

# TECH PAPER

## NAVIGATION, SIGNAL LIGHTS & CONTROL SYSTEMS

### NAUT-OSV & NAUT-AW COMPLIANCE

#### TEF 4900 COMMANDER

## NAUT- OSV COMPLIANCE

### INTRODUCTION

The development project called Bridge Design Offshore Service Vessels (NAUT-OSV), was led by DnV (Det norske Veritas) and involved two major Norwegian oil companies as well as five Norwegian operators of offshore service vessels. The goal of the project was to enhance the safety and efficiency of the bridge operations on these vessels.

While developing the navigation and signal lights controller TEF 4900 Commander Navigation, Tranberg ensured that the requirements of NAUT-OSV was embedded into the design. The result is that this control system, besides being probably the most sophisticated of its kind on the market, is equipped as standard with the features required for interfacing to the bridge control systems of the NAUT-OSV class.

### TEF 4900 COMMANDER NAVIGATION

The TEF 4900 Commander Navigation system consists of a custom-built, backlit control panel, featuring application-specific buttons for various navigation- and signal lights, plus standard buttons for system on/standby, backlight intensity adjustment, and alarm silence/acknowledge. In addition to the panel, the system consists of a main processor with the application-specific functionality, and several output modules.

The main processor has four monitored 24VDC power supply inputs, connecting up to four independent power supplies for the controller. The main processor also includes two alarm relay outputs and a 24VDC digital input. One relay will be active at any alarm condition, while the other is an alarm silence signal. Alarm conditions may be the loss of one of the power supply inputs, a faulty lantern or fuse, a defective output module or other system errors.

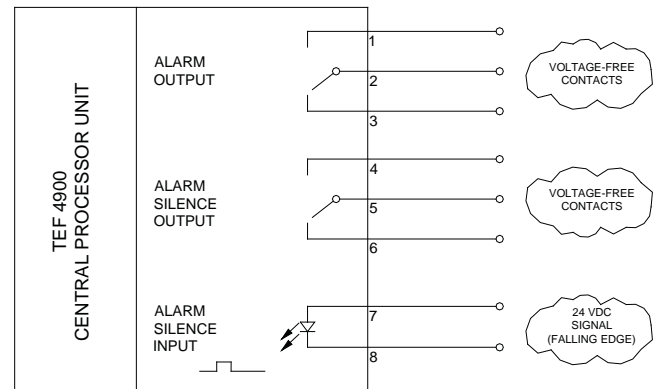
### SYSTEM ACTION IN CASE OF ALARM

When the alarm relay activates, the system will go through several events:

- In case of a power supply loss, all output modules using this supply as main supply for their outputs will automatically change over to the emergency supply. The panel will indicate a power loss with both a visible and audible alarm. Each power supply has a separate error LED in the panel.
- In case of a faulty lantern (lamp, fuse or cable), the alarm buzzer will sound and the button LED corresponding to that lantern will flash and indicate an alarm. The system will automatically change over to a spare lantern, typically within a couple of seconds.
- If an output module is not functioning the alarm buzzer will sound and a LED will indicate the cause of the alarm.
- The user may press the 'alarm silence' button on the panel. This will stop the alarm buzzer in the control panel, and the alarm silence output relay will pulse on and off for about one second. Depending on the type of alarm, the alarm relay will go to its inactive state.
- A 24VDC signal/pulse may be applied to the alarm silence input in the main processor. As the input level goes from high to low

(24VDC to 0VDC), this will trigger the alarm silence signal: The alarm buzzer in the panel will turn off, and depending on the type of alarm, the alarm relay will go to its inactive state.

- The alarm acknowledgement is, depending on the type of alarm, done either by pressing the button signalling an alarm, or by the 'alarm silence' button (for power and system errors). If the fault is recoverable (i.e. it is possible to switch to a spare lantern or an emergency power supply), the alarm relay will deactivate. In this way, the system is able to handle and segregate multiple alarm conditions. If there are no possibilities to recover from the error, the alarm relay will stay activated until the system is set in standby by the 'on/standby' button.



### INTERFACING TO BRIDGE ALARM SYSTEM

The main processor unit of the TEF 4900 Commander Navigation can be connected to a Bridge Alarm System in the following ways:

- The voltage-free contact set of the alarm relay may be connected to the Bridge Alarm System, thereby signaling an alarm condition.
- The alarm silence output relay in the main processor can be used to silence an external audible alarm in the Bridge Alarm System triggered by an alarm condition in the Commander. Approximately one second after the alarm silence button in the panel has been activated, the alarm silence relay output will pulse for one second.
- The 24VDC alarm silence input may be connected to the Bridge Alarm System to allow external equipment to silence an alarm in the TEF 4900 Commander Navigation.

All three connections between the Commander and the Bridge Alarm System are provided with galvanic isolation.

**TRANBERG**®

# NAVIGATION, SIGNAL LIGHTS & CONTROL SYSTEMS, NAUT-OSV & NAUT-AW COMPLIANCE, TEF 4900 COMMANDER

## NAUT- AW COMPLIANCE

### INTRODUCTION

The DnV (Det norske Veritas) class notation NAUT-AW (All Waters), denotes that the vessel is designed for an enhanced navigational safety. An important requirement of this class is to enable the officer of the watch to perform all of the normal bridge functions from a single pilot station.

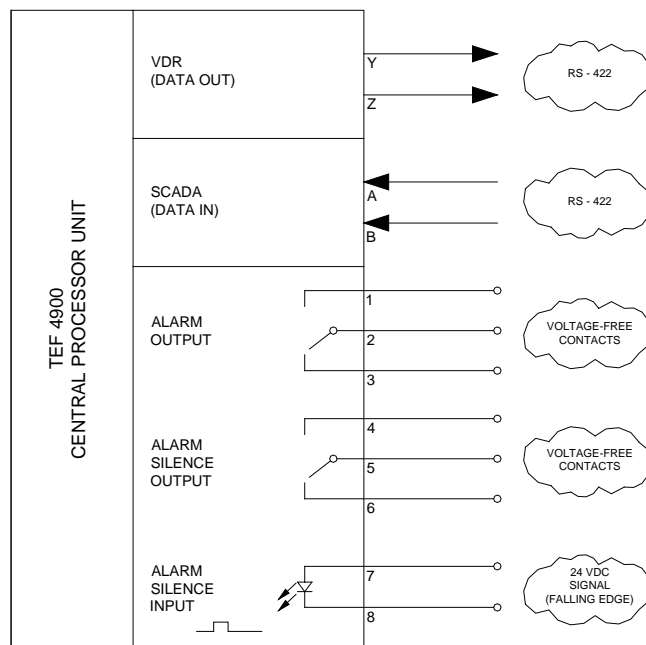
While developing the navigation and signal lights controller TEF 4900 Commander Navigation, Tranberg ensured that the requirements of NAUT-AW was embedded into the design. The result is that this control system, besides being probably the most sophisticated of its kind on the market, is capable of being interfaced to external control systems. Precisely what the NAUT-AW classification calls for.

### TEF 4900 COMMANDER NAVIGATION

The TEF 4900 Commander Navigation system consists of a custom-built, backlit control panel, featuring application-specific buttons for various navigation- and signal lights, plus standard buttons for system on/standby, backlight intensity adjustment, and alarm silence/acknowledge. In addition to the panel, the system consists of a main processor with the application-specific functionality, and several output modules.

The TEF 4900 Commander Navigation offers the following functions corresponding to the NAUT-AW classification:

- **User Interface:** A backlit and compact control panel for both navigation lights and signal lights, including all spare lights. This reduces stress on officers, as the user interacts with one single panel with clearly visible and readable text and graphics.
- **Automation:** When a lantern fails, the Commander system will, besides notifying the officers by audible and visual alarms, automatically turn on spare lanterns. This significantly increases safety.
- **Interface:** The Commander is equipped with a serial interface for communication with external equipment. Typical devices it can interface with are: VDR (Voyage Data Recorder), SCADA (Supervisory Control and Data Acquisition) system, and Bridge Alarm Systems.
- **Communication:** The data to and from the Commander are in accordance with IEC 61162 (NMEA). The sentences consists partly of a proprietary type, giving a detailed control and status of power supplies and outputs, and partly of standard ALR and ACK sentences.



### REMOTE CONTROL CAPABILITIES

The TEF 4900 Commander Navigation interfaces with external equipment through a galvanically isolated 4-wire serial RS-422 port with a baud rate of 38400 bps. The galvanic isolation further increases the integrity of the system.

Some of the remote control capabilities:

- Any button in the panel may be remotely controlled; either by turning on a main lantern, its spare lantern, or turn both off.
- It is possible to turn off the entire system by one single remote command. Likewise, the system may be remotely turned on, in which case all lanterns that previously were on, automatically will be turned on again.
- Dimming level of e.g. Panama signal lights may be remotely adjusted.
- The backlight intensity of the control panel may be remotely adjusted.
- Alarm silencing and system operation may be remotely controlled and monitored.

The protocol formats are described in detail in the user manual for the TEF 4900 Commander Navigation.

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