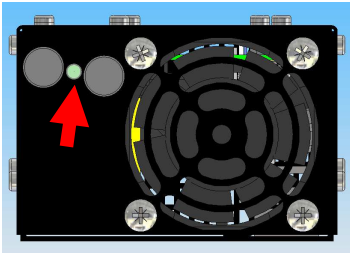
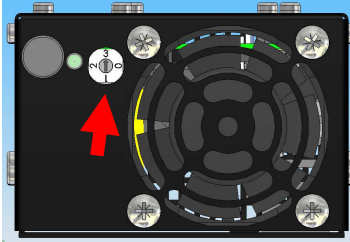
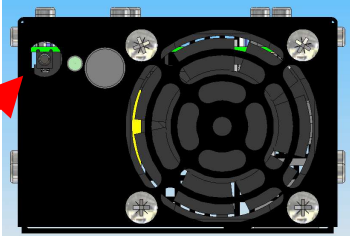
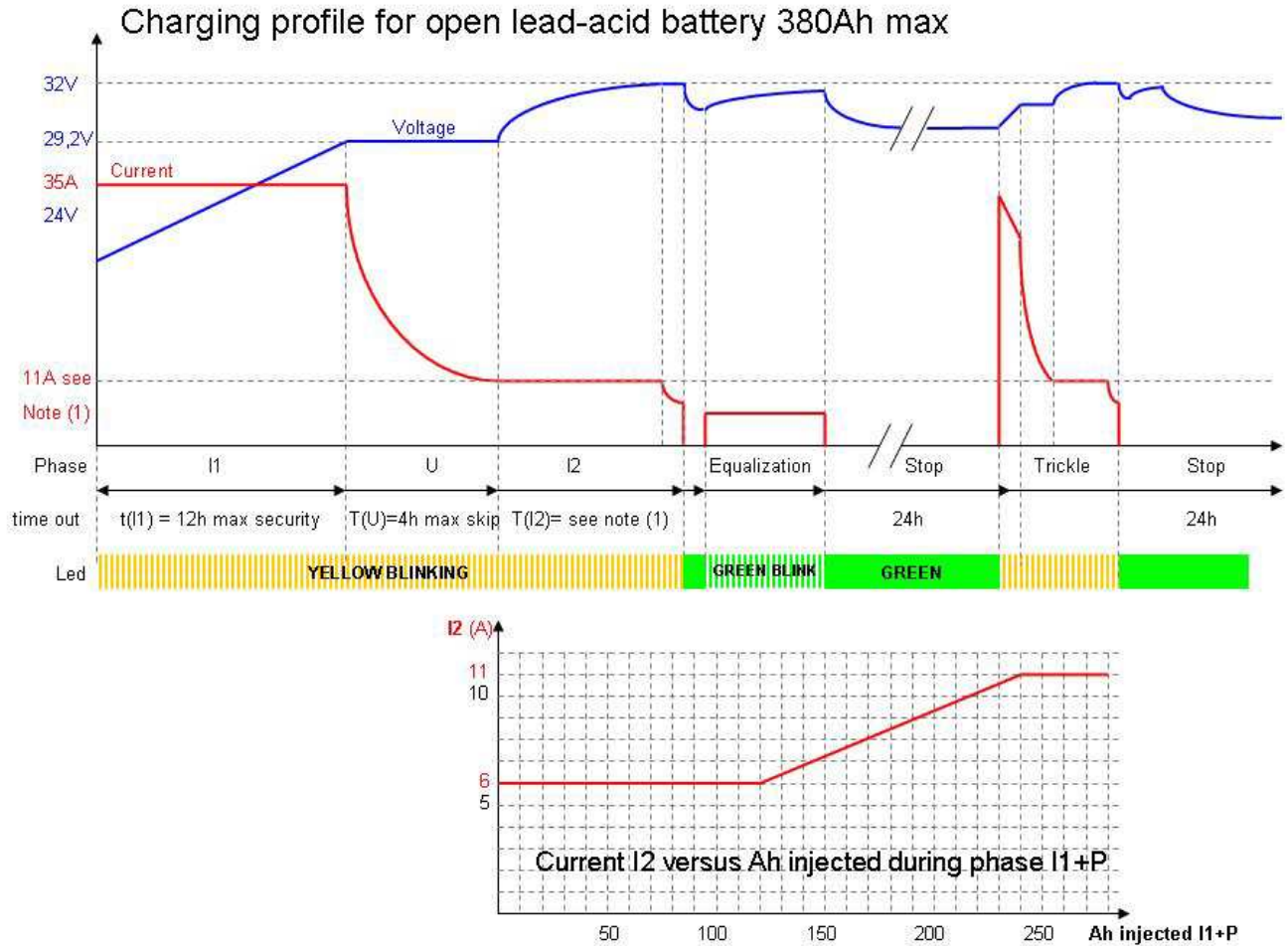


Charger connection	<ul style="list-style-type: none"> • Mains supply connection: mains cable to be ordered separately. 2.50m mains lead with IEC 320 connector (female) and European molded plug. Mains cable connected to charger by means of IEC C13 connector (male). Cable maintained by fixation clips • Wire + to battery: 6 mm² red cable with ring diameter 8 mm, length 1120mm +/-30 mm • Wire – to battery: 6 mm² black cable with ring diameter 6 mm, length 1120mm +/-30 mm • Relay: cable 2x1 mm² with Minifit Junior 2Pts, length 220mm +/-30 mm. 																
LED Indicator 	Normal Functionality A charger is delivered with a tricolor bright indicator (LED) located at the back. Functionality LEDs : <table border="1" data-bbox="552 589 1428 819"> <thead> <tr> <th>Phase</th> <th>LED</th> </tr> </thead> <tbody> <tr> <td>Mains supply disconnected</td> <td>OFF</td> </tr> <tr> <td>Phases I1, P, U1, I2, U2</td> <td>YELLOW BLINKING</td> </tr> <tr> <td>Equalization phase</td> <td>GREEN BLINKING</td> </tr> <tr> <td>Stop</td> <td>GREEN ON</td> </tr> <tr> <td>Floating phase</td> <td>GREEN ON</td> </tr> <tr> <td>Charging time too long or defect</td> <td>RED BLINKING</td> </tr> <tr> <td>Reverse polarity battery</td> <td>OFF</td> </tr> </tbody> </table> <p>GREEN or GREEN BLINKING means: the battery is charged.</p>	Phase	LED	Mains supply disconnected	OFF	Phases I1, P, U1, I2, U2	YELLOW BLINKING	Equalization phase	GREEN BLINKING	Stop	GREEN ON	Floating phase	GREEN ON	Charging time too long or defect	RED BLINKING	Reverse polarity battery	OFF
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Reverse polarity battery	OFF																
Security relay	The charger is delivered with a security relay in order to prevent any utilization of the vehicle when the charger is connected to Mains supply. Contact position is: <table border="1" data-bbox="483 938 1497 1164"> <thead> <tr> <th>Contacts</th> <th>Battery connected (YES / NO)</th> <th>Mains connected (YES / NO)</th> </tr> </thead> <tbody> <tr> <td>OPEN</td> <td>NO</td> <td>NO</td> </tr> <tr> <td>OPEN</td> <td>NO</td> <td>YES</td> </tr> <tr> <td>CLOSE</td> <td>YES</td> <td>NO</td> </tr> <tr> <td>OPEN</td> <td>YES</td> <td>YES</td> </tr> </tbody> </table> <p>The relay has a breaking capacity of 10A maximum.</p>	Contacts	Battery connected (YES / NO)	Mains connected (YES / NO)	OPEN	NO	NO	OPEN	NO	YES	CLOSE	YES	NO	OPEN	YES	YES	
Contacts	Battery connected (YES / NO)	Mains connected (YES / NO)															
OPEN	NO	NO															
OPEN	NO	YES															
CLOSE	YES	NO															
OPEN	YES	YES															
Charge activation	Charging is activated simply by connecting the charger to mains supply Start up is not guaranteed if the battery voltage is below 10V.																
Curve selector 	The choice of the curve is carried out by a selector four positions accessible on front face of the charger: <p>Position 0 = open lead battery, 210Ah < capacity < 380Ah, Position 1 = open lead battery, 140Ah < capacity < 210Ah, eg T105 Trojan Position 2 = GEL lead-acid battery, 140Ah < capacity < 380Ah, Position 3 = open lead Battery with permanent floating, 140Ah < capacity < 380Ah.</p> <p>CAUTION: Position 0 & 1 are restricted to Open lead-acid battery. DO NOT use GEL battery with selector in position 0 or 1. The charger is delivered in position 2 (GEL) by default.</p>																
Serial connection to PC 	Serial communication: A specific jack connector allows to link the charger to PC. Then, by using the software PROVISTA (IES proprietary) and a specific cable (not provided in standard with charger), it is possible to control, monitor, get the history of the charger.																

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Selector in position 0:



- Phase **I1**: maximum rated current **35A** is maintained as long as battery voltage is less than **29,2V**. This phase ends when battery voltage has reached **29,2V** (2,43V / cell).

- Phase **U**: voltage is stable at **29.2V**. Note: Voltage will increase slightly up to +0.3V at the end of this phase due to influence of voltage drop into cables. The current accepted by the battery decreases progressively. The phase U ends either when the current decreases down to the value for phase I2 or when **4h** time out is reached.

-Phase **I2**: constant current phase that provides the necessary boost of charging with agitation of the electrolyte.

Note (1) The current I2 is depending to the injected Ah during phases I1 + P. See graph above. In addition, the voltage is limited to **32V maximum** (2.67V/cell), Then the current may decrease accordingly. The Phase I2 ends either when 13% of the Ah injected during I1-P-U periods is provided to battery (means boost coefficient is 1.13) or if **4h** time out is reached.

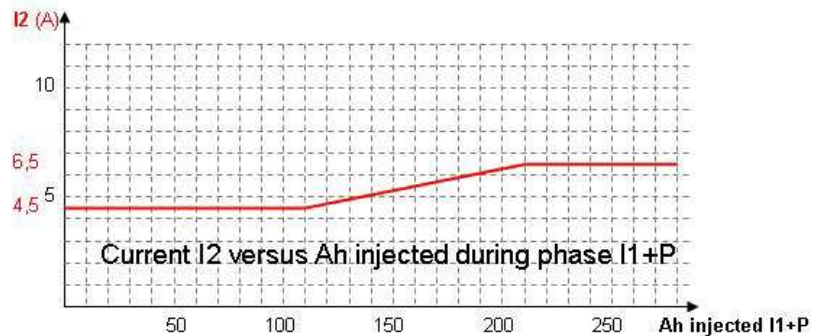
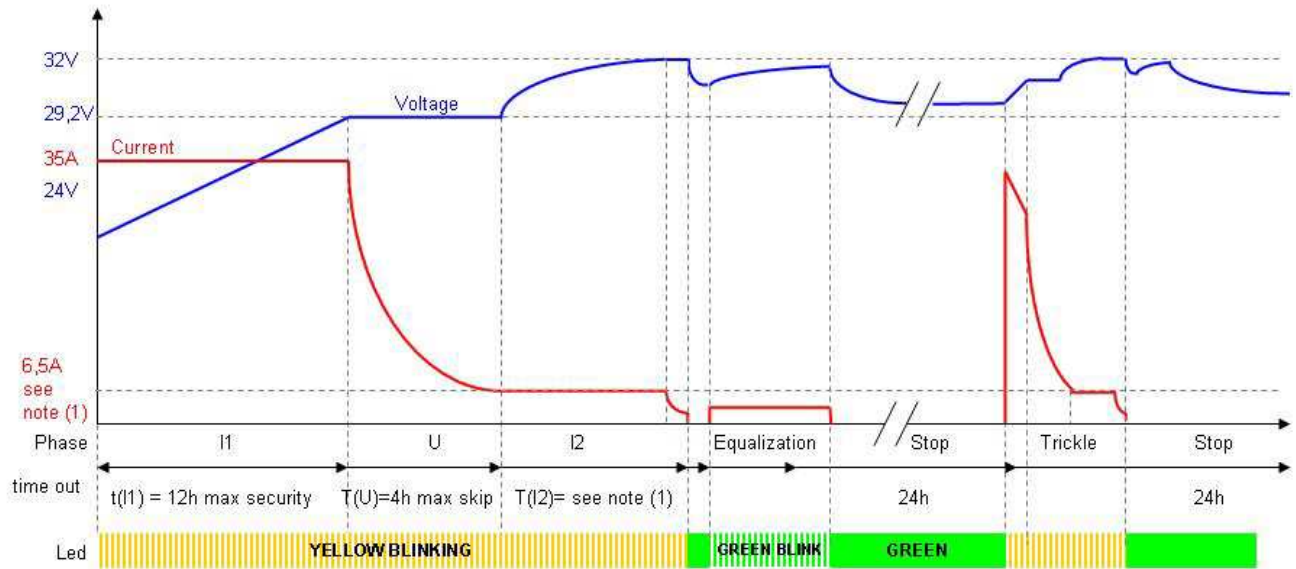
- **Equalization** is performed only at every 7 completed cycles. See more details at end of document.

- **Trickle charge**: when the charger remains connected to mains, a new charge cycle is triggered every 24 hours after the end of the last charge cycle in order to compensate the auto-discharge.

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Selector in position 1:

Charging profile for open lead-acid battery 240Ah max



- Phase **I1**: maximum rated current **35A** is maintained as long as battery voltage is less than **29,2V**. This phase ends when battery voltage has reached **29,2V** (2,43V / cell).

- Phase **U**: voltage is stable at **29,2V**. Note: Voltage will increase slightly up to +0.3V at the end of this phase due to influence of voltage drop into cables. The current accepted by the battery decreases progressively. The phase U ends either when the current decreases down to the value for phase I2 or when **4h** time out is reached.

-Phase **I2**: constant current phase that provides the necessary boost of charging with agitation of the electrolyte.

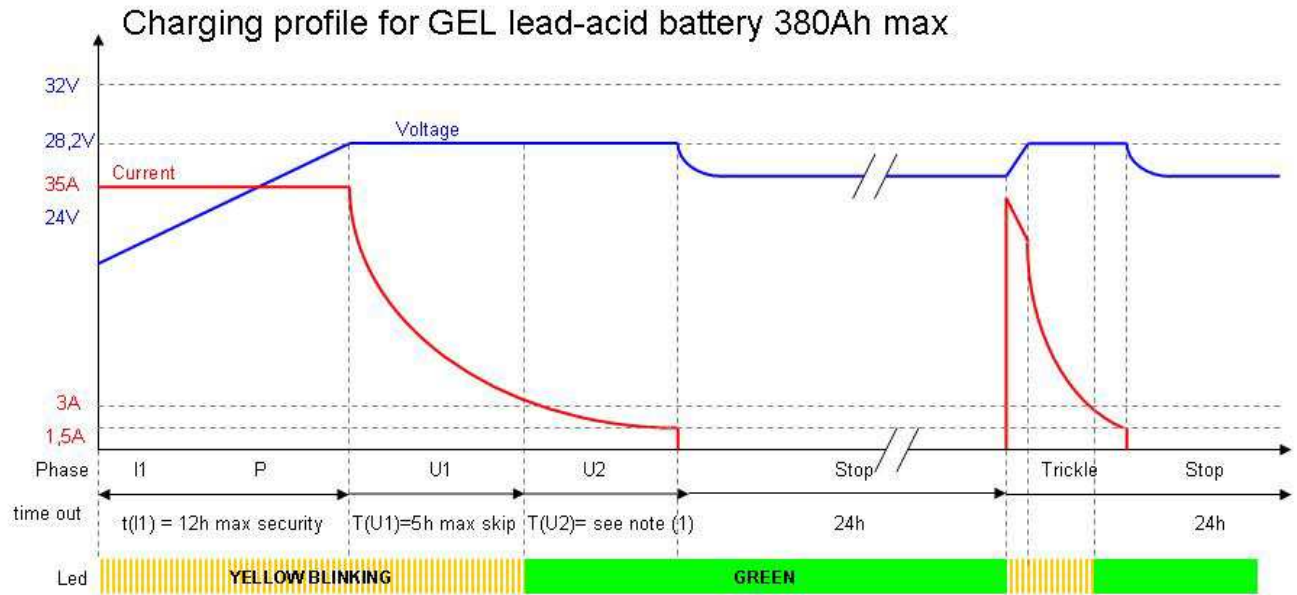
Note (1) The current I2 is depending to the injected Ah during phases I1 + P. See graph above. In addition, the voltage is limited to **32V maximum** (2.67V/cell), Then the current may decrease accordingly. The Phase I2 ends either when 10% of the Ah injected during I1-P-U periods is provided to battery (means boost coefficient is 1.10) or if **4h** time out is reached.

- **Equalization** is performed only at every 7 completed cycles. See more details at end of document.

- **Trickle charge**: when the charger remains connected to mains, a new charge cycle is triggered every 24 hours after the end of the last charge cycle in order to compensate the auto-discharge.

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Selector in position 2:



Phase I1: maximum rated current **35A** is maintained as long as battery voltage is less than **28,2V**. This phase ends when battery voltage has reached **28,2V** (2,35V / cell).

- Phase **U1**: voltage is stable at **28,2V**. Note: Voltage will increase slightly up to +0.3V at the end of this phase due to influence of voltage drop into cables. The phase U1 ends either when the current has decreased to **3A** or when **5h** time out is reached.

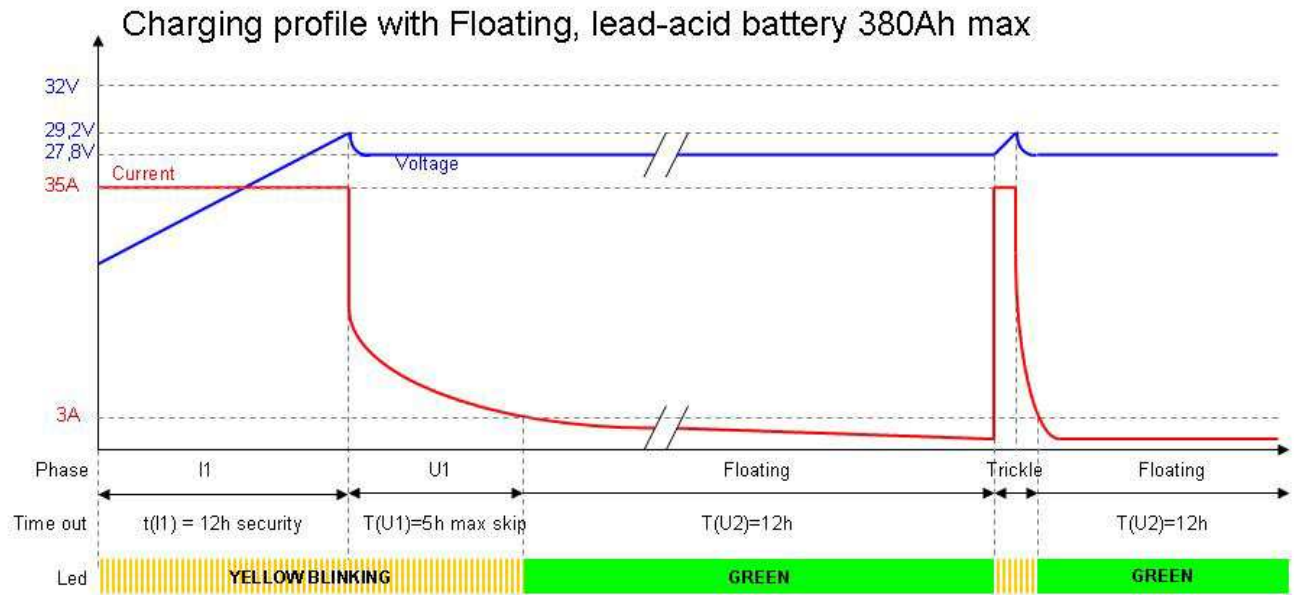
-Phase **U2**: it provides the finishing of the battery. Voltage remains stable at **28,2V**. The current continues to decrease down to **1,5A**. In any case the phase U2 is time limited to **4h**.

Note (1): during phase U2, the LED turns GREEN indicating that the battery can be used normally.

- **Trickle charge**: when the charger remains connected to mains, a new charge cycle is triggered every 24 hours after the end of the last charge cycle in order to compensate the auto-discharge.

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Selector in position 3:



- Phase **I1**: maximum rated current **35A** is maintained as long as battery voltage is less than **29,2V**. This phase ends when battery voltage has reached **29,2V** (2,43V / cell).

- Phase **U1**: voltage is stable at **27,8V** (2,43V / cell). Note: Voltage will increase slightly up to +0.3V at the end of this phase due to influence of voltage drop into cables. The phase U1 ends either when the current has decreased to **3A** or when **5h** time out is reached.

-Phase **floating (U2)**: voltage remains stable at **27,8V** (2,43V / cell). The current continues to decrease down to a level, which compensates the self-discharge of the battery at least. For safety reason the current is not authorized to increase during this phase.

- **Trickle charge**: After 12h running in floating phase U2, the charger will restart automatically a new charging cycle (I1-P-U1-U2). This feature is called Trickle charge. It compensates either the self-discharge of the battery or the consumption of the application during the floating.

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Other charge characteristics

Equalization (only for Open lead- Acid profile)

To eliminate the phenomenon of sulfatation of cells of the battery, this stage starts automatically 15 minutes after the end of a complete charge *only if seven complete charges have been made*. The equalizing current is equal to half of the I2 boost current level. The equalization stops either when battery voltage becomes stable (variation of voltage less than **120mV / hours**) or when **4h** time out is reached.

Mains power interruption

In case of temporary power cuts, all parameters of charge in progress are stored in memory for a period of 13 minutes. As soon as power is back, the charge cycle continues from the point (I, U) attained just before power cut. The number of ampere-hours already charged are stored into the memory of the microcontroller.

If the power cut lasts more than 13 minutes, the charger assumes that the vehicle has been used then parameters are reset. Charger is ready for a new charging cycle.

Protections during charge

Temperature safety facility

A self-protection facility ensures that the charger decreases output current when charger's internal temperature exceeds a nominal value. The charger continues automatically the charge cycle when temperature has decreased. If a temperature default is detected, the charger automatically stops. Then the LED turns RED blinking

Security time out & fault indication

If the security time out is reached during cycle (see indication into respective profile above), then the charging cycle will be interrupted and the LED will turn RED blinking. This problem may occur if one or several battery elements would failed (eg: short-circuit) or if ambient temperature would be too high.

It is recommended to check the battery state before to restart the charger.

The charger returns to normal state by simple disconnection / reconnection of the mains. The LED stops blinking at the next connection of the mains.

If the charger doesn't start please check:

- The black cable is correctly connected to the negative pole of the battery and the red cable to the positive pole of the battery.
- The battery voltage is over 10V.
- There isn' any corrosion or oxidation on the two battery terminals
- The position of the curve selector is correct.
- The battery type complies with the ones listed into technical specification (page 1).
- The level Mains voltage must be in the range specified (page1).

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