ENCONNEX

Enconnex RF Shielded Cabinet

USER MANUAL

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Precautions

Read the manual carefully before installing, servicing, or using the Enconnex RF shielded cabinet. Use the cabinet and all cabinet equipment according to instructions from Enconnex.

General Precautions

- Assemble the product according to the instructions.
- Do not exceed the weight capacity of this product. Overloading this product might result in injury or property damage. This product can support the following weight: Stationary: 1500 lb. (680 kg), Rolling: 1000lb. (454 kg).
- This product is intended for indoor use only and should not be used outdoors.
- Operate product within an ambient temperature of 54C (12C) to 85F (29C).
- Use only manufacturer-recommended or supplied spare parts.
- Keep cabinet and cabinet components such as honeycomb air vents free of dust and debris.
- Do not perform any action that creates a potential hazard to people or makes the cabinet unsafe.
- Minimum spacings between the Accessories and components and the IT Cabinet shall be maintained for the safe operation of the equipment when installed in accordance with the National Electric Code, ANSI/NFPA 70.
- Carry out regular inspection for damage and safety.
- Ensure that all personnel are trained, qualified, and authorized.
- Product should be repaired by personnel trained by the manufacturer or returned to the manufacturer for repair or replacement.

Physical Precautions

- Use suitable lifting gear during deployment and installation.
- All lifting should be done using safe lifting techniques.
- To move the cabinet,
    - Clear a path.
    - Agree on a plan.
    - Lift with multiple personnel or approved material moving devices.
- Floor must be level, firm, and capable of bearing the weight of the cabinet.
- Secure cabinet to floor, walls, or ceiling.
- Castor Wheels may be provided or used for the temporary transport of an empty or a fully loaded Cabinet System from one location to the permanent installation location. Once in place at the desired/intended location, the leveling feet shall be fully deployed for maximum stability.
- Additional stabilization of the cabinet may be needed when deployed in locations with seismic activity.
- Tipping hazard! Extending multiple components from this enclosure increases the chance that the enclosure will tip over. Do not extend more than one component from the enclosure to avoid this risk.
- Do not stack objects on top of the cabinet.
- Do not spill food or liquids on the cabinet.
- Do not operate the cabinet in a wet environment.
- Do not leave loose components, tools, or cleaning cloths on or inside the cabinet.

- Do not step inside or climb on the cabinet.

Electrical Precautions

- Disconnect power during installation or maintenance of electrical equipment such as the power distribution unit or power line filter.
- Do not touch the power line filter terminal when power is connected to the cabinet.
- Never assume that power is disconnected; always check.
- Cabinet is intended to be internally and externally grounded.
- Use the correct external power source.
- Operate the product only from the type of power source indicated by the power line filter.
- Power cable must be rated for the cabinet.
- Before working on a cabinet that is connected to power, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and cause serious burns or weld the metal objects to the terminals.
- Do not overload the power outlet strips when installing multiple devices.
- Grounding Proper installation of an equipment grounding terminal must be made. The cabinet must be grounded in accordance with NFPA 70, “National Electrical Code,” and the applicable sections of ANSI C2, “National Electrical Safety Code.
- Bonding - The following parts are not effectively bonded to the protective earthing terminal: Cabinet rails, shelves, baffle, blanking panels, cable managers. If these parts need to be bonded to the protective earthing terminal, it shall be done in accordance with Article 250 of the National Electrical Code.

RF Shielding Precautions

- Cabinet does not function with doors open or I/O panel removed.
- Install fiber optic cables through provided waveguides.
- Do not pass wires, cables, or any other metal conductors through waveguides, across gaskets, or otherwise breach the enclosure shield line.
- Do not create holes in the enclosure.

Product Information

The primary purpose of the Enconnex RF shielded cabinet is as a technical surveillance countermeasure (TSCM) mitigating risks from power analysis and EMI side-channel attacks. The secondary application is in spectrum management preventing electromagnetic interference between various systems. Spectrum management applications include the separation of communications equipment from computing systems and the isolation of devices for compliance testing.

The Enconnex RF shielded cabinet is a highly configurable product. Each customer configuration receives a unique part number linked to a specific selected option.

Configurable Features

- Height (Default: 42U)
- Depth (Default: 1100mm)
- Electrical (Default: Dual Single Phase 20A 250V; L6 Outside; C19 Inside; No PDU)
    - Phase
    - Amps
    - Volts
    - Connectors
    - Power Distribution Unit
    - Power installation location
- IO Panel
    - Connectors
    - Panel installation location

This product manual applies to all cabinets with standard configuration options.

Part Numbers

- Part number format: ECX-RFC-61342-<Configuration Number>

Serial Numbers for Traceability

All cabinets are identified with a unique serial number.
Format: < Product Code>-<Counter>

Product Code	Counter
1706001	01

Serial numbers create traceability information including

- Part Number
- Cabinet Configuration
- Date of Manufacturer
- Test Data Sheets
- Vendor / Supplier Purchase Orders

Cabinet serial numbers are located on the cabinet front door interior honeycomb air vent frame.

Features

Doors

- Front Door
    - 5X Honeycomb intake vents
    - 5X Replaceable intake filters
    - Lift-off hinges
- Rear Door
    - 5X Honeycomb exhaust vents
    - 10X Fans (2X per vent; see Cooling)
    - Lift-off hinges

Electrical

- Power: Dual Single Phase 20A 250V; L6 Outside; C19 Inside; No PDU
- Power Distribution Unit: None; 2X mounting brackets installed rear right (when facing rear)
- Power Installation Location: Customer-specified (top by default)
- 2X Power cords for external power
    - 10-foot length
    - 12 AWG SOOW E123366 600V
    - 20A locking male plug (side 1)
    - 20A locking female plug (side 2)
- Grounding kit

Cooling

- Performance: Up to 10 KW cooling with a 25° delta
- Fans: 10X Exhaust fans installed on rear door
    - Power: 230V, 35W
    - CFM: 235

Cabinet Mounting

- 4X Adjustable vertical rails with square holes

Paint

- Sherwin Williams - F63B12 (Polane-T Black)

Accessories

- 2X Floor mount brackets
- 4X Casters
- 4X Leveling feet

Attenuation Performance

- 2.4GHz-2.5 GHz – 85 dB with 2.45 GHz test frequency
- 5.170GHz-5.835GHz – 85 dB with 5.332 GHz test frequency

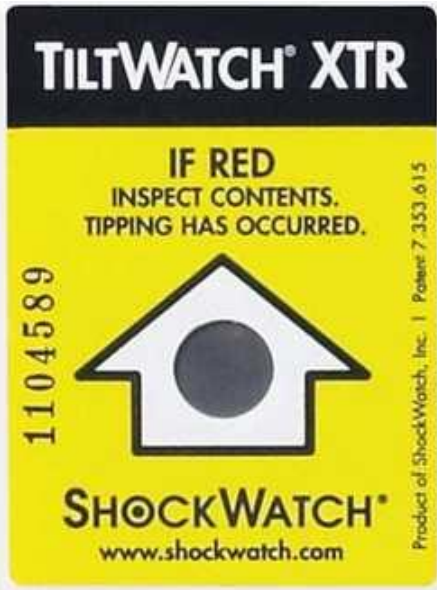
Unpacking the Cabinet

Enconnex RF Shielded Cabinets arrive in a custom crate.

Warnings: The cabinet is heavy. Exercise caution when removing the cabinet from the pallet. At a minimum, three people are required to unpack the cabinet. Do not attempt to unpack the cabinet without assistance.

Removing from Crate

1. Check the tilt sensor and the shock sensor before opening the crate and make sure they are not turning red.



2. One person will hold the crate door in place while a second person unfastens the clip holding the door in place.

3. Two people will lower the crate door into the ramp position.

4. Two people will pull the cabinet from the crate.

5. Hold the cabinet secure while rolling down the ramp.
6. Remove wrapping and cardboard from the cabinet exterior.

Installation

Rogue comes standard with casters to aid in placement. Do not load cabinet equipment without securing the cabinet to the floor with leveling feet and, whenever possible, mounting bracket.

Moving the Cabinet

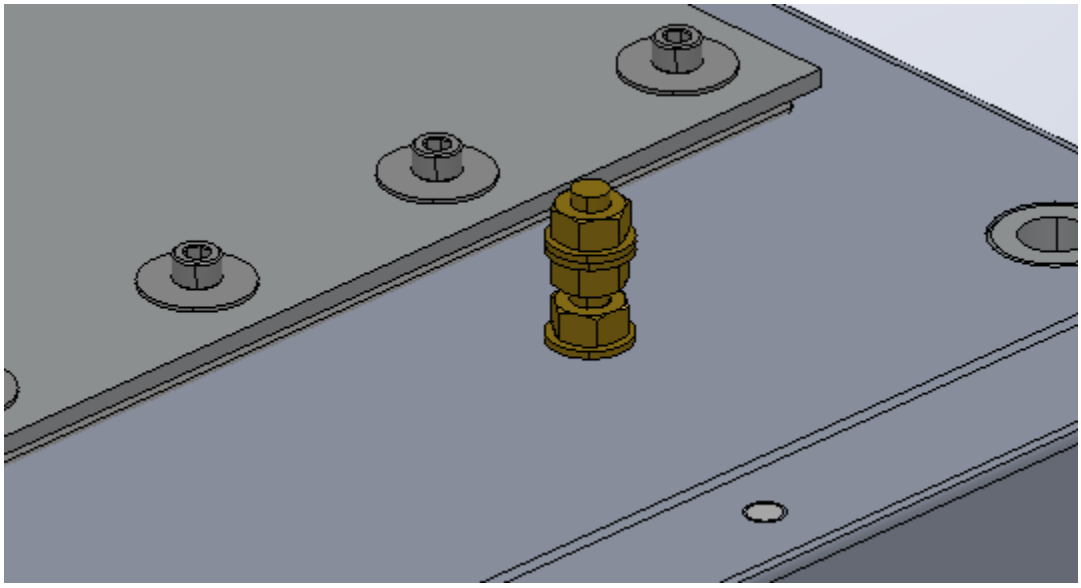
1. Two people will roll the cabinet into place.
2. A third person should ensure a clear path. The cabinet is a sensitive piece of calibrated equipment. Mishandling will affect performance.

Leveling the Cabinet

1. The cabinet must be properly level prior to installing any cabinet equipment to ensure stability. The surface the cabinet is located on must also be a flat, level surface in order to support the combined weight of the rack and cabinet equipment installed.
2. Use a level to ensure the installation location is a flat, level surface.
3. Using a wrench, lower the Leveler (4 located next to each caster) by turning it clockwise until the base of the leveler is tightly pressed against the surface, supporting the weight of the cabinet.
4. Place the level on the top of the cabinet to ensure that the Levelers are adjusted correctly. If the cabinet is not level, make the required adjustments to the Levelers until the cabinet is level.

Attaching the Ground

1. The cabinet provides brass grounding studs on top and bottom towards the rear of the enclosure.



2. Ground stud consists of a ¼-20 threaded rod installed on the enclosure with a brass washer and brass hex nut.
3. Note: Fully removing the Ground Stud will impact shielding performance.

4. To ground the cabinet
    a. Remove the outermost nut.
    b. Remove the outermost brass washer.
    c. Place terminal of ground cable around threaded rod.
    d. Place the brass washer over the ground cable terminal.
    e. Secure terminal by threading brass hex nut.

General Information

Door Opening

- Place both hands on the provided handle grips.
- Pull the handle towards the body to disengage the latches from the receiver.
- Swing the door open in a controlled motion.

Door Closing

- Place both hands on the grips of the vertical handle shaft.
- Swing door to ajar position.
- Lift handle to move latch lever tabs into a down position, aligned with receiver block keepers on cabinet weldment door flange.
- Push door closed.
- Push handle shaft toward cabinet to the full down position, completely engaging latch tongues into receivers.
- **Ensure all latches are engaged in receivers.**

Cabinet Maintenance

Enconnex cabinets require minimal maintenance compared to shielded rooms. The environment dictates cleaning frequency. Cabinets installed in clean office environments should only require minimal periodic maintenance. NiCu fabric over foam gaskets do not oxidize or break as fingerstock.

Cleaning Door Gasket and Contact Surface

A monthly cleaning cycle for the door gasket is recommended. Lightly wipe the door gasket with a white lint-free cloth dampened with denatured alcohol. Clean all exposed surfaces – the inside and outside of the gasket. In situations where denatured alcohol is not available, acetone may be used as a replacement.

Note: The gasket for the honeycomb air vent is not accessible and should never require cleaning.
Caution: Over-wetting the gasket can allow the denatured alcohol to seep into the core, causing damage to the foam, such as shrinkage and hardening.

The environment will determine the frequency of door gasket repairs or replacement. Operation in extreme conditions of moisture, heat, dust, dirt, or other contaminants or abuse and neglect will accelerate the deterioration of components and reduce the life expectancy. The gasket manufacturer claims there are no changes in surface resistivity for 1,000,000 cycles and approximately 15-19% compression set.

The door frame flange shield line surface that contacts the gasket is treated with a clear chromate conversion coating that acts as a corrosion inhibitor and helps to retain electrical conductivity. The exposed door flange contact surfaces should be cleaned at the same monthly cycle as the door gasket. Lightly wipe the door frame flange with a white lint-free cloth dampened with denatured alcohol. The use of abrasive scrubbing pads is not recommended.

Replacing I/O Panel Gasket

Replacement gasket kits can be purchased from Enconnex

Caution: Gasket must be shipped and stored horizontally to prevent creasing.

- Remove I/O from the cabinet by uninstalling the 28x 10-32 ¾ inch long socket cap screws using a 5/32 hex bit and clutch drive screw gun set to 8.
- Place the I/O panel on a large flat surface gasket side facing up.
- Peel off the door gasket strips as needed.
- Use a scraping blade and denatured alcohol to remove residual gasket adhesive.
- Peel off the liner on the back of the replacement gasket to expose PSA. Apply the gasket and ties as detailed in the below schematic.

- Lightly wipe the gasket surface with a white lint-free cloth dampened with denatured alcohol.
- Clean the exposed cabinet I/O panel contact surfaces and lightly wipe them with a white lint-free cloth dampened with denatured alcohol.
- Position the I/O panel in the cabinet, aligning the through holes in the panel with the blind hardware insert in the cabinet I/O panel frame
- Reinsert all 28 screws with the washer in through holes of the I/O panel and press down with thumb to seat.
- Set clutch drive on screw gun to low setting 2-4 and tightened all hardware consecutively in a close wise or counterclockwise direction.
- Set clutch drive on screw gun to higher setting 7-8 and repeat tightening of hardware.

Caution: Over tightening of I/O panel causing gasket beyond 70 % compression can degrade shielding performance.

Door Removal

Replacing the door gasket requires door removal. The process requires two people. The rear door with fans is heavy.

- Open the door to approximately 90 degrees
- Remove the lanyard from the door
- Place hands on both hinge and latch sides
- Lift straight up
- Place the door on a flat, level, clean surface

Replacing Door Gasket

Replacement gasket kits can be purchased

Caution: Gasket must be shipped and stored horizontally to prevent creasing.

Process

- Remove the door from the cabinet using the lift-off hinges.
- Place the door on a large flat surface gasket side facing up.
- Remove existing gasket
- Use a scraping blade and denatured alcohol to remove residual gasket adhesive.
- Gasket application sequence (See figure for visual aid)

    - Peel PSA from 21110614-01 D Gasket
    - Place 21110614-01 at the top horizontal edge of the door

    - Peel PSA from 21110614-01 D Gasket
    - Place 21110614-01 at the bottom horizontal edge of the door

    - Peel PSA from 21110616 C-Fold Gasket
    - Place 21110616 at the hinge side vertical edge of the door

    - Peel PSA from 21110614-42-01 D Gasket

- Place 21110614-42-01 at the latch side vertical edge of the door

- Peel PSA from 21110614-02 D Gasket
- Place 21110614-02 against the previously laid gasket at the door bottom

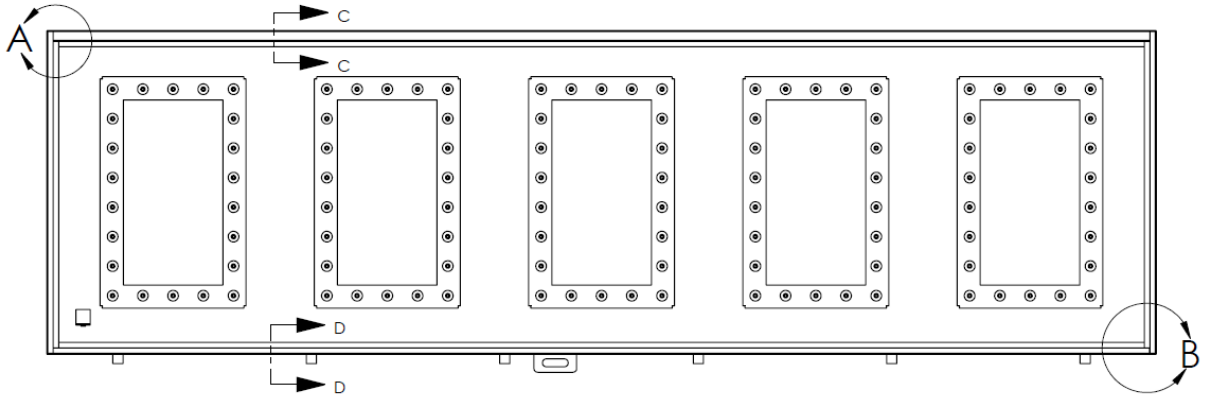
- Peel PSA from 21110614-02 D Gasket
- Place 21110614-02 against the previously laid gasket at the door top

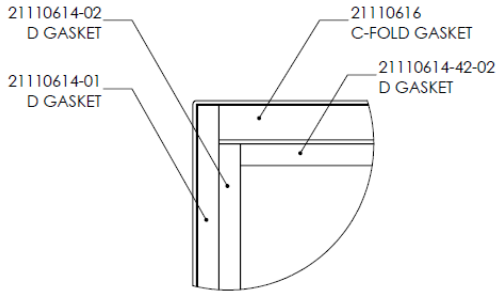
- Peel PSA from 21110614-42-02 D Gasket
- Place 21110614-42-02 against the previously laid gasket on hinge side

- Peel PSA from 21110614-42-02 D Gasket
- Place 21110614-42-02 against the previously laid gasket on latch side

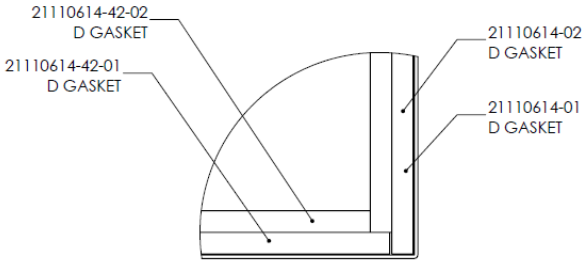
- Lightly wipe the gasket with white lint-free cloth dampened with denatured alcohol
- Lightly wipe gasket mating surface on cabinet with a white lint-free cloth dampened with denatured alcohol
- Replace door on hinges

Door Gasket Illustrations





DETAIL A
SCALE 1 : 2



DETAIL B
SCALE 1 : 2

Repairing Door Gasket

Gasket repairs can include:

- Affixing loose gasket
- Replacing fabric tape joins at corners
- Replacement of gasket lengths

Affixing Gasket

If the gasket has sustained damage and is no longer adhered to the shield line surface, it can be affixed. The fabric over the foam gasket uses a 3M 969 Series transfer tape with pressure-sensitive adhesive (PSA) and no carrier.
Note: The shelf life of 3M 969 tape in roll form is 24 months from the date of manufacture when stored in original cartons at 70°F (21°C) and 50% relative humidity. See manufacturer specification for complete product details.
Procedure

- Lift the loose gasket.
- Remove residual PSA with a scraping type of X-Acto blade and denatured alcohol[1].
- Press the adhesive side down to the back of the gasket.
- Peel off the liner, the adhesive "transfers" from the liner and is ready to bond.
- Reaffix the gasket to the proper location.

Note: Do not kink, bend, or crease the gasket. Superficial wrinkles in the gasket are normal and do not affect shielding performance. Creases caused by kinking or bending the gasket can cause loss of attenuation.

Replacing Fabric Tape at Corner Joins

Fabric tape is used to boot the ends of all fabric over foam gasket. At corner intersections, fabric tape ties one gasket row with the next for increased electrical continuity. The fabric tape is 3M CN3190 CuNi polyester rip-stop fabric with conductive PSA. It is oxidation resistant with high strength for shielding and grounding.
The fabric tape used on the gaskets 3M CN3190 Series Fabric Tape 1 inch x 54.50 yards. Peel off any loose section of tape and lightly wipe the gasket surface with a white lint-free cloth dampened with denatured alcohol. Use the removed section as a template to cut a replacement piece. Remove the fabric tape liner and affix the replacement piece to the gasket.

Replacement of Gasket Lengths

Should it be necessary, lengths of the gasket on the doors and or I/O panel can be removed and replaced.

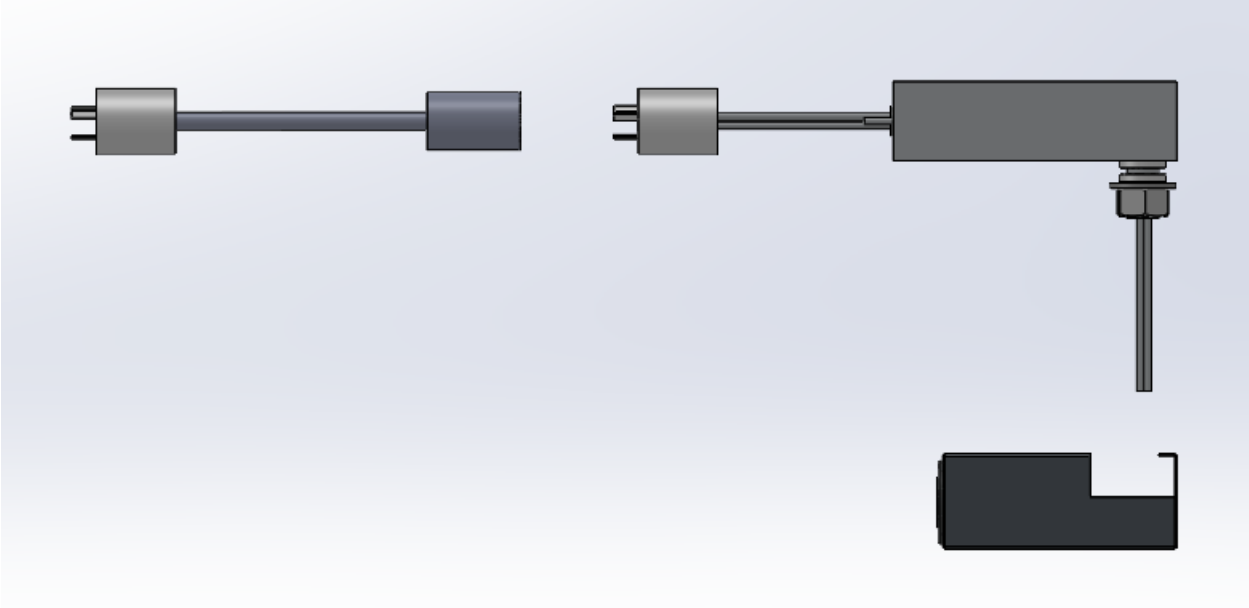
Power Line Filter Installation

Tools Required

- Adjustable wrench
- #2 screwdriver Phillips head
- White lint-free wipes
- Denatured alcohol

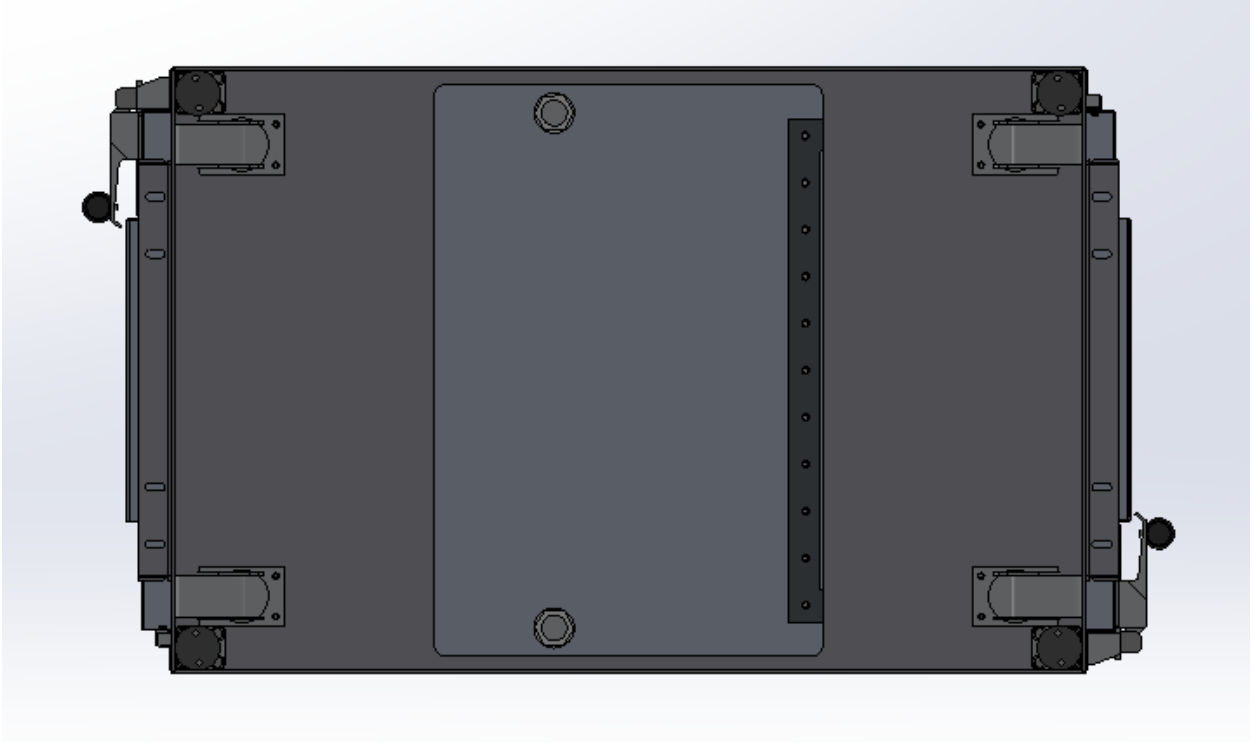
Powerline Filter Kit

The Power Line Filter kit comes in a variety of configurations accommodating different power and connectors. Installation requires qualified personnel.

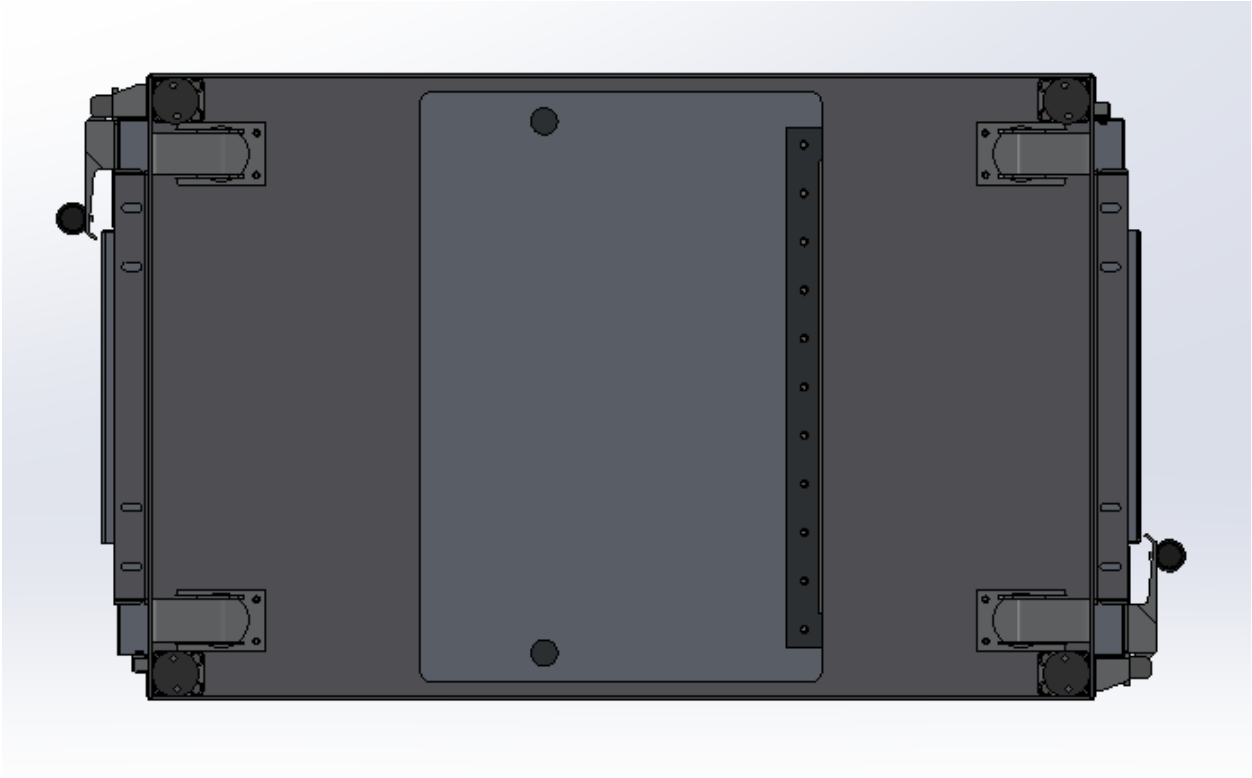


Process

- Lift door off hinges and set aside
- Place the cabinet on a supportive, non-marring surface with a solid side down



- Remove Goof plugs (image shows goof plugs installed on the cabinet bottom. This is the default location)



- Place the power line filter pipe through the hole in the cabinet oriented as shown below
- From the inside of the cabinet, thread Monel doughnut gasket over the powerline filter pipe penetration to the cabinet bottom.

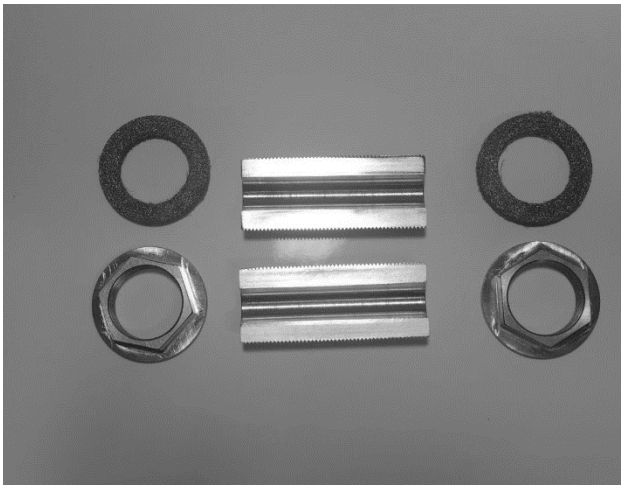
- Thread the flange nut onto the powerline filter pipe penetration until it contacts the Monel doughnut gasket.
- Tighten the power line filter with an adjustable wrench to 10 ft./lbs.
- Ensure power line filter maintains orientation
- Wire the power line filter to the receptacle in power cover per connector manufacturer instructions
- Enconnex provides power line filter wires stripped to the appropriate length
- Remove liner tape from power cover dual lock
- Affix power cover to the cabinet inside

SplitFORM Waveguide Installation

SplitFORM waveguides separate in half and rejoin. The waveguide accommodates larger fiber bundles or connectors than conventional fiber optic waveguides.

The center bore of the SplitFORM is available in three diameters depending on fiber optic cable thickness and attenuation requirements.

12010370-01: .375-inch center bore, 100 dB of attenuation from 400 MHz to 18 GHz
12010370-02: .500-inch center bore, 100 dB of attenuation from 400 MHz to 13 GHz
12010370-03: .620-inch center bore, 100 dB of attenuation from 400 MHz to 9 GHz



Part Number	Description	Quantity
12010369	Body	2
14032916	Flange Nut	2
18030777	Monel Doughnut Gasket	2

Standard cabinet I/O panel connectors are sealed at the shield line using a conductive silver epoxy to ensure high levels of shielding effectiveness. The SplitForm waveguide is an exception since it must be removed from the I/O panel during integration to route fiber optic cables.

Tools and Materials

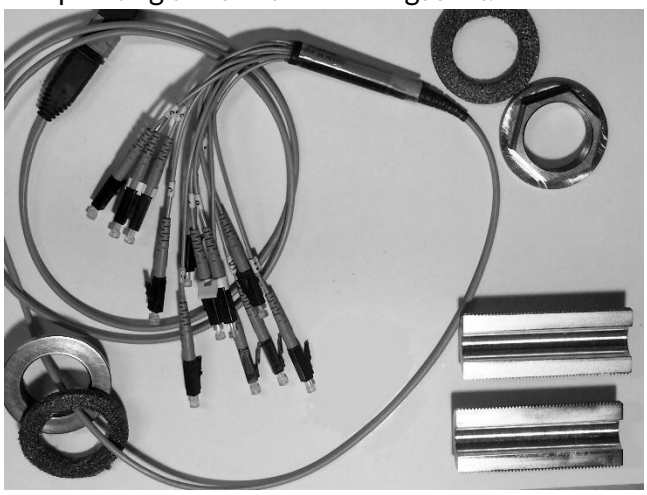
- Denatured Alcohol
- White Lint-free Cloths
- 2X adjustable Wrenches

Removal Process

- Use adjustable wrench to prevent the outer flange nut from turning during disassembly.
- Loosen the interior flange nut. An adjustable may be used to loosen the interior flange nut if necessary.
- Remove the Monel doughnut gasket by slowing twisting it down the waveguide threads.
- Remove the remaining SplitFORM components from the I/O panel exterior.
- Unscrew the second flange nut and Monel doughnut gasket from the waveguide body.
- The two halves of the waveguide body will separate.

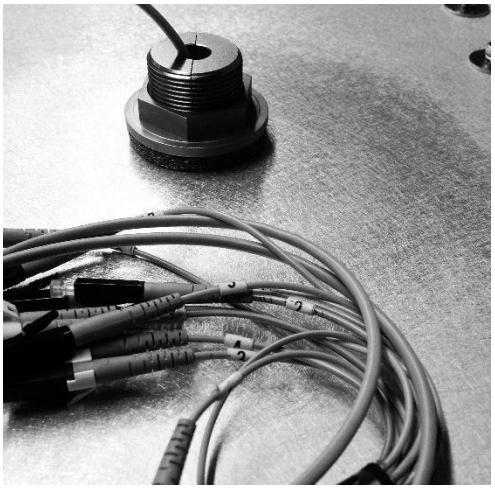
Installation

- Insert the fiber optic cable through a flange nut
- Insert the fiber optic cable through a Monel doughnut gasket. The mounting surface of the flange nut should be pointing toward the Monel gasket.



- Place a waveguide body section directly in front of the flange nut/Monel gasket.
- Lay the fiber optic cable into the waveguide body bore.
- Place the second waveguide body section on top of the first to encase the fiber optic cable in the waveguide center bore.

- Hold the two waveguide sections together making sure the halves are aligned at the ends and along the seams.
- Twist the Monel doughnut gasket over the waveguide body end.
- Twist the gasket until reaching the desired position on the waveguide, generally short of halfway.
- Thread the flange nut onto the waveguide body.



- Insert waveguide body through the I/O panel clear opening. The waveguide may be inserted from the cabinet interior or exterior.
- Thread the second Monel doughnut gasket followed by the flange nut onto the waveguide from the opposite side.
- Tighten to 10 ft./lbs.

Component Specifications

Hinge Specifications

Manufacturer	Southco	Color/Finish	Black Powder Coat
Address	P.O. Box 0116 210 North Brinton Lake Rd Concordville, PA 19331-0116	Description	Removable Lift-off Hinge
Phone	610-459-4000	Material	Zinc Alloy (Cast)
Website	http://www.southco.com		

Hinge Performance Details	Radial Load	Axial Load
Maximum Static Load	1000 N (255 lbf)	2220 N (500 lbf)
Average Ultimate Load	1550 N (350 lbf)	14,000 N (3200 lbf)

Fan Specifications

Fans are mounted to the interior rear door. The fans are mounted to fan plates for simplified replacement. Door fans are configured to draw cool room air through the cabinet and exhaust warm air from the rear door.

General

Manufacturer	Laridium	Color/Finish	Black Powder Coat
Email	connor@laridium.com	Description	172mm AC Fan
Website	www.laridium.com	Material	Diecast Alum. Housing PBT, UL94V-0 Impeller

Performance

Air Flow	235 CFM	Life Expectancy	60000 hour (L10@40C)
Noise	52 dBa	Operating Temperature	-40C - +70C
Speed	3200 RPM	Connection	Terminals
Power	230V	Power Rating	35 W
Size	172mm x 51mm		

See Manufacturer datasheet for complete specifications.

Fan Harness

A harness joins the fans in series to a single C19 outlet. Spiral wrap prevents pinching or binding of the power cord at the door hinge while closing the cabinet door. The cabinet powers each fan column by separate harnesses allowing power redundancy to mitigate thermal issues during a PDU or circuit failure.

Power Line Filter (PLF) Information

Enconnex cabinets use a proprietary power line filter.
Filters are CE, not UL approved.

Single Phase Power Line Filters

- 32 Amps, 250V
- 2-conductor plus ground
- 10 AWG wire
- Threaded Pipe penetration
- Lightweight, approximately 8 lbs.
- Ground wire not filtered
- Technical Data
    - Rated Voltage: 250V
    - Rated Current Load: Up to 32 Amps
    - Operating Frequency: 50/60 Hz
    - Insertion Loss: 100 dB, 150 kHz to 18 GHz
    - Leakage Current: ≤20 mA

Three-Phase Power Line Filters

- 32 Amps, 400V
- 3-conductor plus ground and neutral, dual 3-phase, 400V
- 10 AWG wire
- Threaded Pipe penetration
- Lightweight, approximately 8 lbs.
- Ground wire not filtered
- Technical Data
    - Rated Voltage: 440/250V
    - Rated Current: Up to 32 Amps
    - Operating Frequency: 50/60 Hz
    - Insertion Loss: 100 dB, 150 kHz to 18 GHz
    - Leakage Current: ≤20 mA

Intake Filter Specifications

POLYX air filters are made of progressively bonded uniform non-woven polyester filtration media and expanded aluminum face grids. The polyester is manufactured using advanced technology

air-laid equipment. This process produces a media of high quality, uniformity, and excellent filtration performance.

POLYX filters are frequently used in electronic cabinets where blowers are drawing air from the floor level or cabinets in an office environment. The filter is easily cleaned and is also resistant to most inorganic alkalis, salts, and acids as well as commonly used organic chemicals.

Typical Specifications
Frame: .025 Aluminum channel
Closure: Aluminum blind rivet
Filtration Media: Non-woven polyester
Face Grids: Slit and expanded aluminum
Tolerances: Length ± 1/16, width ± 1/16, thickness ± 1/32 (closer tolerances may be available)
Thickness: ½ inch
Finishes: Chemical film, clear iridite

POLYX filtration media carries an Underwriters Laboratories 900 Class 2 listing.
ASHRAE Standard 52
Size: 1/2" 1"
Initial Resistance: .13 .17 in. w.g.
Average Arrestance: 60% 65%

Standards: POLYX filtration media carries an Underwriters Laboratories 900 Class 2 listing.

ASHRAE Standard 52
Size: ½ inch 1 inch
Initial Resistance: .13 .17 inch w.g.
Average Arrestance: 60% 65%

RF Gasket Specification

Fabric over foam CuNi (Copper/Nickel) gaskets are utilized at the shield line of the doors, honeycomb air vents, angled I/O panel, and blank I/O panel.

Material Specifications

- Shielding Effectiveness: > 100dB attenuation from 20 MHz to 10 GHz
- Electrical Resistance: < 0.05 Ohms/Sq
- Compression Deflection: < 1 lbs/in
- Compression Set: 15-19%
    - 15 % at 70° F (21° C)
    - 19 % at 158° F (70° C)
- Service Temperature: -40° F (-40° C) to 158° F (70° C)
- Flammability Rating: UL94V-0
- Note: The application and EMI/RF gasket geometry may influence shielding effectiveness, compression deflection and compression set.

Honeycomb Air Vents

Description

Ten (10) each honeycomb air vents are installed in the cabinet:

- 5 each 16-inch x 10-inch x ½ inch – front cabinet door
- 5 each 16-inch x 10-inch x ½ inch – rear cabinet door

The honeycomb air vents utilized in the cabinets are typical to those used in shielded enclosures. The vent panels consist of corrugated metal foil strips material fused together with a thin layer of tin solder, forming a continuous electrical and mechanical bond. Cell geometry allows the maximum amount of open space while uniformity and depth of the honeycomb tubes reduce air turbulence. The honeycomb air vents provide the same shielding effectiveness (100+ dB) over the test frequencies range of 100 MHz to 10 GHz.

Cleaning Honeycomb Air Vents

Spray honeycomb waveguide air vents every 3-4 months or as needed with compressed air. Cleaning and replacement of air filters on doors (intake air) will help to honeycomb to remain debris free.

Cleaning and Replacing Door Filter Media

The front and rear doors contain Polyx particle filters installed behind the exterior door grid. The filters may be easily removed for cleaning or replacement by sliding the filter out the side slot of the door grid.

- Remove loose dust and debris from the filter with a vacuum.
- If vacuuming does not sufficiently clean the filter, it may be rinsed under running water or with a hose.
- Do not use high water pressure, cleaning solvents, or soaps.
- Ensure the filter is completely dry before reinstalling.