



## Safety instructions

### AIM OF THIS MANUAL

This manual is designed for use by any skilled worker wishing to use *Fiamm Motive Power Premium ES* battery chargers for recharging lead/acid vented, (with or without electrolyte mixing), valve regulated AGM and gel batteries. This manual provides details of:

- The chargers' functions.
- Any adjustments required and how to use the chargers.

When producing this manual, *Fiamm Motive Power* has aimed to provide its information in as simple and precise a manner as possible but cannot assume any responsibility for any misinterpretation.

The owner of the equipment is required to retain this manual throughout the equipment's life and to pass it on to any purchaser in the event of its resale.

### GUARANTEE

The manufacturer covers the guarantee in accordance with the local regulations. Please contact your dealer for more detailed information.

### RECOMMENDATIONS

This manual contains information and advice that should be followed by the operator to ensure his safety and maintain the equipment's safe condition.

### Recommended use

This manual should be read through carefully before using the equipment and also read by anyone likely to use the equipment. The equipment:

- Presents no obstacles to the free circulation of air through the air inlet and outlet but, nevertheless, should be cleaned of dust every six months by a qualified person.
- Must be used in conformance with its indicated level of protection and never come into contact with water.
- Must be used within the temperature limits stated in the technical characteristics.
- Must not be installed on surfaces subject to vibration (near to compressors, engines, motors, etc.).

### Operator safety

Take all necessary precautions when the equipment will be used in areas where there is the possible risk of an accident occurring. Ensure appropriate ventilation according to standard EN50272-3 to allow any gases released to escape. Never disconnect the battery while it is being charged.

### ELECTRICAL SAFETY

The prevailing safety regulations must be observed.

The system protection installed on the power supply to the charger must conform to the charger's electrical characteristics. The installation of a suitable circuit breaker is recommended. It is imperative to ensure that when fuses are being replaced only fuses of the specified type and of the correct calibre are used. It is strictly forbidden to use inappropriate fuses or to short-circuit the fuse holders.

This equipment conforms to Class 1 safety standards, which means that the appliance must be earthed and requires to be powered from an earthed supply. Earthing is provided by means of a braid or cable of cross-section in excess of or equal to 6 mm<sup>2</sup>; this cable must be as short as possible. Before opening the equipment for the purposes of adjustment, replacement of components, maintenance or repairs, it must be disconnected from all sources of electrical power (including mains and battery power). The battery must only be disconnected **after** the Stop/Start button has been pressed (see on models 1 and 2 on following page) or the Start/Stop button has been set to "0"

(models 3 and 4). Any adjustment, maintenance or repairs to the equipment while it is open must only be carried out by an appropriately skilled person who is aware of the risks involved.

**Contact one of the company's trained technicians if any problem is encountered when putting the charger into operation.**

### LIMITATIONS ON USE

This equipment has been designed for indoor use. It is only designed to recharge lead/acid batteries on industrial premises.

### DESTRUCTION OF THE EQUIPMENT

When the equipment becomes obsolete, the casings and the other internal components can be disposed of by specialist companies. Local legislation takes precedence over any instructions in this document and must be scrupulously observed (WEEE 2002/96 EEC).

### IMPROVEMENTS AND MODIFICATIONS

Fiamm Motive Power reserves the right to make any improvements and/or modifications to the product described in this manual at any time and without prior notice and is not obliged under any circumstances whatsoever to update the contents of this manual nor the equipment concerned.

### RECEIPT – STORAGE

Upon receipt of the package, check for any external or internal damage and, if necessary, notify the haulier at his usual premises, by recorded delivery letter, fax or telex, within 24 hours of delivery.

If the charger is to be stored before its use, it must be kept carefully sealed in its original packaging. It must be stored in a clean and dry location at a moderate temperature (-20°C to +40°C). Equipment stored at a temperature of less than 15°C must be brought progressively to operating temperature (over a period of 24 hours) to avoid any risk of condensation causing electrical faults (particularly short-circuits).

### REPLACEMENT PARTS

The equipment's production number must be supplied when ordering any replacement parts. This number can be found on the information plate.

### INFORMATION PLATE

This is located on one side of the charger.

### EEC DECLARATION OF CONFORMITY



Fiamm Motive Power hereby declares that the chargers in the Premium ES range covered by this declaration conform to the descriptions laid down in European Directives

• 89/336/EEC:  
EN61000-6-2, EN61000-6-4: Immunity and emissions limits for industrial electronics (Class A - Industrial Environments)

• 2006/35/EC:  
EN60950, EN60335 (Low Voltage Directive)

• RoHS 2002/95/EEC.

# Presentation & Use

## INTRODUCTION

The *Premium ES* range of chargers enable batteries to be recharged from the mains supply. They can recharge 24V, 36V, 48V, 72V or 80 V batteries (depending on the version supplied).

The microprocessor control automatically recognises the battery's voltage, capacity, state of charge, etc., providing optimum battery control from highly efficient analyses of its condition. Several charging profiles are available for free electrolyte vented lead/acid, batteries: ionic and pneumatic mixing, valve-regulated AGM and gel, battery types, depending on the user's configuration. Moreover, desulphation, equalizing and refreshing charges are also integrated.

## UNPACKING

The charger is supplied with the following components:

- A power cable 3 metres long.
- A battery cable 3 metres long.
- The present Installation Instructions.
- The Technical Characteristics sheet.

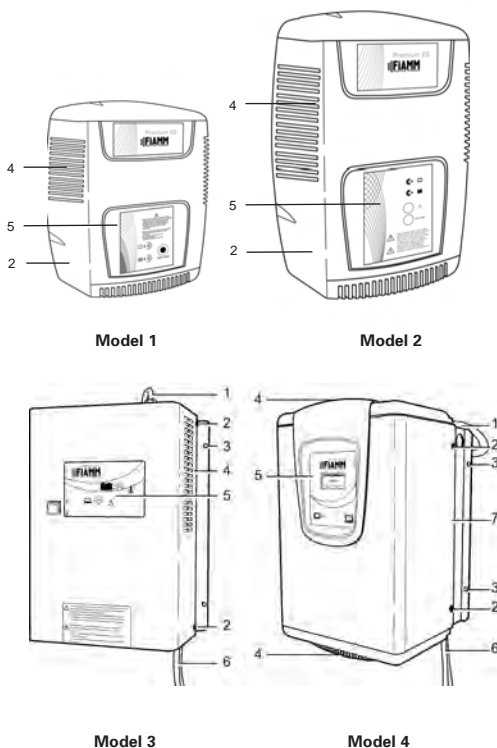
## GENERAL CHECKS

Before putting the charger into service, we recommend that you check:

- That it is correctly earthed.
- That the local power supply conforms to the charger's operating voltage.
- That the battery voltage conforms to that of the charger.
- That the charger's output is suitable for the battery's capacity.

## EXTERNAL COMPONENTS

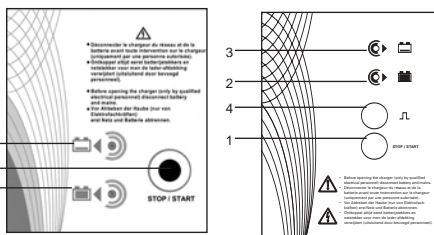
The general components are shown below:



Ref.	Function
1.	Power supply cable.
2.	Screws holding the cover.
3.	Wall fixing.
4.	Ventilation holes.
5.	Display and controls (refer to next figure).
6.	Battery cable.
7.	Wall mounting bracket

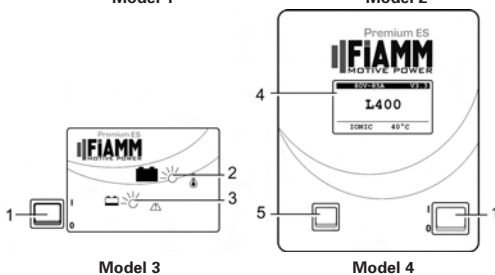
## CONTROL PANEL

This contains the display and the control buttons. Please refer to the sections The meaning of the lights and LCD fault messages for details of the information shown.



Model 1

Model 2



Model 3

Model 4

No.	Function
1.	Start-Stop or Stop/Start switch.
2.	Green 'Charging completed' light (battery charged). Unlit: charger stopped or battery not available. Flashing: thermal fault. Permanently lit: battery available.
3.	Red 'Fault' light. Unlit: charger stopped or battery not in charge. Flashing: charger fault. Permanently lit: 'Charging in progress'.
4.	LCD display.
5.	Button for exiting the menu, initiating equalisation and initiating desulphation.

## MECHANICAL INSTALLATION

The charger must be mounted on the wall free of vibrations in a vertical position (except for floor standing chargers). For wall-mounted chargers, the lower part of the charger must be at least 0.60 m from the floor and/or the charger below and the upper part 1.0 m from the ceiling. The minimum distance between two chargers must be 0.50 m. You must avoid areas where the chargers may be splashed with water.

The charger must be held by 4 fixings suitable for the type of support. The drilling pattern varies according to the model of charger (please refer to the technical brochure).

ELECTRICAL CONNECTION

To the mains supply

You may only connect to the 1-phase 230Vac or 3-phase 400Vac mains supply (depending on the type of the charger) via a standard socket and an appropriate circuit breaker (not supplied). The current consumption is shown on the charger's information plate.

To the battery

Polarity must be observed. Any reversal of polarity will blow the output fuse, prevent charging and cause DF fault code to be displayed (on model 4). Please refer to the Fault Messages section.

The charger must be connected to the battery by the cables supplied:

- The RED cable: to the battery's POSITIVE terminal.
- The BLACK cable: to the battery's NEGATIVE terminal.

CHARGING THE BATTERY  
(CHARGERS WITH LIGHTS ONLY)

Initiating charging

1. Models 1 and 2: Connect the battery.  
Model 3: Switch the Start/Stop switch to position "1".  
The "Charging" and "OK" lights flash, depending on the charging profile, as follows:

Flashing alternately	Ionic (1 red/1 green)
Flashing simultaneously	Other (depending on order) Gel (red and green) Pneumatic (3 red/1 green)

After approximately 30 seconds, the red "CHARGING" light illuminates permanently. If this does not happen, refer to the paragraph on "The meaning of the lights".

2. Charging is initiated and starts automatically.


Completion of charging

1. The green "OK" light stays on permanently.  
The battery is charged and ready for use.  
2. Switch the Start/Stop switch to "0" (Model 3).  
3. Disconnect the ready to use battery.

On model 1 and 2 you can stop the charge by pressing the Stop/Start button.  
If the battery remains connected, in order to keep it charged, compensation and subsequent equalisation charging operations will be initiated automatically.

Completion of charging with equalisation (Models 2 and 3)  
Equalisation only concerns vented lead/acid batteries. It will be initiated manually or automatically by switch

Manual initiation

1. As soon as charging is complete (the green light is permanently lit or is flashing), press the  button.  
The red light permanently lit indicates that equalisation has been initiated  
2. The battery is ready for use as soon as the green light illuminates.


Automatic initiation

If equalisation has been programmed, equalisation charging is initiated automatically.

Desulphation

- Either starts automatically when the battery is heavily discharged; the length of the desulphating operation is defined by the charger's electronics. The charging process is initiated automatically at the end of the desulphation period.
- Or is initiated manually, as shown below.  
To initiate desulphation manually:

Can be carried out on models 2 and 3 equipped with desulphation button.

1. Press STOP button to stop the charge. The 2 lights are unlit.
2. Press the  while maintaining the STOP button pressed.  
The red light illuminates. Desulphation charge is initiated.
3. End of charge : the green light is lit. The battery is ready for use.

CHARGING THE BATTERY  
(CHARGERS WITH LCD DISPLAY ONLY)

The charger can only be started when a technically compliant battery is connected to it (type, capacity, voltage).

Initiating desulphation before charging

- Desulphation of a vented lead/acid battery:
- Either starts automatically when the battery is heavily discharged; the length of the desulphating operation is defined by the charger's electronics. The charging process is initiated automatically at the end of the desulphation period.
  - Or is initiated manually, as shown below.

- To initiate desulphation manually:
1. Set the Start/Stop switch to "0".
  2. Hold down the  button.
  3. Set the Start/Stop switch to "1".  
Release .

Desulphation is initiated for the programmed period. The charging initiation process must be started manually on completion of the desulphation period.

Initiating charging

1. Set the Start/Stop switch to "1".  
The display shows the information on the battery connected and counts down the time remaining before effective charging starts.

Once the two-minute countdown is complete, the display shows the information on the charging operation.

Faults can prevent charging. Please refer to the section on Fault Messages.

During charging

The display shows the information on the charging operation.

Information displayed

Sign	Type of measurement	Example
U	Battery voltage (V).	26.1
u	Voltage per cell (V).	2.18
I	Instantaneous charging current (A).	55
C	Capacity recharged (Ah).	71
t	Charging time spent (hh:mm).	03:36
H	Estimated remaining charging time (hours).	05
DF	No. of any fault occurring. See § Fault Messages.	DF5

Completion of charging without equalisation

1. The green light illuminates when charging has been completed correctly.  
The green 'charging complete' light is illuminated and the message AVAIL is displayed. The display shows, in alternation:
- The charging time taken.
  - The number of amp hours recharged.

Any other visual indication from any of the three lights indicates a problem during charging.  
If the battery remains connected, in order to keep it charged, compensation and subsequent equalisation

charging operations will be initiated automatically, depending on the type of battery.

If the green light is flashing, the battery is in its resting phase.


Wait until the light stops flashing.

2. Set the Start/Stop switch to "0".
3. Disconnect the battery, which is now ready for use.

### Completion of charging with equalisation

Equalisation only concerns vented lead/acid batteries. It can be initiated either manually or automatically.

#### Manual initiation

1. As soon as charging is complete (the green light is permanently lit or is flashing), press the  button. The messages EQUAL I = (equalisation current) and EQUAL H = (remaining equalisation time) indicate that equalisation has been initiated.
2. The battery is ready for use as soon as the green light illuminates.

#### Automatic initiation

If equalisation has been programmed, equalisation charging is initiated automatically.

Furthermore, if the battery remains connected, in order to keep it charged, maintenance charges (compensation and subsequent equalisation charging operations) will be initiated automatically, depending on the type of battery. The same information as for manual initiation is displayed (see above).

### THE MEANING OF THE LIGHTS

Lights	Cause	Remedial action
Red & green flashing.	Start of the charge.	None. See § "Charging".
Red permanently lit & green unlit	Normal status during charging.	Wait until charging is complete, indicated by the red light going out and the green light illuminating.
Red flashing & green unlit.	No current to the battery.	Check and/or change the output fuse.
Red unlit & green perm. lit.	Charging complete.	Battery ready.
Red unlit & green flashing.	Thermal fault (ambient temperature too high, no ventilation), or battery voltage too high or too low	Check battery voltage. Charge is stopped. Check the charger's installation and operating conditions.
Red perm. lit & green flashing.	Air pressure fault. Charging in progress.	Check the air circuit.
Red & green permanently lit.	Profile configuration error.	Check the switches configuration.
Red and green unlit.	No mains supply	Check the power supply voltage.
	Defective power supply fuse.	Check the power supply voltage against the voltage accepted by the charger and the fuse.
	Battery not connected.	Check that the battery and/or the battery cable is correctly connected

### LCD Fault messages

Fault	Cause	Remedial action
No display	No mains supply.	Check the power supply and the input fuse(s).
DC	Appears before a DF1 fault is displayed.	
DF1/DF2*	Charger fault.	Check the power supply voltage.  Check that the battery is correctly connected (that the cables are not reversed) and check the output fuse.
DF3*	Unsuitable battery.	Battery voltage too high or too low. Connect the correct battery to the charger
DF4	The battery has been discharged more than 80% of its capacity.	Charging continues.
DF5	Battery requires inspection.	Check the charging cables (cross-section too small), the terminals (oxidisation, not tight) and the battery (defective cells).
DF7	Pneumatic mixing air circuit fault (the red light flashes).	Check the air circuit (pump, tubing).
TH*	Thermal fault resulting in interruption of charging.	Check that the fan(s) is (are) working correctly and/or that the ambient temperature is not too high or whether there is poor natural ventilation to the charger.

(\*): A blocking fault preventing charging from continuing.

### TECHNICAL CHARACTERISTICS

Refer to the Technical Characteristics sheet joined to the charger.

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