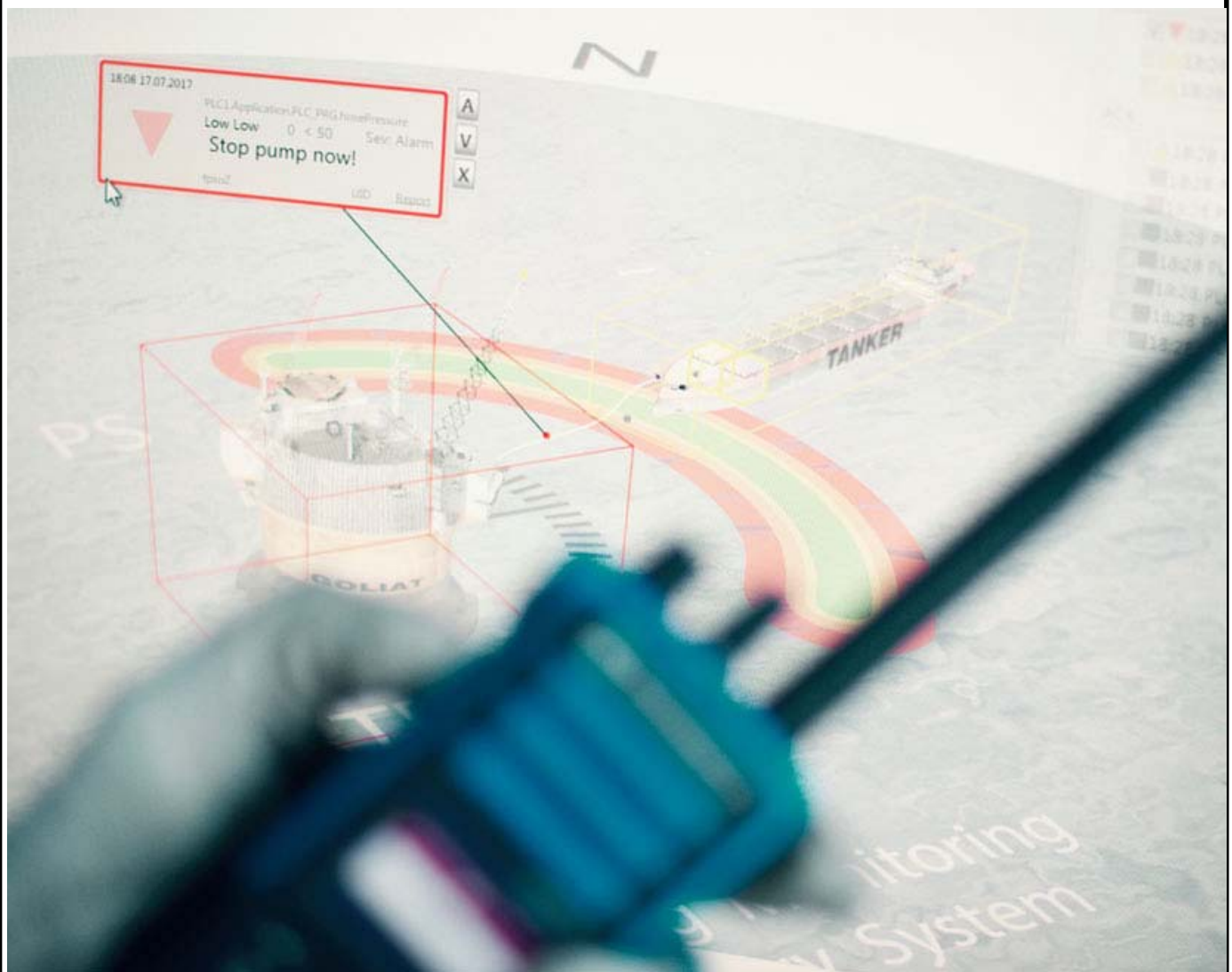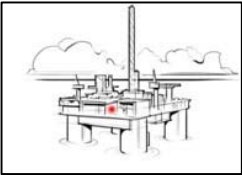# Offloading Monitoring Telemetry System
Operator's Manual

6/29/2019
DATAMATIK AS
Jerikoveien 16, 1067 Oslo, Norway

ENGLISH

Read these instructions carefully and make sure you understand them before using the system.

SYMBOLS SIGNIFICANCE

- Do not manipulate the marked equipment in hazardous areas.

- This Control System should go through an installation acceptance test & commissioning phase before turning operational.

- The marked equipment is ANATEL certified for use in Brazil.

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REVISION HISTORY

| Version	Date	Description
1	26/07/2017	First release
2	24/06/2019	Second release
2.1	25/06/2019	Small improvements

TABLE OF CONTENTS

1. WHAT IS THE OMTS?

The Offloading Monitoring Telemetry System allows for remote control of offloading operations from the FLNG (or FPSO) to a receiving Tanker using UHF radio links to transmit start/stop commands.

The OMTS starts the offloading pump if and only if the Tanker Portable Radio is READY and the FLNG Bridge operator pushes START command on the touch HMI panel installed inside the control room or with an optional UHF portable radio located onboard the FLNH/FPSO.

The OMTS automatically stops the offloading in either of the following situations:

- the portable radio is set to NOT READY,
- the bridge operator stops the transfer from the HMI panel,
- the ESD button of the portable radio is triggered,
- an electrician accessing the OMTS 10-rack presses the physical ESD button.
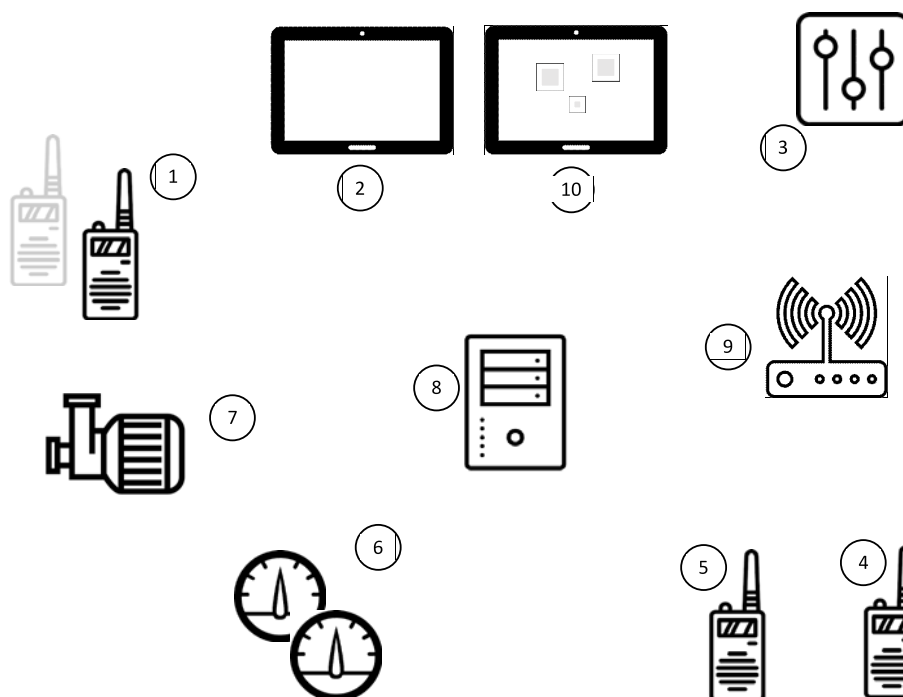
1) Optional - Active Portable Radio and Stand-by Portable Radio[1] for the FLNG vessel
2) 2D Visualisation Panel
3) Control Panel (Bridge HMI)
4) Tanker - Active Portable Radio 1
5) Tanker – Active Stand-by Tanker Portable Radio 2
6) Optional - Hydrocarbons pressure and tank level sensors
7) Offloading/transfer pump
8) PLC handling the logic
9) Mobile Radio to connect the Portable Radios
10) Optional (3D Alarm Overview Panel) and (Alarm List).

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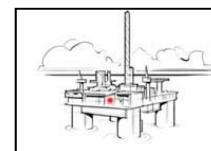
[1] See **Radio replacement** for details about active/stand-by Radio

2. USING THE OMTS

HOW TO: Set-up the system before a new offloading operation

1) Turn-ON the HMI Panel inside the bridge control area
2) Bring the two[1] fully charged Tanker Radios (ACTIVE and STAND-BY) on-board the Tanker and turn them ON[2]
3) Ensure that the ESD button is not initially engaged. Reset the ESD when required by pushing the ESD RESET button on the Active portable radio.
4) Repeat this ESD reset, but this time for the ESD[3] physical button inside the electrical control panel. This button is not accessible during nominal operations. It may be used as a back-up access to the ESD functionality.
5) Check the By-pass selector on the Control Panel[4]
6) Turn-ON one of the Portable Radios onboard the receiving tanker. The radio LCD displays the message 'Waiting for Status'. When the radio gets designated as the Active Radio, the LCD displays NOT Active.
7) Turn-on the second portable radio, wait until the radio gets designated as the STAND-BY radio.
8) Monitor on the HMI panel which radio is ACTIVE, READY and that the transfer pump is Active.

HOW TO: Start the offloading operations

1) Tanker radio must press the READY button[3]
2) Press the START transfer button on the HMI panel
3) The offloading transfer pump starts. The HMI displays a transfer in progress animation.

HOW TO: stop the offloading operations

- Press STOP button on one of the Tanker Radios[3], OR
- Press ESD button of the ACTIVE Tanker Radio[3], OR
- Press ESD button on the Control Panel[4] (this button is not supposed to be easily accessible)

HOW TO: restart offloading after an ESD

1) Reset the Control Panel ESD if the Control Panel ESD was triggered[4], OR/AND reset the Portable Radio ESD which triggered the ESD[3,]**Error! Bookmark not defined.**
2) Follow the steps described in **HOW TO: Start the offloading operations**.

---

[1] See **3.4.1 How to trigger the** INHIBIT to temporarily remove one of the Tanker Radios from the control system.

[2] See Tanker Radio

[3] See Control Panel

3. DESCRIPTION OF OMTS INTERFACES

3.1.Tanker Radio

Summary: Offloading cannot start until the [1] Tanker Radios is in READY state.

3.1.1. What is what?

FRONT   BACK
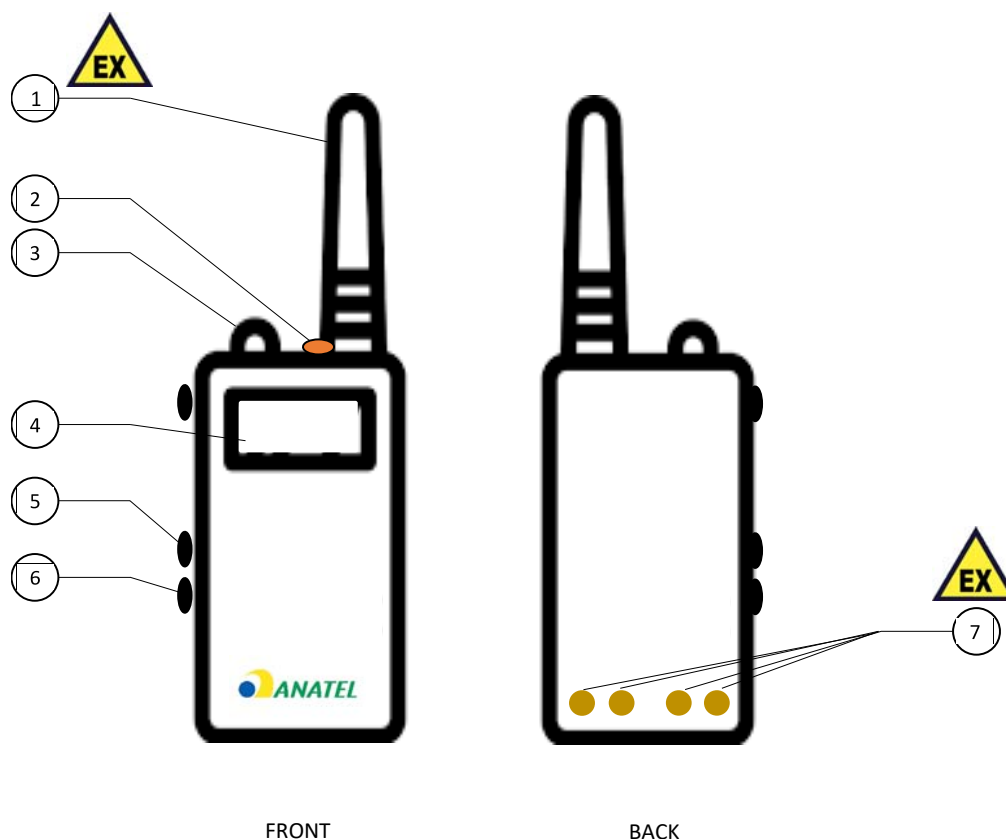
Radio antenna. Do not leave unattached in hazardous atmosphere!

1) ESD button. Press to trigger ESD from this Radio.
2) Power knob. Turn ON and OFF the Radio using this button.
3) LED screen. Displays the current state of the Radio[2].
4) READY/STOP buttons.
5) RESET button. Long press 3s to reset after ES has been triggered.
6) Battery pins. Do not charge the battery in hazardous atmosphere! Do not leave the radio without a battery attached in hazardous atmosphere!

---

[1] See **How to trigger the** INHIBIT to temporarily remove one of the Tanker Radios from the control system.

[2] See **Tanker Radio LED displays**

### 3.1.2. Tanker Radio LED displays

Display	Description	Offloading
NOT READY	This Radio is not READY. Press READY button to enter in READY state.	Cannot start
READY	This Radio is READY, press STOP button to leave the READY state.	Can start
ESD	This Radio has triggered an ESD. Use the RESET button to leave ESD1 state.	Cannot start
OFFLOADING	This Radio is READY and the offloading is in progress. Please note that delays may occur regarding this feedback.	In progress

Figure 1 ESD message on radio LED display.

3.2.HMI (optional)
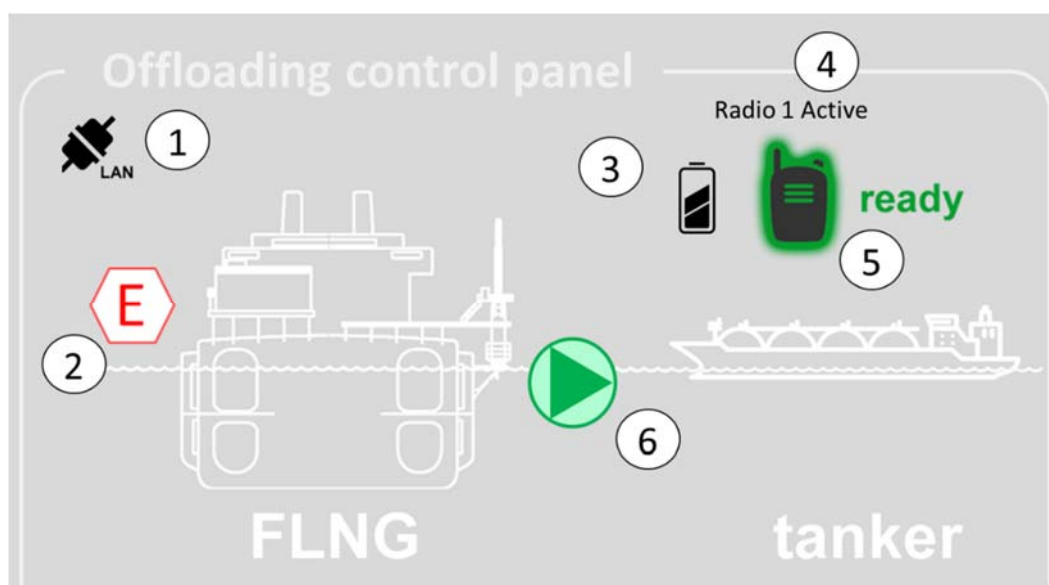
Figure 2 HMI controlling the START/STOP transfer pump when READY Signal

1) HMI is connected to the RTU on the control network
2) Physical ESD switch activated from the Control Cabinet
3) Battery Gage from the Active Portable Radio located on the receiving tanker
4) Active Portable radio (Radio 1 / Radio 2)
5) Tanker Radio is READY State
6) Offloading is ready to start (Tanker Portable Radios is READY, the START Button is visible)
7) Animated when transfer is in progress
8) ESD has been triggered by one of the Active Portable Radio on the tanker
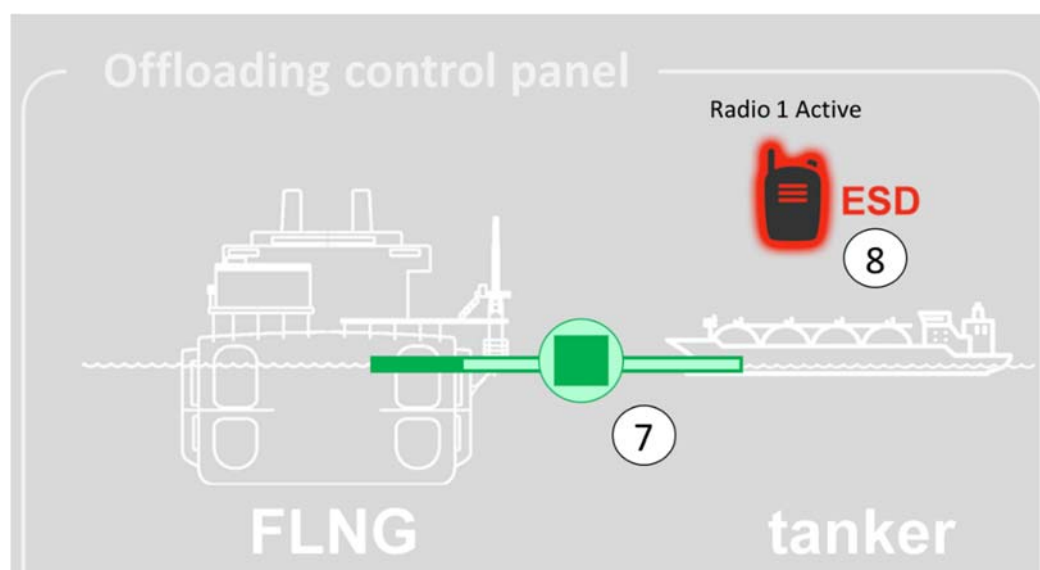
Figure 3 HMI control panel on the FLNG bridge
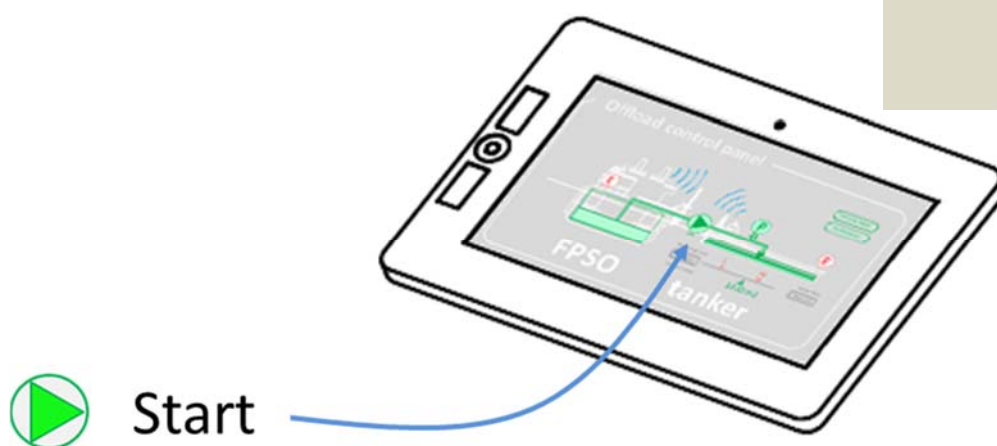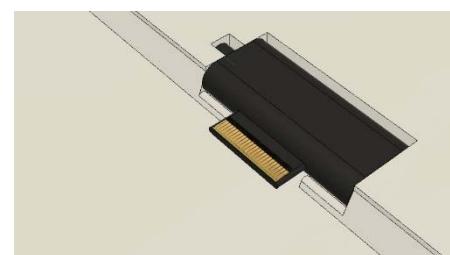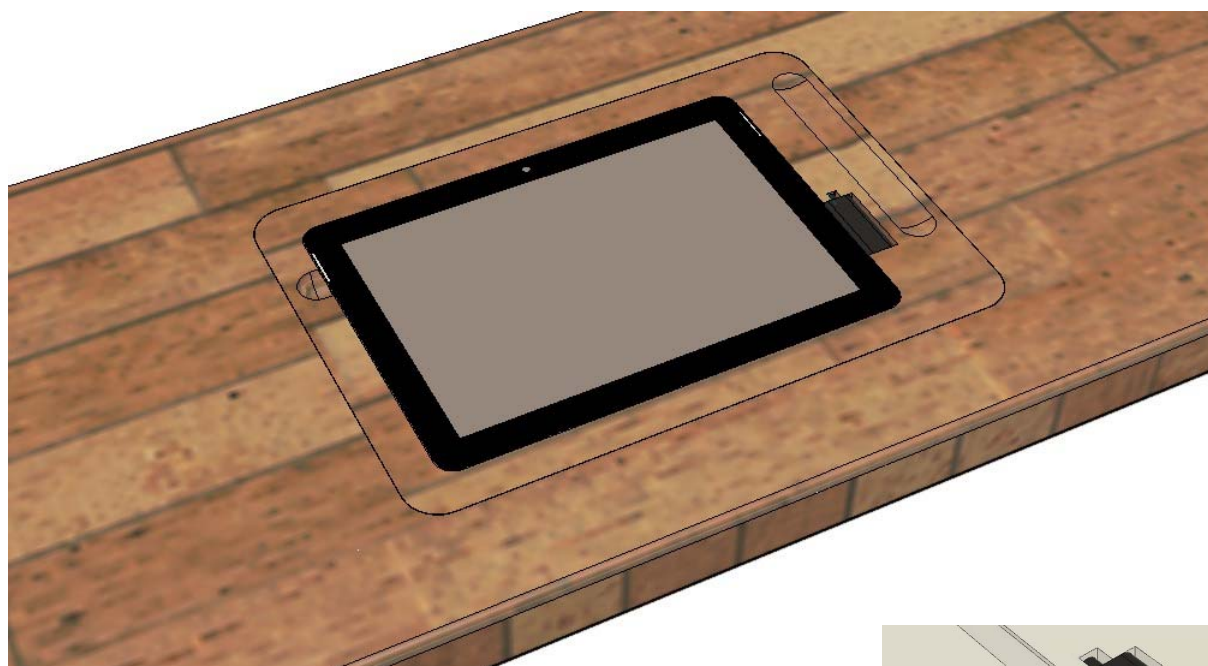
Figure 4 Please note that the START transfer is accessible from the HMI panel

The HMI is usually a good source of information for troubleshooting. For example, the connect/disconnect icon located on the top-left-hand corner of the HMI gives an indication if the control network is consistent.

Ensure that the OMTS control panel is connected to the Operational Network either via WIFI or via ETHERNET cable. As soon as the tablet is positioned inside it birthing docking station, the ethernet LAN connectivity is established via the magnetic plug.

Figure 5 Network online check

Figure 6 Offloading transfer 'Ready to Start'

3.3.Portable Radios States

Figure 7 Portable Radio States

When the Portable Radio is turned-on, the radio boot loader will display the MOTOTRBO logo for a very short while (2s) and immediately after the vessel splash screen for another (2s) before it should switch to its 'Waiting for Status' state. At this stage the portable tanker radio is asking the FLNG Base Station if it should act as "Stand-by" or "Active Radio".
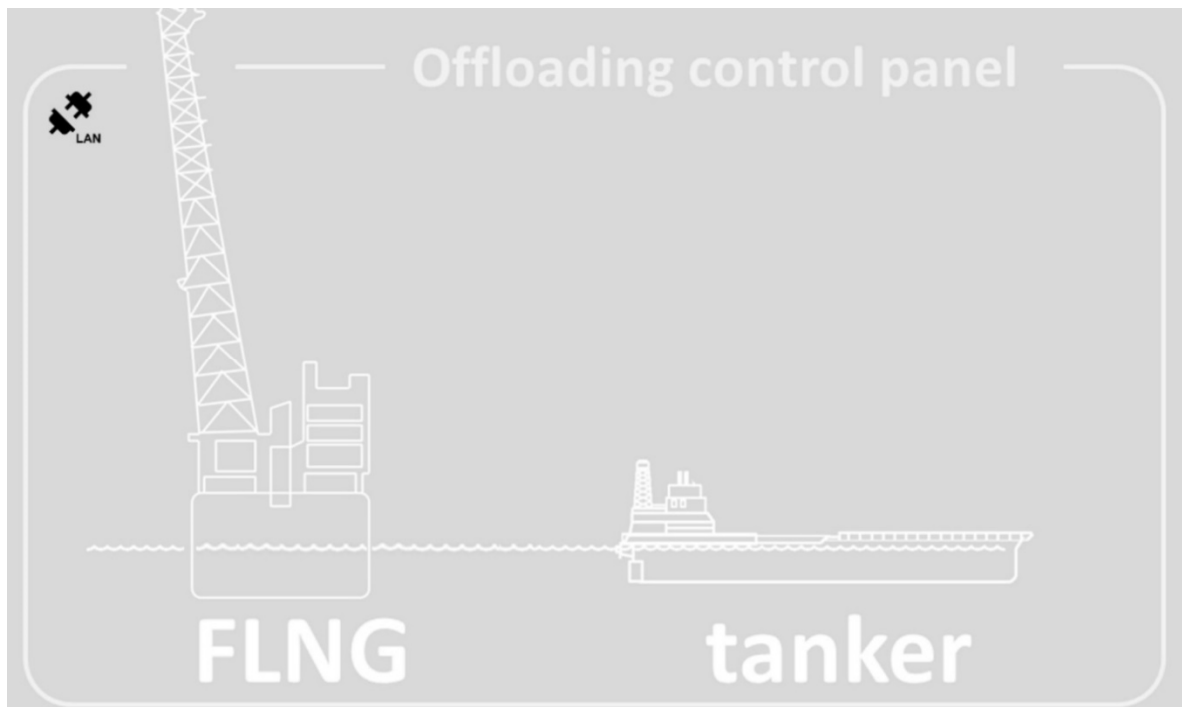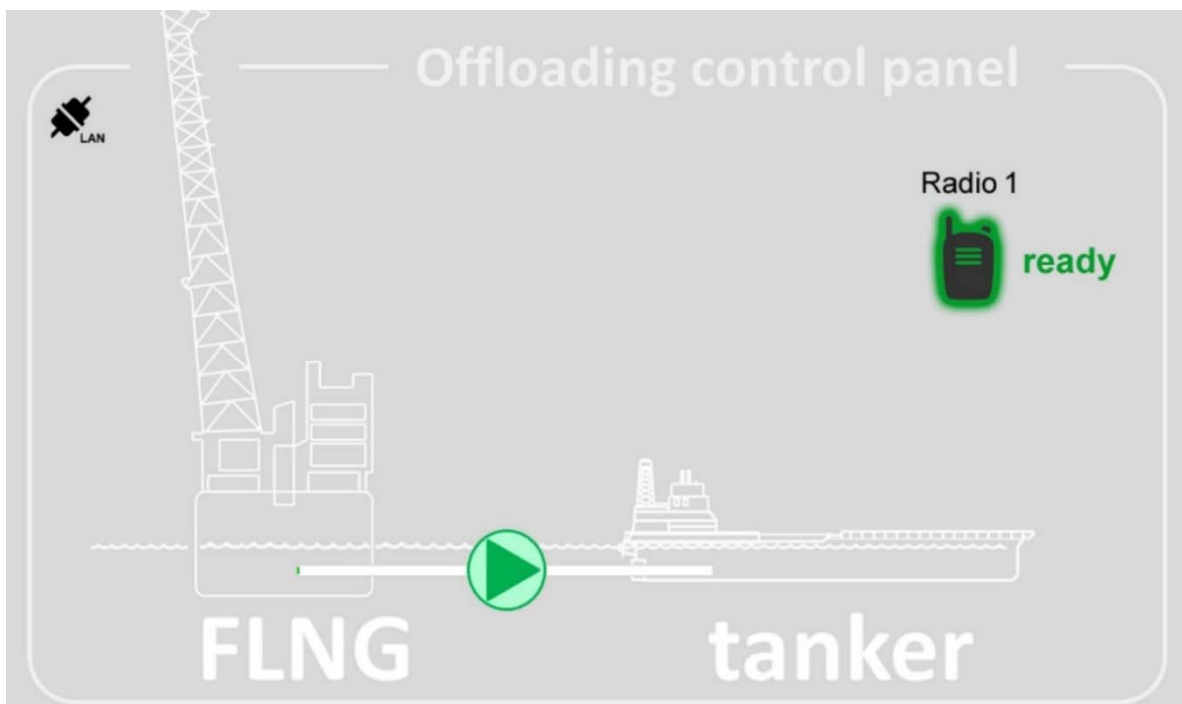
When the Portable Radio is defined as Active, it will automatically switch to its "Not Ready State". It is then up to the operator to switch the portable radio to 'Ready' when ready.

An Emergency Shutdown (ESD) command can be sent at any-time from the Active Radio.

When the ESD button is pressed, the radio will move to a 'Sending ESD…' state until the ESD acknowledged signal is received from the FLNG vessel. The radio then moves to 'ESD' State.

In case of a signal loss, the portable radio moves to 'Loss of Signal' state.

The 'Low Battery' state can take place at any time based on the battery remaining capacity. The radio 'Low Battery' message will show for a second and disappear. The radio will keep full-filling its duties until swapping to the automatic hot swap mechanism replaces the Standby radio with the Active radio.

3.4. Control Panel
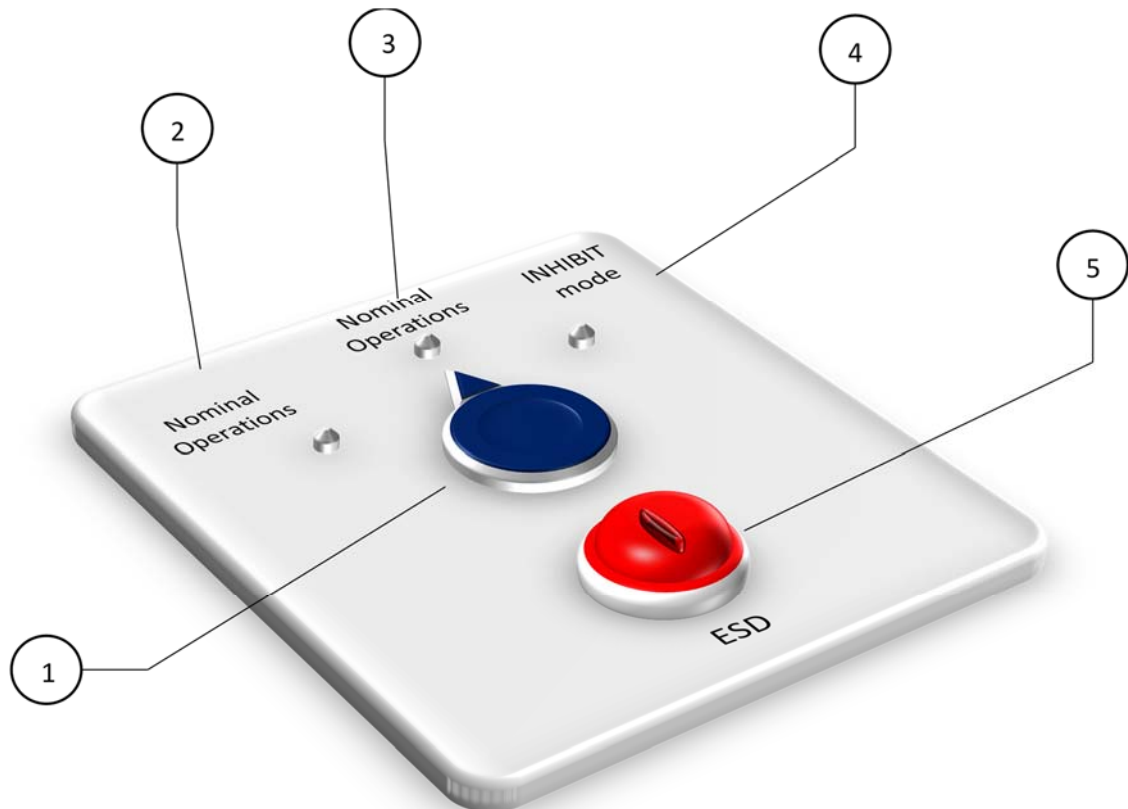
Figure 8 Inhibit Mode versus Nominal Operations (inside FLNG OMTS electrical rack)

1) Inhibit selector
2) Nominal Operations
3) Nominal Operations
4) Inhibit Activated, no ESD propagation. Testing purposes.
5) ESD button. Reset with a key.

3.4.1. How to trigger the INHIBIT from the Control Cabinet (FLNG)

This control panel is located inside the control cabinet of the OMTS 10u rack onboard the FLNG vessel. The inhibit mode is used during testing or commissioning to NOT propagate the ESD to the other systems. The OMTS is usually run from its 'NOMINAL OPERATIONS" mode.

When the INHIBT Mode is active. The Surface-Go tablet computer displays a inhibit mode message onto the HMI.

3.4.2. How to trigger the INHIBIT from the portable radio (tanker)

The inhibit mode can be triggered from the portable radios (tanker) using the keypad of the active radio. The following string should be typed in manually using (T9):

INHIBIT

The corresponding string is: 444 66 44 444 22 444 8

In order to get back to a nominal mode, type in:

NOMINAL

The corresponding string is: 66 666 6 444 66 2 555

3.5.Manual Radio Swap

Whereas radios are programmed to perform an automatic hot radio swap, the operators may want to decide of the most convenient time to perform a swap between their Standby and Active radio. Typically to anticipate a shift of personnel and swap the active radio to the mostly charged radio.

Manual swapping is performed using (T9):

SWAP

The corresponding string is: 777 9 2 7

3.6.Alarm Overview Panel – (optional)

3.6.1 3D-HMI (RIVOPS OPC based software)

Summary: RIVOPS is an OPC client with 3D visualization of alarms and acknowledgement capabilities.
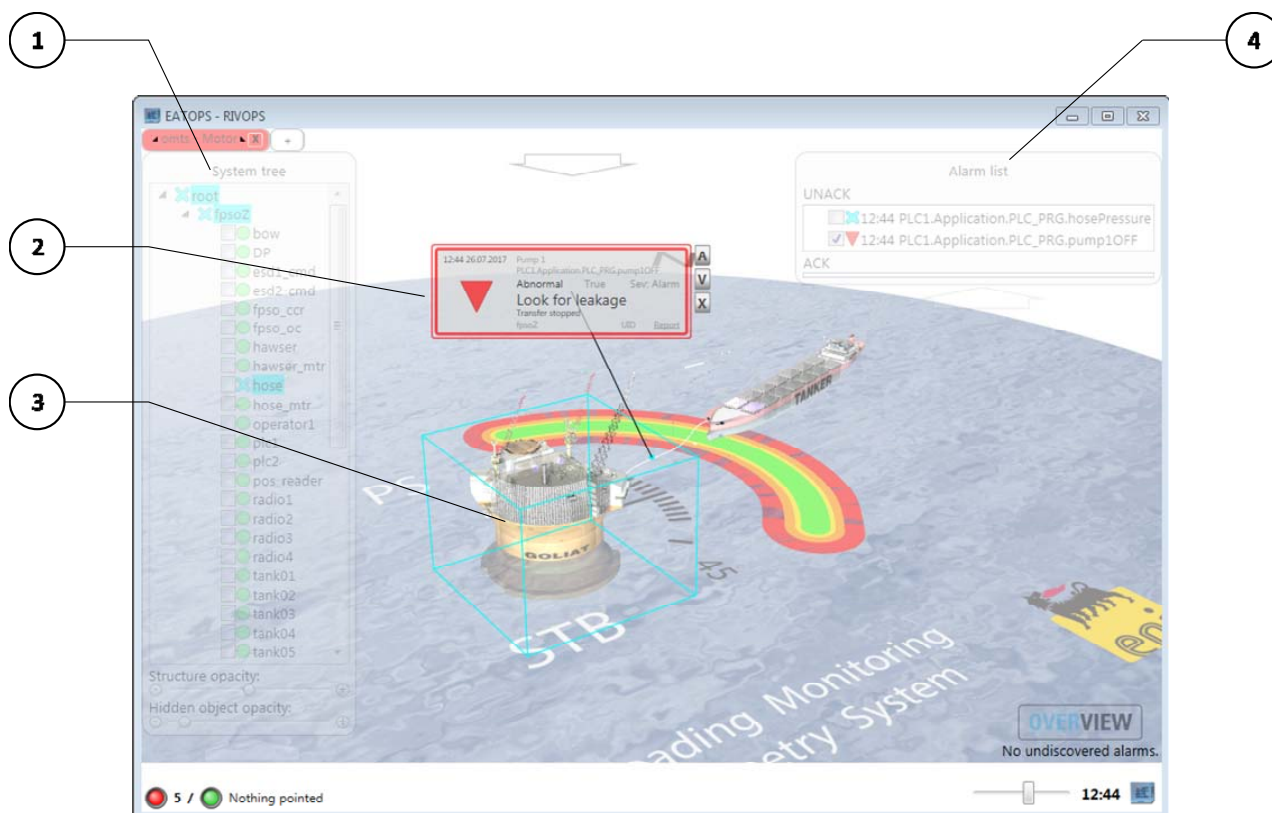
1) System tree with all OMTS relevant systems grouped by zone
2) Alarm box, signalling that an alarm was raised
3) Overview of the FPSO and shuttle tanker
4) Alarm and events list

3.6.2   Severity table

Color	Nature	Ack behaviour
(grey)	Low severity message	No ack required
(green)	Low severity message	No ack required
(yellow)	Medium severity alarm	Ack required
(red)	High severity alarm	Ack required

3.6.3   Alarm messages (NA)

3.6.4 Alarm Acknowledgement
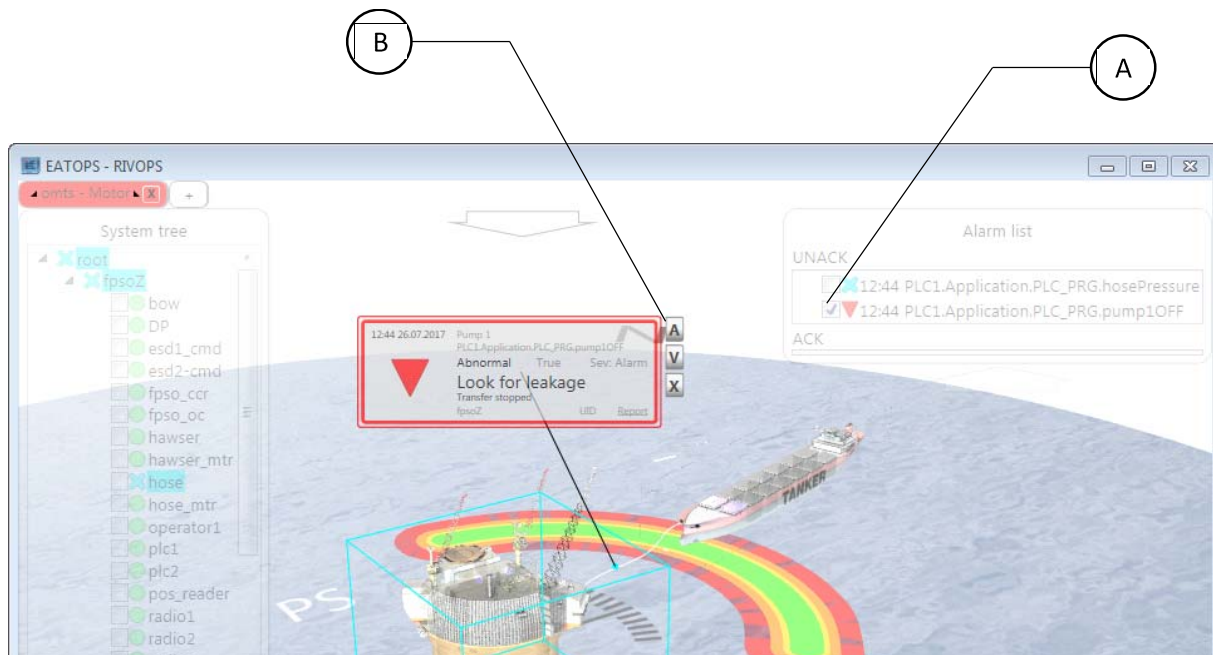
A. Select the Alarm you wish to Acknowledge
B. Click on the Acknowledge button

Notes on acknowledgement:

- Acknowledgements are shared with other OPC clients
- You cannot acknowledge an Alarm which has already been acknowledged

3.7 Alarm List (optional)
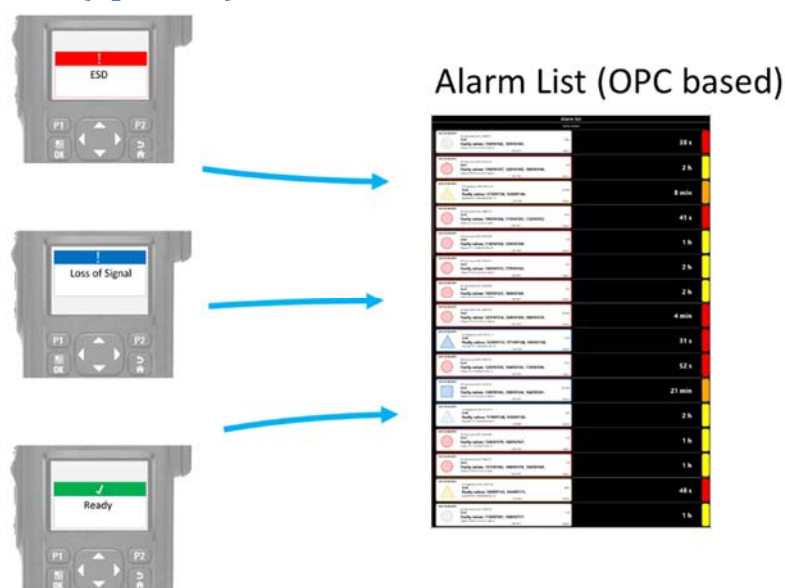
Figure 9 Radio Alarm Messages can be forwarded to a stand-alone alarm list HMI

4 MAINTENANCE

4.1 Radio-battery management

Portable Radios must be fully charged before starting a new offloading operation.

If an active Portable Radio runs out of battery while an offloading operation is in progress:

- Note that offloading operations will automatically stop (change from Ready to Not ready state)
- Hot-swap mechanism will automatically swap the Active Radio with the Stand-by radio.
- Turn-off the low battery radio and bring it back to its charging station inside a non-hazardous atmosphere and turn it back ON again. It will most likely be defined as Standby due to the automatic hot swap mechanism.
- There is not safety lock preventing to resume the offloading operations on one radio only. HOWERVER IT IS STRONGLY ADVISED TO WAIT FOR THE DEAD RADIO TO RECHARGE BEFORE RESUMING OFFLOADING. NB: One could make use of a spare fully charged battery to resume the offloading.
- Resume offloading operations on the standby radio, now defined as active radio.

4.2 Radio replacement

If an Active Portable Radio gets broken or lost while an offloading operation is in progress:

- Note that offloading operations will automatically stop
- Wait for a Radio replacement before resuming offloading operations, OR
- run your operations from one radio only

4.3 System failure

Should a system fault occur during operations, an electrician will start his investigation following the UHF/VHF line looking for a broken antenna, or a power failure or even a network failure. The investigation can be done remotely via the control panel installed inside the control room or via a service computer temporarily connected to the control network. If the fault cannot be diagnosticated or fixed on the sport, it is recommended, considering the small volume occupied by the 10-u rack unit, to host a spare system on-board which could be deployed and act as a replacement unit.

A list of spare parts is available on demand.

4.4 Abnormal behaviour

In case of abnormal behaviour of the system

- Restart all powered Portable Radios
- Power cycle the OMTS rack unit. The total Reboot time is estimated to 6 minutes
- Take a screen capture or picture of the OMTS control panel located inside the control room
- Take a picture of the 10-u rack unit when the PLC is powered
- Send a report to info @ eatops.com

TECHNICAL DATA-SHEET

Offloading Monitoring Telemetry System – OMTS

Exclusive Worldwide Distributor	Datamatik AS
Single CPU with automatic hot-swap	With remote portable ESD control
Dual CPUs with automatic hot-swap	With remote portable ESD and START/STOP
Triple CPUs with automatic hot-swap	With remote portable ESD and START/STOP
DP positioning	Option (available Oct 2019).

Embedded Software Provider	EATOPS Sarl
Reaction time (ESD)	1400ms
Reaction time (loss of signal)	1700ms
Max. distance between Portable Radios and Mobile Radio	2000 m

Tanker Portable Radio

Manufacturer	Motorola Solutions
Reference	DP4801 Ex
Battery autonomy (READY state)	8h
Battery autonomy (NOT READY/ESD state)	12h
Battery charging time	4h
Voice capabilities enabled	No
Weight	420g
Firmware Version	R02.07.01.0000

Master Portable Radio

Manufacturer	Motorola Solutions
Reference	DP4801 Ex
Battery autonomy (START state)	8h
Battery autonomy (READY/NOT READY/ESD state)	12h
Battery charging time	4h
Voice capabilities enabled	No
Weight	420g
Firmware Version	R02.07.01.0000

Mobile Radio

Manufacturer	Motorola Solutions
Reference	DM4400e
Weight	1.8kg
Firmware Version	R02.07.03.0000

Process Logic Controller – PLC / RTU

Manufacturer	Motorola Solutions
Reference	ACE1000 RTU
Reboot-safe	Yes
Firmware	3.5.10.x

2D HMI Tablet (optional)

Manufacturer	Microsoft Inc
Product	Microsoft SurfaceGO (or equivalent)
OS	Windows 10 Pro x64

HMI Client Software (optional)

Manufacturer	3S-Smart Software Solutions GmbH
Product	CodeSysHMI
OS	Windows 10 Pro x64

Alarm Overview Software (OPC based)

Manufacturer	EATOPS Sarl
Product	RIVOPS
OS	Windows 7, Windows 10 Pro 32/64

Alarm List Software (OPC based)

Manufacturer	EATOPS Sarl
Product	Alarm List
OS	Windows 7, Windows 10 Pro 32/64

Alarm Dispatch Software (OPC based)

Manufacturer	EATOPS Sarl
Product	Alarm Dispatch
OS	Windows 7, Windows 10 Pro 32/64

This is the end of this Operator's Manual.

For spare parts orders, please visit us at:

www.omts.datamatik.no