ViaLiteAIR fotonX OS Handbook

User Guide

ARF-S-HB-3

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Instrument Care and Safety Information

*Please read the whole of this section before using your **ViaLiteAIR fotonX OS** product. It contains important safety information and will enable you to get the most from your product.*

This product is designed to be used by instructed or skilled persons.

Electrical Safety

This ***ViaLiteAIR fotonX OS*** optical switch is a Safety Class 1 product (having a metal chassis directly connected to earth via the power cable). When operating it, note the following precautions:

- Hazardous voltages exist within the rack-mounted equipment.
- There are no user serviceable parts inside the product; the covers **MUST NOT** be removed.
- The mains fuses of the product are user replaceable by external equipment access. The instructions in the relevant sections of this handbook **MUST** be followed.
- Safety earthing SHOULD be provided via the C14 power inlet.
- When using a 2-pin power supply cable, the product earth stud **MUST** be connected to the safety earth.

Optical Safety

The ***ViaLiteAIR fotonX OS*** optical switch does not contain laser sources, however, when connected to external optical sources, hazardous invisible optical radiation may be present when in the ON or OFF state. As such, the following shall be considered when handling or servicing:

- Avoid viewing the fibre ends
- Always assume fibres may be carrying optical power unless verified otherwise
- Ensure external laser sources are disabled before installing, removing or servicing fibre connections

Caution

- The ***ViaLiteAIR fotonX OS*** equipment is made with folded sheet metal, and care should be taken when handling due to the potential for sharp edges.
- This equipment is not suitable for use in locations where children are likely to be present.
- This equipment is designed to be used by instructed or skilled persons.
- The equipment is to be installed below 2000m in altitude.
- The ***ViaLiteAIR fotonX OS*** chassis must be installed in a 19” rack or placed on a level surface.
- Do not cover the chassis vents and ensure there is sufficient room (> 8 cm) around the unit for air circulation.
- Do not use the chassis in a dusty environment.
- Handle the chassis with care and save the packaging materials for transport later.
- The product contains delicate parts, take care when handling.

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Acronyms

AC	Alternating Current
API	Application Programming Interface
APIPA	Automatic Private IP Addressing
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
GUI	Graphical User Interface
HTTP	Hypertext Transfer Protocol
IP	Internet Protocol
LCD	Liquid Crystal Display
OS	Optical Switch
RFoF	Radio Frequency Over Fibre

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1 Initial Inspection

Unpack and inspect the equipment as soon as possible. If there is any sign of damage or any parts missing, do not install the equipment before seeking advice from ***ViaLite Communications*** or your local agent.

The equipment received should match the delivery note that is shipped with the equipment. If there are any discrepancies, contact ***ViaLite Communications*** or your local agent.

2 Introduction to the ViaLiteAIR Range

The ***ViaLiteAIR fotonX*** product range has been developed to support the distribution of analogue microwave RFoF signals and complements the ***ViaLiteAIR infonX*** product range**.**

The ***ViaLiteAIR infonX*** product range provides a modular solution for the transmission of a wide range of analogue microwave RF signals where traditional coaxial cable or waveguide systems cannot be used, for example, in electrically noisy environments or over long distances.

The ***ViaLiteAIR fotonX*** range is ideal for permanent and semi-permanent installation in satellite communications, antenna remoting and other related applications.

All ***ViaLiteAIR fotonX*** equipment operates over single mode glass fibre optic cable, which can be supplied by **ViaLite Communications** in low-cost 3mm jacket, riser and outdoor specifications if needed (please contact your sales representative). The links can also be used with existing cable systems at customer premises.

A ***ViaLiteAIR fotonX*** system can be added to at any time, enabling the system to evolve with the needs of the user.

ViaLiteAIR fotonX is a product brand manufactured by Pulse Power and Measurement Ltd (PPM). ***ViaLite Communications*** is a division of Pulse Power and Measurement Ltd (PPM).

3 System Overview

The ***ViaLiteAIR fotonX OS*** is a 19-inch rack mounted networked optical switch which can be used for RFoF applications. The ARF-S08-9T-1A model configuration has eight switches which are all remotely operated by logging into the on-board web browser or using optional HTTP API, see section 7.5 for further details. The optical path of each switch can be switched to the A or B position.

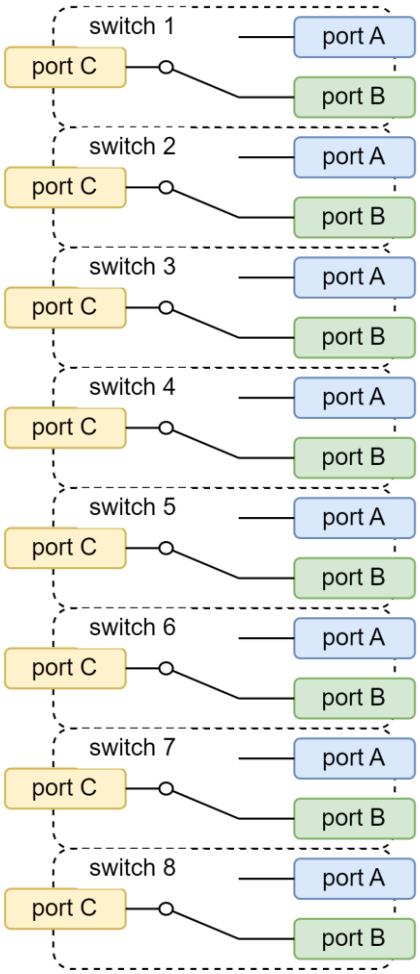


Figure 1 optical switch hardware mapping

The switches are latching and will therefore remain in the switched position until the user selects the other switch position via the web application or HTTP API commands. Each optical path will remain in position following removal of power.

4 *ViaLiteAIR fotonX OS* 19" 1U Chassis

The ***ViaLiteAIR fotonX OS*** chassis is a 1U chassis suitable for 19" rack mounting that is factory configured for AC worldwide mains covering 100 – 240 V AC 50/60Hz.

The chassis has a built-in site controller and LCD display screen to manage the local system and provide Ethernet based remote management access via the rear RJ45 connector.

The chassis has integrated cooling fans that draw cooler air in from the left-hand side (as viewed from the front) and exhausts the warmer air from the right-hand side. These fans are thermally controlled by the site controller such that they are nominally OFF unless the ambient temperature exceeds 30°C.

4.1 Front Panel Interfaces

The front panel features an LCD display and two push buttons used for initial set-up and visual status information.

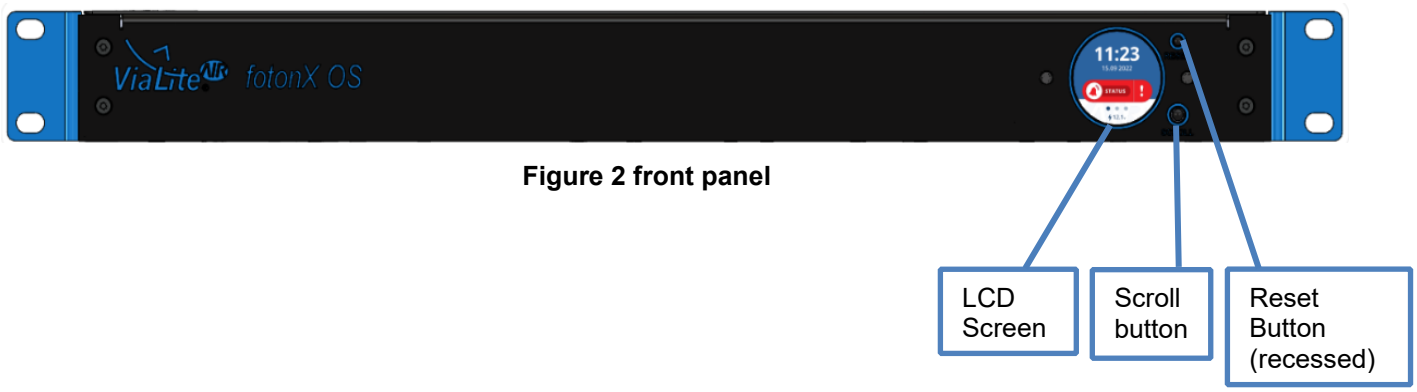


Figure 2 front panel

4.1.1 Screen Interface

The front panel display provides the following information:

- Unit status
- Time/date
- IP address
- Hostname
- Version Information

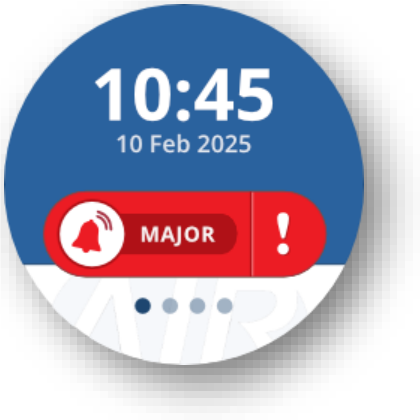
Control of the optical switch is possible through the web interface accessible using the IP address displayed.

The home view of the screen shows the time, date and an indication of the unit status.

Use the scroll button to page through the screens.

The reset button can be used to reboot the system or to perform a factory reset.

The status indicator is green to reflect that there are no alarms.



In the event of an error or alarm the unit will update the status indicator. The web interface provides further details on the condition of the unit.

4.2 Rear Panel Interfaces

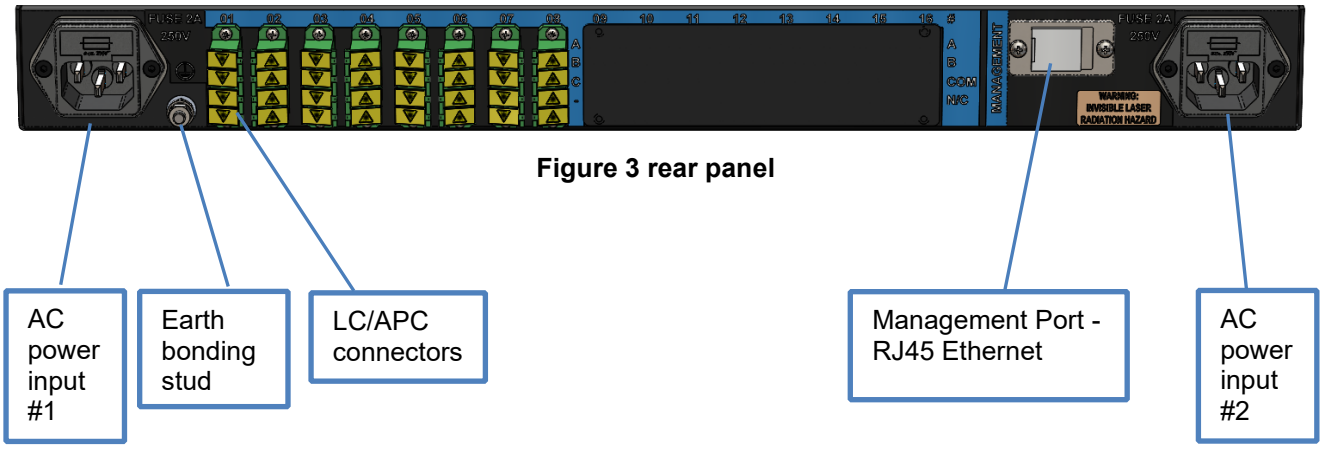


Figure 3 rear panel

4.2.1 Input Power

The equipment has been designed to operate from one or two of the AC inputs via IEC C13 type AC power cords (as provided with equipment).
Using both AC inputs provides redundancy: if one of the supplies fails or is disconnected, the other supply takes over and powers the unit with no interruption to service. Both AC inputs are fused with user replaceable 2 Amp anti-surge fuses.

For convenience, an Earth bonding stud is available, but mains Earth should be connected via the 3 terminal AC input connectors.

4.2.2 Remote Management Interface

Remote management and control of the optical switch is provided via the Management port.

4.2.3 LC/APC Optical Switch Interface Connectors

The quad connectors are labelled A, B, COM and N.C. Each optical switch can be set via the remote interface to connect COM to port A or port B. N.C. connectors are not used on this variant.
During switching, there is a short period whereby all three ports have reduced isolation during switch-over duration of less than 500 uS (this duration is within overall optical switching time quoted in section 5). If complete break-before-make operation is required, then two switches should be connected in series.

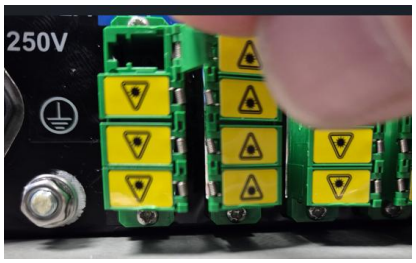
To connect LC/APC optical connectors:

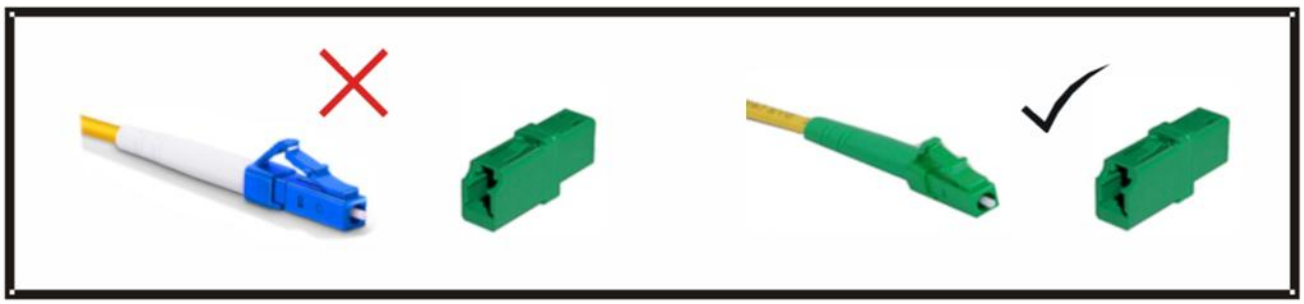
1. Remove the dust caps from the cable connector and lift hinged spring-loaded dust cap on the receptacle.
2. There is a key (lug) on the side of the plug, which must match the keyway (gap) in the receptacle shroud.
3. When they are aligned, gently push the plug home until the plastic latch clicks into place.

To disconnect LC/APC optical connectors:

1. Using fingers, push the key and gently withdraw the connector.
2. Replace the dust caps on cable plug. The dust flap should return to cover the receptacle aperture.

To maximise available space for connecting and disconnecting LC/APC connectors, the orientation of the LC/APC connectors are back-to-back such that Switch 1,3,5 and 7 locating keyways are pointing to the left and Switches 2,4,6 and 8 locating keyways are pointing to the right:





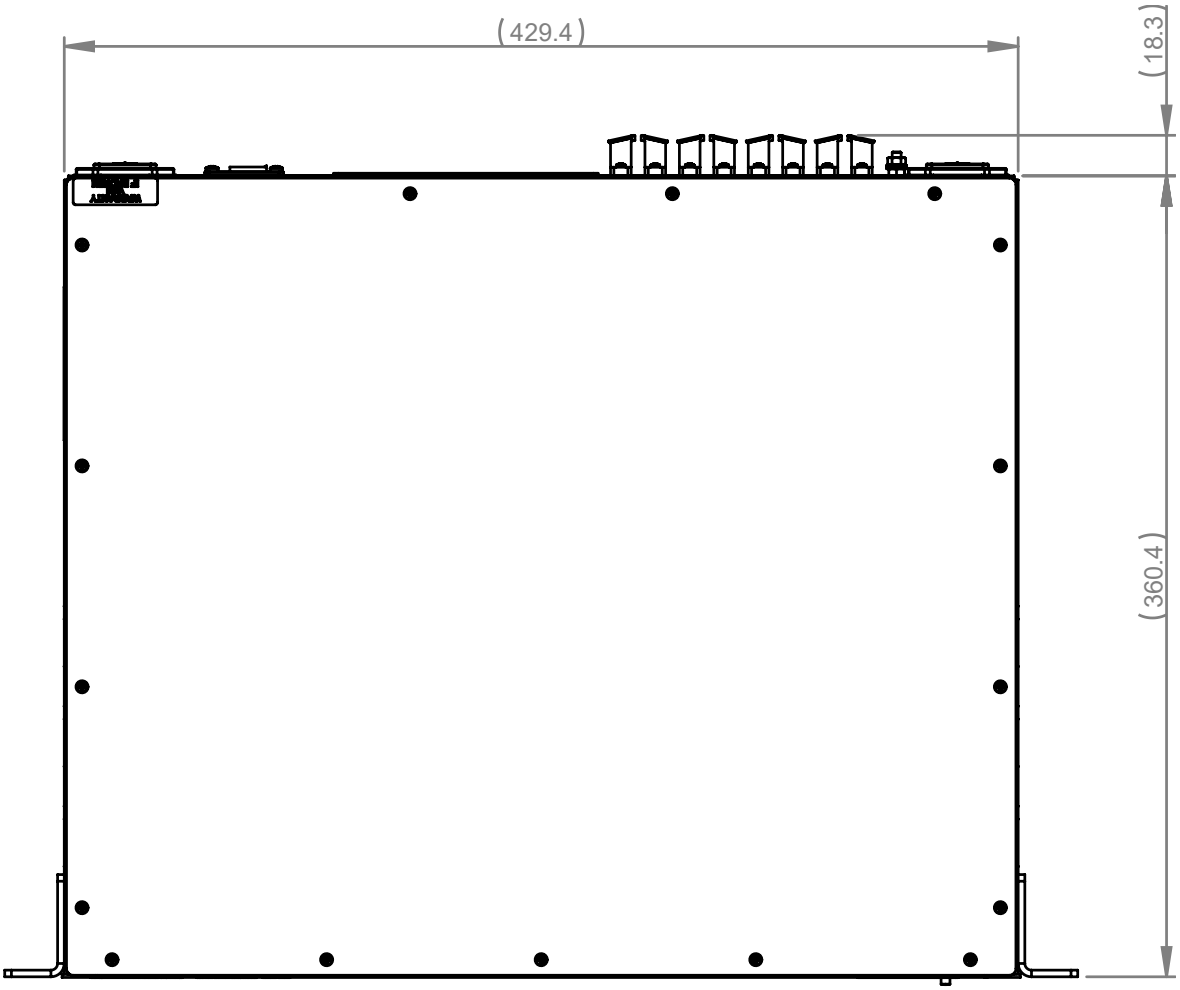
Only connect LC/APC cable to LC/APC. Do not mix green and blue connections.

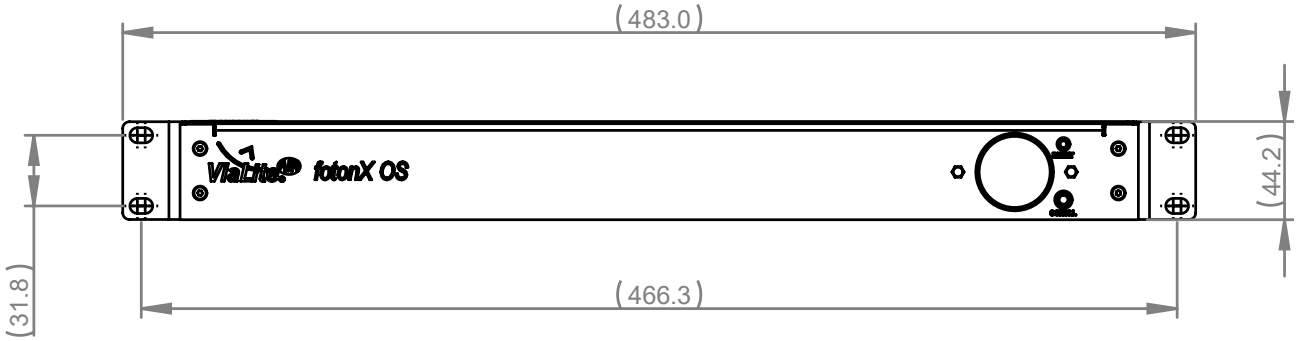
5 Technical Specification

Parameter	Specification (ARF-S08-9T-1A model)
Optical Parameters	
Fibre connections	LC/APC
Number of optical switch channels	8
Optical switch configuration	1:2 (latching / bidirectional)
Insertion loss	1.0 dB max (0.6 dB typical)
Crosstalk	55 dB min (equivalent to 110 dB RF isolation)
Return loss	55 dB typical
Polarisation dependant loss	0.1 dB max
Optical wavelength	1260 nm to 1620 nm
Optical power handling (continuous)	27 dBm max
Optical switching time	300 ms typical – including browser and networking 10 ms max (3ms typical) – optical switch-over time
Environmental Parameters	
Operating temperature	-5°C to 60°C
Storage temperature	-40°C to 85°C
Working relative humidity	95% max
Maximum operating altitude	2000 m
External dimensions	44.5 x 483 x 378 mm (including mounting lugs and rear connectors)
Weight	2.6 kg
Power Parameters	
Power connections	IEC C14 mains socket to accept IEC C13 power cable 2 (dual redundant) per chassis
Supply voltage	Mains 100 to 240 V AC, 50/60 Hz
Power consumption	7 watts max; 0.3 PF
Surge at switch-on	< 11 A (peak instantaneous current)
Legislation	
CE standards	EN IEC 62368-1 Safety Requirements EN IEC 60825-2 Safety of optical fibre communication systems EN IEC 61000-6-4 EMC Emission EN IEC 61000-6-2 EMC Immunity EN IEC 63000 RoHS

5.1 **Dimensions**

All dimensions are shown in **mm**.





6 Installation Guidance

The ***ViaLiteAIR fotonX OS*** is a 19-inch rack mount chassis with connectivity on the rear and user interface elements on the front. This system has been designed for installation in a 19-inch rack by instructed or skilled person familiar with 19-inch rack installations.

The ***ViaLiteAIR fotonX OS*** is connected to mains supply via two IEC C14 plugs. To isolate from mains, **both** plugs must be removed from this equipment. These plugs are easily accessible at the rear of the unit.

.
Refer to your system wiring diagram or handbook to ensure correct corrections are made.

7 Monitor and Control interface

7.1 Connecting to *fotonX*

The **ViaLiteAIR fotonX OS** optical switch is controlled and managed remotely via ethernet.
When the ***ViaLiteAIR fotonX OS*** optical switch chassis is connected to a network, the default operation is as follows:

1. The chassis will broadcast a DHCP client discovery packet.
2. If a DHCP server is present on the network, the chassis will seek a network address.
3. If a DHCP server is **NOT** present on the network or the request is denied, the chassis will revert to a link local address according to the APIPA scheme in the range 169.254.0.1 to 169.254.255.254, with a subnet mask of 255.255.0.0. The first APIPA assigned address is 169.254.205.141.
4. If a link local address is assigned, DHCP requests will continue periodically.
5. The current IP address in use, either link local or acquired from a DHCP server, will be shown on the display screen.

If DHCP server-based IP address allocation is unsuitable for the user network, a static IP address can be manually assigned to the chassis.

The chassis will ask the DHCP server to register its hostname with the DNS server. The hostname format is based on the part number and serial number e.g. ARF-<Serial Number>.

The following browsers have been tested with the web browser (others may be supported):

Vendor	Version Tested
Edge	142.0.3595.94 (Official build) (64-bit)
Chrome	142.0.7444.175 (Official Build) (64-bit)
Firefox	145.0.1 (64-bit)

7.2 Graphical User Interface

By entering the ***ViaLiteAIR fotonX OS*** chassis IP address or hostname into a web browser on the same network, access can be obtained to the web GUI for manual system management. The first screen that the user is greeted with is the Login screen. The following email and password combinations provide different levels of access:

Email	Password	Access Level
admin@vialite.co.uk	vialite-admin	• Allows switching of each optical switch. • Allows creation of new switch scenarios • Full control of switch description metadata (rename switches and switch ports). • Full access to settings (alarms, software update, system time, network configuration, system reboot). • View target info including serial, part numbers and lifetime / uptime.
write@vialite.co.uk	vialite-write	• Allows switching of each optical switch. • Allows creation of new switch scenarios
read@vialite.co.uk	vialite-read	• Allows viewing of switch status only

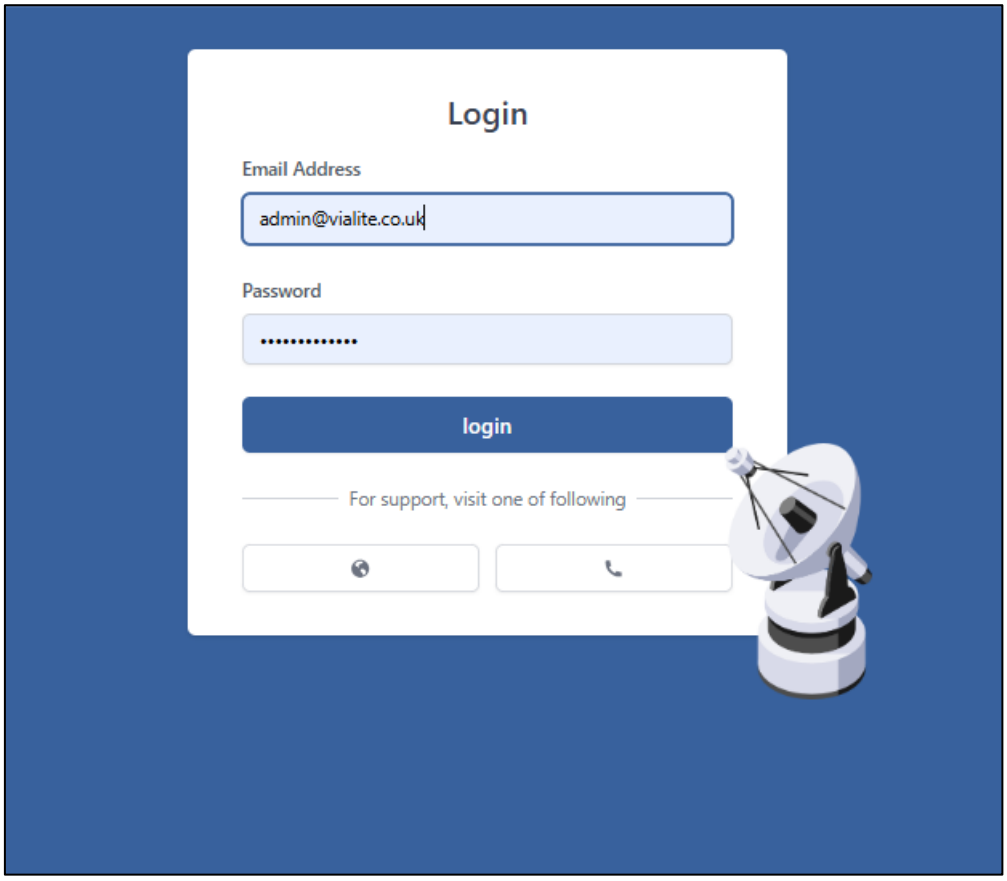


Figure 4 web GUI login screen

The web GUI is auto scaling allowing supporting accessibility on smaller screens such as tablets or smart phones.

7.3 Web Browser Homepage – Switch Status and Control

Following successful log-in the user can set, view and configure optical switches dependant on access level. Figure 5 shows the home page. In this example, where switch metadata has already been set in accordance with guidance in section 7.3.3, switch 1 connects Engineering lab to a roof-top antenna, all other rooms have been switched off, see Figure 6 for this mock site set-up.

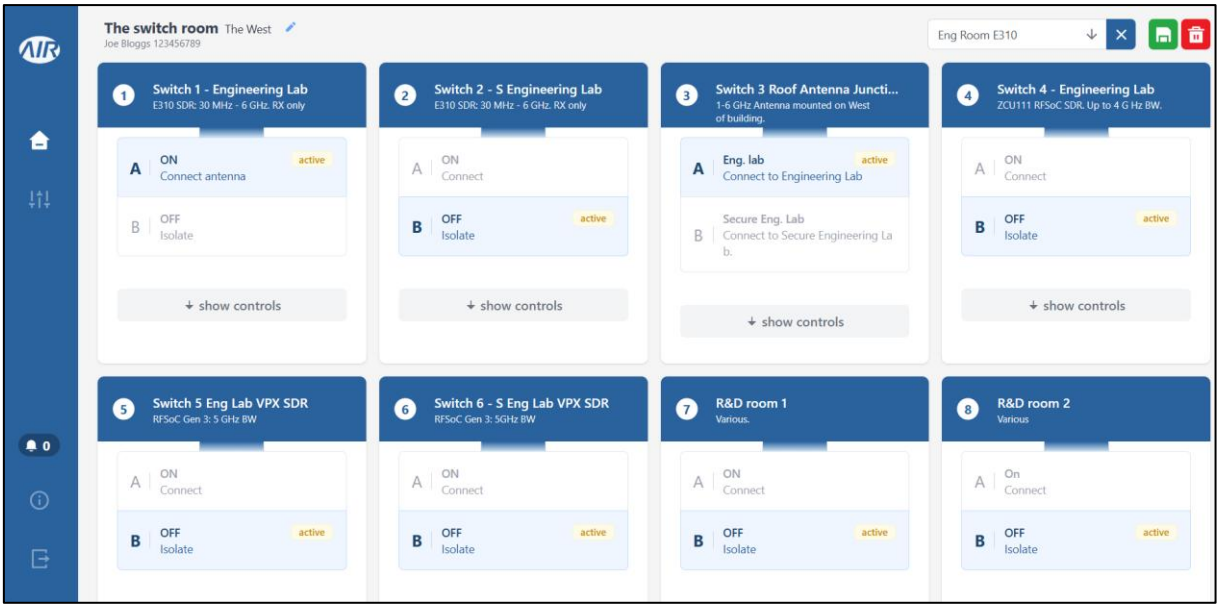


Figure 5 switch status and control

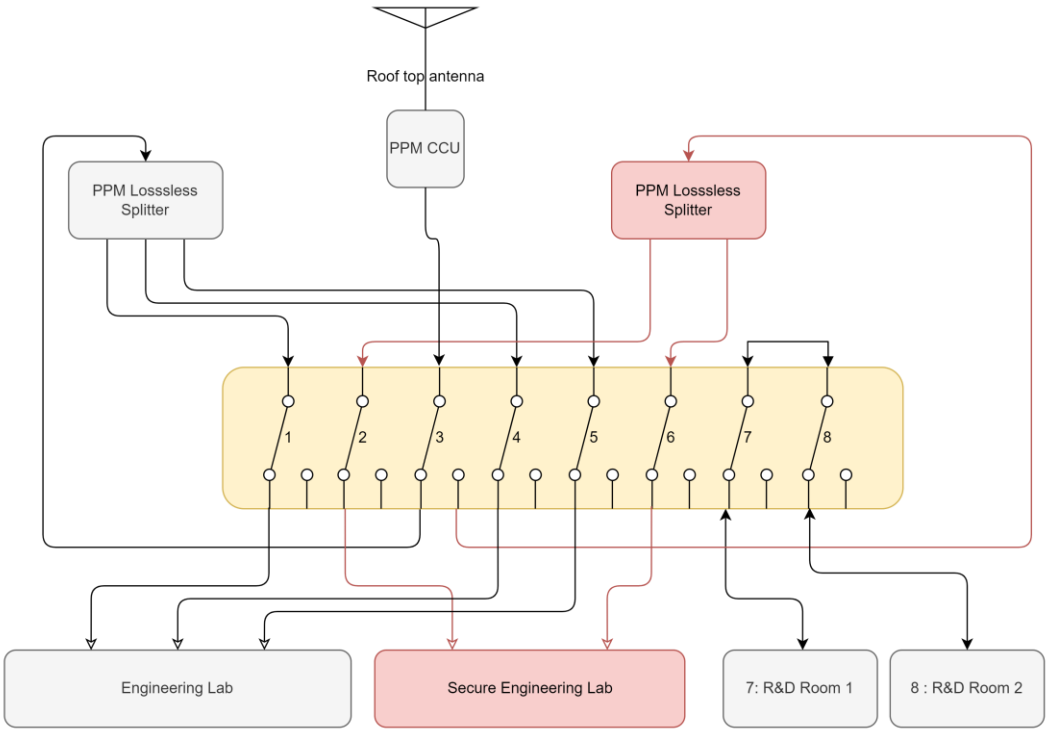


Figure 6 mock RFoF network

7.3.1 Site Information

User defined site information can be added by selecting the edit button as shown below:

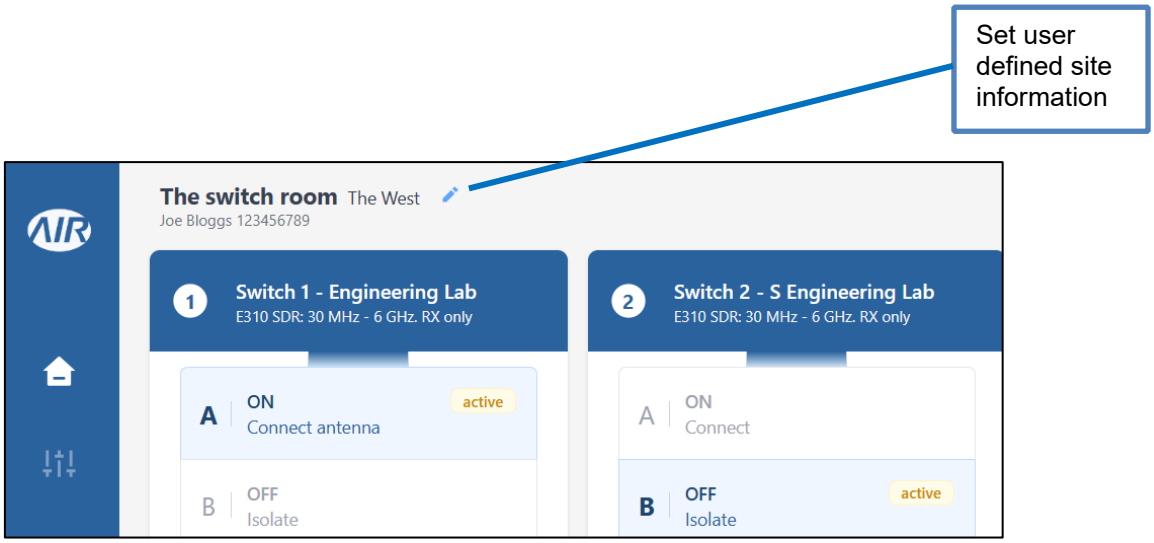


Figure 7 edit site information and contact details

Manual Select Port Connectivity

Each switch position can set by left clicking over port A or port B, see Figure **8** and Figure **9**. This example connects or disconnects Engineering Lab 1 to a distributed RFoF network.

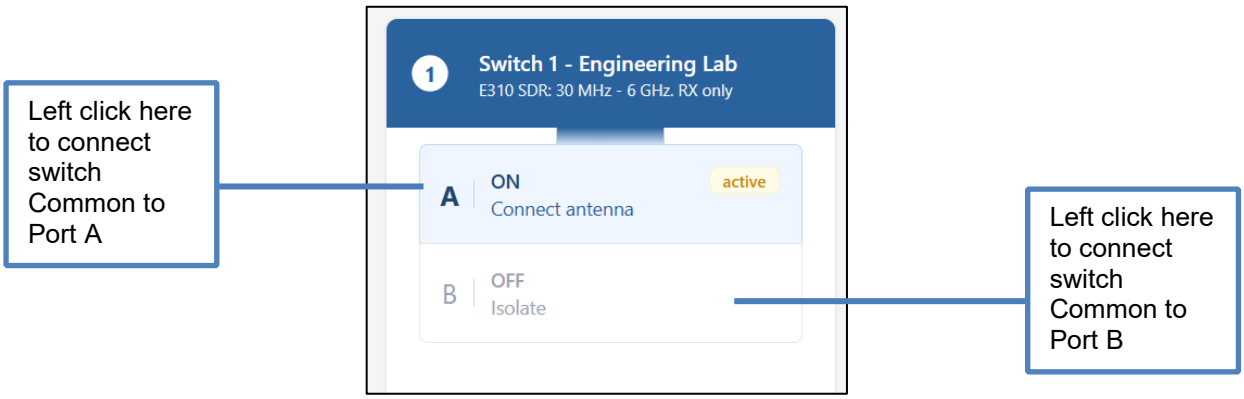


Figure 8 manual switch control

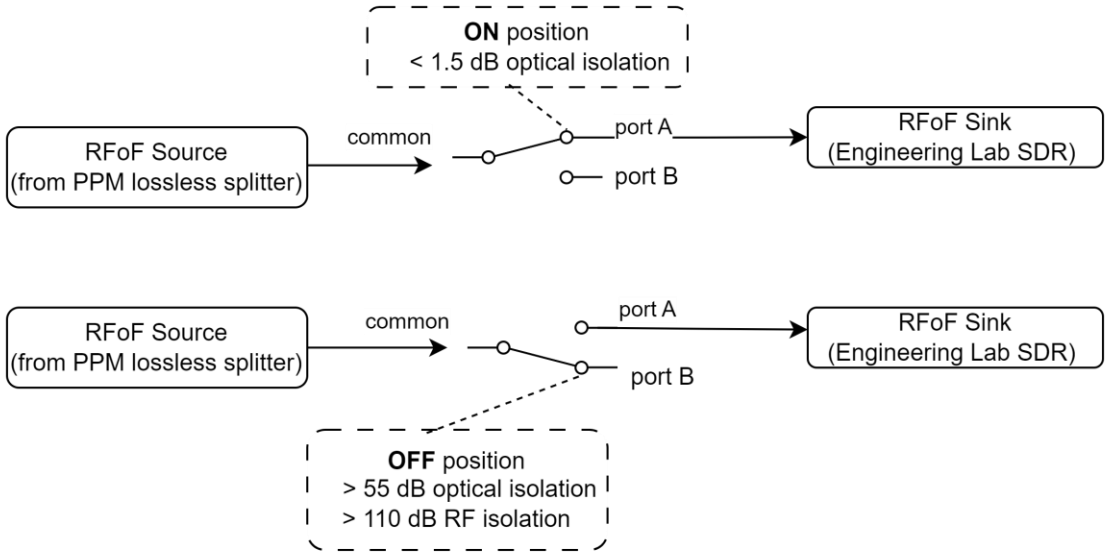


Figure 9 **switch 1: isolate or connect Engineering Lab 1**

If a scenario (see section 7.3.2) has previously been loaded and the new switch position differs from the active scenario, the GUI will provide a warning indication by flashing the relevant port in red, as shown below:

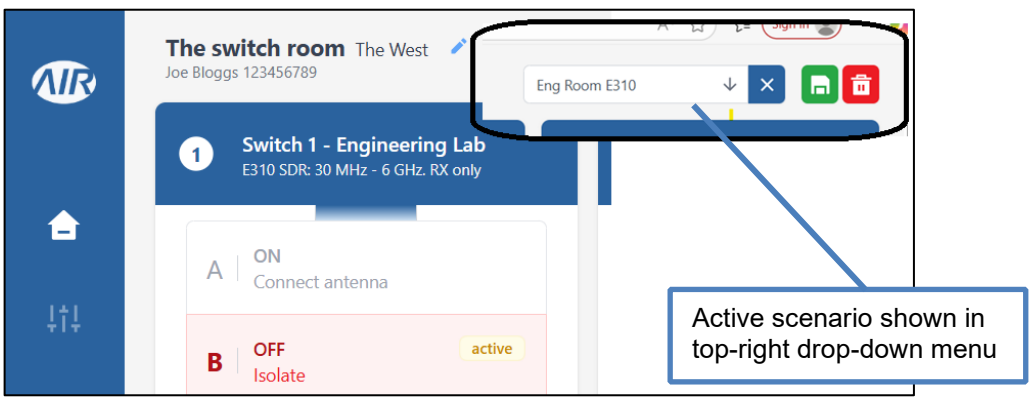


Figure 10 **warning: Switch 1 Port A does not match active scenario**

7.3.2 Create Switch Scenario

All switches can be preset to positions that have been defined as a switch scenario. Switch scenarios are created by manually setting each switch to desired position, selecting the “create new scenario” button which will then allow the user to enter a scenario name in the pop-up modal. Switch configuration files are recalled by selecting files from the drop-down menu. Refer to Figure 11 below showing web GUI switch scenario buttons.

An example of the creation of a new scenario which connects all ports to A is described below:

1) Manually set all switches to connect Common to Port A (as per section 0)
2) Select the green save button.
3) Type the title and description of the scenario in the text fields.
4) Select save.
5) The scenario can then be recalled using the drop-down menu.

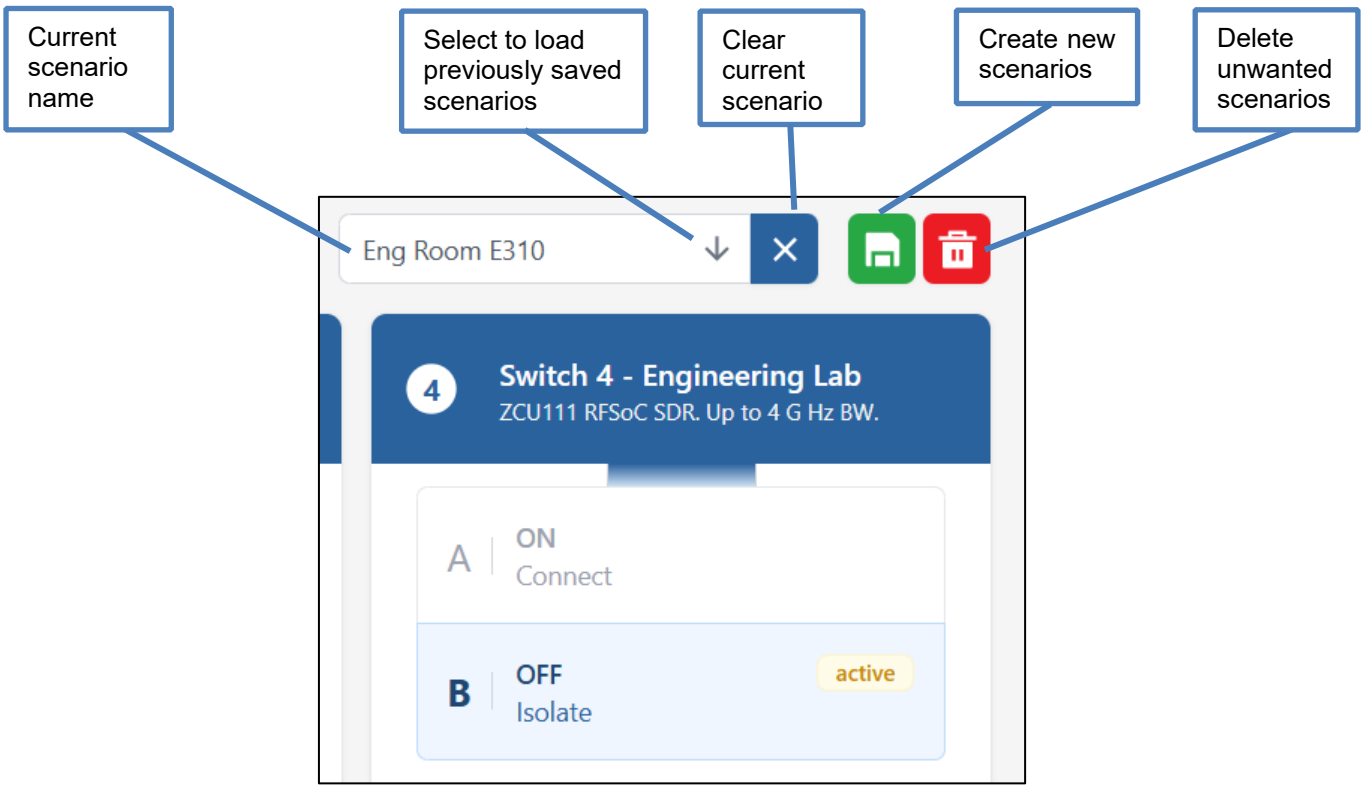


Figure 11 switch scenario drop down menu

7.3.3 Configure Switch Metadata

The GUI allows each switch title to be renamed and allows for an associated description to be added. The A and B output port titles can be renamed for further clarification of physical set-up. An example switch configuration is shown below:

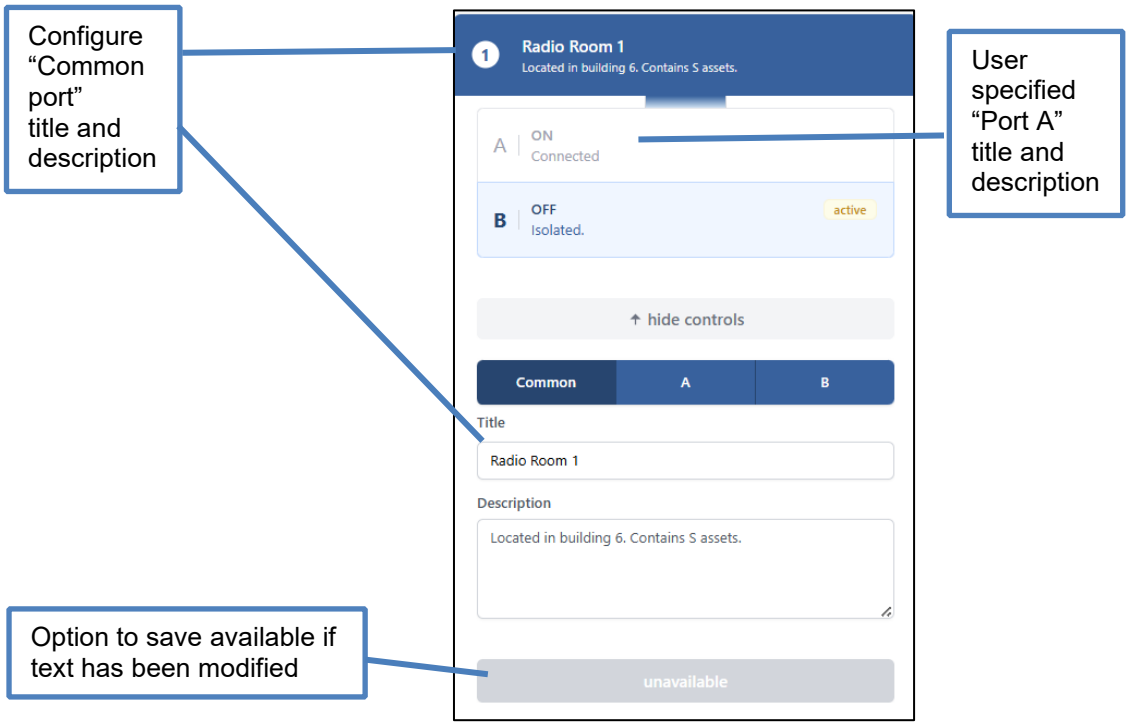


Figure 12 configure switch metadata

7.3.4 **Sidebar Controls**

The sidebar panel is accessible from the homepage and settings pages and include controls for:

- Accessing homepage
- Accessing settings page
- Quick view of health status, red when a major alarm is active, yellow when minor alarm is active and no major alarm active
- Downloading licensing information
- Logging out

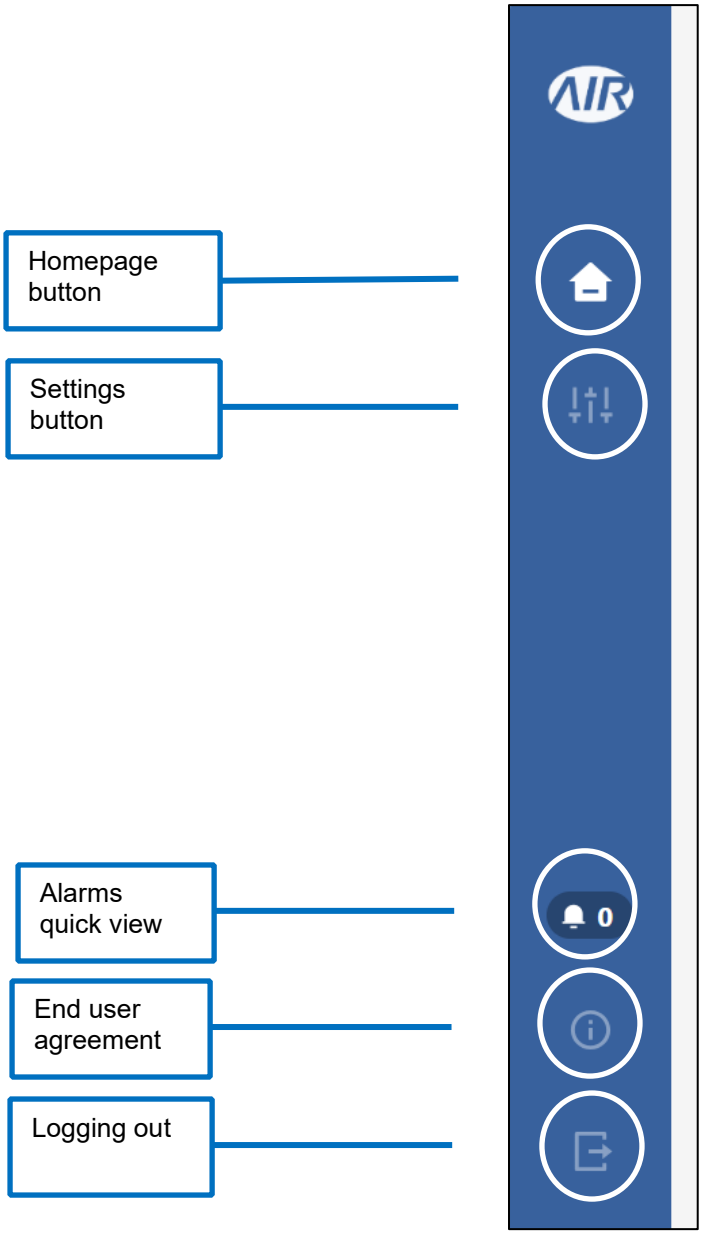


Figure 13 sidebar controls

7.4 Web Browser – Settings

Assuming admin user login credentials the settings page can be accessed by selecting the settings button on the sidebar, as highlighted below:

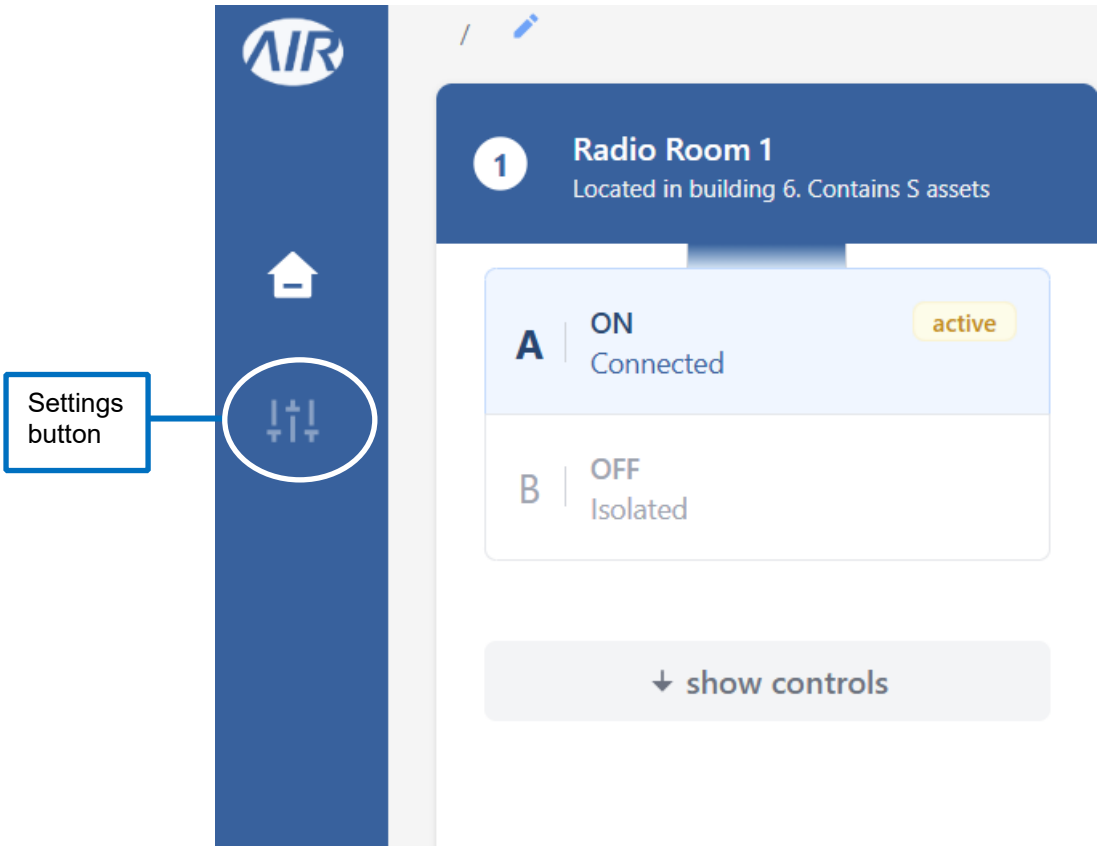


Figure 14 access settings page

The ***ViaLiteAIR fotonX OS*** Optical switch settings options include:

- Network configuration: DHCP (default) or STATIC
- Target hardware information
- System Time configuration: NTP (default) or manual.
- Provision to upload and install latest software remotely and view current software release information.
- Apply a reset (top-right red icon)
- View Active Alarms (Optical Switch feedback alarm and internal voltage alarms)

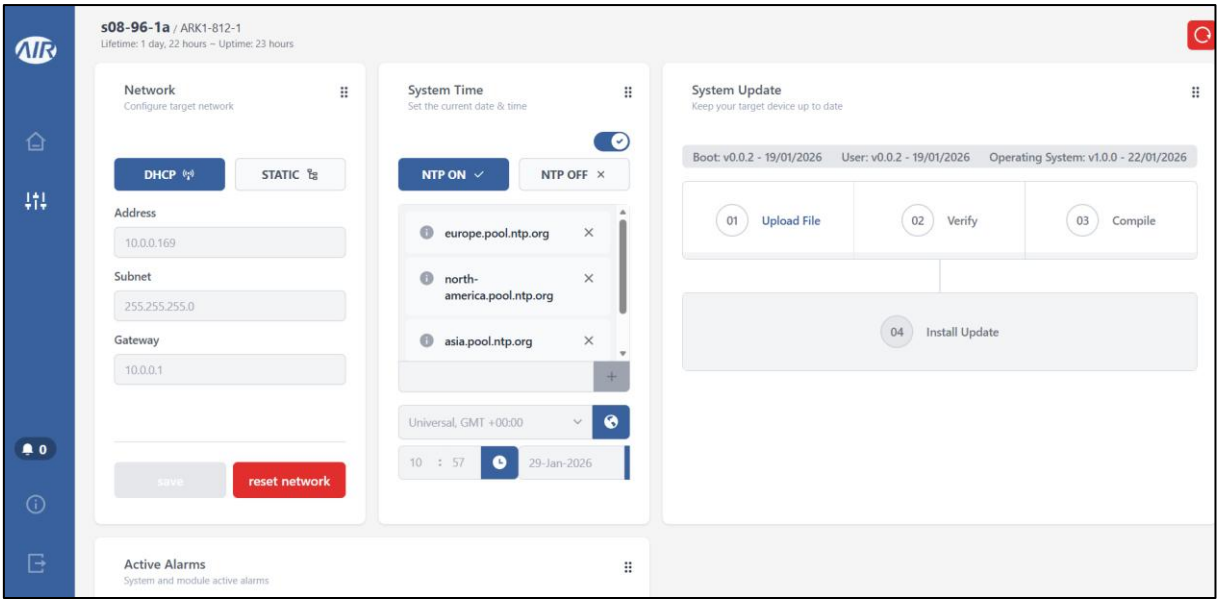


Figure 15 settings page

7.4.1 Target Hardware Information

The settings page provides unit part number, serial number, lifetime and uptime information. Lifetime, measured in hours, is the time since the unit was first turned on. Uptime is the time the unit has been powered on for, or since the last reboot.

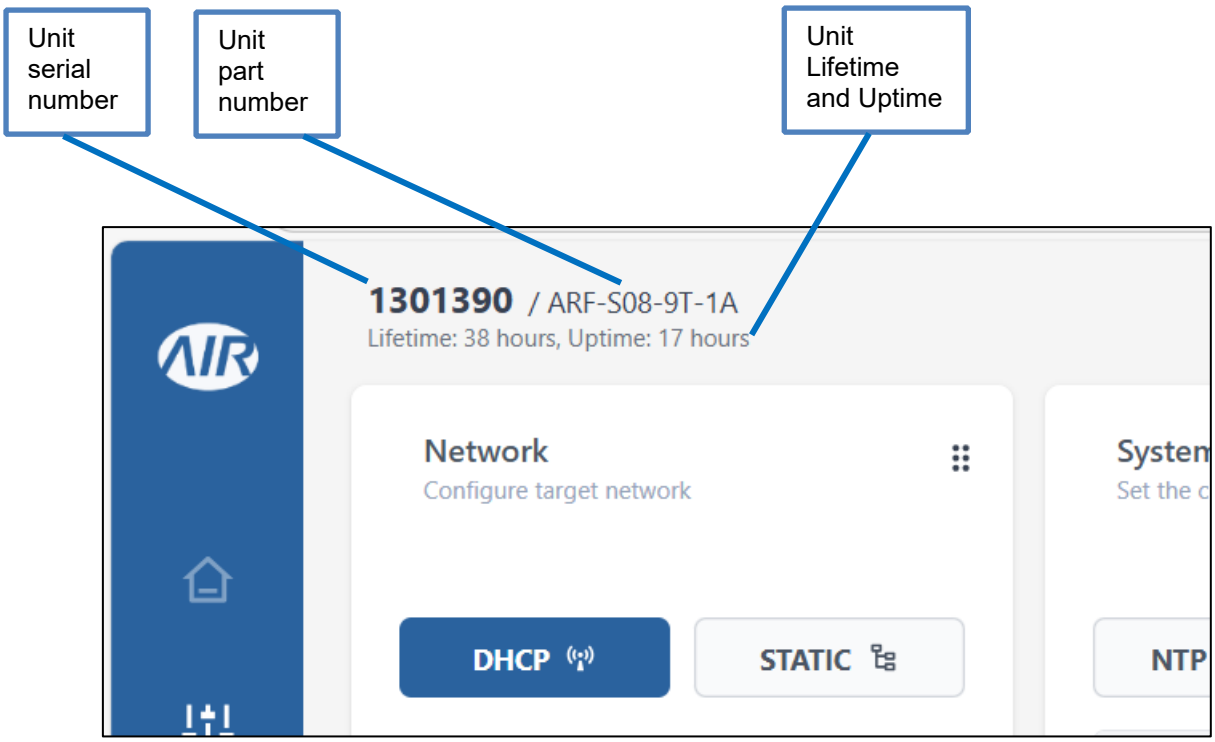


Figure 16 target hardware information

7.4.2 Network Configuration

The Network Configuration panel is used to switch operation between a static IP configuration and a dynamic one via DHCP. The initial default operation setting is DHCP.

When configuring a static IP, the desired address must be entered along with the subnet mask and Gateway. Basic syntax checks will be performed by the system to ensure valid data has been entered and a pop-up to confirm changes will appear before final application.

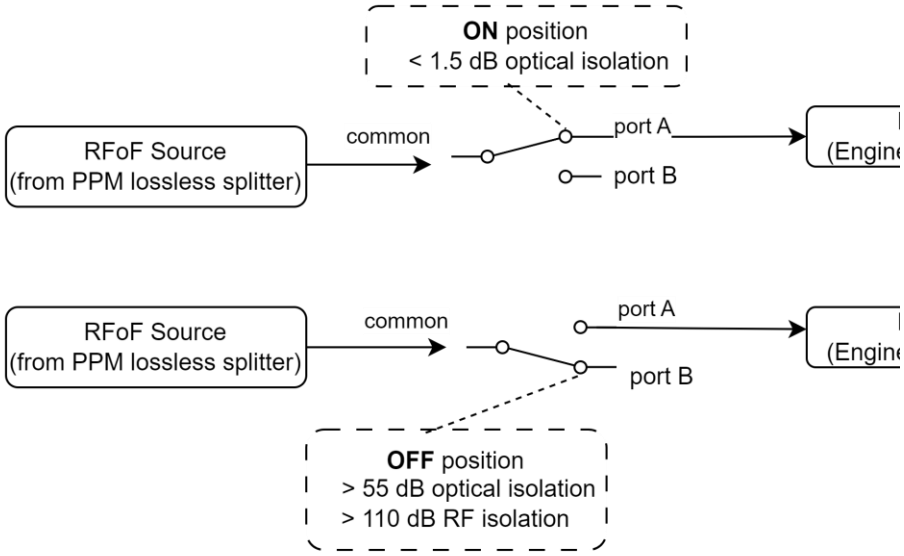
Network changes will take affect after a reboot is administered. To apply the settings immediately without rebooting the device, the user must click the “reset network” button. The configured static IP address will also appear on the chassis display screen.

Figure 17 network configuration

7.4.3 Active Alarms

The Active Alarm panel shows all current active alarms.

For each alarm indicator, the alarm code is shown along with a short description.



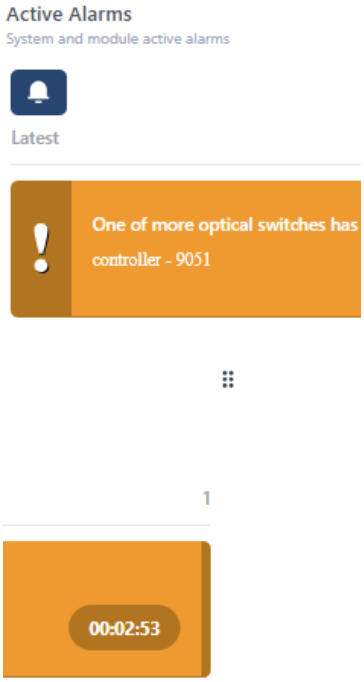


Figure 18 alarm example

represents an Optical Switch failure whereby the switch has failed to connect the required ports. The counter field specifies the duration that the alarm has been active. It is formatted to express this information in Days:Hours:Minutes:Seconds, show as **00:02:53** in this example.

7.4.4 System Time

By default, the system is set to NTP time whereby the time and date are set automatically.

This setting can be overridden to allow the user to set manually entered time for networks where NTP is not available.

To set user-defined time:

1) Slide the top slide switch to the left position.
2) Left-click “NTP OFF”
3) Hover curser over system time area and use arrow keys to scroll down to “Set NTP” button and click.
4) Slide the top slide switch to the left position.
5) Enter time and date directly into appropriate fields.
6) Hover curser over system time area and use arrow keys to scroll down to “Set Clock” button and click.

To revert to NTP time:

1) Slide the top slide switch to the left position.
2) Left click “NTP ON”
3) Hover curser over system time area and use arrow keys to scroll down to “Set NTP” button and click.

To add alternative NTP servers:

1) Slide the top slide switch to the left position.
2) Select NTP ON
3) Enter URL of alternative NTP servers in the text field and select “+”. Unwanted NTP servers can be removed from the list.
4) Hover curser over system time area and use arrow keys to scroll down to “Set NTP” button and click.

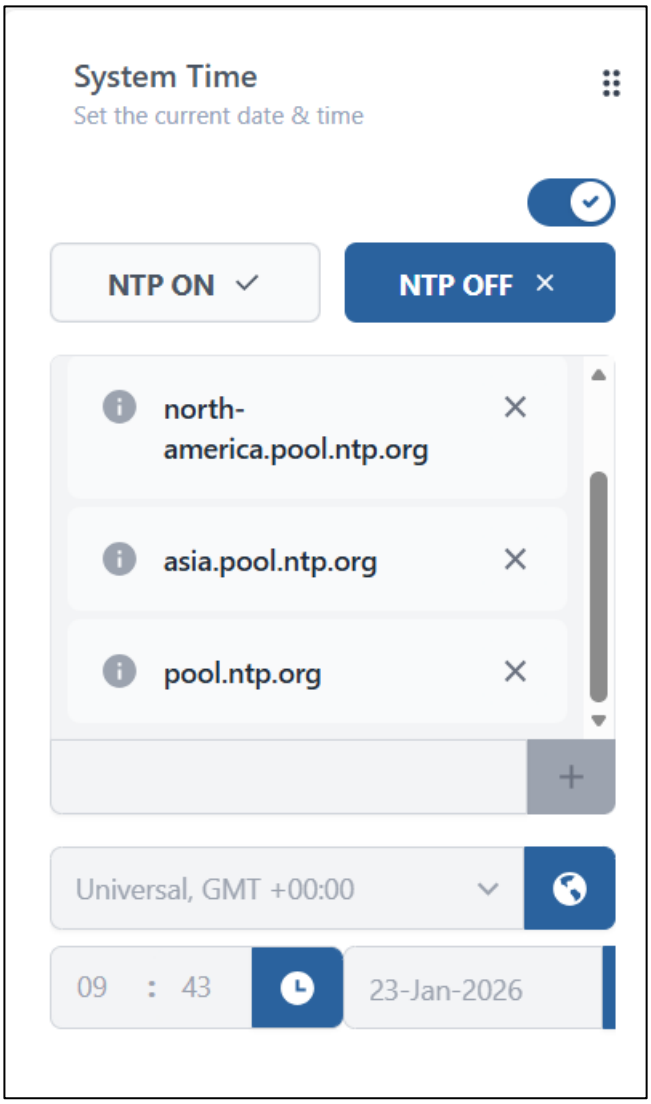


Figure 19 set time and date

7.4.5 System Update

The system can be updated by navigating to the latest software image after the selecting the “Upload File” button. Following upload, the system checks the image and then allows the user to select “Install Update”. After the process has been complete, the system should be rebooted. New images will be made available on the following ***ViaLiteAIR*** **Communications** web address : https://www.vialite.com/downloads/software/

If the software update included a display update, the display firmware will be automatically updated which takes around 10 minutes. Although the display is not usable during this time, the web GUI is available allowing control of switches.

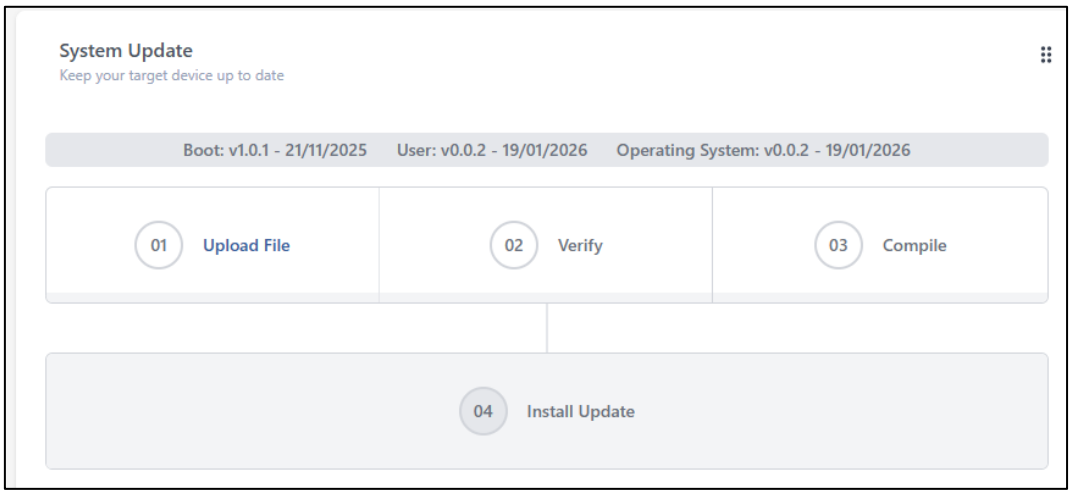


Figure 20 system update

7.4.6 System Reboot

The settings page features a reset button, located above the System Update, as shown below. Left clicking this button causes the system to reboot, which takes less than 30 seconds.

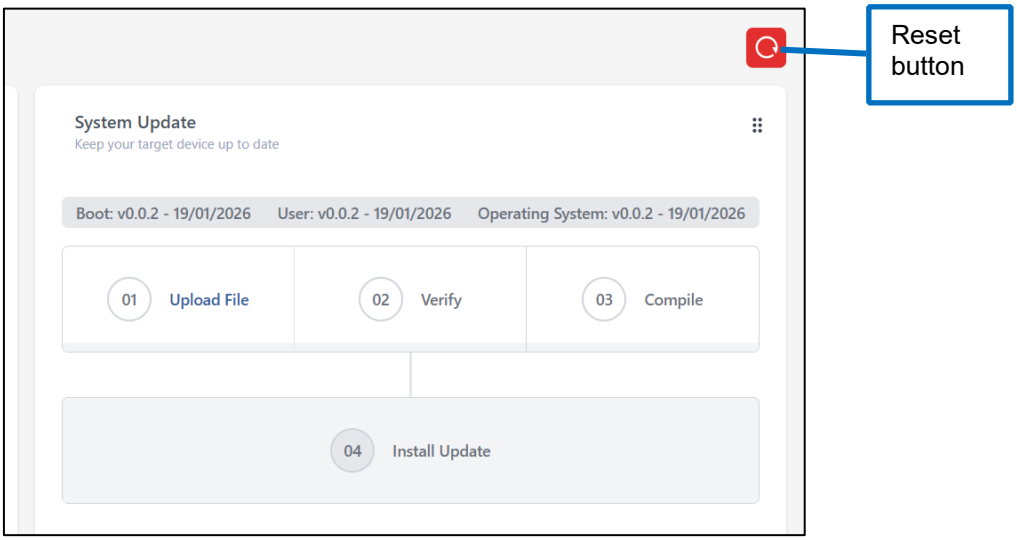


Figure 21 system reboot

7.5 **HTTP API interface**

In addition to the web browser, the **ViaLiteAIR fotonX OS** optical switch can be controlled and monitored using an API. All API commands have been documented using Swagger (https://swagger.io/product/), please contact ***ViaLite Communications*** or your local agent for further information.

8 Fibre Optic Interface Care

8.1 Connector and Cable Types

All ***ViaLiteAIR fotonX OS*** optical ports use single-mode (9 µm / 125 µm) cable terminated in a range of supported optical connectors detailed below.

Warning!

Angle polished (APC) and standard (PC) connectors must not be confused. The two connector types are not interchangeable and mating one with the other may damage both the cable and the module connectors.

The specification of optical connectors is critical to the performance of the complete Fibre Optic Link. System performance can only be guaranteed with fibre optic cables and connectors supplied by ***ViaLite Communications***. When FC/APC connectors are specified, they must be 'narrow key width'.

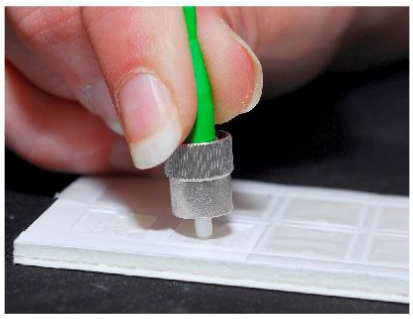
8.2 Connecting and Disconnecting

Before connecting optical fibres, ensure that the mating connectors are clean (see below).

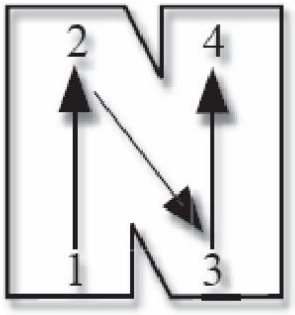
8.3 Cleaning Optical Connectors – Cleaning Before Every Use

Optical connectors **MUST** be cleaned before use, even where they have been protected with dust caps.
A large percentage of performance issues can be attributed to dirty fibres. For more details, please read the cleaning instruction that accompanies the connector cleaning kit.

ViaLite support FC, LC, SC/APC and E2000 connectors. The method for cleaning these connector types is the same and is as follows:



- Peel the plastic cover from an unused 'N' cleaning pad.
- Hold the connector between your thumb and forefinger.
- Clean the connector using firm pressure by swiping in a pendulum motion through each segment of the 'N' shape, following the diagram.
- Do not swipe over the same space twice.



8.4 Cleaning Optical Connectors – High Levels of Contamination

If there are performance issues that are not resolved by basic cleaning in section 8.3, then the following procedure should be used, noting that it may be necessary to repeat this procedure for very high levels of contamination:

1. Cleaning items required:
    a. Lint-free fibre cleaning tissues and/or cleaning sticks (normal cosmetic tissues produce dust and are not suitable).
    b. Reagent grade isopropyl alcohol (IPA).
    c. Air duster or filtered, compressed air line.

2. Cable connector cleaning:
    a. Dampen a patch of cleaning tissue with IPA and clean all surfaces of the plug ferrule.
    b. Using a dry-cleaning tissue, dry the ferrule and clean the end face.
    c. Using the air duster, blow away any residue from the end of the connector.

3. Module female receptacle cleaning (only recommended if problems are being experienced):
    a. Either use an optical cleaning stick or twist a cleaning tissue to form a stiff probe and moisten with IPA. Gently push the probe into the receptacle and twist around several times to dislodge any dirt.
    b. Repeat the above process with a dry tissue.
    c. Using the air duster, blow away any residue from the receptacle.

Important note: IPA is flammable and harmful if spilt on skin – Follow appropriate precautions / local guidelines when handling and storing, including the use of appropriate protection when handling. It should only be necessary to clean the female receptacles on the modules if problems are being experienced.

Never inspect an optical fibre or connector with the naked eye or an instrument unless you are certain that there is no optical radiation being emitted by the fibre. Remove all power sources to all modules and completely disconnect the optical fibres.

8.5 **Minimum Bend Radius**

Because optical fibre is made of glass, it is important not to subject it to excessive stress. For this reason, each type of cable has a minimum bend radius specification, beyond which the cable cannot be bent without permanent damage occurring.

The minimum bend radius of fibre optic cable fitted to the ***ViaLiteAIR fotonX OS*** is 50 mm.

9 Product Warranty

The guarantee / warranty period, unless otherwise agreed in writing, shall be as stated in document 'F292 - PPM Manufactured Product – Warranty', which is available at: https://ppm.co.uk/warranty-periods/. Extended warranty options are available at the time of purchase.

Prior to returning any goods for warranty or non-warranty repairs, please contact PPM / ***ViaLite Communications*** for a returns reference.

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