

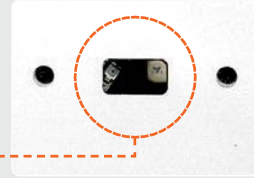
## Automatic power factor controllers DCRG series

# THE SOLUTION FOR ALL APPLICATIONS!

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

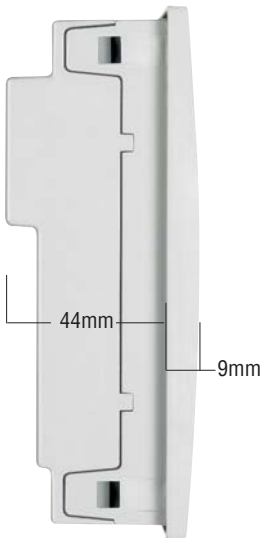


- **OPTICAL COMMUNICATION PORT**  
The optical port on the front using a standard USB or Wi-Fi point, allows to communicate with a PC, smartphone and tablet, to carry out programming, diagnostics and data download without removing power to the electric panel.

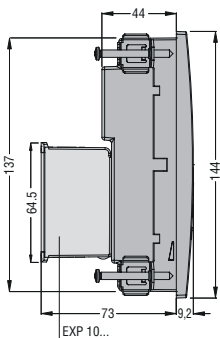


- **CUSTOMISING OPTION**  
There is a customising slot available on the panel front to show controller brand name, logo, trademark, part number, brief indication or wording, etc.

## ● 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 dynamic 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
- Data logging and calendar-clock (RTC).



- 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 minimum detail aesthetics.

### ● 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 maximum 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, in addition to detecting a failure on any phase.

### ● THREE CURRENT INPUTS

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

### ● WIDE RANGE OF RATED VOLTAGE MEASUREMENTS

The wide measurement range between 100 to 600VAC allows to use the controller in most types of applications.

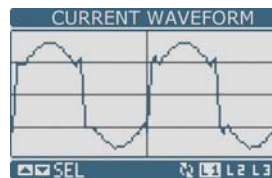
### ● GSM/GPRS MODEM

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 and **email** can be transmitted by the controller to FTP servers.

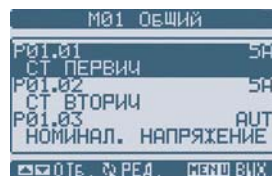
### ● 5A AND 1A BOTH ON THE SAME CONTROLLER

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 MULTI LANGUAGES



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

## DCRG series

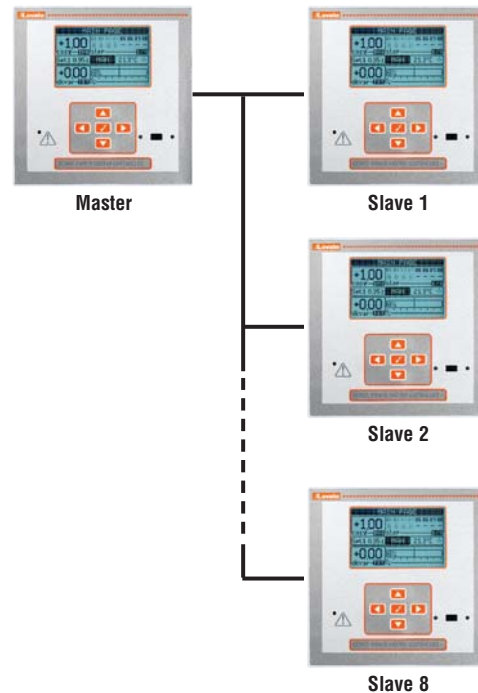


DCRG 8

Order code	Steps	Flush-mount housing size	Qty per pkg	Wt
	n°	[mm(in)]	n°	[kg]
<b>DCRG 8</b>	8	144x144 (5.7x5.7)	1	0.980

### 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



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 the capacitor banks by carrying out the "Master" controller commands.

The monitoring of each electric panel and specific capacitor banks is controlled by the relative slave controller.

### General characteristics

The DCRG8 controller has been designed to satisfy technical characteristics of modern electrical installations in industry and of new users' needs.

Main power factor controller characteristics include: reliability, capability of working in all conditions and the ability to detect critical operating conditions and all this to protect the power factor correction system.

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

User's 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 customisable
- Automatic identification of sense of CT current flow
- Connection to single and three-phase lines, three-phase lines with neutral control and co-generation systems with 4-quadrant operation
- Use with medium-voltage lines
- 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 installed step
- Recording of the number of connections per step
- Capacitor over-current protection on all three phases
- Over-temperature protection by internal sensor
- Accurate no-voltage release protection function
- Current and voltage harmonic analysis
- Harmonic analysis of current and voltage waveforms recorded for overload events
- Quick CT programming function
- USB and Wi-Fi communication interface for personal computer, smartphone and tablet connection
- Modbus®-RTU, TCP and ASCII communication protocols
- Set-up and remote control software
- SMS sending for alarm conditions with 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: 0.5 ind to 0.5 cap
  - Voltage measurement range: 85-720VAC
  - Current measurement range: 0.025-6A
  - TRMS voltage and current measurements
  - Reconnection delay time of the same step: 1-30000s
  - Tripping sensitivity: 1-1000s/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
  - IEC degree of protection: IP54 on front; IP20 at terminals.

### Certifications and compliance

Certifications obtained: UL Listed for USA and Canada (cULus - File E93601), as Auxiliary Devices.

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

## Expansion modules



EXP 10...

Order code	Description	Qty per pkg	Wt
		n°	[kg]
Inputs and outputs.			
EXP10 06	2 relay outputs to increase number of steps	1	0.064
EXP10 01	4 static outputs, opto-isolated, to increase number of steps	1	0.054
EXP10 16	Capacitor bank protection	1	0.080
EXP10 00	4 digital inputs, opto-isolated	1	0.060
EXP10 02	2 digital inputs and 2 static outputs, opto-isolated	1	0.058
EXP10 03	2 relay outputs, rated 5A 250VAC	1	0.050
EXP10 04	2 analog inputs, opto-isolated, 0/4-20mA, PT100, 0-10V or 0 to ±5V	1	0.056
EXP10 05	2 analog outputs, opto-isolated 0/4-20mA, 0-10V or 0 to ±5V	1	0.064
Communication ports.			
EXP10 11	Opto-isolated RS232 interface	1	0.040
EXP10 12	Opto-isolated RS485 interface	1	0.050
EXP10 13	Opto-isolated Ethernet interface with Web server function	1	0.060
EXP10 14	Opto-isolated Profibus-DP interface	1	0.080
Various functionality.			
EXP10 15	GPRS/GSM modem	1	0.080
EXP10 30	Data storage, clock-calendar with backup energy for data logging	1	0.050

### General characteristics

EXP series expansion modules can add extra functions to the DCRG series power factor controllers. Each controller can mount a maximum of four expansion modules.

These modules snap on to the rear of the controller and allow to:

- Increase the number of steps to connect
- Use in applications with static real-time (fast) power factor correction
- Add analog type of inputs and outputs to have 0/4-20mA, 0-10V, -5 to +5V or PT100 function
- Add RS232 and RS485 communication ports
- Predispose the controller for connection to Ethernet TCP/IP, Profibus-DP, GPRS/GSM.

### Certifications and compliance

Certifications obtained: UL Listed, for USA and Canada (cULus - File E93601), as Listed Accessory under Auxiliary Devices, for EXP... modules only except for EXP10 15 and EXP10 16 pending.

Compliant with standards: IEC/EN 61010-1, IEC/EN 61000-6-2, IEC/EN 61000-6-4 for EXP10 13, IEC/EN 61000-6-3 for all the rest, UL508, CSA C22.2 n° 14.

For overall dimensions, wiring diagrams and technical characteristics, consult the instructions manuals online in the LOVATO Electric website; see details on inside front cover.

## Communication devices



CX 01

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

### General characteristics

Communication and connection devices allow the DCRG8 controller to be linked to:

- Personal computers (PC)
- Smartphones
- Tablets.

### CX 01

This USB optic connector, complete with cable, provides for connection of the DCRG8 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 event logs
- Complete diagnostics.

The PC identifies the connection as a standard USB.

### CX 02

Using Wi-Fi connection, the DCRG8 power factor controllers can be viewed by a PC, smartphone and tablet without having to connect cables and allows to:

- Program parameters
- Download data and event logs
- Complete diagnostics.

### CX 03

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

For overall dimensions, wiring diagrams and technical characteristics, consult the instructions manual online in the LOVATO Electric website; see details on inside front cover.

## Software and accessories

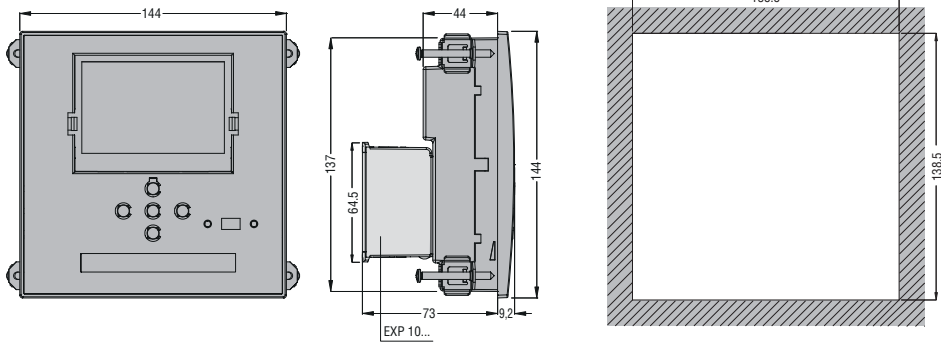


51 C4

Order code	Description	Qty per pkg	Wt
		n°	[kg]
Software.			
DCRJ SW	Set-up, automatic panel test and remote control software, with 51 C2 connecting cable	1	0.246
Accessories.			
51 C2	PC↔DCRG8 c/w EXP10 11 connecting cable, 1.8m/2yd long	1	0.090
51 C4	PC↔4 PX1 converter drive connecting cable, 1.8m/2yd long	1	0.147
51 C6	4 PX1 converter drive↔DCRG8 c/w EXP10 11 connecting cable 1.8m/2yd long	1	0.102
51 C9	PC↔Analog modem connecting cable, 1.8m/2yd long	1	0.137
4 PX1	RS232/RS485 converter drive, galvanically isolated, 220-240VAC (110-120VAC on request)❶	1	0.600

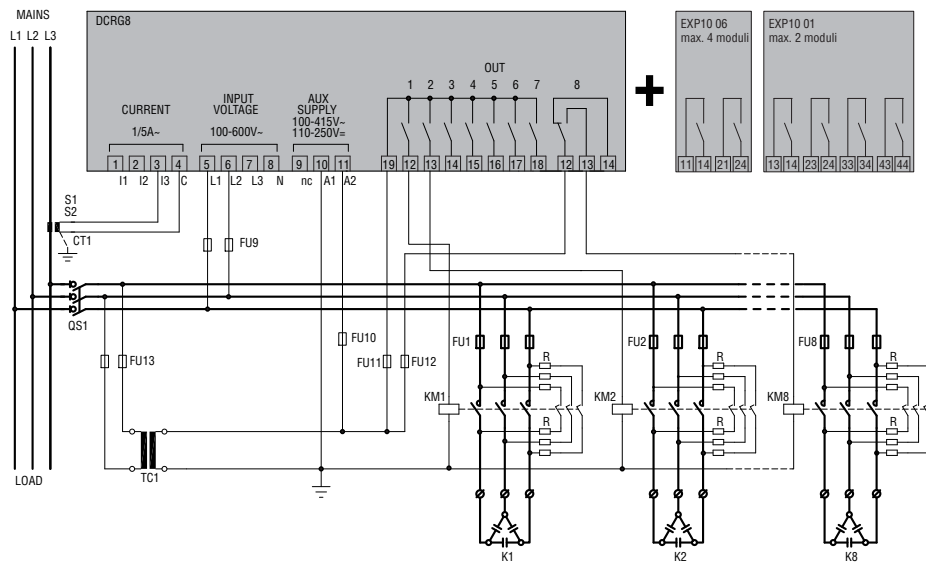
❶ RS232/RS485 opto-isolated analog modem, 38,400 Baud rate maximum, automatic or manual TRANSMIT line supervision, 220-240VAC ±10% power supply (110-120VAC on request).

### DCRG 8



## Wiring diagrams

### DCRG 8 con contattori tipo BF...K



**IMPORTANT**  
a. The polarity of the current input is irrelevant.  
**CAUTION!** Always remove the power supply before operating on the terminals.

TYPE	DCRG8
<b>AUXILIARY SUPPLY CIRCUIT</b>	
Rated auxiliary voltage $U_s$	100-415VAC
Operation range	-10 to +10%
Rated frequency	50Hz or 60Hz $\pm 10\%$
Maximum power consumption	12VA
Maximum power dissipation (output contacts excluded)	4.5W
<b>VOLTAGE CIRCUIT</b>	
Control voltage	100-600VAC
Operating range	50-720VAC
Rated frequency	50 or 60Hz $\pm 10\%$ - 360-440Hz
Immunity time for microbreakings	35ms (110VAC) - 80ms (220-415VAC)
<b>CURRENT CIRCUIT</b>	
Rated current $I_e$	Programmable 5A/1A
Operating range	0.025-6A / 0.025-1.2A
Constant overload	1.2 $I_e$
Short time withstand current	50 $I_e$ for 1s
Current consumption	0.6VA
<b>MEASUREMENT DATA</b>	
Type of voltage-current measurement	TRMS
Power factor adjustment	0.5 inductive to 0.5 capacitive
Type of temperature sensor	internal + PT100 with EXP10 04 + NTC with EXP10 16
<b>RELAY OUTPUTS</b>	
Number of outputs	8 (10, 12, 14, 16 with EXP...)
Contact arrangement	7 NO (SPST) + 1 changeover (SPDT) contacts
IEC rated capacity	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)	$10^5$ cycles
Mechanical life	$30 \times 10^6$ cycles
<b>STATIC OUTPUTS</b>	
Number of outputs	4 or 8 with EXP10 01
<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	-30...+70°C
Storage temperature	-30...+80°C
<b>HOUSING</b>	
Version	Flush mount 144x144mm
Material	Polycarbonate
IEC degree of protection	IP54



ENERGY AND AUTOMATION

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