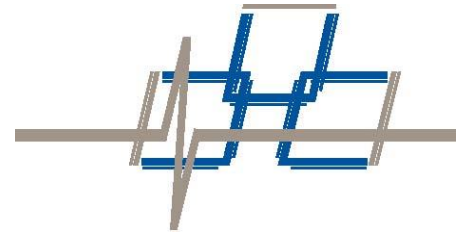


FD322-Rapid Fiber™ Kit Installation



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1. Introduction

This application note will instruct the reader on the proper methods for installing the **FD322-Rapid Fiber™ Kit**. Prior to installing the **Alarm Processing Unit (APU)** and deploying the sensor cable, the site to be protected must be assessed carefully so that all security needs are met and all potential threats are accounted for.

Ultimately, the method by which the sensor cable is installed and deployed is up to the end user. Fiber SenSys does not mandate one particular installation design over another; however, the general procedure for installing the fiber optic perimeter security system is as follows:

1. **Assess:** Survey the site to be protected and record all information needed for the site design phase
2. **Design:** Create a strategy for protecting the site. This includes planning the level of security, choosing the location of the APUs, provision of electrical power, and planning cable routing
3. **Install:** Proper deployment of the fiber optic sensor and correct installation of the Fiber SenSys system

2. Site Assessment and Design

Before installing any equipment, carefully survey the area to determine how many zones will be required and where each zone will be located. The locations of zones should work with the locations of lights, cameras, and other security considerations. A map of the perimeter should be generated, showing the locations of gates, corners, security cameras, key assets, etc.

FD322-Rapid Fiber™ Kits come in 100 meter or 200 meter zone lengths. The 100 meter zone kit comes with a spool of 250 meters of pre-connectorized sensor cable for each channel, while the 200 meter zone kit comes with a spool of 500 meters of pre-connectorized sensor cable for each channel. The additional cable accounts for a loop-back deployment as well as installation of service loops and sensitivity loops. For detailed information about deployment techniques, refer to the application note: **AN-ENG-027 Site Design and Installation for FD300 Series.**

Zones extend in both directions along the fence from the zone start location. Below is a simplified illustration of a fence with the locations of two zones labeled.

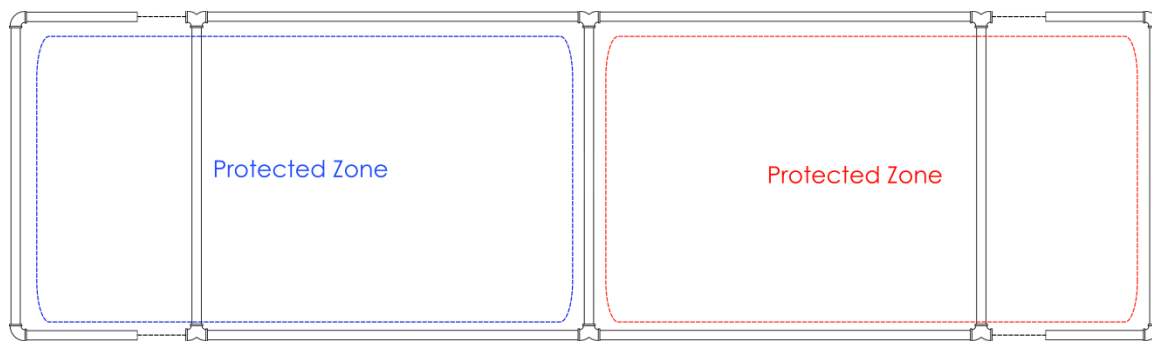


Figure 2-1. Simplified fence for FD322-Rapid Fiber Kit deployment.

Once the perimeter has been surveyed and the locations of zones approved, the physical locations of the edges of the zones should be marked in some way. A good way to mark these points is to tie a ribbon or a flag to the fence.

3. FD322-Rapid Fiber™ Kit Enclosure Installation

The **FD322-Rapid Fiber™ Kit** contains an **FD322 APU** that runs on 12-24VDC. The kit comes with the **APU** pre-connected to an included universal AC input power supply (120-240V, 50-60Hz). Power will need to be routed to the enclosure, and because of the variety of available power cables there is no pre-drilled port in the enclosure for power cable entry. It is up to the customer to drill the correct sized entry port for power and to install a weatherproof fitting for the diameter of their particular power cable. A label is placed on the enclosure indicating the location where the power entry port opening should be drilled out.

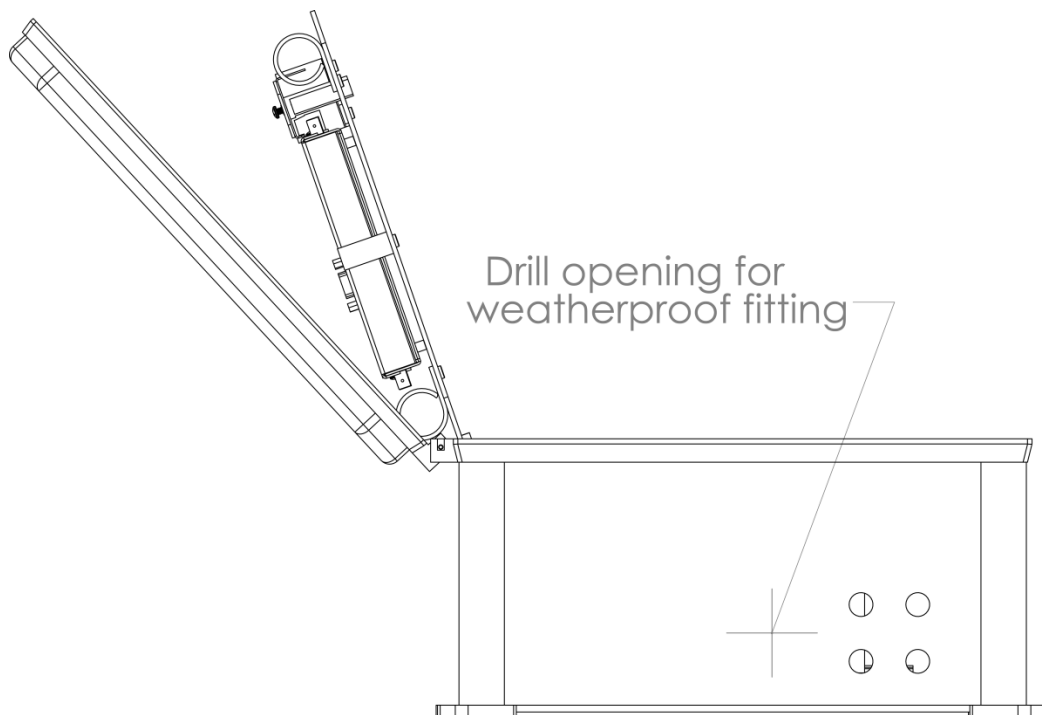


Figure 3-1. Drill a hole in the enclosure where indicated for a power cable entry port.

The kit enclosure has #10-32 threaded holes on the back side and comes with universal mounting feet that support many mounting options. Simply screw the mounting feet into the back of the enclosure using the provided #10-32 screws.

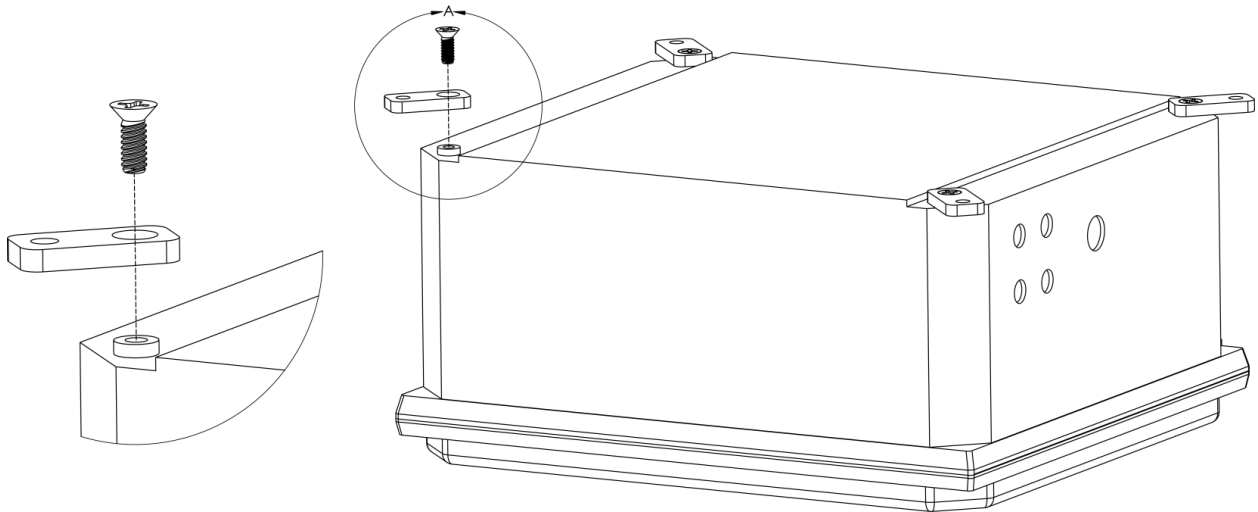


Figure 3-2. Install the universal mounting feet to the back of the enclosure.

Once the power entry port has been drilled and the mounting feet have been installed, the enclosure is ready to be attached to the fence. The method by which the enclosure is mounted is up to the customer, though it is typically preferable to mount the enclosure to a fence post due to the higher level of rigidity.

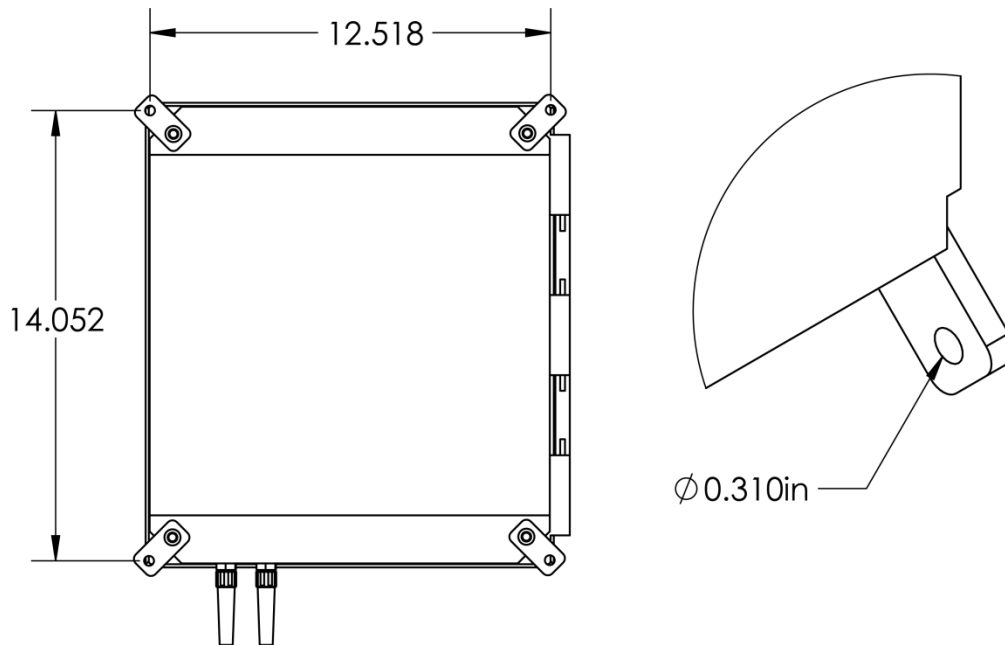


Figure 3-3. Dimensions of mounting hardware on the enclosure.

Orient the enclosure such that the power and optical entry ports are on the bottom to reduce the likelihood of moisture entering and remaining within the weatherproof enclosure. Locate the enclosure between two zones, as the zones will extend outward in either direction from the APU.

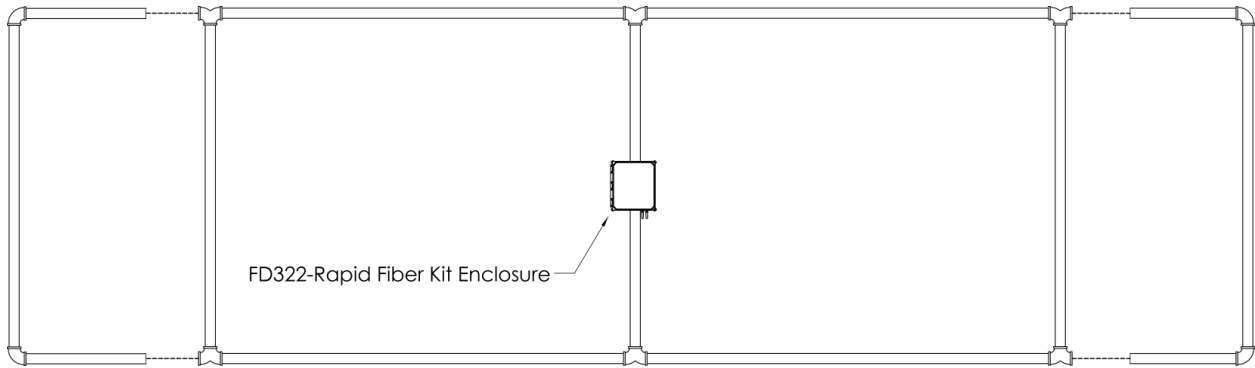




Figure 3-4. FD322-Rapid Fiber™ Kit installed at the intersection of two zones.

4. Fiber Optic Sensor Installation

 **CAUTION:** Some components of the cable assembly are extremely fragile. Pulling on the sensor cables at any point with greater than 60 lbs. of force can break optical fibers.

The **FD322-Rapid Fiber™ Kit** comes with two spools of pre-connectorized SC-4 cable. The spools come in lengths of 500 m (for the 200 m zone kit) or 250 m (for the 100 m zone kit). Take the free end of each spool, and route the fiber in through an optical entry port.

 **Note:** It is important that you only insert clean optical connectors into the APU's optical ports. Dirty connectors can degrade the performance of the APU, or even cause irreversible damage. When leaving connectors unconnected make sure they have protective caps installed on the ferrules. Caps protect the ferrule from damage that might be caused by bumping the ferrule against a foreign object, but caps can be dirty, and don't protect (effectively) against microscopic contamination. Consequently, be sure to clean all connectors prior to insertion into the alignment port, whether or not they have been capped. For more information on the care and cleaning of fiber optic connectors, refer to the fiber optics application note: **AN-SM-007 Fiber Optics**.

Route and Connect Optical Outputs

Route the fiber once around the base of the enclosure then pass the cable up to the upper level through the slot cut out of the hinged panel and connect to the optical outputs of the APU (shown in figure 4-1). Do not bend the fiber in a radius less than 5 cm (2 inches) when routing the fiber. Run the cable through the nylon cable restraints located along the edges.

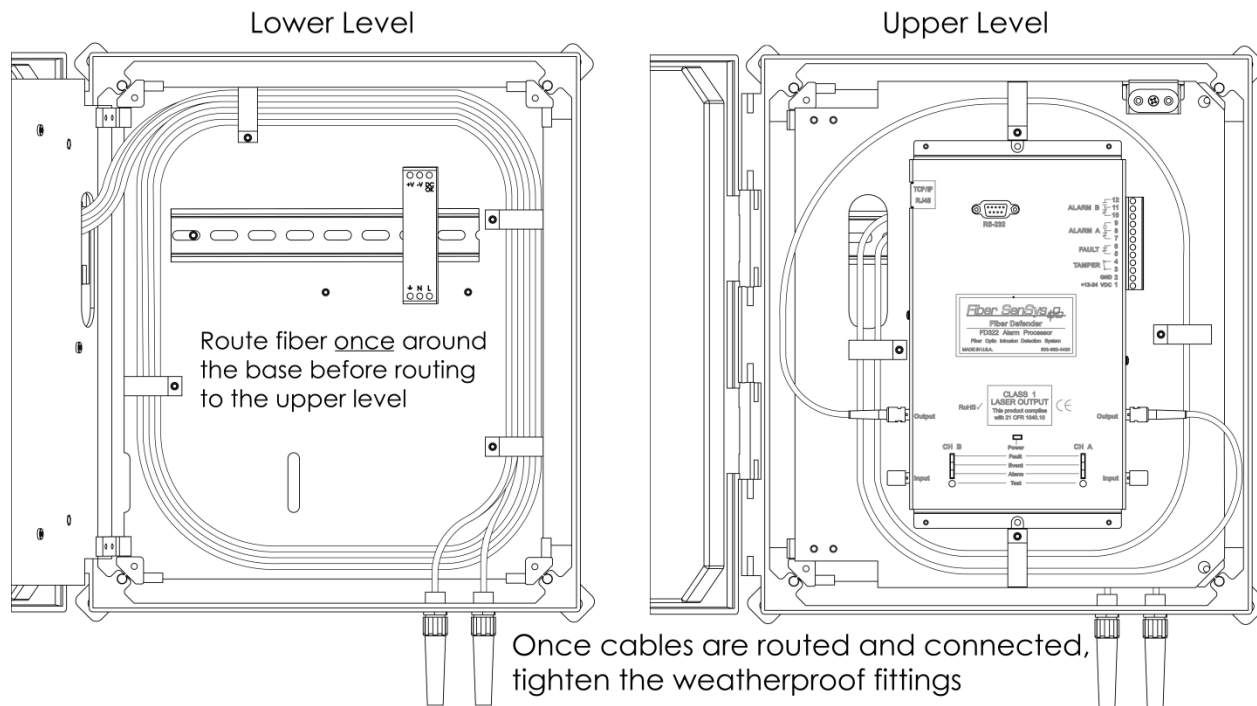


Figure 4-1. Route the fiber from the optical input port, around the lower level one full circle before routing to the upper level and connecting to the optical output ports on the APU.

Be sure to make one full pass around the base before routing the fiber to the upper level. This extra loop of fiber is intended to facilitate repairs to the sensor cable should it ever get damaged. Do not make more than one full pass, however, as storing excessive amounts of cable in the enclosure will cause it to become overly sensitive and may act as a source of nuisance alarms. Once the fibers have been routed and connected, secure and tighten the weatherproof fittings.

The kit also comes with packs of UV-rated nylon cable ties. Use the ties to route and secure the fiber optic sensor cable to the fence. It is easiest to un-spool the fiber as it is installed, attaching the top run of the loop first. The fiber should be routed around the enclosure once before routing to the end of the zone so that the two zones overlap at the enclosure (see figure 4-2).

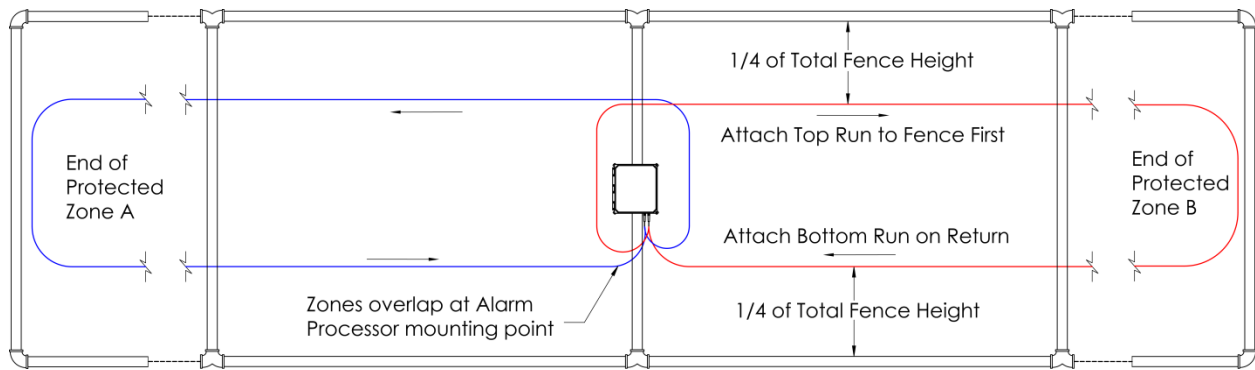


Figure 4-2. Install the fiber optic sensor on the fence.

Attach the sensor cable to the fence $\frac{1}{4}$ the total fence height from the top. Attach cable ties every 12" (30 cm), which is typically 4 fence diamonds. Be sure there is enough tension in the cable to prevent it from sagging.

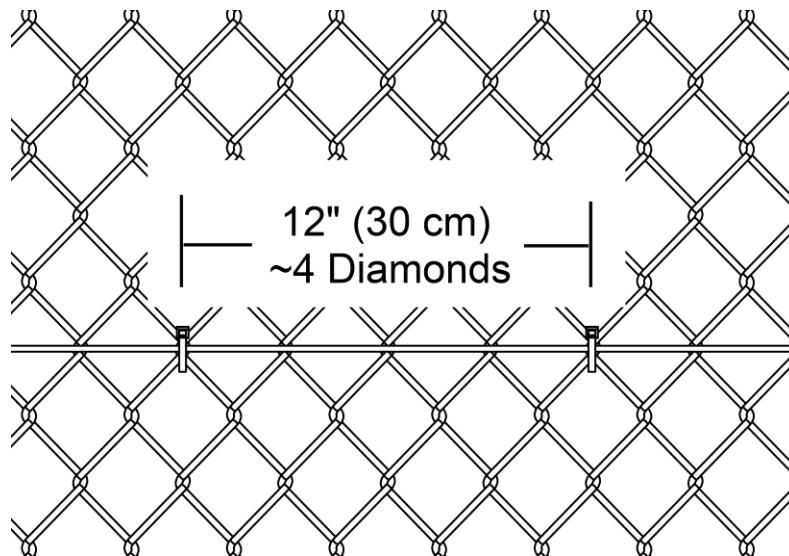


Figure 4-3. Cable tie spacing.

When fastening the cable to the fence, loop the ties between two vertically adjacent diamonds; do not loop diagonally as diagonally routed ties can kink the cable. Excessive kinking of the cable can cause optical loss, which will adversely affect the system's nuisance alarm rate and ability to detect intrusions.



Figure 4-4. Correctly tied through vertically adjacent diamonds.

Continue unrolling the spool and attaching the cable to the fence until you reach the marker indicating the edge of the zone. At this point, route the cable down to $\frac{1}{4}$ the total fence height from the bottom rail and begin the loop back to the **FD322-Rapid Fiber™ APU Enclosure**.

Once the fiber has been routed back to the enclosure, un-spool the remaining fiber. Route the remaining end of the sensor cable into the enclosure. Do not store more than 3 meters of excess cable within the enclosure. If more than 3 meters of fiber remains after reaching the enclosure, the excess must be removed or buried to prevent the enclosure from becoming overly sensitive and a potential nuisance alarm source.

Removing Excess

Pull all the fiber through optical port into the enclosure. Measure out 3 meters of cable from the entry port and cut the fiber. Re-connectorize the end of the 3 m of fiber with an industry-standard ST-type connector. Connector kits are available from Fiber SenSys for terminating SC-4 sensor cables. For detailed instructions on how to connectorize SC-4, watch the training video: **TM-ENS-002 Fiber Optic Cable Termination Video**.

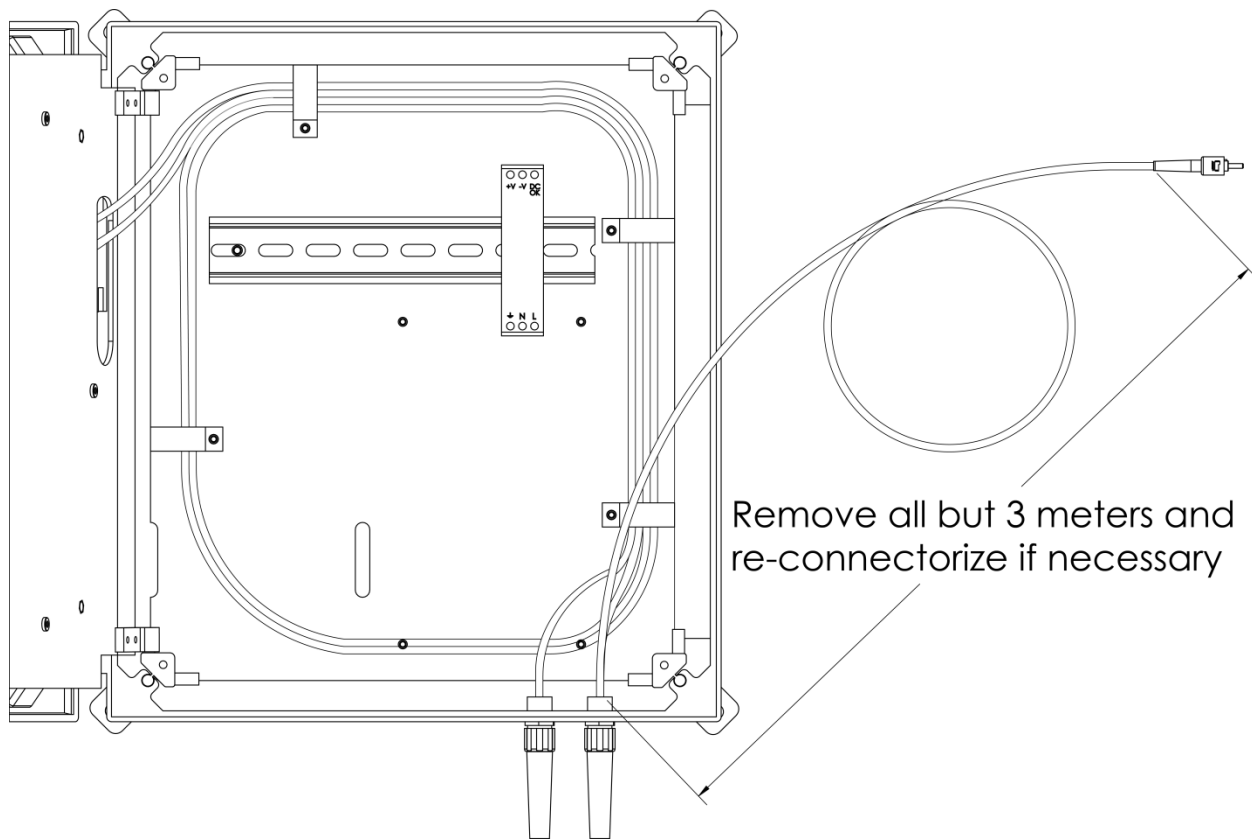


Figure 4-5. Removing excess fiber at the APU enclosure.

Burying the Excess

Pull 3 m of fiber through optical port into the enclosure. Coil up the rest of the excess fiber outside of the enclosure and bury the fiber 0.3 m or 1 foot underground to render it insensitive. If it is impossible to bury at the location of the APU, desensitize the excess fiber by filling a bucket with sand and burying the excess cable within the sand.

Route and Connect to Optical Inputs

Once the excess cable has been dealt with, there should be up to 3 meters of cable entering the optical entry ports. Route the fiber around the base of the enclosure until there is just enough remaining to pass the cable up to the upper level through the slot cut out of the hinged panel and connect to the optical inputs of the APU. Do not bend the fiber in a radius less than 5 cm (2 inches) when routing the fiber. Run the cable through the nylon cable restraints located along the edges. Once the fibers have been routed and connected, secure and tighten the weatherproof fittings.

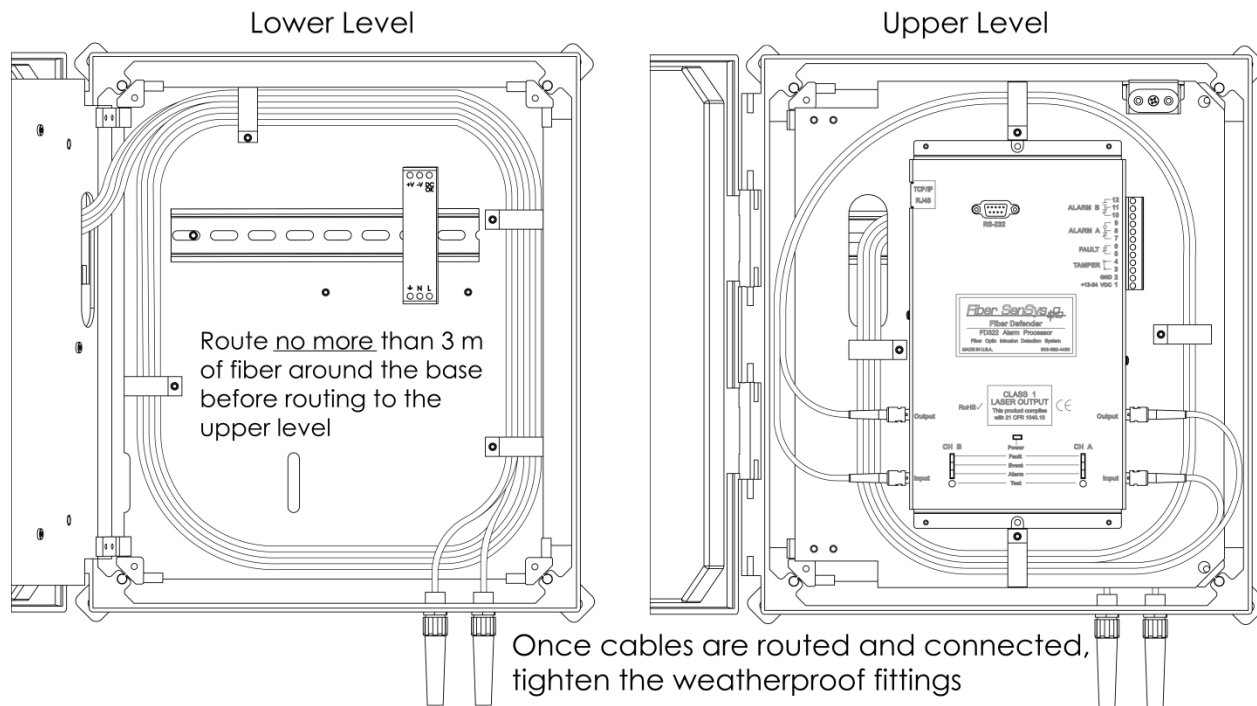


Figure 4-6. Route and connect the optical inputs.

Route and Connect Power

The power supply in the enclosure requires 120-240V, 50-60Hz AC power. Route the power cable in through the power entry port that was drilled during kit enclosure installation. The power supply has screw terminals for easy installation.

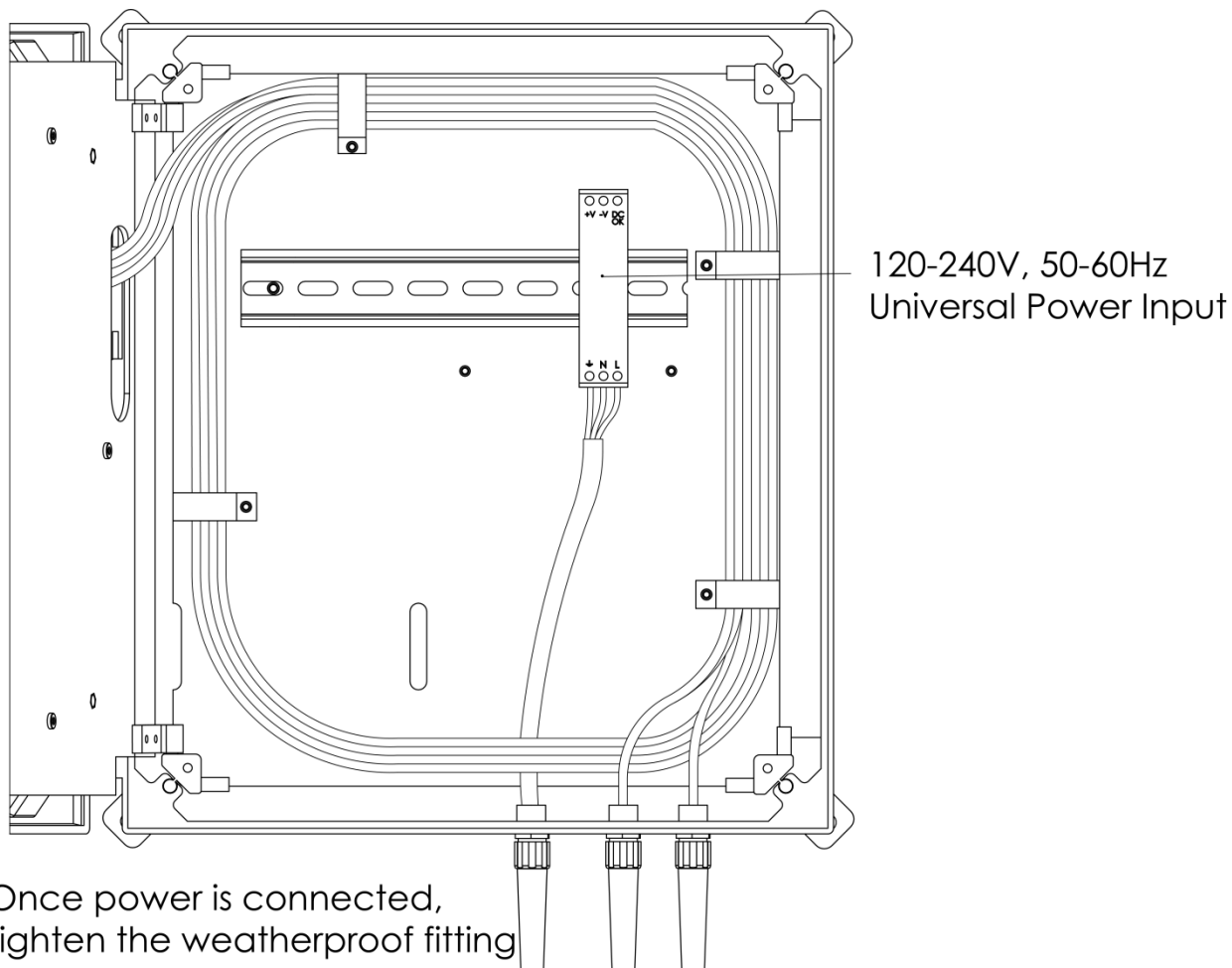


Figure 4-7. Route and connect power.

After the power cable is routed and connected, tighten the weatherproof fitting. Be sure that the weatherproof fitting matches the cable diameter of the power cable to keep moisture and dust from entering the enclosure. The power supply comes pre-connected to the APU so once the power cable is routed, connected and energized, the APU will turn on.

5. Calibration and Tuning

Before the system can be tuned to maximize Probability of Detection (PD) while minimizing nuisance alarms, the APU needs to be calibrated to compensate for the optical loss of the sensing fiber installation. Connect RS-232 communication between the APU and a laptop. The APU has a standard DB-9 connector, located on the front of the APU as shown below:

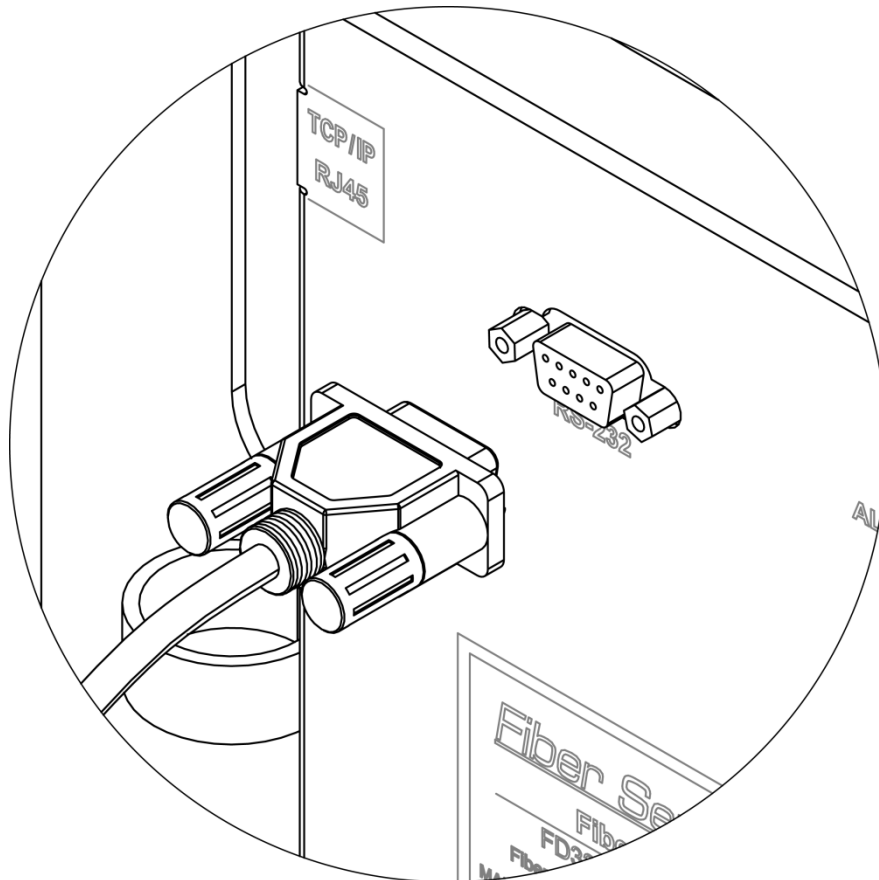
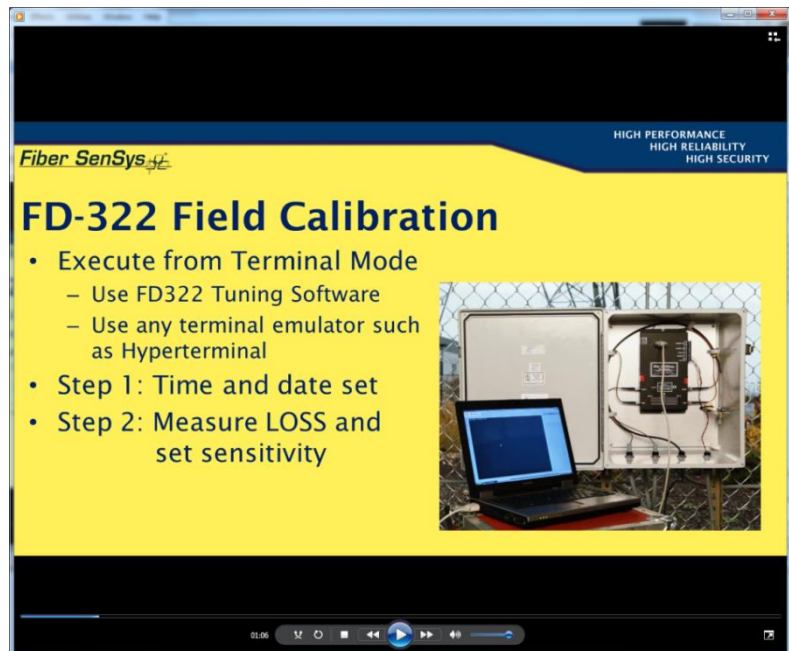


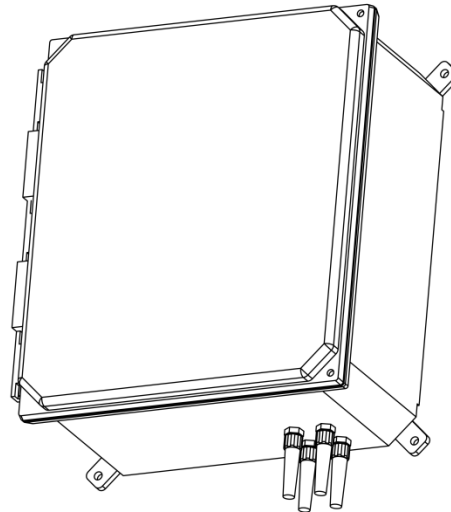
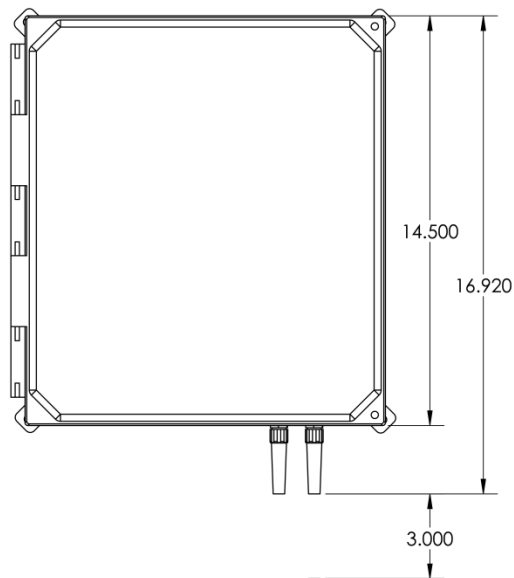
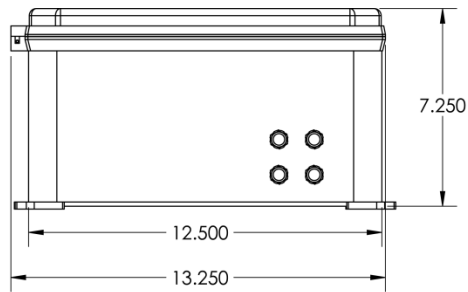
Figure 5-1. Connecting RS-232 communication to the APU.

Insert the CD and install FD322 Tuning Software on the laptop. For detailed calibration instructions, watch the training video: **TM-ENS-004E-FD322 Training-Cal & Tuning** located on the CD. This video gives detailed information and step by step instruction on the calibration and tuning process for the **FD322 APU**.

**Watch TM-ENS-004E-
FD322 Training-Cal &
Tuning video for detailed
instructions on how to
perform APU calibration
and tuning.**



Appendix A. FD322-Rapid Fiber™ Kit Specifications



NEMA 4X (IP66) Rated Polycarbonate Enclosure

Allow at least three inches for cable to prevent sharp bends

FD322-Rapid Fiber™ Kit Specifications	
Exterior Dimensions	Width: 12.00 in. (30.48 cm) Length: 14.00 in. (35.54 cm) Height: 6.00 in. (15.24 cm)
Industry Standards	NEMA 4X (IP66) rated
Operating Temperature	-20 degrees to +70 degrees centigrade (-4° to 158° F.)
Weight	12.5 lbs.
Power Supply Specifications	Input Voltage Range: 85 – 264 VAC Input Frequency Range: 47 – 63 Hz Output Voltage: 12 VDC Max Power: 10 W

Appendix B. Referenced Documents

AN-SM-007 Fiber Optics
AN-ENG-027 Site Design and Installation for FD300 Series
TM-ENS-002 Fiber Optic Cable Termination Video
TM-ENS-004E-FD322 Training-Cal & Tuning



Note: It is possible to download these documents online from the **Fiber Sensys** web page:
www.fibersensys.com