NAVI-SAILOR 4000/4100 ECDIS

(VERSION 2.00.009)

INSTALLATION GUIDE

This document contains:

PREAMBLE

WARNINGS AND CAUTIONS

Service engineers intend this document for use only, providing installation or service for Transas Ltd. navigation systems, and holding Transas Ltd. Certificates for aforementioned works.

WARNING!

Lethal Voltage Hazard!

Inside the equipment and in the cables lethal voltage hazard is present. When access covers are removed, lethal voltages may be exposed. Some capacitors used in the equipment, take several minutes to discharge their stored voltages after the switching OFF, this is a lethal voltage hazard. Always set the supply switch-fuse to OFF and remove the fuses, before removing the access covers of the equipment.

Cables must be connected to the power supplies only provided with grounding.

Cables must not have damaged insulation and must exclude contact with parts conducting current.

WARNING!

Health Hazard!

When cleaning the inside of the equipment, take care not to inhale dust. The dust is a temporary health hazard, depending on individual allergies.

Units radiate heat and must be installed in such way that free air circulation is ensured.

It is necessary to strictly follow the requirements set forth in the operation manuals for computers and system's peripheral devices.

CAUTION!

Electrostatic Sensitive Devices (ESSDs)!

The equipment may contain ESSDs. Take care not to damage these devices by discharge of electrostatic voltages.

The guarantee will not apply if the system has been used improperly, i.e. the system is found to have been operated in a manner other than that set out in the user manuals, or if the system has been connected or adjusted in ways other than described and recommended in technical and/or installation manuals.

Users shall pay special attention to the following, to avoid damaging the system and voiding the guarantee. Users shall not:

- Expose the system to any liquids, including but not limited to tea, coffee, juices, soft drinks or chemical cleaners;
- Expose the system to fire, or to temperatures that exceed the normal operating conditions specified for the system;
- Expose the system to improper or insufficient ventilation by obstructing ventilation holes, fans etc, or by mounting the equipment in such a way that proper ventilation cannot be achieved;

- Expose the system to incorrect line voltages, voltage spikes, or use incorrect fuses;
- Replace whole or part of the system or components of the system with parts not specified, approved or certified by Transas or its sub manufacturers, without prior Transas written approval;
- Expose the system to violent movements, excessive vibration or any situation where physical damage results;
- Connect any type of storage device or data media that contains a virus or other malware that can damage the system. It is the customer’s obligation to check prior to connection that any such device or media does not contains any virus or malware;
- Install any applications or software on the system besides what has been supplied by Transas, without prior written approval from Transas.

HOW TO USE THIS MANUAL

This manual is intended for use by the NS 4000 ECDIS Operator or Service Engineers. It should be used in conjunction with other related documents (for the full list). The structure of this manual and layout of the pages can help you to find the information that need.

Chapter 1	Hardware Installation.
Chapter 2	System Settings.
Chapter 3	Technical Specification.
Chapter 4	Interface Capabilities.
Annex A	Cisco PIX-501-BUN-K9 Firewall Installation and Adjustment.
Annex B	Additional Settings for Navi-Conning 4000.
Annex C	Commissioning Table.
Annex D	Additional Information on Sensors Connection.
Annex E	Upgrade RS3 and RS4 to RS6 Computer.
Annex F	RS4v2 Computer Based Hardware.
Annex G	Diagrams.

LIST OF DOCUMENTS

Navi-Sailor 4000/4100 ECDIS (v. 2.00.009). User Manual.

Navi-Sailor 4000/4100 ECDIS (v. 2.00.009). Functional Description.

Navi-Sailor 4000/4100 ECDIS (v. 2.00.009). Additional Functions.

Navi-Sailor 4000/4100 ECDIS (v. 2.00.009). Quick Reference.

Navi-Sailor 4000/4100 ECDIS (v. 2.00.009). Installation Guide.

Navi-Sailor 4000/4100 ECDIS (v. 2.00.009). Utilities.

Navi-Sailor 4100 ECDIS (v. 2.00.009). Special Functions.

ABBREVIATIONS IN USE

- AIS – Automated Identification System;
- ARPA – Automatic Radar Plotting Aids;
- COG – Course Over Ground;
- CPA – Closest Point of Approach;
- ECDIS – Electronic Chart Display Information System;
- ENC – Electronic Navigational Chart;
- GPS – Global Positioning System;
- HDG – Heading;
- IEC – International Electrotechnical Commission;
- IHO – International Hydrographic Organization;
- IMO – International Maritime Organization;
- MFD – Multi Functional Display;
- NAVTEX – Navigational Telex;
- NS – Navi-Sailor;
- OS – Operating System;
- RAM – Random Access Memory;
- SOG – Speed Over Ground;
- UPS – Uninterruptible Power Supply;
- UTC – Universal Time Coordinated;
- WP – Waypoint;
- WS – Workstation;
- XTD – Cross Track Distance.

PRINTING HOUSE CONVENTIONS

Sample of notation	Usage comments
NAVI-SAILOR 4000/4100 ECDIS (V. 2.00.009). FUNCTIONAL DESCRIPTION	To highlight names of documents
Chapter 3	To highlight sections of a document
ECDIS	To highlight, in a printed document, user interface elements and the ECDIS task objects
`Setup.exe`	To highlight messages, commands, files, and other Windows OS information
<Enter>	To highlight names of keyboard keys
“Tasks”	To highlight names of windows, pages, buttons, etc.
START	To highlight menu items
C:\SPOSROUTE	To highlight a path to the menu, file, etc.

CHAPTER 1

Hardware Installation

NS 4000 MFD HARDWARE AND SOFTWARE REQUIREMENTS

ATTENTION!

The use of this computer for other purposes is discouraged. Other programs loaded in RAM may adversely affect the video plotter's operation.

Hardware Requirements

- PC – RS6 Computer (see paragraph **RS6 Dedicated Computer** of the **Chapter 3**):
  - CPU:

    CPU1 Intel® Core™2 CPU T7400 2.16 GHz;
    CPU2 Intel® Core™2 CPU T7400 2.16 GHz.
  - RAM: 1 x DDR2 SO-DIMM 2 Gb;
  - Video: NVIDIA GeForce 9600M GT (512 MB);
  - Storage: Fujitsu MHV2080BH 80GB G2;
  - Devices with removable storage: Optiarc CD-RW CRX880A.
- Monitors (see paragraph **Transas Monitors** of the **Chapter 3**): Jakob Hatteland LCD Maritime Multi Displays (MMD);
- Keyboards (see paragraph **Transas Dedicated Keyboards** of the **Chapter 3**): ES6/ES3/ES4 Dedicated Keyboards with Trackballs;
- Uninterruptible Power Supply Unit (see paragraph **Uninterruptible Power Supply Unit UPS6** of the **Chapter 3**): UPS6.

Operational System Requirements

Operational System – Windows XP Professional English version Service Pack 2 + DirX 9.0.

WORKSTATIONS INSTALLATION

The NS 4000 ECDIS MFD Workstation consists of the following elements:

- RS6 Computer;
- TFT Monitor;
- ES6 Keyboard with Trackball;
- Radar Integrator Board RIB6;
- Connection Board X1 (optional);
- Uninterrupted Power Supply UPS6 (optional);
- Data Collector Unit DCU6 (optional);
- Ethernet Switches Moxa EDS-305/308/316 series (optional);
- WAGO Modules for Navi-Conning (optional).

Dongle Installation

After the computer has been mounted securely in its place, connect the dongle to the computer's printer port, as marked "DONGLE" (see picture below).
The dongle should be connected to the printer port of a personal or industrial computer before the software installation.

Fig. 1. RS6 LPT port for the dongle

The NS 4000 ECDIS MFD System will not operate unless the dongle is connected to the computer. Description of the dongle is presented in **Chapter 3** of this document.

RS6 Computer

The basic component of Workstation is the RS6 Computer.

Specification of RS6 Computer is presented in **Chapter 3** of this document.

Layout of RS6 Computer connectors for Workstation is described in drawings "RS6 Computer. Connectors layout" enclosed in **Annex G** of this document.

Transas ES6 Dedicated Keyboard with Trackball Installation

Specification of ES6 keyboard with trackball is presented in **Chapter 3** of this document.

For connection ES6 keyboard with trackball to RS6 computer see diagrams enclosed in **Annex G** of this document.

ES6 Keyboard Configuration Switch

ES6 keyboard connected to computer can work in following master modes: ES6 or ES3. For position of the Configuration switch and connections to the RS6 computer in the different master modes see table below:

Table 1. ES6 keyboard master modes

Master modes	Configuration switch position	Connection to the computer
ES6 keyboard	8	USB
ES3 keyboard	0	PS/2 keyboard PS/2 mouse Com port RS232

Configuration switch settings 1–7 designates CAN network node addresses when keyboard is used as an ES6 slave (secondary) keyboard.

ES6 Keyboard Connections

CAN

Termination resistor is selectable by jumper. Both ends of the CAN network must be terminated with 120 ohm resistor.

Node number is selectable 0–7 by jumpers (Configuration switch).

Node number 0 is considered master node, and must be selected for the keyboard connected to PC by PS/2 or USB. This must be true even if only one node exists.

Information received by the master from the PC is sent out on the CAN-bus, and slave units will act accordingly (indicators on/off etc.). Information received by the master from the CAN-bus will be transferred to the PC if there is no risk for misinterpretation (e.g. if any key is down, no keys on other keyboards may be sent to PC).

Units with node numbers 1–7 are considered peripheral (slave) units.

Data from the keyboard and PS/2 device port is transferred to the CAN-bus. Data from the CAN-bus (regarding indicators, background light etc.) is received and action is taken.

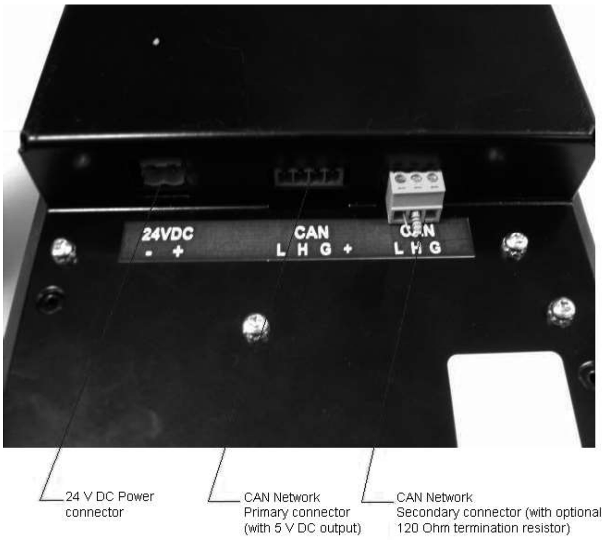


Fig. 2. ES6 keyboard. View of 24 VDC and CAN connectors

RS232

Data from the PC received by the master will be transferred to the CAN-bus and also handled locally.

Data regarding function keys and encoders will be sent to the CAN-bus by slaves and to the RS232 port by the master.

PS/2 Device Ports

The keyboard may connect to an external pointing device (e.g. trackball or joystick) by a PS/2 port.

Data received on this port will be transferred to the PS/2 mouse port connected to the PC if node number 0 is set or to the CAN-bus if node number 1–7 is set. If node number 0 is set but no PC is connected to the PS/2 mouse port, data will be transferred via the USB port if PC connection is established.

USB

Pointer data from CAN-bus and PS/2 device port will be transferred to USB port if node number 0 is set and no PC is connected to PS/2 mouse port.

Keyboard data from CAN-bus and keyboard matrix will be transferred to USB port if node number 0 is set and no PC is connected to PS/2 keyboard port.

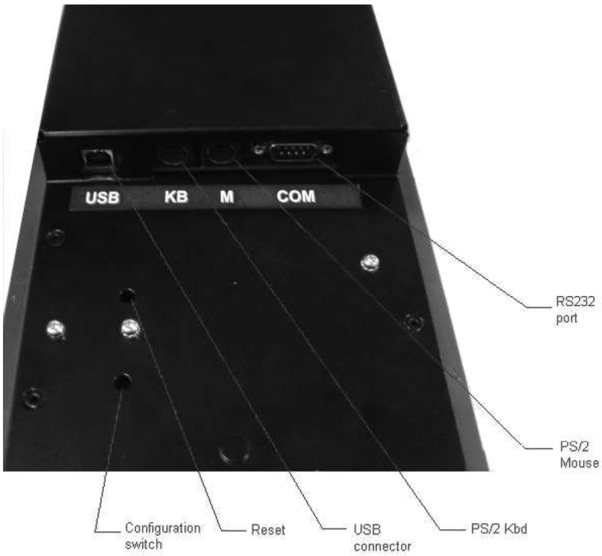


Fig. 3. ES6 keyboard. View of USB, PS/2 and RS232 connectors

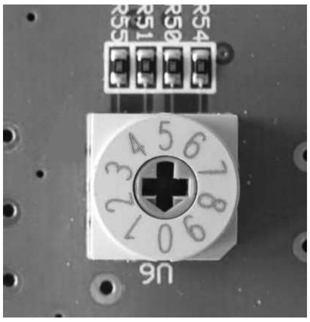


Fig. 4. ES6 keyboard. View of Configuration switch

Trackball Connections

The ES6 Trackball can be connected using the CAN Interface to a CAN master (the ES6 keyboard) or using the USB Interface to connect to a computer's USB Host.

Switch 4 on the DIP-Switch is used to set CAN (switch OFF) or USB (switch ON) interface active. Switch 1–3 set CAN node address (must be in range 1–7).

USB uses a USB-B contact to connect to the USB Host and CAN uses a 4-pin Phoenix contact for CAN-Bus IN (supplied 5 VDC) and a 3-pin Phoenix contact for CAN-Bus OUT.

It is possible to supply power by USB port even if CAN interface is selected.

Both ends of the CAN network must be terminated with 120 ohm resistor.

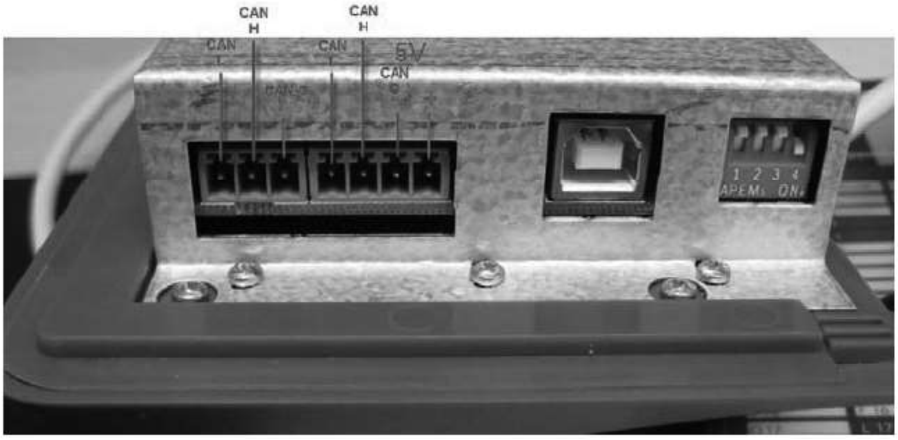


Fig. 5. ES6 Trackball. View of CAN, USB connectors and DIP-Switch

Radar Integrator Board RIB6

Specification of RIB6 is presented in **Chapter 3** of this document.

ATTENTION!

Check that technical characteristics of the connected equipment match characteristics of the RIB6 Input/Output signals specified in **Chapter 3**, section **Hardware Technical Specification**, paragraph **Radar Integrator Board (RIB6)**, item **Electrical Characteristics**.

Cables

Cables are run and installed in accordance with the cabling schedules.

RIB6 is connected with the Ethernet ports of RS6 Computer by means of a standard category 5 screened cables used in Ethernet 10/100/1000 Mbit networks. The cable contains 4 twisted pairs within the common screen and has RJ-45 connectors on both ends. Connection of cable cores with the connector contacts is identical on both sides.

External lines of Video and Trigger signals to the RIB6 are connected by means of coaxial cables with BNC connector plug.

External lines of Bearing, Heading, RS 422 Control signals to the RIB6 are connected by means of screw connectors. Any types of cables with a wire cross section of up to 1.5 mm^2 can be used. In case of considerable length of external cables, a screened cable is recommended.

Connections

For connection of RIB6 to some radar types see diagrams “Connection of RIB6 to Some Radar Types. Connection Diagrams” enclosed in **Annex G** of this document.

- 24 V nominal supply voltage: use connector X11 (pin 1 is minus, pin 2 is plus, see);
- Ethernet port 1:
  - Use connector X4 (IP: 10.8.1.209, Netmask: 255.255.255.0, Gateway: 10.8.1.240);
  - This port can be used after Linux has booted. It will send out video data and can receive a TCP connection on port 4172 (Max 1 connection globally for RIB6).

- Ethernet port 2:
  - Use connector X5 (IP: 10.8.2.209, Netmask: 255.255.255.0, Gateway: 10.8.2.240);
  - This port must be used for firmware upgrades. (It is possible to use Port 1, but a few extra commands are needed);
  - This port can be used after Linux has booted. It will send out video data and can receive a TCP connection on port 4172 (Max 1 connection globally for RIB6).
- Video:
  - Connect to J3;
  - Termination can be selected using “SW5”. The following combinations are possible:

50 Ohm	1: ON	2: OFF	3: OFF	4: OFF;
75 Ohm	1: OFF	2: ON	3: OFF	4: OFF;
1,2 kOhm	1: OFF	2: OFF	3: ON	4: OFF.

- Trigger pulse:
  - Connect to J2;
  - Termination can be selected using “SW2”. The following combinations are possible:

50 Ohm	1: OFF	2: ON	3: OFF	4: OFF;
75 Ohm	1: OFF	2: OFF	3: ON	4: OFF;
1,2 kOhm	1: OFF	2: OFF	3: OFF	4: ON.

- Bearing pulse:
  - Connect to X9;
  - Termination can be selected using “SW3”. The following combinations are possible:

560 Ohm pull-up	1: ON	2: OFF	3: OFF	4: OFF;
1,2 kOhm	1: OFF	2: ON	3: OFF	4: OFF;
Composite mode	1: OFF	2: OFF	3: OFF	4: ON.

- Heading pulse:
  - Connect to X9;
  - Termination can be selected using “SW4”. The following combinations are possible:

560 Ohm pull-up	1: ON	2: OFF	3: OFF	4: OFF;
1,2 kOhm	1: OFF	2: ON	3: OFF	4: OFF;
Composite mode	1: OFF	2: OFF	3: OFF	4: ON.

- RS 422 control signal: connect to X10;

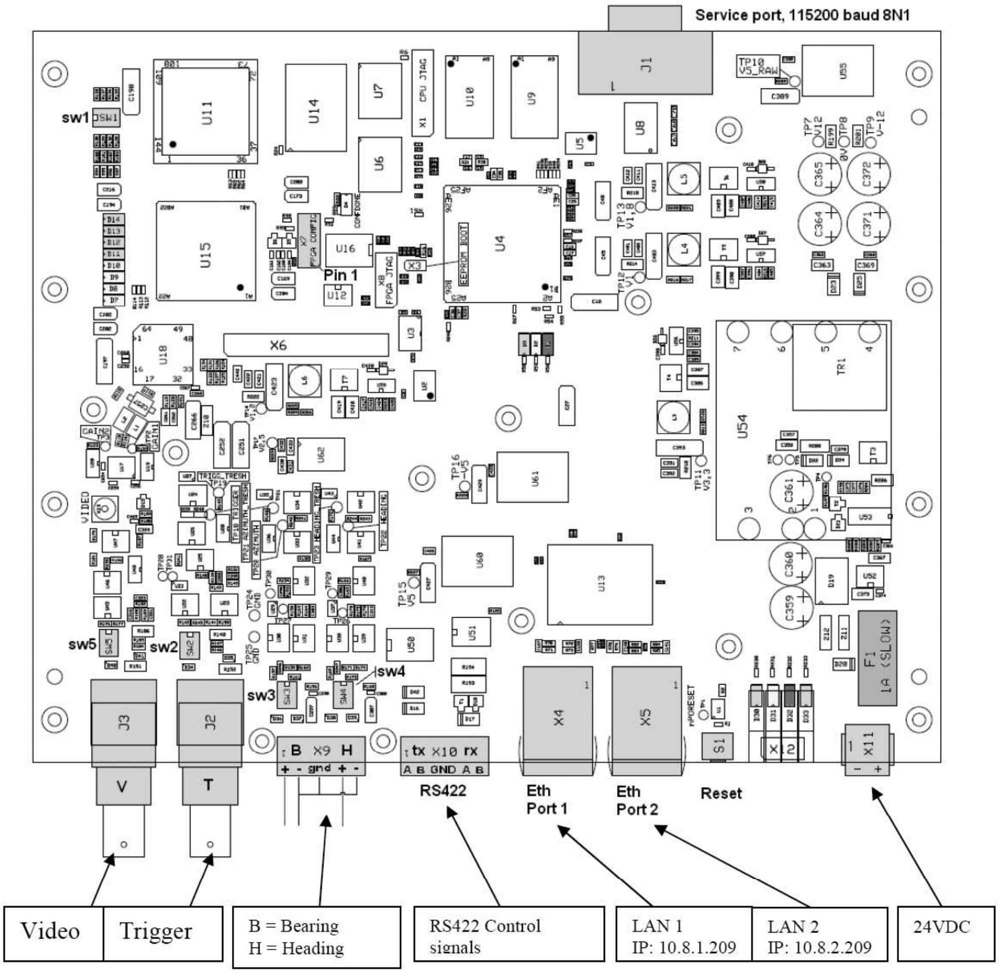


Fig. 6. RIB6. Layout drawing

Signal Input Resistor Selector

General Recommendation

High resistor (1,2 kOhm) for Video and Trigger pulse is used in case of original transceiver signal distributing between Radar Display and RIB6.

Low resistor (50 Ohm) for Video and Trigger pulse is used in case of direct transceiver signal connection to RIB6.

If the video signal is too weak for the normal work of the RIB6, it is required to increase the input resistance, with small deterioration of the picture's quality.

SW2-SW5 switches are shown in the figure below.
Examples of switches positions for different radars are shown in table below:

Table 2. Status SW2- SW5 switch for different type of radar

Type of Radar	Signal switch	Input	1	2	3	4
Racal-Decca Bridgemaster Series	Video	1,2 kOhm	OFF	OFF	ON	OFF
	Trigger Pulse	1,2 kOhm	OFF	OFF	OFF	ON
	Bearing Pulse	1,2 kOhm	OFF	ON	OFF	OFF
	Heading Pulse	1,2 kOhm	OFF	ON	OFF	OFF

Type of Radar	Signal switch	Input	1	2	3	4
Atlas 8600	Video	1,2 kOhm	OFF	OFF	ON	OFF
	Trigger Pulse	1,2 kOhm	OFF	OFF	OFF	ON
	Bearing Pulse	1,2 kOhm	OFF	ON	OFF	OFF
	Heading Pulse	1,2 kOhm	OFF	ON	OFF	OFF
Nucleus 6000	Video	1,2 kOhm	OFF	OFF	ON	OFF
	Trigger Pulse	1,2 kOhm	OFF	OFF	OFF	ON
	Bearing Pulse	1,2 kOhm	OFF	ON	OFF	OFF
	Heading Pulse	1,2 kOhm	OFF	ON	OFF	OFF
Atlas 9600	Video	1,2 kOhm	OFF	OFF	ON	OFF
	Trigger Pulse	Not connected	OFF	OFF	OFF	ON
	Bearing Pulse	Not connected Composite mode	OFF	OFF	OFF	ON
	Heading Pulse	Not connected Composite mode	OFF	OFF	OFF	ON
Raytheon Pathfinder	Video	1,2 kOhm	OFF	OFF	ON	OFF
	Trigger Pulse	Not connected	OFF	OFF	OFF	ON
	Bearing Pulse	Not connected Composite mode	OFF	OFF	OFF	ON
	Heading Pulse	Not connected Composite mode	OFF	OFF	OFF	ON
JRC JMA 9000 Series	Video	50 Ohm	ON	OFF	OFF	OFF
	Trigger Pulse	50 Ohm	OFF	ON	OFF	OFF
	Bearing Pulse	560 Ohm pull-up	ON	OFF	OFF	OFF
	Heading Pulse	560 Ohm pull-up	ON	OFF	OFF	OFF
JRC JMA 5300 Series	Video	50 Ohm	ON	OFF	OFF	OFF
	Trigger Pulse	50 Ohm	OFF	ON	OFF	OFF
	Bearing Pulse	560 Ohm pull-up	ON	OFF	OFF	OFF
	Heading Pulse	560 Ohm pull-up	ON	OFF	OFF	OFF
Sperry Rascar	Video	50 Ohm	ON	OFF	OFF	OFF
	Trigger Pulse	50 Ohm	OFF	ON	OFF	OFF
	Bearing Pulse	560 Ohm pull-up	ON	OFF	OFF	OFF
	Heading Pulse	560 Ohm pull-up	ON	OFF	OFF	OFF
Furuno FR 21XX, FR 28XX Series, Furuno FR 15XX Series	Video	50 Ohm	ON	OFF	OFF	OFF
	Trigger Pulse	50 Ohm	OFF	ON	OFF	OFF
	Bearing Pulse	1,2 kOhm	OFF	ON	OFF	OFF
	Heading Pulse	1,2 kOhm	OFF	ON	OFF	OFF
Bridge Master E Series	Video	1,2 kOhm	OFF	OFF	ON	OFF
	Trigger Pulse	50 Ohm	OFF	ON	OFF	OFF
	Bearing Pulse	1,2 kOhm	OFF	ON	OFF	OFF
	Heading Pulse	1,2 kOhm	OFF	ON	OFF	OFF

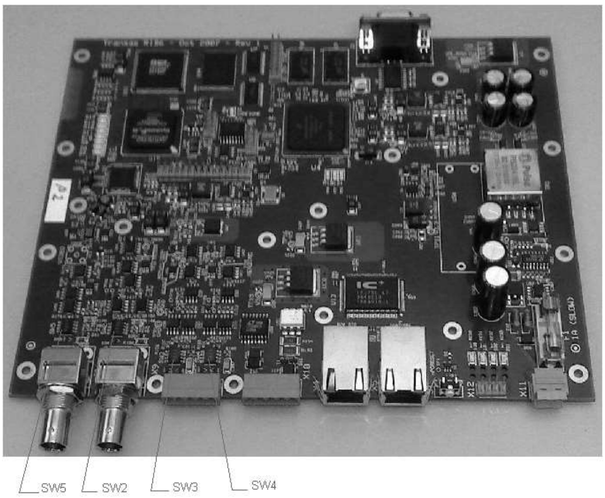


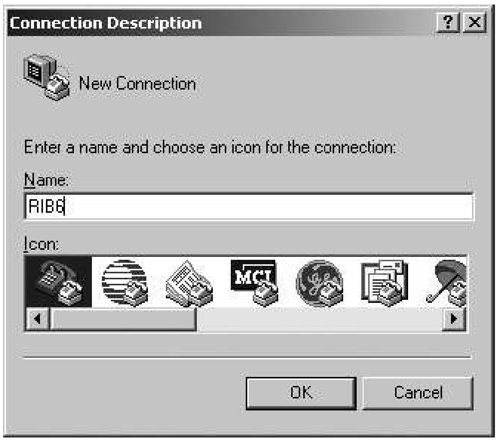
Fig. 7. RIB6. Resistor selectors

Checking and Settings RIB6 IP Addresses

Checking RIB IP Addresses

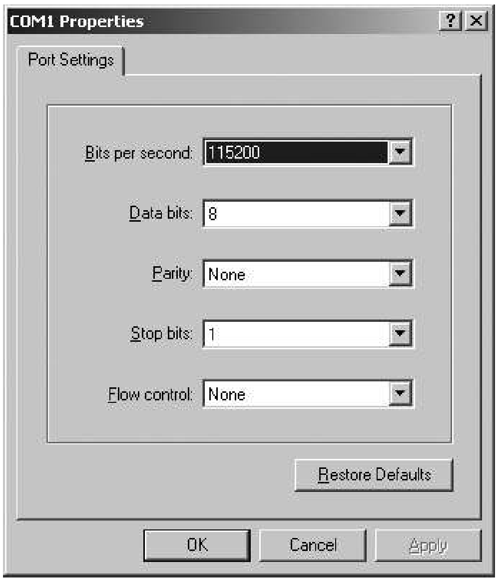
In the event of absence of the connection between PC and RIB6 check values RIB6 IP addresses. For this connect RS232 port of PC to RS232 service COM of RIB6.

1. Start terminal emulation program (i.e. “Hyper Terminal”) and enter name for example “RIB6”:

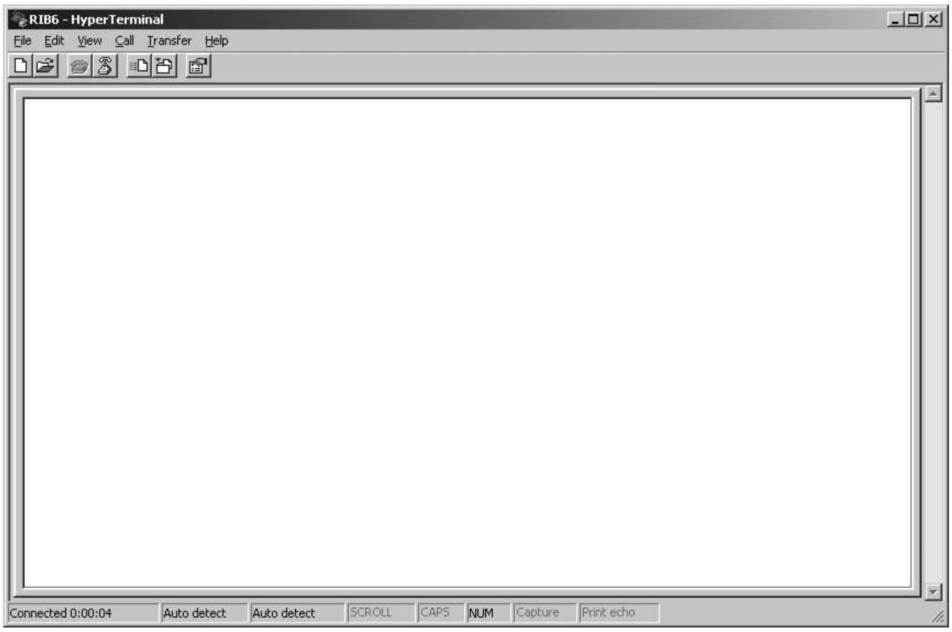


2. Select port number of PC:

3. Configure the terminal for 115200 baud, 8 data bits, no parity, 1 stop bit, none flow control. Press “Apply” and “OK” buttons:

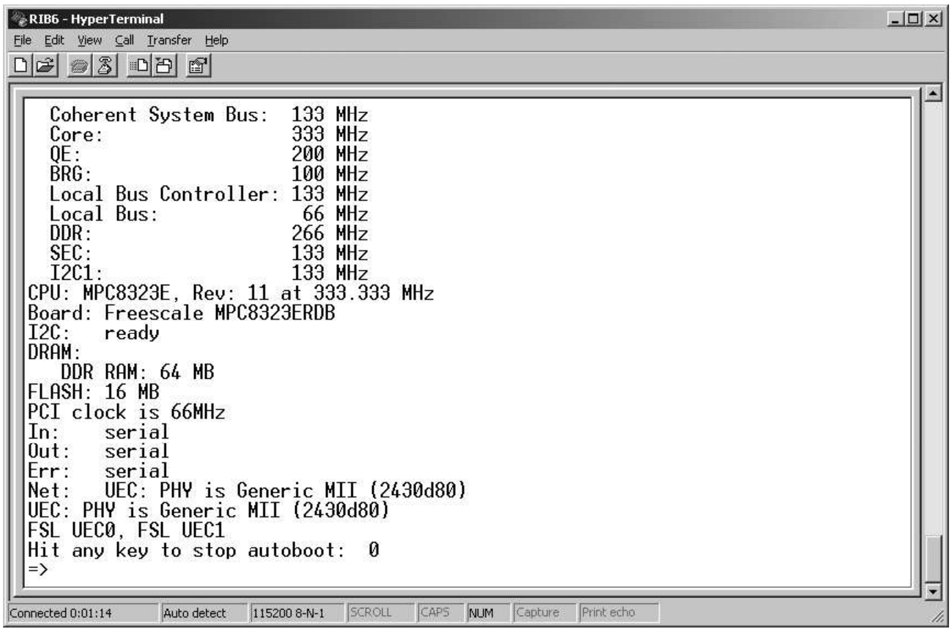


4. Restart RIB6 by means of small button Reset on RIB6 panel:

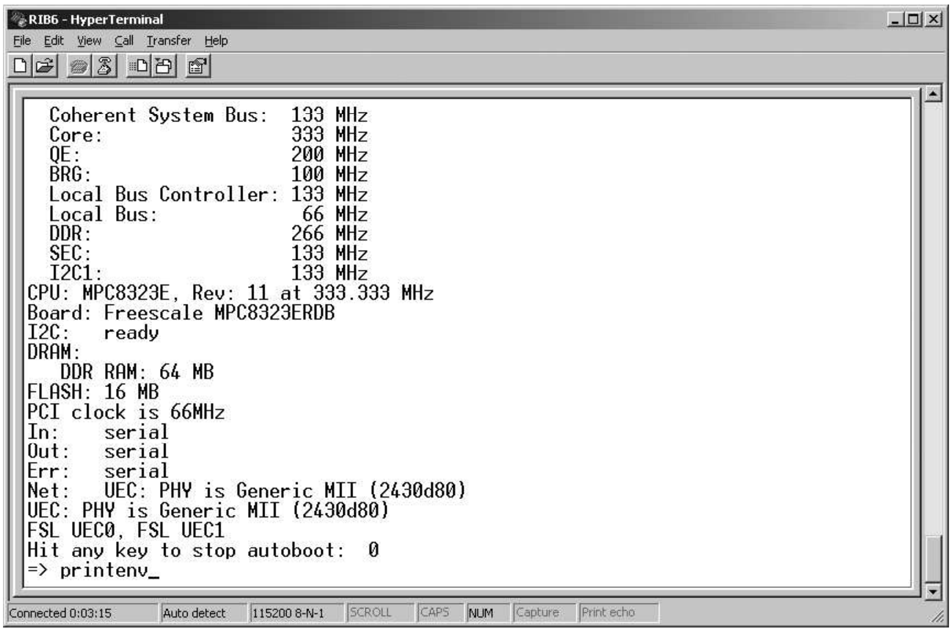


5. When the words “Hit any key to stop autoboot” appear, press any key.

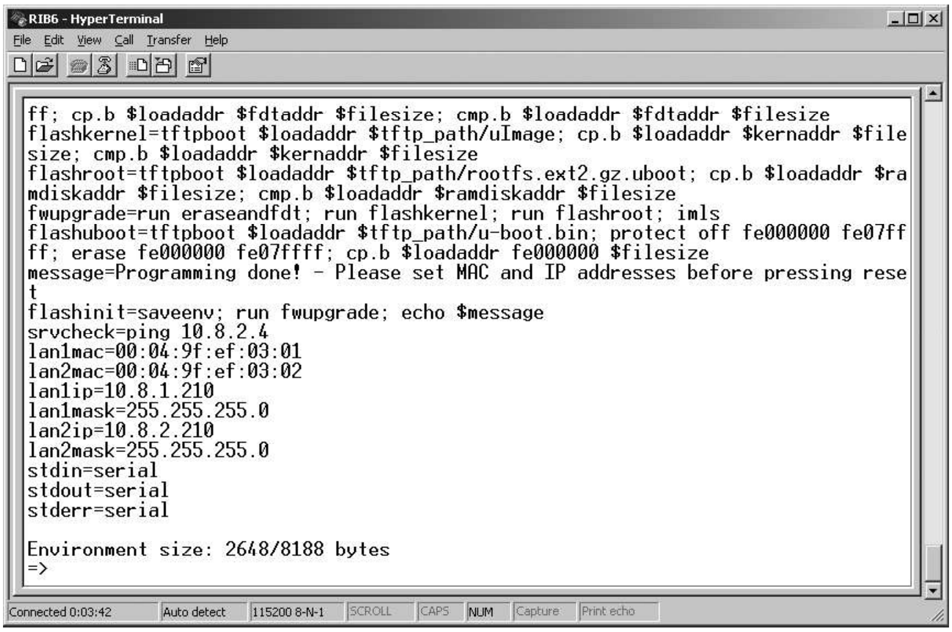
   If the loading continues, perform the restart by using the Reset button.



6. For printing configuration type “printenv” and press <Enter> button:



7. Check IP and Netmask values for LAN1 and LAN2 in correspondence to values given below:



For the first type RIB6 values must be following:

– Lan1ip Address: 10.8.1.209;

– Lan1Mask: 255.255.255.0;

– Lan2ip Address: 10.8.2.209;

– Lan2Mask: 255.255.255.0.

For the second type RIB6 values must be following:

– Lan1ip Address: 10.8.1.210;

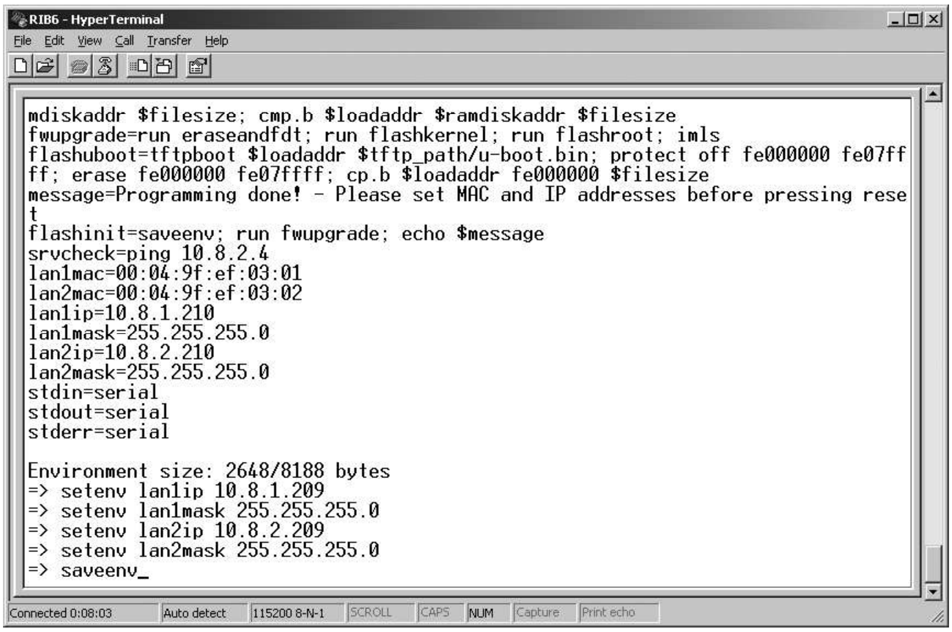
– Lan1Mask: 255.255.255.0;

– Lan2ip Address: 10.8.2.210;

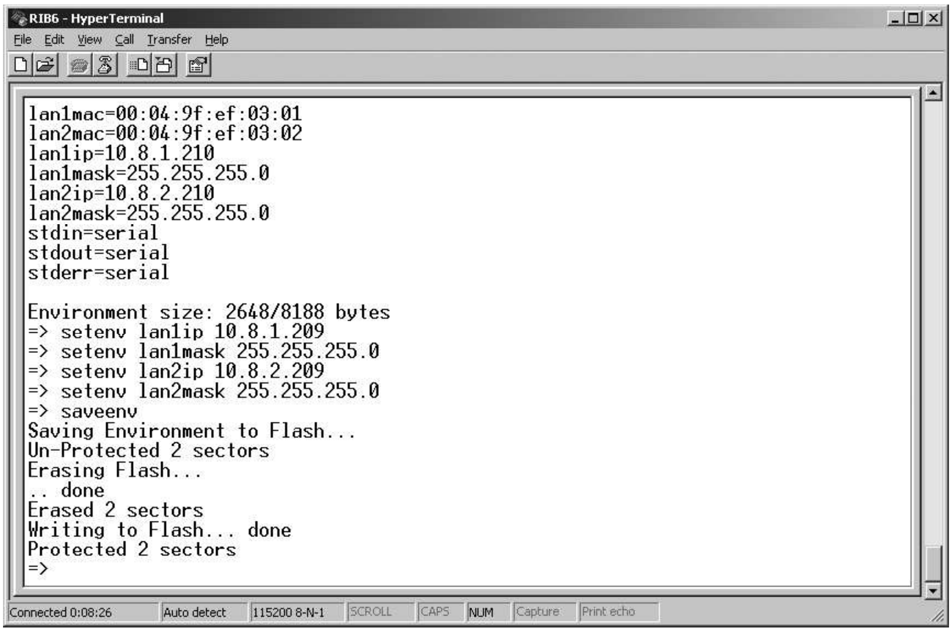
– Lan2Mask: 255.255.255.0.

Setting RIB6 IP Addresses

1. Set the IP addresses by using the following commands (press <Enter> button after entering each command):
   - Setenv lan1ip <value>;
   - Setenv lan1mask <value>;
   - Setenv lan2ip <value>;
   - Setenv lan2mask <value>;
   - Saveenv.



2. Wait until new data is recorded.



3. Then switch off/on RIB6 power and check preservation of all settings.

Uninterruptible Power Supply Unit UPS6

UPS6 installation consists of installation following units:

- EMC Filter ME-MAX/NEF/QUINT20A;
- Primary-Switched Power Supply Unit QUINT-PS/1AC/24DC/20;
- Uninterruptible Power Supply Unit for Universal Use QUINT-DC-UPS/24DC/20;
- Battery Module 24 V DC, 3.4 Ah QUINT-BAT/24DC/3.4AH (7.2 or 12 AH).

Fig. 8. View of UPS6

Technical specification of UPS6 is given in **Chapter 3**.

For connection of the units see also connection diagram enclosed in **Annex G**.

Installation of the Primary-Switched Power Supply Unit QUINT-PS/1AC/24DC/20

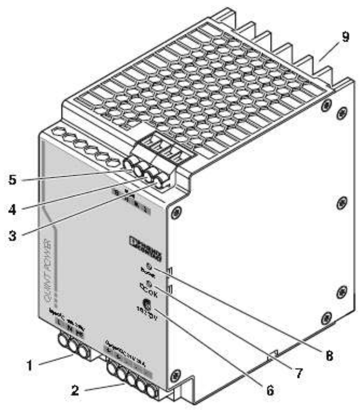


Fig. 9. Structure

Table 3. Structure

No.	Comments
1	AC input: 85...264 V AC input voltage, 45...65 Hz frequency
2	DC output: 24 V DC output voltage (default), can be set between 18 and 29.5 V DC
3	Active POWER BOOST switching output
4	DC OK output active
5	DC OK output floating
6	Potentiometer (covered) 18V DC...29.5 V DC
7	“DC OK” LED
8	“BOOST” LED
9	Universal DIN rail adapter UTA 107/30

WARNING!

The device contains dangerous live elements and high levels of stored energy. Never carry out work when the power is turned.

The housing temperature can reach high values depending on the ambient temperature and the load of the device.

In order to guarantee sufficient convection, we recommend observing the following minimum distance to other modules: 5 cm in the vertical direction and 0.5 cm in the horizontal direction. A lateral distance of 5 mm, and in case of active components, that of 15 mm is necessary for proper functioning of the module.

The power supply unit can be snapped onto all DIN rails in acc. with EN 60715. They must be horizontal (connecting terminal blocks above and bellow).

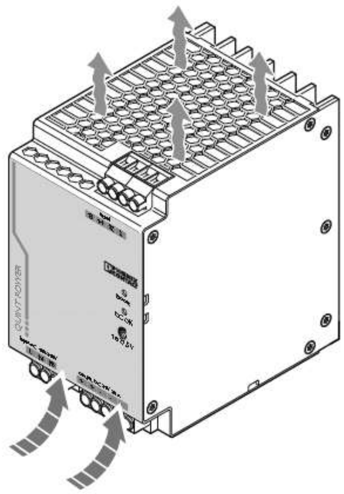
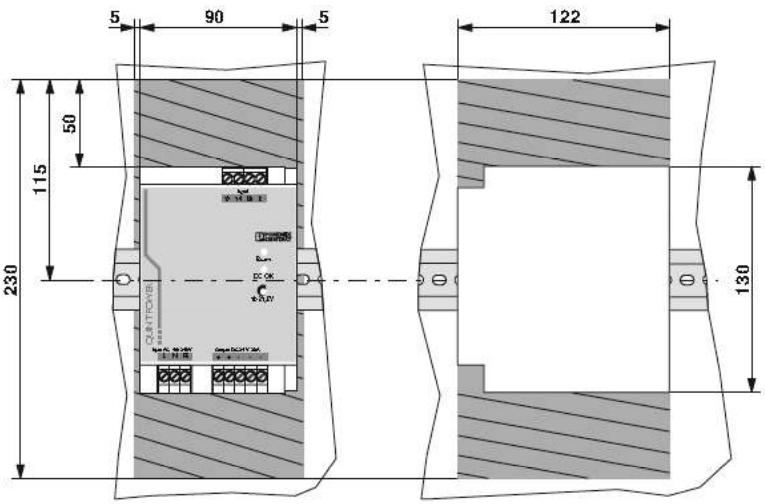


Fig. 10. Convection

Installation Position



Slim-style installation: Installation depth 125 mm (+ DIN rail)
(state at delivery)

Low-profile installation: Installation depth 90 mm (+ DIN rail)

Fig. 11. Mounting position drawing

- Slim-style installation:

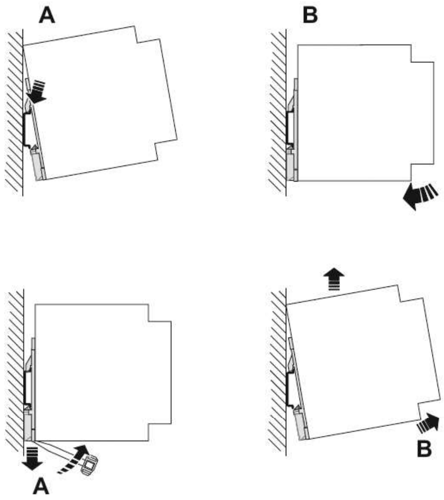


Fig. 12. View of slim-style position

  – Assembly.

  Position the module with the DIN rail guide on the upper edge of the DIN rail, and snap it in with a downward motion.

  – Removal.

  Pull the snap lever open with the aid of a screwdriver and slide the module out at the lower edge of the DIN rail.

- Low-profile installation:

  Low-profile installation can be achieved by mounting the device at right-angles to the DIN rail. Mount the DIN rail adapter (UTA 107/30) as described in the figure. No additional mounting material is required. Fixing screws: Torx T10 (torque 0.8 Nm ... 0.9 Nm).

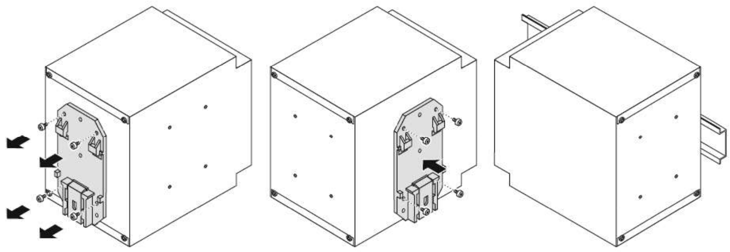


Fig. 13. View of low-profile position

Connection

Use a screwdriver with the correct blade width for wiring. The cable cross sections listed in the table below can be connected.

Note: For reliable and safe-to-touch connections, strip the cable ends according to the table.

Table 4. Connecting cables

	Solid [mm²]	Stranded [mm²]	AWG	Torque [Nm]	Stripping Length [mm]
Input	0,2–6	0,2–4	18–10	0,5–0,6	7 mm
Output	0,2–6	0,2–4	12–10	0,5–0,6	7 mm
Signal	0,2–6	0,2–4	18–10	0,5–0,6	7 mm

The 100 ... 240 V AC connection is established using the L, N and PE screw connections. The device can be connected to 1-phase AC networks or to two of the phase conductors of three-phase systems (TN, TT or iT systems in acc. with VDE 0100-300/IEC 60364-3) with nominal voltages of 100 V AC ... 240 V AC.

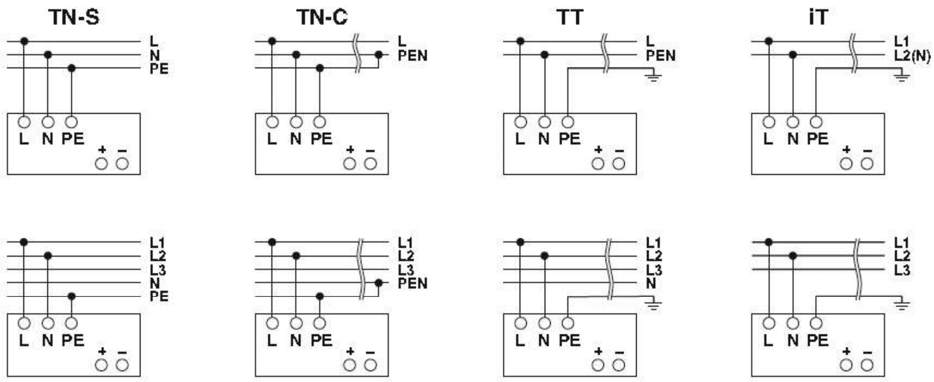


Fig. 14. Connection to various network forms drawing

Note: For operation on two of the phase conductors of a three-phase system, an isolating facility for all poles must be provided.

- Input:

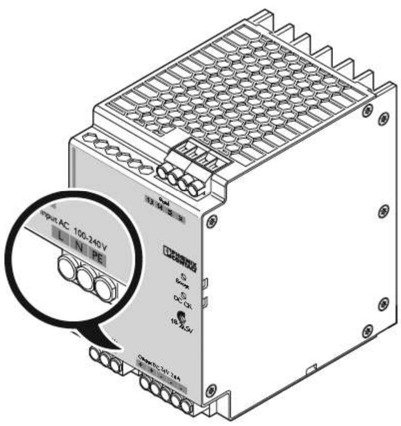


Fig. 15. View of Input

– Protecting the primary side.

The device must be installed in according with the regulations as in EN 60950. It must be possible to disconnect the device using a suitable isolating facility outside the power supply. The primary sideline protection, for example, is suitable. For device protection, there is an internal fuse. Additional device protection is not necessary.

– Recommended backup fuse for mains protection.

Power circuit breaker 10 A or 16 A, characteristic B (or identical function). In DC applications, a suitable fuse must be wired in upstream.

Note: If an internal fuse is triggered, there is most probably a malfunction in the device. In this case, the device must be inspected in the factory!

- Output:

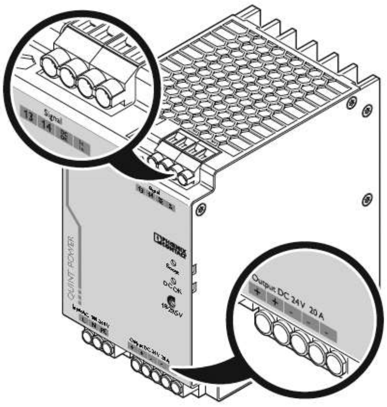


Fig. 16. View of Output

– Connecting the Output.

The connection is established using screw connections on the screw connection of the DC output:

24 V DC: “+” and “-”;
DC OK switching output active: “DC OK” and “-”;
DC OK output floating: “13” and “14”;
POWER BOOST switching output active: “I < IN” and “-”.

At the time of delivery, the output voltage is 24 V DC. The output voltage can be set on the potentiometer.

– Protecting the Secondary Side.

The device is electronically protected against short circuit and idling.
In the event of a malfunction, the output voltage is limited to 35 V DC.

Note: Make sure that all output lines are dimensioned according to the maximum output current or are separately protected. The cables on the secondary side must have sufficiently large cross sections in order to keep the voltage drops on the lines as low as possible.

- Signaling:

The active signal output, the floating signal contact and the active POWER BOOST switching output are provided for function monitoring. The DC OK-LED and the BOOST-LED also enable the function evaluation of the power supply unit directly on the operation site (see table below).

Table 5. Signalling

	I < In (20 A)	**I > In (20 A)**	**Uout < 0.9 x Un (24 V)**
“DC OK” LED	ON	ON	Flashing
“BOOST” LED	OFF	ON	ON
Active DC OK switching output	ON	ON	OFF
Floating DC OK output	Closed	Closed	Open
Active POWER BOOST switching output	ON	OFF	OFF
Meaning	Normal operation of the power supply (Uout > 21.5 V)	POWER BOOST operation, e.g. to start loads	Overload mode, e.g. consumer short circuit or overload

– Floating contact.

The floating signal contact opens and signalizes a drop in the output voltage as set of more than 10%. Signals and ohmic loads of up to 30 V and currents of up to 1 A can be connected. For heavily inductive loads such as a relay, a suitable protection circuit (e.g. damping diode) is necessary.

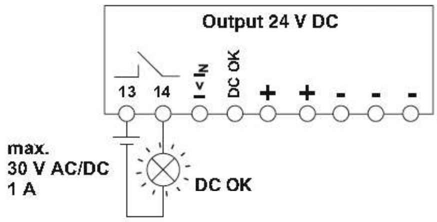


Fig. 17. Floating contacts drawing

– Active signal outputs.

The 24 V DC signal is applied between the “DC OK” and the “-” connecting terminal blocks or between “I < IN” and “-” and can carry up to 1 mA. By switching from “active high” to “low”, the DC OK signal output signalizes when the output voltage is more than 10% below the output voltage.

The DC OK signal is decoupled from the power output. It is thus not possible for parallel switched devices to provide external supply.

The 24 V DC signal can be directly connected to a logic input for evaluation.

The POWER BOOST signal output signalizes that the nominal current is exceeded.

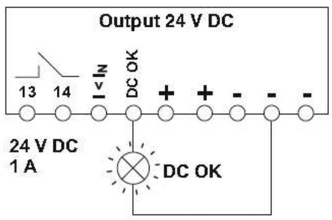


Fig. 18. Active signal outputs drawing

– Signal loop.

Monitoring two devices: use the active signal output of device 1 and loop in the floating signal output of device 2. In the event of malfunctioning, a common alarm is output. Any number of devices can be looped in. This signal combination saves wiring costs and logic inputs.

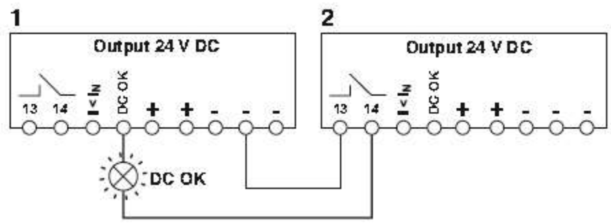


Fig. 19. Signal loop drawing

Installation of the Uninterruptible Power Supply Unit for Universal Use QUINT-DC-UPS/24DC/20

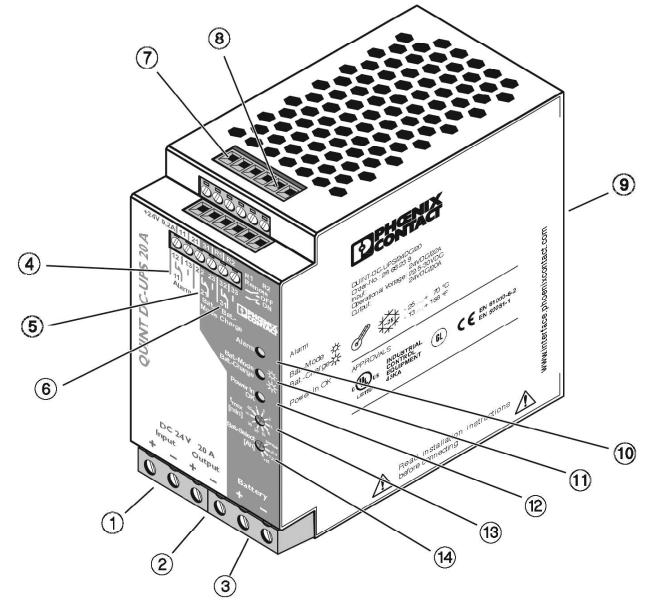


Fig. 20. Structure

Table 6. Structure

No.	Comments
1	Input voltage 24 V DC unbuffered (internal fuse 25 AT)
2	Output voltage 24 V DC buffered (the device is idling-proof and short-circuit-proof)
3	24 V battery module connection
4	Floating PDT (11,12,13): Alarm
5	Floating PDT (21,22,23): Battery Mode
6	Floating PDT (31,32,33)
7	24 V supply voltage, maximum current limit 0.2 A for grouped contacts 11, 21, 31
8	Remote shutdown (R1, R2)
9	Universal DIN rail adapter UTA 107
10	Red LED: Alarm
11	Yellow LED: Battery Mode/Battery Charge
12	Green LED: Power In OK
13	Buffer time setting 0.5–30 minutes
14	Battery module/Service setting selection

CAUTION!

Never carry out work when the power is turned, this is highly dangerous.

Mounting

The uninterruptible power supply unit together with the battery module can be snapped onto all DIN rails according to EN 60715 and should be mounted horizontally (input terminal blocks facing downwards).

Note: No minimum spacing to other modules at the sides is required for proper operation of the device.

- Narrow Mounting Position.

  The device is supplied ex works for a narrow mounting position.

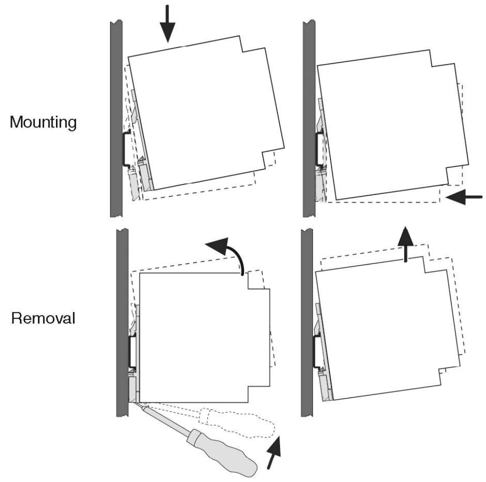


Fig. 21. Narrow mounting position

  – Assembly.

    Place the module with the DIN rail guide way on the top edge of the DIN rail and then snap it downwards.

  – Removal.

    Release the snap-on catch using a screwdriver and then detach the module from the bottom edge of the DIN rail.

- Flat Mounting Position.

  A flat mounting position can be achieved by mounting the module onto the DIN rail at a 90° angle. To do this, mount the DIN rail adapter (UTA 107) as shown in Figure 46. No additional assembly material is required. Mounting screws: Torx T10 (torque 0.8...0.9 Nm).

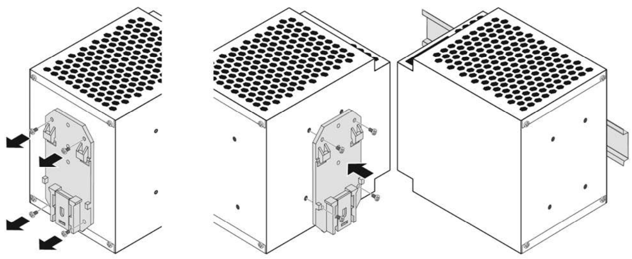


Fig. 22. Flat mounting position

Connections

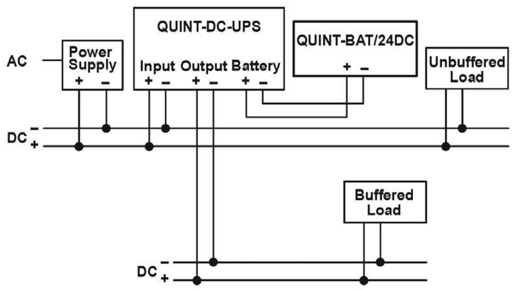


Fig. 23. Connection diagram

For reliable and safe-to-touch connections, strip the cable ends according to the table.

Table 7. Connecting cables

	Solid [mm²]	Stranded [mm²]	AWG	Torque [Nm]
Input	0,5–16	0,5–10	20–6	1,2–1,5
Output	0,5–16	0,5–10	20–6	1,2–1,5
Battery	0,5–16	0,5–10	20–6	1,2–1,5
Signal	0,2–4	0,2–2,5	24–12	0,5–0,6

Strip 10 mm (0.39 in.) from the input and output side connector ends and 7 mm (0.28 in.) from the signal connector ends:

To maintain UL approvals, use copper cables, which are designed for operating temperatures > 75 °C (167 °F). To meet GL requirements, unused terminal compartments should be closed.

- Input.

  The QUINT-DC-UPS is connected to the 24 V DC output of the power supply via the “Input +” and “Input -” terminal blocks. The output is isolated from the input by the internal diode. The stored power is only supplied to the output. The device is protected against over current and short circuit by an internal input fuse. Additional device protection is not required.

Note: If an internal fuse is blown, this is most probably due to a device fault. In this case, the device should be checked in the factory.

- Output.

  All devices that must be supplied without interruption in the event of a supply voltage failure (“Buffered Load”), are connected to the “Output +” and “Output -” terminal blocks of the DC output. It is recommended that all other loads, which do not require buffering (“Unbuffered Load”), are connected to the 24 V DC output of the power supply. This increases the buffer time, as this time depends on the output current. The internal diode ensures that the buffered loads are isolated from the unbuffered loads.

- Battery module.

  The battery module is connected to the QUINT-DC-UPS via the “Battery +” and “Battery -” terminal blocks. To interrupt the charge/discharge current of the battery module, the “Battery module selection” selector switch 14 must be set to “Service” (see below Fig. 24).

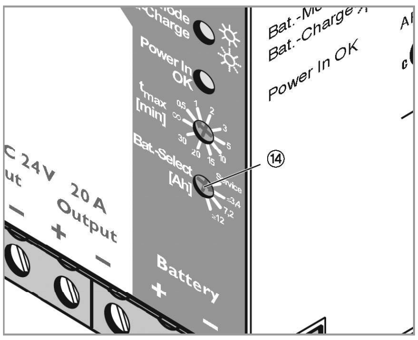


Fig. 24. “Battery Module Selection” selector

The QUINT-DC-UPS is optimized for use with QUINT-BAT/24DC type battery modules.

The following battery modules are recommended:

– QUINT-BAT/24DC/3,4AH (Order No. 2866349);

– QUINT-BAT/24DC/7,2AH (Order No. 2866352);

– QUINT-BAT/24DC/12AH (Order No. 2866365).

Following successful installation, the capacity of the connected battery module must be selected using the “Battery module selection” rotary switch 14.

Note: The fuse on the battery module must be removed when installing or replacing the battery module.

- Signaling outputs.

  The signal outputs are connected via terminal blocks 11/12/13 (4), 21/22/23 (5) or 31/32/33 (6). The contacts are floating contacts. The plug-in bridge provided can be used to supply +24 V to grouped contacts 11, 21, 31. This means that N/C contacts 12, 22, 32 and N/O contacts 13, 23, 33 can be evaluated as switching outputs with 0 V and +24 V voltage levels.

- Remote Shutdown.

  The device has a UPS remote shutdown function for specific shutdown.

  Remote shutdown must be deactivated for the device to switch to buffer mode in the event of a supply voltage failure.

  – Remote Shutdown Off:

    The “Remote shutdown R1” and “Remote shutdown R2” terminal points are short circuited (e.g., with a plug-in bridge) OR. The “Remote shutdown R2” terminal point is supplied with a 24 V DC voltage.
    The QUINT-DC-UPS switches to buffer mode in the event of a supply voltage failure.

  – Remote Shutdown On:

    The “Remote shutdown R1” and “Remote shutdown R2” terminal points are not connected.
    All LEDs are off.
    The QUINT-DC-UPS does not switch to buffer mode in the event of a supply voltage failure, instead the device is shut down. When the supply voltage is reapplied, the battery module is charged and the device remains off until remote shutdown is deactivated.
    Connected loads are supplied as long as the supply voltage is present.

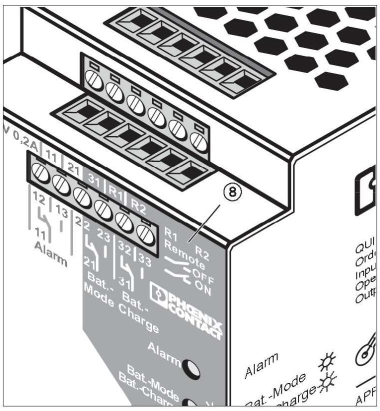


Fig. 25. Remote shutdown

Setting Options on the Device

- Buffer Time Setting.

  Buffer mode can be exited after a predefined time has elapsed or by external shutdown. If the device is to be shut down after a specific time has elapsed, the time can be set via the selector switch 13 on the front of the device. When the supply voltage is reapplied, the device can switch to buffer mode again.

ATTENTION!

The buffer time setting must be set to value not less than 1 minute according to ECDIS requirements.

- Battery Module Setting.

  Before startup, the capacity of the battery module used must be set on the device via the selector switch 14. When replacing the battery, the selector switch must be set to “Service”.

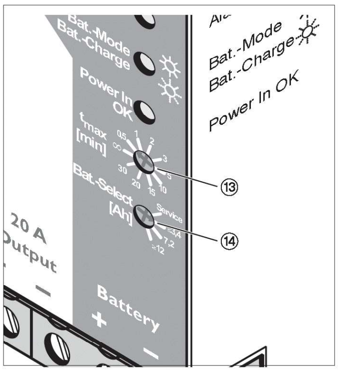


Fig. 26. Settings

Method of Operation

In the event of a power failure at the output, the QUINT-DC-UPS supplies all connected devices with a 24 V DC voltage without interruption at a load current up to 20 A. When the 24 V supply voltage is applied, the connected battery module is charged. In the event of a supply voltage failure, the battery module is connected to the output, and the stored power ensures that all connected devices continue to operate without interruption. The professional signaling via function LEDs and floating PDT contacts enables reliable evaluation of all the main operating states.

- Output Voltage.

  In normal operation, the QUINT-DC-UPS output voltage corresponds to the usual supply voltage. If the supply voltage drops more than 1 V in the space of 0.1 seconds or falls below the minimum threshold of 22 V, the device switches to buffer mode. If the output voltage drops below 20.4 V in buffer mode, this is indicated by the Alarm indicator. If the output voltage drops to 19.2 V because the battery module is flat, the device is shut down completely. When the supply voltage is reapplied, the device automatically switches on again. The device is electronically short circuit- proof and idling-proof.

- Signaling.

  Three floating PDT contacts and three indicators are provided for function monitoring.

Table 8. Status Indicators

Key/Indicators	Green Power IN OK	Yellow Bat. Mode/Charge	Red Alarm
Supply voltage OK, battery module charging	ON	Flashing	OFF
Supply voltage OK, battery module charged (normal operation)	ON	OFF	OFF
Buffer mode	OFF	ON	OFF
Battery module flat	OFF	OFF	ON
• Battery module quality test negative • No battery module • Service	ON	OFF	ON
• Buffer time elapsed • Remote shutdown activated	OFF	OFF	OFF

Table 9. Status Contacts

Key/Output	Bat. Charge	Bat. Mode	Alarm
Supply voltage OK, battery module charging	31–33	21–22	
Supply voltage OK, battery module charged (normal operation)	31–32	21–22	
Buffer mode	31–32	21–23	
Battery module flat	31–32	21–22	11–13
• Battery module quality test negative • No battery module • Service	31–32	21–22	11–13
• Buffer time elapsed • Remote shutdown activated		21–22	11–13

Where:

– xx - xx: contact closed;

– 1x Alarm, 2x Battery Mode, 3x Battery Charge;

– x1 group contact, x2 N/C contact, x3 N/O contact.

- Temperature Response.

  The charging rate of the connected battery module depends on the temperature.

- Testing the Battery Module.

  A quality test is carried out on the battery module once a week and its presence is verified every minute. A negative test result is indicated by the Alarm indicator.

Installation of the Battery Modules QUINT-BAT/24DC/3.4AH, QUINT-BAT/24DC/7.2AH, QUINT-BAT/24DC/12AH

QUINT-BAT/24DC are maintenance-free lead gel rechargeable batteries for use with QUINT-DC-UPS 20A/40A.

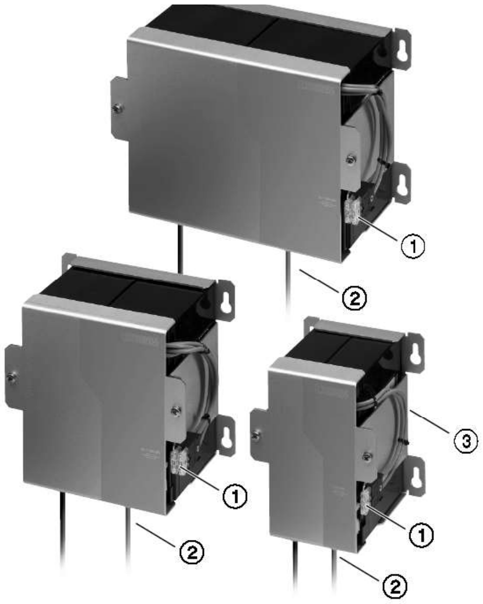


Fig. 27. View of Battery modules

Safety and Warning Notes

In order to guarantee safe operation of the device, please read these instructions thoroughly! The operating instructions for the particular QUINT-DCUPS must also be observed.

The device may only be installed and put into operation by qualified personnel. The corresponding national regulations (e.g. VDE, DIN) must be observed. The VDE 0510 regulations regarding storage, installation and operation of the rechargeable battery module must be observed.

The site in which the rechargeable battery module is located must have sufficient ventilation. The rechargeable batteries may only be disposed of when fully discharged and in acc. with the valid regulations.

The fuse must be removed from the rechargeable battery module when work is being performed!

When replacing rechargeable batteries, please note that only rechargeable batteries from the same batch may be used together!

Device Connections

The connection to QUINT-DC-UPS is established using the black (-) and red (+) connecting cables. The fuse is not inserted until installation has been completed.

1. DC fuse.
2. Connection cable, red = +24 V, black = 0 V.
3. DIN rail adapter QUINT-ADAPTER/4 (only QUINT-BAT/24DC/3,4AH).

Installation

In conjunction with adapter QUINT-ADAPTER/4, it is possible to snap the rechargeable battery module onto all 35 mm DIN rails in acc. with EN 60 715, or “keyhole” fixing eyelets can be used for rear wall mounting (drilling diagram on reverse). Only QUINT-BAT/24DC/3,4AH is supplied with QUINTADAPTER/4. QUINT-ADAPTER/4 (Order No. 28 66 85 7) can be ordered separately for other rechargeable battery modules.

The module should be installed horizontally in the coolest part of the control cabinet. For the device to function in the manner intended, it is not necessary to observe any minimum spacing to other modules.

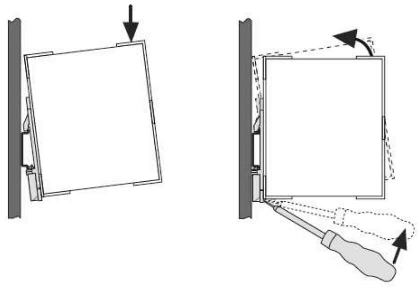


Fig. 28. Installation of Battery module

Data Collector Unit DCU6

Technical specification and dimensional drawings of DCU6 are given in **Chapter 3**.

For connection DCU6 to WS, see optional connection and block diagrams for each WS enclosed in **Annex G**.

Connections

DCU6 is connected with the Ethernet ports LAN1 and LAN2 of RS6 Computer by means of a standard category 5 screened cables used in Ethernet 10/100 Mbit networks. The cable contains 4 twisted pairs within the common screen and has RJ-45 connectors on both ends. Connection of cable cores with the connector contacts is identical on both sides.

Navigational sensors to the DCU6 are connected by means of screw connectors. In case of considerable length of external cables, a screened cable is recommended. For the connection of the DCU6 with navigational sensors, use double core screened cable in the insulating shell, category TP5. The screen is connected to earthing on the sensor side. Where the level of electromagnetic field is insignificant, “twisted pair” type unscreened cable up to 1.5 mm^2 cross section may be used. As the electric current in the cable does not exceed 20 mA the conductors' cross section is of no importance. The maximum length of the cable will depend on the type of interface and is shown for each specific sensor in the appropriate connection schedule.

Fig. 29. DCU6. Rear View

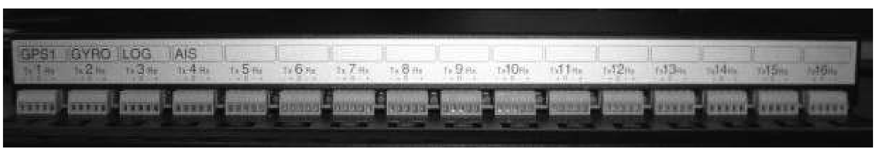


Fig. 30. DCU6. Front View

DCU6 interfaces and cables fixing are shown in the figures below.

DCU6 ports number 1–14 are RS 422 bi-directional channels.

DCU6 ports number 15–16 are RS 422 bi-directional channels by default and may be configured by jumpers X16 and X17 accordingly as follows:

- Output channels transmit RS 232 signal;
- Input channels receive RS 422 signal.

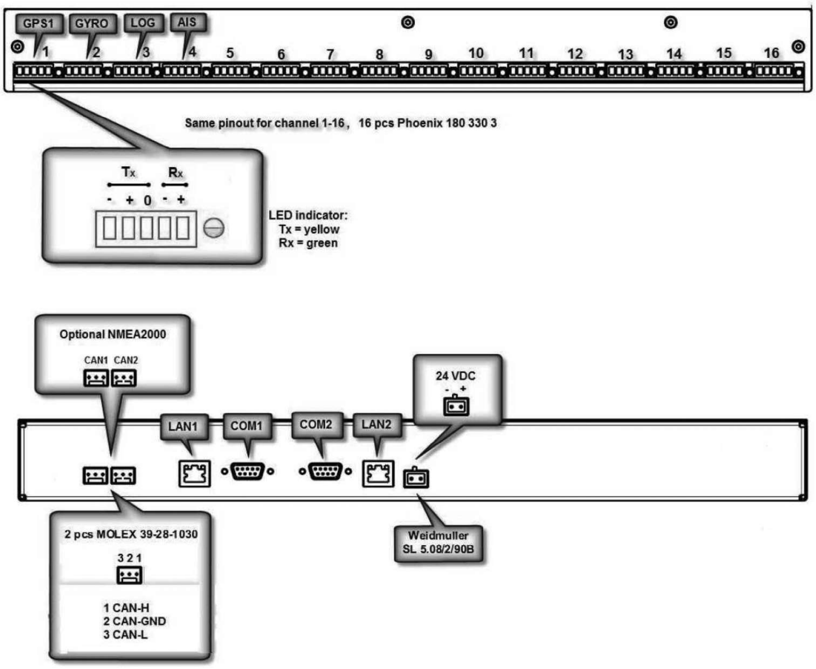


Fig. 31. DCU interfaces

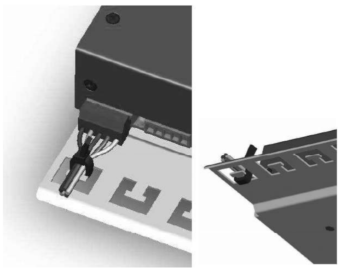


Fig. 32. DCU cables fixing

Diagnostic Indication

DCU is equipped with the following Diagnostic Indicators, reflecting current processes of the device:

- Indicator of the RS-422 interface activity with use of TX/RX Channels. The corresponding indicator is lit while transmitting/receiving of the NMEA message;
- DCU modes indicator are sown in the table bellow.

Table 10. DCU status indicator

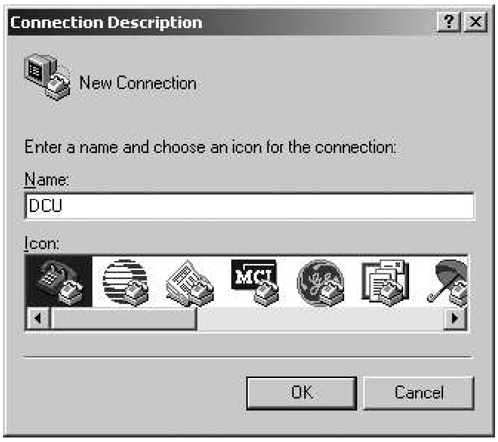
Indicator condition	Mode
Green, blinking	DCU data receiving
Yellow, blinking	DCU data transmitting

Checking and Settings DCU IP Addresses

Checking DCU IP Addresses

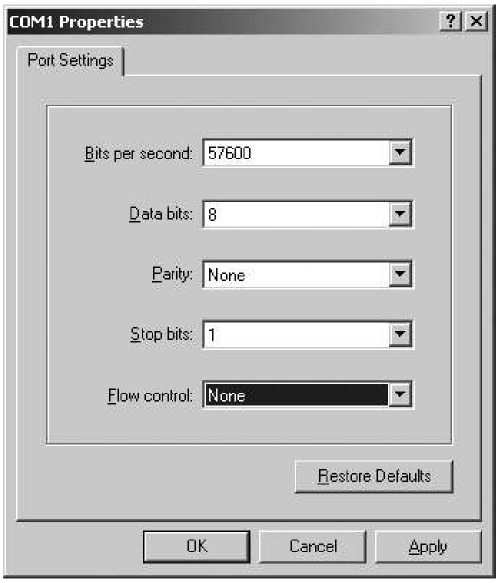
In the event of absence of the connection between PC and DCU check values DCU IP addresses. For this connect RS232 port of PC to RS232 COM1 of DCU.

1. Start terminal emulation program (i.e. “Hyper Terminal”) and enter name for example “DCU”:

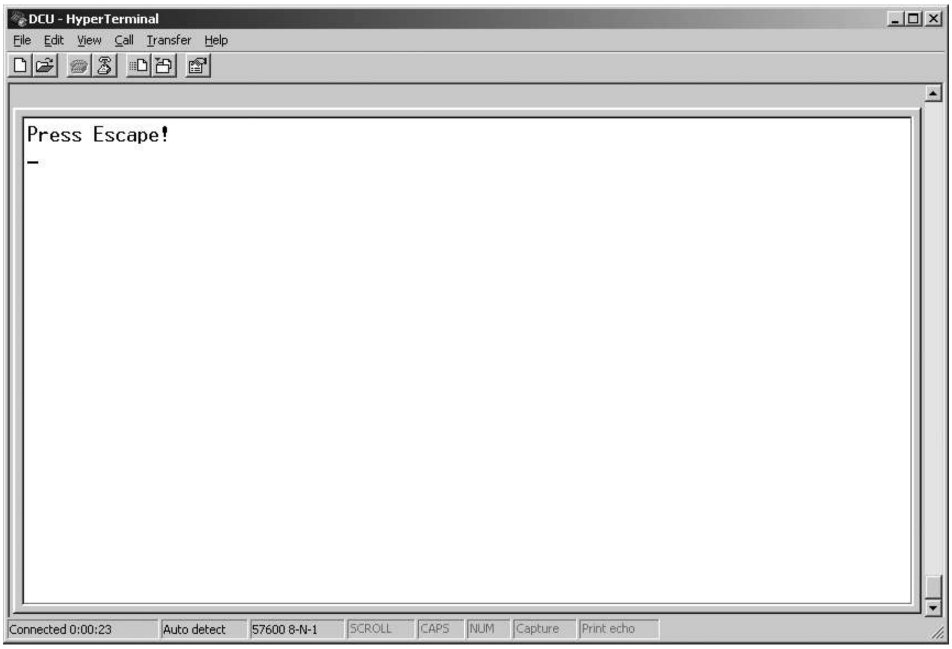


2. Select port number of PC:

3. Configure the terminal for 57600 baud, 8 data bits, no parity, 1 stop bit, none flow control. Press “Apply” and “OK” buttons:

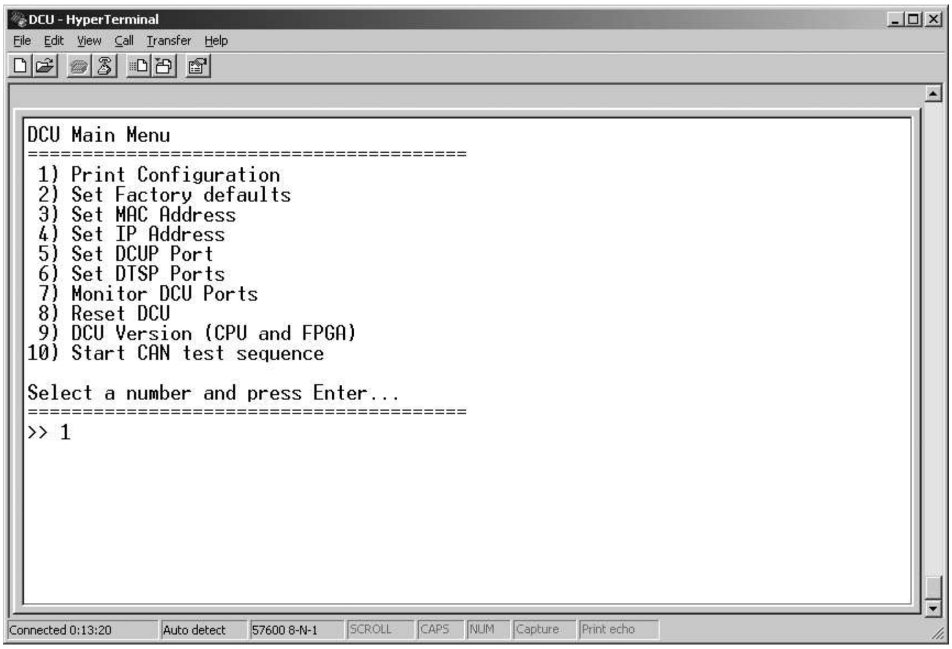


4. This screen appears. Otherwise restart DCU by means of small buttons on DCU panel:

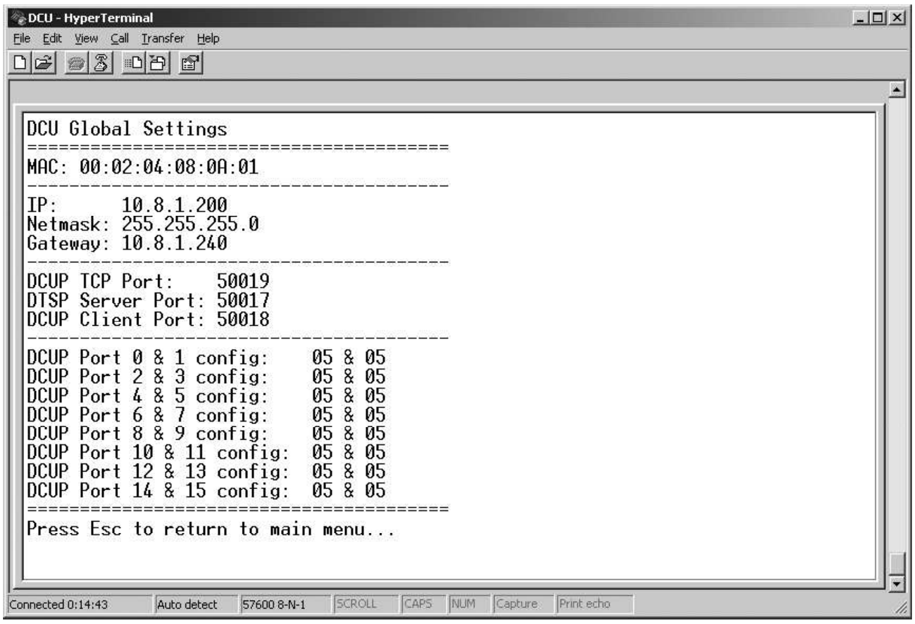


Press <Escape> button.

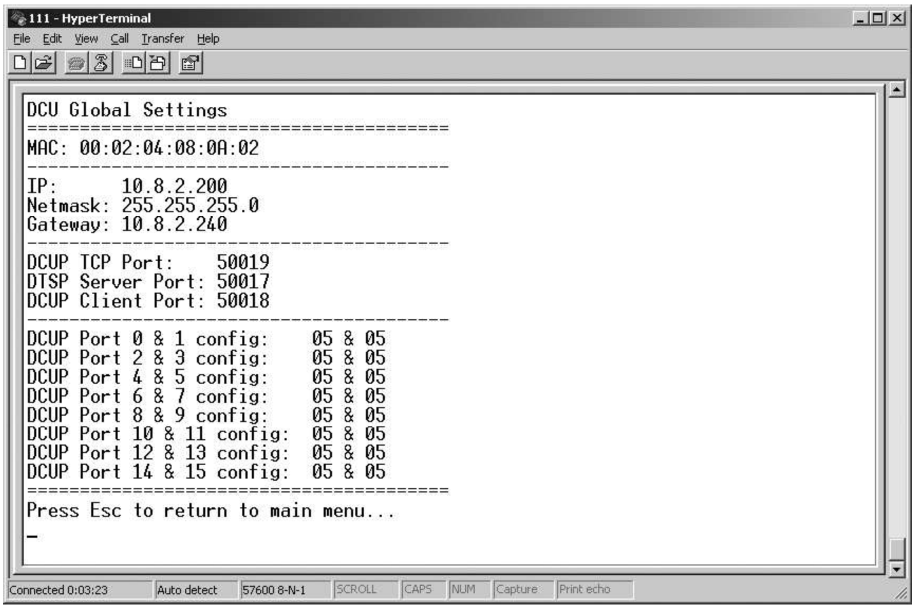
5. For printing configuration type “1” and press <Enter> button:



6. Check IP, Netmask, Gateway values for LAN1 in correspondence to values given below. If necessary change them by means of “Set IP Address” option in “DCU Main Menu”:



7. For the first type DCU values must be following:
   – IP1 Address: 10.8.1.200;
   – Subnet Mask: 255.255.255.0;
   – Default Gateway: 10.8.1.240.
8. For the second type DCU values must be following:
   – IP1 Address: 10.8.1.201;
   – Subnet Mask: 255.255.255.0;
   – Default Gateway: 10.8.1.240.
9. Connect PC RS232 port to DCU RS232 COM2 and perform procedure described above. Check IP, Netmask, Gateway values for LAN2 in correspondence to values given below:

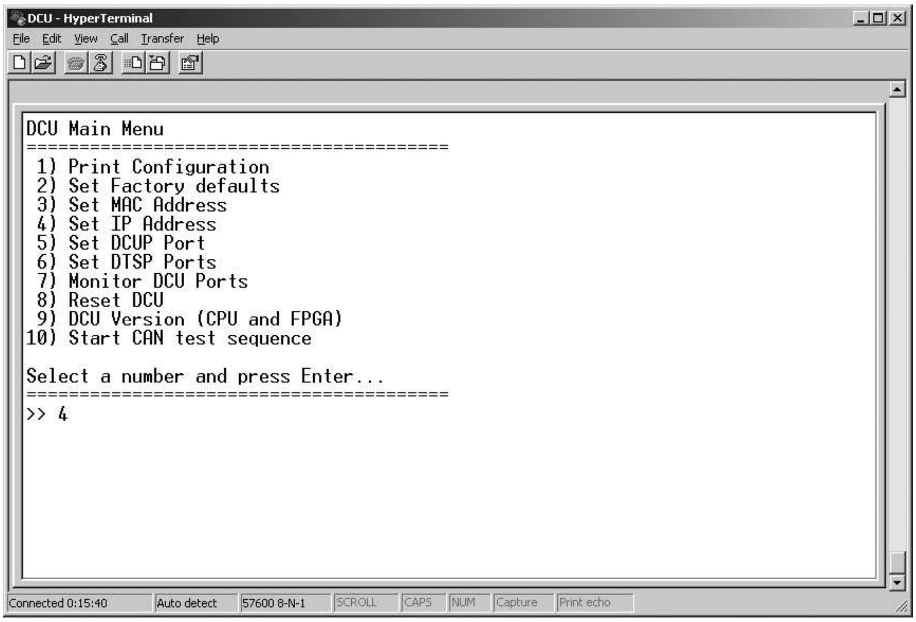


If necessary change them by means of “Set IP Address” option in “DCU Main Menu”.

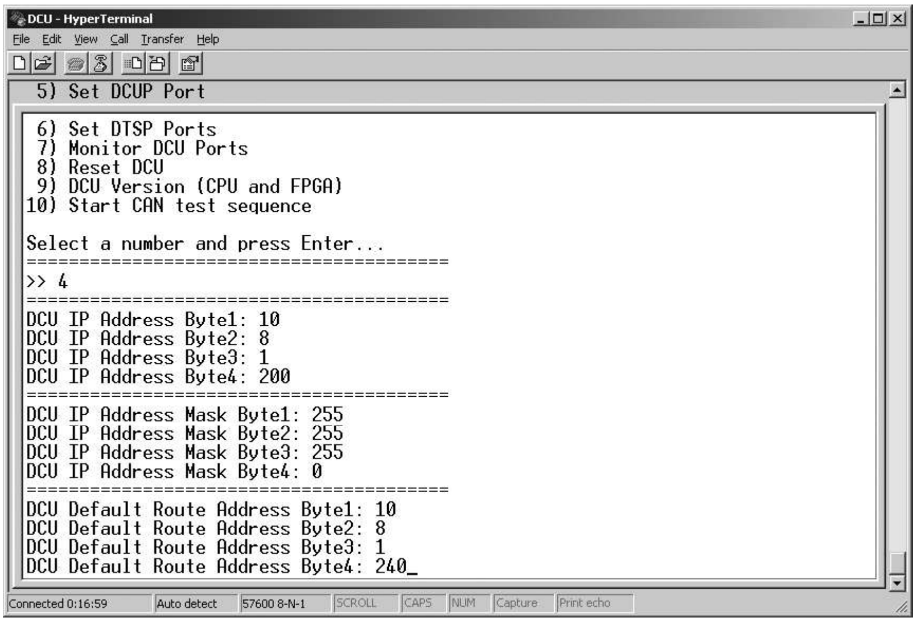
10. For the first type DCU values must be following:
    - IP2 Address: 10.8.2.200;
    - Subnet Mask: value 255.255.255.0;
    - Default Gateway: 10.8.2.240.
11. For the second type DCU values must be following:
    - IP2 Address: value 10.8.2.201;
    - Subnet Mask: value 255.255.255.0;
    - Default Gateway: 10.8.2.240.

Setting DCU IP Addresses

1. In “DCU Main Menu” type “4” and press <Enter> button:



2. Enter values (IP Address, Mask, Default Route) specified above determined in section **Checking DCU IP Addresses** for LAN1 and for LAN2. Press <Enter> after typing of each value.



Then switch off/on DCU power and check preservation of all settings.

Power Connection

Workstation requires 24 VDC. This power must be provided from 24 VDC ship's distribution board or from optional UPS6 connected with 110/220 VAC ship's distribution board with Main/Emergency Automatic Switch. For details, see "NS 4000/4100 ECDIS WS. Optional Configuration. Power Supply Distribution. Connection Diagram" and connection diagram for each scanner enclosed in **Annex G** of this document.

RS6 Computer Discrete Signal Interface

General

Discrete signal interface for alarms distribution is provided by digital I/O ports of RS6 computer. Four digital output (DO) ports provide issue NR MFD alarm signals on Alarm Panel. Four digital input (DI) ports are used for NR MFD alarms acknowledgment (silence) from Alarm Panel and for receiving alarm signals from UPS (see drawing "RS6 Computer. Connectors Layout" enclosed in **Annex G** and connection diagrams).

Digital Input

Digital input ports are designed for dry contact (5VDC@1mA) closure to GND.
DI ports receive control signals from digital field devices (sensors, switches, etc.).
Each pair of the port's terminals shall be used for connection with digital devices.
Each pair of the ports has one ground terminal.
The inputs use a Phoenix 3.81 mm 6-pin connector.

Digital Output

DO ports switch the connected load by means of internal, isolated relays.
The relays are capable of the switching 30VDC@1A and 100VAC@300mA.
Each pair of the port's terminals shall be connected to the certain indication unit (Alarm Panel optical indicators, etc). The each port has separate ground.
The outputs use a Phoenix 3.81 mm 8-pin connector.

WAGO I/O Modules for Conning

General

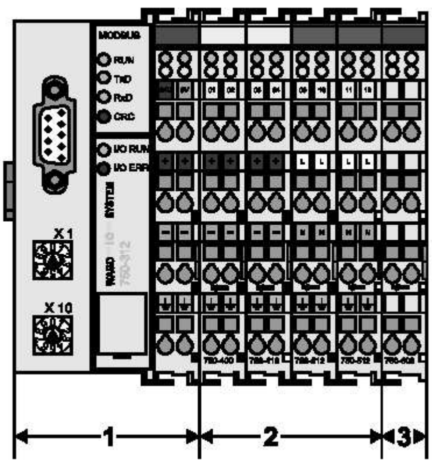


Fig. 33. WAGO modules set

WAGO I/O Set of Modules used in NS 4000 MFD System for Conning includes the following parts:

- MODBUS Coupler/Controller: the module is intended for communication of the set of WAGO I/O Modules with the Working Station via RS-232 protocol. Baud rate value recommended for use in NS 4000 MFD is 9600. Voltage supply – DC 24 V. Power AC/DC Adaptor might be used as a power supply source. With its I/O functions the coupler/controller forms the logic operation between the Fieldbus used and the field area. All control tasks necessary for the perfect operation of the I/O are performed by the coupler/controller;
- I/O modules: the input and output of the process data is made at the I/O modules. I/O modules are available for various tasks in accordance with varying requirements. Available are digital and analog input and output modules, I/O modules for angle and path measurement as well as communication modules. The individual I/O modules used in NS 4000 MFD are described in **Chapter 3**;
- End module: the module completes the internal data circuit and ensures correct data flow. One is required for each bus-coupler. The node end module is indispensable. It is always fitted as the last module, to guarantee the internal node communication. The end module has no I/O function.

All modules forming the above set must be mounted on the DIN rail to provide the common grounding contact.

Technical specification of WAGO modules for Conning is given in **Chapter 3**.

The connection diagram of WAGO set of modules is shown in drawing "WAGO Set for Conning. Functional Diagram" enclosed in **Annex G** of this document.

List of I/O Modules Used in NS 4000 MFD

List of I/O modules used in NS 4000 MFD is presented in the table below:

Table 11. List of WAGO modules

No.	Module	Ref. No.
1	MODBUS	750-314
2	4-Channel Digital Input Module DC 24 V	750-403
3	2-Channel Analog Input Module 4-20 mA	750-454
4	2-Channel Analog Input Module +/- 10 V	750-476
5	4-Channel Analog Input Module 0-10 V	750-468
6	2-Channel Relay Output Module AC 230 V, DC 30 V	750-513
7	End Module	750-600

Assembling of the WAGO I/O Set Modules

All system components can be snapped directly on a carrier rail (DIN rail) in accordance with the European standard EN 50022 (TS 35). All modules have the same shape to minimize the project commitment. The reliable positioning and connection of the coupler/controllers and the individual I/O modules is made using a tongue and groove system. Due to the automatic locking the individual components are securely seated on the rail after installing.

The coupler/controller must be fixed on the carrier rail with the lateral orange-coloured locking disk. To fix the coupler/controller apply pressure on the upper groove of the locking disk using a screwdriver.

To remove the coupler/controllers release the locking disk by pressing on the bottom groove. It is also possible to release an individual I/O module from the unit by pulling an unlocking lug.

The following sequence of modules must be observed in the course of assembling:

- MODBUS Module;
- Digital/Analog Input Modules;
- Relay Output Modules;
- End Module.

Cabling of the WAGO I/O Modules

The following requirements must be taken into consideration prior to cabling of the WAGO I/O Modules within the NS 4000 MFD System:

- Relay Output Modules: each pair of active contacts of the modules shall be connected to the certain indication unit (Alarm Panel optical indicators, etc.);
- Input Modules: each pair of active contacts on the modules shall be used for connection with different type of sensors (digital and analog);
- MODBUS: 24 V DC input contacts are marked on the module accordingly. The other contacts of the module are used for the power distribution only.

NETWORK

Network is basement of NS 4000 ECDIS MFD System for communication between Workstations and RIB6 (and DCU6). The network redundancy is provided by double network. The physical layer is Ethernet; the transport layer is TCP/IP.

Physical Layout

NS 4000 ECDIS MFD network could be connected in accordance with drawing "NS 4000/4100 ECDIS MFD (WS1 and WS2). Optional Configuration. Data Flow Diagram" enclosed in **Annex G** of this document, by means of FTP Cat.5 cables.

The Ethernet switches type approved MOXA EDS-305/308/316 series are the multiport high-speed switches which can be used for building of the high-performance communication.

Technical specification of the Moxa switch EDS-305/308/316 series is given in **Chapter 3**.

IP Addresses

IP addresses table is shown below:

Table 12. WS's IP addresses

STATION	LAN 1 IP address	LAN 2 IP address	Subnet mask
Workstation 1 (W01)	10.8.1.101	10.8.2.101	255.255.255.0
Workstation 2 (W02)	10.8.1.102	10.8.2.102	255.255.255.0
Workstation 3 (W03)	10.8.1.103	10.8.2.103	255.255.255.0
Workstation 4 (W04)	10.8.1.104	10.8.2.104	255.255.255.0
Workstation 5 (W05)	10.8.1.105	10.8.2.105	255.255.255.0
DCU I type	10.8.1.200	10.8.2.200	255.255.255.0
DCU II type	10.8.1.201	10.8.2.201	255.255.255.0
RIB6 I type	10.8.1.209	10.8.2.209	255.255.255.0
RIB6 II type	10.8.1.210	10.8.2.210	255.255.255.0

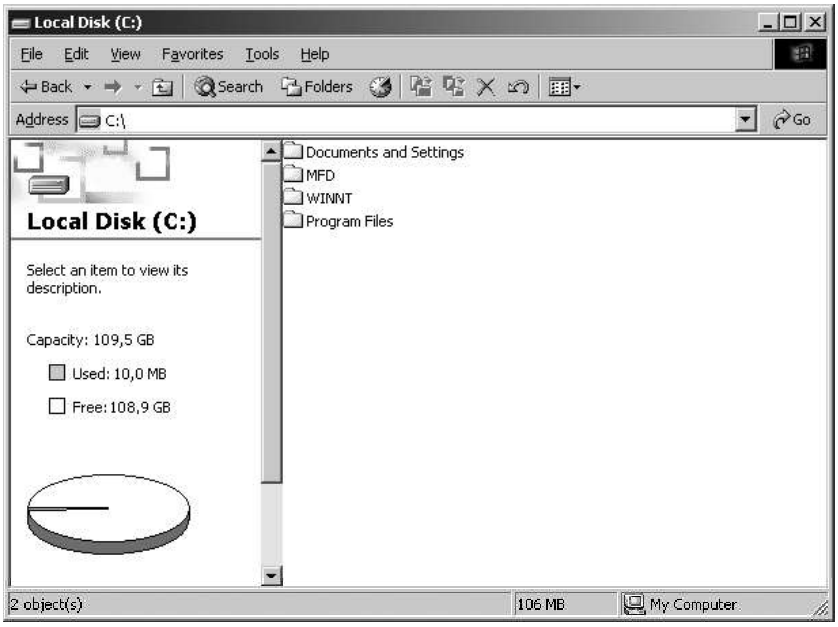
CHAPTER 2

System Settings

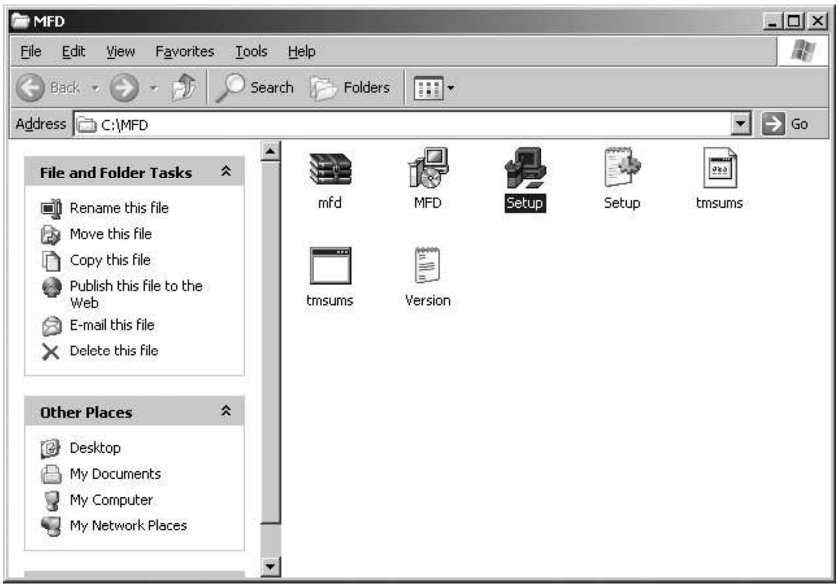
SOFTWARE INSTALLATION

Pre-installation

On a disk *C:* create folder *C:\MFD*:



Insert CD with product to the CD-drive.



Copy all files from this folder to *C:\MFD* and close this folder.

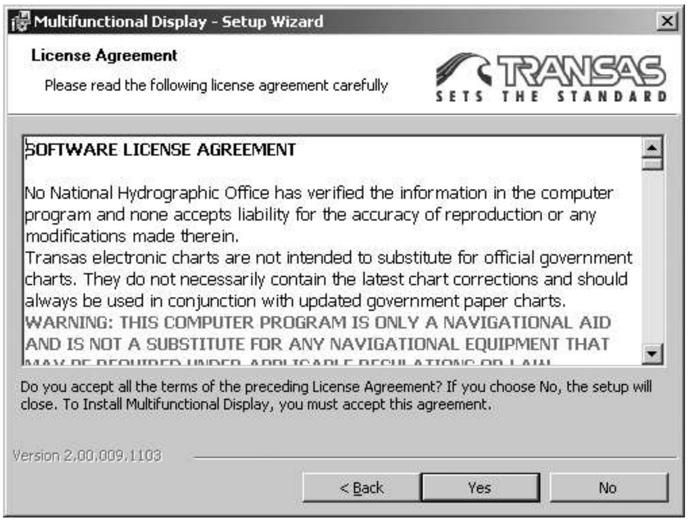
Install SPOS-6 software from Transas MNS CD.

Installation of NS 4000

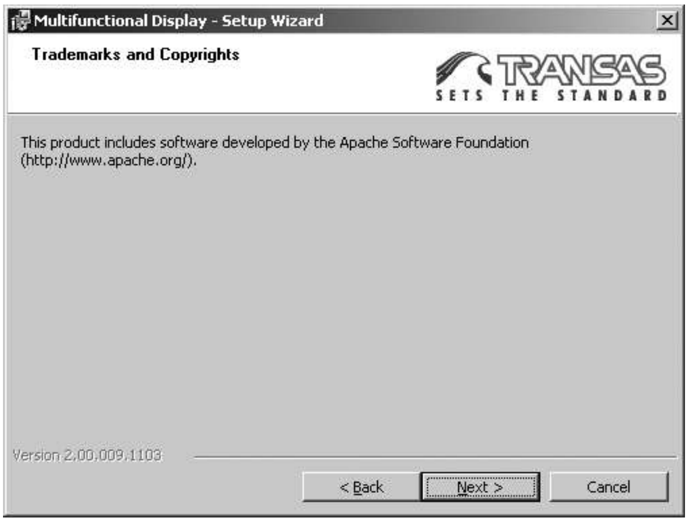
At each workstation, perform the following procedure.

Run `Setup.exe` file in the folder *C:\MNS*:

Press “Next >” button. A window containing the licensing agreement text will be displayed:

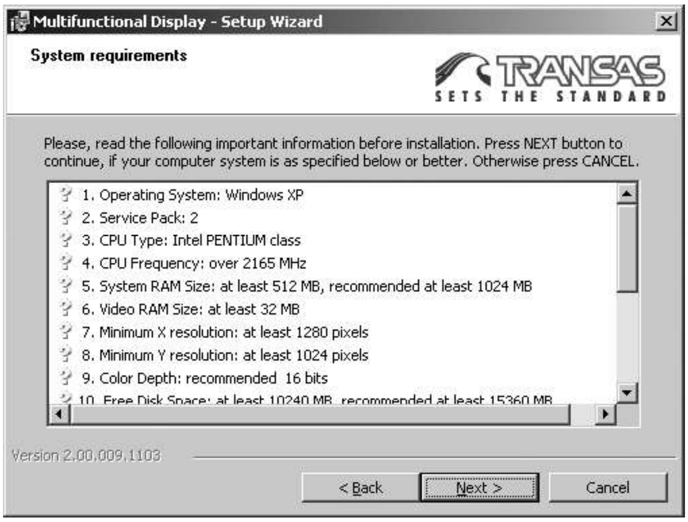


Press “Yes” button. The copyright information window will be displayed:

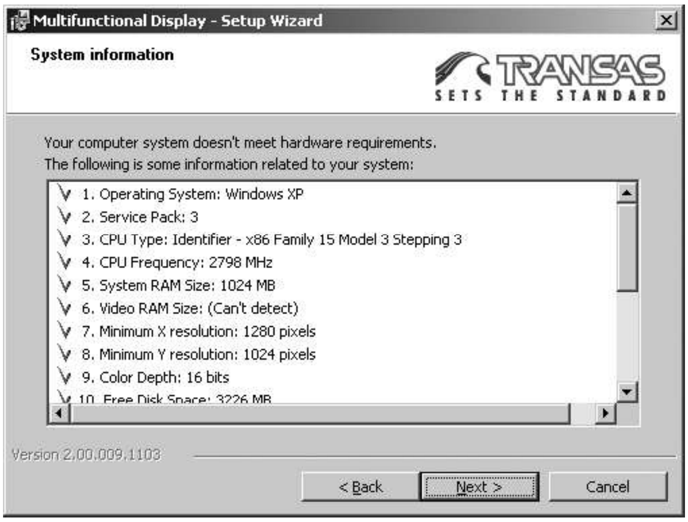


Press “Next >” button.

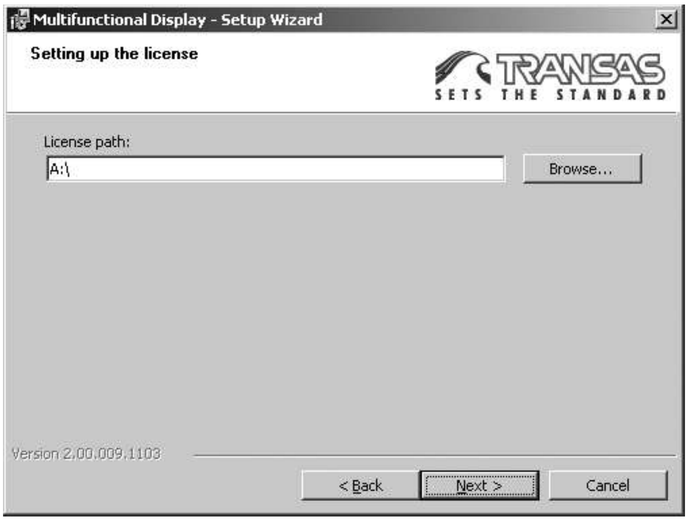
At this installation stage, it is necessary to make sure that the computer parameters and pre-installed software comply with specified requirements. If any critical non-compliance is identified, the installation will not be continued:



Press “Next >” button. A window containing system information will be displayed.

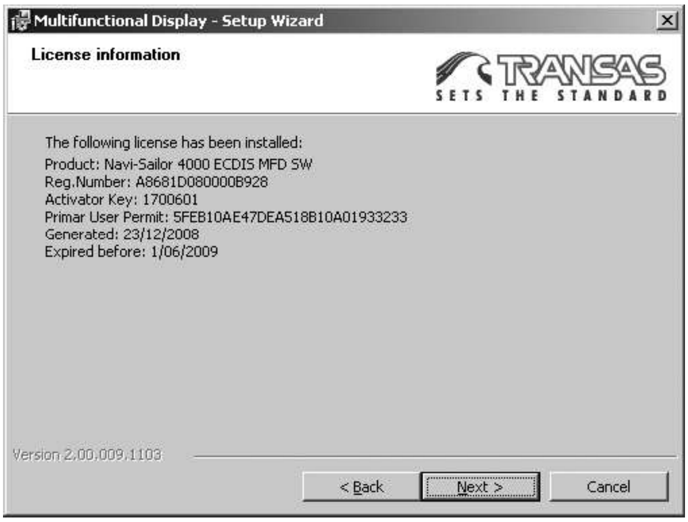


Press “Next >” button. Specify the path to the product license (*A:* by default) in displayed window:

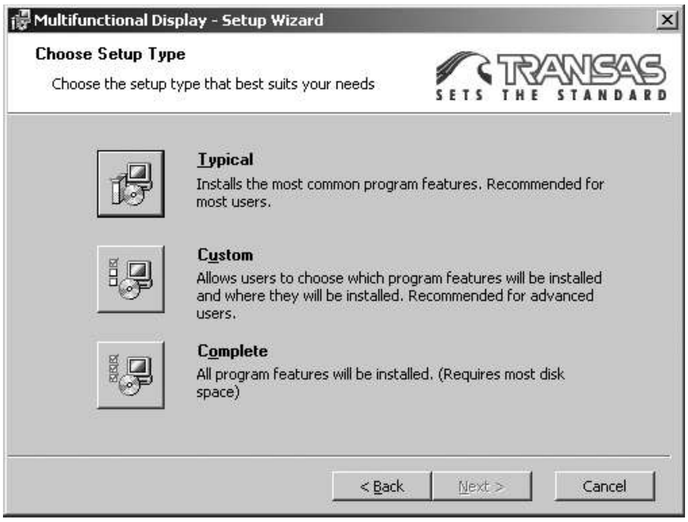


Press “Next >” button.

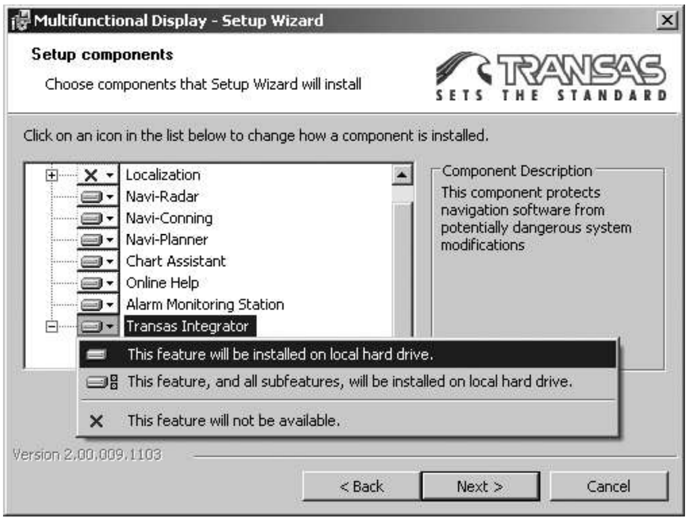
The license information will be displayed:



Press “Next >” button.



Select “Custom”.



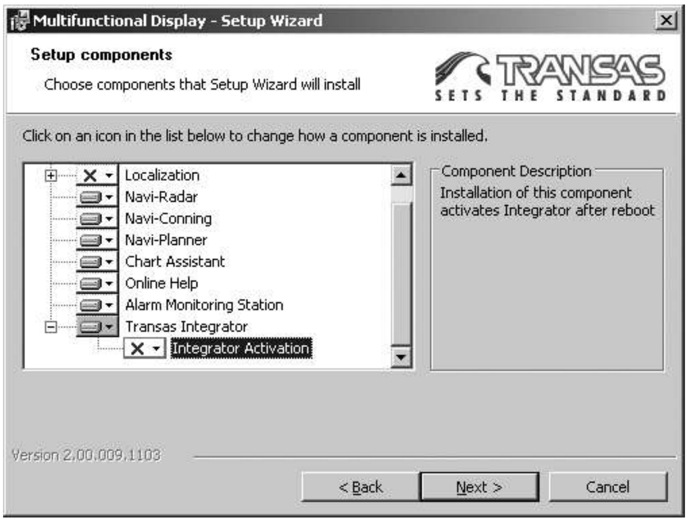
Select components to be installed by the Setup Wizard (on each WS as per the licensed NS 4000 configuration). To prohibit the installation of selected component, select option “This feature will not be installed”.

WARNING!

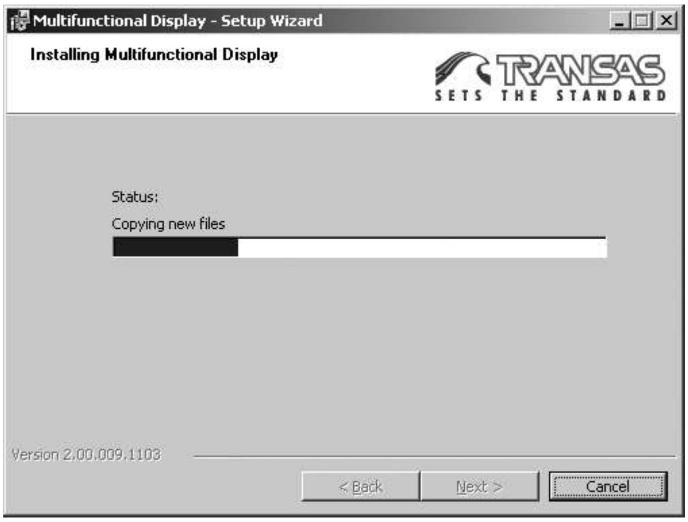
It’s strictly recommended to install “Chart Assistant” utility on the all WS.

Select component “Transas Integrator” and set option “This feature will be installed on local hard drive”.

Keep feature “Integrator Activation” not available, it will be activated later:



Press “Next >” button.



The program will perform the product installation.

In displayed window, press “Finish” button.

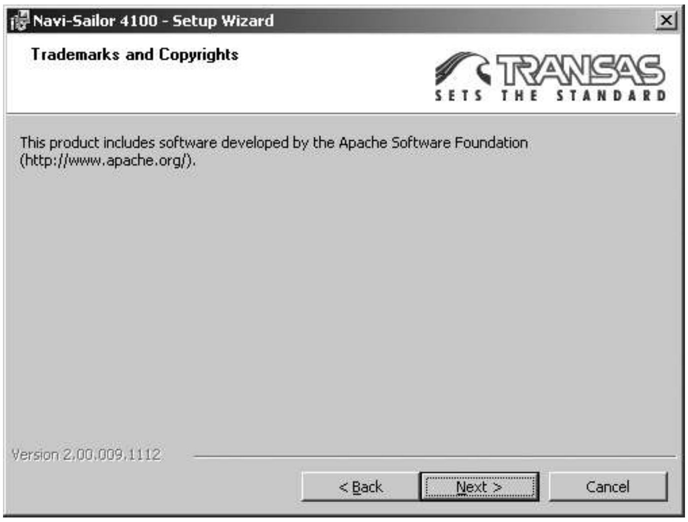
Installation of NS 4100

At each workstation, perform the following procedure.

Run `Setup.exe` file in the folder *C:*:

Press “Next >” button. A window containing the licensing agreement text will be displayed:

Press “Yes” button. The copyright information window will be displayed:



Press “Next >” button.

At this installation stage, it is necessary to make sure that the computer parameters and pre-installed software comply with specified requirements. If any critical non-compliance is identified, the installation will not be continued:

Press “Next >” button. A window containing system information will be displayed.

Press “Next >” button. Specify the path to the product license (*A:* by default) in displayed window:

Press “Next >” button.

The license information will be displayed:

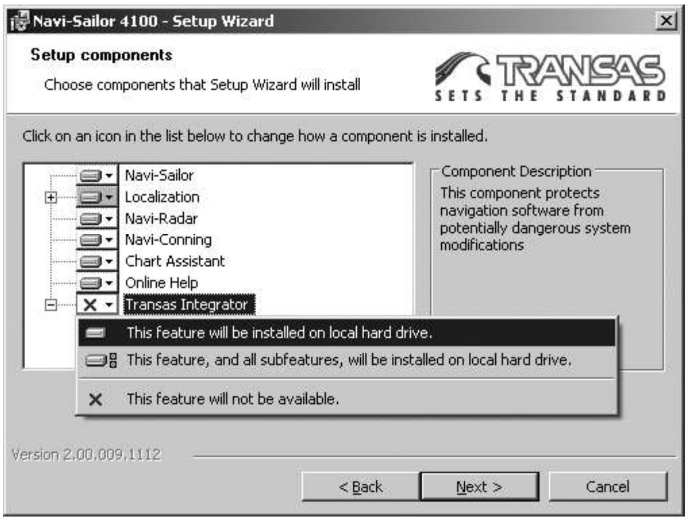
Press “Next >” button.

Select components to be installed by the Setup Wizard (on each WS as per the licensed NS 4100 configuration). To prohibit the installation of selected component, select option “This feature will not be installed”.

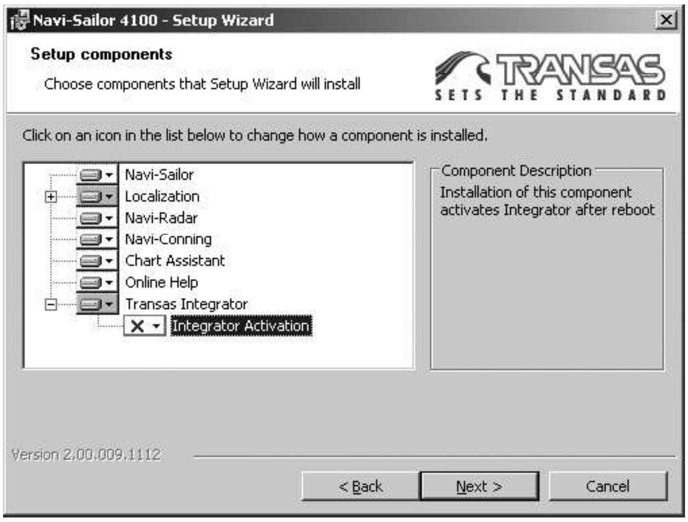
WARNING!

It’s strictly recommended to install “Chart Assistant” utility on the all WS.

Select component “Transas Integrator” and set option “This feature will be installed on local hard drive”:

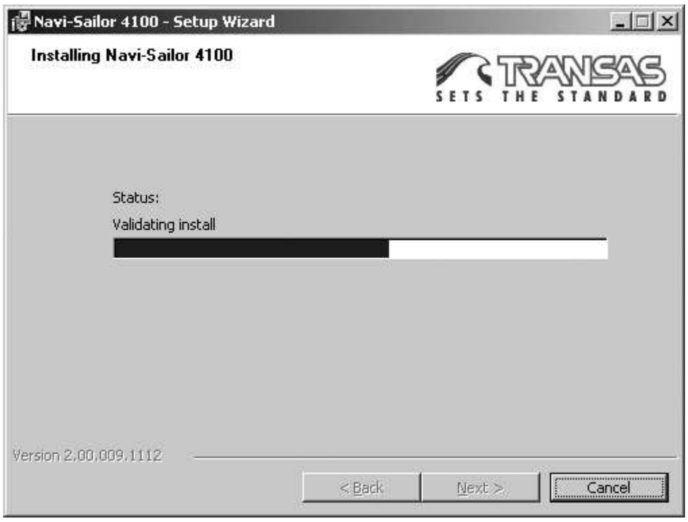


Keep feature “Integrator Activation” not available, it will be activated later:



Press “Next >” button.

Select **ECDIS** and press “Next >” button.



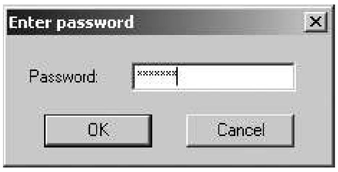
The program will perform the product installation.

In displayed window, press “Finish” button.

NS 4000 CONFIGURATION

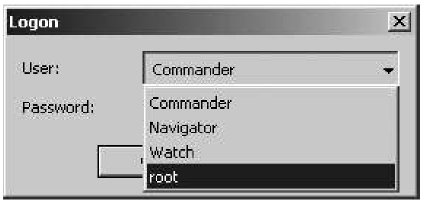
Run the System Configuration utility by selecting the appropriate item in the START menu (START\PROGRAMS\MULTIFUNCTIONAL DISPLAY\SYSTEM CONFIGURATION):

During the NS 4000 installation enter the password.



Press the “OK” button and go on to the next installation step.

If the NS 4100 is being installed, in the “Logon” dialogue box which will appear, from the **User** listbox select the “root” user. Press “OK” button.



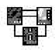
The screen will display a window showing the automatically generated master password intended for unlocking the system (the system is locked by default after three unsuccessful attempts to enter the password).

Save it and store in a safe place to prevent the unauthorised access.

Press the “OK” button and go on to the next installation step.

General

The System Configuration utility consists of 5 panels; pages divide each panel.
To open the required panels, press the appropriate buttons:

Panel Name	Purpose	Button
INS	Configuration of the entire NS 4000/4100	 INS
Workstation	Configuration of each Workstations separately	 Workstation
Sensors	Sensors settings, configuration of alarms, and warnings	 Sensors
Radar	Configuration of scanners and RIB-equipped Workstations	 Radar
Security	For NS 4000 to create users permitted to edit the electronic ship logbook and set passwords permitting this access. For NS 4100 configuration of security access system	 Security
Commissioning Table	Formation of NS 4000/4100 commissioning table	 Comissioning Table

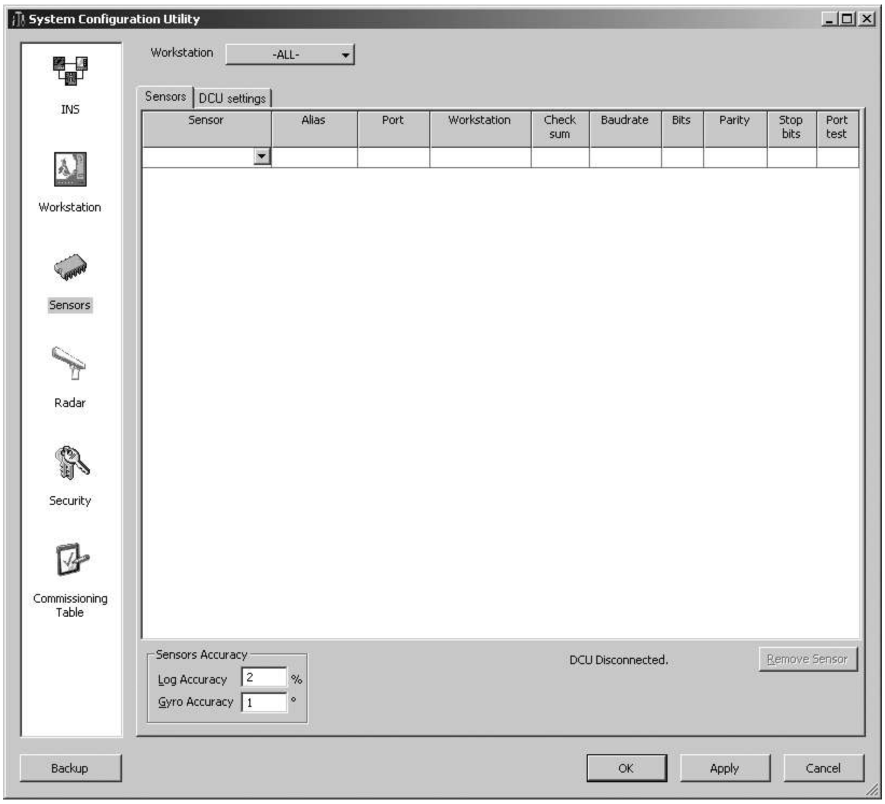
Sensors Settings

Press **Sensors** button. The drop-down **Workstation** list specifies the name of the workstation which settings will be made for, and “ALL” line for all WS’s.

ATTENTION!

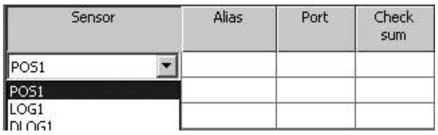
Perform individual settings for each Workstation, selecting them consecutively from the droop-down list **Workstation**. All data will be synchronized at all the Workstations after the settings saving.

1. Select “ALL” line from the **Workstation** drop-down list.
2. Open “Sensors” page to set the WS connected sensors.

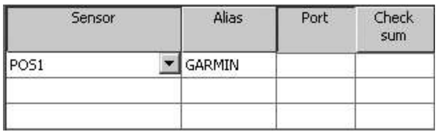


– Adjust COM ports for operation with connected sensors. The following actions shall be done for this purpose:

Select required sensor from the drop-down list in the column **Sensor**:

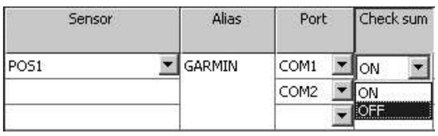


In the **Alias** column, specify the sensor name to enable its identification for the purpose of the redundancy concept. After the input of an alias, it becomes possible to connect this sensor to other ports. I.e., should one COM port fail, data will be received from the next port on other WS connected to this sensor:



In the column **Port**, select from drop-down list the required COM-port of the Workstation computer, which this sensor is physically connected to:

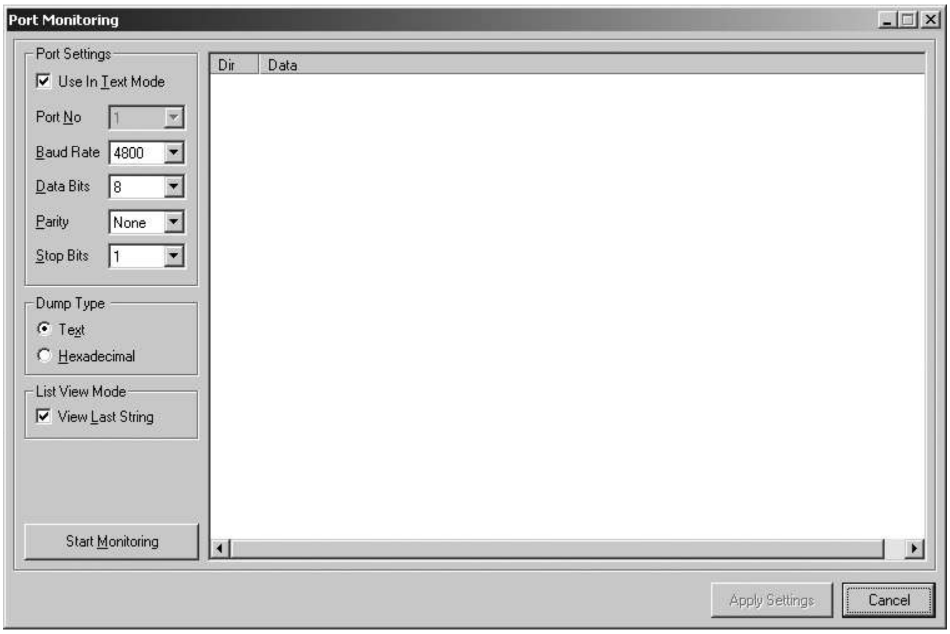
In the **Check sum** column, if required disable the checksum by selected "OFF" from drop-down list:



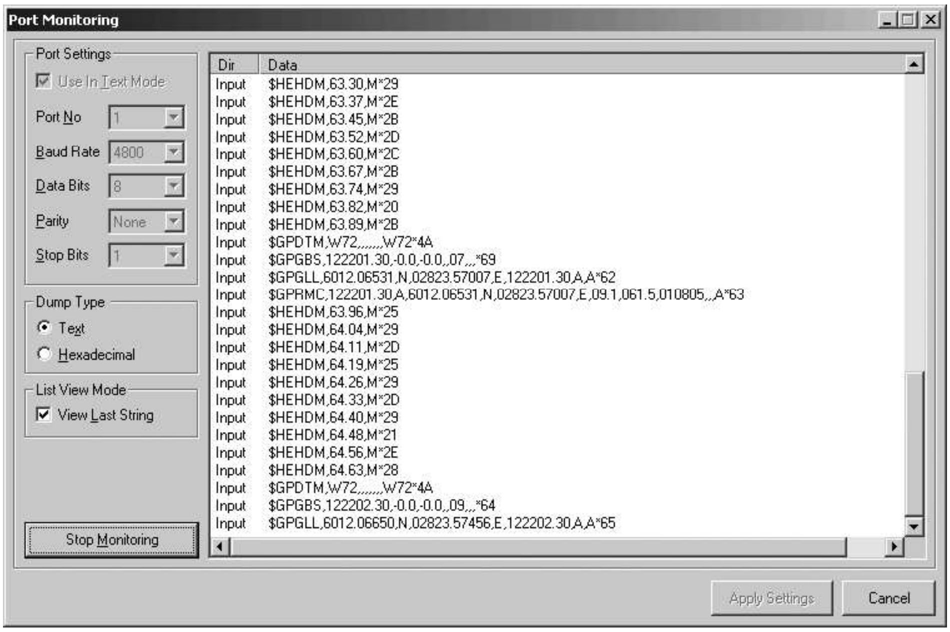
– Check for the relevant port of this sensor:

If COM-port was selected, specify in the drop-down list the following COM port exchange parameters, defined in technical description of connected sensor: Baud rate, Bits, Parity, and Stopbits;
To check the propriety of sensor connection, press the button **Test** in the column **Port test**.

Note: The above mentioned checking can be carried out only on the Workstation, which COM-port the sensor is connected to:



– Press **Start Monitoring** button.



– If incorrect data is received, or there is no data, change the COM port parameters in **Port Settings** group. COM port parameters:

Baud Rate: 50–115200 (by default – 4800);
Data Bits: 7,8 (by default – 8);
Parity: None, Event, Odd, Space, Mark (by default – None);
Stop Bits: 1,2 (by default – 1).

All the changes in the communication channel parameters are required to be made with the data monitoring turned off.

If data from some sensor is not processed by the NS 4000 but is nonetheless displayed in the monitoring window, it is necessary to turn off the processing of data checksum from the device in *System Configuration Utility\Sensors\Sensors*.

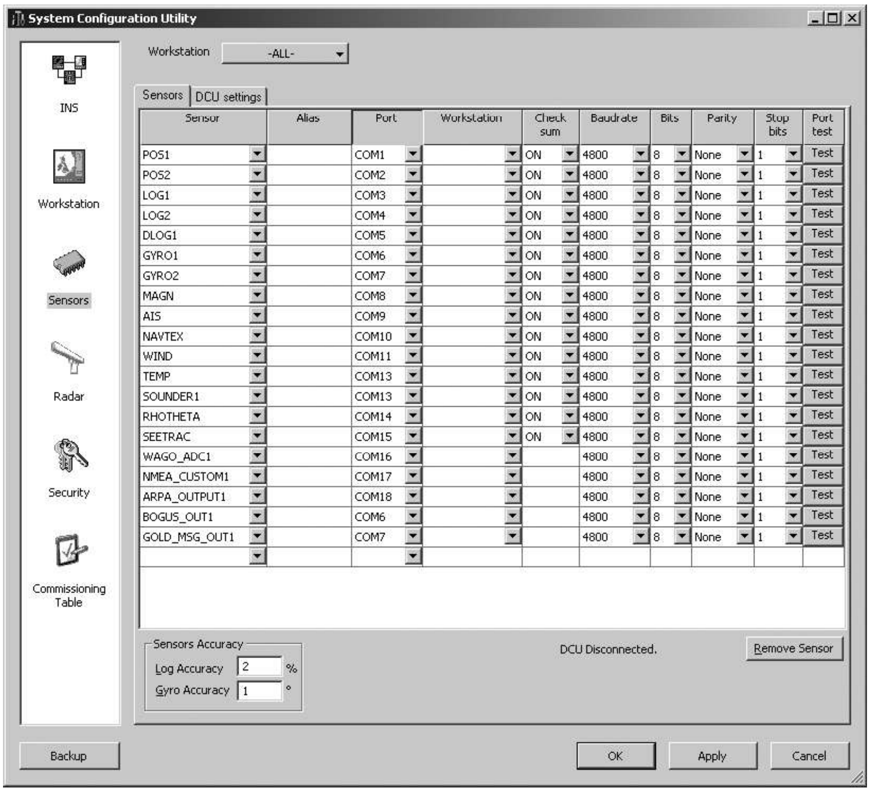
Finish testing by pressing **Stop Monitoring** and **Close** buttons.

– Enter as required, the log and gyro reading accuracy in **Log Accuracy** and **Gyro Accuracy** fields;

– Use the button **Remove Sensor** for deletion of unnecessary sensors;

– Press "Apply" button.

3. During the NS 4100 installation, in addition to item 2, to use the functions for sending AIS bogus data on the own ship and target parameters, it is necessary to the WS with NS 4100 which the AIS sensor is connected to, in addition connect any free AIS port – Sensor 1, 2 or 3 (see **INSTALLATION MANUAL R4 AIS CLASS A TRANSPONDER SYSTEM** under **Wiring Cable Connections**). Connection should be made via ports with the RS-422 interface. This functionality is only available with the use of the SAAB R4SW Secure WAIS Transponder System. For the additional data on the functionality operation see **NAVI-SAILOR 4100 ECDIS (V. 2.00.009). SPECIAL FUNCTIONS**, section **AIS Targets Simulation**.

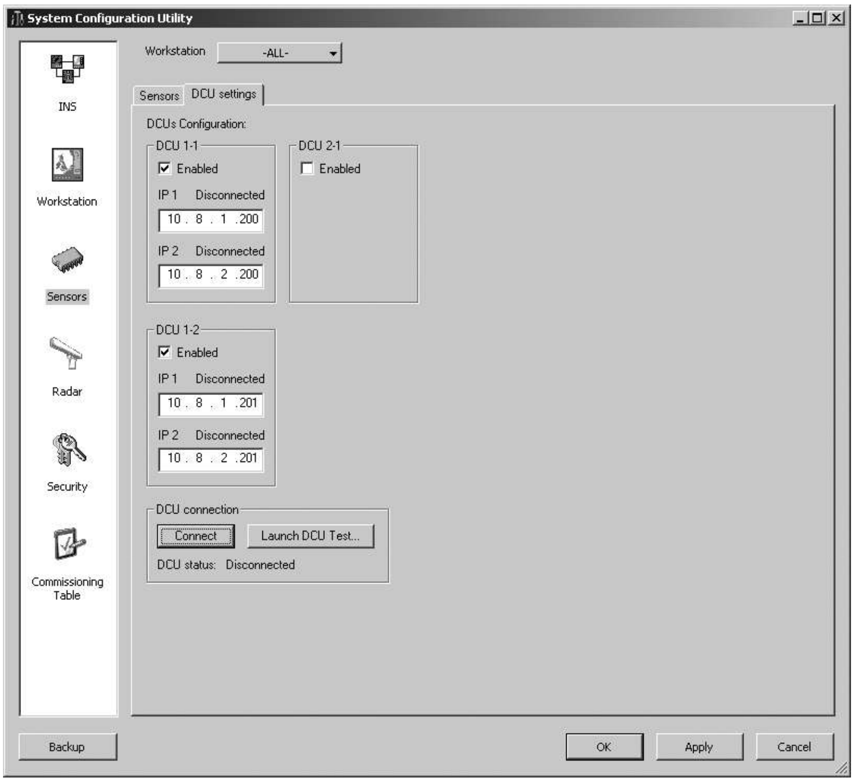


– From the drop-down list in the **Sensors** column, select BOGUS_OUT, and assign the necessary COM port to it. By default, the Baudrate is 4800, the value can be checked or modified by using the AIS MKD (see under **Port Rate Config** in the **OPERATOR'S MANUAL R4 AIS CLASS A TRANSPONDER SYSTEM**);

– From the drop-down list in the **Sensors** column, select GOLD_MSG_OUT, and assign the necessary COM port to it;

– In the **Check sum** column, if required disable the checksum by selected "OFF" from drop-down list.

4. Switch to “DCU settings” page (if the DCU is available in the equipment set):



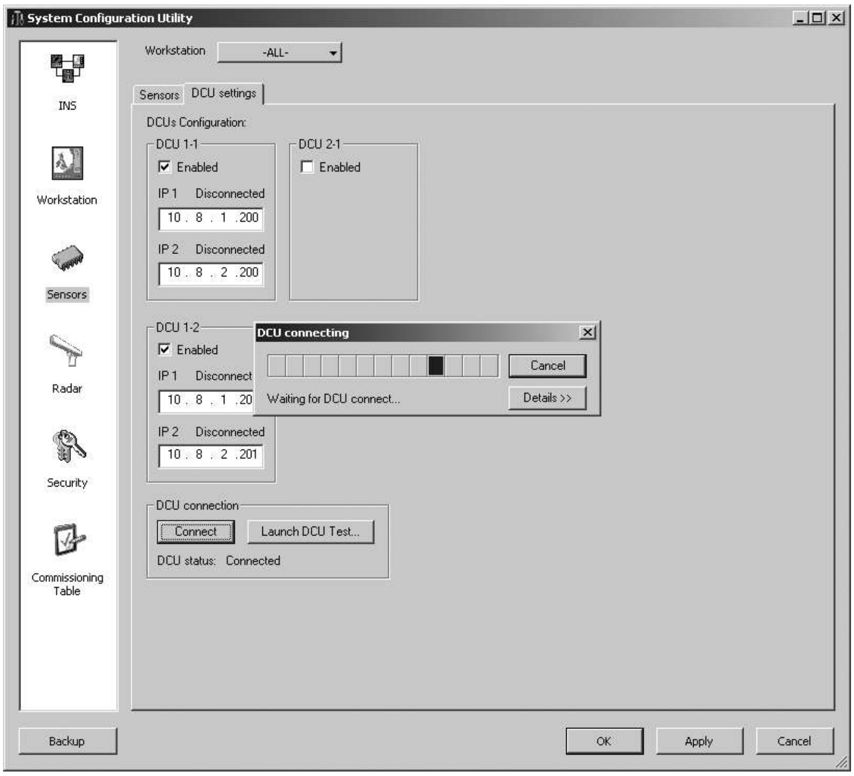
– In **DCU 1-1** group check **Enabled** checkbox:

In **IP 1** input box enter “10.8.1.200” IP address;
In **IP 2** input box enter “10.8.2.200” IP address.

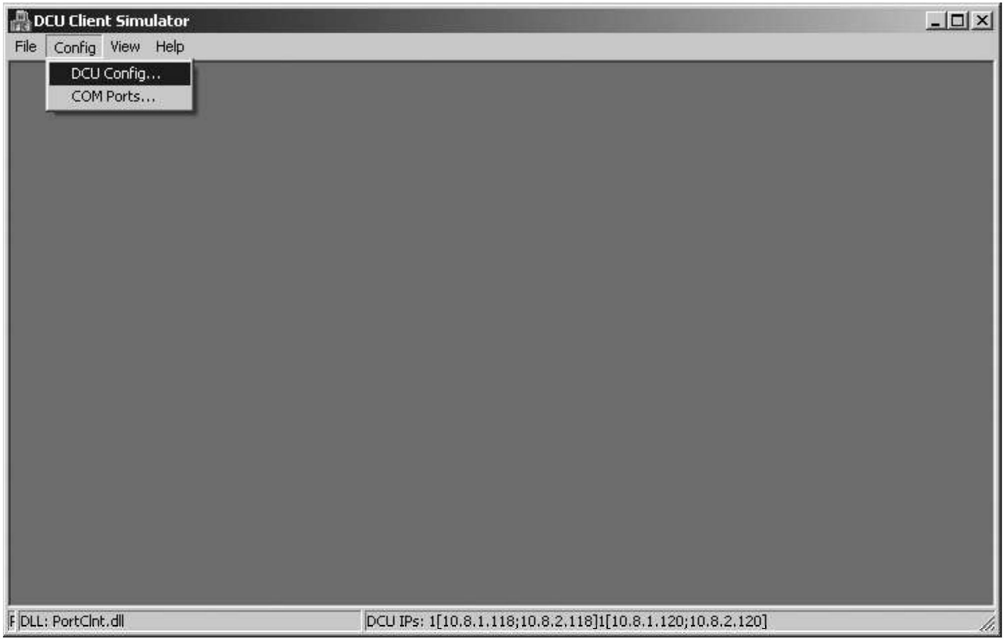
– In **DCU 1-2** group check **Enabled** checkbox:

In **IP 1** input box enter “10.8.1.201” IP address;
In **IP 2** input box enter “10.8.2.201” IP address.

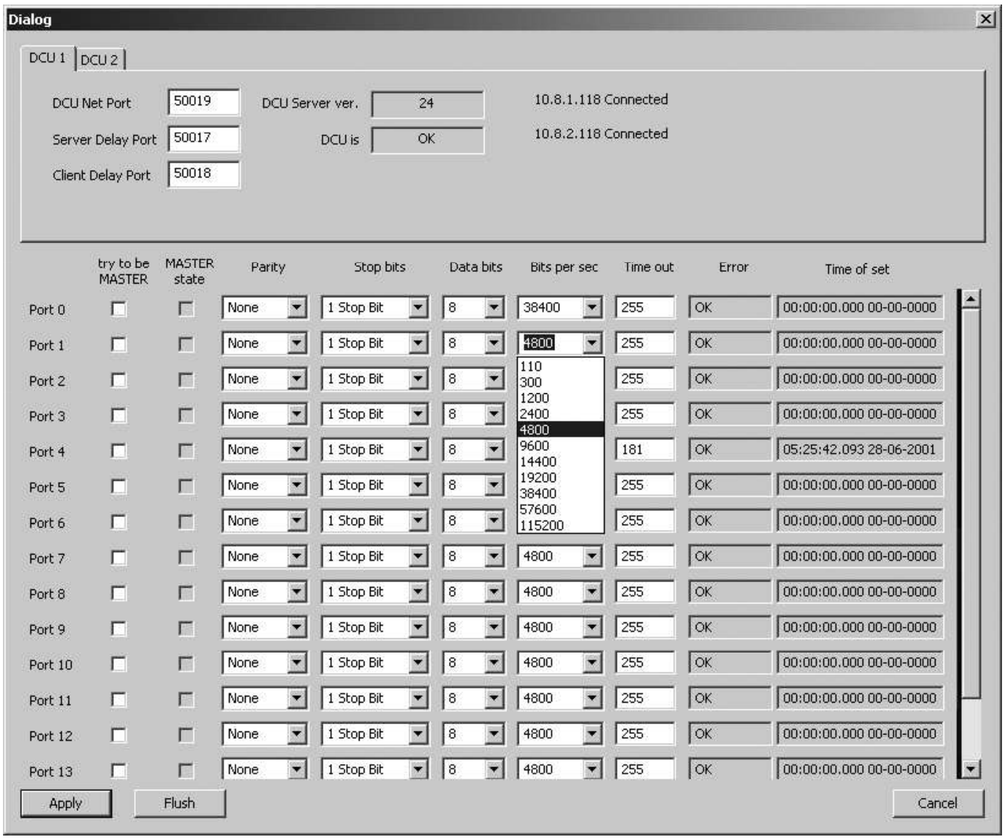
– In **DCU connection** group press **Connect** button:



– After the connection of the DCU press the **Launch DCU Test** button and in the "DCU Client Simulator" utility window select the CONFIG/DCU CONFIG menu item:

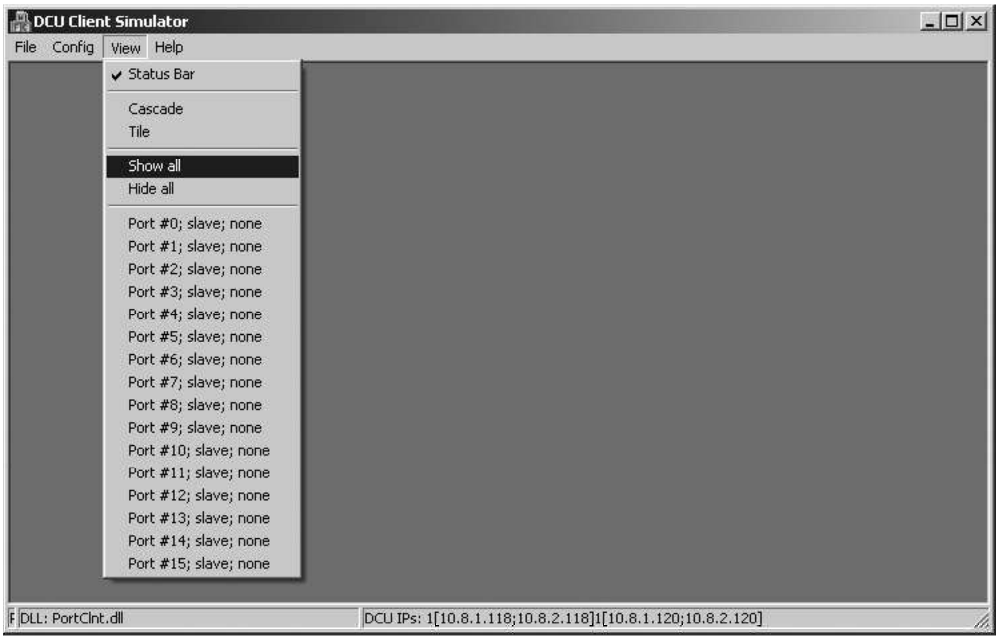


– For the devices connected to the DCU ports, specify in the drop-down list the following COM port exchange parameters, defined in the technical description of connected sensor: Baud rate, Bits, Parity, and Stopbits;

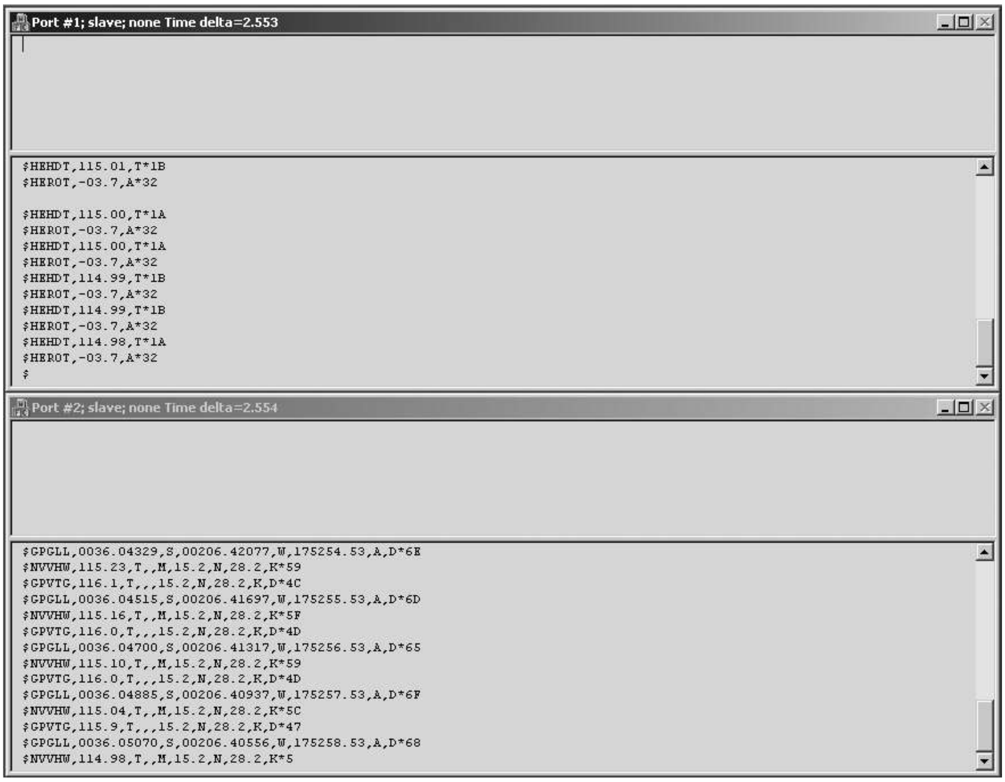


– Press the **Flush** and "Apply" buttons and then close the "Dialog" window;

– To check correctness of the sensor connection in the “DCU Client Simulator” utility window select the VIEW/SHOW ALL menu item:

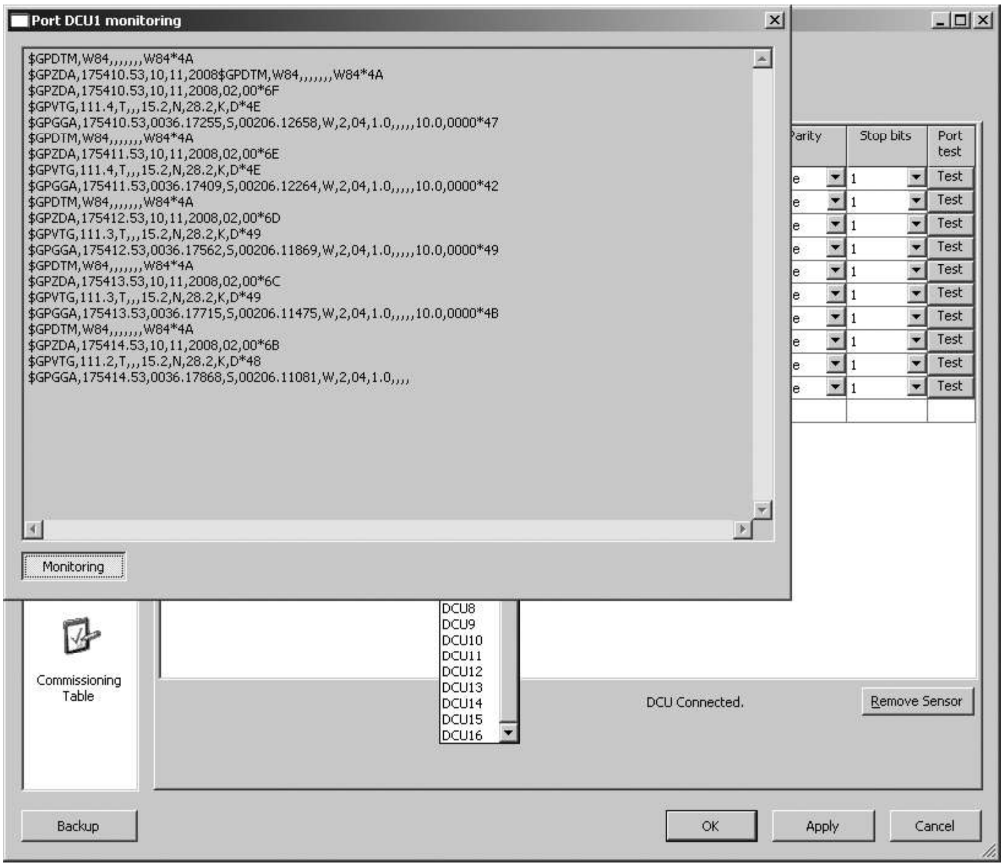


– If the settings are correct, the utility windows will display information supplied to the DCU ports:



– Close “DCU Client Simulator” utility;

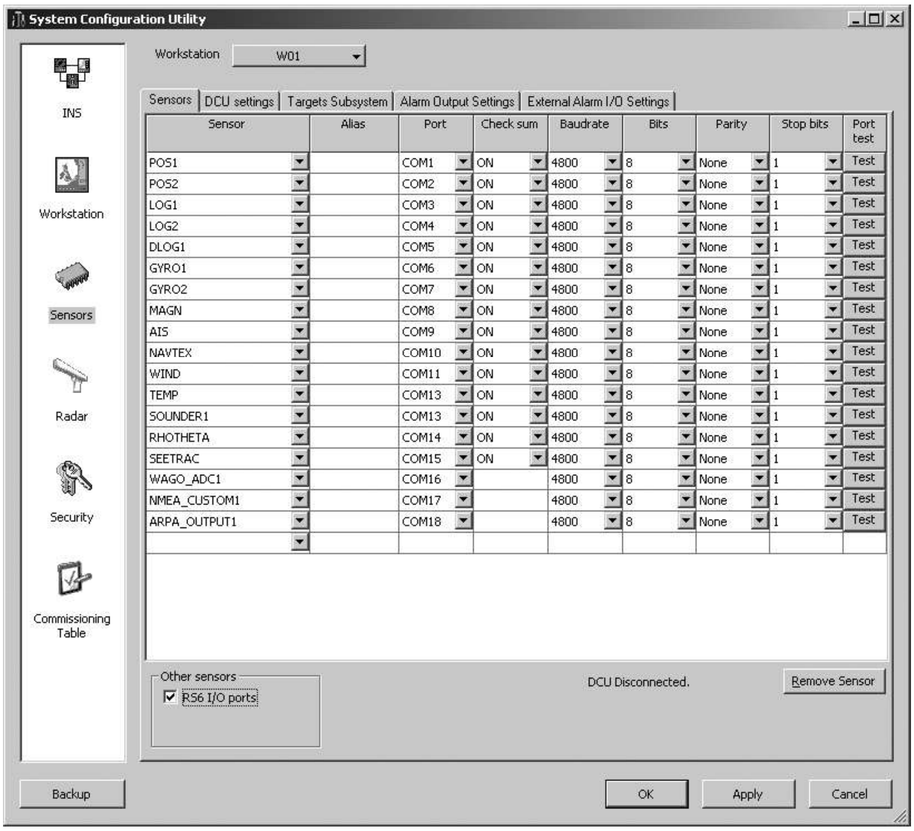
– Switch to the “Sensors” page and in the line of the device connected to the NS 4000 via the DCU, press the **Test** button in the **Port test** column. The ”Port DCU monitoring” window will display information supplied via the DCU to the NS 4000:



5. In the **Workstation** drop-dawn list, select the name of the workstation, which settings will be made for.

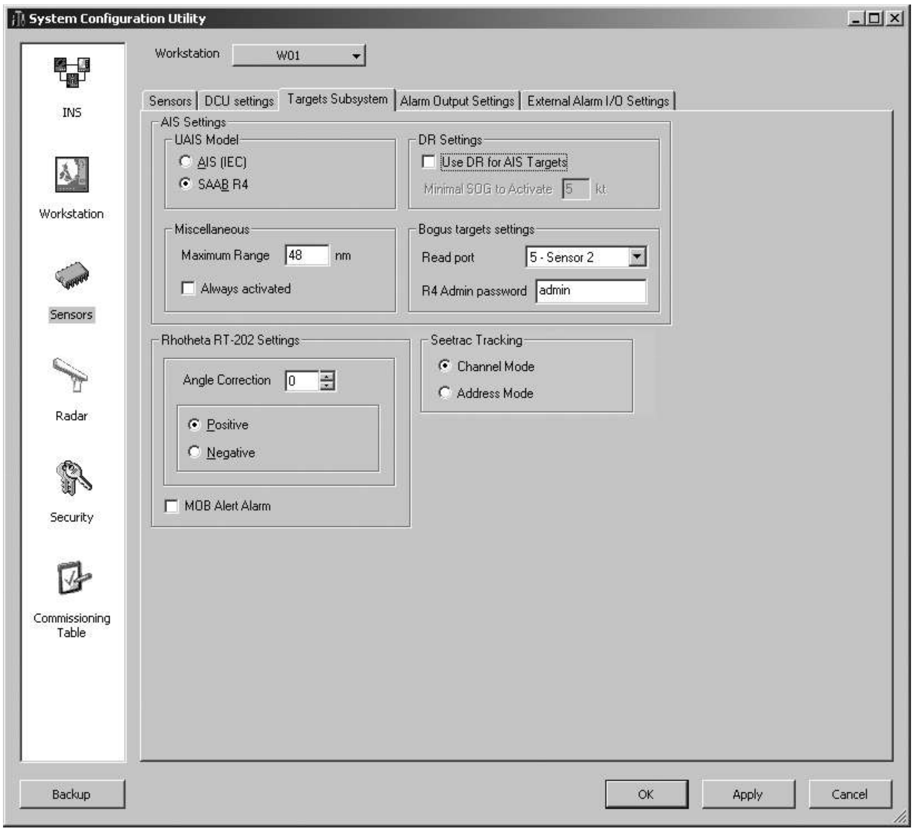
ATTENTION!

Perform individual settings for each Workstation, selecting them consecutively from the droop-down list **Workstation**. All data will be synchronized at all the Workstations after the settings saving.



– Check the **RS6 I/O ports** checkbox if you intend to work with the alarms/warnings via the RS6 computer discrete ports (for the port setup see items 7 and 8).

6. Switch to “Targets Subsystem” page:



– Use **UAIS Model** group to select the model of the transponder:

Press **AIS (IEC)** radio button to operate with any transponder complying with IEC 61993-2;
Press **SAAB R4** radio button to operate with SAAB R4 transponder as an MKD.

– Use **DR Settings** group to set configuration of AIS targets DR mode:

Check **Use DR for AIS Targets** checkbox to turn on the AIS targets DR mode (recommended);
In **Minimal SOG to Activate** input box, enter the AIS targets minimum speed whereby their positions will be reckoned (recommended SOG – 2 kn).

– Use **Miscellaneous** group to set AIS targets display mode:

In **Maximum Range** input box, enter the radius (up to 64 nm) of an area within which the AIS targets will be displayed;
Check **Always activated** checkbox for activation displayed AIS targets (see also document **NAVI-SAILOR 4000/4100 ECDIS (V. 2.00.009). FUNCTIONAL DESCRIPTION**, **Chapter 8**, section **AIS**, paragraph **AIS Transponder Interface**).

– Use the **Bogus targets settings** group to set bogus functionality parameters (for NS 4100 installation only when working with the AIS SAAB R4):

From the **Read Port** drop-down list select the SAAB R4 transponder port which the BOGUS_OUT port in the NS 4100 is connected to (see item 3);

In **R4 Admin password** input box enter SAAB R4 administrator transponder password (see document **OPERATOR'S MANUAL R4 AIS CLASS A TRANSPONDER SYSTEM**).

– Use **Rhotheta RT-202 settings** group for RDF settings (see also document **NAVI-SAILOR 4000/4100 ECDIS (V. 2.00.009). ADDITIONAL FUNCTIONS**, **Chapter 1**, section **MOB Mode with Use of RDF Rhotheta RT-202**):

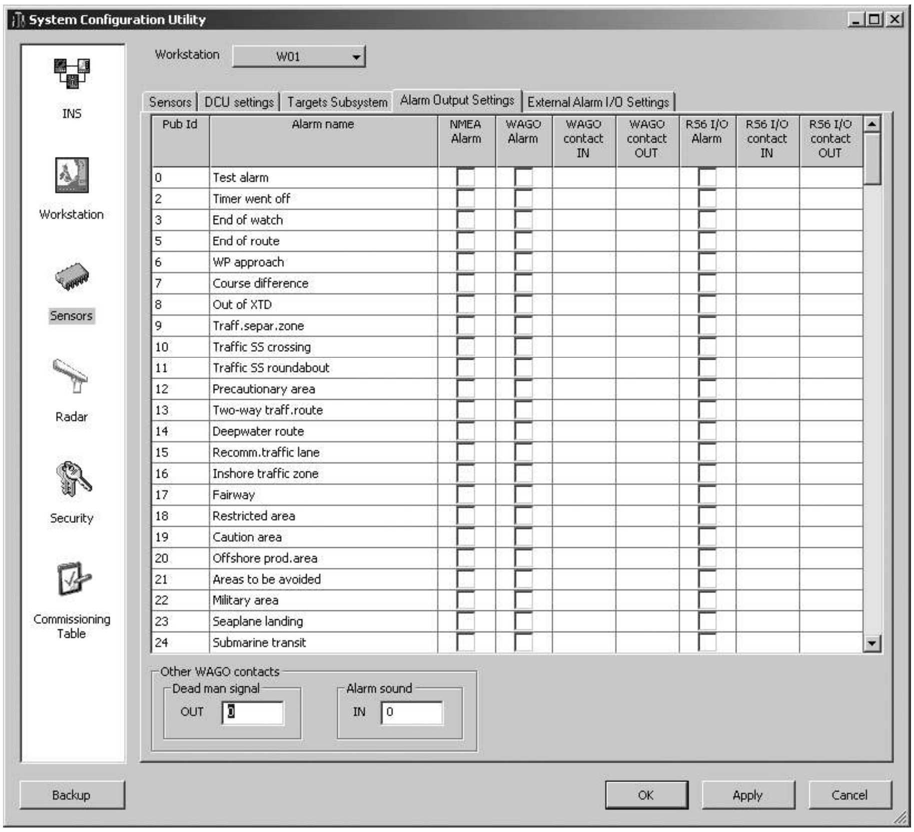
In Angle Correction input box, enter an exact correction between the initial direction of RDF Rhotheta RT-202 bearing origin and the ship's centreline plane;
Set the necessary correction polarity **Positive** or **Negative** by pressing the appropriate radio button.

Note: The correction should be within 180 degrees with a positive (0–179º clockwise) or negative (0–179º counter-clockwise) relative to the own ship centreline plane.

Check **MOB Alert Alarm** checkbox to turn on the NS 4000 alarm upon reception of bearing from Rhotheta RT-202 or AIS targets (see also document **NAVI-SAILOR 4000/4100 ECDIS (V. 2.00.009). ADDITIONAL FUNCTIONS**, **Chapter 1**, section **MOB Mode with Use of RDF Rhotheta RT-202**). Connection of the external MOB button is detailed in the relevant paragraph of **Annex B** in the **Adjustment of NS 4000 ECDIS MFD Operation with WAGO Modules** section.

– Use **Seetrac Tracking** group to specify the necessary Seetrac tracking mode: Channel Mode or Address Mode, by pressing the appropriate radio button.

7. Switch to “Alarm Output Settings” page:



– To transfer the alarm from the NS 4000 to the external device via NMEA interface (Output), check the checkbox in the column **NMEA Alarm**. Therefore, when the certain alarm is triggering off in the NS 4000, the ALR sentence with ID specified in the column **Pub Id**, will be outputted;

– To transfer the alarm from the NS 4000 to the external device via WAGO Module, check the checkbox in the column **WAGO Alarm**. In this case, when the certain alarm is triggering off in the NS 4000, the WAGO Module contact specified in the column **WAGO contact OUT**, will be closed. This alarm will be confirmed by closing the WAGO Module contact specified in the column **WAGO contact IN**:

  In the column **WAGO contact IN**, specify the WAGO Module contact intended for acknowledgement of the selected alarm;
  In the column **WAGO contact OUT**, specify the WAGO Module contact intended for transferring the alarm to the external device.

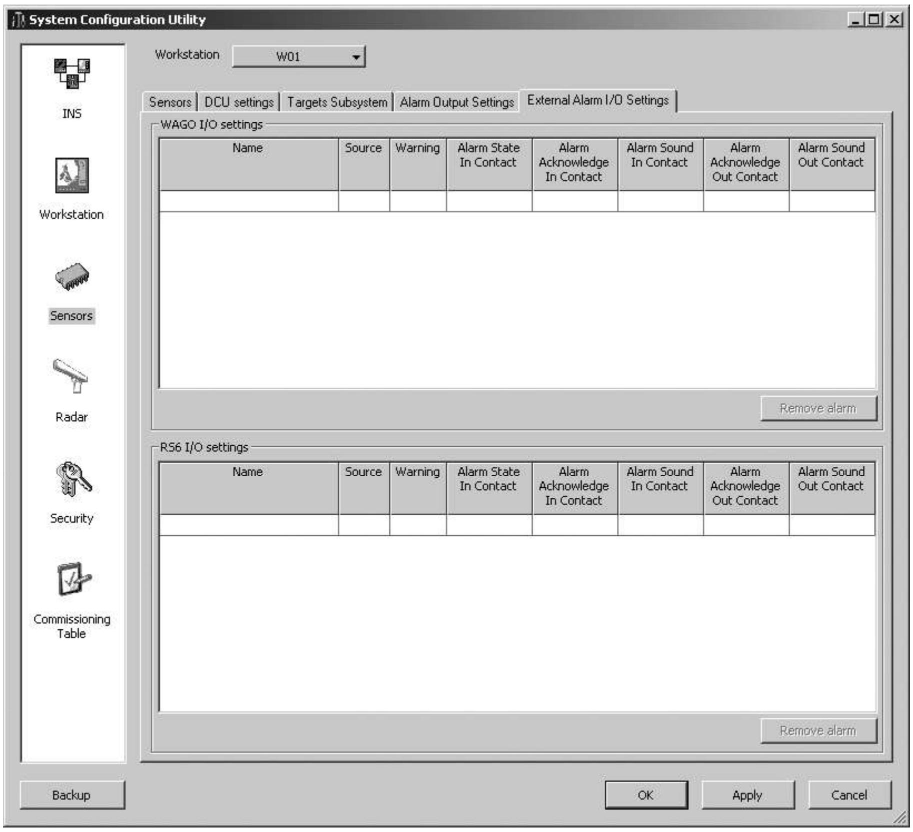
– To transfer the alarm from the NS 4000 to the external device via RS6 output contacts, check the checkbox in the column **RS6 I/O Alarm**. In this case, when the certain alarm is triggering off in the NS 4000, the RS6 output contact specified in the column **RS6 I/O contact OUT**, will be closed. This alarm will be confirmed by closing the RS6 input contact specified in the column **RS6 I/O contact IN**:

  In the column **RS6 I/O contact IN**, specify the RS6 input contact intended for acknowledgement of the selected alarm;
  In the column **RS6 I/O contact OUT**, specify the RS6 output contact intended for transferring the alarm to the external device.

– In the window **Dead man signal** of the group **Other WAGO contacts**, specify the number of WAGO Module contact intended for transferring the timer reset signal to the outer Alarm Panel. Therefore, the specified contact will be closed by trackball movement with resetting the “Dead Man” timer on the outer Alarm Panel;

– In the window **Alarm Sound** of the group **Other WAGO contacts**, specify the number of WAGO Module contact intended for silencing the alarm sound signal came from outer equipment. Closing the specified contact performs the silencing of all the active alarms.

8. Switch to “External Alarm WAGO Settings” page:



In **WAGO I/O settings** group make settings for work with alarms and warnings via WAGO modules:

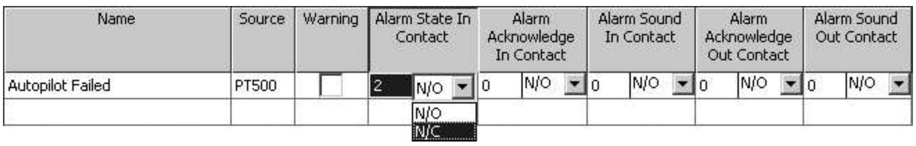
– In the column **Name**, enter the alarm name which is to be displayed in NS 4000 by closing/unclosing the WAGO Module contacts specified in the column **Alarm State In Contact**;

– In the column **Source**, enter the alarm source name (up to 5 characters) which is to be displayed in the NS 4000 tasks;

– In the **Warning** column, check checkbox if this alarm is required to be a warning which is to be displayed in the NS 4000 “Warnings” task window;

– In the column **Alarm State In Contact**, specify the alarm mode:

N/C – normal closed;
N/O – normal opened:



Name	Source	Warning	Alarm State In Contact	Alarm Acknowledge In Contact	Alarm Sound In Contact	Alarm Acknowledge Out Contact	Alarm Sound Out Contact
Autopilot Failed	PT500		2 N/O	0 N/O	0 N/O	0 N/O	0 N/O
			N/O N/C				

Specify the WAGO Module contact by closing/unclosing of which the specified alarm will be triggered off in NS 4000.

– In the column **Alarm Acknowledge In Contact**, specify the outer source alarm acknowledge mode:

N/C – normal closed;
N/O – normal opened.

Specify the WAGO Module contact by closing/unclosing of which the specified alarm will be acknowledged in NS 4000 from the outer source.

– In the column **Alarm Sound In Contact**, specify the outer source alarm silencing mode:

N/C – normal closed;
N/O – normal opened.

Specify the WAGO Module contact by closing/unclosing of which the specified alarm will be silenced in NS 4000 from the outer source.

– In the column **Alarm Acknowledge Out Contact**, specify the mode of outer source alarm acknowledge from the NS 4000:

N/C – normal closed;
N/O – normal opened.

Specify the WAGO Module contact by closing/unclosing of which the specified outer source alarm will be acknowledged from the NS 4000.

– In the column **Alarm Sound Out Contact**, specify the mode of outer source alarm silencing from the NS 4000:

N/C – normal closed;
N/O – normal opened.

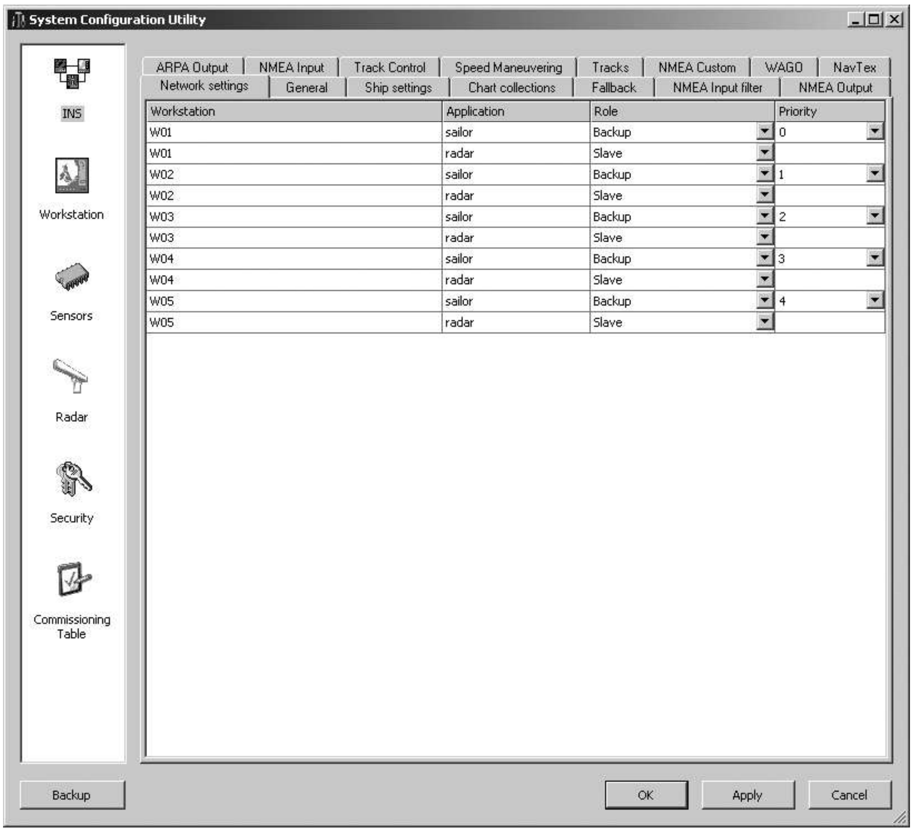
Specify the WAGO Module contact by closing/unclosing of which the specified outer source alarm will be silenced from the NS 4000.

In much the same way, make settings in the **RS6 I/O settings** group for work with alarms and warnings via RS6 input/output contacts.

NS 4000/4100 Settings

1. Press **INS** button. Open "Network settings" page to set the NS 4000 network parameters (in the case of NS 4000 network configuration). This page is intended for specifying the ECDIS task priority on each NS 4000 Workstation. The priority can only be set for a WS with the Backup role. The highest priority ("0") has a Workstation engaged in primary navigation data processing. The function of navigation data processing is transferred to the Workstations with the lower priority in a queue ("1", "2", etc.) in the case of ECDIS task failure on the Workstation with "0" priority.

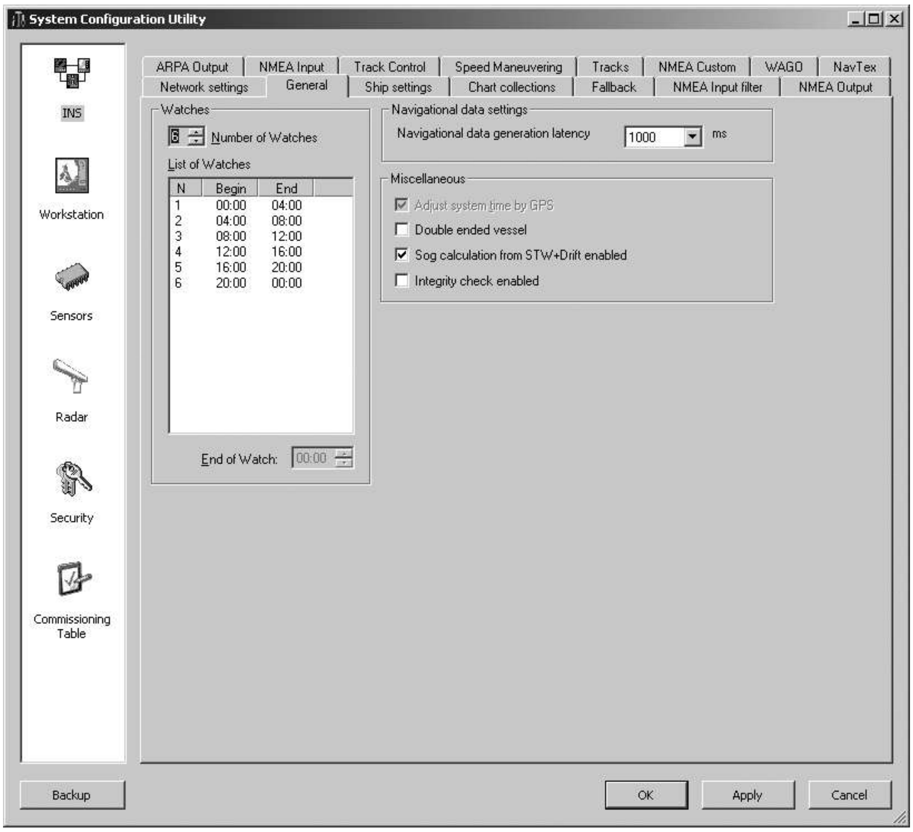
   If the Slave role is set for a workstation, it can never be used as the ECDIS MASTER.



– In **Role** column, by default set Backup role for ECDIS tasks on all WS. For RADAR task on all WS set Slave role;

– Use **Priority** column to set the workstation priority for ECDIS tasks in accordance with the NS 4000 configuration.

2. Switch to “General” page:



– In the field **Watches**, set the navigation watches schedule;

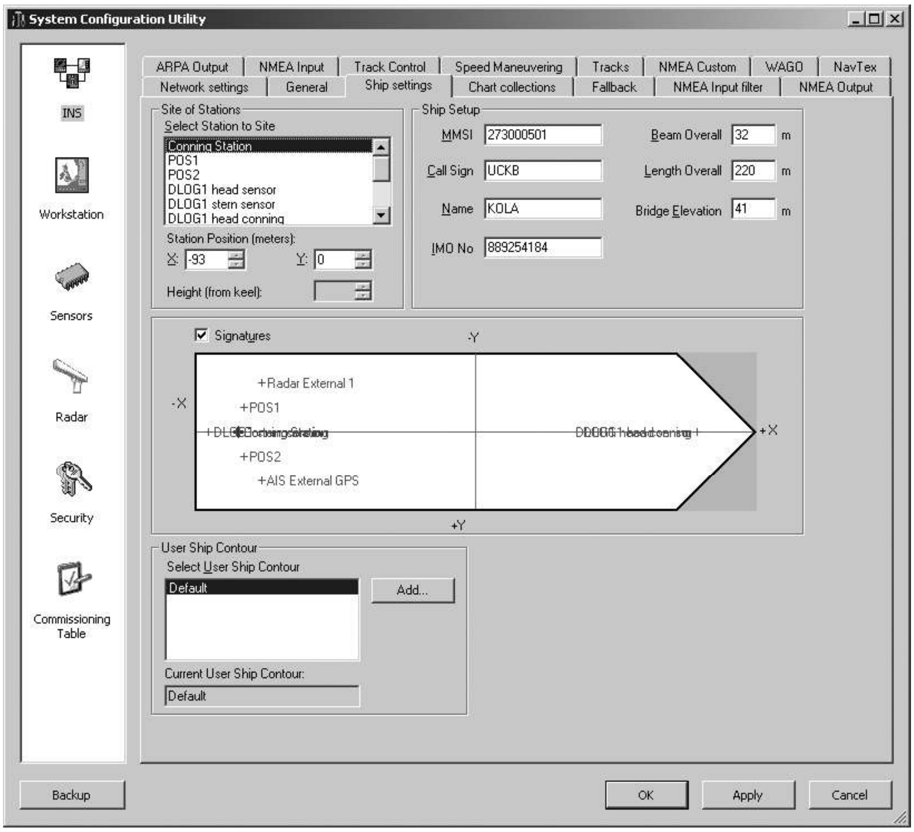
– In the field **Navigational data settings**, specify the period of the navigation data processing (milliseconds) (see document **NAVI-SAILOR 4000/4100 ECDIS (v. 2.00.009). FUNCTIONAL DESCRIPTION**, **Chapter 2**, section **Navigation Sensors**, paragraph **Consistent Common Reference System**);

– Check the **Double ended vessel** checkbox if it is this type of ship which NS 4000 is installed on;

– Check the **SOG calculation from STW+drift enabled** check box if it is necessary to have such source for the SOG;

– Keep **Integrity check enabled** checkbox unchecked for non-certified (DNV, Lloyd's Register) installations (it is strictly recommended!).

3. Switch to "Ship settings" page:



– In the field **Ship Setup**, enter the following own ship identification data to be used in the AIS transponder work:

MMSI;
Call Sign;
Ship's Name;
IMO No.

– In the field **Ship Setup**, enter the principal dimensions of the own ship:

Beam Overall (in metres);
Length Overall (in metres);
Bridge Elevation (in metres), the value which is used for lights visibility calculation.

– Enter the **Conning Station** coordinates and coordinates of the next connected sensor antenna units. Configuration of external devices connection to the NS 4000 ports is performed on the page "Sensors" of the panel "Sensors" (see above). If external device is not connected, the group will be blank:

  POS1 – (D)GPS1;
  POS2 – (D)GPS2;
  DLOG1 head sensor – the head Dual-Axis Bottom Speed sensor, which will be used for calculations in the NS 4000 (see **NAVI-SAILOR 4000/4100 ECDIS (v. 2.00.009). FUNCTIONAL DESCRIPTION**, **Chapter 3**, section **Docking Mode**);
  DLOG1 stern sensor – the stern Dual-Axis Bottom Speed sensor, which will be used for calculations in the NS 4000;
  DLOG1 head conning – head point, which the calculated transverse vector will originate from when displayed on the "Dual" panel of ECDIS task in Docking Mode (see **NAVI-SAILOR 4000/4100 ECDIS (v. 2.00.009). FUNCTIONAL DESCRIPTION**, **Chapter 3**, section **Docking Mode**);
  DLOG1 stern conning – stern point, which the calculated transverse vector will originate from when displayed on the "Dual" panel of ECDIS task in Docking Mode;
  Radar Master 1 – scanner X-band;
  Radar Master 2 – Scanner S-band;
  External AIS GPS – (D)GPS for the AIS;
  Internal AIS GPS – DGPS for the SAAB R4 AIS type only.

Note: Input can be made either with the cursor on the ship's scheme in the middle part of the page or by the direct coordinates entering in **Station Position** (meters) field. Geographic coordinates of the ship are always referred to the reference point. See document **NAVI-SAILOR 4000/4100 ECDIS (v. 2.00.009). FUNCTIONAL DESCRIPTION**, **Chapter 2**, section **Navigation Sensors**, paragraph **Consistent Common Reference System**.

– In the field **Height (from keel)**, specify the heights from the keel for transducers of each Echosounder (+/-);

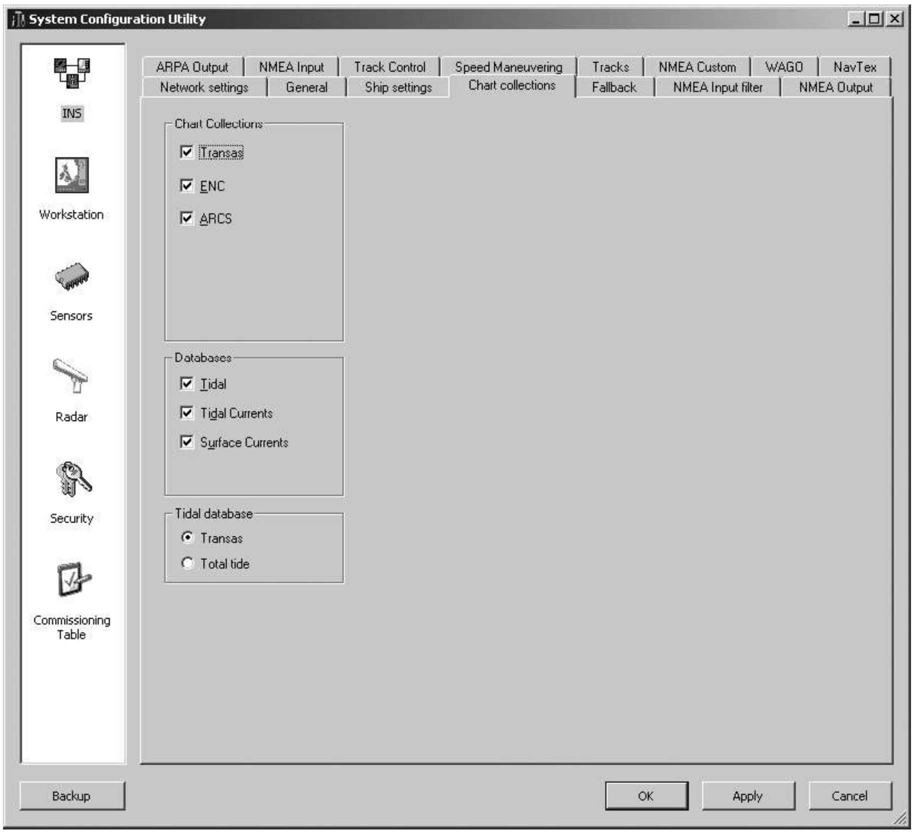
– In **User Ship Contour** field, select the User Ship Contour, which is to be displayed on the ECDIS task screen when the ship size comparable scale is selected (the licensed option to be ordered in Transas).

4. Switch to "Chart collections" page:

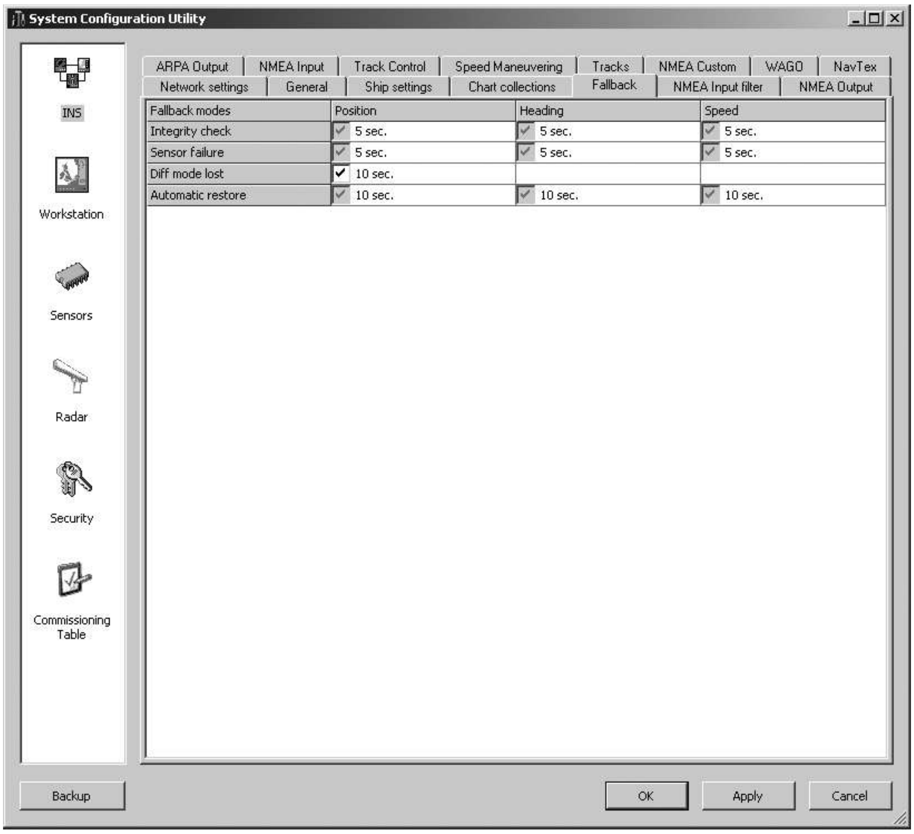
   – In **Chart Collections** field, specify chart formats required for work with the application. All checkboxes are checked by default, i.e. upon installation of charts of specified formats they will be displayed; if checkbox is not checked, the charts of this format will not be displayed;

   – In **Databases** group, specify databases required for work with the application (see document **NAVI-SAILOR 4000/4100 ECDIS (v. 2.00.009). FUNCTIONAL DESCRIPTION**, **Chapter 7**).

   – In **Tidal databases** group specify databases sources required for work with the NS 4000 in **Databases** group. **Total Tide** source can be chosen if Total Tide SW product had been pre-installed and the appropriate option is opened by the license.



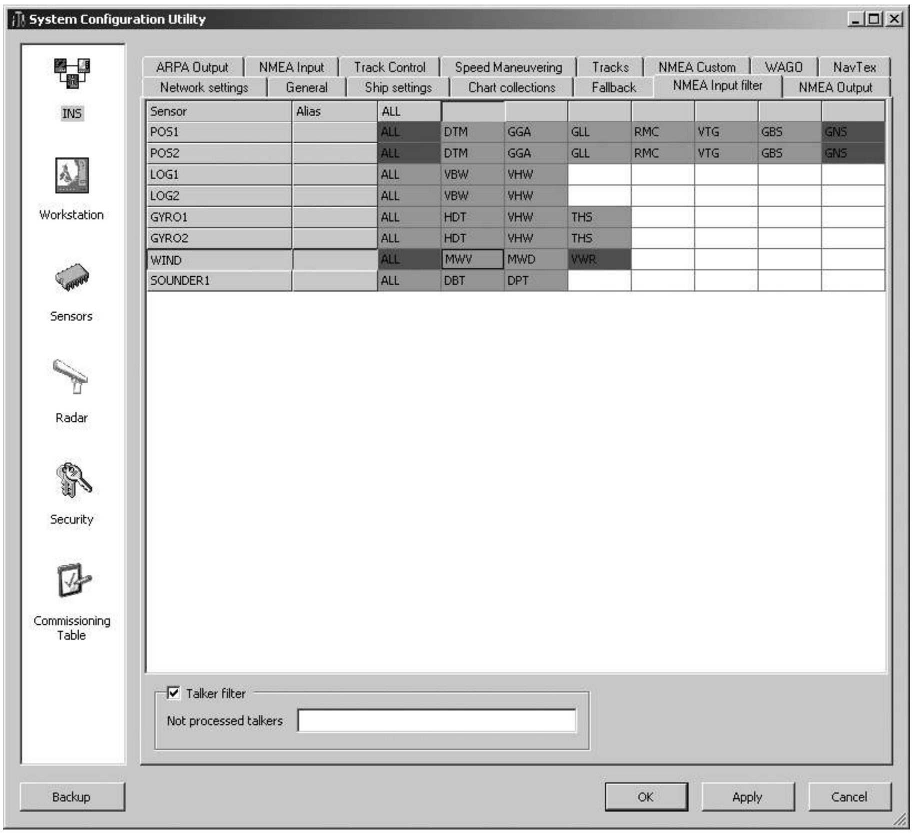
5. Switch to “Fallback” page:



– If an alarm is required to be generated by the loss of the GPS differential mode, check the **Diff. Mode lost** checkbox.

The rest of the parameters of shifting to the reserve data sources are set by default and not accessible for editing (**Navi-Sailor 4000/4100 ECDIS (v. 2.00.009). Functional Description**, **Chapter 2**, section **Navigational Sensors**, paragraph **Navigational Sensors Selection**, item **Automatic Source Selection with Actuation of Fallback Functionality**).

6. Switch to “NMEA Input Filter” page:



The table provides all the messages from the data sources processed in the NS 4000:

– Press the button with the message name to prohibit its processing;

– Press the **ALL** button to prohibit the processing of all the messages from the source in question;

– In **Not processed talkers** input field enter talkers of sensors messages from which will be ignored. If necessary to switch-off the talker filter uncheck **Talker filter** checkbox.

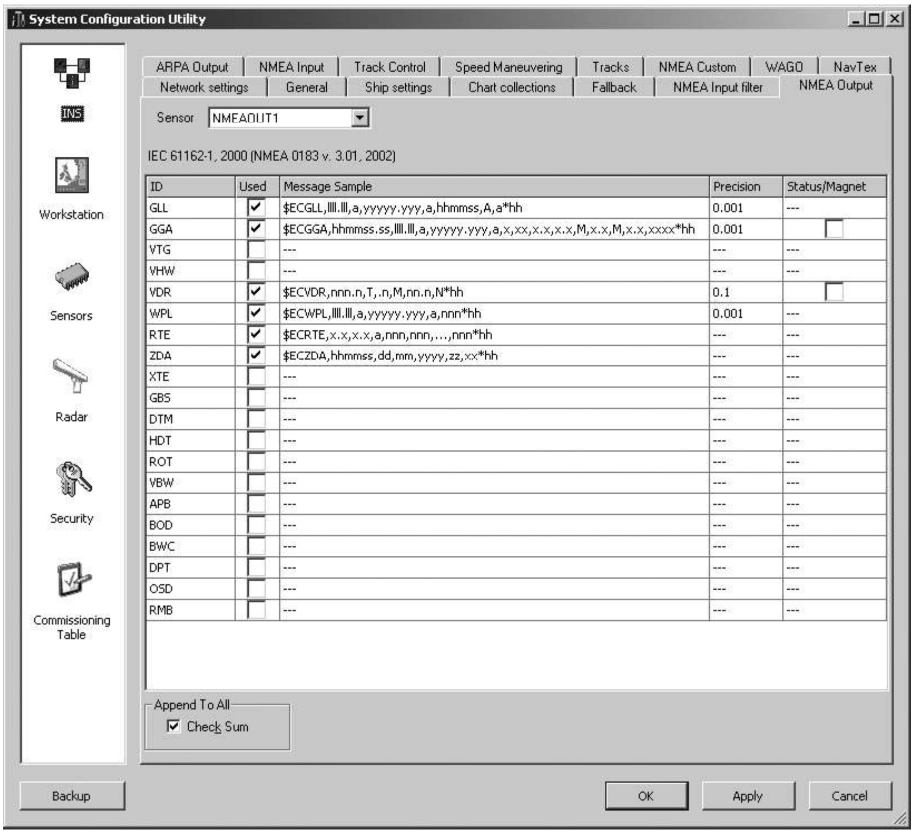
7. Switch to “NMEA Output” page:

– In the field **Sensor**, select the NMEAOUT where the NMEA sentences will be transmitted from NS 4000. Configuration of NMEAOUT connection to the NS 4000 ports is performed on the page “Sensors” of the panel “Sensors” (see above). If external device is not connected, the page will be blank;

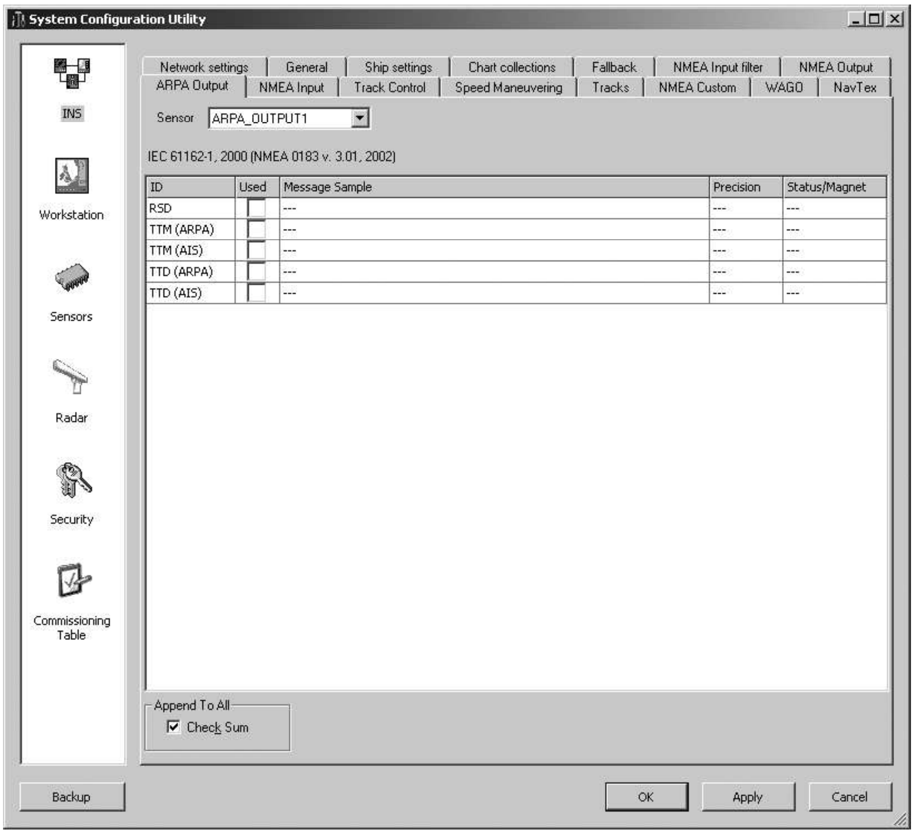
– By default, some sentences available for transmitting to the external devices will be transmitted by the NS 4000. Clear the corresponding checkboxes to disable the unnecessary sentences transmitting;

– For the GLL, GGA, VDR and WPL sentences, select the required precision (a number of decimals after the comma) in the **Precision** column. If necessary, for GGA and VDR sentences disable the status value transmitting by unchecking the checkbox in the **Status** column;

– To disable the NMEA sentences checksum transmitting, uncheck the checkbox **Check Sum** in the **Append To All** group.



8. Switch to “ARPA Output” page:

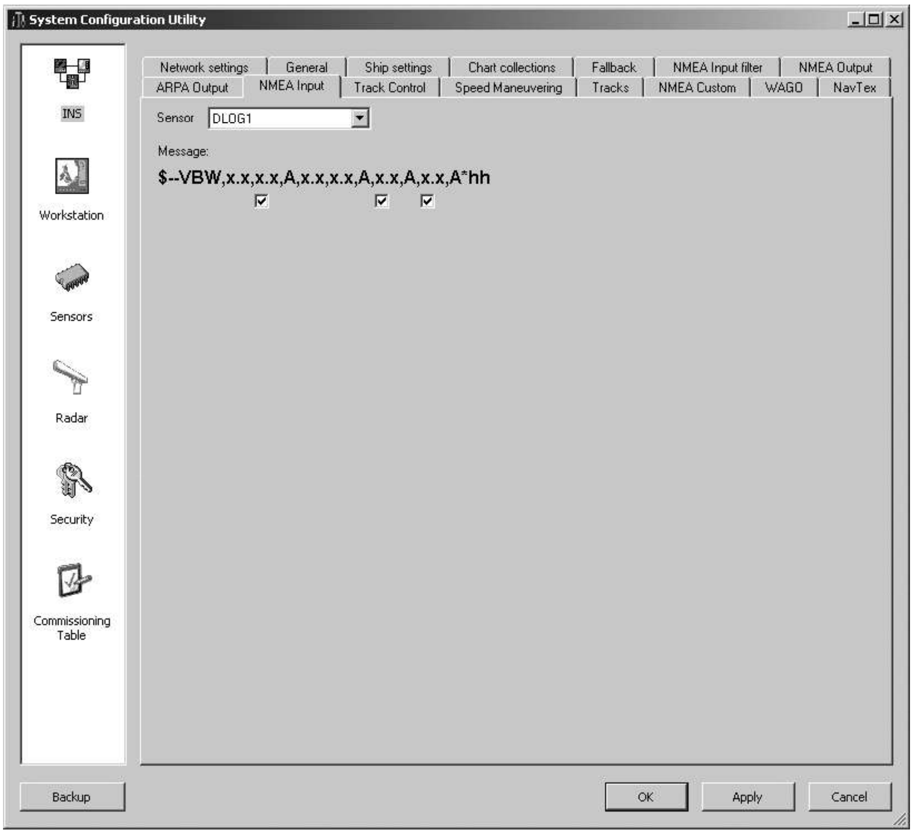


– In the field **Sensor**, select the ARPA_OUTPUT where the NMEA sentences will be transmitted from NS 4000. Configuration of ARPA_OUTPUT connection to the NS 4000 ports is performed on the page “Sensors” of the panel “Sensors” (see above). If external device is not connected, the page will be blank;

– Check the corresponding checkboxes to enable the necessary sentences transmitting to the external devices from NS 4000;

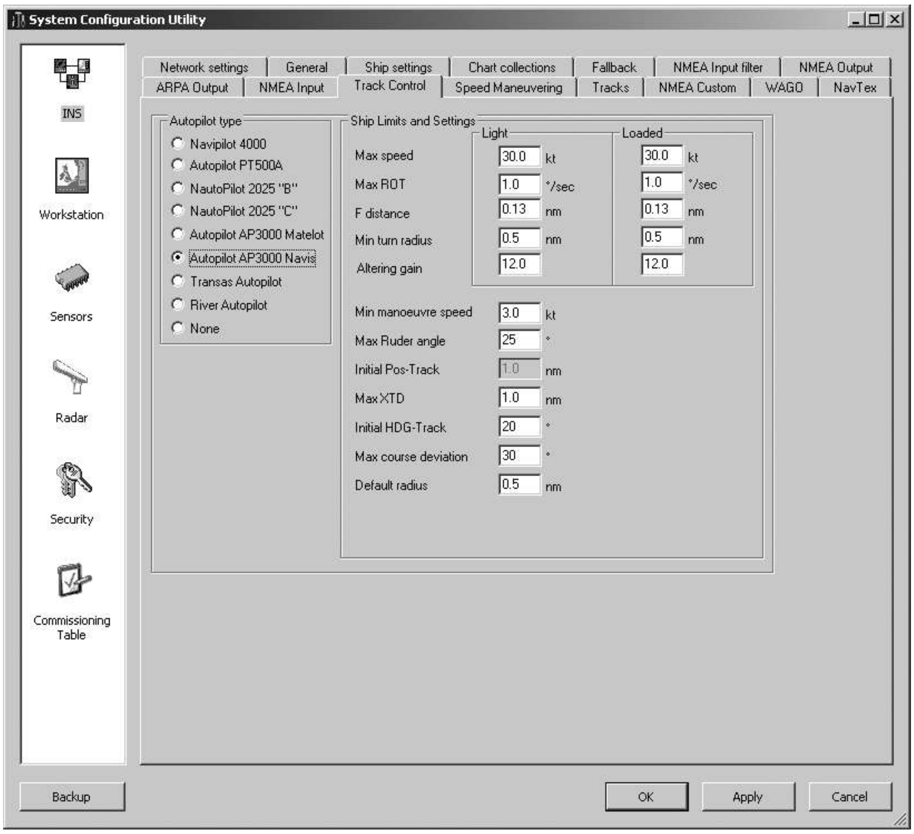
– To disable the NMEA sentences checksum transmitting, uncheck the checkbox **Check Sum** in the field **Append To All**.

9. Switch to “NMEA Input” page:



– For each connected DLOG (Dual-Axis Bottom Tracking Log), uncheck checkboxes for VBW sentence fields which should not be processed in the NS 4000 (e.g., due to the absence of relevant sensors). Configuration of external devices connection to the NS 4000 ports is performed on the page “Sensors” of the panel “Sensors” (see above). If external DLOG sensor is not connected, the page will be blank.

10. Switch to “Track Control” page. This page is intended for configuration Track Control functionality.



– Configuration of TCS connection to the NS 4000 ports is performed on the page “Sensors” of the panel “Sensors” (see above). If external device is not connected, the page will be blank;

– In **Autopilot** type group, select the name of the autopilot used for Track Control mode:

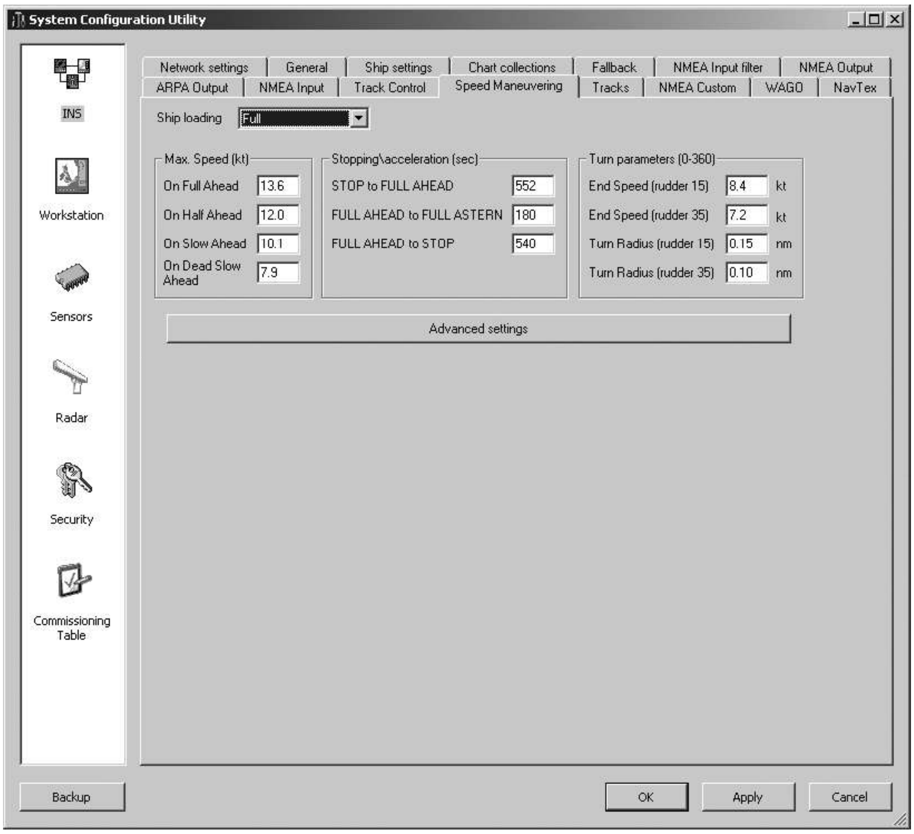
NautoPilot 2025 Plus “C” – with the use of NP2025 autopilot by “Raytheon” for TCS Class C installation;
Autopilot AP3000 – with the use of AP3000 autopilot by “Navis” for TCS Class C installation;
None – Track Control is switched off.

– In **Ship limits and Settings** group, set the limitations required for the operation of Track Control mode:

Max speed – maximum ship speed (up to 30 knots) (for an empty and loaded ship);
Max ROT – maximum rate of turn within the range of 1.0 to 10.0 degrees per second (for an empty and loaded ship);
F distance – lead distance within the range of 0.01 to 1.00 mile (for an empty and loaded ship);
Min turn radius – minimum radius within the range of 0.1 to 3.0 miles (for an empty and loaded ship);
Altering gain – coefficient of the ownship control accuracy adjustment within 0.1 to 20.0 (for an empty and loaded ship);
Min manoeuvre speed – minimum speed within the range of 1.0 to 10.0 knots;
Max rudder angle within the range of 25 to 70 degrees;
Initial Pos-Track – maximum distance of the ship position from the monitored route leg for steering to this leg at the time of turning on Track Control mode. The value is forcedly synchronised with the **Max XTD** value;

Max XTD – maximum distance from the leg of the monitored route expected to be used in Track Control mode. It is set within the range of 1.0 to 5.0 mile;
Initial HDG-Track – maximum deviation of the current ship course from the monitored route leg for steering to this leg with Track Control mode ON. It is set within the range of 20 to 60 degrees;
Max course deviation – maximum possible deviation of the current ship course from the leg of the monitored route as it is proceeded along in Track Control mode. It is set within the range of 5 to 30 degrees;
Set the turn arc radius to be used by default when Quick Track mode is turned on (**Default radius**), not less than 0.1 mile.

11. Switch to "Speed Maneuvring" page. This page is intended for configuration Trial Manoeuvre functionality:



– In the **Ship Loading** drop-down list, select the ship loading option;

– In the **Max. Speed** group, set the ship speed in the conditions of the selected ship loading option for the following main engine operating modes (from the Pilot Card):

On Full Ahead;
On Half Ahead;
On Slow Ahead;
On Dead Slow Ahead.

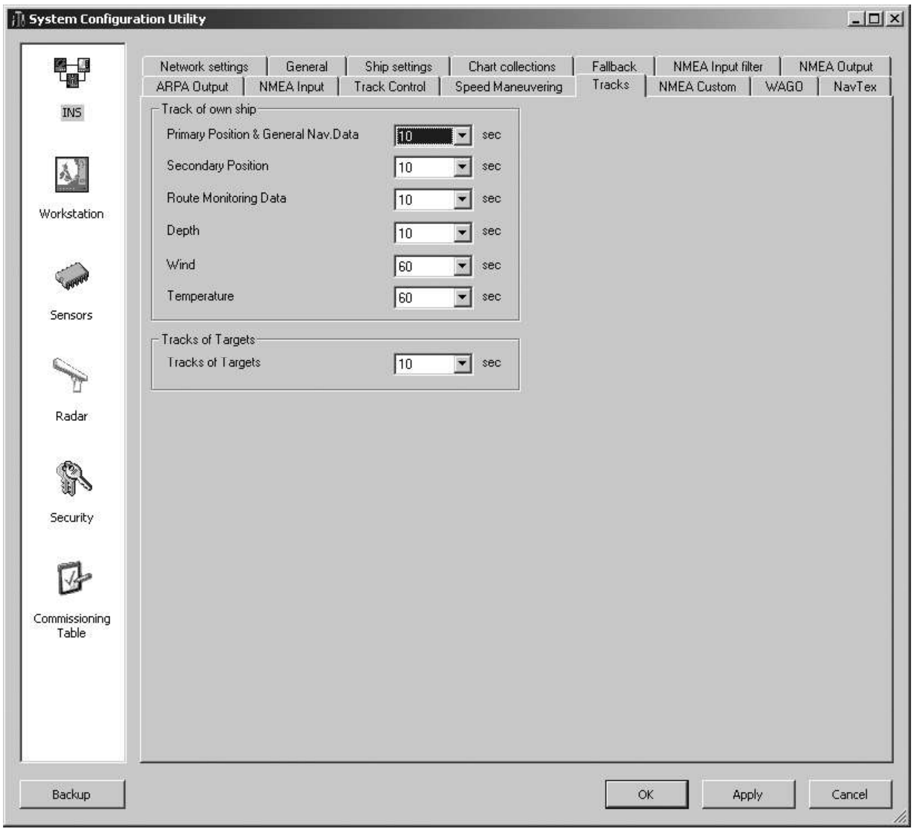
– In the **Stopping\acceleration** group, set the ship acceleration (stopping) time in the conditions of the selected loading option for the following modes (from Pilot Card):

STOP to FULL AHEAD – from 0 ("Stop" engine operating mode) to the maximum speed ("Full Ahead" main engine operating mode);
FULL AHEAD to FULL ASTERN – maximum speed ("Full Ahead" main engine operating mode) to 0 ("Full Astern" main engine operating mode);
FULL AHEAD to STOP – maximum speed ("Full Ahead" main engine operating mode) to 0 ("Stop" main engine operating mode).

– In the **Turn parameters** group, set the ship turning circle parameters in the conditions of the selected loading option for the "Full Ahead" main engine operating mode:

End Speed (rudder 15) – steady turn speed at 15º rudder angle;
End Speed (rudder 35) – steady turn speed at 35º rudder angle;
Turn Radius (rudder 15) – turn radius at 15º rudder angle;
Turn Radius (rudder 35) – turn radius at 35º rudder angle.

12. Switch to "Tracks" page:



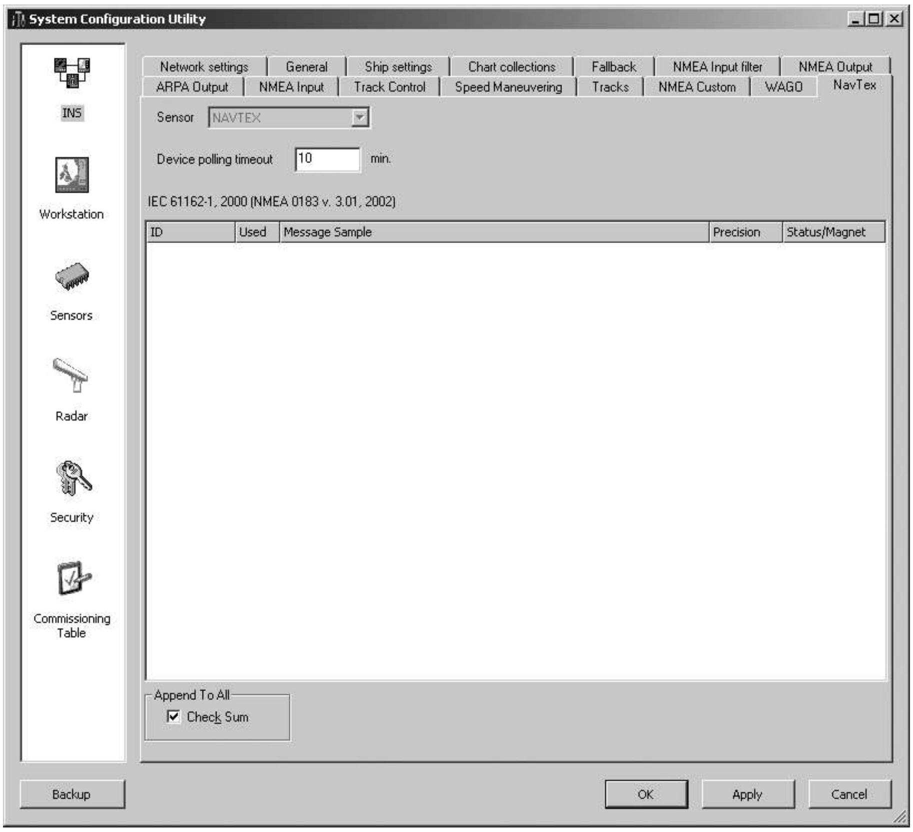
– In the **Track of own ship** group, set the time interval for recording the following data (see **NAVI-SAILOR 4000/4100 ECDIS (v. 2.00.009). FUNCTIONAL DESCRIPTION**, **Chapter 6**, sections **General** and **Own Ship Track**):

Primary Position & General Nav. Data – for own ship position and its motion parameters (HDG/STW/COG/SOG): 10 sec only;
Secondary Position – for own ship secondary position: 10 sec only;
Route Monitoring Data – for the monitored route name, monitored WPT, XTD, WPT selection mode: 10 or 20 sec;
Depth – for depth from echosounder: 10 or 20 sec;
Wind – for wind: 10, 20, 30, or 60 sec;
Temperature – for temperature: 20, 30, or 60 sec.

– In the **Tracks of Targets** group, set the time interval (10, 20, or 60 sec) for recording the targets' information (identifiers, coordinates and motion parameters) (see **NAVI-SAILOR 4000/4100 ECDIS (v. 2.00.009). FUNCTIONAL DESCRIPTION**, **Chapter 6**, sections **General** and **Target Data**).

13. Switch to the "NMEA Custom" page. For setting up of the reception of customised NMEA-like sentences for the CONNING task see **Annex B**, section **Adjustment of NS 4000 ECDIS MFD Operation with NMEA Custom**.

14. Switch to the “WAGO” page. For setting up the reception of analog and discrete parameters for the CONNING task via the WAGO modules, see **Annex B**, section **Adjustment of NS 4000 ECDIS MFD Operation with WAGO Modules**.
15. Switch to “NavTex” page:



– Configuration of NAVTEX receiver connection to the NS 4000 ports is performed on the page “Sensors” of the panel “Sensors” (see above). This page is available if only NMEA NAVTEX receiver (no ASCII) connected, otherwise the page will be blank;

– In the **Device polling timeout** field enter the time interval (from 5 to 60 min) which the NAVTEX Messages database will be updated at (see **NAVI-SAILOR 4000/4100 ECDIS (V. 2.00.009). FUNCTIONAL DESCRIPTION**, **Chapter 7**, section **NAVTEX Messages**);

Note: Where messages are required to be transmitted to the NAVTEX receiver, use the NMEAOUT (see item 7).

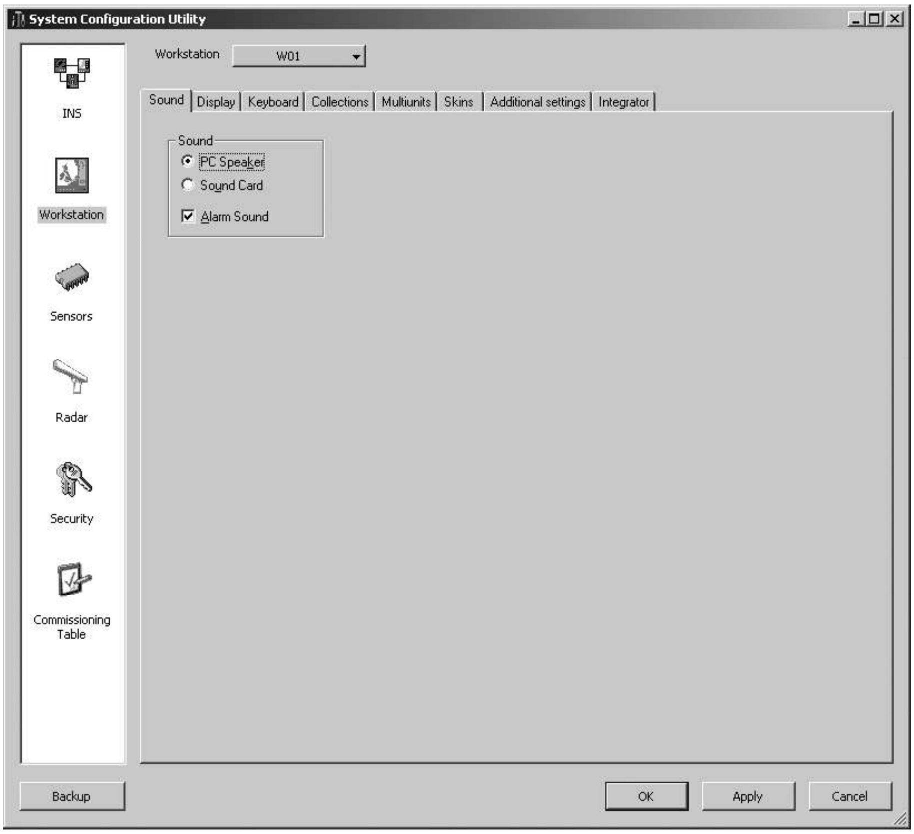
Workstation Settings

Press **Workstation** button. The drop-down **Workstation** list specifies the name of the workstation which settings will be made for.

ATTENTION!

Perform individual settings for each Workstation, selecting them consecutively from the droop-down list **Workstation**. All data will be synchronized at all the Workstations after the settings saving.

1. Open “Sound” page to set the WS sound parameters:

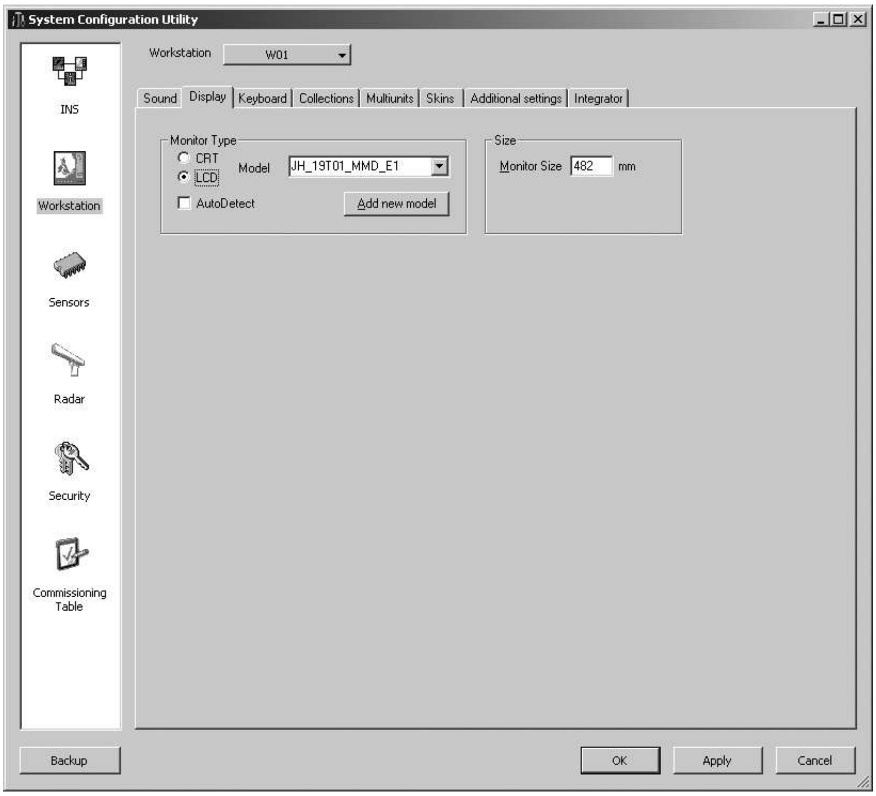


– In **Sound** group, select the device for the reproduction of acoustic alarms:

PC Speaker – via the built in speaker;
Sound Card – via the sound card and external speakers.

– Checkbox **Alarm Sound** must be check on.

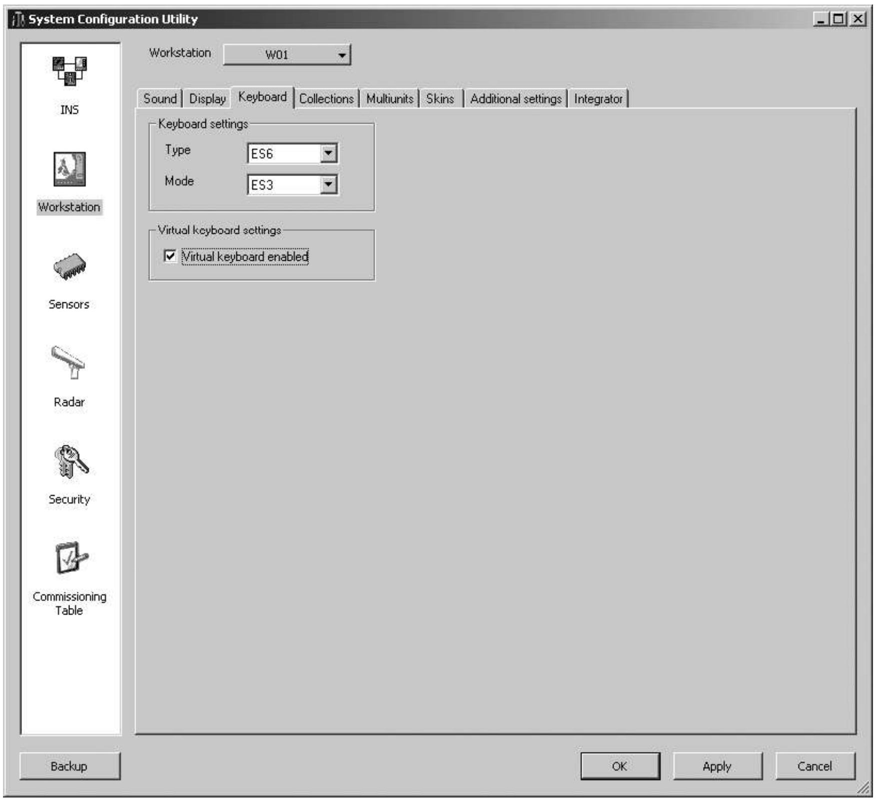
2. Switch to “Display” page:



– In **Monitor Type** group of “Display” page, press **LCD** radio button, and in **Model** drop-down list, select the monitor type depending on the display size and WS PC configuration or check **AutoDetect** checkbox;

– In **Monitor Size** input window, enter the display diagonal size in mm.

3. Switch to “Keyboard” page:

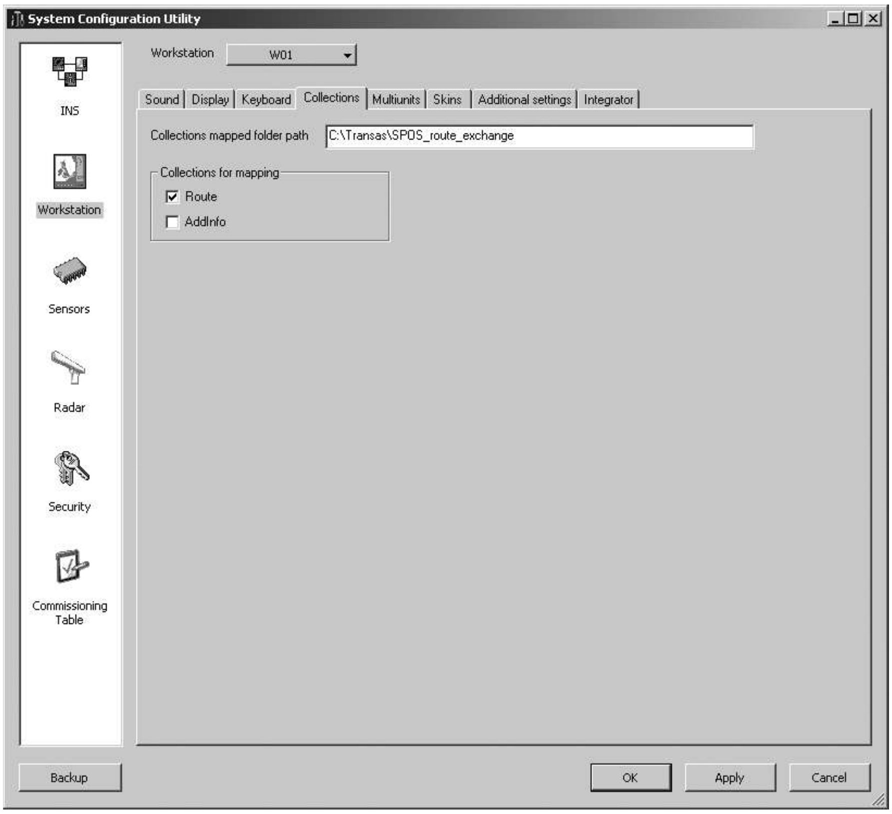


– In **Keyboard settings** group of "Keyboard" page, from **Type** and **Mode** drop-dawn lists select the keyboard type and mode (see **Chapter 1**, section **Workstation Installation**, paragraph **Transas ES6 Dedicated Keyboard with Trackball Installation**);

– Check **Virtual keyboard enabled** checkbox for use the virtual keyboard.

4. Switch to "Collections" page.

Note: The settings specified here, are only made for the WS which the SPOS 6 software is installed on:



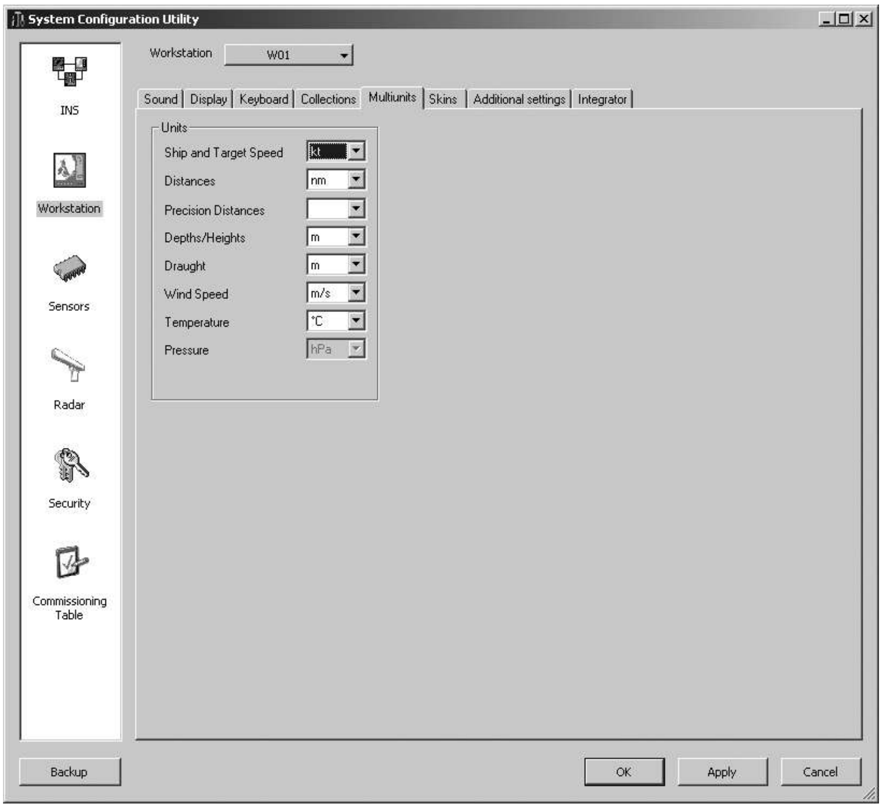
– In the **Collection mapped folder path** field, specify the path to the folder for the route exchange and synchronising with the SPOS 6 program (*C:\Transas\SPOS_route_exchange*);

– Check **Route** checkbox in **Collection for mapping** group and press "Apply" button.

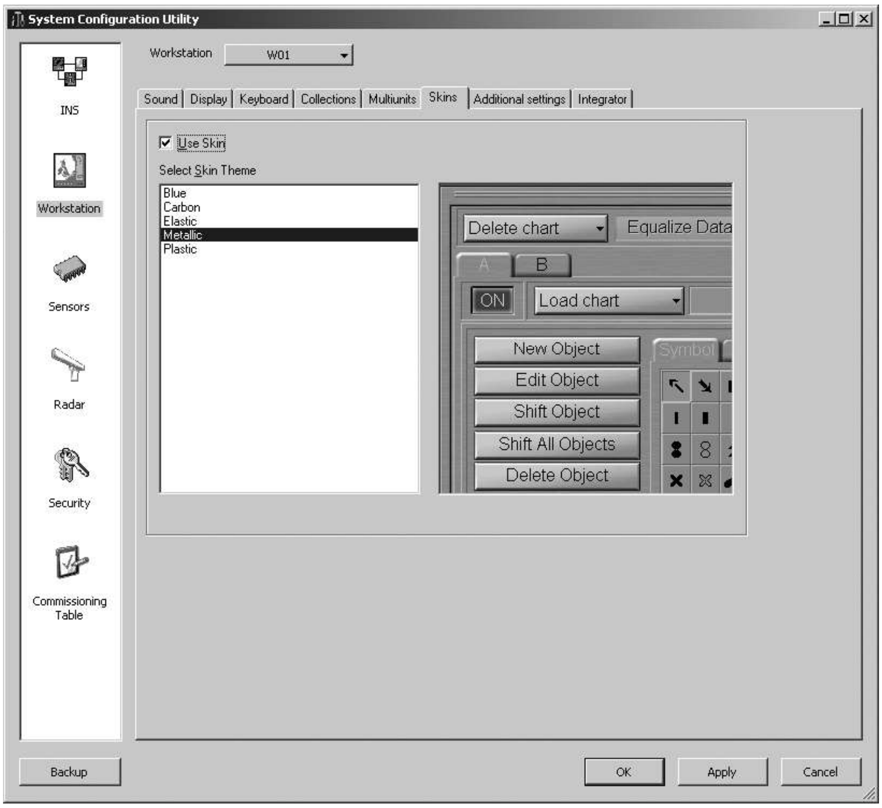
5. Switch to "Multiunits" page:

– On "Multiunits" page in **Units** group, set the measurement units which will be used for the display of the following parameters in the NS 4000:

Ship and Target Speed – in knots (kt) or kilometres per hour (km/h);
Distances – in miles (nm), kilometres (km) or statute miles (stm);
Depths/Heights – in metres (m), feet (ft), or fathoms (fms);
Draught – in metres (m) or feet (ft);
Wind Speed – in metres per second (m/s), kilometres per hour (km/h), or knots (kt);
Temperature – in degrees Celsius (C) or degrees Fahrenheit (F).

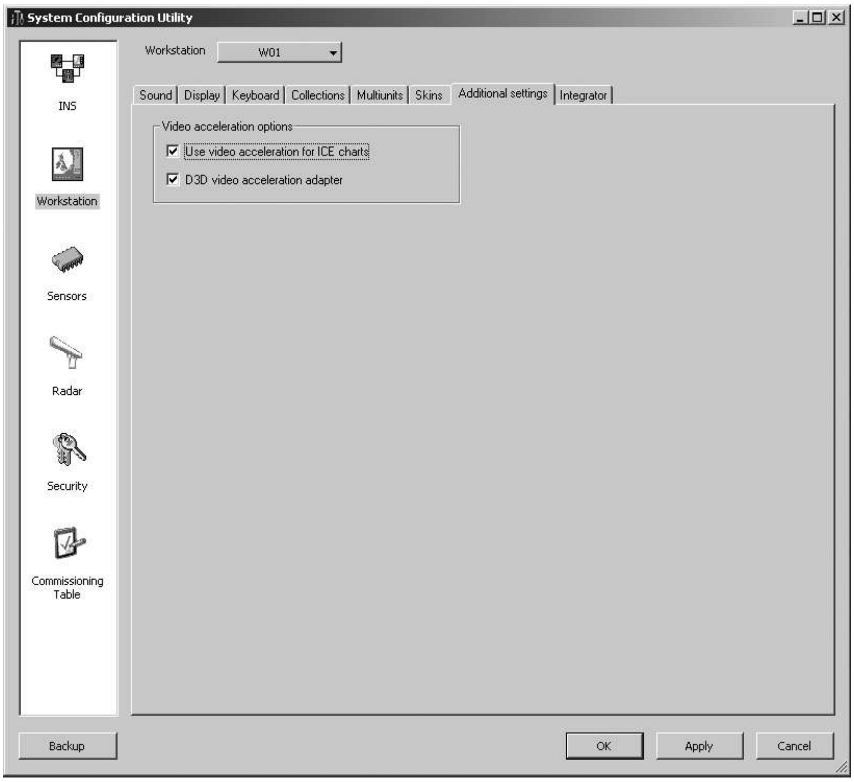


6. Switch to “Skins” page:



– Check **Use Skin** checkbox and select the type of graphic presentation in **Select Skin Theme** window.

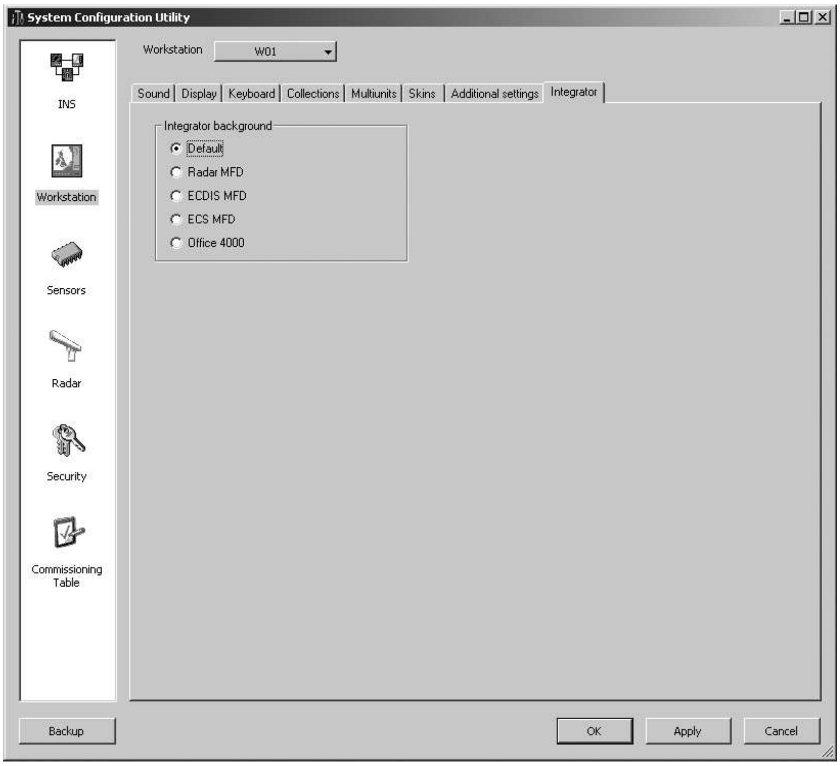
7. Switch to “Additional settings” page:



– Check the **Use video acceleration for ICE charts** checkbox if the ice charts are to be installed;

– **D3D video acceleration adapter** checkbox is not used in this version.

8. Switch to “Integrator” page:



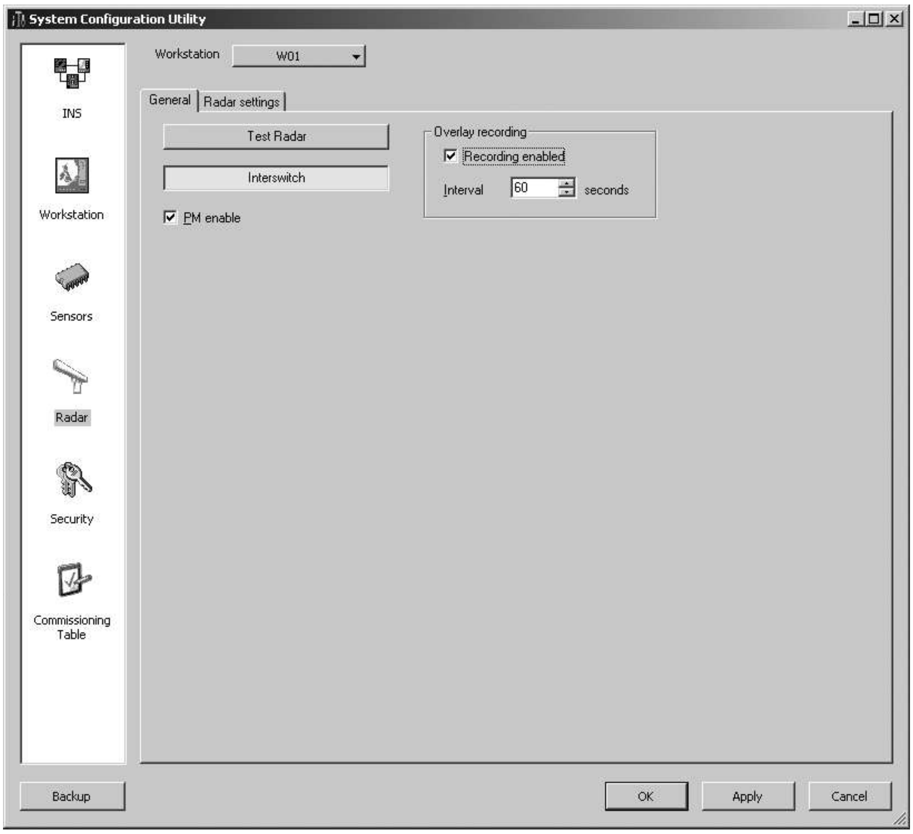
– In the **Integrator background** group select the necessary product for setting the appropriate background for the Transas Integrator.

Radar Settings

Press **Radar** button. The drop-down **Workstation** list specifies the name of the Workstation which settings will be made for.

> **ATTENTION!**
>
> Perform individual settings for each Workstation, selecting them consecutively from the droop-down list **Workstation**. All data will be synchronized at all the Workstations after the settings saving.

1. Open “General” page:



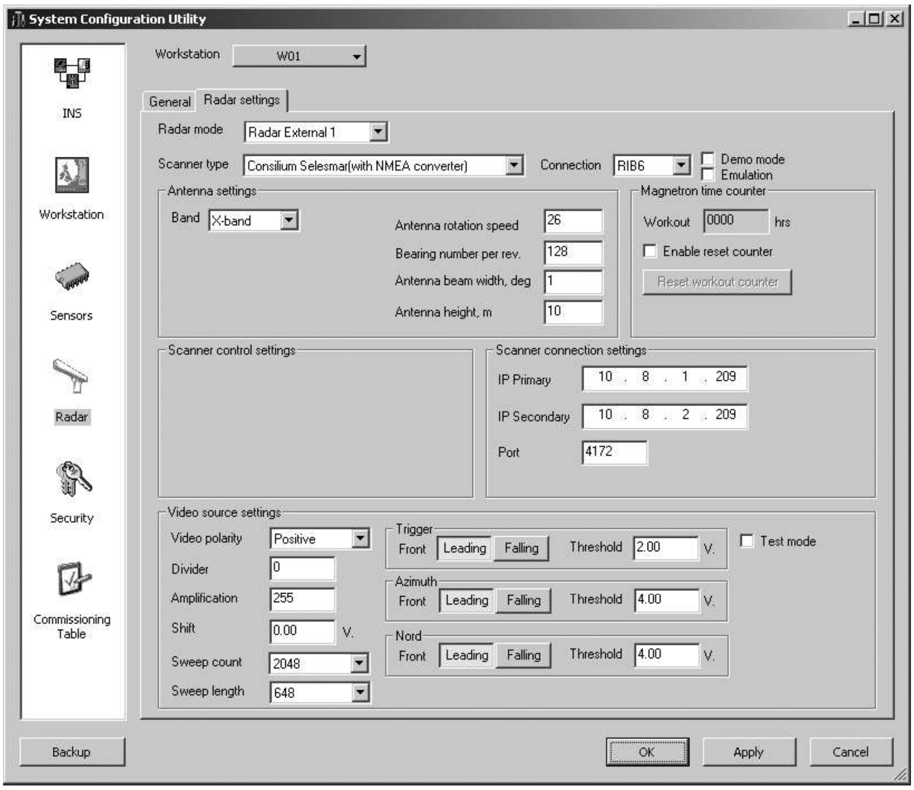
– The **Interswitch** button is pressed by default for the control of the RIB6 with the NS 4000 (it is strictly recommended that it should remain in the depressed state);

– If the scanner in use has a Performance Monitor, check **PM enable** checkbox;

– Set the radar picture recording parameters in **Overlay recording** group (see document **NAVI-SAILOR 4000/4100 ECDIS (v. 2.00.009). FUNCTIONAL DESCRIPTION**, **Chapter 6**, paragraph **Radar Overlay**):

Recording enabled – to turn on (by checking the checkbox) the radar picture recording function;
Interval – to set the recording interval (1–60 seconds).

2. Switch to “Radar settings” page:



There may be two configurations in setting up the radar operation:

– connected to the WS is an external radar which only supplies the signals (video, trigger, heading marker and bearing marker) via RIB 6;

– DEMO mode (for demo purposes at the exhibitions), the signals is supplied from the previously recorded `*.raf` or `*.rax` files.

If external radar is connected:

– In **Radar mode**, select “External Radar”;

– Select the type scanner in the drop-down list **Scanner type**;

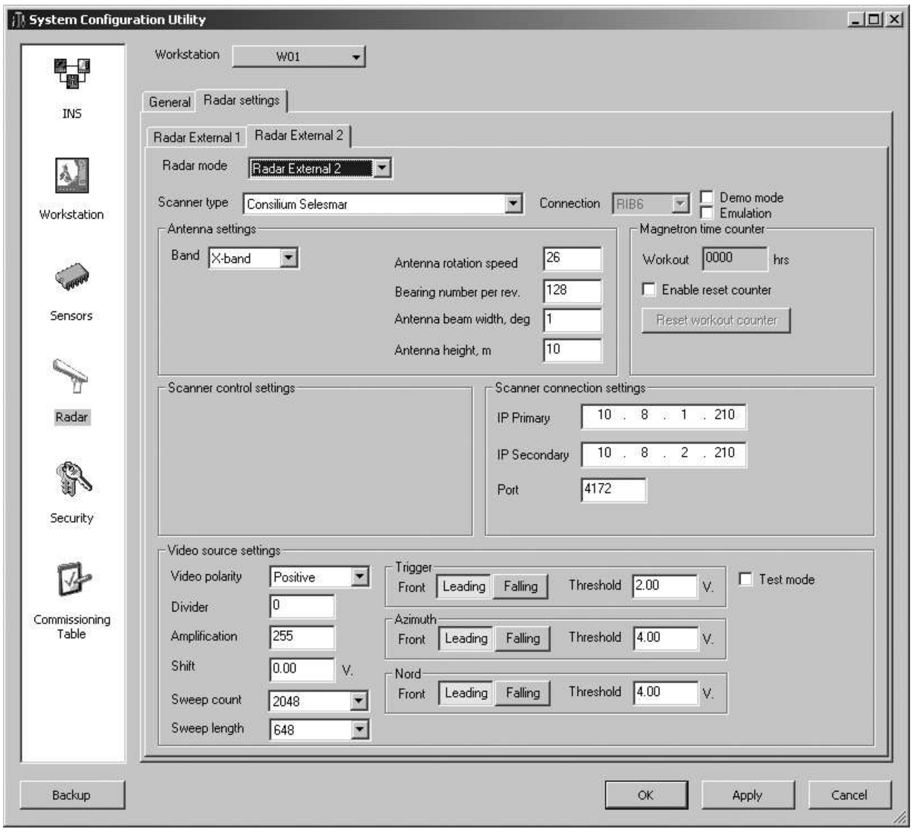
– Set the following antenna parameters in **Antenna settings** group:

In the box **Band,** select the range of scanner connected to the WS;
Antenna rotation speed – rate of revolutions (rpm);
Bearing number per rev. – number of bearing sensor pulses per one revolution;
Antenna beam width – beam width;
Antenna height – antenna installation height above the waterline.

– Specify IP addresses:

In **IP Primary** input box enter “10.8.1.209”;
In **IP Secondary** input box enter “10.8.2.209”.

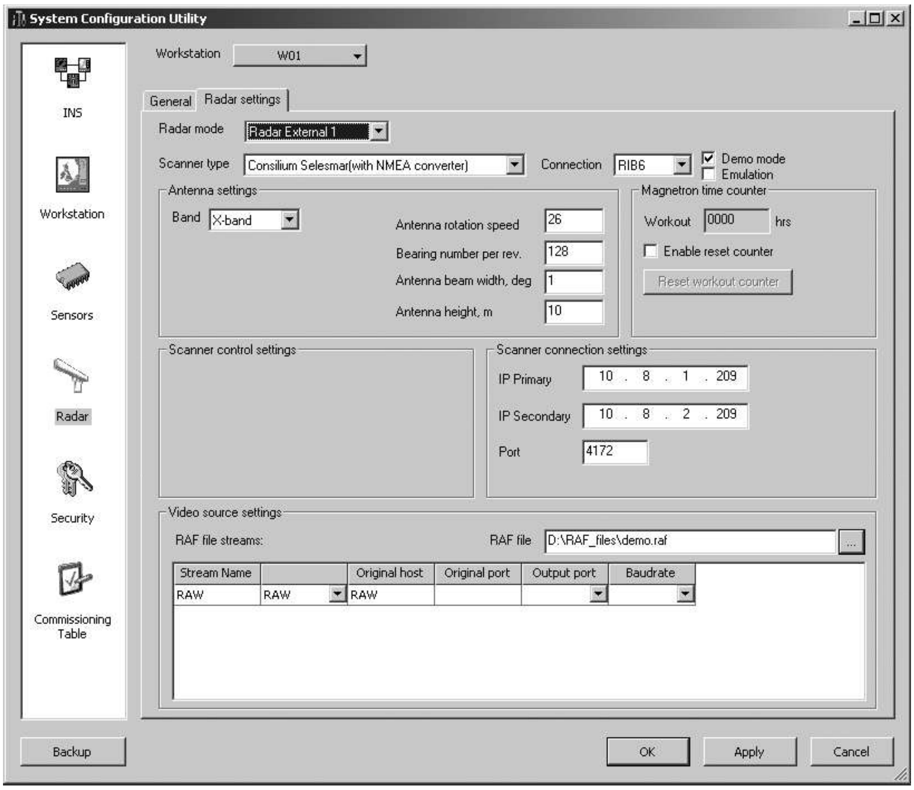
When installing the NS 4100 you can connect two RIB6 to a single WS. In this case, when the RIB6 is selected from the **Connection** drop-down list, an additional tab appears where you can select the second radar.



– Make settings in much the same way as for the previous radar, for the IP addresses specify the following values:

In **IP Primary** input box enter “10.8.1.210”;
In **IP Secondary** input box enter “10.8.2.210”.

Demo Mode:



– In **Radar mode** drop-down list, select “Master Radar” or “External Radar”;

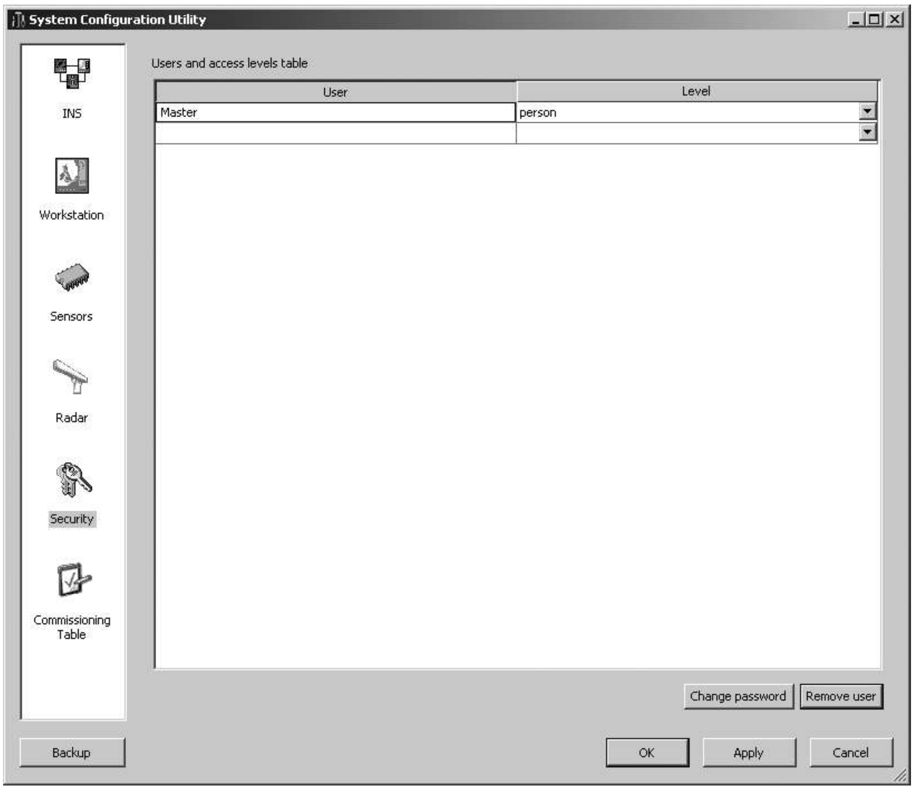
– Check **Demo mode** checkbox;

– In the **RAF file** input field of **Video source settings** group specify the path to the folder with `*.raf` or `*.rax` files;

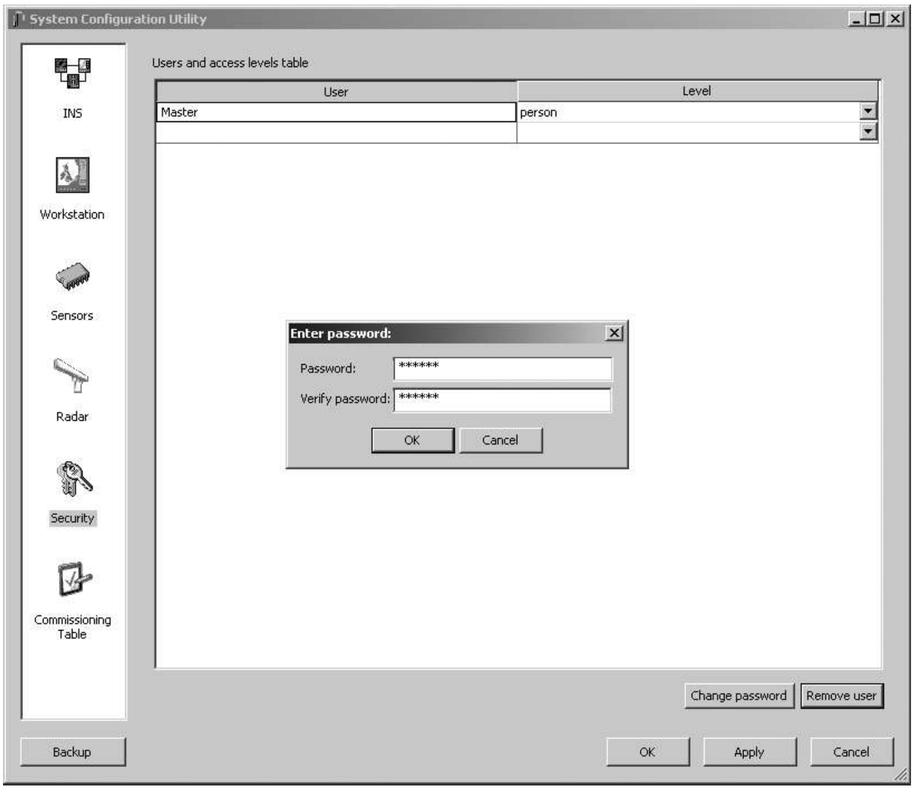
– If necessary, in the **Video source settings** group, select from drop-down list the required ports of the Workstation computer, where the NMEA sentences will be transmitted from the selected file (for connection these ports, see paragraph **Sensors Settings**). Specify in the drop-down list the baud rate for selected ports.

Security Settings for NS 4000

Press **Security** button.



- In the **User** column enter the name of the user permitted to edit the electronic ship logbook and press <Enter>;



- Enter the password and the password confirmation and press the “OK” button;
- Set all the users whom access is granted to.

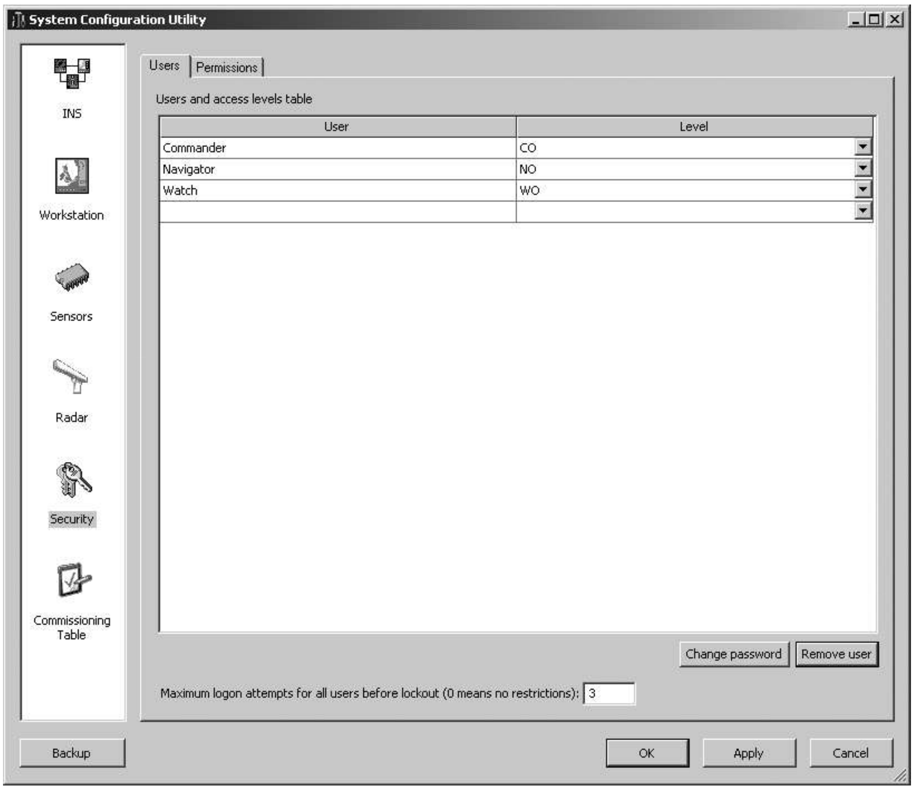
ATTENTION!

After completion of settings of all the Workstations, press the “Apply” button to save all changes done without exiting the System Configuration utility; or press the “OK” button to save all settings and exit the System Configuration utility.

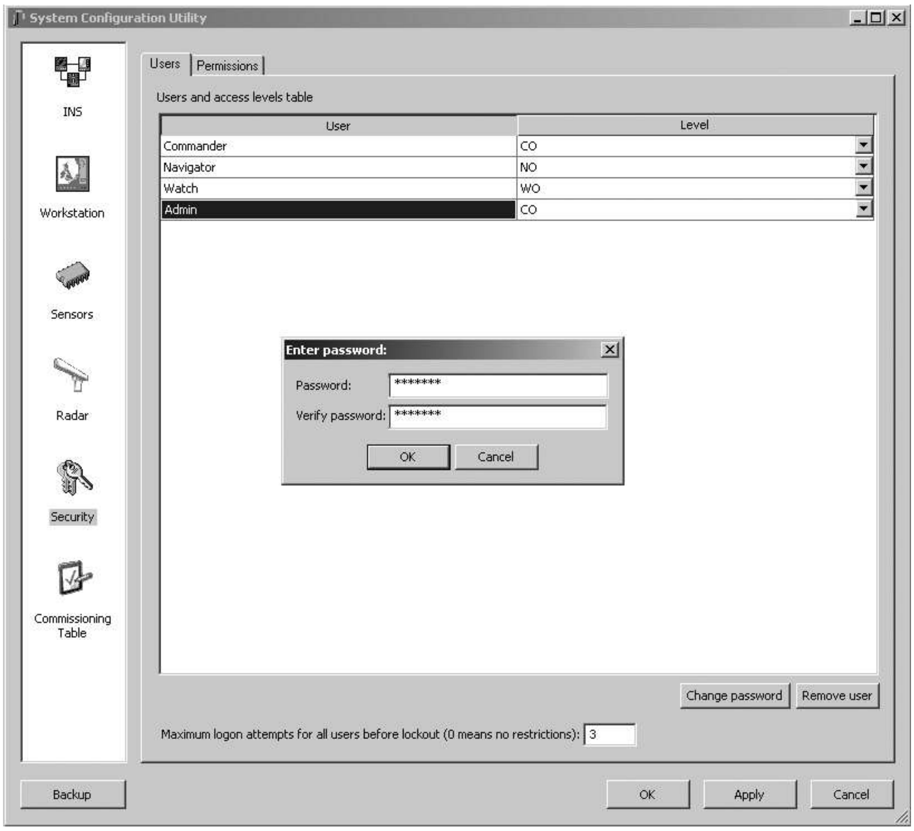
After restart PC, run ECDIS on all WS and check performed settings.

Security Settings for NS 4100

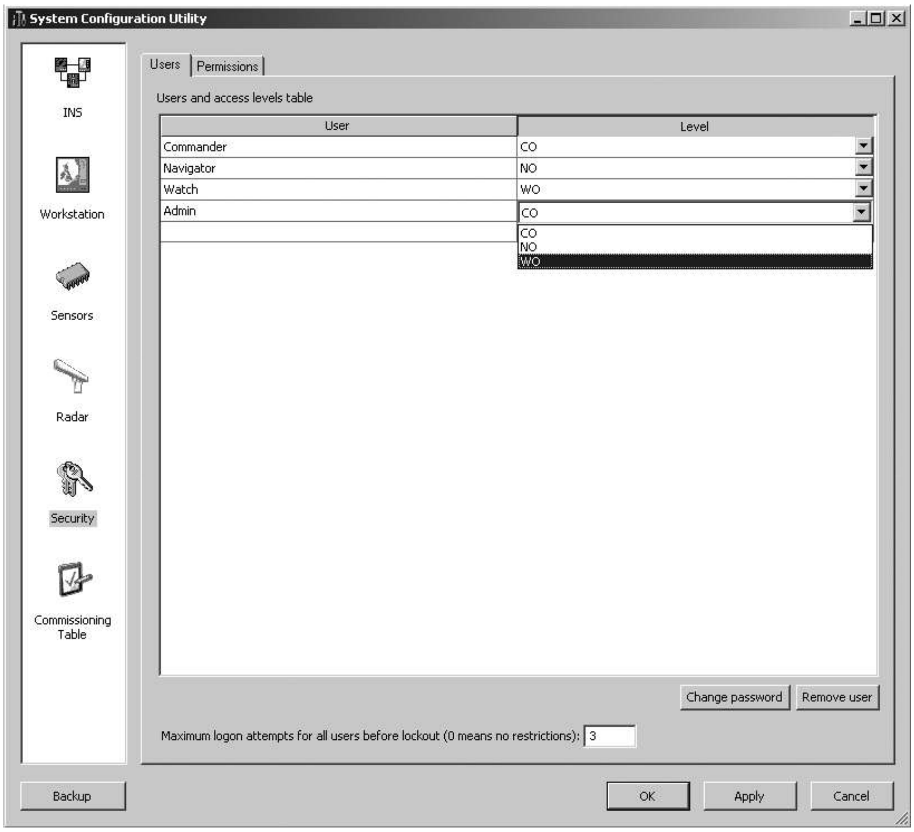
Press **Security** button.



- In the **Users** column enter the user name for configuring access to protected functions (the name can include the following characters only: “A”–“Z”, “a”–“z”, “0”–“9”, “.”, “_”);



- Enter the password and the password confirmation and press the "OK" button;



- In the **Level** column, select the required access level from the listbox.

The NS 4100 system has three preset user categories and access levels:

- Commander ("CO" access level – Commanding Officer);
- Navigator ("NO" access level – Navigation Officer);
- Watch ("WO" access level – Watch Officer).

By default, the following passwords are used for the three user categories:

User	Password
Commander	TRANSASCO
Navigator	TRANSASNO
Watch	TRANSASWO

For a more detailed description of the NS4100 access protection system configuring, see **NAVI-SAILOR 4100 ECDIS (V. 2.00.009). SPECIAL FUNCTIONS**, section **NS4100 Security Access System**.

ATTENTION!

After completion of settings of all the Workstations, press the "Apply" button to save all changes done without exiting the System Configuration utility; or press the "OK" button to save all settings and exit the System Configuration utility.

After restart PC, run ECDIS on all WS and check performed settings.

SPOS WEATHER MODULE ADJUSTMENT

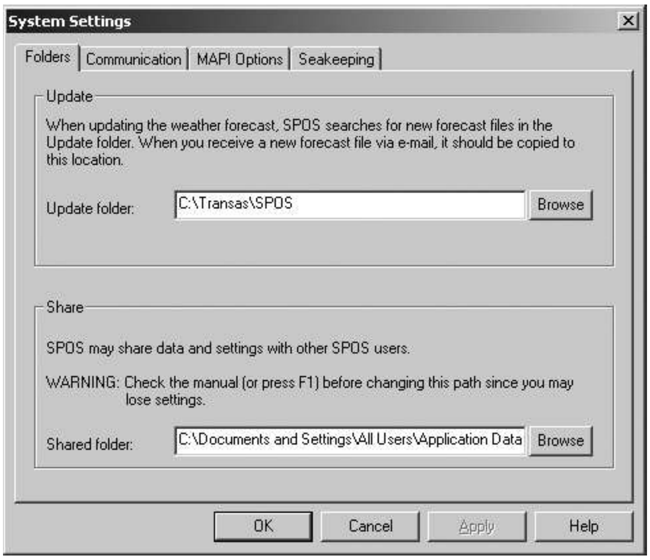
ATTENTION!

The SPOS 6 program setup is only made on the WS, which it is installed in.

This paragraph describes settings of the SPOS program and its integration with the NS 4000 for work in FILE mode.

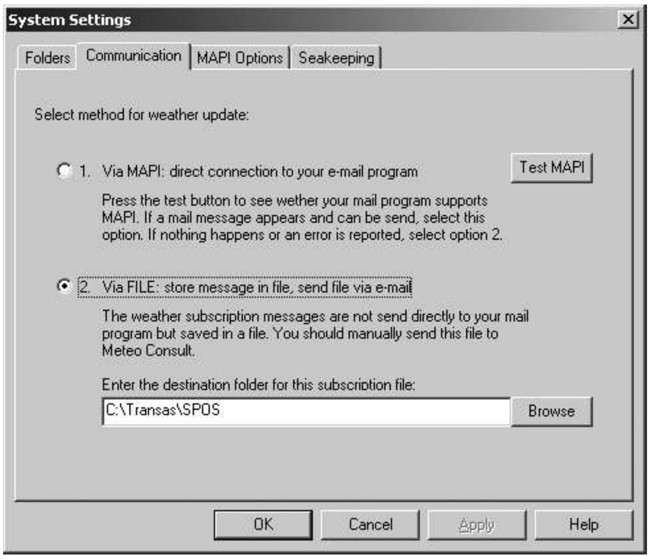
Run SPOS program utility by selecting the appropriate item in the START menu (START\PROGRAMS\SPOS\SPOS):

In command line, press “File”. Select “System Settings” from the fall-off list.



Open the page “Folders”. In the **Update folder** field, specify path to the folder *SPOS* which was created automatically (*C:\Transas\SPOS*).

Open the page “Communication”:

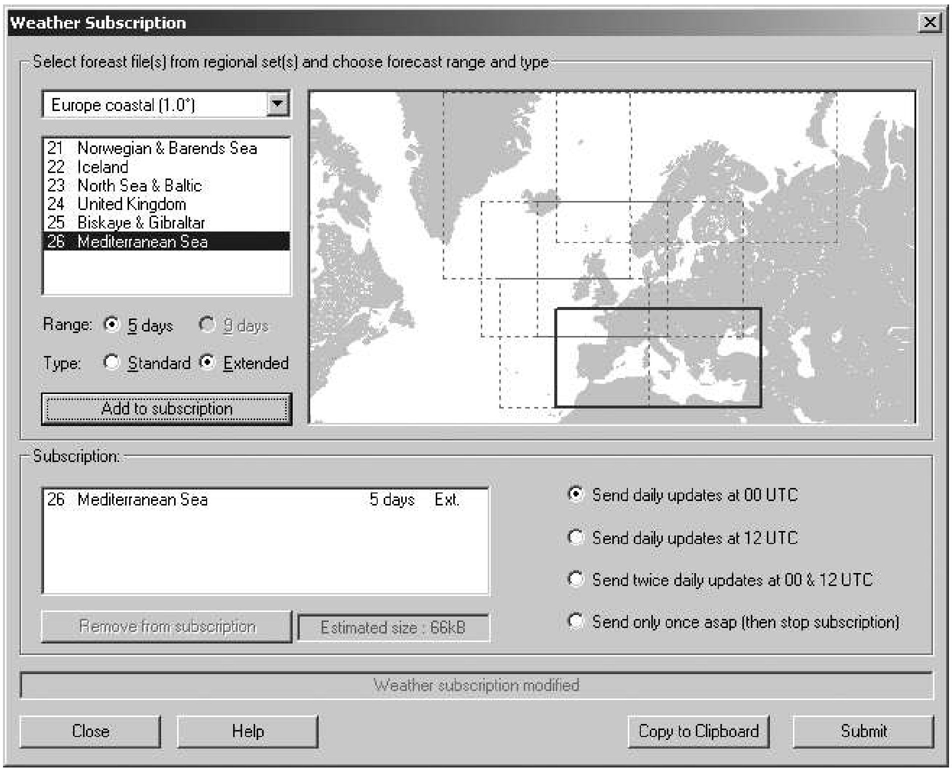


Select method for the messages sending by checking the checkbox **2. Via FILE: store message in file, send file via e-mail**. Specify the path to the folder *SPOS* as described above (*C:\Transas\SPOS*).

Note: For selection the method “Via MAPI”, each installation shall be examined individually, depending on the e-mail client installed on the bridge workstation.

Press “OK” button to save the performed settings and close “System Settings” window.

On the “Weather” page, press the button **Weather Subscription**. In the opened window, select the region(s) of the weather forecast coverage and press **Add to subscription** button. Several regions are available for selection depending on the sailing area:

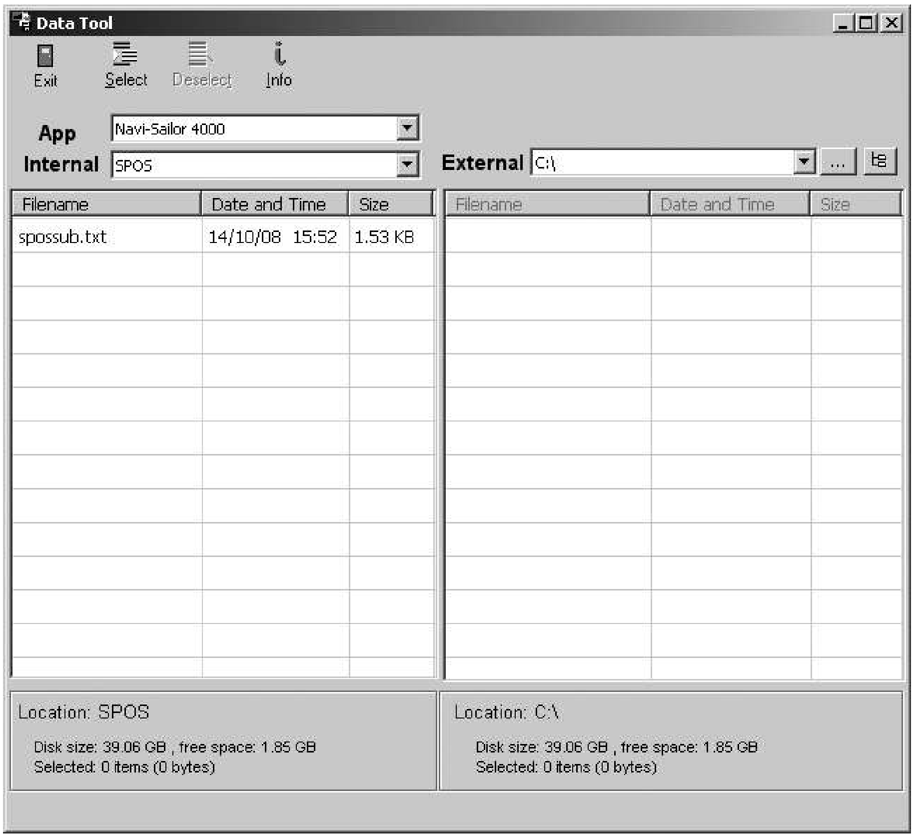


Select the frequency of the forecast update. Press the **Submit** button. The following dialog box will be displayed:

Press the “OK” button. The subscription request `spossub.txt` will be saved in the folder *SPOS* (*C:\Transas\SPOS\spossub.txt*).

To make sure that SPOS settings were carried out properly, run Data Tool utility by selecting the appropriate item in the Start menu (START\PROGRAMS\MULTIFUNCTIONAL DISPLAY/DATA TOOL):

Open internal group **SPOS**:



The file `spossub.txt` shall be displayed in the above mentioned group showing propriety of the SPOS program settings. The file should be copied onto the outer carrier (e.g. floppy disc) by means of the Data Tool utility and sent to the e-mail address: Subscription@spos.eu via ship's communication workstation. Received weather forecasts should be copied later to internal *SPOS* folder.

NAVI-CONNING 4000 ADJUSTMENT

> **ATTENTION!**
>
> The Navi-Conning 4000 program setup is made separately for each WS, which it is installed in. For the correct setup it is necessary that the ECDIS tasks be run on this WS. In the ECDIS task create a route and load it for monitoring (see **NAVI-SAILOR 4000/4100 ECDIS (v. 2.00.009). USER MANUAL**, **Chapter 4**, section **Loading of Route and Schedule in the Navigation Mode**).

General

The indicators contained in the CONNING Screen View windows are set up automatically except for the following indicators:

- Weather window:
  - Air temperature;
  - Barometric Pressure;
  - Humidity.
- Ship Contour window:
  - Bow Thruster;
  - Rudder;
  - Lights.
- Engine window:
  - Engine Telegraph;
  - RPM.

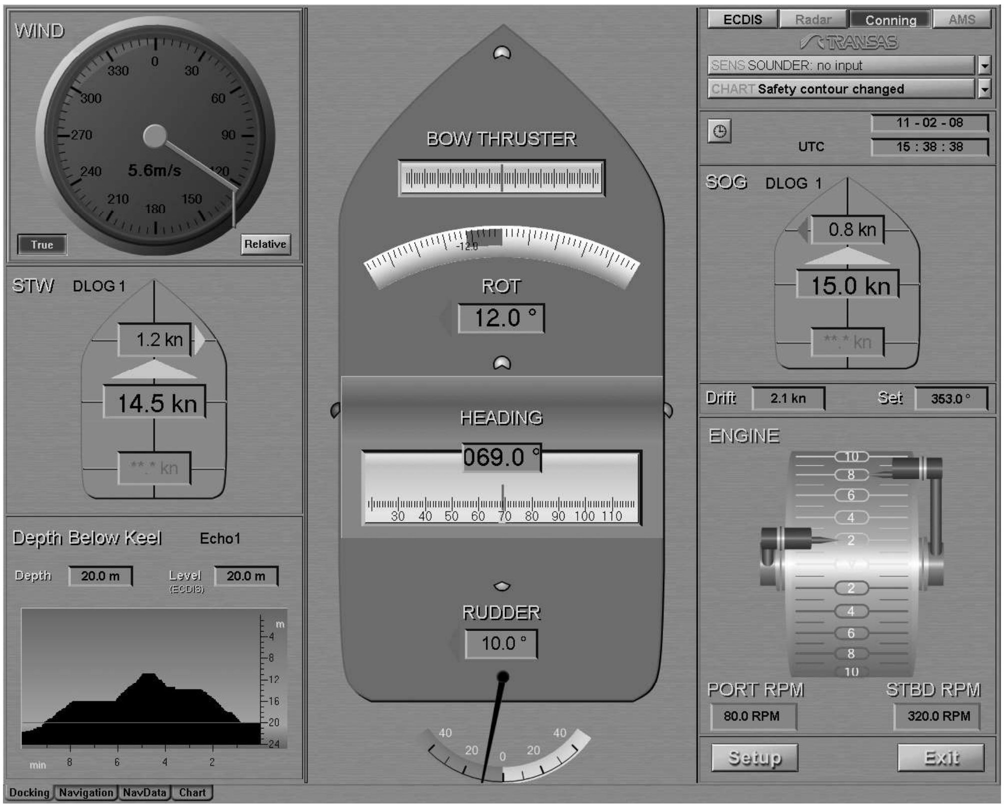
These indicators are set up by the service engineer at the installation stage.

> **ATTENTION!**
>
> Parameters for the setup of these indicators will not be available in the program database unless they were previously created in the System Configuration utility. If the data is supplied via the WAGO interface, the parameter will have the WAGO_ADC_parameter_name for a name (see **Annex B** section **Adjustment of NS 4000 Operation with WAGO Modules**). If the data is supplied via the NMEA Custom, the parameter will be named NMEA_CUSTOM_parameter_name (see **Annex B** section **Adjustment of NS 4000 Operation with NMEA Custom**). To avoid the incorrect operation of the NC4000 program, it is not advisable to connect to the indicators parameters whose names are different from those listed above.

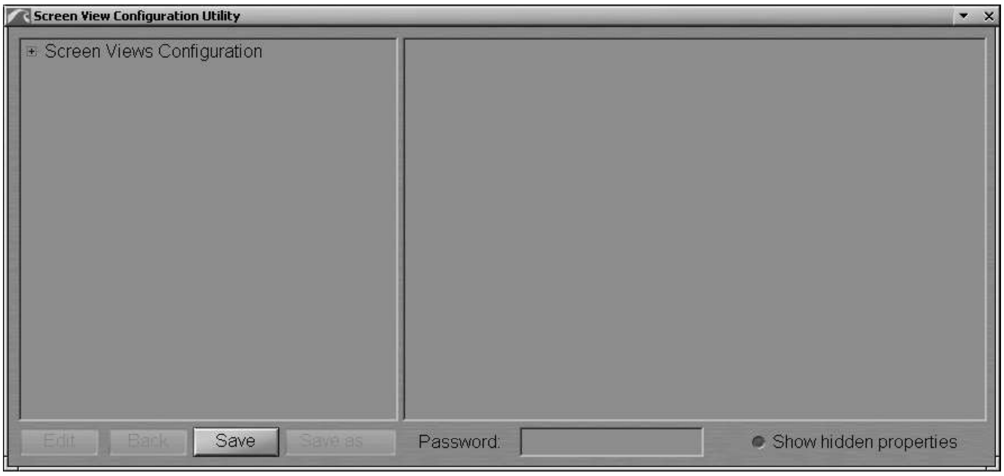
We will consider the indicator setup procedure using the Air Temperature as an example.

Run the CONNING task by selecting the appropriate item in the START menu (START\PROGRAMS\MULTIFUNCTIONAL DISPLAY/NAVI-CONNING):

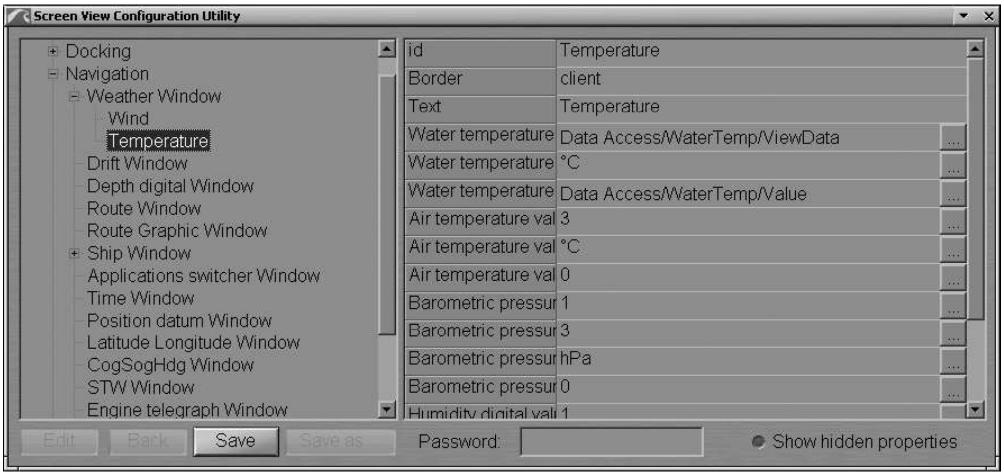
After the program start, the NC 4000 Screen Views will be displayed.



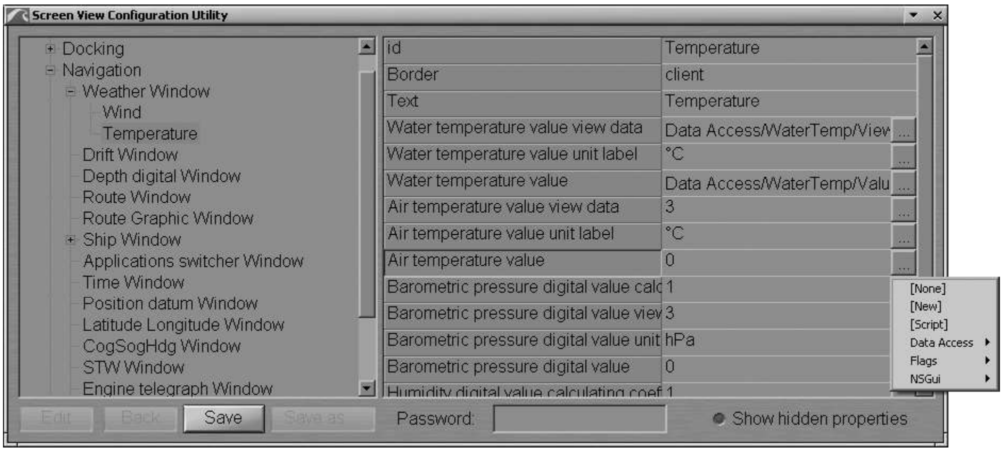
Press **Setup** button.



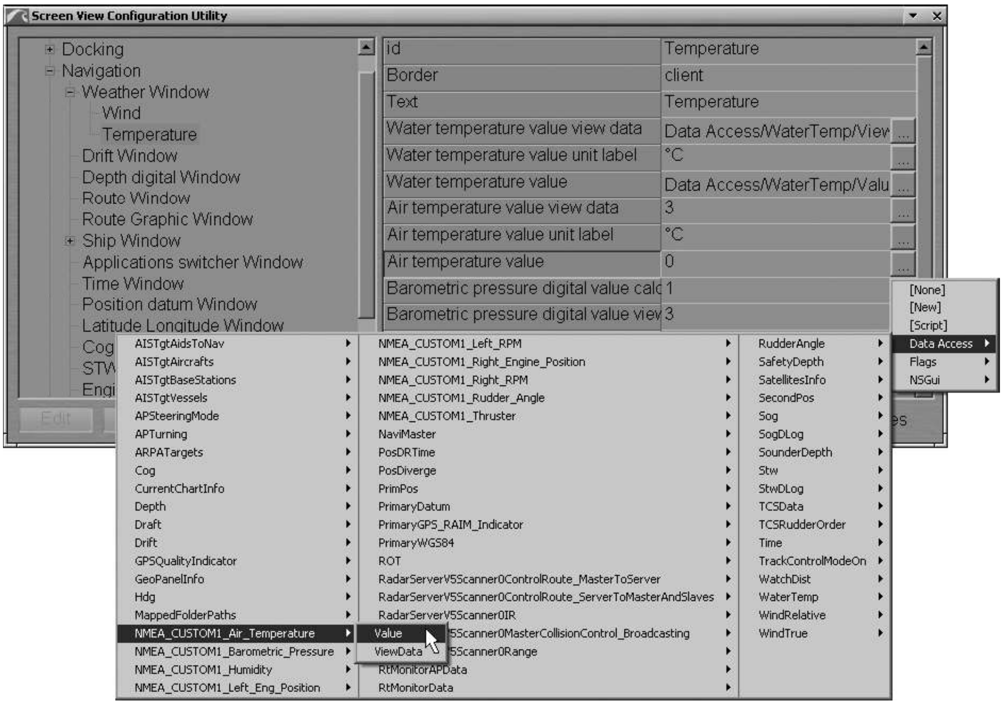
In the "Screen View Configuration Utility" window open the SCREEN VIEWS CONFIGURATION/ NAVIGATION/WEATHER WINDOW/TEMPERATURE menu.



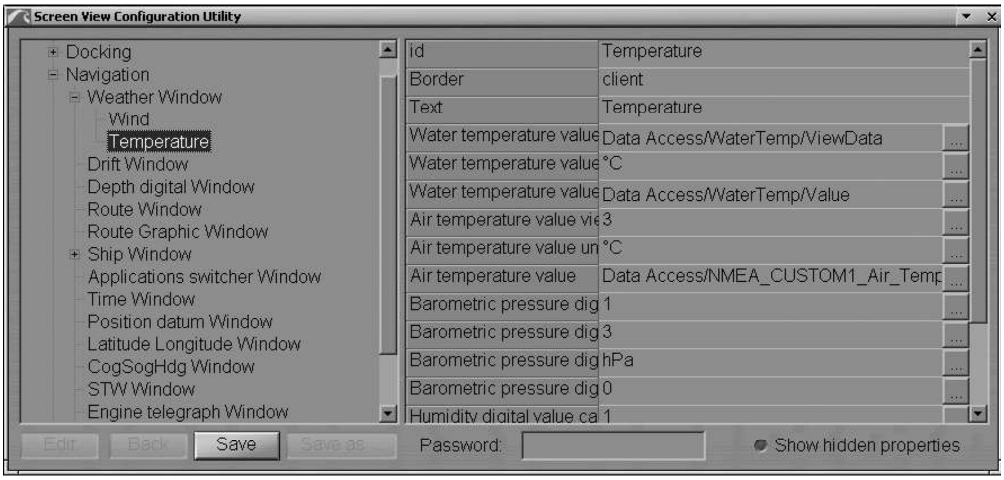
In the right hand part of the "Screen View Configuration Utility" window select the AIR TEMPERATURE VALUE line from the menu and press the button. 



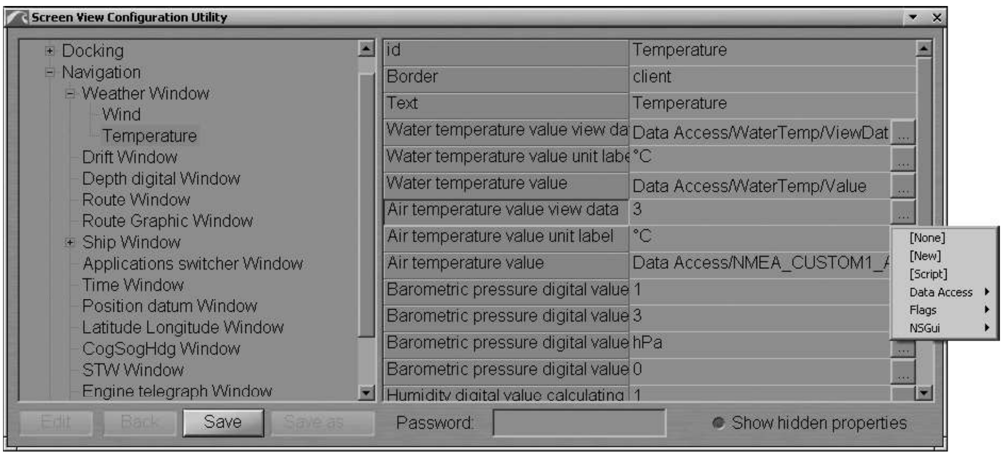
From the menu which will open up, select the DATA ACCESS/NMEA_CUSTOM_AIR_TEMPERATURE/ VALUE line.



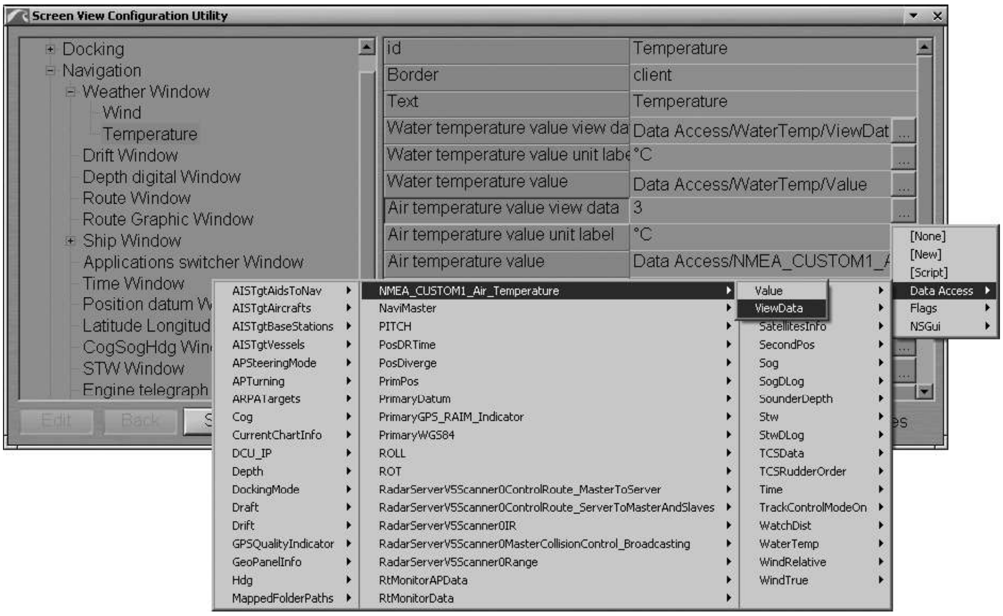
The selected source for the parameter value will be displayed in the right hand part of the “Screen View Configuration Utility” window in the AIR TEMPERATURE VALUE line.



In the right hand part of the “Screen View Configuration Utility” window select the AIR TEMPERATURE VALUE VIEW DATA line from the menu and press the button. 



From the menu which will open up, select the DATA ACCESS/NMEA_CUSTOM_AIR_TEMPERATURE/VIEWDATA line.



If connected correctly, parameters will be shown dynamically on the relevant indicators, there is not need to restart Navi-Conning 4000.

Press the “Save” button in the “Screen View Configuration Utility” window.

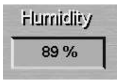
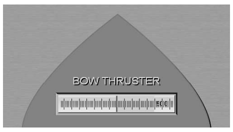
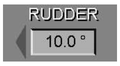
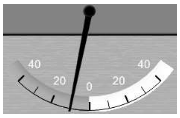
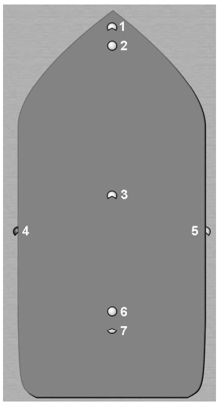
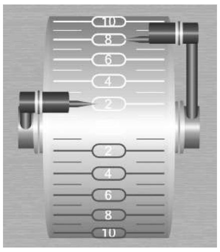
WARNING!

For each indicator both characteristics VALUE and VIEWDATA should be adjusted. For each Screen View the indicator is set up individually. I.e., in the “Screen View Configuration Utility” window, it is necessary to repeat the setup procedure for the “NavData” Screen View (SCREEN VIEWS CONFIGURATION/NAVDATA SV/WEATHER WINDOW/TEMPERATURE).

Indicator Setup Table

Set up the indicators in accordance with the above procedure by using the following table:

Indicator	Window	Screen Views	Path
Air Temperature 	Weather/Temperature Tab	Navigation	SCREEN VIEWS CONFIGURATION/NAVIGATION SV/WEATHER WINDOW/TEMPERATURE
		NavData	SCREEN VIEWS CONFIGURATION/NAVDATA SV/WEATHER WINDOW/TEMPERATURE
Barometric Pressure 	Weather/Temperature Tab	Navigation	SCREEN VIEWS CONFIGURATION/NAVIGATION SV/WEATHER WINDOW/TEMPERATURE
		NavData	SCREEN VIEWS CONFIGURATION/NAVDATA SV/WEATHER WINDOW/TEMPERATURE

Indicator	Window	Screen Views	Path
Humidity 	Weather/Temperature Tab	Navigation	Screen Views Configuration/ Navigation SV/Weather Window/ Temperature
		NavData	Screen Views Configuration/ NavData SV/Weather Window/Temperature
Bow Thruster 	Ship Contour	Docking	Screen Views Configuration/ Docking SV/Ship Window
		Navigation	Screen Views Configuration/ Navigation SV/Ship Window
Rudder Digital 	Ship Contour	Docking	Screen Views Configuration/ Docking SV/Ship Window
		Navigation	Screen Views Configuration/ Navigation SV/Ship Window
Rudder Graphic 	Ship Contour	Docking	Screen Views Configuration/ Docking SV/Ship Window
		Navigation	Screen Views Configuration/ Navigation SV/Ship Window
Lights 	Ship Contour	Navigation	
	1 – Top Light, Front		Screen Views Configuration/ Navigation SV/Ship Window
	2 – Anchor Light, Front		Screen Views Configuration/ Navigation SV/Ship Window
	3 – Top Light, Rear		Screen Views Configuration/ Navigation SV/Ship Window
	4 – Port Side Light		Screen Views Configuration/ Navigation SV/Ship Window
	5 – Stb Side Light		Screen Views Configuration/ Navigation SV/Ship Window/
	6 – Anchor Light, Rear		Screen Views Configuration/ Navigation SV/Ship Window
	7 – Stern Light		Screen Views Configuration/ Navigation SV/Ship Window/
Engine Telegraph 	Engine	Docking	Screen Views Configuration/ Docking SV/Engine Telegraph Window
		Navigation	Screen Views Configuration/ Navigation SV/Engine Telegraph Window
		Chart	Screen Views Configuration/ Chart SV/Engine Telegraph Window
PORT RPM (see the next Item) 	Engine	Docking	Screen Views Configuration/ Docking SV/Engine Telegraph Window
		Navigation	Screen Views Configuration/ Navigation SV/ Engine Telegraph Window
		Chart	Screen Views Configuration/ Chart SV/Engine Telegraph Window

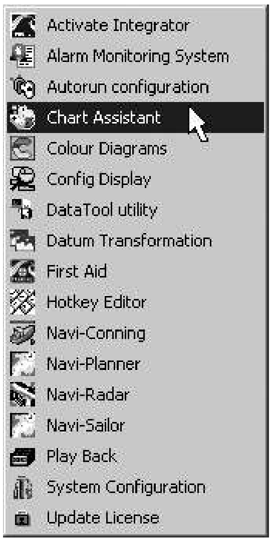
Indicator	Window	Screen Views	Path
STBD RPM (see the next Item)  	Engine	Docking	SCREEN VIEWS CONFIGURATION/ DOCKING SV/ENGINE TELEGRAPH WINDOW
		Navigation	SCREEN VIEWS CONFIGURATION/ NAVIGATION SV/ENGINE TELEGRAPH WINDOW
		Chart	SCREEN VIEWS CONFIGURATION/ CHART SV/ENGINE TELEGRAPH WINDOW

Note: Do not forget to set up the same indicators individually for each Screen View (see the Warning in the previous item).

If there is one engine on the ship, neither the parameter source nor the rules of displaying the second engine telegraph handle are specified for the Engine Telegraph indicator.

CHARTS INSTALLATION AND CHART ASSISTANT ADJUSTMENT

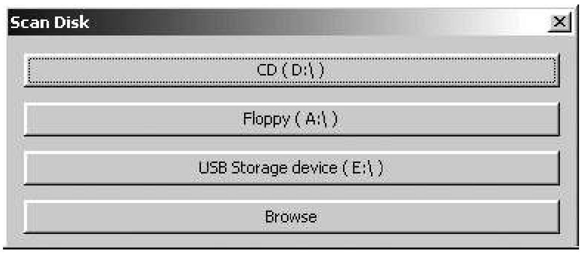
Run Chart Assistant utility by selecting the appropriate item in the START menu (START\PROGRAMS\MULTIFUNCTIONAL DISPLAY\CHART ASSISTANT):



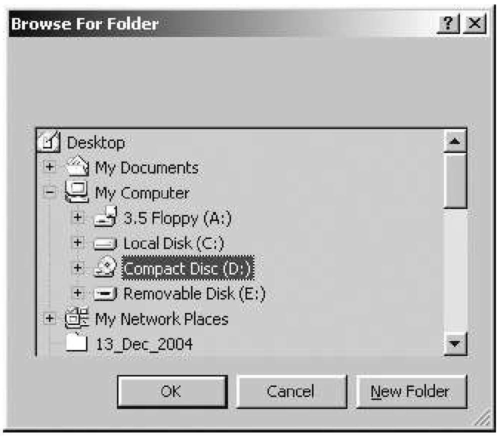
Charts Installation

Insert the CD with a chart folio into the CD drive. Press **Update** button.

In the “Scan Disk” window, which will open up, specify the external storage containing chart collection:

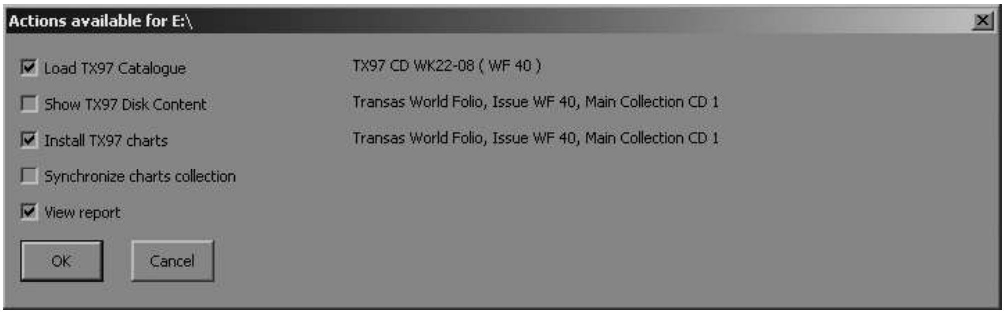


If necessary, press “Browse” button and specify the path to the directory, which contains the chart collection:



Press “OK” button in the search window.

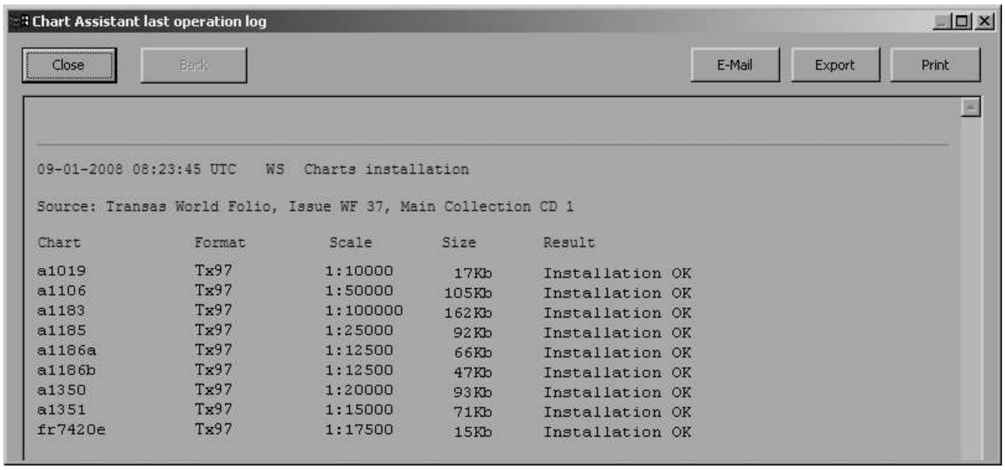
Chart Assistant will scan the external storage, will automatically identify the chart format and type of data it contains, and will produce a list of available actions:



Install TX97 charts checkbox is checked by default, in this case all charts, contained on the disk, which the licenses are available for, will be automatically installed.

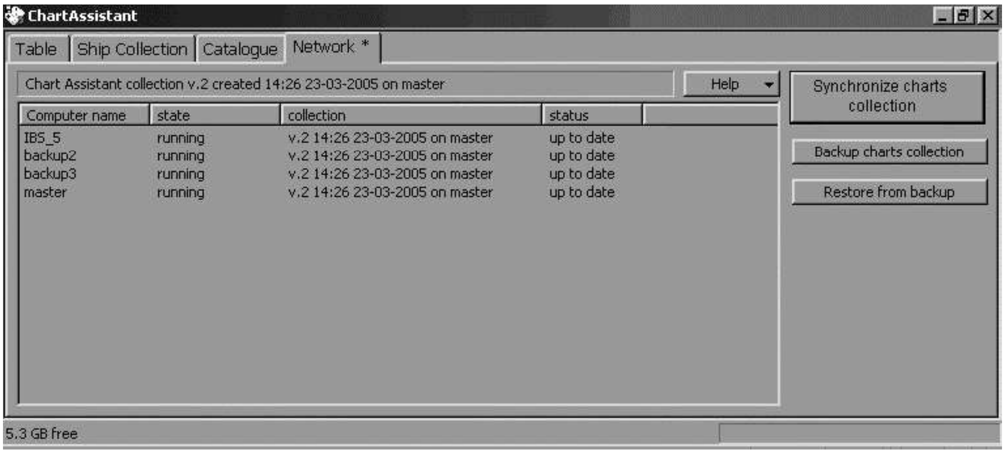
Press “OK” button.

After chart installation, general log is displayed:



Close the log. Chart installation process is completed.

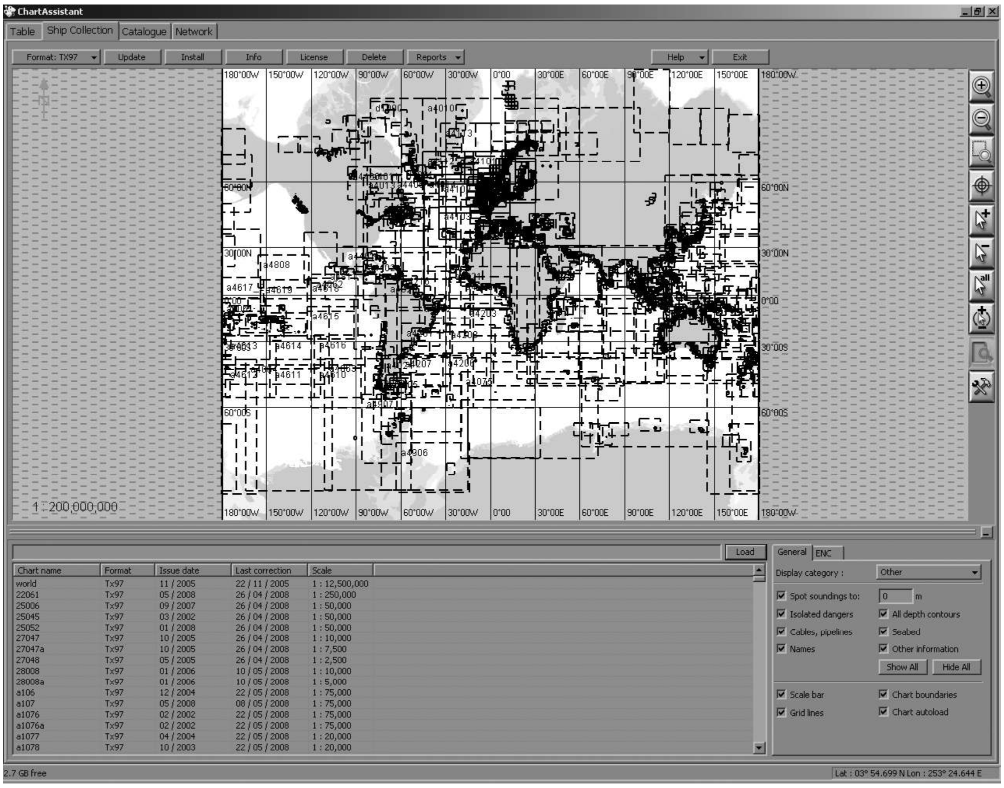
By using the tab in the left top corner, switch to “Network” panel.



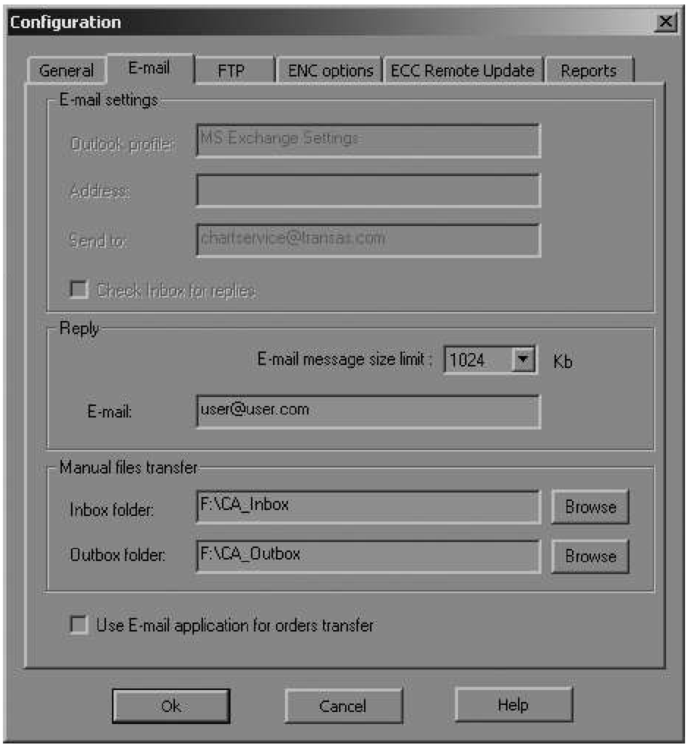
To synchronize the collection at all the workstations, press the **Synchronize charts collection** button.

Chart Assistant Adjustment

Use the appropriate tab in the top left corner of the screen to switch to “Ship Collection” or “Catalogue” panel:



Press  button and open “E-Mail” page.



On "E-Mail" page uncheck **Use E-Mail application for orders transfer** checkbox if it is checked.

In **Manual files transfer** group fill appropriate fields as follows (e.g., for a USB flash drive):

- **Inbox** – <*Name of Disk*>*:\CA_Inbox*;
- **Outbox** – <*Name of Disk*>*:\CA_Outbox*.

In **Reply** group it is necessary to input the following:

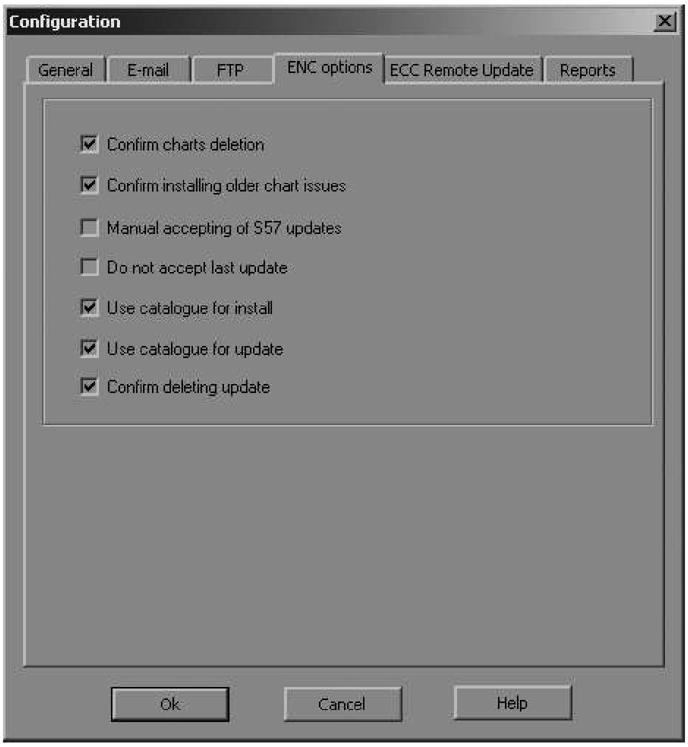
- **E-Mail** – the ship's e-mail address should be written here;
- **E-Mail message size limit** – select necessary size of answer request. The answer request size can be selected from a list.

Create and send an order to make a subscription for chart corrections (see paragraph **Ordering Data in On-line Mode**). As the result, the order will be saved on the diskette or memory stick in the *CA_Outbox* folder.

Take off the diskette or memory stick and send a file from the *CA_Outbox* folder (this will be a file with `*.cdf` extension) as an attachment to chartservice@transas.com. No special subject or text is necessary. Then delete the `*.cdf` file from the memory stick to prevent mixing up with other orders (files which will be saved by CA in the future).

When you receive an e-mail from chartservice@transas.com, save attachment(s) (these will be `*.cdf` files) to memory stick in the *CA_Inbox* folder. Then insert the memory stick into the computer with the Chart Assistant utility. When the Chart Assistant detects new data in the memory stick, it offers to install updates. Press "OK" and apply chart corrections.

Open "ENC options" page.



On this page, all the checkboxes are checked by default. Uncheck the relevant checkboxes for performing the following operations when handling S-57 format charts:

- **Confirm delete** – to delete charts without additional warning;
- **Confirm install old** – to install new charts automatically on the charts already installed;

ATTENTION!

By default, the next checkboxes **Manual Accept** and **Do not accept last update** are unchecked, and in this case updating of ENC charts will be accepted automatically.

- **Manual accept** – to install the successive updating automatically, without prompt for accepting previous updating;
- **Do not accept last** – to accept automatically the latest updating (if the checkbox is checked, the latest updating should be accepted on “ENC” page of “Ship Collection” panel);
- **Use catalogue for install** – file with chart catalogue (`CATALOG.031`) will not be used during the chart installation;
- **Use catalogue for update** – file with chart catalogue (`CATALOG.031`) will not be used during the chart updating;
- **Confirm deleting update** – to confirm automatically the deleting updating.

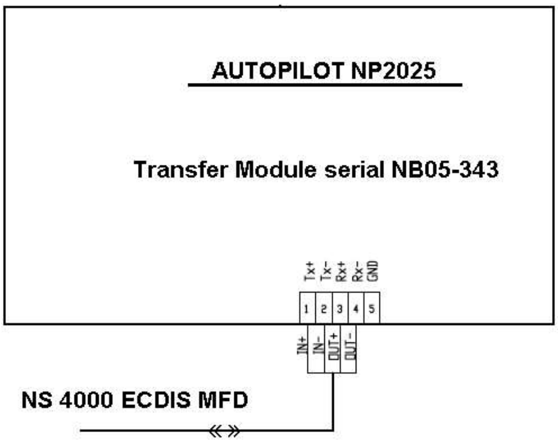
SETTINGS IN AUTOPILOT

Raytheon Heading Control System NP 2025 (NP 2025 Plus)

To provide compliance to Track control standard there are should be done following settings:

HW Settings

- Sensors connection as per service manual;
- NS serial data connection (“Autopilot” port) as described below:



Software Settings

Service part – “parameter” mode (provided by service engineer):

- DV Bus – No;
- ECDIS – Yes;
- Turn Type – HTR;
- XTD – nautical miles;
- TrScal – (0–5, depends on ship maneuverability (for NP2025+ only). Gain setting of track controller to increase (bigger values) or reduce accuracy and activity (0 by default).

Typical settings for TrScal:

Fast Ferry	Container Ship	Tanker
+2	+2	+2

- EcdisSRoTW – Set “Y”. Set ROT is calculated using ship’s speed through water in NS (for NP2025+ only);
- TPosfilt – 50 by default, 0-200 depends on ship maneuverability (for NP2025+ only). Determines drift estimation and time constant. If set 0 – drift estimation off;

Typical settings for TPosfilt:

Fast Ferry	Container Ship	Tanker
150	50	50

- Time out – 10-30 (10 sec by default);
- Speed – VHW;
- HSC – off.

Other data is ship's type depending and/or ship's model tuning characteristics.

User part – Ship and environment conditions.

Parameter Y/R/C – correct settings shall be provided before track control settings.

For the different type of vessel should be used different values, as a default next settings can be applied, note that this parameters can be changed depend on environment.

Typical Settings for Yawing:

Fast Ferry	Container Ship	Tanker
2	2	1

Typical Settings for Rudder:

Fast Ferry	Container Ship	Tanker
7	4	5

Typical Settings for Counter Rudder:

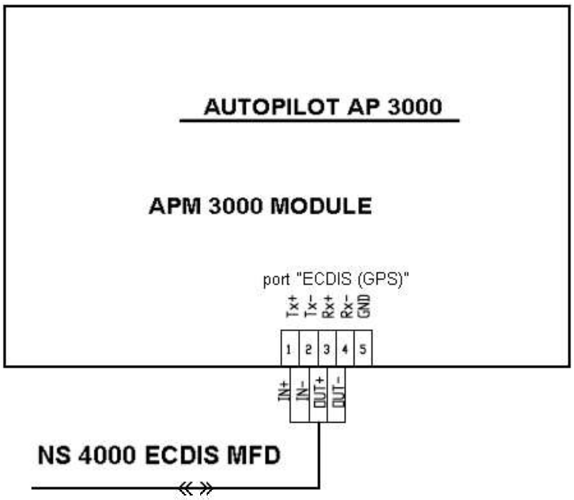
Fast Ferry	Container Ship	Tanker
1	2	2

Navis Heading Control System AP 3000

To provide compliance to Track control standard there are should be done following settings:

HW Settings

- Sensors connection as per service manual;
- NS serial data connection ("Autopilot" port) as described below:



Software Settings

Service part:

- “INSTALLATION” main menu – (provided by service engineer only);
- “DOCKTRIAL” menu:
  - TrackMode: ExtHTC;
  - ECDIS presents: Yes.
- “INTERFACE” menu:
  - * IN (submenu):

    COMP1: GYRO1;
    COMP2: GYRO2 (if available);
    LOG: LOG;
    ECDIS: ECDIS.
  - * ECDIS OUT (submenu): Yes:

    Baud: 9600;
    Freq: 1;
    HTD: Yes;
    RSA: Yes.
  - * COMP1: GYRO1;
  - * COMP2: GYRO2 (if available).

Press “NMEA testt” button in the “Main Installation menu” to identify all connected sensors:

- “PARAMETERS” menu:
  - Vessel Length: actual vessel length in meters;
  - Vmax: actual maximum speed in knots;
  - Vmin: minimal manoeuvring speed in knots;
  - Wmax: maximum Rate of Turn, deg/ per minute.

Make “AP Turning” procedure as described in AP3000 “Installation Guide”.

Press “Master Reset” button.

User part, press “Menu” button in operating mode:

- “SET DEVICES” menu:
  - Set compass: GYRO1 or GYRO2 (if available);
  - Set position: ECDIS;
  - Speed: LOG;
  - Heading Monitor: (ON/OFF) in case if GYRO2/MAGN is connected).
- “PARAMETERS” menu:
  - Turn Rate: operating Rate of Turn value (deg. per minute);
  - Rudder Limit: operating manoeuvring Rudder limit;
  - Sensetivity: Set up actual sensitivity value (depending on ship type and weather conditions);
  - Heading Alarm: 20 degrees.

Typical Settings for AP3000 after AP Turning procedure:

Parameter/Vessel type	Fast Ferry	Container Ship	Tanker
PARAM1	1,15	1,08	1,40
PARAM2	2,34	0,44	0,48
PARAM3	5,00	5,00	5,00
Rudder	5	8	9
Speed	20	19	10
Unstab	01	00	00
Vmax	30	36	10
Vmin	3	3	3
Wmax	300 deg per min	110 deg per min	60 deg per min
Lenght	64	250	350

ATTENTION!

Autopilot settings should match the ship characteristics. Otherwise, frequent deviations from the course and, as a consequence, frequent use of the steering gear will be inevitable.

PROCEDURE OF TCS CONTROL SETUP ALGORITHMS

Essentials

TCS algorithm settings are stored in `nm.cfg`, `tcs.cfg`, `tcsfull.cfg` and `tcshalf.cfg` files.

To adjust control algorithms for a particular ship, use the following procedure:

1. Adjust “Track control” section in System Configuration utility as per settings specified for the given ship type.
2. Open `tcs.cfg`, `tcsfull.cfg` and `tcshalf.cfg` files in stored in *C:\Program Files\Common Files\Transas Shared\Navigation\NSS* directory.
3. Change the settings as required by using the fine adjustment procedure described below and save the files.

Fine Adjustment

The fine adjustment procedure is intended for improving accuracy of steering the ship along the route and should be made, as required, by a system engineer only, and checked in the process of sea trials. It is necessary to take into account the fact that the TCS system adjustment is maid for “ship+autopilot” combination on the whole, so considerable changes in the autopilot settings may require the re-adjustment of the control system parameters as well.

Fine adjustment consists primarily in the selection of correct temporal ship characteristics. Such characteristics are set separately for a loaded (`tcsfull.cfg` file), half loaded (`tcshalf.cfg`) and empty (`tcs.cfg`) ship condition. `tcsNNNN.cfg` files are expected to be edited with the aid of NotePad editor included in Windows OS.

Passing-of-Turn Settings

1. PivotX. Average shift of the ship's pivot point forward relative to the ship's geometric centre, in meters. If set incorrectly, the ship may tend to go inside (to correct this, it is necessary to increase PivotX) or outside (reduce the PivotX) relative to the set turn trajectory. PivotY is normally "0".

2. TurnRelaxROTChange. Characteristic time of the ship ROT change in milliseconds. The larger TurnRelaxROTChange corresponds to smaller ship manoeuvrability relative to the present configuration, and the other way round.

Typical Parameters:

Ship Type	Fast Ferry	Container Ship	Tanker
Parameter in milliseconds	5000	4000	8000

3. ROTDriftKoeff Characteristic of the ship ROT change. The approximate value can be calculated as a constant ship drift angle during the turn/ROT grad/min. If set incorrectly, the ship always goes inside (to correct this, it is necessary to increase value) or outside (reduce the value) relative to the set turn trajectory.

Typical Parameters:

Ship Type	Fast Ferry	Container Ship	Tanker
Parameter (value)	0.26	0.14	0.115

Note: In the case of excessive value reduction which is not commensurate with the actual manoeuvring characteristics, there may be the ship track oscillation.

Motion-Along-Straight-Line Settings

For Raytheon (Anshutz) NP 2025 (NP2025+) autopilot, this values are of no importance.

1. TimeOnLeg – Characteristic time of the ship's HTS change in milliseconds. The larger TimeOnLeg corresponds to a smaller ship manoeuvrability relative to the ready configuration, and the other way round.

Typical Parameters:

Ship Type	Fast Ferry	Container Ship	Tanker
Parameter in milliseconds	12 000	50 000	30000

2. XTEs; XTE_Ks – values which determine width of ranges and their corresponding course correction in the direction which will bring back to the route leg. The change of values is required in the case of incorrect ship behaviour as it moves along the straight line under constant environmental conditions (motion along a pronounced sinusoid or motion at a large distance off the route leg). If the ship moves along a sinusoid around the route leg, the course correction coefficient should be decreased within the observed amplitude. If the ship's mean position is off the route leg, the coefficient is required to be increased, or a new band should be set. In any case, it is advisable to leave a band with zero coefficient (deadband). The table provides initial range value and their corresponding correction coefficients.

XTEs (Width of Range, nm)	XTE_Ks (Course correction, deg)	Value (example)
0.000	0.0	Deadband
0.01	0.0	
0.0101	2.0	2 deg
0.04	2.0	
0.04001	4.0	4 deg
0.10	4.0	
0.10001	6.0	6 deg
0.5	6.0	
0.50001	6.0	

XTEs (Width of Range, nm)	XTE_Ks (Course correction, deg)	Value (example)
0.75	8.0	8 deg
1.00	8.0	

Plausibility Check Adjustments

1. MaxHDGJump – threshold value of course change in degrees. As the course changes by a value larger than the setting within the period of one second, the Track Control mode will be stopped. On ships with a high rate of turn (Fast Ferry), it is necessary to set the appropriate value in order to avoid unfounded stops.

Typical Parameters:

Ship Type	Fast Ferry	Container Ship	Tanker
Parameter in degrees	~ 15–20	~ 15–20	~ 10–15

2. MaxLogJump – threshold value of speed change in knots. As the speed changes by a value larger than the setting within the period of one second, the Track Control mode will be stopped. On ships with high acceleration/stopping value(Fast Ferry), it is necessary to set the appropriate value in order to avoid unfounded stops.

Typical Parameters:

Ship Type	Fast Ferry	Container Ship	Tanker
Parameter in knots	~ 15–20	~ 5–10	~ 5

Sample of tcsNNNN.cfg File (Editable strings are highlighted).

```
[DeltaHTS_XTE]
LinesCount=10
MaxDTW=0.1
XTEs=0.000,0.01,0.0101,0.04,0.04001,0.10,0.10001,0.5,0.50001,
0.75,1.00
XTE_Ks=0.0,0.00,2.0000,2.00,4.00000,4.00,6.00000,6.0,6.00000,
8.00,8.00
FixedXTE=ON
Test=ON

[DriftCalc]
DriftAddPeriod=2000
DriftMaxROT=4
DriftAvgPeriod=10000
UseSmartWay=OFF
Test=ON
IgnoreDriftTest=OFF
UseDeltaDrift=ON

[COG_Evaluator]
PivotX=60
PivotY=0
Test=ON

[TurnManager]
EndOutrun=0.07
EndOfTurnTime=5
StopTurnAsCurve=OFF
DriftPredictDist=0.3
Tau=60000
QTrackXTE=0.15
XTEReduceTime=300000
TurnDeltaHTS_K=1.0
```

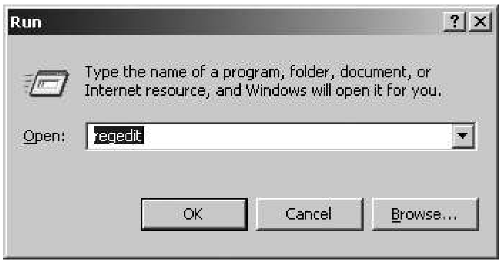
```
[COGCalc]
MaxROT_Min=0.5
TimeOnLeg=90000
LargeDeltaCOG=99
TurnPercChangeROT=0.000001
TurnRelaxROTChange=10000
NoDriftROT=6.0
DecreaseDriftLock=OFF
ROTDriftKoeff=0.571

[ConstantError]
Use=ON
TotalPeriod=600000
KoefAvgError=0.0

[DriftUpload]
Use=ON
DriftUploadTime=000000
Dgr2XTE=-5

[JumpDetector]
MaxHDGJump=5
MaxLogJump=5
```

ALARM STATION SETUP

Note: For Alarm Station licensed option only.

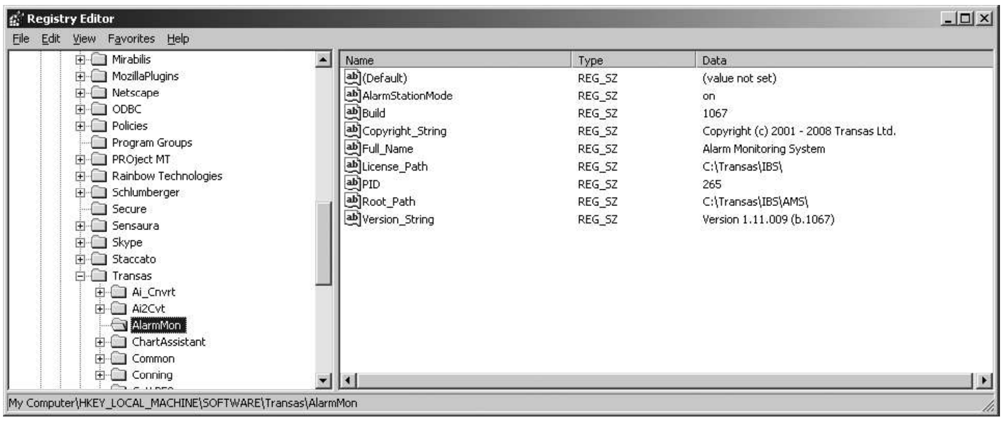
Press “Start” button of the *Main* menu and select “Run” line.

For registry edit in “Open” input window enter “regedit”.

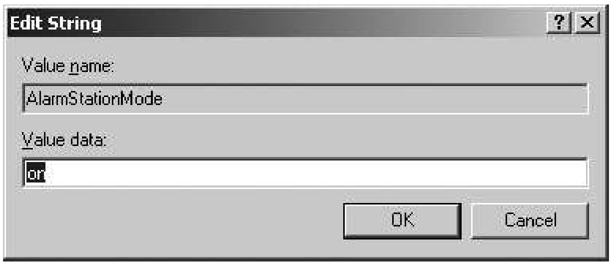


Press “OK” button.

Open *HKEY_LOCAL_MACHINE\Software\Transas\AlarmMon* folder.



In `AlarmMon` folder select `AlarmStationMode` and press <Enter>.

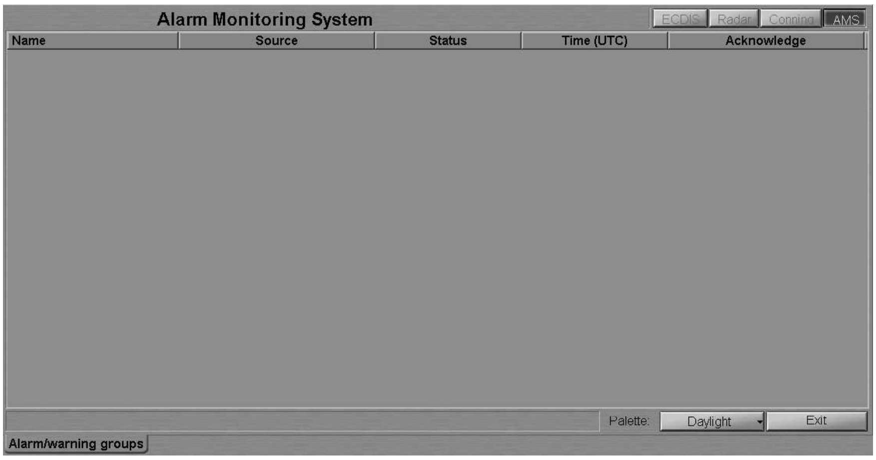


Type “on” in “Value data” line and press “OK” button.

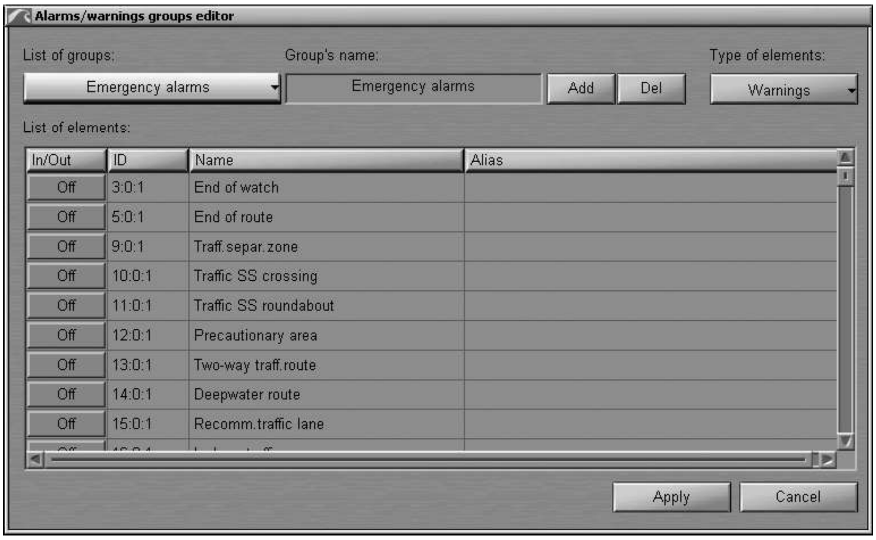
Note: Changes in the registers should be made individually on each workstation where the Alarm Station will be installed.

Run AMS task by selecting the appropriate item in the START menu (START\PROGRAMS\MULTIFUNCTIONAL DISPLAY\ALARM MONITORING SYSTEM):

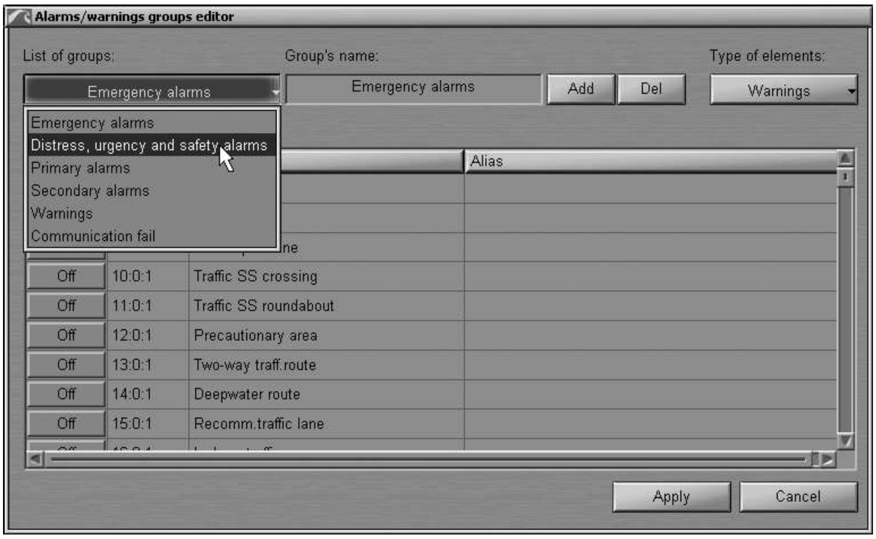
After the program loading, the Alarm Station screen will be displayed.



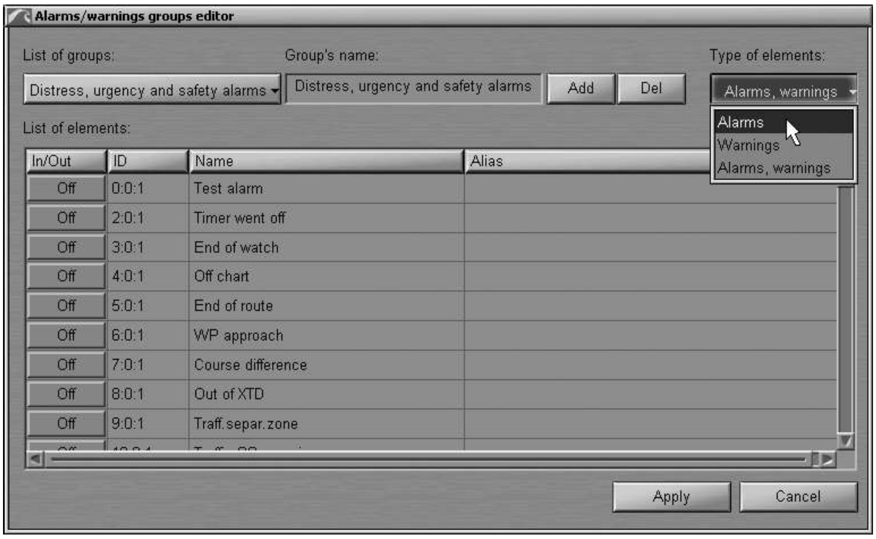
Press the <Ctrl>+<Shift>+<Q> buttons: the “Alarms/warnings groups editor” window will appear.



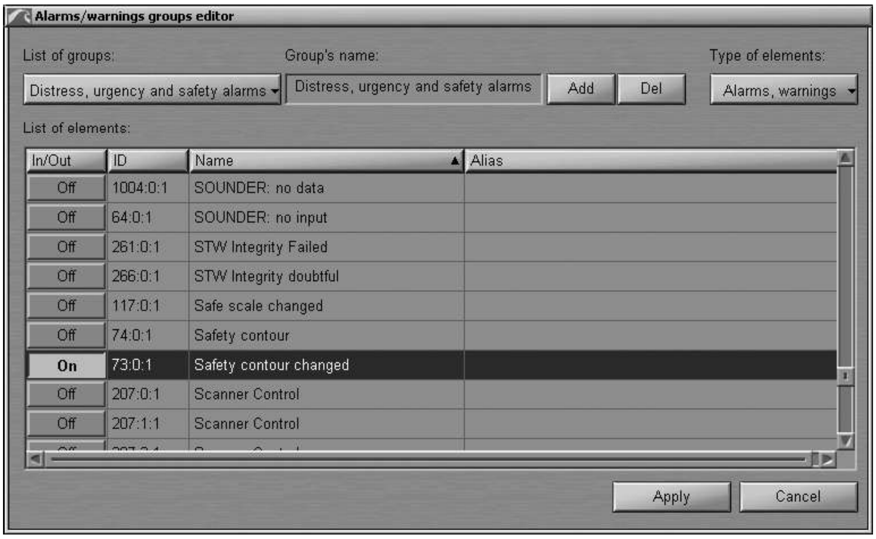
From the **List of groups** listbox select a group of alarms which should be formed. By default, the list contains 6 groups. To add a group name to the list, enter it in the **Group's name** input box and press the **Add** button. To delete a group name from the list, select it and press the **Del** button.



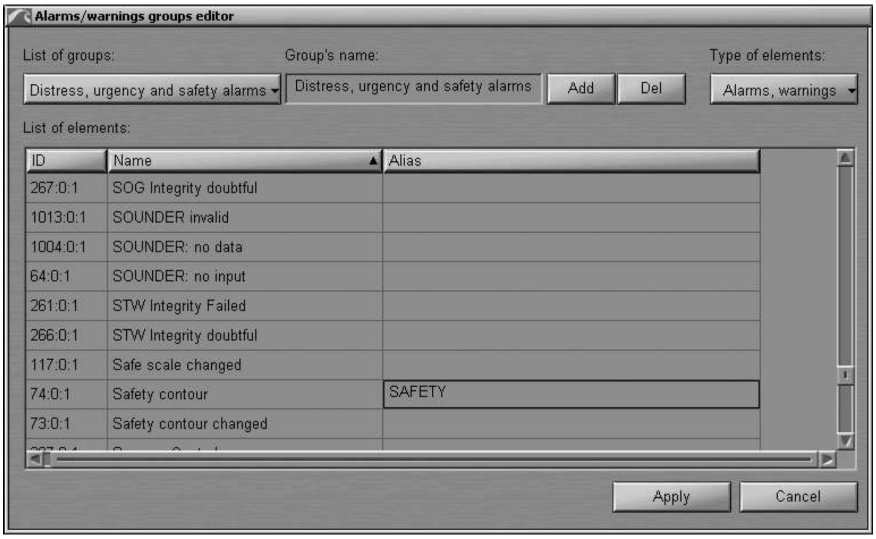
From the **Type of elements** listbox select the alarms and/or warnings which will be shown in the table.



You can sort the alarms in the table by the name and ID by pressing on the relevant column name. Press the **Off** button to the left of the name of the alarm (warning), which should be included in the group (**Off** is replaced with **On**).



If necessary, enter the name of the alarm (warning) under which it will be displayed in the Alarm Station, in the **Alias** column.



Set all the alarms (warnings) which will be included in the group

Note: The alarms (warnings) supplied by the external devices via the NMEA interface are required to be generated for the recording. It is only then they will appear on the list, and can be included in a group.

After configuring all the groups, press the “Apply” button.

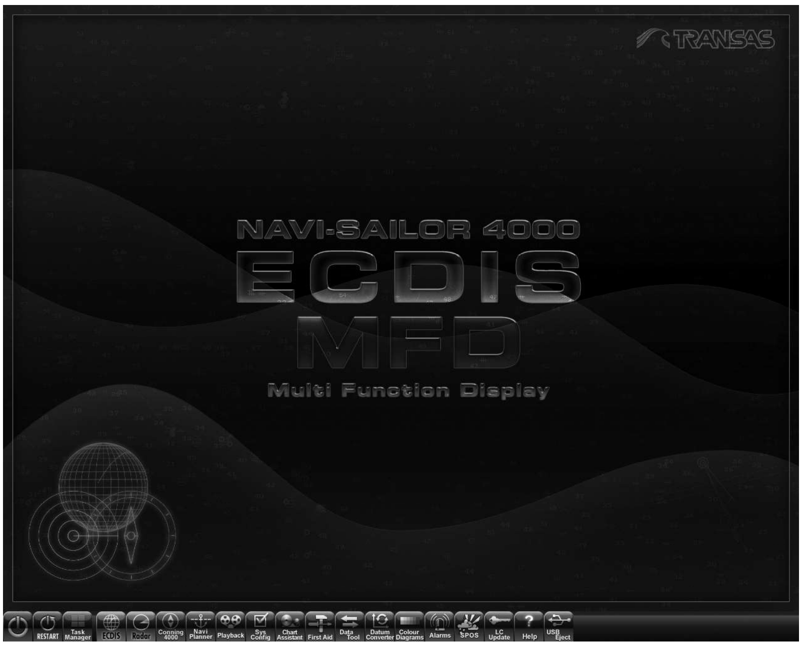
ACTIVATION OF TRANSAS INTEGRATOR

ATTENTION!

This procedure is performed for each WS.

Activate Transas Integrator by selecting the appropriate item in the START menu (START\PROGRAMS\MULTIFUNCTIONAL DISPLAY\ACTIVATE INTEGRATOR):

Upon computer restart, the Transas Integrator window will be opened:



Run all the tasks on the all the WS's and check their correct operation.

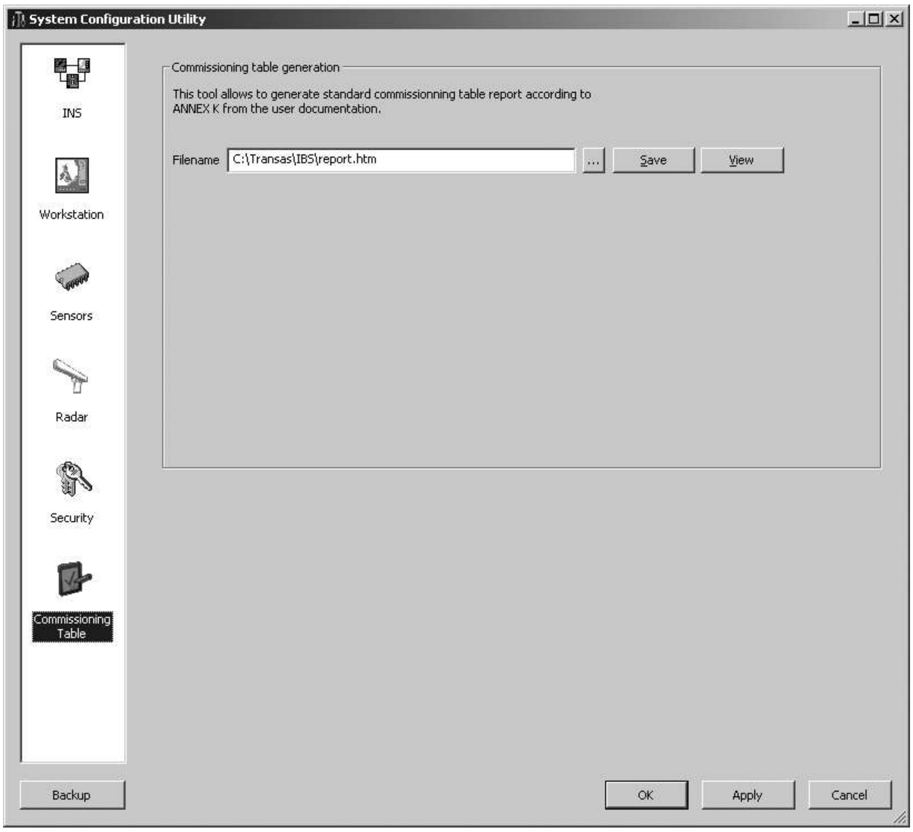
COMMISSIONING TABLE CREATION AND SYSTEM CONFIGURATION BACK UP

Restart all WS.

Press button for run System Configuration utility.

Commissioning Table Creation

Press **Commissioning Table** button:



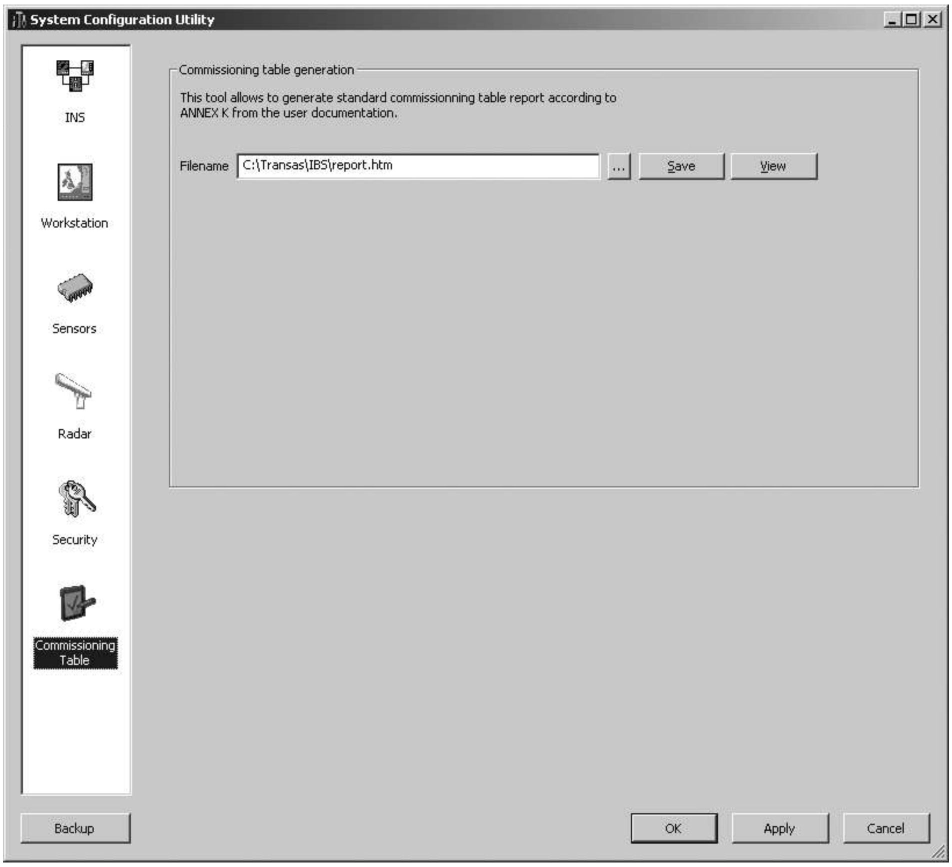
In **Filename** input field specify the path to Commissioning Table file (by default, *C:\Transas\IBS*).

Press “Save” button.

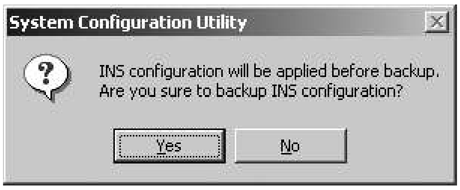
When the Commissioning Table is created, this should be done at each WS. Also, after each change of configuration (e.g., if a new GPS is connected) the Commissioning Table should be made anew at each WS.

When making up a Commissioning Table, it is necessary to remember that the BRG/Dist offset is only saved on that station, which RIB is installed on.

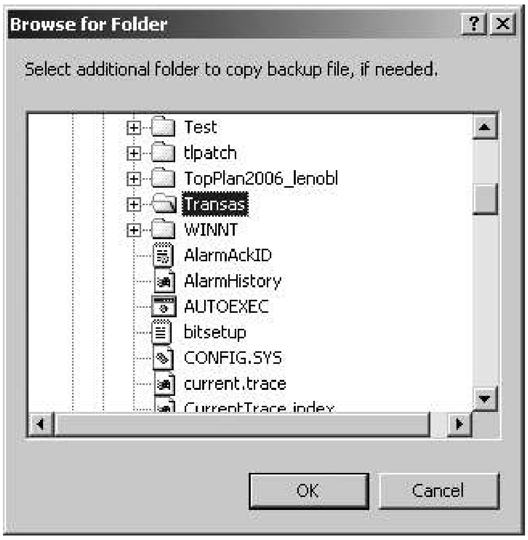
NS 4000 Configuration Back Up



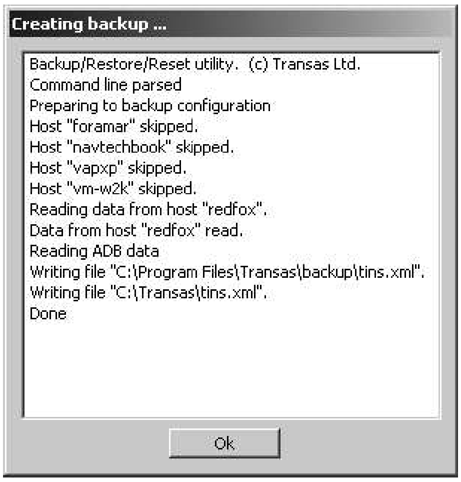
Press “Backup” button in the left bottom corner of the window.



Press “Yes” button.



Specify the path here backup the file will be stored, and press “OK” button.



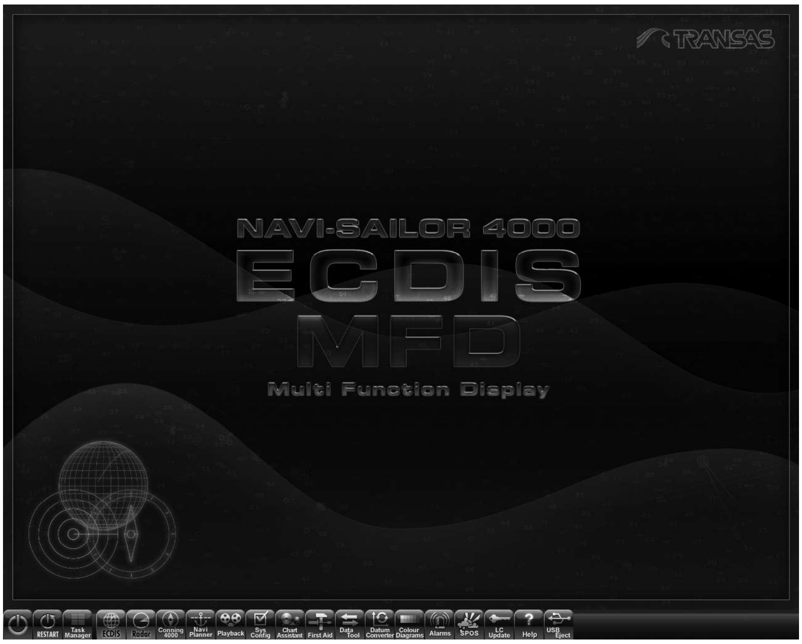
Press “OK” button.

Press “OK” button.

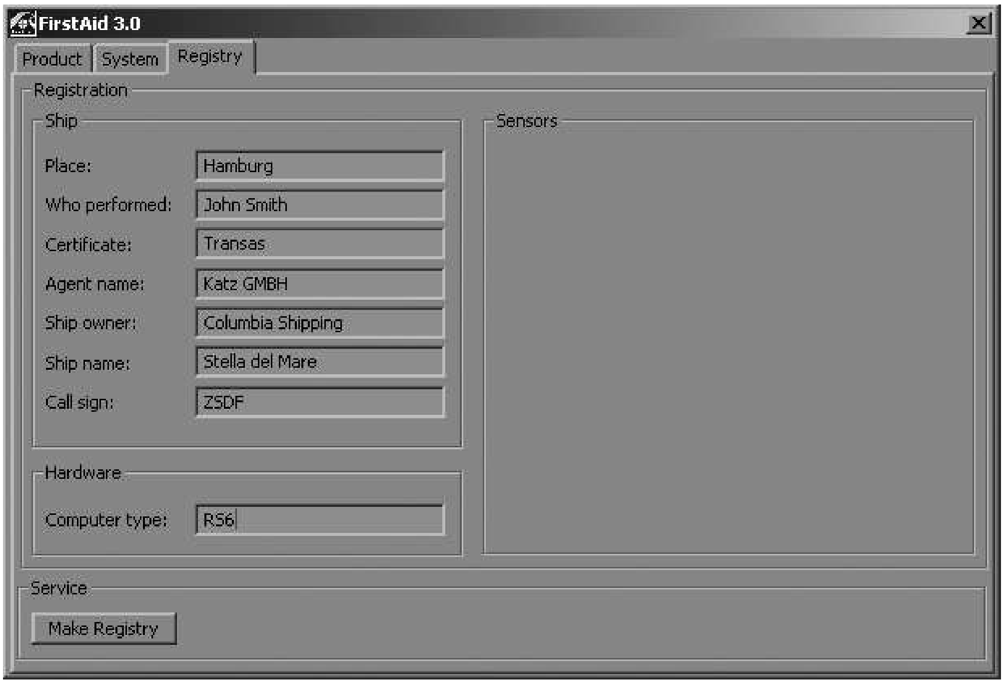
Note: The Navi-Conning configuration in the new product version is saved simultaneously with the NS 4000 configuration backup.

NS 4000 Registry

Press button for run First Aid utility.



Switch to “Registry” page:



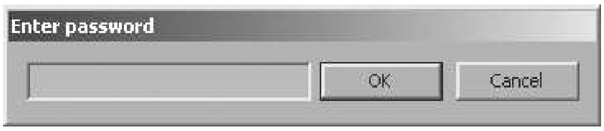
Fill in all the lines and press the **Make Registry** button.

SOFTWARE UPGRADE

Upgrade of Entire NS 4000 Product

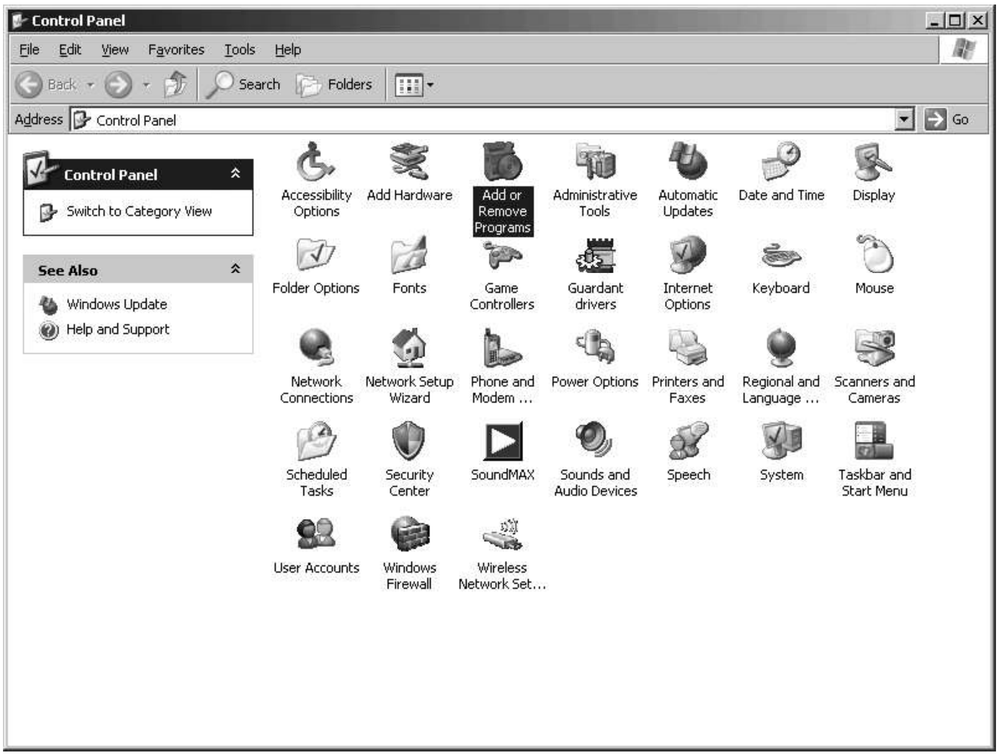
Perform the NS 4000 Configuration Backup procedure on one of the WS with RIB6 installed.

Deactivate Transas Integrator on each WS. To do this, press <Ctr>+<Alt>+<Shift>+<F8> keys.

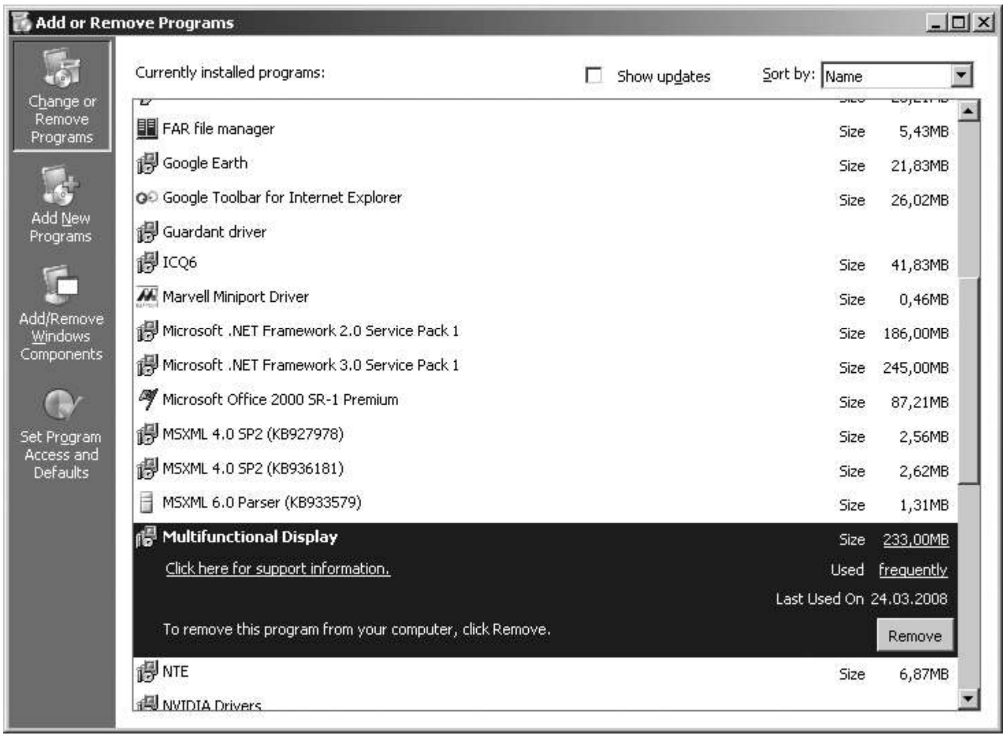


Enter password and press “OK” button, PC will be restarted.

Run to START\CONTROL PANEL. Click “Add or Remove Programs” icon:



Select “Multifunctional Display”.



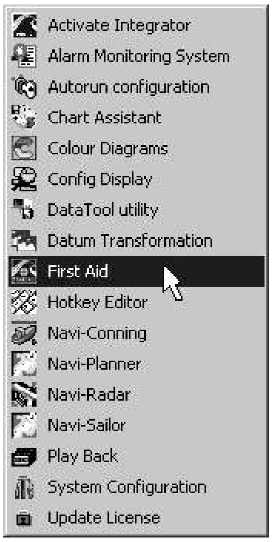
Press “Remove” button.

Press “Yes” button.

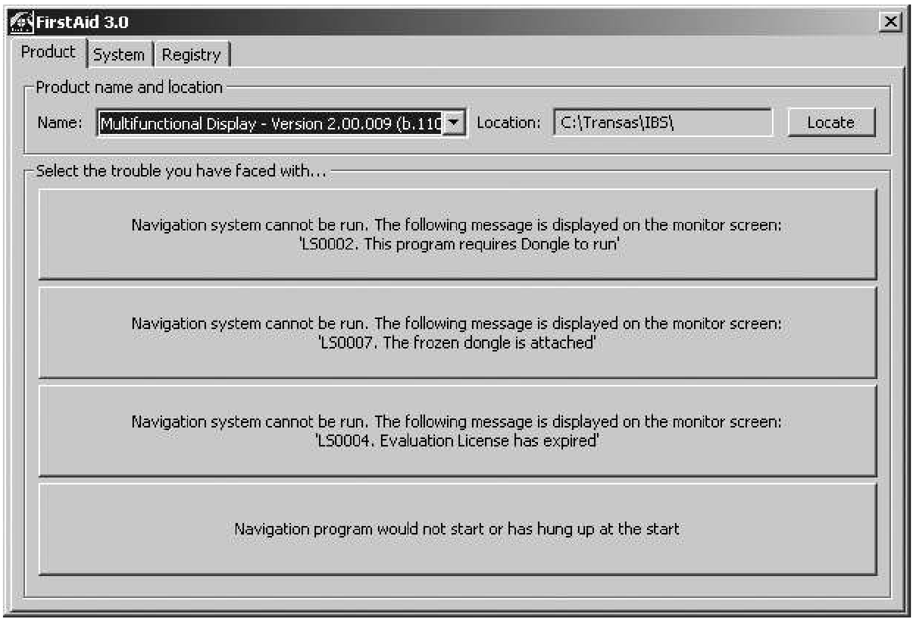
After program deinstallation, restart PC.

Install new version of NS 4000 (see section **Software Installation**, paragraph **Installation of NS 4000**).

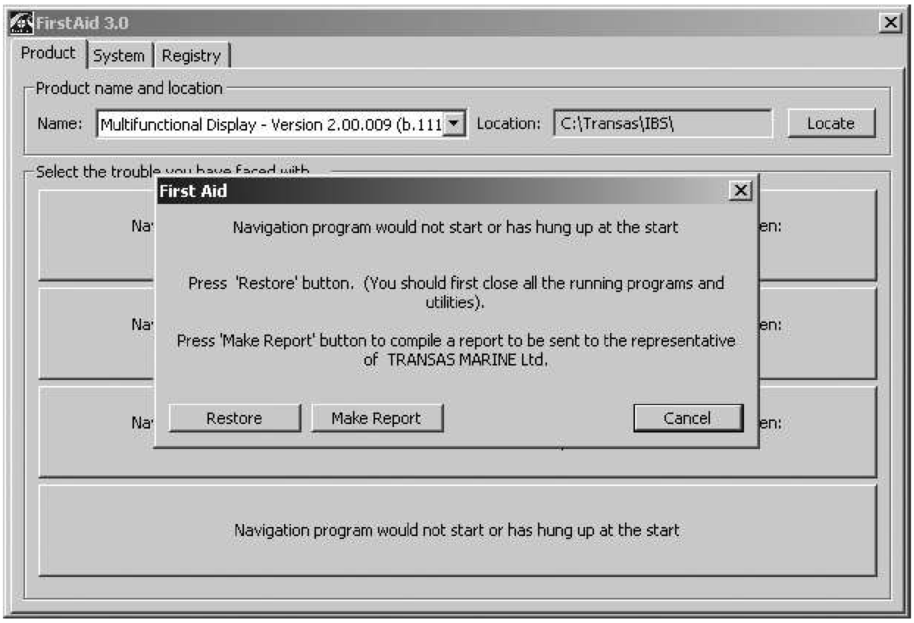
Run First Aid utility by selecting the appropriate item in the START menu (START\PROGRAMS\MULTIFUNCTIONAL DISPLAY\FIRST AID):



On “Product” page in **Name** drop-down list, press button and select product (if necessary).

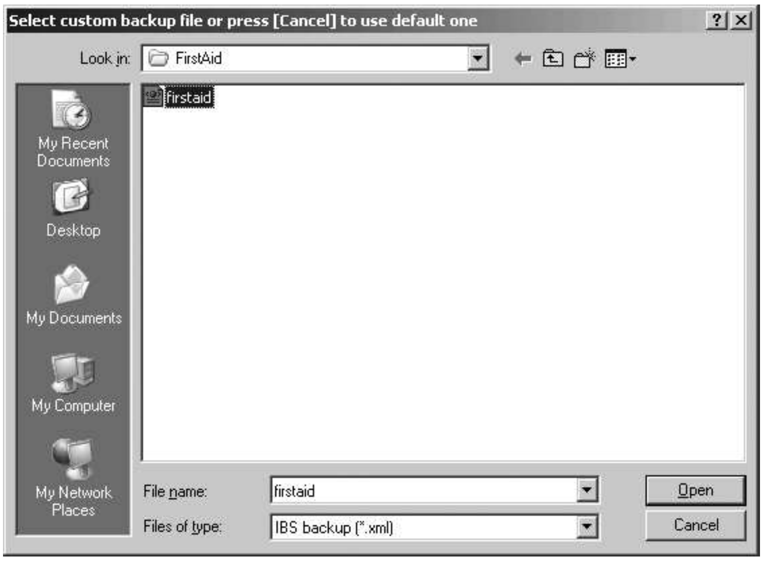


Press **Navigation program would not start or has hung up at the start** button:

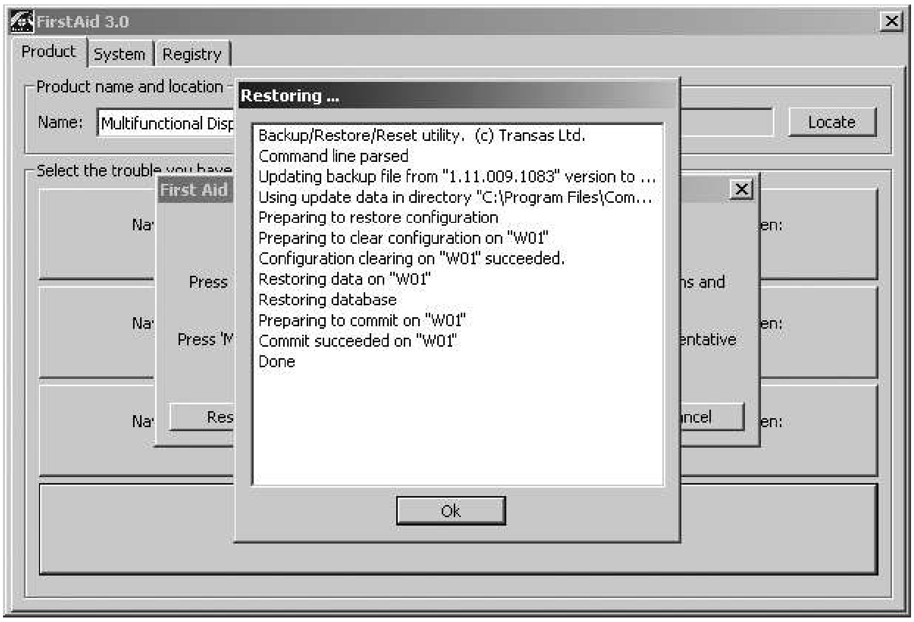


Press **Restore** button.

Press “Yes” button.



Specify the path to back up file and press “Open”.

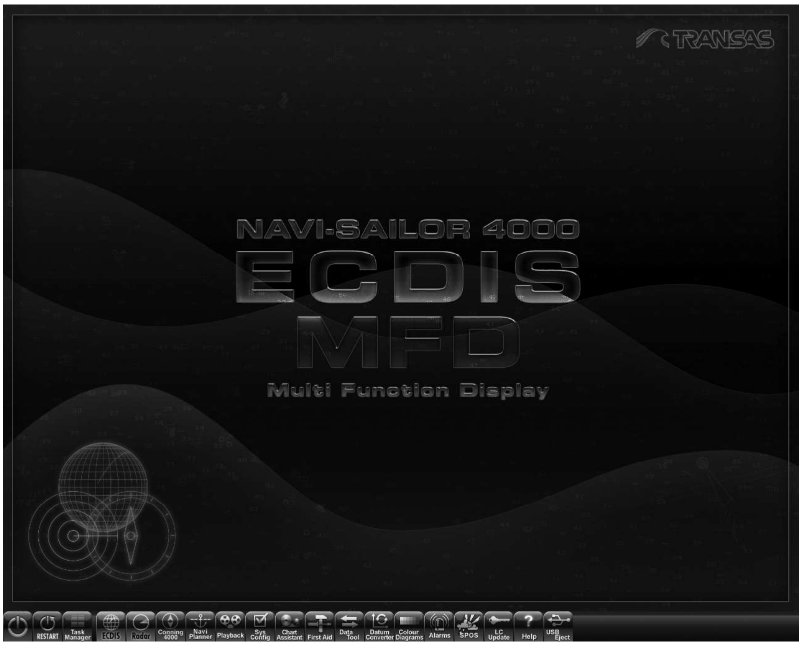


The configuration will be restored. Press “OK” button and close First Aid utility.

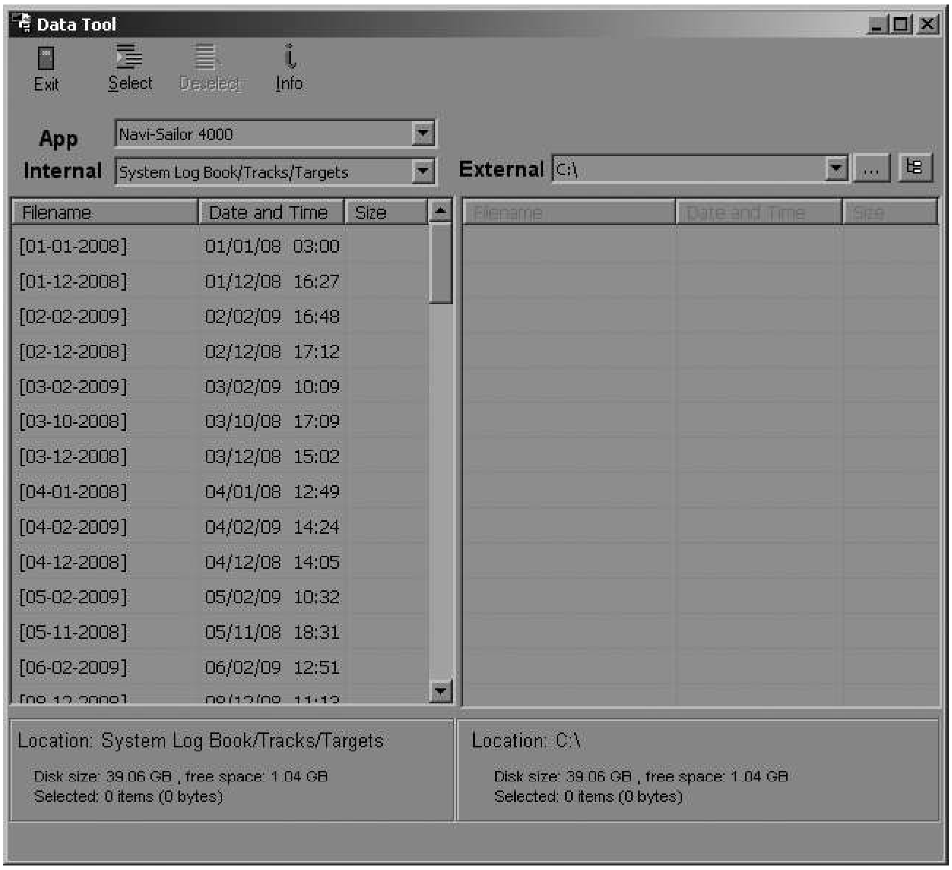
Activate Transas Integrator (see section **Activation of Transas Integrator**).

Upgrade Navi-Conning 4000

To start Data Tool utility press the button.



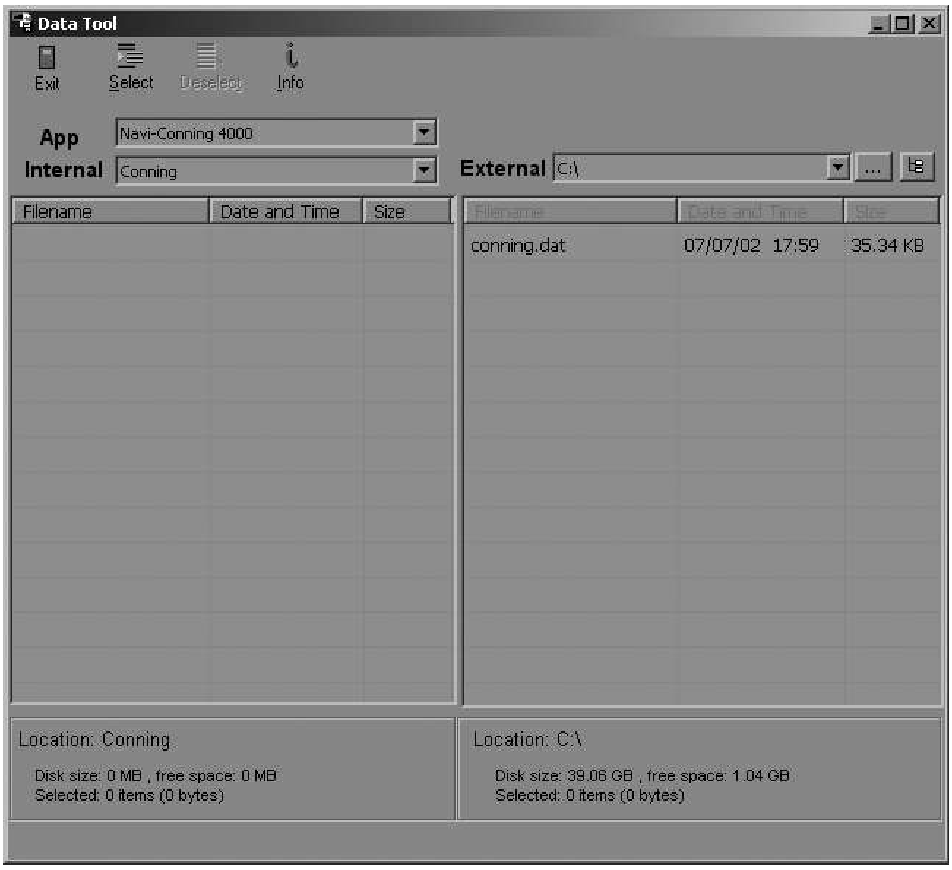
After the utility is run the screen displays a control window:



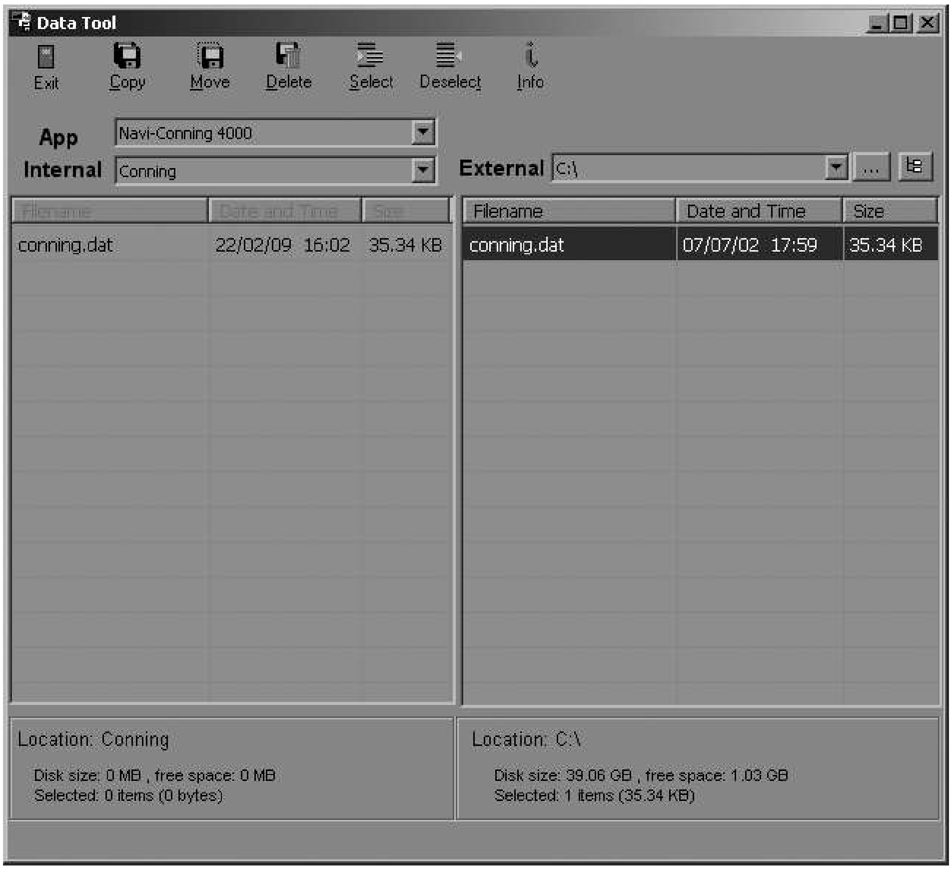
Select from the **App** drop-down list the Navi-Conning 4000 application.

Select from the **Internal** drop-down list the **Conning** group.

In **External** group press call button to the right of the window and specify the path to the folder with new configuration file `conning.dat`.



Press **Copy** button in the utility toolbar.



Exit from the Data Tool utility.

Restart Navi-Conning 4000.

CHAPTER 3

Technical Specification

GENERAL

NS 4000 Physical Layout

The purpose of the NS 4000 is to provide maximum to simplify and facilitate the officer in charge of the navigational watch (OOW), planning, monitoring, and control the voyage of a vessel.

Sensors and control systems are not the part of NS 4000 but just connected equipment with none or minimal modification in order to ensure proper integration.

More detailed block-diagrams, and also cable list and RS6 connectors layout see in **Annex G**. The technical specification at components of WS's, see in the section **NS 4000 ECDIS MFD Hardware Components**.

Integrating Equipment

Integrating Equipment includes two Ethernet switches Moxa EDS-305/308/316 series.

The technical specification at components of Integrating equipment, see in the section **NS 4000 Hardware Components**.

Detailed block-diagrams and connection diagrams on connection Integrating Equipment see in **Annex G**.

NS 4000 HARDWARE COMPONENTS

RS6 Dedicated Computer

General

The main hardware part of the NS 4000 system is the RS6 computer.

Dimensions and View of RS6 Computer

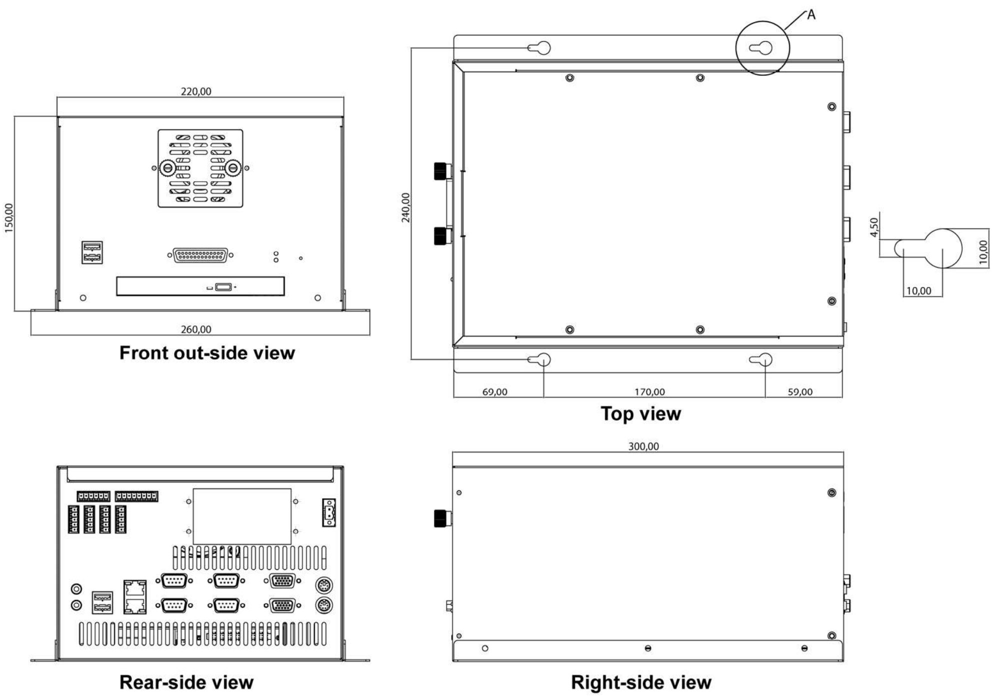


Fig. 34. RS6 dimensions

Fig. 35. View of RS6 front side

Fig. 36. View of RS6 rear side

RS6 Housing

- RS6 mountable chassis (shown on figures above);
- Cooling unit: Cooltek 80 x 80 x 25 mm 16 CFM fan;
- Indicators: LEDs for power and HDD activity;
- Buttons: system reset;
- Dimensions: 572 x 390 x 780 mm (W x H x L);
- Power Supply: 24V DC -10/+30%.

RS6 Computer Based on ICES200 Intel® Socket, Core TM Duo/Celeron M Processor COM Express Module

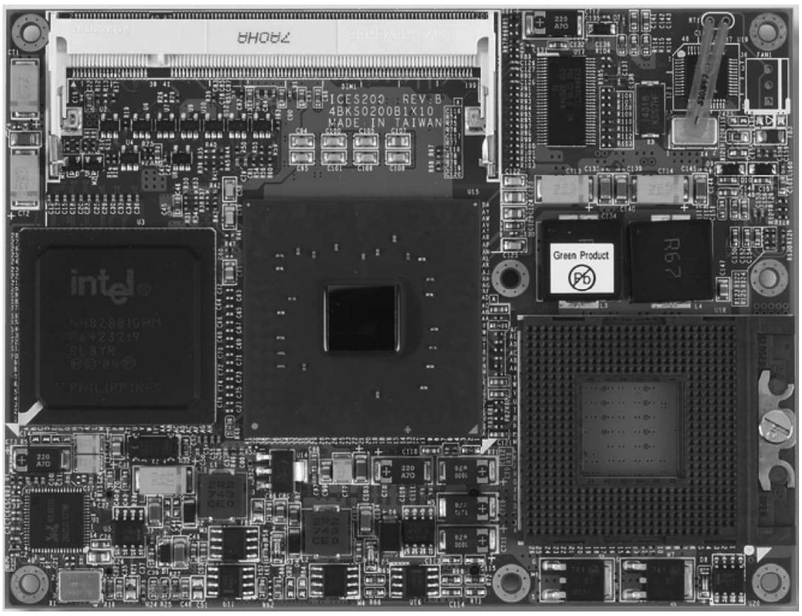


Fig. 37. View of ICES200 Module

ICES200 Features

The ICES 200 is a Type 2 COM Express Module featuring Intel® 945GME and ICH7M chipset, switch supports Intel® Core 2 Duo and Intel® Core 2 Duo LV processors with 533/667 MHz FSB and one DDR2 memory socket up to 2GB. The ICES 200 integrated with Intel® Graphics Media Accelerator (GMA950).

RS6 Technical Specifications

- CPU:
  - CPU1 Intel® Core™2 CPU T7400 2.16 GHz;
  - CPU2 Intel® Core™2 CPU T7400 2.16 GHz.
- Main Memory: 1 x DDR2 SO-DIMM 2 Gb;
- Chipset:
  - Intel 945GME;
  - ICH7M I/O Controller Hub.
- BIOS:
  - Award System BIOS;
  - Plug & Play support;
  - 4M bits Flash ROM.
- LAN: 2 x RJ45 (Gbit);
- Graphics:
  - NVIDIA GeForce 9600M GT (512 MB);
  - Resolution up to 2048 x 1536 @ 60 Hz, 1600 x 1200 @ 85 Hz.
- Audio:
  - Line In;
  - Line Out.
- Interfaces:
  - 1 x VGA1 (module 9600M GT);
  - 1 x VGA2 (GMA950);
  - 2 x USB 2.0 (front side);
  - 2 x USB 2.0 (rear side);
  - 2 x PS/2 (Keyboard/Mouse);
  - 1 x LPT;
  - 4 x RS232;
  - 4 x RS422/NMEA Input (Opto isolated);
  - 4 x Digital In (Opto isolated);
  - 4 x Digital Out (Opto isolated).
- Storage:
  - HDD Fujitsu MHV2080BH 80GB G2;
  - Device with removable storage: Optiarc CD-RW CRX880A.
- Environment conditions:
  - Operating temperatures: -15 to +55 ºC;
  - Storage temperatures: -20 to 70 ºC;
  - Relative humidity: Operating 10–95%, non-condensing.

Uninterruptible Power Supply Unit UPS6

General

This Uninterruptible Power Supply (UPS) is designed to prevent blackouts, brownouts, sags and surges from reaching computer with NS 4000. This UPS also filters out small utility line fluctuations and isolates equipment from large disturbances by internally disconnecting from the utility line, while supplying power from its internal batteries until the utility line returns to safe level.

UPS6 consists of following Phoenix modules:

- Low Frequency Filter;
- Primary-Switched Power Supply Unit QUINT-PS/1AC/24DC/20;
- Uninterruptible Power Supply Unit for Universal Use QUINT-DC-UPS/24DC/20;
- Battery Module 24 V DC, 3.4 Ah QUINT-BAT/24DC/3.4AH (7.2 or 12 AH).

QUINT-PS/1AC/24DC/20 Primary-Switched Power Supply with SFB Technology, 1 AC, Output Current 20 A

Description

QUINT POWER power supply units – highest system availability due to SFB technology.

Compact power supply units of the new QUINT POWER generation maximize the availability of your system. Even the standard power circuit-breakers can be tripped reliably and quickly with the SFB technology (Selective Fuse breaking Technology) and six times the nominal current for 12 ms. Defective current paths are is connected selectively, the defect is limited and the important system parts remain in operation. A comprehensive diagnostics is carried out by continuously monitoring the output voltage and current. This preventive function monitoring visualizes the critical operating modes and reports them to the control unit before an error occurs.

Features

- Quick tripping of standard power circuit breakers with dynamic SFB technology power reserve;
- Reliable starting of difficult loads with static POWER BOOST power reserve;
- Preventive function monitoring;
- Can be used worldwide;
- High degree of operational safety due to high MTBF > 500 000 h, long mains buffering times > 20 ms, high dielectric strength up to 300 V AC.

Ordering Data

- Product: Primary-switched power supply with SFB technology, 1 AC, output current 20 A;
- Type: QUINT-PS/1AC/24DC/20;
- Order No: 28668776.

Technical Data

- Input data:
  - Nominal input voltage range: 100...240 V AC;
  - Input voltage range: 85...264 V AC, 90...350 V DC;
  - Short-term input voltage: 300 V AC;
  - Frequency range: 45...65 Hz (0 Hz at DC input);
  - Current consumption: approx. 5.1 A (120 V AC) and 2.3 A (230 V AC);
  - Inrush current limitation < 20 A (typical);
  - Power failure bypass: > 20 ms (for 120 V AC) and > 20 ms (for 230 V AC);
  - Typical response time: < 0.5 s;
  - Protective circuit: transient surge protection varistor;
  - Input fuse, integrated: 12 A (slow-blow, internal);
  - Recommended backup fuse: circuit breaker 10 A or 16 A (characteristic B);
  - Discharge current to PE: < 3.5 mA;
  - Stripping length: 7 mm.
- Output data:
  - Nominal output voltage: 24 V DC ±1%;
  - Setting range for the output voltage: 18...29.5 V DC (>24 V constant capacity);
  - Output current: 20 A (-25...+70 ºC), 26 A (with POWER BOOST, < 40 ºC permanent), 120 A (with SFB technology, 12 ms);
  - Derating: from +60 ºC 2.5% per Kelvin;
  - Control deviation: < 1% (change in load, static 10% ... 90%), < 2% (change in load, dynamic 10% ... 90%), < 0.1% (change in input voltage ±10%);
  - Power loss nominal load max: 46 W;
  - Maximum power dissipation idling: 10 W;
  - Efficiency: > 93 % (for 230 V AC and nominal values);
  - Ascent time: < 0.5 ms;
  - Residual ripple: < 80 mVpp (with nominal values);
  - Connection in parallel: yes, for redundancy and increased capacity;
  - Connection in series: yes;
  - Surge protection against internal surge voltages: yes, limited to approx. 35 V DC;
  - Resistance to reverse feed: max. 35 V DC;
  - Stripping length: 7 mm.
- Signal output DC OK active:
  - Output description: Uout > 0.9 x Un: high signal;
  - Voltage: + 24 V DC;
  - Current: ≤ 1 A (short circuit resistant);
  - Status display: “DC OK” LED green/Uout < 0.9 x Un: LED flashing.

- Signal output DC OK floating:
  - Output description: relay contact, Uout > 0.9 x Un: contact closed;
  - Voltage: ≤ 30 V AC/DC;
  - Current: ≤ 1 A;
  - Status display: “DC OK” LED green/Uout < 0.9 x Un: LED flashing.
- Signal output POWER BOOST active:
  - Output description: Iout < In: high signal;
  - Voltage: + 24 V DC;
  - Current: ≤ 1 A (short circuit resistant);
  - Status display: LED “BOOST”, yellow/Iout > In: LED on.
- General Data:
  - Insulation voltage input/output: 4 kV AC (type test)/2 kV AC (routine test);
  - Insulation voltage input/PE: 3.5 kV AC (type test)/2 kV AC (routine test);
  - Insulation voltage output/PE: 500 V DC (routine test);
  - Mounting position: on horizontal NS 35 DIN rail according to EN 60715;
  - Degree of protection: IP20;
  - Protection class: I, with PE connection;
  - MTBF: > 500,000 h according to IEC 61709 (SN 29500);
  - Housing version: steel sheet, zinc-plated;
  - Weight: 1.7 kg;
  - Dimensions (width x height x depth) state of delivery: 90 x 130 x 125 mm;
  - Dimensions (width x height x depth) 90º tuned: 122 x 130 x 93 mm.
- Ambient conditions:
  - Ambient temperature (operation): -25 ... 70 ºC (> 60 ºC derating);
  - Ambient temperature (storage/transport): -40 ... 85 ºC;
  - Max. permissible relative humidity (operation): 95% (at 25 ºC, no condensation).

Dimensions

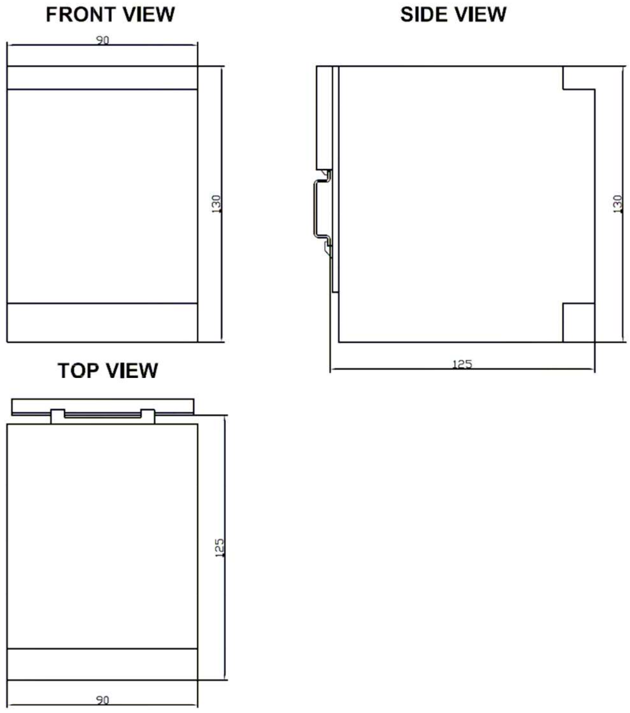


Fig. 38. Power Supply Unit QUINT PS/1AC/24DC/20 dimensional drawing

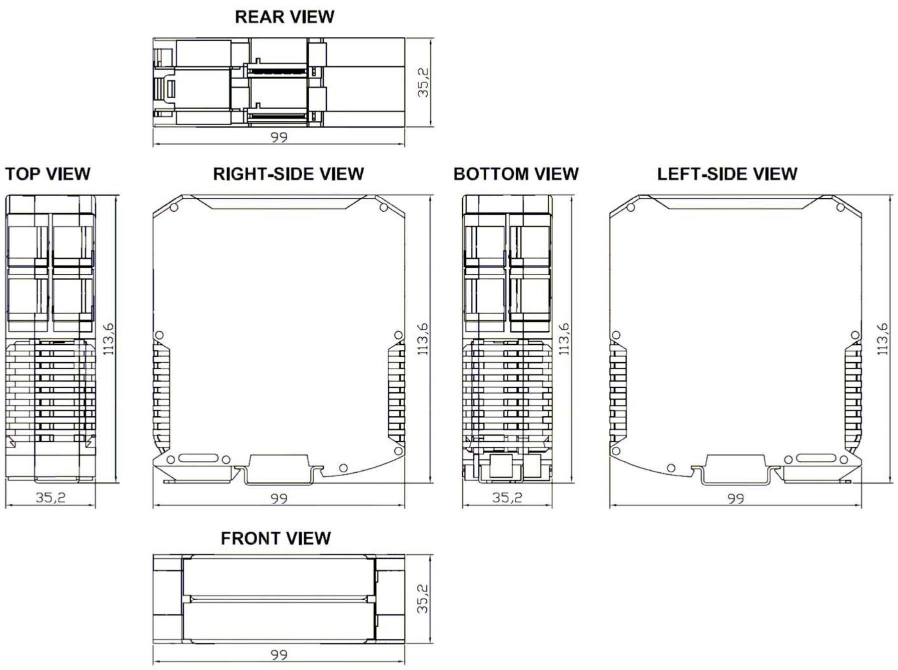


Fig. 39. EMC Filter dimensional drawing

Uninterruptible Power Supply Unit for Universal Use QUINT-DC-UPS/24DC/20

Description

Uninterruptible Power Supply Units for Buffering Long-Term Power Interruptions:

- Saves space thanks to the compact, uniform design;
- Integrated diode saves money through isolation of loads;
- Maximum system availability through optimum battery management and reliable signaling;
- Minimum installation time due to ready-to-use plug-in bridges and integrated timeout.

QUINT-DC-UPS uninterruptible power supply units with long-life lead-acid batteries provide long buffer times at high currents. Even in the event of a longer supply voltage failure, the units ensure that all connected devices continue to operate without interruption.

The devices have a narrow and uniform design, which makes them ideal for use on the DIN rail where space is limited. In addition, short wiring paths ensure order and clarity in the control cabinet.

The high level of availability and the particularly long service life of the battery modules are achieved through professional battery management. An automatic presence check (every minute), automatic quality test (once a week), temperature-determined charging, and electronic over current protection ensure the battery modules are ready to operate at all times. Power is therefore available in the event of an error and the service life of the battery module is maximized.

The actual state must be determined quickly so that the right decision can be made in an emergency. Optimum signaling is thus required for maximum system availability. Three floating PDT contacts and three LEDs are provided for function monitoring, which indicate all the operating states clearly.

So that relay signaling is more reliable and more durable than before, an additional positive supply output has been provided. The contact, which is current-limited and resistant to continued short circuits, is located next to the relay connections and enables easy bridging. In the event of wiring errors, the shortcircuit protection prevents any welding of the relay contacts. This ensures that the user can rely on an OK signal. Even in the event of connection errors, currents remain below 100 mA, which prevents damage to the relay contacts.

A system is switched off after a specific time that can be set on the device or by an external signal.

No additional installation is required for shutdown. In addition, ready-to-use plug-in bridges minimize the installation time.

The connected devices can be divided into buffered and unbuffered loads using the isolated input. This extends the buffer time, which depends on the output current. If only critical devices are protected using fuses, smaller battery modules can be used that save money and space in the control cabinet. In addition, the isolated input protects the connected devices against errors in the internal network.

Ordering Data

- Product: Uninterruptible power supply unit;
- Type: QUINT-DC-UPS/24DC/20;
- Order No: 2866239.

Technical Data

- Input data:
  - Nominal input voltage: 24 V DC;
  - Input voltage range: 22.5–30 V DC;
  - Current consumption (no load/charging/maximum): 0.1 A/2.0 A/22.0 A;
  - Switching threshold: U_a < 22 V; dynamic U_{in} – 1 V/0.1 s;
  - Buffer time (can be configured): 0.5; 1; 2; 3; 5; 10; 15; 20; 30; continuous;
  - Input fuse: internal, 25 A;
  - Maximum power dissipation (ready/buffer mode): 15 W/20 W.
- Output data: Can be connected in parallel (battery module): yes, to increase the buffer time.
- Output data in normal operation:
  - Nominal output voltage: 24 V DC;
  - Output voltage: U_{in};
  - Output current: 20 A;
  - Current limit: None;
  - Overload fuse: Internal, 25 A.
- Output data in buffer mode:
  - Nominal output voltage: 24 V DC;
  - Output voltage (maximum): 27.9 V DC;
  - Output current: 20 A;
  - Current limit: 27 A;
  - Overload fuse: electronic;
  - Level of efficiency (typical): 95%;
  - Remote shutdown: yes.
- Charging:
  - Charge characteristic curve: I/U characteristic curve;
  - End-of-charge voltage: temperature compensated;
  - Charge current: < 2.5 A;
  - Battery presence check/time interval: 60 seconds;
  - Battery quality test/time interval: 180 hours.
- Memory medium: external:
  - Nominal voltage: 24 V DC;
  - Nominal capacity: 3.4 Ah, 7.2 Ah, 12 Ah;
  - Charge current: < 2.5 A.
- Signaling:
  - Power In OK: green LED;
  - Alarm: red LED, floating PDT, 30 V AC/DC, maximum; 1 A, maximum;
  - Battery mode: yellow LED, floating PDT, 30 V AC/DC, maximum; 1 A, maximum;
  - Battery charge: yellow LED, flashing, floating PDT, 30 V AC/DC, maximum; 1 A, maximum.

- General data:
  - Insulation voltage (Input/output to housing): 1 kV AC type test/1 kV AC routine test;
  - Mounting position: on a horizontal 35 mm (1.378 in.) DIN rail EN 60715;
  - Degree of protection: IP20;
  - Class of protection: II;
  - MTBF According to IEC 1709 (SN 29 500): > 500,000 h;
  - Housing version: AluNox (AlMg1), closed;
  - Dimensions (W x H x D) default upon delivery: 66 x 130 x 125 mm;
  - Dimensions (W x H x D) rotated 90º: 122 x 130 x 69 mm;
  - Weight (approximately): 0.8 kg.
- Ambient conditions:
  - Ambient temperature (operation): -25 ºC ... 70 ºC (> 60 ºC derating);
  - Ambient temperature (storage/transport): -40 ºC ... 85 ºC;
  - Max. permissible relative humidity (operation): 95% (at 25 ºC, no condensation).

Dimensions

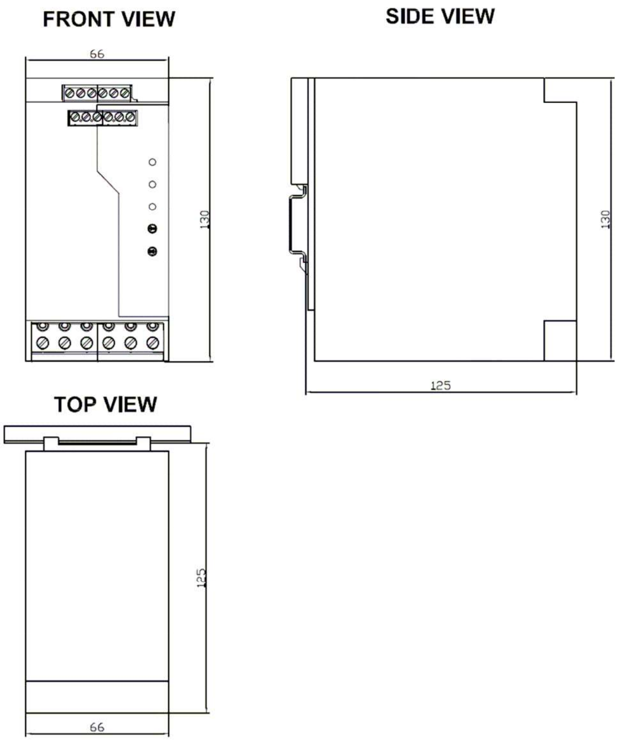


Fig. 40. Uninterruptible Power Supply Unit

QUINT-DC-UPS/24DC/20 dimensional drawing

Battery Modules 24 V DC

- Ordering Data:
  - Product: Battery Module 24 v DC, 3.4 Ah;
  - Type: QUINT-BAT/24DC/3.4AH;
  - Order No: 2866349.

Technical Data

Technical data of Battery modules presented in the table below:

Table 13. Battery modules technical specification

Technical data/Type	QUINT-BAT/24DC/3.4AH	QUINT-BAT/24DC/7.2AH	QUINT-BAT/24DC/12AH
Order No.	28 66 34 9	28 66 35 2	28 66 36 5
Nominal voltage	24 V DC	24 V DC	24 V DC
Nominal capacity	3,4 Ah	7,2 Ah	12Ah
Max. charging current	0,8 A	1,8 A	3,0 A
End-of-charge voltage (at 20 ºC)	27,6 V	27,6 V	27,6 V
Buffer period	20 A/4,5 min. 25 A/3 min	20 A/10 min. 40 A/4,5 min	20 A/22,5 min. 40 A/9 min
Nominal output current, max	25 A	50 A	50 A
Output fuse, internal	25 A	2 x 25 A	2 x 25 A
Connection in parallel, to increase the buffer time	Yes		
Degree of protection/Protection class	IP20/III		
Service life (years)	6 (20 ºC)		
Housing	Galvanized sheet steel		
Dimensions (W x H x D) mm	112 x 145 x 123	164 x 156 x 123	231 x 156 x 123
Weight approx.	3,54 kg	6 kg	9 kg
Rechargeable battery type	Panasonic UP-RW1220P1	Panasonic LC-R127R2PG	Panasonic LC-RA1212PG

Dimensions

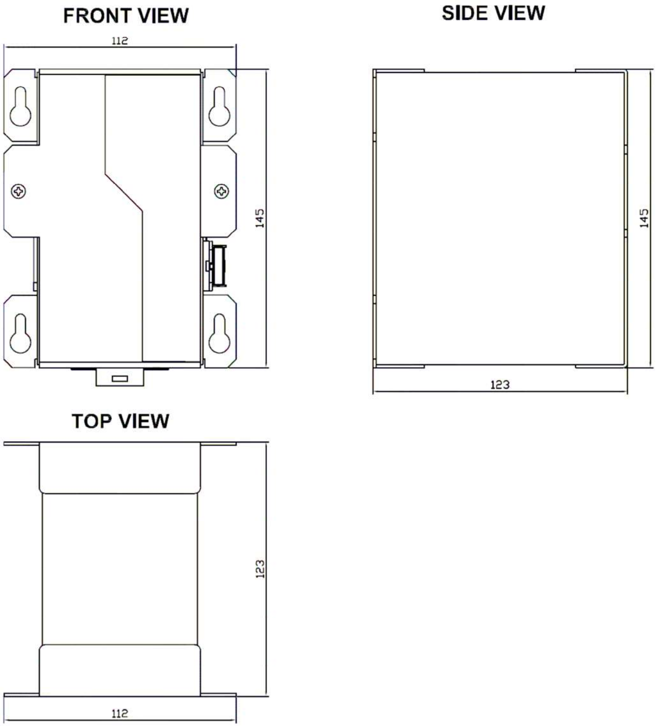


Fig. 41. QUINT-BAT/24DC/3.4AH battery dimensional drawing

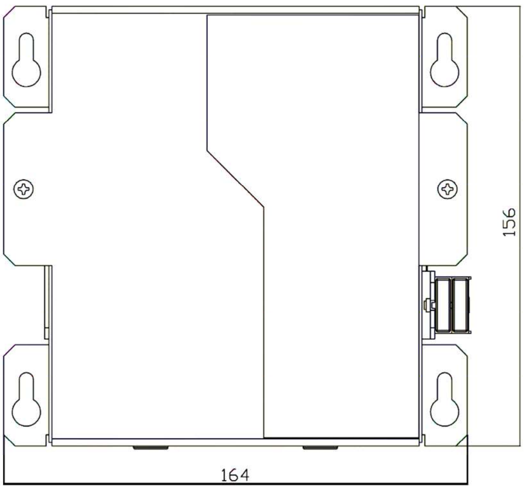


Fig. 42. QUINT-BAT/24DC/7.2AH battery dimensional drawing

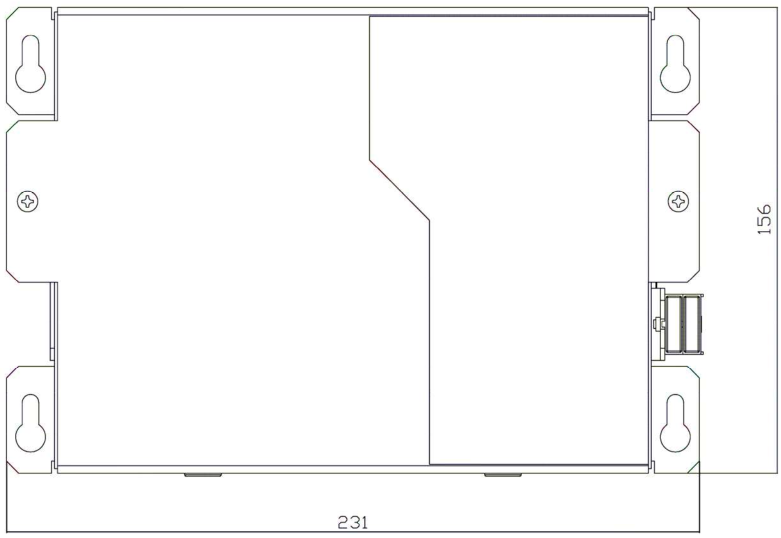


Fig. 43. QUINT-BAT/24DC/12AH battery dimensional drawing

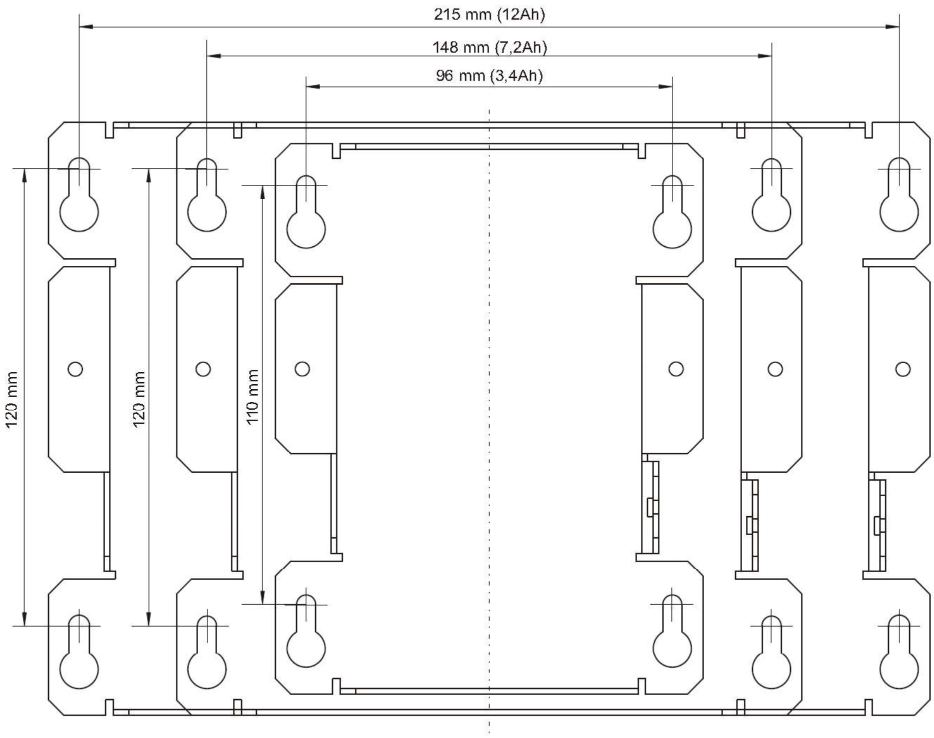


Fig. 44. Battery modules mounting brackets dimensional drawing

Transas ES6 Dedicated Keyboard with Trackball

General

- ES6 keyboard with Trackball (the ES6 in what follows) is a control unit inside the Transas systems;
- The ES6 consists of:
  – The PC compatible keyboard unit with two fields (QWERTY- and function-keys);
  – Separate trackball unit with trackball, two left buttons (one on each side of the Trackball), one right button and an optional scroll wheel.
- Dimensions remain unchanged (ES3 and ES4);
- Power supply 24VDC (-10/ +30% according to IEC 60945);
- Possibility to connect external KBD and pointing device via CAN-bus interface;
- Possibility to connect external pointing device via PS/2 interface;
- Possibility to connect to PC via USB interface by means of a built in USB hub;
- RS232 interface is compatible with ES3.

Keyboard Unit Overview

The keyboard unit is made up of basically four parts:

- Plastic front part with holes for keys, indicators and rotational controls e.g. Rain, Gain, Dimmer;
- Silicon rubber keypad with contact pads for the QWERTY-keys;
- Printed circuit board with LEDs for background light and indicators, tactile switches for function keys, rotary encoders, control electronics and connectors;
- Plastic back cover.

Keyboard QWERTY-Field

The keys are designed (looks and feel) and placed in a way to resemble a standard English-American laptop keyboard.

All keys are backlit with orange/yellow LEDs (Light Emitting Diodes). The keys are printed with a “hiding-effect“, i.e. the key legends are normally invisible when not lit. The QWERTY-field is normally not lit, when a key is pressed the backlight is switched on and this first key press is not sent to the PC. When no key of the QWERTY-field is pressed for more than 30 seconds the backlight will be switched off.

Keyboard Function Field

All function keys have a tactile switch on the PCB to give a distinct “click” feeling.

The tracking keys are printed with a “hiding-effect“, i.e. the key legends are normally invisible when not lit. They are lit only when the tracking function is active.

Fig. 45. View of ES6 keyboard

Functional Keys

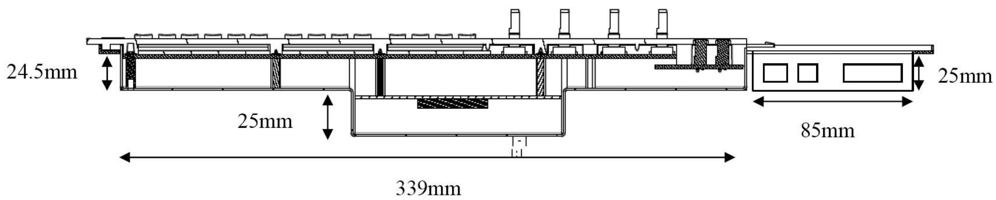
Table 14. ES6 Functional keys

N/N	ES6 key/control	Function	Comment
1	ECDIS	To turn on the ECDIS task	
2	RADAR	To turn on the RADAR task	
3	CONNING	To turn on the CONNING task	
4	AUX	Not used	
5	TX/STBY	Not used	
6	SHOW RADAR	To backlight the radar picture on the screen	For ECDIS task as you press this button and keep it depressed: • To turn on the overlay; • Transparency value – 0; • Chart Base display. For RADAR task as you press this button and keep it depressed: • Display of ARPA and AIS targets is turned off; • Turns off CHARTS and MAPS. Display of chart information is switched to “Gray transparency” colour palette; • Display of “Radar Rings” is turned off. As the button is released, the system returns to the initial display mode
7	SHOW CHART	To select chart information	For ECDIS task as you press this button and keep it depressed: • Transparency value – 3; • No targets are displayed; • No tides or currents are displayed; • No Add Info objects are displayed. For RADAR task as you press this button and keep it depressed, contours of chart objects are backlighted. As the button is released, the system returns to the initial display mode

N/N	ES6 key/control	Function	Comment
8	ALL LAYERS	To turn on display of all the possible chart information layers	
9	OVERLAY	To turn on/off the Overlay mode	
10	DAY/NT	To switch successively colour palettes	• Daylight; • Twilight; • Dusk; • Night; • Dusk inverted; • Night inverted
11	AHEAD	To turn on the Navigation mode	For RADAR task also: • In Relative Motion: To switch to a new stabilisation course value; • In True Motion: To set the ship symbol to the initial state on the Plan Position Indicator
12	TGT	To turn on/off display of ARPA and AIS targets on NS screen	
13	MOB	To turn on the Man Overboard alarm mode	
14	EVENT	To make an instant position recording in the electronic log	
15	ST. DISP	To turn on presentation of the Primary Chart Information Set	
16	N/H/C UP	To switch successively to North UP/Heading UP/Course UP motion mode	• North Up; • Head Up; • Course Up
17	TM/RM	To switch between True Motion and Relative Motion modes	
18	EBL 1 2	To adjust the electronic bearing line value EBL1 and EBL2. A press on this switches the control between EBL1 and EBL2	EBL1 is displayed in the form of a solid light blue coloured line originating from the centre of the own ship mark. EBL2 is displayed on the PPI as dashed light blue coloured line. By default, the direction of EBL is set at 0º
19	EBL ON/OFF	To turn on/off EBL	
20	VRM 1 2	To adjust the variable range marker value VRM1 and VRM 2 A press on this switches the control between VRM1 и VRM2	VRM1 is displayed in the form of a solid light blue coloured ring with centred on the own ship mark centre. VRM2 is displayed as dashed light blue coloured ring. By default, VRM1 radius is set to 0.25 mile
21	VRM ON/OFF	To turn on/off VRM	
22	TRACK	To turn on the Track Control mode	
23	Qtrack	To turn on the mode for creating a temporary route (Quick Track)	
24	STOP	To turn off the Track Control mode	
25	ZOOM OUT	To reduce the chart display scale in the ECDIS task. To reduce the radar picture scale by one value with a single press in the RADAR task	
26	ZOOM IN	To increase the chart display scale in the ECDIS task. To increase the radar picture scale by one value with a single press in the RADAR task	

N/N	ES6 key/control	Function	Comment
27	ALARM	To display and acknowledge alarms	Each press on the button acknowledges successively active alarms in NS system. The indicator can assume the following values depending on the alarm status: • The button is highlighted in red, flashing red indicator – active unacknowledged alarm; • The button is highlighted in red – active acknowledged alarm; • The button is not highlighted in red – no active alarms
28	DIM	To control the keybords's backlighting	The illumination intensity is controlled by using Dimmer
29	GAIN	To adjust the video signal gain level	
30	SEA	To adjust the sea clutter suppressions	
31	RAIN	To adjust the rain clutter suppressions	

Dimensions



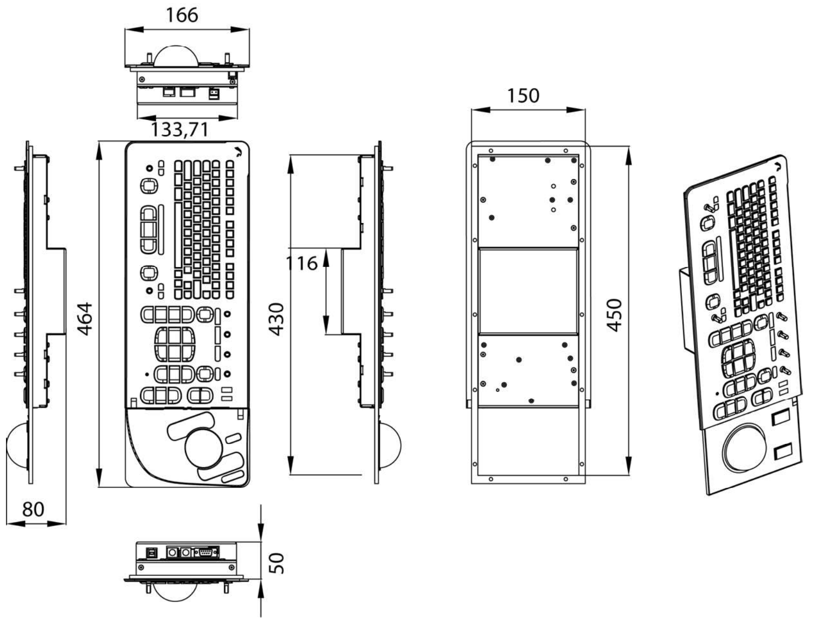


Fig. 46. Transas ES6 dedicated keyboard dimensional drawing

Transas Monitors

Jakob Hatteland LCD Maritime Multi Displays (MMD)

General

As a dedicated part of systems Transas Marine Ltd uses Industrial Colour Monitors manufactured for Transas by Jakob Hatteland Display AS. The following types of monitors are used:

- 19" TFT Hatteland JH19T14 MMD Series 1, ref no: JH19T14MMD-D(A)A1-AOAA;
- 23" TFT Hatteland JH23T12 MMD, Series 1 ref no: JH23T12MMD-D(A)A1-AAAA;
- 19" TFT Hatteland JH19T02 MMD, Series 1 ref. no: JH19T02MMD-E1/JH19T02-E2;
- 23" TFT Hatteland JH23T02 MMD, Series 1 ref. no: JH23T02MMD-E1/JH23T02-E2;
- 19" TFT Hatteland HD19T03 MMD, Series 2 ref. no: HD19T03BOAA+HDMMD01-A02. (HD19T03BOAA – Display module; HDMMD01-A02 – Backpack module).

Features

Hatteland Display’s marine monitors are based on high quality and state-of-art components with the highest specifications, and meet all requirements for harsh maritime use. These color displays are industrialized versions of a high quality Sharp and Fujitsu TFT based display with MVA Premium technology. The MMD allows you to display professional applications with clarity and enhanced color and image quality, VGA STD input, Video input and PIP (Picture in Picture) functions. The display provides you with automatic compatibility with multiple upgrading platforms and a vast array of graphic standards allowing resolution upgrades without upgrading the display.

The key features for the Maritime Multi Display Series 2 range are optically bonded, modular backpacks, slimmest design possible, PIP) functionality, easy operation with either the IP22 1-button user controls + USB connector in front.

Products HD19T03, JH19T14 and JH23T12 Specification

Table 15. Jakob Hatteland LCD Maritime Multi Displays HD19T03, JH19T14 and JH23T12 Characteristics

	19" TFT Hatteland HD19T03 MMD	**19" TFT Hatteland JH19T14 MMD**	**23" TFT Hatteland JH23T12 MMD**
TECHNICAL DESCRIPTION			
TFT Characteristics			
TFT Technology	Color Active Matrix LCD Module MVA Premium Technology (TFT) Thin Film Transistor (TFT)		
TFT size	19 inch viewable image size		23.1 inch viewable image size
Pixel number	1280 x 1024	1280 x 1024	1600 x 1200
Pixel pitch (RGB)	0.294 (H) x 0.294 (V) mm	0.294 (H) x 0.294 (V) mm	0.294 (H) x 0.294 (V) mm
Response Time	12 ms (typical) black to white to black	12 ms (typical), “black” to “white”	10 ms (typical), “black” to “white”
Contrast Ratio	600:1 (typical)	900:1 (typical)	500:1 (typical)
Light Intensity	450 cd/m^2 (typical)	300 cd/m^2 (typical)	250 cd/m^2 (typical)
Viewable Angle	+/- 89 deg. (typical) (Up/Down/Left/Right)	+/- 85 deg. (typical) (Up/Down/Left/Right)	+/- 85 deg. (typical) (Up/Down/Left/Right)
Active Display Area	376.32 (H) x 301.056 (V) mm	376.32 (H) x 301.056 (V) mm	470.4 (H) x 352.8 (V) mm
Max Colors	16.7 millions	16.7 millions	16.7 millions

	19" TFT Hatteland HD19T03 MMD	**19" TFT Hatteland JH19T14 MMD**	**23" TFT Hatteland JH23T12 MMD**
Synchronization			
Sync Signal	• Digital separate synchronization; • Composite synchronization; • Synchronization on green; • Interlaced and non interlaced		
	• Auto detect VGA -> UXGA	Auto detect VGA -> SXGA	
Synchronization Range			
• Horizontal	31,5 kHz to 80 kHz	31,5 kHz to 91,1 kHz	
• Vertical	60 Hz[*] to 87 Hz	60 Hz[*] to 85 Hz	
Supported Signal Inputs			
Resolutions			
• VGA	640 x 480 (including 640 x 350)		
• SVGA	800 x 600 (including 720 x 400)		
• XGA	1024 x 768		
• SXGA	1280 x 1024[**]		
• UXGA	1600 x 1200		1600 x 1200[**]
Video Signals	• Interlaced NTSC and PAL/SECAM video; • Composite video		
Power Specifications			
Power Supply option	115&230VAC – 50/60 Hz + 24 VDC		
Power Consumption	Operating: 66 W (max)	Operating: 100 W (max)	
MECHANICAL DESCRIPTION			
Physical Considerations			
Physical Dimensions	416 (W) x 372 (H) x 75 (D) mm	483 (W) x 444 (H) x 82 (D) mm	584 (W) x 534 (H) x 85 (D) mm
Weight	9.0 kg (approx)	11.5 kg (approx w/bracket)	20 kg (approx w/bracket)
Signal Terminals			
DVI-I Signal In	1 x 24p DVI-I (or as RGB IN with adapter)	1 x 29p DVI Female (or as RGB IN with adapter)	
RGB Signal In	15p HD-SUB (female)		
RGB Signal Out		15p HD-SUB (female) – Clone of RGB IN	
Comp. Video IN	1xRCA Phono (female)		
S-Video IN	1xSVHS S-VIDEO (female)		
HATTELAND I/O		1 x 160p D-SUB (female) – Also see table below	
USB IN	1xUSB TYPE A (for loopthrough)		
USB OUT	1xUSB TYPE A (for loopthrough)	1 x TYPE B Connector (female)	
AC power IN	1 x Std IEC Inlet		
AC power OUT		1 x Std IEC Outlet	
DC power IN	1xScrew Terminals	1 x 2p D-SUB Connector (male) – Amphenol FCC17	

[*] Recommended for optimum picture quality.

[**] Recommended for optimum picture quality (60 Hz only).

	19" TFT Hatteland HD19T03 MMD	19" TFT Hatteland JH19T14 MMD	23" TFT Hatteland JH23T12 MMD
Available Options/Accessories			
COM2	1 x D-SUB 9P (female)		
Bracket	• HD VESA 19TBR-A1 – VESA bracket for complete unit; • HD 19TBR CMB-A1 – Console Mounting Bracket for complete unit	JH MMD BR	JH 23TBR T01-A1
Rotary Bracket		JH MMDROSTD-A1	
User Controls			
On front bezel	Power On/Off and On Screen Display Menu (push button).		
	Brightness control (up/down – push buttons).		
		Hotkeys (left/right - push buttons).	
	Mode status Red/Green Illuminated LED-Ring Indicator		
Environmental Considerations			
Operating	Temperature -15 ºC to +55 ºC. Humidity 30% to 90% (non condensing)		
Storage	Temperature -20 ºC to +60 ºC. Humidity 10% to 90% (non condensing)		
Safety Considerations	Even although the test conditions for bridge units provide for a maximum operating temperature of 55 ºC, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25 ºC. This is a necessary prerequisite for a long life and low service costs		

HD19T03, JH19T14 and JH23T12 MMD Dimensions

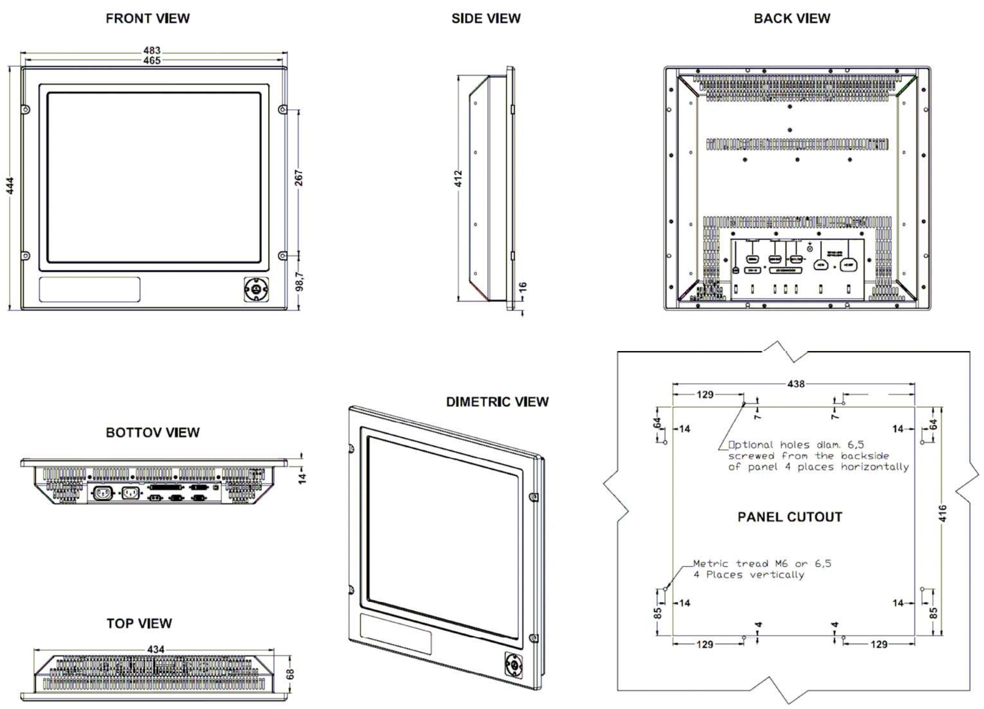


Fig. 47. 19" TFT Hatteland JH19T14 MMD. Standard View

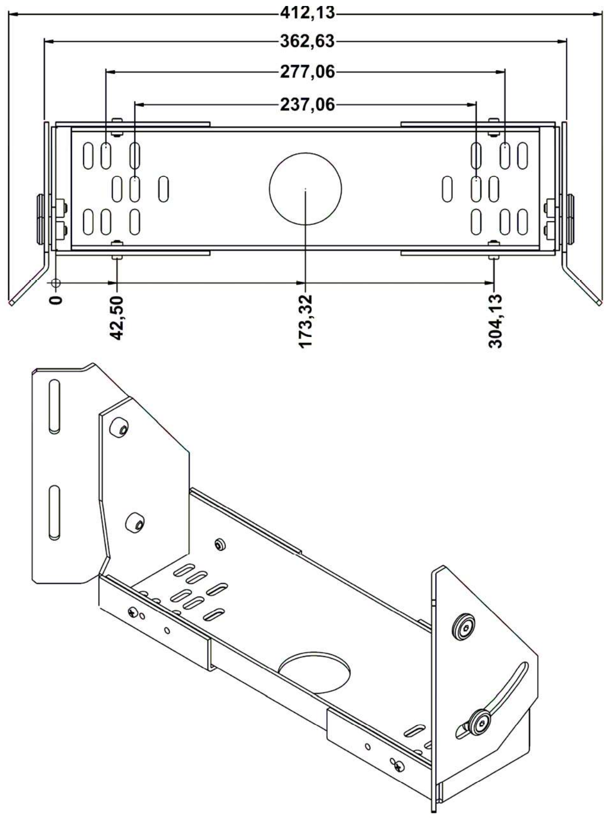


Fig. 48. 19'' TFT Hatteland JH19T14 MMD. Bracket View

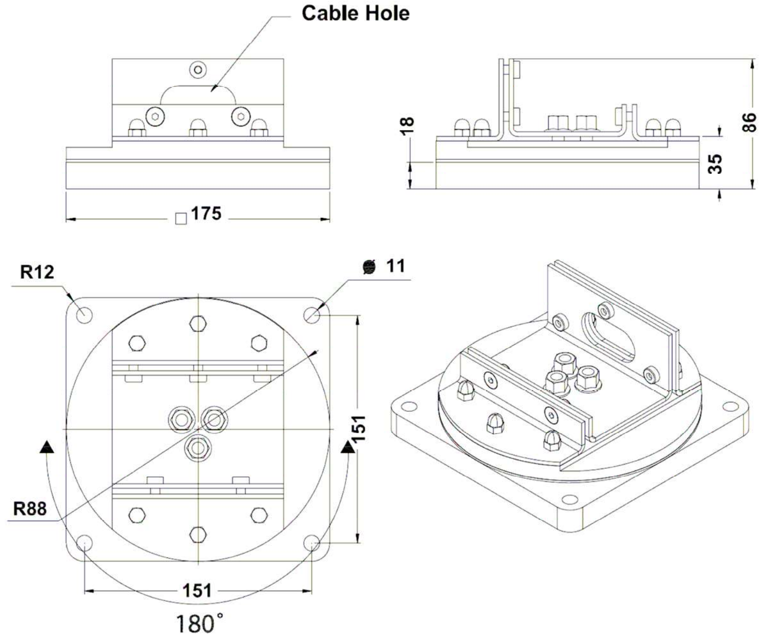


Fig. 49. 19''/23" TFT Hatteland JH19T14/JH23T12 MMD. Rotary Bracket View

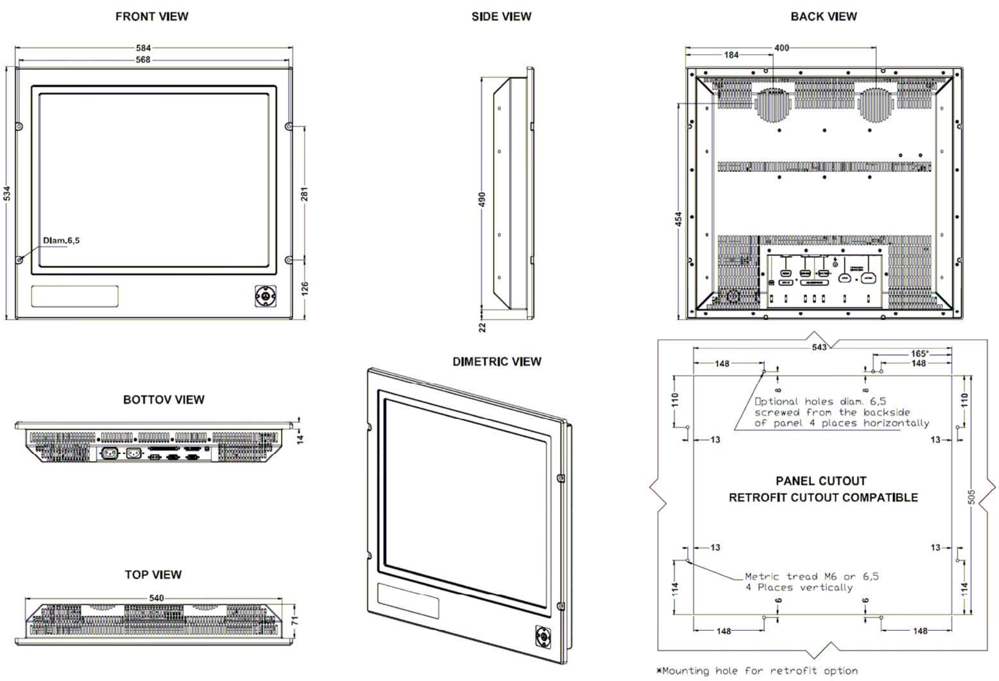


Fig. 50. 23'' TFT Hatteland JH23T12 MMD. Standard View

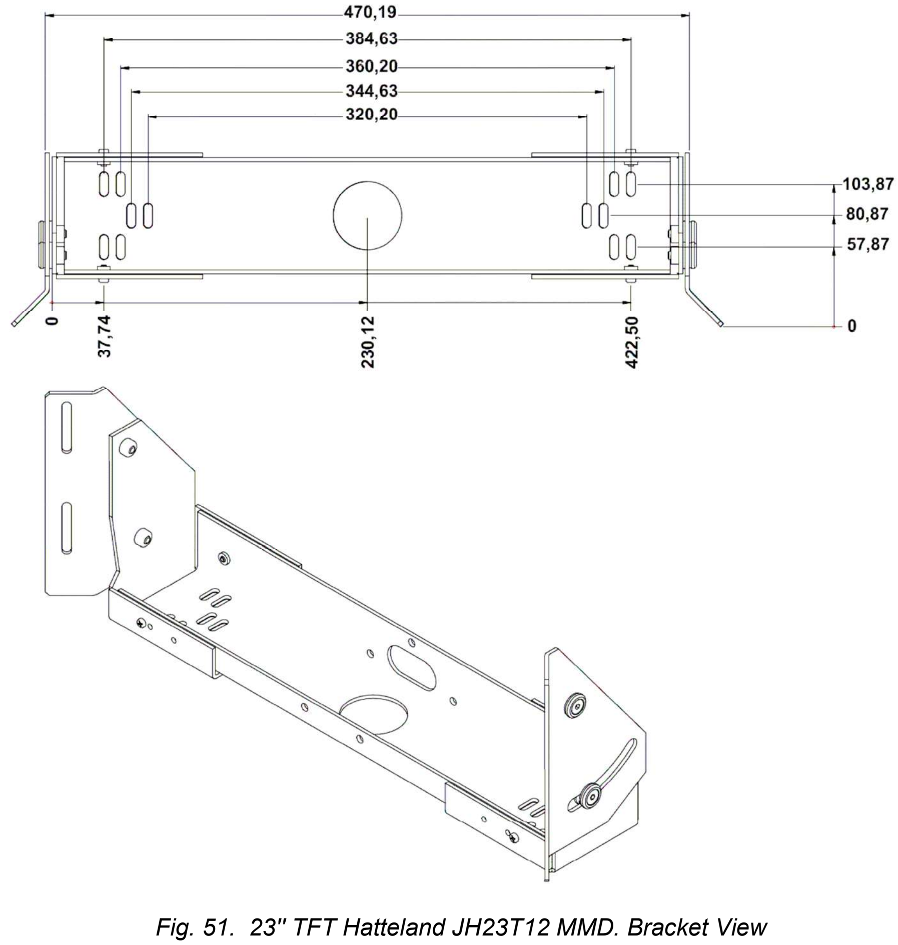


Fig. 51. 23'' TFT Hatteland JH23T12 MMD. Bracket View

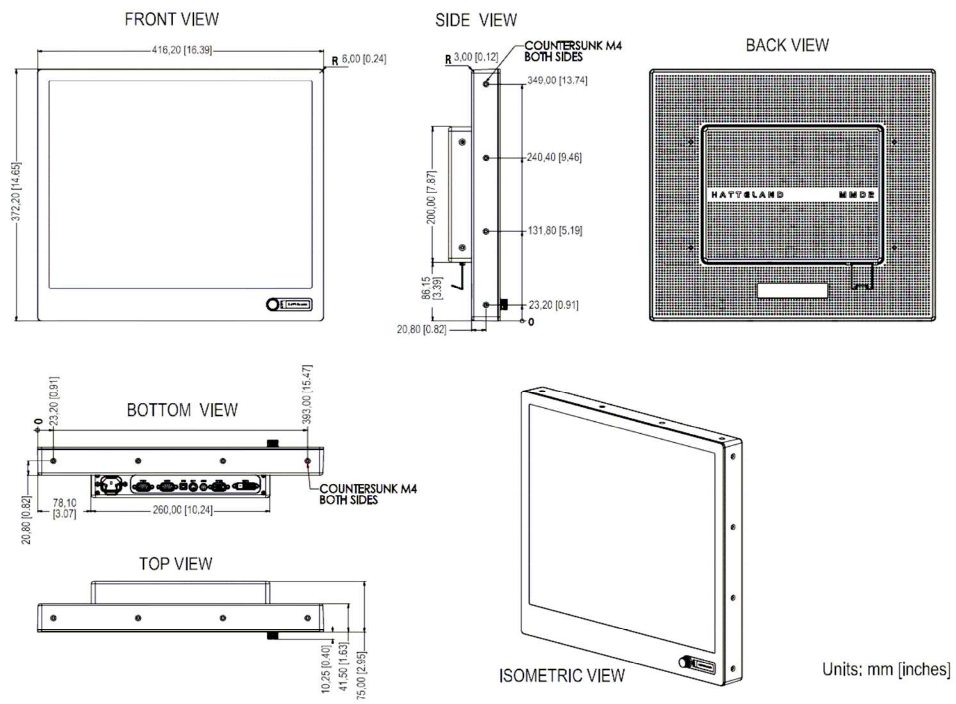


Fig. 52. 19'' TFT Hatteland HD19T03 MMD. Standard View

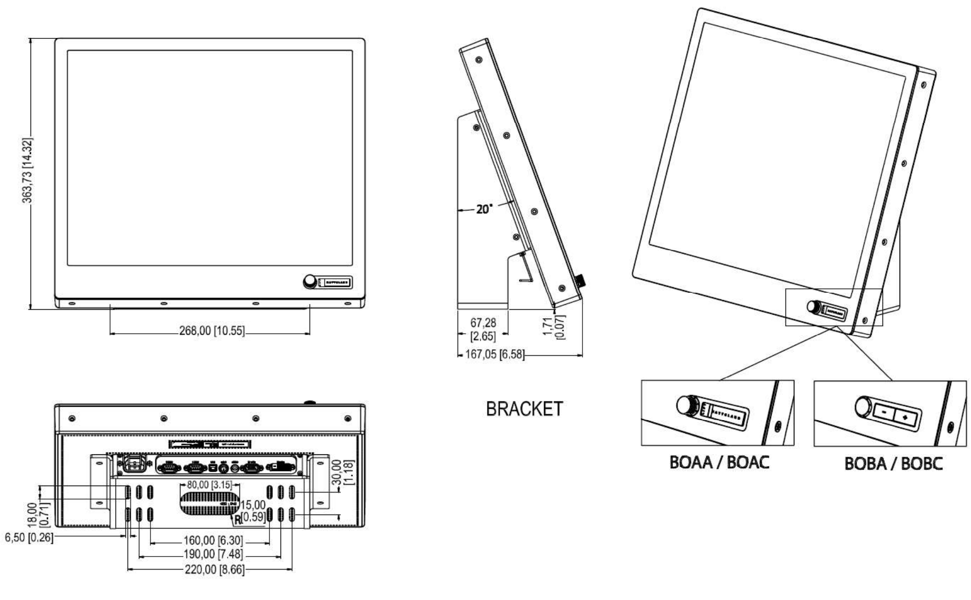


Fig. 53. 19'' TFT Hatteland HD19T03 MMD Bracket View

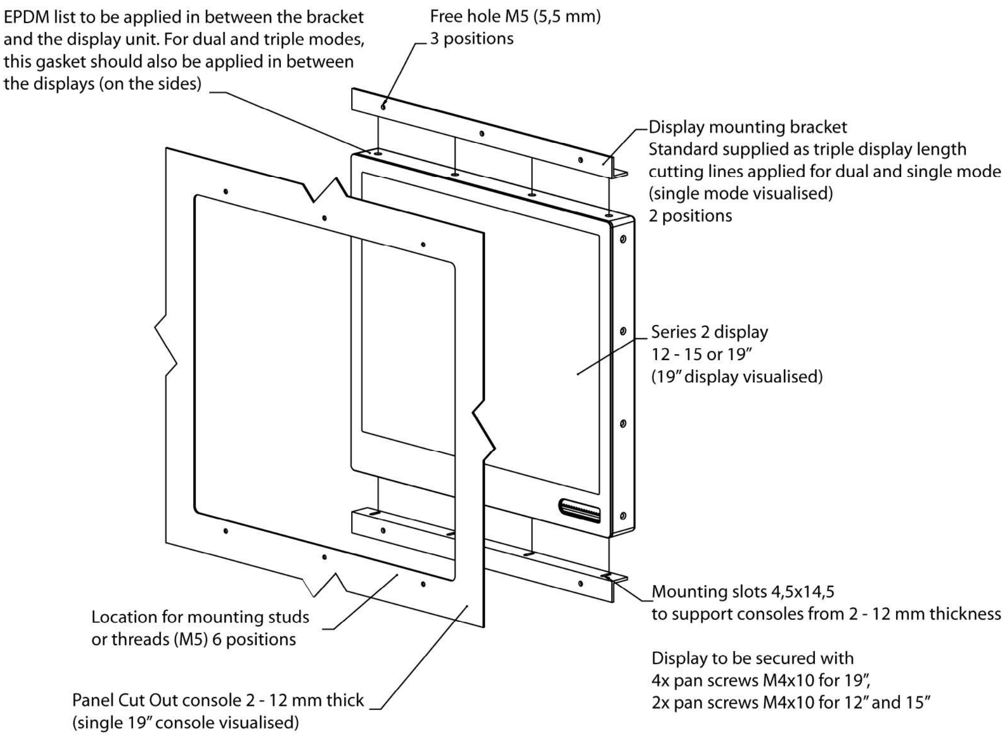


Fig. 54. 19'' TFT Hatteland HD19T03 MMD Console Bracket View

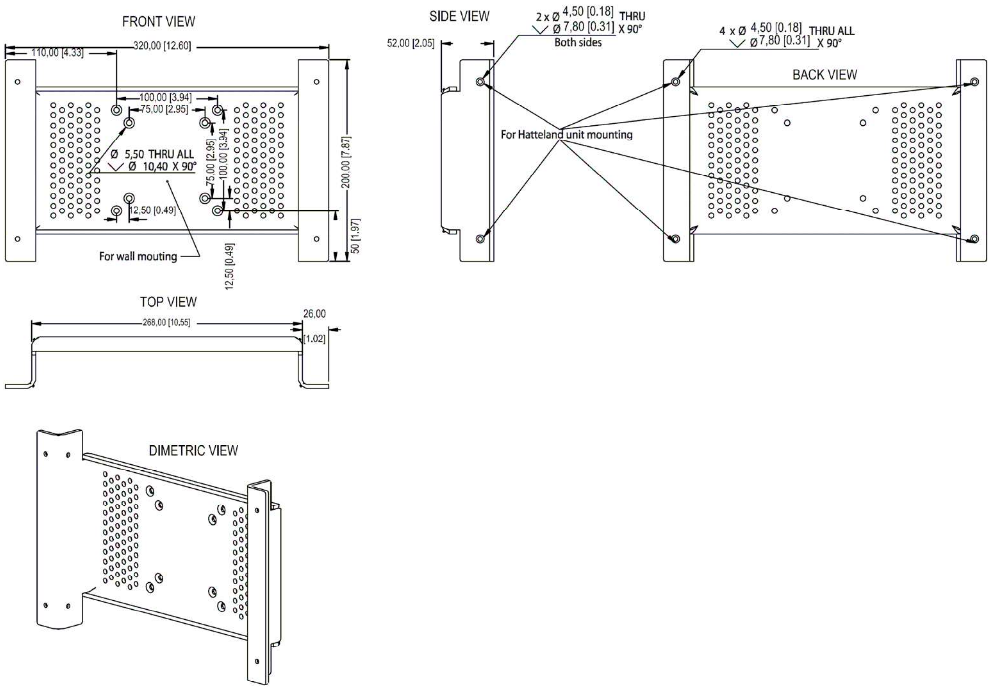


Fig. 55. 19'' TFT Hatteland HD19T03 MMD Vesa Bracket View

Products JH19T02 and JH23T02 Specification

Table 16. Jakob Hatteland LCD Maritime Multi Displays JH19T02 and JH23T02 Characteristics

	19" TFT Hatteland JH 19 T02 MMD E1/E2	**23" TFT Hatteland JH 23 T02 MMD E1/E2**
TECHNICAL DESCRIPTION		
TFT Technology	19.0 inch viewable image size Active Matrix Thin Film Transistor (TFT) MVA Premium technology	23.1 inch viewable image size Thin Film Transistor (TFT) MVA Premium technology
TFT Characteristics		
Pixel number	1280 x 1024	1600 x 1200
Pixel pitch (RGB)	0.294 (H) x 0.294 (V) mm	0.294 (H) x 0.294 (V) mm
Response Time	15 ms (typical), “black” to “white”	20 ms (typical), “black” to “white”
Contrast Ratio	600:1 (typical)	
Light Intensity	250 cd/m^2 (typical)	
Viewable Angle	+/- 80 deg. (typical) (Up/Down/Left/Right)	+/- 85 deg. (typical) (Up/Down/Left/Right)
Active Display Area	376.32 (H) x 302.056 (V) mm	470.4 (H) x 352.8 (V) mm
Max Colors	262.144 (depending on graphic card)	16.777.26 (depending on graphic card)
Video Signal	Analog RGB 0,7 Vp-p. Input Impedance 75 Ohm	
Synchronization		
Sync Signal	• Digital separate synchronization; • Composite synchronization; • Synchronization on green; • Auto detect VGA -> SXGA, interlaced and non interlaced	
Synchronization Range		
• Horizontal	31,5 to 91,1 kHz	31,5 to 106,259 kHz
• Vertical	60 to 85 Hz	
Supported Signal Inputs		
Resolutions:		
• VGA	640 x 480 (including 640 x 350)	
• SVGA	800 x 600 (including 720 x 400)	
• XGA	1024 x 768	
• SXGA	1280 x 1024	
• UXGA		1600 x 1200
Video Signals:	• Interlaced NTSC and PAL/SECAM video; • Composite video; • S-Video; • Component video (YCrCb)	
Power Specifications		
Power supply option	115VAC/60Hz & 230VAC/50Hz for E1 series and 24 VDC for E2 series	
Power Consumption	Operating: 40 W (max)	Operating: 100 W (max)
MECHANICAL DESCRIPTION		
Physical Dimensions	483 (W) 444 (H) 68 (D)	584 (W) 534 (H) 72 (D)
Weight	14 kg (approx w/bracket)	17 kg (approx w/bracket)
Input Signal Terminal		
RGB (PC) signal	15 pin mini D-SUB (female)	
Composite Video	RCA Phono plug	
S-Video signal	S-Video (SVHS) plug	
AC power signal	Std IEC Inlet	

	19" TFT Hatteland JH 19 T02 MMD E1/E2	23" TFT Hatteland JH 23 T02 MMD E1/E2
Accessories		
Touch screen	1 x D-SUB 9P Connector (female)	
Remote Control	2 x D-SUB 9P Connector (female)	
User Controls		
On front bezel	• Power On/Off (push button); • Brightness control; • 2 x hotkeys; • Mode status LED	
Behind hatch	On Screen Display control (OSD/OSM)	
Environmental Considerations		
Operating	Temperature of -15 ºC to +55 ºC. Humidity 30% to 90% (non condensing)	
Storage	Temperature of -20 ºC to +60 ºC. Humidity 10% to 90% (non condensing)	
Safety Conside-rations	Even although the test conditions for bridge units provide for a maximum operating temperature of 55 ºC, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25 ºC. This is a necessary prerequisite for a long life and low service costs	

JH19T02 and JH23T02 MMD Dimensions

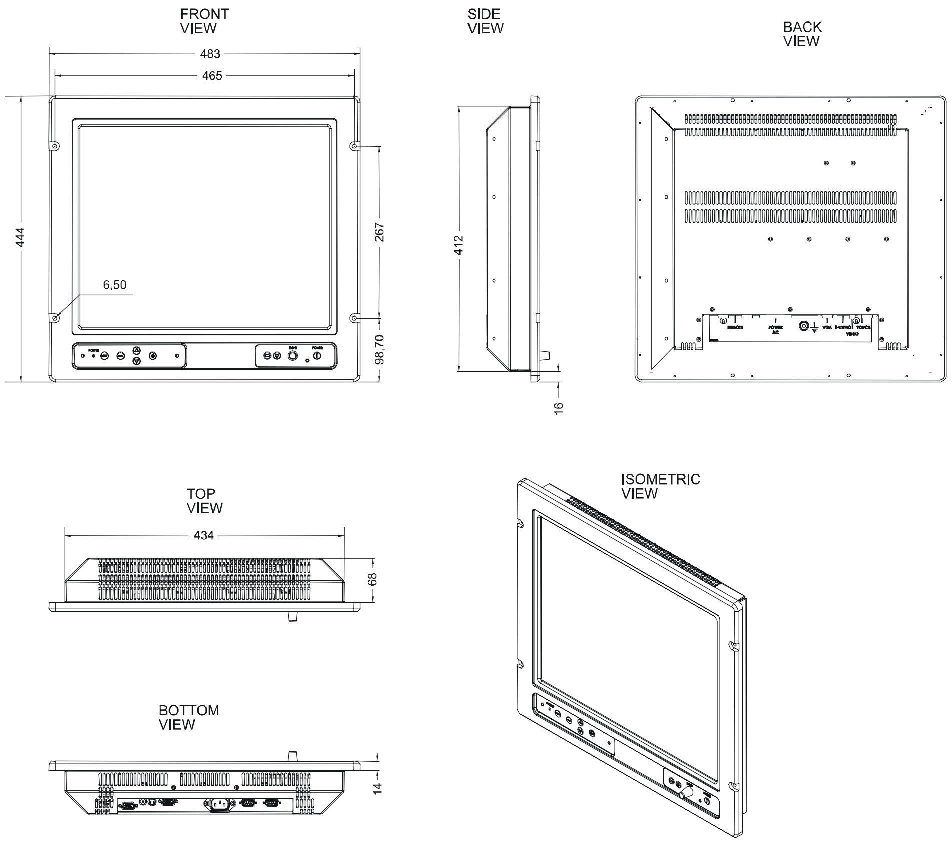


Fig. 56. 19" TFT Hatteland JH 19 T02 MMD. Standard View

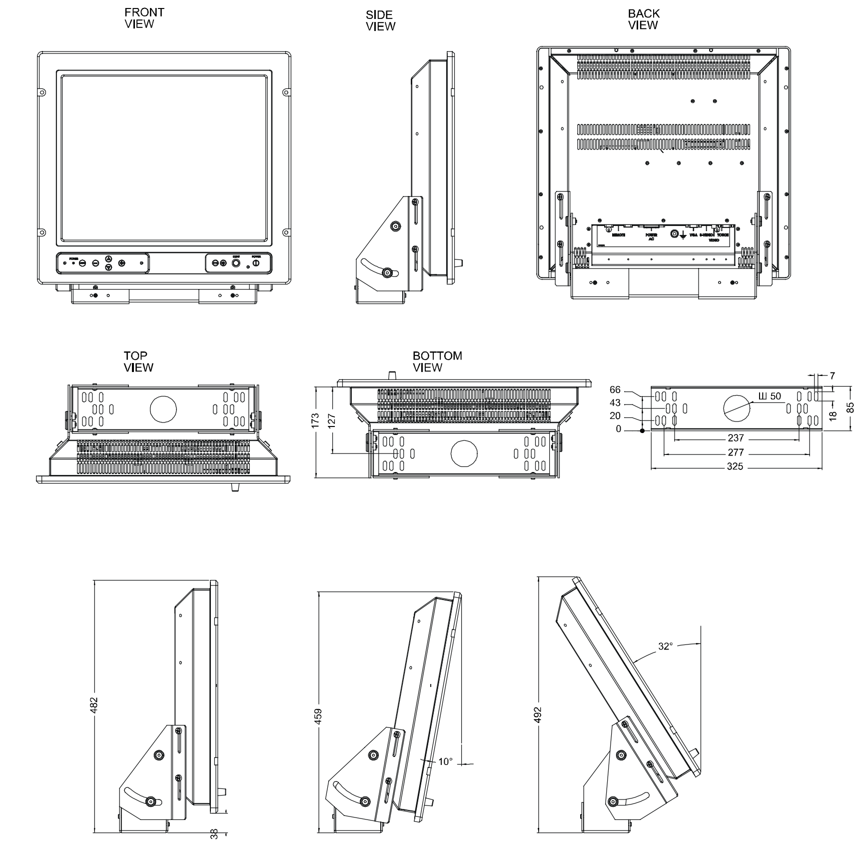


Fig. 57. 19" TFT Hatteland JH 19 T02 MMD. Bracket View

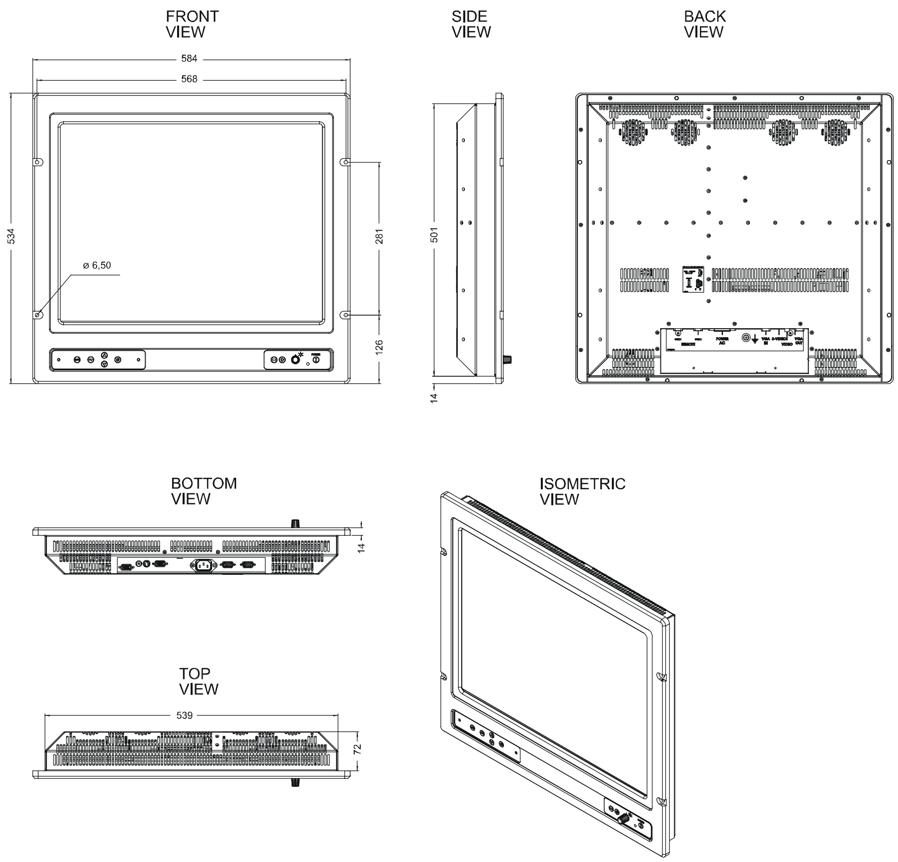


Fig. 58. 23" TFT Hatteland JH 23 T02 MMD. Standard View

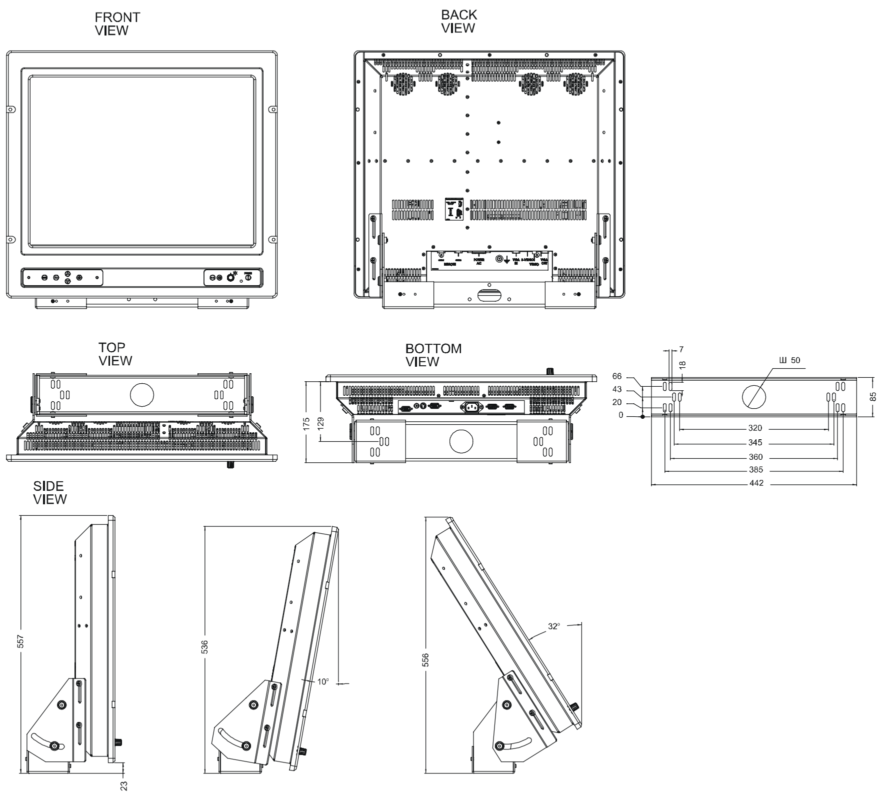


Fig. 59. 23" TFT Hatteland JH 23 T02 MMD. Bracket View

Radar Integrator Board RIB6

General Description

The Radar Integrator Board (what's follow RIB6) is designed for the reception of analog video signals from the radar and their digitizing, pre-processing and relay of the radar signal to the dual network as per network protocols for the TRANSAS navigational products.

The RIB6 enables the automatic detection, automatic acquisition and automatic tracking of targets, calculations of targets coordinates and motion parameters, and on-line transmission of this data to the system, as well as the formation of a radar picture to be displayed in combination with an electronic chart.

The RIB6 is intended as means to connect radars from different manufacturers to a personal computer executing the Transas Navi-Radar and Navi-Sailor software.

The signal processing is performed in the following order.

At a Trigger signal, the digitizing of the input signal is performed in a pulse sweep whose size is calculated from the set number of output samples and decimation coefficients.

After the IFA band matched filters the random pulse interference rejection algorithm and pulse matched filter is implemented. The resulting sector presented at stage A in the figure below.

Stage B in the figure below presents the result after the azimuth integration algorithm. The resulting sector shall correspond to the center of all sectors used in the integration which is presented in stage C in the figure below.

The incoming data flow, regardless of the trigger repetition rate and antenna rpm, is reduced to the set number of sectors per an antenna revolution. So before sending the determined outgoing sector, RIB6 has to perform range compression and sector interpolation of the 16-bits samples related to stage D in the figure below.

Concurrently with the operation of the data reception and processing algorithm, data is transmitted and received via the RS422 serial port.

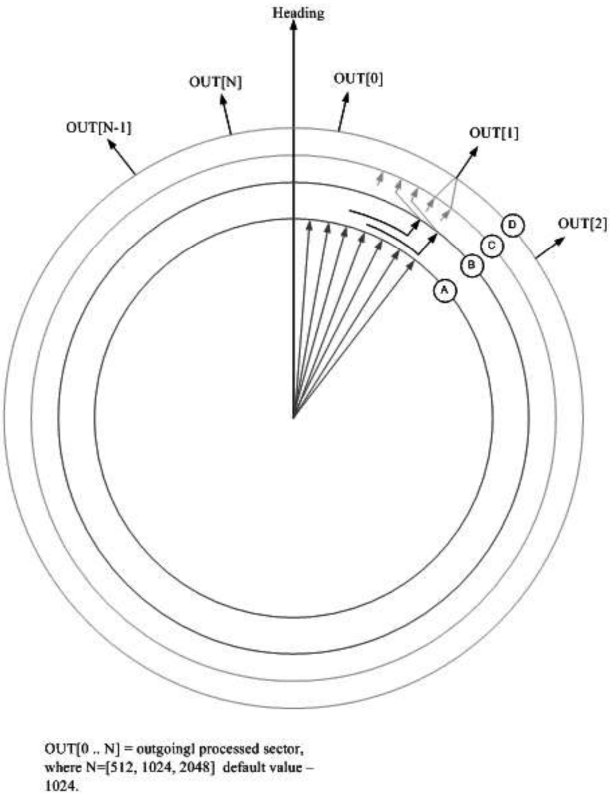


Fig. 60. Radar signal processing

Electrical Characteristics

- Control Signal:
  - Electrical format: RS422.
  - Signal type: binary or alpha numeric (NMEA).
  - Information:

    TX ON/OFF;
    Rotation ON/OFF;
    Pulse length;
    Trigger PRF;
    Magnetron current;
    Heating;
    Tuning indicator;
    BIT;
    PM control.
- Generic radar video signal:
  - Maximum voltage: +/- 25 V;
  - Input Impedance: 10 KOhm, 1 KOhm, 75 Ohm, 50 Ohm (manually selectable by jumper);
  - Signal type: analog;
  - Singled ended and differential input for generic radar (manually selectable by jumper);
  - The video and the combined video signal shall use the same connector.

- Trigger:
  - Maximum voltage: +/- 25 V;
  - Input Impedance: 10KOhm, 1 KOhm, 75 Ohm, 50 Ohm (manually selectable by jumper);
  - Signal type: square pulse;
  - Singled ended and differential input (manually selectable by jumper);
  - Pulse length of not less than 100 ns. Protection from pulse interference of less than 50 ns. Implemented by means of a low pass filter;
  - Electronic adjustment of the operation threshold within +/-10 V.
- Azimuth:
  - Maximum voltage: +/- 25 V;
  - Input Impedance: 1 KOhm, 10 KOhm, or a pull up resistor of 500 ohm to 12 V power supply for connection to open collector driver (manually selectable by jumper);
  - Signal type: square pulse;
  - Singled ended and differential input (manually selectable by jumper);
  - Rejection of pulse interference not less than 1 us. Valid pulse assumed to be at least 2 us;
  - Electronic adjustment of the operation threshold within +/-10 V.
- Heading:
  - Maximum voltage: +/- 25 V;
  - Input Impedance: 1 KOhm, 10 KOhm, or a pull up resistor of 500 ohm to 12 V power supply for connection to open collector driver (manually selectable by jumper);
  - Singled ended and differential input (manually selectable by jumper);
  - Rejection of pulse interference of less than 1 us. Valid pulse assumed to be at least 2 us;
  - Electronic adjustment of the operation threshold within +/-10 V.
- Output: 2 x 100 Mbit LAN;
- Power supply: 24 VDC.

Environmental Requirements

RIB6 operates from -40 ºC to +85 ºC in dry air.

RIB6 is for “Protected” category of IEC 60945 standard (temperature range: from -15 to +55 ºC).

Dimensions

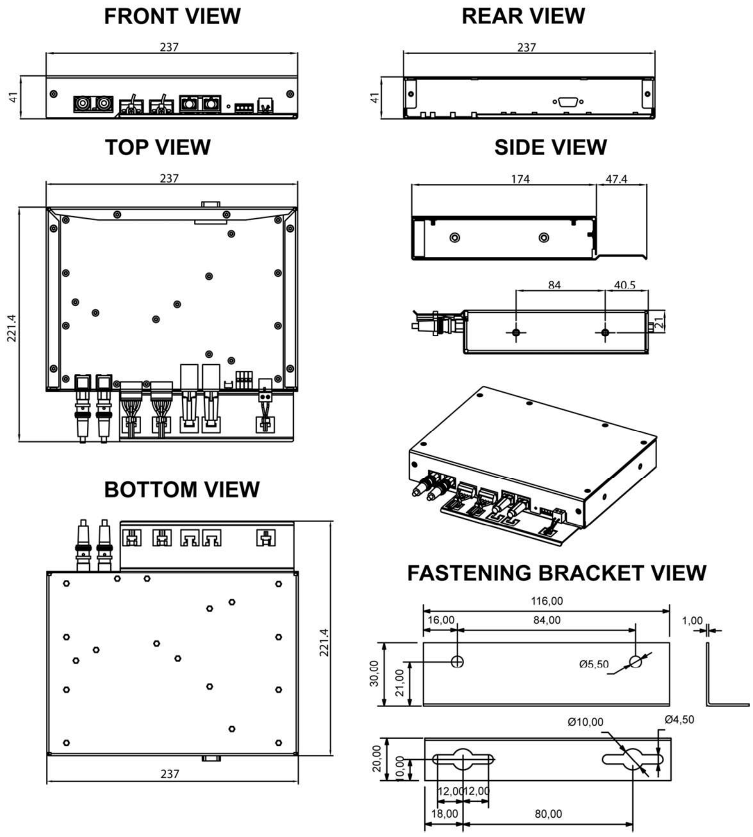


Fig. 61. RIB6. Dimensional drawing

Data Collector Unit DCU6

General

Data Collecting Unit (what's follow DCU), this device through which is realized connection of navigational data sources (such as GPS, GYRO, LOG, AIS, etc) using NMEA standard (IEC 61162) to Transas Workstations.

DCU power supply is performed with the cable connected to the external 24 VDC power supply.

The purpose of Data Collecting Unit (DCU) is:

- to convert data from RS 422 to Ethernet and visa versa;
- to share resources (data) between multiple clients.

DCU6 maximum dimensions are shown in figure below.

General Technical Characteristics

Table 17. Technical characteristics

Input voltage	24 V DC
Power consumption, max	25 Watts
Humidity (relative, operating and storage)	0 ÷ 95%, without condensation
EMC	IEC 60945 edition 4
Acoustic pressure of loud speaker (distance 1 m)	80dB
Working temperature	-15 ÷ +55 ºC
Storage temperature	-25 ÷ +70 ºC
Dimensions	430(+40)x200x44 mm
Weight	2.7 kg

Interfaces Description

Table 18. Input/Output channels

	Description	Notes
Quantity	16 x RS 422 bi-directional channels (default configuration)	1–14 ports are RS 422 bi-directional channels. 15 and 16 ports are RS 422 bi-directional channels by default and may be configured by jumpers X16 and X17 accordingly as follows: Output channels transmit RS 232 signal; Input channels receive RS 422 signal
Data format	IEC 61162 ed. 1/2 (NMEA 0183) Any type of binary data	
Parity	None Even Odd	
Baud rate	1200 2400 4800 9600 19200 38400 57600 115200	Limitations: • In case if all 16 RS ports will be loaded by bi-directional data transferring with baud rate between 1200 and 38400 then no more than 25 Transas Workstations could work with same DCU; • Baud rate 57600 – then no more than 15 Transas Workstations could work with same DCU; • Baud rate 115200 – then no more than 10 Transas Workstations could work with same DCU
Data transfer delay	30 to 255 msec	Adjusted by operator
Ethernet	2 (two) LAN 10/100 Mbits/sec adapters	

Dimensions

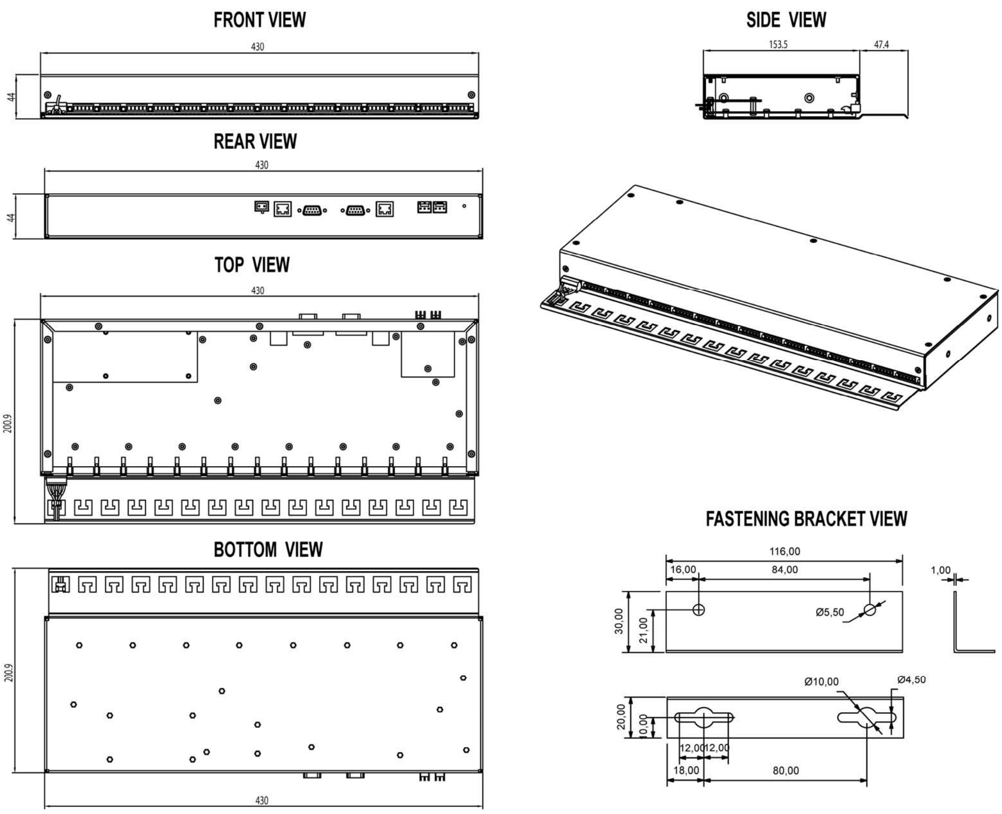


Fig. 62. DCU6. Dimensional drawing

WAGO I/O Modules

MODBUS Fieldbus Coupler (750-314)

This buscoupler allows connection of the WAGO-I/O-SYSTEM as a slave to the MODBUS fieldbus. The buscoupler is capable of supporting all bus modules. The bus coupler automatically configures, creating a local process image which may include analog, digital or specialty modules. Analog and specialty module data is sent via words and/or bytes, digital data is sent bit by bit.

MODBUS allows the storing of the process image in the corresponding Master control (PLC, PC or NC).

The data of the analog modules is stored in the process image which is created automatically according to the order in which the modules are connected to the buscoupler. The bits of the digital modules are sent byte by byte and added to the analog data (registers). If the amount of digital information exceeds 8 bits, the buscoupler automatically starts with a new byte.

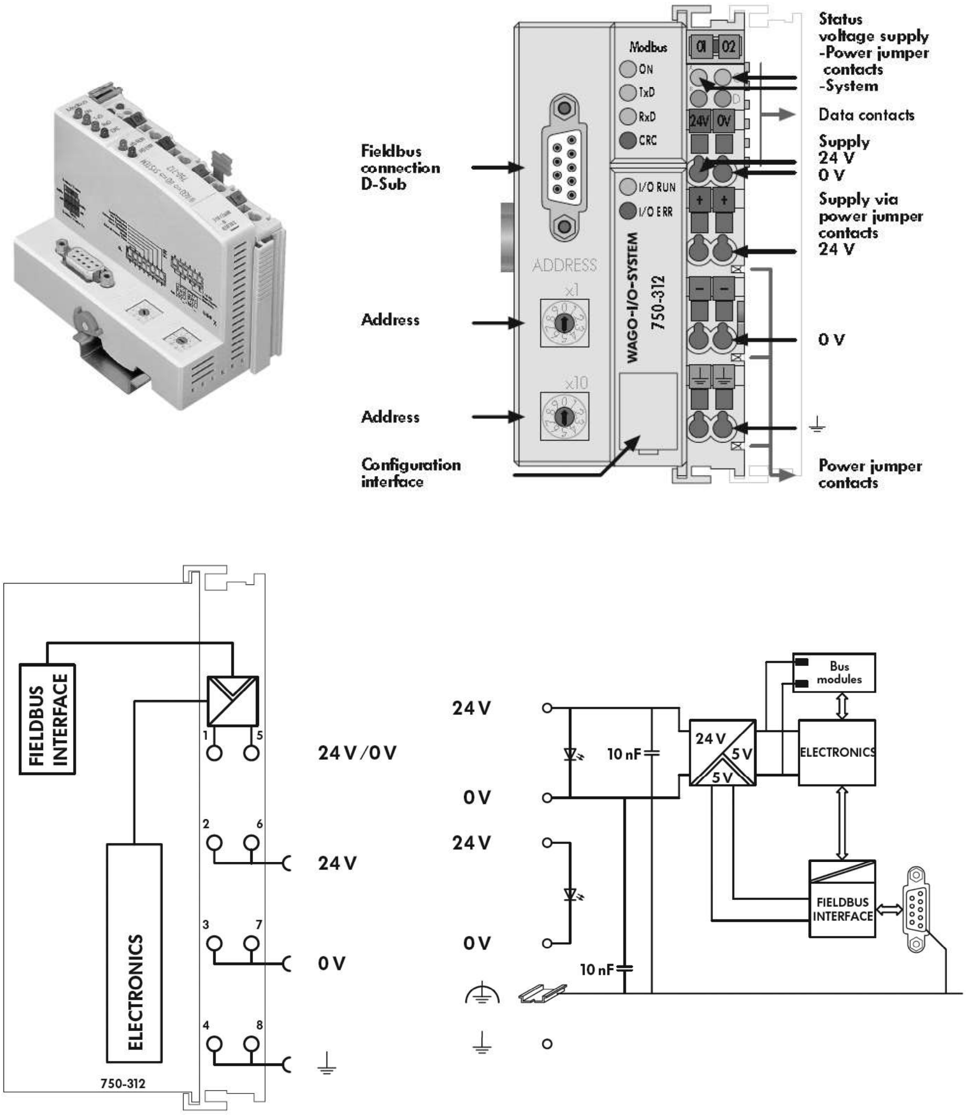


Fig. 63. WAGO MODBUS Fieldbus Coupler

Table 19. WAGO MODBUS specification

Description	
MODBUS/ RS 232/ 150–19200 Bd	750-314
General specifications	
Dimensions from upper edge of DIN 35 rail (mm) W x H x L	51 x 65 x 100
Weight	200 g
Wire connection CAGE CLAMP	0.08–2.5 mm^2; AWG 28–14, 8–9 mm/0.33 in stripped length
System data	
No. of nodes	99 with repeater
No. of I/O points	Ca 6000 (depends on master)
Transmission medium	Shielded Cu cable 2 (4) x 0.25 mm^2/AWG 23
Max. length of fieldbus segment	1200 m (depends on baud rate/on the cable)
Baud rate	(1200) 150 baud ... (115200) 19200 baud
Buscoupler connection	1 x D-SUB 9, socket
Technical data	
Max. no. of I/O modules	64
Fieldbus Input/Output process image	max. 512 bytes
Configuration	DIP switch and 2 decimal Coder or via PC or PLC
Voltage supply	DC 24 V (-25% ... +30%)
Input current (max.)	500 mA at 24V
Efficiency of the power supply	87%
Internal current consumption	350 mA at 5 V
Total current for I/O modules	1650 mA at 5 V
Isolation	500 V system/supply
Voltage via power jumper contacts	DC 24 V (-25% ... +30%)
Current via power jumper contacts (max.)	DC 10 A

4-Channel Digital Input Module DC 24 V (750-403)

2- to 3-conductor Connection; High-side Switching

The digital input modules receive control signals from digital field devices (sensors, etc.). Each input module has a noise-rejection filter. This filter is available with different time constants. An optocoupler is used for electrical isolation between the bus and the field side.

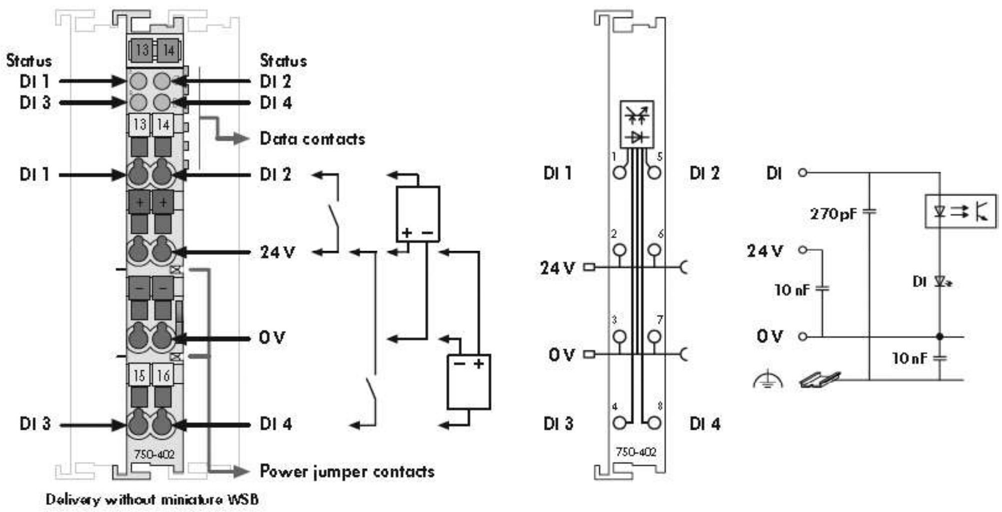


Fig. 64. 4-Channel Digital Input Module DC 24 V

Table 20. 4-Channel Digital Input modules DC 24 V specification

Description	
4DI 24V DC 0.2 ms	750-403
General specifications	
Dimensions from upper edge of DIN 35 rail (mm) W x H x L	12 x 64 x 100
Weight	50 g
Wire connection CAGE CLAMP	0.08–2.5 mm^2; AWG 28–14, 8–9 mm/0.33 in stripped length
Technical data	
No. of inputs	4
Current consumption (internal)	7.5 mA
Voltage via power jumper contacts	DC 24 V (-25% ... +30%)
Signal voltage (0)	DC -3 V ... +5 V
Signal voltage (1)	DC 15 V ... 30 V
Current supply (typ.)	4.5 mA
Isolation	500 V system/supply
Internal bit width	4 bits

2-Channel Analog Input Module 4–20mA (750-454)

The analog input module receives signals with standardized values of 4-20 mA. The input signal is electrically isolated and will be transmitted with a resolution of 12 bits. The internal system supply (via the data bus contacts) is used for the power supply of the module. The input channels are differential inputs. The shield (screen) is directly connected to the DIN rail.

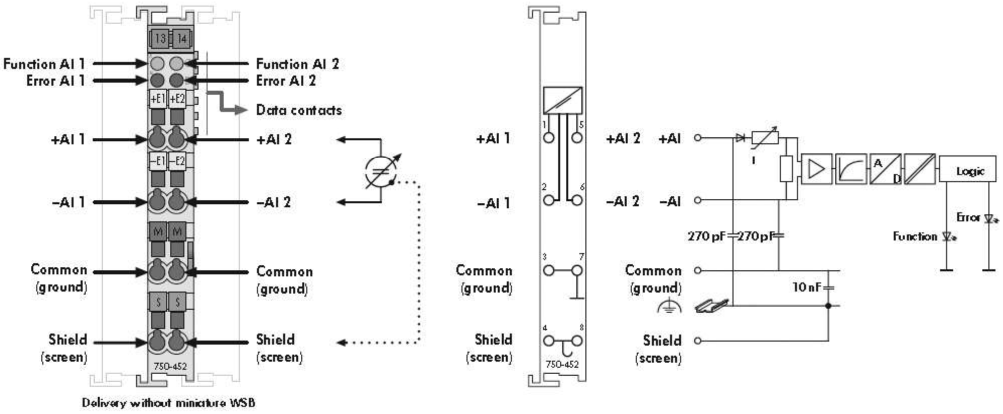


Fig. 65. 2-Channel Analog Input Module 4-20 mA

Table 21. 2-Channel Analog Input modules 4-20 mA specification

Description	
2AI 4-20 mA Different Inputs.	750-454
General specifications	
Dimensions from upper edge of DIN 35 rail (mm) W x H x L	12 x 64 x 100
Weight	55 g
Wire connection CAGE CLAMP	0.08–2.5 mm^2; AWG 28–14, 8–9 mm/0.33 in stripped length

Technical data	
No. of inputs	2
Voltage supply	Via system voltage DC /DC
Current consumption typ. (internal)	70 mA
Common mode voltage (max.)	35 V
Signal current	4 mA - 20 mA (750-454)
Input resistance	< 220 Ohm at 20 mA
Resolution	12 bits
Conversion time (typ.)	2 ms
Measuring error (25 ºC)	<±0.2% of the full scale value
Temperature coefficient	<±0.01%/K of the full scale value
Isolation	500V system/supply
Bit width	2 x 16 bits data and 2 x 8 bits control/status (option)

2-Channel Analog Input Module ± 10 V (750-476)

The analog input module receives signals with the standard-ized values +/- 10 V. The input signal is electrically isolated and will be transmitted with a resolution of 16 bits. The internal system supply is used for the power supply of the module. The input channels of a module have one common reference potential. The 24 V supply is derived from the power jumper contacts. The shield (screen) is directly connected to the DIN rail.

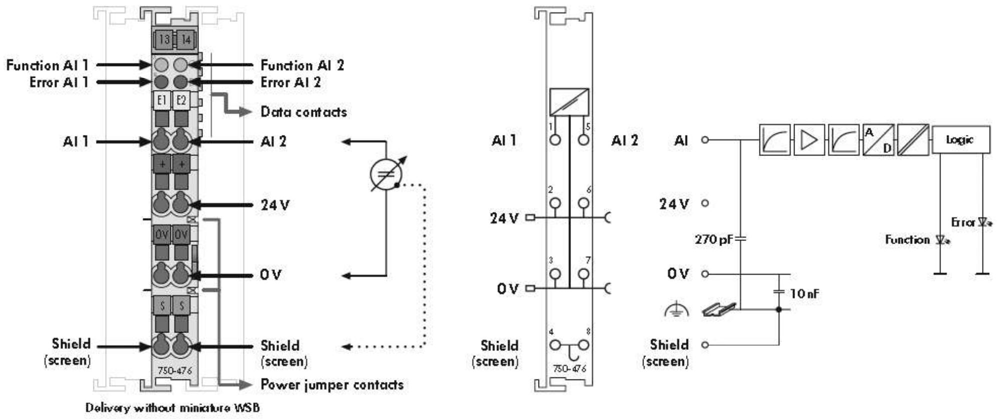


Fig. 66. 2-Channel Analog Input Module +/-10 V

Table 22. 2-Channel Analog Input modules +/-10 V specification

Description	
2AI +/-10 V DC 16 Bit single-ended.	750-476
General specifications	
Dimensions from upper edge of DIN 35 rail (mm) W x H x L	12 x 64 x 100
Weight	55 g
Wire connection CAGE CLAMP	0.08–2.5 mm^2; AWG 28–14, 8–9 mm/0.33 in stripped length
Technical data	
No. of inputs	2
Voltage supply	Via system voltage DC /DC
Current consumption typ. (internal)	75 mA
Common mode voltage (max.)	24 V
Signal voltage	+/-10 V (750-476)
Internal resistance (typ.)	130 kOhm + sign bit
Resolution	15 bits

Conversion time (typ.)	80 ms
Measuring error (25 ºC)	<±0.1% of the full scale value
Temperature coefficient	<±0.01%/K of the full scale value
Isolation	500V system/supply
Bit width	2 x 16 bits data and 2 x 8 bits control/status (option)
Input filter	50 Hz
Noise rejection at sampling frequency	<-100 dB
Noise rejection above sampling frequency	<-40 dB

4-Channel Analog Input Module 0-10 V (750-468)

The analog input module receives signals with the standardized values of 0-10 V. The input signal is electrically isolated and will be transmitted with a resolution of 12 bits. The internal system supply is used for the power supply of the module.
The input channels of a module have one common ground potential.
The shield (screen) is directly connected to the DIN rail.

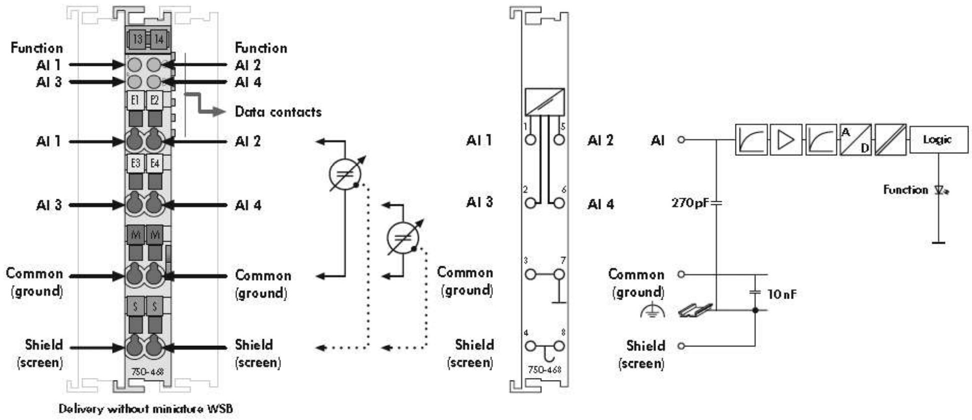


Fig. 67. 4-Channel Analog Input Module 0–10 V

Table 23. 4-Channel Analog Input module 0–10 V specification

Description	
4AI 0–10 V DC single-ended.	750-468
General specifications	
Dimensions from upper edge of DIN 35 rail (mm) W x H x L	12 x 64 x 100
Weight	55 g
Wire connection CAGE CLAMP	0.08–2.5 mm^2; AWG 28–14, 8–9 mm/0.33 in stripped length
Technical data	
No. of inputs	4
Voltage supply	Via system voltage DC /DC
Current consumption typ. (internal)	60 mA
Common mode voltage (max.)	35 V
Signal voltage	0 V - 10 V
Internal resistance (typ.)	133 kOhm
Resolution	12 bits
Conversion time (typ.)	4 ms
Measuring error (25°C)	<±0.2% of the full scale value
Temperature coefficient	<±0.01%/K of the full scale value
Isolation	500V system/supply
Bit width	4 x 16 bits data and 4 x 8 bits control/status (option)

2-Channel Relay Output Module AC 230 V, DC 30 V

The connected load is switched via the digital output (relay contacts) from the control system. The internal system voltage is used to trigger the relay. The NO contacts are electrically isolated. The switched status of the relay is shown by a LED. The module is a 2-channel, 4-conductor device and actuators with a ground (earth) wire may be directly connected to the module.

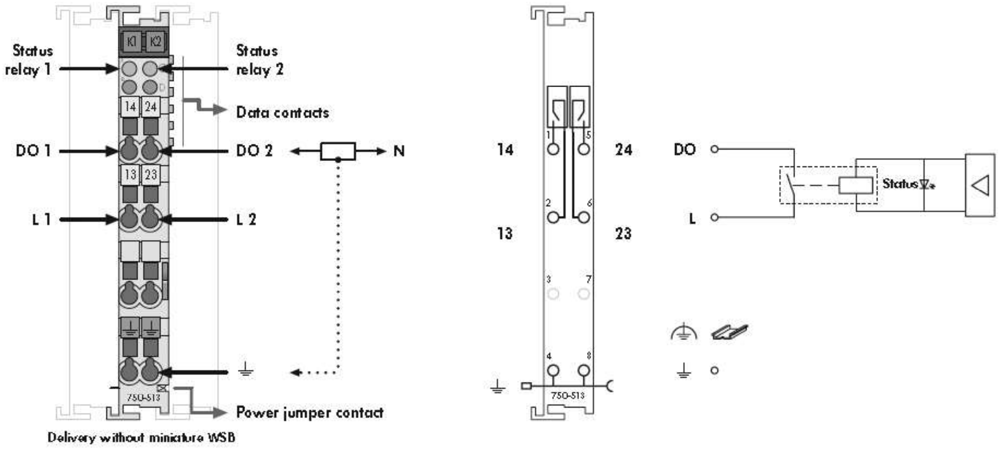


Fig. 68. 2-Channel Relay Output Module AC 230 V, DC 30 V

Table 24. 2-Channel Relay Output module AC 230 V, DC 30 V specification

Description	
2DO 230 vAC 2.0 A/Relay 2NO/Potential Free	750-513
General specifications	
Dimensions from upper edge of DIN 35 rail (mm) W x H x L	12 x 64 x 100
Weight	55 g
Wire connection CAGE CLAMP	0.08–2.5 mm^2; AWG 28–14, 8–9 mm/0.33 in stripped length
Technical data	
No. of outputs	2 make contacts
Current consumption typ. (internal)	100 mA
Switching voltage	AC 250 V/DC 30 V
Switching power	500 VA/60 W cos jmax = 0.4; L/Rmax = 7 ms
Switching current (max.)	AC/DC 2A
Switching current (min.)	10 mA at 5 V DC
Switching rate (max.)	30/min (at nominal load)
Pull-in time (max.)	10 ms
Bounce time (typ.)	1.2 ms
Drop out time (max.)	10 ms
Contact material	silver alloy
Mechanical life (min.)	2 x 107 switching operations
Electrical life (min.)	3 x 105 switching operations (AC 2A/250 V) or (DC 2A/30 V)
Isolation	1.5 KV eff. (field /system)* * 2.5 kV Rated surge voltage Overvoltage category III
Internal bit width	2 bits

End Module (750–600)

After the fieldbus node is assembled with the correct buscoupler and selected I/O modules, the end module is snapped onto the assembly. It completes the internal data circuit and ensures correct data flow. One is required for each buscoupler.

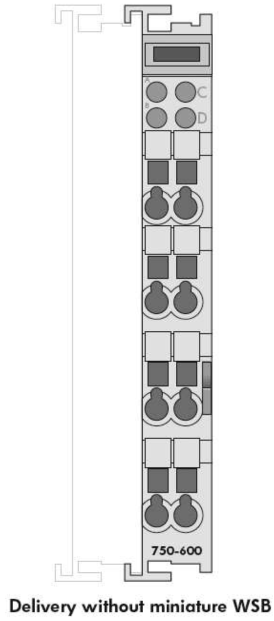


Fig. 69. End Module

MOXA Switch Type Approved EDS-305/308/316 Series

Fig. 70. Appearance of MOXA switch type approved EDS-305/385/316 series

The EDS-305/308/316 are 5, 8, and 16-port Ethernet switches that provide an economical solution for your industrial Ethernet connections. The built-in relay warning function alerts network engineers when power failures or port breaks occur, and the switches are designed for harsh industrial environments.

The EDS-305/308/316 series switches can be installed easily on a DIN-Rail or in a distribution box.

Features

- Redundant dual 24 VDC power inputs;
- Relay output warning for power failure and port break alarm;
- Broadcast storm protection;
- Transmits VLAN tag packets transparently;
- -40 to 75 ºC operating temperature range (T models).

Specification

Technology

- Standards: IEEE802.3, 802.3u, 802.3x;
- Processing type: Store and Forward;
- Flow control: IEEE802.3x flow control, back pressure flow control.

Interface

- RJ45 ports: 10/100BaseT(X) auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection;
- Fiber ports: 100BaseFX ports (SC/ST connector);
- LED indicators: PWR1, PWR2, Fault, 10/100M (TP port), and 100M (Fiber port);
- DIP switch: port break alarm mask;
- Alarm contact: one relay output with current carrying capacity of 1A @ 24 VDC.

Power Requirements

- Input voltage: 24 VDC (12 to 45 VDC), redundant inputs;
- Input current (@ 24 VDC): 0.27A (EDS-316), 0.13A (EDS-308, EDS-305);
- Overload Current Protection: 1.6A (EDS-316), 1.1A (EDS-305, EDS-308);
- Connection: removable 6-pin terminal block;
- Reverse polarity protection: present.

Physical Characteristics

- Housing: IP30 protection, metal case;
- Dimensions (W x H x D):
  - EDS-305/308 series: 53.6 x 135 x 105 mm (2.11 x 5.31 x 4.13 in);
  - EDS-316 series: 80.5 x 135 x 105 mm (3.16 x 5.31 x 4.13 in).
- Weight:
  - EDS-309/308/305 series: 630 g;
  - EDS-316 series: 1140 g.
- Installation: DIN-Rail mounting, wall mounting (optional kit).

Environmental Limits

- Operating temperature: -40 to 75 ºC (-40 to 167 ºF) (T models);
- Storage temperature: -40 to 85 ºC (-40 to 185 ºF);
- Ambient relative humidity: 5 to 95% (non-condensing).

Dimensional Drawing

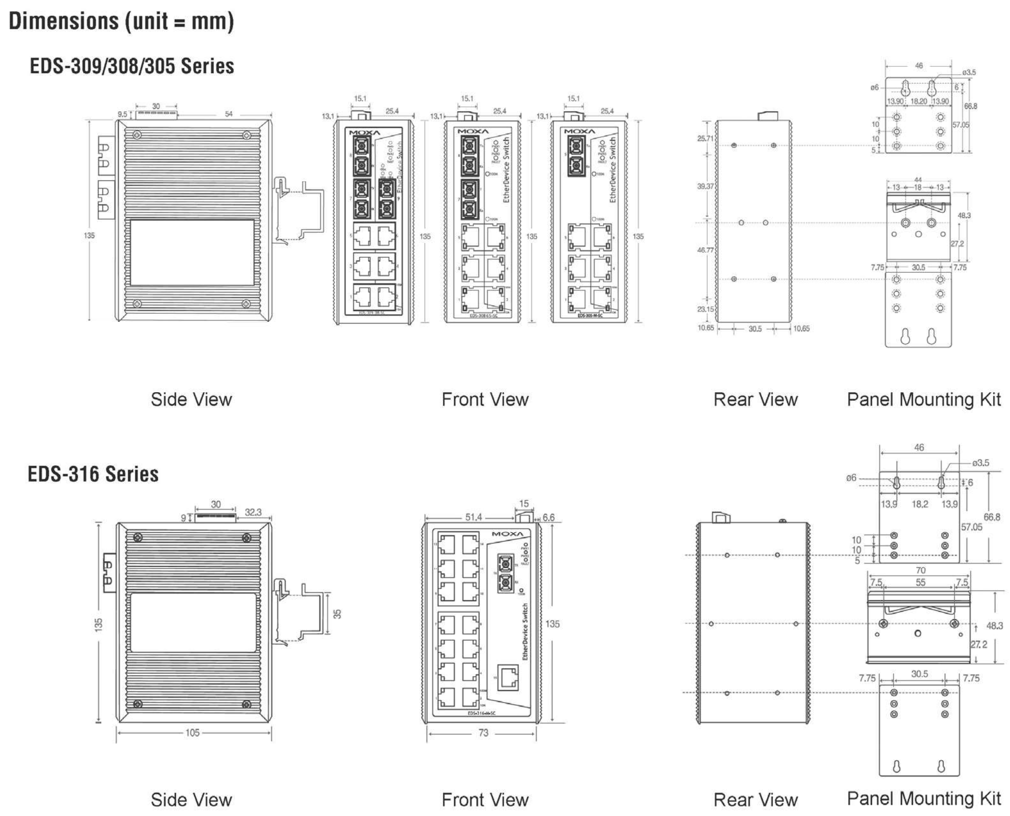


Fig. 71. MOXA switch type approved EDS-305/308/316 series dimensional drawing

CHAPTER 4

Interface Capabilities

GENERAL

In order to operate adequately in conjunction with navigational sensors, the NS 4000 should receive certain data from them. This data is required to be transmitted in accordance with Standard IEC 61162-1 **MARITIME NAVIGATION AND RADIO COMMUNICATION EQUIPMENT AND SYSTEMS. DIGITAL INTERFACES. PART1: SINGLE TALKER AND MULTIPLE LISTENERS** or in NMEA-0183 format. In addition, there is also a range of navigation equipment using specific data exchange protocols. NS 4000 allows operation with several types of such equipment.

Note: Non-compliance of the sentence Talker ID with the specified standards does not affect its processing in the NS 4000. This has been done for ensuring the NS 4000 compatibility with devices operating according to earlier versions of standards.

ATTENTION!

It is necessary to verify that GPS transmits geographical coordinates referred to WGS-84 Datum. If it does not, use GPS settings to select WGS-84.

“Primary/Secondary Not WGS 84” alarm status does not change when invalid DTM sentence is received.

In the processing of all NMEA sentences by the NS 4000, the maximum admissible reception interval between them, whereby no alarm is triggered off, is accepted to be equal to 5 seconds. The exceptions are provided by DTM (35 seconds).

FORMAT OF DATA EXCHANGE USED IN ACCORDANCE WITH IEC 61162-1 STANDARD

Input

Summary Table

The summary table shows the principles of operation with each navigation sensor.

Sensor	Data type transmitted by sensor	Sentences carrying this data	NS 4000 channel which the sensor is connected to
GPS (GLONASS, DECCA, LORAN)	Position (Lat. and Lon.)	GGA GLL RMC	POS 1 (POS 2…)
	COG and SOG	RMC VTG	POS 1 (POS 2…)
	Satellite information	GGA	POS 1 (POS 2…)
	Datum Reference	DTM	POS 1 (POS 2…)
	GPS RAIM Indicator	GBS	POS 1 (POS 2…)
	UTC time	ZDA	UTC
	UTC date	ZDA	UTC
SOUNDER	Depth under the sounder transducer	DBT DPT	SOUNDER 1 (SOUNDER 2...)
COMPASS	Heading	HDT VHW THS	GYRO 1 (GYRO 2…)
MAGNETIC COMPASS	Heading	HDG	MAGN 1 (MAGN 2…)
RATE OF TURN INDICATOR	Direction and rate-of-turn	ROT	ROT
SPEED LOG	Speed through the water	VHW VBW	LOG 1 (LOG 2…)
DUAL AXIS LOG	Dual Axis Speed	VBW	DLOG 1 (DLOG 2…)
AIS	AIS targets information	AIQ, ALR AIQ, SSD AIQ, TXT AIQ, VSD ABK ABM ALR BBM SSD TXT VDM VDO VSD For SAAB R4 also proprietary format used	AIS
ARPA	ARPA targets information	TTM	ARPA_A, ARPA_B
DIGITAL ANEMO-METER	Wind direction and speed	MWD MWV VWR	WIND
DIGITAL THERMOMETER	Water temperature	MTW	TEMP
YEOMAN DIGITIZER	WPT position (Lat. and Lon.)	WPL	YEOMAN 1 (YEOMAN 2…)

Sensor	Data type transmitted by sensor	Sentences carrying this data	NS 4000 channel which the sensor is connected to
ALARM STATION	Alarm state and acknowledgement	ALR ACK	ALARM STATION 1 (ALARM STATION 2…)
NMEA NAVTEX	NAVTEX Messages	CRQ NRX NRM	NAVTEX
ASCII NAVTEX	NAVTEX Messages	ASCII format	ASCIINAVTEX
RDF “Rhotheta RT202”	Direction finder value	ASCII format	RHOTHETA
SEETRAC	Seetrac targets information	Proprietary format	SEETRAC

Format of Input Data

This section describes format of all the sentences of IEC 61162-1 or/and NMEA 0183 standards, received from different types of navigational sensors.

Format of the sentences consists of the following parts.

$--AAA,x.x,a,c---c,…*hh <CR><LF>.

N	Field	Description
1	$	Start of sentence
2	--	Talker ID
3	AAA	Mnemonic code of data type identification
4	,	Data field delimiter
5	x.x,a,c---c...	Data
6	*hh	Checksum field
7	<CR><LF>	End of sentence

ACK – Acknowledge Alarm

Standard: IEC 61162-1, 2000.

$--ACK, xxx[1]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	xxx	Local alarm identifier	Alarm number	

ALR – Set Alarm State

Standard: IEC 61162-1, 2000.

$--ALR, hhmmss.ss[1],xxx[2],A[3],A[4],c--c[5]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	hhmmss.ss	Time of alarm condition change	Hours, minutes, seconds (UTC)	
2	xxx	Local alarm identifier	Alarm number	
3	A	Alarm condition	A = threshold exceeded, V = not exceeded	
4	A	Alarm’s acknowledge state	A = acknowledged, V = unacknowledged	
5	c--c	Alarm’s description text		

DBT – Depth Below Transducer

Standard: IEC 61162-1, 2000.

$--DBT, x.x[1], f[2], x.x[3], M[4], x.x[5], F[6]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Depth	Depth value	
2	f	Measurement unit	“f” – feet	
3	x.x	Depth	Depth value	
4	M	Measurement unit	“M” – meters	
5	x.x	Depth	Depth value	
6	F	Measurement unit	“F” – fathoms	

DPT (Depth) – Depth

Standard: IEC 61162-1, 2000 IMO Resolution A.224 (VII).

Contains values of depth measured from the sounder vibrator and the vibrator position correction.

$--DPT, x.x[1], x.x[2], x.x[3]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Depth (in meters)		
2	x.x	Correction (in meters)		Not processed
3	x.x	Maximum range scale in use		Not processed

DTM – Datum Reference

Standard: IEC 61162-1, 2000.

Contains information on the reference ellipsoid which the received coordinates are referred to.

$--DTM, ccc[1], a[2], x.x[3], a[4], x.x[5], a[6], x.x[7], ccc[8]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	ccc	Local datum	“W72” – WGS 72 “W84” – WGS 84 “IHO” – IHO terminology reference ellipsoid “999” – user determined reference ellipsoid “S85” – SGS85 “P90” – PE90	“W84” value is processed only
2	a	Local datum subdivision code		Not processed
3	x.x	Lat. offset, min		Not processed
4	a	Hemisphere	“N” – North “S” – South	Not processed
5	x.x	Lon. offset, min		Not processed
6	a	Hemisphere	“E” – East “W” – West	Not processed
7	x.x	Altitude offset, m		Not processed
8	ccc	Reference datum	“W84” – WGS84 “W72” – WGS72 “S85” – SGS85 “P90” – PE90	Not processed

GBS – GPS Satellite Fault Detection

Standard: NMEA 0183 v.3.00, 2000.

This message is used to support Receiver Autonomous Integrity Monitoring (RAIM). Given that a GNSS receiver is tracking enough satellites to perform integrity checks of the positioning quality of the position solution a message is needed to report the output of this process to other systems to advice the system user.

$--GBS,hhmmss.ss,x.x,x.x,x.x,xx,x.x,x.x,x.x* hh<CR><LF>.

N	Field	Name	Value	Comments
1	hhmmss.ss	UTC time of the GGA or GNS fix associated with this sentence	Hours, minutes, seconds	
2	x.x	Expected error in latitude	Meters due to bias, with noise = 0	
3	x.x	Expected error in longitude	Meters due to bias, with noise = 0	
4	x.x	Expected error in altitude	Meters due to bias, with noise = 0	Not processed
5	Xx	ID number of most likely failed satellite		Not processed
6	x.x	Probability of missed detection for most likely failed satellite		Not processed
7	x.x	Estimate of bias on most likely failed satellite	Meters	Not processed
8	x.x	Standard deviation of bias estimate		Not processed

GGA – Global Positioning System Fix Data

Standard: IEC 61162-1, 2000.

Contains time, position, and fix related data for a GPS receiver.

$--GGA, hhmmss.ss[1], llll.ll[2], a[3], yyyyy.yy[4], a[5], x[6], xx[7], x.x[8], x.x[9], M[10], x.x[11], M[12], x.x[13], xxxx[14]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	hhmmss.ss	UTC time of position fix	Hours, minutes, seconds	Not processed
2	llll.ll	WPT latitude	Degrees, minutes, tenths of minutes	
3	a	Hemisphere	"N" – North "S" – South	
4	yyyyy.yy	WPT longitude	Degrees, minutes, tenths of minutes	
5	a	Hemisphere	"E" – East "W" – West	
6	x	GPS positioning quality indicator	0 = Fix not available or invalid 1 = GPS SPS Mode, fix valid 2 = Differential GPS, SPS Mode, fix valid 3 = GPS PPS Mode, fix valid 4 = RTK Mode, fix valid 5 = Float RTK. Satellite system used in RTK mode, floating integers 6 = Estimated (DR) mode 7 = Manual Input mode 8 = Simulator mode	Values from "4" through "8" are not processed
7	xx	Number of satellites in use	From 0 to 12	

N	Field	Name	Value	Comments
8	x.x	Horizontal dilution of precision		
9	x.x	Antenna altitude re: mean-sea-level		Not processed
10	M	Measurement units	"M" – metres	Not processed
11	x.x	Geoidal separation	Vertical difference between the WGS-84 earth ellipsoid and mean-sea-level (geoid), "-" = mean-sea-level below ellipsoid	Not processed
12	M	Measurement units	"M" – metres	Not processed
13	x.x	Differential GPS data age (in seconds)		
14	xxxx	Differential GPS station code	From 0000 to 1023	

GLL – Geographic Position – Latitude/Longitude

Standard: IEC 61162-1, 2000.

Contains: coordinates of the current vessel position, time of position fix, and data status.

$--GLL, llll.ll[1], a[2], yyyyy.yy[3], a[4], hhmmss.ss[5], A[6], a[7]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	llll.ll	WPT latitude	Degrees, minutes, tenths of minutes	
2	a	Hemisphere	"N" – North "S" – South	
3	yyyyy.yy	WPT longitude	Degrees, minutes, tenths of minutes	
4	a	Hemisphere	"E" – East "W" – West	
5	hhmmss.ss	Position fix UTC time	Hours, minutes, seconds	Not processed
6	A	Status of data received from the sensor	"A" – Data valid "V" – Data not valid	
7	a	Positioning system Mode indicator	"A" – Autonomous "D" – Differential "E" – Estimated (dead reckoning) "M" – Manual input "S" – Simulator "N" – Data not valid	Not processed

HDG – Heading, Deviation, and Variation

Standard: IEC 61162-1, 2000 IMO Resolution A.382 (X).

$--HDG, x.x[1], x.x[2], a[3], x.x[4], a[5]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Magnetic Sensor Heading (degrees)		
2	x.x	Magnetic Deviation (degrees)		
3	A	Deviation hemisphere	E/W	
4	x.x	Magnetic Variation (degrees)		Not processed
5	A	Variation hemisphere	E/W	Not processed

HDT – Heading, True

Standard: IEC 61162-1, 2000 IMO Resolution A.424 and A.821.

$--HDT, x.x[1], T[2]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Heading (degrees)		
2	T	Heading type	“T” – True	

MTW – Water Temperature

Standard: IEC 61162-1, 2000.

$--MTW, x.x[1], C[2]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Temperature		
2	C	Measurement units	“C” – degrees, C	

MWD – Wind Direction and Speed

Standard: IEC 61162-1, 2000.

Contains: wind speed and direction, data status.

$--MWD, x.x[1], T[2], x.x[3], M[4], x.x[5], N[6], x.x[7], M[8]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Wind direction	In degrees (from 0 to 359)	
2	T	Wind type	“T” – true	
3	x.x	Wind direction	In degrees (from 0 to 359)	
4	M	Wind type	“M” – magnetic	
5	x.x	Wind speed		
6	N	Measurement units	“N” – knots	
7	x.x	Wind speed		
8	M	Measurement units	“M” – meters/second	

MWV – Wind Speed and Angle

Standard: IEC 61162-1, 2000.

Contains: wind speed and direction, data status.

$--MWV, x.x[1], a[2], x.x[3], a[4], A[5]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Wind direction	In degrees (from 0 to 359)	
2	a	Wind type	“R” – relative “T” – theoretical, calculated actual wind	
3	x.x	Wind speed		
4	a	Measurement units	“K” – km per hour “M” – meters/second “N” – knots	
5	A	Status	“A” – Data valid “V” – Data not valid	

RMC – Recommended Minimum Specific GPS Data

Standard: IEC 61162-1, 2000.

Contains: time, date, position, course and speed data provided by a GPS receiver.

$--RMC, hhmmss.ss[1], A[2], llll.ll[3], a[4], yyyyy.yy[5], a[6], x.x[7], x.x[8], xxxxxx[9], x.x[10], a[11], a[12]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	hhmmss.ss	Position fix UTC time	Hours, minutes, seconds	
2	A	Data status	"A" = Data valid "V" = Data invalid	
3	llll.ll	Latitude	Degrees, minutes, tenths of minutes	
4	a	Hemisphere	"N" – North "S" – South	
5	yyyyy.yy	Longitude	Degrees, minutes, tenths of minutes	
6	a	Hemisphere	"E" – East "W" – West	
7	x.x	Speed over ground (knots)		
8	x.x	Course over ground, degrees true		
9	xxxxxx	Date (ddmmyy)		
10	x.x	Magnetic variation		Not processed
11	a	Hemisphere	"E" – East "W" – West	Not processed
12	a	Positioning system Mode indicator	"A" – Autonomous mode "D" – Differential mode "E" – Estimated (dead reckoning) mode "M" – Manual input mode "S" – Simulator mode "N" – Data not valid	

ROT – Rate of Turn

Contains: rate of turn and direction of turn.

$--ROT,x.x[1],A[2]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Rate of turn	Degrees, minute	"-" = Bow turns to port
2	A	Status	A = Data valid B = Data invalid	

THS – True Heading and Status

Standard: IEC 61162-1, 2007.

$--THS,x.x[1],a[2]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Heading	Degrees true	
2	a	Indicator mode	A – Autonomous E – Estimated (dead reckoning) M – Manual input S – Simulator mode V – Data not valid (including standby)	

TTM – Tracked Target Message

Standard: IEC 61162-1, 2007.

$--TTM, xx[1], x.x[2], x.x[3], a[4], x.x[5], x.x[6], a[7], x.x[8], x.x[9], a[10], c--c[11], a[12], a[13], hhmmss.ss[14], a[15] *hh<CR><LF>.

N	Field	Name	Value	Comments
1	xx	Target number	00 to 99	
2	x.x	Target distance from own ship		
3	x.x	Bearing from own ship	Degrees	
4	a		T – True, R – Relative	
5	x.x	Target speed		
6	x.x	Target course	Degrees	
7	a		T – True, R – Relative	
8	x.x	Distance of closest-point-of-approach		
9	x.x	Time to CPA	min	"-" Increasing
10	a	Speed/distance units	K/N/S	
11	c--c	Target name		
12	a	Target status	L = Lost, tracked target has been lost, Q = Query, target in the process of acquisition, T = Tracking	
13	a	Reference target	"R" – reference target Null field otherwise	
14	hhmmss.ss	Time of data (UTC)		
15	a	Type of acquisition	A = Automatic, M = manual, R = reported	

VBW – DUAL Ground/Water Speed

Standard: IEC 61162-1, 2000.

Contains: X and Y components of speed through the water and over the ground.

$--VBW, x.x[1], x.x[2], A[3], x.x[4], x.x[5], A[6], x.x[7],A[8], x.x[9], A[10]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Longitudinal component of speed through the water, knots		Negative aftward
2	x.x	Transverse component of speed through the water, knots		Negative to the portside
3	A	Data status	"A" – reliable data "V" – unreliable data	Shall not be null
4	x.x	Longitudinal component of speed over the ground, knots		Negative aftward
5	x.x	Transverse component of speed over the ground, knots		Negative to the portside
6	A	Data status	"A" – reliable data "V" – unreliable data	Shall not be null
7	x.x	Stern transverse water speed (knots)		Negative to the portside

N	Field	Name	Value	Comments
8	A	Data status	"A" – reliable data "V" – unreliable data	Shall not be null
9	x.x	Stern transverse ground speed (knots)		Negative to the portside
10	A	Data status	"A" – valid data "V" – invalid data	Shall not be null

VHW – Water Speed and Heading

Standard: IEC 61162-1, 2000.

$--VHW, x.x^{1}, T^{2}, x.x^{3}, M^{4}, x.x^{5}, N^{6}, x.x^{7}, K^{8}*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Heading (degrees)		Not processed
2		Type	"T" – True	Not processed
3	x.x	Heading (degrees)		Not processed
4	M	Type	"M" – Magnetic	Not processed
5	x.x	Speed		
6	N	Measurement units	"N" – Knots	
7	x.x	Speed		Processed if field "5" is transmitted empty
8	K	Speed units	"K" – Km/hr	Processed if field "5" is transmitted empty

VTG – Course Over Ground and Ground Speed

Standard: IEC 61162-1, 2000.

$--VTG, x.x^{1}, T^{2}, x.x^{3}, M^{4}, x.x^{5}, N^{6}, x.x^{7}, K^{8}, A^{9}*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Course over ground (degrees)		
2	T	Type	"T" – True	
3	x.x	Magnetic course (degrees)		Not processed
4	M	Type	"M" – Magnetic	Not processed
5	x.x	Speed		
6	N	Measurement units	"N" – Knots	
7	x.x	Speed		Processed if field "5" is transmitted empty
8	K	Measurement units	"K" – Km/hr	Processed if field "5" is transmitted empty
9	A	Positioning system mode indicator	"A" – Autonomous mode "D" – Differential mode "E" – Estimated (dead reckoning) mode "M" – Manual input mode "S" – Simulator mode "N" – Data not valid	Not processed

VWR – Relative (Apparent) Wind Speed and Angle

Standard: IEC 61162-1, 2000.

$--VWR, x.x[1], a[2], x.x[3], N[4], x.x[5], M[6], x.x[7], K[8] *hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Measured wind angle relative to the vessel	In degrees (from 0 to 180)	
2	a	Left/right of the vessel heading	“L” – left “R” – right	
3	x.x	Measured wind speed		
4	N	Measurement units	“N” – knots	
5	x.x	Wind speed		
6	M	Measurement units	“M” – meters/second	
7	x.x	Wind speed		
8	K	Measurement units	“K” – Km/hr	

WPL – Waypoint Location

Standard: IEC 61162-1, 2000.

Contains: WPT latitude and longitude.

$--WPL, llll.ll[1], a[2], yyyyy.yy[3], a[4], c—c[5]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	llll.ll	WPT latitude		
2	a	Hemisphere	“N” – North “S” – South	
3	yyyyy.yy	WPT longitude		
4	a	Hemisphere	“E” – East “W” – West	
5	c—c	WPT number		Not processed

ZDA – Time & Date

Standard: IEC 61162-1, 2000.

Contains: UTC, day, month, year, and local time zone.

$--ZDA, hhmmss.ss[1], xx[2], xx[3], xxxx[4], xx[5], xx[6]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	hhmmss.ss	UTC time	Hours, minutes, seconds	
2	xx	Day (UTC)	01–31	
3	xx	Month (UTC)	01–12	
4	xxxx	Year (UTC)		
5	xx	Local zone, hours	00 h to +/- 13 h	Not processed
6	xx	Local zone, minutes	Time zone minutes	Not processed

Output

The NS 4000 system has a strictly fixed data transmission frequency (on a certain data channel) for each group of data in use:

Data channel in “System Configuration Utility”	Sentence transmitted
NMEA output	APB, BOD, BWC, DTM, DPT, GBS, GGA, GLL, HDT, OSD, RTE, ROT, TTM, VBW, VTG, VHW, VDR, WPL, XTE, ZDA
Autopilot output	APB, BOD, BWC, GLL, HDT, OSD, RTE, VTG, VHW, VDR, WPL, XTE, ZDA
YEOMAN	GLL

Group of transmitted data	Data channel in "System Configuration Utility"	Sentence transmission rate
NAV DATA (ALR, ACK, DTM; GLL; HDT; ZDA; OSD; DPT)	NMEA output	Every second
NAV DATA	AUTOPILOT	Every second
Ownship position (GLL)	YEOMAN	Once every 3 seconds

Device	Channel for the sensor connection via "System Configuration Utility"	Type of transmitted data
Any navigation equipment which requires reception of the ownship motion data	NMEA output	NAV DATA
Autopilot	Autopilot	NAV DATA
YEOMAN digitizer	YEOMAN	Ownship position

Format of Output Data

This section describes formats of all the output sentences of IEC 61162-1 or/and NMEA 0183 standards output onto the navigational sensors connected to the NS 4000 system.

ATTENTION!

The sentences are transmitted to the output in the following order:

- for positioning system – sentences transmitted from the source selected as Primary Positioning System;
- for the rest of data – sentences transmitted from the sources selected in "Navigation" panel of the NS.

Sentence format consists of the following parts:

$--AAA,x.x,a,c---c,…*hh <CR><LF>.

N	Field	Description
1	$	Start of sentence
2	--	Talker ID
3	AAA	Mnemonic code of identifying the data type
4	,	Data field delimiter
5	x.x,a,c---c...	Data
6	*hh	Checksum field
7	<CR><LF>	End of sentence

ACK – Acknowledge Alarm

Standard: IEC 61162-1, 2000.

$--ACK, xxx[1]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	xxx	Local alarm identifier	Alarm number	

ALR – Set Alarm State

Standard: IEC 61162-1, 2000.

$--ALR, hhmmss.ss[1],xxx[2],A[3],A[4],c--c[5]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	hhmmss.ss	Time of alarm condition change	Hours, minutes, seconds (UTC)	
2	xxx	Local alarm identifier	Alarm number	
3	A	Alarm condition	A = threshold exceeded, V = not exceeded	
4	A	Alarm's acknowledge state	A = acknowledged, V = unacknowledged	
5	c--c	Alarm's description text		

APB – Heading/Track Controller (Autopilot) Sentence B

Standard: IEC 61162-1, 2007.

$--APB, A[1], A[2], x.x[3], a[4], N[5], A[6], A[7], x.x[8], a[9], c--c[10], x.x[11], a[12], x.x[13], a[14], a[15]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	A	Status	A = Data valid, V = LORAN-C blink or SNR warning, V = general warning flag for other navigation systems when a reliable fix is not available	
2	A	Status	A = OK or not used, V = LORAN-C cycle lock warning flag	
3	x.x	Magnitude of XTE		
4	a	Direction to steer	L/R	
5	N	XTE units	Nautical miles	
6	A	Status	A = arrival circle entered, V = arrival circle not passed	
7	A	Status	A = perpendicular passed at waypoint, V = perpendicular not entered	
8	x.x	Bearing origin to destination		
9	a		M/T	
10	c--c	Destination waypoint ID		
11	x.x	Bearing, present position to destination		
12	a		Magnetic or true	
13	x.x	Heading to steer to destination waypoint		
14	a		Magnetic or true	
15	a	Mode indicator	A = Autonomous mode; D = Differential mode; E = Estimated (dead reckoning) mode; M = Manual input mode; S = Simulator mode; N = Data not valid	Values “E”, “M”, “S” are processed as “N”

BOD – Bearing Origin to Destination

Standard: IEC 61162-1, 2007.

$--BOD, x.x[1], T[2], x.x[3], M[4], c--c[5], c--c[6]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Bearing	Degrees	
2	T	True		
3	x.x	Bearing	Degrees	
4	M	Magnetic		
5	c--c	Destination waypoint ID		
6	c--c	Origin waypoint ID		

BWC – Bearing and Distance to Waypoint – Great Circle

Standard: IEC 61162-1, 2007.

$--BWC, hhmmss.ss[1], llll.ll[2], a[3], yyyyy.yy[4], a[5], x.x[6], T[7], x.x[8], M[9], x.x[10], N[11], c--c[12], a[13]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	hhmmss.ss	UTC of observation		
2	llll.ll	Waypoint latitude		
3	a		N/S	
4	yyyyy.yy	Waypoint longitude		
5	a		E/W	
6	x.x	Bearing	Degrees	
7	T	True		
8	x.x	Bearing	Degrees	
9	M	Magnetic		
10	x.x	Distance	Nautical miles	
11	N	Units	Nautical miles	
12	c--c	Waypoint ID		
13	a	Mode indicator	A = Autonomous mode, D = Differential mode, E = Estimated (dead reckoning) mode, M = Manual input mode, S = Simulator mode, N = Data not valid	Values “E”, “M”, “S” are processed as “N”

DTM – Datum Reference

See paragraph **Format of Input Data** of this section.

DPT – Depth

See paragraph **Format of Input Data** of this section.

GBS – GPS Satellite Fault Detection

See paragraph **Format of Input Data** of this section.

GGA – Global Positioning System Fix Data

See paragraph **Format of Input Data** of this section.

GLL – Geographic Position – Latitude/Longitude

See paragraph **Format of Input Data** of this section.

HDT – Heading, True

See paragraph **Format of Input Data** of this section.

OSD – Own Ship Data

Standard: IEC 61162-1, 2007.

$--OSD, x.x[1], A[2], x.x[3], a[4], x.x[5], a[6], x.x[7], x.x[8], a[9]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Heading, true	Degrees	
2	A	Heading status	A = data valid, V = data invalid	
3	x.x	Vessel course, true	Degrees	
4	a	Course reference	B = bottom tracking log, M = manually entered, W = water referenced, R = radar tracking (of fixed target), P = positioning system ground reference	
5	x.x	Vessel speed		
6	a	Speed reference	B = bottom tracking log, M = manually entered, W = water referenced, R = radar tracking (of fixed target), P = positioning system ground reference	
7	x.x	Vessel set, true	Degrees	Manually entered
8	x.x	Vessel drift (speed)		Manually entered
9	a	Speed units	K = km/h, N = knots, S = statute miles/h	

RMB – Recommended Minimum Navigation Information

Standard: IEC 61162-1, 2007.

$--RMB, A[1], x.x[2], a[3], c--c[4], c--c[5], llll.ll, a[6], yyyyy.yy,a[7],x.x[8], x.x[9], x.x[10], A[11], a[12]
*hh<CR><LF>

N	Field	Name	Value	Comments
1	A	Status	The positioning system mode indicator field supplements the status field (field No. 1) which should be set to V = invalid for all values of Mode indicator except for A = Autonomous and D = Differential. The positioning system mode indicator and status fields should not be null fields	
2	x.x	Cross track error	nautical miles If cross track error exceeds 9,99 nautical miles, display 9,99	
3	a	Direction to steer	L/R	
4	c--c	Origin waypoint ID		
5	c--c	Destination waypoint ID		
6	llll.ll, a	Destination waypoint latitude, N/S		
7	yyyyy.yy,a	Destination waypoint longitude, E/W		
8	x.x	Range to destination,	nautical miles	
9	x.x	Bearing to destination	degrees	

N	Field	Name	Value	Comments
10	x.x	Destination closing velocity	knots	
11	A	Arrival status		
12	a	Mode indicator	A = Autonomous mode, D = Differential mode, E = Estimated (dead reckoning) mode, M = Manual input mode, S = Simulator mode, N = Data not valid	

RTE – Routes

Standard: IEC 61162-1, 2007.

$--RTE, x.x[1], x.x[2], a[3], c--c[4], c--c[5], …[6], c--c[n]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Total number of sentences being transmitted		
2	x.x	Sentence number		
3	a	Message mode	c = complete route, all waypoints, w = working route, first listed waypoint is “FROM”, second is “TO” and remaining are rest of route	
4	c--c	Route identifier		
5	c--c	Waypoint identifier		
6	c--c	Additional waypoint identifiers		
n	c--c	Waypoint “n” identifier		

ROT – Rate of Turn

See paragraph **Format of Input Data** of this section.

TTM – Tracked Target Message

See paragraph **Format of Input Data** of this section.

VBW – DUAL Ground/Water Speed

See paragraph **Format of Input Data** of this section.

VTG – Course Over Ground and Ground Speed

See paragraph **Format of Input Data** of this section.

VHW – Water Speed and Heading

See paragraph **Format of Input Data** of this section.

VDR – Set and Drift

Standard: IEC 61162-1, 2007.

$--VDR, x.x[1], T[2], x.x[3], M[4], x.x[5], N[6]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Direction, true	Degrees	
2	T	True		
3	x.x	Direction, magnetic	Degrees	
4	M	Magnetic		
5	x.x	Current speed	Knots	
6	N	Knots		

WPL – Waypoint Location

See paragraph **Format of Input Data** of this section.

XTE – Cross-Track Error, Measured

Standard: IEC 61162-1, 2007.

$--XTE, A^1, A^2, x.x^3, a^4, N^5, a^6*hh<CR><LF.

N	Field	Name	Value	Comments
1	A	Status	A = data valid, V = LORAN – C blink or SNR warning	
2	A	Status	A = data valid, V = Loran-C cycle lock warning flag	
3	x.x	Magnitude of cross-track error		
4	a	Direction to steer	L/R	
5	N	Units	Nautical miles	
6	A	Mode indicator	A = Autonomous mode, D = Differential mode, E = Estimated (dead reckoning) mode, M = Manual input mode, S = Simulator mode, N = Data not valid	Values “E”, “M”, “S” are processed as “N”

ZDA – Time & Date

See paragraph **Format of Input Data** of this section.

UNIVERSAL AIS TRANSPONDER INTERFACE

Description of Universal AIS Transponder Interface

General

This section describes functionality associated with the data reception/transmission with the Universal AIS Transponder connected to the NS 4000.

Universal AIS Transponder is an interface developed strictly in accordance with the following standards:

- IEC 61993-2, 2001-11-09 “Maritime navigation and radiocommunication equipment and systems – Class A Shipborne installation of the Universal Shipborne automatic identification system (AIS) using VHF TDMA techniques”;
- IEC 61162-1, 2001-07 “Maritime navigation and radiocommunication equipment and systems – digital interfaces”;
- ITU-R M.1371, 2000 “Technical characteristics for a universal shipborne automatic identification system using time division multiple access in the VHF maritime mobile band”;
- IALA Technical Clarification on Recommendation ITY-R M.1371-1 Edition 1.3.

Reception of current own ship identifiers (IMO number, MMSI number) from the transponder is by VDO sentence (VHF Data-link Own-vessel message).

Data on UAIS targets is received by using VDM sentence (VHF Data-link message).

Reception and transmission of different information between the transponders are strictly on definite channels (A and B).

Level 3

Data processing is implemented to a full extent according to the descriptions provided below in sections:

- **IALA Technical Clarifications on Recommendation ITU-R M.1371 Edition 1.3 Standard Sentences**;
- **Sentences Transmitted by the ECDIS via AIS Channel in the Operation with a Transponder**.

Summary Table

Message	NS 4000 channel	Direction	Transmission Interval	Standard
AIQ, ALR	AIS	Transmission	• At the NS 4000 start; • At the transponder restart	
AIQ, SSD	AIS	Transmission	• At the NS 4000 start; • As change occurs; • At the transponder restart	
AIQ, TXT	AIS	Transmission	• At the NS 4000 start; • At the transponder restart	
AIQ, VSD	AIS	Transmission	• At the NS 4000 start; • As change occurs; • At the transponder restart; • Once in 10 minutes	
ABK	AIS	Reception	As event occurs	IEC 61993-2, 2001-11-09
ABM	AIS	Transmission	As event occurs	IEC 61993-2, 2001-11-09
ACK	AIS	Transmission	Alarm acknowledgment	
ALR	AIS	Reception and Transmission	As event occurs	IEC 61162-1, 2001-07
BBM	AIS	Transmission	As event occurs	IEC 61993-2, 2001-11-09
SSD	AIS	Reception and Transmission	As event occurs	IEC 61993-2, 2001-11-09
TXT	AIS	Reception	As event occurs	IEC 61162-1, 2001-07
VDM	AIS	Reception	AIS Data	IEC 61993-2, 2001-11-09
VDO	AIS	Reception	Own ship data	IEC 61993-2, 2001-11-09
VSD	AIS	Reception and Transmission	As change occurs	IEC 61993-2, 2001-11-09

Data Exchange Format

Format of the sentences consists of the following parts:

$--AAA,x.x,a,c---c,…*hh <CR><LF>.

N	Field	Description
1	$ or !	Start of sentence
2	--	Talker ID
3	AAA	Mnemonic code of identifying the data type
4	,	Data field delimiter
5	x.x,a,c---c...	Data
6	*hh	Checksum field
7	<CR><LF>	End of sentence

As NS 4000 system receives a sentence with a field containing an ignored value, no processing of information in this field is performed.

IALA Technical Clarifications on Recommendation ITU-R M.1371 Edition 1.3 Standard Sentences

VDO – VHF Data-Link Own-Vessel Message

The NS 4000 for the reception uses this sentence only. It contains information on the own ship set in the ship UAIS station.

Standard: IEC 61993-2, 2001-11-09.

!--VDO, x^1, x^2, x^3, a^4, s--s^5, x^6*hh<CR><LF>.

N	Field	Name	Value	Comments
1	X	Total number of sentences needed to transfer the message	1 to 9	
2	X	Sentence number	1 to 9	
3	X	Sequential message identifier	0 to 9	
4	A	AIS channel	“A” or “B”	
5	s—s	Encapsulated ITU-R M.1371 radio message		See Note
6	X	Number of fill-bits	0 to 5	

Note: Sentences 1, 2, 3, 5, 18 of ITU-R M.1371 standard are processed.

VDM – VHF Data-Link Message

The NS 4000 for the reception uses this sentence only. It contains target information received by the NS 4000 from the ship UAIS station.

Standard: IEC 61993-2, 2001-11-09.

!--VDM, x^1, x^2, x^3, A^4, s--s^5, x^6*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x	Total number of sentences needed to transfer the message	1 to 9	
2	x	Sentence number	1 to 9	
3	x	Sequential message identifier	0 to 9	
4	A	AIS channel	“A” or “B”	
5	s--s	Encapsulated ITU-R M.1371 radio message		See Note
6	x	Number of fill-bits	0 to 5	

Note: Sentences 1, 2, 3, 4, 5, 6, 8, 9, 12, 14, 17, 18, 19, 21, 22 of ITU-R M.1371 standard are processed.

1, 2, 3 – Position Report (in VDO and VDM Sentences)

The NS 4000 for the reception uses this sentence only.

Standard: ITU-R M.1371, 2000.

Parameter	Number of bits	Description	Comments
Message ID	6	Identifier for message 1, 2, or 3	
Repeat Indicator	2		Not processed by the NS 4000
User ID	30	MMSI number	

Parameter	Number of bits	Description	Comments
Navigational status	4	0 = Underway using engine 1 = At anchor 2 = Not under command 3 = Restricted manoeuvrability 4 = Constrained by her draught 5= Moored 6 = Aground 7 = Engaged in Fishing 8 = Underway sailing 9 = HSC (High Speed Craft) 10 = WIG (Wing In Ground) 11–14 = Reserved for future use 15 = Not defined = default	
Rate of turn ROT_{AIS}	8	0...+126 = turning right at up to 708 degrees per minute or higher. 0...-126 = turning left at up to 708 degrees per minute or higher. Values between 0 and 708 degrees/min coded by ROT_{AIS} = 4.733 SQRT (ROT_{sensor}) degrees/min where ROT_{sensor} is the Rate of Turn as input by an external Rate of Turn Indicator. ROT_{AIS} is rounded to the nearest integer value. + 127 = turning right at more than 5º/30s (No TI available). -127 = turning left at more than 5º/30s (No TI available). -128 (80 hex) indicates no turn information available (default). ROT data should not be derived from COG information	
SOG	10	Speed over ground in 1/10-knot steps (0–102.2 knots). 1023 = not available; 1022 = 102.2 knots or higher	
Position accuracy	1	1 = high (< 10 m; Differential Mode of, e.g. DGNSS receiver). 0 = low (> 10 m; Autonomous Mode of, e. g. GNSS receiver or of other Electronic Position Fixing Device); default = 0	
Longitude	28	Longitude in 1/10 000 min. (±180 degrees, East = positive (as 2's complement), West = negative (as 2's complement). 181 degrees (6791AC0 hex) = not available = default)	
Latitude	27	Latitude in 1/10 000 min. (±90 degrees, North = positive (as 2's complement), South = negative (as 2's complement), 91 degrees (3412140 hex) = not available = default)	
COG	12	Course over ground in 1/10 degrees (0–3599). 3600 (E10 hex)= not available = default; 3601–4095 should not be used	
True Heading	9	Degrees (0–359) (511 indicates not available = default)	
Time stamp	6		Not processed by the NS 4000
Reserved for regional applications	4		Not processed by the NS 4000
Spare	1		Not processed by the NS 4000
RAIM-Flag	1		Not processed by the NS 4000
Communication State	19		Not processed by the NS 4000
Total number of bits	168		

4 – Base Station Report (VDM)

The NS 4000 for the reception uses this sentence only.

Standard: ITU-R M.1371, 2000.

Parameter	Number of bits	Description	Comments
Message ID	6	Identifier for message 4 4 = UTC and position report from base station	
Repeat Indicator	2		Not processed by the NS 4000
User ID	30	MMSI number	
UTC year	14		Not processed by the NS 4000
UTC month	4		Not processed by the NS 4000
UTC day	5		Not processed by the NS 4000
UTC hour	5		Not processed by the NS 4000
UTC minute	6		Not processed by the NS 4000
UTC second	6		Not processed by the NS 4000
Position accuracy	1	1 = high (< 10 m; Differential Mode of e.g. DGNSS receiver). 0 = low (> 10 m; Autonomous Mode of e.g. GNSS receiver, or of another Electronic Position Fixing Device), default = 0	
Longitude	28	Longitude in 1/10 000 minute (±180 degrees, East = positive (as 2's complement), West = negative (as 2's complement)). 181 degrees (6791AC0 hex) = not available = default	
Latitude	27	Latitude in 1/10 000 minute (±90 degree, North = positive (as 2's complement), South = negative (as 2's complement)). 91 degrees (3412140 hex) = not available = default	
Type of Electronic Position Fixing Device	4	Use of differential corrections is defined by field "position accuracy" above: 0 = Undefined (default); 1 = GPS 2 = GLONASS 3 = Combined GPS/GLONASS 4 = Loran-C 5 = Chayka 6 = Integrated Navigation System 7 = Surveyed 8–15 = Not used	
Spare	10		Not processed by the NS 4000
RAIM-Flag	1		Not processed by the NS 4000
Communication State	19		Not processed by the NS 4000
Total number of bits	168		

5 – Static and Voyage Related Data (In Sentences VDO and VDM)

The NS 4000 for the reception uses this sentence only.

Standard: ITU-R M.1371, 2000.

Parameter	**Number of bits**	**Description**	**Comments**
Message ID	6	Identifier for message 5	
Repeat Indicator	2		Not processed by the NS 4000
User ID	30	MMSI number	
AIS Version Indicator	2		Not processed by the NS 4000
IMO number	30	1–999999999; 0 = not available = default	
Call sign	42	7 x 6 bit ASCII characters, "@@@@@ @@" = not available = default	
Name	120	Maximum 20 characters 6 bit ASCII, "@@@@ @@@@@@@@@@@@@@@@" = not available = default	
Type of ship and cargo type	8	0 = not available or no ship = default 1–99 = as defined in Table "Type of ship" (see above) 100–199 = reserved, for regional use 200–255 = reserved, for future use	
Overall Dimension/Reference for Position	30	Reference point (VDM 1, 2, 3) for reported position. Indicates the dimension of ship in metres (see SSD message)	
Type of Electronic Position Fixing Device	4	0 = Undefined (default) 1 = GPS 2 = GLONASS 3 = Combined GPS/GLONASS 4 = Loran-C 5 = Chayka 6 = Integrated Navigation System 7 = surveyed 8–15 = not used	
ETA	20	Estimated Time of Arrival; MMDDHHMM UTC Bits 19–16: month 1–12 0 = not available = default Bits 15–11: day 1–31 0 = not available = default Bits 10–6: hour 0–23 24 = not available = default Bits 5–0: minute 0–59 60 = not available = default	
Maximum Present Static Draught	8	in 1/10 m 255 = draught 25.5 m or greater 0 = not available = default in accordance with IMO Resolution A.851	Maximum permissible draft in the NS 4000 is 25.5 m
Destination	120	Maximum 20 characters using 6-bit ASCII; "@@@@@@@@@@@@@@@@@@@@" = not available	
DTE	1		Not processed by the NS 4000
Spare	1		Not processed by the NS 4000
Number of bits	424		

6 – Addressed Binary Message (In VDM)

The NS 4000 for the reception uses this sentence only.

Standard: ITU-R M.1371, 2000.

Parameter	Number of bits	Description	Comments
Message ID	6	Identifier for message 6	
Repeat Indicator	2		Not processed by the NS 4000
Source ID	30	MMSI number of source station	
Sequence Number	2	0–3	Not processed by the NS 4000
Destination ID	30	MMSI number of destination station	
Retransmit Flag	1	Retransmit Flag should be set upon retransmission: 0 = no retransmission = default; 1 = retransmitted	Not processed by the NS 4000
Spare	1		Not processed by the NS 4000
Binary Data	Max 936	Application Identifier always contains: DAC (Designated Area Code) = 001 (IAI – International Application Identifier); FI (Function Identifier) = 00 (text telegram using 6-bit ASCII, general FI Group) – 16 bit Application Data – 920 bit maximum	
Maximum Number of bits	Max 1008	Occupies 1 to 5 slots subject to the length of sub-field Message Content	

8 – Binary Broadcast Message (In VDM)

The NS for the reception uses this sentence only.

Standard: ITU-R M.1371, 2000.

Parameter	Number of bits	Description	Comments
Message ID	6	Identifier for message 8	
Repeat Indicator	2		Not processed by the NS 4000
Source ID	30	MMSI number of source station	
Spare	1		Not processed by the NS 4000
Binary Data	Max 968	Application Identifier always contains: DAC (Designated Area Code) = 001 (IAI – International Application Identifier); FI (Function Identifier) = 00 (text telegram using 6-bit ASCII, general FI Group) – 16 bit Application Data – 952 bit maximum	
Maximum Number of bits	Max 1008	Occupies 1 to 5 slots	

9 – Standard SAR Aircraft Position Report (In VDM)

The NS 4000 for the reception uses this sentence only.

Standard: ITU-R M.1371, 2000.

Parameter	Number of bits	Description	Comments
Message ID	6	Identifier for message 9; always 9	
Repeat Indicator	2		Not processed by the NS 4000
User ID	30	MMSI number	
Altitude (GNSS)	12	Altitude (derived from GNSS) expressed in metres (0–4094 metres). 4095 = not available; 4094 = 4094 metres or higher	
SOG	10	Speed over ground in knot steps (0–1022 knots) 1023 = not available; 1022 = 1022 knots or higher	
Position accuracy	1	1 = high (< 10 m; Differential Mode of e.g. DGNSS receiver). 0 = low (> 10 m; Autonomous Mode of e. g. GNSS receiver or of other Electronic Position Fixing Device); default = 0	
Longitude	28	Longitude in 1/10 000 min (± 180 degrees, East = positive (as per 2´s complement), West = negative (as per 2´s complement). 181 degrees (6791AC0 hex) = not available = default)	
Latitude	27	Latitude in 1/10 000 min (± 90 degrees, North = positive (as per 2´s complement), South = negative (as per 2´s complement). 91 degrees (3412140 hex) = not available = default)	
COG	12	Course over ground in 1/10 degrees (0–3599). 3600 (E10 hex)= not available = default; 3601–4095 should not be used	
Time stamp	6		Not processed by the NS 4000
Reserved for regional applications	8		Not processed by the NS 4000
DTE	1	Data terminal ready (0 = available 1 = not available = default)	
Spare	5		Not processed by the NS 4000
RAIM-Flag	1		Not processed by the NS 4000
Communication State	19		Not processed by the NS 4000
Total number of bits	168		

12 – Addressed Safety Related Message (In VDM)

The NS 4000 for the reception uses this sentence only.

Standard: ITU-R M.1371, 2000.

Parameter	Number of bits	Description	Comments
Message ID	6	Identifier for Message 12; always 12	
Repeat Indicator	2		Not processed by the NS 4000
Source ID	30	MMSI number of station which is the source of the message	
Sequence Number	2		Not processed by the NS 4000
Destination ID	30	MMSI number of station which is the destination of the message	
Retransmit Flag	1		Not processed by the NS 4000
Spare	1		Not processed by the NS 4000
Safety related text	Max 936	6-bit ASCII	
Total Maximum Number of bits	Max 1008	Occupies 1 to 5 slots subject to the length of text	

14 – Safety Related Broadcast Message (In VDM)

The NS 4000 for the reception uses this sentence only.

Standard: ITU-R M.1371, 2000.

Parameter	Number of bits	Description	Comments
Message ID	6	Identifier for message 14; always 14	
Repeat Indicator	2		Not processed by the NS 4000
Source ID	30	MMSI number of source station of message	
Spare	2		Not processed by the NS 4000
Safety related Text	Max 968	6-bit ASCII	
Total Number of bits	Max 1008	Occupies 1 to 5 slots subject to the length of text	

18 – Standard Class B Equipment Position Report (In VDO and VDM)

The NS 4000 for the reception uses this sentence only.

Standard: ITU-R M.1371, 2000.

Parameter	Number of bits	Description	Comments
Message ID	6	Identifier for message 18; always 18	
Repeat Indicator	2		Not processed by the NS 4000
User ID	30	MMSI number	
Reserved for regional or local applications	8		Not processed by the NS 4000
SOG	10	Speed over ground in 1/10 knot steps (0–102.2 knots): 1023 = not available; 1022 = 102.2 knots or higher	

Parameter	Number of bits	Description	Comments
Position accuracy	1	1 = high (< 10 m; Differential Mode of e.g. DGNSS receiver). 0 = low (> 10 m; Autonomous Mode of e.g. GNSS receiver or of other Electronic Position Fixing Device); default = 0	
Longitude	28	Longitude in 1/10 000 min. (±180 degrees, East = positive (as per 2´s complement), West = negative (as per 2´s complement). 181 degrees (6791AC0 hex) = not available = default)	
Latitude	27	Latitude in 1/10 000 min. (±90 degrees, North = positive (as per 2´s complement), South = negative (as per 2´s complement); 91 degrees (3412140 hex) = not available = default)	
COG	12	Course over ground in 1/10 degrees (0–3599): 3600 (E10 hex)= not available = default; 3601–4095 should not be used	
True Heading	9	Degrees (0–359) (511 indicates not available = default)	
Time stamp	6		Not processed by the NS 4000
Reserved for regional applica-tions	4		Not processed by the NS 4000
Spare	4		Not processed by the NS 4000
RAIM-Flag	1		Not processed by the NS 4000
Communication State Selector Flag	1		Not processed by the NS 4000
Communication State	19		Not processed by the NS 4000
Total number of bits	168		

19 – Extended Class B Equipment Position Report (In VDM)

The NS 4000 for the reception uses this sentence only.

Standard: ITU-R M.1371, 2000.

Parameter	Number of bits	Description	Comments
Message ID	6	Identifier for message 19; always 19	
Repeat Indicator	2		Not processed by the NS 4000
User ID	30	MMSI number	
Reserved for regional or local applications	8		Not processed by the NS 4000
SOG	10	Speed over ground in 1/10 knot steps (0–102.2 kts): 1023 = not available; 1022 = 102.2 knots or higher	
Position accuracy	1	1 = high (> 10 m; Differential Mode of e.g. DGNSS receiver). 0 = low (< 10 m; Autonomous Mode of e.g. GNSS receiver or of other Electronic Position Fixing Device); default = 0	

Parameter	Number of bits	Description	Comments
Longitude	28	Longitude in 1/10 000 min. (±180 degrees, East = positive (as per 2´s complement), West = negative (as per 2´s complement). 181 degrees (6791AC0 hex) = not available = default)	
Latitude	27	Latitude in 1/10 000 min. (±90 degrees, North = positive (as per 2´s complement), South = negative (as per 2´s complement); 91 degrees (3412140 hex) = not available = default)	
COG	12	Course over ground in 1/10 degrees (0–3599): 3600 (E10 hex)= not available = default; 3601–4095 should not be used	
True Heading	9	Degrees (0–359). (511 indicates not available = default)	
Time stamp	6		Not processed by the NS 4000
Reserved for regional applica-tions	4		Not processed by the NS 4000
Name	120	Maximum 20 characters 6 bit ASCII, "@@@@@ @@@@@@@@@@@@@@@" = not available = default	
Type of ship and cargo type	8	0 = not available or no ship = default 1–99 = as defined in Table "Type of ship" (see above) 100–199 = reserved, for regional use 200–255 = reserved, for future use	
Dimension of Ship/Reference for Position	30	Reference point for reported position; Also indicates the dimension of ship in metres (see SSD message)	
Type of Electronic Position Fixing Device	4	0 = Undefined (default) 1 = GPS 2 = GLONASS 3 = Combined GPS/GLONASS 4 = Loran-C 5 = Chayka 6 = Integrated Navigation System 7 = surveyed 8–15 = not used	Not processed by the NS 4000
RAIM-Flag	1		Not processed by the NS 4000
DTE	1	Data terminal ready (0 = available 1 = not available = default)	
Assigned Mode Flag	1		Not processed by the NS 4000
Spare	5		Not processed by the NS 4000
Total number of bits	312		

21 – Aids-to-Navigation Report

The NS 4000 for the reception uses this sentence only.

Standard: ITU-R M.1371, 2000.

Parameter	Number of bits	Description	Comments
Message ID	6	Identifier for message 21; always 21	
Repeat Indicator	2		Not processed by the NS 4000
ID	30	MMSI number	
Type of Aids-to-Navigation	5	See table below	
Name of Aids-to-Navigation	120	Maximum 20 characters 6 bit ASCII, "@@@@@@@@@@@@@@@@@@@@" = not available = default. The name of the Aid-to-Navigation may be extended by the parameter "Name of Aid-to-Navigation Extension" below	
Position accuracy	1	1 = high (< 10 m; Differential Mode of e.g. DGNSS receiver). 0 = low (> 10 m; Autonomous Mode of e.g. GNSSW receiver or of other Electronic Position Fixing Device). Default = 0	
Longitude	28	Longitude in 1/10 000 min of position of an Aid-to-Navigation. (±180 degrees, East = positive, West = negative. 181 degrees (6791AC0 hex) = not available = default)	
Latitude	27	Latitude in 1/10 000 min of position of an Aid-to-Navigation. (±90 degrees, North = positive, South = negative, 91 degrees (3412140 hex) = not available = default)	
Dimension/Reference for Position	30	Reference point for reported position; also indicates the dimension of Aids-to-Navigation in meters[1]	
Type of Electronic Position Fixing Device	4	0 = Undefined (default) 1 = GPS 2 = GLONASS 3 = Combined GPS/GLONASS 4 = Loran-C 5 = Chayka 6 = Integrated Navigation System 7 = Surveyed. For fixed A-to-Ns and virtual/pseudo A-to-Ns, the surveyed position should be used. The accurate position enhances its function as a radar reference target 8–15 = not used	

[1] – the following should be observed:

- for fixed Aids-to-Navigation, virtual and pseudo A-to-Ns, and for off-shore structures, the orientation established by the dimension A should point to true north;
- for floating aids larger than 2 m x 2 m, the dimensions of the Aids to Navigation should always be given approximated to a square, i.e. the dimensions should always be as follows A=B=C=D≠0. (This is due to the fact, that the orientation of the floating Aid to Navigation is not transmitted. The reference point for reported position is in the center of the square.);
- A=B=C=D=1 should indicate objects (fixed or floating) smaller than or equal to 2 m x 2 m. (The reference point for reported position is in the center of the square.).

Parameter	Number of bits	Description	Comments
Time Stamp	6	UTC second when the report was generated by the EFPS (0–59, or 60 if time stamp is not available, which should also be the default value, or 61 if positioning system is in manual input mode, or 62 if Electronic Position Fixing System operates in estimated (dead reckoning) mode, or 63 if the position system is inoperative)	
Off-Position Indicator	1	For floating Aids-to-Navigation only: 0 = on position; 1 = off position. Note: This flag should only be considered valid by receiving station, if the Aid-to-Navigation is a floating aid, and if Time Stamp is equal to or below 59. For floating A-to-N, the guard zone parameters should be set on installation	
Reserved for regional or local application	8	Reserved for definition by a competent regional or local authority. Should be set to zero, if not used for any regional or local application. Regional application should not use zero	Not processed by the NS 4000
RAIM-Flag	1		Not processed by the NS 4000
Virtual/pseudo A-to-N Flag	1	0 = default = real A-to-N at indicated position; 1 = virtual/pseudo A-to-N, does not physically exist, may only be transmitted from an AIS station nearby under the direction of a competent authority[2]	
Assigned Mode Flag	1		Not processed by the NS 4000
Spare	1	Spare. Not used. Should be set to zero	
Name of Aid-to-Navigation Extension	0, 6, 12, 18, 24, 30, 36, ..., 84	This parameter of up to 14 additional 6-bit-ASCII characters for a 2-slot message may be combined with the parameter “Name of Aid-to-Navigation” at the end of that parameter, when more than 20 characters are needed for the Name of the Aid-to-Navigation. This parameter should be omitted when no more than 20 characters for the name of the A-to-N are needed in total. Only the required number of characters should be transmitted, i.e. no @-character should be used	
Spare	0, 2, 4, or 6	Spare. Used only when parameter “Name of Aid-to-Navigation Extension” is used. Should be set to zero. The number of spare bits should be adjusted in order to observe byte boundaries	
Number of bits	272–360	Occupies two slots	

Note: The competent international body for Aids-to-Navigation, IALA, defines an Aid-to-Navigation as: “a device or system external to vessels designed and operated to enhance safe and efficient navigation of vessels and/or vessel traffic” (IALA Navguide, Edition 1997, Chapter 7).

The IALA Navguide stipulates: “A floating aid to navigation, which is out of position, adrift or during the night is unlighted, may itself become a danger to navigation. When a floating aid is out of position or malfunctioning, navigational warnings must be given”. Therefore, a station, which transmits Message 21, could also transmit Safety Related Broadcast Message (Message 14) upon detecting that the floating Aid-to-Navigation has gone out of position or is malfunctioning, at the competent authority's discretion.

[2] – when transmitting virtual/pseudo Aids to Navigation information, i.e. the virtual/pseudo Aids to Navigation Target Flag is set to one (1), the dimensions should be set to A=B=C=D=0 (default). This should also be the case, when transmitting “reference point” information (see table below).

Table "Type of Aids to Navigation"

The nature and type of A-to-N can be indicated with 32 different codes, as shown below:

	Code	Definition
	0	Default, Type of A-to-N not specified
	1	Reference point
	2	RACON
	3	Structure off shore, such as oil platforms, wind farms, rigs. (Note: This code should identify an obstruction that is fitted with an Aid-to-Navigation AIS station.)
	4	Spare
Fixed A-to-N	5	Light, without sectors
	6	Light, with sectors
	7	Leading Light Front
	8	Leading Light Rear
	9	Beacon, Cardinal N
	10	Beacon, Cardinal E
	11	Beacon, Cardinal S
	12	Beacon, Cardinal W
	13	Beacon, Port hand
	14	Beacon, Starboard hand
	15	Beacon, Preferred Channel port hand
	16	Beacon, Preferred Channel starboard hand
	17	Beacon, Isolated danger
	18	Beacon, Safe water
	19	Beacon, Special mark
Floating A-to-N	20	Cardinal Mark N
	21	Cardinal Mark E
	22	Cardinal Mark S
	23	Cardinal Mark W
	24	Port hand Mark
	25	Starboard hand Mark
	26	Preferred Channel Port hand
	27	Preferred Channel Starboard hand
	28	Isolated danger
	29	Safe Water
	30	Special Mark
	31	Light Vessel/LANBY

Note: The types of Aids to Navigation listed above are based on the IALA Maritime Buoyage System, where applicable.

There is potential for confusion when deciding whether an aid is lighted or unlighted. Competent authorities may wish to use the regional/local section of the message to indicate this.

Sentences Transmitted by the NS 4000 via AIS Channel in the Operation with a Transponder

AIQ, ALR – Monitoring of Set Alarm State

The NS 4000 in following cases transmits this sentence:

- At the NS 4000 start;
- At the transponder restart.

$xxAIQ, ALR[1]*hh<CR><LF>.

N	Field	Name	Comments
1	ALR	Request for set alarm state information	In response to this request, the NS 4000 receives the sentence from the SAAB R4 transponder

AIQ, SSD – Monitoring of Static Ship Data

The NS 4000 in following cases transmits this sentence:

- At the NS 4000 start;
- As change occurs;
- At the transponder restart.

$xxAIQ, SSD[1]*hh<CR><LF>.

N	Field	Name	Comments
1	SSD	Request for static ship data	In response to this request, the NS 4000 receives the sentence from the SAAB R4 transponder

AIQ, TXT – Monitoring of Text Transmission

The NS 4000 in following cases transmits this sentence:

- At the NS 4000 start;
- At the transponder restart.

$xxAIQ, TXT[1]*hh<CR><LF>.

N	Field	Name	Comments
1	TXT	Request for static ship data	In response to this request, the NS 4000 receives the sentence from the SAAB R4 transponder

AIQ, VSD – Monitoring of Voyage Information

The NS 4000 in following cases transmits this sentence:

- At the NS 4000 ECDIS MFD start;
- As change occurs;
- At the transponder restart;
- Once in 10 minutes.

$xxAIQ, VSD[1]*hh<CR><LF>.

N	Field	Name	Comments
1	VSD	Request for voyage information	In response to this request, the NS 4000 receives the sentence from the SAAB R4 transponder

ABK – Addressed Binary and Safety Related Message

This sentence is used by the NS 4000 for the reception only via AIS channel in NS 4000.

The ABK-sentence is generated when a transaction, initiated by reception of an ABM, AIR, or BBM sentence, is completed or terminated.

This sentence provides information about the success or failure of a requested ABM broadcast of either ITU-R M.1371 messages 6 or 12. The ABK process utilizes the information received in ITU-R M.1371 messages 7 and 13. Upon reception of either a VHF Data-link message 7 or 13, or the failure of messages 6 or 12, the AIS unit delivers the ABK sentence to the external application.

This sentence is also used to report to the external application the AIS unit's handling of the AIR (ITU-R M.1371 message 15) and BBM (ITU-R M.1371 messages 8 and 14) sentences. The external application initiates an interrogation through the use of the AIR-sentence, or a broadcast through the use of the BBM sentence. The AIS unit generates an ABK sentence to report the outcome of the AIR or BBM broadcast process.

Standard: IEC 61993-2, 2001-11-09.

$--ABK, xxxxxxxxx[1], a[2], x.x[3], x[4], x[5]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	xxxxxxxxx	MMSI of the addressed destination AIS unit	Identifies the distant addressed AIS unit involved with the acknowledgement. If more than one MMSI are being addressed (ITU-R M.1371 message 15), the MMSI of the first distant AIS unit, identified in the message, is the MMSI reported here. When the Message ID is a general broadcast (ITU-R M.1371 messages 8 or 14), this field is null	
2	a	AIS channel of reception		Not processed by the NS 4000
3	x.x	ITU-R M.1371 message ID	This indicates to the external application the type of ITU-R M.1371 message that this ABK sentence is addressing. Also see the message IDs listed in Note 1	
4	x	Message Sequence Number		See note 1
5	x	Type of acknow-ledgement		See note 2

Note: The message sequence number, together with the ITU-R M.1371 message ID and MMSI of the addressed AIS unit, uniquely identifies a previously received ABM, AIR, or BBM sentence. Generation of an ABK sentence makes a sequential message identifier available for reuse. The ITU-R M.1371 Message ID is used to determine the origin of the message sequence identifier number. The following table lists the origins by message ID:

ITU-R M.1371 Message ID	Message Sequence Number source
6	Sequential message identifier from ABM-sentence, IEC 61162-1
7	Addressed AIS unit's message 7, sequence number, ITU-R M.1371
8	Sequential message identifier from BBM-sentence, IEC 61162-1
12	Sequential message identifier from ABM-sentence, IEC 61162-1
13	Addressed AIS unit's message 13, sequence number, ITU-R M.1371
14	Sequential message identifier from BBM-sentence, IEC 61162-1
15	No source, field shall be null

Note: Acknowledgements provided are:

- 0 = message (6 or 12) successfully received by the addressed AIS unit; 1 = message (6 or 12) was broadcast, but no acknowledgement by the distant addressed AIS unit;
- 2 = message could not be broadcast;
- 3 = requested broadcast of message (8, 14, or 15) has been successfully completed;
- 4 = late reception of a message 7 or 13 acknowledgement “addressed to ownship” MMSI – identified by; destination MMSI, acknowledgement source MMSI, message sequence identifier, and message type. Late reception means that the AIS unit did not have an acknowledgement process active for the acknowledgement that was received.

ABM – Addressed Binary and Safety Related Message

This sentence is used by the NS 4000 for the transmission only via AIS channel in NS 4000.

This sentence supports ITU-R M.1371 messages 6 and 12. It provides an external application with a means to exchange data using AIS. The message data is defined by the application only – not the AIS. This message offers great flexibility for implementing system functions that use the AIS like a communications device. After receiving this sentence, the AIS initiates a radio broadcast on the VHF Data Link (VDL) of either message 6 or 12. The AIS will make up to four broadcasts of the message. The actual number will depend on the reception of an acknowledgement from the addressed “destination” AIS. The default time between retries is 4 sec. Retries will not be attempted more frequently than 4 sec. Retries stop when the appropriate acknowledgement (See ITU-R M.1371 messages 7 and 13) is received. The AIS will make up to 4 broadcasts, original broadcast plus three retires. This process could take 32 sec to complete.

The success or failure of the reception of this broadcast by the intended AIS unit is confirmed through the use of the “Addressed and binary Broadcast Acknowledgement (ABK)” sentence formatter, and the processes that support the generation of an ABK-sentence. The AIS is also limited in the amount of encapsulated data that can be sent in each slot and frame. If the length of the message would exceed five slots, or the AIS broadcast would exceed the limit of 20 RATDMA slot transmissions for the current frame, the AIS will return an ABK-sentence with an acknowledgement of “2” – message could not be broadcast.

Standard: IEC 61993-2, 2001-11-09.

!--ABM, x^1, x^2, x^3, $xxxxxxxxx^4$, x^5, $x.x^6$, $s\text{--}s^7$, x^8*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x	Total number of sentences needed to transfer the message	1 to 9	
2	x	Sentence number	1 to 9	
3	x	Sequential message identifier	0 to 3	
4	xxxxxxxxx	The MMSI of destination AIS unit for the ITU-R M.1371 message		
5	x	AIS channel for broadcast of the radio message		
6	x.x	ITU-R M.1371 message	6 or 12	6 – normal text 12 – safety text
7	s--s	Encapsulated data	156 characters if field “6” = 12 153 characters if field “6” = 6	
8	x	Number of fill-bits	0 to 5	

ALR – Set Alarm State

This sentence is used by the NS 4000 for the transmission and reception via AIS channel in NS 4000.

Local alarm condition and status. This sentence is used to report an alarm condition on a device and its current state of acknowledgment.

Standard: IEC 61162-1, 2001-07.

$--ALR, hhmmss.ss[1], xxx[2], A[3], A[4], c—c[5]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	hhmmss.ss	Time of alarm condition change, UTC		
2	xxx	ID number of the alarm source		
3	A	Alarm condition	A = threshold exceeded V = not exceeded	
4	A	Alarm's acknowledge state	A = acknowledged V = unacknowledged	
5	c--c	Alarm's description text		

BBM – Broadcast Binary Message

This sentence is used by the NS 4000 for the transmission only via AIS channel in NS 4000.

Standard: IEC 61993-2, 2001-11-09.

!--BBM, x[1], x[2], x[3], x[4], x.x[5], s--s[6], x[7]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x	Total number of sentences needed to transfer the message	1 to 9	
2	x	Sentence number	1 to 9	
3	x	Sequential message identifier	0 to 9	
4	x	AIS channel for broadcast of the radio message		
5	x.x	ITU-R M.1371 message	8 or 14	8 – normal text 14 – safety text
6	s--s	Encapsulated data	156 characters if field "5" = 14 153 characters if field "5" = 8	
7	x	Number of fill-bits	0 to 5	

Note: Transmission of a target from the NS 4000 is made in ABM, BBM safety related sentences in the form of text information containing the target identifier, coordinates, COG, SOG as of the moment of the target acquisition by the NS 4000 operator.

SSD – Ship Static Data

This sentence is used by the NS 4000 for the transmission and reception via AIS channel in NS 4000.

Standard: IEC 61993-2, 2001-11-09.

$--SSD, c--c[1], c--c[2], xxx[3], xxx[4], xx[5], xx[6], c[7], aa[8]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	c--c	Ship’s call sign	1 to 7	Set in “System Configuration” utility
2	c--c	Ship’s name	1 to 20	Set in “System Configuration” utility
3	xxx	Pos. ref. Point distance “A”, from bow	0 to 511 (meters)	See Note
4	xxx	Pos. ref., “B”, from stern	0 to 511 (meters)	See Note
5	xx	Pos. ref., “C”, from port beam	0 to 63 (meters)	See Note
6	xx	Pos. ref., “D”, from starboard beam	0 to 63 (meters)	See Note
7	c	DTE indicator flag		Transmitted by the with value = 0
8	aa	Source identifier		Not transmitted by the NS 4000

Note: Coefficients A, B, C, D depend on LOA, BOA, X/Y Conning Station or External GPS parameters set in “System Configuration” utility. NS 4000 transmits to SAAB R4 transponder parameters (A, B, C, D) of the internal and external GPS receiver antenna units, by using the internal data exchange protocol. In this case, fields 3-6 in SSD sentence are transmitted empty.

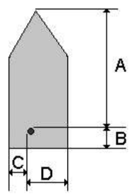


Fig. 72. Dimensions of the Vessel

TXT – Text Transmission

This sentence is used by the NS 4000 for the reception only via AIS channel in NS 4000.

For the transmission of short text messages. Using multiple sentences may transmit longer text messages.

Standard: IEC 61162-1, 2001-07.

$--TXT, xx[1], xx[2], xx[3], c—c[4]*hh<CR><LF>

N	Field	Name	Value	Comments
1	x.x	Total number of messages	01 to 99	Not processed by the NS 4000
2	x.x	Message number	01 to 99	Not processed by the NS 4000
3	x.x	Text identifier	The text identifier is a number, 01 to 99, used to identify different text messages	
4	c--c	Text message	ASCII characters, and code delimiters if needed, up to the maximum permitted sentence length (i.e. up to 61 characters including any code delimiters)	

VSD – Voyage Static Data

This sentence is used by the NS 4000 for the reception and transmission via AIS channel in NS 4000.

Standard: IEC 61993-2, 2001-11-09.

$--VSD, x.x[1], x.x[2], x.x[3], c--c[4], hhmmss.ss[5], xx[6], xx[7], x.x[8], x.x[9]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x.x	Type of ship and cargo category	0 to 255	See the table below
2	x.x	Maximum current static draught	0 to 25.5 (meter)	
3	x.x	Persons on board	0 to 8191	
4	c--c	Destination	1 to 20 characters	
5	hhmmss.ss	Est. UTC time of arrival at destination	Hours, minutes, and seconds	Only hours and minutes are processed in NS 4000
6	xx	Est. day of arrival at destination	00 to 31 (UTC)	
7	xx	Est. month of arrival at destination	00 to 12 (UTC)	
8	x.x	Navigational status	0 = Underway using engine 1 = At anchor 2 = Not under command 3 = Restricted manoeuvrability 4 = Constrained by draught 5 = Moored 6 = Aground 7 = Engaged in fishing 8 = Under way sailing 9 = High Speed Craft (HSC) 10 = Wing In Ground (WIG) 15 = Undefined (default)	
9	x.x	Regional application flags	0 to 15	Transmitted by the NS 4000 with value = 0

Ship and Cargo Type

Ships/Cargo type	VSD message identifier
WIG (Carrying DG, HS, or MP IMO hazard or pollutant category A)	21
WIG (Carrying DG, HS, or MP IMO hazard or pollutant category B)	22
WIG (Carrying DG, HS, or MP IMO hazard or pollutant category C)	23
WIG (Carrying DG, HS, or MP IMO hazard or pollutant category C)	24
WIG (No additional information)	29
Fishing vessel	30
Towing vessel	31
Towing vessel (length of the tow exceeds 200 m, breadth exceeds 25 m)	32
Vessel engaged in dredging or underwater operations	33
Vessel engaged in diving operations	34
Vessel engaged in military operations	35
Sailing vessel	36
Pleasure craft	37
HSC (Carrying DG, HS, or MP IMO hazard or pollutant category A)	41
HSC (Carrying DG, HS, or MP IMO hazard or pollutant category B)	42
HSC (Carrying DG, HS, or MP IMO hazard or pollutant category C)	43

Ships/Cargo type	VSD message identifier
HSC (Carrying DG, HS, or MP IMO hazard or pollutant category D)	44
HSC (No additional information)	49
Pilot vessel	50
Search and rescue vessel	51
Tug	52
Port tender	53
Vessel with antipollution facilities	54
Law enforcement vessel	55
Medical transport (as defined in the 1949 Geneva Conventions)	58
Ship according to Resolution No 18 (Mob – 83)	59
Passenger ship. All ships of this type	60
Passenger ship (Carrying DG, HS, or MP IMO hazard or pollutant category A)	61
Passenger ship (Carrying DG, HS, or MP IMO hazard or pollutant category B)	62
Passenger ship (Carrying DG, HS, or MP IMO hazard or pollutant category C)	63
Passenger ship (Carrying DG, HS, or MP IMO hazard or pollutant category D)	64
Passenger ship (No additional information)	69
Cargo ship. All ships of this type	70
Cargo ship (Carrying DG, HS, or MP IMO hazard or pollutant category A)	71
Cargo ship (Carrying DG, HS, or MP IMO hazard or pollutant category B)	72
Cargo ship (Carrying DG, HS, or MP IMO hazard or pollutant category C)	73
Cargo ship (Carrying DG, HS, or MP IMO hazard or pollutant category D)	74
Cargo ship (No additional information)	79
Tanker. All ships of this type	80
Tanker (Carrying DG, HS, or MP IMO hazard or pollutant category A)	81
Tanker (Carrying DG, HS, or MP IMO hazard or pollutant category B)	82
Tanker (Carrying DG, HS, or MP IMO hazard or pollutant category C)	83
Tanker (Carrying DG, HS, or MP IMO hazard or pollutant category D)	84
Tanker (No additional information)	89
Other type. All ships of this type	90
Other type (Carrying DG, HS, or MP IMO hazard or pollutant category A)	91
Other type (Carrying DG, HS, or MP IMO hazard or pollutant category B)	92
Other type (Carrying DG, HS, or MP IMO hazard or pollutant category C)	93
Other type (Carrying DG, HS, or MP IMO hazard or pollutant category D)	94
Other type (No additional information) – (its default)	99

Additional Information

Position Sensors Fallback Conditions

Priority	Position Sensor status	Position (Latitude/Longitude)
1	External DGNSS in use (differential corrected)	Lat/Lon (external)
2	Internal DGNSS in use (differential corrected)	Lat/Lon (internal)
3	Internal DGNSS in use (differential corrected, beacon). Applicable only if (optional) an internal beacon receiver is provided	Lat/Lon (internal)
4	External Positioning Fixing System in use (differential uncorrected)	Lat/Lon (external)
5	Internal GNSS in use (differential uncorrected)	Lat/Lon (internal)
6	Manual position input	Lat/Lon (manual)
	Dead reckoning position	Lat/Lon (dead reckoning)
	No position	Not available

The AIS automatically selects the position source with the highest priority available. If data availability changes, the AIS automatically switch to the position source with the highest priority available after 5 sec when switching downwards, or 30 sec when switching upwards. During this period, the latest valid position is used for reporting.

Class A Shipborne Mobile Equipment Reporting Intervals

Type of Ship	Reporting interval
Ship at anchor or moored and not moving faster than 3 knots	3 min
Ship at anchor or moored and moving faster than 3 knots	10 s
Ship with a speed of between 0–14 knots	10 s
Ship with a speed of between 0–14 knots and changing course	3 1/3 s
Ship with a speed of between 14–23 knots	6 s
Ship with a speed of between 14–23 knots and changing course	2 s
Ship with a speed of greater than 23 knots	2 s
Ship with a speed of greater than 23 knots and changing course	2 s

Note: The reporting rate shall increase to once per 2 sec in accordance with Recommendation ITU-R M.1371-1, Annex 1, Chapter 4.2.1, Footnote (1), when the station determines that it is the semaphore.

If the autonomous mode requires a higher rate than the assigned mode, the AIS shall use the autonomous mode.

Reporting Intervals For Equipment Other Than Class A Shipborne Mobile Equipment

Platform's Condition	Nominal Reporting Interval
Class B Shipborne Mobile Equipment not moving faster than 2 knots	3 min
Class B Shipborne Mobile Equipment moving 2–14 knots	30 sec
Class B Shipborne Mobile Equipment moving 14–23 knots	15 sec
Class B Shipborne Mobile Equipment moving > 23 knots	5 sec
Search and Rescue aircraft (airborne mobile equipment)	10 sec
Aids to Navigation	3 min
AIS base station[3]	10 sec

ROT Sensor Fallback Conditions

The AIS automatically select the ROT source with the highest priority available as given in table below:

Priority	Position Sensor status	Contents of ROT field Affected data in messages 1, 2, 3 (ITU-R M.1371, 2000)
1	Rate of Turn Indicator in use[4]	0…+126 = turning right at up to 708 degrees per minute or higher; 0…-126 = turning left at up to 708 degrees per minute or higher. Values between 0 and 708 degrees/min shall be coded by ROT_{AIS} = 4.733 SQRT (ROT_{sensor}) degrees/min ROT_{sensor} is the Rate of Turn as input by the external Rate of Turn Indicator (TI). Values of 709 degrees per minute and above shall be cut to 708 degrees per minute
2	Other ROT source in use[5]	+127 = turning right at more than 5°/30s (No TI is available); -127 = turning left at more than 5°/30s (No TI is available)
3	No valid ROT information available	-128 (80 hex) indicates no turn information available (default)

[3] – the base station rate should increase to once per $3^1/_3$ seconds after the station detects that one or more stations are synchronizing to the base station.

[4] – rate of turn indicator according to IMO A.526 (13); determined by talker ID.

[5] – i.e. based on compass information.

NAVTEX SENSOR DATA EXCHANGE FORMAT

NMEA Format

NRX – NAVTEX Received Message

The NRX sentence is used to transfer the contents of a received NAVTEX message from the NAVTEX receiver to another device. As the length of a single NAVTEX message may exceed the number of characters permitted in a single sentence, many NRX sentences may be required to transfer a single NAVTEX message.

$--NRX,xxx[1],xxx[2],xx[3],aaxx[4],x[5],hhmmss.ss[6],xx[7],xx[8],xxxx[9],x.x[10],x.x[11],A[12], c--c[13]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	xxx	Number of sentences	001–999	
2	xxx	Sentence number	001–999	
3	xx	Sequential message id	00–99	
4	aaxx	NAVTEX message code	The first character identifies the transmitter coverage area, and the second character identifies the type of message. The remaining two characters are restricted to numerals with a range of 00 to 99 and represent a serial number for each type of message	
5	x	Frequency table index 0–9	The frequency indicator identifies the frequency that the NAVTEX message was received on: 0 = not received over air (e.g. test messages); 1 = 490 kHz; 2 = 518 kHz; 3 = 4209.5 kHz	
6	hhmmss.ss	UTC of receipt of message		
7	xx	Day	1–31	
8	xx	Month	1–12	
9	xxxx	Year		
10	x.x	Total number of characters in this series of NRX sentences	The total number of characters indicates the expected size of the message body sent in this sequence of NRX sentences	
11	x.x	Total number of bad characters		
12	A	Status indication	A = correct message reception, V = incorrect message reception	
13	c--c	Message body		

NRM – NAVTEX Receiver Mask

This command is used to manipulate the configuration masks that control which messages are stored, printed, and sent to the NS 4000 port of the NAVTEX receiver.

$--NRM,x[1],x[2],hhhhhhhh[3],hhhhhhhh[4]*hh<CR><LF>.

N	Field	Name	Value	Comments
1	x	Function code	The function code is used to further identify the purpose of the sentence. The meaning of the function code is as follows: 0 – request messages for the given mask; 1 – set/report the storage mask; 2 – set/report the printer mask; 3 – set/report the NS 4000 mask	
2	x	Frequency table index	The frequency indicator identifies the frequency that the NAVTEX message was received on: 1 = 490 kHz; 2 = 518 kHz; 3 = 4209.5 kHz	
3	hhhhhhhh	Transmitter coverage area mask	The transmitter coverage area mask is defined as a 32 bit hex field where the least significant bit represents transmitter coverage area “A”, the next bit is “B” and so on up to bit 25 which is “Z”	
4	hhhhhhhh	Message type mask	The message type mask is defined as a 32 bit hex field where the least significant bit represents message type “A”, the next bit is “B” and so on up to bit 25 which is “Z”	

When another device wishes to determine the current values of the bit masks it sends a query sentence to the NAVTEX receiver as follows:
$--CRQ,NRM*hh<CR><LF>.

ASCII Format

NAVTEX messages have the following format (the message shown in the drawing serves as an example):

```
ZCZC SA43    (Error rate:  0 percent)
WZ 250.
ENGLAND, SOUTH COAST. APPROACHES TO PLYMOUTH. HANDS
DEEP LIGHTBUOY
50-13N 004-21W MISSING
CANCEL WZ 247 (SA41)
NNNN
```

Fig. 73. NAVTEX Message

- ZCZC – message start identifier;
- S – transmitting station identifier (S – Nitone);
- A – message type identifier (A – navigational warnings);
- 43 – message number (43);
- Error rate – message reception error transmitted by the NAVTEX receiver;
- WZ 250 – warning type identifier and its current number:
  – Text of the message.
- CANCEL WZ 247 (SA41) indicates cancellation of WZ 247 warning sent in message SA41. It is highlighted with the red colour;
- NNNN – message end identifier.

DESCRIPTION OF THE NS 4000 AND RHOTHETA RT-202 RDF INTERFACE

The NS 4000 is processing a constant data flow supplied by Rhotheta RT-202 radio direction finder according to certain rules. No messages are transmitted from the NS 4000 to RT-202. The message format is described in detail in **RHOTHETA RT-202 OPERATING INSTRUCTION**. This document specifies the rules of processing messages from RT202:

- Data output protocol.

  Each message starts with a header-sign (ASCII-sign for identifying the type of message). Following headers are possible: “S” = hex53, “P” = hex50, “V” = hex56, “A” = hex41, “L” = hex4C, “N” = 0x4E. Then follows the proper information, consisting of three ASCII decimals: “0” to “9” = hex30 to hex39. As end mark two ASCII final marks are used: “CR” = hex0D (CarriageReturn) and “LF” = hex0A (LineFeed).

Header	Content	Specification
S	xxx = 0xx = 2xx = 1xx	Status output: no received signal (no bearing); received signal but active frequency storage; (no bearing/error caused by exceeding frequency deviation of transmitted signal (> ±6 kHz); receiving signal (bearing active)
P	xxx = 000…099	Level of received signal/field intensity in %
V	xxx = 050…280	Display of supplied voltage, e.g. 132 corresponds to 13.2 Volt
N	xxx = 000…255	Low audio-frequency (averaged about 100 ms) in 10 Hz, e.g. 124 corresponds to 1240 Hz
A	xxx = 000…353	Averaged DF value in degrees (average-value, resolution 2 degrees)
1	xxx = 000…359	Unvaried DF value in degrees (momentary value, resolution 1 degree)

- Remarks.

  The unaveraged DF value shows a certain spread, depending on the received signal. It can be used, if required, as indicator of the DF value quality. When working with the direction finder only the displayed averaged value should be used:

  – Field “S” is the first to be processed. The message is further ignored if “S” field contains 0xx or 2xx parameters. And, vice versa, it is processed if the message contains 1xx parameter meaning that a bearing signal has been received;

  – The second step is to analyse “P” field. Field “P” contains information (in per cent) on the intensity level of the received MOB bearing signal (transmitter of 121.5 MHz signal). Accordingly, the lower the level, the weaker signal has been received. It should be noted that the signal processing level is set direct from RT-202 sensor (for a detailed description, see **RHOTHETA RT202 OPERATING INSTRUCTION**). The optimum condition would be to make an identical setting of the processed signal level in RT-202 sensor and in on “SAR” page of “Tasks” panel of ECDIS task. The signal is analysed by comparing a parameter from “P” field and data entered by the operator in “Use the signal with the level of intensity more than XX %” input window on “SAR” page of “Tasks” panel of ECDIS task. If “P” parameter is lower than the signal processing level set by the operator, the message is ignored. Otherwise, the message is accepted for further processing;

– If the two above conditions are fulfilled, the NS 4000 processes field “A” containing information on the MOB object bearing. It should be noted that this is a relative bearing, whereas to be plotted in the ECDIS task or transmitted to other ships via the AIS, the bearing should be corrected to true.

ATTENTION!

For the NS 4000 “MAN OVERBOARD” functionality to operate with the radio direction finder and AIS, the NS 4000 is required to receive a valid compass heading value. Otherwise, it will be impossible to plot a true MOB object bearing on the electronic chart, or to transmit it to other targets via AIS facilities.

ANNEX A

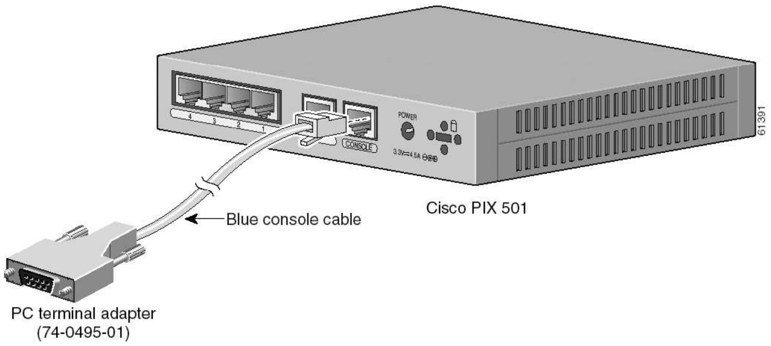
Cisco PIX-501-BUN-K9 Firewall Installation and Adjustment

CONFIGURING THE PIX-501-BUN-K9

There are two ways of configuring PIX-501-BUN-K9:

- Configuring using the Console Port;
- Configuring using the PDM.

Configuring the PIX-501-BUN-K9 Using Console Port



You can access the Command Line Interface (CLI) for administering by using the console port on the PIX Firewall. To do so, run a serial terminal emulator on the PC which will be used for configuring.

Follow these steps to connect a console for local administrative access:

1. Plug one end of the PC terminal adapter (74-0495-01) into a standard 9-pin serial port.
2. Plug one end of the blue console cable (72-1259-01) into the PC terminal adapter.
3. Plug the other end of the blue console cable into the Console port.
4. Power on the PIX Firewall.
5. Start your terminal emulation program (i.e. “Hyper Terminal”) and configure the terminal for 9600 baud, 8 data bits, no parity, and 1 stop bit.
6. After startup messages appear, you are prompted with the following unprivileged mode prompt: `pixfirewall>`. Enter `enable` and press the <Enter>.
7. The following prompt appears: `Password`. Press the <Enter>.
8. You are now in privileged mode. The following prompt appears: `pixfirewall#`. Enter `configure terminal` command and press <Enter>. You are now in configuration mode: `pixfirewall(config)#`.
9. Enter `configure factory-default 10.8.1.100 255.255.255.0` command and press <Enter>.
10. Enter `ip address outside 10.8.0.1 255.255.255.0` command and press <Enter>.
11. To save configuration, enter `write memory` command and press <Enter>.
12. Enter `reload` command and press <Enter>.
13. To confirm the reboot, press <Enter>.

Configuring the Firewall PIX-501-BUN-K9 is completed now.

Configuring the PIX-501-BUN-K9 Using PDM Version 3.(0)2

The PIX-501-BUN-K9 contains an integrated configuration utility called Cisco PIX Device Manager (PDM). PDM is a web browser-based configuration tool designed to help you set up, configure, and monitor the PIX Firewall. PDM is preinstalled on the PIX-501-BUN-K9. To access PDM, make sure that JavaScript and Java software are enabled in your web browser. Use Native (built-in) JVM (VM 3809) or Java Plug-in 1.4.2. You can download the latest Java Plug-in from Sun Microsystems (www.java.sun.com). For best performance, use Microsoft Internet Explorer 6.0.

The following requirements are set for a PC which will be used for configuring:

- SOFTWARE. PDM is not supported on Macintosh, Windows 3.1, Windows 95, Windows 98, Windows ME, Windows NT operating systems;
- Hardware Requirements for Windows platforms using PDM 3.0:
  - Processor: Pentium III or equivalent running at 450 MHz or higher;
  - Random Access Memory: 256 MB;
  - Display Resolution and Colors: 1024x768 pixels and 256 colors;
  - Minimum of at least 4 MB of temporary disk space to load into the browser.

HTTP 1.1 – Settings for *Internet Option\Advanced\HTTP 1.1 settings* should use HTTP 1.1 for both proxy and non-proxy connections.

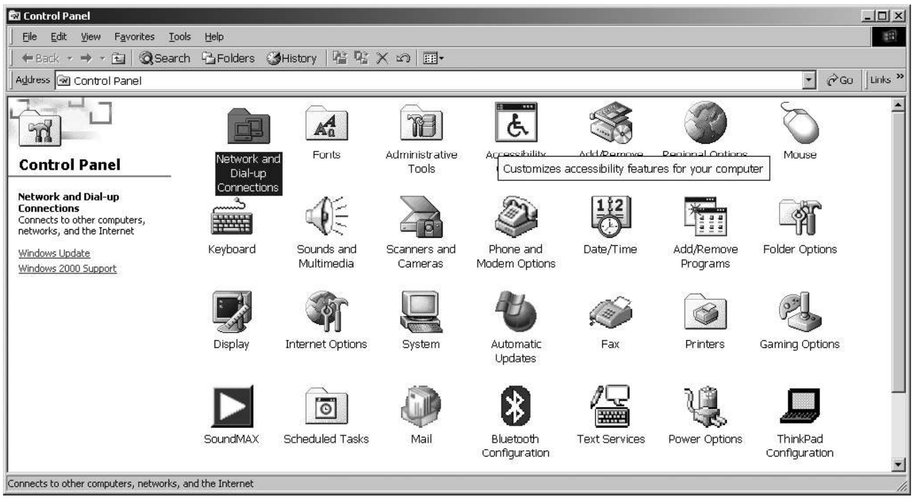
Use Ethernet cable to connect the configuring PC to one of the four switched inside ports on the rear panel of the PIX Firewall.

Check the LINK LED to verify that configuring PC has basic connectivity to the PIX Firewall on one of the inside ports (1 through 4). When connectivity occurs, the LINK LED on the front panel of the PIX Firewall lights up solid green.

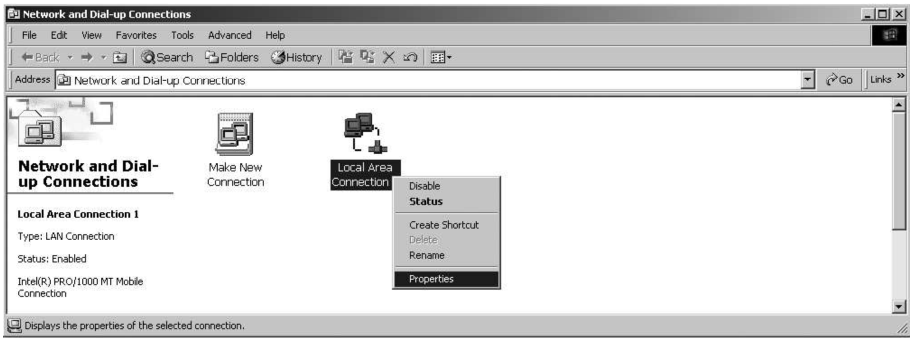
Follow these steps to configure the PIX-501-BUN-K9:

1. Run to START\SETTINGS\CONTROL PANEL.

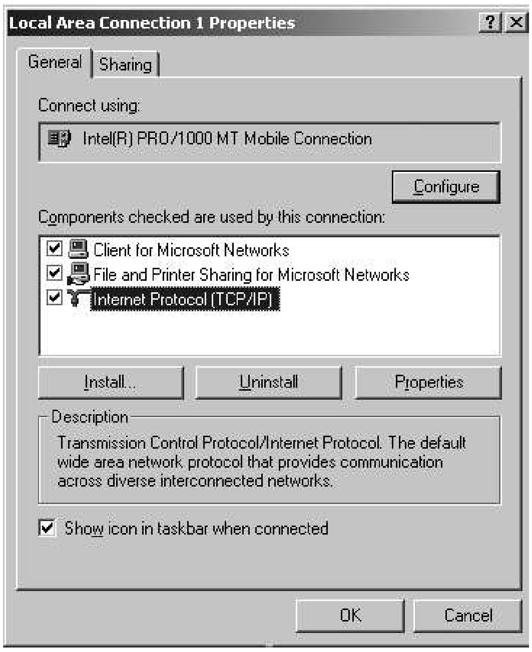
   Double-click the "Network and Dial-up Connections" icon:



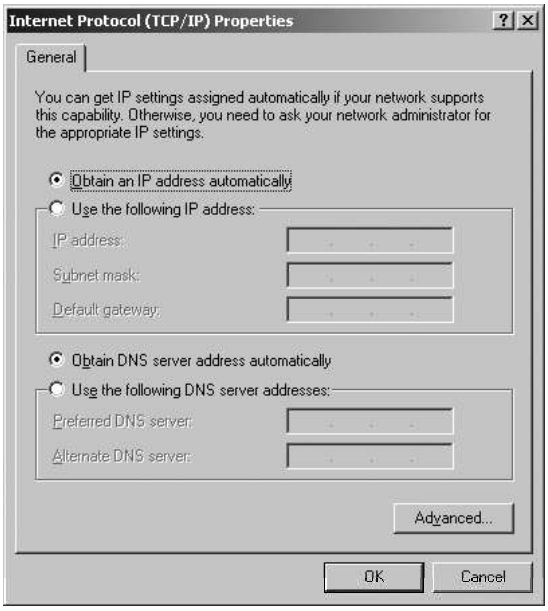
2. Click on “Local Area Connection” icon, press right mouse button and select PROPERTIES:



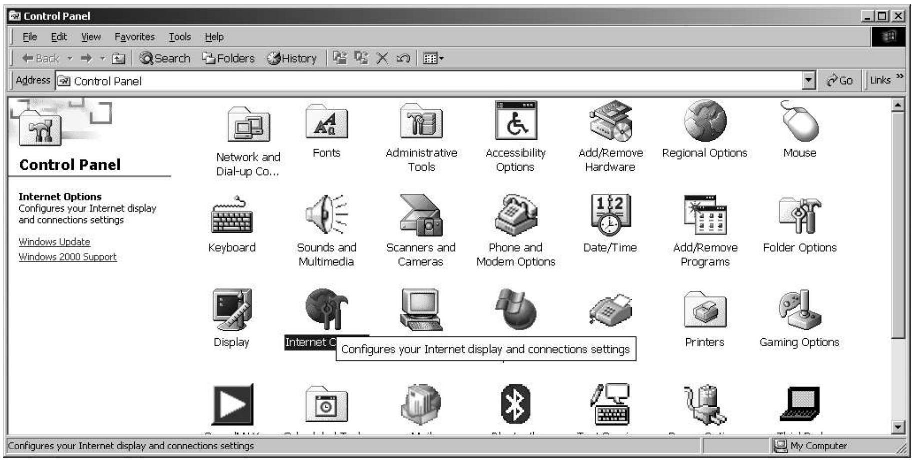
3. Select “Internet Protocol (TCP/IP)” and press “Properties” button:



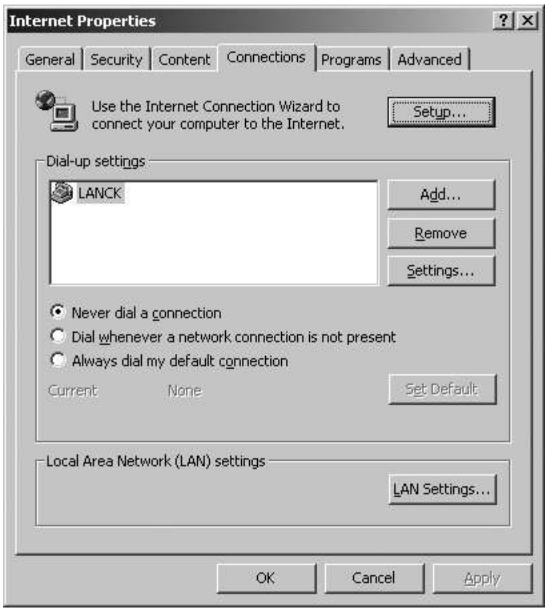
4. Switch on “Obtain an IP address automatically” and “Obtain DNS server address automatically”. Press “OK” button:



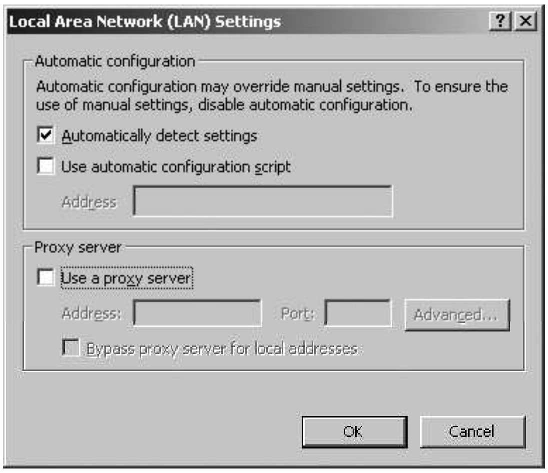
5. Run to START/SETTING/CONTROL PANEL. Double-click the “Internet Options” icon:



6. Switch to “Connections” tab and press “LAN Settings…” button:

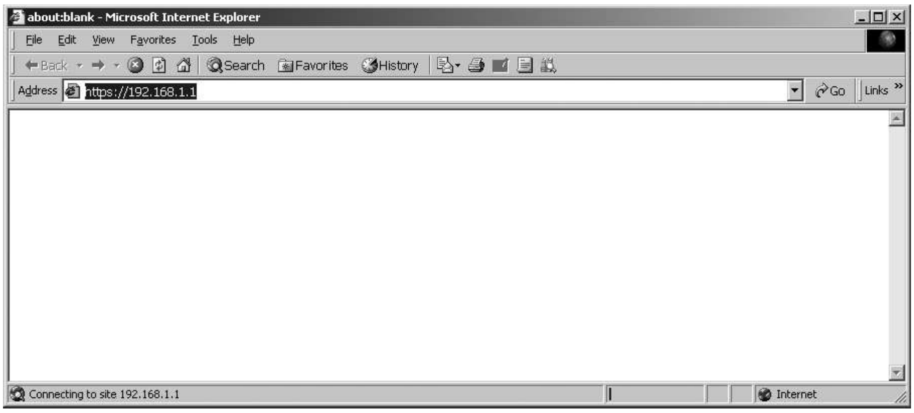


7. Check “Automatically detect settings” checkbox and press “OK” button:



8. To access the PDM, enter the URL: https://192.168.1.1 into your browser.

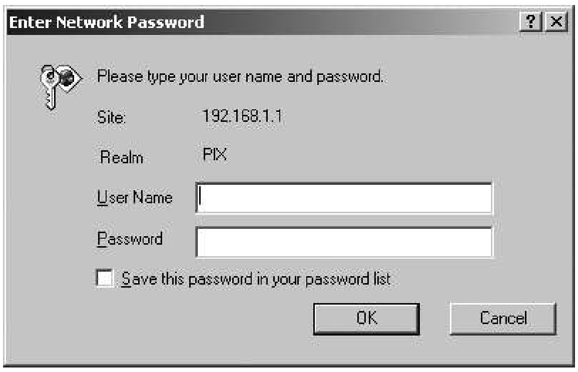
Note: Remember to add the "s" to "https" or the connection fails.



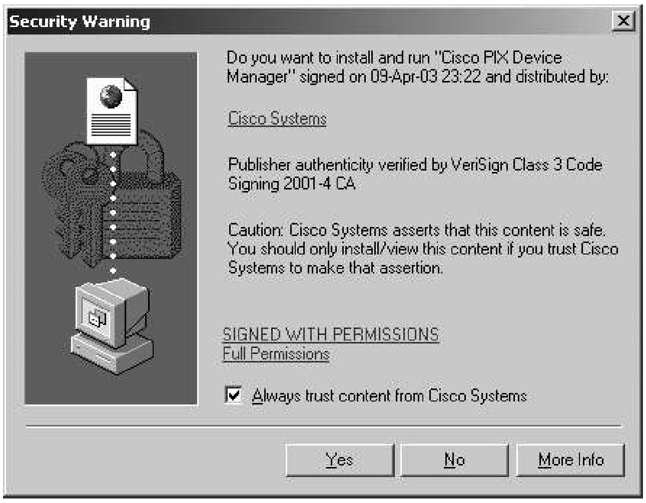
9. Press "OK" button:

10. Press "Yes" button:

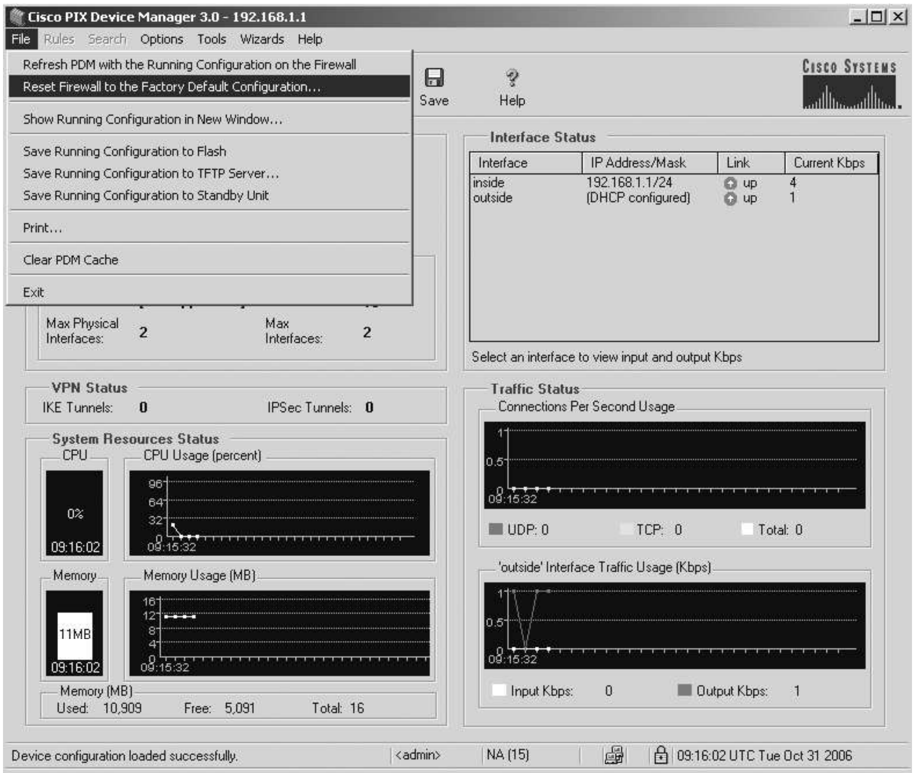
11. Leave both the "User Name" and "Password" input windows empty. Press "OK" button and wait for loading PDM:

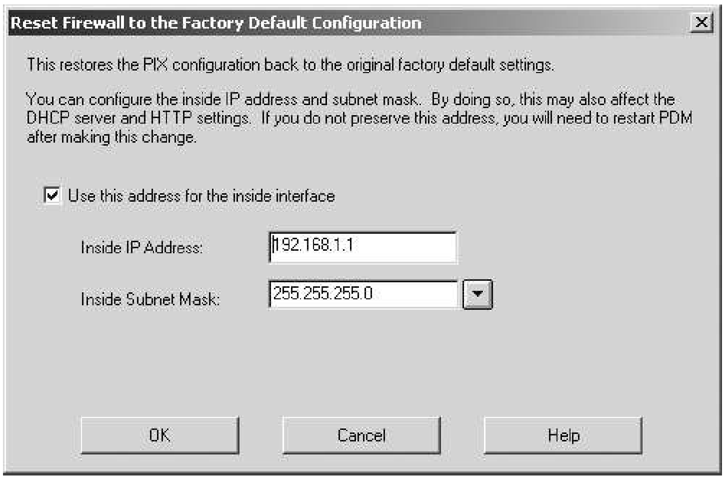


12. Check “Always trust content from Cisco Systems” checkbox and press “Yes” button:

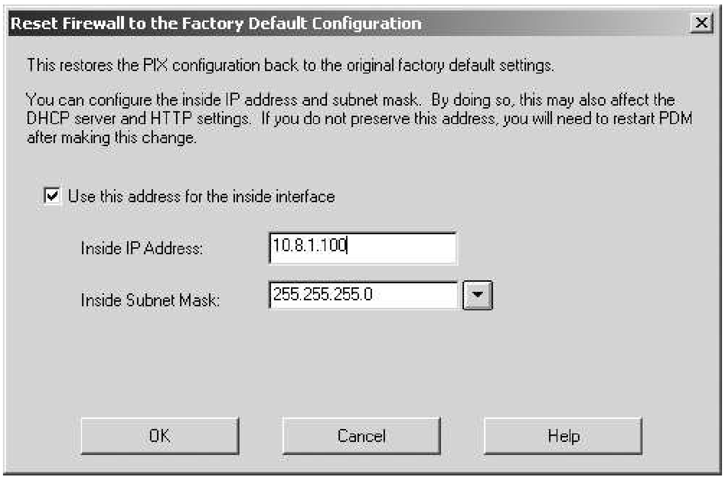


13. Run to FILE menu and click on RESET FIREWALL TO THE FACTORY DEFAULT CONFIGURATION:

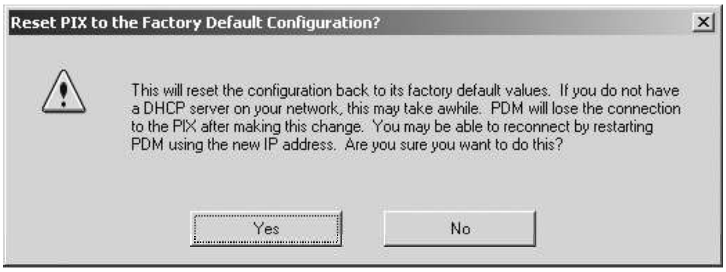




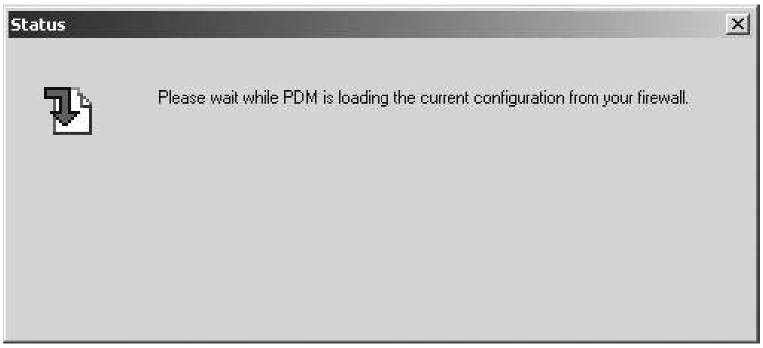
14. In the “Inside IP Address” field enter the value 10.8.1.100 and in “Inside Subnet Mask” field choose 255.255.255.0. Press “OK” button:



15. Press “Yes” button and wait for one minute:

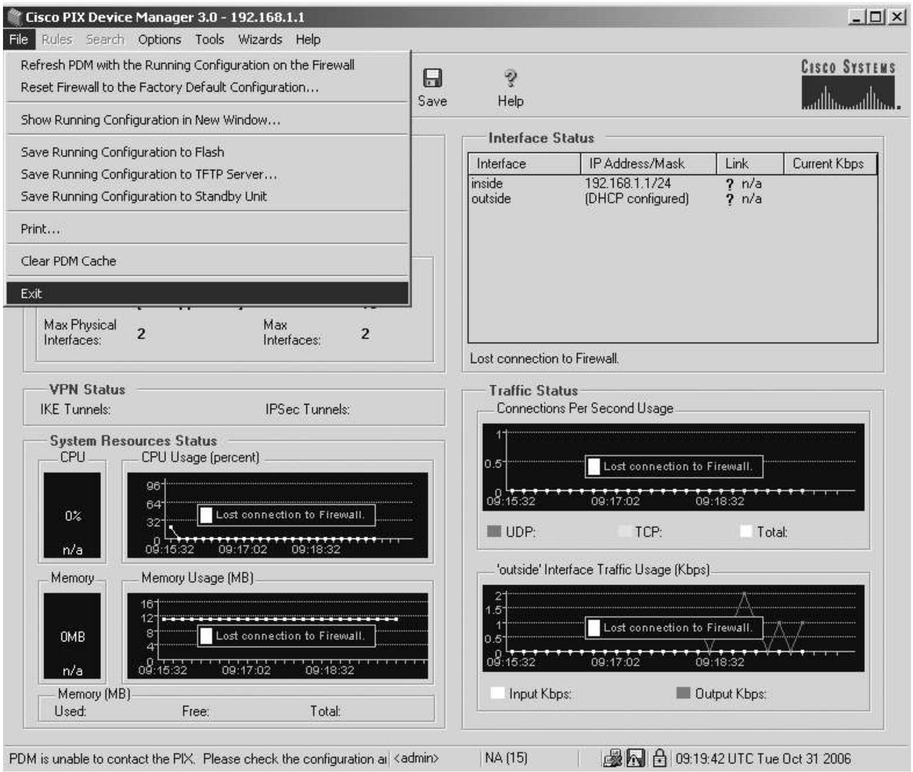


16. Press “OK” button and wait while PDM is loading the current configuration from Firewall:

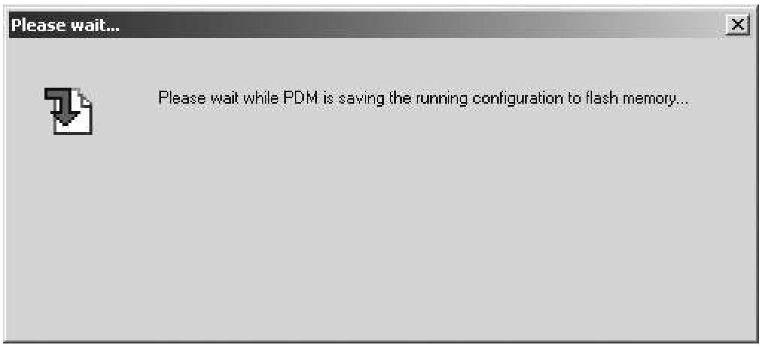


17. Press “OK” button:

18. Run to FILE menu and select EXIT:

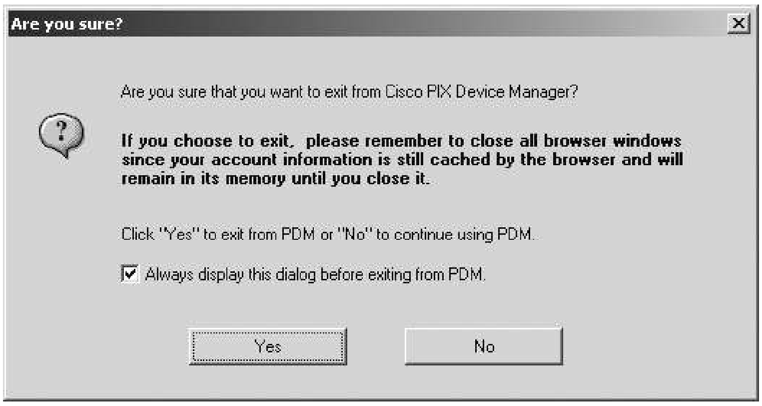


19. Press “Save” button and wait while PDM is saving the running configuration to flash memory.

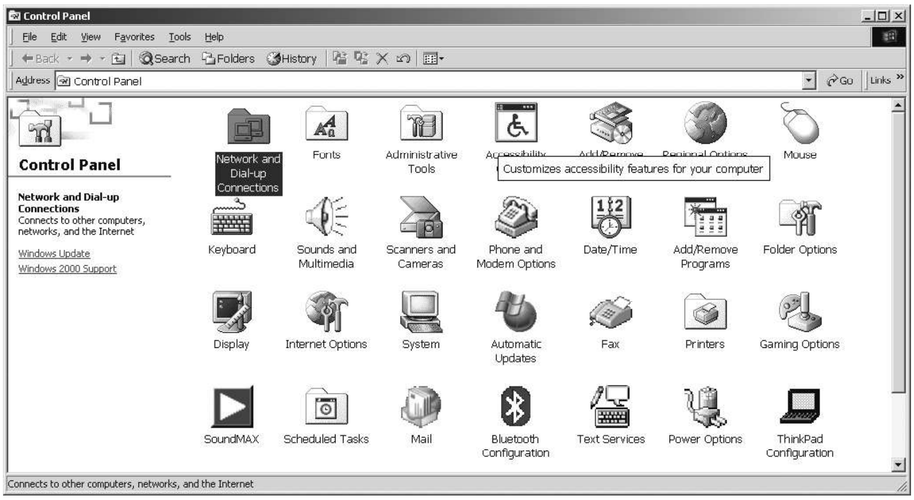


20. Press “OK” button:

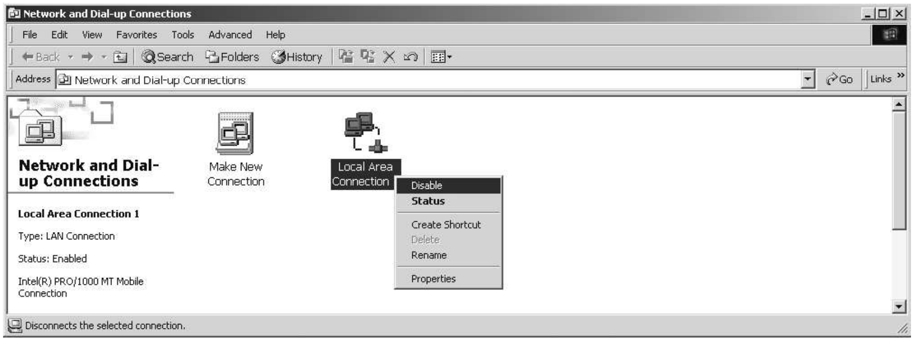
21. Press “Yes” button:



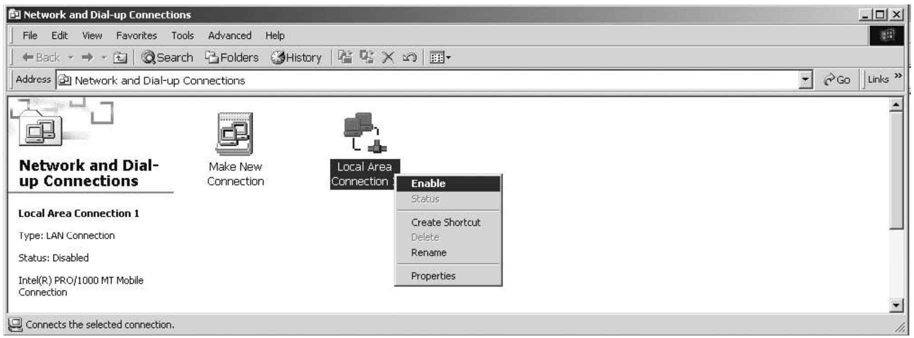
22. Run to START\SETTINGS\CONTROL PANEL. Double-click the “Network and Dial-up Connections” icon:



23. Click right button mouse on “Local Area Connection” icon and click on DISABLE:



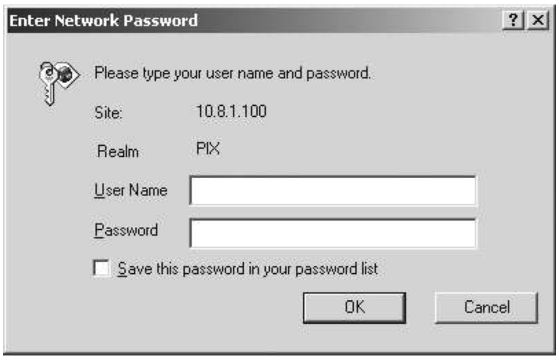
24. Then click on ENABLE:



25. To access the PDM, enter the URL: https://10.8.1.100 into your browser and press <Enter>:

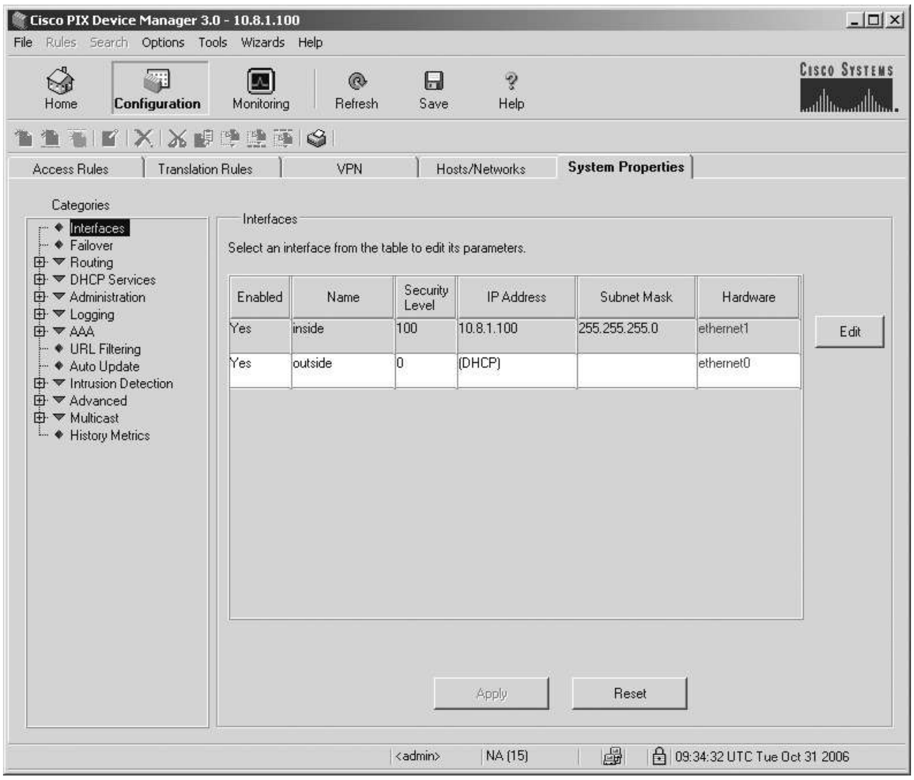
26. Press “Yes” button:

27. Press “OK” button:

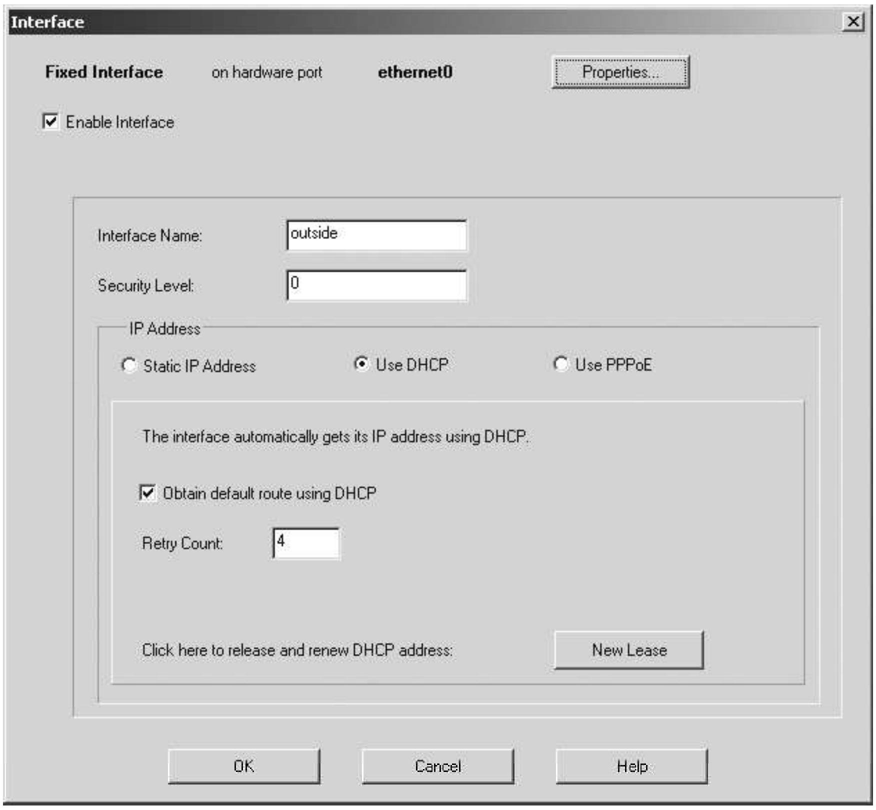


28. Click on “Configuration” icon:

29. Switch to “System Properties” tab and select the outside interface from the table to edit its parameters:

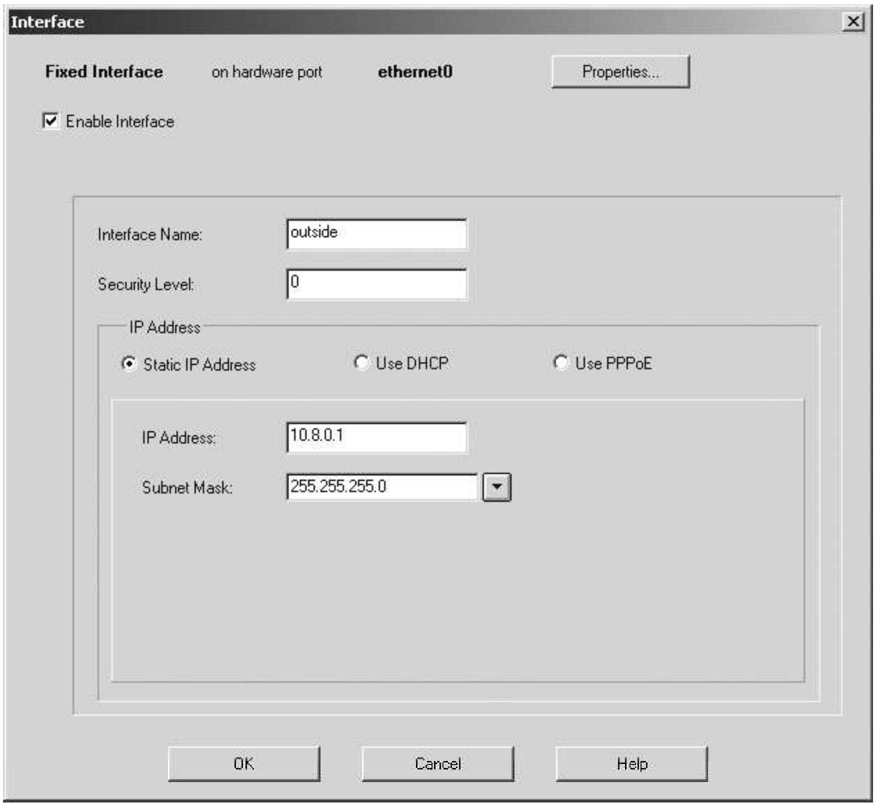


30. Press “Edit” button:

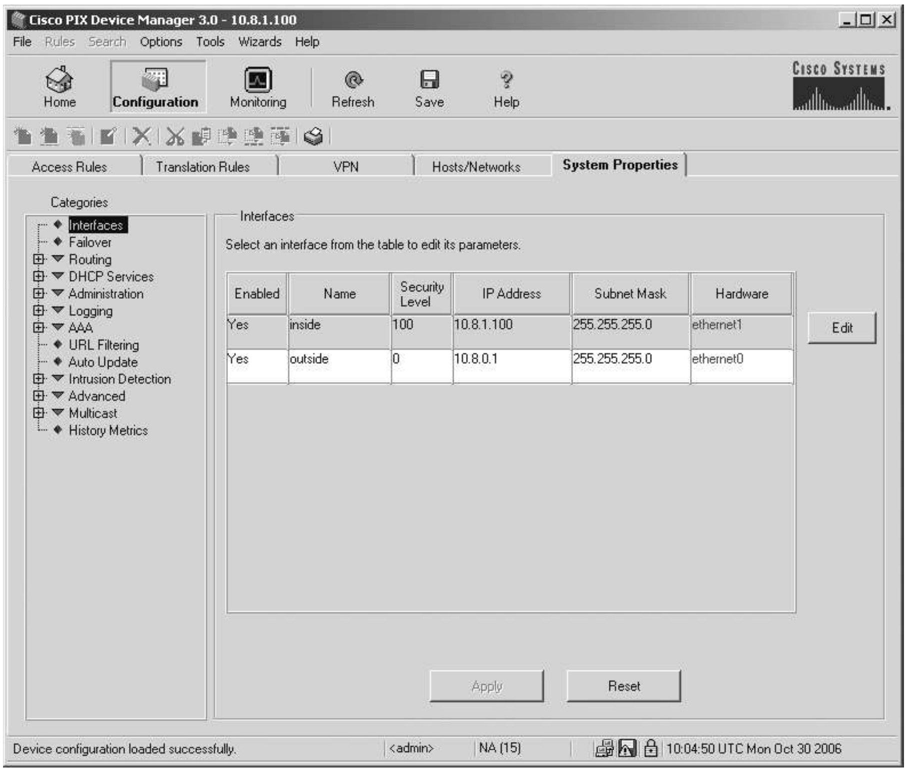


31. In the “IP Address” group, press “Static IP Address” button and enter:
   – IP address: 10.8.0.1;
   – Subnet Mask: 255.255.255.0.

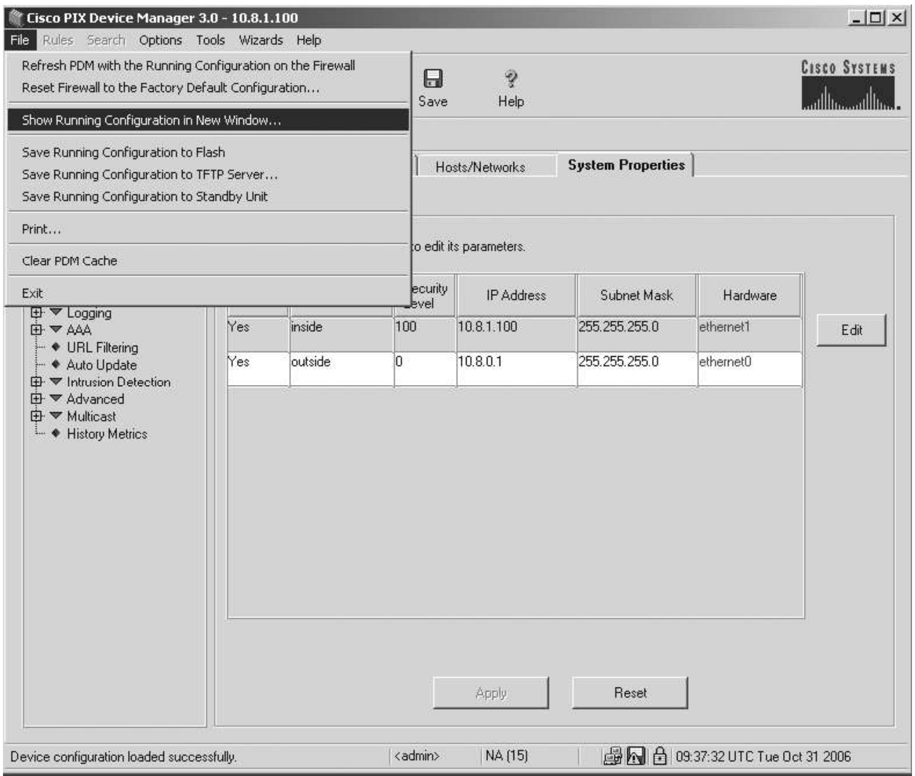
   Press “OK” button:

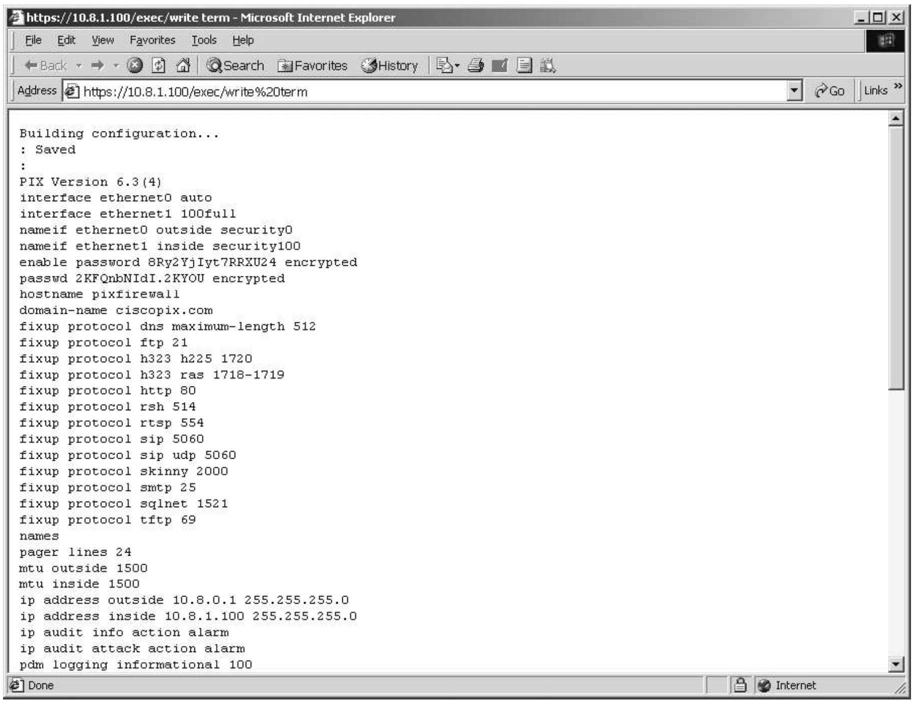


32. Press “Apply” button:

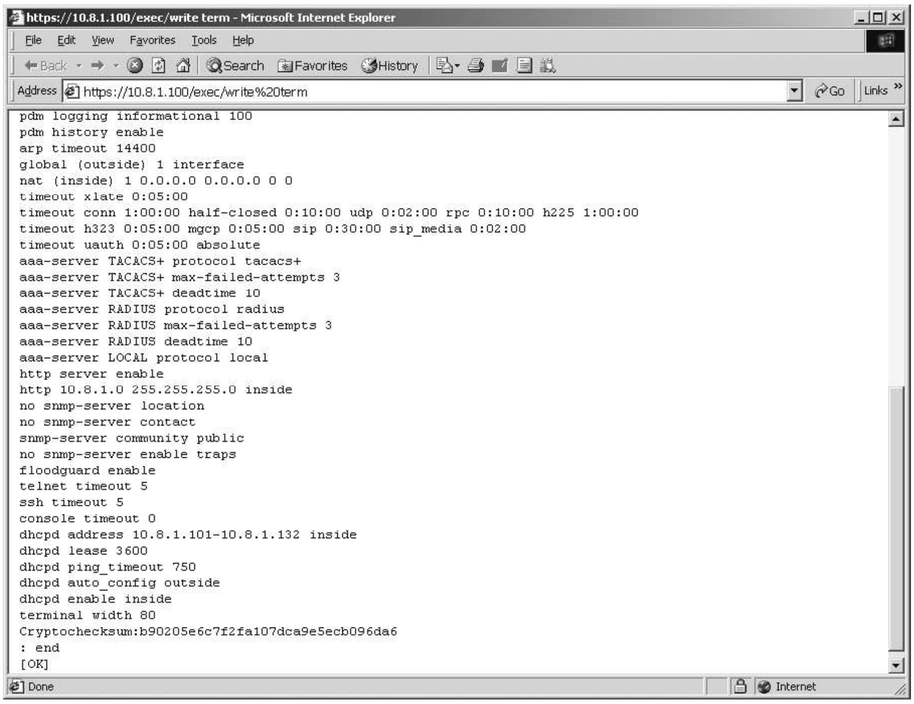


33. You can check the running configuration. Select in FILE menu SHOW RUNNING CONFIGURATION IN NEW WINDOW:



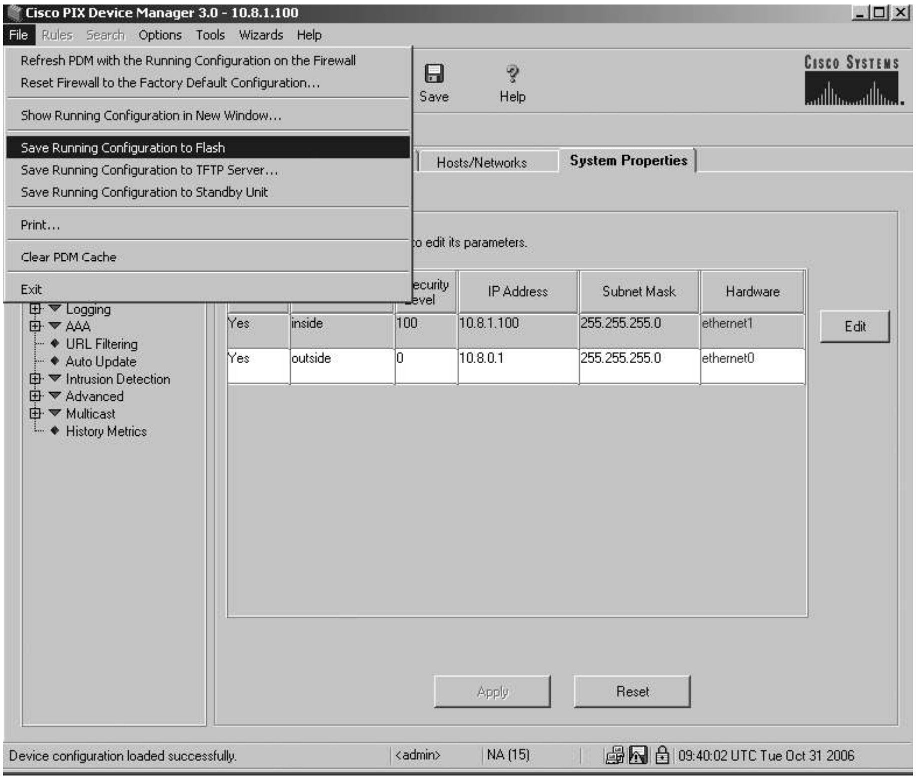



```
Building configuration...
: Saved
:
PIX Version 6.3(4)
interface ethernet0 auto
interface ethernet1 100full
nameif ethernet0 outside security0
nameif ethernet1 inside security100
enable password 8Ry2YjIyt7RRXU24 encrypted
passwd 2KFQnbNIdI.2KYOU encrypted
hostname pixfirewall
domain-name ciscopix.com
fixup protocol dns maximum-length 512
fixup protocol ftp 21
fixup protocol h323 h225 1720
fixup protocol h323 ras 1718-1719
fixup protocol http 80
fixup protocol rsh 514
fixup protocol rtsp 554
fixup protocol sip 5060
fixup protocol sip udp 5060
fixup protocol skinny 2000
fixup protocol smtp 25
fixup protocol sqlnet 1521
fixup protocol tftp 69
names
pager lines 24
mtu outside 1500
mtu inside 1500
ip address outside 10.8.0.1 255.255.255.0
ip address inside 10.8.1.100 255.255.255.0
ip audit info action alarm
ip audit attack action alarm
pdm logging informational 100
```



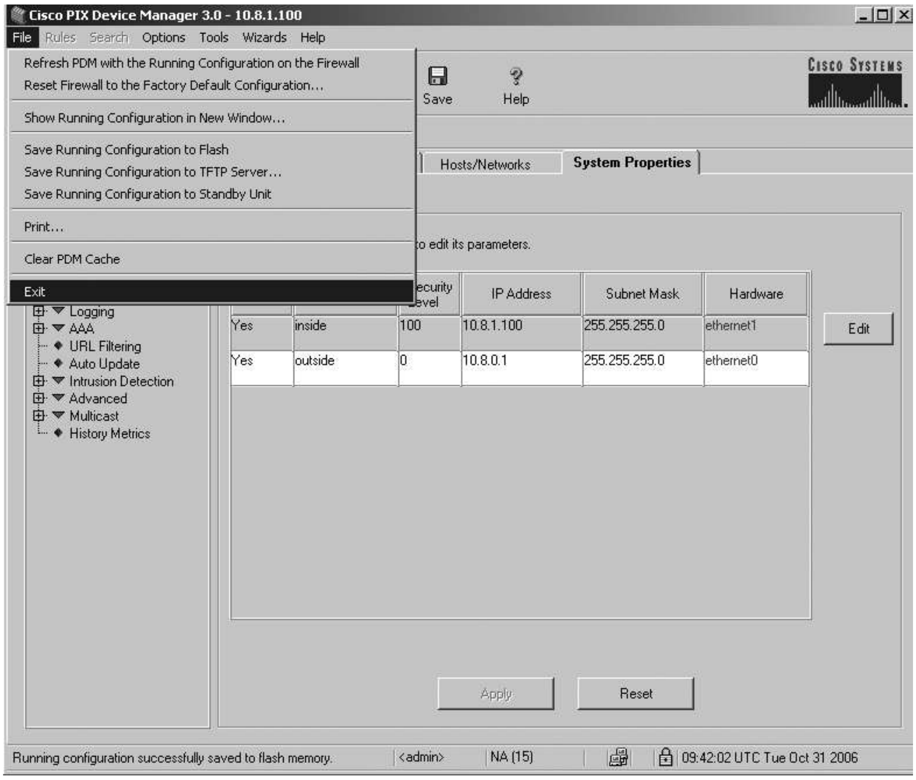

```
pdm logging informational 100
pdm history enable
arp timeout 14400
global (outside) 1 interface
nat (inside) 1 0.0.0.0 0.0.0.0 0 0
timeout xlate 0:05:00
timeout conn 1:00:00 half-closed 0:10:00 udp 0:02:00 rpc 0:10:00 h225 1:00:00
timeout h323 0:05:00 mgcp 0:05:00 sip 0:30:00 sip_media 0:02:00
timeout uauth 0:05:00 absolute
aaa-server TACACS+ protocol tacacs+
aaa-server TACACS+ max-failed-attempts 3
aaa-server TACACS+ deadtime 10
aaa-server RADIUS protocol radius
aaa-server RADIUS max-failed-attempts 3
aaa-server RADIUS deadtime 10
aaa-server LOCAL protocol local
http server enable
http 10.8.1.0 255.255.255.0 inside
no snmp-server location
no snmp-server contact
snmp-server community public
no snmp-server enable traps
floodguard enable
telnet timeout 5
ssh timeout 5
console timeout 0
dhcpd address 10.8.1.101-10.8.1.132 inside
dhcpd lease 3600
dhcpd ping_timeout 750
dhcpd auto_config outside
dhcpd enable inside
terminal width 80
Cryptochecksum:b90205e6c7f2fa107dca9e5ecb096da6
: end
[OK]
```

34. Select in FILE menu SAVE RUNNING CONFIGURATION TO FLASH:

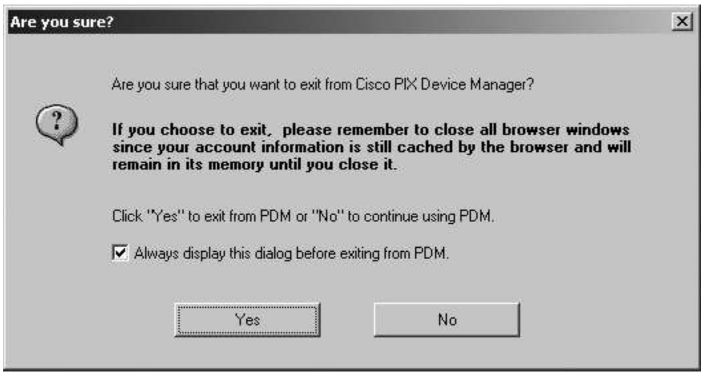


35. To save the running configuration, press “Apply” button:

36. To leave PDM, select in FILE menu option EXIT:



Press “Yes” button:

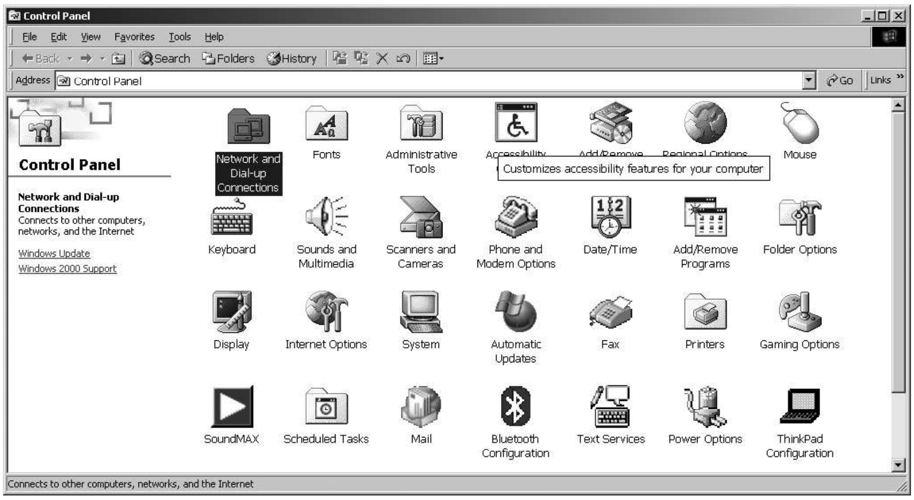


Configuring the PIX-501-BUN-K9 is completed.

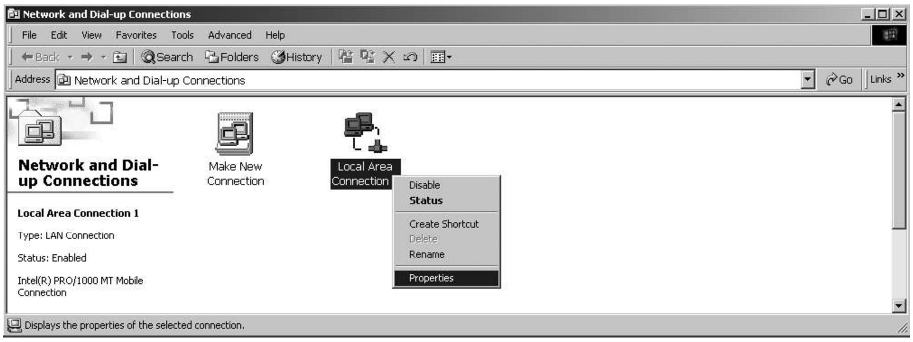
SETTINGS ON COMMUNICATION COMPUTER

On the PC which the communication program is installed on, make the following settings:

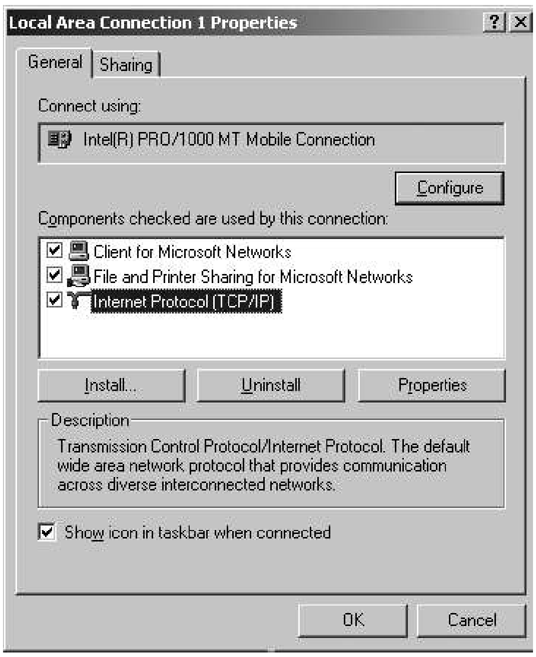
1. Run to START\SETTINGS\CONTROL PANEL. Double-click the “Network and Dial-up Connections” icon:



2. Click on “Local Area Connection” icon, click right mouse button and select PROPERTIES:

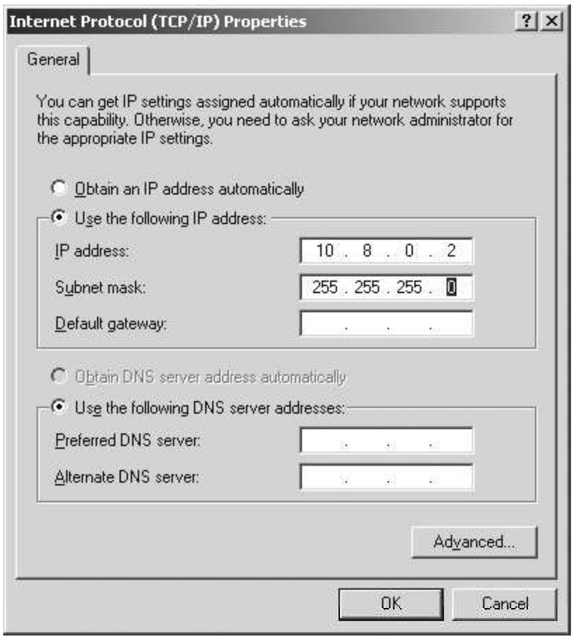


3. Select “Internet Protocol (TCP/IP)” and press “Properties” button:



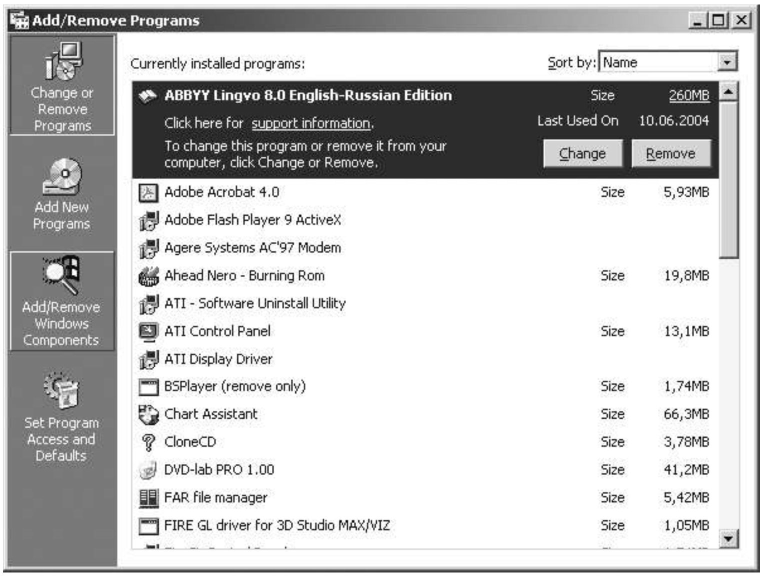
4. Press “Use the following IP addresses” button and enter the following:
   – IP address: 10.8.0.2;
   – Subnet mask: 255.255.255.0.

   Leave the fields “Default gateway” and “Use the following DNS server addresses” empty. Press “OK” button:

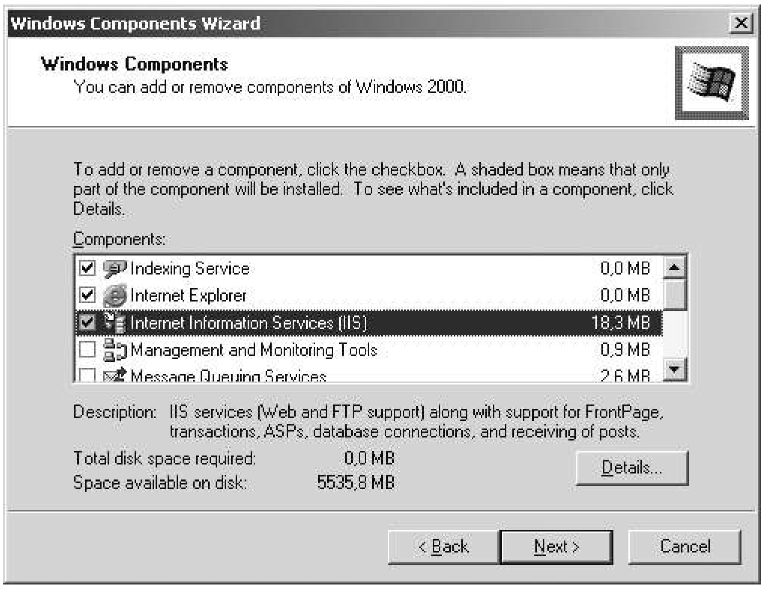


5. To install the FTP Server, switch to the START\SETTINGS\CONTROL PANEL. Double-click the “Add/Remove Programs” icon:

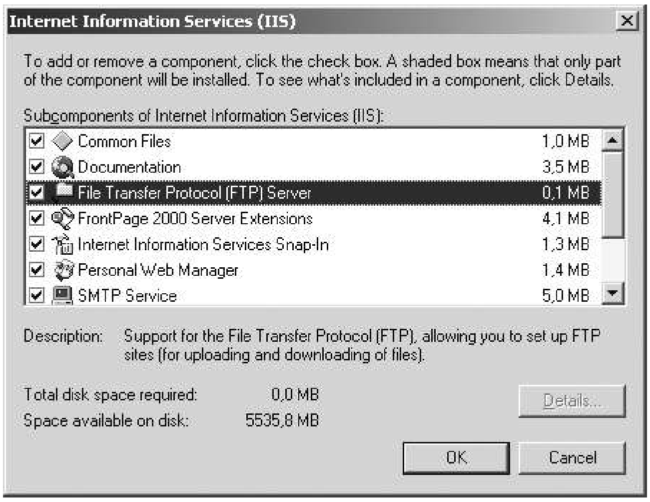
6. Press “Add/Remove Windows Components” button:



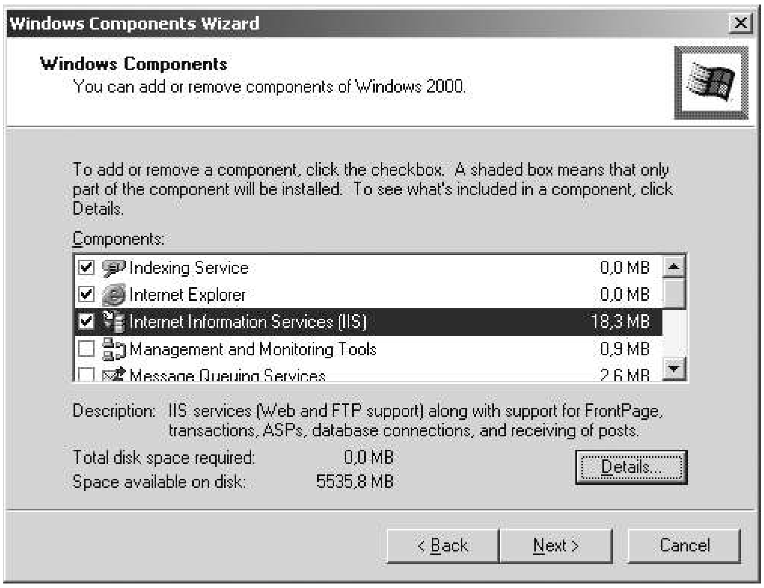
7. Select “Internet Information Services (IIS)” and press “Details” button:



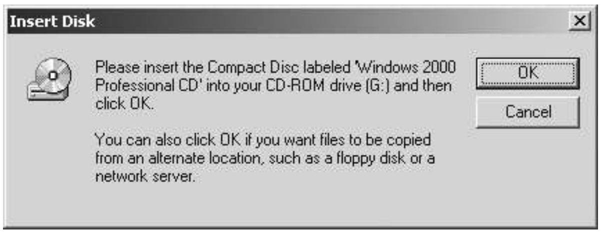
8. Check “File Transfer Protocol (FTP) Server” checkbox and press “OK” button:



9. Press “Next >” button:

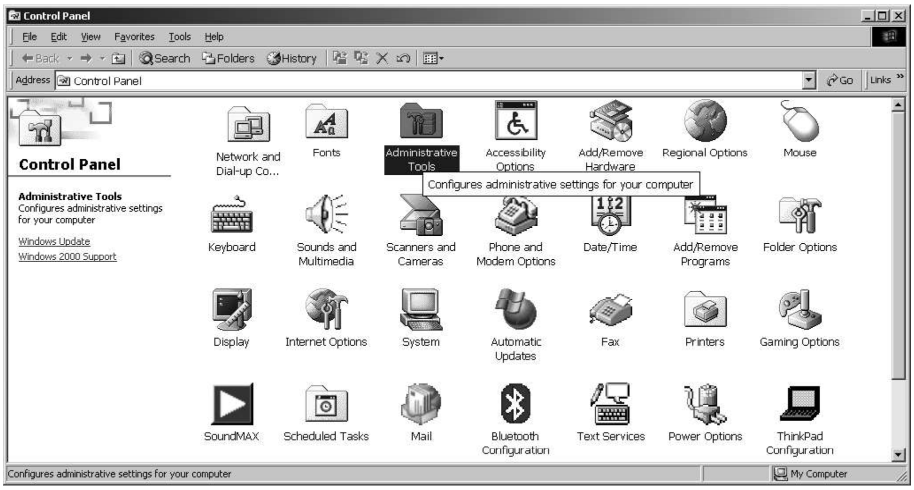


10. Insert Windows boot CD into CD-ROM and press “OK” button:



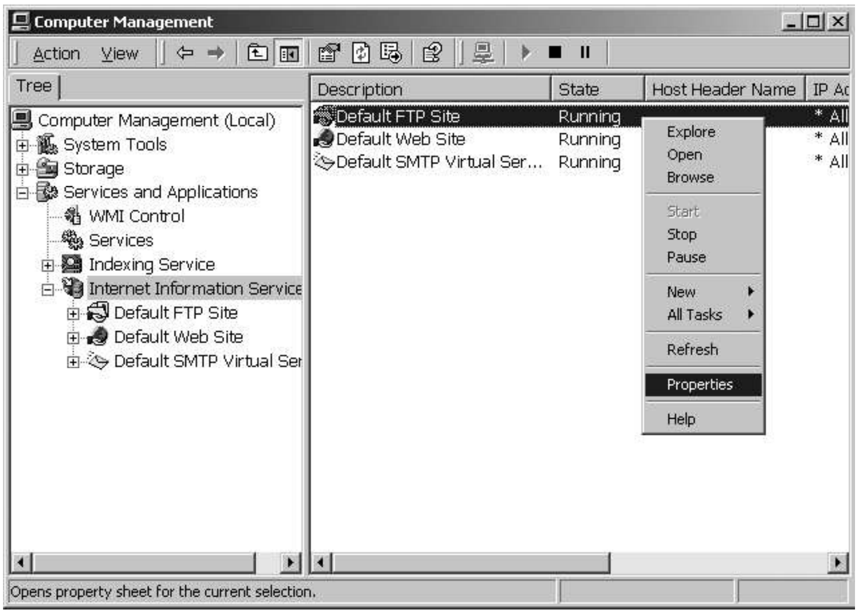
11. Wait for setup and click on “Finish” button. FTP Server is installed now:

12. Run to START\SETTINGS\CONTROL PANEL. Double-click the "Administrative Tools" icon:

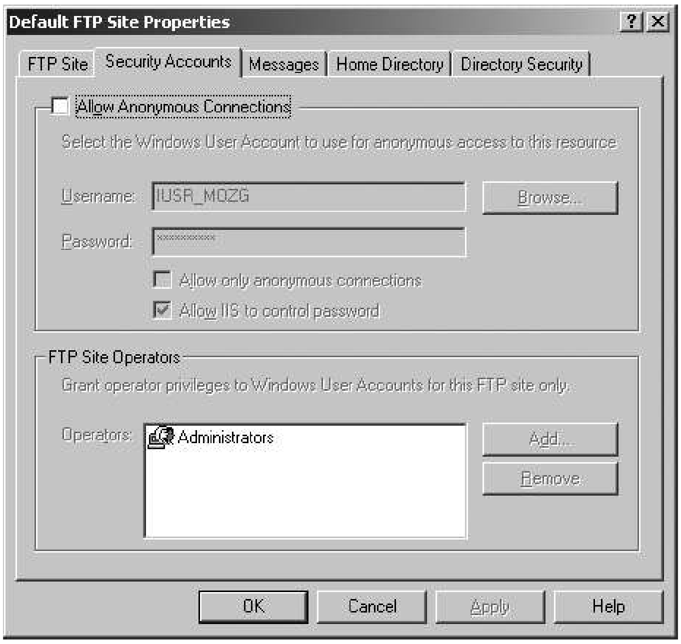


13. Double-click the "Computer Management" icon:

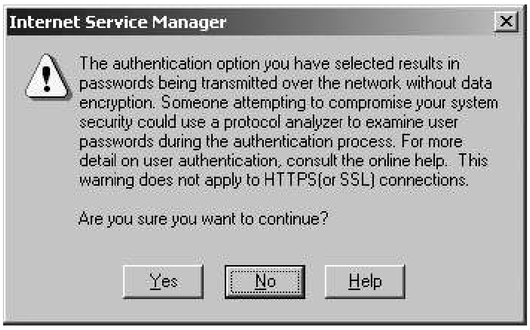
14. Go to *Services and Applications/Internet Information Services,* select option *Default FTP Site*. Press right trackball button and from drop dawn menu select PROPERTIES:



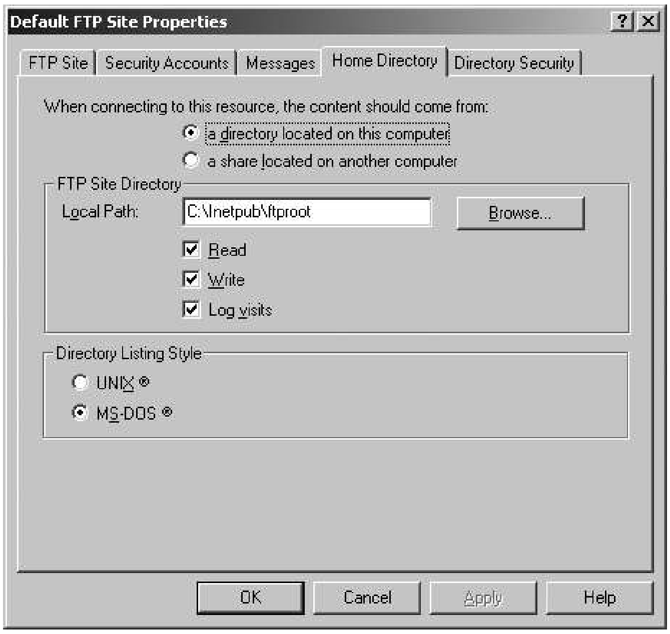
15. Switch to “Security Accounts” tab and uncheck “Allow Anonymous Connections” checkbox. Press “Apply” button:



16. Press “Yes” button:



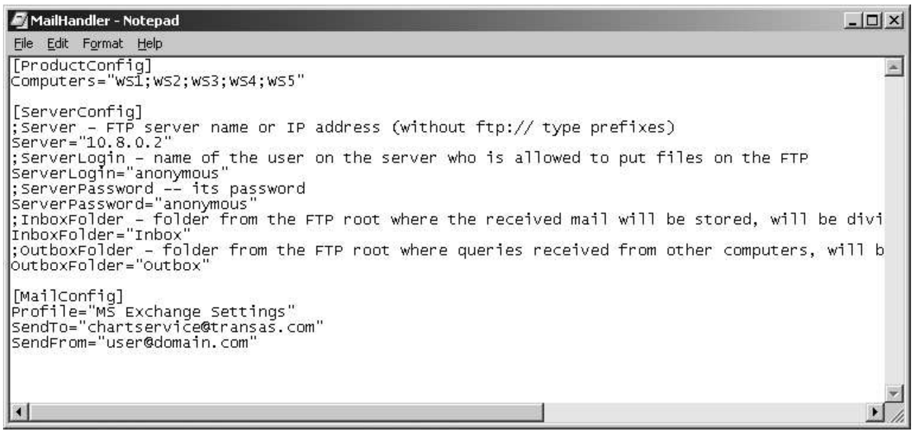
17. Switch to “Home Directory” tab and check “Read”, “Write”, “Log visits” checkboxes:



Press “OK” button.

18. Install the “MailUtility” on communication PC.

Edit the `Mailhandler.ini` file (*C:\Transas\MailUtility* by default) intended for configuring the mail program:




```
[ProductConfig]
Computers="WS1;WS2;WS3;WS4;WS5"

[ServerConfig]
;Server - FTP server name or IP address (without ftp:// type prefixes)
Server="10.8.0.2"
;ServerLogin - name of the user on the server who is allowed to put files on the FTP
ServerLogin="anonymous"
;ServerPassword -- its password
ServerPassword="anonymous"
;InboxFolder - folder from the FTP root where the received mail will be stored, will be divi
InboxFolder="Inbox"
;OutboxFolder - folder from the FTP root where queries received from other computers, will b
OutboxFolder="Outbox"

[MailConfig]
Profile="MS Exchange Settings"
SendTo="chartservice@transas.com"
SendFrom="user@domain.com"
```

– in the `[ProductConfig]` section, replace the `Computers` key value with the actual list of computer names separated with the “;” semicolon (i.e., `WS1;WS2;WS3;WS4;WS5`);

– in the `[ServerConfig]` section, replace the `Server` key value with the IP address or name of the communication PC (i.e., the PC which the FTP Server is installed on). In this case, the ftp:// type prefix should not be specified (i.e., `10.8.0.2`);

– in the `[ServerConfig]` section, replace the `ServerLogin` key value with the name of the communication PC user (i.e., the user of the PC which the FTP Server is installed on);

– in the `[ServerConfig]` section specify the password for the communication PC in the `ServerPassword` key;

– in the `[MailConfig]` section, replace the `SendFrom` key value with the user E-mail address (User@domain.com);

– define the Microsoft Exchange configuration. In the `[MailConfig]` section, replace the `Profile` key value with the configuration name. By default, the “MS Exchange Settings” configuration is used (this same configuration is used in the “Outlook”).

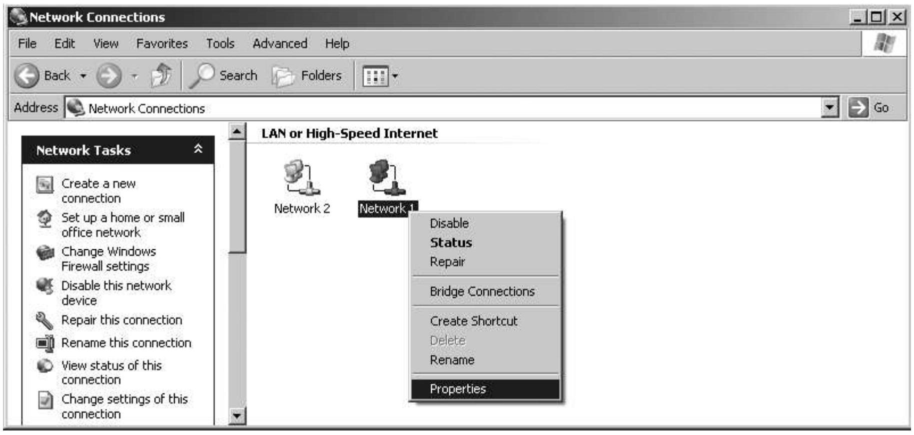
The settings on communication PC are completed.

SETTINGS ON PC WITH CHART ASSISTANT

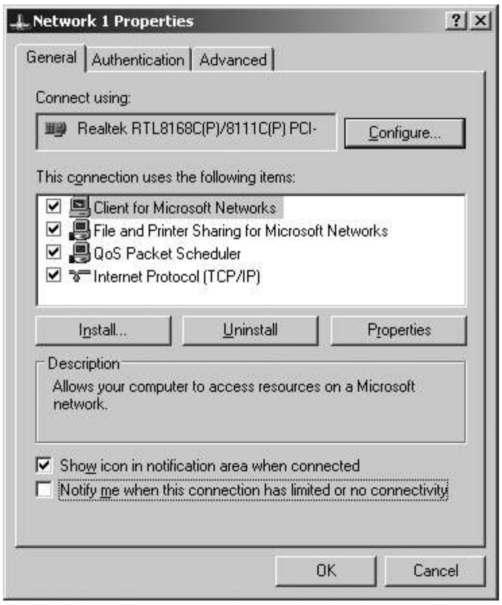
On the PC which the “Chart Assistant” utility is installed on (for the NS 4000 MFD on all the WS’s), make the following settings:

1. Run to START\SETTINGS CONTROL PANEL. Double-click the “Network Connections” icon:

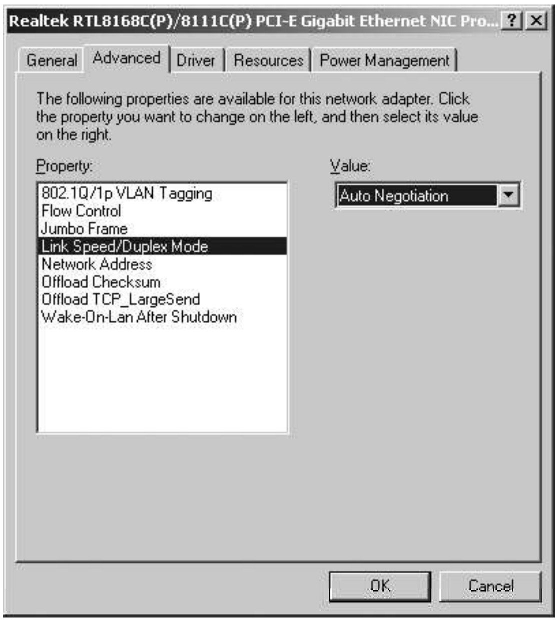
2. Click on “Network 1” icon, press right mouse button and select PROPERTIES:



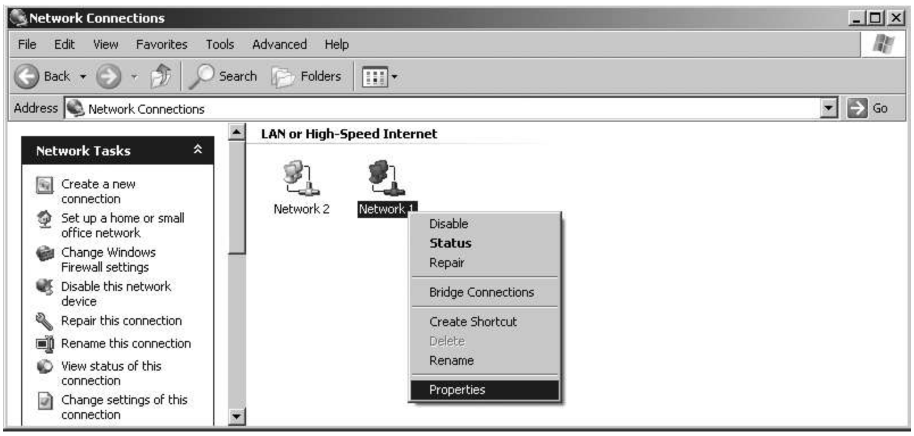
3. Press “Configure” button:



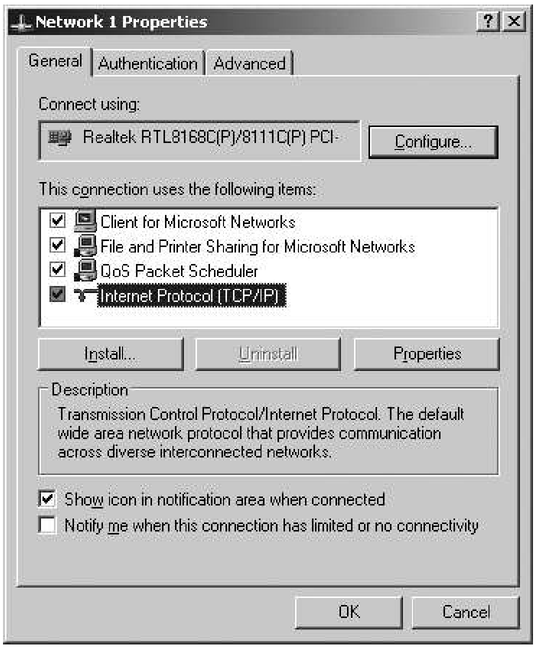
4. Switch to “Advanced” tab and in “Property” field set “Link Speed/Duplex Mode”. Press “OK” button:



5. Click on “Network 1” icon, press right mouse button and select PROPERTIES:

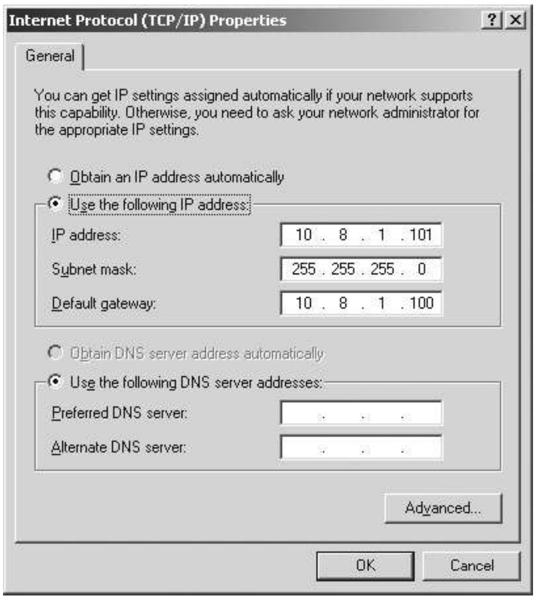


6. Select “Internet Protocol (TCP/IP)” and press “Properties” button:



7. Press “Use the following IP addresses” radio button and enter the following for WS1:
   – IP address: 10.8.1.101;
   – Subnet mask: 255.255.255.0;
   – Default gateway: 10.8.1.100.

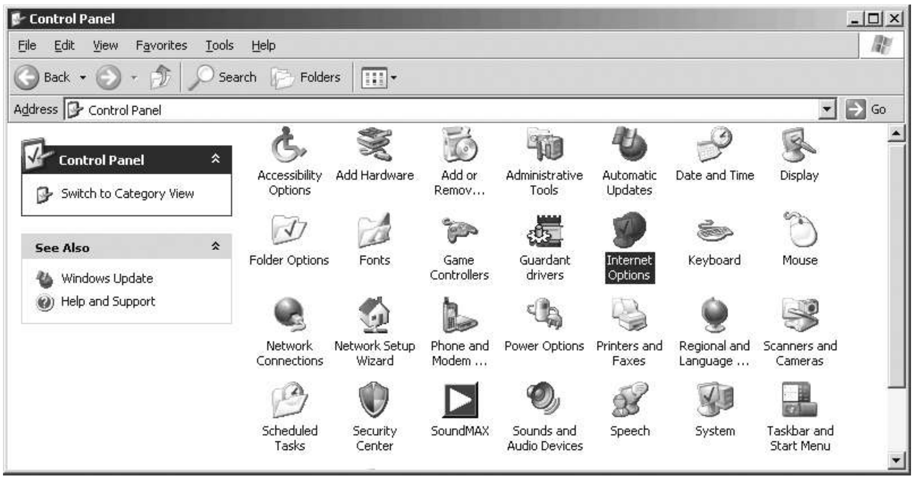
   Press “OK” button:



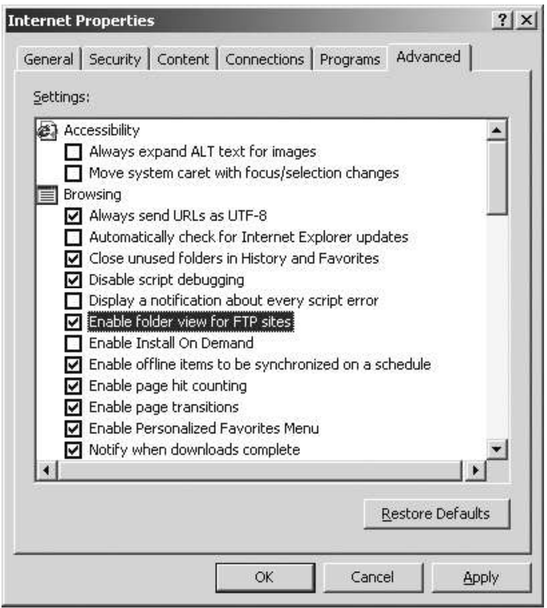
   – For WS2 IP address: 10.8.1.102;
   – For WS3 IP address: 10.8.1.103;
   – For WS4 IP address: 10.8.1.104;
   – For WS5 IP address: 10.8.1.105;
   – “Subnet mask” and “Default gateway” must be the same for each station: 255.255.255.0 and 10.8.1.100 (inside IP address of Firewall PIX-501-BUN-K9).

   Press “Close” button in the window “Network 1 Properties”.

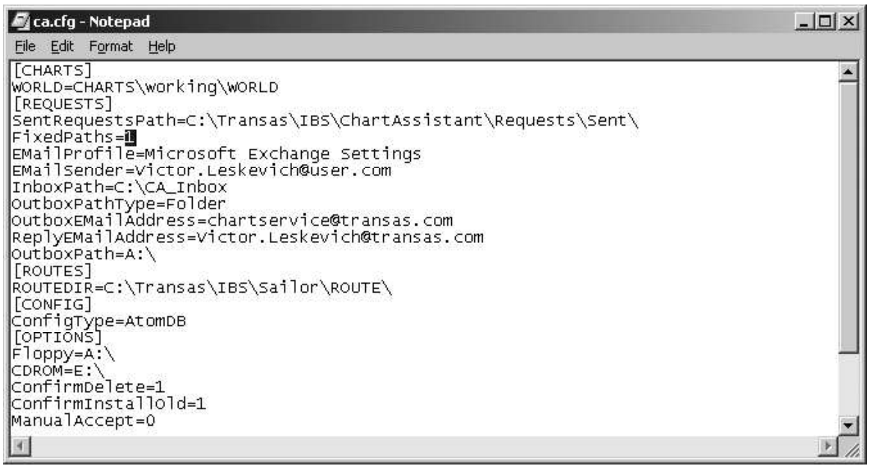
8. On each PC (W01–W05), run to START\SETTINGS\CONTROL PANEL. Double-click the “Internet Options” icon:



9. Switch to “Advanced” tab and check “Enable folder view for FTP sites” checkbox. Press “OK” button:



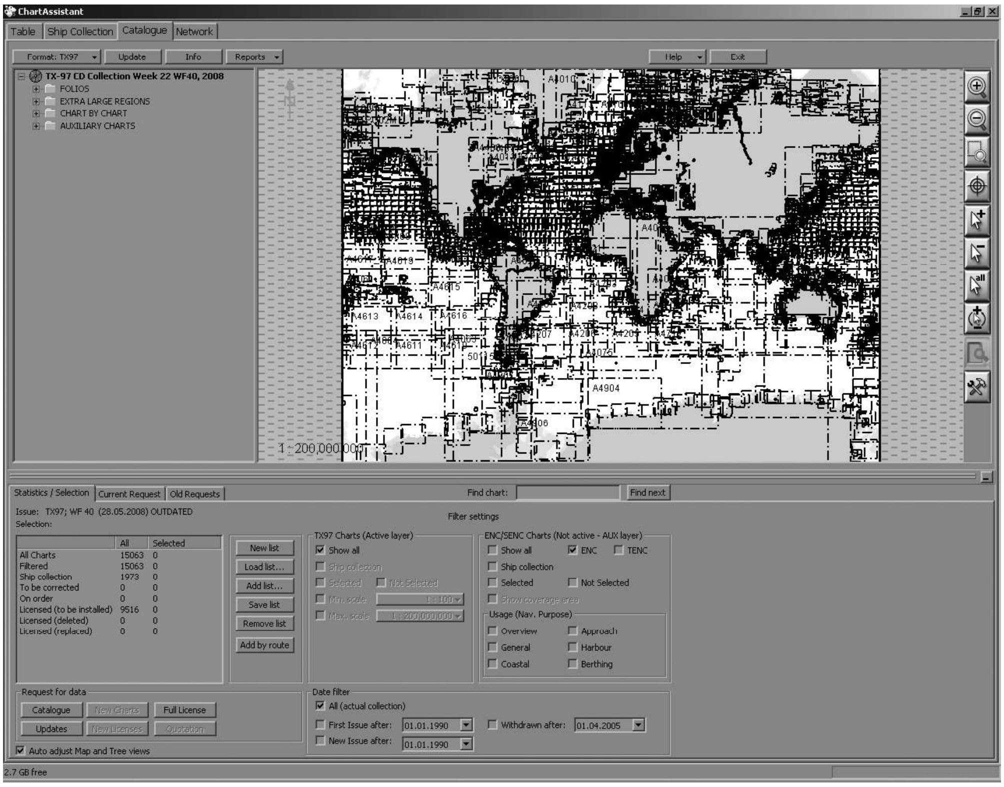
10. Edit `ca.cfg` file (by default, *C:\Transas\IBS\ChartAssistant*) intended for configuring the “Chart Assistant” utility:



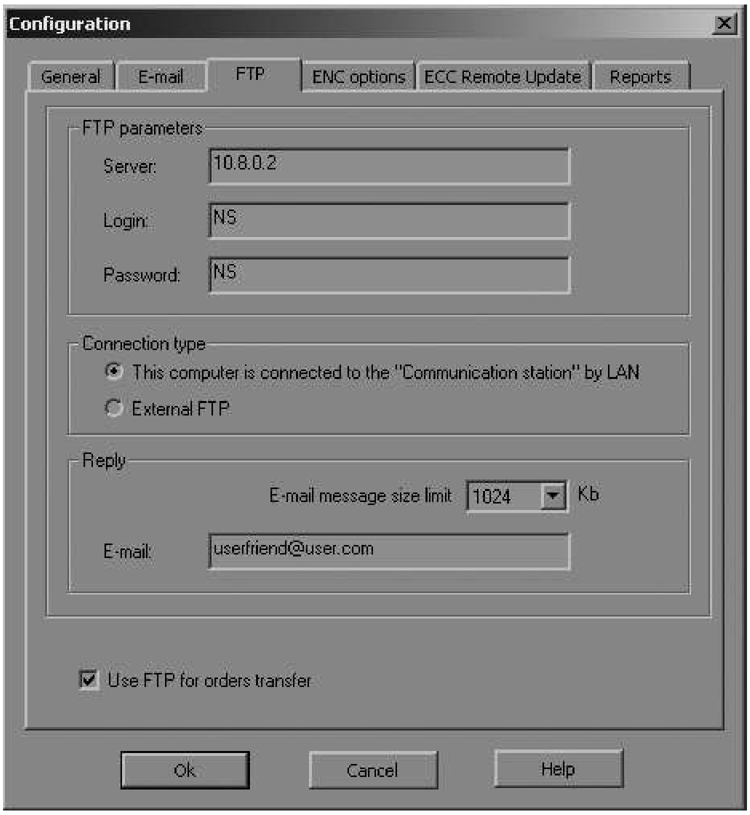
In the `[REQUESTS]` section, set the key `FixedPaths=1`.

11. Run Chart Assistant utility by selecting the appropriate item in the START menu (START\PROGRAMS\MULTIFUNCTIONAL DISPLAY\CHART ASSISTANT):

12. Use the appropriate tab in the top left corner of the screen to switch to “Ship Collection” or “Catalogue” page:



13. Press  button:



– Open “FTP” page;

– In the **Server** line of **FTP parameters** group, enter the IP-address of the communication PC (i.e., the PC which the FTP Server is installed on – `10.8.0.2`). In this case, the ftp:// type prefix should not be specified;

– In the **Login** line of **FTP parameters** group, enter the name of the communication PC user (i.e., user of the PC which the FTP Server is installed on);

– In the **Password** line of **FTP parameters** group, enter the password for the communication PC;

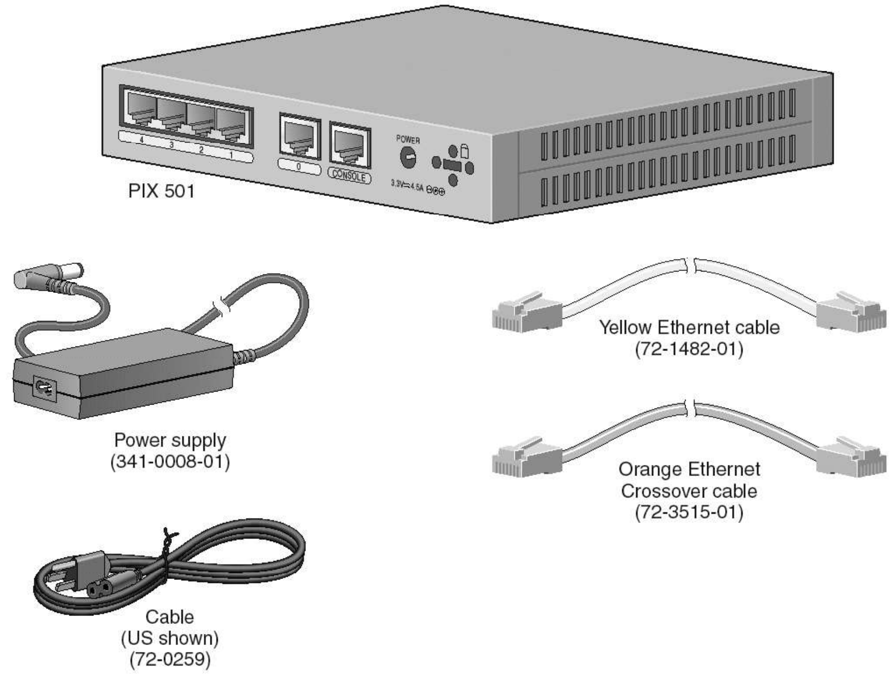
– In **E-mail** line of **Reply** group, specify the e-mail address, which Transas chart server will be sending processed requests to;

– Press “OK” button.

The settings on PC are completed.

PIX-501-BUN-K9 CONNECTIONS

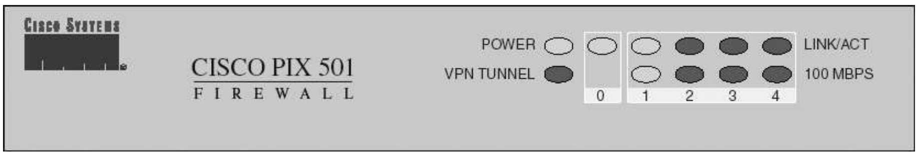
Place the chassis on a flat stable surface. The chassis is not rack mountable.



If the firewall is connected direct to the communication PC, use the orange Ethernet crossover cable (72-3515-01) to connect Port 0 of PIX 501 (the outside Ethernet port) to the Ethernet port of the communication PC.

If the firewall is connected to the communication PC via a switch or a hub, use the yellow Ethernet straight cable (72-1482-01) to connect Port 0 of PIX501 to the switch or hub. Then:

- Connect HP Network switch (LAN 1) with the yellow Ethernet cable to one of the four switched PIX 501 inside ports (numbered 1 through 4);
- Connect the power supply (341-0008-01) with power cable;
- Connect the small, round connector of the power supply cable to the power connector on the rear panel of the PIX-501-BUN-K9;
- Connect the AC power connector of the power supply input cable to an electrical outlet;
- Check the power LED, if it is solid green, then the device is powered on;
- Check the LINK/ACT LED indicators on the front panel of the PIX Firewall. LED indicators are normally solid green when a link is established, and flashing green when the ports are active. Each inside Ethernet interface (1 through 4) has two LEDs to indicate the operating speed and that the physical link is established.



The PIX-501-BUN-K9 Firewall is ready for use.

ANNEX B

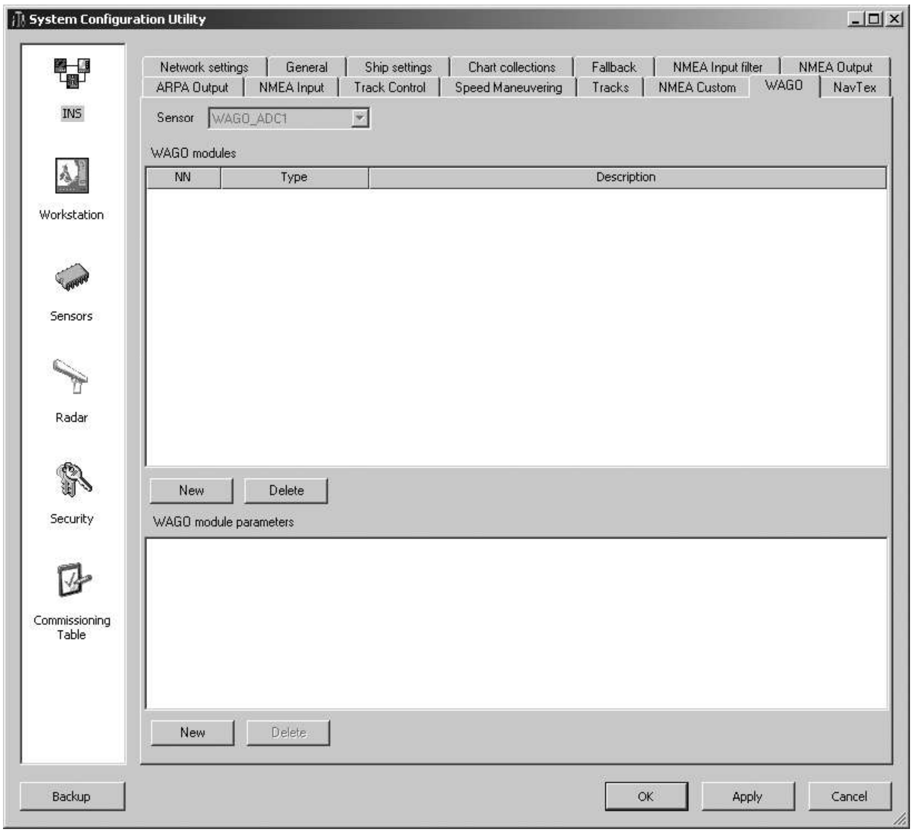
Additional Settings for Navi-Conning 4000

ADJUSTMENT OF NS 4000 OPERATION WITH WAGO MODULES

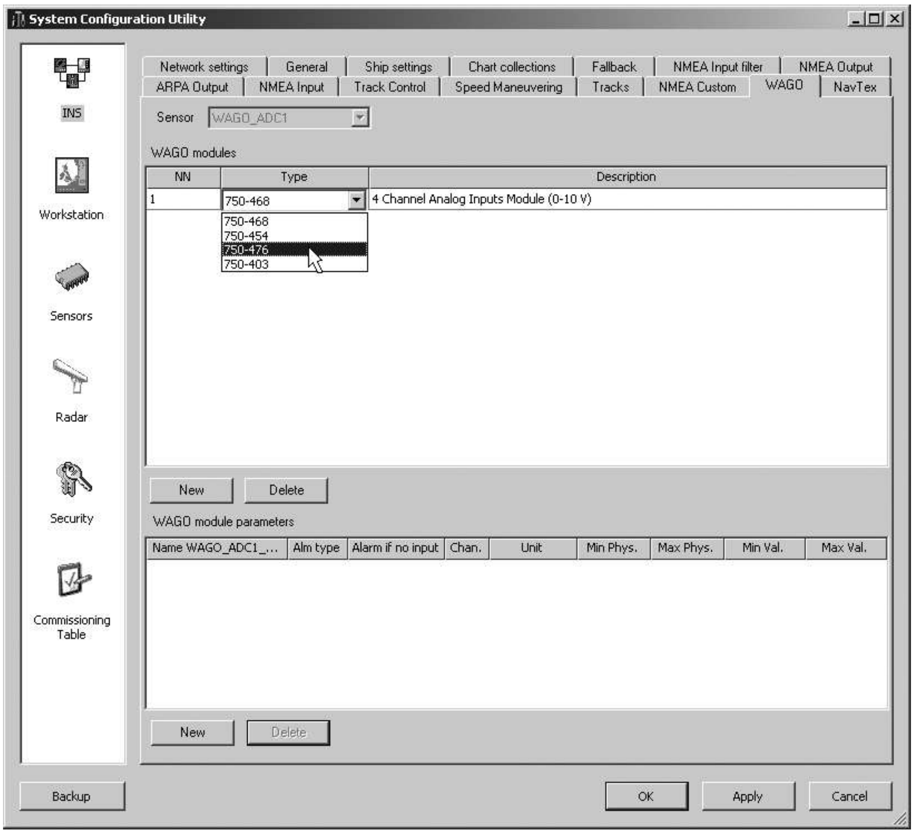
General

Run the System Configuration utility by selecting the appropriate item in the START menu (START\PROGRAMS\MULTIFUNCTIONAL DISPLAY\SYSTEM CONFIGURATION):

Press **INS** button and switch to “WAGO” page. This page is intended for creating and editing the database of parameters supplied to the NS 4000 via WAGO modules. Configuration of WAGO modules connection to the NS 4000 ports is performed on the page “Sensors” of the panel “Sensors” (see **Chapter 2**, section **NS 4000 Configuration**, paragraph **Sensors Settings**). If WAGO modules are not connected, the page will be blank.



In **WAGO modules** group, press **New** button. Position the cursor on a cell in **Type** column and double click the left trackball/mouse button:

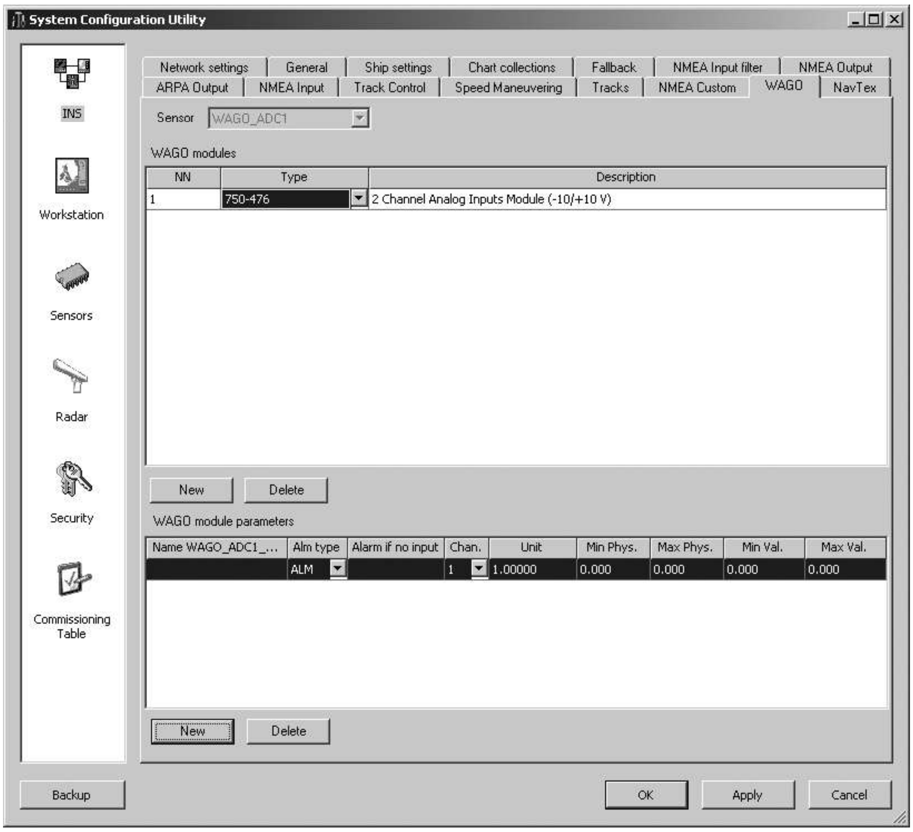


In the drop-down list, which will open up, select the device included in WAGO module.

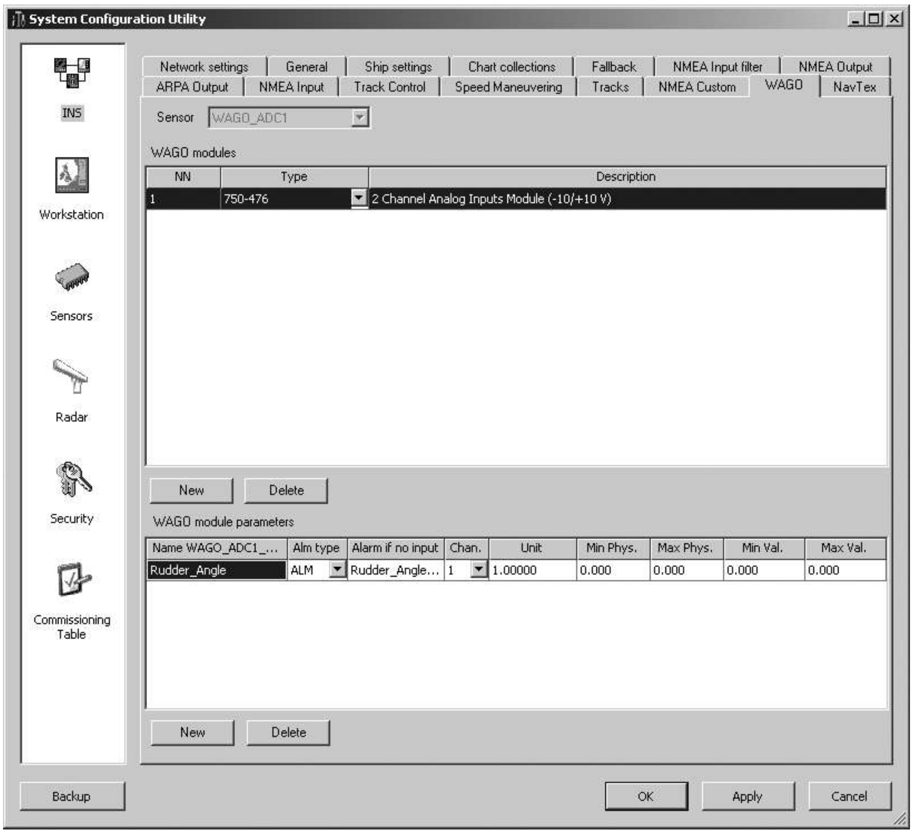
ATTENTION!

The first unit to be adjusted is the one, which is located next to 750-314 "Main Module" on the DIN rail.

In **WAGO module parameters** group, press **New** button to adjust parameters supplied by the installed unit:



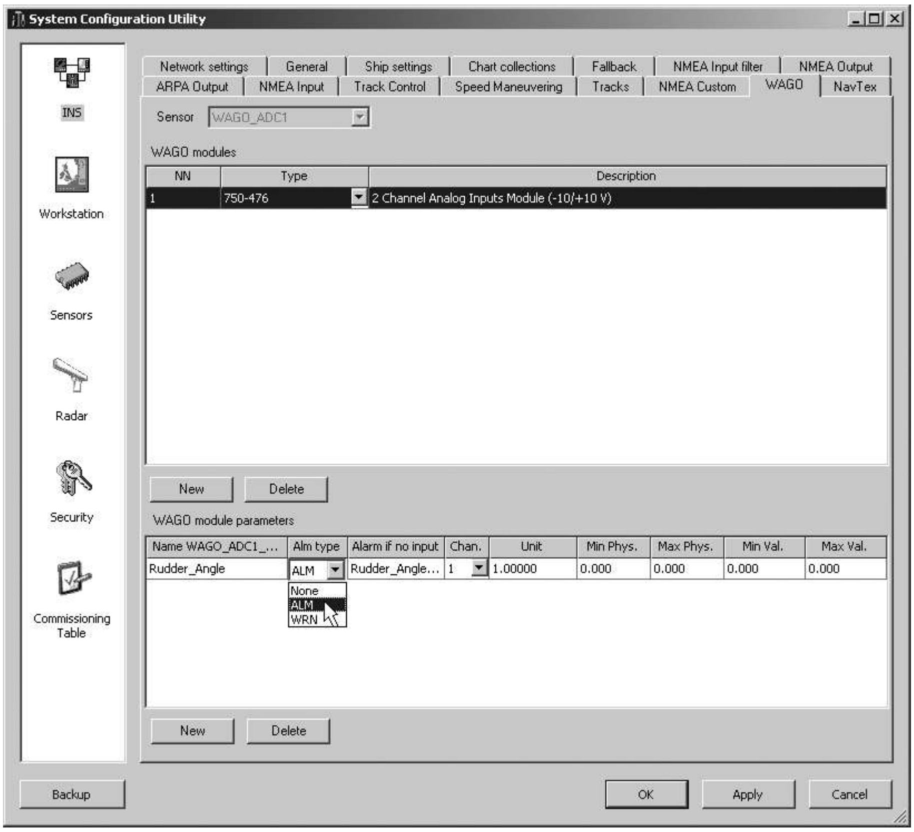
Use the **Name** column to enter the parameter name:



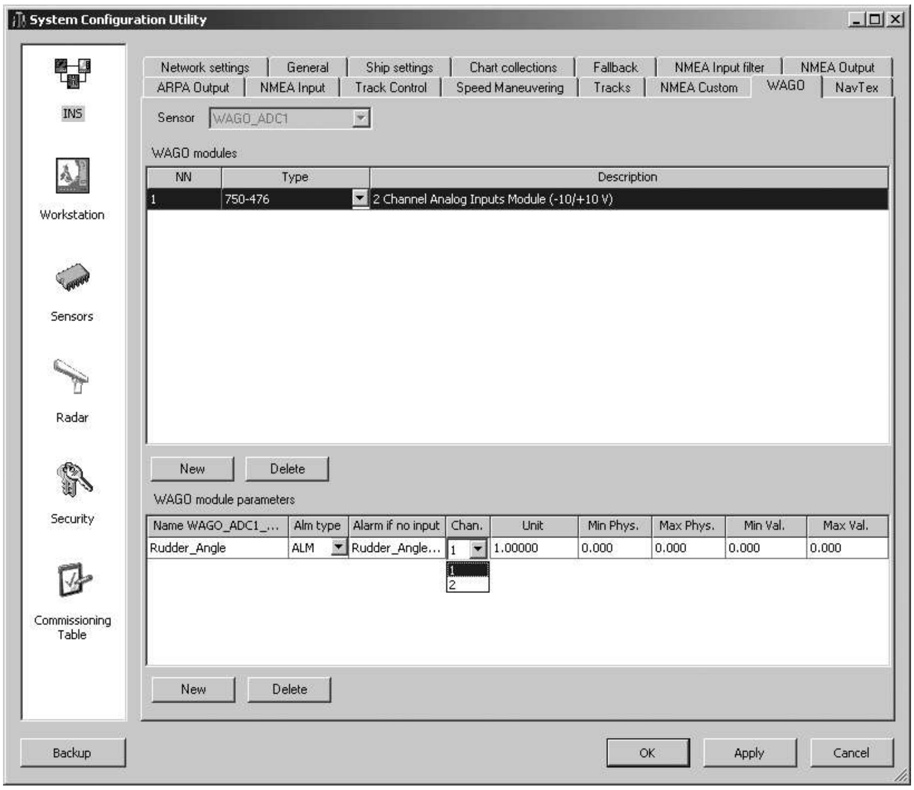
In the **Alarm if no input** column, after the input of the parameter name, the screen displays automatically the name of the alarm (warning) which will be shown in the NS 4000 in the absence of a signal at the WAGO module input. Edit the alarm (warning) name as required.

From the drop-dawn list in **Alm type** column, select the type of an alarm generated by the absence of a signal at the WAGO module input:

- None – no alarm;
- ALM – an alarm is triggered off;
- WRN – a warning is triggered off.



From drop-dawn list in **Channel** column, select the channel of the WAGO unit, which the parameter is supplied by:

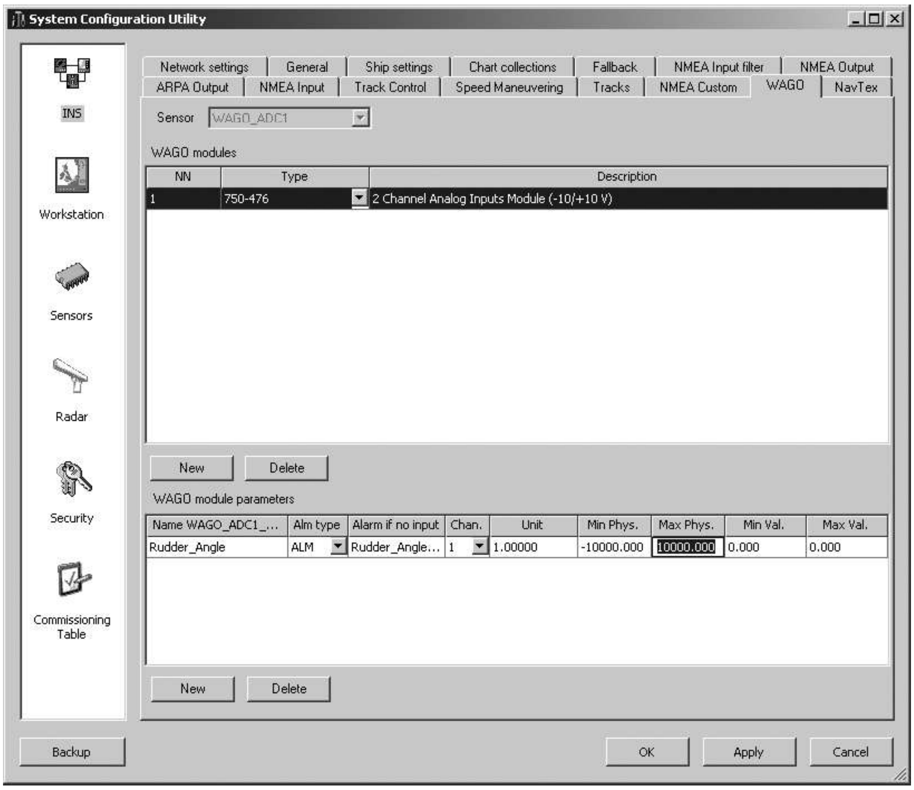


In **Unit** column, set translation coefficient (“1” by default).

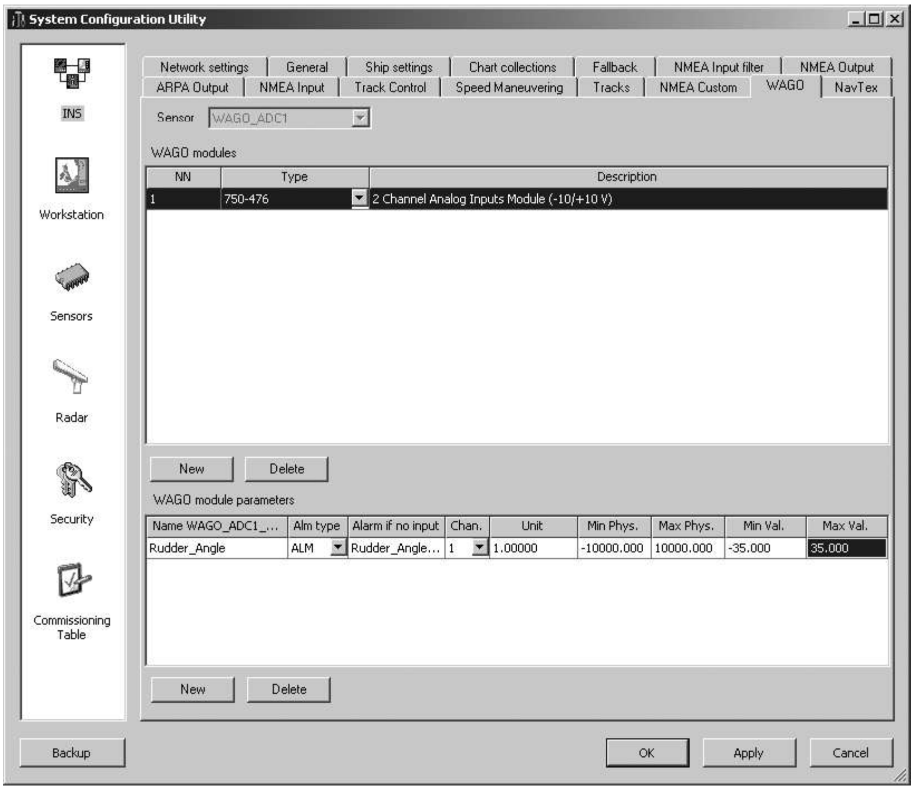
In **Min Phys.** column, set the minimum, and in **Max Phys.** column, set the maximum physical value (of current, voltage, etc.), which is supplied to the ADC and corresponds to the maximum and minimum parameter value.

ATTENTION!

In **Min Phys.** and **Max Phys.** columns, the voltage value is required to be set in millivolts (10 V are specified as 10000), whereas the current value should be specified in microamperes (for 4 mA 4000 is specified).



In **Min Val.** column, set the minimum, and in **Max Val.** column, set the maximum value of the associated parameter:



Another parameter can be set for other ADC channel. By using **New** button in **WAGO module parameters** window, specify all the parameters, which received via this WAGO module.

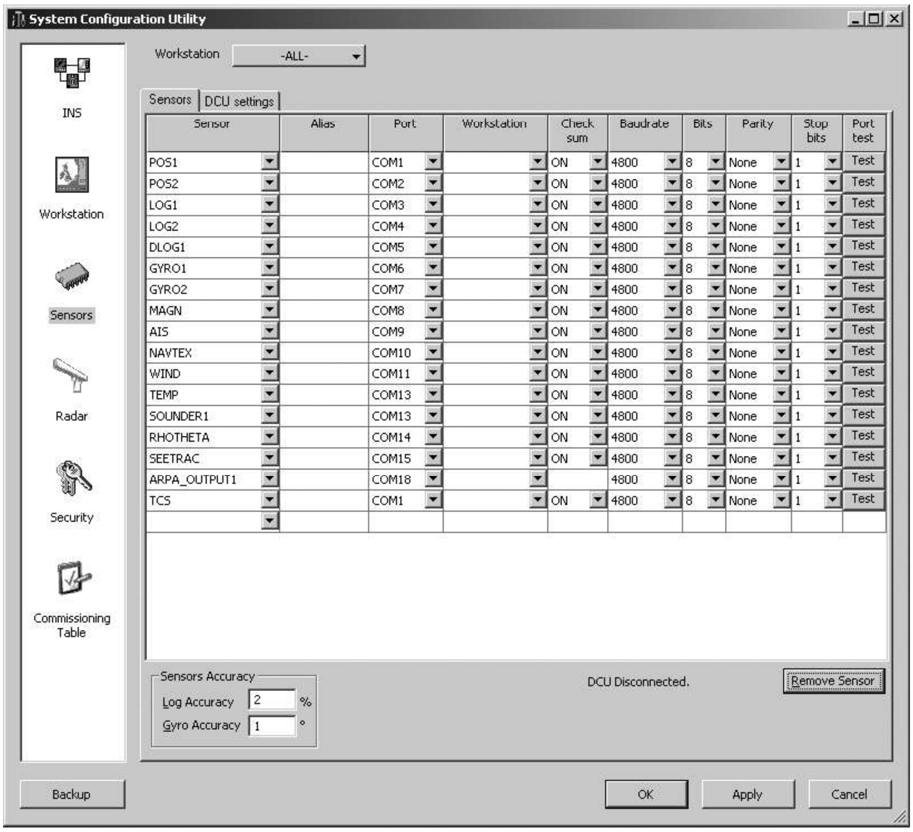
By using **New** button in **WAGO modules** window, specify all the units, which WAGO Conning Box consists of.

> **ATTENTION!**
>
> Adjustment of WAGO CB units should be performed in the order of their positions on the DIN rail from 750-314 “Main Module”.

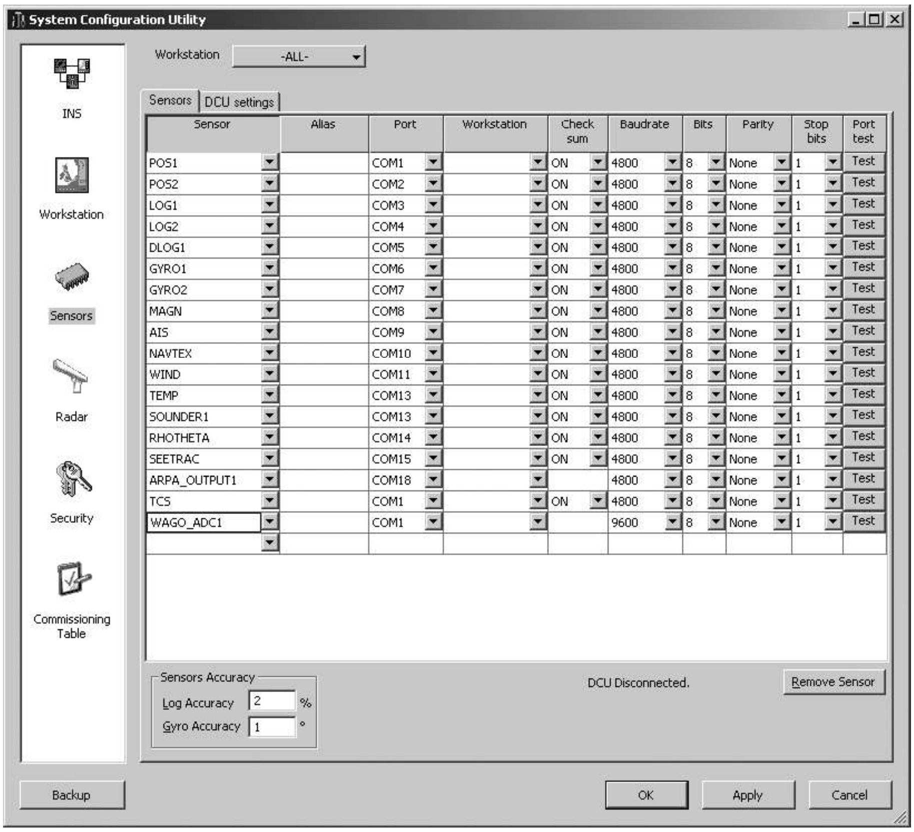
Press “OK” button to save the settings you have made, and exit from the System Configuration utility.

Connection of External MOB Button

1. Press the **Sensors** button. The drop-down **Workstation** list specifies the name of the workstation which the external MOB button will be connected to.
2. Open “Sensors” page.



– Select WAGO ADC sensor from the drop-down list in the column **Sensor**:



– In the column **Port**, select from drop-down list the required COM-port of the Workstation computer, which this sensor is physically connected to;

– In the **Check sum** column, if required disable the checksum by selected “OFF” from drop-down list;

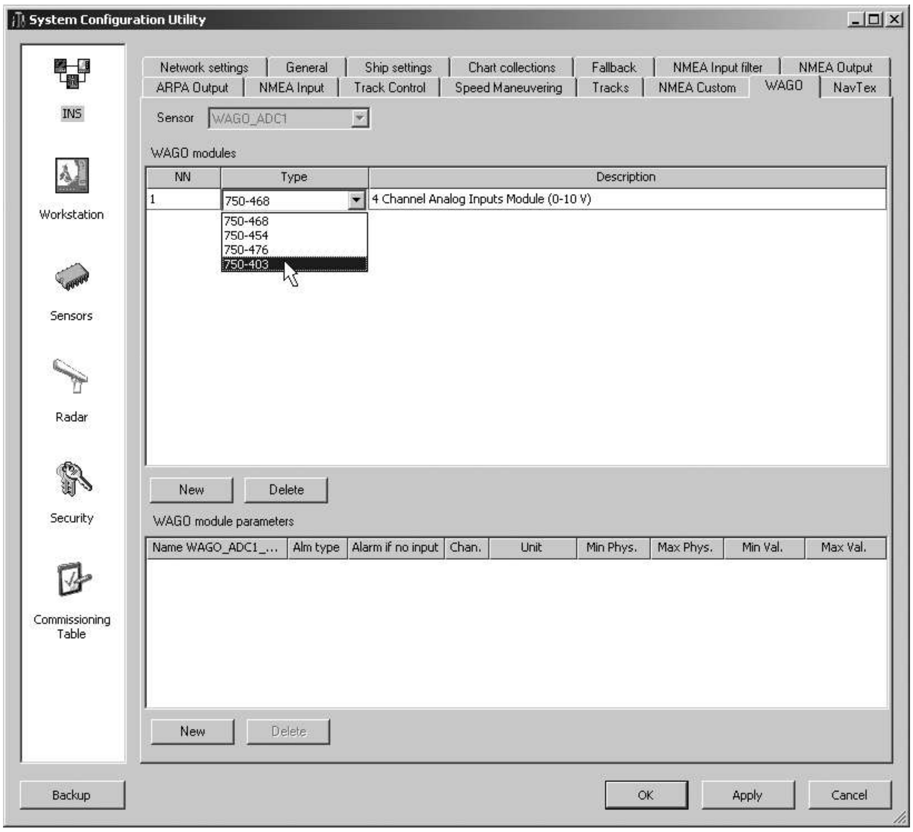
– Specify in the drop-down list the following COM port parameters:

Baud Rate: 9600;
Data Bits: 8;
Parity: None;
Stop Bits: 1.

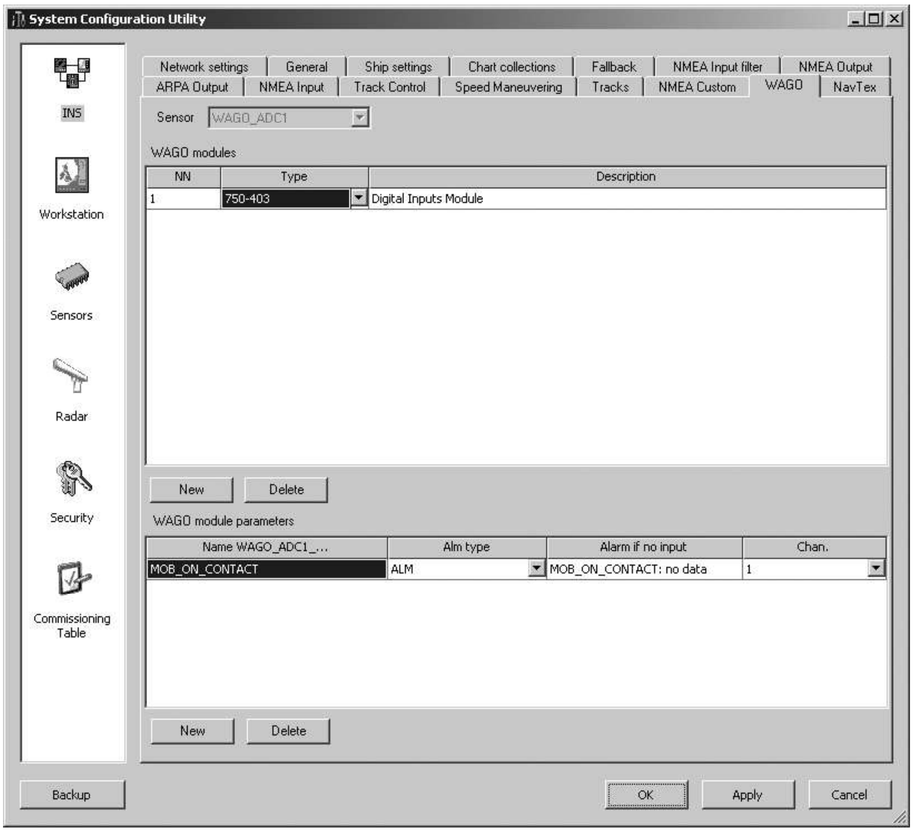
– Press “Apply” button.

3. Press **INS** button and switch to “WAGO” page.

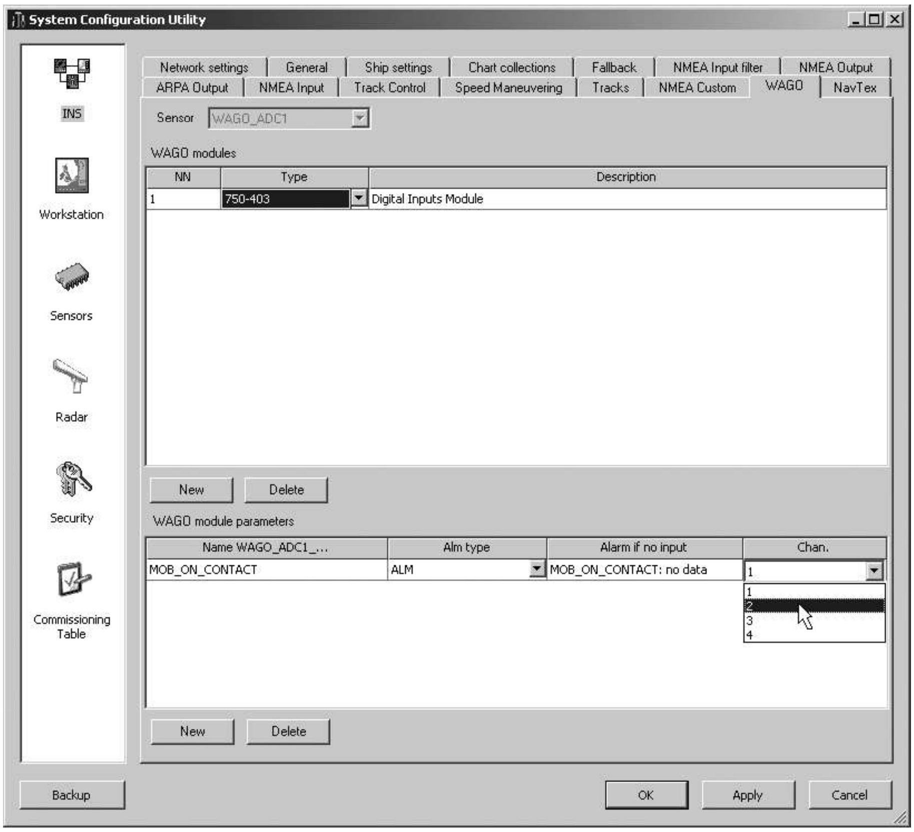
– In **WAGO modules** group, press **New** button. Position the cursor on a cell in **Type** column and double click the left trackball/mouse button. Select “750-403 Digital Inputs Module”:



– In the **WAGO module parameters** group, press the **New** button. Use the **Name** column to enter the parameter name. It is exactly the following “MOB_ON_CONTACT” name which should be entered:



– From the drop-down list in the **Channel** column select the channel of the WAGO unit which the external MOB button is connected to:

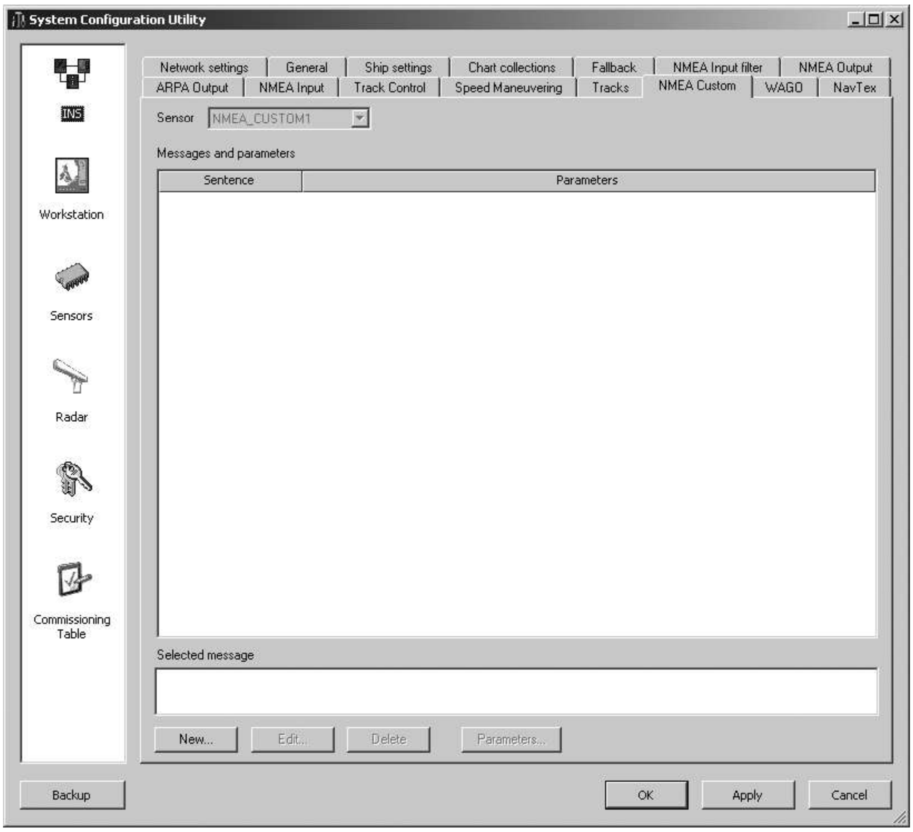


4. Press “OK” button to save the settings you have made, and exit from the System Configuration utility.

ADJUSTMENT OF NS 4000 OPERATION WITH NMEA CUSTOM

Run the System Configuration utility by selecting the appropriate item in the START menu (START\PROGRAMS\MULTIFUNCTIONAL DISPLAY\SYSTEM CONFIGURATION):

Press INS button and switch to “NMEA Custom” page. This page is intended for creating and editing the database of user sentences supplied to the NS 4000 input. Configuration of NMEA Custom sensor connection to the NS 4000 ports is performed on the page “Sensors” of the panel “Sensors” (see **Chapter 2**, section **NS 4000 Configuration**, paragraph **Sensors Settings**). If NMEA Custom sensor is not connected, the page will be blank:

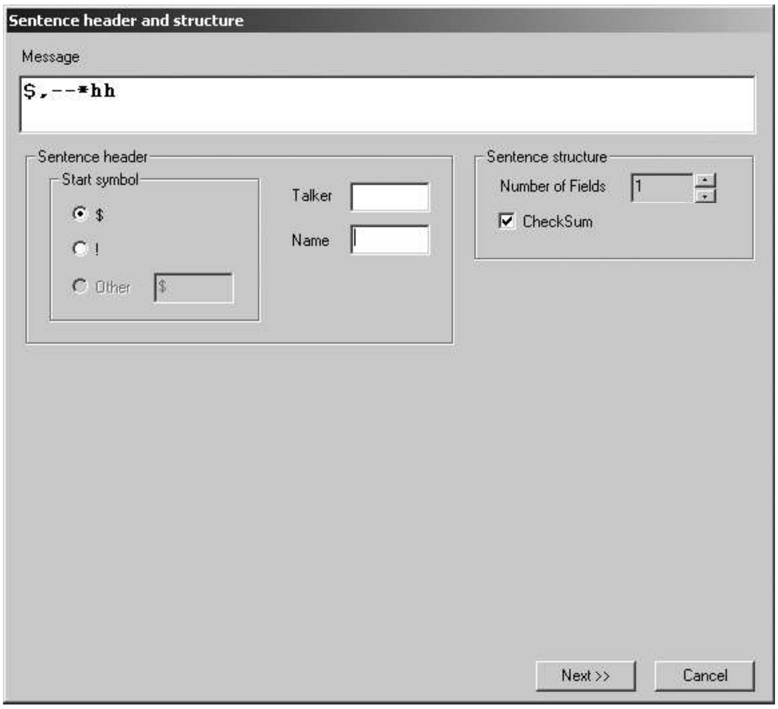


General

Sentence Structure

A special Sentence Editor is used for the aforementioned purposes. The Editor contains the database of like NMEA sentences, which are processed by the NS 4000.

When creating or editing sentences, the user specifies to the NS 4000 the rules which this sentence will be processed by.

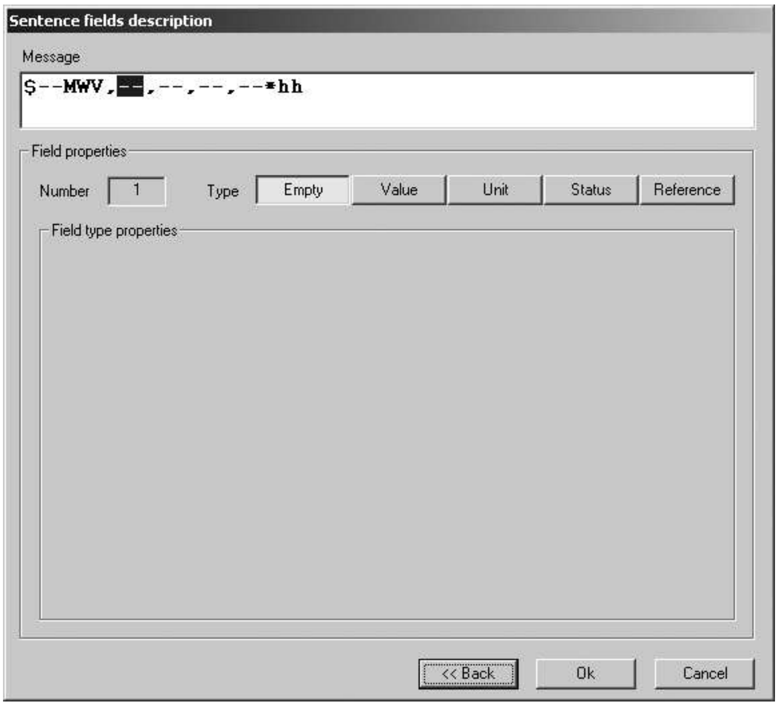


The first step in the setting of parameter extraction rules is the determining of the structure of a sentence containing parameters. Press **New** button.

While creating the sentence structure, the user sets the criterion for checking the correctness of the sentence, which is being received. If at least one of the characteristics of a newly created sentence does not correspond to the characteristics of the sentence, which is being received, it will be ignored. The sentence has the following characteristics:

- **Start Symbol** – sentence start symbol;
- **Talker** – information source identifier. If the identifier is specified, only those sentences, which have the set identifier, will be processed. The rest of the sentences, even if they have the same structure, will be ignored. If a identifier isn't specified, all the sentences which have this structure, will be processed regardless of the information source identifier;
- **Name** – sentence identifier. If the identifiers of the sentence which is being received and which is being created do no match, they will be ignored;
- **Number of fields** – number of fields in the sentence. Where the number of fields in a received sentence does not correspond to the value set by the user, the sentence will be ignored;
- **Checksum** – a mandatory validity check performed on the data contained in the sentences, calculated by the external device, appended to the message, then re-calculated by the NS 4000 for comparison to determine if the message was received correctly. If these checksums do no match, the sentence will be ignored.

Set several fields and press the "Next >" button. An example of creating a custom NMEA will be provided in the next paragraph:



The next step is to determine the structure of sentence fields. Each field in a sentence can contain the following characteristics:

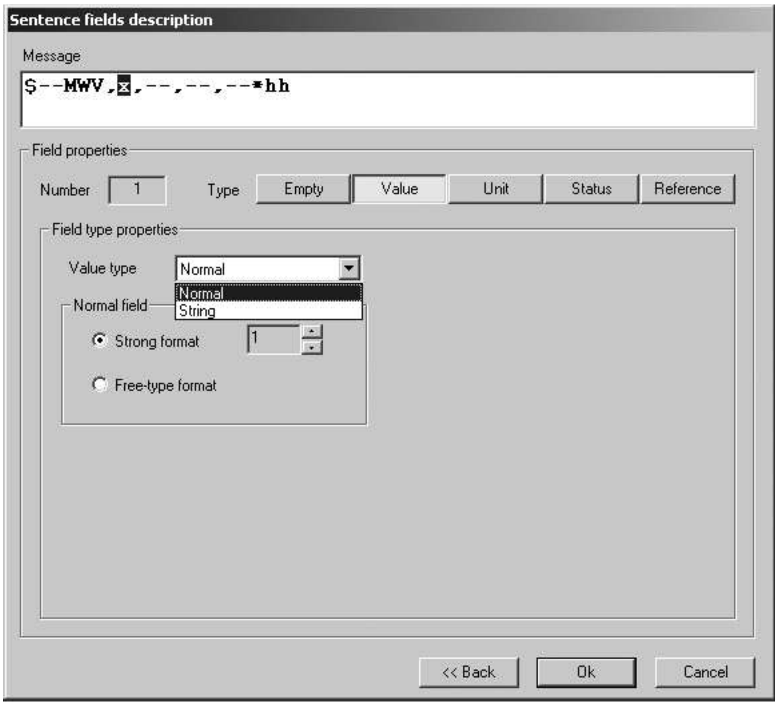
- **Value** – parameter value;
- **Unit** – parameter measurement units;
- **Status** – parameter status;
- **Reference** – parameter reference;
- Empty field.

By default, fields in the sentence structure are empty, which corresponds to the pressed **Empty** button.

To determine which parameter characteristics the selected field contains (value, measurement units, status or reference), position the cursor on the necessary field and press the appropriate button.

Parameter Value

Parameters may have digital and symbol values, which may be of constant or variable length; this is why it is necessary to determine the format of the field containing the parameter value. These settings are made at the fields' structure formation stage.

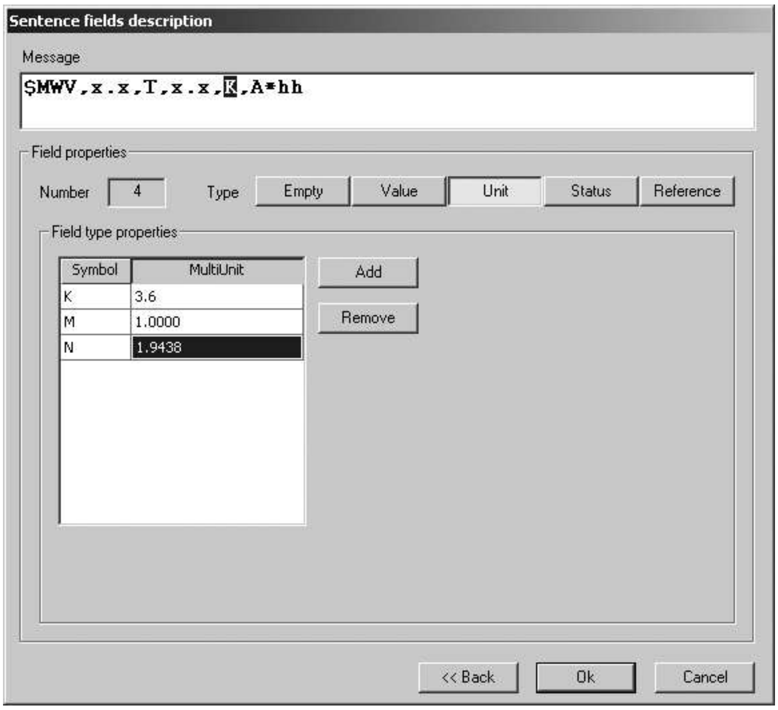


Field formats are provided in the table below:

Format type	Format	Notation in the sentence structure	Field description
Normal	Free-type Format	x.x	Fields of variable length containing integers or numbers with floating point
Normal	Strong Format	x	Fixed length field containing the number of digits as determined by the user
String	Text	c– –c	Variable length field containing any permitted characters
		– –	Empty field

Parameter Measurement Units

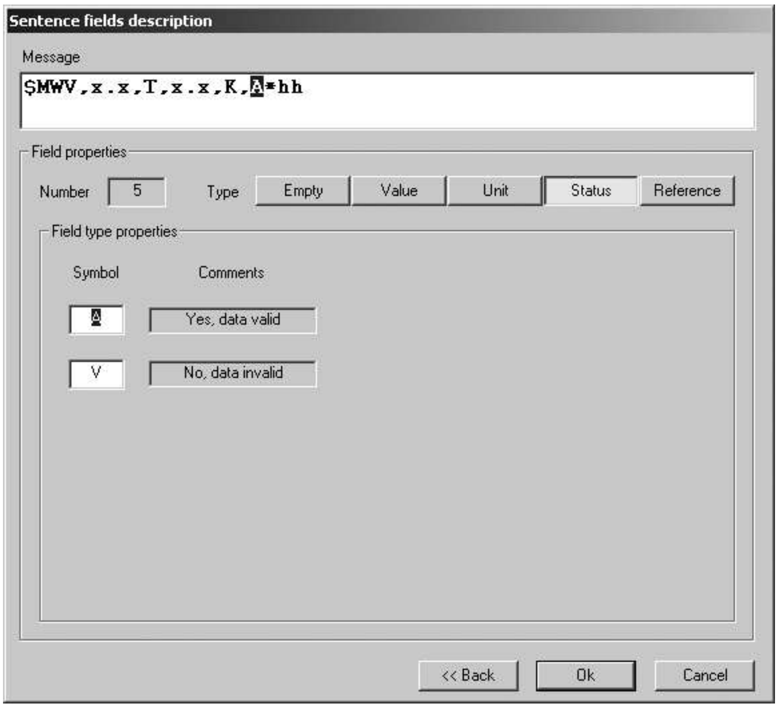
The parameter has the measurement units determined by the measurement unit identifier, which arrives in a separate field of the same sentence as the parameter itself. It is necessary to specify all the possible identifier values, which may arrive in this field. Appropriate measurement units will be selected according to this identifier. These settings are made at the field structure formation stage.



Factors for re-calculating all the measurement units to the system which the NS 4000 operates with are specified separately in **MultiUnit** column.

Parameter Status

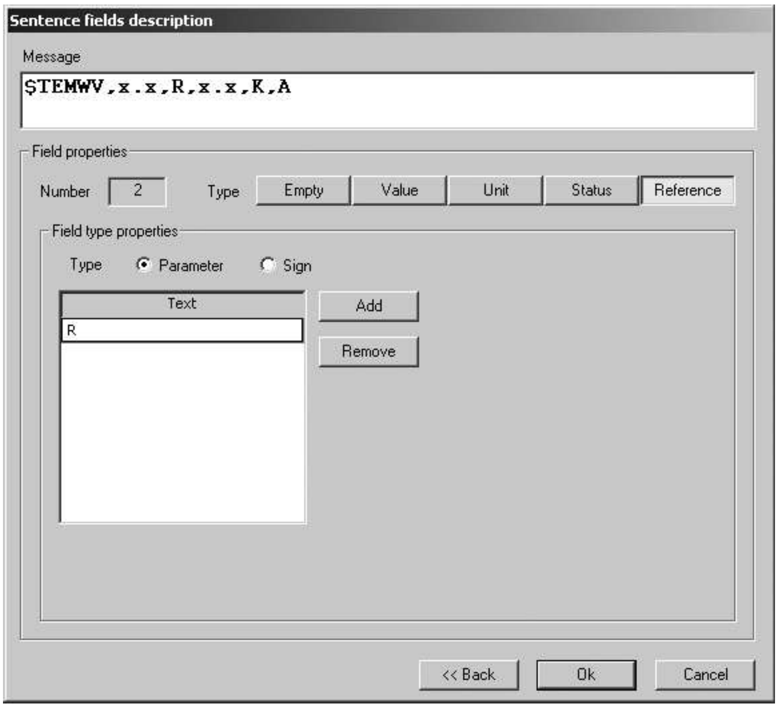
The parameter may have a status, which determines its reliability. The status always has two values: Valid/Invalid. The user determines characters, which may arrive in Status field, at the field structure formation stage.



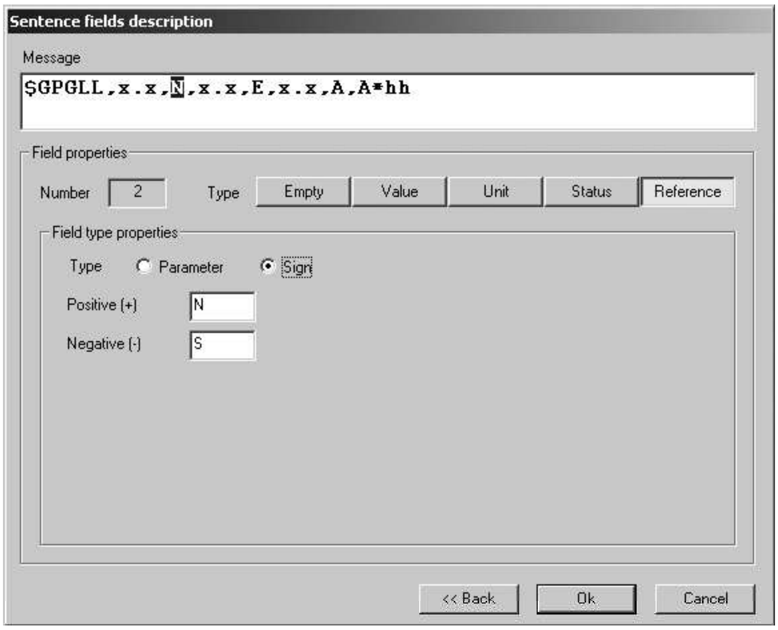
Parameter Reference

The parameter may have an additional characteristic: a reference, which may be of two types:

- Parametric, which differs the parameter from other parameters, whose value arrives in the same sentence field. E.g. in MWV sentence, the reference indicates theoretical or relative wind is specified in the given sentence.



- Sign, which allows a positive or negative value to be assigned to the parameter and then taken into account in the further processing. This reference always has two values only. E.g. it is used in GLL for the ship coordinates ("+" – North, "-" – South) or XTD to specify the direction ("+" – starboard, "-" – port).



Characters, which may arrive in **Reference** field, are determined by the user at the field structure formation stage.

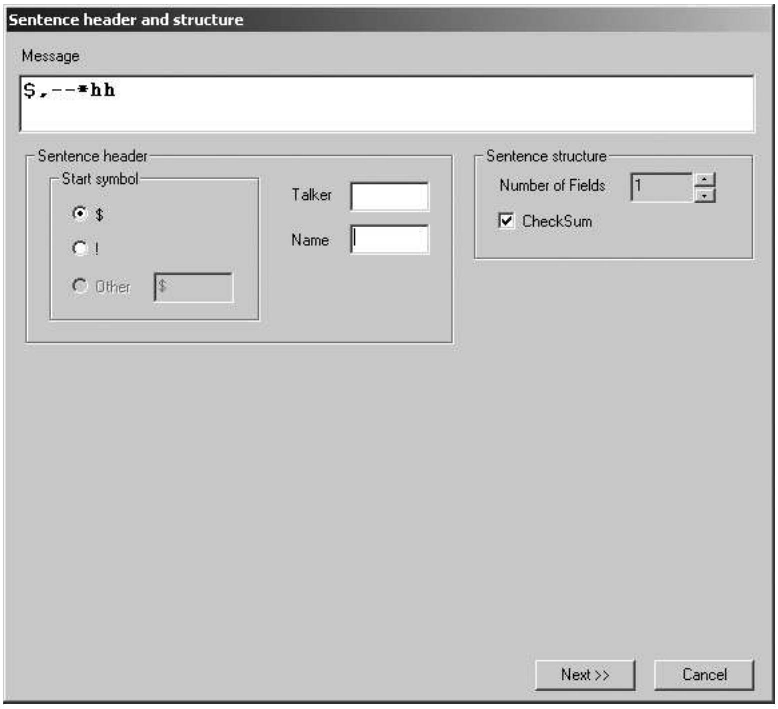
Empty Fields

An empty field (**Empty** button is pressed) is not processed by NS 4000.

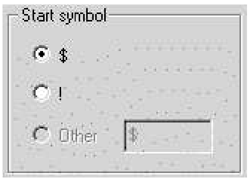
Creating New Sentences Structure

As an example, we will consider an algorithm for retrieving parameters from the NMEA MWV sentence, which can be used in much the same way for retrieving parameters from any customised NMEA like sentence.

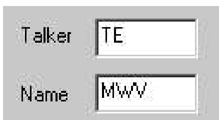
In “NMEA Custom” window press **New** button:



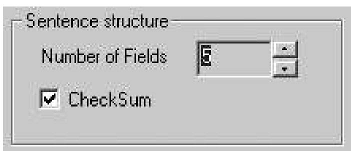
In “Sentence header and structure” window, which will open up, in **Start Symbol** group set the necessary start symbol by choosing the appropriate option button. E.g. for MWV sentence, select “$”:



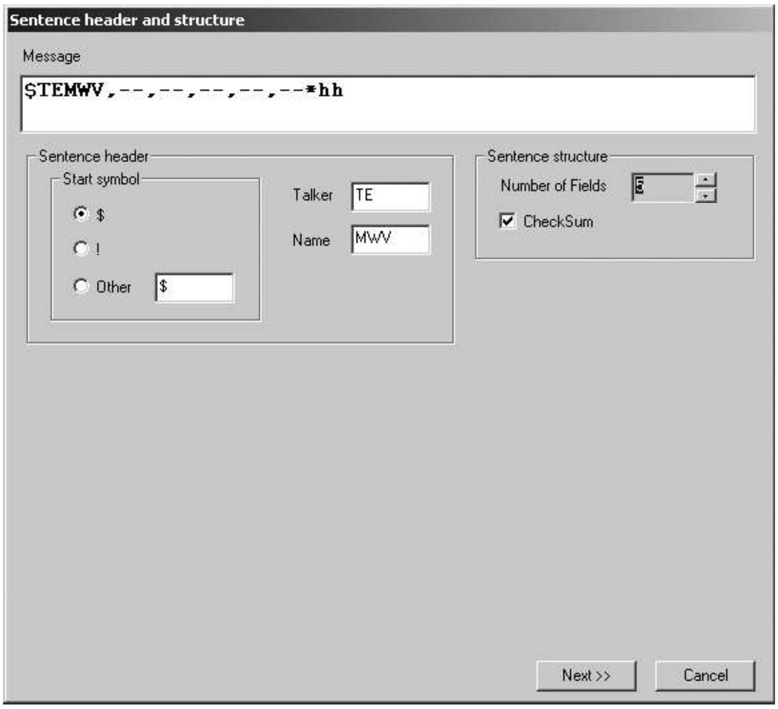
In **Talker** box set the identifier of the device, which the sentence is supplied by; to do this, enter it in block letters in **Manual** input box. The number of entered identifier characters should be two. E.g. for MWV sentence which is supplied by the wind sensor imitator, the identifier will be “TE”. Use **Name** text box to enter the sentence identifier. The number of entered sentence identifier characters should be three:



Use **Number of Fields** text box to enter the number of fields in the sentence, which is being created. E.g. for MWV sentence, it is 5. If necessary, check **Check Sum** checkbox for checksums comparison:

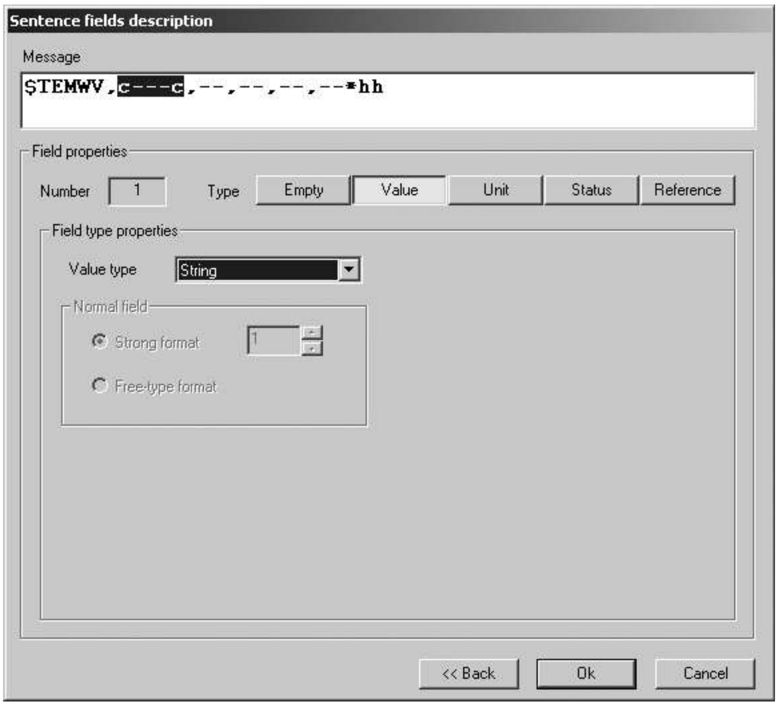


The formed sentence structure will be displayed in the information line in the top part of “Sentence header and structure” window:

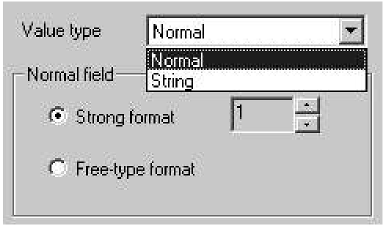


Press “Next >” button.

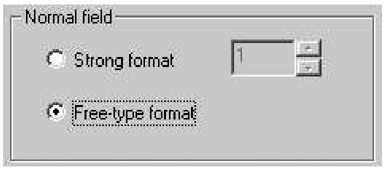
Specify the fields, which will contain parameter characteristics. E.g. for MWV sentence, position the cursor on the first field containing the parameter value, and press **Value** button:



Specify the format type for the field describing the parameter value. To do this, select the required value from the drop-down list. E.g. “Normal” for the given value of a MWV sentence parameter:

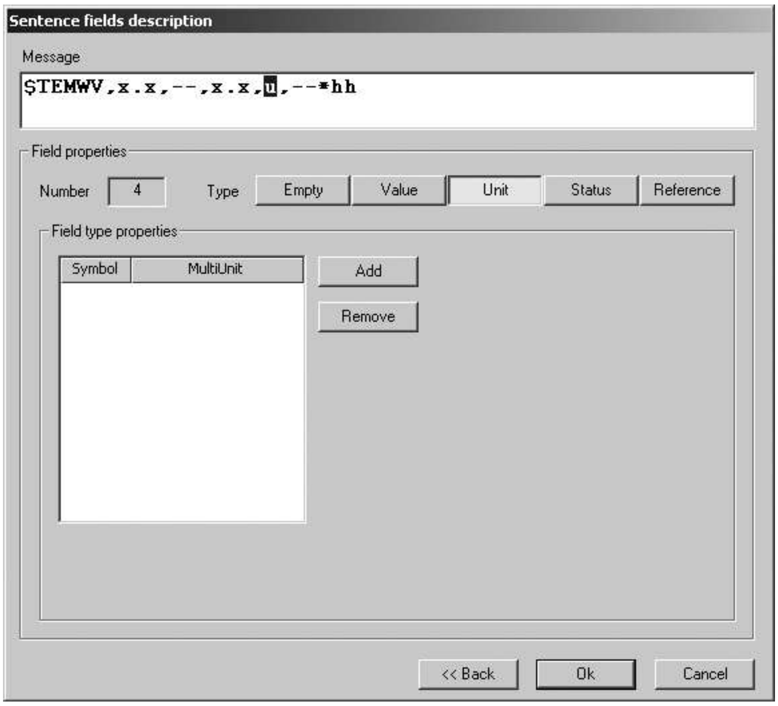


For Normal field type, set the format by selecting the appropriate option button in **Normal Field** group. E.g. for “Wind Angle” parameter of MWV sentence, set **Free-Type Format**. This will be a variable length field containing integers or numbers with floating point. If **Strong Format** is set, the field will have a fixed value and contain numbers with a set number of digits:



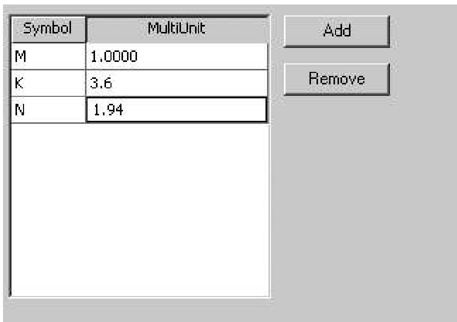
Use a similar procedure to specify fields containing values of other parameters, e.g. the third field for MWV sentence.

Position the cursor on the field containing the parameter measurement units (e.g. wind speed measurement units in MWV sentence) and press **Unit** button:

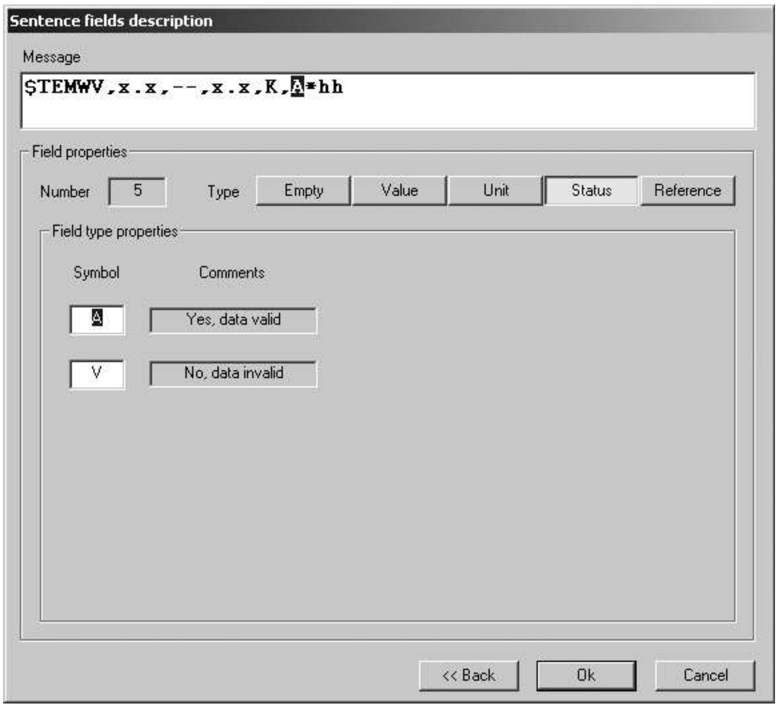


Press **Add** button. Position the cursor on a cell in **Symbol** column and double click the left trackball/mouse button. Enter the measurement unit symbol and press <Enter>. In **MultiUnit** column, enter the coefficients for re-calculating the measurement units to the system which the NS 4000 operates corresponding to the unit symbol, and press <Enter>.

Use **Add** button to enter all the possible measurement units for the given parameter:

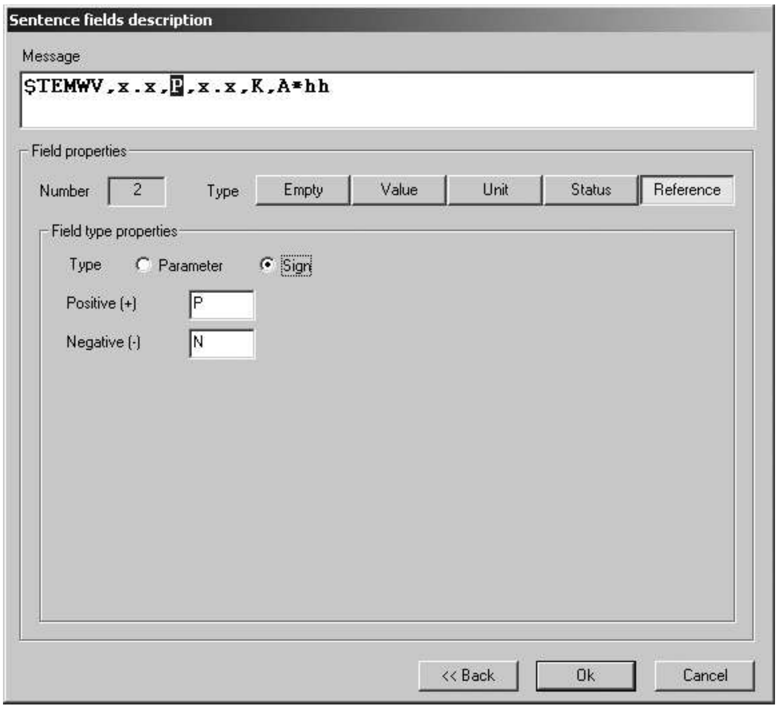


Position the cursor on the field containing the parameter status, and press **Status** button:



Set the symbols corresponding to reliable and unreliable data in **Symbol** column.
As the set symbols are received, the NS 4000 as valid or invalid will assess the edited parameter.

Position the cursor on the field containing the parameter reference (e.g. the second field in MWV sentence) and press **Reference** button:



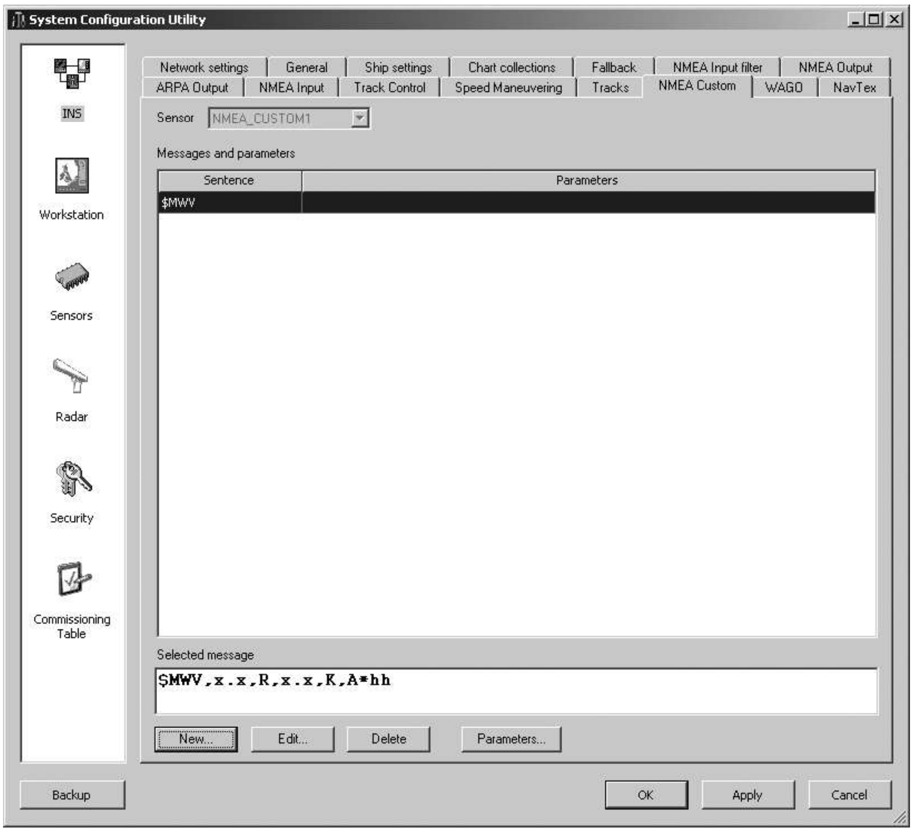
In **Type** line, select the reference type (for MWV sentence – “Parameter”).

Press **Add** button. Position the cursor on **Symbol** column cell and double click the left trackball/mouse button. Enter the reference symbol and press <Enter> key.

Use **Add** button to enter all the possible reference symbols for the given sentence:

Formation of the sentence structure is completed. Press “OK” button.

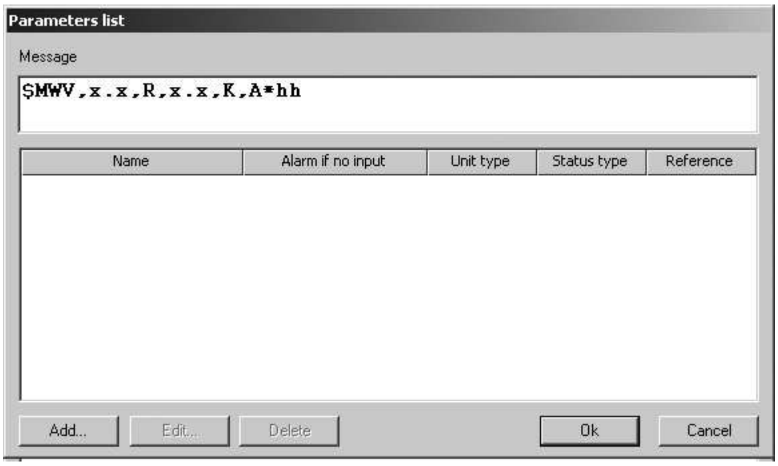
In **Messages and parameters** group the entered sentence will be added in the top part in “Sentence” column:



It is then necessary to set rules for the extraction of parameters from the sentence which you are editing.

Defining Parameter Extraction Rules

To define rules for extracting parameters from the sentence, press **Parameters** button:

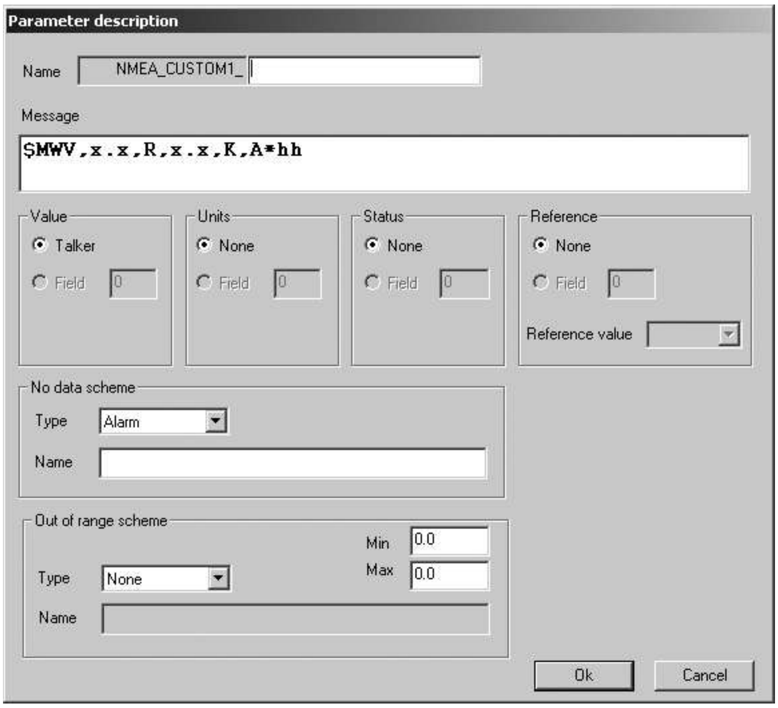


Addition of New Parameters

ATTENTION!

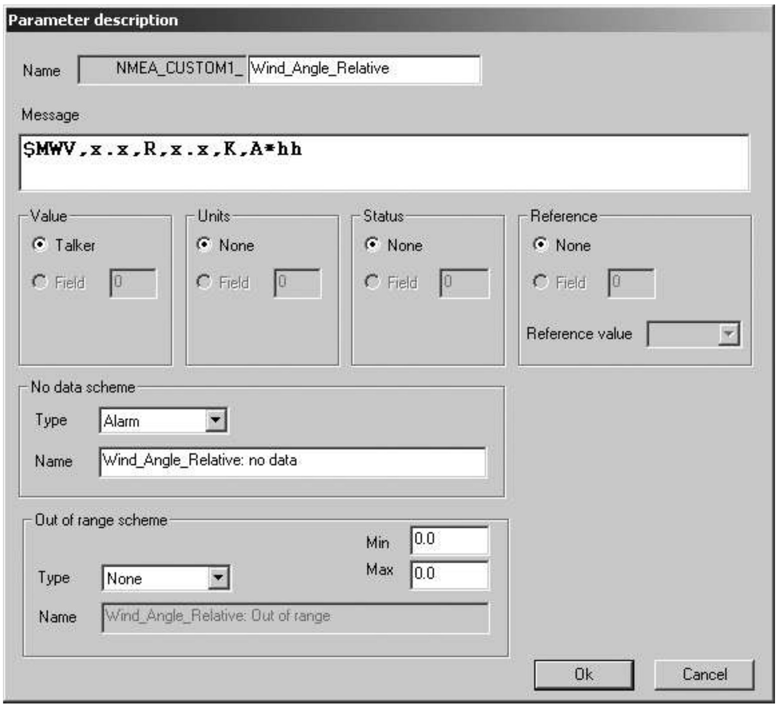
The previously set sentence structure is displayed in "Parameters list" window and cannot be edited at this stage.

To add a parameter, which the extraction-from-sentence rules should be defined for, press **Add** button of "Parameters list" window:

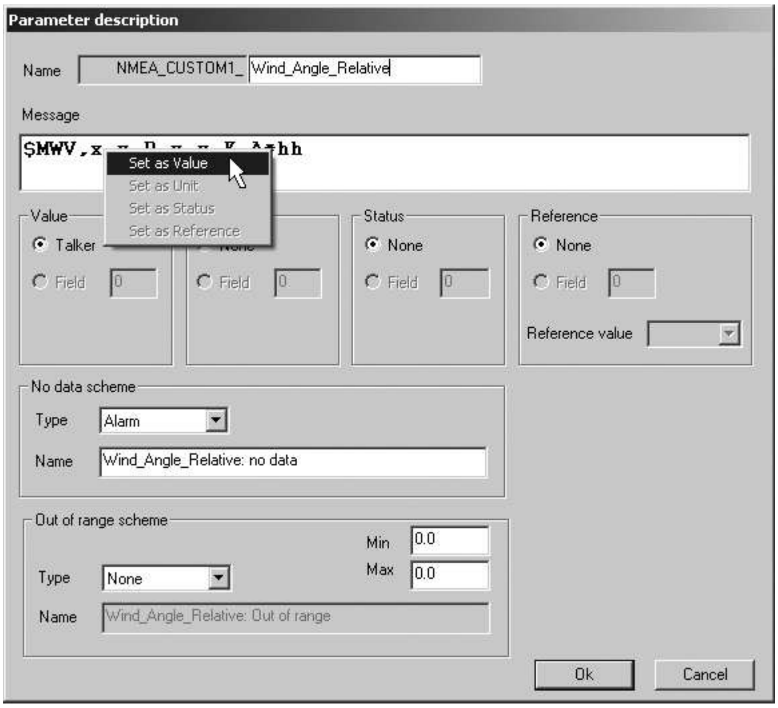


In **Name** field, enter the parameter name.

Note: There should be no spaces in the parameter name; it is advisable to replace them with underlines. The parameter name cannot be the same as that of indicators on the Navi-Conning 4000.

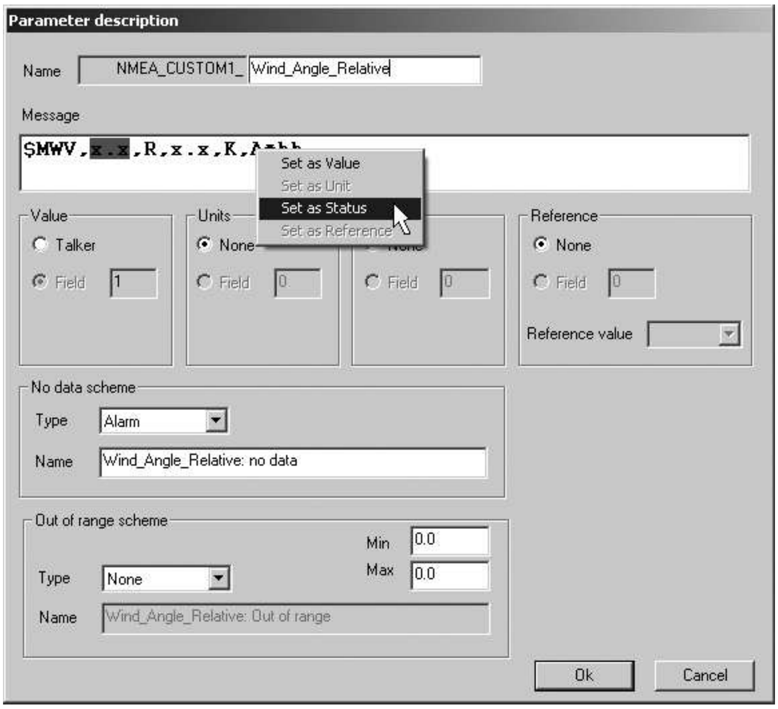


Position the cursor on the field of the sentence containing the value of the necessary parameter, and press the right trackball/mouse button:



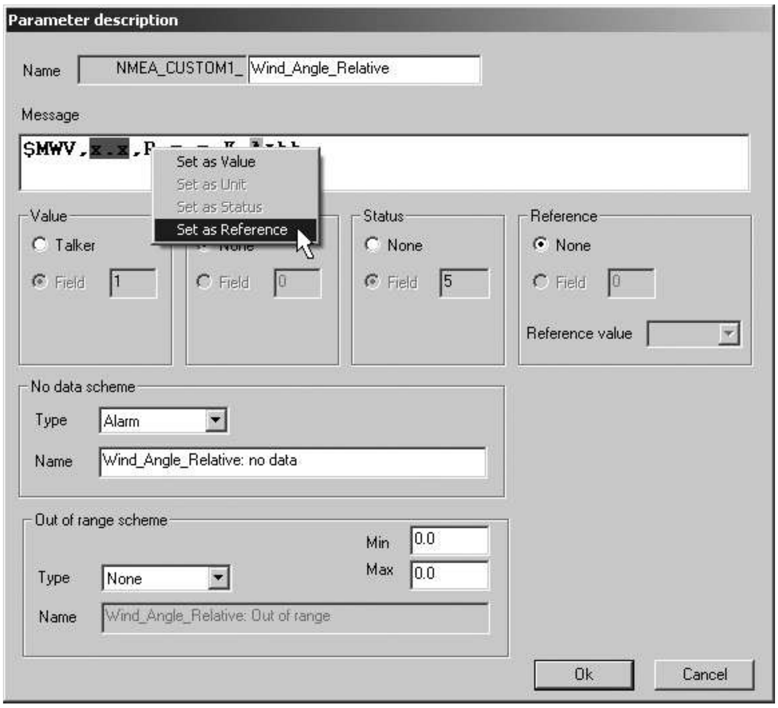
To set the parameter value, select SET AS VALUE line from the pop-up menu. E.g. for MWV sentence, the first field should contain the value of the wind angle. The field, which you are editing, will be colored in red.

Position the cursor on the field determining the parameter status, and press the right trackball/mouse button:



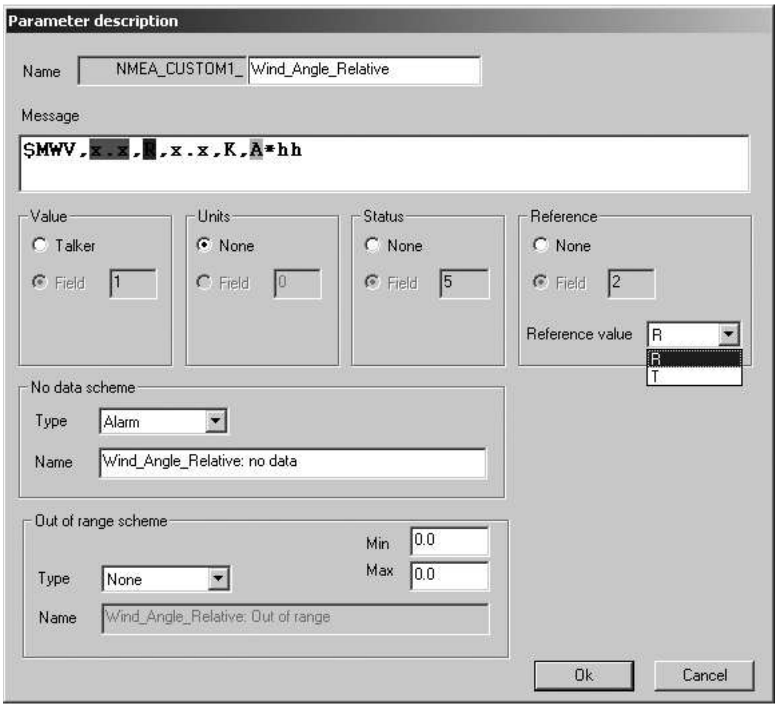
To set the parameter status, select SET AS STATUS line from the pop-up menu. The edited field will be coloured in khaki.

Position the cursor on the field determining the parameter reference, and press the right trackball/mouse button:



To set the parameter reference, select SET AS REFERENCE line from the pop-up menu. The edited field will be coloured in dark blue.

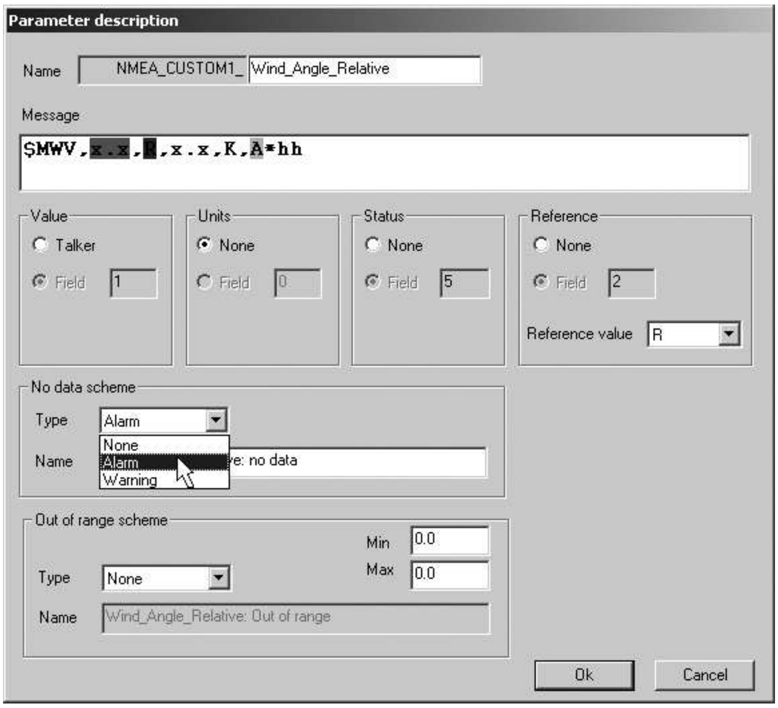
Use **Reference Value** input box of **Reference** group to select a reference from the drop-down list corresponding to the parameter, which is being set (see paragraphs **Parameter Reference** and **Creating of New Sentences**). E.g. for “Wind angle, 0 to 359 degrees, Relative” parameter in MWV sentence, this will be “R”.



If necessary, in the **No data scheme** group use the **Type** drop-down list to select the type of the alarm generated by the absence of the parameter:

- None – no alarm;
- ALM – an alarm is triggered off;
- WRN – a warning is triggered off.

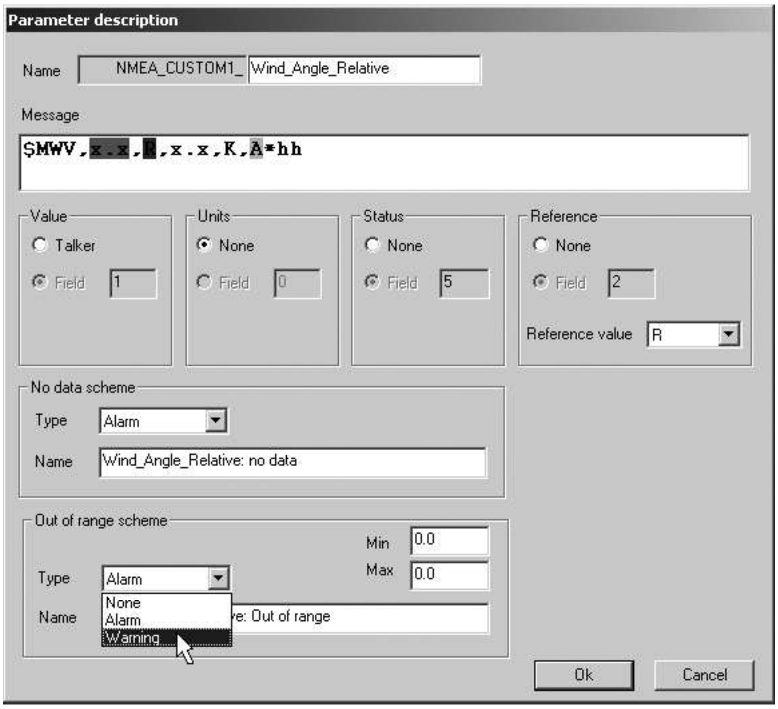
In the **Name** text box, after the input of the parameter name, the screen displays automatically the name of the alarm (warning) which will be generated in the NS 4000 by the absence of this parameter. Edit the alarm (warning) as required.



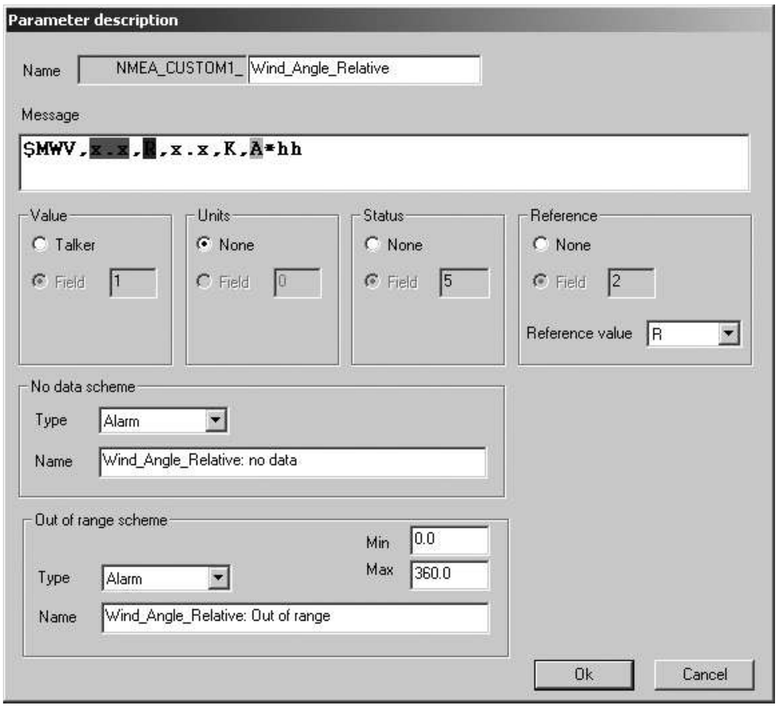
If necessary, in the **Out of range scheme** group use the **Type** drop-dawn list to select the type of an alarm generated by the parameter exceeding the set values:

- None – no alarm;
- ALM – an alarm is triggered off;
- WRN – a warning is triggered off.

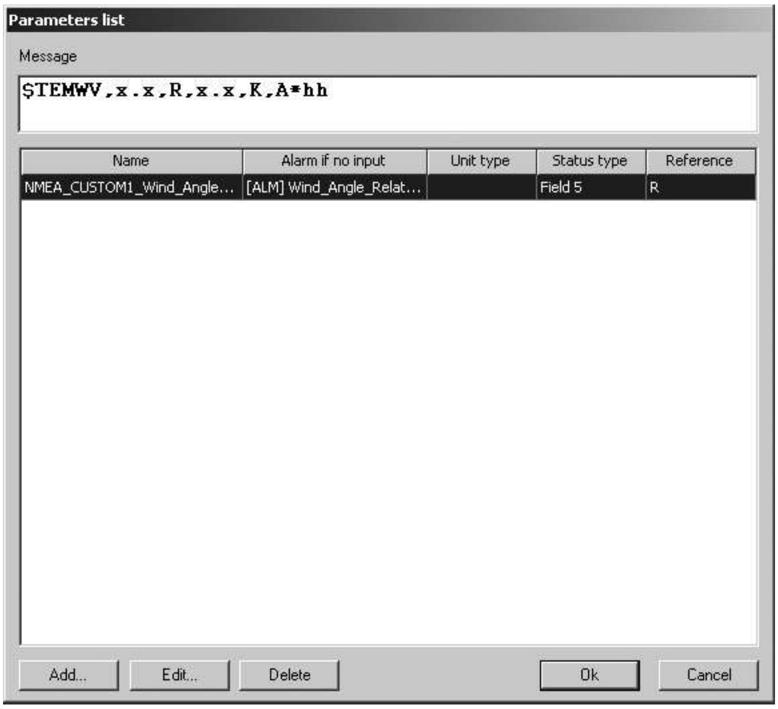
In the **Name** text box, after the input of the parameter name, the screen displays automatically the name of the alarm (warning), which will be generated in the NS 4000 if the parameter exceeds the set values. Edit the alarm (warning) as required.



In the **Min.** and **Max.** input boxes set the minimum and maximum parameter values. When these are exceeded, an alarm will be generated.

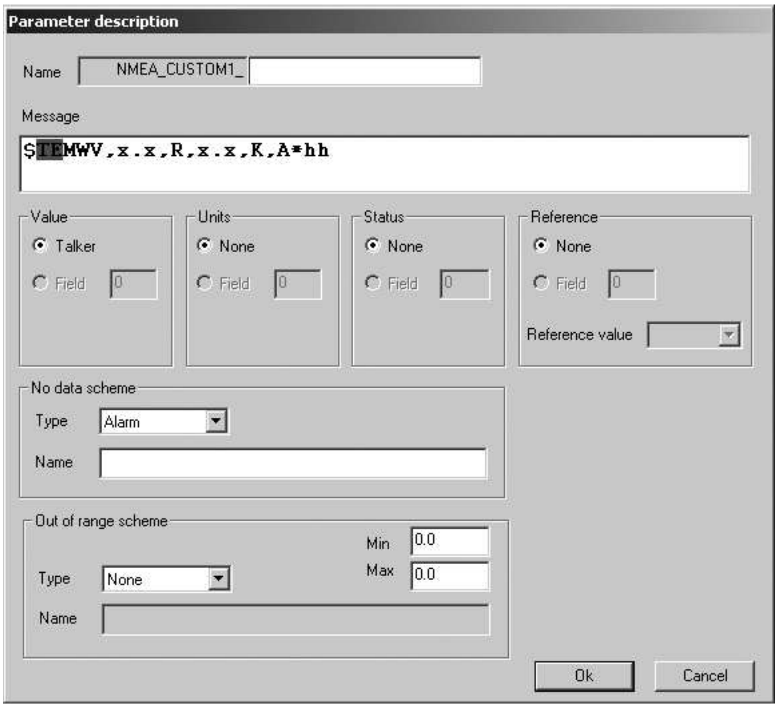


Press “OK” button.



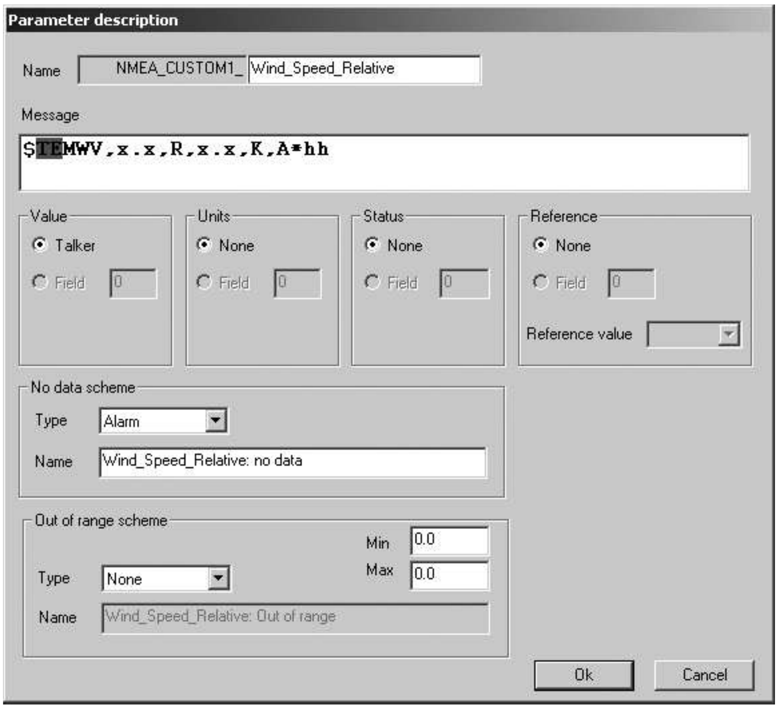
“Parameters list” window will open up. Input of rule for the extraction of a sentence parameter is completed. The parameter is added to the table.

Enter the rules of retrieving the next sentence parameter, e.g. “Wind Speed Relative”, which contains measurement units. To do this, press **Add** button:

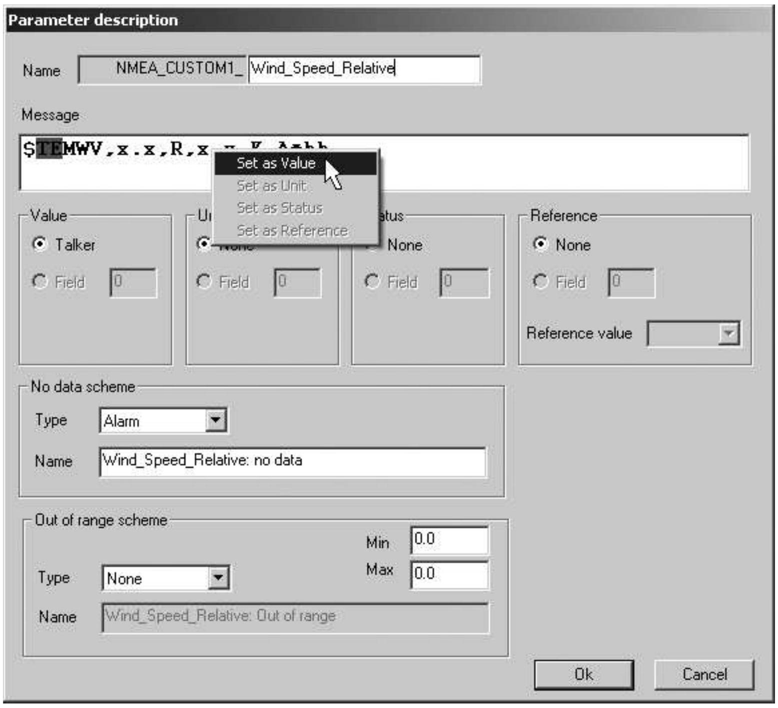


In **Name** field, enter the parameter name.

Note: There should be no spaces in the parameter name, it is advisable to replace them with underlines. The parameter name cannot be the same as that of indicators on the Navi-Conning 4000.

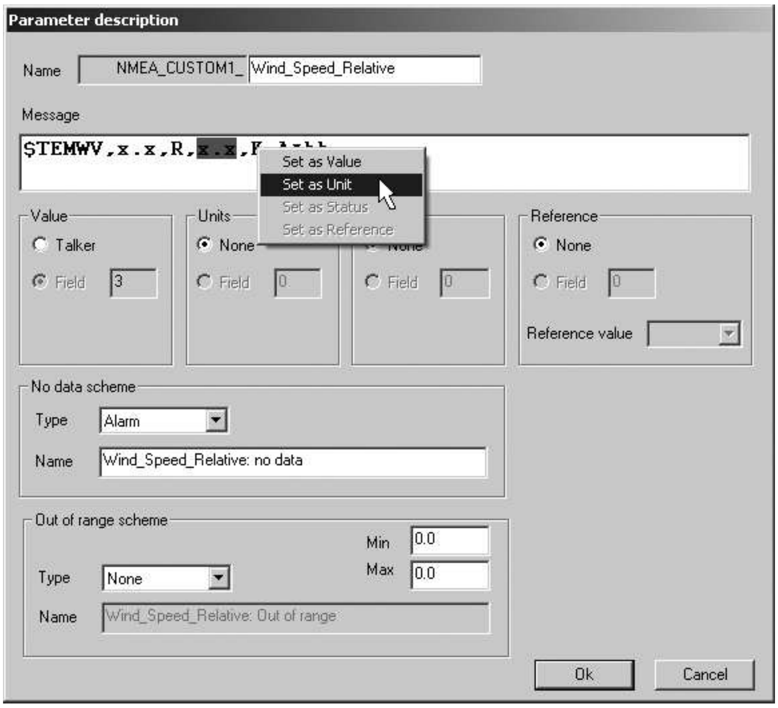


Position the cursor on the field of the sentence containing the value of the necessary parameter, and press the right trackball/mouse button:



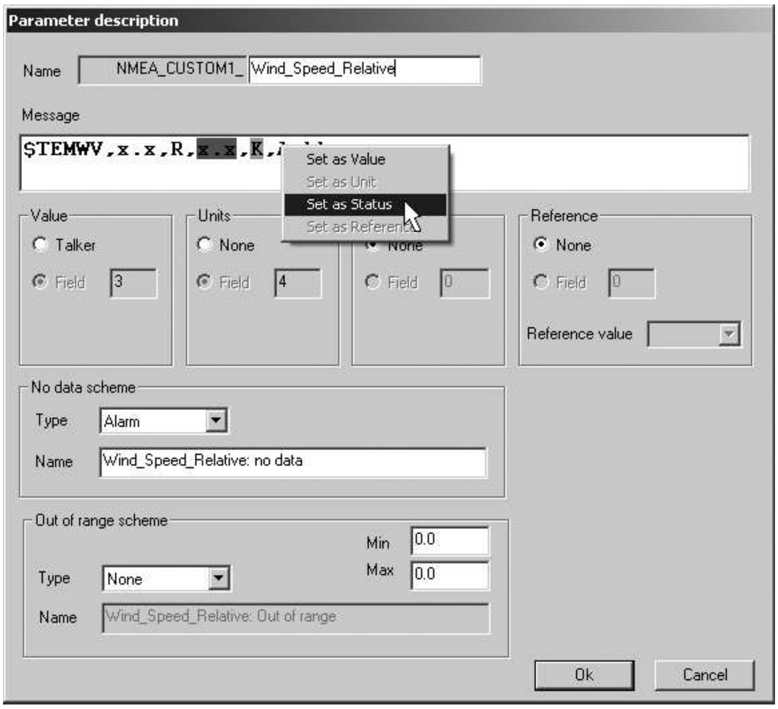
To set the parameter value, select SET AS VALUE line from the pop-up menu. E.g. for MWV sentence, the first third should contain the value of the wind speed. The field, which you are editing, will be colored in red.

Position the cursor on the field determining the parameter units, and press the right trackball/mouse button:



To set the parameter measurement units, select SET AS UNITS line from the pop-up menu. The edited field will be coloured in green.

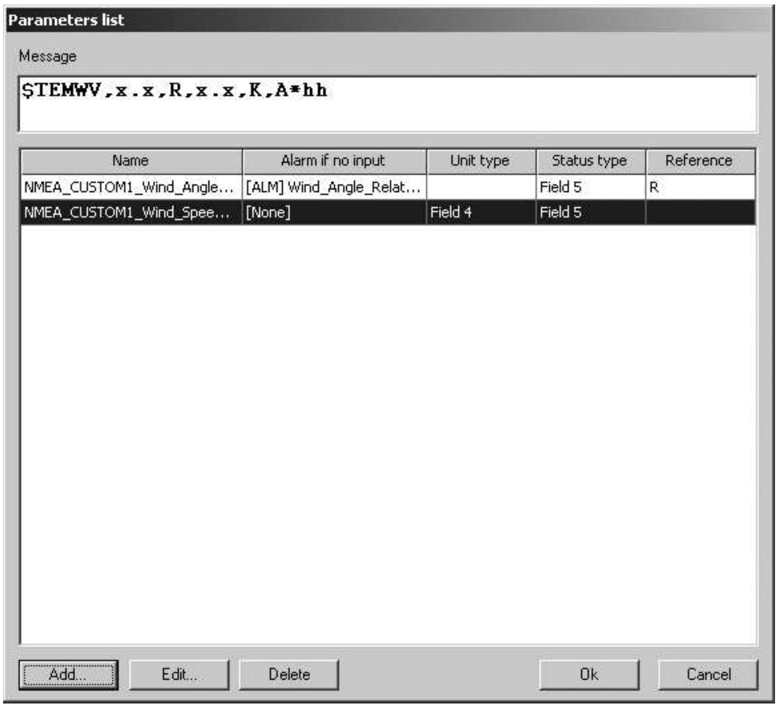
Position the cursor on the field determining the parameter status, and press the right trackball/mouse button:



To set the parameter status, select SET AS STATUS line from the pop-up menu. The edited field will be coloured in khaki.

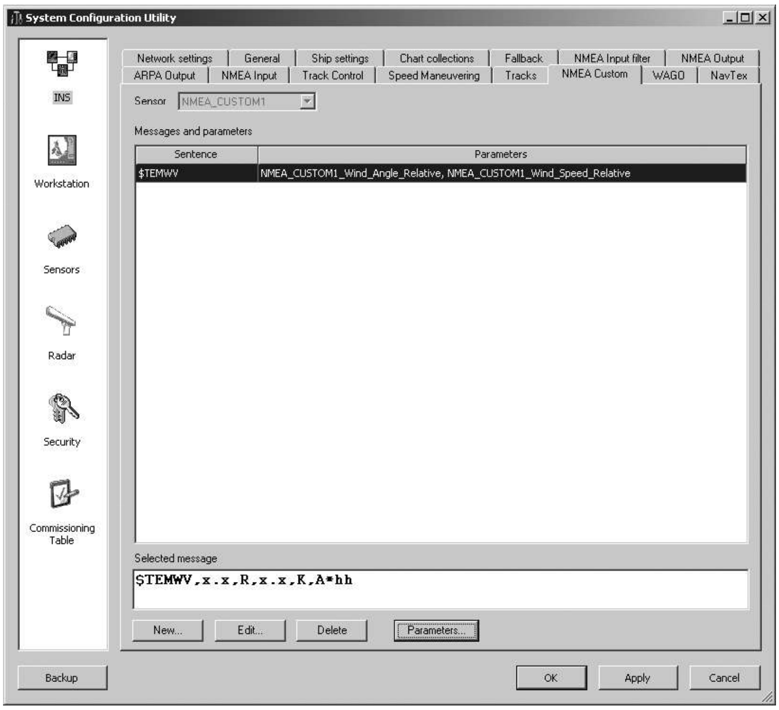
If necessary, in the **No data scheme** and **Out of range scheme** groups set the type and name of alarms for the parameter in question (see above).

Press “OK” button:



“Parameters list” window will open up. Input of rule for the extraction of a sentence parameter is completed. The parameter is added to the table.

Press “OK” button:

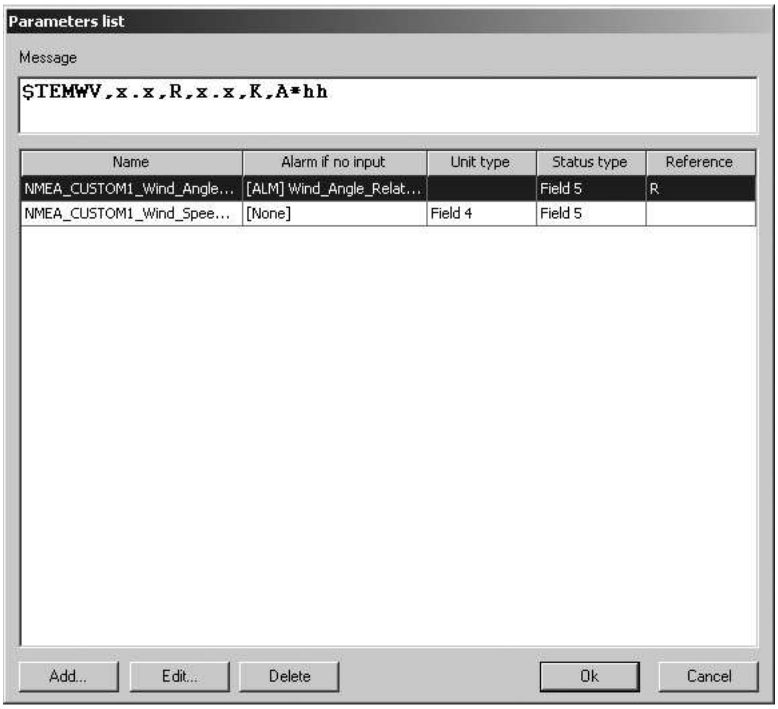


The entered sentence with set parameters is displayed in the table. Input of new sentence and its parameters in the databases is completed.

Press “OK” button to save the entered parameters and the sentence in the appropriate databases, and exit from the System Configuration utility.

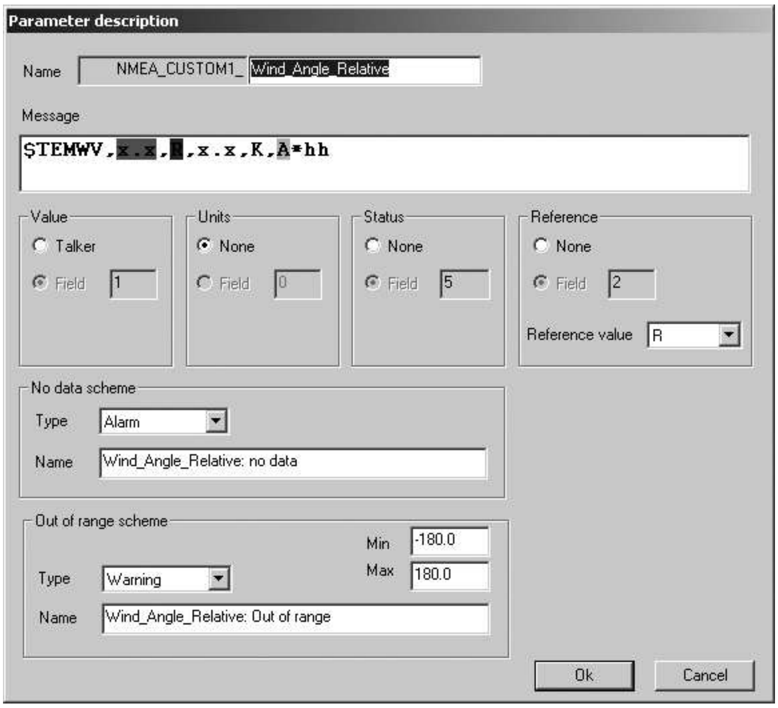
Editing of Parameters

In **Messages and parameters** group, select a sentence whose parameter is required to be edited, and press **Parameters** button:



Use the table to select the parameter required to be edited.

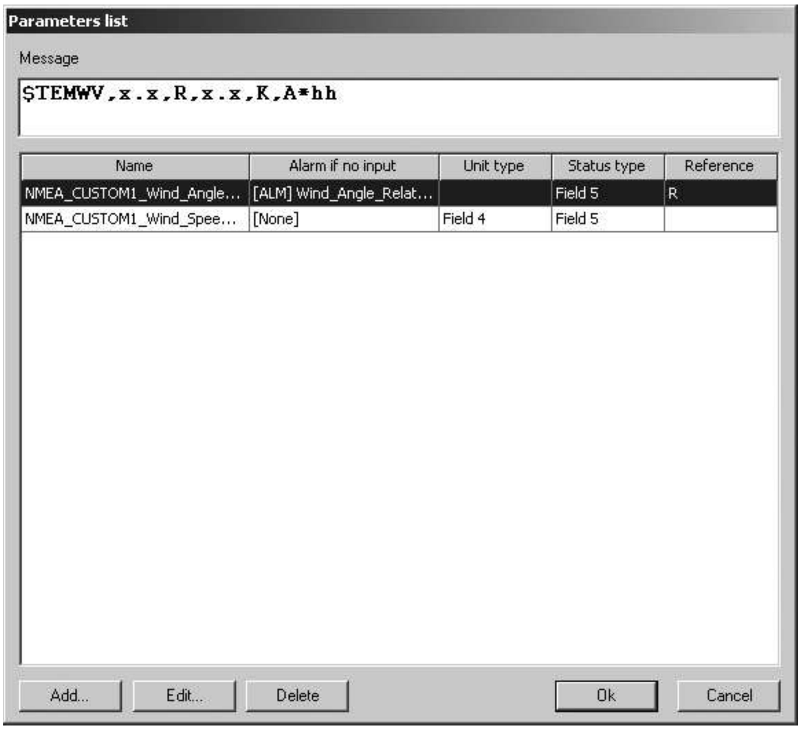
Press **Edit** button. Edit the parameter characteristics:



ATTENTION!

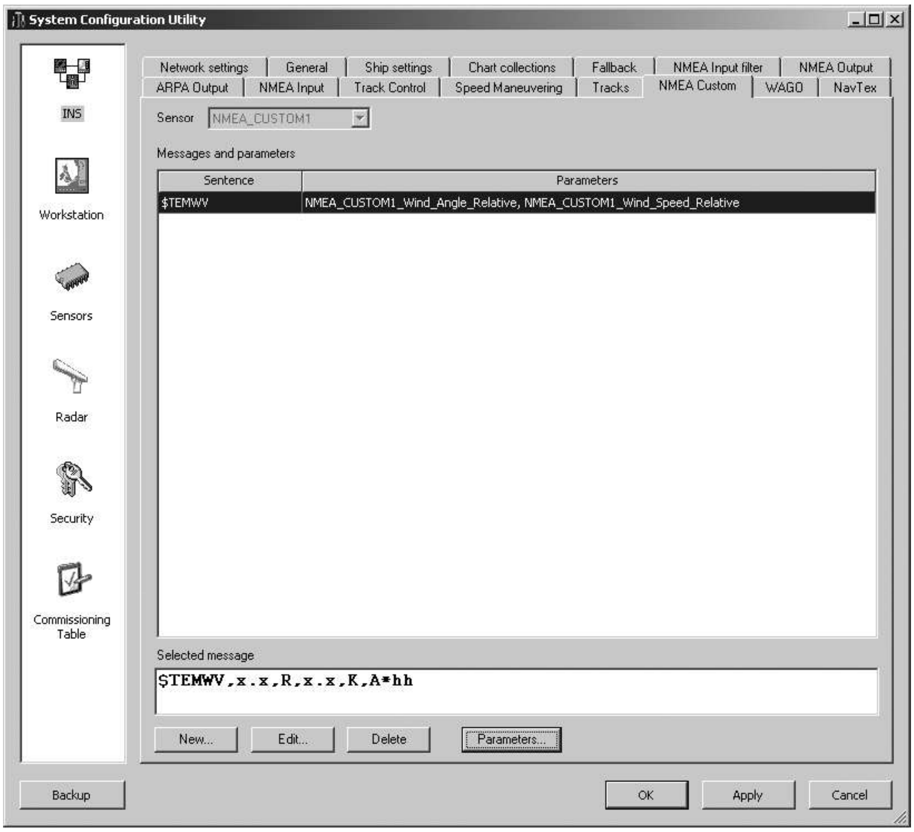
In the editing mode, it is possible to change parameter characteristics within the framework of the existing sentence structure. For the editing of the sentence structure, see the next paragraph.

Press “OK” button:



“Parameters list” window will open up. Input of rule for the extraction of a sentence parameter is completed. The parameter is added to the table.

Press “OK” button.

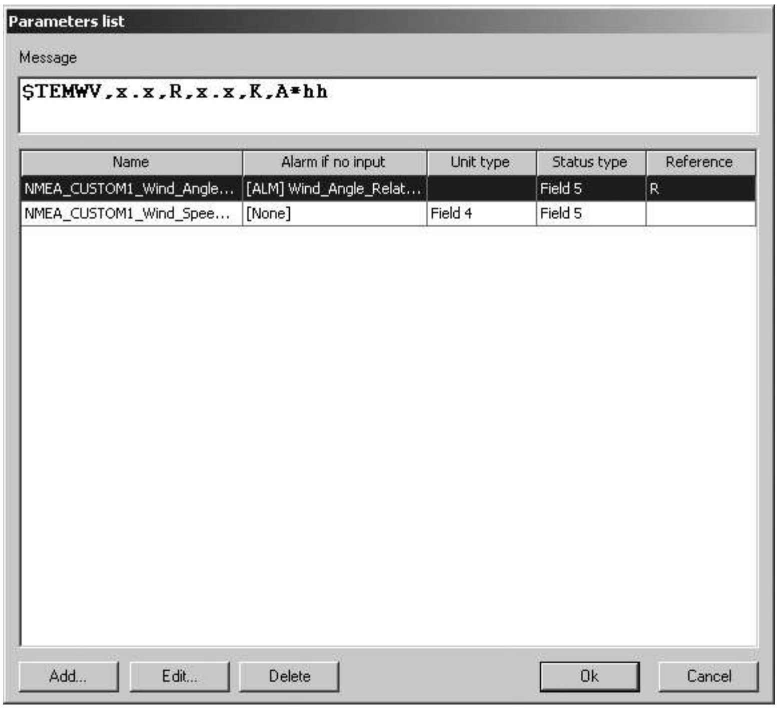


The entered sentence with set parameters is displayed in the table. Input of new sentence and its parameters in the databases is completed.

Press “OK” button to save the entered parameters and the sentence in the appropriate databases and exit from the System Configuration utility.

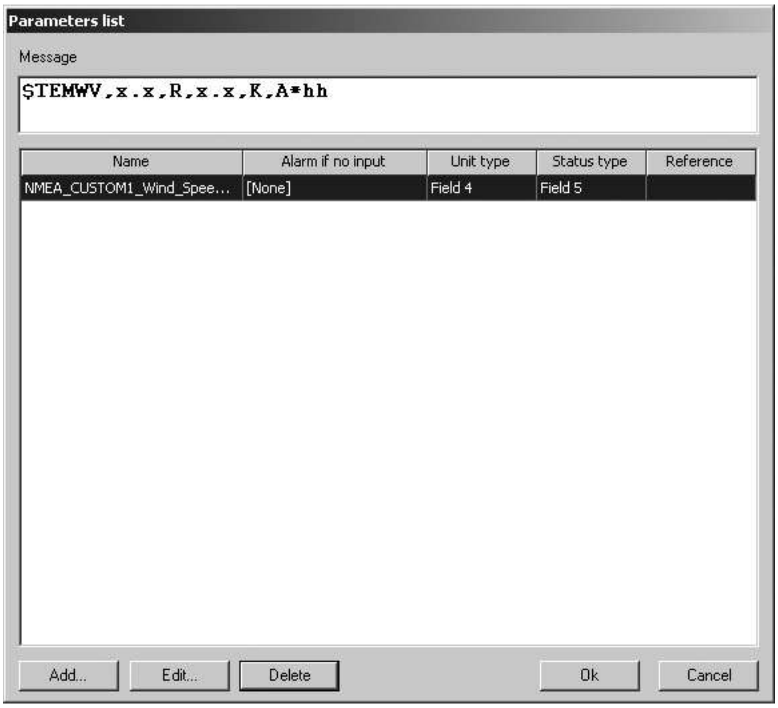
Parameters Deletion

In **Messages and parameters** group, select a sentence whose parameter is required to be edited, and press **Parameters** button:



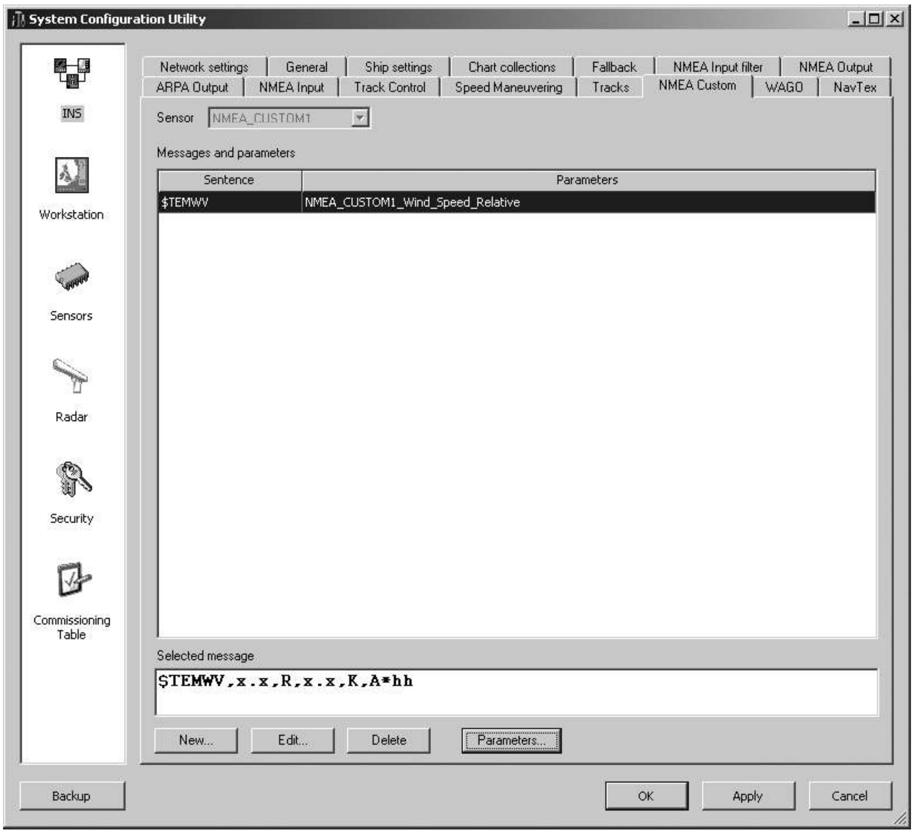
Use the table to select the parameter required to be edited.

Press **Delete** button:



The parameter will be deleted from the table.

Press “OK” button.

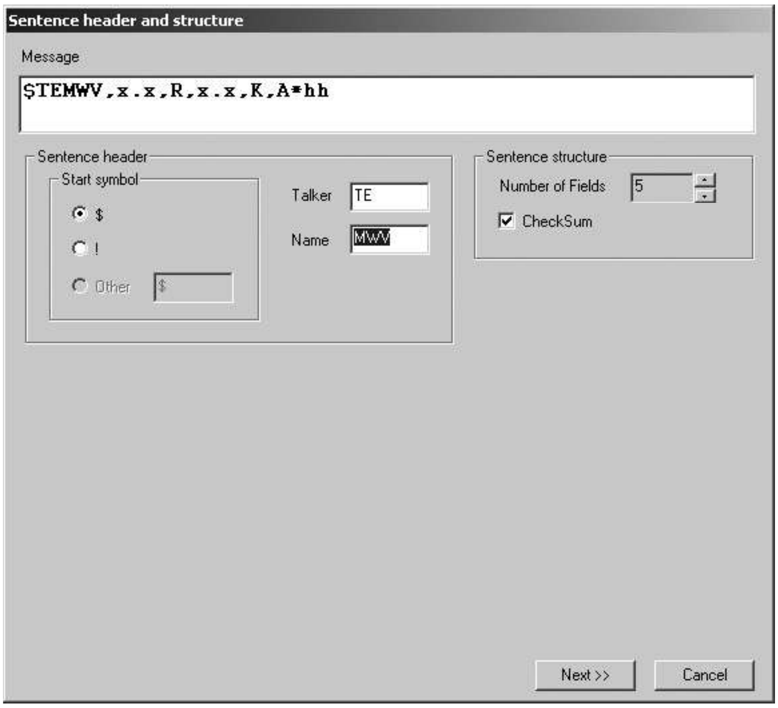


The entered sentence with set parameters is displayed in the table. Input of new sentence and its parameters in the databases is completed.

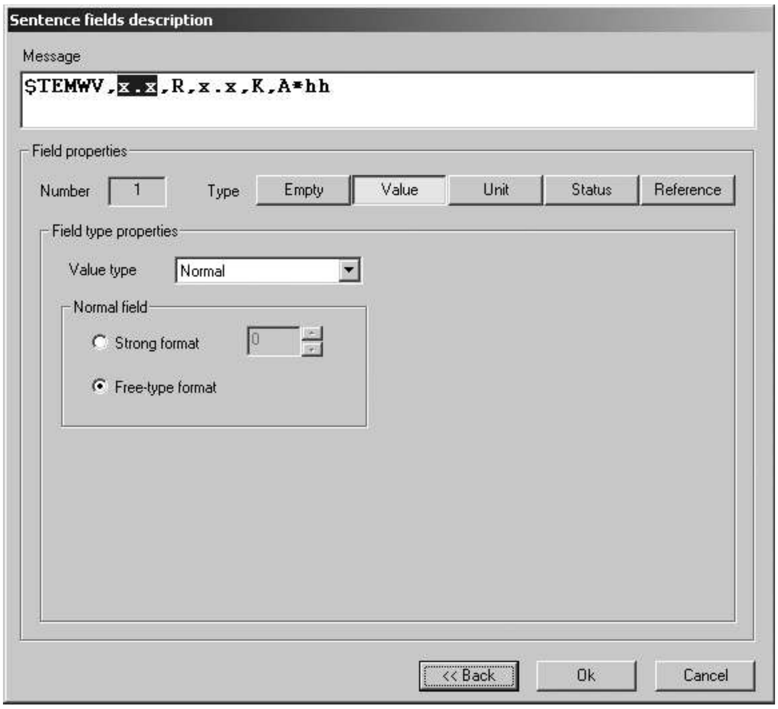
Press “OK” button to save the entered parameters and the sentence in the appropriate databases, and exit from the System Configuration utility.

Editing Sentence Structure

In **Messages and parameters** group, select a sentence whose structure is required to be edited. Press **Edit** button:

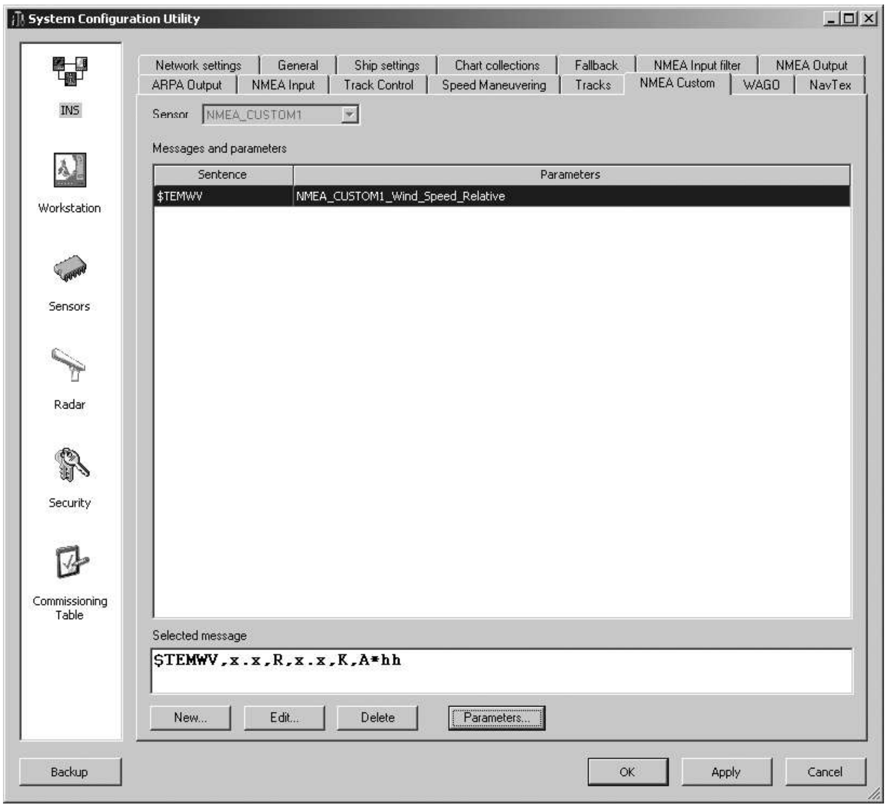


In “Sentence header and structure” window, you can change start symbol, talker, sentence name, number of fields and leave or remove checksum. Press “Next” button:



In “Sentence fields description” window, you can change the order of sentence fields and edit their structure by using **Value**, **Unit**, **Status**, or **Reference** buttons. You may leave the field empty as required by pressing **Empty** button.

Press “OK” button:

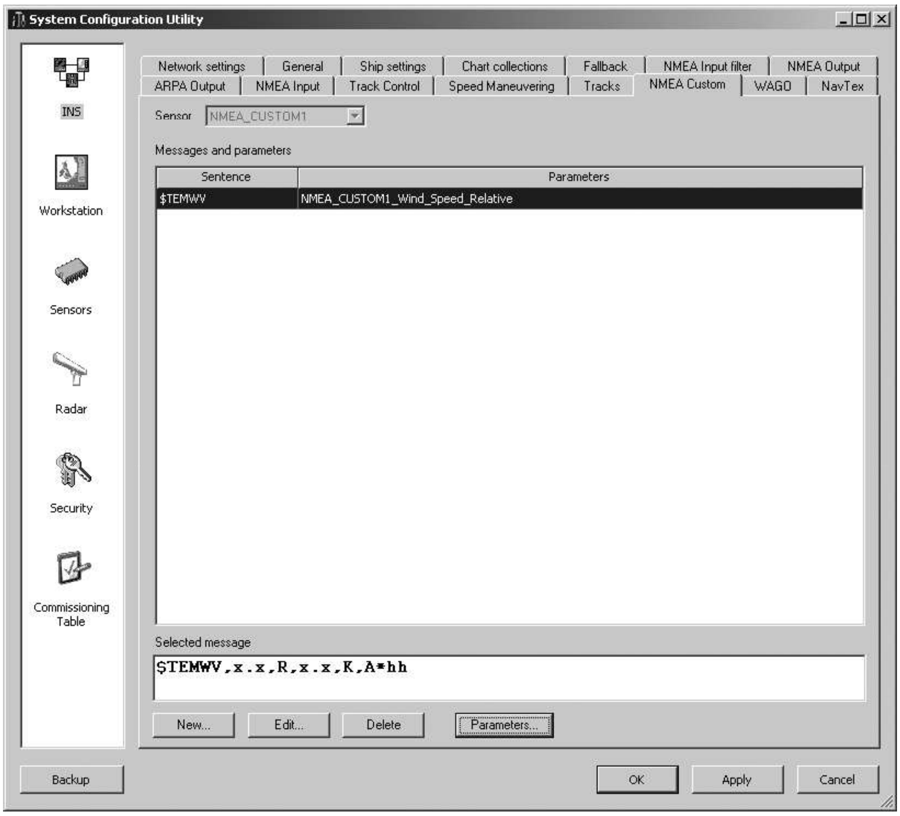


Set the parameters anew in the edited sentence structure (see the previous paragraph).

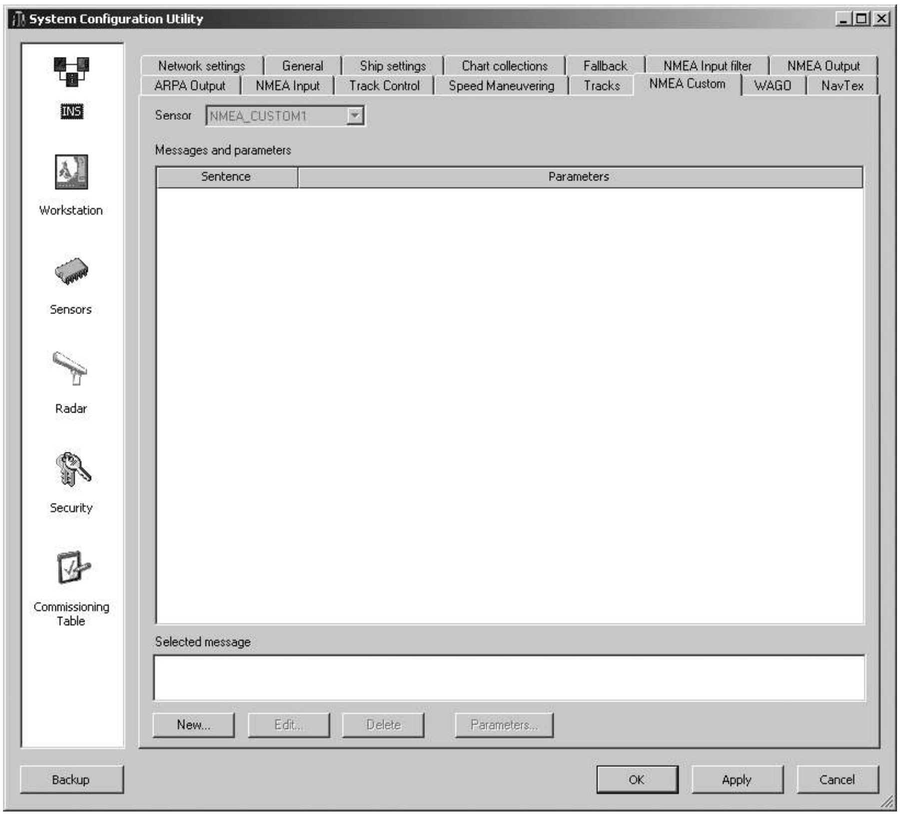
Press “OK” button to save the entered parameters and the sentence in the appropriate databases, and exit from the System Configuration utility.

Sentences Deletion

In **Messages and parameters** group, select a sentence, which is required to delete:



Press **Delete** button. The sentence will be deleted from the database:



Press “OK” button to save the entered parameters and the sentence in the appropriate databases, and exit from the System Configuration utility.

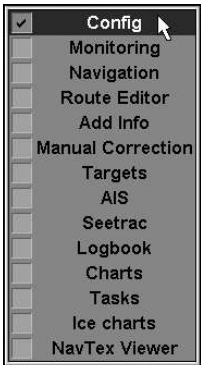
CHECK OF SETTINGS AND CONNECTION OF PARAMETERS TO NAVI-CONNING

ATTENTION!

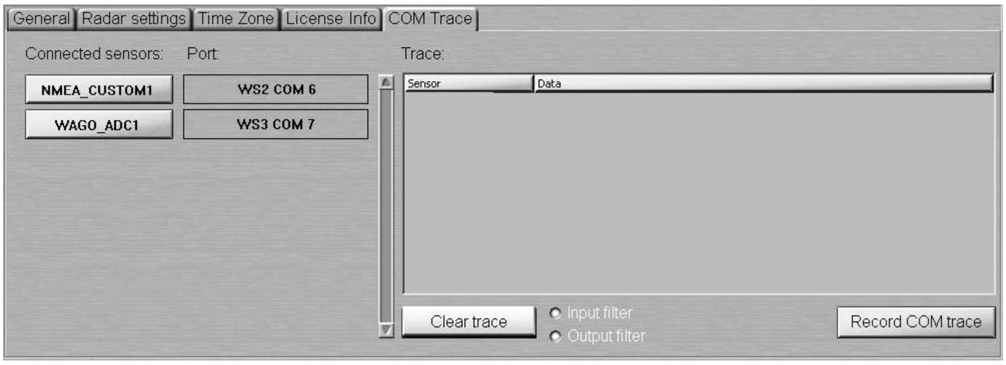
For the parameters (supplied via the WAGO modules or extracted from custom NMEA sentences), set and saved in the System Configuration utility, to be processed in the NS 4000, it is necessary to run the ECDIS task.

Run ECDIS task by selecting the appropriate item in the START menu (START\PROGRAMS\MULTIFUNCTIONAL DISPLAY\NAVI-SAILOR):

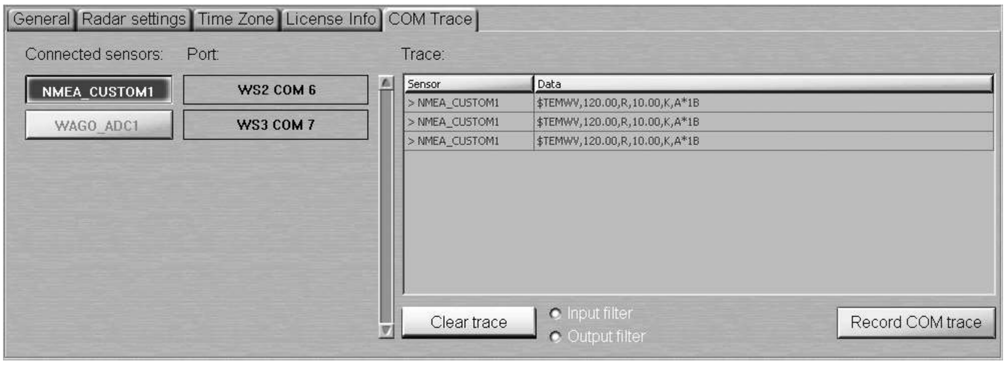
Open "Config" panel by selecting the appropriate line of TASKS LIST menu on the Control panel:



Use the tab in the top part of “Config” panel, which will open up, to switch to “COM trace” page:

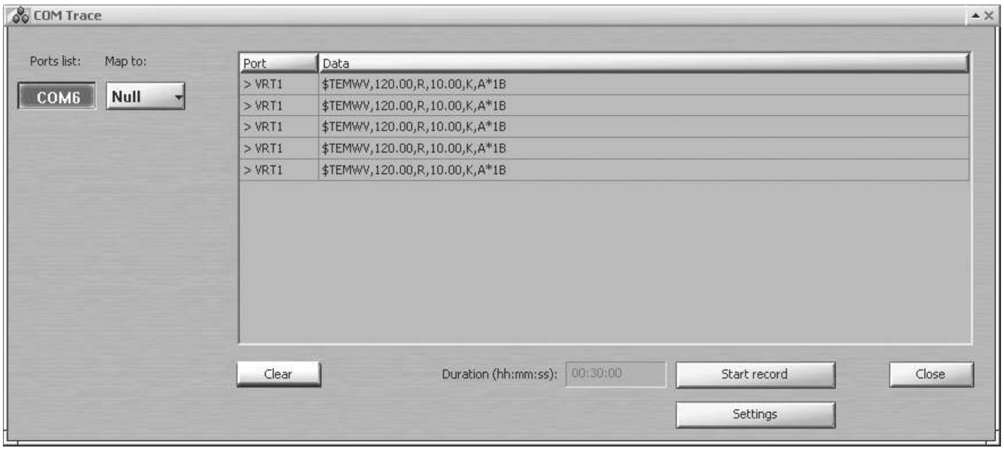


To display the traffic between the NS 4000 and NMEA Custom external device, press the button in the **Connected sensors** column:



The data flow will be shown in the **Trace** window. If the data is not displayed, it may not be arriving in the NS 4000. This can only be checked on the WS which the NMEA Custom external device is physically connected to. Press the **Record COM trace** button:

In the “COM Trace” window which will open up, in **Ports list** column press the button with name of port, which NMEA Custom external device connected to:



If the data is supplied to the port but is not processed by the NS 4000, this means that the NMEA Custom sentence or extracted parameters set in the System Configuration utility do not correspond to the received sentence. Check the settings described in the previous chapter. Also check parameters which are supplied via the WAGO modules.

ANNEX C

Commissioning Table

PRODUCT INFORMATION

Product name	
Version	
Build	
License expiration date	
Copy registration number	
Dongle number	

NETWORK CONFIGURATION

Location: *System Configuration\INS\Network Settings*.

Workstation's name	Role	Priority

SHIP'S SETTINGS

1. Ship setup (*System Configuration\INS\Ship Settings*).

Parameter	Value
MMSI	
Call sign	
Name	
IMO No	
Beam Overall	
Length Overall	
Bridge elevation	

2. Equipment layout (*System Configuration\INS\Ship Settings*).

	X	Y
Conning station		
PS1		
PS2		
DLOG1 head sensor		
DLOG1 stern sensor		
DLOG1 head conning		
DLOG1 stern conning		
External AIS GPS		
AIS Internal GPS		
Radar Master 1		
Radar Master 2		
Radar External 1		

3. Equipment height from keel (*System Configuration\INS\Ship Settings*).

	Equipment height from keel
Sounder 1	
Sounder 2	

WORKSTATIONS SETTINGS

Location: *System Configuration\Workstation\Sound and Display*.

Workstation's name	**Alarm sound**	**Sound source**	**Display type**	**Display model**	**Display size, mm**
W01					
W02					
W03					
W04					
W05					

CHARTS SETTINGS

Chart Collections

Location: *System Configuration\INS\Chart Collections*.

Chart Collection	**Used**
Transas	
ENC	
ARCS	

Databases

Location: *System Configuration\INS\Chart Collections*.

Database	**Used**
Tidal	
Tidal currents	
Surface currents	

NMEA OUTPUT

Location: *System Configuration\INS\NMEA output*.

Sensor	**ZDA**	**DTM**	**HDT**	**DPT**	**OSD**	**WPL**	**RTE**	**GLL**	**GLL (precision)**	**GLL (status)**	**Checksum**
NMEAOUT1											
UPLOAD ROUTE											

NMEA INPUT

1. NMEA Input.

Location: *System Configuration\INS\NMEA input*.

DLOG.

Transverse water speed	
Stern transverse water speed	
Stern transverse ground speed	

2. NMEA Input Filter.

Location: *System Configuration\INS\NMEA input filter*.

Sensor	Alias	Messages					
POS1		DTM=ON	GGA=ON	GLL=ON	RMC=ON	VTG=ON	GBS=ON
POS2		DTM=ON	GGA=ON	GLL=ON	RMC=ON	VTG=ON	GBS=ON
LOG1		VBW=ON	VHW=ON				
LOG2		VBW=ON	VHW=ON				
GYRO1		HDT= N	VHW=ON				
GYRO2		HDT=ON	VHW=ON				
SOUNDER1		DBT=ON	DPT=ON				
SOUNDER2		DBT=ON	DPT=ON				

3. NMEA Input miscelanious.

Location: *System Configuration\INS\NMEA input filter*.

Talker filter	
Not processed talkers	

SENSORS

Location: *System Configuration\Sensors\Sensors*.

1. COM ports.

Sensor	Alias	Workstation	Port	Baud rate	Check sum

2. VIRT ports.

Sensor	Alias	Workstation	Port	Check sum

3. DCU ports.

Sensor	Alias	Workstation	Port	Check sum

4. Alarm output settings.

Location: *System Configuration\Sensors\Alarm Output Settings*.

<table>
<tr><th rowspan="3">Workstation</th><th rowspan="3">Alarm name</th><th colspan="3">Type</th></tr>
<tr><th rowspan="2">NMEA alarm</th><th colspan="2">WAGO alarm</th></tr>
<tr><th>WAGO contact IN</th><th>WAGO contact OUT</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table>

5. External alarm WAGO settings.

Location: *System Configuration\Sensors\Ext. Alarm WAGO settings*.

Work-station	Alarm name	Source	Alarm state IN contact	Alarm ack. IN contact	Alarm sound IN contact	Alarm ack. OUT contact	Alarm sound OUT contact

TARGET SUBSYSTEM SETTINGS

Location: *System Configuration\Sensors\Target Subsystem*.

AIS Settings	
UAIS model	
Maximum range, nm	
Always activated	
DR for ais targets	
Minimal SOG to activate DR mode for ais targets, kt	
Rhotheta RT-202 Settings	
Angle correction	
MOB Alert Alarm	
Seetrack Settings	
Seetrack Tracking mode	

DCU SETTINGS

Location: *System Configuration\INS\DCU settings*.

DCU 1-1 nIP nIP	
DCU 1-2 nIP nIP	

FALLBACK

Location: *System Configuration\INS\Fallback*.

Fallback modes	Position ON	Position time, sec	Heading ON	Heading time, sec	Speed ON	Speed time, sec
Integrity check	X	5	X	5	X	5
Sensor failure	X	5	X	5	X	5
Diff mode lost	10					
Automatic restore	X	10	X	10	X	10

TRACK CONTROL SETTINGS

1. Autopilot type: AP3000 Navis.
2. Autopilot is connected to the Workstation, port.
3. Ship limits and settings.

Location: *System Configuration\INS\TrackControl*.

Parameter	Light	Loaded
Max Speed		
Max ROT		
F Distance		
Min turn radius		
Altering gain		
Min maneuver speed		
Max rudder angle		
Initial Pos-Track		
Max XTD		
Initial HDG-Track		
Max Course deviation		
Default radius		

SPEED MANEUVERING SETTINGS

1. Full ship loading.

   Location: *System Configuration\INS\Speed maneuvering\Ship loading full*.

   Basic parameters.

Parameter	Value
Max. Speed on FSA, kt	
Max. Speed on FA, kt	
Max. Speed on MA, kt	
Max. Speed on SA, kt	
Time 0 – Max. Speed on FSA, sec	
Time Max. Speed – 0 on FSBW, sec	
Time Max. Speed – 0 on STOP, sec	
Stable Turn Speed 15, kt	
Stable Turn Speed 35, kt	
Conf. Turn Radius 15, nm	
Conf. Turn Radius 35, nm	

   Advanced parameters.

Annunciator state	Acceleration	Slowdown	Max. Speed (kt)	Turn. Speed 15 (kt)	Turn. Speed 35 (kt)
FSBW					
FBW					
MBW					
SBW					
STOP					
SA					
MA					
FA					
FSA					

2. Empty ship loading.

   Location: *System Configuration\INS\Speed maneuvering\Ship loading empty*.

   Basic parameters.

Parameter	Value
Max. Speed on FSA, kt	
Max. Speed on FA, kt	
Max. Speed on MA, kt	
Max. Speed on SA, kt	
Time 0 – Max. Speed on FSA, sec	
Time Max. Speed – 0 on FSBW, sec	
Time Max. Speed – 0 on STOP, sec	
Stable Turn Speed 15, kt	
Stable Turn Speed 35, kt	
Conf. Turn Radius 15, nm	
Conf. Turn Radius 35, nm	

Advanced parameters.

Annunciator state	**Acceleration**	**Slowdown**	**Max. Speed (kt)**	**Turn. Speed 15 (kt)**	**Turn. Speed 35 (kt)**
FSBW					
FBW					
MBW					
SBW					
STOP					
SA					
MA					
FA					
FSA					

ANNEX D

COM-Ports Interfaces

GENERAL

NS 4000 ECDIS MFD system is equipped with NMEA ports, which are completely corresponding to IEC 61162-1,2 Standard requirements.

The following terms are used in this Annex:

- Talker – NMEA port Output, which transmits data to other devices;
- Listener – NMEA port Input, which receives data from another device.

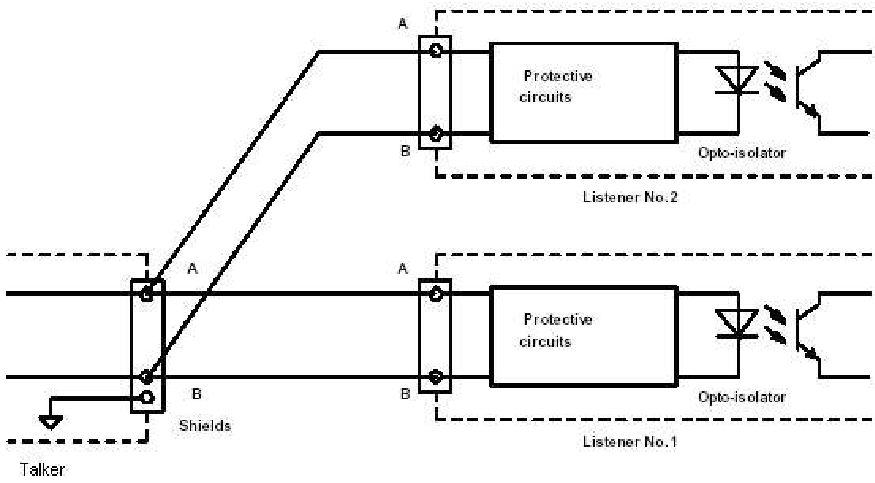


Fig. 74. COM-Ports interface diagram

All signal line A connections are connected in parallel with all device A connections, and all signal line B connections are connected in parallel with all device B connections. The shields of all Listener cables should be connected to the talker chassis only and should not be connected at each listener.

The idle, marking, logical 1, OFF or stop bit states are defined by a negative voltage on line A with respect to line B.

The active, spacing, logical 0, ON or start bit states are defined by a positive voltage on line A with respect to line B.

To meet the demand of high reliability in industrial environment and to prevent the boards from damage caused by lighting or high potential voltage, an optical isolation (2 kV DC) is implemented in the Listener's receive circuit.

The Listener's receive circuit is designed for the operation with a minimum differential input voltage of 2,0 V and shall not take more than 2,0 mA from the line at that voltage.

The drawing below shows the connection corresponding to the Talker/Listener Interface.

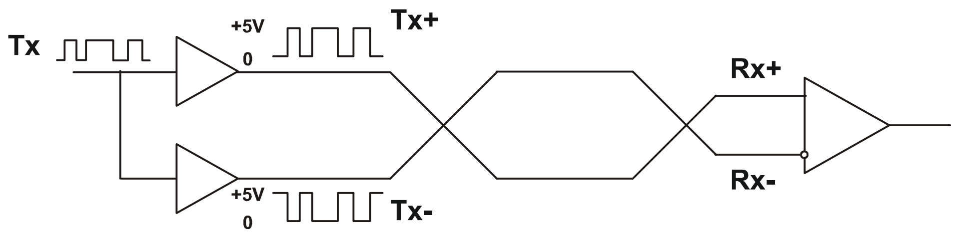


Fig. 75. Talker/Listener interface diagram

DCU6 RS422 PORTS SCHEMATIC

Optocoupler Fairchild H11L1 input-output isolation voltage 7500 V minimum.

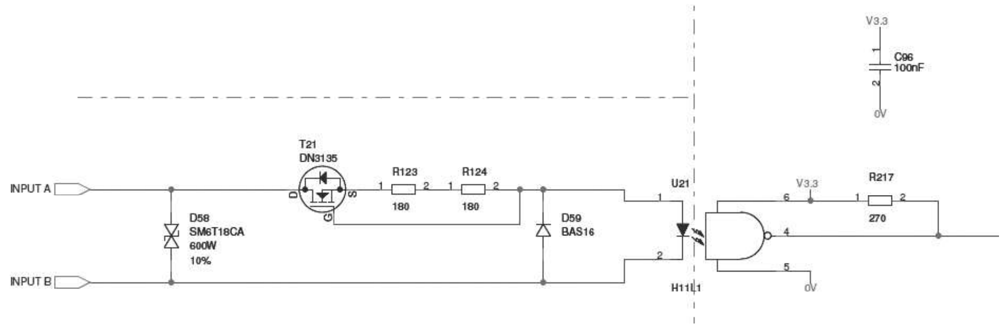


Fig. 76. DCU6. RS422 ports isolation

RS6 COMPUTER RS422 AND ETHERNET PORTS ISOLATION SCHEMATICS

RS6 RS422 EBK RS6-IO Schematic

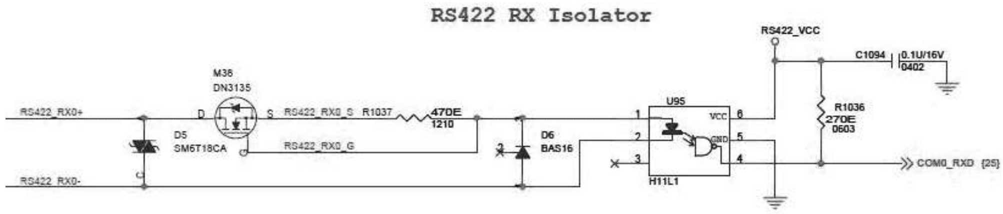


Fig. 77. RS6. RS422 ports isolation drawing

RS6 RS422 Ports PCB DRSE-00-0017 Schematic

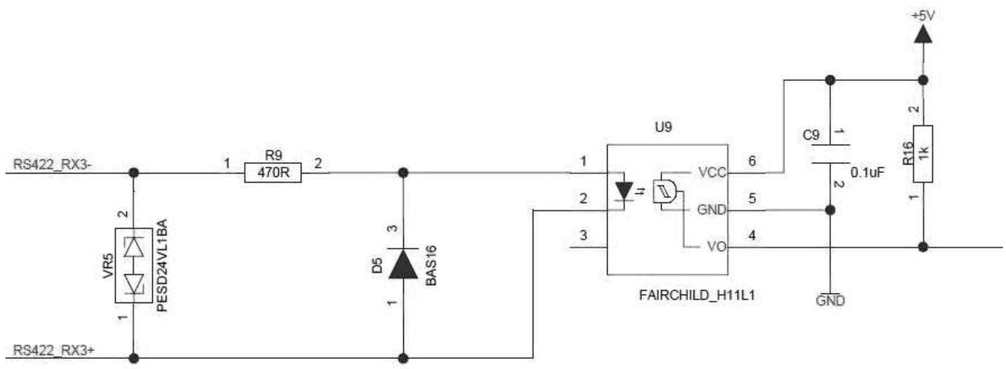


Fig. 78. RS6. Additional extension board RS422 ports isolation drawing

RS6 Ethernet ports LAN1 and LAN2 Schematic

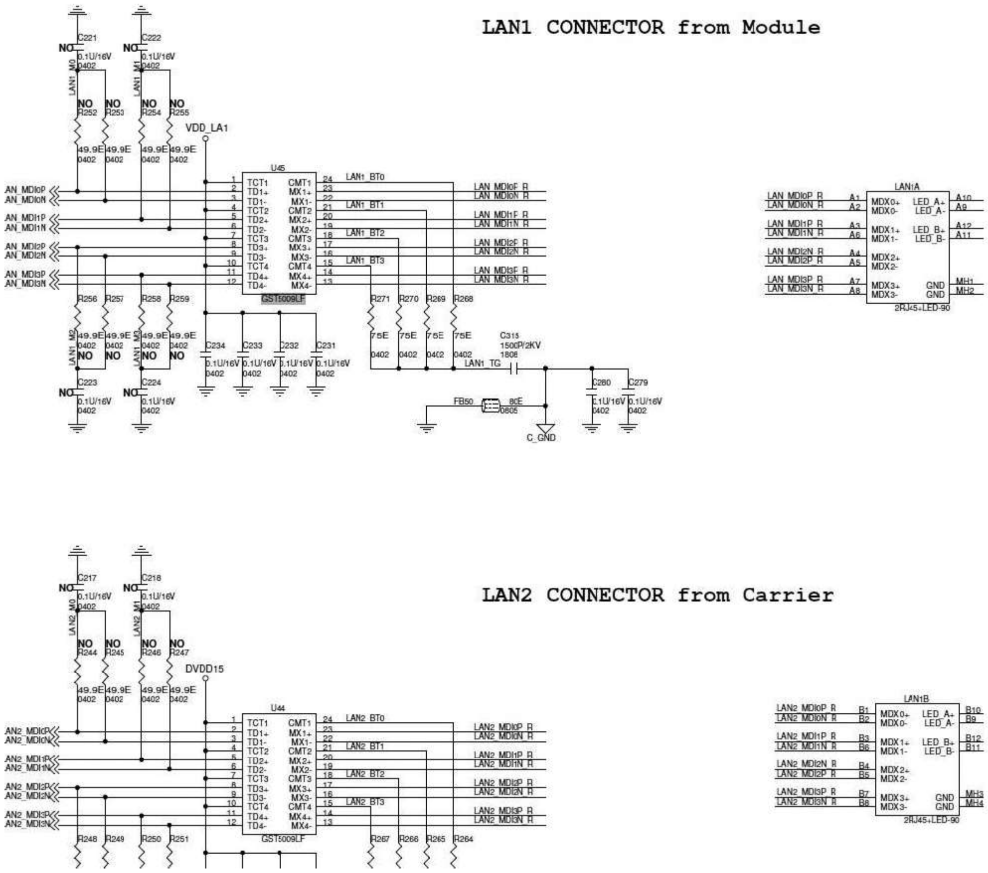


Fig. 79. RS6. Ethernet ports isolation drawing

ANNEX E

Upgrade RS3 and RS4 to RS6 Computer

RS6 COMPUTER WITH DRSE-00-0017 EXTENSION BOARD (ADDITIONAL SERIAL PORTS)

General

RS6 computer with additional extension serial board is delivered for upgrade of RS3 and RS4 computers.

The serial extension board has three Dsub connectors (see figure below):

- J3 – Dsub-37 connector – 2 x NMEA0183, 2 x configured as NMEA0183 or RS232;
- J4 – Dsub-37 connector – 2 x NMEA0183, 2 x configured as NMEA0183 or RS232;
- J5 – Dsub-62 connector – 8 x RS232.

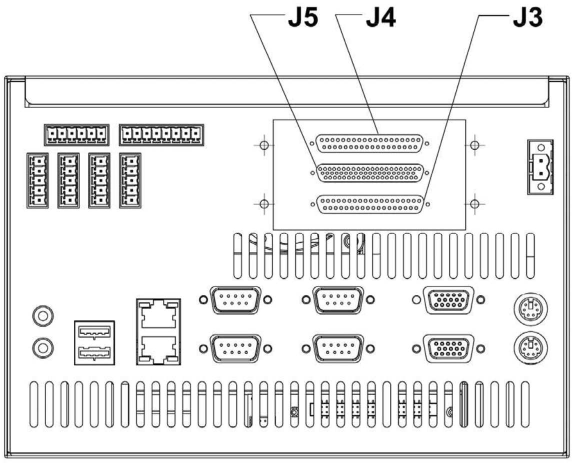


Fig. 80. RS6 computer. Extension board's connectors layout

The board is connected inside the RS6 to the motherboard with a 26 pin ribbon cable.

If the ribbon cable is connected to the header J1 marked "168-mode" the J5 is active.

If the ribbon cable is connected to the header J2 marked "114-mode" the J3 and J4 are active.

Ports Configuration

Each configurable port has 4 jumpers to move to change from NMEA0183 to RS232.

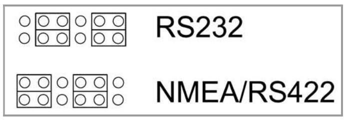


Fig. 81. RS6 computer. Ports RS232/RS422 configuration jumpers

The jumpers to select NMEA0183 or RS232 are placed between the J1 and J2 headers inside the RS6.

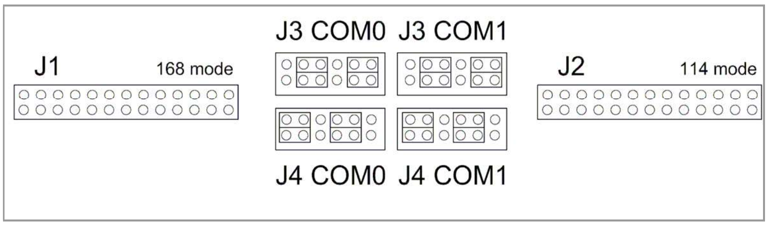


Fig. 82. RS6 computer. Jumpers position

ANNEX F

RS4v2 Computer Based Hardware

WORKSTATIONS INSTALLATION

The NS 4000 ECDIS MFD Workstation consists of the following elements:

- RS4v2 dedicated Computer;
- TFT Monitor;
- ES4 (ES3) Keyboard;
- Connection Board X1 (optional);
- Connection Board X2 (optional);
- 24 VDC Power Supply (optional);
- WAGO set of Modules (optional).

RS4v2 Computer

The basic component of Workstation is the RS4v2 Dedicated Computer containing an Interface Boards. Installation and performance test is provided by supplier.

Specification and location of Interface Boards for Workstation is presented on drawing below:

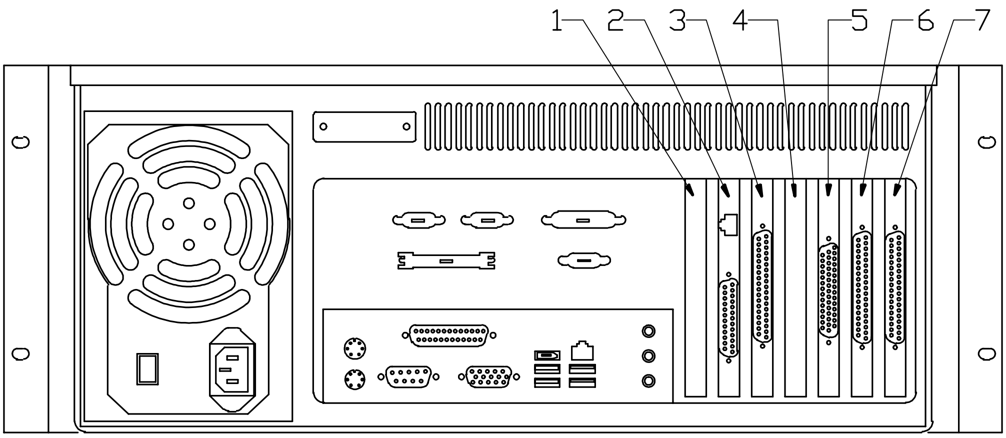


Fig. 83. RS4v2 computer. Board configuration

1. Empty
2. Radar Integrator Board (RIB2)
3. MOXA CP114I Card
4. Empty
5. 4xRS232 4456A Card (optional)
6. MOXA CP114I Card
7. MOXA CP114I Card (optional)

Layout of RS4v2 computer connectors for Workstation is described in drawing below:

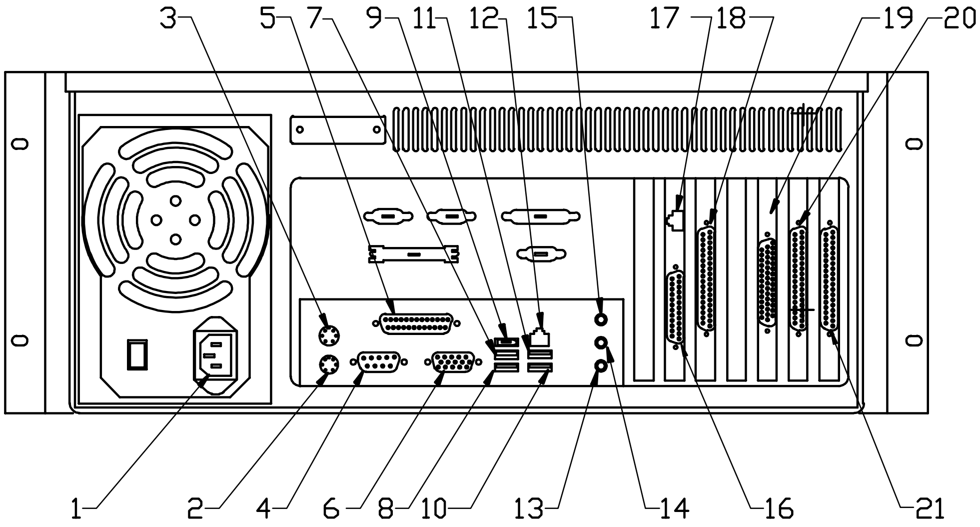


Fig. 84. RS4v2 computer. Connectors layout

1. Power
2. PS/2 Keyboard
3. PS/2 Trackball
4. COM1 (RS232)
5. LPT
6. VGA onboard
7. USB
8. USB
9. 1394 (OPT)
10. USB
11. USB
12. LAN onboard (LAN1)
13. Mic
14. Line Out
15. Line In
16. RIB LF (Optional Radar Processor Card)
17. RIB HF (Optional Radar Processor Card)
18. COM6 (RS232/RS422/RS485),
    COM7 (RS232/RS422/RS485),
    COM8 (RS422/RS485),
    COM9 (RS422/RS485)
19. COM2, COM3, COM4, COM5 (Optional PCI-E
    4xRS232 4456A Card)
20. COM10 (RS232/RS422/RS485),
    COM11 (RS232/RS422/RS485),
    COM12 (RS422/RS485),
    COM13 (RS422/RS485)
21. COM14 (RS232/RS422/RS485),
    COM15 (RS232/RS422/RS485),
    COM16 (RS422/RS485), COM17
    (RS422/RS485) (Optional 3-rd Moxa card)

Additional Serial Ports

Additional serial ports interface provides by two type of interface board. First is optional 4xRS232 PCI Express Serial Board Sunix 4456A. This board is not configurable and has four RS232 interfaces. Second are two MOXA CP114I boards. This board is configurable and supports the following physical interfaces: RS232; RS422; RS485.

The installation of the MOXA CP114I board includes hardware and software installation. The hardware installation is detailed in this paragraph.

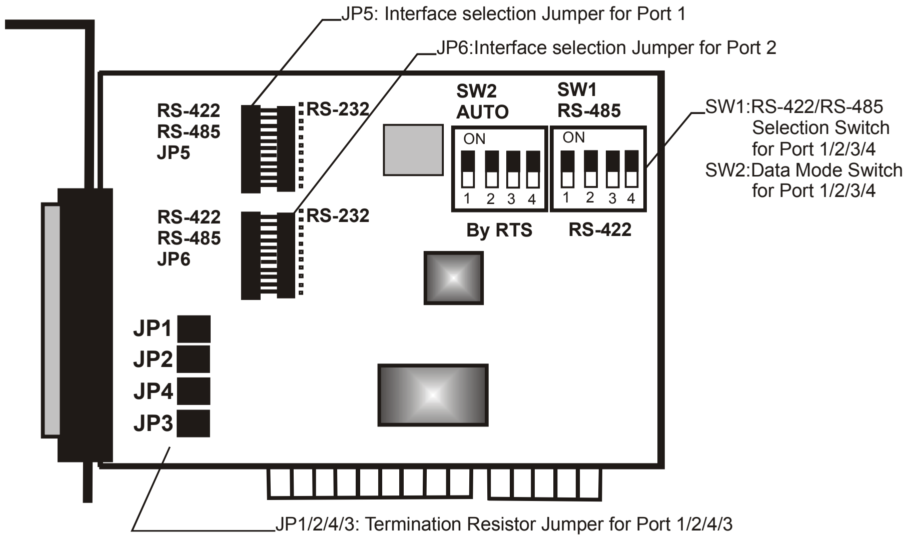


Fig. 85. CP-114I Moxa Board

Before installing the board into the slot, you should set all the jumpers to desired position.

The default (manufacturer's) settings are as follows: Port 1, Port 2, Port 3 and Port 4 RS-485, Automatic Data Direction Control mode, no Termination Resistor, indicated as *:

- JP5/6 Interface Selection Jumper for Port 1/2:
  - Left* Set the port interface to RS-422/RS-485;
  - Right Set the port interface to RS-232.
- S1 RS-422/485 Selection Switch for Port 1/2/3/4:
  - ON* Set the port interface to RS-485;
  - OFF Set the port interface to RS-422.
- S2 Data Mode Selection Switch for Port 1/2/3/4.

  (Valid if JP5/6 is Left and S1 is ON):
  - ON* Set the RS-485 port to Automatic Data Direction Control Mode;
  - OFF Set the RS-485 port to By RTS Mode.
- JP1/2/3/4 Termination Resistor Port 1/2/3/4.

  (Valid if JP5/6 is Left and S1 is ON):
  - Open* Not using Termination Resistor;
  - Short Using Termination Resistor.

The Boards installation is described below:

The BIOS automatically assigns the IRQ number and I/O addresses for the MOXA CP114I PCI board. Hence, it is a must to have the board plugged first before installing the software driver. After this, simply install the control board into the PC and then connect the connection cable:

- Power off the PC.

ATTENTION!

Make sure your system is switched off before you start installing any board. If you don't, you may risk damaging your system and the board.

- Remove the slot cover bracket if present.

Plug the MOXA CP114I PCI control board firmly into a PCI slot according to Fig. 83 "RS4v2 computer. Board configuration":

- Fasten the holding screw to fix the control board in place;
- Connect the Moxa cable DB37;
- Power on the PC and the BIOS will automatically set the IRQ and I/O address.

Note: Each board must occupy one unique IRQ and four 8-byte I/O addresses, which are assigned automatically by the BIOS. However, you can select a free IRQ number manually via the PC's BIOS setup for the PCI slot, but normally this method is not available for the I/O address. The possible IRQ numbers are 2, 3, 4, 5, 7, 10, 11, 12, and 15. The possible I/O addresses are from 0x0000 to 0xFFFF.

- Proceed with the software (driver) installation.

RIB2 Installation

ATTENTION!

Check that technical characteristics of the connected equipment match characteristics of the RIB Input\Output signals specified in section **Technical Specification**, paragraph **Radar Integrator Board**, item **Interface Capabilities**.

Cabling

Cables are run and installed in accordance with the cabling schedules.

The LF-box is connected with the PCI board by means of a standard computer cable with a common screen and DB25 connectors on both ends. Connection of cable cores with the connector contacts is identical on both sides.

External communication lines to the LF-box are connected by means of screw terminals. Any types of cables with a wire cross section of up to 1.5 mm^2 can be used. In case of considerable length of external cables, a screened cable is recommended.

HF-box is connected with the PCI board by means of a standard category 5 screened cable used in Ethernet 10/100 Mbit networks. The cable contains 4 twisted pairs within the common screen and has RJ-45 connectors on both ends. Connection of cable cores with the connector contacts is identical on both sides.

Cables of this type are produced within 2–60 m range of lengths. A non-standard length cable can be assembled by using special tools manufactured by companies like AMP, Molex, and others. Assembly is carried out in accordance with the manual delivered with the tool. In doing this, it is necessary to arrange the twisted pairs in the connector as recommended. Only the screened cable and appropriate connectors should be used. The maximum cable length is 100 m, however it would be preferable to limit the cable length to 30 m if a high quality radar signal is to be obtained.

External lines to the HF-box are connected by means of coaxial cables with BNC connectors (plug). If the connection is made to the already existing matched coaxial line (internal matching in the HF-box is turned off), a tap cable to the HF-box should have a minimum length (preferably not more than 1 m). With the matching turned on, however, the maximum length of the cable is determined by the characteristics of the cable used and may be several hundred metres.

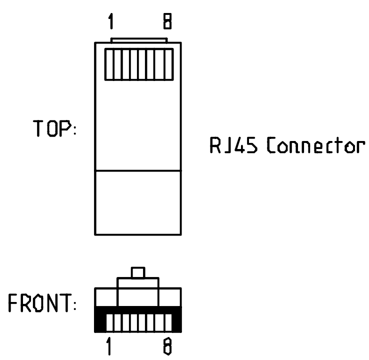
Directions on the Splicing of Category 5 Cable for RJ-45 Connection

Baring of category 5 cables with four twisted pairs is carried out with a special HT-501 type tool.

The cable is bared for the length of 14 mm from the end of the cable. When baring the cable, be careful not to cut off the cable screen lead-out (the screening foil is removed together with the insulation).

Before laying the wires, set the appropriate fixtures on the cable, including RJ-45 connection screen.

The laying of wires in both RJ-45 connectors is identical to that in the standard “patch” cable.



Pin	Color	Signal
1.	White/Orange	Video +
2.	Orange/White	Video -
3.	White/Green	Ground
4.	Blue/White	Trigger +
5.	White/Blue	Trigger -
6.	Green/White	LED
7.	White/Brown	-12V
8.	Brow/Whiten	+12V

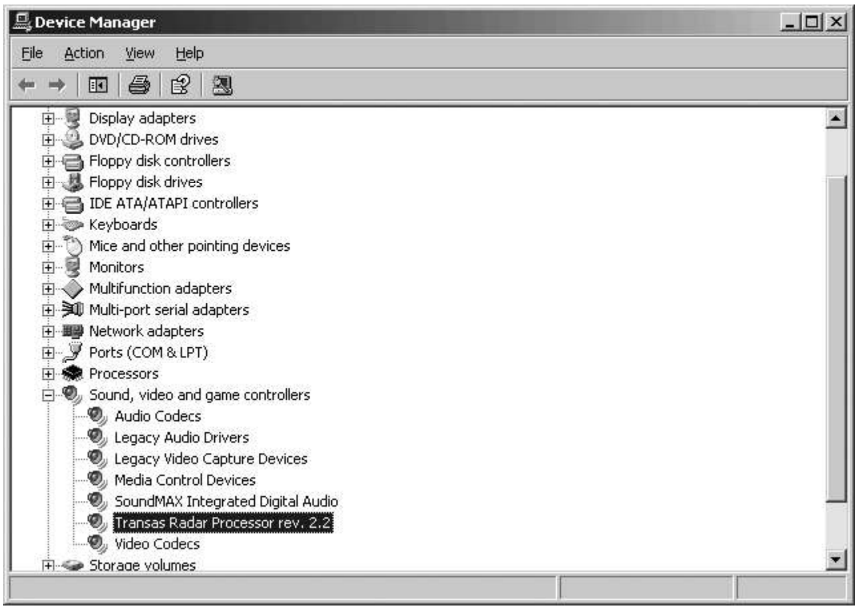
Before putting on the screen on RJ-45 connector, turn the cable screen lead-out by 180 degrees so that it is under the squeezed part of RJ-45 connector screen. Cut off the surplus of the cable screen lead-out.

Having completed operations on the laying of the cable lead-outs and the screening lead-out, and having put on the screen on RJ-45 connector, crimp RJ-45 connection. For crimping use a special Molex 69008-1100 type tool designed for the screened cable with four twisted pairs.

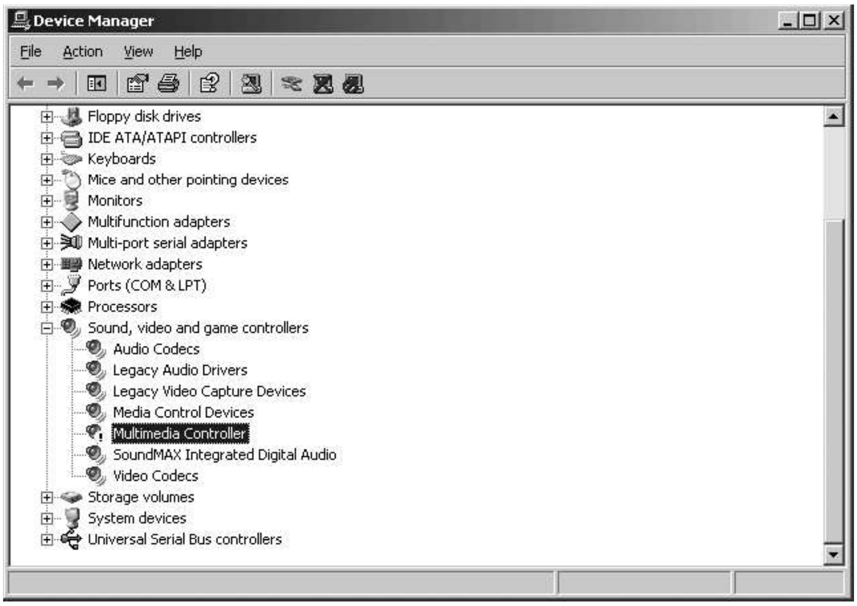
Check cable making by means of RJ-45 link tester.

Procedure for Checking the Correct Installation of the RIB2 Driver

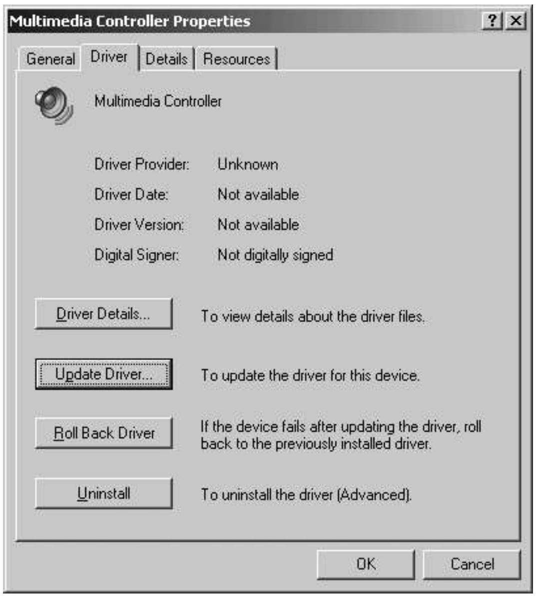
Upon installation NS 4000 or NS 4100 ECDIS and restarting of the computer with assistance of Device Manager Utility (START MENU\CONTROL PANEL\SYSTEM\HARDWARE), make sure that RIB drivers are installed properly:



If RIB drivers were installed improperly, the above window will look as follows:

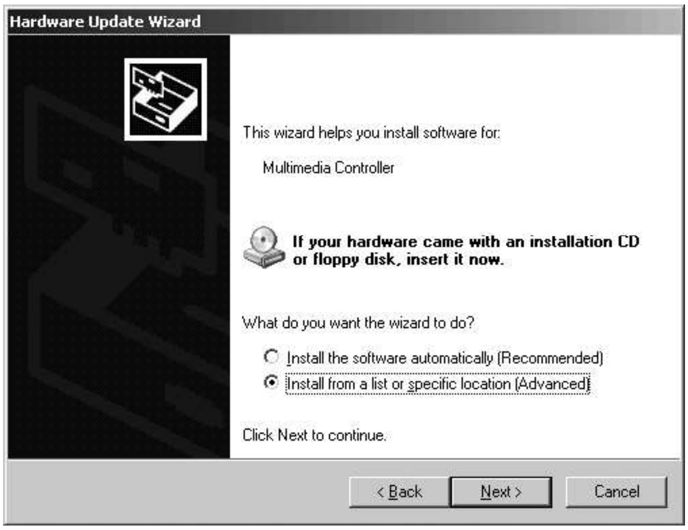


In this case, double click the respective line in the window:

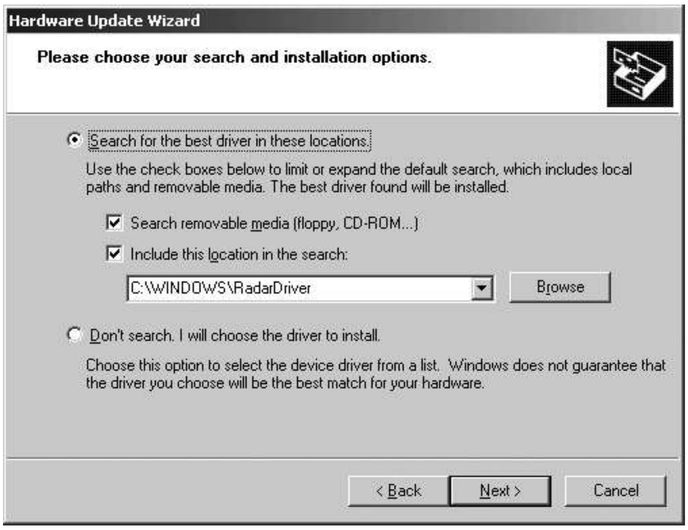


In the opened “Multimedia Controller Properties” window press the button “Update Driver”:

Select “No, not this time” and press “Next >” button:



Select “Install from a list or specific location (Advanced)” and press “Next >” button:



Check the checkbox “Include this location in the search”. Press the “Browse” button and specify path to required files (*C:\WINDOWS\RadarDriver*). Press the “Next >” button:

Press the “Finish” button. Computer will be restarted.

Power Supply

Workstation requires 220 VAC 1Ph. This power must be provided from ship’s distribution board with Main/Emergency Automatic Switch.

Discrete Signal Interface

Discrete signal interface for alarms distribution is provided by WAGO set of modules.

Detailed information on WAGO Modules is presented in **Chapter 1**, section **Workstations Installation**, paragraph **WAGO I/O Modules for Conning** and in **Chapter 3**, section **NS 4000 Hardware Components**, paragraph **WAGO I/O Modules**.

NETWORK

Network is basement of NS 4000 MFD for communication between Workstations and Sensors interfaces. The physical layer is Ethernet; the transport layer is TCP/IP.

Physical Layout

NS 4000 MFD network could be connected by means of FTP Cat.5 cables. The HP J4812A is a multiport high-speed switch which can be used for building of the high-performance communication. This switch is store-and-forward device offering low latency for high-speed networking. For technical specification of this unit see section **Technical Specification**, paragraph **Ethernet Switch 12xRJ45 ACHP J4812A** of this **Annex.**

IP Addresses

IP addresses table is shown below:

Station	LAN IP address	Subnet mask
Workstation 1 (W01)	10.8.1.101	255.255.255.0
Workstation 2 (W02)	10.8.1.102	255.255.255.0
Workstation 3 (W03)	10.8.1.103	255.255.255.0
Workstation 4 (W04)	10.8.1.104	255.255.255.0
Workstation 5 (W05)	10.8.1.105	255.255.255.0

TECHNICAL SPECIFICATION

RS4v2 Dedicated Computer

General

The main hardware part of the NS 4000 MFD systems is the RS4v2 BASIC marine industrial computer produced for TRANSAS by CAPAX.

RS4 Basic Data Processing Unit

RS4 Dimensions

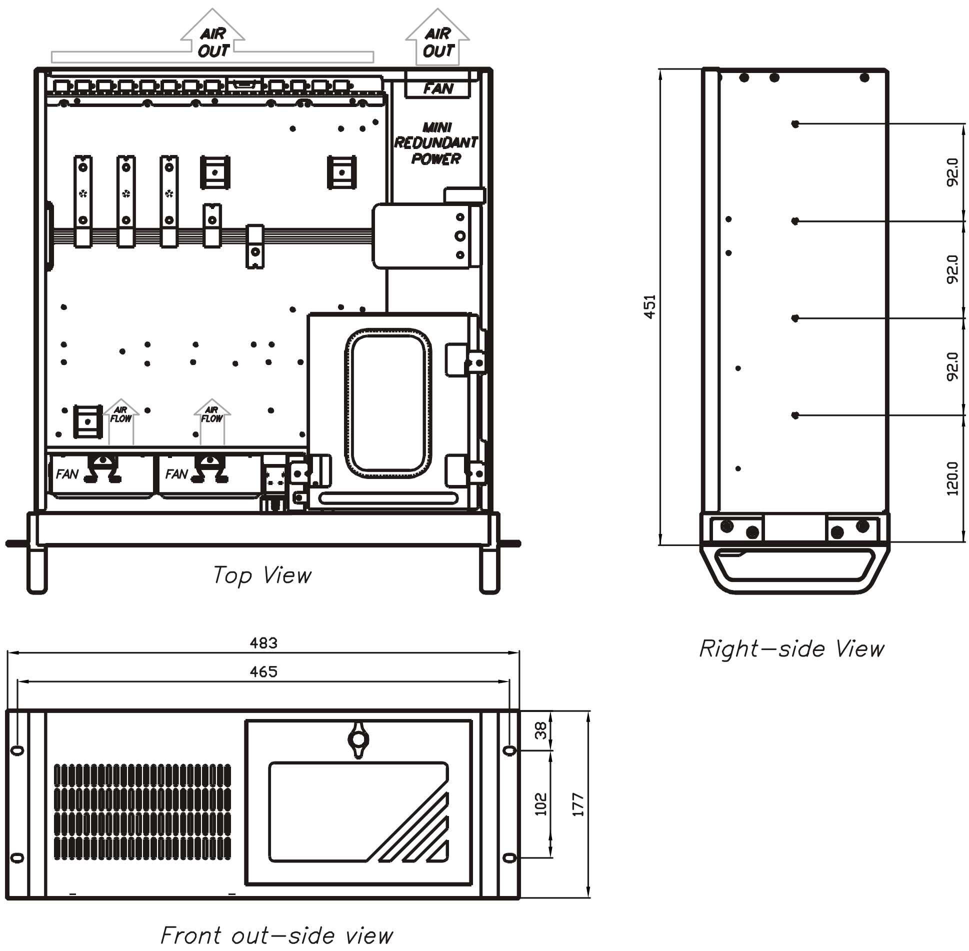


Fig. 86. RS4v2 dimensions

RS4v2 Housing

- 19" 4U rack mountable chassis;
- Cooling units: 2 x 9 cm ball bearing fans;
- Drive bays: 3 x 5.25", 1 x 3.5" FDD;
- Expansion slots: 4 PCI-slots, 2 PCI Express x 1, PCI Express x 16;
- Indicators: LED for power and HDD activity;
- Buttons: power on/off, system reset;
- Dimensions: 480 x 177 x 451 mm (W x H x D);
- Power supplies 300 W 115/230 VAC.

Intel D945GNT Motherboard

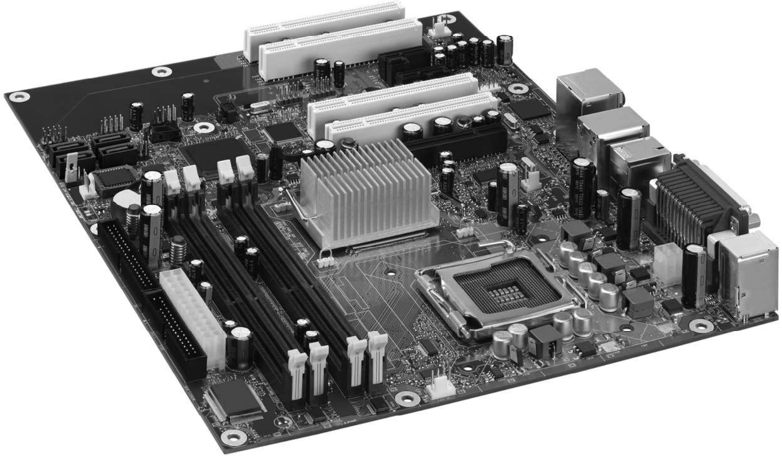


Fig. 87. View of D945GNT motherboard

- Form Factor:
  - ATX (12.00" x 9.60") desktop board D945GNT.
- Processor:
  - Support for an Intel® Pentium® D, Pentium® 4, and Celeron® D processor in the LGA775 package with a 1066/800/533 MHz system bus;
  - Hyper-Threading Technology Support.
- Memory:
  - Four 240-pin, 1.8 V SDRAM Dual Inline Memory Module (DIMM) sockets;
  - 667/533/400 MHz single or dual channel DDR2 SDRAM interface;
  - Support for up to 4 GB of system memory.
- Chipset Intel 945G Express:
  - Intel® 82945G Graphics and Memory Controller Hub (GMCH) with Direct Media Interface;
  - Intel® 82801GB I/O Controller Hub (ICH7) or 82801GR I/O Controller Hub (ICH7R) supporting Intel® Matrix Storage Technology;
  - Firmware Hub (FWH).
- Graphics:
  - Intel® 945G Express Chipset with Intel® Graphics Media Accelerator 950.
- Audio:
  - Intel 945G Express Chipset;
  - Intel® High Definition Audio interface;
  - SigmaTel codec.
- Expansion Capabilities:
  - Four PCI bus ad-in card connectors (SMBus routed to PCI bus 2);
  - One PCI Express x 16 connector;
  - Two PCI Express x 1 connectors.

- Peripheral Interfaces:
  - Up to eight USB 2.0 ports (four ports routed to the back panel, four ports routed to two USB headers);
  - Four Serial ATA (SATA) channels (3.0 GB/s), via the ICH7 or ICH7R, one device per channel;
  - One IDE interface with ATA-66/100 support (two devices);
  - One VGA connector;
  - One diskette drive interface;
  - One serial port;
  - One parallel port;
  - PS/2* keyboard and mouse ports;
  - Optionally up to 3 digital optical IEEE – 1394a ports (1 back port);
  - Optionally Intel® 82562GZ 10/100 Mbit/sec Platform LAN Connect (PLC) device with RJ-45 connector;
  - Optionally Intel® 82573E or 82573V gigabit Ethernet Controller with RJ-45 connector.
- BIOS:
  - Intel® Platform Innovation Framework for extensible firmware interface;
  - 4 Mbit symmetrical flash memory;
  - Support for SMBIOS;
  - Intel® Rapid BIOS Boot;
  - Intel® Express BIOS Update.
- Power Management:
  - Support for Advanced Configuration and Power Interface (ACPI);
  - Suspend to RAM (STR);
  - Wake on USB, PCI, PCI Express, PS/2, LAN, and front panel.
- Hardware Management. Hardware Monitor with:
  - Three fan sensing inputs used to monitor fan activity;
  - Remote diode temperature sensing;
  - Intel® Precision Cooling Technology fan speed control;
  - Voltage sensing to detect out of range values;
  - Optionally Trusted Platform Module;
  - Optionally Intel® Active Management Technology.

CPU

CPU-IP42-3400/800, Intel Pentium® D, 3400 GHz, 800 MHz FSB, 512 KB.

Memory

1 GB RAM, 2 x RAM-DDR2-512-533-G, RAM DDR2 512MB, 533 MHz.

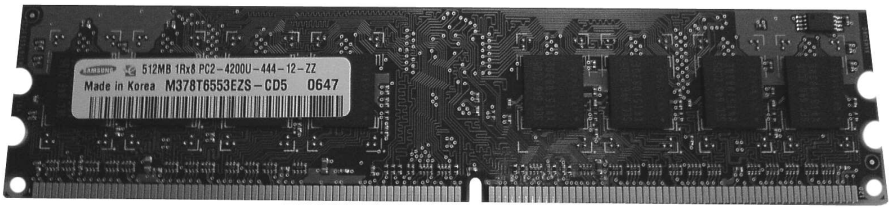


Fig. 88. View of DDR2 512 MB 533 MHz memory

Storage

HDI3-WD360GD, Western Digital 36 GB 10000 rpm SATA.

Devices with Removable Storage

- DVD-SAM-162WBEBN, Samsung DVD-RW 16X IDE;
- FDD-SONY-BL, 1.44" MB 3.5" Floppy drive.

I/O Device Moxa CP114I PCI Serial Board.

Moxa Industio products are smart, multiport serial I/O solutions for industrial applications. The CP-114I Series boards are RS-232/RS-422/RS-485 4-port serial communication interface board for 32-bit PCI bus with “Plug and Play” feature. Industio products support all three serial interfaces, RS-232, RS-422, and RS-485, in one board, and provide a reliable communication link over a longer distance (up to 4000 ft for ports set to the RS-422/485 interface). Two of the four ports are RS-422/485 ports and the other two ports can be configured to RS-232 or RS-422/485 individually. Each RS-422/RS-485 port can control up to 32 devices in a multi-drop environment.

The board complies with PCI Spec. 2.1 and has neither switch nor jumper. The BIOS automatically assigns the hardware configuration for the IRQ number and memory addresses. Hence, the board must be plugged first before installing the software driver.

To ease the 2-wire RS-485 half-duplex control, Automatic Data Direction Control intelligence is built on Industio CP-114I Series boards, eliminating the need of software interference. Hence, the applications can manage the RS-485 port without extra code to control the half-duplex protocol.

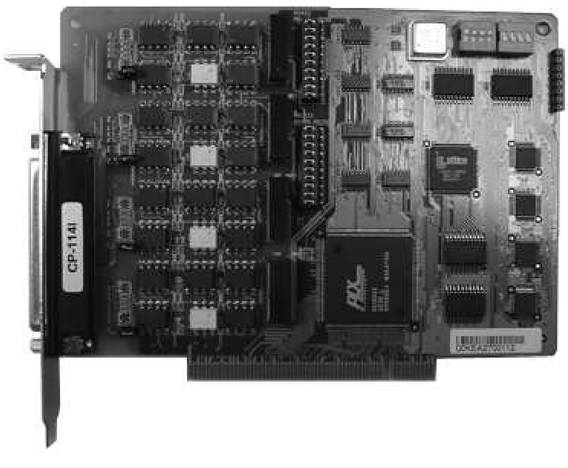


Fig. 89. View of PCI COM4xRS232/422/48 card

With a well-designed and fine-tuned device driver, the Industio products make full use of the 32 byte Tx/Rx FIFO and on-chip H/W flow control, so that it can transfer data without loss even at high speed such as 921.6 bps, providing a reliable and high performance solution for serial multiport communications.

COM-4 ports CP114I PCI Serial Board:

- Supports all three interfaces in one board (2 ports for RS-232 or RS-422/485, selectable by jumper, 2 ports for RS-422/485);
- High speed 16C550C Communication Controllers with on-chip hardware flow control guarantees no data loss and data integrity;
- High speed up to 921.6 Kbps each port;
- Support optical isolation, max. 2KV (RS422/485);
- Support surge protection (25KV ESD) for all signal lines to prevent interference and noise and protect your system and minimize the system down time;
- Support 2-wire RS485 half-duplex operation;
- Supports ADDC (Automatic Data Direction Control) intelligence to simplify the RS485 software programming;
- RS-485 data control: Auto (ADDC) or by RTS;
- Built-in termination resistors – eliminates impedance matching headaches;
- Compatible with PC standard COM ports;
- Powerful Serial Comm tool – Pcomm and API-232;
- Support popular OS – Windows 2000/XP/2003, Windows NT, Windows 95/98, and DOS.

I/O Device Sunix 4456A PCI Express Serial Board

RS232 Golden I/O series is a line of PCI Express Multi-port Serial Communication Board with independent high-speed RS232 V24 standard serial interfaces. The card attaches 4 independent DB9 or DB25 RS232 serial ports on your system for industrial communication and automation applications. It is compatible with PCI Express x1, x2, x4, x8, x16 lane Bus, allowing this multi-port serial card to be installed in virtually any available PC system and compatible with all major operating systems. Users do not need to manually set jumpers to configure I/O addresses and conflicts with other cards or devices:

COM-4xRS232 4456A PCI Express Serial Board:

- Expands 4 RS-232 serial ports with communication speeds up to 921.6 Kbps;
- Designed to meet PCI Express Base Specification Revision 1.1;
- Single-lane (or x1) PCI Express throughput up to 2.5 GBps;
- Supports x1, x2, x4, x16 (lane) PCI Express Bus connector keys;
- High speed 16C650 compatible communication controller with SUN1889 chip hardware flow control to guarantee no data loss and best technical support;
- Each serial port has built-in 64 byte hardware FIFO & 128K byte software FIFO;
- Built-in 15KV ESD protection for all serial signals;
- Certified by Microsoft WHQL, CE, FCC approval;
- Support Linux, Microsoft Windows 2000, XP and 2003;
- Ready for the Intel® and AMD® 32/64-bit CPU system.

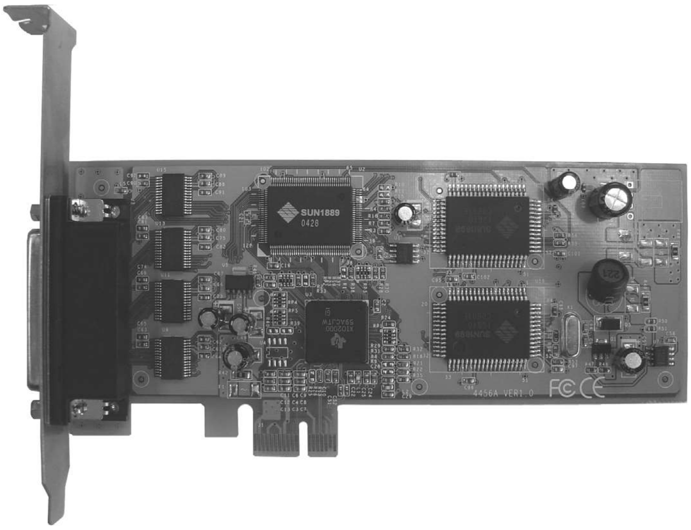


Fig. 90. View of PCI 4xRS232 Sunix 4456A card

Transas Dedicated Keyboards

Transas ES4 Dedicated Keyboard

Functional Description

The Trackball-Keyboard consists of two keyboard fields (“QUERTY”, function and DIM-keys) and a separate Trackball:

1. Keyboard.

   All key are backlit with yellow LEDs (Light Emitting Diodes). The QUERTY-field is printed with a “hiding-effect”, i.e. the key legends are normally invisible when not lit. The QUERTY-field normally is not lit. When a key is pressed the backlight is switched on and the first key press is not sent to the PC. When the light is dimmed down to the lowest level, the QUERTY-field will be lit with full brightness (daylight operation). Above this level the brightness of both fields are equal. When no key of the QUERTY-field is pressed for more than 30 seconds the backlight of will be switched off. With the keys “Dimmer +” and “Dimmer -” the brightness can be adjusted in 255 steps.

   The keyboard has a standard PS/2 Interface to the PC. On the back of the keyboard is a PS/2-plug, which accepts a standard PS/2 compatible keyboard. Key codes from this keyboard will be forwarded transparently to the PC.

   The QUERTY-field produces standard key codes according to the imprinted legend. The coding is for an US-keyboard. Some key have a second code imprinted on their upper half. This is sent when the key is pressed together with the FN-key.

   The Function-have the following coding:

Legend	Key-Code
A	<Alt> + <G>
B	<Alt> + <K>
C	<Alt> + <T>
Ahead	<F8>
Alarm	<Ctrl> + <A>
Zoom In	<+> (from Num-block)
N/H/C Up	<Alt> + <H>

Legend	Key-Code
Standard-Display	<Shift> + <F7>
Zoom Out	<–> (from Num-block)
Night/Day	Cyclic the codes <Alt> + <F1>...<Alt> + <F6>
All Layers	<Shift> + <F8>
Event	<F4>
Screen Shot	<Ctrl> + <Print Screen>
Target Table	<Alt> + <J>
Trial-Manoeuvre	<F9>
Overlay On/Off	<Alt> + <Q>
Target On/Off	<Shift> + <F11>
Plot Target	<Alt> + <S>

2. Trackball.

   The Trackball works as a standard PS/2-mouse with two buttons. In release 2 of the keyboard, the buttons of the trackball can be backlit, too. When connected with the plug on the back of keyboard the light will be dimmed together with the keyboard.

3. Loudspeaker.

   The keyboard has an integrated loudspeaker and an audio-amplifier with an output power of approximately 1W. With the “Volume +/-” keys the loudness can be adjusted between approximately 75 … 85 db, assuming an input signal of 1Vss.

4. Power supply.

   Keyboard and trackball are supplied from PS/2 interface. The supply voltage should be 5V-DC +/- 10%.

   The backlight and the audio amplifier are supplied with 12V-DC from an AC PSU with an input range of 85 … 260 V-AC.

Keyboard Legend

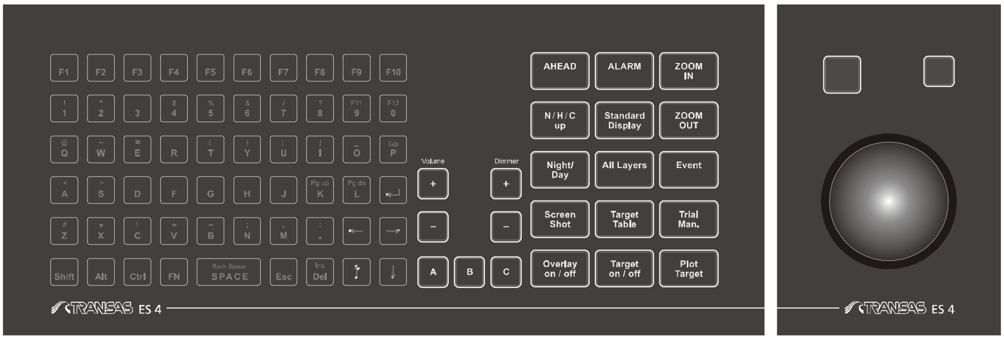


Fig. 91. ES4 keyboard

Technical Data

Dimensions:

- Keyboard alone: 350 x 150 x 63 mm (W x H x D);
- Trackball alone: 100 x 150 x 60 mm (W x H x D);
- Keyboard with trackball: 450 x 150 x 63 mm (W x H x D).

Power supply:

- Keyboard electronics: 5V-DC +/- 10 %, approximately 60 mA;
- Trackball electronics: 5V-DC +/- 10 %, approximately 30 mA;
- Backlight + Audio: 12V-DC +/- 10 %, approximately 1.2 A;
- PSU for 12V: 85…260V-AC 50–60Hz, approximately 20 W.

Rear Panel

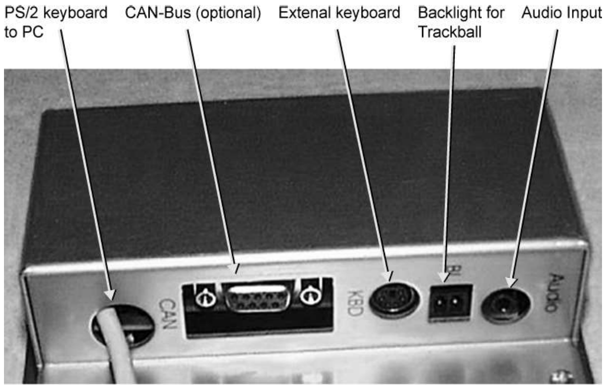


Fig. 92. ES4 rear panel sockets scheme

Interfaces:

- PS/2 for keyboard, cable with PS/2 connector, length 3 m;
- PS/2 for trackball, cable with PS/2 connector, length 3 m;
- PS/2 plug for external keyboard;
- Connector for trackball backlight (12V PWM);
- Audio input, 1Vss;
- Optional CAN-bus for connecting other input devices, not supported in current software.

Transas ES3 Dedicated Keyboard

Appointment

Keyboard ES3, further ES3, it is a control unit inside Transas systems. ES3 consists of three units inside: PC compatible keyboard, functional keyboard, and two-buttons trackball.

PC compatible keyboard and trackball are connected to PC by PS/2 interface and use standard keyboard PC protocol and Microsoft mouse correspondingly.

Functional keyboard is connected to PC by RS 232 interface and use special done protocol.

Functional keyboard unit controls highlighting of buttons, loudspeaker, and control buttons.

ES3 power supply is 220 Volts AC.

External Connections

ES3 has possibility of external connections (PC compatible keyboard and mouse) via standard mini-DIN plugs, situated on backside of keyboard. It is necessary to push buttons to connect external PS/2 devices.

Technical Characteristics

Input voltage	85–264 VAC
Input voltage frequency	47–63 Hz
Power consumption, max	25 Watts
Humidity	0–95%, without condensation
EMC	IEC 60945 edition 4
Acoustic pressure of loud speaker (distance 1 m)	80 dB
Working temperature	-15 … +55 ºC
Storage temperature	-30 … +70 ºC
Dimensions	450 x 150 x 95 mm
Weight	2.7 kg
Cables length	2.6 m

Specification of ES3 Communications Protocol by RS-232 Interface

Physical level – RS-232, baud rate 19200, No parity, 8 bits, 1 stop bit.

Format of NMEA parcel:

$AACMD [,arguments]*CC\r\n

N	Field	Description
1	$	Start of sentence
2	AA	ID of sender: NS (Navi-Sailor), ES (ES3 keyboard)
3	CMD	Code of command
4	CC	Checksum of NMEA command

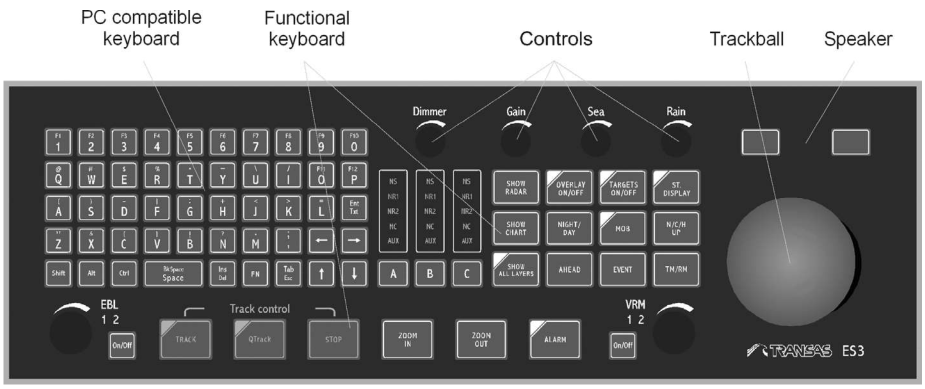


Fig. 93. ES3 keyboard. Front view

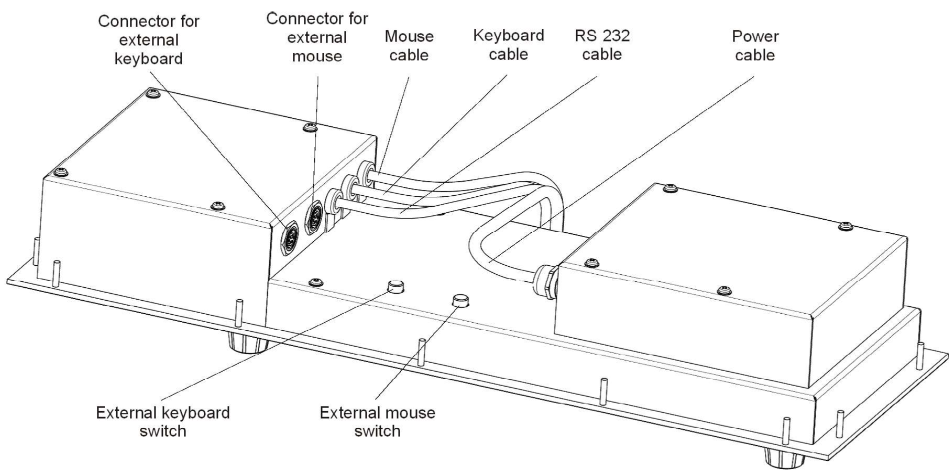


Fig. 94. ES3 keyboard. Back view

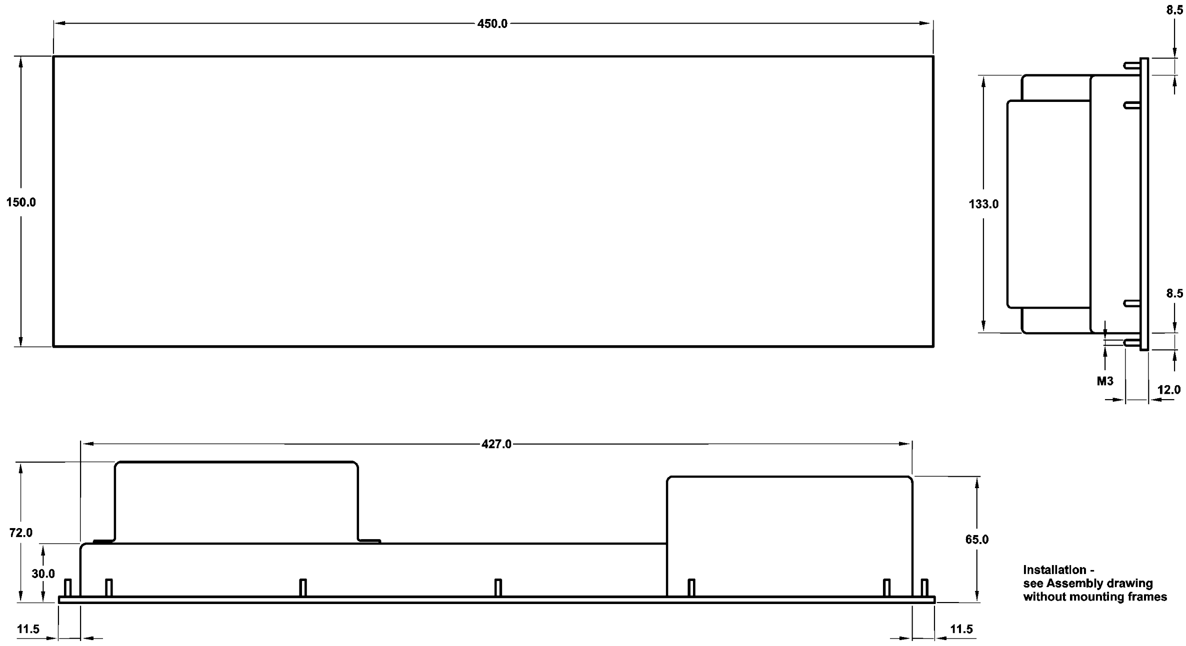


Fig. 95. Transas ES3 dedicated keyboard. Dimensional drawing

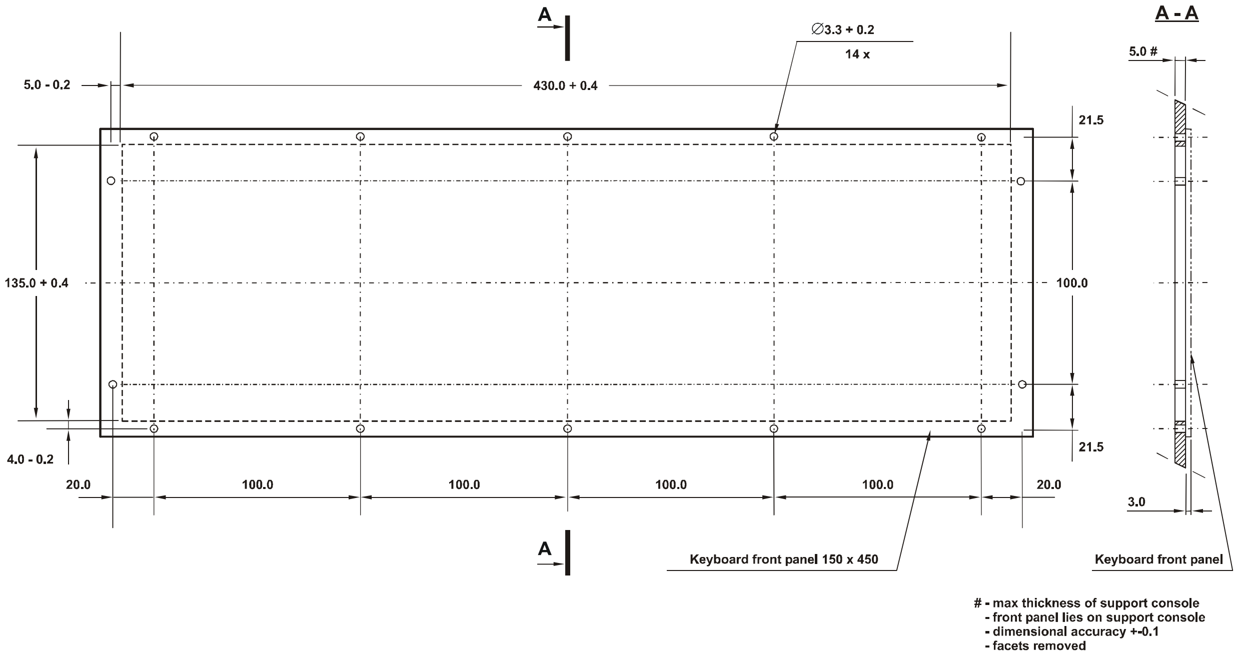


Fig. 96. Transas ES3 dedicated keyboard. Assembly drawing without mounting frames

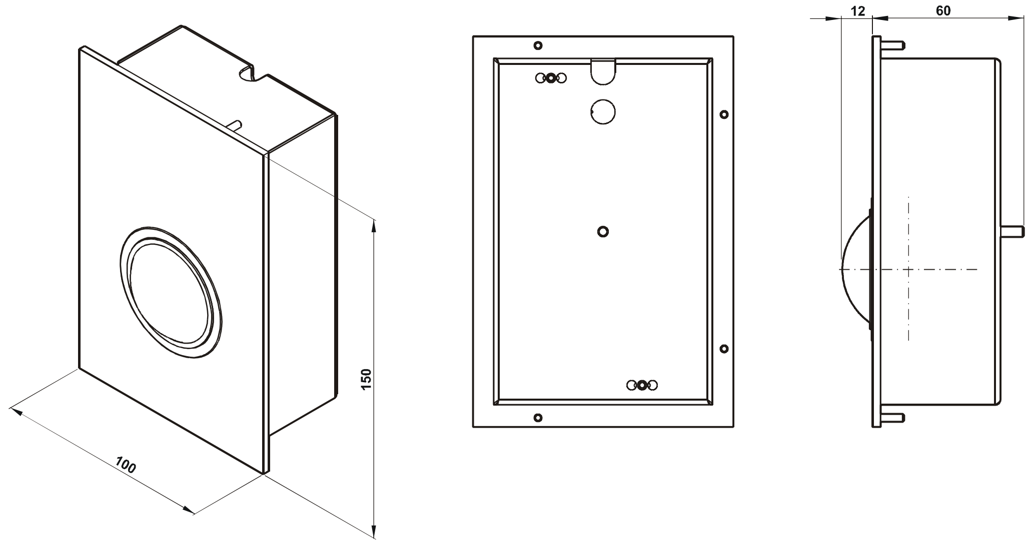


Fig. 97. Transas ES4 dedicated keyboard. Dimensional drawing of Trackball

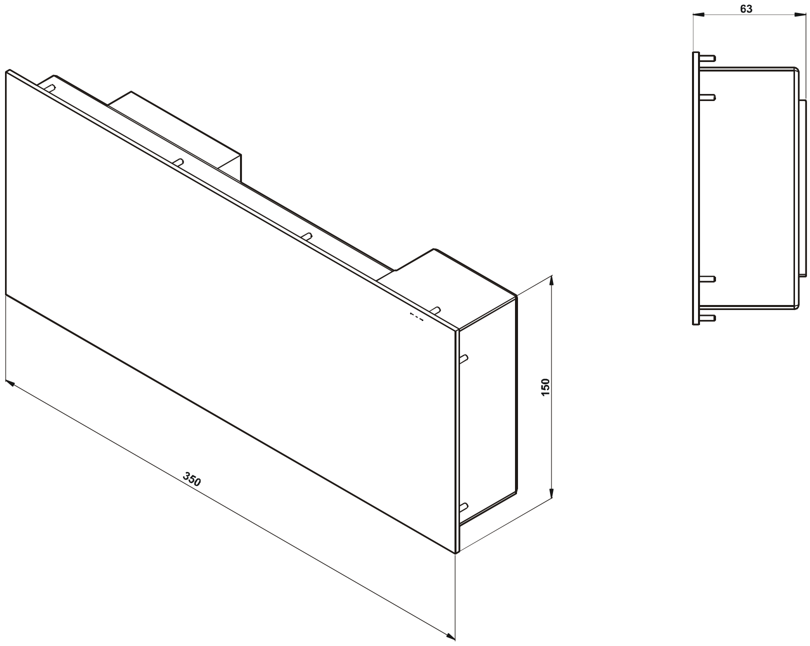


Fig. 98. Transas ES4 dedicated keyboard. Dimensional drawing of Keyboard

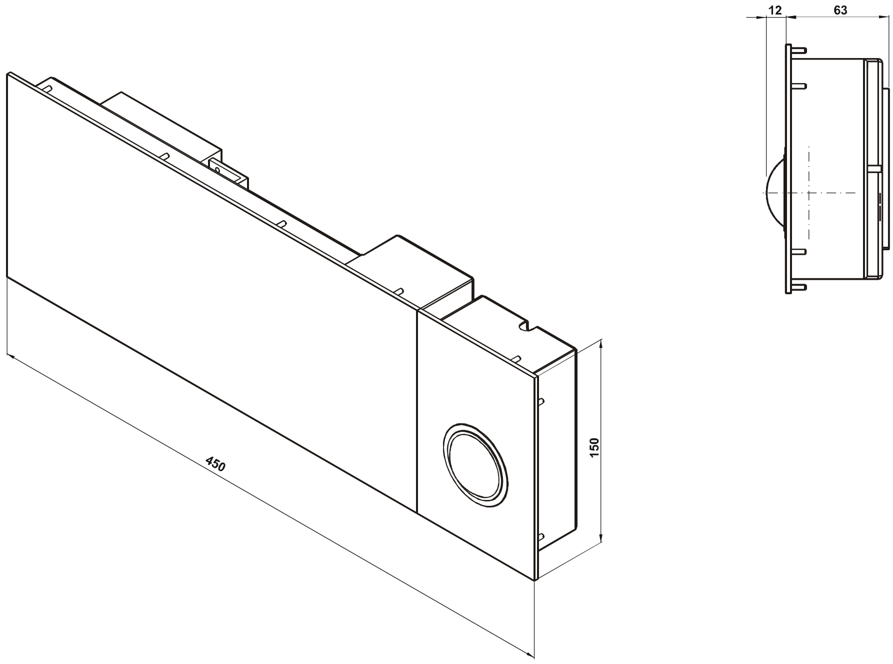


Fig. 99. Transas ES4 dedicated keyboard. Dimensional drawing of combined Keyboard and Trackball

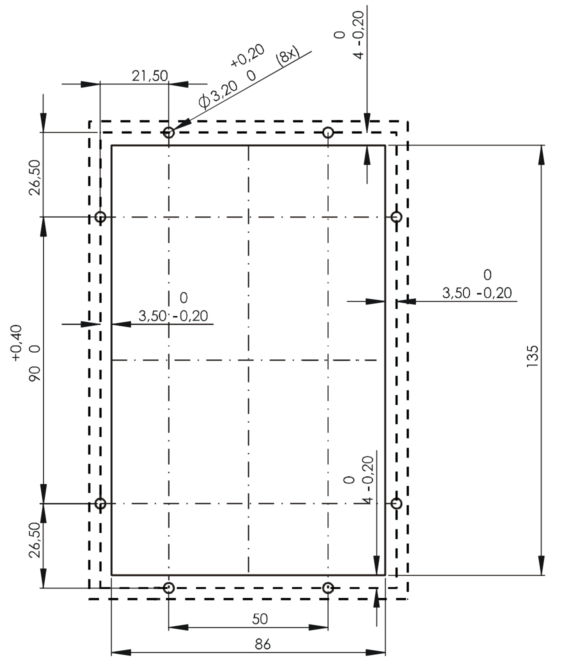


Fig. 100. Transas ES4 dedicated keyboard. Trackball mounting hole

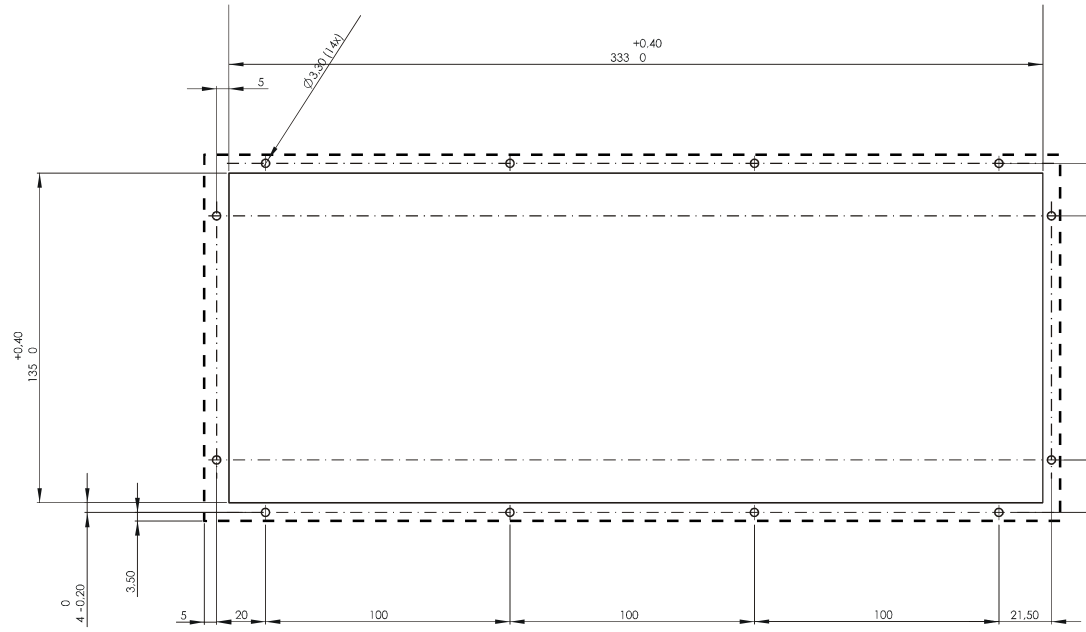


Fig. 101. Transas ES4 dedicated keyboard. Keyboard mounting hole

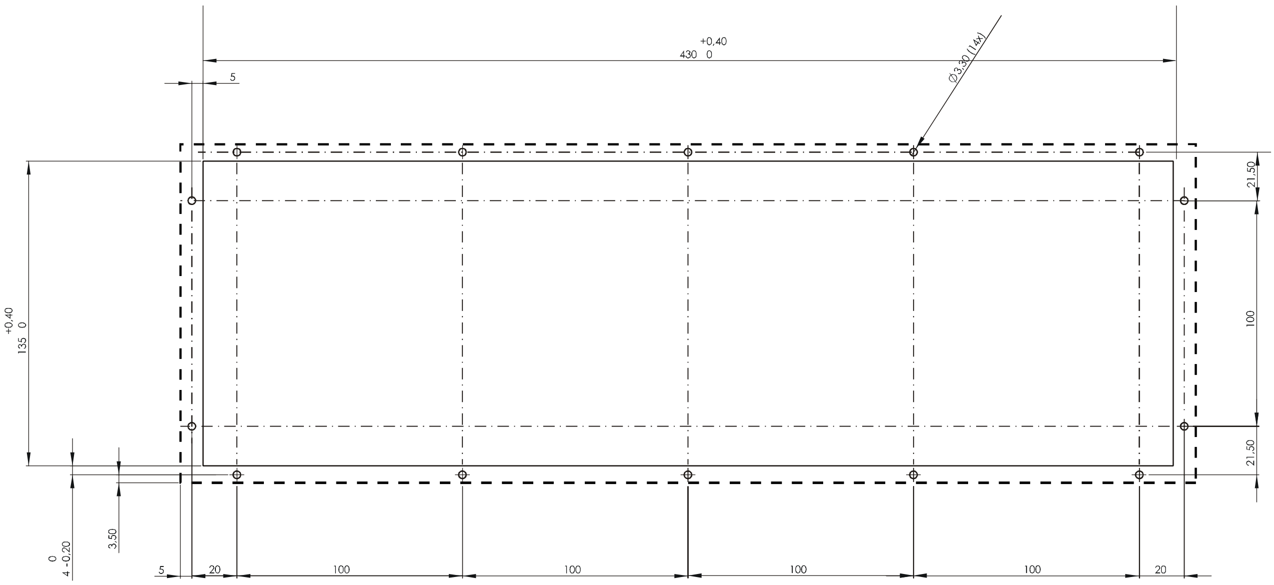


Fig. 102. Transas ES4 dedicated keyboard. Combined Keyboard and Trackball mounting

Radar Integrator Board

General Description

The Radar Integrator board (RIB) is a module operating in combination with an IBM PC compatible computer to enhance functional capabilities of the ECDIS system.

The Radar Integrator board is designed for the reception of analog video signals from the radar and their processing. The RIB enables the automatic detection, automatic acquisition and automatic tracking of targets, calculations of targets coordinates and motion parameters and on-line transmission of this data to the ECDIS system as well as the formation of a radar picture to be displayed in combination with an electronic chart.

Purposes

Input of Radar Signals

- Analog/digital conversion of radar signals;
- Reception of information on the course and speed.

Selection of Radar Targets

- Suppression of sea clutter, interference from operating radars and other occasional clutter;
- Detection of radar echoes with an adaptive threshold;
- Selection of objects by size out of the set range of values;
- Determining of targets' gravity centers and measurement of their coordinates;
- Automatic acquisition and automatic tracking of targets.

Note: The criterion for selecting targets for tracking is the availability; in several consecutive scans, of an echo with a higher intensity as compared to the background within a spatial locality fitting the set range in size and discrimination.

- Automatic assigning of names to new targets;
- Determining of the targets' current courses and speeds;
- Recording of target loss time;
- Computation, preparation, and transmission to the Navi-Sailor series systems of all the tracked targets' data cards including the following parameters:
  - Number or name assigned to the target;
  - Target status or type:

    New target;
    Steadily tracked target;
    Target not observed;
    Target lost.
  - Target's range (in nautical miles);
  - Target's true bearing (in degrees);
  - Target's relative course (in degrees);
  - Target's relative speed (in knots);
  - Target's true course (in degrees);
  - Target's true speed (in knots).

Formation of a Radar Image

- Formation of a digital radar image, enhancement of sea surface, and coastline presentation (filtering and clutter suppression);
- Conversion of the radar picture coordinates, orientation, and scale;
- Offsetting the effect of non-uniformity of antenna rotation on the formation of the radar picture;
- Scan-to-scan accumulation for an improved quality of presentation;
- Formation of surface radar images converted to suit the set parameters, for the display in the Navi-Sailor system.

Interface Capabilities

HF-Box Input Signals

"Video" – an analog signal from the radar receiver output:

- Amplitude of up to 12 V;
- Polarity is positive or negative (program selectable);
- Dynamic range of up to 60 dB;
- 20 MHz band;
- Switchable impedance: 75 Ohm or > 1 kOhm.

"Video" input could be used for the reception of a complex signal containing an analog signal, start pulses, and digital information. The signal components are program extractable.

"Trigger" – pulses coincident with the radar's outgoing pulse:

- Amplitude of up to 20 V;
- Minimum length of 30 nS;
- Repetition frequency of up to 4000 Hz;
- Polarity is positive or negative (program selectable);
- Switchable impedance: 75 Ohm or >1 kOhm.

LF-Box Input Signals

"Head marker" – origin of reading of antenna turn angle:

- Pulses with amplitude of 3–50 V;
- AC input;
- Input resistance of > 50 kOhm;
- Polarity is positive or negative (program selectable).

"Bearing" – pulses of change in the antenna turn angle:

- Logic signals with the following levels: "0" – not more than 1.2 V, "1" – within the range of 3–100 V;
- Input resistance of > 50 kOhm;
- Active level is program selectable.

"IN1–IN4" – additional programmable inputs:

- Logic signals with the following levels: "0" – not more than 1.2 V, "1" – within the range of 3–100 V;
- Impedance of > 50 kOhm.

"LOG" and "GND" – input of log signals in the form of a closing relay contact. "LOG" contact is connected with source +5 V via 4.7 kOhm resistor.

"LOG+" and "LOG-" is opto-isolated log input.

"CMPSR+" and "CMPSR-" – opto-isolated input of the gyro's reference voltage.

"CMPS1+" and "CMPS1-", "CMPS2+" and "CMPS2-", "CMPS3+" and "CMPS3-" – opto-isolated inputs of gyro phases.

All the opto-isolated inputs have identical parameters:

- Input logic levels: "0" – not more than 1.5 V, "1" – not less than 3.5 V in the absence of a jumper in the relevant channel;
- "0" – not more than 3 V, "1" – not less than 6 V with a jumper available;
- Maximum permissible input constant voltage – 200 V, pulse voltage – 400 V;
- Protection from the reverse voltage of up to 400 V;
- Input currents – not more than 0.3 mA at the voltage of 3.5 VL:
  - Not more than 1 mA at the voltage of 50 V;
  - Not more than 4 mA at the voltage of 400 V.
- Isolation voltage – 1000 V.

Compass inputs can be used for both compasses with stepper output and for compasses with an output in the form of synchrovoltage within 12–220 V range. The mode is program selectable.

Minimum lengths for all the signals are set by program controllable filters.

LF-Box Output Signals

"OUT1-OUT4" – programmable logic outputs:

- Level "0" – not more than 0.5 V, level "1" – switchable, not less than 4 V or not less than 10 V;
- Maximum load – 5 mA;
- Pulse front length – not more than 2 mkS.

Technical Specification

Hardware Components

The Radar Integrator consists of a short (120 mm) PCI standard Radar Processor board and two external modules: a high-frequency module (HF-box) and a low-frequency modules (LF-box), connected to the PCI board with cables.

The high-frequency module (HF-box) has two BNC connectors for the input signals, whilst the external lines are connected to the low-frequency module (LF-box) by means of screw terminals.

The high-frequency module (HF-box) is connected to the Radar Processor board via RJ45 connector. The low-frequency module (LF-box) is connected to the Radar Processor board via DB25 connector.

Software Components

The software package stored on a standard Transas CD, is designed for supporting the Radar Integrator board's operation and enables control of this unit's operating modes, reception, processing, and transmission of a radar picture as well as the extraction and tracking of radar targets.

The package includes:

- RIB2 driver `transas.sys` – for Windows XP;
- A set of libraries with configuration file: `i_radar.dll`, `second.dll`, `rad_int.dll`, `rad_int.cfg`;
- Testing program: (*System Configuration Utility\Radar\General*, "Test Radar" button) (`RTest.exe`).

The installation package enables the necessary software to be copied into the folder determined by the user, ensures the necessary registration of software by the operating system, and runs the configuring utility which provides the package's referencing to the parameters of the installed radar equipment.

The Radar Configuration utility is designed for:

- Selecting two types of radars (named "Radar 1" and "Radar 2" respectively) which can be connected to the system if Interswitch unit is available;
- Enabling additional manual adjustment of the system parameters used when the customer has radar whose type is not on the radar type selection menu, and for taking into account parameters of particular radar, such as the beam width, bearing, and distance offsets.

The Test Radar utility is a facility for testing the previously installed and configured "Radar processor libraries" package jointly with the Radar Integrator board. The program ensures the formation of a radar picture and also displays the results of the signal and tracked targets processing.

Description of the Delivery Set

The Radar Integrator Board delivery set includes the components listed in table below.

N	Item	Quality
1	Radar Processor board with a bracket	1
2	High Frequency box	1
3	Low Frequency box	1
4	Extension cable DB25 – DB25, 1 m in length	1
5	Coaxial cable with BNC type connector on one end, 1 m in length	2
6	RJ45 connector	2
7	Jumper	10
8	Documentation (Radar Integrator User and Installation Manuals (B5 format))	1 set
9	LF box installation kit: Velcro type connection; Screw	 2 4
10	HF box installation kit: Velcro type connection	 1

Weight and Dimensions

Weight of the HF box: 0.15 kg.

Weight of the LF box: 0.3 kg.

Overall and installation dimensions are specified in Fig. 103–51.

Replacement Parts

The Radar Integrator is not subject to repairs in the shipboard conditions.

The Radar Processor's serviceability is restored on the ship, in the port or at a plant by replacing it with a new unit bought from the manufacturer.

Separate Delivery Units

The separate delivery units include:

- HF box;
- LF box.

PC Resources Required

The Radar Processor takes up the following processor unit resources via the PCI interface:

- One IRQ line (3–7, 9–15);
- Power supply from the processor unit's organic (internal) supply module: +5.0V/0.7A, +12V/0.1A, -12V/0.1A.

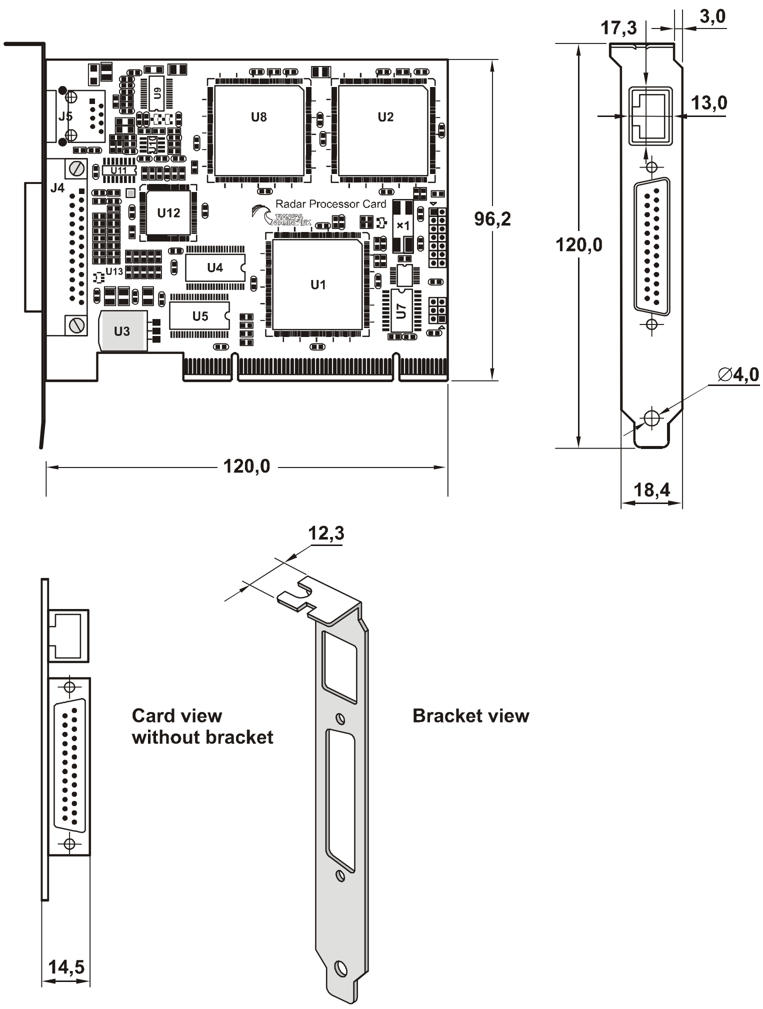
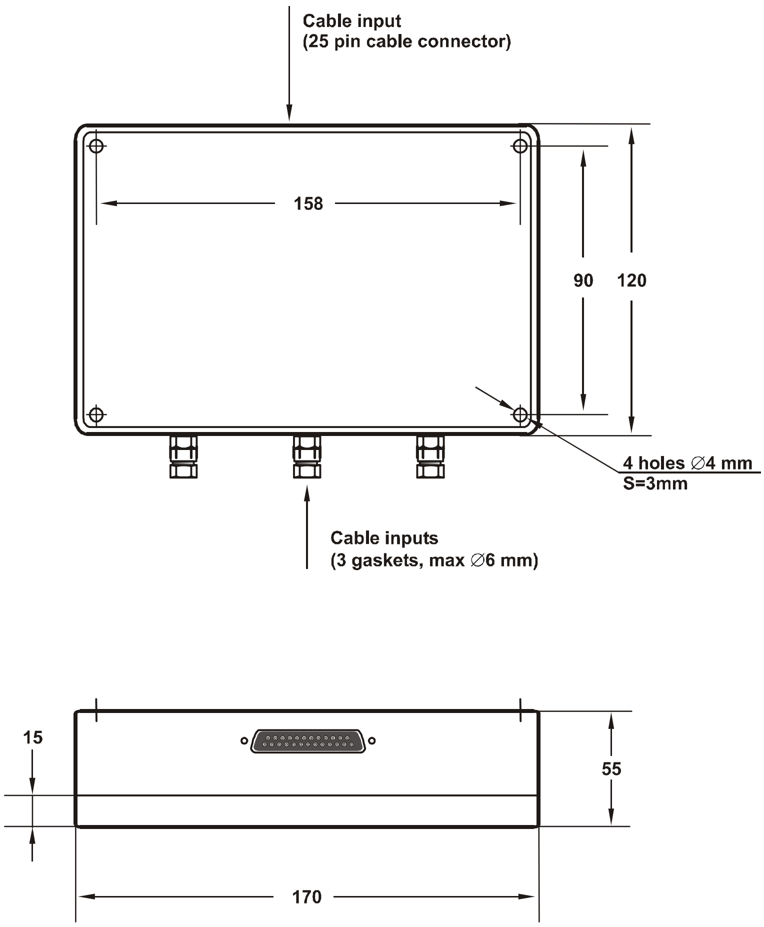
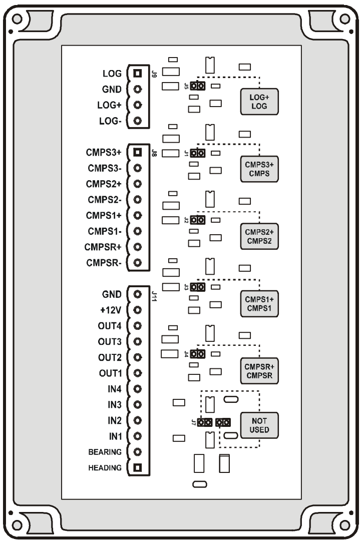


Fig. 103. RIB Radar processor card. General view



Casing material: plastic
Weight: 0,3 kg
Fixture is with double-faced scotch tape
(applied in the installation kit)

Fig. 104. RIB Low frequency box



Cover backside
with connection table

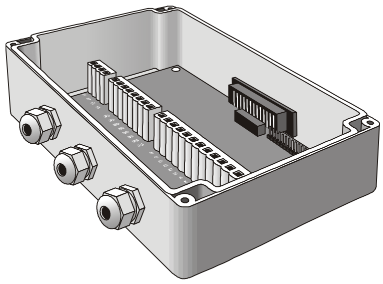


Fig. 105. RIB Low frequency box. General view

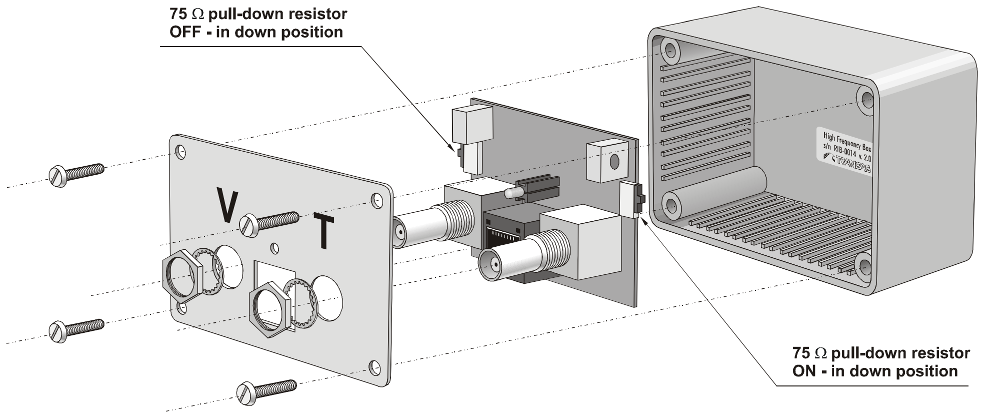
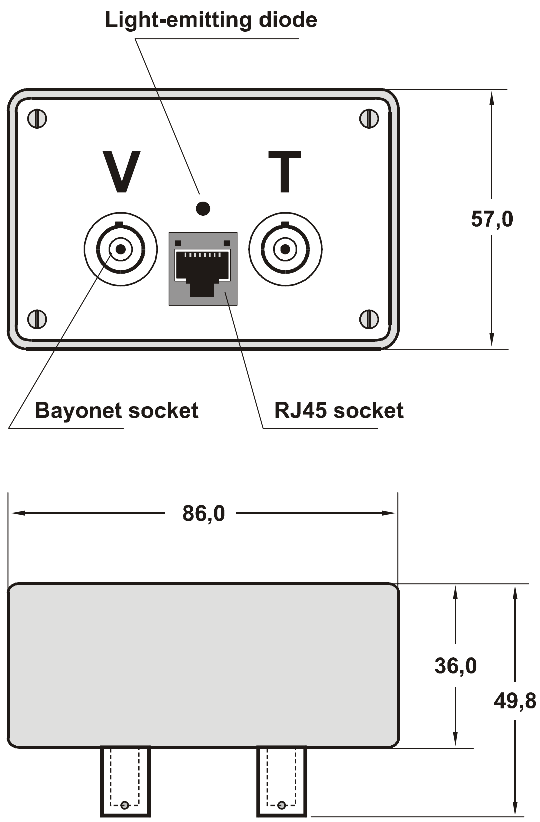


Fig. 106. RIB High frequency box. General view



Casing material: plastic
Weight: 0.15 kg
Fixture is with double-faced scotch tape
(applied in the installation kit)

Fig. 107. RIB High frequency box

Ethernet Switch 12xRJ45 ACHP J4812A

Ethernet switch ACHP J4812A in conjunction with marinizing kit Mariner MS630:

Fig. 108. Appearance of Ethernet switch 12xRJ45 ACHP J4812A

- Provide 12 RJ-45 10/100Base-TX ports (IEEE 802.3 Type 10Base-T; 802.3u Type 100Base-TX);
- 9.6 GBps switch fabric integrated on-chip: high performance switch design with a non-blocking architecture: automatically adjusts for straight-through or crossover cables on all 10/100 and 100/1000 ports;

- Stacking capability: single IP address management for a virtual stack of up to 16 switches including the 1600M, 2400M, 2424M, 2512M, 2524M, 4000M, and 8000M;
- RMON and extended RMON: provide advanced monitoring capabilities;
- Certificate – IEC 60945, DNV;
- Dimensions: 17.4 x 8.0 x 1.8 in. (44.2 x 20.3 x 4.6 cm);
- Weight: 6.0 lb. (2.7 kg);
- Mounting. Mounts in a standard 19 in. rack;
- Environment:
  – Temperature: -15 to 55 ºC;
  – Relative humidity: 15% to 95% @ (40 ºC), non-condensing;
  – Shock and vibration: HP759, HP760 (similar to EN 60068, IEC 68).
- Electrical characteristics:
  – Heat dissipation: 123 BTU/hr;
  – Power: 36 W;
  – Voltage: 100–127 VAC/200–240 VAC;
  – Current: 2.4 A max/1.2 A max;
  – Frequency: 50/60 Hz.
- Safety. EN 60950/IEC 950 UL 1950 3rd edition cUL (CSA 950) NOM-019-SCFI-1994.

Type approval valid only with marinizing kit Mariner MS630 installed.

ANNEX G

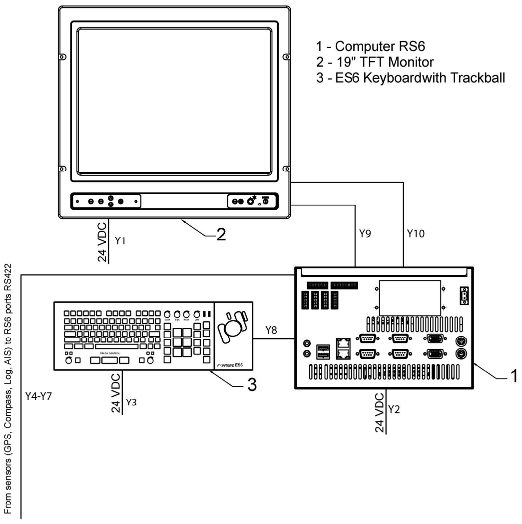
Diagrams

The following Diagrams are enclosed in this Annex:
NS 4000 ECDIS MFD WS. Base Configuration. Block Diagram;
NS 4000 ECDIS MFD RS6 Computer. Connectors Layout;
NS 4000 ECDIS MFD WS. Base Configuration. Connection Diagram;
NS 4000 ECDIS MFD System (WS1 and WS2). Optional Configuration. Block Diagram;
NS 4000 ECDIS MFD System (WS1). Optional Configuration. Connection Diagram;
NS 4000 ECDIS MFD System (WS2). Optional Configuration. Connection Diagram;
NS 4000 ECDIS MFD System (WS1 and WS2). Cables List;
NS 4000 ECDIS MFD WS. Optional Configuration. Power Supply Distribution. Connection Diagram;
NS 4000 ECDIS MFD System (WS1 and WS2). Optional Configuration. Data Flow Diagram;
WAGO Set for Conning. Connection Diagram;
Connection of RIB6 to Some Radar Types. Connection Diagrams.

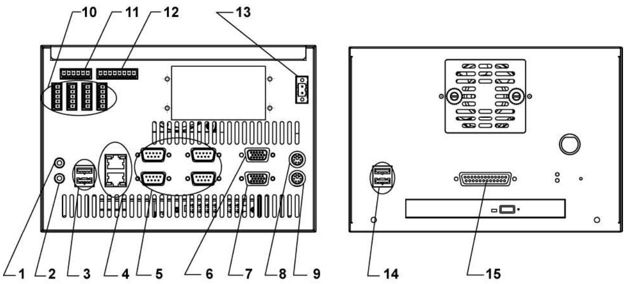
NS 4000/4100 ECDIS MFD WS. BASE CONFIGURATION. BLOCK DIAGRAM

CABLES LIST

CABLES N	TYPE CABLE REQUIREMENT	QUANTITY	SUPPLIER	NOTES
Y1	2x1.5	1	YARD	24VDC POWER-MONITOR
Y2	2x1.5	1	YARD	24VDC POWER-RS6
Y3	2x1.5	1	YARD	24VDC POWER-ES6 KBD
Y4-Y6	2x0.5	3	YARD	GPS,GYRO,LOG-RS6 RS422 PORTS
Y7	4x0.5	1	YARD	AIS-RS6 RS422 PORT
Y8	USB KEYBOARD	1	TSC	ES6 USB-RS6 USB
Y9	VGA CABLE	1	TSC	RS6 VGA2-MONITOR VGA
Y10	RS232 SERIAL	1	TSC	DB9M-DB9F (COM1)

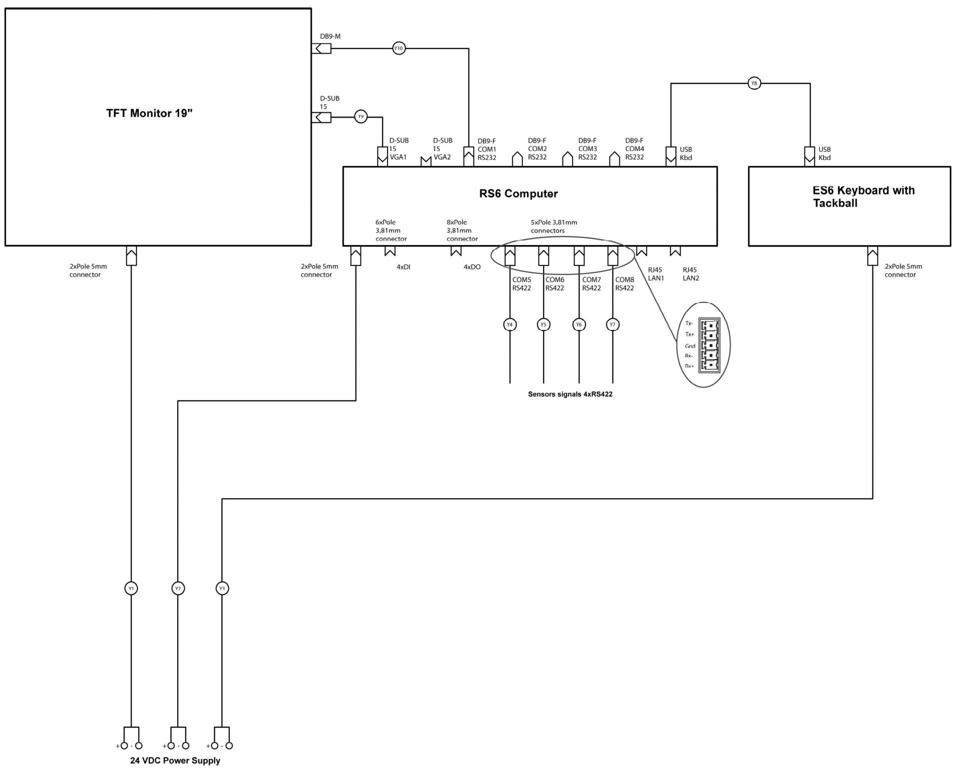


RS6 COMPUTER. CONNECTORS LAYOUT

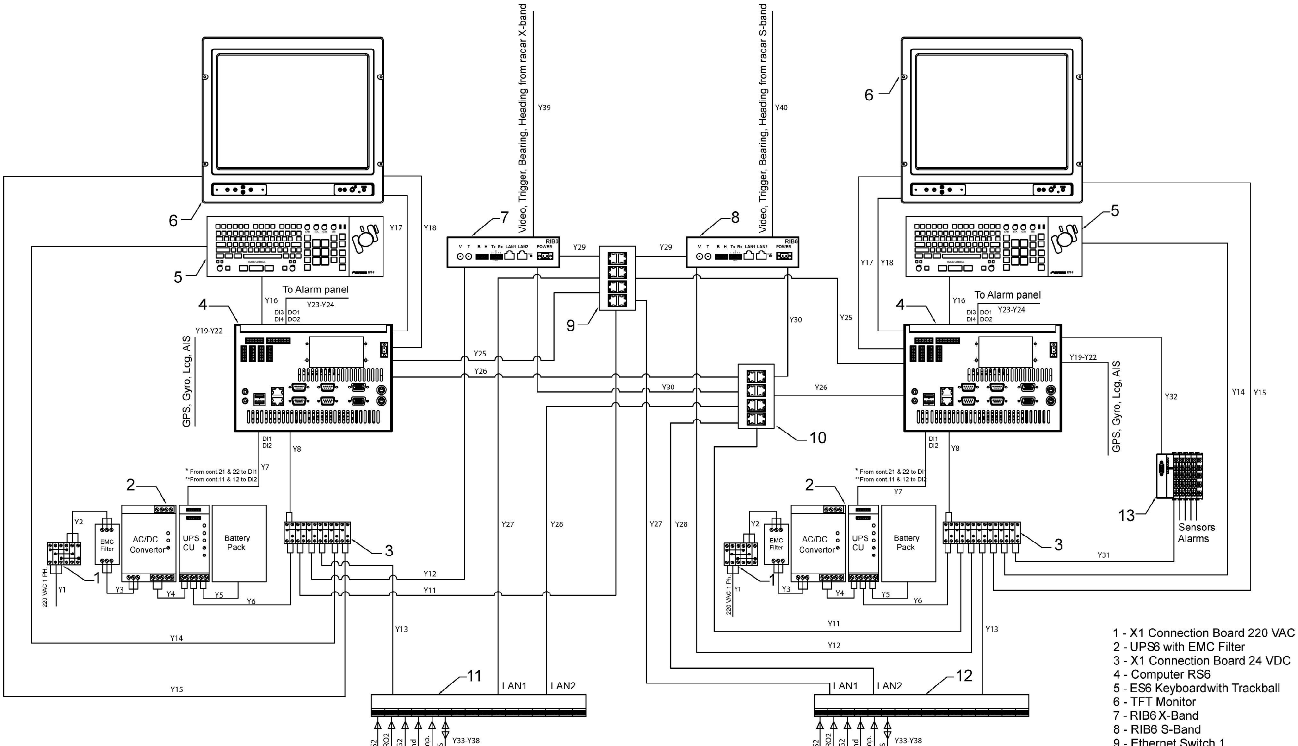


1 - Line Out
2 - Mic
3 - 2xUSB ports
4 - LAN1 / LAN2 Ethernet ports
5 - 4xRS232 ports
6 - VGA1
7 - VGA2
8 - PS/2 Trackball
9 - PS/2 Keyboard
10 - 4xRS422 ports
11 - 4xDigital Input (DI)
12 - 4xDigital Output (DO)
13 - Power 24 VDC
14 - 2xUSB ports
15 - LPT port

NS 4000/4100 ECDIS MFD WS. BASE CONFIGURATION. CONNECTION DIAGRAM

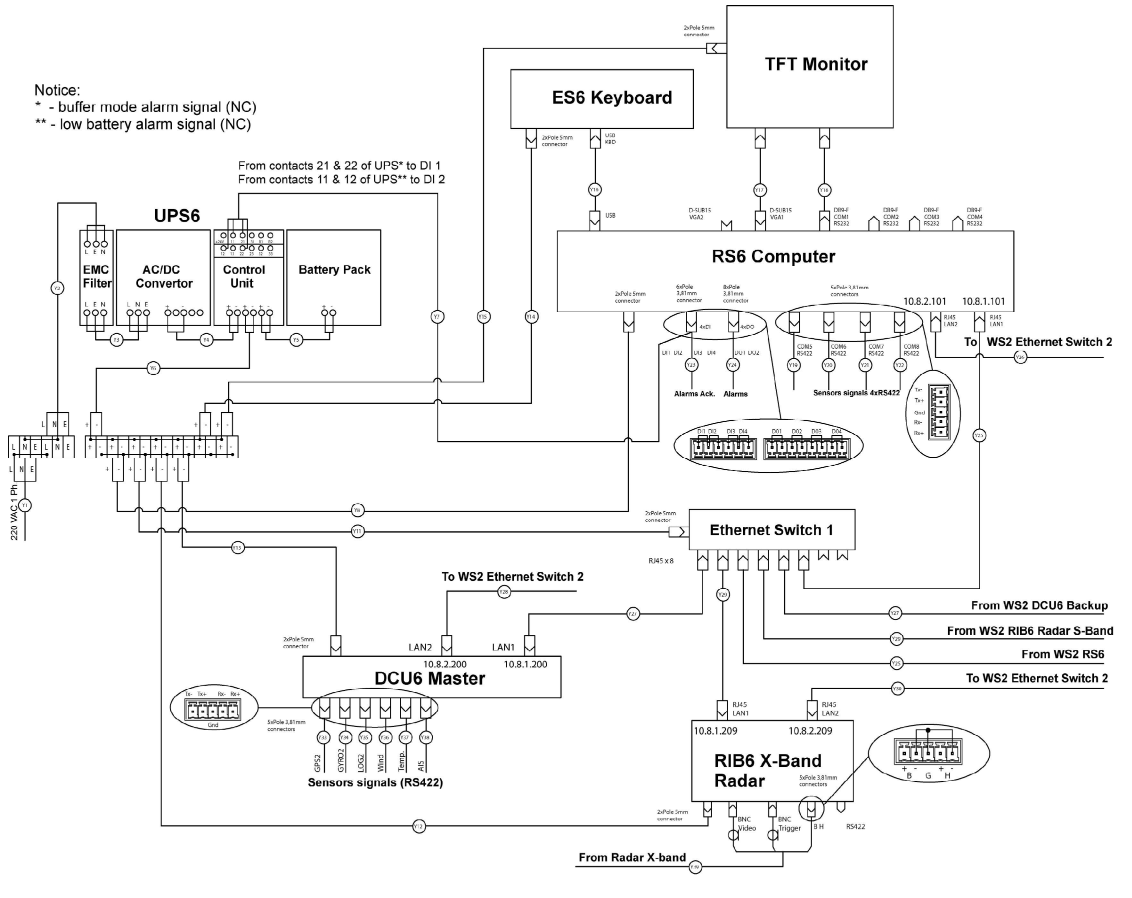


NS 4000/4100 ECDIS MFD (WS1 AND WS2). OPTIONAL CONFIGURATION. BLOCK DIAGRAM

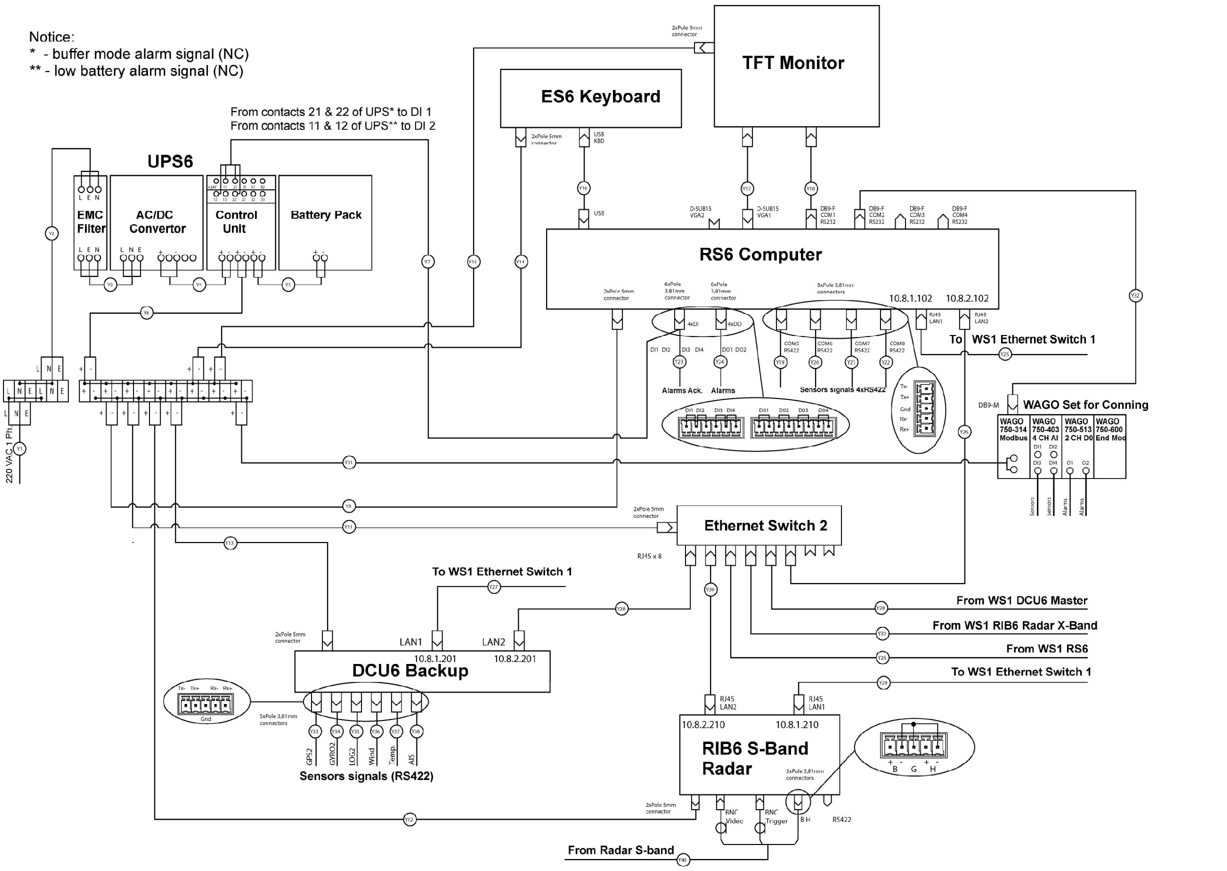


Notice:
* - buffer mode alarm signal (NC)
** - low battery alarm signal (NC)

NS 4000/4100 ECDIS MFD WS1. OPTIONAL CONFIGURATION. CONNECTION DIAGRAM



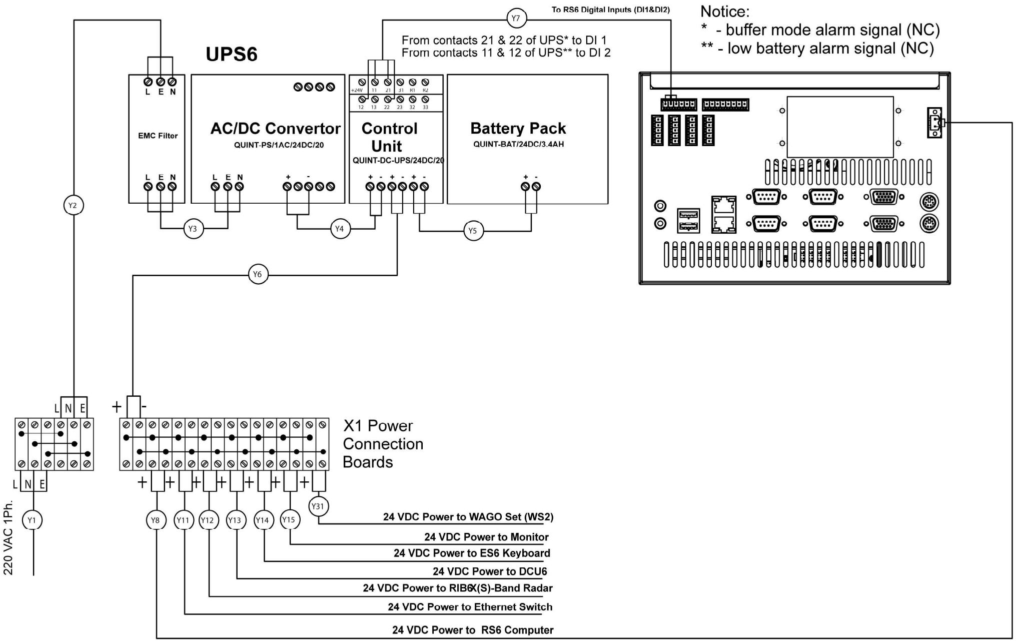
NS 4000/4100 ECDIS MFD WS2. OPTIONAL CONFIGURATION. CONNECTION DIAGRAM



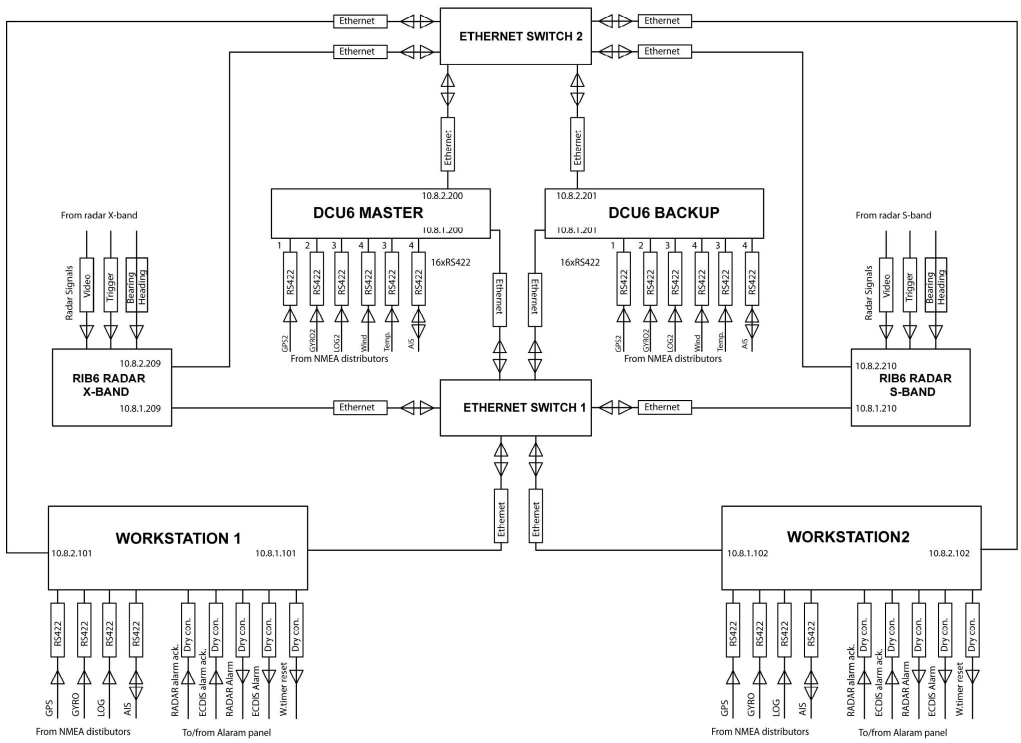
CABLES LIST

CABLES N	TYPE CABLE REQUIREMENT	QUANTITY	SUPPLIER	NOTES
Y1	3x1.5	2	YARD	220VAC POWER-X1 BOARD
Y2	3x1.5	2	YARD	220VAC POWER X1-EMC FILTER
Y3	3x1.5	2	YARD	220VAC POWER FILTER-UPS
Y4	2x2.5	2	YARD	24VDC-CONTROL UNIT (CU)INPUT
Y5	2x2.5	2	TSC	CU-BATTERY (PART OF UPS)
Y6	2x2.5	2	YARD	24VDC UPS-TERMINAL X1
Y7	4x0.75	2	YARD	CU UPS-RS6 DIGITAL INPUTS
Y8	2x1.5	2	YARD	24VDC POWER-RS6 COMPUTER
Y11	2x1.5	2	YARD	24VDC POWER-ETHERNET SWITCH
Y12	2x1.5	2	YARD	24VDC POWER-RIB6
Y13	2x1.5	2	YARD	24VDC POWER-DCU6
Y14	2x1.5	2	YARD	24VDC POWER-ES6 KBD
Y15	2x1.5	2	YARD	24VDC POWER-MONITOR
Y16	USB KBD CABLE	2	TSC	ES6 KBD USB-RS6 USB
Y17	VGA CABLE	2	TSC	RS6 VGA1-MONITOR
Y18	RS232 SERIAL CABLE	2	TSC	RS6(COM1)-DISPLAY DB9M-F
Y19-21	2x0.75	6	YARD	SENSORS-RS6 RS422 PORTS
Y22	4x0.75	2	YARD	SENSOR AIS-RS6 RS422 PORT
Y23-24	4x0.75	4	YARD	RS6 DI/DO-ALARM PANEL
Y25	FTP CAT 5	2	TSC	RS6 LAN1-E.SWITCH 1 RJ45
Y26	FTP CAT 5	2	TSC	RS6 LAN2-E.SWITCH 2 RJ45
Y27	FTP CAT 5	2	TSC	DCU6 LAN1-E.SWITCH 1 RJ45
Y28	FTP CAT 5	2	TSC	DCU6 LAN2-E.SWITCH 2 RJ45
Y29	FTP CAT 5	2	TSC	RIB6 LAN1-E.SWITCH 1 RJ45
Y30	FTP CAT 5	2	TSC	RIB6 LAN2-E.SWITCH 2 RJ45
Y31	2x1.5	1	YARD	24VDC POWER-WAGO SET
Y32	RS232 SERIAL CABLE	1	TSC	WAGO-RS6 (COM2) DB9M-F
Y33-37	2x0.75	10	YARD	SENSORS-DCUS6 RS422 PORTS
Y38	4x0.75	2	YARD	SENSOR AIS-DCU6 RS422 PORT
Y39	MULTICORE CABLE	1	YARD	RIB6-RADAR X-BAND
Y40	MULTICORE CABLE	1	YARD	RIB6-RADAR S-BAND

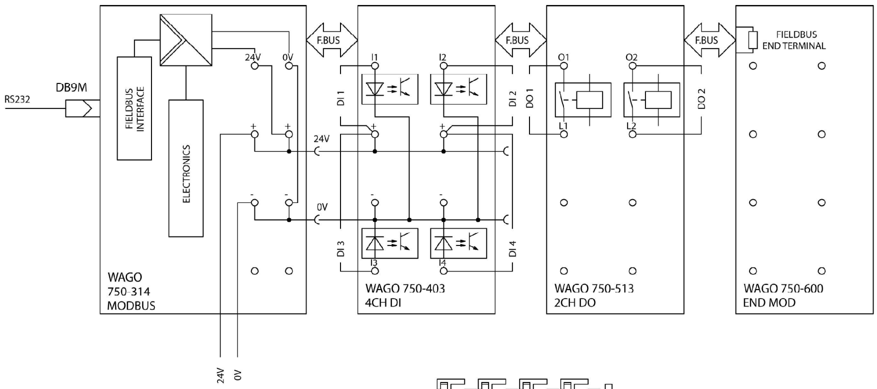
NS 4000/4100 ECDIS MFD WS. OPTIONAL CONFIGURATION. POWER SUPPLY DISTRIBUTION. CONNECTION DIAGRAM

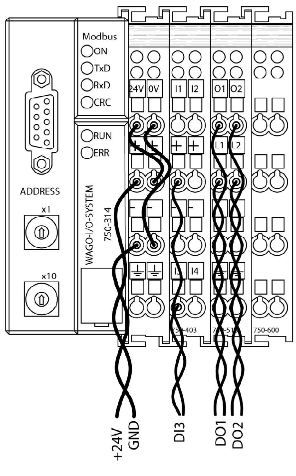


NS 4000/4100 ECDIS MFD (WS1 AND WS2). OPTIONAL CONFIGURATION. DATA FLOW DIAGRAM



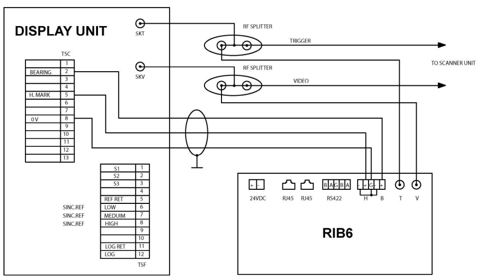
WAGO SET FOR CONNING. FUNCTIONAL DIAGRAM



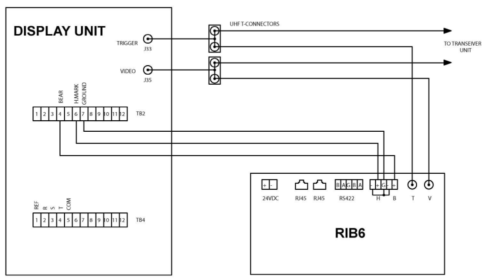


CONNECTION OF RIB6 TO SOME RADAR TYPES. CONNECTION DIAGRAMS

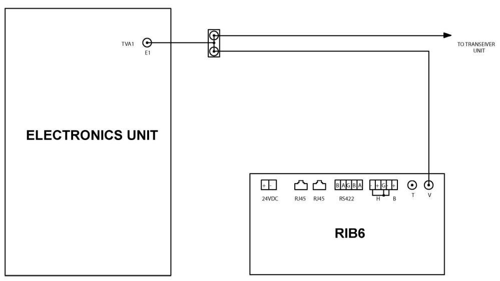
RACAL-DECCA BRIDGEMASTER SERIES



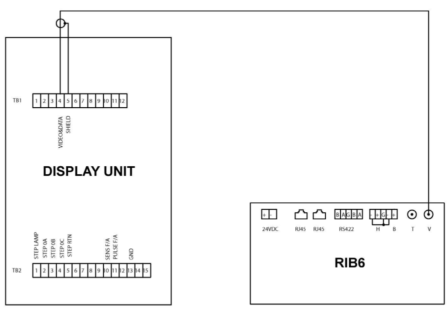
ATLAS 8600



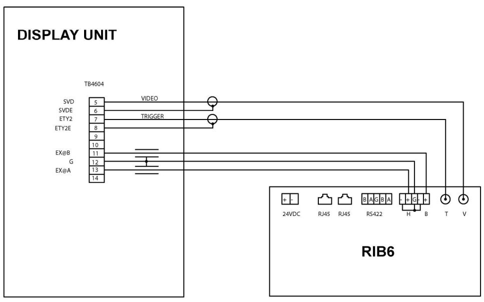
ATLAS 9600



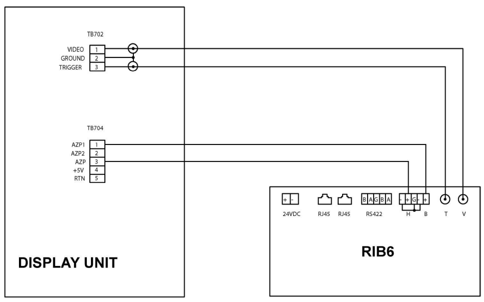
RAYTHEON PATHFINDER



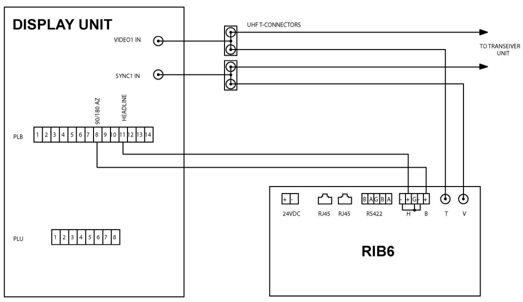
JRC JMA 9000 SERIES



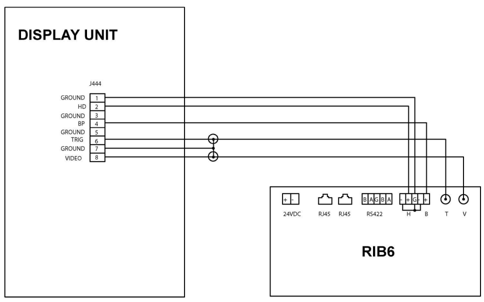
SPERRY RASCAR



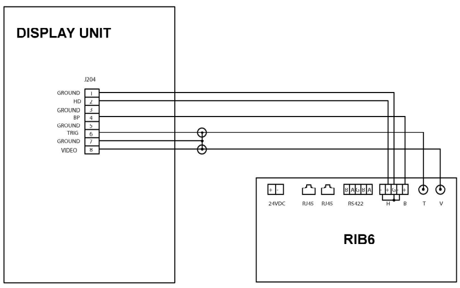
NUCLEUS 6000



FURUNO FR 21XX, FR 28XX SERIES



FURUNO FR 15XX SERIES



BRIDGE MASTER E SERIES