

TeleObserver MR3140 / MR3140-M

Mobile digital video hybrid recorder



 *Made in
Germany*

EDRESEARCH 

System overview

Technical specification
Version 1.0 – firmware 6.0



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1 System description

The MR3140 resp. MR3140-M is a hybrid video recording system. Both devices are up to the styling of the LAN interface on the front panel identical. Whereas the MR3140 is equipped with a RJ-45 interface, is the LAN interface of the MR3140-M executed as M12 variant. The device (MR3140 and MR3140-M) records video data from up to 8 cameras. This can be IP network cameras as well as commercially available analogue cameras. For displaying live pictures on two analogue driver monitors it's even possible to configure up to 12 network cameras. Owing to its design and construction it is particularly suitable for video monitoring in public transport vehicles (buses, trams and rail carriages) and for documenting, and therefore hindering losses in vans and trucks belonging to transport and cash-in-transit operators.

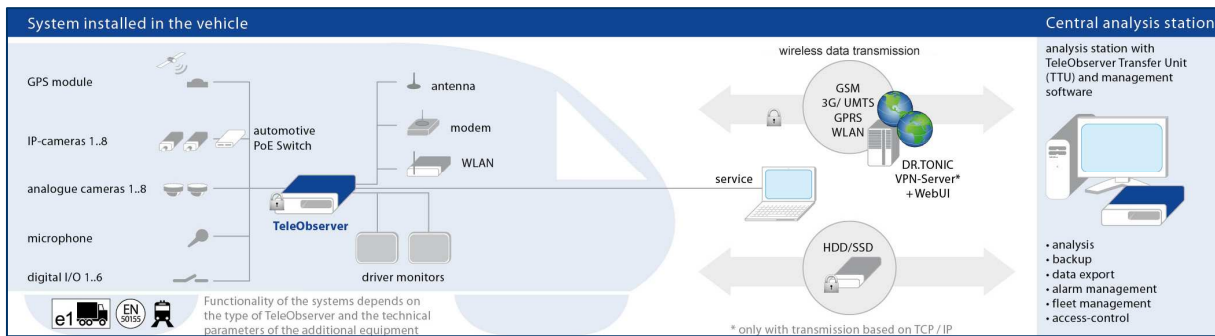
The MR3140/MR3140-M makes high quality permanent or event-controlled recordings and pre and post alarm pictures from the network cameras which are connected to it. It records to a special removable hard disk which is protected against vibrations and impacts. If there is an event, analysis of the recordings is conducted away from the vehicle using a so-called transfer unit into which the removable hard disk is inserted.

The transfer unit is linked via USB to a PC on which runs a special analysis software package – DResearch ImageFinder NX. Alternatively the MR3140/MR3140-M in the vehicle can be accessed from the local control centre via wireless LAN or elsewhere via UMTS (with limited transmission rates!). DResearch's CMS software, which is also used for configuration and setting up the system, is needed for this kind of remote access.

Besides video pictures, the MR3140/MR3140-M can also integrate and record functional data provided by a GPS receiver or by IBIS into the picture data. As well as controlling events and the expanded information content (i.e. location of recording, vehicle speed, route number, bus/tram/train stop, system time, etc) this also enables more targeted searching within the recordings. In addition the MR3140/MR3140-M also supports the independent recording of two audio channels.

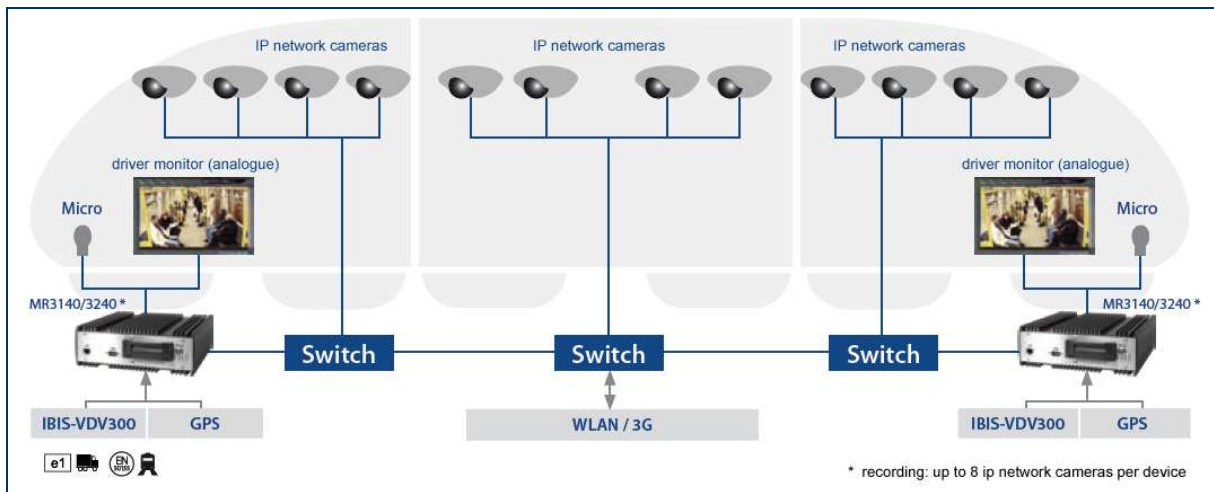
2 Overview and installation scenario

The following system plan represents a typical rail application scenario. The system here is built into a rail locomotive or railcar. It is possible to search the data by removing the removable disk and handing it over to the control centre for analysis. This ensures that only authorised people have access to the data.



The MR3140/MR3140-M does not have an IP-based alarm system for automatic picture switching to a control centre, but using an optional GSM modem alarm and system reports can be sent to recipients via SMS.

Inside the vehicle several units can be coupled together to provide complete cover of all the areas which are important for surveillance. Since the recorder can display the video pictures from up to 12 cameras on two analogue video outputs, all cameras can be switched through in the driver's cab.

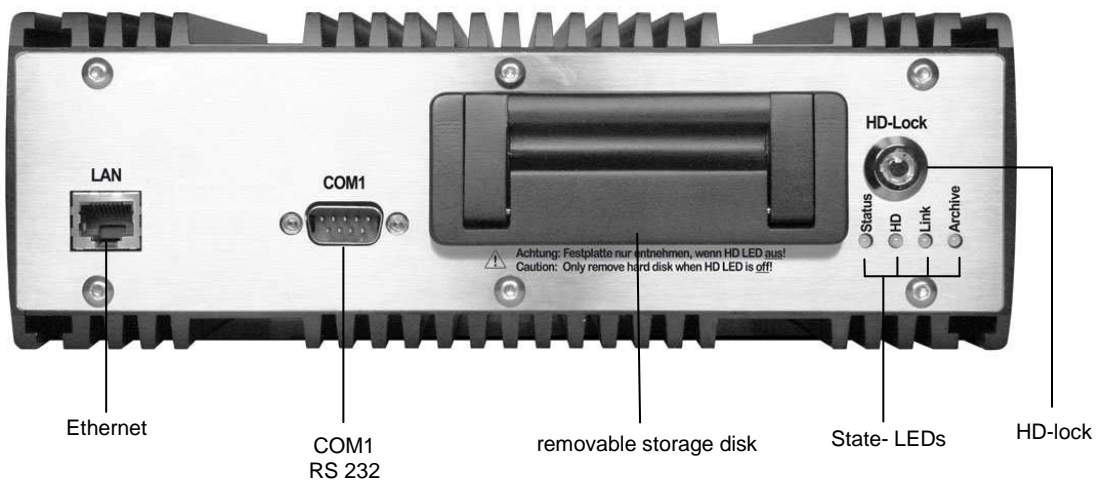


* This is a sample scenario showing the possibility to combine two devices in one train

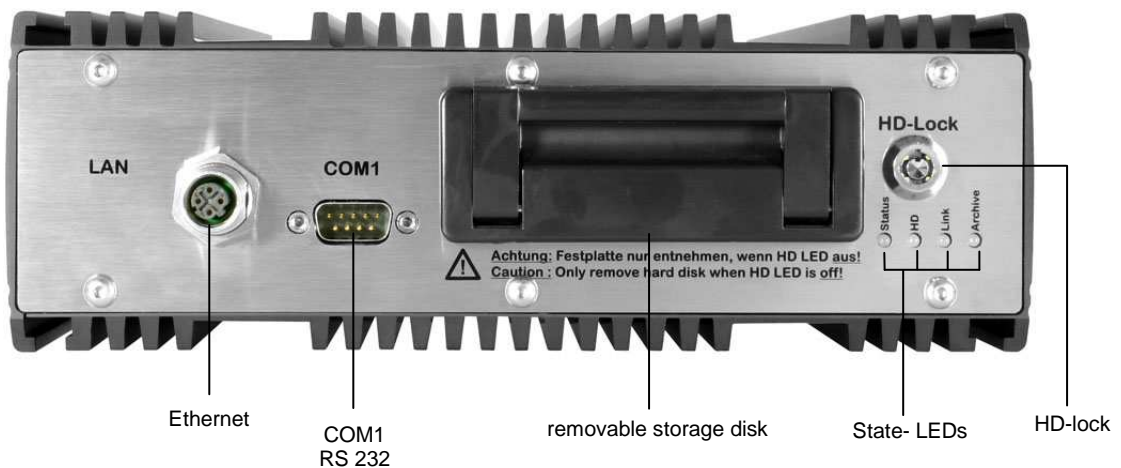
3 The MR3140 / MR3140-M device

The MR3140/MR3140-M is special because of its compact nature and indestructible construction. Thanks to its low power consumption (typically 15 W) it works without a fan and is therefore also largely resistant to environmental influences such as heat and dust. The unit provides several interfaces which can be seen in the illustrations below. Please refer to the manual for a detailed description of the interfaces.

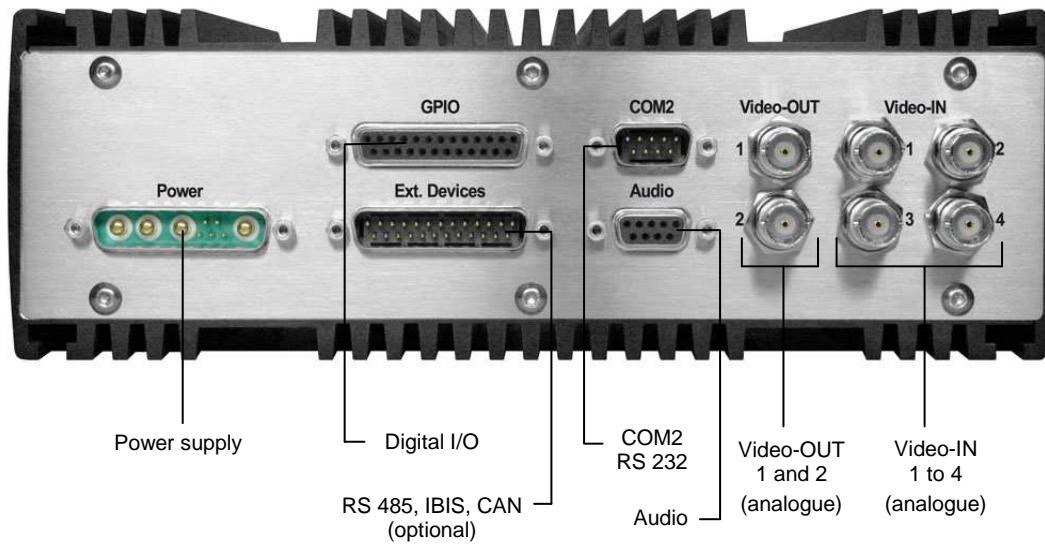
Front view MR3140



Front view MR3140-M



Rear view MR3140



4 Network cameras, picture format and recording time

The MR3140/MR3140-M saves pictures from the network cameras in JPEG format because the video streams for analogue video output (e.g. for the driver's monitor) have to be decoded again without any great delay. The device supports a variety of different picture display formats (3:2, 4:3, 5:4, 16:9 and others).

The MR3140/MR3140-M also supports the recording of high resolution IP cameras. Here there is no upper limit as far as picture format is concerned, only a limit relating to the file size – which cannot be greater than 512 kB per picture. The picture recording rate is determined largely by the bandwidth of the available internal memory bus of the MR3140/MR3140-M. This is 4MByte/s, which means the recording performance is dependent on the picture size and compression settings.

Resolution	1 IP-Camera	4 Cameras (2 x IP, 2 x analogue)	8 Cameras (4 x IP, 4 x analogue)
320 x 240 pixels	up to 30 fps	up to 30 fps	up to 25 fps
640 x 480 pixels	up to 20 fps	up to 20 fps	up to 20 fps
1.280 x 1.024 pixels	10 - 20 fps	6 - 15 fps	6 – 12 fps

The maximum picture recording rates are dependent on the number of cameras set up for recording, the resolution settings and environmental conditions (movement in the picture, lighting conditions). The frame rates are average values, the resolution refers to the configured resolution of the IP cameras, the resolution of the analogue cameras is 2CIF.

The MR3140/MR3140-M can save the pictures from the network cameras on the internal removable hard disk in a linear or circular fashion. Typically this is a mix, i.e. while the vehicle is operating, the unit saves all picture data in a ring memory which are overwritten using the FiFo process when the maximum picture storage capacity is reached.

If the MR3140/MR3140-M receives an event report via a digital input, serial interface or even via the network interface, it saves a picture sequence of a preset duration (typically a picture sequence before and after the event) linearly in a so-called alarm archive and bars this against overwriting until it is released by the user or released automatically after a specific time or event.

The MR3140/MR3140-M has a standard hard disk capacity of 160 GB and can optionally be fitted with a 250 GB disk. Depending on the picture size and compression, this can record for over 30 days from 8 network cameras with a picture recording rate of 1fps per camera, and a picture resolution of 320 x 240 pixels. Typically in buses and trains a picture recording rate of 3-4 pictures per second per camera and a picture resolution of 640 x 480 pixels are used so that with a hard disk capacity of 250 GB 72 hours of recordings can be made.

5 Analogue video output

The MR3140/MR3140-M has 2 analogue video outputs (composite) for feeding the network camera streams to analogue driver monitors in real time. Although the MR3140/MR3140-M can record from up to 8 cameras, it can play back pictures from up to 12 network cameras in full screen (as a switched sequence or event controlled) or in various split screen views (MultiView).

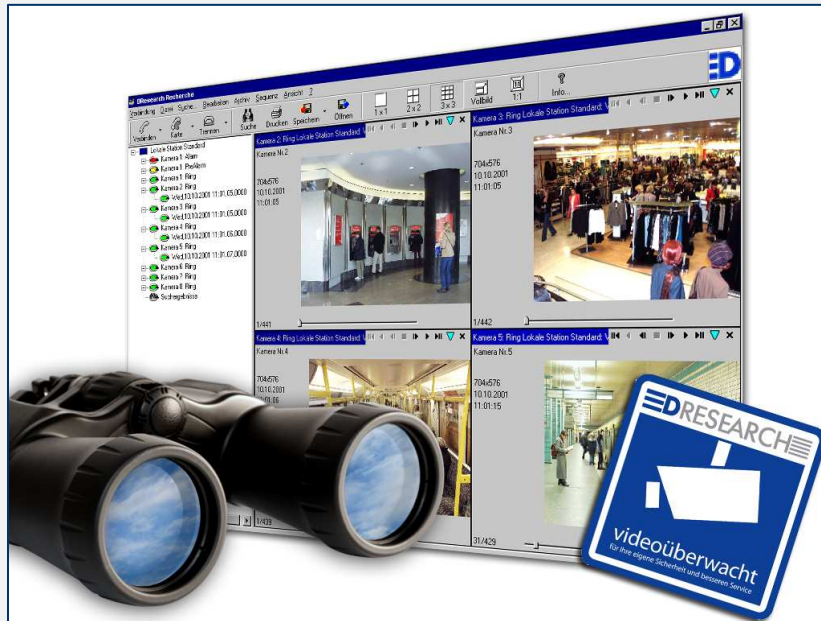
The use of analogue e1 or rather EN 50155 certified monitors offers a significantly higher reliability with lower cost compared to a digital solution with an industrial computer and screen.

6 Housing dimensions, weight, environmental parameters and certifications

Housing dimensions		Mechanical strain	
Height:	80 mm	Vibration (operation): 1 G (5 – 500 Hz)	
Width:	238 mm	Shock (all axes): 3 G	
Depth:	248 mm		
Weight:	3.400 g	Humidity:	10 to 90% (non-condensing)
Operating temperature: 0°... 55°C		Certifications & Conformity:	
		<ul style="list-style-type: none"> ▪ e1 approval from the German Federal Bureau of Motor Vehicles and Drivers (KBA) ▪ EN 50155 ▪ CE, RoHS conformity 	

7 The Central Management Software (CMS)

The CMS is the Central Monitoring software to manage DResearch devices and analyse recorded data. It is a modular system and will be delivered with every device. The software can be operated on a standard commercial computer running under a Windows XP (Prof.) or Vista operating system.



Requirements

- PC with CPU min. 2 GHz, min. 1 GB RAM
- Operating systems Windows XP Prof. SP2, Vista

Modules

- SystemManagement (configuration of the devices)
- ImageFinder (searching in video archives)
- Vision (display of live pictures from the cameras)

Features

- Display of the archives in tree form
- Loading of different sources (devices) possible
- Display of add. Data, i.e. IBIS
- Linking of maps to display GPS coordinates
- User administration, access control, event log and others

8 Data analysis with USB TTU and ImageFinder NX1

The analysis of recordings and the export and back-up of relevant pictures (for example after an event) usually takes place outside the vehicle. If a crime has been committed then the authorities often conserve the evidence by taking the recording medium.

Because of this the MR3140/MR3140-M has a removable hard disk, whose recordings can be conveniently and intuitively reviewed, archived and exported – out of the vehicle - at a so-called TTU (TeleObserver Transfer Unit) using its ImageFinderNX1¹ software.



Requirements

- PC with CPU mind. 2 GHz, mind. 2 GB RAM
- Operating systems Windows XP Prof. SP2, Vista

Module

- ImageFinder (searching in video archives)

Features

- representation of the archives in time line, ergonomic graphical interface schnelle
- quick installation and easy operation
- display of additional data, such as IBIS and GPS
- Comfortable searching in video- and IBIS data
- Event Protocol, service for disk etc.

¹ The ImageFinderNX 1 software the successor to the CMS module ImageFinder offers even easier data analysis. The software currently only supports the search of the MR range of data storage units.

9 Accessories and components for system extension

Accessories and components for system extension



Detailed information about the accessories you will find in the actual product catalogue of DResearch.

19"- mounting rack

When you order the MR3140/MR3140-M it comes on a 19" mounting rack, ready wired for connection to the on-board power supply.

Removable hard disk with insertion system

The MR3140/MR3140-M is normally supplied with one 160 GB removable hard disk which operates in temperatures between +5 and +55 °C. Other options available are a removable hard disk with 250 GB storage capacity or a 40 GB removable hard disk with an extended temperature range up to +80 °C. For order numbers see the DResearch product catalogue.

Solid State DISK (SSD) with insertion system

For operation in particularly extreme working conditions, solid state disks (SSD) with 32 or 64 GB capacity for picture storage are available. Solid state disks are flash storage media. They are impervious to any kind of vibration and have an extended working temperature range of up to +70 °C. For order numbers see the DResearch product catalogue.

Voltage transformers for use in rail vehicles.

The MR3140/MR3140-M works with a nominal supply of 12 – 24 V DC, as is usually available from the on-board circuit in buses or trucks. However rail vehicles on the other hand usually provide an on-board power supply of 110 V DC, so that to supply power to the MR3140/MR3140-M a special transformer has to be used which complies with the standards for rail vehicles.

PoE-Switches for operating in buses and rail vehicles.

Supplying power to network cameras in buses and rail vehicles is usually done from the data circuit using PoE (IEEE 802.3af). Since the primary power supply in buses and rail vehicles is between 12 and 24 V or 110V DC and special standards (i.e. e1, EN 50155) have to be observed, only very special switches can and have to be used in these vehicles. Models and order numbers supplied on request.

UMTS-Modem and VPN

With a UMTS modem it is possible to access the MR3140/MR3140-M in the vehicle remotely via mobile wireless. For secure transmission and for the connection management (using dynamic IP addresses for mobile wireless subscribers) between vehicles and receiver stations, DResearch offers a specially developed VPN solution for this kind of application: "DR.Tonic". Models and order numbers on request.

GSM-Modem

For transmitting system reports by SMS to mobile wireless subscribers or by e-mail.

GPS Receiver

The integration of GPS data (Global Positioning System data), i.e. the combining of picture and location data, enables the location where the recording takes place to be accurately determined even for live pictures. In addition this also provides information on the speed the vehicle was travelling at the time of the recording and thus supplies valuable information on events.

The GPS receiver can be connected to the RS 485 port or the COM interface of the MR3140/MR3140-M. A single licence for Microsoft's MapPoint is needed for displaying it in the DResearch CMS software.

Power-cable

Power supply cables for connecting the MR3140/MR3140-M to the on-board power circuit in buses consist of a 2m long cable with a recessed grip, electric contacts, ignition contact and an FMK3G metal plug for standard connection.

GPIO-Test unit

Service unit for testing the switched inputs and outputs, connection via sub connector.

Driver monitors

The MR3140/MR3140-M converts the video streams from the linked network cameras into analogue video signals and feeds these to the two video outputs (composite). Analogue TFT monitors with e1/ EN50155 certification can be used to provide the driver with information. This reduces costs and improves the reliability (compared to a computer-based monitor solution). DResearch offers approved TFT monitors of various screen sizes as accessories. Models and order numbers are given in the DResearch product catalogue.

10 The company DResearch Digital Media Systems GmbH

As early as 1996 DResearch became the first company in the world to develop a technology for live video data transmission over narrow band transmission channels, including the 9.6 KBit/s-GSM data channel. It was this development which enabled mobile video surveillance solutions. Since then the company has become the German market leader for professional, high quality video data transmission systems.

Today DResearch provides its benchmark recording and transmission solutions for use in public transport, cash transportation and logistics organizations as well as in government, military, industrial and commercial applications. DResearch systems have proved themselves in daily use world-wide. To date thousands of buses, trams, trains, armoured vehicles, police vehicles and technical installations have been equipped with DResearch systems. Leading transport companies in Germany and across Europe as well as well-known European logistics and cash transportation companies carry out large CCTV monitoring projects with DResearch as their partner.

DResearch's products and solutions are systematically designed to meet the needs of the market and the customer. They combine easy operation, the latest technology and high quality. DResearch develops robust, low-maintenance solutions which are ideal for mobile use, as well as innovative audio and video codecs. This all-round expertise which has expanded over the years makes DResearch a first choice partner in its target markets.

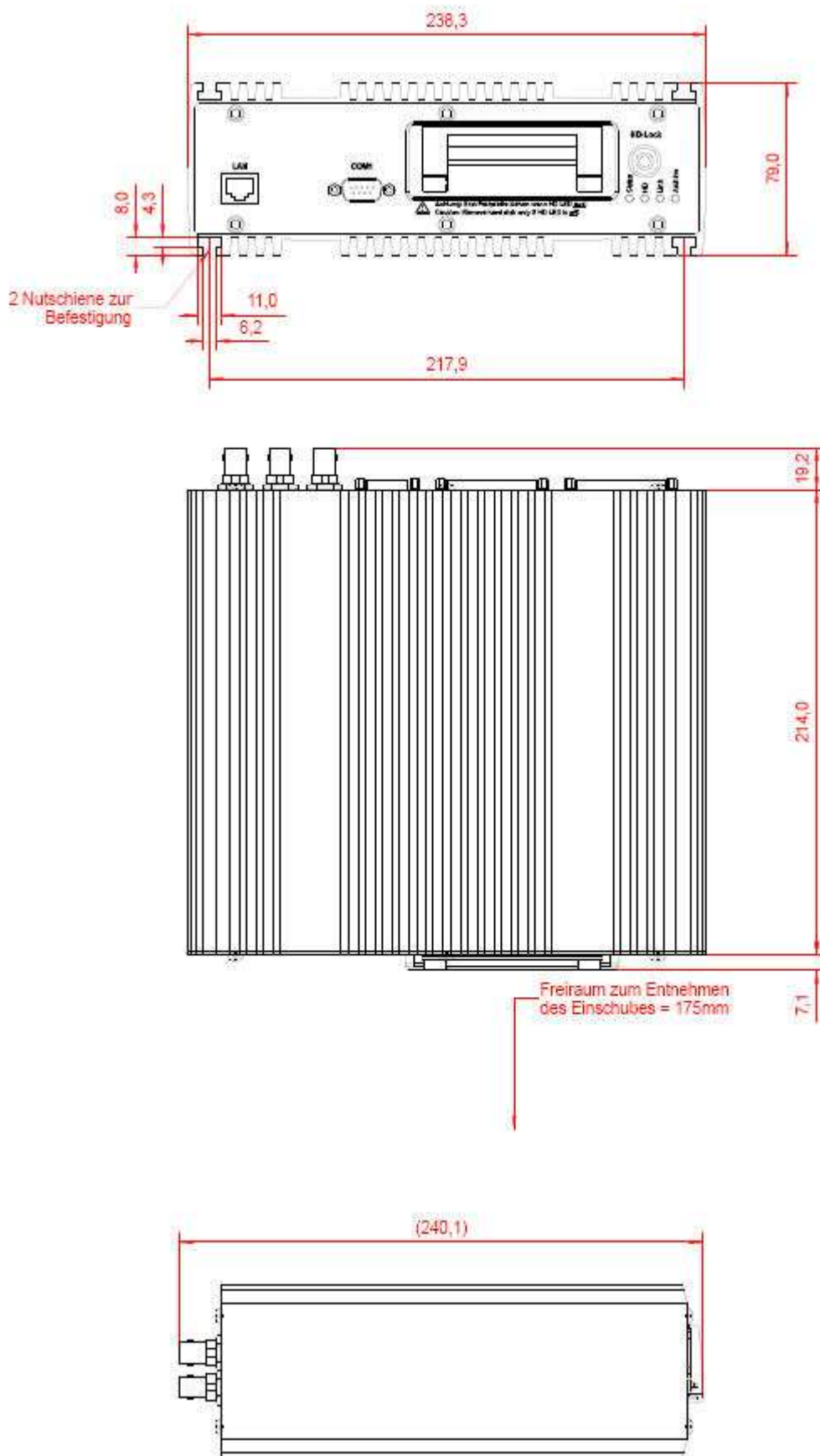
11 Technical Data

Dimensions			
Dimensions (H x W x D)	80 mm x 238 mm x 240 mm		
Weight	3.4 kg		
Environmental conditions			
Parameter	minimum	maximum	
Temperature			
Operation (recording)	0 °C	+55°C	
Extended range	-20 °C	+70 °C	
Storage	-40 °C	+70 °C	
Humidity	10 %	90 % (non-condensing)	
Mechanical loading			
Vibration (operation)	1 G (5 – 500 Hz)		
Shock (all axes)	3 G		
Electrical connected load			
Parameter	minimum	typical	maximum
Power supply	+7 V DC	12 – 24 V DC	+32 V DC
Power consumption (without cameras)			18 W
Power consumption (with peripherals)			40 W
Power supply for peripherals	12 V/1.5 A		
Digital video sub-system			
Parameter	minimum	typical	maximum
Picture storage rate @ PAL @ NTSC	1		25 pictures/s 30 pictures/s
Picture storage rate for IP cameras	1	50 pictures/s	200 pictures/s
Max. storage duration	48 hours at 4 pictures/s and 160 GB HD		
Video interfaces			
Video input			
Connector:	BNC		
Number:	4, composite video (PAL/NTSC)		
Resolution:	analogue: CIF, 2CIF digital: data delivered of IP cameras, dynamic control of the frame rates according to the utilization 8 Bit Luminance, 8 Bit Chrominance		
Impedance:	75 Ohm		
Signal level (peak-peak):	1 V +/- 3 dB		
Video output			
Connector:	BNC		
Number:	2 x BNC, composite video (PAL/NTSC) with the same signal		
Output:	1 x video source, quad view, video switching of all cameras		
Impedance:	75 Ohm		
Signal level (type., peak-peak):	1 V		

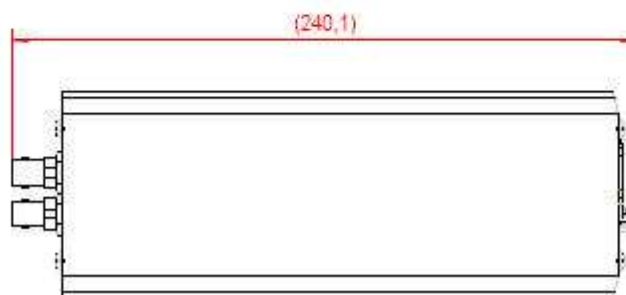
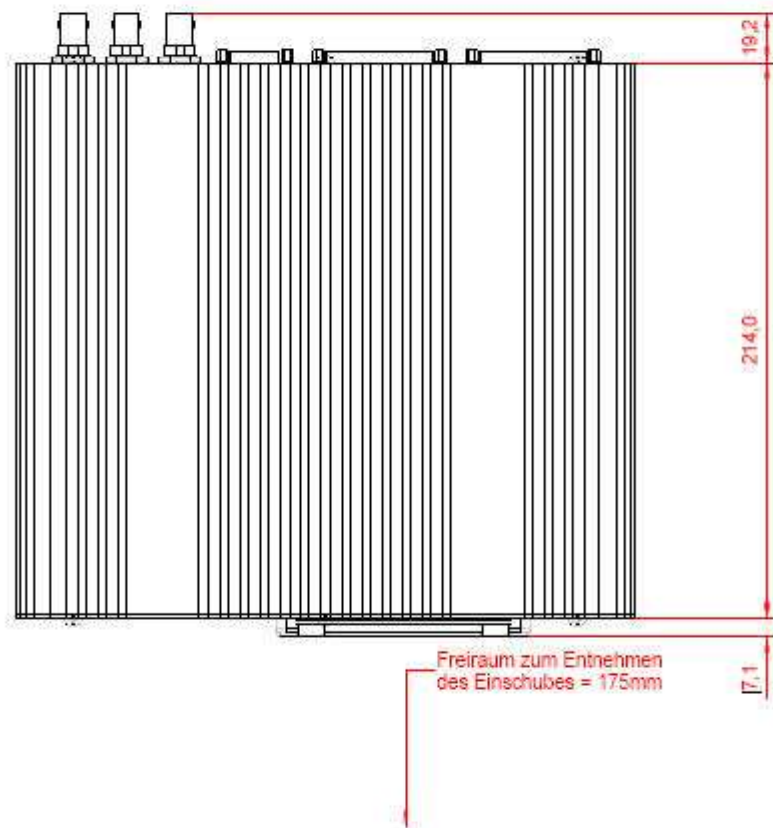
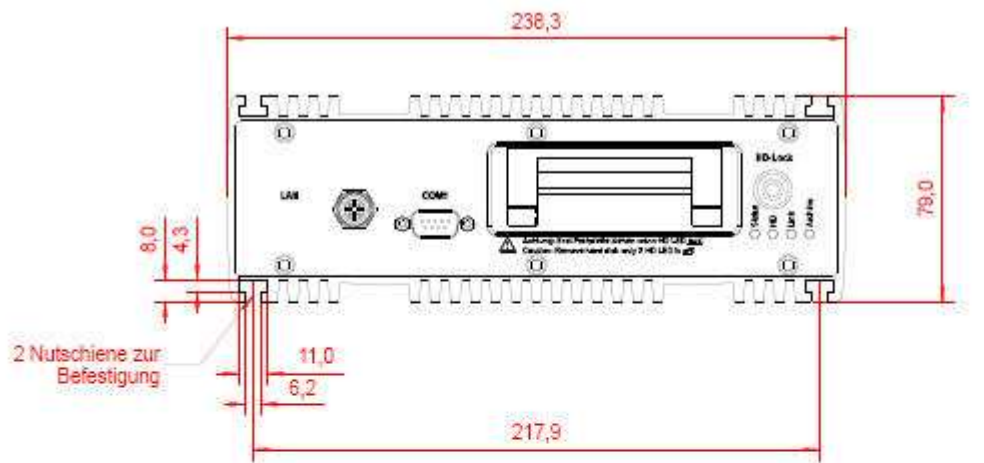
Audio-interface		
Audio input		
Connector:	D-Sub-9-pin socket (female)	
Number:	1	
Signal level (max., peak-peak):	2.8 V (+2 dBu), 0.5 V (-13 dBu) with input amplifier	
Input impedance:	>10 kOhm	
Frequency response (+/-3 dB):	100 Hz ... 10 kHz	
Digital interfaces		
Digital Inputs		
Connector:	D-Sub-25-pin socket (female)	
Number:	6	
Input level:	Low: 0 ... 3 V High: 6 ... 34 V	
Ignition input		
Number:	1 (differential)	
Differential input level:	Low: 0... 3V High: 6... 34V	
Digital outputs		
Connector:	D-Sub-25-pin socket (female)	
Number:	4 Relay (SPDT)	
Capacity:	60 V DC, 125 V AC, 500 mA	
Picture data transmission		
Communication link	Transmission rate	Bandwidth
LAN/Ethernet	25 pictures/s	100 Mbit/s
WLAN	25 pictures/s	54 Mbit/s
Other interfaces		
RS232	D-Sub-9-pin plug (male)	
RS485:	D-Sub-25- pin plug e (male)	
IBIS	D-Sub-25- pin plug (male)	
LED	4 (Status conditions: off, red, yellow, green)	

12 Technical drawing

MR3140



MR3140-M



Comments:



DResearch is member of ZVEI, BHE und VDS

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