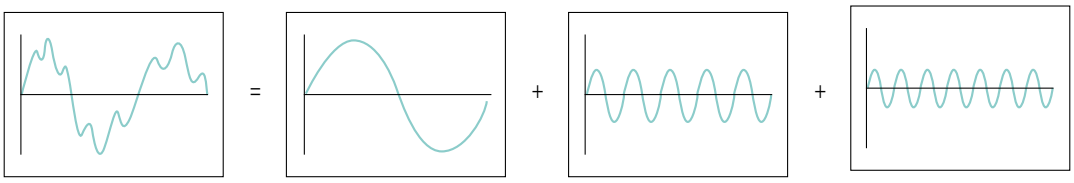
4. Special Capacitor

> 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

4-7 Low Frequnecy Induction Furnace Capacitor

> Application

This product was developed in 1977 with the purpose of rationalizing power supply by improving heat efficiency and power factor of Low Frequency Induction Furnace. This product consists of polypropylene film, aluminum thin film or metalized film which has excellent voltage resistance.
It contains specially produced composite oil, resulting in high reliability.

> Product Scope

- Installation Place : Indoor
- Ambient Temperature for use : −20℃ ~ +40℃ [below 35℃ average for 24 hours]

> Technical Data

Tolerance	−5 ~ +15% [at 20℃]
Withstand Voltage	10 seconds of 2.0 times of rated voltage between mutual terminals
Insulation Level	$2U_N$ + 2kV or 3kV, whichever is the higher, for 10s
Max Overvoltage	Less than 105% of rated voltage : within 12hours per day
Max overcurrent	120% of rated capacity [less than 60Hz], 115% of rated capacity [more than 60Hz] or less
Capacitor Loss [Under stabilized condition]	0.35% [rated voltage, 20℃] or less

> Diagram

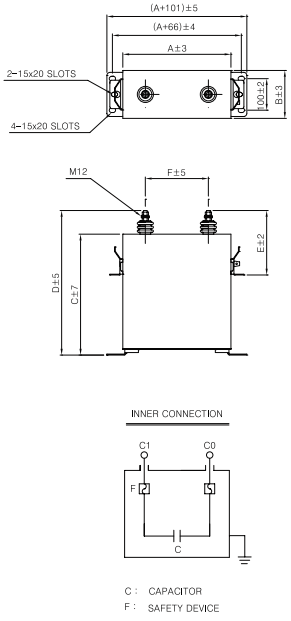


Figure 1

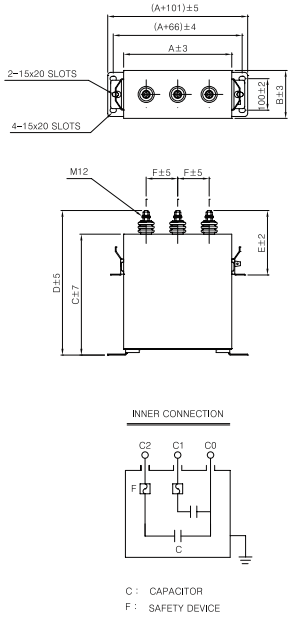


Figure 2

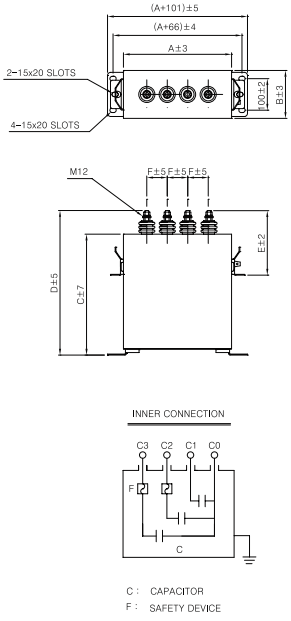


Figure 3

4-7 Low Frequnecy Induction Furnace Capacitor

> Ratings and Dimensions

Capacity	Votage [V]	Phase	Frequency [Hz]	Rated Capacity [kvar]	Type	Dimension [mm]						Figure
						A	B	C	D	E	F	
50	630	1	60	50	SMFL-66050KS	343	153	280	355	205	200	1
100	440	1	60	11.1+22.2+66.7	SMFL-46100KS	343	153	390	465	205	65	3
	600	1	60	50+50	SMFL-66100KS	630	135	380	455	205	100	2
	630	1	60	100	SMFL-66100KS	343	153	380	455	205	200	1
	800	1	60	100	SMFL-86100KS	343	153	470	545	205	200	1
150	600	1	60	50+100	SMFL-66150KS	630	135	500	575	205	100	2
	800	1	60	150	SMFL-86150KS	343	153	640	715	295	200	1
200	600	1	60	200	SMFL-66200KS	343	153	660	735	255	200	1
	750	1	60	25+40+135	SMFL-76200KS	343	153	580	655	255	65	3
	1000	1	60	30+60+110	TAFL-106200KS	343	153	840	915	295	65	3
	1000	1	60	100+100	TAFL-106200KS	530	135	610	685	295	100	2
	1200	1	60	25+25+150	TAFL-126200KS	530	170	480	555	205	65	3
	1200	1	60	50+50+100	TAFL-126200KS	530	170	480	555	205	65	3

* Approximate Dimensions and ratings are given above. Please contact factory to check it before order.