isofotón

INSTALLATION, USE AND MAINTENANCE MANUAL FOR ISOLER 10/20/30 (V. 3) AND ISOLER D 10/20/30 (V.3) REGULATOR

R.M. MÁLAGA T. 496. L. 364 F. 92 H. 2497 – A-29072931 © Note: ISOFOTÓN, S. A. reserves the right to make any amendment to this leaflet.

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1- DESCRIPTION

To ensure correct functioning of ISOLER/ISOLER D regulators, please read this manual carefully before installation and its subsequent use. Remember that the following information is important.

ISOLER/ISOLER D are regulators designed and manufactured by Isofotón for application in isolated photovoltaic installations. Their reliability and versatility make them ideal equipment for home systems. They have a compact design and are easily fitted; specialised labour being unnecessary either for assembly or start up.

2- INSTALLATION AND MAINTENANCE

ISOLER/ISOLER D regulators are protected against any type of faulty connections made by the user, special attention must be paid to the various alarm signals that may occur, since, in the event of continuing with the installation, the regulators could be damaged.

The following order is recommended for carrying out the regulator connection:
Battery → Sensing + **(S- should not be connected)** → Photovoltaic generator → Consumption

Caution: Once the battery is connected it must be checked that the acoustic alarm of the equipment is not triggered and that the LED's do not light. If both of them happen, it would be a symptom of reversed polarity in the battery connection. In case of connecting the rest of the elements (modules and consumption) without taking notice of this alarm signals and without reconnecting correctly the battery, there is a risk of damaging the regulator.
If beginning the installation with the photovoltaic generation an identical alarm signal is produced if its polarity is reversed. A similar procedure to that described above, reconnecting the modules appropriately before connecting the battery and appliance, should be followed.

It is recommended to disconnect the regulator in the following order:
Sensing + → Photovoltaic generator → Battery → Consumption

Being the regulator a completely electronic device it needs virtually no maintenance. The terminals of the regulator should be checked for tightness every six months. Because the regulator is completely electronic, it needs virtually no maintenance. Only every six months do the terminals of the regulator need to be checked for tightness every six months.

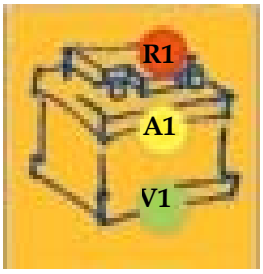
3- OPERATION

The charging regulator is an indispensable part of the photovoltaic system, it is responsible for protecting the battery against overcharge and overdischarge to extend its useful life.
The ISOLER/ISOLER D regulators optimise its work depending on the selected battery and incorporate a sensing line to read the real voltage of the battery **(S+ terminal should be connected directly on the battery positive terminal and S- terminal must not be connected)** avoiding mistakes in the meter reading due to voltage drop in the power cables. It likewise includes protection against nocturnal discharge of the battery through the photovoltaic modules by means of an intelligent diode, which switches off the current when it detects this. Various protections and alarms might be displayed all moments through the LED´s indicators (and on their display in ISOLER D models) on it and that are described in the following sections.

4- LIGHT INDICATORS

ISOLER/ISOLER D have two perfectly differentiated signalling areas. One advises the charge status of the battery by means of LED's (green V1, yellow A1 and red R1) and the other informs about alarms and regulator charge phase (yellow A2 and red R2).

4.A- Battery status indicators



Battery charged (V1); the blinking of this led, indicates that the battery is almost fully charged and that the photovoltaic modules are supplying current. Its consumptions are available to the user without restriction, although the operating period of the system will depend on the system used rationally. When the regulator disconnects the generating system from the battery, the LED will be lit continuously, returning to intermittent when the PV modules are reconnected.
Half battery (A1); when the diode LED is blinking, it advises the user that the battery is approximately half charged and that the regulator is allowing current to pass both from the generating system to the battery (whenever "night" mode has not been detected) and from the battery to the consumption. Users should moderate consumption.
Battery discharged (R1); its intermittent flashing indicates low battery voltage. Under such conditions, the user must reduce consumption to the minimum or, otherwise, the energy supply will shortly be interrupted. This LED remains continuously lit when the voltage is below a critical value for more than ten seconds, which results in the consumption being disconnected to protect the battery from overdischarge. In either case, the battery is charging and, therefore, receiving current from the PV generator (whenever "night" mode has not been detected). Consumption will not be renewed until the battery is half charged.

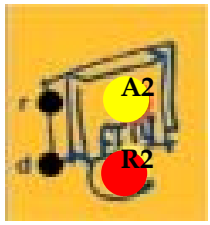
This indicator also advises, remaining lit with continuous buzzing, when there is an error or disconnection in the sensing line.

4.B- Alarm/functioning mode indicators

Charge phase (A2); It shows the charging mode by cyclical blinking code:

- 1 pulse/cycle : Flotation
- 2 pulses/cycle: Deep charge
- 3 pulses/cycle: Equalization

Alarm (R2); its lighting indicates a major problem has arisen in the installation. Its meaning could be related to the other regulator LED's, indicating any of these three situations:



Over-charge: LED R2 flashes when the generation or consumption current exceeds by 25% the nominal regulator current capacity. If the overcurrent conditions last for more than 5 seconds, disconnection occurs of the affected stage (generation or consumption) with the LED R2 remaining continuously illuminated until the "RESET" key is pressed.

Short circuit: if this happens, the two LED alarms (A2 and R2) light simultaneously. The consumption output is disconnected until the "RESET" key is pressed.

High battery: In this case LED R2 together with V1, A1 and R1 are lit. This alarm indicates regulator malfunction.

Caution: If a short circuit or an overload has occurred in the consumption line, before pressing the "RESET" key (r), the user must reduce consumption to the maximum regulator current or eliminate the short circuit.

4.C- Display (only ISOLER D models)

The ISOLER D regulators supply the user with abundant information on the photovoltaic system status by means of its cyclical screens. This information is shown in two languages merely be configuring the internal jumper JP3 (Spanish-OFF and English-ON). The data displayed is:

- Serial nº and version of the software installed.
- Manufacturer and model.
- Web page of ISOFOTON (www.isofoton.com).
- Battery voltage and type selected.
- Battery status and charge phase.
- Temperature (current, maximum and minimum).
- Generated energy (since the last reset).
- Consumed energy (since the last reset).
- Generating power and current.
- Power and current consumed.

If a certain screen needs to be set, DISPLAY (d) is pressed and its cyclical circulation is restored after 30 seconds.

Pressing DISPLAY (d) twice running accesses the battery voltage reading screen directly.

5- TABLE OF VISUAL AND ACOUSTIC ALARM SIGNALLING

ISOLER AND ISOLER D ALARM TABLE

Alarm	LED's	Acoustic Alarm	Display
Low bat. voltage pre-alarm	R1 blinking	Intermittent	Low battery
Low bat. voltage alarm	R1 constant	Intermittent	Low battery
High bat. voltage alarm	R1-A1-V1-R2 constant	Intermittent	High alarm
Sensing error	R1 constant	Constant	Error sensing
Reverse polarity in Modules	None	Constant	Switched off
Reverse polarity in battery	None	constant	Switched off
Reverse polarity in Sensing	R1 constant	Constant	Error sensing
Module overcurrent	R2 constant	Intermittent	Module overcharge
Consumption overcurrent	R2 constant	Intermittent	Appliance overload
Short circuit	R2-A2 constant	Intermittent	Short circuit
Temperature sensor error	Normal	constant	Temp. probe error

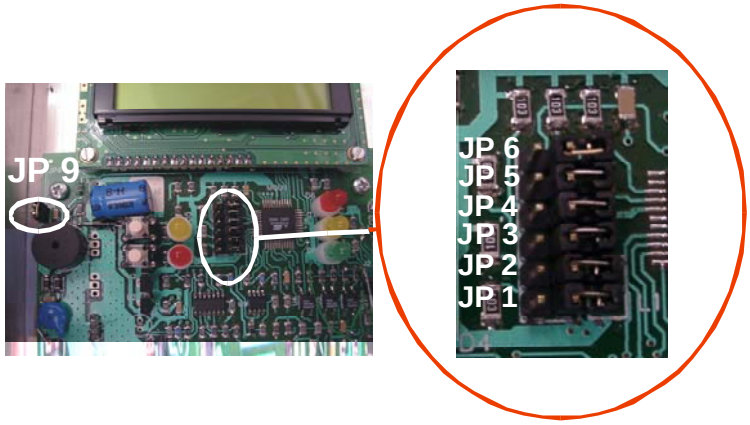
6- REGULATOR´ SETTINGS

ISOLER regulators allow selection between their multiple functions, simply by appropriate configuration of the internal jumpers installed (Section A). Thus it is possible to:

- Select between different battery technologies: MODIFIED SLI (traction battery adapted to solar applications), OPEN TUBULAR, GEL TUBULAR and AGM. (section B)
- Enable/disable acoustic alarm (Section C)
- Select between the function of twilight relay (the consumption is enabled only during nocturnal functioning) to activate systems such as streetlights, beacons, etc. or as a standard charge/discharge regulator (Section D)

- Select various time settings for activating/deactivating the consumption output working in the function of a twilight relay (Section E)
- Select language (only in ISOLER D). (Section F)
- Select linear or PWM functioning mode (Section G)

6.A- Locating the configuration jumpers



6.B.- Battery selection

The useful battery life is directly related to the appropriate selection of working voltages of the regulator action.

There follows a table showing the working voltages based on the manufacturing technology of the selected battery and the corresponding jumper settings.

BATTERY	JP1	JP2
OPEN TUBULAR	OFF	OFF
GEL TUBULAR	OFF	ON
MODIFIED SLI	ON	OFF
AGM	ON	ON

6.B.1- Voltage table for linear mode

The working values in linear mode (ON/OFF) at 25ºC, based on the selected battery, are:

VOLTAGE 12V (x2 FOR 24V)	**SLI MOD**	**OPEN TUB.**	**GEL. TUB**	**AGM**
High voltage alarm *	15.18	15.18	14.88	14.88
Equalization band (30 min) *	15.00÷14.70	15.00÷14.70	N.A	N.A
Deep charge voltage (3 sec) *	14.70	14.70	14.70	14.70

Floating band *	14.40÷13.80	14.40÷13.80	14.40÷13.80	14.40÷13.80
Deep charge voltage *	12.60	12.60	12.60	12.60
Low voltage alarm	11.80	11.52	11.52	11.52
Consumption disconnection voltage	11.60	11.40	11.40	11.40
Consumption reconnection voltage	12.70	12.70	12.70	12.70

* Temperature compensated values -2mV/ºC/V

6.B.2- Voltage table for PWM mode

For PWM mode, the working values at 25º C, based on the selected battery are:

VOLTAGE 12V (X2 FOR 24V)	**SLI MOD**	**OPEN TUB.**	**GEL. TUB**	**AGM**
High voltage alarm *	15.18	15.18	14.88	14.88
Equalization voltage (30 min) *	14.70	14.70	N.A	N.A
Deep charge voltage (3 sec) *	14.70	14.70	14.70	14.70
Floating band *	14.1	14.1	14.1	14.1
Deep charge voltage *	12.60	12.60	12.60	12.60
Low voltage alarm	11.80	11.52	11.52	11.52
Consumption disconnection voltage	11.60	11.40	11.40	11.40
Consumption reconnection voltage	12.70	12.70	12.70	12.70

* Temperature compensated values -2mV/ºC/V

6.C - Acoustic alarm selection

By means of the Jumper JP9, it is possible to activate/deactivate the acoustic alarm.

ACOUSTIC ALARM	JP9
ENABLED	ON
DISABLED	OFF

6.D- .Standard regulator/ twilight relay mode

MODE	JP4
STANDARD REGULATOR	OFF
TWILIGHT RELAY	ON

6.E- Time setting selections in twilight mode

The regulator, in twilight mode, detects both dusk and dawn, activating the output to the appliance based on the time selected by means of jumpers JP1, JP2 and JP5 with the option of choosing between ON-OFF mode (output to the appliance is enabled when "night" is detected and is disconnected at dawn or when the time set has elapsed) and ON-OFF-ON (as well as doing that previously mentioned on the ON-OFF function and, after the time set has elapsed, it re-activated the appliance one hour before dawn).

The following table shows the possible configurations.

MODE	**TIME SETTING (h)**	**JP1**	**JP2**	**JP5**
ON-OFF-ON	7-SWITCHED OFF-1	OFF	OFF	OFF
ON-OFF	7- SWITCHED OFF	OFF	OFF	ON
ON-OFF-ON	3- SWITCHED OFF -1	OFF	ON	OFF
ON-OFF	2- SWITCHED OFF	OFF	ON	ON
ON-OFF-ON	5- SWITCHED OFF -1	ON	OFF	OFF
ON-OFF	4- SWITCHED OFF	ON	OFF	ON
ON-OFF	ALL NIGHT	ON	ON	ON

In "twilight" mode function the selection between batteries is disabled with the voltage table being of the AGM type.

6.F- Language selection (only ISOLER D models)

By means of jumper JP3, it is possible to choose between Spanish and English language on the display.

LANGUAGE	**JP3**
SPANISH	OFF
ENGLISH	ON

6.G- Working/functioning mode

MODE	JP6
PWM REGULATION	OFF
LINEAR REGULATION	ON

7- ENVIRONMENTAL RECOMMENDATIONS

ISOFOTON S.A. develops an **Environmental Management System** based on a policy of preservation and respect for the environment. We therefore supply the users of our products with simple recommendations to encourage these policies.

ISOLER is packed in a cardboard case. This material is completely recyclable, which means its disposal in suitable rubbish containers for its subsequent recycling is recommended.
At the end of its useful life, the apparatus should be delivered to a Clean Point (neighbourhood centres for rubbish collection and recycling), which are ever more numerous, where all types of waste is suitably handled.

8- CERTIFICATIONS

The ISOLER D range has E.C. markings. This marking show that European standards of electromagnetic compatibility are met, in accordance with the following tests and standards:

- EN 61000-4-2, Electrostatic discharges
- EN 61000-4-3 y ENV 50204, Radiated immunity
- EN 61000-4-4, EFT Burst
- EN 55022, Conducted and radiated emissions
- EN 61000-4-5, Surges
- EN 61000-4-8, Magnetic fields
- EN 61000-4-11, Voltage variations
- EN 61000-4-6, Radiofrequency common mode injection

You can request any additional information to your authorised distributor, or to Isofoton (C/ Montalbán, 9, Madrid, www.isofoton.com)

ISOLER / ISOLER D

Domestic regulator

CHARACTERISTICS	ISOLER D 10	ISOLER D 20	ISOLER D 30
PHYSICAL			
Width	156 mm		
Height	157 mm		
Depth	26.9 mm		
Weight	540gr		
ELECTRICAL			
Nominal voltage	Dual voltage: automatic selection 12/24V ó 48V		
Maximum generating current	10 A	20 A	30 A
Maximum appliance current	10 A	20 A	30 A
Allowable overload	25%		
Internal consumption	36÷40 mA		
Maximum generation/consumption loss	< 168mV / 130mV	< 253mV / 190mV	< 310mV / 230mV
CONSTRUCTION			
Regulation type	Series, microprocessor controlled with solid state relay ON/OFF or PWM selectable.		
Battery selection	AGM / SLI MOD / TUBULAR ABIERTA / TUBULAR GEL.		
Battery sensing line	Yes.		
Language selection	Spanish/English.		
Regulation system	Deep charge/flotation/equalization [1]		
Charge status display	Deep; flotation and balance by means of LED and LCD (Isoler D), LED's (Isoler).		
Temperature compensation	Yes: -2mV / ºC / V (by means of external probe		
Low voltage appliance disconnection	Yes (with automatic resetting)		
Local alarms by means of LCD, LED's and acoustic (Isoler D), LED's and Acoustic (Isoler).	High and low battery voltage, overcharge and short circuit, sensing line, temperature probe, reverse polarity		
State of charge indicators	Full, half and low battery charge		
Twilight relay	Yes, configurable ON-OFF or ON-OFF-ON mode		
Alphanumeric LCD parameters (Isoler D)	Battery voltage, instantaneous generating and appliance current, temperature, Wh consumed etc.		
Battery reverse current protection	By means of an intelligent diode (MOSFET type)		
Reverse polarity protection	Yes (generation, battery, consumption and sensing lines)		
Overcharge protection	Yes, in appliance and generation lines (25% more than I nominal).		
Short circuit protection	Yes, instantaneous – consumption line		
Over-voltage protection	Yes, by means of varistors (generation, battery and appliance lines)		
Battery disconnection protection	Yes		
Sensing line disconnection protection	Yes, with automatic reconnection resetting		
Tropicalisation of circuits	Yes		
Working temperature range	0 – 50 ºC at full load		
Short circuit/overload resetting after disconnection	Yes, manual reset		
Bow	Aluminium (base), steel sheet (front).		
Paint	Oven-cured epoxy		
Degree of watertightness	IP 32		

[1] Equalization is deactivated for gel electrolyte batteries