TeleObserver MR3140

Mobile hybrid digital video recorder

Made in **Germany**

ED RESEARCH

User Manual
startup and configuration
version 1.5 – firmware 6.0

This document may not be copied, reproduced, summarised, translated or otherwise reproduced without the express permission of DResearch. It has been compiled to the best knowledge of DResearch. DResearch is not responsible for the consequences of typographical or residual errors relating to the user manual which is only informative in nature.

DResearch retains the right to make amendments to the contents of the user manual without having any duty to inform third parties. Any change made to the product or its associated software not expressly confirmed by DResearch will result in the termination of the operating licence and warranty.

Any company and/or product names are trade names and or legally protected trade marks of the relevant manufacturer.

Copyright 2008 by DResearch (Germany)

C O N T E N T S

1   DResearch system overview and general information about MR3140

Congratulations on the acquisition of your MR3140!

Dear customer, thank you for deciding to purchase an MR3140 mobile hybrid recorder, we are most grateful for your custom. You have made an excellent choice in acquiring this device, a top quality product from DResearch. The MR3140 is a compact digital unit for recording video sequences from analogue and digital cameras as well as other associated data (IBIS and GPS). With industrial styling and a robust nature, the device is intended for mobile and static use under the severest conditions. Because of the particular application requirements of mobile CCTV monitoring, the MR3140 is designed to be a compact, efficient system with a long service life.

Owing to its tolerance of temperature variations and its resistance to vibration and shocks, corrosion, dust and moisture, the unit is particularly well equipped for flexible use in vehicles. The system digitizes and records up to 4 analogue video streams. Alternatively up to 8 digital video streams from IP cameras can be recorded from a local network. The MR3140 also has many interfaces for configuration, expansion, maintenance and integration in all-in-one systems. As many as 12 IP cameras can be set up in the network for display on a control room monitor.

Please take some time to read the user manual carefully so that you are familiar with the complete functional scope of the system and its application requirements. The documentation for the device is provided on the software CD supplied with the device.

We wish you every success in working with the MR3140 mobile hybrid recorder!

DResearch mDVR at a glance						
	MR3040	MR3140	MR3240	MR3180	TO1200	TO3100
Analogue recording	yes	yes	-	yes	-	yes
Digital recording	-	yes	yes	yes	-	-
Video-IN analogue (max.)	4	4	-	8	4	8
Video-IN digital (max.)	-	8	8	8	-	-
Video-OUT	2	2	2	2	-	1
Transmission via SMS, Video (GSM, GPRS, EDGE) if an alarm is triggered	yes **	yes **	yes**	yes **	yes *	yes *
GPS	yes	yes	yes	yes	yes	yes *
IBIS	yes	yes	yes	yes	-	yes *
Max. capacity HD in GB	250	250	250	250	-	160
Motion detection	yes	yes	yes	yes	-	-
Sabotage detection	yes	yes	yes	yes	-	-
Encryption/digital signature	yes	yes	yes	yes	yes	yes
Digital inputs	6	6	6	8	6	8
Digital outputs/switch relays	4	4	4	2	4	6
RS232/485	yes	yes	yes	yes	yes	yes
Video management software incl.	yes	yes	yes	yes	yes	yes

* optional, depends on type of device and/or software module key
** only for SMS transmission via external device

1.1   Scope of delivery

- MR3140 digital hybrid recorder
- 160 GB HDD removable hard disk
- Software for configuration and analysis (Central Monitoring Software - CMS)
- Licences for the CMS
- Product CD with software and documentation

1.2   Accessories & additional devices

The devices can be expanded with various accessories. For a detailed list of all the accessories offered by DResearch, please refer to the current product catalogue. For other information and ordering of accessories please contact your system integrator or our team direct.

Assortment of additional devices for the system:

- Power supply unit 24V/2,5A
- Power – plug (ready-made 75cm cable with pin sleeves)
- MO-bearing for vibration damped mounting
- Mounting kit
- Service cable (Crosslink and patch cables, serial service cable)
- Plug set *GPIO*, Plug set *Ext. Device*
- Power-over-Ethernet switch (PoE) for supplying power to IP cameras
- DC/DC transformer (various input voltages, Out: 12-24V)
- Removable hard disks in various capacities 80 - 250 GB
- Video- and network cables (CAT 5; 6) in various lengths
- GPIO tester

Assortment of additional devices to extend the system

- WLAN module
- Various versions of GPS receiver and GSM antenna
- Modems for sending SMS
- Rail media coupler
- Various analogue and IP network cameras
- Colour and b&w surveillance monitors for fitting into vehicles (trucks, buses, trams, trains)

A complete installation in a rail carriage when expanded with accessories could look like this:*
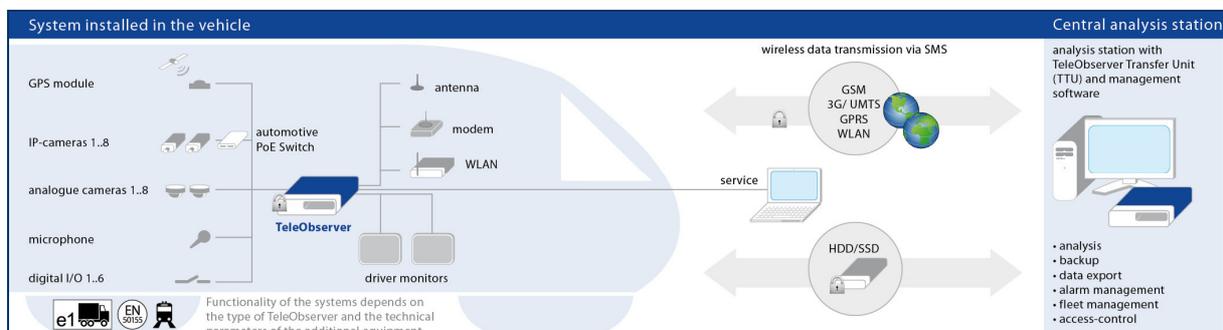
* This is an illustrative example. Up to 8 cameras can be recorded.

1.3   Safety advice

Incorrect handling can, at its worst, lead to personal injury or destruction of the device, and/or the termination of the guarantee. Therefore please be sure to note and follow the advice below before operating the device.

- **Never try to insert objects into any device openings since this could cause short-circuits or deliver electric shocks because of the voltage inside the unit.**

- **Only use original parts or products recommended by the manufacturer in the operation of the equipment. If you have a problem please consult your system integrator.**

- **Avoid installing equipment where it could be exposed to excessive smoke, dust, vibration, chemicals, moisture, heat, direct sunlight or electromagnetic fields. Such exposure can have a detrimental effect on the operation of the device and – in the worst case – can cause damage to the device.**

- **Never operate the device in locations where there is a danger that water might penetrate the device.**

- **When connecting up the device with the peripherals ensure that the cable is not under tension. Ensure all cables are installed properly.**

- **Only remove the hard disk from the device when all the LEDs on the front panel are off. To remind you this warning is printed on the front of the removable hard disk.**

> ## Remove only, when all LEDs are off!

This is an (EMC, EN 55022) Class B system and can be used in all environments.

1.4   Warranty

The warranty terms for materials and manufacturing faults are, unless otherwise agreed by special negotiation, set out by DResearch Digital Media Systems GmbH in its General Terms and Conditions. The General Terms and Conditions are to be found in the documents supplied. No further, expressed or tacit guarantees are accepted. The manufacturer is not responsible for claims arising from the improper handling or faulty installation by third parties.

The warranty is terminated if repairs or interventions are made by people who have not been authorised by the manufacturer. Claims arising from the inappropriate use of the equipment, incorrect maintenance or the use of accessories not recommended by the manufacturer are not covered under the terms of the warranty.

Opening the device inevitably leads to the cancellation of all existing guarantee cover, guaranteed rights and agreed warranties.

The supplied software and installation pack presuppose a conflict-free operating system. Solving problems relating to this require detailed knowledge of the systems used or their complete reinstallation. The manufacturer makes no guarantees that programs or systems operated by the user will deliver the desired benefits.

If a product is returned under the terms of the warranty this is always to be agreed in advance with the supplier, otherwise the return will not be processed. If returning an item, you will be given a returns number which is to be used throughout the procedure. The manufacturer takes no responsibility for damage or insurance during transit. Cash on delivery and 'carriage forward' shipments are not accepted.

1.5   Certifications, standards and conformities

The device is made to current safety and reliability standards (state: 09/2008) for use in a variety of environments. It was designed specially for use in trucks and locomotives and meets current requirements of various European standards.

Certifications, standards and conformities:

- **CE compliant to EN55022 class B**
- **RoHS conformity**
- **Conformity to European rail standard EN50155**
- **e1 certification from the German Federal Bureau of Motor Vehicles and Drivers (KBA)**
- **Conformity to European EMC guidelines**
- **Vibration IEC 61373 (9) and shock IEC 61373 (10.5)**
- **Heat & fire resistance DIN 53438-2, DIN 5510-2**

1.6   Scope of use

Public transport sectors
Trams, suburban railways, underground railways, buses, local and long distance trains and other vehicles
Distribution, logistics and transport sectors
Secure cash transport, transportation of hazardous loads, trailers and storage areas, high-bay warehousing and distribution centres, etc..
Housing and construction industry
Local properties, lifts and entrance halls as well as building sites.
Industry and commerce
Builders yards, industrial sites, waterworks and water treatment works, pumping stations, power stations, transformer substations, wind farms, geothermal power stations, retail branches, shopping centres, etc.
Maritime - Offshore
Locks, sea level measuring stations, oil drilling platforms, off-shore wind farms, etc.
Private sector
Holiday cottages, residential property, bungalows, boats, yachts, other vessels. Caravans, camper vans, etc.

1.7   General installation information

Power supply

- The device must be plugged into a buffered power supply (UPS or unswitched supply/permanent positive).

- Do NOT use the on board train power supply switch to turn the system on. Use the ignition.

- Ensure that the device is wired up exactly as described in the manual.

> **Ensure there is a <u>constant</u> power supply of 12-24 VDC. Temporary power outages will be tolerated by the device but they are always to be avoided and can lead to system failures and permanent damage to the equipment (e.g. from lack of proper vehicle battery maintenance).**
>
> **The UPS must be a device which has been recommended by the manufacturer and has valid certification for the application type.**
>
> **Any damage resulting from disregarding this advice will not be covered by any guarantee or warranty.**

Cable length between device and cameras

Long connection paths between device and cameras have detrimental effects on the quality of the video signals. Select camera positions so that as much as possible of the area to be monitored can be covered with minimum cable lengths. Your system integrator will help you with the design of the system.

<u>Ventilation and cooling</u>

Avoid installations where heat can build up. The equipment is designed to function without the need for a fault-prone fan, but adequate air circulation needs to be provided round the cooling fins.

<u>Mounting</u>

The device has 2 guide rails on the top and bottom which take mounting screws. If at all possible, mount the device on a mounting plate which can also take the necessary additional components such as a transformer and connection block.

⚡ **The device must <u>not</u> be mounted with the hard disk drive aperture facing down! When fitting ensure that it is possible to change the removable hard disks easily!**

1.8   Temperature range

Storage temp.:	maximum + 70°C
Operating temp.:	0°C to + 55°C (normal HDD)
	0°C to + 70°C (HT- HDD, SSD)
Humidity:	10 … 90 % (not condensed)

When using conventional data storage devices (HDD) the unit will automatically shut down when it reaches its temperature limit of + 55°C (for normal HDD) in order to protect the hard disk.

When the temperature reduces to below this limit, the device will automatically switch back on. This temperature-dependent switching event is stored in a log file.

1.9   System components and device features

The complete system consists of three different modules which communicate with each other via a proprietary software data protocol which is the same irrespective of the operating system.

The device MR3140

- Data recording and storage of video streams with metadata according to the predetermined configuration
- Storage on a removable hard disk
- Connection of a control monitor with OSD in **quad view**
- Function and configuration: see following chapter
- **Default IP address of the device when shipped: 192.168.0.1**

Service computer and analysis station

Usually the review station is used for analysing the recorded data. A service laptop is often employed for installation, configuration and system maintenance. A standard commercial computer can be used. Currently DResearch offers two software packages:

Central Management Software (CMS)
With the modules **Vision**, **ImageFinder** and **SystemManagement** for

- Visualisation of recorded data (video, add. data)
- Searching recorded data according to freely configurable parameters (e.g. time, events etc.)
- Display of live video sequences (incl. additional data)
- Device configuration
- Operating systems (OS) supported: Windows XP Prof. and Vista

ImageFinderNX
The successor to the CMS ImageFinder package – for investigating and analysing recorded data. It also enables backing up of video data from the recording devices.
(Operating systems: Windows XP Prof., Vista). Usable only in conjunction with the USB-TTU.

For more details about the software packages refer to the respective manuals.

The TeleObserver Transfer Unit (TTU)

This separate device (USB-TTU, MR40-TTU) has the following uses:

- takes the removable hard disk for the evaluation/analysis of data
- formats the hard disk
- activates removable hard disks and decodes data (not for USB-TTU when using DR.Secure encryption)
- displaying synchronous video images

Detailed information you will find in this manual and the data sheet.

System specification – an overview

- Hybrid recorder for recording video, audio and metadata, designed for buses, trains, trams and other vehicles, certified to e1 and EN 50155

- 4 x video-in analogue (BNC), 8 x video-in to record from IP network cameras (AXIS, Mobotix and others up to 1 Megapixel, 1280 x 1024 Pixel)

- 2 channel audio recording (e.g. for the documentation of the driver communication)

- removable hard disk: up to 250 GB HDD, 64 GB SSD

- 2 x video-OUT for analogue up to 12 IP network cameras, split screen display and onward signal switching

- recording of metadata such as IBIS (VDV 300), GPS, CAN-Bus optional

- Interfaces: RS232, RS485, Ethernet, IBIS

- 6 digital alarm inputs and 4 outputs for switch relays

- Integrated power supply for 4 analogue cameras

- Compact, robust industrial design for use in the most difficult conditions with protection against vibration

- Stable cast aluminium housing, maintenance-free through fan-free operation

Software and data management

- Live video pictures, search and playback function and fast video download via an Ethernet-Interface

- Configuration and management software with ergonomic graphical user interface

- Expanded event and information management, including IBIS / GPS metadata

- Support for alarm and fleet management

- Data encryption, watermark, sabotage recognition, role-based access management, motion detection

- Flash based pSOS operating system and hardware control system

- MJPEG and H.264 (MPEG-4 AVC) picture compression with recording rates up to 200 frames per second

- SMS support for alarm events as well as for maintenance/service-support (GSM modem required)

Feature	Description
Configurable video recording	▪ Recording of video sequences from up to 8 cameras (hybrid operation of analogue and IP cameras) in automatic generated archives (one ring, alarm and pre-alarm archive per camera). ▪ Maximum of 25 pictures/s for analogue cameras to the 4 video inputs ▪ Recording of up to 8 IP cameras with a maximum of 25 pictures/s per camera ▪ Definable setting for maximum age for the video footage

Configurable picture resolution (picture format)	**The picture format has to be determined before recording begins!**
	▪ Recording formats from analogue cameras
	   ▪ **CIF** (352 x 288 = 101 376 Pixels)
	   ▪ **Half frame/2CIF** (704 x 288 = 202 752 Pixels)
	▪ Recording formats from IP cameras:
	  The IP camera picture format has to be determined in the camera set up – not via CMS!

Configurable picture quality	▪ For each analogue camera there are 5 different settings for the picture quality of the recorded video footage. ▪ The picture quality from the IP cameras is determined by the camera configuration settings.

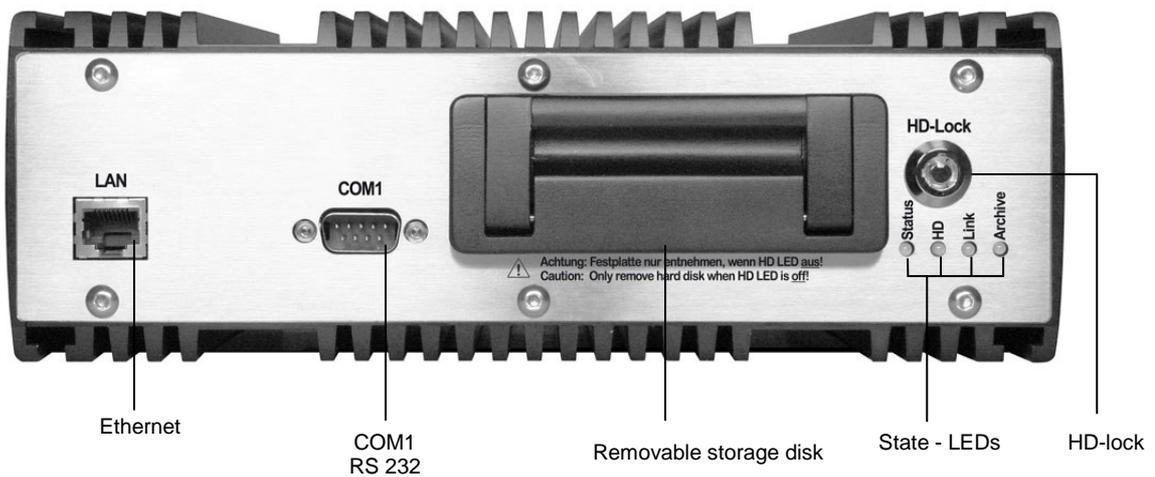| Feature	Description
Configurable alarm recording	▪ Pre- and post-alarm recording times are configurable ▪ Events can be used to start alarm recording ▪ Data recorded with this feature are marked as such. The alarm footage is not automatically overwritten. ▪ The maximum age of the alarm sequences can be determined.
Activated alarm recording display	▪ If alarm recording is activated, this is indicated by the yellow HD LED and it is displayed on the control monitor.
Configurable metadata recording	▪ Besides video footage, additional data such as date/time, camera name, IBIS and GPS data are recorded.
Calling up status information	▪ Information about the current status of the device is indicated via the devices LEDs and displayed on a control monitor (OSD).
Display of the event log	▪ Information about the device is recorded in the event log. The log can be viewed in **ImageFinder**.
System events	▪ Indicate the various device and archive conditions. They can be viewed on a control monitor (OSD).
Motion detection	▪ Trigger-level-controlled motion detection ▪ Motion detection can be limited by masking off particular areas of the picture. ▪ Configurable actions in response to motion detection, e.g. alarm recording and/or switching relays..
Camera sabotage	▪ Trigger-level-controlled camera sabotage detection ▪ Configurable actions in response to camera sabotage, e.g. relay switching

2   The MR3140 mobile digital video recorder (mDVR) in detail
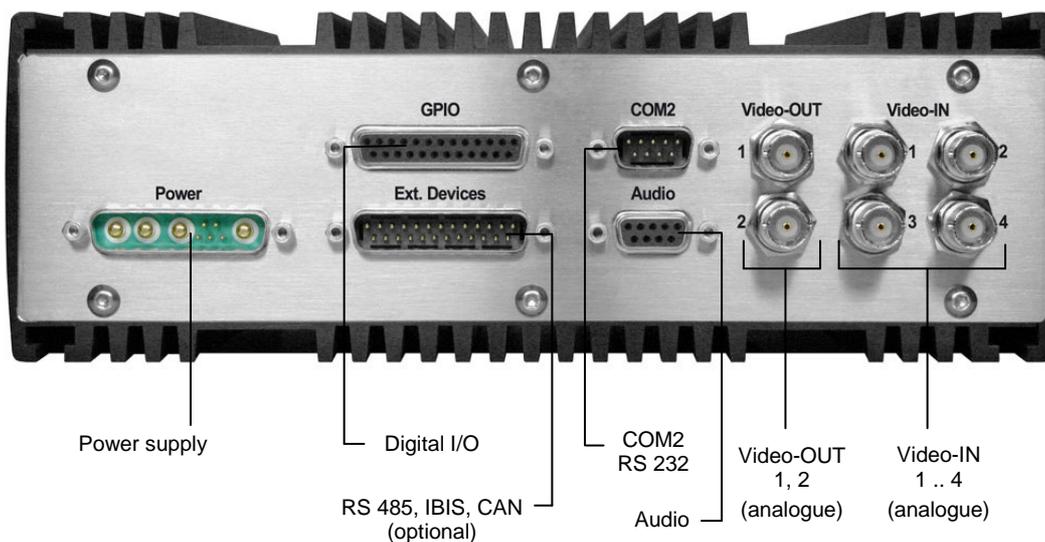
2.1   Device description

The MR3140 is one part of the complete recording system and works without a fan. The housing is made from non-rusting, maintenance-free material. The data transmission and recording processes in the device are encrypted to prevent unauthorised access to the data. The file and security operating systems used prevent loss of important files if there is a power outage and therefore maintain continuity.

The device forms the switching centre and link between all other system components. It provides the interfaces for the connection of cameras, peripherals such as WLAN modem, GSM modem, PoE switch, driver monitors, relays and switches as well as other components.

Front view of the MR3140

| Ethernet | COM1 RS 232 | Removable storage disk | State - LEDs | HD-lock |

Rear view of the MR3140

| Power supply | Digital I/O | COM2 RS 232 | Video-OUT 1, 2 (analogue) | Video-IN 1 .. 4 (analogue) |
| RS 485, IBIS, CAN (optional) | Audio |

2.2   Changing and inserting the removable disk

the MR recorder series' removable disk

Please ask your system integrator or the manufacturer about the sizes and models currently available.

In MR3140 devices use only the hard disks provided and pre-formatted by DResearch. Only hard disks with the same capacity should be used within each fleet. For more information and for ordering hard disks please contact the sales team (E-Mail: <u>sales@dresearch.de</u>).

Use only original hard disks from the manufacturer!
Otherwise all existing warranties and guarantees are invalidated.

Only remove the hard disk when all the LEDs on the front of the device are off! Removing the hard disk before the LEDs go out results in damage to the device. All warranties and guarantees are thereby invalidated!

To prevent any manipulation of the data, the hard disk is adopted by the device. This process happens when the device starts up with the hard disk for the first time. Only after this can recording start. To prepare the device for recording for the first time proceed as follows:

- Switch the device off and wait until all the LEDs have gone out
  (by unlocking the HD lock) – this takes several seconds
- Without using physical force carefully insert a formatted (!) removable hard disk (label upwards) in the carrier guides.
- Lock the HD lock again.
- The system will start again (so long as the power is on).
- The hard disk capacity will be automatically allocated to the camera archives by the software. No further intervention is necessary.

If you anticipate exchanging hard disks between different devices (so-called swap) then the following details are important: Make sure you read the details in section *System – basic settings*!

The hard disk is a sensitive part of the system. To ensure constantly reliable functioning we recommend that the hard disks are given and intensive check-up in the TTU every 3 months.

2.3 Significance of the status LEDs

On the front of the unit there are four coloured LEDs which indicate the current status of the device. At any time you can determine the current status of the device from the colour codes. We recommend that you print out the following table and keep it with your service documents.

LED	State	Description
Status (state of the device)	off	▪ Device is switched off
	green	▪ Device is ready for operation
	orange	▪ Device is booting or shutting down
	red	▪ Error – contact the service department!
HD (recording)	off	▪ Device is not recording
	green	▪ Actively recording into the ring archive (normal)
	orange	▪ Actively recording into the alarm archive (alarm event)
	orange flashing	▪ HD will be adopted by the device in 30 seconds
	red	▪ Hard disk is not available or could not be recognised/adopted by the device. ▪ **No recording on the hard disk** ▪ other errors
Link (LAN-connection)	off	▪ No connection between PC and device
	green	▪ Active data transmission, connection between PC and device
	orange	▪ Not busy
	red	▪ Error – no communication
Archive (archive fill level)	off	▪ Archives cannot be recognised (fault)
	green	▪ 0% - 60% of the capacity full
	orange	▪ > 60% - 80% of the capacity full
	red	▪ > 80% - 100% of the capacity full

The codes listed here could be changed by the manufacturer. If in doubt contact your system integrator or the manufacturer.

2.4 Device interfaces

### 2.4.1 Analogue video inputs 1 ... 4 – connection of analogue CCTV cameras

Up to four standard commercial CCTV cameras can be connected via the BNC connections **IN-1** to **IN-4** (rear of device) provided they have BNC connectors and deliver an analogue CCIR standard (CVBS, PAL/NTSC) signal. The operating voltage for the cameras is provided by the MR3140 recorder itself (12V).

Before video footage can be recorded from a camera (analogue and IP), video recording for this camera has to be explicitly activated in the Central Monitoring Software (See configuration chapter).

Note that you can only ensure a stable camera power supply of 12 V if the power supply to the recorder is always over 13V.

2.4.2 LAN Interface – connection of IP network cameras or other devices
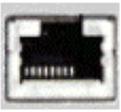
	Pin	Name	Description
	1	Tx+	Transceive Data+
	2	Tx-	Transceive Data-
	3	Rx+	Receive Data+
	4		Not used
	5		Not used
	6	Rx-	Receive Data-
	7		Not used
	8		Not used
This interface supports a bandwidth of 100 Mbit			

Table 1: Pinout of the RJ45 network interface

Using the RJ45-interface (LAN, Ethernet) and a patch cable (CAT 5 or higher) you can connect the device with other external devices. This might be:

A computer   -   for configuration and/or control through the CMS

External devices   -   such as a WLAN-modem, a switch, a single IP-camera
                                          or several IP-cameras over a switch

Connection of IP-cameras

Up to 12 IP cameras can be connected via the LAN interface and an external switch (see system diagram on page 4). Video recording can be activated for up to 8 IP cameras, the remainder can be set up in parallel to provide video pictures on an monitor.

Please note that the device does not support Power over Ethernet (PoE). Depending on the type of cameras used (e.g. AXIS 209 FD-R) their power supply has to come via a separate power supply unit or the PoE supply belonging to the external switch. Consult the relevant camera manual for power supply details. Activation of cameras is dealt with in chapter 3.

Only use DResearch recommended accessories!

2.4.3   Video Out 1, 2 – connection of control monitors

Two control monitors for monitoring the cameras can be connected in parallel via the recorder's analogue video outputs. This enables the camera pictures to be viewed in two different locations.

The cameras to be displayed on the monitors can be configured in the **SystemManagement** software module. All 4 analogue and up to 12 IP cameras can be displayed using a video switcher and/or in multi-view (single, quad, nona etc.). The position of the individual camera signals/video pictures within the screen and the switching sequence can be individually configured.

It is not necessary for the relevant camera to be activated for recording in order to display video pictures. Although only 8 IP cameras can be activated for recording, up to 12 IP cameras can be connected to the recorder via the external switch and all 12 video signals can be displayed.

Please note that displaying video makes additional demands on the device. Too many video signals can lead to reduced frame rates and hesitation in playback. Because of this only set those cameras for video OUT which are absolutely necessary. Usually it makes sense only to set up those cameras which cover sensitive areas (vehicle entry area or rear view camera).

A suitable monitor is available directly from DResearch. Please look at our current product catalogue or contact us.

2.4.3.1   Sequential video output and multiviews

Live pictures from the linked cameras can be switched through in sequence to be shown on the control monitor – this is controlled via a digital input. Configuration is dealt with in full in chapter 3.

2.4.3.2   Display of information and system events (OSD)

Using OnScreenDisplay the recorder shows additional information in the form of symbols and texts when particular system events and alarms occur. The following information and system events are displayed:

Symbol	Significance	Description
	Name of the warning device	▪ Symbols for the six digital inputs **IN1** to **IN6** ▪ Displays the number of the active alarm or electromechanical lock at the bottom of the screen.
⊗	-	▪ Alarm in the last hour ▪ Automatically increases the duration if another alarm is activated or deactivated within this period.
*	Alarm recording active	▪ Alarm sequence recording
HD (!)	No disk found	▪ No disk or disk faulty
HD (60%) HD (80%)	Alarm archives 60% full Alarm archives 80% full	▪ At least 60% (or 80%) of the hard disk capacity has been written with alarm footage.
HD (full)	Alarm archives full	▪ No further alarm sequence recording possible ▪ Archiving and release of the alarm archive in **ImageFinder**
GPS	GPS fault	▪ Device not receiving GPS signal
IBIS	IBIS-Bus fault	▪ Device not receiving IBIS signal
RMC	RMC fault	▪ Fault in the Rail Media Coupler
IP (1..8)	Camera number	▪ IP camera video signal missing
A (1..4)	Camera number	▪ Analogue camera video signal missing or camera has been sabotaged or covered. (A = Camera group A = 1..4)

Table 2: Alarm system conditions and events indicators

2.4.4   Power supply for the device and cameras

The interface provides power for the device itself and makes camera voltage available for the analogue cameras. The device is switched on and off via a connection through the vehicle's ignition switch.

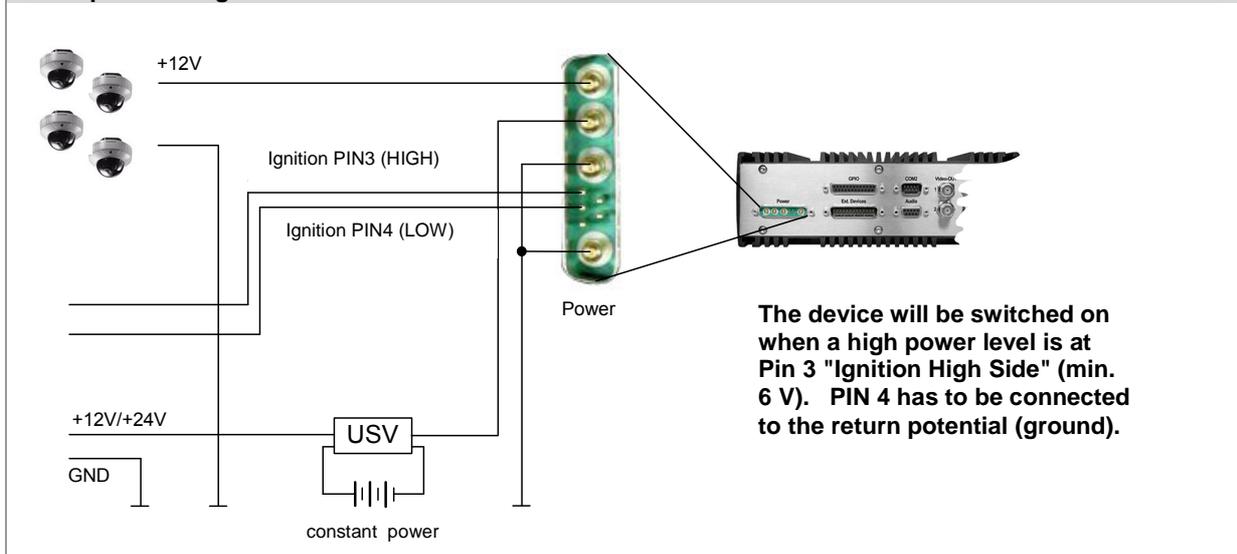| Interface	Pin	Name	Description
	A1	Camera_POWER(+12V)	+ camera power supply
	A2	POWER_IN (12V – 32V)	+ power supply
	A3	GND	- power supply
	A4	Camera_GND	- camera power supply
	1	-	
	2	-	
	3	Input1+	Ignition, high, galvanically separated (optocoupler)
	4	Input1-	Ignition, low, galvanically separated (optocoupler)
	5	-	

Table 3: Pinout of the *Power* interface

⚡ **Ensure there is a <u>constant</u> power supply of 12-24 VDC on Pin A2. Temporary power outages (e.g. from lack of proper vehicle battery maintenance) will be tolerated by the device but they are always to be avoided and can lead to system failures and permanent damage to the equipment.**

The UPS must be a device which has been recommended by the manufacturer and has valid certification for the application type. Any damage resulting from disregarding this advice will not be covered by any guarantee or warranty.

Example showing connection of device and cameras

The device will be switched on when a high power level is at Pin 3 "Ignition High Side" (min. 6 V).   PIN 4 has to be connected to the return potential (ground).

2.4.5   COM 1 – Serial data transmission and GPS connection

The COM1 port (RS232) on the front of the recorder is used (as a service interface) for maintenance of the device or for connecting external devices such as a GPS receiver or modem.

The interface (D-SUB 9, male) is configured as standard for RS232:

Interface	Pin	Name	Description
1 5 (male)	1	CD	Carrier Detect
	2	RxD	Receive Data
	3	TxD	Transmit Data
	4	DTR	Data Terminal Ready
	5	GND	System Ground
	6	DSR	Data Set Ready
	7	RTS	Request to Send
	8	CTS	Clear to Send
	9	RI	Ring Indicator

Table 4: Pinout of interface COM 1

GPS receiver connection

Note that the only navigation systems and GPS receivers supported are those recommended by DResearch. The GPS receiver can be connected directly to the COM1 port. The port parameters can be configured in **SystemManagement → GPS**. (See Chapter 3, Configuration)

Use as service interface

The service interface allows analysis of the device using a terminal. This should only be carried out by authorised experts. This requires the use of a fully wired serial service cable from DResearch.

2.4.6   COM 2 Interface – External modem connection

An external modem for sending SMS messages can be connected via the COM2 (RS232) port. This is automatically recognised by the recorder. The only modems which are supported are these ones available as accessory. A connected modem is automatically recognised by the recorder. An SMS-capable software receiver must be installed on your PC. This is not included in the shipment!

When operating a GSM modem for the first time the access to the relevant providers has to be configured (PIN, AT commands etc.) before inserting the SIM card and connecting the modem to the MR3140

Incorrect operation can lead to the SIM card being blocked! DResearch takes no responsibility for the costs associated with a blocked SIM card if the above instructions are ignored and the equipment is operated improperly!

2.4.7   COM 3 and COM 4–Interface (IBIS and RS485)

Ports COM 3 and COM 4 (RS485) are used for connecting the IBIS-Bus (COM 3) and any external RS485 devices (e.g. a GPS-receiver). Both ports lead out via the pins on the unit's **Ext. Device** external interface.

2.4.8   The audio interface

Use the audio adapter cable which is provided in the accessories to connect external audio devices to the recorder. The interface (D-SUB 9, female) is wired as follows:

Interface	Pin	Name	Description
5 1 9 6 (female)	1	Audio PWR2	Microphone phantom voltage 2
	2	AudioIn2	Audio input 2
	3	GND	Audio GND
	4	AudioIn1	Audio input 1
	5	Audio PWR1	Microphone phantom voltage 1
	6	GND	Audio GND
	7	GND	Audio GND
	8	GND	Audio GND
	9	GND	Audio GND

Table 5: Audio interface pin layout

2.4.9   GPIO-interface – detector inputs and switch relay outputs
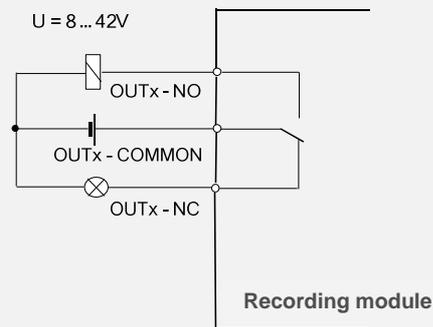
Sensor input 1 ... 6
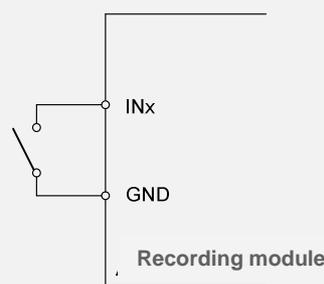
Each of the 6 available inputs is constructed as shown in the adjacent circuit.

Sensor systems can be connected as desired depending on requirements. This allows the MR3140 to be fully integrated within existing systems.

Relay output 1…4

Each of the 4 relay outputs is constructed as shown (left).
Here too the connection options enable the recorder to offer full flexibility for the connection of devices and systems.

It is possible to connect indicators, diodes and bulbs or to control other whole systems directly.

2.4.10   GPIO-Interface

The GPIO interface (HD-SUB 25, female) provides for the connection of alarm detectors. For this use the **GPIO connector set** which can be obtained as an accessory from your system integrator or DResearch. Up to 6 sensors (optocoupler inputs) and 4 switch outputs (relays) can be connected.

Pin	Name	Description	Pin	Name	Description
1	OUT2-COMMON	Relay output 2 – common contact	14	OUT4-COMMON	Relay output 4 - common contact
2	OUT2-NC	Relay output 2 – unprotected contact	15	OUT4-NC	Relay output 4 - unprotected contact
3	OUT2-NO	Relay output 2 – make contact	16	OUT4-NO	Relay output 4 - make contact
4	OUT1-COMMON	Relay output 1 - common contact	17	OUT3-COMMON	Relay output 3 - common contact
5	OUT1-NC	Relay output 1 - unprotected contact	18	OUT3-NC	Relay output 3 - unprotected contact
6	OUT1-NO	Relay output 1 - make contact	19	OUT3-NO	Relay output 3 - make contact
7	GND	Reference potential for digital inputs	20	GND	Reference potential for digital inputs
8	IN6	Digital input 6	21	GND	Reference potential for digital inputs
9	IN5	Digital input 5	22	GND	Reference potential for digital inputs
10	IN4	Digital input 4	23	GND	Reference potential for digital inputs
11	IN3	Digital input 3	24	GND	Reference potential for digital inputs
12	IN2	Digital input 2	25	GND	Reference potential for digital inputs
13	IN1	Digital input 1			

Table 6: Pinout of interface general purpose input/output (GPIO)

2.4.11 "Ext. Devices" Interface – IBIS, CAN and RS485

External Devices interface - Pinout

Pin 1 …   …13

14   25

The (HD-SUB-25, male) socket marked **Ext. Devices** on the recorder is an RS485 interface. This is shown as **COM4** in the setup configuration. This connection is used for the connection and integration of an IBIS system or a rail media coupler. The interface is also suitable for connecting an external GPS receiver. A connection for a CAN bus ** is offered as an additional option.

To use this interface the **plugset ext. device** is required. This can be obtained from your system integrator or from the manufacturer.

Pin	Name	Description	Pin	Name	Description
1	GND	Ground	14	WBSD	IBIS Call -Bus Signal
2	CAN_GND**	CAN Ground**	15	WBMS	IBIS-GND-Call-Bus
3	CAN_L**	CAN_L Bus Signal**	16	WBED	IBIS-Response-Bus Signal
4	CAN_H**	CAN_H Bus Signal**	17	WBME	IBIS-GND- Response -Bus
5	reserved		18	GND	Ground
6	GND	Ground	19	not used	
7	GND	Ground	20	reserved	
8	reserved		21	not used	
9	reserved		22	reserved	
10	reserved		23	not used	
11	GND	Ground	24	GND	Ground
12	RS485A	RS485 Signal A	25	GND	Ground
13	RS485B	RS485 Signal B			

* **IBIS = COM3, RS485 = COM4**

** The hardware is prepared to support a CAN-Bus and can be offered. Contact DResearch about this.

Table 7: Pinout of interface Ext. Devices

3   Device Configuration - The CMS and its main menu

.

💡 **To set up a connection to the device, an outstation with the name of your choice (e.g. MR3140_001) and the IP address of the MR3140 (Default: 192.168.0.1) has to be set up in the CMS module SystemMangement → Outstaion.**

The CMS consists of the modules Vision, ImageFinder and SystemManagement. Only the system management module is relevant for the configuration of the recorder. There is a detailed description of the CMS software in the software manual.

Vision - Display of live pictures

With the MR3140 this module can be used for the installation of a whole system for adjusting and function checking the cameras. You can check the adjustment of the cameras with it. Proceed as follows:

- Create a connection between PC and device (Ethernet)
- Start the CMS and afterwards **Vision**
- Connection to the device → **Connect**
- After successfully establishing the connection you will see the camera pictures.

ImageFinder – search of recorded data

Enables the searching of recorded video data. The various different types of archives are shown colourcoded: ring archive (green), alarm archive (red) and pre-alarm archive (yellow). Archives are automatically established for each camera which is activated for recording in the system management module. Proceed as follows:

- Creating a connection between PC and device (Ethernet)
- Start the CMS and then **ImageFinder**
- Connection to the device → **Connect**
- Once the connection is established the recorder's individual archives will be shown.

SystemManagement – module for device configuration

💡 **Configuration should only be conducted by the manufacturer's authorised specialist. The manufacturer accepts no liability or responsibility if damage results from improper treatment or incorrect settings.**

- Create a connection between the PC and the recorder (Ethernet)
- Start the CMS and then **SystemManagement**
- Load the device configuration → **Received**
- After the connection is made the device configuration will be loaded.

The following section will deal in detail with the menu of the SystemManagement module and the configuration of the device.

3.1   SystemManagement –module for device configuration

Function bar
The individual functions are activated depending on the function call-up of the selection window.

Menu and description	
Save	▪ Saves the setting local on the PC, not on the device.
Undo	▪ Currently selected changes are discarded.
Initializing	▪ System is re-initialised. ▪ Communications unit is re-started.
Connect	▪ Opens the **Connection** dialogue box in which the device is selected and whose configuration is to be loaded. After selecting and setting up the connection to the device the configuration is loaded.
Reject	▪ Button is active when the recorder configuration is loaded. ▪ Any configuration changes which have just been made are discarded and the device configuration menu is closed.
Transmitting	▪ Current configuration changes are transmitted to the device, the configuration menu is closed and the device starts with new settings.
New	▪ Activates the entry fields.
Delete	▪ Deletes a selected element ▪ Is activated with the **New** button.
Info...	▪ Activates a window with the current version number.

Table 8: function bar

The main menu	
	The functions **File**, **Connection**, **Edit**, **View** and Info **(?)** are available in the **SystemManagement** main menu.

File	
Save	▪ Saves all current changes. ▪ Only effective after system is initialised (menu option Initialising)
Cancel	▪ Cancels the current procedure.
Initialising	▪ Re-initialises the system
Save as	▪ Saves the configuration. ▪ First give the outstation a name.
Open	▪ Opens a saved configuration (choose from directory) ▪ For security reasons saved configurations from other MR3140 devices cannot be opened and transmitted.
Close	▪ Closes SystemManagement.

Connection	
Receive settings	▪ Sets up a connection to the MR3140 and receives the settings from an outstation. ▪ The dialog **Connection** will be opened.
Discard settings	▪ Is active if the device´s configuration menu is loaded. ▪ Current configuration amendments are discarded and the device configuration menu is closed.
Send settings	▪ Sets up a connection to the MR3140 and sends the amended settings to the device. Then the device starts with the new settings.

	Before establishing a connection with the outstation (MR device) check whether this is also in operation. If the device is not available an appropriate error message will be shown. **In this case the device is either switched off, the connection to the device is broken (cable) or the network settings are not correct.**

Edit	
Undo	▪ Undoes the new changes made.
New	▪ Activates the entry fields.
Delete	▪ Deletes a selected element. ▪ Is activated with the **New** button.

View	
Tooltips	▪ Switches on and off the brief help tips which appear when the mouse rests on individual dialog fields.

?	
Info about	▪ Activates a window with the current version number and copyright details (equivalent of the **Info** button in the function bar).

3.1.1 The device configuration

Configuration of the device	
	The device configuration is loaded via **SystemManagement → Receive** After selecting the particular device the configuration data is displayed in tree form. By selecting the individual entries on the left, the relevant dialogue box opens (on the right). The individual dialogue fields with the parameters and their significance are described in detail below.

System	
Basic settings	▪ **General Settings** (system follow-up time, system language, video output properties) and **archive settings** (storage duration, pre and post alarm times). ▪ IBIS and/or GPS data recording can be activated.
Time	▪ Select the time zone and the time synchronisation process.

Passwords	▪ Entry or change:
	  ▪ the passwords for remote configuration and hard disk access
	  ▪ the access codes for the MR3140.

Version	▪ Displays the serial number and hard and software version numbers for the MR3140 device.

Devices	
Cameras	▪ Can set **general camera settings** (video standard, picture rate) and **specific camera settings** (activation of video recording, motion detection and sabotage detection, quality, resolution, brightness, contrast, colour saturation).
IP cameras	▪ Configuration of camera name and IP address.
Detector	▪ Selection of detector type and actions which are to be carried out when the detector is triggered. ▪ Can activate RMC detectors
Relay	▪ All relays are shown
Audio	▪ Settings for audio recording

Connections	
Modems	▪ Configuration of modem settings and interface parameters
GPS	▪ Configuration of GPS properties and the interface parameters
Network	▪ Configuration of network address and gateway

Video output	
QuadView	▪ Configuration of multi-views for the video outputs (Video-OUT 1..2)
Switch through sequence	▪ Configuration of the switch through sequence for video output (Video-OUT 1..)
System events	▪ Configuration of system events which are to trigger relay switching.

3.1.1.1   System :: Basic settings

Once a hard disk is put in a different MR3140 unit all the data on the hard disk will be automatically deleted after 30 seconds, if this is set up in the device configuration. (It is the standard setting under **Archive settings → action when exchanging hard disks**). This is a security mechanism!

For these 30 seconds the HD LED on the front of the device flashes yellow. During this time you can switch the machine off if the data are not to be deleted.

After 30 seconds the data are irretrievably deleted and are no longer recoverable! The hard disk is automatically adopted by the recorder and prepared for recording. (Exception: if the HD is password-protected and this is not stored in the device configuration. In this case the disk will be declined and the HD LED on the device lights red.)

We recommend that all hard disks which are to be swapped from one device into another should be routinely formatted in the TTU. In this process the password for the storage device is replaced and any problems with disk adoption in the other unit are avoided.

Parameters	Description
General settings	
System follow up time	• After the ignition is switched off the device remains active in the recording mode for this period. • Controlled shutdown after this period has elapsed.
System language	• Language options for standard names of sensors, cameras and relays. • User-defined names are not affected by this setting.
Video output	

Text insertions in the video output (OSD)	• Display of text insertions (OSD) through the video OUT on a monitor
	
	• Additional display of:
	  ▪ Date
	  ▪ Time
	  ▪ Camera name
	  ▪ Activated sensor
	  ▪ System events (no camera signal, movement, etc.)

Standard version	• Choice of the analogue camera signal which is to be shown on the external monitor as standard when the MR3140 is switched on.

Automatic switching of video output after	• Activating the checkbox enables the display of
	  ▪ the video sequences from all cameras
	  ▪ or multi-views (quad view etc.)
	
	changing at regular intervals (beginning with the camera selected under **standard output)**
	
	• Video footage from IP cameras cannot be displayed at the control monitor.
	
	• The delay setting for the camera switching at the video output.
	
	• Can interrupt the video output or switch to one determined by the detector.
	
	• Continuation of the continuous video output (beginning with the camera signal defined as **standard output)** after the set time (as defined in **Video output automatic switching)** has elapsed
	
	• Configuration of the **video output** display format (from selection options; in selection tree)

Archive settings	
Size of hard disk	• Display the hard disk size (in the MR3140 unit).
Limit recording period to	• Determine the retention period of the saved data by activating the checkbox. • Once this time has elapsed the device automatically over-writes the data. ▪ If the set value is shorter than that in the **pre-alarm time** field then the pre-alarm time is automatically reduced to match. ▪ If you do NOT activate this checkbox the device will record data until the hard disk capacity is full (then too over-writing is automatic).
Automatically release alarm recordings after:	• Automatic over-writing is blocked from areas of the hard disk with alarm recording video data. • Activating the checkbox removes this block. • Set a time period after which the alarm data can be over-written. ▪ If the value set here is smaller than the **post alarm time** then the post alarm time is automatically reduced to match ▪ If this checkbox is not activated blocked hard disk areas can be manually released in the ImageFinder software package.

Pre alarm time	▪ Adds video data which were recorded before the alarm event to the data from the alarm period.
	▪ Determine here how long the period should be.
	▪ The value entered here must be less than the recording period
	If a larger value is entered this will automatically be reduced to match that entered in the **Limit recording period to** field
Post alarm time	▪ Adds video data which was recorded after the alarm event to the data from the alarm period.
	▪ Determine here how long the period should be.
	▪ The value entered here must be less than that in the **Automatically release alarm recordings after** field. If a larger value is entered this will automatically be reduced to match that in the **Automatically release alarm recordings after** field.
Actions relating to hard disk swapping.	**If you use several units in your company and intend to swap hard disks between them be sure to follow the guidance on the previous page under the screenshot!**
	▪ Foreign hard disks wiped: HD will be wiped after 30 seconds.
	▪ Refuse: HD is NOT adopted! HD LED switches to RED, no recording takes place.
	Caution: If the hard disk is protected with a password and this is not configured for access in the unit, the disk will also not be adopted, the HD LED will also show **RED.**
Additional data	
Record GPS data	▪ Start the GPS data recording by activating the checkbox.
	▪ Configuration of the GPS parameters is done in the GPS dialogue box (see section 9.1)
Record IBIS data	▪ Start the IBIS data recording by activating the checkbox (MR3140 unit must be connected to an IBIS bus).
	▪ Which of the IBIS parameters are recorded by the MR3140 depends on the used IBIS protocol.
IBIS –unit status report as	▪ Determine here how the unit is to behave within the IBIS bus.
Address	▪ Enter here a unique bus ID by which the MR3140 is to be known within the IBIS system

3.1.1.2   System :: Time

In this dialogue box choose your time zone and the settings for automatic time synchronization.

💡 **Caution: If you reset the time of the MR3140 unit backwards, and you then save the new configuration, all the video footage which is now in the future according to the new time, is automatically deleted!**

Field	Description
Time Zone	▪ Select a time zone from the listing. ▪ The valid properties for that time zone are displayed in the fields below.
Time	
Update time (while sending the configuration)	▪ When the configuration is sent the time of the unit is synchronised with that of the service PC.
External time sync	▪ Regular synchronisation of the unit's time with that of an external source.
Synchronization	

Source	▪ Here you select the external source for synchronising the device time.
	▪ For this the following conditions have to be fulfilled:
	   ▪ A GPS receiver is connected
	   ▪ The MR3140 is linked to the IBIS bus.

Synchronize time every … Hour(s)	▪ This is used to determine the synchronisation cycle.
Maximum difference … Minute(s)	▪ Enter here the maximum time deviation (in minutes) from the synchronisation source. ▪ If when compared, the time deviation is greater than this value then synchronisation takes place. After that the device starts new.

3.1.1.3   System :: Passwords

The length of all passwords and access codes has to be a minimum of 6 and a maximum of 16 characters. There are no passwords in the default factory setting. The codes and passwords are reset when the works settings are reset (see section on updating the device).

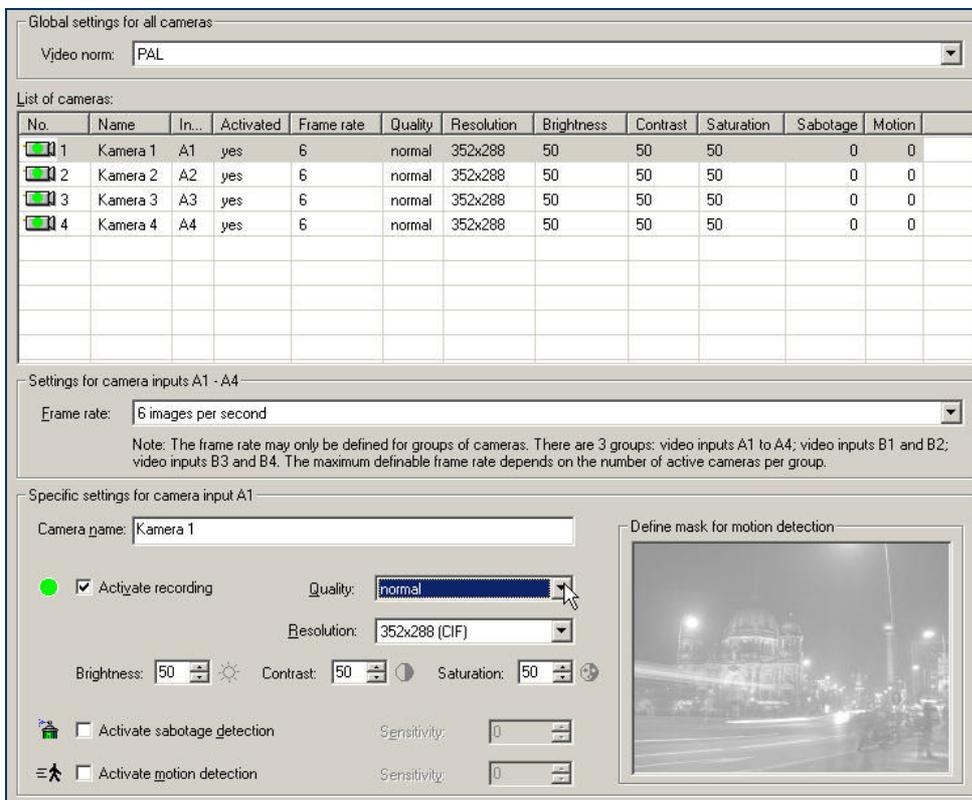| Name	Description
MR3140	▪ The access code is for authorising connections to and from this unit. ▪ <u>Tip:</u> This code and the one in the outstation settings for this unit in the **Central Monitoring Software** <u>have to be identical.</u> Otherwise the encrypted video sequences in the software modules **Vision** and **ImageFinder** cannot be displayed (see also Central Monitoring Software User Manual, Section 6.5) ▪ Repeat the access code in the **Confirmation** field.
Remote configuration	▪ This password protects the device configuration from changes by third parties. ▪ The password is saved in the device after the **Send** button has been clicked. ▪ This password also leads the access to the Web-Interface of the device . ▪ The new password is required when reloading the device configuration. This does not have to be entered with additional entries of the configuration password in the CMS dialogue box **Outstations** (see too Central Monitoring Software User Manual, Section 6.5) ▪ Repeat the remote configuration password in the **Confirmation** field.

Data security/ Digital Signature	▪ The password is used:
	   ▪ to protect the data against unauthorised access if the hard disk is put in a TTU or other external device.
	   ▪ to check the digital signature in the **ImageFinder** software package.
	▪ Repeat the password in the **Confirmation** field for data security.

3.1.1.4   System :: Version

This dialogue box shows the current information of the MR3140 unit in use. No changes can be made. You should also print out this information and keep it with your documentation. You will need this data for servicing.

3.1.1.5   Devices :: Cameras

In this dialogue box you determine the cameras which are to be activated for recording. To determine the settings select one of the cameras and change the values to suit your requirements.

Name	Description
Video standard	▪ For selecting the video standard (PAL or NTSC) for data recording.
List of cameras	▪ Lists the activated/deactivated analogue cameras and their settings.
Picture rate	▪ Select how many pictures per second are to be recorded (valid for all cameras). ▪ Maximum picture rate varies depending on the number of active cameras. ▪ Configuration of one or more analogue cameras for the video-OUT reduces the frame rate of the other cameras, as if they were activated for recording!
Camera name	▪ Give the camera a name (max. 50 characters). ▪ To achieve accurate identification the name might include reference to the camera's location (Cam1_entrance). ▪ Keep names as short as possible so that the whole name is visible on the monitor.

Activate recording	▪ Permanent recording from the selected camera or activation of the detector action **Alarm recording of the camera** by activating the checkbox. ▪ Symbol for activated cameras: ▪ A ring archive is automatically allocated on the hard disk for each activated camera. ▪ When a camera is deactivated the relevant ring archive is automatically deleted – except for alarm data.
Quality	▪ Select the quality for the recordings from the activated camera. ▪ <u>Tip</u>: The lower the quality the lower the storage requirement but also the less detail retained in the video footage.
Resolution	▪ The following resolutions are available for all analogue cameras: 704x288 Pixel (2CIF/field) , 352x288 Pixel (CIF) ▪ Formatting of the IP camera is done separately in the camera configuration. See the camera manual.
Brightness	▪ Enter a brightness value for the selected camera.
Contrast	▪ Here set the contrast for the recordings.
Saturation	▪ Here set the value for saturation.
Activate sabotage detection	▪ This checkbox activates the camera's sabotage detection function. ▪ When the unit registers sabotage activities (the camera lens is covered, dirty or cross fading occurs) then a report is sent and/or a relay is switched. ▪ The video recording itself is not interrupted by sabotage.
Sabotage detection sensitivity	▪ Set the sensitivity of the sabotage detection. ▪ The value should match the picture content and not be extreme. <u>Tip:</u> Generally constant pictures → higher value Highly changing picture contents and lightning conditions → low value Factory setting: 41
Activate	▪ Marking the checkbox activates motion detection for the camera. ▪ Motion detection can trigger various actions: e.g. alarm recording or relay switching
Motion detection sensitivity	▪ Setting the sensitivity of the motion detection. ▪ The value should match the picture content and not be extreme. <u>Tip:</u> Generally little movement in picture → higher value Lots of movement in picture → low value Factory setting: 10
Set movement mask	▪ Motion detection can be deactivated for selected areas of the picture by setting a mask (privacy zones) ▪ Click the picture areas to add or remove them from the masked area. ▪ Those areas not monitored for movement detection are shown semi-transparent.

3.1.1.6   Devices :: IP-Cameras
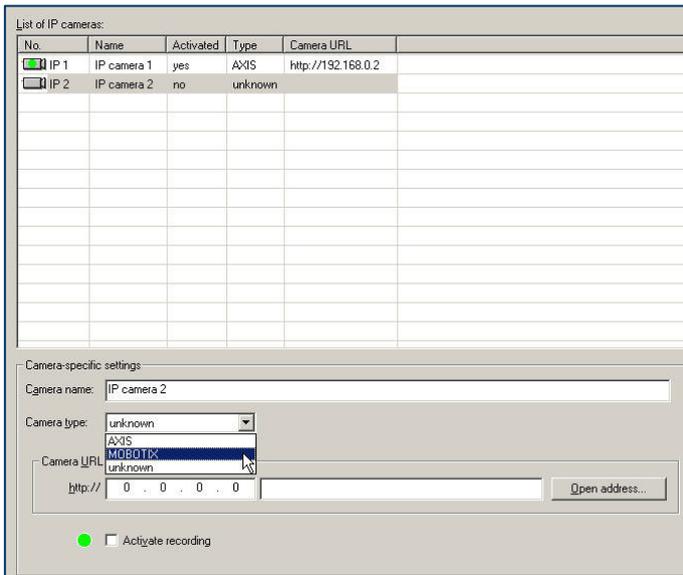
In this dialogue box you activate the IP cameras which are to be recorded. Please note that we are dealing here with the basic integration parameters of the network cameras.

Network cameras are usually set up using their own web interface. Parameters such as picture format, quality, colour saturation, frame rate, contrast, etc. have to be configured there as a separate operation.

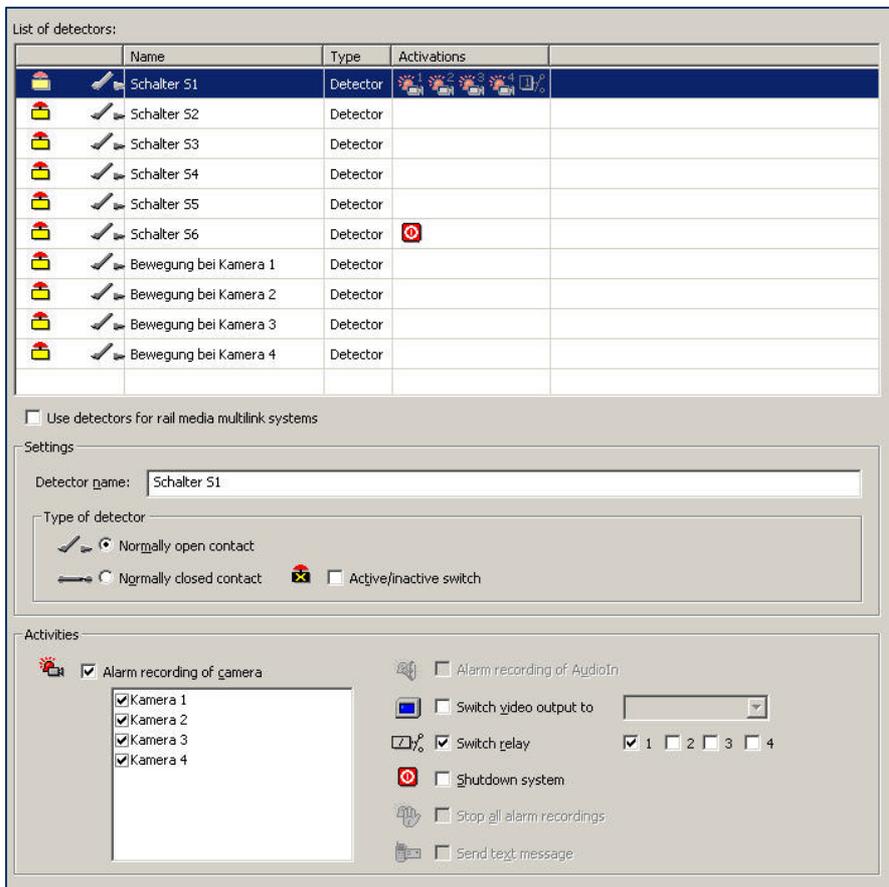| Name	Description
List of IP cameras	▪ The list contains all cameras as well as basic settings. Detailed configuration of IP cameras is done in their own setup.
Specific setting for each camera	
Camera name	▪ Give the selected camera a name (max. 50 characters)
Camera type	▪ Select the type of IP camera. ▪ Those camera types currently supported by the software are: **AXIS**, **MOBOTIX** and **UNKNOWN** (manual entry of an http-URL)
Activate recording	▪ Activating the checkbox results in permanent recording of the selected camera's video footage or activation of detector driven recording **Alarm recording from the camera.** Symbol for activated cameras: ▮◻ ▪ Automatic generation of a ring archive on the hard disk for each activated camera. ▪ When a camera is deactivated its ring archive is deleted – except for the alarm data.

Camera URL	▪ The **Camera URL** field is divided into two.
	  ▪ The first part: Enter the IP address where the camera can be reached in the network.
	  ▪ Latter part (camera type **UNKNOWN**): Enter the HTTP-URL of the IP camera. When called up on the above URL, the camera must provide an MPEG stream (MIME-Typ Multipart, 8-bit) with length data in the header. **(E.g. Axis: `axis-cgi/mjpg/video.cgi?showlength=on`)**
	▪ One completed field is sufficient to accurately identify the IP camera in the network.

Open address....	▪ Click on the **Connect** button to open your PC's standard browser and create a connection to the IP camera. ▪ Possibility to check if the camera can be reached and make camera-specific amendments to the settings. ▪ To configure the IP camera's parameters via the browser the cameras and the **Central Monitoring Unit** have to be located in the same network segment.

Please note: For IP cameras, the camera configuration must be set so that the MR3140 is set as a "guest" and gets access to the camera without having to provide access data. Otherwise with some cameras (e.g. AXIS 209 FD) recording is not possible.

3.1.1.7   Devices :: Detectors

When a detector is triggered the MR3140 unit can respond specifically to particular (predetermined) events (according to preset actions). Up to 6 external detectors can be linked to the unit's digital inputs **IN1** to **IN6**. These can be switches or sensors of any kind (light beams, motion detectors, temperature sensors, etc.).

In addition so-called **virtual detectors** can be set up and configured. These indicate events which occur within the device. Such detectors can be activated by, for example a rail media coupler and/or by the analogue cameras' motion detection function. By selecting **Detector** in the tree structure, the appropriate dialogue box opens. This shows factory-settings for each detector.

Activated detectors are shown with the detector number at the bottom of the screen. Each activation of an external detector is indicated on the control monitor. In addition, when an alarm recording is activated a popup window appears for a short time showing the detector names. The status of the individual detectors is shown in **Vision** if there is a connection to the relevant unit.

| Name	Description
List of detectors	▪ List of detectors and their settings. ▪ Highlight the detector whose properties are to be configured.
Use RMC detector	▪ Activating the checkbox adds the rail media coupler (RMC) detector to the list of alarms.
Detector name	▪ Here you can change the alarm names (default names **Switch S1** to **Switch S6**)
Detector type	▪ All detectors can be assigned one of the following detector types: **opener**, **closer or block lock**. ▪ When the block lock is activated external events from the alarms are not evaluated and no actions are triggered.
Actions	▪ Mark the checkboxes for the actions (multiple selection possible), which are to be carried out when an alarm is triggered. ▪ <u>Tip:</u> The actions **Alarm recording from the camera** and **Stop all alarm recordings** cannot be triggered by an alarm.
Alarm recording of cameras	▪ Video footage from the cameras selected here will be recorded in the video archive when the alarm is triggered. ▪ Alarm recording ends when the detector is reset after the post alarm time has elapsed. ▪ Selecting cameras for detector activation is only possible if the normal ring recording has been activated in the **Cameras** dialogue box.
Switch relay	▪ Here select the relays to be switched when the alarm is triggered. ▪ The relay is automatically reset when the alarm is reset. ▪ Relays which are used for signalling system events cannot be selected for detector activation.

Switch video output on	▪ Analogue camera signals are switched to the video output or switched off.
	▪ When the alarm is triggered the active video output is interrupted and replaced with that of the camera selected here.
	▪ The analogue camera signals can only be switched to the video output if the relevant cameras have already been activated for recording in the **Cameras** dialogue box. The following selections are possible:
	  ▪ Next camera
	  ▪ Camera 1 to camera 4
	  ▪ Quad view
	  ▪ Off

Shut down system	▪ The device is shut down. ▪ If the ignition is active the system is rebooted after shutting down. ▪ If the ignition is not active the unit is switched off immediately after shutting down.
Stop all alarm recordings	▪ All alarm-controlled video recordings will be stopped.
Send SMS	▪ When the alarm is triggered an SMS is sent with the alarm number, date and time. ▪ This can only happen if an external modem is connected to the device and has been configured.

3.1.1.8   Devices :: Relays

Relays which are to be switched by the recorder can be connected to its digital outputs.

Settings have not been entered for each relay in the factory. Change these to suit your requirements by selecting each entry.

Name	Description
List of relays	▪ Contains a list of all available relays.
Relay name	▪ You can change the relay names (default names **Output 1** to **Output 4**).

### 3.1.1.9   Devices :: Audio
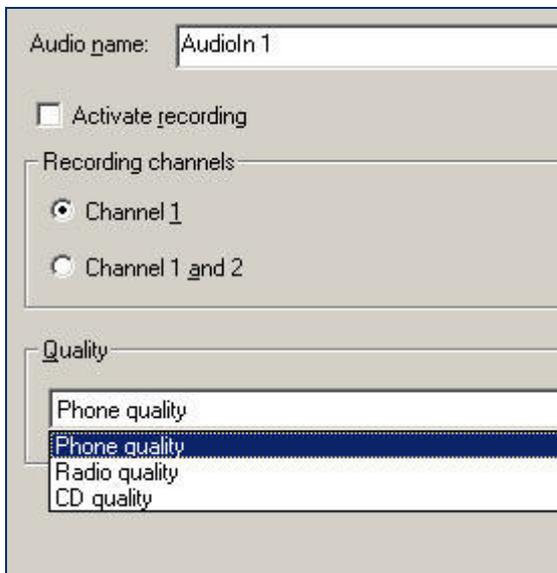
You can use 2-channel audio recording. For this activate the checkbox **activate recording**.
On COM 2 port must ensure corresponding
device   can   be   connected   (microphone).

Note: Check the record only if it is really necessary. The recording of the data is uncompressed. It creates large volumes of data.

3.1.1.10 Connectors :: GPS

The device supports the connection of an external GPS receiver for receiving GPS data. This can be connected either via the COM1 port or the Ext. Devices (COM4 = RS485) port. This has to be configured in the SystemManagement module as follows:

- In the options on the main window select the **Connections – GPS** entry.
- Select the **COM 1** or **COM4** (RS485) port.
- Click the **Save** button on the toolbar to set the default settings.
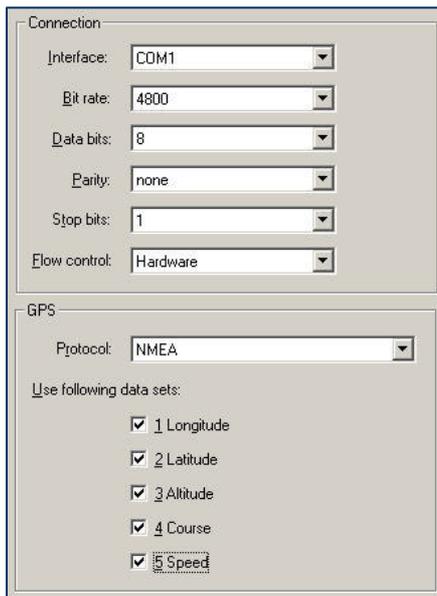
Bitrate: 4800
Data bits: 8
Parity: none
Stop bits: 1
Flow control: none
Protocol: NMEA
GPS databases are not activated

Field	Description
Connection	
Interface	▪ Select the unit's **COM1** or **Ext. Device** (=**COM4=RS485**) interface to which the GPS receiver is to be connected. ▪ **COM1** is recommended as this is a direct connection. ▪ If a rail media coupler is connected to the unit then the **Ext. Device** port is not available.
Bit rate	▪ Set the maximum bit rate which can be used for transmission between the GPS receiver and the unit's COM port.
Data bits	▪ Number of bits which can be transmitted in a data packet.
Parity	▪ Shows whether error checking is carried out or not.
Stop bits	▪ Number of stop bits between two transmitted data packets.
Flow control	▪ Shows how the data flow between the serial interface and GPS receiver is controlled.
GPS	
Protocol	▪ Set the protocol used by the GPS receiver. ▪ The **NMEA** protocol is supported.
Use the following databases	▪ Mark the parameters, whose values will be recorded for a subsequent search and displayed in **Vision** in live pictures.

3.1.1.11 Connectors :: Network

The network configuration of the MR3140 device is determined in this dialogue box. Changes to the settings can only be made by authorised specialists with a thorough network knowledge.

Incorrect settings may mean that the device can no longer be reached!

Standard IP: 192.168.0.1

Field	Description
Gateway	▪ Enter the IP address of the gateway. ▪ <u>Note</u>: The IP addresses of the recorder and gateway have to be in the same network sector. ▪ The gateway enables communication and data transmission between computers which are in different networks or in a linked external communication system. ▪ Enter the IP address of the unit if all the connections to be made to the MR3140 are in its network sector or no gateway is available.
List of the network interfaces	▪ All the network adapters installed in the MR3140 are shown here. ▪ Click and highlight to display the parameters of a network interface.
IP address	▪ Shows the IP address of the highlighted network adapter.
Net mask	▪ Shows the current network mask.

3.1.1.12 Video output :: QuadView
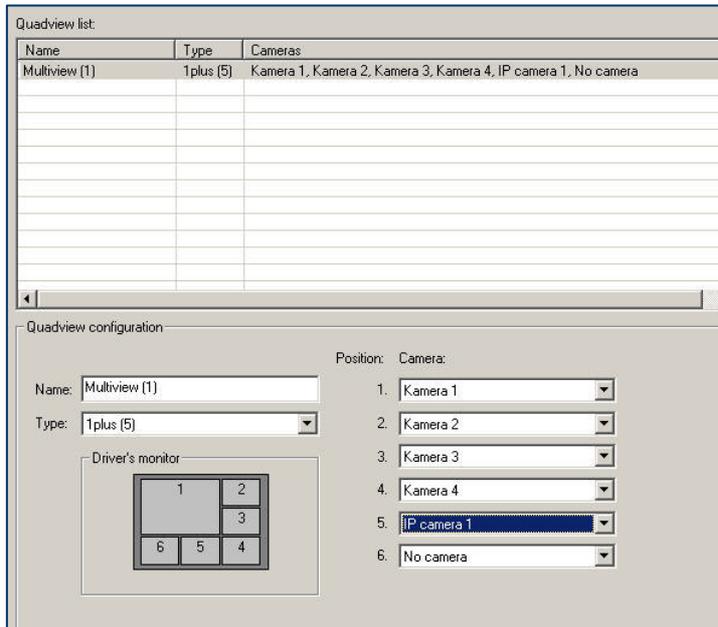
Store new viewing formats here by pressing the NEW button and configure the display as you want.

Several types of views are available for selection:

- Quad - 4 cameras
- Nona - 9 cameras
- 1plus (5) - 6 cameras
- 1plus (7) - 8 cameras

A maximum of 9 camera signals can be displayed in a view.

QuadView with the analogue cameras 1-4 is set as standard. However several views can be defined which can be activated for a switching at the control monitor.
If you want to set one of these views as the start up view set this under System :: basic settings in the "video output" field → Standard output".

3.1.1.13 Video output :: Transfer order
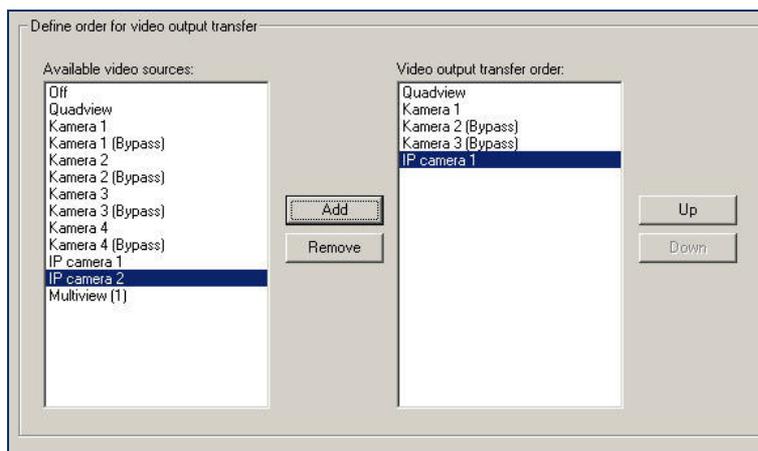
Here you determine the switching sequence. You can select from all the camera entries, even the IP cameras which are not activated for recording.

Bypass means that the camera signal goes directly from video-IN to video-OUT. This setting relieves the recorder but means no overlay of additional information is possible.

The switching time, after which the view is switched to the next camera picture or multi-view format is determined by the "Video output" → "…switch after..." field in the basic settings. The automatic transfer order stops at source OFF. After that you have to switch manually. For this reason the source OFF shouldn't be admitted into the video output transfer.

3.1.1.14 System events

System events are actions or status changes which are activated by the device or other components connected to it. All system events are displayed on the control monitor. Also, when an event occurs a blue popup window appears for a short time.

Furthermore when a system event occurs the recorder can switch relays.
The current status of the system events is shown in the **Vision** selection options (under **detectors**) if there is a connection to the relevant device.

Field	Description
Signals alarm recordings via relay	▪ If alarm video sequences are to be recorded from at least one camera, select the relay to be activated. ▪ The relay remains activated as long as there is active alarm recording including during the post-alarm period. ▪ Relays which have already been switched by detector activations cannot indicate any alarm recording and are therefore not included in the list of options.
Signals system fault 1 via relay	▪ Select the relay to be activated if a system fault occurs. ▪ The system event which is to be treated as fault 1 can be determined in the **System events** list. ▪ Relays which have already been switched by detector activations cannot indicate any system fault and are therefore not included in the list of options.
Signals system fault 2 via relay	▪ Select the relay to be activated if a system fault occurs. ▪ The system event which is to be treated as fault 2 can be determined in the **System events** list. ▪ Relays which have already been switched by detector activations cannot indicate any system fault and are therefore not included in the list of options.
List of events	▪ Shows all system events. ▪ Mark the appropriate event by double clicking to assign a system fault.

System event	Description
Alarm archive full	▪ The unit's archive is 100% full. ▪ No more alarm data can be stored. ▪ If necessary archive the data and then release the archive..
Alarm archive 80% full	▪ The unit's archive is 80% full.
Alarm recording active	▪ The recorder is recording alarm footage from one or more linked cameras.
Block lock active	▪ The recorder's block lock is activated.
Hard disk defect	▪ The hard disk in the recorder is defective. ▪ Data recording is no longer possible.
No hard disk found	▪ No hard disk has been inserted into the recorder.

IBIS bus fault	▪ IBIS signals are not being received.
	▪ Possible causes:
	  ▪ no available signal
	  ▪ signal cannot be read or,
	  ▪ other fault.

System ready for operation	▪ The recorder is ready for operation, i.e. it is connected to the power supply and has completed the booting process..
Video signal from a camera is missing	▪ One of the cameras connected to the unit is not delivering a video signal.
Camera sabotaged	▪ One of the cameras connected to the unit has been sabotaged.
GPS fault	▪ GPS reception is disrupted. ▪ Possible causes:: GPS aerial is faulty or not installed or there is no GPS reception (e.g. in a tunnel).

4   Update & Reset, maintenance, problem analysis and technical support

4.1   Update and Reset of the device via the web interface

> **Only MR3140/3140-M, 3240, 3080 and 3180 units allow updates.**
> **NOTE: An update of the MR3040 device done by the customer is NOT possible. Please contact your system integrator or the manufacturer directly.**
>
> **The device can be returned to its factory settings with a "Reset". This can be required if the unit is no longer reachable because inappropriate parameters have been set. Please note that the WebUI is protected, if you have set a configuration password.**
>
> If the factory settings are restored the device parameters are returned to their factory settings. Apart from the network settings, (IP address, gateway and subnet mask) all previously set parameter values are overwritten.
>
> This measure should only be carried out in an absolute emergency (e.g. if the unit can no longer be reached and all physical connection faults have been ruled out (defective or faulty connectors, cables or connections)).

- Connect the unit to your PC via the LAN interface (using a patchcable).
- Switch the service-PC and the MR3140 unit on.
- Copy the update file which you have received from your system integrator/manufacturer into a folder on the service laptop.
- Start a web browser on the service laptop (IE, Firefox, etc.)
  In the browser's address line enter "http://<IP address of the recorder>"
  (e.g. "http:// 192.168.0.1") – the recorder interface will opened.
- Click on the **Firmware-Update** or **Reset** button and follow the instructions on the screen.

4.2   Maintenance, cleaning and care of the system

You have purchased a system which works largely without maintenance. Depending on the type and kind of installation it will still require external cleaning of the unit. When doing so please follow these instructions:

- Clean the external case with just a soft dry cloth.
- Under no circumstances should the unit be dipped in water.
- Never use solvents and/or cleaning fluids!
- Except for occasional function checks and cleaning of the case and the external connections no further care is necessary.

Checking the functionality of the device has to be carried out at predetermined intervals. Since this is a security system which is part of a larger security infrastructure it is subject to particular maintenance guidelines. Irrespective of these, as the manufacturer we recommend the following checks be carried out once every 6 months:

- **Check all connections, cables and plugs on the unit.**
- **Clean the case with a soft cloth (without solvent).**
- **Check the configuration with the "SystemManagement" CMS module.**
- **Check the recording with the "ImageFinder" CMS module.**
- **Check the live pictures with the "Vision" CMS module.**

The hard disk is a sensitive element of the system. To ensure continuous, problem-free function we recommend checking the disk every 3 months.

Incorporate this function check in your service plans.

4.3   Problem analysis and resolution

Problem	LED state	Root/What to do
▪ Device cannot be switched on ▪ Cameras do not deliver any pictures ▪ The camera power supply is less than 12V	Status = off	▪ Check whether all the cables are properly connected to the unit. ▪ Check whether the prescribed minimum voltage of 12V is being applied uninterrupted at the unit. (Measurement) ▪ Is the HD lock locked?
	Status = red (flashing)	▪ The unit requires repair and needs to be sent to the manufacturer. Contact the manufacturer's support unit.
▪ Ring archive is too small (ImageFinder)	Archive = red	▪ Checks the status of the alarm archive, if necessary empty it. ▪ Check whether the hard disk has been correctly inserted. ▪ Change the hard disk (beware of possible password protection) ▪ Perhaps the unit has switched itself off automatically because of excessive temperature – it will automatically come on again when the temperature reduces to below its limit.
▪ The unit cannot be reached through the network	Link = off	▪ Check if the Ethernet cable is functioning properly. ▪ Are the PC's network settings correct? ▪ Are you using a CAT 5 (min) patch cable? ▪ Have you called up the correct IP address?
▪ Recorder is not recording any video data from the cameras	HD = green	▪ Check whether the video recording is activated for the cameras (**SystemManagement**, factory setting = all cameras active). ▪ When using **MotionDetection and Sabotage detection**: if necessary reduce the motion detection level. ▪ Is there a HD/SSD in the unit? If necessary put one in. Check the seating of the hard disk.
	HD = red	▪ Has the hard disk been swapped? Perhaps the HD is password protected! Check and format the HD in the TTU. ▪ No recording from IP cameras: the camera is password protected – set up access without login data (guest account)
▪ Video data are not in 2CIF format (field)	---	▪ Check the configuration in **SystemManagement** and change it if necessary.

4.4   Technical support by the manufacturer

If you have questions about your DResearch product we recommend that you first read through the product documentation. You have purchased a top quality product which generally works without servicing. The units are tested several times by DResearch in the test laboratory in order to supply you with a perfect, flawless product. If your unit suddenly does not work perfectly please first ensure that other sources of error can be definitively ruled out.

Please check carefully before making the support inquiry:

- Have you followed all the advice in the manual?
- Are all the plugs and sockets properly and firmly connected to the unit?
- Can the recorder be switched on?
- Are you absolutely sure you have ruled out all other sources of error?

If you need technical support please contact our support team by email (*support@dresearch.de*) giving them the following information:

- Precise name and serial number of the device.
  The serial number is on the bottom of the device. Without the serial number the support request cannot be processed.
- Invoice number / Delivery note number
- What firmware version is your MR3140 using? (To find the firmware version go to the setup menu and open the **Version** dialogue box.)
- What version number of the **Central Monitoring Software** are you using? Details of this will be found on the title page of the launcher.
- What operating system are you using?
- At what point or in what application does the problem or error report occur? Please note down the exact wording of the error message displayed.
- A description of the problem and what actions were being performed before the problem appeared.

Our support team will process your request as quickly as possible and assist you in resolving the problem.

> **If it is necessary to return an item this is always to be negotiated with the manufacturer beforehand. Only pre-agreed returns are processed. You will be provided with a special (RMA) code before you return the shipment.**
>
> **The manufacturer takes no responsibility for any damage incurred during transportation or for the costs of transportation insurance.**
>
> **No 'cash on delivery' or 'carriage forward' shipments will be accepted.**

5   Technical data

Dimensions	
Dimensions (H x B 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 % (not condensing)

Mechanical loading	
Vibration (operation)	1 G (5 – 500 Hz)
Shock (all axes)	3 G

Electrical connected load			
Parameter	**minimum**	**typical**	**maximum**
Power supply	+ 12 V DC	+ 24 V DC	+ 32 V DC
Power consumption (without cameras)			18 W
Power consumption (inc. cameras)			40 W
Power supply to cameras	12 V/1.5 A		

Digital Video Subsystem			
Parameter	**minimum**	**typical**	**maximum**
Picture storage rate @ PAL			25 pictures/s
@ NTSC	1		30 pictures /s
Picture storage rate IP cameras	1	50 pictures /s	200 pictures /s
Max. storage duration	48 hours with 4 pictures /s and 160 GB hard disk		

Video interfaces	
Video inputs	
Connectors:	BNC
Number:	4 x BNC, composite (PAL/NTSC)
Resolution:	analogue: CIF, 2CIF digital: data from IP camera, dynamic control of frame rates depending on load 8 Bit Luminance, 8 Bit Chrominance
Impedance:	75 Ohm
Signal level (peak-peak):	1 V +/- 3 dB
Video output	
Connectors:	BNC
Number:	2 x BNC, composite (PAL/NTSC), same signal
Output:	1 x video source, quad view, video switching of all cameras
Impedance:	75 Ohm
Signal level (typical, peak-peak):	1 V

Audio interface	
Audio input	
Connectors:	D-Sub-9 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	
Connectors:	D-Sub-25-socket (female)
Number:	6
Input level:	Low: 0 ... 3 V High: 6 ... 34 V
Ingnition input	
Number:	1 (differential)
Differential input levels:	Low: 0… 3V High: 6... 34V
Digital outputs	
Connectors:	D-Sub-25-socket (female)
Number:	4 Relay (SPDT)
Capacity:	60 V DC, 125 V AC, 500 mA

Picture data transmission		
Communication links	**Transmission rate**	**Bandwidth**
LAN/Ethernet	25 pictures/s	100 Mbit/s
WLAN	25 pictures/s	54 Mbit/s

Other interfaces	
RS232	D-Sub-9-socket (male)
RS485:	D-Sub-25- socket (male)
IBIS	D-Sub-25- socket (male)
LED	4 (Status conditions: off, red, yellow, green)

6   Technical drawing

Demo Version

Freiraum zum Entnehmen
des Einschubes = 175mm
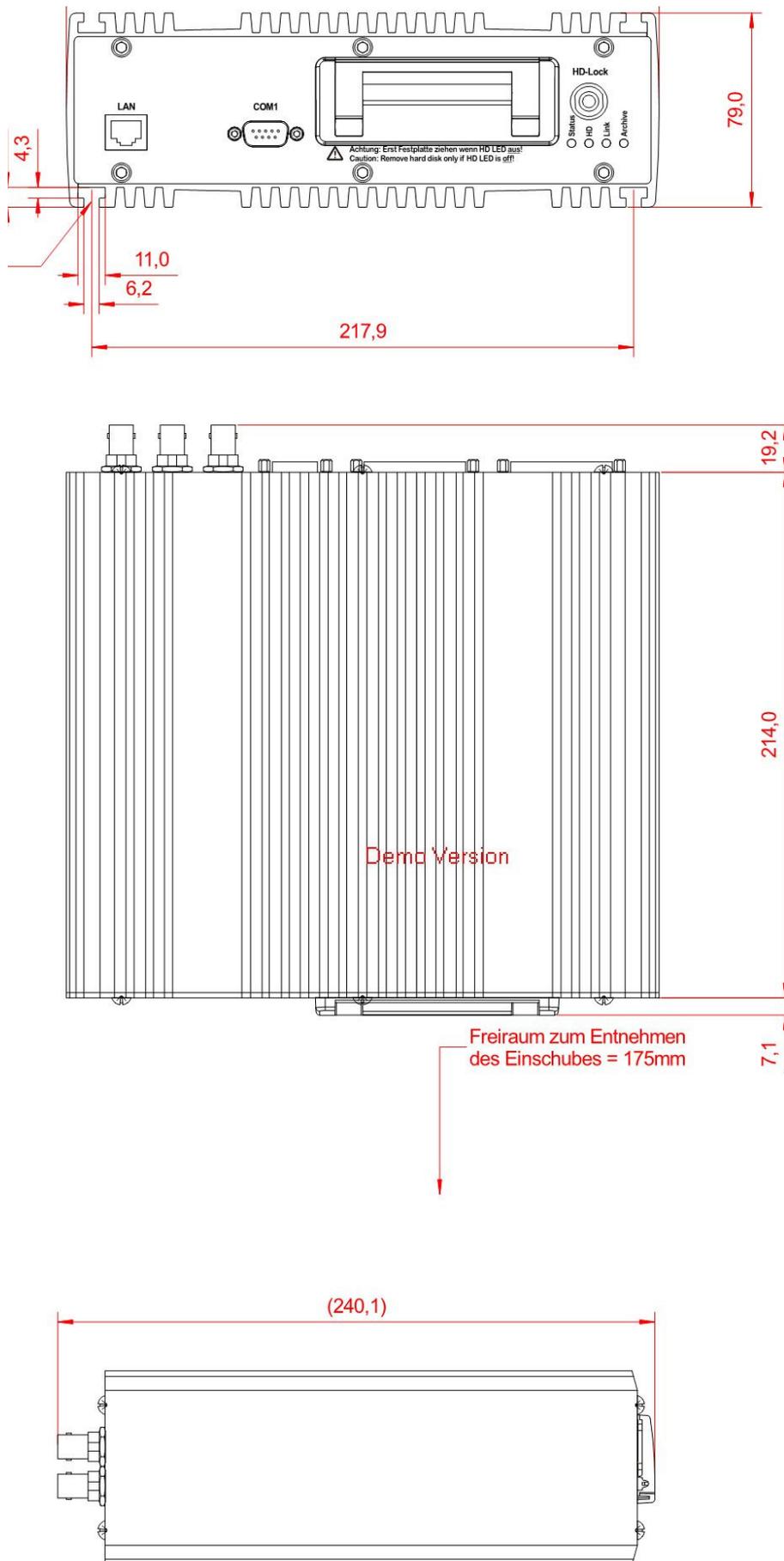
7   Abbreviations

AC/DC	Alternating Current/Direct Current
CAN	Controller Area Network
CIF	Common Intermediate Format
CMS	Central Monitoring Software
CMU	Central Monitoring Unit
DSL	Digital Subscriber Line
EMC	Electromagnetic Compatibility
GPI	General Purpose Input
GPIO	General Purpose Input/Output
GPS	Global Positioning System
HD	Hard Disk
HDD	Hard Disk Drive
IBIS	Integrated on-Board Information System
ISDN	Integrated Service Digital Network
LAN	Local Area Network
LED	Light-emitting Diode
NTSC	National Television Standards Committee
PAL	Phase Alternated Line
RMA	Return of Material Authorization
RMC	Rail Media Coupler
SMS	Short Message Service
SPDT	Single-Pole Double Throw
TTU	TeleObserver Transfer Unit
UMTS	Universal Mobile Telecommunications System
UPS	Uninterruptible Power Supply
UTC	Universal Time Code
WLAN	Wireless Local Area Network

Annotations: