# AID – Alencon Isolated Disconnect

## A PV disconnect solution for DC-DC Optimizers and Solar + Storage Devices


## Installation, Operation and Maintenance Manual for use with all variants of the AID product.

Alencon Systems – Passionate About Power

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# 2 General Information

All efforts have been made to ensure the accuracy of material provided in this document at the time of release. Items are subject to continuous development and improvements. All specifications and descriptions are subject to change without notice.

## 2.1 Purpose

This manual provides information about installing, operating, maintaining, and troubleshooting the Alencon AID device.

**Who Should Read this Manual?**

This manual should be read by anyone who needs to:

- Understand the product
- Plan the installation
- Install the product
- Commission the product
- Operate the product
- Maintain the product, if necessary

## 2.2 Product Warranty

Alencon Systems warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for three years from the date of purchase. Extended warrantees of an additional five (5), ten (10) and twenty (20) years are also available for purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Alencon System, or which have been subject to misuse, abuse, accident, or improper installation. This warranty does not cover the repair or replacement of any goods which fail as a result of damage in transit, misuse, neglect, accident, Act of God, abuse, improper handling, misapplication, modification, improper storage, excessive stress, faulty or improper installation, testing or repair, negligent maintenance, or failure to comply with the written instructions for installation, testing, use or maintenance (if any) provided by Alencon Systems. Alencon Systems assumes no liability under the terms of this warranty as a consequence of such events.

Because of Alencon Systems' high quality-control standards and rigorous testing, most of our customers never need to use our warranty service. If an Alencon Systems product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult Alencon Systems for more details. If you think you have a defective product, follow these steps:

- Collect all the information about the problem encountered. (For example, issues you are encountering in your PV array) Note anything abnormal when the problem occurs.
- Call Alencon Systems or your licensed Alencon Systems dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
- If your product is diagnosed as defective, obtain an RMA (return merchandise authorization) number from Alencon Systems. This allows us to process your return more quickly.
- Carefully pack the defective product (preferably in the original packaging material it was shipped in), a fully completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.

## 2.3 Warnings, Cautions and Notes

| | | |
|---|---|---|
|  | ***Warning!*** | *Warnings indicate conditions, which if not observed, can cause personal injury!* |
|  | ***Caution!*** | *Cautions are included to help you avoid damaging hardware or losing data.* |
|  | ***Note!*** | *Notes provide optional additional information.* |

## 2.4 Packing List

The AID is assembled and tested at the ALENCON factory. Before installation, please ensure the following items have been shipped:

- Commensurate # of AID units specified for your project.
- 1 x Warranty Card
- 4 x 1/4"-20 zinc plated slotted indented hex washer head thread cutting screws (for SPOT/BOSS side mounting option **only**)


FIGURE 1: AID UNIT

## 2.5 Ordering Information

See the AID model number and configuration matrix below:

AID-1500-F20-NFGI

**Ground Fault Detection**
NG – No Fuses to Ground
PFGI – Positive Grounded with Ground Fault Fuse and Indicator LED
NFGI – Negative Grounded with Ground Fault Fuse and Indicator LED

**Fusing**
NF – No Fuses
F# – Fuses rated to # Amps

**Max Voltage Rating**
600 – 600V Rating
1000 – 1000V Rating
1500 – 1500V Rating

FIGURE 2: AID CONFIGURATION MATRIX

## 2.6 Technical Specifications

| Device | AID 1000 | AID 1500 | |
|---|---|---|---|
| Max Operating Voltage | 1000 VDC | 1250 VDC | 1500 VDC |
| Number of Inputs | 4 | 4 | |
| Number of Outputs | 4 | 4 | |
| Max Load Break Current at Operating Voltage | 30A/120A | 21A/84A | 13A/52A |
| Weather Rating | IP65 | | |
| Fusing | Optional – 10A, 15A, 20A, 30A | | |
| Dimensions (H * W * D) | 360mm * 290mm * 190mm | | |
| Weight | 4 -7 kg (depending on configuration) | | |
| Certification | Switch: UL 508i, Case: UL 508A, UL 50 and UL 50E Types 1, 2, 3, 3R, 4, 4X, 12 and 13; CSA C22.2 No. 94 Types 1, 2, 3, 3R, 4, 4X, 6P, 12 and 13; File No. 89590, EC 60204-1 and 60529 | | |
| Storage Temp | -40°C to 80° | | |
| Operating Temp | -40°C to 70° | | |
| Closure Type | 4-Screw Lift-Off | | |

# 3 Important Safety Instructions

**SAVE THESE INSTRUCTIONS**– This manual contains important instructions for use with the AID that shall be followed during installation and maintenance of these devices.

Installation of this equipment must be performed by an authorized electrician in accordance with the local and NEC ANSI/NFPA 70 and OSHA requirements.

1. Before installing and using the AID, read all instructions presented in this manual and the cautionary markings shown on the AID's enclosure.

2. During operation, hazardous voltages and currents may be present. Only authorized and qualified personnel should perform servicing/installation.

3. Exposed PV strings to sunlight represent a shock hazard at the PV wires and exposed terminals. Test any terminal for voltage before touching them. Check if any current is flowing through the strings before removing connectors.

4. Only use accessories recommended or approved by the manufacturer.

5. Ensure that wiring is in good conditions and that all wiring is sized according to NEC 310-16 specifications.

6. PV modules produce electrical energy when exposed to light and thus can create an electrical shock hazard. Wiring of the PV modules should only be performed by qualified personnel.

7. Always have AID manual on hand, for reference.

# 4 Introduction

## 4.1 Product Overview

The Alencon Isolated Disconnect (AID) is the ideal companion to your outdoor deployment of Alencon's SPOT or BOSS products. The AID provides a convenient, load break DC-disconnect on the input of the SPOT and/or BOSS. For the BOSS, it can be used on the output as well. Depending on your application and needs, the AID can be provided with fusing and or a fuse to ground that can easily be included as options.

Please consult your Alencon technical sales consultant for assistance in determining which AID configuration is right for your needs.

FIGURE 3: ALENCON ISOLATED DISCONNECT (INTERNAL VIEW)

## 4.2 Disconnect Switch Operation

Both positive and negative terminals of PV strings are isolated from the SPOT/BOSS when the switch is in the OFF position. Additionally, the disconnect switch can be locked when in the OFF position. Figure 4 below shows how the disconnect switch is oriented.

- OFF (OPEN) at 3 o'clock and 9 o'clock
- ON (CLOSED) at 6 o'clock and 12 o'clock

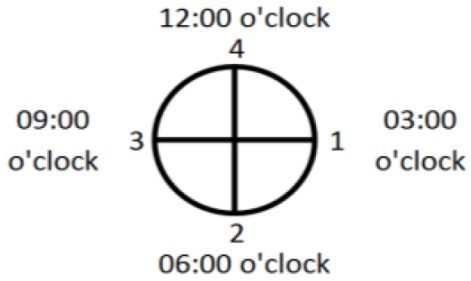


FIGURE 4: DISCONNECT SWITCH (LOCKABLE)

## 4.3 Fusing

AID can include fusing on the positive leads of PV input as desired. Fuse rating should be specified in accordance with local jurisdictions and all relevant electrical codes. The fuse and fuse holders specified will depend on the voltage rating of the AID itself:

| AID Voltage Rating | Fuse Holders | Fuses |
|---|---|---|
| 1000V | Mersen USM1HEL | Mersen HP10M (10*38mm) |
| 1500V | Mersen HP15FHM32 | Mersen HP15M (10*85mm) |

## 4.4 AID Enclosure

The AID is packaged in a non-corrosive, non-conductive, light weight enclosure. It has a rigid design with back panel inserts. Nonmetallic mounting brackets and a gasket system encased in a continuous channel on the cover assure long life and water tightness.

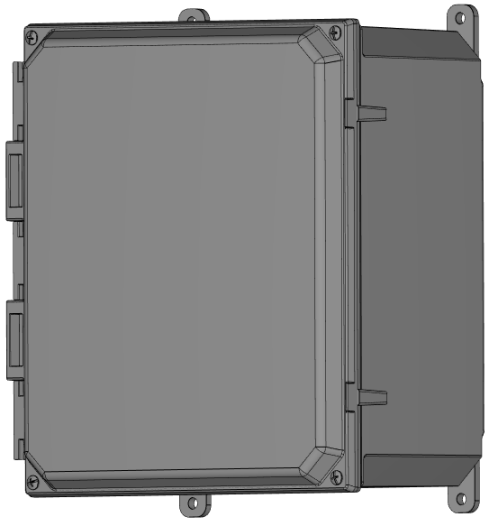

FIGURE 5: AID ENCLOSURE

## 4.5 Grounding/Ground Fault Indication

Ground fault indication is an option available with the AID. A fused connection between main earth ground and input voltage will blow in the case of a ground fault and a bright red indicator LED will turn on to show the fault occurrence.

This fused connection can be used to bond the positive or negative input to GND, depending on the desired grounding scheme. Note that this feature is only available for SPOT units with grounded input, an AID with floating SPOT or BOSS units will not have this feature.

Ground fault fuse can be replaced in the field after ground leak has been located and repaired. Indicator LED will then turn back off.

# 5 Installation

The AID may be mounted on the side of the SPOT/BOSS or on a separate Unistrut hanging plate and wired directly into SPOT inputs. Use the following steps to install an AID device.

Ensure the switch is in the OFF (OPEN) position before beginning the install process.

## 5.1 Mounting Procedure – Separate Mounting Bracket

1. AID is shipped already mounted on the Alencon Bracket (see Figure 6).
2. Lift the AID so that the mounting plate lines up with and hooks into the Unistrut (see Figure 7).
3. Once AID is secured in place you must fasten the other end of the mounting bracket to the Strut Channel using 5/16" Hex Head Screws (see Figure 7).

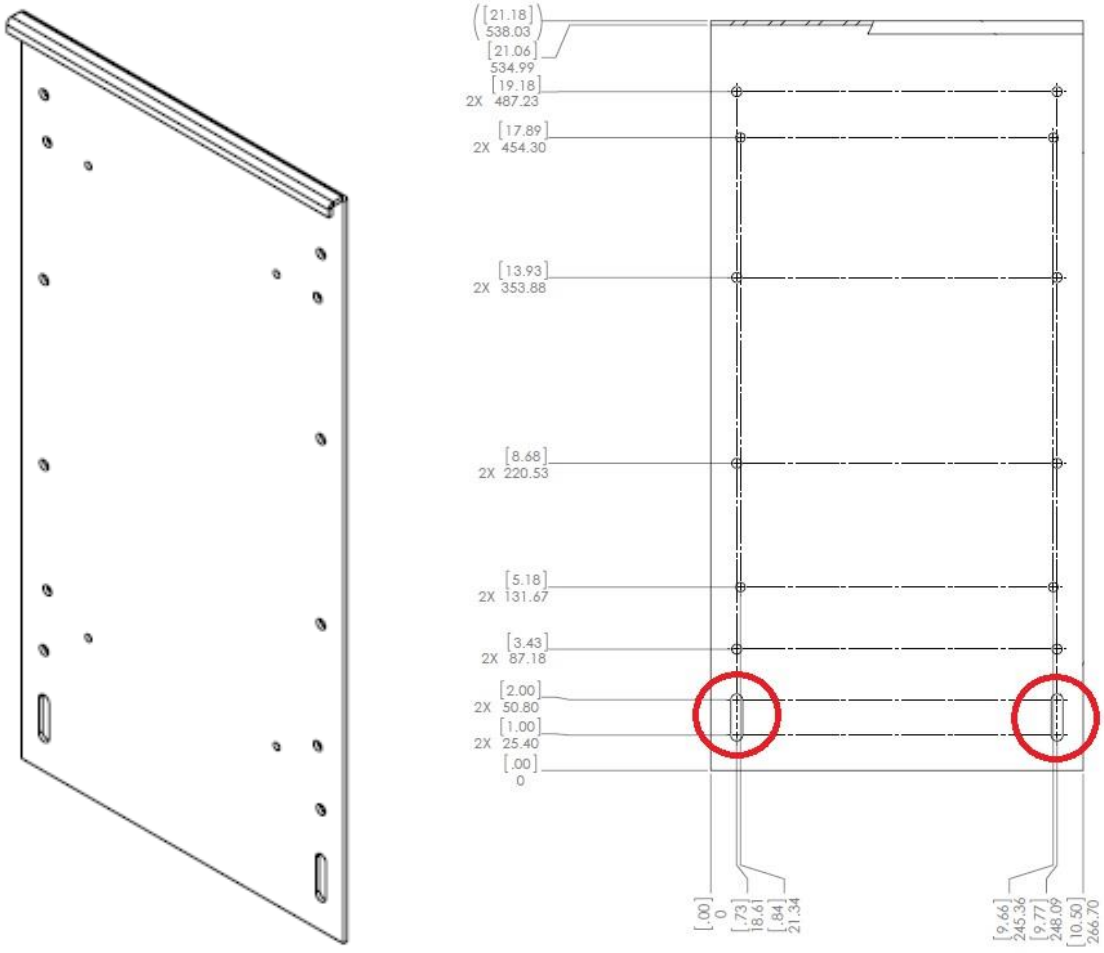


FIGURE 6: AID MOUNTING BRACKET (INSTALLATION HOLES ARE HIGHLIGHTED

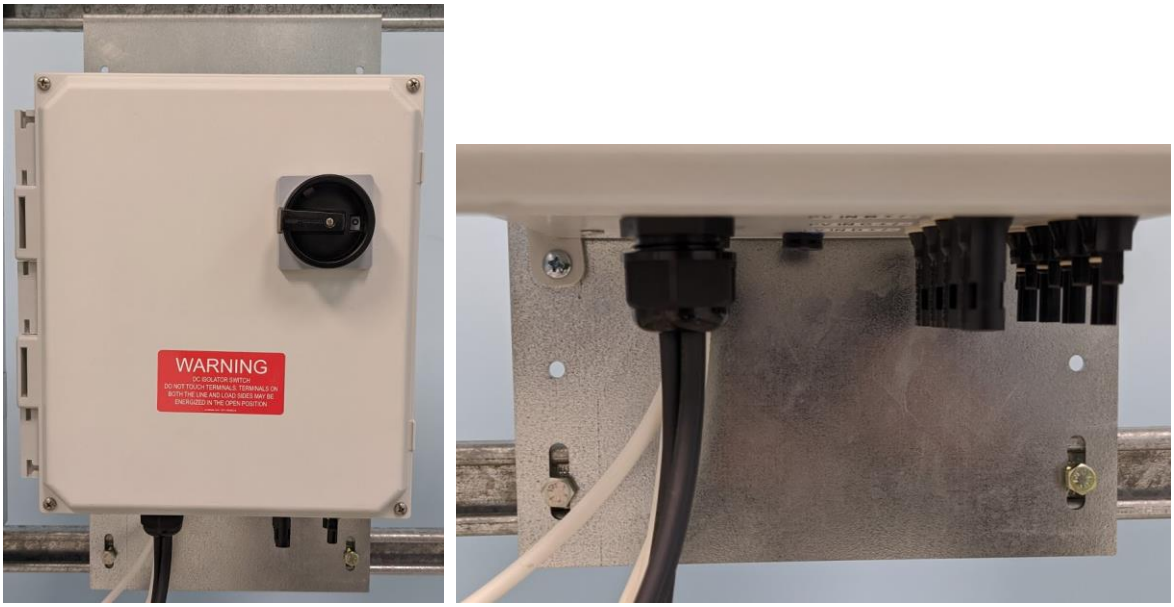


FIGURE 7: AID MOUNTED ON STRUT CHANNELS

## 5.2 Mounting Procedure – SPOT/BOSS Side Mounted

1. The AID has 4 mounting 'legs' that can pivot from each corner of the enclosure where they are attached (see Figure 8).
2. Adjust the positioning of the 'legs' to line them up with the grooves on the side of the SPOT/BOSS chassis (see Figure 9).
3. The AID can be mounted on either side of the SPOT/BOSS as both sides have mounting grooves.
4. Use the separately included 4 x 1/4"-20 thread cutting screws to fasten the AID onto the side of the SPOT/BOSS through the mounting grooves (see Figure 10).

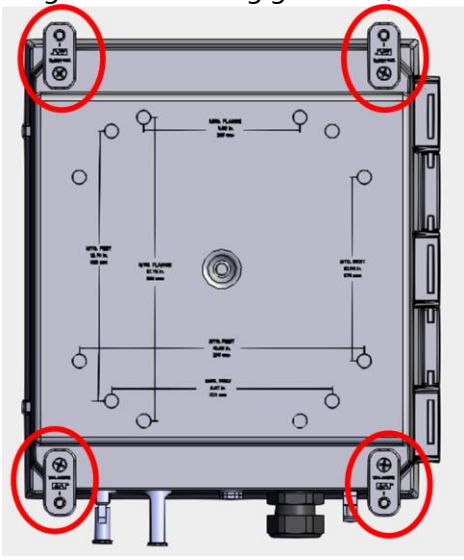

FIGURE 8: AID (BACK VIEW) MOUNTING LEGS HIGHLIGHTED

FIGURE 9: SPOT DEVICE MOUNTING GROOVES HIGHLIGHTED

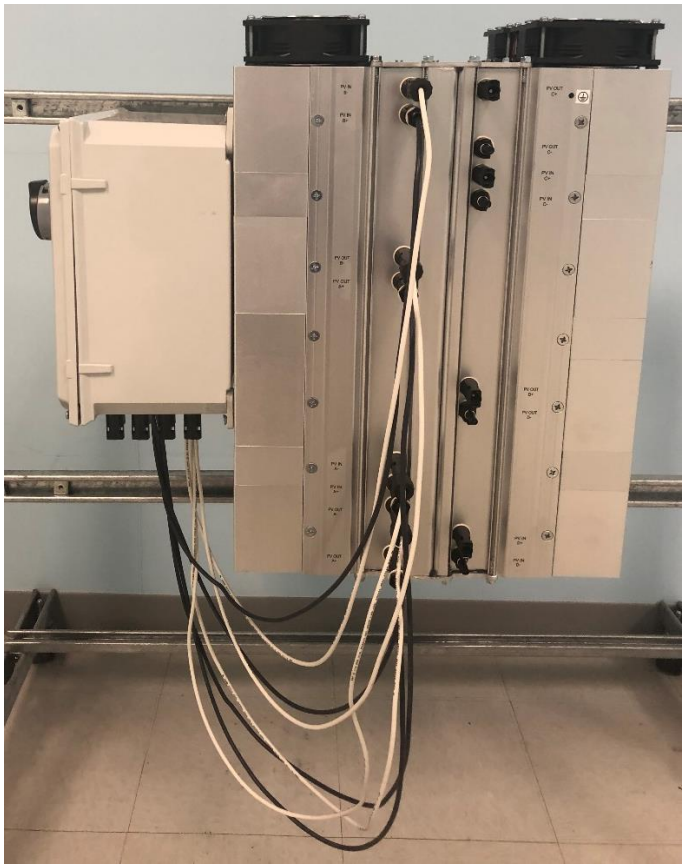

FIGURE 10: SPOT WITH SIDE-MOUNTED AID

## 5.3 Connecting to Input and Output

1. Connect PV Strings to appropriate PV IN Amphenol H4 connectors on the bottom of the AID (see Figure 11).


FIGURE 11: BOTTOM VIEW OF AID, INPUT PORTS

2. Connect PV wires from the AID to the corresponding SPOT/BOSS ports by following the wire labels as shown in Figure 12 below.


FIGURE 12: PV WIRES TO SPOT/BOSS INPUTS

# 6 Servicing and Maintenance

## 6.1 Opening and Closing AID for Service

To perform service and troubleshooting on the AID, it is often necessary to open the device. After which, it should be properly closed and sealed to maintain weather rating. See the component parts labeled in Figure 13.

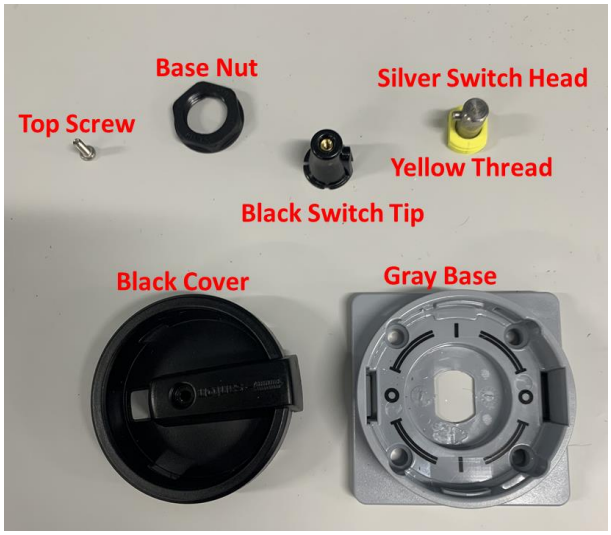


FIGURE 13: DISCONNECT SWITCH COMPONENT PARTS

### 6.1.1 To Open the AID:

1. Ensure disconnect is in OPEN/OFF position
2. Disconnect PV input cables so that HV is not present inside the AID
3. Unscrew top screw from the top of the disconnect switch using a Phillips 1 screwdriver
4. Pull off the black cover (will only come off when switch is in OFF 3 O'clock position)
5. Pull off the black switch tip as well
6. Unscrew the base nut from the gray switch base using a 7/8-inch socket wrench
7. Remove the gray switch base from the silver switch head with yellow thread
8. Unscrew 4 lid corner screws using a Phillips 2 screwdriver
9. Remove lid from AID enclosure

### 6.1.2 To Close the AID:

1. Replace lid onto the AID enclosure, hinges must align between both pieces
2. Screw 4 corner screws back into place, using a Phillips 2 screwdriver
3. Place the gray switch base back over the silver switch head and yellow thread
4. Screw the base nut on to yellow thread and tighten with a 7/8-inch socket wrench
5. Place black switch tip back onto sliver switch head
6. Place black cover on top of the switch tip as well
7. Use a Phillips 1 screwdriver to fasten the top screw into place small and secure the assembly
8. Ensure disconnect is in OPEN/OFF position
9. Connect PV input cables to AID front ports, take care to follow labels and keep cable pairs together
10. AID can now be switched to CLOSED/ON position as desired

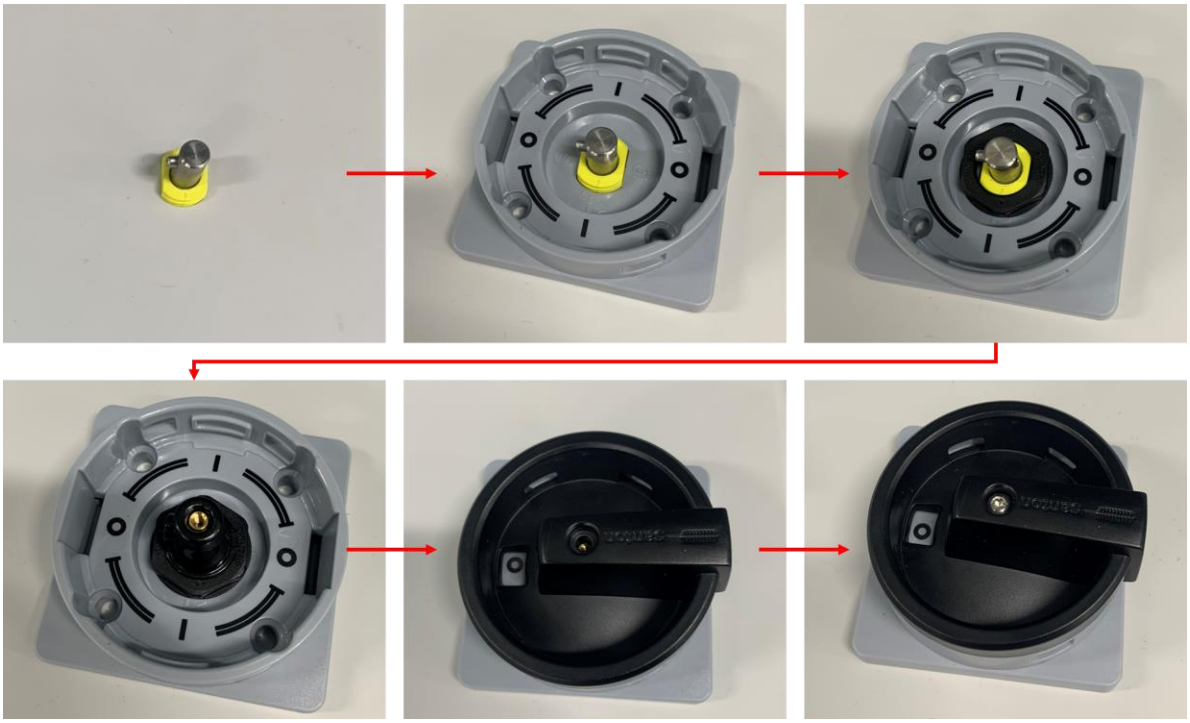

FIGURE 14: DISCONNECT SWITCH CLOSING PROCEDURE

## 6.2 General Maintenance

### 6.2.1 Fuse Replacement:

Fuses within the AID enclosure can be replaced in the field if necessary.

Refer to manufacturer recommendations for the safe handling of fuse holders and fuses in HV systems.

To replace fuses within the AID:

1. Turn OFF the AID
2. Open the AID enclosure, see section 6.1.1
3. Use a multimeter to check internal fuses for continuity
4. If any fuses are blown (discontinuous), open the fuse holder
5. Remove dead fuse and replace with a new fuse of the same rating
6. Close the fuse holder and use the multimeter to confirm it now passes a continuity test
7. Close the AID enclosure, see section 6.1.2
8. AID can be turned ON again

### 6.2.1 Additional Maintenance:

If AID still does not operate as expected, please contact Alencon Systems technical support for assistance with troubleshooting (see Appendix C).

# Appendix A - Safety Precautions

## A.1 Degree of Danger Symbols

| | | |
|---|---|---|
|  | ***Warning!*** | *Warnings indicate conditions, which if not observed, can cause personal injury!* |
|  | ***Caution!*** | *Cautions are included to help you avoid damaging hardware or losing data.* |
|  | ***Note!*** | *Notes provide optional additional information.* |

## A.2 Electrical hazards

### A.2.1 Electric shock from live voltage

 High voltages are present at the equipment and its components. Some maintenance work must be done when voltage is present. Failure to adhere to the safety messages may lead to severe or lethal injuries due to electric shock. To avoid electric shock from live voltage:

- Wear class 2 personal protective equipment.
- Always perform work in compliance with the regulations specified in 29 CFR, Chapter XVII, Part 1910 (OSHA), NEC, and NFPA 70E.
- Do not touch any live components of the equipment or the medium-voltage grid.
- Follow all instructions precisely.
- Observe safety messages.
- Before performing any work on the equipment, always disconnect the equipment if voltage is not
- absolutely necessary.
- After disconnecting the equipment, wait at least 10 minutes for the equipment's capacitors to discharge completely.
- Before performing work on the equipment, ensure that no voltage is present (with a Voltmeter or other measuring instrument).

### A.2.2 Electric shock caused by ground fault

 If a ground fault occurs, plant sections that are supposedly grounded may in fact be live. Failure to adhere to the safety messages may lead to severe or lethal injuries due to electric shock. To avoid electric shock from ground faults:

- Ensure that no voltage is present before touching any components.
- Wear class 2 personal protective equipment.

### A.2.3 Electric shock due to damaged equipment

 Operating damaged equipment can lead to hazardous situations that may result in serious or lethal injuries caused by electric shock. To avoid electric shock from damaged equipment:

- Only operate the equipment if it is in safe and technically faultless working order.
- Only operate the equipment if there is no visible damage.
- Regularly check the equipment for visible damage.
- Make sure that all external safety equipment is always freely accessible.
- Make sure that all safety equipment is in good working order.

## A.3 Environmental hazards

### A.3.1 Danger to life due to blocked escape routes

In hazardous situations, blocked escape routes can lead to serious injury or death. To avoid harm from blocked escape routes:

- An escape route of at least 3 ft. (915 mm) wide must always be available.
- Do not place any objects in the escape route area.
- Remove all tripping hazards from the escape routes.

### A.3.2 Damage to the equipment caused by dust or moisture penetration

 Dust intrusion or moisture penetration can damage and impair the functionality of the equipment. To avoid damage from dust or moisture penetration:

- Do not open the equipment when it is raining or when humidity exceeds 95%.
- Perform maintenance on the SPOT-BOX only when the environment is dry and free of dust
- Always cover electrical bus channel prior activating the equipment.

### A.3.3 Danger to life due to electric shock when the equipment is unlocked

Unlocked equipment can be opened by unauthorized persons. This means that unauthorized persons have access to components on which lethal voltages are present. To avoid danger from unlocked equipment:

- Ensure that unauthorized persons have no access to the equipment.
- Always lock the equipment
- Keep the electrical bus channel covered

## Appendix B – Glossary

| Word(s)/Acronyms | Definition |
|---|---|
| **ALS** | ALENCON Systems, LLC |
| **DC** | Direct Current |
| **ESD** | Electrostatic Discharge |
| **ESS** | Energy Storage System |
| **FEED** | Fused Electrical Disconnect |
| **GFDI** | Ground-Fault Detection |
| **GND** | System Ground Potential |
| **HV / LV** | High Voltage / Low Voltage |
| **IP** | Internet Protocol |
| **LD** | Leak Detector |
| **PODD** | Point of Data Distribution |
| **RTU** | Remote Terminal Unit. Microprocessor controlled electronic protocol to exchange data with other devices |
| **SCADA** | Supervisory Control and Data Acquisition system. Performed by transmitting telemetry data to a master system and by using |

| | |
|---|---|
| | messages from the master supervisory system to control connected objects |
| **SPOT** | String Power Optimizes and Transmitters |
| **SPOT-BOX** | Container with (1) to (4) SPOT's and Junction Box |

## Appendix C – Technical Support and Assistance

Visit the Alencon Systems web site at www.alenconsystems.com where you can find the latest information about the product. Contact your distributor, sales representative, or Alencon Systems' technical support if you need additional assistance. Please have the following information ready before you call:

- Product name, serial number, and LIN (all can be located on the product label)
- Description of your peripheral attachments including fusing and cables

For technical support please email: support@alenconsystems.com or call **+1 (215) 816-3366**