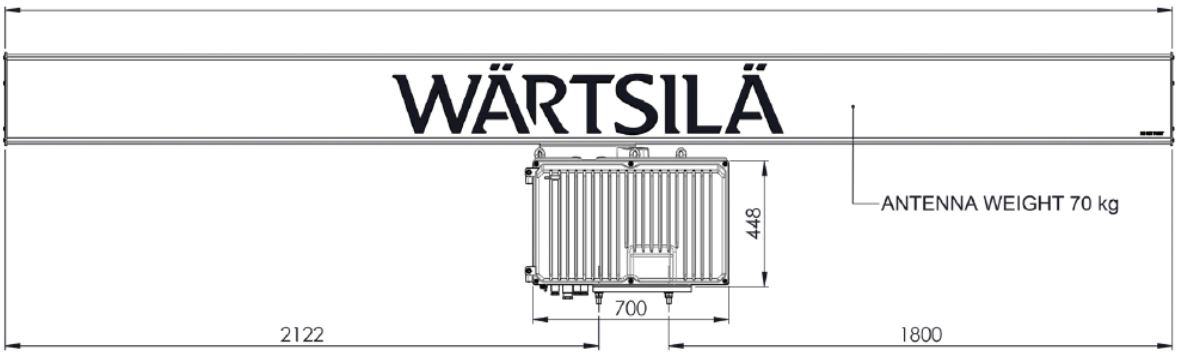
Wärtsilä NACOS Platinum Solid State S-Band Radar

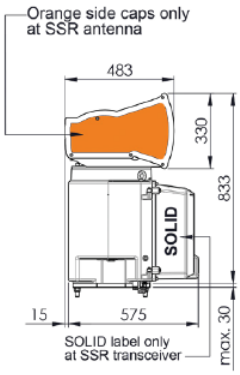
PRODUCT LEAFLET

The new NACOS Platinum Solid State S-Band Radar is a next generation marine radar system using a stabilized high power solid state transceiver. It utilizes advanced signal processing technology and comes with a 14 ft antenna.

Benefits

The major advantages for customers are the added safety provided through optimized target detection under all environmental conditions, reliability thanks to the compactly designed transceiver, gearbox and antenna, and reduced lifecycle costs as a result of drastically reduced maintenance (no magnetron).





Performance Data S-Band Scanner

S-Band Scanner	14 foot
Antenna Type	slotted antenna
Horizontal beam-width	1.9°
Vertical beam-width	20°<X<25°
Side-lobe attenuation within ±10°	>25 dB
Side-lobe attenuation outside ±10°	>33 dB
Polarization	horizontal
Antenna gain	26.5 dBi
Frequency band	2,9...3,1 GHz
Max. permissible peak transmission power	80 kW
Diameter of swing circle	4300 mm
Height	330 mm
Width	4187 mm
Depth	485 mm
Weight	70 kg

Performance Data Transceiver

S-Band:	
Peak power	200 W
Frequency:	eight channels with 20 MHz spacing in the rage of 2900...3100 MHz

Weight

Weight of equipment	
Transceiver	10 Kg
Gearbox	118 Kg
Scanner	70 Kg

Transceiver Pulse Forming

Overview

The Solid State Transmitter is a radical departure from convention due to its low power RF architecture. Traditional navigation radars use short high power (typically 25-30 kW) pulses of microwave energy to detect objects on the sea surface. Solid State Transmitters have a nominal peak output power into the antenna of just 250 W, operating with duty ratios of up to 13%.

Operating Frequency

When using the new Solid State transceiver transmission will be on one of 8 operator selectable frequencies in the 3 GHz RADAR range. The ability to operate at different frequencies within the S-band ensures that the system has the flexibility to work alongside existing / additional S-band radar systems with reduced risk of interference. Frequency selection is made available for dynamic selection during operation.

Pulse Pattern

The transceiver outputs a frame of transmission pulses in a defined sequence to satisfy the requirements of short, medium and long range detection.

An adaptive pulse pattern is used up to 24 NM. It comprises a short pulse, a medium pulse and a long pulse, which are applied adaptively in order to track targets outside of the currently selected Master MFD range. The pulses use two different alternating frequencies. One is about 20 MHz above the carrier frequency and is used for short and long pulse. The one below is used for the medium pulse. The length of pulses increases with the range.

Above 24 NM a fixed pattern is used with one medium pulse followed by one long pulse This combination of pulse length and coding results in each transmission within a frame being unique in both length and coding, thereby enabling pulse compression.

Digital Signal Processing

Digitization of radar data is carried out within the radar transceiver. Doppler and CFAR processing is then applied and the signal is output from the transceiver to the Ethernet network which connects all RADAR workstations (MFDs). The key stages of the processing are described in the following sections.

Digital Pulse Compression

A digital pulse compressor restores the medium and long chirps to an equivalent range resolution of 15 meters, equivalent to a 0.1 µsec transmit pulse.

The pulse compression algorithm achieves a time/range side lobe reduction of better than 65dB through the use of innovative algorithms to define the transmission waveforms and associated weighting functions applied to received signals.

Further processing is also applied post pulse compression, to provide additional suppression of unwanted time/range side lobe effects that result from large object reflections.

Doppler Processing

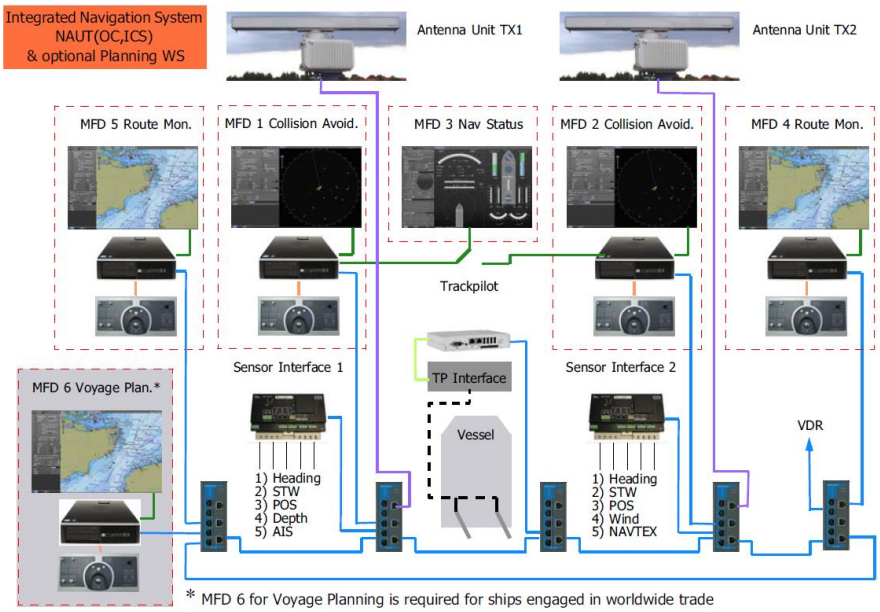
The Solid State Transceiver is different from conventional magnetron radars in its use of Doppler processing to determine the radial component of the relative radar target velocity.

This technique is typically known as moving target detection. Echoes received from a train of pulses are processed in a bank of coherently integrated narrow-band filters and resolved into specific velocity bands. Using this filtering technique, the Solid State Transceiver is able to separate targets from clutter through the differing radial velocity components. This additional dimension provides a significant advantage over existing radar systems in the detection of small targets in sea clutter or rain.

DISPLAY MULTIPILOT
NACOS Platinium Series

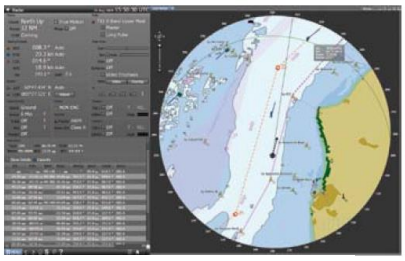
Huge Range of Functionalities

MULTIPILOT Platinum includes the following functionalities : Radar, Chartradar, ECDIS with radar overlay, and Coning.
The navigation via the menu bar or from the Super Home screen allows an easy access to the different above mentioned applications.
It is the universal solution providing all information for the reliable, safe and easy operation of a vessel.



Example of Integrated Navigation System NAUT

Super home



Chartradar mode

ECDIS mode with radar overlay

Additionnal naval software functions

Sector Transmission

The operator can define up to 3 sectors in which transmission is to take place while radar silence is to be maintained in all other bearings. The Sector Transmission is in addition to the fixed blanking sectors which are a standard feature of the MULTIPILOT Platinum which will have priority to the case by case generated transmission sectors.

Target Assigment with STANAG 4420 Symbols 1

14 symbols according to STANAG 4420 can be assigned to ARPA/AIS targets for unique identification of unknown, neutral, friendly or hostile contacts and to define sub-surface, surface and air targets.

Also additional user symbols for mines are available with assignment of identification, type and status.

Synthetic Targets 2

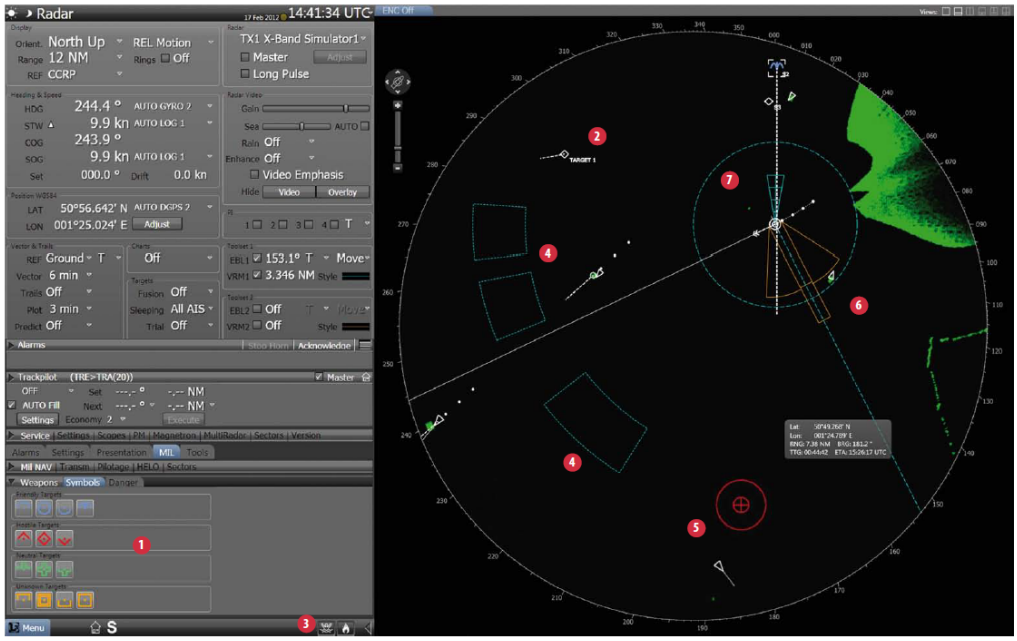
This feature allows pursuit of targets and to create targets for training purposes. The targets can be defined by bearing/range, by position and manually on the PPI, together with course and speed values.

Man over Board 3

An always visible button on the menu bar allows to mark immediately a fix position on the radar PPI and on ECDIS in case of man over board. The MoB position can also be corrected by position and time data with values for current and wind.

Dynamic Blanking Sector

The dynamic blanking zone is the sector within each revolution of the sensor rotor where the laser is switched off. This is used by the DP operator to mask out unwanted reflections when needed.



Relative Velocity Calculation

Relative Velocity Calculation enables the radar operator to plan and implement an interception of a tracked target. The intercept course and time based on a default speed is displayed for any cursor position on the PPI as long as this feature is activated.

Meeting Point

Meeting Point extends the functionality Relative Velocity Calculation by providing the opportunity to calculate with an offset position to the target. This is particularly useful in maritime interdiction operations.

Blind Piloting

This feature provides the ability for passage preparation and Blind Piloting in narrow fairways. It provides additional index lines similar to the already in the radar implemented parallel index lines. Up to 16 index lines are available with user defined length.

RIB Tracking

This feature will display the RIB/RHIB as a radar target based on the data which are received from the RIB transponder base station (which is not in scope of supply of MULTIPILOT-N.

Sector Zones 4

Sector Zones define the positions of vessels which are sailing in a fixed formation and to monitor own ship's position but also to monitor the station keeping of the vessels in the formation.

The shape of a Sector Zone is a segment of a circle similar to a radar guard zone. The sectors can be linked to own ship but also to any other target.

Torpedo Zones 5

The Torpedo Zone indicates the launch of a torpedo. An expanding circle with the theoretical (assumed) speed of the torpedo is displayed after activation with the hostile vessel in its center.

The Torpedo Zone disappears automatically when the maximum run time of the launched torpedo is passed The Weapon Arc is used for gunnery practice with live ammunition. It defines a danger zone where the impact of projectiles is wanted respective probable ricochets are possible.

Weapon Arcs 6

The Weapon Arc is used for gunnery practice with live ammunition. It defines a danger zone where the impact of projectiles is wanted respective probable ricochets are possible.

Helicopter Landing Path 7

The Helicopter Landing Path provides the ability to set up an approach sector on the screen. It allows the radar operator to monitor the helicopter's approach and to offer guidance.

The Helicopter Landing Path is rotable from relative 90 to 270 degrees. The triangle is fixed to a length of 2 nm with a beam width of 10 degrees. It is divided in 4 ranges of 0,5 nm each.

DISPLAY MULTIPILOT
NACOS Platinium Series

Functional Package - Multipilot Platinum-N

- Combined IP Radar/ECDIS
- High resolution wide screen displays
- Multiple view mode
- Built –in radar interswitch
- Overlay and tracking ARPA and AIS targets (actually 100/500)
- Automatic clutter suppresion
- Enhanced small target detection
- Chart data bases
  - ENC S 57/S63
  - C-Map CM93-3;
  - Admirality AVCS/ARCS
- Chart maintenance based on real time update and dynamic licensing
- Extented Man over Board functions
- Separate ECDIS layer for user (Mariner Notes)
- Type approved as Minimum Keyboard Display for the Wärtsilä SAM Electronics R5 Supreme AIS
- Integrated VDR display and operation of the Wärtsilä SAM Electronics VDR 4360
- Easy to operate by trackball or functional radar keyboard
- On screen NAVTEX updates
- Integrated conning page

Software Options

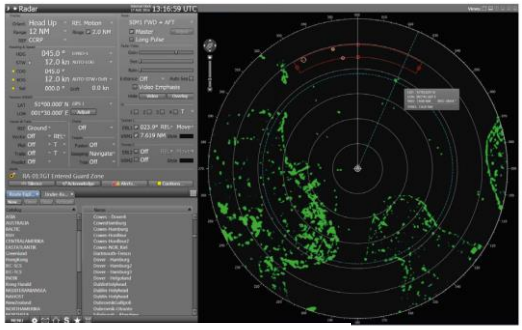
- Up to 12 additional naval software functions

Hardware Options

- High speed turning antenna for helicopter tracking
- Interface for external remote control of SAM Electronics navigation radar
- Blanking trigger output for ECM/ECCM
- Transponder connection (e.g. RIB, RBB)
- IP based radar video output
- Type approved radar picture merging with inpuls from up to 4 radar antennas

Other Option

- **Interface with searching lights (target tracking and remote control)**



Radar display mode

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