PARS CAPACITORS

MANUFACTURE (S.S.K)

PCM

معرفی شرکت
PARS CAPACITOR S.S.K

شرکت کاپاسیتور پارس (PCM) به عنوان اولین تولید کننده خازنهای اصلاح ضریب قدرت جهت ارائه خدمات و تولید محصولات مرغوب تحت لیسانس شرکت Roderstein آلمان در سال ۱۳۵٤ در ایران تأسیس وفعالیت خود را آغاز نمود.

- فعالیت و تلاش مستمر در بخش تحقیق و توسعه (R&D) شرکت همراه با ارتقای کیفیت محصولات تولیدی با استفاده از تکنولوژی روز دنیا موجب فعالیت بخش صادرات به کشور های مهم اروپای غربی من جمله آلمان، سوئیس، فرانسه، رومانی و ... از سال ۱۳۶۵ گردید و در حال حاضر این شرکت به عنوان تنها صادر کننده خازنهای اصلاح ضریب قدرت فرکانسی در ایران و خاورمیانه می باشد.
- عمده فعالیت این شرکت در تأمین نیازهای داخلی در بخش صنعتی و همچنین وزارت نیرو بوده و به عنوان بزرگترین تأمین کننده خازنهای اصلاح ضریب قدرت فشار ضعیف، فشار متوسط و فرکانسی می باشد.
- تمامی محصولات تولیدی با استفاده از مرغوب ترین مواد اولیه و ماشین آلات مدرن تحت استانداردهای بین المللی VDE, EN, IEC تولید و با مجهزترین آزمایشگاه مورد تست و آزمایش قرار می گیرند.

چند نمونه از تست های لازم که بر روی خازن ها انجام می گردد به شرح زیر می باشند:

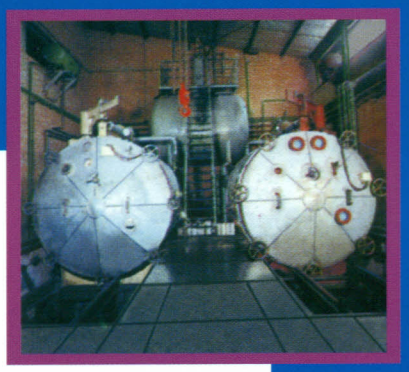
- تست اندازه گیری ظرفیت همراه با ولتاژ DC بر روی هر المنت خازنی
- تست نشتی روغن
- تست ولتاژ بین دو قطب (AC) و (DC)
- تست ولتاژ ایزولاسیون (بین قطب و بدنه)
- اندزه گیری تانژانت تلفات
- اندازه گیری ظرفیت
- تست موج ضربه
- سایر تستها در صورت لزوم بر اساس نیاز مشتری قابل انجام می باشد.

- DC. Voltage test and capacitance measurement
- (Sealing test)
- Voltage test between terminals (AC & DC)
- A.C.Voltage test between terminals and container
- capacitance loss tangent
- capacitance measurment
- lighning impules test between terminals and container

تولیدات شرکت

۱. **انواع خازنهای اصلاح ضریب قدرت فشار ضعیف سه فاز و تک فاز**
(حداکثر ۳۰۰ کیلووار با ولتاژ ۲۲۰ الی ۶۶۰ ولت)
۲. **بانک های خازنی اصلاح ضریب قدرت جهت شبکه های فشار ضعیف**
۳. **انواع خازنهای اصلاح ضریب قدرت فشار متوسط سه فاز و تک فاز**
(۲۵کیلووار الی ۶۰۰ کیلووار با ولتاژ حداکثر ۲٤۰۰۰ ولت)
٤. **بانک های خازنی اصلاح ضریب قدرت جهت شبکه های فشار متوسط**
۵. **بانک های فیلتر خازن اصلاح ضریب قدرت فشار ضعیف و فشار متوسط**
۶. **انواع خازنهای اصلاح ضریب قدرت با فرکانس متوسط که با سیستم آب خنک می شوند.**
(حداکثر با فرکانس ۲۰۰،۰۰۰ سیکل در ثانیه با قدرت ۶۶۰۰ کیلو وار در واحد)
۷. **انواع خازنهای اصلاح ضریب قدرت با فرکانس شبکه که با هوا یا آب خنک می شوند.**
(با قدرتهای ۱۰۰ الی ۱۲۰۰ کیلو وار با ولتاژ ۶۶۰ الی ۳۰۰۰ ولت)
۸. **انواع خازنهای خود ترمیم شونده از نوع روغنی - خشک - گازی**
(از ۵ کیلو وار الی ۱۰۰ کیلو وار با حداکثر ولتاژ ۶۹۰ ولت)
۹. **انواع خازن برای مدارهای الکترونیکی قدرت (جریان مستقیم)**
۱۰. **انواع خازنهای فیلتر جریان مستقیم با حداکثر ولتاژ ۱۰۰ کیلووار**
۱۱. **انواع خازنهای کوپلاژ ۷۲/۵ کیلو ولت برای شبکه های مخابراتی (PLC)**
۱۲. **انواع رگولاتورهای فرمان جهت کنترل بانکهای خازنی اتوماتیک**
۱۳. **انواع کنترلهای حرارتی مورد استفاده در خازنهای فرکانس بالا**
۱٤. **کلیه سفارشات مخصوص خازن**

Impregnation System



PRODUCTION

The production program includes a wide range of standard capacitors, equipment and special design according to customer specification.

OUR PRODUCTION PROGRAM

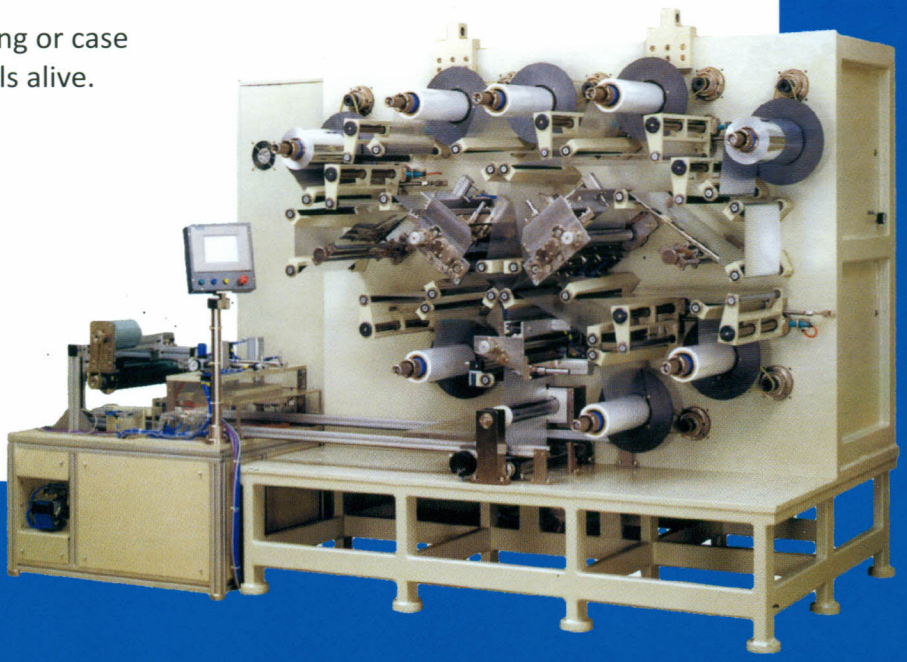
- Low-voltage power factor correction Capacitors.
- Medium-voltage power factor Correction Capacitors.
- Capacitors for Induction furnace Air-cooled, water-cooled.
- Medium Frequency Capacitors Air-cooled, Water-cooled.
- Medium Voltage Surge-Absorbing capacitors.
- Capacitors for Power Electronics.
- Medium voltage Power factor Correction Capacitor Banks.
- Low-voltage Capacitors Provided with a choke, and Audio-Fequency Blocking Circuits.

HI-LOW VOLTAGE POWER CAPACITORS

Hi-low voltage power capacitors are employed for power factor corection, consisting of wounded elements by aluminium foil, impregnated with non-PCB liquid.
The dielectric consists of polypropylene film.

MEDIUM FREQUENCY CAPACITORS

150 ..... 200,000 Hz
250 ..... 3,000 volt
Other voltage and frequencies available on request.
IEC 110
VDE 0560/9
Isolated dead casing or case
and water channels alive.



Winding Machine

PRODUCT RANGE TYPE M

MEDIUM FREQUENCY

100/200.000 Hz
Dielectric: Polypropylen film
Electrode material: Aluminium foil
Impregnant: NON-PCB liquid

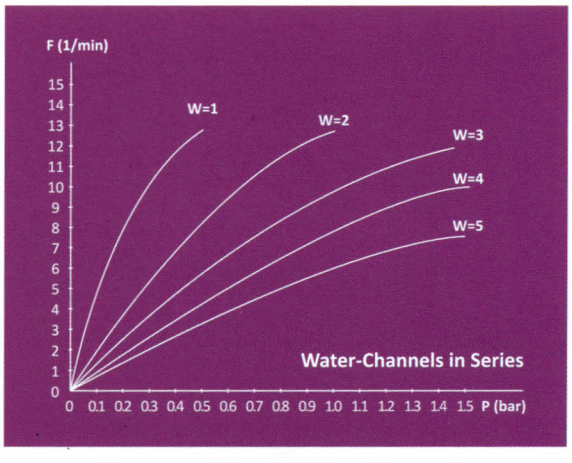
2500 V	4500 KVAR	1000 Hz
1500 V	2500 KVAR	2000 Hz
2500 V	4000 KVAR	3000 Hz
1500 V	2500 KVAR	4000 Hz
1000 V	2000 KVAR	10000 Hz

Water Cooling
100/10000 Hz

1000 V	1500 KVAR	100 Hz
1000 V	2000 KVAR	150 Hz
2000 V	1500 KVAR	300 Hz
2000 V	1500 KVAR	400 Hz
2000 V	3300 KVAR	600 Hz
3000 V	2000 KVAR	700 Hz
1000 V	2000 KVAR	900 Hz

20000/200.000 Hz

1000 V	1200 KVAR	20000 Hz
1500 V	1500 KVAR	30000 Hz
1500 V	1700 KVAR	40000 Hz
1000 V	1500 KVAR	50000 Hz
600 V	600 KVAR	100000 Hz
600 V	500 KVAR	200000 Hz



Pressure Drop Water-Channels in Medium Frequency Capacitors

PRODUCT RANGE TYPE N
(Low Voltage)

■ MAIN FREQUENCY
Dielectric: Polypropylene film
Electrode material: Aluminium foil
Impregnate: NON-PCB liquid

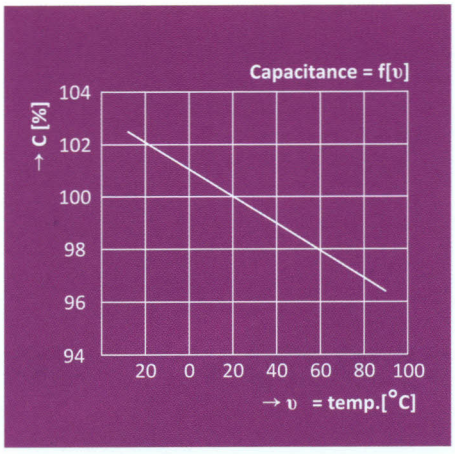
■ Rated voltage and frequency
230V to 3000V, 50Hz (60Hz on request)

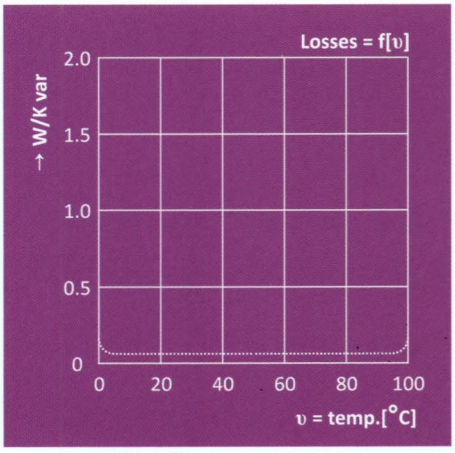
■ Test voltage terminal / terminal
AC 2 x Un, 10s

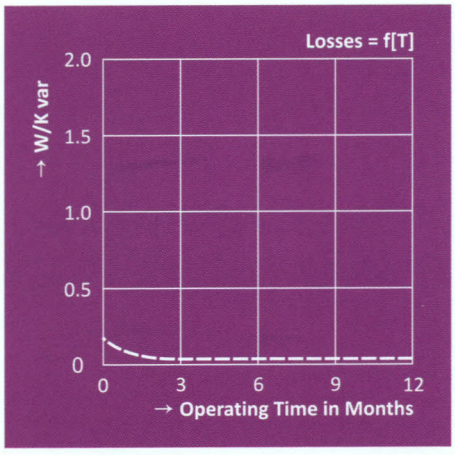
■ Test voltage terminal/casing
3-16 KV, 50Hz 10s

TEMPERATURE LIMITS
Air cooling = -20 ... +55°C
Water cooling = + 5 ... +45°C

COOLING SYSTEM
Natural air cooling or water cooling
ALL - FILM DIELECTRIC
POLYPROPYLENE







HIGH VOLTAGE POWER CAPACITORS

SCOPE

Single phase capacitor units from 1kV up to maximum 24kV, 50 or 60Hz, 20kVAr up to maximum 600kVAr

for indoor or outdoor use.

- with dead casing, open terminal IP00 (2 bushings)
- with dead casing, type of enclosure IP55 (2 bushings)
- with live casing, open terminal IP00 (1 bushing)

Three phase capacitor units from 1kV up to maximum 12kV, 50 or 60Hz, 20kVAr up to max. 600kVAr with pressure monitoring device.

- with dead casing (3 bushings), open terminal IP00 (indoor use only)
- with dead casing (3 bushings), protected terminals, type of enclosure IP55 (indoor or outdoor)

STANDARDS

- VDE 0560/4
- IEC 60871-1 Power Capacitors
- IEC 143 'Series capacitors for power systems

SAFETY REGULATIONS

When installing the equipment, relevant IEC or VDE recommendations shall be observed, in particular VDE 0101 and 0111, as well as VDE 0560 Part 4 Section C.

FIELDS OF APPLICATION

POWER FACTOR CORRECTION

The active power produced by the active current can alone be turned into an effective use for the consumer; while the reactive power produced by the reactive current does not yield usable power, and consequently, is not registered on the active performance meter. The reactive power has, however, a negative effect on generators, transformers, and conductor lines, while causing voltage drops and □nancial losses due to additional electric heating.

The reactive power required for the creation of the magnetic fields around motors, transformers, and conductor lines continuously oscillates between the current generators and the consumers. A more cost effective way to provide this reactive power is to produce it by placing capacitors close to the consumers of reactive power (motors, transformers), thus relieving the line between generator and consumer of the transport of the reactive current portion. This way, several more current consumers can be connected to an existing supply system without having to extend or amplify that system if the capacitors are suitably positioned.

Individual Power Factor Correction

The power factor correction capacitor is connected directly to the terminals of the consumer and will be switched together with it. The advantages of this method are: Relief of the conductor lines and switches, no capacitor switches or discharge resistors are needed, and the installation is simple and cheap. The individual compensation is the best solution for large consumers (e.g. motors), particularly if they are in continuous operation.

Individual Power Factor Correction of 3-Phase Motors

The motor and the capacitor are connected in parallel. They are both switched in and out by means of one and the same switchgear and also monitored by a common protective device. A discharge device is not required, because discharging takes place through the motor windings.

The switchgear must be rated to be capable of withstanding the inrush current of the capacitor and the connection lines must be capable of withstanding the full load current of the motor. The capacitor, in this case, has to be installed in close proximity to the motor.

Individual Power Factor Correction of Power Transformers

The direct connection of the capacitor to a power transformer, which is jointly switched in and out, is feasible and permissible both at the H.V. side and the L.V. side.

In cases where harmonics exist in the line, the line should be checked to determine whether the capacitors and the power transformer are connected in series and create a resonance.

Care should be taken not to overcompensate the power transformer during low load operation in order to avoid an unacceptable rise in voltage.

Individual Power Factor Correction of Welding Machines

The output of capacitors for welding transformers and resistance welding machines only needs to be in the range of 30% to 50% of the nominal transformer capacity. For welding recti□ers, a capacitor output of about 10% of the nominal capacity of the transformer/recti□er is suf□cient.

Group Power Factor Correction

The power factor correction capacitor is connected to the secondary distribution system which feeds a number of individual motors, operating either continuously or at intervals.

The motors and the capacitors are each switched in and out separately and are monitored by separate protective devices. The capacitors can be switched in or out individually or in groups.

HIGH VOLTAGE POWER CAPACITORS

Central Power Factor Correction

In large installations where many individual electrical appliances of various size (motors etc.) operate at different times and for different periods, the power factor correction capacitors are centrally connected to the main buss bar. The capacitors can be switched either manually or, by means of power factor control relays, automatically.

Advantage

Automatic control and optimal matching of the capacitor output to the speci□c requirements for reactive power insures that the speci□ed cos phi is maintained in the most cost effective way.

Disadvantage

The conductor lines between the buss bar and electrical appliances are not relieved of the reactive current.

D General Data

Dielectric

An all □lm dielectric is used and consists of polypropylene in the form of biaxially oriented □lm, hazy on both side, and in 2 or 3 layers with a laser cut aluminium foil for the electrodes.

Impregnating Agent

The capacitors are impregnated with a NON-PCB based □uid.

Dielectric Losses and Total Losses

Dielectric losses in new state are approx. 0.1W/kVar and reduce after 500 operating hours to a stable state of approx. 0.02 to 0.05W/kVar (see curve 1 and curve 2).

The dielectric losses, depending on capacitor design, shall be added to the losses caused by:

- discharge resistors
- internal connections
- internal fuses

Total losses will reach values from 0.07 to approx. 0.15W/kVAr.

Testing

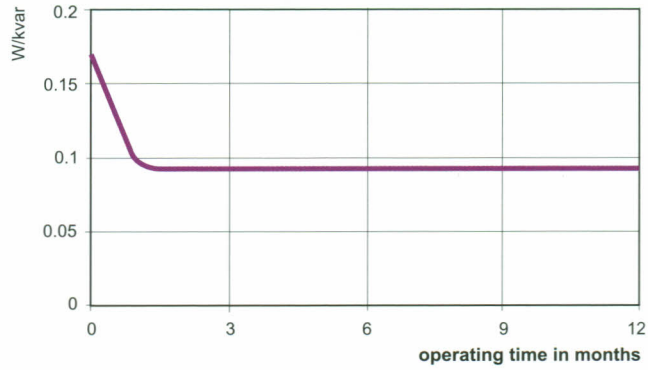
Capacitors are tested in accordance with IEC-Standard 60871-1

Other standards upon request.

Curve 1

Losses as a function of operating time

Losses=f(t)

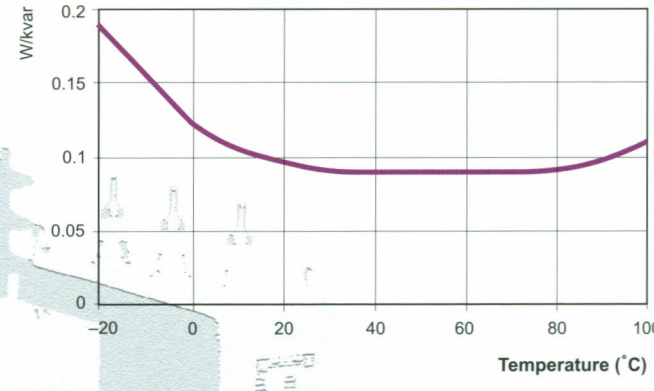


Losses variation of a representative capacitor unit

Curve 2

Losses as a function of dielectric temperature

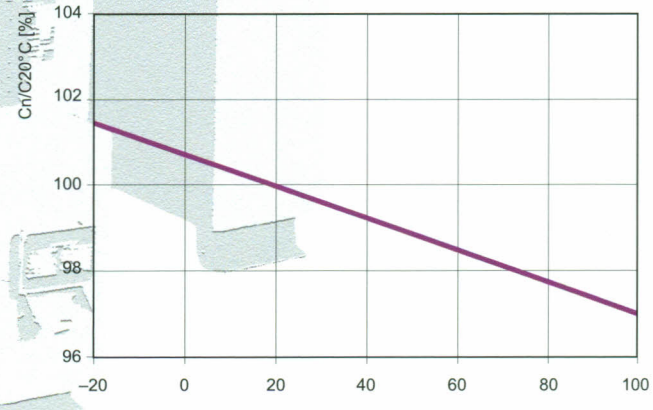
Losses=f(T)



Curve 3

Capacitance as a function dielectric temperature

Capacitance=f(T)



HIGH VOLTAGE POWER CAPACITORS

Temperature Range

Capacitors are classified in temperature categories, with each category being specified by a number followed by a letter.

SYMBOL	AMBIENT AIR TEMPERATURE (°C)		
	MAXIMUM	HIGHEST MEAN OVER ANY PERIOD OF	
		24 HOURS	1 YEAR
A	40	30	20
B	45	35	25
C	50	40	30
D	55	45	35

The number represents the lowest ambient air temperature at which the capacitor may operate.
The letters represent upper limits of temperature variation ranges, having maximum values specified in above table.

Overloads

a) Maximum permissible voltage (continuous)
Capacitor units shall be suitable for operation at voltage levels according to the following table.
The amplitudes of the over voltages that may be tolerated without significant deterioration of the capacitor depend on the duration, the total number and the capacitor temperature.

TYPE	VOLTAGE FACTOR (t.m.s)	MAXIMUM DURATION	OBSERVATION
Power frequency	$1.0U_N$	continuous	Highest average value during any period of capacitor energization. For energization periods less than 24h, exceptions apply in accordance with the value below
	$1.1U_N$	12h in every 24h	System voltage regulation and fluctuations
	$1.15U_N$	30 min in every 24h	System voltage regulation and fluctuations
	$1.2U_N$	5 min	Voltage rise at light load
	$1.3U_N$	1 min	

b) Maximum permissible current
Capacitor units shall be suitable for continuous operation at an r.m.s. current of 1.30 times the current that occurs at rated sinusoidal voltage and rated frequency, excluding transients.

Discharging

Following may be used as discharge device:
- discharge resistors
- discharge coils
- discharge transformers
- windings of motors or transformers

Each capacitor unit shall be provided with means for discharging to 75V or less.

Corrosion Protection

Case material:	stainless steel
Pre-treatment:	-pickling with acid -washing with water -alkalinous degreasing -washing with water -washing with distilled water
First coating:	two-component agent on polyacryl basis,
Top coating:	Dedelan, two component agent on acryl-polyurethan basis
Coating thickness:	total 50-60µm

HIGH VOLTAGE POWER CAPACITORS

Protection Devices for Power Capacitors

Detailed information is provided in IEC 60871-3 “Protection of shunt capacitors and shunt capacitor banks.”

a) Internal Fuses

Detailed information is provided in IEC 60871-4 “Internal fuses.”

Internal fuses are designed to isolate faulty elements in order to allow further operation of the capacitor unit and the bank in which the capacitor is connected.

Complete protection is obtained when using internal fuses together with an unbalance protection device.

b) Pressure Monitoring Device

The pressure inside the capacitor casing is monitored by means of an over pressure sensor. In the event that the setting (critical value) is exceeded, a change-over contact initiates disconnection of the capacitor. Such an early disconnection from the source of supply after an internal breakdown can stop gas evolution in the capacitor casing, avoiding the bursting of it.

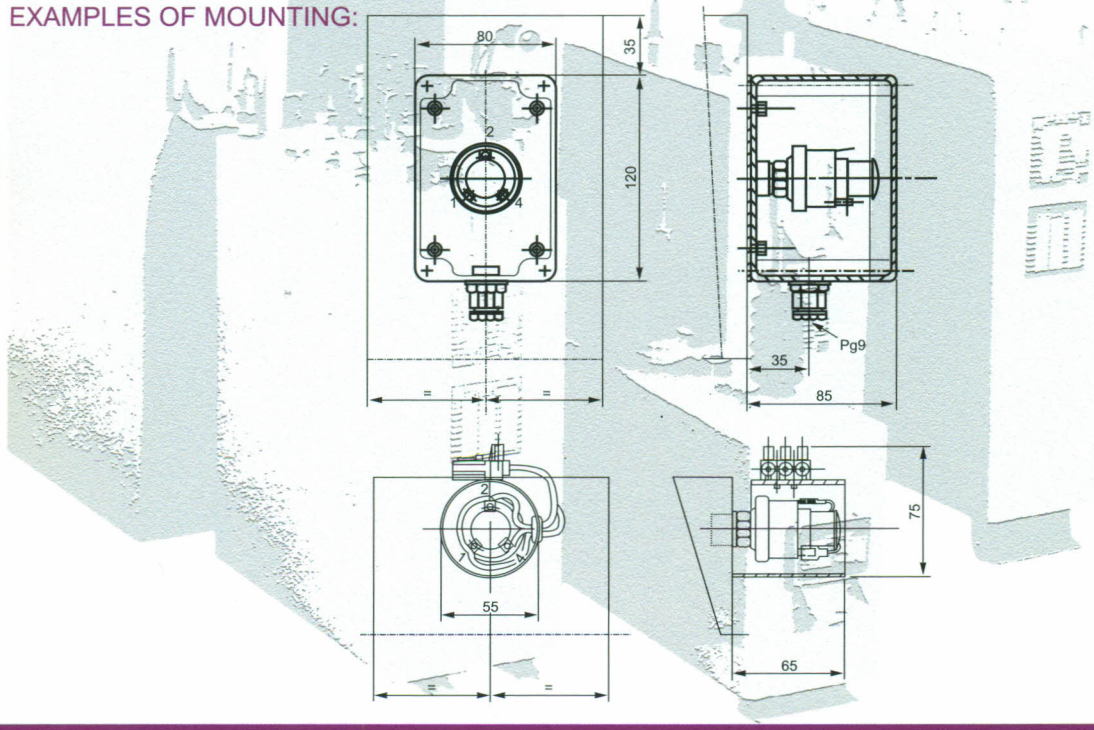
Complete protection is obtained when using the pressure monitoring device together with H.R.C. fuses.

Technical Data

Casing:	Bakelite, resistant up to 100°C
Electrical connection:	AMP-plug type lugs 6.35mm
Contacts:	1 change-over contact 15 A/220V ohmic load
Insulation test voltage:	1500V
Setting range:	0.2 - 0.9 bar
Standard setting:	0.6 - 0.8 bar
Pressure limit:	6.0 bar
Accessory:	rubber protective cap
Temperature range:	- 25° up to + 70°C
Dimension:	see dimension
Fitting:	R 1/4" and mechanical protection
Mounting position:	dependant on design of capacitor
Testing:	functional test and leakage test

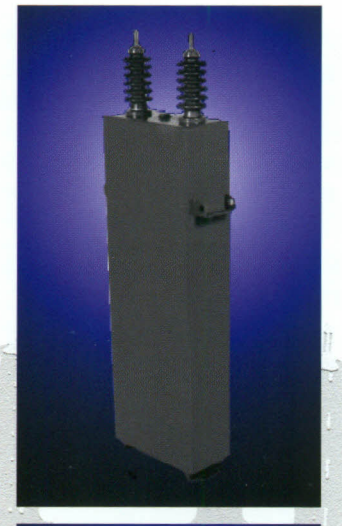
Important ! If the pressure monitoring device has operated, the capacitor must not be placed back into service, but returned together with the device to our factory for examination.

EXAMPLES OF MOUNTING:



HIGH VOLTAGE POWER CAPACITORS

FORM OF CONSTRUCTION



In the case of single phase capacitor units with dead casings, both polarities are led out through the casing in an insulated condition by means of ceramic bushings

In the case of single phase capacitor units with one bushing only, the second polarity is connected to the casing

Three-phase capacitors are provided with three bushings for connection to the phases and have dead casings with grounding connection point. They are connected either in star or in delta.

PRODUCT RANGE TYPE N

(Hi Voltage)

■ MAIN FREQUENCY

Dielectric: Polypropylene film
Electrode material: Aluminium foil
Impregnate: NON-PCB liquid

■ Rated voltage and frequency

Up to 20 KV, 50Hz (60 Hz on request)
Max. permissible operating voltage
1,0 x Un continuous
1,1 x Un over 12 hour daily

■ Max. permissible operating current

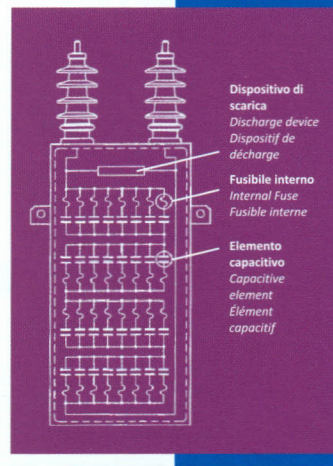
1,3 x In continuous

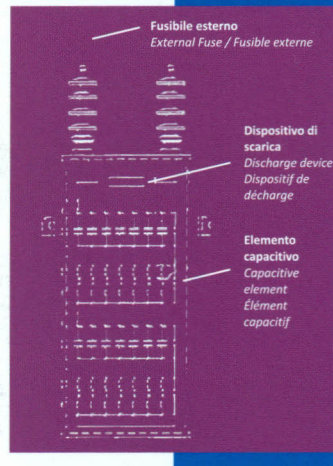
■ Test voltage terminal/terminal

DC 4 x Un, 10s or
AC 2 x Un, 10s

■ Test voltage terminal/casing

AC in accordance with VDE 0560-4/4A & IEC 871





Medium Voltage Power Capacitors

Rated Voltage Kv	Power Rating Kvar	Rated Capacity Mf	Rated Current I
1.38	100	167.22	72.46
	150	250.84	108.69
	200	334.45	144.92
	250	418.07	181.15
1.9	100	88.17	52.63
	150	132.26	78.94
	200	176.34	105.26
	250	220.54	131.57
3.00	100	33.36	33.33
	150	53.05	50.00
	200	70.73	66.66
	250	88.41	83.33
5.53	100	10.40	18.08
	200	20.80	36.16
	250	26.20	45.20

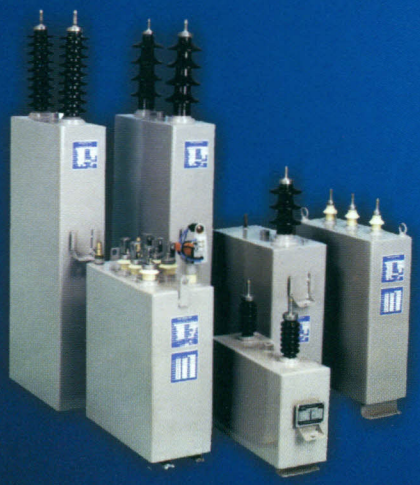
Rated Voltage Kv	Rated Capacity Mf	Power Rating Kvar	Rated Current I
6.00	100	8.84	16.66
	150	13.26	25.00
	200	17.68	33.33
	250	22.10	41.66
7.60	100	5.51	13.15
	200	11.2	26.31
	250	13.77	32.89
12	100	2.21	8.33
	200	4.42	16.66
	250	5.52	20.83
19.05	100	0.88	5.24
	200	1.75	1049

NOTE: In above table the standard outputs are stated,intermediate values are accepted on request.

PCM

PARS CAPACITORS

MANUFACTURE (S.S.K)



تهران - خیابان احمد قصیر، خیابان شانزدهم، شماره ۲۰ / کد پستی: ۱۵۱۴۸۱۳۷۱۴
صندوق پستی: ۴۸۷۹-۱۵۸۷۵ تلفن: ۸۸۷۳۴۳۷۱ فاکس: ۸۸۷۳۴۳۷۰

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