META-Automation

REMOTE CONTROL & PROPULSION SYSTEM "M/Y ALEXANDRA K"

TYPE: SMK 9000

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1. General System Description

The SMK-9000 system is a modular built platform for

-Alarm- Monitoring of all measured parameters for main engines, electrical engines, pumps, power systems etc.

All parameters can be recorded, printed out and resolve to a fully documented events history.

Due to the modular architecture the system monitoring values are unlimited to a certain quantity.

-Safety and Shut-Down System on the base of the monitored critical system parameters (e.g. main engine water temperature, lubrication pressure, overspeed etc).

In case of exceeding the alarm values a predefined amount of parameters can lead to intervention to the propulsion plant like “engine shut down” or cut up (overspeed protection).

-Remote Control for Propulsion system (-engines)

This system part is designed for main engines propulsion control and adaptable to different requirements. The main functions include speed control and gear control generating the necessary signals for the engine-control and gear-control interfaces.

Depending on customer demands all three system parts of SMK-9000 can be integrated to a syatem fot total vessel control or each part can be installed separately.

2. System Description for Remote Control and Propulsion System for M/Y “ALEXANDRA K”

The SMK-9000 System for remote and propulsion control consists of three (3) control stands -Bridge Stand, (Front-) Flying Bridge Stand and Mobile (Rear-) Bridge Stand-.
The Rear Bridge Stand is a special designed mobile stand with full functionality. This stand also includes full Bow Thrust Control and Engine Stop function.

2.1 System Requirements :

Power Supply : 24Vdc (tolerance 30-/-18 Vdc)
Ambient Conditions : 0 – 60 oC, 95% rH (non condensing)
Protection : System Components IP 54, Console Stands IP56
Signals level :
Analogue I/O 0-10 V, +/- 10V, +/- 5V, 0/4 – 20 mA
Digital I/O 24 Vdc
Load of Digital I/O <=0.5 A
Resolution of Analogue Signals : 10, 12 or (14 bit Input)
Quantity of AIOs for ALEXANDRA K : 4 @12 bit
Quantity of DIOs for ALEXANDRA K : 40 @ 24V

The system architecture of the SMK-9000 system for
MY “ALEXANDRA K” is depicted in

- DRWNo 96573_19.

The system comprises
- a Bridge Stand Panel

- DRWNo 96573_20

-a Flying Bridge Stand Panel

- DRWNo 96573_21 and

-a Mobile Stand Panel

- DRWNo 96573_22.

The cabling Topology across the different Stands is depicted in

- DRWNo 96573_0 and
- DRWNo 96573_1.

3. Engine Room

The Engine Room-Equipment conists of a Terminal Box (ER Box).
In this Box end all control and feedback signals from the Electronic Unit (EU-Unit placed in the area of the Bridge Room) to/from the Linear Motors for speed Control for both main Engines and the Reverse Gear electrical Interface for Gear Engage Ahead/ Engage Astern and Disengage/Neutral Position.
All signals for Engine and Reverse Gear Control are isolated through high Power Relays (capacity 30 A).
The Engine Room installation is depicted in

- DRWNo 96573_2 (Wiring Engine & Reverse Gear Port-side)
- DRWNo 96573_3 (Wiring Engine & Reverse Gear Starboard-side)
- DRWNo 96573_4 (ER-Box wiring for Engine Port-side)
- DRWNo 96573_5 (ER-Box wiring for Reverse Gear Port-side)
- DRWNo 96573_6 (ER-Box wiring for Engine Stbd-side)
- DRWNo 96573_7(ER-Box wiring for Reverse Gear Stbd-side)

4. Bridge Room – Bridge Control Station

In the Bridge Room are placed

I) The Electronic Unit of the Remote Control System consisting of two (2) independent identical Electronic Units for Port- and Stbd side.

The Wiring of the EU-Unit to the ER-Box in Engine Room is depicted in

- DRWNo 96573_8 (for the Port-Side) and
- DRWNo 96573_9 (for the Stbd-Side)

II) Two (2) pieces remote control apparatus for bridge consisting of:

Per each engine:

- One (1) piece “hand throttle” for speed control.
- One (1) piece illuminating indicator, indicating the control state (Local/Remote).
- One (1) piece illuminating push-button for demand of control transfer to bridge (“take over” request).

The indicator starts blinking while the user has pressed the button, demanding control for bridge station, and lights steadily as soon the throttles are in same position as the throttles in the engine room.

Once synchronized, and the indicator keeps steadily illuminating the control is overtaken to the Bridge Stand.

- Two (2) pieces illuminating indicators, indicating the Reverse Gear Engaging (Forward/AH and Backward/AS Trip .

- a Push_Button for Lamp Test (24V) .

All these elements are integrated in the throttle tableau for Bridge Station.

A junction box/Terminal Block positioned under the tableau connects the wires coming from the EU-Unit with the wires from the Bridge Stand.

The Bridge Station to the EU Wiring is depicted in

- DRWNo 96573_14

5. Flying Bridge Control Station

The Flying Bridge Control Station comprises :

Two (2) pieces remote control apparatus for flying bridge installation consisting of :

Per each engine:

- One (1) piece “hand throttle” for speed control.
- One (1) piece illuminating indicator, indicating the control state (Local/Remote).
- One (1) piece illuminating push-button for demand of control

transfer to front flying bridge (take over request). The indicator starts blinking while the user has pressed the button, demanding control for bridge station, and lights steadily as soon the throttles are in same position as the throttles in the engine room.

Once synchronized the indicator keeps steadily illuminating and the control is overtaken to the front Flying Bridge.

- Two (2) pieces illuminating indicators, indicating the Reverse Gear Engaging (Forward/AH and Backward/AS Trip).
- a Push_Button for Lamp Test .

All these elements are integrated in the throttle tableau for Flying Bridge station.

A Junction Box /Terminal Block positioned under the tableau connects the wires coming from the EU-Unit with the wires from the Flying Bridge Stand.
The Flying Bridge Station to the EU Wiring is depicted in

- DRWNo 96573_15

6. Mobile Bridge Control Station

The Mobile Bridge Control Station comprises :

Two (2) pieces Remote Control Stand for additional Bridge installation connected on demand with a 12m cable.and comprises:

I) Per each engine:

- One (1) piece “hand throttle” for speed control.
- One (1) piece illuminating indicator, indicating the control state (Local/Remote).
- One (1) piece illuminating push-button for demand of control

  transfer to front flying bridge (take over request). The indicator starts blinking while the user has pressed the button, demanding control for bridge station, and lights steadily as soon the throttles are in same position as the throttles in the engine room.

  Once synchronized the indicator keeps steadily illuminating and the control is overtaken from the rear flying bridge.
- Two (2) pieces illuminating indicators, indicating the Reverse Gear Engaging (Forward/AH and Backward/AS Trip).
- a Push_Button for Lamp Test .

All these elements are integrated in the throttle tableau for Mobile Bridge Control Station.

II) A Bow Thrust Control Tableau for full Bow Thrust Control
(70%, 85% and 100% for Port- Stbd-Side Maneuvering and Stop)

III) For each Engine a dedicated Engine-Stop Button for Engine Shut Down.

The Wiring of Bow Thrust Control and Emergency Stop is depicted in

- DRWNo96573-17
- DRWNo96573_18

A dedicated Junction Box positioned in an outdoor Cabin connects the wires coming from the engine room with the wires from the Mobile Control Station.

The Mobile Bridge Station to the EU Wiring is depicted in

- DRWNo 96573_16

7. Electronic Unit Wiring

The Electronic Control Unit of the system is build from two identical PLC Units one for each side.
This unit is activated from Engine Room by switching the main Switch in the front door of the ER-Box from “Local” to “Remote”.
Once active each unit performs a self test (ca 15 ms time periode).
Passing the test means that all electronic unit components are functioning properly and the system is ready for control.
The wiring of the unit and its connection to the different control stations is depicted in

- DRWNo 96573_10
- DRWNo 96573_11
- DRWNo 96573_12
- DRWNo 96573_13

8. Remote Propulsion Control SMK-9000 Characteristics for M/Y “ALEXANDRA K”:

- Speed-Control/RPM-Control from three (3) stations of the vessel via hand throttles (levers).
- Control transfer from one station to another only if the hand throttle of the control demanding station is synchronized with the throttle position in the engine room, assuring that way always safe and smooth control transfer between the stations.
- The system offers the fail-safe advantage in case of electrical black out to easily disconnect the electrical components and drive the vessel manually from engine room station.

9. Spare Parts List

Itm	Description	Qnty	S/N Designation
1	Electronic Unit CPU	2	98573-6ES7314
2	MMC Memory Unit	2	98573-6ES7953
3	Electronic Unit Digital I/O (16X16)	2	98573-6ES7323
4	Terminal Connector Element DIO (40X)	2	98573-6ES73392
5	Electronic Unit Analog I/O (4X2)	2	98573-6ES7334
6	Terminal Connector Element AIO (20X)	2	98573-6ES73392
7	Constant Power Supply 10V	2	98573-KSQ-10V
8	Power Relays I/O Isolation	8	98573-BUERK-27G3052
9	Linear Motor Main Engine Sonderausfuehrung 0	2	98573-ELER--753887801
10	DC-Fan Motor	1	98573-CONR-538-098-14
11	RU/UI- Tranmitter	6	98573-NOR-SA502-2G
12	Dimmer Elements, IP54	3	98573-NOR-SAR011
13	Bridge Control Panel	1	98573-NOR-FPNFDK03-V1
14	Flying Bridge Control Panel	1	98573-NOR-FPNFDK03-V2
15	Mobile Commander Panel	1	98573-NOR-FPNFDK04
16	Fuse Elements 5X20 Traege	8	98573-NOR-9321001

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