Maintenance Instructions

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The Manual for:	SA180
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SYSTEM MAINTENANCE PROCEDURE

1. Scope

This document defines the maintenance procedures and guidelines required to ensure optimal performance, reliability, and longevity of the **SA180 system** when deployed in harsh environmental conditions, or in marine and high-salinity environments.

2. Environmental Considerations

2.1 Maritime Environment

Operations in marine environments expose the system to:

• High salinity and salt spray exposure

• Elevated humidity and condensation

• Corrosion risk to metallic components

• Contamination of optical surfaces (salt residues, water droplets)

• Thermal cycling and condensation

2.2 land-based Environment

Operations in land-based harsh environments expose the system to:

• Airborne dust and sand (abrasive particles)

• High solar radiation (UV exposure and heating)

• Large temperature variations (day/night cycles)

• Soil and debris accumulation

The system is designed with **IP67** protection, nitrogen purging, and military grade hermetic connector ; however, periodic maintenance is mandatory.

3. General Maintenance Guidelines

• Perform inspections at regular intervals, depending on operating conditions.

• Always power down the system before performing maintenance.

• Avoid opening hermetically sealed units.

• Use only approved cleaning materials, anti-static, non-abrasive cleaning tools.

• Ensure all connectors, seals, and mechanical interfaces are properly secured after maintenance.

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4. Optical Components Maintenance

The system includes:

Sapphire window (Day sensor)

Germanium (Ge) window (LWIR sensor)

4.1 Maritime Environment

Procedure:

1. Rinse with freshwater (Non-saline water) to remove salt deposits.
2. Gently wipe using soft lint-free optical cloth.
3. Apply non-abrasive cleaning solution if required.
4. Dry using clean, dry air or microfiber cloth.

Warnings:

Do not use abrasive materials or paper wipes.

Avoid dry wiping without prior rinsing (prevents scratching due to salt crystals).

4.2 Land-based Environment

Procedure:

1. Use compressed air (dry, oil-free) to remove loose particles
2. Rinse gently with clean water if required
3. Clean using lint-free optical cloth
4. Apply non-abrasive cleaning solution if necessary

Warnings:

Never wipe dry dust directly (causes scratches)

Avoid excessive pressure on optical surfaces

Clean only when necessary to reduce wear

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5. Mechanical Structure and Housing

5.1 Protection Against Dust, Sand and Salt

• The system includes an aluminum chassis with stainless steel fasteners, but exposure to sand, salt and dust may still cause corrosion over time.

• Remove sand deposits using compressed air

•Rinse external surfaces with freshwater (Non-saline water) after exposure to sea spray.

• Dry thoroughly to prevent residue buildup.

5.2 Structural Stability

• Inspect all external screws and mounting interfaces for corrosion or loosening.

• Verify mounting integrity (bolts, brackets)

• Ensure system is securely fastened to platform

• Inspect for misalignment caused by wind loads

• In marine environments, apply anti-corrosion Grease.

6. Connectors and Electrical Interfaces

The system uses hermetic military-grade connectors (D38999 series).

6.1 Maintenance Actions : Inspect connectors for:

- Salt accumulation (marine)
- Dust/sand contamination (land)
- Moisture ingress
- Corrosion signs

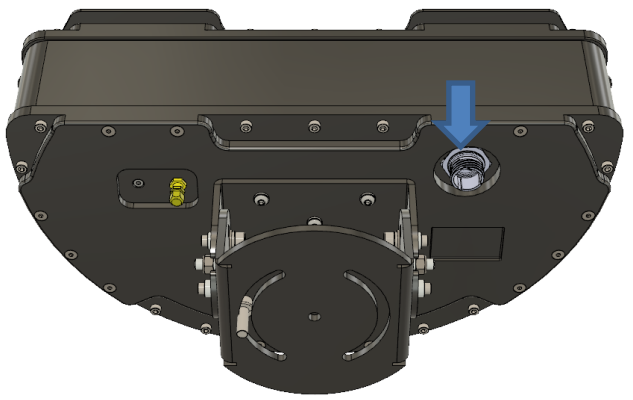

image 6

6.2 Cleaning Procedure:

• Ensure all connectors are properly sealed and tightened after maintenance.

• Never connect/disconnect under power.

• Use dry compressed air for cleaning the connectors (*see image 6*)

7. Thermal and Solar Exposure Management

7.1 Solar Radiation

• Avoid prolonged direct exposure when not required

• Use shading solutions where possible

7.2 Temperature Effects

• Verify system operation after extreme temperature shifts

• Allow system stabilization before operation (warm-up / cool-down)

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8. Sealing and Nitrogen Purging Integrity

FUSION F is nitrogen purged and hermetically sealed.

8.1 Nitrogen Wash Procedure

 This procedure shall be performed by qualified personnel only and in accordance with safety regulations.

Procedure:

1. Open the Nitrogen screw (1) (Using an Allen screwdriver) (*see image 8.1*)
2. Remove the cap from the Nitrogen valve (2) (*see image 8.1*)
3. Inject dry nitrogen gas through the Nitrogen valve (2) for a few minutes to flush the system and remove any internal humidity
1. Remove the Nitrogen tube from the Nitrogen valve (2) .
2. Close the Nitrogen screw (1)

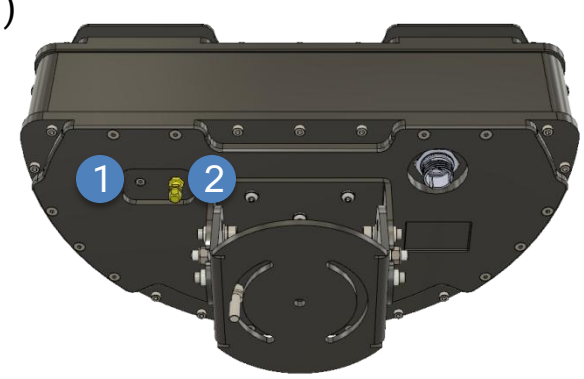

image 8.1

8.2 Nitrogen filling process

1. Remove the cap from the Nitrogen valve (2)
2. Inject dry nitrogen gas through the Nitrogen valve (2)
3. Fill the system up to a maximum pressure of 0.2 bar (≈ 3 psi)
4. Securely close and lock for Nitrogen valve (2) and Nitrogen screw (1)

NOTE:

Nitrogen filling may be performed using an inflation gun equipped with a pressure gauge (see example image 8.2).

image 8.2

8.3 Readiness Test

After completing the nitrogen filling process, verify system integrity:

1. Remove the cap from the Nitrogen valve (2)
2. Measuring gas pressure using a sensitive air pressure device (*see example image 8.3*)
3. Confirm that no gas is released

If gas leakage is detected: Do not operate the system Refer to authorized maintenance

image 8.3

8.4 Important Notes

Do not exceed the specified pressure limit

Use clean, dry nitrogen gas only

Improper handling may compromise system sealing and performance

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9. Periodic Maintenance Schedule (Recommended)

Interval	action
Weekly	Visual inspection, send removal, optics cleaning
Monthly	Connector inspection, mechanical checks and external surfaces cleaning, corrosion check
Quarterly	Functional test (sensors, communication)
Semi-Annually	Sealing and Nitrogen Purging Integrity inspection (verify sealing condition) – refill if needed
Annually	Full system inspection

10. Storage Guidelines

When not in use:

1. Store in dry, temperature-controlled environment
2. Use protective covers for optics
3. Avoid direct exposure to send or salty air
4. Maintain connectors capped and sealed
5. Always power down the system when storage.

11. Safety Notes

• Do not disassemble sealed units

• Avoid direct exposure of sensors to high-power laser sources

• Ensure proper grounding via designated ground pin connector

• Operate within specified voltage ranges

12. Summary

Proper maintenance in harsh environments is critical despite the system's rugged design. Regular cleaning, inspection, and preventive actions will ensure:

1. Long-term optical clarity
2. Reliable mechanical performance
3. Protection against corrosion
4. Proper operational operation

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