



VTSW System Requirements Tender Specification (VSE)

Description of

Supply of radar systems for Waddenzee and Wijk bij Duurstede Lot A

Case number: 31180393

This document has been translated to English to make it easier for non-Dutch entities to determine whether or not they want to participate in this tender. In case of contradictions between the Dutch and English variants of this document, the Dutch variant will prevail.



Colophon

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Contents

1 INTRODUCTION 4

- 1.1 Identification 4
- 1.2 Purpose of this document 4
- 1.3 Reader's guide 4
- 1.4 Verification methods 5
- 1.5 Definitions 5
- 1.6 Abbreviations used 5
- 1.7 Referenced documents 5

2 BACKGROUND 7

- 2.1 General 7
- 2.2 Installation of radar systems 7
 - 2.2.1** *Wadden Islands* 7
- 2.3 Overview of the system chain 9

3 SYSTEM REQUIREMENTS 10

- 3.1 Components 10
- 3.2 Quality of radar data 10
- 3.3 Technical parameters 11
 - 3.3.1** *Radar technology* 11
 - 3.3.2** *Format* 12
 - 3.3.3** *Safety* 13
- 3.4 Security 13
- 3.5 Availability 14
- 3.6 Data interface 14
- 3.7 Installation and maintenance 15
 - 3.7.1** *Installation and maintenance* 15
- 3.8 Management 16



1 Introduction

1.1 Identification

The System Requirements Tender Specification [**Vraagspecificatie Systemeisen; VSE**] is part of the tender documents of the European tender "Supply of radar systems for Waddenzee and Wijk bij Duurstede", with case number 31180393. The total set of tender documents forming part of this European tender is set out in the Descriptive Document [**Beschrijvend document; BD**].

This document concerns the [**VSE**] for lot A 'Waddenzee'.

1.2 Purpose of this document

The purpose of this [**VSE**] document is to list all qualitative requirements that the systems and products to be supplied must satisfy.

1.3 Reader's guide

Requirements are identifiable because they are included in boxes and have unique numbers [**xxx-yyy**] and titles, both displayed in **bold text**, where the requirement is described in more detail in the following manner:

[Eis] defines the requirement in more detail, in which the included sub-requirements are numbered to allow unique references, where:

- If reference is made to a [Requirement], this means that this must be satisfied *unconditionally* and *without reservation*. If this is not satisfied, the offer will be disregarded.
- If reference is made to a [Wish], that means that it is not required to be satisfied. Satisfying the [Wish] may result in a higher rating.

[Explanation]: (optional) provides an additional explanation of the requirement so it can be interpreted properly. They can also be references to indicate traceability, for example. Enumerations in the explanations are usually not numbered.

[Verification]: for each requirement [Requirement], it describes how verification takes place. The notation in bold text at [Verification] shows the verification method. The verification method may be supplemented by further details in non-bold text. Verification methods are described in section 1.4.

In all other respects:

- All other texts serve to introduce, explain or provide background information and context;
- The **definitions and abbreviations** should be read first so as to properly interpretate the requirements and texts. These are included in the [**VSP**];
- If a reference is made to the [**VSP**], such a reference should be interpreted as a reference to the [**VSP**] and all underlying documents listed in the tables as referenced documents;
- References in a specific [**xxx**] document should be interpreted as a reference to that document and all referenced documents indicated in this document and (in the relevant tables).



1.4 Verification methods

The verification methods indicated for the requirements have the meanings given below.

Method	Description
Analysis	The use of documentation data, test data, simulations, and/or calculations, or simulations under predefined conditions, to demonstrate that one or more requirements are satisfied under prescribed/defined conditions.
Certification	If present: the submission of the certificate, or if not present: verification by an independent expert on the subject from a party authorised in this regard.
Demonstration	A qualitative representation of the functional performance of one or more requirements for the system or a component of the system through use of the system.
Document check	Assessment of the content of documents such as system descriptions, design documents, test and measurement reports, drawings, diagrams etc. in terms of completeness, consistency, correctness and in accordance with the requirements specified. These may be standard documents.
Inspection	Visual inspection of the delivery for completeness and absence of (external/internal) damage.
Test	Methodical approach, through the performance of test procedures, to demonstrate that the system satisfies the requirements specified.

1.5 Definitions

Please see the **[VSP]** for the glossary.

1.6 Abbreviations used

Please see the **[VSP]** for the list of abbreviations.

1.7 Referenced documents

Normative documents are documents that contain requirements for functionality, technology, process control and services to be supplied. These documents form an integral part of the contract. The following documents are normative:

Identifier	Name
[BD]	The Descriptive Document (<i>Beschrijvend Document</i>) "Supply of radar systems for Waddenzee and Wijk bij Duurstede", case number 31180393, dated 23/10/2023, version number 1.0



Identifier	Name
[BIO]	Government Information Security Baseline (<i>Baseline Informatiebeveiliging Overheid</i>), 2020 version 1.04 https://bio-overheid.nl/media/13kduqsi/bio-versie-104zv_def.pdf
[CAT010]	EUROCONTROL Specification for Surveillance Data Exchange Part 7: Category 010 Transmission of Monosensor Surface Movement Data, SUR.ET1.ST05.2000-STD-07-01, edition number 1.1, edition data March 2007.
[CAT034]	EUROCONTROL Specification for Surveillance Data Exchange ASTERIX Part 2b Category 34 Mono Radar Service Messages, Edition: 1.29, Edition date: 15 March 2021, Reference no.: EUROCONTROL-SPEC-0149-2b
[CAT048]	EUROCONTROL Specification for Surveillance Data Exchange ASTERIX Part 4 Category 048 Monoradar Target Reports, Edition: 1.31, Edition date: 03/10/2022, Reference no.: EUROCONTROL-SPEC-0149-4
[CAT240]	EUROCONTROL Specification for Surveillance Data Exchange ASTERIX Category 240 Radar Video Transmission. Document identifier: EUROCONTROL-spec-0149-240, edition number 1.3, edition data 13/05/2015.
[IALA1111]	IALA Guideline 1111, Preparation of Operational and Technical Performance Requirements for VTS systems, edition 1.1, January 2022.
[IRSIDD]	Interface Requirements Specification / Interface Design Description Nautical Radar (Radar Distribution Layer RDL), Nautical Radar ASTERIX CAT 240, date 01/06/2023, version number 1.6
[NEN1991]	NEN-EN 1991-1-4+A1+C2:2011/NB:2019+C2:2023 nl: National Appendix to NEN-EN 1991-1-4+A1+C2: Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions
[VSE]	The System Requirements Tender Specification (<i>Vraagspecificatie Systeem Eisen</i>) "Supply of radar systems for Waddenzee and Wijk bij Duurstede – plot A" case number 31180393, dated 23/10/2023, version number 1.0 (this document).
[VSP]	The Process Requirements Tender Specification (<i>Vraagspecificatie Proceseisen</i>) "Supply of radar systems for Waddenzee and Wijk bij Duurstede", case number 31180393, dated 23/10/2023, version number 1.0

2 Background

2.1 General

The Client aims to replace end-of-life radar systems in two regions. Four radar systems on lighthouses on the Wadden Islands Texel, Terschelling, Ameland and Schiermonnikoog must be replaced. Along and near the Amsterdam-Rhine Canal between Maarssen and Tiel, fourteen radar systems are to be replaced. These are radar systems used by the traffic control centre in Wijk bij Duurstede (Lekdijk Oost 11, Wijk bij Duurstede). In addition to the replacement of radar systems also some spare radar systems and spare components are taken in stock.

This [VSE] describes the specifications for the radar systems on the Wadden Islands: lot A.

2.2 Installation of radar systems

2.2.1 Wadden Islands

The radar systems are to be placed on the lighthouses of the Wadden Islands of Texel, Terschelling, Ameland and Schiermonnikoog. The map below, figure 1, shows the locations of the four lighthouses.



Figure 1 - Locations of the lighthouses on the Wadden Islands

The four radar systems to be installed on the Wadden Islands will each be installed on a unique lighthouse. Each lighthouse has a different structure. Two of the four lighthouses (Texel and Ameland) currently have turning units installed, which are integrated with the antenna and these two lighthouses do not offer the possibility of installing a separated turning unit. A refurbishment of these lighthouses is being considered so that a separated turning unit can be installed on each lighthouse. Depending on whether that refurbishment will take place, and its progress, RWS (Rijkswaterstaat) will only indicate at some point after award whether an integrated or a separated turning unit must be supplied for those lighthouses. For the other two lighthouses (Schiermonnikoog and Terschelling), there is



limited space for turning units in the dome (Schiermonnikoog and Terschelling). The figures below show the current turning units and space available in these lighthouses.

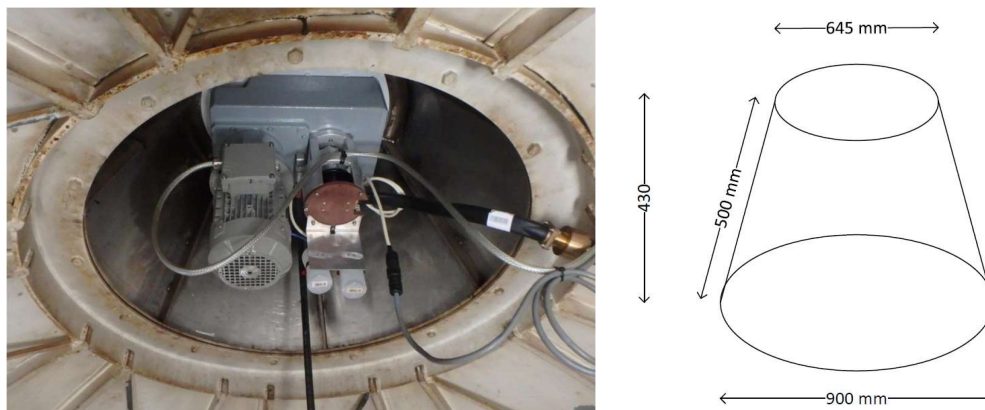


Figure 2 - Current turning unit and figure showing space available in the lighthouse in Terschelling

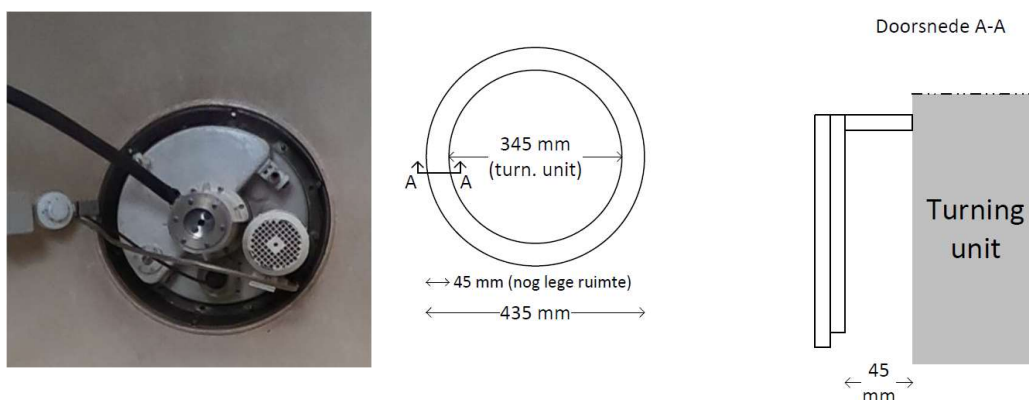


Figure 3 - Current turning unit and figure showing space available in the lighthouse in Schiermonnikoog

The height at which the radar system is to be installed also varies from lighthouse to lighthouse. The table below shows the heights measured from the bases of the lighthouses.

Lighthouse	Height of tower plus lamp body
Texel	33.5 m
Ameland	55.3 m
Terschelling	51.1 m
Schiermonnikoog	36.1 m



The lighthouses are all located in the Waddenzee region. This area falls within Wind Area I according to [NEN1991]. This is the wind area with the heaviest winds in the Netherlands.

2.3 Overview of the system chain

The radar systems are to be connected to Rijkswaterstaat's VTS system. The radar systems are also to be connected to the Radar Distribution Layer (RDL). This distribution layer handles the distribution of radar data to external parties. Monitoring tools communicate with the radar system through SNMP (Simple Network Management Protocol). The figure below shows the category A radar system with the interface with other systems. The "Radar Management tools" refer to tools provided by the Contractor within the scope of this offer.

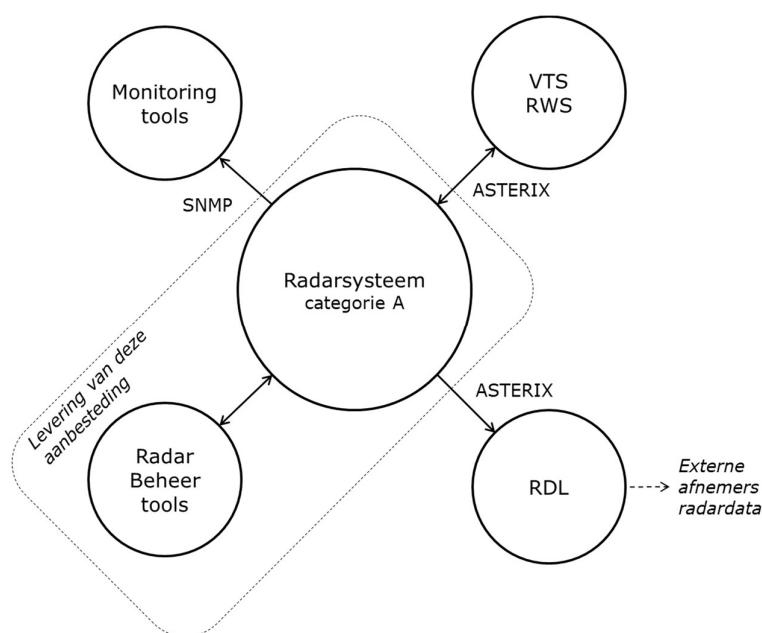


Figure 4 - System context – category A

In addition to the data interfaces described above, radar systems have:

- Electrical interfaces: power supplies, motor control;
- Mechanical/mounting interfaces: mounting in and on building and/or pedestal.



3 System requirements

3.1 Components

VSE-001	Components of the radar system
Requirement	The Contractor must supply a complete radar system. This consists of at least the following components: 1. radar antenna; 2. transceiver; 3. radar signal processing software and interface software; 4. motor; 5. motor control unit; 6. transmission; 7. connection box; 8. waveguide; 9. power supply unit; 10. signal cabling and connectors; 11. power cabling and connectors.
Explanation	-
Verification	Inspection

3.2 Quality of radar data

VSE-100	IALA Advanced category
Requirement	The radar system must satisfy the IALA Advanced category specifications.
Explanation	IALA Guideline 1111 ([IALA1111]) names several specifications that apply to a radar system in the Advanced category. The radar system must satisfy all these specifications.
Verification	Document check, Analysis Demonstration in OSD

VSE-109	Filtering in SPS
Requirement	The signal processing software (SPS) must at least have filtering for: 1. Noise suppression; 2. Interference suppression; 3. Wave clutter suppression; 4. Rain clutter suppression. In addition: 5. Filtering must be adjustable; 6. Filtering must automatically adapt to conditions.
Explanation	Interference suppression refers to interference from other radar systems. Automatic adjustment of filtering can apply to rain clutter suppression, for example. The degree of filtering then depends on the amount of rainfall. It is preferred that filtering setting can be stored in profiles.



Verification	Document check Demonstration in OSD
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VSE-110	Plots and tracks
Requirement	The radar system must be able to calculate plots and tracks from raw data.
Explanation	RWS firstly wants plots and tracks to be calculated in the VTS, based on ASTERIX CAT240 data provided by the radar system. RWS wants to keep the option of having plots and tracks calculated by the radar system open. Requirement VSE-503 "ASTERIX - CAT010, CAT034 and CAT048" describes sending plots and tracks from the VTS to RWS.
Verification	Demonstration

3.3 Technical parameters

3.3.1 Radar technology

VSE-200	Solid State Radar technology
Requirement	The radar system should be based on Solid State Radar technology.
Explanation	A hybrid solution, in which another technology is used alongside Solid State Radar technology, is permitted.
Verification	Document check

VSE-201	Designated frequency space
Requirement	The radar system must limit the transmission of radio waves to the frequency space designated to RWS of 9.3 GHz to 9.5 GHz.
Explanation	<u>All</u> frequencies used to transmit radio waves must fall within the designated frequency range of 9.3 GHz to 9.5 GHz. This is the frequency space designated to RWS for VTS. Please note that the radar system must be able to offer all required functionalities within the designated frequencies. If the radar system can also transmit outside the frequency space listed here, and it is possible to limit use to the designated frequency space, then all the requirements in this VSE apply to the situation where the radar system transmits exclusively within the designated frequency space. The designated frequency range will probably be extended to a range of 9.2 GHz to 9.5 GHz. At the time of publishing this has however not been formally decided. The notice of information for this tender will state whether the designated frequency range has been formally changed at that time and, if so, to what range.
Verification	Document check



3.3.2 Format

VSE-203	Maximum mass and dimensions
Requirement	The structure of the radar system must exclusively meet the following specifications: 1. The maximum mass must be 550 kilograms; 2. The area exposed to wind must be 6.58 m² at the most; 3. The length of the antenna must be 21 feet at the most; 4. The turning units for the lighthouses on Terschelling and Schiermonnikoog must fit within the dome.
Explanation	The maximum mass is limited to that part that burdens the dome. The turning unit and antenna burden the dome. The area exposed to wind is limited to that part of the radar system installed on top of the lighthouse and is thus exposed to wind. Section 2.2.1 shows the space available for the turning units for the lighthouses on Terschelling and Schiermonnikoog.
Verification	Document check

VSE-204	Climatic conditions of the coast
Requirement	The part of the radar system placed outdoors must be able to withstand the climatic conditions for <i>Cold and Basic Environment</i> in <i>Table 7 International standards and specification levels for outdoor equipment</i> of [IALA1111] .
Explanation	The <i>Subject Wind</i> from <i>Table 7</i> is elaborated in VSE-205.
Verification	Document check

VSE-205	Peak wind load
Requirement	The radar system must be able to withstand hurricanes (12 Bft) with extreme wind gusts that can be expected based on the height and location of the radar system, as specified in [NEN1991] .
Explanation	It is not required that the antenna beam rotates during this peak load. [NEN1991] classifies the Waddenzee region as Wind Area I.
Verification	Document check

VSE-206	Power
Requirement	The radar system should have sufficient power for the turning units in view of the wind force on the Wadden Islands combined with the size of the antenna.
Explanation	See section 2.2.1 for details regarding the lighthouses (height and location) and region (wind area classification).
Verification	Document check



3.3.3 Safety

VSE-210	Fire-proof materials
Requirement	The radar system must be constructed with fire-proof materials.
Explanation	-
Verification	Document check

VSE-211	No radioactive substances / materials / components
Requirement	The radar system may not contain any radioactive substances, materials or components.
Explanation	-
Verification	Document check

3.4 Security

VSE-300	Management functionality authentication
Requirement	Access to the management functionality must be secured by means of authentication.
Explanation	-
Verification	Document check Demonstration in OSD

VSE-301	Passwords
Wish	The authentication listed under VSE-300 must satisfy the following requirements: 1. Strong passwords are mandatory, in accordance with the definition in [BIO]; 2. Passwords may not be reusable; 3. Default passwords must be changed on first use.
Explanation	Please note that this is a <u>wish</u> .
Verification	Document check

VSE-303	Blocking network services and ports
Requirement	The radar system must limit communications to necessary network services and ports: 1. Non-necessary data network services must be able to be switched off; 2. It must be possible to block unused ports.
Explanation	'Ports' refers to any physical interface with the radar system. This includes for example USB-ports.
Verification	Document check



VSE-304	Logging
Requirement	The radar system must keep activities in a log.
Explanation	Logged activities concern security. This concerns, for example: • Signing in (time, username) • Changing parameters
Verification	Document check Demonstration in OSD

VSE-305	Access to log
Requirement	The log must only be accessible through the management interface.
Explanation	The log referred to here is the log from requirement VSE-304.
Verification	Document check Demonstration in OSD

3.5 Availability

VSE-400	Mean Time Between Failure
Requirement	The radar system must have a minimum Mean Time Between Failure (MTBF) of at least 1 year (365 days).
Explanation	The radar system may malfunction less than once a year on average, ensuring high availability, while simultaneously reducing corrective maintenance.
Verification	Document check

3.6 Data interface

VSE-500	Multiple LAN ports
Requirement	The radar system must provide at least two independent data interfaces suitable for data communication in separate VPN environments. The radar system must have at least two RJ-45 LAN ports for this purpose.
Explanation	For security reasons, RWS wants radar data communication and communication for management purposes to take place in separate environments.
Verification	Test

VSE-501	Multiple receivers of radar data
Requirement	The radar system must be able to send radar data to multiple receivers through the same LAN port through a logical separation of data traffic from that LAN port.
Explanation	RWS wants to be able to send radar data to multiple receivers.



Verification	Test OG will verify whether data can be sent to two clients from one LAN port.
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VSE-502	ASTERIX - CAT240
Requirement	The radar system must exchange data in accordance with ASTERIX protocol CAT240.
Explanation	The Interface Requirements Specification / Interface Design Documentation [IRSIDD] describes how RWS uses ASTERIX to exchange radar video data. It is preferred that the radar system conforms to [IRSIDD] .
Verification	Test

VSE-503	ASTERIX - CAT010, CAT034 and CAT048
Requirement	The radar system must exchange data in accordance with the ASTERIX protocols: 1. CAT034 as specified in [CAT034] 2. CAT010 and/or CAT048 as specified in [CAT010] and [CAT048] , respectively
Explanation	There is currently no specific implementation for CAT010, CAT034 and CAT048 by RWS. Requirement VSE-110 "Plots and tracks" describes the creation of the plots and tracks sent to RWS's VTS using CAT010 and/or CAT048.
Verification	Document check

3.7 Installation and maintenance

3.7.1 Installation and maintenance

VSE-610	Cables
Requirement	The radar system must be supplied including cables from the antenna to the transceivers, and from the transceivers to the network the cabinet.
Explanation	Transceivers are currently installed up to 3-4 floors below the actuator. Cables run mainly along the inside of the lighthouse.
Verification	Inspection The Contractor must check whether the supply is complete before transport to a location of RWS and provide a checklist in this respect. This checklist must take into account the required cable length for the specific target location.

VSE-615	Locking rings and lifting rings
Requirement	The radar system must be supplied including the following mounting assemblies: 1. Locking rings for installing new actuators; 2. Lifting rings and/or lifting beams on the actuators.
Explanation	-



Verification	Inspection The Contractor must check whether the supply is complete before transport to a location of RWS and provide a checklist in this respect. This checklist must include the locking rings and lifting rings.
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VSE-611	Down-mast transceiver
Wish	The radar system must have a down-mast transceiver.
Explanation	A down-mast transceiver simplifies maintenance work. Please note that this is a <u>wish</u> .
Verification	Document check

VSE-613	Corrective maintenance: repair by replace
Requirement	It must be possible to repair a defective radar system by replacing the defective part with a spare part.
Explanation	Repair by replace contributes to higher availability by reducing the Mean Time To Repair. Examples of components are the antenna and the turning units.
Verification	Document check

VSE-614	Additional monitoring features
Wish	The radar system should have the following additional monitoring features: 1. Oil level sensor; 2. Electrical power meters.
Explanation	Please note that this is a <u>wish</u> .
Verification	Document check

3.8 Management

VSE-700	SNMP
Requirement	The radar system must support SNMP.
Explanation	SNMP traps automatically report the condition of the radar system through the RWS network. It is preferred that version 3 is supported.
Verification	Demonstration in OSD, Test in SAT

VSE-701	Monitoring – basic
Requirement	It must be possible to monitor the performance of the radar system remotely, either through a web browser or through applications provided by the Contractor. The data to be monitored in any event include: 1. Whether or not the antenna is rotating;



	2. Whether or not radar data is being sent; 3. Condition and error messages.
Explanation	-
Verification	Demonstration in OSD, Test in SAT

VSE-702	Monitoring – jamming and SART
Wish	It should be possible to monitor the performance of the radar system remotely, either through a web browser or through applications provided by the Contractor. The radar system should send data on: 1. jamming or suspicions of jamming; 2. SART signals.
Explanation	Please note that this is a <u>wish</u> .
Verification	Demonstration

VSE-703	Local and remote control
Requirement	It must be possible to set up and maintain the radar system both locally and remotely (remote control over the network). This in any event includes: 1. Starting and stopping the radar system; 2. Configure all necessary parameters; 3. Performing software updates.
Explanation	-
Verification	Demonstration in OSD