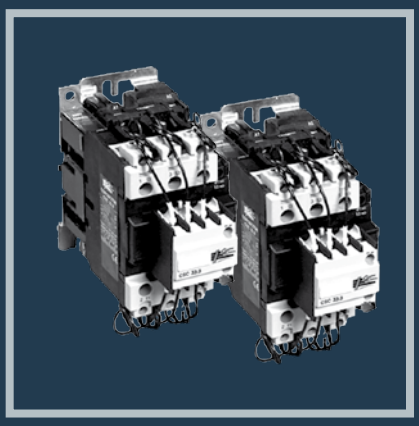
CAPACITORS

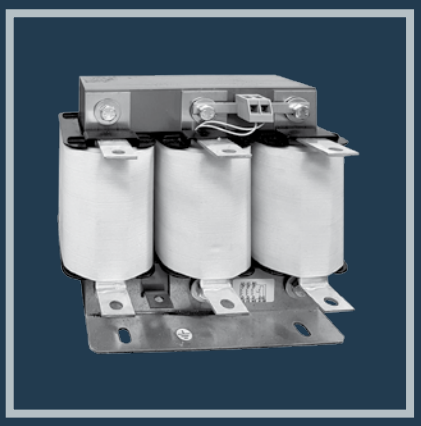
GRUPPO ENERGIA

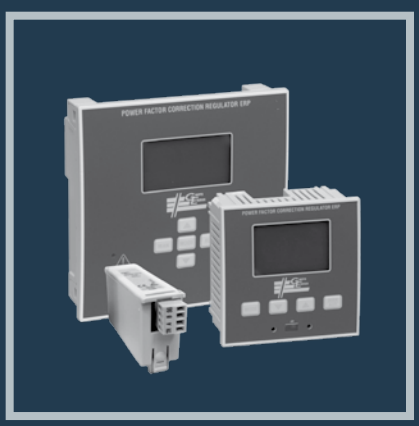
*live with energy...*

# Power Factor Correction Capacitors and Components

# LV







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VERS. 02-2019

VDE Prüf- und Zertifizierungsinstitut

GUTACHTEN MIT FERTIGUNGSÜBERWACHUNG

CERTIFICATE OF CONFORMITY WITH FACTORY SURVEILLANCE

GRUPPO ENERGIA s.r.l.
Via Cavezzo 36
25045 CASTEGNATO BS
ITALY

ist berechtigt, für ihr Produkt /
is authorized to use for their product

Leistungs-Parallelkondensator -
Dreiphaseneinheit in Dreieckschaltung

die hier abgebildeten markenrechtlich geschützten Zeichen
für die auf Blatt 2 aufgeführten Typen zu benutzen /
the legally protected Marks as shown below for the types referred to on page 2 ff.

VDE REG.-Nr. 7150 VDE REG.-Nr. 7150

Geprüft und zertifiziert nach /
Tested and certified according to

DIN EN 60831-1 (VDE 0560-46):2014-11, EN 60831-1:2014
DIN EN 60831-2 (VDE 0560-47):2014-11, EN 60831-2:2014

Aktenzeichen: 5010497-4880-9001 / 225852
File ref.:

VDE Prüf- und Zertifizierungsinstitut GmbH
VDE Testing and Certification Institute
Zertifizierungsstelle / Certification

Auswies-Nr. 40045756 Blatt 1
Certificate No. Page

Offenbach, 2017-01-30

VDE



# CERTIFICATE OF COMPLIANCE

| | |
|---|---|
| **Certificate Number** | 20140422-E365338 |
| **Report Reference** | E365338-20140422 |
| **Issue Date** | 2014-APRIL-22 |
| **Issued to:** | GRUPPO ENERGIA SRL<br>Via Cavezzo 36<br>25045 Castegnato Bs ITALY |
| **This is to certify that representative samples of** | COMPONENT - CAPACITORS, CONSTRUCTION ONLY<br>Series LI/L/M CP.<br><br>Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate. |
| **Standard(s) for Safety:** | U.S. National Standard: UL 810, standard for Capacitors<br>Canadian National Standard, CSA C22.2 No. 190, Capacitors for Power Factor Correction |
| **Additional Information:** | See the UL Online Certifications Directory at www.ul.com/database for additional information |

Only those products bearing the UL Recognized Component Marks for the U.S. and Canada should be considered as being covered by UL's Recognition and Follow-Up Service and meeting the appropriate U.S. and Canadian requirements.

The UL Recognized Component Mark for the U.S. generally consists of the manufacturer's identification and catalog number, model number or other product designation as specified under "Marking" for the particular Recognition as published in the appropriate UL Directory. As a supplementary means of identifying products that have been produced under UL's Component Recognition Program, UL's Recognized Component Mark: ᵲᵘL, may be used in conjunction with the required Recognized Marks. The Recognized Component Mark is required when specified in the UL Directory preceding the recognitions or under "Markings" for the individual recognitions. The UL Recognized Component Mark for Canada consists of the UL Recognized Mark for Canada: ᵲᵘL and the manufacturer's identification and catalog number, model number or other product designation as specified under "Marking" for the particular Recognition as published in the appropriate UL Directory.

Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to UL LLC.

Look for the UL Recognized Component Mark on the product.

William R. Carney, Director, North American Certification Programs

UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please contact a local UL Customer Service Representative at www.ul.com/contactus

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# CERTIFICATE OF COMPLIANCE

| | |
|---|---|
| **Certificate Number** | 20160402 E365338 |
| **Report Reference** | E365338 20160401 |
| **Issue Date** | 2016 APRIL 02 |
| **Issued to:** | GRUPPO ENERGIA SRL<br>Via Cavezzo 36, 25045 Castegnato Bs ITALY |
| **This is to certify that representative samples of** | COMPONENT CAPACITORS, CONSTRUCTION ONLY<br>USR, CNR Component Capacitors, Construction Only, Series DCM, may be prefixed by EP, followed by additional letters and numbers; Series GCMR, followed by additional letters and numbers. V ac rated capacitors<br><br>USR Component Capacitors, Construction Only, Series DCM, may be prefixed by EP, followed by additional letters and numbers; Series GCMR, followed by additional letters and numbers. V ac rated capacitors and V dc rated capacitors.<br><br>Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate. |
| **Standard(s) for Safety:** | UL 810 Standard for Capacitors, CSA C22.2 No. 190 14 Standard for Capacitors for Power Factor Correction. |
| **Additional Information:** | See the UL Online Certifications Directory at www.ul.com/database for additional information |

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow Up Service.

Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to UL LLC.

Look for the UL Certification Mark on the product.

Bruce Mahrenholz, Director North American Certification Program

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BUREAU VERITAS
Certification

GRUPPO ENERGIA SRL

Registered and Operative Site:
Via Cavezzo, 36 – 25045 CASTEGNATO (BS) - ITALY

*Bureau Veritas Italia spa certify that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below*

Standard

ISO 9001:2015

Scope of certification

Design and manufacture of single-phase and three-phase electrical capacitors for power factor correction of industrial plants, lamps, motors; design and manufacture of capacitors for power electronics applications; development and production of contactors, regulators and power factor reactors (chokes).

EA Sector(s): 19

Certification cycle start date: 10 January 2018

Subject to the continued satisfactory operation of the organisation's Management System, this certificate expires on: 11 January 2021

Original certification date: 13 January 2006

Certificate No. IT241879 Version N. 1 Revision date: 10 January 2018

ANDREA PILENI – Local Technical Manager

Certification body address:
Bureau Veritas Italia SpA Viale Monza, 347 - 20128 Milano, Italia

ACCREDIA

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation. To check this certificate validity please refer to the website http://www.bureauveritas.it/certificati

# How To Choose LV Capacitors Following Your Operating Conditions

The operating conditions are very important to the capacitors and can strongly influence the life expectancy. This is why, different categories of capacitors, with different levels of resistance, must be chosen according to operating conditions.

Capacitors must be selected in function of:

- Ambient temperature,
- Expected over-current related to voltage disturbances including maximum sustained over voltage,
- Requested life expectancy,
- Maximum number of switching during the year.

## Harmonics And Capacitors

Capacitors are strongly sensitive to harmonics and particularly to harmonics currents. Harmonic currents are caused by non-linear loads connected to the distribution system. The presence of harmonics in electrical systems means that current and voltage are distorted and deviate from sinusoidal waveforms.

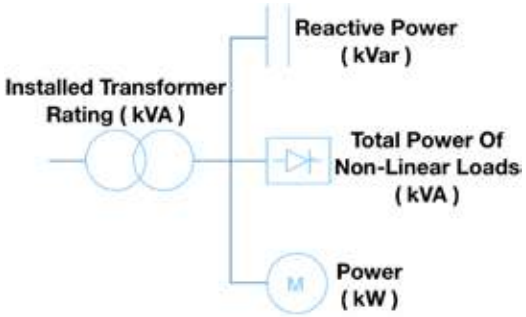
This phenomenon is particularly dangerous for capacitors since their impedance decreases proportionally to the order of the harmonics present with consequent capacitor overload and shortening steadily the life.
In some situations, resonance effect can occur as a result of amplification of harmonic currents and a very high voltage distortion.

## NON-LINEAR Loads

Considering what has been said before it is always necessary to keep in mind the level of harmonics in your network before choosing any kind of equipment especially Power Factor Correction one.
A significant parameter is the cumulated power of the non-linear loads generating harmonic currents.
Since the harmonics are caused by non-linear loads, an indicator for the magnitude of harmonics is the ratio of the total power of non-linear loads to the supply transformer rating.

$$N_{LL} = \frac{Total\ Power\ of\ Non-Linear\ Loads}{Instaled\ Transformer\ Rating}$$

## Example Of Calculations Of NON-LINEAR Loads




Installed transformer rating: 500 kVA

Total power of non-linear loads: 115 kVA

$N_{LL}$= ( 115 / 500 ) x 100 = 23%

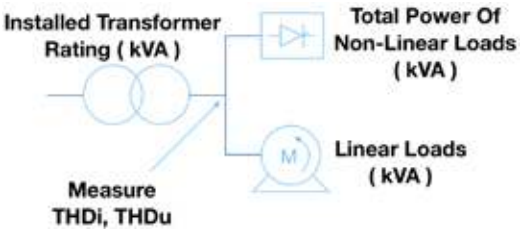
**INTACT BASE** RCM-INB-3: Capacitors designed to be used in standard conditions when there aren't any significant non-linear loads.
NLL< 10%

**INTACT PLUS (Heavy Duty)** RCM-INP-3: Capacitors for working in di cult conditions, resistant to voltage overloads or when the limited quantity of non-linear loads are installed.
Particularity – largely increased current resistance.
NLL< 20%

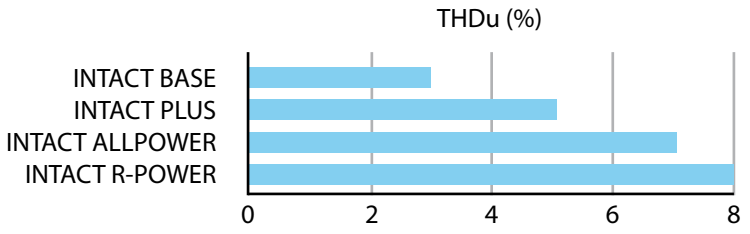
**INTACT AllPOWER (Extra Heavy Duty)** RCM-INA-3: Highly reliable capacitors for operating in harsh environments or with a significant level of non-linear loads. Resistant to high overloads in current and voltage. Intact AllPOWER is also resistant to high temperatures.
NLL< 25%

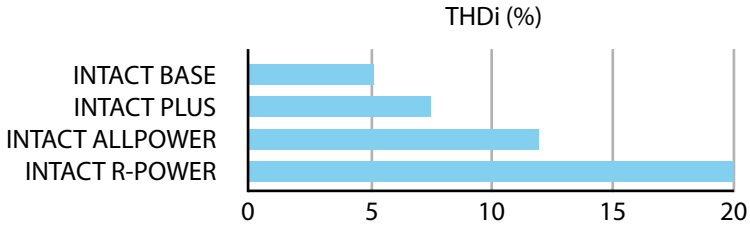
**INTACT R-POWER** RCM-INR-3: Capacitors to be used with detuned harmonic reactor. This is the optimal solution for reactive power compensation in networks where there is a significant quantity of non-linear loads, therefore the use of reactors is mandatory.
NLL< 30%

## Capacitors Selection Taking In Mind Level Of Harmonics




As said before the percentage of non-linear loads NLL is a very important indicator of magnitude of harmonics but a more detailed estimation of the magnitude of harmonics can be made with measurements.
Significant indicators are current harmonic distortion THDi and voltage harmonic distortion THDu. Both values must be measured at the transformer secondary without connected capacitors. According to the measured distortion, different technologies of capacitors shall be selected.




**Note:**
The capacitor type should be selected according to the most restrictive measurement. For Example, a measurement is giving the following results:

- THDi = 14,0%
- THDu = 4,0%

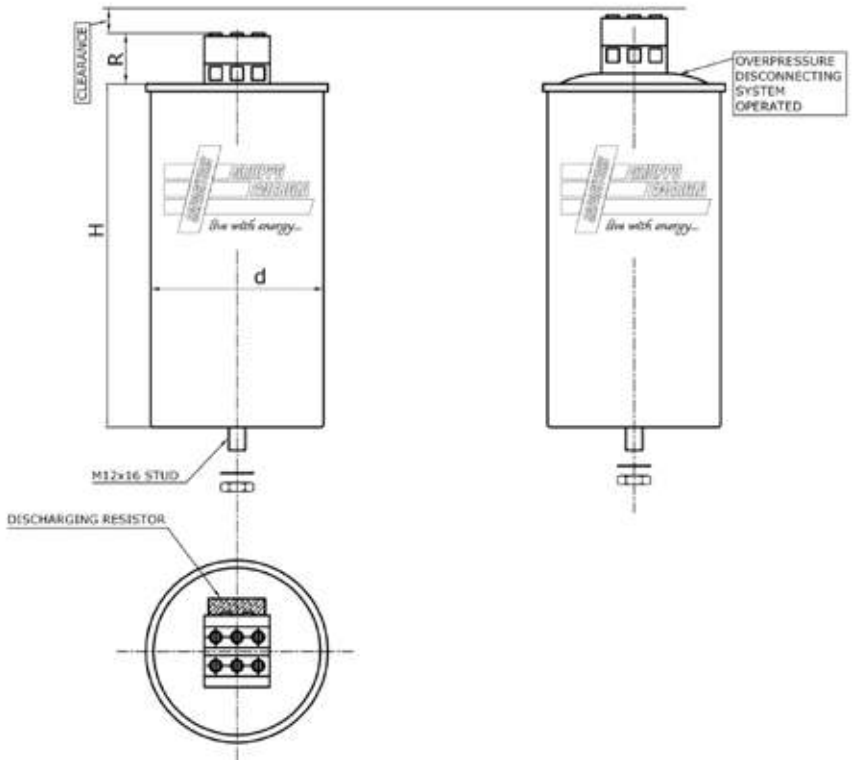
INTACT R-POWER with Detuned Reactor has to be selected.

# Capacitor Selection Table

| Capacitor Family | Type | Applications | Max. Conditions |
|---|---|---|---|
| Intact Base<br>RCM - INB - 3 | Standard Capacitor | • Networks with non significant non-linear loads<br>• Standard over-current<br>• Standard operating temperature<br>• Normal switching frequency<br>• Standard life expectancy | • NLL< 10%<br>• 1,5 In<br>• 55 °C<br>• 5000 / year<br>• Up to 100000 h* |
| Intact Plus<br>RCM - INP - 3 | Heavy Duty Capacitor | • Few non-linear loads<br>• Significant over-current<br>• Hight operating temperature<br>• Significant switching frequency<br>• Long life expectancy | • NLL< 20%<br>• 1,8 In<br>• 60 °C<br>• 7000 / year<br>• Up to 160000 h* |
| Intact AllPower<br>RCM - INA - 3 | Extra Heavy Duty Capacitor | • Significant number of non-linear loads (up to 25%)<br>• Significant over-current<br>• Extreme temperature conditions<br>• Frequent switching frequency<br>• Extra long life expectancy | • NLL< 25%<br>• 2,5 In<br>• 60 °C<br>• 10000 / year<br>• Up to 180000 h* |
| Intact R-Power +<br>Detuned Harmonic<br>Reactor<br>RCM - INR - 3 | Capacitor For Critical Applications | • High level of non-linear loads (up to 30%)<br>• Significant over-current<br>• Standard operating temperature<br>• Significant switching frequency<br>• Long life expectancy | • NLL< 30%<br>• 1,5 In<br>• 55 °C<br>• 7000 / year<br>• Up to 160000 h* |

**Advise For You:**
It is highly recommended to do harmonic study and detailed load study before selecting the capacitor family.
For more informations don't hesitate to contact Gruppo Energia team.

## Construction Diagram




**CASE**

- Expansion: Maximum 12 mm.
- Clearance: Minimum 15 mm.

**MOUNTING**

- M12 threaded bolt
- Tightening torque: T= 10 Nm.
- Toothed washer: DIN 6789.
- Hexagonal nut: DIN 439.

**TERMINALS**

- Finger-proof terminal: Yes.
- **MT 16**
  - For 16 mmq cable.
  - M4 terminal screw.
  - Tightening torque: T= 1,3 Nm
  - R = 33 ±2
- **MT 25**
  - For 25 mmq cable.
  - M5 terminal screw.
  - Tightening torque: T= 2,5 Nm
  - R = 33 ±2
- **MT 35**
  - For 35 mmq cable.
  - M5 terminal screw.
  - Tightening torque: T= 3,0 Nm
  - R = 43 ±2

* The maximum life expectancy is given considering standard operating conditions as rated voltage (Un), rated current (In), 35 °C ambient temperature.
* Attention: The life expectancy will be reduced if capacitors are used at maximum working conditions.

## TECHNICAL CHARACTERISTICS INTACT BASE RCM-INB

| General | |
|---|---|
| Standards: | IEC 60831-1:2014, UL810, VDE 0560-46:2014-11 |
| Origin: | 100% made in Italy |
| Voltage range: | 220 V to 690 V |
| Frequency: | 50 Hz / 60 Hz |
| Power range: | 1 kVar to 62,5 kVar |
| Dielectric losses: | < 0,2 W/kVar |
| Total losses: | < 0,5 W/kVar |
| Capacitance tolerance: | ± 5% |
| Voltage test between terminals: | 2,15 Un, 50 Hz, 10 seconds (routine test) |
| Voltage test between terminals: | 3,00 Un, 50 Hz, 60 seconds (type test) |
| Voltage test terminal / case: | ≤ 525 V 3000 V, 50 Hz for 10 seconds or > 525 V 3660 V, 50 Hz for 10 seconds |
| Insulation level: | 3 / 8 kV |
| External discharge resistor: | 50 V in 1 min. 1 kVar - 30 kVar or 75 V in 3 min. 30,5 kVar - 62,5 kVar |
| Cooling: | Natural air or forced ventilation |

| Operating Conditions | |
|---|---|
| Ambient temperature: | -25 °C / 55 °C |
| Humidity: | up to 95% |
| Altitude above sea level: | 2000 m. |
| Overvoltage: | Un+10% for 8 hrs. daily<br>Un+15% for 30 min. daily<br>Un+20% for 5 min. daily<br>Un+30% for 1 min. daily |
| Overcurrent: | up to 1,5 x In (Including Harmonics) |
| Inrush current: | up to 180 x In |
| Service life: | up to 100.000 hrs. |
| Harmonic presence: | NLL < 10% |

| Safety Features | |
|---|---|
| Safety: | Overpressure disconnector on 3 phase + Incorporated fuses + Self-healing + Discharge device |
| Protection degree: | IP20 |

| Construction | |
|---|---|
| Casing: | Aluminium can |
| Dielectric: | Polypropylene film with slope metallisation and wave-cut |
| Impreganation: | Polyurethene resin, Non-PCB |

| Installation | |
|---|---|
| Mounting position: | Vertical preferable for better cooling |
| Fastening & Earthing: | Through 1 point, screw M12 at the bottom |

# INTACT BASE
# CAPACITORS NLL <10%

## RCM-INB CAPACITOR RATED VOLTAGE 400 V / 415 V - 3 PHASE - 50 HZ / 60 HZ

| POWER AT SYSTEM VOLTAGE 50 Hz | | POWER AT SYSTEM VOLTAGE 60 Hz | | In 50 Hz CURRENT | | In 60 Hz CURRENT | | RATED CAPACITANCE | AVAIBLE DIMENSIONS* | | | TERMINAL TYPE | PCS/BOX | PCS/BOX | PCS/BOX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 400 V kVar | 415 V kVar | 400 V kVar | 415 V kVar | 400 V A | 415 V A | 400 V A | 415 V A | 3 x µF | ø x H (7) | ø x H (8) | ø x H (9) | mmq | ø 85 | ø 100 ø 116 | ø 136 |
| 2,5 | 2,7 | 3,0 | 3,2 | 3,6 | 3,7 | 4,3 | 4,5 | 16,6 | 85 x 130 | 85 x 185 | - | MT 16 | 9 | - | - |
| 5 | 5,4 | 6,0 | 6,5 | 7 | 7,5 | 8,7 | 9,0 | 33,2 | 85 x 130 | 85 x 185 | - | MT 16 | 9 | - | - |
| 6,25 | 6,72 | 7,5 | 8,1 | 9,02 | 9,34 | 10,8 | 11,2 | 41,4 | 85 x 130 | 85 x 185 | - | MT 16 | 9 | - | - |
| 10 | 10,8 | 12,0 | 12,9 | 14 | 15,0 | 17,3 | 18,0 | 66,3 | 85 x 225 | - | - | MT 16 | 9 | - | - |
| 12,5 | 13,4 | 15,0 | 16,1 | 18,0 | 18,7 | 21,6 | 22,5 | 82,9 | 85 x 225 | - | - | MT 16 | 9 | - | - |
| 15 | 16,1 | 18,0 | 19,4 | 22 | 22,5 | 26,0 | 26,9 | 99,5 | 100 x 225 | 85 x 260 | - | MT 25/16 | 9 | 5 | - |
| 20 | 21,5 | 24,0 | 25,8 | 29 | 29,9 | 34,6 | 35,9 | 132,6 | 116 x 225 | 100 x 260 | 85 x 285 | MT 25 | 9 | 5 | - |
| 25 | 26,9 | 30,0 | 32,3 | 36 | 37,4 | 43,3 | 44,9 | 165,8 | 116 x 225 | - | 100 x 300 | MT 25 | - | 5 | - |
| 30 | 32,3 | 36,0 | 38,7 | 43 | 44,9 | 51,9 | 53,9 | 198,9 | 136 x 225 | 116 x 260 | 116 x 285 | MT 25 | - | 5 | 4 |
| 40 | 43,0 | 48,0 | 51,6 | 58 | 59,9 | 69,3 | 71,9 | 265,3 | 116 x 285 | - | - | MT 25 | - | 5 | - |
| 50 | 53,8 | 60,0 | 64,6 | 72 | 74,8 | 86,6 | 89,8 | 331,6 | 136 x 300 | - | - | MT 35 | - | - | 4 |
| 62,5 | 67,3 | - | - | 90,2 | 93,6 | - | - | 414,6 | 136 x 375 | - | - | MT 35 | - | - | 2 |

## RCM-INB CAPACITOR RATED VOLTAGE 440 V / 450 V - 3 PHASE - 50 HZ / 60 HZ

| POWER AT SYSTEM VOLTAGE 50 Hz | | POWER AT SYSTEM VOLTAGE 60 Hz | | In 50 Hz CURRENT | | In 60 Hz CURRENT | | RATED CAPACITANCE | AVAIBLE DIMENSIONS* | | | TERMINAL TYPE | PCS/BOX | PCS/BOX | PCS/BOX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 440 V kVar | 450 V kVar | 440 V kVar | 450 V kVar | 440 V A | 450 V A | 440 V A | 450 V A | 3 x µF | ø x H (7) | ø x H (8) | ø x H (9) | mmq | ø 85 | ø 100 ø 116 | ø 136 |
| 2,5 | 2,6 | 3,0 | 3,1 | 3,3 | 3,4 | 3,9 | 4,0 | 13,7 | 85 x 130 | 85 x 185 | - | MT 16 | 9 | - | - |
| 5 | 5,2 | 6,0 | 6,3 | 7 | 6,7 | 7,9 | 8,0 | 27,4 | 85 x 130 | 85 x 185 | - | MT 16 | 9 | - | - |
| 6,25 | 6,5 | 7,5 | 7,9 | 8,20 | 8,4 | 9,8 | 10,1 | 34,3 | 85 x 130 | 85 x 185 | - | MT 16 | 9 | - | - |
| 10 | 10,5 | 12,0 | 12,5 | 13 | 13,4 | 15,7 | 16,1 | 54,8 | 85 x 225 | 85 x 185 | - | MT 16 | 9 | - | - |
| 12,5 | 13,1 | 15,0 | 15,7 | 16,4 | 16,8 | 19,7 | 20,1 | 68,5 | 85 x 225 | - | - | MT 16 | 9 | - | - |
| 15 | 15,7 | 18,0 | 18,8 | 20 | 20,1 | 23,6 | 24,1 | 82,2 | 100 x 225 | 85 x 260 | - | MT 25 / 16 | 9 | 5 | - |
| 20 | 20,9 | 24,0 | 25,1 | 26 | 26,8 | 31,5 | 32,2 | 109,6 | 116 x 225 | 100 x 260 | 85 x 285 | MT 25 | 9 | 5 | - |
| 25 | 26,1 | 30,0 | 31,4 | 33 | 33,5 | 39,3 | 40,2 | 137 | 116 x 225 | - | 100 x 300 | MT 25 | - | 5 | - |
| 30 | 31,4 | 36,0 | 37,6 | 39 | 40,2 | 47,2 | 48,3 | 164,4 | 136 x 225 | 116 x 260 | 100 x 300 | MT 25 | - | 5 | 4 |
| 40 | 41,8 | 48,0 | 50,2 | 52 | 53,6 | 62,9 | 64,4 | 219,2 | 116 x 285 | - | - | MT 25 | - | 5 | - |
| 50 | 52,3 | 60,0 | 62,7 | 66 | 67,1 | 78,7 | 80,5 | 274 | 136 x 300 | - | - | MT 35 | - | - | 4 |
| 62,5 | 65,3 | - | - | 82,0 | 83,8 | - | - | 342,5 | 136 x 375 | - | - | MT 35 | - | - | 2 |

## RCM-INB CAPACITOR RATED VOLTAGE 525 V / 550 V - 3 PHASE - 50 HZ / 60 HZ

| POWER AT SYSTEM VOLTAGE 50 Hz | | POWER AT SYSTEM VOLTAGE 60 Hz | | In 50 Hz CURRENT | | In 60 Hz CURRENT | | RATED CAPACITANCE | AVAIBLE DIMENSIONS* | | | TERMINAL TYPE | PCS/BOX | PCS/BOX | PCS/BOX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 525 V kVar | 550 V kVar | 525 V kVar | 550 V kVar | 525 V A | 550 V A | 525 V A | 550 V A | 3 x µF | ø x H (7) | ø x H (8) | ø x H (9) | mmq | ø 85 | ø 100 ø 116 | ø 136 |
| 2,5 | 2,7 | 3,0 | 3,3 | 2,7 | 2,9 | 3,3 | 3,4 | 9,6 | 85 x 130 | 85 x 185 | - | MT 16 | 9 | - | - |
| 5 | 5,5 | 6,0 | 6,6 | 5 | 5,7 | 6,6 | 6,9 | 19,2 | 85 x 130 | 85 x 185 | - | MT 16 | 9 | - | - |
| 6,25 | 6,9 | 7,5 | 8,2 | 6,87 | 7,2 | 8,3 | 8,7 | 24,1 | 85 x 225 | 85 x 185 | - | MT 16 | 9 | - | - |
| 10 | 11,0 | 12,0 | 13,2 | 11 | 11,5 | 13,2 | 13,8 | 38,5 | 100 x 225 | 85 x 260 | - | MT 25 / 16 | 9 | 5 | - |
| 12,5 | 13,7 | 15,0 | 16,4 | 13,7 | 14,4 | 16,5 | 17,3 | 48,1 | 100 x 225 | 100 x 260 | 85 x 285 | MT 25 / 16 | 9 | 5 | - |
| 15 | 16,4 | 18,0 | 19,7 | 16 | 17,3 | 19,8 | 20,7 | 57,7 | 116 x 225 | 100 x 260 | 100 x 300 | MT 25 | - | 5 | - |
| 20 | 21,9 | 24,0 | 26,3 | 22 | 23,0 | 26,4 | 27,6 | 77,0 | 136 x 225 | 116 x 260 | 100 x 300 | MT 25 | - | 5 | - |
| 25 | 27,4 | 30,0 | 32,9 | 27 | 28,8 | 33,0 | 34,5 | 96,2 | 136 x 225 | - | 116 x 285 | MT 25 | - | 5 | 4 |
| 30 | 32,9 | 36,0 | 39,5 | 33 | 34,5 | 39,6 | 41,5 | 115,5 | 136 x 300 | - | - | MT 25 | - | - | 4 |
| 40 | 43,9 | 48,0 | 52,7 | 44 | 46,1 | 52,8 | 55,3 | 154,0 | 136 x 300 | - | - | MT 25 | - | - | 4 |
| 50 | 54,9 | 60,0 | 65,8 | 55 | 57,6 | 66,0 | 69,1 | 192,5 | 136 x 375 | - | - | MT 25 | - | - | 2 |

**Up to 37,5 kVar 400 V or 50 kVar 525 V capacitors are also available in single-phase version.**
**Other capacitor powers and voltages are available on request. Contact us info@gruppoenergia.it**

*All dimensions are in "mm" and will be confirmed at the time of order.

# INTACT BASE
# CAPACITORS NLL <10%

## RCM-INB 400 V / 440 V - 3 PHASE - 50 HZ / 60 HZ

| ORDER CODE | CAPACITOR POWER 50 Hz | CAPACITOR POWER 60 Hz | RATED CAPACITANCE | In 50 Hz CURRENT | In 60 Hz CURRENT | Un SYSTEM VOLTAGE | Ur RATED VOLTAGE | DIMENSIONS* | TERMINAL TYPE | PCS/BOX |
|---|---|---|---|---|---|---|---|---|---|---|
| | kVar | kVar | 3 x µF | A | A | V | V | ø x H | mmq | |
| 3PF2,5C3INB160 | 2,5 | 3,0 | 13,7 | 3,3 | 3,9 | 400 | 440 | 85 x 185 | MT 16 | 9 |
| 3PF5C3INB160 | 5 | 6,0 | 27,4 | 6,6 | 7,9 | 400 | 440 | 85 x 185 | MT 16 | 9 |
| 3PF6,25C3INB160 | 6,25 | 7,5 | 34,3 | 8,2 | 9,8 | 400 | 440 | 85 x 185 | MT 16 | 9 |
| 3PF10C3INB160 | 10 | 12,0 | 54,8 | 13,1 | 15,7 | 400 | 440 | 85 x 185 | MT 16 | 9 |
| 3PF12,5C3INB160 | 12,5 | 15,0 | 68,5 | 16,4 | 19,7 | 400 | 440 | 85 x 225 | MT 16 | 9 |
| 3PF15C3INB160 | 15 | 18,0 | 82,2 | 19,7 | 23,6 | 400 | 440 | 85 x 225 | MT 16 | 9 |
| 3PF20C3INB250 | 20 | 24,0 | 109,6 | 26,2 | 31,5 | 400 | 440 | 100 x 225 | MT 25 | 5 |
| 3PF25C3INB250 | 25 | 30,0 | 137,0 | 32,8 | 39,3 | 400 | 440 | 100 x 260 | MT 25 | 5 |
| 3PF30C3INB250 | 30 | 36,0 | 164,4 | 39,4 | 47,2 | 400 | 440 | 100 x 285 | MT 25 | 5 |
| 3PF40C3INB250 | 40 | 48,0 | 219,2 | 52,5 | 63,0 | 400 | 440 | 116 x 285 | MT 25 | 5 |
| 3PF50C3INB350 | 50 | 60,0 | 274,0 | 65,6 | 78,7 | 400 | 440 | 136 x 300 | MT 35 | 4 |
| 3PF62,5C3INB350 | 62,5 | - | 342,5 | 82,0 | - | 400 | 440 | 136 x 375 | MT 35 | 2 |

## RCM-INB 400 V / 480 V - 3 PHASE - 50 HZ / 60 HZ

| ORDER CODE | CAPACITOR POWER 50 Hz | CAPACITOR POWER 60 Hz | RATED CAPACITANCE | In 50 Hz CURRENT | In 60 Hz CURRENT | Un SYSTEM VOLTAGE | Ur RATED VOLTAGE | DIMENSIONS* | TERMINAL TYPE | PCS/BOX |
|---|---|---|---|---|---|---|---|---|---|---|
| | kVar | kVar | 3 x µF | A | A | V | V | ø x H | mmq | |
| 3PF2,5C5INB160 | 2,5 | 3,0 | 11,5 | 3,0 | 3,6 | 400 | 480 | 85 x 185 | MT 16 | 9 |
| 3PF5C5INB160 | 5 | 6,0 | 23,0 | 6,0 | 7,2 | 400 | 480 | 85 x 185 | MT 16 | 9 |
| 3PF6,25C5INB160 | 6,25 | 7,5 | 28,8 | 7,5 | 9,0 | 400 | 480 | 85 x 185 | MT 16 | 9 |
| 3PF10C5INB160 | 10 | 12,0 | 46,1 | 12,0 | 14,4 | 400 | 480 | 85 x 225 | MT 16 | 9 |
| 3PF12,5C5INB160 | 12,5 | 15,0 | 57,6 | 15,0 | 18,0 | 400 | 480 | 85 x 225 | MT 16 | 9 |
| 3PF15C5INB160 | 15 | 18,0 | 69,1 | 18,0 | 21,6 | 400 | 480 | 85 x 260 | MT 16 | 9 |
| 3PF20C5INB250 | 20 | 24,0 | 92,1 | 24,1 | 28,9 | 400 | 480 | 100 x 260 | MT 25 | 5 |
| 3PF25C5INB250 | 25 | 30,0 | 115,1 | 30,1 | 36,1 | 400 | 480 | 100 x 260 | MT 25 | 5 |
| 3PF30C5INB250 | 30 | 36,0 | 138,2 | 36,1 | 43,3 | 400 | 480 | 100 x 285 | MT 25 | 5 |
| 3PF40C5INB250 | 40 | 48,0 | 184,2 | 48,1 | 57,7 | 400 | 480 | 136 x 300 | MT 25 | 4 |
| 3PF50C5INB350 | 50 | 60,0 | 230,3 | 60,1 | 72,1 | 400 | 480 | 136 x 300 | MT 35 | 4 |
| 3PF62,5C5INB350 | 62,5 | - | 287,8 | 75,2 | - | 400 | 480 | 136 x 375 | MT 35 | 2 |

## RCM-INB 400 V / 525 V - 3 PHASE - 50 HZ / 60 HZ

| ORDER CODE | CAPACITOR POWER 50 Hz | CAPACITOR POWER 60 Hz | RATED CAPACITANCE | In 50 Hz CURRENT | In 60 Hz CURRENT | Un SYSTEM VOLTAGE | Ur RATED VOLTAGE | DIMENSIONS* | TERMINAL TYPE | PCS/BOX |
|---|---|---|---|---|---|---|---|---|---|---|
| | kVar | kVar | 3 x µF | A | A | V | V | ø x H | mmq | |
| 3PF2,5C7INB160 | 2,5 | 3,0 | 9,6 | 2,7 | 3,3 | 400 | 525 | 85 x 185 | MT 16 | 9 |
| 3PF5C7INB160 | 5 | 6,0 | 19,2 | 5,5 | 6,6 | 400 | 525 | 85 x 185 | MT 16 | 9 |
| 3PF6,25C7INB160 | 6,25 | 7,5 | 24,1 | 6,9 | 8,2 | 400 | 525 | 85 x 185 | MT 16 | 9 |
| 3PF10C7INB160 | 10 | 12,0 | 38,5 | 11,0 | 13,2 | 400 | 525 | 85 x 225 | MT 16 | 9 |
| 3PF12,5C7INB160 | 12,5 | 15,0 | 48,1 | 13,7 | 16,5 | 400 | 525 | 85 x 225 | MT 16 | 9 |
| 3PF15C7INB160 | 15 | 18,0 | 57,7 | 16,5 | 19,8 | 400 | 525 | 85 x 260 | MT 16 | 9 |
| 3PF20C7INB250 | 20 | 24,0 | 77,0 | 22,0 | 26,4 | 400 | 525 | 100 x 225 | MT 25 | 5 |
| 3PF25C7INB250 | 25 | 30,0 | 96,2 | 27,5 | 33,0 | 400 | 525 | 100 x 260 | MT 25 | 5 |
| 3PF30C7INB250 | 30 | 36,0 | 115,5 | 33,0 | 39,6 | 400 | 525 | 100 x 285 | MT 25 | 5 |
| 3PF40C7INB250 | 40 | 48,0 | 154,0 | 44,0 | 52,8 | 400 | 525 | 116 x 285 | MT 25 | 5 |
| 3PF50C7INB250 | 50 | 60,0 | 192,5 | 55,0 | 65,9 | 400 | 525 | 136 x 300 | MT 35 | 4 |
| 3PF62,5C7INB350 | 62,5 | - | 240,6 | 68,7 | - | 400 | 525 | 136 x 375 | MT 35 | 2 |

**Up to 37,5 kVar 400 V or 50 kVar 525 V capacitors are also available in single-phase version.**
**Other capacitor powers and voltages are available on request. Contact us info@gruppoenergia.it**

*All dimensions are in "mm" and will be confirmed at the time of order.

## TECHNICAL CHARACTERISTICS INTACT PLUS RCM-INP

| General | |
|---|---|
| Standards: | IEC 60831-1:2014, UL810, VDE 0560-46:2014-11 |
| Origin: | 100% made in Italy |
| Voltage range: | 220 V to 550 V |
| Frequency: | 50 Hz / 60 Hz |
| Power range: | 2,5 kVar to 50 kVar |
| Dielectric losses: | < 0,2 W/kVar |
| Total losses: | < 0,5 W/kVar |
| Capacitance tolerance: | ± 5% |
| Voltage test between terminals: | 2,15 Un, 50 Hz, 10 seconds (routine test) |
| Voltage test between terminals: | 3,00 Un, 50 Hz, 60 seconds (type test) |
| Voltage test terminal / case: | ≤ 525 V 3000 V, 50 Hz for 10 seconds or > 525 V 3660 V, 50 Hz for 10 seconds |
| Insulation level: | 3 / 8 kV |
| External discharge resistor: | 50 V in 1 min. 1 kVar - 30 kVar or 75 V in 3 min. 30,5 kVar - 62,5 kVar |
| Cooling: | Natural air or forced ventilation |

| Operating Conditions | |
|---|---|
| Ambient temperature: | -45 °C / 60 °C |
| Humidity: | up to 95% |
| Altitude above sea level: | 2000 m. |
| Overvoltage: | Un+10% for 8 hrs. daily<br>Un+15% for 30 min. daily<br>Un+20% for 5 min. daily<br>Un+30% for 1 min. daily |
| Overcurrent: | up to 1,8 x In (Including Harmonics) |
| Inrush current: | up to 250 x In |
| Service life: | up to 160.000 hrs. |
| Harmonic presence: | NLL < 20% |

| Safety Features | |
|---|---|
| Safety: | Overpressure disconnector on 3 phase + Incorporated fuses + Self-healing + Discharge device |
| Protection degree: | IP20 |

| Construction | |
|---|---|
| Casing: | Aluminium can |
| Dielectric: | Special polypropylene film with slope metallisation and wave-cut |
| Impreganation: | Special polyurethene resin, Non-PCB |

| Installation | |
|---|---|
| Mounting position: | Vertical preferable for better cooling |
| Fastening & Earthing: | Through 1 point, screw M12 at the bottom |

# INTACT PLUS
# CAPACITORS NLL <20%

## RCM-INP CAPACITOR RATED VOLTAGE 400 V / 415 V - 3 PHASE - 50 HZ / 60 HZ

| POWER AT SYSTEM VOLTAGE 50 Hz | | POWER AT SYSTEM VOLTAGE 60 Hz | | In 50 Hz CURRENT | | In 60 Hz CURRENT | | RATED CAPACITANCE | AVAIBLE DIMENSIONS* | | | TERMINAL TYPE | PCS/BOX | PCS/BOX | PCS/BOX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 400 V kVar | 415 V kVar | 400 V kVar | 415 V kVar | 400 V A | 415 V A | 400 V A | 415 V A | 3 x µF | ø x H (7) | ø x H (8) | ø x H (9) | mmq | ø 85 | ø 100 ø 116 | ø 136 |
| 2,5 | 2,7 | 3,0 | 3,2 | 3,6 | 3,7 | 4,3 | 4,5 | 16,6 | 85 x 130 | 85 x 185 | - | MT 16 | 9 | - | - |
| 5 | 5,4 | 6,0 | 6,5 | 7 | 7,5 | 8,7 | 9,0 | 33,2 | 85 x 130 | 85 x 185 | - | MT 16 | 9 | - | - |
| 6,25 | 6,72 | 7,5 | 8,1 | 9,02 | 9,34 | 10,8 | 11,2 | 41,4 | 85 x 185 | - | - | MT 16 | 9 | - | - |
| 10 | 10,8 | 12,0 | 12,9 | 14 | 15,0 | 17,3 | 18,0 | 66,3 | 85 x 225 | - | - | MT 16 | 9 | - | - |
| 12,5 | 13,4 | 15,0 | 16,1 | 18,0 | 18,7 | 21,6 | 22,5 | 82,9 | 100 x 225 | 85 x 260 | - | MT 25 / 16 | 9 | 5 | - |
| 15 | 16,1 | 18,0 | 19,4 | 22 | 22,5 | 26,0 | 26,9 | 99,5 | 100 x 225 | - | 85 x 285 | MT 25 / 16 | 9 | 5 | - |
| 20 | 21,5 | 24,0 | 25,8 | 29 | 29,9 | 34,6 | 35,9 | 132,6 | 116 x 225 | 100 x 260 | 100 x 300 | MT 25 | 9 | 5 | - |
| 25 | 26,9 | 30,0 | 32,3 | 36 | 37,4 | 43,3 | 44,9 | 165,8 | 136 x 225 | 116 x 260 | 100 x 300 | MT 25 | - | 5 | 4 |
| 30 | 32,3 | 36,0 | 38,7 | 43 | 44,9 | 51,9 | 53,9 | 198,9 | 136 x 225 | - | 116 x 285 | MT 25 | - | 5 | 4 |
| 40 | 43,0 | 48,0 | 51,6 | 58 | 59,9 | 69,3 | 71,9 | 265,3 | 136 x 300 | - | - | MT 35 | - | - | 4 |
| 50 | 53,8 | 60,0 | 64,6 | 72 | 74,8 | 86,6 | 89,8 | 331,6 | 136 x 375 | - | - | MT 35 | - | - | 2 |

## RCM-INP CAPACITOR RATED VOLTAGE 440 V / 450 V - 3 PHASE - 50 HZ / 60 HZ

| POWER AT SYSTEM VOLTAGE 50 Hz | | POWER AT SYSTEM VOLTAGE 60 Hz | | In 50 Hz CURRENT | | In 60 Hz CURRENT | | RATED CAPACITANCE | AVAIBLE DIMENSIONS* | | | TERMINAL TYPE | PCS/BOX | PCS/BOX | PCS/BOX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 440 V kVar | 450 V kVar | 440 V kVar | 450 V kVar | 440 V A | 450 V A | 440 V A | 450 V A | 3 x µF | ø x H (7) | ø x H (8) | ø x H (9) | mmq | ø 85 | ø 100 ø 116 | ø 136 |
| 2,5 | 2,6 | 3,0 | 3,1 | 3,3 | 3,4 | 3,9 | 4,0 | 13,7 | 85 x 130 | 85 x 185 | - | MT 16 | 9 | - | - |
| 5 | 5,2 | 6,0 | 6,3 | 7 | 6,7 | 7,9 | 8,0 | 27,4 | 85 x 130 | 85 x 185 | - | MT 16 | 9 | - | - |
| 6,25 | 6,5 | 7,5 | 7,9 | 8,20 | 8,4 | 9,8 | 10,1 | 34,3 | 85 x 185 | - | - | MT 16 | 9 | - | - |
| 10 | 10,5 | 12,0 | 12,5 | 13 | 13,4 | 15,7 | 16,1 | 54,8 | 85 x 225 | - | - | MT 16 | 9 | - | - |
| 12,5 | 13,1 | 15,0 | 15,7 | 16,4 | 16,8 | 19,7 | 20,1 | 68,5 | 100 x 225 | 85 x 260 | - | MT 25 / 16 | 9 | 5 | - |
| 15 | 15,7 | 18,0 | 18,8 | 20 | 20,1 | 23,6 | 24,1 | 82,2 | 100 x 225 | 85 x 260 | - | MT 25 / 16 | 9 | 5 | - |
| 20 | 20,9 | 24,0 | 25,1 | 26 | 26,8 | 31,5 | 32,2 | 109,6 | 116 x 225 | 100 x 260 | - | MT 25 | 9 | 5 | - |
| 25 | 26,1 | 30,0 | 31,4 | 33 | 33,5 | 39,3 | 40,2 | 137 | 136 x 225 | 116 x 260 | 100 x 300 | MT 25 | - | 5 | 4 |
| 30 | 31,4 | 36,0 | 37,6 | 39 | 40,2 | 47,2 | 48,3 | 164,4 | 136 x 225 | - | 116 x 285 | MT 25 | - | 5 | 4 |
| 40 | 41,8 | 48,0 | 50,2 | 52 | 53,6 | 62,9 | 64,4 | 219,2 | 136 x 300 | - | - | MT 35 | - | - | 4 |
| 50 | 52,3 | 60,0 | 62,7 | 66 | 67,1 | 78,7 | 80,5 | 274 | 136 x 375 | - | - | MT 35 | - | - | 2 |

## RCM-INP CAPACITOR RATED VOLTAGE 525 V / 550 V - 3 PHASE - 50 HZ / 60 HZ

| POWER AT SYSTEM VOLTAGE 50 Hz | | POWER AT SYSTEM VOLTAGE 60 Hz | | In 50 Hz CURRENT | | In 60 Hz CURRENT | | RATED CAPACITANCE | AVAIBLE DIMENSIONS* | | | TERMINAL TYPE | PCS/BOX | PCS/BOX | PCS/BOX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 525 V kVar | 550 V kVar | 525 V kVar | 550 V kVar | 525 V A | 550 V A | 525 V A | 550 V A | 3 x µF | ø x H (7) | ø x H (8) | ø x H (9) | mmq | ø 85 | ø 100 ø 116 | ø 136 |
| 2,5 | 2,7 | 3,0 | 3,3 | 2,7 | 2,9 | 3,3 | 3,4 | 9,6 | 85 x 130 | 85 x 185 | - | MT 16 | 9 | - | - |
| 5 | 5,5 | 6,0 | 6,6 | 5 | 5,7 | 6,6 | 6,9 | 19,2 | 85 x 130 | 85 x 185 | - | MT 16 | 9 | - | - |
| 6,25 | 6,9 | 7,5 | 8,2 | 6,87 | 7,2 | 8,3 | 8,7 | 24,1 | 85 x 225 | 85 x 185 | - | MT 16 | 9 | - | - |
| 10 | 11,0 | 12,0 | 13,2 | 11 | 11,5 | 13,2 | 13,8 | 38,5 | 100 x 225 | 85 x 260 | - | MT 25 / 16 | 9 | 5 | - |
| 12,5 | 13,7 | 15,0 | 16,4 | 13,7 | 14,4 | 16,5 | 17,3 | 48,1 | 100 x 225 | 100 x 260 | 85 x 285 | MT 25 / 16 | 9 | 5 | - |
| 15 | 16,4 | 18,0 | 19,7 | 16 | 17,3 | 19,8 | 20,7 | 57,7 | 116 x 225 | 100 x 260 | 100 x 300 | MT 25 | - | 5 | - |
| 20 | 21,9 | 24,0 | 26,3 | 22 | 23,0 | 26,4 | 27,6 | 77,0 | 136 x 225 | 116 x 260 | 100 x 300 | MT 25 | - | 5 | - |
| 25 | 27,4 | 30,0 | 32,9 | 27 | 28,8 | 33,0 | 34,5 | 96,2 | 136 x 225 | - | 116 x 285 | MT 25 | - | 5 | 4 |
| 30 | 32,9 | 36,0 | 39,5 | 33 | 34,5 | 39,6 | 41,5 | 115,5 | 136 x 300 | - | - | MT 25 | - | - | 4 |
| 40 | 43,9 | 48,0 | 52,7 | 44 | 46,1 | 52,8 | 55,3 | 154,0 | 136 x 300 | - | - | MT 35 | - | - | 4 |
| 50 | 54,9 | 60,0 | 65,8 | 55 | 57,6 | 66,0 | 69,1 | 192,5 | 136 x 375 | - | - | MT 35 | - | - | 2 |

**Up to 37,5 kVar 400 V or 50 kVar 525 V capacitors are also available in single-phase version.**
**Other capacitor powers and voltages are available on request. Contact us info@gruppoenergia.it**

*All dimensions are in "mm" and will be confirmed at the time of order.

## TECHNICAL CHARACTERISTICS INTACT ALLPOWER RCM-INA

| General | |
|---|---|
| Standards: | IEC 60831-1:2014, UL810, VDE 0560-46:2014-11 |
| Origin: | 100% made in Italy |
| Voltage range: | 220 V to 550 V |
| Frequency: | 50 Hz / 60 Hz |
| Power range: | 2,5 kVar to 30 kVar |
| Dielectric losses: | < 0,2 W/kVar |
| Total losses: | < 0,5 W/kVar |
| Capacitance tolerance: | ± 5% |
| Voltage test between terminals: | 2,15 Un, 50 Hz, 10 seconds (routine test) |
| Voltage test between terminals: | 3,00 Un, 50 Hz, 60 seconds (type test) |
| Voltage test terminal / case: | ≤ 525 V 3000 V, 50 Hz for 10 seconds or > 525 V 3660 V, 50 Hz for 10 seconds |
| Insulation level: | 3 / 8 kV |
| External discharge resistor: | 50 V in 1 min. 1 kVar - 30 kVar or 75 V in 3 min. 30,5 kVar - 62,5 kVar |
| Cooling: | Natural air or forced ventilation |

| Operating Conditions | |
|---|---|
| Ambient temperature: | - 45 °C / 60 °C |
| Humidity: | up to 95% |
| Altitude above sea level: | 2000 m. |
| Overvoltage: | Un+10% continuous operation<br>Un+15% for 30 min. daily<br>Un+20% for 5 min. daily<br>Un+30% for 1 min. daily |
| Overcurrent: | up to 2,5 x In (Including Harmonics) |
| Inrush current: | up to 280 x In |
| Service life: | up to 180.000 hrs. |
| Harmonic presence: | NLL < 25% |

| Safety Features | |
|---|---|
| Safety: | Overpressure disconnector on 3 phase + Incorporated fuses + Self-healing + Discharge device |
| Protection degree: | IP20 |

| Construction | |
|---|---|
| Casing: | Aluminium can |
| Dielectric: | Special polypropylene film with slope metallisation and wave-cut |
| Impreganation: | Special polyurethene resin, Non-PCB |

| Installation | |
|---|---|
| Mounting position: | Vertical preferable for better cooling |
| Fastening & Earthing: | Through 1 point, screw M12 at the bottom |

# Intact ALLPOWER
# Capacitors Nll <25%

## RCM-INA Capacitor Rated Voltage 400 V / 415 V — 3 Phase — 50 Hz / 60 Hz

| POWER AT SYSTEM VOLTAGE 50 Hz | | POWER AT SYSTEM VOLTAGE 60 Hz | | In 50 Hz CURRENT | | In 60 Hz CURRENT | | RATED CAPACITANCE | AVAIBLE DIMENSIONS* | | | TERMINAL TYPE | PCS/BOX | PCS/BOX | PCS/BOX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 400 V kVar | 415 V kVar | 400 V kVar | 415 V kVar | 400 V A | 415 V A | 400 V A | 415 V A | 3 x µF | ø x H (7) | ø x H (8) | ø x H (9) | mmq | ø 85 | ø 100 ø 116 | ø 136 |
| 2,5 | 2,7 | 3,0 | 3,2 | 3,6 | 3,7 | 4,3 | 4,5 | 16,6 | 85 x 225 | 85 x 185 | - | MT 16 | 9 | - | - |
| 5 | 5,4 | 6,0 | 6,5 | 7 | 7,5 | 8,7 | 9,0 | 33,2 | 85 x 225 | 85 x 185 | - | MT 16 | 9 | - | - |
| 6,25 | 6,72 | 7,5 | 8,1 | 9,02 | 9,34 | 10,8 | 11,2 | 41,4 | 85 x 225 | 85 x 185 | - | MT 16 | 9 | - | - |
| 10 | 10,8 | 12,0 | 12,9 | 14 | 15,0 | 17,3 | 18,0 | 66,3 | 85 x 225 | - | - | MT 16 | 9 | - | - |
| 12,5 | 13,4 | 15,0 | 16,1 | 18,0 | 18,7 | 21,6 | 22,5 | 82,9 | 100 x 225 | 85 x 260 | - | MT 25 | - | 5 | - |
| 15 | 16,1 | 18,0 | 19,4 | 22 | 22,5 | 26,0 | 26,9 | 99,5 | 100 x 225 | - | 85 x 285 | MT 25 | 9 | 5 | - |
| 20 | 21,5 | 24,0 | 25,8 | 29 | 29,9 | 34,6 | 35,9 | 132,6 | 136 x 225 | 116 x 260 | - | MT 35 | - | 5 | 4 |
| 25 | 26,9 | 30,0 | 32,3 | 36 | 37,4 | 43,3 | 44,9 | 165,8 | 136 x 225 | - | 116 x 285 | MT 35 | - | 5 | 4 |
| 30 | 32,3 | 36,0 | 38,7 | 43 | 44,9 | 51,9 | 53,9 | 198,9 | 136 x 300 | - | - | MT 35 | - | - | 4 |

## RCM-INA Capacitor Rated Voltage 440 V / 450 V — 3 Phase — 50 Hz / 60 Hz

| POWER AT SYSTEM VOLTAGE 50 Hz | | POWER AT SYSTEM VOLTAGE 60 Hz | | In 50 Hz CURRENT | | In 60 Hz CURRENT | | RATED CAPACITANCE | AVAIBLE DIMENSIONS* | | | TERMINAL TYPE | PCS/BOX | PCS/BOX | PCS/BOX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 440 V kVar | 450 V kVar | 440 V kVar | 450 V kVar | 440 V A | 450 V A | 440 V A | 450 V A | 3 x µF | ø x H (7) | ø x H (8) | ø x H (9) | mmq | ø 85 | ø 100 ø 116 | ø 136 |
| 2,5 | 2,6 | 3,0 | 3,1 | 3,3 | 3,4 | 3,9 | 4,0 | 13,7 | 85 x 225 | 85 x 185 | - | MT 16 | 9 | - | - |
| 5 | 5,2 | 6,0 | 6,3 | 7 | 6,7 | 7,9 | 8,0 | 27,4 | 85 x 225 | 85 x 185 | - | MT 16 | 9 | - | - |
| 6,25 | 6,5 | 7,5 | 7,9 | 8,20 | 8,4 | 9,8 | 10,1 | 34,3 | 85 x 225 | 85 x 185 | - | MT 16 | 9 | - | - |
| 10 | 10,5 | 12,0 | 12,5 | 13 | 13,4 | 15,7 | 16,1 | 54,8 | 100 x 225 | 85 x 260 | - | MT 25 / 16 | 9 | 5 | - |
| 12,5 | 13,1 | 15,0 | 15,7 | 16,4 | 16,8 | 19,7 | 20,1 | 68,5 | 100 x 225 | - | 85 x 285 | MT 25 | 9 | 5 | - |
| 15 | 15,7 | 18,0 | 18,8 | 20 | 20,1 | 23,6 | 24,1 | 82,2 | 116 x 225 | 100 x 260 | 85 x 285 | MT 25 | 9 | 5 | - |
| 20 | 20,9 | 24,0 | 25,1 | 26 | 26,8 | 31,5 | 32,2 | 109,6 | 136 x 225 | 116 x 260 | - | MT 25 | - | 5 | 4 |
| 25 | 26,1 | 30,0 | 31,4 | 33 | 33,5 | 39,3 | 40,2 | 137 | 136 x 225 | 116 x 260 | - | MT 35 | - | 5 | 4 |
| 30 | 31,4 | 36,0 | 37,6 | 39 | 40,2 | 47,2 | 48,3 | 164,4 | 136 x 225 | - | 116 x 285 | MT 35 | - | 5 | 4 |

## RCM-INA Capacitor Rated Voltage 525 V / 550 V — 3 Phase — 50 Hz / 60 Hz

| POWER AT SYSTEM VOLTAGE 50 Hz | | POWER AT SYSTEM VOLTAGE 60 Hz | | In 50 Hz CURRENT | | In 60 Hz CURRENT | | RATED CAPACITANCE | AVAIBLE DIMENSIONS* | | | TERMINAL TYPE | PCS/BOX | PCS/BOX | PCS/BOX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 525 V kVar | 550 V kVar | 525 V kVar | 550 V kVar | 525 V A | 550 V A | 525 V A | 550 V A | 3 x µF | ø x H (7) | ø x H (8) | ø x H (9) | mmq | ø 85 | ø 100 ø 116 | ø 136 |
| 2,5 | 2,7 | 3,0 | 3,3 | 2,7 | 2,9 | 3,3 | 3,4 | 9,6 | 85 x 225 | 85 x 185 | - | MT 16 | 9 | - | - |
| 5 | 5,5 | 6,0 | 6,6 | 5 | 5,7 | 6,6 | 6,9 | 19,2 | 85 x 225 | - | - | MT 16 | 9 | - | - |
| 6,25 | 6,9 | 7,5 | 8,2 | 6,87 | 7,2 | 8,3 | 8,7 | 24,1 | 100 x 225 | 85 x 225 | - | MT 25 / 16 | 9 | 5 | - |
| 10 | 11,0 | 12,0 | 13,2 | 11 | 11,5 | 13,2 | 13,8 | 38,5 | 116 x 225 | - | 85 x 285 | MT 25 / 16 | 9 | 5 | - |
| 12,5 | 13,7 | 15,0 | 16,4 | 13,7 | 14,4 | 16,5 | 17,3 | 48,1 | 136 x 225 | - | 100 x 300 | MT 25 | - | 5 | 4 |
| 15 | 16,4 | 18,0 | 19,7 | 16 | 17,3 | 19,8 | 20,7 | 57,7 | 136 x 225 | - | 116 x 285 | MT 25 | - | 5 | 4 |
| 20 | 21,9 | 24,0 | 26,3 | 22 | 23,0 | 26,4 | 27,6 | 77,0 | 136 x 300 | - | 116 x 285 | MT 25 | - | 5 | 4 |
| 25 | 27,4 | 30,0 | 32,9 | 27 | 28,8 | 33,0 | 34,5 | 96,2 | 136 x 300 | - | - | MT 25 | - | - | 4 |
| 30 | 32,9 | 36,0 | 39,5 | 33 | 34,5 | 39,6 | 41,5 | 115,5 | 136 x 375 | - | - | MT 35 | - | - | 2 |

**Up to 30 kVar 400 V or 30 kVar 525 V capacitors are also available in single-phase version.**
**Other capacitor powers and voltages are available on request. Contact us info@gruppoenergia.it**

*All dimensions are in "mm" and will be confirmed at the time of order.

## TECHNICAL CHARACTERISTICS INTACT R-POWER + DETUNED HARMONIC REACTOR RCM-INR

| General | |
|---|---|
| Standards: | IEC 60831-1:2014, UL810, VDE 0560-46:2014-11 |
| Origin: | 100% made in Italy |
| Voltage range: | 220 V to 550 V |
| Frequency: | 50 Hz / 60 Hz |
| Power range: | 2,5 kVar to 50 kVar |
| Dielectric losses: | < 0,2 W/kVar |
| Total losses: | < 0,5 W/kVar |
| Capacitance tolerance: | ± 5% |
| Voltage test between terminals: | 2,15 Un, 50 Hz, 10 seconds (routine test) |
| Voltage test between terminals: | 3,00 Un, 50 Hz, 60 seconds (type test) |
| Voltage test terminal / case: | ≤ 525 V 3000 V, 50 Hz for 10 seconds or > 525 V 3660 V, 50 Hz for 10 seconds |
| Insulation level: | 3 / 8 kV |
| External discharge resistor: | 50 V in 1 min. 1 kVar - 30 kVar or 75 V in 3 min. 30,5 kVar - 62,5 kVar |
| Cooling: | Forced ventilation |

| Operating Conditions | |
|---|---|
| Ambient temperature: | - 45 °C / 55 °C |
| Humidity: | up to 95% |
| Altitude above sea level: | 2000 m. |
| Overvoltage: | Un+10% continuous operation<br>Un+15% for 30 min. daily<br>Un+20% for 5 min. daily<br>Un+30% for 1 min. daily |
| Overcurrent: | up to 1,8 x In (Including Harmonics) |
| Inrush current: | up to 250 x In |
| Service life: | up to 160.000 hrs. |
| Harmonic presence: | NLL < 30% |

| Safety Features | |
|---|---|
| Safety: | Overpressure disconnector on 3 phase + Incorporated fuses + Self-healing + Discharge device |
| Protection degree: | IP20 |

| Construction | |
|---|---|
| Casing: | Aluminium can |
| Dielectric: | Special polypropylene film with slope metallisation and wave-cut |
| Impreganation: | Special polyurethene resin, Non-PCB |

| Installation | |
|---|---|
| Mounting position: | Vertical preferable for better cooling |
| Fastening & Earthing: | Through 1 point, screw M12 at the bottom |

# Intact R-POWER
# Capacitors Nll <30%

## RCM-INR Capacitor Rated Voltage 440 V / 525 V - 3 Phase - 50 Hz
## Reactor Rated Voltage 400 V - 189 Hz - P=7%

| CAPACITOR POWER | | POWER REACTOR | TOTAL POWER LC CAPACITOR + REACTOR | RATED CAPACITANCE | RATED INDUCTANCE | In CURRENT | AVAIBLE DIMENSIONS* | | TERMINAL TYPE | PCS/BOX | PCS/BOX | PCS/BOX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 440 V kVar | 525 V kVar | 400 V kVar | 400 V kVar | 3 x µF | 3 x mH | 400 V | ø x H 440 V (7) | ø x H 525 V (8) | mmq | ø 85 | ø 100 ø 116 | ø 136 |
| 2,5 | 3,6 | 2,2 | 2,2 | 13,7 | 17,30 | 3,2 | 85 x 225 | 85 x 225 | MT 16 | 9 | - | - |
| 2,8 | 4,0 | 2,5 | 2,5 | 15,4 | 15,33 | 3,6 | 85 x 225 | 85 x 225 | MT 16 | 9 | - | - |
| 5 | 7,1 | 4,4 | 4,4 | 27,4 | 8,64 | 6,4 | 85 x 225 | 85 x 225 | MT 16 | 9 | - | - |
| 5,6 | 8,0 | 5,0 | 5 | 30,8 | 7,66 | 7,2 | 85 x 225 | 85 x 225 | MT 16 | 9 | - | - |
| 6,25 | 8,9 | 5,5 | 5,5 | 34,3 | 6,90 | 8,0 | 85 x 225 | 85 x 225 | MT 16 | 9 | - | - |
| 7 | 10,0 | 6,25 | 6,25 | 38,6 | 6,13 | 9,0 | 85 x 225 | 85 x 225 | MT 16 | 9 | - | - |
| 10 | 14,2 | 8,9 | 8,9 | 54,8 | 4,32 | 12,8 | 85 x 285 | 85 x 285 | MT 16 | 9 | - | - |
| 11,3 | 16,0 | 10 | 10 | 61,7 | 3,83 | 14,4 | 85 x 285 | 85 x 285 | MT 16 | 9 | - | - |
| 12,5 | 17,8 | 11,1 | 11,1 | 68,5 | 3,46 | 16,0 | 85 x 285 | 100 x 300 | MT 16 / 25 | 9 | 5 | - |
| 14,1 | 20,0 | 12,5 | 12,5 | 77,1 | 3,07 | 18,0 | 85 x 285 | 100 x 300 | MT 16 / 25 | 9 | 5 | - |
| 15 | 21,3 | 13,3 | 13,3 | 82,2 | 2,88 | 19,2 | 85 x 285 | 100 x 300 | MT 16 / 25 | 9 | 5 | - |
| 16,9 | 24,0 | 15 | 15 | 92,6 | 2,50 | 21,7 | 100 x 300 | 100 x 300 | MT 25 | - | 5 | - |
| 20 | 28,5 | 17,8 | 17,8 | 109,6 | 2,17 | 25,6 | 100 x 300 | 116 x 285 | MT 25 | - | 5 | - |
| 22,5 | 32,0 | 20 | 20 | 123,4 | 1,90 | 28,9 | 116 x 285 | 116 x 285 | MT 25 | - | 5 | - |
| 25 | 35,6 | 22,2 | 22,2 | 137,0 | 1,73 | 32,0 | 116 x 285 | 136 x 300 | MT 25 | - | 5 | 4 |
| 28,1 | 40,0 | 25 | 25 | 154,0 | 1,53 | 36,0 | 116 x 285 | 136 x 300 | MT 25 | - | 5 | 4 |
| 30 | 42,7 | 26.7 | 26.7 | 164,4 | 1,44 | 38,4 | 116 x 285 | 136 x 300 | MT 25 | - | 5 | 4 |
| 33,8 | 48,1 | 30 | 30 | 185,1 | 1,30 | 43,3 | 136 x 300 | 136 x 300 | MT 25 | - | - | 4 |
| 40 | 56,9 | 35,5 | 35,5 | 219,2 | 1,08 | 51,3 | 136 x 300 | 136 x 375 | MT 25 | - | - | 4 / 2 |
| 45 | 64,1 | 40 | 40 | 246,8 | 0,96 | 57,7 | 136 x 300 | 136 x 375 | MT 25 | - | - | 4 / 2 |
| 50 | 2 x 35,6 | 44,4 | 44,4 | 274,0 | 0,86 | 64,1 | 136 x 375 | - | MT 35 | - | - | 2 |
| 56,3 | 2 x 40 | 50 | 50 | 308,5 | 0,77 | 72,1 | 136 x 375 | - | MT 35 | - | - | 2 |
| 2 x 33,8 | 2 x 48,1 | 66 | 66 | 407,6 | 0,58 | 95,3 | - | - | - | - | - | - |
| 2 x 40 | 3 x 40 | 75 | 75 | 463,6 | 0,51 | 108,4 | - | - | - | - | - | - |
| 2 x 50 | 4 x 35,6 | 90 | 90 | 549,8 | 0,43 | 128,6 | - | - | - | - | - | - |
| 2 x 56,3 | 4 x 40 | 100 | 100 | 622,2 | 0,38 | 145,5 | - | - | - | - | - | - |

**Other capacitor powers and voltages are available on request. Contact us info@gruppoenergia.it**

## How To Order?

| 3PF | 25 | A | 400 | INP | 25 | 7 | 3PF25A400INP257 |
|---|---|---|---|---|---|---|---|
| **Number of Phase**<br>1PF = One<br>3PF = Three | **Power** | **Frequency**<br>A = 50 Hz<br>B = 60 Hz<br>**R-Power Tuning Frequency**<br>D = 210 Hz<br>E = 189 Hz<br>F = 134 Hz<br>G = 250 Hz<br>H = 230 Hz<br>I = 160 Hz | **Voltage** | **Series**<br>INB = Base<br>INP = Plus<br>INA = AllPower<br>INR = R-Power | **Terminal Type** | **Dimension** | **Order Code** |

*All dimensions are in "mm" and will be confirmed at the time of order.

# Harmonic Detuned Reactors

The detuned reactors are designed to protect the capacitors by preventing amplify cation of the harmonics present on the network.

As we know systems with significant non-linear loads generate harmonics and harmonics shortening steadily operating life of capacitors.

Amplification of harmonic currents is very high when the natural resonance frequency of the capacitor and the network combined happened to be close to any of the harmonic frequencies present.

To avoid this possibility detuned reactors have to be associated to Power Factor Correction capacitors. Capacitors and reactors are configured in a series resonant circuit in the way that the series resonant frequency is below the lowest harmonic frequency present in the system.

Detuned harmonic reactors prevents harmonic resonance problems, avoids the risk of overloading the capacitors and contributes to reducing voltage harmonic distortion in the network.

The most common values of reactors tuning frequency are 189 Hz and 134 Hz. (134 Hz is used with high level of 3rd harmonic voltages).

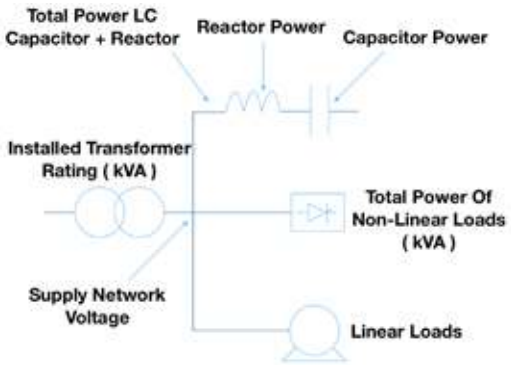
## Capacitors Rated Voltage With Detuned Reactors

INTACT R-POWER capacitors are oppositely designed to be used with detuned GE-RT3 reactors. This is because, capacitance and inductance must be chosen properly for series resonant circuit. Moreover the rated voltage of capacitors must be higher that network service voltage.

The recommended rated voltage of capacitors to be used with detuned harmonic reactors with respect to different network service voltage, relative tuning frequency and capacitance - inductive connection is given in the table below.

| Network Service Voltage | Network Service Frequency | Tuning Frequency | Relative Impedance | INTACT R-POWER Rated Voltage | |
|---|---|---|---|---|---|
| 400 V | 50 Hz / 60 Hz | 189 Hz | 7 % | 440 V | STANDARD SOLUTION |
| | | 134 Hz | 14 % | | |
| 400 V | 50 Hz / 60 Hz | 189 Hz | 7 % | 525 V | EXTRA LIFE SOLUTION |
| | | 134 Hz | 14 % | | |

## Example of Capacitor Selection with a Detuned Reactor




**Case:**
For a 400 V 50 Hz system, it is required to compensate 25 kVar reactive power with a detuned reactor, tuning frequency 189 Hz and 7% relative impedance.

**Step 1:**
Go to page 11 and check for 25 kVar in the "Total Power LC Capacitor + Reactor" column. Select the capacitor power from standard solution at 440 V or extra live solution at 525 V. The selection of the 25 kVar detuned reactor can be made on the page 13.

**Step 2:**
Combination of capacitor with order code **3PF28,1E440INR257** and detuned reactor with order code **GE3RTM25.400R189** will give 25 kVar reactive power as required.

## GE-RT3 DETUNED HARMONIC REACTORS GENERAL CHARACTERISTICS

| General | |
|---|---|
| Standards: | IEC 61558-2-20 EN 61558-2-20 |
| Origin: | 100% made in Italy |
| Voltage range: | 220 V to 690 V |
| Frequency: | 50 Hz — 60 Hz |
| Relative impedance: | 5,7%, 7%, 14% |
| Tuning frequency: | 189 Hz / 230 Hz, 134 Hz / 160 Hz, 210 Hz / 250 Hz ( at 50 Hz / 60 Hz ) |
| Power range: | 2,5 kVar to 100 kVar |
| Insulation class: | Class H |
| Winding material: | Al ( Cu on request ) |
| Working class: | Class F |
| Protection degree: | IP00 |
| Test voltage: | 3kV/1' |
| Maximum ambient temperature: | Ta 40 °C |

## GE-RT3 REACTORS - REACTORS RATED VOLTAGE: 400 V - 189 HZ - P=7%

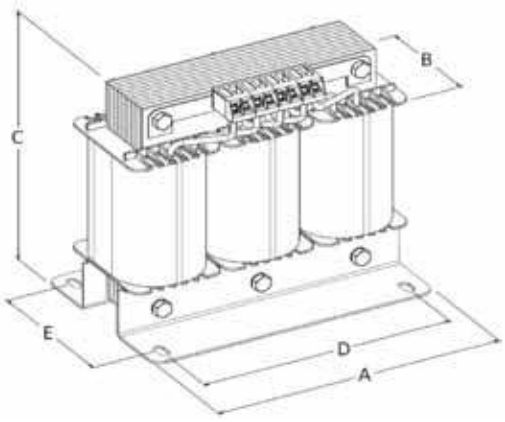
| ORDER CODE | POWER | RATED INDUCTANCE | REACTOR CURRENT | REACTOR LOSSES | DIMENSIONS* | | | WEIGHT | TERMINAL TYPE | CLAMP SIZE | TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 400 V kVar | 3 x mH | A | At 75° C W | A (mm) | B (mm) | C (mm) | Kg | mmq | | |
| GE3RTM5.400R189 | 5 | 7,66 | 7,2 | 47 | 180 | 90 | 173 | 5 | Connector | 6 sqmm | 1 |
| GE3RTM10.400R189 | 10 | 3,84 | 14,4 | 68 | 180 | 102 | 173 | 7 | Connector | 6 sqmm | 1 |
| GE3RTM12,5.400R189 | 12,5 | 3,07 | 18 | 72 | 180 | 113 | 173 | 10 | Connector | 6 sqmm | 1 |
| GE3RTM15.400R189 | 15 | 2,50 | 22 | 75 | 180 | 128 | 173 | 12 | Connector | 6 sqmm | 1 |
| GE3RTM20.400R189 | 20 | 1,90 | 29 | 108 | 240 | 160 | 185 | 15 | Bars | 25 x 3 mm M8 | 2 |
| GE3RTM25.400R189 | 25 | 1,53 | 36 | 120 | 240 | 160 | 185 | 16 | Bars | 25 x 3 mm M8 | 2 |
| GE3RTM50.400R189 | 50 | 0,77 | 72,1 | 177 | 250 | 175 | 205 | 24 | Bars | 25 x 3 mm M8 | 2 |
| GE3RTM75.400R189 | 75 | 0,51 | 108,2 | 240 | 300 | 175 | 260 | 31 | Bars | 30 x 3 mm M8 | 2 |
| GE3RTM100.400R189 | 100 | 0,38 | 144,3 | 320 | 300 | 200 | 260 | 42 | Bars | 30 x 3 mm M8 | 2 |

**Other reactor powers and voltages are available on request. Contact us info@gruppoenergia.it**

## CONSTRUCTION DIAGRAM

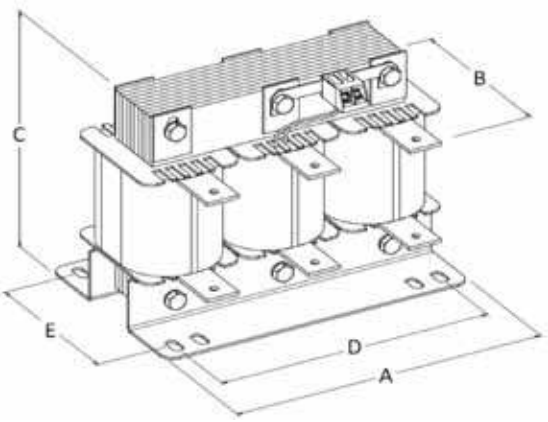
### TYPE 1

**Thermal PTC inserted in the middle coil**




### TYPE 2

**Thermal PTC inserted in the middle coil**




*All dimensions are in "mm" and will be confirmed at the time of order.

# Contactors For Capacitors Switching

- Excellent damping of inrush current.
- Reduced watt loss during "ON" condition to save energy.
- Capacitor bank switching in parallel without derating.
- Enhanced equipment life.
- Low maintenance and down-time.
- Power quality improvement.
- Optimized solution cost.

CSC Duty Contactors are appositely designed for switching three phase, single or multiple step, capacitor banks without choke inductors.

## Special Contactors

CSC capacitor contactors are specially designed to meet stringent requirements of capacitors switching as this operation is associated with high inrush current all CSC contactors are fitted with front-mounted block of three early make auxiliary contact in series with six quick discharge damping resistors, 2 per phase. These auxiliary contacts limit peak current in first stage of switching. Subsequently the nominal current is transferred through main contacts which are switched in next stage and the auxiliary contacts are switched - off at the same time.

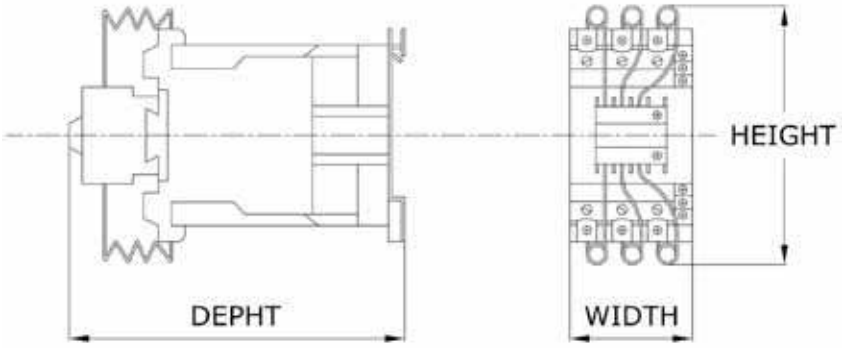
## CSC Contactors General Characteristics

| General | |
|---|---|
| Standards: | IEC 60947-4-1 EN 60947-4-1 |
| Origin: | 100% made in Italy |
| Voltage range: | 220 V to 690 V |
| Frequency: | 50 Hz — 60 Hz |
| Coil operating voltage: | 220 V — 240 V |
| Number of pole: | 3 |
| Terminal: | Screw |

## CSC Contactors Selection Table

| ORDER CODE | POWER | | | DIMENSIONS* | | | WEIGHT | TIGHTENING TORQUE | MAXIMUM OPERATING RATE | ELECTRICAL LIFE |
|---|---|---|---|---|---|---|---|---|---|---|
| | 400 V-440 V kVar | 220 V-240 V kVar | 660 V-690 V kVar | W (mm) | D (mm) | H (mm) | Kg | Nm | Operations / Hour | Operations |
| CSC02,5 | 2,5 | 1,4 | 3 | 45 | 75 | 74 | 0,36 | 1,2 | 240 | 200000 |
| CSC05 | 5 | 2,8 | 6,5 | 45 | 75 | 74 | 0,37 | 1,2 | 240 | 200000 |
| CSC07,5 | 7,5 | 4 | 9 | 45 | 130 | 117 | 0,50 | 1,2 | 240 | 200000 |
| CSC010 | 10 | 5,5 | 12,5 | 45 | 130 | 117 | 0,51 | 1,2 | 240 | 200000 |
| CSC012,5 | 12,5 | 6,7 | 18 | 45 | 130 | 117 | 0,52 | 1,2 | 240 | 200000 |
| CSC016,7 | 16,7 | 8,5 | 24 | 45 | 130 | 122 | 0,60 | 1,7 | 240 | 200000 |
| CSC020 | 20 | 10 | 30 | 56 | 140 | 130 | 0,76 | 1,9 | 100 | 100000 |
| CSC025 | 25 | 15 | 36 | 56 | 140 | 135 | 0,78 | 2,5 | 100 | 100000 |
| CSC033,3 | 33,3 | 20 | 48 | 75 | 180 | 150 | 1,71 | 5,0 | 100 | 100000 |
| CSC040 | 40 | 25 | 58 | 75 | 180 | 150 | 1,72 | 5,0 | 100 | 100000 |
| CSC050 | 50 | 30 | 72 | 75 | 180 | 150 | 1,72 | 5,0 | 100 | 100000 |
| CSO060 | 60 | 40 | 92 | 85 | 200 | 157 | 1,88 | 9,0 | 100 | 100000 |
| CSS075 | 75 | 50 | 120 | 85 | 200 | 157 | 1,90 | 9,0 | 100 | 100000 |
| CSC080 | 80 | 48 | 128 | 120 | 150 | 186 | 2,40 | 9,0 | 100 | 100000 |
| CSC100 | 100 | 60 | 143 | 120 | 150 | 186 | 2,50 | 9,0 | 100 | 100000 |

## Construction Diagram




*All dimensions are in "mm" and will be confirmed at the time of order.

# Load Break Switches

- Efficient and reliable construction.
- Efficient switching and long life.
- Flexibility to suit application.
- Safety built-in.
- Convenient and swift.

Main switch disconnector installed on capacitor bank is used to disconnect power factor correction panel from the main circuit.
The choice of Circuit breaker will depending on rating of the PFC equipment and the required fault current handling capacity.
The rating must be chosen as following:
• 1,5 x ( Total Power / ( System voltage x 1,73 ))
**Example:**
Capacitor bank with Intact PLUS capacitors.
Total Power: 250 kVar at 400 V, 50 Hz
===> 1,5 x ( 250 kVar / ( 0,4 V x 1,73 )) = 1,5 x 361,3 A = 542 A
Select a 630 A switch disconnector, order code GE630K3

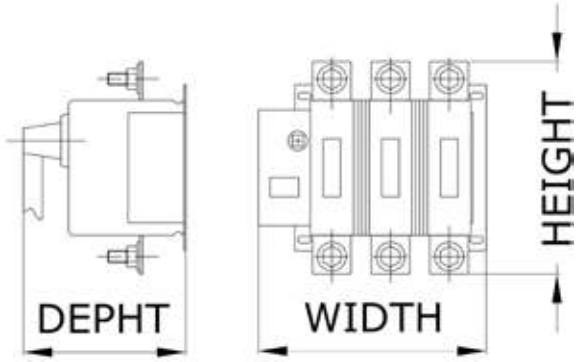
## GE-VC-3 Switch Disconnectors General Characteristics

| General | |
|---|---|
| Standards: | IEC 60947-3 EN 60947-3 |
| Origin: | 100% made in Italy |
| Frequency: | 50 Hz — 60 Hz |
| Ambient / Cubicle service temp.: | 55 °C |
| IP level after mounting: | IP 54 |

## GE-VC-3 Selection Table

| ORDER CODE | RATED CURRENT | OPERATED VOLTAGE | INSULATION VOLTAGE | DIMENSIONS* | | | WEIGHT | TERMINAL TIGHTENING TORQUE | IMPULSE WITHSTAND VOLTAGE | MINIMUM CONDUCTOR CROSS SECTION | NUMBER of POLE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | V | V | W (mm) | D (mm) | H (mm) | Kg | Nm | kV | Cu mmq | |
| GE160DM3 | 160 | 415 | 750 | 190 | 90 | 142 | 1,8 | 8 | 8,0 | 70 | 3 |
| GE200DM3 | 200 | 415 | 750 | 198 | 105 | 163 | 3 | 30…44 | 12,0 | 95 | 3 |
| GE250DM3 | 250 | 415 | 750 | 198 | 105 | 163 | 3 | 30…44 | 12,0 | 120 | 3 |
| GE315DM3 | 315 | 415 | 750 | 198 | 105 | 163 | 3 | 30…44 | 12,0 | 185 | 3 |
| GE400K3 | 400 | 415 | 1000 | 211 | 130 | 205 | 5,2 | 30…44 | 12,0 | 2 x 150 | 3 |
| GE630K3 | 630 | 415 | 1000 | 244 | 130 | 223 | 6,2 | 50…75 | 12,0 | 2 x 185 | 3 |
| GE800K3 | 800 | 415 | 1000 | 260 | 130 | 223 | 6,2 | 50…75 | 12,0 | 2 x 240 | 3 |
| GE1000K3 | 1000 | 415 | 1000 | 383 | 125 | 352 | 16,3 | 50…75 | 12,0 | 2 x (60 x 5) | 3 |
| GE1250K3 | 1250 | 415 | 1000 | 383 | 125 | 352 | 16,3 | 50…75 | 12,0 | 2 x (80 x 5) | 3 |
| GE1600K3 | 1600 | 415 | 1000 | 383 | 125 | 352 | 17,5 | 50…75 | 12,0 | 2 x (100 x 5) | 3 |
| GE2000K3 | 2000 | 415 | 1000 | 468 | 271 | 352 | 37 | 50…75 | 12,0 | 3 x (100 x 5) | 3 |
| GE2500K3 | 2500 | 415 | 1000 | 468 | 271 | 352 | 37 | 50…75 | 12,0 | 4 x (100 x 5) | 3 |
| GE3150K3 | 3150 | 415 | 1000 | 468 | 271 | 352 | 37 | 50…75 | 12,0 | 3 x (100 x 10) | 3 |

## Construction Diagram




*All dimensions are in "mm" and will be confirmed at the time of order.

# Power Factor Controllers

## ERN 11005 / ERN 11007 Advanced Key Features:

- Current measurement sensitivity 20 mA
- Perfect for smaller less demanding applications
- Features automatic control section recognition
- Independent alarm warnings
- Precise measurement and control even under conditions of voltage or current waveform distortion
- Measurement 1 U and 1 I.
- Automatic set up.
- Capacitor protection.
- Programmable alarms.
- Measurement U, I, P and Q.
- Control of PF, cosφ and THD control.
- Power import / export.
- Measurement up to 19-th harmonic.
- Integrated thermometer.

## ERN 11206 / ERN 11214 Smart Key Features:

- Current measurement sensitivity 2 mA
- Input for 2nd tariff
- Suitable for LV and HV application
- 2-nd rate inputs
- Separate AC / DC supply
- Ethernet port (optional)
- RS485 port (optional)
- Modbus (optional)
- Features automatic control section recognition
- Independent alarm warnings
- Precise measurement and control even under conditions of voltage or current waveform distortion
- Measurement 1 U and 1 I.
- Automatic set up.
- Capacitor protection.
- Programmable alarms.
- Measurement U, I, P and Q.
- Control of PF, cosφ and THD control.
- Power import / export.
- Measurement up to 19-th harmonic.
- Integrated thermometer.

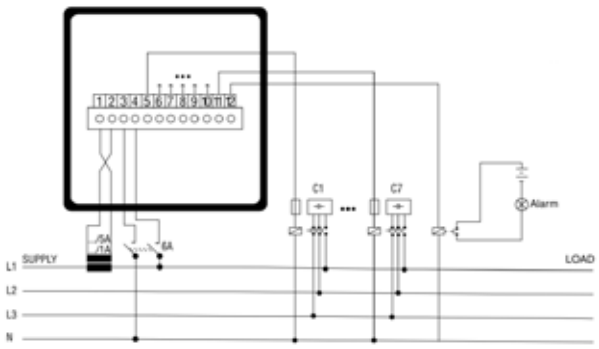
## ERN Technical Specifications

| | ERN 11005 | ERN 11007 | ERN 11206 | ERN 11214 |
|---|---|---|---|---|
| **Power factor desired** | 0,80 ind. through 0,80 cap. | | | |
| **Connection time** | 5 to 1200 seconds | | | |
| **Smallest capacitor current** | ( 0,02 A ÷ 2 A ) x CT | | ( 0,002 A ÷ 2 A ) x CT ratio | |
| **Compensation section values setting** | Automatic or Manual | | | |
| **Connection configuration setting** | Automatic or Manual | | | |
| **Power supply** | 80 ÷ 275 V AC<br>43 ÷ 67 Hz, 5VA | | 90 ÷ 275 V AC (43÷67 Hz)<br>or 100÷300 V DC, 7VA | |
| **Measurement voltage** | The same as power supply voltage | | 57.7 ÷ 690 V AC,<br>+10/-20%, 43 ÷ 67 Hz | |
| **Operating temperature** | -40 °C +60 °C | | | |

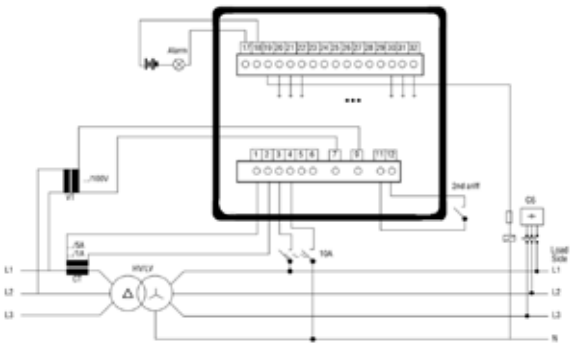
| | ERN 11005 | ERN 11007 | ERN 11206 | ERN 11214 |
|---|---|---|---|---|
| **Measurement current (galv. isolated)** | 0,02 ÷ 7 A | | 0,002 ÷ 7 A | |
| **Peak overload** | 70 A / 1 second; maximum repetition frequency > 5 minutes | | | |
| **Number of output relays** | 6 | 8 | 6 | 14 |
| **Output relay load rating** | 250 V AC / 4 A<br>110 V DC / 0.3 A | | | |
| **Enclosure IP front panel** | IP 40 ( IP 54 option ) | | | |
| **Enclosure IP back panel** | IP 20 | | | |
| **Dimensions*** | 96x96 | 96x96 | 144x144 | 144x144 |
| **Weight** | 0,3 kg max. | 0,3 kg max. | 0,7 kg max. | 0,7 kg max. |

## Wiring Diagram

**ERN 11005**
**ERN 11007**




**ERN 11206**
**ERN 11214**




*All dimensions are in "mm" and will be confirmed at the time of order.

## ERP3/ERP5/ERP8 Standard Plus Series Key Features:

- 3 Relay outputs built-in ERP 3 (96x96 mm), expandable up to 6
- 5 Relay outputs built-in ERP 5 (96x96 mm), expandable up to 8
- 8 Relay outputs built-in ERP 8 (144x144 mm), expandable up to 14
- Expansion bus for MERP series expansion modules:
  - Additional relay outputs (steps)
  - RS232, RS485, USB ports
  - Ethernet communications interface (ERP 8 only)
- High accuracy TRMS measurements
- Connection in single or three phase lines and co-generation systems with 4-quadrant operation with dedicated set point cosθ
- Wide selection of electrical measurements, including voltage and current THD with harmonic analysis up to 15-th order
- Voltage input separated from power supply, suitable for Its connection in MV applications
- Wide range power supply (100-440 Vac)
- Wide voltage measurement range (50-720 Vac)
- Balanced use of steps with same power rating
- Reactive power measurement per step installed
- Capacitor over-current protection
- Step failure alarm
- Maintenance counter in hours and number of operations for the steps
- Configurable rated current input (1 A or 5 A)
- Programming from panel front, from PC or from tablet/ smartphone
- Backup copy of default settings commissioning
- 2-level password protection for settings
- Built-in temperature sensor
- LCD display
- Programmable alarms

## ERGP 8 High Performance Series Key Features:

- **This regulator includes all the features of the ERP 3/5/8 series in addition to the features listed below:**

- 8 Relay outputs built-in (144x144 mm), expandable up to 24
- Expansion bus for MERP series expansion modules
- Backlight graphic display 128x80 pixel LCD with text in 10 languages: Italian, English, Spanish, French, German, Czech, Polish, Russian, Portuguese.
- Automatic identification of sense of CT current flow
- Connection to single and three-phase lines, three-phase lines with neutral control and co-generation systems with 4-quadrant operation
- Use with MV lines
- Capability to correctly operate also in systems having high harmonic current
- Extreme reduction of the number of switching operations
- Balanced use of steps with same power rating
- Reactive power measurement per installed step
- Recording of the number of connections per step
- Capacitor over-current protection on all three phases
- Over-temperature protection by internal sensor
- Accurate no-voltage release protection function
- Current and voltage harmonic analysis
- Harmonic analysis of current and voltage waveforms recorded for overload events
- Quick CT programming function
- USB and WI-FI communication interface for personal computer, smartphone and tablet connection
- Modbus-RTU, TCP and ASCII communication protocols
- Set-up and remote control software
- SMS sending for alarm conditions with MERP1015 expansion module

## ERP / ERGP Technical Specifications

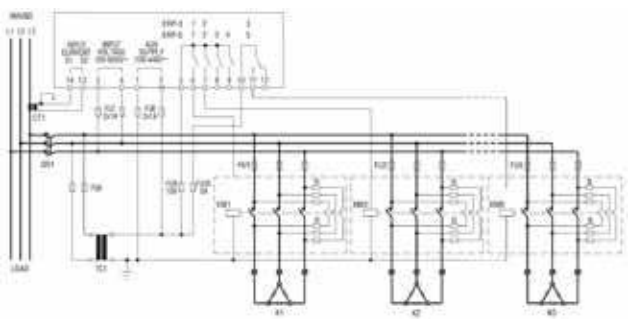
| | ERP 3 | ERP 5 | ERP 8 | ERGP 8 |
|---|---|---|---|---|
| **Supply rated voltage** | 100 - 440 Vac<br>110 - 250 Vdc | | | |
| **Supply rated frequency** | 45 - 66 Hz | | | |
| **Measuring voltage range** | 50 - 720 V L-L<br>415 Vac L-N | | | |
| **Maximum rated voltage inputs Ue** | 600 Vac L-L (346 Vac L-N) | | | |
| **Rated current input** | 1A or 5 A | | | |

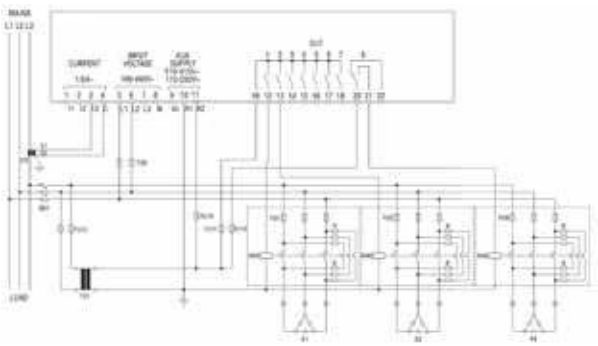
| | ERP 3 | ERP 5 | ERP 8 | ERGP 8 |
|---|---|---|---|---|
| **Overload peak** | 50 A for 1 second | | 0,002 ÷ 7 A | |
| **Enclosure IP front panel** | IP 54 | IP 54 | IP 65 | IP 65 |
| **Enclosure IP back panel** | IP 20 | | | |
| **Dimensions*** | 96x96 | 96x96 | 144x144 | 144x144 |
| **Weight** | 0,32 kg max. | 0,32 kg max. | 0,64 kg max. | 0,98 kg max. |

## Wiring Diagram

**ERP 3**
**ERP 5**
**ERP 8**

**ERGP 8**







*All dimensions are in "mm" and will be confirmed at the time of order.

## ERD6 / ERD12 STANDARD KEY FEATURES:

- Measurements;
  - cosφ, inductive and capacitive;
  - Phase to phase voltage and current;
  - Reactive power needed;
  - cosφ desired;
  - Total harmonic distortion;
  - Sensitivity;
  - Ambient temperature.
- Suitable for MV (medium-voltage) systems;
- Autorecognized capacitor bank;
- Anti-hunting function;
- Fixed step programmable;
- Relay programmable for alarm or fan;
- RJ11 - TTL standard - serial interface;
- Self-extinguished materialULI94 V0.

## ERDS7 / ERDS13 SMART KEY FEATURES:

- The most common measurements and much more;
- Suitable for MV (medium-voltage) systems;
- Easier programming;
- 4 quadrants operativity;
- LCD graphic display;
- Lighted silicon keyboard;
- Measure circuit separated from supply;
- Comm ports: RS485 modbus rtu;
- NTC external probe for temp monitoring (optional);
- Instant system status view;
- Double cosφ programmable;
- Expandable up to 53 steps with expansion 4 steps module;
- Self-extinguished material UL94 V0.

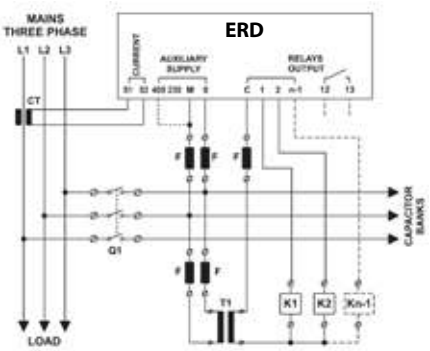
## ERD / ERDS TECHNICAL SPECIFICATIONS

| | ERD6 | ERD12 | ERDS7 | ERDS13 |
|---|---|---|---|---|
| **Supply voltage** | 230 – 400 Vac (range 220 – 440 Vac) | | | |
| **Operating limits (Ue)** | -15% +10% | | | |
| **Nominal frequency** | 50 – 60 Hz (range 47 – 63 Hz) | | | |
| **Power consumption (max. AC)** | 5,8 VA | 6,1 VA | 5,5 VA | 5,5 VA |
| **Immunity time for microbreakings** | <6 ms | | <30 ms | |
| **Display type** | 3 Digit - 7 Segment | | LCD 64x128 | |
| **Rated current (CT)** | 5 A | | 1 A or 5 A | |
| **Voltage Reading Limits (N/Lx)** | 180 – 485 Vac | 195 – 460 Vac | 10 – 460 Vac | |
| **Current Reading Limits (CT)** | 0,125 – 5,5 A | | 0,020 – 5,5 A | |
| **Measuring Values** | True RMS | | | |
| **Power Factor Correction** | 0,85 Inductive 0,95 Capacitive | | 0,85 Inductive 0,95 Capacitive (operates in all four-quadrantes) | |
| **FFT - Harmonic Spectrum** | THD% 64 st | | | |
| **Number of Output** | 6 | 12 | 7 Expandable up to 47 | 13 Expandable up to 53 |

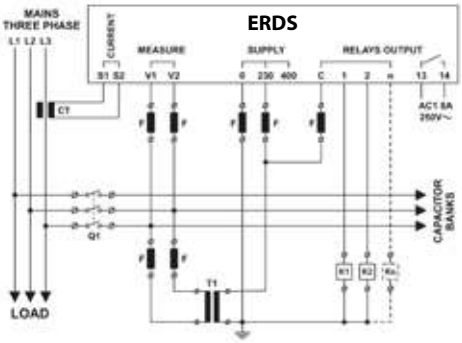
| | ERD6 | ERD12 | ERDS7 | ERDS13 |
|---|---|---|---|---|
| **Serial Interface** | Optional | TTL-standard | RS-485 (not insulate) | |
| **Communication Protocol** | Optional | Owner Modbus RTU | Owner Modbus RTU or TCP/IP | |
| **Connector type** | Optional | RJ11 | ---- | |
| **Working temperature** | - 40°C + 55° C | | | |
| **Storage temperature** | - 40°C + 55° C | | | |
| **Electrical Insulation** | 4 kV | | | |
| **Overvoltage Category** | II | | | |
| **Protection degree** | IP41 front cover – IP20 terminal block connections | | | |
| **Pollution degree** | 2 | | | |
| **Relative Humidity w/o cond.** | RH% 90 | | | |
| **Altitude up to** | 2000 m | | | |
| **Weight** | 0,37 Kg. | 0,70 Kg. | 0,65 Kg. | 0,73 Kg. |
| **Dimensions** | 96x96x74 | 144x144x68 | 144x144x68 | |

## ERD / ERDS WIRING DIAGRAM

**ERD 6**
**ERD 12**




**ERDS 7**
**ERDS 13**




*All dimensions are in "mm" and will be confirmed at the time of order.

# Automatic Power Factor Correction Systems

## Optimize Energy

- By reducing electricity bills.
- By reducing power losses.
- By reducing CO2 emissions.

## Increase Power

- Compensate for voltage sags detrimental to process operation.
- Avoid nuisance tripping and supply interruptions.

## Improve Your Business Performance

- Compensate for voltage sags detrimental to process operation.
- Avoid nuisance tripping and supply interruptions.

## CBAm-3 General Characteristics

| General | |
|---|---|
| Standards: | IEC 60439-1/2, IEC 61921, IEC 60831-1/2 |
| Origin: | 100% made in Italy |
| Construction: | Three phase INTACT PLUS capacitors or INTACT R—POWER capacitors |
| Frequency: | 50 Hz — 60 Hz |
| Temperature range: | -25 °C / 55 °C |
| Insulating voltage: | 690 V |
| Service: | Continous |
| IP level after mounting: | IP 54 |
| Inner surface finish: | Zinc passivation |
| Use: | Indoor ( Outdoor on request ) |

## CBAm-3 Automatic Power Factor Correction Systems
## 400 V / 415 V - 3 Phase - 50 Hz / 60 Hz

| POWER AT SYSTEM VOLTAGE 50 Hz | | POWER AT SYSTEM VOLTAGE 60 Hz | | BANKS POWER | | | | | | | | STEPS | In 50 Hz | SWITCH DISCONNECTOR | | AVAIBLE DIMENSIONS IP 54 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 400 V kVar | 415 V kVar | 400 V kVar | 415 V kVar | 400 V 50 Hz kVar | | | | | | | | | 400 V A | 50Hz A | 60Hz A | W (mm) | D (mm) | H (mm) |
| 50 | 54 | 60 | 65 | 5 | 5 | 10 | 10 | 20 | | | | 10 | 72 | 160 | 160 | 600 | 600 | 1510 |
| 75 | 81 | 90 | 97 | 5 | 10 | 20 | 40 | | | | | 15 | 108 | 160 | 200 | 600 | 600 | 1510 |
| 100 | 108 | 120 | 129 | 12,5 | 12,5 | 25 | 50 | | | | | 8 | 144 | 250 | 250 | 600 | 600 | 1510 |
| 125 | 135 | 150 | 162 | 12,5 | 25 | 37,5 | 50 | | | | | 10 | 180 | 250 | 315 | 600 | 600 | 1510 |
| 150 | 162 | 180 | 194 | 12,5 | 25 | 37,5 | 75 | | | | | 12 | 217 | 315 | 400 | 600 | 600 | 1510 |
| 175 | 188 | 210 | 226 | 25 | 50 | 50 | 50 | | | | | 7 | 253 | 400 | 630 | 600 | 600 | 1510 |
| 200 | 215 | 240 | 258 | 25 | 50 | 50 | 75 | | | | | 8 | 289 | 400 | 630 | 600 | 600 | 1510 |
| 250 | 269 | 300 | 323 | 25 | 25 | 50 | 75 | 75 | | | | 10 | 361 | 630 | 630 | 600 | 600 | 1710 |
| 300 | 323 | 360 | 388 | 25 | 50 | 75 | 75 | 75 | | | | 12 | 433 | 630 | 800 | 600 | 600 | 1710 |
| 400 | 431 | 480 | 517 | 25 | 50 | 75 | 100 | 150 | | | | 16 | 577 | 800 | 1250 | 600 | 600 | 1710 |
| 500 | 538 | 600 | 646 | 50 | 100 | 100 | 100 | 150 | | | | 10 | 722 | 1000 | 1600 | 600 | 600 | 2110 |
| 600 | 646 | 720 | 775 | 50 | 100 | 150 | 150 | 150 | | | | 12 | 866 | 1250 | 1600 | 600 | 600 | 2110 |
| 750 | 807 | 900 | 969 | 75 | 75 | 150 | 150 | 150 | 150 | | | 10 | 1083 | 1600 | 2 x 1000 | 1200 | 600 | 2110 |
| 825 | 888 | 990 | 1066 | 75 | 150 | 150 | 150 | 150 | 150 | | | 11 | 1191 | 2 x 1000 | 2 x 1250 | 1200 | 600 | 2110 |
| 900 | 969 | 1080 | 1163 | 50 | 100 | 150 | 150 | 150 | 150 | 150 | | 18 | 1299 | 2 x 1250 | 2 x 1250 | 1200 | 600 | 2110 |
| 975 | 1050 | 1170 | 1259 | 75 | 150 | 150 | 150 | 150 | 150 | 150 | | 13 | 1407 | 2 x 1250 | 2 x 1600 | 1200 | 600 | 2110 |
| 1125 | 1211 | 1350 | 1453 | 75 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 15 | 1624 | 2 x 1600 | 2 x 1600 | 1200 | 600 | 2110 |

**Other banks powers and steps configurations are available on request. Contact us info@gruppoenergia.it**

*All dimensions are in "mm" and will be confirmed at the time of order.

# Detuned Automatic Power Factor Correction Systems

## CBAmF-3 Detuned Automatic Power Factor Correction Systems
## 400 V / 415 V - 3 Phase - With 189 Hz - P=7% Filter

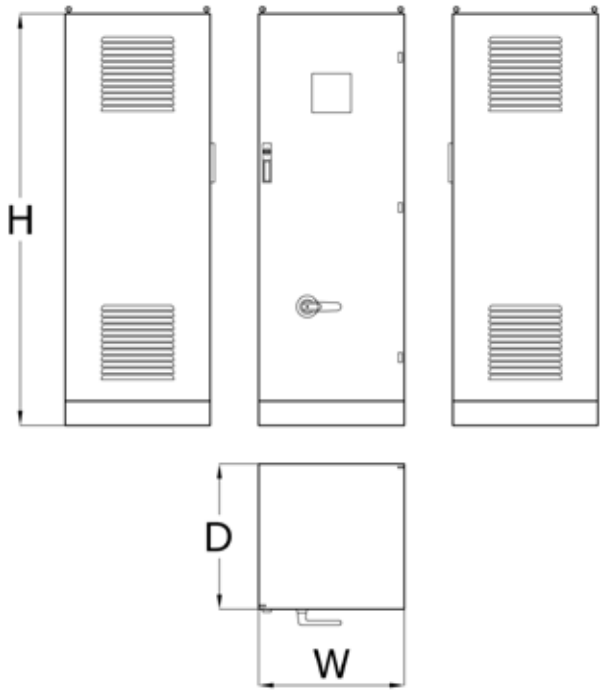
| POWER AT SYSTEM VOLTAGE 50 Hz | POWER AT SYSTEM VOLTAGE 60 Hz | BANKS POWER | | | | | | | | STEPS | In 50 Hz | SWITCH DISCONNECTOR | AVAIBLE DIMENSIONS IP 54 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 400 V kVar | 400 V kVar | 400 V 50 Hz kVar | | | | | | | | | 400 V A | 50Hz A | W (mm) | D (mm) | H (mm) |
| 56 | 60 | 18,75 | 37,5 | | | | | | | 3 | 81 | 160 | 600 | 600 | 1510 |
| 75 | 80 | 25 | 50 | | | | | | | 3 | 108 | 160 | 600 | 600 | 1710 |
| 88 | 94 | 12,5 | 25 | 50 | | | | | | 7 | 126 | 160 | 600 | 600 | 1710 |
| 131 | 140 | 18,75 | 37,5 | 75 | | | | | | 7 | 189 | 250 | 600 | 600 | 1710 |
| 150 | 161 | 25 | 50 | 75 | | | | | | 6 | 217 | 250 | 600 | 600 | 2110 |
| 206 | 221 | 18,75 | 37,5 | 75 | 75 | | | | | 11 | 298 | 400 | 600 | 600 | 2110 |
| 300 | 321 | 25 | 50 | 75 | 75 | 75 | | | | 12 | 433 | 630 | 1200 | 600 | 1710 |
| 356 | 381 | 18,75 | 37,5 | 75 | 75 | 75 | 75 | | | 19 | 514 | 630 | 1200 | 600 | 1710 |
| 450 | 482 | 25 | 50 | 75 | 75 | 75 | 75 | 75 | | 18 | 650 | 800 | 1200 | 600 | 2110 |
| 506 | 542 | 18,75 | 37,5 | 75 | 75 | 75 | 75 | 75 | 75 | 27 | 731 | 800 | 1200 | 600 | 2110 |

**Other banks powers and steps configurations are available on request. Contact us info@gruppoenergia.it**

## How To Order?

| 3CB | A | 200 | S | ( 7 ) | 400 | A | 25 | 0 | 3CBA200S400A250 |
|---|---|---|---|---|---|---|---|---|---|
| **Series** | **Type**<br>A = Automatic<br>F = Fix | **Power** | **Correction Type**<br>S = Standard<br>F = Detuned | **Detuned Type**<br>7 = P 7%<br>14 = P 14% | **Voltage** | **Frequency**<br>A = 50 Hz<br>B = 60 Hz | **First Step Power** | **Dimensions**<br>0 = Standard | **Order Code** |

## Construction Diagram

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