danelec
M A R I N E

Operator's Manual
for DM100 VDR and DM100 S-VDR G2

Document Number	DBS11011
Version Number	2.0
Date	June 2019
P/N (hard copy)	9302721-20

Revision record

Version	Date	Description
1.0	April 2014	Original issue of document
1.1	May 2014	Minor revision
1.2	June 2014	Minor revision
1.3	May 2016	Update of error text for error 054 and 184
1.4	September 2018	Description of Remote Audio Interface included. Description new features and changes related to software release 1.60.
2.0	June 2019	Information related to DM100 S-VDR G2, included

Contents

1 Scope and purpose

Operator's Manual for DM100 VDR and DM100 S-VDR G2.
The DM100 VDR complies with IEC 61996-1 Ed.2 which applies to VDRs installed from 1st of July 2014.
The DM100 S-VDR G2 complies with IEC 61996-2 Ed.2, however with changes required by IEC 62288 Ed.2 and IEC 61162-450 Ed.2.

1.1 References

DBS10704   Installation Manual for DM100/DM400 VDR compact Sensor Interface Unit
DBS10956   Installation Manual for DM100 VDR and DM100 S-VDR G2
DBS11010   Inspector's and Authorities' Manual for DM100 VDR and S-VDR G2
DBS10919   Installation Manual for Remote Video Interface with PoE RVI 02-004, RVI 02-004D
DBS00327   Installation Manual for DM100/DM400 modular Sensor Interface Unit

1.2 Terms and Abbreviations

BCP   Bridge Control Panel
BMU   Bridge Microphone Unit
DAU   Data Acquisition Unit
DPU   Data Processing Unit (located inside the DAU)
OPT   Operational Performance Test (self-test according to IEC 61996-1 Ed.2)
SIU   Sensor Interface Unit
RVI   Remote Video Interface
RAI   Remote Audio Interface
NAS   Network attached storage (option used for external extended backup)

1.3 Nomenclature

The term "VDR" will be used a generic term which covers both the DM100 VDR and DM100 S-VDR G2. When required, the full product names "DM100 VDR" and "DM100 S-VDR G2" will be used to distinguish between the products.

2 System overview for DM100 VDR

Ethernet PoE
STP CAT5

Fixed
Capsule

Ethernet PoE
STP CAT5

DAU

Float-free
capsule

Ethernet PoE
STP CAT5

BCP

Ethernet STP
CAT5/CAT6

Images from
RADAR and ECDIS

BMU

Ethernet PoE
STP CAT5

Optional
Remote
Video I/F

6 x BMU

VHF   Serial inputs (12)
e.g. GPS

Ethernet
STP CAT5

Video inputs (2)
Analog or DVI from
e.g. RADAR

SIU

Serial inputs (8)   Analog inputs (8)   Digital inputs (64)

DM100 VDR System overview (typical configuration)

2.1.1 Data Acquisition Unit (DAU)

The Data Acquisition Unit contains the Data Processor Unit (DPU). The DAU must be installed indoors in the proximity of the bridge.

2.1.2 VDR Bridge Control Panel (BCP)

The BCP must be installed on the bridge; either in a console or mounted on a bulkhead. The BCP is the interface for the VDR Operational Performance Test, which must be carried out regularly. VDR system errors will also be shown here as a caution (steady yellow light).

2.1.3 Bridge Microphone Units (BMU)

A number of BMUs must be installed on the bridge (console, ceiling or bulkhead mounted). Watertight outdoor BMUs for the bridge wings are available.

2.1.4 Fixed capsule

The fixed data capsule ("the orange box") must be installed on an "external deck close to the vessel's center line" - typically on the external deck above the bridge.

2.1.5 Float-free capsule

The float-free capsule is an additional data capsule which is required according to IEC 61996-1 ed2.0. It must be installed in the same way as an EPIRP.

2.1.6 Remote Video Interface (RVI)

The RVI is optional equipment. An RVI may be used to capture video from, for example, a RADAR which is unable to send images to the VDR using Ethernet; i.e. typically older equipment. The RVI must be installed indoors, normally close to the RADARs. It must be connected to the DAU with a cable which may be up to 100m in length.

2.1.7 Sensor Interface Unit (SIU)

The SIU is optional equipment. An SIU is needed if, for example, door status cannot be provided using a serial or Ethernet interface on the VDR.
A standard non-modular compact SIU has 8 serial interfaces, 8 analog interfaces and 64 digital interfaces. A modular SIU also exists which can be configured to have other combinations of interfaces. The SIU must be installed indoors. It must be connected to the DAU with an Ethernet cable up to 100m long.

2.2 System overview for DM100 S-VDR G2

The requirements for recorded data types for an S-VDR are reduced compared to a VDR. The typical S-VDR installation is therefore simpler.
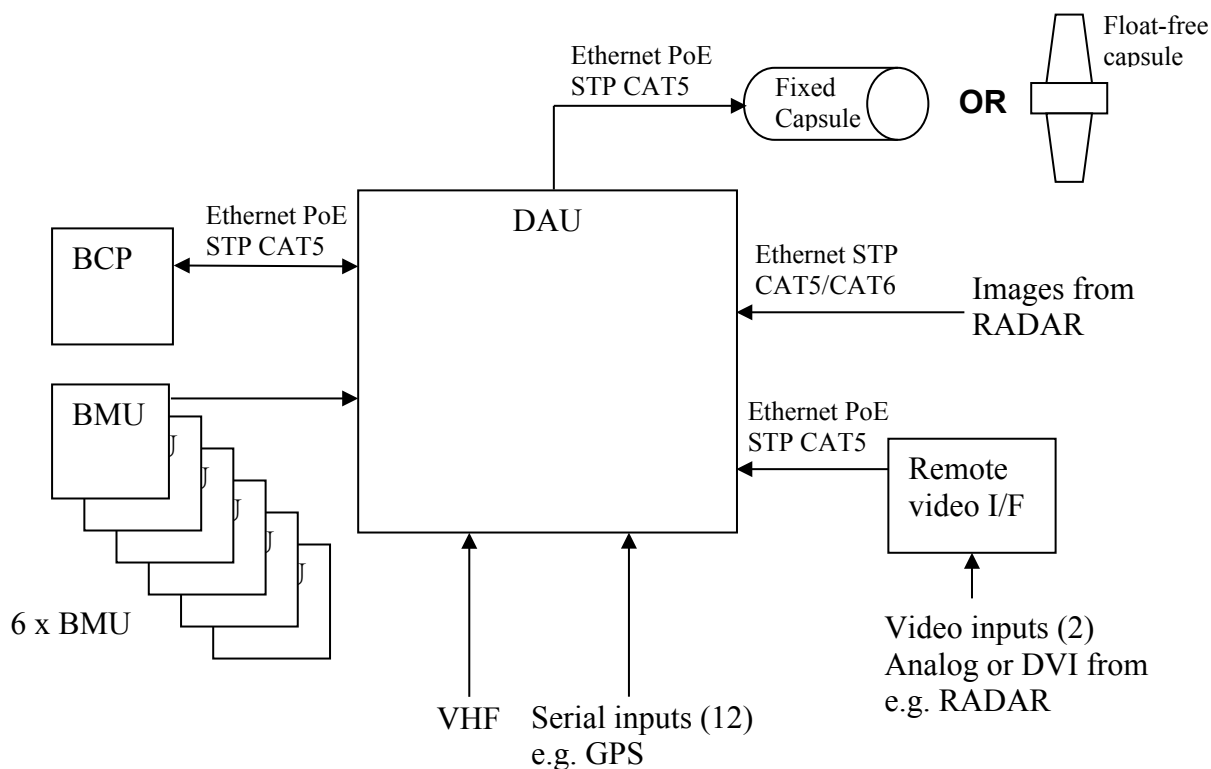
DM100 S-VDR G2 System overview (typical configuration)

2.3 Maximum number of supported interfaces

If needed, additional equipment may be used to make larger or non-standard configurations. The maximum number of supported interfaces for a DM100 VDR and a DM100 S-VDR G2 is listed below:

Type of input	Maximum configuration
Ethernet interfaces*	7 on DAU
Serial inputs	36 (12 on DAU + 3 modules)
Analog inputs	32**
Digital inputs	128**
Audio inputs	18 (10 on DAU + 8 on RAI)
Video inputs	8

* For configuration of the VDR, acquiring network data and acquiring image data.

** VDR core inputs on SIUs. There is not limit for number of digital and analog input on RDIs

3 Operation

3.1 Bridge Control Panel

The BCP is the primary user interface for an installed operational VDR. It serves two purposes:

- Alert (caution) display
- Interface for initiating VDR self-test (Operational Performance Test)

3.1.1 Alert display

The VDR will generate an alert message (caution) if a system error is detected. An alert message will be displayed on the BCP and the yellow caution indicator will be illuminated. No audible alert will be generated and alerts should not be acknowledged. When the cause of error is resolved, the alert message will be cleared and the caution indicator turned off.

3.1.2 Self-test – Operational Performance Test

An Operational Performance Test (OPT) of the VDR must be carried out regularly, and always after service and maintenance, which may affect the operation of the VDR. An OPT is best done while the vessel is en route and all navigation equipment is switched on. A service agent must be contacted if the OPT report shows problems which cannot be fixed by the master on the vessel. Click on "F2" and follow the instructions in order to carry out an OPT.

3.1.3 Setting the display brilliance level to default

Pressing the DIM bottom for 5-7 seconds will restore the display brilliance level to default.
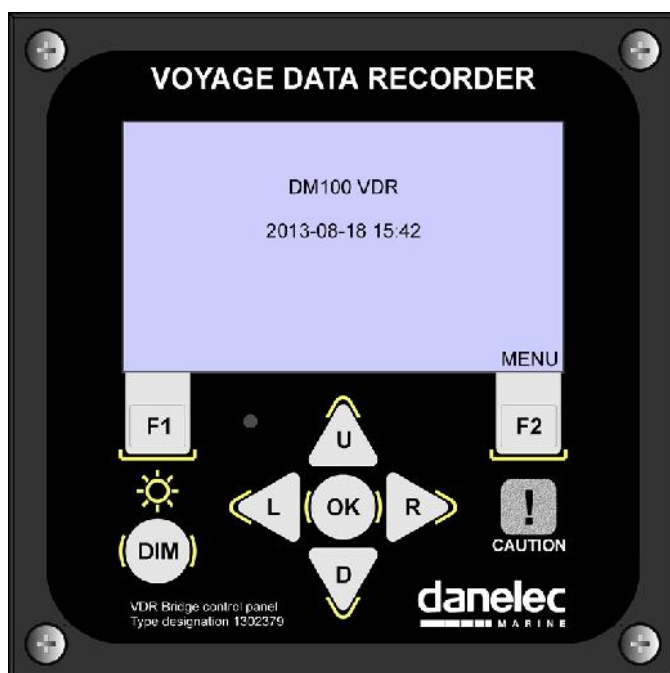
3.1.4 Download of VDR data to USB stick

Insert a USB stick in one of the USB ports on the DPU. The USB stick must be formatted with a file system supported by Windows 7 or 10 (FAT32 or NTFS).

On the BCP go to "Menu->Download data to USB disk" and press "OK".

Two options are possible:
- Download of VDR data (download of latest VDR data, duration is user-selectable).
- Save dump for support (download of data which may be used for troubleshooting).

3.2 Operation of the DM100 DAU

The door to the DAU must be locked after the VDR has been installed and is operating normally. This section of the manual is only relevant during installation and service.
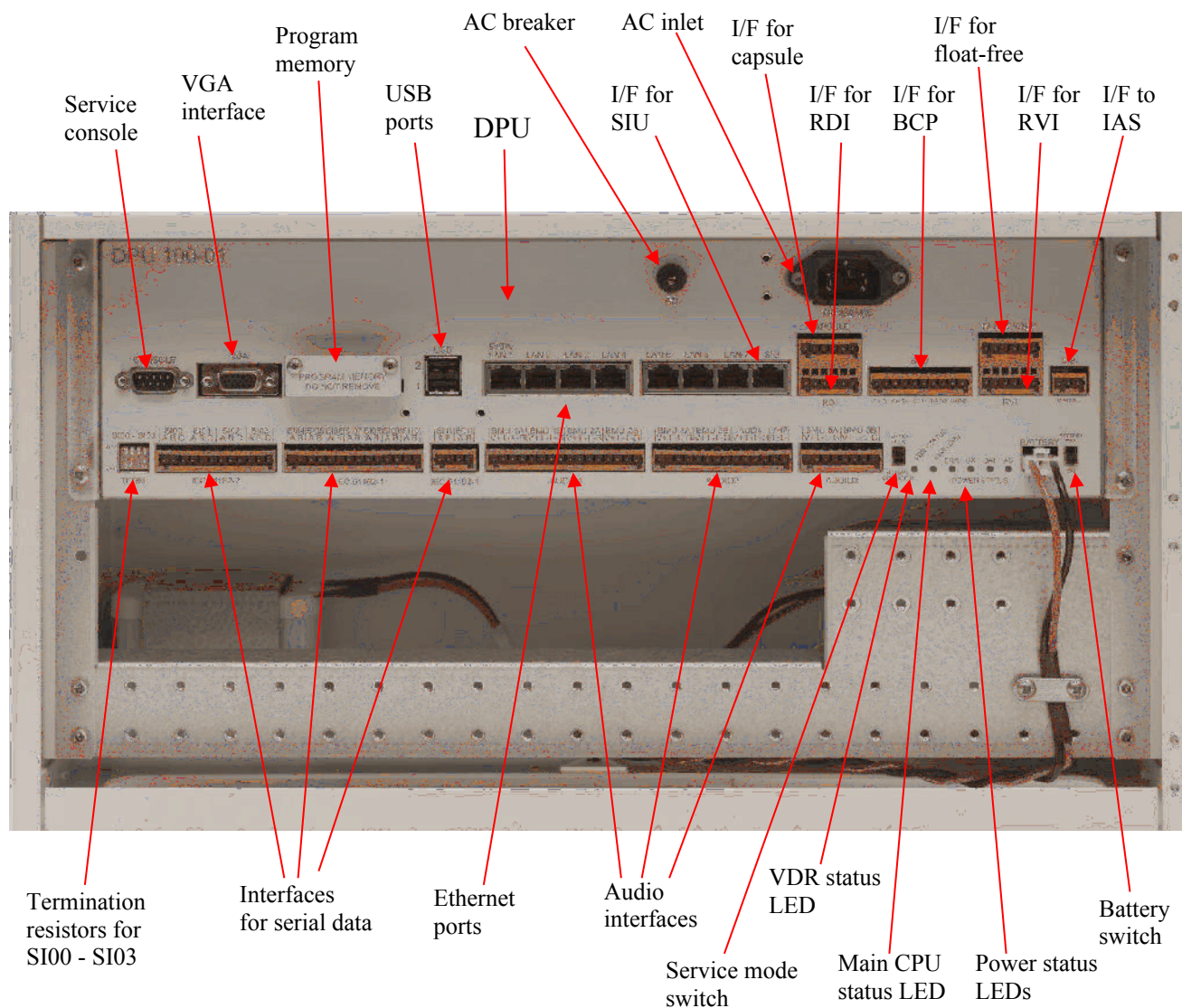
3.3 Data Processing Unit (DPU)

The DPU is the main computer in the system. It is basically a PC, but it has been designed from scratch in a completely different manner in order to withstand environmental stress, which far exceeds what an ordinary industrial PC can tolerate.

3.3.1 Power LEDs

BAT LED (blue)

Steady light	Battery fully charged	OK
Blinking (1Hz)	Charging battery	OK
Blinking (5Hz)	Battery is not detected	Error
Off	The battery switch on the DPU is "OFF"	(Error)

AC LED (blue)

Steady light	AC power OK	OK
Off	AC power failed	Error

ERR LED (red)

Steady light	The internal power control circuit has failed	Error
Off	The internal power control circuit is operating	OK

OK LED (blue)

Steady light	Power to DPU present	OK
Off	No power to the DPU	Error (note 1)

3.3.2 AC breaker

The AC breaker is a combination of a fuse and a manually operated switch, i.e. it can be used to manually switch off the AC power sources, but it will also pop out automatically if too much current is being drawn from the power source or if overvoltage is detected.

Warning: The AC breaker must be released (popped out) and the battery switch on the front of the DPU must be in its "OFF" position in order to switch the unit fully off.

3.3.3 AC inlet

The main power source for the VDR is the ship's AC (110V-230V).

3.3.4 Battery switch

The battery switch indirectly controls a relay between the DPU and the battery pack. When switching the VDR off; do the following: Pop out the AC breaker and briefly move the battery

switch to its "OFF" position. Move the battery switch back to its "ON" position after the VDR has been turned off.

3.3.5 VDR status LED

The status of the system is displayed using a tri-color LED. The BCP will display text messages and error codes explaining the problem(s) if the LED becomes yellow or red.

VDR status LED (tri color)

Steady green	The information displayed is just information	OK
Steady yellow	The information displayed is a warning. The system is still fully operational but may fail soon. Contact a service agent if the problem cannot be rectified.	(OK)
Steady red	The information displayed contains information about system errors which prevent normal operation. Contact a service agent if the problem cannot be rectified.	Error

3.3.6 Main CPU LED

The main CPU LED is controlled by the power control circuit which will become active as the first circuit after power is applied. The power circuit uses the LED to show information about the main CPU.

OFF	The power circuit has not started yet – this should take a few seconds only.	(OK)
Green 1Hz	The power circuit is waiting for the main CPU to start (boot load) – may take up to two minutes	(OK)
Steady green	The main CPU is operating normally	OK
Steady red	The main CPU is not responding	Error

3.3.7 LEDs in the Ethernet connectors

Two LEDs are integrated into each Ethernet connector. The left LED will be illuminated when a communication link is established and shows the speed (yellow = 100Mbit/sec, green = 1000Mbits/sec). The right LED (green) will be illuminated when a communication link is established and will flicker depending on the traffic load.

4 Operation of the non-modular compact SIU
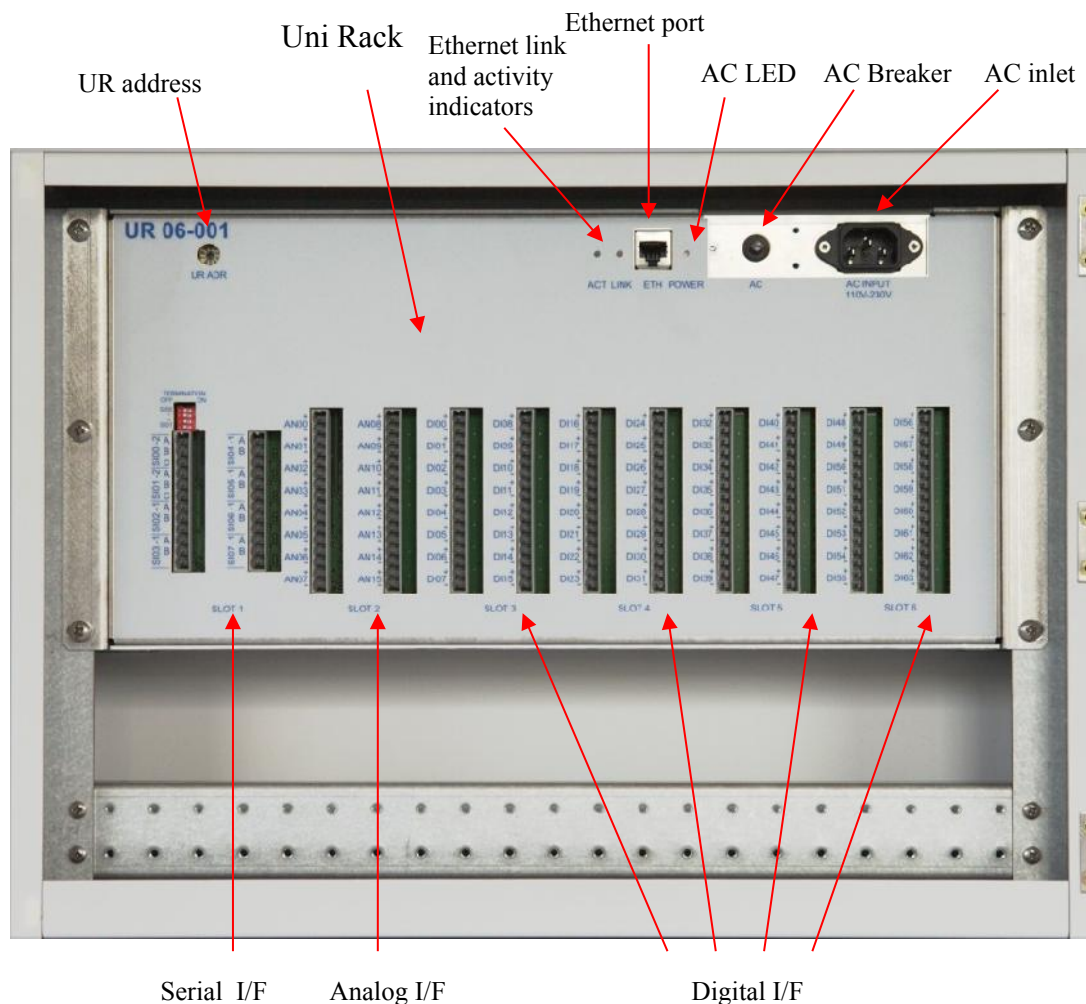
Uni-rack with 16 analog interfaces

4.1 LEDs on the Uni-rack

4.1.1 AC LED

Indicates the power (AC) is present.

4.1.2 AC breaker

The AC breaker is a combination of a fuse and a manually operated switch, i.e. it can be used to manually switch off the power source, but it will also pop out automatically if too much current is being drawn from the power source.

4.1.3   Ethernet link and activity indicators

The LINK LED (right) will be illuminated (yellow) when a communication link is established to the DAU. The ACT LED (left) will flicker (green) depending on the traffic load.

4.1.4   UR address

Must be set to "0" for the first SIU, and "1" for an additional second SIU.

5 Operation of the modular SIU

Module Rack with six modules

5.1 LEDs on Module Rack

5.1.1 AC LED

Indicates the power (AC) is present.

5.1.2 Link indications

Indicates that the Module Rack has detected a module in the corresponding slot.

5.1.3 AC breaker

The AC breaker is a combination of a fuse and a manually operated switch, i.e. it can be used to manually switch off the power source but it will also pop out automatically if too much current is being drawn from the power source.
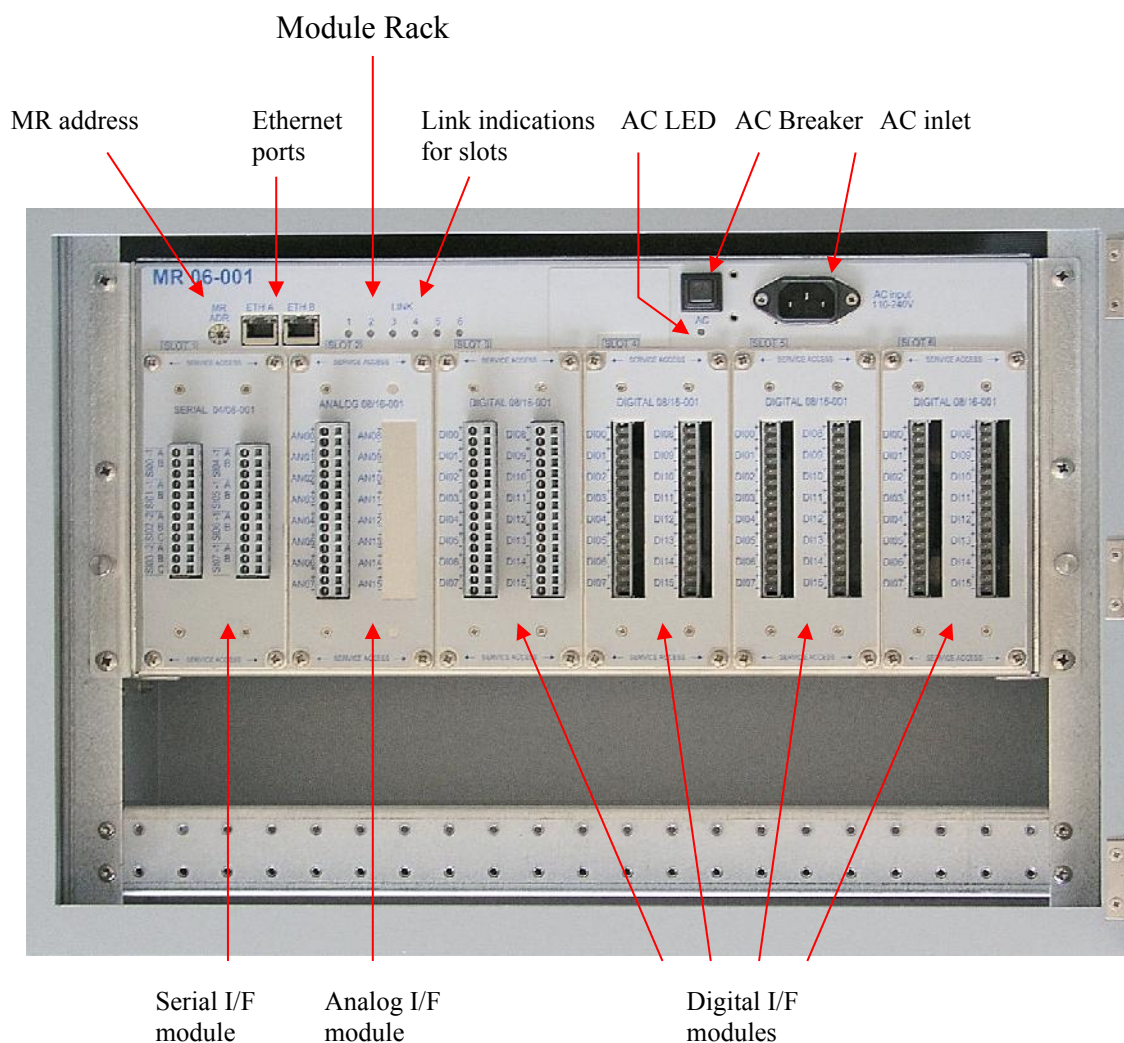
5.1.4   LEDs in the Ethernet connector

Two LEDs are integrated into each Ethernet connector. The right LED (yellow) will be illuminated when a communication link is established to the DAU. The LED will flicker depending on the traffic load. The left LED is not used. Please notice that the behavior of the LEDs is different from other parts of the system; for example the DAU.

5.1.5   Allocation of system labels for digital interfaces

	Card number in VDR configuration	Interface number in VDR configuration and VDR Explorer
Digital I/F module in Slot 3	1	DI00 – DI15
Digital I/F module in Slot 4	2	DI16 – DI31
Digital I/F module in Slot 5	3	DI32 – DI47
Digital I/F module in Slot 6	4	DI48 – DI63

5.1.6   MR address

Must be set to "0" for the first SIU, and "1" for an additional second SIU.

6 Operation of standard RVI 02-004 and RVI 02-004D (PoE)

The DM100 may use RVI 02-004 and RVI 02-004D for image capture. The DM100 will power RVIs connected to the RVI or RDI port on the DAU. An RVI may be connected to a LAN port on the DAU if the RDI and RVI ports on the DPU are being used for other purposes. An AC power kit (p/n 2304449) will be required as the power source.

RVI 02-004

RVI 02-004D
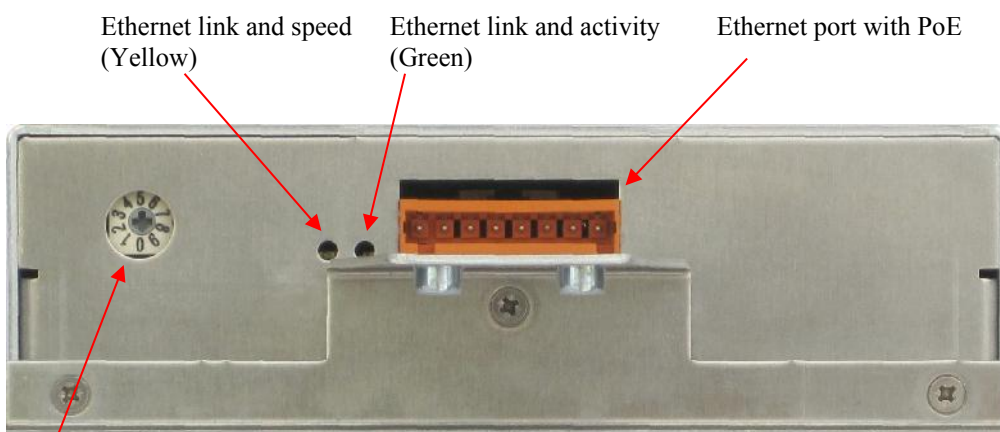
RVI 02-004(D) rear panel

The RVI address i.e. the rotary switch located behind the rear panel. Must be set to "0" for RVIs connected to the PoE ports on the DPU (labeled "RVI" or "RDI").
The RVI address must be set from 1 to 4 for locally powered RVIs (each locally powered RVI connected to the DM100 must have a unique RVI address).

7 Operation of the RAI

For some installations, a Remote Audio Interface is used for capturing additional audio signals from microphones and/or VHF sets.

RAI 08-001
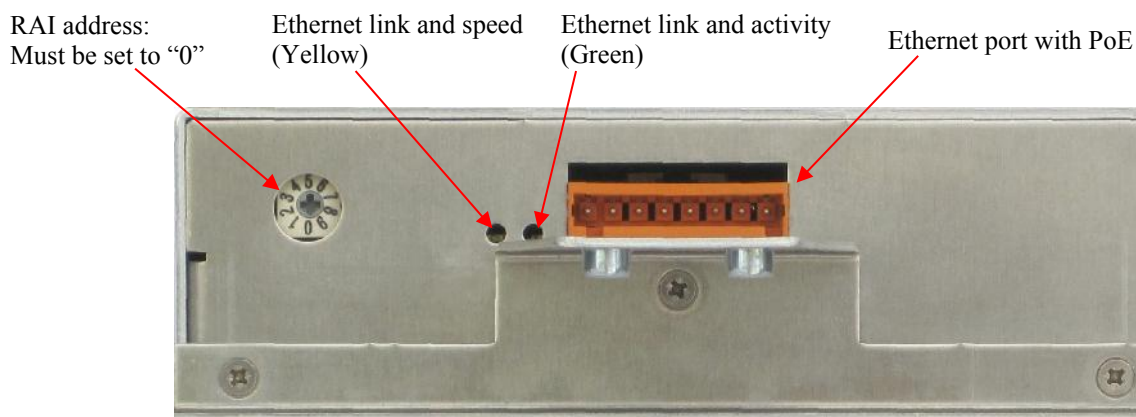
RAI 08-001 rear panel

8 Error codes

Error codes and messages will be displayed by the BCP.

8.1 Error codes

004	SYSTEM FATAL ERROR	The VDR has encountered an unrecoverable system error. Reboot the system. If the error persists, the most probable cause is a defective CPU board or defective system RAM
036	CONFIG Unable to save	The VDR was unable to save the configuration. Please retry. This error is only expected to occur during configuration (installation) of the system
042	CONFIG Configuration failed	The VDR is unable to find any configuration at all. Replace the compact flash in the DPU (a properly made boot flash contains a default configuration from which the system can start). Restore a backup of the configuration.
054	PSU Running on battery	The system is running on battery. Both the main power and the emergency power are absent. If there is a general power failure on the vessel, ignore this message; otherwise check the power supply in the DAU. Consult section 3.2 for details.
056	AUDIO Microphones failed	The microphone test failed. Force a microphone test (this is a feature on the BCP). This test will reveal which microphone is causing the problem. Check that the "BMU active" checkbox is unchecked for non-existing microphones. Check the cable for microphone(s) reported as faulty. Test the inputs on the audio interface module with a spare microphone. Replace microphones which are reported faulty if no other error is discovered.
058	AUDIO Power short circuit	One or more microphones are using too much power. The cabling and microphones must be checked.
060	STATUS UTC timeout	The system is not receiving UTC from the GPS. Check that GPS is on. Check the signal from the GPS (use serial monitor in VDR explorer, WEB status or VGA status display). If no signal is present check the cable. Otherwise check that the configuration has been done correctly.
062	UTC time from GPS jumped (go to menu)	UTC time from the GPS has changed unexpectedly (at least two hours) from current system time and is not accepted for VDR sync. Check that the UTC time of the VDR matches the UTC you would expect, using an external time source. If not inspect the data on the configured UTC port to make sure that it is indicating the correct UTC. If the UTC time from the GPS is correct; you can accept its value and clear this alert from the BCP menu.
063	VDR not synchronized to UTC time from GPS	UTC from the GPS differs by more than 2 seconds from current system time. The VDR will synchronize within 2 minutes, if the UTC differs by less than 2 hours from the system time. If UTC time of GPS is correct; you can accept its value and clear this alert from the BCP menu.
070	PSU Communication failed	The communication between the power supply circuit and the main CPU in the DPU has been interrupted. If the error persists,

		the DPU is probably defective.
074	SERIAL module 1 Missing (SI00-07)	The serial data interface module on the SAP board in the DPU cannot be detected. If the error persists, the DPU is probably defective.
076	RVI VIDEO module 1 Missing	VIDEO module 1 cannot be detected. The most probable cause is that the cable to the RVI from the DPU is disconnected or the RVI is defective. In addition, for an AC powered RVI: Power to the RVI is switched off, the internal Ethernet cable in the RVI is disconnected or the video interface module is defective.
078	AUDIO module 1 Missing (BMU1-BMU5)	The audio data interface module on the SAP board in the DPU cannot be detected. If the error persists, the DPU is probably defective.
081	NETWORK IMAGE Duplicate Location	More than one source (e.g. an ECDIS) is sending images with the same Location ID. Inspecting the received images using the monitor tool in the VDR configurator may help. Check the setup of sources which are sending images to the VDR
083	NETWORK IMAGE From 'new' Location	A source (e.g. an ECDIS) is sending images with "Location ID" marked as 'new', i.e. the source has not been configured correctly yet. Inspecting the received images using the monitor tool in the VDR configurator may help locate the source.
087	IMAGE Too big images	The combined size of the received images exceeds the allocated space in a record. Use the "Analysis of recorded data" utility on the BCP or in the configurator tool to determine the cause. If the problem relates to image data, carry out an OPT and check the recorded images.
090	FIXED CAPSULE Wrongly connected	The fixed capsule is working properly; but it is not connected to connector on the DAU labeled "CAPSULE".
092	FLOAT-FREE Wrongly connected	The float-free is working properly; but it is not connected to connector on the DAU labeled "FLOAT FREE".
096	Not configured Configure VDR	The VDR has started up using the default configuration. Configure the system correctly. The VDR is unable to operate correctly using the default configuration since at least the GPS antenna position and vessel ID must be entered.
108	VIDEO module 1 Not started	The VDR could not detect the video module in RVI#1 following system startup. The most probable cause is that the power to the RVI is switched off, the cable to the RVI from the DPU is disconnected, the internal Ethernet cable in the RVI is disconnected or the video interface module is defective.
110	AUDIO module 1 Not started	The audio data interface module on the SAP board in the DPU cannot be detected following system startup. If the error persists, the DPU is probably defective.
112	SERIAL module 1 Not started	The serial data interface module on the SAP board in the DPU cannot be detected following system startup. If the error persists, the DPU is probably defective.
117	PSU battery Battery switch "OFF"	The battery switch on the front of the DPU is in the "OFF" position.
118	PSU battery Not present	The power supply is unable to detect the battery pack. Check that the battery pack is connected to the DPU. If the error persists for

		more than five minutes, the batteries are probably defective.
120	PSU battery Could not be charged	The charger was unable to fully charge the battery within a pre-defined time. Switch the battery switch on the DPU to "OFF" briefly and then to "ON". If the error returns (this may take 18 hours), the battery pack is defective and must be replaced.
124	PSU Low output voltage	The output voltage from the battery pack has dropped below 16V. This message will appear shortly before the battery is discharged when the VDR is operating from the battery only. This message will not appear if the battery pack is new and was fully charged, since the VDR will power down automatically after two hours when operating from the batteries (well before the voltage drops below 16V). If AC power is present (and the AC fuse/breaker is pushed) while this error is displayed, the DPU must be repaired.
128	AUDIO module 2 Missing (AUD6-AUD9)	This will only happen if audio module 2 (the Remote Audio Interface) is enabled in the VDR configuration. Check the cable to the Remote Audio Interface.
130 132 134	xxxxxx Module duplicate	xxxxxx = SERIAL, VIDEO, AUDIO Two modules with identical system locations have been detected. Restart the system. If the error persists, check the installation and the VDR configuration.
136 138 140 142 144	xxxxxx Wrong rack type	xxxxxx = SERIAL, ANALOG, DIGITAL, VIDEO, AUDIO A module is located in a rack (DPU, SIU or RVI) where it is not supposed to be. Check the installation.
146	AUDIO module 2 Not started	This will only happen if audio module 2 (the Remote Audio Interface) is enabled in the VDR configuration. Check the cable to the Remote Audio Interface.
148	SERIAL Module in wrong slot	The VDR configuration is not consistent with the physical configuration of the VDR; for example, an additional serial module is not installed in the slot which is specified in the VDR configuration.
150	AUDIO Module in wrong slot	The VDR configuration is not consistent with the physical configuration of the VDR; for example, the additional remote audio interface is not connected to the port on the DPU which is specified in the VDR configuration.
152	VIDEO Module in wrong slot	The VDR configuration is not consistent with the physical configuration of the VDR; for example, the additional remote video interface is not connected to the port on the DPU which is specified in the VDR configuration.
160	EXTERNAL BACKUP Not recording	The system is unable to record data to the extended external backup disk (NAS). If no other relevant errors e.g. #162 are displayed, the NAS is probably defective.
162	EXTERNAL BACKUP Cannot find	The communication to the extended external backup disk (NAS) has been interrupted. Check that the extended external backup disk is installed correctly (e.g. is the LAN cable connected to DPU). Reboot system. If the error persists, the most probable cause is a

		defective/misconfigured NAS.
170	AUDIO Recording muted	Recording of audio has been stopped due to manual intervention
172	NETWORK Data Accumulated Excess	Too much network data is being transmitted to the VDR. Network data in this context does not include image data. Try to determine what is wrong using the VDR Explorer i.e. check what has been received on NI200 – NI215
180	SYSTEM In Service Mode	The VDR is in service mode. It is possible to make changes to the VDR configuration. When this is done, the mode switch on the DPU front must be set to position "Normal operation".
182	BCP Communication error	The DPU is unable to communicate with the Bridge Control Panel. Check the cable from the DPU to the BCP. Reboot the system. If the error persists, the most probable cause is a faulty cable or BCP.
184	BAM BAM comm. timeout	The communication to the Bridge Alert Management system has been interrupted.
190	DPU CPU fan failed	The primary fan in the DPU has failed. The secondary fan in DPU will serve as a backup until the problem is rectified. The VDR will be able to operate normally unless the secondary fan also fails (error 191). This problem must be rectified latest at the next APT.
191	DPU Backup fan failed	The secondary fan in the right side of the DPU has failed. This is only a major problem if the primary fan has also failed (error 190).
300-307	SERIAL Timeout on SIxx	Mandatory serial data is not being received. Check that the source is on. Check the signal from the source (serial monitor in VDR explorer, WEB status or VGA status display). If no signal is present check the cable and make sure that the configuration is correct.
320-335	NETWORK Channel Timeout on NI2xx	Mandatory network data is not being received on channel NI2xx. Check that the source is switched on and active, check the cable and that the VDR configuration is correct.
360-375	NETWORK Channel Excess Data on NI2xx	Too much network data is currently being received on channel NI2xx. Check that the source is operating correctly. The VDR Explorer may be used to monitor the data.
400-431	SERIAL Timeout on SIxx	Mandatory serial data is not being received. Check that the source is on. Check the signal from the source (serial monitor in VDR explorer, WEB status or VGA status display). If no signal is present check the cable and make sure that the configuration is correct.
441	SERIAL module 2 Missing (SI08-12)	For a DM100, the second serial module is integrated on the SAP board in the DPU. The most probable cause is that the SAP board in the DPU is defective.

442	ANALOG module 1 Missing (AN00-15)	**If only one module is affected:** A module has been removed or has failed. Check that the module is installed correctly. If installed in a modular SIU the blue "link" LED for the module must be illuminated. If the LED is already illuminated switch the power to the SIU off and on. If the error persists replace the module. **If all modules in a SIU are affected:** Check the power to the SIU. Check the cable from the SIU to the DAU and link status; see section 3.3.7, 4.1.3 and 5.1.4. If no error is found, try to restart both the DAU and the SIU (power off and then on) If the error persists, the DPU or the Module rack/Uni rack is probably defective.
443	DIGITAL module 1 Missing (DI00-31)	
444	DIGITAL module 2 Missing (DI16-31)	
445	DIGITAL module 3 Missing (DI32-47)	
446	DIGITAL module 4 Missing (DI48-63)	
450-452	SIU xxxxxxx Module in wrong slot	xxxxxxx = SERIAL, ANALOG, DIGITAL A module has been misplaced. Modules must be installed according to the VDR configuration.
460-462	SIU xxxxxxx Wrong MR address	xxxxxxx = SERIAL, ANALOG, DIGITAL A SIU with the wrong Module Rack address has been detected. Set the MR/UR address to 0 or 1. See section 5.1.6
470-472	SIU xxxxxxx Module duplicate	xxxxxxx = SERIAL, ANALOG, DIGITAL The VDR has detected two different modules with the same MR/UR address and slot number. This may occur if two SIUs are connected to the DAU, with the same address.
480	VIDEO Illegal settings	Recording of radar images to the FRM has been disabled which is unacceptable for a DM100 VDR installation. The system configuration must be changed, consult the Installation Manual.
482	RVI VIDEO module 2 Missing	VIDEO module 2 cannot be detected. The most probable cause is that that the cable to the RVI from the DPU is disconnected or the RVI is defective. In addition, for an AC powered RVI: Power to the RVI is switched off, the internal Ethernet cable in the RVI is disconnected or the video interface module is defective.
484	RVI VIDEO Wrong RVI address	An AC powered RVI with incorrect RVI address has been detected. The RVI address must be 0 or 1. All RVIs connected to the VDR must be set up in the VDR configuration.
486	RVI VIDEO Module 3 missing	VIDEO module 3 cannot be detected. The most probable cause is that that the cable to the RVI from the DPU is disconnected or the RVI is defective. In addition, for an AC powered RVI: Power to the RVI is switched off, the internal Ethernet cable in the RVI is disconnected or the video interface module is defective.
488	RVI VIDEO Module 4 missing	VIDEO module 4 cannot be detected. The most probable cause is that that the cable to the RVI from the DPU is disconnected or the RVI is defective. In addition, for an AC powered RVI: Power to the RVI is switched off, the internal Ethernet cable in the RVI is disconnected or the video interface module is defective.

500	ANALOG module 2 Missing (AN16-31)	If only one module is affected: A module/RDI has been removed or has failed. Check that the module/RDI is installed correctly. If installed in a modular SIU, the blue "link" LED for the module must be illuminated. If the LED is already illuminated switch the power to the SIU off and on. If the error persists replace the module. If all modules in a SIU are affected: Check the power to the SIU. Check the cable from the SIU to the DAU and link status; see section 3.3.7, 4.1.3 and 5.1.4. If no error is found, try to restart both the DAU and the SIU (power off and then on) If the error persists, the DPU or the Module rack/Uni rack is probably defective.
501	DIGITAL module 5 Missing (DI64-79)	
502	DIGITAL module 6 Missing (DI80-95)	
503	DIGITAL module 7 Missing (DI96-111)	
504	DIGITAL module 8 Missing (DI112-127)	
505	SERIAL module 3 Missing (SI16-23)	
506	SERIAL module 4 Missing (SI24-31)	
507	SERIAL module 5 Missing (SI32-39)	
540	IMAGE RADAR no input	No images are currently being recorded on any of the RADAR channels. Check the image sources and the cables. Enter the image calibration menu for RADAR channels and examine the image. Unused image channels must be configured as inactive (the "Active" parameter must be unchecked).
541	IMAGE ECDIS no input	No images are currently being recorded on any of the ECDIS channels. Check the image sources and the cables. Enter the image calibration menu for RADAR channels and examine the image. Unused image channels must be configured as inactive (the "Active" parameter must be unchecked).
542	IMAGE OTHER displays no input	No images are currently being recorded on any of the OTHER channels. Check the image sources and the cables. Enter the image calibration menu for RADAR channels and examine the image. Unused image channels must be configured as inactive (the "Active" parameter must be unchecked).
550	STORAGE Dataset incomplete	One or more types of data have not been recorded. If the error persists then restart the VDR. Authorized service of the VDR is required if this error still persists.
571-578	VIDEO VD0n wrong size	The radar image does not have the size defined in the configuration. Check the size of the image from the radar. If correct, check calibration and settings for the video channel.
580	NETWORK IMAGE Missing (VD01-VD08)	The network image processor in the DPU cannot be detected. If the error persists, the most probable cause is that the network image processor in the DPU is defective, i.e. the DPU must be repaired.
581-588	IMAGE VDxx no input	No images are currently being recorded on channel VDxx. Check the image source and the cable. Enter the image calibration menu for that channel and examine the image. Unused image channels must be configured as inactive (the "Active" parameter field must be unchecked).

591-598	`IMAGE` `VDxx image too large`	The image recorded on channel VDxx exceeds the allocated space in the capsule. Check the video image for noise. Check the calibration of the video channel. Check that "Image Format" in the VDR configuration is set to PNG. Reduce the number "color mask bits" if necessary.
701	`CAPSULE` `Not recording`	The VDR is unable to record data to the fixed capsule. Another error explaining why (e.g. #702 CAPSULE Cannot find) is normally displayed in advance. Try to fix the preceding error. Otherwise reboot the system.
702	`CAPSULE` `Cannot find`	The VDR is unable to detect a fixed capsule. Check that the fixed capsule is connected correctly. If the error persists, the fixed capsule is probably defective.
703	`CAPSULE` `Cannot access`	The VDR has detected a fixed capsule but is unable to get access to the memory. If the error persists, the fixed capsule is probably defective.
704	`CAPSULE, too many` `write errors`	Too many write-errors (writing to the fixed capsule) have been detected by the DPU over a period of time. The most likely cause is communication problems. Check the cable from the DPU to the fixed capsule.
705	`CAPSULE, too many` `write errors`	Too many write-errors (writing to the FRM memory) have been detected by the fixed capsule over a period of time. The most likely cause is serious communication problems or a defective fixed capsule.
706	`CAPSULE, too many` `read errors`	Too many read-errors (reading back data from the fixed capsule) have been detected by the DAU over a period of time. The VDR was unable to write and verify data despite several attempts. The most likely cause is serious communication problems or a defective fixed capsule.
707	`CAPSULE, too many` `read errors`	Too many read-errors (reading back data from the fixed capsule) have been detected by the fixed capsule over a period of time. The VDR was unable to write data despite several attempts. The most likely cause is serious communication problems or a defective fixed capsule.
708	`CAPSULE` `Verification failed`	The VDR found too many data errors within a given interval when verifying the data written to the fixed capsule. The fixed capsule is probably defective.
709	`CAPSULE` `Record too big`	The amount of data collected for a 15-second period exceeds the maximum allowed size for the fixed capsule. This is typically caused by receipt of too much image data. Use the "Analysis of recorded data" utility on the BCP or in the configurator tool to determine the cause. If the problem relates to image data, carry out an OPT and check the recorded images.

710	CAPSULE Record-data too big	The amount of data received by the VDR exceeds the capacity of the fixed capsule. This is typically caused by receipt of too much image data. Use the "Analysis of recorded data" utility on the BCP or in the configurator tool to determine the cause. If the problem relates to image data, carry out an OPT and check the recorded images.
711	Capsule Data loss rate too high	The DPU has detected a too high data loss rate (saving to the fixed capsule) over a period of time. The most likely cause is communication problems. Check the cable from the DPU to the fixed capsule.
721	FLOAT-FREE Not recording	The VDR is unable to record data to the float-free capsule. Another error explaining why (e.g. #722 FLOAT-FREE Cannot find) is normally displayed in advance. Try to fix the preceding error, otherwise reboot the system.
722	FLOAT-FREE Cannot find	The VDR is unable to detect the float-free capsule. Check that the float-free capsule is connected correctly. If the error persists, the float-free capsule is probably defective.
723	FLOAT-FREE Cannot access	The VDR has detected a float-free capsule but is unable to get access to the memory. If the error persists, the float-free capsule is probably defective.
724	FLOAT-FREE, too many write errors	Too many write-errors (writing to the float-free capsule) have been detected by the DPU over a period of time. The most likely cause is communication problems. Check the cable from the DPU to the float-free capsule.
725	FLOAT-FREE, too many write errors	Too many write-errors (writing to the FRM memory) have been detected by the float-free capsule over a period of time. The most likely cause is serious communication problems or a defective float-free capsule.
726	FLOAT-FREE, too many read errors	Too many read-errors (reading back data from the float-free capsule) have been detected by the DPU over a period of time. The VDR was unable to write and verify data despite several attempts. The most likely cause is serious communication problems or a defective float-free capsule.
727	FLOAT-FREE, too many read errors	Too many read-errors (reading back from the memory) have been detected by the float-free capsule over a period of time. The VDR was unable to read back data despite several attempts. The most likely cause is serious communication problems or a defective float-free capsule.
728	FLOAT-FREE Verification failed	The VDR found too many data errors within a given interval when verifying the data written to the float-free capsule.
729	FLOAT-FREE Record too big	The amount of data collected for a 15-second period exceeds the maximum allowed size for the float-free capsule. This is typically caused by receipt of too much image data. Use the "Analysis of recorded data" utility on the BCP or in the configurator tool to determine the cause. If the problem relates to image data, carry out an OPT and check the recorded images.

730	`FLOAT-FREE` `Record-data too big`	The amount of data received by the VDR has exceeded the capacity of the float-free capsule. This is typically caused by receipt of too much image data. Use the "Analysis of recorded data" utility on the BCP or in the configurator tool to determine the cause. If the problem relates to image data, carry out an OPT and check the recorded images.

731	`FLOAT-FREE`
	`Data loss rate too`
	`high`
		The DPU has detected a too high data loss rate (saving to the float-free capsule) over a period of time. The most likely cause is communication problems. Check the cable from the DPU to the float-free capsule.

741	`LONG-TERM` `Not recording`	The VDR is unable to utilize the VDR data disk for the long term recording. Another error explaining why (e.g. #742 LONG-TERM Cannot find) is normally displayed in advance. Try to reboot the system. If the error persists, the DPU is probably defective.
742	`LONG-TERM` `Cannot find`	The VDR is unable to detect the VDR data disk or utilize the disk for long term recording. Try to reboot the system. If the error persists, the DPU is probably defective
743	`LONG-TERM` `Cannot access`	The VDR has detected the VDR data disk but is unable utilize the disk. If the error persists, the disk is probably defective.
744	`LONG-TERM, too many` `write errors`	Too many write-errors (writing to the VDR data disk) have been detected by the DPU over a period of time. The most likely cause is an internal problem in the DPU. If the error persists, the DPU must be repaired.
745	`LONG-TERM, too many` `write errors`	Too many write-errors (writing to the VDR data disk) have been detected by the DPU over a period of time. The most likely cause is a defective VDR data disk (i.e. the SDD inside the DPU). If the error persists, the DPU must be repaired.
746	`LONG-TERM, too many` `read errors`	Too many read-errors (reading back data from the VDR data disk) have been detected by the over a period of time. The VDR was unable to read back data despite several attempts. The most likely cause is an internal problem in the DPU. If the error persists, the DPU must be repaired.
747	`LONG-TERM, too many` `read errors`	Too many read-errors (reading back data from the VDR data disk) have been detected by the long-term disk over a period of time. The VDR was unable to read back data despite several attempts. The most likely cause is a defective VDR data disk (i.e. the SDD inside the DPU). If the error persists, the DPU must be repaired.
748	`LONG-TERM` `Verification failed`	The VDR found too many data errors within a given interval when verifying the data written to the VDR data disk.
749	`LONG-TERM` `Record too big`	The amount of data collected for a 15-second period has exceeded the maximum allowed size for the VDR data disk. This is typically caused by the receipt of too much image data. Use the "Analysis of recorded data" utility on the BCP or in the configurator tool to determine the cause. If the problem relates to image data, carry out an OPT and check the recorded images.
750	`LONG-TERM` `Record-data too big`	The amount of data received by the VDR exceeds the capacity of the VDR data disk. This is typically caused by receipt of too much

		image data. Use the "Analysis of recorded data" utility on the BCP or in the configurator tool to determine the cause. If the problem relates to image data, carry out an OPT and check the recorded images.

751	`LONG-TERM`
	`Data loss rate too`
	`high`
		The DPU has detected a too high data loss rate (saving to the long term storage) over a period of time. The most likely cause is an internal problem in the DPU. If the error persists, the DPU must be repaired.

901-933	`SYSTEM FAILURE` `ERROR 901-933`	The software is not working properly. Restart the VDR and report this error if it is repeated.

970	`SELF-TEST`
	`RAM size xxx MB,`
	`Should be >= yyy MB`
		The amount of RAM is insufficient to start the VDR. Restart the system. If the error persists, then call for assistance.

971	`SELF-TEST`
	`xx network`
	`interfaces found, 4`
	`required`
		Required networking interfaces are not available to start the VDR. Restart the system. If the error persists, then call for assistance.

972	`SELF-TEST`
	`Failed to initialize`
	`VGA`
		Required Video (VGA) circuitry could not be initialized. Restart the system. If the error persists, then call for assistance

983	`No communication` `to DPU`	The BCP has never been able to communicate with the DPU. The most probable cause is a defective cable or that the VDR did not boot up correctly.
984	`No communication` `to DPU`	The initial communication was functional but the communication has failed at some point. The most probable cause is that the VDR has encountered a system error and completely stopped. Restart the VDR. If the error persists, the DPU is probably defective.

9   Service and maintenance

The VDR requires an annual performance test carried out by a certified service organization. Please refer to the installation manual for further details.

9.1   Verification of the VDR functionality following service on any sensor

It is a requirement of the VDR standard that the functionality of the VDR is verified following service on any sensor (e.g. the GPS) connected to the VDR. A self-test (Operational Performance Test) may be started from the BCP, see section 3.1.2.

9.2   List of most common spare parts

P/N	Description
1302116	Uni Rack UR 06-002 - 8ch analog
1302358	RVI with PoE (for DM100) 2 x 5 x BNC
1302365	RVI with PoE (for DM100) 2 x DVI-I
1302373	MK4 capsule with cradle, beacon and 50m cable
1302379	VDR Bridge Control Panel BCP
1302389	MK1 float-free capsule with 50m cable and junction box
1302646	BMU 003 - Bridge Microphone Unit Indoor, BMU-I
1302647	BMU 004 - Bridge Microphone Unit Outdoor, BMU-O
1302662	Cradle for MK4 capsule
1302726	DM100 DPU, DPU 100-01
2302807	Ethernet Interface for Capsule MK4 - assembled PCB
2302731	Set of fans (2) for DPU 100-01 (spare part)
2302786	Battery pack and fans(2) for DPU 100-01 (spare part)
3000671	Beacon replacement kit
3302519	50m zero halogen FTP CAT5 cable w. RJ45 and Wago for capsule MK4 and FF MK1
7302532	Boot flash for DM100 VDR
7304878	Boot flash for DM100 S-VDR G2
9302376	Manual for compact Sensor Interface Unit (hard copy and CD)
9302719	Set of manuals for the DM100 VDR and DM100 S-VDR (Hardcopy and CD)