

SPC-15



15A 12/24V Charge regulator for photovoltaic stand-alone solar systems

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How to use the Serial Number

SPC15 is identified by a Serial Number (SN) which is put on the label in the external side of the metallic box.

In the main offices of Western CO. snc Serial Numbers are registered in proper files.

In case of communications concerning SPC15 or in case of coming back to the seller/distributor or at Western CO. snc for any reason, always take note of the Serial Numbers of each SPC15 and communicate them together with explanations of the case; write the serial number in the delivery notes and in warranty documents which have always to go with the products.

Keep this manual for future consultations.

Updated version of this manual is in "Technical manuals" section of www.western.it internet site.



Fig. 1: SPC15 front view

SPC15 FEATURES:

- Recharge system for **12/24V** Pb batteries.
- Microcontroller design.
- Surface Mounting Technology.
- Max recharge current: **15A**.
- Max panel current: **15A**.
- Settable working voltage.
- "Watch-dog" protection (against radiofrequencies and disturbs from users).
- LED for battery status signalling.
- LED for deactivated load signalling.
- LED for end charge signalling.
- Output for external low battery indicator.
- Control for load deactivation (by optional external relay).
- Nominal working voltage 12/24Vdc: settable.
- Easy cabling.
- IP 20.

Solar battery charger for Pb batteries 12 and 24V (internally settable) microprocessor controlled and SMT technology (surface mounting devices to reduce number of components and improve reliability).
 Status monitoring is with light emitting diodes (LED) to show: battery charge status (maximum charge, medium charge, minimum charge), CPU status, modules status and end charge.
 Output for almost low battery signalling by external indicator.
 Output for low battery charge disconnection by external relay (optional accessory relay).
 Multiple terminal block with screws for PV modules, batteries, external indicator, external relay.
 Protection against external disturbs.

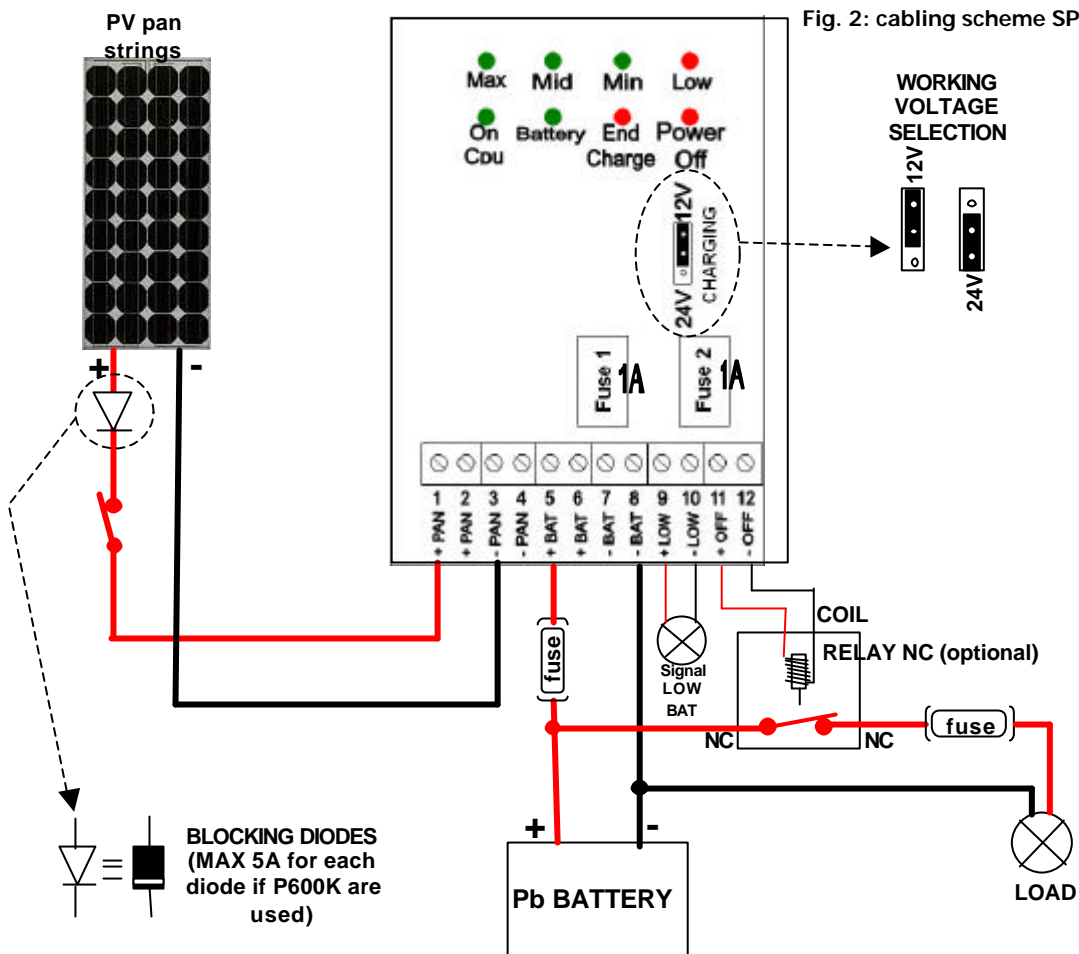


Fig. 2: cabling scheme SPC15

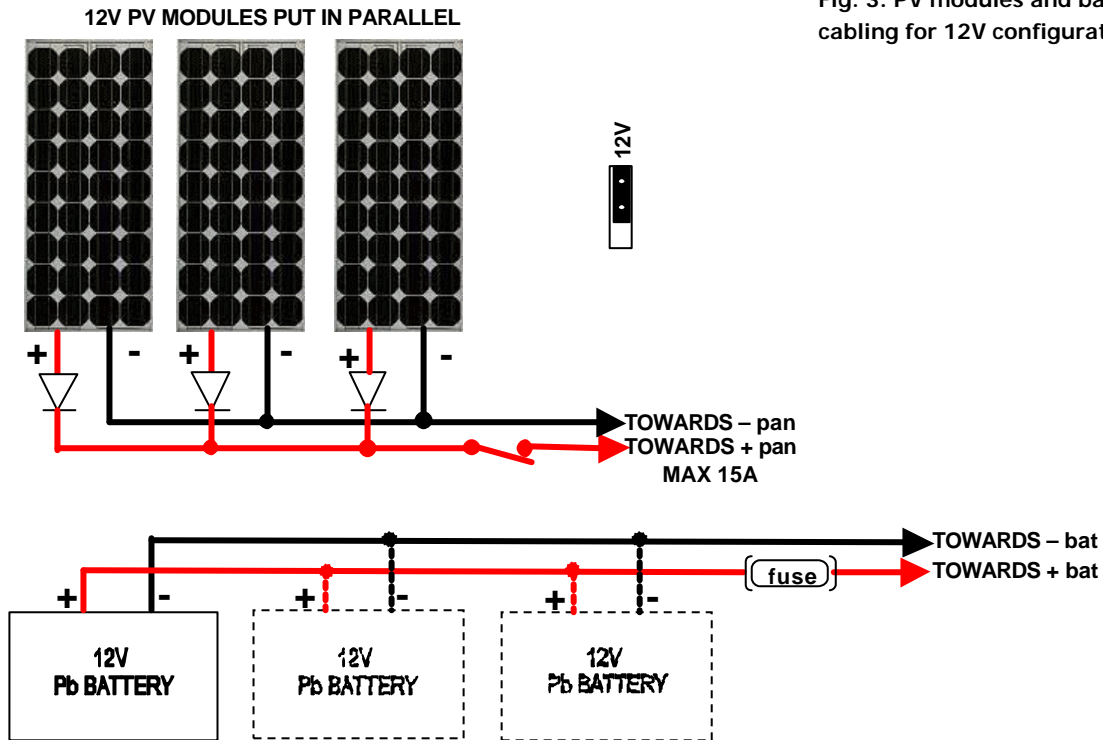


Fig. 3: PV modules and batteries cabling for 12V configuration

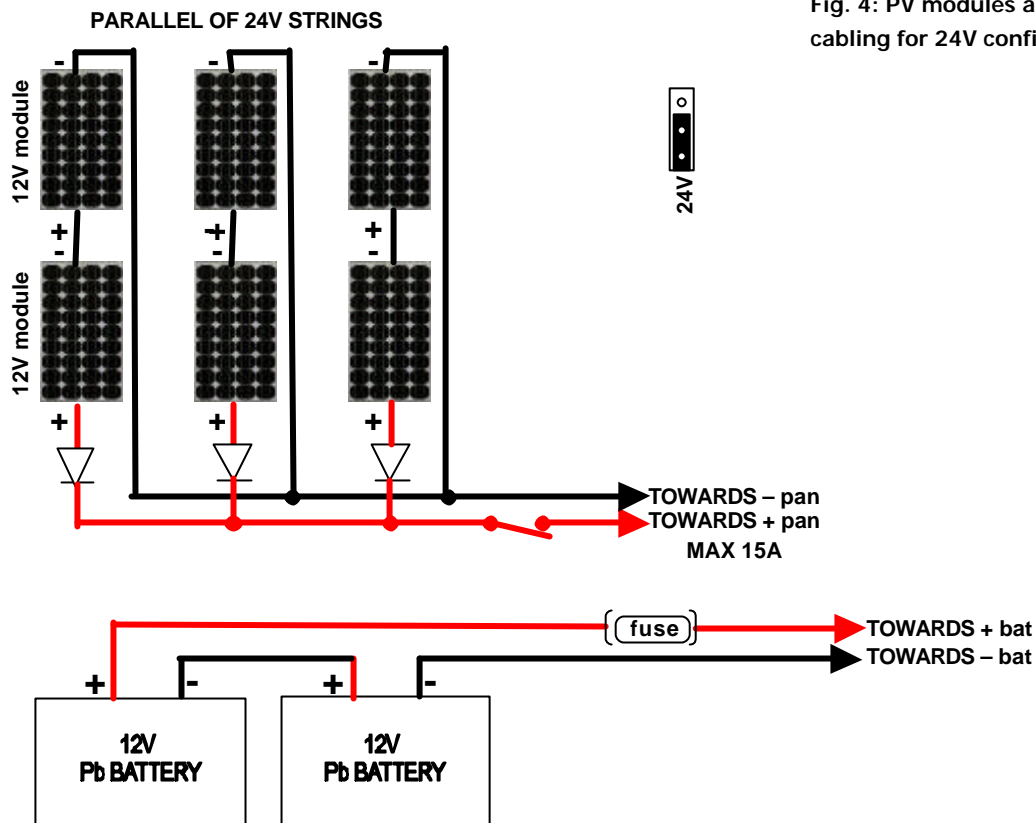


Fig. 4: PV modules and batteries cabling for 24V configuration

Circuit preparation:

- Put the SPC15 charge regulator in an internal place protected against humidity, dust, etc.. To fix it use holes on the back of the case.
- Select working voltage 12V or 24V as in figure 2, 3 and 4.
- If you want to use an external relay normally closed (optional) to interrupt the supplying of load when battery is low, cable it as first component, as in figure 2. Relay's nominal supplying voltage must be the same voltage of working of the PV system

and the minimum relay disconnection voltage must be very much inferior than the working voltage. The relay's power contact must be able to manage a current > load current.

- Cable PV modules referring to working voltage according to figures 2, 3, 4.
- If PV modules are already 24V, each string will have only one module and the only configuration allowed is 24V.
- Put in series in each string, on the positive pole, the correspondent blocking diode (see figures 2, 3, 4).
- We advise to use a switch between PV modules and charge regulator as indicated in figures 2, 3, 4.
- Keep open the switch during other cabling operations.
- Cable batteries as in figures 3 or 4 as working voltage needs.
- We advise to put a proper size fuse (> short circuit modules' current) in series between battery and regulator.
- Connect battery and PV modules to the regulator leaving fuse and switch open.
- Charge regulator is able to supply an indicator absorbing maximum 1A at working voltage for low battery signalling.

System activation

- Control again polarities for all cables.
- Polarity inversion can seriously damage the charge regulator.
- Close battery circuit; the regulator activates. Meaning of LEDS is in table 1.
- Close PV modules circuit; their current flows in the battery to charge it.
- If battery is discharged, the external relay (if present) is piloted to open the load circuit (POWER OFF output is activated).
- Charging continues until battery reaches end charge voltage (PV modules disconnection voltage). Recharging starts again when battery voltage falls below threshold of PV modules reconnection.
- Thresholds are in table 2.

Table 1: LEDS' meaning

Active LED	Meaning
On Cpu	Internal microcontroller is ON; regulator is active and controls the charge
Max, Mid, Min	Battery respectively in maximum, middle and minimum charge level
Low	Battery almost low; "LOW" output is activated (max 1A) and can drive an indicator (remote light, acoustics alarm, end so on). It deactivates with low battery when Power Off comes.
Batt	Power supplying signalling
Power Off	Low battery; "OFF" output is activated (max 1A) and can drive a proper external relay (optional) to disconnect the load.
End Charge	Battery is full charged; regulator disconnects PV modules.

Table 2: Electrical features

FEATURE	SYM.	CONDITION	MIN.	TYP.	MAX.	
Working voltage	VDD	12V configuration	6	12		V
	VDD	24V configuration		24		V
Working current	IDD	at 12V or 24V	9	10	11	mA
	IDD	with VDD = 14.4V or 28.8V	52	55	58	mA
PV panels voltage	VPAN		0		50	V
PV panels current	IPAN	at 12V and at 24V	0		15	A
PV modules disconnection voltage during charging	VEC	12V configuration	14.3	14.4	14.5	V
		24V configuration	28.6	28.8	29.0	V
PV modules reconnection voltage	VBC	12V configuration	12.5	12.6	12.7	V
		24V configuration	25.0	25.2	25.4	V
Threshold voltage for almost low battery signalling ("LOW" output activation)	VLBL	12V configuration	10.9	11.0	11.1	V
		24V configuration	21.8	22.0	22.2	V
"LOW" output current	ILOW				1	A
Threshold voltage for low battery ("OFF" output activation for extern relay driving to disconnect load; "LOW" output is deactivated)	VLBO	12V configuration	10.4	10.5	10.6	V
		24V configuration	20.8	21.0	21.2	V
"OFF" output current	IOFF				1	A
Threshold of end low battery ("OFF" output deactivation and load reconnection)	VELB	12V configuration	12.2	12.3	12.4	V
		24V configuration	24.4	24.6	24.8	V
Environment Working temperature	TA		-	-	-	°C
PV module section cables	-	Double input available	-	2,5	-	mm ²
Battery section cables	-	Double input available	-	2,5	-	mm ²
Weight	-		-	200	-	g

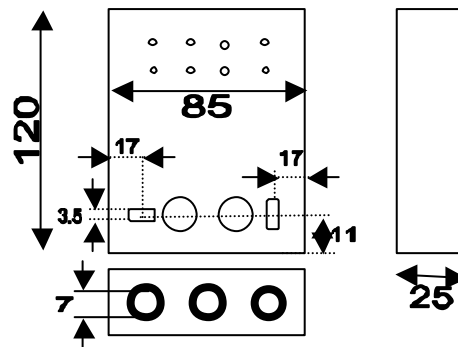


Fig. 5: Dimensions (mm)

Accessories

- Optional cod. **REL-H** DIN support for relay
 Optional cod. **REL-12-16-NC** 12Vdc relay coil, 16A normally closed contact (to be ordered always together the REL-H)
 Optional cod. **REL-24-16-NC** 24Vdc relay coil, 16A normally closed contact (to be ordered always together the REL-H)

Maintenance

Protect regulator against dust, humidity, extreme temperatures.
 Control periodically the health of battery; for flooded lead acid batteries control at least every 6 months and, if necessary, refill with distilled water the batteries electrolyte to cover plates of min. 1cm (NOTE: in a discharged battery the electrolyte has got a lesser volume; please avoid to fill too much to avoid that expansion after charge causes exit of electrolyte).
 Control periodically the health of contacts on all components.
 Control periodically the health of cables avoiding wear on cutting or abrasive surfaces and also avoiding direct contact with sunrays.
 Keep this manual for future consultations.

Anomalies

Detected behaviour	Interpretation	Remedy
Regulator activates but remains always in "POWER OFF"	Modules and battery work at 12V but regulator is in 24V configuration	Set 12V configuration moving the charging jumper on the circuit (see figure 2,3)
Buzzing is heard from regulator and leds turn on and off in irregular manner	PV modules are under sunlight and battery is not connected (broken cable or disconnected for some reason)	Reconnect the battery
When battery is low the output "LOW" activates, LOW spy and OFF spy activates at the same time	Internal Fuse2 is broken	Control the external relay and/or external signaller to avoid too high current absorption and change the broken fuse.
System does not reactivate after a long storage period and/or a not working period	Battery suffered a self-discharge and/or was stored discharged for a long time; it degraded as consequence	Try to recharge the battery with a charger from the grid; if result is not good, replace the battery.
Fast oscillations in battery charge state	Battery is too little in comparison with the load (it has a too high absorption) and in comparison with PV modules (they recharge the battery too fast).	Replace the battery with one of proper size.
Fast oscillations in battery charge state	Battery exhausted.	Replace the battery with a new one.
CPU led is off	Internal Fuse1 is broken and PV modules charges battery at the bitter end	Replace Fuse1 immediately before the battery damages itself with an overcharge

PV modules orientation.

Orientate PV modules towards SOUTH if in northern emisphere, towards NORTH if in southern emisphere. For a winter use or yearly use, modules' surface has to be tilted perpendicularly to the sunrays at noon in the worst month.
 For further details on PV systems sizing we advise to consult the internet site www.western.it in "L'energia fotovoltaica" section.

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**Exhausted batteries are highly polluting
 DO NOT leave them in the environment.
 Bring them in an authorized collecting center.**