

# FAM05

## Three-Phase Modular Passive Filters



**FAM05** is realized by appropriately tuning in frequency, a battery of capacitors and a three-phase reactance. In this way a resonant circuit is realized which is chosen as the preferred way from the harmonic current which is to be reduced, and is equipped with a **microprocessor control system** for inserting modules. Features:

- consisting of standard racks of equal dimensions connected to each other
- Easily increases the size of the filter
- prevents the insertion of filter groups L-C, having too high reactive power, bring the power factor of the load to a capacitive  $\cos\phi$ , with possible consequent problems of DC drives.

### PERFORMANCE DATA

■ Rated voltage	400 Vac (altre a richiesta)
■ Rated frequency	50 Hz (a richiesta 60 Hz)
■ Insulation voltage	690 Vac
■ auxiliary voltage	230 Vac
■ Overvoltage	1,1 Un (tensione nominale)
■ Temperature range	-5 / +40 °C
■ Impulse withstand	8 kV

### TUNED FILTER

Filtri di 5<sup>a</sup> Armonica

### TECHNICAL DATA

<b>Enclosures</b>	Made of sheet steel, protected against corrosion by phosphating and epoxy powder coating. RAL 7032 colour (others on request). Degree of protection: external panel IP 31 (others on request); internal panel IP 20 at the input of power cables (IP 20 with open doors on request).
<b>Ventilation</b>	Forced.
<b>Thermal protection</b>	Made by means of two thermoprobes. The first, with an operating threshold of 35 ° C, controls the insertion of the cooling fans on the roof. The second (50 ° C) separates the filter branch if the temperature exceeds the maximum allowed limit. When the phenomenon ceases, there is automatic recovery.
<b>Insertion</b>	Manual, or automatic piloted remotely (commands by the installer).
<b>Supply</b>	To be carried out directly on the line choke or on the power supply of the fuses. Three-phase input + grounding cable from below for G6E and G8E cabinets. The termination of an NC contact of max 5 Amps 250 Vac for the remote indication of the operation of the equipment is provided by a terminal board. If not used, the remote control must be short-circuited.
<b>Signals</b>	On the front of each panel there is a luminous signal with green light for a live panel, the selector for the insertion of the filter with white light, the intervention of the amperometric protection with yellow light and the relative reset button, the intervention maximum temperature with yellow light signal..
<b>3-pole contactors</b>	Each battery is switched on / off by a three-pole contactor (Class AC6-b) to offer high reliability.
<b>Fuses</b>	Each capacitors bank is protected by fuses. The protection system of both the power circuits (NH-00 curve gG fuses) and the auxiliary ones (isolable fuse holders and 10.3x38 fuses) foresees the use of high breaking power fuses (100kA).
<b>Capacitors</b>	Single-phase capacitors in self-healing metallized polypropylene (MKP), equipped with an anti-burst device and discharge resistance. They are impregnated in vegetable oil, PCB free. Delta connection. Type of continuous service. <ul style="list-style-type: none"><li>• rated voltage: 550 Vac</li><li>• overvoltage: 1.1 x A (8h / 24h)</li><li>• current overload: 1.3 x In</li><li>• capacity tolerance: -5% / + 10%</li><li>• losses due to dissipation: <math>\leq 0.4</math> W / kvar</li><li>• temperature category: -25 / D</li></ul>

**Filtering reactor** It is manufactured using magnetic low losses core plates and it is tuned with the capacitors. Class H and linearity up to  $2I_n$ .

- agreement frequency of 245Hz (FA05)
- losses due to dissipation: depending on the power of the filter
- maximum possible harmonic distortion in the THD network ( $v$ ) = 5% (others on request).

**Amperometric protection** Protects condenser banks by disabling them in case of overcurrents.

### QUALITY AND TESTING

**Regulations** Capacitors: IEC/EN 60831-1 / 2 certified by IMQ (V1927); Equipment: IEC/EN 61439-1 / 2, IEC/EN 61921.

**European directives** Low voltage: 2014/35/CE; Electromagnetic compatibility: 2014/30/CE.

**Testing** 100% of the automatic equipment is subject to visual inspection, insulation test: phase-phase and phase-earth, battery efficiency and ventilation circuit control: the report is included in the documentation. The capacitors are tested in three consecutive stages of the production process: after winding, regeneration and before labeling.

### CONFIGURATION

#### General notes

- The rated power is expressed at 400 V - 50 Hz.
- The choice of supply cables depends on the installation conditions, the length of the same and the ambient temperature. For a correct sizing, refer to the IEC 60364-5, CEI 64-8 and the UNEL 35024/01 standards.

The application of the filters involves an in-depth analysis of the operating conditions of the system.

Below is a list of the information essential for a correct sizing:

- Nominal data and operating cycle of the load to be filtered.
- Campaign of harmonic distortion measurements, to determine the frequency and the value of the harmonic current to be reduced.
- Electrical scheme of the system, with indication of the installation point of the filter.
- Presence of power factor correction equipment (automatic or fixed), type and location.
- Nominal data of other distorting loads present in the system.

#### Table

Code	Load Data			Filter Data				
	Max. power load U.P.S.	Pn <sup>1</sup>	Rated current	In max. to be filtered at 250 Hz	Qtot	Steps Combination	Type	Weight
	(kVA)	(kW)	(A)	(A)	(kvar)	(A)		(kg)
FAM 05 120-400	120	96	172	70	32	16+16	G6E	210
FAM 05 180-400	180	144	258	105	48	32+16	G6E	230
FAM 05 240-400	240	192	344	140	64	22+22+22	G6E	250
FAM 05 320-400	320	256	460	200	88	44+44	G6E	290
FAM 05 400-400	400	320	570	250	110	44+44+22	G8E	390
FAM 05 480-400	480	384	690	300	132	44+44+44	G8E	430
FAM 05 560-400	560	448	800	350	154	66+44+44	G8E (II)	560
FAM 05 640-400	640	512	920	400	176	66+66+44	G8E (II)	640
FAM 05 720-400	720	576	1040	450	198	66+66+66	G8E (II)	730
FAM 05 800-400	800	640	1150	500	220	88+66+66	G8E (II)	810
FAM 05 880-401	880	704	1270	550	242	88+88+66	G8E (II)	890
FAM 05 960-400	960	768	1386	600	264	88+88+88	G8E (III)	1020
FAM 05 1040-400	1040	832	1501	650	286	110+88+88	G8E (III)	1100
FAM 05 1120-400	1120	896	1617	700	308	110+110+88	G8E (III)	1180
FAM 05 1200-400	1200	960	1732	750	330	110+110+110	G8E (III)	1260
FAM 05 1280-400	1280	1024	1848	800	352	132+110+110	G8E (III)	1340

(1) Sizing realized considering the working load at full power and an average  $\cos \varphi$  of the line = 0.80