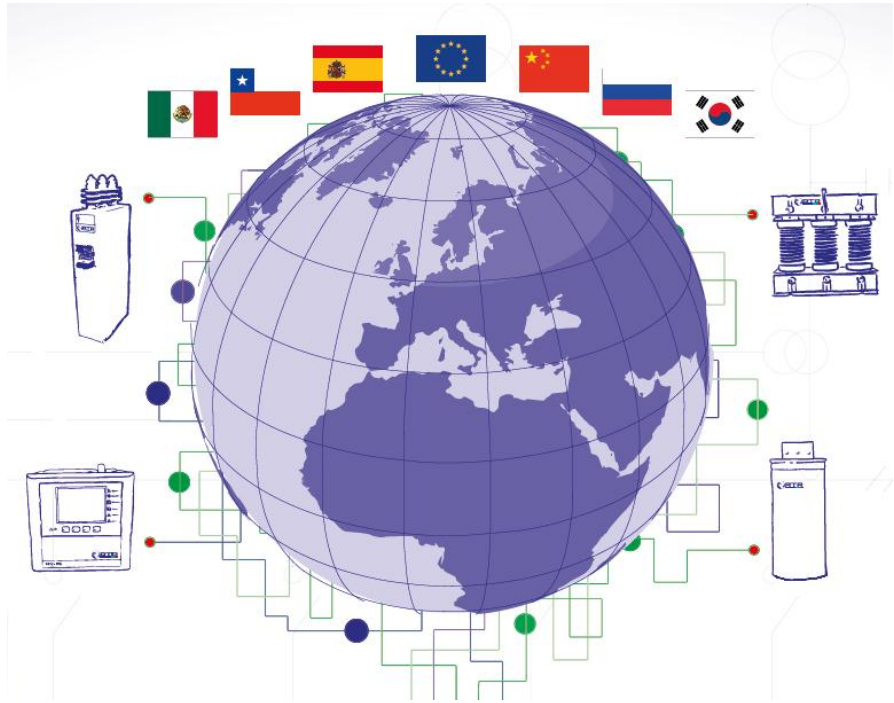


RTR

Our mission is promoting

Energy Savings

Electrical Energy Efficiency





Baterías de condensadores

Capacitor banks



Spanish company which designs and manufactures:

Electric Capacitors

APFC Systems for LV & MV

Harmonic Filters

Polyurethane resins

Lighting & Motor Capacitors

Street Lighting Solutions.





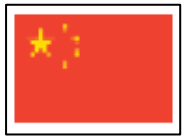


RTR Energia has a strong international vocation,
present in over 65 different countries,
60% of its turnover is on exports.
Establish in:
Chile, Russia, China, South Korea, Thailand & Mexico.











Leaders in Power factor Correction 40 years experience
Focused in innovations and developments of new products

QUALITY & CERTIFICACIONS

Engineering and technology
Assistance and customized manufacturing
Innovation and design
Verification and control laboratories



Offering one the largest Power Factor Correction Capacitor range:

LV Three Phase capacitors Cylindrical type. 0,5 Kvar–50 Kvar. 240v–690v.
UL approved range.
5 Possible different designs for OEM and distribution Networks.

PATENT New DWCAP Three Phase Capacitor. First capacitor worldwide with such design. Triple safety.

IEC/EN 60831 part 1 & 2.: 2014 Type tested

DC High Voltage Capacitors for different power electronic applications.

One of the largest Three Phase LV Capacitors manufacturing capacity worldwide.



DWCAP PATENT

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 654 051 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

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(74) Representative: **Monzón de la Flor, Luis Miguel**
SILEX CONSULTING, S.L.
C/Velazquez 109, 2ºD
28006 Madrid (ES)

(54) **THREE-PHASE CAPACITOR FORMED BY TWO ALIGNED CYLINDERS WITH OVERPRESSURE DISCONNECTION**



CERTIFICATIONS

MINISTERIO DE INDUSTRIA, ENERGIA Y TURISMO

L.C.O.E. LABORATORIO CENTRAL OFICIAL DE ELECTROTECNIA

FUNDACIÓN PARA EL FOMENTO DE LA INNOVACIÓN INDUSTRIAL

TEST REPORT
IEC/EN 60831-1& IEC/EN 60831-2
Shunt power capacitors of the self-healing type for a.c. systems having a rated voltage up to and including 1kV
Part 1: General – Performance, testing and rating – Safety requirements – Guide for installation and operation
Part 2: Ageing test, self-heating and destruction test

Report Number. ..... :	2015030110B1
Date of issue ..... :	29/05/2015
Total number of pages.....	20
Applicant's name..... :	RTR ENERGIA, S. L.
Address ..... :	Gavilanes, 11 bis - Pol. Ind. Pinto-Estación 28320 Pinto (Madrid) SPAIN
Test specification:	
Standard..... :	IEC 60831-1:1996& EN 60831-1:1996 IEC 60831-2:1995 & EN 60831-2:1996
Test procedure ..... :	–
Non-standard test method..... :	N/A
General disclaimer:	

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description ..... :	SHUNT POWER CAPACITORS
Trade Mark ..... :	RTR
Manufacturer..... :	RTR Energía, S. L.
Model/Type reference ..... :	Serie DWCAP, DWCAP RCT AND DWCAP RTF
Ratings ..... :	See additional table



New 3Phase DWCAP Series

MINISTERIO DE INDUSTRIA, ENERGIA Y TURISMO

L.C.O.E. LABORATORIO CENTRAL OFICIAL DE ELECTROTECNIA

FUNDACIÓN PARA EL FOMENTO DE LA INNOVACIÓN INDUSTRIAL

INFORME DE ENSAYOS
TEST REPORT

Ensayo Nº/*Test Report Nº*: 201411100275

Solicitante/ *Applicant's name:*	RTR ENERGIA, S.L.		
Domicilio/ *Address:*	GAVILANES 11 BIS POL IND LA ESTACION 28320 PINTO (MADRID) SPAIN		
Aparato/ *Test item description:*	Filtering reactor associated to capacitors	Fecha recepción *Date of receipt of test item:*	18/11/2014
Marca/ *Trade mark:*	RTR Energía	Fecha de ensayo *Date(s) of performance of test:*	18/11/2014 to 19/01/2015
Modelo/ *Model:*	RTF0230-0525XXXXXXX	Nº total de págs./ *Total pags. Number:*	1 + 9
Tipo, Nº de Ref./ *Type reference:*	---		
Normas aplicadas/ Test Specification-*Standard:*	IEC 60076- 6:2007 (First Edition) / EN 60076-6:2008 / UNE-EN 60076-6:2010		

Los resultados de los ensayos están contenidos en las hojas adjuntas/ The tests results are included in the following pages.

Fecha de emisión/*Date of issue*: 16 de Febrero de 2014

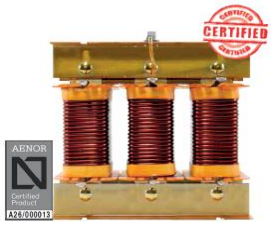
Ensayado por/ *Tested by,*

ESTEBAN IZQUIERDO GONZALEZ

Responsable Unidad Operativa/ Head of business unit,

JESUS SANCHEZ PANDO

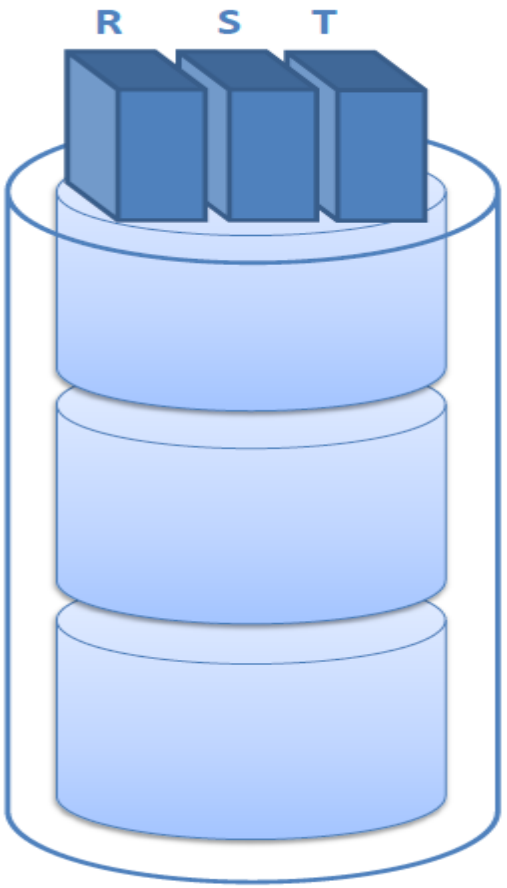
* Los ensayos se refieren exclusivamente a la muestra ensayada, dicha muestra es la descrita en el informe y corresponde a la muestra originalmente recibida, con las modificaciones que en el transcurso de los ensayos puedan haberse producido, para dar cumplimiento a los mismos. Estas modificaciones están documentadas en los archivos del LCOE y, disposición del solicitante u organismo por el autorizado / The test results presented in this report relate only to the object tested; the simple is described in the report and is the originally received with all the modifications that can be made during the testing to comply with the Standard requirements. All of this modifications are reported in the LCOE files available to the applicant or other body authorized by the applicant.
* Queda prohibida la reproducción parcial de este documento/ This test report shall not be reproduced except in full without written approval of the testing laboratory.



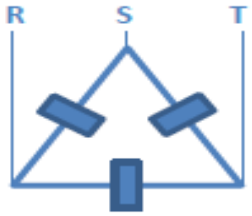
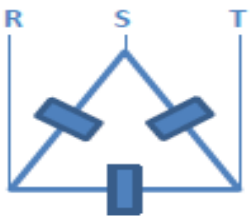
AENOR

Certified Product

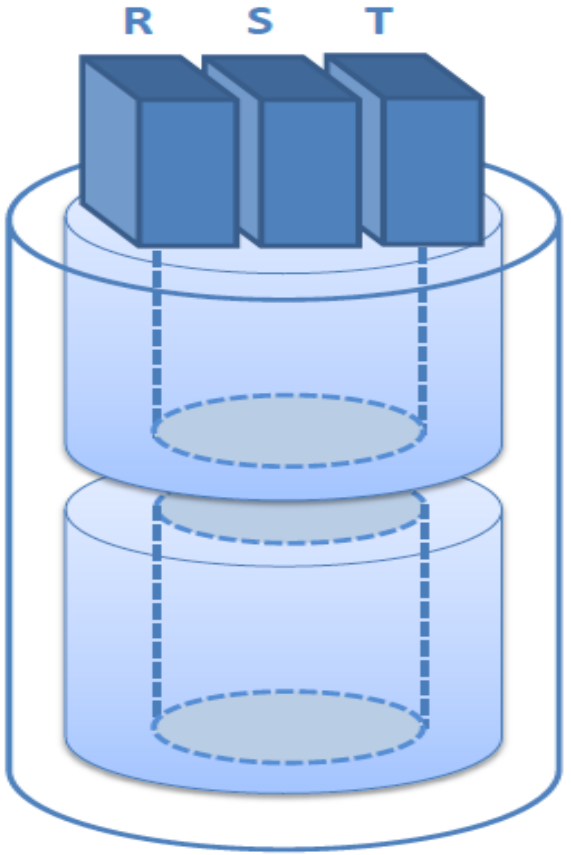
MA/C/CE/TER



PLAY

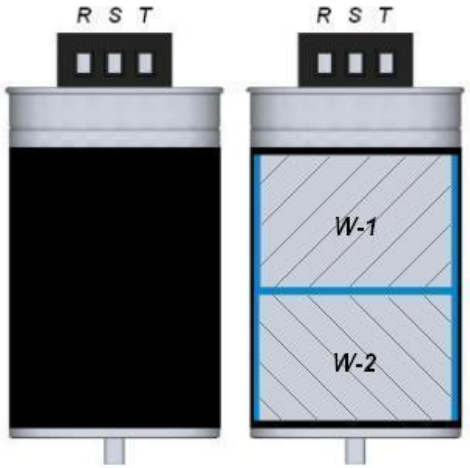
Internal connection	
	
Safety	
• Overpressure disconnection system. • V0 polyurethane encapsulating resin	• Overpressure disconnection system. • V0 polyurethane encapsulating resin. • Capacitive elements individually protected with internal fuses. • Internal elements safe disconnection by shifting dielectric film (Patent).
Other Benefits	
	• Compact Size • Better heat dissipation. • Unique technology. • Worldwide patent.

NEW DWCAP series

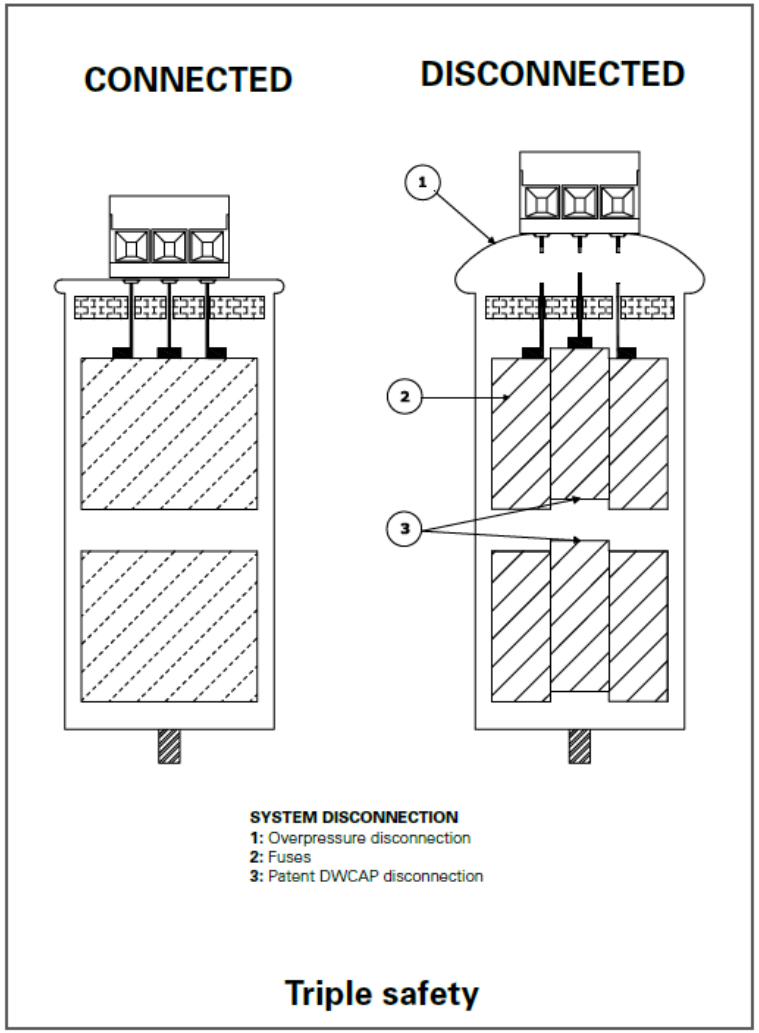


Committed to **quality** and **innovation**, RTR is continuously working on improving and developing its products range.





AENOR
Certified Product

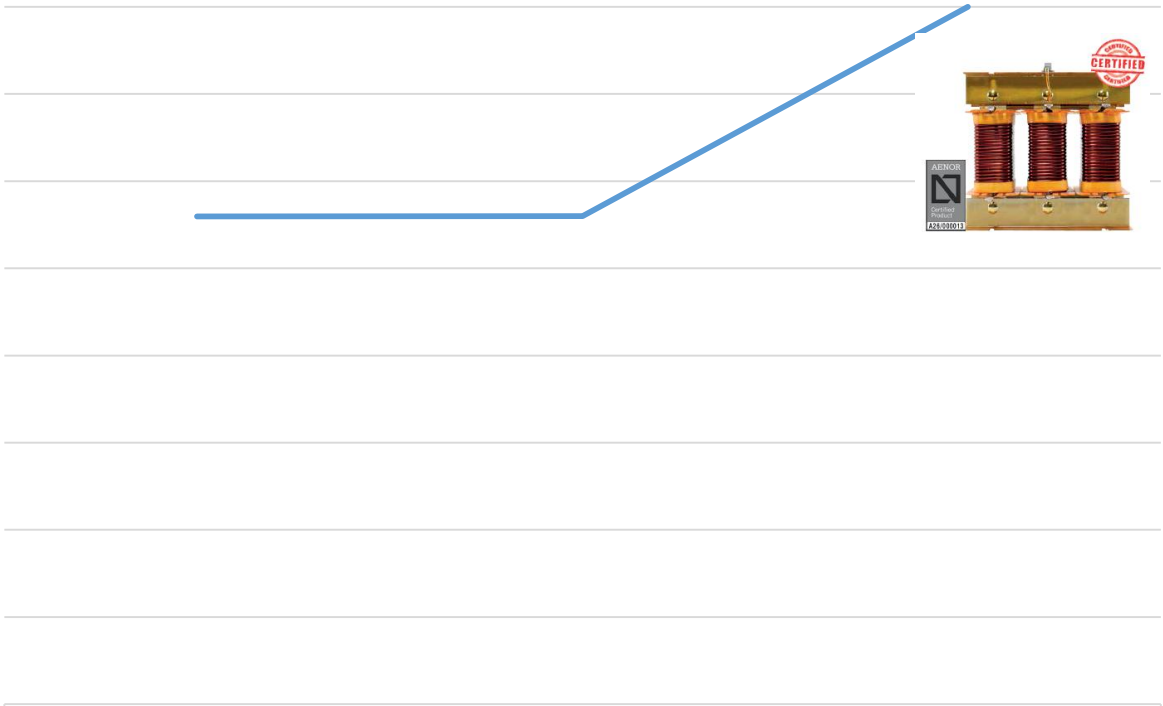


CONTINUOUS EXPANSION & GROWTH

LV CAPACITOR EVOLUTION 2007-2015
DOUBLE VOLUME 2013 – 2015: 2 YEARS



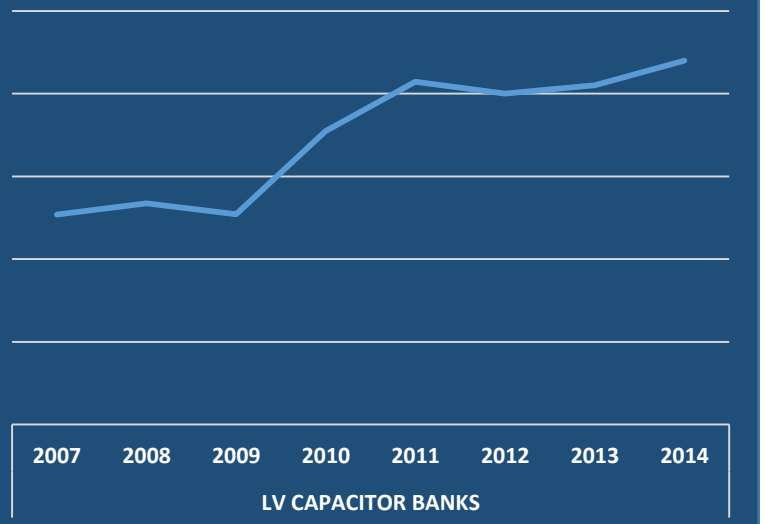
HARMONIC FILTER EVOLUTION 2013-2015
DOUBLE VOLUME 2013-2015: 2 YEARS



Automatic Power Factor Correction Systems LV.

A solution for every need:

- Compact Series: From 2,5 Kvar to 630 Kvar:
  Compact in Size, Immediate delivery, Cost effective.
- Modular Series. Up to 4,8 Mvar: Covers any systems requirements.
- APFC Systems with detuned harmonic filters.
- APFC Systems with Thyristor Switching and harmonic filters.
- Fixed Capacitor Banks.




Compact-1


Compact-2



Compact-3

Compact-7


Compact-9


ARM Series
with harmonic filters


ST Series with static contactors

Harmonic Filters and transformers.

- Full Range of Cooper and Aluminum Harmonic Filters. 5.67%, 7% & 14%. IEC-EN 60076-6 type tested.
- Single Phase Transformers
- IP-54 Transformers
- IP-65 Transformers
- Large production capacity





MV Fixed and Automatic Power Factor Correction Systems.

Approved by Spanish utilities:



e·on

endesa

UNION FENOSA

IBERDROLA



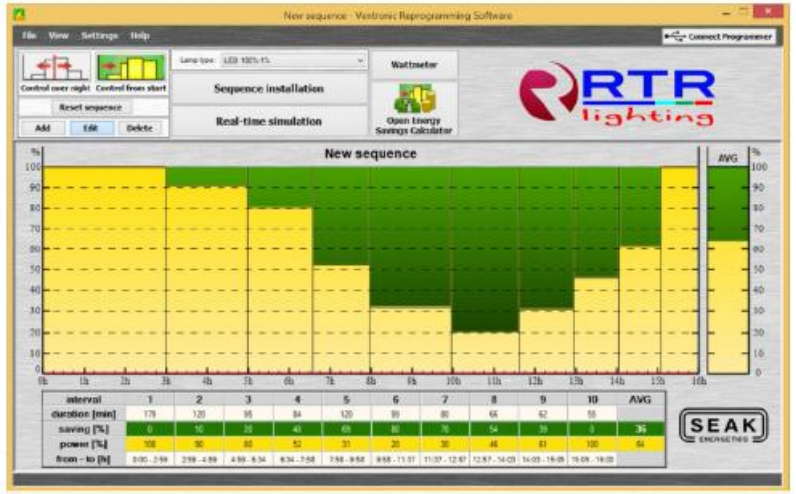
Lighting Solutions.

Street Lighting Energy Saving. LED & HID.

- Lighting Capacitors. Economy of scale. Film volume. OEM customers. HID market Segment.

- Electronic Lighting systems for Street and Industrial Lighting. Energy Saving and efficiency Solutions.

- Street Lighting
- Industrial Lighting
- Retail Lighting
- PLC Energy Saving Solutions. PART NIGHT





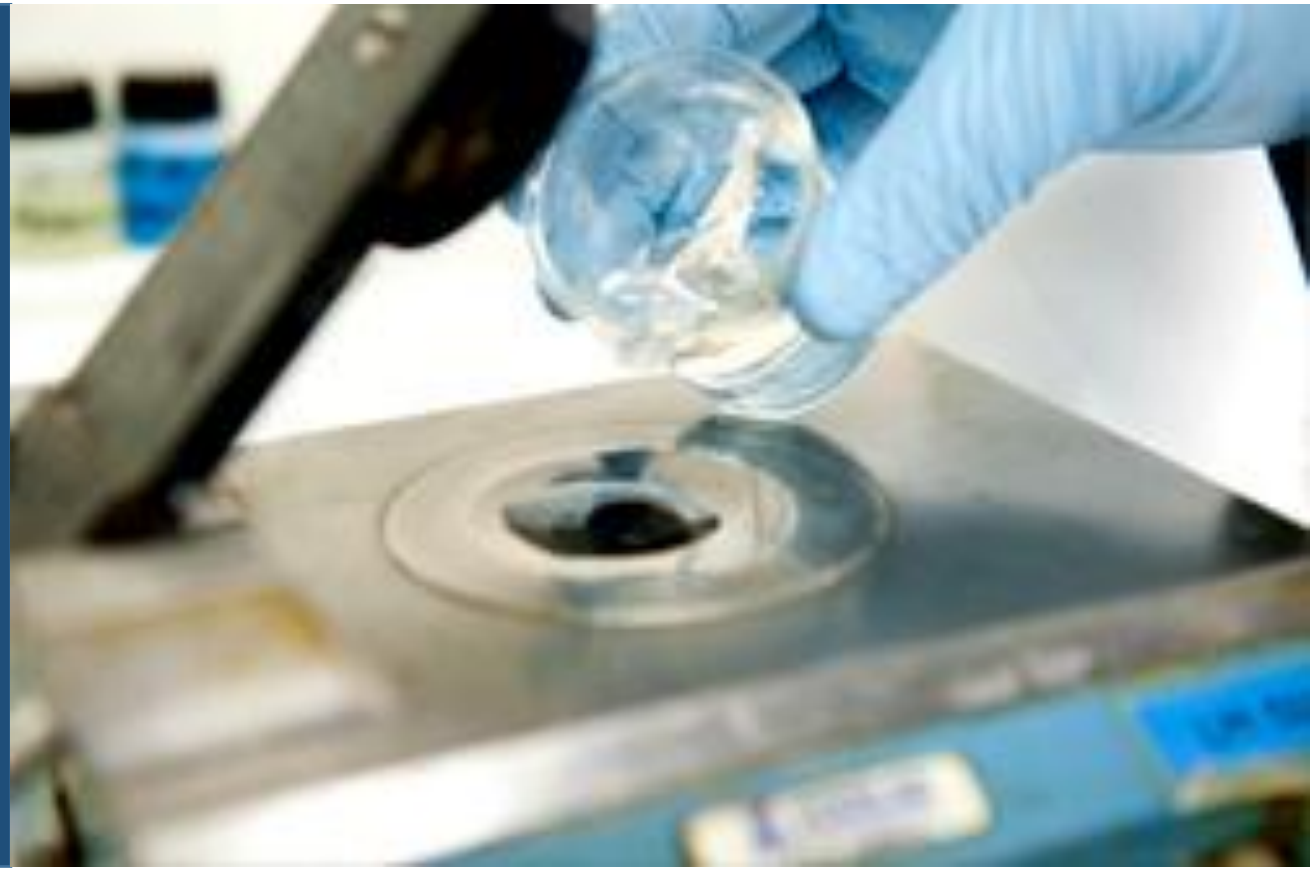




Chemicals Division:

Synergies

- Polyurethane resin for different encapsulating applications:
  - Capacitors
  - Transformers
  - Ballasts & Ignitors
  - CT’s
  - Miscellaneous.



LV Switch Gear Components

- RTR Capacitor Duty Contactors.
- RTR MCB & MCCB
- RTR Switch break in load
- Automatic power Factor Controller
- Split Core Current Transformers.



CAPACITOR DUTY CONTACTOR



MCCB



ON-LOAD BREAK SWITCH



MCB



SPLIT CORE CURRENT TRANSFORMER



PR12-D12 REMOTE MANAGEMENT

Thanks to our **200 peoples** team we are able to offer personalized solutions to our worldwide clients.

RTR Know-How.











Keeping in Spain one of the largest **client** portfolio within different Segments:

- **Distribution:**

- **Utility:**



RTR energía

Keeping in Spain one of the largest client portfolio within different Segments:

- Engineering & Contracting:























- Institutions & Government:

















Member in board of Directors of two main associations in Spain.

Industrial Products: AFME

Lighting Products: ANFALUM

RTR Energia Key factors:

- One of the world´s Largest manufacturing capacity for Cylindrical high power capacitors, LV & DC.
- UL Approved range for Three Phase Capacitors. (USA)
- DWCAP Patent for NEW three phase capacitors design (Worldwide).
- Leader In Spanish APFC System market.
- Complete marketing positioning: Distribution, Utilities, Contracting & Engineering.
- 60% Turnover (Spain Factory) Exports. Worldwide exports.
- Know – how on manufacturing technology. Automation.
- Only Capacitor manufacturer established in Spain.
- Own Harmonic Filter and Polyurethane production.
- Future Developments and technology alliances on NEW Energy Saving and Efficiency Solutions.

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www.rtr.cl

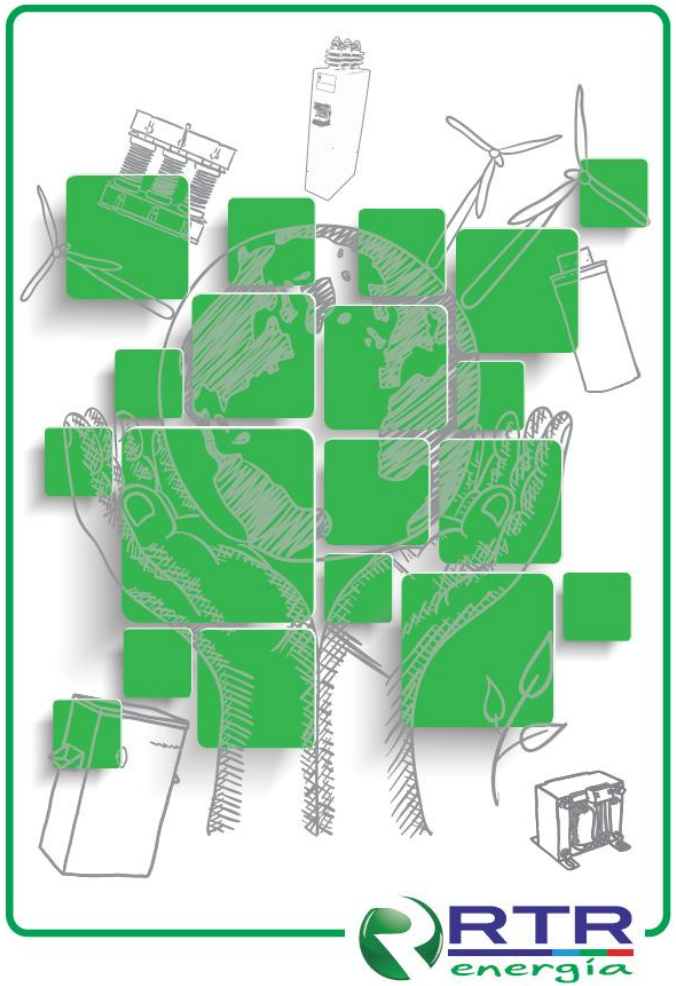
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www.rtr.es

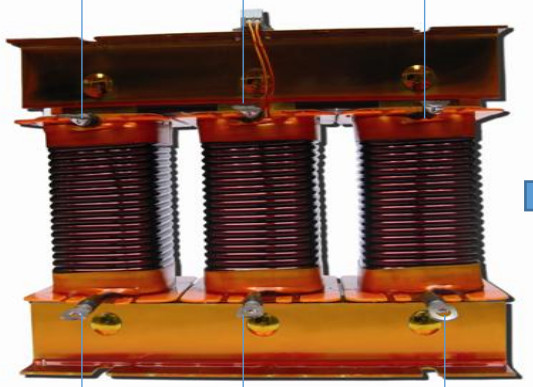
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Selection of Detuned harmonic filters

L1
L2
L3

415V



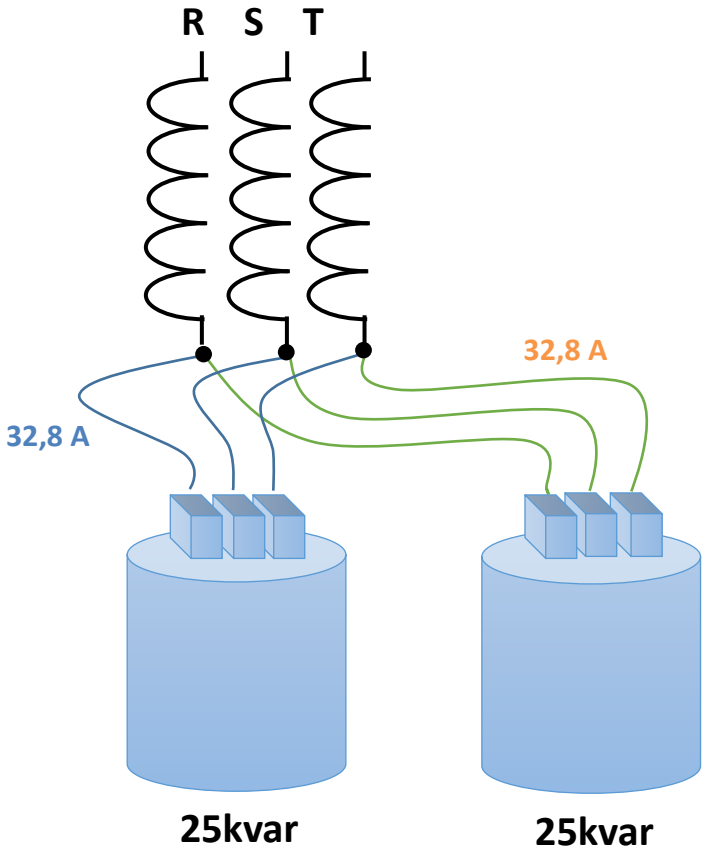
$$p(\%) = \begin{cases} 5{,}67\% \\ 7\% \\ 14\% \end{cases}$$

415V+(p/100)415V
5,67%➔ 438,5V
7,00%➔ 444,1V
14,0%➔ 473,1V

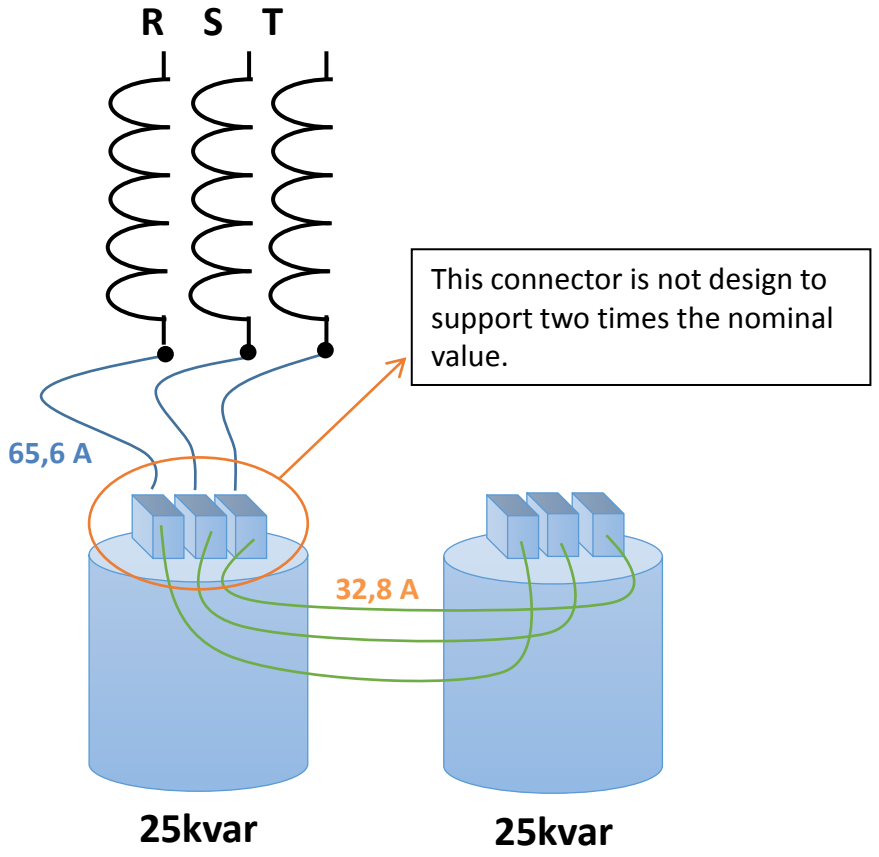


How to parallel 3-phase capacitors

☑ Proper connection



☒ Wrong connection



3 basic rules of calculating capacitor banks

- Seasonality: load requirements (KW, KVA, PF)
- Voltage available and neutral wire
- Harmonic distortion (without Capacitors)

3 basic rules of designing capacitor banks

- First step power
- Nominal current is NOT design current: **safety factor 1.6**

  e.g.: 30kvar – 440V

  In = 1000·30/(440·sqrt(3)) = 39,36A

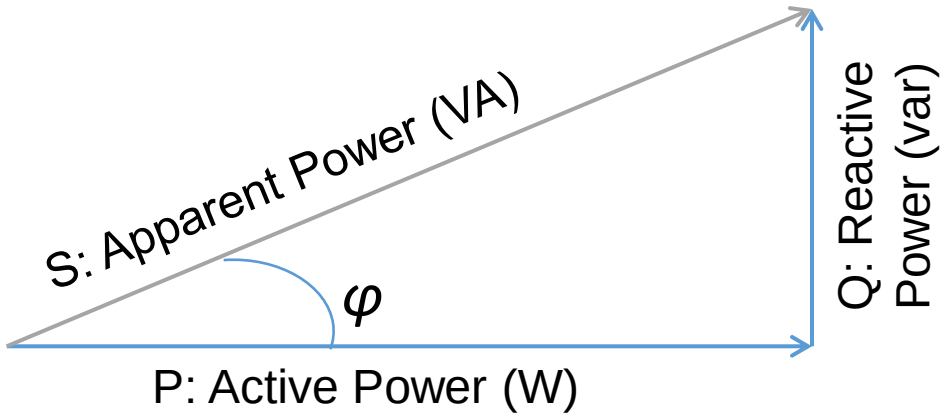
  Id = 1,6·In = 62,98A

- Heat dissipation

Active power (P) = 500 kW
Initial PF = 0,70
Desired PF = 0,95

Multiplying factor = 0,692

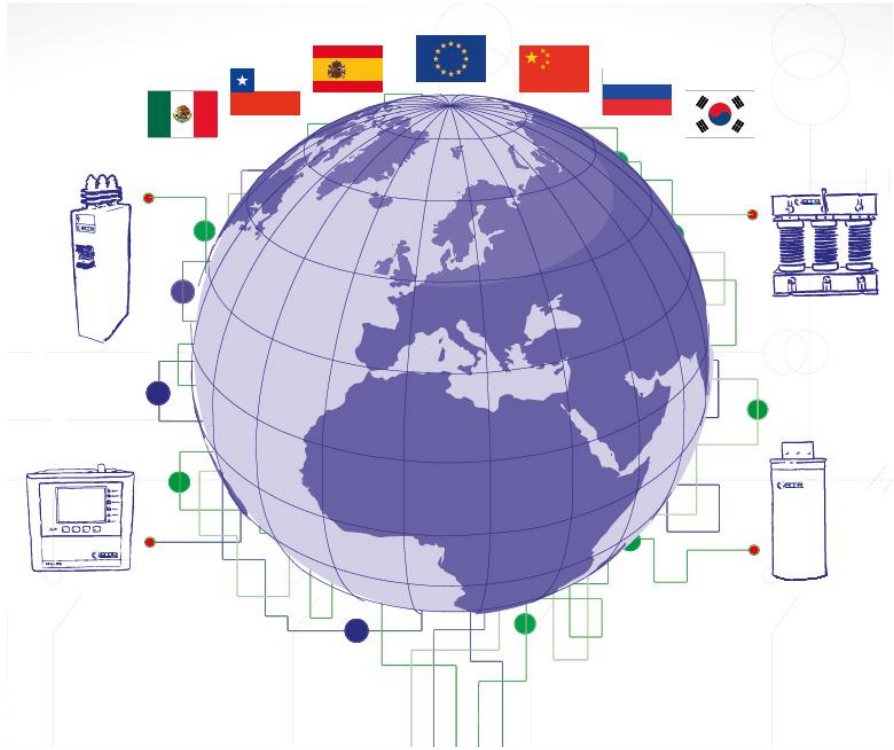
Qc = P x M.Factor = 500 x 0,692
= 356 kVAr



FP before compensation		PF AFTER COMPENSATION										
cosφ	0,80	0,84	0,88	0,90	0,90	0,95	0,96	0,97	0,98	0,99	1,00
tgφ	0,750	0,646	0,540	0,484	0,484	0,329	0,292	0,251	0,203	0,142	0,000
cosφ	tgφ											
0,400	2,291	1,541	1,645	1,752	1,807	1,865	1,963	2,000	2,041	2,088	2,149	2,291
0,430	2,100	1,350	1,454	1,560	1,615	1,674	1,771	1,808	1,849	1,897	1,957	2,100
0,460	1,930	1,180	1,284	1,391	1,446	1,504	1,602	1,639	1,680	1,727	1,788	1,930
0,490	1,779	1,029	1,133	1,239	1,295	1,353	1,450	1,487	1,528	1,576	1,637	1,779
0,520	1,643	0,893	0,997	1,103	1,158	1,217	1,314	1,351	1,392	1,440	1,500	1,643
0,550	1,518	0,768	0,873	0,979	1,034	1,092	1,190	1,227	1,268	1,315	1,376	1,518
0,580	1,405	0,655	0,759	0,865	0,920	0,979	1,076	1,113	1,154	1,201	1,262	1,405
0,610	1,299	0,549	0,653	0,759	0,815	0,873	0,970	1,007	1,048	1,096	1,157	1,299
0,640	1,201	0,451	0,555	0,661	0,716	0,775	0,872	0,909	0,950	0,998	1,058	1,201
0,670	1,108	0,358	0,462	0,568	0,624	0,682	0,779	0,816	0,857	0,905	0,966	1,108
0,700	1,020	0,270	0,374	0,480	0,536	0,594	0,692	0,729	0,770	0,817	0,878	1,020
0,730	0,936	0,186	0,290	0,396	0,452	0,510	0,608	0,645	0,686	0,733	0,794	0,936
0,760	0,855	0,105	0,209	0,315	0,371	0,429	0,526	0,563	0,605	0,652	0,713	0,855
0,790	0,776	0,026	0,130	0,236	0,292	0,350	0,447	0,484	0,525	0,573	0,634	0,776
0,800	0,750	-	0,104	0,210	0,266	0,324	0,421	0,458	0,499	0,547	0,608	0,750
0,810	0,724	-	0,078	0,184	0,240	0,298	0,395	0,432	0,473	0,521	0,581	0,724
0,820	0,698	-	0,052	0,158	0,214	0,272	0,369	0,406	0,447	0,495	0,556	0,698
0,830	0,672	-	0,026	0,132	0,188	0,246	0,343	0,380	0,421	0,469	0,530	0,672
0,840	0,646	-	-	0,106	0,162	0,220	0,317	0,354	0,395	0,443	0,503	0,646
0,850	0,620	-	-	0,080	0,135	0,194	0,291	0,328	0,369	0,417	0,477	0,620
0,860	0,593	-	-	0,054	0,109	0,167	0,265	0,302	0,343	0,390	0,451	0,593
0,870	0,567	-	-	0,027	0,082	0,141	0,238	0,275	0,316	0,364	0,424	0,567
0,880	0,540	-	-	-	0,055	0,114	0,211	0,248	0,289	0,337	0,397	0,540
0,890	0,512	-	-	-	0,028	0,086	0,184	0,221	0,262	0,309	0,370	0,512
0,900	0,484	-	-	-	-	0,058	0,156	0,193	0,234	0,281	0,342	0,484
0,910	0,456	-	-	-	-	0,030	0,127	0,164	0,205	0,253	0,313	0,456
0,920	0,426	-	-	-	-	-	0,097	0,134	0,175	0,223	0,284	0,426
0,930	0,395	-	-	-	-	-	0,067	0,104	0,145	0,192	0,253	0,395
0,940	0,363	-	-	-	-	-	0,034	0,071	0,112	0,160	0,220	0,363
0,950	0,329	-	-	-	-	-	-	0,037	0,078	0,126	0,186	0,329
0,960	0,292	-	-	-	-	-	-	-	0,041	0,089	0,149	0,292
0,970	0,251	-	-	-	-	-	-	-	-	0,048	0,108	0,251
0,980	0,203	-	-	-	-	-	-	-	-	-	0,061	0,203
0,990	0,142	-	-	-	-	-	-	-	-	-	-	0,142

Cable and fuse selection chart

Power kvar	Voltage V	Inominal A	Idesign 1,6·In (A)	Fuse A	Wire mm2
5	440	6,56	10,50	16	6
10	440	13,12	20,99	25	6
20	440	26,24	41,99	50	10
30	440	39,36	62,98	63	10
40	440	52,49	83,98	100	25
50	440	65,61	104,97	125	35
80	440	104,97	167,96	200	70



PLAY

RTR