



8-STAGE AUTOMATIC

BATTERY CHARGER

MCU CONTROLLED & HIGH FREQUENCY SWITCHMODE



P/No. MFC1205L, MFC1207L, MFC1210L, MFC1212L,
MFC1215L, MFC1220L, MFC2405L, MFC2410L

Instruction Manual

Please read user manual carefully before use.



1. WARNING

- ◆ Explosive gases may escape from the battery during charging. Prevent flames and sparks. Provide adequate ventilation.
- ◆ Before charging, read the instructions.
- ◆ For indoor use. Do not expose to rain.
- ◆ For charging 12V/24V Lithium-ion with LiFePO₄ batteries and Lead Acid batteries ONLY.
- ◆ Disconnect the 110V/220-240V AC mains supply before making or breaking the connections to the battery.
- ◆ The battery charger must be plugged into an earthed socket-outlet.
- ◆ Connection to supply mains is to be in accordance with National wiring rules.
- ◆ Do not attempt to charge non-rechargeable batteries.
- ◆ Never charge a frozen battery.
- ◆ If the AC cord is damaged do not attempt to use. It must be replaced or repaired by a qualified person.
- ◆ Corrosive substances may escape from the battery during charging and damage delicate surfaces. Store and charge in a suitable area.
- ◆ Ensure all vehicle accessories including lights, heaters, appliances etc are turned off prior to charging
- ◆ This appliance is not intended for use by young children or infirm persons unless they have been adequately supervised by a responsible person to ensure that they can use the appliance safely.
- ◆ Young children should be supervised to ensure that they do not play with the appliance.

2. FEATURES

8-STAGE AUTOMATIC CHARGING

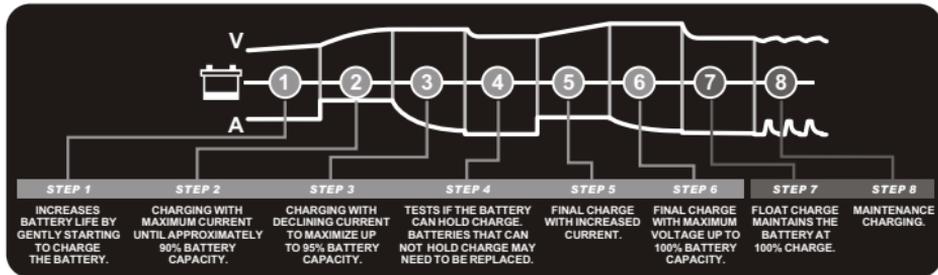
This is a fully automatic battery charger with 8 charge stages.

Automatic charging protects your battery from being overcharged. So you can leave the charger connected to the battery indefinitely.

8-stage charging is a very comprehensive and accurate charging process that gives your battery longer life and better performance compared to using traditional chargers.

8-stage chargers are suitable for most battery types including LITHIUM, GEL, AGM, WET, MF and CALCIUM batteries. They may also help restore drained and sulphated batteries.

The Lithium battery mode 8 stages are: Soft Start, Bulk, Absorption, Analyse, Completion, Maximization, Float and Maintain.



		LIMIT
STEP 1 SOFT START	25% Current until 11V/22V	Max 30s
STEP 2 BULK	100% Current until 13.8V/27.6V	Max 10h
STEP 3 ABSORPTION	Constant 13.8V/27.6V until current drops to 15%	30 minutes
STEP 4 ANALYSE	Checks if voltage drops to 12V/24V	3 minutes
STEP 5 COMPLETION	30% Current until 14.5V/29V	
STEP 6 MAXIMIZATION	Constant 14.5V/29V until current drops to 15%	30 minutes
STEP 7 FLOAT	13.6V/27.2V, 100% Current	10 days Charge cycle restarts if voltage drops*
STEP 8 MAINTAIN	During 13.0V-13.8V/26.0V-27.6V, the current control at 100%~20%	Charge cycle restarts if voltage drops

STEP 1 SOFT START

A preliminary charge processes that gently introduces power to the battery. This protects the battery and increases battery life.

STEP 2 BULK

Charging with maximum current until approximately 90% battery capacity.

Bulk mode for the charging cycle. The start phase continues until the battery's terminal voltage has risen above the set limit, at which point the charger switches to bulk charging. If the terminal voltage has not passed the voltage limit within the time limit, the charger switches to fault mode (Step 2 lamp solid) and discontinues the charging. If so, the battery is faulty or its capacity is too large.

STEP 3 ABSORPTION

Charging with declining current to maximize up to 95% battery capacity.

STEP 4 ANALYSE

Tests if the battery can hold charge. Batteries that can not hold charge may need to be replaced.

STEP 5 COMPLETION

Final charge with increased current.

STEP 6 MAXIMIZATION

Final charge with maximum voltage up to 100% battery capacity.

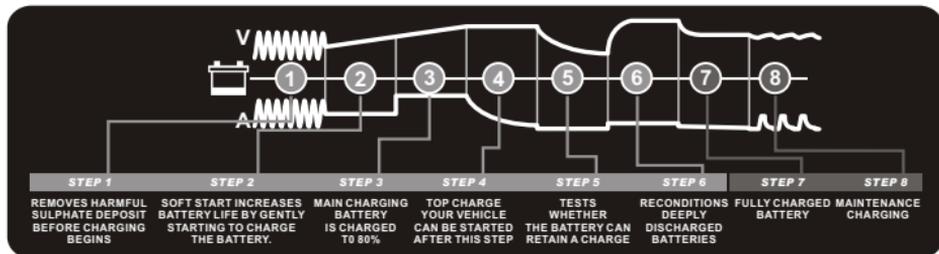
STEP 7 FLOAT

The Float stage maintains the battery at 100% charge without overcharging or damaging the battery. This means the charger can be left connected to the battery indefinitely.

STEP 8 MAINTAIN

Maintaining the battery at 95 -100% capacity. The charger monitors the battery voltage and gives a maintain when necessary to keep the battery fully charged.

The Lead Acid battery mode (Including GEL, AGM, WET, MF and CALCIUM) 8 stages are: Desulphation, Soft Start, Bulk, Absorption, Analyse, Recondition, Float and Pulse



	SMALL 	NORMAL	COLD 	RECOND	LIMIT
1 DESULPHATION	11V	11V/22V	11V/22V	11V/22V	Max 8h
2 SOFT START	Half the rated until 12.5V	Half the rated until 12.5V/25V	Half the rated until 12.5V/25V	Half the rated until 12.5V/25V	Max 8h
3 BULK	100% Current until 14.4V	100% Current until 14.4V/28.8V	100% Current until 14.7V/29.4V	100% Current until 14.4V/28.8V	Max 24h
4 ABSORPTION	Constant 14.4V until current drops to 15%	Constant 14.4V/28.8V until current drops to 15%	Constant 14.7V/29.4V until current drops to 15%	Constant 14.4V/28.8V until current drops to 15%	30 minutes
5 ANALYSE	Checks if voltage drops to 12V	Checks if voltage drops to 12V/24V	Checks if voltage drops to 12V/24V	Checks if voltage drops to 12V/24V	3 minutes
6 RECONDITION				Constant current (15%) limited to 16V/32V	30 mins or 4h depending on battery voltage
7 FLOAT	13.7V 100% Current	13.7 V/27.4V 100% Current	13.7V/27.4V 100% Current	13.7V/27.4V 100% Current	10 days Charge cycle restarts if voltage drops*
8 PULSE	During 12.6V -14.4V, the current control at 0.8-0.4A	During 12.6V -14.4V/25.2V -28.8V, the current control at 100%~20%	During 12.6V -14.7V/25.2V -29.4V, the current control at 100%~20%	During 12.6V -14.4V/25.2V -28.8V, the current control at 100%~20%	Charge cycle restarts if voltage drops

*SMALL - This mode only for MFC1205L

*NIGHT - This mode is equal to NORMAL, but with reduced current

Desulphation

The Desulphation stage may break down sulphation that occurs in batteries that have been left flat for extended periods of time, returning them back to full charge. Sulphation occurs when lead-sulphate hardens and clogs up the battery cells.

Soft Start

A preliminary charge processes that gently introduces power to the battery. This protects the battery and increases battery life.

Bulk (Constant Current)

Charging with maximum current until approximately 80% battery capacity. Bulk mode for the charging cycle. The start phase continues until the battery's

terminal voltage has risen above the set limit, at which point the charger switches to bulk charging. If the terminal voltage has not passed the voltage limit within the time limit, the charger switches to fault mode (Step 3 lamp solid) and discontinues the charging. If so, the battery is faulty or its capacity is too large.

Absorption (Constant Voltage)

Charging with declining current to maximize up to 100% battery capacity.

Analyse

An automatic battery test is conducted immediately after the absorption stage. The test monitors the voltage for 90 seconds to determine if the charge was successful.

◆12V charger If the voltage is below 13.2 volts (fail), the charger will initiate the Recondition stage.

◆12V charger If the voltage is above 13.2 volts (pass), the charger will proceed to the final stage: Float.

◆24V charger If the voltage is below 26.4 volts (fail), the charger will initiate the Recondition stage.

Recondition

Choose the Recond program to add the Recond step to the charging process. During the Recond step voltage increases to create controlled gassing in the battery. Gassing mixes the battery acid and gives back energy to the battery.

This recondition stage can recover batteries from a deeply discharged state increasing performance and battery life.

RECOND - This mode is used to recover deep discharged flooded batteries where you could expect a stratified acid (high acid weight in the bottom, low on top). Check with battery manufacturer when in doubt.

Use this mode with care, because the high voltage will cause some water loss. 16V/32V is normally no problem for electronics in 12V/24V system. Consult your supplier when in doubt. Life of light bulbs will be reduced at higher voltage. Try to disconnect light from the battery during this phase. Maximum effect and minimum risk for electronics is achieved by charging a disconnected battery.

Float

The Float stage maintains the battery at 100% charge without overcharging or damaging the battery. This means the charger can be left connected to the battery indefinitely.

Pulse

Maintaining the battery at 95 - 100% capacity. The charger monitors the battery voltage and gives a pulse when necessary to keep the battery fully charged.

The AUTOMATIC BATTERY CHARGER has an 8-step fully automatic charging cycle, the cycle is repeated infinitely. If the terminal voltage drops below a lower limit, the charger automatically goes back to the beginning of the charging curve.

3. SWITCHMODE TECHNOLOGY

Using the latest technology in battery chargers, switch mode chargers convert 110V/220-240V AC power to 12V/24V DC power using electronic components unlike traditional battery chargers that rely on heavy transformers. This allows the charger to be light weight and compact without sacrificing on performance.

4. PROTECTIVE FEATURES

POLARITY PROTECTION

Prevents the output leads from sparking due to accidental reverse connection or short circuit, making the charger safer to use around batteries.

OUTPUT SHORT PROTECTION

Short circuit connection of the clips: Check clips are not touching each other
OR Check the clips are correctly connected to the battery.

NON BATTERY LINK PROTECTION

If battery charger connects with non battery load, it will go into protection state.

DISCONNECT PROTECTION

The charger has entered the energy save mode. This happens if the charger isn't connected to the battery in 2 minutes.

OVER VOLTAGE PROTECTION

Lithium battery mode

The 12V lithium battery charger will automatically protection if the voltage is higher than 15.5V.

The 24V lithium battery charger will automatically protection if the voltage is higher than 31V.

Lead Acid battery mode (Including GEL, AGM, WET, MF and CALCIUM)

The 12V lead acid charger will automatically protection if the voltage is higher than 17.5V.

The 24V lead acid charger will automatically protection if the voltage is higher than 35V.

OVER TEMPERATURE PROTECTION

Internal temperature is above 65°C +/- 5°C

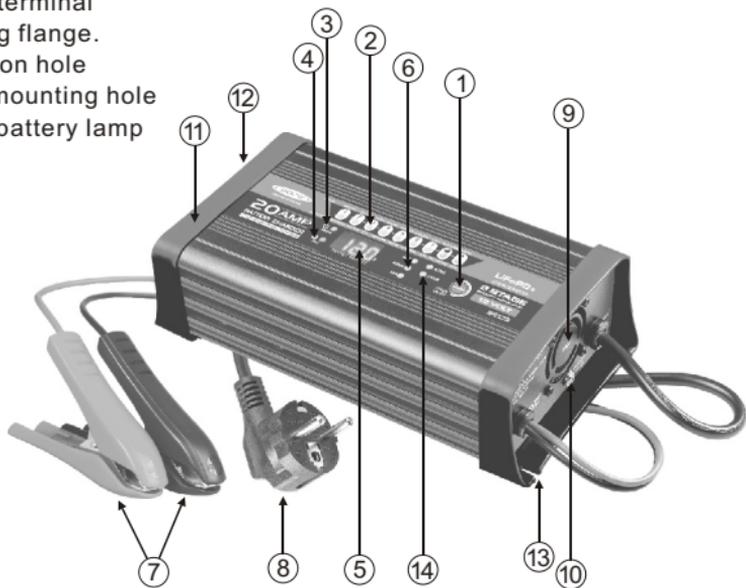
COOLING FAN

The charger is fitted with a thermostatically controlled fan to cool onboard electronics and maintain charging performance. The cooling fan will engage automatically when there is a high load on the battery or there is sufficient heat build up.

5. PRODUCT OVERVIEW

The 8-stage automatic charging consists of the following components:

- 1.Mode button
- 2.Stage lamp status display indicates power, charging and fully charged.
- 3.Power lamp
- 4.Fault Led
- 5.Output voltage meter
- 6.Charging mode
- 7.DC leads.
- 8.Power Cord
- 9.Thermostatically controlled cooling fan
- 10.Ground terminal
- 11.Mounting flange.
- 12.Ventilation hole
- 13.3.5mm mounting hole
- 14.Lithium battery lamp



REMARK:

1. NIGHT - The "NIGHT" mode will fail in the event of a power failure and also the charger is disconnected with the battery. Next time use this function to be reset.
2. Night - Charging with reduced power and almost silent fan for 8 hours.
3. If you want to cancel the "NIGHT" function, press the mode button to cancel until "NIGHT" indicator quenches.

6. CHARGE STATUS INDICATOR

The LITHIUM BATTERY CHARGING and STAGE LAMP will illuminate and flash in various patterns to indicate the different stages of charging. See below for flash / steady patterns.

		Power on lamp	Stage lamp	Fault lamp	LED display
Power Off		—	—	—	—
Power On		●	—	—	0.0
Stage	1. Soft Start	●	☀ / ●	—	Out volt
	2. Bulk	●	☀ / ●	—	
	3. Absorption	●	☀ / ●	—	
	4. Analyse	●	☀ / ●	—	
	5. Completion	●	☀ / ●	—	
	6. Maximization	●	☀ / ●	—	
	7. Float	●	☀ / ●	—	
	👍 Fully Charged	●	☀ / ●	—	
	8. Maintain	●	☀ / ●	—	
Non Battery Link Protection		●	—	—	0.0
Output Short Protection		●	—	☀	- U -
Output Polarity Reverse Protection		●	—	☀	
Disconnect Protection		☀	—	—	0.0
Over Voltage Protection		●	—	☀	- U -
Not accept charge		●	☀ (Step 1 Lamp)	●	Battery volt
Faulty Battery		●	☀ (Step 2 Lamp)	●	
Can not keep charge		●	☀ (Step 4 Lamp)	●	
Battery Charge Fully		●	● (Fully lamp)	—	
Thermal Protection		●	—	☀	- t -

Note: ● : (Solid) ☀ : (Flashing) — : (EXTINGUISH)

STAGE LAMP: illuminates and flashes when 8-stage charging process.

STAGE LAMP: illuminates solid when fully charged.

POWER ON LAMP

If the power lamp is lit with a:

1. STEADY LIGHT

The mains cable is connected to the wall socket.

2. FLASHING LIGHT

The charger has entered the energy save mode. This happens if the charger isn't connected to the battery in 2 minutes.

FAULT LAMP STEADY LIGHT

If the fault lamp is lit solid, check the following:

Has charging been interrupted in STEP 1, 2, or 4?

Restart the charger by pressing the MODE-button. If charging is still being interrupted, the battery.

STEP 1: ...cannot accept charge and may need to be replaced.

STEP 2: ...battery is faulty and may need to be replaced. (Bulk charging has timed out and stopped after 10 hours.)

STEP 4: ...cannot keep charge and may need to be replaced.

FAULT LAMP FLASHING LIGHT

★ Charger's internal temperature is higher than $65^{\circ}\text{C} \pm 5^{\circ}\text{C}$

The Lead Acid battery CHARGING and STAGELAMP will illuminate and flash in various patterns to indicate the different stages of charging. See below for flash / steady patterns.

		Power on lamp	Stage lamp	Fault lamp	LED display
Power Off		—	—	—	—
Power On		☀	☀	☀	—
Power On		●	—	—	0.0
Stage	1. Desulphation	●	☀ / ●	—	Out volt
	2. Soft Start	●	☀ / ●	—	
	3. Bulk	●	☀ / ●	—	
	4. Absorption	●	☀ / ●	—	
	5. Analyse	●	☀ / ●	—	
	6. Recondition	●	☀ / ●	—	
	7. Float	●	☀ / ●	—	
	8. Pulse	●	●	—	
Non Battery Link Protection		●	—	—	0.0
Output Short Protection		●	—	—	
Output Polarity Reverse Protection		●	—	—	
Disconnect Protection		☀	—	—	
Over Voltage Protection		●	—	☀	- U -
Is seriously sulphated		●	☀ (Step 1 Lamp)	●	Battery volt
Not accept charge		●	☀ (Step 2 Lamp)	●	
Faulty Battery		●	☀ (Step 3 Lamp)	●	
Not keep charge		●	☀ (Step 5 Lamp)	●	
Battery Charge Fully		●	● (Fully lamp)	—	
Thermal Protection		●	—	☀	- t -

Note: ● : (Solid) ☀ : (Flashing) — : (EXTINGUISH)

STAGE LAMP: illuminates and flashes when 8-stage charging process.

STAGE LAMP: illuminates solid when fully charged.

POWER ON LAMP

If the power lamp is lit with a:

1. STEADY LIGHT

The mains cable is connected to the wall socket.

2. FLASHING LIGHT

The charger has entered the energy save mode. This happens if the charger isn't connected to the battery in 2 minutes.

FAULT LAMP STEADY LIGHT

If the fault lamp is lit solid, check the following:

Has charging been interrupted in STEP 1, 2, 3 or 5?

Restart the charger by pressing the MODE-button. If charging is still being interrupted, the battery.

STEP 1: ...is seriously sulphated and may need to be replaced.

STEP 2: ...cannot accept charge and may need to be replaced.

STEP 3: ...battery is faulty and may need to be replaced. (Bulk charging has timed out and stopped after 24 hours.)

STEP 5: ...cannot keep charge and may need to be replaced.

FAULT LAMP FLASHING LIGHT

★ Charger's internal temperature is higher than 65°C +/- 5°C

7. SPECIFICATIONS

P/No.	MFC 1205L	MFC 1207L	MFC 1210L
Charger Type	8-Stage automatic		
Input Voltage	<input type="checkbox"/> 220-240V~, 50/60Hz	<input type="checkbox"/> 110V~, 60Hz	
Input Power	154W	215W	307W
Output Voltage	12V DC	12V DC	12V DC
Output Current	5A	7A	10A
Minimum Start Voltage	Lead Acid: 2.0V Lithium: 1.0V		
Back Drain	4mA		
Current Fuse Rating	T3.15A, 250V AC		
CHARGE CONTROL			
Desulphation	Pulse charge up to 11V		
Soft Start	Half the rated set current upto 12.5V		
Bulk	5A up to 14.4V/0.8A(SMALL) 14.4V(NORMAL) 14.7V(COLD) 14.4V(RECONDITION)	7A up to 14.4V(NIGHT) 14.4V(NORMAL) 14.7V(COLD) 14.4V(RECONDITION)	10A up to 14.4V(NIGHT) 14.4V(NORMAL) 14.7V(COLD) 14.4V(RECONDITION)
Absorption	Constant voltage until current drops to 0.75A	Constant voltage until current drops to 1.05A	Constant voltage until current drops to 1.5A
Analyse	Monitors voltage for 90 seconds		
Recondition	Max 16V / 0.75A for 30 mins or 4h depending on battery voltage	Max 16V / 1.05A for 30 mins or 4h depending on battery voltage	Max 16V / 1.5A for 30 mins or 4h depending on battery voltage
Float	13.7V also with pulse feature		
Pulse	12.6V-14.4V,0.8-0.4A(SMALL) 12.6V- 14.4V, 5-1A(NORMAL) 12.6V- 14.7V, 5-1A(COLD) 12.6V-14.4V,5-1A(RECONDITION)	12.6V- 14.4V, 7-1.4A(NIGHT) 12.6V- 14.4V, 7-1.4A(NORMAL) 12.6V- 14.7V, 7-1.4A(COLD) 12.6V- 14.4V, 7-1.4A(RECONDITION)	12.6V- 14.4V, 10-2A(NIGHT) 12.6V- 14.4V, 10-2A(NORMAL) 12.6V- 14.7V, 10-2A(COLD) 12.6V- 14.4V, 10-2A(RECONDITION)
Over Voltage Protection	The 12V lead acid charger will automatically protection if the voltage is higher than 17.5V		
CHARGE CONTROL LITHIUM			
Soft Start	25% Current until 11V		
Bulk	5A up to 13.8V	7A up to 13.8V	10A up to 13.8V
Absorption	Constant voltage until current drops to 0.75A	Constant voltage until current drops to 1.05A	Constant voltage until current drops to 1.5A
Analyse	Monitors voltage for 3 minutes		
Completion	1.5A Current until 14.5V	2.1A Current until 14.5V	3A Current until 14.5V
Maximization	Constant 14.5V until current drops to 0.75A	Constant 14.5V until current drops to 1.05A	Constant 14.5V until current drops to 1.5A
Float	13.6V, 100% Current		
Maintain	13.0V-13.8V, 5-1A	13.0V-13.8V, 7-1.4A	13.0V-13.8V, 10-2A
Over Voltage Protection	The 12V lithium charger will automatically protection if the voltage is higher than 15.5V.		
BATTERY RANGE			
Deep Cycle	35-100Ah	50-140Ah	70-200Ah
Lithium	10-50Ah	14-70Ah	20-100Ah
Types of Batteries	Most types of 12V Lithium-ion LiFePO4 batteries and Lead Acid batteries including WET, MF, Calcium, AGM and GEL		
Efficiency	App.85%		
Thermal Protect	65°C+/-5°C		
Cooling Fan	Automatic temperature controlled		
Ambient temperature	-20°C to +50°C, output power is reduced automatically at high temperatures		
Dimension (L×W×H)	197×116×62mm	197×116×62mm	197×116×62mm
Weight	1.05Kg	1.05Kg	1.1Kg

*Specifications are subjected to change without prior notice.

8. SPECIFICATIONS

P/No.	MFC 1212L	MFC 1215L	MFC 1220L
Charger Type	8-Stage automatic		
Input Voltage	<input type="checkbox"/> 220-240V~, 50/60Hz	<input type="checkbox"/> 110V~, 60Hz	
Input Power	332W	415W	554W
Output Voltage	12V DC	12V DC	12V DC
Output Current	12A	15A	20A
Minimum Start Voltage	Lead Acid: 2.0V Lithium: 1.0V		
Back Drain	4mA		
Current Fuse Rating	T3.15A, 250V AC	<input type="checkbox"/> T3.15A, 250V AC <input type="checkbox"/> T5A, 250V AC	<input type="checkbox"/> T5A, 250V AC <input type="checkbox"/> T6.3A, 250V AC
CHARGE CONTROL			
Desulphation	Pulse charge up to 11V		
Soft Start	Half the rated set current upto 12.5V		
Bulk	12A up to 14.4V(NIGHT) 14.4V(NORMAL) 14.7V(COLD) 14.4V(RECONDITION)	15A up to 14.4V(NIGHT) 14.4V(NORMAL) 14.7V(COLD) 14.4V(RECONDITION)	20A up to 14.4V(NIGHT) 14.4V(NORMAL) 14.7V(COLD) 14.4V(RECONDITION)
Absorption	Constant voltage until current drops to 1.8A	Constant voltage until current drops to 2.25A	Constant voltage until current drops to 3A
Analyse	Monitors voltage for 90 seconds		
Recondition	Max 16V / 1.8A for 30 mins or 4h depending on battery voltage	Max 16V / 2.25A for 30 mins or 4h depending on battery voltage	Max 16V / 3A for 30 mins or 4h depending on battery voltage
Float	13.7V also with pulse feature		
Pulse	2.6V- 14.4V, 12-2.4A(NIGHT) 12.6V- 14.4V, 12-2.4A(NORMAL) 12.6V- 14.7V, 12-2.4A(COLD) 12.6V- 14.4V, 12-2.4A(RECONDITION)	12.6V- 14.4V, 15-3A(NIGHT) 12.6V- 14.4V, 15-3A(NORMAL) 12.6V- 14.7V, 15-3A(COLD) 12.6V- 14.4V, 15-3A(RECONDITION)	12.6V- 14.4V, 20-4A(NIGHT) 12.6V- 14.4V, 20-4A(NORMAL) 12.6V- 14.7V, 20-4A(COLD) 12.6V- 14.4V, 20-4A(RECONDITION)
Over Voltage Protection	The 12V lead acid charger will automatically protection if the voltage is higher than 17.5V		
CHARGE CONTROL LITHIUM			
Soft Start	25% Current until 11V		
Bulk	12A up to 13.8V	15A up to 13.8V	20A up to 13.8V
Absorption	Constant voltage until current drops to 1.8A	Constant voltage until current drops to 2.25A	Constant voltage until current drops to 3A
Analyse	Monitors voltage for 3 minutes		
Completion	3.6A Current until 14.5V	4.5A Current until 14.5V	6A Current until 14.5V
Maximization	Constant 14.5V until current drops to 1.8A	Constant 14.5V until current drops to 2.25A	Constant 14.5V until current drops to 3A
Float	13.6V, 100% Current		
Maintain	13.0V-13.8V, 12-2.4A	13.0V-13.8V, 15-3A	13.0V-13.8V, 20-4A
Over Voltage Protection	The 12V lithium charger will automatically protection if the voltage is higher than 15.5V.		
BATTERY RANGE			
Deep Cycle	80-240Ah	100-300Ah	134-400Ah
Lithium	24-120Ah	30-150Ah	40-200Ah
Types of Batteries	Most types of 12V Lithium-ion LiFePO ₄ batteries and Lead Acid batteries including WET, MF, Calcium, AGM and GEL		
Efficiency	App.85%		
Thermal Protect	65°C +/- 5°C		
Cooling Fan	Automatic temperature controlled		
Ambient temperature	-20°C to +50°C, output power is reduced automatically at high temperatures		
Dimension (L×W×H)	197×116×62mm	217×116×62mm	217×116×62mm
Weight	1.1Kg	1.28Kg	1.28Kg

*Specifications are subjected to change without prior notice.

9. SPECIFICATIONS

P/No.	MFC 2405L	MFC 2410L
Charger Type	8-Stage automatic	
Input Voltage	<input type="checkbox"/> 220-240V~, 50/60Hz	<input type="checkbox"/> 110V~, 60Hz
Input Power	296W	547W
Output Voltage	24V DC	24V DC
Output Current	5A	10A
Minimum Start Voltage	Lead Acid: 4.0V Lithium: 2.0V	
Back Drain	8mA	
Current Fuse Rating	T3.15A, 250V AC	<input type="checkbox"/> T5A, 250V AC <input type="checkbox"/> T6.3A, 250V AC
CHARGE CONTROL		
Desulphation	Pulse charge up to 22V	
Soft Start	Half the rated set current up to 25V	
Bulk	5A up to 28.8V(NIGHT) 28.8V(NORMAL) 29.4V(COLD) 28.8V(RECONDITION)	10A up to 28.8V(NIGHT) 28.8V(NORMAL) 29.4V(COLD) 28.8V(RECONDITION)
Absorption	Constant voltage until current drops to 0.75A	Constant voltage until current drops to 1.5A
Analyse	Monitors voltage for 90 seconds	
Recondition	Max 16V / 0.75A for 30 mins or 4h depending on battery voltage	Max 16V / 1.5A for 30 mins or 4h depending on battery voltage
Float	27.4V also with pulse feature	
Pulse	25.2V- 28.8V, 5-1A(NIGHT) 25.2V- 28.8V, 5-1A(NORMAL) 25.2V- 29.4V, 5-1A (COLD) 25.2V- 28.8V, 5-1A (RECONDITION)	25.2V- 28.8V, 10-2A(NIGHT) 25.2V- 28.8V, 10-2A(NORMAL) 25.2V- 29.4V, 10-2A (COLD) 25.2V- 28.8V, 10-2A (RECONDITION)
Over Voltage Protection	The 24V lead acid charger will automatically protection if the voltage is higher than 35V.	
CHARGE CONTROL LITHIUM		
Soft Start	25% Current until 22V	
Bulk	5A up to 27.6V	10A up to 27.6V
Absorption	Constant voltage until current drops to 0.75A	Constant voltage until current drops to 1.5A
Analyse	Monitors voltage for 3 minutes	
Completion	1.5A Current until 29V	3A Current until 29V
Maximization	Constant 29V until current drops to 0.75A	Constant 29V until current drops to 1.5A
Float	27.2V, 100% Current	
Maintain	26.0V-27.6V, 5-1A	26.0V-27.6V, 10-2A
Over Voltage Protection	The 24V lithium battery charger will automatically protection if the voltage is higher than 31V.	
BATTERY RANGE		
Deep Cycle	35-100Ah	70-200Ah
Lithium	10-50 Ah	20-100 Ah
Types of Batteries	Most types of 24V Lithium-ion LiFePO ₄ batteries and Lead Acid batteries including WET, MF, Calcium, AGM and GEL	
Efficiency	App.85%	
Thermal Protect	65°C+/-5°C	
Cooling Fan	Automatic temperature controlled	
Ambient temperature	-20°C to +50°C, output power is reduced automatically at high temperatures	
Dimension (L×W×H)	197×110×62mm	217×116×62mm
Weight	1.1Kg	1.28Kg

*Specifications are subjected to change without prior notice.

10. CHARGING INSTRUCTIONS

1. Settings are made by pressing the MODE-button. After about two seconds the charger activates the selected program. The selected program will be restarted next time the charger is connected.
2. To turn off the charger by pressing and holding the Mode button for 3 seconds.
3. To restart the charger by pressing and holding the Mode button for 3 seconds.

The table explains the different Charging Programs:

Mode	Explanation	Temp range
NORMAL	Normal battery program 14.4V/28.8V. Use for WET, Calcium, MF and for most GEL batteries	-20°C~+50°C (-4°F~122°F)
COLD ❄️	AGM battery program 14.7V/29.4V Use for AGM batteries. Cold weather program	-20°C~+5°C (-4°F~41°F)
RECOND	Recond program 16V/32V Use to return energy to the empty WET and Calcium batteries. Recond your battery once per year and after deep discharge to maximise lifetime and capacity. The Recond program adds STEP 6 to the normal battery program. Frequent use of the Recond program may cause water loss in the batteries and reduce service life of electronics. Contact your vehicle and battery supplier for advice.	-20°C~+50°C (-4°F~122°F)
SMALL 🚲	Small battery program 14.4V/0.8A Use for smaller batteries.	-20°C - +50°C (-4°F - 122°F)
NIGHT	NIGHT - This mode is equal to NORMAL, but with reduced current. The noise of the built-in fan has reduced to its lowest level and the unit is almost silent. The Unit returns automatically to NORMAL after 8 hours. To ensure that the charger restarts in "NIGHT" mode in the event of a power failure the setting is stored in a memory. The indication shows "NIGHT" even if the charger has returned to NORMAL mode to remind that the charger will start in NIGHT mode next time.	

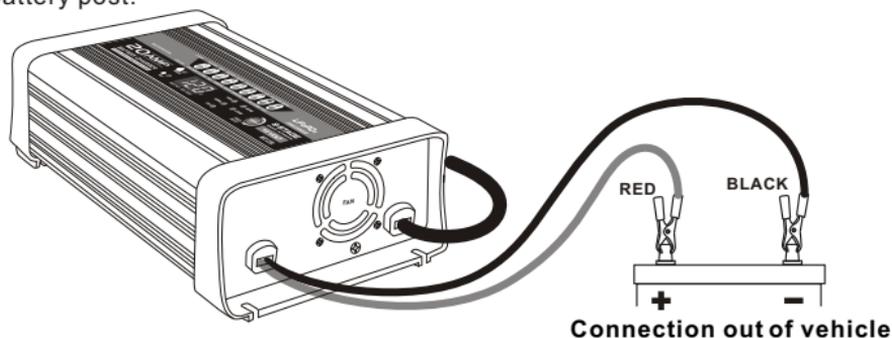
STEP 1 - CHECK THE ELECTROLYTE LEVEL

Prior to charging the battery, remove the vent caps and check the electrolyte level (not required on sealed & maintenance free batteries). The electrolyte should be 6mm (1/4") above the battery's plates. If low, top up with distilled water to the correct level and refit the vent caps.

STEP 2A - CONNECTION OUT OF THE VEHICLE

Connect the RED lead (battery clip) from the charger to the Positive (+) battery post.

Connect the BLACK lead (battery clip) from the charger to the Negative (-) battery post.



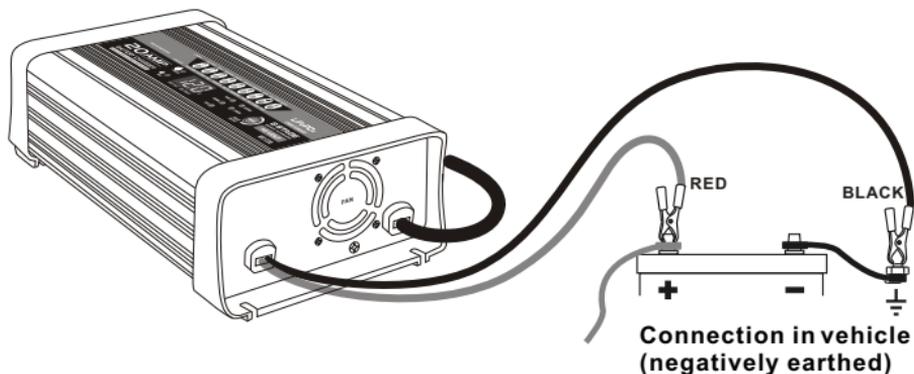
STEP 2B - CONNECTION IN VEHICLE

Determine if the vehicle is Positively (+) or Negatively (-) earthed. Negatively earthed vehicles have a cable (usually black) from the Negative battery terminal to the vehicle's chassis.

a) Negatively earthed (most vehicles)

Connect the RED lead (battery clip) from the charger to the Positive (+) battery terminal.

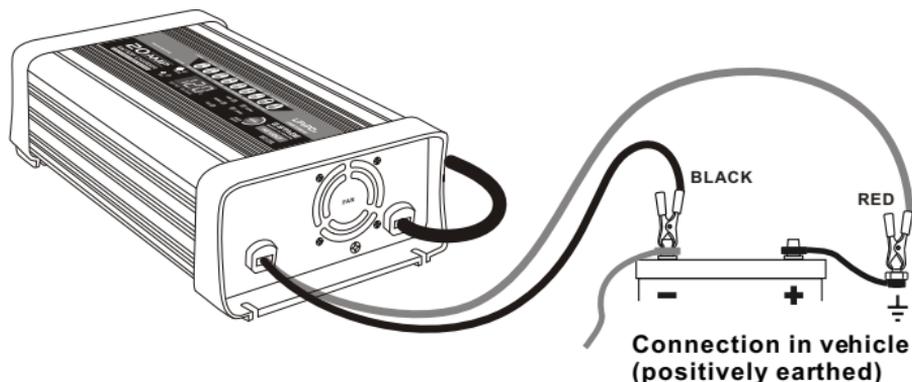
Connect the BLACK lead (battery clip) from the charger to the vehicle's chassis away from the fuel line or moving parts.



b) Positively earthed

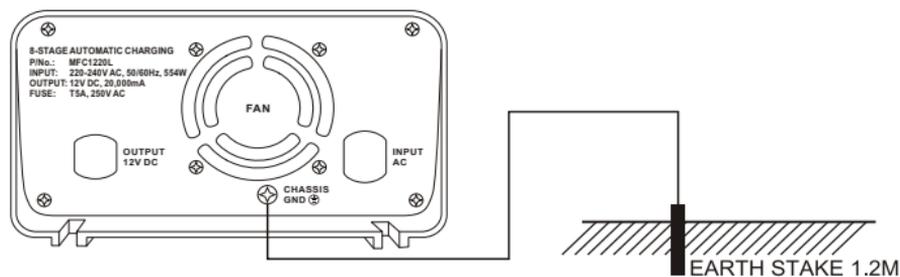
Connect the BLACK lead (battery clip) from the charger to the Negative (-) battery terminal.

Connect the RED lead (battery clip) from the charger to the vehicle's chassis away from the fuel line or moving parts.



c) Chassis earthing

The chassis earthing lug should be connected to an earthing point which will be depending on where the battery charger is installed. In a vehicle, connect the chassis ground lug to the chassis of the vehicle. In a boat, connect to the boat's grounding systems. In a fixed location, connect to earth.



STEP 3 - CONNECT TO 110V/220-240V AC MAINS POWER

Connect the battery charger to the 110V/220-240V AC mains powered socket and turn on the mains power.

STEP 4 - CHARGING

During the charge process, the CHARGING and STAGE LAMP will flash various patterns. This is normal and indicates the various charge stages. Refer to "How can I know what stage the battery charger is in" in the FAQ section, page 22. When the STAGE LAMP remains on, this is known as the float stage and the charger can be left connected to the battery without over charging. If the POWER ON LAMP is flashing, there is fault; refer to "Fault Codes" explanation on page 21 of this manual.

STEP 5 - DISCONNECTION

Ensure the 110V/220-240V AC mains switch is turned off and the charger is disconnected from the 110V/220-240V AC mains power.

Battery out of vehicle

Remove the BLACK lead (battery clip) from the battery.

Remove the RED lead (battery clip) from battery.

Battery in vehicle

Remove the chassis connection.

Remove the battery terminal connection.

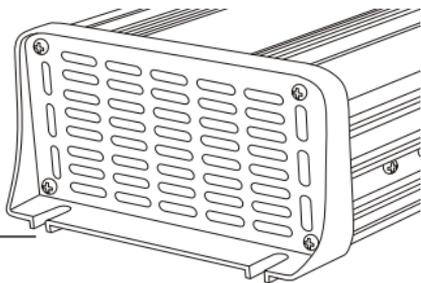
11. MOUNTING INSTRUCTIONS

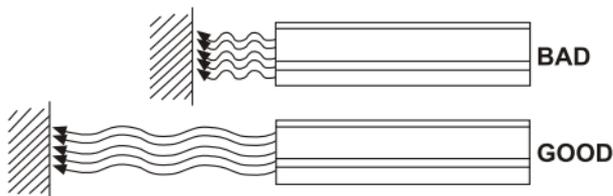
8-stage chargers are designed for indoor, out of weather use only. Ensure that both charger and battery are in a well-ventilated space during charging.

The battery charger end plates include a mounting flange for easy mounting.

If permanently fixed the charger should be mounted to a suitable horizontal or vertical panel, with at least 10cm clearance from the end plates to provide adequate ventilation for the cooling fan.

3.5mm
mounting hole





12. PERMANENT WIRING TO BATTERY

It is possible to hard wire the DC charging leads to the battery for permanent installations.

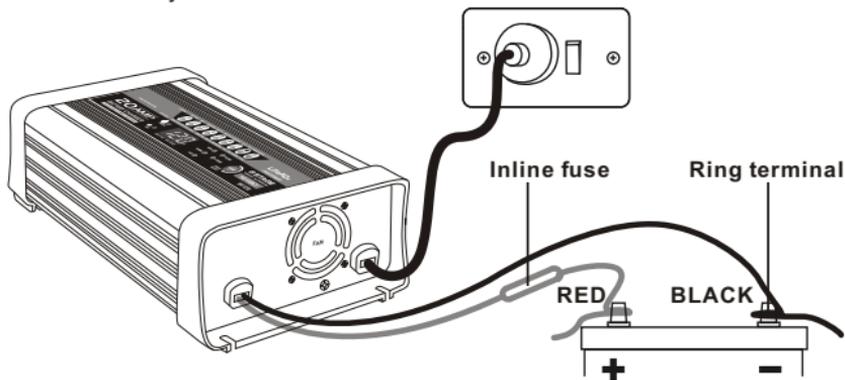
You will need 2x ring terminals, an inline fuse holder and a fuse with a rating equal to or more than twice of the charger's output. (See below)

5A = 10 Amp fuse 7A = 14 Amp fuse 10A = 20 Amp fuse

12A = 24 Amp fuse 15A = 30 Amp fuse 20A = 40 Amp fuse

Connection:

1. Cut off the supplied battery clips; ensure you leave sufficient cable to reach the battery terminals. (DO NOT extend the battery charger DC cables, as the added voltage drop will cause incorrect charging).
2. Fit a ring terminal to the BLACK Negative (-) wire.
3. Connect the inline fuse to the RED Positive (+) wire.
4. Connect a ring terminal to the other end of the inline fuse.
5. Connect the RED lead (with inline fuse and ring terminal) to the Positive (+) battery post.
6. Connect the BLACK lead (with ring terminal) to the Negative (-) battery post.
7. Fit the correctly rated fuse.



If the charger is used in a Permanent / Hard Wired application and the vehicle will not be used for some time, it is best to leave the charger connected to mains power (turned "On") so that it can maintain the battery fully charged.

Ensure any modification to the 110V/220-240V AC mains lead is carried out by a qualified person and that connection to supply mains is in accordance with National wiring rules.

13.ADJUSTABLE CHARGER RATES

CHARGE RATE BATTERY SIZE (12V)

	Lithium Battery size (Ah)	Charger time (hours)	Lead Acid Battery size (Ah)	Charger time (hours)
5Amp	10-50Ah	2-14	35-100Ah	7-24
7Amp	14-70Ah	2-14	50-140Ah	7-24
10Amp	20-100Ah	2-14	70-200Ah	7-24
12Amp	24-120Ah	2-14	80-240Ah	7-24
15Amp	30-150Ah	2-14	100-300Ah	7-24
20Amp	40-200Ah	2-14	134-400Ah	7-24

CHARGE RATE BATTERY SIZE (24V)

	Lithium Battery size (Ah)	Charger time (hours)	Lead Acid Battery size (Ah)	Charger time (hours)
5Amp	10-50 Ah	2-14	35-100Ah	7-24
10Amp	20-100 Ah	2-14	70-200Ah	7-24

14. FAULT CODES

There are error codes that may be displayed. These will be displayed in the following way:

Error Code	Power on lamp	Stage lamp	Fault lamp	Cause	Remedy
Polarity Reverse / Output Short	●	—	Lithium:  Lead Acid: —	Short circuit or reverse connection of the clips	Check clips are not touching each other. OR Check the clips are correctly connected to the battery.
Non Battery Link	●	—	—	Non battery link	Please choose the right battery type for connection.
Faulty Battery	●	Lithium:  (Step 2 lamp) OR Lead Acid:  (Step 3 lamp)	●	Bulk charging has timed out and stopped after 10 hours (Lithium Mode) / 24 hours (Lead Acid Mode).	Battery is faulty and may need to be replaced.
Over Voltage	●	—		Lithium: The 12V lithium battery voltage is above 15.5V. The 24V lithium battery voltage is above 31V. OR Lead Acid: The 12V battery voltage is above 17.5V. The 24V battery voltage is above 35V.	Disconnect the charger and check the battery voltage. This charger is suitable for 12V/ 24V Lithium and Lead Acid batteries ONLY.
Over Temperature	●	—		Internal temperature is above 65°C +/- 5°C	Turn off charger and allow to cool.

15. FREQUENTLY ASKED QUESTIONS

Q. How do I know if the battery is charged?

A. The charger's FULLY STAGE LAMP will illuminate (solid). Alternatively use a Battery Hydrometer A reading of 1.250 or more in each cell indicates a fully charged battery.

Q. I have connected the charger properly but the 'STAGE LAMP' does not come on?

A. In some cases batteries can be flattened to the point where they have very little or no voltage. This can occur if a small amount of power is used for a long time, for example a map reading light is left on for a week or more. 8-Stage chargers are designed to charge Lithium battery from as little as 1.0 Volts (12V) and 2.0 Volts (24V). Lead Acid battery from as little as 12V charger 2.0 Volts and 24V charger 4.0 Volts.

LITHIUM battery mode

If the voltage is less than 1.0 Volts (12V) / 2.0 Volts (24V) this is very low and the battery may not be rechargeable. You could try a very an electronic power supply to gradually bring the battery voltage above 1.0 Volts (12V) / 2.0 Volts (24V) so the charger can then take over or take the battery back to the place of purchase so they can try and repair it.

Lead Acid battery mode (Including GEL, AGM, WET, MF and CALCIUM)

If the voltage is lower than 2.0 Volts and 4.0 Volts use a pair of booster cables to connect between two batteries to provide more than 2.0 Volts and 4.0 Volts to the battery being charged. The charger can then start to charge the battery and the booster cables can be removed.

Q. Can I use the charger as a power supply?

A. 8-Stage chargers are designed to only supply power to the battery clips when they are connected correctly to a battery. This is to prevent sparks during connection to the battery or if connected incorrectly by mistake. This safety feature prevents the charger from being used as a 'Power Supply'. No Voltage will be present at the clips until connected to the battery.

Q. How can I know what stage the battery charger is in?

A. Below are the conditions that are displayed by the LAMP for each of the charge stages.

	① Stage	② Stage	③ Stage	④ Stage	⑤ Stage	⑥ Stage	⑦ Stage	⑧ Stage
Step Finish	●	●	●	●	●	●	●	—

Note: ● : (Solid) ☀ : (Flashing) — : (EXTINGUISH)

CAUTION

ALWAYS PLACE THE BATTERY CHARGER IN AN ENVIRONMENT WHICH IS:

- A. WELL VENTILATED.
- B. NOT EXPOSED TO DIRECT SUNLIGHT OR HEAT SOURCE.
- C. OUT OF REACH FROM CHILDREN.
- D. AWAY FROM WATER / MOISTURE, OIL OR GREASE.
- E. AWAY FROM ANY FLAMMABLE SUBSTANCE.
- F. SECURE NO RISK OF FALLING.



SAFETY

- ◆ The charger is designed for charging 12V/24V Lithium batteries and lead-acid batteries. Do not use the charger for any other purpose.
- ◆ Check the charger cables prior to use. Ensure that no cracks have occurred in the cables or in the bend protection. A charger with damaged cables must not be used. A damaged cable must be replaced by a professional representative.
- ◆ Never charge a damaged battery.
- ◆ Never charge a frozen battery.
- ◆ Never place the charger on top of the battery when charging.
- ◆ Always provide for proper ventilation during charging.
- ◆ Avoid covering the charger.
- ◆ A battery being charged could emit explosive gasses. Prevent sparks close to the battery. When batteries are reaching the end of their lifecycle internal sparks may occur.
- ◆ All batteries fail sooner or later. A battery that fails during charging is normally taken care of by the charger's advanced control, but some rare errors in the battery could still exist. Don't leave any battery during charging unattended for a longer period of time.
- ◆ Ensure that the cabling does not jam or come into contact with hot surfaces or sharp edges.
- ◆ Battery acid is corrosive. Rinse immediately with water if acid comes into contact with skin or eyes, seek immediate medical advice.
- ◆ Batteries consume water during use and charging. For batteries where water can be added, the water level should be checked regularly. If the water level is low add distilled water.
- ◆ This appliance is not designed for use by young children or people who cannot read or understand the manual unless they are under the supervision of a responsible person to ensure that they can use the battery charger safely. Store and use the battery charger out of the reach of children, and ensure that children cannot play with the charger.
- ◆ Connection to the mains supply must be in accordance with the national regulations for electrical installations.