DCRM SERIES
• Modular housing
• 2 steps
• Settings by front potentiometers
• 3 LED indications.

DCRG SERIES (EXPANDABLE)
• Flush-mount housing: DCRG 8 - DCRG 8IND (144x144mm/5.67x5.67”)
• 8 steps, expandable with EXP series modules (step increment, digital inputs and outputs, communication ports, GPRS/GSM modem, data memory, etc.) and with Master-Slave function
• 128x80 backlit graphic LCD, facilitating data reading even in poor lighting conditions and the display of system information clearly and intuitively
• Ethernet communication interface
• Texts in 10 languages: Italian, English, Spanish, French, German, Czech, Polish, Russian, Portuguese and one customisable
• Voltage measurement input independent of supply input
• Suitable for low and medium voltage systems
• Capacitor overload protection
• Internal panel temperature sensor
• Voltage and current harmonic-content measurement up to 31st order
• Suitable for dynamic power factor correction.
• Power factor correction by single phase (SPPFC)
• Capacitive reactive power factor correction (DCRG 8IND version)
• Front optical USB and Wi-Fi communication port for PC, smartphone and tablet connection
• Programmable alarms
• Protection via 2-level password to prevent all undesired access
• Compatible with Synergy supervision and energy management software, Express configuration and remote control software and with the Synergy application for Android/iOS.

DCRL SERIES (EXPANDABLE)
• Flush-mount housing: DCRL 3 - DCRL 5 (96x96mm/3.78x3.78”) DCRL 8 (144x144mm/5.67x5.67”)
• 3/5/8 steps, expandable with EXP series modules (step increment, digital outputs, communication ports, etc.)
• Backlit icon LCD
• Ethernet communication interface (only for DCRL 8)
• Alarm codes with scrolling texts, programmable in 6 languages (Italian, English, Spanish, French, German and Portuguese)
• Independent voltage measurement input
• Suitable for low and medium voltage systems
• Capacitor overload protection
• Internal panel temperature sensor
• Voltage and current harmonic-content measurement up to 15th order
• Front optical USB and Wi-Fi communication port for PC, smartphone and tablet connection
• Programmable alarms
• Protection via 2-level password to prevent all undesired access
• Compatible with Synergy supervision and energy management software, Express configuration and remote control software and with the Synergy application for Android/iOS.

THYRISTOR MODULES
• 30, 50, 100kvar
• Suitable for dynamic power factor correction
• Current flow zero-crossing controlled connection-disconnection
• Over-temperature protection
• Over-current protectional capacitor switching.
Microprocessor supervision and control
Accurate TRMS measurement circuit
Automatic intelligent adjustment system
Versions from 2 to 24 steps and up to 32 with Master-Slave function
Versions with static outputs
Versions for capacitive reactive power factor correction
Use in cogeneration and medium-voltage systems
USB, serial, Ethernet communication interfaces
Modbus-RTU and ASCII communication protocols
Thyristor modules for dynamic correction.
Automatic power factor controllers and thyristor modules

### Automatic power factor controllers and thyristor modules

#### Steps
- **DCRL 3**: 3 steps (up to 6 with EXP10 07)
- **DCRL 5**: 5 steps (up to 8 with EXP10 07)
- **DCRL 8**: 8 steps (up to 14 with EXP10 07)
- **DCRG 8 / DCRG 8IND**: 8 steps (up to 18 relay outputs with EXP 1006 and EXP10 07) (up to 24 mixed relay and static outputs with EXP10 01)

#### On Front/Housing
- **Display**: Backlit icon LCD
- **128x80 pixel backlit graphic LCD**
- **Languages**: 6 languages (scrolling text of alarm codes only)
- **Italian, English, Spanish, French, German, Portuguese**
- **German, Czech, Polish, Russian, Portuguese and 1 customisable**
- **Dimensions**: 96x96mm/3.78x3.78" (up to 8 with EXP10 07)
- **IP54**
- **Protection rating**: IP54
- **IP65**
- Expandable with EXP... modules

#### Control/Functions
- **Automatic recognition of current flow direction**
- **4-quadrant operation**
- **Master-Slave function**
- **Independent auxiliary supply input**
- **Three-phase voltage control**
- **Current inputs**: 1 (by 5A or 1A CTs)
- **Dynamic (FAST) power factor correction**: 1 (by 5A or 1A CTs) with EXP10 01 (maximum 16 static outputs)
- **Power factor correction by single phase**
- **Possibility of connecting inductive steps**: (DCRG 8IND only)
- **Medium-voltage usage**
- **Phase-neutral connection in three-phase systems**
- **Analog inputs**
- **Analog outputs**
- **Input programmable as function or external temperature sensor**
- **USB communication interface**
- **RS232 communication interface**
- **Opto-isolated RS485 communication interface**
- **Ethernet communication interface**
- **Opto-isolated Profibus-DP interface**
- **GPRS/GSM modem**
- **Optical USB communication port on front**
- **Optical Wi-Fi communication port on front**
- **Fast setting of current transformer**
- **Compatible with Xpress configuration and remote control software**
- **Compatible with Synergy supervision and energy management software**
- **Compatible with Smart App**
- **Calendar-clock with backup reserve power**
- **Data logging memory**
- **Event logging: alarms, setup changes, etc.**
- **Customisable internal counters**
### Automatic power factor controllers and thyristor modules

#### DCRL 3, DCRL 5, DCRL 8, DCRG 8 / DCRG 8IND

<table>
<thead>
<tr>
<th><strong>MEASUREMENTS</strong></th>
<th><strong>DCRL 3</strong></th>
<th><strong>DCRL 5</strong></th>
<th><strong>DCRL 8</strong></th>
<th><strong>DCRG 8 / DCRG 8IND</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated measurement voltage</td>
<td>600VAC max</td>
<td>600VAC max</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement voltage range</td>
<td>50...720VAC</td>
<td>50...720VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instantaneous cosφ (power factor displacement)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instantaneous and average weekly power factor values</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage and current</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reactive power to reach set-point and total values</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacitor overload</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical panel temperature</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum voltage and current value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum capacitor overload value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum panel temperature value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum capacitor temperature value</td>
<td>[with EXP10 04 and EXP10 15]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active and apparent power value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active, reactive, apparent energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current and voltage harmonic analysis</td>
<td>up to 15th</td>
<td></td>
<td>up to 31st</td>
<td></td>
</tr>
<tr>
<td>Var-measured value per step</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of switches for each step</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### PROTECTIONS

<table>
<thead>
<tr>
<th><strong>PROTECTIONS</strong></th>
<th><strong>DCRL 3</strong></th>
<th><strong>DCRL 5</strong></th>
<th><strong>DCRL 8</strong></th>
<th><strong>DCRG 8 / DCRG 8IND</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage too high and too low</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current too high and too low</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over compensation (capacitors disconnected and cosφ higher than set-point)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under compensation (capacitors connected and cosφ lower than set-point)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacitor overload</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacitor overload on all 3 phases</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over temperature</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mains micro-breaking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacitor bank failure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over maximum n° of switches</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over maximum harmonic distortion level limit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Programmable alarm property (enable, trip delay, relay energising, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacitor protection</td>
<td>[with EXP10 16]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Automatic power factor controllers and thyristor modules

DCRL series

Essential and performance too!

DCRL 3 - DCRL 5

- Optical Communication Port
  The optical port on the front permits communication with PCs, smartphones and tablets through the USB and Wi-Fi standards for carrying out programming, diagnostics and data download without disconnecting power to the electrical panel.

- User Interface
  The backlit icon LCD ensures excellent legibility as well as the texts for the display of measurements and description of alarms. The 4 navigation buttons are for settings and functions.

- An Expansion Slot for Exp... Series Modules

- Expandable up to 8 steps

- Compact Size
  The space taken by the housing does not increase (96x96x73mm / 3.78x3.78x2.87") even with the expansion module fitted.

- Fixing System
  The system of fixing with clips is simple, with a press to click into place and push to ensure hold over time.
  Correct application of the standard seal and clips in the panel ensures a front IP54 protection degree.

- Expandability
  Basic controller functionality can be extended easily using the EXP series expansion modules:
  - digital outputs
  - relay outputs to increase number of steps
  - opto-isolated USB interface
  - opto-isolated RS232 interface
  - opto-isolated RS485 interface.

- Software Compatibility
  - Sim... Application for Android and iOS
  - Express for configuration and remote control
  - Synergy for supervision and energy management.

- Characteristics of the DCRL Series
  - Wide Range of Voltage Measurements
    The wide measurement range between 50...720VAC L-L and between 50...415VAC L-N allows the controllers to be used in most applications.
  - Suitable for Low- and Medium-Voltage Systems
    The controllers can be used in medium-voltage systems thanks to the ability to set a voltage transformer ratio, obtaining measurements regarding the transformer primary value both for adjustment and for the display.
  - Alarm Messages in 6 Languages
    The alarm texts can be displayed in Italian, English, French, German, Portuguese and Spanish.
  - Defective Step
    The DCRL measures the percentage of residual power for each step, comparing it with the value set in the main menu.
    The defective step alarm is generated if this value is below the set limit.
Automatic power factor controllers and thyristor modules

DCRL series

DCRL 8

- **USER INTERFACE**
The backlit icon LCD ensures excellent legibility as well as the texts for the display of measurements and description of alarms. The 5 navigation buttons are for settings and functions, while an LED indicates the alarms and the optical port for communication via USB and Wi-Fi.

- **EXPANDABLE UP TO 14 STEPS**

- **OPTICAL COMMUNICATION PORT**
The optical port on the front permits communication with PCs, smartphones and tablets through the USB and Wi-Fi standards for carrying out programming, diagnostics and data download without disconnecting power to the electrical panel.

- **TWO EXPANSION SLOTS FOR EXP... SERIES MODULES**

- **ETHERNET COMMUNICATION INTERFACE**
By using the expansion module with EXP 1013.

- **CUSTOMISATION**
An insert for labels customised with text, logos, codes, etc. is available, to be fixed onto the controller frames.

- **COMPACT SIZE**
Reduced profile and depth simplify installation of the power factor controller even in very compact electrical panels. The total depth of the controller is 73mm (2.87”) inside the panel with the expansion modules installed.

- **FIXING SYSTEM**
The fixing system with metal screws guarantees excellent, lasting hold over time.

- **HIGH PROTECTION RATING**
The front of the controller and seal have been designed to ensure a front protection rating of IP65.

- **EXPANDABILITY**
Basic controller functionality can be extended easily using the EXP series expansion modules:
- relay outputs to increase number of steps
- digital outputs
- opto-isolated RS232 interface
- opto-isolated RS485 interface
- opto-isolated ETHERNET interface.

- **SOFTWARE COMPATIBILITY**
- SimApp for Android and iOS
- EXPRESS for configuration and remote control
- SYNERGY for supervision and energy management.

- **CHARACTERISTICS OF THE DCRL SERIES**

- 5A OR 1A IN THE SAME CONTROLLER
A parameter can enable the controller for use with a 5A or 1A secondary current transformer.

- WHITE BACKLIT DISPLAY
It can be programmed to flash during alarm conditions.

- HARMONIC ANALYSIS
It includes voltage and current THD measurements and single harmonic measurement up to the 15th order and they can be shown on the display.

- **MAINTENANCE INTERVALS**
There are 2 counters: one to count the operating hours for the steps and the other for the number of interventions of each step. An alarm threshold can be set for both counters.

- **BUILT-IN TEMPERATURE SENSOR**
The internal temperature of the controller is monitored constantly by the built-in sensor. The user can program the thresholds to activate and stop the cooling fan and/or generate the temperature alarm.
Automatic power factor controllers and thyristor modules
DCRG series

**THE SOLUTION FOR ALL APPLICATIONS!**

**DCRG 8**

- **COMPACT SIZE**
  Frame profile and reduced total depth simplify installation of the controller also in very compact electric panels.

- **FIXING SYSTEM**
  The fixing system with metal screws guarantees excellent adhesion over time.

- **EXPANDABILITY**
  Basic controller functionality can be extended easily using the EXP series expansion modules:
  - Relay outputs to increase the number of steps
  - Opto-isolated static outputs (also for dynamic correction)
  - Capacitor protection
  - Digital and analog inputs and outputs
  - Expandable up to 24 mixed outputs
  - Opto-isolated RS232 interface
  - Opto-isolated RS485 interface
  - Opto-isolated ETHERNET interface with web server function
  - Opto-isolated Profibus-DP interface
  - GPRS/GSM modem
  - Data memory, calendar-clock with backup reserve power for data logging.

- **OPTICAL COMMUNICATION PORT**
  The optical port on the front permits communication with PCs, smartphones and tablets through the USB and Wi-Fi standards for carrying out programming, diagnostics and data download without disconnecting power to the electrical panel.

- **CUSTOMISATION**
  There is a customisation slot available on the front panel for the description of the controller by adding texts, logos, codes, etc.

- **BACKLIT GRAPHIC LCD**
  High-legibility 128x80 pixels, with adjustable brightness.

- **HIGH PROTECTION DEGREE**
  The controller front and the rear seal have been designed to warrant an IP54 protection degree.

---

**144 (5.67")**

**137 (5.39")**

**73 (2.87")**

**9 (0.35")**

**44 (1.73")**

**9 (0.35")**

**EXP 10...**

**MAX 4**

**CX 01**

**CX 02**
MASTER-SLAVE FUNCTION
The DCRG controller can control the outputs of other analog controllers in addition to its own steps. In this way, it offers a Master-Slave architecture. Up to 8 slaves can be controlled to create a system with a maximum of 32 steps.

WEB SERVER FUNCTION
By installing the Ethernet expansion module EXP10 13, the main measured values of the controller can be viewed by the most common web clients on the market compatible with Java, with no need to install any additional software on the PC.

CAPACITOR PROTECTION
By adding the dedicated EXP10 16 expansion module, the DCRG controller can be equipped with additional capacitor protection functions. The module can measure the harmonic current values and the capacitor temperature on-site as well as detecting malfunction on any phase.

3 CURRENT INPUTS
- Independent power factor correction for each single phase
- Analysis of all electrical measurements in the system (multimeter).

WIDE RANGE OF RATED VOLTAGE MEASUREMENTS
The wide measurement range between 100...600VAC allows the controller to be used in most applications.

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WIDE RANGE OF RATED VOLTAGE MEASUREMENTS
The wide measurement range between 100...600VAC allows the controller to be used in most applications.
Automatic power factor controllers and thyristor modules

Reactive current control relay

**General characteristics**

The DCRM allows the reactive current of a system to be controlled. It can correct to the best \( \cos \phi \) value possible, reducing the request for reactive current from the mains.

It can control the connection of two capacitor banks. Each one can be individually enabled and its power can be set through a dedicated trimmer.

It is also possible to adjust the time for connection and disconnection of the capacitors, thereby modifying the reaction speed of the system.

The controller can be used both in three- and single-phase wiring.

**Operational characteristics**

- **Auxiliary supply voltage:**
  - 380...415VAC standard
  - 220...240VAC and 440...480VAC on request

- **Rated frequency:** 50/60Hz

- **80...528VAC voltage measurement input**

- **Current measurement input:**
  - By CT /5A
  - Measuring range: 0.1...6A
  - Measurement type: true root mean square (TRMS)
  - Automatic identification of CT connection polarity (straight / inverted)

- **Relay outputs:**
  - 2 relays (steps), each with 1 changeover contact
  - Rated current: 8A 250VAC (AC1)
  - Individual enablement of control of the two relays
  - Modular DIN 43880 housing (3 modules)
  - IEC degree of protection: IP40 on front (if placed in IP40 housing and/or electrical panel), IP20 terminals.

**ADJUSTMENTS**

<table>
<thead>
<tr>
<th>Order code</th>
<th>Steps</th>
<th>Auxiliary supply voltage</th>
<th>Qty</th>
<th>Wt</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCRM 2</td>
<td>2</td>
<td>380...415VAC</td>
<td>1</td>
<td>0.284</td>
</tr>
</tbody>
</table>

**INDICATIONS**

- 1 green LED for power on and inhibition time
- 2 red LEDs for relay connection.

**Certifications and compliance**

Certifications obtained: EAC; UL Listed, for USA and Canada (File E93601), as Auxiliary Devices-Modular ampere monitoring relays (with 415VAC maximum only).

DCRL series

<table>
<thead>
<tr>
<th>Order code</th>
<th>Description</th>
<th>Qty per pkg</th>
<th>WT</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCRL 3</td>
<td>Single and three-phase low and medium-voltage</td>
<td>1</td>
<td>0.340</td>
</tr>
<tr>
<td></td>
<td>systems.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DCRL 5</td>
<td>5 steps, expandable up to 8 steps, 100…440VAC</td>
<td>1</td>
<td>0.340</td>
</tr>
<tr>
<td>DCRL 8</td>
<td>8 steps, expandable up to 14 steps, 100…440VAC</td>
<td>1</td>
<td>0.640</td>
</tr>
</tbody>
</table>

Accessory.

<table>
<thead>
<tr>
<th>Order code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXP80 00</td>
<td>Plastic insert for customisation label (only for DCRL 8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXPANSION MODULES: Additional steps.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXP10 06</td>
</tr>
<tr>
<td>EXP10 07</td>
</tr>
</tbody>
</table>

Inputs and outputs.

<table>
<thead>
<tr>
<th>EXP10 03</th>
<th>2 relay outputs 5A 250VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXP10 10</td>
<td>Opto-isolated USB interface</td>
</tr>
<tr>
<td>EXP10 11</td>
<td>Opto-isolated RS232 interface</td>
</tr>
<tr>
<td>EXP10 13</td>
<td>Opto-isolated RS485 interface</td>
</tr>
</tbody>
</table>

DCRL 3 - DCRL 5 with 1 module

DCRL 8 with 2 modules

**General characteristics**

The DCRL series was developed with advanced functionality and produced with a dedicated ultra-compact housing. It combines modern front design with practical mounting and expandability (EXP… modules).

### Its main features are:

- Backlit LCD with excellent information display
- Alarm codes with scrolling texts, programmable in 6 languages (Italian, English, Spanish, French, German and Portuguese)
- Connection in single or three phase lines and co-generation systems with 4-quadrant operation
- Voltage measurement input independent of supply and which can be used in medium-voltage lines with VTs
- Drastic reduction in the number of switching operations
- Balanced use of steps with same power rating
- Measurement of reactive power installed for each step
- Capacitor over-current protection
- Panel over-temperature protection via internal sensor
- Accurate micro-breaking protection
- Vast choice of measurements available, including voltage and current with single harmonic analysis up to the 15th order.

### Operational characteristics

- **Supply:**
  - Auxiliary voltage: 100…440VAC
  - Frequency: 50/60Hz ±10%
  - Voltage input:
    - Rated voltage: 600VAC L-L (346VAC L-N)
    - Frequency range: 45…65Hz
  - Current input:
    - Single-phase connection
    - Rated current: 1A or 5A, configurable
    - Measurements and control:
      - Power factor adjustment: 0.5ind…0.5cap.
      - Voltage measurement range: 50…720VAC L-L; 50…415VAC L-N
      - Current measurement range: 0.025…6A for 1A full scale; 0.025…1.2A for 5A full scale
      - Type of voltage and current measurement: true root mean square (TRMS).
- **Relay outputs (steps):**
  - DCRL 3: 3 outputs
  - DCRL 5: 5 outputs
  - DCRL 8: 8 outputs
- **Contact arrangement:** NO; the last is a changeover
- **Rated current:** 5A 250VAC AC1
- **Flush-mount housing:**
  - DCRL 3, DCRL 5 IP54 and DCRL 8 IP65 on front;
  - DCRL 3, DCRL 5 (96x96mm / 3.78x3.78”); DCRL 8 (144x144mm / 5.67x5.67”)
- **IEC degree of protection:**
  - DCRL 3, DCRL 5 IP64 and DCRL 8 IP65 on front;
  - IP20 on terminals for all.

### Certifications and compliance:

Certifications obtained: UL Listing for USA and Canada (cULus - File E93601), as Auxiliary Devices - Power factor controllers, EAC, RCM.

Compliant with standards: IEC/EN 61010-1, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL508, CSA C22.2 n° 14.

Contact for power factor correction

See section 2. See section 27.

**Software: sEnergy, xPress and sAM**

See section 27.

**EXP expansion modules**

See section 28.

DCRL series
Automatic power factor controllers and thyristor modules

DCRG series

General characteristics
The DCRG automatic power factor controller satisfies the technical requirements of modern electrical systems in industry.

It is designed to satisfy them, with the option of extending its functionality by using specific EXP series expansion modules. Mention should also be made of the optical communication port as standard, for programming the controller, diagnostics and data download. The backlit graphic LCD facilitates data reading even in poor lighting conditions and permits the display of system information clearly and intuitively.

Its main features are:
- 128x60-pixel backlit graphic LCD with texts in 10 languages: Italian, English, Spanish, French, German, Czech, Polish, Russian, Portuguese and one customisable
- Connection in single and three-phase lines as well as three-phase lines with neutral control and cogeneration systems (4 quadrants)
- Capacitive reactive power factor correction (DCRG 8IND)
- Independent power factor correction for each single phase (SPPFC)
- Use with medium-voltage lines with VTs
- Capability for correct operation even in systems characterised by high harmonic content
- Drastic reduction in the number of switching operations
- Balanced use of steps with same power rating
- Measurement of reactive power installed for each step
- Recording of the number of connections for each step
- Capacitor over-current protection on all three phases
- Panel over-temperature protection via internal sensor and external sensor
- Accurate micro-breaking protection
- Current and voltage harmonic analysis
- Quick CT programming function
- USB (CX 01 dongle) and Wi-Fi (CX 02 dongle) communication port for PC, smartphone and tablet connection
- Modbus-RTU TCP and ASCII communication protocol
- Compatible with energy management software, Xpress configuration and remote control software and with the Xpress application for Android/iOS
- Sending and reception of SMS, sending of e-mails with alarm diagnosis and data files, FTP Client function (with EXP10 15 module).

Operational characteristics
- Voltage measurement circuit:
  - Auxiliary supply voltage: 100...415VAC
  - Rated frequency: 50/60Hz (+10%)
- Current measurement circuit:
  - Single and three-phase input
  - Rated current: 5A (1A programmable)
- Measurements and control:
  - Power factor adjustment: 0.5ind...0.5cap.
  - Voltage measurement range: 50...720VAC
  - Current measurement range: 0.025...6A
- Capacitor overload current measurement range: 0.0...40mA

Other functions.
- Data memory, calendar-clock with backup reserve power for data logging
- For configuration via software, contact our Customer Service Office (Tel. +39 035 4282422; E-mail: service@LovatoElectric.com).

Certifications obtained: UL Listing for USA and Canada (cULus - File E93601), as Auxiliary Devices - Electronic power factor regulator, EAC, RCM (only for DCRG 8).

Compliant with standards: IEC/EN 61010-1, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL508,

Technical characteristics
- IEC degree of protection: IP65 on front; IP20 on terminals
- Temperature measurement range: -30...+55°C
- Capacitor overload current measurement range: 0...250%
- Type of voltage and current measurement: true root mean square (TRMS).
- Relay outputs:
  - 7 each with NO contact and the last as changeover
  - Rated current: 5A 250VAC AC1
  - Push-mounting housing (144x144mm / 5.67x5.67“)
  - IEC degree of protection: IP65 on front; IP20 on terminals.

Contactors for power factor correction
See section 2, page 2-14.

Software: Xpress, Xpress and Xpress1
See section 27.

EXP expansion modules
See section 28.

Automatic power factor controllers and thyristor modules

DCRG series

Maximum expandability DCRG 8 / DCRG 8IND

<table>
<thead>
<tr>
<th>Controller</th>
<th>Module with 2 relay outputs</th>
<th>Module with 3 relay outputs</th>
<th>Module with 4 static outputs</th>
<th>TOTAL STEPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steps</td>
<td>no. of modules</td>
<td>no. of modules</td>
<td>no. of modules</td>
<td>Relay</td>
</tr>
<tr>
<td>8</td>
<td>4 (2 steps)</td>
<td>max. 2 (3 steps)</td>
<td>max. 4 (4 steps)</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>2 (steps)</td>
<td></td>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

Snap-in fixing of 4 EXP… expansion modules
DCRG 8 / DCRG 8IND

Order code | Description | Qty per pkg | Wt [kg] |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DCRG 8</td>
<td>8 steps, expandable up to 24 steps, 100...440VAC</td>
<td>1</td>
<td>0.980</td>
</tr>
<tr>
<td>DCRG 8IND</td>
<td>8 steps, expandable up to 24 steps, 100...440VAC, for capacitive reactive power factor correction</td>
<td>1</td>
<td>0.980</td>
</tr>
</tbody>
</table>

Accessories.

NTC 01 | Remote temperature sensor, length 3m/3.3yd | 1 | 0.150 |

EXPANSION MODULES

Additional steps.

EXP 10 06 | 2 relay outputs to increase number of power factor correction steps |
EXP 10 07 | 3 relay outputs to increase number of power factor correction steps |

Inputs and outputs.

EXP 10 00 | 4 opto-isolated digital inputs |
EXP 10 01 | 4 opto-isolated static outputs to increase number of static steps |
EXP 10 02 | 2 digital inputs and 2 opto-isolated static outputs |
EXP 10 03 | 2 relay outputs 5A 250VAC |
EXP 10 04 | 2 PT100 opto-isolated analogue inputs, either 0/4…20mA, 0…10V or 0…±5V |
EXP 10 05 | 2 opto-isolated analogue inputs 04…20mA, 0…10V or 0…±5V |
EXP 10 08 | 2 opto-isolated digital inputs and 2 relay outputs 5A 250VAC |
EXP 10 16 | Capacitor protection with 2 inputs for temperature measurement with NTC sensors and 2 three-phase measurement inputs |

Communication ports.

EXP 10 10 | Opto-isolated USB interface |
EXP 10 11 | Opto-isolated RS232 interface |
EXP 10 12 | Opto-isolated RS485 interface |
EXP 10 13 | Opto-isolated ETHERNET interface with web server function |
EXP 10 14 | Opto-isolated Profibus-DP interface |
EXP 10 15 | GPRS/GSM modem, without antenna |

Other functions.

EXP 10 30 | Data memory, calendar-clock with backup reserve power for data logging |

For configuration via software, contact our Customer Service Office (Tel. +39 035 4282422; E-mail: service@LovatoElectric.com).
Automatic power factor controllers and thyristor modules

**Automatic power factor controllers**

When the correction system is divided into several panels, a DCRG 8 (Master) controller can control up to 8 DCRG 8 (Slave) controllers. The “Slave” controllers serve as remote outputs for the connection of capacitor banks that carry out the “Master” controller’s commands. The single controllers are responsible for monitoring the electrical panel and the capacitor banks in particular, while the \( \cos \varphi \) reading is centralised in the “Master” panel where the line arrives.

**General characteristics**

By using the Xpress software, the quick setup of the controllers can be carried out via PC, avoiding parameter programming errors. The parameter programming of a DCRL... or DCRG 8 controller can also be saved on PC and quickly loaded into another device requiring the same programming.

It permits the following operations:

- System operation monitoring:
  - Graphical and numerical display of measurements
  - Controller status
- Capacitor efficiency control
- Current kvar measurement for each step
- Counters for the number of connections for each step
- Total hour counter for connection time for each individual step
- Access all setup parameters
- Saving / loading parameters
- Highlighting of changed values
- Resetting to default values.

The Synergy software permits remote control and supervision of the DCRL... and DCRG 8 controllers. See section 27 for details. This software has structures and applications based on MS SQL relational databases, and the data can be consulted using the most popular browsers. It is a highly versatile system, simultaneously accessible to a large number of users/workstations via intranets, VPN or Internet.

**APP for smartphone and tablet**

The Syn application allows the user to program the controller, view alarms, send commands, read measurements, download statistical data and events and send retrieved data by e-mail. The connection is made by Wi-Fi with a smartphone or tablet using the CX 02 device. It is iOS and Android compatible. For details, consult section 27 or our Customer Service office; see contact details on inside front cover.

---

**Software and APP**

*Xpress* configuration and remote control software

*Synergy* Supervision and energy management software

*Sam* APP
Accessories

Communication devices

Accessories for DCRL and DCRG

<table>
<thead>
<tr>
<th>Order code</th>
<th>Description</th>
<th>Qty per pkg</th>
<th>Wt [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 C2</td>
<td>Connection cable PC→DCRL/DCRG+EXP10 11 length 1.8m/2yd</td>
<td>1</td>
<td>0.090</td>
</tr>
<tr>
<td>S1 C4</td>
<td>Connection cable PC→converter 4 PX1, length 1.8m/2yd</td>
<td>1</td>
<td>0.147</td>
</tr>
<tr>
<td>S1 C5</td>
<td>Connection cable DCRG+EXP1011→Modem length 1.8m/2yd</td>
<td>1</td>
<td>0.111</td>
</tr>
<tr>
<td>S1 C6</td>
<td>Connection cable DCRG+EXP10 11+converter 4 PX1, length 1.8m/2yd</td>
<td>1</td>
<td>0.102</td>
</tr>
<tr>
<td>S1 C9</td>
<td>Connection cable PC→Modem, length 1.8m/2yd</td>
<td>1</td>
<td>0.137</td>
</tr>
<tr>
<td>EXC CON 01</td>
<td>RS485/ Ethernet converter, 12...48VDC, including DIN rail fixing kit</td>
<td>1</td>
<td>0.400</td>
</tr>
<tr>
<td>4 PX1</td>
<td>RS232/RS485 converter drive, galvanically isolated, 220...240VAC (110...120VAC on request)</td>
<td>1</td>
<td>0.600</td>
</tr>
<tr>
<td>EXC M3G 01</td>
<td>RS485 Gateway/3G modem, 9.5…27VAC/9.5…35VDC, including antenna and programming cable</td>
<td>1</td>
<td>0.340</td>
</tr>
</tbody>
</table>

CX 01
USB/optical dongle PC→DCRL/DCRG+, for programming, data download, diagnostics and updating firmware.

CX 02
Wi-Fi connection device for PC→DCRL/DCRG, for downloading data, programming, diagnostics and cloning.

CX 03
GSM penta-band antenna (850/900/1800/1900/2100MHz), for EXP10 15 expansion.

General characteristics

Communication and connection devices to connect the DCRL and DCRG power factor controllers to personal computers, smartphones and tablets.

CX 01
This USB dongle, complete with cable, permits connection of the power factor controller with a PC without needing to disconnect the electrical panel supply, in order to:
- Program parameters
- Copy the settings to external units
- Download data and events
- Carry out diagnostics
- Update the firmware.

The PC identifies the connection as a standard USB.

CX 02
Via Wi-Fi connection, the power factor controllers can be viewed from PCs, smartphones and tablets without having to connect cables, in order to:
- Program parameters
- Download data and events
- Carry out diagnosis and cloning of the device.

CX 03
Compatible with major worldwide mobile phone networks, thanks to the use of 850/900/1800/1900/2100MHz frequencies.

IEC degree of protection: IP67.
Fixing hole Ø10mm (0.40”).
Cable length 2.5m/2.73yd.

For dimensions, wiring diagrams and technical characteristics, consult the manuals available online in the Download section of the following website: www.LovatoElectric.com
Automatic power factor controllers and thyristor modules

Thyristor modules

**General characteristics**
- Suitable for dynamic (fast) power factor correction
- Connection at current flow zero-crossing
- Capacitor over-current protection on connection
- Over-temperature protection via built-in sensor.

**Operational characteristics**
- 30kvar, 50kvar and 100kvar steps
- Rated operating voltage:
  - 400...480VAC for DCTM3 400 030
  - 400...525VAC for DCTM3 400 050 and DCTM3 400 100
- Auxiliary fan supply voltage: 230VAC (only for DCTM3 400 100)
- Rated frequency: 50/60Hz
- Control circuit: 8...30VDC
- Controlled voltages: 2
- Forced ventilation: DCTM3 400 100 only
- Ambient conditions:
  - Operating temperature: -10...+45°C
  - Use at higher temperatures with power derating (see page 24-19)
  - IEC degree of protection: IP10.

**Indications**
- Auxiliary power on
- Over-temperature alarm
- Trigger LED.

**Compliance:**
Compliant with standards: EN 50178.

---

### Wiring diagrams

#### page 24-16

### Technical characteristics

#### page 24-19

---

### Automatic power factor controllers and thyristor modules

#### Thyristor modules

**General characteristics**
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- Trigger LED.

**Compliance:**
Compliant with standards: EN 50178.

---

### Automatic power factor controllers and thyristor modules

#### Thyristor modules

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- Trigger LED.

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### Automatic power factor controllers and thyristor modules

#### Thyristor modules

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- Rated operating voltage:
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  - 400...525VAC for DCTM3 400 050 and DCTM3 400 100
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- Rated frequency: 50/60Hz
- Control circuit: 8...30VDC
- Controlled voltages: 2
- Forced ventilation: DCTM3 400 100 only
- Ambient conditions:
  - Operating temperature: -10...+45°C
  - Use at higher temperatures with power derating (see page 24-19)
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- Trigger LED.

**Compliance:**
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---

### Automatic power factor controllers and thyristor modules

#### Thyristor modules

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- Connection at current flow zero-crossing
- Capacitor over-current protection on connection
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- 30kvar, 50kvar and 100kvar steps
- Rated operating voltage:
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- Rated frequency: 50/60Hz
- Control circuit: 8...30VDC
- Controlled voltages: 2
- Forced ventilation: DCTM3 400 100 only
- Ambient conditions:
  - Operating temperature: -10...+45°C
  - Use at higher temperatures with power derating (see page 24-19)
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**Indications**
- Auxiliary power on
- Over-temperature alarm
- Trigger LED.

**Compliance:**
Compliant with standards: EN 50178.
Automatic power factor controllers and thyristor modules

**Dimensions [mm (in)]**

**REACTIVE CURRENT CONTROL RELAY**

**DCRM 2**

**AUTOMATIC POWER FACTOR CONTROLLERS**

**DCRL 3 - DCRL 5**

**DCRL 8 - DCRG 8...**

**THYRISTOR MODULES**

**DCTM3 400 030 - DCTM3 400 050**

**DCTM3 400 100**
AUTOMATIC POWER FACTOR CONTROLLERS
DCRL... with BFK... type contactors

IMPORTANT
a. For three-phase connection, the voltage measurement input must be connected between two phases; the line CT must be connected on the remaining phase.
b. The polarity of the current measurement input is irrelevant.

CAUTION! Always disconnect the power supply when operating on the terminals.
AUTOMATIC POWER FACTOR CONTROLLERS

DCRG 8 with BF...K type contactors

IMPORTANT
a. For three-phase connection, the voltage measurement input must be connected between two phases; the line CT must be connected on the remaining phase.
b. The polarity of the current measurement input is irrelevant.

CAUTION! Always disconnect the power supply when operating on the terminals.

DCRG 8IND

THYRISTOR MODULES

DCTM3 400...
### Technical characteristics

**DCRM series reactive current control relay**

<table>
<thead>
<tr>
<th>Type</th>
<th>DCRM 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AUXILIARY SUPPLY CIRCUIT</strong></td>
<td></td>
</tr>
<tr>
<td>Rated auxiliary voltage (Us)</td>
<td>380...415VAC standard 220...240VAC and 440...480VAC on request</td>
</tr>
<tr>
<td>Operating range</td>
<td>0.85...1.1 Us</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>50/60Hz ±5%</td>
</tr>
<tr>
<td>Maximum power consumption/dissipation</td>
<td>4.4VA / 2.4W</td>
</tr>
<tr>
<td>Micro-breaking immunity</td>
<td>≤17ms</td>
</tr>
<tr>
<td>No-voltage release</td>
<td>≥8ms</td>
</tr>
<tr>
<td><strong>VOLTAGE INPUT</strong></td>
<td></td>
</tr>
<tr>
<td>Maximum rated voltage Ue</td>
<td>480VAC</td>
</tr>
<tr>
<td>Measuring range</td>
<td>80...528VAC</td>
</tr>
<tr>
<td>Frequency range</td>
<td>50 or 60Hz ±1% self configurable</td>
</tr>
<tr>
<td>Measurement input impedance</td>
<td>&gt;1MΩ</td>
</tr>
<tr>
<td>Type of connection</td>
<td>L1-L2 or -N</td>
</tr>
<tr>
<td><strong>CURRENT INPUT</strong></td>
<td></td>
</tr>
<tr>
<td>Type of connection</td>
<td>By current transformer (CT)</td>
</tr>
<tr>
<td>Rated current Ie</td>
<td>5A AC</td>
</tr>
<tr>
<td>Measurement range</td>
<td>0.1...5A</td>
</tr>
<tr>
<td>Type of input</td>
<td>Shunt supplied by external current transformer (low voltage), Max. 5A</td>
</tr>
<tr>
<td>Measurement method</td>
<td>True RMS value</td>
</tr>
<tr>
<td>Overload capacity</td>
<td>+20% Ie</td>
</tr>
<tr>
<td>Overload peak</td>
<td>10In for 1s</td>
</tr>
<tr>
<td>Dynamic limit</td>
<td>160A for 10ms</td>
</tr>
<tr>
<td>Burden</td>
<td>≤0.6W</td>
</tr>
<tr>
<td><strong>ADJUSTMENTS</strong></td>
<td></td>
</tr>
<tr>
<td>C/K step 1 and 2</td>
<td>OFF / 0.15...2</td>
</tr>
<tr>
<td>Connection / disconnection</td>
<td>1...60s</td>
</tr>
<tr>
<td>System configuration</td>
<td>3-phase - 1-phase</td>
</tr>
<tr>
<td><strong>RELAY OUTPUTS</strong></td>
<td></td>
</tr>
<tr>
<td>Number of relays</td>
<td>2 (each with 1 changeover)</td>
</tr>
<tr>
<td>Rated operational voltage</td>
<td>250VAC</td>
</tr>
<tr>
<td>Maximum switching voltage</td>
<td>400VAC</td>
</tr>
<tr>
<td>IEC conventional free air thermal current (Ith)</td>
<td>8A</td>
</tr>
<tr>
<td>IEC/EN 60947-5-1 and UL/CSA designation</td>
<td>8300</td>
</tr>
<tr>
<td>Electrical life with rated load</td>
<td>10⁶ cycles</td>
</tr>
<tr>
<td>Mechanical life</td>
<td>30x10⁶ cycles</td>
</tr>
<tr>
<td><strong>INSULATION (input-output)</strong></td>
<td></td>
</tr>
<tr>
<td>Rated insulation voltage</td>
<td>480VAC</td>
</tr>
<tr>
<td><strong>CONNECTIONS</strong></td>
<td></td>
</tr>
<tr>
<td>Maximum tightening torque</td>
<td>0.8Nm (7 lbin; 7-9 lbin according to UL/CSA)</td>
</tr>
<tr>
<td>Conductor section min...max.</td>
<td>0.2...4.0mm² (24...12 AWG, 18...12 AWG according to UL/CSA)</td>
</tr>
<tr>
<td><strong>AMBIENT CONDITIONS</strong></td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-20...+60°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-30...+80°C</td>
</tr>
<tr>
<td><strong>HOUSING</strong></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Self-extinguishing polyamide</td>
</tr>
</tbody>
</table>

UL/CSA certification obtained with 415VAC maximum.
### Automatic power factor controllers and thyristor modules

#### Technical characteristics

**DCRL... and DCRG series automatic power factor controllers**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DCRL 3</th>
<th>DCRL 5</th>
<th>DCRL 6</th>
<th>DCRG 6 / DCRG 6IND</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AUXILIARY SUPPLY CIRCUIT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated supply voltage (Us)</td>
<td>100...440VAC</td>
<td>100...415VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating range</td>
<td>90...484VAC</td>
<td>90...456VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated frequency</td>
<td>50Hz; 60Hz</td>
<td>50Hz; 60Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum power consumption</td>
<td>9.5VA</td>
<td>7VA</td>
<td>27VA</td>
<td></td>
</tr>
<tr>
<td>Maximum power dissipation (excluding power dissipation from the output contacts)</td>
<td>3.5W</td>
<td>2.5W</td>
<td>105W</td>
<td></td>
</tr>
<tr>
<td><strong>VOLTAGE CIRCUIT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control voltage</td>
<td>100...600VAC L-L; 100...346VAC L-N</td>
<td>100...600VAC L-L; 100...346VAC L-N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating range</td>
<td>50...720VAC L-L; 50...415VAC L-N</td>
<td>50...720VAC L-L; 50...415VAC L-N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency range</td>
<td>45...65Hz</td>
<td>46...65Hz; 360...440Hz</td>
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<td></td>
</tr>
<tr>
<td>Immunity time for microbreaking</td>
<td>&lt;25ms</td>
<td>35ms (110VAC) - 80ms (220...415VAC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No-voltage relay release</td>
<td>➝8ms</td>
<td>➝8ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CURRENT CIRCUIT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated current Ie</td>
<td>Programmable 5A or 1A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating range</td>
<td>0.025...6A for 5A full scale; 0.025...1.2A for 1A full scale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant overload</td>
<td>1.2Ie</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overload peak</td>
<td>50A for 1 second</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>0.6VA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEASUREMENT DATA</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Type of voltage and current measurement</td>
<td>True RMS value</td>
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<tr>
<td>Power factor adjustment</td>
<td>0.5ind...0.5cap.</td>
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<tr>
<td>Type of temperature sensor sensor type</td>
<td>Internal</td>
<td>Internal</td>
<td>+ PT100 with EXP10 04 + NTC with EXP10 16</td>
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<tr>
<td>Temperature measurement range</td>
<td>0...+212°C</td>
<td>0...+212°C</td>
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<tr>
<td><strong>RELAY OUTPUTS</strong></td>
<td></td>
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<tr>
<td>Number of outputs</td>
<td>3/5/8 (up to 14 with EXP10 06 - EXP10 07)</td>
<td>8 (up to 18 with EXP10 06 - EXP10 07)</td>
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<tr>
<td>Contact arrangement</td>
<td>2/4/7 NO contacts + 1 changeover</td>
<td>7 NO contacts + 1 changeover</td>
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<tr>
<td>IEC rated current</td>
<td>5A 250V AC1</td>
<td>5A 250V AC1</td>
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<tr>
<td>Maximum current at common contact terminal</td>
<td>10A</td>
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<tr>
<td>Maximum switching voltage</td>
<td>415VAC</td>
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<tr>
<td>IEC/EN 60947-5-1 and UL/CSA designation</td>
<td>B300</td>
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<tr>
<td>Electrical life with rated load</td>
<td>10³ cycles</td>
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<tr>
<td>Mechanical life</td>
<td>30x10⁶ cycles</td>
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<td><strong>STATIC OUTPUTS</strong></td>
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<tr>
<td>Number of outputs</td>
<td>—</td>
<td>4 or 8 with EXP10 01</td>
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<tr>
<td><strong>INSULATION</strong></td>
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<tr>
<td>Rated insulation voltage Ui</td>
<td>600VAC</td>
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<tr>
<td>Rated impulse withstand voltage Uimp</td>
<td>9.5kV</td>
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<tr>
<td>Power frequency withstand voltage</td>
<td>5.2kV</td>
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<td><strong>CONNECTIONS</strong></td>
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<td>Type of terminal</td>
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<tr>
<td>Condenser section min...max</td>
<td>0.2...2.5mm² (24...12 AWG; 18...12 AWG according to UL)</td>
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<tr>
<td><strong>AMBIENT CONDITIONS</strong></td>
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<tr>
<td>Operating temperature</td>
<td>-20...+60°C</td>
<td>-20...+70°C</td>
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<tr>
<td>Storage temperature</td>
<td>-30...+80°C</td>
<td>-30...+80°C</td>
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<tr>
<td><strong>HOUSING</strong></td>
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<tr>
<td>Version</td>
<td>Rush-mount 96x96mm (3.78x3.78&quot;)</td>
<td>Rush-mount 144x144mm (5.67x5.67&quot;)</td>
<td>Rush-mount 144x144mm (5.67x5.67&quot;)</td>
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<td>Material</td>
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<tr>
<td>IEC degree of protection</td>
<td>IP54</td>
<td>IP65</td>
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## Technical characteristics

### Thyristor modules DCTM3...

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<tr>
<th>TYPE</th>
<th>DCTM3 400 30</th>
<th>DCTM3 400 50</th>
<th>DCTM3 400 100</th>
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<tbody>
<tr>
<td>VOLTAGE CIRCUIT</td>
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<tr>
<td>Rated auxiliary voltage (Us)</td>
<td>400...480VAC ±10%</td>
<td>400...525VAC ±10%</td>
<td>400...525VAC ±10%</td>
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<tr>
<td>Rated current Ie</td>
<td>43A</td>
<td>72A</td>
<td>144A</td>
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<td>Step power at 400 VAC</td>
<td>30kvar</td>
<td>50kvar</td>
<td>100kvar</td>
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<tr>
<td>Maximum inverse voltage</td>
<td>2200VAC</td>
<td>2800VAC</td>
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<tr>
<td>Number of controlled phases</td>
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<tr>
<td>Auxiliary voltage</td>
<td>230VAC ±10%</td>
<td>230VAC ±10%</td>
<td>230VAC ±10%</td>
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<tr>
<td>Fan supply</td>
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<td>—</td>
<td>230VAC ±10%</td>
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<tr>
<td>Maximum power consumption</td>
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<td>9VA</td>
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<tr>
<td>Control circuit</td>
<td>8...30VDC</td>
<td>8...30VDC</td>
<td>8...30VDC</td>
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<td>(2mA at 12VDC)</td>
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<td>Over-temperature protection</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Cooling system</td>
<td>Natural</td>
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<td>Forced ventilation</td>
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<td>AMBIENT CONDITIONS</td>
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<tr>
<td>Operating temperature</td>
<td>-10...+45°C (Ie&lt;50A)</td>
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<td>-10...+45°C (Ie&lt;190A)</td>
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<td>-10...+50°C (Ie&lt;48A)</td>
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<td>-10...+50°C (Ie&lt;180A)</td>
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<td>-10...+55°C (Ie&lt;46A)</td>
<td>-10...+55°C (Ie&lt;85A)</td>
<td>-10...+55°C (Ie&lt;170A)</td>
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<tr>
<td>Storage temperature</td>
<td>-30...+80°C</td>
<td>-30...+80°C</td>
<td>-30...+80°C</td>
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<tr>
<td>Altitude</td>
<td>1000 m with no derating; higher up derating 10%/1000m up to 4000m</td>
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<tr>
<td>HOUSING</td>
<td></td>
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<tr>
<td>Material</td>
<td>Metal</td>
<td>Metal</td>
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