PROJECTA

INTELLI-RV

12V POWER MANAGEMENT SYSTEM

(Not inc. PM435-BT)

(Not inc. PM435-BT)

P/No. PM400 & PM435-BT

IMPORTANT SAFETY INFORMATION

Please read this manual thoroughly before use and store in a safe place for future reference.

WARNINGS

- Explosive gases. Prevent flames and sparks. Provide adequate ventilation during charging
- Before charging, read the instructions
- For indoor use. Do not expose to rain
- For charging Lead Acid and $LiFePO_4$ batteries ONLY (of the size & voltage specified in the specification table.
- Always charge the battery on the correct voltage setting. Never set the charger to a higher voltage than the battery
- Disconnect the 240V mains supply before making or breaking the connections to the battery
- The battery charger must be plugged into an earthed socket outlet
- Connection to supply mains is to be in accordance with National wiring rules
- Do not attempt to charge non-rechargeable batteries
- Never charge a frozen battery
- If the AC cord is damaged, do not attempt to use. It must be replaced or repaired by a qualified person
- Corrosive substances may escape from the battery during charging and damage delicate surfaces. Store and charge in a suitable area
- This charger is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning the use of the appliance by a person responsible for their safety
- Young children should be supervised to ensure that they do not play with the appliance
- If the recreational vehicle is to be put in to storage without power, please turn off the BATTERY MASTER SWITCH. If the recreational vehicle is to be put in to long term storage without power, disconnect ALL cabling from the battery.

CONTENTS

1. INTRODUCTION

PM400 is designed for caravan or motor home with integrating many functions, including battery charger, distribution blocks, MPPT solar charger controller, charging relay, low voltage disconnect, water pump controller, water tank indicator, preconfigured switch panels as well as a crystal central monitor.

The PM400 is designed for an easy installation and user-friendly interface.

PM435-BT is essentially the same as the PM400 without the 10way switch panel and 2 x 2way switch panels. All other functionality is the same. Is equipt with Bluetooth I/O controls etc...

SYSTEM COMPONENTS:

1 Master Power Unit

2 Monitor with Bluetooth connectivity

3 10 position switch panel (not inc. PM435-BT)

4 4 Water tank sensors (not supplied)

5 2 x 2 Position switch panel (not inc. PM435-BT)

6 Cables (Refer to Chapter 4.1 for the cable list)

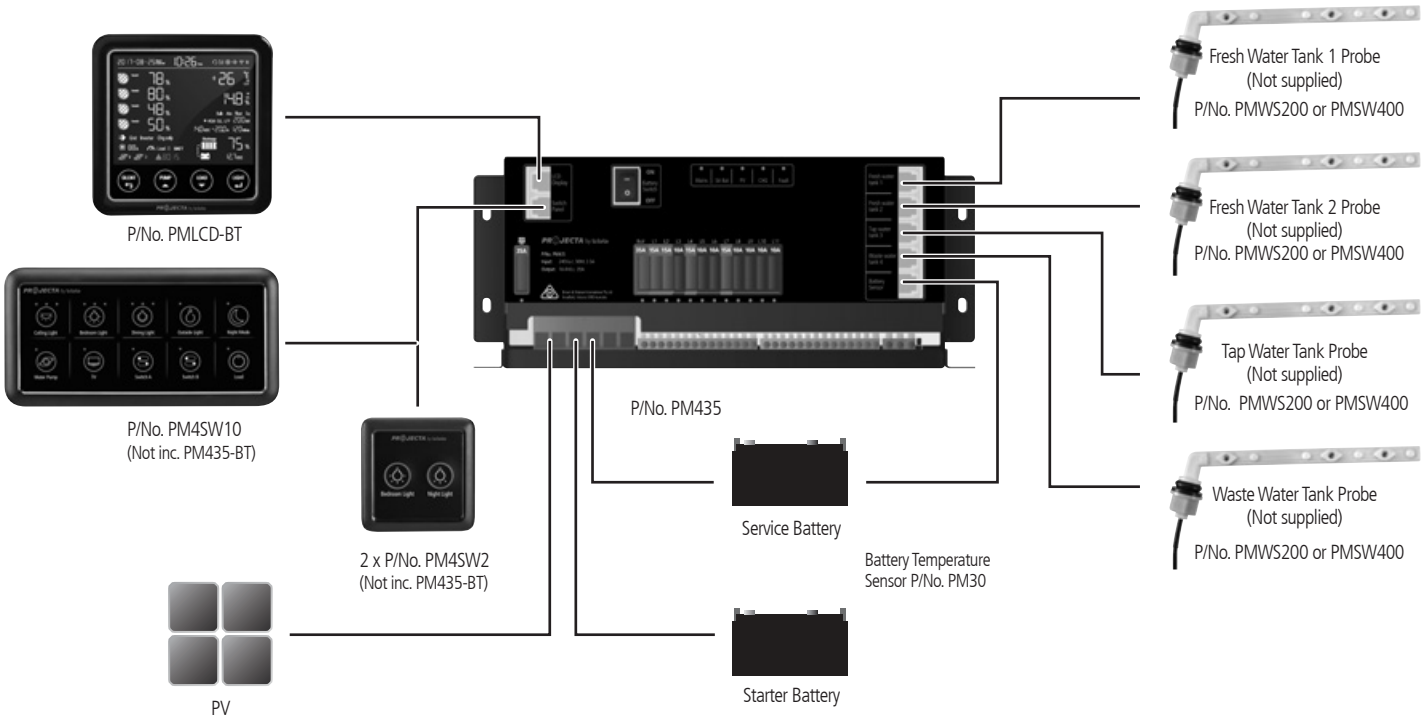


Figure 1 System Components for PM400 & PM435-BT

1.1 Features

- Smart battery charger 12V 35A (30A for charging current)
- Multi stage adaptive charging algorithm
- Active Power Factor Correction PFC charging
- Temperature compensation Charging
- Voltage compensation Charging
- Float Charge for starter battery
- 30A MPPT Solar charge controller
- Built-in 14 outputs
- 11 x fused outputs
- Battery charging relay 12V 60A – 60A continuously, 100A 30mins
- Battery Low Voltage Protection (Low Voltage Disconnect)
- Built-in Battery Switch
- Support external remote battery switch
- Built-in shunt for precise battery measurement
- Control one water pump with four tank probes
- Thermal controlled fan
- Spring terminal & Screw terminal
- T-bus compatible

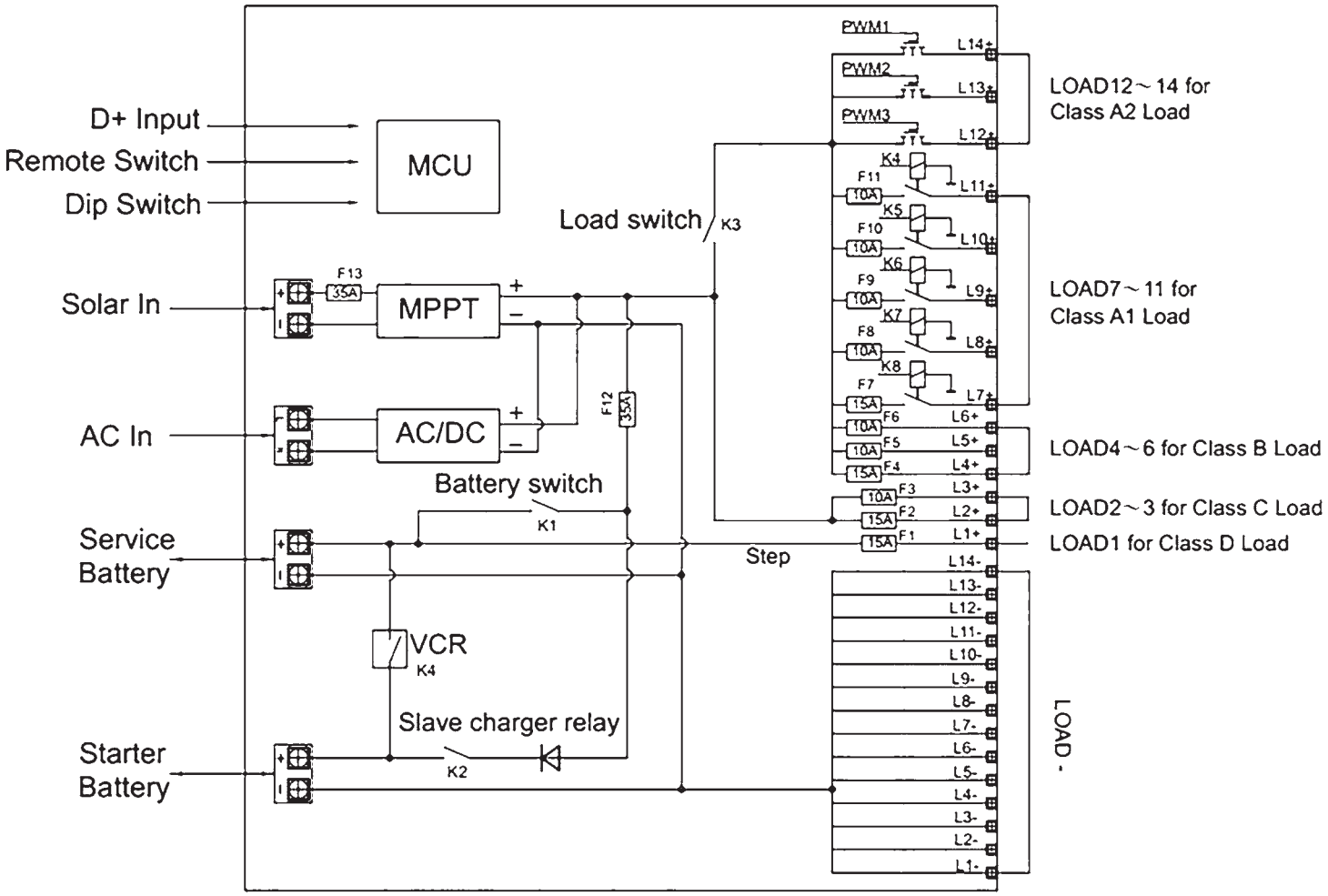


Figure 2 System Schematic

1.2 Monitor

The monitor is a digital control center for complete on-board power system.

Features:

- T-Bus design (can be connected to multiple devices)
- System monitoring
- Configuration

Figure 3 Overview of Monitor

1.3 10-Position Switch Panel (not inc. PM435-BT)

PM4SW10 switched panel was preconfigured with functions listed as below Table 1

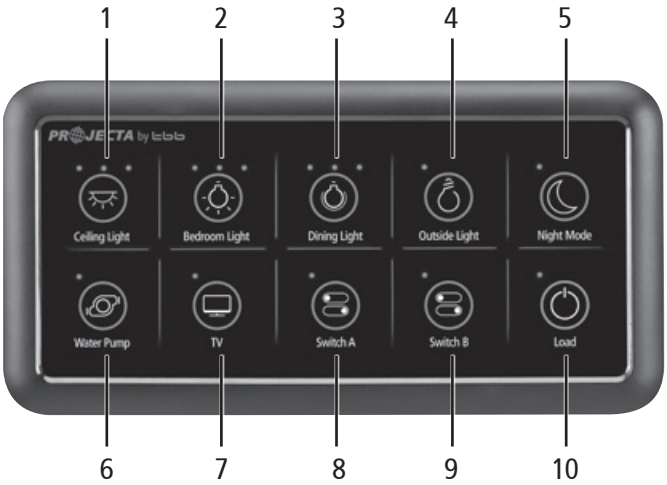


Figure 4 Overview of 10 Position Switch Panel PM4SW10

No.	LABEL	TYPE	DESCRIPTION
1	Ceiling light	DC load control	Load control, support brightness adjustment
2	Bedroom light	DC load control	Load control, support brightness adjustment
3	Dining light	DC load control	Load control, support brightness adjustment
4	Outside light	DC load control	Load control, on/off control
5	Night mode	Scene mode	Refer to Chapter 2.11
6	Water pump	DC load control	Load control, on/off control
7	TV	DC load control	Load control, on/off control
8	Switch A		
9	Switch B		
10	Load	DC load control	Refer to Chapter 2.7

Table 1 Function list of PM4SW10

1.4 Bedroom Switch Panel (not inc. PM435-BT)

With two bedroom switches, the PM400 offers extra customisation

Figure 5 An overview of Switch Panel PM4SW2

No.	NAME	TYPE	DESCRIPTION
1	Bedroom light	DC load control	Load control, support brightness adjustment
2	Night light	Scene mode	Load control, support brightness adjustment. Refer to Chapter 2.11

Table 2 Function list of PM4SW2

Note: Dimming function may not be compatible with some capacitive touch lights..

1.5 Water Tank Probe

For PM435, a maximum of 4 probes can be monitored.

NOTE: Always check the probe required for the water tank before purchase. There are 2 probe styles:

PMWS200:

- Side installation
- Suitable for water tank
- Depth >200mm

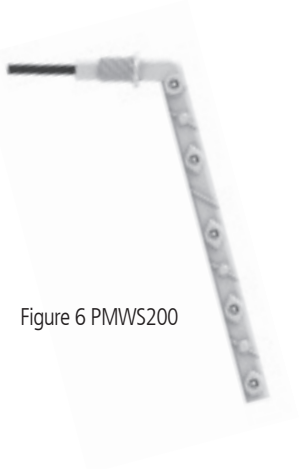


Figure 6 PMWS200

PMWS400:

- Side installation
- Suitable for water tank
- Depth 300-400mm

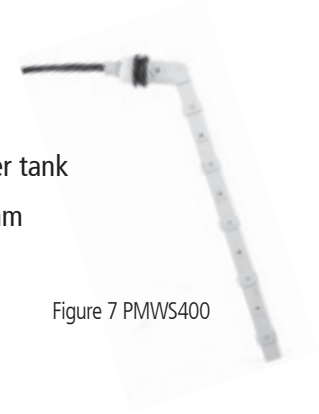


Figure 7 PMWS400

2. KEY FEATURES AND FUNCTIONS

2.1 Multiple Inputs

The PM435 accepts inputs from AC mains, Solar and Starter Battery (Alternator). However, only one source will provide power at one time, see table below for details:-

AC MAINS	**X**	**X**	
SOLAR	**X**		**X**
STARTER BATTERY		**X**	**X**
DOMINATING SOURCE	AC MAINS	AC MAINS	STARTER BATTERY

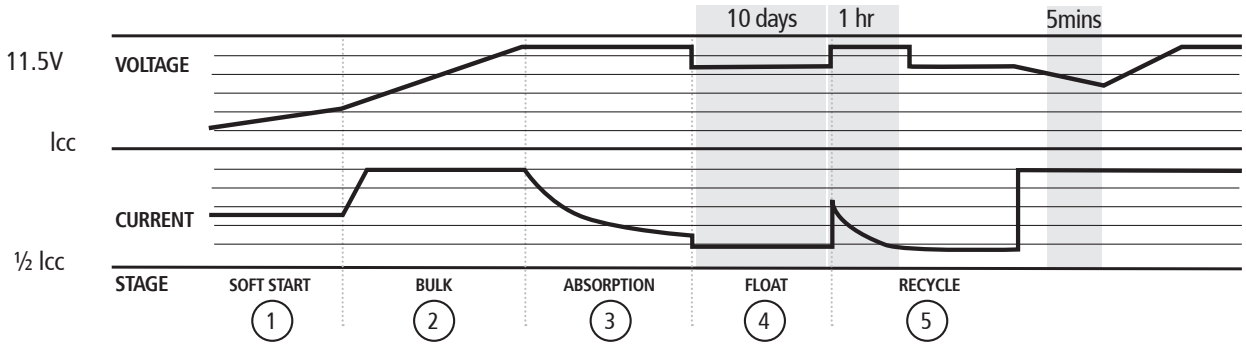
Table 3 Input Priority

2.2 Battery Charger Of Stationery/Service Battery

The charger automatically starts when the appropriate qualified power is connected, either from grid, generator or solar.

With multiple charging stages (soft start-bulk absorption float-recycle), PM435 is designed to fully charge the battery quickly. To guarantee the optimal charging for batteries of different states, the PM435 features Microprocessor-controlled charging algorithm. The Float and Recycle charging programs guarantees that the battery condition does not change despite being connected for a longer period.

Figure 8 Charging Algorithm



1. **SOFT START**
   Increases battery life by gently starting to charge the battery 5% of bulk
2. **BULK**
   Reduces charging time by delivering maximum charge to set voltage life by gently starting to charge the battery 25% of bulk
3. **ABSORPTION**
   Ensures a full charge to the battery without overcharging
4. **FLOAT**
   Float charge maintains the battery at 100% charge
5. **RECYCLE**

Battery Temperature Sensor

The BTS P/n: PM30 (Battery Temperature Sensor) supplied with PM435, measures the temperature of the battery and automatically adjusts, in real time, to charge the battery properly at compensation rate of –4mv±10%/°C/cell. In case BTS is not present, the PM435 will use 25°C as default.

Voltage Compensation Charging

With a voltage sensor the PM435 can, automatically adjust its output to compensate the voltage drop caused by a cable. This assures the right voltage is being delivered for optimal charging.

Adjustable Charging Capacity

Users can adjust the charging current by specifying the battery capacity. The charging current is set at threshold rate of 10% the of the battery capacity (I = 0.1C) by default.

Lithium Battery Charging

The PM435 can be configured to charge Lithium Iron Phosphate batteries. With the Lithium battery, the max charging current will automatically be set at 30% of battery capacity (Imax=0.3C).

2.3 Vehicle Battery Charger

Along with a powerful charger for service battery, PM435 offers a float charge of up to 3A to keep the starter battery charged, whether connected to the AC main or PV. When the starter battery is less than 12.4V, the PM435 starts charging after 30 minutes delay and stops charging when voltage reaches 12.8V.

2.4 Power Supply Mode

If no battery is attached to PM435 unit, it will work as a power supply automatically with a 12.8VDC output.

2.5 MPPT Solar Charger Controller

PM435 has a built-in MPPT charger for the service battery with:

- Max input voltage 50VDC
- Max charging current 30A
- Max supply current 30A

2.6 Voltage Charging Relay (VCR or commonly known as a VSR)

PM435 master power unit has a built-in voltage charging relay (VCR), which offers a convenient source to charge the service battery by alternator whilst the engine is running.

LEAD ACID BATTERY – When the starter battery reaches 13.4VDC with threshold time delay, the VCR will charge the service battery from the alternator. VCR will continue charging until the starter battery voltage drops under 12.8VDC.

$LiFePO_4$ LITHIUM BATTERY – When the starter battery reaches 14.0VDC with threshold time delay, the VCR will charge the service battery from the alternator. VCR will continue charging until the starter battery voltage drops below 13.5VDC and less than 2A charge to service battery with threshold time delay.

NOTE: The PM435, when charging from the starter battery, does not provide 5 stage charging. It simply takes whatever power and charging is available from the vehicle alternator.

NOTE: If your vehicle is fitted with a smart charging system (Variable Voltage or Temperature Compensating), the VCR may not function correctly and a DC-DC Charging system is recommended.
Please consult your local dealer or installer for further information.

2.7 Categorised Outputs

The 14 outputs of PM435, are categorized into different groups for different controls.

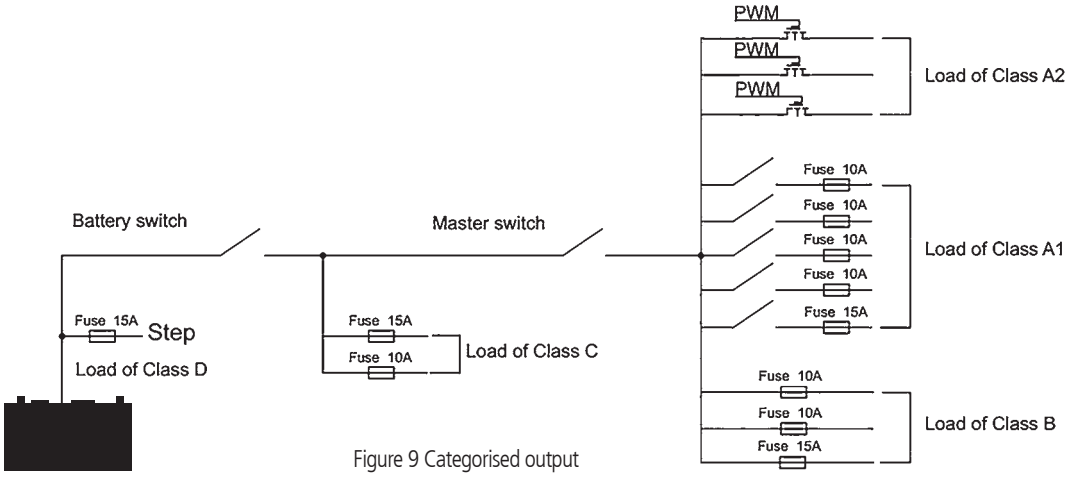


Figure 9 Categorised output

TYPE	QTY	DESCRIPTION	POSSIBLE LOAD SUITABLE
Class A1	5	Relay controlled output with fuse, protected by main master switch relay	Water pump, Water tank heating, TV etc.
Class A2	3	PWM controlled, protected by master switch relay	General lighting, such as, Ceiling light, Dining light, Bedroom light etc.
Class B	3	Fused outputs, protected by master switch relay	Ventilation fan etc.
Class C	2	Always alive load	Fridge, security alarm etc.
Class D	1	Permanent on load	Auto step

Table 4 Categorized outputs definition

2.8 Battery Low Voltage Protection (BLVP or commonly known as an LVD)

The PM435 unit has a built-in battery low voltage protection relay. It will disconnect the load once the battery voltage drops below the threshold voltage. The default setting is 10.5Vdc and it can be changed by crystal central monitor or mobile APP from 10.0Vdc to 11.7Vdc.

2.9 Battery Switch

The PM435 unit offers a convenient way to switch off the output of the service battery on-board. It protects the service battery from being drained by electronics on board, completely isolating the battery. PM435 unit also supports a remote manual battery switch. Before using the remote switch, ensure the 'switch selector' is set to 'Remote'. The switch is only effective when the system has no other energy resource for the load except the battery.

2.10 Precise Battery Measurement

PM435 unit has a battery measurement system controlled by microprocessor. It measures battery voltage, charge/discharge current, remaining AH and display time to go.

Compared to conventional indicating meters, a small current can be measured and read accurately with this device. With this feature, it highlights faults, alarms and installation errors.

ATTENTION: If you have loads connected directly on battery instead of PM435 Power Management System, the measurement will not be accurate.

2.11 Scene mode setting

The PM435 supports the preconfigured scene mode for multiple loads controlled. There are two modes programmed in MSP10 and MSP2.

"Night mode" on 10 Position Switch Panel (not inc. PM435-BT) or "Silent" mode on the Monitor

By pressing "Night mode" on the switch panel or "Silent mode", all LED indicators of the 10 Position Switch and backlight of Monitor will be turned off; in the meantime, the output power of PM435 will be reduced in order to stop the fan for a noiseless night.

"Night Light" on 2 Position Bedroom Switch (not inc. PM435-BT)

By pressing "Night Light", the Ceiling light will be turned on, and by holding down "Night Light" button to adjust a proper brightness for night without disturbing other's sleeping. The brightness setting will be remembered.

3. STRUCTURE AND INSTALLATION

3.1 PM435 Power Management System

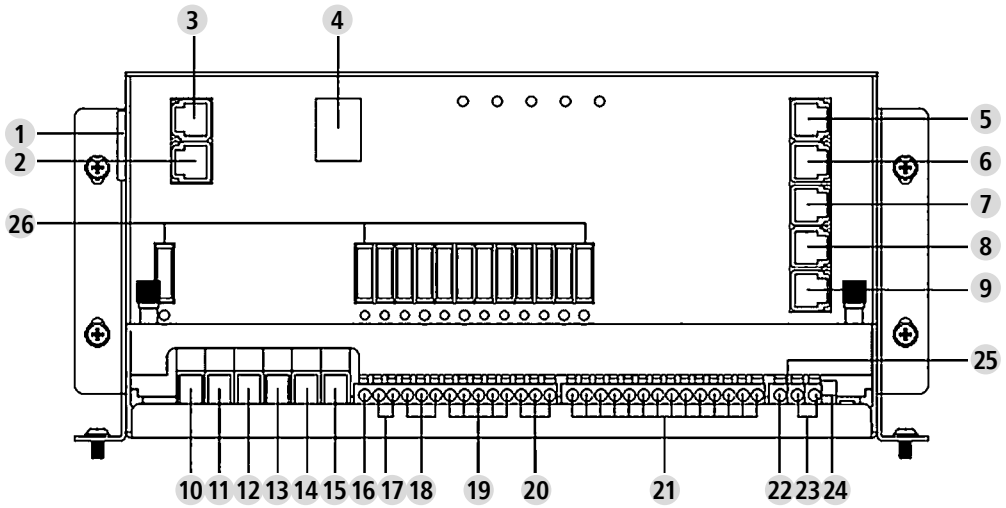


Figure 10 Front panel of PM435

No.	LABEL	DEFINITION	DESCRIPTION
1	Power	AC input port	
2	Switch panel	Comm port	Connect to switch panel
3	LCD Display	Comm port	Connect to Monitor
4	Battery switch	Service battery switch	Manual battery switch
5	Fresh water tank 1		Connect to fresh water tank 1
6	Fresh water tank 2		Connect to fresh water tank 2
7	Tap water tank		Connect to tap water tank
8	Waste water tank		Connect to waste water tank
9	Battery sensor	For temp compensation	Connect to service battery+
10	PV+	Solar input	Connect to PV+
11	PV-		Connect to PV-
12	Starter Bat+	Starter battery+	Connect to starter battery+ (<20Vdc)
13	Service Bat+	Service battery+	Connect to service battery+ (<20Vdc)
14	Starter Bat-	Starter battery-	Connect to starter battery-
15	Service Bat-	Service battery-	Connect to service battery-
16	L1+	Step	Connect to load of class D
17	L2+ ~ L3+		Connect to load of class C
18	L4+ ~ L6+		Connect to load of class B
19	L7+	Switch B	Connect to Switch B+
	L8+	Switch A	Connect to Switch A+
	L9+	Outside light	Connect to Outside light+
	L10+	TV	Connect to TV+
	L11+	Water pump	Connect to Water pump+
20	L12+	Dining light	Connect to Dining light+
	L13+	Bedroom light	Connect to Bedroom light+
	L114+	Ceiling light	Connect to Ceiling light+
21	L1- ~ L14-		Connect to DC load -
22	D+ Point	D+ input	Connect to D+
23	Remote Switch	Terminal block	Connect to remote switch
24	Select Switch	Dip switch	Select local switch or remote switch (Notice: open the upper cover board to operate)
25	Setting	Dip switch	Set the battery type and capacity (Notice: open the upper cover board to operate)
26	Fuse		Fuses with indicator for blown

Table 5 Connection of PM435

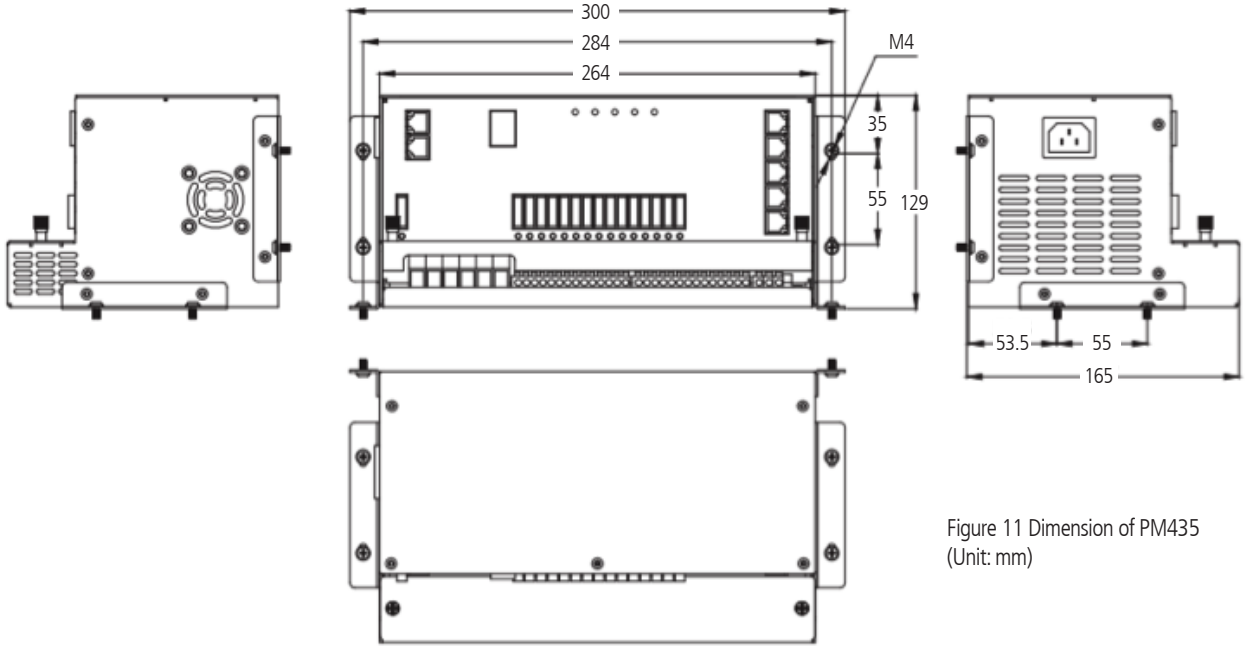
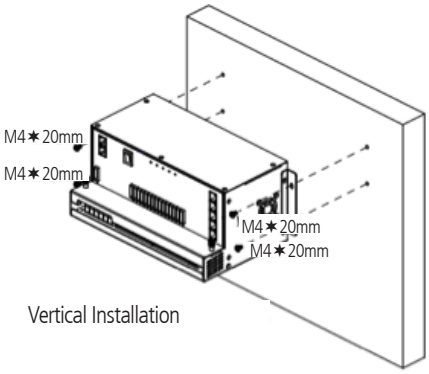


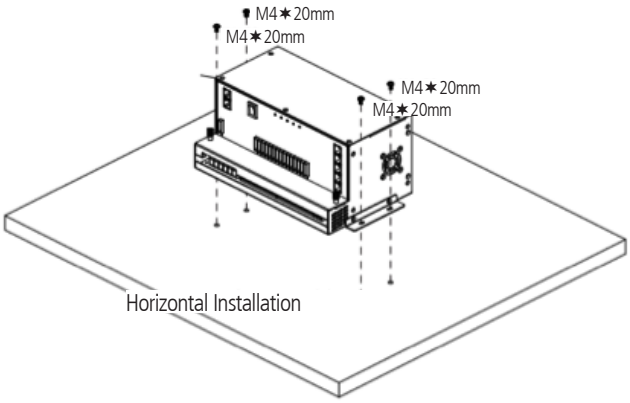
Figure 11 Dimension of PM435
(Unit: mm)

Installation

PM435 can be installed on a horizontal surface or vertically on a wall. Please see following instructions:



Vertical Installation



Horizontal Installation

Ensure clearance on both sides of PM435 unit upon installation. A recommended clearance of 5cm on each side.

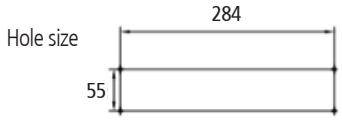


Figure 12 Installation of PM435
(Unit: mm)

3.2 Monitor

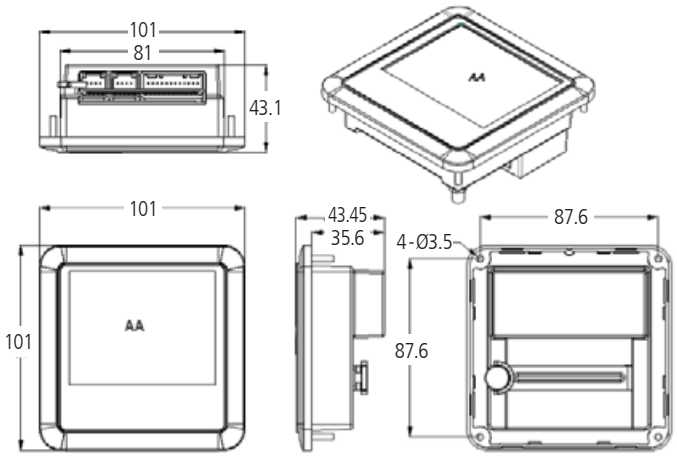


Figure 13 Dimension of Monitor
(Unit: mm)

Installation

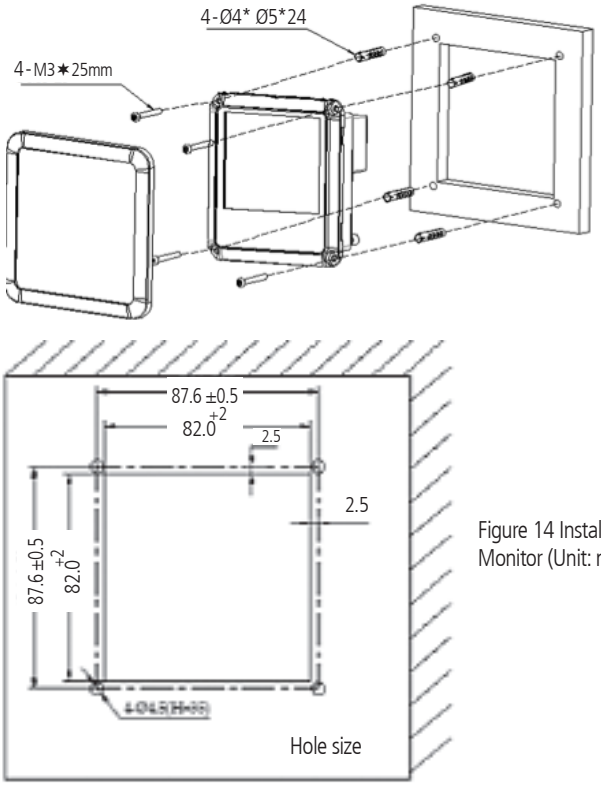


Figure 14 Installation of Monitor (Unit: mm)

3.3 10 and 2 Position Switch Panel (not inc. PM435-BT)

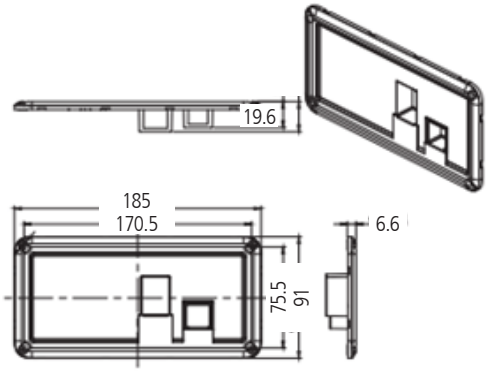


Figure 15 Dimension of PM4SW10 (Unit: mm)

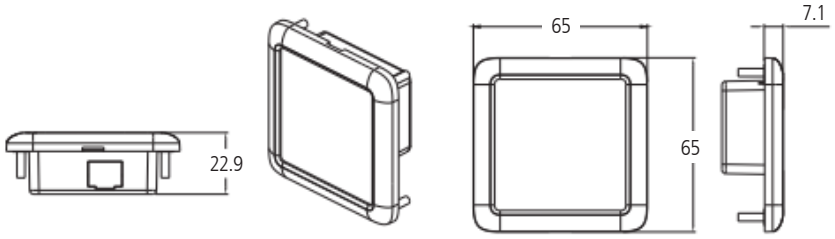


Figure 16 Dimension of PM4SW2 (Unit: mm)

Installation

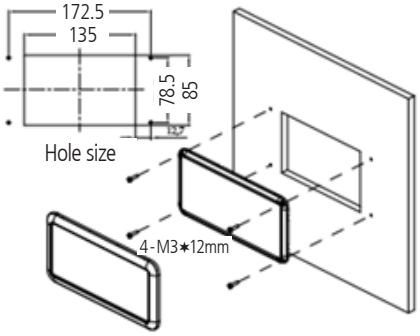


Figure 17 Installation of PM4SW10 (Unit: mm)

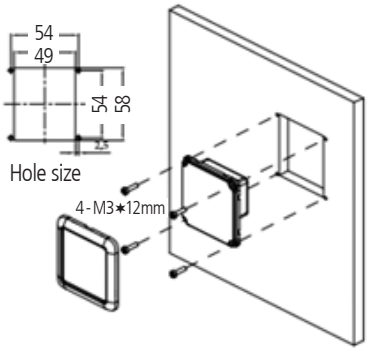


Figure 18 Installation of PM4SW2 (Unit: mm)

3.4 Water Tank Probe

3.4.1 PMWS400 Water Tank Probe

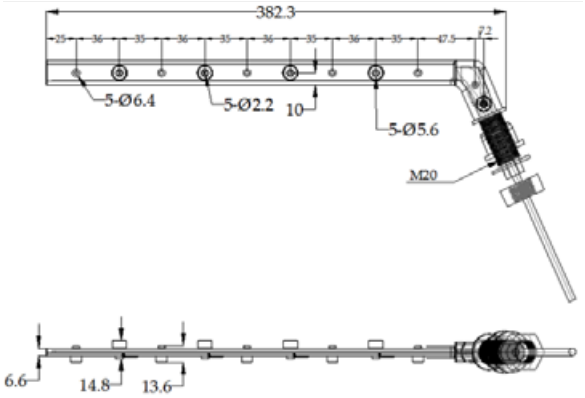


Figure 19 Dimension of PMWS400 (Unit: mm)

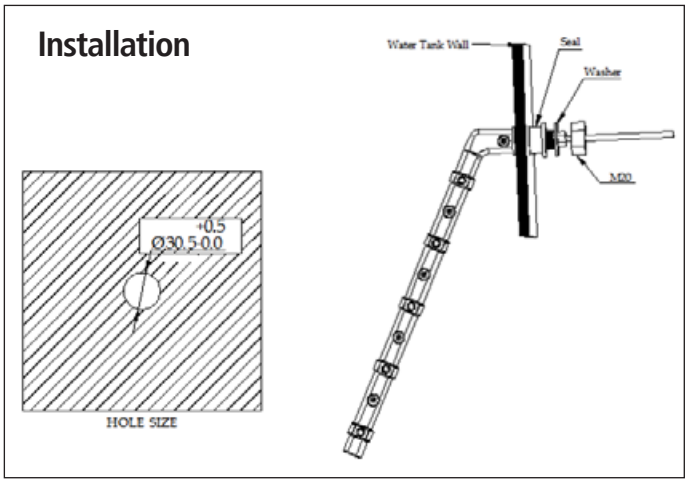


Figure 20 Installation of PMWS400 (Unit: mm)

3.4.2 PMWS200 Water Tank Probe

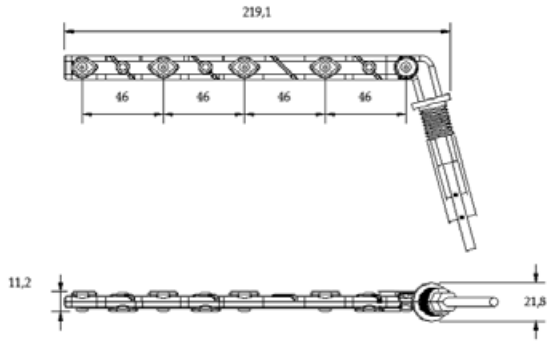


Figure 21 Dimension of PMWS200 (Unit: mm)

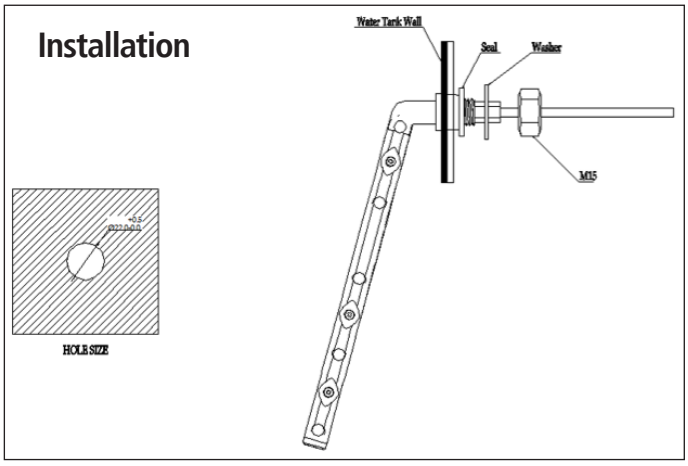


Figure 22 Installation of PMWS200 (Unit: mm)

4. WIRING

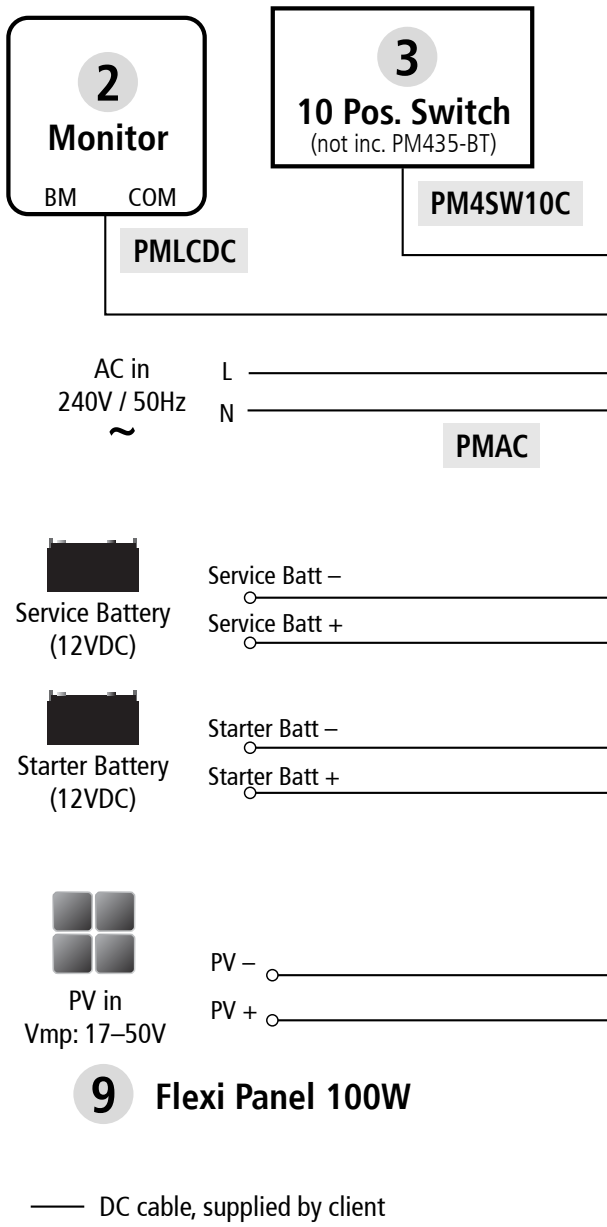
4.1 Material

Following components are delivered the PM400 package.

CODE	NAME	MODEL OR LENGTH	QTY.	PART No. ON DRAWING
1	Caravan Master Power	PM435	1	1
2	Monitor with Bluetooth	PMLCD-BT	1	2
3	10 Position Switch Panel	PM4SW10	1	3
4	Fresh water tank 1 level sensor	Not Included	0	4
5	Fresh water tank 1 level sensor		0	5
6	Tap water tank level sensor		0	6
7	Waste water tank level sensor		0	7
8	2 Position Switch Panel	PM4SW2	2	8
9	PV	Not Included	0	9
10	Communication line – RS485	5m	1	PMLCDC
11	Switch panel line	5m	1	PM4SW10C
12	Battery sensor line	3m	1	PMBS
13	Water tank probe line	Not Included	0	PMWS200 / PMWS400
14	Water tank probe line		0	
15	Water tank probe line		0	
16	Water tank probe line		0	
17	Power Cable	1.5m	1	PMAC

Table 6 Component list of PM435

4.2 System Schematic



4.3 Preparation

PM435 system is designed with concept of 'Plug in and Play' in mind. To complete the easy installation, a screw driver and DC cables are required. Follow Table 5 recommendation for minimum wirings.

CURRENT	MINIMUM CABLE SIZE
0–5A	1.0mm2 or 18 AWG
5–10A	2.0mm2 or 14 AWG
10–15A	3.0mm2 or 13 AWG
15–20A	4.0mm2 or 11 AWG
20–25A	5.0mm2 or 10 AWG
25–30A	6.0mm2 or 9 AWG

Table 7 Minimum cable size

When running cables, if they pass through panels or wall, ensure the cables are protected from damage by sharp edges. In such cases, it is recommended to use cable glands.

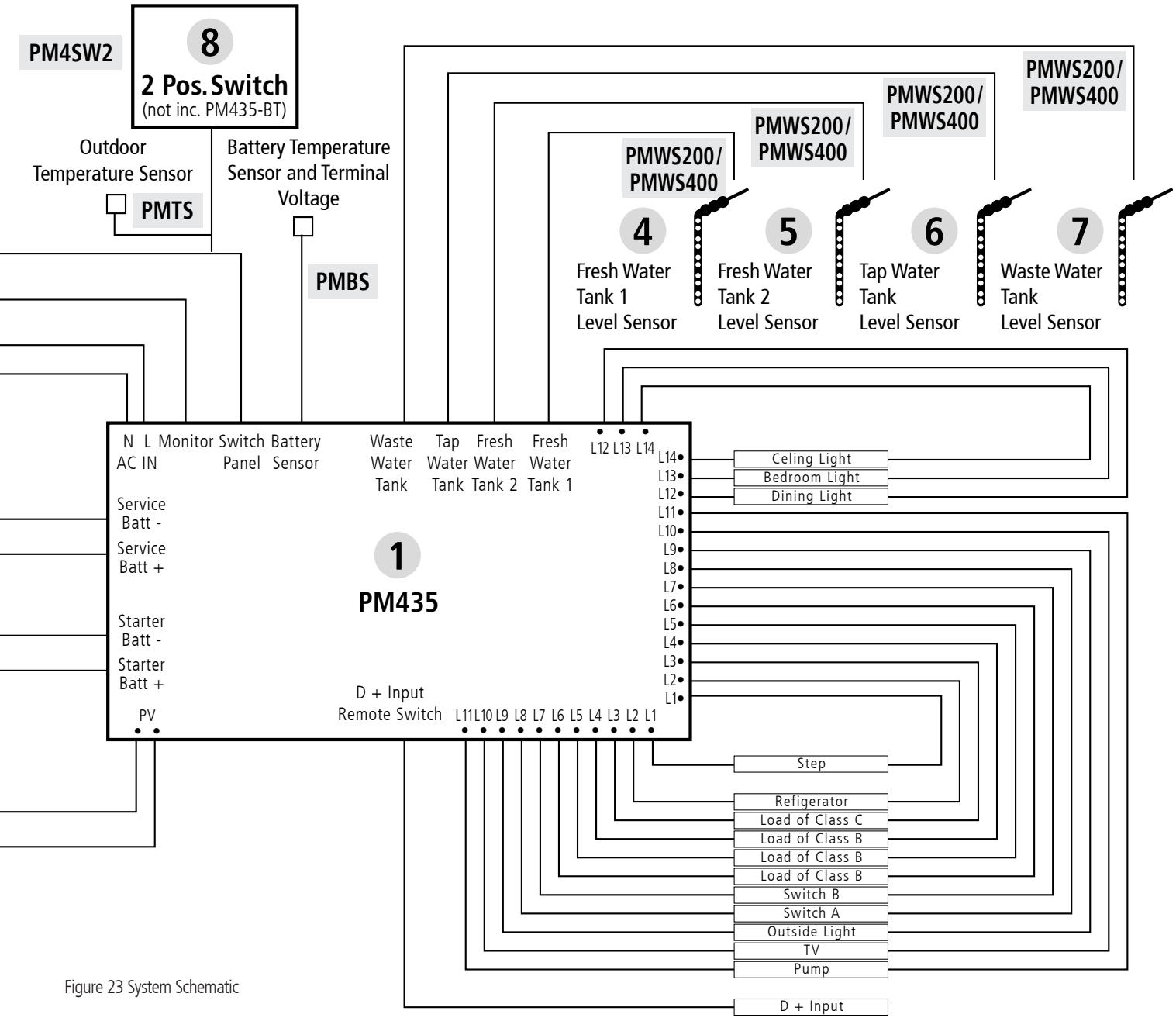


Figure 23 System Schematic

4.4 Connection

PM435 unit is designed with a spring and screw terminal. Please refer to following illustration at right.
Each type of terminal is designed to fit a different range of cables.

TYPE	TERMINAL MODEL NUMBER	SUITABLE CABLE GAUGE
Type 1	ERTB10-10.16	0.5mm2 - 10mm2
Type 2	wago804-114	0.25mm2 - 2.5mm2

Table 8 Recommended terminal and cable gauge

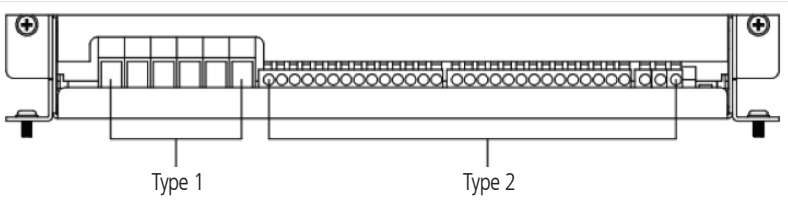


Figure 24 PM435 Terminal

TYPE 1

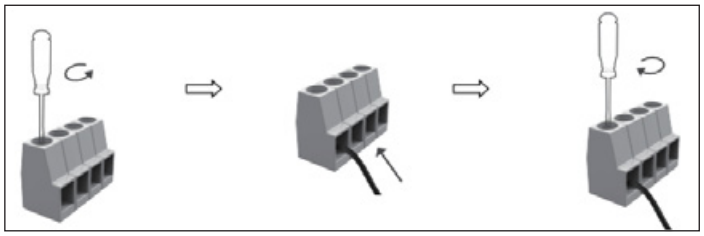


Figure 25 Connection of Terminal Type 1

TYPE 2

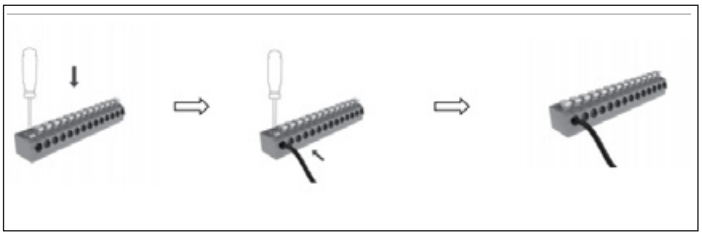


Figure 26 Connection of Terminal Type 2

5. DISPLAY

5.1 PM435 Power Management System

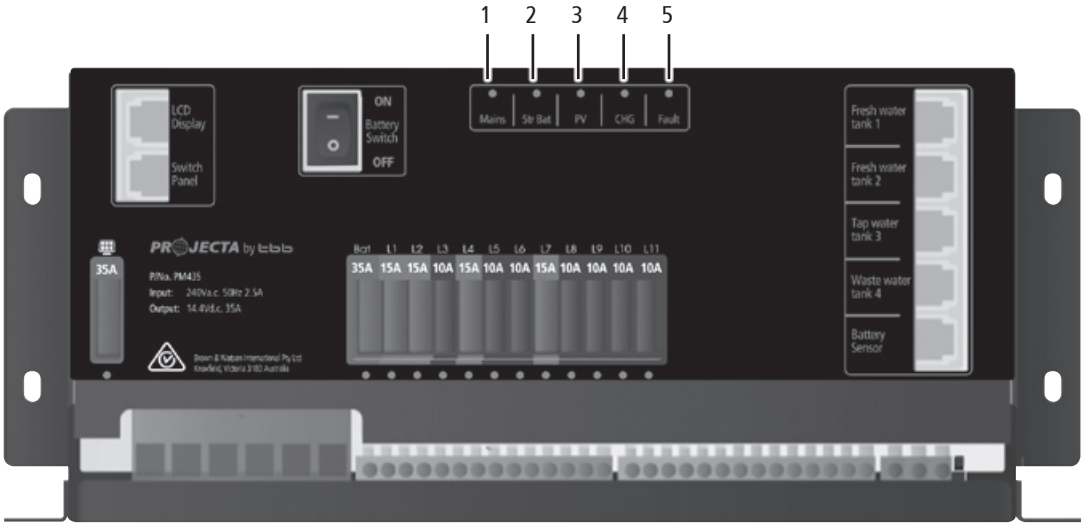


Figure 27 An overview of PM435

No.	LED	COLOUR	STATUS	DESCRIPTION
1	Mains	GREEN	ON	AC input OK
			OFF	AC disconnected
			Quick flashing (flash twice every second)	AC input abnormal
2	Starter Battery	GREEN	ON	Alternator charging the SERVICE battery
			Slow flashing (flash once every second)	Starter battery is >13.4V and is being charged by the PM435
			Quick flashing (flash twice every second)	The Starter Battery is 2~13.4V or >16.0V, while AC power is connected.
			OFF	Starter battery is disconnected.
3	PV (Solar)	GREEN	ON	Solar charging the battery
			Slow flashing (flash once every second)	The input voltage of the Solar is normal and the service battery is charged by the AC or Alternator
			Quick flashing (flash twice every second)	PV input error
			OFF	PV disconnected
4	CHG	GREEN	ON	Battery charged
			Flashing (flash once every second)	Battery charging
			Slow flashing (1 second on 2 seconds off)	Battery discharge
			OFF	Battery disconnected
5	FAULT	RED	ON	Short circuit
			Flash once per cycle	Service battery voltage low
			Flash twice per cycle	Service battery voltage high
			Flash 3 times per cycle	PM435 unit Over Temperature
			Flash 4 times per cycle	Bulk charge timeout
			Flash 5 times per cycle	VCR anomaly
			Flash 6 times per cycle	Environment Over Temperature

Table 9 LED indicator description of PM435

5.2 10 Position Switch Panel PM4SW10 (not inc. PM435-BT)

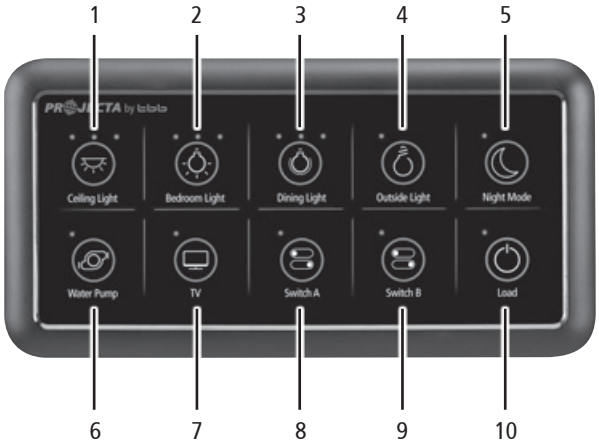


Figure 28 An overview of PM4SW10

No.	NAME	TYPE	DESCRIPTION
1	Ceiling light	DC load control	Load control, support brightness adjustment. May not be compatible with capacitive touch lights
2	Bedroom light		
3	Dining light		
4	Outside light		Load control, on/off control
5	Night mode	Scene mode	Refer to Chapter 2.11
6	Water pump	DC load control	Load control, on/off control
7	TV		
8	Switch A		
9	Switch B		
10	Load		Refer to Chapter 1.3

Table 10 Button explanation of PM4SW10

5.2.1 2 Position Switch Panel PM4SW2 (not inc. PM435-BT)

Figure 29 An overview of PM4SW2

No.	NAME	TYPE	DESCRIPTION
1	Bedroom light	DC load control	Load control, brightness adjustment
2	Night light	Scene mode	Load control, Brightness adjustment, refer to Chapter 2.11

Table 11 Button explanation of PM4SW2

When there are more than one PM4SW2 in the system. The customer should pay attention to the address setting by dip switch P3 and P4 for them. They should not be the same.

P3	P4	ADDRESS
On	On	1#
On	Off	2#
Off	On	3#
Off	Off	4#

Table 12 Switch address settings of PM4SW2

5.3 Monitor PMLCD-BT

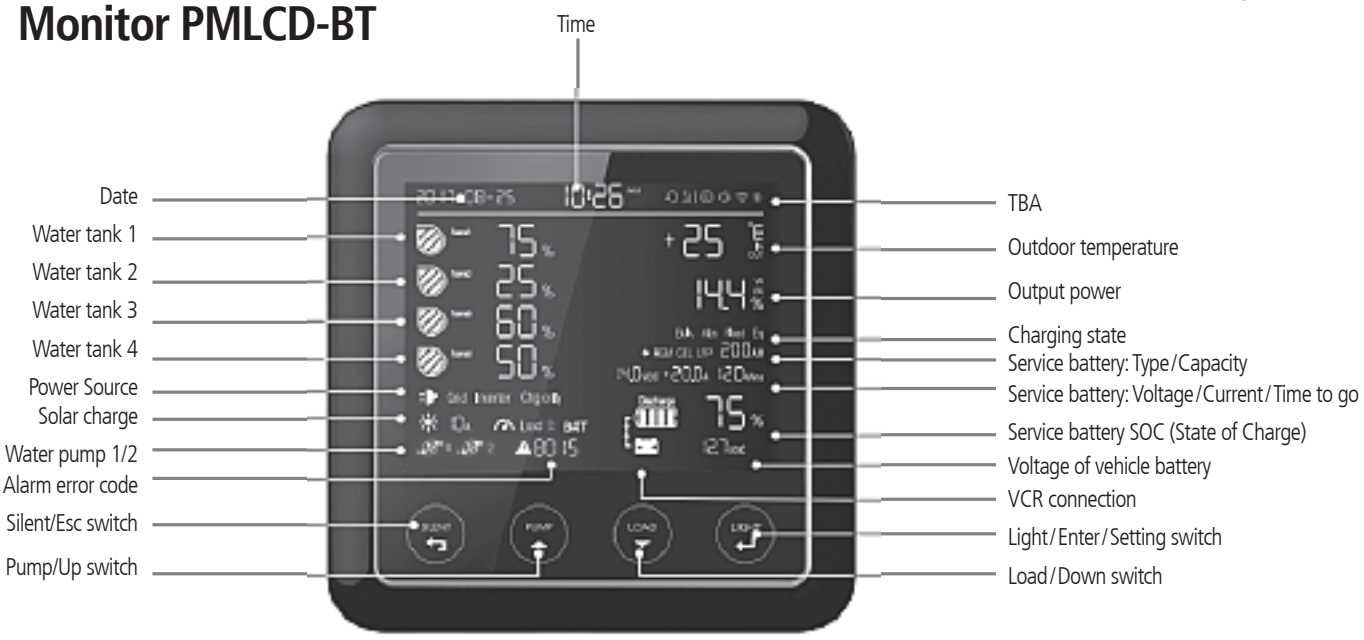


Figure 30 An overview of Monitor PMLCD-BT

5.3.1 Monitor Symbol Explanation

No.	DESCRIPTION		COMMENTS
1	Water level		0%-25%-50%-75%-100%
	Water Tank 1	EMPTY	Flashing, the water is less than the recommended level
	Water Tank 2		
	Water Tank 3		
	Water Tank 4	FULL	Flashing, the gray water or waste water is more than the alarm level
2	Working Mode	GRID	AC grid status
		CHARGE ONLY	Battery charger only
3	Load		Status of DC-Load switch in system: on / off
		BATTERY	DC loads are powered by battery
4	Water Pump		Pump 1 is ON
			Pump 1 is OFF
5	Alarm Error Code		Overload alarm
			Over temperature alarm
			System error code. Refer to the error codes on page 22
6	VCR connection		Voltage charging relay (VCR) is connected
			Voltage charging relay (VCR) is disconnected
7	Output power		Voltage of system output
			Current of system output

Table 13 Monitor Symbol explanation

5.3.2 Switch Explanation

SWITCH	FUNCTION	DESCRIPTION
SILENT & ↵	Stop the fan ventilation in order to reduce the noise Refer to 3.11	Press 'Silent/Esc' button until  shows on the screen, then press 'Light/Enter'.
PUMP & ↵	To switch on/off pump	Pump on:  Pump off:  The detailed steps are shown as below Figure 31
LOAD & ↵	To switch off all the loads connected on DC charger	The function is the same as Load switch in PM4SW10. The detailed steps are shown as below Figure 32
LIGHT ↵	To adjust the brightness and switch off the backlight of he monitor	Total three levels of brightness
LIGHT For Setting ↵	To set clock, battery battery tank quantity etc	Hold down the 'LIGHT' button until the Date zone (Table 20) shows the setting code. It means the unit enters the setting mode. For the full details of setting codes, please refer to Chapter 6.2.1

Table 14 Switch explanation

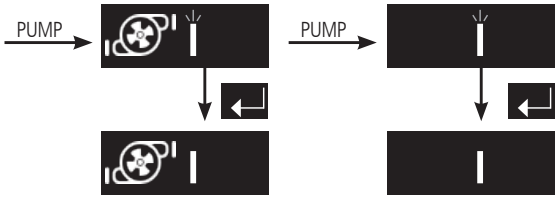


Figure 31 Switch ON /OFF Pump

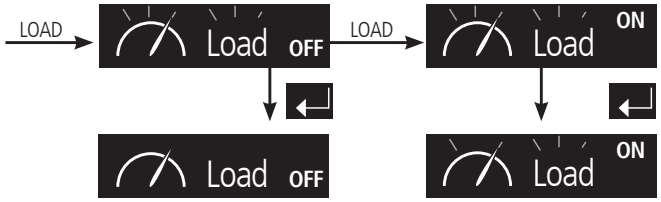


Figure 32 Switch ON/OFF all of the DC Loads

5.3.3 Alphabet Explanation

CHARACTER	A	b	C	d	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	X	Y
ALPHABET	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	X	Y

Table 15 Alphabet explanation

6. OPERATION

If there is conflict between the configuration on PM400 and the monitor, the monitor will flash as a reminder.

6.1 Configuration on PM435

If there is conflict between the configuration on PM435 and the monitor, the monitor will flash as a reminder.

6.1.1 Battery Capacity and Battery Type

There is a dip switch for you to set battery capacity and battery type.

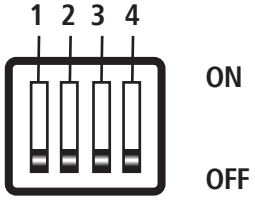


Figure 33 Dip Switch of PM435

Dip switch definitions:

DIP SWITCH	1	2	3	4
	Battery Capacity		Battery Type	

Table 16 Dip Switch definition

Configure the Max Charging Current of PM435

DS1	DS2	BATTERY CAPACITY	CHARGING CURRENT OF PM435
ON	ON	100Ah	10A
ON	OFF	150Ah	15A
OFF	ON	200Ah	20A
OFF	OFF	300Ah	30A

Table 17 Battery capacity setting by dip switch

When choosing max charging current, please take into consideration the consumption of the DC load connected with the system.

Configure the Battery Type Installed

DS3	DS4	BATTERY TYPE	ABSORPTION	FLOAT
OFF	OFF	AGM	14.4V	13.5V
OFF	ON	GEL	14.1V	13.5V
ON	OFF	LFP ($LiFePO_4$)	14.4V	13.5V
ON	ON	WET	14.7V	13.7V

Table 18 Battery type setting by dip switch

Factory default setting

DIP SWITCH	1	2	3	4
STATUS	OFF	OFF	OFF	OFF

Table 19 Factory default setting

Settings of 'Battery Type' and 'Battery Capacity' need to be the same at both the PM435 dip switch and the monitor.

When the battery type and capacity setting on the monitor is not the same as PM435 dip switch, the icons are flashing.

Figure 34 Reminder when conflict setting between PM435 and Monitor

6.1.2 Select Battery Switch Local/Remote

This function offers a possibility for user to use a remote battery switch to power on/off the service battery output

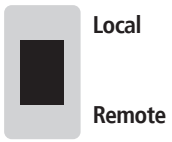


Figure 35 Local/Remote Select Switch

DIP SWITCH	DESCRIPTION
Local	The switch on PM435 unit works
Remote	The remote switch works and local one is disabled

Table 20 Local/Remote Setting

6.2 Configuration on Monitor

Access to the configuration menu is safeguarded with a passcode. The default is 0000 and may be set by a user.

PASSCODE DESCRIPTIONS

0000 Factory Default, no passcode

1999 Factory access passcode

XXXX User define

Press the 'Light' button until the setting code is showing on the date time area which means the monitor is ready for configuration. The 'PUMP' button and 'LOAD' button can be used to scroll through the configuration menu.

CODE	FUNCTION	DESCRIPTION
CLOC	Time Setting	Set date system 12H/24H and date.
bAtt	Battery Setting	
tyPE	Battery Type	AGM / GEL / LFP ($LiFePO_4$)/WET
CAPA	Battery Capacity	
bLuP	Battery Low Voltage Protection	To shutdown the output of loads
PUnP	Pump	Pumps enable or disable
PUnP1	Pump 1	Select Pump 1
PUnP1 On	Pump 1 ON	Pumps 1enable
PUnP1 OF	Pump 1 OFF	Pump 1 disable
FACtry	Restore factory defaults	
CAnCEL	Cancel	Cancel to restore factory defaults
ACCEPt	Accept	Confirm to restore factory defaults
uEr	Version	Software version of devices. read only
CnP	CMP	Software Version of PM435
LCd	LCD	Software Version of LCD
bLE rAd	Cut off BlueTooth	Shut down connection of Crystal to APP
UPdAt En	Update enable	Enable to update firmware

Table 21 Setting code of the Monitor

6.2.1 Monitor Configuration Menu

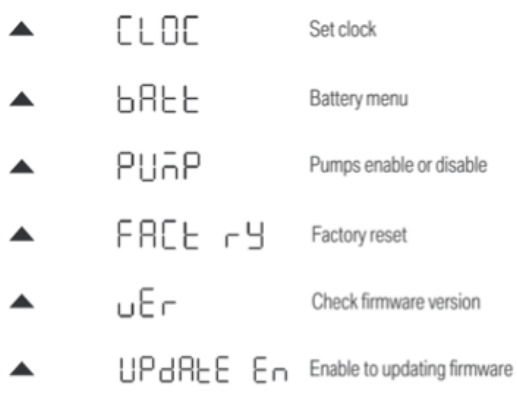


Figure 36 Main menu of setting

Figure 37 Date and Time setting

Figure 38 Battery Type setting

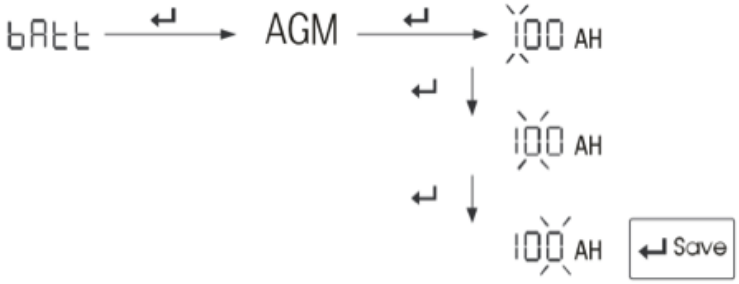


Figure 39 Battery Capacity setting

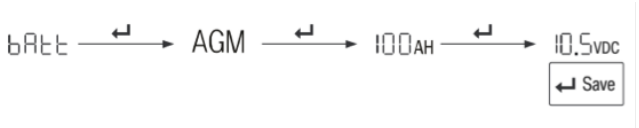


Figure 40 Low Voltage Protection setting

Figure 41 Water Pump Enable/Disable setting

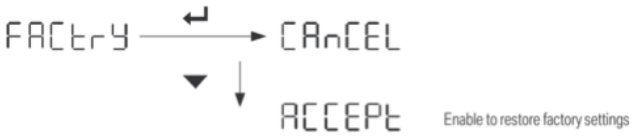


Figure 42 Restore factory setting

Figure 43 Update firmware

6.3 Operation of Switch Panels PM4SW10 and PM4SW2 (not inc. PM435-BT)

6.3.1 Dimming Operation

There are three buttons on the PM4SW10 (not inc. PM435-BT) which can support brightness adjustment which is also mirrored on the APP. They are "Ceiling light"," Bedroom light" and "Dining light". 3 levels brightness each of them. Press and hold the button can switch between the different brightness. Short press the button is to switch on/off the LED.

Warning: PM435-BT / PM400 dimming function may cause lights with capacitive touch switches to flicker.

The dimmable outputs are 3.5A output each. If the current is exceeded it will turn the lights on and off.

6.3.2 Scene Mode Operation

There are two modes built in PM4SW10, PM4SW2 and also the APP control.

"Night mode" on PM4SW10 (not inc. PM435-BT, but can be triggered via the APP)

Press "Night mode" is to switch on/off "Night mode". Details of "Night mode" please refer to chapter 2.11.

"Night Light" on PM4SW2 (not inc. PM435-BT). On the APP also

Short press the "Night light" is to switch on/off the ceiling light.

Long press the "Night light" can adjust the brightness of the ceiling light. The brightness of the ceiling light at this mode is even darker than the darkest level of the button "Ceiling light" of PM4SW10. The brightness will be remembered for next operation.

6.4 MAINTENANCE

6.4.1 Battery Monitor Maintenance

There is a built-in battery measurement in the PM400 & PM435-BT systems. To assure the accuracy, maintain the system with the following instructions:

1. Fully charge the battery from AC grid instead of PV every 2 weeks.

2. Do a full charge to the battery every 3 months.

- Charge the battery with AC grid until the 'CHG' LED light on PM435 unit or 'FLOAT' shows on the monitor

Every 3 months, the monitor will display a code (8018) suggesting maintenance. If you have performed maintenance and would like to turn off this alarm, press 'SILENT' button for 1s.

Only the energy consumption of the loads connected on the PM435 is measured and calculated in the data on the Monitor.

6.4.2 Daily Maintenance

- Confirm the Battery Switch is turned on when you want to charge the battery with the AC grid.
- Check the nominal battery voltage is 12VDC.
- Ensure the space (5cm each side) beside the PM435 unit for the appropriate ventilation

Upon long time parking, you are recommended to switch off the local Battery Switch on main panel of PM435 power unit or remote switch to cut off the consumption of the service battery.

7. TROUBLE SHOOTING

7.1 L.E.D Display on PM435

No.	LED	COLOUR	STATUS	DESCRIPTION
1	Mains	Green	Quick flashing (flash twice every second)	AC input abnormal
2	Str Bat	Green	Quick flashing (flash twice every second)	The Starter Battery is 2~13.4V or >16.0V, while AC power is connected.
3	PV	Green	Quick flashing (flash twice every second)	Solar input voltage error – Solar input >50Vdc
4	Fuse LED	Red	Solid	Fuse blown, need to check load and replace fuse
5	Fault	Red	ON	Short circuit
			Flash once per cycle	Service battery voltage low
			Flash twice per cycle	Service battery voltage high
			Flash 3 times per cycle	PM435 unit over temp
			Flash 4 times per cycle	Bulk charge timeout
			Flash 5 times per cycle	VCR anomaly
			Flash 6 times per cycle	Environment over temp

Table 22 Error LED indicator of PM435

7.2 Error Code on Monitor

ERROR CODE	DESCRIPTION
8001	Lose communication
8003	Battery voltage low
8004	Battery voltage high
8005	PV voltage low
8006	PV voltage high
8010	Battery temperature high
8011	Battery temperature low
8012	Internal temperature high
8013	Starter battery voltage low
8014	Starter battery voltage high
8015	Over load
8016	Output short circuit
8017	Module protection

ERROR CODE	DESCRIPTION
8018	Battery maintenance notice
8027	VCR connect is error
8028	VCR disconnect error
8030	Environment temperature is high
8031	Bulk stage time-out

Table 23 Error code list

8. SPECIFICATION

MODEL		PM435
ELECTRICAL SPECIFICATIONS		
Grid	Nominal input voltage (V)	240 10%VAC 50/60Hz
	Power factor	0.95
	Input current at full load	2.5A
Battery	Starter Battery	12VDC
	Starter battery voltage range	12.8-16VDC
	Service battery	12VDC
	Service battery voltage range	10.5-16VDC
PV	Charger type	MPPT
	Open circuit voltage	50VDC
	Max supply current	30A
	Max charging current	30A
Charging Relay	Relay specification	12VDC 60A continuous, peak current 100A, 30mins
	Connect voltage	Lead Acid 13.4VDC $LiFePO_4$ 14.0VDC
	Connect delay time	10sec
	Disconnect voltage	Lead Acid 13.4VDC $LiFePO_4$ 13.5VDC<2A
	Disconnect delay time	60sec
	High voltage limit	16.0VDC
Charger Mode	Charge Algorithms	5 Stage
	Battery type	AGM/GEL/LFP (LiFePO4)//WET
	Start voltage	2V (Gel, AGM, Wet) 0V (LFP)
	Bulk current	30A (Max)
	Absorption voltage	(14.4/14.1 /14.4/14.7) 0.15VDC
	Float voltage	(13.5/13.5 /13.5/13.7) 0.13VDC
Power Supply Mode	Nominal output voltage	12.8 0.2 VDC
	Rated output current	35A (Continuous)
Efficiency		88%
Working temperature		-40°C +65°C (50°C:full load; 60°C:20A; 65°C: shutdown the output)

MODEL		PM435	
ELECTRICAL SPECIFICATIONS			
Battery Disconnect (LVD)	Disconnect voltage	AGM/GEL/WET	10.5VDC (default)
		LFP (LiFePO4)	11.2 VDC (Default)
	Delay off time	60 sec	
	Reconnect voltage	AGM/GEL/WET	11.5VDC (default)
		LFP (LiFePO4)	12.2 VDC (Default)
Current draw on Battery	240VAC is off, no vehicle charging	720mA	
	Load switch off	295mA	
	LVD off, Service<10.5V current draw on battery	165mA	
	Battery switch OFF <10V draw on battery	0mA	
Fused outputs	Numbers	11	
	Rated Current	15A x 4: 10A x 7	
	Light Outputs	(L12, L13, L14) 3.5A x 3	
Protection	Short circuit on output	Fuse blown	
	Reverse polarity	Diode reverse isolation	
	Overload protection	Derate the output until overload is removed	
	Battery charger over temperature	Shut down PM435	
	Ambient over temperature	Alarm	
	Battery over voltage limits	Battery charger disconnect, loads disconnect	
PHYSICAL SPECIFICATIONS			
Dimensions (L*W*H)	264 × 164 × 128mm		
Weight	3kgs		
Enclosure	Steel Case		
Battery Connector	M4 Screw (16mm2)		
Load Connector	Wago804-114 (2.5mm2)		
Cooling	Forced cooling		
Protection category	IP20		
Approvals			
Electrical	AS/NZS 60335.2.29		
EMC	CISPR14		

Table 24 Specification of PM435 Standard system

WARRANTY STATEMENT

Applicable only to product sold in Australia

Brown & Watson International Pty Ltd of 1500 Ferntree Gully Road, Knoxfield, Vic., telephone (03) 9730 6000, fax (03) 9730 6050, warrants that all products described in its current catalogue (save and except for all bulbs and lenses whether made of glass or some other substance) will under normal use and service be free of failures in material and workmanship for a period of one (1) year (unless this period has been extended as indicated elsewhere) from the date of the original purchase by the consumer as marked on the invoice. This warranty does not cover ordinary wear and tear, abuse, alteration of products or damage caused by the consumer.

To make a warranty claim the consumer must deliver the product at their cost to the original place of purchase or to any other place which may be nominated by either BWI or the retailer from where the product was bought in order that a warranty assessment may be performed. The consumer must also deliver the original invoice evidencing the date and place of purchase together with an explanation in writing as to the nature of the claim.

In the event that the claim is determined to be for a minor failure of the product then BWI reserves the right to repair or replace it at its discretion. In the event that a major failure is determined the consumer will be entitled to a replacement or a refund as well as compensation for any other reasonably foreseeable loss or damage. This warranty is in addition to any other rights or remedies that the consumer may have under State or Federal legislation.

IMPORTANT NOTE

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Distributed by

AUSTRALIA

Brown & Watson International Pty Ltd
Knoxfield, Victoria 3180
Telephone (03) 9730 6000
Facsimile (03) 9730 6050
National Toll Free 1800 113 443

NEW ZEALAND

Narva New Zealand Ltd

22–24 Olive Road
PO Box 12556 Penrose
Auckland, New Zealand
Telephone (09) 525 4575
Facsimile (09) 579 1192

IS404
Issue 04/08/20