DEUTA REDBOX® Multifunctional Recorders





DEUTA REDBOX®

+13/LAN

+10/USB

TO BUS 3

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»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 Multifunctional Recorder: the Multitasking Talent DEUTA REDBOX®!«

Simple integration in the project

The DEUTA REDBOX[®] hardware always finds room. The Multifunctional 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.

DEUTA AMERICA

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.

ADS4 - the Efficient Evaluation Software!

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.

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.





»DEUTA REDBOX[®] 2K –

The Platform Concept«

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

DEUTA REDBOX[®] 2K

Basic configuration	DEUTA REDBOX° 2K in 19" ca
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; S
Storage medium	Internal microSD card with 1
Location and time synchronisation	GPS receiver via TNC socket connection an active or pass antenna can be configured
Real-time clock	RRTC with TCXO: ± 2 minutes rature range
Diagnostic interface	Gbit-Ethernet
Service interface	Gbit-Ethernet, USB 2.0
Bus interfaces	MVB (Standard), optional Gb 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 transisto
Digital inputs	High level: +12 to +154 V DC
Frequency inputs for digital sources	Rectangle input, fmax = 10 kl
Frequency inputs for AC encoder	suitable for 20 V / 80 V encod
CodePlug	for the continued use of vehi devices
Internal web server	entry of vehicle data, display
Width	14 HP: with no expansion ca
	32 HP: with four expansion c
	44 HP: with three expansion
Height	3U
Depth	171 mm without plugs and m
	1 to 3 kg (depends on variant
Protected memory unit	Protected Memory Unit PML
	Connection via USB 2.0 inter Standards GM/RT 2472, IEEE FRA 49 CFR Part 229, Sect. 22
MVB- Master	MVB Master expansion card
Safe+ module	Safety functions up to SIL4
	Connection via USB 2.0 inter Standards GM/RT 2472, IEEE FRA 49 CFR Part 229, Sect. 22
Removable memory card (optional)	a memory card that can be r using tools for the purpose o
Removable SolidStateDisk (optional)	for the storage of video data
Applied standards	EN 50155, EN 50121-3-2, EN 4 EN 50129



DEUTA REDBOX[®] 7

cassette

;

Storage: -40 °C to +85 °C

6 GB available storage

sive GPS

s/per year across the entire tempe-

bit-Ethernet, CAN, Profibus,

or output, max. 100 mA

Hz, Imin. 2 mA

ders

cle specific data when exchanging

of process values

rds

ards

cards and Safe+ module

ating plugs

)

U22, PMU23, PMU24 or PMU25/1

rface, E Std. 1482.1-1999 FRA Guideline 49, 229.135 Appendix D)

rface, E Std. 1482.1-1999 FRA Guideline 49, 229.135 Appendix D)

emoved via the front plate without of vehicle data archival

45545-2, EN 50126, EN 50128,





REDBOX M/L



REDBOX XL/L



REDBOX XXL



Wide range power supply		Processor board	Multi-interface card	
24 - 110 V DC MVB GPS		ARM-CPU + NETX500	Profibus, RS-485 RS-422, CAN TTY, IBIS, LZB, MVB- Master 2x Ethernet Gbit	
Basic e	equ	ipment	2 -4 expa	nsic

»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













Up to 3 configurable cards & Safe+ modul

DEUTA AMERICA



»DEUTA REDBOXpro -

Your Recorder with Display and Keyboard!«

Your options

The DEUTA REDBOX*pro* 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 even
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	IP20
Connection	2 F48 plugs, DIN 41612 for IP20 M12 d round connector, M8 round co 3 D-Sub plug 9-pin





REDBOX*pro* (with display and keyboard)



REDBOX*pro* (Box) (Standard)

onnector,





»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 (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.





»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 safety source for additional safe speed monitoring.

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





»DEUTA REDBOX[®] 2K safe+ -

for flexability 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 (<u>+</u> 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	±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 even
	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 Colle
	Interfaces	MVB, Ethernet CAN & Profibus optionally RS 422/485 optionally
	Service connections	1 Ethernet, 1 USB
	Tracking	GPS
-		

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)



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REDBOX 2K safe+





»DEUTA REDsafe -

the safe stand-alone unit«

DEUTA RED*safe* 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 RED*safe* was developed according to the standards EN 50126, EN 50128, EN 50129 as well as EN 50155.

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

DEUTA RED safe 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 SIL3
- Rollback protection SIL3
- Speed monitoring SIL3
- Speed indicator SIL3
- DSD functionality with the aid of a hand switch and a foot pedal corresponding to the predetermined Safety Integrity Level – SIL3
- Transmission of speed values SIL3

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, two 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	IP20
Connection	2 x F48 plugs, DIN 41612 1 x USB 2 x Ethernet M12 1 x D-Sub plug 2-pin



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RED*safe*





»DEUTA REDBOX*top*-

Symbiosis for greater freedom of variety!«

Variety for individual requirements

DEUTA REDBOX*top* in the basic version is a symbiosis of the variety of the "all-in-one" recorder REDBOX 2K and the protected travel data memory PMU in a 19" housing. As a *safe*+ variant, the REDBOX*top* 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 REDBOX*top* vary according to the equipment of the Multifunctional Recorder. Our product and project engineers will be happy to help you choose the optimum combination and find the right DEUTA REDBOX*top* 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 filewith 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





REDBOX*star* 1

PTC integrable compact unit

- Compact unit
- LSI 6 MCU rack mount compliant
- IEEE 1482.1 and FRA crashprotected memory
- RS422 and Ethernet vehicle network

REDBOX*star* 2

IEEE recorder • Compact unit

- Digital and analogue inputs • Digital and relay outputs



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



 LSI 6 MCU rack mount compliant IEEE 1482.1 and FRA crashprotected memory Vehicle bus RS422 – RS485



REDBOX*star* 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 crashprotected 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 Multifunctional 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 (PMU23)
- Can be mounted alternatively in the 19" module rack (PMU22/2 / PMU25/2)

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 Std 1482.1-2013 and 1999
- Mechanical load capacity as per GM/RT 24/72 (PMU22/2 / PMU23 / PMU25/2)

DEUTA PMU

	PMU22/2	PMU23	PMU25/2	PMU26
Standards	GM/RT 2472 IEEE Std 1482.1-1999 EN 62625	GM/RT 2472 IEEE Std 1482 1-1999 EN 62625	GM/RT 2472 IEEE Std 1482.1-1999 EN 62625	IEEE Std 1482.1:2013 and 1999 FRA 49 CFR Part 229 App D
Power consumption	max. 100 mA	max. 130 mA	max. 100 mA	24-110 VDC, 10W
Temperature range	-40°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	16 GB	1 GB	16 GB, 64 GB	up to 512 GB
Service PC connection	1x M8 USB 2.0	1x USB	1x USB 2.0	M12 10/100 MB Ethernet, Direct Ethernet connection to NVR, 1x USB 2.0, service interface for unit manage- ment and IP camera setup, etc.
Width	122 mm (4.8 inch) 24TE	120mm (4.72inch) without fastening bracket 180mm (7.09inch) with fastening bracket	152 mm (6 inch) 30TE	160mm (6.3 inch) without fastening bracket 220mm (8.7 inch) with fastening bracket
Height	128.4 mm (5.08 inch) 3HE	120mm (4.72inch) with-out fastening bracket 125mm (4.92inch) with fastening bracket	128,4 mm (5,08 inch) 3HE	160mm (6.3 inch) without fastening bracket 165mm (6.5 inch) with fastening bracket
Depth	170 mm (6.7 inch)	233 mm (9.17 inch)	170 mm (6.7 inch)	292 mm (11.5 inch)
Weight	approx. 3.5 kg	approx. 7.5 kg	approx. 3 kg	approx. 13 kg
Protection category	Outside housing IP64 (mechanical protection) Inside housing IP67 (tightness protection)	Outside housing IP20 (mechanical protection) Inside housing IP67 (tightness protection)	Outside housing IP64 (mechanical protection) Inside housing IP67 (tightness protection)	Outside housing IP20 (mechanical protection) Inside housing IP67 (tightness protection)
Static pressure	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	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	55 g Peak (10 ms duration)	55 g Peak (100 ms duration)	55 g Peak (100 ms duration)	55 g Peak (100 ms duration)
Thermal load capacity	650 °C (1200 °F) for approx. 30 min. 300 °C (570 °F) for approx. 60 min. 100 °C (212 °F) for approx. 5 hrs.	650 °C (1200 °F) for approx. 30 min. 300 °C (570 °F) for approx. 60 min. 100 °C (212 °F) for approx. 5 hrs.	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. 260 °C (500 °F) for approx. 10 min.
Tightness	#1 Diesel (ASTM D975), #2 Diesel (ASTM D975), water, salt water, lubricating oil (each liquid for 48 hrs, immersion in fire extinguis- hing agent for 10 min.)	#1 Diesel (ASTM D975), #2 Diesel (ASTM D975), water, salt water, lubricating oil (each liquid for 48 hrs, immersion in fire extinguis- hing agent for 10 min.)	#1 Diesel (ASTM D975), #2 Diesel (ASTM D975), water, salt water, lubricating oil (each liquid for 48 h, im- mersion 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, im- mersion in fire extinguishing agent for 10 min.)
Hydrostatic pressure	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.)

	PMU22/2	PMU23	PMU25/2	PMU26
Standards	GM/RT 2472 IEEE Std 1482.1-1999 EN 62625	GM/RT 2472 IEEE Std 1482 1-1999 EN 62625	GM/RT 2472 IEEE Std 1482.1-1999 EN 62625	IEEE Std 1482.1:2013 and 1999 FRA 49 CFR Part 229 App D
Power consumption	max. 100 mA	max. 130 mA	max. 100 mA	24-110 VDC, 10W
Temperature range	-40°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	16 GB	1 GB	16 GB, 64 GB	up to 512 GB
Service PC connection	1x M8 USB 2.0	1x USB	1x USB 2.0	M12 10/100 MB Ethernet, Direct Ethernet connection to NVR, 1x USB 2.0, service interface for unit manage- ment and IP camera setup, etc.
Width	122 mm (4.8 inch) 24TE	120 mm (4.72 inch) without fastening bracket 180 mm (7.09 inch) with fastening bracket	152 mm (6 inch) 30TE	160mm (6.3 inch) without fastening bracket 220mm (8.7 inch) with fastening bracket
Height	128.4 mm (5.08 inch) 3HE	120 mm (4.72 inch) with-out fastening bracket 125 mm (4.92 inch) with fastening bracket	128,4 mm (5,08 inch) 3HE	160mm (6.3 inch) without fastening bracket 165mm (6.5 inch) with fastening bracket
Depth	170 mm (6.7 inch)	233 mm (9.17 inch)	170 mm (6.7 inch)	292 mm (11.5 inch)
Weight	approx. 3.5 kg	approx. 7.5 kg	approx. 3 kg	approx. 13 kg
Protection category	Outside housing IP64 (mechanical protection) Inside housing IP67 (tightness protection)	Outside housing IP20 (mechanical protection) Inside housing IP67 (tightness protection)	Outside housing IP64 (mechanical protection) Inside housing IP67 (tightness protection)	Outside housing IP20 (mechanical protection) Inside housing IP67 (tightness protection)
Static pressure	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	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	55 g Peak (10 ms duration)	55 g Peak (100 ms duration)	55 g Peak (100 ms duration)	55 g Peak (100 ms duration)
Thermal load capacity	650 °C (1200 °F) for approx. 30 min. 300 °C (570 °F) for approx. 60 min. 100 °C (212 °F) for approx. 5 hrs.	650 °C (1200 °F) for approx. 30 min. 300 °C (570 °F) for approx. 60 min. 100 °C (212 °F) for approx. 5 hrs.	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. 260 °C (500 °F) for approx. 10 min.
Tightness	#1 Diesel (ASTM D975), #2 Diesel (ASTM D975), water, salt water, lubricating oil (each liquid for 48 hrs, immersion in fire extinguis- hing agent for 10 min.)	#1 Diesel (ASTM D975), #2 Diesel (ASTM D975), water, salt water, lubricating oil (each liquid for 48 hrs, immersion in fire extinguis- hing agent for 10 min.)	#1 Diesel (ASTM D975), #2 Diesel (ASTM D975), water, salt water, lubricating oil (each liquid for 48 h, im- mersion 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, im- mersion in fire extinguishing agent for 10 min.)
Hydrostatic pressure	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.)





»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.

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

DEUTA AMERICA

App for fleet managment 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

DEUTA-WERKE	Q	
 HOME FLEET STATUS 	Fleet Cost Outlook What is the cost outlook for the leased locomotives in my fleet?	
LOCATION MAINTENANCE COSTOUTLOOK UTILIZATION DETAIL	6124 0128 Confliction Francisco Confliction Confliction Francisco Confliction Confliction Confliction Confliction Confliction Confliction Confliction Confliction Confliction Confliction Confliction Confliction Confliction Confliction Confliction Confliction	2 leased fleets will exceed contract (RLL and NorthNat) 1 leased fleets will be under contract (Natipool)
HEPOHIS	What is the outlook per leased fleet contract?	
	Contract Description c750	000 €1.6 ml

Mileage & running times



Capacity utilisation and deadlines

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Language selection



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.

»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

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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.

DEUTA REDBOX[®] | 29



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	1054 - Copyright Deuta Werke 2011
\square	Beautieten Hite 0_20100610_115709_etcs.user 123_20110301_143426_short.olar Control brio
	Start Time 2000-09-01 15:49:15.910
	End Time 2010-09-01 16:34:26.260
	Start Way 16230764
	End Way 168415145
	Hehicle
	No envire F

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.





»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

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