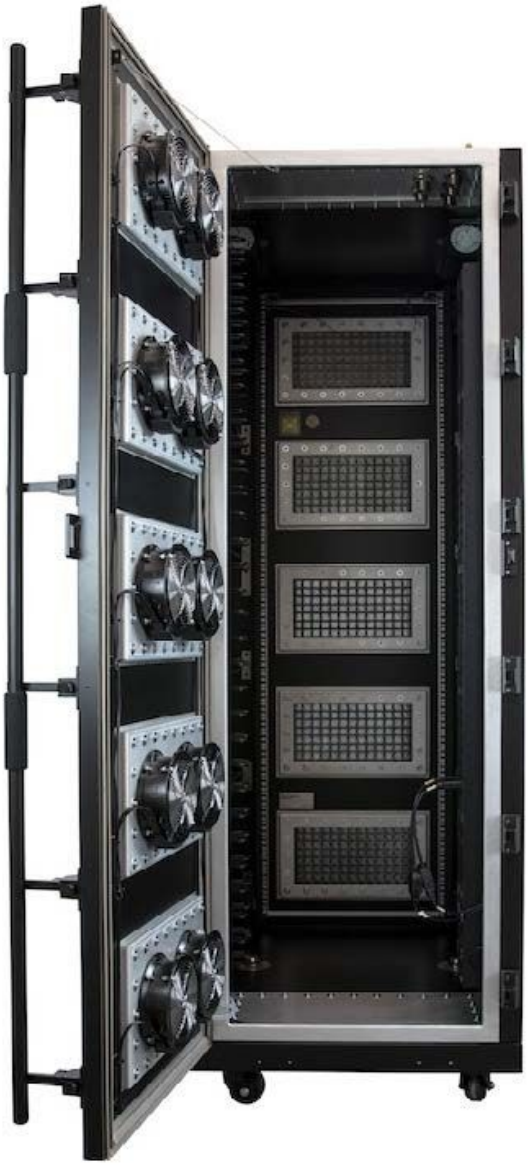
ENCONNEX

Enconnex Defense Shield Cabinet

USER MANUAL



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1. Precautions

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

1.1. General Precautions

- Ensure that all personnel are trained, qualified, and authorized
- Use only manufacturer recommended or supplied spare parts
- Carry out regular inspection for damage and safety
- Keep rack and rack 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 rack unsafe

1.2. Physical Precautions

- Use suitable lifting gear during deployment and installation
- All heavy lifting should be done using safe lifting techniques
- To move the rack:
    - 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 weight of the rack
- Recommend fasten rack to floor, walls or ceiling
- Additional stabilization of rack may be needed when deployed in locations with seismic activity
- To prevent tipping hazard, first load heavy equipment at the bottom of the rack and then lighter equipment toward the top
- Do not extended more than one appliance out of the rack at the same time
- Do not stack objects on top of rack
- Do not spill food or liquids on the rack
- Do not operate the rack in a wet environment
- Do not leave loose components, tools, or cleaning cloths on or inside the rack
- Do not step inside the or climb on the rack

1.3. Electrical Precautions

- Disconnect power during installation or maintenance of electrical equipment such as the power distribution unit or power line filter
- Do not touch power line filter terminal when power is connected to rack
- Never assume that power is disconnected, always check
- Rack 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 rack
- Before working on a rack that is connected to power, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground causing serious burns or weld metal objects to the terminals.
- Do not overload the power outlet strips when installing multiple devices
- Rack does not function with doors open or the 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.

2. Features

2.1. 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

2.2. Electrical

- Interchangeable power options
- Power line filters are installed on either top or bottom of rack
- Dual single phase 2X20A (250V)
  - 2X 2x30A power line filters
  - 2X Electrical boxes with L6-20R receptacles (Hubbel Raco - HBL2326)
  - 2X Power cords for external power
    - 12 feet length
    - 12 AWG SOOW E123366 600V
    - 20A locking male plug (side 1)
    - 20A locking female plug (side 2)
  - 2X Vertical switched PDU
  - 2X Power cords for internal power

- Dual three phase 4X30A (250V)
  - 2X 4x32A power line filters (L1, L2, L3, N, Ground)
  - 2X Electrical boxes with locking receptacles (Hubbel Raco - HBL2816)
  - 2X Power cords for external power
    - 12 foot length
    - 10AWG SOOW E324517 600V
    - 30A locking plug (Hubbel Raco - HBL2311)
  - 2X Power cords for internal power (customer provided)

- Dual three phase 4X32A (400V)
  - 2X 4x32A power line filters (L1, L2, L3, N, Ground)
  - 2X Electrical boxes with locking receptacles (IEC 60309)
  - 2X Power cords
    - 12 foot length
    - 10AWG SOOW E324517 600V
    - 30A locking plug (IEC 60309)
    - 30A locking receptacle (IEC 60309)
- Ground Bar System (customer provided)

3.1 Cooling

- Performance: Up to 10 KW cooling with a 25° delta
- 10X Fans in front to rear airflow configuration
    - Power: 230V, 35W
    - CFM: 235

3.2 Rack Mounting

- 4X Adjustable vertical rails with square holes

3.3 Cable Management:

- 4X Modified Exconnex cable managers (customer supplied)

3.4 Paint Color:

- Textured Black

3.5 Custom Accessories

- 4X Antenna brackets
- 2X Floor mount brackets
- 2X Baying brackets
- 4X Casters (customer supplied)
- 4X Leveling feet
- Top fence
- Custom plinth

3.6 Customer I/O Panel

- 1X Blank I/O panel
- 1X Populated I/O panel
    - 5X SplitFORM fiber optic waveguides, .50 bore

3.7 Media Conversion

- 2X Gigabit Ethernet RJ45 to Fiber Media Converter (Data Interfaces FMC-1000S-AC)
- Outside
    - Mounted on I/O panel
    - AC power
- Inside
    - Mounted on I/O panel
        - Powered by PDU

3.8 Attenuation Performance

- 2.4GHz-2.5 GHz – 95 dB with 2.45 GHz test frequency
- 5.170GHz-5.835GHz – 95 dB with 5.332 GHz test frequency

4. General Rack Use

4.1 Door Opening

- Place hands on provided handle grips.
- Pull handle towards your body to disengage latches from the receiver.
- Swing doors open in a controlled motion.
- Note: Door lanyard prevents over opening of door.

4.2 Door Closing

- Place hands on the grips of the vertical handle shaft
- Swing door closed to ajar position
- Lift handle shaft to move latch lever tabs into down position, aligned with receiver block keepers on rack weldment door flange
- Push handle shaft toward rack to full down position, completely engaging latch lever tabs into receiver block keepers
- Check to ensure all latches are engaged in receiver blocks keepers

4.3 Door Removal

- Open the door to approximately 90 degrees.
- Place hands on both hinge and latch sides.
- Lift straight up.
- Use your foot as leverage, at door bottom, if necessary.

4.4 Fan Specifications

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		

5. Daisy Chain Fan Cable

A daisy chain power cord joins the fans in series to a single PDU outlet. Spiral wrap prevents pinching or binding of the power cord at the door hinge while closing the rack door. In dual power rack configurations, Enconnex powers fans by the separate PDUs to mitigate thermal issues during a PDU or circuit failure. Fan plugs will utilize a IEC to NEMA adapter as necessary to plug into the rack PDUs.

6. Power Line Filter (PLF) Information

Enconnex racks use a proprietary power line filter. Filters are not UL approved.

6.1 Single Phase Power Line Filters

- 2 X 30 Amps (2 each), dual single phase, 277V
- 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 30 AMPS

- Operating Frequency: 50/60 Hz
- Insertion Loss: 100 dB, 150 kHz to 18 GHz
- Leakage Current: ≤20 mA

6.2 Three Phase Power Line Filters

- 3 X 32 Amps (2 each)
- 3-conductor plus ground and neutral, dual 3-phase, 400V
- 10 AWG wire
- Threaded Pipe penetration
- Lightweight, approximately 8 lbs.
- Ground wire from pipe not filtered
- Technical Data
  - Rated Voltage: 440/250V
  - Rated Current: 32A

- 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 which are located 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.

7. Rack Maintenance

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

8. Cleaning Door Gasket and Contact Surface

A monthly cleaning cycle for C-Fold door gasket is recommended. Lightly wipe the C-Fold 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: 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 door frame flange shield line surface that contacts the C-Fold gasket is treated as 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 C-Fold 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.

9. Replacing and Repairing Door Gasket

Your environment will determine the frequency of door gasket repairs or replacement. Operating 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 little compression set.

Gasket repairs can include:

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

10. Affixing Gasket

In the event that the gasket has sustained damage and is no longer adhered to the shield line surface, it can be affixed. The fabric over 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 date of manufacture when stored in original cartons at 70°F (21°C) and 50% relative humidity. See manufacturer specification for complete product details.

10.1 Procedure

- Lift up the loose gasket.
- Remove residual PSA with a scraping type of X-Acto blade and denatured alcohol[1].
- Press 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.

11. Replacing Fabric Tape at Corner Joins

Fabric tape is used to boot the ends of all fabric over foam gaskets. 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 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 replacement piece to gasket.

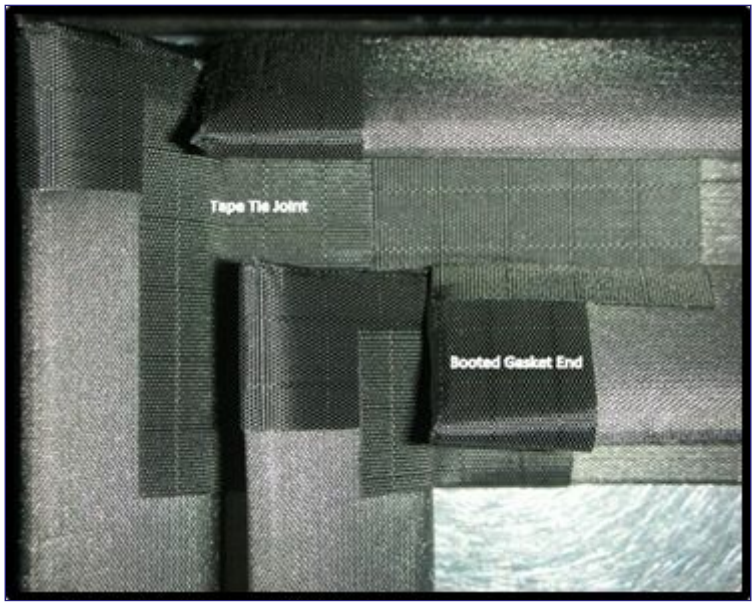

Figure: Door Gasket Corner

12. Replacement of Gasket Lengths

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

13. Replacing Door Gasket

Replacement gasket kits can be purchased from Enconnex include:

- 8 each cut to size and booted C-Fold horizontal door gaskets.
- 8 each cut to size and booted C-Fold vertical door gaskets.

- 1 each 18-inch piece fabric over foam tape.

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

13.1 Process

- Remove the door leaf from the cabinet using the lift off hinges.
- Place the door on a large flat surface gasket side facing up. Chocks can be used to level the door due to the handle depth.
- Peel off the door gasket strips as needed.
- Use an X-Acto type scraping blade and denatured alcohol to remove residual gasket adhesive.
- If the entire gaskets are being replaced, an adhesive remover can be used. Adhesive removers are not recommended for use when replacing individual gaskets as it may contaminate adjacent gaskets with an oily residue. Remove oily residue from adhesive remover with denatured alcohol. The use of abrasive scrubbing pads is not recommended as they may degrade the chromate conversion coating applied to the aluminum surface.
- 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 white lint free cloth dampened with denatured alcohol.
- Clean the exposed door flange contact surfaces, lightly wipe them with a white lint free cloth dampened with denatured alcohol.
- Replace door on hinges

14. Replacing I/O Panel Gasket

Replacement gasket kits can be purchased from Enconnex and include:

- 4 each cut to size and booted rectangle horizontal door gaskets
- 4 each cut to size and booted rectangle vertical door gaskets
- 1 each 18 inch piece fabric over foam tape

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 an X-Acto type scraping blade and denatured alcohol to remove residual gasket adhesive.
- If the entire gaskets are being replaced, an adhesive remover can be used. Adhesive removers are not recommended for use when replacing individual gaskets as it may contaminate adjacent gaskets with an oily residue. Remove oily residue from adhesive with denatured alcohol. The use of abrasive scrubbing pads

is not recommended as they may degrade the chromate conversion coating applied to the aluminum surface.

- 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 white lint free cloth dampened with denatured alcohol.
- Clean the exposed rack I/O panel contact surfaces, 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 rack I/O panel frame
- Reinsert all 28 screws with washer in through holes of 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.

15. Honeycomb Air Vents

15.1 Description

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

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

The honeycomb air vents utilized in the racks 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 reduces air turbulence. The honeycomb air vents provide the same shielding effectiveness (100+ dB) over the test frequencies range of 100 MHz to 10 GHz.

15.2 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.

15.3 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.

Appendix

Safety Symbols and Definitions

Safety

Important Safety Information

Read the instructions carefully to become familiar with the equipment before trying to install, operate, service, or maintain. The following special messages may appear throughout this manual or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠DANGER
DANGER indicates an imminently hazardous situation which can result in death or serious injury.

⚠WARNING
WARNING indicates a potentially hazardous situation which can result in death or serious injury.

⚠CAUTION

CAUTION indicates a potentially hazardous situation which can result in minor or moderate injury.

NOTICE

NOTICE addresses practices not related to physical injury including certain environmental hazards, potential damage or loss of data.

Read the handle information before trying to install, operate, service, or maintain equipment. Comply with local regulations and law when handling refrigerant.

⚠⚠DANGER

Hazard of electric shock, explosion, or arc flash

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices.
- This equipment must be installed and serviced by qualified personnel only.
- Turn off all power supplying this equipment before working on or inside the equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Or can result in death or serious injury.

⚠WARNING

Hazard from moving parts

· Keep hands, clothing, and jewelry away from moving parts. Check the equipment for foreign objects before closing the doors and starting the equipment.

Or can result in death or serious injury.

⚠CAUTION

Hazard to equipment or personnel

· All work must be performed by Enconnex qualified personnel.

Or can result in serious injury or equipment damage.

⚠WARNING

Hazard of equipment falling over

· Use two or more persons at all times to move or turn this equipment.

· Always push, pull, or turn while facing the front and rear of this equipment. Never push pull, or turn while facing the sides of this equipment.

· Slowly move this equipment across uneven surfaces or door thresholds.

· Lower leveling feet to floor when this equipment is at rest.

· Lower leveling feet and attach joining brackets to adjacent racks when this equipment is in final position.

Or can result in serious injury or equipment damage.

⚠CAUTION

Hazard to equipment or personnel

· Make sure no spare part or tool is in the equipment before handling equipment.

Or can result in serious injury or equipment damage.

⚠CAUTION

Refrigerant high pressure and hazard to equipment

· The equipment is to be charged with R-410A only.

· Copper pipe must support minimum 55bar pressure.

Or can result in serious injury or equipment damage.