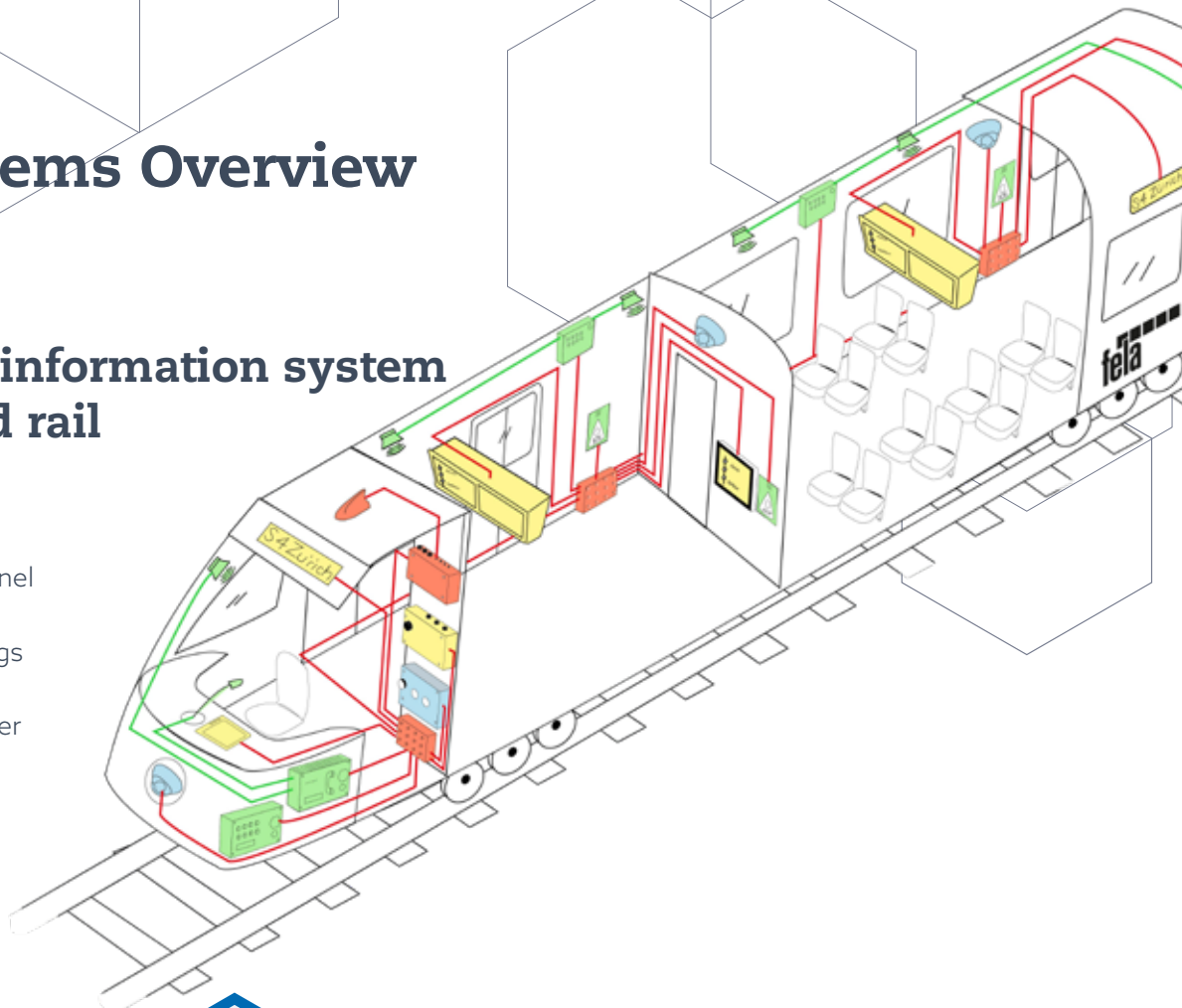
**At FELA, we have
our feet on the
ground, are reliable
and focus on
solutions for our
customers.**

FELA Systems Overview

■ Passenger information system for bus and rail

Pages 20 – 39

- POISCentral
- HMI operating panel
- TFT monitors
- Monitor mountings
- Intercoms
- Audiocast amplifier
- Telephone box



CCTV system

- Interior cameras
- Front camera
- Video recorder

Passenger information

- HMI operating panel
- TFT monitors
- Virtualisation computer
- Side display
- Front display

ZUKO system

- Ethernet switches
- Router
- Antenna

PAN audio system

- Passenger intercoms
- Telephone box
- Telephone server
- Digital audio amplifiers
- Driver's microphone
- Loudspeakers



■ Ticket vending machines and billing systems for public transport, cable cars, ships or stop areas

Pages 42 – 45

- EasyDriveCentral
- Mobile ticket vending machine



■ Smart Mobility for different means of transport and cargo

Pages 46 – 51

- Smart Mobility Portal
- Smart Mobility Logbook
- Smart Mobility AT Fleet



Passenger info in FELA Cloud

On the railways or in trams, centrally or mobile

The Cloud solution for FELA applications and services incorporates all digital processes seamlessly: for electronic ticketing, big data, GPS-based asset tracking or for the passenger information system.

The web-based passenger information system controls all systems and components centrally. It displays all relevant vehicle data in real time and allows rapid and transparent maintenance of timetables and customer information.

With Cloud technology, all functions are monitored and controlled regardless of location. Only a computer or a tablet with a current browser is needed. In combination with dynamic information systems, passengers receive reliable, up-to-date information about their journey and potential changes at all times.

Functional overview

- Real-time information
- Intuitive operating concept
- Modular and scalable
- Platform-independent
- Attractive licensing model
- VDV 452 interface
- VDV 453/454 et al.



Passenger information

FELA Cloud benefits

- No proprietary infrastructure needed, hence particularly useful for small companies
- Access via various internet-enabled devices possible from any location
- Simply scalable
- Enhanced data security
- Reduced IT administration costs





HMI

Robust and sturdy

The robust and sturdy panel acts as the control device for the driver and displays various items of information in the driver's cabin. Designed for use in rail passenger transport under conditions with adverse mechanical and electromagnetic influences.

The HMI operating panel can be connected to third-party systems and adapted flexibly to the customer's installation situation. The reflection-free display is fitted with LED background lighting and regulated using a light sensor.

Robust and sturdy, it is easy to install using fixing holes in accordance with UIC 612 and complies with Railway Standard EN 50155.

HMI operating panel

- Robust
- Easy to install
- Configurable
- Resistant to vibration
- Protected against electromagnetic effects and temperature differences
- Can be connected to third-party systems
- Adaptable to installation situation
- Automatic backlight control

In addition, maintenance and quick diagnostic functions can also be carried out via the operating panel:

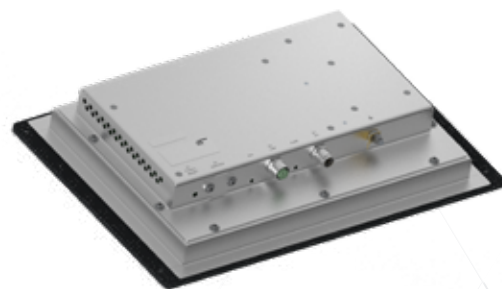
- Update of equipment software
- Query of the device status of all PIS components
- Function for updating the data supply

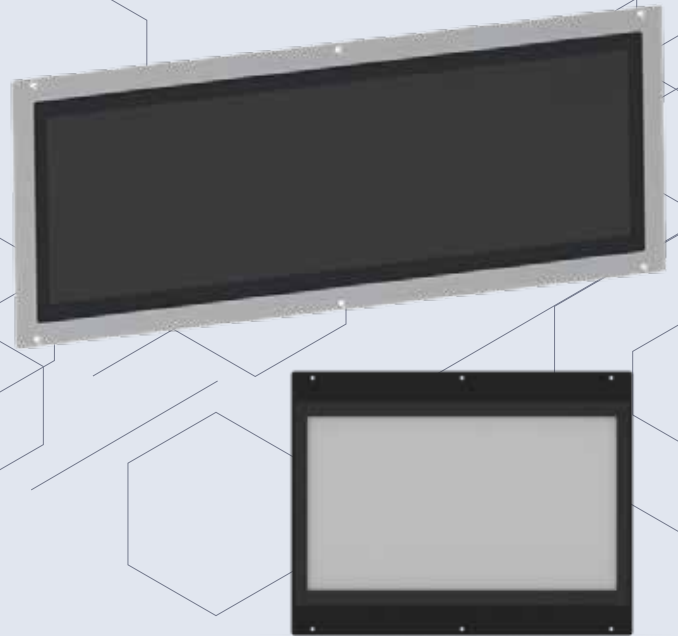


HMI

Technical specifications

■ Nominal voltage	Wide range input 24 V – 110 V, -30 / +25% (EN 50155)
■ Power interruption	Class S2 (EN 50155)
■ Power consumption	Max. 50 W
■ Operating temperature	Temperature class T1 acc. to EN 50155
■ Storage temperature	-20 to +60 °C
■ Humidity	Max. 90% relative humidity, non-condensing
■ Ethernet	10/100Base-TX [FD] acc. to IEEE 802.3
■ Protection class	Front IP65 built-in, Rear IP20
■ Weight	2.5 kg
■ Dimensions	Height 214, Width 310, Depth 69.5 mm, Installation depth 63.5 mm
■ Construction	Metal housing made of aluminium and chrome steel, front glass 3 mm ESG, optically anti-reflective; front panel with anti-graffiti powder coating





TFT monitor family

Modern in all formats

Based on an electronic board that is compatible with the very latest technology, we offer TFTs in full HD quality in a variety of formats.

The TFT board, at the heart of the system, is the same for all monitors. Depending on the requirement, we incorporate all conventional panel sizes on the market. Our expertise in construction, embedded development and electronics offers vehicle-specific TFT integrations with or without a frame, built into the wall or with mountings tailored to the vehicle. We offer conventional TFT sizes from 10.4 up to 21.5 inches, with touch screens and stretched TFTs as well. Other formats go up to 43 inches and thus improve the rail experience of the future.

Installation and configuration are quick and easy since all monitors are equipped with the same electronics and control software. This reduces the maintenance and personnel load for the transport company.

Let us know what space you have available. We will integrate the display for you.

This applies for all panel sizes:

- Robust and railway-certified (EN 50155)
- Easy to install
- Suitable for buses and trains
- Configurable to various PIS data protocols such as VDV301, IPxPT
- Fixed, bonded front glass
- Lightweight and very flat design
- Fastenings can be adapted to the vehicle
- Housing colours freely selectable
- Maintenance free
- Customised construction on request
- Adaptable to different mountings

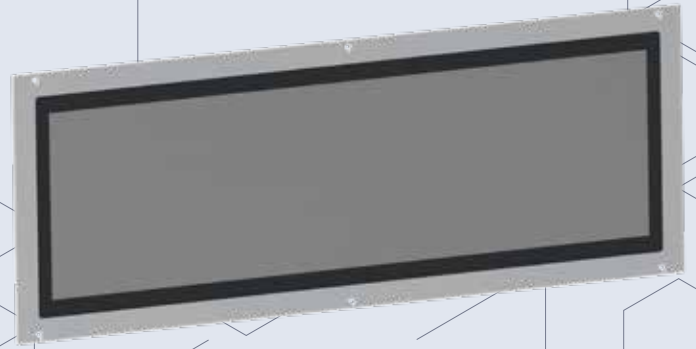


TFT monitor family

Technical specifications

■ Nominal voltage	Wide range input 24 V – 110 V, -30% / +25% (EN 50155)
■ Power interruption	Class S2 (EN 50155)
■ Power consumption	Max. 50 W
■ Operating temperature	Temperature class T1 acc. to EN 50155 (TFT panel is switched off at -5 / +50 °C)
■ Humidity	Max. 90% relative humidity, non-condensing
■ Ethernet	10/100Base-TX [FD] acc. to IEEE 802.3
■ Protection class	Front IP65 built-in, Rear IP20
■ Display	Full HD, colours 16.7M (8 bit), LED backlight, brightness 300 cd/m²





Stretched TFT display

Modern and versatile

Stretch monitors impress with their flat and transparent finish, giving them an elegant look.

They can be incorporated practically seamlessly in housing components, bolted from the front into existing recesses or mounted conventionally on a gondola. The flat surface of the anti-reflective display in the metal frame creates a modern appearance and facilitates cleaning.

Installation and configuration are quick and easy since all monitors are equipped with the same electronics and control software. This reduces the maintenance and personnel load for the transport company.

For standard and wide screens

- Robust and railway-certified (EN 50155)
- Easy to install
- Suitable for buses and trains
- Configurable to various PIS data protocols such as VDV301 and APFZ 2.0
- Fixed, bonded front glass
- Lightweight and very flat design
- Fastenings can be adapted to the vehicle
- Housing colours freely selectable
- Maintenance free
- Customised construction on request

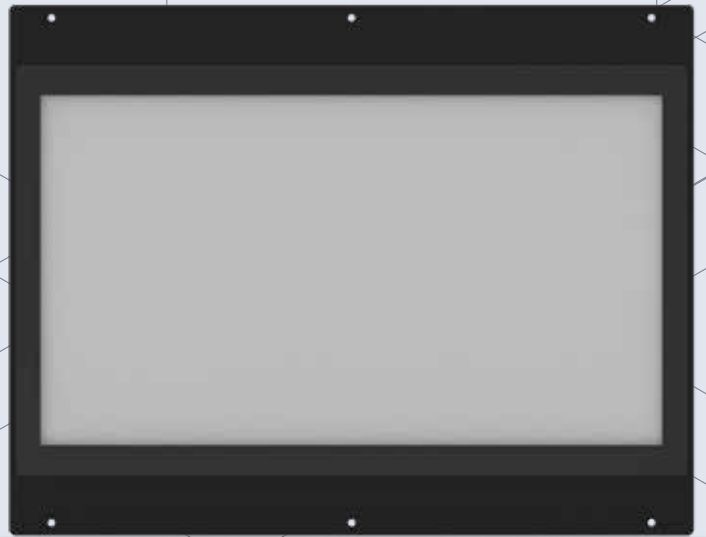


Stretched TFT display

Technical specifications

■ Nominal voltage	Wide range input 24 V – 110 V, -30% / +25% (EN 50155)
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■ Power consumption	Max. 50 W
■ Operating temperature	Temperature class T1 acc. to EN 50155 (TFT panel is switched off at -5 / +50 °C)
■ Humidity	Max. 90% relative humidity, non-condensing
■ Ethernet	10/100Base-TX [FD] acc. to IEEE 802.3
■ Protection class	Front IP65 built-in, Rear IP20
■ Display	Full HD, colours 16.7M (8 bit), LED backlight, brightness 700 cd/m ²





TFT Monitor Panel Mount

Classic and versatile

Panel mount monitors are designed for front mounting and protected by toughened front glass ESG.

The flat surfaces of the non-reflective displays create a classic look and simplify cleaning due to the bonded front glass.

Installation and configuration are quick and easy since all monitors are equipped with the same electronics and control software. This reduces the maintenance and personnel load for the transport company.

For 15, 18.5 and 21.5 inches

- Robust and railway-certified (EN 50155)
- Easy to install
- Suitable for buses and trains
- Configurable to various PIS data protocols such as VDV301 and APFZ 2.0
- Fixed, bonded front glass
- Lightweight and very flat design
- Fastenings can be adapted to the vehicle
- Housing colours freely selectable
- Maintenance free
- Customised construction on request
- Adaptable to different mountings

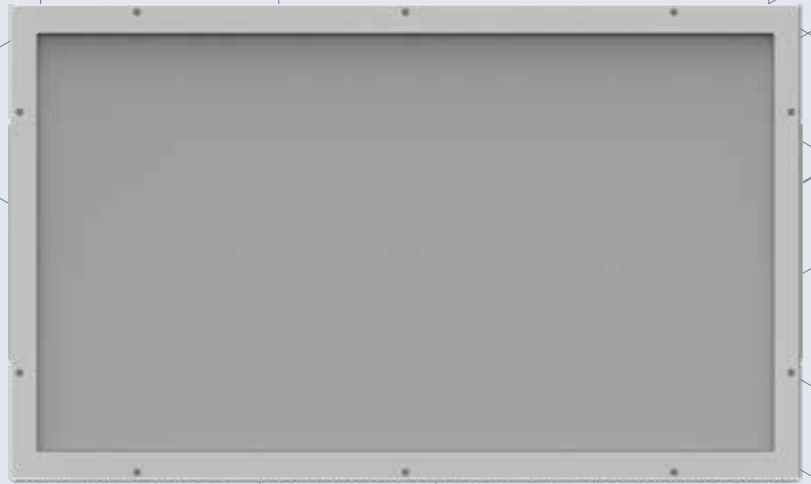


TFT Monitor Panel Mount

Technical specifications

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■ Power interruption	Class S2 (EN 50155)
■ Power consumption	Max. 50 W
■ Operating temperature	Temperature class T1 acc. to EN 50155 (TFT panel is switched off at -5 / +50 °C)
■ Humidity	Max. 90% relative humidity, non-condensing
■ Ethernet	10/100Base-TX [FD] acc. to IEEE 802.3
■ Protection class	Front IP65 built-in, Rear IP20
■ Display	Full HD, colours 16.7M (8 bit), LED backlight, brightness 300 cd/m ²





TFT Monitor Open Frame

Concealed mounting, versatile

Open frame monitors are convincing due to the flat installation from behind on existing constructions.

Due to the light construction, the monitors are easily and inexpensively installed behind existing, non-tinted glass surfaces. This is how it is incorporated virtually seamlessly and almost invisibly in the present design.

Installation and configuration are quick and easy since all monitors are equipped with the same electronics and control software. This reduces the maintenance and personnel load for the transport company.

For 18.5 and 21.5 inches

- Robust and railway-certified (EN 50155)
- Easy to install
- Suitable for buses and trains
- Configurable to various PIS data protocols such as VDV301, IPxPT
- Fixed, bonded front glass
- Lightweight and very flat design
- Fastenings can be adapted to the vehicle
- Housing colours freely selectable
- Maintenance free
- Customised construction on request



TFT Monitor Open Frame

Technical specifications

■ Nominal voltage	Wide range input 24 V – 110 V, -30% / +25% (EN 50155)
■ Power interruption	Class S2 (EN 50155)
■ Power consumption	Max. 50 W
■ Operating temperature	Temperature class T1 acc. to EN 50155 (TFT panel is switched off at -5 / +50 °C)
■ Humidity	Max. 90% relative humidity, non-condensing
■ Ethernet	10/100Base-TX [FD] acc. to IEEE 802.3
■ Protection class	Front IP65 built-in, Rear IP20
■ Display	Full HD, colours 16.7M (8 bit), LED backlight, brightness 300 cd/m²





Customer-specific ceiling mounting

Shapely and light

The FELA ceiling mounting has been developed for use in rail vehicles in the public transport network. The designation "V-mounting" is also used for ceiling mountings with two or four monitors, because the side view resembles a "V".

It is used to hold TFT monitors.

Mounted on the ceiling in rail vehicles, it gives passengers an unobstructed view of the displayed passenger information:

- the current location
- the further course of the journey with a way station display
- the arrival time
- connections or advertising if needed

For 18.5 and 21.5 inches

- Aluminium frame, welded
- Powder coating with anti-graffiti properties
- Easy assembly, installation and light weight
- Can be used flexibly
- Colour choice according to customer requirements (RAL, NCS)
- Customised solutions for simplified assembly in refit projects
- Renewal of existing vehicles

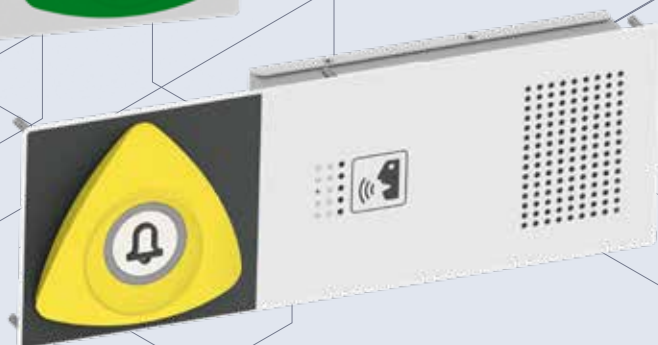


Ceiling mounting for 18.5 and 21.5 inches

Technical specifications

■ Material	Welded aluminium frame, steel press-fit bolts and rivet nuts
■ Coating	Powder coating with anti-graffiti properties
■ Colour	Standard NCS S fine structure, matt; available in RAL, NCS colours according to customer requirements
■ Weight	From 3.7 to 12.0 kg





Passenger Intercom

Compact and full duplex mode

The emergency intercom NRSS and help call intercom HRSS were developed VoIP-capable for SIP applications in public transport. Its full duplex mode enables rapid assistance for the passenger thanks to high communication quality. It is designed for emergency calls in rail vehicles.

Due to the IP interface, the intercom can be integrated into SIP-compatible telephone systems and so guarantee the highest audio quality. PoE connections minimise cabling and thus installation costs. The intercom is impressive with its robust construction paired with an attractive design. It is also protected against vandalism.

The emergency intercom complies with all European guidelines (TSI PRM) required for operation in public transport as well as other European standards and Swiss guidelines (suitable for the disabled).

Emergency call and call for help

- Fully implemented according to RTE 40100
- PoE (802.3.AF)
- Meets all relevant railway standards (EN 50155)
- Certification according to TSI PRM
- Designed as a help and emergency call intercom available in several mounting variants
- Easy assembly, installation and commissioning
- Low cabling effort
- Vandalism protection
- Safe operation in emergency situations
- Robust construction



Emergency call and call for help intercom

The passenger intercom Emergency Call – designed as a hands-free device – allows voice calls to and from the control centre, as well as calls to the train driver. Communication takes place via LAN using VoIP (SIP call). The intercom operating status is indicated by a row of LEDs, as well as the illuminated SOS button.

Technical specifications

■ Nominal voltage	48 V PoE (802.3af)
■ Power consumption	Max. 7 W
■ SOS button	Flat, metallised push button, LED ring illumination (green or yellow), triangular plastic mounting frame Emergency call with tactile white SOS lettering and Braille lettering Help call with tactile symbol
■ Operating temperature	-25 to +55 °C environment (Class T1 - EN 50155)
■ LED	5x multicolour LED
■ Storage temperature	-40 to +85 °C
■ Humidity	Max. 90% relative humidity, non-condensing
■ Ethernet	10/100Base-TX [FD] acc. to IEEE 802.3
■ Weight	1.1 kg
■ Dimensions	Front plate Width 115, Height 330, Depth 59 together with button, Installation depth 45 mm
■ Construction	All-metal body (aluminium/steel combination)





Passenger Intercom

Compact and full duplex mode

The emergency intercom NRSS was developed VoIP-capable for SIP applications in public transport. Its full duplex mode enables rapid assistance for the passenger thanks to high communication quality. It is designed for emergency calls in rail vehicles.

Due to the IP interface, the intercom can be integrated into SIP-compatible telephone systems and so guarantee the highest audio quality. PoE connections minimise cabling and thus installation costs. The intercom is impressive with its robust construction paired with an attractive design. It is also protected against vandalism.

The emergency intercom complies with all European guidelines (TSI PRM) required for operation in public transport as well as other European standards and Swiss guidelines (suitable for the disabled).

Emergency call

- Fully implemented according to RTE 40100
- PoE (802.3.AF)
- Meets all relevant railway standards (EN 50155)
- Certification according to TSI PRM
- Designed as an emergency intercom (green frame)
- Easy assembly, installation and commissioning
- Low cabling effort
- Integration into operator-specific information design
- Vandalism protection
- Safe operation in emergency situations
- Robust construction



Passenger intercom Emergency Call

The 2301 and 1801 passenger intercom Emergency Call – designed as a hands-free device – allows voice calls to and from the control centre, as well as calls to the train driver. Communication takes place via LAN using VoIP (SIP call).

2301: The intercom operating status is indicated by a row of LEDs, as well as the illuminated SOS button.

1801: The current mode, such as a running light when the call is established, is displayed using an LED control. When the intercom is in operation, a row of LEDs and the SOS button light up. Digital I/O, used to read out an activated emergency brake request.

Technical specifications

■ Nominal voltage	48 V PoE (802.3af)
■ Power consumption	Standby: 7 W (with emergency call button) Call: 5 W (with emergency call button)
■ SOS button	2301: Raised pushbutton, LED ring illumination (green), triangular plastic mounting frame with tactile white SOS lettering and Braille lettering 1801: Flat, metallic push button, LED ring illumination (green) with tactile SOS lettering
■ Operating temperature	-25 to +55°C environment (Class T1 - EN 50155)
■ LED	5x multicolour LED
■ Storage temperature	2301: -20 to +85°C 1801: -40 to +85°C
■ Humidity	Max. 90% relative humidity, non-condensing
■ Ethernet	10/100Base-TX [FD] acc. to IEEE 802.3
■ Weight	Approx. 1.0 kg
■ Dimensions	2301: Front plate Width 130, Height 190, Installation depth 55.7 mm 1801: Front plate Width 105, Height 185, Installation depth 55.4 mm
■ Construction	All-metal body (aluminium/steel combination)
■ LED	5x multicolour LED





Audiocast Amplifier

Digital and redundant design

The digital FELA audio amplifier with LAN and UIC interfaces enables a failsafe passenger audio system. The system is designed to be redundant; power supply and amplifier are duplicated and in all provide four individually controllable audio channels with an output of 50 watts. For increased safety, two separate DC/DC converters provide the power supply. This reduces the number of devices.

The amplifiers are connected directly via LAN and can also be controlled via UIC interface, in order to output priority announcements. Thanks to a clever, robust design, the amplifier can be installed anywhere, even in the smallest spaces.

The standards according to EN 50155 and 45545-2 and the TSI LOC&PAS and CE/RED conformity significantly simplify the approval process.

With the FELA amplifier, rail operators get a cost-optimised solution for both new and retrofit projects.

Audiocast Amplifier

- Four individually controllable audio channels
- Total output 50 watts (4 x 12.5 W)
- Control via LAN and UIC interfaces
- Redundancy according to TSI LOC&PAS
- EN 50155 and EN 45545-2 and CE/RED compliant
- Low cost for optimum solution
- Possible as a SIP client in existing PAN system
- USB connection helps with service
- Compact design, ideal for installation in confined spaces
- Quick and easy to install and dismantle thanks to freely selectable mounting

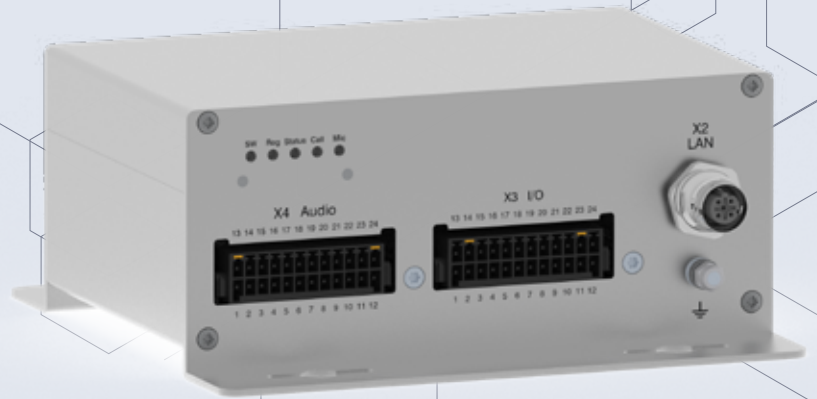


Audiocast amplifier, redundant design

Technical specifications

■ Power supply	Versions: 24 V, 36 V, 110 V
■ Power interruption	Class S1 according to EN 50155
■ Power consumption	Standby: 3 W nominal Operation: 5 W and amplifier output power
■ Operating temperature	Temperature class T3 acc. to EN 50155
■ Ethernet	Fast Ethernet, 100 BaseTX/IEEE 802.3
■ Audio amplifier	50 W, (4 x 12.5 W) at 4 Ω
■ Loudspeaker impedance	4 Ω , 8 Ω , 16 Ω
■ Protection class	IP40
■ Weight	Approx. 0.9 kg
■ Dimensions	Width 137, Height 46, Depth 124.3 mm
■ Construction	Metal housing made of aluminium and stainless steel





Telephone Box

Versatile

The FELA telephone box is a SIP telephone in the train driver's cab and enables the transmission of announcements or communication from the control centre to the train driver or from the train driver to the control centre, transmitted via SIP.

It is connected to the communication between the emergency and help call intercoms in the vehicle and the control centre.

The FELA telephone box also offers a "juke box" function, which the train driver can use to feed individual voice recordings into the vehicle's audio system. The FELA telephone box has three amplifier outputs, a line-in connection and a line-out connection.

Telephone box

- Robust and railway-certified
- Easy to install
- Versatile configuration
- Power supply via PoE
- Vibration resistant
- Ring and dial tones are freely selectable
- Existing microphones or those recommended by FELA can be used
- Equipment software update possible
- Supports RTE 40100 emergency calls



Telephone box

Technical specifications

■ Nominal voltage	48 V PoE (802.3af)
■ Power interruption	Class S2, C1 (EN 50155)
■ Power consumption	Max. 13 W
■ Operating temperature	-25 to +70 °C; Temperature class T3 acc. EN 50155
■ Storage temperature	-20 to +85 °C
■ Humidity	Max. 90% relative humidity, non-condensing
■ Ethernet	10/100Base-TX [FD] acc. to IEEE 802.3
■ Protection class	IP20
■ Weight	1 kg
■ Dimensions	Height 81.5, Width 165, Depth 160 mm
■ Construction	All-metal aluminium body





EasyDriveCentral

From the local transport company to the large network

EasyDriveCentral is the comprehensive multi-client SaaS system for the FELA ticketing solution.

Developed for the Swiss market, it covers the requirements from small transport companies with few vehicles up to large networks. You only need a web browser to operate all functions.

The backend offers a consistent system for all sales channels: attended sales mobile and stationary as well as unattended sales at vending machines or on the internet.

EasyDriveCentral

- Comprehensive backend system for the Swiss market
- Covers the needs of small businesses to larger networks
- Multi-client capable
- Requires only a web browser
- Supports all common standards
- Multilingual
- Comprehensive report generator
- Interfaces to third-party systems



EasyDriveCentral

Technical specifications

Data supply

■ Import	<p>Timetable data acc. to VDV 452 lines, circuits, day tickets</p> <p>Fare data such as way stations, zones, localities including reference stops, fare tables, line triangles</p>
■ Operational master data	Vehicles, drivers, staff, sales devices
■ DV products	Compatible with ZPS-NOVA
■ Editors	<p>Layouts, fare tables, distance triangles, sales groups, passenger categories, classes, fare durations, sales periods, sales time windows within a day, aggregated triangles, clients, authorisations</p> <p>Currencies: Exchange rates, quick select buttons for driver vending devices by line and for vending machines by location, menu tree on front-end devices for additional products</p>
■ Versioning	Any number of fare and timetable data versions , that can be edited in parallel, secure releases for new fare versions on a key date, test and product releases

System management

■ System monitoring	Server, databases, various IT components
■ Event viewer and acknowledgement	Alarms and error conditions on vending machines
■ Monitoring	Seamless sales and cash register closings, version statuses, operational states of the vending machines with ZPS-NOVA processing
■ Automatic distribution	New software versions on cash registers and ticket vending machines, promotional images on ticket vending machines

Sales statement

■ Report generator	About 40 different reports with countless itemisations and selection criteria
■ Sales	Sales statistics based on many criteria

■ Preparation, creation	Network, DV accounts according to ZPS NOVA, driver statements including debt collections
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■ ESR postal deposits	From the driver (payment slip with reference number), separately for CHF and EUR cash receipts as well as coupons and vouchers
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■ Period formation	Audit-proof sales periods
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Data distribution

■ Communication	VPN via various channels: Cellular 3G/4G, WLAN network, Internet connection, ticket vending machines with ADSL-fixed or optical fibre connection
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Assortments

■ Network items	Zone-based individual, group or short-haul tickets, multi-journey tickets, class changes, zone connection, subscriptions, event tickets
■ National transport items	Normal tickets, city, city-city tickets, multi-journey tickets, day tickets: Day class, multi-day class change, bicycle, dog day tickets, FVP tickets

■ House fares	Route or fixed price items, luggage transport, special tourist offers, P+R tickets, subscriptions, cable car tickets, group tickets, night tickets, vouchers, combination tickets with separate vouchers, event tickets, shop items
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■ Specialities	Cross-border tickets with: differentiated VAT, item-specific EUR fare, mixed Switzerland-foreign fares
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Electronic tickets and customer cards

■ Integrated RFID Card system with	Bonus function (customer discount), multi-journey function, closed payment system based on RFID with offline-capable wallet, blacklisting of cards, self-service card issuing: at the vending machine, from the driver or at the ticket office, personal and impersonal cards, storage of subscription and multi-journey tickets on the card
■ API for Webshop	Easy integration on other website like a company website



Ticket Vending Machine

Compact, intuitive, cashless

The mobile ticket vending machine saves space with its compact, lightweight construction and creates more room for your passengers.

On its large touchscreen, with intuitive menu navigation, passengers can quickly make a cashless purchase of the right ticket with all everyday payment cards. Drivers do not have to waste time handling cash and tills and thus can give their full attention to the traffic and the passengers.

You can mount the automatic ticketing machines with a standard locking system quickly and easily on the existing rails.

The transport company can also include in this solution groups of persons who do not have a credit card, using special chargeable customer cards. Depending on the need for ticket inspections, we fit automatic ticketing machines with or without paper rolls.

FELA offers not only sales devices, but a complete system including backend, which is already in use in hundreds of automatic ticketing machines. This is how we can exchange existing backends or offer our complete solution if it is needed.

Ticket Vending Machine

- Distribution solution for mobile and stationary applications
- Compact and well-thought out design
- Inclined LCD 10.4" PCAP touchscreen, simple operation
- RFID reader for eTicketing and contactless payment
- Available with and without a printer
- 2D barcode scanner
- Low cost, minimum service and maintenance overheads
- Complies with current EU directives for installation in buses



Ticket Vending Machine

Technical specifications

■ Power supply	24 V DC (16 – 32 V), internal power supply with UPS function as backup battery
■ Temperature and relative humidity	working and storage -25 - +55 °C, -40 - +85 °C, <95%
■ Screen and computer	10,4" PCAP touchscreen, 204 dpi, 600 x 1024 px, 500 cd/m ² , ARM 1.4 GHz, 1 GB RAM, exchangeable memory 16 GB flash SD
■ Printer	Thermal printer 204 dpi with automatic feed, compatible with public transport in Switzerland, paper quality 80 to 140 g/m ² VT 570, paper - 82.5 mm, print width 80 mm, roll diameter 90 mm
■ Payment terminal	Contactless RFID reader for all current standards, 1/2D barcode scanner
■ Connections	Power including ignition signal, LAN, GSM 4G and GPS, USB, GPIO
■ Dimensions and material	Width 300, Height 577, Depth 212 mm, plastic with double closure
■ Weight	Approx. 20 kg
■ Alarm	Audio buzzer on door opening
■ Optional	cVend from Feig, IBIS Wagenbus VDV 300, WLAN, ZPS-NOVA





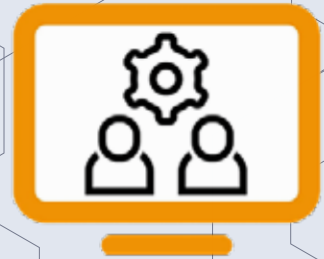
Monitoring



Asset Management



Analytic Dashboard



User Management

Smart Mobility Portal

Quick and accurate

The Smart Mobility Portal combines efficient fleet and transport management. You benefit from simple and well thought-out user guidance.

It enables uniform management of all traffic carriers: from a few vans or trains to lorry, construction vehicle or container fleets. Important data such as whereabouts, vehicle or door status, cooling temperature and more are presented in clear tables. Digital maps based on Google® Maps leave nothing to be desired.

Smart Mobility devices deliver travel times, routes, idle times or driver identification: Whether it is data from external input devices or integrated sensors, FELA Cloud offers customised processing of all recorded values into user-friendly information.

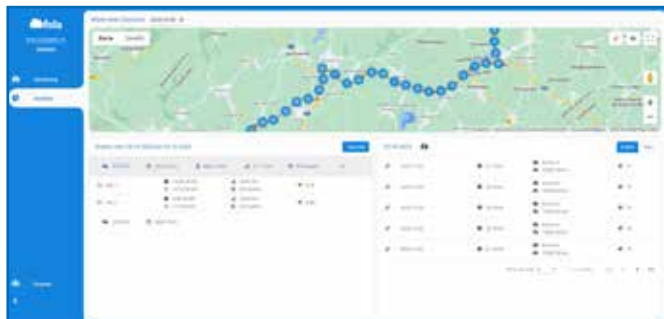
The built-in alarm function automatically informs about exceptional conditions via SMS and e-mail.

FELA Cloud

- Web-based telematics portal
- Easy operation
- Automatic recording and evaluation of operating data and map tracking
- Reports and dynamic tables
- Flexible management
- No installation costs due to Cloud solution
- Easily adaptable
- Accessible worldwide
- Secure data through FELA Cloud
- FELA Cloud monitors, administers and analyses your data



Smart Mobility Portal



Reports and dynamic tables

Companies need data in order to make the right decisions.

The Smart Mobility Portal automatically supplies the desired information as predefined reports. Alternatively, the dynamic tables allow flexible online evaluations that can be exported, such as: Consumption statistics, temperature history or Eco drive evaluations.

They enable a targeted assessment of fleet efficiency, employee deployment or transport cycles. A transparent authorisation concept ensures level-based access to all data and evaluations.

Flexible management

Organise portal users, vehicle assignment and transport management, adapted to your proven internal structures. The Smart Mobility Portal's management options support you in many ways:

- Assign vehicle groups to employees, departments or customers
- User and access rights can be individually adapted to the organisation and are multi-client capable
- Targeted automatic delivery of information, alerts and reports

Simple web-based system access

A PC with an Internet connection is sufficient for use and access via all of your global branches:

- As an independent information, scheduling and fleet management system
- As an extension for data acquisition with interfaces to the existing dispatch or ERP system
- Fully integrated into your order processing or fleet management system



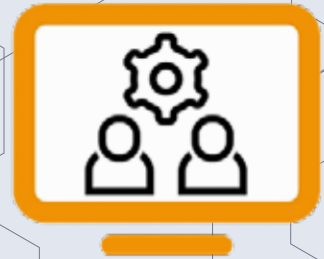
Monitoring



Asset Management



Analytic Dashboard



User Management

Smart Mobility Application

Logbook

The Smart Mobility logbook combines precise, automatic mileage recording of all trips of your fleet with a user-friendly web application.

After simple installation of the hardware via Plug'n'Play, it enables the driver to book trips quickly.

In addition to trip exports compliant with the tax regulations, it offers the administrator the option of managing drivers and vehicles with little expenditure.

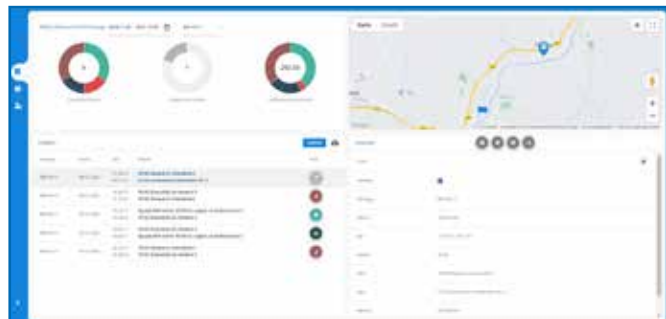
Informative statistics, generated automatically, provide you with an overview of all data in the logbook for your fleet.

Advantages

- Simple Plug'n'Play installation by the driver
- Automatic and precise mileage data recording
- Intuitive operation of the web application
- Multi-stage administrator access
- Exports in PDF format, compliant with the tax regulations
- Exports of drivers, vehicles and trips (CSV and Excel)
- Bulk imports of drivers and vehicles (CSV and Excel)
- Division into fleets
- Configurable statistics
- Privacy protection



Smart Mobility Application



Logbook

Do you and your employees still devote too much time to compiling and checking logbooks?

That doesn't have to be the case.

Trips are recorded completely automatically with our "Smart Mobility Logbook" cloud-based solution. After the simple Plug'n'Play installation of the OBD dongle by the user, he/she books his/her journeys in just a few steps. A fleet worker can check these bookings and export them as a PDF compliant with the tax regulations

Administration

Organise your drivers, vehicles and fleets using versatile import and export functions (CSV and Excel) as well as via manual processing. Use our intelligent entry to keep an overview of vehicles and drivers at all times, assign fleets to your workforce and manage your vehicle fleet.

Optional features

Inter alia, automatically generated statistics give an overview of:

- The mileage per month
- Overview of the monetary advantage
- Refuelling stops
- Breakdown into private journeys, business journeys and journeys to work in kilometres and %.

A reminder is sent by email for unbooked journeys or vehicles without data.

Approval for retrospective changes of private journeys after the 7-day period of grace with recording by a technical administrator (fleet manager).

Driver's licence checking.



Smart Mobility AT Fleet

Robust and durable

The CarLoc® AT Fleet was specially designed for quick installation and universal use. It is installed without additional external antennas inside the vehicle or outside, where it can be exposed to wind and weather. The large selection of interfaces and standard protocols means that it can be connected to current sensors and sub-systems. CarLoc® AT Fleet has reliably accompanied vehicles over the years and gives information about the vehicle position and load status (optional) at any time. High functionality, paired with comfortable configuration options, allow tailor-made operation at minimum cost. The intelligent device logic automatically reports all processes relevant to the transport to the CarLoc® portal – and this world-wide.

CarLoc® AT Fleet provides precise locating (even in difficult environments) using a highly sensitive GPS receiver. Remotely configurable settings, data storage for recordings over several months as well as the option of monitoring up to 6,000 geographical zones supplement the Smart Mobility AT Fleet.

Smart Mobility AT Fleet

- Precise location even in a difficult environment
- LTE-enabled – supports the latest mobile data transfer standard
- Autonomous detection of areas that are barred for transport
- Continuous monitoring, even in standby
- 9-axis MEMS sensor for acceleration, angular velocity and magnetic field
- Theft protection function, area monitoring, external sensors can be connected
- Mileage recording
- Easy and flexible remote configuration of devices
- Backup battery



Smart Mobility AT Fleet

Technical specifications

■ Power supply	12 - 24 VDC lithium battery pack
■ Communication	Quad Band GSM 850/900/1800/1900 MHz GPRS, G2, G4 (LTE) and SMS
■ Geofencing	6,000 geographic zones can be stored on the device
■ Localization	72-channel receiver GPS/QZSS/GLONASS/Beidou/Galileo accurate to 2.5 m
■ Data storage	30,000 sensor records, incl. time and position
■ Protection class	IP67 (IP96)
■ Temperature range	-20 to +65 °C
■ Dimensions	Length 133, Width 118, Height 36 mm
■ Weight	250 g
■ Connections	Tachograph, door switch, load, level, pressure sensors and up to three temperature sensors (PT100/1000)
■ Portal	Individualised web portal, high availability and secure hosting in the Swiss Cloud. Integration of third party devices is possible
■ External interfaces	1x CAN (SAEJ1939), 2x RS232 (114200 baud), 2x digital output (100 mA), 8x digital input (30 V), 4x analogue input (0-28 V/ 16 bit)
■ Options	Bluetooth LE, 1-Wire/iButton, lithium battery, 100 days of autonomous operation depending on the number of connection establishments





Power for Mobility!

FELA Management AG

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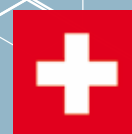
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TIS



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Union des transports publics
Unione dei trasporti pubblici