1. Overview

The MCK is a device which allows user to remotely monitor and control TBB's inverters, such as CM3.0L, CM2.0L, CM3.0S, CM5.0S, CG3.0S, CG5.0S etc. The user can learn information from MCK's display: Battery voltage、current, Inverter load percentage, AC input/output voltage、current、frequency and power.

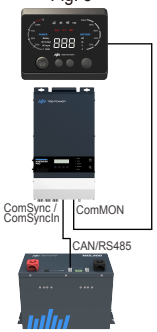
The MCK is a device which allows user to remotely monitor and control TBB's lithium battery, such as M12 series, P12 series, etc. The user can learn information from MCK's display: Battery voltage、current, SOC and load percentage.

The MCK is a device which allows user to remotely monitor and control TBB's inverter with TBB's lithium battery, such as CC3.0L with M12 series, etc. The user can learn information from MCK's display: Battery voltage、current and SOC, Inverter load percentage, AC input/output voltage、current、frequency and power.

Fig. 1

Fig. 2

Fig. 3



2.Installation and connection

2.1 Installation

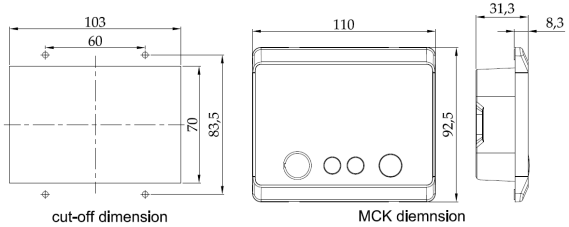


Fig. 4 Installation dimension of MCK(Unit: mm)

Installation step:

1)Cut holes on mounting surface following the cut-off dimension in Fig. 4.

2)Place the MCK in position properly and fix the MCK by 4pcs m2*12 screws.

2.2 Connection

Use the cable with RJ45 terminal to connect the MCK to the **ComMON** terminal of TBB's inverter in Fig.1.

Use the cable with RJ45 terminal to connect the MCK to the **Display** terminal of TBB's lithium battery in Fig.2.

Use the cable with RJ45 terminal to connect the MCK to the **ComMON** terminal of TBB's inverter, and connect the **ComSync** or **ComSyncIn** terminal of TBB's inverter to the **CAN/RS485** terminal of the TBB's lithium battery in Fig.3.

3.Display

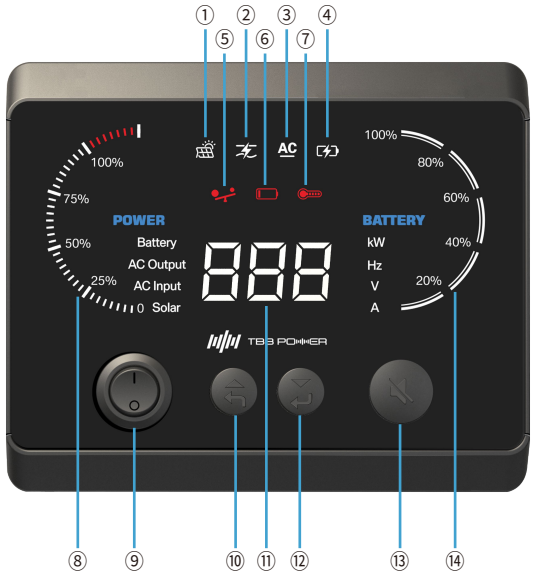


Fig.5 Display and Button of MCK

Table 1 Display and Button of MCK

NO.	Definition	Description
①	Solar	To indicate solar charger is charging
②	Invert	To indicate inverter is working
③	Bypass	To indicate Grid or generator is presenting
④	Charge	To indicate battery is charging
⑤	Overload alarm	To indicate when inverter / battery is overloaded
⑥	Battery low voltage alarm	To indicate when inverter reach under-voltage
⑦	Over-temperature alarm	To indicate when inverter / battery is over-temperature
⑧	Load percentage	To indicate the percentage of actual load power against rated power of inverter / battery installed
⑨	Inverter ON/OFF switch	To turn the inverter / battery ON or OFF
⑩	Scroll up or Return button	To scroll up to last item. Or, as function of exit Configuration with long press of 3 secs
⑪	Value information area	LCD displaying value
⑫	Scroll down or Confirm button	To scroll down to next item. Or, as function of confirmation of your selection and configuration, with long press for 3 secs
⑬	Mute button	To mute or unmute the alarm
⑭	Battery SOC	To indicate battery state of charge

Use the MCK to monitor TBB's inverters or to monitor and control TBB's inverters with TBB's lithium battery, the MCK can dispalay information among Battery, AC Output, AC Input and Solar for multiple parameters listed in Table 1 by the **Scroll Up** or **Scroll Down** button.

Use the MCK to monitor TBB's lithium battery, the MCK can dispalay information among Battery for multiple parameters listed in Table 1 by the **Scroll Up** or **Scroll Down** button.

The information of Solar is available only the bi-directional inverter with built-in MPPT charger controller such as Apollo Maxx, CG3.0S, RiiO Sun etc.

Table 2 Detail LED display information of Battery SOC

Battery status	SOC	LED1	LED2	LED3	LED4	LED5
Charging	SOC=100%	illuminate	illuminate	illuminate	illuminate	illuminate
	80%≤SOC < 100%	illuminate	illuminate	illuminate	illuminate	flash
	60%≤SOC < 80%	illuminate	illuminate	illuminate	flash	off
	40%≤SOC < 60%	illuminate	illuminate	flash	off	off
	20%≤SOC < 40%	illuminate	flash	off	off	off
	0%≤SOC < 20%	flash	off	off	off	off
Discharge	80%≤SOC≤100%	illuminate	illuminate	illuminate	illuminate	illuminate
	60%≤SOC < 80%	illuminate	illuminate	illuminate	illuminate	off
	40%≤SOC < 60%	illuminate	illuminate	illuminate	off	off
	20%≤SOC < 40%	illuminate	illuminate	off	off	off
	0% < SOC < 20%	illuminate	off	off	off	off
	SOC=0	off	off	off	off	off

Table 3 Display information in value area

Display information		Item
Battery	V	Battery voltage
	A	Battery current
AC Output	kW	AC output power
	Hz	AC output frequency
	V	AC output voltage
	A	AC output current
AC Input	kW	AC Input power
	Hz	AC Input frequency
	V	AC Input voltage
	A	AC Input current
Solar	kW	PV power
	V	PV voltage

4. Configuration

Following parameters can be configured via MCK.

Table 4 Configuration items and setting value of MCK

Display information		Configuration item	Default setting and setting step
Battery	V	Absorption voltage, ON	Step:0.1V, Default:14.1V
	V	Float voltage, flashing	Step:0.1V, Default:13.6V
	A	Max charge current	Step:1A, Default:30A
AC Output	V	Output voltage	Step:10V, Default:230V
	Hz	Output frequency	Default:50/60Hz
AC Input	A	AC input rating	Step:1A, Default:32A
Buzzer	Alarms	Buzzer ON or OFF	Default: ON
Enable SOC Display		SOC lights and battery background lights are all flash	ON: Enable SOC display OFF: Disable SOC display Default: ON
Enable Screen Off Function		Power lights and battery background lights are all flash	ON: Enable the Screen Off function OFF: Disable the Screen Off function Default: OFF

Note: 1. The setting items of absorbtion charging voltage 、 float charging voltage and Max charge current are not displayed when the battery Type is "TBB LFP".

2. Once the Screen Off function is enabled, the screen will automatically go off if there is no key operation for three minutes. If the inverter status changes or an alarm occures, it will be restarted keep the screen on for three minutes.

3. When working with an inverter (or an inverter + lithium battery), you can set all the setting items in Table 4; When working with a lithium battery, only the Buzzer setting and Screen Off function in Table 4 can be set.

Step1. To enter into the configuration, Press Scroll down/Confirm button for 2secs.

Step2. Then you can use scroll up or scroll down button to choose the parameter you want to change.

Step3. Long press the Scroll down / Confirm button for 2secs to trigger on the configuration, the number/icon will flash.

Step4. Use Scroll up or Scroll down button to change the value.

Step5. Afterwards, long press the Scroll down / Confirm button for 2secs to confirm the configuration. The two bars (load ratio and battery soc) will flash indicating the configuration is in process.

Step6. After you have done all configuration you need, please press Scroll up/Return button for 2secs to exist configuration.

5. Error and Warning Code (The MCK to monitor TBB's inverters)

Upon any error and warning happened, MCK will display corresponding error and warning code. Please find following chart the definition for each code.

Table 5 Error code list (The MCK to monitor TBB's inverters)

Error Type	Error Code	Display	Description
Inverter error code	101	U_Bus_OV	DC bus over-voltage
	102	U_Bus_LV	DC bus under-voltage
	103	U_Bus_HW_Pro	DC bus hardware under-voltage
	104	PSU_Fault	Auxiliary power error
	105	T_HS_OT	Heat sink over-temperature
	106	T_TX_OT	Transformer over-temperature
	107	Sam_HD_Fault	Sampling fault
	108	EEPROM_Fail	EEPROM fault
	109	Output_ShortCut	Output short circuit
	110	Output_OverLoad	Output over-load
	111	CoolSys_Err	Cool system failed
	112	U_BAT_Low_Deep	Battery deep discharge
	113	U_INV_LV	Inverter output under-voltage
	114	Instant_OC_Soft	Inverter output instant over-current
	115	EPO	Emergency stop
	116	Rly_Err	Relay error

Error Type	Error Code	Display	Description
MPPT charger controller error code	301	U_Bus_OV	DC bus over-voltage
	303	U_Bus_OV HD	Battery over-voltage(Hardware)
	304	Buck_ShortCut	Buck short circuit
	305	I_Buck1_OC	Buck1 over-current
	306	I_Buck2_OC	Buck2 over-current
	307	T_Board_OT	Control board over-temperature
	308	T_HS_OT	Heat sink over-temperature
	309	PSU_LV	Auxiliary power under-voltage
	310	PSU_LV_HD	Auxiliary power under-voltage (Hardware)
	311	Sam_HD_Fault	Sampling error
	312	EEPROM_Fail	EEPROM error

Error Type	Error Code	Display	Description
BMS error code	040	Module_OV	Lithium module is over voltage protection.
	041	Module_UV	Lithium module is under voltage protection.
	042	Module_OT	Lithium module's temperature is too high.
	043	Module_UT	Lithium module's temperature is too low.
	044	Discharge_OC	Lithium module's discharge current is over normal value.
	045	Charge_OC	Lithium module's charge current is over normal value.
	046	Module_INT_Err	Lithium Battery Module fault.

Table 6 Warning code list (The MCK to monitor TBB's inverters)

Warning type	Warning Code	Display	Description
Inverter warning code	001	U_BAT_OV	Battery over-voltage warning
	002	U_BAT_LV	Battery under-voltage warning
	003	U_BAT_LV_Fault	Battery under-voltage protection
	004	OverLoad	Over-load
	005	NTC_HS_Fault	Heat sink NTC failed
	006	NTC_TX_Fault	Transformer NTC failed
	007	T_BAT_OT	Battery over-temperature
	008	Fan_Fault	Fan error
	009	ParConnect_Err	Parallel connection error
	010	ParComm_Err	Parallel CAN communication error
	011	Par_ID_Conflict	Parallel ID conflict
	012	Par_ParaSet_Conflict	Parallel parameter setting conflict
	013	Par_SyncTimeOut_Err	Parallel synchronization timeout
	014	ModeSet_Mismatch	Working mode setting mismatched
	015	Par_OutputCircuit_Err	Parallel output circuit error
	020	ACin_OV	AC input over-voltage
	022	ACin_OF	AC input over-frequency
	023	ACin_LF	AC input under-frequency
	024	ACin_PhaseErr	AC input phase error
	025	U_Neu_2_GND_Err	AC input voltage between Neutral and Ground error

Warning type	Warning Code	Display	Description
MPPT charger controller warning code	203	CUR_Limit	MPPT current limit warning
	205	NTC_HS_Fault	Heat sink NTC failed
	207	Fan_Fault	Fan error

Warning type	Warning Code	Display	Description
BMS warning code	050	Module_HV	Lithium module is over voltage.
	051	Module_LV	Lithium module is under voltage.
	052	Module_HT	Lithium module's temperature is too high.
	053	Module_LT	Lithium module's temperature is too low.
	054	Discharge_HC	Lithium module's discharge current is over normal value.
	055	Charge_HC	Lithium module's charge current is over normal value.
	056	INT_Comm Fail	Communication among Lithium modules is abnormal.
	057	EXT_Comm Fail	Communication with inverter is abnormal.
	058	SOC_Low	Lithium module's SOC is too low.

6. Error and Warning Code (The MCK to monitor TBB's lithium battery)

Upon any error and warning happened, MCK will display corresponding error and warning code. Please find following chart the definition for each code.

Table 7 Error code list (The MCK to monitor TBB's lithium battery)

Error Type	Error Code	Display	Description
BMS error code	E01	Module_OV	Lithium module is over voltage protection.
	E02	Module_UV	Lithium module is under voltage protection.
	E03	Module_OT	Lithium module's temperature is too high.
	E04	Module_UT	Lithium module's temperature is too low.
	E05	Discharge_OC	Lithium module's discharge current is over normal value.
	E06	Charge_OC	Lithium module's charge current is over normal value.
	E07	Module_INT_Err	Lithium Battery Module fault.
	E08	Outside_OV	Lithium module external port is over voltage.
	E09	Switch_BMS_OT	Lithium module's BMS temperature is over normal value.

Table 8 Warning code list (The MCK to monitor TBB's lithium battery)

Warning type	Warning Code	Display	Description
BMS warning code	E11	Module_HV	Lithium module is over voltage.
	E12	Module_LV	Lithium module is under voltage.
	E13	Module_HT	Lithium module's temperature is too high.
	E14	Module_LT	Lithium module's temperature is too low.
	E15	Discharge_HC	Lithium module's discharge current is over normal value.
	E16	Charge_HC	Lithium module's charge current is over normal value.
	E17	INT_Comm Fail	Communication among Lithium modules is abnormal.
	E18	Switch_BMS_HT	Lithium module's BMS temperature is too high.