



Page 24-6

**DCRM SERIES**

- 2 steps in modular housing
- Settings by front adjustment potentiometers
- 3 LED indications.



Page 24-7

**DCRL SERIES (EXPANDABLE)**

- 3 or 5 steps in 96x96mm housing expandable up to 7 steps maximum
- Expandable with EXP series modules, such as outputs, step increment, communication port, etc.
- Backlight graphic display, 128x80 pixels
- Optic interface port for programming, data download and diagnostics
- Independent voltage measurement input
- Capacitor overload protection
- Internal panel temperature sensor
- Voltage and current harmonic-content measurement up to 15° order
- Configurable alarms
- Suitable for medium-voltage installations
- Compact and easy installation.



Page 24-8

**DCRG SERIES (EXPANDABLE)**

- 8, 10, 12, 14 or 16 steps in 144x144mm housing
- Expandable with EXP series modules such as inputs and outputs, step increment, capacitor protection, communication port, etc.
- Backlight graphic display, 128x80 pixels
- Optic interface port for programming, data download and diagnostics
- Independent voltage measurement input
- Capacitor overload protection
- Internal and external panel temperature sensor
- Voltage and current harmonic-content measurement up to 31° order
- Event logging
- Configurable alarms
- Suitable for medium-voltage installations
- Suitable for dynamic power factor correction.



Page 24-11

**THYRISTOR MODULES**

- 30, 50, 100kvar step units
- Suitable for dynamic power factor correction
- Current flow zero-crossing controlled connection-disconnection
- Over-temperature protection
- Over-current protection at capacitor switching.



- Microprocessor supervision and control
- Accurate TRMS measurement circuit
- Automatic intelligent adjustment system
- Versions with 3, 5, 7, 8, 12, 14 and 16 steps
- Versions with static outputs
- Use in co-generation and medium-voltage systems
- USB, serial, Ethernet communication interfaces
- ASCII and Modbus-RTU communication protocols
- Thyristor modules for dynamic correction.

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| <b>Reactive current controller</b>        |             |
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## Automatic power factor controllers



**DCRL**



**DCRG**

|  |  |  |
|--|--|--|
| Number of steps  | DCRL 3: 3 (5 with EXP10 06)<br>DCRL 5: 5 (7 with EXP10 06)   | 8<br>(10, 12, 14, 16 with EXP...)  |
| <b>ON FRONT / HOUSING</b>  |  |  |
| Display  | Backlight icon LCD   | Backlight graphic 128x80 pixel LCD   |
| Languages  | 6<br>Scrolling text only of alarm codes<br>in Italian, English, Spanish, French,<br>German, Portuguese | 10<br>Italian, English, Spanish, French,<br>German, Czech, Polish, Russian,<br>Portuguese and 1 customisable |
| Dimensions   | 96x96mm / 3.8x3.8"   | 144x44mm / 5.7x5.7"  |
| IEC degree of protection   | IP54   | IP54   |
| Expandable with EXP... module                                    | ●  | ●  |
| <b>CONTROL/FUNCTIONS</b>   |  |  |
| Automatic recognition of current flow direction                  | ●  | ●  |
| 4-quadrant operation   | ●  | ●  |
| Master-slave architecture  |  | ●  |
| Independent auxiliary supply input                               | ●  | ●  |
| Three-phase voltage control                                      |  | ●  |
| Current input  | 1 (by CT, /5A or 1A)   | 3 (by CTs, 5A or 1A)   |
| Dynamic (FAST) power factor correction usage                     |  | ● (with EXP10 01 8 steps)  |
| Medium-voltage usage   | ●  | ●  |
| Independent power factor correction per phase                    |  | ●  |
| Phase-neutral connection in three-phase systems                  | ●  | ●  |
| Programmable input as function or<br>external temperature sensor |  | ● (with EXP10 04 module)   |
| USB communication interface                                      | ● (with EXP10 10 module)   | ● (with EXP10 10 module)   |
| RS232 communication interface                                    | ● (with EXP10 11 module)   | ● (with EXP10 11 module)   |
| Opto-isolated RS485 communication interface                      | ● (with EXP10 12 module)   | ● (with EXP10 12 module)   |
| Ethernet communication interface with web server function        |  | ● (with EXP10 13 module)   |
| Optical USB communication port on front                          | ● (with CX 01 dongle)  | ● (with CX 01 dongle)  |
| Optical Wi-Fi communication port on front                        | ● (with CX 02 dongle)  | ● (with CX 02 dongle)  |
| Fast setting of current transformer                              | ●  | ●  |
| Setup software with automatic panel test available               | ●  | ●  |
| Remote control software available                                | ●  | ●  |
| Calendar-clock (RTC) with backup reserve energy                  |  | ●  |
| Event logging: Alarms, setup changes, etc.                       |  | ●  |
| <b>MEASUREMENTS</b>  |  |  |
| Rated measurement voltage  | 600VAC max   | 600VAC max   |
| Measurement voltage range  | 50-720VAC  | 50-720VAC  |
| Instantaneous $\cos\varphi$ (power factor displacement)          | ●  | ●  |
| Instantaneous and average weekly power factor values             | ●  | ●  |
| Voltage and current  | ●  | ●  |
| Reactive power to reach set-point and total values               | ●  | ●  |
| Capacitor overload   | ●  | ●  |
| Electric panel temperature                                       | ●  | ●  |
| Maximum voltage and current value                                | ●  | ●  |
| Maximum capacitor overload value                                 | ●  | ●  |
| Maximum panel temperature value                                  | ●  | ●  |
| Maximum capacitor temperature value                              |  | ● (with EXP10 04 module)   |
| Active and apparent power value                                  |  | ●  |
| Current and voltage harmonic analysis                            | ● up to 15° order  | ● up to 31° order  |
| Var-measured value per step                                      | ●  | ●  |
| Number of switching per step                                     | ●  | ●  |

## Automatic power factor controllers

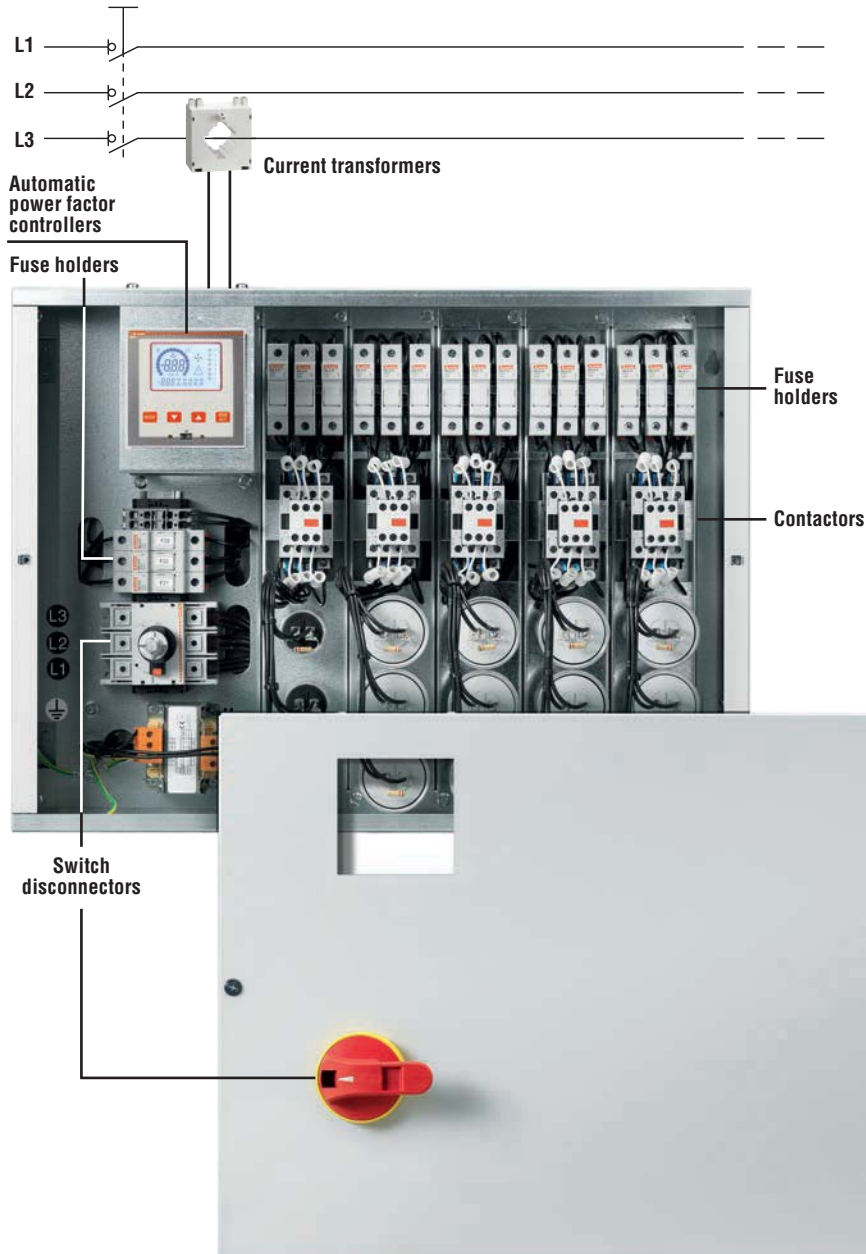


DCRL



DCRG

| PROTECTION   | DCRL | DCRG |
|--|------|------|
| Voltage too high and too low   | ●    | ●    |
| Current too high and too low   | ●    | ●    |
| Over compensation (all capacitors disconnected and $\cos\phi$ value higher than set-point) | ●    | ●    |
| Under compensation (all capacitors connected and $\cos\phi$ value lower than set-point)    | ●    | ●    |
| Capacitor overload   | ●    | ●    |
| Capacitor overload on all 3 phases   |      | ●    |
| Over temperature   | ●    | ●    |
| Mains micro-breakings  | ●    | ●    |
| Capacitor bank failure   | ●    | ●    |
| Over maximum harmonic distortion level limit   | ●    | ●    |
| Programmable alarm property (enable, trip delay, relay energising, etc.)                   | ●    | ●    |

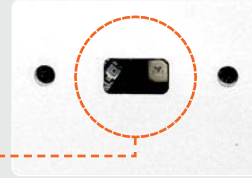


# THE SOLUTION FOR ALL APPLICATIONS!

- **BACKLIGHT GRAPHIC DISPLAY**  
128x80 pixels with excellent legibility, with adjustable brightness and contrast.

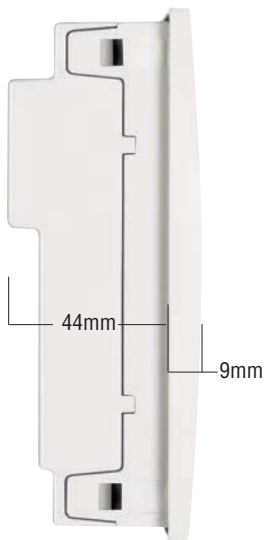


- **OPTICAL COMMUNICATION PORT**  
The optical port on the front using a standard USB or Wi-Fi point, permits to communicate with a PC, smartphone and tablet, to carry out programming, diagnostics, and data download without removing power to the electric panel.

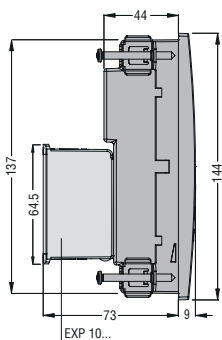


- **CUSTOMISING OPTION**  
There is a customising slot available on the panel front to show controller brand name, logo, trademark, part number, brief indication or wording, etc.

## ● COMPACT SIZE



Trim 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.

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

## ● EXPANDABILITY



Basic controller functionality can be easily extended using the EXP series expansion modules:

- Relay outputs to increase the number of steps
- Opto-isolated static outputs also for synamic correction
- Capacitor protection
- Digital and analog inputs and 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.



- SUITABLE FOR POWER FACTOR CORRECTION USING CONTACTORS OR THYRISTOR MODULES
- SMS SENDING FOR ALARM CONDITIONS
- DATA SENDING BY EMAIL OR FTP SERVER
- WEB SERVER FOR DATA READING
- STREAMLINE DESIGN  
The DCRG controller has an ergonomic design and, at the same time, particular care has been given to details.

### ● 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 obtain a system with a total of 32 steps.



Master



Slave 1



Slave 2



Slave 8

### ● WEB SERVER FUNCTION



By installing the **Ethernet** expansion module EXP10 13, the main measured values of the controller can be viewed by most common web-client compatibles, on the market, using Java platform and with no need to install any additional PC software.

### ● CAPACITOR PROTECTION

By adding the apposite 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 along with detecting any phase malfunction.

### ● THREE CURRENT INPUTS

- **Independent power factor correction** of each step can be done.
- Analysis of all electrical parameters of the installation by a multimeter.

### ● WIDE RANGE OF RATED VOLTAGE MEASUREMENTS

The wide measurement range between 100 to 690VAC allows using the controller in most types of applications.

### ● GSM/GPRS MODEM

By fitting the EXP10 15 expansion module, the controller is automatically equipped and configures a GSM/GPRS modem. This simplifies installation and wiring. Once a data-enabled SIM card is inserted, alarm or event SMS, **email messages** and latest logged data can be transmitted by the controller to FTP servers.

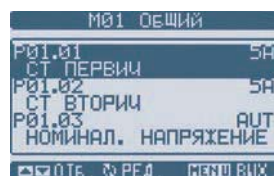
### ● 5A AND 1A BOTH ON THE SAME CONTROLLER

By configuring an apposite parameter, the controller can be enabled for use with either a 5A or 1A secondary current transformer.

### ● GRAPHS AND TEXT IN 10 LANGUAGES



Viewing of waveforms, text, trend and bar graphs in 10 languages: Italian, English, Spanish, French, German, Czech, Polish, Russian, Portuguese and one customisable.



### ● SUITABLE FOR MEDIUM-VOLTAGE SYSTEMS

The controllers can be installed in medium-voltage systems thanks to its configuration for voltage transformer ratio, thereby obtaining measurements with regards to the transformer primary value both for the correction adjustment and the display readouts.

### ● SUITABLE FOR DYNAMIC (FAST) POWER FACTOR CORRECTION

With the EXP10 01 static output expansion module installed, the controller can be used in dynamic power factor correction systems where the reactive load quickly varies over time. Also taking advantage of the built-in controller relay outputs, a mixed system of traditional relay and dynamic type of correction steps can be obtained.

### DCRM series



DCRM 2

| Order code                                  | Steps | Auxiliary supply voltage | Qty per pkg | Wt    |
|---|-------|--------------------------|-------------|-------|
|   | n°    | [V]                      | n°          | [kg]  |
| Single and three-phase low-voltage systems. |       |                          |             |       |
| <b>DCRM 2</b>                               | 2     | 380-415VAC               | 1           | 0.166 |

#### General characteristics

DCRM2 permits to control the reactive current of a plant, eliminating it from the total current drawn from the mains and correcting the cos-phi of the load to the best possible value.

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

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

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

#### Operational characteristics

- Auxiliary supply voltage: 380-415VAC standard stock; 220-240VAC and 440-480VAC on request
- Rated frequency: 50/60Hz
- Voltage measurement input range: 80-528VAC 50/60Hz  $\pm 1\%$  self configurable
- Current input:
  - By CT /5A
  - Measurement range: 0.1-6A
  - TRMS measurements (True Root Mean Square)
  - Automatic identification of CT polarity connection (direct-reverse)
- Relay outputs
  - 2 outputs, each with 1 changeover contact (SPDT) rated 8A-250VAC (in AC1 IEC) / B300
  - Independent enabling of each
- Modular DIN 43880 housing, 3 module
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

#### ADJUSTMENTS

|                        |  |
|------------------------|--|
| "C/K Step 1"           | C/K ratio threshold for step 1<br>OFF/0.15-2               |
| "C/K Step 2"           | C/K ratio threshold for step 2<br>OFF/0.15-2               |
| "Connection delay"     | Step connection delay 1-60s                                |
| "Disconnection delay"  | Step disconnection delay<br>1-60s                          |
| "System configuration" | Wiring selection for single or three-phase system 1PH-3PH. |

#### INDICATIONS

- 1 green LED for power on and inhibition time
- 2 red LEDs for step 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). Compliant with standards: IEC/EN 60255-5, IEC/EN 61010-1, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL508, CSA C22.2 n°14.

#### Contactors for power factor correction

See Section 2, page 14.

### DCRL series



DCRL 3 - DCRL 5



EXP80 00

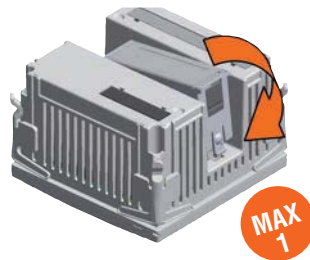


EXP 10...

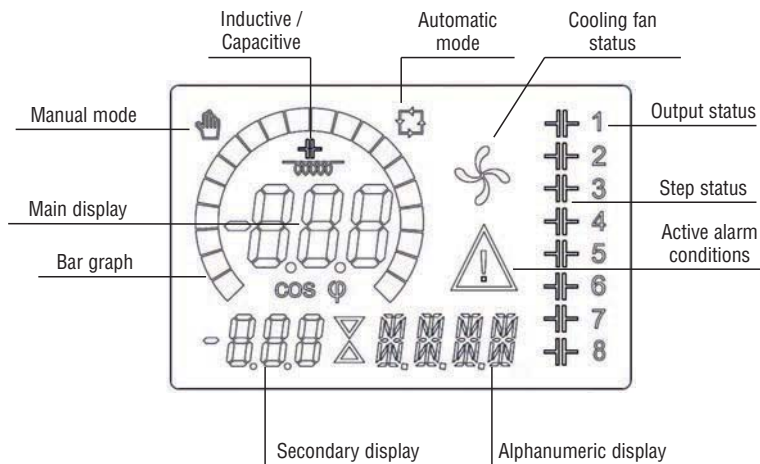
| Order code   | Steps                                       | Flush-mount housing size | Qty per pkg | Wt    |
|--|---|--------------------------|-------------|-------|
|  | n°  | [mm/in]                  | n°          | [kg]  |
| Single and three-phase low and medium-voltage systems. |   |                          |             |       |
| <b>DCRL 3</b>  | 3   | 96x96/3.8x3.8            | 1           | 0.300 |
| <b>DCRL 5</b>  | 5   | 96x96/3.8x3.8            | 1           | 0.350 |
| Accessory.   |   |                          |             |       |
| <b>EXP80 00</b>  | Plastic insert for fixing customised labels |                          | 10          | 0.050 |

| Order code   | Description   |
|--|---|
| <b>EXPANSION MODULES</b>   |   |
| Snap in fixing of only one module on DCRL... rear. Inputs and outputs. |   |
| <b>EXP10 06</b>  | 2 relay outputs to increase number of capacitor steps |
| <b>EXP10 03</b>  | 2 relay outputs rated 5A 250VAC                       |
| <b>Communication ports.</b>  |   |
| <b>EXP10 10</b>  | Opto-isolated USB interface                           |
| <b>EXP10 11</b>  | Opto-isolated RS232 interface                         |
| <b>EXP10 12</b>  | Opto-isolated RS485 interface                         |

EXP... expansion module fixing  
DCRL 3 - DCRL 5



### Backlight icon LCD screen



### General characteristics

DCRL series has been developed with advanced functionality and made with a dedicated ultra compact housing. It combines modern front design with mounting and expandability ease. The LCD screen provides a clear and intuitive user interface.

Main features include:

- Backlight icon LCD with excellent information viewing
- Alarm codes with scrolling tests, 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
- Independent voltage measurement input which can be used in medium-voltage lines with VTs
- Extreme reduction of the number of switching operations
- Balanced use of steps with same power rating
- Reactive power measurement per step installed
- Capacitor over-current protection
- Panel over-temperature protection by internal sensor
- Accurate no-voltage release protection
- Extensive choice of available measurements, including voltage and current THD with single harmonic analysis up to 15° order.
- Wide voltage measurement range
- High accuracy measurement (TRMS)
- Front optical USB (with CX01 dongle) or Wi-Fi (with CX02 dongle) communication port for PC, smartphone and tablet connection
- DCRL SW setup software
- Compatible with **Synergy** supervision software
- Front label customising facility.

### Operational characteristics

- Voltage circuit:
  - Auxiliary supply: 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
- Measurement and control
  - Power factor adjustment: 0.5 ind to 0.5 cap
  - Voltage measurement range: 50-720VAC L-L; 50-415VAC L-N
  - Current measurement range: 0.025-1.2A for 1A full scale; 0.025-6A for 5A full scale
  - Type of voltage and current measurement: TRMS
- Relay outputs (steps)
  - DCRL3: 3 outputs
  - DCRL5: 5 outputs
  - Output arrangement: Normally Open (NO / SPST) contact; except the last being a changeover (SPDT) use)
  - Rated capacity: 5A 250VAC (UL/CSA B300 general use)
- Flush-mount housing: 96x96mm/3.8x3.8"
- IEC degree of protection: IP54 on front; IP20 at terminals.

### Certifications and compliance:

Certifications obtained: EAC; UL Listing for USA and Canada (cULus - File E93601), as Auxiliary Devices - Power factor controllers.  
Compliant with standards: IEC/EN 61010-1, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL508, CSA C22.2 n°14.

### Contactors for power factor correction

See Section 2, page 14.

### Synergy supervision software

See Section 27.

### EXP series expansion modules

See Section 28, page 2.



## Serie DCRG



DCRG 8



EXP 10...



| Order code | Steps | Flush-mount housing size | Qty per pkg | Wt   |
|------------|-------|--------------------------|-------------|------|
|            | n°    | [mm(in)]                 | n°          | [kg] |

Single and three-phase low and medium-voltage systems.

|               |   |                   |   |       |
|---------------|---|-------------------|---|-------|
| <b>DCRG 8</b> | 8 | 144x144 (5.7x5.7) | 1 | 0.980 |
|---------------|---|-------------------|---|-------|

Accessories.

|               |  |   |       |
|---------------|--|---|-------|
| <b>NTC 01</b> | External/remote temperature sensor, with 3m/3.3yd long cable | 1 | 0.150 |
|---------------|--|---|-------|

| Order code | Description |
|------------|-------------|
|------------|-------------|

### EXPANSION MODULES

Snap in fixing of 4 modules on DCRG 8 rear. Inputs and outputs.

|                 |   |
|-----------------|---|
| <b>EXP10 06</b> | 2 relay outputs to increase number of capacitor steps   |
| <b>EXP10 00</b> | 4 opto-isolated digital inputs  |
| <b>EXP10 01</b> | 4 opto-isolated static outputs to increase number of static steps   |
| <b>EXP10 02</b> | 2 digital inputs and 2 static outputs, opto-isolated  |
| <b>EXP10 03</b> | 2 relay outputs rated 5A 250VAC   |
| <b>EXP10 04</b> | 2 opto-isolated analog inputs PT100 or 0/4-20mA or 0-10V or 0...±5mA  |
| <b>EXP10 05</b> | 2 opto-isolated analog inputs 0/4-20mA or 0-10V or 0...±5mA   |
| <b>EXP10 08</b> | 2 opto-isolated digital inputs and 2 relay outputs rated 5A 250VAC  |
| <b>EXP10 16</b> | Capacitor bank protection with 2 temperature measurement inputs for NTC 01 sensors and 2 three phase current measurement inputs |

Communication ports.

|                 |   |
|-----------------|---|
| <b>EXP10 10</b> | Opto-isolated USB interface                               |
| <b>EXP10 11</b> | Opto-isolated RS232 interface                             |
| <b>EXP10 12</b> | Opto-isolated RS485 interface                             |
| <b>EXP10 13</b> | Opto-isolated Ethernet interface with web server function |
| <b>EXP10 14</b> | Opto-isolated Profibus-DP interface                       |

Other functionality.

|                 |                                |
|-----------------|--------------------------------|
| <b>EXP10 15</b> | GPRS/GSM modem without antenna |
|-----------------|--------------------------------|

❶ For configuration by software, consult Customer Service; see contact details on inside front cover.

### Maximum DCRG 8 expandability

| DCRG 8 Controller | EXP10 06 2 relay-output module | EXP10 01 4 static-output module | TOTAL STEPS |        |
|-------------------|--------------------------------|---------------------------------|-------------|--------|
|                   |                                |                                 | Relay       | Static |
| N° of steps       | N° of modules                  | N° of modules                   |             |        |
| 8                 | 1 (2 steps)                    | -                               | 10          | -      |
| 8                 | 1 (2 steps)                    | 1 (4 steps)                     | 10          | 4      |
| 8                 | 2 (4 steps)                    | -                               | 12          | -      |
| 8                 | 2 (4 steps)                    | 1 (4 steps)                     | 12          | 4      |
| 8                 | 3 (6 steps)                    | -                               | 14          | -      |
| 8                 | 4 (8 steps)                    | -                               | 16          | -      |
| 8                 | -                              | -                               | 8           | -      |
| 8                 | -                              | 1 (4 steps)                     | 8           | 4      |
| 8                 | -                              | 2 (8 steps)                     | 8           | 8      |

EXP... expansion module fixing DCRG 8



### General characteristics

DCRG8 controller has been designed to satisfy technical requirements of modern electrical installations in industry. Main power factor controller characteristics include: reliability, capability of working in all conditions and the ability to detect critical operating conditions, all this to protect the power factor correction system.

DCRG8 can satisfy these requirements and with the option to extend its own functionality by using EXP series expansion modules. A standard-supplied USB optic port is also available for controller programming, diagnostics and data downloads.

User interface is easy thanks to the backlight graphic LCD that contributes to excellent data reading even with bad lighting conditions and to view information clearly and comprehensively.

Main features are:

- Backlight graphic 128x80 pixel LCD with text in 10 languages: Italian, English, Spanish, French, German, Czech, Polish, Russian, Portuguese and 1 customisable
- Automatic identification of direction of CT current flow
- Connection to single and three-phase lines, three-phase lines with neutral control and co-generation systems with 4-quadrant operation
- Use with medium-voltage lines by VTs
- Capability to correctly operate also in systems having high harmonic content
- Extreme reduction of the number of switching operations
- Balanced use of steps with same power rating
- Reactive power measurement per step installed
- Recording of the number of connections per step
- Capacitor over-current protection on all three phases
- Over-temperature protection by internal or remote sensor
- Accurate no-voltage release protection
- Current and voltage harmonic analysis
- Quick CT programming function
- USB (CX01 dongle) and Wi-Fi (CX02 dongle) communication interface for personal computer, smartphone and tablet connection
- Modbus-RTU and ASCII communication protocols
- DCRJ SW setup software
- Compatible with Synergy supervision software
- SMS and email sending for alarm conditions with EXP10 15 expansion module.

### Operational characteristics

- Voltage circuit
  - Auxiliary power supply: 100-415VAC
  - Rated frequency: 50/60Hz ±10%
- Current circuit
  - Single and three-phase input
  - Rated current Ie: 5A (1A programmable)
- Measurement and control
  - Power factor adjustment: 0.8 ind to 0.8 cap
  - Voltage measurement range: 50-720VAC
  - Current measurement range: 0.125-6A
  - Temperature measurement range: -30...+85°C
  - Capacitor over-current measurement: 0-250%
  - TRMS voltage and current measurements
  - Reconnection delay time of the same step: 5-3600s
  - Tripping sensitivity: 5-600s/step
- Relay outputs
  - 8 outputs, each with 1 Normally Open (NO / SPST) contact, except the last being a changeover (SPDT)
  - Rated capacity: 5A 250VAC (in AC1 IEC) / B300
- Flush-mount housing, 144x144mm/5.7x5.7"
- IEC degree of protection: IP54 on front; IP20 at terminals.

### Certifications and compliance

Certifications obtained: EAC; UL Listing for USA and Canada (cULus - File E93601), as Auxiliary Devices - Electronic power factor regulator. Compliant with standards: IEC/EN 61010-1, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL508, CSA C22.2 n°14.

### Contactors for power factor correction

See Section 2, page 14.

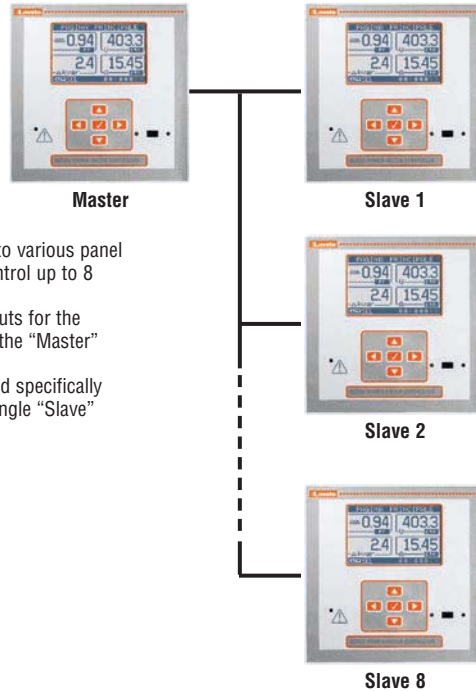
### Synergy supervision software

See Section 27.

### EXP series expansion modules

See Section 28, page 2.

### “Master-Slave” power factor correction system with DCRG 8



When the correction system is subdivided into various panel boards, a DCRG8 “Master” controller can control up to 8 DCRG8 “Slave” controllers.

The “Slave” controllers serve as remote outputs for the connection of capacitor banks that carry out the “Master” controller commands.

The monitoring of the electric panel board and specifically the capacitor banks is under control of the single “Slave” controllers.

### Software and accessories for DCRL 3, DCRL 5 and DCRG 8



51 C4

| Order code                               | Description   | Qty per pkg | Wt    |
|--|---|-------------|-------|
|  |   | n°          | [kg]  |
| Setup and automatic panel test software. |   |             |       |
| <b>DCRJ SW</b>                           | For DCRL... and DCRG 8 types with 51 C2 connecting cable                                | 1           | 0.246 |
| Accessories.                             |   |             |       |
| <b>51 C2</b>                             | PC↔DCRL/DCRG c/w EXP10 11 connecting cable, 1.8m/2yd long                               | 1           | 0.090 |
| <b>51 C4</b>                             | PC↔4 PX1 converter drive connecting cable, 1.8m/2yd long                                | 1           | 0.147 |
| <b>51 C5</b>                             | Analog modem ↔DCRL/DCRG c/w EXP10 11 connecting cable, 1.8m/2yd long①                   | 1           | 0.111 |
| <b>51 C6</b>                             | 4 PX1 converter drive↔DCRG8 c/w EXP10 11 connecting cable 1.8m/2yd long                 | 1           | 0.102 |
| <b>51 C9</b>                             | PC↔Analog modem connecting cable, 1.8m/2yd long   | 1           | 0.137 |
| <b>4 PX1</b>                             | RS232/RS485 converter drive, galvanically isolated, 220-240VAC (110-120VAC on request)② | 1           | 0.600 |

① Consult Customer Service for information; see contact details on inside front cover.  
 ② RS232/RS485 opto-isolated analog modem, 38,400 Baud rate maximum, automatic or manual TRANSMIT line supervision, 220-240VAC ±10% power supply (110-120VAC on request).

#### General characteristics

By using the **DCRJ SW** software, the quick setup of the controllers can be done by PC avoiding parameter programming error and omissions.

The parameter programming of a DCRL... or DCRG8 controller can also be PC saved and quickly uploaded into another device requiring the same programming. It permits to carry out the following operations:

- Control installation operation:
  - Bar graph and numerical viewing of measurements
  - Controller status
- Control of capacitor bank efficiency:
  - Actual kvar measurement of each step
  - View counters for number of switching operations per step
  - View total count for total connection time of each step
  - Access all setup parameters
  - Save, upload and print parameter programming
  - Changed programming highlighted in bold
- Automatic test of electric panel board.

The **Synergy** software provides for the remote control and supervision of the DCRL... and DCRG8 controllers. See details given in Section 27.

Its structure and applications are based on MS SQL relational database management system. Consulting is made through popular programs for Internet browsing available across different platforms and operating systems. 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

**Sam1** (Setup And Maintenance 1) application allows the user to program the controller, view alarm conditions, send commands, read measurements, download statistical data and events and send retrieved data by email. The connection is made by Wi-Fi with a smartphone or tablet using the CX02 dongle. It is iOS and Android compatible. For more details, see Section 27 or consult Customer Service; see contact details on inside front cover.





CX 01



CX 02



CX 03

| Order code           | Description   | Qty       | Wt    |
|----------------------|---|-----------|-------|
|                      |   | per conf. |       |
|                      |   | n°        | [kg]  |
| <b>CX 01</b>         | PC↔DCRL/DCRG connecting cable, with USB dangle for programming, data download, diagnostics and firmware upgrade | 1         | 0.090 |
| <b>CX 02</b>         | PC↔DCRL/DCRG Wi-Fi dangle for programming, data download, diagnostics and cloning                               | 1         | 0.090 |
| For DCRG8 type only. |   |           |       |
| <b>CX 03</b>         | GSM quad-band antenna (800/900/1800/1900MHz) for EXP10 15 expansion module                                      | 1         | 0.090 |

### General characteristics

Communication and connection devices allow DCRL 3, DCRL 5 and DCRG8 controllers to be linked to:

- Personal computers (PC)
- Smartphones
- Tablets.

#### CX 01

This USB dangle, complete with cable, provides for connection of the controller with a PC without even disconnecting the power supply of the electric panel board and to be able to:

- Program parameters
- Download data and events
- Complete diagnostics.

The PC identifies the connection as a standard USB.

#### CX 02

Using Wi-Fi connection, the power factor controllers can be viewed by a PC, smartphone and tablet without having to connect cables and permits to:

- Program parameters
- Download data and events
- Complete diagnostics.

#### CX 03

Compatible with major worldwide mobile phone networks, thanks to the 800/900/1800/1900MHz frequencies.

IEC protection degree: IP67.

Fixing by Ø12mm/0.04" drilling.

For overall dimensions, wiring diagrams and technical characteristics, refer to technical instructions manual online in Downloads of local or global websites or consult Customer Service; see details on inside front cover.





DCTM3 400...

| Order code    | Step description                 | Qty per pkg | Wt    |
|---------------|----------------------------------|-------------|-------|
|               |                                  | n°          | [kg]  |
| DCTM3 400 030 | 30-kvar step module, 400-480VAC  | 1           | 4.300 |
| DCTM3 400 050 | 50-kvar step module, 400-525VAC  | 1           | 4.300 |
| DCTM3 400 100 | 100-kvar step module, 400-525VAC | 1           | 5.600 |

### Power rating available depending on voltage

|                            | DCTM3 400 030 | DCTM3 400 050 | DCTM3 400 100 |
|----------------------------|---------------|---------------|---------------|
| Current I <sub>e</sub> [A] | 43A           | 72A           | 144A          |
| Voltage [VAC]              | Power [kvar]  | Power [kvar]  | Power [kvar]  |
| 400                        | 30            | 50            | 100           |
| 440                        | 33            | 55            | 110           |
| 480                        | 36            | 60            | 120           |
| 525                        | —             | 66            | 131           |

### General characteristics

- Suitable for dynamic (fast) power factor correction
- Capacitor switching at current flow zero-crossing
- Protection against high in-rush currents at capacitor switching
- Protection against over temperature detected by the built-in sensor.

### Operational characteristics

- 30-kvar, 50-kvar and 100-kvar steps
- Rated operational voltage:
  - 400-480VAC for DCTM3 400 030 type
  - 400-525VAC for DCTM3 400 050 and DCTM3 400 100 types
- Auxiliary fan power supply: 230VAC (DCTM3 400 100 only)
- Rated frequency: 50/60Hz
- Control circuit input range: 8-30VDC
- Controlled phases: 2
- Forced ventilation: DCTM3 400 100 only
- Ambient conditions
  - Operating temperature: -10...+45°C
  - Use at higher temperatures with power derating, refer to page 24-17
  - IEC degree of protection: IP10.

### INDICATIONS

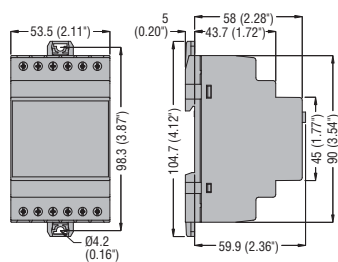
- Auxiliary power on
- Over temperature alarm
- Trigger LED.

### Reference standards

Compliant with standards: EN 50178.

## REACTIVE CURRENT CONTROLLER

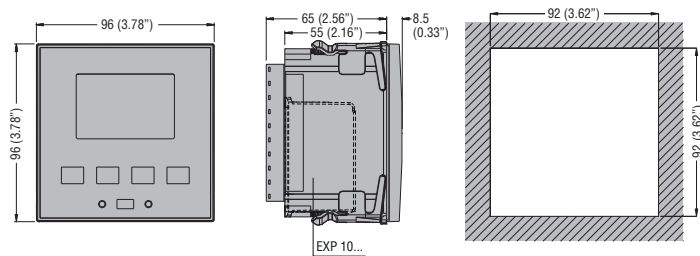
### DCRM 2



## POWER FACTOR CONTROLLERS

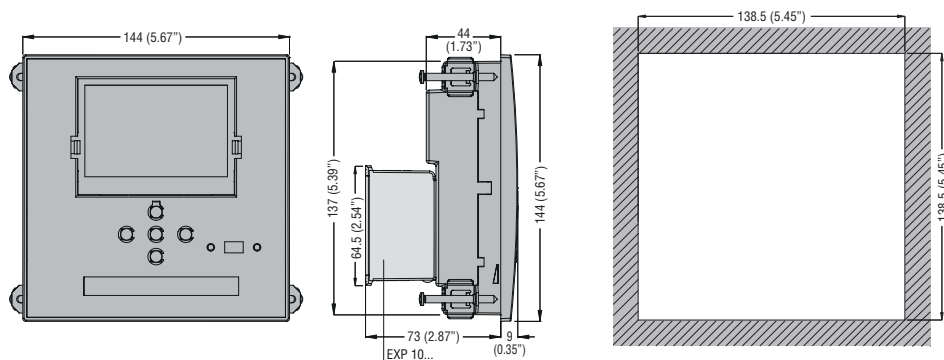
### DCRL 3 - DCRL 5

Cutout



### DCRG 8

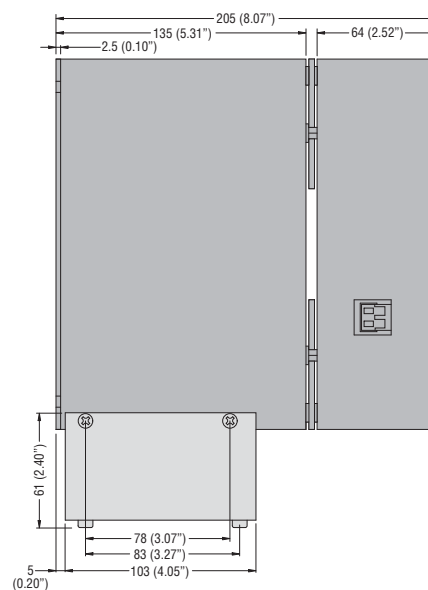
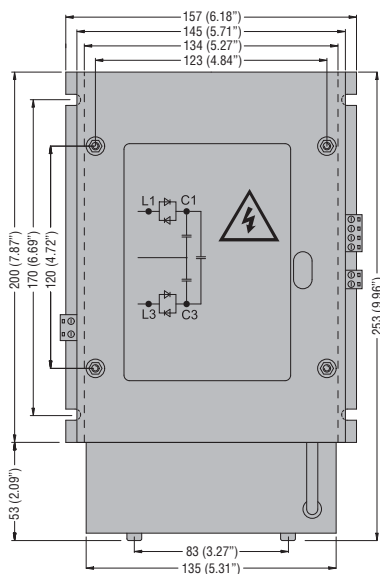
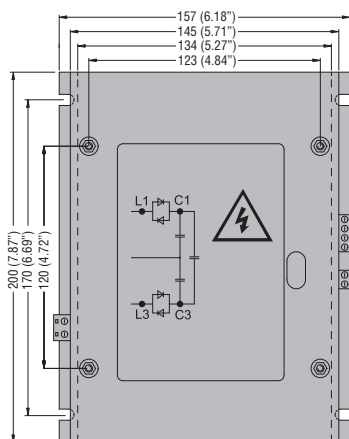
Cutout



## THYRISTOR MODULES

### DCTM3 400 030 - DCTM3 400 050

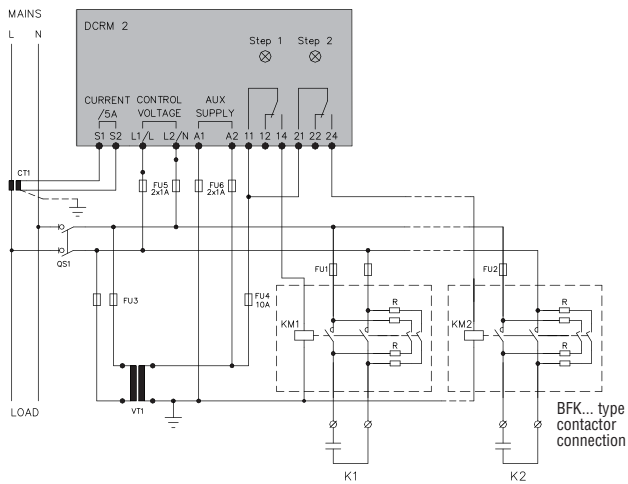
### DCTM3 400 100



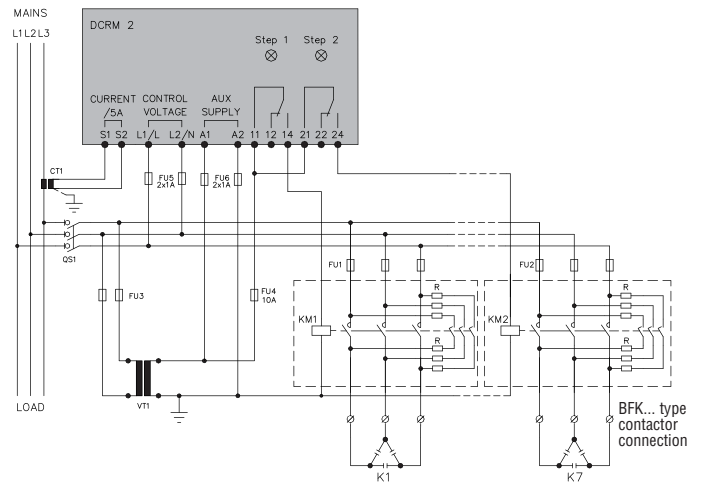
### REACTIVE CURRENT CONTROLLER

#### DCRM 2

#### Single-phase connection

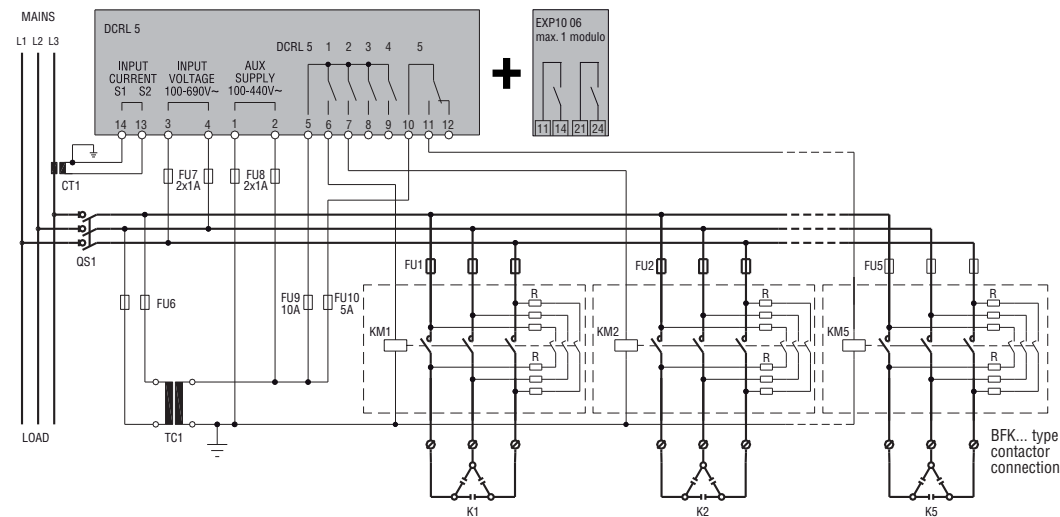


#### Three-phase connection



### POWER FACTOR CONTROLLERS

#### DCRL... with BFK... type contactors



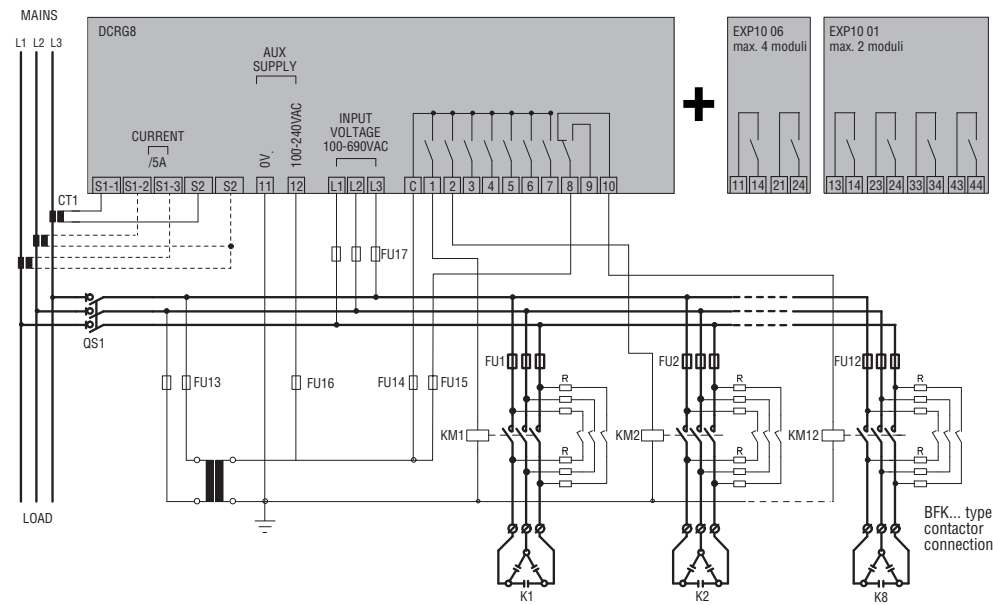
#### IMPORTANT

- For three-phase connection, the voltage input must be connected between two phases only; the line current transformer must be connected on the remaining free phase.
- The polarity of the current input is irrelevant.

**CAUTION!** Always remove the power supply before operating on the terminals.

### POWER FACTOR CONTROLLERS

#### DCRG 8 with BFK... type contactor



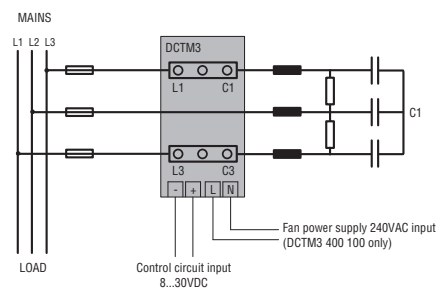
#### IMPORTANT

- For three-phase connection, the voltage input must be connected between two phases only; the line current transformer must be connected on the remaining free phase.
- The polarity of the current input is irrelevant.

**CAUTION!** Always remove the power supply before operating on the terminals.

### THYRISTOR MODULES

#### DCTM3 400...



| TYPE   | DCRM 2  |
|--|---|
| <b>AUXILIARY SUPPLY CIRCUIT</b>                    |   |
| Rated auxiliary voltage $U_s$                      | 380-415VAC (standard); 220-240VAC and 440-480VAC on request ❶         |
| Operating range                                    | 0.85-1.1 $U_s$  |
| Rated frequency                                    | 50/60Hz $\pm 5\%$   |
| Power consumption/dissipation maximum              | 4.4VA / 2.4W  |
| Micro-breaking immunity                            | $\leq 17$ ms  |
| No-voltage release                                 | $\geq 8$ ms   |
| <b>VOLTAGE INPUT</b>                               |   |
| Maximum rated voltage $U_e$                        | 480VAC ❶  |
| Measurement range                                  | 80-528VAC   |
| Frequency range                                    | 50 or 60Hz $\pm 1\%$ self configurable                                |
| Measurement input impedance                        | $> 1$ M $\Omega$  |
| Type of connection                                 | L1-L2 or L-N  |
| <b>CURRENT INPUT</b>                               |   |
| Type of connection                                 | By current transformer (CT)   |
| Rated current $I_e$                                | 5A AC   |
| Measurement range                                  | 0.1...6A  |
| Type of input                                      | Shunt supplied by external current transformer (low voltage). Max. 5A |
| Measurement method                                 | True RMS value  |
| Overload capacity                                  | +20% $I_e$  |
| Overload peak                                      | 10In for 1s   |
| Dynamic limit                                      | 160A for 10ms   |
| Burden   | $\leq 0.6$ W  |
| <b>ADJUSTMENTS</b>                                 |   |
| C/K step 1 and 2                                   | OFF / 0.15-2  |
| Connection and disconnection time delays           | 1 - 60s   |
| System configuration                               | 3 phase or 1 phase  |
| <b>RELAY OUTPUTS</b>                               |   |
| Number and type of outputs                         | 2 each with 1 changeover contact (SPDT)                               |
| Rated operational voltage                          | 250VAC  |
| Maximum switching voltage                          | 400VAC  |
| IEC conventional free air thermal current $I_{th}$ | 8A  |
| UL/CSA and IEC/EN 60947-5-1 designation            | B300  |
| Electrical life (with rated load)                  | $10^5$ cycles   |
| Mechanical life                                    | $30 \times 10^6$ cycles   |
| <b>CONNECTIONS</b>                                 |   |
| Maximum tightening torque                          | 0.8Nm (7 lbin; 7-9lbin per UL/CSA)                                    |
| Conductor section min-max                          | 0.2-4.0mm <sup>2</sup> (24-12AWG; 18-12AWG per UL/CSA)                |
| <b>INSULATION (input-output)</b>                   |   |
| Rated insulation voltage                           | 480VAC  |
| <b>AMBIENT CONDITIONS</b>                          |   |
| Operating temperature                              | -20...+60°C   |
| Storage temperature                                | -30...+80°C   |
| <b>HOUSING</b>                                     |   |
| Material   | Self-extinguishing polyamide  |

❶ UL/CSA certified with 415VAC maximum.



| TYPE   | DCRL3 - DCRL5  | DCRG8  |
|--|--|--|
| <b>AUXILIARY SUPPLY CIRCUIT</b>                      |  |  |
| Rated auxiliary voltage Us                           | 100-440VAC   | 100-415VAC   |
| Operating range                                      | 90-484VAC  | 100-415VAC   |
| Rated frequency                                      | 50Hz; 60Hz   | 50Hz; 60Hz   |
| Power consumption maximum                            | 9.5VA  | 27VA   |
| Power dissipation maximum (output contacts excluded) | 3.5W   | 4.5W   |
| <b>VOLTAGE CIRCUIT</b>                               |  |  |
| Control voltage                                      | 100-600VAC L-L; 100-346VAC L-N                           | 100-600VAC L-L; 100-346VAC L-N                     |
| Operating range                                      | 50-720VAC L-L; 50-415VAC L-N                             | 50-720VAC L-L; 50-415VAC L-N                       |
| Rated voltage  | 45-65Hz  |  |
| Immunity time for microbreakings                     | 35ms (110VAC) - 80ms (220-415VAC)                        |  |
| No-voltage release                                   | ≥8ms   |  |
| <b>CURRENT CIRCUIT</b>                               |  |  |
| Rated current Ie                                     | Programmable 5A or 1A                                    |  |
| Operating range                                      | 0.025-6A for 5A full scale; 0.025-1.2A for 1A full scale |  |
| Constant overload                                    | 1.2 Ie   |  |
| Short time withstand current                         | 50 Ie for 1s   |  |
| Current consumption                                  | 0.6VA  |  |
| <b>MEASUREMENT DATA</b>                              |  |  |
| Type of voltage-current measurement                  | TRMS   |  |
| Power factor adjustment                              | 0.5 inductive 0.5 capacitive                             |  |
| Type of temperature sensor                           | Internal   | Internal + PT100 with EXP10 04 + NTC with EXP10 16 |
| Temperature measurement range                        | 0-100°C  | 0-212°C  |
| <b>RELAY OUTPUTS</b>                                 |  |  |
| Number of outputs                                    | 3/5 (up to 7 with EXP...)                                | 8 (10, 12, 14, 16 with EXP...)                     |
| Contact arrangement                                  | 2/4 NO (SPST) + 1 changeover (SPDT)                      | 7 NO (SPST) + 1 changeover (SPDT)                  |
| IEC rated capacity                                   | 5A 250V AC1  | 5A 250V AC1  |
| Maximum capacity of common terminal of contacts      | 10A  |  |
| Maximum switching voltage                            | 415VAC   |  |
| UL/CSA and IEC/EN 60947-5-1 designation              | B300   |  |
| Electrical life (at rated load)                      | 10 <sup>5</sup> cycles                                   |  |
| Mechanical life                                      | 30x10 <sup>6</sup> cycles                                |  |
| <b>STATIC OUTPUTS</b>                                |  |  |
| Number of outputs                                    | —  | 4 or 8 with EXP10 01                               |
| <b>INSULATION</b>                                    |  |  |
| Rated insulation voltage Ui                          | 600VAC   |  |
| Rated impulse withstand voltage Uimp                 | 9.5kV  |  |
| Power frequency withstand voltage                    | 5.2kV  |  |
| <b>CONNECTIONS</b>                                   |  |  |
| Type of terminal                                     | Removable/plug-in  |  |
| Conductor section min-max                            | 0.2-2.5mm <sup>2</sup> (24-12AWG)                        |  |
| <b>AMBIENT CONDITIONS</b>                            |  |  |
| Operating temperature                                | -20...+60°C  | -20...+70°C  |
| Storage temperature                                  | -30...+80°C  | -30...+80°C  |
| <b>HOUSING</b>                                       |  |  |
| Version  | Flush mount 96x96mm/3.8x3.8"                             | Flush mount 144x144mm/5.7x5.7"                     |
| Material   | Polycarbonate  |  |
| IEC degree of protection                             | IP54   |  |

| TYPE                          | DCTM3 400 30  | DCTM3 400 50   | DCTM3 400 100  |
|-------------------------------|---|--|--|
| <b>VOLTAGE CIRCUIT</b>        |   |  |  |
| Rated auxiliary voltage $U_s$ | 400-480VAC $\pm 10\%$   | 400-525VAC $\pm 10\%$  | 400-525VAC $\pm 10\%$  |
| Rated current $I_e$           | 43A   | 72A  | 144A   |
| Step power at 400VAC          | 30kvars   | 50kvars  | 100kvars   |
| Maximum inverse voltage       | 2200VAC   | 2800VAC  | 2800VAC  |
| Number of controlled phases   | 2   | 2  | 2  |
| Auxiliary voltage             | 230VAC $\pm 10\%$   | 230VAC $\pm 10\%$  | 230VAC $\pm 10\%$  |
| Power consumption maximum     | 9VA   |  |  |
| Control circuit               | 8-30VDC<br>(2mA at 12VDC)   |  |  |
| Over-temperature protection   | Yes   |  |  |
| Cooling system                | Natural   | Natural  | Forced ventilation   |
| IEC degree of protection      | IP10  |  |  |
| <b>AMBIENT CONDITIONS</b>     |   |  |  |
| Operating temperature         | -10...+45°C ( $I_e < 50A$ )<br>-10...+50°C ( $I_e < 48A$ )<br>-10...+55°C ( $I_e < 46A$ ) | -10...+45°C ( $I_e < 100A$ )<br>-10...+50°C ( $I_e < 90A$ )<br>-10...+55°C ( $I_e < 85A$ ) | -10...+45°C ( $I_e < 190A$ )<br>-10...+50°C ( $I_e < 180A$ )<br>-10...+55°C ( $I_e < 170A$ ) |
| Storage temperature           | -30...+80°C   |  |  |
| Altitude maximum              | 1000m with no derating; higher up derating: 10%/1000m from 1000m to 4000m                 |  |  |
| <b>HOUSING</b>                |   |  |  |
| Material                      | Metal   |  |  |