Operator's Manual

For DM100 VDR G1, G2, G3 and DM100 S-VDR G2, G3

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Contents

1 Scope and purpose

Operator's Manual for DM100 VDR G1, G2, G3 and DM100 S-VDR G2, G3.

The DM100 VDR G3 complies with IEC 61996-1 Ed. 2.0, which applies to VDRs installed after the 1st of July 2014.
The DM100 VDR G3 complies with MSC.333(90) amendment MSC.494(104).

The DM100 S-VDR G3 complies with IEC 61996-2 Ed. 2.0, however, with changes required by IEC 62288 Ed. 3.0 and IEC 61162-450 Ed.3.0.
The DM100 S-VDR G3 complies with MSC.163(78) amendment MSC.493(104).

1.1 References

MAN15690 Installation Manual for DM100 VDR G3 and DM100 S-VDR G3
MAN16025 Inspector's and Authorities' Manual for DM100 VDR G3 and DM100 S-VDR G3
MAN16209 Installation Manual for DM100/DM400 VDR compact Sensor Interface Unit
MAN16210 Installation manual for Remote Video Interface RVI 02-004(D) for DM100

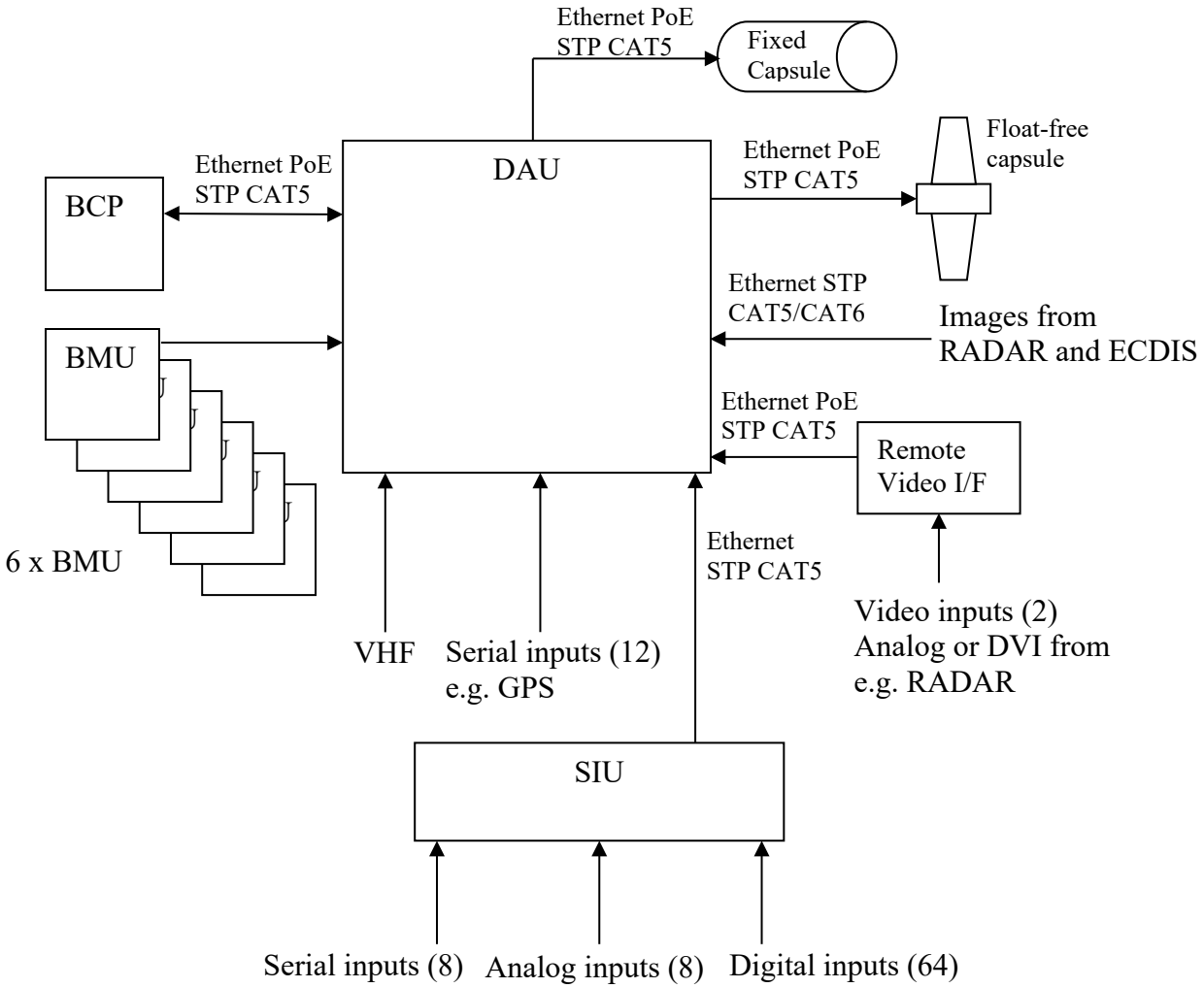
1.2 Terms and Abbreviations

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 a generic term covering all models. The entire product name will distinguish between the models when required.

2 System overview for DM100 VDR



DM100 VDR System overview (typical configuration)

2.1.1 Data Acquisition Unit (DAU)

The Data Acquisition Unit contains the Data Processing Unit (DPU). The DAU must be installed indoors and in proximity to the bridge.

2.1.2 VDR Bridge Control Panel (BCP)

The BCP must be installed on the bridge 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)

Several BMUs must be mounted on the bridge (console, ceiling, or bulkhead). 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 EPIRB.

2.1.6 Remote Video Interface (RVI)

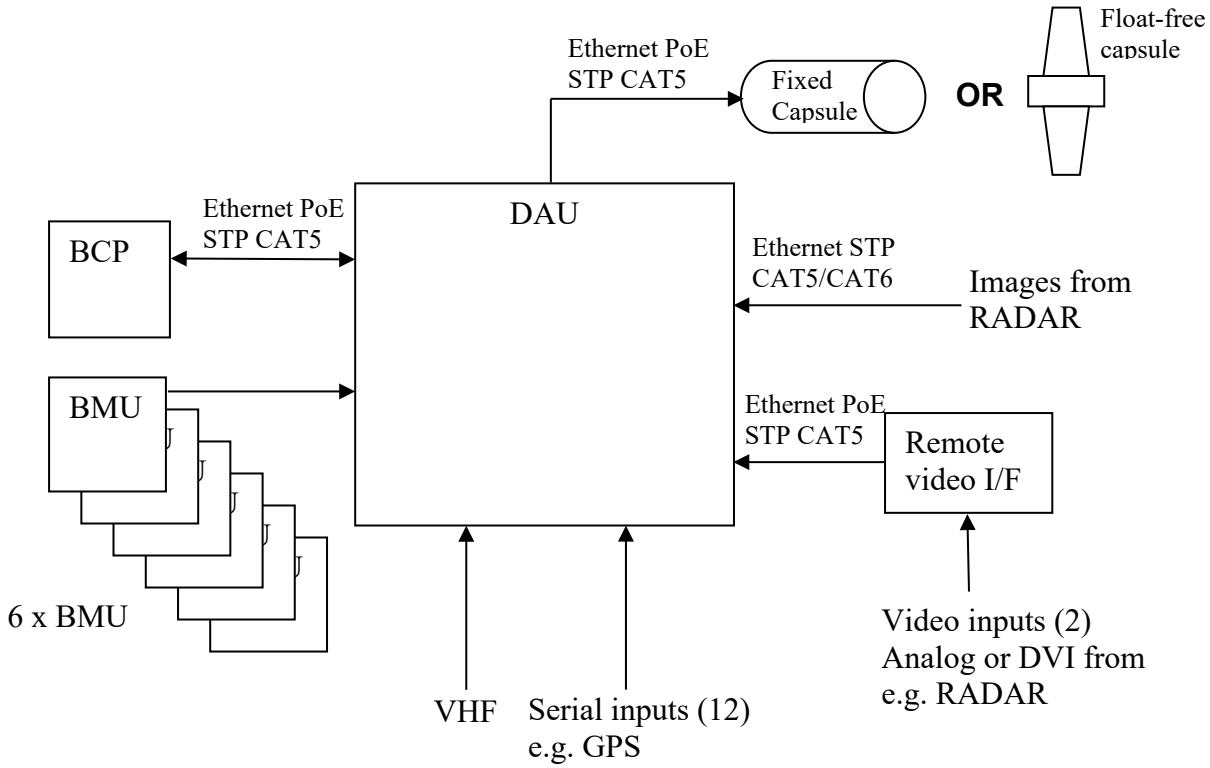
The RVI is optional equipment. An RVI may be used to capture video from, for example, a RADAR that cannot send images to the VDR using Ethernet, i.e., typically older equipment.
The RVI must be installed indoors, typically close to a RADAR or ECDIS. It must be connected to the DAU with a cable up to 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 eight serial interfaces, eight analog interfaces, and 64 digital interfaces. It must be connected to the DAU with an Ethernet cable that is up to 100m long.

2.2 System overview for DM100 S-VDR G2, G3

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, G3 System overview (typical configuration)

2.3 Maximum number of supported interfaces

Additional equipment may be used to make larger or non-standard configurations if needed. The maximum number of supported interfaces for a DM100 VDR and S-VDR 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 and acquiring network and image data.

** VDR core inputs on SIUs. There is no limit to the number of digital and analog inputs 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)

The nominal viewing distance is 70cm.

3.1.1 Alert display

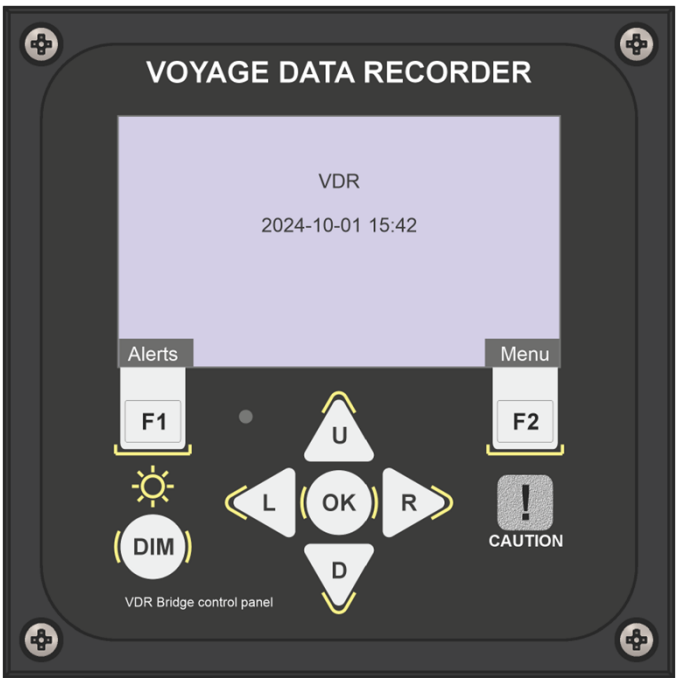
The VDR will generate an alert message (caution) if a system error is detected. An alert message will be displayed on the BCP, and the yellow caution indicator will be illuminated. No audible alert will be generated, and alerts should not be acknowledged. When the cause of the error is resolved, the alert message will be cleared, and the caution indicator will be 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 partner must be contacted if the OPT report shows problems the crew cannot fix on the vessel. Click on “F2” and follow the instructions for an OPT.

3.1.3 Setting the display brilliance level to default

Pressing the DIM button for 5-7 seconds will restore the display brilliance level to the default.



3.1.4 Download of VDR data to a USB stick

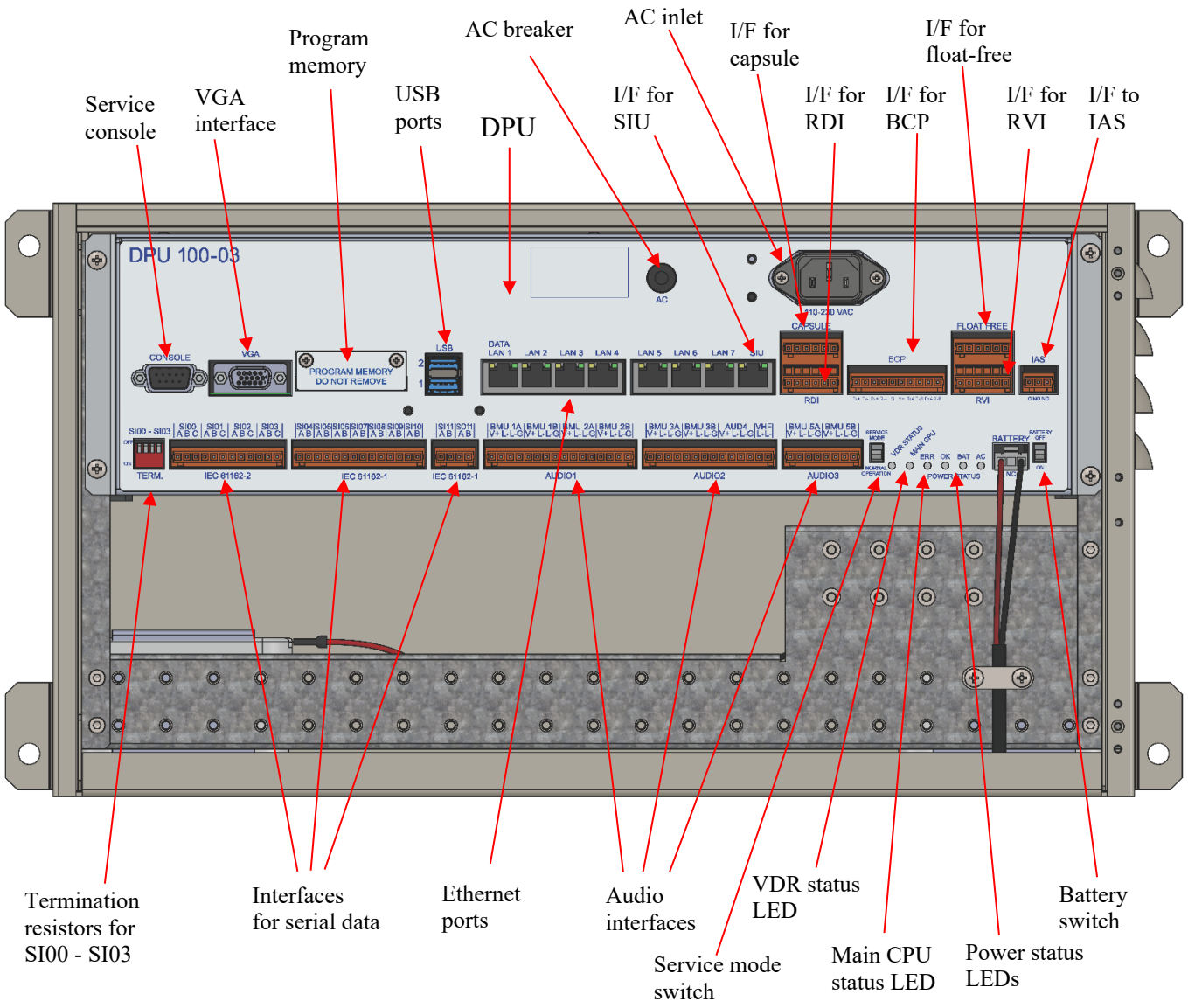
Insert a USB stick in one of the USB ports on the DPU. The USB stick must be formatted with a file system supported by Windows 7 or 10 (FAT32 or NTFS).

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 that 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 has been designed from scratch to withstand environmental stress, far exceeding 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)	The 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

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 switch off the AC power source manually, 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 to switch the unit completely 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, 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)

	Information on PCB	Severity
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 that prevent normal operation. Contact a service agent if the problem cannot be rectified.	Error

3.3.6 Main CPU LED

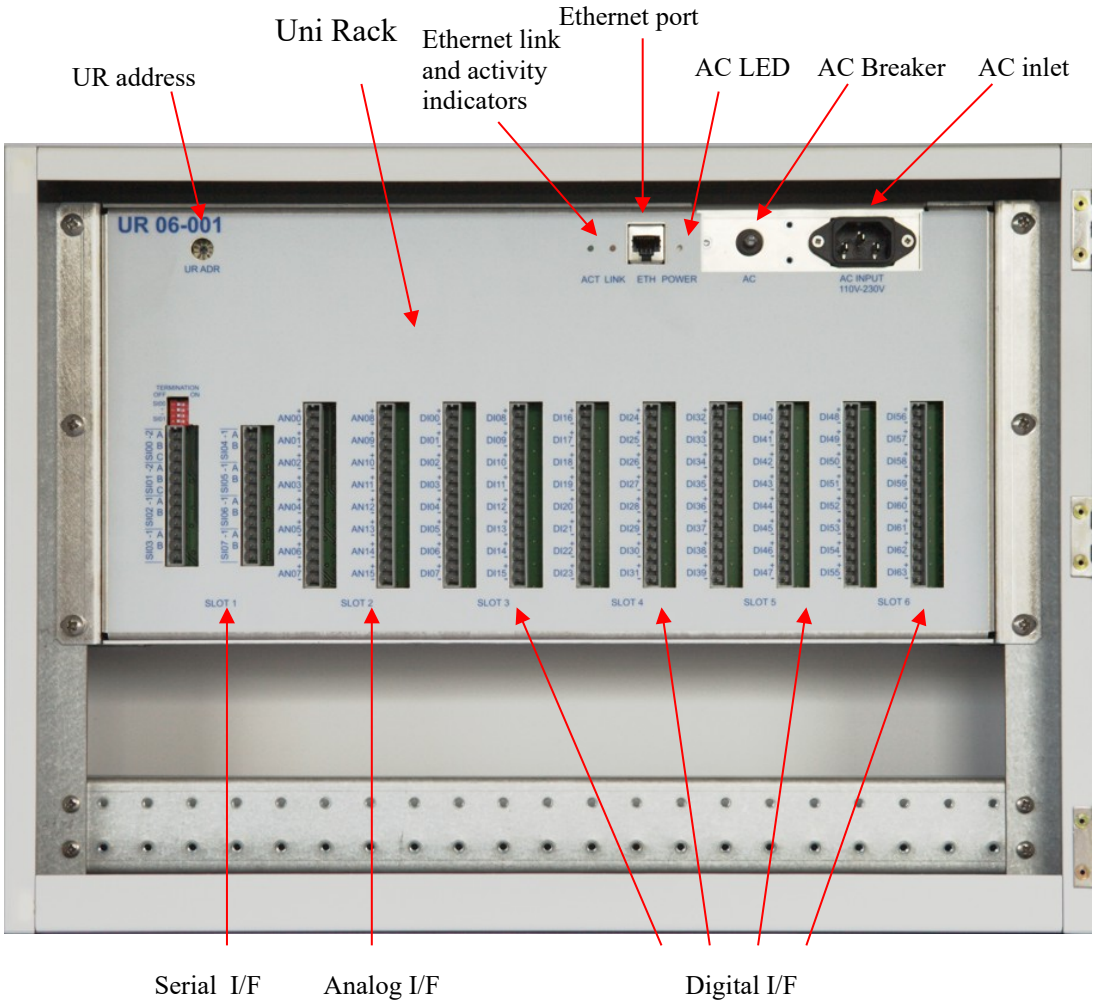
The power control circuit controls the main CPU LED and monitors the CPU system after power is applied. The power circuit uses the LED to show information about the main CPU.

OFF	The power circuit has not started yet – this should take only a few seconds.	(OK)
Green 1 Hz	The power circuit is waiting for the main CPU to start (boot load), which 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. When a communication link is established, the left LED will be illuminated and show the speed (yellow = 100 Mbit/sec, green = 1000 Mbits/sec). The right LED (green) will be illuminated when a communication link is established and flickers 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 switch off the power source manually. In addition, it will pop out automatically if too much current is being drawn from the power source.

4.1.3 Ethernet link and activity indicators

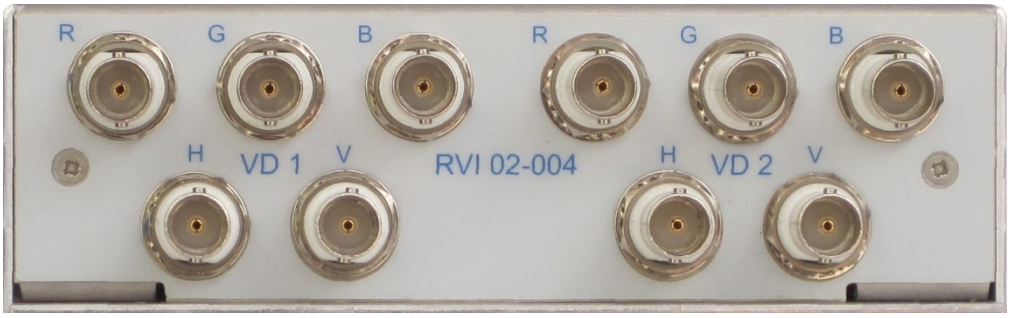
The LINK LED (right) will be illuminated (yellow) when a communication link is established to the DAU. The ACT LED (left) will flicker (green) depending on the traffic load.

4.1.4 UR address

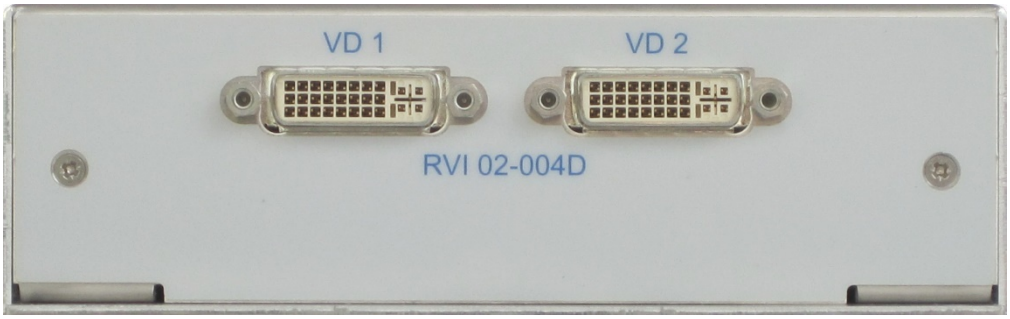
It must be set to “0” for the first SIU and “1” for an additional second SIU.

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

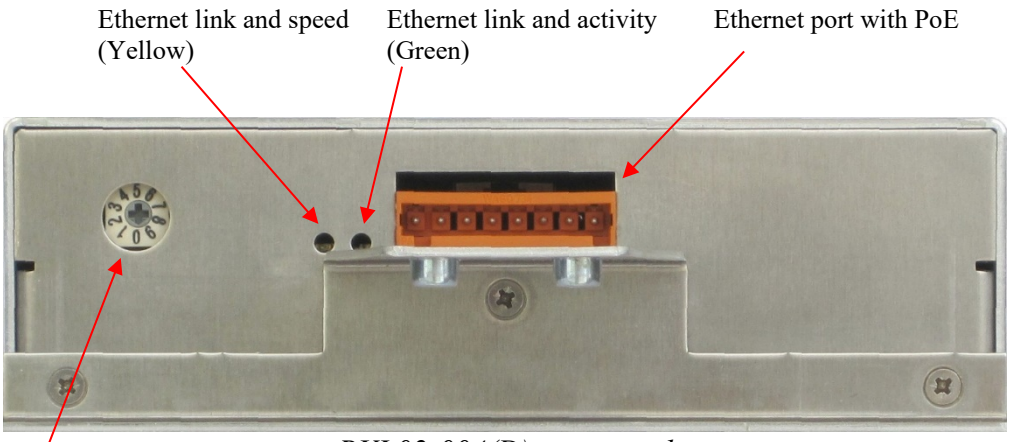
The DM100 may use RVI 02-004 and RVI 02-004D for image capture. The DM100 will power RVIs connected to the RVI or RDI port on the DAU. An RVI may be connected to a LAN port on the DAU if the RDI and RVI ports on the DPU are being used for other purposes. An AC power kit (p/n 2304449) will be required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



RVI 02-004



RVI 02-004D

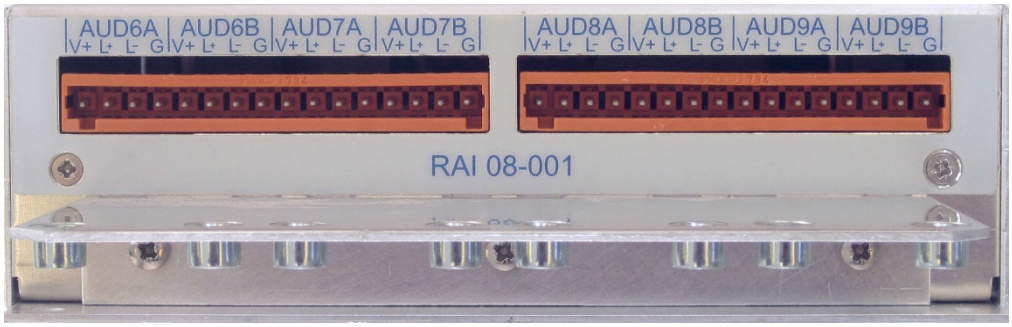


RVI 02-004(D) rear panel

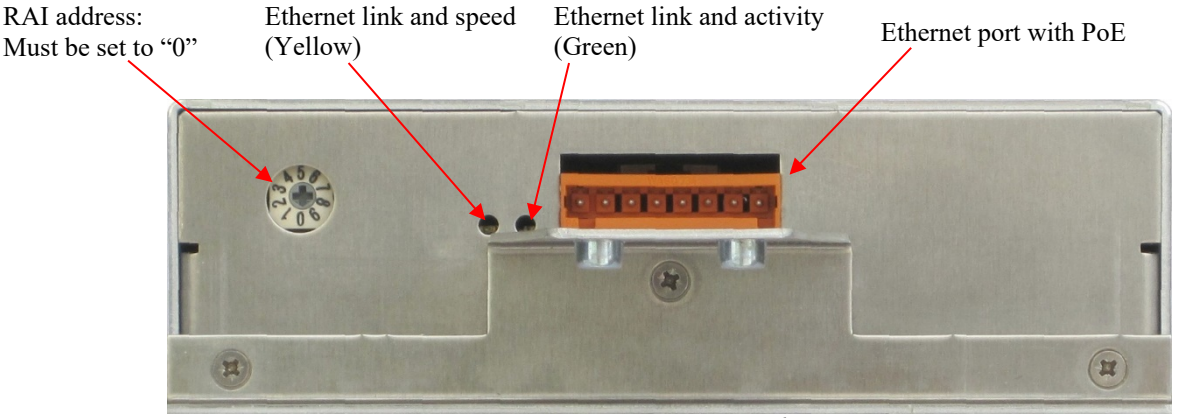
The RVI address i.e. the rotary switch located behind the rear panel. Must be set to “0” for RVIs connected to the PoE ports on the DPU (labeled “RVI” or “RDI”).
The RVI address must be set from 1 to 4 for locally powered RVIs (each locally powered RVI connected to the DM100 must have a unique RVI address).

7 Operation of the RAI

A Remote Audio Interface captures additional audio signals from microphones and/or VHF sets for some installations.



RAI 08-001



RAI 08-001 rear panel

8 VDR Alerts

The BCP will display alerts and messages.
All alerts are priority Caution.
All alerts are in category B.
The VDR does not support alert responsibility transfer, alert grouping, and alert aggregation.

8.1 Alert List

Alert ID	**Alert title** Alert description	Explanation of the reason for the alert and, if possible, a solution for the cause
60004	**VDR sys-error** 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 system RAM.
60036	**Configuration** CONFIG - Unable to save	The VDR was unable to save the configuration. Please retry. This error is only expected during the system configuration (installation).
60042	**Configuration** 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.
60054	**Power Loss** 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.
60056	**Microphone fail** 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-existent microphones. Check the cable for the microphone(s) that were reported as faulty. Test the inputs on the audio interface module with a spare microphone. Replace microphones that are reported to be defective if no other error is discovered.
60058	**Microphone fail** AUDIO - Power short circuit	One or more microphones are using too much power. The cabling and microphones must be checked.
60060	**GPS time** STATUS - UTC timeout	The system is not receiving UTC from the GPS. Check that the GPS is on. Check the signal from the GPS (use the 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.
60062	**GPS time** UTC time from GPS jumped (go to menu)	UTC from the GPS has changed unexpectedly (at least two hours) from the current system time and is not accepted for VDR sync. Check that the UTC of the

		VDR matches the UTC you expect using an external time source. If not, inspect the data on the configured UTC port to ensure it indicates the correct UTC. If the GPS UTC is correct, you can accept its value and clear this alert from the BCP menu.
60063	**GPS time** VDR not synchronized to UTC time from GPS	UTC from the GPS differs by more than 2 seconds from the current system time. The VDR will synchronize within 2 minutes if the UTC differs by less than 2 hours from the system time. If the GPS UTC is correct, you can accept its value and clear this alert from the BCP menu.
60070	**PSU issue** 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.
60074	**Serial missing** 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.
60076	**RVI missing** 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.
60078	**Audio missing** 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 will probably be defective.
60081	**Image issue** NETWORK IMAGE - Duplicate Location	Multiple sources send 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 that are sending images to the VDR.
60083	**Image issue** NETWORK IMAGE - From 'new' Location	A source (e.g., an ECDIS) sends 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.
60087	**Too much data** 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, perform an OPT and check the recorded images.
60090	**Capsule issue** FIXED CAPSULE - Wrongly connected	The fixed capsule operates properly, but is not connected to the connector on the DAU labeled “CAPSULE”.
60092	**Float-free issue** FLOAT-FREE - Wrongly connected	The float-free is working properly, but it is not connected to the connector on the DAU labeled “FLOAT FREE”.
60096	**Configuration**	The VDR has started up using the default configuration. Configure the system correctly. The VDR cannot operate correctly using the default configuration since at

	Not configured - Configure VDR	least the GPS antenna position and vessel ID must be entered.
60108	**RVI missing** 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.
60110	**Audio missing** 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.
60112	**Serial missing** 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 will probably be defective.
60117	**Battery issue** PSU battery - Battery switch "OFF"	The battery switch on the front of the DPU is in the "OFF" position.
60118	**Battery issue** PSU battery - Not present	The power supply is unable to detect the battery pack. Check that the battery pack is connected to the DPU. The batteries are probably defective if the error persists for over five minutes.
60120	**Battery issue** PSU battery - Could not be charged	The charger was unable to charge the battery fully within a predefined 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.
60124	**PSU issue** 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 operates only from the battery. This message will not appear if the battery pack is new and 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.
60128	**Audio missing** 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 for the remote audio interface.
60130 60132 60134	**Install issue** 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.
60136 60138	**Install issue**	xxxxxx = SERIAL, ANALOG, DIGITAL, VIDEO, AUDIO

60140 60142 60144	Xxxxxx - Wrong rack type	A module is located in a rack (DPU, SIU or RVI) where it is not supposed to be. Check the installation.
60146	**Audio missing** 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 for the remote audio interface.
60148	**Install issue** SERIAL - Module in wrong slot	The VDR configuration is inconsistent with the physical configuration of the VDR; for example, an additional serial module is not installed in the slot specified in the VDR configuration.
60150	**Install issue** AUDIO - Module in wrong slot	The VDR configuration is inconsistent with the physical configuration of the VDR; for example, the additional remote audio interface is not connected to the port on the DPU specified in the VDR configuration.
60152	**Install issue** VIDEO - Module in wrong slot	The VDR configuration is inconsistent with the physical configuration of the VDR; for example, the additional remote video interface is not connected to the port on the DPU specified in the VDR configuration.
60160	**NAS issue** EXTERNAL BACKUP - Not recording	The system cannot record data to the extended external backup disk (NAS). The NAS is probably defective if no other relevant errors, e.g., #162, are displayed.
60162	**NAS missing** EXTERNAL BACKUP - Cannot find	Communication with 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 the DPU). Reboot the system. If the error persists, the most probable cause is a defective/misconfigured NAS.
60170	**Audio rec. off** AUDIO - Recording muted	Recording of audio has been stopped due to manual intervention.
60172	**Too much data** 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
60180	**Service mode on** 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”.
60182	**VDR BCP issue** 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.
60184	**BAM issue** BAM - BAM comm. Timeout	Communication with the Bridge Alert Management system has been interrupted.
60186	**SFI collision**	More than one device in the network is using the same SFI.

	DPU - SFI ccxxxx collision in the network.	
60190	**FAN issue** 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 at the latest at the next APT.
60191	**FAN issue** DPU - Backup fan failed	The secondary fan in the right side of the DPU has failed. This is only a significant problem if the primary fan has also failed (error 190).
60300-60307	**Serial timeout** 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 there is no signal, check the cable and ensure the configuration is correct.
60320-60335	**Net-data timeout** 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.
60360-60375	**Too much data** 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.
60400-60431	**Serial timeout** 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 there is no signal, check the cable and ensure the configuration is correct.
60441	**Serial missing** SERIAL module 2 Missing (SI08-12)	For a DM100, the second serial module is integrated into the SAP board in the DPU. The most probable cause is that the SAP board in the DPU is defective.
60442	**Analog missing** 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 module's blue “link” LED 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 **Error! Reference source not found.**. If no error is found, try to restart both the DAU and the SIU (power off and then on) The DPU or the Module rack/Uni rack is probably defective if the error persists.
60443	**Digital missing** DIGITAL module 1 - Missing (DI00-15)	
60444	**Digital missing** DIGITAL module 2 - Missing (DI16-31)	
60445	**Digital missing** DIGITAL module 3 - Missing (DI32-47)	
60446	**Digital missing** DIGITAL module 4 - Missing (DI48-63)	

60450-60452	**Install issue** SIU xxxxxxx Module in wrong slot	xxxxxxx = SERIAL, ANALOG, DIGITAL A module has been misplaced. Modules must be installed according to the VDR configuration.
60460-60462	**Install issue** SIU xxxxxxx Wrong MR address	xxxxxxx = SERIAL, ANALOG, DIGITAL An SIU with the wrong Module Rack address has been detected. Set the MR/UR address to 0 or 1. See section **Error! Reference source not found.**
60470-60472	**Install issue** SIU xxxxxxx Module duplicate	xxxxxxx = SERIAL, ANALOG, DIGITAL The VDR detected two modules with the same MR/UR address and slot number. This may occur if two SIUs with the same address (ID) are connected to the DAU.
60480	**Configuration** 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.
60482	**RVI missing** RVI VIDEO module 2 - Missing	VIDEO module 2 cannot be detected. The most probable cause is that the cable to the RVI from the DPU is disconnected or the RVI is defective
60484	**Install issue** RVI VIDEO - Wrong RVI address	An AC-powered RVI with an 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.
60486	**RVI missing** RVI VIDEO - Module 3 missing	VIDEO module 3 cannot be detected. The most probable cause is that the cable to the RVI from the DPU is disconnected or the RVI is defective.
60488	**RVI missing** RVI VIDEO - Module 4 missing	VIDEO module 4 cannot be detected. The most probable cause is that the cable to the RVI from the DPU is disconnected or the RVI is defective.
60500	**Analog missing** 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 module's blue “link” LED 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 **Error! Reference source not found.**. If no error is found, try to restart both the DAU and the SIU (power off and then on) The DPU or the Module rack/Uni rack is probably defective if the error persists.
60501	**Digital missing** DIGITAL module 5 - Missing (DI64-79)	
60502	**Digital missing** DIGITAL module 6 - Missing (DI80-95)	
60503	**Digital missing** DIGITAL module 7 - Missing (DI96-111)	
60504	**Digital missing** DIGITAL module 8 - Missing (DI112-127)	
60505	**Serial missing** SERIAL module 3 - Missing (SI16-23)	

60506	**Serial missing** SERIAL module 4 - Missing (SI24-31)	
60507	**Serial missing** SERIAL module 5 - Missing (SI32-39)	
60540	**Image R missing** 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).
60541	**Image E missing** 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).
60542	**Image O missing** 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).
60550	**Data incomplete** 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 persists.
60571-60578	**Image issue** 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 the calibration and settings for the video channel.
60580	**VDR NDP missing** 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.
60581-60588	**Image timeout** 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).
60591-60598	**Image too large** 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 the “Image Format” in the VDR configuration is PNG. Reduce the number of "color mask bits" if necessary.

60701	**Capsule issue** 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 typically displayed in advance. Try to fix the preceding error. Otherwise, reboot the system.
60702	**Capsule issue** 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.
60703	**Capsule issue** CAPSULE – Cannot access	The VDR detected a fixed capsule but could not access the memory. If the error persists, the fixed capsule is probably defective.
60704	**Capsule issue** CAPSULE, too many write errors	Too many write errors (writing to the fixed capsule) have been detected by the DPU over some time. The most likely cause is communication problems. Check the cable from the DPU to the fixed capsule.
60705	**Capsule issue** CAPSULE, too many write errors	Too many write errors (writing to the FRM memory) have been detected by the fixed capsule over some time. The most likely cause is serious communication problems or a defective fixed capsule.
60706	**Capsule issue** CAPSULE, too many read errors	Too many read errors (reading back data from the fixed capsule) have been detected by the DAU over some 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.
60707	**Capsule issue** CAPSULE, too many read errors	Too many read errors (reading back data from the fixed capsule) have been detected by the fixed capsule over some time. The VDR was unable to write data despite several attempts. The most likely cause is serious communication problems or a defective fixed capsule.
60708	**Capsule issue** CAPSULE - Verification failed	When verifying the data written to the fixed capsule, the VDR found too many errors within a given interval. The fixed capsule is probably defective.
60709	**Capsule issue** CAPSULE - Record too big	The data collected for 15 seconds exceeds the maximum allowed size for the fixed capsule. 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, perform an OPT and check the recorded images.
60710	**Capsule issue** 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 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, perform an OPT and check the recorded images.

60711	**Capsule issue** Capsule - Data loss rate too high	The DPU has detected a data loss rate that is too high (saving to the fixed capsule) over some time. The most likely cause is communication problems. Check the cable from the DPU to the fixed capsule.
60721	**Float-free issue** FLOAT-FREE - Not recording	The VDR is unable to record data in the float-free capsule. Another error explaining why (e.g., #722 FLOAT-FREE Cannot find) is typically displayed in advance. Try to fix the preceding error; otherwise, reboot the system.
60722	**Float-free issue** 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.
60723	**Float-free issue** FLOAT-FREE - Cannot access	The VDR detected a float-free capsule but was unable to access the memory. If the error persists, the float-free capsule is probably defective.
60724	**Float-free issue** FLOAT-FREE, too many write errors	Too many write errors (writing to the float-free capsule) have been detected by the DPU over some time. The most likely cause is communication problems. Check the cable from the DPU to the float-free capsule.
60725	**Float-free issue** FLOAT-FREE, too many write errors	Too many write errors (writing to the FRM memory) have been detected by the float-free capsule over some time. The most likely cause is serious communication problems or a defective float-free capsule.
60726	**Float-free issue** 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 some 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.
60727	**Float-free issue** FLOAT-FREE, too many read errors	Too many read errors (reading back from the memory) have been detected by the float-free capsule over some 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.
60728	**Float-free issue** FLOAT-FREE - Verification failed	The VDR found too many errors within a given interval when verifying the data written to the float-free capsule.
60729	**Float-free issue** FLOAT-FREE - Record too big	The amount of data collected for 15 seconds exceeds the maximum allowed size for the float-free capsule. 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, perform an OPT and check the recorded images.

60730	**Float-free issue** 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 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, perform an OPT and check the recorded images.
60731	**Float-free issue** FLOAT-FREE - Data loss rate too high	The DPU has detected a data loss rate that is too high (saving to the float-free capsule) over some time. The most likely cause is communication problems. Check the cable from the DPU to the float-free capsule.
60741	**Long-term issue** LONG-TERM - Not recording	The VDR cannot utilize the VDR data disk for long-term recording. Another error explaining why (e.g., #742 LONG-TERM Cannot find) is typically displayed in advance. Try to reboot the system. If the error persists, the DPU is probably defective.
60742	**Long-term issue** LONG-TERM - Cannot find	The VDR cannot detect or utilize the VDR data disk for long-term recording. Try to reboot the system. If the error persists, the DPU is probably defective
60743	**Long-term issue** LONG-TERM - Cannot access	The VDR has detected the VDR data disk but is unable to utilize the disk. If the error persists, the disk is probably defective.
60744	**Long-term issue** LONG-TERM, too many write errors	Too many write errors (writing to the VDR data disk) have been detected by the DPU over some time. The most likely cause is an internal problem in the DPU. If the error persists, the DPU must be repaired.
60745	**Long-term issue** LONG-TERM, too many write errors	Too many write errors (writing to the VDR data disk) have been detected by the DPU over some 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.
60746	**Long-term issue** LONG-TERM, too many read errors	Too many read errors (reading back data from the VDR data disk) have been detected over some 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.
60747	**Long-term issue** 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 some 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.
60748	**Long-term issue** 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.
60749	**Long-term issue** LONG-TERM - Record too big	The amount of data collected for 15 seconds 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, perform an OPT and check the recorded images.
60750	**Long-term issue** 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 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, perform an OPT and check the recorded images.
60751	**Long-term issue** LONG-TERM - Data loss rate too high	The DPU has detected a too high data loss rate (saving to the long-term storage) over some time. The most likely cause is an internal problem in the DPU. If the error persists, the DPU must be repaired.
60901-60933	**VDR sys-error** SYSTEM FAILURE - ERROR 901-933	The software is not working correctly. Restart the VDR and report this error if it is repeated.
60970	**VDR sys-error** SELF-TEST - RAM size xxx MB, Should be >= yyy MB	The amount of RAM needed for the VDR to start is insufficient. Restart the system. If the error persists, then call for assistance.
60971	**VDR sys-error** 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.
60972	**VDR sys-error** 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.
60973	**VDR sys-error** SELF-TEST - Failed to configure internal networking	Errors occurred during internal network configuration. Details should have been logged. Check the network configuration files or log files. If the error persists then call for assistance.
60983	**VDR BCP sys-error** No communication to DPU	The BCP has never been able to communicate with the DPU. The most probable cause is a defective cable or the VDR not booting up correctly.
60984	**VDR BCP** No communication to DPU	The initial communication was functional, but the communication 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

The VDR standard requires 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.