

DEUTA

Indicating Units



DEUTA-WERKE 
Technology under Control

Safety technology

Economic efficiency

Modular concept

Obsolescence management

Longevity

» DEUTA indicating units-
our modular system...

for your individual requests«

DEUTA indicating units - reliable and flexible

By choosing components of high quality, the indicating units fulfil the highest demands towards reliability, maintainability, safety and longevity. They can be configured in varied ways as to colour design and variability of input variables.

So you will be on the safe side!



»DEUTA indicator units -

Product highlights at a glance!«

- **Holistic:** Deuta controls the entire process chain for your individual indicating units.
- **Flexible:** Three technologies for indicating units: Stepper motor, moving coil instrument, digital indicator
- **Safe:** SIL 2-capable solutions
- **Compatible:** Form-fit-function
- **Rugged:** Regarding extreme environmental conditions
- **High:** The MTBF values



Forward-looking technology



- **Everything from one source**
Consultation, development, layout and selection of components, fitting, testing and production: DEUTA controls the entire process chain from production to qualification and worldwide support.
- **Platform concept**
Three platforms, many possibilities for individualisation. With just a few components and plug connections, we have indicating units compatible in terms of installation and function available at any time.
- **Safety technology**
DEUTA indicating units offer SIL 2-capable solutions. That is what makes DEUTA the leader in safety technology for indicating units.

- **Longevity**
High-quality components and processes lead to high MTBF values and low life-cycle costs.
- **Obsolescence management**
Follow-up concepts are already considered during the design phase. This ensures the availability of the indicating units across the entire life cycle. New indicating units are compatible to the predecessors in form, fitting accuracy and function.



»DEUTA analogue panel meters -

ENG indicating units - a round affair for more safety!«

- Controlled either with voltage, currents or PWM signal
- Device versions available either with LED lighting or lamp bulb



Flexible control

The round indicating units **ENG 6** to **ENG 13** can be controlled either with voltages (AC, DC), currents (DC) or a PWM signal. Devices with current input can also be controlled with 4-20 mA.

Glowing example

All ENG devices, besides the versions with LED lighting, are also available the lamp bulb versions. These are called, e.g., "**ENG 13/8**".

Choice

Indicating units with 4...20 mA current input each have a "mechanical" and an "electrical" zero point (life zero). They are available either with flat connectors or D-Sub.



ENG 6



ENG 8/8, ENG 8/9



ENG 10/8, ENG 10/9



ENG 13/8, ENG 13/9

Feature/Specification	ENG 6	ENG 8/9	ENG 10/9	ENG13/9
Panel cutout	ENG 6: Ø 61+0.5 mm ENG 8/9 Ø 81+0.5 mm ENG 10/9: Ø 101+0.5 mm ENG 13/9: Ø 131+0.5 mm			
Installation depth	ENG 6: approx. 80 mm ENG 8/9 approx. 90 mm ENG 10/9: approx. 90 mm ENG 13/9: approx. 90 mm			
Weight	ENG 6: approx. 0.3 kg ENG 8/9: approx. 0.5 kg ENG 10/9: approx. 0.6 kg ENG 13/9: approx. 0.8 kg			
Mounting	Clamping yoke / clamp			
Installation position	0-90-180°			
Degree of protection front face	IP53			
Degree of protection plug	IP40			
Connection	6.3 x 0.8 DIN 46244 / D-Sub			
Internal scale illumination	ENG 6, ENG.../8: 1 x 2 W Ba7s ENG 8/9, ENG 10/9, ENG13/9: LED			
External scale illumination	For devices without internal lighting possible via light slits			
Input signals	AC, DC, PWM			
Data for moving coil device	e.g. 20 mA, 1.5 mA ¹⁾			
Load resistance	< 20 ohm at 20 mA meas.res.			
Pointer deflection	240°			
Accuracy class	ENG 6: 1.5 ENG 8/9, ENG 10/9, ENG13/9: 1.5; 1 ²⁾			
Temperature range	-25°C to +70°C			
Test voltage	1,000 V _{eff} , 50 Hz, 1 min			
Vibration testing	EN61373 cat:1, class: B			
Device definition	EN60051, EN50155			
Conformity	CE			
Housing	Sheet steel			
Additional indicator	Individual versions with mileage recorder			

¹⁾ others upon request
²⁾ at extra charge

»DEUTA analogue panel meters -

EQG indicating units - square and good!«

- Controlled either with voltage, currents or PWM signal
- Device versions available either with LED lighting or lamp bulb



Durable

The EQG../9 indicating units have a square housing. They have the same features as the ENG series. A long-life LED lighting is integrated in the housings.

They are available in versions with flat connectors or with D-Sub.



EQG 9/9



EQG 14/9

Feature / Specification	EQG 9/9	EQG 14/9
Panel cutout	EQG 9/9: 92 x 92 +0.8 mm EQG 14/9: 138 x 138 +1 mm	
Installation depth	approx. 90 mm	
Weight	EQG 9/9: approx. 0.6 kg EQG 14/9: approx. 0.8 kg	
Mounting	Tensioning elements at the housing	
Installation position	0- 90-180°	
Degree of protection front face	IP53	
Degree of protection plug	IP40	
Connection	6.3 x 0.8 DIN 46244 / D-Sub	
Internal scale illumination	with LED	
External scale illumination	-	
Input signals	AC, DC, PWM	
Data for measuring device	e.g. 20 mA, 1.5 mA ¹⁾	
Load resistance	< 20 ohm at 20 mA meas.res.	
Pointer deflection	240°	
Accuracy class	1.5	
Temperature range	-25°C to +70°C	
Test voltage	1,000 V _{eff} , 50 Hz, 1 min	
Vibration testing	EN61373, cat: 1, class: B	
Device definition	EN60051, EN50155	
Conformity	CE	
Housing	Aluminium	

¹⁾ others upon request

»DEUTA analogue panel meters -

Double indicating units EGS -
independent indicating units for reference and actual values«

- Controlled either with voltage, currents or PWM signal
- Device versions available either with LED lighting or lamp bulb



Doubly safe

EGS 3/8 a indicating units have two independently operating moving coil instruments whose inputs can be adapted to current, voltage (AC/DC) or PWM signals.

Versions with current inputs of 4-20 mA make it easier to recognise malfunctions thanks to the mechanical and electrical zero point. The pointer will be below the zero position in case of errors in the current loop.

Choices

The indicating units EGS 3/8 d correspond in function to the EGS series. A 3-digit 7-segment display and an A/D converter are also installed. Control possible via current or voltage.

EGS 3/8 a



EGS 3/8 az



EGS 3/8 d



Feature / Specification	EGS 3/8 a	EGS 3/8 az	EGS 3/8 d
Panel cutout	Ø 131 ^{+0.5} mm		
Installation depth	approx. 110 mm		
Weight	approx. 1 kg		
Mounting	Clamp		
Installation position	0-90-180°		
Degree of protection front	IP53		
Degree of protection plug	IP40		
Connection	6.3 x 0.8 DIN 46224		
Internal scale illumination	2 x 2W Ba7s		
External scale illumination	through light slits		
Input signal	AC, DC		
Data for measuring device	e.g. 20 mA, 1.5 mA ¹⁾		
Load resistance	< 20 ohm at 20 mA meas.res.		
Pointer deflection	240°		
Accuracy class	1.5, 1 ²⁾		
Temperature range	-25°C to +70°C		
Test voltage	1,000 V _{eff} , 50 Hz, 1 min		
Vibration testing	EN61373, cat: 1, class: B		
Device definition	EN60051, EN50155		
Conformity	CE		
Housing	Sheet steel		
Additional indicator	EGS 3/8 az: Counter 7-digit EGS 3/8 d: DVM 3-digit		
Supply	EGS 3/8 az: Counter 24 V DC ± 30 %, P = 250 mW EGS 3/8 d: 24 V DC ± 30 %		
Input signal	EGS 3/8 az: f _{max} 12 Hz, pulse dur. min. 20ms EGS 3/8 d: 0-20 mA / voltage DC		

¹⁾ others upon request
²⁾ at extra charge

»DEUTA analogue panel meters -

Double indicating units EGS -
independent indicating units for reference and actual values«

- Controlled either with voltage, currents or PWM signal
- Device versions available either with LED lighting or lamp bulb

Doubly safe
The indicating units have two independently operating moving coil instruments whose inputs can be adapted to current, voltage (AC/DC) or PWM signals.

Versions with current inputs of 4-20 mA make it easier to recognise malfunctions thanks to the mechanical and electrical zero point. The pointer will be below the zero position in case of errors in the current loop.



Zero point at 12 o'clock pos.
The indicating units EGS 3/8 e are produced with the zero point at 12 o'clock position. The adjustment occurs to current or voltage.

Scale lighting
The EGS 3/9 and EGS 5/9 are also equipped with an internal LED scale lighting.



Additional indicators
The special feature of the EGS 3/8 o is the additionally installed 3-digit 7-segment display. The connection of every single segment, except for the last digit (fixed to zero) is run to the connecting plug. The device is controlled over external electronics.



EGS 3/8 e



EGS 3/8 o



EGS 5/8, EGS 5/9

Feature / Specification	EGS 3/8 e	EGS 3/8 o	EGS 5/8, EGS 5/9
Panel cutout	EGS 3/8 e, EGS 3/8 o: Ø 131 ^{+0.5} mm EGS 5/8, EGS 5/9: Ø 101 ^{+0.5} mm		
Installation depth	EGS 3/8 e, EGS 3/8 o: approx. 110 mm EGS 5/8, EGS 5/9: approx. 98 mm		
Weight	approx. 1 kg		
Mounting	Clamp		
Installation position	0-90-180°		
Degree of protection front	IP53		
Degree of protection plug	IP40		
Connection	EGS 3/8 e: 6.3 x 0.8 DIN 46224 EGS 3/8 o: D-Sub 37-pole EGS 5/8, EGS 5/9: 6.3 x 0.8 DIN 46244		
Internal scale illumination	EGS 3/8 e: 2 x 2W Ba7s EGS 5/8: 2 x 2W Ba7s EGS 5/9: with LED		
External scale illumination	through light slits		
Input signal	EGS 3/8 e: DC EGS 3/8 o: AC, DC EGS 5/8, EGS 5/9: AC, DC, PWM		
Data for moving coil device	EGS 3/8 e: -20-0-20 mA or -0, 75-0-0, 75 mA ¹⁾ EGS 3/8 o: 0-20 mA, 1.5 mA ¹⁾ EGS 5/8, EGS 5/9: 0-20 mA, 1.5 mA ¹⁾		
Load resistance	< 20 ohm at 20 mA meas.res.		
Pointer deflection	EGS 3/8 e: 120° EGS 3/8 o: 240° EGS 5/8, EGS 5/9: 240°		
Accuracy class	EGS 3/8 e: 1.5 EGS 3/8 o: 1 EGS 5/8, EGS 5/9: 1.5, 1 ²⁾		
Temperature range	-25°C to +70°C		
Test voltage	1,000 V _{eff} 50 Hz, 1 min		
Vibration testing	EN61373, cat: 1, class: B		
Device definition	EN60051, EN50155		
Conformity	CE		
Housing	Sheet steel		
Additional indicator	EGS 3/8 o: 3-digit 7-segment display com. anode or cathode		

¹⁾ others upon request
²⁾ at extra charge

»DEUTA analogue panel meters - Double indicating unit EGS - doubly safe«

- Controlled either with voltage, currents or PWM signal
- Device versions available either with LED lighting or lamp bulb

Doubly safe

The indicating units have two independently operating moving coil instruments whose inputs can be adapted to current, voltage (AC/DC) or PWM signals.

Versions with current inputs of 4-20 mA make it easier to recognise malfunctions thanks to the mechanical and electrical zero point. The pointer will be below the zero position in case of errors in the current loop.



Traction and voltage values

EGS 6 indicating units with a customer-specific RS485 - protocol and LED lighting.

The microcontroller is monitored with a reset module. The power is supplied through a galvanically isolated DC/DC converter.

Scale lighting

The EGS 10/9 is also equipped with an internal LED scale lighting.

EGS 9/8 bfa

EGS 10

EGS 6

Feature / Specification	EGS 9/8 bfa	EGS 10/8	EGS 10/9	EGS 6
Panel cutout	EGS 9/8 bfa: Ø 138 ⁺¹ x 138 ⁺¹ mm EGS 10/9: Ø 92 ^{+0.8} x 92 ^{+0.8} mm EGS 6: Ø 185 ⁺¹ x 92 ⁺¹ mm			
Installation depth	EGS 9/8 bfa: approx. 109 mm EGS 10/9: approx. 108 mm EGS 6: approx. 100 mm			
Weight	EGS 9/8 bfa, EGS 10/9: approx. 1 kg EGS 6: approx. 0.8 kg			
Mounting	EGS 9/8 bfa: Clamp EGS 10/9: Tensioning element at the housing EGS 6: V-clamp			
Installation position	EGS 9/8 bfa, EGS 10/9: 0-90-180° EGS 6: 0-90-160°			
Degree of protection front	EGS 9/8 bfa: IP50 EGS 10/9, EGS 6: IP 53			
Degree of protection plug	IP40			
Connection	EGS 9/8 bfa, EGS 10/9: 6.3 x 0.8 DIN 46224 EGS 6: Push-on terminal strip 10-pole, + D-Sub9			
Internal scale illumination	EGS 9/8 bfa: with lamps EGS 6, EGS 10/9: with LED EGS 10/8: 2 x 2W Ba7s			
Input signal	EGS 9/8 bfa: AC, DC EGS 10/9: AC, DC, PWM EGS 6: RS 485 - Telegram			
Data for moving coil device	EGS 9/8 bfa, EGS 10/9: 0-20 mA, 1.5 mA ¹⁾ EGS 6: 1.5 mA			
Load resistance	< 20 ohm at 20 mA meas.res.			
Pointer deflection	240°			
Accuracy class	EGS 9/8 bfa: 1.5; 1 EGS 6, EGS 10/9: 1.5			
Temperature range	-25°C to +70°C			
Test voltage	1,000 V _{eff} 50 Hz, 1 min			
Vibration testing	EN61373, cat: 1, class: B			
Device definition	EN60051, EN50155			
Conformity	CE			
Housing	EGS 9/8 bfa: Sheet steel EGS 10/9: Aluminium EGS 6: Plastic, fibre reinforced			

¹⁾ others upon request

»DEUTA analogue panel meters -

ENGK indicating units - rugged and proven!«

- Rugged plastic housing
- Moving coil instrument with 240° pointer deflection



Particularly rugged

The indicating units **ENGK 6** to **ENGK 10** have a rugged plastic housing. Moving coil instruments with 240° pointer deflection are used for the ENGK devices. They can be controlled with AC or DC but also with PWM signals. The zero point of the scale is at bottom left



ENGK 6



ENGK 8



ENGK 10

Feature / Specification	ENGK 6	ENGK 8	ENGK 10
Panel cutout	ENGK 6: Ø 61 ^{+0.5} mm ENGK 8: Ø 81 ^{+0.5} mm ENGK 10: Ø 101 ^{+0.5} mm		
Installation depth	approx. 85 mm		
Weight	ENGK 6: approx. 0.3 kg ENGK 8: approx. 0.35 kg ENGK 10: approx. 0.4 kg		
Mounting	Clamp		
Installation position	0-90-180°		
Degree of protection front face	IP66		
Degree of protection plug	IP20		
Connection	6.3 x 0.8 DIN 46244		
Internal scale illumination	1 x 2W Ba7s		
External scale illumination	through light slits		
Input signal	AC, DC		
Data for moving coil device	0-20 mA, 1.5 mA ¹⁾		
Load resistance	< 20 ohm at 20 mA meas.res.		
Pointer deflection	240°		
Accuracy class	1.5		
Temperature range	-25°C to +70°C		
Test voltage	1,000 V _{eff} , 50 Hz, 1 min		
Vibration testing	EN61373, cat: 1, class: B		
Device definition	EN60051, EN50155		
Conformity	CE		
Housing	Ultradur, UL Standard 94-V-0		

¹⁾ others upon request

»DEUTA digital indicating units - for optimal readability«

- No moving parts (solid state technology), high degree of ruggedness
- Good fault detection, very good readability



BDA 4 - Compact digital indicating unit
The speed indicating unit equipped with 5 bit Gray Code ensures increased safety in rail vehicles. It is suitable to indicate the speed as well as the driving stage.



DQA 9 - Digital single indicating unit
With a resolution of 1 mph/km/h the **DQA 9** offers optimal readability even from a greater distance. In addition to the integrated odometer indicator, the DQA 9 provides a 4...20 mA input for fault detection. The display can be controlled in two different brightness levels.



DQA 14 af - Digital double indicating unit
With a resolution of 128 LEDs the **DQA 14 af** offers optimal readability of the analogue display even from a greater distance. The 4...20 mA input provides fault detection. In addition to the two signal lamps for displaying operating states, the scale and the front are printed with long persistence after-glow. The brightness of the display can be varied in two stages.



BDA 4



DQA 9



DQA 14 af

Feature / Specification	BDA 4	DQA 9	DQA 14 af
Panel cutout	BDA 4: 92 x 22.2 mm DQA 9: 92 x 92 mm DQA 14 af: 138 x 138 mm		
Front dimensions	BDA 4: 96 x 24 mm DQA 9: 96 x 96 mm DQA 14 af: 144 x 144 mm		
Installation depth	BDA 4: approx. 175 mm DQA 9: approx. 109 mm DQA 14 af: approx. 102 mm		
Weight	BDA 4: approx. 0.5 kg DQA 9, DQA 14 af: approx. 1 kg		
Mounting	BDA 4: V-clamp DQA 9, DQA 14 af: Tensioning element		
Installation position	0-90-180°		
Degree of protection front	BDA 4, DQA 9: IP52 DQA 14 af: IP53		
Degree of protection plug	BDA 4, DQA 9: IP40 DQA 14 af: IP41		
Connection	BDA 4: Phoenix MC 1.5 DQA 9: Sub-D9 DQA 14 af: 2 x Sub-D 15		
Display	BDA 4: 7-segment LED, 2-digit DQA 9: 7-segment LED, 2-digit, 1.75" DQA 14 af: 7-segment LED, bar graph		
Input signal	BDA 4: 5 bit Gray code DQA 9: DC 4-20 mA DQA 14 af: DC 4-20 mA		
Load resistance	DQA 9, DQA 14 af: Ri - 200 Ω		
Scale angle	DQA 14 af: 320°		
Accuracy class	DQA 9, DQA 14 af: 1.0		
Operating temperature range	BDA 4, DQA 9: -25°C to +70°C DQA 14 af: -40°C to +70°C		
Test voltage	BDA 4: 500 V _{eff} , 50 Hz, 1 min DQA 9, DQA 14 af: 1000 V _{eff} , 50 Hz, 1 min		
Vibration testing	EN61373, cat: 1, class: B		
Conformity	CE		
Housing	BDA 4: Plastic DQA 9, DQA 14 af: Aluminium		
Additional indicator	DQA 9: Counter DQA 14 af: Signal lamp "Red" and "Yellow"		
Supply	BDA 4, DQA 9: 37.5 VDC DQA 14 af: 72 VDC		

»DEUTA indicating units with stepper motor -

ESG indicating units - for technically demanding usage conditions! «

- Modern ergonomic indicating configuration
- Continuous monitoring of pointer position through autonomous system
- Different types of measured variables can be displayed
- ESG 14 cy: two separate controllers for increased safety requirements (SIL 2)



Modern and secure
Pointers and scales are designed according to the most modern ergonomic aspects of design.

Monitoring function
The pointer position of the **ESG 3** can be transferred back as an 8 bit information to an upper level control unit.

The **ESG13/1 bqw** sends feedback as a 4...20 mA current signal.

Increased safety
The **ESG 14 cy** has a second separate controller as additional safety for the feedback. The ESG 14 cy is characterised by an integrated monitoring system (feedback unit) which always informs the user about the reliability of the speed information via monitoring by master computer.



ESG 3



ESG 13/1bqw



ESG 14 dybo



ESG 14 cy



Feature / Specification	ESG 3, ESG 13/1bqw, ESG 14 dybo, ESG 14 cy
Panel cutout	ESG 3, ESG 13/1 bqw: Ø 131 ^{+0.5} mm ESG 14 dybo, ESG 14 cy: 138 ⁻¹ x 138 ⁻¹ mm
Installation depth	ESG 3: approx. 100 mm ESG 13/1 bqw: approx. 70 mm ESG 14 dybo: approx. 140 mm incl. connection ESG 14 cy: approx. 140 mm
Weight	ESG 3: approx. 0.65 kg ESG 13/1 bqw: approx. 0.35 kg ESG 14 dybo, ESG 14 cy: approx. 1 kg
Mounting	ESG 3, ESG 13/1 bqw: Clamp or assembly bracket ESG 14 dybo, ESG 14 cy: Tensioning element at the housing
Installation position	0-90-180°
Degree of protection front face	ESG 3, ESG 13/1 bqw, ESG 14 dybo: IP53 ESG 14 cy: IP54
Degree of protection plug	ESG 3, ESG 13/1 bqw, ESG 14 dybo: IP40 ESG 14 cy: IP41
Connection	ESG 3: 2 x D-Sub 37-pole ESG 13/1 bqw: 1 x D-Sub 37-pole ESG 14 dybo: 2 x D-Sub 15-pole 1 x Phoenix 10 -pole ESG 14 cy: 1 x D-Sub 15-pole/ 1 x D-Sub 24
External scale illumination	ESG 3: through light slits ESG 13/1 bqw, ESG 14 dybo, ESG 14 cy: with int. LED
Operating voltage	24V DC +/-30 % ; ESG 14 dybo: 36 V DC +/-30 %
Input signal	ESG 3, ESG 13/1 bqw: PWM, TTL ESG14dybo: 0...20 mA ESG 14 cy: RS 485 8 bit
Output	ESG 3, ESG 13: 8 bit binary ESG 14 dybo: 0..20 mA ESG 14 cy: RS 485
Error message	ESG 3: Open Collector, max. 30 V ESG 13/1 bqw: Relays and via LCD ESG 14 dybo: Open Collector, max. 30 V & signal lamp ESG 14 cy: via LCD
Pointer deflection	256° ESG14cy: 320°
Accuracy class	ESG 3, ESG 13/1 bqw: 0.6 % ESG14dybo: 1 % ESG 14 cy: 0.7 %
Adjustment speed	ESG 3, ESG 13/1 bqw, ESG 14 dybo: 60° <) second ESG 14 cy: 70° <) second
Temperature range	-25°C to +70°C
Test voltage	ESG 3: none ESG 3/1 bqw, ESG14 cy: 1000 V _{eff} 50 Hz, 1 min ESG 14 dybo: 500 V _{eff} 50 Hz, 1 min
Vibration testing	ENG61373, cat:1, class:B
Conformity	ESG 3: – ESG 13/1 bqw, ESG 14 dybo: CE ESG 14 cy: CE, SIL 2
Housing	ESG 3, ESG 13/1 bqw: Sheet steel ESG 14 dybo, ESG 14 cy: Aluminium, painted black
Additional indicator	ESG 3: 3-digit 7-segment display ESG13/1bqw: Error display ESG 14 dybo: 4 signal lamps / 1 brightness controller ESG 14 cy: 2 signal lamps, 1 LCD error display, expertise according to SIL 2

»DEUTA mechanical and electronic counters – proven and reliable!«

- For distance counting, as event counter, for quantity or length registration
- Stationary and mobile use
- Three counters with respectively individual start values
- Operating button and configuration software



ZE 15

The electronic counter **ZE 15** can be used as a distance or event counter and for counting quantity. It is equipped with three counters which can be incremented or decremented. A starting value can be individually assigned to every counter. One of the counters can be given a limit value which, once exceeded or dropped below, can activate an electrically isolated alarm output. With an operating button it is possible to determine the internal counter indicated on the display as well as the brightness level of the indicating unit.

The ZE 15 with the convenient configuration software offers diverse configuration and read-out possibilities of the counter module.

The maintenance free device has a non-volatile memory for storing the configuration and counter readings.



ZW 28/1

The odometer **ZW 28/1** records the distance in kilometres or miles at periodic examinations of the vehicle. The counter is attached to the axle bearing lid of rail vehicles with different drive options. ZW 28/1 odometer are purely mechanical counters and do not require auxiliary power.



ZE 15



ZW 28/1

Feature / Specification	ZE 15
Panel cutout	69+0.5 x 38+0.5 mm (WxH)
Installation depth	approx. 75 mm incl. connecting plug
Display	8-digit, LED
Digit height	9 mm
Weight	0.2 kg (without plugs and mounting)
Mounting	Clamp
Degree of protection front	IP54
Degree of protection plug	IP20
Connection	Screw terminal
Operating voltage	24V DC ±30 %
Pulse voltage	10-30 V DC, 30-140 V DC
Max. input frequency	83 Hz
Min. pulse duration	6 ms
Reset	per software
Division ratio	variably configurable per software
Temperature range	-40°C to +70°C
Test voltage	1500 V _{eff} , 50 Hz, 1 min
Vibration testing	EN61373 cat:1, class:B
Device definition	EN60051, EN50155
Conformity	CE
Housing	Polystyrene
Fire protection	UL94-V0

Feature / Specification	ZW 28/1
Flange dimension	Flange dimensions 92 x 92 mm
Display	6-digit, number wheels
Digit height	5 mm
Weight	approx. 0.7 kg
Mounting	4 x M8
Degree of protection housing	IP65
Degree of protection drive	IP65 (drive)
Drive	Axle drive
Operating voltage	none required
Max. speed	2000 rpm ⁻¹
Reset	sealable
Division ratio	195:1 to 11850:1
Temperature range	-25°C to +85°C
Housing	Cast aluminium

»DEUTA MFA - modular driver's cab indicating unit!«

- Autonomous input and output device
- Up to 30 signal lamps can be realised in one MFA device



MFA 20 - Your access to the vehicle central devices

The indicating and input unit **MFA 20** is a central source of important information from the vehicle computer for the locomotive driver and the maintenance personnel.

The modular driver's cab indicating unit has a isolated power supply and communicates over an MVB interface. The indicating units are implemented as stepper motor indicating units, quasi analogue LED bar displays and seven-segment displays.



MFA 20 ba

Feature / Specification	MFA 20
Installation cut-out	360 x 205 mm (WxH)
Surface, colour	Membrane, according to choice
Installation depth	170 mm (without plug)
Weight	approx. 9 kg
Control V_actual	MVB
Feedback V_actual	MVB
Control V_target	MVB
Display V_actual, V_target	with pointer (ESG3)
Control V_target speed	MVB
Display V_target speed	3-digit 7-segment
Control distance from destination	MVB
Display distance from destination	Bar graph and 7-segment
Control train-braking force	MVB
Display train-braking force	with pointer (ESG3)
Control signal lamp	MVB and via plug connections
Version signal lamp	LED, 2 units each
Number of signal lamps	max. 30
Control elements	max. 8 buttons
Lighting	LED
Connection	different according to series ¹⁾
Power supply	24 VDC or 110 VDC
Power consumption	< 60 W
Temperature range	-20°C to 55°C
Test voltage	1000 V _{eff} , 50 Hz, 1 min ²⁾
Vibration testing	EN 61373, cat: 1, class: B
Conformity	CE, DBAG, EBA

¹⁾ 2 x DIN 41612 design F
3 x D-Sub 9-pole
1 x D-Sub 15-pole
With MFA 20 for ICT, ICE 3,
ODU-MAC 169-pole

²⁾ Only if secondary OV is not
connected to the housing

»DEUTA competence -

tailor-made solutions and system safety!«

- Many years of DEUTA "know how" adapted to your application case
- System safety with SIL 2-capable DEUTA indicating units

»Transnationally deployable products,

with international competence!«

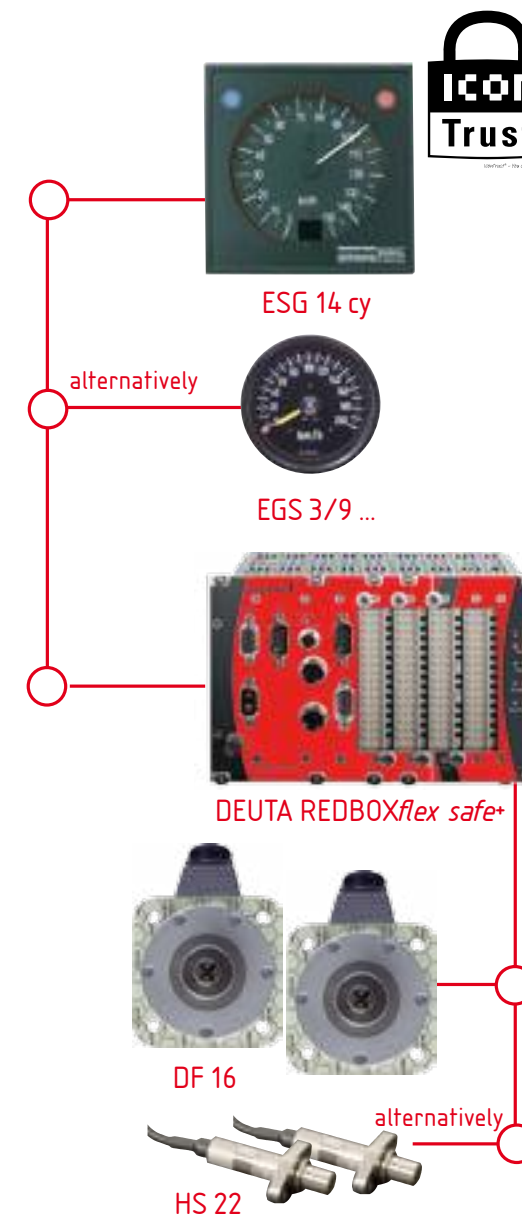
MFM 21 - An example for DEUTA Engineering Competence
in the sector of transnational traffic

The modular driver's cab multi-system indicating unit MFM 21 is a device with signal lamps and key functions for train protection systems on rail vehicles of the Dutch and the Belgian state-owned railway.

The MFM 21 is an additional indicating and operating unit for the train interaction systems ATB and TBL.



»SIL 2 system safety with DEUTA indicating units - assessed and certified!«



SIL 2-certified indicating units in functional safety systems

The DEUTA SIL indicating units offer additional safety. The ESG indicating units with stepper motor provide feedback over a separate controller. They are characterised by an integrated monitoring system in the form of a feedback unit.

The electrical EGS indicating units are equipped with two independently operating moving coil instruments whose input for Vactual is adapted to current signals.

Example for a DEUTA safety system:

- two indicating units: ESG 14 cy or alternatively EGS 3/9
- a multi-functional recorder DEUTA REDBOXflex safe+
- two axle-mounted generators DF 16, alternatively two Pick-up HS 22



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DEUTA

Multi-Functional Terminals



DEUTA-WERKE 
Technology under Control



Ser. Nr.
0000000 651

SIL safe

Economical

Trendsetting

Patented

Long-life

» DEUTA Multi-Functional Terminals - You can depend on it!

Today and tomorrow«

Patented for sure!

DEUTA Multi-Functional Terminals stand for a forward-looking display generation always in touch with the latest trends yet is also flexible and economical.

When we develop our MFTs, we exploit the latest in technology for applications in rail vehicle traffic. SIL-capable Multi-Functional Terminals with patented IconTrust® technology are the new standards in terms of driving safety for displays which correspond to the safety standards of today and tomorrow.

Tailor-made!



»DEUTA MFT Highlights -

Innovative safety technology from one source!«

- **Safe:** SIL 3-capable display solutions thanks to patented IconTrust® technology
- **Economical:** Minimised life-cycle costs and form-fit-function compatibility
- **Rugged:** Regarding extreme environmental conditions
- **High:** The MTBF values of the displays

Bus interfaces:

MVB, CAN, RS 422 / RS 485 /
RS 232 / Ethernet / Profibus,
HDLC interface protocol
secured data,
Safe protocol

Operating systems:

LINUX, DOS 6.2,
Win XP, QNX,
DOS 6.22 / WIN 3.11,
QT library

Voltage supply:
24 V, 74 V, 110 V

Service interface:
USB / Ethernet

Audio output/input:
Line-Out, amplifier 2 W,
Line-In

Entry:
diverse keyboard
and touch variants

Video:
Analogue input FBAS
IP videoeo

Memory:
128 MB - 2 GB

Specification:
acc. to ETCS / PTC,
SIRF compatible



IconTrust®:
SIL-3 certified



20 years of trendsetting technology

6.5"



○ Everything from one source

Advice, development, layout and selection of components, board assembly, qualification, testing, production and support: DEUTA controls the entire process chain of display development

8.4"



○ Platform concept

One platform, many possibilities for individualisation. With just a few components and plug connections, we have displays compatible in terms of installation and function available at any time.

○ Safety technology

DEUTA MFTs offer SIL-capable display solutions thanks to the patented IconTrust® technology. That is what makes DEUTA the leader in safety technology for display applications.

10.4"



○ Longevity

The long-term availability of the components and their reliability have top priority. This sustainable strategy guarantees displays that will work for decades and long-term security of investment with high MTBF values and minimised life-cycle costs.

○ Obsolescence management

Follow-up concepts are already considered during the design phase. This ensures the availability of the MFTs across the entire life cycle. New displays are compatible to the predecessors in form, fit and function.

12.1"



»DEUTA IconTrust® -

You can trust!«

- Patented safety technology
- Can be implemented and demonstrated up to SIL 3 and completely appraised upon request
- Monitoring unit independent from PC with long service life
- Can be easily retrofitted as add-on in every terminal



Simple, secure, flexible

What is IconTrust®?

IconTrust® is a stand-alone monitoring technology which is integrated as a small module with large safety effect into the safety-relevant display.

IconTrust® reliably checks safety-related data and immediately recognises deviations. A Multi-Functional Terminal equipped with **IconTrust®** will only display secure data you can trust.

Even overlapping areas can be monitored exclusively and at the same time. Each of the individual areas of the displayed image are analysed and compared to the value of the respective input variable during every image refresh cycle in **IconTrust®**.

Adjustments outside the monitored areas to existing applications do not need to be verified again. Our customers can simply adjust the safety areas and contents with the **IVEN** configuration tool. This saves on costs for complex recertification.

reliable entries!«



Iven offers a preview of the configured monitoring areas and checks the configuration for consistency. In the process, **Iven** records all process values with the corresponding screen photo, transfers the configuration to the **IconTrust®** module and automatically generates the PDF validation report.

»DEUTA MFT 111 -

High Performance in the driver's cab!«

- 10.4" colour TFT with at least 640 x 480, 18 bit, LED light
- AMD Fusion Dual-Core 1 GHz processor
- Resistive, scratch-proof touch screen or short-stroke keyboard
- Protection category: IP 65 front / IP 54 rear



Innovative leap in the MFT world

The MFT 111 is an innovative leap in the MFT world. As a high-performance MFT in the area of driver's cab terminals, DEUTA' MFT 111 consistently maintains its high requirements as technology leader in the market. The dual core processor is eminently suited for high-performance applications, .e. g., IP video applications.

Also applicable to the DEUTA MFT 111: few components, few plug-type connectors, everything on one pc board and minor power losses. DEUTA thus ensures that each individual application is quickly and reliably ready for use and even exceeds the record-breaking MTBF values of the field data.

The compact housing of the MFT 111 also fits into tight installation conditions. When equipped with the optionally available IconTrust, the MFT 111 is converted into the SIL terminal MFT S111 with a maximum of certified evaluated safety.



MFT 111

Feature/Specification	MFT 111
Display lighting	LED backlight
Dimmable lighting	0 to 350 cd/m ²
Status LEDs	3 LEDs
CPU/clock frequency	AMD Fusion, Dual-Core processor, 1 GHz
RAM memory	1 GB
Flash-EPROM	1 MB
Video memory	4 MB
Flash memory	min. 2 GB
Extensibility	upon request
PC keyboard connection	USB keyboard
Additional controller	Environment Controller
Buzzer	yes
Temperature management	yes
Ambient light sensor	front side
Power supply	24, 48 or 74 - 110 V (DC $\pm$ 30%) (wideband optional)
Power consumption	typ. 30 W
Display type/size	Colour TFT/10.4" (26.4 cm) or upon request
Display resolution, colour intensity	640 x 480, 18 bit, or upon request 800 x 600 or 1024 x 768
Ethernet	2x 10/100 BaseT as (M12 d-coded ¹⁾)
Video	up to 4 cameras
Audio out	2x Line-Out or 2x2 W loudspeakers
USB	2x USB 2.0 (M8 a-coded ¹⁾) + 1x Feature Connector
Vehicle bus, I/O	Ethernet, RS 422, RS 485, MVB, CAN, RS 232, Profibus
Device address	3 bit
Keypad device front	Short-stroke keyboard upon request
Keypad backlight	upon request
Touch screen	yes, scratch-proof
Front dimension (W x H)	310 mm x 214 mm
Mounting dimension (W x H x D)	280 mm x 204 mm x 88.5 mm
Weight	approx. 3.6 kg
Protection class front/rear	IP 65 / IP 54
Temperature range operation	-25°C to +70 °C (full functionality)
Temperature range storage	-35°C to +85°C
MTBF value	calculated approx. 100,000 hrs.
Operating system	OS LINUX, QNX™, Windows™
Applications	ETCS, diagnostics, brake control, etc.
SIL certificate	IconTrust®

¹⁾ Available as accessory from DEUTA: Adapter/Cables/Loud-speaker front plates/serial switchbox/USB Ethernet adapter/Power supply

»DEUTA MFT S11/2 -

Safety and reliability with IconTrust®!«

- 10.4" colour TFT with 640 x 480, 18 bit, lit by LED
- Geode, LX 800, 500 MHz processor
- Safety Integrity Level SIL 3
- Safe Supervision Function: IconTrust®

Patented safety

The MFT S11/2 is equipped with the patented IconTrust® technology as standard. IconTrust® monitors dedicated areas on the TFT panel and differentiates between safety-related and non safety-related information.

Each of the individual areas of the displayed image are analysed and compared to the value of the respective input variable during every image refresh cycle in **IconTrust®**. The patented procedure demonstrably ensures topicality and correctness. The generic verification is certifiable up to the SIL 3 level. If the application changes, our customers can easily modify the monitoring areas with the **IVEN** Engineering Tool and document it for the experts.





MFT S11/2

Feature/Specification	MFT S11/2
Display lighting	LED backlight
Dimmable lighting	0 to 350 cd/m ²
Status LEDs	3 LEDs
CPU/clock frequency	Geode, LX 800, 500 MHz
RAM memory	256 MB (incl. video memory)
Flash-EPROM	1 MB
Video memory	4 MB
Flash memory	minimum 2 GB
PC keyboard connection	USB keyboard
Additional controller	Environment Controller
Service Interface	USB and Ethernet
Buzzer	yes
Temperature management	yes
Ambient light sensor	front side
Power supply	24, 48 or 74 - 110 V (DC ±30 %)
Power consumption	typ. 25 W
Display type/size	colour TFT 10.4" (26.4 cm), additional sizes upon request
Display resolution, colour intensity	640 x 480, 18 bit, additional resolutions upon request
Ethernet	2x 10/100 BaseT as (M12 d-coded ¹⁾)
Audio out	2x Line-Out or 2x2 W loudspeakers
USB	2x USB 2.0 (M8 a-coded ¹⁾) + 1x Feature Connector
Vehicle bus, I/O	Ethernet, RS 422, RS 485, MVB, CAN, RS 232, Profibus
Device address	3 bit
Keypad device front	upon request
Keypad backlight	upon request
Touch screen	yes, resistive, scratch-proof
Front dimension (W x H)	310 mm x 214 mm
Mounting dimension (W x H x D)	280 mm x 204 mm x 65 mm
Weight	approx. 3.6 kg
Protection category front/rear	IP 65 / IP 54
Temperature range operation	-25°C to +70°C (full functionality)
Temperature range storage	-35°C to +85°C
MTBF value	calculated approx. 100.000 hrs.
Operating system	LINUX, QNX™, Windows™
Applications	ETCS, diagnostics, brake control, etc.
Safe Supervision Function	IconTrust®, SelectTrust®



Absolutely safe

Equipped with IconTrust®, the MFT S11/2 offers a maximum of safety.

¹⁾ Available as accessory from DEUTA: Adapter/Cables/Loud-speaker front plates/serial switchbox/USB Ethernet adapter/Power supply

»DEUTA MFT 11/2 -

High-end terminal - singularly successful!«

- 10.4" colour TFT with 640 x 480, 18 bit, lit by LED
- Single Board Computer with AMD Geode, LX 800, 500 MHz processor
- No moving components (such as fans)
- Minor installation depth, more random access memory, energy-saving technology



Different variations in keyboard layout

The Multi-Functional Terminal MFT 11/2 is used in complex control and guidance systems as a man-machine interface for process visualisation and data input.

The data is entered either via touch panel or short-stroke membrane keypad. Different keyboard layouts are available.

The MFT 11/2 is based on a single board PC with AMD-GEODE™ processor. An active matrix colour display (TFT) is used for the display.



MFT 11/2



MFT 11/2



MFT 11/2 S1

Feature/Specification	MFT 11/2
Display lighting	LED backlight
Dimmable lighting	0 to 350 cd/m ²
Status LEDs	3 LEDs
CPU/clock frequency	Geode, LX 800, 500 MHz
RAM memory	256 MB (incl. video memory)
Flash-EPROM	1 MB
Video memory	4 MB
Flash memory	min. 2 GB
Extensibility	upon request
PC keyboard connection	USB keyboard
Additional controller	Environment Controller
Buzzer	yes
Temperature management	yes
Ambient light sensor	front side
Power supply	24, 48 or 74 - 110 V (DC $\pm$ 30%)
Power consumption	typ. 25 W
Display type/size	Colour TFT/6.5" (16.5 cm) Colour TFT/8.4" (21.34 cm) Colour TFT/10.4" (26.4 cm) Colour TFT/12.1" (30.7 cm)
Wide angle display	optional
Display resolution, colour intensity	640 x 480 18 bit, 800 x 600 18 bit, 1024 x 768 bit
Ethernet	2x 10/100 BaseT as (M12 d-coded ¹⁾)
Video in	up to 4 cameras
Audio out	2x Line Out or 2x2 W loudspeakers
Sound amplifier	optional
Serial interfaces	1x RS 485/RS422, RS232 (CAN variant)
USB	2x USB 2.0 (M8 a-coded ¹⁾) + 1x Feature Connector
Vehicle bus, I/O	Ethernet, MVB on board (ESD or EMD), CAN Profibus, RS 422, RS 485, RS 232, dig. inputs/outputs
Device address	3 bit
Keypad device front	Short-stroke membrane keypad
Keypad backlight	yes, LED dimmable
Touch screen	yes, resistive, scratch-proof
Front dimension (W x H)	310 mm x 214 mm
Mounting dimension (W x H x D)	280 mm x 204 mm x 47 mm
Weight	approx. 3.6 kg
Protection class front/rear	IP 65 / IP 54
Temperature range operation	-25°C to +70° (full functionality)
Temperature range storage	-35°C to +85°C
MTBF value	approx. 100,000 hrs
Operating system	OS LINUX, QNX™, Windows™
Applications	ETCS, diagnostics, brake control, etc.

¹⁾ Available as accessory from DEUTA: Adapter/Cables/Loud-speaker front plates/serial switchbox/USB Ethernet adapter/Power supply

»DEUTA MFT 8/2 and 9/2 -

Solutions for special requirements!«

MFT 8/2

- 8.4" colour TFT with 640 x 480, 18 bit, LED lighting
- Geode, LX 800, 500 MHz processor
- Resistive touch screen
- Protection category: IP 65 front / IP 54 rear
- Installation dimension: 264 mm w x 140 mm h x 65 mm

MFT 9/2

- 6.5" colour TFT with 640 x 480, 18 bit, LED lighting
- Geode, LX 800, 500 MHz processor
- Short-stroke membrane keyboard
- Protection category: IP 65 front / IP 54 rear
- Installation dimension: 308 mm w x 162 mm h x 65 mm



MFT 8/2

The MFT 8/2 presented a tailor-made Multi-functional 8.4" terminal for trams where MFTs with a display size of 6.5" were too small and 10.4" were too large. Whatever the matching size for your train, we will find the correct solution.

MFT 9/2

As a form-fit-function compatible solution, the MFT 9/2 replaces older working principles with additional features such as keypad, a control and a changeover switch as well as wired LEDs. The result: The maximum possible compatibility for the next decades.





MFT 8/2



MFT 9/2

Feature/Specification	MFT 8/2 & MFT 9/2
Display lighting	LED backlight
Dimmable lighting	0 to 350 cd/m ²
Status LEDs	2-3 device-dependent
CPU/clock frequency	Geode, LX 800, 500 MHz
RAM memory	256 MB
Flash memory	min. 2 GB
Flash-EPROM	1 MB
Video memory	4 MB
Extensibility	upon request
PC keyboard connection	USB keyboard
Additional controller	Environment Controller
Buzzer	yes
Temperature management	yes
Ambient light sensor	front side
Power supply	24, 48 or 74 - 110 V (DC ± 30%)
Power consumption	typ. 25 W
Display type/size	MFT 8/2: Colour TFT/8.4" (21.34 cm) MFT 9/2: Colour TFT/6.5" (16.50 cm)
Display resolution, colour intensity	640 x 480, 18 bit
Ethernet	10/100 Base T as M12 d-coded ²⁾
Video in	MFT 8/2: 1 x Video
Audio out	MFT 8/2: 2 x Line Out
Serial interfaces	MFT 8/2: 1 x RS 485, IBIS upon request MFT 9/2: 1 x RS 485
USB	MFT 8/2: 2 x USB1.1 (M8 a-coded ²⁾) MFT 9/2: 2 x USB
Device address	MFT 8/2: 3 bit MFT 9/2: 3 bit + Digital I/O
Inputs/outputs	digital I/Os
Keypad device front	MFT 9/2: Short-stroke membrane keypad
Keypad backlight	MFT 9/2: LED
Touch screen	MFT 8/2: resistive
Front dimension (W x H)	MFT 8/2: 300 mm x 186 mm MFT 9/2: 376 mm x 201 mm
Mounting dimension (W x H x D)	MFT 8/2: 264 mm x 140 mm x 65 mm MFT 9/2: 308 mm x 162 mm x 65 mm
Weight	MFT 8/2: approx. 3 kg MFT 9/2: approx. 4 kg
Protection class front/rear	IP 65 / IP 54
Operating temperature	-25°C to 70°C
Temperature storage	MFT 8/2: -35°C to 85°C (full functionality) MFT 9/2: -25°C to 70°C
MTBF value	MFT 8/2: 105,000h MFT 9/2: 100,000h
Operating system	OS LINUX, QNX™, Windows™

²⁾ Available as accessory from DEUTA: Adapters/
cables/loudspeaker front plates/serial switchbox/
USB Ethernet adapter/ power supply

»DEUTA MFT 5/2 -

The successful compact terminal in its third generation!«

- 6.5" colour TFT with 640 x 480, 18 bit, LED lighting
- Geode, LX 800, 500 MHz processor
- Resistive touch screen
- Protection category: IP 65 front / IP 54 rear
- Installation dimension: 248 mm w x 140 mm h x 65 mm d



MFT 5/2

Compact displays with 6.5" had already been deployed in trams and metro projects since the mid 1990s. The first MFD 5 was delivered in 1996; the displays are now in their third generation. The use of the MFT 5 as successor to the MFD 5 increases the service life of the display in a form-fit-function compatible manner.



MFT 5/2

Feature/Specification	MFT 5/2
Display lighting	LED backlight
Backlight dimmable	0 to 350 cd/m ²
Status LEDs	2-3 device-dependent
CPU/clock frequency	Geode, LX 800, 500 MHz
RAM memory	256 MB
Flash memory	min. 2 GB
Flash-EPROM	1 MB
Video memory	4 MB
Extensibility	upon request
PC keyboard connection	USB keyboard
Additional controller	Environment Controller
Buzzer	yes
Temperature management	yes
Ambient light sensor	front side
Power supply	24 or 74 - 110V (DC $\pm$ 30%)
Power consumption	typ. 25 W
Display type/size	Colour TFT/6.5" (16,5 cm)
Display resolution, colour intensity	640 x 480, 18 bit
Ethernet	10/100 Base T as M12 d-coded ¹⁾
Video in	1 x FBAS (analogue)
Audio out	2 x Line Out
Serial interfaces	RS 442/RS 485, IBIS upon request
USB	2 x USB1.1 (M8 a-coded ¹⁾)
Vehicle bus	MVB on board (ESD), CAN, DIN
Device address	3 bit
Keypad device front	Short-stroke membrane keypad
Keypad backlight	LED
Front dimension (W x H)	275 mm x 144 mm
Mounting dimension (W x H x D)	248 mm x 140 mm x 65 mm
Weight	approx. 2.3 kg
Protection class front/rear	IP 65 / IP 54
Operating temperature	-25°C to 70°C (full functionality)
Temperature storage	-35°C to 85°C
MTBF value	105,000h
Operating system	OS LINUX, QNX™, Windows™

¹⁾ Available as accessory from DEUTA: Adapters/ cables/loudspeaker front plates/serial switchbox/ USB Ethernet adapter/ power supply

»DEUTA MFT 6/2 -

Much information in the 12.1" terminal!«

- 12.1" colour TFT with 800 x 600, 18 bit, LED lighting
- Geode, LX 800, 500 MHz processor
- Short-stroke membrane keypad/ resistive touch screen
- Protection category: IP 65 front / IP 54 rear
- Installation dimension: 319 mm w x 235 mm h x 47 mm d
- Easy portability of customer application due to platform concept



MFT 6/2

The Multi-Functional Terminal MFT 6/2 with its 12.1" SVGA TFT display is the largest in the DEUTA product range. For much useful information in the driver's console.



MFT 6/2

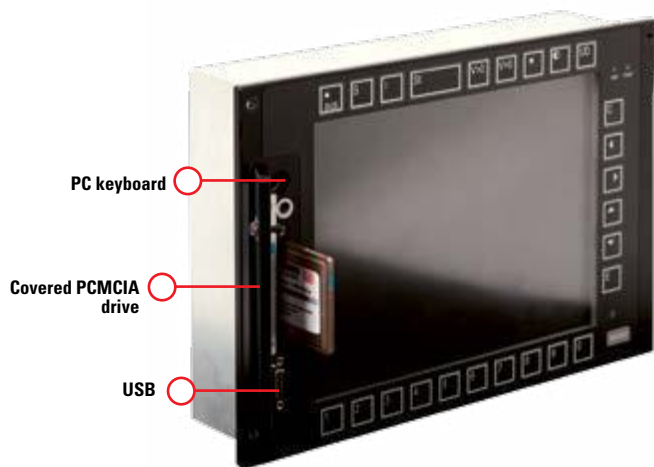
Feature/Specification	MFT 6/2
Display lighting	LED backlight
Dimmable lighting	0 to 350 cd/m ²
Status LEDs	2-3 device-dependent
CPU/clock frequency	Geode, LX 800, 500 MHz
RAM memory	256 MB
Flash memory	min. 2 GB
Flash-EPROM	1 MB
Video memory	4 MB
Extensibility	upon request
PC keyboard connection	USB keyboard
Additional controller	Environment Controller
Buzzer	yes
Temperature management	yes
Ambient light sensor	front side
Power supply	24 od. 74 - 110V (DC $\pm$ 30%)
Power consumption	typ. 25 W
Display type/size	Colour TFT/12.1" (30.7 cm)
Display resolution, colour intensity	800 x 600, 18 bit (optional 1024 x 768)
Ethernet	2x 10/100 Base T as M12 d-coded ¹⁾
Video in	4 x FBAS (analogue)
Audio out	2 x Line Out or 2 x 2 W loudspeakers
Serial interfaces	1 x RS 422/RS 485
USB	2 x USB2.0 (M8 a-coded ¹⁾)
Digital Input / Output	+ Feature Connector
Vehicle bus	MVB on board (EMD or ESD), Ethernet
Device address	3 bit
Keypad device front	Short-stroke membrane keypad
Keypad backlight	LED
Touch screen	resistive, scratch-proof
Front dimension (W x H)	349 mm x 245 mm
Mounting dimension (W x H x D)	319 mm x 235 mm x 47 mm
Weight	approx. 3.8 kg
Protection class front/rear	IP 65 / IP 54
Operating temperature	-25°C to 70°C
Temperature storage	-35°C to 85°C
MTBF value	105,000h
Operating system	OS LINUX, QNX™, Windows™

¹⁾ Available as accessory from DEUTA: Adapters/
cables/loudspeaker front plates/serial switchbox/
USB Ethernet adapter/ power supply

»DEUTA MFT 102 - EBUla Display -

flexible, powerful and low-maintenance!«

- 10.4" TFT with 640 x 480, 256 K colours, LED lighted
- AMD Fusion, Dual-Core processor 1 GHz
- Internal Flash disk with 2 GB
- Protection category: IP 54 front / IP 21 rear
- Environmental Controller
- Approved for the "EBUla" application by the DB AG



Low-maintenance structure

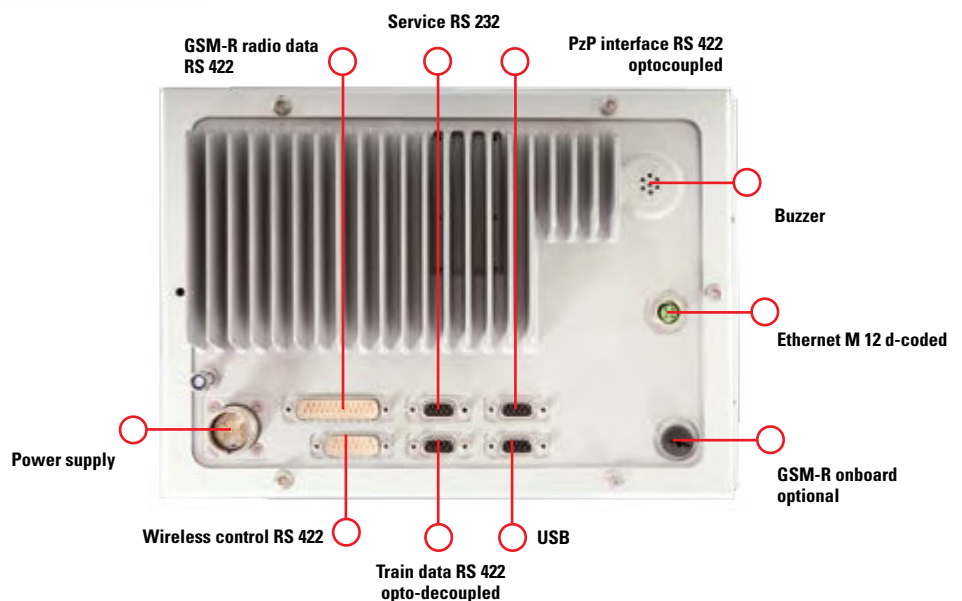
The EBUla display has omitted the accumulator block, fan, CD-ROM and hard disk, thus making the MFT 102 a nearly maintenance free device.

Reduced installation depth

More room in the driver's console thanks to the reduced installation depth of 88.5 mm.

Environmental Controller

Simplified operating time diagnostics, optimally scheduled maintenance intervals and screen contents that can be read out at any time, and keyboard confirmations.





MFT 102

Flexible system

Easily expandable system with integrated PC 104 interface. Next to the main EBUla application under WIN XP Embedded®, additional applications can be used simultaneously under different operating systems such as, e.g. LINUX, QNX™ or WINDOWS™.

High performance

The high performance of the MFT 102 permits parallel applications.

Compliant with standards

The MFT 102 complies with the standards: EN 50155-V.2001, EN 50121-3-2, EN 61000-6-4, and EN 61000-6-2, LESDB.

Feature/Specification	MFT 102
Technology	TFT
Resolution, colour intensity	640 x 480, 256 K colours
Screen diagonal	10.4", 26.4 cm
Lighting	LED backlight
Dimmable lighting	automatic regulation
CPU/clock frequency	AMD Fusion, Dual-Core processor, 1 GHz
RAM memory	1 GB
Flash-EPROM	for BIOS and setup data
Video memory	16 MB
CFast™ Card	2 GB
Additional controller	yes
Slot for vehicle bus	optional onboard (e.g. CAN)
Expansion options	optional
Ethernet	10 BASE-T; 100 BASE-Tx M 12d
Serial interfaces	RS 232 for service, RS 422 for train data, LZB, PzP 2x RS 422 for EBUla radio approved for GSM-R by the DB AG
USB connection	D-Sub front and rear
PC card (PCMCIA)	yes
Ambient light sensor	front side
Keypad device at front	Short-stroke membrane keypad
Keypad backlight	LED
PC keyboard connection	yes, front face
Power supply	24 to 110 VDC
Power consumption	< 40 W
Mounting dimension (W x H x D)	310 x 214 x 88.5 mm
Temperature range operation	-25°C to 70°C (full functionality)
Temperature storage	-35°C to +85°C
Weight	approx. 4.5 kg
Protection class front/rear	IP 54 / IP 21
MTBF value	100,000 hrs.

»DEUTA DST 1 050 Q - Smart Terminal -

Retrofit terminal with SIL 2 safety!«

- 5" colour TFT, 640 x 640 screen resolution / 1,000 cd/m² lighting
- ARM technology
- TFT indicator with additional functions
- Safety Integrity Level SIL 2 - SIL 4
- Safe Supervision Function: IconTrust® optional
- extremely compact, also ideal as fall-back level for information such as, e.g. Full Supervision, Speed or ETCS

Form-fit function

The DEUTA Smart Terminal 1 050 Q replaces analogue indicating units without requiring slot expansion.

Added information

Next to traditional analogue indication information, the DST 1 050 Q offers additional options such as, e.g., pressure, traction force or filling level. As an option to a clearly structured display, further useful information is combined for optimum use of the slot in the driver's console.

Added safety

With IconTrust® DEUTA Smart Terminals are converted into safe man-machine interfaces with SIL 2-capability. User software such as, e.g., ETCS, speed or Full-Supervision indicators can be updated quickly and easily.



DST 1 050 Q are form-fit-function compatible with ESG 14 cy



Feature / Specification	DST 1 050 Q
Panel cutout	138 ⁺¹ x 138 ⁺¹ mm
Installation depth	approx. 140 mm incl. connection
Weight	approx. 0.7 kg
Screen resolution	640 x 640
Display type / size	Colour TFT / 5"
Touch screen	Optional
Lighting	1000 cd/m ²
IconTrust®	Optional
Computer core	ARM technology
Mounting	at the housing
Protection category front	IP54
Protection category plug	IP40
Connection	1 x 9-pole D-Sub 1x 25 pole D-Sub
Operating voltage	24V DC ±30 %
Actuation	RS 485
Output	RS 485
Error message	via TFT display
Temperature range	-25°C to +70°C
Test voltage	1,000 V _{eff} , 50 Hz, 1 min
Vibration testing	EN 61373 category 1, class B
Device definition	EN 50155
Approval	—
Housing	Black anodised aluminium
Additional indicator (optional)	2 signal lamps, 1 LCD error display with software to a TFT
Operating system	LINUX

»DEUTA MFT R -

Redundant display solutions!«

MFT R 8/2

- Two redundant 8" colour terminals
- 10.4" total surface
- ARM , 500 MHz processor
- optimised for ETCS and LZB

MFT R 11/2

- 6.5" colour TFT with 640 x 480, 18 bit, LED lighting
- Geode, LX 800, 500 MHz processor
- Short-stroke membrane keyboard
- optimised for C2 ATP



MFT R 8/2

Two redundant full-value 8" vertical terminals with a total surface of 10.4" optimise the display availability of the MFT R 8/2.

Each of the two displays are full-value, individually replaceable function modules, thus satisfying the requirement towards minimised life-cycle costs. The train driver can manually switch between the terminals.

For train protection applications such as ETCS, LZB, and of course any customer application.

MFT R 11/2

The four most important parts of travel information are displayed as needed on the digital display of the MFT R 11/2. The train driver can manually switch between the TFT and the digital display. When upgrading to the MFT R 11/2, the 10.4" applications do not need to be adapted to the existing application.





MFT R 8/2



MFT R 11/2

	MFT R 8/2	MFT R 11/2
	consisting of 2 DATS2080kwe	
Feature/Specification	per DAT 2080kwe	
Display lighting	LED backlight	LED backlight
Dimmable lighting	0 to 350 cd/m ²	0 to 350 cd/m ²
Status LEDs	3	2-3 device-dependent
CPU/clock frequency	ARM, CPU, >500 MHz	Geode, LX 800, 500 MHz
RAM memory	512 MB	256 MB
Flash memory	minimum 4 GB	minimum 2 GB
Video memory		4 MB
Flash-EPROM	1 MB	1 MB
Extensibility	upon request	upon request
PC keyboard connection	USB keyboard	USB keyboard
Additional controller	Environment Controller	Environment Controller
Service Interface	USB and Ethernet	
Buzzer	yes	yes
Temperature management	yes	yes
Ambient light sensor	front side	front side
Power supply	24 - 110V (DC ± 30%)	24 - 110V (DC ± 30%)
Power consumption	typ. 22 W	typ. 22 W (for one DMI)
Display type/size	colour TFT / 8"	colour TFT / 10.4"
Display resolution, colour intensity	480 x 800, 18 bit	480 x 800, 18 bit
Ethernet	10/100 Base T as M12 d-coded ¹⁾	10/100 Base T as M12 d-coded ¹⁾
Vehicle bus	2x MVB	MVB or Profibus
Audio out	amplifier output 1 x 8W	
Serial interfaces	1 x RS 485, IBIS upon request	1 x RS 485/RS422, RS232 (CAN variant)
USB	2x USB 2.0 (M8 a-coded ¹⁾)	2x USB 2.0 (M8 a-coded ¹⁾) + 1x Feature Connector
Device address	3 bit	3 bit
Keypad device front	none	none
Keypad backlight	none	none
Touch screen	capacitive	capacitive
Weight	approx. 3 kg	approx. 4 kg
Protection category front/rear	IP 65 / IP 40	IP 65 / IP 54
Operating temperature	-25 °C to 70°C (full functionality)	-30°C to 70°C
Temperature storage	-25°C to 85°C	-25°C to 70°C
MTBF value	> 89.000 hrs.	> 100.000 hrs.
Operating system	LINUX, others upon request	LINUX (others upon request)
Applications	ETCS, diagnostics, brake control, etc.	ETCS, diagnostics, brake control, etc.
Safe Supervision Function	IconTrust®, SelectTrust®	
Feature/Specification	per MFT R 8/2	
Front dimension (W x H)	652 mm x 244 mm	407 mm x 245 mm x 62 mm
Mounting dimension (W x H x D)	372 mm x 211 mm x 80 mm	295 mm x 222 mm x 62 mm
Indicator light	EZ155b	

¹⁾ Available as accessory from DEUTA: Adapters/
cables/loudspeaker front plates/serial switchbox/
USB Ethernet adapter/ power supply

»Engineering competence!

DEUTA Know-How - unique and unbeatable!«

- System solutions that meet customer requirements, upon request with approvals and SIL certification
- Own board development
- Highly specialised expert knowledge
- High manufacturing depth due to outstanding process and product competence
- In-house application development



Own board development

DEUTA develops for every Multi-Functional Terminal an own motherboard solution that is based on a common platform. The DEUTA printed circuit board specialists pursue a sustainable product strategy for serviceable displays and long-term security of investment.

Precisely projected - MFTs in the SIL system

The Multi-Functional Terminals with IconTrust® together in interaction with the indicators, sensors and REDBOX® recorders form the DEUTA Safety System.

Every DEUTA Safety System is configured specific to project in accordance with the CENELEC standard DIN EN 50128. The system characteristic is variable and ranges from simple product combinations to sophisticated project characteristics up to SIL 4.

As the only provider in the worldwide market, DEUTA configures products of its own design and production to a safe speed system.

Upon request, DEUTA will also assume communications with the system expert. Our customers can count on DEUTA's experience and precision - which will save time and money.



Multi-Functional Terminal MFT S11 (SIL 3)



Electrical stepper motor indicating unit ESG 14 (SIL 2)



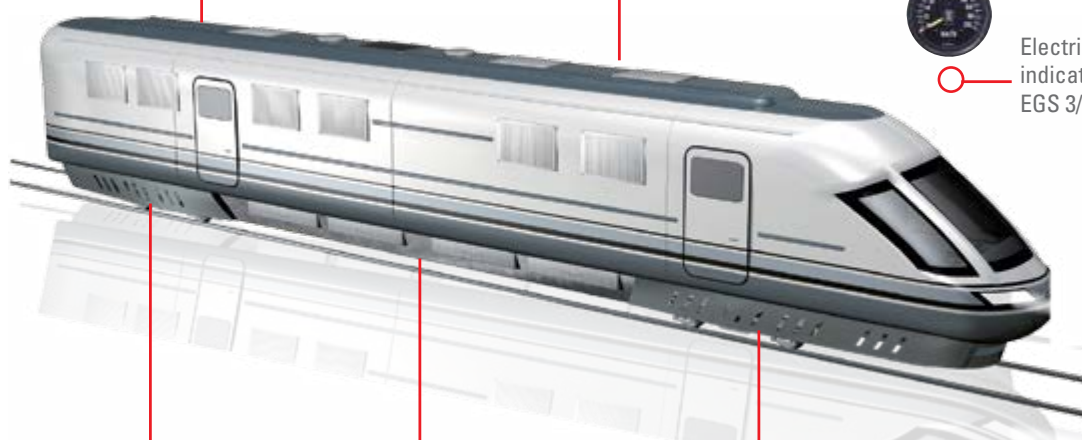
Electrical indicating unit EGS 3/9 (SIL 2)



DEUTA REDBOXflex safe+ (SIL 2-4)



DEUTA REDsafe (SIL 2-4)



Speed Sensor DF 16 (SIL 2)



Doppler Radar Sensor DRS 05



Pick-Up Sensor HS 22 (SIL 2)



DEUTA-WERKE GmbH

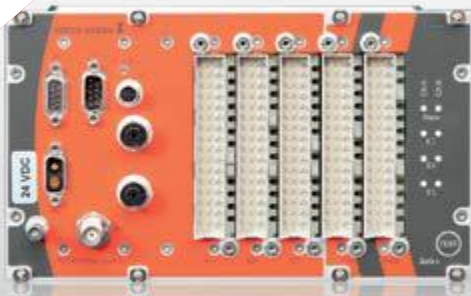
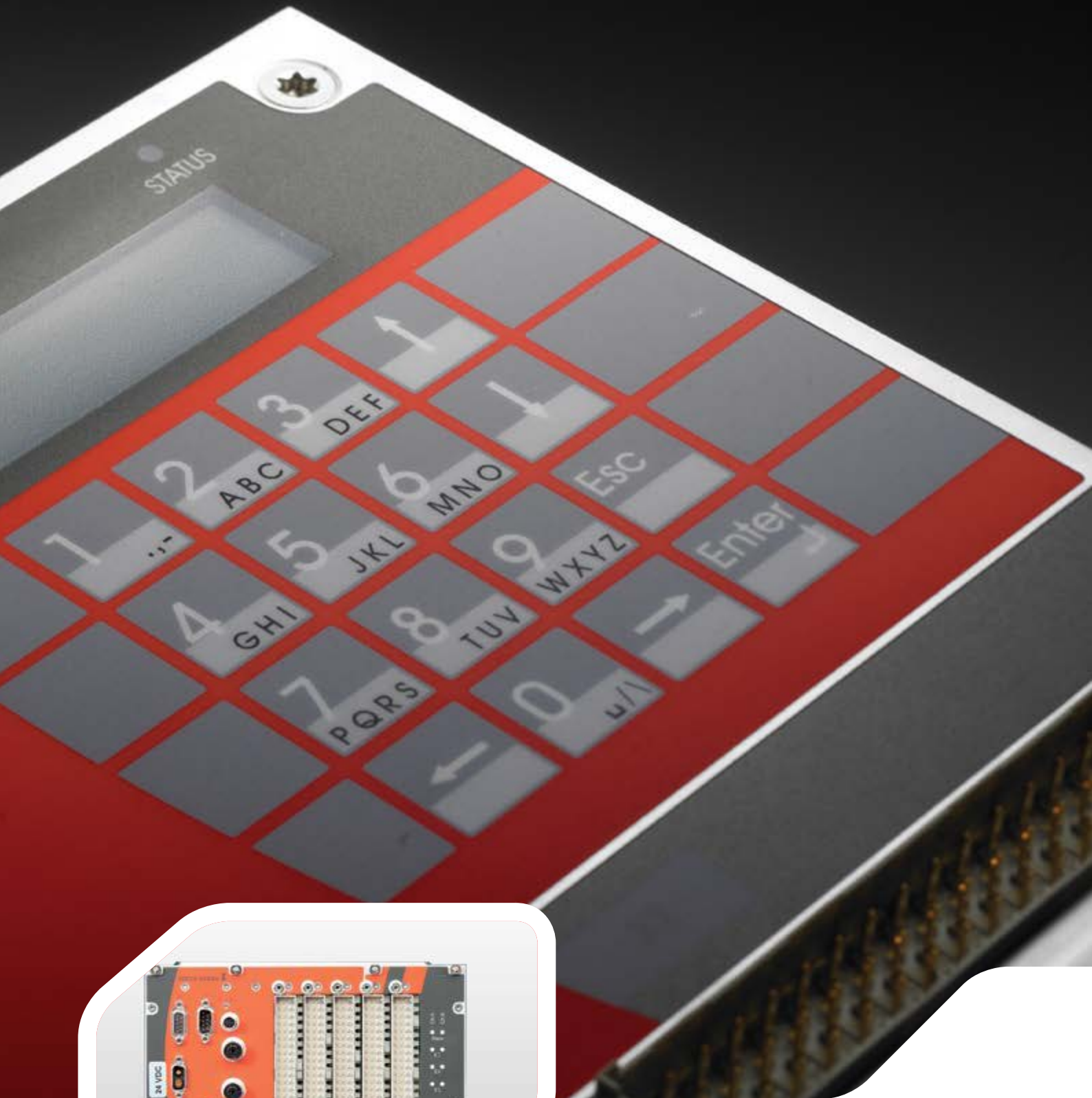
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DEUTA

Multi-Functional Recorders



DEUTA-WERKE 
Technology under Control



SIL safe

Obsolescence optimised

Flexibly configured

ETCS tested

World-wide availability

»DEUTA REDBOX® – Recorder Variety

from Data Logger to Multi-Functional Recorder!«

DEUTA REDBOX® for all events

The right DEUTA REDBOX® is available for every application. From the REDBOX/*log* data recorder to the REDBOX/*flex Safe+* Multi-Functional Recorder with its variable interface flexibility and SIL functions.

Make the DEUTA REDBOX® the heart of your railway safety!



»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

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



DEUTA produces the right REDBOX for your individual application

DEUTA REDBOX® recorders adapt perfectly to every vehicle environment.

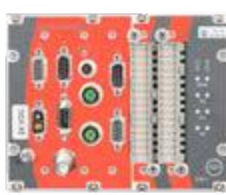
The smart REDBOX concept offers travel data security
and innovative service and evaluation possibilities – world-wide.



REDBOXlog



REDBOXpro



REDSafe



REDBOXflex



REDBOXopen

REDBOX*master*REDBOX*flex Safe+*REDBOX*top*

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.

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.

»DEUTA REDBOXlog – your Recorder for Juridical Data!«

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

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



REDBOXlog (19")



REDBOXlog (Stand-alone)

Feature/Specification	DEUTA REDBOXlog	
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	
Vehicle buses	MVB, Ethernet	
	CAN & Profibus optionally	
Serial interfaces	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
Protection category	IP 20 IP 20	

Vehicle buses / serial interfaces

- MVB
- Ethernet
- Profibus
- CAN
- RS 422/485
- RS 232
- IBIS

Supply voltage

- 24 / 74 / 110 V

USB

- Download travel data

Ethernet

- Service interface



»DEUTA REDBOX_{pro} – your Recorder with Display and Keyboard!«

- Can be integrated everywhere
- Int. CompactFlash, 2 GB
- Digital and Analog Inputs and Outputs
- Display and keyboard option

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





REDBOX_{pro}
(with display and keyboard)



REDBOX_{pro} (Box)
(Standard)

Feature/Specification	DEUTA REDBOX _{pro}
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	$\pm$ 0 to 10 V or 4 to 20mA
20 digital inputs	High level +12 to +154 V DC
Recording raster	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
Vehicle buses	MVB, Ethernet CAN & Profibus optionally
Serial interfaces	RS 232, RS 422/485 optionally
Service PC connection	1 Ethernet, 1 USB
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

»DEUTA REDBOX*flex* – the "All-in-one" Recorder!«

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

Flexible and versatile

The flexible "All-in-one-Recorder" DEUTA REDBOX*flex* was developed according to the current CENELEC standards and is compliant with ETCS and ERMTS. The REDBOX*flex* 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 varied in modules, depending on the field of application
- ERMTS/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

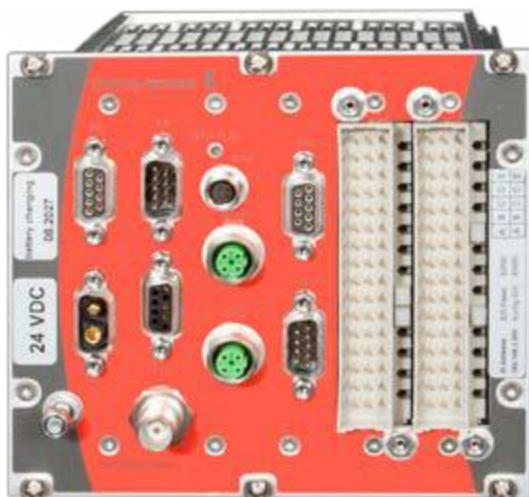
Convenience with travel data memory

- 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



REDBOXflex

Feature/Specification	DEUTA REDBOXflex
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 medium	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	
Vehicle buses	MVB, Ethernet CAN & Profibus optionally
Serial interfaces	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 for IP 20 2 M12 d round plug, M8 round plug (Ethernet) 6 D-Sub plug 9-pole (USB)



»DEUTAsafe+ – the Safety Module!«

- For requirement levels SIL 2 to SIL 4
- Several SIL functions configurable
- Integrates into all DEUTA REDBOX® versions
- Complete SIL Engineering by DEUTA

Safety up to SIL 4

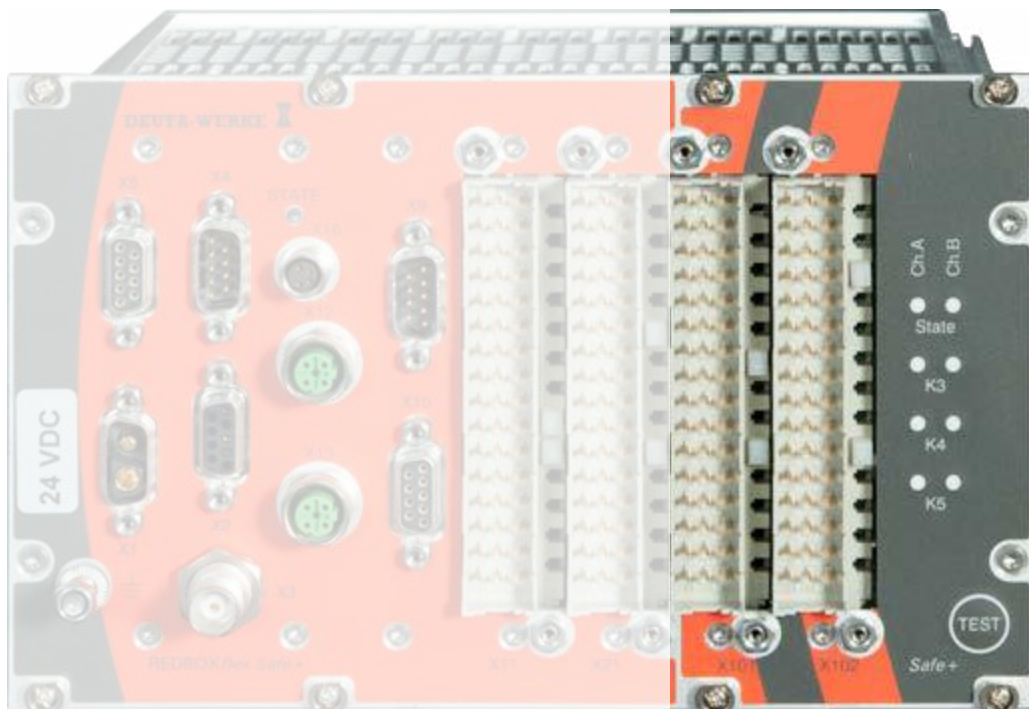
The Safe+ module takes over safety functions for the requirement levels SIL 2 to SIL 4 and thus extends the safety-related field of application of the DEUTA REDBOX® series. The two channel "fail-safe" structure forms the basis for the functional technical safety of the Safe+ module.

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 REDBOX//ex recorders. The versatile hardware structure allows the Safe+ module to be integrated into many different vehicle architectures. DEUTA supports the expertise process of your Safe+ module up to certification.





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 ($V_{act} \leq V_{limit}$). 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.

»DEUTA REDBOX*flex Safe+* – for flexibility and safety!«

- "All-in-one" recorder: Recording
Communication
Control
Safety

Safe, safer, REDBOX*flex Safe+*

REDBOX*flex Safe+* is a combination of a REDBOX*flex* recorder with a Safe+ module.

The advantages of the REDBOX*flex* 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

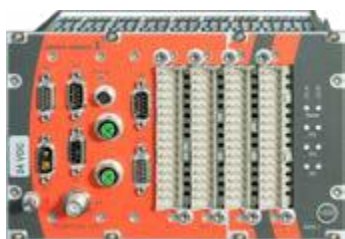
Connection to the speed and radar sensors allows calculation of the travel speed. Different input or output signals can be configured optionally.

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 REDBOX*flex Safe+* module up to certification.

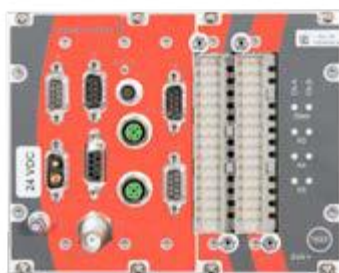


REDBOXflex Safe+

Example configuration	DEUTA REDBOXflex Safe+
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 medium	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
Vehicle buses	MVB, Ethernet CAN & Profibus optionally
Serial interfaces	RS 232, 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
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 for IP 20 2 M12 d round plug, M8 round plug (Ethernet) 4 x D-Sub plug 9-pin (USB)

»DEUTA REDsafe – for that added safety!«

- 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



DEUTA REDsafe is the "stand-alone" unit for that added safety. It takes over safety functions for the requirement levels SIL 2 to SIL4 and thus extends the safety-related field of application of the DEUTA REDBOX® series.

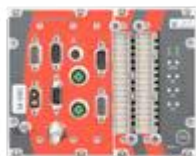
The REDsafe was developed according to the standards EN 50126, EN 50128, EN 50129 as well as EN 50155.

The concept of the DEUTA REDsafe allows high flexibility in the configuration, the parametrisation and the application, e.g. as a time-time or distance-distance 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 4
 - Rollback protection – SIL 3
 - Speed monitoring – SIL 4
 - Speed indicator – SIL 2
 - DSD functionality with the aid of a hand switch and a foot pedal corresponding to the predetermined Safety Integrity Level – SIL 4
 - Transmission of speed values – SIL 3



REDsafe

Example configuration	DEUTA REDsafe
Operating voltage	24 VDC, 72 VDC or 110 VDC
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, 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
1 vehicle bus	Ethernet
Service PC connection	1 Ethernet, 1 USB
Safety functions	Driving safety switch DSD Standstill detection Rollback protection Monitoring of the limit speed Monitoring of maximum speed Speed output
Dimensions	
Width	162.2 mm
Height	128.4 mm
Depth	169 mm
Weight	approx. 1 kg
Protection category	IP 20
Connection	2 x F48 plugs, DIN 41612 for IP 20 1 x USB 2 x Ethernet M12 1 x D-Sub plug 2-pin

»DEUTA REDBOX^{top} –

symbiosis for greater freedom of variety!«

- Integration of a DEUTA REDBOX^{log} or REDBOX^{flex} with a crash-protected memory unit in an 84 TE 19" module rack
- Crash-protected memory unit in the basic version or retrofittable
- All REDBOX^{flex} versions can be integrated



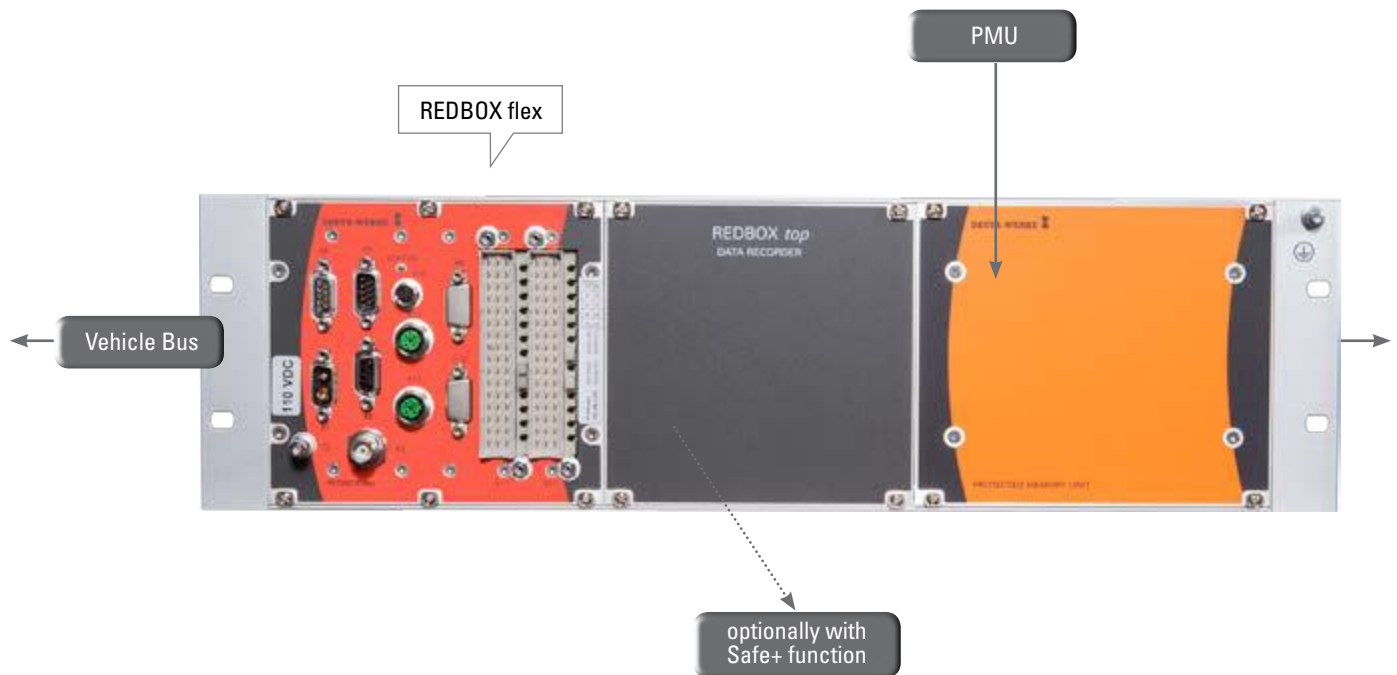
Variety for individual requirements

DEUTA REDBOX^{top} in the basic version is a symbiosis of the variety of the "all-in-one" recorder REDBOX^{flex} 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 Multi-Functional 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 REDBOX*star* – the Event Recorder!«

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



REDBOX*star* 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



REDBOX*star* 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



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 crash-protected memory
- RS422 and Ethernet vehicle network
- Vehicle data compliant recording
- PTC compliant recording



REDBOXstar 1



REDBOXstar 2



REDBOXstar 3

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 or UTC time over GPS
- Geo data recording

Onboard Maintenance Web Interface

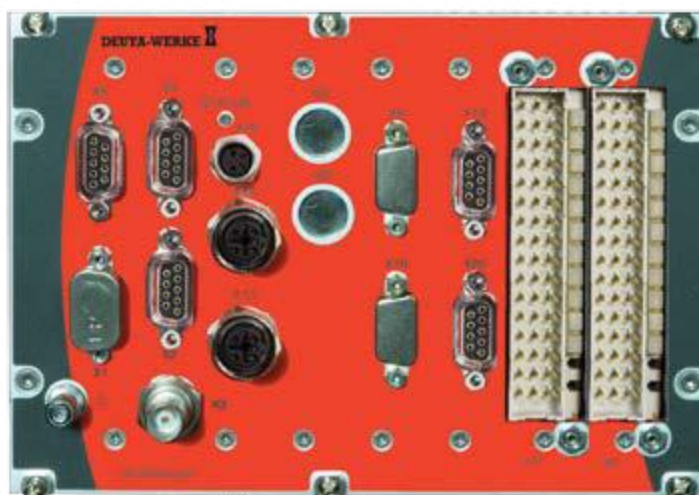
- Integrated Web Interface for service purposes
- Works with a standard web browser
- Works on different operating systems
- Convenient and easy to use
- Also usable via Ethernet interface
- Access to all service pages
- Different levels with password protection
- Process value display
- Detailed recorder 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

»DEUTA REDBOX^{open} – open for All Events!«

- Basic recorder with extension options
- Optimal as a basic unit with project related adaptation requirements
- Maximum flexibility in the engineering phase of a project



The REDBOX for all applications

The DEUTA REDBOX^{open} is equipped for all applications.

The open architecture leaves room for changes and additions to the customers needs through allowing for future functional component boards to be added. Software and hardware extensions can be integrated easily into the 19" housing years after its first use if required.

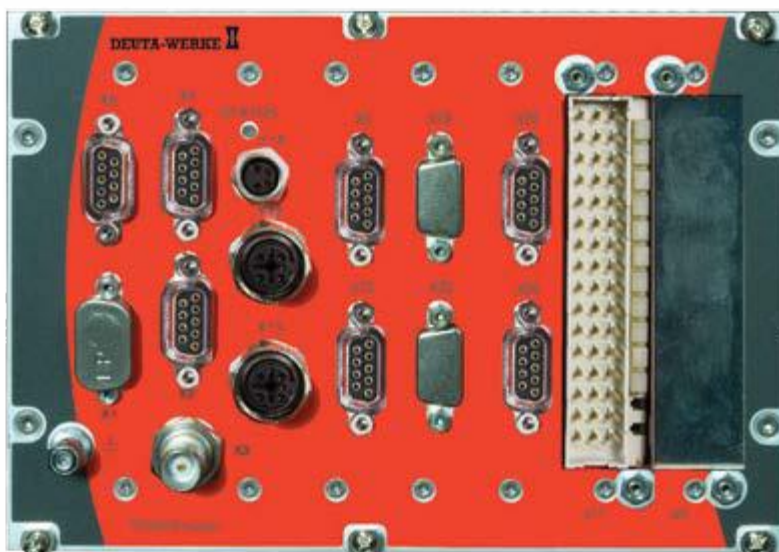


REDBOXopen

Example configuration	DEUTA REDBOXopen
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)
Frequency inputs	project-dependent
Analogue inputs	project-dependent
Digital inputs	project-dependent
Recording raster	project-dependent
Storage medium	int. CompactFlash 2 GB
Analogue outputs	project-dependent
Frequency outputs	project-dependent
Outputs	project-dependent
Vehicle buses	MVB, Ethernet CAN & Profibus optionally
Serial interfaces	RS 232, RS 422/485 optionally
Service connections	1 Ethernet, 1 USB
Tracking	GPS
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 for IP 20 2 M12 d round plug, M8 round plug (Ethernet) 4 x D-Sub plug 9-pin (USB)

»DEUTA REDBOX^{master} – one REDBOX for All!«

- MVB Master function
- Flexibility like the REDBOX^{open}
- Project-related structure
- Complete DEUTA engineering



Central point of an MVB

The REDBOX^{master} takes over the master function in a Multifunctional-Vehicle-Bus (MVB). All other REDBOX properties are retained hereby – including the flexibility of the hardware structure.

This reduces the variety in the equipping phase and minimises your configuration costs.



REDBOXmaster

Example configuration**DEUTA REDBOXmaster**

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 medium	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
Vehicle buses	MVB, Ethernet CAN & Profibus optionally
Serial interfaces	RS 232, RS 422/485 optionally
Service connections	1 Ethernet, 1 USB

Example configuration**safe+**

Safety functions	Driving safety switch DSD Standstill detection Rollback detection Monitoring of the limit speed Monitoring of 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 for IP 20 2 M12 d round plug, M8 round plug (Ethernet) 4 x D-Sub plug 9-pin (USB)

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

- For data protection according to GM/RT2472 / IEEE1482 / FRA49 CFR
- Int. Flash Memory with 1 GB, 2 GB or 16 GB
- USB connection
- For stand-alone without 19" technology assembly
- Can be connected to all REDBOX*flex* or REDBOX*log*



The DEUTA Protected Memory Unit (PMU) adds a protected travel data memory to the REDBOX Multi-Functional Recorder family. 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)

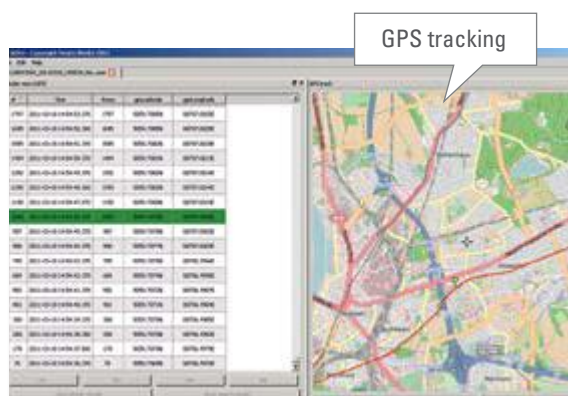


PMU 22 / PMU 23 / PMU 24 / PMU 25

Feature/Specification	PMU 22	PMU 23	PMU 24	PMU 25
Standards	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
Power consumption	max. 180 mA	max. 130 mA	max. 130 mA	max. 200 mA
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)
Storage medium	int. Flash Memory 2 GB	int. Flash Memory 1 GB	int. Flash Memory 1 GB	int. Flash Memory 16 GB
Service PC connection	1x USB	1x USB	1x USB	1x USB
Dimensions				
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)
Height	128,4 mm (5.08 inch)	120 mm (4.72 inch) without astening bracket125 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)
Depth	168 mm (6.61 inch)	233 mm (9.17 inch)	257 mm (10.1 inch)	180 mm (7,09 inch)
Weight	approx. 2 kg	approx. 7.5 kg	approx. 13 kg	approx. 3 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)
Load capacity of the housing				
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.
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)
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)
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.
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.)
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.)

»DEUTA ADS 4 – 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 through USB stick

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.

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.

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.

Language selection



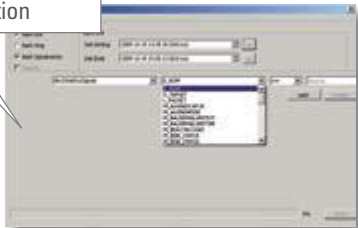
ADS 4 speaks **many languages** – Easy language change for example to Chinese, German, English, Italian, Dutch, Polish, Portuguese, Russian, Spanish, Hungarian ... for world-wide use and also at operating level the ADS 4 is multi-talented and compliant with LINUX, Windows XP / Windows 7 and Mac OS.

Tooltips



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.

Search and filter function



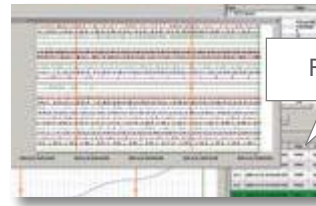
With a highly advanced **search and filter function** you can search forwards and backwards in the data records for events or track values or you can compare nominal and actual travel data with each other. Fleet data can also be evaluated independently of vehicle and data record in this way.

Online help



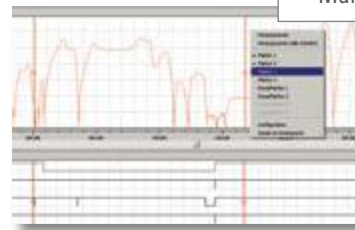
An **online help** for every dialogue is available in the ADS 4. It provides quick, clear answers to the basic questions of handling the ADS 4 evaluation software.

Floating Windows



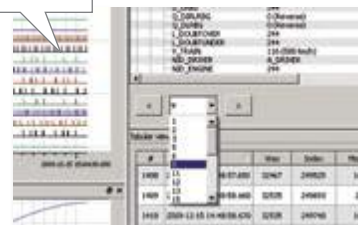
Floating Windows – You can determine how the train data are presented to you individually for every train and configure them with drag&drop. You can save every layout configuration.

Marker



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

Fast search



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



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



Diagnostics



Device status



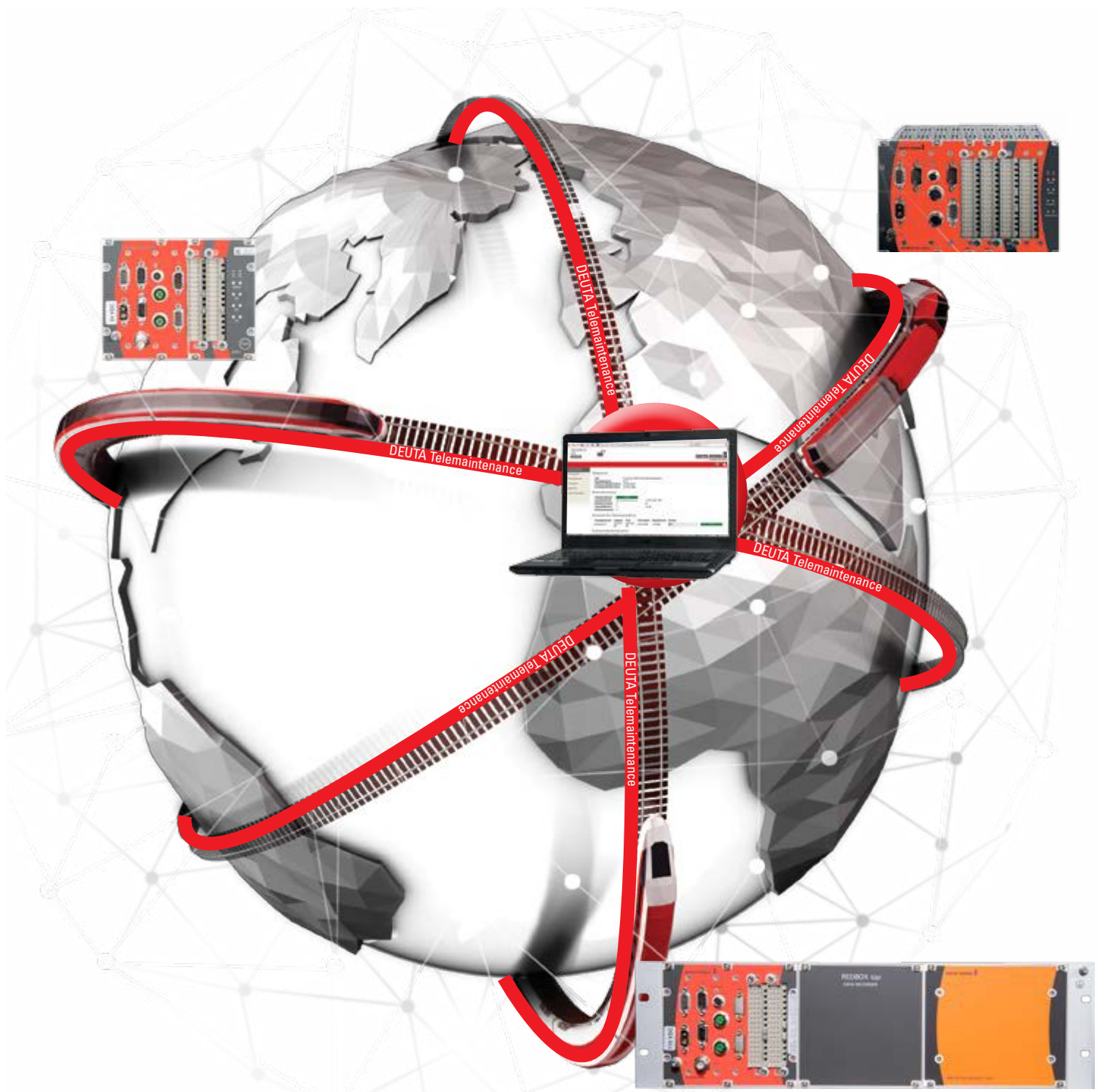
Readout

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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DEUTA Sensors



DEUTA-WERKE 
Technology under Control



Reliability

Patented

Robustness

Self-diagnosis

Longevity

»DEUTA Sensors- Robustness, self-diagnosis and reliability!«

- Robustness: to extreme temperature / wear / impact of stones
- Patented: Doppler radar with innovative evaluation algorithm
- Self-diagnosis: Information about operating mode and condition of the sensor
- Long-lasting: Low-wear thanks to non-contact measurements
- Mechanical defined number of pulses per revolution als captive property of the product

Sensors for your safety!

For an entire system to be safe and precise, quality and robustness, self-diagnosis and reliability of the sensors are the decisive factors. Due to the different forms of output signals, DEUTA sensors transport information reliably and can be integrated and used flexibly in different environments.

DEUTA offers you three groups of sensors which differ in their measuring principle:



Radar sensor
Doppler radar
dual antenna system

○ Radar sensors

The sensors operate contactless and measure the speed and distance over the ground by deploying the Doppler principle with a patented antenna layout. The integrated digital signal processor performs sophisticated evaluation algorithms in the device.



Pick-up sensors
Hall sensor

○ Pick-up sensors

Feature an extremely long service life because the space-saving sensors operate contactless and therefore with low wear.



Axle-mounted sensors
1- to 4-channel pulse generator

○ Axle-mounted sensors

Insensitive to soiling and vibration, the sensors operate largely maintenance-free and offer different resolutions (pulses per revolution). For all DEUTA axle-mounted sensors the pulses per revolution are mechanically defined and therefore a captive property of the product. This "memorized" number of pulses is the solid basis to ensure a reliable measurement.

»DEUTA Radar Sensors-

Speed not affected by slip and spin!«

- uses the Doppler principle of microwaves to calculate the measurement values
- an integrated digital signal processor (DSP) performs sophisticated evaluation algorithms in the device
- serial interfaces gives values for speed, path, direction of travel and acceleration
- the protocol can be adapted to individual customer requirements

Radar sensors

DEUTA radar sensors were the first sensors to make use of the Doppler principle of microwave technology for railways. DEUTA has developed two different algorithms for radar sensors for different applications. The one-channel and the two-channel Doppler radar.

One-channel Doppler radar

The algorithm evaluates the current speed. It was optimised especially for applications such as traction controls and for measurements at higher acceleration.

Two-channel Doppler radar

Special two-channel algorithms analyse the Doppler signals of both antennas. They are optimised with regard to high accuracy and a measuring range up to 600 km/h. A serial interface transfers the information in data packets which additionally deliver status information of the antenna signals. The protocol is adapted to individual requirements for different applications.

The two-channel system offers highest measuring accuracy even at changing underground, it reduces the calibration shift effect and offers a redundancy concept.



Permanent protection at high speeds

In the DRS 05/1S1, an integrated protective cover increases the durability of the radar sensors when they are hit by stone and extends the availability in winter conditions. Such housing is specially recommended for high-speed trains with ETCS / ERMTS. In case such a cover cannot be installed in the subfloor, DEUTA offers a protective sheet that is tested up to 400 km/h.



DRS 4/1

Feature/Specification	DRS 4/1
Working principle	Doppler radar with antenna system
Speed range	0.2 to max. 250 km/h
Statistical errors (1σ)	<1 km/h (v <100 km/h) <1 % (v >100 km/h)
Error due to variation of the underground	<1 % typical (3 % max.)
Dynamic error	σV = 0.65 km/h at a = 1 m/s²
Path measurement reproducibility (1σ)	<0.1% from 1000 m distance
Power supply	DRS 4/1 y: 24 VDC (10V...30V) DRS 4/1 q: 110 VDC (70V...140V)
Power consumption	<10 W
Standard interface	4 push-pull outputs (pulse duty factor 1:1) Electrically isolated 2 x 2 outputs, 90° phase offset) 4 mm / pulse
Forward/Backward recognition	Yes (by 90° phase offset)
Inverse polarity protection/ short-circuit-proof	Yes / yes
Operating temperature	-30° C to +70° C
Dimensions	Approx. 214 mm x 134 mm x 90 mm (LxWxH) (without device socket and mating plug)
Distance to the reflection surface	300 to 500 mm
Housing material	Aluminium cast anodised, cover PEEK (colourlessly chromated paint)
Protection class	IP67 (with plug and cable)
Weight	Approx. 1.8 kg (without plug and cable)
Design antenna	Intermediate transmission frequency 24.125 GHz, transmission power 5 mW

»DEUTA Radar Sensors-

Speed not affected by slip and spin!«

- DRS 051S1 with integrated protective cover against impact of stones and extreme temperatures
- especially suitable for ETCS / ERMTS high-speed trains



DRS 5/1 a

Feature/Specification	DRS 05/1 a
Working principle	Doppler radar with dual antenna system
Speed range	0.2 to max. 600 km/h
Statistical errors (1σ)	<0.4 km/h (v <100 km/h) <0.4 % (v >100 km/h)
Error due to variation of the underground	<1 % typical 3 % max.
Dynamic error	øV = 0.65 km/h at a = 1 m/s ¹
Path measurement reproducibility (1σ)	<0.1% from 1000 m distance
Power supply	24 VDC < U _E <110 VDC
Power consumption	Max. 10 W
Standard interface	RS 485 2-wire with DEUTA protocol pulse output standard 69.44 Hz per km/h (open collector)
Forward/Backward recognition	Yes (info output via serial interface)
Inverse polarity protection/ short-circuit-proof	Yes / yes
Operating temperature	DRS 05/1a: -30° C to +70° C
Dimensions	DRS 05/1a: approx. 244 x 140 x 134 (LxWxH)
Distance to the reflection surface	500 to 1000 mm
Housing material	Die-cast aluminium, anodised, cover PEEK
Protection class	IP67 (with plug and cable)
Weight	DRS 05/1a : approx. 2.1 kg (without plug and cable)
Design antenna	Intermediate transmission frequency 24.125 GHz, transmission power 5 mW per antenna PLL-stabilised transceiver in planar technology frequency within the K-band freely programmable

¹⁾ Plug connection KPSE 10-pole, water-tight. The connecting cable must be ordered separately. It is fixed in the housing plate by 3 x M6 threads



DRS 05/1S1a

Feature/Specification	DRS 05/1S1 a
Working principle	Doppler radar Dual antenna system
Speed range	0.2 to max. 600 km/h
Statistical errors (1σ)	<0.4 km/h (v <100 km/h) <0.4 % (v >100 km/h)
Error due to variation of the underground	<1 % typical 3 % max.
Dynamic error	øV = 0.65 km/h at a = 1 m/s ¹
Path measurement reproducibility (1σ)	<0.1% from 1000 m distance
Power supply	24 VDC < U _E <110 VDC
Power consumption	Max. 10 W
Standard interface	RS 485 2-wire or RS 232
Forward/Backwards recognition	Yes (info output via serial interface)
Inverse polarity protection/ short-circuit-proof	Yes / yes
Operating temperature	-40° C to +70° C
Dimensions	Approx. 481 x 214 x 140 (LxWxH) (each without device socket and mating plug)
Distance to the reflection surface	500 to 1000 mm
Housing material	Aluminium cast anodised, cover PEEK
Protection class	IP67 (with plug and cable)
Weight	Approx. 5.1 kg (without plug and cable)
Design antenna	Intermediate transmission frequency 24.125 GHz, transmission power 5 mW per antenna PLL-stabilised transceiver in planar technology frequency within the K-band freely programmable

¹⁾ Plug connection KPSE 10-pole, water-tight. The connecting cable must be ordered separately. It is fixed in the housing plate by 3 x M6 threads

»DEUTA Pick-up Sensors- extremely high longevity! «

- almost wear-free due to contactless measuring
- three different types of pick-up sensors: - pulse generator with hall sensor
 - magnetic sensors
 - oscillatory sensors



DEUTA pick-up sensors

Pick-up sensors from DEUTA have an extraordinary durability, as they operate contact-free and therefore almost wear-free. The measurement takes place by scanning a gear or magnet wheels, in the process the sensor is mounted in a defined distance over the wheel. DEUTA offers three types of sensors.

Pulse generator with hall sensor- determines speed and direction of rotation

They use the hall effect to measure the rotational speed. Within the HS 22 two hall elements are geometrically arranged in such a way that even the direction of rotation is identified. The output gauge of both signals receivable separated galvanically from each other is prepared for a wide area of power supply. If recording of the direction of rotation is not necessary, use the one-channel HS 21.



HS 21/22...ha HS 21/22... HS 21/22...cb

Feature/Specification	HS 21/22
Working principle	HS 22: 2-channel system HS 21: 1-channel system
Frequency range	0 to max. 20 kHz, depending on cable length and ext. load
Operating distance, air gap	0.5 to 2.0 mm
Operating temperature	-40° C to +120° C
Storage temperature	-40° C to +120° C
Protection class	IP67
Power supply	U _B = +10 VDC to +30 VDC ¹⁾
Pulse duty factor	50 % ±10 %
Short-circuit-proof	Yes, continuous short-circuit-proof ²⁾
Polarity reversal protection	Yes, all connecting wires to each other
Insulation voltage	1 kV _{EFF} /50 Hz/1 min, (all isol. zones with each other)
EMV	EN 50155, EN 50121-3-2, EN 61000-6-2, EN 61000-6-4
Permitted mechanical load	EN 61373, category 3
Broadband noise	3.8 g
Vibration	30 g, 10 Hz ... 2 kHz
Shock	100 g, 6 ms, sine half-wave
Weight	Approx. 260 g with 1 m cable ³⁾ with open cable end
MTBF according to MIL-HDBK-217F	>100.000 h, ground mobile, depending on the version
Indication medium	Ferromagnet. gear wheels or gear linkages, module 2 ⁴⁾ involute gear teeth acc. to DIN 867
Gear wheel material	Steel, demagnetised St37 or St50 according to DIN 10027

¹⁾ Load current I_L = 0 mA to +20mA (push-pull variant 1, other amplifiers available)
²⁾ Short-circuit at v = 120°C and U_B. = +24 VDC without damage
³⁾ without cable connection or protective tube
⁴⁾ optimisation to other modules on request

»DEUTA Axle-mounted Sensors-

The number of pulses per revolution are mechanically defined and therefore a solid basis for reliable measurement!«

- extremely high durability thanks to their predominantly wear-free operation
- insensitivity to dirt and vibration



DF 16/1 a, ac
1- to 4-channel pulse generator



EF 66.20.16 nw, i
AC voltage generator



EF 66.50.16 e, f, m
AC voltage generator

Proven impulse sensors

Axle-mounted sensors from DEUTA are driven by a mechanical coupling on the axle of the vehicle. Impervious to dirt and vibration, they are virtually maintenance-free and achieve high resolution even at low rotational speeds.

The traditional AC generator generates a voltage and frequency that is proportional to the rotational speed, which can be fed directly to a converter or indicator via a cable, without the need for an additional power supply.

Impulse sensors in different variants

The electronic pulse generators (incremental encoders) are based on a variety of principles, for example optical barrier photocells or hall sensors

All axle-mounted sensors can be supplied as multi-channel units. They can be customised to a certain extent with regard to the number of pulses, the phase relationships, and the output circuits.



DF 16/1 a, ac, ad, af, nf



DF 17/1 a, ac, ad, b

Feature/Specification	DF 16/1 a, ac, ad, af	DF 17/1 a, ac, ad, af
Working principle	1- to 6-channel pulse generator	1- to 4-channel pulse generator
Pulse per revolution per channel	1-max. 230	1-max.140
Power supply	10 VDC to 30 VDC ¹⁾	10 VDC to 30 VDC ¹⁾
Power consumption per channel	Max. 50 mA	Max. 50 mA
Load current	Max. 100 mA (with external R _L)	Max. 100 mA (with external R _L)
Pulse duty factor	0.5 ±0.1	0.5 ±0.1
U _{out} high	10V DC to 30V DC	10V DC to 30V DC
U _{out} low	<2 V	<2 V for monitoring purposes
Operating temperature	-40° C to +70° C	-40° C to +70° C
Speed range	0 to 2.000 min ⁻¹	0 to 2.000 min ⁻¹
Insulation channel/housing	1.500 V, 50 Hz, 1 min	1.500 V, 50 Hz, 1 min
Protection class housing	IP66	IP66
Protection class drive side	IP54	IP54
Weight without plug and drive	Approx. 2.3 kg	Approx. 1.7 kg
Design drive	a: Cross slot ac: Drive braket ad: Actuator switch 20 x 7 af: Drive Disk nf: Flat Shaft	a: Cross slot ac: Drive braket ad: Actuator switch 20 x 7 af: Drive Disk b: Driver tongue 14 x 5

¹⁾ Other output switches available

»DEUTA Axle-mounted Sensors-

The number of pulses per revolution are mechanically defined
and therefore a solid basis for reliable measurement!«

- extremely high durability thanks to their predominantly wear-free operation
- insensitivity to dirt and vibration



EF 66.20.16 e,f,m



EF 66.20.16 n, nf, nh



EF 66.20.16 nw,i

Feature/Specification	EF 66.20.16 e, f, m, n, nf, nh, nw, i
Working principle	16-pin
Voltage at 1,000 min ⁻¹	20 V, 133 1/3 Hz ±1% ¹⁾
Max. measuring current at 2 % voltage drop	Approx. 25 mA at 1,000 rpm
Resistance of the coil	Approx. 6 Ω
Rotational Speed	5.000 min ⁻¹
Operating temperature	-40° C to +100° C
Protection class housing	IP65
Protection class drive side	IP54
Weight without drive	Approx. 0.9 kg
Design drive	e: Flat shaft, diameter 10 mm f: ø 40 sockets DIN 75 532E2 m: Slot axis and PIV flange n: Basic design nf: With fixing flange nh: Special flange with feather coupling nw: Feather coupling sheet corner i: ø 40 sockets serrated coupling

¹⁾ All voltage specifications according to DIN 5376



EF 66.50.16 e,f,m



EF 66.50.16 n, nw,i

Feature/Specification	EF 66.50.16 e, f, m, n, nw, i
Working principle	16-pin
Voltage at 1,000 min ⁻¹	50 V, 133 1/3 Hz ±1% ¹⁾
Max. measuring current at 3% voltage drop	Approx. 12 mA at 500 min ⁻¹
Resistance of the coil	Approx. 15 Ω
Rotational speed	3.000 min ⁻¹
Operating temperature	-40° C to +100° C
Protection class housing	IP65
Protection class drive side	IP54
Weight without drive	Approx. 0.9 kg
Design drive	e: ø 40 sockets smooth axle f: ø 40 sockets DIN 75 532 E2 i: ø 40 sockets serrated coupling m: Slot axis + PIV flange n: Basic design nw: Feather coupling sheet corner



EF 67/2.20.16 a,b



EF 67/2.20.16 ad, ae



EF 67/2.50.16 a,b,ac



EF 67/2.50.16 ad, ae

Feature/Specification	EF 67/2.20.16 a, b, ad, ae	EF 67/2.50.16 a, b, ac, ad, ae
Working principle	16-pin	16-pin
Voltage at 1,000 min ⁻¹	20 V ±1%	50 V ±1%
Frequency at 1,000 min ⁻¹	133.3 Hz	133.3 Hz
Distortion factor at 1,000 min ⁻¹	Approx. 7 %	Approx. 7 %
Resistance of the coil	Approx. 6 Ω	Approx. 15 Ω
Rotational speed max.	5.000 min ⁻¹	3.000 min ⁻¹
Operating temperature	-40° C to +80° C	-40° C to +80° C
Protection class housing	IP65	IP65
Protection class drive side	IP54	IP54
Weight without drive	Approx. 1.6 kg	Approx. 1.6 kg
Design drive	a: Cross Slot b: Switch 14 x 5 (length as per specification) ad: Switch 20 x 7 ae: Elastic actuator bridge	a: Cross Slot b: Switch 14 x 5 (length as per specification) ac: Fork drive ad: Switch 20 x 7 ae: Elastic actuator bridge

»DEUTA Axle-mounted Sensors-

The number of pulses per revolution are mechanically defined and therefore a solid basis for reliable measurement!«

- extremely high durability thanks to their predominantly wear-free operation
- insensitivity to dirt and vibration



EFI 67/1.20.16 a, ac, ad



EFI 67/1.50.16 a, b, ac, ad, ae

Feature/Specification	EFI 67/1.20.16 a, ac, ad	EFI 67/1.50.16 a, b, ac, ad, ae
Working principle	AC/pulse generator	AC/pulse generator
Polarity number	16	16
Voltage specification	20 V ±1 % (DIN 5376)	50 V ±1 % (DIN 5376)
Frequency	133.3 Hz at 1,000 rpm	133.3 Hz at 1,000 rpm
Distortion factor at 1,000 min ⁻¹	Approx. 10 %	Approx. 10 %
Resistance of the coil	Approx. 6 Ω	Approx. 15 Ω
Rotational speed max.	5.000 min ⁻¹	3.000 min ⁻¹
Impulse transmission	1:1 to 256:1 ¹⁾	1:1 to 256:1 ¹⁾
Load pulse component	15 VA induction-free Max. 250 VAC ²⁾	15 VA induction-free Max. 250 VAC ²⁾
Pulse number	Max. 20 Hz = 1.200 pulses/min	Max. 20 Hz = 1.200 pulses/min
Test voltage	2 kV	2 kV
Protection class housing	IP65	IP65
Protection class drive side	IP64	IP64
Temperature range	-40° C to +80° C	-40° C to +80° C
Weight	Approx. 1.85 kg	Approx. 1.85 kg
Design drive	a: Basic design ac: Fork drive ad: Switch 20 x 7 ¹⁾	a: Basic design b: Switch 14 x 5 ac: Fork drive ad: Switch 20 x 7 ¹⁾ ae: elastic driver bridge



EF 83.20.8 a



EF 83.20.12 c, d, i



EF 83.20.12 m, n

Feature/Specification	EF 83.20.8 a	EF 83.20.12 c, d, i, m, n
Working principle	8-pin	12-pin
Voltage at 1,000 min ⁻¹	20 V ±1%, 66.6 Hz	20 V ± 1%, 100 Hz
Distortion factor	Approx. 5 %	Approx. 8 %
Temperature error	<0.2 % / 10° K	<0.2 % / 10° K
Resistance of the coil	Approx. 67 Ω	Approx. 35 Ω
Rotational speed	5.000 min ⁻¹	5.000 min ⁻¹
Operating temperature	-30° C to +80° C	-30° C to +80° C
Protection class drive side	IP54	IP54
Test voltage	1.500 VAC, 50 Hz, 1 min	1.500 VAC, 50 Hz, 1 min
Weight without drive	Approx. 0.5 kg	Approx. 0.5 kg
Design drive	a: According to DIN 75532 L1	c: Flat shaft ø 7, with sockets ø 30 d: Slit shaft with flange i: Flat shaft ø 10, with sockets ø 40 m: PIV flange with slit shaft n: Tetrahedral shaft with flange

¹⁾ Specify the switch length with the order

²⁾ 130 VDC, max. 1.5 A

³⁾ All voltage specifications according to DIN 5376

»DEUTA Axle-mounted Sensors-

The number of pulses per revolution are mechanically defined and therefore a solid basis for reliable measurement!«

- extremely high durability thanks to their predominantly wear-free operation
- insensitivity to dirt and vibration



EFI 61/2S1 a,ad



EFI 501S1 a,d

Feature/Specification	EFI 61/2S1 a,ad	EFI 501S1 a,d
Working principle	Three-phase/pulse generator	8-pin
Voltage at 1,000 min ⁻¹	80V ± 0.5% per phase	24 V ±10%
Rotational speed max.	Max. 2.000 min ⁻¹	Max. 3.500 min ⁻¹
Protection class housing	IP65	IP65
Protection class drive side	IP54	IP54
Temperature range	-30° C to +90° C	-40° C to +80° C
Weight	Approx. 4.7 kg	Approx. 1.6 kg
Design drive	a: Cross slot shaft ad: Switch 20 x 7	a: Cross slot shaft d: Switch 20 x 7



EFK 83.20.8 a
EFK 83.20.12 a



EFK 84.20.8 a
EFK 84.20.12 a

Feature/Specification	EFK 83.20.8 a / EFK 84.20.8 a	EFK 83.20.12 a / EFK 84.20.12 a
Working principle	AC generator	AC generator
Polarity number	8	12
Voltage at 1,000 min ⁻¹	20 V ±1 %, 66.6 Hz	20 V +/-1 %, 100 Hz
Resistance of the coil	Approx. 67 Ω	Approx. 35 Ω
Distortion factor	Approx. 5%	Approx. 8%
Rotational speed max.	5.000 min ⁻¹	5.000 min ⁻¹
Test bed coil	1.500 VAC, 50 Hz, 1 min	1.500 VAC, 50 Hz, 1 min
Winding against winding	-	1.500 VAC, 50 Hz, 1 min
Protection class housing	IP65	IP65
Protection class drive side	IP64	IP64
Temperature range	-40° C to +80° C	-40° C to +80° C
Temperature error	<0.2 % / 10° K	<0.2 % / 10° K
Weight	Approx. 0.6 kg	Approx. 1.3 kg
Connection electrical	EFK 83.20.8a: Bolting M18 x 1,5 DIN 89280 EFK 84.20.8a: 5 m cable, fused	EFK 83.20.12 a: Bolting M18 x 1,5 DIN 89280 EFK 84.20.12 a: 5 m cable, fused



DEUTA - The Home of Trust-Technology:



IconTrust®



SignalTrust®



TouchTrust®



SelectTrust®



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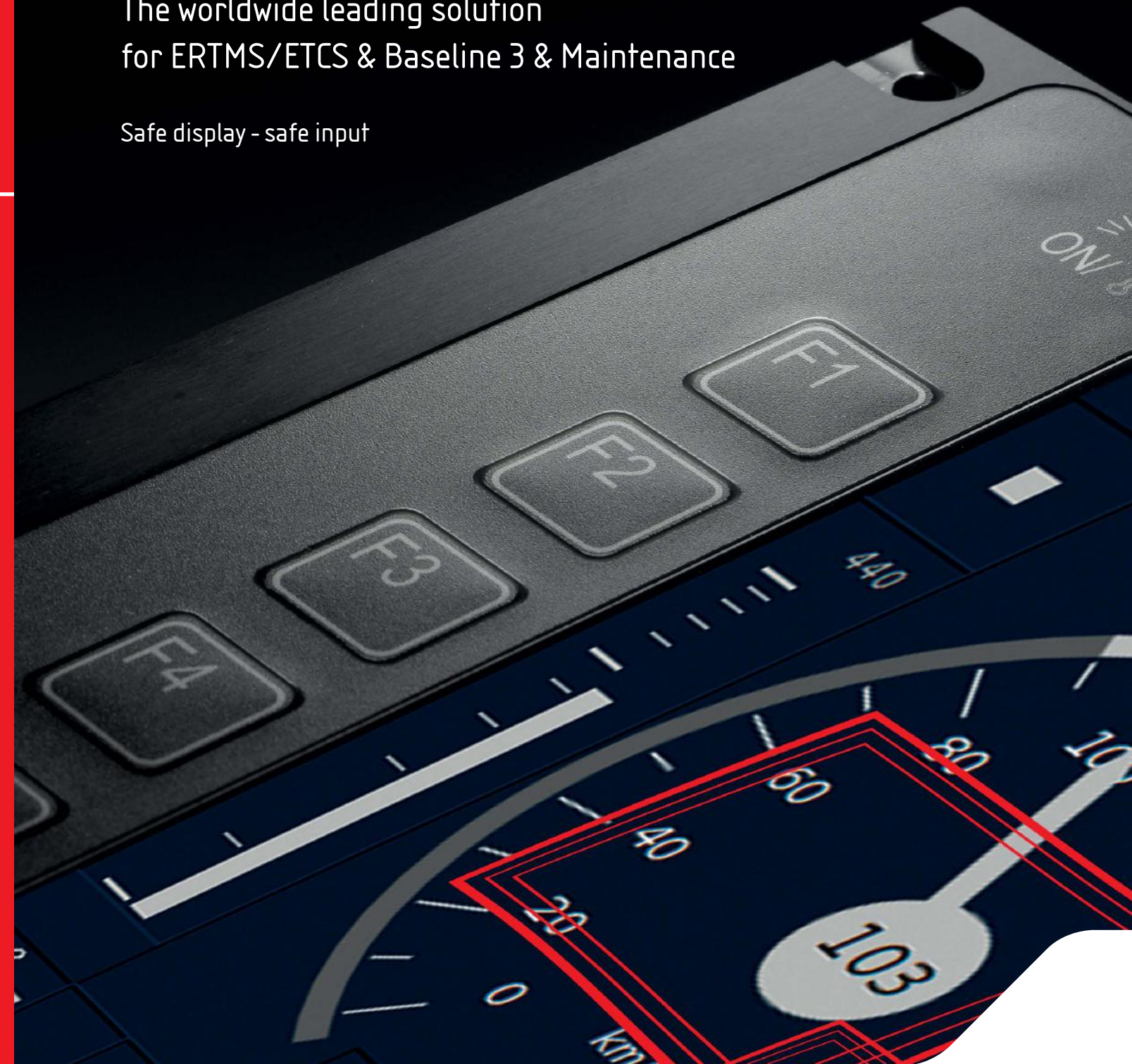
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The state of products pictured and described in this brochure corresponds with that on the final editing, however, DEUTA-WERKE GmbH reserves the right to make changes in the meantime.
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DEUTA Trust-Terminals

The worldwide leading solution
for ERTMS/ETCS & Baseline 3 & Maintenance

Safe display - safe input



IconTrust® - You can Trust.

»DEUTA Trust Terminals

The No. 1 worldwide for driver's cab displays«

DEUTA

Trust technology:

- + Generic expertise up to SIL 3
- + Safe input and output
- + Software and hardware from a single source
- + Integrated Trust technology
- + Cost-efficient validation
- + Easy assessment of application changes
- + Cost-efficient
- + Many successful project references with component and system expertise

With the commencement of the new Subset-091 Issue 3.3.0 release, focus has been placed for the first time on the **mandatory specification of the Driver Machine Interface (DMI) as Safety Integrity Level (SIL) component** as part of Baseline 3 and its "Safety Requirements for the Technical Interoperability".

The requirement of Subset-091 regarding the monitoring of safe **display and input areas on a touch panel** is fulfilled by **IconTrust** on the DEUTA Multi-Functional Terminals. IconTrust detects representation errors of an unsafe PC system and differentiates between the safety-related input areas on the TFT. The therein contained **SelectTrust function** checks the activation or release of the touch area, or the single or continuous transmission of the activation. The technology thus complies with the requirements of Subset-091 through a safe, flexible and cost-efficient fully solution.

DEUTA-WERKE is a pioneer of the proven and safe representation of Driver Machine interfaces. For 5 years DEUTA has been supplying Multi-Functional Terminals with an validation proof of safety.

DEUTA as sole provider offers the combination of highly-available redundant displays, safe SIL 3 display and SIL 2 input.



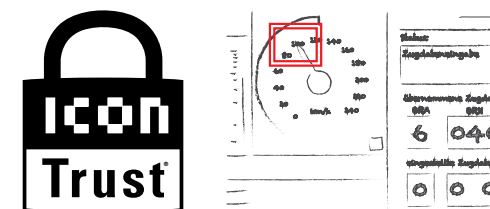
MFT R8/2

»DEUTA Trust Technology

Safe hardware and software from a single source«

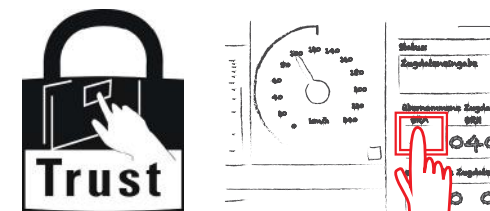
IconTrust® – for safe display

IconTrust monitors **dedicated areas on the TFT panel** and differentiates **between safety-related and non-safety-related information**. IconTrust uses a safe computer to transmit the safe data to the panel PC. This is where the data are processed and displayed. IconTrust monitors the represented screen areas on the TFT display and transmits the protocol back to the safe computer. Comparison occurs in the safe computer, e.g. in the EVC (European Vital Computer).



SelectTrust® – for safe input

SelectTrust is worldwide the first technology which demonstrably **secures the safe manual input of information** via touch screen. The entry position and the visualisation at this position are checked in the functional safe SelectTrust solution. Only in case of total correctness the functional safe entry action will be transmitted to the safe computer.



Independent and cost-effective solutions

Along with IconTrust, SelectTrust provides a cost-effective solution for safety considerations and proof of compliance with current safety requirements. Both monitoring systems work fully decoupled from the display function and operating function making them unique in their mode of operation.

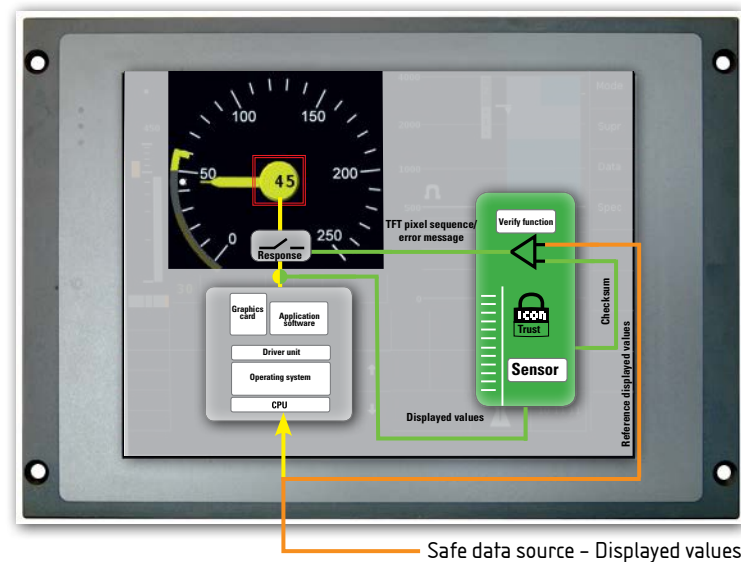


IconTrust is an economical and safe solution which meets today's and tomorrow's safety standards in railway traffic. **Even up to SIL3 already today!**

The patented SelectTrust technology monitors SIL-related input areas of the DMI.

»IconTrust®

Infinite control up to SIL 3«



IconTrust Technology:

The independent monitoring unit guarantees that only correct display values are represented.

IconTrust is realised through economical components available long-term.

IconTrustGenericPlus: already evaluated in many projects up to SIL 3.

IconTrust®

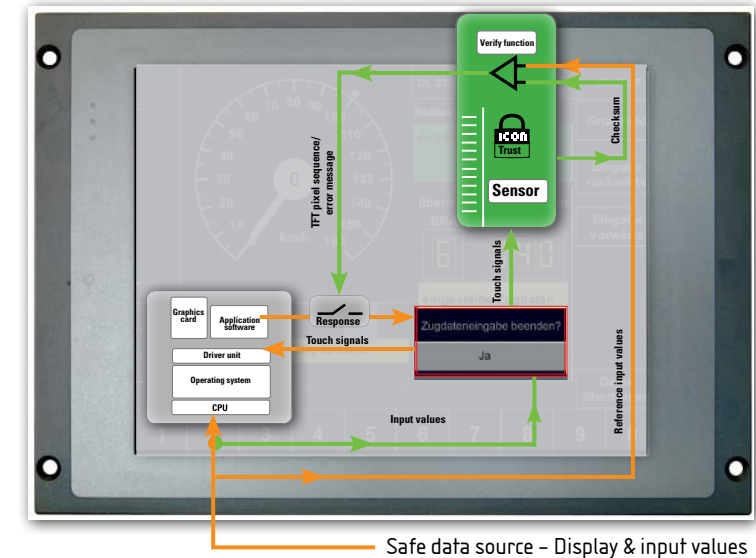
IconTrust **monitors predefined areas on the TFT display**. IconTrust analyses the displayed image there and compares the image data with the value of the original input variable. In the event of deviations IconTrust triggers a safety-oriented response.

IconTrust is independent of the chosen computer architecture. In the IconTrustGenericPlus model, a project-specific and **time-saving SIL expertise** is possible. IconTrustGenericPlus has already been evaluated successfully in many projects up to the safety level **SIL 3**. Obsolescence and device modifications can be recertified with acceptable expenditure.

In the non safety-related display zones, **customer- or project-specific software adaptations are possible without re-evaluation**. In the safety-related areas, adaptations are easily mastered with the IconTrust IVEN configuration tool.

»SelectTrust®

Ensuring correct touch input«



SelectTrust®

SelectTrust is worldwide the first technology to demonstrably **ensure correct manual input** of information via touch screen.

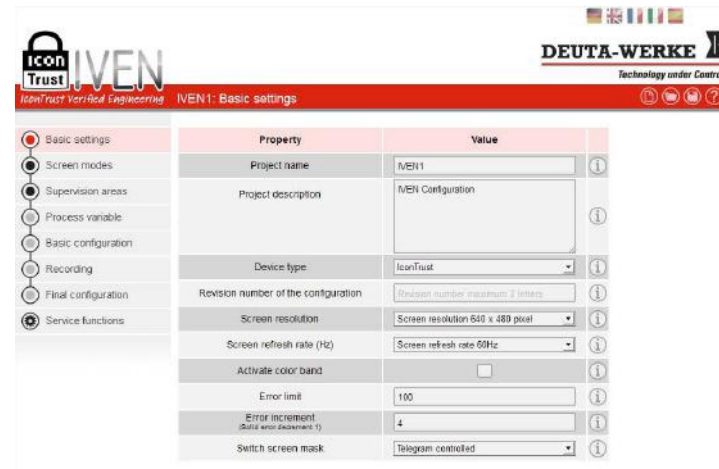
This technology is invisible to the operator: A graphical control element displayed on the TFT display is selected and touched. **SelectTrust uses IconTrust to select that activated control element**, assigns it a signature and transmits the corresponding checksum to the safe computer. There the information of the "classical" touch event is compared with the SelectTrust signatures on the basis of the previously defined reference tables. This **ensures the reliability of the information**. SelectTrust and IconTrust monitors only the customer defined safety-related areas.

SelectTrust

Technology:
Patented safety at the touch screen.

Together with IconTrust, **SelectTrust** offers a cost-efficient solution method for the assessment or verification of current safety requirements.

»IVEN – makes SIL display configuration easy«



There will always be new CENELEC requirements and additional customer requests. **Safety-related changes and new configurations** of the monitoring areas can be configured specific to project with the IVEN engineering tool and prepared for the expertise.

IVEN offers a preview of the configured monitoring areas and checks the configuration for consistency. In the process, IVEN records all process values with the corresponding screen photo, transfers the configuration to the IconTrust module and automatically **generates a PDF validation report** as direct documentation for the expertise.

IVEN configuration, diagnostic & test

Define

- configuration of SIL-related monitoring areas and dialog boxes
- definition of basic parameters (resolution, error counter behaviour, etc.)

Automatically record

- determine and record the checksums for all permitted graphical elements

Programming

- upload the configuration to the IconTrust board

Document

- automatically generation of a PDF validation report as documentation for the expertise

Testing

- diagnosis of communication and hardware with detailed error output

With IVEN our customers can configure the safety-related input and display areas.

DEUTA Hardware and Software Engineers are experts in the field of Functional Safety Engineering and make the latest SIL technologies applicable for any individual terminal solution.

Upon request DEUTA-WERKE can supply the displays, including the application software, with a safety certificate and other approvals.

»TSI-compliant application software«

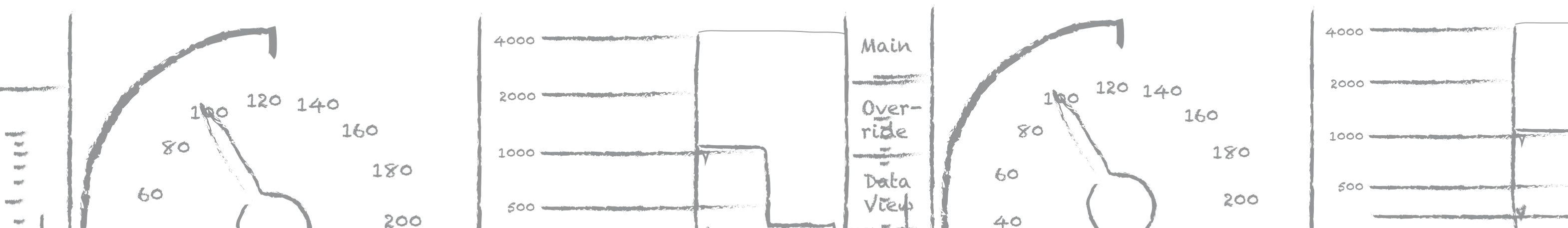
The DMI forms the stable basis for the safety functions and is an essential part for vehicle interoperability.

In the ERA ERTMS 015560 Ver. 3.4.0, the input and output behaviour of the DMIs for Baseline 3 is strictly standardised. The DEUTA software designers are acutely aware of the requirements down to the pixel and develop standards-compliant applications for their Multi-Functional Terminal from design to SIL validation for PZB and ETCS.

Upon request you can use the DEUTA communication protocol - developed and evaluated up to SIL 3 - or we will implement your specified protocol.



DEUTA also supports national train protection systems – integrated in ETCS such as the shown PZB interface.



What needs to be considered for a safe display and touch input?

- Errors and obsolescence in modern complex computer cores, caches, graphic units, etc. need to be mastered
- Errors have to be assessed in operating systems and complex software and checked and documented at great cost. Changes make elaborate verification efforts and impact analyses necessary.
- The position of the touch input must be safely acquired and the input unit must be diagnosed. If not all error states can be diagnosed and a higher safety level is required, then position acquisition must occur redundantly.
- The project-specific resource use (time and money) should be kept as low as possible.
- The safely imaged representation at the input position is required. It has to be assured that the representation is appropriate for the triggered input function. For that reason, a safe display is always necessary for a safe input.
- Input safety for operating systems depends on the safety functions:
 - Safe starting of an actuator
 - Safe stop / safe release
 - Emergency stop function

What does Subset-091 define?

As part of Baseline 3, the Subset-091 defines the European-wide uniform standardisation of the ETCS application, whereby for the first time the safe display and input of information is prerequisite for compliance with ergonomic and safety-oriented specifications.

For the producers of Driver Machine Interfaces for ETCS vehicles this means that their terminals must comply with a Safety Integrity Level of at least SIL 2 on the basis of a Tolerable Hazard Rate of $7.4 \cdot 10^{-7}$. Railway vehicles and train protection manufacturers justifiably expect SIL 3 from DMI producers already now in order to comply with the higher safety requirements in future.

Display and input behaviour of the DMI are strictly standardised in the Subset-091. The response time after input and the representation of graphical objects is limited to 20 ms. The probability of incorrectly entering vehicle data and parameters must be minimised for the driver. Here, too, there is a standard time value: The DMI for data entry must be available within 60 seconds from out of standby mode. In the process it must be ensured that the locomotive driver can carry out his work quickly and error-free at all times without unnecessarily increasing the complexity of the overall system. It should be possible to read and understand every message on the DMI within the shortest time possible.

»SIL 3 – The cost side«

A SIL 3 DMI of the latest generation does not generally cost more than a SIL1 terminal. For the macroeconomic assessment, not only the acquisition costs of the DMI but also the future security and the follow-up costs-must be considered. A modern, cost-optimised DMI concept ensures that changes in the software application and the DMI hardware will not affect each other. The advantage is obvious: Irrespective of hardware discontinuations during a DMI life cycle, the safety assessment will retain its validity.



Trust Technology Terminals



MFT R 8/2

Redundant terminals

Two redundant full-value 8" vertical terminals with a total surface of 10.4" optimise the display availability of the Multi-Functional Terminal MFT R 8/2 S3.

Both terminals are full-value, individually replaceable function modules, thus satisfying the requirement towards minimised life-cycle costs. The train driver can manually switch between the terminals.

IconTrust monitors dedicated areas on the TFT panel and differentiates between safety-related and non safety-related information. The touch panels are optionally equipped with SelectTrust.

MFT R 8/2	
	consisting of 2 DATS2080kwe
Feature/Specification	per DAT 2080kwe
Display lighting	LED backlight
Dimmable lighting	0 to 350 cd/m²
Status LEDs	3
CPU/clock frequency	ARM, CPU, >500 MHz
RAM memory	512 MB
Internal flash disk	minimum 4 GB
Flash-EPROM	1 MB
Extensibility	upon request
PC keyboard connection	USB keyboard
Additional controller	Environment Controller
Service Interface	USB and Ethernet
Buzzer	yes
Temperature management	yes
Ambient light sensor	front side
Power supply	24 - 110V (DC ± 30%)
Power consumption	typ. 22 W
Display type/size	colour TFT / 8"
Display resolution, colour intensity	480 x 800, 18 bit
Ethernet	10/100 Base T as M12 d-coded ¹⁾
Vehicle bus	2x MVB
Audio out	amplifier output 1 x 8W
Serial interfaces	1 x RS 485, IBIS upon request
USB	2x USB 2.0 (M8 a-coded ¹⁾)
Device address	3 bit
Keypad device front	none
Keypad backlight	none
Touch screen	capacitive
Weight	approx. 3 kg
Protection category front/rear	IP 65 / IP 40
Operating temperature	-25 °C to 70°C (full functionality)
Temperature storage	-25°C to 85°C
MTBF value	> 89.000 hrs.
Operating system	LINUX, others upon request
Applications	ETCS, diagnostics, brake control, etc.
Safe Supervision Function	IconTrust®, SelectTrust®
Feature/Specification	per MFT R 8/2
Front dimension (W x H)	652 mm x 244 mm
Mounting dimension (W x H x D)	372 mm x 211 mm x 80 mm
Indicator light	EZ155b



MFT S11/2

Patented safety

The Multi-Functional Terminal MFT S11/2 is equipped with the patented IconTrust technology as standard. IconTrust monitors dedicated areas on the TFT panel and differentiates between safety-related and non safety-related information.

Each of the individual areas of the displayed image are analysed and compared to the value of the respective input variable during every image refresh cycle in IconTrust.

The patented procedure demonstrably ensures topicality and correctness. The generic verification is certifiable up to the SIL 3 level. If the application changes, our customers can easily modify the monitoring areas with the IVEN Engineering Tool and document it for the validation.

¹⁾ Available as accessory from DEUTA: Adapter/cables/loudspeaker front plates/ serial switchbox/USB Ethernetadapter/power supply

Feature/Specification	MFT S11/2
Display lighting	LED backlight
Dimmable lighting	0 to 350 cd/m²
Status LEDs	3 LEDs
CPU/clock frequency	Geode, LX 800, 500 MHz
RAM memory	256 MB (incl. video memory)
Flash-EPROM	1 MB
Video memory	4 MB
Flash memory	minimum 2 GB
PC keyboard connection	USB keyboard
Additional controller	Environment Controller
Service Interface	USB and Ethernet
Buzzer	yes
Temperature management	yes
Ambient light sensor	front side
Power supply	24, 48 or 74 - 110 V (DC ±30 %)
Power consumption	typ. 25 W
Display type/size	colour TFT 10.4" (26.4 cm), additional sizes upon request
Display resolution, colour intensity	640 x 480, 18 bit, additional resolutions upon request
Ethernet	2x 10/100 Base T as (M12 d-coded ¹⁾)
Audio out	2x Line-Out or 2x2 W loudspeakers
USB	2x USB 2.0 (M8 a-coded ¹⁾) + 1x Feature Connector
Vehicle bus, I/O	Ethernet, RS 422, RS 485, MVB, CAN, RS 232, Profibus
Device address	3 bit
Keypad device front	upon request
Keypad backlight	upon request
Touch screen	yes, resistive, scratch-proof
Front dimension (W x H)	310 mm x 214 mm
Mounting dimension (W x H x D)	280 mm x 204 mm x 65 mm
Weight	approx. 3.6 kg
Protection category front/rear	IP 65 / IP 54
Temperature range operation	-25°C to +70°C (full functionality)
Temperature range storage	-35°C to +85°C
MTBF value	calculated approx. 100.000 hrs.
Operating system	LINUX, QNX™, Windows™
Applications	ETCS, diagnostics, brake control, etc.
Safe Supervision Function	IconTrust®, SelectTrust®



DEUTA XP 20 -Travel Simulation with real Travel Data

Wheel Pulse Generator Actuator

DEUTA-WERKE GmbH

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support@deuta.de · www.deuta.de · www.icontrust.com

XP 20Drive - Drive unit for Wheel Pulse Generator
Simulation of the rotating vehicle axle

Holistic Sensor Simulation

DEUTA XP 20 Test Benches offer advanced possibilities in sensor testing for rail operators, system integrators and workshops:

Travel Simulation with real Driving Data

With the XP 20 Test Benches speed and route information systems which have been installed on the vehicle can be tested. The traction operations are adjusted through direct simulation of the sensor input parameters. The XP 20 Test Benches allow „system testing of traction operations“ without the vehicle actually moving on the track. The sensors remain in the vehicle wiring and are „driven“ via the XP 20 Test Benches with real speed profiles. Calibration test runs are therefore unnecessary. DEUTA takes an holistic view of 'sensor simulation'. The XP 20 product family consists of test benches which stimulate axle generators, pick-up sensors or Doppler radar sensors.



XP 20 Drive - Simulation of the rotating vehicle axle
Pulse generators capture the speed via the rotating vehicle axle (axle mounted generator) or via a rotating gear wheel on the gear box of the vehicle drive (pick-up sensor).



XP 20 Move - Simulation of the moving ground
Doppler radar sensors are mounted on the under side of the vehicle and detect the speed based on the moving ground. Objects in the track bed and the timing of the positional changes of these in relation to each other form the basis for the speed capture. The XP 20 Move test device for Doppler radar sensors simulates the Doppler signal of the objects in the track bed.

Possible Operating Modes:

XP 20D (Drive)

The stand-alone test bench which drives the pulse generator is operated using the integrated touch terminal.



XP 20DS (Drive Service) + XP 20R (Remote)

The service test bench which drives the pulse generator is operated using the mobile operation terminal XP 20R or a PC with software emulation of the XP 20 user interface.



Synchronous operation

Up to nine XP 20 test benches are networked and operated using the integrated touch terminal of an XP 20D, the mobile operation terminal XP 20R or a PC with software emulation of the XP 20 user interface.



The advantages of the XP 20 Test Benches at a glance:

Real Travel Simulations

- System testing without costly and time-consuming calibration runs
- no reservation of test routes
- maximum reproducibility
- identical boundary conditions
- no environmental influences

Operating terminal

- comfortable & ergonomic
- memory function and operational profile mode
- optional software for operation terminal simulation
- a variety of possibilities for application with mobile operation terminal
- synchronous control of up to nine XP 20 drivers

Time and Money Savings

- shorter development and project processing times during system integration
- reduced need for personnel during system tests following maintenance and commissioning



Sample Applications

System calibration in the depot and on track

The XP 20 actuators emulate real and fictitious test runs within a signal chain. They are not subject to changes in weather and are free from external influences. Commissioning tests and annual safety inspections are carried out directly on the vehicle using the XP 20. The costly investment in time and staff for separate test drives can be dispensed with. The XP 20s are protected for tough on-site use with robust, portable casing. The XP 20DS service devices can be operated via a data link from the vehicle using the mobile operation terminal XP 20R.



System testing in the Laboratory

The XP 20 drivers save time and money. Up to nine XP 20DS drivers can be coupled to a test and simulation environment and centrally operated via Ethernet interface. In this way, the XP 20 drivers cover the growing demand for system and integration testing resulting from shorter development times for newer vehicles and train safety systems, multiple uses of vehicles in cross-border traffic as well project-specific applications.

Analysis of critical results in the laboratory

The areas of applications of the XP 20 actuators range from analysis of critical results within safety relevant assessments, to post-processing and analysis of incidents right up to accident assessment.

Component testing in the Workshop

The XP 20 drive units are an important part of quality assurance. Testing of functions during and following maintenance and servicing measures ensure the correct function of the signal chain: Sensor—Recorder—Indicator.

Operators of large fleets of vehicles stockpile large numbers of spare components. In order to guarantee the correct functioning of these, even after many years in storage, the operators carry out a test of components with the XP 20 drive unit prior to installation in the vehicle or during an inventory.



Simple Operation

Operation of the software controlled XP 20 drive unit is via a 7" touch display. The operation terminal can be optionally integrated into the XP 20 or placed in separate housing. The software emulation of the operation terminal is also separately available for the user PCs.

Signal Evaluation

The speed signal of the XP 20 drive units is used for system components such as indicators, DEUTA REDBOX® Multifunctional Recorders and train safety systems. For detailed investigations of the pulse generator signals, the XP 20 is combined with evaluation software using an oscilloscope or a measuring board.

A variety of accessory kits

With the appropriate accessory parts, the XP 20 actuators can be combined with all sensors: from heavyweight alternating current generators and electronic incremental generators to pick-up sensors.



XP 20 actuators for System Manufacturers:

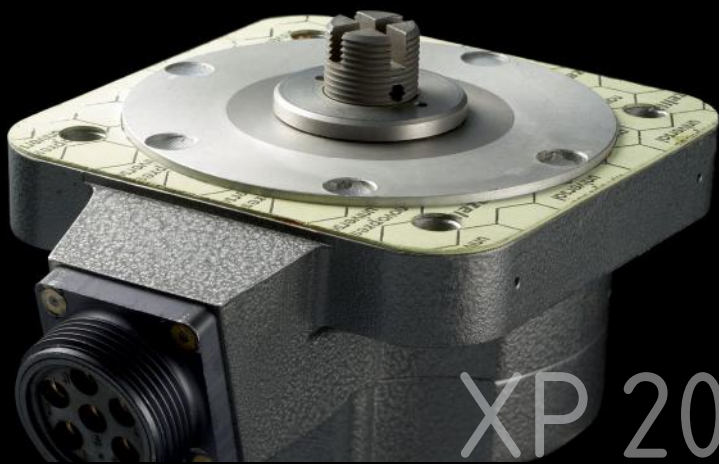
System integration, Implementation, Analysis

- Integration tests in the laboratory
- Integration tests in the vehicle
- Investigation into critical incidents within safety relevant assessments in the laboratory
- Analysis of breakdowns and accident assessment in the laboratory

XP 20 actuators for Railway operators:

Maintenance Service Repair

- annual system safety inspections on the vehicle (e.g. PZB - intermittent automatic train control)
- cyclical testing and calibration of components (e.g. indicators) in the workshop
- operation and implementation tests following maintenance and servicing measures on the vehicle
- system testing of replacement component parts on the vehicle
- function testing of replacement components prior to installation in the vehicle
- testing of components which have been in storage (incoming and outgoing goods)
- error diagnosis of components in the workshop



XP 20 D, DS, R

The XP 20D and XP 20DS drive units for axle mounted generators and pick-up sensors are an integral part of the simulation environment for system testing of speed sensors within train protection. The compact housing facilitates testing directly on the vehicle.

In the XP 20D the operation terminal is integrated in the housing. The XP 20DS variant serves as a remotely controlled service device for testing on the vehicle. It is supplied without its own operation terminal. Activation of the service device XP 20DS is effected via the mobile operation terminal XP 20R, the software emulation of the XP 20 operator interface or indirectly in synchronous operation through an XP 20D. With the operation terminal up to nine XP 20 Test Benches are simultaneously activated. Variable settings, e.g. wheel diameter, are set separately for each driver.

The required revolutions or speed are entered into the operation terminal. The current revolutions or speed of the XP 20 driver are displayed on the operation terminal. The rotational direction can be changed at any time.

On the rear side of the XP 20D there is a power unit on which all current generators and pick-up sensors can be installed. A range of accessory kits is available for this.

20 freely programmable memory spaces are available for both speed and revolutions. Real or fictitious train runs can be simulated in the "Operational Profile" mode.



Rear side XP 20D and XP 20DS:

On the XP 20D and XP 20DS the sensors to be tested are installed on the rear side of the drive shaft .



XP 20D
(with integrated operating terminal)



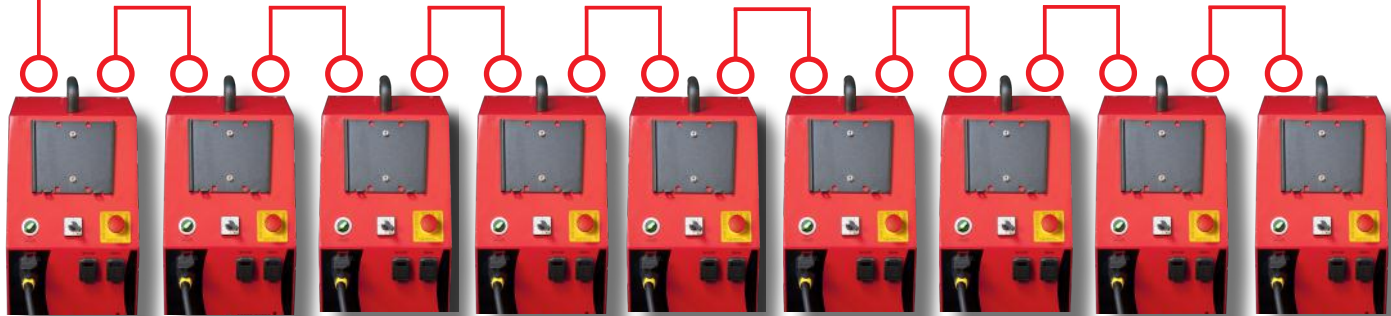
XP 20DS
(and mobile operation terminal XP 20 R)

Characteristics/Specifications

XP 20D	Test Bench
Function	Simulation of real drives and speed profiles for axle mounted generators and pick-up sensors
Field of application	For laboratory environments, maintenance workshops and servicing on the vehicle
Operation	7" Touch Operation Terminal
Range of adjustment	0 ... 4.000 U/min or 0 ... 400 km/h
Wheel diameter	Adjustable from 450 - 2,000 mm
Direction	Adjustable left and right
Operating voltage	110 - 240 V 50-60 Hz
Power consumption	max. 500 W
Weight	approx. 11.5 kg
Dimensions (HxWxD)	330 x 215 x 280 mm
XP 20DS	Test bench
	Specifications as for XP 20D without operating terminal
Weight	10.5 kg
(Dimensions (HxWxD)	330 x 215 x 280 mm
XP 20R	Mobile Operating Terminal with 7" Touch display
Weight	2.5 kg
Dimensions (HxWxD)	254 x 276 x 64 mm



XP 20R



XP 20DS