4. Special Capacitor

› Application

Harmonic is commonly generated in electricity system due to devices using Thyristor.
It can causes electricity accidents and interference in the system
Therefore, the application of filter facilities is essential to prevent the effect
of Harmonic in the system and use electricity more efficiently.

› What is harmonic

Cyclic distortion wave is expressed as the sum of sine wave [50Hz], the integral number frequency and major sine wave, integral number [50Hz] frequency.
This integral number frequency is called harmonic wave and according to the change of amplitude and phase, wave form is changed resulting in synthetic distortion.
Combined distortion wave is manifested in distorted sine wave form. This form can be analyzed into one fundamental wave [50Hz] which has random cycle and major sine wave which has integral number frequency or subharmonic frequency.
If the frequency of it is higher than the fundamental frequency, it is called harmonics and if the frequency of it is lower, it is called fractional harmonic wave or subharmonic.
For example, an distorted wave form comprising sine wave type [50Hz] and 5th [250Hz] and 7th [350Hz] wave form is analyzed as following :

| ex) Harmonic | = | Fundamental Wave | + | 5th Harmonic Part | + | 7th Harmonic Part |
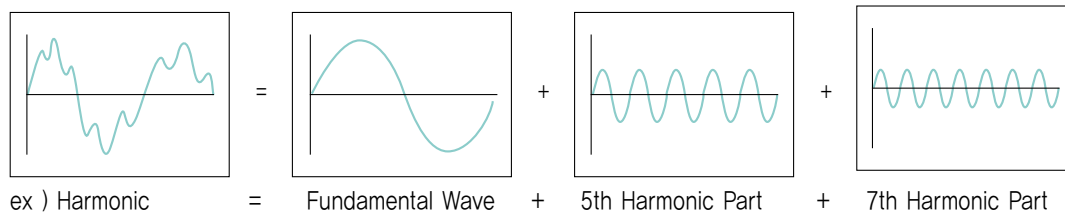
› Harmonic Generator

- Thyristior controller
- Speed controller
- Low speed starter
- Power factor compensator
- Rectifier
- Arc furnace
- Transformer, Reactor
- Transformer, Reactor
- Non−linear loads such as rotating devices changing the wave form of the current which generates harmonics.

› Process of Harmonic Filter Engineering

- Collecting data[system condition, harmonics spectrum, THD limit]
- Drawing system impedance map
- Calculating harmonics impedance and determining filtering order
- Harmonic flow calculation
- Simulation
- Checking abnormal resonance in the system and the possibility of harmonics extension
- Designing Switcher PNL, Structure
- Testing the operation after installation
- Test report

4-11 Pulse Power Capacitor

> Application

It is normally used in the area of power supply device for tests,for example IVG, ICG, Mark Generator, Power Supply for L−C resonance circuit and small scale power supply for fusion study and Power supply pulse power[state of art medical instruments, rock destruction and pulse laser] and recently, households which use this capacitor have been rapidly increased.

Since high energy density capacitor for pulse power is the key part of aircrafts [fighter, artificial satellite and passenger airplane], electronic / electric heat chemical gun, high efficiency laser and high efficiency munitions such as radar, the supply of this product was difficult since the industrialized countries regulated the outflow of technology. But, recently our company mass porduced the capacitor resulting in smooth supply of the product. In 1997, 11kVDC 150μF 9kJ rated capacitor for energy storage was developed with our own technology and delivered them for power supply of simple composite test facility and its performance has been recognized.

Several capacitors were also installed at heavy electro mechanics manufacturers in Korea and are used for test facilities.
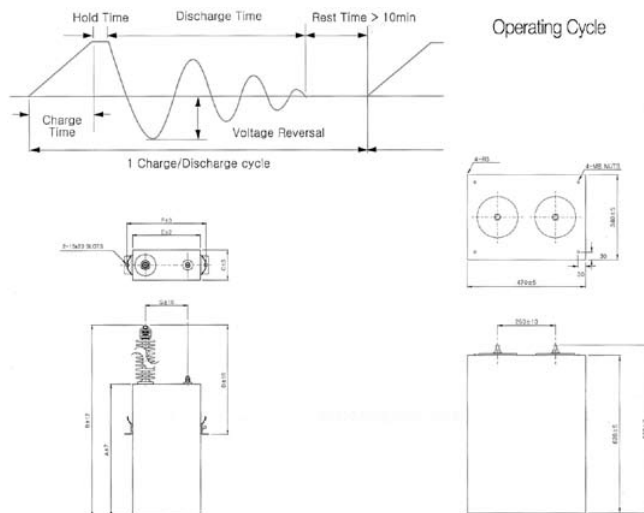

Figure 1   Figure 2

> PulsePower Low Capacitor

This product uses polypropylene film which has excellent withstand voltage and good quality capacitor paper as dielectric and contains refined impregnation oil, resulting in high reliability. To minimize inner inductance, it employs non inductive solder for reducing self inductance.

• Installation Place : Indoor
• Ambient Temperature : −10℃ ~ +40℃ [Average 35℃ or less per day]
• Technical Data

Tolerance	−10% ~ +10% [at 20℃]
Insulation Resistance	More than 1000MΩ between batch terminal and case [below20℃]
Withstand Voltage	Rated voltage×1.2times, for 60 seconds between terminal and case
Painting Color	Munsell no. 5Y 7/1
Self Inductance	Max. 150nH
Duty Cycle	Pause for more than 10 min. per charging / discharging
Voltage Reversal	20% ~ 90%

4-11 Pulse Power Capacitor

› Ratings and Dimensions

Rated Volage [kVDC]	Capacity [μF]	Joule [kJ]	Type	Dimension [mm]							Weight [kg]	Figure	Remarks
				A	B	C	D	E	F	F			
11	150	9.08	TFT−T11150S	810	995	160	315	370	424	228	70.7	1	Steel Case
40	0.01	0.01	TFT−T40001S	190	375	115	315	430	496	300	20.8		
	11	8.80	TFT−T40011S	560	745	170	530	530	583	300	71.8		
100	0.5	2.50	TFT−T100001S	390	660	135	530	530	583	380	42.6		
	1.0	5.00	TFT−T100001S	690	690	135	530	530	583	380	73.4		
25	0.3	0.09	TAE−25001S	–	–	–	–	–	–	–	6.7	2	Plastic Case
100	0.1	0.50	THE−100001S	–	–	–	–	–	–	–	7.5		

* Approximate Ratings and Dimensions are given above. Please contact factory before order.

› High Energy Density Pulse Power Capacitor

With metalized polypropylene film made through metalized technology and good quality capacitor paper as dielectric, this product realized high energy density, high reliability and long life span.
• Installation Place : Indoor
• Ambient Temperature for Use : −10℃ ~ +40℃ [below 35℃ average per day]
• Techinical Data

Tolerance	−10% ~ +10% [at 20℃]
Insulation Resistance	More than 1000MΩ between batch terminal and case [below 20℃]
Withstand Voltage	Rated voltage×1.2 times, for 60 seconds between terminal and case
Painting Color	Munsell no. 5Y 7/1
Self Inductance	Max. 150nH
Duty Cycle	Pause for more than 10 min. per charging / discharging
Voltage Reversal	20% ~ 90%

› Ratings and Dimension

Rated Volage [kVDC]	Capacity [μF]	Energy Density [kJ/kg]	Type	Dimension [mm]			Weight [kg]	Figure
				A	B	C		
20	200	0.33	SDF−T20200S	620	660	340	120	2

› Basic Information for Order

• Capacity and tolerance on capacitance
• Rated voltage and voltage reversal [%]
• Required life span and 1 time charging / discharging cycle
• Charging time and hold time
• Maximum current [kA] in discharging and discharge time