HITACHI
Inspire the Next


Low voltage capacitors
for improved power quality

# QCap

Hitachi Energy

# Enhanced power quality and energy efficiency

## Applications in several areas of the power value chain

Hitachi Energy is a global technology leader that is advancing a sustainable energy future for all. We serve customers in the utility, industry and infrastructure sectors with innovative solutions and services across the value chain. Together with customers and partners, we pioneer technologies and enable the digital transformation required to accelerate the energy transition towards a carbon-neutral future. We are advancing the world's energy system to become more sustainable, flexible and secure whilst balancing social, environmental and economic value. Hitachi Energy has a proven track record and unparalleled installed base in more than 140 countries. Headquartered in Switzerland, we employ around 38,000 people in 90 countries and generate business volumes of approximately $10 billion USD.

Hitachi Energy is a leader in high-voltage technology, offering a wide range of high-voltage products up to 1,200-kilovolt (kV) helping enhance the safety, reliability and efficiency of power networks while minimizing environmental impact. Our technology leadership continues to facilitate innovations in areas such as ultra-high-voltage power transmission, enabling smart grids and enhancing eco-efficiency.

Power Quality is a major concern for utilities, industries, transport and infrastructure sectors. It affects grid reliability, productivity, leads to higher operating costs and penalties for non-compliance.

Hitachi Energy is a pioneer in power quality solutions and offers a wide product portfolio that helps enhance the power quality of electrical networks in high, medium and low voltage systems. These products and solutions help improve reliability and availability of power in the supply network, ensure energy efficiency, industrial productivity and lower carbon emissions thereby leading to stronger, smarter and greener power networks.

Capacitors play an important role in power grids and electrical networks. They compensate reactive power in the electrical network and increase the power factor. This results in a more stable grid with increased transmission capacity and reduced losses.

**The benefits of enhanced power quality can be seen across the power value chain:**

**Utilities**
- Enhanced asset utilization
- Lower network losses and CO2 emissions
- Expansion of network capacity
- Voltage stability

**Industries**
- Reduction of electricity expenses
- Lower network losses and $CO_2$ emissions
- Grid compliance
- Increase in plant capacity
- Higher productivity (i.e. fewer outages, lower operating costs)



# Applications

## Power factor correction

In electrical networks, different load types exist. Many loads are of inductive type (such as motors or transformers). In addition to active power, they draw reactive power from the network. This additional reactive power conventionally is supplied by the supply generators and burdens the upstream supply network (cables, transformers) down to the point where the power is needed, making the system less efficient. Power factor correction using capacitors at the point where the loads are located is a convenient way to render the installation more efficient.

In alternating current circuits, the current absorbed by a load can be represented by two components:
- The active component IR, in phase with the supply voltage
- The reactive component IQ, in phase quadrature to the voltage

Therefore, in an electrical installation, it is necessary to generate and transmit, in addition to the active power P, a certain reactive power Q. The apparent power S can be calculated by the quadrature summation of the active P and reactive Q powers. Power factor is defined as the ratio between the active component $I_R$ and the apparent value of the current I. ϕ is the phase angle between the voltage and the current.

For a given phase voltage V, this results in (as illustrated in figure 1):

$$\text{Cos } \phi = \frac{I_R}{I} = \frac{P}{S}$$


**Figure 1** Power factor definition

- **P** is the active power
- **$Q_1$, $\phi_1$** are the reactive power and the phase displacement angle before power factor correction
- **$Q_2$, $\phi_2$** are the reactive power and the phase displacement angle after power factor correction
- **$Q_c$** is the reactive power needed for power factor correction

Hitachi Energy's QCap addresses poor power factor issues and helps improve power quality of the network.

By correcting the power factor of an installation supplying locally the necessary reactive power, it is possible to reduce the current value and consequently the total power absorbed from the supply network; this gives numerous advantages:
- Preventing penalties applied by the electrical utilities
- Better utilization of electrical network components e.g. generators and transformers
- Better utilization of electrical lines (transmission and distribution lines)

In the case of sinusoidal waveforms, the reactive power necessary to pass from one power factor cos $\phi_1$ to another power factor cos $\phi_2$ is given by the relation (valid for both three-phase as well as single-phase systems): as shown in figure 2.

$$\mathbf{Qc = Q1 - Q2 = P \cdot (tg\varphi_1 - tg\varphi_2)}$$

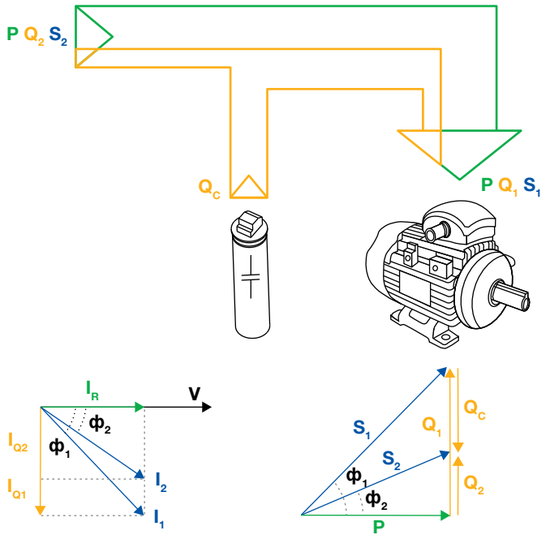



**Figure 2** Reactive power definition



# Applications

## Detuned capacitor banks

Electrical distribution is nowadays highly polluted due to the usage of non-linear loads such as variable speed drives, UPS systems, inverters, computers, LED and compact fluorescent lamps, welding machines, etc.

Non-linear loads are equipment that absorb a non-sinusoidal current when supplied by a sinusoidal voltage. Such currents induce a non-sinusoidal voltage drop across the network impedances, with the consequence that even the linear loads are supplied by a distorted voltage. By using Fourier analysis it is possible to decompose any repetitive waveform into several sinusoidal waveforms at integer multiples of the fundamental frequency. These waveforms are called harmonics. For power networks, 50 Hz/60 Hz is the fundamental frequency, 150 Hz/180 Hz and 250 Hz/300 Hz, for example, are harmonic orders, in this case the 3rd and 5th harmonics order: (as shown in figure 03).

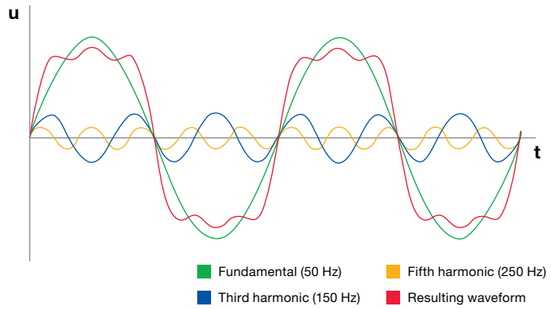


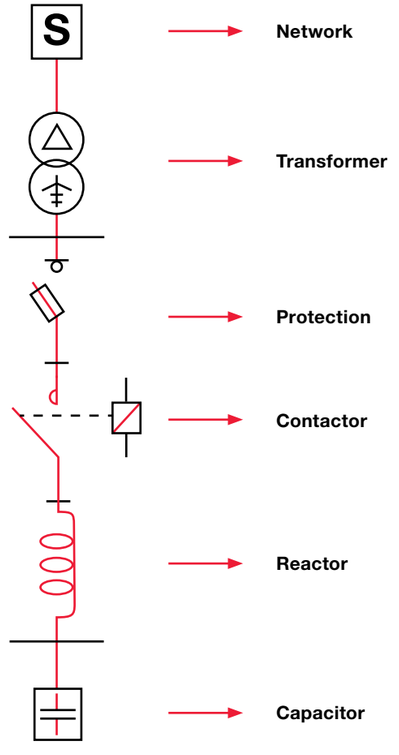

**Figure 3** Harmonics waveforms

Power factor correction capacitors are highly sensitive to harmonics since the capacitive impedance is inversely proportional to frequency. This means that, when supplied by a distorted voltage, the capacitors draw an overcurrent due to harmonics that could seriously damage them, especially if there is a series or parallel resonance phenomenon occurring at a harmonic frequency.

In order to protect capacitors against harmonics, the installation of a detuning reactor in series with the capacitor is strongly recommended. This reactor will increase the impedance for the high frequencies and will limit the current flowing into the capacitor. We usually protect the capacitor from the 3rd harmonic upwards for commercial applications (due to the presence of single phase loads) and 5th harmonic upwards for industrial loads (due to the presence of VSD's generating 5th and 7th harmonic upwards). This type of configuration requires expertise and high quality products.

Hitachi Energy offers the complete solution for detuned capacitor banks and a selection tool containing the apparatus set you will need to assemble each step of your capacitor bank- capacitors, reactors, fuses, switches and contactors.

To view the selection tool, scan the QR code



# Low voltage capacitor QCap

## Unique features and benefits

QCap is a cylindrical type capacitor. It is based on Hitachi Energy's latest technologies and developments in the field of power quality and is a result of over 70 years of expertise in capacitor technologies. These decades of dedication and continuous improvement in each manufacturing process guarantee the customer the best quality capacitor in the market.

### Customer benefits

**Quality**
The unique low losses design of QCap decreases the temperature of the capacitor and increases its lifetime. The optimized thermal dissipation prevents premature failure which is not uncommon with many low quality capacitors.

**Installation**
QCap size is the same for all ratings and can also be installed in any position. These two characteristics will allow to standardize the design of capacitor banks.

**Safety**
At the end of its lifetime the capacitor must disconnect itself safely. The specially designed overpressure disconnection device by Hitachi Energy guarantees a safe disconnection.

**Reliability**
Hitachi Energy is strictly selecting its raw materials to ensure the use of first class components and of a very pure polypropylene, with a high degree of crystalline phase. This is reducing the losses and increasing the lifetime of the capacitor which guarantees QCap's high reliability and exceptional performance.

**Consistency**
Consistent quality over a period of time is most often a challenge for manufacturers. Hitachi Energy tests 100% of its products with criteria surpassing even international standards ensuring high quality products.

### Unique features

**Overpressure disconnection**
A unique feature of QCap is the safety mechanism of the capacitor. Under faulty conditions, the safety mechanism guarantees a prompt and reliable breaking of all three wires and overpressure disconnection. This mechanism consists of three parts explained figure 4 below.

**Airtight cylinder**
The state-of-the-art seaming and sealing technology ensures a perfectly hermetic cylinder.

**Locking device**
Hitachi Energy's unique design for the locking device holds the inside elements tight under both normal and disconnected conditions.

**Snap**
The snap is the only moving part of the capacitor. At the end of capacitor‘s lifetime it will break the wires to ensure a prompt and safe disconnection of the three phases.

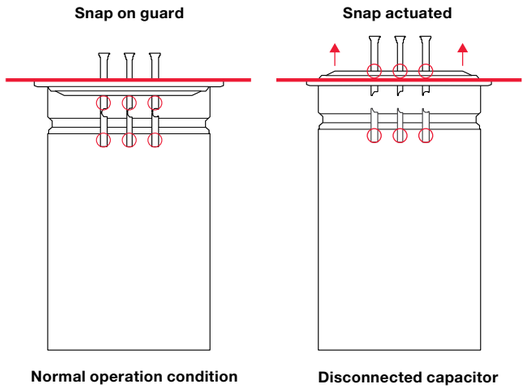
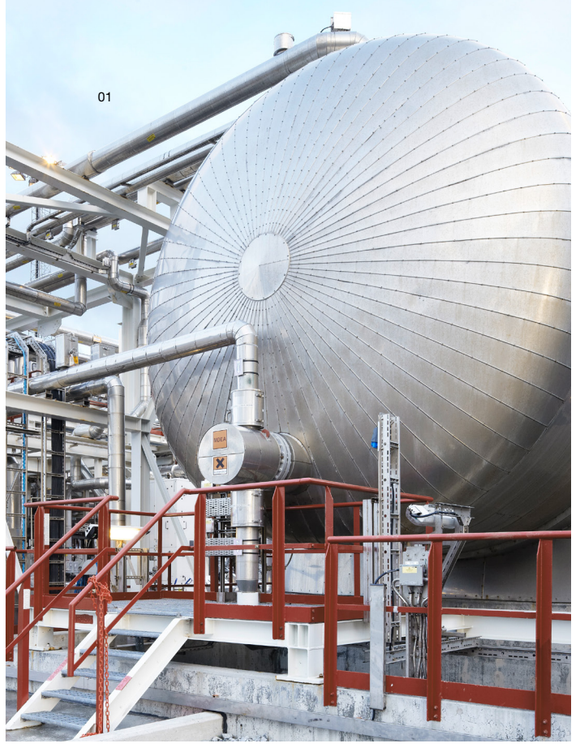



**Figure 4** Overpressure disconnection of a Qcap capacitor







**01** Statoil LNG, Melkoya, Norway

**02** Stora Enso Kvarnsveden, Sweden paper mill

**03** Commercial buildings

# Technical specifications

## Range 50Hz

### U network - 220 V

| Qnet (kvar)[1] | Detuning reactor ( %)[2] | Article number |
|---|---|---|
| 2,5 | - | 2GCA296600A0031 |
| | 5,67 % | 2GCA296601A0031 |
| | 7,00 % | 2GCA296602A0031 |
| | 12,50 % | 2GCA296603A0031 |
| | 14,00 % | 2GCA296604A0031 |
| 3,75 | - | 2GCA296605A0031 |
| | 5,67 % | 2GCA296606A0031 |
| | 7,00 % | 2GCA296607A0031 |
| | 12,50 % | 2GCA296608A0031 |
| | 14,00 % | 2GCA296609A0031 |
| 5 | - | 2GCA296610A0031 |
| | 5,67 % | 2GCA296611A0031 |
| | 7,00 % | 2GCA296612A0031 |
| | 12,50 % | 2GCA296613A0031 |
| | 14,00 % | 2GCA296614A0031 |
| 6,25 | - | 2GCA296615A0031 |
| | 5,67 % | 2GCA296616A0031 |
| | 7,00 % | 2GCA296617A0031 |
| | 12,50 % | 2GCA296618A0031 |
| | 14,00 % | 2GCA296619A0031 |
| 7,5 | - | 2GCA296620A0031 |
| | 5,67 % | 2GCA296621A0031 |
| | 7,00 % | 2GCA296622A0031 |
| | 12,50 % | 2GCA296623A0031 |
| | 14,00 % | 2GCA296624A0031 |
| 10 | 12,50 % | 2GCA296625A0031 |
| | 14,00 % | 2GCA296626A0031 |
| 12,5 | - | 2GCA296627A0031 |
| 15 | 12,50 % | 2GCA296628A0031 |
| | 14,00 % | 2GCA296629A0031 |

(1) Qnet (kvar) is the net reactive power output in combination with the associated reactor (if existing).

(2) Detuning reactor ( %) is the value of the reactor (if existing) connected in series with the capacitor. Reactors are not provided.

(3) Not CSA/UL recognized.

Other ratings available on request.

### U network - 380 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 3,75 | - | 2GCA296630A0031 |
| | 5,67 % | 2GCA296631A0031 |
| | 7,00 % | 2GCA296632A0031 |
| | 12,50 % | 2GCA296633A0031 |
| | 14,00 % | 2GCA296634A0031 |
| 5 | - | 2GCA296635A0031 |
| | 5,67 % | 2GCA296636A0031 |
| | 7,00 % | 2GCA296637A0031 |
| | 12,50 % | 2GCA296638A0031 |
| | 14,00 % | 2GCA296639A0031 |
| 6,25 | - | 2GCA296640A0031 |
| | 5,67 % | 2GCA296641A0031 |
| | 7,00 % | 2GCA296642A0031 |
| | 12,50 % | 2GCA296643A0031 |
| | 14,00 % | 2GCA296644A0031 |
| 7,5 | - | 2GCA296645A0031 |
| | 5,67 % | 2GCA296646A0031 |
| | 7,00 % | 2GCA296647A0031 |
| | 12,50 % | 2GCA296648A0031 |
| | 14,00 % | 2GCA296649A0031 |
| 10 | - | 2GCA296650A0031 |
| | 5,67 % | 2GCA296651A0031 |
| | 7,00 % | 2GCA296652A0031 |
| | 12,50 % | 2GCA296653A0031 |
| | 14,00 % | 2GCA296654A0031 |
| 12,5 | - | 2GCA296655A0031 |
| | 5,67 % | 2GCA296656A0031 |
| | 7,00 % | 2GCA296657A0031 |
| | 12,50 % | 2GCA296658A0031 |
| | 14,00 % | 2GCA296659A0031 |
| 15 | - | 2GCA296660A0031 |
| | 5,67 % | 2GCA296661A0031 |
| | 7,00 % | 2GCA296662A0031 |
| | 12,50 % | 2GCA296663A0031 |
| | 14,00 % | 2GCA296664A0031 |
| 20 | - | 2GCA296665A0031 |
| | 5,67 % | 2GCA296666A0031 |
| | 7,00 % | 2GCA296667A0031 |
| | 12,50 % | 2GCA296668A0031 |
| | 14,00 % | 2GCA296669A0031 |
| 25 | 5,67 % | 2GCA296670A0031 |
| | 7,00 % | 2GCA296671A0031 |
| | 12,50 % | 2GCA296672A0031 |
| | 14,00 % | 2GCA296673A0031 |

### U network - 400 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 3,75 | - | 2GCA296674A0031 |
| | 5,67 % | 2GCA296675A0031 |
| | 7,00 % | 2GCA296676A0031 |
| | 12,50 % | 2GCA296677A0031 |
| | 14,00 % | 2GCA296678A0031 |
| 5 | - | 2GCA296679A0031 |
| | 5,67 % | 2GCA296680A0031 |
| | 7,00 % | 2GCA296681A0031 |
| | 12,50 % | 2GCA296682A0031 |
| | 14,00 % | 2GCA296683A0031 |
| 6,25 | - | 2GCA296684A0031 |
| | 5,67 % | 2GCA296685A0031 |
| | 7,00 % | 2GCA296686A0031 |
| | 12,50 % | 2GCA296687A0031 |
| | 14,00 % | 2GCA296688A0031 |
| 7,5 | - | 2GCA296689A0031 |
| | 5,67 % | 2GCA296690A0031 |
| | 7,00 % | 2GCA296691A0031 |
| | 12,50 % | 2GCA296692A0031 |
| | 14,00 % | 2GCA296693A0031 |
| 10 | - | 2GCA296694A0031 |
| | 5,67 % | 2GCA296695A0031 |
| | 7,00 % | 2GCA296696A0031 |
| | 12,50 % | 2GCA296697A0031 |
| | 14,00 % | 2GCA296698A0031 |
| 12,5 | - | 2GCA296699A0031 |
| | 5,67 % | 2GCA296700A0031 |
| | 7,00 % | 2GCA296701A0031 |
| | 12,50 % | 2GCA296702A0031 |
| | 14,00 % | 2GCA296703A0031 |
| 15 | - | 2GCA296704A0031 |
| | 5,67 % | 2GCA296705A0031 |
| | 7,00 % | 2GCA296706A0031 |
| | 12,50 % | 2GCA296707A0031 |
| | 14,00 % | 2GCA296708A0031 |
| 20 | - | 2GCA296709A0031 |
| | 5,67 % | 2GCA296710A0031 |
| | 7,00 % | 2GCA296711A0031 |
| | 12,50 % | 2GCA296712A0031 |
| | 14,00 % | 2GCA296713A0031 |
| 25 | - | 2GCA296714A0031 |
| | 5,67 % | 2GCA296715A0031 |
| | 7,00 % | 2GCA296716A0031 |
| | 12,50 % | 2GCA296717A0031 |
| | 14,00 % | 2GCA296718A0031 |

### U network - 415 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 3,75 | - | 2GCA296719A0031 |
| | 5,67 % | 2GCA296720A0031 |
| | 7,00 % | 2GCA296721A0031 |
| 5 | - | 2GCA296722A0031 |
| | 5,67 % | 2GCA296723A0031 |
| | 7,00 % | 2GCA296724A0031 |
| | 12,50 % | 2GCA296725A0031 |
| | 14,00 % | 2GCA296726A0031 |
| 6,25 | - | 2GCA296727A0031 |
| | 5,67 % | 2GCA296728A0031 |
| | 7,00 % | 2GCA296729A0031 |
| | 12,50 % | 2GCA296730A0031 |
| | 14,00 % | 2GCA296731A0031 |
| 7,5 | - | 2GCA296732A0031 |
| | 5,67 % | 2GCA296733A0031 |
| | 7,00 % | 2GCA296734A0031 |
| | 12,50 % | 2GCA296735A0031 |
| | 14,00 % | 2GCA296736A0031 |
| 10 | - | 2GCA296737A0031 |
| | 5,67 % | 2GCA296738A0031 |
| | 7,00 % | 2GCA296739A0031 |
| | 12,50 % | 2GCA296740A0031 |
| | 14,00 % | 2GCA296741A0031 |
| 12,5 | - | 2GCA296742A0031 |
| | 5,67 % | 2GCA296743A0031 |
| | 7,00 % | 2GCA296744A0031 |
| | 12,50 % | 2GCA296745A0031 |
| | 14,00 % | 2GCA296746A0031 |
| 15 | - | 2GCA296747A0031 |
| | 5,67 % | 2GCA296748A0031 |
| | 7,00 % | 2GCA296749A0031 |
| | 12,50 % | 2GCA296750A0031 |
| | 14,00 % | 2GCA296751A0031 |
| 20 | - | 2GCA296752A0031 |
| | 5,67 % | 2GCA296753A0031 |
| | 7,00 % | 2GCA296754A0031 |
| | 12,50 % | 2GCA296755A0031 |
| 25 | - | 2GCA296756A0031 |
| | 5,67 % | 2GCA296757A0031 |
| | 7,00 % | 2GCA296758A0031 |
| | 12,50 % | 2GCA296759A0031 |
| | 14,00 % | 2GCA296760A0031 |
| 30[3] | 7,00 % | 2GCA296761A0031 |
| | 12,50 % | 2GCA296762A0031 |

## U network - 440 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 5 | - | 2GCA296763A0031 |
| | 5,67 % | 2GCA296764A0031 |
| | 7,00 % | 2GCA296765A0031 |
| | 12,50 % | 2GCA296766A0031 |
| | 14,00 % | 2GCA296767A0031 |
| 6,25 | - | 2GCA296768A0031 |
| | 5,67 % | 2GCA296769A0031 |
| | 7,00 % | 2GCA296770A0031 |
| | 12,50 % | 2GCA296771A0031 |
| | 14,00 % | 2GCA296772A0031 |
| 7,5 | - | 2GCA296773A0031 |
| | 5,67 % | 2GCA296774A0031 |
| | 7,00 % | 2GCA296775A0031 |
| | 12,50 % | 2GCA296776A0031 |
| | 14,00 % | 2GCA296777A0031 |
| 10 | - | 2GCA296778A0031 |
| | 5,67 % | 2GCA296779A0031 |
| | 7,00 % | 2GCA296780A0031 |
| | 12,50 % | 2GCA296781A0031 |
| | 14,00 % | 2GCA296782A0031 |
| 12,5 | - | 2GCA296783A0031 |
| | 5,67 % | 2GCA296784A0031 |
| | 7,00 % | 2GCA296785A0031 |
| | 12,50 % | 2GCA296786A0031 |
| | 14,00 % | 2GCA296787A0031 |
| 15 | - | 2GCA296788A0031 |
| | 5,67 % | 2GCA296789A0031 |
| | 7,00 % | 2GCA296790A0031 |
| | 12,50 % | 2GCA296791A0031 |
| | 14,00 % | 2GCA296792A0031 |
| 20 | - | 2GCA296793A0031 |
| | 12,50 % | 2GCA296794A0031 |
| | 14,00 % | 2GCA296795A0031 |
| 25 | - | 2GCA296796A0031 |
| | 5,67 % | 2GCA296797A0031 |
| | 7,00 % | 2GCA296798A0031 |
| 30 | - | 2GCA296799A0031 |
| 30[3] | 5,67 % | 2GCA296800A0031 |
| | 7,00 % | 2GCA296801A0031 |

## U network - 480 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 5 | - | 2GCA296802A0031 |
| | 5,67 % | 2GCA296803A0031 |
| | 7,00 % | 2GCA296804A0031 |
| 6,25 | - | 2GCA296805A0031 |
| | 5,67 % | 2GCA296806A0031 |
| | 7,00 % | 2GCA296807A0031 |
| | 12,50 % | 2GCA296808A0031 |
| | 14,00 % | 2GCA296809A0031 |
| 7,5 | - | 2GCA296810A0031 |
| | 5,67 % | 2GCA296811A0031 |
| | 7,00 % | 2GCA296812A0031 |
| | 12,50 % | 2GCA296813A0031 |
| | 14,00 % | 2GCA296814A0031 |
| 10 | - | 2GCA296815A0031 |
| | 5,67 % | 2GCA296816A0031 |
| | 7,00 % | 2GCA296817A0031 |
| | 12,50 % | 2GCA296818A0031 |
| | 14,00 % | 2GCA296819A0031 |
| 12,5 | - | 2GCA296820A0031 |
| | 5,67 % | 2GCA296821A0031 |
| | 7,00 % | 2GCA296822A0031 |
| | 12,50 % | 2GCA296823A0031 |
| | 14,00 % | 2GCA296824A0031 |
| 15 | - | 2GCA296825A0031 |
| | 5,67 % | 2GCA296826A0031 |
| | 7,00 % | 2GCA296827A0031 |
| | 12,50 % | 2GCA296828A0031 |
| | 14,00 % | 2GCA296829A0031 |
| 16,7 | - | 2GCA297376A0031 |
| 20 | - | 2GCA296830A0031 |
| | 5,67 % | 2GCA296831A0031 |
| | 7,00 % | 2GCA296832A0031 |
| 25 | - | 2GCA296833A0031 |
| 30 | - | 2GCA296834A0031 |
| 30[3] | 5,67 % | 2GCA296835A0031 |
| | 7,00 % | 2GCA296836A0031 |
| 31,5[3] | - | 2GCA297218A0031 |
| 32,5[3] | - | 2GCA297390A0031 |
| 33,6[3] | - | 2GCA297217A0031 |

## U network - 525 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 6,25 | - | 2GCA296837A0031 |
| | 5,67 % | 2GCA296838A0031 |
| | 7,00 % | 2GCA296839A0031 |
| | 12,50 % | 2GCA296840A0031 |
| | 14,00 % | 2GCA296841A0031 |
| 7,5 | - | 2GCA296842A0031 |
| | 5,67 % | 2GCA296843A0031 |
| | 7,00 % | 2GCA296844A0031 |
| | 12,50 % | 2GCA296845A0031 |
| | 14,00 % | 2GCA296846A0031 |
| 10 | - | 2GCA296847A0031 |
| | 5,67 % | 2GCA296848A0031 |
| | 7,00 % | 2GCA296849A0031 |
| | 12,50 % | 2GCA296850A0031 |
| | 14,00 % | 2GCA296851A0031 |
| 12,5 | - | 2GCA296852A0031 |
| | 5,67 % | 2GCA296853A0031 |
| | 7,00 % | 2GCA296854A0031 |
| | 12,50 % | 2GCA296855A0031 |
| | 14,00 % | 2GCA296856A0031 |
| 15 | - | 2GCA296857A0031 |
| | 5,67 % | 2GCA296858A0031 |
| | 7,00 % | 2GCA296859A0031 |
| | 12,50 % | 2GCA296860A0031 |
| | 14,00 % | 2GCA296861A0031 |
| 20 | - | 2GCA296862A0031 |
| | 5,67 % | 2GCA296863A0031 |
| | 7,00 % | 2GCA296864A0031 |
| | 12,50 % | 2GCA296865A0031 |
| | 14,00 % | 2GCA296866A0031 |
| 23,2 | - | 2GCA297430A0031 |
| 25 | - | 2GCA296867A0031 |

## U network - 600 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 7,5 | - | 2GCA296868A0031 |
| | 5,67 % | 2GCA296869A0031 |
| 10 | - | 2GCA296870A0031 |
| | 5,67 % | 2GCA296871A0031 |
| | 7,00 % | 2GCA296872A0031 |
| | 12,50 % | 2GCA296873A0031 |
| | 14,00 % | 2GCA296874A0031 |
| 12,5 | - | 2GCA296875A0031 |
| | 5,67 % | 2GCA296876A0031 |
| | 7,00 % | 2GCA296877A0031 |
| | 12,50 % | 2GCA296878A0031 |
| | 14,00 % | 2GCA296879A0031 |
| 15 | - | 2GCA296880A0031 |
| | 5,67 % | 2GCA296881A0031 |
| | 7,00 % | 2GCA296882A0031 |
| | 12,50 % | 2GCA296883A0031 |
| | 14,00 % | 2GCA296884A0031 |
| 20 | - | 2GCA296885A0031 |
| | 5,67 % | 2GCA296886A0031 |
| | 7,00 % | 2GCA296887A0031 |
| | 12,50 % | 2GCA296888A0031 |
| | 14,00 % | 2GCA296889A0031 |
| 25 | - | 2GCA296890A0031 |
| | 5,67 % | 2GCA296891A0031 |
| | 7,00 % | 2GCA296892A0031 |

## U network - 690 V[4]

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 10 | - | 2GCA296893A0031 |
| | 5,67 % | 2GCA296894A0031 |
| | 7,00 % | 2GCA296895A0031 |
| 12,5 | - | 2GCA296896A0031 |
| | 5,67 % | 2GCA296897A0031 |
| | 7,00 % | 2GCA296898A0031 |
| 15 | - | 2GCA296899A0031 |
| | 5,67 % | 2GCA296900A0031 |
| | 7,00 % | 2GCA296901A0031 |
| 20 | - | 2GCA296902A0031 |
| | 5,67 % | 2GCA296903A0031 |
| | 7,00 % | 2GCA296904A0031 |
| 25 | - | 2GCA296905A0031 |
| | 5,67 % | 2GCA296906A0031 |
| | 7,00 % | 2GCA296907A0031 |
| 30 | - | 2GCA296908A0031 |

(1) Qnet (kvar) is the net reactive power output in combination with the associated reactor (if existing).

(2) Detuning reactor ( %) is the value of the reactor (if existing) connected in series with the capacitor. Reactors are not provided.

(3) Not CSA/UL recognized.

(4) Not UL recognized.

Other ratings available on request.

# Technical specifications

## Range 60Hz

### U network - 220 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 2,5 | - | 2GCA296909A0031 |
| | 5,67 % | 2GCA296910A0031 |
| | 7,00 % | 2GCA296911A0031 |
| | 12,50 % | 2GCA296912A0031 |
| | 14,00 % | 2GCA296913A0031 |
| 3,75 | - | 2GCA296914A0031 |
| | 5,67 % | 2GCA296915A0031 |
| | 7,00 % | 2GCA296916A0031 |
| | 12,50 % | 2GCA296917A0031 |
| | 14,00 % | 2GCA296918A0031 |
| 5 | - | 2GCA296919A0031 |
| | 5,67 % | 2GCA296920A0031 |
| | 7,00 % | 2GCA296921A0031 |
| | 12,50 % | 2GCA296922A0031 |
| | 14,00 % | 2GCA296923A0031 |
| 6,25 | - | 2GCA296924A0031 |
| | 5,67 % | 2GCA296925A0031 |
| | 7,00 % | 2GCA296926A0031 |
| | 12,50 % | 2GCA296927A0031 |
| | 14,00 % | 2GCA296928A0031 |
| 7,5 | - | 2GCA296929A0031 |
| | 5,67 % | 2GCA296930A0031 |
| | 7,00 % | 2GCA296931A0031 |
| | 12,50 % | 2GCA296932A0031 |
| | 14,00 % | 2GCA296933A0031 |
| 10 | - | 2GCA296934A0031 |
| | 5,67 % | 2GCA296935A0031 |
| | 7,00 % | 2GCA296936A0031 |
| | 12,50 % | 2GCA296937A0031 |
| | 14,00 % | 2GCA296938A0031 |
| 15 | - | 2GCA296939A0031 |

### U network - 380 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 3,75 | - | 2GCA296940A0031 |
| | 5,67 % | 2GCA296941A0031 |
| | 7,00 % | 2GCA296942A0031 |
| 5 | - | 2GCA296943A0031 |
| | 5,67 % | 2GCA296944A0031 |
| | 7,00 % | 2GCA296945A0031 |
| | 12,50 % | 2GCA296946A0031 |
| | 14,00 % | 2GCA296947A0031 |
| 6,25 | - | 2GCA296948A0031 |
| | 5,67 % | 2GCA296949A0031 |
| | 7,00 % | 2GCA296950A0031 |
| | 12,50 % | 2GCA296951A0031 |
| | 14,00 % | 2GCA296952A0031 |
| 7,5 | - | 2GCA296953A0031 |
| | 5,67 % | 2GCA296954A0031 |
| | 7,00 % | 2GCA296955A0031 |
| | 12,50 % | 2GCA296956A0031 |
| | 14,00 % | 2GCA296957A0031 |
| 10 | - | 2GCA296958A0031 |
| | 5,67 % | 2GCA296959A0031 |
| | 7,00 % | 2GCA296960A0031 |
| | 12,50 % | 2GCA296961A0031 |
| | 14,00 % | 2GCA296962A0031 |
| 12,5 | - | 2GCA296963A0031 |
| | 5,67 % | 2GCA296964A0031 |
| | 7,00 % | 2GCA296965A0031 |
| | 12,50 % | 2GCA296966A0031 |
| | 14,00 % | 2GCA296967A0031 |
| 15 | - | 2GCA296968A0031 |
| | 5,67 % | 2GCA296969A0031 |
| | 7,00 % | 2GCA296970A0031 |
| | 12,50 % | 2GCA296971A0031 |
| | 14,00 % | 2GCA296972A0031 |
| 20 | - | 2GCA296973A0031 |
| | 5,67 % | 2GCA296974A0031 |
| | 7,00 % | 2GCA296975A0031 |
| | 12,50 % | 2GCA296976A0031 |
| | 14,00 % | 2GCA296977A0031 |
| 25 | - | 2GCA296978A0031 |
| | 5,67 % | 2GCA296979A0031 |
| | 7,00 % | 2GCA296980A0031 |
| | 12,50 % | 2GCA296981A0031 |
| | 14,00 % | 2GCA296982A0031 |
| 30[3] | 5,67 % | 2GCA296983A0031 |

(1) Qnet (kvar) is the net reactive power output in combination with the associated reactor (if existing).

(2) Detuning reactor ( %) is the value of the reactor (if existing) connected in series with the capacitor. Reactors are not provided.

(3) Not CSA/UL recognized.

Other ratings available on request.

### U network - 400 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 3,75 | - | 2GCA296984A0031 |
| 5 | - | 2GCA296985A0031 |
| | 5,67% | 2GCA296986A0031 |
| | 7,00% | 2GCA296987A0031 |
| | 12,50% | 2GCA296988A0031 |
| | 14,00% | 2GCA296989A0031 |
| 6,25 | - | 2GCA296990A0031 |
| | 5,67% | 2GCA296991A0031 |
| | 7,00% | 2GCA296992A0031 |
| | 12,50% | 2GCA296993A0031 |
| | 14,00% | 2GCA296994A0031 |
| 7,5 | - | 2GCA296995A0031 |
| | 5,67% | 2GCA296996A0031 |
| | 7,00% | 2GCA296997A0031 |
| | 12,50% | 2GCA296998A0031 |
| | 14,00% | 2GCA296999A0031 |
| 10 | - | 2GCA297000A0031 |
| | 5,67% | 2GCA297001A0031 |
| | 7,00% | 2GCA297002A0031 |
| | 12,50% | 2GCA297003A0031 |
| | 14,00% | 2GCA297004A0031 |
| 12,5 | - | 2GCA297005A0031 |
| | 5,67% | 2GCA297006A0031 |
| | 7,00% | 2GCA297007A0031 |
| | 12,50% | 2GCA297008A0031 |
| | 14,00% | 2GCA297009A0031 |
| 15 | - | 2GCA297010A0031 |
| | 5,67% | 2GCA297011A0031 |
| | 7,00% | 2GCA297012A0031 |
| | 12,50% | 2GCA297013A0031 |
| | 14,00% | 2GCA297014A0031 |
| 20 | - | 2GCA297015A0031 |
| | 12,50% | 2GCA297016A0031 |
| | 14,00% | 2GCA297017A0031 |
| 25 | - | 2GCA297018A0031 |
| | 5,67% | 2GCA297019A0031 |
| | 7,00% | 2GCA297020A0031 |
| | 12,50% | 2GCA297021A0031 |
| | 14,00% | 2GCA297022A0031 |
| 30 | - | 2GCA297023A0031 |
| 30[3] | 5,67% | 2GCA297024A0031 |
| 30[3] | 12,50% | 2GCA297025A0031 |

### U network - 415 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 5 | - | 2GCA297026A0031 |
| | 5,67 % | 2GCA297027A0031 |
| | 7,00 % | 2GCA297028A0031 |
| | 12,50 % | 2GCA297029A0031 |
| | 14,00 % | 2GCA297030A0031 |
| 6,25 | - | 2GCA297031A0031 |
| | 5,67 % | 2GCA297032A0031 |
| | 7,00 % | 2GCA297033A0031 |
| | 12,50 % | 2GCA297034A0031 |
| | 14,00 % | 2GCA297035A0031 |
| 7,5 | - | 2GCA297036A0031 |
| | 5,67 % | 2GCA297037A0031 |
| | 7,00 % | 2GCA297038A0031 |
| | 12,50 % | 2GCA297039A0031 |
| | 14,00 % | 2GCA297040A0031 |
| 10 | - | 2GCA297041A0031 |
| | 5,67 % | 2GCA297042A0031 |
| | 7,00 % | 2GCA297043A0031 |
| | 12,50 % | 2GCA297044A0031 |
| | 14,00 % | 2GCA297045A0031 |
| 12,5 | - | 2GCA297046A0031 |
| | 5,67 % | 2GCA297047A0031 |
| | 7,00 % | 2GCA297048A0031 |
| | 12,50 % | 2GCA297049A0031 |
| | 14,00 % | 2GCA297050A0031 |
| 15 | - | 2GCA297051A0031 |
| | 5,67 % | 2GCA297052A0031 |
| | 7,00 % | 2GCA297053A0031 |
| | 12,50 % | 2GCA297054A0031 |
| | 14,00 % | 2GCA297055A0031 |
| 20 | - | 2GCA297056A0031 |
| | 5,67 % | 2GCA297057A0031 |
| | 7,00 % | 2GCA297058A0031 |
| | 12,50 % | 2GCA297059A0031 |
| | 14,00 % | 2GCA297060A0031 |
| 25 | - | 2GCA297061A0031 |
| | 5,67 % | 2GCA297062A0031 |
| | 7,00 % | 2GCA297063A0031 |
| | 12,50 % | 2GCA297064A0031 |
| 30 | - | 2GCA297065A0031 |
| 30[3] | 5,67 % | 2GCA297066A0031 |
| | 7,00 % | 2GCA297067A0031 |
| | 14,00 % | 2GCA297068A0031 |

## U network - 440 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 5 | - | 2GCA297069A0031 |
| | 5,67 % | 2GCA297070A0031 |
| | 7,00 % | 2GCA297071A0031 |
| 6,25 | - | 2GCA297072A0031 |
| | 5,67 % | 2GCA297073A0031 |
| | 7,00 % | 2GCA297074A0031 |
| | 12,50 % | 2GCA297075A0031 |
| 7,5 | - | 2GCA297076A0031 |
| | 5,67 % | 2GCA297077A0031 |
| | 7,00 % | 2GCA297078A0031 |
| | 12,50 % | 2GCA297079A0031 |
| | 14,00 % | 2GCA297080A0031 |
| 10 | - | 2GCA297081A0031 |
| | 5,67 % | 2GCA297082A0031 |
| | 7,00 % | 2GCA297083A0031 |
| | 12,50 % | 2GCA297084A0031 |
| | 14,00 % | 2GCA297085A0031 |
| 12,5 | - | 2GCA297086A0031 |
| | 5,67 % | 2GCA297087A0031 |
| | 7,00 % | 2GCA297088A0031 |
| | 12,50 % | 2GCA297089A0031 |
| | 14,00 % | 2GCA297090A0031 |
| 15 | - | 2GCA297091A0031 |
| | 5,67 % | 2GCA297092A0031 |
| | 7,00 % | 2GCA297093A0031 |
| | 12,50 % | 2GCA297094A0031 |
| | 14,00 % | 2GCA297095A0031 |
| 20 | - | 2GCA297096A0031 |
| | 5,67 % | 2GCA297097A0031 |
| | 7,00 % | 2GCA297098A0031 |
| | 12,50 % | 2GCA297099A0031 |
| | 14,00 % | 2GCA297100A0031 |
| 25 | - | 2GCA297101A0031 |
| | 5,67 % | 2GCA297102A0031 |
| | 7,00 % | 2GCA297103A0031 |
| | 12,50 % | 2GCA297104A0031 |
| | 14,00 % | 2GCA297105A0031 |
| 30 | - | 2GCA297106A0031 |
| 30[3] | 5,67 % | 2GCA297107A0031 |
| 30[3] | 7,00 % | 2GCA297108A0031 |

## U network - 480 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 6,25 | - | 2GCA297109A0031 |
| | 5,67 % | 2GCA297110A0031 |
| | 7,00 % | 2GCA297111A0031 |
| | 12,50 % | 2GCA297112A0031 |
| | 14,00 % | 2GCA297113A0031 |
| 7,5 | - | 2GCA297114A0031 |
| | 5,67 % | 2GCA297115A0031 |
| | 7,00 % | 2GCA297116A0031 |
| | 12,50 % | 2GCA297117A0031 |
| | 14,00 % | 2GCA297118A0031 |
| 10 | - | 2GCA297119A0031 |
| | 5,67 % | 2GCA297120A0031 |
| | 7,00 % | 2GCA297121A0031 |
| | 12,50 % | 2GCA297122A0031 |
| | 14,00 % | 2GCA297123A0031 |
| 12,5 | - | 2GCA297124A0031 |
| | 5,67 % | 2GCA297125A0031 |
| | 7,00 % | 2GCA297126A0031 |
| | 12,50 % | 2GCA297127A0031 |
| | 14,00 % | 2GCA297128A0031 |
| 15 | - | 2GCA297129A0031 |
| | 5,67 % | 2GCA297130A0031 |
| | 7,00 % | 2GCA297131A0031 |
| | 12,50 % | 2GCA297132A0031 |
| | 14,00 % | 2GCA297133A0031 |
| 20 | - | 2GCA297134A0031 |
| | 5,67 % | 2GCA297135A0031 |
| | 7,00 % | 2GCA297136A0031 |
| | 12,50 % | 2GCA297137A0031 |
| | 14,00 % | 2GCA297138A0031 |
| 25 | - | 2GCA297139A0031 |
| | 5,67 % | 2GCA297140A0031 |
| | 7,00 % | 2GCA297141A0031 |
| 30 | - | 2GCA297142A0031 |

## U network - 525 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 7,5 | - | 2GCA297143A0031 |
| | 5,67 % | 2GCA297144A0031 |
| | 7,00 % | 2GCA297145A0031 |
| | 12,50 % | 2GCA297146A0031 |
| | 14,00 % | 2GCA297147A0031 |
| 10 | - | 2GCA297148A0031 |
| | 5,67 % | 2GCA297149A0031 |
| | 7,00 % | 2GCA297150A0031 |
| | 12,50 % | 2GCA297151A0031 |
| | 14,00 % | 2GCA297152A0031 |
| 12,5 | - | 2GCA297153A0031 |
| | 5,67 % | 2GCA297154A0031 |
| | 7,00 % | 2GCA297155A0031 |
| | 12,50 % | 2GCA297156A0031 |
| | 14,00 % | 2GCA297157A0031 |
| 15 | - | 2GCA297158A0031 |
| | 5,67 % | 2GCA297159A0031 |
| | 7,00 % | 2GCA297160A0031 |
| | 12,50 % | 2GCA297161A0031 |
| | 14,00 % | 2GCA297162A0031 |
| 20 | - | 2GCA297163A0031 |
| | 5,67 % | 2GCA297164A0031 |
| | 7,00 % | 2GCA297165A0031 |
| | 12,50 % | 2GCA297166A0031 |
| | 14,00 % | 2GCA297167A0031 |
| 25 | - | 2GCA297168A0031 |
| | 5,67 % | 2GCA297169A0031 |
| | 7,00 % | 2GCA297170A0031 |
| | 12,50 % | 2GCA297171A0031 |
| | 14,00 % | 2GCA297172A0031 |
| 30 | - | 2GCA297173A0031 |

## U network - 600 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 10 | 5,67 % | 2GCA297174A0031 |
| | 7,00 % | 2GCA297175A0031 |
| | 12,50 % | 2GCA297176A0031 |
| | 14,00 % | 2GCA297177A0031 |
| 12,5 | - | 2GCA297178A0031 |
| | 5,67 % | 2GCA297179A0031 |
| | 7,00 % | 2GCA297180A0031 |
| | 12,50 % | 2GCA297181A0031 |
| | 14,00 % | 2GCA297182A0031 |
| 15 | - | 2GCA297183A0031 |
| | 5,67 % | 2GCA297184A0031 |
| | 7,00 % | 2GCA297185A0031 |
| | 12,50 % | 2GCA297186A0031 |
| | 14,00 % | 2GCA297187A0031 |
| 20 | - | 2GCA297188A0031 |
| | 5,67 % | 2GCA297189A0031 |
| | 7,00 % | 2GCA297190A0031 |
| | 12,50 % | 2GCA297191A0031 |
| | 14,00 % | 2GCA297192A0031 |
| 25 | - | 2GCA297193A0031 |
| | 5,67 % | 2GCA297194A0031 |
| | 7,00 % | 2GCA297195A0031 |
| | 12,50 % | 2GCA297196A0031 |
| | 14,00 % | 2GCA297197A0031 |
| 30 | - | 2GCA297198A0031 |
| 30[3] | 5,67 % | 2GCA297199A0031 |

## U network - 690 V

| Qnet (kvar)[1] | Detuning reactor (%)[2] | Article number |
|---|---|---|
| 12,5[4] | - | 2GCA297200A0031 |
| | 5,67 % | 2GCA297201A0031 |
| | 7,00 % | 2GCA297202A0031 |
| 15[4] | - | 2GCA297203A0031 |
| | 5,67 % | 2GCA297204A0031 |
| | 7,00 % | 2GCA297205A0031 |
| 20[4] | - | 2GCA297206A0031 |
| | 5,67 % | 2GCA297207A0031 |
| | 7,00 % | 2GCA297208A0031 |
| | 12,50 % | 2GCA297209A0031 |
| 25[4] | - | 2GCA297210A0031 |
| | 5,67 % | 2GCA297211A0031 |
| | 7,00 % | 2GCA297212A0031 |
| | 12,50 % | 2GCA297213A0031 |
| 30[4] | - | 2GCA297214A0031 |
| 30[3] | 5,67 % | 2GCA297215A0031 |
| | 7,00 % | 2GCA297216A0031 |

(1) Qnet (kvar) is the net reactive power output in combination with the associated reactor (if existing).

(2) Detuning reactor ( %) is the value of the reactor (if existing) connected in series with the capacitor. Reactors are not provided.

(3) Not CSA/UL recognized.

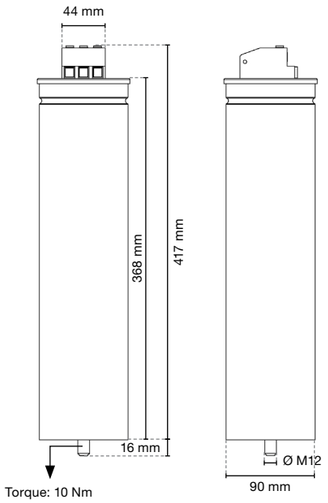
(4) Not UL recognized.

Other ratings available on request.

# Technical specifications

## QCap

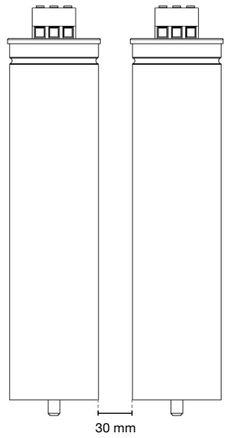
| | |
|---|---|
| **Network voltage range** | From 220 to 690 V |
| **Frequency** | 50 and 60 Hz |
| **Connection** | Three-phase |
| **Net output power** | From 2.5 to 30 kvar |
| **Tolerance on capacitance** | 2.5-12.5 kvar: -5 % / +10 %<br>15-30 kvar: 0 % / +10 % |
| **Losses** | < 0.2 Watt/kvar (dielectric only)<br>< 0.35 Watt/kvar (typical without discharge resistor).<br>< 0.5 Watt/kvar (including discharge resistor) |
| **Discharge resistor** | Included. Discharge to 50 V in 1 minute |
| **Maximum permissible current** | 1.3 x In for continuous operation |
| **Tolerance on voltage** | 1.1 x Un for maximum 8 hours in every 24 hours (according to IEC 60831) |
| **Case material** | Recyclable aluminum |
| **Color** | Raw aluminum |
| **Fixing** | 1 stud (M12). Recommended torque: 10 Nm |
| **Dimensions (DxH)** | 90x417 mm |
| **Weight** | 3 kg |
| **Terminals** | Cage screws. Recommended torque: 2 Nm |
| **Minimum distance above unit** | 20 mm |
| **Minimum distance between capacitors** | 30 mm |
| **Earth** | Earth connection on the enclosure fixation |
| **Execution** | Indoor use only |
| **Installation** | Horizontal or vertical |
| **Temperature range** | -25°C / +55°C (class D according to IEC 60831) |
| **Altitude** | Up to 2000 m without derating. For higher altitudes consult Hitachi Energy. |
| **Protection degree** | IP20 |
| **Standards** | IEC 60831-1 (2014), IEC 60831-2 (2014), UL 810, CSA C22.2 No 190 |




**Front view**



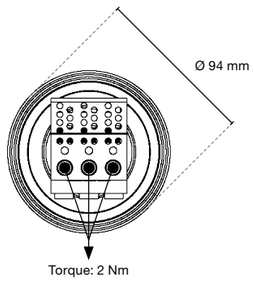

**Side view**




**Minimum distance between units**

Dimensions

| | |
|---|---|
| **Total H** | 401 mm |
| **Can H** | 368 mm |
| **D** | 90 mm |
| **D fixation screw** | M12 |
| **H fixation screw** | 16 mm |




**Top view**



# Hitachi Energy's commitment

**Quality assurance**
At Hitachi Energy, we are committed to providing the best products and services. Our products comply with or exceed the latest international standards. In addition to type tests in independent laboratories, our certified design and manufacturing processes guarantee the highest quality. We are certified according to the latest relevant ISO quality standards.

**Sustainability**
For Hitachi Energy, sustainability is about balancing economic success, environmental stewardship and social progress to benefit all our stakeholders.

Sustainability considerations cover how we design and manufacture products, what we offer customers, how we engage suppliers, how we assess risks and opportunities, and how we behave in communities where we operate and towards one another, while striving to ensure the health, security and safety of our employees, contractors and others affected by our activities. We are certified according to the latest relevant ISO quality standards.

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