

DS100 Series

De-tuned Fixed Filter Capacitor Bank



Low Voltage Solution in Fixed Power Factor and Harmonic Correction to the Motor



Rated for:

- 20 to 400 HP
- 208 to 600 volts
- Nema / type 1, 12, 3R

Variable Frequency Drive and distribution networks 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 DriveSaver **DS100** having detuned frequency in the anti-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. 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, save the VFD and power quality improvement.

Rated for:

- 400 HP to 2000 HP
- 208 to 600 volts
- Nema / type 1, 12, 3R

TECHNICAL DATA - DS100 Series

Rated Voltage / Phase	208 to 600 volts / 3 phases
Rated Frequency	50 Hz or 60 Hz
Rated Power	20 to 500 kVAR / Unit
Tuned Frequency	7 % or 12.6 % (other tuned frequency on request)
Insulation Level	3 kV
Continuous Overvoltage	110 %
Harmonic Dimensioning	IEEE 519
Mounting Type	Floor Mounting
Enclosure Type	Indoor and Outdoor
Temperature Class	0 °C to 45 °C
o Average 24h:	+ 35 °C
Certification	cCSAus
Color	ASA 61 (Light Grey)
Construction Standard	UL, CSA, IEC

➤ Technical Data *DS100 Series*

Standard Features	Series I	Series II
Enclosure floor mounted (Type 1, 2, 3R)	1, 2, 12	1, 2, 12
Light biege (other color on request)	■	■
Incoming silver Flashed Copper Bus 30 kV BIL c/w mechanical lugs	■	■
Top or bottom Cable entry	■	■
Capacitors space / KVAR max / Unit (Custom Staging Ratios)	1, 2, 4	1, 2, 4
Power and Control wires	T90 / T105	T90 / T105
DSHI Capacitor (Heavy Duty type on request)	■	■
Current limiting fuses HRC type ____ Amp. 200 ka	■	■
Detuned reactor c/w thermal detection device	■	■
Optional (s)		
Main Breaker or Fuses Disconnect	○	○
Blown fuses indicating light c/w push bottom test	○	○
Main current metering c/w Ammeter and phase selector	○	○
Kirk Key system interlock with the remote main breaker	○	○
Special Metering Arrangement	○	○
Disconnect switches interlocked with doors and main supply	○	○
Magnetic Contactor	○	■
Power Quality Meter	○	○

■ = Standard ○ = Optional

➤ Technical Application

If harmonic filters are being considered only for the purpose of power factor correction, then a de-tuned filter bank is the best choice. This filter will do little for removing any harmonic distortion present on the system but will allow the installation of a large capacitor bank without any adverse system interactions. De-tuned filter banks are less costly and are more reliable than partially de-tuned and tuned filter banks. The anti-resonant frequency should be considered to assure that it does not fall near the 3rd harmonic.

- **DriveSaver**

When the resonant frequency of the series resonant filter circuit is tuned to a frequency lower than the harmonic occurring in the system, the filter circuit is termed as detuned filter. The philosophy of the detuned filters would be clear from the following example.

The harmonics that would be generated are 5th, 7th, 11th and 13th and so on. The lowest harmonic frequency which would occur in the system is the fifth harmonic i.e. 300 Hz. If the series resonant circuit is tuned to a frequency of 245 Hz, then at all the harmonic frequencies the filter acts as an inductive component and the possibility of resonance at the fifth harmonic is eliminated.

The impedance offered to the 5th harmonic signal is less than the capacitor alone. This means that the series resonant filter will absorb the 5th harmonic to a certain extent.

The reactor to capacitance ratio $p(\%)$ reflects the ratio of reactor reactance to capacitor reactance at fundamental frequency. The resonant frequency of the series resonant filter circuit is indicated indirectly by p . The following table shows a comparison for various reactor/capacitor combinations at fundamental frequency of 60 Hz.

Resonance Frequency F_r	Relative Resonance	Reactor/Capacitor Factor: p
227	3.8	7.0
245	4.1	6.0
252	4.2	5.67
282	4.7	4.52
288	4.8	4.33
300	5.0	4.0

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

Tuning frequency Hz	Reactor percentage %	I_{net} %

150MVA



Motor HP	DS100 Series						Options				Auto	Fixed
	Basic Part. #	System Voltage	Motor HP	Tuned Filter	Reactive Power	Type 1, 12	Series I or II	Fuses	3 Ph Ind. light	Series II	Series I	
480 V.	+ -- →	Suffix	Suffix	Suffix	Suffix	Suffix	Suffix	Suffix	Suffix	Fig.#	Fig.#	
40	DS100	480	25	4.1	17	1	I	F	BFI	3	3	
50	DS100	480	30	4.1	20	1	I	F	BFI	3	3	
60	DS100	480	40	4.1	20	1	I	F	BFI	3	3	
75	DS100	480	50	4.1	34	1	I	F	BFI	3	3	
100	DS100	480	60	4.1	40	1	I	F	BFI	3	3	
125	DS100	480	75	4.1	50	1	I	F	BFI	3	3	
150	DS100	480	100	4.1	67	1	I	F	BFI	3	3	
200	DS100	480	125	4.1	80	1	I	F	BFI	4	4	
250	DS100	480	150	4.1	101	1	I	F	BFI	4	4	
300	DS100	480	200	7.1	117	1	II	F	BFI	4	4	
350	DS100	480	250	4.1	134	1	II	F	BFI	4	4	
400	DS100	480	300	4.1	134	1	II	F	BFI	4	4	
450	DS100	480	350	4.1	151	1	II	F	BFI	5	5	
500	DS100	480	400	4.1	188	1	II	F	BFI	5	5	
600	DS100	480	500	4.1	201	1	II	F	BFI	5	5	
800	DS100	480	600	4.1	268	1	II	F	BFI	5	5	
900	DS100	480	800	4.1	308	1	II	F	BFI	5	5	
1000	DS100	480	1000	4.1			II	F	BFI	5	5	

Motor HP	DS100 Series						Options				Auto	Fixed
	Basic Part. #	System Voltage	Motor HP	Tuned Filter	Reactive Power	Type 1, 12	Series I or II	Fuses	3 Ph Ind. light	Series II	Series I	
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60	DS100	600	40	4.1	20	1	I	F	BFI	3	3	
75	DS100	600	50	4.1	34	1	I	F	BFI	3	3	
100	DS100	600	60	4.1	40	1	I	F	BFI	3	3	
125	DS100	600	75	4.1	50	1	I	F	BFI	3	3	
150	DS100	600	100	4.1	67	1	I	F	BFI	3	3	
200	DS100	600	125	4.1	80	1	I	F	BFI	3	3	
250	DS100	600	150	4.1	101	1	I	F	BFI	3	3	
300	DS100	600	200	7.1	117	1	II	F	BFI	3	4	
350	DS100	600	250	4.1	134	1	II	F	BFI	3	4	
400	DS100	600	300	4.1	134	1	II	F	BFI	3	4	
450	DS100	600	350	4.1	151	1	II	F	BFI	3	4	
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800	DS100	600	600	4.1	268	1	II	F	BFI	5	5	
900	DS100	600	800	4.1		1	II	F	BFI	5	5	
1000	DS100	600	1000	4.1		1	II	F	BFI	5	5	
Model	1	2	3	4	5	6	7	8				
No ...	DS100	600	1000	5		1	B	BFI				

Series I

DS100

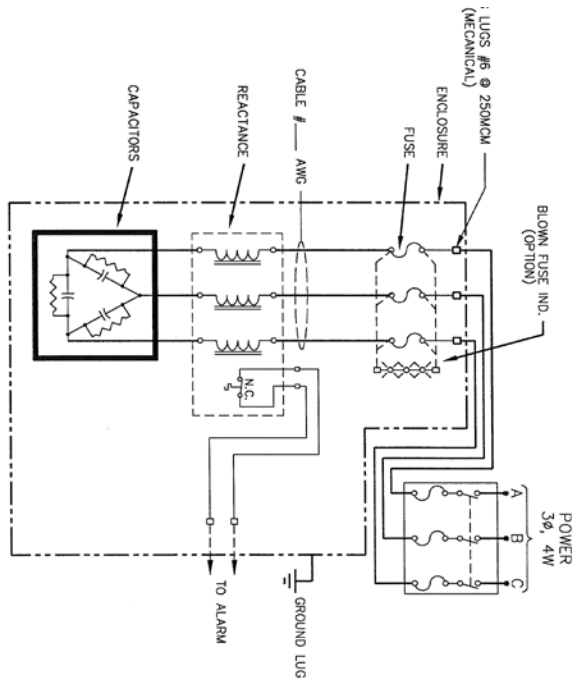


Fig.: 1

Series II

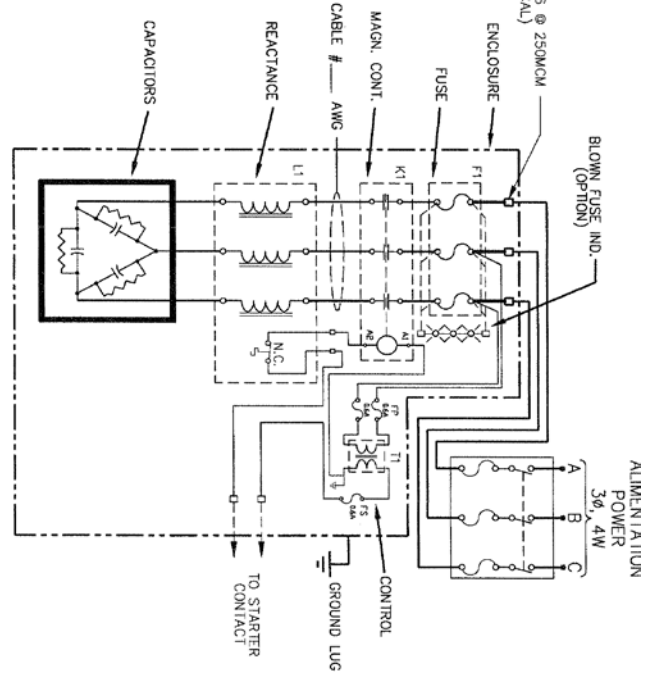


Fig.: 2

Series I

DS100

Series II

