Reactors - Antiresonance Harmonic Filter

Type tested at CPRI • 'H' Class insulation • Thermal Micro Switch • Linearity 173%

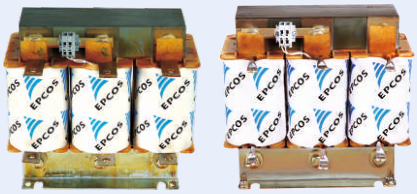
General

The increasing use of modern power electronic apparatus (drives, uninterruptible power supplies, etc.) produces nonlinear current and thus influences and loads the network with harmonics (line pollution).

The power factor correction or capacitance of the power capacitor forms a resonant circuit in conjunction with the feeding transformer. Experience shows that the self-resonant frequency of this circuit is typically between 250 and 500 Hz, i.e. in the region of the 5th and 7th harmonics.

Such a resonance although can lead to the following undesirable effects:
– overloading of capacitors,
– overloading of transformers and transmission equipment,
– interference with metering and control systems, computers and electrical gear,
– resonance elevation, i.e. amplification of harmonics,
– voltage distortion.

These resonance phenomena can be avoided by connecting capacitors in series with filter reactors in the PFC system. These so called "detuned" PFC systems are scaled in a way that the self-resonant frequency is below the lowest line harmonic. The detuned PFC system is purely inductive seen by harmonics above this frequency. For the base line frequency (50 or 60 Hz usually), the detuned system on the other hand acts purely capacitive, thus correcting the reactive power.



Applications

- Avoidance of resonance conditions
- Tuned and detuned harmonic filters
- Reduction of harmonic distortion (network clearing)
- Reduction of power losses

Features

- High harmonic loading capability
- Very low losses
- High linearity to avoid choke tilt
- Low noise
- Convenient mounting
- Long expected life time
- Temperature protection (NC contact)

Technical data and limit values	
Filter reactors	
Harmonics*	V_3 = 0.5% V_R (duty cycle = 100%)
	V_5 = 6.0% V_R (duty cycle = 100%)
	V_7 = 5.0% V_R (duty cycle = 100%)
	V_{11} = 3.5% V_R (duty cycle = 100%)
	V_{13} = 3.0% V_R (duty cycle = 100%)
Effective current	Irms = $\sqrt{(I_1^2 + I_3^2 \ldots I_{13}^2)}$
Fundamental current	I_1 = 1.06 · I_R (50 Hz or 60 Hz current of capacitor)
Temperature protection	microswitch (NC)
Dimensional drawings and terminals	see page 62 and 63
Three-phase filter reactors to EN 60289	
Frequency	50 Hz or 60 Hz
Voltage	400, 415, 440, 690*#
Output	5 … 100 KVAr
Detuning	5.67%, 7%, 14%
Cooling	natural
Ambient temperature	40 °C
Class of insulation	H
Enclosure	IP00

* According to DIN ENV VV61000-2-2
# Other voltage ratings on request

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Rated voltage - 440 V 7% aluminum wound reactors

Electrical Parameters and Terminations

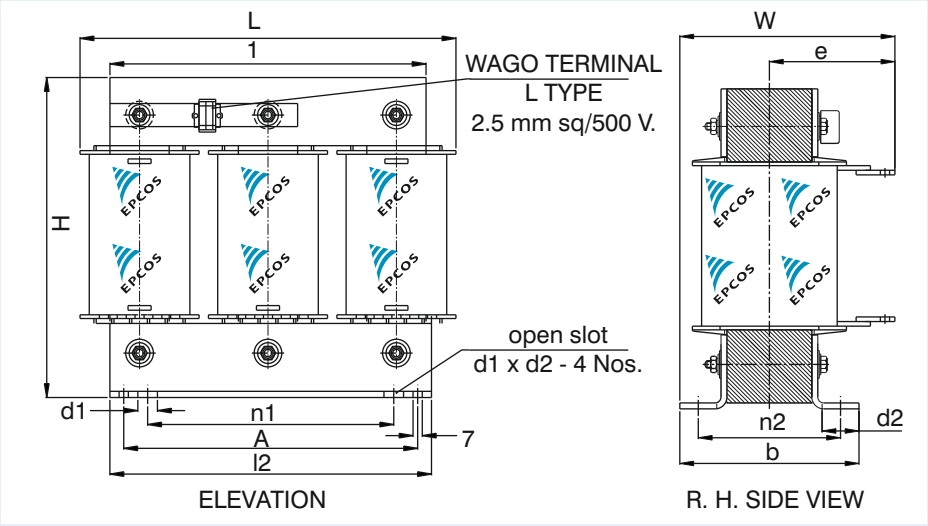
KVAr	Material Code	Rated Current (A)	I rms (A)	Inductance (mH)	Terminations
5	B44066D7005K440N1	6.6	7.45	9.28	CU. 6/6 Sq. mm
10	B44066D7010K440N1	13.2	14.9	4.65	CU. 6/6 Sq. mm
12.5	B44066D7012K440N1	16.5	18.7	3.71	CU. 6/6 Sq. mm
15	B44066D7015K440N1	19.65	22.35	3.1	AL. 8/35 Sq. mm
20	B44066D7020K440N1	26.24	29.78	2.32	AL. 8/35 Sq. mm
25	B44066D7025K440N1	32.8	37.2	1.86	AL. 8/35 Sq. mm
30	B44066D7030K440N1	39.36	44.7	1.55	AL. 8/50 Sq. mm
40	B44066D7040K440N1	52.49	59.6	1.16	AL. 8/50 Sq. mm
50	B44066D7050K440N1	65.61	74.5	0.93	AL. 8/50 Sq. mm
75	B44066D7075E440N1	98.41	111.68	0.62	20X3 CU BUSBAR
100	B44066D7100E440N1	131.22	148.91	0.46	25X3 CU BUSBAR

Rated voltage - 415 V 7% aluminum wound reactors

Electrical Parameters and Terminations

KVAr	Material Code	Rated Current (A)	I rms (A)	Inductance (mH)	Terminations
5	B44066D7005K415N1	6.96	7.89	8.257	CU. 6/6 Sq. mm
10	B44066D7010K415N1	13.91	15.79	4.128	CU. 6/6 Sq. mm
12.5	B44066D7012K415N1	17.39	19.73	3.303	CU. 6/6 Sq. mm
15	B44066D7015K415N1	20.87	23.68	2.752	AL. 8/35 Sq. mm
20	B44066D7020K415N1	27.82	31.58	2.064	AL. 8/35 Sq. mm
25	B44066D7025K415N1	34.78	39.47	1.651	AL. 8/35 Sq. mm
30	B44066D7030K415N1	41.74	47.36	1.376	AL. 8/50 Sq. mm
40	B44066D7040K415N1	55.65	63.15	1.032	AL. 8/50 Sq. mm
50	B44066D7050K415N1	69.56	78.94	0.826	AL. 8/50 Sq. mm
75	B44066D7075E415N1	104.34	118.41	0.55	20x3 CU BUSBAR
100	B44066D7100E415N1	139.12	157.88	0.413	25x3 CU BUSBAR

Reactor dimensional details



Reactors - Antiresonance Harmonic Filter

Type tested at CPRI • 'H' Class insulation • Thermal Micro Switch • Linearity 173%

Rated voltage - 440 V 7% aluminum wound reactors

Dimensions

KVAr	Material Code	L	W	H	l1	l2	n1	n2	b	e	d1	d2	A	B
5	B44066D7005K440N1	175	95 ± 5	158	150	150	100	56 ± 3	73	60 ± 5	10.8	15.5	125	56
10	B44066D7010K440N1	175	124 ± 5	160	150	150	100	78 ± 3	95	75 ± 5	10.8	15.5	125	78
12.5	B44066D7012K440N1	175	124 ± 5	160	150	150	100	78 ± 3	95	75 ± 5	10.8	15.5	125	78
15	B44066D7015K440N1	225	150 ± 5	230	190	190	150	73 ± 3	93	105 ± 5	10.8	15.5	180	73
20	B44066D7020K440N1	225	165 ± 5	205	190	190	150	95 ± 3	114	115 ± 5	10.8	15.5	180	95
25	B44066D7025K440N1	225	165 ± 5	205	190	190	150	95 ± 3	114	115 ± 5	10.8	15.5	180	95
30	B44066D7030K440N1	260	225 ± 5	240	220	220	150	165 ± 3	185	127 ± 5	10.8	15.5	175	165
40	B44066D7040K440N1	260	225 ± 5	240	220	220	150	165 ± 3	185	127 ± 5	10.8	15.5	175	165
50	B44066D7050K440N1	260	225 ± 5	240	220	220	150	165 ± 3	185	127 ± 5	10.8	15.5	175	165
75	B44066D7075E440N1	310	180 ± 5	270	265	265	150	132 ± 3	150	97 ± 5	10.8	15.5	175	132
100	B44066D7100E440N1	330	180 ± 5	270	285	285	150	132 ± 3	155	97 ± 5	10.8	15.5	175	132

* All dimensions are in mm.

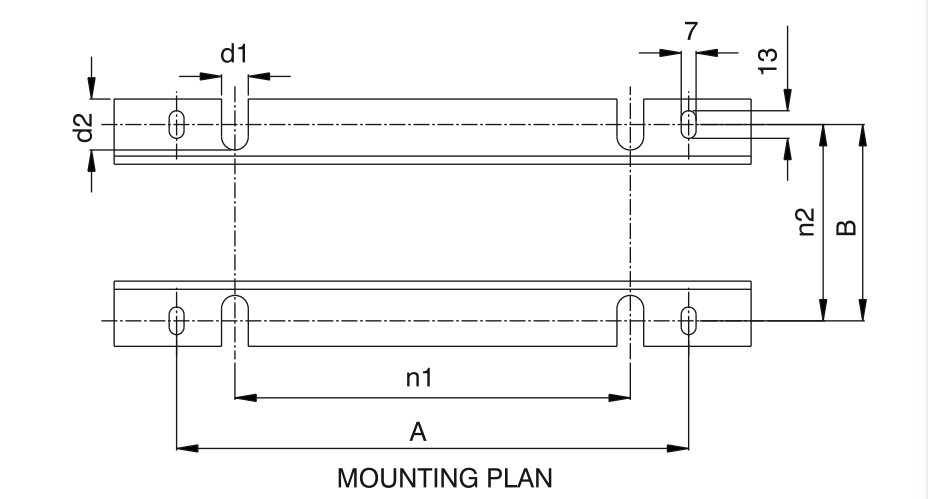
Rated voltage - 415V 7% aluminum wound reactors

Dimensions

KVAr	Material code	L	W	H	l1	l2	n1	n2	b	e	d1	d2	A	B
5	B44066D7005K415N1	175	95 ± 5	158	150	150	100	56 ± 3	73	60 ± 5	10.8	15.5	125	56
10	B44066D7010K415N1	175	124 ± 5	160	150	150	100	78 ± 3	95	75 ± 5	10.8	15.5	125	78
12.5	B44066D7012K415N1	175	124 ± 5	160	150	150	100	78 ± 3	95	75 ± 5	10.8	15.5	125	78
15	B44066D7015K415N1	225	150 ± 5	230	190	190	150	73 ± 3	93	105 ± 5	10.8	15.5	180	73
20	B44066D7020K415N1	225	165 ± 5	205	190	190	150	95 ± 3	114	115 ± 5	10.8	15.5	180	95
25	B44066D7025K415N1	225	165 ± 5	205	190	190	150	95 ± 3	114	115 ± 5	10.8	15.5	180	95
30	B44066D7030K415N1	260	225 ± 5	240	220	220	150	165 ± 3	185	127 ± 5	10.8	15.5	175	165
40	B44066D7040K415N1	260	225 ± 5	240	220	220	150	165 ± 3	185	127 ± 5	10.8	15.5	175	165
50	B44066D7050K415N1	260	225 ± 5	240	220	220	150	165 ± 3	185	127 ± 5	10.8	15.5	175	165
75	B44066D7075E415N1	310	180 ± 5	270	265	265	150	132 ± 3	150	97 ± 5	10.8	15.5	175	132
100	44066BD7100E415N1	330	180 ± 5	270	285	285	150	132 ± 3	155	97 ± 5	10.8	15.5	175	132

* All dimensions are in mm.

Reactor dimensional details



MOUNTING PLAN