



Rev. 1.2 - 03/11/2020

1. GENERAL DESCRIPTION

The *SPY-BATT* is a device that allows to monitor the state of your battery.

The **SPY-BATT** stores over time the performance of the various voltages, currents and temperature of the battery in use. It can be installed on 24V to 96V nominal battery voltage and it is capable of measuring both currents of charge or discharge from 1A to 800A. Once installed, the maximum absorption from battery is 200mW.

The device stores 5 years of general data regarding charge, discharge and pause events.

It shows detailed data of the last 165 days recorded every five minutes, that will allow to do an in-depth analysis of all stored values.

You can access the internal memory and download all the data stored by the *SPY-BATT* by removing the top panel and connecting a PC to the internal USB port.

Data will be kept permanently stored in the device even in absence of power.

An internal battery guarantees the internal clock working for at least 12 hours if the **SPY-BATT** is removed from the battery.

The *LadeLight Manager* program allows you to view and analyze easily and intuitively all downloaded data and to perform an in-depth and accurate analysis of the battery status, the mode of use and efficiency of your whole energy system. For the specific use of the *LadeLight Manager* program, see the relevant Software *LadeLight Manager* manual.

<u>Please note: to access the installation and programming functions of the SPY-BATT device you must install the</u> Lade Light Manager program on your PC and request the activation password to the manufacturer.

To ensure proper functioning, the installation must be performed only by properly trained qualified personnel and the specifications described below must be followed carefully.

The staff with the SPY-BATT device assumes full responsibility for the installation.

The manufacturer shall in no event be liable for any damage or loss of data resulting from incorrect installation or improper use.

2. CONTENT OF THE PACKAGE

- **SPY-BATT** wired with plugs and electrolyte probe.
- Acid resistant cable Ties to secure the wiring to the battery.

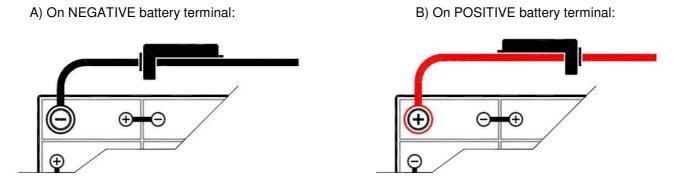


Check the package contents. If there any doubts contact your supplier.

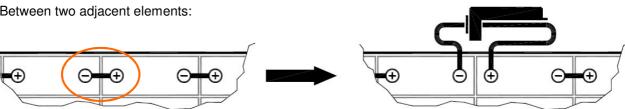
3. PLACEMENT ON BATTERY CABLE

Slide a battery cable into the SPY-BATT front hole. The device can be installed **ONLY** in one of the ways below:

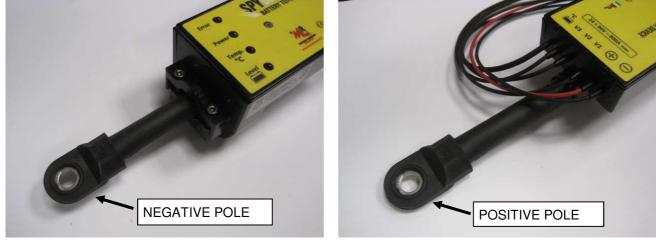
WARNING ! Respect the indicated direction



C) Between two adjacent elements:



The battery cable must pass through the SPY-BATT front hole.





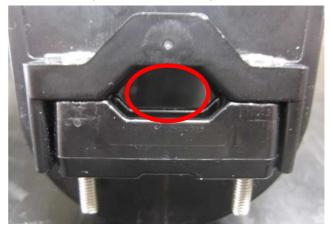
Block SPY-BATT on the cable in the desired position:

NOTE: Select the right side of cable block according to the cable diameter to be tightened:

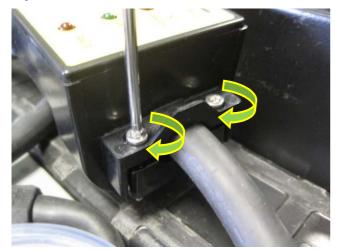


Till 25mm² (ø9mm max.)

Over 25mm² (ø 10 to 22mm max.)



Tighten the two screws to secure the cable block.



Secure with cable tie on the peg anchoring the cable.



4. VOLTAGE PLUGS CONNECTION

The *SPY-BATT* has 5 plugs with insulation piercing pin. These plugs have to be connected on the output cables and connection cables between the various elements of the battery corresponding to the relative tensions.

<u>WARNING:</u> <u>CONNECT THE VARIOUS PLUGS RESPECTING THE ORDER INDICATED.</u> <u>A wrong sequence might cause damage to the device.</u>

- 1. Plug (black wire) Connect on NEGATIVE battery output cable
- 2. Plug \bigoplus (red wire) Connect on POSITIVE battery output cable
- 3. Intermediate Plug V1 (black wire) Connect on 1/4 Vbat position (Max. 12 Elements).
- 4. Intermediate Plug V2 (black wire) Connect on 2/4 Vbat position (Max. 24 Elements).
- 5. Intermediate Plug V3 (black wire) Connect on 3/4 Vbat position (Max. 36 Elements).

Follow these steps:

Remove the rubber protective cone to find out the grip nail.

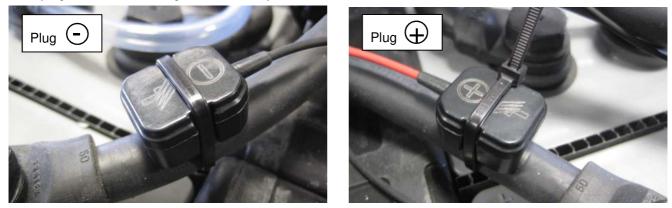
WARNING

The nail tip becomes dangerous without protection. Handle with care to not to get injured

Connect the plug inserting the nail insulation piercing into the cable.

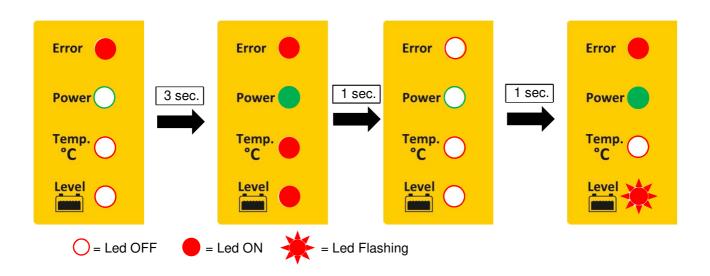


Lock plugs to the cable using the cable ties provided.



By connecting the plug on the positive terminal of the battery the SPY-BATT is powered.

The device offers the following messages in sequence:

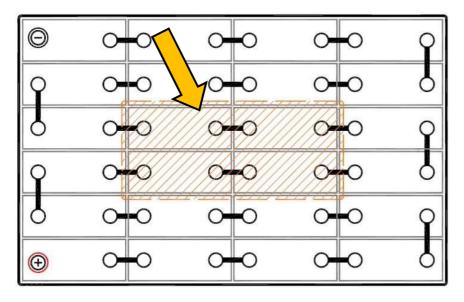


Proceed with the connection of intermediate plugs:



5. THERMAL PROBE INSTALLATION

Optimal area for probe placement (central battery elements):

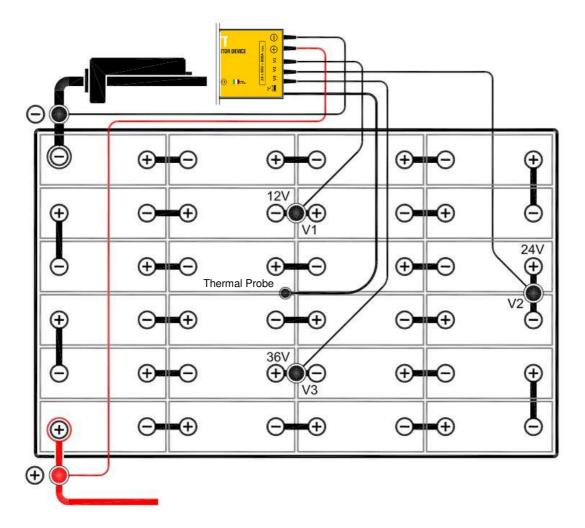


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Insert the thermal probe into the interstices between the battery elements by inserting it as far as possible:



Example of a full installation to a 48V battery:



NOTICE: the layout of the example shown may not match the actual layout of your battery

6. SPY-BATT INITIALIZATION:

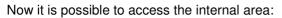
The initialization of a new **SPY-BATT** requires three simple operations:

- a) Introduction of master data
- b) Internal clock set-up
- c) Setup and configuration test

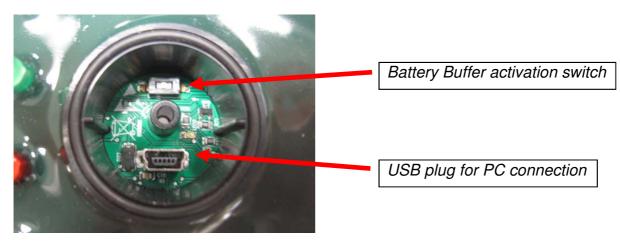
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Remove the screw and open the SPY-BATT cover:



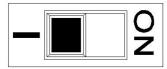






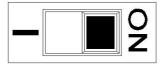
WARNING: BEFORE PROCEEDING WITH THE DEVICE INITIALIZATION, YOU MUST ACTIVATE THE BATTERY BUFFER SWITCH:

BUFFER BATTERY OFF





BUFFER BATTERY ON



Connect the SPY-BATT to PC with USB cable. If the connection is active the internal red led starts to flashing :





If your SPY-BATT is connected to the PC for the first time, the necessary drivers will be automatically installed.

The SPY-BATT Drivers can be downloaded from site <u>www.spybatt.it.</u> (See LADELIGHT Manager Software - User manual for specifications) Wait until the installation is complete:



Note: the language of this window depends of PC OS

Open *LADE LIGHT MANAGER* program on your PC, using the icon:



The MAIN window appears:



Type text **POWERUSER** in **User** field (default selection) and type the password <u>provided by the manufacturer</u> in **Password** field. Note: all fields are case sensitive. Select "**Save Password**" option and Login.

Login			
	User POWERUSER		
	Password 		
	✓ Save Password		
	Login	Cancel	

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ADE LIGHT Manager (EN) SPY-BATT ? CONTRACT ?	X		_		
Select Devices			 ×		
Description	D	Lecid	SerialNumber		
SPY-BATT	0403/a/1	00000	DB00566G	DLUTION n battery	
٠				2	
Refresh Wireless	Cc	onnect	Close		

Select **SPY-BATT** in list and click on "Connect" button:

Select Devices			×		
Description SPY-BATT	10 04037a	Lectd	SerialNumber DB00566G		
45				AUT	
				DLUTION n battery	
*	./III.		F		

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The **SPY-BATT** main window opens and the General device data are shown:

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File SPY-BATT ?			
Select Devices			
Led Mode			- • •
General Summary Dashboard Compa	risons Statistics Phases Data Setup Plann	ing Real Time Clock Service Functions Firmware	
Customer Info			
Customer			
Battery Brand	Battery Model		
Battery Ident Descrizione	Expected Cycle		
Notes			
SPY-BATT ID EAD0:906F:1300:2D00 Rev Hardware 4 Serial Number		Download	
ID SPT-BALL	Model	Last Data Download	
EAD0:906F:1300:2D00	SPY_BATT		
Rev Hardware	Rev BootLoader / Firmware Rev Strategia		
4	1.02.01 2.0405 1.08.006	Dowload SPY-BATT Data	
Serial Number	Recorded Phases Active Setup		
		Save Customer Info	

Fill in all the **Customer** and **Battery** fields in **CUSTOMER INFO** section and select "**Save Customer Info**" button. These data will be stored in *SPY-BATT* and will be shown in future device readings.

IMPORTANT: It is critical for the operation to insert the value of "Expected Cycles".

Introduce in this field the number of life cycles at 25 °C indicated by the battery manufacturer. All other data are non-essential for the operation, but important for traceability.

Open the	"Real Tir	me Clock"	window and	d select Set	t Clock function	to automatically	/ update the	SPY-BATT	time and
date with	the ones	of the PC ir	n use.						

🔩 LADE LI	GHT Manager (EN)			
	Y-BATT ?			
Select De	vices			^^
Led M	ode			
G	eneral Summary Dashboard Comp SPY-BATT Clock Date Time 02/08/2016 10:43 Read Clock Set Clock	Setup Planning Real Time Cl	ock Service Functions Firmware	E

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Open "Setup" window and select New Setup:

SPY-BATT ?	(EN)			States and states in	-		_	
8 🛃 🖪								
Devices								
Mode General Sum Active Setu ID 1	Nominal Volta _! Nom		Statistics Phases Date of Cells Cells 12	T		e Probe Current direction	Firmware	
Parametri Modo Ric	di Impianto arica ▼	Planning None						
Setup	Creation Date 26/07/2017		def Type 100.0 0	Tot Cells Cells	V3 Cells V2 9 6			
Read	l Setup					New Setup		

The Device configuration window opens:

w Setup 2 Base Parameters		
Nominal Voltage 0 V	Nominal Capacity 0 Ah N. of Turns 1	Cells Cells V3 Cells V2 Cells V1 0 0 0
Installation Direction	Reverse	T Alam (°C) T Recovery (°C) 65 50 Image: Solution of the state
		Insert Setup Cancel

Fill in all the fields with the battery options.

IMPORTANT:

Remove the tick from the "Electrolyte Probe Installed" box to avoid anomalous device signals.

Example of configuration for a 24V - 100Ah (C5) battery:

New Setup 2	and the second sec	
Base Parameters		
24 V	Iominal Capacity 100 Ah 1 of Turns 1 Cells V3 Cells V2 9 6 T Alarm (°C) 65 © Reverse	6 3 T Recovery (°C) 50
		Insert Setup Cancel

<u>Warning</u>: In the field "Nominal capacity" the capacity value expressed in C5 must be inserted, see the data sheet of the battery.

In Cells V3, Cells V2 e Cells V1 fields the number of cells between the negative pole of the battery and the socket relative must be inserted.

The intermediate sockets MUST be connect with tensions rising from V1 to V3. (See par. *4:* VOLTAGE PLUGS CONNECTION).

Confirm the configuration by pressing the "Insert Setup" button. Wait for the finalization of the configuration window.

Select the button "Read Setup":

The new configuration will appear in the first row of the table and will be the configuration used.

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File SPY-BATT ?	
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Select Devices	
Led Mode	
General Summary Dashboard Comparisons Statistics Phas	es Data Setup Planning Real Time Clock Service Functions Firmware
R	
Active Setup	
ID Nominal Volta; Nominal Capac Tipo Batt. # of Cells 0 1 24.00 V 100.0 Ah N.D. 12	Sells V2 Cells V1 Turns Electrolyte Probe Current direction 9 6 3 1 Abilitata Diretto
Parametri di Impianto	
Modo Ricarica Planning	
, Noile ,	
Setup Creation Date V def Ah def Type	Tot Cells Cells V3 Cells V2 Cells V1
1 26/07/2017 24.00 100.0	0 12 9 6 3
Read Setup	New Setup
P	
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To check all the connections of the **SPY-BATT** to the battery, open the "Service Functions" window:

LADE LIGHT Manager (EN) File SPY-BATT ? File SPY-BATT ?
Select Devices
Let Mode Comparisons Statustics Plases Data Setup Fundame Fundame Variables record V2 V1 I Batt Read Data Fundame Fundame Variables record V2 V1 I Batt Read Data Read Data Battery temperate. Electrolyte V backup battery S.o.C. C.F. Read Automatic read Ah discharged KWh discharged KWh discharged KWh discharged KWh discharged Read Data SPY_BATT status SPY_BATT status SPY_BATT status SPY_BATT status SPY_BATT status Ononection status V 24 V 14 V 14 Reatore Charge Level

Select "Read" button:

🚯 LADE LIGHT Manager (EN)	
File SPY-BATT ?	
Select Devices 🔯	
Led Mode	
General Summary Dashboard Comparisons Statistics Phases Data Setup Planning	Real Time Clock Service Functions Firmware
Variables record	Read Data
V Ratt V3 V2 V1 IBatt 24.7) 18.1 11.7 5.8 0	Read
Battery temperatu. Electrolyte V backup battery 0 0 0	Automatic read
Ah discharoed Ah charoed KWh discharged KWh charoed	Erase
SPY_BATT status	Reboot
Connection staus V Batt V 3/4 V 2/4 V 1/4	SPY-BATT Reboot

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The Variable record section displays real magnitudes read from *SPY-BATT*: V Batt (Total Battery voltage), V3 – V2 – V1 (intermediate voltages), I Batt (charge or discharge current), Battery temperature.

If the connections of the sockets are correct, all the check boxes in the **Connection status** section will be popped. If some of the variables are abnormal, check the connections and repeat the initialization procedure.

With a new device, only the fields with voltage measurement, temperature and electrolyte will contain significant values, all other fields will be empty.

The section **SPY_BATT status** indicates the actual device working conditions: Possible indications are:

- "Setup NOT READY": It means that no configuration is programmed.
- "Setup READY": It means that a valid configuration is programmed.
- "Recording DISABLED": It means that the device is not connected to a battery to be monitored.
- "Recording ENABLED": It means that the device is connected to a battery and is recording.

The device is fully operational when the box says: ""Setup READY, Recording ENABLED"

See Lade Light Manager Software manual for Memory Erase function.

It is recommended to verify that all the settings have been made correctly, then:

- a) Close all active windows.
- b) Update the Connected device list with "Refresh" function.
- c) Re-select SPY-BATT device and re-connect it using "Connect" button.

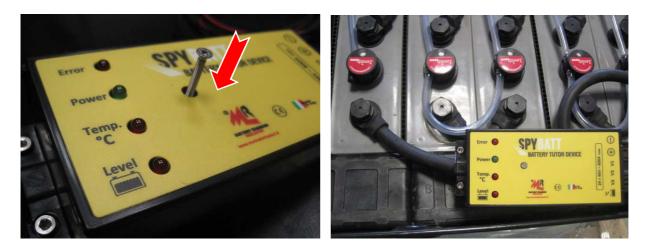
🔥 LA	DE LIGHT Manager (EN)				
File	SPY-BATT ?				
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	Select Devices				
	Description	ID Locid Seria	Number		
0	SPY-BATT	04037a71 00000 D8005	66G		
	J				
			97 D 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
			UE		
			ITEGRATEI	D SOLUTION	
			for tra	ction battery	
	Refresh Wireless	Connect	Close		
		·			
					-11

Reopen the various windows and verify:

- a) All the data in Customer Info (General window)
- b) The Internal real clock (Real time clock window)
- c) The Setup (Setup window Read Setup button)

Now the device is active and begins to store all the data of the battery.

Disconnect the USB cable from SPY-BATT and close the panel.



The installation is complete.

7. LED INDICATIONS

Possible led indications during normal working:



- Led *Power* flashing: SPY-BATT is active and is recording data
- Led *Error* flashing: Connection error or generic error.
- Led *Temp*°*C* flashing: HIGH battery temperature.
- Led *Level* flashing: NOT Enabled.