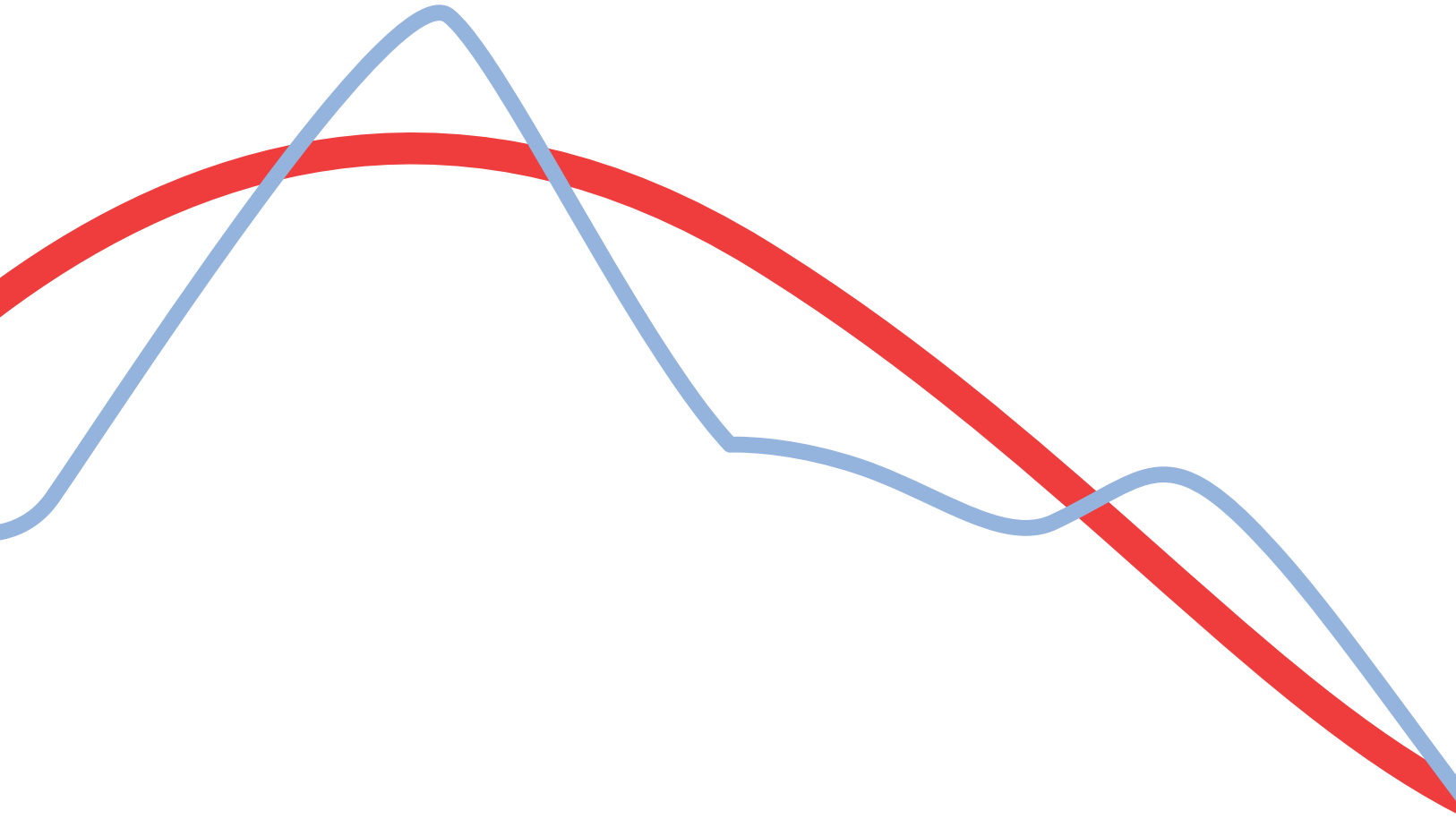
ENERDOOR

HARMONIC FILTERS



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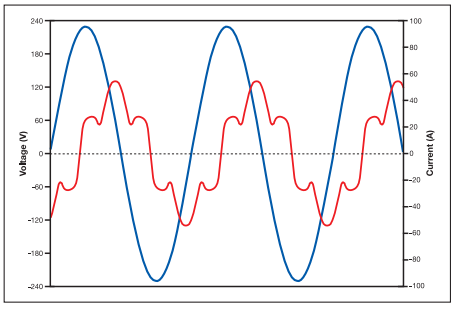
Power quality is a significant concern for manufacturing and power generation facilities. This is due to harmonic disturbance and reactive power, which is produced by unbalanced loads, variable frequency drives and motors. These issues have serious consequences, including prematurely aging of equipment, unreliable controls, system synchronization loss, and increased energy, maintenance and replacement costs.

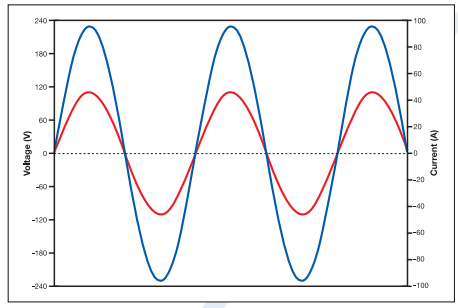
Enerdoor is an industry leader in radio frequency interference solutions. The Enerdoor harmonic filter series solves harmonic disturbance and power quality issues by compensating current harmonic and power factor correction generated by industrial loads.



Example of a distorted drawn current due to a 6P rectifier

FINHRM
FINHRM5

FINHRMA
FINHRMAC



Example of a sinusoidal drawn current

Problems generated by harmonic and displacement power factor

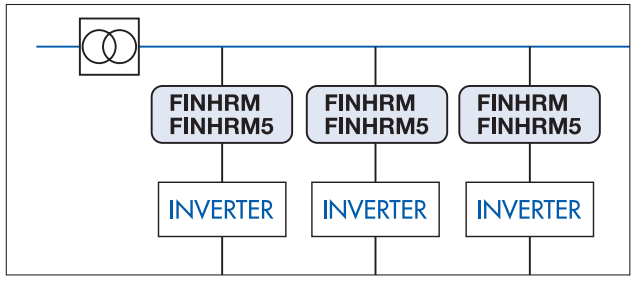
Both harmonic distortion and displacement power cause the following problems in an installation:

- Over sizing of power cables, transformers and generators to support higher currents due to reactive energy
- Voltage harmonic distortion due to an unbalanced load propagated to other loads in the installation
- Disruptive resonance with other reactive components on the same power line
- Higher utility costs due to kVAR returning to the mains
- Communication interference
- Energy loss

The majority of automation systems and manufacturers are required to follow the IEC 61000-3-2, IEC 61000-3-12 and IEEE 519 International Standards which regulate harmonic distortions in the mains.

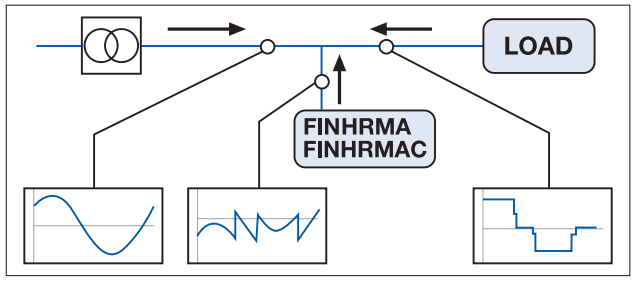
Passive Harmonic Filters

Enerdoor passive harmonic FINHRM and FINHRM5 series attenuates the distorted current and is connected in series to the load (normally 6 pulse rectifier) without causing a significant voltage drop.



Active Harmonic Filters

Enerdoor active harmonic FINHRMA and FINHRMAC series eliminates harmonic distortion due to nonlinear loads and improves power factor by minimizing reactive power generated by the load. These models are connected in parallel to the mains to compensate the harmonic distorted current.



FINHRM5

ELECTRIC CHARACTERISTICS

Nominal voltage	**Up to 480 Vac**
Peak current @ 50°C	**150% for 60 s every 10 minutes**
Frequency	**50 Hz (.6 for 60 Hz)**
Case	**Enclosure or open frame**
THDI reduction	**<5%**
Overvoltage on no load condition	**<5%**
Reactive power on no load	**25%**

RoHS

FINHRM5	Current (A) @ 50°C	Rated Power (KW) 400 Vac	Rated Power (KW) 480 Vac	Power Loss (W) 400 (480) Vac	Connection
FINHRM5.010.M	10	4	5.5	55 (80)	Terminal blocks
FINHRM5.016.M	16	7,5	11	105 (160)	Terminal blocks
FINHRM5.032.M	32	15	18,5	210 (275)	Terminal blocks
FINHRM5.045.M	45	22	30	273 (370)	Terminal blocks
FINHRM5.080.M	80	40	48	398 (475)	Terminal blocks
FINHRM5.120.M	120	60	72	492 (672)	Terminal blocks
FINHRM5.160.M	160	80	96	590 (710)	Lugs
FINHRM5.210.M	210	105	126	610 (750)	Lugs
FINHRM5.260.B	260	130	160	780 (940)	Busbars
FINHRM5.320.B	320	160	200	940 (1150)	Busbars
FINHRM5.400.B	400	200	241	940 (1150)	Busbars
FINHRM5.460.B	460	230	277	1280 (1410)	Busbars
FINHRM5.600.B	600	280	360	1480 (1750)	Busbars
FINHRM5.750.B	750	360	440	1690 (1920)	Busbars

FINHRM

ELECTRIC CHARACTERISTICS

Nominal voltage	**Up to 480 Vac (600 optional)**
Peak current @ 50°C	**150% for 60 s every 10 minutes**
Frequency	**50 Hz / 60 Hz**
Case	**Enclosure**
THDI reduction	**<15%**
Overvoltage on no load condition	**<5%**

RoHS

FINHRM	Current (A) @ 40°C	Rated Power (KW) 400 Vac	Rated Power (KW) 480 Vac	Power Loss (W) 400 (480) Vac	Connection
FINHRM.016.M	16	7,5	11	80 (116)	Terminal blocks
FINHRM.030.M	30	15	18,5	97 (145)	Terminal blocks
FINHRM.050.M	50	25	34	170 (250)	Terminal blocks
FINHRM.075.M	75	37	45	225 (335)	Terminal blocks
FINHRM.100.M	100	50	68	257 (380)	Terminal blocks
FINHRM.150.M	150	75	90	320 (480)	Terminal blocks
FINHRM.200.M	200	100	120	575 (850)	Terminal blocks

FINHRMAC

Compact Active Harmonic Filter

- High performance and reliable
- High efficiency: harmonic filtering rate more than 95%
- Touch screen LCD HMI
- Easy installation
- Unaffected by network conditions
- Active load balancing
- Combination of power factor and harmonic correction (both inductive and capacitive power)
- Free from resonance due to automatic resonance elimination
- Complete protection for: over voltage, under voltage, over current and over heating
- Paralleled up to 10 modules
- Rack unit or wall mounting installation options

TECHNICAL SPECIFICATIONS

Active Filter Rating	HRMAC.030.M	HRMAC.N.030.M	HRMAC.050.M	HRMAC.N.050.M
Grid type	3 phase	3 phase plus neutral	3 phase	3 phase plus neutral
Rated AC current	30A	30A	50A	50A
Rated voltage	380 – 480 Vac (± 10%)			
Rated frequency	50 / 60 Hz (± 1%)			
Power consumption	1 Kw	1.5 Kw	1 Kw	1.5 Kw
Residual THD(I)	<5%			
Output ability	100% Self limited			
Harmonic order	2nd - 50th			
Full response time	10 ms			
Response time	100 µs			
Neutral compensation current		300%		300%
CT ratio	500:5 ~ 5000:5			
HMI	Touch screen panel			
Communication	RS 485			
Parallel configuration	Up to 10 units			
Protection level	IP 30			
Cable entry	Back			
Mounting	Rack or wall mount			
Dimensions WxHxD (mm)	482 x 176 x 600	482 x 176 x 650	482 x 176 x 600	482 x 176 x 600
Weight	26 Kg	26 Kg	28 Kg	28 Kg

- Active Mode - Fast adaption of output currents, according to the actual harmonic and reactive conditions of the load.
- Power Factor Correction - Compensates the load reactive power and brings the power factor to the target value.
- Immunity - Any harmonic current injected into the line by nearby user equipment. Does not affect filtering effectiveness and is not influenced by any line voltage distortion.
- No Resonance - Operation principles prevent undesired oscillations.
- Zero Absorption - The active power absorbed by the line is restricted to the loss of the power section (inverter, conductor, cables). The active filter generates only harmonic and reactive currents without any exchange of energy with the mains.
- Ease of Installation - The active filter is connected in parallel with the supply line. The load current is monitored by current transformers (CTs) installed on the load side.
- Ease of Disconnection - Active filters may be disconnected from the supply line simply by switching off the main breaker without interrupting the supplied load.

TECHNICAL SPECIFICATIONS

Active Filter Rating	FINHRMA.075.M	FINHRMA.100.M	FINRMA.200.M	FINHRMA.300.M
Grid type	3-phase / 3-phase + neutral available as an option			
Rated AC current	75A	100A	200A	300A
Rated voltage	Up to 690 Vac			
Rated frequency	50 / 60 Hz (± 1%)			
Residual THD(I)	<5%			
Power factor correction	Up to 0.95*			
Response time	<300 µs			
CT ratio	100:5 ~ 50000:5			
HMI	Touch screen panel			
Controller topology	Digital with FTT analysis			
Available interface protocols	Ethernet, RS485, ModBus			
Parallel configuration	Up to 5 units			
Protection degree	IP 31			
Cable entry	From the bottom			
Mounting	Cabinet			
Dimensions WxHxD (mm)	820 x 2200 x 610		1220 x 2200 x 610	
Color	RAL 7035			
Cooling	Air cooling			
Operative temperature range	Operating: 0°C / 40°C and Storage: -10°C / 50°C			
Humidity	<80% @ 20°C not condensing			
Altitude	<1000m a.s.l.			

*Maximum power factor compensation capability depending on compensation current

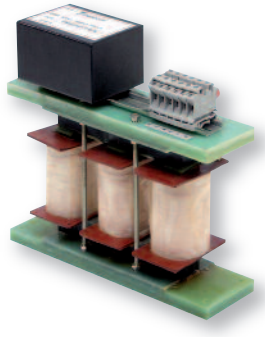
Transformers and Line Reactors

RFI Filters

Voltage Stabilizers

Surge Arresters

Motor Protection



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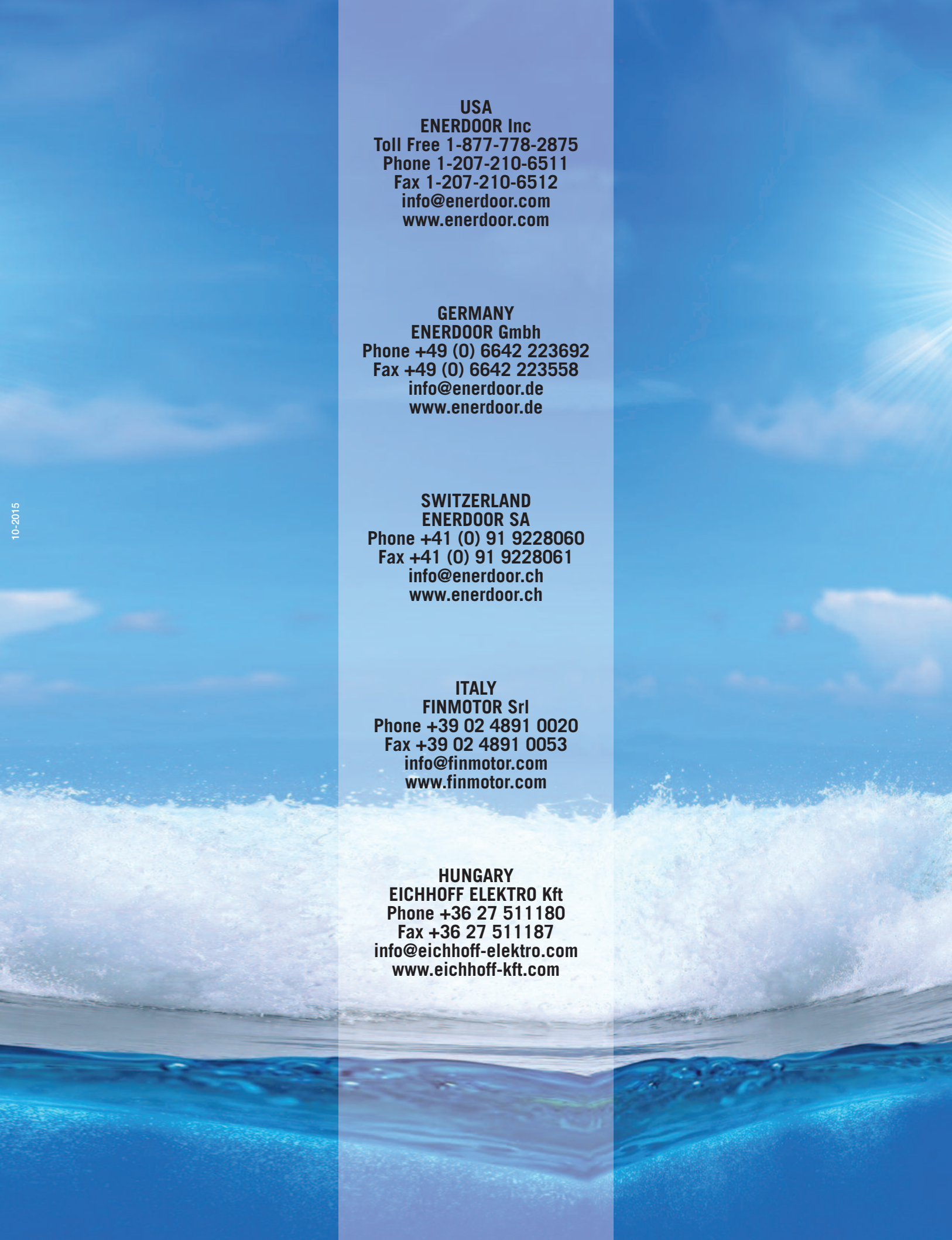

USA
ENERDOOR Inc
Toll Free 1-877-778-2875
Phone 1-207-210-6511
Fax 1-207-210-6512
info@enerdoor.com
www.enerdoor.com

GERMANY
ENERDOOR Gmbh
Phone +49 (0) 6642 223692
Fax +49 (0) 6642 223558
info@enerdoor.de
www.enerdoor.de

SWITZERLAND
ENERDOOR SA
Phone +41 (0) 91 9228060
Fax +41 (0) 91 9228061
info@enerdoor.ch
www.enerdoor.ch

ITALY
FINMOTOR Srl
Phone +39 02 4891 0020
Fax +39 02 4891 0053
info@finmotor.com
www.finmotor.com

HUNGARY
EICHHOFF ELEKTRO Kft
Phone +36 27 511180
Fax +36 27 511187
info@eichhoff-elektro.com
www.eichhoff-kft.com

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