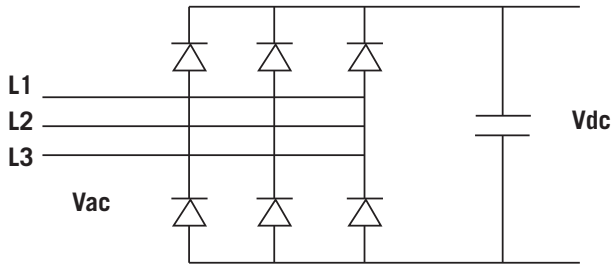
Introduction

Power quality is a significant concern for today's manufacturing and power generation facilities. Finding the right solution for unbalanced loads is important. Two major power quality issues are harmonic distortion and reactive power generated by a low power factor.
Devices such as variable frequency drives, servo drives, LED light drivers and other devices that rectify AC to DC can generate harmonic distortion. It is important to limit the distortion under a certain level in order to reduce effects on other equipment in a facility.
Reactive power, which may be capacitive or inductive, causes the current waveform to change phases respective to the voltage waveform. The capacitance causes the current to lead and the inductance causes the current to lag.
In power transmission, due to the fact that most loads are inductive, there is more reactive power resulting in extra current being supplied. This leads to power loss and high temperatures with additional cost to the operator. For this reason industries are charged extra if they have a low power factor.

Harmonic Theory

In a sinusoidal wave it is important to understand when harmonics are generated. The electrical network provides a sinusoidal voltage and the load absorbs a certain current which depends on the impedance of the load itself.
If the response is linear, the relationship between voltage and current is constant. In a resistive load for example, the current wave shape will be identical to the shape of the voltage wave that is sinusoidal and therefore without distortion.
If the load response is not linear, the current waveform will not follow the voltage waveform but will depend on the ratio between voltage and current at each instant. This will therefore result in a non-sinusoidal waveform.
A typical example of a non-linear load is represented by the input rectifier bridge built inside drives.



INPUT RECTIFIER BRIDGE IS A TYPICAL EXAMPLE OF NON-LINEAR LOAD

Harmonic Rating

THD and TDD parameters are used to evaluate harmonic content.
THD or Total Harmonic Distortion is expressed as a percentage and is calculated according to the following formula:

$$THD = \frac{\sqrt{I2^2+I3^2+I4^2+I5^2+\cdots}}{I1}$$

Where I1 represents the current at that moment, I2, I3... represent the harmonic currents at that moment.

$$TDD = \frac{\sqrt{I2^2+I3^2+I4^2+I5^2+\cdots}}{Ir}$$

TDD or Total Demand Distortion is the same as calculating the THD but instead of referring to the fundamental current, it refers to the current Ir which is the rated current of a full load.

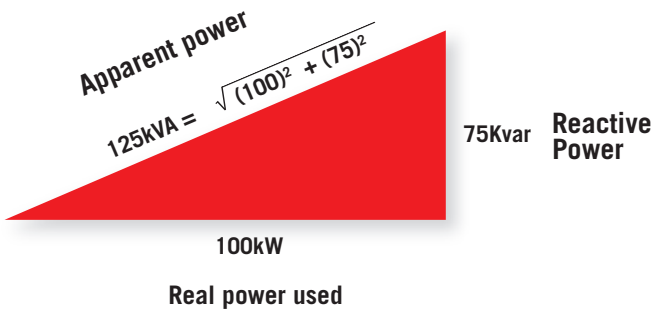
The THD is measured by a percentage instant value and has no real indication of the amount of harmonic distortion without knowing the load current absorbed at that particular moment.
The TDD refers to the rated current and gives an immediate indication of the harmonic distortion, as the rated current is a known datum. THD and TDD coincide with the rated current.

Power Factor

Power factor is defined as a ratio between real power and apparent power in the circuit.
The measured value of power factor is the interval between -1 and 1. A power factor less than one indicates that the voltage and current waveforms are not in phase. A negative power factor occurs when the load generated power flows back to the source.

Typical examples of low power factor are:
- Linear loads: induction motors
- Non-linear loads: rectifiers

In a typical electric power system, a load with low power factor draws more current than a load with higher power factor. Higher current increases energy loss, requiring a larger cable wire and additional solution. For this reason, electrical utilities usually charge a higher price to facilities with low power factor.



$$\text{Power Factor } \cos\Theta = \frac{\text{P, real power}}{\text{S, apparent power}}$$

Problems Generated by Harmonics and Displacement Power Factor

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

Harmonic Solutions

The Enerdoor devices used to reduce current harmonic distortion are:
- DC chokes
- Line reactors
- Passive or active harmonic filters

Below are typical examples of a non-linear load with current THD % versus Enerdoor solutions.

Technique	Current THD %
No mitigation	50 - 70%
DC Choke	30 - 40%
3% Line reactor + DC choke	30 - 40%
5% Line reactor + DC choke	25 - 35%
Passive harmonic filter	5 - 10%
Active front end	3 - 6%
Active harmonic filter	5%

Enerdoor has developed a series of line reactors and passive and active harmonic filters to meet any type of requirements in terms of harmonic reduction and cost.
Line reactors and passive harmonic filters are recommended for single drive applications and sized by the total current.
As an alternative, the active harmonic filter works in parallel and compensates current for single or multiple load applications operating under varied loads. They may be used for single applications or an entire facility.

Power Factor

The most common solution to compensate power factor correction is a capacitor bank. Capacitance compensates for inductive loads floating the power factor close to 1.
The Enerdoor static var generator is a superior alternative to the capacitor bank. It compensates the power factor using an Insulated Gate Bipolar Transistor (IGBT) instead of traditional capacitor banks. This superior technology is a modular system which may be installed in parallel to the main line.
Major advantages of a static var generator vs traditional capacitor banks:
- Not influenced by harmonic resonance
- Compensates both inductive and capacitive reactive power
- System is active. Voltage from the grid has no influence on the compensation capacity
- Very fast response

ENERDOOR

Filter Selection Guide Harmonic Filters	Description	Current Range (A)	Voltage	CONNECTORS			FEATURES					APPLICATIONS					Approval
				Terminal Blocks	Screws	Bus Bar	Additional Power Factor Port	Enclosed	Active Technology	Meets IEC61000-3-12 / IEEE 519	Compact Case	Variable Frequency Drive	Automation	Power Factor Correction	HVAC System	End-User Application	
FINFF	3-phase	1-750	0-600	✘	✘	✘					✘	✘	✘				c UL us
FINHRM	3-phase	16-200	400-600	✘			✘	✘			✘	✘	✘		✘		
FINHRM5	3-phase	10-800	400-600	✘	✘	✘				✘		✘			✘		
FINHRMAD	3-phase 3-phase plus neutral	-	208-690	✘				✘	✘	✘	✘		✘			✘	
FINSVG	3-phase 3-phase plus neutral	-	208-690	✘			✘	✘	✘					✘		✘	c ETL us

Harmonic Filters

The Enerdoor harmonic filter series includes line reactors, passive and active harmonic filters, and static var generators.

Enerdoor line reactors are available with 3% and 5% impedance and with nominal voltage up to 600 Vac.

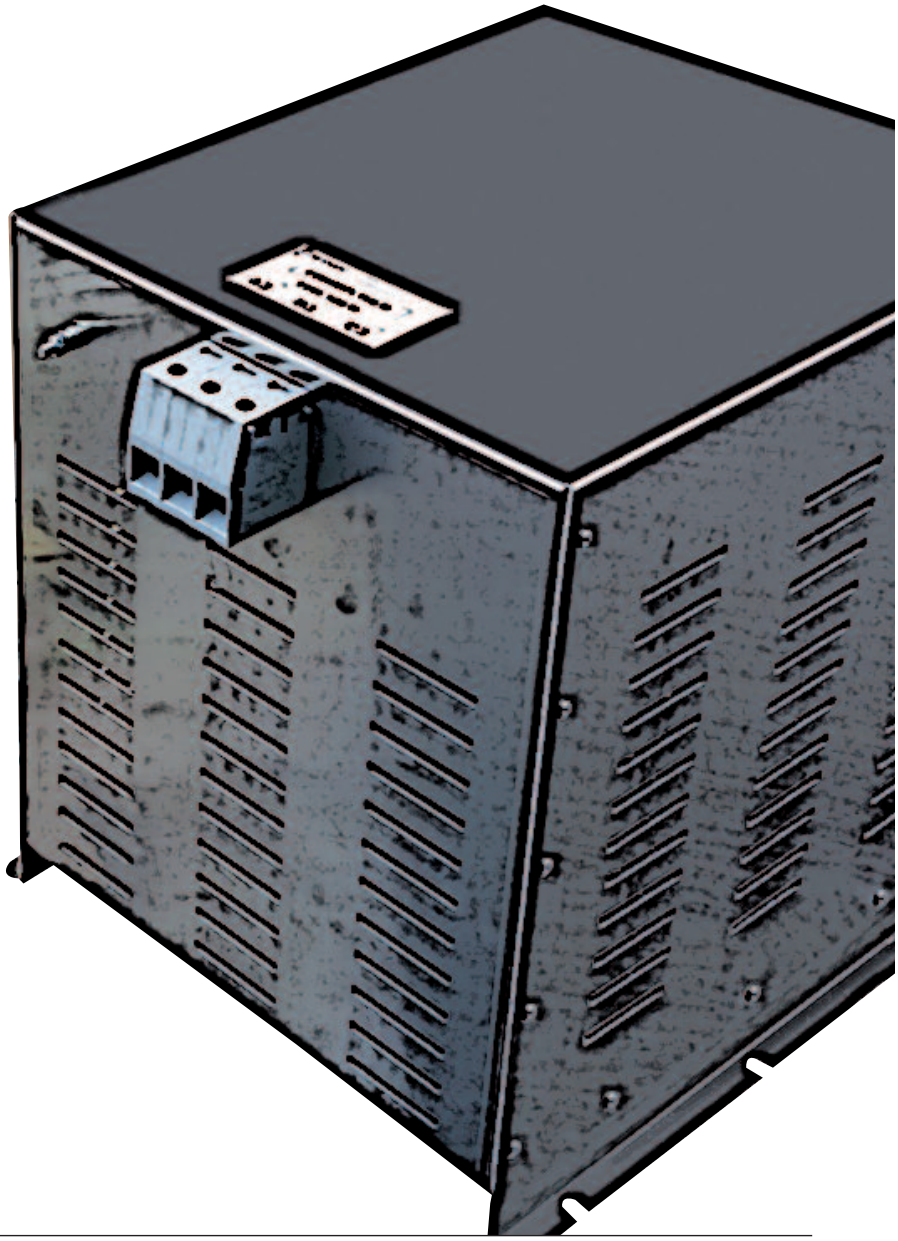
Enerdoor passive harmonic filter series is available up to 800A with nominal voltage up to 480 Vac. Custom filters are available with voltage up to 690 Vac. This series features different levels of attenuation offering the best solution to meet the EN61000-3-2, EN61000-3-12 and IEEE519 International Standard requirements.

As a standard, the FINHRM5 offers a current range up to 800A and the FINHRM up to 200A. The typical THDI reduction is <5% for the FINHRM5 and <15% for the FINHRM. Neither filter is effected by network impedance. This series is designed to guarantee a power factor greater than 0.9 considering an initial value of 0.7. An additional external capacitor to improve power factor correction may be included, as required.

This series reduces the effects of voltage dips less than 5 ms on the machine performance and reduces flicker emissions.

The Enerdoor active harmonic filter FINHRMAD is a modular design installed in parallel to the power line and reduces harmonics below 5%. This line is available from 230 Vac to 600 Vac with nominal current from 35A to 150A. Features include remote control and wall or panel mount installation.

Enerdoor static var generator FINSVG is a modular design installed in parallel to the power line and compensates reactive power in order to improve power factor.

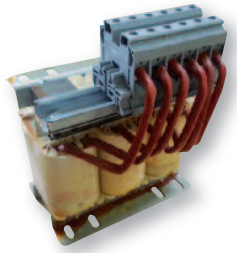


Datasheet 3/2019

Line reactor 230 Vac, 3% and 5% impedance, with high attenuation of current distortion and overvoltage spikes

APPROVALS:

c UL us E361634 UL1283 CSA C22.2 RoHS CE



FINFF (terminal blocks)

FEATURES

- Rated current from 2.5 to 250A
- High differential mode attenuation
- Terminal blocks up to 130A

BENEFITS

- Various connections available
- Finger safe protection available
- Nema 1 and Nema 3R enclosures

MARKETS

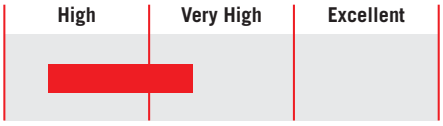
- Variable frequency drives / servo drives
- Automated machinery
- Industrial automation
- Pumps

ORDERING CODE

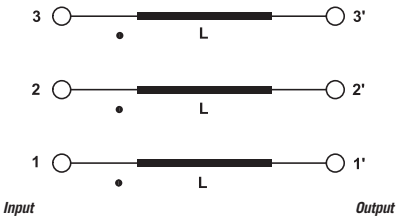
FINFF	020P1	01P1	0831
Model	Inductance (L)	Current (A)	Internal ID
	20.1 mH	1.1A	

FINFF (lug connections)

ATTENUATION INDICATOR



ELECTRIC DIAGRAM



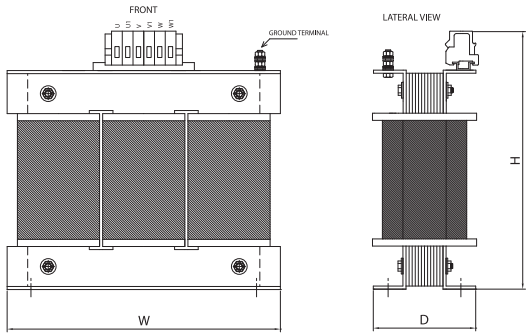
TECHNICAL SPECIFICATIONS

Nominal voltage	0 / 600 Vac
Frequency	50 – 60 Hz
Rated current	7 to 250A
Potential test voltage phase to phase	2400 Vdc (2 sec.)
Potential test voltage phase to ground	3200 Vdc (2 sec.)
Saturation current	1.5 x In
Dielectric strength	4 kV
IP Protection	IP20 up to 180A IP00 over 180A
Climatic class	-40 / +85° C
MTBF at 40°C	250.000 Hrs.

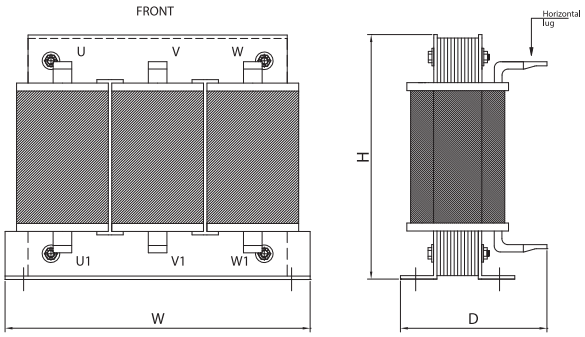
ELECTRICAL CHARACTERISTICS - MECHANICAL DIMENSIONS

HP@230 Vac	Rated Current 40°C	FF 3% @230Vac	Open Frame Dimensions			Weight (Kg)	Case	Nema 1 Enclosure	FF 5% @230Vac	Open Frame Dimensions			Weight (Kg)	Case	Nema 1 Enclosure
			H	W	D					H	W	D			
0.5	2.4	**FF5P05502P11291**	120	120	80	1.8	1	FINENCL.31	**FF010P602P10829**	120	120	90	1.9	1	FINENCL.31
0.75	3.5	**FF03P1203P41292**	120	120	80	1.8	1	FINENCL.31	**FF006P503P40827**	120	120	90	2	1	FINENCL.31
1	4.6	**FF02P2104P81293**	120	120	80	1.9	1	FINENCL.31	**FF004P604P80826**	120	120	90	2.1	1	FINENCL.31
2	7.6	**FF001P407P61294**	120	120	90	2.4	1	FINENCL.31	**FF02P9107P60832**	165	160	120	4	1	FINENCL.31
3	11	**FF0P96500111295**	160	160	120	3.9	1	FINENCL.31	**FF02P0100110833**	165	160	120	4	1	FINENCL.31
5	14	**FF0P75800141296**	160	160	120	4	1	FINENCL.31	**FF01P5800140834**	165	160	130	4.7	1	FINENCL.31
7	21	**FF0P50500211297**	160	160	120	4	1	FINENCL.31	**FF01P0500210835**	165	160	130	5	1	FINENCL.31
10	34	**FF0P26500401301**	210	160	130	5	1	FINENCL.41	**FF00P6400340837**	250	180	135	7.6	1	FINENCL.41
15	52	**FF0P20500521302**	240	180	135	7.5	1	FINENCL.41	**FF00P4200520840**	250	180	145	9	1	FINENCL.41
25	83	**FF0P12800831303**	300	240	150	12	1	FINENCL.41	**FF0P26800831002**	300	240	180	22	1	FINENCL.41
35	105	**FF0P10101051304**	300	240	150	12.5	1	FINENCL.41	**FF0P26301050976**	300	240	185	23	1	FINENCL.41
40	130	**FF0P08201301305**	305	240	165	17	1	FINENCL.41	**FF00P1701301003**	350	300	190	27	1	FINENCL.41
60	160	**FF0P06601601306**	210	240	165	17	2	FINENCL.41	**FF00P1501600954**	300	300	210	29	2	FINENCL.51
70	200	**FF0P05302001307**	210	240	185	22	2	FINENCL.41	**FF0P11102001004**	300	220	300	33	2	FINENCL.51
90	250	**FF0P04302501308**	315	300	230	26	2	FINENCL.51	**FF0P08902501005**	300	230	300	41	2	FINENCL.51

CASE 1



CASE 2

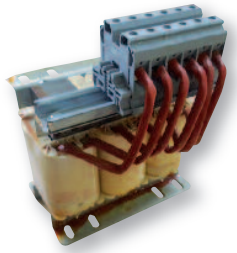


Datasheet 3/2019

Line reactor 400 Vac, 3% and 5% impedance, with high attenuation of current harmonic distortion and overvoltage spikes

APPROVALS:

c UL us E361634 UL1283 CSA C22.2 RoHS CE



FINFF (terminal blocks)

FEATURES

- Rated current from 1 to 865A
- High differential mode attenuation
- Terminal blocks up to 180A

BENEFITS

- Various connections available
- Finger safe protection upon request
- Nema 1 and Nema 3R enclosures available

MARKETS

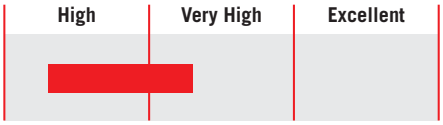
- Variable frequency drives and servo drives
- Automated equipment
- Industrial automation
- Pumps

ORDERING CODE

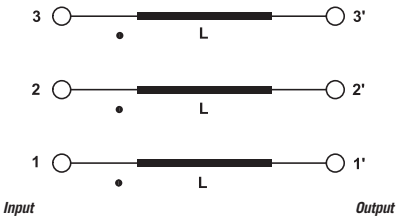
FINFF	4P050	006	1818
Model	Inductance (L)	Current (A)	Internal ID
	4.050 mH	6A	

FINFF (lug connections)

ATTENUATION INDICATOR



ELECTRIC DIAGRAM



FINFF (bus bar connections)

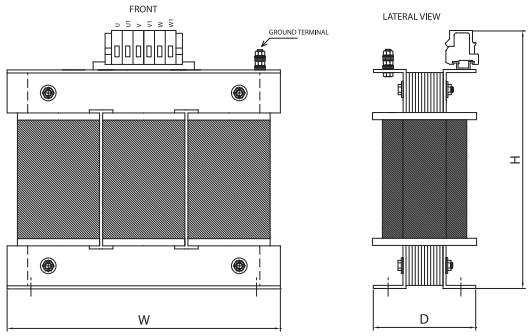
TECHNICAL SPECIFICATIONS

Nominal voltage	0 / 750 Vac
Frequency	50 – 60 Hz
Rated current	1 to 865A
Potential test voltage phase to phase	2400 Vdc (2 sec.)
Potential test voltage phase to ground	3200 Vdc (2 sec.)
Saturation current	1.5 x In
Dielectric strength	4 kV
IP Protection	IP20 up to 180A IP00 over
Climatic class	-40 / +85° C
MTBF at 40°C	250.000 Hrs.

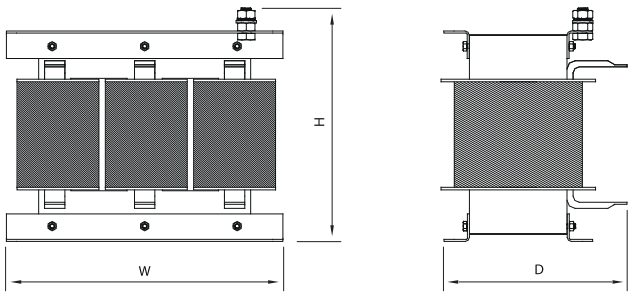
ELECTRICAL CHARACTERISTICS - MECHANICAL DIMENSIONS

HP@400 Vac	Rated Current 40°C	FF 3% @400Vac	Open Frame Dimensions			Weight (Kg)	Case	Nema 1 Enclosure	FF 5% @400Vac	Open Frame Dimensions			Weight (Kg)	Case	Nema 1 Enclosure
			H	W	D					H	W	D			
3.5	6	**FF04P0500061818**	120	120	90	2.2	1	FINENCL.31	**FF6P7520006**	160	160	120	3.3	1	FINENCL.31
8	12	**FF2P0250012**	160	160	120	3.6	1	FINENCL.31	**FF3P3750012**	160	160	130	4.5	1	FINENCL.31
11	18	**FF1P17200181833**	160	160	120	3.7	1	FINENCL.31	**FF1P97500181834**	160	160	130	4.6	1	FINENCL.31
15	24	**FF0P88100241819**	180	180	120	5.5	1	FINENCL.31	**FF1P4680024**	180	180	130	7	1	FINENCL.31
20	32	**FF00P660032**	180	180	120	6	1	FINENCL.31	**FF01P010032**	300	240	140	11	1	FINENCL.41
24	38	**FF0P63900381820**	180	180	135	7.5	1	FINENCL.31	**FF1P0660038**	300	240	140	11.5	1	FINENCL.41
28	45	**FF0P5410045**	300	240	140	11	1	FINENCL.41	**FF000P90045**	300	240	165	15.5	1	FINENCL.41
38	60	**FF0P40500601821**	300	240	140	11	1	FINENCL.41	**FF0P6750060**	300	240	165	16.5	1	FINENCL.41
46	73	**FF0P3340073**	300	240	165	16	1	FINENCL.51	**FF0P5550073**	300	240	165	17	1	FINENCL.51
57	90	**FF0P2670091**	300	240	165	16.5	1	FINENCL.51	**FF0P4450091**	300	240	180	20	1	FINENCL.51
70	110	**FF0P22101101822**	300	240	165	17	1	FINENCL.51	**FF0P3680110**	270	300	200	27	1	FINENCL.61
95	150	**FF0P16201501826**	215	240	250	21	1	FINENCL.61	**FF00P2701501828**	270	300	210	31	2	FINENCL.61
114	180	**FF0P1350180**	270	300	200	26	1	FINENCL.61	**FF0P2250180**	270	300	240	39	2	FINENCL.61
139	220	**FF00P1102201827**	270	300	200	28	2	FINENCL.61	**FF0P1840220**	340	340	250	49	2	FINENCL.61
164	260	**FF0P0980260**	270	300	250	38	2	FINENCL.71	**FF0P1620260**	340	340	250	52	2	FINENCL.71
196	310	**FF0P07803101829**	270	300	250	39	2	FINENCL.71	**FF0P1310310**	340	340	260	60	2	FINENCL.71
234	370	**FF0P06006831824**	340	340	250	50	3	FINENCL.71	**FF0P1090370**	340	340	280	82	3	FINENCL.81
290	460	**FF0P0540460**	340	340	270	61	3	FINENCL.81	**FF0P0900460**	410	480	300	95	3	FINENCL.81
347	550	**FF0P04405501831**	340	340	270	63	3	FINENCL.81	**FF0P0740550**	410	480	300	110	3	FINENCL.81
388	615	**FF0P03906161832**	340	340	280	80	3	FINENCL.81	**FF0P0660616**	410	480	330	119	3	FINENCL.101
429	680	**FF0P0360683**	410	480	300	90	3	FINENCL.101	**FF0P06006831824**	410	480	320	120	3	FINENCL.101
546	865	**FF0P02808661823**	410	480	300	100	3	FINENCL.101	**FF0P04708661825**	650	600	370	173	3	FINENCL.101

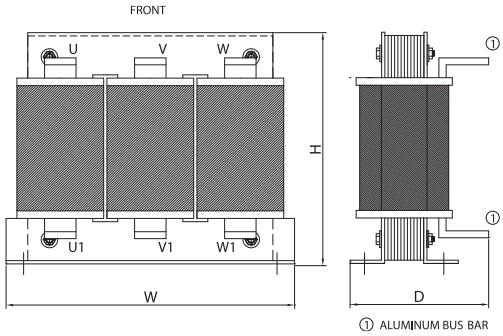
CASE 1



CASE 2



CASE 3

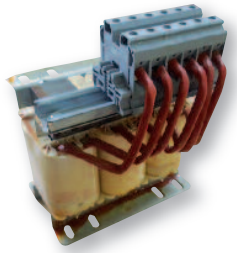


Datasheet 3/2019

Line reactor 480 Vac, 3% and 5% impedance, with high attenuation of current harmonic distortion and overvoltage spikes

APPROVALS:

c UL us E361634 UL1283 CSA C22.2 RoHS CE



FINFF (terminal blocks)

FEATURES

- Rated current from 1 to 750A
- High differential mode attenuation
- Terminal blocks up to 180A

BENEFITS

- Various connections available
- Finger safe protection available
- Nema 1 and Nema 3R enclosures available

MARKETS

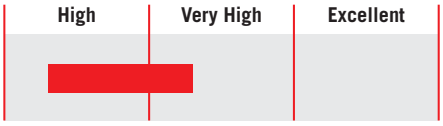
- Variable frequency drives / servo drives
- Automated equipment
- Industrial automation
- Pumps

ORDERING CODE

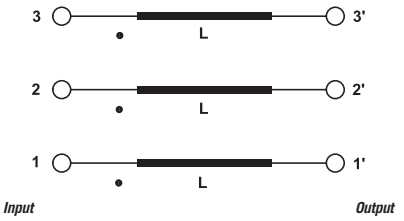
FINFF	020P1	01P1	0831
Model	Inductance (L)	Current (A)	Internal ID
	20.1 mH	1.1A	

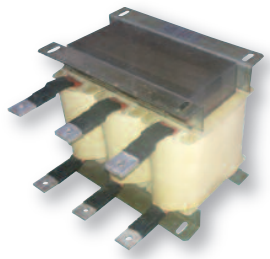
FINFF (lug connections)

ATTENUATION INDICATOR



ELECTRIC DIAGRAM





FINFF (bus-bar connections)

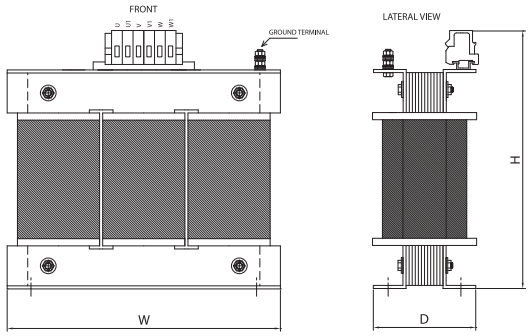
TECHNICAL SPECIFICATIONS

Nominal voltage	0 / 750 Vac
Frequency	50 – 60 Hz
Rated current	1 to 750A
Potential test voltage phase to phase	2400 Vdc (2 sec.)
Potential test voltage phase to ground	3200 Vdc (2 sec.)
Saturation current	1.5 x In
Dielectric strength	4 kV
IP Protection	IP20 up to 180A IP00 over
Climatic class	-40 / +85° C
MTBF at 40°C	250.000 Hrs.

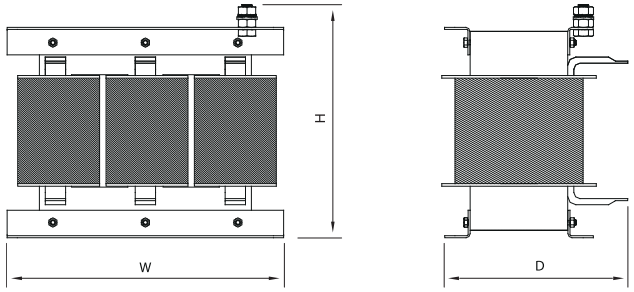
ELECTRICAL CHARACTERISTICS - MECHANICAL DIMENSIONS

HP@480 Vac	Rated Current 40°C	FF 3% @480Vac	Open Frame Dimensions			Weight (Kg)	Case	Nema 1 Enclosure	FF 5% @480Vac	Open Frame Dimensions			Weight (Kg)	Case	Nema 1 Enclosure
			H	W	D					H	W	D			
0.5	1.1	**FF020P101P10831**	120	120	90	1.6	1	FINENCL.31	**FF033P501P10978**	120	120	90	2	1	FINENCL.31
0.75	1.6	**FF0013P901P60830**	120	120	90	1.85	1	FINENCL.31	**FF0002301P60979**	120	120	90	2.1	1	FINENCL.31
1	2.1	**FF010P602P10829**	120	120	90	1.9	1	FINENCL.31	**FF0001802P10980**	120	120	90	2.5	1	FINENCL.31
2	3.4	**FF006P503P40827**	120	120	90	2	1	FINENCL.31	**FF0001103P40981**	120	120	90	2.8	1	FINENCL.31
3	4.8	**FF004P604P80826**	120	120	90	2.1	1	FINENCL.31	**FF007P704P80982**	160	160	120	4	1	FINENCL.31
5	7.6	**FF02P9107P60832**	165	160	120	4	1	FINENCL.31	**FF04P8407P60983**	160	160	120	4.5	1	FINENCL.31
7.5	11	**FF02P0100110833**	165	160	120	4	1	FINENCL.31	**FF003P300110984**	160	160	130	5.3	1	FINENCL.31
10	14	**FF01P5800140834**	165	160	130	4.7	1	FINENCL.31	**FF002P600140985**	160	160	130	5.5	1	FINENCL.31
15	21	**FF01P0500210835**	165	160	130	5	1	FINENCL.31	**FF01P7600210986**	180	180	130	8	1	FINENCL.31
20	27	**FF00P8200340836**	250	180	135	7.4	1	FINENCL.31	**FF001P300270987**	180	180	140	9	1	FINENCL.41
25	34	**FF00P6400340837**	250	180	135	7.6	1	FINENCL.31	**FF001P200340988**	300	240	145	12	1	FINENCL.41
30	40	**FF00P5500400839**	250	180	135	8	1	FINENCL.31	**FF00P9800460989**	300	240	145	12.5	1	FINENCL.41
40	52	**FF00P3400650840**	250	180	145	9	1	FINENCL.41	**FF00P7500520990**	300	240	145	13	1	FINENCL.41
50	65	**FF00P3400650841**	250	180	145	9	1	FINENCL.41	**FFP566300651951**	250	240	165	15	1	FINENCL.41
60	83	**FF0P26800831002**	300	240	150	14	1	FINENCL.41	**FF00P5100830991**	300	240	180	23	1	FINENCL.41
75	104	**FF0P26301050976**	300	240	180	22	1	FINENCL.41	**FF0P37501040992**	350	300	190	28	1	FINENCL.51
100	130	**FF00P1701301003**	300	240	185	23	1	FINENCL.41	**FF000P301300993**	350	300	190	28.5	2	FINENCL.51
125	160	**FF00P1501600954**	350	300	190	27	2	FINENCL.61	**FF00P2601600994**	300	300	210	33	2	FINENCL.61
150	200	**FF0P11102001004**	300	300	210	29	2	FINENCL.61	**FF000P202000995**	300	300	250	41	2	FINENCL.61
200	250	**FF0P08902501005**	300	300	220	33	2	FINENCL.61	**FF0P17702501853**	340	395	240	55	2	FINENCL.61
250	322	**FFP068703221006**	300	300	230	41	3	FINENCL.61	**FFP135603251854**	340	395	250	62	3	FINENCL.61
300	414	**FFP053504141007**	375	395	265	56	3	FINENCL.81	**FF0P10604151855**	340	395	260	80	3	FINENCL.61
400	515	**FF0P04305151008**	375	395	275	63	3	FINENCL.81	**FFP085805151856**	340	395	280	90	3	FINENCL.101
475	600	**FFP036906001009**	375	395	375	67	3	FINENCL.101	**FFP073606001857**	340	395	280	91	3	FINENCL.101
600	750	**FFP029507501010**	375	395	300	80	3	FINENCL.101	**FF0P04907501858**	400	480	350	120	3	FINENCL.101

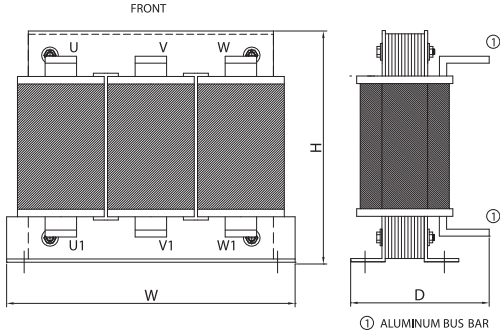
CASE 1



CASE 2



CASE 3



Datasheet 3/2019

Passive harmonic filter with very high attenuation of current harmonic distortion and overvoltage spikes

APPROVALS:

RoHS CE

FINHRM.(016 - 200).M

FEATURES

- Rated current from 16 to 200A
- THDI reduction <15%
- THDI <10% with DC reactor

BENEFITS

- 2 Year warranty
- Safety terminal block connectors
- Improves harmonics and flicker

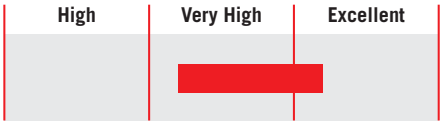
MARKETS

- Variable frequency drives
- Woodworking machinery
- Packaging machinery
- Printing machinery

ORDERING CODE

FINHRM	.016	.M	010
Model	Current (A)	Connection	
		M = Terminal block	

ATTENUATION INDICATOR



TECHNICAL SPECIFICATIONS

Nominal voltage	400 / 480 Vac (600Vac upon request)
Frequency	50 – 60 Hz
Rated current	16 to 200A
Potential test voltage phase to phase	2400 Vdc (2 sec.)
Potential test voltage phase to ground	3200 Vdc (2 sec.)
IP Protection	IP20
Overload capability	4 x Rated current (Switch ON) 2 x In 10 seconds 1.5 In for 10 minutes
Climatic class	-40 / +85° C
MTBF at 40°C	250.000 Hrs

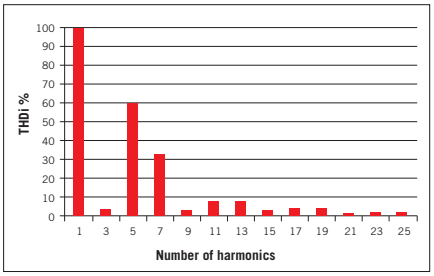
ELECTRICAL CHARACTERISTICS

FINHRM	Rated Current 40°C	Rated Current 50°C	Power Loss (W)
.016.M	16	12	80
.030.M	30	24	97
.050.M	50	45	170
.075.M	75	68	225
.100.M	100	90	257
.150.M	150	135	320
.200.M	200	180	575
.215.M	218	215	600

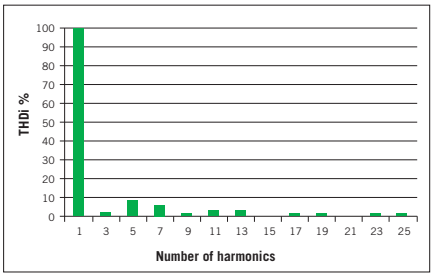
CONNECTIONS

	LINE			PE	
FINHRM	Solid Cable (mm^2)	Stranded Cable (mm^2)	Terminal Torque (Nm)	d2 (mm)	Torque (Nm)
.016.M	0.2 - 10	0.2 - 6	1.2	M6	6
.030.M	0.2 - 10	0.2 - 6	1.2	M6	6
.050.M	0.2 - 10	0.2 - 6	1.2	M6	6
.075.M	4 - 25	6 - 35	4.5	M6	6
.100.M	10 - 50	10 - 50	4	M6	6
.150.M	35 - 95	35 - 95	20	M6	6
.200.M	35 - 95	35 - 95	20	M6	6
.215.M	35 - 95	35 - 95	20	M6	6

TYPICAL MEASUREMENT



Typical measurement without FINHRM

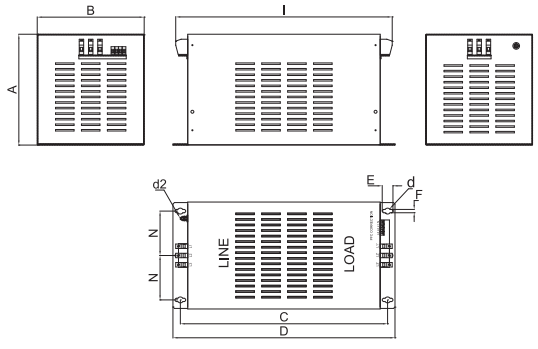


Typical measurement with FINHRM

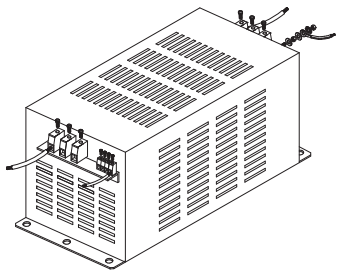
MECHANICAL DIMENSIONS mm

FINHRM	A	B	C	D	E	F	I	N	d	d2	Weight Kg.	Case
.016.M	300	250	400	440	29	9	396	100	16	M6x20	25	1
.030.M	300	250	400	440	29	9	396	100	16	M6x20	28.2	1
.050.M	300	290	560	600	29	9	585	120	16	M6x20	45.5	1
.075.M	300	290	560	600	29	9	585	120	16	M6x20	65	1
.100.M	320	440	660	700	29	9	706	195	16	M6x20	83	1
.150.M	320	440	660	700	29	9	706	195	16	M6x20	104	1
.200.M	450	504	860	900	29	9	920	225	16	M6x20	190	1
.215.M	450	504	860	900	29	9	920	225	16	M6x20	195	1

CASE 1



ASSEMBLY CONNECTION "M"

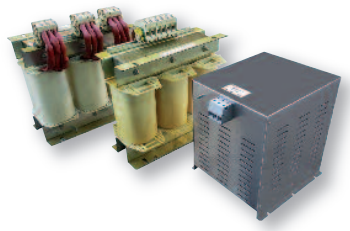


Datasheet 3/2019

Passive harmonic filter with excellent attenuation of current harmonic distortion and overvoltage spikes

APPROVALS:

RoHS CE



FINHRM5. (010 - 160).M

FEATURES

- Rated current from 10 to 800A
- THDi reduction <5%
- Improves flicker and power factor

BENEFITS

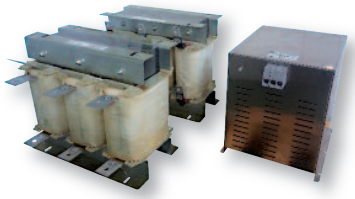
- Breakers available
- Finger safe protection available
- Enclosure available upon request

MARKETS

- Variable frequency drives
- HVAC systems
- Industrial equipment
- Uninterruptible power supplies
- Pumps

ORDERING CODE

FINHRM5	.007	.M	-60	.HV
Model	Current (A)	Connection	Frequency	690 Vac
		M = Terminal block V= Screw BC= Bus bar	Only for 60Hz application	

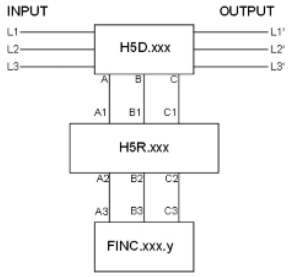


FINHRM5.(210 – 800).B

ATTENUATION INDICATOR

High	Very High	Excellent

ELECTRIC DIAGRAM



TECHNICAL SPECIFICATIONS

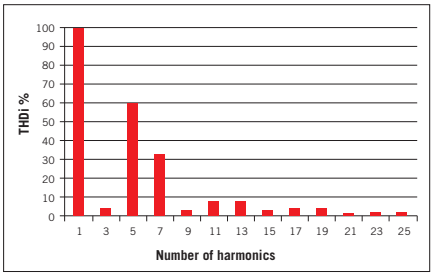
Nominal voltage	230 / 400 / 480 / 690 Vac
Frequency	50 – 60 Hz
Rated current	10 to 800A
Potential test voltage phase to phase	2400 Vdc (2 sec.)
Potential test voltage phase to ground	3200 Vdc (2 sec.)
IP Protection	IP20 up to 160A
	IP00 over 210A
Overload capability	4 x Rated current (Switch ON)
	2 x In 10 seconds
	1.5 In for 10 minutes
Climatic class	-40 / +85° C
MTBF at 40°C	250.000 Hrs

ELECTRICAL CHARACTERISTICS

CONNECTIONS

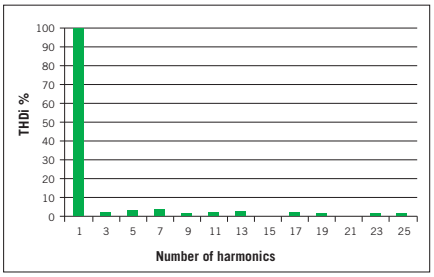
TYPICAL MEASUREMENT

FINHRM5	Rated Current 50° C	Rated Power (KW)		Power Loss (W)		LINE			PE	
		400 Vac	480 Vac	400 Vac	480 Vac	Solid Cable (mm^2)	Stranded Cable (mm^2)	Terminal Torque (mm^2)	d (mm)	Torque (Nm)
.010.M	10	4	5.5	55	80	0.2-10	0.2-6	1.2	M10	6
.016.M	16	7.5	11	105	160	0.2-10	0.2-6	1.2	M10	6
.032.M	32	15	18.5	210	275	0.2-10	0.2-6	1.2	M10	6
.045.M	45	22	30	273	370	0.5-10	0.5-10	1.8	M10	6
.080.M	80	40	48	398	475	0.5-10	0.5-10	1.8	M10	6
.120.M	120	60	72	492	672	6-35	4-25	4.5	M10	6
.160.M	160	80	96	590	710	10-50	10-50	4.0	M10	6



Typical measurement without FINHRM5

FINHRM5	Rated Current 50° C	Rated Power (KW)		Power Loss (W)		LINE		PE	
		400 Vac	480 Vac	400 Vac	480 Vac	l (mm)	Torque (Nm)	(mm)	Torque (Nm)
.210.B	210	105	126	610	750	M12	20	M10	18
.260.B	260	130	160	780	940	M12	20	M10	18
.320.B	320	160	200	940	1150	M8	14	M10	18
.400.B	400	200	241	980	1200	M8	14	M10	18
.460.B	460	230	277	1280	1410	M8	14	M10	18
.600.B	600	280	360	1480	1750	M8	14	M10	18
.750.B	750	360	440	1690	1920	M8	14	M10	18
.800.B	800	380	460	1730	1970	M12	25	M10	18



Typical measurement with FINHRM5

MECHANICAL DIMENSIONS mm

FINHRM5.010.M	A	B	C	D	E	F	G	H	Weight Kg.	Case
H5D.010.M	240	200	130	100	210	-	258	8	16.2	1
H5R.010.M	180	150	120	90	160	-	208	8	9.2	1
FINC.010.M *	260	100	135	120	210	104	5	-	2	1

FINHRM5.016.M	A	B	C	D	E	F	G	H	Weight Kg.	Case
H5D.016.M	240	200	130	95	210	-	275	8	28	2
H5R.016.M	180	150	120	90	156	-	205	8	16	2
FINC.016.M *	260	100	135	120	210	104	5	6	4	2

FINHRM5.032.M	A	B	C	D	E	F	G	H	Weight Kg.	Case
H5D.032.M	300	250	150	110	260	180	334	8	31	3
H5R.032.M	240	200	130	100	210	160	270	8	19	3
FINC.032.M *	300	120	135	120	320	104	5	-	6	3

FINHRM5.045.M	A	B	C	D	E	F	G	H	Weight Kg.	Case
H5D.045.M	300	250	150	110	260	180	334	8	44	4
H5R.045.M	240	200	130	100	210	160	270	8	31	4
FINC.045.M *	300	120	135	120	320	104	5	-	7	4

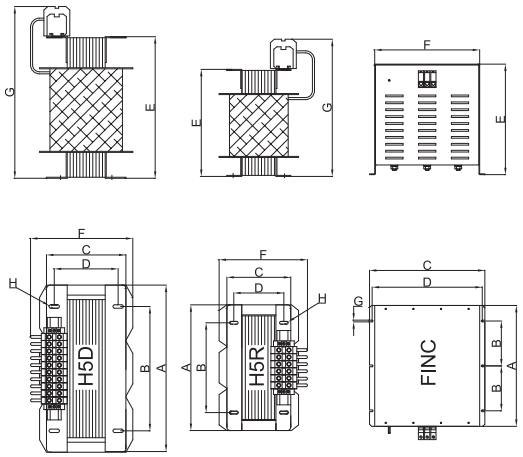
FINHRM5.080.M	A	B	C	D	E	F	G	H	Weight Kg.	Case
H5D.080.M	360	260	185	145	310	220	397	8	65	5
H5R.080.M	360	260	155	115	310	190	397	8	46	5
FINC.080.M *	350	130	135	120	380	104	5	-	8	5

FINHRM5.120.M	A	B	C	D	E	F	G	H	Weight Kg.	Case
H5D.120.M	480	360	230	185	410	320	505	10	120	6
H5R.120.M	360	260	185	145	310	270	410	8	68	6
FINC.120.M *	350	130	334	319	320	304	5	-	15	6

FINHRM5.160.M	A	B	C	D	E	F	G	H	Weight Kg.	Case
H5D.160.M	480	360	230	185	410	270	505	10	123	7
H5R.160.M	480	360	200	155	410	240	505	10	87	7
FINC.160.M *	350	130	234	219	380	204	5	-	16	7

* 60Hz option available, FINC.xxx.M-60

CASE 1, 2, 3, 4, 5, 6, 7



MECHANICAL DIMENSIONS mm

FINHRM5.210.B	A	B	C	D	E	F	G	H	I	Weight Kg.	Case
H5D.210.B	480	360	260	215	420	310	50x5	10	12	154	8
H5R.210.B	480	360	230	185	420	280	30x7	10	12	119	8
FINC.210.M *	350	130	334	319	380	5	9	16	-	18	8

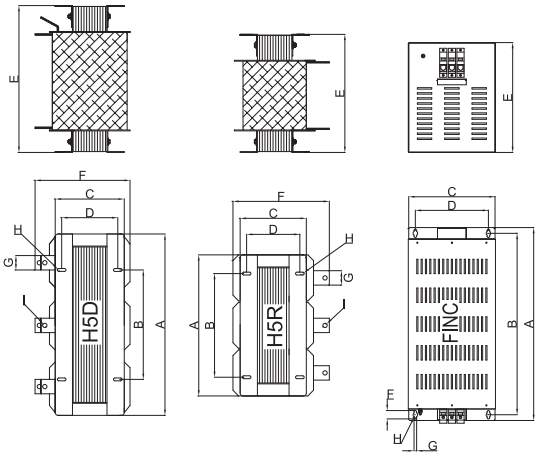
FINHRM5.260.B	A	B	C	D	E	F	G	H	I	Weight Kg.	Case
H5D.260.B	480	360	280	230	420	340	50x5	10	12	172	9
H5R.260.B	480	360	230	185	420	300	50x5	10	12	122	9
FINC.260.M *	670	630	300	254	382	29	9	16	-	30	9

FINHRM5.320.B	A	B	C	D	E	F	G	H	I	Weight Kg.	Case
H5D.320.B	600	380	230	185	520	330	50x5	10	15	195	10
H5R.320.B	480	360	240	195	420	280	50x5	10	15	130	10
FINC.320.M *	670	630	300	254	382	29	9	16	-	33	10

FINHRM5.400.B	A	B	C	D	E	F	G	H	I	Weight Kg.	Case
H5D.400.B	600	380	260	220	520	360	60x5	10	15	256	11
H5R.400.B	480	360	260	210	420	320	50x5	10	15	158	11
FINC.400.M *	670	630	300	254	382	29	9	16	-	35	11

*** 60Hz option available, FINC.xxx.M-60**

CASE 8, 9, 10, 11



MECHANICAL DIMENSIONS mm

FINHRM5.480.B	A	B	C	D	E	F	G	H	I	J	Weight Kg.	Case
H5D.480.B	600	380	280	230	520	330	60x5	10	15	-	285	12
H5R.480.B	480	360	280	230	420	360	60x5	10	15	-	178	12
FINC.480.B*	800	760	300	254	382	29	9	16	9	25x10	40	12

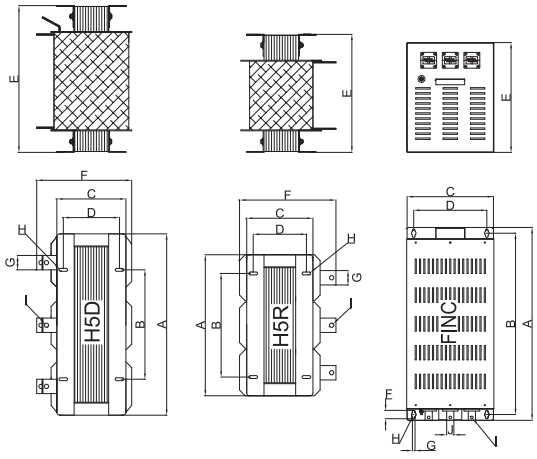
FINHRM5.600.B	A	B	C	D	E	F	G	H	I	J	Weight Kg.	Case
H5D.600.B	660	540	275	230	610	320	60x5	10	15	-	315	13
H5R.600.B	620	380	255	210	510	300	60x5	10	15	-	240	13
FINC.600.B*	800	760	300	254	382	29	9	16	9	25x10	45	13

FINHRM5.750.B	A	B	C	D	E	F	G	H	I	J	Weight Kg.	Case
H5D.750.B	660	540	320	240	650	350	50x10	12	-	-	400	14
H5R.750.B	540	420	300	230	670	330	60x5	12	-	-	250	14
FINC.750.B*	750	710	585	540	382	29	9	16	11	30x15	47	14

FINHRM5.800.B	A	B	C	D	E	F	G	H	I	J	Weight Kg.	Case
H5D.800.B	660	540	320	240	700	420	50x10	10	12	-	410	15
H5R.800.B	660	420	300	230	480	360	60x5	10	12	-	260	15
FINC.800.B*	750	710	585	540	382	29	9	16	11	30x15	48	15

*** 60Hz option available, FINC.xxx.M-60**

CASE 12, 13, 14, 15



Active harmonic filter with excellent attenuation of current harmonic distortion

Datasheet 3/2019

APPROVALS:

RoHS CE

FINHRMAD.(050 - 150)

FEATURES

- Advanced digital control
- Rack unit or wall mounting installation options
- Modular system
- Remote control RS485 standard (Modbus-Profibus optional)

BENEFITS

- Complete protection for overvoltage, under voltage, over current and over heating
- Unaffected by network conditions
- Touch screen LCD HMI
- Compensation for inductive and capacitive reactive power

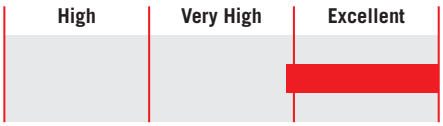
MARKETS

- Variable frequency drive
- Commercial building
- Oil and water plant
- Process automation
- End-user plant

ORDERING CODE

FINHRMAD	.090.	.5	.3F	.R
Model	Current (A)	4 = 400V	3F = 3phase	R = Rack mount
		5 = 480V	4F = 3phase with neutral	W = Wall mount

ATTENUATION INDICATOR



TECHNICAL SPECIFICATIONS

Nominal voltage	400 / 480 Vac
Frequency	50 – 60 Hz -5 / +3%
Reactive power compensation	50 to 150A
Overall efficiency	>97%
Power grid structure	3-phase, 3-phase plus neutral
Current transformer	150:5 ~ 10,000:5
Harmonic filtering range	2nd to 50th orders
Reaction time	<50 us
Overall response time	<5 ms
Switching frequency	20 KHz
Communication ports	RS485, Ethernet
Communication protocols	Modbus, TCP/IP
Module display interface	4.3 inch color LCD touch screen
Altitude	1500m Over power decreases by 1% every 100m
Operating temperature	-10°C / + 40°C
Protection class	IP 20
Noise level	<56 dB
Color	Ral 7035, Light gray

ELECTRICAL CHARACTERISTICS

FINHRMAD	Rated Current (A)	Rated Voltage (Vac)	Power Grid Structure	Cooling Mode	Response Time
.050.4.X.Y.Z	50	400 (-10%+10%)	3P3W ; 3P4W	Air 75L/sec	<5ms
.050.5.X.Y.Z	50	480 (-10%+10%)	3P3W	Air 75L/sec	<5ms
.100.4.X.Y.Z	100	400 (-10%+10%)	3P3W ; 3P4W	Air 75L/sec	<5ms
.100.5.X.Y.Z	100	480 (-10%+10%)	3P3W	Air 75L/sec	<5ms
.150.4.X.Y.Z	150	400 (-10%+10%)	3P3W ; 3P4W	Air 75L/sec	<5ms
.050.5.X.Y.Z	150	480 (-10%+10%)	3P3W	Air 75L/sec	<5ms

X = power grid structure Y = mounting type Z = HMI display

208Vac and 600Vac version available

MECHANICAL DIMENSIONS mm

FINHRMAD	A	B	C	D	Weight Kg.
.050.4.X.Y.Z	483	132	653	610	32
.050.5.X.Y.Z	483	132	653	610	32
.100.4.X.Y.Z	483	266	653	610	38
.100.5.X.Y.Z	483	266	653	610	38
.150.4.X.Y.Z	483	266	653	610	40
.050.5.X.Y.Z	483	266	653	610	40

Wall mounted available

RACK MOUNTED