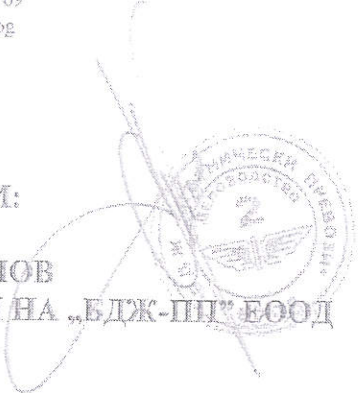# "БДЖ – ПЪТНИЧЕСКИ ПРЕВОЗИ" ЕООД
ЦЕНТРАЛНО УПРАВЛЕНИЕ

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ОДОБРЯВАМ:

ЛЮБЕН НАНОВ
УПРАВИТЕЛ НА „БДЖ-ПП" ЕООД

ИВАН ВЪЛЧЕВ
ПРОКУРИСТ НА „БДЖ-ПП" ЕООД

ТЕХНИЧЕСКА СПЕЦИФИКАЦИЯ

за

„Доставка на 70 броя системи за регистриране и записване на данни тип Teloc®4000, производство на HaslerRail, за електрически локомотиви серии 43, 44, 45 и 46200 собственост на „БДЖ – Пътнически превози" ЕООД"

Приложени 16 листа.

Съгласувано с:

.... инж. Велик Тонев
Директор, дирекция „ПЖПС"

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Зам.Директор, "Локомотиви", дирекция „ПЖПС"

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.... к. Стефан Костов
*Ръководител отдел "Ремонт на ТПС"*

Заличено на основание Регламент 2016/679

Datasheet TELOC®4000 (EN)

TELOC®4000 is part of a brand new smart-tech equipment generation that satisfies the most demanding requirements. Due to the modular architecture of the system, new functions can be integrated at hardware and software level. The housing can be customised to customer's requirements and is based on a 19 inch 3U rack technology. The TELOC®4000 generation has been developed for use on all railway vehicles such as electric and diesel locomotives, high speed trains, electric and diesel multiple units and mountain railways. It is also suitable for mass transit, i.e. on light rail vehicles, trams and metro trains.

HaslerRail also offers a wide range of peripheral products, such as speed indicator, pulse generators, etc. Furthermore, HaslerRail has the possibility to transfer data from the data recorder to a ground server via different wireless solutions, e.g. LTE, WiFi, etc. Together with HaslerRail's software Hasler® EVA+ it is possible that data can be automatically scanned according customer predefined events and requirements. Depending on the connectivity to the train a live view of the train's location is available.

System overview
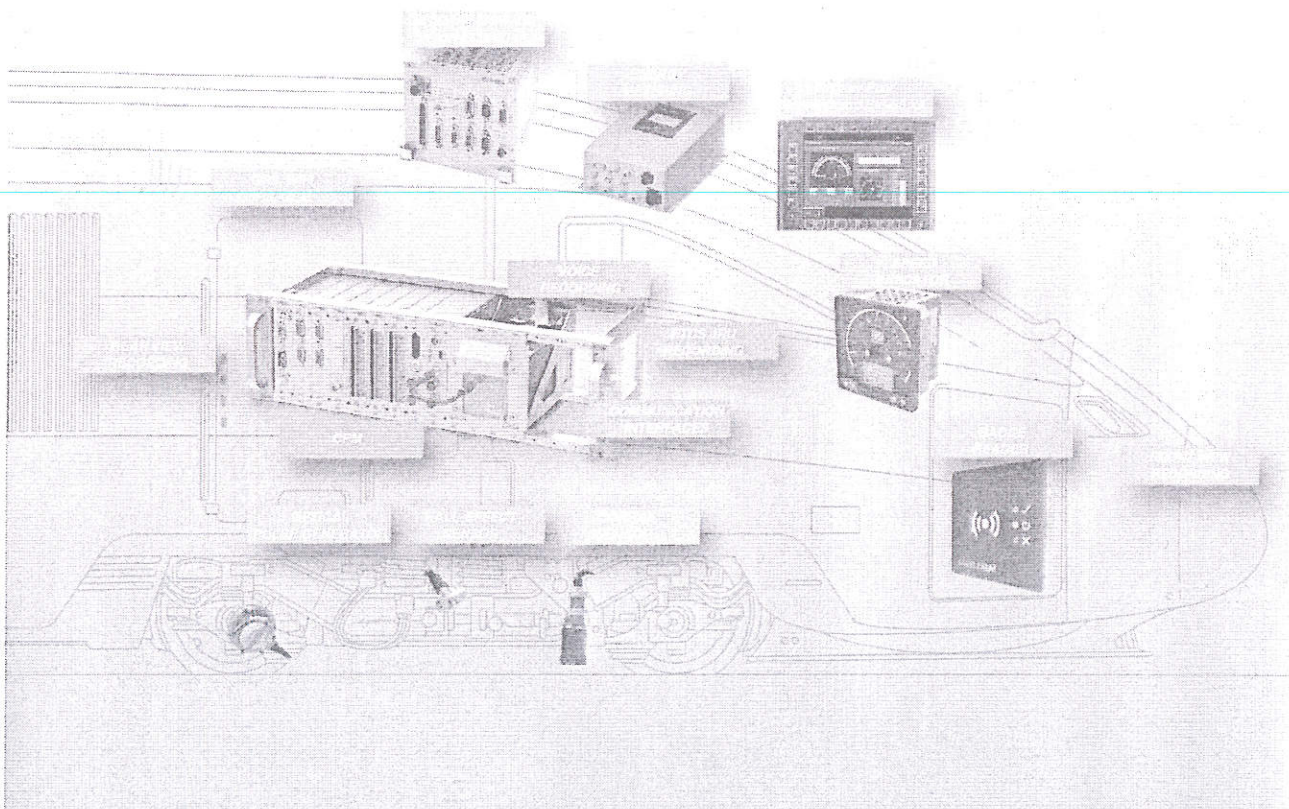
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HASLERRail

The instructions presented below reflect the status as per the date of creation.

HaslerRail AG – a Member of Sécheron Hasler Group

Table of contents

1. Functional description

TELOC®4000 is a modular platform for data recording from various sources. According to customer requirements, a device is defined and configured to record and store discrete signals or information from bus systems and networks. If required, signals can also be controlled discretely or via interfaces to provide information to higher-level systems or field devices. Each device requires a power supply module and a CPU module. All other components are added during project planning according to customer requirements.
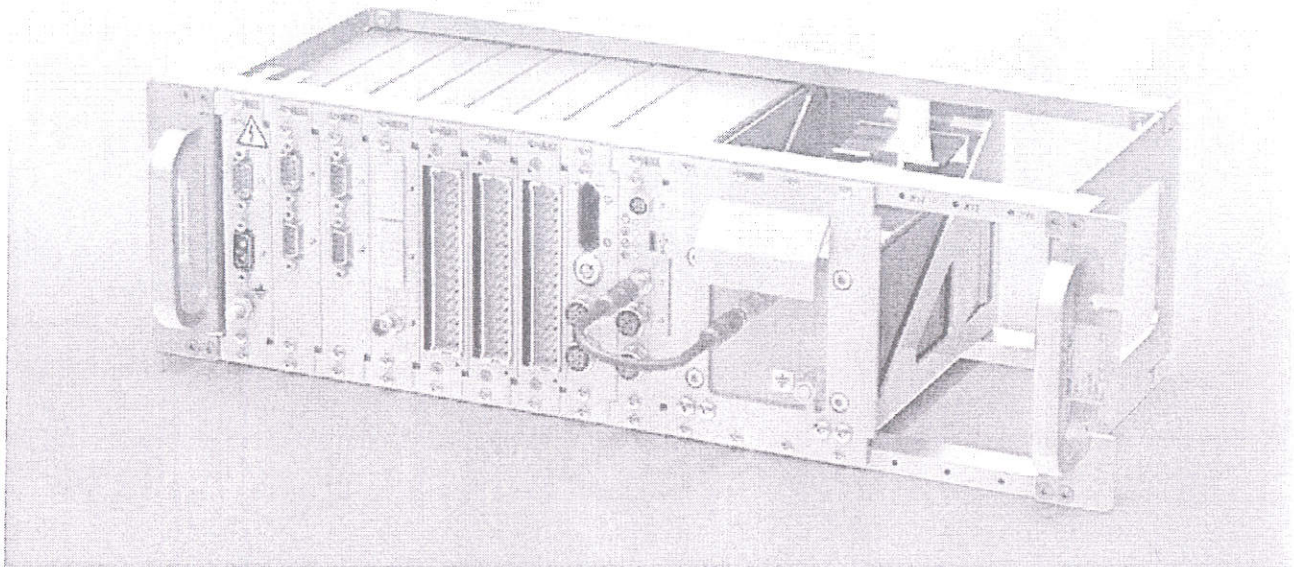
ds_t4000_a00 (2)

1.1 Hardware architecture
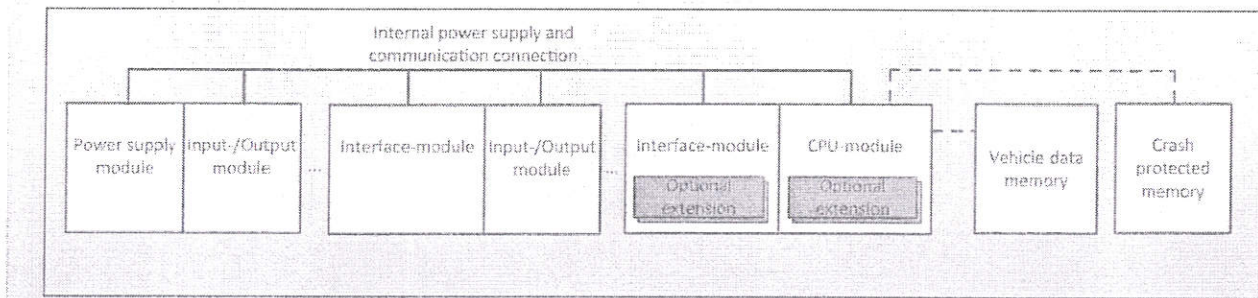
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1.2 Fundamental components

Power supply module POCAA

Power supply input	Galvanically isolated, 24 – 110 V nominal
Maximal power consumption external	50 W
Maximal power distribution internal	30 W

CPU-module SITAA

Interfaces	1x Service interface, USB Type C (USB 2.0) 1x Interface to vehicle data memory, connector M9, 4 pin, female 1x Interface to crash protected memory (CPM), connector M8, 4 pin, female 2x Ethernet 100 Mbps IEEE 802.3, connectors M12, D-coded, 4 pin female 2x Ethernet 100 Mbps IEEE 802.3, connectors M12, D-coded, 4 pin female (Option EXETA, EXEDA) 1x Datacard slot (Option EXEDA, EXDAA)
Indicator	4 RGB-LED, 3 for status indication and 1 user configurable LED
Maximal power consumption internal	4 W
Memory	4 GB (physically) up to 1.5 GB (User Recording Memory) The effective memory size for data recording strongly depends on the project-specific configuration See the TELOC®4000 operating instructions (5.0302.220TEN) for more information
Real time clock (RTC)	Accuracy typical case: ±1 min per year, at room temperature (25 °C) Accuracy worst case: ±4 min per year, whole temperature range (-40 °C – + 85 °C)
Real-time clock (RTC) backup buffer concept	A battery is fitted as standard RTC backup buffer (soldered). If the battery is empty, a battery extension BACAA can be plugged onto the CPU module (soldered battery does not need to be removed, see TELOC®4000 Installation & Maintenance Manual 5.0303.220TEN) for more information. As an alternative to the standard soldered battery, an exchangeable battery or supercapacity extension can be selected.
Battery lifetime	Battery lifetime typical case: >20 years, TELOC®4000 switched on 60 %, switched off 40 % (at 25 °C) Battery lifetime worst case: 8 years, TELOC®4000 switched off permanently at 85 °C
Optional extensions	As an alternative to the standard battery Exchangeable battery extension or supercap extension for RTC backup (BACAA) Memory extension (FLASC) Interface extensions (one option selectable): - 2x Ethernet 100 Mbps IEEE 802.3, M12 D-coded connector, female (EXETA) - 1x Datacard slot (EXDAA) - 2x Ethernet 100 Mbps IEEE 802.3, M12 D-coded connector, female and slot for 1x datacard (EXEDA)

1.3   Input-/Output components

Digital input module DECAA

Digital inputs (24/module)	Galvanically isolated, 0 V – 110 V nominal
Interface connector	1x DIN 41612 type F connector, 48 pin, male
Maximal power consumption internal	2 W

Analog input-/output module AIOEA

Analog inputs (8/module)	Not galvanically isolated against each other, galvanically isolated against other types of inputs and outputs. 12 Bit resolution, accuracy 1 % of input range
Analog outputs (max. 2/module)	Not galvanically isolated against each other, galvanically isolated against other types of inputs and outputs. 12 Bit resolution, accuracy 1 % of output range
Interface connector	1x DIN 41612 type F connector, 48 pin, male
Maximal power consumption internal	1.5 W

Tachymetry input-/output module TECAA

Tachymetry blocks (2/module)	Tachymetry blocks are galvanically isolated against each other and against other types of inputs- and outputs. 2x Inputs (voltage or current signal) per block 1x Pulse generator power supply output per block Output voltage 15 VDC Maximal output current 160 mA, short circuit protected
Digital-, Pulse- or PWM-outputs (4/module)	Galvanically isolated against each other and against other types of inputs and outputs. Swichting voltage range: 0 – 110 VDC nominal Switching current range: 0 – 0.25 A 3x Semiconductor outputs, similar to relay closing contact 1x Semiconductor output, similar to relay opening contact
Analog outputs (2/module)	Not galvanically isolated against each other Galvanically isolated against other types of inputs and outputs 12 Bit resolution, accuracy 1 % of output range
Interface connector	1x DIN 41612 type F connector, 48 pin, male
Maximal power consumption internal	3 W plus power consumption of pulse generators * 1.33

1.4 Interface components

RS-485 interface module DRSCA

RS-485 interface (2/module)	Galvanically isolated Maximal baud rate 1 Mbps Half- or full-duplex mode is software configurable Bus termination activation is software configurable
Interface connector	1x D-Sub connector, 9 pin, female (per interface)
Maximal power consumption internal	2 W, (power consumption increases, if optional power supply module is used by output power * 1.33)
Optional extensions	One power supply module (POMOA) pluggable per interface

GNSS interface module GNSCA

GNSS interface (1/module)	Galvanically isolated Configurable for GPS, GLONASS, Galileo and Beidou The integrated untethered dead reckoning mechanism allows to approximate the actual position without signal reception from GNSS.
Interface connector	1x TNC connector, female
Maximal power consumption internal	2 W

RS-485 and GNSS interface module DSGPA

RS-485 interface (2/module)	Galvanically isolated Maximal baud rate 1 Mbps Half- or full-duplex mode is software configurable Bus termination activation is software configurable
Interface connector	1x D-Sub connector, 9 pin, female (per interface)
GNSS interface (1/module)	Galvanically isolated Configurable for GPS, GLONASS, Galileo and Beidou The integrated untethered dead reckoning mechanism allows to approximate the actual position without signal reception from GNSS.
Interface connector	1x TNC connector, female
Maximal power consumption internal	3 W, (power consumption increases, if optional power supply module is used by output power * 1.33)
Optional extensions	One power supply module (POMOA) pluggable per interface

MVB interface module MVBDA

MVB interface (1/module)	Galvanically isolated Available for EMD or ESD configuration Supported frame types in accordance with IEC 61375-3-1: - Process Data - Message Data (on request)
Interface connector	1x D-Sub connector, 9 pin, female 1x D-Sub connector, 9 pin, male
Maximal power consumption internal	5 W

1.5 Optional extension modules

Power supply extension POMOA for interface modules

Power supply output (1/interface)	Galvanically isolated Maximal output power: 4 W, short circuit protected Options available with +5 V, +12 V, +15 V or +24 V output voltage
Interface connector	2x Pin header 2x5 pin
Maximal power consumption internal	Output power * 1.33

Memory extension FLASC for CPU-modules

Memory size	2 GB, 8 GB, 16 GB, 32 GB (physically), up to 1GB, 4 GB, 8 GB, 16 GB (User Recording Memory) The effective memory size for data recording strongly depends on the project specific configuration See the TELOC®4000 operating instructions (5.0302.220TEN) for more information
Interface connector	1x Socket 2x5 pin
Maximal power consumption internal	1 W

Real time clock (RTC) backup battery extension or supercap extension BACAA for CPU-modules

Energy storage type	Battery or supercap
Interface connector	1x Socket 2x5 pin
Maximal power consumption internal	0.1 W

Interface extension EXETA for CPU-modules

Interface	2x Ethernet 100 Mbps IEEE 802.3, M12 D-coded connector, female
Interface connector	1x Socket 2x6 pin
Maximal power consumption internal	2 W

Interface extension EXDAA for CPU-modules

Interface	1x Datacard slot (without Ethernet)
Interface connector	1x Socket 2x6 pin
Maximal power consumption internal	3 W

Interface extension EXEDA for CPU-modules

Interface	2x Ethernet 100 Mbps IEEE 802.3, M12 D-coded connector, female 1x Slot for datacard
Interface connector	1x Socket 2x6 pin
Maximal power consumption internal	3 W

1.6 Optional external devices

Vehicle plug VEIDA, connectable to CPU-module

Memory	4 kB EEPROM
Interface connector	1x M9 connector, 4 pin, male
Maximal power consumption internal	0.1 W

Crash Protected Memory (CPM), connectable to CPU-module

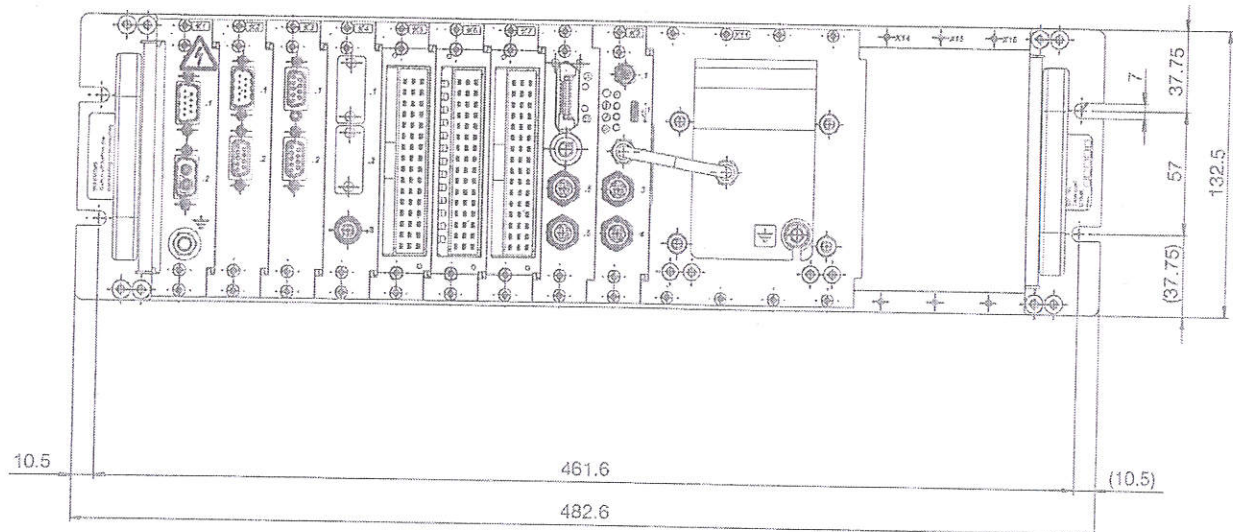|	
Memory	2 GB, 8 GB, 16 GB, 32 GB (physically), up to 1 GB, 4 GB, 8 GB, 16 GB (User Recording Memory) The effective memory size for data recording strongly depends on the project specific configuration See the TELOC®4000 operating instructions (5.0302.220TEN) for more information
Interface connector	1x M8 connector, 4 pin, male
Maximal power consumption internal	1 W

2. Technical features

2.1 Electrical features

Nominal supply voltage Un		24 - 110 VDC
Maximal power consumption		50 W
Inrush current characteristics		< 5 A (1 ms - 1 s)
DC power supply fluctuation range	$Un \leq U \leq 1.4\ \text{'}Un$ for ≤ 0.1 s	Performance criterion A
	$1.25\text{'}Un \leq U \leq 1.4\ \text{'}Un$ for ≤ 1 s	Performance criterion B
	$0.6\ \text{'}Un \leq U \leq Un$ for ≤ 0.1 s	Performance criterion A
Interruption on power supply voltage class		Class S2 (10 ms, Performance criterion A)
Supply change-over class		Class C1

2.2 Mechanical features

Weight	3 - 10 kg
IP code	IP20, other protection classes on request

2.3 Mechanical drawing

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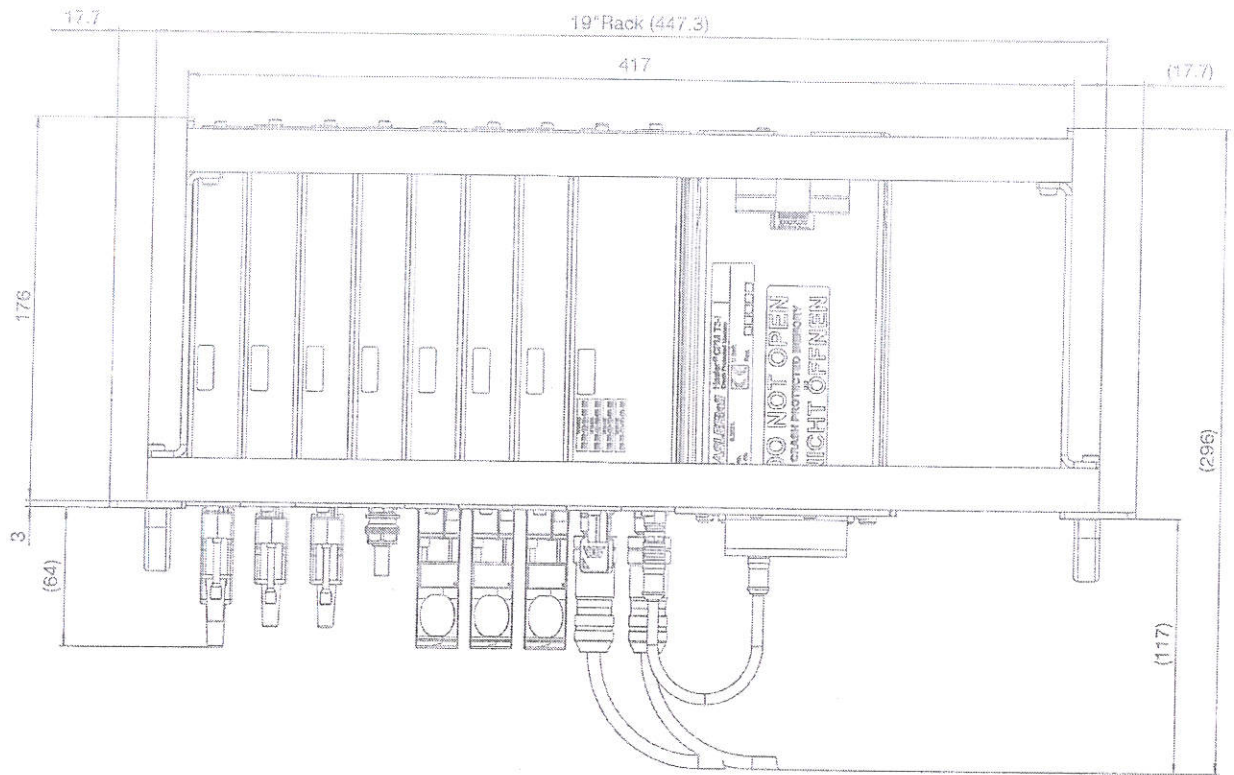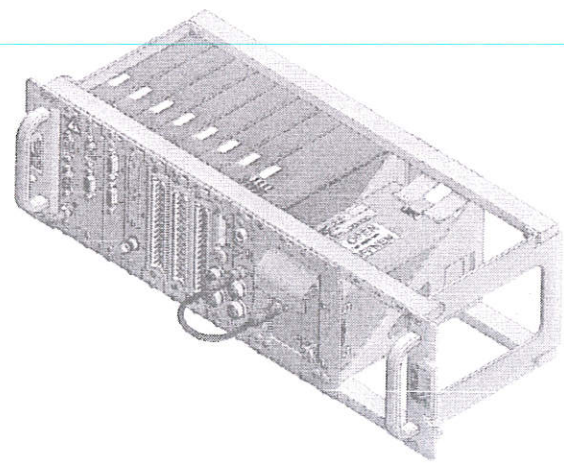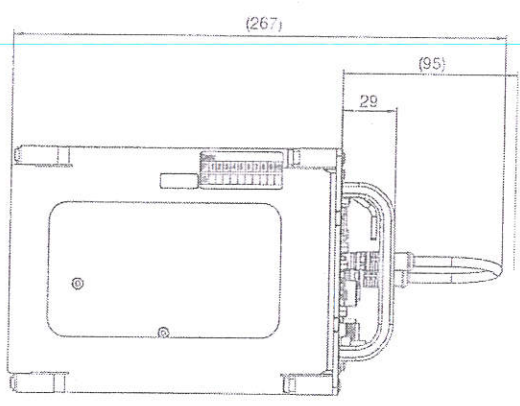
ds_t4000_a00 (4c)

2.4 Environmental features

Operating temperature range	-40 °C – +70 °C (ambient temperature, in accordance with EN 50155:2017 class OT4
Switch-on extended operating temperature class	Class ST1
Natural cooling or forced ventilation constraints	Natural convection, no active cooling required
Storage temperature range	-40 °C – +85 °C
Relative humidity compliance	≥ 95 % at 55 °C respectively 25 °C in accordance with EN 60068-2-30:2005
Altitude class	≤ 3000 MSL
Pollution degree conformance	PD2
Shock and vibration categories & classes	EN 61373:2010 +AC:2017 categorie 1 class B
Rapid temperature variation class	Class H1
Conformal coating type	PC2
RoHS compliance	Yes, in accordance with 2011/65/EU
REACH compliance	Yes, in accordance to EU regulation (EG) Nr. 1907/2006
Information relating to any hazardous materials that are present in the equipment	No SVHC in a concentration subjected to declaration in the equipment, in accordance to SVHC candidate list from 7.7.2017 with 174 listed substances
Fire behaviour compliance	HL3 (EN 45545-2:2013 +A1:2015)

2.5 RAMS features

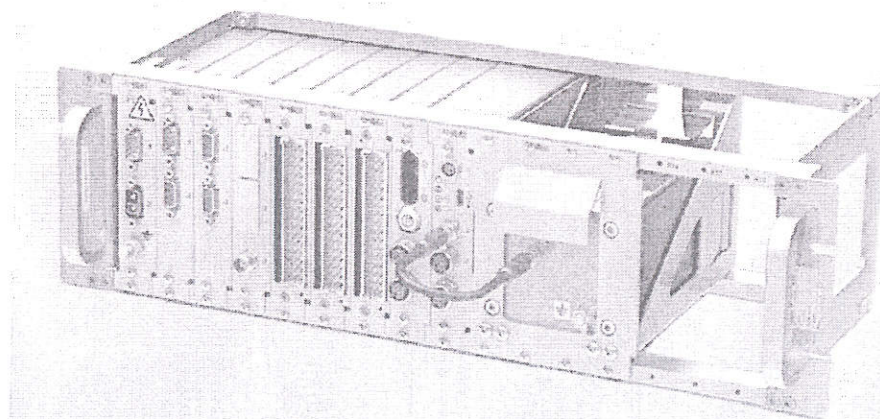|	
Useful life class	> 20 years
Non repairable items list	TELOC®4000 modules (module is shop replaceable)
Repairable items list	TELOC®4000 device (device is line replaceable and shop repairable)
Identification of the LRU	TELOC®4000 device
Identification of the SRU	TELOC®4000 modules
Mean time to restoration (MTTR)	LRU: Labour on vehicle: 10 minutes Labour off vehicle: not applicable SRU: Labour on vehicle: not applicable Labour off vehicle: 15 minutes
List of limited life components	None
Storage precautions	In the range 0 °C – +45 °C with maximum temperature variation of 20 °C in one day the equipment is considered in storage. Storage time is not deducted from useful lifetime of the product, this being limited to the maximum duration of 3 years.

Identification of commercial off-the-shelf equipment/components inside the electronic equipment	None
Periodic maintenance instructions	None
Reliability [MTBF hours]	Device specific
Reliability calculation model	Average temperature surrounding TELOC®4000 device Te: 45 °C Diurnal temperature variation dT: 10 °C Use factor: 100 %
Functional safety reference	TELOC®4000 device does not fulfil any applications requiring functional safety.
Information relating to any implosion or explosion hazards	TELOC®4000 device is not intended for use in potentially explosive atmospheres.
Specification and demonstration of reliability, availability, maintainability and safety (RAMS)	EN 50126-1:2017 EN 50126-2:2017

2.6   Name plate

The TELOC® contains a name plate with the article number, which stipulates the hardware for the device. Since TELOC® devices are customer-specific and application-specific, a dedicated TELOC®4000 device with its own article number is defined for most applications.

The article number for TELOC®4000 devices is: 5.2810.yyy/zz

The nameplate also contains a unique serial number [2], with which any traceability is achieved, as well as the voltage range [3] and the device revision number [4].

2.7 Routine and type test compliance

	Type test	Routine test	Standard	Performance criterion
Railway applications - Rolling stock - Electronic equipment	See details	See details	EN 50155:2017 IEC 60571:2012	See details
Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock - Apparatus	See details	See details	EN 50121-3-2:2016 +A1:2019 IEC 62236-3-2:2018	See details
Visual inspection	Yes	Yes	EN 50155:2017, 13.4.1	
Performance test	Yes	Yes	EN 50155:2017, 13.4.2	
Power supply test	Yes	No	EN 50155:2017, 13.4.3	Nominal voltage 24 – 110 V Interruptions of voltage supply class S2 Supply change over class C1
Insulation test	Yes	Yes	EN 50155:2017, 13.4.9	Insulation resistance > 20 MΩ Insulation test voltage 1500 VDC
Low temperature storage test	No	No	EN 50155:2017, 13.4.6 EN 60068-2-1:2007 IEC 60068-2-1:2007	Test Ad @ temperature class OT4 (-40 °C) 16 hours in offstate After recovery performance criteria A
Low temperature start-up test	Yes	No	EN 50155:2017, 13.4.4 EN 60068-2-1:2007 IEC 60068-2-1:2007	Test Ad @ temperature class OT4 (-40 °C) 2 hours in operation
Dry heat test	Yes	No	EN 50155:2017, 13.4.5 EN 60068-2-2:2007 IEC 60068-2-2:2007	Test Bd @ temperature class OT4 (70 °C) 6 hours @ 70 °C, then 10 minutes @ 85 °C
Cyclic damp heat test	Yes	No	EN 50155:2017, 13.4.7 EN 60068-2-30:2005 IEC 60068-2-30:2005	Temperatures: +25 °C / +55 °C @ 93 % rH 2 cycles each 24 h, total duration 48 h
Salt mist test	On request	No	EN 50155:2017, 13.4.10 EN 60068-2-11:1999 IEC 60068-2-11:1981 +COR1:1999	After recovery performance criteria A
Enclosure protection test (IP code)	On request	No	EN50155:2017, 13.4.12 EN 60529:1991 +A1:2000 +A2:2013 IEC 60529:1989 +A1:1999 +A2:2013	IP20
Electromagnetic compatibility test	Yes	No	EN 50155:2017, 13.4.8 EN 50121-3-2:2016 +A1:2019 IEC 62236-3-2:2018 Conducted emission	Battery power supply: 0.15 – 0.5 MHz, 99 dB µV quasi peak 0.5 – 30 MHz, 93 dB µV quasi peak

	Type test	Routine test	Standard	Performance criterion
Electromagnetic compatibility test	Yes	No	EN 50155:2017, 13.4.8 EN 50121-3-2:2016 +A1:2019 IEC 62236-3-2:2018 Radiated emission	Enclosure port: 30 – 230 MHz, 40 dB uV/m quasi-peak at 10 m 230 MHz – 1 GHz, 47 dB uV/m quasi-peak at 10 m 1 – 3 GHz: 76 dB µV/m peak at 3 m 56 dB µV/m avg. at 3 m 3 – 6 GHz: 80 dB µV/m peak at 3 m 60 dB µV/m avg. at 3 m
			EN 50155:2017, 13.4.8 EN 61000-4-2:2009 IEC 61000-4-2:2008 Electrostatic discharge	Contact discharge: ± 6 kV Performance criteria B
			EN 50155:2017, 13.4.8 EN 61000-4-3:2006 +A1:2008 +A2:2010 IEC 61000-4-3:2006 +A1:2007 +A2:2010 Radiated radiofrequency	80 – 1000 MHz: 20 V/m rms 1400 – 2000 MHz: 10 V/m rms 2000 – 2700 MHz: 5 V/m rms 5100 – 6000 MHz: 3 V/m rms Performance criteria A
			EN 50155:2017, 13.4.8 EN 61000-4-4:2012 IEC 61000-4-4:2012 Fast transient/Burst	Battery referenced ports: ± 2 kV Signal and communication ports: ± 2 kV Burst frequency: 5 kHz Performance criteria A
			EN 50155:2017, 13.4.8 EN 61000-4-5:2014 +A1:2017 IEC 61000-4-5:2014 +A1:2017 Surge	Battery referenced ports: Line to ground: ± 2 kV, 42 Ω, 0.5 µF Line to line: ± 1 kV, 42 Ω, 0.5 µF Performance criteria B
			EN 50155:2017, 13.4.8 EN 61000-4-6:2014 IEC 61000-4-6:2013 Immunity to conducted disturbances	Battery referenced, signal and communication ports: 0.15 MHz – 80 MHz 10 V rms, 80 % AM, 1 kHz Performance criteria A
Vibration and shock test	Yes	No	EN 50155:2017, 13.4.11 EN 61373:2010 +AC: 2017-09 IEC 61373:2010 +COR1: 2011	Category 1 Body mounted, Class B
Equipment stress screening test	No	No	EN50155:2017, 13.4.13 EN 61163-1:2006 IEC 61163-1:2006	
Rapid temperature variation test	On request	No	EN 50155:2017, 13.4.14	

2.8 Document references

Document number	Description	Item number
5.0302.220Txx	Operating manual TELOC®4000	...
5.0303.220Txx	Installation- & maintenance manual TELOC®4000	...
5.0302.171Txx	Operating manual ServiceTool Hasler SG	...
5.0302.053Txx	Operating manual evaluation software EVA+ Desktop	...
5.0600.xxxTxx	TechNote	...
5.0301.202-02Txx	Datasheet MVBDA	5.2811.102.xx
5.0301.202-04 Txx	Datasheet DRSCA	5.2811.102.xx
5.0301.202-05Txx	Datasheet GNSCA	5.2811.102.xx
5.0301.202-06Txx	Datasheet DSGPA	5.2811.102.xx
5.0301.203Txx	Datasheet SITAA	5.2811.103.xx
5.0301.206-01Txx	Datasheet POCAA	5.2811.106.xx
5.0301.207Txx	Datasheet VEIDA	5.2811.107.xx
5.0301.214Txx	Datasheet DECAA	5.2811.114.xx
5.0301.215Txx	Datasheet AIOEA	5.2811.115.xx
5.0301.216Txx	Datasheet TECAA	5.2811.116.xx
5.0301.217Txx	Datasheet DOCAA	5.2811.117.xx

2.9 Revision index

Revision	Date	Modification	Created	Released
A00	07.2020	First edition	MBE	PFR