



- 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
- Basic controller functionalities can be extended using the EXP series of expansion modules
- USB, serial, Ethernet communication interfaces
- Modbus-RTU and ASCII communication protocols
- Thyristor modules for dynamic correction.

**Reactive current control relay**

DCRM series ..... 25 - 8

**Automatic power factor controllers**

DCRL series ..... 25 - 9  
 DCRG series ..... 25 - 10  
 Accessories ..... 25 - 12  
 Communication devices ..... 25 - 12

**Thyristor modules**

25 - 13

**Dimensions**

25 - 14

**Wiring diagrams**

25 - 15

**Technical characteristics**

25 - 17





Page 25-8

**DCRM SERIES**

- Modular housing
- 2 steps
- Settings by front potentiometers
- 3 LED indications.



Page 25-9

**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** and **Synergy<sup>cloud</sup>**, supervision and energy management software, **Xpress** configuration and remote control software and with the **Sami1** application for Android/iOS.



Page 25-10

**DCRG SERIES (EXPANDABLE)**

- Flush-mount housing: DCRG 8 - DCRG 8F - DCRG 8IND (144x144mm/5.67x5.67")
- 8 steps, expandable with EXP series modules (step increment, 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
- Dynamic power factor correction (DCRG 8F version).
- 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
- Calendar-clock with backup reserve energy
- Logging of up to 250 events
- Compatible with **Synergy** and **Synergy<sup>cloud</sup>**, supervision and energy management software, **Xpress** configuration and remote control software and with the **Sami1** application for Android/iOS.



Page 25-13

**THYRISTOR MODULES DCTL SERIES**

- Version for steps from 7.5kvar to 120kvar
- Version with rated voltage from 400 to 690VAC
- Suitable for dynamic power factor correction
- Zero-crossing controlled connection-disconnection
- Over-temperature protection
- Monitoring and protection of current, power and current harmonics of the capacitor bank
- NFC connectivity for parameter settings and programming of protection thresholds with APP **NFC**
- Optical port for programming and diagnostic with software **Xpress** and APP **Sami1**
- Optional RS485 port for the command and monitoring by DCRG 8F controller.



**new**

	<b>DCRL 3</b>	<b>DCRL 5</b>	<b>DCRL 8</b>	<b>DCRG 8 / DCRG 8IND</b>	<b>DCRG 8F</b>
Steps	3 relay steps (up to 6 with EXP10 07)	5 relay steps (up to 8 with EXP10 07)	8 relay steps (up to 14 with EXP10 07)	8 relay steps (up to 18 relay outputs with EXP10 06 and EXP10 07) (up to 24 mixed relay and static outputs with EXP10 01)	8 static steps (up to 24 static outputs with EXP10 01) (up to 23 mixed relays and static outputs with EXP10 06, EXP10 07 and EXP10 01)

**ON FRONT/HOUSING**

Display	Backlit icon LCD			128x80 pixel backlit graphic LCD	
Languages	6 (scrolling text of alarm codes only) Italian, English, Spanish, French, German, Portuguese			10 Italian, English, Spanish, French, German, Czech, Polish, Russian, Portuguese and 1 customisable	
Dimensions	96x96mm/ 3.78x3.78"	96x96mm/ 3.78x3.78"	144x144mm/ 5.67x5.67"	144x144mm/ 5.67x5.67"	
Protection rating	IP54	IP54	IP65	IP65	
Expandable with EXP... modules	●			●	

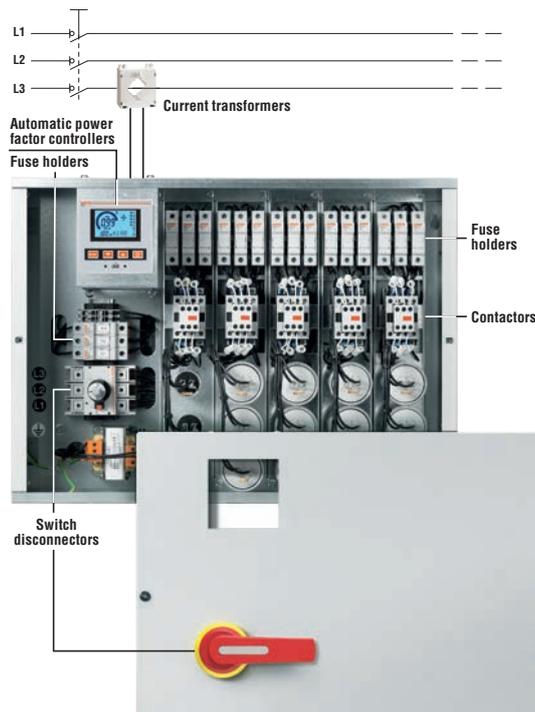
**CONTROL/FUNCTIONS**

Automatic recognition of current flow direction	●			●	
4-quadrant operation	●			●	
Master-Slave function				● (DCRG 8 / DCRG 8IND)	
Independent auxiliary supply input	●			●	
Three-phase voltage control				●	
Current inputs	1 (by 5A or 1A CTs)			3 (by 5A or 1A CTs)	
Dynamic (FAST) power factor correction				● with EXP10 01 (maximum 16 static outputs)	●
Power factor correction by single phase				● (DCRG 8 / DCRG 8IND)	
Possibility of connecting inductive steps				● (DCRG 8IND)	
Medium-voltage usage	●			●	
Phase-neutral connection in three-phase systems	●			●	
Analog inputs				● with EXP10 04	
Analog outputs				● with EXP10 05	
Input programmable as function or external temperature sensor				● with EXP10 04	
USB communication interface	● with EXP10 10			● with EXP10 10	
RS232 communication interface	● with EXP10 11			● with EXP10 11	
Opto-isolated RS485 communication interface	● with EXP10 12			● with EXP10 12	
Ethernet communication interface	● with EXP10 13 (only for DCRL 8)			● with EXP10 13 and web server function	
Opto-isolated Profibus-DP interface				● with EXP10 14	
GPRS/GSM modem				● with EXP10 15	
Optical USB communication port on front	● with CX 01			● with CX 01	
Optical Wi-Fi communication port on front	● with CX 02			● with CX 02	
Fast setting of current transformer	●			●	
Compatible with Xpress configuration and remote control software	●			●	
Compatible with Synergy and Synergy <sub>Cloud</sub> supervision and energy management software	●			●	
Compatible with Sam1 App	●			●	
Calendar-clock with backup reserve power				●	
Data logging memory				● with EXP10 30	
Event logging: alarms, setup changes, etc.				●	
Customisable internal counters				●	



**new**

	DCRL 3	DCRL 5	DCRL 8	DCRG 8 / DCRG 8IND	DCRG 8F
<b>MEASUREMENTS</b>					
Rated measurement voltage		600VAC max		600VAC max	
Measurement voltage range		50...720VAC		50...720VAC	
Instantaneous $\cos\phi$ (power factor displacement)		●		●	
Instantaneous and average weekly power factor values		●		●	
Voltage and current		●		●	
Reactive power to reach set-point and total values		●		●	
Capacitor overload		●		●	
Electrical panel temperature		●		●	
Maximum voltage and current value		●		●	
Maximum capacitor overload value		●		●	
Maximum panel temperature value		●		●	
Maximum capacitor temperature value				● with EXP10 04 and EXP10 15	
Active and apparent power value				●	
Active, reactive, apparent energy				●	
Current and voltage harmonic analysis		● up to 15th		● up to 31st	
Var-measured value per step		●		●	
Number of switches for each step		●		●	
<b>PROTECTIONS</b>					
Voltage too high and too low		●		●	
Current too high and too low		●		●	
Over compensation (capacitors disconnected and $\cos\phi$ higher than set-point)		●		●	
Under compensation (capacitors connected and $\cos\phi$ lower than set-point)		●		●	
Capacitor overload		●		●	
Capacitor overload on all 3 phases				●	
Over temperature		●		●	
Mains micro-breaking		●		●	
Capacitor bank failure		●		●	
Over maximum n° of switches		●		●	
Over maximum harmonic distortion level limit		●		●	
Programmable alarm property (enable, trip delay, relay energising, etc.)		●		●	
Capacitor protection				● with EXP10 16 (DCRG 8 / DCRG 8IND)	



# 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

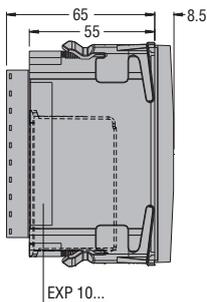
The backlit icon LCD ensures excellent legibility as well as the texts for the display of measurements and description of alarms. The 4 navigation buttons are for settings and functions.

● 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 retention 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

- **Sam1** Application for Android and iOS
- **Xpress** for configuration and remote control
- **Synergy** and **Synergy Control** 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.

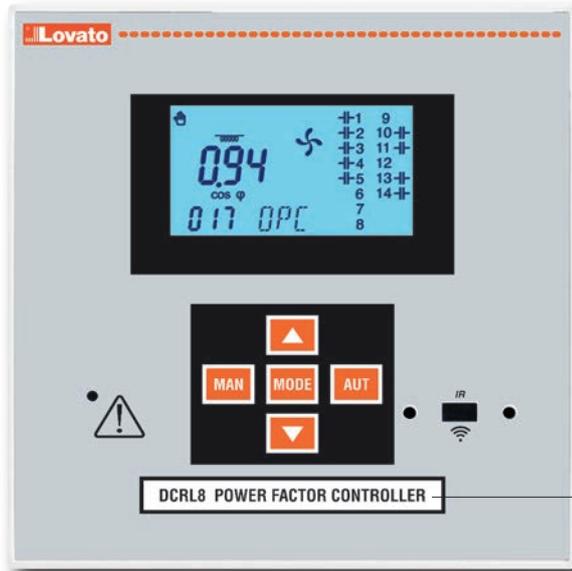
- ALARM MESSAGES IN 6 LANGUAGES

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.

# 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 EXP 1013.

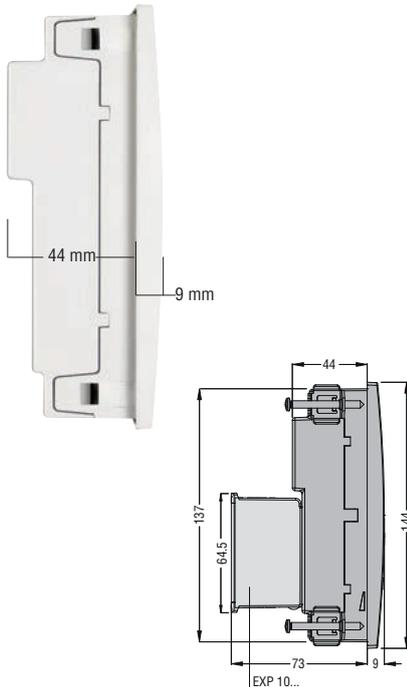
### ● CUSTOMISATION

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 retention over time.



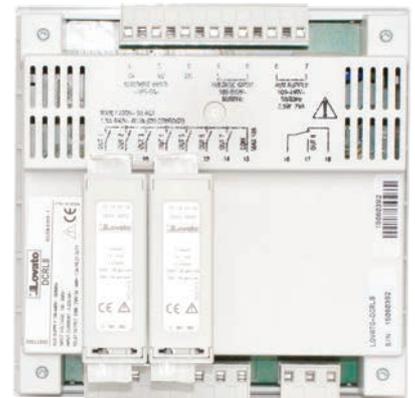
### ● HIGH PROTECTION RATING

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.



**MAX 2**

### ● SOFTWARE COMPATIBILITY

- **Sam1** Application for Android and iOS
- **Xpress** for configuration and remote control
- **Synergy** and **Synergy.com** 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.

# THE SOLUTION FOR ALL APPLICATIONS!

## DCRG 8

**BACKLIT GRAPHIC LCD**

High-legibility 128x80 pixels, with adjustable brightness.

**3 VERSIONS AVAILABLE:**

- DCRG 8: for traditional power factor correction with contactors or dynamic (fast) power factor correction with EXP10 01
- DCRG 8F: for dynamic (fast) power factor correction
- DCRG 8IND: for capacitive reactive power factor correction.



**OPTICAL COMMUNICATION PORT**

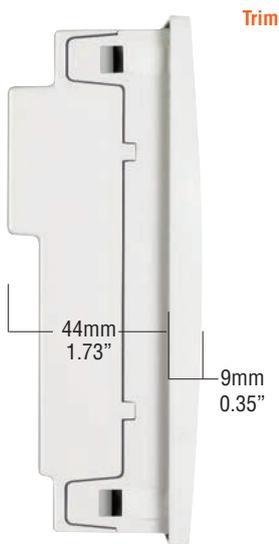
The optical port on the front permits communication with PCs, smartphones and tablets through the USB and Wi-Fi standards for carrying out programming, diagnostics and data download without disconnecting power to the electrical panel.



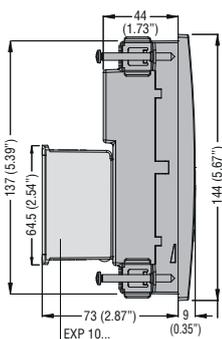
**CUSTOMISATION**

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

**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 retention over time.

**HIGH PROTECTION DEGREE**

The controller front and the rear seal have been designed to warrant an IP54 protection degree.

**EXPANDABILITY**

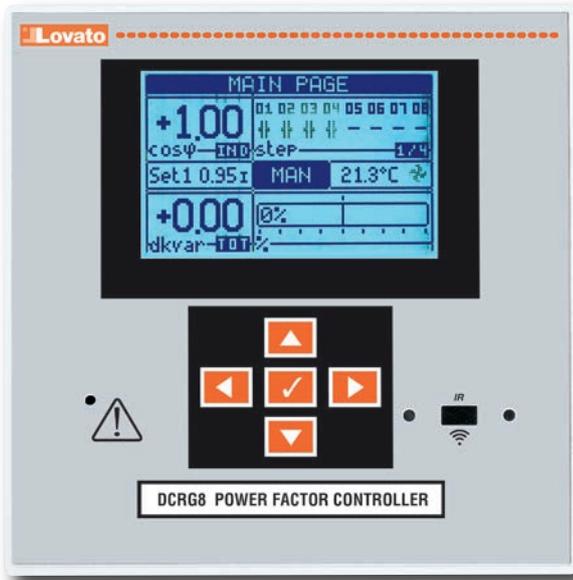


Basic controller functionality can be extended easily using the EXP series expansion modules:

- 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.

**SOFTWARE COMPATIBILITY**

- **Sam1** Application for Android and iOS
- **Xpress** for configuration and remote control
- **Synergy** and **Synergy.com** for supervision and energy management.

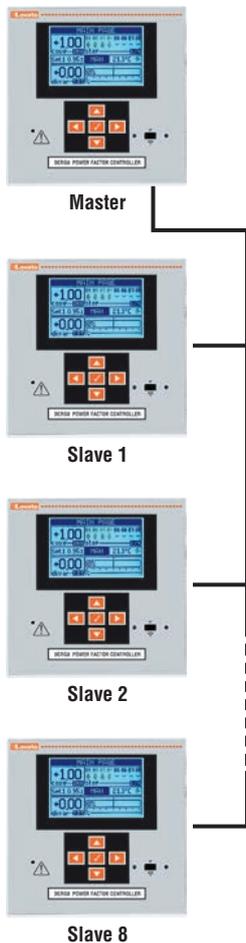


- SUITABLE FOR POWER FACTOR CORRECTION USING CONTACTORS AND THYRISTOR MODULES (WITH DCRG 8F MODEL OR DCRG 8 + EXP10 01)
- INDEPENDENT POWER FACTOR CORRECTION FOR EACH SINGLE PHASE
- CAPACITIVE REACTIVE POWER FACTOR CORRECTION VIA INDUCTIVE STEP MANAGEMENT (WITH DCRG 8IND MODEL)
- SMS SENDING FOR ALARM 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 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.

### ● GSM/GPRS MODEM

With the EXP10 15 expansion module, the controller is equipped with a GSM/GPRS modem, which it automatically configures. This simplifies installation and wiring. Once a data-enabled SIM card is inserted, the controller can send alarm or event SMS and **e-mails** and data files can be transmitted to FTP servers.

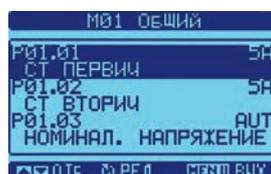
### ● 5A AND 1A BOTH IN THE SAME CONTROLLER

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

### ● GRAPHS AND TEXTS IN 10 LANGUAGES



Display of waveforms, graphs and texts in 10 languages: Italian, English, Spanish, French, German, Czech, Polish, Russian, Portuguese and one customisable.



### ● SUITABLE FOR MEDIUM-VOLTAGE SYSTEMS

The controller 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.

### ● DYNAMIC (FAST) POWER FACTOR CORRECTION

Thyristor-based dynamic power factor correction systems are necessary where the reactive load varies rapidly over time. DCRG 8F has 8 built-in static outputs, while DCRG 8 + EXP10 01, by taking advantage of the built-in relay outputs as well, realizes a mixed traditional (relay) and dynamic system.

### ● INDEPENDENT POWER FACTOR CORRECTION FOR EACH SINGLE PHASE (SPPFC)

In highly unbalanced three-phase systems, power factor correction by single phase can be implemented. The DCRG controller can monitor the  $\cos\phi$  of each single phase and correct through the joint use of single- and three-phase capacitor banks.

### ● CAPACITIVE REACTIVE POWER FACTOR CORRECTION (DCRG 8IND).

The DCRG 8IND version can connect both capacitors and inductors to achieve the desired  $\cos\phi$  should it be necessary to correct the capacitive reactive power factor as well.

### DCRM series



DCRM 2

Order code	Steps	Auxiliary supply voltage	Qty per pkg	Wt
	no.	[V]	n°	[kg]
Single and three-phase low-voltage systems.				
<b>DCRM 2</b>	2	380...415VAC	1	0.284

#### General characteristics

The DCRM allows the reactive current of a system to be controlled.

It can correct to the best  $\cos\varphi$  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 single-phase and three-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

"C/K Step 1"	C/K ratio step 1 (0.15...2)
"C/K Step 2"	C/K ratio step 2 (0.15...2)
"Connection delay"	Step connection delay 1...60s
"Disconnection delay"	Step disconnection delay 0.1...60s
"System configuration"	Single- or three-phase wiring selection.

#### 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).

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.

### DCRL series



DCRL 3 - DCRL 5



DCRL 8



EXP80 00

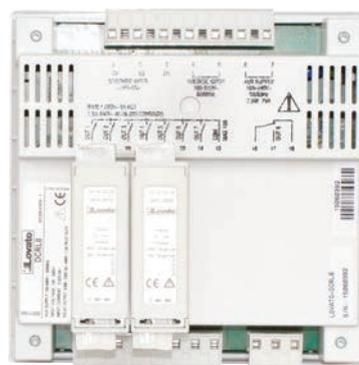


EXP 10...

#### Snap-in fixing of EXP... expansion modules

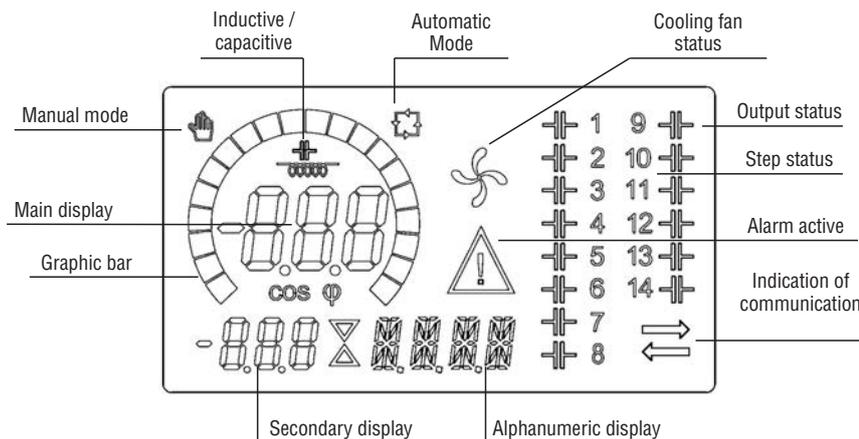


MAX  
1



MAX  
2

#### Backlit icon LCD



Order code	Description	Qty per pkg	Wt
		n°	[kg]
Single and three-phase low and medium-voltage systems.			
DCRL 3	3 steps, expandable up to 6 steps, 100...440VAC	1	0.340
DCRL 5	5 steps, expandable up to 8 steps, 100...440VAC	1	0.340
DCRL 8	8 steps, expandable up to 14 steps, 100...440VAC	1	0.640
Accessory.			
EXP80 00	Plastic insert for customisation label (only for DCRL 8)	10	0.050

Order code	Description
EXPANSION MODULES.	
Additional steps.	
EXP10 06	2 relay outputs to increase number of power factor correction steps
EXP10 07	3 relay outputs to increase number of power factor correction steps
Inputs and outputs.	
EXP10 03	2 relay outputs 5A 250VAC
Communication ports.	
EXP10 10	Opto-isolated USB interface
EXP10 11	Opto-isolated RS232 interface
EXP10 12	Opto-isolated RS485 interface
EXP10 13	Opto-isolated ETHERNET interface (only for DCRL 8)

#### 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 icon 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 THD with single harmonic analysis up to the 15th order
- Wide voltage measurement range
- High accuracy of true root mean square (TRMS) measurements
- Front optical USB (CX 01 dongle) and Wi-Fi (CX 02 dongle) communication port for PC, smartphone and tablet connection
- Compatible with Ethernet communication modules EXP10 13 (only for DCRL 8)
- Compatible with Synergy and Synergy supervision and energy management softwares, Xpress configuration and remote control software and with the Sam1 application for Android/iOS
- Customisation with label on front (only for DCRL 8).

#### 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...1.2A for 1A full scale; 0.025...6A 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 (96x96mm / 3.78x3.78");
  - DCRL 8 (144x144mm / 5.67x5.67")
- IEC degree of protection:
  - DCRL 3, DCRL 5 IP54 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.

#### Contactors for power factor correction

See section 2, page 2-14.

Software Synergy, Synergy, Xpress and Sam1  
See section 29.

#### EXP expansion modules

See section 30.

### DCRG series

**new**



DCRG 8



EXP 10...

#### Snap-in fixing of 4 EXP... expansion modules

DCRG 8 / DCRG 8F / DCRG 8IND



Order code	Description	Qty per pkg	Wt [kg]
DCRG 8	8 relay steps, expandable up to 24 steps, 100...415VAC	1	0.980
DCRG 8F	8 static steps, expandable up to 24 steps, 100...415VAC	1	0.980
DCRG 8IND	8 relay steps, expandable up to 24 steps, 100...415VAC, for capacitive reactive power factor correction	1	0.980

#### Accessories.

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

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

#### EXPANSION MODULES

##### Additional steps.

EXP10 06	2 relay outputs to increase number of power factor correction steps
----------	---

EXP10 07	3 relay outputs to increase number of power factor correction steps
----------	---

##### Inputs and outputs.

EXP10 00	4 opto-isolated digital inputs
----------	--------------------------------

EXP10 01	4 opto-isolated static outputs to increase number of static steps
----------	---

EXP10 02	2 digital inputs and 2 opto-isolated static outputs
----------	---

EXP10 03	2 relay outputs 5A 250VAC
----------	---------------------------

EXP10 04	2 PT100 opto-isolated analogue inputs, either 0/4...20mA, 0...10V or 0...±5V
----------	--

EXP10 05	2 opto-isolated analogue inputs 0/4...20mA, 0...10V or 0...±5V
----------	--

EXP10 08	2 opto-isolated digital inputs and 2 relay outputs 5A 250VAC
----------	--

EXP10 16	Capacitor protection with 2 inputs for temperature measurement with NTC sensors and 2 three-phase measurement inputs
----------	--

##### Communication ports.

EXP10 10	Opto-isolated USB interface
----------	-----------------------------

EXP10 11	Opto-isolated RS232 interface
----------	-------------------------------

EXP10 12	Opto-isolated RS485 interface
----------	-------------------------------

EXP10 13	Opto-isolated ETHERNET interface with web server function
----------	---

EXP10 14	Opto-isolated Profibus-DP interface
----------	-------------------------------------

EXP10 15	GPRS/GSM modem, without antenna
----------	---------------------------------

##### Other functions.

EXP10 30	Data memory, calendar-clock with backup reserve power for data logging
----------	--

❶ For configuration via software, contact our Technical support.

### 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:

- 128x80-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 only)
- Independent power factor correction for each single phase (SPPFC only for DCRG 8 / DCRG 8IND)
- Suitable for dynamic power factor correction with DCRG 8F or DCRG 8 + EXP10 01
- Control of thyristor modules type DCTL... with static outputs or RS485 connection with DCRG 8F controller
- Use with medium-voltage lines with VTs (DCRG 8 / DCRG 8IND only)
- 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 Synergy and Synergy supervision and energy management softwares, Xpress configuration and remote control software and with the Sam1 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
  - Temperature measurement range: -30...+85°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
- Flush-mount housing (144x144mm / 5.67x5.67")
- IEC degree of protection: IP65 on front; IP20 on terminals.

### Certifications and compliance

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

Compliant with standards: IEC/EN 61010-1, IEC/EN 61000-6-2, IEC/EN 61000-6-4, UL508, CSA C22.2 n°14.

### Contactors for power factor correction

See section 2, page 2-14.

Software **Synergy**, **Synergy Cool**, **Xpress** and **Sam1**

See section 29.

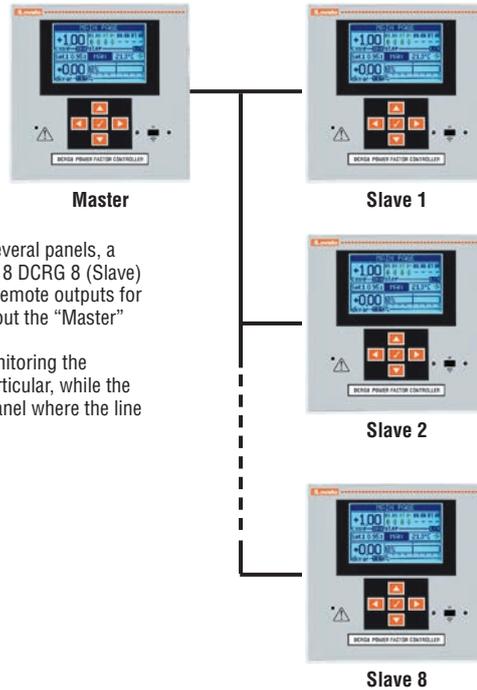
### EXP expansion modules

See section 30.

### Maximum expandability DCRG 8 / DCRG 8IND / DCRG 8F

Controller	Steps	EXP10 06	EXP10 07	EXP10 01	TOTAL STEPS	
		Module with 2 relay outputs no. of modules	Module with 3 relay outputs no. of modules	Module with 4 static outputs no. of modules	Relay	Static
DCRG 8 / DCRG 8IND	8	4 (2 steps)	–	–	16	–
	8	2 (2 steps)	max 2 (3 steps)	–	18	–
	8	–	–	max 4 (4 steps)	8	16
DCRG 8F	8	4 (2 steps)	–	–	8	8
	8	2 (2 steps)	max 2 (3 steps)	–	10	8
	8	–	–	max 4 (4 steps)	–	24

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



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  $\cos\phi$  reading is centralised in the “Master” panel where the line arrives.

### Software and APP

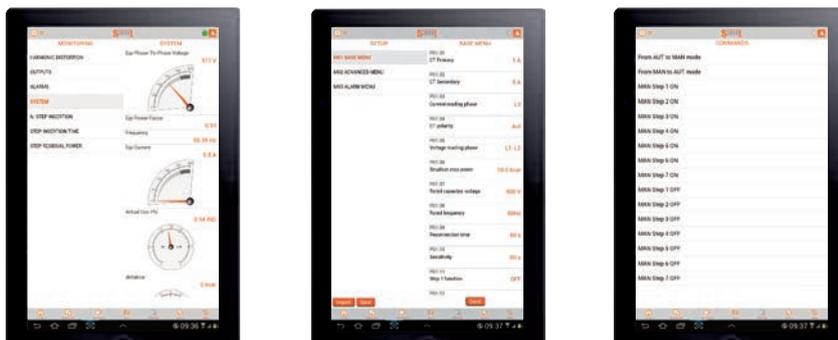
**Xpress** configuration and remote control software



**Synergy** Supervision and energy management software



**Sami** APP



### 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 DCRG... 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 DCRG... and DCRG 8... controllers. See section 29 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 **Sami** 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 29 or our Technical support; see contact details on inside front cover.



## Accessories for DCRL and DCRG



51 C4

Order code	Description	Qty per pkg	Wt
		n°	[kg]
51 C2	Connection cable PC↔DCRL/DCRG+ EXP10 11 length 1.8m/2yd	1	0.090
51 C4	Connection cable PC↔product RS232/RS485 length 1.8m/2yd	1	0.147
51 C5	Connection cable DCRL/DCRG+ EXP1011↔Modem length 1.8m/2yd①	1	0.111
51 C9	Connection cable PC↔Modem, length 1.8m/2yd	1	0.137
EXC CON 01	RS485/ Ethernet converter, 12...48VDC, including DIN rail fixing kit	1	0.400
EXC M3G 01	RS485 Gateway/3G modem, 9.5...27VAC/9.5...35VDC, including antenna and programming cable	1	0.340

① Consult our Technical support for modem details; see contact details on inside front cover.

## Communication devices



CX 01



CX 02



CX 03

Order code	Description	Qty per pkg	Wt
		n°	[kg]
CX 01	USB/optical dongle PC↔DCRL/DCRG, for programming, data download, diagnostics and updating firmware	1	0.090
CX 02	Wi-Fi connection device for PC↔DCRL/DCRG, for downloading data, programming, diagnostics and cloning	1	0.090
For DCRG8... type only.			
CX 03	GSM penta-band antenna (850/900/1800/1900/2100MHz) for EXP10 15 expansion module	1	0.090

### 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](http://www.LovatoElectric.com)

### DCTL series



DCTL...

**new**



NFC



### Accessories for DCTL



EXC 1042



EXP80 03



NTC 01

Order code	Step power	Qty per pkg	Wt
	[kvar]	n°	[kg]
Versions with rated voltage 400VAC			
<b>DCTLA 400 0075</b>	7.5kvar at 400VAC step module	1	1.74
<b>DCTLA 400 0150</b>	15kvar at 400VAC step module	1	1.74
<b>DCTLA 400 0300</b>	30kvar at 400VAC step module	1	1.74
<b>DCTLA 400 0500</b>	50kvar at 400VAC step module	1	2.84
<b>DCTLA 400 1000</b>	100kvar at 400VAC step module	1	6.68
Versions with rated voltage 400...480VAC			
<b>DCTLA 480 0090</b>	9kvar at 480VAC step module	1	1.74
<b>DCTLA 480 0180</b>	18kvar at 480VAC step module	1	1.74
<b>DCTLA 480 0360</b>	36kvar at 480VAC step module	1	1.74
<b>DCTLA 480 0600</b>	60kvar at 480VAC step module	1	2.84
<b>DCTLA 480 1200</b>	120kvar at 480VAC step module	1	6.68
Versions with rated voltage 600...690VAC IEC, 600VAC cULus			
<b>DCTLA 690 0300</b>	30kvar at 690VAC step module	1	2.84
<b>DCTLA 690 0500</b>	50kvar at 690VAC step module	1	2.84
<b>DCTLA 690 1000</b>	100kvar at 690VAC step module	1	6.68

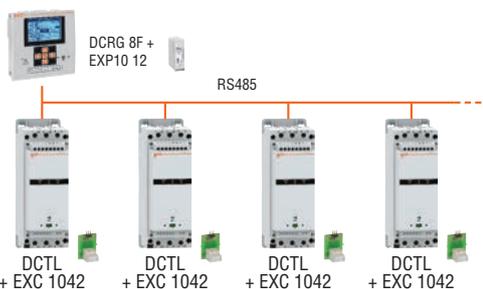
Order code	Description	Qty per pkg	Wt
		n°	[kg]
<b>EXC 1042</b>	RS485 communication board	1	0.020
<b>EXP80 03</b>	DIN rail mount kit for DCTL up to 60kvar max	1	0.200
<b>NTC 01</b>	Remote temperature sensor, 3m	1	0.150
<b>CX 01</b>	USB connection dongle PC↔DCTL, for programming, diagnostics and firmware update	1	0.090
<b>CX 02</b>	Wi-Fi connection dongle PC↔DCTL, for programming, diagnostics and cloning	1	0.090
<b>EXA 01</b>	Kit of 3 UL terminal lugs for DCTLA 400 1000, DCTLA 480 1200 and DCTLA 690 1000	1	0.141
<b>EXA 02</b>	Kit of 3 terminal protection covers for DCTLA 400 1000, DCTLA 480 1200 and DCTLA 690 1000	1	0.125

### Power connections with double lug clamps



The thyristor modules type DCTL up to 60kvar are provided with power connections with double lug clamps which allows to simplify the wiring, in particular when is necessary to connect more thyristor modules in parallel.

### Connection to the automatic power factor controller type DCRG8F via RS485



Alternatively to the standard command from static outputs, the thyristor modules type DCTL can be connected to the automatic power factor controller type DCRG8F with the RS485 optional port (code EXC 10 42), obtaining a simple and linear wiring. In this configuration, it is possible to monitor from the display of the DCRG8F controller the status and measures of each DCTL module such as step power, currents, harmonics, temperature, working hours, etc.

### General characteristics

- Suitable for dynamic (fast) power factor correction
- Silent operation
- Zero-crossing switching
- Monitoring and protection of the current, power and current harmonics of the capacitor bank: thanks to the presence of integrated current transformers, it is possible to monitor and protect the capacitor bank against overcurrents caused by events like the distortion of the voltage waveform. It is also possible to monitor electrical measurements of the capacitor bank such as the residual power three-phase voltages and currents, temperatures, THDI, morning hours, etc...
- Over-temperature protection via built-in sensor and input for the optional external temperature sensor NTC 01 for the measure of the temperature in the area of installation of the capacitors
- Ready to work without need of any programming when used with standard features
- NFC connectivity for parameter settings and programming of the protection thresholds (overtemperature, overcurrent, overvoltage,...) with the APP Lovato **NFC**
- Optical port for programming and diagnostic with software **Xpress** and APP **Samm1**, connection with USB dongle (CX 01) or Wi-Fi dongle (CX 02)
- Command circuit made by 8...30VDC signal or dry contact (which allows to save the use of a power supply)
- Optional RS485 communication card (code EXC 1042) for the command and monitoring from power factor controller type DCRG8F; from the display of DCRG 8F is also possible to monitor the status and the measurements (temperature, power,...) of each DCTL
- 1 programmable relay output with changeover contact for the signaling of alarms or fan command
- Possibility to install the thyristor modules DCTL in both vertical and horizontal position without derating, thanks to the built-in fans
- Monitoring of the functioning of the fans with the analog measure of the current through integrated sensor, which allows to control the status of the fan and recognize automatically any fault like jamming or disconnection
- Power connections with double screw terminals (for sizes up to 60kvar), which simplify the wiring, in particular for the connection of more thyristor modules in parallel; it is also possible to decide to cable or not the central phase according to the layout of the power factor correction panel
- Panel fixing with screw or on DIN guide with the optional accessory EXP80 03 (only for sizes up to 60kvar).

### Operational characteristics

- Step power:
  - 7.5, 15, 30, 50 and 100kvar at 400VAC
  - 9, 18, 36, 60 and 120kvar at 480VAC
  - 30, 50 and 100kvar at 600...690VAC
- Rated operating voltage:
  - 400VAC (IEC and cULus) for version DCTLA 400...
  - 400...480VAC (IEC and cULus) for version DCTLA 480...
  - 600...690VAC (IEC), 600VAC (cULus) for version DCTLA 690...
- Rated frequency 50/60Hz
- Auxiliary supply voltage: 100...240VAC ± 10%
- Command circuit: 8...30VDC or dry contact or RS485 connection from DCRG 8F controller
- Controlled phases: 2
- Forced ventilation monitored from the control logic
- Operating temperature: -20...+45°C (up to 55°C with derating)

### INDICATIONS

- LED POWER: presence of supply
- LED FAULT: alarm active (n° flashes = type of alarm)
- LED ON: command active.

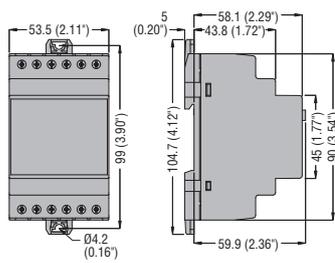
### Certifications and compliance:

Certifications obtained: cULus.  
Compliant with standards: IEC/EN 60947-4-3, IEC/EN 61000-6-2, IEC/EN 61000-6-4.

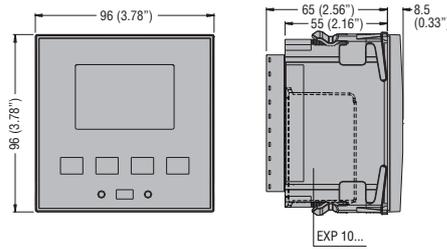
# 25 Automatic power factor controllers and thyristor modules

Dimensions [mm (in)]

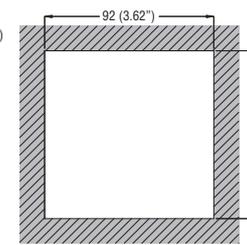
## REACTIVE CURRENT CONTROL RELAY DCRM 2



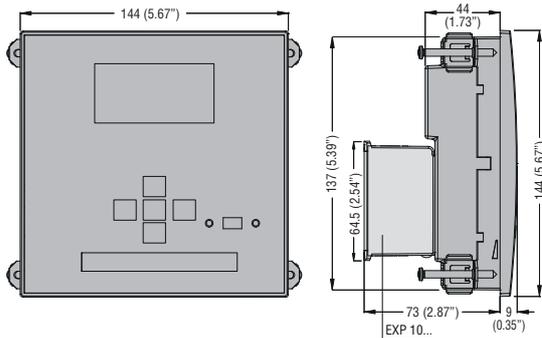
## AUTOMATIC POWER FACT CONTROLLERS DCRL 3 - DCRL 5



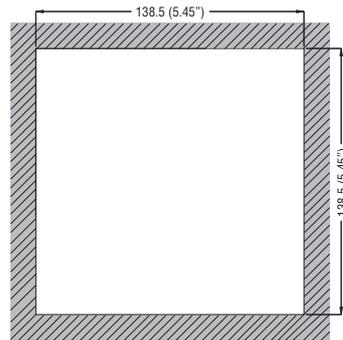
### Cutout



## DCRL 8 - DCRG 8...

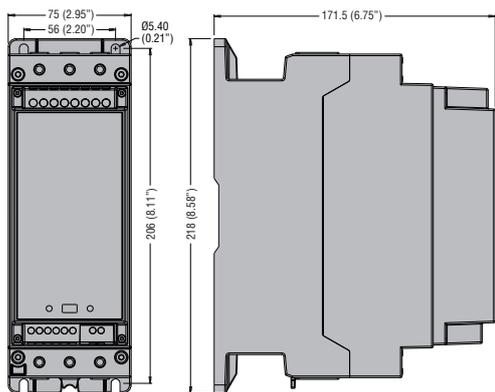


### Cutout

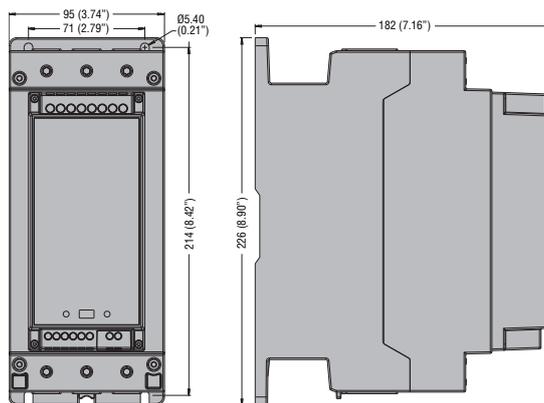


## THYRISTOR MODULES

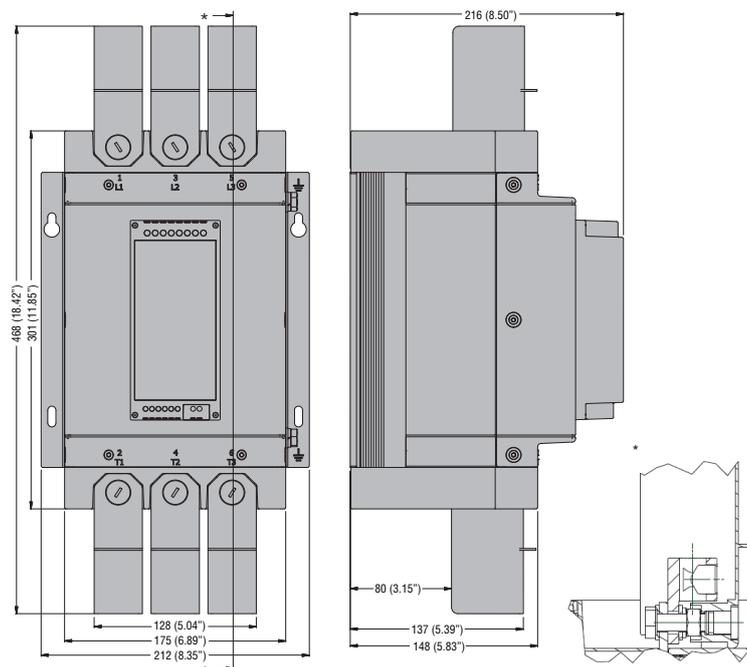
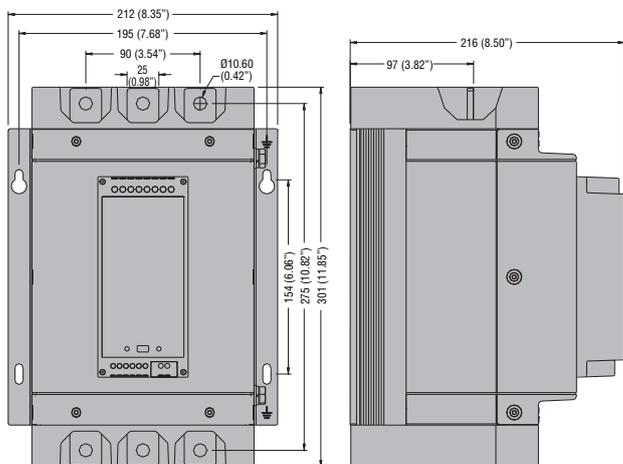
### DCTLA 400 0075 - DCTLA 400 0150 - DCTLA 400 0300 DCTLA 480 0090 - DCTLA 480 0180 - DCTLA 480 0360



### DCTLA 400 0500 - DCTLA 480 0600 DCTLA 690 0300 - DCTLA 690 0500



### DCTLA 400 1000 - DCTLA 480 1200 DCTLA 690 1000

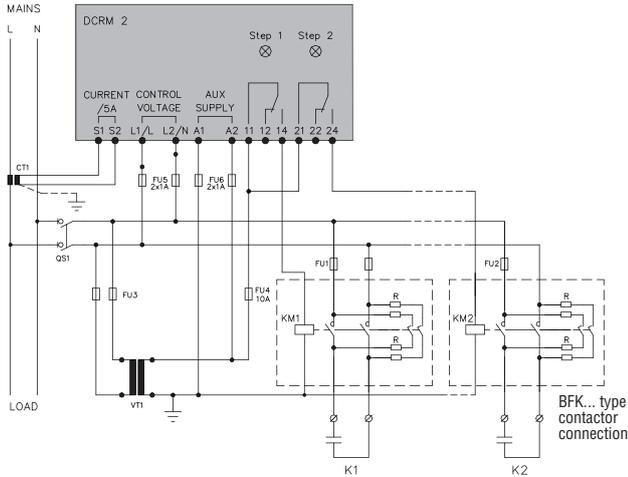


DCTLA 400 1000, DCTLA 480 1200, DCTLA 690 1000 complete with terminal lugs kit EXA01 and terminals protection kit EXA02 (necessary only for cULus compliance).

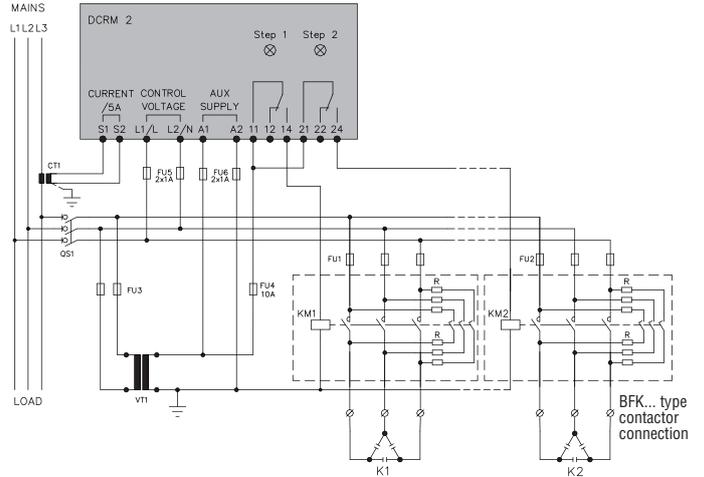
### REACTIVE CURRENT CONTROL RELAY

#### DCRM 2

##### Single-phase connection



##### Three-phase connection



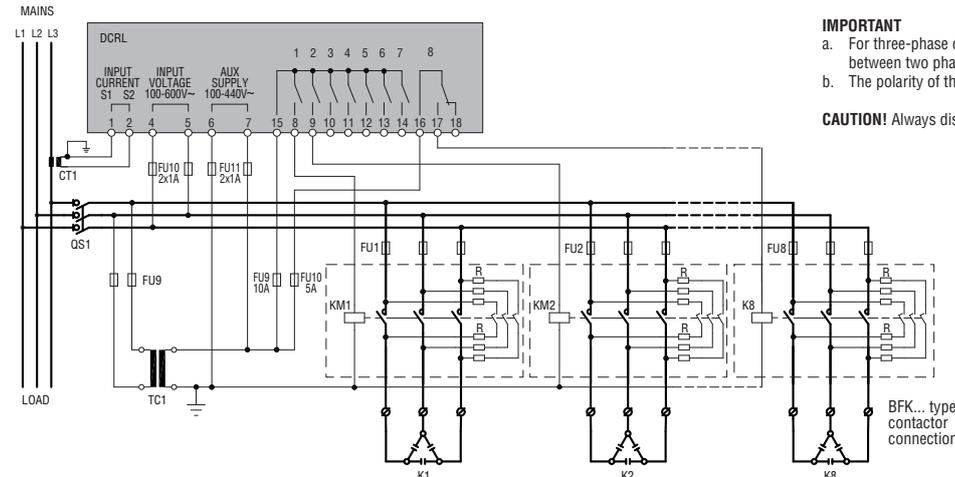
**IMPORTANT**

- 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

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



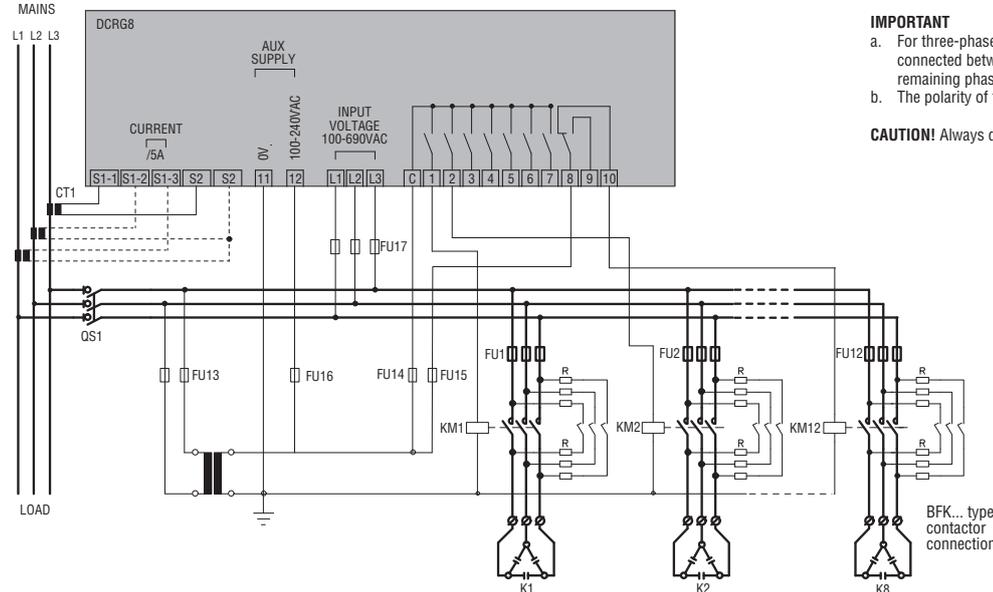
**IMPORTANT**

- 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

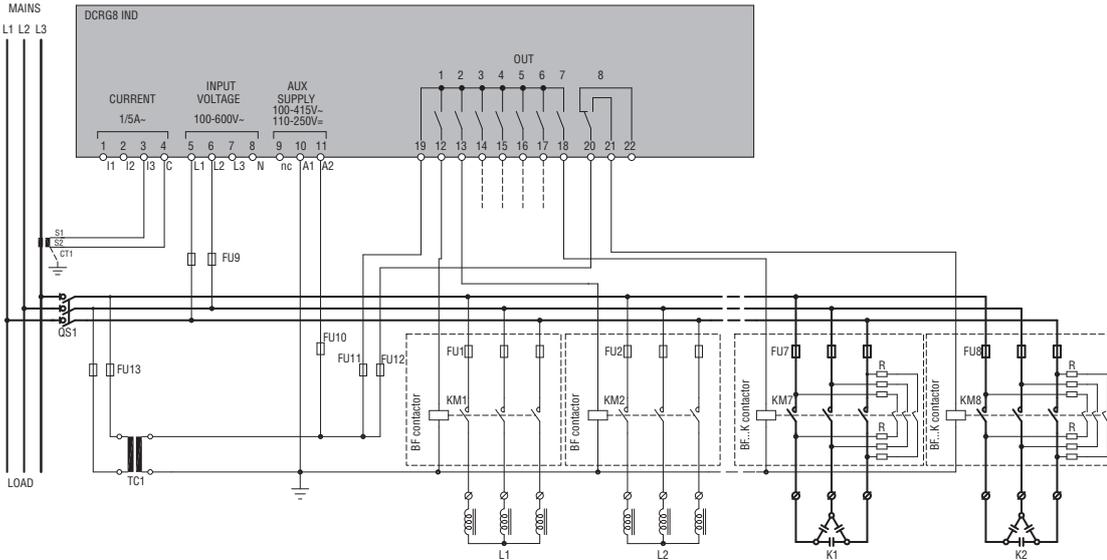


**IMPORTANT**

- 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.

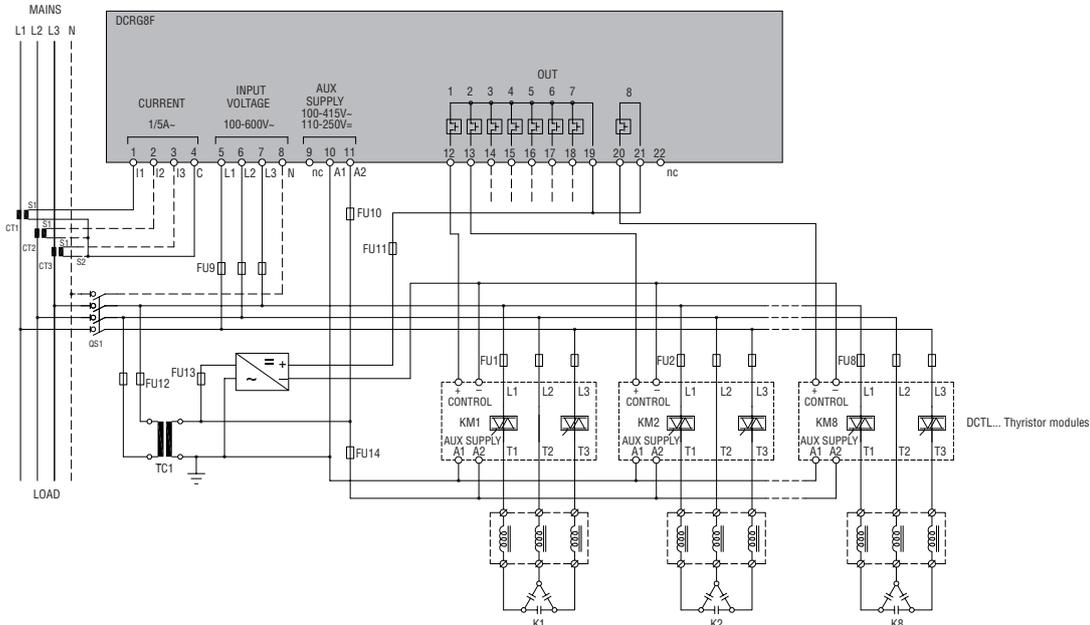
**CAUTION!** Always disconnect the power supply when operating on the terminals.

### DCRG 8IND



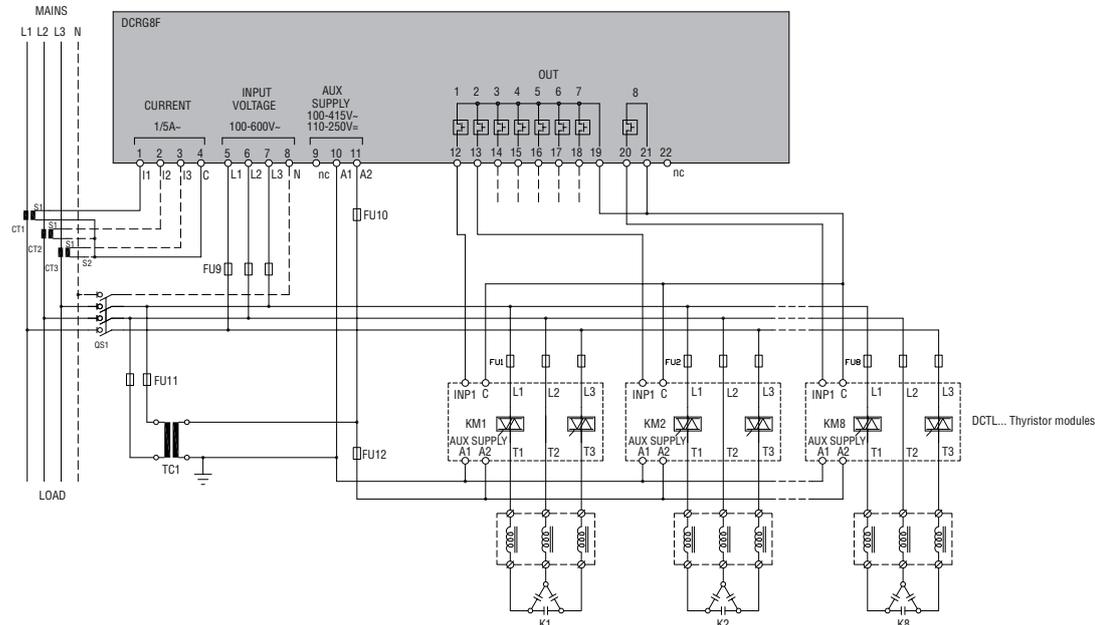
### DCRG 8F

Thyristor module control via 8 ... 30VDC signal



### DCRG 8F

Thyristor module control via clean contact (only for DCTL)



## 25 Automatic power factor controllers and thyristor modules

### Technical characteristics

#### DCRM series reactive current control relay

TYPE	DCRM 2
<b>AUXILIARY SUPPLY CIRCUIT</b>	
Rated auxiliary voltage (Us)	380...415VAC standard 220...240VAC and 440...480VAC on request <sup>❶</sup>
Operating range	0.85...1.1 Us
Rated frequency	50/60Hz ±5%
Maximum power consumption/dissipation	4.4VA / 2.4W
Micro-breaking immunity	≤17ms
No-voltage release	≥8ms
<b>VOLTAGE INPUT</b>	
Maximum rated voltage Ue	480VAC <sup>❶</sup>
Measuring range	80...528VAC
Frequency range	50 or 60Hz ±1% self configurable
Measurement input impedance	>1MΩ
Type of connection	L1-L2 or -N
<b>CURRENT INPUT</b>	
Type of connection	By current transformer (CT)
Rated current Ie	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% Ie
Overload peak	10In for 1s
Dynamic limit	160A for 10ms
Burden	≤0.6W
<b>ADJUSTMENTS</b>	
C/K step 1 and 2	OFF / 0.15...2
Connection / disconnection	1...60s
System configuration	3-phase - 1-phase
<b>RELAY OUTPUTS</b>	
Number of relays	2 (each with 1 changeover)
Rated operational voltage	250VAC
Maximum switching voltage	400VAC
IEC conventional free air thermal current (Ith)	8A
IEC/EN 60947-5-1 and UL/CSA designation	B300
Electrical life with rated load	10 <sup>5</sup> cycles
Mechanical life	30x10 <sup>6</sup> cycles
<b>INSULATION (input-output)</b>	
Rated insulation voltage	480VAC
<b>CONNECTIONS</b>	
Maximum tightening torque	0.8Nm (7 lbin; 7-9 lbin according to UL/CSA)
Conductor section min....max.	0.2...4.0mm <sup>2</sup> (24...12 AWG; 18...12 AWG according to UL/CSA)
<b>AMBIENT CONDITIONS</b>	
Operating temperature	-20...+60°C
Storage temperature	-30...+80°C
<b>HOUSING</b>	
Material	Self-extinguishing polyamide

❶ UL/CSA certification obtained with 415VAC maximum.

# 25 Automatic power factor controllers and thyristor modules

Technical characteristics

DCRL... and DCRG series automatic power factor controllers



TYPE	DCRL 3	DCRL 5	DCRL 8	DCRG 8 / DCRG 8IND	DCRG8 F
<b>AUXILIARY SUPPLY CIRCUIT</b>					
Rated supply voltage (Us)	100...440VAC			100...415VAC	
Operating range	90...484VAC			90...456VAC	
Rated frequency	50Hz; 60Hz			50Hz; 60Hz	
Maximum power consumption	9.5VA		7VA	27VA	
Maximum power dissipation (excluding power dissipation from the output contacts)	3.5W		2.5W	10.5W	
<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	
Frequency range	45...65Hz			46...65Hz; 360...440Hz	
Immunity time for microbreaking	<25ms			35ms (110VAC) - 80ms (220...415VAC)	
No-voltage relay release	≥8ms			≥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	1.2Ie				
Overload peak	50A for 1 second				
Power consumption	0.6VA				
<b>MEASUREMENT DATA</b>					
Type of voltage and current measurement	True RMS value				
Power factor adjustment	0.5ind....0.5cap.				
Type of temperature sensor type	Internal			Internal + PT100 with EXP10 04 + NTC with EXP10 16 (DCRG 8 / DCRG 8IND)	
Temperature measurement range	0...+212°C			0...+212°C	
<b>RELAY OUTPUTS</b>					
Number of outputs	3 (up to 6 with EXP10 06 - EXP10 07)	5 (up to 8 with EXP10 06 - EXP10 07)	8 (up to 14 with EXP10 06 - EXP10 07)	8 (up to 18 with EXP10 06 - EXP10 07)	0 (up to 10 with EXP10 06 - EXP10 07)
Contact arrangement	2 NO contacts + 1 changeover	4 NO contacts + 1 changeover	7 NO contacts + 1 changeover	7 NO contacts + 1 changeover	—
IEC rated current	5A 250V AC1			5A 250V AC1	
Maximum current at common contact terminal	10A				
Maximum switching voltage	415VAC				
IEC/EN 60947-5-1 and UL/CSA designation	B300				
Electrical life with 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 (55mA)	8 (120mA) (up to 24 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				
Conductor section min....max	0.2...2.5mm <sup>2</sup> (24...12 AWG; 18...12 AWG according to UL)				
<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 (3.78x3.78")		Flush-mount 144x144mm (5.67x5.67")		
Material	Polycarbonate		Polycarbonate		
IEC degree of protection	IP54		IP65		

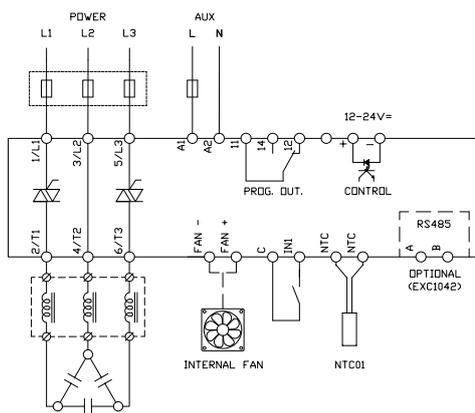
# 25 Automatic power factor controllers and thyristor modules

Technical characteristics  
Thyristor modules DCTL...

TYPE	DCTLA 400 0075	DCTLA 400 0150	DCTLA 400 0300	DCTLA 400 0500	DCTLA 400 1000	DCTLA 480 0090	DCTLA 480 0180	DCTLA 480 0360	DCTLA 480 0600	DCTLA 480 1200	DCTLA 690 0300	DCTLA 690 0500	DCTLA 690 1000	
Rated operating voltage $U_s$	400VAC					400...480VAC					600...690VAC			
Rated frequency	50/60Hz													
Rated current $I_e$	11A	22A	43A	72A	144A	11A	22A	43A	72A	144A	29A	48A	96A	
Step power	400VAC	7.5kvar	15kvar	30kvar	50kvar	100kvar	7.5kvar	15kvar	30kvar	50kvar	100kvar	20kvar	33kvar	67kvar
	440VAC	-	-	-	-	-	8kvar	16.5kvar	33kvar	55kvar	110kvar	22kvar	37kvar	73kvar
	480VAC	-	-	-	-	-	9kvar	18kvar	36kvar	60kvar	120kvar	24kvar	40kvar	80kvar
	525VAC	-	-	-	-	-	-	-	-	-	-	26kvar	44kvar	87kvar
	600VAC	-	-	-	-	-	-	-	-	-	-	30kvar	50kvar	100kvar
	690VAC	-	-	-	-	-	-	-	-	-	-	30kvar	50kvar	100kvar
Peak Inverse Voltage (PIV)	1800VAC					2200VAC					3600VAC			
Number of controlled phases	2													
Auxiliary supply	100...240VAC													
Control circuit	8...30VDC or dry contact or via RS485 serial port (with optional card EXC10 42 in combination with controller DCRG 8F + EXP10 12													
Over-temperature protection	Yes, via integrated probe or optional external probe NTC 01													
Cooling	Forced ventilation													
Operating temperature	-20...+45°C without derating (up to 55°C with derating)													

## THYRISTOR MODULES

### DCTL





- Switching and linear technology
- 1 charging level
- Versions for non-sealed and sealed lead-acid batteries, 1.25 to 12A ratings
- Charging current limitation selectable.

### Automatic battery chargers for lead-acid batteries

	<b>SEC. - PAGE</b>
Switching BCF series, modular version .....	23 - 2
Switching BCG series .....	23 - 3
Linear BCE series .....	23 - 4
<b>Dimensions</b> .....	<b>23 - 5</b>
<b>Wiring diagrams</b> .....	<b>23 - 6</b>
<b>Technical characteristics</b> .....	<b>23 - 7</b>



Page 23-2

#### SWITCHING BATTERY CHARGERS MODULAR VERSION

- For lead-acid batteries up to 50Ah rating
- Rated output current:
  - 2.5 and 4.5A at 12VDC
  - 1.25 and 2.5A at 24VDC
- Electronic lock for shorted battery, reverse polarity and output overload
- Automatic reset at end of alarm conditions
- Output for alarm remote indication.



Page 23-3

#### SWITCHING BATTERY CHARGERS

- For non-sealed and sealed lead-acid batteries up to 150Ah rating
- Rated output current:
  - 6A and 12A at 12VDC
  - 5A and 10A at 24VDC
- Electronic lock for shorted battery, reverse polarity and output overload
- Automatic reset at end of alarm conditions
- Output for alarm remote indication.



Page 23-4

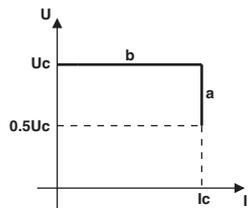
#### LINEAR BATTERY CHARGERS

- For lead-acid batteries up to 150Ah rating
- Rated output current:
  - 3A, 6A, 12A at 12VDC
  - 2.5A, 5A, 10A at 24VDC
- Electronic lock for shorted battery, reverse polarity, output overload and disconnected battery
- Output for alarm remote indication.

### For lead-acid batteries. Modular version



BCF...



a - constant current charge  
b - constant voltage charge

Order code	Rated output current	Rated output voltage in DC	Qty per pkg	Wt
	[A]	[V]	n°	[kg]
1 charging level.				
<b>BCF 0250 12</b>	2.5	12	1	0.332
<b>BCF 0450 12</b>	4.5		1	0.332
<b>BCF 0125 24</b>	1.25	24	1	0.332
<b>BCF 0250 24</b>	2.5		1	0.332

Alarms	VDC ON GREEN LED	BAT LOW RED LED	RELAY
Correct output voltage	ON	OFF	Energised
Reverse polarity	ON	ON	Energised
Short circuit/Overload	OFF	OFF	De-energised

Type	Maximum power consumption		dissipation	Internal fuse mains side (Type T)
	[VA]	[W]	[W]	[A]
BCF 0250 12	80	40	6	2ⓘ
BCF 0450 12	150	70	9	2ⓘ
BCF 0125 24	80	39	6	2ⓘ
BCF 0250 24	150	77	9	2ⓘ

ⓘ Not replaceable.

#### General characteristics

- Switching technology
  - Wide auxiliary supply range
  - Screw fixing or 35mm DIN rail mount (IEC/EN 60715).
- Protection:
- Mains input fuse
  - Battery output fuse
  - Electronic lock in case of short circuit on battery terminals, reverse battery polarity and output overload
  - Automatic reset at end of alarm conditions.

#### LED indications:

- Correct output voltage
- Reverse battery polarity.

#### Operational characteristics

- Auxiliary supply voltage: 100...240VAC ±10% 50/60Hz ±5%
- Fixed charging current
- Current limitation
- Charging current according to DIN 41773 standards
- Fixed clamping screw terminal block with captive screws
- IEC degree of protection: IP20.

#### Alarm output circuit

- Type of output: 3A 250VAC AC1 duty relay, normally energised.

#### Certifications and compliance

Certifications obtained: EAC; UL Recognized for USA and Canada (cURus - File E360865), as Power Supplies - Component.  
Products having this type of marking are intended for use as components of complete workshop-assembled equipment.  
Compliant with standards: IEC/EN 60950-1, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 60950-1, CSA C22.2 n°60950-1.

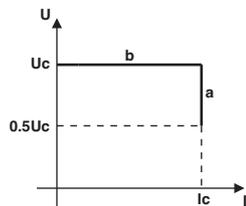
## For non-sealed and sealed lead-acid batteries



BCG...



BCG X00



a - constant current charge  
b - constant voltage charge

Order code	Rated output current	Rated output voltage in DC	Qty per pkg	Wt
	[A]	[V]	n°	[kg]
1 charging level.				
<b>BCG 06 12</b>	6	12	1	0.532
<b>BCG 12 12</b>	12		1	0.710
<b>BCG 05 24</b>	5	24	1	0.532
<b>BCG 10 24</b>	10		1	0.710
Accessories.				
<b>BCG X00</b>	Adapter for 35mm DIN rail vertical mount of BCG 06 12 and BCG05 24		1	0.022

Alarms	ON GRN LED	REV RED LED	ALA RED LED	CHG YEL RED	RELAY
Correct output voltage	ON	OFF	OFF	OFF	Energ.
Charging	ON	OFF	OFF	ON <sup>Ⓢ</sup>	Energ.
Low battery voltage	ON	OFF	ON	ON <sup>Ⓢ</sup>	Energ.
Reverse polarity	OFF	ON	OFF	OFF	De-energ.
Short circuit / Overload	ON	OFF	ON	OFF	De-energ.

Ⓢ Steady light if the charging current is more than approx. 30% of programmed current value.

Ⓢ Flashing during Hiccup operating conditions.

Type	Maximum power consumption			Internal fuse
	[VA]	[W]	[W]	Mains side (type T)
BCG 06 12	230	97	14	4 <sup>Ⓢ</sup>
BCG 12 12	284	290	29	6.3
BCG 05 24	364	158	20	6.3 <sup>Ⓢ</sup>
BCG 10 24	630	311	41	8

Ⓢ Not replaceable.

### General characteristics

- Switching technology
- Wide auxiliary supply range
- High efficiency
- Two charging voltages selectable by DIP-switch
- Boost external control for full battery charging
- Hiccup function for battery recharging when its voltage is lower than 50% rated value
- Charging current limiting trimmer resistor
- Screw fixing or 35mm DIN rail mount (IEC/EN 60715).

### Protection:

- Input fuse on AC side
- Electronic lock in case of short circuit on battery terminals, reverse battery polarity and output overload
- Automatic reset at end of alarm conditions.

### LED indications:

- Power on
- Charging operation ( $I > 30\% I_c$ )
- Overload or short circuit conditions
- Reverse battery polarity.

### Operational characteristics

- Auxiliary supply voltage: 110...240VAC  $\pm 10\%$  50/60Hz  $\pm 10\%$
- Charging voltage selectable by DIP-switch
  - Non-sealed lead-acid batteries
  - Sealed lead-acid batteries
- Maximum charging current can be set with a trimmer on the front: 20...100% of the rated current value
- Current limitation
- Charging cycle according to DIN 41773 standards
- IEC degree of protection: IP20.

### Alarm output circuit

- Type of output: 5A 30VDC duty relay, normally energised.

### Certifications and compliance

Certifications obtained: EAC; UL Recognized for USA and Canada (cURus - File E360865), as Power Supplies - Component.

Products having this type of marking are intended for use as components of complete workshop-assembled equipment. Compliant with standards: IEC/EN 60950-1, IEC/EN 61000-6-2, IEC/EN 61000-6-4, UL 60950-1, CSA C22.2 n°60950-1.

### For lead-acid batteries



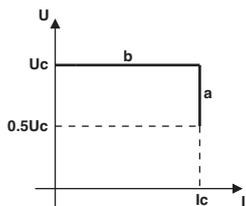
31 BCE 0312  
31 BCE 2V524



31 BCE 0612  
31 BCE 0524



31 BCE 1212  
31 BCE 1024



a - constant current charge  
b - constant voltage charge

Order code	Rated output current	Rated output voltage in DC	Qty per pkg	Wt
	[A]	[V]	n°	[kg]
1 charging level.				
31 BCE 0312	3	12	1	1.984
31 BCE 0612	6		1	4.832
31 BCE 1212	12		1	8.690
31 BCE 2V524	2.5	24	1	1.992
31 BCE 0524	5		1	4.960
31 BCE 1024	10		1	9.560

Alarms	ON GREEN LED	ALARM RED LED	CHARGE GREEN LED	RELAY
Correct output voltage	ON	OFF	OFF	Energ.
Charging	ON	OFF	ON	Energ.
Low battery voltage	ON	ON	OFF	De-energ.
Reverse polarity	ON	ON	OFF	De-energ.
Short circuit / Overload	ON	ON	OFF	De-energ.
Battery disconnected	ON	ON	OFF	De-energ.

Type	Maximum power consumption	dissipation	Mains fuse (type)
	[VA]	[W]	[A]
BCE 0312	117	24	1 (T) ext ❶
BCE 0612	222	46	4 (F) int
BCE 1212	400	73	6.3 (F) int
BCE 2V524	166	26	1 (T) ext ❶
BCE 0524	317	40	4 (F) int
BCE 1024	610	66	6.3 (F) int

❶ Not supplied; installed by customer.

### General characteristics

- Linear technology
  - Housing for internal panel mounting by screws.
- Protection:
- Mains input fuse (except for BCE 2V5 and BCE 03)
  - Battery output fuse
  - Electronic lock in case of short circuit on battery terminals, reverse battery polarity, output overload (<0.5 U<sub>e</sub>) and disconnected battery.

### LED Indications:

- Power on
- Charge (I > 0.2 I<sub>c</sub>)
- Alarm for protection tripping.

### Operational characteristics

- Auxiliary supply voltage: 220...240VAC ±10%, 50/60Hz ±5%
- Charging current: 30...100% I<sub>e</sub> adjustable
- Charging cycle according to DIN 41773 standards
- Current limitation
- Clamping screw terminal block with captive screws:
  - Removable for BCE 03 and BCE 2V5
  - Fixed for BCE 05, BCE 06, BCE 10 and BCE 12
- IEC degree of protection: IP00.

### Alarms

Possible causes of alarm include:

- Low battery voltage
- Battery fuse blown
- Battery not connected
- Battery polarity inverted (reverse polarity).

BCE 2V524 - BCE 0312

These types have a static alarm output for the control of a relay or indicator, maximum 300mA duty.

If it is connected to a relay, this must be normally energised in absence of alarm. In alarm conditions with ALARM LED switched on or in absence of supply, the relay de-energises.

BCE 0524 - BCE 0612 - BCE 1024 - BCE 1212

These types have a normally energised relay alarm output. In alarm conditions with ALARM LED switched on or in absence of supply, the relay de-energises.

### Alarm output circuit

BCE 2V524 - BCE 0312

- Type of output:
  - Negative static; NPN transistor ❶
  - Maximum voltage applicable to load: +V battery terminal
  - Maximum output current: 300mA
  - Maximum over-voltage current for 1 second: 2A
  - Dynamic over-voltage protection with inductive load.

BCE 0524 - BCE 0612 - BCE 1024 - BCE 1212

- Type of output
  - Relay: 1 changeover contact (SPDT)
  - Rated voltage: 250VAC
  - IEC rated capacity in AC1 duty: 5A 250VAC Ith
  - IEC rated capacity in DC13 or DC14 duty: 5A 30VDC
  - Electrical life: >10<sup>5</sup> cycles
  - Mechanical life: >30x10<sup>5</sup> cycles.

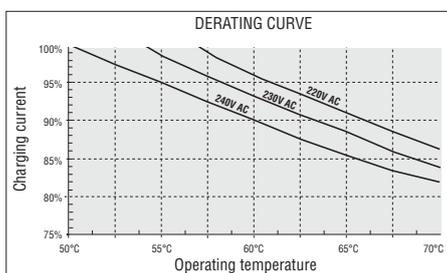
❶ The output is not overload or short-circuit protected. It is however capable of switching on a 3W filament bulb.

### Certifications and compliance

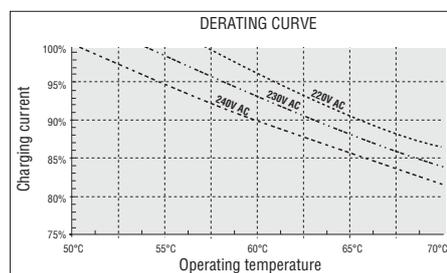
Certifications obtained: EAC.  
Compliant with standards: IEC/EN 60335-2-29.

### DERATING CURVES

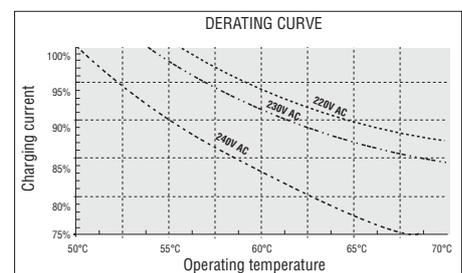
BCE 2V524 - BCE 0312



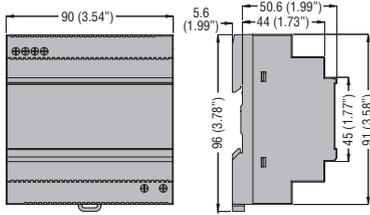
BCE 0524 - BCE 0612



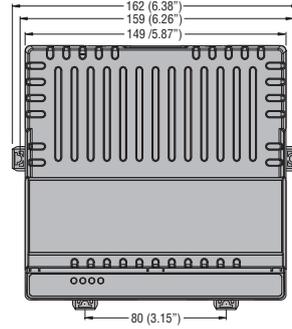
BCE 1024 - BCE 1224



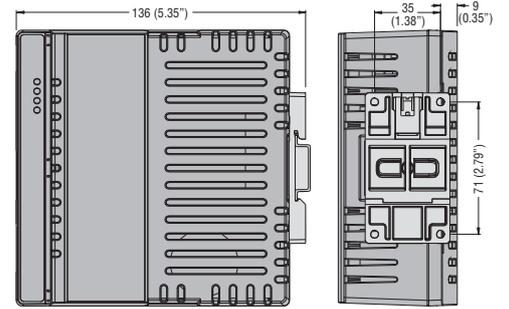
### BCF...



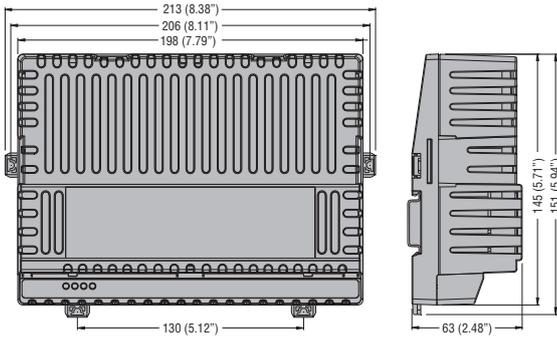
### BCG 0612 - BCG 0524



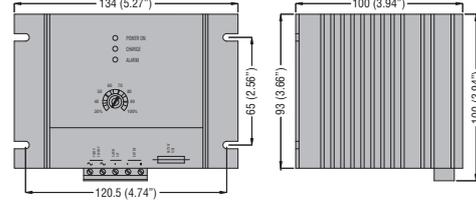
### Mounting adapter BCG X00



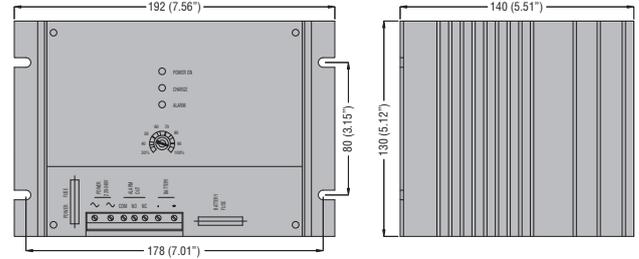
### BCG 1212 - BCG 1024



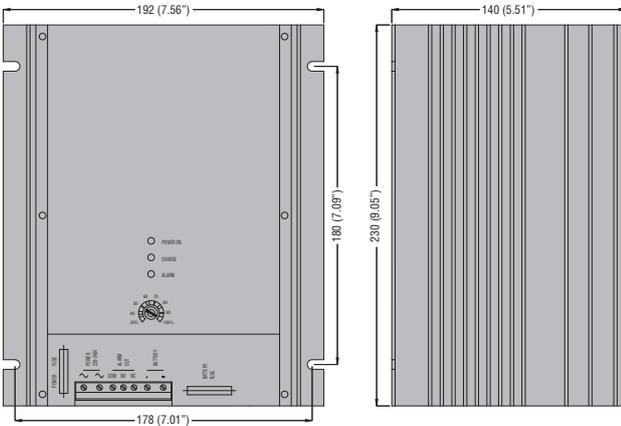
### BCE 0312 - BCE 2V524



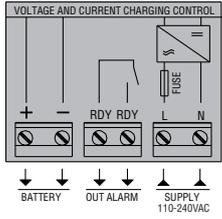
### BCE 0612 - BCE 0524



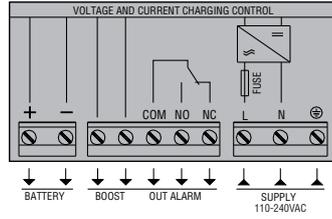
### BCE 1212 - BCE 1024



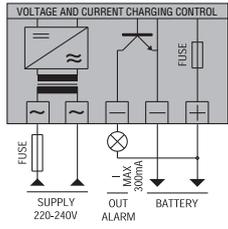
### BCF...



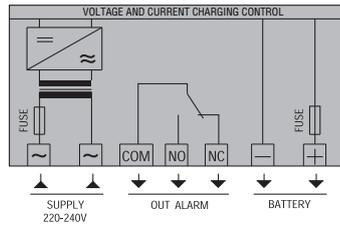
### BCG...



### BCE 2V5... - BCE 03...



### BCE 05... - BCE 06... - BCE 10... - BCE 12...



TYPE	BCF...	BCG...	BCE...
Description	Single phase automatic battery charger 1 charging level for lead-acid batteries	Single phase automatic battery charger 1 charging level for sealed and non-sealed lead-acid batteries	Single phase automatic battery charger 1 charging level for lead-acid batteries
Supply voltage	100-240VAC ±10% 50/60Hz ±5%	110-240VAC ±10% 50/60Hz ±10%	220-240VAC ±10% 50/60Hz ±5%
Rated output voltage (Uoc)	12-24VDC		
Rated charging current (Ic)	2.5-4.5A (12VDC) 1.25-2.5A (24VDC)	6-12A (12VDC) 5-10A (24VDC)	3-6-12A (12VDC) 2.5-5-10A (24VDC)
<b>CHARGING CYCLE</b>			
Reference standards	DIN 41773		
Diagram	<p>a - constant current charge b - constant voltage charge</p>		
End charging voltage U <sub>c</sub>	12V battery: 13.6VDC (2.27V/cell) 24V battery: 27.2VDC (2.27V/cell)	12V battery with DIP2: – in pos. V1: 13.8V – in pos. V2: 13.5V (default). 24V battery with DIP2: – in pos. V1: 27.6V – in pos. V2: 27.0V (default)	12V battery: 13.8VDC (2.3V/cell) 24V battery: 27.6VDC (2.3V/cell)
Charging current	Fixed	Adjustable 20% to 100% I <sub>c</sub> (using potentiometer/trimpot)	Adjustable 30% to 100% I <sub>c</sub> (using potentiometer)
Current limit	Yes		
Boost	—	+4.4% U <sub>c</sub>	—
<b>PROTECTION</b>			
Type	<ul style="list-style-type: none"> <li>– Mains supply fuse</li> <li>– Charging inhibition due to: <ul style="list-style-type: none"> <li>• Short circuit at battery terminals</li> <li>• Reverse battery polarity</li> <li>• Low voltage at battery poles (&lt;0.5 U<sub>oc</sub>)</li> <li>• Output overload</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>– Mains supply fuse</li> <li>– Charging inhibition due to: <ul style="list-style-type: none"> <li>• Short circuit at battery terminals</li> <li>• Reverse battery polarity</li> <li>• Low voltage at battery poles (&lt;0.5 U<sub>oc</sub>)</li> <li>• Output overload</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>– Mains supply fuse (5, 6, 10, 12A types only)</li> <li>– Battery output fuse</li> <li>– Charging inhibition due to: <ul style="list-style-type: none"> <li>• Short circuit at battery terminals</li> <li>• Reverse battery polarity</li> <li>• Low voltage at battery poles (&lt;0.5 U<sub>oc</sub>)</li> <li>• Disconnected battery</li> </ul> </li> </ul>
<b>ALARM OUTPUT CIRCUIT</b>			
Type of output	1 relay 3A 250VAC AC1	1 relay 5A 30VDC	Static (NPN transistor) ①; relay with 1 c/o contact (SPDT), 5A 250VAC ②
<b>AMBIENT CONDITIONS</b>			
Operating temperature	-40...+51°C	-30...+55°C (+55...+70°C with 1-5%I <sub>c</sub> /°C derating by trimpot)	-10...+50°C
Storage temperature	-40...+85°C	-30...+80°C	-30...+80°C
<b>HOUSING</b>			
Version	Modular	Internal panel mount	Internal panel mount
Mounting	35mm DIN rail (IEC/EN 60715) or screw fixing		Screw fixing
IEC degree of protection	IP20	IP20	IP00
Cooling	Natural		
Connections	Fixed terminals	Fixed terminals	Removable/plug-in terminals① Fixed terminals②

① For 2.5A and 3A types only.  
② For 5, 6, 10 and 12A types only.



- Supervision of two or three-phase power sources
- Emergency demand supervision for standby generating set
- Tie-breaker management
- Control of contactors, motorised circuit breakers and motorised changeover switches
- Closed transition
- Automatic non-priority load management
- Event logging
- Remote control and supervision
- Front optical port
- Built-in NFC technology
- Expandable with EXP modules
- Communication protocols Modbus-ASCII, RTU and TCP
- Real time clock
- Enclosed automatic transfer switches ATS.

**Automatic transfer switch controllers for 2 power sources**

	SEC.	PAGE
ATL 100 type modular version for controlling 2 power sources with single-phase control .....	26	- 6
ATL 500 type non expandable with synoptic and NFC for controlling 2 power sources .....	26	- 7
ATL 600 and ATL 601 type non expandable for controlling 2 power sources .....	26	- 8
ATL 610 type expandable with EXP modules for controlling 2 power sources .....	26	- 8
ATL 800 type expandable with EXP modules for controlling 2 power sources and 1 tie breaker .....	26	- 9

**Automatic transfer switch controllers for 3 power sources**

ATL 900 type expandable with EXP modules for controlling 3 power sources and 2 tie breakers .....	26	- 10
---	----	------

**Enclosed automatic transfer switches ATS**

ATP series with ATL 600 automatic transfer switch controller and contactors .....	26	- 11
---	----	------

**Accessories**

Dual power supply module .....	26	- 12
Communication devices, software and accessories .....	26	- 13

**Dimensions** .....

**26 - 14**

**Wiring diagrams** .....

**26 - 15**

**Technical characteristics** .....

**26 - 18**



Pag. 26-7

### ATL 100

- Modular housing
- Management of two power sources
- Single-phase control.



Pag. 26-7

### ATL 500

- Management of two power sources
- Self-seeking power supply
- 2 programmable digital inputs
- 3 programmable digital outputs
- Built-in NFC technology for parameter settings with App **NFC**
- IP40, IP65 with optional gasket.



Pag. 26-8

### ATL 600 - ATL 601

- Management of two power sources
- AC power supply
- 6 programmable digital inputs
- 7 programmable relay outputs.



Pag. 26-8

### ATL 610

- Management of two power sources
- AC and DC power supply
- 6 programmable digital inputs
- 7 programmable relay outputs
- Real time clock (RTC)
- Expandable with EXP series modules (inputs and outputs, communication ports).



Pag. 26-9

### ATL 800

- Management of 2 power sources and 1 tie breaker
- AC and DC power supply
- 8 programmable digital inputs
- 7 programmable relay outputs
- Built-in NFC technology for parameter settings with App **NFC**
- Real time clock (RTC)
- Non-priority load management
- Closed transition with brief parallel configuration
- Built-in RS485 communication
- Built-in PLC logic
- Expandable with EXP series modules (inputs and outputs, communication ports).



Pag. 26-10

### ATL 900

- Management of 3 power sources and 2 tie breakers
- AC and DC power supply
- 12 programmable digital inputs
- 10 programmable relay outputs
- 1 programmable static output
- Built-in NFC technology for parameter settings with App **NFC**
- Real time clock (RTC)
- Non-priority load management
- Closed transition with brief parallel configuration
- Built-in RS485 communication
- Built-in PLC logic
- 4 current inputs
- Expandable with EXP series modules (inputs and outputs, communication ports).



Pag. 26-11

### ATP

- Enclosed automatic transfer switches from 45 to 160A
- Management of 2 power sources
- Four-pole interlocked contactors
- Automatic transfer switch controller type ATL 600
- Dual power supply module type ATL DPS1 for the measurement and control of voltages present at supply inputs
- Miniature circuit breakers for the protection of the measuring lines
- Metallic enclosure IP65.



Pag. 26-12

### ATL DPS1

- Module specifically designed to control power supply voltage of motorised circuit breakers and changeover switches
- Continuous monitoring of supply line status
- Management via microcontroller management.



	ATL 100	ATL 500	ATL 600 - ATL 601	ATL 610	ATL 800	ATL 900
<b>POWER SUPPLY</b>						
Rated DC supply voltage	—	—	12/24VDC (ATL 601)	12/24VDC	12/24/48VDC	12/24/48VDC
Rated AC supply voltage	110...230VAC	110...240VAC (self-powered)	110...240VAC (ATL 600)	110...240VAC	110...240VAC	110...240VAC
Frequency	45...66Hz	45...65Hz	45...66Hz (ATL 600)	45...66Hz	45...66Hz	45...66Hz
<b>FRONT PANEL / HOUSING</b>						
Backlit display	—	—	LCD graphic 128x80 pixel	LCD graphic 128x80 pixel	LCD graphic 128x80 pixel	LCD graphic 128x112 pixel
Languages	—	—	5	5	8	8
Size	Modular housing (3U)	144x144x52.2mm/ 5.67x5.67x2.05"	144x144x52.2mm/ 5.67x5.67x2.05"	144x144x52.2mm/ 5.67x5.67x2.05"	240x180x45mm/ 9.45x7.09x1.77"	240x180x45mm/ 9.45x7.09x1.77"
Degree of protection	IP40 on front / IP20 terminals	IP40 / optional IP65	IP40 / optional IP65	IP40 / optional IP65	IP65	IP65
Expandable with EXP series modules	—	—	—	2 modules	3 modules	3 modules
<b>VOLTAGE AND CURRENT MEASUREMENT INPUT</b>						
Power sources that can be controlled	—	2	2	2	2	3
Voltage inputs per line	1 phase + neutral	3 phases + neutral	3 phases + neutral	3 phases + neutral	3 phases + neutral	3 phases + neutral
Rated voltage Ue	110...230VAC	110...240VAC L-N	480VAC	480VAC	600VAC	600VAC
Current inputs	—	—	—	—	—	4 (by 5A or 1A CTs)
Frequency range	45...65Hz	45...65Hz	45...65Hz	45...65Hz	45...65Hz	45...65Hz
<b>BUILT-IN DIGITAL INPUTS AND OUTPUTS</b>						
Number of inputs	—	2	6	6	8	12
Number of outputs	3	3	7	7	7	11
Contact configuration	3 NO	2 NO + 1 changeover	6 NO + 1 changeover	6 NO + 1 changeover	4 NO + 3 changeover	6 NO + 4 changeover + 1 SSR
<b>INTERFACE</b>						
Programming with NFC technology	—	●	—	—	●	●
Front optical USB communication port	—	—	● with CX 01	● with CX 01	● with CX 01	● with CX 01
Front optical Wi-Fi communication port	—	—	● with CX 02	● with CX 02	● with CX 02	● with CX 02
USB communication	—	—	—	● EXP10 10	● EXP10 10	● EXP10 10
RS232 communication	—	—	—	● EXP10 11	● EXP10 11	● EXP10 11
RS485 communication	—	—	—	● EXP10 12	● (built-in)	● (built-in)
Ethernet communication	—	—	—	● EXP10 13	● EXP10 13	● EXP10 13
Profibus communication	—	—	—	● EXP10 14	● EXP10 14	● EXP10 14
Communication via Modem	—	—	—	—	● EXP10 15	● EXP10 15
<b>FUNCTIONS</b>						
Number of tie breakers that can be managed	—	—	—	—	1	2
Programmable source type (utility or generation)	—	●	●	●	●	●
Closed transition	—	—	—	—	●	●
Non-priority load management	—	—	—	—	●	●
Switching management with power thresholds	—	—	—	—	—	●
PLC logic	—	—	—	—	●	●
Timers	—	—	—	—	●	●
System layout available on display	—	—	—	—	6	14
Custom system layouts	—	—	—	—	●	●
User alarms	—	—	●	●	●	●
Limits	—	—	●	●	●	●
Event logging	—	—	100	100	250	250
Real time clock with backup reserve energy	—	—	—	●	●	●
Acoustic alarms	—	—	—	—	●	●
Analogue inputs	—	—	—	—	● EXP10 04	● EXP10 04
Analogue outputs	—	—	—	—	● EXP10 05	● EXP10 05
Accessory for alarm remoting	—	—	—	—	—	● RGK RR

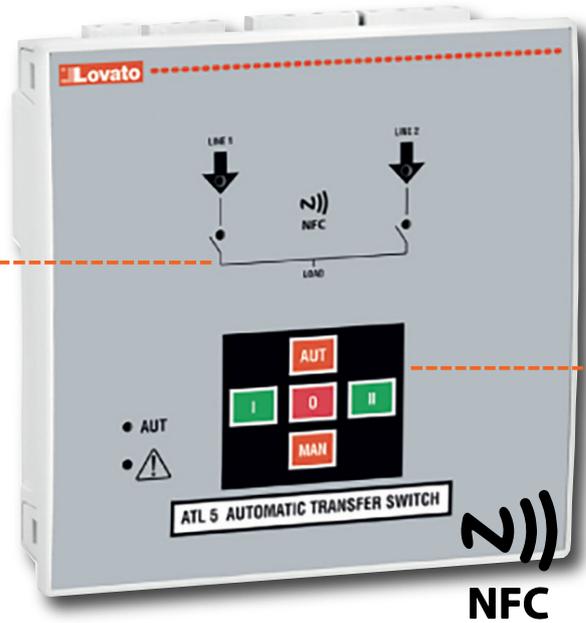
## 26 Automatic transfer switch controllers

For 2 power sources  
ATL 500

# SIMPLE AND READY TO USE

### SYNOPTIC

The frontal synoptic provides a simple and clear view of the status of the plant, signaling with LEDs the status of the power sources and the status of the changeover devices.

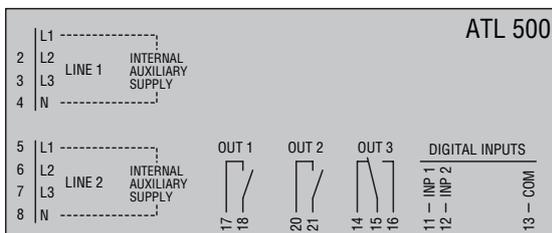


### FRONTAL KEYBOARD

With the frontal keyboard it is possible to select the operating mode (manual or automatic) and command manually the switching between the power sources directly with the buttons I-O-II on the front, without need to program any setting on the controller.

### SELF-SEEKING POWER SUPPLY

ATL 500 has a self-seeking power supply, which automatically selects the best of the two available power sources for the internal supply, taken directly from the two measuring inputs (rated voltage 110...240VAC L-N), without the need of an external circuit or dual power supply module for the selection of the power for the auxiliary supply.



### THREE-PHASE WITH NEUTRAL VOLTAGE MONITORING INPUTS

ATL 500 is provided with three-phase with neutral voltage monitoring inputs for a complete monitoring of the voltage and frequency of both power sources. The controller can be configured to be used in three-phase with neutral, single-phase or two-phase systems.

### PROGRAMMABLE DIGITAL INPUTS AND OUTPUTS

The function of the programmable digital inputs and outputs can be configured via NFC to satisfy different application needs.

### HIGH PROTECTION DEGREE

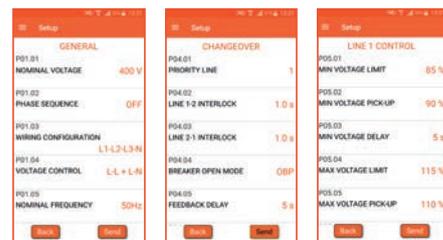
The controller front and the optional frame seal have been designed to warrant an IP65 protection degree.

### NFC CONNECTION

ATL 500 is provided with built-in NFC connectivity for the programming via Android smart devices (smartphone and tablets) with the LOVATO NFC App in a simple, fast and innovative way, which does not need any connection cable and is able to operate even without power supply on the controller.

With the LOVATO NFC App it is possible to configure:

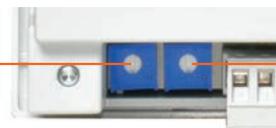
- system parameters: rated system voltage, rated frequency, type of wiring, voltage control mode, etc.
- password for the protection of the access to the settings
- changeover settings: priority line selection, interlock times, feedback delays, etc.
- protection thresholds and tripping delays: min/max voltage, min/max frequency, phase sequence, asymmetry
- function of the programmable digital inputs and outputs
- function of the potentiometers
- alarms properties.



### POTENTIOMETERS

ATL 500 is provided with two potentiometers on the back, one for each power source, which can be used for the manual setting of the line presence delays (default setting) or to set the tripping delays of the protection thresholds, in alternative to the setting via NFC. The function of the potentiometers can be modified with the LOVATO NFC App.

LINE 1  
0...60sec



LINE 2  
0...60sec

## 26 Automatic transfer switch controllers

For 2 power sources  
ATL 600 - ATL 601 - ATL 610

# NON-STOP CONTROL!

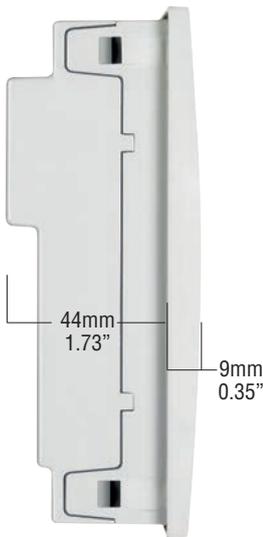
- **BACKLIT GRAPHIC LCD DISPLAY**  
128x80 pixel, with excellent legibility with adjustable brightness and display of events, alarms and measurements in 5 languages: English, Italian, French, Spanish and German.



- **OPTICAL COMMUNICATION PORT**

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

- **COMPACT SIZE**



**Slim frame profile** and reduced total depth simplify installation of the transfer switch controller also in very compact electric panels.

- **HIGH PROTECTION DEGREE**  
The controller front and the optional frame seal have been designed to warrant an **IP65** protection degree.
- **MAINTENANCE COUNTERS**  
ATL features two counters used for maintenance; the first monitors the operating time and the second counts the number of switching operations. Exceeding the limit set on the counters activates the corresponding alarm.

- **FIXING SYSTEM**



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

- **STATISTICS AND EVENTS**  
The recorded statistical data is available to the user for understanding how the system operates. A cyclical internal memory records up to 100 events.
- **EMERGENCY DEMAND SUPERVISION FOR STANDBY GENERATING SET**  
In applications where one of the two supply sources is a generating set, the transfer switch controller has specific functions to supervise the generator starting and stopping operations.

- **INPUTS, OUTPUTS, INTERNAL VARIABLES, COUNTERS**

The inputs and outputs can be configured by the user to manage the various application requirements. Also available to the user are limit thresholds, counters, user alarms and remote control variables (ATL 610 only) to customise the control functions. The limit and counter statuses, if enabled, are shown in the appropriate pages on the display.

- **CALENDAR CLOCK (ATL 610)**

Built-in calendar-clock with backup reserve power.

- **DUAL POWER SUPPLY (ATL 610)**

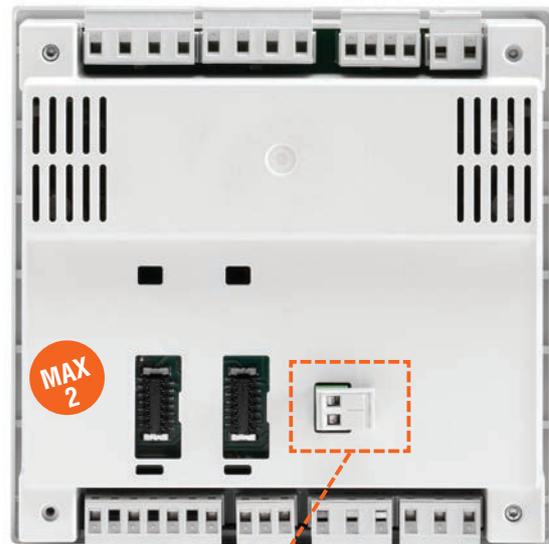
110...240VAC and 12/24VDC supply.

- **EXPANDABILITY (ATL 610)**

Basic functions of the transfer switch controllers can be easily extended using EXP series expansion modules:

- Relay outputs
- Digital and analogue inputs and outputs
- Opto-isolated RS232 interface
- Opto-isolated RS485 interface
- Opto-isolated Ethernet interface.

Using modules dedicated to communications the device can be controlled and supervised by the **Synergy** and **Synergy** softwares and controlled remotely and configured with the **Xpress** software.



12/24VDC battery supply input

## VERSATILE CONFIGURATION



### ATL 800

- Management of 2 energy sources and 1 tie breaker.
- 6 preconfigured system layouts.
- Non-priority load management.
- Management of transition with brief parallel configuration.
- RS485 built-in.
- Built-in NFC technology for parameter settings with App **NFC**.
- App and software: **Synergy**, **Synergy Xpress**, **Sam1.NFC**.



#### ● GRAPHIC LCD AND 8 LANGUAGE TEXT

The backlit graphic display simplifies the user interface and permits good visibility in environments with poor lighting. For ATL 800 and ATL 900 the texts are available in 8 languages: English, Italian, French, Spanish, German, Portuguese, Polish and Russian. The new interface allows the user to see, clearly and simply:

- System status
- Measurements
- Statistical data
- Threshold control
- Alarm pop-up windows.



#### ● MAINTENANCE COUNTERS

Two counters can be used for scheduling maintenance on the transfer systems installed: the first for recording the operating time and the second for monitoring the number of switching operations. Exceeding the limit set on the counters activates the corresponding alarm.

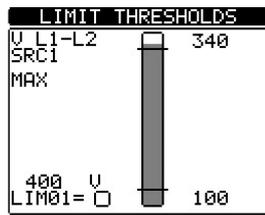


#### ● INPUTS, OUTPUTS, INTERNAL VARIABLES, COUNTERS

The input and output functions are preconfigured with the most frequently used settings; the user can easily modify the predefined configuration and adapt the switch to their application requirements. All the inputs and outputs can be configured. There are various types of programmable internal variables:

- Limit thresholds
- Remote control variables
- User alarms
- Programmable counters
- Timer.

The limit, counter and enabled timer statuses are available for display on dedicated pages.



#### ● HIGH PROTECTION RATING

The controller front and the frame seal have been designed to warrant an **IP65** protection degree.

#### ● STATISTICS AND EVENTS

The statistical data recorded by the transfer switch controller is available to the user for analysing the performance of the switching system. A cyclical internal memory records up to 250 events, providing useful information on the history of the system controlled.

#### ● BUILT-IN CALENDAR CLOCK

A built-in calendar clock with backup reserve energy permits each event to be identified using the time and date on which it occurred.

#### ● BUILT-IN RS485 COMMUNICATION

Thanks to the built-in RS485 communication port, ATL 800 and ATL 900 are already set up for remote supervision and control. In addition to this communication port, the user can install two further types of communication from those available in the EXP... expansion modules.

#### ● DUAL AC/DC SUPPLY

ATL switches can deal with all supply solutions demanded by the market. The best and safest solution is the simultaneous use of AC and DC supply. The switches can then be supplied by the AC line available and, during switching, in the absence of the AC line, the switch will be supplied by the battery via the DC inputs. Non-stop control! AC supply ensures supply during system monitoring and DC supply guarantees constant supply during switching.

#### ● PROGRAMMABLE PLC LOGIC

With the built-in PLC functions, new switching logic can be defined through appropriate combinations of input, output and internal variable signals.

#### ● TIMER

8 timer variables are available for use in the system's PLC logic, in combination with the outputs or user alarms. Each timer variable has an input variable that controls it. When this variable changes state, so does the timer variable, but it remains in the new state only for the time specified then returns automatically to the starting condition.

#### ● NFC CONNECTION

Programming the parameters via tablet and smartphone is now possible also through NFC wireless technology. Bringing a smartphone or tablet with NFC connection enabled close to the display of the ATL 800-900 activates the **NFC** App and the switch connected is recognised automatically. It will then be possible to modify the parameters and program the ATL.

#### ● USB AND WI-FI COMMUNICATION INTERFACES

ATL 800 and ATL 900 feature a front optical port for programming via optional USB (CX 01) or Wi-Fi (CX 02) communication interface. Advantages:

- Not necessary to disconnect the supply from the panel to connect to the switch
- Electrical safety (no physical connection)
- Convenience of operating on the front.

## 26 Automatic transfer switch controllers

For 2 and 3 power sources  
ATL 800 - ATL 900

# FULL OPTIONAL, FOR EVERY REQUIREMENT

### ATL 900

- Management of 3 energy power sources and 2 tie breakers.
- 4 current inputs for the three-phases and neutral.
- 14 preconfigured system layouts.
- Non-priority load management.
- Management of transition with brief parallel configuration.
- RS485 built-in.
- Built-in NFC technology for parameter settings with App **NFC**.
- App and software: **Synergy**, **Synergy<sub>Cloud</sub>**, **Xpress**, **Sam1**, **NFC**.



#### ● WI-FI COMMUNICATION INTERFACE (VIA CX 02)

This connection can be used to:

- Copy the parameters

All the parameters of the ATL can be saved in the CX 02 memory and if necessary loaded back into the same device (backup function) or a new switch (replication of the configuration).

- Clone the device settings

In addition to copying the parameters, the current values of the statistical data, counters and events can be saved in the memory in order to completely replicate an ATL on another device of the same type or restore the ATL to a previously saved state.

#### THREE TYPES OF TRANSITION AVAILABLE

##### Open transition

The switch transfers the load between the two sources, interrupting the supply for a period of time that can be programmed by the user.

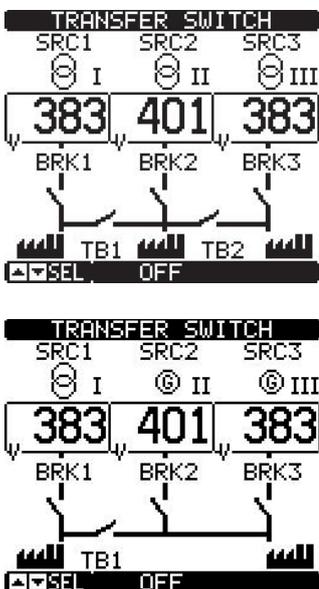
##### In-phase transition

The switch transfers the load between the two sources, interrupting the supply for a period of time that can be programmed. In this case the load is passed to a new source if spontaneous synchronisation is found; the amplitude, phase and frequency of the two sources must not differ from the maximum value set.

##### Closed transition

With switches and external protections, configured appropriately, the two sources will be synchronised (where possible) or spontaneous synchronisation will be expected within a limit time. In presence of all synchronisation conditions the load will be transferred with closed transition and instantaneous parallel without interrupting supply.

#### ATL 900: Management of three sources and two tie breakers



A single transfer switch controller can be used to manage applications which in the past required several transfer switch controllers in a cascade connection. 24 system layouts are available.

##### 4 current inputs

The current inputs permit the monitoring of the demand load and defining of the correct switching strategy. Knowing the power demanded by the system and the rated power of the sources, ATL 900 can select the best source available that can supply the loads correctly.

#### ● EXPANDABILITY

ATL 800 and ATL 900 functionality can be extended thanks to the EXP... series expansion modules. Three expansion slots are available, and while the switch is restarting the modules are recognised and configured entirely automatically. The following EXP... modules are available:

- Digital I/O modules
- Analogue I/O modules
- USB, RS232, RS485, Ethernet and Profibus communication modules
- GPRS/GSM modem

Since the additional modules are shared with other LOVATO Electric products, it is possible to save in management costs, guaranteeing flexibility and ease of installation, above all when the system has already been commissioned.



EXP10...



MAX 3

### Non expandable modular



ATL 100

Order code	Description	Qty per pkg	Wt
		n°	[kg]
ATL 100	Automatic transfer switch controller for 2 power sources with single-phase control, modular housing, 110...230VAC supply	1	0.300

### Non expandable flush-mount



ATL 500

**new**

NFC



Order code	Description	Qty per pkg	Wt
		n°	[kg]
ATL 500	Automatic transfer switch controller with NFC technology and synoptic, for 2 power sources with three-phase control (144x144mm/5.7x5.7"), self-seeking power supply 110...240VAC	1	0.580

#### General characteristics ATL 100

ATL 100 is a single-phase automatic transfer switch controller in modular housing. It monitors 2 single-phase voltage inputs and it connects to the output the line that is within the limits. The priority line is the line 1. The 2 outputs can control contactors or motorized changeover switches to perform the transfer between the lines.

#### Operational characteristics ATL 100

- Self-powered
- Input voltage range: 80...300VAC
- Frequency range: 45...66Hz
- 2 relay outputs with 1 NO contact 4A 250VAC
- 1 relay output with 1 NO contact 3A 250VAC.

#### General characteristics ATL 500

ATL 500 is an automatic transfer switch controller for the automatic or manual switching of the load from the MAIN LINE to a stand-by or emergency SECONDARY LINE and vice versa.

With the integrated outputs it is possible to control contactors or motorised changeover switches.

The main features are:

- Self-seeking power supply from the two measurement inputs
- Measurement inputs for three-phase + neutral voltage values, also suitable for 1 and 2 phase lines
- Synoptic on front with LEDs for a simple and clear visualisation of the status of the lines and the changeover devices
- Parameter programming via NFC technology and App LOVATO **NFC** (rated system parameters, line control settings, changeover settings, password and I/O functions)
- Frontal keyboard for the selection of the operating mode and the manual command of the changeover devices
- 2 programmable digital inputs
- 3 programmable relay outputs
- Potentiometers on the back for the manual setting of the line presence delays or the tripping delays of the protection thresholds.

#### Operational characteristics ATL 500

- Power supply:
  - Self-seeking power supply from the measurement inputs 110...240VAC L-N (range: 90...300VAC L-N)
- Voltage measurement inputs:
  - Rated voltage Ue: 110...240VAC L-N / 190...415VAC L-L
  - Measuring range: 90...300VAC L-N / 155...519VAC L-L
  - Frequency range: 45...65Hz
- Programmable digital inputs:
  - Negative inputs
- Programmable relay outputs:
  - 2 each with 1 normally open contact (NO - SPST) rated 8A 250VAC
  - 1 with 1 changeover contact (NO/NC - SPDT) rated 8A 250VAC
- Enclosure:
  - Flush-mount housing: 144x144mm/5.7x5.7"
  - IEC degree of protection: IP40 on front; IP65 with optional seal EXP80 01; IP20 at rear.

#### Certifications and compliance

Certifications (pending): ReTie (only for ATL 500).  
 Certifications obtained: EAC, RCM (only for ATL 500).  
 Compliant with standards: IEC/EN 61010-1, IEC/EN 61010-2-030, IEC/EN 60947-1, IEC/EN 60947-6-1, IEC/EN 61000-6-2, IEC/EN 61000-6-3.

### Non expandable



ATL 600

Order code	Description	Qty per pkg	Wt
		n°	[kg]
ATL 600	Automatic transfer switch controller with LCD display and optical port for 2 power sources with three-phase control (144x144mm/5.7x5.7"), 110...240VAC supply	1	0.600
ATL 601	Automatic transfer switch controller with LCD display and optical port for 2 power sources with three-phase control (144x144mm/5.7x5.7"), 12...24VDC supply	1	0.600

**new**

### Expandable with EXP... modules



ATL 610

Order code	Description	Qty per pkg	Wt
		n°	[kg]
ATL 610	Automatic transfer switch controller with LCD display and optical port for 2 power sources with three-phase control (144x144mm/5.7x5.7"), 110...240VAC supply and 12/24VDC, expandable with EXP... series modules	1	0.680



EXP10...

Order code	Description
EXPANSION MODULES FOR ATL 610 Snap on fixing of two modules on ATL 610 rear. Inputs and outputs.	
EXP10 00	4 opto-isolated digital inputs
EXP10 01	4 opto-isolated static outputs
EXP10 02	2 digital inputs and 2 static outputs, opto-isolated
EXP10 03	2 relay outputs with changeover contact 5A 250VAC
EXP10 06	2 relay outputs, normally open contact 5A 250VAC
EXP10 07	3 relay outputs, normally open contact 5A 250VAC
EXP10 08	2 opto-isolated digital inputs and 2 5A relay outputs 250VAC
Communication ports.	
EXP10 10	Opto-isolated USB interface
EXP10 11	Opto-isolated RS232 interface
EXP10 12	Opto-isolated RS485 interface
EXP10 13	Opto-isolated Ethernet interface
EXP10 14	Opto-isolated Profibus-DP interface

### EXP... expansion modules fixing on ATL 610



**MAX 2**

### General characteristics ATL 600 - ATL 601 - ATL 610

The automatic transfer switch controllers ATL 600 / ATL 601 / ATL 610 are used for the automatic or manual switching of the load from the MAIN LINE to a stand-by or emergency SECONDARY LINE and vice versa. They have two outputs for the "automatic" and/or "manual" control of contactors or motorised circuit breakers and switches.

The main features are:

- Supply input:
  - Single in AC for ATL 600
  - Single in DC for ATL 601
  - Dual in AC and DC for ATL 610
- Measurement inputs for three-phase + neutral voltage values; also suitable for 1 and 2 phase lines
- 128x80 backlit graphic LCD to view measurements, events and alarms in 5 languages (English, Italian, French, Spanish and German)
- 2 status indication LEDs
- 6 programmable digital inputs
- 7 programmable relay outputs
- Viewing of L-L and L-N voltage values of the controlled lines
- Status viewing of contactor or motorised circuit breakers and switches
- Configuration programming of lines, control and supervision parameters for emergency demand of generating set
- Event logging
- Microprocessor supervision of functions; including virtual real time clock for ATL 610
- Communication interface by front optical port with CX 01 or CX 02 dongle using USB or Wi-Fi
- Compatible with **Synergy** and **Synergy<sub>Cloud</sub>**, supervision and energy management software, **Xpress** remote control and configuration software and with the **Sam1** application for Android/iOS
- Modbus-RTU, ASCII and TCP communication protocol.

### CONTROL FUNCTIONS OF THE LINES

- Phase sequence and phase loss
- Minimum and maximum voltage
- Voltage asymmetry
- Minimum and maximum frequency.

### Operational characteristics ATL 600 - ATL 601 - ATL 610

- Power supply:
  - Power supply voltage: 110...240VAC (ATL 600); 12/24VDC (ATL 601); 110...240VAC (ATL 610)
- Voltage measurement inputs:
  - Rated voltage Ue: 100...480VAC (L-L)
  - Measuring range: 50...576VAC (L-L)
  - Frequency range: 45...65Hz
- Programmable digital inputs:
  - Negative inputs
- Programmable relay outputs:
  - 6 each with 1 normally open contact (NO - SPST) rated 8A 250VAC
  - 1 with changeover contact (NO/NC - SPDT) rated 8A 250VAC
- Enclosure:
  - Flush-mount housing: 144x144mm/5.7x5.7"
  - IEC degree of protection: IP40 on front; IP65 with optional seal EXP80 01; IP20 at rear.

### Certifications and compliance

Certifications obtained: cULus, RCM (only for ATL 600 - ATL 610), EAC.  
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-6-1, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL508, CSA C22.2 n° 14.

### Expandable with EXP... modules



ATL 800



EXP10...

Order code	Description	Qty per pkg	Wt
		n°	[kg]
ATL 800	Automatic transfer switch controller (240x180mm/9.45"-7.09") with LCD display, optical port and NFC for 2 lines control and 1 tie breaker, 110...240VAC supply and 12/24/48VDC, expandable with EXP... series modules	1	1.000

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

EXPANSION MODULES.  
Snap on fixing of three modules on rear of ATL 800.  
Digital inputs and outputs.

EXP10 00	4 opto-isolated digital inputs
EXP10 01	4 opto-isolated static outputs
EXP10 02	2 digital inputs and 2 static outputs, opto-isolated
EXP10 03	2 relay outputs 5A 250VAC
EXP10 06	2 relay outputs, normally open contact 5A 250VAC
EXP10 07	3 relay outputs, normally open contact 5A 250VAC
EXP10 08	2 opto-isolated digital inputs and 2 5A relay outputs 250VAC

Analogue inputs and outputs.

EXP10 04	2 opto-isolated analogue inputs 0/4...20mA or PT100 or 0...10V or 0...+5V
EXP10 05	2 opto-isolated analogue outputs 0/4...20mA or 0...10V or 0...+5V

Communication ports.

EXP10 10	Opto-isolated USB interface
EXP10 11	Opto-isolated RS232 interface
EXP10 12	Opto-isolated RS485 interface
EXP10 13	Opto-isolated Ethernet interface
EXP10 14	Opto-isolated Profibus-DP interface

### EXP... expansion module fixing on ATL 800



MAX 3

### General characteristics

The automatic transfer switch controller ATL 800 is used for the automatic or manual switching of the load between two lines in accordance with the selected switching logic. It has outputs for the "automatic" and/or "manual" control of contactors or motorised circuit breakers and switches. It can also manage a third control device as tie breaker or non-priority load management. The layout and system status are displayed directly on the graphic LCD.

The main features are:

- AC and DC supply inputs
- Measurement inputs for three-phase + neutral voltage values; also suitable for 1 and 2 phase lines
- 128x80 backlit graphic LCD to view measurements, events and alarms in 8 languages (English, Italian, French, Spanish, German, Portuguese, Polish and Russian)
- Active operating mode indicator LED
- Viewing of L-L and L-N voltage values of the controlled lines
- Viewing the status of contactors or motorised circuit breakers both via display and LED
- 6 system layouts available
- Management of a tie breaker
- 8 programmable digital inputs
- 7 programmable relay outputs
- Viewing of L-L and L-N voltage values of the controlled lines
- Configuration programming of lines, type of source (line/generator), control and supervision parameters for emergency demand of generating set
- Possibility of transferring load with closed transition and spontaneous or controlled genset synchronisation
- Non-priority load management
- Built-in programmable PLC logic
- Built-in RS485 communication
- Event logging
- Virtual calendar clock (RTC)
- Communication interface by front optical port with CX 01 or CX 02 dongle using USB or Wi-Fi
- Parameter programming via NFC technology and the App **NFC**
- Compatible with **Synergy** and **Synergy.com**, supervision and energy management software, **Xpress** remote control and configuration software and with the **Sam1** application for Android/iOS
- Modbus-RTU, ASCII and TCP communication protocol.

### CONTROL FUNCTIONS OF THE LINES

- Phase sequence and phase loss
- Minimum and maximum voltage
- Voltage asymmetry
- Minimum and maximum frequency.

### Operational characteristics

- Power supply:
  - Power supply voltage: 100...240VAC; 12/24/48VDC
- Voltage measurement inputs:
  - Rated voltage Ue: 100...600VAC (L-L)
  - Frequency range: 45...65Hz
- Programmable digital inputs:
  - Negative inputs
- Programmable relay outputs:
  - 2 each with 1 normally open contact (NO - SPST) rated 12A 250VAC
  - 2 each with 1 normally open contact (NO - SPST) rated 8A 250VAC
  - 3 each with 1 changeover contact (NO/NC - SPDT) 8A 250VAC
- Enclosure:
  - Flush-mount housing: 180x240mm/5.7x5.7"
  - IEC degree of protection: IP65 on front; IP20 at back.

### Certifications and compliance

Certifications obtained: cULus, EAC, RCM.  
Compliant with standards: IEC/EN 61010-1, IEC/EN 61010-2, IEC/EN 61000-6-2, IEC/EN 61000-6-4, IEC/EN 60947-1, IEC/EN 60947-6-1, UL508 and CSA C22.2 n° 14.

### Expandable with EXP... modules



ATL 900



Order code	Description	Qty per pkg	Wt
		n°	[kg]
ATL 900	Automatic transfer switch controller (240x180mm/9.45"-7.09") with LCD display, optical port and NFC for 3 lines control and 2 tie breakers, 110...240VAC supply and 12/24/48VDC, expandable with EXP... series modules	1	1.800



EXP10...

Order code	Description
EXPANSION MODULES. Snap on fixing of three modules on rear of ATL 900. Digital inputs and outputs.	
EXP10 00	4 opto-isolated digital inputs
EXP10 01	4 opto-isolated static outputs
EXP10 02	2 digital inputs and 2 static outputs, opto-isolated
EXP10 03	2 relay outputs 5A 250VAC
EXP10 06	2 relay outputs, normally open contact 5A 250VAC
EXP10 07	3 relay outputs, normally open contact 5A 250VAC
EXP10 08	2 opto-isolated digital inputs and 2 5A relay outputs 250VAC
Analogue inputs and outputs.	
EXP10 04	2 opto-isolated analogue inputs 0/4...20mA or PT100 or 0...10V or 0...+5V
EXP10 05	2 opto-isolated analogue outputs 0/4...20mA or 0...10V or 0...+5V
Communication ports.	
EXP10 10	Opto-isolated USB interface
EXP10 11	Opto-isolated RS232 interface
EXP10 12	Opto-isolated RS485 interface
EXP10 13	Opto-isolated Ethernet interface
EXP10 14	Opto-isolated Profibus-DP interface
EXP10 15	GPRS/GSM modem

### EXP... expansion module fixing on ATL 900



MAX 3

### General characteristics

The automatic transfer switch controller ATL 900 is used for the automatic or manual switching of the load between three lines in accordance with the selected switching logic. It has outputs for the "automatic" and/or "manual" control of contactors or motorised circuit breakers and switches. It can also manage two more control devices as tie breakers or non-priority load management. It has four current inputs for managing switching with power thresholds. The layout and system status are displayed directly on the graphic LCD. The main features are:

- AC and DC supply inputs
- Measurement inputs for three-phase + neutral voltage values; also suitable for 1 and 2 phase lines
- 4 current measurement inputs
- 128x112 backlit graphic LCD to view measurements, events and alarms in 8 languages (English, Italian, French, Spanish, German, Portuguese, Polish and Russian)
- Active operating mode indicator LED
- Viewing of L-L and L-N voltage values of the controlled lines
- Viewing the status of contactors or motorised circuit breakers both via display and LED
- 6 system layouts available
- Management of a tie breaker
- 12 programmable digital inputs
- 10 programmable relay outputs
- 1 static output
- Viewing of L-L and L-N voltage values of the controlled lines
- Configuration programming of lines, type of source (line/generator), control and supervision parameters for emergency demand of generating set
- Possibility of transferring load with closed transition and spontaneous or controlled genset synchronisation
- Non-priority load management
- Built-in programmable PLC logic
- Built-in RS485 communication
- Event logging
- Virtual calendar clock (RTC)
- Communication interface by front optical port using USB CX 01 or Wi-Fi CX 02 dongle
- Parameter programming via NFC technology and the App **NFC**
- Compatible with **Synergy** and **Synergy**, supervision and energy management software, **Xpress** remote control and configuration software and with the **Sam1** application for Android/iOS
- Modbus-RTU ASCII and TCP communication protocol.

### CONTROL FUNCTIONS OF THE LINES

- Phase sequence and phase loss
- Minimum and maximum voltage
- Voltage asymmetry
- Minimum and maximum frequency.

### Operational characteristics

- Power supply:
  - Power supply voltage: 100...240VAC; 12/24/48VDC
- Voltage measurement inputs:
  - Rated voltage Ue: 100...600VAC (L-L)
  - Frequency range: 45...65Hz.
- Programmable digital inputs:
  - Negative inputs
- Programmable relay outputs:
  - 3 each with 1 normally open contact (NO - SPST) rated 12A 250VAC
  - 3 each with 1 normally open contact (NO - SPST) rated 8A 250VAC
  - 4 each with 1 changeover contact (NO/NC - SPDT) 8A 250VAC
  - 1 30VDC 50mA static output
- Enclosure:
  - Flush-mount housing: 180x240mm/5.7x5.7"
  - IEC degree of protection: IP65 on front; IP20 on back.

**Synergy**, **Synergy**, **Xpress**, **Sam1** and **NFC** software and App

See section 29.

### EXP expansion modules

See page 30-2.

### Certifications and compliance

Certifications obtained: cULus, EAC, RCM. Compliant with standards: IEC/EN 61010-1, IEC/EN 61010-2, IEC/EN 61000-6-2, IEC/EN 61000-6-4, IEC/EN 60947-1, IEC/EN 60947-6-1, UL508 and CSA C22.2 n° 14.



ATP...

Order code	Operating current AC1	Power (400V)	Dimensions (HxWxD)
	[A]	[kVA]	[mm (in)]
Auxiliary supply 230VAC, with four-pole contactors versions.			
<b>ATP 0045 T4 A230 C 600 A</b>	45	31	500x400x200 (19.68x15.75x7.87")
<b>ATP 0060 T4 A230 C 600 A</b>	60	42	500x400x200 (19.68x15.75x7.87")
<b>ATP 0080 T4 A230 C 600 A</b>	80	55	500x400x200 (19.68x15.75x7.87")
<b>ATP 0100 T4 A230 C 600 A</b>	100	69	500x400x200 (19.68x15.75x7.87")
<b>ATP 0125 T4 A230 C 600 A</b>	125	87	600x400x250 (23.62x15.75x9.84")
<b>ATP 0160 T4 A230 C 600 A</b>	160	111	600x400x250 (23.62x15.75x9.84")

### General characteristics

The enclosed automatic transfer switches ATP series are provided in metallic enclosure IP65, complete with automatic transfer switch controller type ATL 600, four-pole contactors BF series, dual power supply module type ATL DPS1 and miniature circuit breakers (MCB) type P1 MB for the protection of the measuring lines.

They are used for the automatic or manual switching of the load between two lines ("MAIN LINE" and "SECONDARY LINE").

They are available in versions from 45 to 160A in four-pole configuration.

### CONTROL FUNCTIONS OF THE LINES

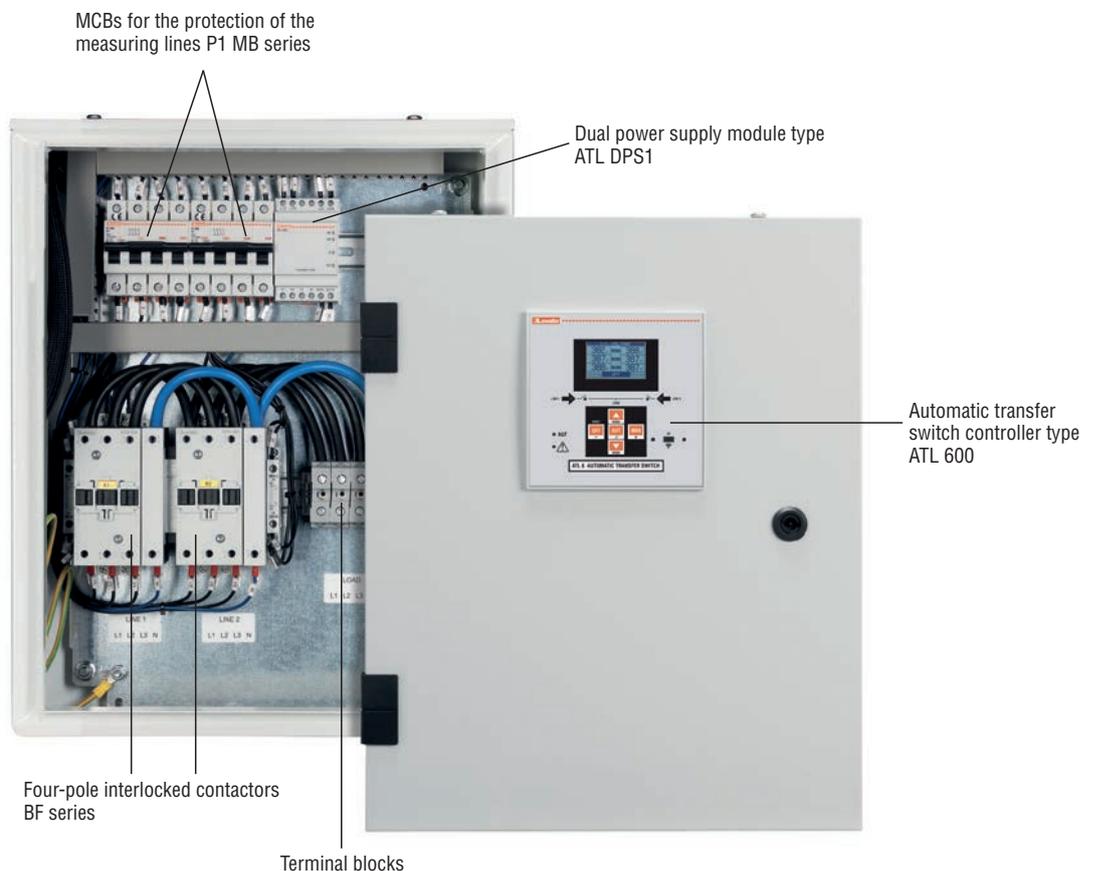
- Phase sequence and phase loss
- Minimum and maximum voltage
- Voltage asymmetry
- Minimum and maximum frequency

### Operational characteristics

- Power supply:
  - Auxiliary supply voltage: 230VAC (taken from the input lines)
- Voltage measurement inputs:
  - Rated voltage Ue: 100...480VAC (L-L)
  - Measuring range: 50...576VAC (L-L)
  - Frequency range: 45...65Hz
- 6 programmable digital inputs
- 7 programmable relay outputs:
  - 6 each with 1 normally open contact (NO-SPST) rated 8A 250VAC
  - 1 with 1 changeover contact (NO/NC - SPDT) rated 8A 250VAC
- Enclosure:
  - Metallic enclosure
  - Flanges for cable entries in the top and bottom sides
  - PVC locking system with double-comb tool insert
  - Opening with left hinges
  - IEC degree of protection: IP65.

### Compliance

Compliant with standards: IEC 60947-6-1, IEC 60947-4-1.



### Dual power supply module



ATL DPS1

Order code	Description	Qty per pkg	Wt
		n°	[kg]
<b>ATL DPS1</b>	For controlling and selecting supply for contactors 110...230VAC configurable	1	0.300

	110VAC		230VAC	
	MIN	MAX	MIN	MAX
Line absent	< 88V	> 152V	< 176V	> 288V
Line present	< 92V	> 144V	< 185V	> 273V

Using the thresholds above ATL DPS1 outputs one of the power supplies available according to the logic shown in the table:

Status Line 1	LED Line 1	Status Line 2	LED Line 2	Output	LED Output	ATL DPS1	Alarm contact	LED Fault
OK	ON	<MIN OR >MAX	OFF	ON - from line 1	ON	ON - OK	Closed	OFF
OK	ON	OK	ON	ON - from line 1	ON	ON - OK	Closed	OFF
<MIN OR >MAX	OFF	OK	ON	ON - from line 2	ON	ON - OK	Closed	OFF
<MIN	OFF	<MIN	OFF	OFF	OFF	OFF	Open	OFF
>MAX	OFF	<MIN OR >MAX	OFF	OFF	OFF	ON	Open	ON
<MIN OR >MAX	OFF	>MAX	OFF	OFF	OFF	ON	Open	ON
>MIN	ON	OK	ON	OFF	OFF	ON - Fault Internal relays	Open	ON
		<MIN OR >MAX	OFF					
OK	ON			ON	OFF	OFF	Open Internal relays	ON
<MIN OR >MAX		OFF	>MIN	ON	OFF	OFF		

### General characteristics

ATL DPS1 is capable of measuring and controlling voltages at its inputs selecting the most ideal to connect to the output. It is suitable to supply motorised circuit breakers and changeover switches in automatic switching systems of 2 three-phase supply lines.

The two voltage inputs of the module are independent and insulated; each is capable of supplying the internal measuring circuit managed by the microcontroller. It reduces the number of components and improves installation safety.

Main ATL DPS1 features include:

- Voltage value selectable via bypass terminals
- Minimum and maximum voltage tripping thresholds
- 2 single-phase L+N inputs
- 1 single-phase L+N output
- L1 priority line
- Use with motorised control units powered at 110VAC or 230VAC
- Output voltage monitoring
- Internal relay self-diagnosis
- Indicating LEDs for abnormal conditions and status of inputs and outputs.

### Operational characteristics

- Rated supply voltage: 110...230VAC configurable
- Frequency: 50/60Hz
- Input voltage range: 80...300VAC
- Voltage tripping thresholds min / max: 80% and 120% of preset value
- 2 line inputs L1-L2: Single-phase, between phase and neutral
- Current output: 4A max.
- Priority line: L1 when both input values are within limits
- Fixed delay time between line switching: 0.5s
- 4 status indication LEDs for voltage of each line within limits, voltage present at output, relay output anomaly
- Mounting: 35mm DIN rail (IEC/EN 60715) or screw-type by means of removable clips
- Modular housing, 3 module
- IEC degree of protection: IP40 on front; IP20 at rear.

### Certifications and compliance

Certifications obtained: cULus, EAC, RCM.

Compliant with standards: IEC/EN 61010-1, IEC/EN 61010-2, IEC/EN 61000-6-2, IEC/EN 61000-6-4, IEC/EN 60947-1, IEC/EN 60947-6-1, UL508 and C22.2 n° 14.

### Communication devices



CX 01



CX 02



CX 03

Order code	Description	Qty per pkg	Wt
		n°	[kg]
<b>CX 01</b>	USB/optical dongle with PC ↔ ATL 600/610/800/900 with optical port for programming data download, diagnostics and firmware upgrade	1	0.090
<b>CX 02</b>	Wi-Fi device for connecting PC ↔ ATL 600/610/800/900 with optical port for programming, data download, diagnostics and cloning	1	0.090
<b>CX 03</b>	GSM penta-band antenna (850/900/1800/1900/2100MHz) for EXP10 15 expansion module	1	0.090

### General characteristics

Communication devices for connection of LOVATO Electric products to personal computers, smartphones and tablets.

#### CX 01

The USB/optical dongle, complete with cable, allows the connection of products compatible with PCs without having to disconnect the power supply from the electric panel. The PC identifies the connection as a standard USB.

#### CX 02

By Wi-Fi connection, compatible LOVATO Electric products can be viewed on PCs, smartphones and tablets with no need for cabling.

#### CX 03

Antenna compatible with major part of worldwide mobile networks thanks to the use of 850/900/1800/1900/2100MHz frequencies. Protection rating IP67. Fixing hole Ø10mm/3.94". Cable length 2.5mm/0.10".

For dimensions, wiring schemes and technical characteristics, refer to technical instructions in Downloads of local or global websites or consult Customer Service.

[www.LovatoElectric.com](http://www.LovatoElectric.com)

### Software and accessories



51 C4



EXC CON 01



EXC M4G 01



RGK RR

**new**

Order code	Description	Qty per pkg	Wt
		n°	[kg]
<b>EXP80 01</b>	Protective seal IP65 for ATL 500/600/601/610	1	0.150
For ATL 610 - ATL 800 - ATL 900.			
<b>51 C2</b>	Connection cable PC ↔ ATL 610/800/900 with EXP10 11, length 1.8m	1	0.090
<b>51 C4</b>	Connection cable PC ↔ product RS232/RS485, length 1.8m	1	0.147
<b>EXC CON 01</b>	RS485/Ethernet converter, 12...48VDC, including kit for DIN rail fixing	1	0.400
<b>EXC M4G 01</b>	RS485 gateway/4G modem, 9...36VDC, including cable for programming	1	0.340
For ATL 900.			
<b>RGK RR</b>	Remote unit for status and alarms, 12/24 VDC, 12 relay outputs, pulse input.	1	0.420

### Software

By using the **Xpress** software, the quick setup of the switch controllers can be carried out via PC, avoiding parameter programming errors.

The parameter programming of ATL 600/610/800/900 controllers can also be PC saved and quickly uploaded into another device requiring the same programming. It permits the correct operation of the system to be checked through graphic and numerical display of the measurements and controller status.

**Synergy** and **Synergy** softwares provide for the supervision of the ATL 600/610/800/900 transfer switch controllers. 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.

See section 29 for details.

### App for smartphone and tablet

The **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 CX 02 dongle.

It is iOS and Android compatible.

For more details consult our Technical support.

For ATL 500, ATL 800 and ATL 900, featuring built-in NFC technology, the LOVATO **NFC** application is available for parameter programming.

Available only for Android devices.

See section 29 for details.

### EXC CON 01

The EXC CON 01 converter allows "Slave" devices connected on an RS485 network to interface with a "Master" featuring Ethernet port:

- Kit comprising MOXA NPORT5230 converter and DIN rail mounting accessory DK35
- Programming via web interface
- Power supply not included.

See section 30 for details.

### EXC M4G 01

The EXC M4G 01 gateway allows "Slave" devices connected on an RS485 network to interface with a "Master" via 4G network.

See section 30 for details.

### RGK RR

It is an expansion unit for remoting statuses and alarms.

RGK RR can be connected at a maximum distance of 1000m/39.37" using the static output of the ATL 900.

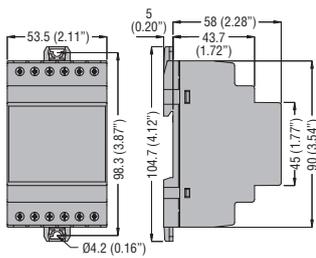
RGK RR has 12 output relays, 7 normally open (2.5A 250VAC/C38) and 5 changeover contacts (5A 250VAC/B300).

# 26 Automatic transfer switch controllers

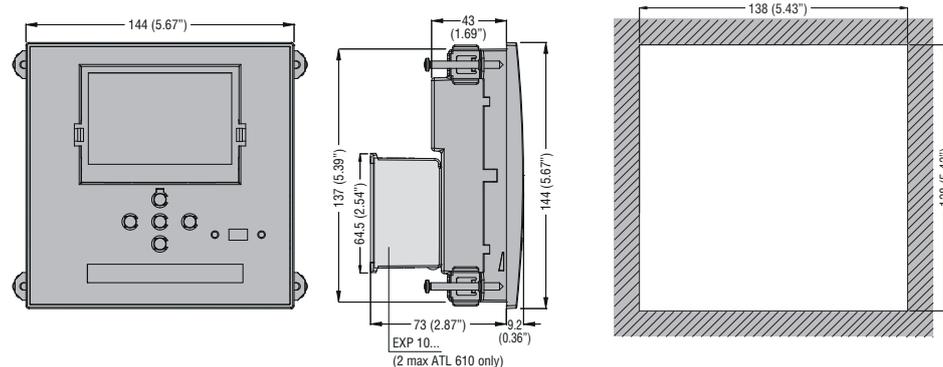
Dimensions [mm (in)]

## AUTOMATIC TRANSFER SWITCH CONTROLLERS

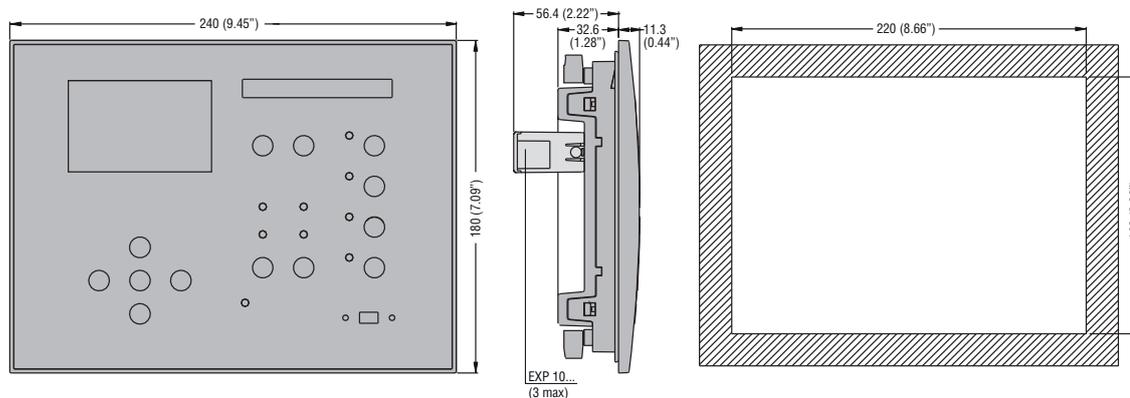
### ATL 100



### ATL 500 - ATL 600 - ATL 601 - ATL 610

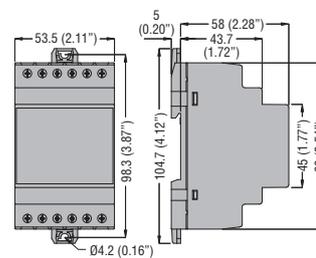


### ATL 800 - ATL 900



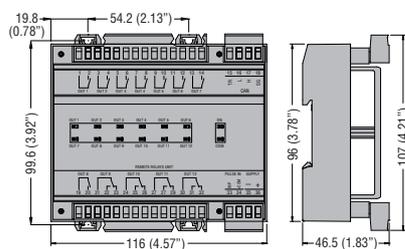
## DUAL POWER SUPPLY MODULE

### ATL DPS1

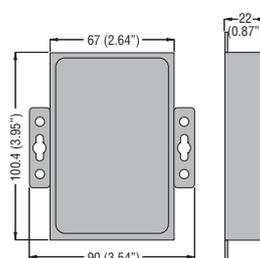


## EXPANSION UNIT

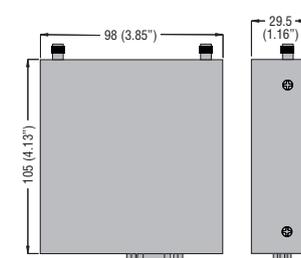
### RGK RR



### EXC CON 01

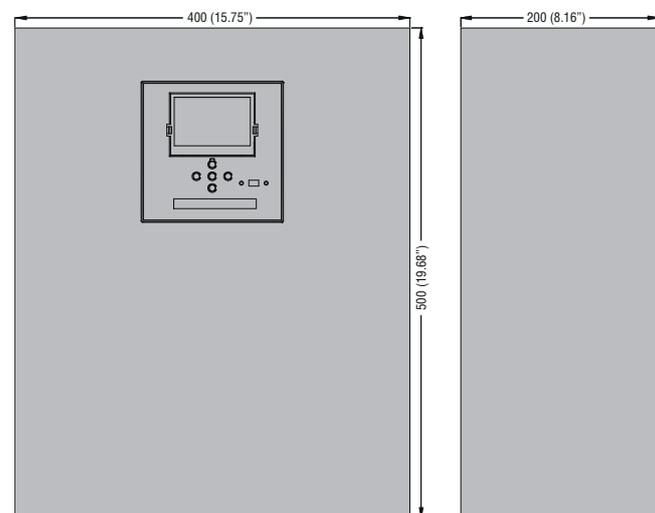


### EXC M4G 01



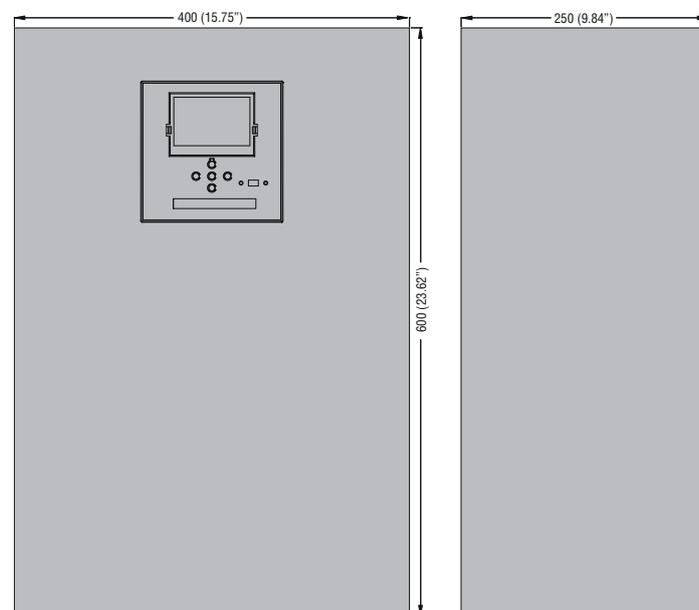
## ENCLOSED AUTOMATIC TRANSFER SWITCHES ATS

ATP 0045... - ATP 0060... - ATP 0080... - ATP 0100...



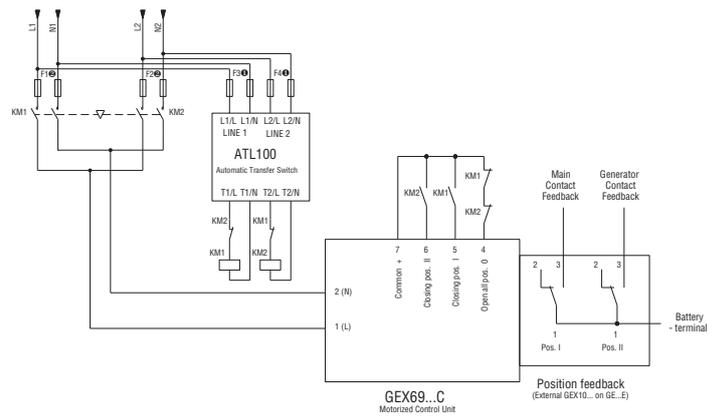
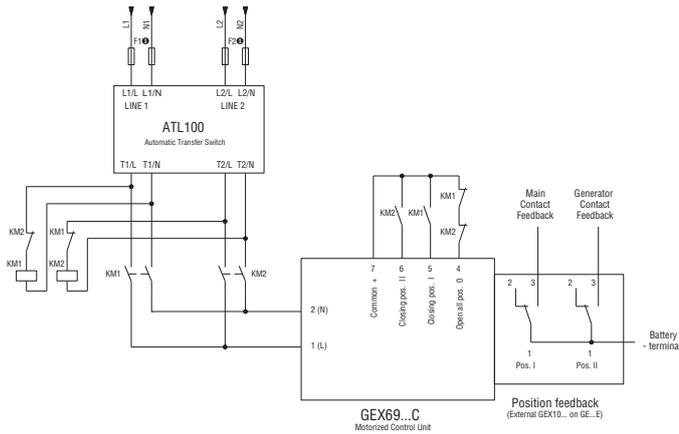
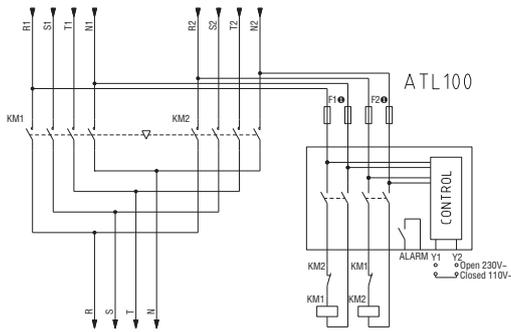
## ENCLOSED AUTOMATIC TRANSFER SWITCHES ATS

ATP 0125... - ATP 0160...



### ATL 100

Connection diagrams

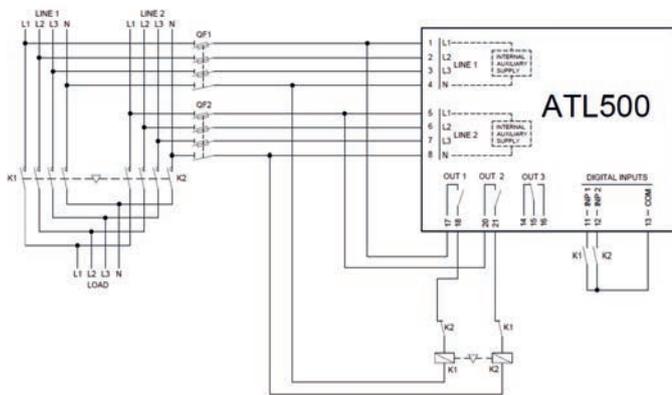


- ① 4A maximum fuses
- ② 1A maximum fuses

### ATL 500

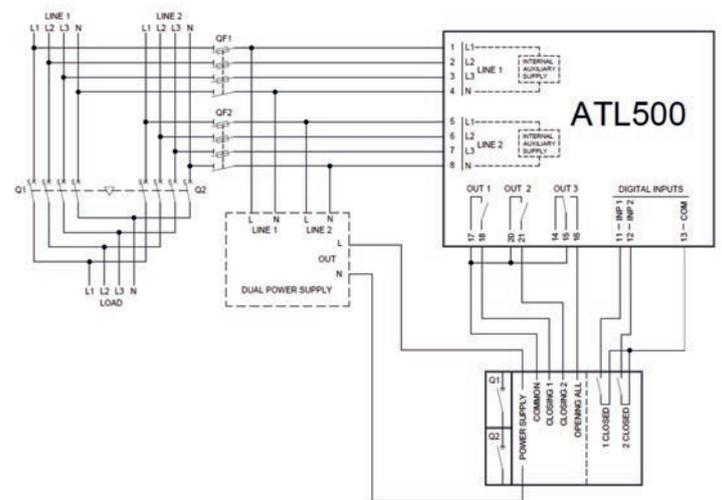
Connection diagrams

Contactors control



### Connection diagrams

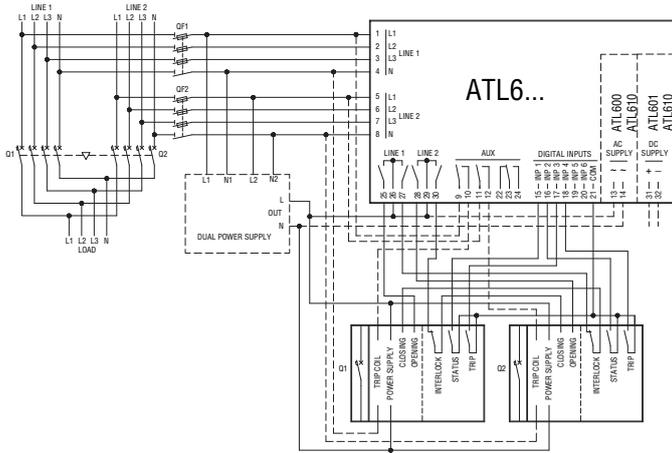
Motorised changeover switches control



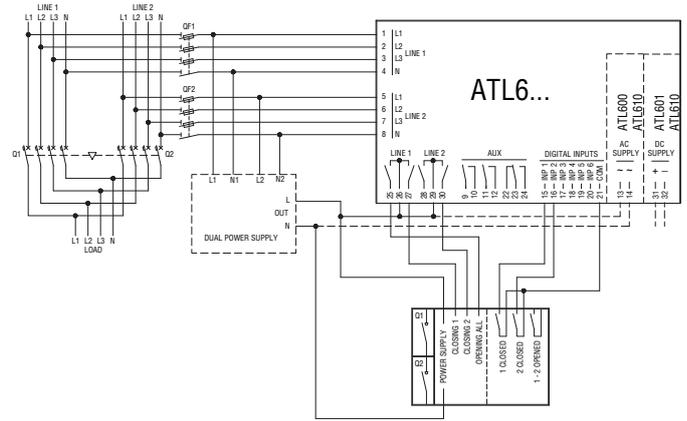
③ For the correct programming of inputs and outputs, consult the installation manuals available at [www.LovatoElectric.com](http://www.LovatoElectric.com).

### ATL 600 - ATL 601 - ATL 610 ①

Connection diagrams  
Motorised breaker control



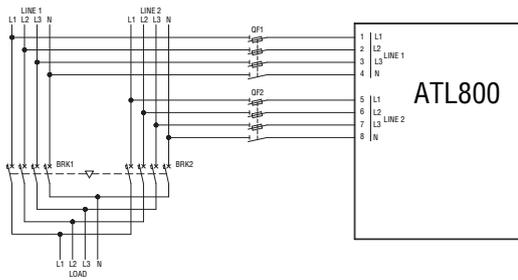
Connection diagrams  
Motorised changeover switches control



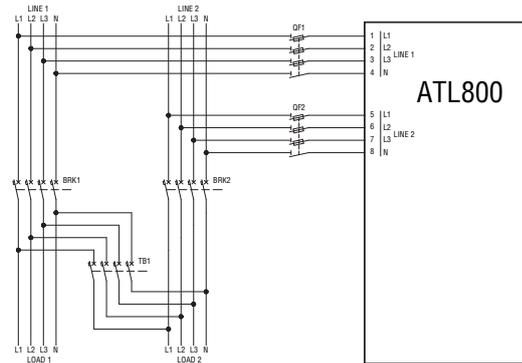
① For the correct programming of inputs and outputs, consult the installation manuals available at [www.LovatoElectric.com](http://www.LovatoElectric.com).

### ATL 800 ①

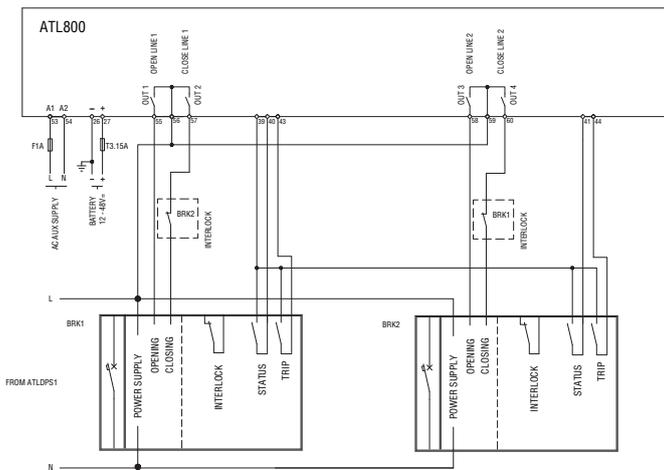
Power connection diagrams  
Two breakers



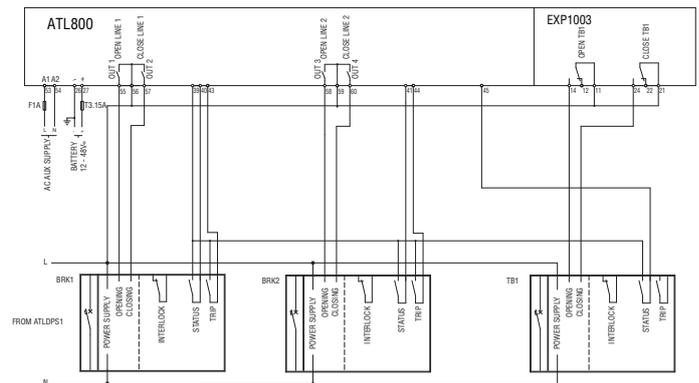
Power connection diagrams  
Two breakers and a tie breaker



Control connection diagrams  
Two breakers



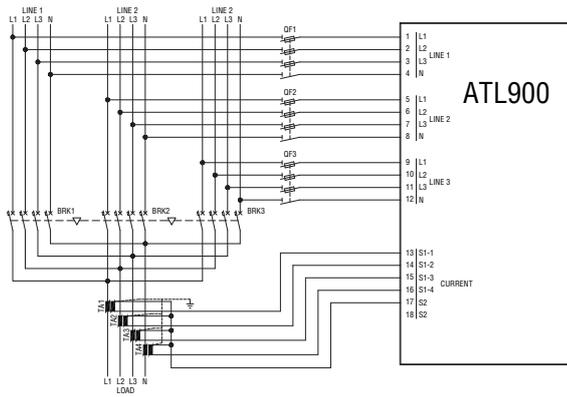
Control connection diagrams  
Two breakers and a tie breaker



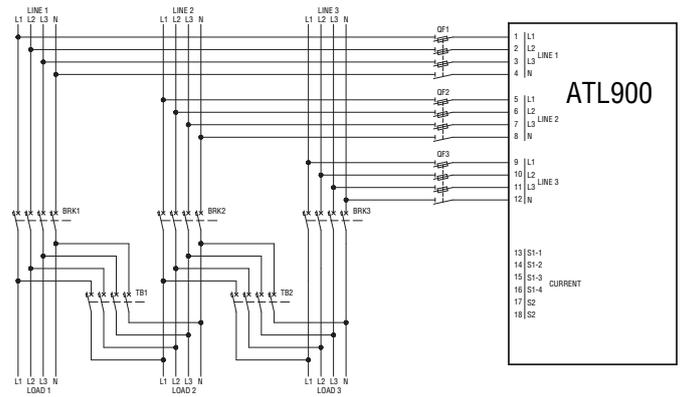
① For the correct programming of inputs and outputs, consult the installation manuals available at [www.LovatoElectric.com](http://www.LovatoElectric.com).

### ATL 900 ①

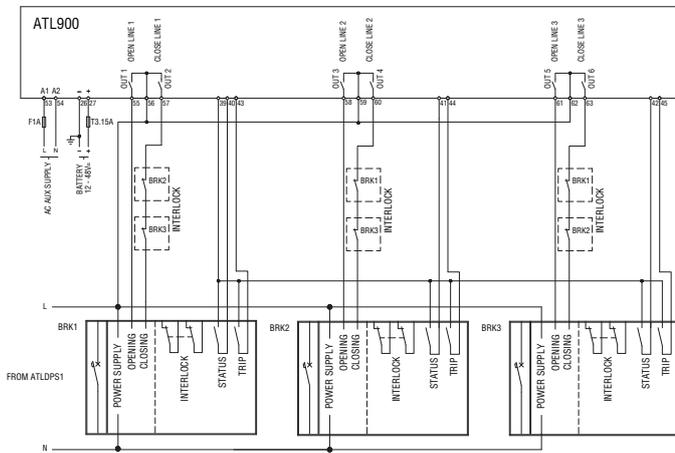
Power connection diagrams  
Three breakers



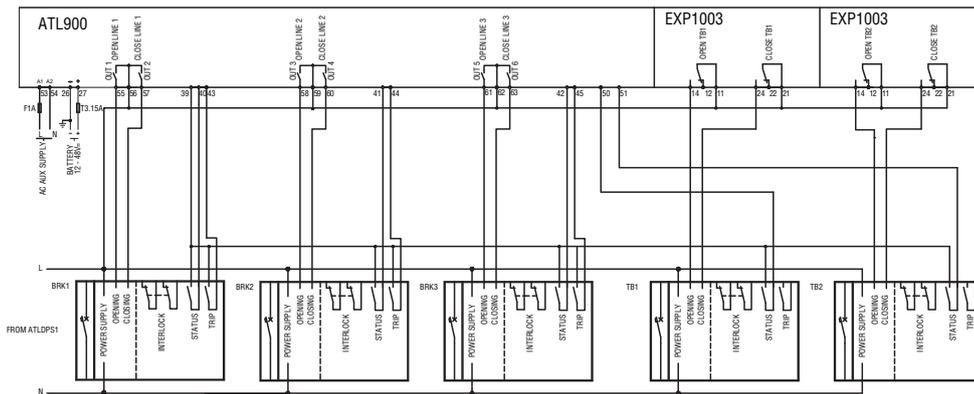
Power connection diagrams  
Three breakers and two tie breakers



Control connection diagrams  
Three breakers

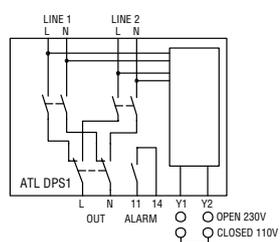


Control connection diagrams  
Three breakers and two tie breakers



### ATL DPS1 ①

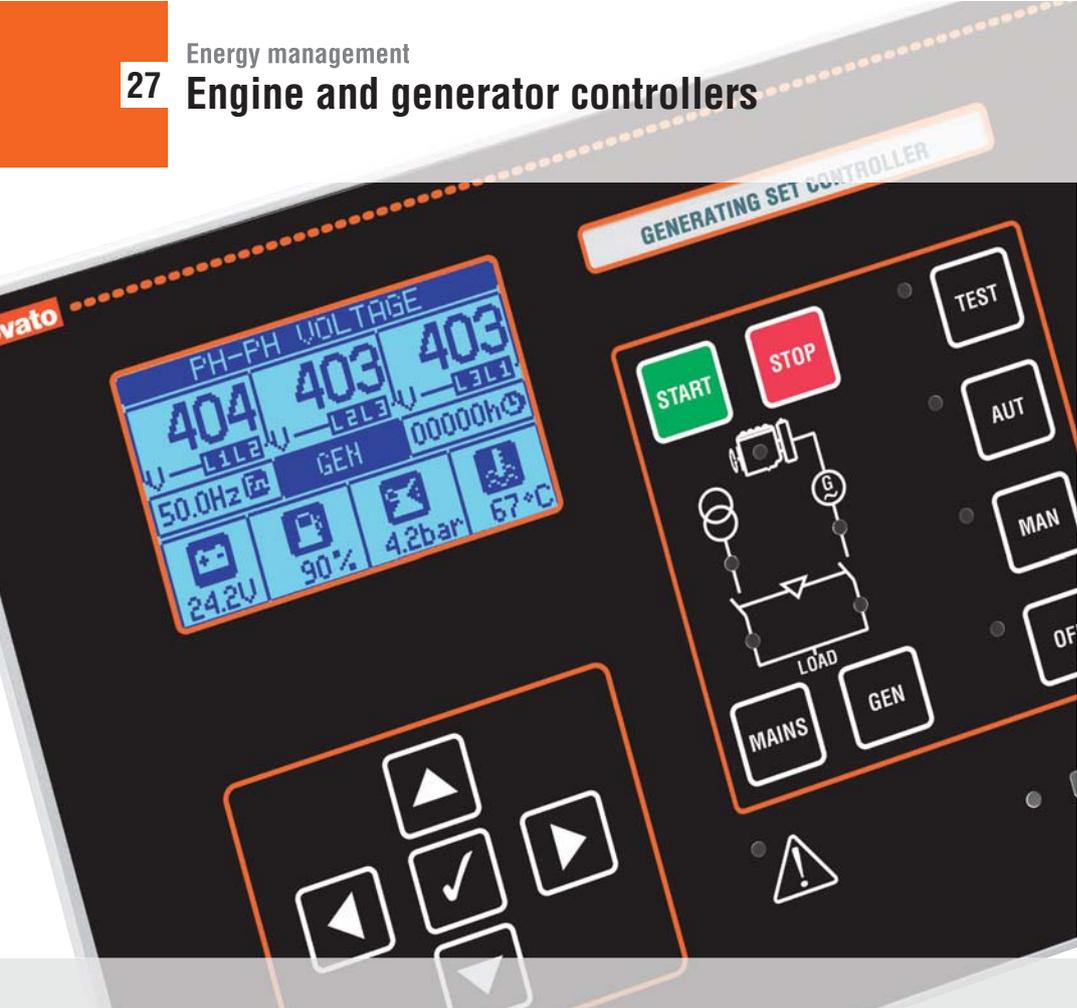
Connection diagram



① For the correct programming of inputs and outputs, consult the installation manuals available at [www.LovatoElectric.com](http://www.LovatoElectric.com).

TYPE	ATL 100	ATL 500	ATL 600 - ATL 601 - ATL 610	ATL 800	ATL 900
<b>AC POWER</b>					
IEC rated insulation Us	110...230VAC	110...240VAC	100...240VAC (ATL 600, ATL 610)	100...240VAC	100...240VAC
Operating range	80...300VAC	90...300VAC	90...264VAC (ATL 600, ATL 610)	90...264VAC	90...264VAC
Frequency	45...66Hz	45...66Hz	45...66Hz	45...66Hz	45...66Hz
Immunity time for micro-breaking	—	≤200ms (110VAC) ≤400ms (220VAC)	≤50ms (110VAC) ≤250ms (220VAC)	≤40ms (110VAC) ≤200ms (220VAC)	≤40ms (110VAC) ≤200ms (220VAC)
Immunity time for micro-breaking (with EXP expansions)	—	—	≤25ms (110VAC) ≤120ms (220VAC)	≤20ms (110VAC) ≤100ms (220VAC)	≤20ms (110VAC) ≤100ms (220VAC)
<b>DC POWER</b>					
Rated battery voltage	—	—	12-24VDC (ATL 601, ATL 610)	12-24-48VDC	12-24-48VDC
Operating range	—	—	7.5...33VDC (ATL 601, ATL 610)	7.5...57.6VDC	7.5...57.6VDC
Maximum power consumption	—	—	230mA to 12VDC e 120mA to 24VDC	400mA to 12VAC; 220mA to 24VDC; 100mA to 48VDC	510mA to 12VAC; 260mA to 24VDC; 135mA to 48VDC
Maximum power consumption/dissipation	—	—	2.9W	4.8W	6.5W
<b>VOLTMETER INPUTS</b>					
Maximum rated voltage Ue	110...230VAC	415VAC L-L (240VAC L-N)	480VAC L-L (277VAC L-N)	600VAC L-L (346VAC L-N)	600VAC L-L (346VAC L-N)
Measuring range	80...300VAC	155...519VAC L-L (300VAC L-N)	50...576VAC L-L (333VAC L-N)	50...720VAC L-L (415VAC L-N)	50...720VAC L-L (415VAC L-N)
Frequency range	45...65Hz	45...65Hz	45...65Hz	45...65Hz	45...65Hz
Measurement method	True root mean square (TRMS)	True root mean square (TRMS)	True root mean square (TRMS)	True root mean square (TRMS)	True root mean square (TRMS)
Measuring input impedance	L-N >8MΩ	>0.5MΩ L-N, >1.0MΩ L-L	>0.5MΩ L-N, >1.0MΩ L-L	>0.55MΩ L-N, >1.10MΩ L-L	>0.55MΩ L-N, >1.10MΩ L-L
Connection method	Single-phase and neutral	Single-phase, two-phase, three-phase line with neutral	Single-phase, two-phase, three-phase line with or without neutral and balanced three-phase		
<b>AMMETER INPUTS</b>					
Rated current Ie	—	—	—	—	1A~ or 5A~
Measuring range	—	—	—	—	for scale 5A: 0.02 - 6A~ for scale 1A: 0.02 - 1.2A~
Type of input	—	—	—	—	Shunt supplied by current transformer external (low voltage) 5A max.
Measurement type	—	—	—	—	True root mean square (TRMS)
Overload capacity	—	—	—	—	-20% Ie
Overload peak	—	—	—	—	50A for 1 second
Burden	—	—	—	—	<0.6VA
<b>MEASUREMENT ACCURACY</b>					
Mains and genset voltage	±0.25% f.s.	±0.25% f.s.	±0.25% f.s. ±1 digit	±0.25% f.s. ±1 digit	±0.25% f.s. ±1 digit
<b>DIGITAL INPUTS</b>					
Number of inputs	—	2	6	8	12
Type of input	—	Negative	Negative	Negative	Negative
Input current	—	<5mA	<8mA	<8mA	<8mA
Low input signal	—	≤2.6V	≤2.2V	≤2.2V	≤2.2V
High input signal	—	≥3.1V	≥3.4V	≥3.4V	≥3.4V
Input signal delay	—	≥50ms	≥50ms	≥50ms	≥50ms
<b>CALENDAR CLOCK</b>					
Backup reserve power	—	—	Backup capacitor (ATL 610)	Backup capacitor	Backup capacitor
Operation without power voltage	—	—	5 min approx. (ATL 610)	14 days approx.	14 days approx.
<b>RELAY OUTPUTS</b>					
Number of outputs	3	3	7	7	10
Configuration	- 2NO: AC1 - 4A 250VAC; 1.5A 250V~ AC15 - 1NO: AC1 - 3A 250VAC; DC1 - 3A 30VDC	- 2NO: AC1 - 8A 250VAC; AC15 - 1.5A 250VAC; - 1 changeover: AC1 - 8A 250VAC, DC1 - 8A 30VDC; AC15 - 1.5A 250VAC	- 6NO: AC1 - 8A 250VAC; AC15 - 1.5A 250VAC; B300 - 1 changeover: AC1 - 8A 250VAC, DC1 - 8A 30VDC; AC15 - 1.5A 250VAC, B300 30VDC1A Auxiliary service	- 2NO: AC1 - 12A 250VAC; AC15 - 1.5A 250VAC; B300 - 2NO: AC1 - 8A 250VAC; AC15 - 1.5A 250VAC; B300 - 3 changeover: AC1 - 8A 250VAC, DC1 - 8A 30VDC; AC15 - 1.5A 250VAC; B300 30VDC 1A Auxiliary service	- 3NO: AC1 - 12A 250VAC; AC15 - 1.5A 250VAC; B300 - 3NO: AC1 - 8A 250VAC; AC15 - 1.5A 250VAC; B300 - 4 changeover: AC1 - 8A 250VAC, DC1 - 8A 30VDC; AC15 - 1.5A 250VAC; B300 30VDC 1A Auxiliary service
Mechanical / electrical endurance	1x10 <sup>7</sup> / 1x10 <sup>5</sup> operations	1x10 <sup>7</sup> / 1x10 <sup>5</sup> operations	1x10 <sup>7</sup> / 1x10 <sup>5</sup> operations	1x10 <sup>7</sup> / 1x10 <sup>5</sup> operations	1x10 <sup>7</sup> / 1x10 <sup>5</sup> operations

TYPE	ATL 100	ATL 500	ATL 600 - ATL 601 - ATL 610	ATL 800	ATL 900
<b>STATIC OUTPUT</b>					
Output type	—	—	—	—	NO
Operating voltage	—	—	—	—	10-30V
Maximum current	—	—	—	—	50mA
<b>AMBIENT CONDITIONS</b>					
Operating temperature	-30...+70°C				
Storage temperature	-30...+80°C				
Relative humidity	<80% (IEC/EN 60068-2-78)				
Maximum pollution degree	2				
Overvoltage category	3				
Measurement category	III				
Climatic sequence	Z/ABDM (IEC/EN 60068-2-61)				
Shock resistance	15g (IEC/EN 60068-2-27)				
Vibration resistance	0.7g (IEC/EN 60058-2-6)				
<b>HOUSING</b>					
Version	Modular housing 3 modules (DIN 43880)	Flush-mount			
Material	Polyamide RAL 7035	Polycarbonate			
IEC degree of protection	IP40 on front IP20 on terminals	IP40 on front IP65 with optional gasket IP20 on terminals		IP65 on front IP20 on terminals	
Weight	300g	580g	600g (ATL 600 - ATL 601) 680g (ATL 610)	1000g	1800g
<b>CERTIFICATIONS AND COMPLIANCE</b>					
Certifications obtained	EAC	EAC, RCM, ReTie (pending)	cULus, RCM (except ATL 601), EAC		
Compliance with standards	IEC/EN 61010-1, IEC/EN 61010-2, IEC/EN 61000-6-2, IEC/EN 61000-6-4, IEC/EN 60947-1, IEC/EN 60947-6-1	IEC/EN 61010-1, IEC/EN 61010-2-030, IEC/EN 61000-6-2, IEC/EN 61000-6-3, IEC/EN 60947-1, IEC/EN 60947-6-1	IEC/EN 61010-1, IEC/EN 61010-2, IEC/EN 61000-6-2, IEC/EN 61000-6-4, IEC/EN 60947-1, IEC/EN 60947-6-1, UL508 e CSA C22.2 n°14		



- Extensive selection of functions to satisfy all application requirements
- Power supply range 12-24VDC for each single product
- Totally programmable inputs, outputs and alarms
- RS232, RS485, USB, Ethernet communication interface
- Engine control by CANbus
- Setup and supervision software
- Modem control for sending alarm messages and emails.

**Engine and generator controllers**

	<b>SEC. - PAGE</b>
Engine protection controllers .....	27 - 6
Stand alone gen-set controllers .....	27 - 7
Automatic mains failure (AMF) gen-set controllers .....	27 - 8
Paralleling controllers for mains-generator and generator-generator .....	27 - 9
Remote and alarm-status relay units .....	27 - 10
Communication devices and accessories .....	27 - 11
Software .....	27 - 12

**Dimensions** ..... 27 - 13





Page 27-6

#### ENGINE PROTECTION CONTROLLERS

- Starting with or without power key switch
- Programmable inputs and outputs
- Front LED indicators for engine alarm conditions and diagnostics.



Page 27-6

#### STAND ALONE GEN-SET CONTROLLERS

- Generator voltage and current control
- Engine protection
- Programmable inputs and outputs
- Programmable alarm properties.



Page 27-7

#### AUTOMATIC MAINS FAILURE (AMF) GEN-SET CONTROLLERS

- Automatic starting of generator and load switching to stand-by emergency source in case of mains failure
- Supervision in "open transition" for contactors, motorised circuit breakers and motorised changeover switches
- Engine protection
- Programmable inputs, outputs and alarms.



Page 27-8

#### PARALLELING CONTROLLERS FOR MAINS-GENERATOR AND GENERATOR-GENERATOR

- Mains-generator "closed transition" synchronising
- Mains-generator load sharing with source peak demand control
- Generator paralleling supervision (island mode with load sharing).



Page 27-9

#### REMOTE UNITS

- Remote viewing and control panels
- Remote annunciator for alarm and status indication
- Digital outputs for alarm and status condition remotely.



Page 27-11

#### COMMUNICATION DEVICES, ACCESSORIES AND SOFTWARE

- Communication interfaces
- Additional digital and analog inputs and outputs
- GPRS-GSM module
- Setup and supervision software
- APP.



	ENGINE PROTECTION CONTROLLERS		STAND ALONE GEN-SET CONTROLLERS			
	RGK 30	RGK 20	RGK 400SA RGK 420SA	RGK 600SA RGK 601SA	RGK 700SA	RGK 800SA
Generator voltage control	–	L-N ①	L1-L2-L3-N	L1-L2-L3-N	L1-L2-L3-N	L1-L2-L3-N
Current control	–	–	L1	L1-L2-L3	L1-L2-L3	L1-L2-L3-N
Rated frequency	–	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60/400Hz
Digital inputs n°	4	4	5 neg.+1 pos. (emergency)	4 neg.+1 pos. (emergency)	6 neg.+1 pos. (emergency)	8 neg.+1 pos. (emergency)
Digital outputs n°	2 (Relay)	3 (SSR)	5 (SSR)	6 (SSR)	3 (Relay) + 4 (SSR)	3 (Relay)+6 (SSR)+1(S0)
Engine running inputs	“D+” and “AC”	“D+”, “AC”, Hz	“D+”, Hz	“D+”, Hz	“D+”, “AC”, Hz	“D+”, “AC”, Hz
Ohmic inputs for fuel-pressure-temperature (programmable as digital inputs)	–	–	1+2 (EXP1040)	●	●	●
Remote supervision	–	–	–	–	●	●
CANbus interface	–	–	–	RGK 601SA	●	●
Rated battery voltage	12/24VDC	12/24VDC	12/24VDC	12/24VDC	12/24VDC	12/24VDC
Power supply range	9...33VDC	9...35VDC	7...33VDC	7...33VDC	7...33VDC	7...33VDC
Mains voltage control	–	–	–	–	–	–
Rated voltage range	–	10...277VAC	100...480VAC	100...480VAC	30...600VAC	30...600VAC
VT programming	–	–	●	●	●	●
Rated input current	–	–	5A/1A	5A/1A	5A/1A	5A/1A
TRMS voltage measurement	–	–	●	●	●	●
TRMS current measurement	–	–	●	●	●	●
Display	–	7 digit LCD	LCD with icons and backlight	Graphic backlight LCD, 128x80 pixels	Graphic backlight LCD, 128x80 pixels	Graphic backlight LCD, 128x80 pixels
Engine running magnetic pick-up input	–	–	●	RGK 600SA	●	●
Engine speed input	“W”	“W” or generator frequency	“W” or generator frequency or “Pick-up”	“W” or generator frequency or “Pick-up” (RGK 600SA)	“W” or generator frequency or “Pick-up”	“W” or generator frequency or “Pick-up”
Auxiliary analog input	–	–	–	–	–	●
I/O expansion	–	–	1 x EXP1040	RGK RR	RGK RR	3 x EXP... + RGK RR
USB/Optical port on front	–	–	●	●	●	●
Wi-Fi port on front	–	–	●	●	●	●
USB port at rear	–	–	–	–	–	EXP1010
Ethernet port with Web server function	–	–	–	–	–	EXP1013
GPRS/GSM modem	–	–	–	–	–	EXP1015
RS232 serial port	–	● (TTL)	–	–	●	EXP1011
RS485 serial port	–	–	–	–	–	●
Event logging	–	–	–	●	●	●
RTC (Real Time Clock)	–	–	–	–	–	●
Programmable Inputs/Outputs	–	●	●	●	●	●
PLC logic function	–	–	–	–	●	●
Alarms	●	●	●	●	●	●
User alarms n°	–	1	2	4	8	8
Alarm property customising	–	●	●	●	●	●
Texts for alarms, events and parameters	–	–	●	●	●	●
Multilanguage (type) n°	–	–	5 (GB - I - F - E - D)	5 (GB - I - F - P - E)②	5 (GB - I - F - P - E)②	5 (GB - I - F - P - E)②
Upload languages	–	–	–	●	●	●
Load sharing	–	–	–	–	–	–
Generator paralleling	–	–	–	–	–	–
Mains-generator synchronising (closed transition)	–	–	–	–	–	–
IEC front degree of protection	IP40	IP40	IP40, IP65 with optional gasket seal③	IP40, IP65 with optional gasket seal	IP65	IP65
Certifications	cULus, EAC	cULus, EAC	cULus, EAC	cULus, EAC	cULus, EAC	cULus, EAC

① Frequency only.

② Controller uploading of other multilanguage sets.

③ For RGK 400SA only.



	AUTOMATIC MAINS FAILURE (AMF) GEN-SET CONTROLLERS				PARALLELING / LOAD SHARING CONTROLLERS	
	RGK 600 RGK 601 RGK 610	RGK 700	RGK 750	RGK 800	RGK 900	RGK 900SA
Generator voltage control	L1-L2-L3-N	L1-L2-L3-N	L1-L2-L3-N	L1-L2-L3-N	L1-L2-L3-N	L1-L2-L3-N
Current control	L1-L2-L3	L1-L2-L3	L1-L2-L3	L1-L2-L3-N	L1-L2-L3-N	L1-L2-L3-N
Rated frequency	50/60Hz	50/60Hz	50/60Hz	50/60/400Hz	50/60/400Hz	50/60/400Hz
Digital inputs	n° 4 neg.+1 pos. (emergency)	6 neg.+1 pos. (emergency)	8 neg.+1 pos. (emergency)	8 neg.+1 pos. (emergency)	12 neg.+1 pos. (emergency)	12 neg.+1 pos. (emergency)
Digital outputs	n° 6 (SSR)	3 (Relay) + 4 (SSR)	3 (Relay)+6 (SSR) + 1(SO)			
Engine running inputs	"D+", Hz	"D+", "AC", Hz	"D+", "AC", Hz	"D+", "AC", Hz	"D+", "AC", Hz	"D+", "AC", Hz
Ohmic inputs for fuel-pressure-temperature	●	●	●	●	●	●
Remote supervision	RGK 610	●	●	●	●	●
CANbus interface	RGK 601	●	●	●	●	●
Rated battery voltage	12/24VDC	12/24VDC	12/24VDC	12/24VDC	12/24VDC	12/24VDC
Power supply range	7...33VDC	7...33VDC	7...33VDC	7...33VDC	7...36VDC	7...36VDC
Mains voltage control	L1-L2-L3-N	L1-L2-L3-N	L1-L2-L3-N	L1-L2-L3-N	L1-L2-L3-N	-
Rated voltage range	100...480VAC	30...600VAC	100...480VAC	30...600VAC	30...600VAC	30...600VAC
VT programming	●	●	●	●	●	●
Rated input current	5A/1A	5A/1A	5A/1A	5A/1A	5A/1A	5A/1A
TRMS voltage measurement	●	●	●	●	●	●
TRMS current measurement	●	●	●	●	●	●
Display	Graphic backlight LCD, 128x80 pixels	Graphic backlight LCD, 128x80 pixels	Graphic backlight LCD, 128x80 pixels	Graphic backlight LCD, 128x80 pixels	Graphic backlight LCD, 128x112 pixels	Graphic backlight LCD, 128x112 pixels
Engine running magnetic pick-up input	RGK 600/RGK 610	●	●	●	●	●
Engine speed input	"W"/"Pick-up" (RGK 600/RGK 610) or generator frequency	"W" or generator frequency or "Pick-up"				
Auxiliary analog input	-	-	●	●	●	●
I/O expansion	1 x EXP... + RGK RR	RGK RR	2 x EXP... + RGK RR	3 x EXP... + RGK RR	4 x EXP... + RGK RR	4 x EXP... + RGK RR
USB/Optical port on front	●	●	●	●	●	●
Wi-Fi port on front	●	●	●	●	●	●
USB port at rear	EXP1010 (RGK 610)	-	EXP1010	EXP1010	EXP1010	EXP1010
Ethernet port with Web server function	-	-	EXP1013	EXP1013	EXP1013	EXP1013
GPRS/GSM modem	-	-	EXP1015	EXP1015	EXP1015	EXP1015
RS232 serial port	EXP1011 (RGK 610)	●	EXP1011	EXP1011	EXP1011	EXP1011
RS485 serial port	EXP1012 (RGK 610)	-	EXP1012	●	●	●
Event logging	●	●	●	●	●	●
RTC (Real Time Clock)	-	-	●	●	●	●
Programmable Inputs/Outputs	●	●	●	●	●	●
PLC logic function	-	●	●	●	●	●
Alarms	●	●	●	●	●	●
User alarms	n° 4	8	8	8	16	16
Alarm property customising	●	●	●	●	●	●
Texts for alarms, events and parameters	●	●	●	●	●	●
Multilanguage (type)	n° 5 (GB - I - F - P - E)②	5 (GB - I - F - P - E)②	5 (GB - I - F - P - E)②	5 (GB - I - F - P - E)②	5 (GB - I - F - P - E)②	5 (GB - I - F - P - E)②
Upload languages	-	●	●	●	●	●
Load sharing	-	-	-	-	●	●
Generator paralleling	-	-	-	-	-	●
Mains-generator synchronising (closed transition)	-	-	-	-	●	-
IEC front degree of protection	IP40, IP65 with optional gasket seal	IP65	IP65	IP65	IP65	IP65
Certifications	cULus, EAC	cULus, EAC		cULus, EAC	cULus, EAC	cULus, EAC

# A SUPERIOR CLASS!



**CUSTOMISING OPTION**

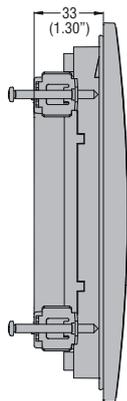
There is a customising slot available on the front to show controller brand name, logo, trademark, part number, brief indication or wording, etc.

**PROGRAMMING OPTICAL PORT**

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

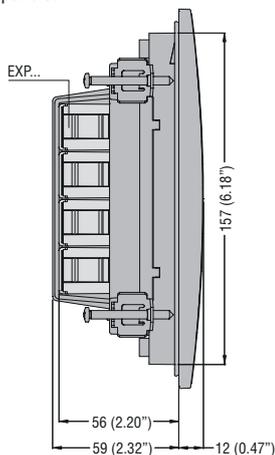


**COMPACT SIZE**



RGK 700  
RGK 800  
RGK 900

**Slim frame profile** and reduced total depth simplify installation of the controllers in very compact electric panels.



RGK 800  
RGK 900

**IP65 DEGREE OF PROTECTION**

The controller front and the internal display frame seal have been designed to warrant an **IP65** protection degree. This with the **UV film** also allow outdoor installation.



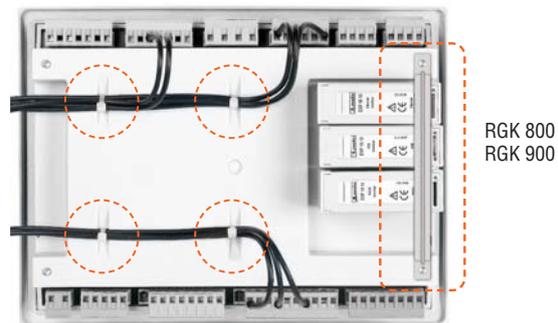
**INSTALLATION**

The fixing with **metal screws** guarantees excellent adhesion over time.



**CABLING AND EXPANSION MODULE FIXING SYSTEM**

The controller rear has 4 fitting slots to secure cables connected to the terminals with cable ties, in an orderly way inside the electric panel. In addition, a plastic retainer is supplied as standard to keep the expansion modules in place when installed in applications with strong vibrations.



RGK 800  
RGK 900

**EXPANDABILITY**

Basic RGK 750, RGK 800 and RGK 900 controller functions can be easily extended using up to 4 EXP series expansion modules:

- Digital and analog inputs and outputs
- Opto-isolated static outputs
- Relay outputs
- Opto-isolated RS232 interface
- Opto-isolated RS485 interface
- Opto-isolated Ethernet interface with Web server function
- GPRS/GSM modem.



RGK 750 (2 modules)  
RGK 800 (3 modules)  
RGK 900 (4 modules)

**CLICK!**



### EXPANDABILITY

An extensive selection of modules is available to increase the controller functionality.

### GPRS/GSM MODEM

Among the expansion modules, there is a GPRS/GSM modem, automatically configured by genset controller.

### MAINTENANCE

Maintenance supervision at programmed intervals.

### STREAMLINE DESIGN

The controller has an ergonomic design and, at the same time, particular care has been given to details.

### GPRS/GSM MODEM



Once a data-enabled SIM card is inserted, RGK 750 - RGK 800 - RGK 900 controllers can send SMS and **email messages** with alarm and event conditions as well as the latest logged events to a FTP server.

### OPTO-ISOLATED ETHERNET INTERFACE WITH WEB SERVER FUNCTION

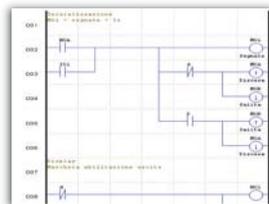


**Web Browsing** of the single controller connected in Ethernet by EXP10 13 expansion module.

### CANBUS COMMUNICATION PORT

Most models are standard equipped with CAN-J1939 communication port.

### PLC FUNCTION



Capability to combine together internal status of controllers with signals incoming from the field to activate outputs and generate alarms.

### LOAD MANAGEMENT

There are different methods of controlling the load conditions; each controller has special parameters functions as follows:

- RGK 700 - RGK 750 - RGK 800 types: load shedding and dummy load modes
- RGK 900 types: base-load and peak shaving modes.

### PARALLELING

RGK 900 and RGK 900SA controllers can control the switching between the mains and generators without having to switch off the power supply to the load. In addition, they can control the paralleling connection of two or more generators sharing in this way the load on more than one source. The RGK 900MC can control and synchronise mains parallel operation with a power bus composed by a series of generating sets.

### REMOTE UNITS

#### Remote display panels



There are "mirror" display units available to remotely operate as if in front of the generating set.

#### Remote annunciator



A remote display can view alarm conditions and can be operated for silencing them.

#### Alarm-state relay unit

The relay unit allows to transmit, on voltage-free contacts, the status and alarms of RGK... controllers.



### SUPERVISION SOFTWARE

**Synergy** is web-based and provides for an easy and efficient way to monitor and control electrical installations as well as field equipment.



It is a server-multiclient system based on MS SQL RDBMS with web-browser interface. Simultaneous management of different communication channels with independent configuration (protocols, speed rate, RS232, RS485, Ethernet, modem) is possible. Live page view, data log tables, charts and alarms are available.

### CLOUD SOLUTION

The supervision software is ready as **SynergyCloud** solution as well, so that the user does not have to install any package on its own servers.

### CONFIGURATION AND REMOTE CONTROL SOFTWARE

**Xpress** is a parameter configuration and remote monitoring software shared by the entire latest generation of RGK gen-set controllers with communication port.

## Engine protection controllers



RGK 30



RGK 20

Order code	Description	Qty per pkg	Wt
		n°	[kg]
RGK 30	12/24VDC, for external start-stop key switch, 96x48mm/3.78x1.89"	1	0.160
RGK 20	12/24VDC, LCD display, built-in power supply key switch, with TTL programming port, 72x72mm/2.83x2.83"	1	0.270

### General characteristics for RGK 30

#### OPERATOR INTERFACE

- 2 programming key buttons
- 1 LED indicator for engine status
- 1 LED indicator for glow plug pre-heating
- 5 LED indicators for alarm status
- Remote starting only.

#### INPUTS/OUTPUTS

- Digital inputs: 3 negative and 1 positive (start/stop by remote key switch)
- Digital outputs: 2 relay (1 programmable).

### Certifications and compliance

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

Compliant with standards: IEC/EN 61010-1, IEC/EN 61000-6-2, EN 55011, UL 508, CSA C22.2 n° 14.

### General characteristics for RGK 20

#### OPERATOR INTERFACE

- 1 ON-OFF power supply key selector switch
- 1 semi-automatic engine START button
- 2 programmable key buttons
- 7 digit LCD display (Hours, Hz, VBatt)
- 1 LED indicator for engine status
- 1 LED indicator for glow plug pre-heating
- 5 LED indicators for alarm status
- Local or remote starting.

#### INPUTS/OUTPUTS

##### Programmable functions:

- Generator frequency input
- Digital inputs: 3 negative and 1 positive
- Digital outputs: 3 static (1 programmable)
- Inputs, outputs and alarms, all with programmable properties.

### Certifications and compliance

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

Compliant with standards: IEC/EN 61010-1, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

## Stand alone gen-set controllers



RGK 400SA



RGK 420SA



RGK 600SA - RGK 601SA



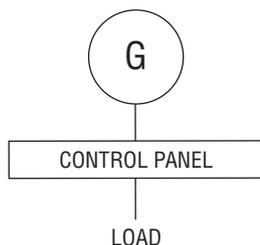
RGK 700SA - RGK 800SA



EXP 10...

**new**

### STAND ALONE APPLICATION



Order code	Description	Qty per pkg	Wt [kg]
		n°	[kg]
RGK 400SA	12/24VDC, icon LCD display, 5 inputs, 5 outputs	1	0.410
RGK 420SA	12/24VDC, icon LCD display, built-in 3 position key switch, 5 inputs, 5 outputs	1	0.430
RGK 600SA	12/24VDC, graphic LCD display, w/Pick-up speed input, 4 inputs, 6 outputs	1	0.540
RGK 601SA	12/24VDC, graphic LCD display, CANbus port, 4 inputs, 6 outputs	1	0.530
RGK 700SA	12/24VDC, graphic LCD display, RS232 serial port, CANbus port, 6 inputs, 7 outputs	1	0.900
RGK 800SA	12/24VDC, graphic LCD display, RS485 serial port, CANbus port. Expandable with EXP... modules, 8 inputs, 10 outputs	1	0.980

### Programmable functions and properties

Charact.	RGK 4...SA	RGK 6...SA	RGK 700SA	RGK 800SA
<b>Inputs</b>	5	4	6	8
<b>Relay outputs</b>	–	–	3	3
<b>Protected static outputs</b>	5	6	4	7
<b>Resistive/Digital inputs</b>	1	3	3	4

Order code	Description
ACCESSORIES FOR RGK 4...SA	
EXP00 05	IP65 housing gasket
ACCESSORIES FOR RGK 600SA AND RGK 601SA	
EXP80 01	IP65 housing gasket
EXPANSION MODULES FOR RGK 4...SA AND RGK 800SA Inputs and outputs.	
EXP10 40	2 digital/resistive inputs, 2 static outputs
EXP10 41	2 thermocouple inputs, 2 static outputs
EXP10 42T	6 digital inputs, PCB tropicalized
EXP10 43T	4 digital input and 2 static outputs, PCB tropicalized

EXPANSION MODULES FOR RGK 800SA Inputs and outputs.	
EXP10 00	4 opto-isolated digital inputs
EXP10 01	4 opto-isolated static outputs
EXP10 02	2 digital inputs and 2 static outputs, opto-isolated
EXP10 03	2 relay outputs rated 5A 250VAC
EXP10 04	2 opto-isolated analog inputs 0/4-20mA or PT100 or 0-10V or 0...±5V
EXP10 05	2 opto-isolated analog outputs 0/4-20mA or 0-10V or 0...±5V
EXP10 08	2 opto-isolated digital inputs and 2 relay outputs rated 5A 250VAC

Communications interfaces.	
EXP10 10	Opto-isolated USB interface
EXP10 11	Opto-isolated RS232 interface
EXP10 12	Opto-isolated RS485 interface
EXP10 13	Ethernet interface with Web server function
EXP10 15	GPRS/GSM modem

### General characteristics for RGK 400SA - RGK 420SA

- Key with 3 positions (OFF, local start, remote start), removable in OFF and remote start position (for RGK 420SA)
- Power supply: 7...33VDC
- VAC inputs: Generator L1-L2-L3-N
- Single, two and three phase voltage control
- Rated measurement voltage range: 100...480VLL (3PH+N)
- Programmable VT ratio
- Frequency measurement range: 45...65Hz
- Current input: 1PH, /5A or /1A
- Display: LCD with icons (52x35mm/2.05x1.38")
- Programming port: IR with support of CX01 (USB) and CX02 (Wi-Fi) dongles
- NFC technology for parameter setup
- Powersave mode
- Inputs: 5 negative + 1 positive for emergency
- Outputs: 5 positive, 2A, protected
- Common pin dedicated to EV and START outputs to be used with emergency push button
- Engine running detection: "D+", Hz
- Engine speed inputs: "W" or Magnetic "Pick-up"
- 1 analog ohmic input for oil pressure, engine temperature or fuel level control
- Alarm and parameter text in 5 languages
- Customisable alarm text (2 alarms)
- Operating temperature: -30...+60°C
- Parameter configuration by NFC technology with **NFC** app
- Compatible with **Synergy**, **Synergy** and **Xpress** software.

### General characteristics for RGK 600SA - RGK 601SA - RGK 700SA - RGK 800SA

- Power supply: 7...33VDC
- VAC inputs: Generator L1-L2-L3-N
- Single, two and three phase voltage control
- Rated measurement voltage range:
  - 100...480VAC for RGK 600SA and RGK 601SA
  - 30...600VAC for RGK 700SA and RGK 800SA
- Programmable VT ratio
- Frequency measurement range: 45...65Hz
- Current input: 3PH, /5A or /1A
- Graphic LCD: 128x80 pixels with backlight
- Programming port: IR with support of CX01 (USB) and CX02 (Wi-Fi) dongles
- Common pin dedicated to EV and START outputs to be used with emergency push button
- Engine running detection: "D+", Hz
- Engine speed inputs: "W" or Magnetic "Pick-up" (RGK 601SA excluded)
- 1 CANbus-J1939 port (RGK 600SA excluded)
- 3 analog ohmic inputs for oil pressure, engine temperature and fuel level control
- 1 built-in alarm remote port
- Non-volatile memory for event storage
- Alarm, event and parameter text in 5 languages
- Customisable alarm text (8 alarms)
- Operating temperature: -30...+70°C
- Modbus-RTU and Modbus-ASCII protocols
- Compatible with **Synergy**, **Synergy** and **Xpress** software.

### For RGK 700SA - RGK 800SA only

- PLC logic for inputs, outputs and internal status
- 1 communication port: RS232 for RGK 700SA; RS485 for RGK 800SA
- Degree of protection: IEC IP65 on front; suitable for use with UL/CSA Type 4X outdoor enclosure installation.

### For RGK 800SA only

- Neutral current measurement range: 0.050...6A or 0.050...1.2A
- 400Hz frequency support
- 1 programmable analog input
- Modbus-TCP communication protocol
- Current leakage control towards earth/ground
- Clock-calendar (RTC)

### Certification and compliance

Certifications obtained: UL Listed, for USA and Canada (cULus - File E93601), as Auxiliary Devices - Generator controllers; EAC. Compliant with standards: IEC/EN 61010-1, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

**Synergy**, **Synergy** and **Xpress** software, **NFC** app  
See Section 29.

**EXP series expansion modules**  
See Section 30, page 2.

**Automatic mains failure (AMF) gen-set controllers**



RGK 600 - RGK 601 - RGK 610

**new**



RGK 700 - RGK 800



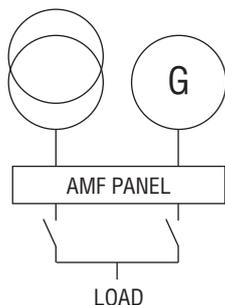
RGK 750



EXP 10...

**new**

**AMF (AUTOMATIC MAINS FAILURE) APPLICATION**



Order code	Description	Qty per pkg	Wt [kg]
		n°	[kg]
<b>RGK 600</b>	12/24VDC, graphic LCD display, w/Pick-up speed input, 4 inputs, 6 outputs	1	0.540
<b>RGK 601</b>	12/24VDC, graphic LCD display, CANbus port, 4 inputs, 6 outputs	1	0.540
<b>RGK 610</b>	12/24VDC, graphic LCD display, w/Pick-up speed input, 4 inputs, 6 outputs, expandable with EXP... modules	1	0.600
<b>RGK 700</b>	12/24VDC, graphic LCD display, RS232 serial port, CANbus port, 6 inputs, 7 outputs	1	0.880
<b>RGK 750</b>	12/24VDC, graphic LCD display, CANbus port, 8 inputs, 10 outputs expandable with EXP... modules	1	0.960
<b>RGK 800</b>	12/24VDC, graphic LCD display, RS485 serial port, CANbus port, 8 inputs, 10 outputs, expandable with EXP... modules,	1	0.960

**Programmable functions and properties**

Characteristic	RGK 600 RGK 601 RGK 610	RGK 700	RGK 750	RGK 800
<b>Inputs</b>	4	6	8	8
<b>Relay outputs</b>	-	3	3	3
<b>Protected static outputs</b>	6	4	7	7
<b>Resistive/Digital inputs</b>	3	3	3	4

Order code	Description
ACCESSORY FOR RGK 600, RGK 601 AND RGK 610	
<b>EXP80 01</b>	IP65 housing gasket
EXPANSION MODULES FOR RGK 610, RGK 750 AND RGK 800 Communications interfaces.	
<b>EXP10 10</b>	Opto-isolated USB interface
<b>EXP10 11</b>	Opto-isolated RS232 interface
<b>EXP10 12</b>	Opto-isolated RS485 interface
Inputs and outputs.	
<b>EXP10 42T</b>	6 digital inputs, PCB tropicalized
<b>EXP10 43T</b>	4 digital input and 2 static outputs, PCB tropicalized

**EXPANSION MODULES FOR RGK 800**  
Inputs and outputs.

<b>EXP10 00</b>	4 opto-isolated digital inputs
<b>EXP10 01</b>	4 opto-isolated static outputs
<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 0/4-20mA or PT100 or 0-10V or 0...±5V
<b>EXP10 05</b>	2 opto-isolated analog outputs 0/4-20mA or 0-10V or 0...±5V
<b>EXP10 08</b>	2 opto-isolated digital inputs and 2 relay outputs rated 5A 250VAC
<b>EXP10 40</b>	2 digital/resistive inputs, 2 static outputs
<b>EXP10 41</b>	2 thermocouple inputs, 2 static outputs

**Communications interfaces.**

<b>EXP10 13</b>	Ethernet interface with Web server function
<b>EXP10 15</b>	GPRS/GSM modem

**General characteristics for RGK 600 - RGK 601 - RGK 610 - RGK 700 - RGK 750 - RGK 800**

- Power supply: 7...33VDC
- VAC inputs: Mains and generator L1-L2-L3-N
- Voltage control for one, two and three phase systems with or without neutral
- Rated measurement voltage:
  - 480VAC for RGK 600, RGK 601, RGK 610 and RGK 750
  - 600VAC for RGK 700 and RGK 800
- Rated measurement voltage range:
  - 100...480VAC for RGK 600, RGK 601, RGK 610 and RGK 750
  - 30...600VAC for RGK 700 and RGK 800
- Frequency measurement range: 45-65Hz
- Programmable VT ratio
- Current measurement range (3 PH): 0.050...6A or 0.050...1.2A
- Graphic LCD: 128x80 pixels with backlight
- 1 USB/optical and Wi-Fi port on front for programming
- Engine running detection: "D+", generator voltage and frequency
- Engine speed inputs: "W" or Magnetic "Pick-up" (RGK 601 excluded)
- 1 CANbus-J1939 port (RGK 600 and RGK 610 excluded)
- 3 analog ohmic inputs for oil pressure, engine temperature and fuel level control
- 1 built-in alarm remote port
- Non-volatile memory for event storage
- Alarm, event and parameter text in 5 languages
- Alarm text customisable (8 alarms)
- Event log
- Modbus-RTU and Modbus-ASCII communication protocols (RGK 600 and RGK 601 excluded)
- Compatible with Synergy, Synergy and Xpress software
- 1 slot for EXP modules for RGK 610
- 2 slots for EXP modules for RGK 750
- 3 slots for EXP modules for RGK 800.

**For RGK 700 - RGK 750 - RGK 800 only**

- PLC logic for inputs, outputs and internal status
- Degree of protection: IEC IP65 on front.

**For RGK 700 - RGK 800 only**

- 1 communication port: RS232 for RGK 700; RS485 for RGK 800
- Degree of protection: IEC IP65 on front; suitable for use with UL/CSA Type 4X outdoor enclosure installation.

**For RGK 800 only**

- Neutral current measurement range: 0.050...6A or 0.050...1.2A
- 400Hz frequency support
- 1 programmable analog input
- Modbus-TCP communication protocol
- Current leakage control towards earth/ground
- Clock-calendar (RTC).

**Certifications and compliance**

Certifications obtained: UL Listed, for USA and Canada (cULus - File E93601), as Auxiliary Devices - Generator controllers except for RGK 750; EAC (except for RGK 750). Compliant with standards: IEC/EN 61010-1, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

**Synergy, Synergy and Xpress software**  
See Section 29.

**EXP series expansion modules**  
See Section 30, page 2.

## Paralleling controllers for mains-generator and generator-generator



RGK 900SA - RGK 900

Order code	Description	Qty per pkg	Wt [kg]
		n°	[kg]

Stand-alone controller.			
<b>RGK 900SA</b>	Paralleling control among generating sets. 12/24VDC, graphic LCD, RS485 port and USB/optical and Wi-Fi point programming port on front. Expandable with EXP... modules	1	1.040
AMF (Automatic Mains Failure) controller.			
<b>RGK 900</b>	Mains-generator paralleling control. 12/24VDC, graphic LCD, with RS485 port, USB/optical and Wi-Fi point programming port on front. Expandable with EXP... modules	1	1.040
Mains-ATS (Automatic Transfer Switching) controller.			
<b>RGK 900MC</b>	Control of mains, automatic transfer switching (ATS), and paralleling on multiple generators controlled by RGK 900SA. 12/24VDC, graphic LCD, with RS485 port and USB/optical and Wi-Fi point programming port. Expandable with EXP... modules	1	1.040

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

EXPANSION MODULES FOR RGK 900... Inputs and outputs.	
<b>EXP10 00</b>	4 opto-isolated digital inputs
<b>EXP10 01</b>	4 opto-isolated static outputs
<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 0/4-20mA or PT100 or 0-10V or 0...±5V
<b>EXP10 05</b>	2 opto-isolated static outputs 0/4-20mA or 0-10V or 0...±5V
<b>EXP10 08</b>	2 opto-isolated digital inputs and 2 relay outputs rated 5A 250VAC
<b>EXP10 40</b>	2 digital/resistive inputs, 2 static outputs
<b>EXP10 41</b>	2 thermocouple inputs, 2 static outputs
Inputs and outputs.	
<b>EXP10 42T</b>	6 digital inputs, PCB tropicalized
<b>EXP10 43T</b>	4 digital input and 2 static outputs, PCB tropicalized

Communications interfaces.	
<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>	Ethernet interface with web server function
<b>EXP10 15</b>	GPRS/GSM modem



EXP 10...

**new**

EXP series expansion modules  
See Section 30, page 2.

### General characteristics

- Power supply: 7...36VDC
- VAC inputs: Mains L1-L2-L3-N for RGK 900 only
- VAC inputs: Generator L1-L2-L3-N
- Voltage measurement rated value: 600VAC (UL/CSA)
- Voltage measurement range: 30-720VAC
- Frequency measurement range: 45...65Hz or 360...440Hz
- Programmable VT ratio
- Current measurement input (3 PH+N): 0.05-6A or 0.05...1.2A
- Fourth CT for neutral measurement or earth/ground leakage detection
- Graphic LCD, 128x112 pixels with backlight
- 13 digital inputs
- 3 relay outputs rated 8A 250VAC
- 6 static outputs rated 2A, protected
- 1 static output 50mA
- Engine running detection: "D+" generator voltage and frequency
- 1 engine speed input: "W" or "Magnetic Pick-up"
- 3 analog ohmic inputs for oil pressure, engine temperature and fuel level control
- 1 programmable analog input
- 2 analog outputs for engine speed control (governor) / voltage regulator (AVR)
- Alarm-event-parameter text in 5 languages (Web upload)
- Alarm text customisable (16 alarms)
- Event log
- Modbus-RTU, Modbus-ASCII and Modbus-TCP communication protocols
- Boolean logic for inputs, outputs and internal status
- Compatible with Synergy, Synergy<sub>com</sub> and Xpress software
- Degree of protection: IEC IP65 on front; suitable for use with UL/CSA Type 4X outdoor enclosure installation
- Built-in buzzer
- Multi-level passwords
- Sleep function (power saving mode)
- Synchronising and load sharing.

### MAIN FUNCTIONS

- Menus for quick selection of rated parameter settings
- "Autocall" function for automatic sending of emails and/or SMS at predefined events/alarms
- Mains (for RGK 900 only) / Generator controls: Phase sequence, phase loss, max and min voltage and frequency, voltage asymmetry
- Programmable maintenance at various intervals
- Current leakage control towards earth/ground
- Mains-generator synchronising (ATS closed transition)
- Mains in base-load with generator in peak shaving
- Paralleling supervision of generators (island mode)
- Generating set start scheduling.

### Certifications and compliance

Certifications obtained: UL Listed for USA and Canada (cULus - File E93601), as Auxiliary Devices, Generator controllers; EAC.  
Compliant with standards: IEC/EN 61010-1, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Synergy, Synergy<sub>com</sub> and Xpress software  
See Section 29.

MAINS-GENERATOR PARALLELING	ISLAND MODE	ATS AND PARALLELING OF MAINS WITH MULTIPLE GENSETS
<p><b>RGK 900</b> is designed for mains-generator synchronising applications, such as:</p> <ol style="list-style-type: none"> <li>Single generator in maintained parallel with the mains in "base-load" mode (generator power supplied at a steady rate)</li> <li>Single generator in maintained parallel with the mains, in peak-shaving mode (import-export - mains power is limited to constant value and load peaks during heavy demand for power are supplied by generator)</li> <li>Single generator in AMF with temporary parallel with the mains (for emergency, with AMF in closed transition).</li> </ol>	<p><b>RGK 900SA</b> is designed for applications with load sharing on an isolated bus, without mains:</p> <ol style="list-style-type: none"> <li>Parallel among generators working together in island mode on power bus with load shared among them</li> <li>Generators connected together to maintain the power reserve (total power available minus load power) within a preset range, switching on and off generators according to a priority level.</li> </ol>	<p>Combination of RGK 900SA and RGK 900MC units is designed for load govern controls with multiple generators in parallel on power bus and mains. In these circumstances, the <b>RGK 900MC</b> unit controls, in base-load or peak-shaving mode, the mains and power bus composed by multiple generators, each controlled by an <b>RGK 900SA</b>.</p>

## Remote units



RGK 800RD



RGK RA

## Alarm-status relay unit



RGK RR

Order code	Description	Qty per pkg	Wt
		n°	[kg]
RGK 800RD SA	Remote display panel for RGK 800SA, 12/24VDC, IP65 protection degree	1	0.820
RGK 800RD	Remote display panel for RGK 800, 12/24VDC, IP65 protection degree	1	0.820
RGK 900RD SA	Remote display panel for RGK 900SA, 12/24VDC, IP65 protection degree	1	0.980
RGK 900RD	Remote display panel for RGK 900, 12/24VDC, IP65 protection degree	1	0.980
RGK RA	Remote display unit for RGK 7..., RGK 8..., RGK 9..., graphic LCD, touch screen 128x112 pixels, IP54 protection	1	0.360

Order code	Description	Qty per pkg	Wt
		n°	[kg]
RGK RR	Alarms-status relay unit 12/24VDC, 12 relay outputs, pulse input, CANbus communication port	1	0.420

### Remote display panel RGK...RD characteristics

For remote controller supervision and viewing, the user operates the remote display panel as if directly in front of the generating set.

- 12/24VDC battery power supply
- Graphic LCD with backlight:
  - 128x80 pixels for RGK 800...
  - 128x112 pixels for RGK 900...
- 13 function and setting keys
- 10 Indication LEDs for operating modes and status
- Built-in buzzer
- 4 digital inputs
- 2 digital outputs
- Conductor cross section: 0.2...2.5mm<sup>2</sup> (24...12 AWG; 18...12 AWG per UL/CSA)
- Tightening torque: 0.56Nm (4.5lbin)
- Front degree of protection: IEC IP65; UL/CSA Type 4X outdoor enclosure installation
- Serial interface ports: opto-isolated RS485 (RGK...RD); CANbus-J1979 (RGK...SA).

### Remote display unit RGK RA characteristics

Alarm conditions can be viewed on the remote display and alarm silencing can also be activated.

- Dual 100-240VAC / 12-24VDC power supply
- Touch screen 120x112 pixel backlight graphic LCD
- Built-in buzzer
- Static (SSR) output for global alarm signalling
- Opto-isolated RS485 interface port
- Conductor cross section: 0.2...2.5mm<sup>2</sup> (24...12 AWG; 18...12 AWG per UL/CSA)
- Tightening torque: 0.56Nm (4.5lbin)
- Front degree of protection: IEC IP54; UL Type 1.

### Alarm-status relay unit characteristics

External relay expansion unit for alarm and status remoting.

Fixing on 35mm DIN rail (IEC/EN 60715).

Communication with RGK... controllers by CANbus or pulse inputs:

- 12 relay outputs of which 5 with changeover (SPDT) contact rated 5A 250VAC / B300 and 7 N/O (SPST) contact rated 2.5A 250VAC / C300
- 12/24VDC power supply
- Up to 2 RGK RR units can be connected in cascade for a total of 24 relays
- Maximum installation distance from the RGK 6... and RGK 700... RGK 900 controllers:
  - CANbus: 30m/33yd (high speed)
  - Inputs/Outputs: 1,000m/1,094yd (low speed)
- Conductor cross section: 0.2...2.5mm<sup>2</sup> (24...12 AWG)
- Tightening torque: 0.56 Nm/4.5lbin.

### Certifications and compliance

Certifications obtained: UL Listed, for USA and Canada (cULus – File E93601), as Auxiliary Devices, Generator controllers remote and relay units; EAC.

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

For wiring schemes and technical characteristics, refer to technical instructions in Downloads of local or global website or consult Technical support; see contact details on inside front cover.

## Communication devices for RGK 4... - RGK 6... - RGK 7... - RGK 8... - RGK 9...



CX 01



CX 02



CX 03

Order code	Description	Qty per pkg	Wt
		n°	[kg]
<b>CX 01</b>	USB/optical dongle with PC↔-controller connecting cable for programming, data download, diagnostics and firmware upgrade	1	0.090
<b>CX 02</b>	Wi-Fi dongle for PC ↔ controller programming, data download, diagnostics, project upload/download and controller cloning	1	0.090
<b>CX 03</b>	GSM/GPRS penta-band antenna (850/900/1800/1900/2100MHz) for EXP10 15 expansion module for RGK 800... - RGK 900...	1	0.090

### General characteristics

Communication and connection devices for generator set controllers RGK 4... - RGK 6... - RGK 7... - RGK 8... - RGK 9... for personal computers, smartphones, tablets, modems, bus drives.

#### CX 01

The USB/optical connector, complete with cable, allows to connect RGK 4... - RGK 6... - RGK 7... - RGK 8... - RGK 9... controllers to a PC without having to disconnect the power supply from the electric panel and to carry out parameter programming, data and event download, diagnostics and firmware upgrade. The PC identifies the connection as a standard USB.

#### CX 02

By Wi-Fi connection, RGK 4... - RGK 6... - RGK 7... - RGK 8... - RGK 9... controllers can be viewed by PC, smartphone and tablet with no need for cabling and to carry out parameter programming, data and event download, diagnostics project upload/download and controller cloning.

#### CX 03

Antenna compatible with the major part of worldwide mobile networks thanks to the available frequencies at 850/900/1800/1900/2100MHz. IP67 IEC protection degree. Fixing by Ø10mm/0.39" drilling. Cable length 2.5m/7.23yd.

For wiring schemes and technical characteristics, refer to technical instructions in Downloads of local or global website or consult Technical support; see contact details on inside front cover.

## Accessories



51 C4



EXC CON 01



4 PX1



EXC M3G 01

Order code	Description	Qty per pkg	Wt
		n°	[kg]
Connecting cables.			
<b>51 C2</b>	For PC ↔ controller, 1.8m/2yd long	1	0.090
<b>51 C3</b>	For PC ↔ GSM modem 1.8/2yd long	1	0.210
<b>51 C4</b>	For PC ↔ RS232/RS485, converter drive, 1.8m/2yd long	1	0.147
Converters.			
<b>EXC CON 01</b>	RS485/ Ethernet converter, 12...48VDC, including DIN rail fixing kit	1	0.400
<b>4 PX1</b>	RS232/RS485 converter drive, opto-isolated, 220...240VAC power supply (110...120VAC on request). <sup>①</sup> Repeater drive for RS485 bus extension	1	0.600
Gateway.			
<b>EXC M3G 01</b>	RS485 Gateway/3G modem, 9.5...27VAC/9.5...35VDC, including antenna (with 2.5m cable) and programming cable	1	0.340

### General characteristics

For general characteristics of converters and gateway see section 30.

For RGK 600..., RGK 601... and RGK 610 controllers.

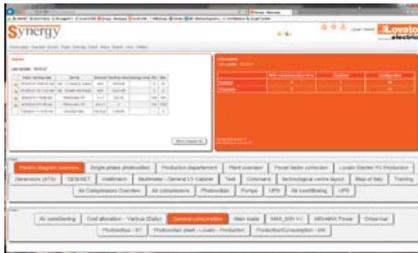
**EXP80 01** IP65 144mm/5.67" housing gasket

For RGK 4...SA.

**EXP80 05** IP65 110mm/4.33" housing gasket

<sup>①</sup> RS232/RS485 opto-isolated converter drive, 38,400 Baud rate maximum, automatic or manual TRANSMIT line supervision, 220...240VAC ±10% (110...120VAC supply on request).

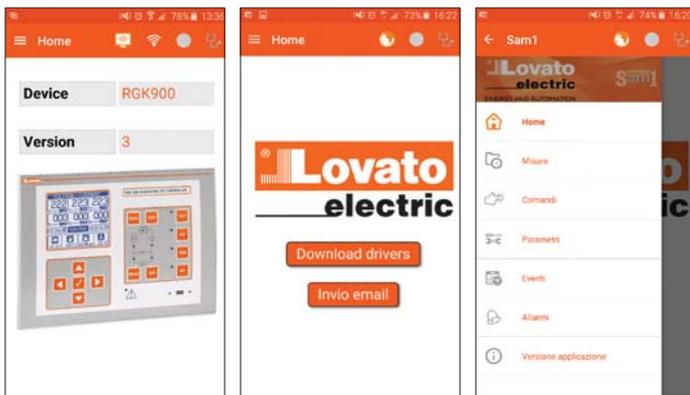
## Synergy Supervision and Energy management software



## Xpress Parameter configuration and remote control software



## Sam1 APP



## NFC APP



## Supervision and Energy management software

The **Synergy** and **Synergy SA** softwares provides for the remote control and supervision of the RGK... controllers. See details given in Section 29.

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.

## Parameter configuration and remote control software

The **Xpress** is a parameter configuration and remote monitoring software shared by the entire latest generation of RGK gen-set controllers with communication port. It can be installed in the Windows® environment and connect individually (one node at a time) to the RGK gen-set controller connected to the network.

- Supports connection via CX01 (USB) or CX02 (Wi-Fi) dongle, USB, RS232, RS485, Ethernet and modem
- Product configuration:

- Parameter setting
- Project file management

- Product firmware upgrade (via CX01)

- Remote control:

- Monitoring of main measurements
- Sending commands to products

- Reading alarms and events memory.

See details given in Section 29.

## APP for smartphone and tablets

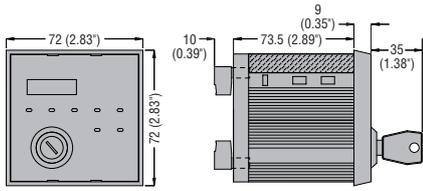
**Sam1** (Setup And Maintenance 1) application allows the user to program the controller, view alarm conditions, send commands, read measurements, download statistical data and events and send retrieved data by email. The connection is made by Wi-Fi with a smartphone or tablet using CX02 dongle. It is iOS and Android compatible. For more details, see Section 29 or consult Technical support; see contact details on inside front cover.

**NFC** App for RGK 4...SA, with integrated NFC technology, allows remote parameter configuration.

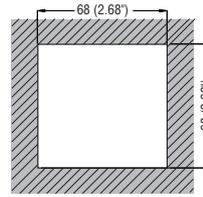
The parameters can be saved in a file for archive purposes. It is Android compatible. For more details, see Section 29 or consult Technical support; see contact details on inside front cover.

## ENGINE PROTECTION CONTROLLERS

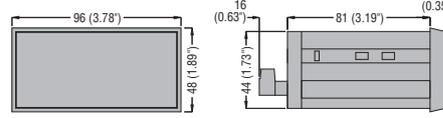
### RGK 20



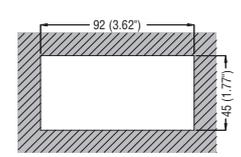
### Cutout



### RGK 30

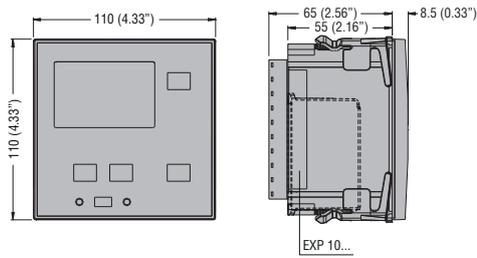


### Cutout

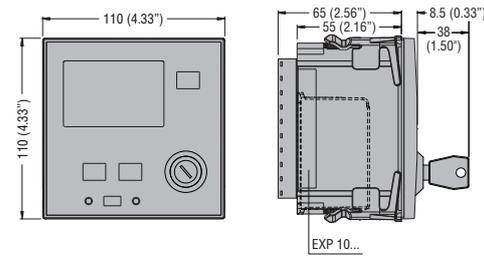


## STAND-ALONE GEN-SET CONTROLLERS

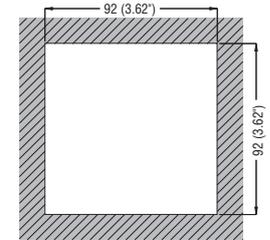
### RGK 400SA



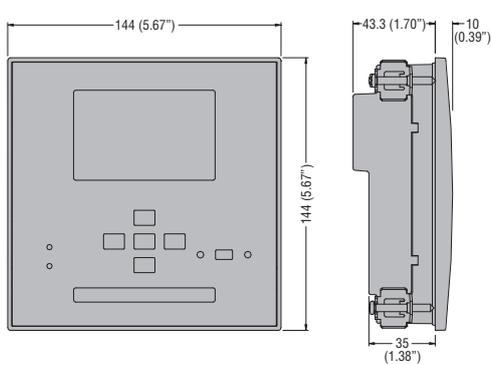
### RGK 420SA



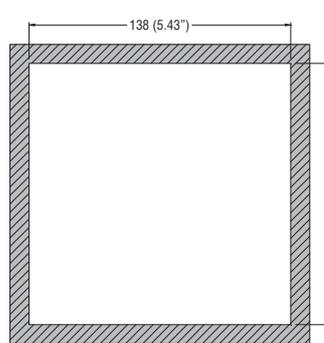
### Cutout



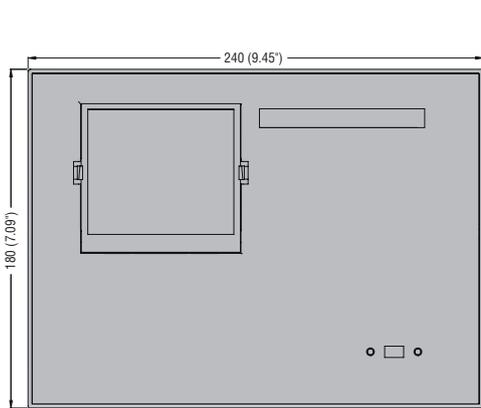
## GEN-SET CONTROLLERS RGK 600... - RGK 601... - RGK 610



### Cutout

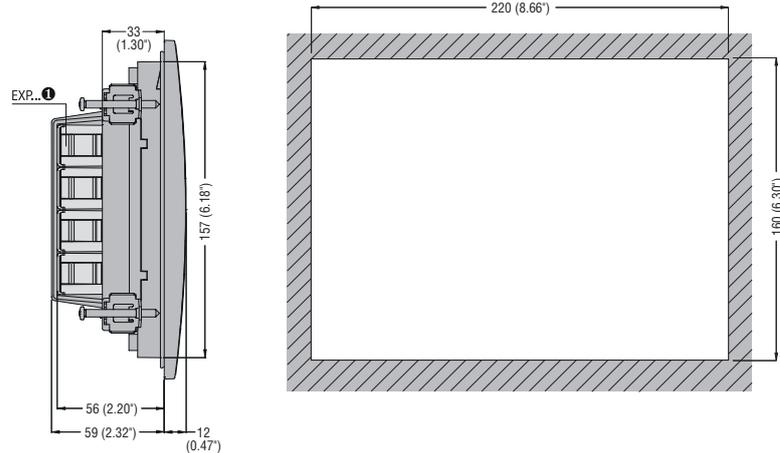


## GEN-SET CONTROLLERS RGK 700... - RGK 750... - RGK 800... - RGK 900... - REMOTE DISPLAY PANELS RGK 800RD - RGK 800RD SA - RGK 900RD - RGK 900RD SA

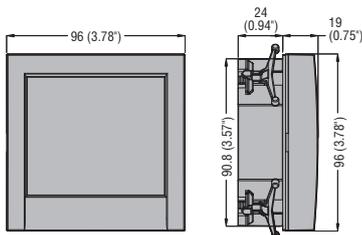


❶ RGK 700, RGK 800RD..., RGK 900RD... excluded.

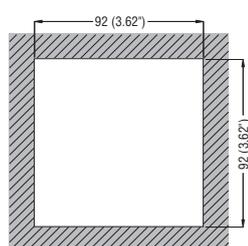
### Cutout



## REMOTE DISPLAY UNIT RGK RA



### Cutout



## ALARM-STATUS RELAY UNIT RGK RR

