



TELEGROUP

Your reliable Partner for PFC Systems
and Harmonic Filtering

CATALOGUE 2019

**LV Power Factor Correction
and Harmonic Filtering**



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About Us

Established in the mid-80s, TELEGROUP was born from an idea by Fabiano Bagnoli, still today Managing and Technical Director of the Company. At that time, he was already founder of a well-known electrical installation company in the Chianti hills, more precisely in Sambuca, a worldwide symbol of history, art and culture.

From the start, TELEGROUP has been focusing its activity on the development, production and marketing of Low-voltage Power Factor Correction systems, which still represent the core business of the Company.

In just a few short years, thanks to the business strategy which was entirely concentrated on extremely high quality products, TELEGROUP successfully established itself in the Italian market as a synonym of reliability.

The will and perseverance within the Company to continually insist on quality has over the years been rewarded with numerous supplies to Italian and international end customers, leaders in their sectors who have chosen and have entrusted TELEGROUP with the development and implementation of LV PFC Systems for their plants.

Today, after thirty years of operations, TELEGROUP remains a dynamic, innovative company on the Italian and International electrical stage, with a Distribution Network able to cover over 40 countries worldwide.



OVER
30 YEARS
OF EXPERIENCE



QUALITY
PRODUCTS



OVER
40 COUNTRIES
SERVED WORLDWIDE

International Presence

Our quality on the market

Thanks to its widespread distribution network, which includes 16 Agencies in Italy and over 25 partners abroad, TELEGROUP boasts the installation of its products in over 40 countries worldwide.



● Directly served markets

Albania, Austria, Australia, Angola, Saudi Arabia, Bulgaria, Chile, Costa Rica, Croatia, Estonia, France, England, Ireland, Northern Ireland, Germany, Ghana, Jordan, Greece, Lebanon, Malta, Morocco, Mauritania, Mexico, Nigeria, Poland, Portugal, Romania, Serbia, Spain, Switzerland, Sweden, Turkey, Tunisia.

● Indirectly served markets

Algeria, Argentina, Egypt, Ethiopia, Indonesia, Iran, Iraq, Kenya, Peru, Russia, Singapore, USA.

Quality

Company certifications

TELEGROUP is a company certified in accordance with ISO 9001:2015, ISO 14001:2004, BS OHSAS 18001:2007, SA 8000:2014, issued by DNV, one of the most accredited certification bodies in the world.

All company processes, from design and procurement to production and testing up to sales and service, have been certified according to regulations and therefore represent further proof of the quality TELEGROUP process.



Product certifications

Following its internationalisation policy, TELEGROUP has over the years acquired multiple product certifications in order to meet the demanding requirements of foreign markets.

All products are designed and manufactured in compliance with international reference standards and, in particular, the entire TELEGROUP range of power factor correction systems is in compliance with:

EN 61921 EN 61439-1 IEC 60831-1 IEC 60831-2 EN 61642 EN 61000

TELEGROUP has carried out all the types of tests required by the KEMA laboratories for its low voltage power factor correction systems and in particular:

IEC 61439-1 par. 10.10 - Required by TELEGROUP - Verification of resistance in a critical environment, **environmental temperature 52°C**.

IEC 61439-1 par. 10.11 - Verification of the resistance to short-circuit withstand current - 50 kA for 1 second - direct on busbars system, **not conditioned by a short-circuit protection device**.



GOST CERTIFICATION

Certification acquired in 2012 for the entire range of products needed for export to the Russian market.

UL CERTIFICATION

Certification acquired on multiple occasions for the export of power factor correction systems in the American market.

CERTIFICATE OF CONFORMITY (SASO)

Acquired in 2015 for the power factor correction range, necessary for export to Saudi Arabia.

Services

Network analysis

TELEGROUP makes use of its technicians and advanced technology equipment to carry out inspections and network analysis, especially in the most critical applications and subject to a greater presence of harmonic phenomena.

Special solutions

In addition to its standard product range, TELEGROUP designs and manufactures power factor correction systems with voltages from 230 V to 800 V, 50 and 60 Hz, according to customer specifications.

Technical seminars

For years, technical meetings in collaboration with professional associations both in Italy and abroad have represented a key step in our activity.

Commissioning

Assistance in panel start-ups, verification of current transformer positioning, illustration of Controller functions.

Checking Electrical Bills

Verification of electricity consumption and penalties for excessive consumption of Reactive Energy imposed by Energy Distributors.



References

Ceramics, Plastics, Automotive, Paper Industry, Telecommunications, Service Sectors

Marazzi Group

Italy, USA // Ceramics industry

Realization of tailor-made Automatic Power Factor Correction systems, equipped with three-phase Capacitors in Nitrogen Gas and Filter Reactors

Total 18,000 kVAr



FCA (2014-2018)

Italy // Automotive industry

Realization of tailor-made Automatic Power Factor Correction systems, equipped with Thyristor modules, three-phase Capacitors in Nitrogen Gas and Filter Reactors

Total 5,000 kVAr



APM Terminals Moin (2016)

Costa Rica // Port terminal

Realization of tailor-made 480 V 60 Hz, Icw 65 kA 1s Automatic Power Factor Correction systems equipped with three-phase Capacitors in Nitrogen Gas

Total 9,000 kVAr



Alcantara (2017)

Italy // Textile industry

Realization of tailor-made Automatic Power Factor Correction systems, equipped with Thyristor modules, three-phase Capacitors in Nitrogen Gas and Filter Reactors

Total 8,000 kVAr



Jordan Petroleum Refinery (2013 and 2018)

Jordan // Oil & Gas

Realization of tailor-made Automatic Power Factor Correction systems, equipped with Thyristor modules, three-phase Capacitors in Nitrogen Gas and Filter Reactors

Total 3,000 kVAr



Amazon Logistic centers (2017 and 2018)

Italy // Large-scale retail

Realization of Automatic Power Factor Correction systems with Contactors and Three-phase Capacitors in Oil

Total 7,000 kVAr

NCIC (2017)

Egypt // Chemical industry

Realization of tailor-made Automatic Power Factor Correction systems, equipped with Thyristor modules, three-phase Capacitors in Nitrogen Gas and Filter Reactors

Total 4,000 kVAr

Thyristor Modules

New

Thanks to the positive experiences gained with the use of this component, TELEGROUP decided to conduct thorough research and development, which led to the total internal production of Thyristor Modules.

This has allowed the company to obtain highly prestigious know-how, complete control over production steps and greater flexibility and competitiveness that drastically reduce the economic gap between insertion to Contactors and insertion to Thyristors.

Why Thyristor modules?

There are applications within Heavy Industry which, due to their operating cycle, tend to vary the load diagram in such a short time (from 1 to 5 seconds) and in some cases to such a high current peak (up to 20 In) that no contactor is able to follow and above all endure operation over time without becoming damaged.

The above conditions therefore require the use of Thyristor Modules for the insertion of Capacitor banks.

Advantages

- ✓ Capacitor bank insertion in times that can be estimated in milliseconds
- ✓ Increased Capacitor life
- ✓ Unlimited number of cycles

Applications

- ✓ Industrial welding machines
- ✓ Robotics
- ✓ Hydraulic presses
- ✓ Automotive systems



Reactive Energy penalties

Almost in all Countries worldwide, the Electric Utilities charge end users for excessive consumption of reactive energy, or $\cos \phi$.

There are many regulation since every Country imposes to respect its target P.F. (usually not less 0,90 but in some areas it's required up to 0,98)

Which are the users under risk of penalties?

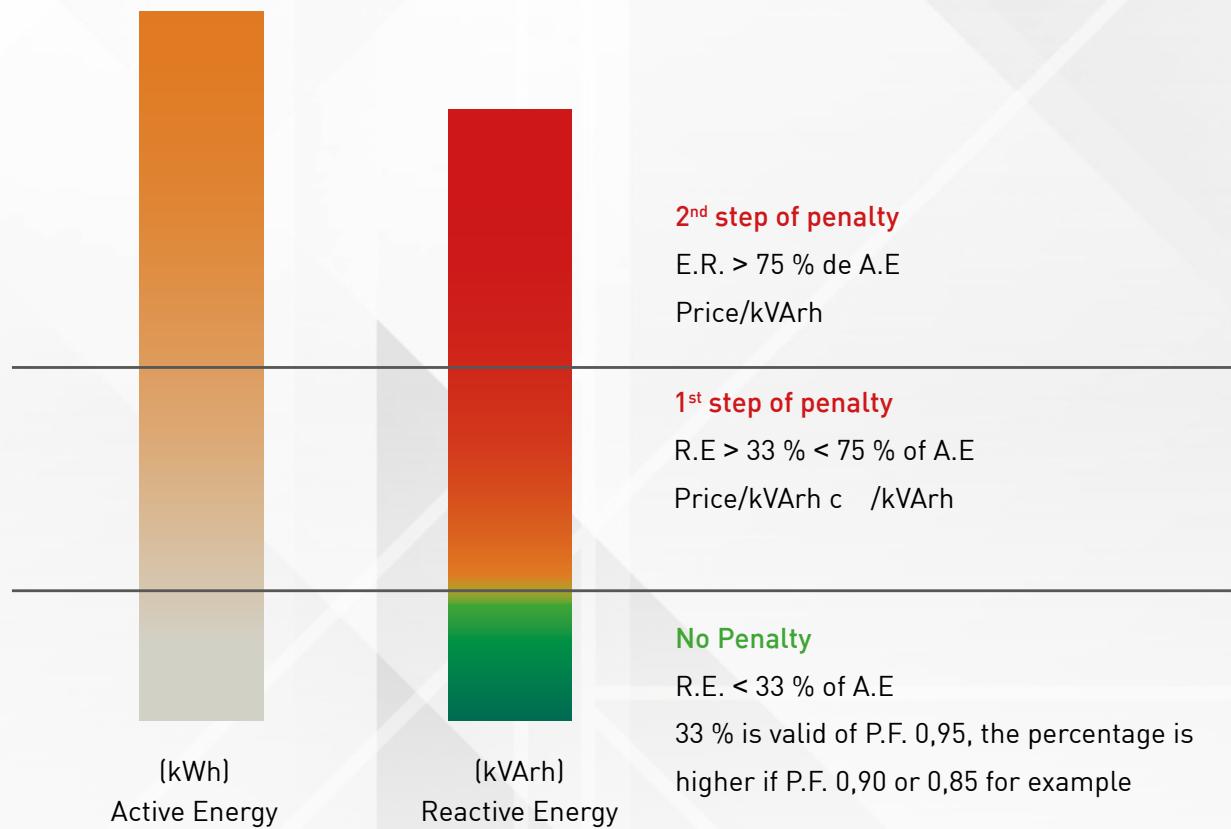
The reactive energy penalties are charged to applications with a minimum available power of «X» kW. For example in Italy start from 16,5 kW, while in others areas from 30 kW, or 50 kW until 1 MW; it depends from the regulation of each Utility.

How much it costs?

The costs of penalties depends about the value of P.F. and the method applied from the Utility for the calculation. In Europe, the Utilities charge end users mainly with a fix price for each excessive kVArh consumed, compared to kWh consumption. In Africa, Asia and South America, even if with different methods, the calculation is approximately the same, while in USA and Oceania are charged the extra kVA compared to kW.

Which is the payback of a PFC?

The standard payback in major cases is inside the 12-18 months after PFC installation and not over 24 months.



Benefits for $\text{Cos } \varphi > 0,95$



COST

Reduced energy costs

The installation of a power factor correction system inside a plant allows for immediate cancellation of the penalties for low $\text{Cos } \varphi$ imposed by Energy Distributors.



QUALITY

Energy quality

The increase of the power factor with the consequent decrease of the current reduces voltage drops. Correcting the power factor and therefore reducing the current value with which electric transformers are charged, one moves away from saturation and therefore from operation in a non-linear zone, with a consequent reduction in the emission of harmonics.



EFFICIENCY

Plant efficiency

- ✓ Correcting the power factor from $\text{Cos } \varphi=0.7$ to $\text{Cos } \varphi=0.98$ reduces both the apparent power and the current by 40%, thus:
 - ✓ 1) Extending the life of machines and components
 - ✓ 2) Reducing Joule Losses (kW) on Generators, Transformers, Cables and Protection Equipment
 - ✓ Thus, with power factor correction that is part of the energy efficiency measures of CEI 64-8 / 8-1, significant savings are also achieved on Active Energy.



POWER

Increased Active Power (kW) supplied by Generators and Transformers

The increased power factor also determines an increase of the Active Power (kW) available to Generator and Transformer terminals, since these machines, exempted from the burden of producing reactive power, can at minimum deliver as much active power as is their apparent power (kVA) by means of power correction.

Capacitors

Why Nitrogen Gas insulation?

While the winding of any single-phase or three-phase capacitor is made with a metallised polypropylene film, there are three different possible types of filling.

Viscous resin/oil and bimetallic paper are the "classic" filling systems for single-phase and three-phase capacitors. The aforementioned filling systems do not guarantee against:

- Air/moisture infiltration inside the cylinder, which is the main cause of capacitor breakage
- Fire propagation
- Failure to activate the overpressure device with consequent explosion (viscous resin type)

Solutions?

Nitrogen gas (N₂) filling, used in our Three-phase Capacitors, has been for the past 20 years been the most reliable, safe and long-lasting technology.

Nitrogen gas (N₂) capacitors have been tested and approved by renowned certification bodies and are currently marketed and sold successfully all over the world.

It should however be noted that technical competence and know-how are the only key factors to guaranteeing a safe and reliable product.



kVAr produced since 2003
6 million



Capacitor faults
0,00001 %



Standard warranty
on Capacitors
24 months

The 7-step filling process

One of the main problems that needs solving in capacitor production processes is moisture. It requires adequate attention during the filling phase, since the presence of moisture inside the cylinder substantially compromises the life of the capacitor.

With cylinder filling in Nitrogen Gas (N2), possible air/humidity infiltration is entirely avoided, because **Nitrogen is a “dry type” gas and therefore without moisture**.

Nitrogen in fact is also used in other specific areas, for example for removing the same moisture from various conductors/pipes.

In addition, **Nitrogen is a non-flammable gas** and therefore the risk of a probable fire due to Capacitor failure is also eliminated.

These characteristics mean that the Capacitors are constructed following an excellent quality standard already from the production process, which is then reflected in the application phase.

Step 1

The windings (pre-assembled) are positioned in the cylinder.



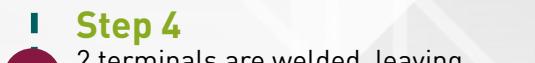
Step 3

The capacitors are placed in the “drying chamber”.



Step 2

The (fixed) cover is positioned on the cylinder and wiring is inserted from the holes on the IP20 terminal.



Step 4

2 terminals are welded, leaving only the central terminal open.

Step 5

The capacitors are filled with Nitrogen Gas (N2) from the central terminal, which is immediately welded.



Step 6

The capacitors are placed in the “test room” to detect any possible gas leaks. The hermetic sealing is a measure that prevents leaks and testing checks the seal.



Step 7

Thanks to a special tracer gas, each individual capacitor is tested in conditions that far exceed the real leak conditions. We have not for the past 20 years have any reports in the field of moisture penetration or consequent loss of capacity.

Calculation of reactive power

Automatic Power Factor Correction Systems

Necessary data

✓ Active Power (kW)

✓ Initial Cos φ (also deduced from the Active and Reactive Energy consumed)

✓ Desired Cos φ

Calculation

$$Q = P * k$$

Q: Necessary reactive power

P: Active Power (kW)

K: Cos φ coefficient from the table

Example

Plant with active power 650 kW and initial Cos φ 0.75, to be brought to 0.95.

What is the necessary reactive power?

$$650 * 0,553 = 360 \text{ kVAr}$$

It is advisable to oversize the necessary reactive power by 15-20% in order to maintain an average Cos φ of 0.95 even with load variations.

In this specific case, it would be advisable to propose an Automatic systems with power **400 kVAr**.

Initial Cos φ (also deduced from the Active and Reactive Energy consumed)	Desired Cos φ							
	0.90	0.92	0.94	0.95	0.96	0.98	1.00	
0.30	2.695	2.754	2.817	2.851	2.888	2.977	3.180	
0.35	2.192	2.250	2.313	2.348	2.385	2.473	2.676	
0.40	1.807	1.865	1.928	1.963	2.000	2.088	2.291	
0.45	1.500	1.559	1.622	1.656	1.693	1.781	1.985	
0.50	1.248	1.306	1.369	1.403	1.440	1.529	1.732	
0.55	1.034	1.092	1.156	1.190	1.227	1.315	1.518	
0.60	0.849	0.907	0.970	1.005	1.042	1.130	1.333	
0.65	0.685	0.743	0.806	0.840	0.877	0.966	1.169	
0.70	0.536	0.594	0.657	0.692	0.729	0.817	1.020	
0.75	0.398	0.456	0.519	0.553	0.590	0.679	0.882	
0.80	0.266	0.324	0.387	0.421	0.458	0.547	0.750	
0.85	0.135	0.194	0.257	0.291	0.328	0.417	0.620	
0.90	-	0.058	0.121	0.156	0.193	0.281	0.484	
0.95	-	-	-	-	0.037	0.126	0.329	

TELEGROUP sizes its Boards to a Cos φ of 0.98.

Fix PFCs

MV/LV Transformers and Asynchronous Motors

Compensation of MV/LV Trafo

For economic reasons, it is advisable to compensate the reactive power that the Transformer absorbs for the magnetisation of the core and for the winder reactors. The choice of Reactive power can be made based on the table below.

Compensation of Asynchronous motors

The reactive power necessary for the power factor correction of Asynchronous Motors is chosen from the following table. It is always advisable in these situations to take into account the possible self-excitation of the capacitors, which is why the installation of an automatic board rather than a fixed one is preferred.

It is always advisable in these situations to take into account possible operation of the Motor as a self-excited generator, and this can result in voltages that are considerably higher than those of the network.

Power (kVA)	Type	
	Oil kVAr	Resin kVAr
100	5	2.5
160	7	4
200	7.5	5
250	8	7.5
315	10	7.5
400	12.5	8
500	15	10
630	17.5	12.5
800	20	15
1000	25	17.5
1250	30	20
1600	35	22
2000	40	25
2500	60	35
3150	60	50

Power		Necessary reactive power (kVAr)				
HP	kW	3000 rpm	1500 rpm	1000 rpm	750 rpm	500 rpm
10	7.38	3	3	4	4	5
15	11	4	5	5	6	6
30	22.1	10	10	10	12	15
50	36.8	15	20	20	25	25
100	73.6	25	30	30	30	40
150	110	30	40	40	50	60
200	147	40	50	50	60	70
250	184	50	60	60	70	80

r40

	24h	8h	30m	15m	5m	1m	Peak
Vmax	440	510	520		530	575	1350
I _{max}	2In		3In	4In			10 In

Rated voltage	400 ÷ 440 V
Frequency	50 Hz
Capacitors Voltage	440 V
Capacitors Voltage max	485 V
THDi max	≤ 15 %
Typology of Capacitors	MKP440R
PFC Controller	PCRL
Temperature class (PFC unit)	-25 / +65°C
Insulation voltage (PFC Unit)	690 V
Max overload (PFC unit)	1,3 In
Total losses (PFC unit)	< 2 W/kvar
Reference standards (PFC unit)	EN61921, EN61439-1
Reference standards (Capacitors)	IEC60831-1/2



Technical Features

Capacitors Three-phase metallized polypropylene Capacitors with Resin insulation, MKP440R Series, Rated Voltage 440 V, Insulation Voltage 690 V, equipped with discharge resistors, overpressure safety device and IP20 terminals. Dielectric losses < 0,2W/kVAr. Reference Standards IEC60831-1/2, UL N.810, CSA

Three-Pole Contactors for capacitor banks, with high number of insertions (>250.000)

- 3-pole mains and 1 built-in auxiliary contact
- block for serial insertion in the circuit of 3 resistors that limit the peak current at the excitation of the condenser battery. Reference standards IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1

Automatic PFC Microprocessor Controller PCRL Series, completed with backlit multilingual LCD Display in 6 languages (Ita, Eng, Deu, Fra, Esp, Por), with the following features: Operation on 4 Quadrants for cogeneration systems, Automatic Recognition of the direction of the current, RMS Voltage and Current, Uniform the use of each Bank / Status of each Bank / Weekly Power Factor, Capacitors overload, Overtemperature, Network THD, AUT / MAN, Protection for overcurrent, overvoltage and overtemperature and micro-interruptions, Setting of Maintenance Program/Advise by month/year

Sheet-steel enclosure 15 and 20/10, painted with epoxy dust paint, colour RAL7035 (others on request). Internal setting in mounting plate ($\leq 112,5$ kVAr) and connection through power cables as per CEI20/22/II e CEI EN 50627-2-1, or Modular Racks ($\geq 112,5$ kVAr), connected through aluminium busbar system (**Type Tested KEMA ref. 5189-16 Icw 50 kA for 1 sec.**). Protection degree IP30 external (IP54 on request), IP00 internal (IP20 with open doors on live parts)

Three-pole Switch Disconnector with door interlock, sized 1,5 time the nominal current of PFC Unit as per EN61921

NH00 Fuses 100 kA for the protection of each capacitor bank. Auxiliary circuits are protected through 10,3 x 38 Fuses

Single phase transformer for separating the power circuit from the auxiliary circuit (220 Vac, others on request).

Ventilation Natural up to 300 kVAr / Forced over 300 kvar, with Fan + Thermostat connected with PFC Controller for alarm signal and switch off contactors in case of overtemperature (natural operation up to 35°C; forced ventilation from 35°; with a temperature of 50°, the PFC will be switched off)

Standard configuration

Code	kvar			Banks					Steps	PCRL	Switch. ¹ (A)	Icc (kA) ²	Cabinet	Weight (Kg)
	400 V	415 V	440 V	400 V										
TLR40 12.5	12,5	13	15	2,5	5	5			5	5	80	1,5	CR5	18
TLR40 17.5	17,5	19	21	2,5	5	10			7	5	80	1,5	CR5	19
TLR40 20	20	22	24	5	5	10			4	5	80	1,5	CR5	20
TLR40 22.5	22,5	24	27	2,5	5	5	10		9	5	80	1,5	CR5	22
TLR40 25	25	27	30	5	10	10			5	5	80	1,5	CR5	21
TLR40 27.5	27,5	30	33	2,5	5	10	10		11	5	80	1,5	CR5	23
TLR40 35	35	38	42	5	10	20			7	5	80	1,5	CR5	24
TLR40 37.5	37,5	40	45	2,5	5	10	20		15	5	80	1,5	CR5	25
TLR40 40	40	43	48	10	10	20			4	5	80	1,5	CR5	26
TLR40 45	45	48	54	5	10	10	20		9	5	125	2,5	CR5	37
TLR40 50	50	54	61	10	20	20			5	5	125	2,5	CR5	27
TLR40 55	55	59	67	5	10	20	20		11	5	125	2,5	CR5	39
TLR40 65	65	70	79	5	10	20	30		13	5	160	8	CR1	41
TLR40 70	70	75	85	10	20	20	20		7	5	160	8	CR1	42
TLR40 75	75	81	91	5	10	20	40		15	5	160	8	CR1	43
TLR40 87.5	87,5	94	106	12,5	25	25	25		7	5	250	15	CR100	45
TLR40 93.75	93,75	101	113	6,25	12,5	25	50		15	5	250	15	CR100	46
TLR40 100	100	108	121	12,5	12,5	25	50		8	5	250	15	CR100	47
TLR40 112.5	112,5	121	136	12,5	25	25	50		9	5	250	15	CR08	48
TLR40 125	125	135	151	12,5	25	37,5	50		10	5	250	15	CR08	49
TLR40 150	150	161	182	12,5	25	37,5	75		12	5	315	15	CR08	66
TLR40 162.5	162,5	175	197	12,5	25	50	75		13	5	400	15	CR08	67
TLR40 175	175	188	212	25	50	50	50		7	5	400	15	CR08	69
TLR40 187.5	187,5	202	227	12,5	25	50	50	50	15	7	400	15	CR08	70
TLR40 200	200	215	242	25	50	50	75		8	5	400	15	CR08	72
TLR40 225	225	242	272	25	50	50	50	50	9	7	500	15	CR14	77
TLR40 250	250	269	303	25	25	50	50	100	10	7	500	15	CR14	78
TLR40 275	275	296	333	25	50	50	50	100	11	7	630	20	CR14	79
TLR40 300	300	323	363	25	25	50	100	100	12	7	630	20	CR14	80
TLR40 325	325	350	393	25	50	50	100	100	13	7	800	20	CR14	159
TLR40 350	350	377	424	50	100	100	100		7	7	800	20	CR14	162
TLR40 375	375	404	454	25	50	100	100	100	15	7	800	20	CR46	178
TLR40 400	400	431	484	50	50	100	100	100	8	7	800	20	CR46	180
TLR40 450	450	484	545	50	100	100	100	100	9	7	1000	50	CR46	185
TLR40 500	500	538	605	50	50	100	100	100	10	8	1000	50	CR46	190
TLR40 600	600	646	726	50	50	100	100	200	12	8	1250	50	CR256	230
TLR40 650	650	700	787	50	100	100	200	100	13	8	1600	50	CR256	245
TLR40 700	700	753	847	50	50	100	100	200	14	8	1600	50	CR256	370
TLR40 750	750	807	908	50	100	100	100	200	15	8	1600	50	CR256	385

Other technical features and optional please check pag. 36-37

r46

		24h	8h	30m	15m	5m	1m	Peak
	Vmax	460	520	535		555	600	1410
	Imax	2In		3In	4In			10 In
Rated voltage	400 ÷ 460 V							
Frequency	50 Hz							
Capacitors Voltage	460 V							
Capacitors Voltage max	510 V							
THDi max	≤ 19 %							
Typology of Capacitors	MKP460R							
PFC Controller	PCRL							
Temperature class (PFC unit)	-25 / +65°C							
Insulation voltage (PFC Unit)	690 V							
Max overload (PFC unit)	1,3 In							
Total losses (PFC unit)	< 2 W/kvar							
Reference standards (PFC unit)	EN61921, EN61439-1							
Reference standards (Capacitors)	IEC60831/1-2							



Technical Features

Capacitors Three-phase metallized polypropylene Capacitors with Resin insulation, MKP460R Series, Rated Voltage 460 V, Insulation Voltage 690 V, equipped with discharge resistors, overpressure safety device and IP20 terminals. Dielectric losses < 0,2W/kVar. Reference Standards IEC60831-1/2, UL N.810, CSA

Three-Pole Contactors for capacitor banks, with high number of insertions (>250.000)

- 3-pole mains and 1 built-in auxiliary contact
- block for serial insertion in the circuit of 3 resistors that limit the peak current at the excitation of the condenser battery. Reference standards IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1

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Single phase transformer for separating the power circuit from the auxiliary circuit (220 Vac, others on request).

Ventilation Natural up to 300 kVAr / Forced over 300 kvar, with Fan + Thermostat connected with PFC Controller for alarm signal and switch off contactors in case of overtemperature (natural operation up to 35°C; forced ventilation from 35°; with a temperature of 50°, the PFC will be switched off)

Standard configuration ||

Code	kvar			Banks					Steps	PCRL	Switch. ¹ (A)	Icc (kA) ²	Cabinet	Weight (Kg)	
	400 V	415 V	460 V	400 V											
TLR46 12.5	12,5	13	17	2,5	5	5			5	5	80	1,5	CR5	18	
TLR46 17.5	17,5	19	23	2,5	5	10			7	5	80	1,5	CR5	19	
TLR46 20	20	22	26	5	5	10			4	5	80	1,5	CR5	20	
TLR46 22.5	22,5	24	30	2,5	5	5	10		9	5	80	1,5	CR5	22	
TLR46 25	25	27	33	5	10	10			5	5	80	1,5	CR5	21	
TLR46 27.5	27,5	30	36	2,5	5	10	10		11	5	80	1,5	CR5	23	
TLR46 35	35	38	46	5	10	20			7	5	80	1,5	CR5	24	
TLR46 37.5	37,5	40	50	2,5	5	10	20		15	5	80	1,5	CR5	25	
TLR46 40	40	43	53	10	10	20			4	5	80	1,5	CR5	26	
TLR46 45	45	48	60	5	10	10	20		9	5	125	2,5	CR5	37	
TLR46 50	50	54	66	10	20	20			5	5	125	2,5	CR5	27	
TLR46 55	55	59	73	5	10	20	20		11	5	125	2,5	CR5	39	
TLR46 65	65	70	86	5	10	20	30		13	5	160	8	CR1	41	
TLR46 70	70	75	93	10	20	20	20		7	5	160	8	CR1	42	
TLR46 75	75	81	99	5	10	20	40		15	5	160	8	CR1	43	
TLR46 87.5	87,5	94	116	12,5	25	25	25		7	5	250	15	CR100	45	
TLR46 93.75	93,75	101	124	6,25	12,5	25	50		15	5	250	15	CR100	46	
TLR46 100	100	108	132	12,5	12,5	25	50		8	5	250	15	CR100	47	
TLR46 112.5	112,5	121	149	12,5	25	25	50		9	5	250	15	CR08	48	
TLR46 125	125	135	165	12,5	25	37,5	50		10	5	250	15	CR08	49	
TLR46 150	150	161	198	12,5	25	37,5	75		12	5	315	15	CR08	66	
TLR46 162.5	162,5	175	215	12,5	25	50	75		13	5	400	15	CR08	67	
TLR46 175	175	188	231	25	50	50	50		7	5	400	15	CR08	69	
TLR46 187.5	187,5	202	248	12,5	25	50	50	50	15	7	400	15	CR08	70	
TLR46 200	200	215	265	25	50	50	75		8	5	400	15	CR08	72	
TLR46 225	225	242	298	25	50	50	50	50	9	7	500	15	CR14	77	
TLR46 250	250	269	331	25	25	50	50	100	10	7	500	15	CR14	78	
TLR46 275	275	296	364	25	50	50	50	100	11	7	630	20	CR14	79	
TLR46 300	300	323	397	25	25	50	100	100	12	7	630	20	CR14	80	
TLR46 325	325	350	430	25	50	50	100	100	13	7	800	20	CR14	159	
TLR46 350	350	377	463	50	100	100	100		7	7	800	20	CR14	162	
TLR46 375	375	404	496	25	50	100	100	100	15	7	800	20	CR46	178	
TLR46 400	400	431	529	50	50	100	100	100	8	7	800	20	CR46	180	
TLR46 450	450	484	595	50	100	100	100	100	9	7	1000	50	CR46	185	
TLR46 500	500	538	661	50	50	100	100	100	10	8	1000	50	CR46	190	
TLR46 600	600	646	794	50	50	100	100	200	100	12	8	1250	50	CR256	230
TLR46 650	650	700	860	50	100	100	100	200	100	13	8	1600	50	CR256	245
TLR46 700	700	753	926	50	50	100	100	200	200	14	8	1600	50	CR256	370
TLR46 750	750	807	992	50	100	100	100	200	200	15	8	1600	50	CR256	385

Other technical features and optional please check pag. 36-37



	24h	8h	30m	15m	5m	1m	Peak
Vmax	440	485	520		530	575	1350
I_{max}	3In		4In	5In			10 In

Rated voltage	400 ÷ 440 V
Frequency	50 Hz
Capacitors Voltage	440 V
Capacitors Voltage max	485 V
THDi max	≤ 25 %
Typology of Capacitors	MKP440G
PFC Controller	PCRL
Temperature class (PFC unit)	-25 / +65°C
Insulation voltage (PFC Unit)	690 V
Max overload (PFC unit)	1,3 In
Total losses (PFC unit)	< 2 W/kvar
Reference standards (PFC unit)	EN61921, EN61439-1
Reference standards (Capacitors)	IEC60831/1-2



Technical Features

Capacitors Three-phase metallized polypropylene Capacitors with Nitrogen Gas (N2) insulation, "dry type", MKP440G Series, Rated Voltage 440 V, Insulation Voltage 690 V, equipped with discharge resistors, overpressure safety device and IP20 terminals. Dielectric losses < 0,2W/kVAr. Reference Standards IEC60831-1/2, UL N.810, CSA

Three-Pole Contactors for capacitor banks, with high number of insertions (>250.000)

- 3-pole mains and 1 built-in auxiliary contact
- block for serial insertion in the circuit of 3 resistors that limit the peak current at the excitation of the condenser battery. Reference standards IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1

Automatic PFC Microprocessor Controller PCRL Series, completed with backlit multilingual LCD Display in 6 languages (Ita, Eng, Deu, Fra, Esp, Por), with the following features: Operation on 4 Quadrants for cogeneration systems, Automatic Recognition of the direction of the current, RMS Voltage and Current, Uniform the use of each Bank / Status of each Bank / Weekly Power Factor, Capacitors overload, Overtemperature, Network THD, AUT / MAN, Protection for overcurrent, overvoltage and overtemperature and micro-interruptions, Setting of Maintenance Program/Advise by month/year

Sheet-steel enclosure 15 and 20/10, painted with epoxy dust paint, colour RAL7035 (others on request). Internal setting in mounting plate ($\leq 112,5 \text{ kVAr}$) and connection through power cables as per CEI20/22/II e CEI EN 50627-2-1, or Modular Racks ($\geq 112,5 \text{ kVAr}$), connected through aluminium busbar system (**Type Tested KEMA ref. 5189-16 Icw 50 kA for 1 sec.**). Protection degree IP30 external (IP54 on request), IP00 internal (IP20 with open doors on live parts)

Three-pole Switch Disconnector with door interlock, sized 1,5 time the nominal current of PFC Unit as per EN61921

NH00 Fuses 100 kA for the protection of each capacitor bank. Auxiliary circuits are protected through 10,3 x 38 Fuses

Single phase transformer for separating the power circuit from the auxiliary circuit (220 Vac, others on request).

Ventilation Natural up to 300 kVAr / Forced over 300 kvar, with Fan + Thermostat connected with PFC Controller for alarm signal and switch off contactors in case of overtemperature (natural operation up to 35°C; forced ventilation from 35°; with a temperature of 50°, the PFC will be switched off)

Standard configuration ||

Code	kvar			Banks					Steps	PCRL	Switch. ¹ (A)	Icc (kA) ²	Cabinet	Weight (Kg)
	400 V	415 V	440 V	400 V										
TLG44 12.5	12,5	13	15	2,5	5	5			5	5	80	1,5	CR5	18
TLG44 17.5	17,5	19	21	2,5	5	10			7	5	80	1,5	CR5	19
TLG44 20	20	22	24	5	5	10			4	5	80	1,5	CR5	20
TLG44 22.5	22,5	24	27	2,5	5	5	10		9	5	80	1,5	CR5	22
TLG44 25	25	27	30	5	10	10			5	5	80	1,5	CR5	21
TLG44 27.5	27,5	30	33	2,5	5	10	10		11	5	80	1,5	CR5	23
TLG44 35	35	38	42	5	10	20			7	5	80	1,5	CR5	24
TLG44 37.5	37,5	40	45	2,5	5	10	20		15	5	80	1,5	CR5	25
TLG44 40	40	43	48	10	10	20			4	5	80	1,5	CR5	26
TLG44 45	45	48	54	5	10	10	20		9	5	125	2,5	CR5	37
TLG44 50	50	54	61	10	20	20			5	5	125	2,5	CR5	27
TLG44 55	55	59	67	5	10	20	20		11	5	125	2,5	CR5	39
TLG44 65	65	70	79	5	10	20	30		13	5	160	8	CR1	41
TLG44 70	70	75	85	10	20	20	20		7	5	160	8	CR1	42
TLG44 75	75	81	91	5	10	20	40		15	5	160	8	CR1	43
TLG44 87.5	87,5	94	106	12,5	25	25	25		7	5	250	15	CR100	45
TLG44 93.75	93,75	101	113	6,25	12,5	25	50		15	5	250	15	CR100	46
TLG44 100	100	108	121	12,5	12,5	25	50		8	5	250	15	CR100	47
TLG44 112.5	112,5	121	136	12,5	25	25	50		9	5	250	15	CR08	48
TLG44 125	125	135	151	12,5	25	37,5	50		10	5	250	15	CR08	49
TLG44 150	150	161	182	12,5	25	37,5	75		12	5	315	15	CR08	66
TLG44 162.5	162,5	175	197	12,5	25	50	75		13	5	400	15	CR08	67
TLG44 175	175	188	212	25	50	50	50		7	5	400	15	CR08	69
TLG44 187.5	187,5	202	227	12,5	25	50	50	50	15	7	400	15	CR08	70
TLG44 200	200	215	242	25	50	50	75		8	5	400	15	CR08	72
TLG44 225	225	242	272	25	50	50	50	50	9	7	500	15	CR14	77
TLG44 250	250	269	303	25	25	50	50	100	10	7	500	15	CR14	78
TLG44 275	275	296	333	25	50	50	50	100	11	7	630	20	CR14	79
TLG44 300	300	323	363	25	25	50	100	100	12	7	630	20	CR14	80
TLG44 325	325	350	393	25	50	50	100	100	13	7	800	20	CR14	159
TLG44 350	350	377	424	50	100	100	100		7	7	800	20	CR14	162
TLG44 375	375	404	454	25	50	100	100	100	15	7	800	20	CR46	178
TLG44 400	400	431	484	50	50	100	100	100	8	7	800	20	CR46	180
TLG44 450	450	484	545	50	100	100	100	100	9	7	1000	50	CR46	185
TLG44 500	500	538	605	50	50	100	100	100	10	8	1000	50	CR46	190
TLG44 600	600	646	726	50	50	100	100	200	12	8	1250	50	CR256	230
TLG44 650	650	700	787	50	100	100	200	100	13	8	1600	50	CR256	245
TLG44 700	700	753	847	50	50	100	100	200	14	8	1600	50	CR256	370
TLG44 750	750	807	908	50	100	100	100	200	15	8	1600	50	CR256	385

Other technical features and optional please check pag. 36-37

g48

		24h	8h	30m	15m	5m	1m	Peak
	Vmax	480	530	555		580	625	1450
	I _{max}	3In		4In	5In			10 In
Rated voltage	400 ÷ 480 V							
Frequency	50 Hz							
Capacitors Voltage	480 V							
Capacitors Voltage max	530 V							
THDi max	≤ 25 %							
Typology of Capacitors	MKP480G							
PFC Controller	PCRL							
Temperature class (PFC unit)	-25 / +65°C							
Insulation voltage (PFC Unit)	690 V							
Max overload (PFC unit)	1,3 In							
Total losses (PFC unit)	< 2 W/kvar							
Reference standards (PFC unit)	EN61921, EN61439-1							
Reference standards (Capacitors)	IEC60831/1-2							



Technical Features

Capacitors Three-phase metallized polypropylene Capacitors with Nitrogen Gas (N2) insulation, "dry type", MKP480G Series, Rated Voltage 480 V, Insulation Voltage 690 V, equipped with discharge resistors, overpressure safety device and IP20 terminals. Dielectric losses < 0,2W/kVAr. Reference Standards IEC60831-1/2, UL N.810, CSA

Three-Pole Contactors for capacitor banks, with high number of insertions (>250.000)

- 3-pole mains and 1 built-in auxiliary contact
- block for serial insertion in the circuit of 3 resistors that limit the peak current at the excitation of the condenser battery. Reference standards IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1

Automatic PFC Microprocessor Controller PCRL Series, completed with backlit multilingual LCD Display in 6 languages (Ita, Eng, Deu, Fra, Esp, Por), with the following features: Operation on 4 Quadrants for cogeneration systems, Automatic Recognition of the direction of the current, RMS Voltage and Current, Uniform the use of each Bank / Status of each Bank / Weekly Power Factor, Capacitors overload, Overttemperature, Network THD, AUT / MAN, Protection for overcurrent, overvoltage and overtemperature and micro-interruptions, Setting of Maintenance Program/Advise by month/year

Sheet-steel enclosure 15 and 20/10, painted with epoxy dust paint, colour RAL7035 (others on request). Internal setting in mounting plate ($\leq 112,5 \text{ kVAr}$) and connection through power cables as per CEI20/22/II e CEI EN 50627-2-1, or Modular Racks ($\geq 112,5 \text{ kVAr}$), connected through aluminium busbar system (**Type Tested KEMA ref. 5189-16 Icw 50 kA for 1 sec.**). Protection degree IP30 external (IP54 on request)l, IP00 internal (IP20 with open doors on live parts)

Three-pole Switch Disconnector with door interlock, sized 1,5 time the nominal current of PFC Unit as per EN61921

NH00 Fuses 100 kA for the protection of each capacitor bank. Auxiliary circuits are protected through 10,3 x 38 Fuses

Single phase transformer for separating the power circuit from the auxiliary circuit (220 Vac, others on request).

Ventilation Natural up to 300 kVAr / Forced over 300 kvar, with Fan + Thermostat connected with PFC Controller for alarm signal and switch off contactors in case of overtemperature (natural operation up to 35°C; forced ventilation from 35°; with a temperature of 50°, the PFC will be switched off)

Standard configuration ■■

Code	kvar			Banks				Steps	PCRL	Switch. ¹ (A)	Icc (kA) ²	Cabinet	Weight (Kg)	
	400 V	415 V	480 V	400 V										
TLG48 63.25	63,25	68	91	5,75	11,5	23	23	11	7	160	8	CR100	42	
TLG48 80.5	80,5	87	116	11,5	23	23	23	7	7	160	8	CR100	44	
TLG48 92	92	99	132	23	23	46		4	7	250	15	CR100	46	
TLG48 103.5	103,5	111	149	11,5	23	23	46	9	7	250	15	CR08	48	
TLG48 115	115	124	166	11,5	23	34,5	46	10	7	250	15	CR14	49	
TLG48 126.5	126,5	136	182	11,5	23	46	46	11	7	315	15	CR14	65	
TLG48 138	138	149	199	11,5	23	23	34,5	46	12	7	315	15	CR14	67
TLG48 149.5	149,5	161	215	11,5	23	34,5	34,5	46	13	7	315	15	CR14	69
TLG48 184	184	198	265	11,5	23	34,5	46	69	16	7	400	15	CR14	72
TLG48 207	207	223	298	11,5	23	34,5	69	69	18	7	500	15	CR14	74
TLG48 230	230	248	331	23	23	46	69	69	10	7	500	15	CR14	77
TLG48 241.5	241,5	260	348	34,5	69	69	69		7	7	500	15	CR46	81
TLG48 276	276	297	397	23	46	46	69	92	12	7	630	20	CR46	132
TLG48 299	299	322	431	23	46	69	69	92	13	7	630	20	CR46	135
TLG48 322	322	347	464	23	46	46	69	138	14	7	800	20	CR46	142
TLG48 414	414	446	596	23	46	69	138	138	18	7	1000	50	CR46	150
TLG48 460	460	495	662	46	46	92	138	138	10	7	1000	50	CR46	161

Other technical features and optional please check pag. 36-37

r48 filter

Automatic Power Factor Correction systems
with detuning chokes 189 Hz (p=7%)

	24h	8h	30m	15m	5m	1m	Peak
Vmax	480	530	555		580	625	1450
Imax	2In		3In	4In			10 In

Rated voltage	400 ÷ 415 V
Frequency	50 Hz
Capacitors Voltage	480 V
Capacitors Voltage max	530 V
THDi max	100 %
Typology of Capacitors	MKP480R
PFC Controller	PCRL
Temperature class (PFC unit)	-25 / +65°C
Insulation voltage (PFC Unit)	690 V
Max overload (PFC unit)	1,3 In
Total losses (PFC unit)	< 2 W/kvar
Reference standards (PFC unit)	EN61921, EN61439-1
Reference standards (Capacitors)	IEC60831/1-2



Technical Features

Capacitors Three-phase metallized polypropylene Capacitors with Resin insulation, MKP480R Series, Rated Voltage 480 V, Insulation Voltage 690 V, equipped with discharge resistors, overpressure safety device and IP20 terminals. Dielectric losses < 0,2W/kVar. Reference Standards IEC60831-1/2, UL N.810, CSA

Detuning Chokes made of copper/aluminum sheet oriented crystals, placed in series between the contactor and the capacitor bank, with the following features: linearity 1.8 lp/ln, realized in class H, over temperature range: 60°C, complete with thermal probe for switching off Capacitors Banks in case of overtemperature, limit the peak current inrush capacitors, detuning frequency 189 Hz (p=7%), standard for 5th Harmonic

Three-Pole Contactors for capacitor banks, with high number of insertions (>250.000)

- 3-pole mains and 1 built-in auxiliary contact
- block for serial insertion in the circuit of 3 resistors that limit the peak current at the excitation of the condenser battery. Reference standards IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1

Automatic PFC Microprocessor Controller PCRL Series, completed with backlit multilingual LCD Display in 6 languages (Ita, Eng, Deu, Fra, Esp, Por), with the following features: Operation on 4 Quadrants for cogeneration systems, Automatic Recognition of the direction of the current, RMS Voltage and Current, Uniform the use of each Bank / Status of each Bank / Weekly Power Factor, Capacitors overload, Overtemperature, Network THD, AUT / MAN, Protection for overcurrent, overvoltage and overtemperature and micro-interruptions, Setting of Maintenance Program/Advise by month/year

Sheet-steel enclosure 15 and 20/10, painted with epoxy dust paint, colour RAL7035 (others on request). Internal setting in Modular Racks connected through aluminium busbar system (**Type Tested KEMA ref. 5189-16 Icw 50 kA for 1 sec.**). Protection degree IP30 external (IP54 on request), IP00 internal (IP20 with open doors on live parts)

Three-pole Switch Disconnector with door interlock, sized 1,5 time the nominal current of PFC Unit as per EN61921

NH00 Fuses 100 kA for the protection of each capacitor bank. Auxiliary circuits are protected through 10,3 x 38 Fuses

Single phase transformer for separating the power circuit from the auxiliary circuit (220 Vac, others on request).

Ventilation Forced with Fan + Thermostat connected with PFC Controller for alarm signal and switch off contactors in case of overtemperature (natural operation up to 35°C; forced ventilation from 35°; with a temperature of 50°, the PFC will be switched off)

Automatic Power Factor Correction systems with detuning chokes 189 Hz (p=7%)

Standard configuration

Code	kVAr		Banks						Steps	PCRL	Switch. ¹ (A)	Icc (kA) ²	Cabinet	Weight (Kg)
	400 V	415 V	400 V											
TLFR48 18	18,75	20	3,125	3,125	6,25	6,25			6	7	160	8	CR08	95
TLFR48 21	21,875	24	3,125	6,25	6,25	6,25			7	7	160	8	CR08	102
TLFR48 25	25	27	3,125	3,125	6,25	12,5			8	7	160	8	CR08	125
TLFR48 25/1	25	27	6,25	6,25	12,5				4	5	160	8	CR08	110
TLFR48 31	31,25	34	6,25	12,5	12,5				5	5	160	8	CR08	115
TLFR48 43	43,75	47	6,25	12,5	12,5	12,5			7	7	160	8	CR08	127
TLFR48 50	50	54	6,25	6,25	12,5	25			8	7	160	8	CR10	128
TLFR48 50/1	50	54	12,5	12,5	25				4	5	160	8	CR10	120
TLFR48 56	56,25	61	6,25	12,5	12,5	25			9	7	160	8	CR10	130
TLFR48 75/1	75	81	12,5	12,5	25	25			6	7	160	8	CR10	143
TLFR48 75/2	75	81	25	25	25				3	5	160	8	CR10	135
TLFR48 81	81,25	87	6,25	12,5	12,5	25	25		13	7	250	15	CR14	138
TLFR48 87.5	87,5	94	12,5	25	25	25			7	7	250	15	CR10	140
TLFR48 100/1	100	108	12,5	12,5	25	50			8	7	250	15	CR14	145
TLFR48 100/2	100	108	25	25	50				4	5	250	15	CR10	152
TLFR48 125/1	125	135	25	25	25	50			5	7	315	15	CR14	145
TLFR48 150	150	161	12,5	12,5	25	50	50		12	7	315	15	CR46	230
TLFR48 150/1	150	161	25	25	50	50			6	7	315	15	CR14	165
TLFR48 175/1	175	188	25	50	50	50			7	7	400	15	CR46	270
TLFR48 200/1	200	215	25	25	50	100			8	7	400	15	CR46	285
TLFR48 225	225	242	25	50	50	50	50		9	7	500	20	CR46	300
TLFR48 250	250	269	25	25	50	50	100		10	7	500	20	CR46	330
TLFR48 250/1	250	269	50	50	50	50	50		5	7	500	20	CR46	330
TLFR48 275	275	296	25	50	50	50	100		11	7	630	20	CR46	350
TLFR48 300	300	323	25	25	50	100	100		12	7	630	20	CR46	370
TLFR48 300/1	300	323	50	50	50	50	100		6	7	630	20	CR46	370
TLFR48 350/1	350	380	377	50	50	50	100	100	7	7	800	20	CR256	440
TLFR48 375	375	408	404	25	50	100	100	100	15	7	800	20	CR256	450
TLFR48 400/1	400	435	431	50	50	100	100	100	8	7	800	20	CR256	480
TLFR48 450	450	489	484	50	50	50	100	100	9	8	1000	50	CR412	630
TLFR48 475	475	516	511	25	50	100	100	100	19	8	1000	50	CR412	640
TLFR48 500	500	543	538	50	50	100	100	100	10	8	1000	50	CR356	660
TLFR48 500/1	500	543	538	50	50	100	100	100	10	8	1000	50	CR412	650
TLFR48 550	550	598	592	50	100	100	100	100	11	8	2x630	20	CR412	680
TLFR48 600	600	652	646	50	50	100	100	100	12	8	2x630	20	CR412	710
TLFR48 700	700	761	753	50	50	100	100	200	14	8	2x800	20	CR506	790
TLFR48 750	750	815	807	50	100	100	200	200	15	8	2x800	20	CR506	820
TLFR48 800	800	870	861	50	50	100	200	200	16	8	2x800	20	CR506	835
TLFR48 900	900	978	969	50	50	100	100	200	18	10	3x630	20	CR756	890
TLFR48 1000	1000	1087	1076	100	100	200	200	200	10	8	3x800	20	CR756	990

Other technical features and optional please check pag. 36-37

g48 filter

Automatic Power Factor Correction systems
with detuning chokes 189 Hz (p=7%)

	24h	8h	30m	15m	5m	1m	Peak
Vmax	480	530	555		580	625	1450
Imax	3In		4In	5In			10 In

Rated voltage	400 ÷ 415 V
Frequency	50 Hz
Capacitors Voltage	480 V
Capacitors Voltage max	530 V
THDi max	100 %
Typology of Capacitors	MKP480G
PFC Controller	PCRL
Temperature class (PFC unit)	-25 / +65°C
Insulation voltage (PFC Unit)	690 V
Max overload (PFC unit)	1,3 In
Total losses (PFC unit)	< 2 W/kvar
Reference standards (PFC unit)	EN61921, EN61439-1
Reference standards (Capacitors)	IEC60831/1-2



Technical Features

Capacitors Three-phase metallized polypropylene Capacitors with Nitrogen Gas (N2) insulation, "dry type", MKP480G Series, Rated Voltage 480 V, Insulation Voltage 690 V, equipped with discharge resistors, overpressure safety device and IP20 terminals. Dielectric losses < 0,2W/kVAr. Reference Standards IEC60831-1/2, UL N.810, CSA

Detuning Chokes made of copper/aluminum sheet oriented crystals, placed in series between the contactor and the capacitor bank, with the following features: linearity 1.8 Ip/ln, realized in class H, over temperature range: 60°C, complete with thermal probe for switching off Capacitors Banks in case of overtemperature, limit the peak current inrush capacitors, detuning frequency 189 Hz (p=7%), standard for 5th Harmonic

Three-Pole Contactors for capacitor banks, with high number of insertions (>250.000)

- 3-pole mains and 1 built-in auxiliary contact
- block for serial insertion in the circuit of 3 resistors that limit the peak current at the excitation of the condenser battery. Reference standards IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1

Automatic PFC Microprocessor Controller PCRL Series, completed with backlit multilingual LCD Display in 6 languages (Ita, Eng, Deu, Fra, Esp, Por), with the following features: Operation on 4 Quadrants for cogeneration systems, Automatic Recognition of the direction of the current, RMS Voltage and Current, Uniform the use of each Bank / Status of each Bank / Weekly Power Factor, Capacitors overload, Overtemperature, Network THD, AUT / MAN, Protection for overcurrent, overvoltage and overtemperature and micro-interruptions, Setting of Maintenance Program/Advise by month/year

Sheet-steel enclosure 15 and 20/10, painted with epoxy dust paint, colour RAL7035 (others on request). Internal setting in Modular Racks connected through aluminium busbar system (**Type Tested KEMA ref. 5189-16 Icw 50 kA for 1 sec.**). Protection degree IP30 external (IP54 on request), IP00 internal (IP20 with open doors on live parts)

Three-pole Switch Disconnector with door interlock, sized 1,5 time the nominal current of PFC Unit as per EN61921

NH00 Fuses 100 kA for the protection of each capacitor bank. Auxiliary circuits are protected through 10,3 x 38 Fuses

Single phase transformer for separating the power circuit from the auxiliary circuit (220 Vac, others on request).

Ventilation Forced with Fan + Thermostat connected with PFC Controller for alarm signal and switch off contactors in case of overtemperature (natural operation up to 35°C; forced ventilation from 35°; with a temperature of 50°, the PFC will be switched off)

Automatic Power Factor Correction systems with detuning chokes 189 Hz (p=7%)

Standard configuration ||

Code	kVAr		Banks						Steps	PCRL	Switch. ¹ (A)	Icc (kA) ²	Cabinet	Weight (Kg)
	400 V	415 V	400 V											
TLFG48 18	18,75	20	3,125	3,125	6,25	6,25			6	7	160	8	CR08	95
TLFG48 21	21,875	24	3,125	6,25	6,25	6,25			7	7	160	8	CR08	102
TLFG48 25	25	27	3,125	3,125	6,25	12,5			8	7	160	8	CR08	125
TLFG48 25/1	25	27	6,25	6,25	12,5				4	5	160	8	CR08	110
TLFG48 31	31,25	34	6,25	12,5	12,5				5	5	160	8	CR08	115
TLFG48 43	43,75	47	6,25	12,5	12,5	12,5			7	7	160	8	CR08	127
TLFG48 50	50	54	6,25	6,25	12,5	25			8	7	160	8	CR10	128
TLFG48 50/1	50	54	12,5	12,5	25				4	5	160	8	CR10	120
TLFG48 56	56,25	61	6,25	12,5	12,5	25			9	7	160	8	CR10	130
TLFG48 75/1	75	81	12,5	12,5	25	25			6	7	160	8	CR10	143
TLFG48 75/2	75	81	25	25	25				3	5	160	8	CR10	135
TLFG48 81	81,25	87	6,25	12,5	12,5	25	25		13	7	250	15	CR14	138
TLFG48 87.5	87,5	94	12,5	25	25	25			7	7	250	15	CR10	140
TLFG48 100/1	100	108	12,5	12,5	25	50			8	7	250	15	CR14	145
TLFG48 100/2	100	108	25	25	50				4	5	250	15	CR10	152
TLFG48 125/1	125	135	25	25	25	50			5	7	315	15	CR14	145
TLFG48 150	150	161	12,5	12,5	25	50	50		12	7	315	15	CR46	230
TLFG48 150/1	150	161	25	25	50	50			6	7	315	15	CR14	165
TLFG48 175/1	175	188	25	50	50	50			7	7	400	15	CR46	270
TLFG48 200/1	200	215	25	25	50	100			8	7	400	15	CR46	285
TLFG48 225	225	242	25	50	50	50	50		9	7	500	20	CR46	300
TLFG48 250	250	269	25	25	50	50	100		10	7	500	20	CR46	330
TLFG48 250/1	250	269	50	50	50	50	50		5	7	500	20	CR46	330
TLFG48 275	275	296	25	50	50	50	100		11	7	630	20	CR46	350
TLFG48 300	300	323	25	25	50	100	100		12	7	630	20	CR46	370
TLFG48 300/1	300	323	50	50	50	50	100		6	7	630	20	CR46	370
TLFG48 350/1	350	380	377	50	50	50	100	100	7	7	800	20	CR256	440
TLFG48 375	375	408	404	25	50	100	100	100	15	7	800	20	CR256	450
TLFG48 400/1	400	435	431	50	50	100	100	100	8	7	800	20	CR256	480
TLFG48 450	450	489	484	50	50	100	100	100	9	8	1000	50	CR412	630
TLFG48 475	475	516	511	25	50	100	100	100	19	8	1000	50	CR412	640
TLFG48 500	500	543	538	50	50	100	100	100	10	8	1000	50	CR356	660
TLFG48 500/1	500	543	538	50	50	100	100	100	10	8	1000	50	CR412	650
TLFG48 550	550	598	592	50	100	100	100	100	11	8	2x630	20	CR412	680
TLFG48 600	600	652	646	50	50	100	100	100	12	8	2x630	20	CR412	710
TLFG48 700	700	761	753	50	50	100	100	200	14	8	2x800	20	CR506	790
TLFG48 750	750	815	807	50	100	100	100	200	15	8	2x800	20	CR506	820
TLFG48 800	800	870	861	50	50	100	200	200	16	8	2x800	20	CR506	835
TLFG48 900	900	978	969	50	50	100	100	200	18	10	3x630	20	CR756	890
TLFG48 1000	1000	1087	1076	100	100	200	200	200	10	8	3x800	20	CR756	990

Other technical features and optional please check pag. 36-37

g48 filter-T

Automatic PFC systems with detuning chokes
189 Hz (p=7%) and thyristor modules

	24h	8h	30m	15m	5m	1m	Peak
Vmax	480	530	555		580	625	1450
Imax	3In		4In	5In			10 In

Rated voltage	400 ÷ 415 V
Frequency	50 Hz
Capacitors Voltage	480 V
Capacitors Voltage max	530 V
THDi max	100 %
Typology of Capacitors	MKP480G
PFC Controller	PCRL
Temperature class (PFC unit)	-25 / +65°C
Insulation voltage (PFC Unit)	690 V
Max overload (PFC unit)	1,3 In
Total losses (PFC unit)	< 2 W/kvar
Reference standards (PFC unit)	EN61921, EN61439-1
Reference standards (Capacitors)	IEC60831/1-2

Technical Features

Capacitors Three-phase metallized polypropylene Capacitors with Nitrogen Gas (N2) insulation, "dry type", MKP480G Series, Rated Voltage 480 V, Insulation Voltage 690 V, equipped with discharge resistors, overpressure safety device and IP20 terminals. Dielectric losses < 0,2W/kVAr. Reference Standards IEC60831-1/2, UL N.810, CSA

Detuning Chokes made of copper/aluminum sheet oriented crystals, placed in series between the contactor and the capacitor bank, with the following features: linearity 1.8 lp/ln, realized in class H, over temperature range: 60°C, complete with thermal probe for switching off Capacitors Banks in case of overtemperature, limit the peak current inrush capacitors, detuning frequency 189 Hz (p=7%), standard for 5th Harmonic

The Thyristor is the intrinsic regulation organ in a Static Module and works in principle as an electronic switch that performs a switching process at each half of the power supply. The thyristors which form part of the module are "triggered" through a gate pulse; the current flows until its value falls below the value of the holding current, which in the alternating current circuits corresponds to the zero crossing of one of the two half-wave in the network. The Module consists of two phase Thyristors (one for the positive half-wave, the other for the negative one) connected in anti-parallel. The insertion of detuning capacitors and ballasts is thus accomplished without moving parts. The thyristors are commanded at the natural passage for the zero of the capacitor current. The capacitors are thus connected to the plant without significant transients; control is also such as to significantly limit harmonic emissions below the regulatory limits.

Automatic PFC Microprocessor Controller PCRJ Series, completed with backlit multilingual LCD Display in 10 languages with the following features: Operation on 4 Quadrants for cogeneration systems, Automatic Recognition of the direction of the current, RMS Voltage and Current, Uniform the use of each Bank / Status of each Bank / Weekly Power Factor, Capacitors overload, Overtemperature, Network THD, AUT / MAN, Protection for overcurrent, overvoltage and overtemperature and micro-interruptions, Setting of Maintenance Program/Advise by month/year

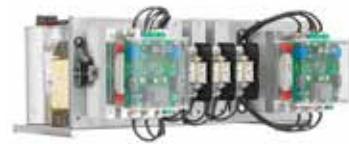
Sheet-steel enclosure 15 and 20/10, painted with epoxy dust paint, colour RAL7035 (others on request). Internal setting in Modular Racks connected through aluminium busbar system (**Type Tested KEMA ref. 5189-16 Icw 50 kA for 1 sec.**). Protection degree IP30 external (IP54 on request), IP00 internal (IP20 with open doors on live parts)

Three-pole Switch Disconnector with door interlock, sized 1,5 time the nominal current of PFC Unit as per EN61921

NH00 Fuses 100 kA for the protection of each capacitor bank. Auxiliary circuits are protected through 10,3 x 38 Fuses

Single phase transformer for separating the power circuit from the auxiliary circuit (220 Vac, others on request).

Ventilation Forced with Fan + Thermostat connected with PFC Controller for alarm signal and switch off contactors in case of overtemperature (natural operation up to 35°C; forced ventilation from 35°; with a temperature of 50°, the PFC will be switched off)



Automatic PFC systems with detuning chokes 189 Hz (p=7%) and thyristor modules

Standard configuration ■■

Code	kVAr		Banks					Steps	PCRL	Switch. ¹		Cabinet	Weight (Kg)	
	400 V	415 V	400 V							(A)	Icc (kA) ²			
TLFG48T 75	75	81	12,5	12,5	25	25		6	8	315	15	CR48	290	
TLFG48T 87,5	87,5	94	12,5	25	25	25		7	8	315	15	CR48	295	
TLFG48T 100	100	108	12,5	12,5	25	50		8	8	315	15	CR48	305	
TLFG48T 125	125	135	12,5	12,5	25	25	50	10	8	315	15	CR48	310	
TLFG48T 150	150	161	25	25	50	50		6	8	315	15	CR48	315	
TLFG48T 150/1	150	161	12,5	12,5	25	50	50	12	8	315	15	CR48	325	
TLFG48T 175	175	188	25	50	50	50		7	8	400	15	CR48	320	
TLFG48T 175/1	175	188	12,5	12,5	25	50	75	14	8	400	15	CR48	328	
TLFG48T 200	200	215	25	25	50	100		8	8	500	15	CR48	325	
TLFG48T 200/1	200	215	12,5	12,5	25	50	100	16	8	500	15	CR48	330	
TLFG48T 225	225	242	25	50	50	100		9	8	500	15	CR48	330	
TLFG48T 225/1	225	242	12,5	12,5	25	25	50	100	18	8	500	15	CR258	420
TLFG48T 250	250	269	25	25	50	50	100		10	8	630	20	CR48	385
TLFG48T 275	275	296	25	50	100	100		11	8	630	20	CR48	395	
TLFG48T 300	300	323	25	25	50	100	100		12	8	630	20	CR258	480
TLFG48T 325	325	350	25	50	50	100	100		13	8	800	20	CR258	515
TLFG48T 350	350	377	50	100	100	100		7	8	800	20	CR258	510	
TLFG48T 350/1	350	377	25	25	50	50	100	100	14	8	800	20	CR258	515
TLFG48T 375	375	404	25	50	50	50	100	100	15	8	800	20	CR258	525
TLFG48T 400	400	430	50	50	100	100	100		8	8	1000	50	CR258	520
TLFG48T 400/1	400	430	25	25	50	100	100	100	16	8	2x500	15	CR416	700
TLFG48T 450	450	484	50	100	100	100	100		9	8	2x630	15	CR416	720
TLFG48T 450/1	450	484	25	25	50	50	100	100	18	10	2x630	15	CR416	730
TLFG48T 475	475	511	25	50	100	100	100	100	19	8	2x630	15	CR416	725
TLFG48T 500	500	538	50	50	100	100	100	100	10	8	2x630	20	CR416	732
TLFG48T 525	525	565	25	50	100	100	100	100	21	10	2x630	20	CR416	738
TLFG48T 550	550	592	50	100	100	100	100	100	11	8	2x630	20	CR416	742
TLFG48T 600	600	646	50	50	100	100	100	200	12	8	2x630	20	CR416	750
TLFG48T 650	650	699	50	100	100	100	100	200	13	8	2x800	20	CR508	780
TLFG48T 700	700	753	50	50	100	100	200	200	14	8	2x800	20	CR508	790
TLFG48T 750	750	807	50	100	100	100	200	200	15	8	2x800	20	CR508	800
TLFG48T 800	800	861	50	50	100	200	200	200	16	8	2x1000	50	CR508	815
TLFG48T 850	850	915	50	100	100	200	200	200	17	8	3x630	20	CR758	910
TLFG48T 900	900	968	50	50	100	100	200	200	18	8	3x630	20	CR758	925
TLFG48T 950	950	1022	50	100	200	200	200	200	19	10	3x800	20	CR758	935
TLFG48T 1000	1000	1076	100	100	200	200	200	200	10	8	3x800	20	CR758	950

Other technical features and optional please check pag. 36-37

r46 Fix

Rated voltage	400 ÷ 460 V
Frequency	50 Hz
Capacitors Voltage	460 V
Capacitors Voltage max	520 V
THDi max	≤ 19 %
Typology of Capacitors	MKP460R
Temperature class (PFC unit)	-25 / +65°C
Insulation voltage (PFC Unit)	690 V
Max overload (PFC unit)	1,3 In
Total losses (PFC unit)	< 2 W/kvar
Reference standards (PFC unit)	EN61921, EN61439-1
Reference standards (Capacitors)	IEC60831/1-2

	24h	8h	30m	15m	5m	1m	Peak
Vmax	460	520	535		555	600	1410
Imax	2In		3In	4In			10 In



Technical Features

Capacitors Three-phase metallized polypropylene Capacitors with Resin insulation, MKP460R Series, Rated Voltage 460 V, Insulation Voltage 690 V, equipped with discharge resistors, overpressure safety device and IP20 terminals. Dielectric losses < 0,2W/kVar. Reference Standards IEC60831-1/2, UL N.810, CSA

Sheet-steel enclosure 15 and 20/10, painted with epoxy dust paint, colour RAL7035 (others on request). Internal setting in mounting plate and connection through power cables as per CEI20/22/II e CEI EN 50627-2-1. Protection degree IP30 external (IP54 on request)l, IP00 internal (IP20 with open doors on live parts)

Three-pole Switch Disconnector with door interlock, sized 1,5 time the nominal current of PFC Unit as per EN61921

NH00 Fuses 100 kA for the protection of each capacitor bank.

Ventilation Natural, thanks to the configuration of cabinets and the low losses of three-phase Capacitors (forced ventilation with fan on request)

Standard configuration

Code	400 V	kvar		Switch Disconnector		Cabinet	Weight (Kg)
		415 V	460 V	(A)	Icc (kA)²		
FTR46 5	5	5,38	6,61	80	1,5	CR5-F	14
FTR46 7.5	7,5	8,07	9,92	80	1,5	CR5-F	15
FTR46 10	10	10,76	13,22	80	1,5	CR5-F	16
FTR46 12.5	12,5	13,45	16,53	80	1,5	CR5-F	18
FTR46 15	15	16,14	19,83	80	1,5	CR5-F	19
FTR46 25	25	26,90	33,05	80	1,5	CR5-F	21
FTR46 50	50	53,80	66,10	125	2,5	CR5-F	23
FTR46 75	75	80,70	99,15	160	8	CR1	33

Other technical features and optional please check pag. 36-37

g44 fix

Rated voltage	400 ÷ 440 V
Frequency	50 Hz
Capacitors Voltage	440 V
Capacitors Voltage max	485 V
THDi max	≤ 15 %
Typology of Capacitors	MKP440G
Temperature class (PFC unit)	-25 / +65°C
Insulation voltage (PFC Unit)	690 V
Max overload (PFC unit)	1,3 In
Total losses (PFC unit)	< 2 W/kvar
Reference standards (PFC unit)	EN61921, EN61439-1
Reference standards (Capacitors)	IEC60831/1-2

	24h	8h	30m	15m	5m	1m	Peak
Vmax	440	485	520		530	575	1350
Imax	2In		3In	4In			10 In



Technical Features

Capacitors Three-phase metallized polypropylene Capacitors with Nitrogen Gas (N2) insulation, "dry type", MKP440G Series, Rated Voltage 440 V, Insulation Voltage 690 V, equipped with discharge resistors, overpressure safety device and IP20 terminals. Dielectric losses < 0,2W/kVar. Reference Standards IEC60831-1/2, UL N.810, CSA

Sheet-steel enclosure 15 and 20/10, painted with epoxy dust paint, colour RAL7035 (others on request). Internal setting in mounting plate and connection through power cables as per CEI20/22/II e CEI EN 50627-2-1. Protection degree IP30 external (IP54 on request), IP00 internal (IP20 with open doors on live parts)

Three-pole Switch Disconnector with door interlock, sized 1,5 time the nominal current of PFC Unit as per EN61921

NH00 Fuses 100 kA for the protection of each capacitor bank.

Ventilation Natural, thanks to the configuration of cabinets and the low losses of three-phase Capacitors (forced ventilation with fan on request)

Standard configuration ■■

Code	400 V	kvar		Switch Disconnector		Cabinet	Weight (Kg)	
		415 V	440 V	(A)	Icc (kA)²			
FTG44	5	5	5,38	6,05	80	1,5	CR5-F	14
FTG44	7.5	7,5	8,07	9,08	80	1,5	CR5-F	15
FTG44	10	10	10,76	12,10	80	1,5	CR5-F	16
FTG44	12.5	12,5	13,45	15,13	80	1,5	CR5-F	18
FTG44	15	15	16,14	18,15	80	1,5	CR5-F	19
FTG44	25	25	26,90	30,25	80	1,5	CR5-F	21
FTG44	50	50	53,80	60,50	125	2,5	CR5-F	23
FTG44	75	75	80,70	90,75	160	8	CR1	33

Other technical features and optional please check pag. 36-37

r48 filter-fix

Fix Power Factor Correction systems
with detuning chokes 189 Hz (p=7%)

Rated voltage	400 ÷ 415 V
Frequency	50 Hz
Capacitors Voltage	480 V
Capacitors Voltage max	530V
THDi max	≤ 19 %
Typology of Capacitors	MKP480R
Temperature class (PFC unit)	-25 / +65°C
Insulation voltage (PFC Unit)	690 V
Max overload (PFC unit)	1,3 In
Total losses (PFC unit)	< 2 W/kvar
Reference standards (PFC unit)	EN61921, EN61439-1
Reference standards (Capacitors)	IEC60831/1-2

	24h	8h	30m	15m	5m	1m	Peak
Vmax	480	530	555		580	625	1450
Imax	2In		3In	4In			10 In



Technical Features

Capacitors Three-phase metallized polypropylene Capacitors with Resin insulation, MKP480R Series, Rated Voltage 480 V, Insulation Voltage 690 V, equipped with discharge resistors, overpressure safety device and IP20 terminals. Dielectric losses < 0,2W/kVar. Reference Standards IEC60831-1/2, UL N.810, CSA

Detuning Chokes made of copper/aluminum sheet oriented crystals, placed in series between the contactor and the capacitor bank, with the following features: linearity 1.8 lp/ln, realized in class H, over temperature range: 60°C, complete with thermal probe for switching off Capacitors Banks in case of overtemperature, limit the peak current inrush capacitors, detuning frequency 189 Hz (p=7%), standard for 5th Harmonic

Sheet-steel enclosure 15 and 20/10, painted with epoxy dust paint, colour RAL7035 (others on request). Internal setting in mounting plate and connection through power cables as per CEI20/22/II e CEI EN 50627-2-1. Protection degree IP30 external (IP54 on request), IP00 internal (IP20 with open doors on live parts)

Three-pole Switch Disconnector with door interlock, sized 1,5 time the nominal current of PFC Unit as per EN61921

NH00 Fuses 100 kA for the protection of each capacitor bank.

Ventilation Natural, thanks to the configuration of cabinets and the low losses of three-phase Capacitors (forced ventilation with fan on request)

Standard configuration

Code		kvar		Switch Disconnector ¹		Cabinet	Weight (Kg)
		400 V	415 V	(A)	Icc (kA) ²		
FFTR48	12.5	12,5	13,45	80	1,5	CR5	35
FFTR48	25	25	26,90	80	1,5	CR1	46
FFTR48	50	50	53,80	125	2,5	CR100	65

Other technical features and optional please check pag. 36-37

g48 filter-fix

Fix Power Factor Correction systems
with detuning chokes 189 Hz (p=7%)

Rated voltage	400 ÷ 415 V
Frequency	50 Hz
Capacitors Voltage	480 V
Capacitors Voltage max	530 V
THDi max	≤ 25 %
Typology of Capacitors	MKP480G
Temperature class (PFC unit)	-25 / +65°C
Insulation voltage (PFC Unit)	690 V
Max overload (PFC unit)	1,3 In
Total losses (PFC unit)	< 2 W/kvar
Reference standards (PFC unit)	EN61921, EN61439-1
Reference standards (Capacitors)	IEC60831/1-2

	24h	8h	30m	15m	5m	1m	Peak
Vmax	480	530	555		580	625	1450
Imax	3In		4In	5In			10 In



Technical Features

Capacitors Three-phase metallized polypropylene Capacitors with Nitrogen Gas (N2) insulation, "dry type", MKP480G Series, Rated Voltage 480 V, Insulation Voltage 690 V, equipped with discharge resistors, overpressure safety device and IP20 terminals. Dielectric losses < 0,2W/kVAr. Reference Standards IEC60831-1/2, UL N.810, CSA

Detuning Chokes made of copper/aluminum sheet oriented crystals, placed in series between the contactor and the capacitor bank, with the following features: linearity 1.8 lp/ln, realized in class H, over temperature range: 60°C, complete with thermal probe for switching off Capacitors Banks in case of overtemperature, limit the peak current inrush capacitors, detuning frequency 189 Hz (p=7%), standard for 5th Harmonic

Sheet-steel enclosure 15 and 20/10, painted with epoxy dust paint, colour RAL7035 (others on request). Internal setting in mounting plate and connection through power cables as per CEI20/22/II e CEI EN 50627-2-1. Protection degree IP30 external (IP54 on request), IP00 internal (IP20 with open doors on live parts)

Three-pole Switch Disconnector with door interlock, sized 1,5 time the nominal current of PFC Unit as per EN61921

NH00 Fuses 100 kA for the protection of each capacitor bank.

Ventilation Natural, thanks to the configuration of cabinets and the low losses of three-phase Capacitors (forced ventilation with fan on request)

Standard configuration ||

Code		kvar		Switch Disconnector ¹		Cabinet	Weight (Kg)
		400 V	415 V	(A)	Icc (kA) ²		
FFTG48	12.5	12,5	13,45	80	1,5	CR5	35
FFTG48	25	25	26,90	80	1,5	CR1	46
FFTG48	50	50	53,80	125	2,5	CR100	65

Other technical features and optional please check pag. 36-37



Rated voltage	400 ÷ 440 V (R40Rack) 400 ÷ 460 V (R46Rack) 400 ÷ 415 V (R48Filter-Rack) 400 ÷ 440 V (R40Rack)
Frequency	50 Hz
Typology of Capacitors	MKPR
Temperature class (PFC unit)	-25 / +65°C
Insulation voltage (PFC Unit)	690 V
Max overload (PFC unit)	1,3 In
Total losses (PFC unit)	< 2 W/kvar
Reference standards (PFC unit)	EN61921, EN61439-1
Reference standards (Capacitors)	IEC60831/1-2



Technical Features

Modular Racks, equipped with Three-phase Oil filled Capacitors 440 V (R40Rack), 460 V, (R46Rack) and 480 V (R48Filter-Rack, with Detuning chokes 189 Hz p=7%), three-pole contactors, protection fuses and busbar system; **TELEGROUP' PFCs are type tested for short circuit withstand current (lcw 50 kA for 1 second, Test KEM- 5189-16)**. Protection degree IP00 (IP20 on request); the wiring is through FS17-450/750V cables as per EN 50627-2-1.

Standard configuration ||

R40Rack / R46Rack*

Code		kvar			Banks			Steps	Current (A)	Dim. (mm) (WxHxD)
		400 V	415 V	440 V	400 V					
CSR40	25	25	27	30	12,5	12,5		2	36	495x435x560
CSR40	50/1	50	54	61	25	25		2	72	495x435x560
CSR40	100/1	100	108	121	25	25	50	4	144	495x435x560
CSR40	150	150	161	182	25	25	50	6	216	495x435x560
CSR40	200/1	200	215	242	50	50	100	4	288	495x435x560
CSR40	250	250	269	303	50	100	100	5	360	495x435x560

*for R46Rack, Code CSR46...

R48Filter-Rack

Code		kvar			Banks			Steps	Current (A)	Dim. (mm) (WxHxD)
		400 V	415 V	400 V	400 V	400 V	400 V			
CFR48	25//1	25	27	12,5	12,5			2	36	495x320x550
CFR48	50/1	50	54	25	25			2	72	495x320x550
CFR48	75	75	81	25	50			3	108	495x320x550
CFR48	100	100	108	25	25	50		4	144	495x320x550
CFR48	100/1	100	108	50	50			2	144	495x320x550

g rack

Rated voltage

400 ÷ 440 V (G44Rack)
 400 ÷ 415 V (G48Filter-Rack-T)
 400 ÷ 415 V (G48Filter-Rack-T)

**Frequency**

50 Hz

Typology of Capacitors

MKPG

Temperature class (PFC unit)

-25 / +65°C

Insulation voltage (PFC Unit)

690 V

Max overload (PFC unit)

1,3 In

Total losses (PFC unit)

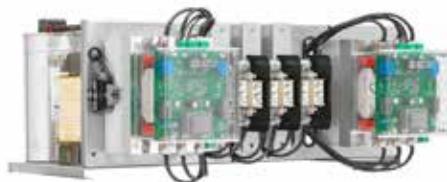
< 2 W/kvar

Reference standards (PFC unit)

EN61921, EN61439-1

Reference standards (Capacitors)

IEC60831/1-2

**Technical Features**

Modular Racks, equipped with Three-phase Nitrogen (N2) Gas filled Capacitors 440 V (G44Rack), 480 V, (G48Rack, G48Filter-Rack, with Detuning chokes 189 Hz p=7%, G48Filter-T with Thyristor modules), three-pole contactors, protection fuses and busbar system; **TELEGROUP' PFCs are type tested for short circuit withstand current (lcw 50 kA for 1 second, Test KEM- 5189-16)**. Protection degree IP00 (IP20 on request); the wiring is through FS17-450/750V cables as per EN 50627-2-1.

Standard configuration ||**G44Rack**

Code		kvar			Banks			Steps	Current (A)	Dim. (mm) (WxHxD)
		400 V	415 V	440 V	400 V					
CSG44	25	25	27	30	12,5	12,5		2	36	495x435x560
CSG44	50/1	50	54	61	25	25		2	72	495x435x560
CSG44	100/1	100	108	121	25	25	50	4	144	495x435x560
CSG44	150	150	161	182	25	25	50	6	216	495x435x560
CSG44	200/1	200	215	242	50	50	100	4	288	495x435x560
CSG44	250	250	269	303	50	100	100	5	360	495x435x560

G48Filter-Rack

Code		kvar		Banks			Steps	Current (A)	Dim. (mm) (WxHxD)
		400 V	415 V	400 V					
CFG48	25//1	25	27	12,5	12,5		2	36	495x320x550
CFG48	50/1	50	54	25	25		2	72	495x320x550
CFG48	75	75	81	25	50		3	108	495x320x550
CFG48	100	100	108	25	25	50	4	144	495x320x550
CFG48	100/1	100	108	50	50		2	144	495x320x550

G48Filter-Rack-T

Code		kvar		Banks			Steps	Current (A)	Dim. (mm) (WxHxD)
		400 V	415 V	400 V					
CFG48T	50	50	54	25	25		2	72	702x320x540
CFG48T	100	100	108	50	50		2	144	702x320x540

**Standard configuration**

Cabinet	Dim. (mm) (WxHxD)	IP		Input of cables	Ventilation
		External	Internal ³		
CR 5	335x555x275	IP 30	IP 00	Top	Natural
CR 5-F	304x370x267	IP 30	IP 00	Top	Natural
CR 1	405x655x275	IP 30	IP 00	Top	Natural
CR 100	455x705x315	IP 30	IP 00	Top	Natural
CR 08	600x860x400	IP 30	IP 00	Top	Natural*
CR 10	600x1060x400	IP 30	IP 00	Top	Natural*
CR 14	600x1410x400	IP 30	IP 00	Top	Natural*
CR 46	600x1730x600	IP 30	IP 00	Bottom	Forced
CR 48	800x1730x600	IP 30	IP 00	Bottom	Forced
CR 256	600x2200x600	IP 30	IP 00	Bottom	Forced
CR 258	800x2200x600	IP 30	IP 00	Bottom	Forced
CR 356	600x2400x600	IP 30	IP 00	Bottom	Forced
CR 416	1600x1730x600	IP 30	IP 00	Bottom	Forced
CR 508	1600x2200x600	IP 30	IP 00	Bottom	Forced
CR 758	2400x2200x600	IP 30	IP 00	Bottom	Forced

1. PFC Systems realized in more columns that provide as many Switch Disconnectors, are achievable with a single protection device.
2. The mentioned Icc value, referred to the Switch Disconnector. The busbar system (where present) in the PFC is guaranteed for 50 kA. However, the equipment must be protected against short circuits by appropriate protection devices
3. IP20 internal protection degree is provided on the internal voltage parts with open door.
4. Icr (Reversed input Cables): is possible to reverse the input of cables than the standard configuration. This option has to be communicated together with order.
5. PFC Systems realized in IP54 enclosure are equipped with Forced Ventilation as standard.
6. IP20 internal, on require.

In the standard configuration, the degree of protection IP20 is already provided on the internal live parts with open door.

Note: for further PFC configuration (Power expansion, Switch Disconnector with Fuses, MCCB etc...), please contact TELEGROUP S.r.l.

Optional Cabinet	Icr ⁴		Ventilation ⁵	IP40		IP54 ⁶ (WxHxD)		IP20 ⁷
	Code	Code		Code	Code	Code	Dim. (mm)	
CR 5	No available		No available	No available	K	400x600x320		J
CR 5-F	No available		No available	No available	K	400x600x250		J
CR 1	No available		No available	No available	K	500x750x320		J
CR 100	No available		W	No available	K	500x750x320		J
CR 08	Y		W	No available	K	600x860x400		J
CR 10	Y		W	No available	K	600x1060x400		J
CR 14	Y		W	X	K	600x1410x400		J
CR 46	Y		standard	X	K	600x1802x600		J
CR 48	Y		standard	X	K	800x1802x600		J
CR 256	Y		standard	X	K	600x2272x600		J
CR 258	Y		standard	X	K	800x2272x600		J
CR 356	Y		standard	X	K	600x2472x600		J
CR 416	Y		standard	X	K	1600x1802x600		J
CR 508	Y		standard	X	K	1600x2272x600		J
CR 758	Y		standard	X	K	2400x2272x600		J

Optional for single Switch disconnector

Standard size n. switch / 3 x (A)	Single 3 x (A)	Code
2 x 3x630	3x1250	Z
2 x 3x 800	3x1600	Z
3 x 3x630	3x2000	Z
3 x 3x800	3x2500	Z



	24h	8h	30m	15m	5m	1m	Peak
Vmax	440	510	520		530	575	1350
	480	530	555		580	625	1450
I _{max}	3In		4In	5In			10 In

Rated voltage	400 ÷ 480 V
Frequency	50 Hz
Capacitors Voltage	MKPG440, 440 V MKPG480, 480 V
Capacitors Voltage max	MKPG440, 485 V MKPG480, 530 V
THDi max	≤ 25 %
Power at 400 V	da 2,5 a 25 kvar
Power at 480 V	Da 4,18 a 33,3 kvar
Capacitance tolerance	-5...+10 %
Power dissipation	0,25 W/kVAr
UTT	1035 V rms / 2 sec.
UTC	3,6 kV rms / 2 sec.
Protection Degree	IP20
Humidity class	C
Temperature class	-50°C / D
Expected life	>150.000 hours
Installation	Vertical and Horizontal
Reference standards	IEC60831/1-2



Construction features

Self-healing metallized polypropylene film.

Housing in cylindrical aluminum box, hermetically sealed. Overpressure safety device. IP20 terminals with terminal board.

The gas insulation, thanks to the characteristics of the Nitrogen (N2), a "free humidity Gas" (dry type) exacerbates any possible infiltration of air inside the cylinder which, following an electrical discharge, would cause the fault of Capacitor.

Furthermore, Nitrogen is a non-flammable gas and therefore the use of this type, even in case of breakage, would not result in a fire risk.

Code	400	415	kvar 440	460	480	Capacitance (μ F)	Discharge res.	Dim. (mm)	pcs/box*
MKPG2.5400	2,5	2,675	3,025			3x16,7	Included	50x176	10
MKPG5400	5	5,35	6,05			3x34	Included	75x180	5
MKPG10400	10	10,7	12,1			3x68	Included	77x268	5
MKPG12.5400	12,5	13,375	15,125			3x82	Included	77x270	5
MKPG25400	25	26,75	30,25			3x166	RSL/1	98x310	3
MKPG4.12480	2,84	3,05	3,46	3,75	4,12	3x19,5	Included	67x180	10
MKPG8.33	5,69	6,11	6,93	7,51	8,25	3x38	Included	75x255	5
MKPG16.5480	11,39	12,21	13,86	15,02	16,50	3x77	RSL/1	85x255	5
MKPG33480	22,77	24,42	27,72	30,03	33,00	3x154	RSL/1	116x262	3



Three-phase and single-phase cylindrical capacitors Oil filled

		24h	8h	30m	15m	5m	1m	Peak
Rated voltage	400 ÷ 480 V	Vmax	440	510	520	530	575	1350
			460	520	535	555	600	1410
			480	530	555	580	625	1450
Rated Frequency	50 Hz	I_{max}	2In		3In	4In		10 In
Rated Voltage of Capacitors	MKPR440, 440 V MKPR460, 480 V							
THDi max	≤ 15 % / ≤ 19 %							
Power at 400 V	from 2,5 to 25 kvar							
Capacitance tolerance	-5...+10 %							
Power dissipation	0,25 W/kVAr							
UTT	1035 V rms / 2 sec.							
UTC	3,6 kV rms / 2 sec.							
Protection Degree	IP20							
Humidity class	C							
Temperature class	-50°C / C							
Expected life	> 85.000 hours							
Installation	Vertical							
Reference standards	IEC60831/1-2							



MKPR Three-phase

Code	kvar						Capacitance (μf)	Discharge resistors	Dim. (mm)	pcs/box*
	400	415	440	460	480	525				
MKPR2.5400	2,5	2,675	3,025				3x16,7	RES01	50x171	21
MKPR5400	5	5,35	6,05				3x34	RES01	75x175	8
MKPR10400	10	10,7	12,1				3x68	RES01	75x235	10
MKPR12.5400	12,5	13,375	15,125				3x82	Included	75x265	5
MKPR25400	25	26,75	30,25				3x166	RSL/1	95x315	3

MKP Single-phase

Code	kvar				Capacitance (μf)	Discharge resistors	Dim. (mm) (WxHxD)	pcs/box*
	230 V	400 V	460 V					
MKP0.87400	0,29	0,87			18	Included	40x92	36
MKP1.67400	0,55	1,67			33	Included	40x155	36
MKP3.33400	1,1	3,33			66	Included	55x165	21
MKP5.13460	1,28	3,85	5,13		77	Included	60x171	18



In an Automatic Power Factor Correction System, the PFC Controller is, along with Capacitors, the essential element for the management and control of all the components.

Designed with advanced features, they combine a modern design with practical and intuitive functionalities. Backlit LCD display with icons, alarm codes with scrolling texts, can be set in 6 languages.

Operation on 4 quadrants for cogeneration systems, drastic reduction in the number of switching, homogeneous use of equal power capacitor banks, reactive power measurement installed for each step, capacitor overcurrent protection, board over temperature protection by internal sensor, protection against micro breaks, wide range of available measurements, including voltage and current THD with analysis of the individual harmonics up to the 15th order.

General Features

PCRL

Backlit LCD display with icons, with texts available in 6 languages (Italian, English, German, French, Spanish, Portuguese)
Automatic Recognition of the direction of the current

Operation of 4 Quadrants for Co-generation systems

Operation in medium voltage through V.T.

Uniform use of capacitor banks

Protection against micro-interruptions

Protection against overcurrent and overtemperature

Communication via USB, RS485, RS232, Ethernet with Expansion modules. MODBUS protocol

Auxiliary supply	100...440 Vac, 50/60 Hz ($\pm 10\%$)
Input voltage	660 Vac L-L (346 Vac L-N)
Input current	1 A o 5 A (configurable)
PF regulation	{0,5 ind...0,5 cap}
Voltage measurements	50 – 720 Vac L- L (50 – 415 Vac L-N)
Current measurements	0,025...1,2 A for 1 A; 0,025 A...6 A, for 5 A

Voltage and Current Measurements in TRMS

Protection degree	IP54 front / IP20 on the terminal
Operating temperature	-20°C / +80°C
Storage temperature	-30°C / +80°C
Humidity	< 30 % not condensing
Reference standards	IEC61010-1, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n.14



General Features

PCRJ

Backlit LCD Display 120x80 pixel with text in 10 languages (Italian, English, German, French, Spanish, Portuguese, Czech, Polish, Russian + 1 customizable)

Insertion of Capacitor Banks through Contactors or Thyristor Modules

Automatic Recognition of the direction of the current

Operation of 4 Quadrants for Co-generation systems

Master-Slave operation for managing up to 8 units

Operation in medium voltage through V.T.

Uniform use of capacitor banks

Protection against micro-interruptions

Protection against overcurrent and overtemperature

Communication via USB, RS485, RS232, Ethernet with Expansion modules. MODBUS protocol

Auxiliary supply	100...440 Vac, 50/60 Hz ($\pm 10\%$)
Input voltage	660 Vac L-L (346 Vac L-N)
Input current	1 A o 5 A (configurable)
PF regulation	(0,5 ind...0,5 cap)
Voltage measurements	50 – 720 Vac L- L (50 – 415 Vac L-N)
Current measurements	0,025...1,2 A for 1 A; 0,025 A...6 A, for 5 A
Voltage and Current Measurements in TRMS	
Protection degree	IP54 front / IP20 on the terminal
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Storage temperature	-30°C / +80°C
Humidity	< 30 % not condensing
Reference standards	IEC61010-1, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n.14



Code	Description	N. Slot	Dim. (mm)
PCRL5/7	PFC Controller 5 outputs	1	96x96
PCRL8/14	PFC Controller 8 outputs	2	144x144
PCRJ8/14	PFC Controller 5 outputs	4	144x144

EXP1002/PCRL	N. 2 outputs for increasing banks
EXP1003/PCRL	N. 3 outputs for increasing banks
EXP1002/PCRJ	N. 2 outputs for increasing banks
EXP1004	N. 4 outputs for increasing banks (Thyristor modules)
EXP1020	USB
EXP1030	RS232
EXP1040	RS485
EXP1050	Ethernet



The Active Filters of AXF series have a very sophisticated energy quality control capability, able to filter harmonics up to the 50th order. Applicable in any condition both in the industrial and civil sectors, they represent the ideal solution for the treatment of non-linear loads.

Principle of operation

AXF picks up the current signal in real time through the C.T., separating the harmonic part through the internal detection circuit. At the same time, it generates a compensation current, 180 ° out of phase with respect to the harmonic signals through IGBT power converters. The output current changes dynamically and precisely according to the harmonic content present in the network

Applications

- Heavy industry
- Data Center
- Cement plant
- Paper mills
- Building Automation
- Automotive
- Waste treatment



General features

- Display touch-screen 7''
- Redundant operation
- Harmonic residue ≤ 6 – 7 %
- Serial port RS232, RS485, Modbus operation

Technical Features

Code	AXF.....
Rated Voltage	400 V ± 15 %
Rated Frequency	50 / 60 Hz
Current	75 A, 100 A, 150 A
Harmonic analysis	from 2° to 50° order
Harmonic residue	from 7 % to 12 %
Alarms	Oversupply, overcurrent, overtemperature (>500 alarms)
Insertion time	< 20 ms
Sampling rate	200 kHz
Switching frequency	80 kHz
Cooling system	Automatic
Working temperature	-10° C / +45°C
Noise	< 60 db
Altitude	< 1500 m
Humidity	< 90 %
Losses	< 3 %
Color	RA7035
Dimensions (WxHxD)	800 x 2200 x 800 mm
Degree of protection	IP30
Standards	IEC standard



TELEGROUP

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