FT1000 series Detuned Filter
FT2000 series Tuned Filter

Automatic
Medium and High Voltage
Detuned & Tuned Filter Bank

Power transmission, distribution networks and motor are designed to operate with sinusoidal voltage and current having constant frequency. However, there are a number of non-linear loads, such as thyristor drives and converters that generate harmonics to the network. This causes distortion in the voltage and current wave forms.

The ***FT1000*** Detuned and ***FT2000*** tuned frequency in the resonant circuit formed by the capacitance of the power capacitor and the network inductance may match an existing harmonic frequency. If there is harmonic current source for the particular harmonic frequency in the network, the harmonic current of this frequency may reach as high 20 times the normal level. Due to the amplified harmonics caused by the resonance, the voltage and current waveforms are distorted and this leads to further current and voltage correction by means of conventional capacitors is not possible in systems affected by harmonics.

To avoid the resonance phenomena described above in an electricity network affected by harmonics, a reactor must be connected in series with the power capacitor. This results in a design which can compensate the fundamental frequency reactive power but does not amplify the harmonics

Automatic configuration

- 50 to 1000 kVAR step
- Nema – 1, 12, 3R, 4X

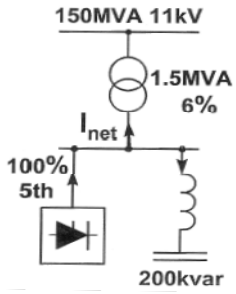
TECHNICAL DATA - ***FT1000 - FT2000 series***	
Rated Voltage / Phase	2400 @ 25000 Volts / 3 phases
Rated Frequency	50Hz or 60Hz
Rated Power	20 to 6000 kVAR / unit
Detuned frequency	7% or 12.6% (other tune frequency on request
Tuned Frequency	5th, 7th, 11th and 13th
Power Factor Controller	N12 or NC12 12 steps
Insulation level	5 kV
Power losses	0.4 w/kVAR
Continuous over-voltage	110 %
Continuous over-current	135 %
Mounting type	Floor mounting
Enclosure type	Indoor , outdoor
Color	ASA 61 (light grey)
Temperature class	-40 `C to 45`C
o Average 24h :	+ 35`C
Color	ASA 61 (light grey)
Construction Standard	UL, CSA

FT1000 Fixed detuned or FT2000 tuned filters are used to compensate the reactive power in individual, standard-power devices or groups of devices in networks affected by harmonics. The use of fixed capacitors equipped with reactors prevents any harmful resonance phenomena between the network inductance and the capacitance of the power capacitor.

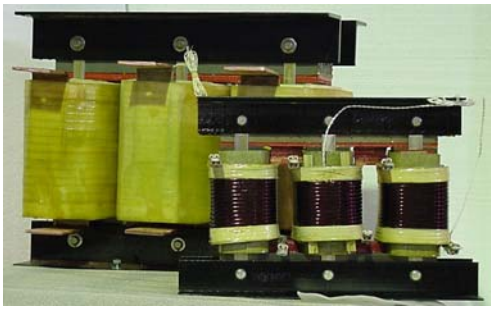
A fixed detuned filter consists of a reactor connected in series with the power capacitor unit. The capacitance of the capacitor is selected to reach the desired compensation power. The inductance of the reactor is selected so that the tuned frequency of the series resonant circuit formed by the capacitor and the reactor is lower than the lowest harmonic frequency between the network phases. The lowest harmonic frequency present in the system is normally the 5th (300 Hz).

Percentage of the 5th harmonic current to the network with different tuning frequencies

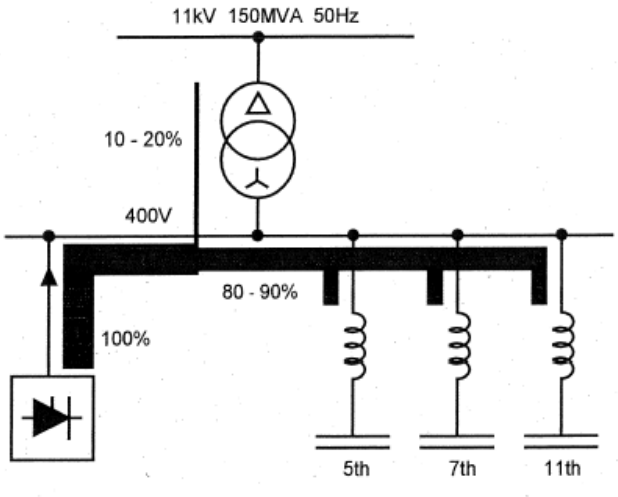
Tuning frequency Hz	Reactor percentage %	I_{net} %
227	7.00	77
245	6.00	69
252	5.67	65
270	4.94	52
282	4.53	24



Below the resonant frequency of the detuned filter, such as the fundamental
Frequency (60 Hz), the detuned filter is capacitive, that is, it produces reactive power. Above the resonant frequency, the detuned filter is inductive and it cannot amplify the typical harmonic frequencies such as the 5th, 7th, 11th harmonics. A fixed detuned filter also eliminates lower order harmonics from the system to some extent.



A fixed detuned filter is usually connected in parallel with the device or the group of devices to be compensated. In this way, the capacitor is switched on and off simultaneously with the load to be compensated. When necessary, a contactor and a fuse base can be installed inside the box in a case when the detuned filter is wanted to be controlled separately. The fuse base can also be replaced by a moulded-case circuit-breaker.



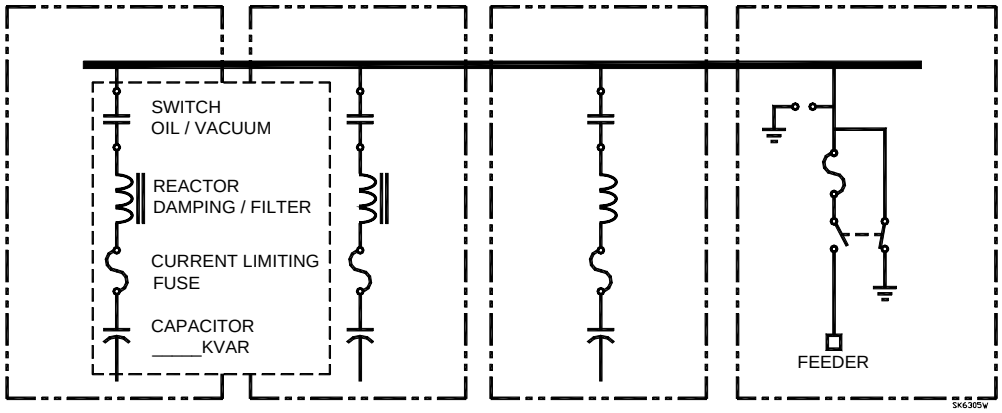
Reactive Power	FT1000 series Basic Part. #	System Voltage	Reactive kvar	No step	Step / Kvar	Option(s) ** Type 1. 12, 3R	Protection Device	Blown Fuse Ind.	System Interlock	Th Filter	
Kvar	+ --→	Suffix	Suffix	Suffix	Suffix	Suffix	Suffix	Suffix	Suffix	__ Th	Fig #
1200	FT1000	4160	1200	1	1200	3R	B	BFI	KK	4.1	1
3600	**FT1000**	**12470**	**4800**	**2**	**1200**	**3R**	**B**	**BFI**	**KK**	**5, 7**	**1**
6000	FT1000	13200	6000	3	2000	3R	B	BFI	KK	5, 7,11	2
9000	**FT1000**	**13800**	**9000**			**3R**	**B**	**BFI**	**KK**		**2**
12000	FT1000	25000	12000			3R	B	BFI			2
***	**FT1000**	***	***	***	***	**	**	**	**		***

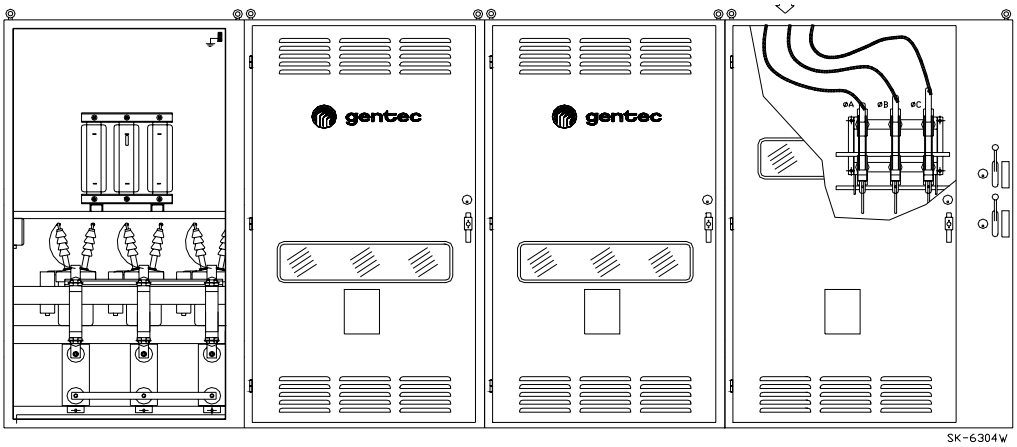
Part	1	2	3	4	5	6	7	8	9
No …	FT1000	4160	1200	2	600	3R	B	BFI	KK

*** Contact Factory for special configuration and are available on request.

1	FT1000 Series for Standard HV Automatic Detuned Filter FT2000 Series for Standard HV Automatic Tuned Filter
2	**System Voltage applied**
3	Total Reactive Power __ Kvar
4	**Number of step(s)**
5	Increment of ___ Kvar / step
6	**Enclosure type 1, 12, 3R**
7	Option : B : Breaker LB : Loadbreak Switch G : Ground Switch
8	**Option : Blown Fuses indicators**
9	Option: Key Interlock System

NC12 PF Controller



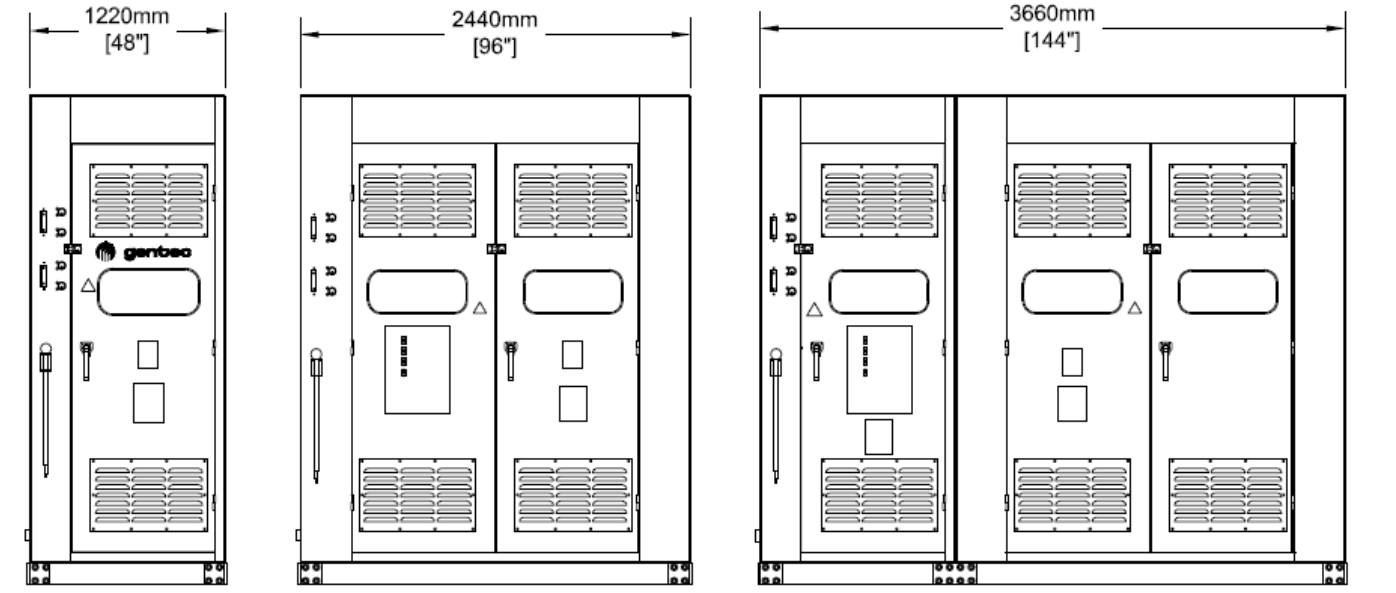


➢ Technical Data *FT1000 & FT2000*

▪ Standard Features	Class	Size	Type
Enclosure floor mounted c/w Lifting devices, Three points lockable handle	**7.2, 15, 25 kV**	**94 x (36, 48, 54")**	**1, 12, 3R, 4X**
ASA 61 Grey (other color on request)	■	■	■
Top Cable entry (Bottom entry on request)	■	■	■
Viewing windows for equipments status	■	■	■
Incoming silver Flashed Copper Bus c/w Main lugs	**7.2, 15, 25 kV**	**600, 800, 1200 A.**	**60,95, 125 kv BIL**
Ground bus c/w lugs	-	¼ , 2 "	Silver cooper
Current limiting fuses HRC type	**7.2, 15, 25 kV**	**15 to 800 A.**	**BFI**
Power Capacitors size / KVAR max / Unit (internally fused)	1.2 to 22 kV	50 to 1000	Internaly Fuse
Oil or Vacuum switches at __ kV BIL	**7.2, 15, 25kV**	**200, 400 A.**	**1 or 3 Poles**
Damping reactor at __ kV BIL	7.2, 15, 25kV	200, 400 A.	50, 100 uHenry
Custom Staging Ratios xxx kVAR	**1.2 to 25 kV**	**1, 2, 3, 4**	**As requiered**
Power Factor or Var Controller	50 A.	1, 6, 12	VAR & P.F.
On / Off switches and indicating lights	**120 v.**	**5 A.**	**Selector**
Control & Potential Transformer c/w secondary GFI breaker* [* UPON REQUEST]	120 v.	5 A.	indoor
CT Shorting devices	**120 v.**	**5 A.**	
Thermostatic control devices	**120 V.**	**450 VFM**	**Heating Element**
Optionnal(s) >> O <<			
Loadbreak switche 600, 800 or 1200 A. 3 poles __kV BIL	**7.2, 15, 27 kV**	**600, 800, 1200 A.**	**indoor**
Ground Switch	7.2, 15, 27 kV	--	4 poles
Current Transformer (Bus barr type) indoor or outdoor	**7.2, 15, 27 kV**		
Main current metering c/w Ammeter and phase selector	600 v. / 5A.	TBD	Panelmount
Unballanced relay Protection "Current and Voltage"	**125 Vcc, ac**	**5 A.**	**Current**
Kirk Key system interlock	▪	▪	▪
Electic Door interlock	**125 Vcc, ac**	▪	▪
Special Metering Arrangement	▪	▪	▪
Arrestors / MOV	**Station**	**7.2, 15, 25kV**	**Polymer**
Detuned and Tuned Iron core Reactor c/w Thermal detection	7.2, 15, 27 kV	xx TH or xx Hz	Tune / Detune

■ Standard O = Optional

➢ Layout - Dimension



A 1 UN B 2 UN C 1+2 UN D 1+2+2

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