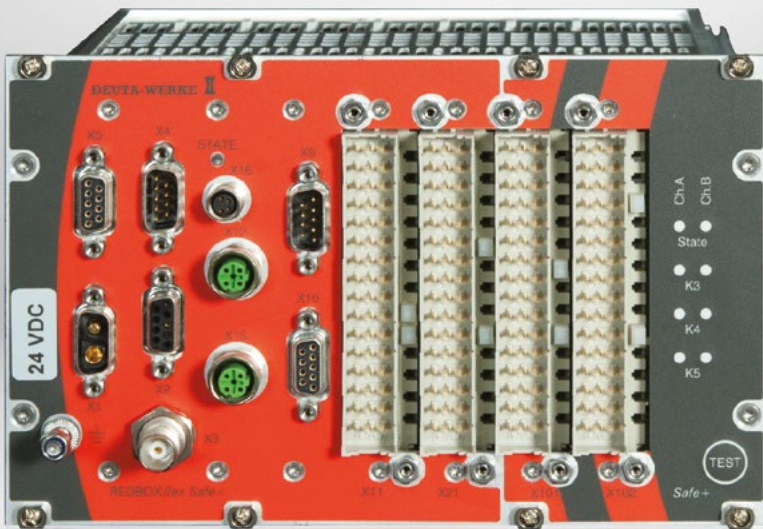


DEUTA REDBOX®

Multi-Functional Recorders



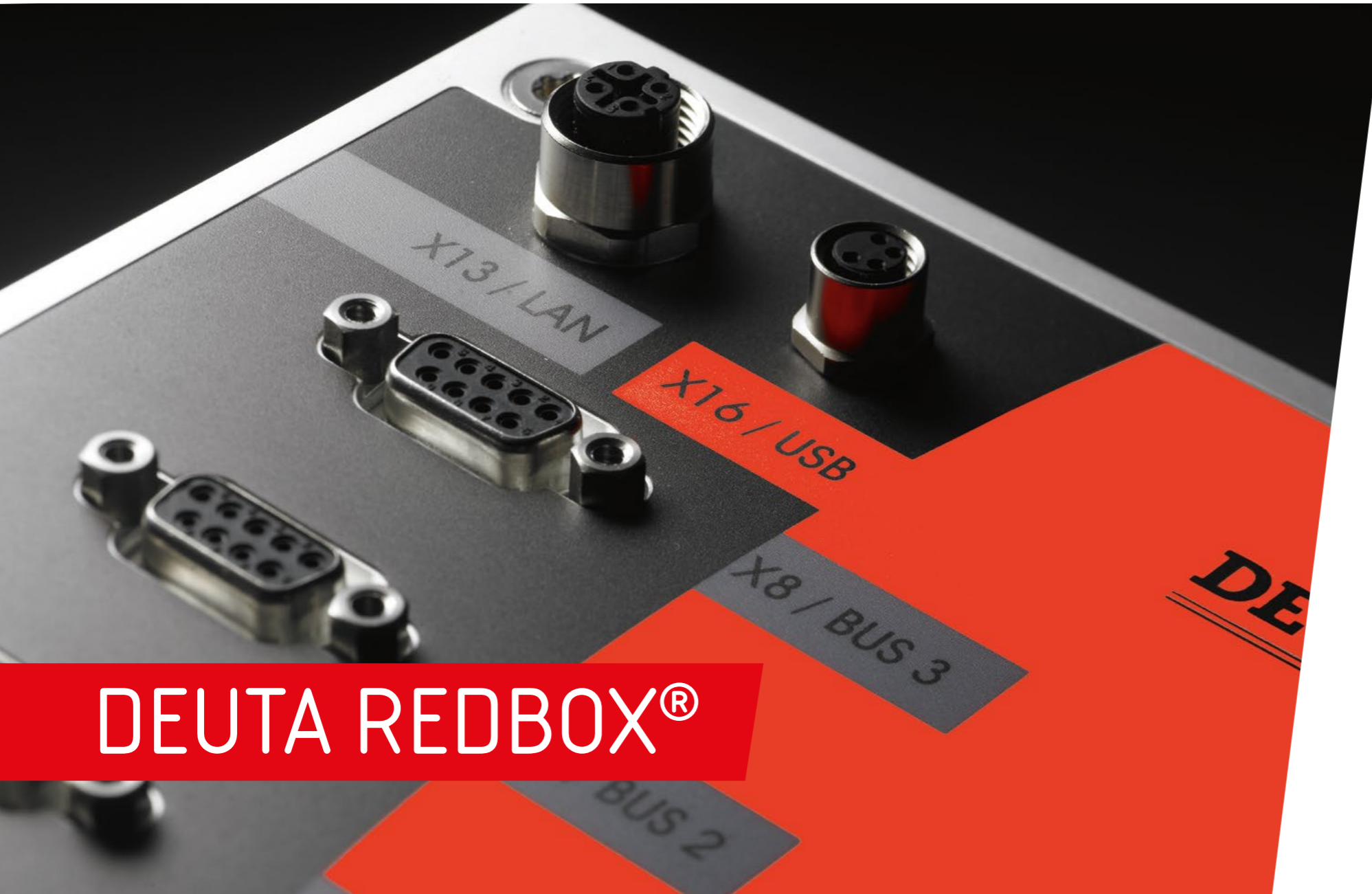


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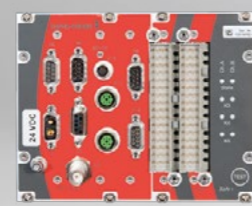
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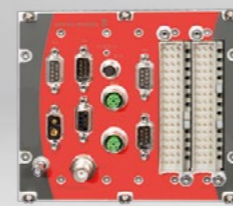
REDBOXlog



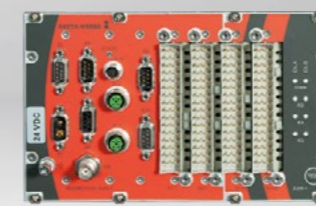
REDBOXpro



REDSafe



REDBOXflex



REDBOXflex Safe+



REDBOXtop

»DEUTA REDBOX® – A world – as versatile as your applications!«

- **Versatile:** One hardware platform for all possible variations
- **Flexible:** Adapts its hardware and software to your system environment
- **Optimised:** You determine which functions you need
- **Convenient:** Service functions for retrieving and evaluating the travel data
- **Unique:** Our know-how and world-wide support

DEUTA produces the right REDBOX for your individual application

DEUTA REDBOX® recorders adapt perfectly to every vehicle environment. The smart REDBOX concept offers travel data security and innovative service and evaluation possibilities – world-wide.

Flexibility and versatility thanks to DEUTA's platform concept

Whatever area of application you are planning for your DEUTA REDBOX® – the basic equipment is identical: A uniform platform for all REDBOX recorder variants. This core unit consists of the communication structure, the microprocessor and the memory module. Developed, produced, tested and qualified by DEUTA staff, actively accompanied by our obsolescence management to ensure consistent and world-class quality.

Regardless of whether you want to integrate your DEUTA REDBOX® as a data logger or as a Multi-Functional Recorder in a complex communication structure, your REDBOX can be equipped for any situation. DEUTA configures the right REDBOX for every application area – quickly and flexibly.

»From Data Logger to Multi-Functional Recorder: the Multitasking Talent DEUTA REDBOX®

Simple integration in the project

The DEUTA REDBOX® hardware always finds room. The Multi-Functional Recorders are easy to integrate in your application environment as a 19" rack unit in the control cabinet or as a stand-alone box.

Under observation world-wide

With the integrated REDBOX Web Interface you communicate directly with your REDBOX. You have access to parameters such as recorder status, status of the data memory or communication status at all times. The REDBOX is operating system independent through the use of html web browser. Wherever your vehicle may be, the REDBOX remote diagnostics package will give you professional support from DEUTA at all times to anytime and anywhere.

Data download and evaluation – as you want it

The travel data can be downloaded through a USB Stick or over the Ethernet interface. The ADS 4 evaluation software allows easy evaluation of recorded travel data in high resolution in tables or graphics.

Compliant with standards

The DEUTA REDBOX® Multi-Functional Recorders comply with standards including, but not limited to, the following: EN 50155, EN 50121-3-2, EN 50126, EN 50128, EN 50129, IEEE1482.1 and FRA.

Product Overview



REDBOX® 2K

- Compact 19" hardware design
- Future-proof performance through multiple vehicle bus system and I/O expansion
- More flexibility through numerous in- and outputs
- Can be used to record data from various train safety systems, e.g. ETCS



REDBOXlog

- Compact
- All data via bus communication
- Available as a box version or 19" rack unit
- Internal CompactFlash, 2 GB
- 2x Ethernet and 1x USB for maintenance and data download



REDBOXpro

- Can be integrated everywhere
- Internal CompactFlash storage card, 2 GB
- Digital and Analog Inputs and Outputs
- Display and keyboard option



REDBOXflex

- Flexible hardware structure
- Multiple simultaneous communication buses
- Digital inputs and outputs as needed
- SIL extensions available
- TSI-compliant



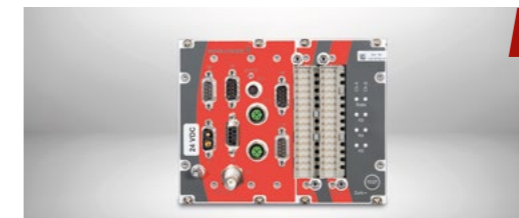
Safe+

- For requirement levels to SIL 4
- Several SIL functions configurable
- Integrates into all DEUTA REDBOX® versions
- Complete SIL Engineering by DEUTA



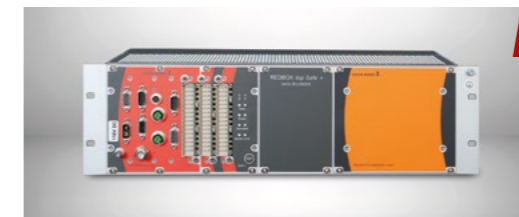
REDBOXflex Safe+

- „All-in-one“ recorder: Recording
Communication
Control
Safety



REDSafe

- The safe stand-alone unit
- All safe functions of the Safe+ module
- Also MVB, CAN and Ethernet communication
- Can be integrated into a DEUTA system



REDBOXtop

- Integration of a DEUTA REDBOXlog or REDBOXflex with a crash-protected memory unit in an 84 TE 19" module rack
- Optional with a Safe+ function
- Crash-protected memory unit in the basic version or retrofittable



REDBOXstar

- Developed for the US market
- IEEE1482 and FRA compliant
- Ethernet and RS422 communication
- For retrofit and PTC integration



PMU

- For data protection according to GM/RT2472/IEEE1482/FRA49 CFR
- Int. Flash Memory with 1 GB, 2 GB or 16 GB
- USB connection
- Can be connected to all REDBOXflex or REDBOXlog



»DEUTA REDBOX® 2K –

Das Plattformkonzept«

Whatever area of operation you are planning for your DEUTA REDBOX® 2K, the basic equipment is identical: A uniform platform for all REDBOX recorder variants. Consistently developed, produced, tested and qualified by DEUTA staff, actively accompanied by our obsolescence management and our in-house board production.

Whether you plan to use your DEUTA REDBOX® 2K as a data logger or as a multi-functional recorder within a complex communication structure: The DEUTA REDBOX® 2K is equipped for all application scenarios. DEUTA configures the right REDBOX for any area of application – quickly and flexibly.

Flexibility through standardisation

- Compact 19" hardware design
- Future-proof performance through multiple vehicle bus system and I/O expansion
- More flexibility through numerous in- and outputs
- Can be used to record data from various train safety systems, e.g. ETCS
- Can be flexibly used for all application areas in railway traffic – from streetcars to high-speed trains
- GPS
- Optional Safe+ module up to SIL4
- Optional protected memory storage for legal data

DEUTA REDBOX® 2K

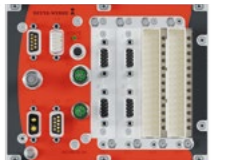
Basic configuration	DEUTA REDBOX® 2K in 19" cassette
Operating voltage	Rated voltage: 24 to 110 V DC
Power consumption	max. 30 W
Protection category	IP 20
Temperature range	Operation: -25 °C to +70 °C; Storage: -40 °C to +85 °C
Storage medium	Internal microSD card with 16 GB available storage
Location and time synchronisation	GPS receiver via TNC socket, connection an active or passive GPS antenna can be configured
Real-time clock	RRTC with TCXO: ± 2 minutes/year across the entire temperature range
Diagnostic interface	Gbit-Ethernet
Service interface	Gbit-Ethernet, USB 2.0
Bus interfaces	MVB (Standard), optional Gbit-Ethernet, CAN, Profibus, RS485, RS422, IBIS, LZB
Analogue outputs voltage or current	0-10 V, 0/4-20 mA
Analogue inputs voltage or current	±10 V, 0/4-20 mA
Digital outputs	with Open Collector transistor output, max. 100 mA
Digital inputs	High level: +12 to +154 V DC
Frequency inputs for digital sources	Rectangle input, fmax = 10 kHz, Imin. 2 mA
Frequency inputs for AC encoder	suitable for 20 V / 80 V encoders
CodePlug	for the continued use of vehicle specific data when exchanging devices
Internal web server	entry of vehicle data, display of process values
Width	14 HP: with no expansion cards 32 HP: with four expansion cards 44 HP: with three expansion cards and Safe+ module
Height	3U
Depth	171 mm without plugs and mating plugs 1 to 3 kg (depends on variant)
Protected memory unit	Protected Memory Unit PMU22, PMU23, PMU24 or PMU25 Connection via USB 2.0 interface, Standards GM/RT 2472, IEEE Std. 1482.1-1999 FRA Guideline 49, FRA 49 CFR Part 229, Sect. 229.135 Appendix D)
MVB- Master	MVB Master expansion card
Safe+ module	Safety functions up to SIL4 Connection via USB 2.0 interface, Standards GM/RT 2472, IEEE Std. 1482.1-1999 FRA Guideline 49, FRA 49 CFR Part 229, Sect. 229.135 Appendix D)
Removable memory card (optional)	a memory card that can be removed via the front plate without using tools for the purpose of vehicle data archival
Removable SolidStateDisk (optional)	for the storage of video data
Applied standards	EN50155, EN50121-3-2, EN45545-2, EN50126, EN50128, EN50129



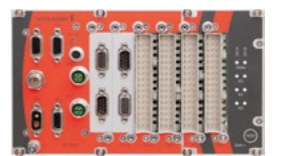
REDBOX S



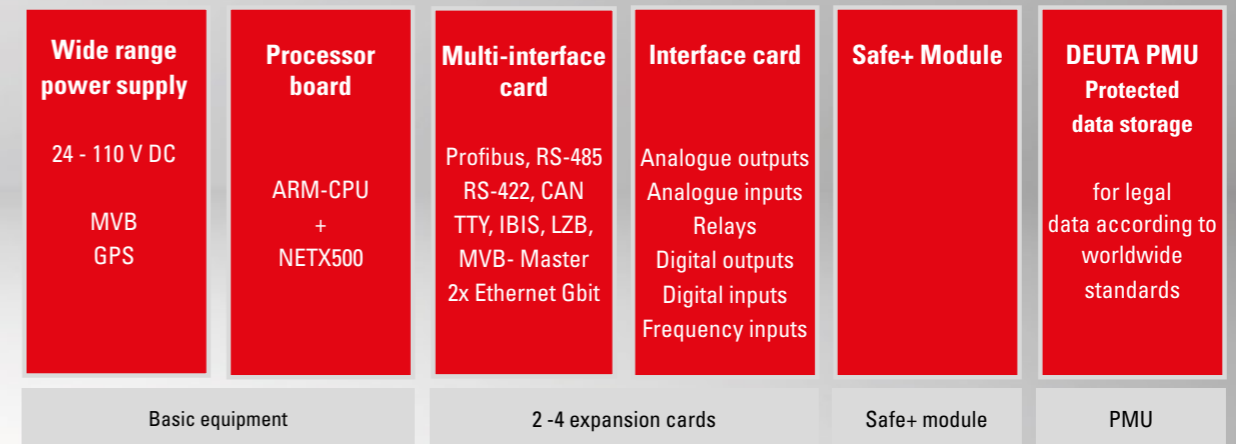
REDBOX M/L



REDBOX XL/L



REDBOX XXL



»DEUTA REDBOX® 2K –

The platform concept«

Functional improvements:

- Faster data transfer when reading trip data via USB and Ethernet
- Improved service mode using the web interface
- Separation of legal and machine-technical data
- Able to process multiple video signals
- Multiple data storage areas can be configured, including on different physical storage media
- User configuration tool (optional)

Non-functional improvements:

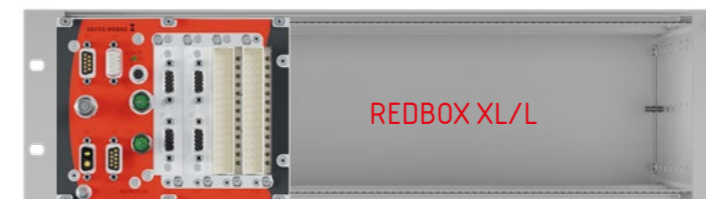
- Uses high-performance ARM CPU
- Robust data recorder with improved thermal management
- Higher reliability due to improved MTBF values
- Improved mechanical protection of data storage
- Optimised housing components for simplified maintenance
- Reduction of component variations due to configurable hardware modules
- Higher availability due to automated testing and inspection scenarios



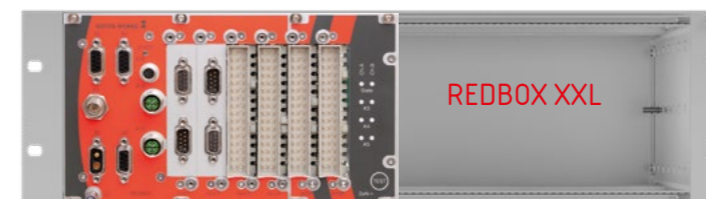
Basic configuration



Up to 2 configurable cards



Up to 4 configurable cards



Up to 3 configurable cards & Safe+ modul



»DEUTA REDBOXlog -

Your Recorder for Juridical Data!«

The mother of all REDBOXES

The DEUTA REDBOXlog stores juridical data reliably and across borders. This core unit consists of the communication structure, the microprocessor and the memory module forms the solid basis of all REDBOX recorders.

Travel data memory

- Stores travel data in high resolution on an internal CompactFlash card
- Download data via USB
- Reconstructs travel data in maximum resolution

Housing

- Space-efficient and compact
- Easy to mount
- User-friendly design

Service concept

- Optimised for service including remote access from anywhere in the world
- Operating system independent through standardised browser access
- Simple and efficient data analysis through DEUTA's ADS4 evaluation software

Cross border travel data

- ETCS/ERTMS-compliant
- Optionally with protected memory
- TSI-compliant
- TSI konform

DEUTA REDBOXlog

Feature/Specification

Operating voltage	24 VDC or 110 VDC
Power consumption	max. 10 W
Temperature range	-25°C to +70°C (operation) -40 °C or up to +85 °C (storage)
Storage medium	int. CompactFlash 2 GB
Interfaces	MVB, Ethernet CAN & Profibus optionally (REDBOXlog (Box)) RS 232, RS 422/485 optionally
Service PC connection	1 Ethernet, 1 USB

Dimensions

	19" rack unit	Box
Width	71.12 mm (14 TE)	245 mm
Height	128.4 mm (3 HE)	160 mm
Depth	169 mm	50 mm
Weight	approx. 1.2 kg	approx. 2 kg
d	IP 20	IP 20



REDBOXlog (19")



REDBOXlog (Box)



» DEUTA REDBOXpro –

Your Recorder with Display and Keyboard!«

Your options

The DEUTA REDBOXpro can, thanks to its housing shape, be positioned anywhere in the vehicle to save space. A user-friendly keypad and display option is also available.

Travel data memory

- Stores travel data from communication buses or wired inputs/outputs in highest resolution on an internal CompactFlash card
- Download travel data via USB and Ethernet interface
- Reconstructs travel data in any resolution

Housing

- Space-efficient and compact
- Easy to mount
- User-friendly design
- Optional display and keyboard

The service concept

- Optimised for service including remote access from anywhere in the world
- Operating system independent through standardised browser access
- Simple and efficient data analysis through DEUTA's ADS4 evaluation software

Display and keyboard

- Multi language support
- Easy to use keypad
- Access to direct setup information such as wheel diameter, vehicle number and train driver number

DEUTA REDBOXpro

Feature/Specification	
Operating voltage	24 VDC or 110 VDC
Power consumption	max. 15 W
Temperature range	-25°C to +70°C (operation) -35°C to +85 °C (storage)
2 frequency inputs	Squarewave, f_{max} 10,0 kHz
2 analogue inputs	± 0 to 10 V or 4 to 20mA
20 digital inputs	High level +12 to +154 V DC
Recording type	Triggered by distance, time or event
Storage medium	int. CompactFlash 2 GB
2 analogue outputs	0 to 10 V or 4 to 20mA
2 transistor outputs	Open Collector
6 relays	Changeover contacts
Interfaces	MVB, Ethernet CAN & Profibus optionally RS 422/485 optionally
Service PC connection	1 Ethernet, 1 USB
Positioning	GPS
Membrane keypad	16 keys (optional)
Display resolution	122 x 32 pixels (optional)

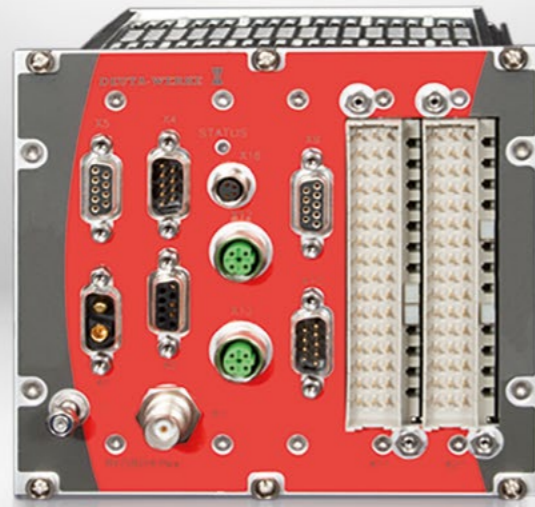
Dimensions	
Width	245 mm
Height	160 mm
Depth	50 mm
Weight	approx. 2 kg
Protection category	IP 20
Connection	2 F48 plugs, DIN 41612 for IP 20 M12 d round connector, M8 round connector, 3 D-Sub plug 9-pin



REDBOXpro
(with display and keyboard)



REDBOXpro (Box)
(Standard)



»DEUTA REDBOXflex – the „All-in-one“ Recorder!«

Flexible and versatile

The flexible “All-in-one-Recorder” DEUTA REDBOXflex was developed according to the current CENELEC standards and is compliant with ETCS and ERTMS. The REDBOXflex is excellently suited for local and long distance traffic. You can keep a close eye on diagnostics, device status, parameters and configurations via the Web Interface. The Service functions are especially convenient: You simply extract the data over the USB or Ethernet interfaces and analyse it with the DEUTA evaluation software ADS4.

Flexibility through standardisation

- Compact 19” rack hardware design
- A future proofed system performance through multiple vehicle buses and I/O expansions
- Additional flexibility through analog and digital I/O expansion
- Further interfaces can be expanded in modules, depending on the field of application
- ETCS Recorder
- GPS
- Optional crash-protected memory module to preserve juridical data

Service via Web Interface

- Optimised for service including remote access from anywhere in the world
- Operating system independent through standardised browser access
- Simple and efficient data analysis through DEUTA’s ADS4 evaluation software

Convenience with travel data memory

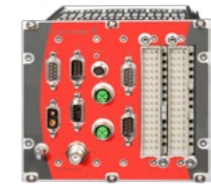
- Stores travel data in the highest resolution on an internal CompactFlash card
- Download travel data via USB and Ethernet interface
- Reconstructs travel data in any resolution

DEUTA REDBOXflex

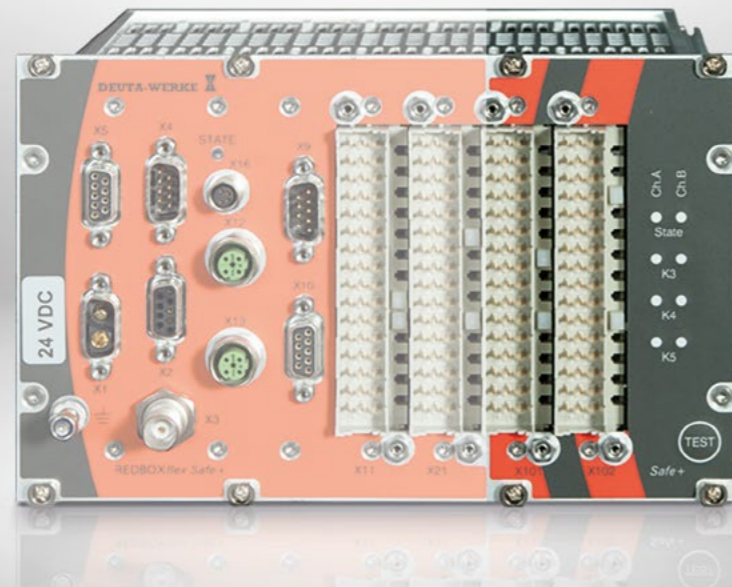
Example configuration	
Operating voltage	24 VDC or 110 VDC
Power consumption	max. 15 W
Temperature range	-25°C to +70°C (operation) -40 °C to +85 °C (storage)
2 frequency inputs	Squarewave, f_{max} 10,0 kHz
2 analogue inputs	\pm 0 to 10 V or 4 to 20mA
4 digital inputs	High level +12 to +154 V DC
Recording raster	Triggered by distance, time or event
Storage type	int. CompactFlash 2 GB
2 analogue outputs	0 to 10 V or 4 to 20mA
2 transistor outputs	Open Collector
1 relays	Changeover contact
Can be extended with additional I/O cards	
Interfaces	MVB, Ethernet CAN & Profibus optionally RS 232, RS 422/485 optionally
Service PC connection	1 Ethernet, 1 USB
Tracking	GPS

Dimensions

Width	121.92 mm (24 TE) 19”
Height	128.4 mm (2 HE) 19”
Depth	180 mm
Weight	approx. 1.2 kg
Protection category	IP 20
Connection	1 F48 plugs, DIN 41612 2 M12 d round plug, M8 round plug (Ethernet) 6 D-Sub plug 9-pole (USB)



REDBOXflex



»Safe+ – the Safety Module!«

Safety up to SIL 4

The Safe+ module takes over safety functions for the requirement levels up to SIL 4 and thus extends the safety-related field of application of the DEUTA REDBOX® series. The two channel “fail-safe” structure forms the basis for the functional technical safety of the Safe+ module.

The Safe+ module was developed according to the standards EN 50126, EN 50128, EN 50129 as well as EN 50155 and controls the following functions:

- Driving safety switch DSD
- Standstill detection
- Rollback protection
- Monitoring of maximum speed
- Monitoring of limit speed
- Speed signals

The concept of the Safe+ module allows high flexibility in the configuration, the parametrisation and the application, e.g. as a time-time or distance-distance DSD. The Safe+ module can be used autonomously as a “stand-alone” unit REDsafe or can be combined with the REDBOXflex recorders. The versatile hardware structure allows the Safe+ module to be integrated into many different vehicle architectures.

Functions of the Safe+ module at a glance:

Driving safety switch – DSD

This DSD function of the Safe+ module stops the locomotive through forced braking, should the locomotive driver become incapacitated during the trip.

Monitors the limit and maximum speed

With this function the Safe+ module continuously checks the current speed for compliance with a defined limit speed (Vact </- Vlimit). The status of the appropriate output (relay) is changed on exceeding this speed.

The maximum speed is also monitored. If the maximum speed is exceeded, forced braking takes place until the vehicle drops back below the maximum speed (intermittent forced braking).

Protects against unwanted rolling

Prevents the unintentional movement of the vehicle for required standstill through forced braking.

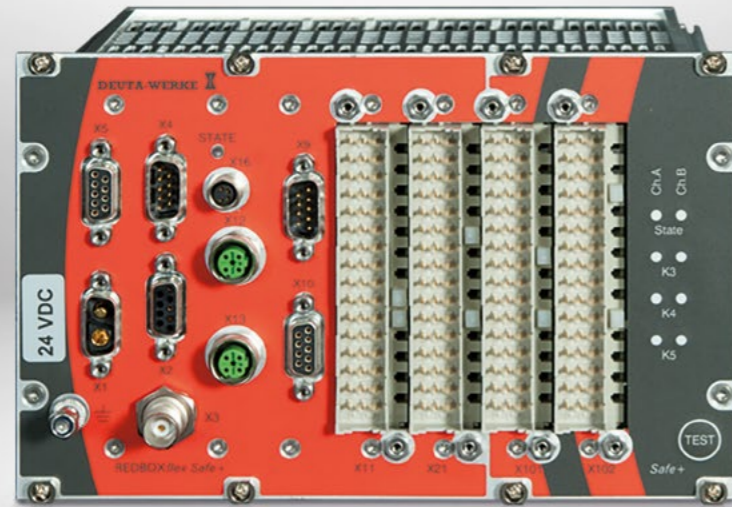
Detects standstill of the train

Uses a signal to report that the vehicle is no longer moving discernibly.

Supplies the speed

The vehicle speed measured by the Safe+ can be provided to safe systems by an analogue signal of 4 - 20 mA.





»DEUTA REDBOXflex Safe+ – for flexibility and safety!«

Safe, safer, REDBOXflex Safe+

REDBOXflex Safe+ is a combination of a REDBOXflex recorder with a Safe+ module. The advantages of the REDBOXflex and the safety of the Safe+ functions are available in one compact drawer unit:

Flexibility in the structure

Easily configurable hardware and software.

Travel data recording

All possibilities of the DEUTA REDBOX® can be used, including the backup in the protected data memory PMU.

Bus communication

The familiar combination buses such as MVB, Profibus or CAN can be implemented individually or in combination. The safe communication with the Safe+ module extends the flexibility of the configuration.

Direct signals

Connection to the speed and radar sensors allows calculation of the vehicle speed and direction of travel. Different input or output signals can be configured optionally.

Safety functions

All functions of the Safe+ module can be applied to:

- DSD
- Standstill detection
- Rollback protection
- Maximum speed
- Limit speed
- Speed signals

DEUTA supports the expertise process of your REDBOXflex Safe+ module up to certification.

DEUTA REDBOXflex safe+

Example configuration

Operating voltage	Nominal 24, 72 or 110V
Power consumption	max. 30 W
Temperature range	-25°C to +70°C (operation) -40 °C to +85 °C (storage)
2 frequency inputs	Squarewave, f_{max} 10,0 kHz
2 analogue inputs	± 0 to 10 V or 4 to 20mA
24 digital inputs	High level +12 to +154 V DC
Recording raster	Triggered by distance, time or event
Storage type	int. CompactFlash 2 GB
2 analogue outputs	0 to 10 V or 4 to 20mA
2 frequency outputs	Squarewave, f_{max} 5,0 kHz
Outputs	2 transistor outputs with Open Collector
Interfaces	MVB, Ethernet CAN & Profibus optionally RS 422/485 optionally
Service connections	1 Ethernet, 1 USB
Tracking	GPS

Example configuration

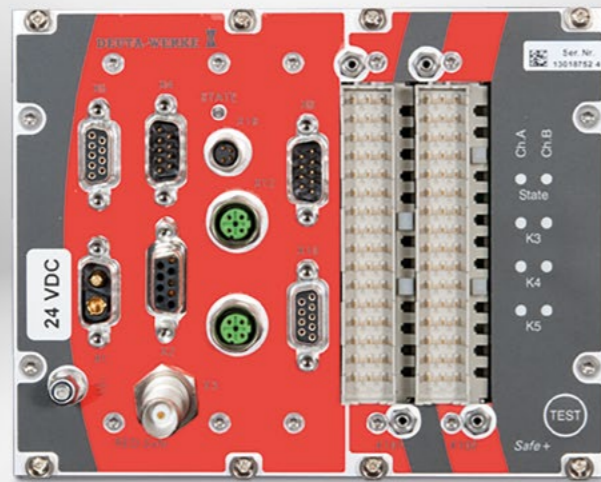
Example configuration	safe+
Safety functions	Driving safety switch DSD Standstill detection Rollback detection Monitoring of the limit speed Monitoring of the maximum speed Speed signals

Dimensions

Width	40 TE (202 mm)
Height	128.4 mm (3 HE)
Depth	169 mm
Weight	approx. 2,5 kg
Protection category	IP 20
Connection	4 x F48 plugs, DIN 41612 2 M12 d round plug, M8 round plug (Ethernet) 4 x D-Sub plug 9-pin (USB)



REDBOXflex Safe+



»DEUTA REDsafe – the safe stand-alone unit«

DEUTA REDsafe is the “stand-alone” unit for that added safety. It takes over safety functions for the requirement levels up to SIL4 and thus extends the safety-related field of application of the DEUTA REDBOX® series. The REDsafe was developed according to the standards EN 50126, EN 50128, EN 50129 as well as EN 50155.

The concept of the DEUTA REDsafe allows high flexibility in the configuration, the parametrization and the application, e.g. as a time-time or distancedistance DSD. The versatile hardware structure allows the REDsafe to be integrated easily into multiple different vehicle architectures. DEUTA supports the expertise process of your REDsafe up to certification.

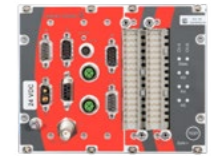
DEUTA REDsafe advantages at a glance

- Compact dimensions for 19" module racks
- Simple system information
- Connection to all DEUTA sensors
- Development of SCUs (Safe Control Units) corresponding to customer requirements for safety functions – e.g. with
 - Standstill detection – SIL 3
 - Rollback protection – SIL 3
 - Speed monitoring – SIL 3
 - Speed indicator – SIL 3
 - DSD functionality with the aid of a hand switch and a foot pedal corresponding to the predetermined Safety Integrity Level – SIL 3
 - Transmission of speed values – SIL 3

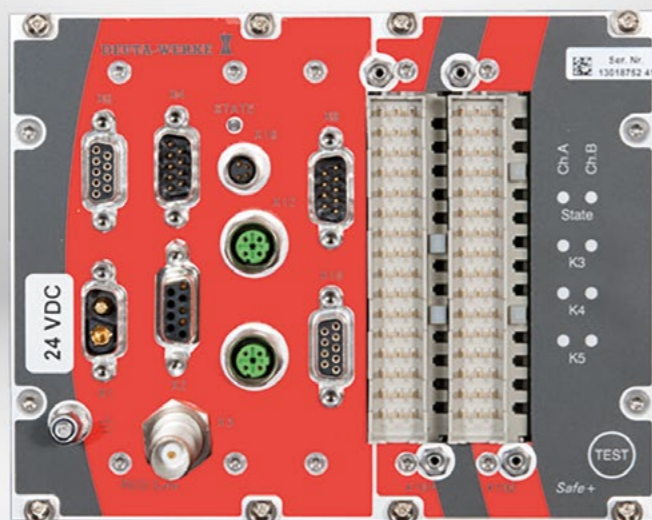
DEUTA REDsafe

Configuration	
Operating voltage	24 VDC, 72 VDC or 110 VDC
Power consumption	typ. 23 W / max. 30 W
Temperature range	-25°C to +70°C (operation) -40 °C to +85 °C (storage)
2 frequency inputs	Squarewave, fmax 10,0 kHz, ten channel
13 digital inputs	High level +12 to +154 V DC
1 analogue output	4 to 20mA
3 x 2 relay contacts	for brake, standstill, limit speed
2 relay contacts	for DSD lamp and buzzer
1 relay contact	for error output
vehicle bus	1 Ethernet, 2 MVB, 1 CAN
Service PC connection	1 Ethernet, 1 USB
Positioning	GPS
Safety functions	Driving safety switch DSD Standstill detection Rollback protection Monitoring of the limit speed Speed output
Additional safety protocols	Cold Movement Detection Braking Curve Monitoring

Dimensions	
Width	162.2 mm
Height	128.4 mm
Depth	169 mm
Weight	approx. 1.75 kg
Protection category	IP 20
Connection	2 x F48 plugs, DIN 41612 1 x USB 2 x Ethernet M12 1 x D-Sub plug 2-pin



REDsafe



»Safety Applications – for that Extra Level of Safety«

REDSafe- Applications & Protocols

In addition to the standard safety functions of the REDsafe, the safety applications and communication protocols offer an extra level of safety. Additional project-relevant safety functions, such as standstill detection or braking curve monitoring for emergency braking, can be easily added to the standard functions.

DEUTA also supports the review process right through to certification.

REDSafe- Cold Movement Detection

ETCS is primarily aimed at cross-border rail traffic on tracks that are utilised to the maximum. Cold Movement Detection (CMD) is an optimisation function within the framework of ETCS Baseline 3.

Without CMD, the driver commences his journey in “staff responsible” mode. This means that the train may only be driven at low speeds until it has been able to accurately determine its position by passing over suitable ETCS balises.

The Cold Movement Detection function avoids this costly and time-consuming procedure. The CMD detects train movement while the ETCS was switched off on-board the vehicle. Parameters such as the position or the radio block center access number can be reused once the ETCS has been reactivated. This makes it possible to obtain a movement authority in “full supervision” mode much earlier – and start travelling at higher speeds.

DEUTA Cold Movement Detection is an integrated safety function of the DEUTA REDBOX recorder and uses the existing speed sensors. It does not require any additional sensors. By integrating the CMD into the REDBOX, no additional device is required.

The DEUTA CMD revalidates the vehicle position and reduces dependency on operational procedures. This DEUTA CMD is suitable for any rail vehicle equipped with an on-board ETCS system: From regional trains to long haul locomotives and high-speed trains.

REDSafe - Braking Curve Monitoring

The REDsafe EBS (Emergency Brake Supervision) braking curve monitoring system checks the force of emergency braking. For this purpose, two axle-mounted incremental encoders transmit the wheel speed via two redundant channels. The EBS compares the speed signals from the two encoders with the target braking curve. Two target braking curves can be configured. Monitoring is activated by signalling the emergency brake. If the speed is exceeded, the braking curve monitoring function intervenes by activating an auxiliary braking system.

REDSafe-SSCU - SIL-Control Function

The REDsafe’s safety-related fields of application are, along with the SCU, focused on additional SIL control functions.

The secure information from the REDsafe SCU can, for instance, be used as a secure source for additional secure speed monitoring.

The two-channel hardware architecture supports the SIL3 functional safety requirement.



»DEUTA REDBOXtop-

Symbiosis for greater freedom of variety!«

Variety for individual requirements

DEUTA REDBOXtop in the basic version is a symbiosis of the variety of the “all-in-one” recorder REDBOXflex and the protected travel data memory PMU in a 19” housing.

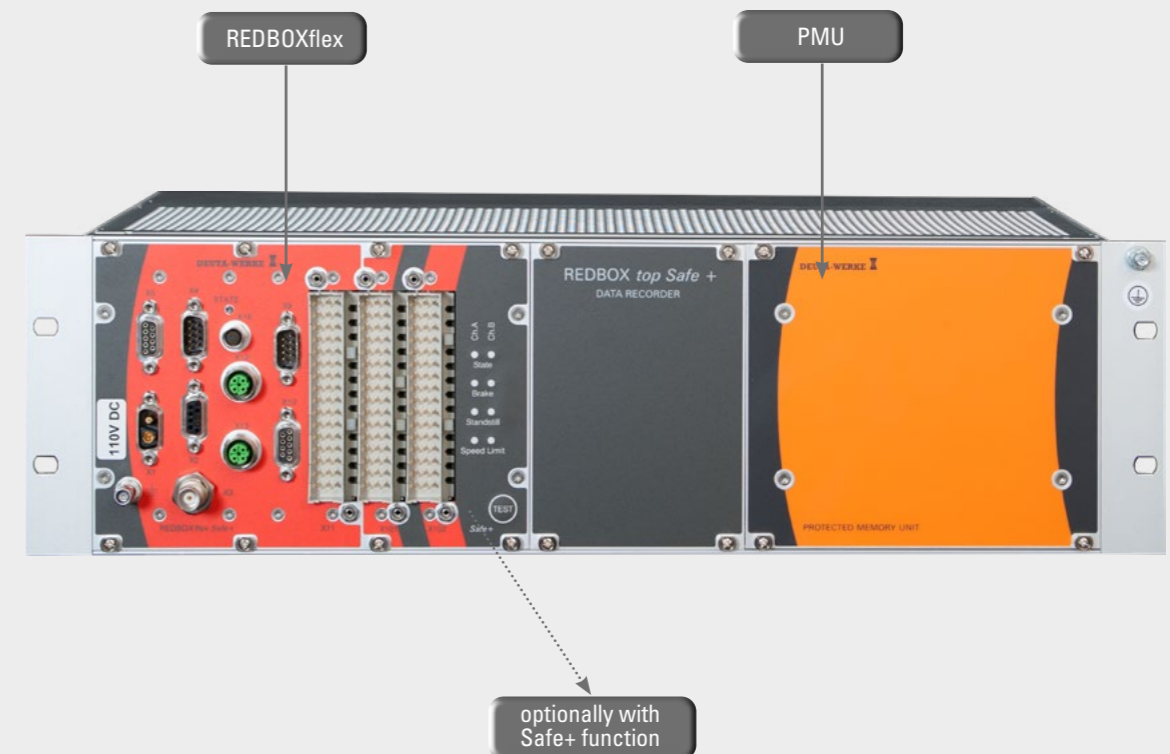
As a Safe+ variant, the REDBOXtop takes over additional safety functions such as the monitoring of the maximum and limit speed, the rollback protection, the standstill detection and the speed output. Another feature is the driving safety device (DSD).

Variable synergy

- Interface flexibility with high integration density
- Additional travel data security in the protected memory
- More monitoring safety with the Safe+ option

Technical properties/specification

The technical properties of a REDBOXtop vary according to the equipment of the Multi-Functional Recorder. Our product and project engineers will be happy to help you choose the optimum combination and find the right DEUTA REDBOXtop for your individual application.





»DEUTA REDBOXstar – the Event Recorder!«

Hardware

- Standard US power supply nominal value: 37.4 or 74 V (± 30 %)
- Crash hardened memory module with 1 GB (FRA certified)
- Ethernet ports for vehicle network, service and automatic data downloading via WLAN. Alternatively data downloading also via card reader unit or download box
- USB port for data downloading and software update
- RS422 serial interface (isolated)
- Digital and analogue inputs according to IEEE1482.1 (isolated)
- MIL Connectors
- Customised mounting plate for a better integration in the vehicle
- Multi-color LED for visual status information

Onboard Software (application)

- Flexible configuration engineering
- Automatic configuration possibility depending on vehicle type (easy commissioning and replacement)
- Configurable data downloading procedure acc. to FRA requirement (48 h) or customised downloading file with data selection e.g. time, distance etc.
- Downloading USB stick – standard or protected
- Automatic time synchronisation with interface
- Geo data recording

Onboard Maintenance Web Interface

- Integrated Web Interface for service purposes
- Works with a standard web browser
- Works on different operating systems
- Convenient and easy to use
- Also usable via Ethernet interface
- Access to all service pages
- Different levels with password protection
- Process value display
- Detailed recorder status and statistic
- Setting of parameters (time setting, wheel diameter, etc.) for vehicle number

Playback Software (Data analysis)

- Windows compliant
- Easy to use
- Defined data evaluation period
- Automatic FRA report (48 h – signals statistic)
- Time or distance view
- Search functions
- ... and many other data evaluation features



REDBOXstar 1

- PTC integrable compact unit
- Compact unit
 - LSI 6 MCU rack mount compliant
 - IEEE 1482.1 and FRA crash-protected memory
 - RS422 and Ethernet vehicle network



REDBOXstar 2

- IEEE recorder
- Compact unit
 - LSI 6 MCU rack mount compliant
 - IEEE 1482.1 and FRA crash-protected memory
 - Vehicle bus RS422 – RS485
 - Digital and analogue inputs
 - Digital and relay outputs



REDBOXstar 3

- Retrofit compliant event recorder – for PTC and customised vehicle data
- Compact unit
 - Digital inputs galvanically isolated
 - Configurable analogue inputs
 - Flexibility over easy configuration for the analogue input
 - IEEE 1482.1 and FRA crash-protected memory
 - RS422 and Ethernet vehicle network
 - Vehicle data compliant recording
 - PTC compliant recording



»DEUTA PMU – Protected Data Memory – optimally protected against stresses in railway traffic!«

DEUTA PMU (Protected Memory Unit) completes the product line of REDBOX Multi-Functional Recorders with protected travel data recorder units. The special structure of the housing is optimised to withstand the extreme mechanical and thermal stresses in exceptional situations.

Housing

- Space-efficient and compact
- As a stand-alone unit with fastening bracket set (PMU 23 / PMU 24)
- Can be mounted alternatively in the 19" module rack (PMU 22 / PMU 25)

The interface

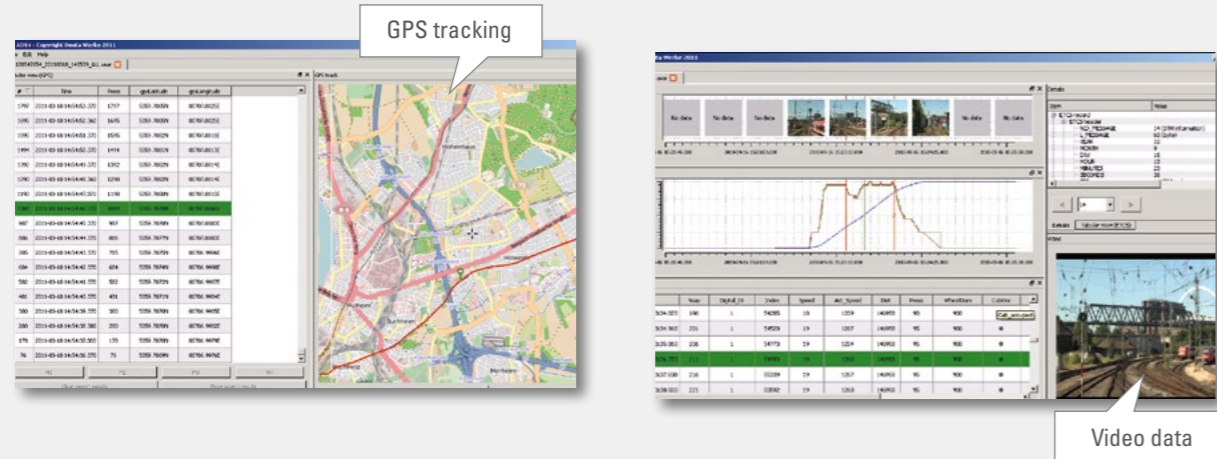
- with USB interface

The load capacity

- Shock and vibration as per EN 60068
- Fire protection as per DIN 5510-2 and EN 45554
- Mechanical load capacity as per IEEE St 1482-1999 (PMU 23 / PMU 24 / PMU 25)
- Mechanical load capacity as per GM/RT 24/72 (PMU 22)

DEUTA PMU

	PMU 22	PMU 23	PMU 24	PMU 25	PMU 26
Standards	GM/RT 24/72	GM/RT 24/72 IEEE Std. 1482.1-1999	IEEE Std. 1482.1-1999 FRA Directive 49, (FRA 49 CFR Part 229, § 229.135 Appendix D)	IEEE Std. 1482.1-1999	IEEE Std. 1482.1-1999 FRA Directive 49, (FRA 49 CFR Part 229, § 229.135 Appendix D)
Power consumption	max. 180 mA	max. 130 mA	max. 130 mA	max. 200 mA	24-110 VDC, 10W
Temperature range	-25°C to +70°C (operation) -40 °C to +85 °C (storage)	-25°C to +70°C (operation) -40 °C to +85 °C (storage)	-25°C to +70°C (operation) -40 °C to +85 °C (storage)	-40 °C to +70 °C (operation) -40 °C to +85 °C (storage)	-25 °C to +70 °C (operation) -40 °C to +85 °C (storage)
Storage medium	int. Flash Memory 2 GB	int. Flash Memory 1 GB	int. Flash Memory 1 GB	int. Flash Memory up to 16 GB	200 GB
Service PC connection	1x USB	1x USB	1x USB	1x USB	Ethernet, 1x USB
Width	122 mm (4.8 inch)	120 mm (4.72 inch) without fastening bracket 180 mm (7.09 inch) with fastening bracket	160 mm (6.3 inch) without fastening bracket 220 mm (8.7 inch) with fastening bracket	152 mm (6 inch)	160 mm (6.3 inch) without fastening bracket 220 mm (8.7 inch) with fastening bracket
Height	128.4 mm (5.08 inch)	120 mm (4.72 inch) without fastening bracket 125 mm (4.92 inch) with fastening bracket	160 mm (6.3 inch) without fastening bracket 165 mm (6.5 inch) with fastening bracket	128,4 mm (5,08 inch)	160 mm (6.3 inch) without fastening bracket 165 mm (6.5 inch) with fastening bracket
Depth	168 mm (6.61 inch)	233 mm (9.17 inch)	257 mm (10.1 inch)	180 mm (7,09 inch)	292 mm (11.5 inch)
Weight	approx. 2 kg	ca. 7,5 kg	approx. 13 kg	approx. 3 kg	approx. 13 kg
Protection category	IP 64	Outside housing IP 20 (mechanical protection) Inside housing IP 67 (tightness protection)	Outside housing IP 20 (mechanical protection) Inside housing IP 67 (tightness protection)	Outside housing IP 20 (mechanical protection) Inside housing IP 67 (tightness protection)	Outside housing IP 20 (mechanical protection) Inside housing IP 67 (tightness protection)
Static pressure	20 kN (25 mm diam. / 1 min.)	110 kN (25000 lbf) for 5 min.	110 kN (25000 lbf) for 5 min.	110 kN (25000 lbf) for 5 min.	110 kN (25000 lbf) for 5 min.
Penetration	no requirement	Steel bolts: 6.4 mm (0.25 inch) diameter and 23 kg (50 lb) weight at a fall height of 1.5 m (5.0 feet)	Steel bolts: 6.4 mm (0.25 inch) diameter and 23 kg (50 lb) weight at a fall height of 1.5 m (5.0 feet)	Steel bolts: 6.4 mm (0.25 inch) diameter and 23 kg (50 lb) weight at a fall height of 1.5 m (5.0 feet)	Steel bolts: 6.4 mm (0.25 inch) diameter and 23 kg (50 lb) weight at a fall height of 1.5 m (5.0 feet)
Shock	100 g Peak (10 ms duration)	55 g Peak (100 ms duration)	55 g Peak (100 ms duration)	55 g Peak (100 ms duration)	55 g Peak (100 ms duration)
Thermal load capacity	700 °C (approx. 5 min.)	650 °C (1200 °F) for approx. 30 min. 300 °C (570 °F) for approx. 60 min. 100 °C (212 °F) for approx. 5 hrs.	750 °C (1382 °F) for approx. 60 min. (FRA) 650 °C (1200 °F) for approx. 30 min. (IEEE) 300 °C (570 °F) for approx. 60 min. (IEEE) 260 °C (570 °F) for approx. 10 hrs. (FRA) 100 °C (212 °F) for approx. 5 hrs. (IEEE)	650 °C (1200 °F) for approx. 30 min. 300 °C (570 °F) for approx. 60 min. 100 °C (212 °F) for approx. 5 hrs.	750 °C (1382 °F) for approx. 60 min. (FRA) 650 °C (1200 °F) for approx. 30 min. (IEEE) 300 °C (570 °F) for approx. 60 min. (IEEE) 260 °C (570 °F) for approx. 10 hrs. (FRA) 100 °C (212 °F) for approx. 5 hrs. (IEEE)
Tightness	60 minutes each: Mains water: Fire extinguisher foam, coolant 134 A	#1 Diesel (ASTM D975), #2 Diesel (ASTM D975), water, salt water, lubricating oil (each liquid for 48 hrs, immersion in fire extinguishing agent for 10 min.)	#1 Diesel (ASTM D975), #2 Diesel (ASTM D975), water, salt water, lubricating oil (each liquid for 48 h, immersion in fire extinguishing agent for 10 min.)	#1 Diesel (ASTM D975), #2 Diesel (ASTM D975), water, salt water, lubricating oil (each liquid for 48 h, immersion in fire extinguishing agent for 10 min.)	#1 Diesel (ASTM D975), #2 Diesel (ASTM D975), water, salt water, lubricating oil (each liquid for 48 h, immersion in fire extinguishing agent for 10 min.)
Hydrostatic pressure	no requirement	15 m depth (50 feet) for 48 hours Salt water 15 m depth (48 hrs.)	15 m depth (50 feet) for 48 hours Salt water 15 m depth (48 hrs.)	15 m depth (50 feet) for 48 hours Salt water 15 m depth (48 hrs.)	15 m depth (50 feet) for 48 hours Salt water 15 m depth (48 hrs.)



GPS tracking

Video data

»DEUTA ADS4 – the Efficient Evaluation Software!«

DEUTA ADS 4 – the future proof evaluation software with which you can evaluate travel data conveniently and efficiently. The software is compliant with all products in the DEUTA REDBOX® series as well as the predecessor DEUTA recorder types such as KWR, DSK and EFA.

Convenient download

The data medium protects the travel data from manipulation. You can download the data from the recorder either with a USB stick or an Ethernet connection. A password reliably protects the output of your travel data against unauthorised access. ETCS data, train security, video and audio data are read in with filter functions for data input and output.

GPS tracking and video data for even greater clarity

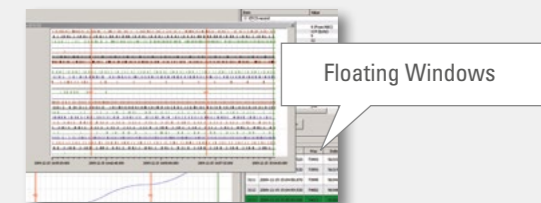
Optional GPS and video data make your data even more transparent. You can track the route virtually on a railmap on the GPS screen. In addition, the video data of the camera shots also give you a clear view of the route.

Graphics and tables synchronously on one screen

The innovative user interface of the ADS 4 presents all data clearly at a glance with freely configurable windows and tabs. Speed, analogue and digital tracks, ETCS data and train security data are displayed synchronously. You have the choice of viewing the data chronologically (time based) or over a certain stretch of the track (route based). The table display shows decoded signals and messages chronologically. Additional items of information such as vehicle number, owner and data scope are also provided.



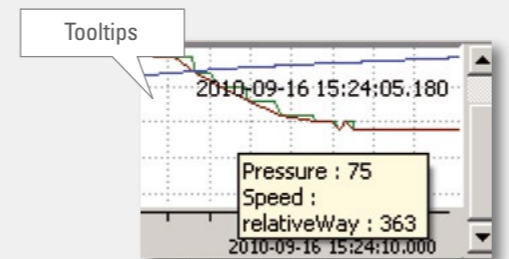
Language selection



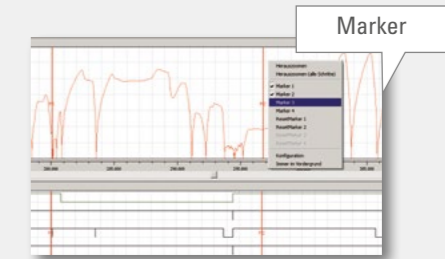
Floating Windows

ADS 4 speaks **many languages** – Easy language change for example to Chinese, German, English, Italian, Dutch, Polish, Portuguese, Russian, Spanish, Hungarian ... for world-wide use and also at operating level the ADS 4 is multi-talented and compliant with LINUX, Windows XP / Windows 7 and Mac OS.

Floating Windows – You can determine how the train data are presented to you individually for every train and configure them with drag&drop. You can save every layout configuration.



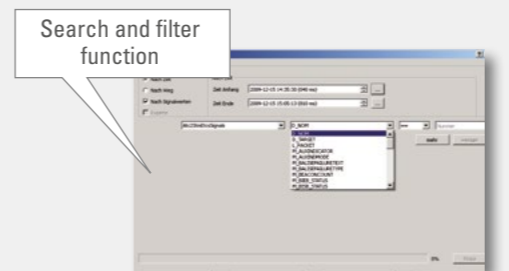
Tooltips



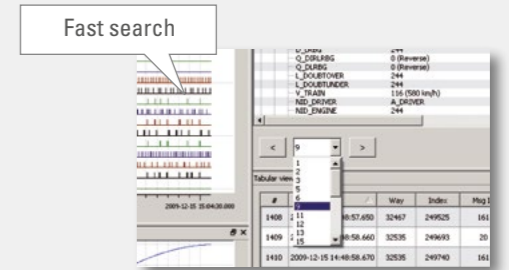
Marker

The helpful **context menus** offer clear text. For every message ID visible as a numeric value in the table, it is displayed what type of information it conceals.

You set **markers** and compare the results quickly and easily with each other: Braking processes, signal sequences or other relevant events.



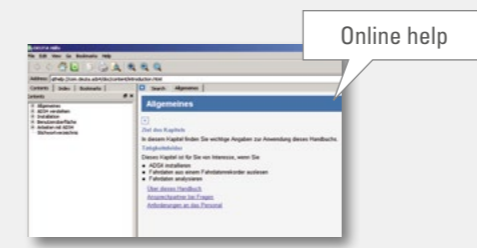
Search and filter function



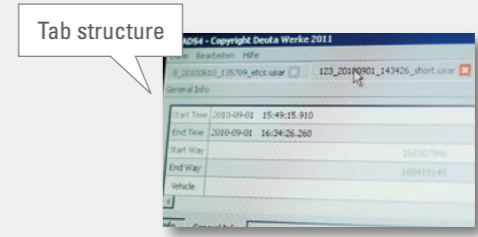
Fast search

With a highly advanced **search and filter function** you can search forwards and backwards in the data records for events or track values or you can compare nominal and actual travel data with each other. Fleet data can also be evaluated independently of vehicle and data record in this way.

With the **quick search** you can jump rapidly from one event to the next. You can choose whether you are interested in the graphical ETCS data, the event in the stretch of track or the table view.



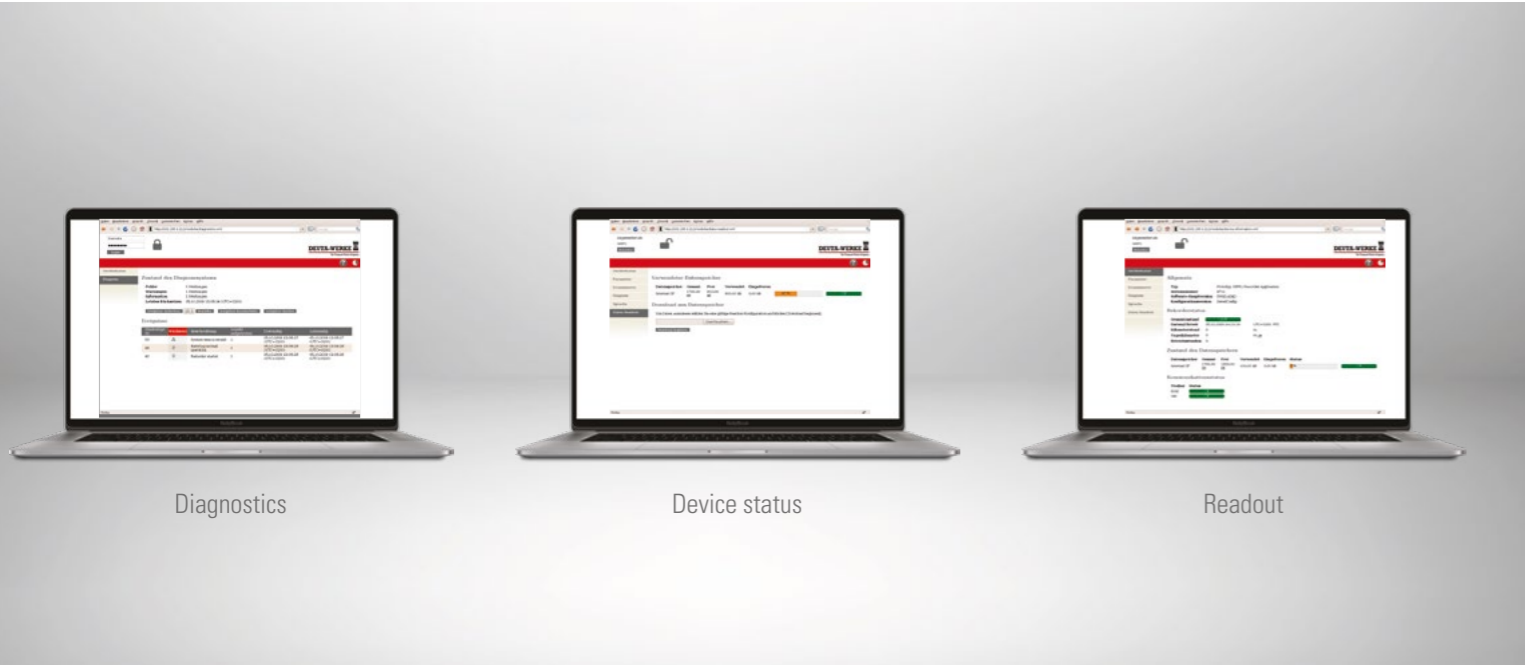
Online help



Tab structure

An **online help** for every dialogue is available in the ADS 4. It provides quick, clear answers to the basic questions of handling the ADS 4 evaluation software.

Tab structure – the next train is just one click away. The ADS 4 evaluation software can be operated elegantly with the tab structure. You simply jump back and forth between the data records of different trains. Tab by tab, train by train.



»DEUTA Web Interface & Remote Access – innovative Service Concepts!«

- Recording and evaluation of video and travel data
- Additional items of information such as distance, time, speed and direction
- Reliable reconstruction and analysis of damage and event cases

DEUTA REDBOX® with Web Interface

With the REDBOX Web Interface you have your REDBOX under control world-wide via W-LAN. The Web Interface works with a standard Web browser on different operating systems and is practical and easy to handle. If your vehicle is not yet equipped with W-LAN, use the Ethernet interface of your DEUTA REDBOX. In connection with a laptop, you then have all the service sites at your disposal.

A small selection of the access possibilities:

- Device status check, e.g. filling level of the data memory or communication status
- Setting of parameters such as device parameters and input possibility for vehicle number
- Display of selected process values
- Display of diagnostic messages
- Display of software statuses
- Language setting of the Service Web Interface
- Test runs in the service mode
- Download and send configuration data



Remote Access – we are always close by – no matter where you may be.

For us, product support does not stop with commissioning. The DEUTA staff are always close by when you need help. Professional support and fast response times are a matter of fact for us. The REDBOX® remote access package reduces service times.

We make configuration changes, software updates and provide many other services within our remote access packages.

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