

# WRD

## Remote display for WESTERN WRD SYSTEM



*Manuale utente*

**IT**

*User manual*

**EN**

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**WESTERN CO.**<sup>®</sup>  
ELECTRONIC EQUIPMENTS - SOLAR SYSTEMS



**REMOTE DISPLAY FOR WESTERN WRD SYSTEM**

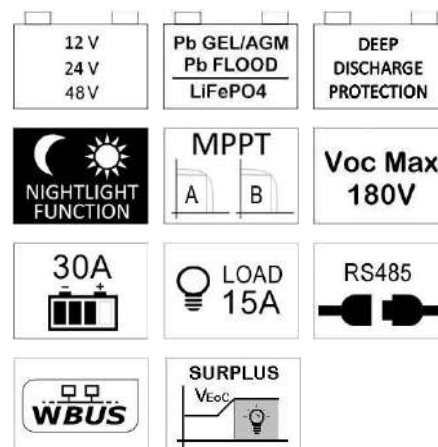
Modelli	Descrizione
WRD	IoT Remote Display and Datalogger 12/24/48V



Il **WRD** è un dispositivo visualizzatore e controllore che assieme al bus proprietario **WBUS** è parte del **WESTERN WRD SYSTEM**, un sistema completo e intelligente per la produzione e l'accumulo di energia fotovoltaica in impianti stand-alone.

Il **WESTERN WRD SYSTEM** è un sistema stand-alone flessibile e avanzato con funzionalità intelligenti, registrazione dei dati storici di funzionamento con controllo remoto da internet (cloud). E' possibile parallelare fino a 8 regolatori MPPT **WRM30+** con potenza di carica modulabile fino a 14kW e monitorare l'energia del banco batteria tramite il battery monitor **WBM**. Il **WRD** è adatto per sistemi a 12/24/48V con accumulatori al piombo o litio. Il sistema è modulare in quanto i regolatori **WRM30+** possono essere parallelati per aumentare la potenza fotovoltaica. Il **WRD** ha un bus di controllo proprietario denominato **WBUS** per comunicare con i vari dispositivi compatibili, in grado di accedere a tutti i parametri sia per la visualizzazione che per la gestione delle funzioni di controllo. La semplice interfaccia utente, con display 128x64 e 4 tasti, permette una visione immediata di tutti i parametri: potenze, tensioni, correnti di carica e di stringa PV, contatori di energia, logger data e eventi. Dal **WRD** si possono eseguire tutte le impostazioni di Setup per ogni singolo regolatore **WRM30+** connesso e/o battery monitor **WBM**. Tramite il **WBM** è possibile gestire dei contatti relazionati allo stato di carica dell'accumulatore per l'attivazione intelligente di carichi. Nella  $\mu$ SD removibile presente sul frontalino sono memorizzati i dati del logger. Con la connessione Ethernet è possibile il collegamento al cloud internet per cui sia i dati del logger che tutte le altre funzioni diventano remotabili e accessibili con il portale **WRD SERVER**.

- Alimentazione 12V, 24V e 48V
- LCD retroilluminato 128x64
- Navigazione menu con 4 tasti
- Orologio interno
- Data Logger su  $\mu$ SD estraibile
- Master per **WESTERN WRD SYSTEM**
- Interfaccia **WBUS**
- Connessione internet (cloud)
- Ethernet RJ45
- Protezione antiinversione
- Installazione da pannello o con scocca
- Contenitore metallico IP20


**APPLICAZIONI**


## Descrizione generale:

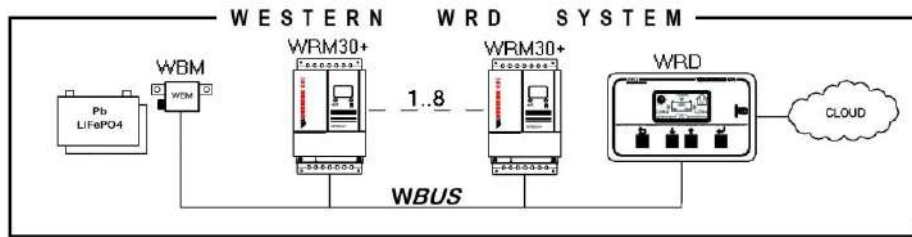


Fig.1 WESTERN WRD SYSTEM

Nel **WESTERN WRD SYSTEM**, il WRD è il coordinatore e può funzionare in due modalità: Visualizzatore o Controllore.

### Visualizzatore:

Impostando nel menu di setup **8.3 WRD-->Oper.Mode: 'MONITOR'**: si ottiene la modalità Visualizzazione.

In questa modalità, il WRD non controlla la ricarica e la scarica del sistema, ma si occupa della sola visualizzazione dei parametri dei dispositivi connessi, può modificare le impostazioni di setup degli slave, raccoglie i dati e li remota nel cloud. I vari device svolgono autonomamente le loro funzioni principali indipendentemente dal WRD.

### Controllore:

Impostando nel menu di setup **8.3 WRD-->Oper.Mode: 'CONTROLLER'**: si ottiene la modalità Controllore<sup>1</sup>.

In questa modalità, il WRD aggiunge un controllo al di sopra dei device, modificando dinamicamente alcuni parametri al fine di ottimizzare la gestione dell'energia dell'intero sistema e garantire il rispetto dei parametri di batteria.

È riconoscibile la modalità di funzionamento del WRD nel menu 2.0 dall'indicazione presente nella grafica di batteria (§ Videate principali).

## Collegamenti e installazione

In appendice (Fig. A1, A2, A3) sono rappresentati i collegamenti del sistema per le varie configurazioni possibili.

Per il suo funzionamento il WRD utilizza l'alimentazione del sistema 12/24/48V e la connessione **WBUS** che fisicamente è un bus RS485, mentre è opzionale il collegamento Ethernet RJ45 al cloud internet.

Il **WESTERN WRD SYSTEM** deve essere configurato impostando a ciascun regolatore WRM30 un indirizzo univoco: da 1 a 32, mentre il WBM ha già un indirizzo fisso (33).

### Procedura d'installazione:

- 1) Installare il WRD in un luogo asciutto, ha due opzioni di fissaggio: da pannello e con scocca (Fig.4)
- 2) Nella parte posteriore si accede alle connessioni elettriche (Fig.4). Sia la connessione di alimentazione che quella del **WBUS**<sup>2</sup> sono di tipo a morsetto estraibile facili da cablare. Collegare correttamente i cavi, se l'alimentazione proviene dalla batteria è raccomandato che sia sotto fusibile (0,5A) per la protezione dei cavi. Infine, se è utilizzato, collegare anche il cavo Ethernet.
- 3) Effettuati tutti i collegamenti, dare alimentazione al sistema. Il WRD si accende e inizia a funzionare.
- 4) Eseguire ora le impostazioni di configurazione del sistema che verranno richieste.
  - Al menu: **8.0 WBUS CONFIG.** si può usare per semplicità il comando di 'AutoConf.', oppure si possono fare le impostazioni degli indirizzi manualmente.
  - Al menu: **7.1 DATE / TIME** si imposta l'orologio e fuso orario (Timezone).
  - Al menu: **7.0 SYSTEM** si eseguono le impostazioni di sistema. **Occorre selezionare il profilo corretto, corrispondente alle caratteristiche di batteria** (una scelta errata potrebbe portare nel tempo a danneggiare la batteria stessa).
- 5) Verificare l'intero funzionamento scorrendo le videate.

<sup>1</sup> È riconoscibile se un WRM30+ è controllato da remoto (da WRD) se, sul display del WRM30+, il contorno della batteria lampeggia ogni ~3sec.

<sup>2</sup> Il WBUS ha come bus fisico la RS485, per cui vanno collegati necessariamente e correttamente i due poli A e B, mentre il polo GND è bene lasciarlo scollegato.

## **Configurazione:**

Il **WESTERN WRD SYSTEM** può funzionare con diverse combinazioni di devices:

1. WRD + WBM (monitoraggio batteria)
2. WRD + WRM30<sub>(1..8)</sub> (monitoraggio produzione PV)
3. WRD + WBM + WRM30<sub>(1..8)</sub> (monitoraggio storage, produzione, consumo su impianti stand-alone)

In funzione dell'hardware presente occorre impostare la configurazione sul WRD. Questa operazione si effettua sul menu: **8.0 WBUS CONFIG.** dove devono essere specificati gli indirizzi dei dispositivi connessi al **WBUS**, per facilitare l'operazione è disponibile un comando di autoconfigurazione che rileva l'hardware connesso.

In base alla configurazione impostata, il WRD visualizza le informazioni e può eseguire i suoi algoritmi sfruttando le risorse disponibili. Le videate di ciascuna configurazione sono descritte di seguito.

## **System Setup:**

Nel menu: **7.0 SYSTEM** si eseguono le impostazioni di sistema, l'elenco dei parametri cambia in funzione della configurazione corrente. Le spiegazioni dettagliate sono descritte nel capitolo *Configurazioni*.

## **Date Time Setup:**

Nel menu: **7.1 DATE / TIME** si imposta l'orologio di sistema e il fuso orario (Timezone). E' importante impostare correttamente quest'ultimo parametro, con il Timezone del sito dove è collocato l'impianto in maniera che l'aggiornamento dell'orologio da remoto possa avvenire correttamente.

## **Data Logger Setup:**

Nel menu: **7.2 DATA LOGGER** si abilita il data logger impostando i minuti di campionamento dei parametri: 10min. è il valore predefinito (abilitato). E' possibile anche richiedere informazioni riguardanti la  $\mu$ SD.

## **Network Setup:**

Nel menu: **7.3 NETWORK** si eseguono le impostazioni dei vari parametri di rete. Di default è impostata la funzionalità DHCP che provvede in automatico a recuperare i valori necessari. La connessione al server remoto può essere abilitata o disabilitata dall'utente.

### Navigazione Menu:

La navigazione tra le varie videate è molto semplice e intuitiva. Il WRD ha due ambienti di visualizzazione (Fig.2): l'ambiente principale **MAIN**, composto da 6 videate dove si monitora il funzionamento del sistema, e l'ambiente d'impostazione **SETUP**, composto da 6 videate + 4 in **ADV. SETUP** dove vengono impostati i setting per il funzionamento. Nell'ambiente **MAIN** si usano solo i tasti Up/Down che permettono di scorrere le videate da 1.0 a 6.0. Premendo contemporaneamente i tasti **Up/Down** per 1 sec. si accede all'ambiente **SETUP**. Qui, si ripete sempre con gli stessi tasti **Up/Down**, lo scorrimento delle videate da 7.0 a 7.5. Per tornare nell'ambiente Main si usa il tasto **Esc** premuto per 1 sec.

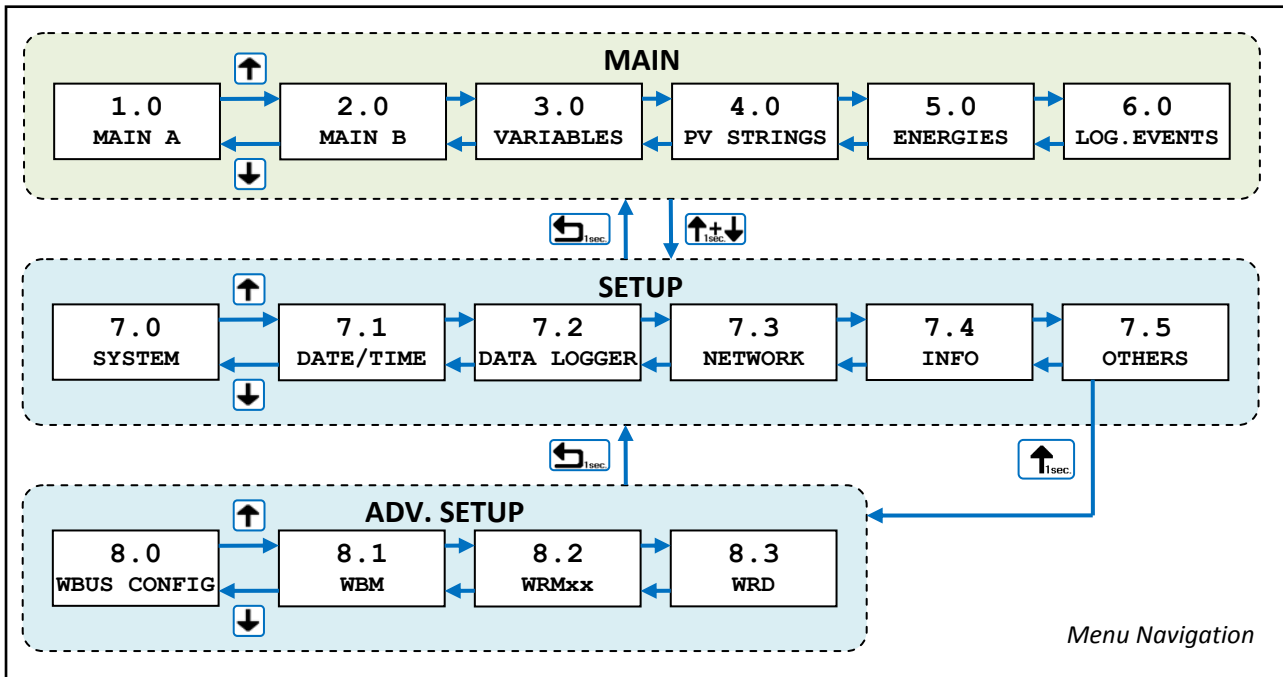


Fig.2 - Menu di navigazione

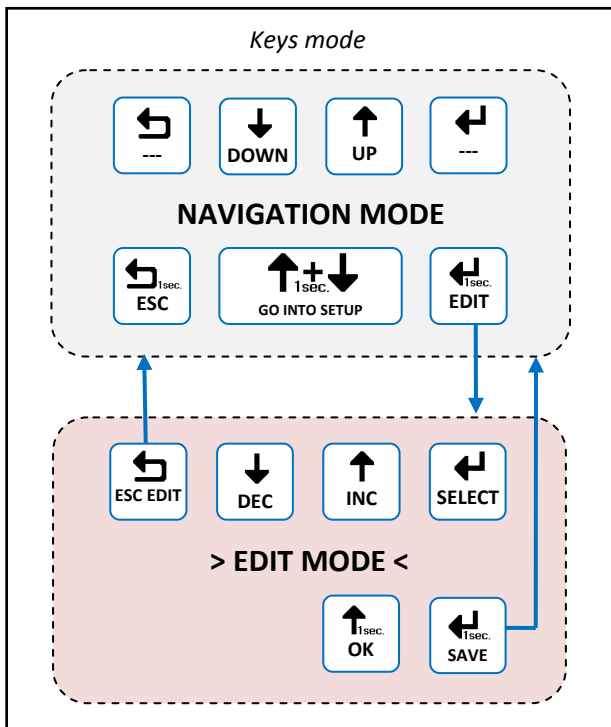


Fig.3 - Menu di editazione

È possibile entrare nella modalità di editazione (Fig.3), laddove è concesso, per modificare i parametri mantenendo premuto per 1 sec. il tasto **Edit**. L'entrata nella modalità di editazione è visibile sul display dalla presenza dei cursori sul parametro modificabile. Per la modifica si usano i tasti **Inc/Dec**, per passare su un altro parametro si usa il tasto **Select** mentre per uscire dalla modalità di Edit, **senza salvare le modifiche**, si usa il tasto **Esc**. Laddove i parametri da modificare sono organizzati in liste, i tasti **Up/Down** scorrono la lista oppure modificano il valore in base alla selezione. Per confermare alcune azioni sulle liste deve essere premuto per 1sec. il tasto **OK**. Per **salvare le modifiche** occorre mantenere premuto per 1 sec il tasto **Save**.

**CARATTERISTICHE ELETTRICHE**

DESCRIPTION	PAR.	VALUE	U.M.
Nominal battery voltage		12 / 24 / 48 autodetect	(V)
Supply voltage range	V <sub>bat</sub>	10 ÷ 64	(V)
Self consumption	P <sub>q</sub>	1,0	(W)
Operating temperature	T <sub>amb</sub>	-10 ÷ +40	(°C)
Max cable section terminal (Power and RS485)		1,5	(mm <sup>2</sup> )
Weight		250	(g)
Dimension LWH		160 x 95 x 27	(mm)
Degree of protection		IP20	

Tab.1 - Caratteristiche elettriche

**DIMENSIONI MECCANICHE**

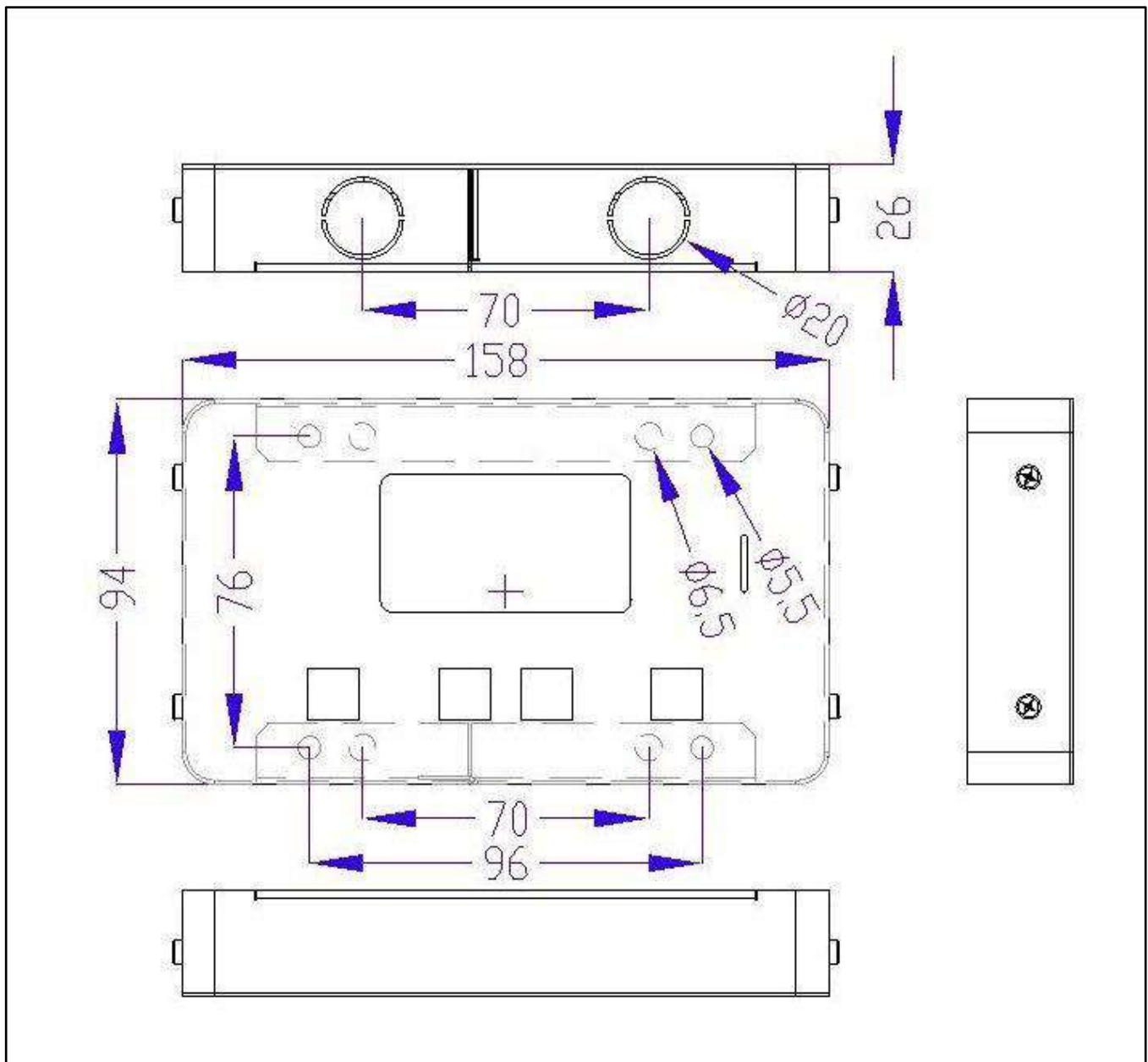


Fig.4 - Dimensioni meccaniche

**OPZIONI DI FISSAGGIO:**

	<p><b>WALL INSTALLATION</b></p>															
	<p><b>WALL INSTALLATION</b></p>															
	<p><b>PANEL INSTALLATION</b></p>															
<table border="1"> <tr> <td><b>1</b></td> <td><b>self-tapping screw</b></td> <td><b>Q.ty 4</b></td> </tr> <tr> <td><b>2</b></td> <td><b>plastic dowel</b></td> <td><b>Q.ty 4</b></td> </tr> <tr> <td><b>3</b></td> <td><b>M3 L6 cross screw</b></td> <td><b>Q.ty 4</b></td> </tr> </table>	<b>1</b>	<b>self-tapping screw</b>	<b>Q.ty 4</b>	<b>2</b>	<b>plastic dowel</b>	<b>Q.ty 4</b>	<b>3</b>	<b>M3 L6 cross screw</b>	<b>Q.ty 4</b>	<table border="1"> <tr> <td><b>4</b></td> <td><b>rubber cable gland</b></td> <td><b>Q.ty 2</b></td> </tr> <tr> <td><b>5</b></td> <td><b>nut M4</b></td> <td><b>Q.ty 4</b></td> </tr> </table>	<b>4</b>	<b>rubber cable gland</b>	<b>Q.ty 2</b>	<b>5</b>	<b>nut M4</b>	<b>Q.ty 4</b>
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<b>5</b>	<b>nut M4</b>	<b>Q.ty 4</b>														

Fig.5 - Opzioni di fissaggio



## Configurazione: WRD + WBM

### Descrizione:

Questa configurazione viene utilizzata in un impianto dove si vuole monitorare il flusso energetico di batteria (Fig.A1). Il battery monitor WBM va connesso sul morsetto negativo di batteria e provvede alla contabilizzazione dell'energia in ingresso e in uscita della stessa. (vedi specifico manuale di prodotto per maggiori dettagli).

Il WRD permette di configurare il WBM nel menu Setup 7.0 o 8.1:

- Selezionare il profilo corretto in funzione della tipologia di batteria.
- Selezionare correttamente la capacità di batteria (Ah), in maniera che il WBM possa calcolare correttamente lo State of Charge (%) di Batteria.
- Impostare le soglie per i due contatti comandati in funzione dello State of Charge (%) di Batteria.

Si può sfruttare il contatto 'Discharge' per comandare un dispositivo capace di disabilitare il carico, determinando così la massima profondità di scarica entro cui ciclerà la batteria. Questo contatto interviene anche in caso di protezioni: overcurrent, overtemperature e undervoltage.

Con il contatto 'Charge', normalmente, si comanda un dispositivo capace di disabilitare la carica in quanto esso interviene in caso di protezioni: overcurrent, overtemperature e overvoltage.

Impostando le soglie per il contatto 'Charge' lo si può comandare anche in funzione dello SoC nel caso alcune applicazioni lo richiedano.

### Videate Principali:

Nelle figure seguenti viene descritta la grafica usata nelle varie videate dei menu principali. Applicare le note rappresentate nelle figure.

#### NOTE:

<sup>1</sup> - non presente in Configurazione WRD + WBM;

<sup>2</sup> - non presente in Configurazione WRD + WRMxx;

<sup>3</sup> - compare l'icona Lampada in Configurazione WRD + WRMxx;

## Configurazione: WRD + WRM30<sub>(1..8)</sub>

### Descrizione:

Questa configurazione viene utilizzata in un impianto stand-alone dove si vuole monitorare principalmente la produzione di energia (Fig.A2).

I regolatori WRM30, parallelabili fino a un massimo di 8 , provvedono a eseguire la carica della batteria. (vedi specifico manuale di prodotto per maggiori dettagli).

Il WRD permette di configurare in maniera collettiva i parametri più comuni di tutti i WRM30 nel menu Setup 7.0, mentre lo effettua singolarmente nel menu Setup 8.2.:

- Selezionare il profilo corretto in funzione della tipologia di batteria.
- Selezionare adeguatamente la programmazione dell'uscita Load
- Impostare la soglia di Low Battery per l'uscita Load.
- Impostare il tempo di passaggio alla fase Float.

Si può sfruttare l'uscita Load con programmazione 'SurPlus' per comandare o alimentare direttamente un carico quando la batteria è carica e c'è ancora energia dai moduli PV per cui abbiamo un esubero di energia che in questa maniera può essere risfruttato.

### Videate Principali:

Nelle figure seguenti viene descritta la grafica usata nelle varie videate dei menu principali. Applicare le note rappresentate nelle figure.

#### NOTE:

<sup>1</sup> - non presente in Configurazione WRD + WBM;

<sup>2</sup> - non presente in Configurazione WRD + WRMxx;

<sup>3</sup> - compare l'icona Lampada in Configurazione WRD + WRMxx;

## Configurazione: WRD + WBM + WRM30<sub>(1..8)</sub>

### Descrizione:

Questa configurazione viene utilizzata in un impianto stand-alone dove si vogliono monitorare le grandezze di produzione, consumo e accumulo (Fig.A3).

Il battery monitor WBM va connesso sul morsetto negativo di batteria e provvede alla contabilizzazione dell'energia in ingresso e in uscita della stessa. (vedi specifico manuale di prodotto per maggiori dettagli).

Il WRD permette di configurare il WBM nel menu Setup 7.0 o 8.1:

- Selezionare il profilo corretto in funzione della tipologia di batteria.
- Selezionare correttamente la capacità di batteria (Ah), in maniera che il WBM possa calcolare correttamente lo State of Charge (%) di Batteria.
- Impostare le soglie per i due contatti comandati in funzione dello State of Charge (%) di Batteria.

Si può sfruttare il contatto 'Discharge' per comandare un dispositivo capace di disabilitare il carico, determinando così la massima profondità di scarica entro cui ciclerà la batteria. Questo contatto interviene anche in caso di protezioni: overcurrent, overtemperature e undervoltage.

Con il contatto 'Charge', normalmente, si comanda un dispositivo capace di disabilitare la carica in quanto esso interviene in caso di protezioni: overcurrent, overtemperature e overvoltage. Impostando le soglie per il contatto 'Charge' lo si può comandare anche in funzione dello SoC nel caso alcune applicazioni lo richiedano.

Considerato che la carica eseguita dai WRM30 è già controllata attraverso il WBUS, in questa configurazione non è necessario sfruttare il contatto 'Charge'.

I regolatori WRM30, parallelabili fino a un massimo di 8 , provvedono a eseguire la carica della batteria. (vedi specifico manuale di prodotto per maggiori dettagli).

Il WRD permette di configurare in maniera collettiva i parametri più comuni di tutti i WRM30 nel menu Setup 7.0, mentre lo effettua singolarmente nel menu Setup 8.2.:

- Selezionare adeguatamente la programmazione dell'uscita Load
- Impostare la soglia di Low Battery per l'uscita Load.
- Impostare il tempo di passaggio alla fase Float.

Si può sfruttare l'uscita Load con programmazione 'SurPlus' per comandare o alimentare direttamente un carico quando la batteria è carica e c'è ancora energia dai moduli PV per cui abbiamo un esubero di energia che in questa maniera può essere risfruttato.

### Videate Principali:

Nelle figure seguenti viene descritta la grafica usata nelle varie videate dei menu principali. Applicare le note rappresentate nelle figure.

#### NOTE:

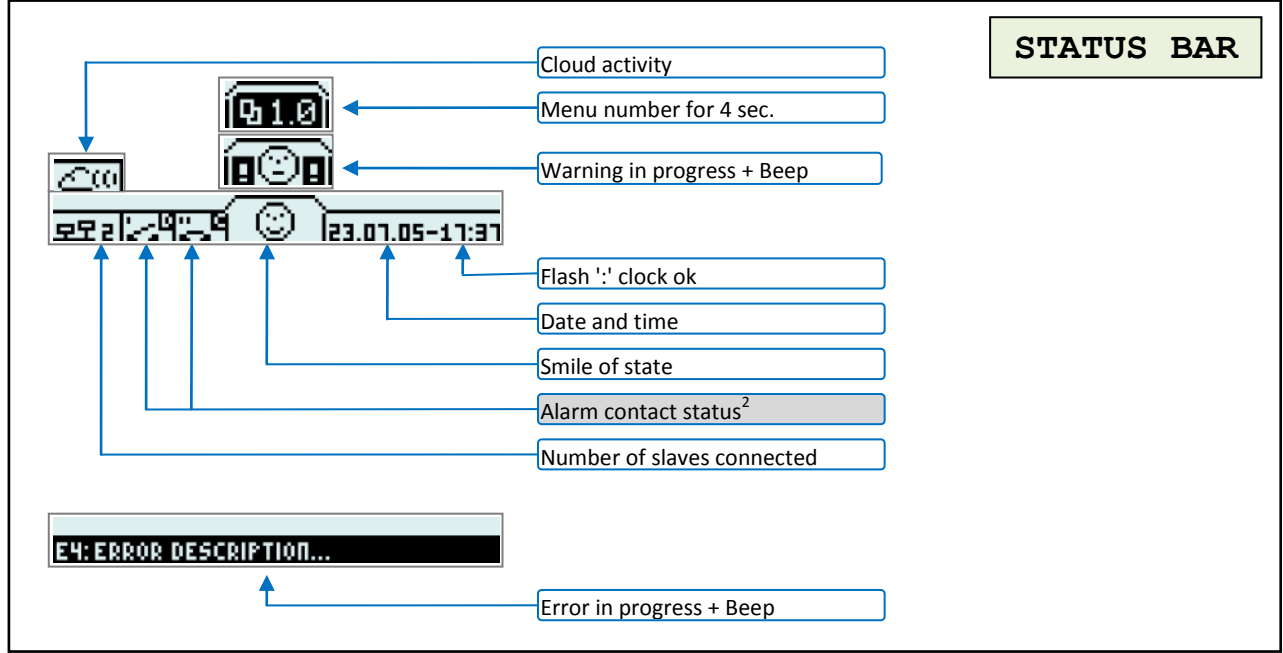
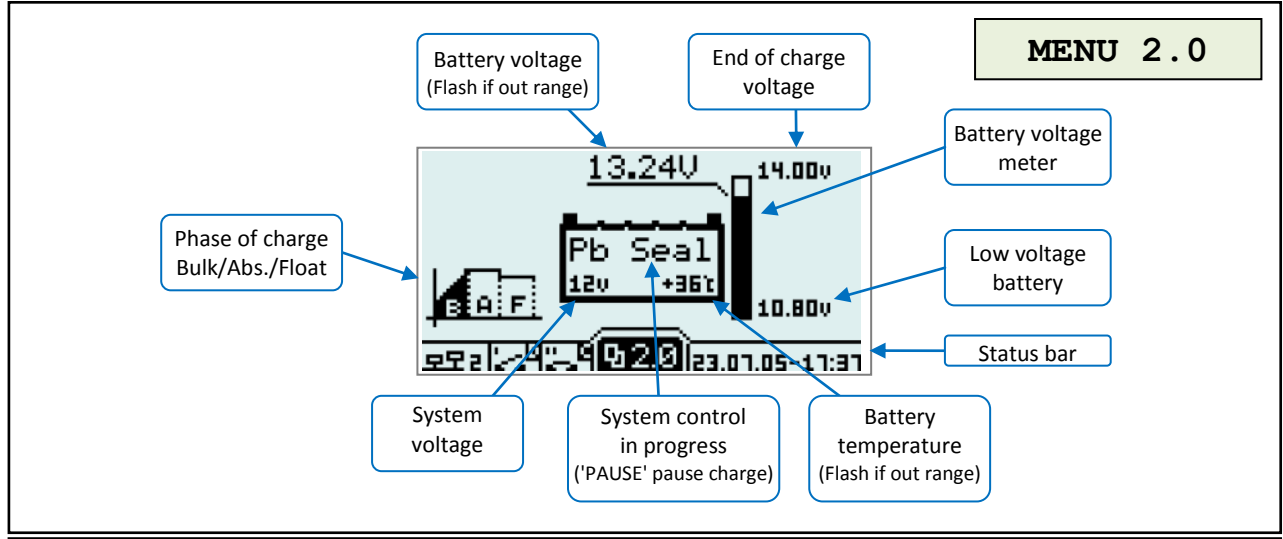
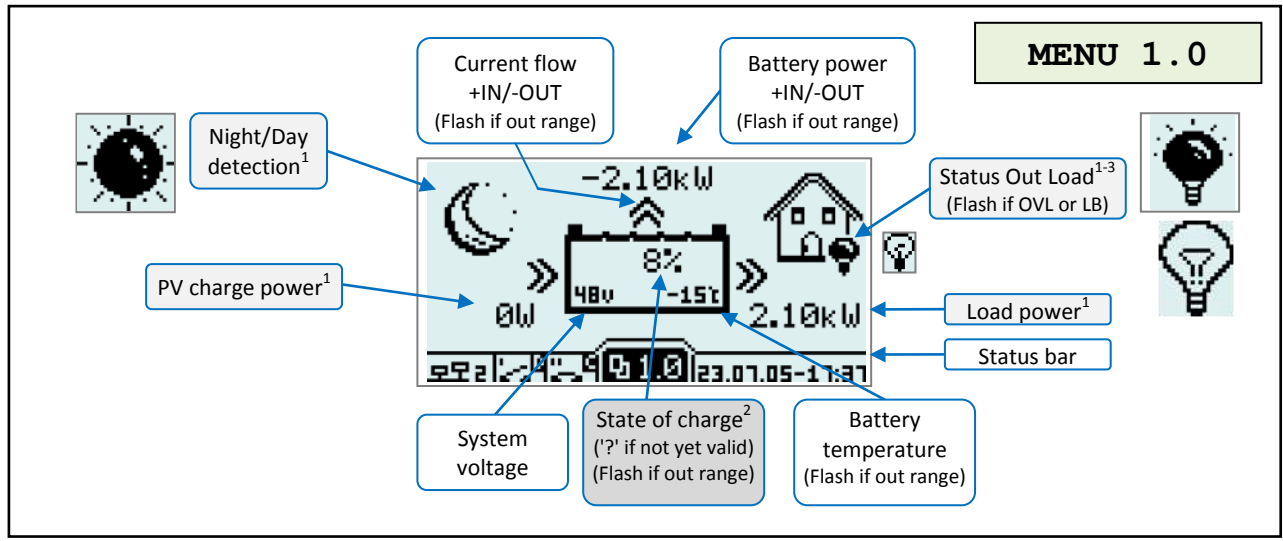
<sup>1</sup> - non presente in Configurazione WRD + WBM;

<sup>2</sup> - non presente in Configurazione WRD + WRMxx;

<sup>3</sup> - compare l'icona Lampada in Configurazione WRD + WRMxx;

**Videate Principali:**

Configurazione con WRD + WBM + WRM30<sup>(1..8)</sup>



Configurazione con WRD + WBM + WRM30(1..8)

**MENU 3.0**

The screenshot shows a menu with four rows of data. The first row is for PV variables (V, A, W), the second for battery variables (V, A, W), and the third for load variables (V, A, W). The bottom row shows the menu number (3.0), the title 'VARIABLES', and a percentage indicator (1.2%).

☀	V	A	W
🔋	V	A	W
🏠	V	A	W
3.0	VARIABLES		1.2%

Annotations:

- Battery voltage (Flash if out range)
- PV charge current<sup>1</sup>
- PV charge power<sup>1</sup>
- Photovoltaic variables
- Battery variables
- Load variables<sup>3</sup>
- n.Menu / Warning
- Battery power IN/OUT (Flash if out range)
- Load power<sup>1</sup>
- Battery current IN/OUT (Flash if out range)
- Load current<sup>1</sup>

**MENU 4.0**

The screenshot shows a menu for selecting PV input strings. It displays 'select PV input: 03' and a table with columns for PV string voltage (V<sub>PV</sub>), current (A<sub>PV</sub>), and power (W<sub>PV</sub>). The bottom row shows the menu number (4.0), the title 'PV STRINGS', and a percentage indicator (1.2%).

select PV input: 03			
Ti+36°C	V <sub>PV</sub>	A <sub>PV</sub>	W <sub>PV</sub>
☀	99.99	99.99	999
☀	999.9	999.9	9.99k
4.0	PV STRINGS		1.2%

Annotations:

- internal temperature
- PV input hardware (Flash if over Temp.)
- PV "A" string
- PV "B" string
- n.Menu / Warning
- PV input displayed
- PV string voltage<sup>1</sup>
- PV string current<sup>1</sup>
- PV string power<sup>1</sup>

**MENU 5.0**

The screenshot shows a menu for energy counters. It displays 'kWh' and 'Start' columns. The bottom row shows the menu number (5.0), the title 'ENERGIES', and a percentage indicator (1.2%).

☀	kWh	Start
🔋	999.999	23/07/05
🏠	9999.99	23/07/05
🏠	99999.9	
5.0	ENERGIES	

Annotations:

- Stored energy counter from Reset
- Energy battery deficit (+-) from Reset
- Supplied energy counter from Reset<sup>3</sup>
- n.Menu / Warning
- Date of Reset WRM counters<sup>1</sup>
- Date of Reset WBM counters<sup>2</sup>

**MENU 6.0**

The screenshot shows a menu for event logs. It displays 'List of: Warnings' and a list of events with columns for event type, code, and date/time. The bottom row shows the menu number (6.0), the title 'LOG. EVENTS', and a percentage indicator (1.2%).

☐ All Events ☐		
☐ Error ☐		
☐ Info ☐		
List of: ☐ Warnings ☐		
M.01-W-Cod.123-30/06/15-23:59.07		
M.02-i-Cod.123-30/06/15-23:59.07		
M.03-E-Cod.123-30/06/15-23:59.07		
M.04-W-Cod.123-30/06/15-23:59.07		
6.0	LOG. EVENTS	

Annotations:

- Progressive number event (1..32)
- Oldest event occurring
- Latest event occurring
- n.Menu / Warning
- Event list filter
- Event type
- Event code
- Date and time event

**Menu di Setup:**

Configurazione con WRD + WBM + WRM30<sup>(1..8)</sup>

List displayed:	Value:	Settable value and descriptions:
<b>MENU 7.0</b>		
<b>Settings:</b>		
Batt.Type: <b>Pb Seal/</b>		<b>WBM SB:</b> Pb Flood 14.80@25°C / 29.60@25°C / 59.20@25°C : Setting to operate with Pb Flood type battery. Pb Seal/Gel 14.40@25°C / 28.80@25°C / 57.60@25°C : Setting to operate with Pb Seal or Gel type battery. LiFePO4 <14.00..14.70V> <28.00..29.40V> <56.00..58.80V> fixed : Setting to operate with Lithium type battery with integrated BMS.
B.Capacity: <b>200Ah</b>		<10..2000Ah> battery bank capacity, to compute SoC. <sup>2</sup>
OFF disch.#1: ↓ <b>25%</b>		<0%..ON disch> below this threshold, the ALARM output 1 is activated. Discharge OFF. <sup>2</sup>
ON disch.#1: ↑ <b>40%</b>		<OFF disch..100%> above this threshold, the ALARM output 1 is deactivated. Discharge ON. <sup>2</sup>
OFF charge#2: ↑ <b>100%</b>		<ON charge..100%> above this threshold, the ALARM output 2 is activated. Charge OFF. <sup>2</sup>
ON charge#2: ↓ <b>90%</b>		<0%..ON charge> below this threshold, the ALARM output 2 is deactivated. Charge ON. <sup>2</sup>
Prog.Load: <b>OnSurplus</b>		24h/24h : LOAD output always active. <sup>1</sup> <1..16h> : LOAD output active from sunset for the set hours. <sup>1</sup> Only Night: LOAD output active only during the night. <sup>1</sup> Only Day : LOAD output active only during the day. <sup>1</sup> OnSurPlus : LOAD output active only during an energy surplus. <sup>1</sup>
LowB.Load: <b>11.12V</b>		<10,8..12,56V> below this threshold, the LOAD output is activated. <sup>1</sup>
<div style="border: 1px solid black; padding: 2px; display: flex; justify-content: space-between;"> <span>7.0</span> <span>SYSTEM</span> <span>◀ ▶</span> </div>		

Configurazione con WRD + WBM + WRM30<sub>(1..8)</sub>

MENU 7.1

List displayed:	Value:	Settable value and descriptions:
<pre>Set Date Time: dd/mm/yy: 31/12/18   hh:mm:ss: 12:59.00   TimeZone: UTC +1</pre>	<pre>31/12/18 12:59.00 UTC +1</pre>	<pre>&lt;1..31&gt;/&lt;1..12&gt;/&lt;00..99&gt; days/months/years &lt;0..23&gt;:&lt;0..59&gt; hours:minutes.seconds &lt;-12..+13&gt; site timezone</pre>
<pre>7.1 DATE / TIME</pre>		

MENU 7.2

List displayed:	Value:	Settable value and descriptions:
<pre>Info &amp; Setting: sample Time: 10min   Info: --&gt; NOT PRESENT   Info: uSD CARD File SYS: FAT32 free space: 3772MB   Info: Find WRD*.* WRDEVENT.LOG 27kB 01/02/12 01:23:45   WRDATA2.LOG 27kB 01/02/12 01:23:45   END LIST Info: SAMPLE EVENT 00:30</pre>	<pre>10min --&gt; uSD CARD WRDEVENT.LOG 27kB WRDATA2.LOG 27kB SAMPLE EVENT 00:30</pre>	<pre>OFF : Data logger disabled (uSD CARD ejectable) &lt;1..30min&gt; logger sampling time.  Logger information:  --&gt; : select the type of information to show. If there is no card show "NOT PRESENT", and no information is available.  uSD CARD : read the type of file system (NONE, FAT12/16/32) and calculates the free space on the card.  FIND WRD*.* : read and list the files one at a time by showing the name, size, and date of the last update. At the end shows "END LIST".  SAMPLE EVENT : show the remaining time for the next sampling</pre>
<pre>7.2 DATA LOGGER</pre>		

Configurazione con WRD + WBM + WRM30<sub>(1..8)</sub>

**MENU 7.3**

List displayed:	Value:	Settable value and descriptions:																																																						
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;">Item:</th> <th style="text-align: left; border-bottom: 1px solid black;">Value:</th> </tr> </thead> <tbody> <tr> <td>CONNECTION</td> <td>: OFF</td> </tr> <tr> <td style="text-align: center;"> </td> <td></td> </tr> <tr> <td>1-IP Address</td> <td>: 192</td> </tr> <tr> <td>2-IP Address</td> <td>: 168</td> </tr> <tr> <td>3-IP Address</td> <td>: 100</td> </tr> <tr> <td>4-IP Address</td> <td>: DHCP</td> </tr> <tr> <td style="text-align: center;"> </td> <td></td> </tr> <tr> <td>1-subNetMask</td> <td>: 255</td> </tr> <tr> <td>2-subNetMask</td> <td>: 255</td> </tr> <tr> <td>3-subNetMask</td> <td>: 255</td> </tr> <tr> <td>4-subNetMask</td> <td>: 000</td> </tr> <tr> <td style="text-align: center;"> </td> <td></td> </tr> <tr> <td>1-Gateway</td> <td>: 255</td> </tr> <tr> <td>2-Gateway</td> <td>: 255</td> </tr> <tr> <td>3-Gateway</td> <td>: 255</td> </tr> <tr> <td>4-Gateway</td> <td>: 255</td> </tr> <tr> <td style="text-align: center;"> </td> <td></td> </tr> <tr> <td>1-prim.DNS</td> <td>: 008</td> </tr> <tr> <td>2-prim.DNS</td> <td>: 008</td> </tr> <tr> <td>3-prim.DNS</td> <td>: 008</td> </tr> <tr> <td>4-prim.DNS</td> <td>: 008</td> </tr> <tr> <td style="text-align: center;"> </td> <td></td> </tr> <tr> <td>1-secon.DNS</td> <td>: 255</td> </tr> <tr> <td>2-secon.DNS</td> <td>: 255</td> </tr> <tr> <td>3-secon.DNS</td> <td>: 255</td> </tr> <tr> <td>4-secon.DNS</td> <td>: 255</td> </tr> </tbody> </table>	Item:	Value:	CONNECTION	: OFF			1-IP Address	: 192	2-IP Address	: 168	3-IP Address	: 100	4-IP Address	: DHCP			1-subNetMask	: 255	2-subNetMask	: 255	3-subNetMask	: 255	4-subNetMask	: 000			1-Gateway	: 255	2-Gateway	: 255	3-Gateway	: 255	4-Gateway	: 255			1-prim.DNS	: 008	2-prim.DNS	: 008	3-prim.DNS	: 008	4-prim.DNS	: 008			1-secon.DNS	: 255	2-secon.DNS	: 255	3-secon.DNS	: 255	4-secon.DNS	: 255		<p>OFF; ON : Disable/Enable cloud connection to transfer data to the server.</p>
Item:	Value:																																																							
CONNECTION	: OFF																																																							
1-IP Address	: 192																																																							
2-IP Address	: 168																																																							
3-IP Address	: 100																																																							
4-IP Address	: DHCP																																																							
1-subNetMask	: 255																																																							
2-subNetMask	: 255																																																							
3-subNetMask	: 255																																																							
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3-secon.DNS	: 255																																																							
4-secon.DNS	: 255																																																							
		<p>&lt;0..255&gt; : set the device IP Address.            &lt;0..255&gt; : "            &lt;0..255&gt; : "            &lt;1..255&gt; : "            DHCP : set the Network Setup automatically (the other values will be ignored).</p>																																																						
		<p>&lt;0..255&gt; : set the subnet mask.            &lt;0..255&gt; : "            &lt;0..255&gt; : "            &lt;0..255&gt; : "</p>																																																						
		<p>&lt;0..255&gt; : set the Gateway IP Address.            &lt;0..255&gt; : "            &lt;0..255&gt; : "            &lt;0..255&gt; : "</p>																																																						
		<p>&lt;0..255&gt; : set the primary DNS IP Address.            &lt;0..255&gt; : "            &lt;0..255&gt; : "            &lt;0..255&gt; : "</p>																																																						
		<p>&lt;0..255&gt; : set the secondary DNS IP Address.            &lt;0..255&gt; : "            &lt;0..255&gt; : "            &lt;0..255&gt; : "</p>																																																						

73
NETWORK
🔧



Configurazione con WRD + WBM + WRM30<sub>(1..8)</sub>

List	Value:	Settable value and descriptions:
<b>MENU 7.4</b>		
<b>Network param. :</b>		
status: OFF-LINE		OFF-LINE; ON-LINE : current status of cloud connection.
IP : 192.168.100.067		current device IP Address.
sNM: 255.255.255.000		current subnet mask.
Gwy: 255.255.255.255		current Gateway IP Address.
DNS: 255.255.255.255		current primary DNS IP Address.
dns: 255.255.255.255		current secondary DNS IP Address.
MAC: D880394F5632		device MAC Address.
KEY:0123456789ABCDEF		device KEY code.
<b>Device: rev.Fw:</b>		
WRD : 1.0		firmware revision of the WRD device.
WBM : 1.0		firmware revision of the WBM device.
WRMxx n.1: 1.0		firmware revision of the WRMxx devices, from 1^ to 8^. (0.0 if device is not present)
WRMxx n.2: 1.0		
WRMxx n.3: 0.0		
WRMxx n.4: 0.0		
WRMxx n.5: 0.0		
WRMxx n.6: 0.0		
WRMxx n.7: 0.0		
WRMxx n.8: 0.0		
7.4 SYSTEM INFO		

List displayed:	Value:	Settable value and descriptions:
<b>MENU 7.5</b>		
<b>Items :</b>		
En.EvBeep: ON		OFF; ON : Disable/Enable sound alert.
PAUSE Charge: OFF		OFF; ON : Pause the PV charge.
Advanced Setup: -->		--> : Access to advanced setup menu 8.X.
7.5 VARIOUS		

Configurazione con WRD + WBM + WRM30<sub>(1..8)</sub>

**MENU 8.0**

<i>List displayed:</i>	<i>Value:</i>	<i>Settable value and descriptions:</i>
<b>Device: Address:</b> <b>AutoConf: ---</b>   <b>WBMonitor : 33</b> <b>WRMxx n.1: 01</b> <b>WRMxx n.2: 02</b> <b>WRMxx n.3: 00</b> <b>WRMxx n.4: 00</b> <b>WRMxx n.5: 00</b> <b>WRMxx n.6: 00</b> <b>WRMxx n.7: 00</b> <b>WRMxx n.8: 00</b>		
		<b>RUN</b> : starts the procedure to automatically identify the connected devices.
		<b>00; 33</b> : WBUS Address of the WBM device.
		<b>&lt;0..32&gt;</b> : WBUS Address of the WRMxx devices, from 1^ to 8^. (00 if device is not present)

8.0 WBUS CONFIG. ⏪

Configurazione con WRD + WBM + WRM30<sub>(1..8)</sub>

List displayed:	Value:	Settable value and descriptions:
<b>MENU 8.1</b>		
<b>WBM SETUP:</b>		
Batt.Type: <b>Pb Seal/</b>		<b>WBM SB:</b> <b>Pb Flood</b> 14.80@25°C / 29.60@25°C / 59.20@25°C : Setting to operate with Pb Flood type battery. <sup>2</sup> <b>Pb Seal/Gel</b> 14.40@25°C/ 28.80@25°C / 57.60@25°C : Setting to operate with Pb Seal or Gel type battery. <sup>2</sup> <b>LiFePO4</b> <14.00..14.70V> <28.00..29.40V> <56.00..58.80V> <b>fixed</b> : Setting to operate with Lithium type battery with BMS integrated. <sup>2</sup>
B.Capacity: <b>200Ah</b>		<10..2000Ah> battery bank capacity, to compute SoC. <sup>2</sup>
OFF disch.#1: ↓ <b>25%</b>		<0%..ON disch> below this threshold, the ALARM output 1 is activated. Discharge OFF. <sup>2</sup>
ON disch.#1: ↑ <b>40%</b>		<OFF disch..100%> above this threshold, the ALARM output 1 is deactivated. Discharge ON. <sup>2</sup>
OFF charge#2: ↑ <b>100%</b>		<ON charge..100%> above this threshold, the ALARM output 2 is activated. Charge OFF. <sup>2</sup>
ON charge#2: ↓ <b>90%</b>		<0%..ON charge> below this threshold, the ALARM output 2 is deactivated. Charge ON. <sup>2</sup>
UPDATE FW: <b>---</b>		<b>RUN</b> : *CAUTION* starts the procedure to update the firmware in the WBM device. The firmware update file must be present in the uSD card. <sup>2</sup>
<div style="border: 1px solid black; padding: 2px; display: flex; justify-content: space-between;"> <span>8.1</span> <span>WBM</span> <span>◀ ▶</span> </div>		

Configurazione con WRD + WBM + WRM30<sup>(1..8)</sup>

List displayed:	Value:	Settable value and descriptions:
<b>MENU 8.2</b>		
WRM30 n.1 SETUP:		<1..8> select the WRM30 to edit. <sup>1</sup>
VEoCharge: 14.40V		Set the battery charge voltage: <b>Pb Flood</b> 14.80@25°C / 29.60@25°C / 59.20@25°C : Setting to operate with Pb Flood type battery. <sup>1</sup> <b>Pb Seal/Gel</b> 14.40@25°C / 28.80@25°C / 57.60@25°C : Setting to operate with Pb Seal or Gel type battery. <sup>1</sup> <b>LiFePO4</b> <14.00..14.70V> <28.00..29.40V> <56.00..58.80V> <b>fixed</b> : Setting to operate with Lithium type battery with integrated BMS. <sup>1</sup>
VLowBatte: 12.56V		<12,00..12,56V> / <24,00..25,12V> / <48,00..50,24V> : below this threshold, the WRM30 goes into Low Battery status and deactivates the LOAD. <sup>1</sup>
VEndLBatt: auto		<b>auto</b> (VEoC-0,2/0,4/0,8V); <12,72..13,68V> / <25,44..27,36V> / <50,88..54,72V> : above this threshold, the WRM30 goes out Low Battery status and reactivates the LOAD. <sup>1</sup>
Prog. Load: 16hour		<b>24h/24h</b> : LOAD always active. <sup>1</sup> <1..16h> : LOAD active from sunset for the set hours. <sup>1</sup> <b>Only Night</b> : LOAD active only during the night. <sup>1</sup> <b>Only Day</b> : LOAD active only during the day. <sup>1</sup> <b>OnSurPlus</b> : LOAD active only during an energy surplus. <sup>1</sup>
VnightThd: 2.00V		2,00V; 3,28V; 4,56V; 5,84V : below this threshold, the WRM30 detect the sunset. <sup>1</sup>
MPPT algo: auto		<b>auto</b> ; <b>parall.</b> ; <b>indep.</b> : mode in which the MPPT algorithm considers the two channels. <sup>1</sup>
HrToFloat: 1hour		<1..8h> : time in Absorption phase before moving to Float phase. <sup>1</sup>
UPDATE FW: ---		<b>RUN</b> : *CAUTION* starts the procedure to update the firmware in the WBM device. The firmware update file must be present in the USD card. <sup>1</sup>
<div style="border: 1px solid black; padding: 2px; display: flex; justify-content: space-between;"> <span>98.2</span> <span>WRM30</span> <span>0-0</span> </div>		

Configurazione con WRD + WBM + WRM30<sup>(1..8)</sup>

List displayed:	Value:	Settable value and descriptions:	MENU 8.3
WRD SETUP:			
Oper. Mode:	MONITOR	MONITOR; CONTROLLER : Operating Mode: Monitor/Controller	
Backlight:	auto OFF	auto OFF; always ON : Backlight LCD: Auto power-OFF/ always ON	
RESET:	RUN	RUN : Reset the WRD device.	
UPDATE FW:	RUN	RUN : *CAUTION* starts the procedure to update the firmware in the WRD device. The firmware update file must be present in the uSD card. To start the procedure press both ↑ and ↓ keys.	
Tech. Menu Psw:	00	<0..FF> password to access the Technical Menu. *CAUTION* Technical Menu is reserved for factory checks.	
8.3 WRD			

NOTE:

- <sup>1</sup> - non presente in Configurazione WRD + WBM;
- <sup>2</sup> - non presente in Configurazione WRD + WRMxx;
- <sup>3</sup> - compare l'icona Lampada in Configurazione WRD + WRMxx;

# ***APPENDICE***

## ***Schemi***

### ***di***

# ***collegamento***

CONFIGURATION WITH WRD + WBM 12/24/48V

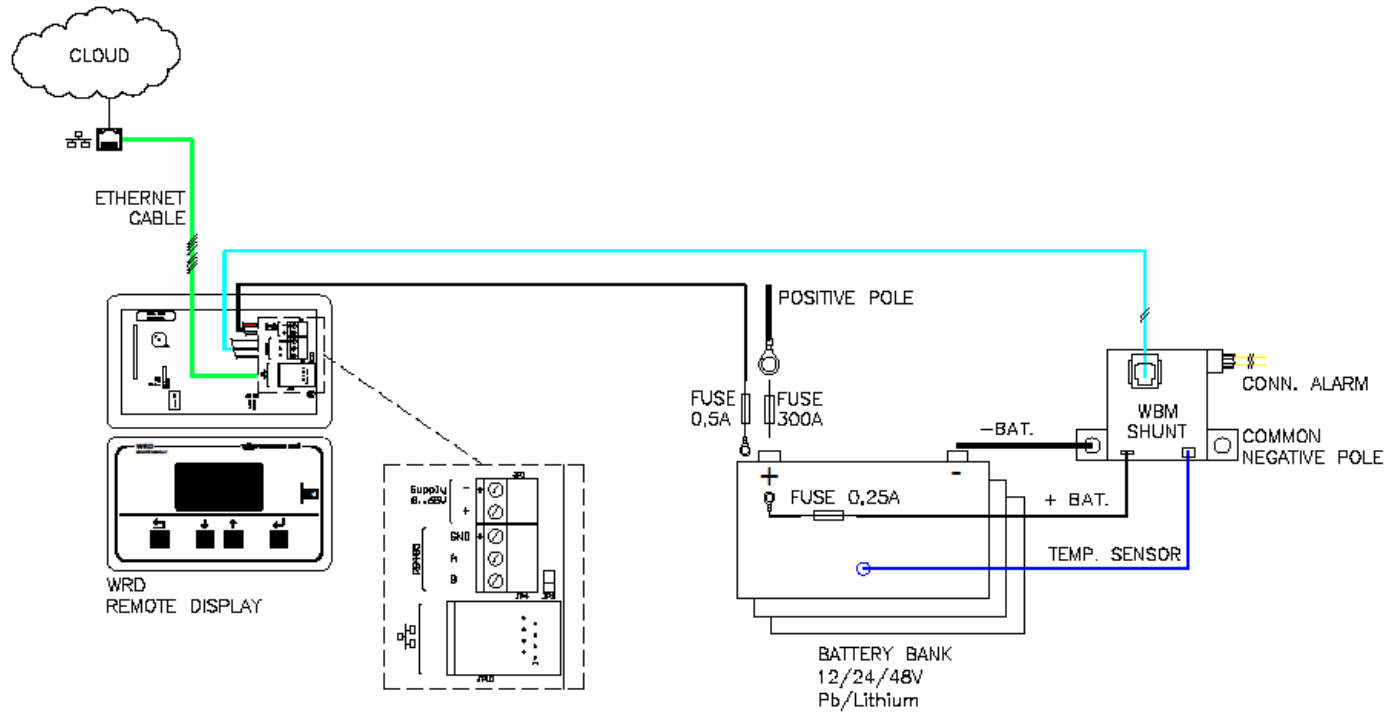


Figura A1

MACCHINA/PIANTO : WRD+WBM 12/24/48V	DISINE :	FOLIO :
---	CONITENTE :	01
DEVIOMINAZIONE : Schema Unifilare	ESECUTORE :	---
DATA : 03/2018	ADR. :	---

CONFIGURATION WITH WRD + WRM30 12/24/48V

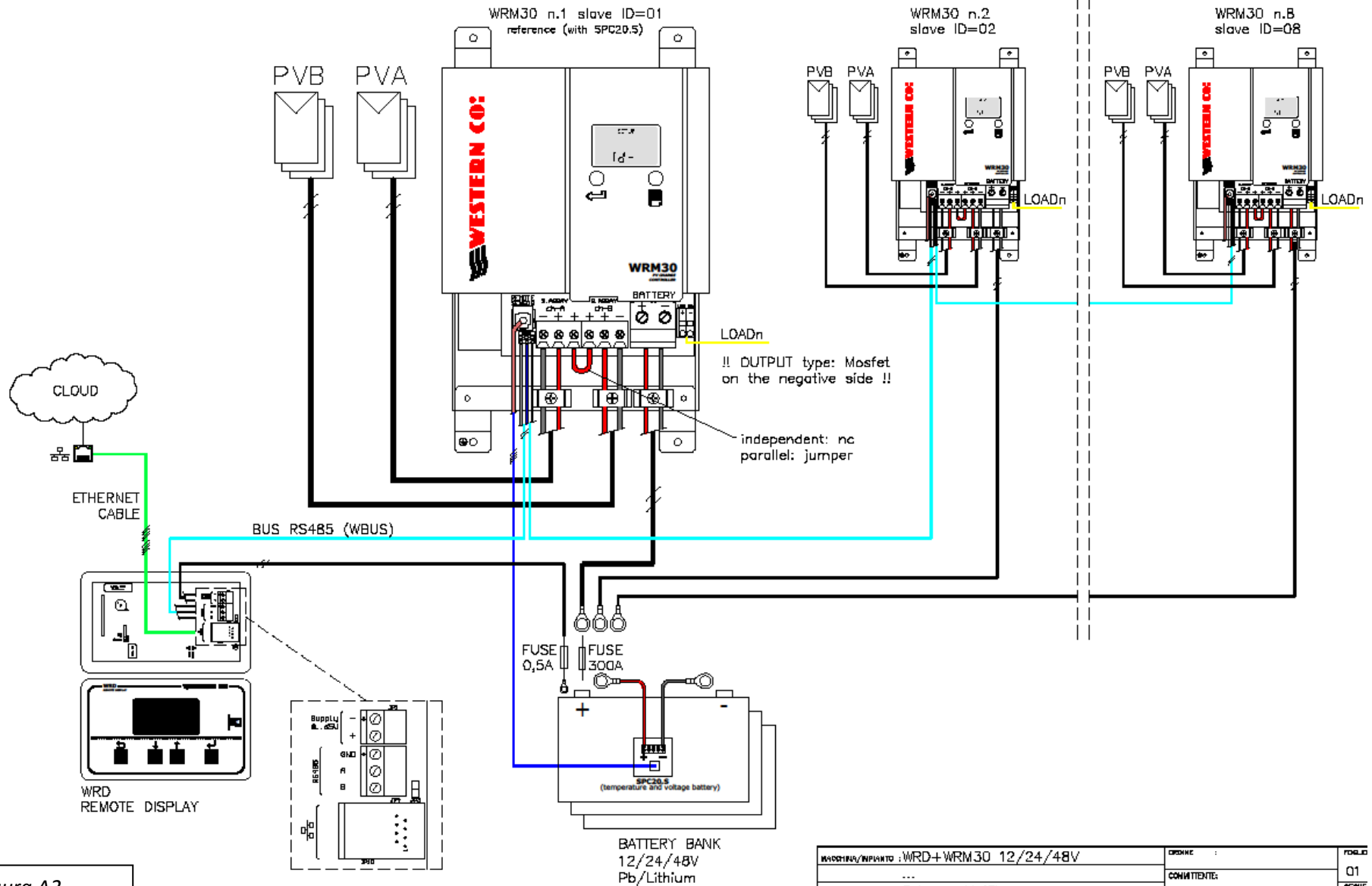


Figura A2

MATERIA/INPIANTO : WRD+WRM30 12/24/48V	ORDINE :	FOLIO
---	CONMITTENTE :	01
DD/OMINAZIONE : Schema Unifilare	ESECUTORE :	---
DATA : 03/2018	ADR. :	



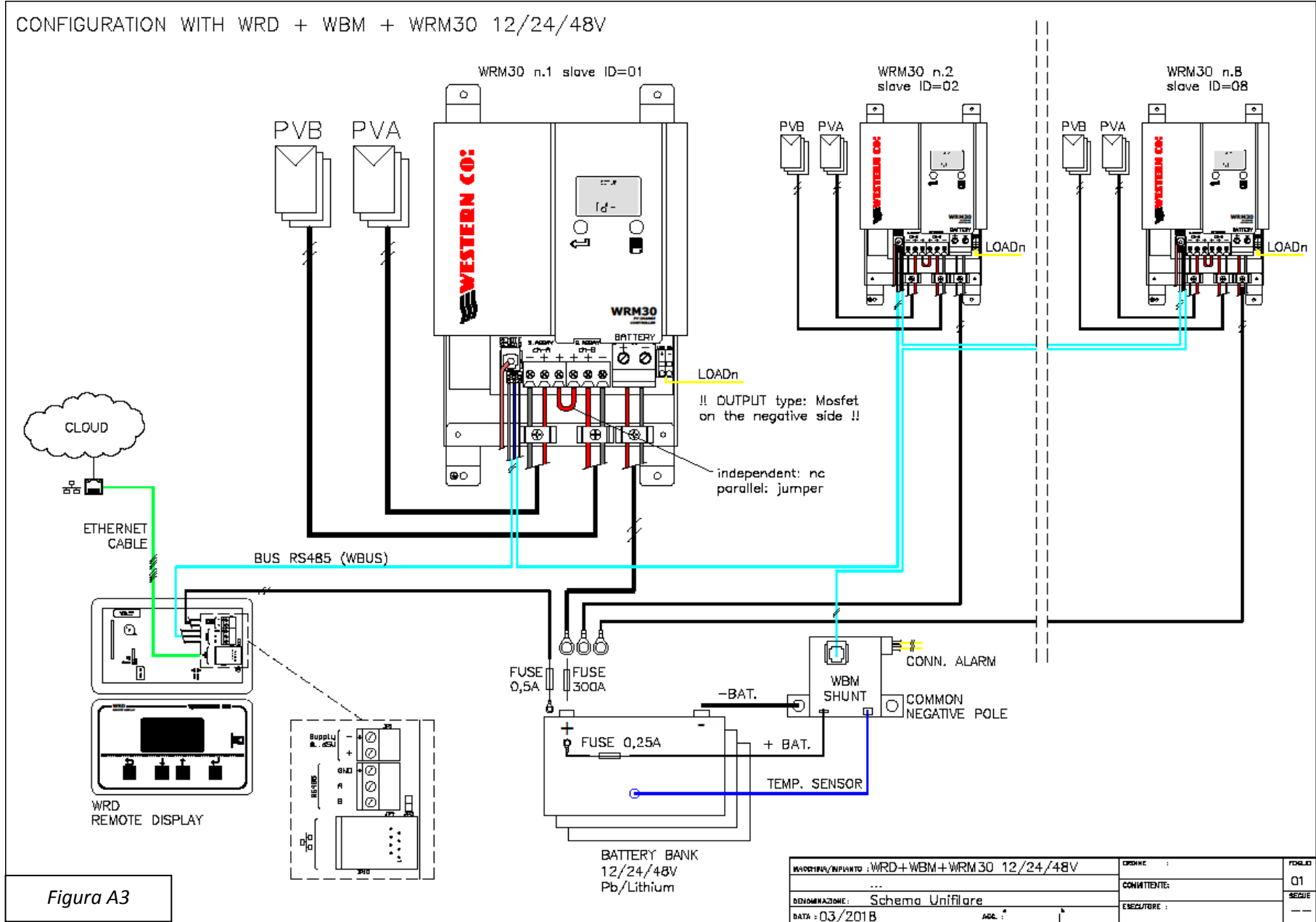


Figura A3

## REMOTE DISPLAY FOR WESTERN WRD SYSTEM

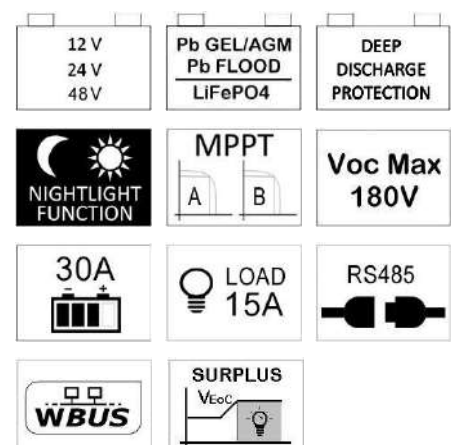
Models	Description
WRD	IoT Remote Display and Datalogger 12/24/48V



WRD is a display and controller device that together with the proprietary bus **WBUS** is part of the **WESTERN WRD SYSTEM**, a complete and intelligent system for the production and storage of photovoltaic energy in stand-alone systems.

The **WESTERN WRD SYSTEM** is a flexible and advanced stand-alone system with intelligent functions, recording of historical functioning data with remote control from the Internet (cloud). Up to 8 MPPT controllers *WRM30+* can be parallelized with adjustable charging power up to 14kW and monitor the battery bank energy through the battery monitor *WBM*. *WRD* is suitable for 12/24/48V systems with lead or lithium batteries. The system is modular as *WRM30+* controllers can be paralleled to increase the photovoltaic power. *WRD* has a proprietary control bus named **WBUS** to communicate with the various compatible devices, able to access all the parameters both for the display and for the management of the control functions. The simple user interface, with 128x64 display and 4 buttons, allows an immediate visualization of all the parameters: powers, voltages, charge and PV string currents, energy meters, data logger and events. From *WRD* all Setup settings can be made for each single *WRM30+* controller connected and/or *WBM* battery monitor. Through *WBM* is possible to manage contacts related to the charge state of the battery for the intelligent activation of the loads. The logger data is stored in the removable  $\mu$ SD on the front panel. Through the Ethernet connection it is possible to connect to the internet cloud so that both the data of the logger and all the other functions become remotely and accessible with the portal *WRD SERVER*.

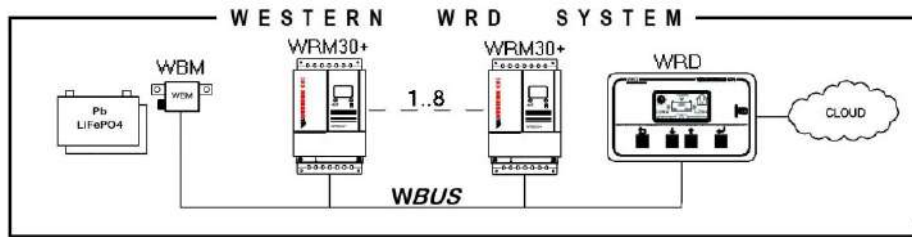
- Power supply 12V, 24V and 48V
- Backlighted LCD 128x64
- Menu navigation with 4 buttons
- Internal clock
- Data logger on extractable  $\mu$ SD
- Master for WESTERN WRD SYSTEM
- WBUS Interface
- Internet connection (cloud)
- RJ45 Ethernet
- Anti-reverse protection
- Installation from panel or with frame
- IP20 Metallic box



### APPLICATIONS



## General Description:



Pic.1 WESTERN WRD SYSTEM

In **WESTERN WRD SYSTEM**, WRD is the coordinator and can work in two modes: Viewer or Controller.

### Viewer:

By setting in the setup menu **8.3 WRD -> Oper.Mode: 'MONITOR'**: you get the View mode.

In this mode, the WRD does not control the charging and discharging of the system, but takes care only of displaying the parameters of the connected devices, can change the setup settings of the slaves, collects data and remotely displays them in the cloud. The various devices autonomously perform their main functions independently from the WRD.

### Controller:

By setting in the setup menu **8.3 WRD -> Oper.Mode: 'CONTROLLER'**: you get the Controller mode<sup>1</sup>.

In this mode, the WRD adds a control over the devices, dynamically modifying some parameters in order to optimize the energy management of the entire system and ensure compliance with the battery parameters.

The functioning mode of the WRD in menu 2.0 can be recognized from the indication in the battery graphics (*\$ Main screens*).

## Connections and installation

In the appendix (*Pic. A1, A2, A3*) the system connections are shown for the various possible configurations.

For its functioning the WRD uses the 12/24 / 48V system power supply and the connection **WBUS** which is physically an RS485 bus, while the RJ45 Ethernet connection to the internet cloud is optional.

The **WESTERN WRD SYSTEM** must be configured by setting to each WRM30 controller a unique address: 1 to 32, while the WBM already has a fixed address (33).

### Installation procedure:

- 1) To install the WRD in a dry place, there are two fixing options: panel and with frame (*Pic.4*)
- 2) At the back you can access the electrical connections (*Pic.4*). Both the power connection and that of the **WBUS** are<sup>2</sup> of a removable clamp type easy to wire. Connect the cables correctly, if the power supply comes from the battery, it is recommended that it is under the use of a fuse (0.5A) for cable protection. Finally, if it is used, also connect the Ethernet cable.
- 3) Once all the connections have been made, power up the system. The WRD turns on and starts to function.
- 4) Now run the system configuration settings that will be required.
  - At the menu: **8.0 WBUS CONFIG**. you can use the 'AutoConf.' command for simplicity, or you can make address settings manually.
  - At the menu: **7.1 DATE / TIME** you set the clock and time zone (Timezone).
  - At the menu: **7.0 SYSTEM** you make system settings. **The correct profile must be selected, corresponding to the battery features** (an incorrect choice could lead over time to damage the battery itself).
- 5) Check the entire functioning by scrolling the screens.

<sup>1</sup> It is recognizable if a WRM30 + is controlled remotely (from WRD) if, on the display of the WRM30 +, the battery outline flashes every ~ 3sec.

<sup>2</sup> The WBUS has as physical bus the RS485, for which the two poles A and B must necessarily and correctly be connected, while the GND pole is good to leave it unplugged.

## ***Configuration:***

The **WESTERN WRD SYSTEM** can work with different combinations of devices:

1. WRD + WBM (battery monitoring)
2. WRD + WRM30<sub>(1..8)</sub> (PV production monitoring)
3. WRD + WBM + WRM30<sub>(1..8)</sub> (storage monitoring, production, consumption on stand-alone systems)

Depending on the current hardware, the configuration must be set on the WRD. This operation is performed on the menu: **8.0 WBUS CONFIG.** where the addresses of the devices connected to the **WBUS** must be specified. To facilitate the operation an auto configuration command is available and this one detects the connected hardware.

Depending on the configuration set, the WRD displays the information and can execute its algorithms using the available resources. The screens for each configuration are described below.

## ***System Setup:***

In the menu: **7.0 SYSTEM** the system settings are executed, the list of parameters changes according to the current configuration. Detailed explanations are described in the chapter *Configurations*.

## ***Date Time Setup:***

In the menu: **7.1 DATE / TIME** you set the system clock and the time zone (Timezone). It is important to correctly set this last parameter with the Timezone of the place where the system is located, so that the remote clock can be updated correctly.

## ***Data Logger Setup:***

In the menu: **7.2 DATA LOGGER** you can enable the data logger by setting the minutes for the sampling parameters: 10min. is the default value (enabled). Here you can also request information regarding the  $\mu$ SD.

## ***Network Setup:***

In the menu: **7.3 NETWORK** you make the settings of the various network parameters. The DHCP function is set by default, which automatically retrieves the necessary values. The connection to the remote server can be enabled or disabled by the user.

**Navigation Menu:**

Navigating through the various screens is very simple and intuitive. The WRD has two viewing environments (*Pic.2*): the main environment MAIN, consisting of 6 screens where you monitor the functioning of the system, and the setting environment SETUP, consisting of 6 screens + 4 in ADV. SETUP where the settings for functioning are set. In the environment MAIN only the Up/Down buttons are used to scroll through the screens from 1.0 to 6.0. Pressing the buttons simultaneously Up/Down for 1 sec. you access the SETUP environment. Here, it is always repeated with the same Up/Down buttons, the scrolling of the screens from 7.0 to 7.5. To return to the MAIN environment the used button is Esc pressed for 1 sec.

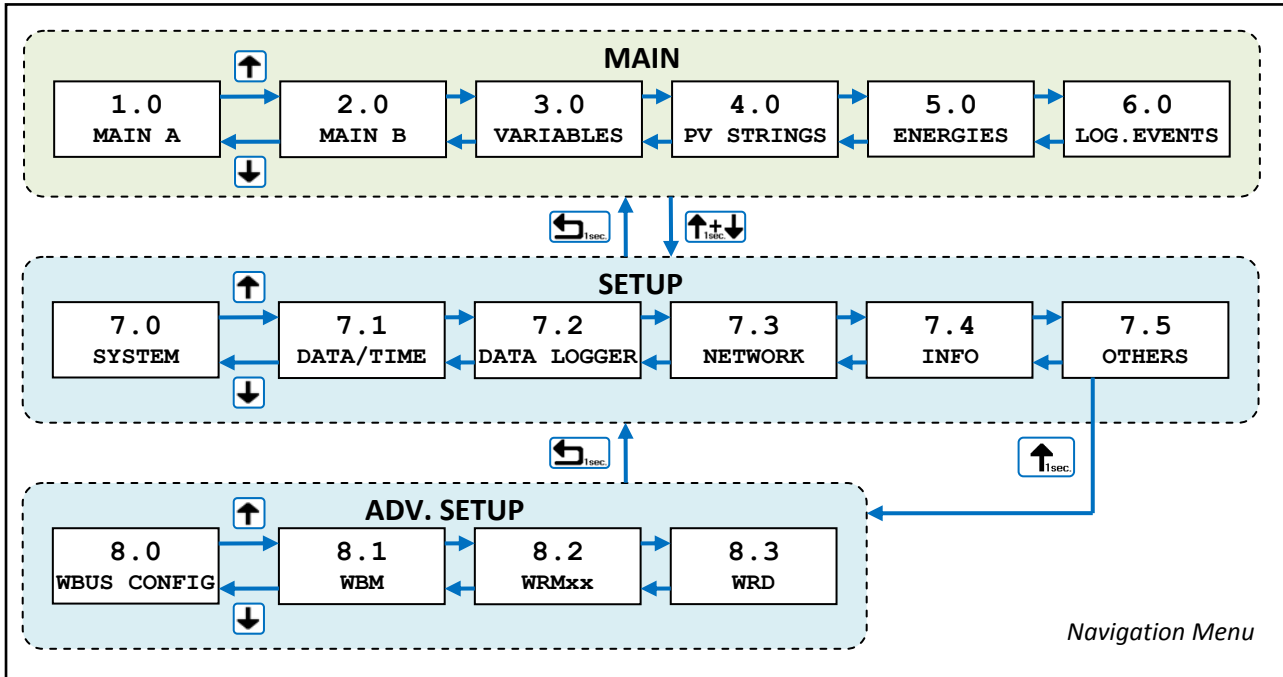
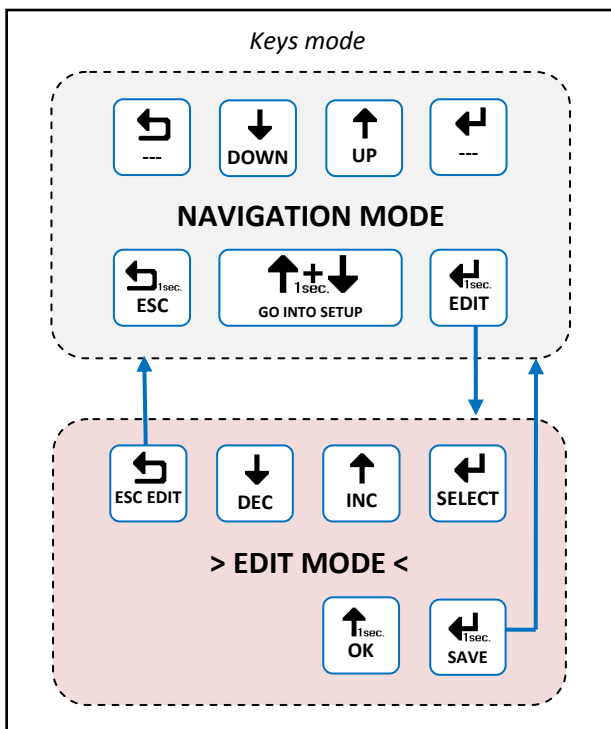


Fig.2 - Navigation menu



Pic.3 - Edit menu

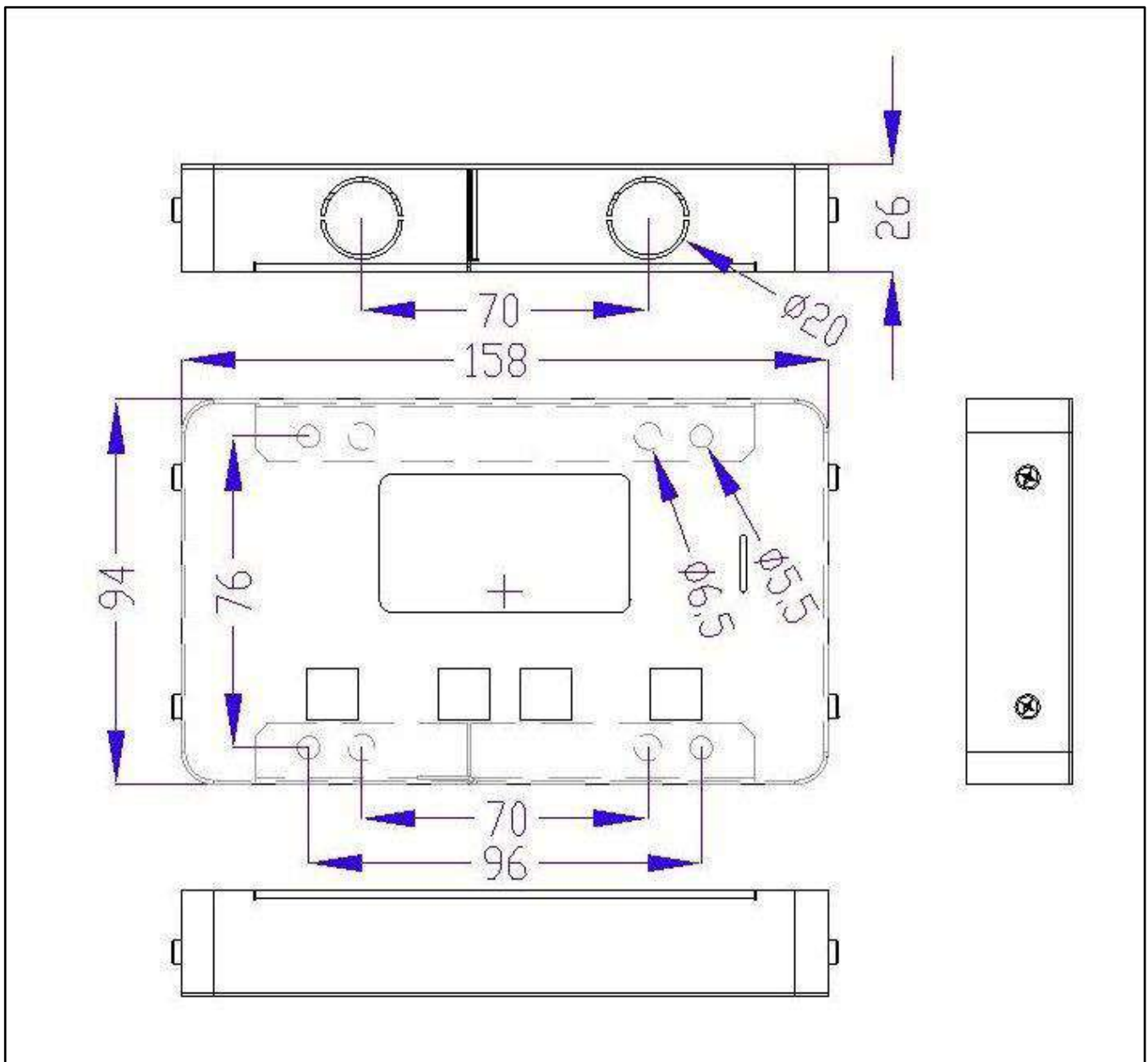
It is possible to enter the edit mode (*Pic.3*), where it is allowed, to modify the parameters by keeping pressed the Edit button for 1 sec. Entry into the editing mode is visible on the display by the presence of the cursors on the modifiable parameter. For editing are used the Inc/Dec buttons, to switch to another parameter, use the Select button while to exit the Edit mode, **without saving the changes**, use the Esc button. Where the parameters to be modified are organized in lists, the buttons Up/Down scroll the list or change the value based on the selection. To confirm some actions on the lists it must be pressed for 1 sec. the OK button. For **save the changes** the button Save must be kept pressed for 1 sec.

**ELECTRICAL FEATURES**

DESCRIPTION	PAR.	VALUE	U.M.
Nominal battery voltage		12 / 24 / 48 auto detect	(V)
Supply voltage range	V <sub>bat</sub>	10 ÷ 64	(V)
Self-consumption	P <sub>q</sub>	1.0	(W)
Operating temperature	T <sub>amb</sub>	-10 ÷ +40	(°C)
Max cable section terminal (Power and RS485)		1.5	(mm <sup>2</sup> )
Weight		250	(g)
Dimension LWH		160 x 95 x 27	(mm)
Degree of protection		IP20	

Tab.1 - Electrical features

**MECHANICAL DIMENSIONS**



Pic.4 - Mechanical dimensions

**FIXING OPTIONS:**

<p>cables hole</p>	<p><b>WALL INSTALLATION</b></p>															
<p>insert cables</p>	<p><b>WALL INSTALLATION</b></p>															
	<p><b>PANEL INSTALLATION</b></p>															
<table border="1"> <tr> <td><b>1</b></td> <td><b>self-tapping screw</b></td> <td><b>Q.ty 4</b></td> </tr> <tr> <td><b>2</b></td> <td><b>plastic dowel</b></td> <td><b>Q.ty 4</b></td> </tr> <tr> <td><b>3</b></td> <td><b>M3 L6 cross screw</b></td> <td><b>Q.ty 4</b></td> </tr> </table>	<b>1</b>	<b>self-tapping screw</b>	<b>Q.ty 4</b>	<b>2</b>	<b>plastic dowel</b>	<b>Q.ty 4</b>	<b>3</b>	<b>M3 L6 cross screw</b>	<b>Q.ty 4</b>	<table border="1"> <tr> <td><b>4</b></td> <td><b>rubber cable gland</b></td> <td><b>Q.ty 2</b></td> </tr> <tr> <td><b>5</b></td> <td><b>nut M4</b></td> <td><b>Q.ty 4</b></td> </tr> </table>	<b>4</b>	<b>rubber cable gland</b>	<b>Q.ty 2</b>	<b>5</b>	<b>nut M4</b>	<b>Q.ty 4</b>
<b>1</b>	<b>self-tapping screw</b>	<b>Q.ty 4</b>														
<b>2</b>	<b>plastic dowel</b>	<b>Q.ty 4</b>														
<b>3</b>	<b>M3 L6 cross screw</b>	<b>Q.ty 4</b>														
<b>4</b>	<b>rubber cable gland</b>	<b>Q.ty 2</b>														
<b>5</b>	<b>nut M4</b>	<b>Q.ty 4</b>														

Pic.5 - Fixing options

## Configuration: WRD + WBM

### Description:

This configuration is used in a plant where you want to monitor the energy flow of the battery (Pic. A1). The WBM battery monitor must be connected to the negative battery terminal and provides for the calculation of the incoming and outgoing energy. (see dedicated product manual for more details).

WRD allows to configure the WBM in the Setup menu 7.0 or 8.1:

- Select the correct profile according to the type of battery.
- Select the battery capacity (Ah) correctly, so that the WBM can correctly calculate the State of Charge (%) of the Battery.
- Set the thresholds for the two contacts controlled according to the State of Charge (%) of the Battery.

The 'Discharge' contact can be used to control a device capable of disabling the load, thus determining the maximum depth of discharge within which the battery will cycle. This contact also intervenes in case of protections: overcurrent, overtemperature and undervoltage.

With the 'Charge' contact, a device is normally controlled that is capable of disabling the charge as it intervenes in the event of protection: overcurrent, overtemperature and overvoltage.

By setting the thresholds for the 'Charge' contact, it can also be controlled according to the SoC, if required by some applications.

### Main screens:

In the following picture are described the graphic used in the various screens of the main menu. Take into account the notes shown in the pictures.

#### NOTES:

<sup>1</sup> - not present in WRD + WBM Configuration;

<sup>2</sup> - not present in WRD + WRMxx Configuration;

<sup>3</sup> - the light bulb icon appears in the WRD + WRMxx Configuration;



## Configuration: WRD + WRM30<sub>(1..8)</sub>

### Description:

This configuration is used in a stand-alone system where you want to mainly monitor the energy production (pic.A2).

The WRM30 controllers, which can be paralleled up to a maximum of 8, are used to charge the battery. (see dedicated product manual for more details).

The WRD allows to collectively configure the most common parameters of all the WRM30 in the Setup Menu 7.0, while it performs this individually in the Setup Menu 8.2.:

- Select the correct profile according to the type of battery.
- Properly select the Load Output programming
- Set the Low Battery threshold for the Load output.
- Set the transition time to the Float phase.

You can use the Load output with 'SurPlus' programming to directly control or power a load when the battery is charged and there is still energy from the PV modules so we have an excess of energy that in this way can be reused.

### Main screens:

In the following pictures are described the graphic used in the various screens of the main menu. Take into account the notes shown in the pictures.

#### NOTES:

<sup>1</sup> - not present in WRD + WBM Configuration;

<sup>2</sup> - not present in WRD + WRMxx Configuration;

<sup>3</sup> - the light bulb icon appears in the WRD + WRMxx Configuration;

## Configuration: WRD + WRM30(1..8)

### Description:

This configuration is used in a stand-alone system where the production, consumption and storage quantities are monitored (Pic.A3).

The WBM battery monitor must be connected to the negative battery terminal and provides for the calculation of the incoming and outgoing energy. (see dedicated product manual for more details).

WRD allows to configure the WBM in the Setup menu 7.0 or 8.1:

- Select the correct profile according to the type of battery.
- Select the battery capacity (Ah) correctly, so that the WBM can correctly calculate the State of Charge (%) of the Battery.
- Set the thresholds for the two contacts controlled according to the State of Charge (%) of the Battery.

The 'Discharge' contact can be exploited to control a device capable of disabling the load, thus determining the maximum discharge depth within which the battery will cycle. This contact also intervenes in case of protections: overcurrent, over temperature and under voltage.

With the 'Charge' contact, normally, is controlled a device capable of disabling the charge as it intervenes in the event of protections: overcurrent, over temperature and overvoltage. Setting the thresholds for the 'Charge' contact it can also be controlled according to the SoC in case some applications require it.

Considering that the charge carried out by the WRM30 is already controlled through the WBUS, in this configuration it is not necessary to take advantage of the 'Charge' contact.

The WRM30 controllers, which can be paralleled up to a maximum of 8, are used to charge the battery. (see dedicated product manual for more details).

The WRD allows to collectively configure the most common parameters of all the WRM30 in the Setup Menu 7.0, while it performs this individually in the Setup Menu 8.2.:

- Properly select the Load Output programming
- Set the Low Battery threshold for the Load output.
- Set the transition time to the Float phase.

You can use the Load output with 'SurPlus' programming to directly control or power a load when the battery is charged and there is still energy from the PV modules so we have an excess of energy that in this way can be reused.

### Main screens:

In the following picture are described the graphic used in the various screens of the main menu. Take into account the notes shown in the pictures.

#### NOTES:

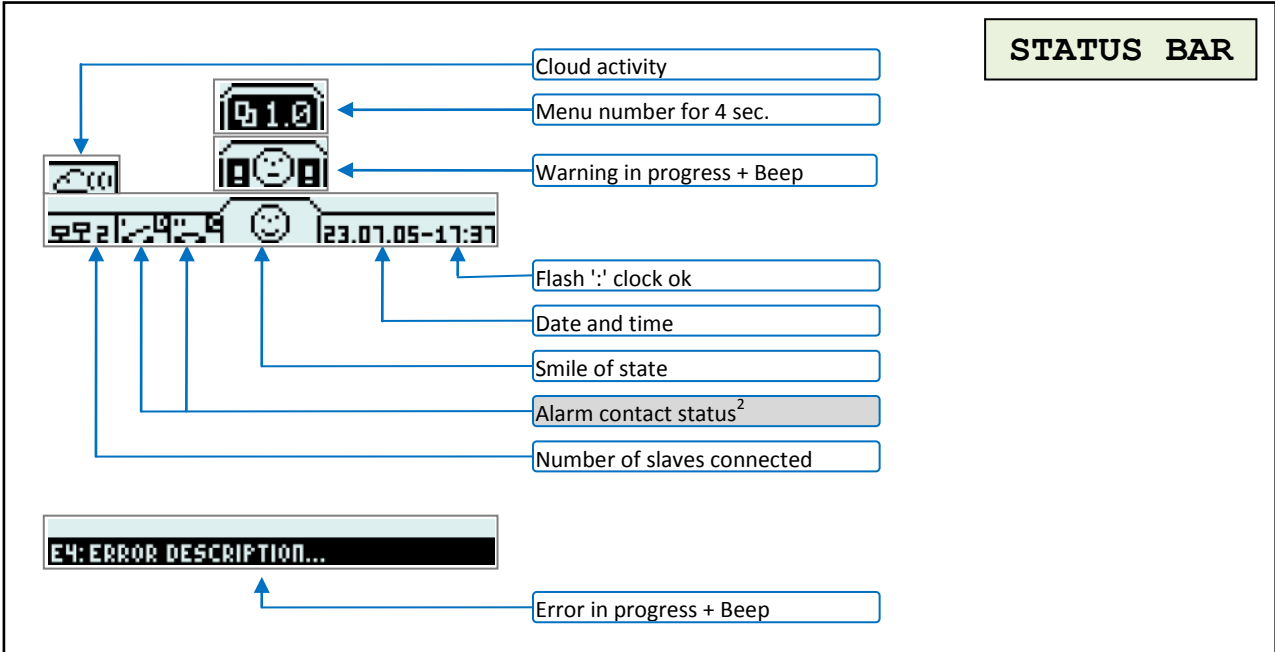
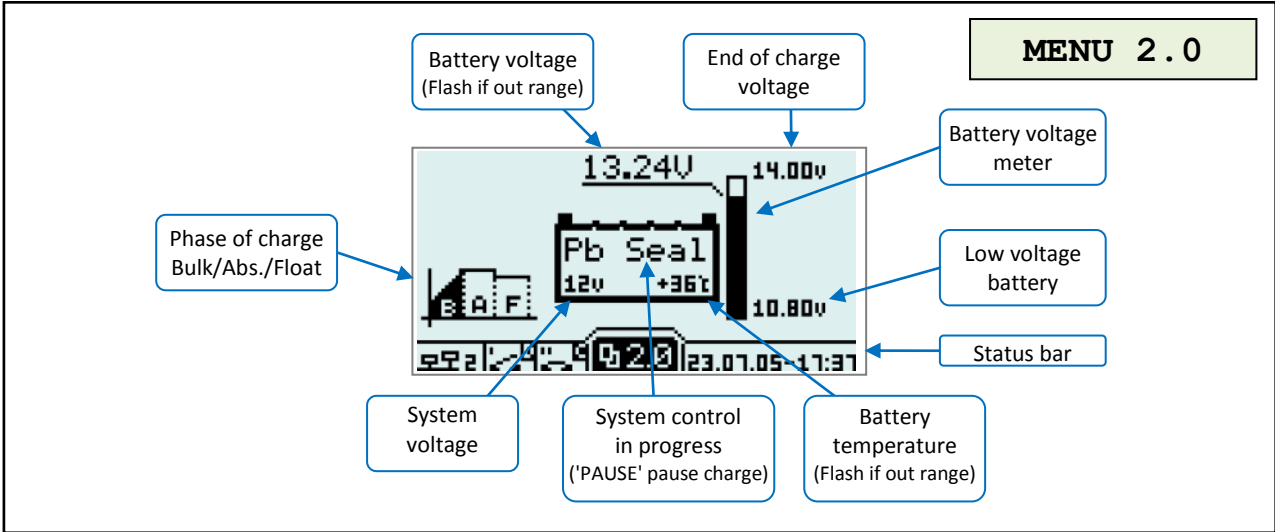
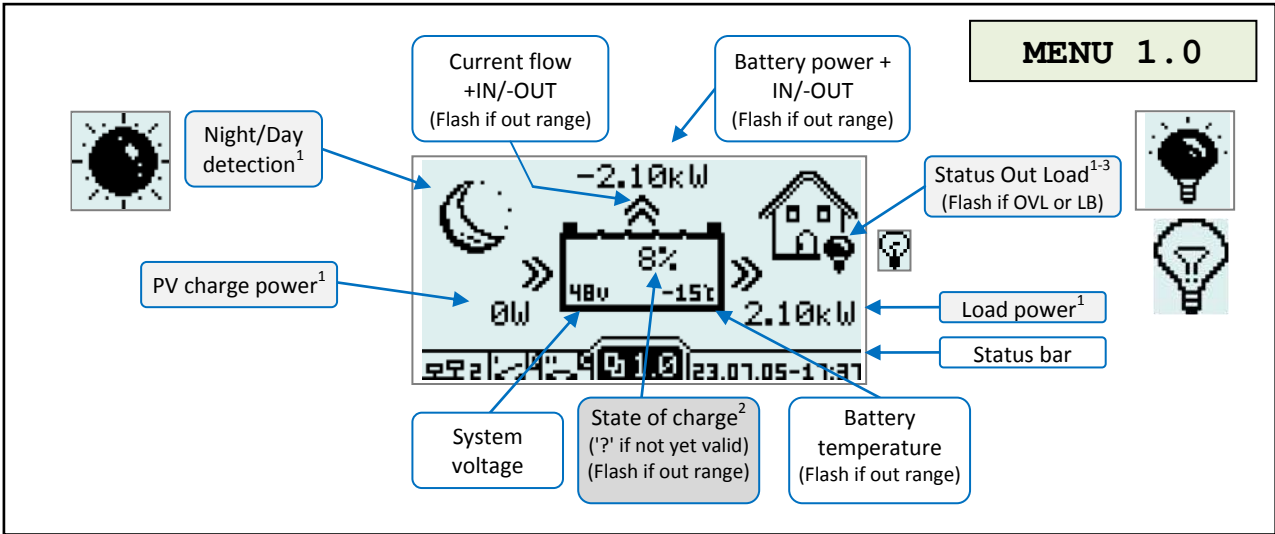
<sup>1</sup> - not present in WRD + WBM Configuration;

<sup>2</sup> - not present in WRD + WRMxx Configuration;

<sup>3</sup> - the light bulb icon appears in the WRD + WRMxx Configuration;

**Main screens:**

**Configuration with WRD + WRM30<sup>(1..8)</sup>**



Configuration with WRD + WRM30<sub>(1..8)</sub>

**MENU 3.0**

Callouts for MENU 3.0:

- Battery voltage (Flash if out range)
- PV charge current<sup>1</sup>
- PV charge power<sup>1</sup>
- Photovoltaic variables
- Battery variables
- Load variables<sup>3</sup>
- n.Menu / Warning
- Battery current IN/OUT (Flash if out range)
- Load current<sup>1</sup>
- Battery power IN/OUT (Flash if out range)
- Load power<sup>1</sup>

V	A	W
99.99	99.99	9.99k
999.9	99.9k	

**MENU 4.0**

Callouts for MENU 4.0:

- internal temperature
- PV input hardware (Flash if over Temp.)
- PV "A" string
- PV "B" string
- n.Menu / Warning
- PV string voltage<sup>1</sup>
- PV string current<sup>1</sup>
- PV string power<sup>1</sup>
- PV input displayed

Ti+36°C	V <sub>PV</sub>	A <sub>PV</sub>	W <sub>PV</sub>
99.99	99.99	999	
999.9	999.9	9.99k	

**MENU 5.0**

Callouts for MENU 5.0:

- Stored energy counter from Reset
- Energy battery deficit (+-) from Reset
- Supplied energy counter from Reset<sup>3</sup>
- n.Menu / Warning
- Date of Reset WRM counters<sup>1</sup>
- Date of Reset WBM counters<sup>2</sup>

kWh	Start
999.999	23/07/05
9999.99	23/07/05
99999.9	

**MENU 6.0**

Callouts for MENU 6.0:

- Progressive number event (1..32)
- Oldest event occurring
- Latest event occurring
- n.Menu / Warning
- Event list filter
- Event type
- Event code
- Date and time event

All Events	Error	Info
List of: Warnings		
M.01-W-Cod.123-30/06/15-23:59.07		
M.02-i-Cod.123-30/06/15-23:59.07		
M.03-E-Cod.123-30/06/15-23:59.07		
M.04-W-Cod.123-30/06/15-23:59.07		

**Setup Menu:**

Configuration with WRD + WRM30<sub>(1..8)</sub>

List displayed:	Value:	Settable value and descriptions:
<b>MENU 7.0</b>		
<b>Settings:</b>		
Batt.Type: <b>Pb Seal/</b>		<b>WBM SB:</b> Pb Flood 14.80@25°C / 29.60@25°C / 59.20@25°C : Setting to operate with Pb Flood type battery. Pb Seal/Gel 14.40@25°C/ 28.80@25°C / 57.60@25°C: Setting to operate with Pb Seal or Gel type battery. LiFePO4 <14.00..14.70V> <28.00..29.40V> <56.00..58.80V> fixed : Setting to operate with Lithium type battery with integrated BMS.
B.Capacity: <b>200Ah</b>		<10..2000Ah> battery bank capacity, to compute SoC. <sup>2</sup>
OFF disch.#1: ↓ <b>25%</b>		<0%..ON disch> below this threshold, the ALARM output 1 is activated. Discharge OFF. <sup>2</sup>
ON disch.#1: ↑ <b>40%</b>		<OFF disch..100%> above this threshold, the ALARM output 1 is deactivated. Discharge ON. <sup>2</sup>
OFF charge#2: ↑ <b>100%</b>		<ON charge..100%> above this threshold, the ALARM output 2 is activated. Charge OFF. <sup>2</sup>
ON charge#2: ↓ <b>90%</b>		<0%..ON charge> below this threshold, the ALARM output 2 is deactivated. Charge ON. <sup>2</sup>
Prog.Load: <b>OnSurplus</b>		<b>24h/24h</b> : LOAD output always active. <sup>1</sup> <b>&lt;1..16h&gt;</b> : LOAD output active from sunset for the set hours. <sup>1</sup> <b>Only Night</b> : LOAD output active only during the night. <sup>1</sup> <b>Only Day</b> : LOAD output active only during the day. <sup>1</sup> <b>OnSurPlus</b> : LOAD output active only during an energy surplus. <sup>1</sup>
LowB.Load: <b>11.12V</b>		<10.8..12.56V> below this threshold, the LOAD output is activated. <sup>1</sup>
<div style="border: 1px solid black; padding: 2px; display: flex; justify-content: space-between;"> <span>7.0</span> <span>SYSTEM</span> <span>☰</span> </div>		

Configuration with WRD + WRM30<sub>(1..8)</sub>

MENU 7.1

List displayed:	Value:	Settable value and descriptions:
<pre>Set Date Time: dd/mm/yy: 31/12/18   hh:mm:ss: 12:59.00   TimeZone: UTC +1</pre>	<pre>31/12/18 12:59.00 UTC +1</pre>	<pre>&lt;1..31&gt;/&lt;1..12&gt;/&lt;00..99&gt; days/months/years &lt;0..23&gt;:&lt;0..59&gt; hours:minutes.seconds &lt;-12..+13&gt; site timezone</pre>
<pre>7.1 DATE / TIME</pre>		

MENU 7.2

List displayed:	Value:	Settable value and descriptions:
<pre>Info &amp; Setting: sample Time: 10min   Info: --&gt; NOT PRESENT   Info: uSD CARD File SYS: FAT32 free space: 3772MB   Info: Find WRD*.* WRDEVENT.LOG 27kB 01/02/12 01:23:45   WRDATA2.LOG 27kB 01/02/12 01:23:45   END LIST Info: SAMPLE EVENT 00:30</pre>	<pre>10min --&gt; NOT PRESENT uSD CARD WRDEVENT.LOG 27kB 01/02/12 01:23:45 WRDATA2.LOG 27kB 01/02/12 01:23:45 END LIST SAMPLE EVENT 00:30</pre>	<pre>OFF : Data logger disabled (uSD CARD ejectable) &lt;1..30min&gt; logger sampling time.  Logger information:  --&gt; : select the type of information to show. If there is no card show "NOT PRESENT", and no information is available.  uSD CARD : read the type of file system (NONE, FAT12/16/32) and calculates the free space on the card.  FIND WRD*.* : read and list the files one at a time by showing the name, size, and date of the last update. At the end shows "END LIST".  SAMPLE EVENT : show the remaining time for the next sampling</pre>
<pre>7.2 DATA LOGGER</pre>		



Configuration with WRD + WRM30<sub>(1..8)</sub>

List	Value:	Settable value and descriptions:
<b>MENU 7.4</b>		
Network param. :		
status: OFF-LINE		← OFF-LINE; ON-LINE : current status of cloud connection.
IP : 192.168.100.067		← current device IP Address.
sNM: 255.255.255.000		← current subnet mask.
Gwy: 255.255.255.255		← current Gateway IP Address.
DNS: 255.255.255.255		← current primary DNS IP Address.
dns: 255.255.255.255		← current secondary DNS IP Address.
MAC: D880394F5632		← device MAC Address.
KEY:0123456789ABCDEF		← device KEY code.
Device: rev.Fw:		
WRD : 1.0		← firmware revision of the WRD device.
WBM : 1.0		← firmware revision of the WBM device.
WRMxx n.1: 1.0		← firmware revision of the WRMxx devices, from 1^ to 8^. (0.0 if device is not present)
WRMxx n.2: 1.0		
WRMxx n.3: 0.0		
WRMxx n.4: 0.0		
WRMxx n.5: 0.0		
WRMxx n.6: 0.0		
WRMxx n.7: 0.0		
WRMxx n.8: 0.0		
7.4 SYSTEM INFO		

List displayed:	Value:	Settable value and descriptions:
<b>MENU 7.5</b>		
Items :		
En.EvBeep: ON		← OFF; ON : Disable/Enable sound alert.
PAUSE Charge: OFF		← OFF; ON : Pause the PV charge.
Advanced Setup: -->		← --> : Access to advanced setup menu 8.X.
7.5 VARIOUS		



Configuration with WRD + WRM30<sub>(1..8)</sub>

**MENU 8.0**

List displayed:	Value:	Settable value and descriptions:
<pre> Device: Address: AutoConf: ---             WBMonitor : 33 WRMxx  n.1: 01 WRMxx  n.2: 02 WRMxx  n.3: 00 WRMxx  n.4: 00 WRMxx  n.5: 00 WRMxx  n.6: 00 WRMxx  n.7: 00 WRMxx  n.8: 00           </pre>		
		<p><b>RUN</b> : starts the procedure to automatically identify the connected devices.</p>
		<p><b>00; 33</b> : WBUS Address of the WBM device.</p>
		<p><b>&lt;0..32&gt;</b> : WBUS Address of the WRMxx devices, from 1^ to 8^. (00 if device is not present)</p>
<pre> 48.0 WBUS CONFIG. &lt;-&gt;           </pre>		

Configuration with WRD + WRM30<sub>(1..8)</sub>

MENU 8.1

List displayed:	Value:	Settable value and descriptions:
<b>WBM SETUP:</b>		
Batt.Type:	Pb Seal/	<b>WBM SB:</b> Pb Flood 14.80@25°C / 29.60@25°C / 59.20@25°C : Setting to operate with Pb Flood type battery. <sup>2</sup> Pb Seal/Gel 14.40@25°C/ 28.80@25°C / 57.60@25°C: Setting to operate with Pb Seal or Gel type battery. <sup>2</sup> LiFePO4 <14.00..14.70V> <28.00..29.40V> <56.00..58.80V> fixed : Setting to operate with Lithium type battery with BMS integrated. <sup>2</sup>
B.Capacity:	200Ah	<10..2000Ah> battery bank capacity, to compute SoC. <sup>2</sup>
OFF disch.#1:	↓ 25%	<0%..ON disch> below this threshold, the ALARM output 1 is activated. Discharge OFF. <sup>2</sup>
ON disch.#1:	↑ 40%	<OFF disch..100%> above this threshold, the ALARM output 1 is deactivated. Discharge ON. <sup>2</sup>
OFF charge#2:	↑ 100%	<ON charge..100%> above this threshold, the ALARM output 2 is activated. Charge OFF. <sup>2</sup>
ON charge#2:	↓ 90%	<0%..ON charge> below this threshold, the ALARM output 2 is deactivated. Charge ON. <sup>2</sup>
UPDATE FW:	---	<b>RUN</b> : *CAUTION* starts the procedure to update the firmware in the WBM device. The firmware update file must be present in the uSD card. <sup>2</sup>

8.1
WBM
◀ ▶

Configuration with WRD + WRM30<sub>(1..8)</sub>

List displayed:	Value:	Settable value and descriptions:
<b>MENU 8.2</b>		
<b>WRM30 n.1 SETUP:</b>		<1..8> select the WRM30 to edit. <sup>1</sup>
<b>VEoCharge: 14.40V</b>		Set the battery charge voltage: <b>Pb Flood</b> 14.80@25°C / 29.60@25°C / 59.20@25°C : Setting to operate with Pb Flood type battery. <sup>1</sup> <b>Pb Seal/Gel</b> 14.40@25°C / 28.80@25°C / 57.60@25°C : Setting to operate with Pb Seal or Gel type battery. <sup>1</sup> <b>LiFePO4</b> <14.00..14.70V> <28.00..29.40V> <56.00..58.80V> <b>fixed</b> : Setting to operate with Lithium type battery with integrated BMS. <sup>1</sup>
<b>VLowBatte: 12.56V</b>		<12.00..12.56V> / <24.00..25.12V> / <48.00 ..50.24V>: below this threshold, the WRM30 goes into Low Battery status and deactivates the LOAD. <sup>1</sup>
<b>VEndLBatt: auto</b>		<b>auto</b> (VEoC-0.2/0.4/0.8V); <12.72 ..13.68V> / <25.44 ..27.36V> / <50.88 ..54.72V>: above this threshold, the WRM30 goes out Low Battery status and reactivates the LOAD. <sup>1</sup>
<b>Prog. Load: 16hour</b>		<b>24h/24h</b> : LOAD always active. <sup>1</sup> <1..16h> : LOAD active from sunset for the set hours. <sup>1</sup> <b>Only Night</b> : LOAD active only during the night. <sup>1</sup> <b>Only Day</b> : LOAD active only during the day. <sup>1</sup> <b>OnSurPlus</b> : LOAD active only during an energy surplus. <sup>1</sup>
<b>VnightThd: 2.00V</b>		2.00V; 3.28V; 4.56V; 5.84V : below this threshold, the WRM30 detects the sunset. <sup>1</sup>
<b>MPPT algo: auto</b>		<b>auto</b> ; <b>parall.</b> ; <b>indep.</b> : mode in which the MPPT algorithm considers the two channels. <sup>1</sup>
<b>HrToFloat: 1hour</b>		<1..8h> : time in Absorption phase before moving to Float phase. <sup>1</sup>
<b>UPDATE FW: ---</b>		<b>RUN</b> : *CAUTION* starts the procedure to update the firmware in the WBM device. The firmware update file must be present in the uSD card. <sup>1</sup>
<div style="border: 1px solid black; padding: 2px; display: flex; justify-content: space-between;"> <span>98.2</span> <span>WRM30</span> <span>0-0</span> </div>		

Configuration with WRD + WRM30<sup>(1..8)</sup>

List displayed:	Value:	Settable value and descriptions:	MENU 8.3
WRD SETUP:			
Oper. Mode:	MONITOR	MONITOR; CONTROLLER : Operating Mode: Monitor/Controller	
Backlight:	auto OFF	auto OFF; always ON : Backlight LCD: Auto power-OFF/ always ON	
RESET:	RUN	RUN : Reset the WRD device.	
UPDATE FW:	RUN	RUN : *CAUTION* starts the procedure to update the firmware in the WRD device. The firmware update file must be present in the uSD card. To start the procedure press both ↑ and ↓ keys.	
Tech. Menu Psw:	00	<0..FF> password to access the Technical Menu. *CAUTION* Technical Menu is reserved for factory checks.	
8.3 WRD			

NOTES:

- <sup>1</sup> - not present in WRD + WBM Configuration;
- <sup>2</sup> - not present in WRD + WRMxx Configuration;
- <sup>3</sup> - the light bulb icon appears in the WRD + WRMxx Configuration;

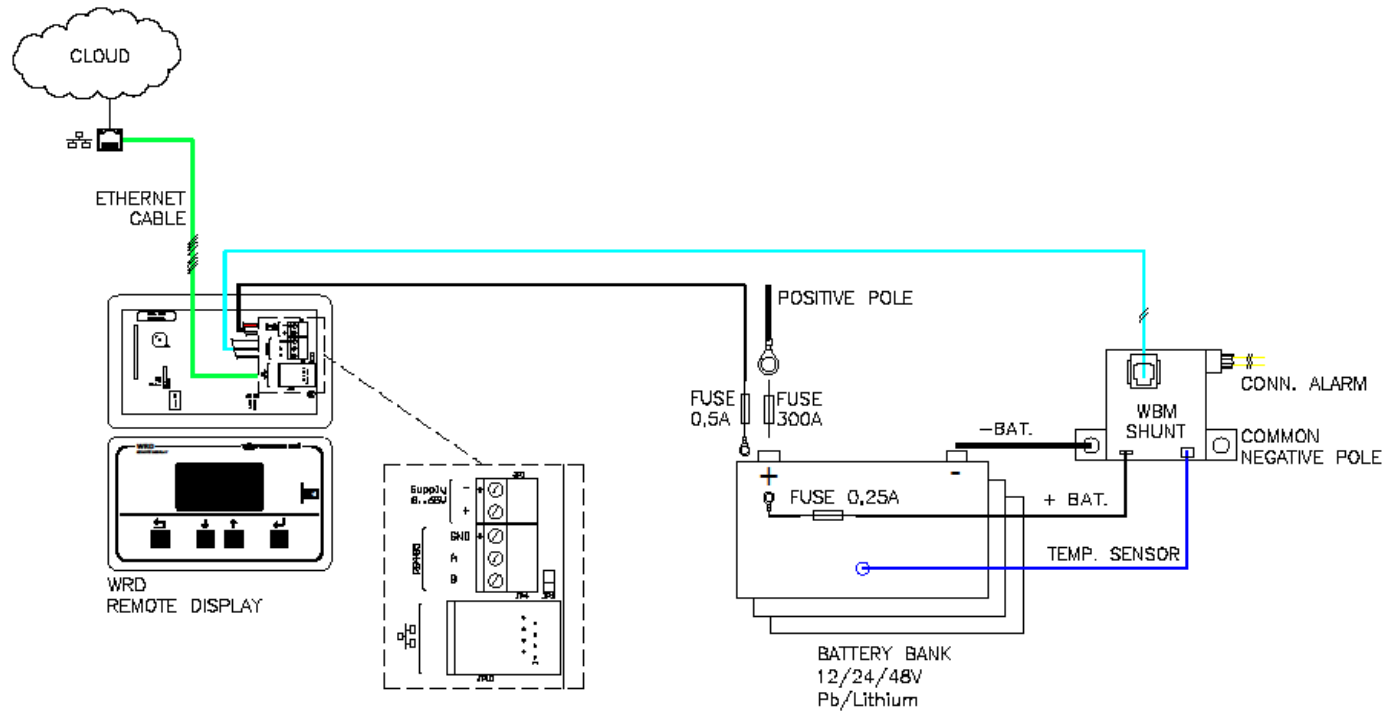
# ***APPENDIX***

## ***Diagrams***

### ***of***

## ***connection***

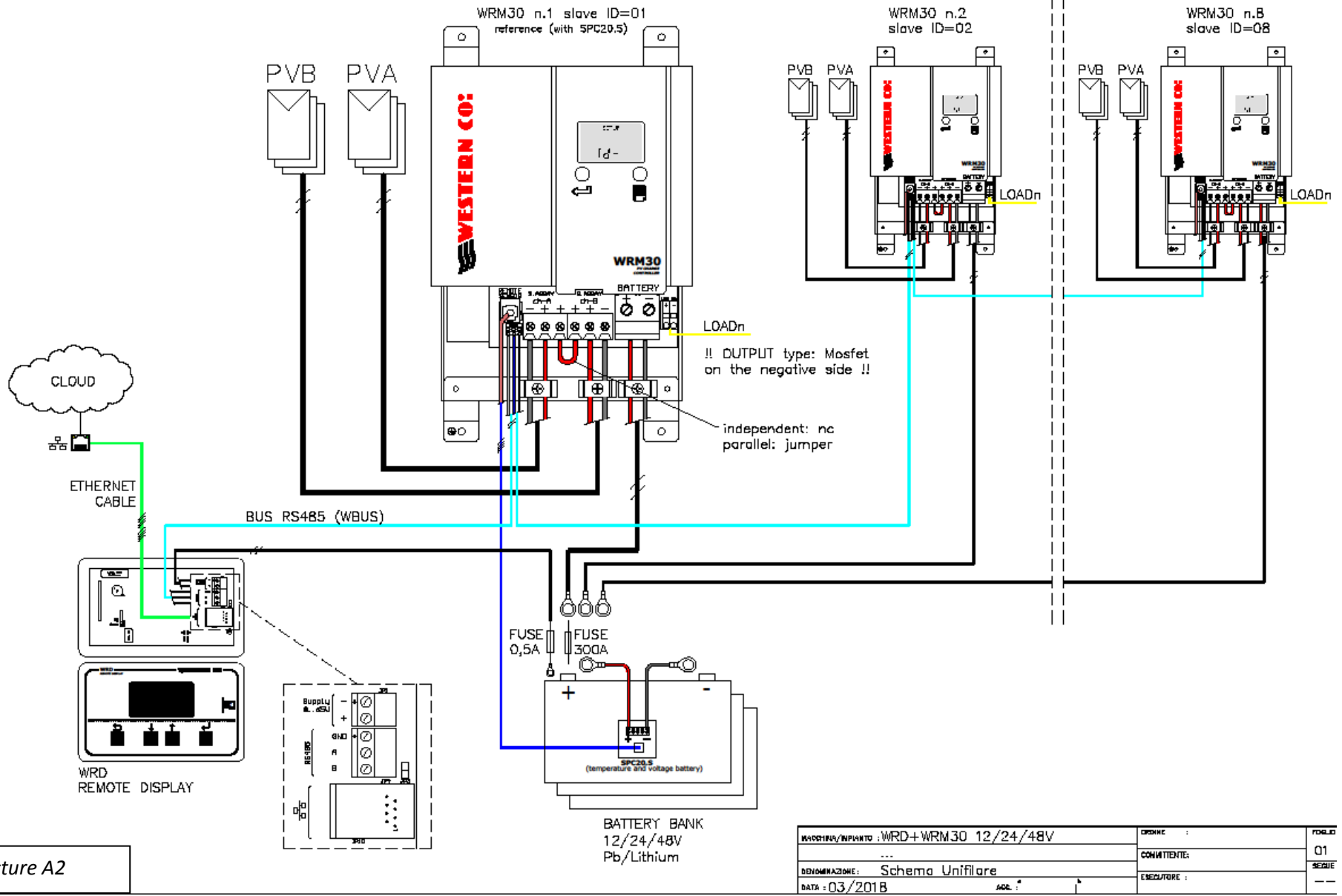
CONFIGURATION WITH WRD + WBM 12/24/48V



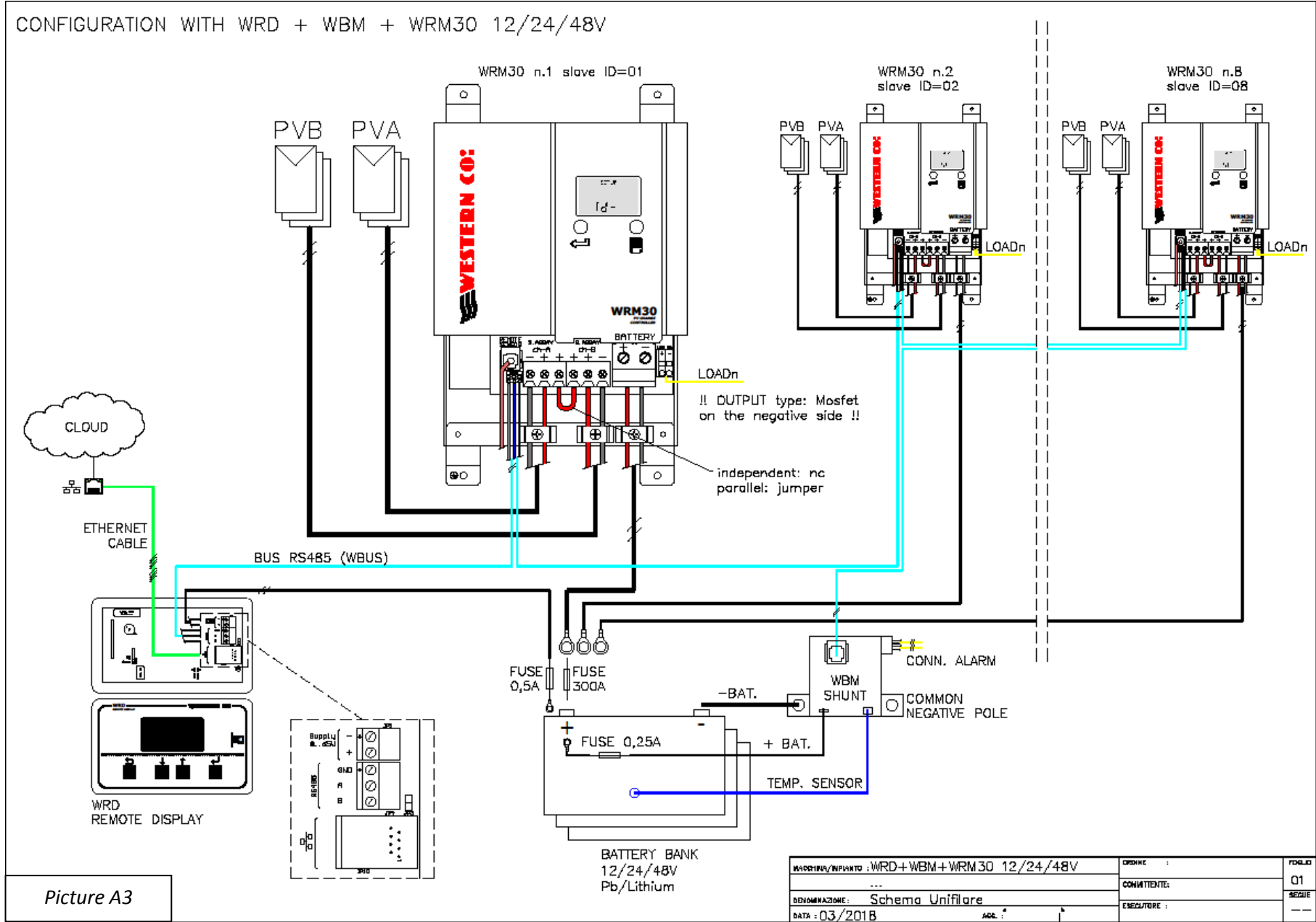
Picture A1

MACCHINA/PIANTA : WRD+WBM 12/24/48V	DISGNE :	FOGLIO :
---	COMITENTE :	Q1
DEGNOMAZIONE : Schema Unifilare	ESECUTORE :	---
DATA : 03/2018	---	---

CONFIGURATION WITH WRD + WRM30 12/24/48V



Picture A2



Picture A3



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**WESTERN CO.**  
ELECTRONIC EQUIPMENTS - SOLAR SYSTEMS

Product Name  
P/N XXXXXXX  
S/N: XXXXXXXXX  
Input: 12/24/48 VDC  
CE



Scan the **QR CODE** placed on the side of the product or visit **[www.western.it](http://www.western.it)** to download the latest manual version.