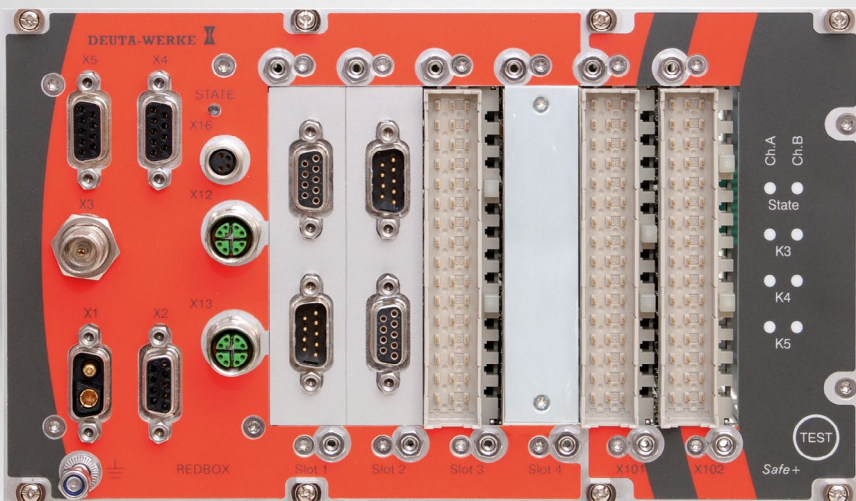


DEUTA REDBOX®

Multifunctional Recorders



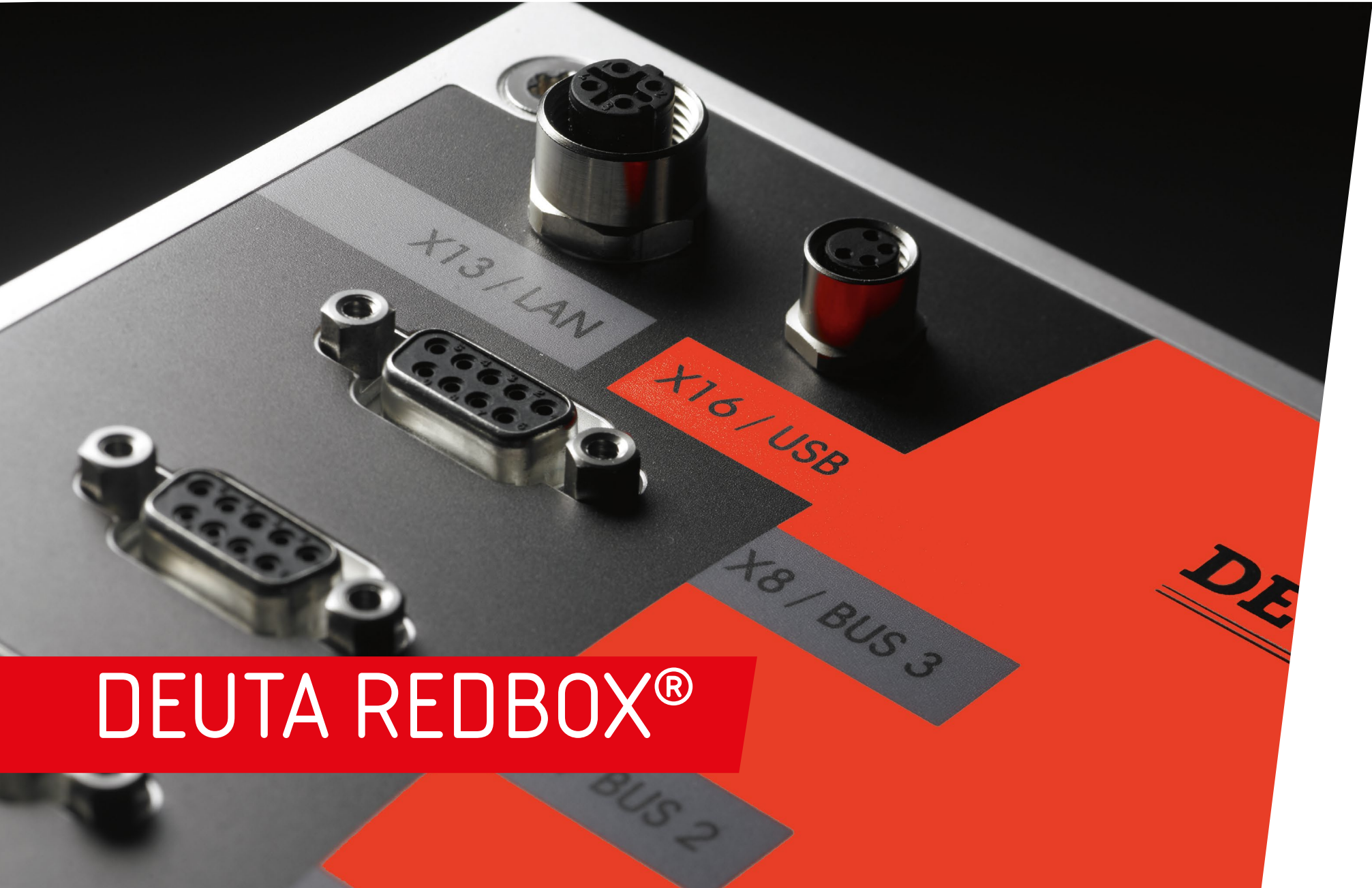


Table of contents

DEUTA REDBOX® 2K	4
Safe+	8
DEUTA REDBOX 2K <i>safe+</i>	10
DEUTA REDBOX <i>star</i>	12
DEUTA PMU – Protected Data Memory	14
DEUTA RedCloud®	16
DEUTA ADS4	18
DEUTA Web Interface & Remote Access	20



»DEUTA REDBOX® 2K – The Platform Concept«

Cyber security functions up to Security Level 2 (SL2)«

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 multifunctional 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

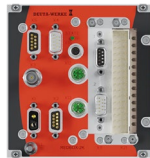
- Compact 19" hardware design
 - Future-proof performance through multiple vehicle bus system and I/O expansion
 - More flexibility through numerous in- and outputs
 - Can be used to record data from various train safety systems, e.g. ETCS
 - Can be flexibly used for all application areas in railway traffic – from streetcars to high-speed trains
 - GPS
 - Optional Safe+ module up to SIL4
 - Optional protected memory storage for legal data
 - Designed for CRA-compliant applications
- Cyber security functionality up to Security Level 2 (SL2)

DEUTA REDBOX® 2K

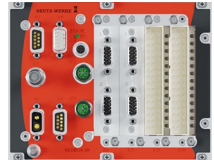
Basic configuration	DEUTA REDBOX® 2K in 19" cassette
Operating voltage	Rated voltage: 24 to 110 V DC
Power consumption	max. 30 W
Protection category	IP20
Temperature range	Operation: -25 °C to +70 °C; Storage: -40 °C to +85 °C
Storage medium	Internal microSD card with 16 GB available storage
Location 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/per 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 PMU2x/ Connection via USB 2.0 interface, Standards GM/RT 2472, IEEE Std. 1482.1-1999 & 2013 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 Driver's Vigilance Device (SiFa), standstill detection, rollback detection, monitoring of speed thresholds, maximum speed monitoring, and a safe analog output.
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	EN 50155, EN 50121-3-2, EN 45545-2, EN 50126, EN 50128, EN 50129



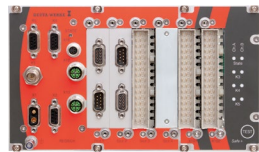
REDBOX S



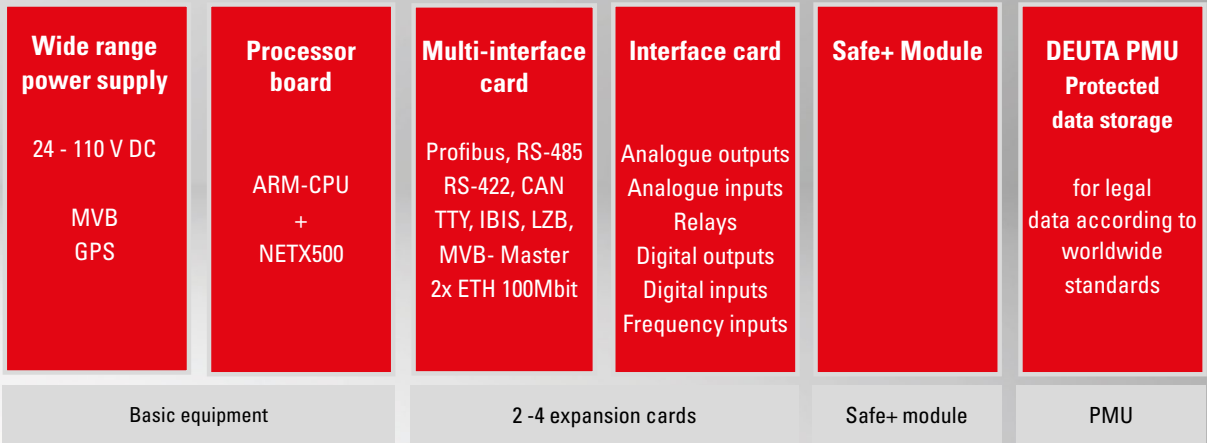
REDBOX M/L



REDBOX XL/L



REDBOX XXL



»DEUTA REDBOX® 2K – The Platform Concept«

Cyber security functions up to Security Level 2 (SL2)«

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)
- Designed for CRA-compliant applications

Cyber security functions up to Security Level 2 (SL2)

Non-functional improvements:

- Uses high-performance Quad-core 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



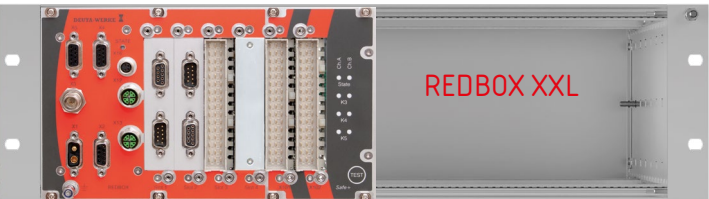
Basic configuration



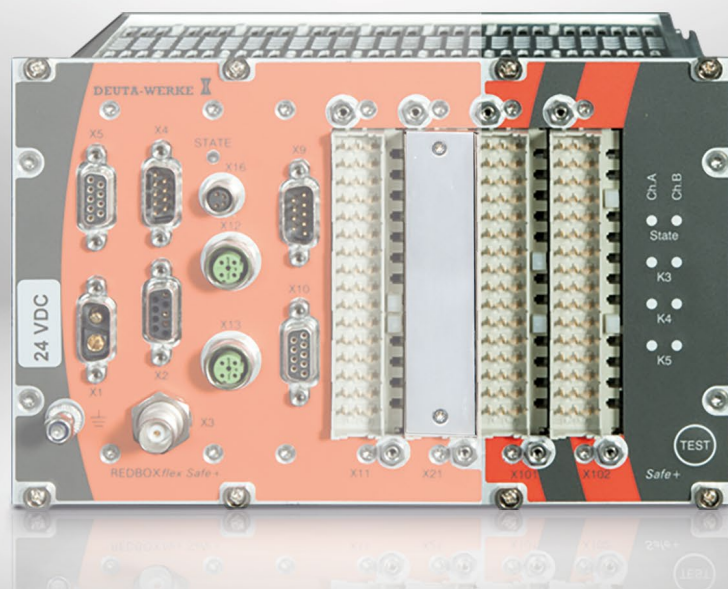
Up to 2 configurable cards



Up to 4 configurable cards



Up to 3 configurable cards & Safe+ modul



»Safe+ – the Safety Module!«

Safety up to SIL4

The Safe+ module 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 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 REDBOX 2K 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 ($V_{act} < V_{limit}$). 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.

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 safety source for additional safe speed monitoring.

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

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.

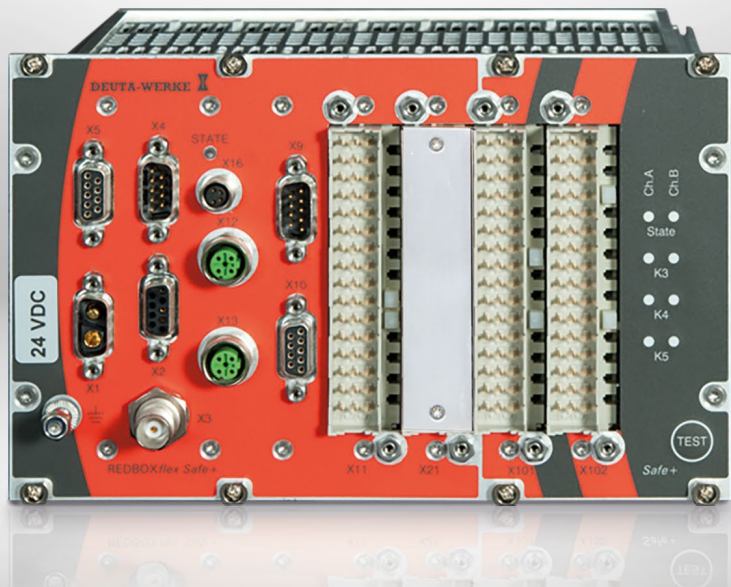
The Cold Movement Detection function avoids this costly and time-consuming procedure. The CMD detects train movement while the ETCS was switched off on-board the vehicle. Parameters such as the position or the radio block center access number can be reused once the ETCS has been reactivated. This makes 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.0

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.



»DEUTA REDBOX® 2K *safe+* – for flexibility and safety!«

Safe, safer, REDBOX 2K *safe+*

REDBOX 2K *safe+* is a combination of a REDBOX 2K recorder with a *safe+* module.
The advantages of the REDBOX 2K 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
- Cold Movement Detection

DEUTA supports the expertise process of your REDBOX 2K *safe+* module up to certification.

DEUTA REDBOX 2K *safe+*

Example configuration

Operating voltage	24 VDC to 110 VDC (+30%)
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	$\pm$ 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 16 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



REDBOX 2K *safe+*

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 Cold Movement Detection
------------------	---

Dimensions

Width	40 TE (202 mm)
Height	128.4 mm (3 HE)
Depth	169 mm
Weight	approx. 2,5 kg
Protection category	IP20
Connection	4 x F48 plugs, DIN 41612 2 M12 d round plug, M8 round plug (Ethernet) 4 x D-Sub plug 9-pin (USB)



»DEUTA REDBOXstar – the Event Recorder!«

Hardware

- Standard US power supply nominal value: 37.4 or 74 V ($\pm 30\%$)
- 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

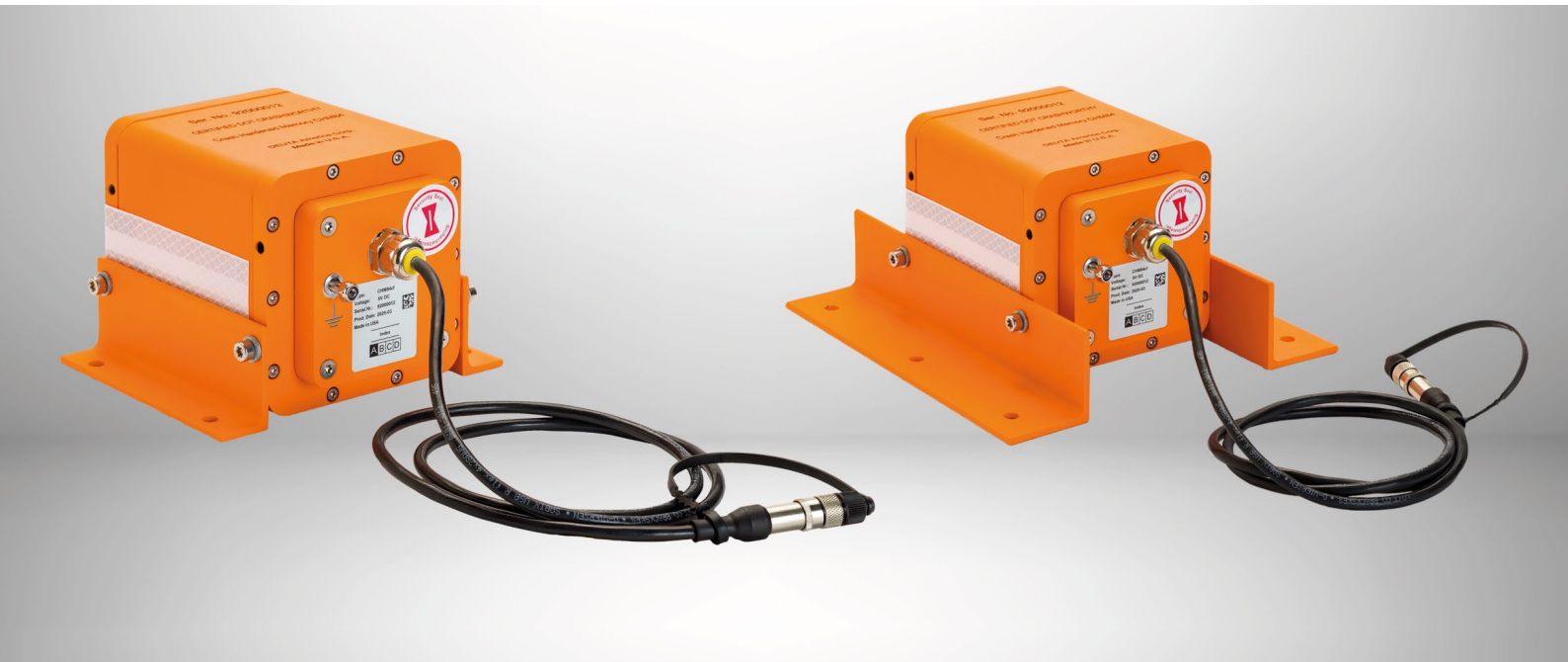
- Compact unit
- LSI 6 MCU rack mount compliant
- IEEE 1482.1 and FRA crash-protected memory
- Vehicle bus RS422 – RS485
- Digital and analogue inputs
- Digital and relay outputs



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



CHM8X Platform

Feature/Specification				
Basic Standards		EN62625 and EN50155, IEEE1482.1:1999 & 2013, FRA 49 CRF Part 229, §229.135 Appendix D Table 1 Option A		
Other Utilized Standards (where deemed applicable)		NFPA130, IEEE16, IEEE1478, AARS9401, AARS9101, EN 45545-2:2023 with Hazard Level 3, EN 61373 category 1, class B:2010, EN 50121-3-2:2017		
Power Supply		via USB/PoE		
Temperature range		-40°C to +85°C (operation) -40°C to +85°C (storage)		
Storage Medium		internal flash		
FTA Buy America Compliance		Yes		

Variant	Standard	Capacity	Interface	Usage
CHM82	EN62625-1/IEEE1482.1:1999	256 GB - 1.5 TB	USB 2.0	Video
CHM84	IEEE1482.1:2013/FRA CFR49	16 GB - 128 GB	USB 2.0	Data
CHM86	IEEE1482.1:2013/FRA CFR49	256 GB - 1 TB	Ethernet	Video



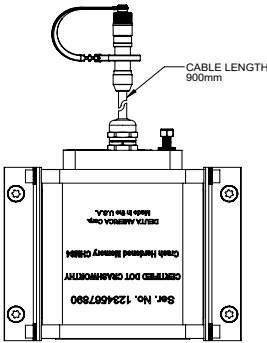
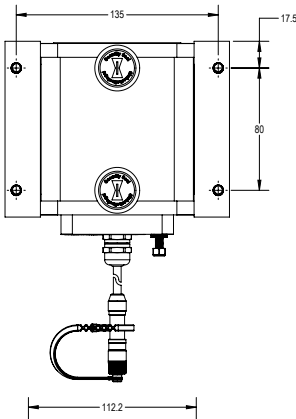
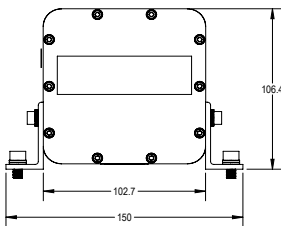
»CHM8X Platform –
Modular Crash Hardened Memory!«

Deuta America Modular Crash Hardened Memory
Deuta America Corporation is an international leading supplier in rail crash hardened memory (CHM) with almost ten different CHM products in service around the world.

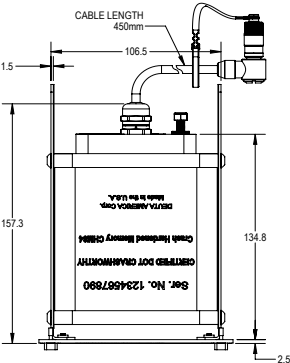
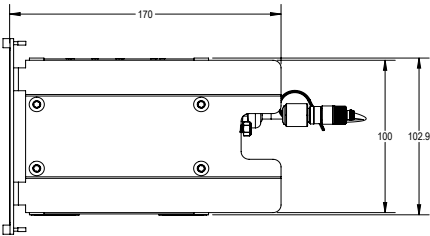
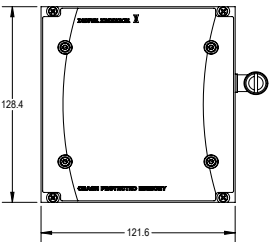
Our new CHM8X product line is the cutting edge of innovation for crash protected memory solutions across markets and applications, allowing for the simple addition of crash memory to any system. The CHM8X is small, light, and can be either 19” rack mounted or bracket mounted.

Scalable, cost-efficient protected memory for data and video across multiple standards in a compact footprint.

Bracket Mounting



Rack Mounting



All units in mm



»DEUTA RedCloud® – Data overview in real time!«

DEUTA RedCloud® is a cloud-based software solution for real time acquisition, processing and analysis of event recorder and sensor data, improving efficiency of railway operations, proving compliance and supporting maintenance activities.

Your evaluation - and fleet data at a glance

The goal of DEUTA RedCloud® is to provide a fleet-level view by aggregating data from multiple trains and subsystems. This would provide insights into train use, operations and maintenance activities, which can improve uptime, reliability, safety and reduce cost.

The innovative user interface of the DEUTA RedCloud® presents all data clearly at a glance: speed, analogue and digital tracks and train control data are displayed at the same time.

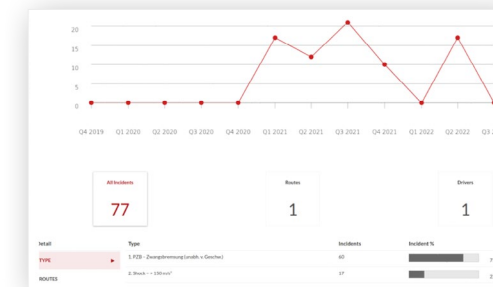
Rule evaluations

According to the regulations of the TSI OPE, railway undertakings must regularly read out their journey data. These rule analyses become a simple daily routine with RedCloud®.

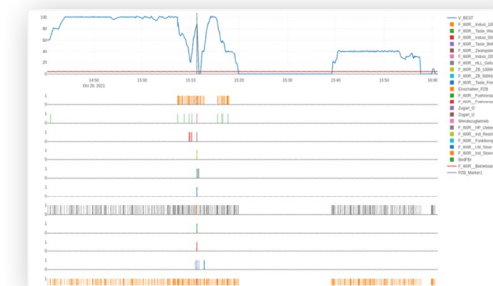
- + Prepared data per recorder without file limits
- + Access to the data within seconds
- + Daily rule evaluations as efficiently as possible
- + Processing of automatically recognised incidents
- + Sensible data preselection for the analysis
- + Interim safed work statuses
- + Freely nameable markers and notes
- + Export e.g. as PDF report

App for rule evaluations

The innovative user interface of the DEUTA RedCloud® presents all data clearly at a glance: speed, analogue and digital tracks and train control data are displayed at the same time.



KPIs, trends, breakdowns by journey, track and vehicle



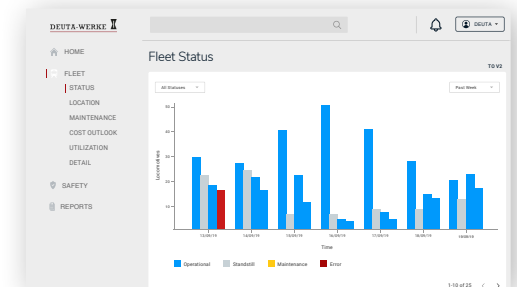
Nameable markers, signal selection, navigation and orientation for the table view.

Date	Time	Mileage	V_RBT	V	W	G	Z	L	V	F	E	T	Z	O	U	H	P	O	I
2023-01-01	00:00:00	00.000.000	00.000	V															
2023-01-01	00:00:01	00.000.001	00.000	V															
2023-01-01	00:00:02	00.000.002	00.000	V															
2023-01-01	00:00:03	00.000.003	00.000	V															
2023-01-01	00:00:04	00.000.004	00.000	V															
2023-01-01	00:00:05	00.000.005	00.000	V															
2023-01-01	00:00:06	00.000.006	00.000	V															
2023-01-01	00:00:07	00.000.007	00.000	V															
2023-01-01	00:00:08	00.000.008	00.000	V															
2023-01-01	00:00:09	00.000.009	00.000	V															
2023-01-01	00:00:10	00.000.010	00.000	V															
2023-01-01	00:00:11	00.000.011	00.000	V															
2023-01-01	00:00:12	00.000.012	00.000	V															
2023-01-01	00:00:13	00.000.013	00.000	V															
2023-01-01	00:00:14	00.000.014	00.000	V															
2023-01-01	00:00:15	00.000.015	00.000	V															
2023-01-01	00:00:16	00.000.016	00.000	V															
2023-01-01	00:00:17	00.000.017	00.000	V															
2023-01-01	00:00:18	00.000.018	00.000	V															
2023-01-01	00:00:19	00.000.019	00.000	V															
2023-01-01	00:00:20	00.000.020	00.000	V															

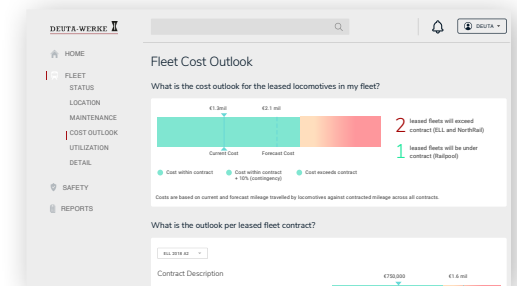
Tabular display: PZB signals, markers and notes with smooth navigation

App for fleet management and maintenance planning

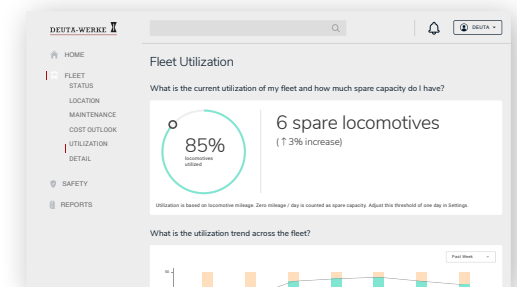
The Fleet Management module provides a view of operational status across the entire fleet. It provides details on fleet location, standstill, upcoming scheduled maintenance based on mileage or operating hours, asnd the ability to drilldown into the details of a single locomotive.



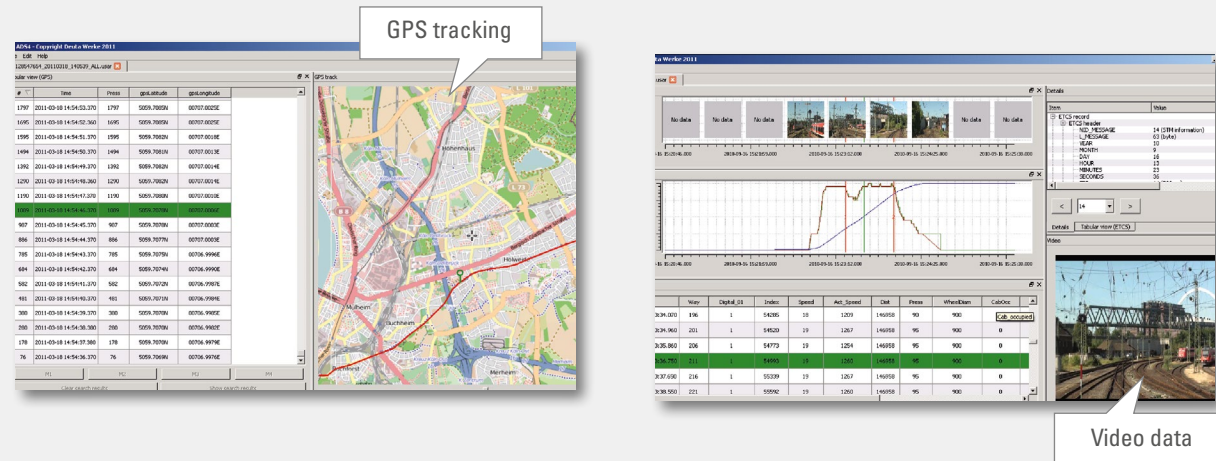
Maintenance planning



Mileage & running times



Capacity utilisation and deadlines



»DEUTA ADS4 – the Efficient Evaluation Software!«

DEUTA ADS4 – 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

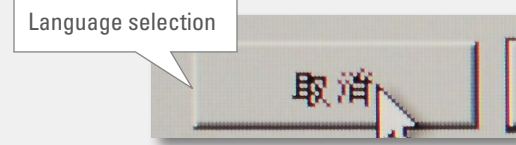
The data medium protects the travel data from manipulation. You can download the data from the recorder either with a USB stick or an Ethernet connection. A password reliably protects the output of your travel data against unauthorised access. ETCS data, train security, video and audio data are read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

GPS tracking and video data for even greater clarity

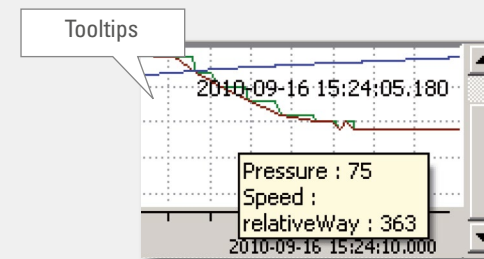
Optional GPS and video data make your data even more transparent. You can track the route virtually on a railmap on the GPS screen. In addition, the video data of the camera shots also give you a clear view of the route.

Graphics and tables synchronously on one screen

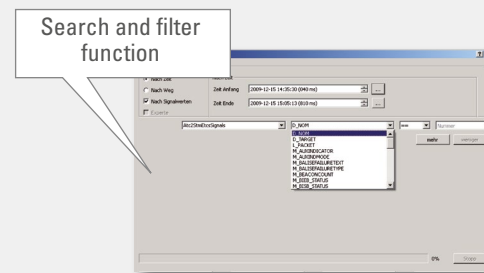
The innovative user interface of the ADS4 presents all data clearly at a glance with freely configurable windows and tabs. Speed, analogue and digital tracks, ETCS data and train security data are displayed synchronously. You have the choice of viewing the data chronologically (time based) or over a 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.



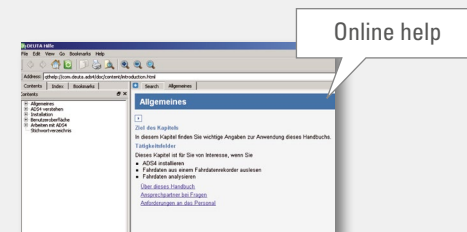
ADS4 speaks **many languages** – Easy language change for example to Chinese, German, English, Italian, Dutch, Polish, Portuguese, Russian, Spanish or Hungarian for world-wide use. The ADS4 is also a multi-talent at operating level and compliant with Windows 10 / Windows XP / Windows 7 and Linux.



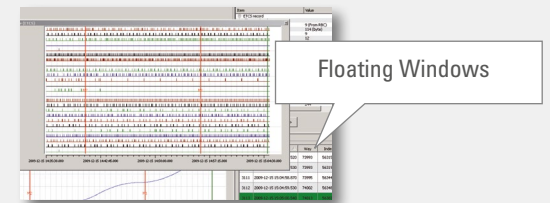
The helpful **context menus** offer clear text. For every message ID visible as a numeric value in the table, it is displayed what type of information it conceals.



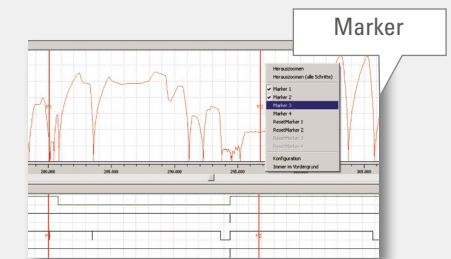
With a highly advanced **search and filter function** you can search forwards and backwards in the data records for events or track values or you can compare nominal and actual travel data with each other. Fleet data can also be evaluated independently of vehicle and data record in this way.



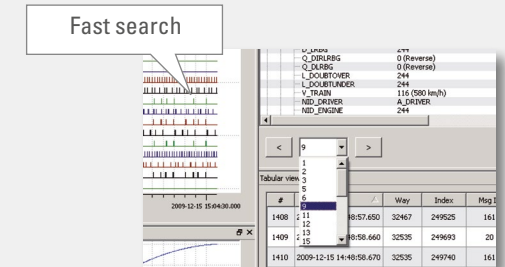
An **online help** for every dialogue is available in the ADS4. It provides quick, clear answers to the basic questions of handling the ADS4 evaluation software.



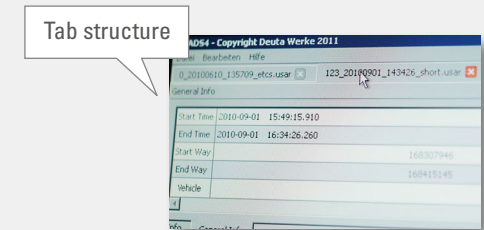
Floating Windows – You can determine how the train data are presented to you individually for every train and configure them with drag&drop. You can save every layout configuration.



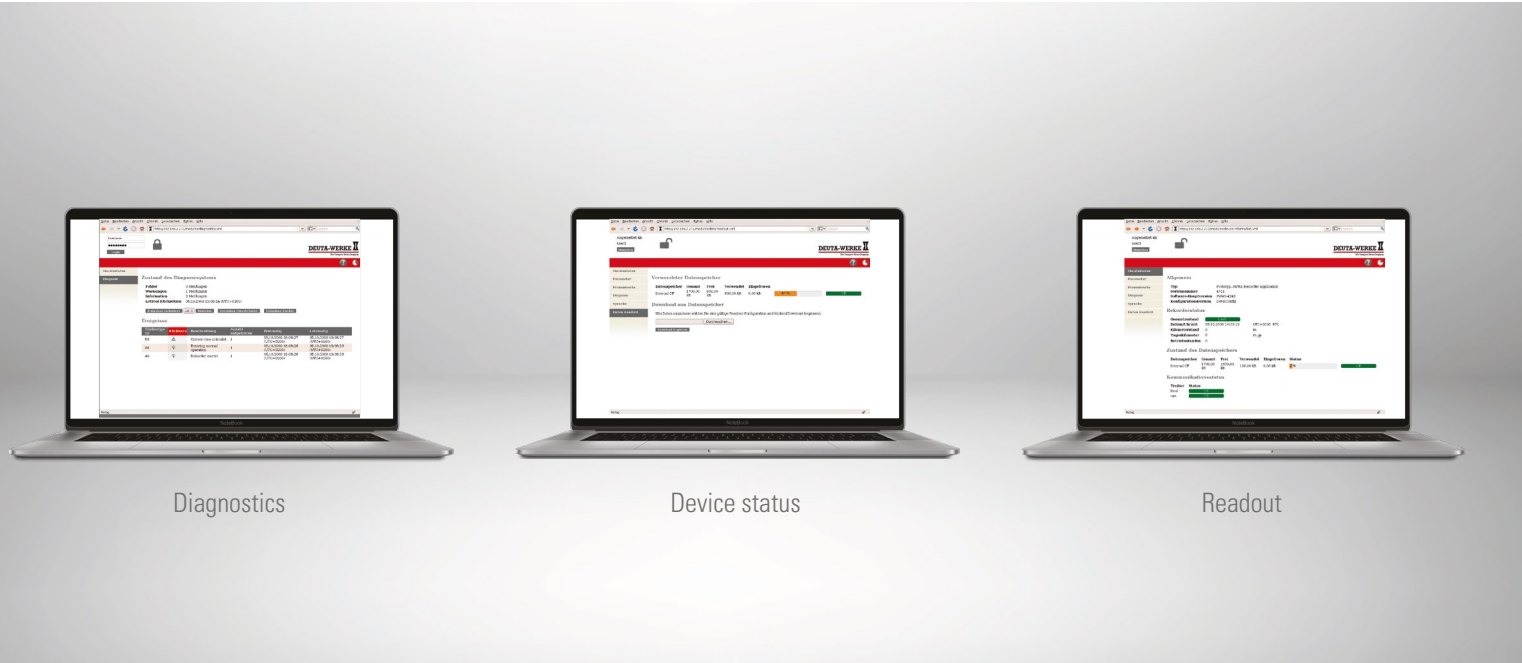
You set **markers** and compare the results quickly and easily with each other: Braking processes, signal sequences or other relevant events.



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.



Tab structure – the next train is just one click away. The ADS4 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.



Diagnostics

Device status

Readout

»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.

DEUTA AMERICA

DEUTA AMERICA Corp.

85 S Dixie Hwy A-B · Saint Augustine · FL 32084

www.deuta-america.com

Phone: + 1 904-429-7910

Please send your enquiries and orders to:

info@deuta-america.com



DEUTA America Corp. | 85 S Dixie Hwy A-B | Saint Augustine | FL 32084 | USA | Phone +1 (904) 429 7910 | E-Mail: info@deuta-america.com | www.deuta-america.com

Represented by the Managing Directors: Mr. Blake Kozol and Mr. Anders Molne | Pictures and articles including any other contents printed in the brochure are proprietary.

The reprint, copy, distribution as well as any other actions violating the copyright are subject to prior written authorization by DEUTA America Corp.

The information contained in this brochure are of general information purposes only representing examples of our standard products. The information contained in the brochure does not constitute any guarantee for technical data or features. DEUTA AMERICA Corp. checked the information carefully, however, it assumes no liability for the timeliness, correctness and completeness or quality of the provided information. Required special features are subject to separate individual agreement on the purchase of a product. Only variations of the pictured standard products agreed on the purchase are decisive.

The state of products pictured and described in this brochure corresponds with that on the final editing, however, DEUTA America Corp. reserves the right to make changes in the meantime.

The names DEUTA REDBOX®, IconTrust®, SelectTrust®, SignalTrust®, MouseTrust®, D-SmartView®, D-EcoView®, D-PowerView® and DEUTA RedCloud® are registered trademarks of DEUTA-WERKE GmbH. SelectTrust® is patented inventions owned by DEUTA-WERKE GmbH. IconTrust® is protected by the following US patent No. 9,164,860 B2. Without prior written consent of DEUTA-WERKE GmbH the use of trademarks and patents is not allowed.