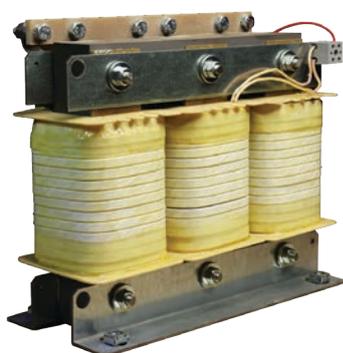




ACCESSORIES AND COMPONENTS





rEvolution R5, R8, R14 and R6T

rEvolution SERIES R5, R8, R14 & R6T

Automatic reactive power regulators are systems that automatically manage the banks of capacitors to compensate the reactive power absorbed by the load and to avoid being charged penalties imposed by the Electricity and Gas Authorities.

Thanks to the know-how acquired over years of designing and manufacturing analyzers for electrical measurements, *DUCATI Energia* has developed the innovative **rEvolution series of reactive power regulators**.

The compactness, the latest technology and the complete range of functions make **the rEvolution models** extremely adaptable to any application context in the field of power factor correction systems for low and medium voltage networks, both single-phase and three-phase, in the presence or absence of power generation systems (e.g. photovoltaic).

Depending on the model, the main connectivity options (SRD radio, NFC, Ethernet, RS485, Bluetooth, USB) can be used both for on-site data exchange via the **"DUCATI Smart Energy" Android app**, and for remote monitoring of the performance of the equipment, the status of the capacitor banks and events related to the electrical parameters of the system.



Model	Part number	Connectivity	Relays
R5	415984050NNNN	NFC	5
R5 RADIO 485	415984050QNDN	NFC, radio, RS-485	5
R8 RADIO	415986080NNDN	NFC, radio	8
R8 485 RADIO	415986080QNDN	NFC, radio, RS-485	8
R8 485 BT RADIO	415986080QBDN	NFC, radio, RS-485, Bluetooth	11
R8 ETH BT RADIO	415986080EBDN	NFC, radio, Ethernet, Bluetooth	11
R14	415988140NNNN	NFC, radio	15
R14 485	415988140QNNN	NFC, radio, RS-485	15
R14 485-BT	415988140QBNN	NFC, radio, RS-485, Bluetooth	18
R14 ETH	415988140ENNN	NFC, radio, Ethernet	15
R6T USB	415988160NSNN	NFC, radio, RS-485, USB	6
R6T BT	415988160NBNN	NFC, radio, RS-485, bluetooth	6

App DUCATI Smart Energy

The dedicated **"DUCATI Smart Energy"** app is designed to simplify the setup and control of all the equipment in which the **rEvolution regulators** are installed. Communication with the smartphone can be carried out thanks to the NFC connection, standard on the entire range, or via **Bluetooth** (on models equipped with it). You will be able to manage and **organize an infinite number of DUCATI regulators** with the convenience of the graphic interface.

Main features:

1. Easy and intuitive reading, modification and export of configuration parameters
2. Firmware update
3. Immediate control of the condition of equipment (battery power, contactors operation etc.)
4. Download the configuration file by email





rEvolution R5

Reactive power controller



The new **R5** by DUCATI Energia is a regulator designed for quick and easy installation and correct start-up of power factor correction equipment. The **R5** models are equipped with technology that allows the exchange of performance and system status data both on site via **App Android (NFC)** or **radio SRD**, and remotely (**RS485**) for monitoring purposes, through DUCATI Energia ENERGY BRIDGE datalogger devices. The large display with red LED backlit icons allows the measured values to be read remotely. The 5-button keypad makes it easy to navigate the menus and intuitive to set the configuration parameters. One of the buttons is dedicated to fast switching from manual to automatic mode and vice versa.

The programming algorithms allow the controller to define in a completely automatic way both the recognition of the direction of the TA and the recognition of the phase on which the TA is installed, thus avoiding possible installation errors. The dual power inputs, one at 230 VAC and one at 400 VAC, allows the regulator to be used in single-phase networks with neutral or in three-phase networks with and without neutral.

Thanks to the advanced features of the microprocessor, the R5 calculates the $\cos\phi$ from the voltage-current phase shift of the fundamental harmonic at the mains frequency; and measures the total harmonic distortion in voltage (THDV%) and current (THDI%) with a total spectrum up to the 60th component.

Smart Communications

Communication with the standard NFC sensor, or the optional **SRD and RS485 radios** allow the quick exchange of data with the "DUCATI Smart Energy" Android app or with the ENERGY BRIDGE datalogger.

Technical details

Power supply:

- Rated voltage: 400 or 230 VAC
- Operating limits: 380÷415 VAC ±10% or 220÷240 VAC ±10%
- Frequency: 45 ÷ 66 Hz
- Power consumption: 2.5 W - 3 VA

Current input:

- Rated current: 5 A
- Self-consumption: < 1.8 VA

Relay outputs:

- Number of Relay Outputs: 5 (1 common)
- Contact type: NO (Normally Open)
- Maximum operating voltage: 440 VAC
- Rated capacity: AC1 6 A - 250 VAC, AC15 1.5 A - 440 VAC

Alarms:

- Overvoltage and overcurrent
- Undervoltage and undercurrent
- Maximum Harmonic Distortion in current (THDI) and voltage (THDV)
- Over-temperature
- No power factor correction (low $\cos\phi$)
- Other alarms (see manual)

Ambient operating conditions:

- Operating temperature: -20 - 70°C
- Overvoltage category: III, Measurement category: 3
- Insulation voltage: 600 VAC
- Relative humidity: < 80%

Container:

- Size: 96x96 built-in
- Protection rating: IP51 on the front - IP20 on the terminals
- Weight: 350 g.

RS485 Interface:

- Modbus-RTU
- Ascii-Ducbus

SRD Radio Interface:

- Carrier Frequency: 868 MHz
- Frequency band: 868.0 - 868.6 MHz
- Maximum output power: 12.5 mW
- Protocol: Modbus-RTU

NFC Interface:

- Frequency: 13.56 MHz
- Data exchange with smartphone via antenna behind the display

Standard Compliance:

- Image that contains text, clock Auto-generated description
- EN 61000-6-2
- EN 61000-6-4
- EN 61326-1
- EN 62311
- EN 301-489-1
- EN 301-489-3
- EN 300-220-2
- EN 300-330



rEvolution R8

Reactive power controller



The new **R8** by DUCATI Energia is an innovative regulator characterized by advanced functions suitable for any application context, a wide range of sizes and various communication solutions, all concentrated in the compact 96x96 mm dimensions.

The R8 models are equipped with all the main connectivity options (**Bluetooth, USB, Wireless-radio, NFC, Ethernet, RS485**) both for local data exchange and for remote monitoring of the performance of the equipment. A clear user guide, with texts translated into 9 languages, makes the **R8** models easy to use both during equipment commissioning and during normal operation of the power factor correction system.

The large 128x128 pixel graphic matrix LCD display backlit with white LEDs allows the display of data, waveforms, histograms and icons.

The programming algorithms allow the controller to define in a completely automatic way both the recognition of the direction of the TA and the recognition of the phase on which the TA is installed, thus avoiding possible installation errors.

Thanks to the advanced features of the microprocessor (voltage and current measurements with 1% accuracy), the **R8** calculates the $\cos\phi$ from the voltage-current phase shift of the fundamental harmonic at the mains frequency and measures the total harmonic distortion in voltage (THDV%) and current (THDI%) with a total spectrum up to the 60th component.

Smart Communications

The following are standard:

- NFC sensor for downloading/uploading configuration parameters via Android App **"DUCATI Smart Energy"**
- Internal memory with data history of up to 1 year and battery-powered RTC sensor
- 868 MHz SRD radio communication interface for connecting to the ENERGY BRIDGE datalogger

The optional "485" models with RS485 interface have a Modbus-RTU communication protocol for interfacing with the DUCATI ENERGIA BRIDGE datalogger or other devices such as PC or SCADA.

Optional "ETH" models with Ethernet network card and isolated RJ45 connector are equipped with integrated Web Server functionality and Modbus-TCP protocol. The optional "USB" models are characterized by a USB host interface for downloading data to memory and/or loading FW updates.

The optional "BT" models are characterized by a Bluetooth interface for the configuration and management of the controller from the "DUCATI Smart Energy" Smartphone App.

Technical details

Power supply:

- Rated voltage: 400 or 230 or 110 VAC
- Operating limits: 110÷415 V AC/DC $\pm 10\%$
- Frequency range: DC or 45 ÷ 66 Hz
- Power consumption: 2.5 W
- Maximum power consumption: 10 W (for "USB ETH" model)

Voltage input:

- Measuring range: 50 ÷ 525 VAC
- Accuracy: 1% ± 0.5 digits

Current input:

- Rated current: 5 A
- Accuracy: 1% ± 0.5 digits

Relay outputs:

- Total number of outputs: 8 (11 for "USB" and "BT" models)
- Contact type: 6 NO (common C1) + 1 NO (common C2) + 1 NO/NC (common C3)

Contact type for "USB" and "BT" models:

- 6 NO (common C1)
- 1 NO (common C2)
- 1 NO/NC (COMMON C3)
- 2 NO (common C4)
- 1 NO (common C5)

Alarms:

- Overvoltage and overcurrent
- Undervoltage and undercurrent
- Maximum Harmonic Distortion in current (THDI) and voltage (THDV)
- Over-temperature
- No power factor correction (low $\cos\phi$)
- Other alarms (see manual)

Ambient operating conditions:

- Operating temperature: -20 - 70°C
- Overvoltage category: III; Size category: 3
- Relative humidity: < 80%

Container:

- Size: 96x96 built-in
- Protection rating: IP51 on the front - IP20 on the terminals
- Weight: 350 g.

Wireless Interface to SRD Radio:

- Carrier Frequency: 868 MHz
- Frequency band: 868.0 - 868.6 MHz
- Maximum output power: 12.5 mW
- Protocol: Modbus-RTU

NFC Interface:

- Frequency: 13.56 MHz
- Data exchange with smartphone via antenna behind the display

RS485 Interface:

- Protocols: Modbus-RTU, Ascii-Ducbus

Ethernet Interface:

- Galvanically isolated RJ45 connector with auto-crossover MDI/MDX function
- Built-in Web Server
- Modbus-TCP protocol

USB Interface:

- Type: USB-Host 2.0

Bluetooth Interface:

- Bluetooth Low Energy (BLE) type

Standard Compliance:

IEC/EN 61010-1, IEC/EN 61000-6-2, IEC/ EN 61000-6-4, EN 61326-1, EN 62311, EN 301-489-1, EN 301-489-3 EN 300-220-2, EN 300-330, EN 300-328-1



rEvolution R14

Reactive power controller



The new **R14** regulators are dedicated to the power factor correction of high-power systems in low and medium voltage networks. The models integrate up to 29 relay outputs, useful for switchboards where many capacitor banks are used to achieve fast and accurate power factor adjustment, or to achieve a high degree of reliability in systems based on multiple bank redundancy. Thanks to the static data, the recorded performance curves and the accessory sensors, you can guarantee a safe management of the banks and a precise diagnosis of the status of all the components of the power factor correction system. These features avoid extraordinary maintenance and allow you to schedule the replacement of the most worn parts well in advance. The display texts are available in 8 languages to help the installer commission the power factor correction system. The **"DUCATI SMART ENERGY"** APP allows you to easily manage both the programming of the regulator and the reading and sharing of diagnostic data using your smartphone. Connectivity options also include a USB port for downloading recorded events, RS485 interface for Modbus-RTU networks and Ethernet-LAN interface for convenient remote management via browser and for Modbus-TCP communication networks. In addition, all **R14** models integrate an SRD 868 MHz radio module as standard, which can be used for IoT wireless networks.

Technical details

Power supply:

- Rated voltage: 400 or 230 or 110 VAC
- Operating limits: 99÷460 V AC/DC
- Frequency range: DC or 45÷66 Hz
- Power consumption: 2.5W (max 10W for models with "USB and ETH")
- Fuses: 1A Quick

Voltage input:

- Measuring range: 50÷525 VAC
- Accuracy: 0.5% ± 0.5 digits
- Frequency range: 45÷400 Hz

Current input:

- Input type: current shunt (use external CTs of appropriate size for the power of the system to be re-phased)
- Rated current: 5 A
- Measuring range: 0.025÷6 A
- Accuracy: 0.5% ± 0.5 digits
- Self-consumption: <1.8VA

Relay outputs:

- Total number of outputs: 15 (expandable up to 29)
- Contact type: up to 28 NO + 1 NO/NC (up to 9 separate commons)
- Maximum operating voltage NO contacts: 440 V~
- Maximum operating voltage NO/NC contact: 400 V~
- Nominal NO contact rating: AC1 6A-250V~, AC15 1.5A-440V~

- Nominal NO/NC contact rating AC1 6A-250V~, AC15 1.5A-440V~
- Mechanical/electrical durability of NO contacts: > 30x10⁶ / > 2x10⁵ manoeuvres
- Mechanical/electrical life of NO/NC contacts: > 1x10⁷ / > 1x10⁴ manoeuvres

User interface:

- 5-button keypad
- Display: 128x128 pixel STN graphic matrix LCD backlit with white LEDs - LCD visual area size: 72.3x57mm
- Languages: Italian, English, French, German, Spanish, Portuguese, Russian, Arabic, Chinese
- Backlight and contrast: adjustable levels from the settings menu

Environmental conditions:

- Operating temperature: -20 - 70°C
- Storage temperature: -30 - 80°C
- Overvoltage category: III - Size category: 3
- Insulation voltage: 600VAC

Connection terminals:

- Type: pull-out
- Conductor cross-section: 0.2+2.5 mm² (24+12 AWG)
- Tightening torque: 0.5 Nm - Stripping length: 7 mm

Container:

- Size: 144x144 built-in, material: PBT - Pocan B4225; Weight: 800g
- Protection rating: IP54 on the front (with adhesive gasket for coupling to the panel of the panel) - IP20 on the terminals

Radio SRD (Short Range Device) interface:

- Carrier Frequency: 868MHz - Frequency Band: 868.0 - 868.6 MHz
- Maximum output power: 12.5 mW

13.56 MHz NFC interface:

- Data exchange with smartphone via antenna behind the display; use the DUCATI SMART ENERGY APP for Android devices
- <https://play.google.com/store/apps/details?id=it.ducatienergia.smartenergy>

Current Inputs for Monitoring Capacitor Banks:

- No. of inputs: 2
- Input Type: Built-in CTs (use 2 external CTs of appropriate size for the power of the capacitor banks)
- Rated current: 5 A
- Measuring range: 0.025÷6 A
- Current measurement accuracy: 0.5% ± 0.5 digits
- Autoconsumption: < 10 mW

Input for external temperature sensors:

- Type of external sensors: Pt100, Pt1000
- Measuring range: -15 - 70°C
- Accuracy: 0.3 °C
- Insulation voltage: 600 V~

4-20mA Input for External Sensors:

- Input span: 0-20mA or 4-20mA configurable from settings menu
- Accuracy: 0.2% FS
- Input Resistance: 50 Ohms

RS485 Interface:

- Protocols: Modbus-RTU, Ascii-Ducbus
- Baud rate: 9600÷115200 bps
- Termination Resistor: 120 Ohm - integrated (jumper on connection terminal)
- Insulation voltage: 600 V~

Ethernet Interface:

- 10/100Base-T network card with galvanically isolated RJ45 connector
- MDI/MDX auto-crossover function for patch or cross cable recognition
- Built-in Web Server
- Modbus-TCP protocol
- Insulation voltage: 600 V~

USB gate:

- USB-Host 2.0 type
- Compatible with pendrives with FAT32 filesystem
- Insulation voltage: 600 V~

Bluetooth Interface:

- Bluetooth Low Energy (BLE) type
- use the DUCATI SMART ENERGY APP for Android devices
- <https://play.google.com/store/apps/details?id=it.ducatienergia.smartenergy>

Standard Compliance:

IEC/EN61010-1, IEC/EN61000-6-2, IEC/EN61000-6-4, IEC/EN 61326-1; EN301-489-1, EN301-489-3, EN300-220-2, EN300-330, EN300-328-1



rEvolution R6T

Three-Phase Reactive Power Regulators



DUCATI Energia presents the new and innovative **R6T** three-phase regulators. The compactness, the latest generation technology and the complete range of features make the **R6T** models extremely adaptable to any application context in the field of power factor correction systems for three-phase low and medium voltage networks. They allow adjustment according to the $\cos\phi$ of one of the phases, the equivalent three-phase $\cos\phi$ or the most inductive or most capacitive $\cos\phi$. The type of target $\cos\phi$ and its value can be selected according to the daily time slots that can be set for each day of the calendar. The R6T models are equipped with all the necessary connectivity options (**Bluetooth, USB, Wireless-radio, NFC, RS485**) both for on-site data exchange and for remote monitoring of equipment performance, capacitor bank status and events related to the electrical parameters of the system. A clear user guide, with texts translated into 9 languages, makes the **R6T** models easy to use both during the commissioning of the equipment and during the normal operation of the power factor correction system with useful tips for troubleshooting the connection of the regulator to the power grid, the setting of configuration parameters and in general the events detected on the quality of voltage and current signals.

Technical details

Power supply:

- Rated voltage: 110÷415V~
- Operating limits: 99÷460 V AC/DC
- Frequency range: DC or 45÷66 Hz
- Power consumption for LV model: < 2.5W
- Power consumption per USB model: < 6W
- Fuses: 1A Quick

Voltage input:

- Rated voltage: 400 or 230 or 110VAC V~
- Measuring range: 50÷525 V~ L-N
- Accuracy: 1% ± 0.5 digits
- Frequency range: 45÷400 Hz
- Type of measurement: true RMS (TRMS)

Current input:

- Input Type: TA
- Rated current: 5 A
- Measuring range: 0.025÷6 A
- Accuracy: 1% ± 0.5 digits
- Type of measurement: true RMS (TRMS)
- Self-consumption: <10mVA

Relay outputs:

- Total number of outputs: 6
- Contact type: 1 NO (common C1) + 2 NO (common C2) + 2 NO (common C3) + 1 NO/NC (common C4)
- Maximum operating voltage NO contacts: 440 V~
- Maximum operating voltage NO/NC contact: 400 V~
- Nominal rating of NO contacts: AC1 6A-250V~, AC15 1.5A-440V~
- NO/NC contact rated rating: AC1 6A-250V~, AC15 1.5A-440V~
- Mechanical/electrical durability of NO contacts: > 30x106/ > 2x105 manoeuvres
- Mechanical/electrical durability of NO/NC contacts: > 1x107/ > 1x104 manoeuvres

User interface:

- 5-button keypad
- Display: 128x128 pixel graphic matrix STN LCD backlit with white LEDs
- LCD view area size: 72.3x57mm
- Backlight and contrast: adjustable levels from the settings menu

Ambient operating conditions:

- Operating temperature: -20 - 70°C
- Storage temperature: -30 - 80°C
- Humid heat sequence: according to IEC60068-2-30 (temperature levels 25°C/40°C - humidity levels 93% / >95%)
- Static humid heat: according to IEC60068-2-78 (temperature level 40°C, humidity level 93%)
- Overtoltage category: III
- Size category: 3
- Insulation voltage: 600 V~

Connection terminals:

- Type: pull-out
- Conductor cross-section: 0.2÷2.5 mm² (24÷12 AWG)
- Tightening torque: 0.5 Nm
- Stripping length: 7 mm

Container:

- Size: 96x96 built-in
- Material: PBT Thermoplastic Polyester
- Protection rating: IP51 on the front - IP20 on the terminals
- Weight: 350 g.

Radio-frequency wireless interface:

- Carrier Frequency: 868 MHz
- Frequency band: 868.0 - 868.6 MHz
- Maximum output power: 12.5 mW
- Protocol: Modbus
- We suggest the use of the DUCATI ENERGY BRIDGE datalogger-gateway

13.56 MHz NFC interface:

- Data exchange with smartphone via antenna behind the display; use the DUCATI SMART ENERGY APP for Android devices
- <https://play.google.com/store/apps/details?id=it.ducatienergia.smartenergy>

RS485 Interface:

- Insulation voltage: 4 kV~
- Protocols: Modbus-RTU, Ascii-Ducbus
- Baud rate: 9600÷115200 bps
- We suggest the use of the DUCATI ENERGY GEAR datalogger-gateway

USB Interface:

- USB-Host 2.0 type

Bluetooth Interface:

- Bluetooth Low Energy (BLE), use the DUCATI SMART ENERGY
- <https://play.google.com/store/apps/details?id=it.ducatienergia.smartenergy> Android device app

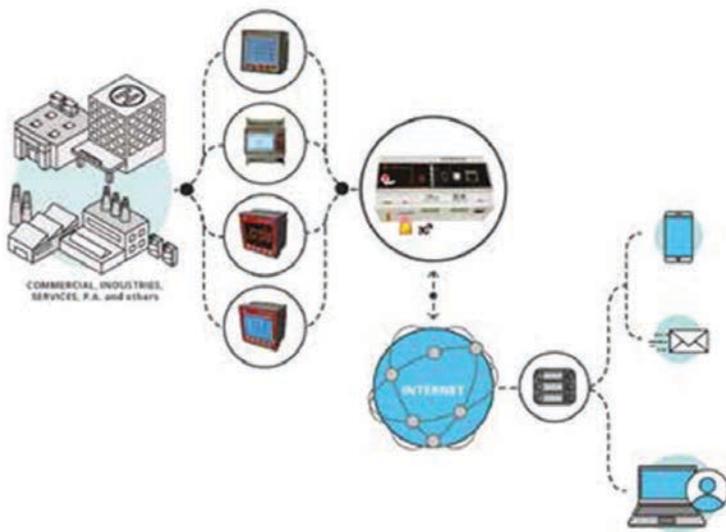
Standard Compliance:

IEC/EN 61010-1, IEC/EN 61000-6-2, IEC/EN 61000-6-4, IEC/EN 61326-1; EN 301-489-1, EN 301-489-3, EN 300-220-2, EN 300-330, EN 300-328-1



DUCNET ENERGY CLOUD

Introduction



The **DUCNET Energy** monitoring system is Ducati's cloud solution providing Energy Monitoring and Energy Management solutions compliant with ISO50001, ISO14001, ISO 50001 and Directive 2012/27 / EU. **DUCNET** is the ideal tool for all Energy Managers, who can easily and automatically access, all the energy data of the monitored installations, in order to make effective strategic decisions, immediately reduce energy wastage and check the results in real time.

Main characteristics

The **DUCNET** system provides an accurate overview of energy consumption data and numerous real-time data related to the proper functioning of the electrical network and the loads it supplies. **DUCNET** can also send alarms via email and SMS in order to immediately alert Facility Managers to any anomaly such as electrical faults, interruptions, excessive energy / power consumption, low power factor, excessive harmonic distortion, etc. **DUCNET** can integrate the new reactive power controllers rEvolution R5 and R8 to share not only network information/data but also the status of the related Industrial Power Factor Correction equipment.

The configuration of the **DUCNET** system, the optional **ENERGY GEAR** dataloggers & gateways and the R5 or R8 reactive power controllers can be done remotely through a web interface (accessed via any browser), without any need of onsite operations.

Diagnostic information is also available for immediate control of the health status of remote monitoring and data collection points.

With **DUCNET Cloud** system it is possible to check all energy and electrical data client connected to the Internet, such as PCs, smartphones, tablets, SmartTVs, etc., without any need to manage multiple, annoying software installations.

All data will be stored on **DUCATI Energia** servers, without any need to install and maintain local software or provide safe, local data storage space. The service autonomously collects all the data and stores it on the **DUCNET** cloud. No action is required by the customer.

Main intended users

INDUSTRY: large plants and high energy demand users, compelled by the law to use power/energy management systems.

PUBLIC BUILDINGS & ADMINISTRATION: hospitals, schools, municipalities, ministries, military facilities, etc.

SERVICE COMPANIES: buildings and structures of post offices, banks, insurance companies, telephone companies, couriers, etc.

RETAIL: department stores, shopping malls, superstores, chain stores.

TOURISM: hotels, airports, ports, camp sites.

RESIDENTIAL: partition of energy costs among multiple users connected to a single utility point.



ENERGY GEAR AND ENERGY BRIDGE

Within the **DUCNET** monitoring system **DUCATI Energia** presents the new **ENERGY GEAR** datalogger-gateway and the **ENERGY BRIDGE** gateway, designed respectively for the energy management and for the monitoring of power factor correction units located in distributed industrial plants, branches of organizations, isolated production facilities or service sites. The main functions of **ENERGY GEAR** are dedicated to reading, storing and communicating data from energy/power analyzers, **rEvolution R5** and **R8** power factor controllers, pulse counters and flow meter and sensors. **ENERGY GEAR** stores the data in its internal memory and shares it with CAN services, servers, or PCs connected to the local LAN.

ENERGY BRIDGE is designed to establish a connection through 868MHz radio interface used by the **rEvolution R5** and **R8** power factor controllers to read and archive data from these. The data is then sent to the **DUCATI Servers** via LAN / GPRS / UMTS connections.



ENERGY GEAR



ENERGY GEAR means flexibility, ease of use, high reliability and guaranteed availability. **ENERGY GEAR** can read and store data from:

- DUCATI Energia power analyzers and controllers, for electrical energy consumption and system control
- DUCATI Energia indoor or outdoor temperature and / or humidity sensors
- DUCATI Energia modules for the acquisition and storage of digital signals from pulse emitting devices: water meters, gas meters, steam / compressed air / fluids meters, parts counters, etc.
- Any other measurement device with RS485 or Ethernet port and MODBUS-RTU or MODBUS TCP communication protocols ENERGY GEAR as a large internal memory capable of storing up to several years worth of data. The overall storage capacity can be extended by connecting a USB memory stick on the front of the device. Data is stored in .xml or .csv format for easy successive analysis but with Modbus-TCP it's also possible do real-time monitoring. A web server allows quick configuration from any browser.

ENERGY GEAR provides different communication modes:

- Automatic remote transmission to the LAN Server or Internet Cloud through Ethernet port
- Automatic remote transmission or manual download via GPRS modem with a M2M data SIM
- Local Download on a USB memory stick connected to the front port of the device
- Local Download on PC through the USB or Ethernet ports on the front of the device

ENERGY GEAR allows you to program an address book with emails and phone numbers to which communications about alerts or alarms should be sent. Excessive consumption, anomalies or power outages, failures and other similar events can be detected and the relevant alert sent to registered phones or smartphones through the **DUCNET** Cloud Service.

ENERGY BRIDGE



The main features of **ENERGY BRIDGE** are ease of installation, flexibility of use, high reliability.

ENERGY BRIDGE is designed for installers and users who, after the complete activation of Power Factor Correction Units equipped with **rEvolution R5** and **R8** controllers, want to remotely connect the Power Factor Correction controllers/units.

Thanks to the wireless radio communication interface, the main features of **ENERGY BRIDGE** are ease/speed of installation, flexibility and high reliability.

ENERGY BRIDGE connects to one or more **R5** and **R8** controllers via a 868 MHz radio channel (where available).

ENERGY BRIDGE has an internal memory that can store up to 2 years of data. The memory can be further extended by plugging a common USB memory stick into the USB HOST port located on the front of the device.

ENERGY BRIDGE can share this data to the DUCATI servers in various ways:

- With Ethernet (port located on the front of the device) to the local network, that must allow an internet connection
- Through GPRS / UMTS port with a data SIM card
- Through an external memory via USB HOST port (located on the front of the device) and subsequent upload to the Ducati Server through integrated import process in the **DUCNET** web interface. Once the **R5** and **R8** data are on the Ducati servers, the user can check them by logging on to the **DUCNET** web portal.

ENERGY BRIDGE allows easy configuration via web server using a common browser, locally or remotely connected to the device.

ENERGY GEAR

Part number	Description
468001313GSPL	ENERGY GEAR Europe/Asia inc. Power supply, GPRS modem for Europe/Asia and antenna
468001313ASPL	ENERGY GEAR America inc. Power supply, UMTS Modem America and Antenna

ENERGY BRIDGE 5.0

Part number	Description
468.00.1371	ENERGY BRIDGE 5.0 data logger with Radio 868Mhz, RS-485 and ETHERNET communication



CHASSIS



The current range of DUCATI Energia chassis includes these series:

- **C160** power range 20-160 kVAr
- **C160-MINI** power range 20-160 kVAr
- **C50-L-MINI** power range 25÷50 kVAr equipped with harmonic blocking reactors
- **C100-L** power range 25-100 kVAr equipped with harmonic blocking reactors

These can be used to create automatic power factor correction systems with existing or special structures. Each chassis holds up to 4 capacitor banks.

Technical details

- Single-phase **MONO Long Life 4In PLUS** series capacitors in PPMh, for a continuous duty under highly demanding conditions in environments with high levels of harmonics.
- Rated voltage 415-450-525 V for series **C160** and **C160-MINI**, 480 V for series **C50-L-MINI** and **C100-L**
- Harmonic filter reactors with tuning frequency 189 Hz (only for C50-L-Mini and C100-L)
- Structure made of galvanized sheet steel
- Contactors designed to control capacitive loads, equipped with an inrush current limiting device, with 230 V 50-60 Hz power supply

General Characteristics

Rated voltage	400 V
Rated frequency	50 Hz
Insulation voltage	690 V
Usage	Indoor
Protection rating	IP00
Duty	Continuous
Temperature range	-5 +40 °C
Power supply	3F + PE
Internal connection	FS17
Discharge devices	On each capacitor according EN 60831
Fuses	NH-00 GL
Standards	EN 61921



DUCATI C160 Un - Cond = 415 V

$THD_{I_{MAX-C}} \% \leq 55\%$ $THD_I \% \leq 14\%$ Un 400 V - 50 Hz

Part number 415.04	Qn (kVAr)	Q (400 V) (kVAr)	Bank Power (kVar)	In (A)	Dissipated Power (W)	Weight (kg)
9010	20	18	2x10	27	24	20
9015	40	37	4x10	54	47	22
9020	60	55	2x10+2x20	80	72	22
9025	80	74	4x20	107	102	23
9030	100	92	3x20+40	134	127	23
9035	120	111	2x20+2x40	161	157	23
9040	140	130	20+3x40	188	190	24
9045	160	148	4x40	215	226	24

DUCATI C160 Un - Cond = 450 V

$THD_{I_{MAX-C}} \% \leq 75\%$ $THD_I \% \leq 22\%$ Un 400 V - 50 Hz

Part number 415.04	Qn (kVAr)	Q (400 V) (kVAr)	Bank Power (kVar)	In (A)	Dissipated Power (W)	Weight (kg)
9110	20	15	2x10	23	20	20
9115	40	31	4x10	46	41	22
9120	60	47	2x10+2x20	68	60	22
9125	80	63	4x20	91	84	23
9130	100	79	3x20+40	114	107	23
9135	120	94	2x20+2x40	137	130	23
9140	140	110	20+3x40	160	155	24
9145	160	126	4x40	182	183	24

DUCATI C160 Un - Cond =525 V

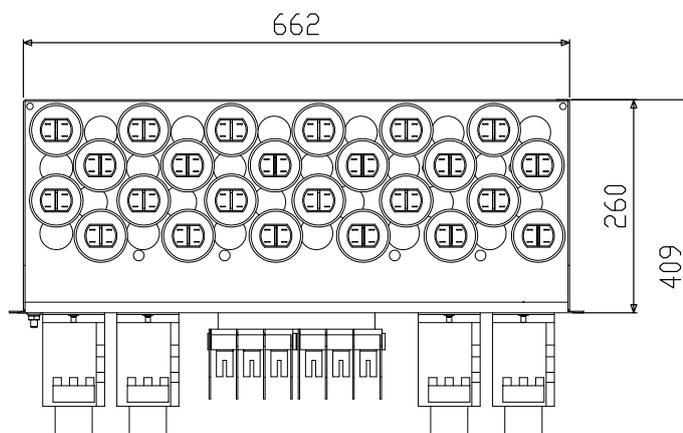
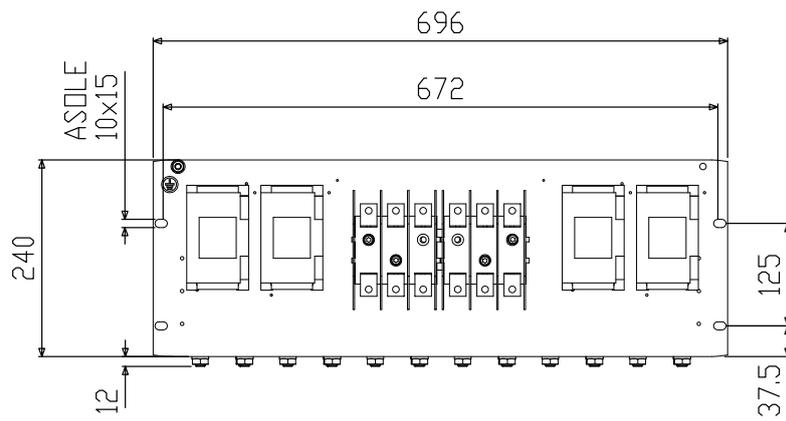
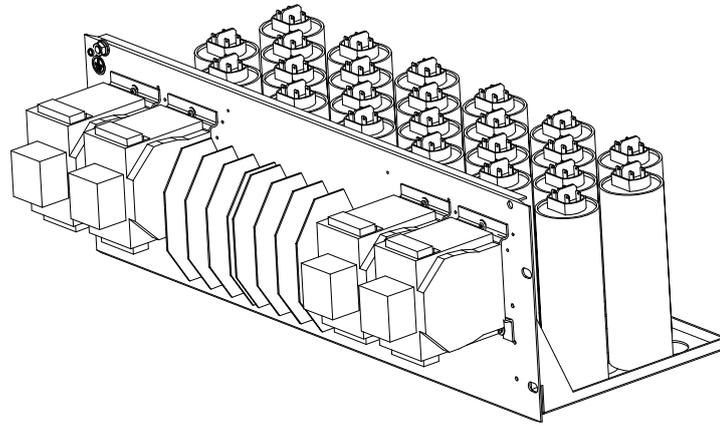
$THD_{I_{MAX-C}} \% \leq 90\%$ $THD_I \% \leq 29\%$ Un 400 V - 50 Hz

Part number 415.04	Qn (kVAr)	Q (400 V) (kVAr)	Bank Power (kVar)	In (A)	Dissipated Power (W)	Weight (kg)
9210	20	11	2x10	17	16	20
9215	40	23	4x10	34	32	22
9220	60	34	2x10+2x20	50	44	22
9225	80	46	4x20	67	59	23
9230	100	58	3x20+40	84	79	23
9235	120	69	2x20+2x40	101	94	23
9240	140	81	20+3x40	117	110	24
9245	160	92	4x40	134	127	24





TECHNICAL DRAWING DUCATI C160





DUCATI C160-MINI Un - Cond = 415 V

$THD_{I_{MAX-C}} \% \leq 55\%$ $THD_I \% \leq 14\%$ Un 400 V - 50 Hz

Part number 415.04	Qn (kVAr)	Q (400 V) (kVAr)	Bank Power (kVar)	In (A)	Dissipated Power (W)	Weight (kg)
3010	20	18	2x10	27	24	19
3015	40	37	4x10	54	47	21
3020	60	55	2x10+2x20	80	72	21
3025	80	74	4x20	107	102	22
3030	100	92	3x20+40	134	127	22
3035	120	111	2x20+2x40	161	157	22
3040	140	130	20+3x40	188	190	23
3045	160	148	4x40	215	226	23

DUCATI C160-MINI Un - Cond = 450 V

$THD_{I_{MAX-C}} \% \leq 75\%$ $THD_I \% \leq 22\%$ Un 400 V - 50 Hz

Part number 415.04	Qn (kVAr)	Q (400 V) (kVAr)	Bank Power (kVar)	In (A)	Dissipated Power (W)	Weight (kg)
3110	20	15	2x10	23	20	19
3115	40	31	4x10	46	41	21
3120	60	47	2x10+2x20	68	60	21
3125	80	63	4x20	91	84	22
3130	100	79	3x20+40	114	107	22
3135	120	94	2x20+2x40	137	130	22
3140	140	110	20+3x40	160	155	23
3145	160	126	4x40	182	183	23

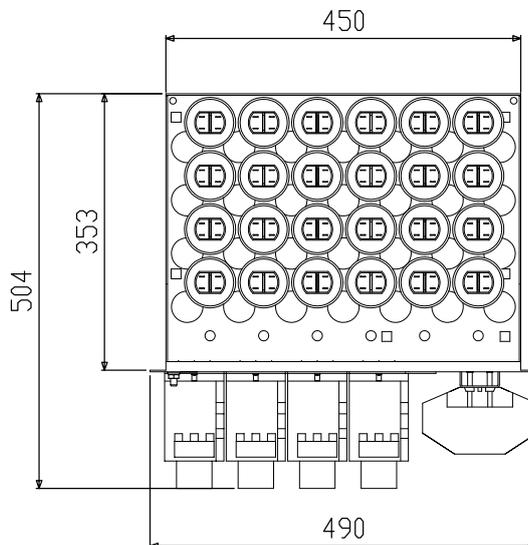
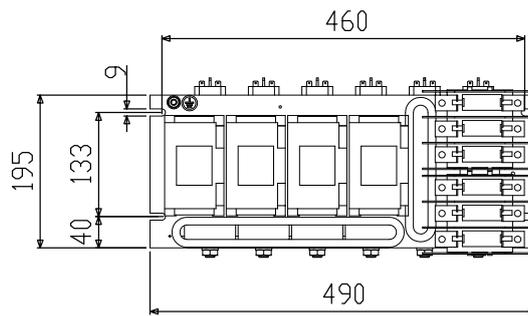
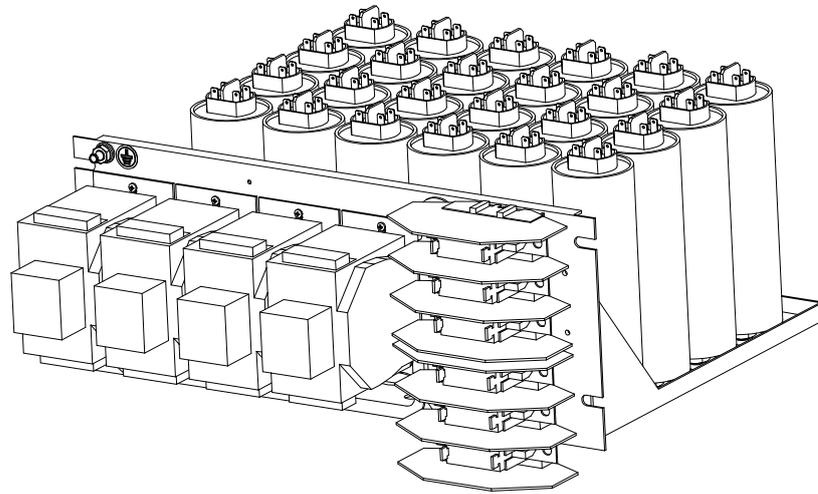
DUCATI C160-MINI Un - Cond =525 V

$THD_{I_{MAX-C}} \% \leq 90\%$ $THD_I \% \leq 29\%$ Un 400 V - 50 Hz

Part number 415.04	Qn (kVAr)	Q (400 V) (kVAr)	Bank Power (kVar)	In (A)	Dissipated Power (W)	Weight (kg)
3210	20	11	2x10	17	16	19
3215	40	23	4x10	34	32	21
3220	60	34	2x10+2x20	50	44	21
3225	80	46	4x20	67	59	22
3230	100	58	3x20+40	84	79	22
3235	120	69	2x20+2x40	101	94	22
3240	140	81	20+3x40	117	110	23
3245	160	92	4x40	134	127	23



TECHNICAL DRAWING DUCATI C160-MINI





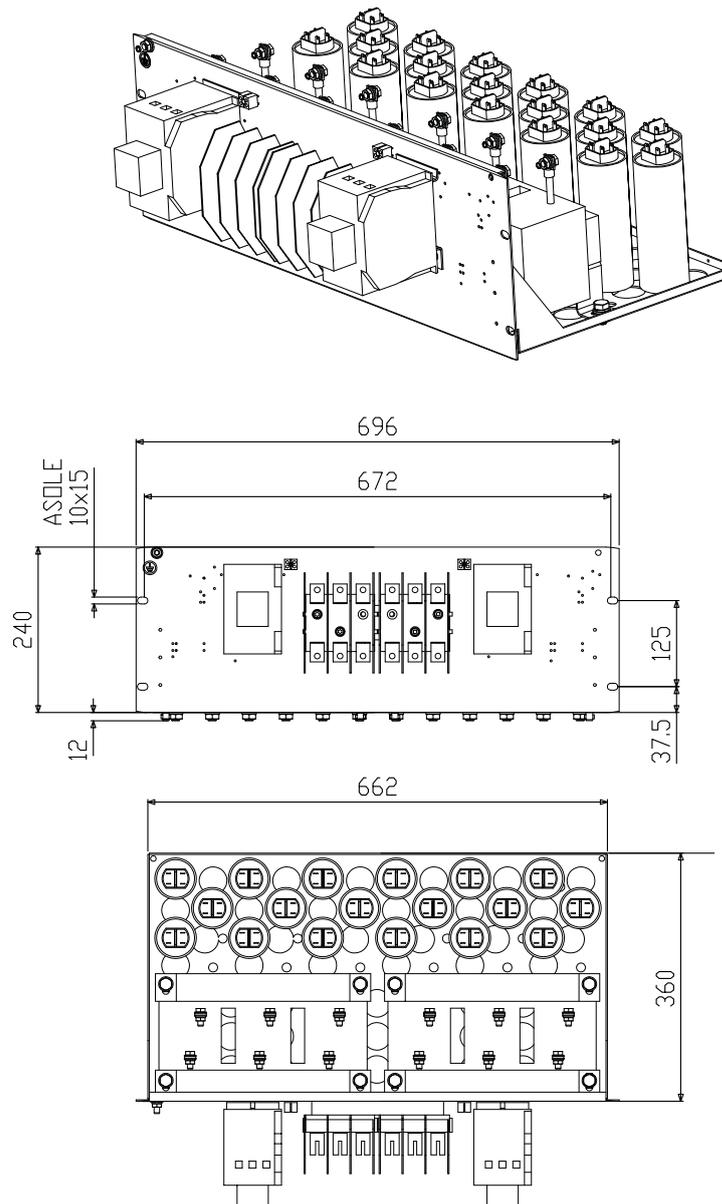
DUCATI C100-L Un - Cond = 480 V FILTER 189 Hz(*)

THD_i % ≤ 100%(*), THD_i % @250 Hz <25%(*), THD_v % ≤ 6%(*), Un 400 V - 50 Hz

Part number 415.04	Qn (kVAr)	Q (400 V) (kVAr)	Bank Power (kVar)	In (A)	Dissipated Power (W)	Weight (kg)
9392	12.5	12.5	1 x 12.5	18	80	17
9393	25	25	1 x 25	36	125	25
9396	25	25	2 x 12.5	36	244	31
9387	37.5	37.5	12.5 + 25	54	293	33
9391	50	50	1 x 50	72	226	42
9388	50	50	2 x 25	72	342	45
9389	75	75	25 + 50	108	412	62
9390	100	100	2 x 50	144	452	76

* Other operating voltages and tuning frequencies available upon request.

TECHNICAL DRAWING DUCATI C100-L





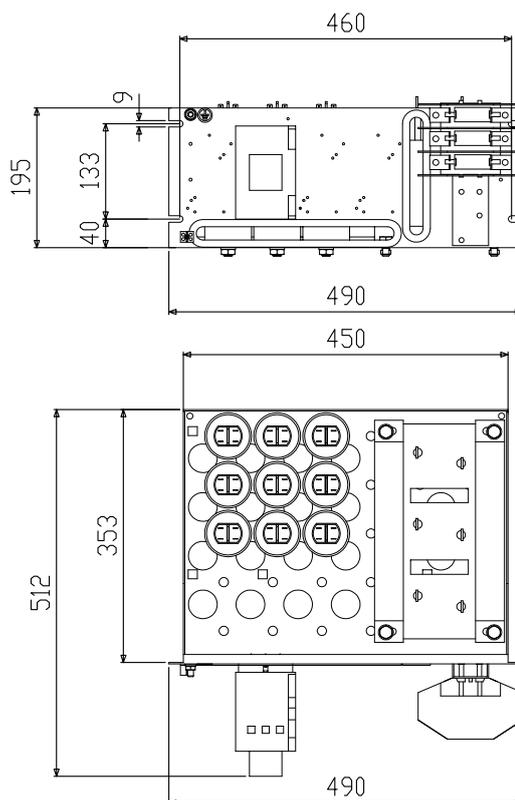
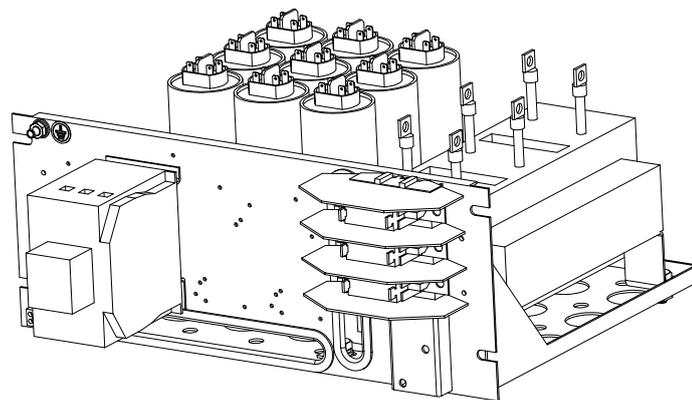
DUCATI C50-L-MINI Un - Cond = 480 V FILTER 189 Hz(*)

THD_i % ≤ 100%(*), THD_i % @250 Hz <25%(*), THD_v % ≤ 6%(*), Un 400 V - 50 Hz

Part number	Qn (kVar)	Q (400 V) (kVar)	Bank Power (kVar)	In (A)	Dissipated Power (W)	Weight (kg)
3310	25	25	2x12.5	36	244	29
3315	37.5	37.5	12.5+25	54	293	31
3320	50	50	2x25	72	342	43
3325	50	50	50	72	337	38

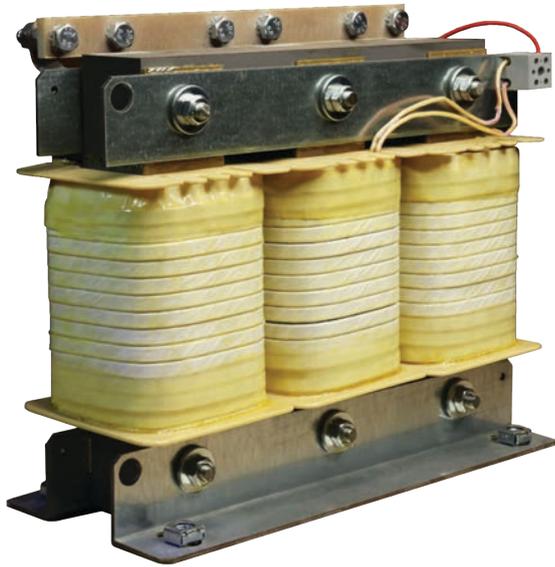
* Other operating voltages and tuning frequencies available upon request.

TECHNICAL DRAWING DUCATI C50-L-MINI

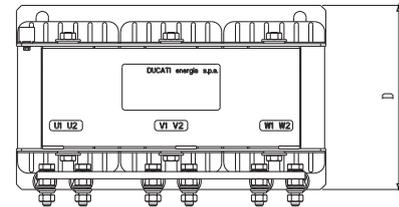
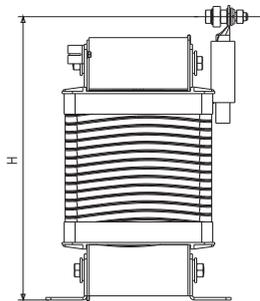
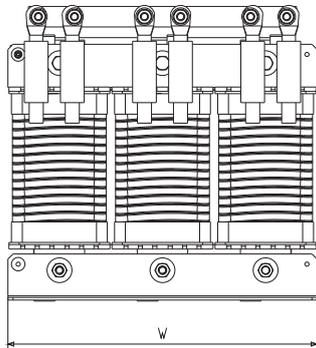




BLOCKING REACTORS



TECHNICAL DRAWING BLOCKING REACTORS



Three-phase reactors P = 7% (189 Hz) e P = 5.67% (210 Hz)

General Characteristics	
Mains voltage	400V - 415V 50 Hz
Power supply	Three-phase + PE
Continuous current harmonic distortion allowed	5%In 3rd harmonic 25%In 5th harmonic 15%In 7th harmonic
Continuous current harmonic distortion allowed	6%
Insulation	3 kV
Q-factor	> 20
Induction value at In	< 1.4 Tesla
Materials	Class H
Thermal protection	Via thermistor with NC contact, opening at 160°C.

Three-phase reactors P = 12.5% (141 Hz) e P = 14% (134 Hz)

General Characteristics	
Mains voltage	400V - 415V 50 Hz
Power supply	Three-phase + PE
Continuous current harmonic distortion allowed	15%In 3rd harmonic 20%In 5th harmonic 10%In 7th harmonic
Continuous current harmonic distortion allowed	6%
Insulation	3 kV
Q-factor	> 20
Induction value at In	< 1.4 Tesla
Materials	Class H
Thermal protection	Via thermistor with NC contact, opening at 160°C.

When choosing a power factor correction system for industrial networks characterized by the presence of harmonics (typically generated by use of non-linear loads such as rectifiers, welders, etc.), you should pay particular attention to the fact that resonance effects may be produced. To avoid such dangerous phenomena, suitable inductances must be placed in series with the capacitors.

The result is a partial absorption of the critical harmonic component and a blocking effect of the upstream power supply network containing harmonics.

The parameter that defines inductance is the degree of inductance p where:

$$p = XL/XC$$

Where XL is the inductive reactance and XC the capacitive inductance.

The presence of the reactor creates other effects, for example the voltage at the capacitor terminals will increase to a value of:

$$UC = U / (1 - p)$$

Where:

U_c = Voltage on the capacitor mains

U = mains voltage

P = Degree of inductance

The reactive power delivered by the combination of reactors + capacitors is different from that delivered by capacitors on their own.

When choosing the components to be used in industrial power factor equipment with blocking reactors, you must thus know the characteristics of the power network in which the equipment will be installed and the impact that the reactor used will have on the capacitors.

The capacitors must possess appropriate characteristics in order to operate reliably in the system.

DUCATI Energia can supply reactors and capacitors to suit the most frequent conditions of use.



THREE-PHASE REACTORS* P= 5.67% (210 HZ) - 400 Vac & 415 Vac - 50 Hz

Mains voltage 400V

Mains voltage 415V

Part n. 415.99.	Power output (kVA _r)	Inductance (mH)	I RMS (A)	Size (mm)			Theoretical Capacity (μF) V _n cond ≥ 440 V	Theoretical Capacity (μF) V _n cond ≥ 450 V
				W	D	H		
415992405	10	3x3.05	17	240	60	161	3x63	3x62
415992410	12.5	3x2.45	21.5	240	60	161	3x78	3x72
415992415	20	3x1.53	35	240	95	161	3x125	3x116
415992420	25	3x1.23	42	240	95	161	3x157	3x145
415992425	40	3x0.76	69	240	90	224	3x251	3x233
415992430	50	3x0.61	86	240	100	224	3x313	3x291
415992435	100	3x0.31	172	300	120	278	3x626	3x582

THREE-PHASE REACTORS* P= 7% (189 HZ) - 400 Vac & 415 Vac - 50 Hz

Mains voltage 400V

Mains voltage 415V

Part n. 415.99.	Power output (kVA _r)	Inductance (mH)	I RMS (A)	Size (mm)			Theoretical Capacity (μF) V _n cond ≥ 440 V	Theoretical Capacity (μF) V _n cond ≥ 450 V
				W	D	H		
415992005	10	3x3.84	16.3	185	100	161	3x62	3x58
415992010	12.5	3x3.07	20.4	185	100	161	3x77	3x72
415992015	20	3x1.91	32.7	240	95	161	3x123	3x115
415992020	25	3x1.53	40.8	240	95	161	3x154	3x144
415992025	40	3x0.96	65	240	100	224	3x247	3x230
415992030	50	3x0.77	82	240	100	224	3x308	3x287
415992050	100	3x0.39	164	300	130	274	3x626	3x574



THREE-PHASE REACTORS* P=12.5% (141 HZ) - 400 Vac & 415 Vac - 50 Hz

Mains voltage 400V

Mains voltage 415V

Part n. 415.99.	Power output (kVA _r)	Inductance (mH)	I RMS (A)	Size (mm)			Theoretical Capacity (μF) V _{n cond} ≥ 480 V	Theoretical Capacity (μF) V _{n cond} ≥ 500 V
				W	D	H		
415992105	10	3x7.28	16.7	240	105	161	3x58	3x54
415992110	12.5	3x5.82	20.9	240	105	161	3x73	3x68
415992115	20	3x3.64	33.4	240	90	224	3x116	3x106
415992120	25	3x2.91	41.8	240	100	224	3x145	3x135
415992125	40	3x1.82	67	300	90	285	3x232	3x216
415992130	50	3x1.46	84	300	90	285	3x290	3x270
415992150	100	3x0.73	168	360	190	380	3x580	3x540

THREE-PHASE REACTORS* P=14.0% (134 HZ) - 400 Vac & 415 Vac - 50 Hz

Mains voltage 400V

Mains voltage 415V

Part n. 415.99.	Power output (kVA _r)	Inductance (mH)	I RMS (A)	Size (mm)			Theoretical Capacity (μF) V _{n cond} ≥ 480 V	Theoretical Capacity (μF) V _{n cond} ≥ 500 V
				W	D	H		
415992505	10	3x8.15	17.5	240	125	161	3x58	3x53
415992510	12.5	3x6.70	20.9	240	125	161	3x73	3x66
415992515	20	3x4.10	35	240	110	224	3x116	3x106
415992520	25	3x3.35	43	240	110	224	3x145	3x133
415992525	40	3x2.05	70	300	100	177	3x232	3x212
415992530	50	3x1.65	87	300	100	177	3x290	3x265
415992550	100	3x0.825	174	360	214	380	3x572	3x530



CONTACTORS

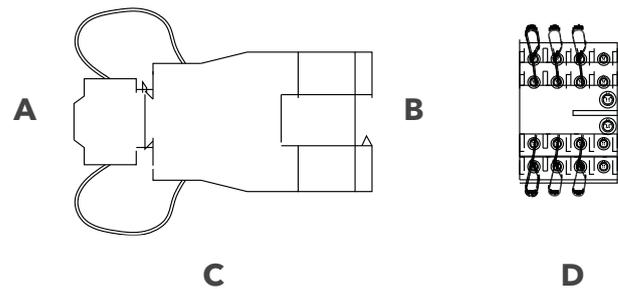


When choosing switching contactors for capacitors used to compensate the reactive power present in the network, you should bear several aspects in mind:

- On being energized the capacitor is connected in parallel to the inductive network and the oscillating circuit produced by connecting the capacitor to the network will result in the passage of a high frequency current (from 3 to 15 kHz), which may be 160 times greater than the I_n current for 1 or 2 ms.
- The presence of harmonic currents and the tolerance with respect to mains voltage determine the continuous passage, within the circuit, of a current whose value is around 1.3 times greater than the rated current I_n of the capacitor.
- Because of the tolerances allowed by the manufacturer, the exact power of a capacitor may be 1.10 times greater than the rated power.
- The contactor employed must therefore be capable of working with:
 - An elevated, albeit transient, peak current during the closing phase
 - A closing current that may be 1.43 times greater than the rated current of the capacitor

The contactors offered by DUCATI Energia are specifically engineered to work in these conditions.

Select the type of contactor based on the working voltage and effective power (in kVAr) of the capacitor bank to be controlled.

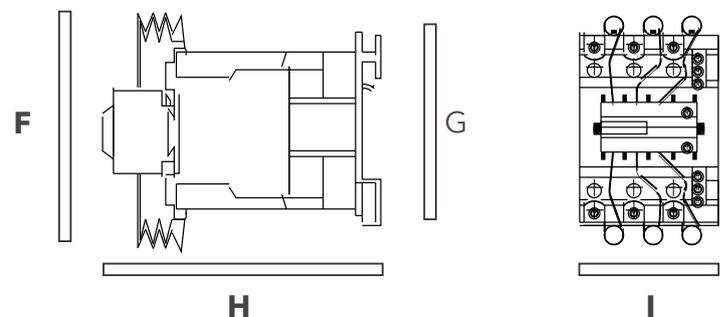


Part number 315.99.	kVAr 50/60 Hz $\vartheta \leq 55^\circ\text{C}$ (*)		Auxiliary contacts		Maximum operating frequency	Electric life with rated load
	200 V 240 V	400 V 440 V	NA	NC		
1143	6.7	12.5	1	1	240	200000
1142	10	20	1	1	240	100000
1141	15	25	1	1	240	100000
1140	20	40	1	2	100	100000
1139	40	60	1	2	100	100000

(*) Average temperature over 24h as per standards IEC 70 and 851.
230 VAC 50/60 Hz coil for all sizes.

WARNING: The capacitors must be completely discharged before being energized by closing contacts (max voltage at terminals < 50 V).

315.99	A (mm)	B (mm)	C (mm)	D (mm)
1143	130	74	117	45
1142	140	84	130	56
1141	140	84	135	56



315.99	F (mm)	G (mm)	H (mm)	I (mm)
1140	180	127	150	75
1139	200	127	157	35



ISOLATING SWITCHES

DUCATI Energia offers a complete series of modular switches for all applications like:

- Main Service Entrance Switch from Transformers & Busbars
- AC or DC Power Distribution System
- Switching & Isolating Motors, capacitors or industrial control equipment
Ducati's switches have compact size and their installation is fast and easy.

The handle in the switch disconnectors has a telescopic shaft. It permits installation of the same switch in installations of different depth, without any modification or addition to the enclosures.

Four hole handle fixing on the door permits last minute rotation of the switch inside the panel by 90 degrees on either side as per convenience, again without any modification to the door.

These time saving features increase the ease and flexibility of installation and also reduce installation cost.

Door interlocking prevents opening in the ON position, guarding the operator against an accidental mishap.

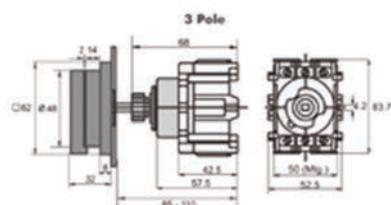
Common Characteristics

Conformity to Standards	-	IEC 60947 Pt.3 e IS 13947 Pt.3
Rated Operational Voltage (Ue)	V	415
Rated Operational Frequency	Hz	50/60
Pollution Degree as per IEC / IC	-	3
Ambient / Cubicle Service Temp.	°C	55
IP Level after mounting	-	IP 54
Number of Poles (4th Pole always 100% rated in 4 Pole switches)	-	3P/4P

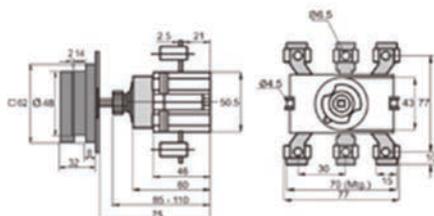
Rated current		40	63	80	125	160
Number of poles (part. n. 315.99)	3	.0200	.0201	.0202	.0203	.0204
	4	.0597	.0598	.0599	.0600	.0601
Rated voltage	V	415	415	415	415	415
Max operating voltage	V	690	690	690	690	690
Rated frequency	Hz	50/60	50/60	50/60	50/60	50/60
Insulation voltage	V	750	750	750	750	750
Rated operational current	A	40	63	80	125	160
Rated capacitor power	kVAr	20	35	45	70	80
Rated short time withstand current Icw (1 sec)	kA	1	1	1.5	2.5	5
Mechanical endurance	cycles	25000	25000	25000	25000	25000
Terminals for cable lug size	Sq mm	16	25	25	70	95
Tightening torque	Nm	2	2	4	6	6

TECHNICAL DRAWING ISOLATING SWITCHES

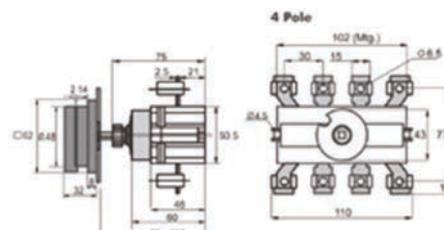
63A Rotatory Type 3 Pole



100A & 125A Rotatory Type 3 Pole



63A - 100A & 125A Rotatory Type 4 Pole





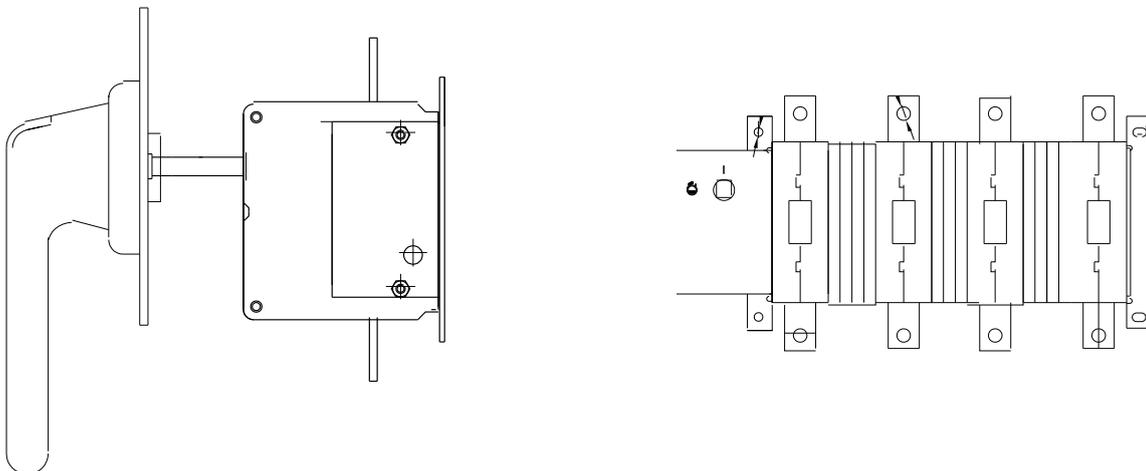
ISOLATING SWITCHES

Rated current		250	400	630	800
Number of poles (part. n. 315.99)	3	.0205	.0206	.0207	.0208
	4	.0602	.0603	.0604	.0605
Rated voltage	V	415	415	415	415
Max operating voltage	V	690	690	690	690
Rated frequency	Hz	50/60	50/60	50/60	50/60
Insulation voltage	V	1000	1000	1000	1000
Rated operational current	A	250	400	630	800
Rated capacitor power	kVAr	125	200	315	400
Rated short time withstand current I_{cw} (1 sec)	kA	8	17	17	17
Mechanical endurance	cycles	10000	10000	10000	10000
Terminals for cable lug size	Sq mm	120	300	400	640
Tightening torque	Nm	12	25	45	45

* Other operating voltages and tuning frequencies available upon request.

Rating	A		B	L		P	Q	S	T
	3P	4P		3P	4P				
400 A	211	257	205	151	197	46	25	4	11
603 A	244	306	223	183	245	62	40	4	13.5
800 A	260	330	223	199	269	70	40	5	13.5

TECHNICAL DRAWING ISOLATING SWITCHES 400 A - 800A





ISOLATING SWITCHES

Rated current		1000	1250	1600
Number of poles (part. n. 315.99)	3	.0209	.0210	.0211
	4	.0606	.0607	.0608
Rated voltage	V	415	415	415
Max operating voltage	V	690	690	690
Rated frequency	Hz	50/60	50/60	50/60
Insulation voltage	V	1000	1000	1000
Rated operational current	A	1000	1250	1600
Rated capacitor power	kVAr	500	630	800
Rated short time withstand current I _{cw} (1 sec)	kA	50	50	50
Mechanical endurance	cycles	10000	10000	10000
Terminals for cable lug size	Sq mm	-	-	-
Tightening torque	Nm	70	70	70

* Other operating voltages and tuning frequencies available upon request.

Rating	A		B	L		T
	3P	4P		3P	4P	
400 A	211	257	205	151	197	11
603 A	244	306	223	183	245	13.5
800 A	260	330	223	199	269	13.5

TECHNICAL DRAWING ISOLATING SWITCHES 1000 A - 1600A

