



*live with energy...*

**HARMONIC REACTORS WITH IRON AND AIR CORE**

**MV & HV**



**MADE IN ITALY**



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## GENERAL FEATURES

MV & HV iron-core or air-core harmonic reactors are used with capacitors to create a series resonant circuit with very low impedance.

All production phases take place inside our plant: from the arrival of the raw materials at our warehouse, to the final testing before shipping the goods to customers.

International standards impose stringent limitations to the amount of harmonics present in a network, since a “clean” network imposes much less strain on the equipment and increases its life span. This translates to lower maintenance costs and lower costs for replacing worn-out equipment.

Gruppo Energia can provide you with a wide range of both single and three phase reactors for manufacturing tuned harmonic filters, which can be manufactured for different voltages from 1 kV up to 20 kV (other on request) and any tuning frequency: 5.67%, 6%, 7%, 14%, etc.

The reactors are made from low-loss plate metal and a copper coil or aluminium band, depending on the model. Once assembled, they are impregnated using a sophisticated vacuum system that guarantees minimum loss, greater mechanical consistency, increased insulation and low noise emissions.

All transformers and reactors are checked with routine tests according to IEC international standards in our testing facilities equipped with latest generation equipment. For special tests, we rely directly on external and /or international authorities, such as universities or other organizations. We are able to perform the following tests:

- Dimensional check;
- Measurement of voltage ratio and vector relationship;
- Measurement of winding resistance;
- Measurement of no load losses and current;
- Measurement of short circuit losses and voltage;
- Separate source AC withstand voltage;
- Induced AC voltage test;
- Temperature rise test.

## BASIC FEATURES

- Limiting inrush current during switching of capacitors;
- Limiting resonance and protection of capacitor banks against over loading arising from higher harmonics;
- Avoiding loss of power frequency (power remote control) from general power company;
- Getting power resonance circuits tuned to higher harmonic frequencies.

## COMPARISON OF IRON AND AIR CORE REACTORS

Iron Core Reactor	Air Core Reactor
Can saturate	Do not saturate
Low stray magnetic field	High stray magnetic field
Compact, low space requirements	Large space requirements
Core must be designed for peak harmonic current (sum of individual harmonic currents) and winding must be designed for RMS current	Winding must be designed for RMS current
Higher weight	Lower weight
More likely to release audible noise if not properly constructed	Less likely to release audible noise if not properly constructed
Low number of turns in the winding	High number of turns in the winding
Simple to enclose	Difficult to enclose due to eddy current heating from stray magnetic fields

## GENERAL CHARACTERISTICS OF IRON-CORE REACTORS

- Standards: IEC 60076-6 EN 60289
- Phase number: 3
- Operating frequency: 50 Hz – 60 Hz
- Tuning frequency: 134 Hz, 189 Hz, 210 Hz (other on request)
- Execution: Vacuum impregnated with polyester resin
- Protection degree: IP00
- Installation altitude:  $\leq 1000$  m
- Over temperature class: F
- Winding material: Aluminium or Copper
- Origin: 100% made in Italy
- Voltage range: 1 kV to 20 kV (other on request)
- Relative impedance: 5.67%, 6%, 7%, 14% (other on request)
- Power range: 10 kVar to 1000 kVar (other on request)
- Cooling: Natural air or or Water cooled
- Intermittent service: Continuous
- Insulation class: F
- Ambient temperature: 40 °C

## SOME STANDARD SOLUTIONS

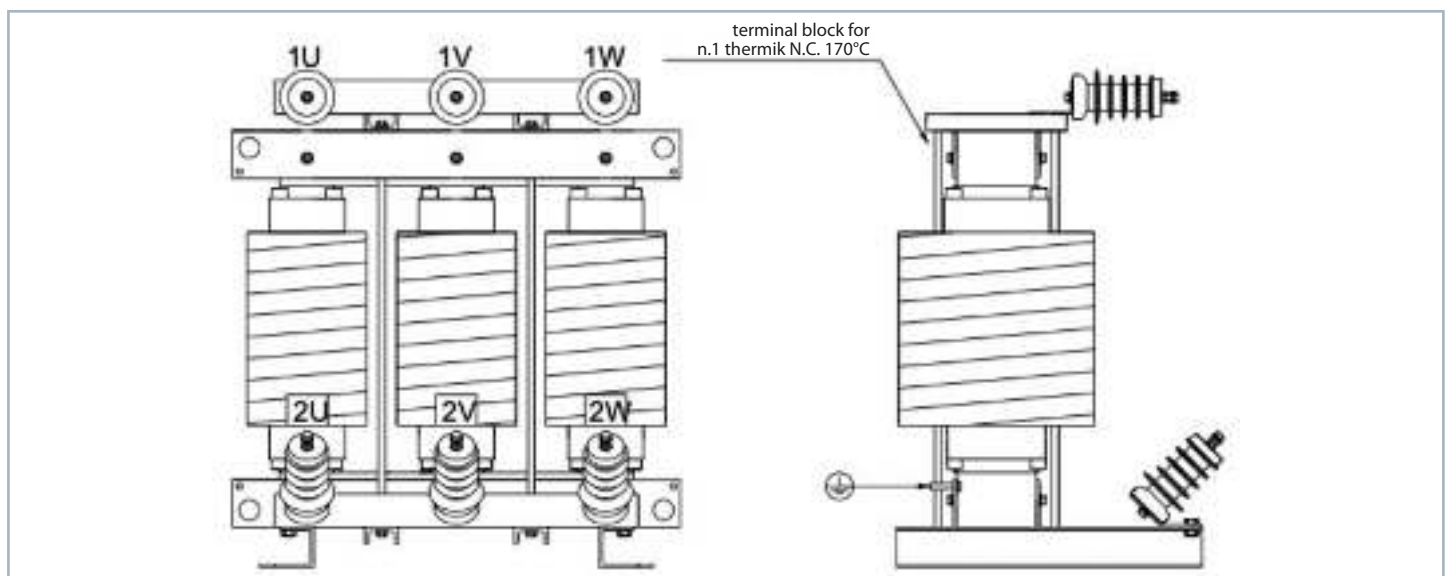
• 3 Phase reactors designed for capacitors at 7200 V (grid voltage 6000 V), 189 Hz

Order Code	Qc POWER	INDUCTANCE 3 x mH	CURRENT A	DIMENSIONS* W x D x H (mm)	WEIGHT* kg
3R7MV75.7,2/6,0	75	154	6	470 x 410 x 560	85
3R7MV150.7,2/6,0	150	77	12	600 x 460 x 590	145
3R7MV300.7,2/6,0	300	38,5	24	600 x 480 x 665	190
3R7MV450.7,2/6,0	450	25,7	36	660 x 560 x 710	240
3R7MV600.7,2/6,0	600	19,25	48	675 x 520 x 755	285
3R7MV900.7,2/6,0	900	12,35	72	675 x 520 x 755	325

• 3 Phase reactors designed for capacitors at 12000 V (grid voltage 10000 V), 189 Hz

Order Code	Qc POWER	INDUCTANCE 3 x mH	CURRENT A	DIMENSIONS* W x D x H (mm)	WEIGHT* kg
3R7MV75.12/10	75	427,6	3,4	490 x 410 x 665	100
3R7MV150.12/10	150	213,8	6,8	620 x 460 x 675	160
3R7MV300.12/10	300	106,9	13,7	620 x 505 x 715	220
3R7MV450.12/10	450	71,3	20,5	660 x 490 x 810	278
3R7MV600.12/10	600	53,4	27,4	660 x 525 x 810	345
3R7MV900.12/10	900	35,6	41,1	810 x 560 x 915	475

## STANDARD CONSTRUCTION DIAGRAM



\* All dimensions and weights are indicative and will be confirmed at the time of order.

## GENERAL FEATURES OF AIR-CORE REACTORS

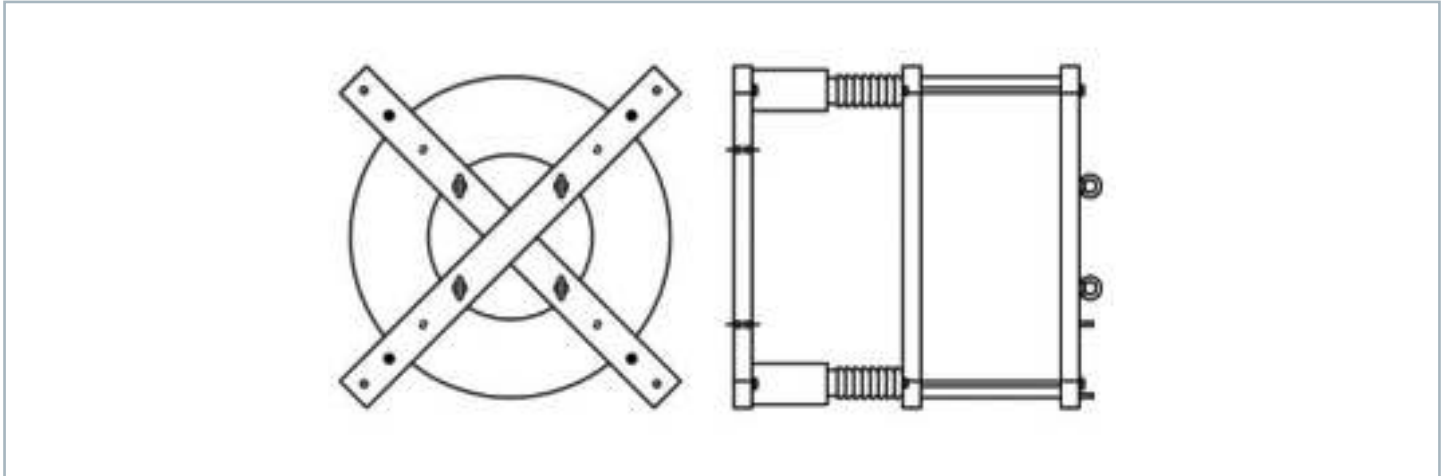
- Standards: IEC 60076-6 EN 60289
- Phase number: 1
- Operating frequency: 50 Hz – 60 Hz
- Rated inductance: according to the customers' request
- Cooling: Natural air
- Protection degree: IP00
- Installation altitude: ≤ 1000 m
- Over temperature class: F
- Winding material: Aluminium or Copper
- Origin: 100% made in Italy
- Voltage range: 1 kV to 20 kV (other on request)
- Rated current: 30 A to 250 A (other on request)
- Execution: Vacuum impregnated with polyester resin
- Design: Indoor or Outdoor
- Intermittent service: Continuous
- Insulation class: F
- Ambient temperature: 40 °C

## SOME STANDARD SOLUTIONS

- 1 Phase reactors

Order Code	NOMINAL VOLTAGE V	INDUCTANCE 3 x mH	CURRENT A	DIMENSIONS* W x D x H (mm)	WEIGHT* kg
1RAI17.10/146	10000	17	146	830 x 830 x 870 - ø 800	185
1RAI17.12/190	12000	17	190	870 x 830 x 969 - ø 800	225
1RAI18.10/73	10000	18	73	730 x 730 x 750 - ø 675	115
1RAI18.12/95	12000	18	95	750 x 730 x 786 - ø 675	125
1RAI45.10/146	10000	45	146	920 x 920 x 1125 - ø 905	380
1RAI45.10/190	12000	45	190	990 x 930 x 1220 - ø 920	440

## STANDARD CONSTRUCTION DIAGRAM



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