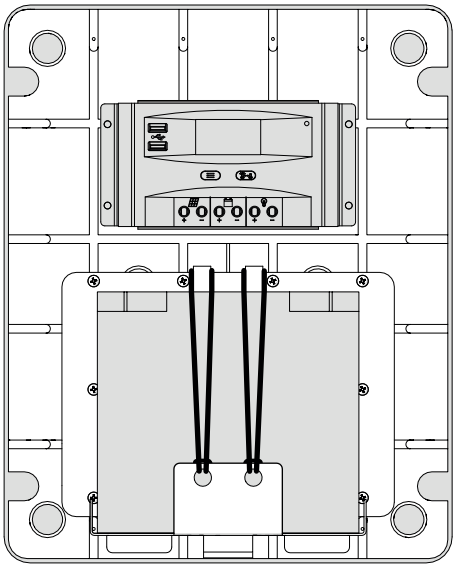
Istruzioni ed avvertenze per l'installazione e l'uso
Instructions and warnings for installation and use
Instructions et avertissements pour l'installation et l'usage
Instrucciones y advertencias para su instalación y uso
Anleitungen und Hinweise zu Installation und Einsatz
Instruções e advertências para a instalação e utilização
Instrukcje i zalecenia dotyczące instalacji i użytkowania



SOLE

Kit di alimentazione con pannello fotovoltaico per l'automazione di cancelli e barriere
Solar power kit for the automation of gates and barrier gates

Management System ISO 9001:2008

www.tuv.com
ID 9105043769

INDEX

1 - SAFETY WARNINGS

⚠ ATTENTION !

ORIGINAL INSTRUCTIONS - important safety instructions. Follow the instructions since incorrect installation can lead to severe inquiry! Save these instructions.
Read the instructions carefully before proceeding with installation.

The design and manufacture of the devices making up the product and the information in this manual are compliant with current safety standards. However, incorrect installation or programming may cause serious injury to those working on or using the system. Compliance with the instructions provided here when installing the product is therefore extremely important.

If in any doubt regarding installation, do not proceed and contact the Key Automation Technical Service for clarifications.

⚠ ATTENTION !

Before starting installation, perform the following checks and assessments:

ensure that every device used to set up the automation system is suited to the intended system overall. For this purpose, pay special attention to the data provided in the “Technical specifications” section. Do not proceed with installation if any one of these devices is not suitable for its intended purpose;

check that the devices purchased are sufficient to guarantee system safety and functionality;

perform a risk assessment, including a list of the essential safety requirements as envisaged in Annex I of the Machinery Directive, specifying the solutions adopted. The risk assessment is one of the documents included in the automation system’s technical file. This must be compiled by a professional installer.

Considering the risk situations that may arise during installation phases and use of the product, the automation system must be installed in compliance with the following safety precautions:

never make modifications to any part of the automation system other than those specified in this manual. Operations of this type can only lead to malfunctions. The manufacturer declines all liability for damage caused by unauthorised modifications to products;

if the power cable is damaged, it must be replaced by the manufacturer or its after-sales service, or in all cases by a person with similar qualifications, to prevent all risks;

do not allow parts of the automation system to be immersed in water or other liquids. During installation ensure that no liquids are able to enter the various devices;

should this occur, disconnect the power supply immediately and contact a Key Automation Service Centre. Use of the automation system in these conditions may cause hazards;

never place automation system components near to sources of heat or expose them to naked lights. This may damage system components and cause malfunctions, fire or hazards;

⚠ ATTENTION !

The drive shall be disconnected from its power source during cleaning, maintenance and when replacing parts. If the disconnect device is not in a visible location, affix a notice stating: “MAINTENANCE IN PROGRESS”:

connect all devices to an electric power line equipped with an earthing system;

the product cannot be considered to provide effective protection against intrusion. If effective protection is required, the automation system must be combined with other devices;

the product may not be used until the automation system “commissioning” procedure has been performed as specified in the “Automation system testing and commissioning” section;

use unions with IP55 or higher protection when connecting hoses, pipes or cable glands;

the electrical system upstream of the automation system must comply with the relevant regulations and be constructed to good workmanship standards;

this appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved;

before starting the automation system, ensure that there is no-one in the immediate vicinity;

⚠ ATTENTION !

Frequently examine the installation for imbalance where applicable and signs of wear or damage to cables, springs and mounting.
Do not use if repair or adjustment is necessary.

⚠ ATTENTION !

The automation system component packaging material must be disposed of in full observance of current local waste disposal legislation.

KEY AUTOMATION reserves the right to amend these instructions if necessary; they and/or any more recent versions are available at www.keyautomation.it

2 - PRODUCT OVERVIEW

2.1 - Product description

Solar powered kit for the automation of gates and barrier gates (fig.1).

2.2 - Models

PF30W		
MODEL	DESCRIPTION	QUANTITY
PF30W	30W solar panel	1

SOLE		
MODEL	DESCRIPTION	QUANTITY
Box	Box with control card with two batteries	1
Batteries	12V - 18Ah - AGM batteries	2
Panel Mount Bracket	Flat mount bracket	1
Bag with screws	fixing hardware for solar panel	1

SOLEAU		
MODEL	DESCRIPTION	QUANTITY
Box	Box with control card without batteries	1
Panel Mount Bracket	Flat mount bracket	1
Bag with screws	fixing hardware for solar panel	1

2.3 - Technical characteristics

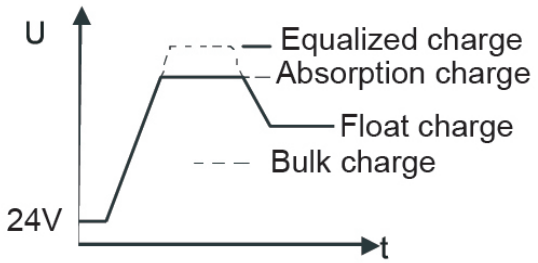
SOLAR CHARGE CONTROLLER	
INPUT	VALUE
PV voltage	⩽ 50V
Rated current	20A
OUTPUT	VALUE
System voltage	24V
HVD	32V
Rated discharge current	20A
No-load loss	⩽ 13mA
Charge loop voltage drop	⩽ 0.21V
Discharge loop voltage drop	⩽ 0.12V
Charging mode	PWM Multi-stage (bulk, absorption, float, equalized)
Voltage of float charging	27.6V (26V ~ 30V)
Voltage of absorption charging	28.8V (26V ~ 30V)
Duration of absorption charging	16 h with solar panel / 2 h with rated current
Voltage of equalized charging	29.2V (26V ~ 31V)
Duration of equalized charging	16 h
LVD	21.6V (20V ~ 28V)
LVR	25.2V (20V ~ 28V)
Load working mode (see par. 5.6)	DEFAULT NIGHT 1 NIGHT 2
Light control voltage	10V (2V ~ 20V)
Battery type	GEL, SLD, FLD and USr
USB	5V 1A
Man-machine interface	LCD, 2 buttons
Wiring	PCB terminal, ⩽6mm^2
Working temperature	-20 ~ +50 °C
Storage temperature	-30 ~ +60 °C
Working humidity	10% ~ 90%, no condensation
Plastic box dimension (mm)	316 (L) × 396 (A) × 188 (P)
Weight (box without batteries)	3 kg (Add 25kg for the approx batteries weight)
IP Code	56

BATTERIES						
MODEL	VOLTAGE OF FLOAT CHARGING	VOLTAGE OF ABSORPTION CHARGING	TIME OF ABSORPTION CHARGING	VOLTAGE OF EQUALIZED CHARGING	TIME OF EQUALIZED CHARGING	INTERVAL OF EQUALIZED CHARGING
GEL	27.6V	28.4V	2h	--	--	--
Sealed	27.6V	28.8V	2h	29.2V	2h	28 day
Flooded	27.6V	29.2V	2h	29.6V	2h	28 day
User	27.6V	28.8V	2h	29.2V	2h	28 day

We strongly suggest to use 2× GEL batteries 12V, 18Ah, AGM (absorbent glass mat) type.

SOLAR PANEL	
PARAMETERS	VALUE
Model	SLP030W - 24V
Cells	polycrystalline silicon solar cell
Irradiance and Cell Temperature	1000W/m² AM1.5 25°C
Peak Power (Pmax)	30W
Voltage at Pmax (Vmp)	34.4V
Current at Pmax (Imp)	0.87A
Open circuit Voltage (Voc)	43.2V
Short-circuit Current (Isc)	0.96A
Operating temperature	-40+85°C
Dimensions	510 x 541 x 30 mm
Weight	3,75 k g

2.4 - Charging mode



⚠ ATTENTION !

No equalized charging mode for GEL batteries.

2.5 - Compatibility

The Key Solar Kit is compatible with the following 24V motors:
Sliding Gate Motors: SUN series 24V, TURBO series 24V
Swing Gate Motors: RAY series 24V, Star 200 24V, Star 500 24V, REVO, MEWA 24V, UNDER 24V
Barriers: ALT series

⚠ ATTENTION !

For barriers ALT3/4/6 do not connect LED lights on boom and disconnect double colour led discs on the barrier (only possible to connect RED led with flashlight function). See instruction of barrier control unit.

2.6 - Consumption

It is possible to estimate the power consumption and thus the number of maneuvers possible by the SOLE KIT, correlating the total system power consumption and the power supplied by the batteries.
Below (see table pag. 6) are the standby power consumption of devices that are commonly powered by the system.
To calculate the daily consumption of the system, follow the installation example (Par. 2.7).

Dayly consumption is the sum of 4 factors:
1. A= consumption in stand-by mode when the gate is closed;
2. B= consumption when the gate is open and not in movement;
3. W= consumption when the gate is moving opening + closing;
4. NLS= activation of the Night Light System during night hours (optional)
Dayly consumption= A+B+W+NLS

For the correct use of the kit, make sure that daily consumption does not exceed the power supplied by solar panel.
Key Automation strongly suggest to use GEL batteries 12V, 18Ah, AGM (absorbent glass mat) type.

⚠ ATTENTION !

Accessories will draw additional power from the battery; the more accessories you connect, the more power your system will require.

⚠ ATTENTION !

The SOLE KIT solar powered system is intended for residential applications and light commercial gate operation with limited cycles per day.

While our system can operate over 30 cycles and/or provide over 1 week of standby time on fully charged batteries, it needs enough standby time to fully recharge the batteries or it will eventually run out of charge to operate the system.

We highly recommend to keep the system as simple as possible and avoid adding accessories that draw current from the batteries. The KEY AUTOMATION control units manages energy consumption and powers down all components, accessories and peripherals that are not required to operate when the gate is fully closed.

⚠ ATTENTION !

YOU MUST ACTIVATE THE STAND-BY FUNCTION. STAND-BY FUNCTION IS ACTIVATED WHEN THE GATE/BARRIER IS TOTALLY CLOSED.

⚠ ATTENTION !

For barriers ALT3/4/6 do not connect LED lights on boom and disconnect double colour led discs on the barrier (only possible to connect RED led with flashlight function). See instruction of barrier control unit.

⚠ ATTENTION !

NEVER USE THE SOLAR PANEL AND THE AC TRANSFORMER AT THE SAME TIME (FIG. 6)

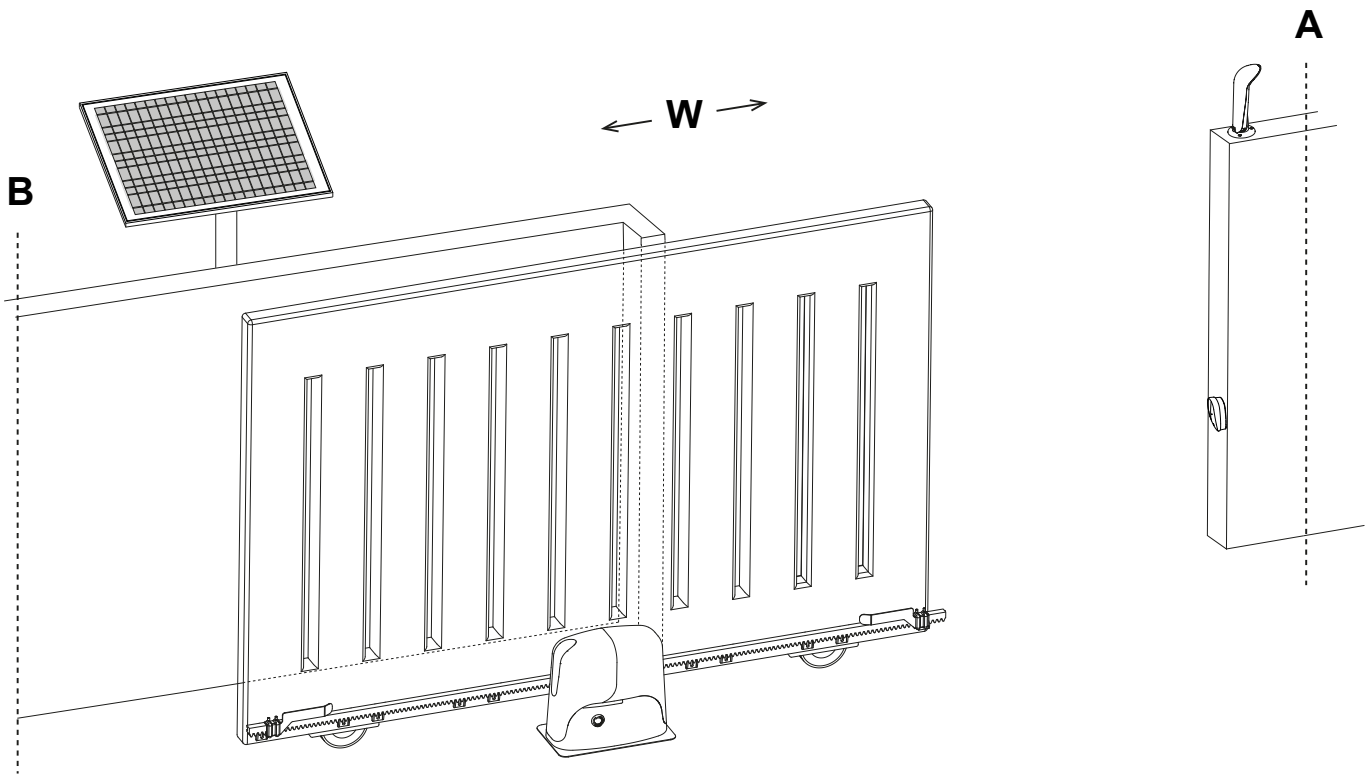
For a balanced system your Solar Panel should recieve at least 6 hours of direct sunlight.
To calculate solar radiance in your area consult the web.

Consumption chart

ITEM	STATUS	FUNCTION	A/h	W
CT10224	in stand-by no accesories	SBY=1	0,0350	0,83
CT20224	in stand-by no accesories	SBY=1	0,0270	0,65
MA24 with one PO24(gate closed)*	in stand-by no accesories	ENERGY SAVING=1	0,0195	0,47
	in stand-by no accesories with RX4X/RX4Y	ENERGY SAVING=1	0,0235	0,56
MA24 with two PO24(gate closed)*	in stand-by no accesories	ENERGY SAVING=1	0,0210	0,51
	in stand-by no accesories with RX4X/RX4Y	ENERGY SAVING=1	0,0250	0,6
FT32/22	One TX and one RX during activation	in function	0,0290	0,69
ECLIPSE	COURTESY light on	in function	0,0325	0,77
	FLASHLIGHT on	in function	0,0200	0,99
LED strip (18 leds)		in function	0,0325	0,77

* For MA24 no DYL (display) connected

2.7 - Installation example



⚠ ATTENTION !

Example of installation with SUN11024 and with 12 hours Night Light System (NLS) (Eclipse + cover LED strip) and without Night Light System.

Daily consumption= A+B+W+NLS

KEY AUTOMATION control units allow to read actual current draw of motors during work cycle, see relative instruction.

DATA	VALUE/DESCRIPTION
Location	Venice, Italy
Sliding gate length	5mt
Gate weight	1000kg
Moving time	1 minute
Pause time	30 seconds
Nc (Cycles/day)	48
Daily NLS activated	12 hours (LIGHT INTENSITY default= 3)
Battery capacity	18Ah

MOTOR	
MODEL	DESCRIPTION
SUN11024	MA24 + one PO24

ACCESSORIES	
MODEL	DESCRIPTION
RX4Y	Radio receiver
ECLIPSE	only FLASHLIGHT
FT32	Pair of photocells TX + RX

NLS	
MODEL	DESCRIPTION
LED	strip motor cover
LED	strip Eclipse

Daily working time in hours

$$\frac{\text{Nc (Number of cycles/day)} \times \text{Moving time}}{60}$$

ES: $\frac{48 \times 1}{60} = 0.8$ hours

Daily standby time while gate is OPEN in hours

$$\frac{\text{Nc (Number of cycles/day)} \times \text{Pause time}}{3600}$$

ES: $\frac{30 \times 48}{3600} = 0.4$ hours

Daily standby time while gate is CLOSE in hours

24 hours - (Daily working time in hours + Daily standby time while gate is OPEN in hours) ES: 24 – (0.8+0.4) = 22.8 hours

Standby consumption/day

product	consumption (A/h) in SBY (gate closed)	consumption (A/h) in SBY (gate open)	hours closed	hours gate open	total (A) gate position closed **A**	total (A) gate position open **B**
MA24 + PO24+ RX4Y	0.0235	0.0235	22.8	0.4	0.535	0.009
FT32	0	0.0290	0	0.4	0	0.011
ECLIPSE flashlight	0	0	22.8	0	0	0
ECLIPSE LED strip	0	0	22.8	0	0	0
LED strip cover SUN	0	0	22.8	0	0	0
TOTAL					0.535	0.02

Working consumption/day

Product	Consumption work cycle (A)	Hours/day	Total daily consumption in work cycle (A/h)
SUN11024 (electric motor)	1.8	0.8	1.440
MA24 + PO24+RX4Y	0.0235	0.8	0.018
FT32	0.0290	0.8	0.023
ECLIPSE Flashlight	0.02	0.8	0.016
TOTAL			1.497

NLS consumption/day (LIGHT INTENSITY default= 3)

Product	Consumption work cycle (A)	Hours/day	Total daily consumption in A/h **NLS**
LED strip SUN cover	0.0325	12	0.39
ECLIPSE LED strip NLS	0.0325	12	0.39
TOTAL			0.78

DAILY CONSUMPTION with cycles and NLS =
A+B+W+NLS= 0.535+0.02+ 1.497+0.78=2.832 A/h

DAYS with no charge with cycles and NLS =
Battery capacity / DAILY CONSUMPTION with NLS = 6 days

DAYS with no charge with no cycle only with NLS =
Battery capacity / (A+NLS) = 13 days

DAILY CONS. with cycles and no NLS, no courtesy light =
A+B+W= 0.535+0.02+1.497= 2.052A/h

DAYS with no charge with cycles and no NLS =
Battery capacity / Daily consumption with cycles and no NLS, no courtesy light = 8.7 days

DAILY CONSUMPTION with no cycle without NLS =
Battery capacity / (0.0235 A/h x 24h) = 32 Days

3 - PRELIMINARY CHECKS

Before installing this product, verify and check the following steps:

Check that the gate or door are suitable for automation;

Check the presence and strength of the security mechanical stops of the gate;

Check that the mounting area of the product isn't subject to flooding;

Conditions of high acidity or salinity or proximity to heat sources could cause malfunction of the product;

Extreme weather conditions (for example the presence of snow, ice, high temperature range, high temperatures) may increase the friction and therefore the force required for the handling and initial starting point may be higher than under normal conditions;

Check that the manual operation of gate is smooth and friction-free and there is no risk of derailment of the same;

Check that the gate is in mechanical equilibrium and stationary if left in any position;

Ensure that all materials used for the installation comply with current regulations;

Contact technical personnel to dismantle or repair the controller;

Keep installation site clear of flammable or explosive, or corrosive gases and dust etc.;

Prevent foreign object or liquid approaching controller;

Don’t put metal object beside battery;

Do not touch terminals or back plate of controller in case of electric shock or scald.

4 - INSTALLING THE PRODUCT

4.1 - Solar panel mount bracket

The mounting kit is a fixed, flat or pole mount design giving a tilt angle range of 0° - 90°.
To fix the mount bracket you have to assemble the components and parts together (fig 2). We suggest you lubricate all nuts and bolts to facilitate easy removal at a later date. Attach the tilt arm and fixed bracket to the middle part of the PV module frame using M8 module bolts and M8 mounting bolts along with washers, lock washers and nuts.

⚠ ATTENTION !

Additional mounting holes may be required if using this mount with a panel other than the PF30W. Great care should be taken when drilling additional holes as damage to the panel can easily occur, rending it useless.

To adjust the tilt angle of the PV panel, change the location of M8 bolts in the arc hole of the tilt arms. Remember to use lock washers to prevent vibration from working them loose.
For pole mounting, use hose clamps (not included) to fix the PV module and mount assembly securely to the pole (fig 3.1).
The dyna bolts are not included in the kit.

Note: For vertical wall mounting, drill holes on the mounting place to be installed according to size of the fixed bracket. Embed two M8 dyna bolts into the mounting surface (fig 3.2). Use washers lock washers and nuts to secure the PV module and mount assembly to the wall surface.

4.2 - Solar panel

To correctly position the solar panel, the following is required:
- Check that the desired installation position is always sunny (direct sun rays), all daylong and all days of the year.
- Check that the position is far from trees, bushes, buildings or any other object which might project shade on the panel surface.

⚠ ATTENTION !

Even a slight shade (e.g. a leaf) on the panel will drastically reduce the performance of the system. It is mandatory that the panel is always completely exposed to sunrays.

Once the most convenient installation position has been selected, the solar panel should be correctly oriented:
For countries north of the Equator, the panel must be oriented to wards the SOUTH.
For countries south of the Equator, the panel must be oriented to wards the NORTH.
The panel can be installed using Solar Panel Mount bracket (par.3) on fixed, flat or pole mount.
Firmly fix the panel to avoid loosening causing incorrect tilt angle.
According to the installation latitude, the panel should be tilted with respect to the ground, with an angle α (fig.4) which must be calculated based on the following table:

Latitude	Tilt angle α *
0-15°	15°
15-25°	same value as the latitude
25-30°	Add 5° to the latitude value
30-35°	Add 10° to the latitude value
35-40°	Add 15° to the latitude value
> 40°	Add 20° to the latitude value

* Tilt angle is an average for all seasons. For specific tilt angles for each season in your area consult the web

As it can be noted, the farther from the equator, the more the panel should be tilted towards the horizon to offset the sunrise-sunset path and therefore obtaining as much sun irradiation as possible. With the increasing of the latitude values, in fact, the sun path is lower with respect to the horizon.
A correct orientation is of key importance for the highest performance of the PV panel.
If the latitude angle of the installation area is unknown, some latitude values of various towns worldwide are included in this instruction manual (fig. 7), for reference purposes.

4.3 - Solar charge controller

See figure 5 for the circuit layout. Wiring of batteries and ground are pre-wired. Connect cable 1 and 2 as in figure 5 and see par. 4.4 for the technical specification.
Make sure battery and solar panel are disconnected to controller, and do not connect the positive and negative terminals of solar panel and battery at the same time to avoid of electric shock.
Make sure installation site meets safety requirements first.
Make sure voltage of solar panel and battery are compatible with controller.
Connect battery to controller and check whether the LCD display is on, if not, please solve the problem as mentioned in chapter 6 (pag.9).
Connect solar panel to controller accordingly. If there's sunlight, controller starts charging battery immediately and charging indicator arrow on LCD on. Connect load to controller.

4.4 - Cable and cable glands

Key Automation strongly suggest to use the following specification for the cable 1 and 2 (fig.5)

	CABLE 1	CABLE 2
Type	H05RNF/H07RNF	H07RNF
Diameter	≥ 2×1,5 mm²	≥ 2×4 mm²
Lenght	≤ 20 m	≤ 5 m
Cable glands	PG16	PG21

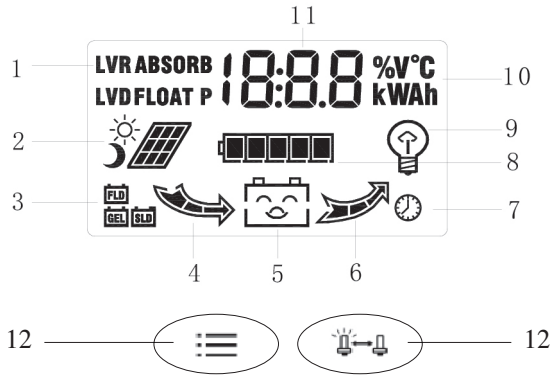
4.5 - Wiring

⚠ ATTENTION !

NEVER USE THE SOLAR PANEL AND THE AC TRANSFORMER AT THE SAME TIME (FIG. 6)

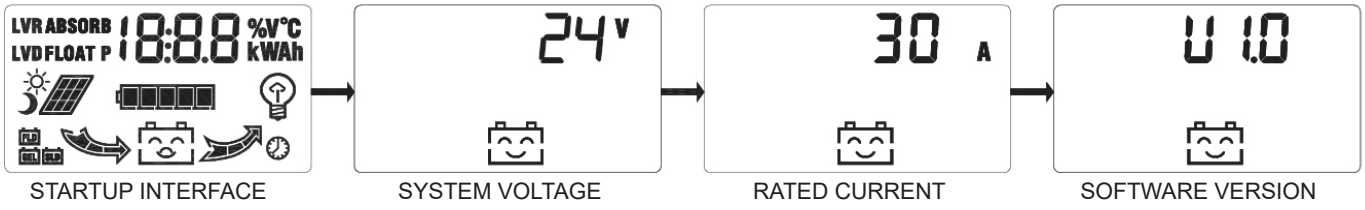
5 - OPERATING INSTRUCTION

5.1 - Symbols



1. LVR, ABSORB , LVD , FLOAT , P(PM)
2. Day and night
3. Battery type: FLD , GEL , SLD , Null means Usr
4. Charging
5.Error
6. Discharging
7. Time
8. Capacity
9. Load state
10. Unit
11. Data display area
12. Button

5.2 - LCD Interfaces

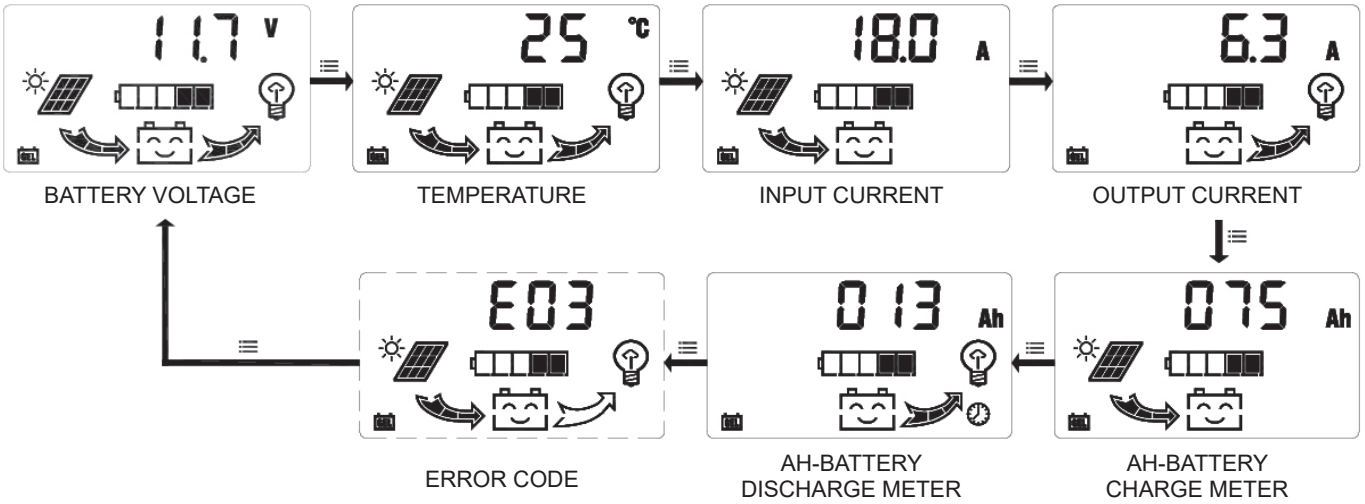


STARTUP INTERFACE | SYSTEM VOLTAGE | RATED CURRENT | SOFTWARE VERSION

Startup interface: the interface when system is powered on by which you check whether the LCD is in good condition
System voltage: battery voltage detected by controller.
Rated current: Rated charging and discharging current of controller

⚠ ATTENTION !

Set System voltage to 24V



BATTERY VOLTAGE | TEMPERATURE | INPUT CURRENT | OUTPUT CURRENT

ERROR CODE | AH-BATTERY DISCHARGE METER | AH-BATTERY CHARGE METER

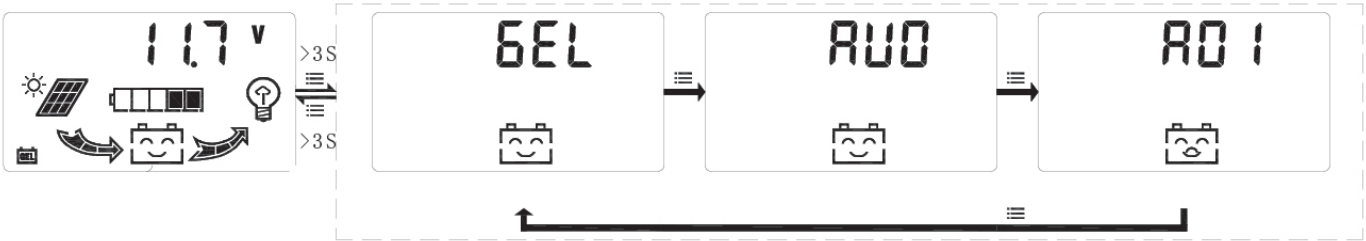
Interface one-way circulation is performed by pressing ☰
If there's no failure, display presents the current interface until press any key; if there 's failure, after 20s absence of key operation the error code interface is presented.

In interface "Battery voltage", or "Error code" by short pressing load is switched on or off.

In interface "Ah-Battery Charge Meter" or "Ah-Battery Discharge Meter" by long pressing (>3S) ☰, data is cleared.

In "Battery voltage" interface, by long pressing and ☰ simultaneously until the screen is fully bright controller is restored to factory defaults.

5.3 - Battery communication



In main loop "Battery voltage" interface, by long pressing (>3S) you can access secondary one-way loop.
In secondary loop, by short pressing you can circulate interfaces, and by short pressing , you can change values, while a long-pressing (>3S) enables data saving and exit, and a 20s absence of operation bring you to main loop interface with data unsaved.

Battery type: Four battery types are preset which are GEL, SLD, FLD and USr. Only parameters of USr type are adjustable.

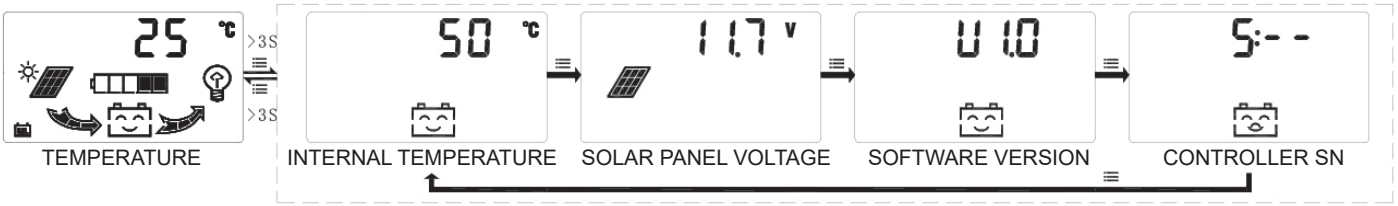
ATTENTION !

Set the appropriate battery type (GEL, SLD, FLD or USr)

Battery voltage level identification: automatic identification (AUO), fixed 12V, fixed 24V, fixed 36V and fixed 48V.

Controller restarts automatically to update data after battery type and voltage grade are set.

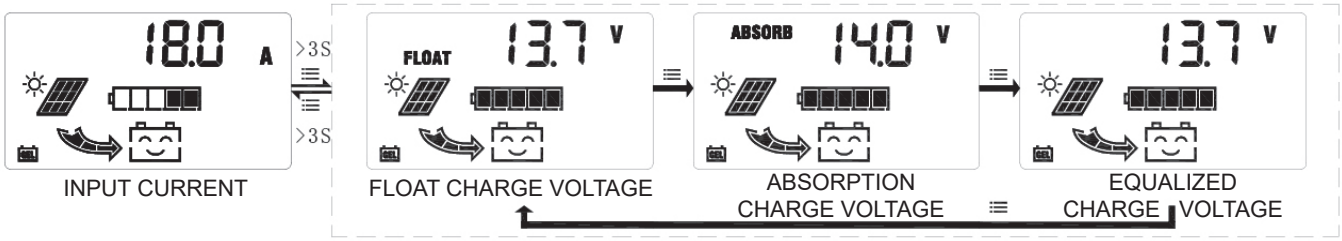
5.4 - Controller SN



In main loop "Temperature" interface, by long pressing (>3S) you can access secondary one-way loop. In secondary loop, by short pressing you can circulate interfaces and a long-pressing (>3S) or a 20s absence of operation, you can exit.

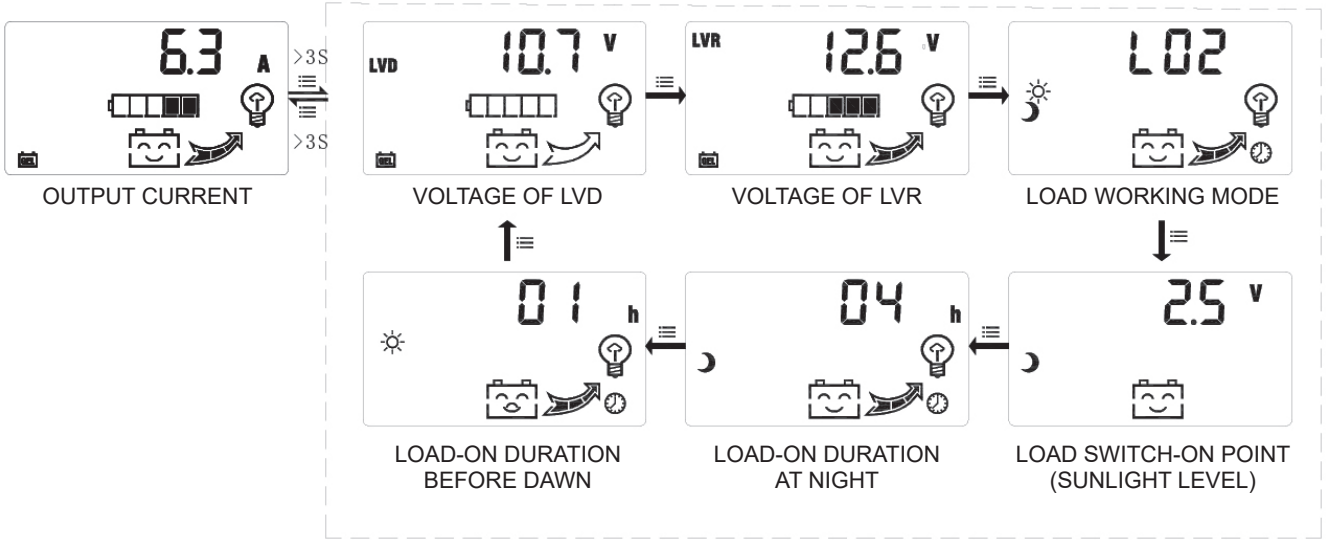
Controller communication SN: composed of 8 digits, every 2 digits displayed sequentially,eg:--88 56 73 24

5.5 - Charging settings



In main loop "Input Current" interface, by long pressing (>3S) you can access secondary one-way loop.
In secondary loop, by short pressings , you can circulate interfaces, and by short pressing you can change values, while a long-pressing (>3 S) enables data saving and exit, and a 20s absence of operation bring you to main loop interface with data unsaved.
Note: Only parameters of USr type are adjustable.

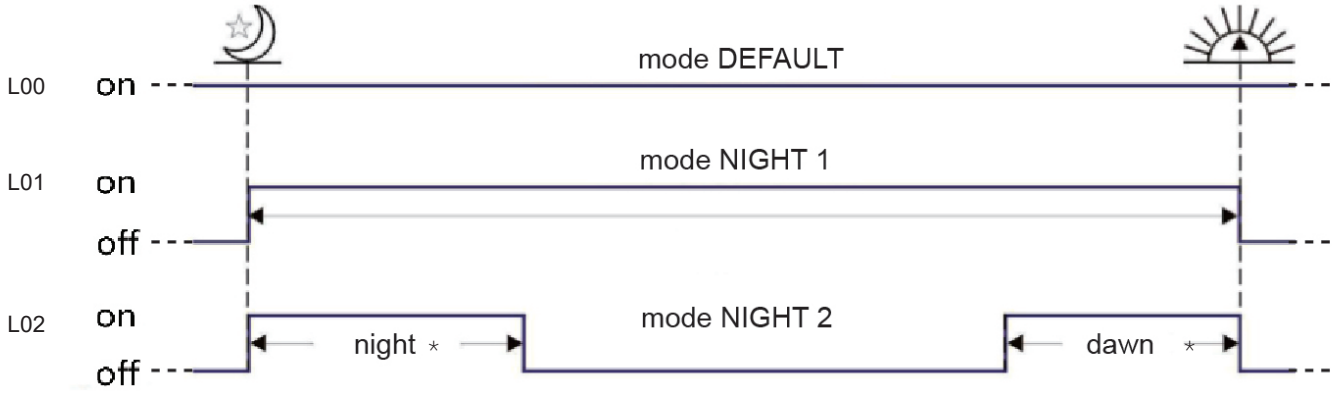
5.6 - Load working mode



In main loop "Output Current" interface, by long pressing(>3S) you can access secondary one-way loop.
In secondary loop, by short pressing you can circulate interfaces, and by short pressing you can change values, while a long-pressing (>S3) enables data saving and exit, and a 20s absence of operation bring you to main loop interface with data unsaved. 3 working mode for load as below. L00 is the default working mode (load always active).

Code	Working mode
L00	Load always active (DEFAULT)
L01	Sunlight control with switch off at sunset and switch on at sunrise (NIGHT 1)
L02	Sunlight control with switch switch off point after sunset (time adjustable) and switch on before sunrise (NIGHT 2)

Different load controlling modes define parameters adjustable and interface displayed.



* period adjustable separately.

6 - TROUBLESHOOTING

6.1 - Error code and correction

Error Code	Symptoms	Checks
E01	LVD	Manually recharge the battery.
E02	Excessive load current and load switched off	Reduce load current at load output, and switch on load manually or wait for 10 mins for auto switch-on by controller.
E03	Short circuit at load output and load switched off	Rectify short circuit and switch on load manually or wait for 5 mins for auto switch-on by controller.
E04	HVD	Make sure connection between battery and controller is good; make sure battery capacity is not too low. When battery voltage is 0.5V lower than defined overvoltage protection point, load switched on automatically by controller.
E05	Battery charging switched off due to over-temperature of controller	Allow the controller to cool down and restart charging automatically.
E06	Over-voltage of solar panel	Make sure voltage of open circuit is not too high.
E07	Charging switched off by controller due to excessive solar panel current	Check power of solar panel and reduce solar panel quantity in parallel connection and wait for 2 mins for restart charging.

6.2 - Symptoms and correction

Symptoms	Checks
No sign on LCD initialization	Make sure no reverse connected battery and connection between battery and controller is good; make sure circuit of battery switched on and fuse protector connected.
No charging current	Make sure no reverse connected solar panel and connection between solar panel and controller is good with no open circuit.
Load not work	Make sure ther's no reverse connected load and controller is not in protection against overload, short circuit, under-voltage or overvoltage.
Load not switched on at preset point	Make sure load controlling mode is correctly set; make sure battery voltage not too low.
Load unable to be switched on at night in Light control mode	Make sure load controlling mode is correctly set and check solar panel not illuminated by other light sources at night.

7 - IMAGES

Fig. 1. IT - Descrizione prodotto
EN - Product description

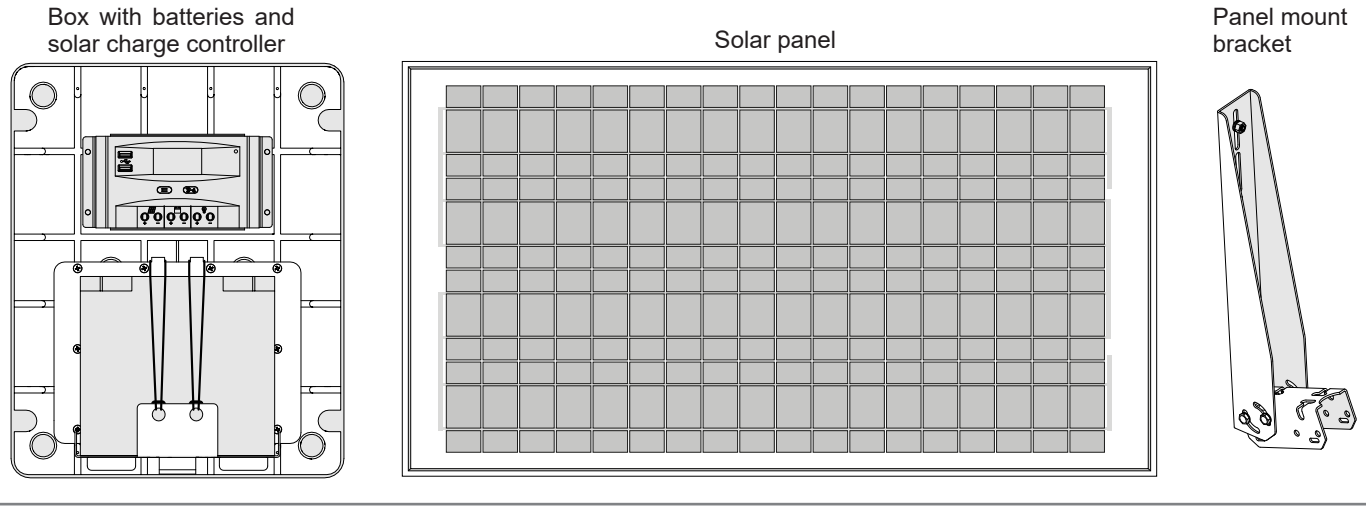
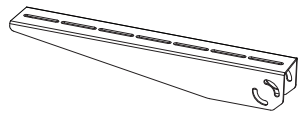
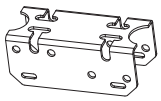


Fig. 2. IT - Staffa di montaggio del pannello solare
EN -Solar panel mount bracket

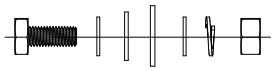


Part 1-1	
Component	Tilt Arm
Material	5052Al
Quantity	1

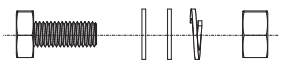


Part 1-2	
Component	Fixed Bracket
Material	5052Al
Quantity	1

Part 1-3-1	
Component	Module Bolt(M8)
Material	AISI304
Quantity	2



Part 1-3-2	
Component	Mounting Bolt(M6×20)
Material	AISI304
Quantity	4



Part 1-4	
Component	Mounting Bolt(M8)
Material	AISI304
Quantity	4

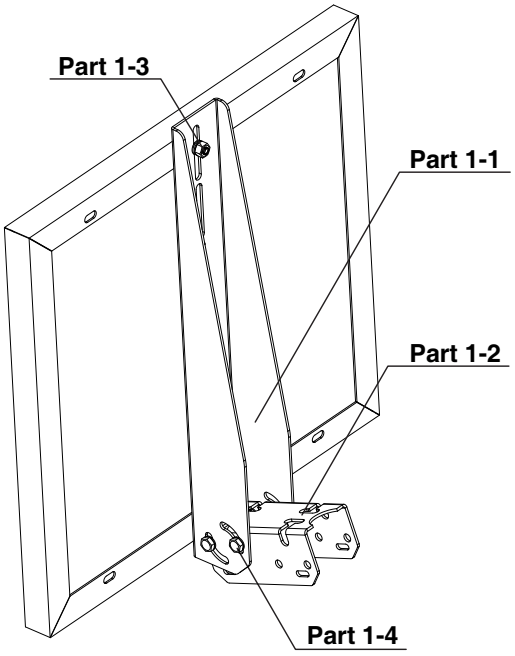
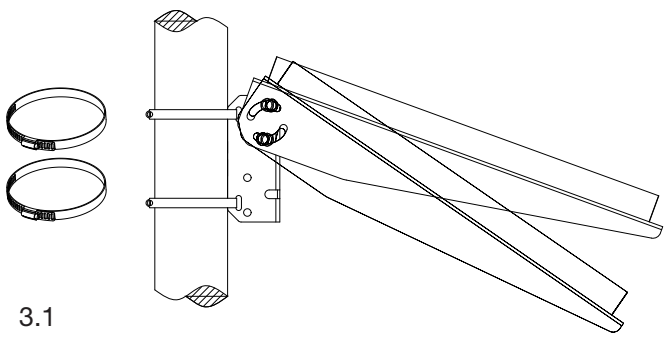


Fig. 3. IT - Staffa di montaggio del pannello solare
EN - Solar panel mount bracket



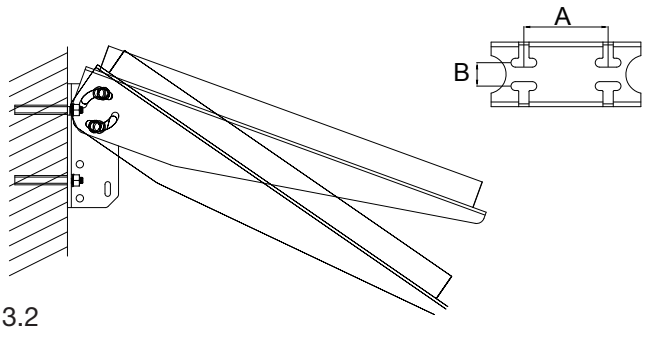


Fig. 4. IT - Installazione tipica
EN - Typical Installation

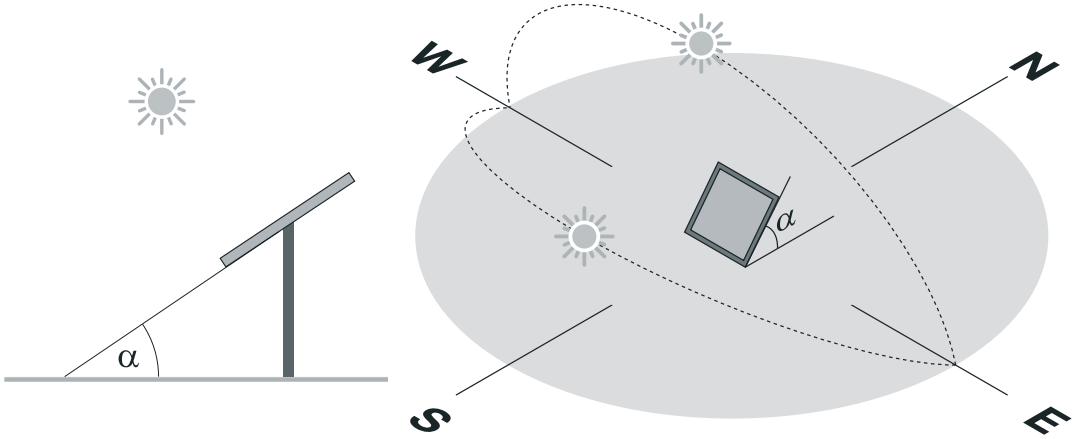


Fig. 5. IT - Layout del circuito
EN - Circuit Layout

⚠ ATTENTION !

IT: ATTENZIONE CON IL COLLEGAMENTO DELLE BATTERIE: IL CORTO CIRCUITO È MOLTO PERICOLOSO.

EN: CAUTION WITH BATTERIES CONNECTION: SHORT CIRCUIT IS VERY DANGEROUS.

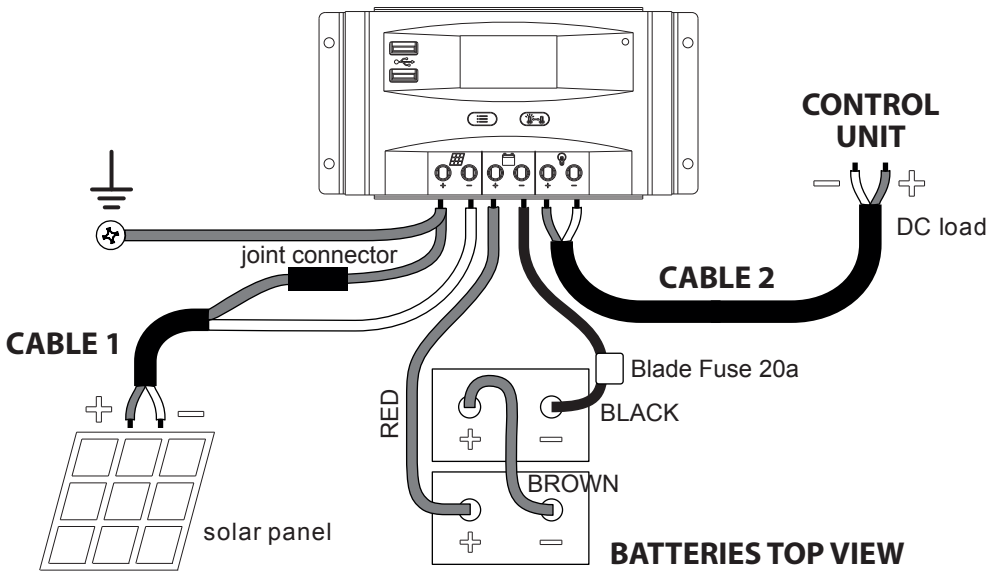


Fig. 6. IT - Cablaggio / Esempio con centralina CT10224
EN - Wiring / Example with CT10224 Control unit

IT: * NON UTILIZZARE MAI IL PANNELLO SOLARE E IL TRASFORMATORE AC ALLO STESSO TEMPO
**** NON COLLEGARE IL CAVO 2 NEL CONNETTORE DELLA BATTERIA. COLLEGARE SOLO ALL'ALIMENTAZIONE.**

EN: * NEVER USE THE SOLAR PANEL AND THE AC TRANSFORMER AT THE SAME TIME
**** DO NOT CONNECT CABLE 2 INTO BATTERY CONNECTOR. ONLY CONNECT TO POWER SUPPLY.**

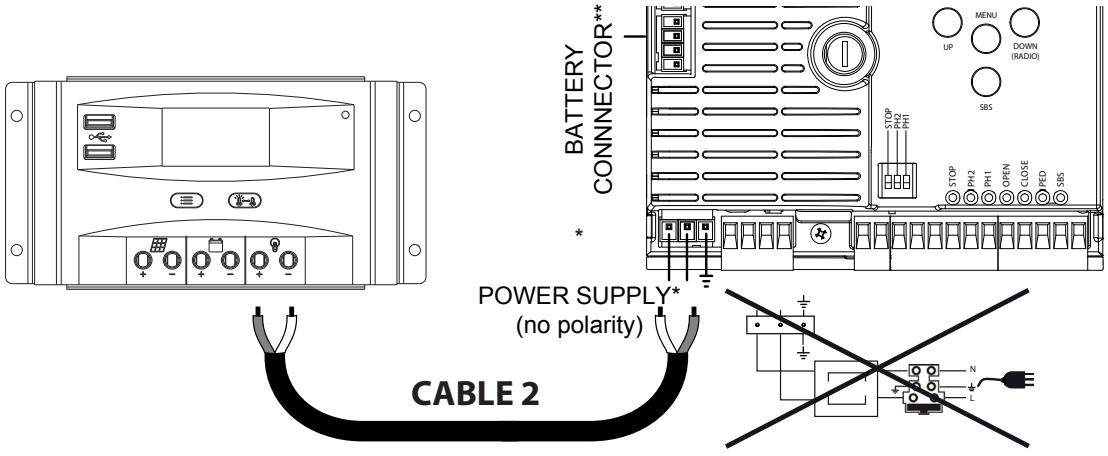


Fig. 7. IT - Valori di latitudine delle città del mondo
EN - Worldwide towns latitude values

AUSTRALIA AND SOUTHWEST PACIFIC	
ADELAIDE, AUSTRALIA	34
ALICE SPRINGS, AUSTRALIA	23
APIA, SAMOA	13
AUCKLAND,NEW ZEALAND	36
BOURAIL	21
BRISBANE, AUSTRALIA	27
CANBERRA, AUSTRALIA	35
COOBER PEDY ,AUSTRALIA	28
DARWIN, AUSTRALIA	12
DERBY, AUSTRALIA	17
HONIARA, SOLOMON ISLAND	9
IRON RANGE	19
MOUNT ISA	20
NADI, FIJI	17
NEWMAN, AUSTRALIA	23
PERTH, AUSTRALIA	31
PORT MORESBY, PAPUA NEW G	9
TIMARU, NEW ZEALAND	44
TOWNSVILLE, AUSTRALIA	19

ASIA	
BANGALORE, INDIA	12
BANGKOK, THAILAND	13
BEIJING, CHINA	39
BOMBAY, INDIA	18
CALCUTTA, INDIA	22
COLOMBO, SRI LANKA	6
DELHI, INDIA	28
HANOI, VIETNAM	21
HARBIN, CHINA	45
HO CHI MINH, VIETNAM	10
HONG KONG, HONG KONG	22
ISLAMABAD, PAKISTAN	33
JAKARTA, INDONESIA	6
KAGOSHIMA, JAPAN	31
KANDLA, INDIA	23
KARACHI, PAKISTAN	24
KATHMANDU, NEPAL	27
GUNUNGSITOLI ,INDONESIA	6
KOTA BHARU, MALAYSIA	2
KOTA KINABALU, MALAYSIA	2
KUALA LUMPUR, MALAYSIA	3
KUNMING ,CHINA	25
MALANG, INDONESIA	7
MANDALAY, MYANMAR	21
MANILA, PHILIPPINES	14
NAGPUR, INDIA	21
PADANG, INDONESIA	6
PALU, INDONESIA	8
PENANG ,MALAYSIA	5
RANGOON, MYANMAR	16
SAPPORO, JAPAN	43
SEOUL, KOREA	37
SHANGHAI, CHINA	31
SINGAPORE, SINGAPORE	1
SORONG, INDONESIA	0
TANAHMERAH, INDONESIA	6
TAIPEI, TAIWAN	25
THIMBU ,BHUTAN	27
TOKYO, JAPAN	35
TONHIL	46
ULAANBAATAR ,MONGOLIA	47
URUMQI, CHINA	43
WUHAN, CHINA	30
XIAN XIGUAN ,CHINA	34
XIAN XIANYANG ,CHINA	34
YUMEN	39

FORMER SOVIET UNION	
ANADYR ,RUSSIAN FED	64
ARKHANGELSK ,RUSSIAN FED	64
ASHKHABAD, TURKMENIS	37
BAKU, AZERBAIJAN	40
BARNAUL ,E URAL RUSSIA	53
CHITA, RUSSIA	52
IGARKA ,E URAL RUSSIA	67
INARIGDA	63
KARGASOK	59
KHATANGA	71
KIEV BORISPOL, UKRAINE	50
KIEV ZHULHANY, UKRAINE	50
KRASNODAR, RUSSIA	45
MAGDAGACHI ,RUSSIAN FED	53
MOSCOW, RUSSIA	55
OKHOTSK	59
PERM ,RUSSIAN FED	58
PETROPAVLOVSK ,KAZAKHSTAN	54
RIGA SKULTE, LATVIA	56
RIGA SPILVE, LATVIA	56
SARATOV ,RUSSIAN FED	51
TASHKENT, UZBEKIS TAN	41
TULUN	54
VANINO	49
VLADIVOSTOK, RUSSIA	43
VORKUTA ,RUSSIAN FED	67
YAKUTSK ,E URAL RUSSIA	62

MIDDLE EAST	
KUWAIT, KUWAIT	29
RIYADH, SAUDI ARABIA	24
BAGHDAD, IRAQ	33
BAM	36
HALAB	36
HERAT, AFGHANISTAN	34
JERUSALEM, ISRAEL	31
KABUL, AFGHANISTAN	34
MASHAD ,IRAN	36
NAZWA	22
SALALAH, OMAN	17
SANAA, YEMEN	15
SHIRAZ, IRAN	29
TABRIZ, IRAN	38
TARIM	16
TEHRAN, IRAN	35

AFRICA	
ABIDJAN, IVORY COAST	5
AD DAKHLA	23
ADDIS ABABA ,ETHIOPIA	9
ALGIERS, ALGERIA	36
ANTANANARIVO, MADAGA	18
ASMARA ,ERITREA	15
ASWAN, EGYPT	24
BAMAKO, MALI	12
BENGHAZI ,LIBYA	32
BANGUI, AFRICA	4
BEIRA, MOZAMBIQUE	19
CAIRO, EGYPT	30
CAPETOWN, SOUTH AFRICA	35
DAKAR, SENEGAL	14
FES	34
FREETOWN, SIERRA LEON	8
HARARE, ZIMBABWE	17
KABWE	14
KAMPALA ,UGANDA	0
KANO, NIGERIA	12
KHARTOUM, SUDAN	15
KINSHASA NDJILI, ZAIRE	4
KINSHASA NDOLO, ZAIRE	4
KISANGANI, ZAIRE	0
LAGOS, NIGERIA	6
PALMAS DE GC	28
LINDI, TANZANIA	10
LOBITO	12
LOME, TOGO	6
LUBUMBASHI, ZAIRE	11
LUDERITZ, SOUTH AFRICA	26
LUZAMBA ,ANGOLA	4
MAPUTO ,MOZAMBIQUE	25
MASERU, LESOTHO	29
MBALA ,ZAMBIA	1
MOGADISHU, SOMALIA	2
MONROVIA, LIBERIA	6
MWANZA, TANZANIA	7
NDJAMENA ,CHAD	12
NAIROBI, KENYA	1
NAIROBI, KENYA	1
NAMIBE, ANGOLA	15
NOUAKCHOTT, MAURITANIA	18
OUAGADOUGOU, BURKINA	12
POINTE NOIRE, CONGO	4
PORT ELIZABETH,SOUTH AFRICA	33
SEBHA ,LIBYA	27
SERONERA ,TANZANIA	22
SIDI IFNI ,MOROCCO	29
TULEAR ,MADAGASCAR	23
TOMBOUCTOU ,MALI	16
TRIPOLI, LIBYA	32
TSUMEB, NAMIBIA	19
TUNIS, TUNISIA	36
WINHOEK	22
YAOUNDE, CAMEROON	3
ZANZIBAR, TANZANIA	6

EUROPE	
ATHENS, GREECE	37
BARCELONA, SPAIN	41
BERNE, SWITZERLAND	46
BORDEAUX, FRANCE	44
BRNO, CZECHOSLOVAKIA	49
BUCHAREST, ROMANIA	44
BANEASA BUCHARE, ROMANIA	44
OTOPENI BUCHARE, ROMANIA	44
BUDAPEST ,HUNGARY	47
ORK CORK, IRELAND	51
GDANSK, POLAND	54
HAMBURG, GERMANY	53
ISTANBUL, TURKEY	41
LONDON, UK	51
LONGYEARBYEN, NORWAY	78
MADRID, SPAIN	40
MILAN, ITALY	45
NAPLES, ITALY	40
NICE, FRANCE	43
NUUGAATSIAQ	71
OSLO, NORWAY	59
PARIS, FRANCE	48
CHARLES DE GAULLE	48
REYKJAVIK, ICELAND	64
ROME, ITALY	41
SCORESBYSUND, GREENLAND	70
STENSELE	65
STOCKHOLM, SWEDEN	59
THULE, GREENLAND	76
TORSHAVN	62
TRABZON, TURKEY	41
VARDOE ,NORWAY	60

NORTH AND SOUTH AMERICA	
ANTOFAGASTA, CHILE	23
AREQUIPA, PERU	16
BELEM, BRAZIL	1
BOGOTA, COLOMBIA	4
BRASILIA, BRAZIL	15
CARACAS, VENEZUELA	10
CAYENNE, FRENCH GUIANA	4
CHIHUAHUA, MEXICO	28
CHURCHILL, CANADA	58
COMODORO, ARGENTINA	45
COPPERMINE, CANADA	67
CORDOBA, ARGENTINA	18
CUIABA, BRAZIL	7
FT MCPHERSON, CANADA	67
FT PROVIDENCE	61
GEORGETOWN, GUYANA	6
GUADALAJARA ,MEXICO	20
GUANTANAMO, CUBA	20
GUATEMALA CITY, GUATEMALA	14
GUAYAQUIL, ECUADOR	2
HAZELTON,BC,CANADA	55
ILHEUS, BRAZIL	14
IQUITOS, PERU	3
HAVANA ,CUBA	23
LABRADOR CITY,CANADA	52
LIMA, PERU	12
MANAGUA, NICARAGUA	12
MANAUS, BRAZIL	3
MERIDA, VENEZUELA	8
MONTEVIDEO, URUGUAY	34
NAKINA, CANADA	59
PANAMA CITY, PANAMA	8
PANAMA CITY, PANAMA	8
PEACE RIVER, CANADA	56
PORT AU PRINCE ,HAITI	18
PORTO VELHO, BRAZIL	8
QUEBEC, CANADA	46
RECIFE, BRAZIL	8
RIO DE JANEIRO ,BRAZIL	22
RIO DE JANEIRO ,BRAZIL	22
RIO DE JANEIRO ,BRAZIL	22
SAN JUAN, PUERTO RICO	18
SANTAREM, BRAZIL	2
SAO PAULO, BRAZIL	23
SASKATOON, CANADA	52
TIJUANA, MEXICO	32
TORONTO, CANADA	43
TORONTO, CANADA	43
VALPARAISO, BRAZIL	21
VANCOUVER, CANADA	49
VERACRUZ, MEXICO	19
WHITEHORSE, CANADA	60
WINNIPEG, CANADA	49

PACIFIC OCEAN	
AMERICAN SAMOA	14
BAKER ISLAND, US	0
EASTER ISLAND, CHILE	27
GAMBIER ISLAND, FRENCH GUY	23
HONOLULU, HI	21
HOWLAND ISLAND, US	0
JARVIS ISLAND	0
KANTON ISLAND	2
LIHUE KAUAI, HI	21
PALMYRA ISLAND	5
PITCAIRN ISLAND, UK	25

SWAINS ISLAND	59

USA	
ABILENE, TX	32
AKRON, OH	41
ALBANY, NY	42
ALBUQUERQUE, NM	35
ALLENTOWN, PA	40
AMERILLO, TX	35
ANCHORAGE, AK	61
ANN ARBOR, MI	42
ASHEVILLE, NC	35
ASHLAND, KY	38
ATLANTA, GA	34
ATLANTIC CITY, NJ	39
AUGUSTA, GA	33
AUGUSTA, ME	44
AUSTIN, TX	30
BAKERSFIELD, CA	35
BALTIMORE, MD	39
BANGOR, ME	45
BATON ROUGE, LA	30
BATTLE CREEK, MI	42
BAY CITY, MI	43
BEAUMONT, TX	30
BELLINGHAM, VA	49
BERKELEY, CA	38
BILLINGS, MT	46
BILOXI, MS	30
BINGHAMTON, NY	42
BIRMINGHAM, AL	33
BISMARCK, ND	47
BLOOMINGTON, IL	40
BOISE, ID	43
BOSTON, MA	42
BOWLING GREEN, KY	37
BRATTLEBORO, VT	43
BRIDGEPORT, CT	41
BROCKTON, MA	42
BUFFALO, NY	43
BURLINGTON, VT	44
BUTTE, MT	46
CAMBRIDGE, MA	42
CANTON, OH	41
CARSON CITY, NV	39
CEDAR RAPIDS, IA	42
CENTRAL ISLIP, NY	41
CHAMPAIGN, IL	40
CHARLESTON, SC	33
CHARLESTON, WV	38
CHARLOTTE, NC	35
CHATTANOOGA, TN	35
CHEYENNE, WY	41
CHICAGO, IL	42
CINCINNATI, OH	39
CLEVELAND, OH	41
COLORADO SPRINGS, CO	39
COLUMBIA, MO	38
COLUMBIA, SC	34
COLUMBUS, GA	32
COLUMBUS, OH	40
CONCORD, NH	43
CORPUS CHRISTI, TX	28
DALLAS, TX	33
DAYTON, OH	40
DAYTONA BEACH, FL	29
DECATUR, IL	40
DENVER, CO	39
DES MOINES, IA	41
DETROIT, MI	42
DODGE CITY, KS	38
DUBUQUE, IA	42
DULUTH, MN	47
DURHAM, NC	36
EAU CLAIRE, WI	45
EL PASO, TX	32
ELIZABETH, NJ	40
ENID, OK	36
ERIE, PA	42
EUGENE, OR	44
EUREKA, CA	41
EVANSVILLE, IN	38
FAIRBANKS, AK	65
FALL RIVER, MA	41
FARGO, ND	37
FLAGSTAFF, AZ	35
FLINT, MI	43
FORT SMITH, AR	35
FORT WORTH, TX	32
FRESNO, CA	36
FT. WAYNE, IN	41
GADSDEN, AL	34
GAINESVILLE, FL	29
GALLUP, NM	35
GALVESTON, TX	29
GARY, IN	41
GRAND JUNCTION, CO	39
GRAND RAPIDS, MI	43
GREAT FALLS, MT	47
GREEN BAY, WI	44
GREENSBORO, NC	35
GREENVILLE, SC	35
GULFPORT, MS	30
HAMILTON, OH	39
HARRISBURG, PA	40
HARTFORD, CT	42
HELENA, MT	46
HOUSTON, TX	30
HUNTSVILLE, AL	34
INDIANAPOLIS, IN	40
IOWA CITY, IA	41
JACKSON, MI	42
JACKSON, MS	32
JACKSONVILLE, FL	30
JERSEY CITY, NJ	40
JOHNSTOWN, PA	40
JOPLIN, MO	37
JUNEAU, AK	58
KALAMAZOO, MI	42
KANSAS CITY, KS	39
KANSAS CITY, MO	39
KENOSHA, WI	42
KEY WEST, FL	24
KNOXVILLE, TN	36
LAFAYETTE, IN	40
LANCESTER, PA	40
LANSING, MI	42
LAREDO, TX	27
LAS VEGAS, NV	36
LAWRENCE, MA	42
LEXINGTON, KY	38
LIMA, OH	40
LINCOLN, NE	41
LITTLE ROCK, AR	34
LOS ANGELES, CA	34
LOUISVILLE, KY	38
LOWELL, ME	42
LUBBOCK, TX	33
MACON, GA	33
MADISON, WI	43
MANCHESTER, NH	43
MARSHALL, TX	32
MEMPHIS, TN	35
MERIDEN, CT	41
MIAMI, FL	26
MILWAUKEE, WI	43
MINNEAPOLIS, MN	45
MINOT, ND	48
MOBILE, AL	30
MONTGOMERY, AL	32
MONTPELLIER, VT	44
MUNCIE, IN	40
NASHVILLE,TN	36
NATCHEZ, MS	31
NEW BRITAIN, CT	41
NEW HAVEN, CT	41
NEW ORLEANS, LA	30
NEW YORK, NY	41
NEWARK, MT	40
NORFOLK, VI	37
OAKLAND, CA	37
OKLAHOMA CITY, OK	35
OMAHA, NE	41
OPDEN, UT	41
ORLANDO, FL	28
PADUCAH, KY	37
PASADENA, CA	34
PENESCOLA, FL	30
PEORIA, IL	40
PETERSON, MT	41
PHILADELPHIA, PA	40
PHOENIX, AZ	33
PIERRE, SD	44
PITTSBURGH, PA	40
PLAINFIELD, MA	42
POCATELLO, ID	43
PORT ARTHUR, TX	30
PORTLAND, ME	43
PORTLAND, OR	45
PORTSMOUTH, NH	43
PORTSMOUTH, VI	37
PROVIDENCE, RI	42
PROVO, UT	40
PUEBLO, CO	38
RACINE, WI	42
RALEIGH, NC	36
RAPID CITY, SD	44
READING, PA	40
RENO, NV	39
RICHMOND, VI	37
ROANOKE, VI	37
ROCHESTER, MN	44
ROCHESTER, NY	43
ROCKFORD, IL	42
SACRAMENTO, CA	38
SAGINAW, MI	43
SALEM, OR	45
SALINA, KS	39
SALT LAKE CITY, UT	41
SAN ANTONIO, TX	29
SAN BERNANDIO, CA	34
SAN DIEGO, CA	32
SAN FRANCISCO, CA	38
SAN JOSE, CA	37
SANTA BARBARA, CA	34
SANTA CRUZ, CA	37
SANTA FE, NM	35
SARASOTA, FL	27
SAVANNAH, GA	32
SCHENECTADY, NY	43
SEATTLE, VA	47
SHEBOYGAN, WI	44
SHERIDAN, WY	45
SHREVEPORT, LA	32
SIOUX CITY, IA	43
SIOUX FALLS, SD	43
SOUTH BEND, IN	41
SPARTANBURG, SC	35
SPOKANE, VA	47
SPRINGFIELD, IL	40
SPRINGFIELD, MD	42
SPRINGFIELD, MO	37
SPRINGFIELD, OH	40
ST. CLOUD, MN	45
ST. JOSEPH, MO	40
ST. LOUIS, MO	38
ST. PAUL, MN	45
ST. PETERSBURGH, FL	28
STANFORD, CT	41
STAUBENVILLE, OH	40
STOCKTON, CA	38
SUPERIOR, WI	46
SYRACUSE, NY	43
TACOMA, VA	47
TALLAHASSEE, FL	30
TAMPA, FL	28
TERRE HAUTE, IN	39
TEXAKANA, TX	33
TOLEDO, OH	41
TOPEKA, KS	39
TRENTON, MT	40
TROY, NY	42
TUCSON, AZ	32
TULSA, OK	38
URBANA, IL	40
UTICA, NY	43
WACO, TX	31
WALLA WALLA, VA	46
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