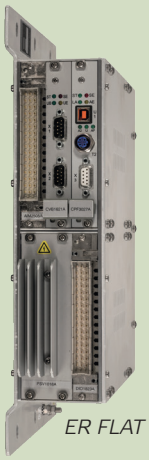
ER FLAT
3U x 12 TE

ER 20TE



ER FLAT 6U x 12TE

ER 44TE

Event Recorders

FUNCTIONS

A Trainnet® Event Recorder (ER) is an on-board data recorder for collecting and storing vital train-borne information. The Trainnet® Event Recorder can record all kinds of data including audio and video streams.

KEY FEATURES

Trainnet® Event Recorders are able to record virtually any available signals, analogue or digital. The Event Recorder can be programmed to record safety critical information like train speed, train position or brake temperature.

The Event Recorder can also record video streams from onboard digital video recorders (DVR) or directly from the cameras. For easy data retrieval, the stream format can be made compatible with your CCTV Software or any other video analysis Software that you are using.

Alternatively, we can develop customized video analysis tools to fit your needs.

Trainnet® Event Recorders have an Ethernet port, a USB port and an RS-485 port at the front for easy access. The Ethernet port

COMPARING TRAINNET® EVENT RECORDERS

	ER FLAT 3U X 12TE	ER 20TE	ER FLAT 6U X 12TE	ER 44TE	ER 84TE	RMM 84TE (e.g. JRU)
External Dimensions (W x H x D)	87 x 229 x 215	158 x 133 x 215	87 x 363 x 215	280 x 133 x 215	280 x 133 x 215	280 x 133 x 215
Rugged Memory Module (RMM)	-	-	-	-	-	✓
Storage Memory	500MB or 4GB	500MB or 4GB	500MB or 4GB	500MB or 4GB	500MB or 4GB	2GB or 16GB
Connectivity *Included interfaces:*	1 x Ethernet M12 1 x USB 3 x RS-485	1 x Ethernet M12 1 x USB 3 x RS-485	1 x Ethernet M12 1 x USB 3 x RS-485	1 x Ethernet M12 1 x USB 3 x RS-485	1 x Ethernet M12 1 x USB 3 x RS-485	1 x Ethernet M12 1 x USB 3 x RS-485
Optional interfaces:	no free slot	2 free slots for:	3 free slots for:	7 free slots for:	17 free slots for:	10 free slots for:
. Bus interfaces		MVB, CAN, SIU	MVB, CAN, SIU	MVB, CAN, SIU, 3U ESU	MVB, CAN, SIU, 3U ESU	MVB, CAN, SIU, 3U ESU
. I/O Interfaces		AIM, HSA, DIO, DRO, AOM, PTI	AIM, HSA, DIO, DRO, AOM, PTI	AIM, HSA, DIO, DRO, AOM, PTI	AIM, HSA, DIO, DRO, AOM, PTI	AIM, HSA, DIO, DRO, AOM, PTI
. Remarks		*Note: Max 1 underlined module*	*Note: Max 1 underlined module*	*Note: Max 5 underlined modules. 3U ESU = 3 slots*	*Note: Max 15 underlined, Max 9 not underlined modules. 3U ESU = 3 slots*	*Note: Max 6 underlined modules. 3U ESU = 3 slots*
Power Supply Input Voltage	24, 36, 48, 52, 72 or 110 V DC	24, 36, 48, 52, 72 or 110 V DC	24, 36, 48, 52, 72 or 110 V DC	24, 36, 48, 52, 72 or 110 V DC	24, 36, 48, 52, 72 or 110 V DC	24, 36, 48, 52, 72 or 110 V DC
Power Supply Cabling	Back	Back	Back	Front	Front	Front
Option for side mounting	side mounted	✓	side mounted	-	-	-
Included Software	Trainnet® TIP	Trainnet® TIP	Trainnet® TIP	Trainnet® TIP	Trainnet® TIP	Trainnet® TIP
Optional Software	CODESYS, PST	CODESYS, PST	CODESYS, PST	CODESYS, PST	CODESYS, PST	CODESYS, PST

ER 84TE

RMM 84TE

EN 50155, EN 45545
IEEE 1482-1.1999
IEC 62625-1
GM/RT2472-1.2002
EEIG 97E461-3.1998

and the USB port can be used to download the data stored in the recorder. Alternatively, the Ethernet port can be used to connect to a sub-system or an Ethernet Switch. The RS-485 port can also be connecting sub-systems.

All the Trainnet® Event Recorders are protected against shocks, vibration, humidity, temperature variations, excessive emissions and excessive voltages (follows the EN50155 standard). Front-panel imprints are available upon request.

MODULARITY

Additional interfaces can be easily added to the Event Recorder, as the system is modular. You can add bus interfaces such as MVB, CAN, S/L or Ethernet to connect with train sub-systems or Train Communication Network (TCN) in order to acquire data. You can also add Input/Ouput Interfaces to record various signals. Available I/O Interface Modules include Analogue Input, High Speed Analogue Input, Digital Input/Output, Digital Relay Output, Analogue Output and Pt-100 temperature Sensor Input.

For a compact and efficient system, Trainnet® Event Recorder can be used as part of a broader Trainnet® system, for instance integrated to a Gateway, a VCU or a TCMS.

DATA RETRIEVAL AND ANALYSIS

Data can be retrieved at any time *via* the Event Recorder Ethernet port using the Trainnet® TIP Software (Train Inspection Program). The TIP Software enables the download and the analysis of the train data. Alternatively, the data can be transferred to a USB stick, for convenient transport or storage. The data is easily imported from the USB stick to the TIP Software.

The Trainnet® Event Recorder proves useful beyond traditional use following an incident. The retrieved data can be visualized with the TIP Software in order to perform regular system performance analysis and train operational optimization.

Illustration: TIP Software

RUGGED MEMORY MODULE

The Trainnet® Rugged Memory Module (RMM) is available as an option whenever a high level of data protection is needed. This crash-proof construction guarantees that the memory board is protected against fire, magnetic fields and any liquids, as well as against any mechanical stress during an impact or continued pressure. In practice, the memory board is embedded in a protected fire insulation block, surrounded by a special steel case that is hermetically sealed.

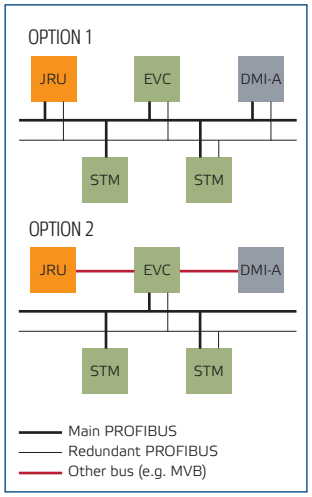
The design of the Trainnet® Rugged Memory Module fulfils the British (GM/RT2472-1.2002) and European (EEIG 97E461-3.1998) crashworthiness as well as the IEEE (1482.-1.1999) standards. This makes the Trainnet® Event Recorder suitable for trains worldwide.

JURIDICAL RECORDING UNIT

The Trainnet® Juridical Recording Unit (JRU) is a train event recorder complying with the ERTMS/ETCS standard. The Trainnet® JRU has all the features of other Trainnet® Event Recorder and is equipped with the Trainnet® Rugged Memory Module for data protection.

The Trainnet® JRU can record data from the ETCS (i.e. European Vital Computer, EVC) and/or from nation-specific control systems (i.e. Specific Transmission Module, STM). The ETCS architecture illustration highlights the two standard setup options.

Illustration: ETCS architecture

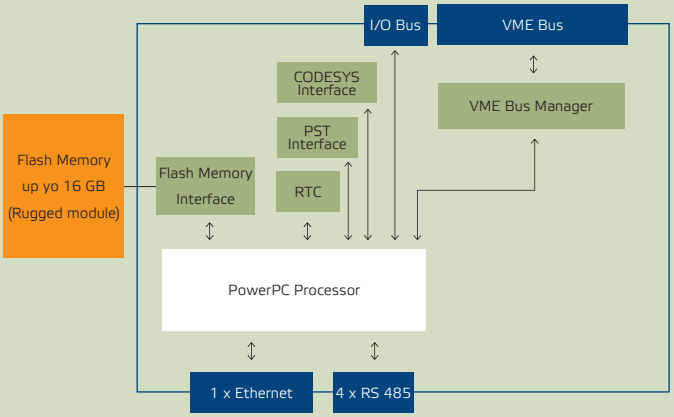


GPS/GNSS

As an option, a GNSS (Global Navigation Satellite System) receiver can be integrated into the Event Recorder. Versions with GPS+GLONASS and GPS+BeiDou are available. This option requires 4TE of additional space in the rack (one free bus interface slot).

RACKS AND SIZES

The modularity of the Trainnet® Event Recorders means you can choose a rack size based on your needs: the more additional interfaces or features you need, the larger is the rack that you need to select. The table on the previous page presents some of the possible alternatives.



Rugged Memory Module (RMM)

EN 50155, EN 45545
IEEE 1482.1-1999
IEC 62625-1:2013
GM/RT2472:2014
EEIG 97E461-3.1998

MODULE FUNCTIONS

The Trainnet® Rugged Memory Module (RMM) is a highly protected memory module to be used as part of a Trainnet® Event Recorder. As the essential part of the Train Event Recorder, it collects and stores vital train-borne information. Depending on your needs, it can record all kinds of data including audio and video recordings.

KEY FEATURES

The Trainnet® Rugged Memory Module is used together with a Trainnet® 3U 84TE Rack and a power supply (usually Trainnet® PSV and Trainnet® PIU modules) to build a fully functional and standalone Event Recorder. The Trainnet® RMM can also be integrated to a larger Trainnet® System, for instance in a 6U 84TE Rack, as an addition to a Gateway, VCU or TCMS.

The Trainnet® Rugged Memory Module (RMM) is meant to be used whenever a high level of data protection is needed. Its crash-proof construction guarantees that the memory board is protected against fire, magnetic fields and any liquids, as well as any mechanical stress during an impact or a continued pressure. In practice, the memory board is embedded in a protected fire insulation block, surrounded by a special steel case that is hermetically sealed.

The design of the Trainnet® Rugged Memory Module fulfils the British (GM/RT2472-1.2002) and European (EEIG 97E461-3.1998) crashworthiness as well as the IEEE (1482.-1.1999) standards.

The Trainnet® RMM can store both analogue and digital signal data. The desired train information can be stored for a predetermined period of time. Data can be retrieved at any time using the Trainnet® TIP Software (Train Inspection Program) which enables system performance analysis and optimization. Data can be copied from the RMM to a USB stick for convenient transport and storage.

The Ethernet and USB ports located on the front of the module can be used to retrieve data from the memory module. The Trainnet® RMM can acquire data from the Ethernet port but also via the VME back plane (thus from added interface modules) and the RS 485 port located on the front panel. The module gets power from the VME back plane.

The RMM can record video streams from onboard digital video recorders (DVR) or directly from cameras. For easy data retrieval, the stream format can be made compatible with your CCTV Software or any other video analysis Software that you use. Alternatively, we can develop customized video analysis tools to fit your needs.

OPTIONS

Memory:
Memory can be 2GB or 16 GB.

Front-panel Inprints:
Front-panel imprints are available on request in English or any other language of your choice.

GPS/GNSS:
A GNSS (Global Navigation Satellite System) receiver can be integrated to the RMM to provide location and time information. One version with GPS+GLONASS and one version with GPS+BeiDou are available. Please note this option will increase the module's width by 4TE.

TECHNICAL SPECIFICATIONS

Dimensions (W x H x D): 32 TE x 3 U x 160 mm
Weight: 7 Kg
Input Power: 5 V DC ± 5 % (1 A max., 0.5 A typ.)
Temperature Range (operational): -40 ºC...+70 ºC
MTBF (40 ºC ambient temperature)
890 000 h (2 GB) and 870 000 h (16 GB)
Interfaces
3 or 4 Isolated RS-485
1 x 10/100 Mbit/s Ethernet, M12 connector
1 x USB 2.0 Host for retrieval
Memory: 2 GB or 16 GB

Protection Levels (Rugged Memory Module)

Ingress Protection (IP) rating: 68
Shock: Up to 100 g / 10 ms and 55 g / 100 ms
Crush: Up to 110 kN for 5 minutes in all axes
Penetration
Up to 23 kg drop from a height of 1,5 m focussed on an area of 30 mm2
Temperature
Up to 700 ºC for 5 minutes and 650 ºC for 30 minutes followed by 300 ºC for 1 hour followed by 100 ºC for 5 hours
Chemical Immersion
Winter Diesel (*), Summer Diesel (*), Regular Water (*), Salt Water (*), Lubricating Oil (*), Transformer Oil (**), Hydraulic Oil (**), Anti Fire Fighting Foam (*), Refrigerant R134A (**), Alcohol (**), Anti Freeze (**), Battery Acid (**)
(*) minimum for 48 hours (**) minimum for 60 min
Magnetic Field
Current flow of 64 kA at rising rate of 107 A/s
Hydrostatic pressure
Immersion in salt water at a depth of 15 meter for 48 hours