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**SHORT FORM** CATALOG

# EMC/EMI & Power Quality
# Filters and Components.

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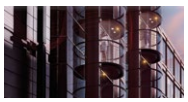
# Industries

**Machinery & Robotics**
Motor Drive, Machinery, Factory Automation, Robotics



**Building Technology**
HVAC, Elevators, Lighting

**Energy Management**
Renewable Energy, EV-Charging, Energy Storage, Smart Infrastructure, Power Supply, UPS, Oil & Gas

**Medical**
Medical Equipment, Laboratory and Analyser Equipment

**Data & Communication**
Datacenter, Networks

## DC Filters

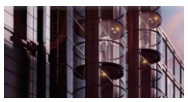
| | | | | | |
|---|---|---|---|---|---|
| FN2200 | ■ | | ■ | | |
| FN2210, FN2211 | ■ | | ■ | | |
| FN2210HV, FN2211HV | ■ | | ■ | | |
| FN2220, FN2230, FN2240 **NEW** | | | ■ | | |

## Single-Phase Filters

| | | | | | |
|---|---|---|---|---|---|
| FN2010 | | | ■ | ■ | |
| FN2020 | | | ■ | ■ | |
| FN2030 | | | ■ | ■ | |
| FN2060 | | ■ | ■ | ■ | |
| FN2070, FN2071 | ■ | ■ | ■ | ■ | |
| FN2080 | ■ | ■ | ■ | ■ | |
| FN2090, FN2091 | ■ | ■ | ■ | ■ | |
| FN2410, FN2412 | ■ | ■ | ■ | | |
| FN2415 | ■ | | | | |
| FN2450 | ■ | ■ | ■ | ■ | |
| FN2500, FN2520 **NEW** | ■ | ■ | ■ | | |
| FN2560 **NEW** | | ■ | | | |
| FN2580 **NEW** | | ■ | | | |
| FN332 | | | ■ | ■ | |
| FN343 | | | ■ | | |
| FN350 | ■ | | | | |
| FN352Z, FN353Z | | ■ | ■ | | ■ |
| FN700Z | | | ■ | ■ | ■ |
| LIS140C-1E **NEW** | | ■ | ■ | | |

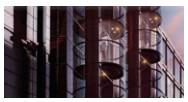
## 3-Phase Filters

| | | | | | |
|---|---|---|---|---|---|
| FN3025, FN3026 | ■ | | ■ | ■ | |
| FN3100 | ■ | | ■ | | |
| FN3120H | ■ | | ■ | | |
| FN3258 | ■ | ■ | ■ | | |
| FN3268 | ■ | ■ | ■ | ■ | |
| FN3270, FN3271 | ■ | ■ | ■ | | |
| FN3287, FN3288 | ■ | ■ | ■ | ■ | |
| FN3310, FN3311 | ■ | ■ | ■ | | |
| FN3310HV, FN3311HV | ■ | ■ | ■ | | |
| FN3359 | ■ | | ■ | | |
| FN3840 **NEW** | ■ | ■ | | | |
| FN351 | ■ | ■ | | | |

| |  **Machinery & Robotics** Motor Drive, Machinery, Factory Automation, Robotics |  **Building Technology** HVAC, Elevators, Lighting |  **Energy Management** Renewable Energy, EV-Charging, Energy Storage, Smart Infrastructure, Power Supply, UPS, Oil & Gas |  **Medical** Medical Equipment, Laboratory and Analyser Equipment |  **Data & Communication** Datacenter, Networks |
|---|---|---|---|---|---|
| **3-Phase Filters with Neutral**  | | | | | |
| FN3256H | ■ | ■ | ■ | ■ | |
| FN3280H | ■ | ■ | ■ | | |
| FN354 | | | ■ | ■ | |
| FN355 | | | ■ | ■ | |
| **IEC Inlet Filters and Power Entry Modules**  | | | | | |
| FN2640, FN2660 **NEW** | | | ■ | | ■ |
| FN9222 | | | ■ | ■ | |
| FN9222E | | | ■ | ■ | |
| FN9226 | | | ■ | ■ | |
| FN9233 | | | ■ | ■ | |
| FN9233E | | | ■ | ■ | |
| FN9244 | | | ■ | ■ | |
| FN9244E | | | ■ | ■ | |
| FN9246 | | | ■ | ■ | |
| FN9255 | | | ■ | ■ | |
| FN9255E | | | | ■ | |
| FN9260 | | | ■ | ■ | |
| FN9261 | | | ■ | ■ | |
| FN9262 | | | ■ | ■ | |
| FN9264 | | | ■ | ■ | |
| FN9266 | | | ■ | ■ | |
| FN9274 **NEW** | | | | ■ | |
| FN9280 | | | ■ | ■ | |
| FN9280E | | | ■ | ■ | |
| FN9290, FN9299 | | | ■ | ■ | |
| FN280 | | | ■ | ■ | |
| FN370, FN372, FN378, FN379 | | | ■ | ■ | |
| FN380 | | | ■ | ■ | |
| FN390, FN1390 | | | ■ | ■ | |
| Power Cords with EMC-Filter IF13 | | ■ | ■ | | ■ |
| **EMC/EMI Chokes**  | | | | | |
| ED Common Mode Chokes **NEW** | | ■ | | | |
| EV/EH Common Mode Chokes | | ■ | ■ | ■ | ■ |
| RB Common Mode Chokes | ■ | ■ | ■ | ■ | ■ |
| RC Common Mode Chokes | ■ | ■ | ■ | ■ | ■ |
| RD Common Mode Chokes | ■ | ■ | ■ | ■ | ■ |
| RI Saturation Chokes | ■ | ■ | | | |
| RN Common Mode Chokes | ■ | ■ | ■ | ■ | ■ |
| RS Differential Mode Chokes | | ■ | ■ | ■ | ■ |
| RT Common Mode Chokes **NEW** | ■ | ■ | ■ | ■ | ■ |
| RV Common Mode Chokes **NEW** | | ■ | ■ | | |

# Industries

**Machinery & Robotics**
Motor Drive, Machinery, Factory Automation, Robotics



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**Data & Communication**
Datacenter, Networks

### PCB Filters

| | | | | | |
|---|---|---|---|---|---|
| FN402 | | | ■ | ■ | ■ |
| FN405 | | | ■ | ■ | ■ |
| FN406 | | ■ | ■ | ■ | ■ |
| FN409 | | ■ | ■ | | ■ |
| FN410 | | ■ | ■ | | ■ |

### Feedthrough Capacitors & Filters

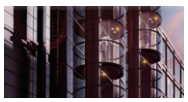
| | | | | | |
|---|---|---|---|---|---|
| FN7510, FN7511, FN7512, FN7513, FN7514 | | | | ■ | ■ |
| FN7560, FN7561, FN7562, FN7563 | | | | | ■ |
| FN7611, FN7612 | | | | ■ | ■ |
| FN7660, FN7661 | | | | | ■ |

### Pulse Transformers

| | | | | | |
|---|---|---|---|---|---|
| IT series, single secondary winding | ■ | ■ | ■ | | |
| IT series, double secondary winding | ■ | ■ | ■ | | |

### Accessories

| | | | | | |
|---|---|---|---|---|---|
| IL13, 13 P, 19 Power Cords with Locking System | | ■ | ■ | ■ | ■ |
| IL13P Angled IEC Lock C13 | | ■ | ■ | ■ | ■ |
| IL13P Rewireable IEC Locking Connector | | ■ | ■ | ■ | ■ |
| IL13P Rewireable Angled Locking Connector | | ■ | ■ | ■ | ■ |

| |  **Machinery & Robotics** Motor Drive, Machinery, Factory Automation, Robotics |  **Building Technology** HVAC, Elevators, Lighting |  **Energy Management** Renewable Energy, EV-Charging, Energy Storage, Smart Infrastructure, Power Supply, UPS, Oil & Gas |  **Medical** Medical Equipment, Laboratory and Analyser Equipment |  **Data & Communication** Datacenter, Networks |
|---|---|---|---|---|---|
| **Active Harmonic Filters**  | | | | | |
| FN3530, FN3531, FN3540, FN3541 | ■ | ■ | ■ | ■ | ■ |
| FN3532, FN3542 | ■ | ■ | ■ | ■ | ■ |
| FN3545 | ■ | ■ | ■ | ■ | ■ |
| SYNC300A, SYNC300X | ■ | ■ | ■ | ■ | ■ |
| **Passive Harmonic Filters**  | | | | | |
| FN3440, FN3442, FN3450, FN3452 | ■ | ■ | | | |
| FN3441, FN3443, FN3451, FN3453 | ■ | ■ | | | |
| FN3470, FN3472, FN3480, FN3482 | ■ | ■ | | | |
| FN3471, FN3473, FN3481, FN3483 | ■ | ■ | | | |
| FN3416, FN3418 | ■ | ■ | | | |
| FN3416LV, FN3418LV | ■ | ■ | | | |
| **Output Filters**  | | | | | |
| FN5060, FN5060HV | ■ | ■ | | | |
| FN5420, FN5040HV, FN5020 | ■ | | | | |
| FN5030, FN530 | ■ | | | | |
| **Reactors**  | | | | | |
| RWK3044, RWK3062 | ■ | ■ | ■ | | |
| RWK305, RWK5420 | ■ | ■ | ■ | | |
| **LCL Filters**  | | | | | |
| FN6840 | ■ | | ■ | | |

# Product Selection EMC/EMI

## EMC/EMI Filters & Components

### Single-Phase Filters

#### PCB Filters

**≤10 A**
FN402
FN405
FN406
FN409
FN410

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#### Feedthrough Components

**≤250 A Capacitors**
FN7510
FN7511
FN7512
FN7513
FN7514
FN7560
FN7561
FN7562
FN7563

**Filters**
FN7611
FN7612
FN7660
FN7661

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#### Chassis Mount Filters

**≤100 A Standard Performance**
FN2010
FN2020
FN2410
FN2412
FN2450
FN332
FN350

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**≤36 A High Performance**
FN2030
FN2060
FN2070
FN2071
FN2080
FN2415
FN2500
FN343

**Page 11**

**≤32 A Very High Performance**
FN2090
FN2091
FN2520
FN2560
FN2580
FN352Z
FN353Z
FN700Z

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### DC-Filters

#### DC-Filters

**25 A–2300 A**
FN2200
FN2211
FN2210
FN2211HV
FN2210HV

**EV-Charging Application**
FN2230
FN2231
FN2220
FN2221
FN2240
FN2241

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### 3-Phase Filters

#### 3-Phase Filters

**≤300 A**
FN3025
FN3026
FN3100
FN3120H
FN3258
FN3287
FN3288
FN3268
FN3840
FN351

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**25 A–2300 A**
FN3270
FN3271
FN3310
FN3311
FN3310HV
FN3311HV
FN3359

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#### 3-Phase Filters with Neutral

**3 A–30 A**
FN354
FN355

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**8 A–600 A**
FN3256H
FN3280H
FN356

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## IEC Inlet Filters/Power Entry Modules PEM

#### IEC Inlet Filters

**≤20 A**
FN2640
FN2660
FN9222
FN9222E
FN9226
FN9233
FN9233E
FN9244
FN9244E
FN9246
FN9255
FN9255E
FN9274

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#### PEM with Fuse or Switch

**≤10 A**
FN9260
FN9261
FN9262
FN9264
FN9266

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#### PEM with Fuse and Switch or Voltage Selector

**≤10 A**
FN1390
FN9280
FN9280E
FN9290
FN9299
FN280
FN370
FN372
FN378
FN379
FN380
FN390

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#### Power Cords with Filters

**≤10 A**
IF13

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## EMC/EMI Chokes

#### Saturation Chokes

**≤25 A**
RI Series

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#### Differential Mode Chokes

**≤4 A**
RS Series

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#### Common Mode Chokes

**Single-Phase**
**0.2 A–10 A**
ED Series
EV/EH Series
RC Series
RD Series
RN Series
RS Series

**6 A–63 A**
RT Series
RV Series

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**3-Phase**
**6 A–64 A**
RD Series
RT Series

**Page 18**

**3-Phase with Neutral**
**6 A–64 A**
RD Series
RV Series

**Page 18**

# Product Selection PQ

## Harmonic Filters

### Mitigation Requirement

**Active**
FN3530
FN3531
FN3540
FN3541
FN3532
FN3542
FN3545

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**Passive**
**≤250kW**
FN3440
FN3441
FN3442
FN3443
FN3450
FN3451
FN3452
FN3453
FN3416
FN3418
FN3416LV
FN3418LV

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**Passive**
**≥250kW**
FN3470
FN3471
FN3472
FN3473
FN3480
FN3481
FN3482
FN3483

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## 3-Phase Reactors and LCL Filters

### Line Side

**Line Reactors**
**4%**
**≤1000 A**
RWK3044
RWK3062

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**LCL Filters**
**25 A**
FN6840

**Page 21**

### Load Side

**Load Reactors**
**0.8%**
**≤1000 A**
RWK305

**6%**
**≤1000 A**
RWK5420

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## Output Filters

### Voltage Shape

**dv/dt Filters**
**≤1200 A**
FN5060
FN5060HV

**Page 23**

**Sine Wave Filters**
**≤1320 A**
FN5420
FN5040HV
FN530
FN5030

**Page 23**

# DC Filters

DC filters are specifically optimized for applications with DC supply like EV charging, DC grids, energy storage and PV installations.

| | Family | Max. Voltage | Rated current [A] / Attenuation Performance (25 · 150 · 250 · 600 · 1000 · 2300; standard · high · very high) | Features: 1-stage filter circuit | 2-stage filter circuit | Low frequency attenuation | High frequency attenuation |
|---|---|---|---|---|---|---|---|
|  | FN2200 | 1200 VDC | 25 – 2300 | ■ | | ■ | ■ |
|  | FN2210<br>FN2211 | 1000 VDC | 250 – 2300 | ■ | | ■ | ■ |
|  | FN2210HV<br>FN2211HV | 1500 VDC | 250 – 2300 | ■ | | ■ | ■ |
| NEW  | FN2220<br>FN2221 | 1000 VDC | 150 – 600 | | ■ | ■ | ■ |
| NEW  | FN2230<br>FN2231 | 500 VDC | 150 – 600 | | ■ | ■ | ■ |
| NEW  | FN2240<br>FN2241 | 1000 VDC | 150 – 600 | | ■ | ■ | ■ |

# Single-Phase Filters

Single-Phase filters for chassis or DIN-rail mounting are key for EMC compliance of low to medium power industrial applications. A broad selection of electrical and mechanical features allows a specific choice and deployment for countless applications.

| | Family | Max. Voltage | Rated current [A] / Attenuation Performance (1 10 20 40 60 100; standard high very high) | Choice of connectors | Low frequency attenuation | High frequency attenuation | Earth line choke | Overvoltage protection | TEMPEST protection | DIN Rail Mounting | Multiple terminal choice |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  | FN2010 | 250 VAC/VDC | 1 – 60 | ■ | | | | | | | |
|  | FN2020 | 250 VAC/VDC | 1 – 60 | ■ | | | | | | | |
|  | FN2030 | 250 VAC/VDC | 1 – 30 | ■ | ■ | ■ | | ■ | | | |
|  | FN2060 | 250 VAC/VDC | 1 – 30 | ■ | | | | | | | |
|  | FN2070<br>FN2071 | 250 VAC/VDC | 1 – 36 | ■ | | ■ | | | | | |
|  | FN2080 | 250 VAC/VDC | 1 – 16 | ■ | ■ | | | | | | |
|  | FN2090<br>FN2091 | 250 VAC/VDC | 1 – 30 | ■ | ■ | ■ | | ■ | | | ■ |
|  | FN2410<br>FN2410H | 250 VAC<br>520 VAC | 8 – 100 | | ■ | | | | | | |
|  | FN2412<br>FN2412H | 250 VAC<br>520 VAC | 8 – 45 | | ■ | | | | | ■ | |
|  | FN2415 | 250 VAC | 6 – 20 | | ■ | ■ | | | | | |
|  | FN2450 | 250 VAC | 6 – 20 | | ■ | ■ | | | | | ■ |
| NEW  | FN2500 | 277 VAC<br>400 VDC | 10 – 32 | | ■ | ■ | | | | | ■ |
| NEW  | FN2520 | 277 VAC<br>400 VDC | 10 – 32 | | ■ | ■ | | | | | ■ |
| NEW  | FN2560 | 300 VAC<br>300 VDC | 1 – 8 | | ■ | ■ | | | | | ■ |
| NEW  | FN2580 | 350 VAC | 1 – 8 | | ■ | ■ | | | | | ■ |
|  | FN332 | 250 VAC | 1 – 10 | | | | | ■ | | | |
|  | FN343 | 250 VAC | 1 – 10 | | | | ■ | | | | |
|  | FN350 | 250 VAC | 8 – 55 | | ■ | | | | | | |
|  | FN352Z<br>FN353Z | 250 VAC | 6 10 | | ■ | ■ | | ■ | ■ | | |
|  | FN700Z | 250 VAC | 6 – 20 | | ■ | ■ | | ■ | ■ | | |
| NEW  | LIS140C-1E | 230 VAC | 1 – 40 | | ■ | | | | | ■ | |

# IEC Inlet Filters and Power Entry Modules

A powerful and compact combination of IEC connector, EMC/EMI filter, fuses, switch and voltage selector in one package.

| | Family | Max. Voltage | Rated current [A] / Attenuation Performance (standard / high / very high) | Features: Fuse(s) | Switch (2-pole) | Voltage selector | Snap-in version | Extra wide mounting | Earth line choke | PCB mounting | Multiple terminal choice |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  | FN9222 | 250 VAC | 1 – 20 | | | | ■ | ■ | | | |
| | FN9222E | 250 VAC | 1 – 15 | | | | ■ | ■ | ■ | | |
|  | FN9226 | 250 VAC | 1 – 10 | | | | | | | ■ | ■ |
|  | FN9233 | 250 VAC | 1 – 15 | | | | ■ | ■ | | | |
| | FN9233E | 250 VAC | 1 – 15 | | | | ■ | ■ | ■ | | |
|  | FN9244 | 250 VAC | 1 – 15 | | | | ■ | ■ | | | |
| | FN9244E | 250 VAC | 1 – 15 | | | | ■ | ■ | ■ | | |
|  | FN9246 | 250 VAC | 1 – 20 | | ■ | | ■ | | | | |
|  | FN9255 | 250 VAC | 2 – 20 | | | | ■ | ■ | | | |
| | FN9255E | 250 VAC | 2 – 15 | | | | ■ | ■ | ■ | | |
|  | FN9260<br>FN9261 | 250 VAC | 1 – 10 | ■ | | | ■ | | | | |
|  | FN9262<br>FN9266 | 250 VAC | 1 – 10 | ■ | ■ | | ■ | | | | |
|  | FN9264 | 250 VAC | 1 – 10 | | ■ | | ■ | | | | |
| NEW  | FN9274 | 250 VAC | 1 – 15 | | ■ | | ■ | | | | |
|  | FN9280 | 250 VAC | 1 – 10 | ■ | ■ | | ■ | | | | |
| | FN9280E | 250 VAC | 1 – 10 | ■ | ■ | | ■ | | ■ | | |
|  | FN9290<br>FN9299 | 250 VAC | 1 – 10 | ■ | ■ | | ■ | | | | |
| NEW  | FN2640 | 250 VAC | 10 – 20 | | | | | | | | ■ |
| NEW  | FN2660 | 250 VAC | 10 – 20 | | | | | | | | ■ |
|  | FN280, FN281, FN282, FN283<br>FN284, FN285, FN286 | 250 VAC | 1 – 10 | ■ | ■ | | ■ | | | | |
|  | FN370, FN372, FN378,<br>FN379 | 250 VAC | 2 – 6, FN379 | ■ | | ■ | ■ | | | | |
|  | FN380, FN382, FN385B<br>FN388, FN389 | 250 VAC | 2 – 6, FN389 | ■ | ■ | | ■ | | | | |
|  | FN390 (6 A)<br>FN1390 (10 A) | 250 VAC | 1 – 10, FN1393/94 | ■ | ■ | ■ | | | ■ | | |
|  | IF13 | 250 VAC | 10 | | | | | | | | |

# Power Cords with Locking Systems

Guarding against accidental disconnection of all electrical appliances with an IEC inlet, no exchange or modification of the IEC inlet or IEC inlet filter is needed. An easy retrofit for all electronic equipment and devices is possible.

■ **standard length**
× **on request**

| | Family | Max. Voltage | 6 ft | 2 m | 3 m | 9 ft | 12 ft | 5 m | 10 m | **Features** C14 line side plug IEC C14 male, straight | C20 line side plug IEC C20 male, straight | EU1 line side plug CEE7/VII right angled | US1 line side plug NEMA5–15 straight | US2 line side plug NEMA5–15 straight hospital grade | UK1 line side plug BS1363, right angled, fused 5 A | CH1 line side plug SEV1011 straight | JP1 line side plug JIS8303 straight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | IL13 | 250 VAC | ■ | ■ | × | ■ | ■ | × | × | ■ | | ■ | ■ | ■ | ■ | ■ | ■ |
|  | IL19 | 250 VAC | | ■ | | | | | | | ■ | ■ | ■ | | ■ | | |
|  | IL13P | 250 VAC | Rewireable Connectors with Locking System | | | | | | | | | | | | | | |

# 3-Phase Filters

EMC/EMI filter solutions for industrial applications like motor drives and machine tools. Furthermore, these types of filters are also suitable for large uninterruptible power supplies, medical equipment, wind turbine power stations and a vast array of other 3-phase power electronics.

| | Family | Max. Voltage | Rated current [A]: 7 / 50 / 180 / 250 / 380 / 2500 — Attenuation Performance: standard / high / very high | Features: Multi-stage filter circuit | Safety connector blocks | Low leakage current | Versions for IT networks | Busbar connection | Optional protective covers | DIN-rail mounting option |
|---|---|---|---|---|---|---|---|---|---|---|
|  | FN3025 | 520 VAC | 10 – 50 | | ■ | ■ | | | | |
|  | FN3026 | 520 VAC | 10 – 50 | | ■ | ■ | | | | ■ |
|  | FN3100 | 520 VAC | 35 – 300 | | ■ | | | | | |
|  | FN3120 | 520 VAC | 25 – 230 | | ■ | | | | | |
|  | FN3258<br>FN3258H | 480 VAC<br>520 VAC | 7 – 180 | | ■ | | | | | |
|  | FN3268 | 520 VAC | 7 – 180 | | ■ | ■ | | | | |
|  | FN3270<br>FN3271 | 520 VAC | 10 – 1000 | | ■ | | | ■ | ■ | |
|  | FN3287 | 530 VAC | 10 – 230 | | ■ | ■ | | | | |
|  | FN3288<br>FN3288IT | 530 VAC | 10 – 230 | ■ | ■ | ■ | ■ | | | |
|  | FN3288HV<br>FN3288HVIT | 760 VAC | 10 – 230 | ■ | ■ | | ■ | | | |
|  | FN3310<br>FN3311 | 520 VAC | 250 – 2300 | | | | ■ | ■ | ■ | |
|  | FN3310HV<br>FN3311HV | 760 VAC | 250 – 2300 | | | | ■ | ■ | ■ | |
|  | FN3359<br>FN3359HV | 520 VAC<br>760 VAC | 150 – 2500 | ■ | | | ■ | ■ | ■ | |
| NEW  | FN3840 | 530 VAC | 25 – 380 | | ■ | | | ■ | | |
|  | FN351<br>FN351H | 440 VAC<br>520 VAC | 8 – 280 | | ■ | | | | | |

# 3-Phase with Neutral Line Filters

3-phase with neutral line filters are a compact solution for interference suppression on the mains input of cabinets and control units of equipment, ranging from industrial applications like machine tools to sensitive medical installations. These installations typically involve several and often insufficiently filtered frequency inverters and SMPS, causing current imbalance and significant interference problems. As individual elements they may be interference suppressed already. The conjunction of several switching components in the same cabinet and a non EMC conscious cabling will increase the demand for an additional EMC/EMI filter on the mains input of the whole installation. Many times this is the only way to get the CE mark for the cabinet in accordance with the EMC directive.

IEC/EN 60939

**Rated current [A]**

3 20 25 150 160 600

**Attenuation Performance**

standard high very high

**Features**

| | Family | Max. Voltage | 1-stage filter circuit | 2-stage filter circuit | Safety connector blocks | Optional screw bolt terminals | Faston connection | Very low leakage current |
|---|---|---|---|---|---|---|---|---|
|  | FN3256 | 3× 520/300 VAC | ■ | | ■ | | | |
|  | FN3280 | 3× 520/300 VAC | | ■ | ■ | | | |
|  | FN354 | 3× 440/250 VAC | | ■ | | | ■ | |
|  | FN355 | 3× 440/250 VAC | ■ | | | | ■ | ■ |
|  | FN356 | 3× 440/250 VAC | ■ | | ■ | ■ | | |

# Feedthrough Components

Interference suppression up into the GHz range for high-tech applications such as IT, telecom, server and networking equipment.

| | Feedthrough Capacitors | Max. Voltage | Rated current [A] 0 10 50 63 100 200 / Capacitance [nF] 2.2 100 220 470 1000 4700 | Features: AC capacitors | DC capacitors | AC filters | DC filters | Y2 capacitor class | Y4 capacitor class |
|---|---|---|---|---|---|---|---|---|---|
|  | FN7510 | 300 VAC<br>250 VAC (UL) | 10 – 100<br>2.2 – 47 | ■ | | | | ■ | |
|  | FN7511 | 300 VAC<br>250 VAC (UL) | 10 – 200<br>4.7 – 220 | ■ | | | | ■ | |
|  | FN7512 | 300 VAC<br>250 VAC (UL) | 16 – 63<br>33 – 100 | ■ | | | | ■ | |
|  | FN7513 | 300 VAC<br>250 VAC (UL) | 16<br>100 | ■ | | | | ■ | |
|  | FN7514 | 300 VAC<br>250 VAC (UL) | 32<br>100 | ■ | | | | ■ | |
|  | FN7560 | 130 VDC<br>130 VAC | 10 – 200<br>10 – 100 | ■ | ■ | | | | ■ |
|  | FN7561 | 130 VDC<br>130 VAC | 63 – 200<br>47 – 470 | ■ | ■ | | | | ■ |
|  | FN7562 | 130 VDC<br>130 VAC | 16 – 200<br>100 – 1000 | ■ | ■ | | | | ■ |
|  | FN7563 | 130 VDC<br>130 VAC | 16 – 200<br>470 – 4700 | ■ | ■ | | | | ■ |

| | Feedthrough Filters | Max. Voltage | Rated current [A] 0 10 50 63 100 200 / Attenuation Performance: standard high very high | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
|  | FN7611 | 300 VAC<br>250 VAC (UL) | 10 – 63 | | | ■ | | ■ | |
|  | FN7612 | 300 VAC<br>250 VAC (UL) | 10 – 63 | | | ■ | | ■ | |
|  | FN7660 | 130 VDC<br>130 VAC | 10 – 200 | | | ■ | ■ | | ■ |
|  | FN7661 | 130 VDC<br>130 VAC | 10 – 200 | | | ■ | ■ | | ■ |

# PCB Filters

Very compact EMI suppression components can directly be mounted on printed circuit boards of low-power office, medical, telecom and IT equipment, DC/DC converters and power supplies etc. Ideal low cost solution for manufacturers who already planned for EMC compliance throughout the equipment design process.

| | Family | Max. Voltage | Rated current [A] / Attenuation Performance (0.5 – 3 – 6.5 – 8.4 – 10 – 13; standard – high – very high) | Features: For DC applications | With metal case | Low profile | Small footprint |
|---|---|---|---|---|---|---|---|
|  | FN402 | 250 VAC | 0.5 – 6.5 | | | ■ | |
|  | FN405 | 250 VAC | 0.5 – 10 | | | ■ | |
|  | FN406 | 250 VAC | 0.5 – 8.4 | | ■ | | ■ |
|  | FN409 | 75 VDC | 3 – 13 | ■ | | ■ | |
|  | FN410 | 250 VAC | 0.5 – 6 | | ■ | ■ | |

# EMC/EMI Chokes

An extensive selection of discrete EMC/EMI chokes with various inductance and current ratings allows optimized circuitry for EMC compliance to be designed easily and economically.

| | Family | Max. Voltage | Rated current [A] / Inductance value [mH] up to: | Features: Common mode choke | DC application | Single phase | 3-phase | 3-phase with neutral | Differential mode choke | Saturation choke | High differential mode inductance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NEW  | ED series | 300 VAC | 0.2 – 2 / 40 | ■ | | ■ | | | | | ■ |
|  | EV/EH series | 250 VAC | 0.3 – 5 / 90 | ■ | | ■ | | | | | |
|  | RB series | 600 VAC<br>1000 VDC | 16 – 50 / 3 | ■ | ■ | ■ | ■ | | | | |
|  | RC series | 250 VAC<br>1000 VDC | 0.25 – 0.7 / 47 | ■ | ■ | ■ | | | | | |
|  | RD 5000 series | 600 VAC<br>850 VDC | 6 – 16 / 10 | ■ | ■ | ■ | ■ | | | | |
|  | RD 6000 series | 600 VAC<br>850 VDC | 6 – 16 / 15 | ■ | ■ | ■ | ■ | | | | |
|  | RD 7000 series | 600 VAC<br>850 VDC | 6 – 36 / 25 | ■ | ■ | ■ | ■ | | | | |
|  | RD 8000 series | 600 VAC<br>850 VDC | 16 – 64 / 12 | ■ | ■ | ■ | ■ | | | | |
|  | RI series | 250 VAC | 1.5 – 25 | | | ■ | | | | ■ | |
|  | RN series | 300 VAC<br>300 VDC | 0.3 – 10 / 100 | ■ | ■ | ■ | | | | | |
|  | RS series | 250 VAC | 0.3 – 4 / 3.6 | | | ■ | | | ■ | | |
| NEW  | RT series | 600 VAC<br>425 VDC | 6 – 63 / 10 | ■ | ■ | ■ | ■ | | | | |
| NEW  | RV series | 530 VAC<br>1000 VDC | 16 – 50 / 16 | ■ | ■ | ■ | | ■ | | | |

# Pulse Transformers

They provide a proper galvanic separation between gate drive circuitry and high voltage path in IGBT, thyristor, triac, power MOSFET and DC/DC converter circuits.

| | Family | Nom. Voltage | Ignition current [A] up to: 0 0.6 1.2 1.8 2.4 3.0<br>Voltage-time area [Vµs] up to: 0 1000 2000 3000 4000 5000 | Features: 1 : 1 | 1 : 1 : 1 | 2 : 1 | 2 : 1 : 1 | 3 : 1 | 3 : 1 : 1 | PCB | Faston | Galvanic isolation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | IT155<br>IT237 | 500 VAC | 0.25<br>1100 | ■ | | | | | | ■ | | ■ |
|  | IT245, IT255, IT258 | 750 VAC | 1<br>500 | ■ | | | | | | ■ | | ■ |
|  | IT239 | 1000 VAC | 0.25<br>350 | ■ | | | | | | ■ | | ■ |
|  | IT370 | 1000 VAC | 1<br>4000 | ■ | | | | | | ■ | | ■ |
|  | IT364 | 3000 VAC | 3<br>5000 | ■ | | | | | | | ■ | ■ |
|  | IT213 | 380 VAC | 0.25<br>450 | | ■ | | | | | ■ | | ■ |
|  | IT312<br>IT313 | 380 VAC | 1<br>1200 | | ■ | | | | | ■ | | ■ |
|  | IT143, IT233, IT242,<br>IT243, IT 253 | 500 VAC | 0.25<br>800 | | ■ | | | | | ■ | | ■ |
|  | IT245<br>IT248 | 750 VAC | 0.25<br>350 | | | ■ | | | | ■ | | ■ |
|  | IT249 | 500 VAC | 0.25<br>350 | | | | ■ | | | ■ | | ■ |
|  | IT260 | 500 VAC | 0.1<br>200 | | | | | ■ | | ■ | | ■ |
|  | IT314 | 380 VAC | 1<br>500 | | | | | | ■ | ■ | | ■ |
|  | IT234, IT244, IT154 | 500 VAC | 0.25<br>600 | | | | | | ■ | ■ | | ■ |

# Active Harmonic Filters

Active harmonic filters are suitable for mixed load installations and applications with dynamic load. Commonly used as a central solution at Point of Common Coupling (PCC). Ecosine Active Sync harmonic filters provide a reliable solution for harmonic mitigation, power factor correction and load balancing in real time. The modular concept offers highest flexibility for customization, redundancy, retrofitting and combination with passive harmonic mitigation components.

| | Family | Nom. Voltage | Rated mitigation current [A] | For 50 Hz grids | For 60 Hz grids | For 6 pulse diode rectifiers without $L_{dc}$ | For 6 pulse diode rectifiers with $L_{dc}$ | For 6-pulse SCR rectifiers | THDi <5% | Power factor correction | Load balancing | 3-phase/3-wire | 3-phase/4-wire |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | FN3530<br>FN3531 | 380–480 VAC | 60 A | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
|  | FN3540<br>FN3541 | 380–415 VAC | 60 A | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ |
|  High speed Bus | FN3532 | 380–480 VAC | 120 A | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
|  High speed Bus | FN3542 | 380–415 VAC | 120 A | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ |
|  | FN3545 | 380–480/415 VAC | 60 – 1200 A* | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

Rated mitigation current [A]: 60 120 180 240 300 600 900 1200

*up to 1200 A by combining multiple cabinets

# 3-Phase Line Reactors and LCL Filters

Line side harmonic mitigation solutions for industrial applications like motor drives and Active Front End/Active Infeed Converters. 3-Phase Line Reactors offer a first stage of mitigation with possiblity to combine with other filtering solutions like an Active Harmonic Filter. LCL Filters protect the grid from disturbances induced during energy regeneration from the Active Front End.

| | Family | Nom. Voltage | Rated mitigation current [A] 0 200 400 600 800 1000 <1000 | For 50 Hz grids | For 60 Hz grids | For 6-pulse diode rectifiers | For 6-pulse SCR rectifiers | For Active Front End | Less commutation notches | Inrush current limitation | Harmonics reduction | Reduces the current and voltage ripples | 4% impedance | 2% impedance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | RWK3044 | 380–480 VAC | 2 – 1000 | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | ■ | |
|  | RWK3062 | 500–690 VAC | 1.5 – 870 | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | | ■ |
|  | FN6840 | 380–480 VAC | 25 | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | | |

# Passive Harmonic Filters

Passive harmonic filters help to obtain compliance with international standards like e.g. IEEE 519-1992 or EN 61000-3-12, and with local utility codes. They reduce electrical and thermal stress upon the electrical infrastructure, eliminate the risk of harmonics-related reliability problems, and support long-term energy efficiency and cost savings.
Ecosine passive harmonic filters are the industry standard for 6-pulse rectifiers and non-regenerative motor drives to achieve the often specified level of THDi <5%.

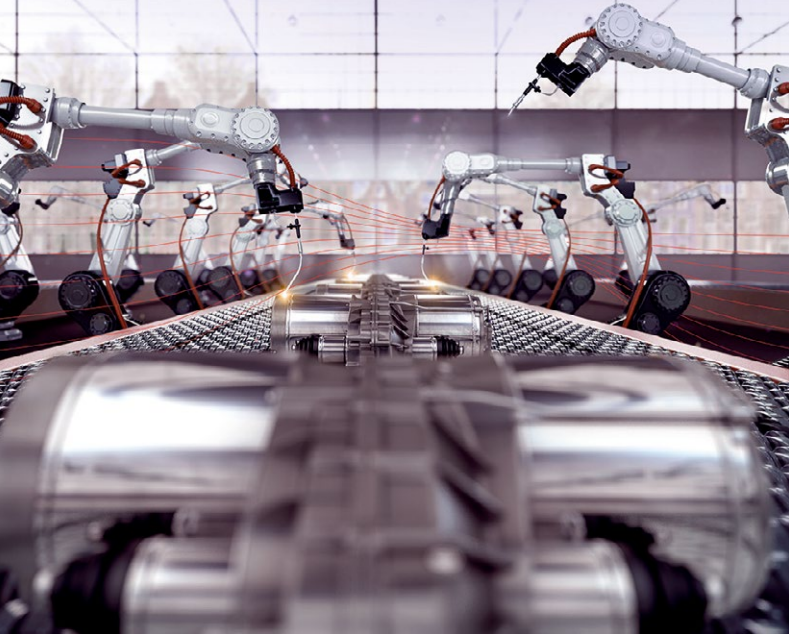
| | Family | Nom. Voltage | Rated power [kW/HP] 0 100 200 300 400 500 600 | For 50 Hz grids | For 60 Hz grids | For 6 pulse diode rectifiers without $L_{dc}$ | For 6 pulse diode rectifiers with $L_{dc}$ | For 6-pulse SCR rectifiers | Full performance THDi <5% | Economy THDi 5–15% | 3-phase/3-wire |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  | FN3440 | 380–415 VAC | 1.1 250 kW | ■ | | ■ | ■ | ■ | ■ | | ■ |
|  | FN3441 | 380–415 VAC | 1.1 250 kW | ■ | | | ■ | | ■ | | ■ |
|  | FN3442 | 380–415 VAC | 1.2 240 HP | | ■ | ■ | ■ | ■ | ■ | | ■ |
|  | FN3443 | 380–415 VAC | 1.2 240 HP | | ■ | | ■ | | ■ | | ■ |
|  | FN3450 | 440–500 VAC | 1.1 315 kW | ■ | | ■ | ■ | ■ | ■ | | ■ |
|  | FN3451 | 440–500 VAC | 1.1 315 kW | ■ | | | ■ | | ■ | | ■ |
|  | FN3452 | 440–480 VAC | 1.5 300 HP | | ■ | ■ | ■ | ■ | ■ | | ■ |
|  | FN3453 | 440–480 VAC | 1.5 300 HP | | ■ | | ■ | | ■ | | ■ |
|  | FN3470 | 380–415 VAC | 250 500 kW | ■ | | ■ | ■ | ■ | ■ | | ■ |
|  | FN3471 | 380–415 VAC | 250 500 kW | ■ | | ■ | ■ | ■ | | ■ | ■ |
|  | FN3472 | 380–415 VAC | 280 480 HP | | ■ | ■ | ■ | ■ | ■ | | ■ |
|  | FN3473 | 380–415 VAC | 280 480 HP | | ■ | ■ | ■ | ■ | | ■ | ■ |
|  | FN3480 | 440–480 VAC | 315 560 kW | ■ | | ■ | ■ | ■ | ■ | | ■ |
|  | FN3481 | 440–480 VAC | 315 560 kW | ■ | | ■ | ■ | ■ | | ■ | ■ |
|  | FN3482 | 440–480 VAC | 350 600 HP | | ■ | ■ | ■ | ■ | ■ | | ■ |
|  | FN3483 | 440–480 VAC | 350 600 HP | | ■ | ■ | ■ | ■ | | ■ | ■ |
|  | FN3416 | 380–500 VAC | 4 160 kW | ■ | | ■ | ■ | ■ | | ■ | ■ |
|  | FN3418 | 380–480 VAC | 5 250 HP | | ■ | ■ | ■ | ■ | | ■ | ■ |
|  | FN3416LV | 200–240 VAC | 2.5 90 kW | ■ | | ■ | ■ | ■ | | ■ | ■ |
|  | FN3418LV | 200–240 VAC | 2.5 125 HP | | ■ | ■ | ■ | ■ | | ■ | ■ |

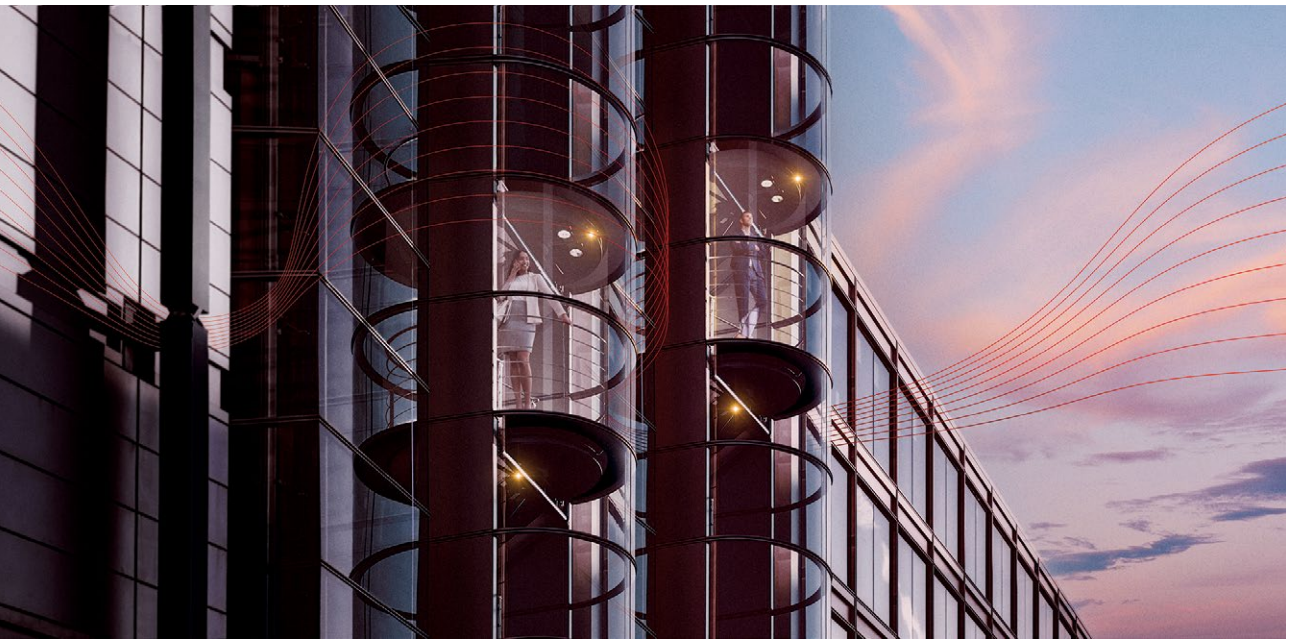
# Output Filters and 3-Phase Load Reactors

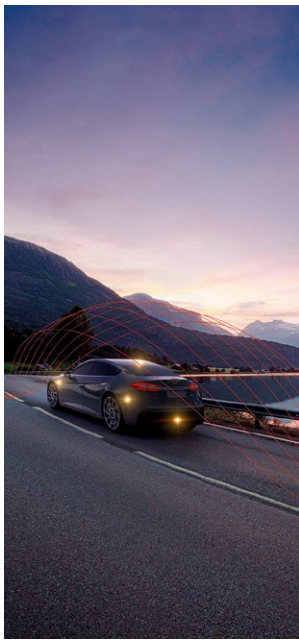
Schaffner offers a wide range of Power Quality motor protection devices. Improving the system reliability, availability and functionality to avoid expensive downtimes of installations, manufacturing plants, machinery and other applications caused by premature motor damage. Dv/dt Reactors reduce the voltage rise induced by the pulse wide modulation generated by the variable frequency drive, dv/dt Filters reduce the voltage rise even further and the voltage peaks at the motor terminals. Sine Wave Filters are differential mode low-pass filters providing a sinusoidal phase-to-phase output voltage and allow the use of cables up to 2'000 m long, eliminate the bearing currents and reduce acoustic noises. Sine Wave Plus Filters add a common mode filtering to smooth out the voltage and current phase-to-phase and phase-to-earth allowing the usage of long unshielded motor cables.

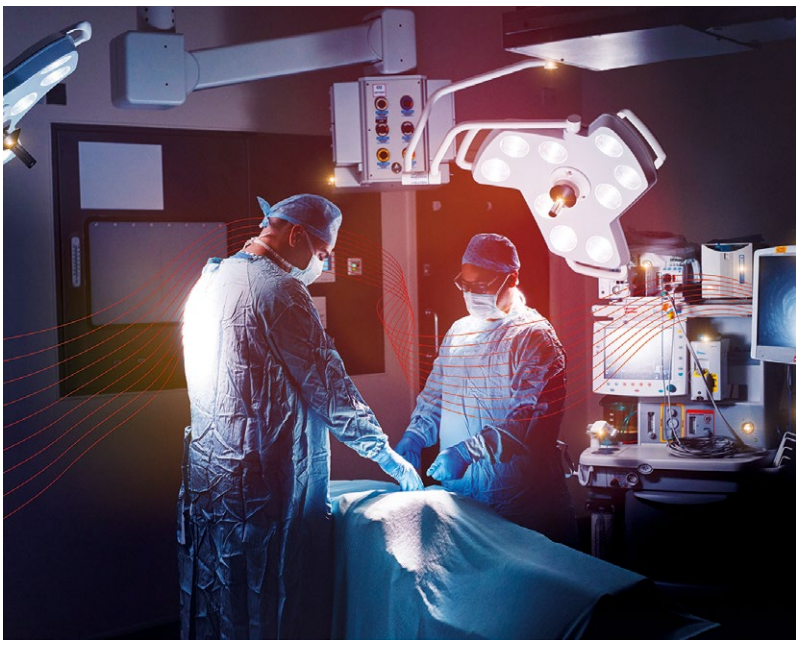
| | Family | Nom. Voltage | Rated current [A] / Motor frequency* [Hz] | Maximum cable length [m] | dv/dt reduction | Overvoltage reduction | Motor temperature reduction | Acoustic motor noise reduction | Sym. sinusoidal output signal | Asym. sinusoidal output signal | Elimination of bearing damage | Replaces cable shields | Connection to DC link required | Improves overall EMC | Reduces equipment downtime |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0 200 400 600 800 1000 1200 / 0 50 60 100 120 200 600 | | | | | | | | | | | | |
|  | FN5420 | 480 VAC | 2.3 – 1000 A | 2000 | ■ | ■ | ■ | ■ | ■ | | | | | ■ | ■ |
|  | FN5040HV | 690 VAC | 13 – 1320 A | 2000 | ■ | ■ | ■ | ■ | ■ | | | | | ■ | ■ |
|  | FN5020 | 500 VAC | 0 – 120 A | 1000 | ■ | ■ | ■ | ■ | ■ | | | | | ■ | ■ |
|  | FN5030** | 500 VAC | 0 – 120 A | 1000 | | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ |
|  | FN530 | 500 VAC | 0 16 A | 1000 | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ |
|  | FN5060 | 500 VAC | 12 – 1100 A | 500 | ■ | ■ | ■ | | | | | | | ■ | ■ |
|  | FN5060HV | 690 VAC | 30 – 1100 A | 500 | ■ | ■ | ■ | | | | | | | ■ | ■ |
|  | RWK5420 | 480 VAC | 2.3 – 1000 A | 100 | ■ | | ■ | | | | | | | ■ | ■ |
|  | RWK305 | 500 VAC | 0 – 1100 A | 30 | ■ | | ■ | | | | | | | ■ | ■ |

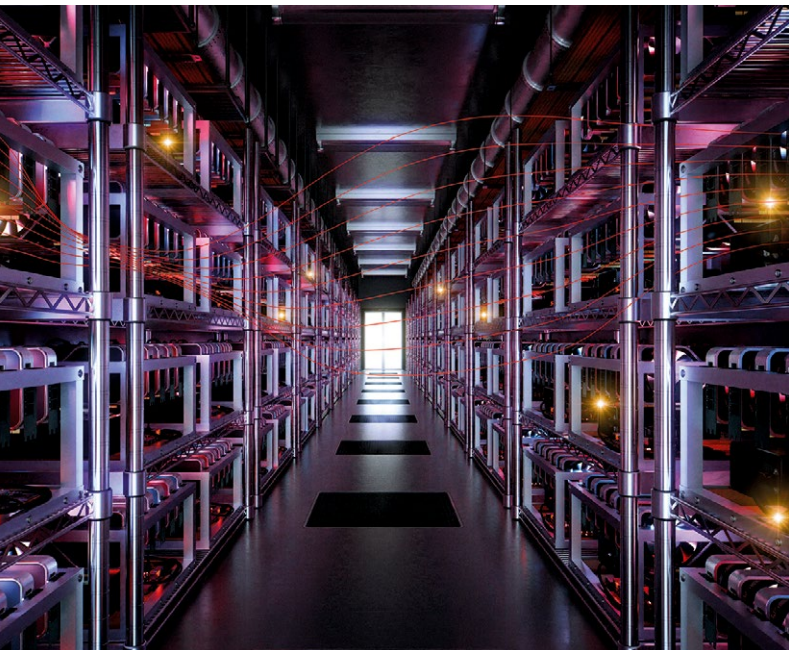
*motor frequencies above 60 Hz require a derating except for FN5020 (see user manual).
** Additional output filter module to be operated in conjunction with FN5420 or FN5020.











## Headquarters, Global Innovation and Development

**Switzerland**
**Schaffner Group**
Industrie Nord
Nordstrasse 11 e
4542 Luterbach
P + 41 32 681 66 26
info@schaffner.com

## Sales and Application Centers

**China**
**Schaffner EMC Ltd. Shanghai**
T20 - 3 C No 565 Chuangye Road
Pudong district 201201
P + 86 21 38 139 500
cschina@schaffner.com

**Finland**
**Schaffner Oy**
Sauvonrinne 19 H
08500 Lohja
P + 358 50 468 72 84
finlandsales@schaffner.com

**France**
**Schaffner EMC S.A.S.**
16 - 20 Rue Louis Rameau
95875 Bezons
P + 33 1 34 34 30 60
francesales@schaffner.com

**Germany**
**Schaffner Deutschland GmbH**
Schoemperlenstrasse 12 B
76185 Karlsruhe
P + 49 721 56 910
germanysales@schaffner.com

**India**
**Schaffner India Pvt. Ltd**
Regus World Trade Centre
WtC 22nd Floor Unit No 2238
Brigade Gateway Campus 26 / 1
Dr. Rajkumar Road
Malleshwaram (W)
560055 Bangalore
P + 91 80 679 35 355
indiasales@schaffner.com

**Italy**
**Schaffner EMC S.r.l.**
Via Ticino 30
20900 Monza (MB)
P + 39 039 21 41 070
italysales@schaffner.com

**Japan**
**Schaffner EMC K.K.**
Taiju - Seimei Sangenjaya Bldg.
1 - 32 - 12 Kamiuma Setagaya-ku
154 - 0011 Tokyo
P + 81 3 57 12 36 50
japansales@schaffner.com

**Singapore**
**Schaffner EMC Pte Ltd.**
# 05 - 09 Kg Ubi
Ind. Estate 408705
P + 65 63 77 32 83
singaporesales@schaffner.com

**Spain**
**Schaffner EMC España**
Calle Caléndula 93 Miniparc III
Edificio El Soto de Moraleja
Alcobendas 28109 Madrid
P + 34 917 912 900
spainsales@schaffner.com

**Sweden**
**Schaffner EMC AB**
Östermalmstorg 1
114 42 Stockholm
P + 46 8 50 50 2425
swedensales@schaffner.com

**Switzerland**
**Schaffner EMV AG**
Industrie Nord
Nordstrasse 11 e
4542 Luterbach
P + 41 32 681 66 88
P + 41 32 681 66 26
switzerlandsales@schaffner.com

**Taiwan**
**Schaffner EMV Ltd.**
20 Floor - 2 No 97 Section 1
XinTai 5th Road
22175 XiZhi District
New Taipei City 22175
P + 886 2 2697 55 00
taiwansales@schaffner.com

**Thailand**
**Schaffner EMC Co. Ltd.**
Northern Region Industrial
Estate 67 Moo 4 Tambon
Ban Klang Amphur Muang
P.O. Box 14 51000 Lamphun
P + 66 53 58 11 04
thailandsales@schaffner.com

**United Kingdom**
**Schaffner Ltd.**
1 Oakmede Place Binfield
RG42 4JF Berkshire
P + 44 118 977 00 70
uksales@schaffner.com

**USA**
**Schaffner EMC Inc.**
52 Mayfield Avenue
Edison New Jersey
P + 1 732 225 95 33
usasales@schaffner.com

To find your local partner within Schaffner's global network, please visit schaffner.com



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**Schaffner Group**
Nordstrasse 11e
4542 Luterbach
Switzerland
P + 41 32 681 66 26
info@schaffner.com

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