



Reactor Product Catalogue

Jiangsu LTEC Electric Co., Ltd.



Jiangsu LTEC Electric Co., Ltd.

Address: No.86 Mei Gui Road, Kunshan Development Zone,
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>>>INTRODUCTION

>>> About LTEC

Jiangsu LTEC Electric Co., Ltd. is a high-tech enterprise established in 2004, coved by 20,000 square meters. The registered capital is RMB 50 Million (about USD7.8 Million). We locate at No.86 Mei Gui Road, Kun Shan, China (very close to Shanghai). We are specialized in the research, development and manufacture of low voltage and medium voltage reactor products for power factor correction system, as well as reactors for frequency converter. We can also provide you OEM and ODM services, and special product solutions.

>>>Our Technology

We focus on the improvement of power quality, measurement and analysis of harmonic load. Over the years, our engineers have rich experiences in power quality components, such as reactors, capacitors, controllers, in addition to passive or active filter devices. Their unique technology guarantees the stable quality of our products and provides the best solutions for you. So far, More than 1 million pieces reactors have been widely used in industry, buildings, medical and municipal government etc.

>>> Our Quality

Inspired to become a world class reactor manufacturer, LTEC understand that merely producing good quality reactors are not enough, it has to produce good quality reactors consistently to keep it competitive in the global market. The ISO 9001 Quality Management System is a proven tool employed internationally to address such requirement. The products have been certified by TUV Germany the CE directive and TUV mark approval. In addition, our plant is qualified by annual audit by TUV and SGS.



>>> CERTIFICATES

CERTIFICATE
of Conformity
Low Voltage Directive 2006/95/EC

Registration No.: AN 50318264 0001
Report No.: 15088442 001

Holder: JIANGSU LTEC ELECTRIC CO.,LTD.
No.423 Kunja Road
Kunshan Development Zone
Kunshan, Jiangsu Province
P.R. China

Product: Choke Coil
(Three-phase Reactors)

Identification: Type Designation: LTFR307xK LTFR307yA LTFR107yA
LTFR114xK LTFR114yA
Serial No.: Engineering sample

Remark: Issued in conjunction with TÜV Rheinland license
R 50318263 0001.

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the License Holder's disposal. This is to certify that the tested sample is in conformity with all revision of Annex I of Council Directive 2006/95/EC, in its latest amended version, referred to as the Low Voltage Directive. This certificate does not imply assessment of the series-production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to Annex III of the Directive.

Certification Body
TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

Date: 09.10.2015

CE The CE marking may be used if all relevant and effective EC Directives are complied with. CE

CERTIFICATE
of Conformity
Low Voltage Directive 2006/95/EC

Registration No.: AN 50322228 0001
Report No.: 15088178 001

Holder: JIANGSU LTEC ELECTRIC CO.,LTD.
No.423 Kunja Road
Kunshan Development Zone
Kunshan, Jiangsu Province
P.R. China

Product: Choke Coil
(Single-phase Reactors)

Identification: Type Designation: LTFR107xK LTFR107yA LTFR107yA
LTFR114xK LTFR114yA
Serial No.: Engineering sample

Remark: Issued in conjunction with TÜV Rheinland license
R 50322227 0001.

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the License Holder's disposal. This is to certify that the tested sample is in conformity with all revision of Annex I of Council Directive 2006/95/EC, in its latest amended version, referred to as the Low Voltage Directive. This certificate does not imply assessment of the series-production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to Annex III of the Directive.

Certification Body
TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

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Produkte
Products

Prüfbericht-Nr.: 15085446 001
Test Report No.: 15085446 001

Auftrags-Nr.: 154104388
Order No.: 154104388

Kunden-Referenz-Nr.: N/A
Client Reference No.: N/A

Auftraggeber: JIANGSU LTEC ELECTRIC CO.,LTD.
Client: No.423 Kunja Road, Kunshan Development Zone, Kunshan, Jiangsu Province, P.R.China

Prüfgegenstand: Detuned reactor
Test item: Detuned reactor

Bezeichnung / Typ-Nr.: LTHR12-84.5/6-3
Identification / Type No.: LTHR12-84.5/6-3

Auftrags-Inhalt: CoC declaration
Order content: CoC declaration

Prüfgrundlage: EN 60076-6
Test specification: EN 60076-6

Wareneingangsdatum: 15.07.2015
Date of receipt: 15.07.2015

Prüfmuster-Nr.: N/A
Test sample No.: N/A

Prüfzeitraum: 15.05.2015 - 05.07.2015
Testing period: 15.05.2015 - 05.07.2015

Ort der Prüfung: China National Center for Quality Supervision and Test of Electrical Apparatus Products
Place of testing: China National Center for Quality Supervision and Test of Electrical Apparatus Products

Prüflaboratorium: TÜV Rheinland (Shanghai) Co., Ltd.
Testing laboratory: TÜV Rheinland (Shanghai) Co., Ltd.

Prüfergebnis: Pass
Test result: Pass

geprüft von / tested by: Wencan zhang / PE
Date: 24.07.2015
Name / Stellung: Wencan zhang / PE
Signature: Wencan zhang

kontrolliert von / reviewed by: Ma Rui / Reviewer
Date: 24.07.2015
Name / Stellung: Ma Rui / Reviewer
Signature: Ma Rui

Sonstiges / Other: List of Attachments: Attachment 1: list of equipment - 2 pages, Attachment 2: Photograph - 1 page

IEC Test report templated was used, considering no differences between IEC 60076-6: 2007 and EN 60076-6: 2008

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: Test item complete and undamaged

Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft
Passes: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor
Fails: 1 = failed a.m. test specification(s) Fails: failed a.m. test specification(s) NT = not tested

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugewiesen vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report only relates to the a.m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.

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Mail: service@de.tuv.com - Web: www.tuv.com

Produkte
Products

Prüfbericht-Nr.: 15085447 001
Test Report No.: 15085447 001

Auftrags-Nr.: 154104388
Order No.: 154104388

Kunden-Referenz-Nr.: N/A
Client Reference No.: N/A

Auftraggeber: JIANGSU LTEC ELECTRIC CO.,LTD.
Client: No.423 Kunja Road, Kunshan Development Zone, Kunshan, Jiangsu Province, P.R.China

Prüfgegenstand: Detuned reactor
Test item: Detuned reactor

Bezeichnung / Typ-Nr.: LTFR848072/40-07
Identification / Type No.: LTFR848072/40-07

Auftrags-Inhalt: CoC declaration
Order content: CoC declaration

Prüfgrundlage: EN 60076-6
Test specification: EN 60076-6

Wareneingangsdatum: 15.07.2015
Date of receipt: 15.07.2015

Prüfmuster-Nr.: N/A
Test sample No.: N/A

Prüfzeitraum: 15.05.2015 - 05.07.2015
Testing period: 15.05.2015 - 05.07.2015

Ort der Prüfung: China National Center for Quality Supervision and Test of Electrical Apparatus Products
Place of testing: China National Center for Quality Supervision and Test of Electrical Apparatus Products

Prüflaboratorium: TÜV Rheinland (Shanghai) Co., Ltd.
Testing laboratory: TÜV Rheinland (Shanghai) Co., Ltd.

Prüfergebnis: Pass
Test result: Pass

geprüft von / tested by: Wencan zhang / PE
Date: 29.07.2015
Name / Stellung: Wencan zhang / PE
Signature: Wencan zhang

kontrolliert von / reviewed by: Ma Rui / Reviewer
Date: 29.07.2015
Name / Stellung: Ma Rui / Reviewer
Signature: Ma Rui

Sonstiges / Other: List of Attachments: Attachment 1: list of equipment - 2 pages, Attachment 2: Photograph - 1 page

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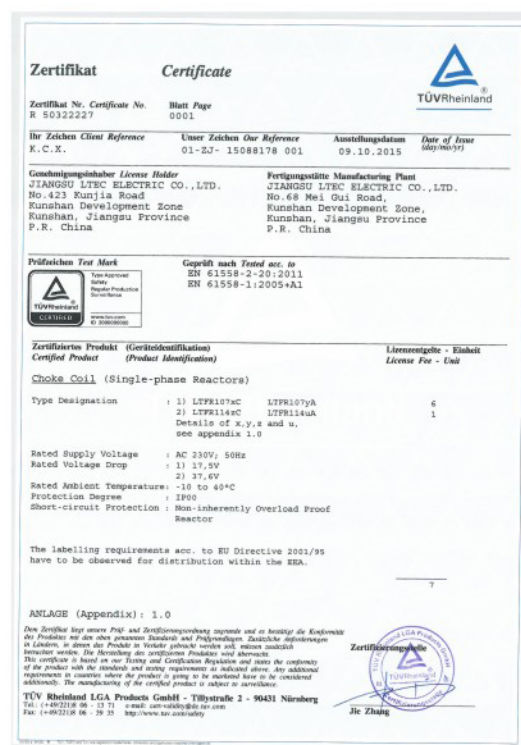
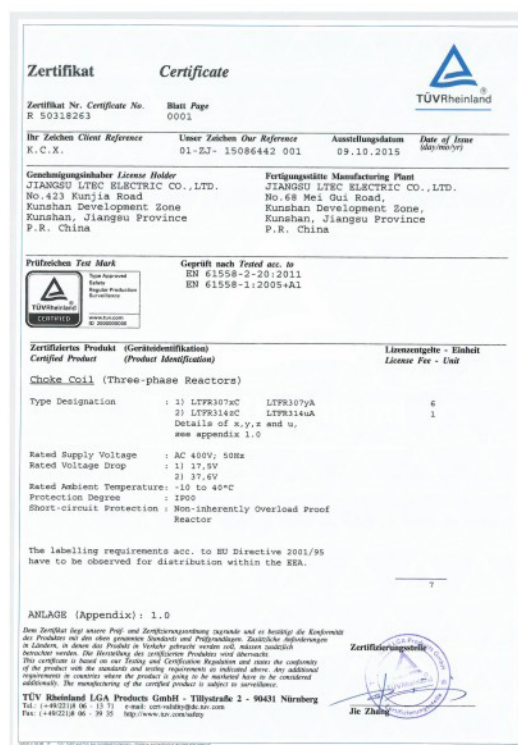
Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: Test item complete and undamaged

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Mail: service@de.tuv.com - Web: www.tuv.com

>>> CERTIFICATES



Report Number: QIP-ASI164019

This report is issued by Focus Technology Co., Ltd. (Made-in-China.com) and the supervising inspectorate (SGS-CSTC Standards Technical Services Co., Ltd.) to confirm that:

Company Name : Jiangsu Leite Electric & Machinery Joint Stork Co., Ltd.
江苏雷特电机股份有限公司
Remark: The company also used company name of Jiangsu LTEC Electric Co., Ltd.
in business.
Showroom : <http://lretractor.en.made-in-china.com/>
Address : No. 423 Kunjia Road, Kunshan, Jiangsu, China
Product : Production: Reactor
Sales: Capacitor

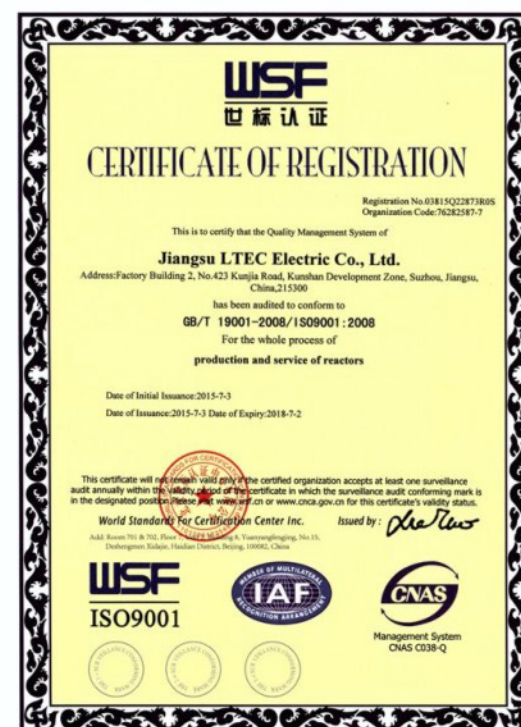
has been on site audited for the Following Scope of Activity

1. General Information
2. Management System and Product Certification
3. Production Capacity & Quality Control
4. Working Environment
5. Photos



General Comments:
Jiangsu Leite Electric & Machinery Joint Stork Co., Ltd. is a manufacturer with 51 employees; it was established in 2004 located in No. 423 Kunjia Road, Kunshan, Jiangsu, China. The land occupies an area of 3,382.8 square meters. They have passed ISO9001:2008 certification in 2009, and obtained CE certificates & TUV Test Mark.

Sign for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd.

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>>> DIRECTORY

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>>> BASICS OF PFC

Today, electricity is the most common energy in the world. The growing use of electronic devices with non-linear waves leads to a distortion of sinusoidal voltage and current now, and brings in the additional losses of power. They have also resulted in current increase of power capacitors and other parts of the system as well as the possibility of capacitor resonance with other inductive loads. Therefore, it could destroy the components in the systems.

In the industrial system with non-linear waves, the capacitors without series reactors prove to be unworkable. The reason is that the shunt resonance between power capacitors and the impedance in the system will cause the amplification of harmonic current. The solution is the use of detuned reactors forming a series resonant circuit with capacitors. The basic principle is very simple, according to below resonance frequency formula.

$$f_r = f_n \cdot \sqrt{\frac{100\%}{p}}$$

The capacitor cabinet in the PFC system is actually a passive filter.

Reactors with different blocking factors will absorb and limit its amplification, according to different harmonic load. It has below features:

- For frequencies below f_r , the reactor/capacitor system behaves like a capacitance and compensates the reactive energy.
- For frequencies above f_r , the reactor/capacitor system behaves like an inductance, prevents any risk of parallel resonance and absorb certain harmonic current.

Therefore, the overall power cost will be cut down in the way of power factor compensation and harmonic restriction. We could reduce the power loss, prolong the life of capacitors and eliminate the unnecessary interference of electronic products. LTEC endeavours to provide you a unique power solution, and create a clean, green and safe environment!

>>> PARAMETERS AND DEFINITIONS

Power Factor λ

The power factor is the ratio of active power P to apparent power S under sinusoidal conditions.

$$\lambda = \frac{|P|}{S}$$

Blocking Factor p

Ratio of the impedances of a reactor/capacitor combination in PFC.

$$p = 100 \cdot \frac{X_L}{X_C} = 100 \cdot 4 \cdot \pi^2 \cdot f^2 \cdot L \cdot C$$

Harmonic Order h

Ratio of the frequency of a harmonic to the fundamental network frequency

Ip_{xx} Degree of Protection

A measure of the degree of protection: the first digit refers to electric shock hazards and the second one to the intrusion of unwanted substances.

Insulation Class

Permissible temperature for the insulation materials used in the reactor.

Low Voltage LV

In PFC, voltages up to 1 kV RMS

Medium Voltage MV

In PFC, voltages above 1 kV RMS and below 35 kV RMS

Rated Frequency f_N

Repetition rate of the fundamental wave of system voltage. Usually 50 or 60 Hz.

Rated Voltage U_N

In PFC, this is usually the rated AC RMS voltage.

Rated Current I_N

Specified continuous r.m.s value of current at power frequency.

>>> PARAMETERS AND DEFINITIONS

Capacitor Voltage U_c

Required voltage strength of the capacitor. The series connection of capacitor and reactor causes a voltage rise at the capacitor terminals, which must be considered as below formula when selecting a capacitor for the application.

$$U_c = \frac{U_N}{(1 - \frac{P}{100\%})}$$

Rated Inductance L_N

Specified inductance at rated frequency. It also includes mutual inductance between phases, if applicable.

RMS Current I_{rms}

Current load on the reactor in permanent operation, caused by the fundamental wave plus harmonics in the system.

Total Losses P_{tot}

Losses are measured at the rated frequency and current. It includes the winding resistance losses and additional losses due to harmonics, referring to 75°C.

Rated Power of Capacitor Q

Reactive power of capacitor resulting from the ratings of capacitance, frequency and voltage.

$$Q = 2 \pi f_x C_x U_N^2$$

Output of Capacitor Q_{LC}

Net compensation power of capacitor resulting from series connection with reactors in PFC.

$$Q_{LC} = Q \times (\frac{U_N}{U_c})^2 \div (1 - p\%)$$

>>> PARAMETERS AND DEFINITIONS

Rated Tuning Frequency f_r

The specified tuning frequency of the filter circuit in which the reactor is operating as a key component. Below is the reference charts between common blocking factors and tuning frequencies.

Blocking factor p	Tuning frequency f_r		Recommended applications
	$f_n=50\text{Hz}$	$f_n=60\text{Hz}$	
5.67%	210Hz	252Hz	when THDI in mains must be reduced due to 5th and 7th harmonic current distortions
6%	204Hz	245Hz	Generally given in Japan or USA in 3 phase circuit with 5th and 7th harmonics for better detuning results
7%	189Hz	227Hz	Most common PFC in Europe with major 5th ,7th harmonics in the mains to avoid inductance attenuations
12.7%	140Hz	168Hz	when THDI in mains must be reduced due to 3rd harmonic current distortions
13%	138Hz	166Hz	Generally given in Japan or USA in 3 phase circuit with 3rd harmonics for better detuning results
14%	134Hz	160Hz	Most common PFC in Europe with major 3rd harmonics in the mains to avoid inductance attenuations

>>> USER MANUAL

Acceptance

- Check that no parts are missing and that the shipment has not been subjected to any damage due to improper transit.
- Check that the electrical characteristics indicated on the rating plate correspond to those specified on the order.

In other cases, please attach the packing list with your complaint.

Handling

- Unpack the reactors on the site properly.
- Lift up the reactors at the top of four loops with the sling if required.

If a fork lift truck is used, ensure that the type of fork is appropriate for the size and weight for the reactor.

Operations

- Make sure that the mounting screws of the reactors are well fixed.
- Install the reactors in the cabinet in vertical directions with adequate clearance to other electrical components.
- Don't touch the hot reactors during operations.
- Sufficient heat dissipations and cooling system shall be considered.

In case of any doubts, pls contact LTEC for technical support.

Storage

- Store the goods in a dry, well-ventilated area free from rain, water spray, chemicals and dust
- Storage temperature: -0°C+ 40°C
- check the conditions of the reactors in stock regularly.

Maintenance

- Monthly check the tightness of the reactor terminals
- Yearly check the cleanness of the equipment, the ventilation system, the temperature of the area where reactors are installed.

Periodical checks and inspections are required to ensure reliable operation of reactors.

Protection

Temperature switch for low voltage products are provided with a separate screw terminal to cut off the line in the event of over heating, normally 135°C closed contact (250VAC,5A).

>>> USER MANUAL

Safety

Special attentions must be taken to avoid any misuse of the reactors in each application.

No particular fire precautions are required.

All the operations described in this document shall be performed in accordance with current safety standards and under the responsibility of a competent authority.

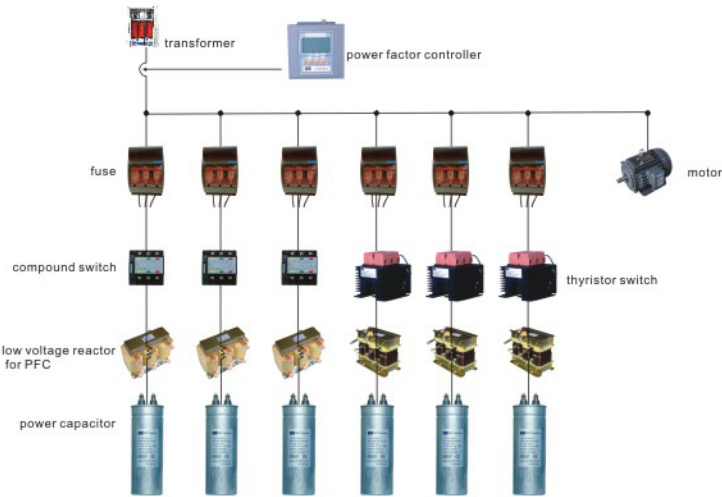
>>> LOW VOLTAGE REACTORS FOR PFC

The products, also called detuned reactors or filter reactors, are generally used in series with capacitors in PFC system, in order to reach its target induced current. It can be tuned to a certain resonance frequency to absorb the harmonic currents in the grid.

Technical data

Standard	EN 60076-6, EN 61558-2-20, UL 1446
Rated voltage	230V to 1000V
Rated frequency	50Hz/60Hz
Dielectric test	50Hz 3KV, 60s
Cooling method	Natural air
Ambient temperature	-25 to +50°C
Elevation above sea level	≤1000m a.s.l.
Protection class	IP00 indoor mounting
Permitted harmonic content	U3=0.5%; U5=5%; U7=5%;
Inductance tolerance	0/+5% (or +/-3% as requested)
Blocking factor	5%-14%
Linearity	1.55-2.2In
Insulation class	H (UL approved resin)
Maximum humidity	95%
Design method	Single phase or three phase, dry type, iron core, multiple air gap
Winding material	Copper/ Aluminum
Thermal protection	135°C normally closed switch
Terminals	Copper terminals, Copper busbars, Cable lugs
Approval marks	CE, TUV, EAC, 

Recommended Design



Features

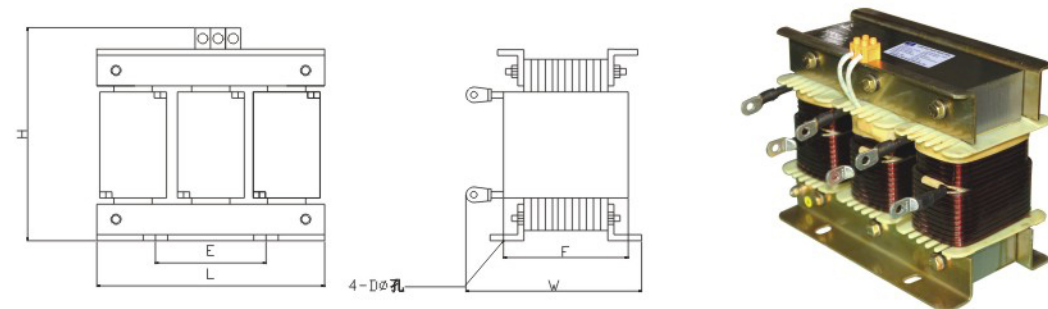
- Very higher linearity
- Lower temperature rising
- Stand 25 times short circuit current in one second
- Vacuum impregnation in full automatic system
- Over heat protection
- Anti-dust non-wooden packing
- Certified by international standards

Standard Series Reactors for Power Capacitors

Ordering Code	U _N (V)	Q _{LC} (Kvar)	Q(Kvar)	U _c (V)	L _N (mH)	I _N (A)	I _{rms} (A)	P	Weight(kg)
f _N =50Hz, 3Phase, Copper winding									
LTFR307013C	400	13.3	15	440	3*2.879	19.2	21.7	7%	11
LTFR307022C		22.2	25		3*1.727	32.0	36.2		17
LTFR307026C		26.7	30		3*1.439	38.5	43.5		18
LTFR307044C		44.4	50		3*0.864	64.1	72.4		27
LTFR307066C		66.6	75		3*0.575	96.2	108.7		36
LTFR307088C		88.9	100		3*0.432	128.3	144.9		57
LTFR307015C	400	15.0	20	480	3*2.557	21.7	24.5	7%	13
LTFR307025C		25.0	33.4		3*1.534	36.1	40.8		17
LTFR307030C		30.0	40		3*1.278	43.3	48.9		18
LTFR307050C		50.0	66.8		3*0.767	72.2	81.6		28
LTFR307075C		75.0	100		3*0.511	108.3	122.3		37
LTFR307100C		100.0	134		3*0.384	144.3	163.1		58
LTFR314010C	400	10.1	15	525	3*8.194	14.6	16.5	14%	14
LTFR314016C		16.9	25		3*4.916	24.4	27.5		19
LTFR314020C		20.0	30		3*4.148	28.9	32.6		27
LTFR314025C		25.0	37		3*3.318	36.1	40.8		29
LTFR314033C		33.7	50		3*2.458	48.7	55.0		36
LTFR314050C		50.0	74		3*1.659	72.2	81.6		58

Other specifications are available upon request.

Figure 1

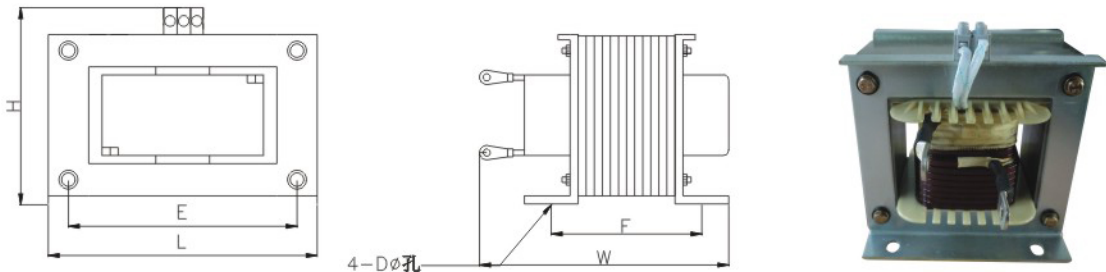


Standard Series Reactors for Power Capacitors

Ordering Code	U _N (V)	Q _{LC} (Kvar)	Q(Kvar)	U _C (V)	L _N (mH)	I _N (A)	I _{rms} (A)	P	Weight(kg)
f _N =50Hz, 3Phase, Aluminum foil winding									
LTFR307022A	400	22.2	25	440	3*1.727	32.0	36.2	7%	18
LTFR307026A		26.7	30		3*1.439	38.5	43.5		19
LTFR307044A		44.4	50		3*0.864	64.1	72.4		28
LTFR307066A		66.6	75		3*0.575	96.2	108.7		40
LTFR307088A		88.9	100		3*0.432	128.3	144.9		44
LTFR307025A	400	25.0	33.4	480	3*1.534	36.1	40.8	7%	19
LTFR307030A		30.0	40		3*1.278	43.3	48.9		20
LTFR307050A		50.0	66.8		3*0.767	72.2	81.6		29
LTFR307075A		75.0	100		3*0.511	108.3	122.3		44
LTFR307100A		100.0	134		3*0.384	144.3	163.1		46
LTFR314016A	400	16.9	25	525	3*4.916	24.4	27.5	14%	28
LTFR314020A		20.0	30		3*4.148	28.9	32.6		30
LTFR314025A		25.0	37		3*3.318	36.1	40.8		34
LTFR314033A		33.7	50		3*2.458	48.7	55.0		36
LTFR314050A		50.0	74		3*1.659	72.2	81.6		49

Other specifications are available upon request

Figure 2

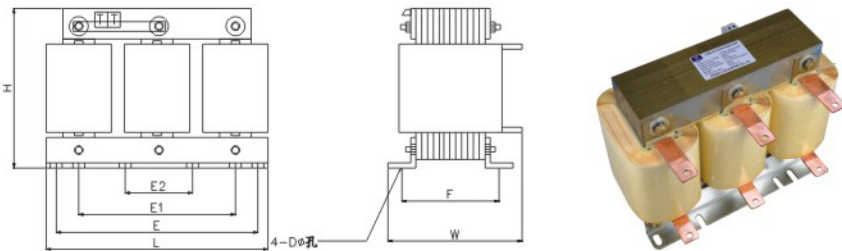


Standard Series Reactors for Power Capacitors

Ordering Code	U _N (V)	Q _{LC} (Kvar)	Q(Kvar)	U _C (V)	L _N (mH)	I _N (A)	I _{rms} (A)	P	Weight(kg)
f _N =60Hz, 3Phase, Aluminum foil winding/Copper winding									
LTFR307026A	480	26.9	30	525	3*1.710	32.0	35.0	7%	18
LTFR307032A		32.3	36		3*1.430	39.0	42.0		20
LTFR307053A		53.8	60		3*0.860	65.0	69.0		31
LTFR307064A		64.5	72		3*0.710	77.0	83.0		38
LTFR307080A		80.6	90		3*0.570	97.0	104.0		40
LTFR307129A		129.0	144		3*0.360	155.0	167.0		66
LTFR312027A	480	27.7	50	690	3*3.210	33.3	36.0	12.7%	29
LTFR312055A		55.4	100		3*1.600	66.7	72.0		56
LTFR312110A		110.9	200		3*0.800	133.4	144.0		100
LTFR314005C	220	5.3	15	400	3*3.960	13.8	15.0	14%	10
LTFR314010C		10.6	30		3*1.980	27.7	30.0		17
LTFR314021C		21.1	60		3*0.990	55.4	60.0		30

Other specifications are available upon request.

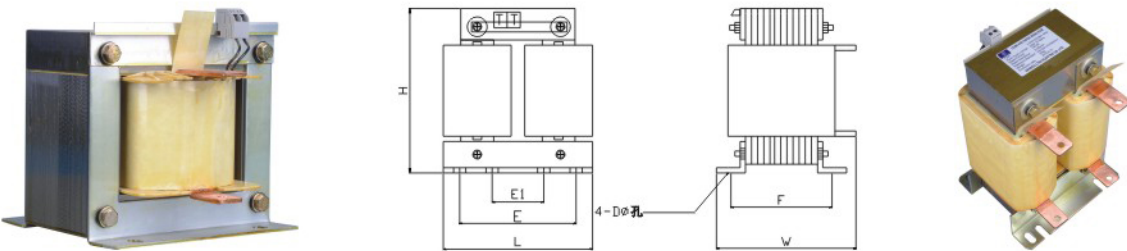
Figure 1



Standard Series Reactors for Power Capacitors

Ordering Code	U _N (V)	Q _{LC} (Kvar)	Q(Kvar)	U _C (V)	L _N (mH)	I _N (A)	I _{rms} (A)	P	Weight(kg)
f _N =50Hz,3Phase,Aluminum wire winding									
LTFR307017AL	400	17.7	20	440	3*2.159	25.6	28.9	7%	15
LTFR307022AL		22.2	25		3*1.727	32.0	36.2		16
LTFR307026AL		26.7	30		3*1.439	38.5	43.5		17
LTFR307035AL		35.5	40		3*1.080	51.3	57.9		24
LTFR307044AL		44.4	50		3*0.864	64.1	72.4		25
LTFR307066AL		66.6	75		3*0.575	96.2	108.7		39
LTFR307088AL		88.9	100		3*0.432	128.3	144.9		55
LTFR307020AL	415	20.1	30	525	3*2.050	28.0	31.7	7%	16
LTFR307026AL		26.9	40		3*1.537	37.4	42.2		24
LTFR307033AL		33.6	50		3*1.230	46.7	52.8		25
LTFR307040AL		40.3	60		3*1.025	56.1	63.3		26
LTFR307050AL		50.4	75		3*0.820	70.1	79.2		28
LTFR307067AL		67.2	100		3*0.512	112.1	126.7		39
LTFR307100AL		100.7	150		3*0.331	173.5	196.0		57

Figure 3



>>> LOW VOLTAGE SHUNT REACTORS

The products, also called decompensation reactors, are generally used in parallel connections where the inductive load is needed. It can reduce the line voltage and avoid the system overloaded by the capacitive power and thus increase efficiency of the system.

Technical data

Standard	EN 60076-6, EN 61558-2-20, UL 1446
Rated voltage	230V to 1000V
Rated frequency	50Hz/60Hz
Dielectric test	50Hz 3KV, 60s
Cooling method	Natural air
Ambient temperature	-25 to +50°C
Elevation above sea level	≤ 1000m a.s.l.
Protection class	IP00 indoor mounting
Inductance tolerance	0/+5% (or +/-3% as requested)
Blocking factor	100%
Insulation class	H (UL approved resin)
Maximum humidity	95%
Design method	Single phase or three phase, dry type, iron core, multiple air gap
Winding material	Aluminum
Terminals	Terminal blocks, Copper busbars
Approval marks	CE, TUV, EAC, 

Features

- Vacuum impregnation in full automatic system
- Over heat protection
- Anti-dust non-wooden packing
- Certified by international standard
- Suitable for long transmission lines

Standard shunt reactors for Power Capacitors

Ordering Code	U _N (V)	Q(Kvar)	L _N (mH)	I _N (A)	Weight(kg)
f _N =50Hz, 3Phase, Aluminum wire winding					
LTSR30400001AL	400	1	505	1.45	15
LTSR30400002AL		2	252	2.9	15
LTSR30400005AL		5	102	7.2	37
LTSR30400010AL		10	51.2	14.4	45
LTSR30400012AL		12.5	40	18	73
LTSR30400015AL		15	33.6	22	77
LTSR30400020AL		20	25.3	28.9	78
LTSR30400025AL		25	20.4	36.3	121
LTSR30400030AL		30	16.6	43.5	156
LTSR30400040AL		40	12.75	58	179
LTSR30400050AL		50	10.2	72.5	235

Other specifications are available upon request.

>>> SPECIAL PRODUCTS

- Other system voltages(for example 110V,208V,690V) lower than 1000V
- Other temperature rise(for example 20K))
- Other linearity and inductance accuracy(for example 3.4In)
- Special temperature protection switch(for example 145°C)
- Special power capacitor application request
- Special environment situation
(for example ambient temperature 52°C or attitude 4000 meters)
- Higher humid conditions (around 70%)



>>> MEDIUM VOLTAGE REACTORS FOR PFC

The products, also called detuned reactors or filter reactors, are generally used in series with capacitors in PFC system, in order to reach its target induced current. It possesses the functions of increasing power factors and limiting harmonic current.

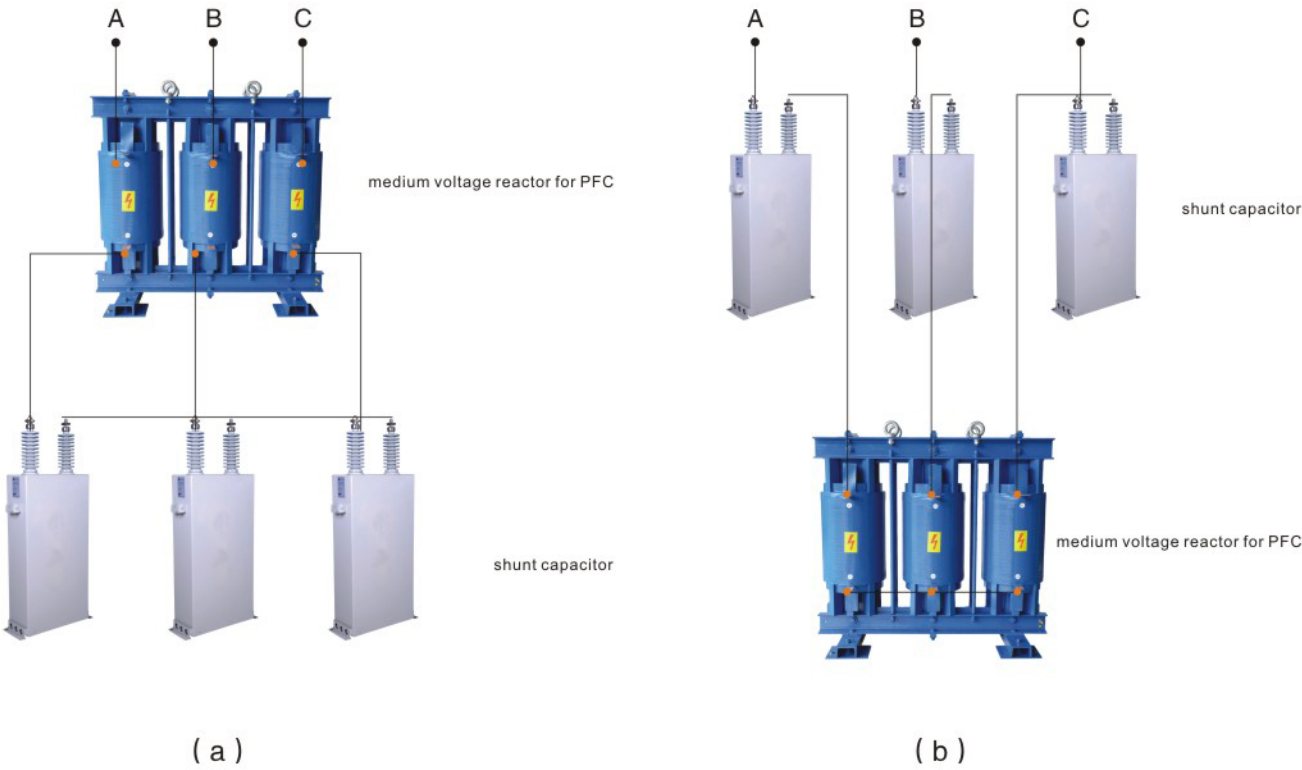
Technical data

Reference standard	EN 60076-6,UL1446
Rated voltage	≤35KV
Rated frequency	50Hz/60Hz
Cooling method	Natural air
Ambient temperature	-25 to +50℃
Elevation above sea level	≤1000m a.s.l.
Protection class	IP00 indoor mounting
Permitted harmonic content	U3=0.5%; U5=5%; U7=5%,
Inductance tolerance	-/+3%
Blocking factor	5%-14%
Linearity	1.55-2.2In
Insulation class	H(UL approved resin)
Maximum humidity	95%
Design method	Single phase or three phase, dry type Iron core, multiple air gap
Winding material	Copper/Aluminum
Terminals	Copper bar
Approval marks	TUV, 

Features

- Very higher linearity
- Lower temperature rising
- Stand 25 times short circuit current in one second
- VPI process control
- Anti-dust non-wooden packing
- EN standard type testing

Recommended Design

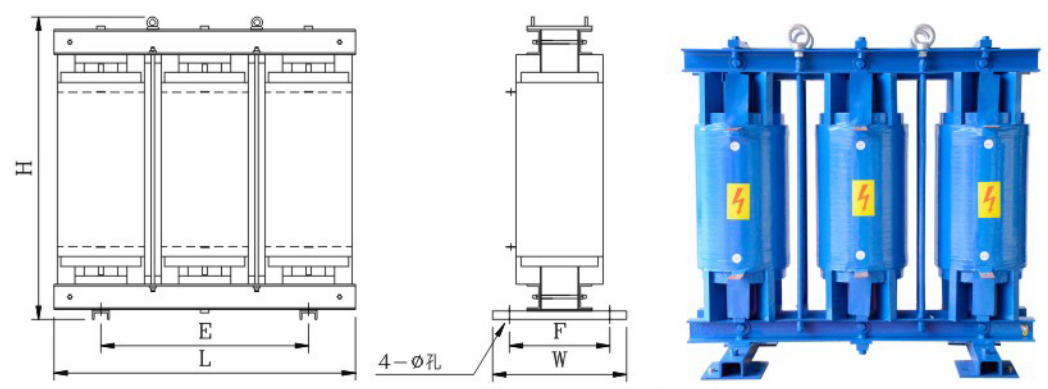


Standard Reactors for shunt Capacitors

Ordering Code	U _N (KV)	Q _{LC} (Kvar)	Q(Kvar)	U _C (KV)	L _N (mH)	I _N (A)	I _{rms} (A)	P	Weight(kg)
f _N =50Hz, 3Phase, Aluminum wire winding									
LTHR3070150A	11	150	166	12	3*193.366	7.9	8.9	7%	180
LTHR3070300A		300	332		3*96.683	15.7	17.8		280
LTHR3070500A		500	554		3*58.010	26.2	29.7		340
LTHR3071000A		1000	1008		3*29.005	52.5	59.3		520
LTHR3071500A		1500	1662		3*19.337	78.7	89.0		860
LTHR3072000A		2000	2016		3*14.502	103.9	117.4		1130
LTHR3072500A		2500	2770		3*11.602	129.8	146.7		1220
LTHR3140100A	6.3	100	125	7.6	3*205.770	9.2	10.4	14%	158
LTHR3140200A		200	250		3*102.885	18.3	20.7		250
LTHR3140300A		300	375		3*68.590	27.5	31.1		310
LTHR3140400A		400	500		3*51.442	36.7	41.4		380
LTHR3140550A		550	688		3*37.413	50.4	57.0		460
LTHR3140900A		900	1126		3*22.863	82.5	93.2		800
LTHR3141750A		1750	2190		3*11.758	160.4	181.2		1160

Other specifications are available upon request.

Figure 1



Filter Reactors for shunt Capacitors

Ordering Code	U _N (KV)	L _N (mH)	I _N (A)	I _{rms} (A)	Weight(kg)
f _N =60Hz,3Phase, Aluminum wire winding					
LTHR3029040A-13.8KV	13.8	3*29.780	35	40	405
LTHR3023050A-13.8KV		3*23.824	45	50	420
LTHR3019060A-13.8KV		3*19.853	55	60	445
LTHR3014090A-13.8KV		3*14.890	75	90	540
LTHR3009125A-13.8KV		3*9.926	110	125	890
LTHR3008140A-13.8KV		3*8.508	125	140	900
LTHR3007164A-13.8KV		3*7.445	150	164	1050
LTHR3186020A-34.5KV	34.5	3*186.726	15	20	550
LTHR3093035A-34.5KV		3*93.363	30	35	760
LTHR3062050A-34.5KV		3*62.242	45	50	870
LTHR3046065A-34.5KV		3*46.681	55	60	1180
LTHR3037085A-34.5KV		3*37.345	70	85	1540

Other specifications are available upon request.



>>> PASSIVE HAMONIC FILTERS

PHF is kind of low-pass harmonic filter to help improving harmonic currents, so that the total THDI and THDV can meet the limits of IEEE519, and the power factor can reach above 0.95 at 100% loading. There is no resonance between PHF and system power. The input capacity can be switching in different groups according to the load request, to avoid the over compensation and under compensation of power factor.

It can be applied to single or multiple 6-pluse inverter diving device, and other three-phase 6-pulse diode or SCR rectifier as follows:

- AC Inverter
- DC Motor Drives
- Fans and Pumps
- Elevators
- Water Treatment Facilities
- Diode or Silicon Rectifiers

Technical data

Standard	IEEE-519, EN61558-2-2-20, EN60076-6	
Rated frequency	50Hz/60Hz	
Rated voltage	220V-690V	
Total harmonic current distortion	According to IEEE519	
Total voltage distortion limits	Special application (hospitals, airports)	3%
	General system applications	5%
Line voltage tolerance	+/-10%	
System impedance	1.5%-6%	
Design method	Three phase	
THDI Target value	<5%, 8%, 12% at 100% load	
Efficiency	>95%	
Insulation class	H (UL approved resin and capacitor)	
Dielectric test	50Hz 3KV, 60s	
Protection class	IP00(IP20 to IP54 optional)	
Overload capability	1.5 times rated current for 1 minute	
Ambient temperature	-40 to +50℃	
Cooling method	Natural air	
Elevation above sea level	<1000m a.s.l.	
Voltage unbalance distortion rate	<1%	
Approval marks	CE, TUV, EAC, 	

>>> HARMONIC FILTERS

TSquare harmonic filter does not need power system analysis, and can be directly applied to reduce the distortion of harmonic voltage and current, and to avoid the resonance in the system. TSHF comply with IEEE-519 harmonic voltage and current distortion limits. It can solve the harmonic distortion problem, and provide a series impedance to effectively suppress the voltage surge and protect the load, thus improving the overall power quality. It is mostly applied to below types 6 Pulse rectified devices. Customer can select the different harmonic filter according to actual current consumed by the power of the load.

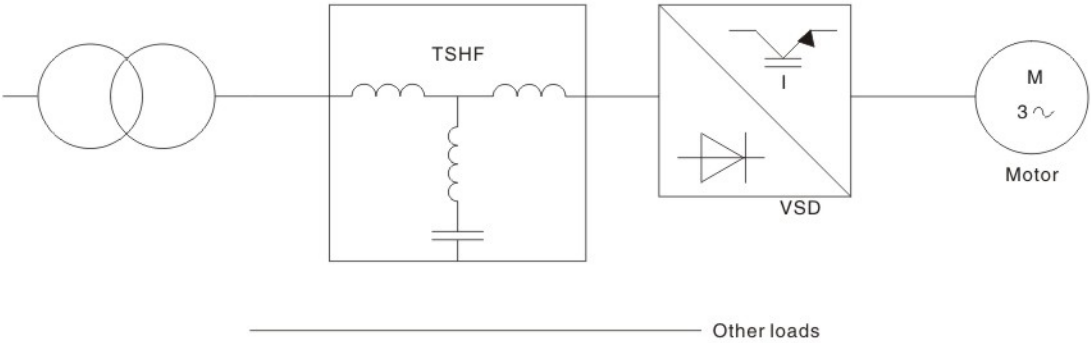


- AC Inverter
- DC Motor Drives
- Fans and Pumps
- Elevators
- Water Treatment Facilities
- Diode or Silicon Rectifiers

Technical data

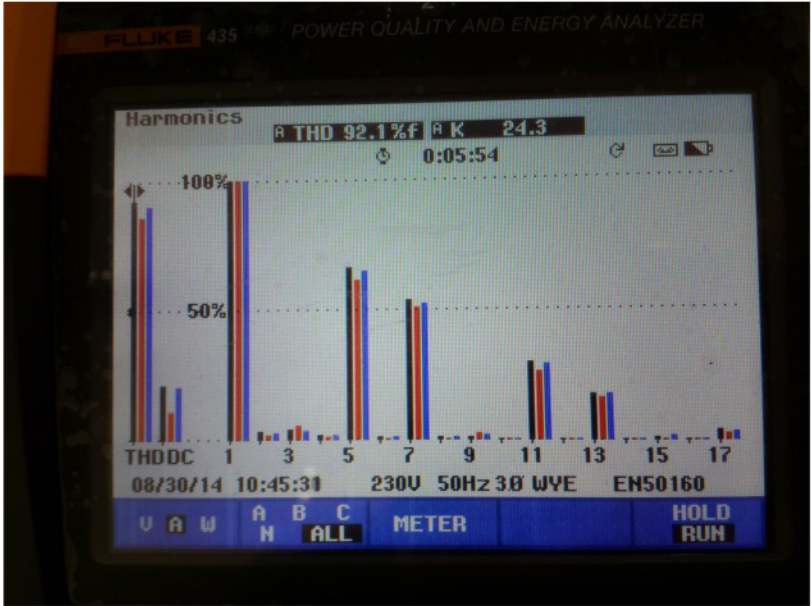
Standard	IEEE-519
Rated frequency	50Hz/60Hz
System voltage	rated voltage ± 10%
System impedance	1.5%-6%
Design method	Three phase
THDI Target value	<5%, 8%, 12%
Ambient temperature	-40 to +50℃
Elevation above sea level	<2000m a.s.l.
Distortion rate	<1%

TSHF Structure

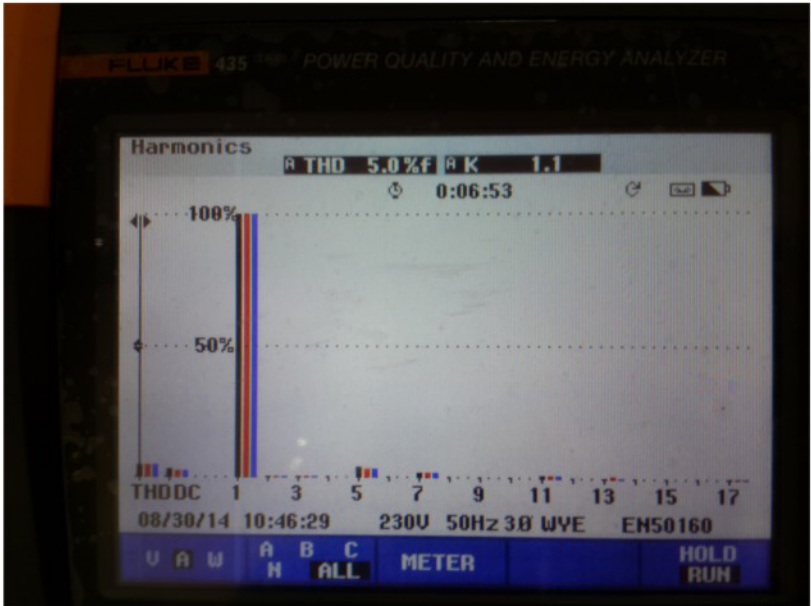


Improvement contrast chart

Without TSHF (THDI=92.1%)



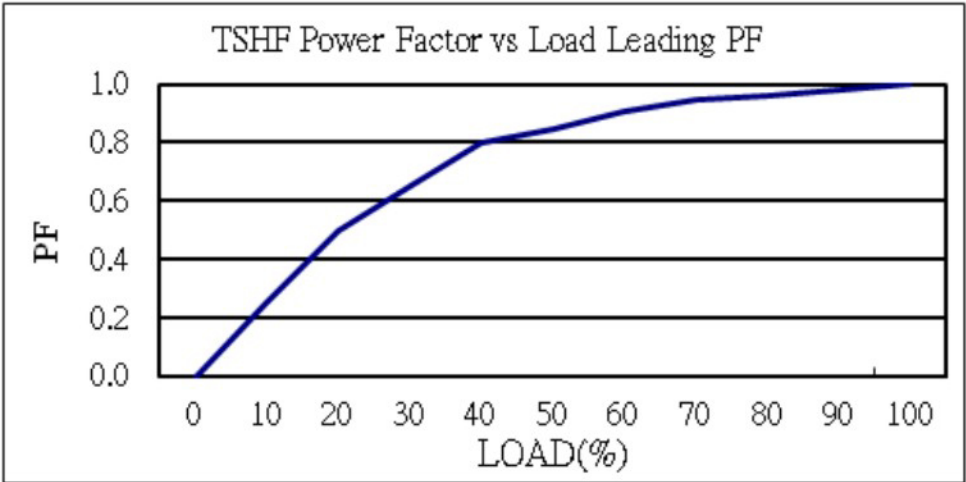
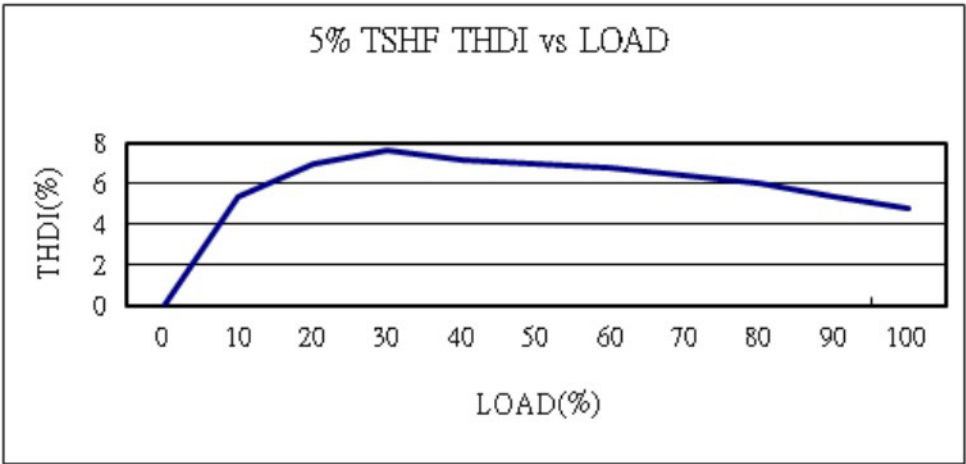
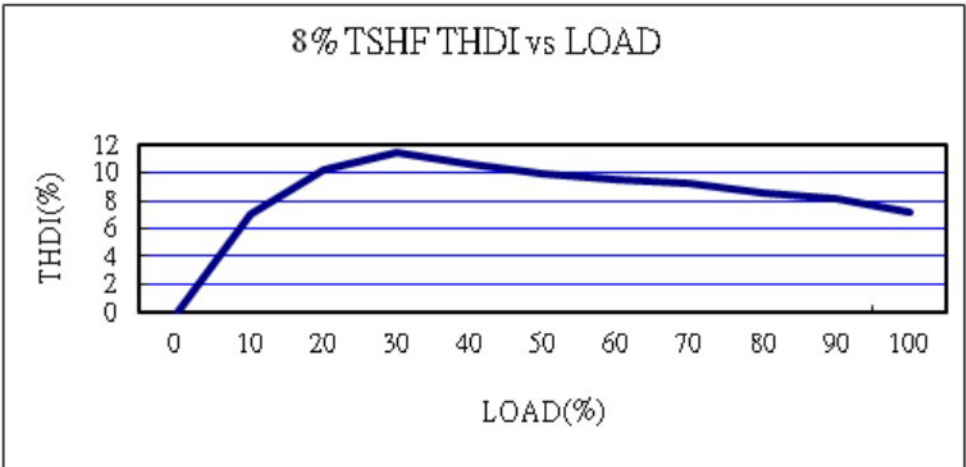
With TSHF (THDI=5.0%)



Ordering code (THDI<8%)	Ordering code (THDI<5%)	U _N (V)	Motor(HP)	Power(KW)	Rated current(A)
f _N =50Hz, 3Phase, Copper winding					
TSHF84020-08	TSHF84020-05	400	20	15	32
TSHF84025-08	TSHF84025-05		25	19	40
TSHF84030-08	TSHF84030-05		30	22	48
TSHF84040-08	TSHF84040-05		40	30	60
TSHF84050-08	TSHF84050-05		50	37	75
TSHF84060-08	TSHF84060-05		60	45	90
TSHF84075-08	TSHF84075-05		75	55	110
TSHF84100-08	TSHF84100-05		100	75	145
TSHF84120-08	TSHF84120-05		125	90	180
TSHF84150-08	TSHF84150-05		150	110	210
TSHF84200-08	TSHF84200-05		200	160	280
TSHF84250-08	TSHF84250-05		250	185	350
TSHF84300-08	TSHF84300-05		300	220	420
TSHF84400-08	TSHF84400-05		400	300	610
TSHF84600-08	TSHF84600-05		600	450	860
TSHF84300-08	TSHF84300-05		300	220	420
TSHF84400-08	TSHF84400-05		400	300	610
TSHF84600-08	TSHF84600-05		600	450	860

Other specifications are available upon request.

>>> PERFORMANCE CHARACTERISTICS



>>> REACTORS FOR FREQUENCY CONVERTER

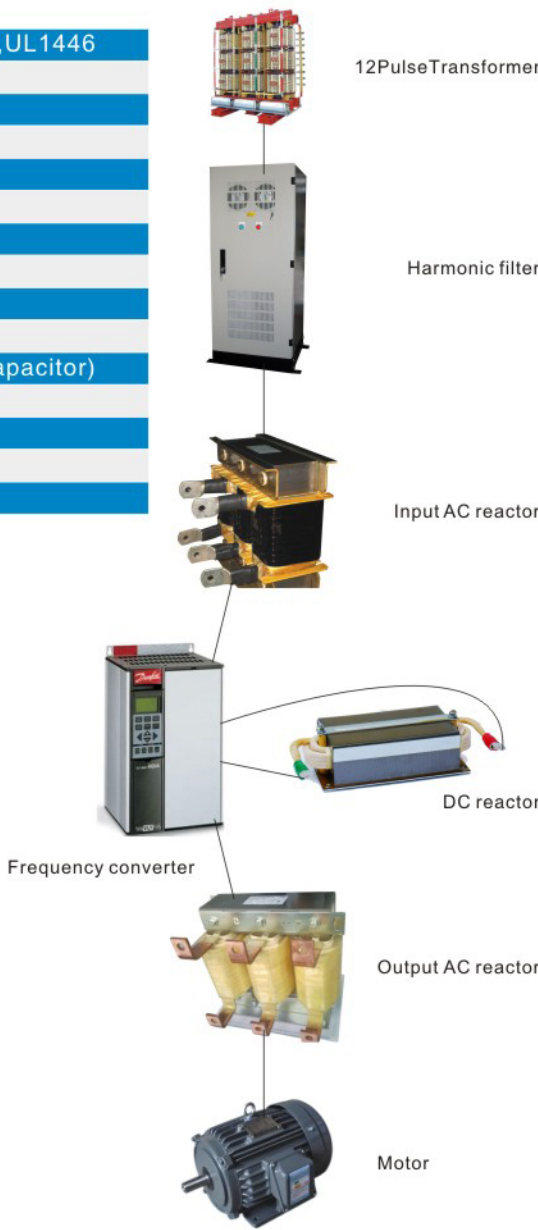
The products are often installed at the outer side or inner side of converters. The main function is to limit the surge current flowing in the power grid, and to reduce its interference with other electrical components.

Technical data

Standard	EN61558-2-20, EN60076-6, UL1446
Rated voltage	380V-1140V
Rated frequency	50Hz/60Hz
Line voltage tolerance	+/- 10%
Dielectric test	50Hz 3KV, 60s
Cooling method	Natural air
Ambient temperature	-25 to +50℃
Elevation above sea level	<1000m a.s.l.
Protection class	IP00 indoor mounting
Rated voltage drop	3%~6%
Insulation class	H(UL approved resin and capacitor)
Maximum humidity	95%
Winding material	Copper
Terminals	Copper terminals
Approval marks	CE, TUV, EAC, 

Features

- High voltage dip
- Vacuum impregnation in full automatic system
- Anti-dust non-wooden packing
- Certified by international standard



Input AC reactors, also called line reactors, are used at inner side of the converter, so as to protect its electrical components and DC circuit from transient overpressure. It can also reduce the surge and peak current and increase the input power factor, as well as restrain the harmonics in the grid and improve the functions of input current wave, to ensure the safe operations of the frequency converter and motors.

Ordering Code	U _N (V)	Converter (HP)	Power (KW)	I _N (A)	L _N (mH)	Weight(kg)	Voltage drop
f _N =50Hz, 3Phase, Copper winding							
LTACL38007	400	7	5.5	15	1.42	5	3%
LTACL38010		10	7.5	20	1.06	6	
LTACL38015		15	11	30	0.7	7	
LTACL38020		20	15	40	0.63	9	
LTACL38025		25	18.5	50	0.42	10	
LTACL38030		30	22	60	0.36	11	
LTACL38040		40	30	80	0.26	15	
LTACL38050		50	37	90	0.24	16	
LTACL38060		60	45	120	0.18	21	
LTACL38075		75	55	150	0.15	23	
LTACL38100		100	75	200	0.11	29	
LTACL38120		120	90	220	0.1	32	
LTACL38150		150	110	250	0.09	34	
LTACL38175		175	132	290	0.07	37	
LTACL38200		200	150	330	0.06	40	
LTACL38250		250	185	380	0.05	43	
LTACL38300		300	220	490	0.04	60	
LTACL38400		400	300	660	0.03	70	

Other specifications are available upon request.

Output AC reactors, also called outlet reactors, are used for output side of the converter. It can have smooth filtering by reducing the transient voltage dv/dt, and prolong the motor's service life. The reactors are also applied to reduce eddy-current loss and the leak current caused by the harmonics, so as to protect the IGBT power switching components inside the frequency converter.

Ordering Code	U _N ((V)	Converter (HP)	Power (KW)	I _N (A)	L _N (mH)	Weight(kg)	Voltage drop
f _N =50Hz, 3Phase, Copper winding							
LTACL38007-3	400	7	5.5	15	1.42	6	3%
LTACL38010-3		10	7.5	20	1.06	7	
LTACL38015-3		15	11	30	0.7	10	
LTACL38020-3		20	15	40	0.63	12	
LTACL38025-3		25	18.5	50	0.42	13	
LTACL38030-3		30	22	60	0.36	15	
LTACL38040-3		40	30	80	0.26	19	
LTACL38050-3		50	37	90	0.24	21	
LTACL38060-3		60	45	120	0.18	28	
LTACL38075-3		75	55	150	0.15	30	
LTACL38100-3		100	75	200	0.11	38	
LTACL38120-3		120	90	220	0.1	42	
LTACL38150-3		150	110	250	0.09	45	
LTACL38175-3		175	132	290	0.07	49	
LTACL38200-3		200	150	330	0.06	53	
LTACL38250-3		250	185	380	0.05	58	
LTACL38300-3		300	220	490	0.04	79	
LTACL38400-3		400	300	660	0.03	92	

Other specifications are available upon request.

Figure 1

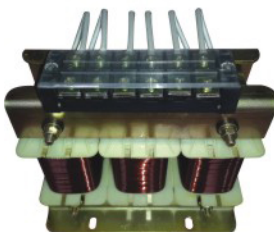
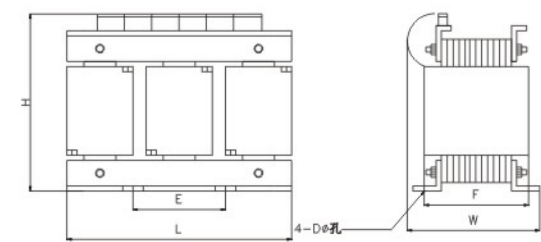


Figure 2

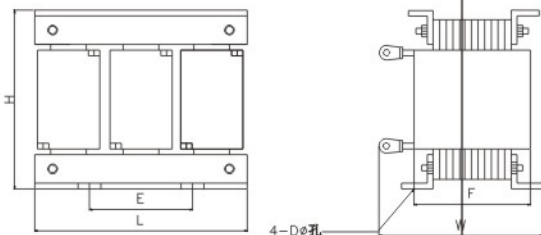
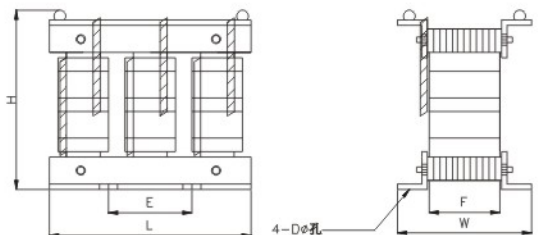


Figure 3



The DC reactor is used at the DC side of the rectifier, mostly on the frequency converter (AC-DC-AC). It has the function of limiting the current waveform pulse in the rectifier, and the harmonics caused by the converter, thus improving the input power factor.

Ordering Code	U _N ((V)	Converter (HP)	Power (KW)	I _N (A)	L _N (mH)	Weight(kg)
f _N =50Hz, 3Phase, Copper winding						
LTDCL38007	400	7	5.5	15	4.45	5
LTDCL38010		10	7.5	20	3.2	6
LTDCL38015		15	11	30	2.23	7
LTDCL38020		20	15	40	1.77	8
LTDCL38025		25	18.5	50	1.46	10
LTDCL38030		30	22	60	1.19	11
LTDCL38040		40	30	80	0.9	14
LTDCL38050		50	37	90	0.73	15
LTDCL38060		60	45	120	0.6	16
LTDCL38075		75	55	140	0.48	18
LTDCL38100		100	75	180	0.36	19
LTDCL38120		120	90	220	0.28	21
LTDCL38150		150	110	270	0.24	23
LTDCL38175		175	132	320	0.2	24
LTDCL38200		200	150	400	0.16	25
LTDCL38250		250	185	440	0.14	28
LTDCL38300		300	220	530	0.12	35
LTDCL38400		400	300	750	0.08	49

Other specifications are available upon request.

>>> SINE WAVE FILTERS

The products are specially designed for VFD to protect the motors. It is used at the output side of frequency converters and converted the PWM output signal of motor into a smooth sine wave form. Besides it reduces the resonance phenomenon caused by distributed capacitance and inductance of the long cable (longer than 50 meters).

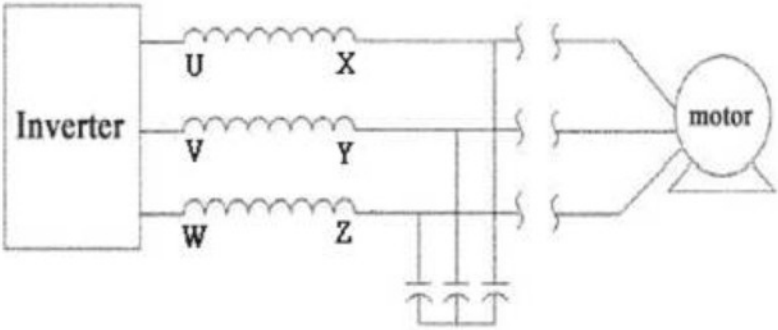
Technical data

Standard	EN61558-2-20,EN60076-6,UL1446,EN60939
Rated voltage	380V-1000V
Rated frequency	50Hz/60Hz
Line voltage tolerance	+/- 10%
Switching frequency	4KHz-10KHz
Dielectric test	50Hz 3KV,60s
Cooling method	natural air
Ambient temperature	-25 to +50℃
Elevation above sea level	<1000m a.s.l.
Protection class	IP00 indoor mounting
Insulation class	H(UL approved resin)
Maximum humidity	95%
Winding material	Copper
Terminal	Copper terminal blocks
Approval marks	CE,TUV, EAC, 

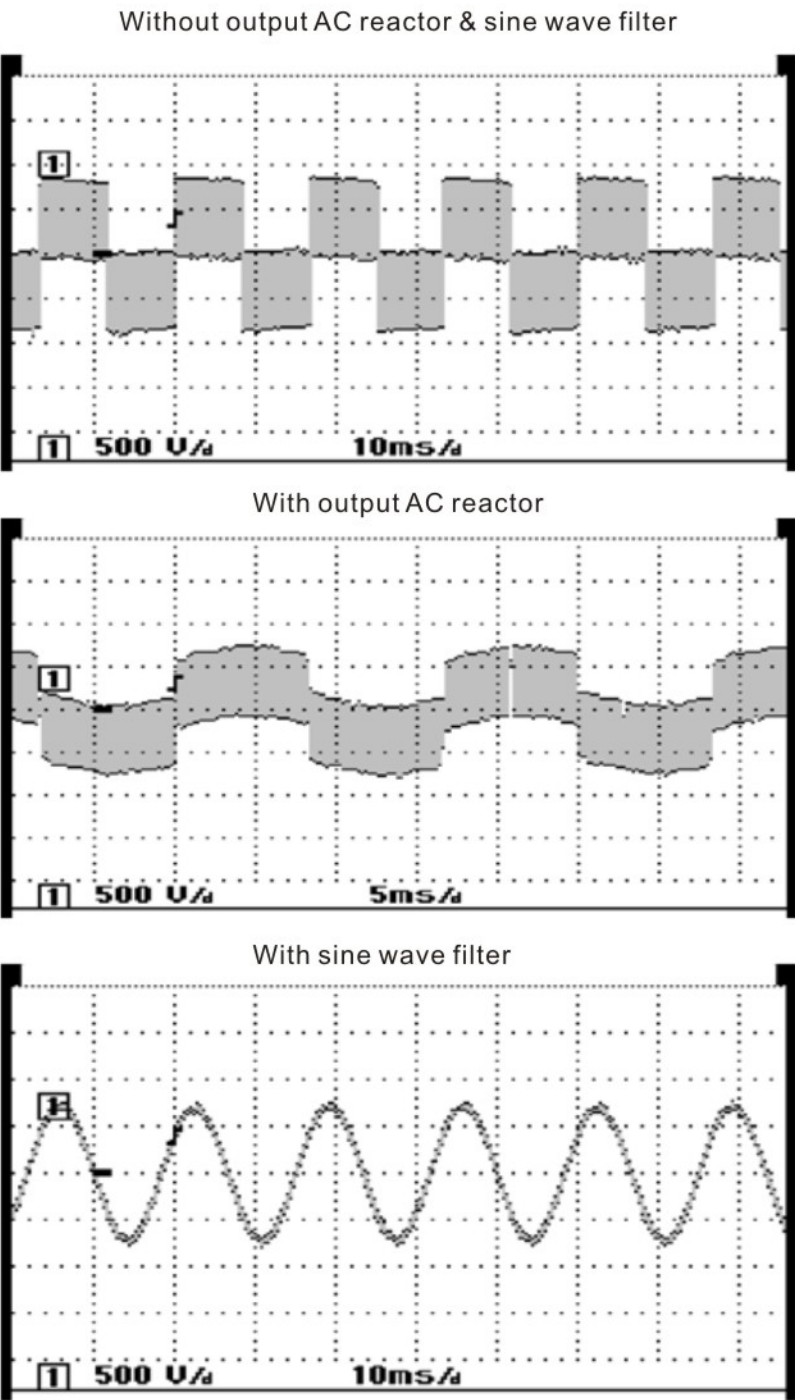
Features

- *Substantially reduce the high dv/dt and eddy-current loss generated by VFD
- *Reduce the motor noise and prolong its lifetime
- *Improve the THDV<5% at 100% load condition
- *Recommended for applications with long cable distances and higher frequency interferences

Connection diagram



>>> Performance Characteristics



Ordering Code	U _N (V)	Converter (HP)	Power (KW)	I _N (A)	Weight(kg)
f _N =50Hz, 3Phase, Copper winding					
SFR840007	400	7	5.5	12	13
SFR840010		10	7.5	16	14
SFR840015		15	11	24	18
SFR840020		20	15	32	22
SFR840025		25	18.5	40	29
SFR840030		30	22	48	34
SFR840040		40	30	60	42
SFR840050		50	37	75	48
SFR840060		60	45	90	64
SFR840075		75	55	115	72
SFR840100		100	75	150	96
SFR840125		125	90	180	108
SFR840150		150	110	220	143

Other specifications are available upon request.

>>> LOW VOLTAGE CAPACITORS FOR PFC

The use of power capacitors with reactors reduces harmonic distortion and minimizes the disturbing effects on operation of other loads. Depending on the chosen tuned frequency, a part of the harmonic current will be absorbed by the power capacitor.

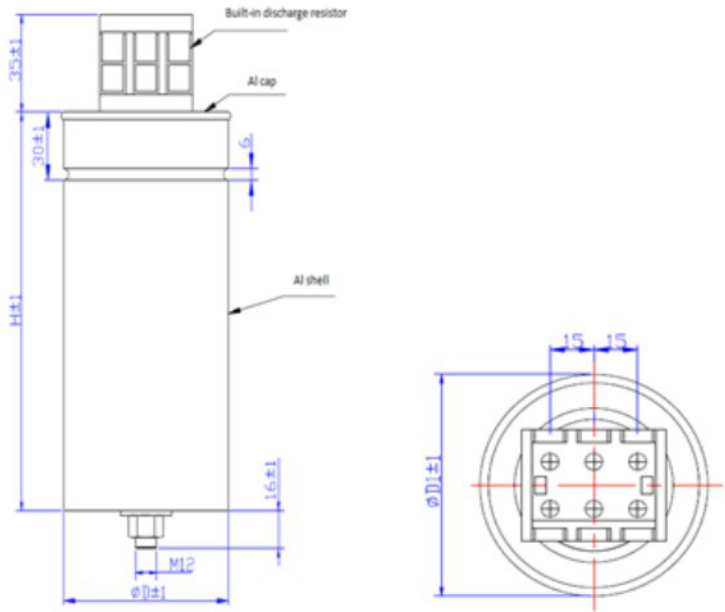
Technical data

Standard	IEC 60831
Rated voltage	230V to 1000V
Rated frequency	50Hz/60Hz
Output range	2.5 to 30kvar
Tolerance of capacitance	-5....+10%
Elevation	<1000m
Filling material	PU Resin
Insulation level	3/-KV
Max permissible current	1.35 IN
Max permissible voltage	1.1 UN
Dielectric	Low loss polypropylene film
Loss	tangent: ≤0.002(20℃ 50Hz)
Temperature range	-40℃~55℃
Protection class	IP00 indoor mounting
Design method	Single phase or three phase, dry type, cylindrical structure,
Safety device	Overpressure separation (Discharging to 75V in 1 minute)
Approval marks	CE,TUV

Standard capacitors for Power Factor Corrections

Ordering Code	U _N ((V)	Q(Kvar)	C _N (μF)	I _N (A)	ΦD×H (mm)	Weight (kg)	Package (pcs/box)	fr(Hz)
LTMJYS0.440-5.0-3	440	5	3*27	3*7	65×160	0.6	10	189
LTMJYS0.440-10-3		10	3*55	3*14	76×230	1.0	6	
LTMJYS0.440-15-3		15	3*82	3*20	86×230	1.5	6	
LTMJYS0.440-20-3		20	3*110	3*27	86×278	1.8	6	
LTMJYS0.440-25-3		25	3*137	3*33	96×278	2.0	4	
LTMJYS0.440-30-3		30	3*164	3*40	106×278	2.4	4	
LTMJYS0.480-7.5-3	480	7.5	3*34.5	3*9	65×230	0.6	10	
LTMJYS0.480-10-3		10	3*46	3*12	76×230	0.8	6	
LTMJYS0.480-12.5-3		12.5	3*57.6	3*15	76×230	0.9	6	
LTMJYS0.480-15-3		15	3*69	3*18	86×230	1.2	6	
LTMJYS0.480-25-3		25	3*115	3*30	96×278	1.8	4	
LTMJYS0.480-30-3		30	3*138	3*36	106×278	2.0	4	
LTMJYS0.525-10-3	525	10	3*38	3*11	76×230	1.0	6	
LTMJYS0.525-12.5-3		12.5	3*48	3*14	86×230	1.5	6	
LTMJYS0.525-15-3		15	3*58	3*17	86×230	1.7	6	
LTMJYS0.525-20-3		20	3*77	3*22	86×278	1.8	6	
LTMJYS0.525-25-3		25	3*96	3*28	96×278	2.0	4	
LTMJYS0.525-30-3		30	3*115	3*33	106×278	2.4	4	

Other specifications are available upon request.



>>> MEDIUM VOLTAGE CAPACITORS FOR PFC

The MV capacitors are used for those AC power systems with power frequency 50Hz or 60Hz and 1 kV or above AC power system to improve power factor, quality of power grid and efficiency of power supply equipment.

Technical data

Standard	IEC 60871
Rated voltage	3KV to 12KV
Rated frequency	50Hz/60Hz
Output range	50kvar to 500kvar
Tolerance of capacitance	-5...+10%
Elevation	<1000m
Filling material	Non PCB oil
Insulation level	As per IEC standard
Max permissible current	1.43 IN
Max permissible voltage	2.2UN
Dielectric	Polypropylene film
Loss	tangent: ≤0.0005(20℃at rated frequency)
Temperature range	-25℃-50℃
Protection class	IP00 indoor mounting
Design method	Single phase or three phase, oil type,
Safety device	Overpressure separation (Discharging to 75V in 10 minutes)

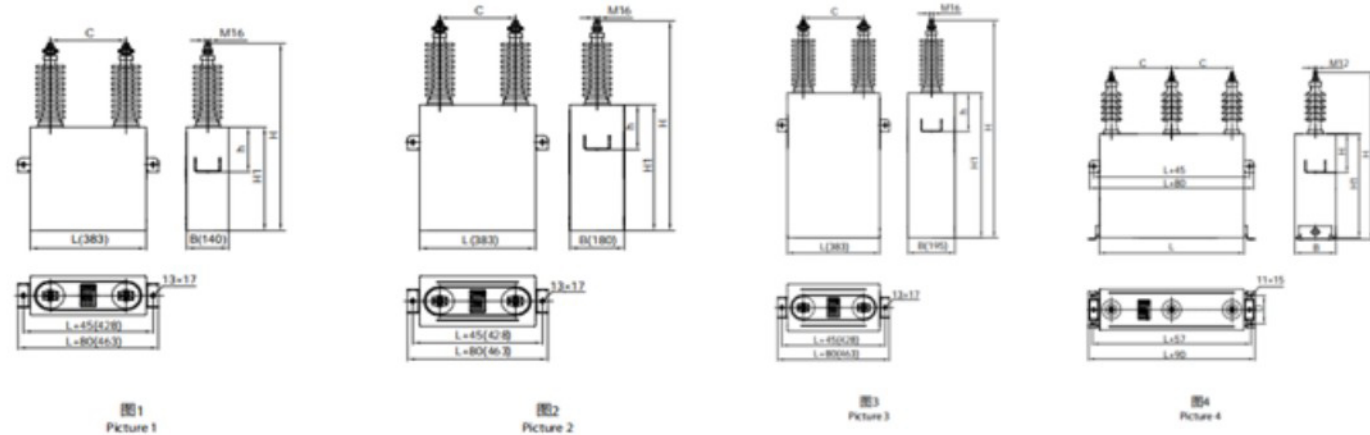
Standard capacitors for Power Factor Corrections

Ordering Code	U _N (KV)	Q (Kvar)	C _N (μF)	Dimension(mm)							Stud	Weight (kg)	Figure
				L	B	h	H1	H	C	D			
LTBF-M-6.6√3-100-1W	6.6	100	21.92	383	140	134	310	530	250		M16	29	1
LTBF-M-6.6√3-200-1W		200	43.84	383	180	160	415	635	250		M16	46	1
LTBF-M-6.6√3-300-1W		300	65.77	383	180	160	590	810	250		M16	64	2
LTBF-M-6.6√3-400-1W		400	87.69	383	180	200	760	980	250		M16	80	2
LTBF-M-6.6√3-500-1W		500	109.61	383	195	200	870	1090	250		M16	96	3
LTBF-M-11√3-100-1W	11	100	7.89	383	140	134	295	595	250		M16	29	1
LTBF-M-11√3-200-1W		200	15.78	383	140	160	510	810	250-		M16	46	1
LTBF-M-11√3-300-1W		300	23.68	383	180	160	590	890	250-		M16	64	2
LTBF-M-11√3-400-1W		400	31.57	383	180	200	760	1060	250		M16	80	2
LTBF-M-11√3-500-1W		500	39.46	383	195	200	865	1165	250		M16	96	3

Ordering Code	U _N (KV)	Q (Kvar)	C _N (μF)	Dimension(mm)							Stud	Weight (kg)	Figure
				L	B	h	H1	H	C	D			
LTBF-M-7.2-100-3W	7.2	100	3*6.14	600	170	110	220	481	250	117	M12	38	4
LTBF-M-7.2-200-3W		200	3*12.28	600	150	134	360	621	250	107	M12	54	4
LTBF-M-7.2-300-3W		300	3*18.42	600	170	160	430	691	250	117	M12	69	4
LTBF-M-7.2-400-3W		400	3*24.56	645	1956	160	430	691	250	150	M12	83	4
LTBF-M-7.2-500-3W		500	3*30.70	725	195	160	490	751	250	150	M12	104	4
LTBF-M-12-100-3W	12	100	3*2.21	600	170	110	220	481	250	117	M12	38	4
LTBF-M-12-200-3W		200	3*4.42	600	150	134	360	621	250	107	M12	54	4
LTBF-M-12-300-3W		300	3*6.63	600	170	160	430	691	250	117	M12	69	4
LTBF-M-12-400-3W		400	3*8.84	645	195	160	430	691	250	150	M12	83	4
LTBF-M-12-500-3W		500	3*11.05	725	195	160	490	751	250	150	M12	104	4

Other specifications are available upon request.

Figures:



>>> THYRISTOR SWITCHES

The thyristor switches adopts the leading technology of zero-crossing switching, which could give the user an ideal and timely reactive power compensation. In practical application, the switching module could replace the contactor in PFC system, and will input the reactive capacity in zero-crossing switching voltage, to avoid the inrush current and sudden voltage variation.

Technical data

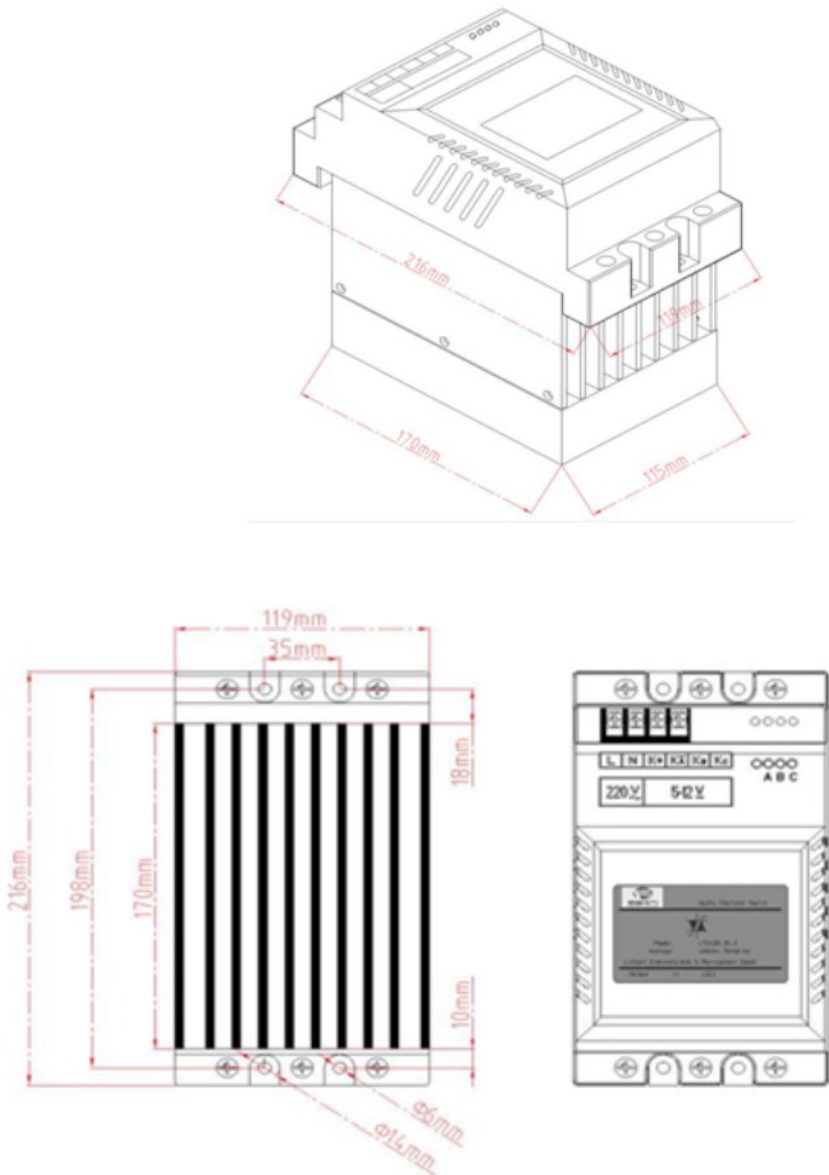
Standard	IEC 60947
Rated Voltage	230V to 690V
Rated frequency	50Hz/60Hz
Signal voltage	DC 12V 25mA/steps
Control voltage	220V 50Hz
Dynamic response time	≤20ms
Protection class	IP30
Elevation above sea level	≤2000m
Maximum humidity	90%
Ambient temperature	-25℃ to +55℃
Mounting position	vertical

Standard thyristor switches for three phase compensation

Ordering Code	U _N ((V)	Q(Kvar)	I _N (A)	Fan	Weight (kg)
LTSCR-20KVAR-400V	400	20	30	X	4
LTSCR-25KVAR-400V	400	25	37.5	X	4
LTSCR-30KVAR-400V	400	30	45	X	4
LTSCR-40KVAR-400V	400	40	60	X	4
LTSCR-50KVAR-400V	400	50	75	X	4
LTSCR-60KVAR-400V	400	60	90	X	4

Other specifications are available upon request

Figures:



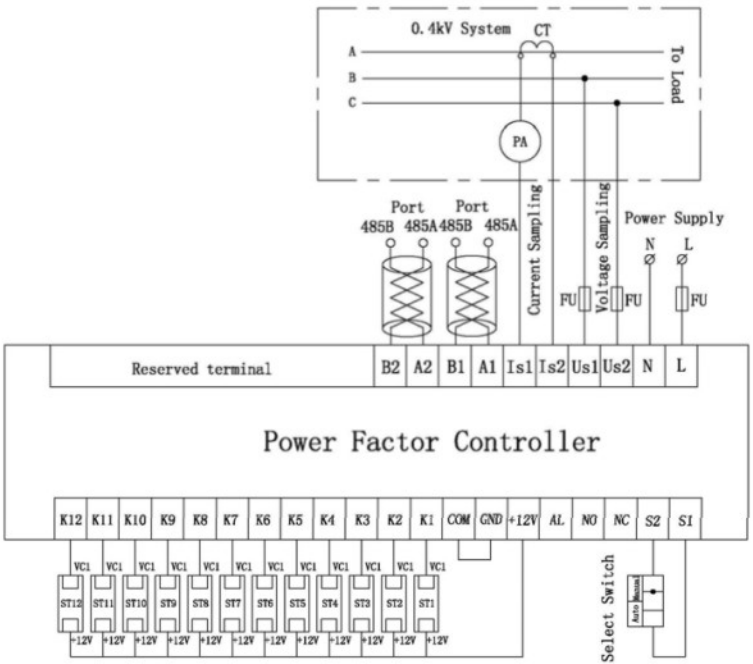
>>> POWER FACTOR CONTROLLERS

The controllers can be used in the low and medium voltage range with dual-core MCU and DSP control, advanced software algorithms and reliable electromagnetic compatibility design. It can effectively and reasonably control the shunt capacitor bank switching, improve power factor, reduce line losses, and improve voltage quality.

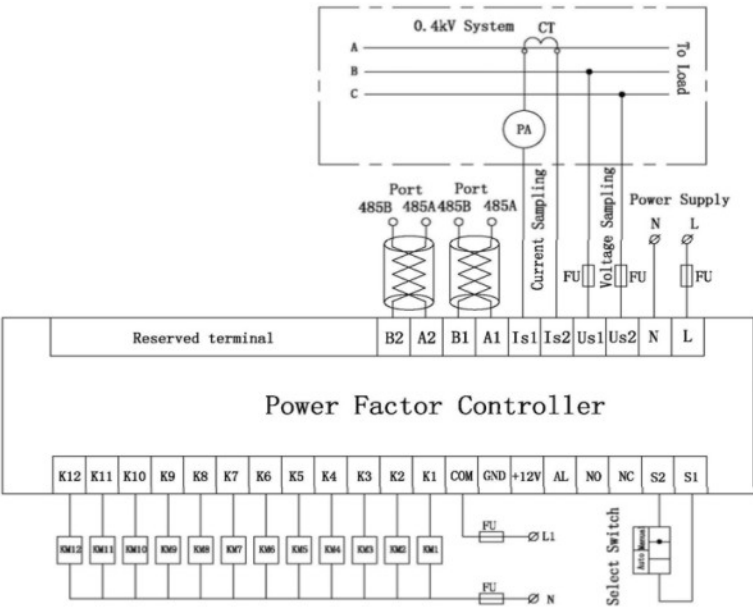
Technical data

Standard	JB/T 9663-2013
Sampling voltage	100V(MV system)/380V(LV system)
Rated frequency	50Hz
No. of output relays	12 outputs
Output rating	250V/5A normally open contact
Switching delay	0-999s
Display	4.3inch touch screen, 2-50 harmonics
Measuring current	5A/1A
Adjustable CT ratio	1-10000
Alarm contact	Yes
Interface	MODBUS RS485
Elevation	<2500m
Temperature range	-25℃~70℃
Max Humidity	90%
Protection class	Front IP40 Back IP30
Mounting position	no restrictions
Weight	1kg

Wiring Diagram

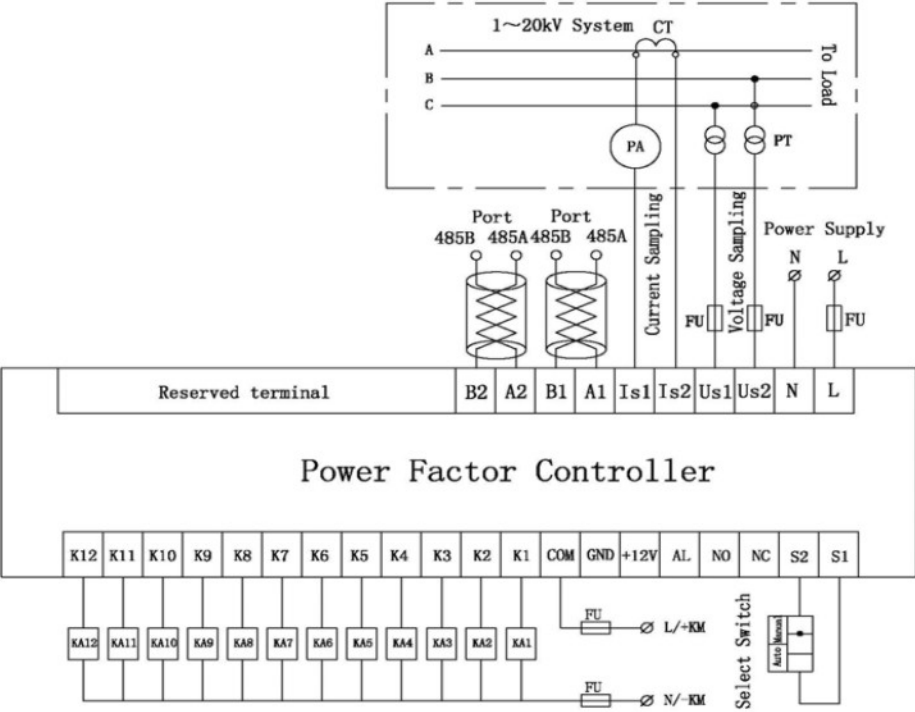


Electrical Wiring Layout (1)
(Low Voltage Thyristor Switch Control)



Electrical Wiring Layout (2)
(Low Voltage Contactor Switch Control)

Wiring Diagram



Electrical Wiring Layout (3)
(Medium-voltage vacuum switch control,
KA is relay of driving vacuum switch)

>>> ACTIVE POWER FILTERS

APF products have the multiple compensation functions including harmonic compensation, power factor compensation and three phase unbalance compensation. They are the perfect solutions to filter the orders from 2rd to 50th harmonics, especially for harsh conditions.

Technical data

Specification	Specification of module	35A	50A	75A	100A	150A
	Weight of module	35KG	35KG	40KG	50KG	55KG
	Size of module W*D*H (rack type)	420*500*190	420*500*190	500*550*200	500*240*580	500*260*578
	Size of module W*D*H (wall-mounted type)	420*500*190	420*500*190	500*550*210	500*270*578	
	Size and maximum capacity of single cabinet W*D*H	600*600*2200mm (max 300A)				
		800*800*2200mm (max 600A)				
		1000*1000*2200 (max 900A)				
	Color	Black (module); grey, national standard 7035 (cabinet type)				
Input	Working voltage	400V/690V (-20% ~ +15%)				
	Working frequency	50Hz/60Hz (-10% ~ +10%)				
	Power grid structure	3-phase and 3-wire/3-phase and 4-wire				
	CT	100:5 ~ 10000:5				
Function	Filtering range	2-50 orders				
	Harmonic elimination rate	THDI<5% at the 100% load(as agreed)				
	Reactive compensation	-1~+1 adjustable				
	Compensation of three-phase imbalance	100% imbalance complete compensation				
Communication protocol	Communication method	RS232, 485, Modbus protocol, TCP/IP optional				
	Communication interface	RS485, network access				
	Upper computer software	Yes, all parameters can be set up through upper computer.				
	Fault alarm	Yes, 500 pieces of alarm information can be recorded at most.				
	Monitoring	Supporting each module's independent monitoring/centralized monitoring of overall equipment.				
Technical index	Full response time	<10ms				
	Active loss	<2.5%				
	Method of heat dissipation	Intelligent air-cooling				
	Noise	<60dB				
	Sampling/control frequency	20kHz				
	Equivalent switching frequency	20kHz				
	Protection function	More than twenty protections including overvoltage protection, under voltage protection, overheating protection, over current protection and short-circuit protection				
	CT installation position	Load side/grid side, optional				
	Cable entry	Top/bottom(cabinet type)				
	Quantity of capacitor channels available for parallel connection	Unlimited				
Environmental requirements	Working temperature	-10℃~+45℃				
	Storage temperature	0℃~+40℃				
	Altitude	<5000 m (when the altitude is above 1,500m, the capacity will be lowered by 1% for every extra 100m.)				
	Relative humidity	<90%				
	Protection level	IP20 (higher protection level can be customized.)				
	Relevant standard	IEEE519,IEC62477, IEC61000-3-6				

>>> STATIC VAR GENERATORS

SVG products are the ideal solutions to solve the problems of lower reactive power as well as the harmonic current pollutions at the same time. They can dynamically compensate the reactive power in a very fast response time.

Technical data

Specification	Specification of module	30KVAR	50KVAR	75KVAR	100KVAR
	Weight of module	35KG	40KG	45KG	55KG
	Size and color of module W*D*H (rack type)	420*500*190	500*550*200	500*580*240	500*580*260
	Size of module W*D*H (wall-mounted type)	420*500*190	500*550*210	500*550*210	500*580*270
	Size and maximum capacity of single cabinet W*D*H	600*600*2200mm (max 200KVAR)			
		800*800*2200mm (max 300KVAR)			
		1000*1000*2200 (max 600KVAR)			
Input	Color	Black (module); grey, national standard 7035 (cabinet type)			
	Working voltage	400V/690V (-20% ~ +15%)			
	Working frequency	50Hz/60Hz (-10% ~ +10%)			
	Power grid structure	3-phase and 3-wire/3-phase and 4-wire			
Function	CT	100:5 ~ 10000:5			
	Filtering range	2-13 orders			
	Reactive compensation	-1~+1 adjustable			
	Compensation of three-phase imbalance	100% imbalance complete compensation			
Communication protocol	Communication method	RS232, 485, Modbus protocol, TCP/IP optional			
	Communication interface	RS485, network access			
	Upper computer software	Yes, all parameters can be set up through upper computer.			
	Fault alarm	Yes, 500 pieces of alarm information can be recorded at most.			
Technical index	Monitoring	Supporting each module's independent monitoring/centralized monitoring of overall equipment.			
	Full response time	<10ms			
	Active loss	<2.5%			
	Method of heat dissipation	Intelligent air-cooling			
	Noise	<60dB			
	Sampling/control frequency	20kHz			
	Equivalent switching frequency	20kHz			
	Protection function	More than twenty protections including overvoltage protection, under voltage protection, overheating protection, over current protection and short-circuit protection			
	CT installation position	Load side/grid side, optional			
Environmental requirements	Cable entry	Top/bottom(cabinet type)			
	Quantity of capacitor channels available for parallel connection	Unlimited			
	Working temperature	-10℃~+45℃			
	Storage temperature	-0℃~+40℃			
	Altitude	<5000 m (when the altitude is above 1,500m, the capacity will be lowered by 1% for every extra 100m.)			
	Relative humidity	<90%			
	Protection level	IP20 (higher protection level can be customized.)			
	Relevant standard	IEEE519,IEC62477, IEC61000-3-6			

Reference IEC standard 60076:

60076-22 © IEC:2004

Table2-Winding temperature-rise limits

Insulation system temperature (see Note1) C	Average winding-temperature rised limits at rated current (see Note2) K
105(A)	60
120(E)	75
130(B)	80
155(F)	100
180(H)	125
200	135
220	150
NOTE1 Letters refer to the temperature classifications given in IEC60085 NOTE2 Temperature rise measured in accordance with Clause 23	

60076-3 © IEC:2013

Table4-Minimum clearances in air(1of2)

Highest Voltage for equipment Um kV	Full Wave Lightning impulse (LI) kV	Switching impulse (SI) kV	Minimum air clearance	
			Line to earth mm	Phase to phase mm
<1.1	-	-		
3.6	20	-	60	60
	40	-	60	60
7.2	60	-	90	90
	75 ^a	-	120	120
12	75	-	120	120
	95	-	160	160
	110 ^a	-	200 ^a	200 ^a
17.5	95	-	160	160
	125 ^a	-	220	220
24	125	-	220	220
	145	-	270	270
	150 ^a	-	280 ^a	280 ^a
36	170	-	320	320
	200 ^a	-	380	380

Reference IEC standard 60076:

60076-11 © IEC:2004

Table3-Insulation levels based on European practice

Highest voltage for equipment U_m (r.m.s.) kV	Rated short duration separate source AC withstand voltage (r. m. s.) kV	Rated lightning impulse withstand voltage (peak value) kV	
		List1	List2
≤1.1	3	-	—
3.6	10	20	40
7.2	20	40	60
12.0	28	60	75
17.5	38	75	95
24.0	50	95	125
36.0	70	145	170

The choice between list 1 and list 2 should be made considering the degree of exposure to lightning and switching overvoltages, the type of system neutral earthing and, where applicable, the type of overvoltage protective device, see IEC 60071.

Table4-Insulation levels based on North American practice

Dielectric insulation levels for dry type transformers used on system with BILs 200 kV and below												
Max LL system voltage kV	Nominal LL system voltage kV	Low frequency voltage insulation level kV r.m.s.	Basic Lightning Impulse Levels (BILs) in common use (peak value 1,2us)									
			10	20	30	45	60	95	110	125	150	200
0.25	0.25	2.5	None									
0.6	0.6	3	S	1	1							
1.2	1.2	4	S	1	1							
2.75	2.5	10		S	1	1						
5.6	5	12			S	1	1					
9.52	8.7	19				S	1	1				
15.5	15	34					S	1	1			
18.5	18	40						S	1	1		
25.5	25	50						2	S	1	1	
36.5	34.5	70								2	S	1
Impulse chopped wave: minimum time to flash over(us)			1	1	1	1.3	2	2	1.8	2	2.3	2.7
S=Standard values 1=Optional higher levels where exposure to overvoltage occurs and protective margins are required 2=Lower levels where surge arrester protective devices can be applied with lower spark-over levels												

Reference standard IEEE-519

IEEE Std 519-1992

IEEE RECOMMENDED PRACTICES AND REQUIREMENTS

The limits listed in Table 11-1 should be used as system design values for the "worst case" for normal operation (conditions lasting longer than one hour). For shorter periods, during start-ups or unusual conditions, the limits may be exceeded by 50%.

Table 11-1-Voltage Distortion Limits

Bus Voltage at PCC	Individual Voltage Distortion(%)	Total Voltage Distortion THD(%)
69kV and below	3.0	5.0
69.001kV through 161kV	1.5	2.5
161.001 kV and above	1.0	1.5

NOTE-High-voltage systems can have up to 2.0% THD where the cause is an HVDC terminal that will attenuate by the time it is tapped for a usec

IEEE Std 519-1992

IEEE RECOMMENDED PRACTICES AND REQUIREMENTS

Table 10-3-Current Distortion Limits for General Distribution Systems (120V Through 69 000 V)

Maximum Harmonic Current Distortion in Percent of I _L						
Individual Harmonic Order (Odd Harmonics)						
I _{sc} /I _L	< 11	11 ≤ h < 17	17 ≤ h < 23	23 ≤ h < 35	35 ≤ h	TDD
< 20*	4.0	2.0	1.5	0.6	0.3	5.0
20 < 50	7.0	3.5	2.5	1.0	0.5	8.0
50 < 100	10.0	4.5	4.0	1.5	0.7	12.0
100 < 1000	12.0	5.5	5.0	2.0	1.0	15.0
> 1000	15.0	7.0	6.0	2.5	1.4	20.0
Even harmonics are limited to 25% of the odd harmonic above						
Current distortions that result in a dc offset, e.g., half-wave converters, are not allowed						
*All power generation equipment is limited to these values of current distortion, regardless of actual I _{sc} /I _L where I _{sc} =maximum short-circuit current at PCC I _L =maximum demand load current (fundamental frequency component) at PCC.						

>>> CALCULATIONS OF REQUIRED CAPACITOR POWER

Original power factor $\cos \phi 1$	Target power factor $\cos \phi 2$										
	0.90	0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.00
0.70	0.536	0.564	0.591	0.625	0.657	0.691	0.729	0.769	0.811	0.878	1.020
0.71	0.508	0.536	0.563	0.597	0.629	0.663	0.701	0.741	0.783	0.850	0.992
0.72	0.479	0.507	0.534	0.568	0.600	0.634	0.672	0.712	0.754	0.821	0.963
0.73	0.452	0.480	0.507	0.541	0.573	0.607	0.645	0.685	0.727	0.794	0.936
0.74	0.425	0.453	0.480	0.514	0.546	0.580	0.618	0.658	0.700	0.767	0.909
0.75	0.398	0.426	0.453	0.487	0.519	0.553	0.591	0.631	0.673	0.740	0.882
0.76	0.371	0.399	0.426	0.460	0.492	0.526	0.564	0.604	0.652	0.713	0.855
0.77	0.345	0.373	0.400	0.434	0.466	0.500	0.538	0.578	0.620	0.687	0.829
0.78	0.319	0.347	0.374	0.408	0.440	0.474	0.512	0.552	0.594	0.661	0.803
0.79	0.292	0.320	0.347	0.381	0.413	0.447	0.485	0.525	0.567	0.634	0.776
0.80	0.266	0.294	0.321	0.355	0.387	0.421	0.459	0.499	0.541	0.608	0.750
0.81	0.240	0.268	0.295	0.329	0.361	0.395	0.433	0.473	0.515	0.582	0.724
0.82	0.214	0.242	0.269	0.303	0.335	0.369	0.407	0.447	0.489	0.556	0.698
0.83	0.188	0.216	0.243	0.277	0.309	0.343	0.381	0.421	0.463	0.530	0.672
0.84	0.162	0.190	0.217	0.251	0.283	0.317	0.355	0.395	0.437	0.504	0.645
0.85	0.136	0.164	0.191	0.225	0.257	0.291	0.329	0.369	0.417	0.478	0.620
0.86	0.109	0.140	0.167	0.198	0.230	0.264	0.301	0.343	0.390	0.450	0.593
0.87	0.083	0.114	0.141	0.172	0.204	0.238	0.275	0.317	0.364	0.424	0.567
0.88	0.054	0.085	0.112	0.143	0.175	0.209	0.246	0.288	0.335	0.395	0.538
0.89	0.028	0.059	0.086	0.117	0.149	0.183	0.230	0.262	0.309	0.369	0.512
0.90		0.031	0.058	0.089	0.121	0.155	0.192	0.234	0.281	0.341	0.484

FOR EXAMPLE:

Working load of the plant: 500KW

Power factor before improvement: $\cos\phi_1 = 0.70$

Desired power factor after improvement: $\cos\phi_1 = 0.95$

Required capacitor power: $500 \times 0.691 = 345.5 \text{ kvar}$

(Note: 0.691 co-efficient is obtained from the above table)

NOTES

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