• Company Introduction
• Quality & Production Capabilities
• Technical Information
• Photos and Descriptions
Corporate Headquarters

Filnor, Inc.
227 North Freedom Ave.
Alliance, OH 44601
United States

Major markets located nearby:

• Pittsburgh - 76 miles
• Cleveland - 57 miles
• Columbus - 147 miles
• Akron/Canton Airport - 16 miles
Four buildings combine to 45,000 square feet for all of our manufacturing, engineering and office personnel.
Since 1970, Filnor has designed and manufactured products for industries worldwide:

- Paper Mills
- Aluminum Plants
- Ship Building
- Automotive
- Construction
- Mining
- Mass Transit
- Utilities
- Power Generation
- Steel
- Telecommunications
Filnor’s Product Groups

• Power Resistors
• Disconnect Switches
• AC & DC Power Distribution Equipment & Controls
Power Resistor
Applications

• Neutral Grounding Resistors
• AC & DC Motor Acceleration
• Dynamic Braking
• Load Banks
• Harmonic Filtering
• Crane Control
• Transit
• Mining Equipment
Disconnect Switch Capabilities

- Current Ratings: 30 ampere- 20 kA
- Voltage Ratings AC/DC: 250 to 38 kV
- Open Panel Mounting
- Enclosed: Nema 1 - Nema 4X, IP23 – IP66
Disconnect Switches

Switch Designs

• Knife Switches
• Bolted Pressure Contact Switches
• High Current DB Switches
• Medium Voltage Switches - Up to 38 kV
• Transfer Switches
• Special Design Switches
AC & DC Power Distribution and Controls

Capabilities

• AC and DC panelboard
• AC and DC switchboards
• Custom power distribution equipment
• Custom control equipment
Filnor’s partial customer list:

- ABB
- AK Steel
- Alcoa
- Algoma Steel
- Alstom
- Bombardier
- Bucyrus International
- Chicago Transit Authority
- Detroit Edison
- Eaton
- Electric Boat
- Electro-Motive/GM
- First Energy
- Florida Power Light
- Hydro Quebec
- General Electric
- Graybar Electric Company
- ISG Steel Group
- Illinois Power Company
- Joy Mining
- Powell Electrical Mfg.
- Siemens
- Square D Company
- The Timken Company
- Toshiba
- US Steel Corp.
- Wesco Distribution
- Wisconsin Power & Light
Transit Projects Sample Listings

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<td>NYCTA R62</td>
<td>General Electric</td>
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<td>MTA BARTA</td>
<td>AAI / Alstom</td>
<td>Dynamic Braking Resistors, Main Vehicle Disconnects, Line Charging Resistors, &amp; Battery Disconnects</td>
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Quality & Production Capabilities

- Quality System and Testing
- Production Capabilities
- Experience and Product Deliveries
- Service and Warranties
Quality System Certification

ISO9001 certified since August of 1999

“Quality Products and Services Delivered On Time”
ELECTRICAL TEST EQUIPMENT

- **HIGH POT** - 2,000 to 100,000 volts AC @ 50 mA max with computer interface and graphic/memory capability
- **HIGH POT** - 0 to 16,000 volts AC or DC
- **THERMOCOUPLE MONITOR** - 16 channel thermocouple recorder with printer interface
- **MEGGER** - measures insulation strength at working voltages - 0 to 15,000 volts
- **(2) MICRO-OHM-METER** - to measure micro-ohms
ELECTRICAL TEST EQUIPMENT

• (6) DIGITAL MULTIMETERS- measures volts/amps/ohms

• RESISTANCE BRIDGE- used to accurately measure resistance

• HIGH CURRENT TRANSFORMER- used to heat run/test resistors and switches up to 1200 amps (150Kva)

• AMMETER- measure currents to 1000 amps
**ELECTRICAL TEST EQUIPMENT**

- **INFRARED**
  
  THERMOMETER - remotely measures temperatures to 1000 degrees C.

- **FLUKE SCOPEMETER** - measures/captures/records AC waveforms

- **LCR METER** - measures inductance/capacitance/resistance
MECHANICAL ITEMS

• OPTICAL COMPARATOR- optically measures distance, angle and radius

• (2) FORCE GAUGE- measures tension or compression forces to 500 lbs. w/computer interface

• (3) SURFACE PLATES- flat surface to accurately measure heights

• (6) TORQUE WRENCHES- accurately torque hardware from 0-250 ft/lbs
MECHANICAL ITEMS

• (32) DIAL CALIPERS (0-8”)- accurately measure inside/outside distances

• (18) MICROMETERS (0-12”)- accurately measure outside distances

• DEPTH- measure bore depths

• DIGITAL HEIGHT VERNIER (0-12”)- measure object height from surface plate
Production Capabilities

Resources

- Excellent Trained Staff
- Certified Welders and Machinists
- Mechanical and Electrical Engineering
- Years of Experience
- Great Location for Skilled Labor
- Very well maintained working Environment and Equipment
Production Capabilities

Resources

Complete In-house Machine Shop
- Quality
- Delivery
- React to Emergency Situations and unique requirements
Experience, Expectation and Delivery

Warranty

- Standard One Year
- Special Customer Agreement Warranties

Service Team

- Very Well-Trained Staff – Hands On Experience
- Engineering and Technicians
Transit Trackside Switches and Switchboards

Technical Presentation

• Bolted Pressure Contact Switches Overview

• Projects and Photos
Bolted Pressure Contact Switches

What is a Bolted Pressure Contact Switch?

The switch consists of two parallel movable blades with stationary contacts at each end.

A bolt passes through the blades, hinge and clip stationary contacts and a fixed clamping nut.

Pressure is applied on the contacts by rotating the clip and hinge bolts, connected together by a linkage assembly, effectively tightening the joint.

The result is a joint current carrying capacity similar to bolted bus bar.
Bolted Pressure Contact Switches

Design Criteria and Features

Engineered to ensure reliability, safety, ease of operation, and low maintenance.

Switch Current Carrying Materials & Features:

• Switch current carrying members are ETP 110 Copper Bar
• Terminals and Contact interface Silver Plated - .0005 minimum
• Silver Plating ensures low contact resistance and is not affected by oxidation
• Current Density designed to 1kA amps per square inch
• Switch designed for current flow straight through switch to reduce overload stresses
• Vertical Terminals with Standard Nema hole pattern

Filnor Inc.
Bolted Pressure Contact Switches

Design Criteria and Features

• GPO-3 insulating base – ease of mounting
• Spacing per UL977
• Switches can be supplied open frame or enclosed
• Manual or Motor operated
• Mechanical Interlock
• Options supplied are Auxiliary Switches, Key interlock Provisions and Specific Customer custom features.
Bolted Pressure Contact Switches

Design Criteria and Features

Switch Testing:

- Individual units prior to shipment are factory tested for dielectric withstand, contact resistance, dimensional outline, and build configuration.
- A copy of factory test report is included with each switch
- Each unit is date coded on label for tracking purposes
- Applicable warning signs applied
Design Criteria

Engineered to ensure reliability, safety and ease of installation.

• Filnor Bolted Pressure Switches are designed and tested in strict accordance with the following standards as applicable, UL, CUL, Nema, ANSI, IEEE.

• Custom designed per customer specifications
Filnor Inc. is a designer and manufacturer of Power Resistors, Disconnect Switches, Control Equipment and Transit Products.

Filnor has been manufacturing industrial electrical products and controls since 1970.
TRANSIT TRACKSIDE EQUIPMENT

- THIRD RAIL ISOLATION SWITCHES
- SUBSTATION SWITCHES
- EARTHING SWITCHES
- TROLLEY DISCONNECT
- TRANSFER SWITCHES
- DC SWITCHBOARDS
- RECTIFIER DISCONNECT SWITCHES
RAIL ISOLATION SWITCH

St. Louis Transit

- 4000 Amp
- 1000 Volt
- Manual Operated
- Auxiliary Contacts
- Quick Blade Feature
RAIL ISOLATION SWITCH

St. Louis Transit

- 4000 Amp
- 1000 Volt
- Motor Operated
- Auxilliary Contacts
- Quick Blade Feature
RAIL ISOLATION SWITCH

DART

- 1200 Amp
- 1000 Volt
- Motor Operated
- Voltage Sensing Circuit
- NEMA 4X Enclosure
RAIL ISOLATION SWITCH

Vancouver Sky Train

- 4500 Amp
- 1000 VDC
- 2-Pole, Single Throw
- 200 Amp
- 4-Pole, Single Throw
- Auxiliaries
- Motor Operated
- Voltage Sensing Circuitry
- Viewing Windows
RAIL ISOLATION SWITCH

Vancouver Sky Train

- 4500 Amp
- 1000 VDC
- 2-Pole, Single Throw
- 200 Amp
- 4-Pole, Single Throw
- Auxiliaries
- Motor Operated
- Voltage Sensing Circuitry
- Viewing Windows
TRANSIT TRACKSIDE EQUIPMENT

- THIRD RAIL ISOLATION SWITCHES
- SUBSTATION SWITCHES
- EARTHING SWITCHES
- TROLLEY DISCONNECT
- TRANSFER SWITCHES
- DC SWITCHBOARD
- RECTIFIER DISCONNECT SWITCHES
GROUNDING SWITCH

Vancouver Sky Train

- 1200 Amp
- 1000 VDC
- 2-Pole, Single Throw
- Auxiliaries
- Motor Operated
- Voltage Sensing Circuitry
- Spring Operated
- Viewing Windows
DC SWITCHBOARD

DFW Airport

- 1000 DC Volt
- Switchboard Lineup
- Transit Application
- Switch, Fuse, Contactor
- Key Interlock System
DC SWITCHBOARD

DFW Airport

- 1000 DC Volt
- Switchboard Lineup
- Transit Application
- Switch, Fuse, Contactor
- Key Interlock System
DC SWITCHBOARD

MARTA

- 1000 DC Volt
- Switchboard Lineup
- Transit Application
- Switch, Fuse, Contactor
DC SWITCHBOARD

MARTA

• 1000 DC Volt
• Switchboard Lineup
• Transit Application
• Switch, Fuse, Contactor
DC SWITCHBOARD

Las Vegas Monorail

- 1000 DC Volt
- Switchboard Lineup
- Transit Application
- Maintenance Facility
- PLC Logic
- Switch, Fuse, Contactor
DC SWITCHBOARD

Las Vegas Monorail

- 1000 DC Volt
- Switchboard Lineup
- Transit Application
- Maintenance Facility
- PLC Logic
- Switch, Fuse, Contactor
RAIL DISCONNECT SWITCH

Las Vegas Monorail

- 1000 DC Volt
- Contactor Fuse Assembly
- PLC Logic
- NEMA 4X Enclosure
RAIL DISCONNECT SWITCH

Las Vegas Monorail

- 1000 DC Volt
- Contactor Fuse Assembly
- PLC Logic
- NEMA 4X Enclosure
TRANSFER SWITCH

- 1200 Amp
- 1500 Volt
- Manual Operated
- Transfer Switch
- Key Interlock System
RAIL HEATER DISCONNECT SWITCH

WMATA

- 200 Amp
- 1000 Volt
- One Pole
- NEMA 4X Enclosure
- Viewing Window
- Spring Operated
TROLLEY LINE DISCONNECT SWITCH

SEPTA

- 600 Amp
- 1000 Volt
- One Pole
- NEMA 4X Enclosure
TRANSIT VEHICLE ELECTRICAL EQUIPMENT

- Main Vehicle Disconnect Switches
- Fuse Boxes
- Braking Resistors
- Snubber Resistors
- Truck Vehicle Disconnect Switches
- Polarity Reversing Switches
TRANSIT MAIN VEHICLE DISCONNECT SWITCH

NEW YORK CITY

- 1200 Amp
- 1000 Volt
- One Pole
- Double Throw
- NEMA 4X Enclosure
- Four Position
  - Run
  - Auxilliary from Third Rail
  - Open
  - Shop Test
TRANSLIT VEHICLE FUSE BOXES

M7 & LONG ISLAND RR

- Inner Car Bus Line Fuse
- 1500 Amp
- 1500 Volt
- Ribbon Fuse
- Undercar Hung
TRANSIT BRAKING RESISTORS

- Designed for roof mounted or under car hung
- Compact, lightweight, rugged designs for severe applications
- Filnor designs can be used on light or heavy rail vehicles or trackside braking
TRANSIT BRAKING RESISTORS

NEW YORK CITY

• Trackside Braking Resistors
• Convection or Fan Cooled Designs