

LITHIUM BATTERIES USE & MAINTENANCE

T-ZERO_{PRO}
POWER & INNOVATION

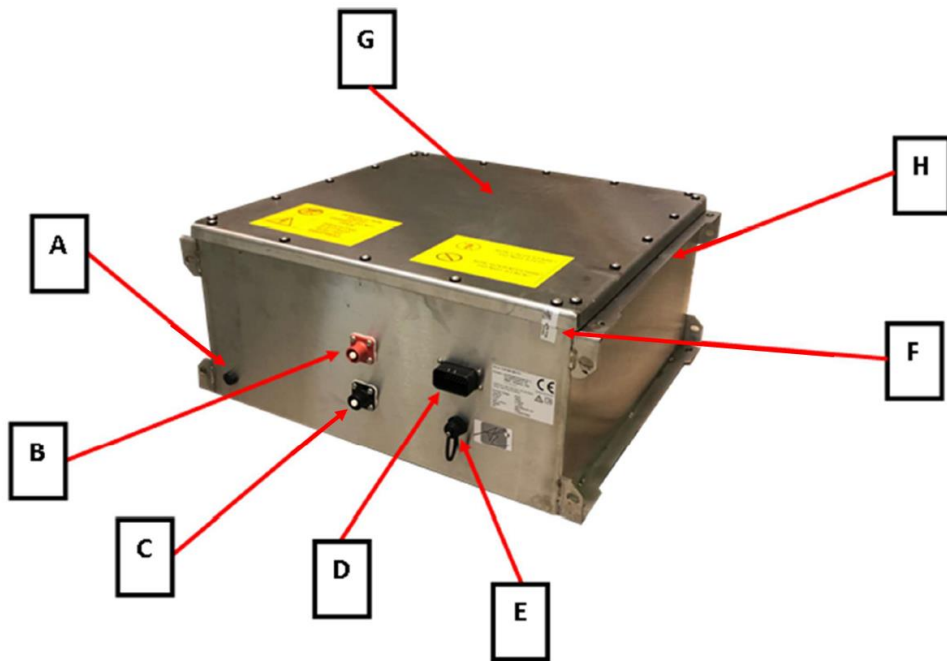


eco-sustainability



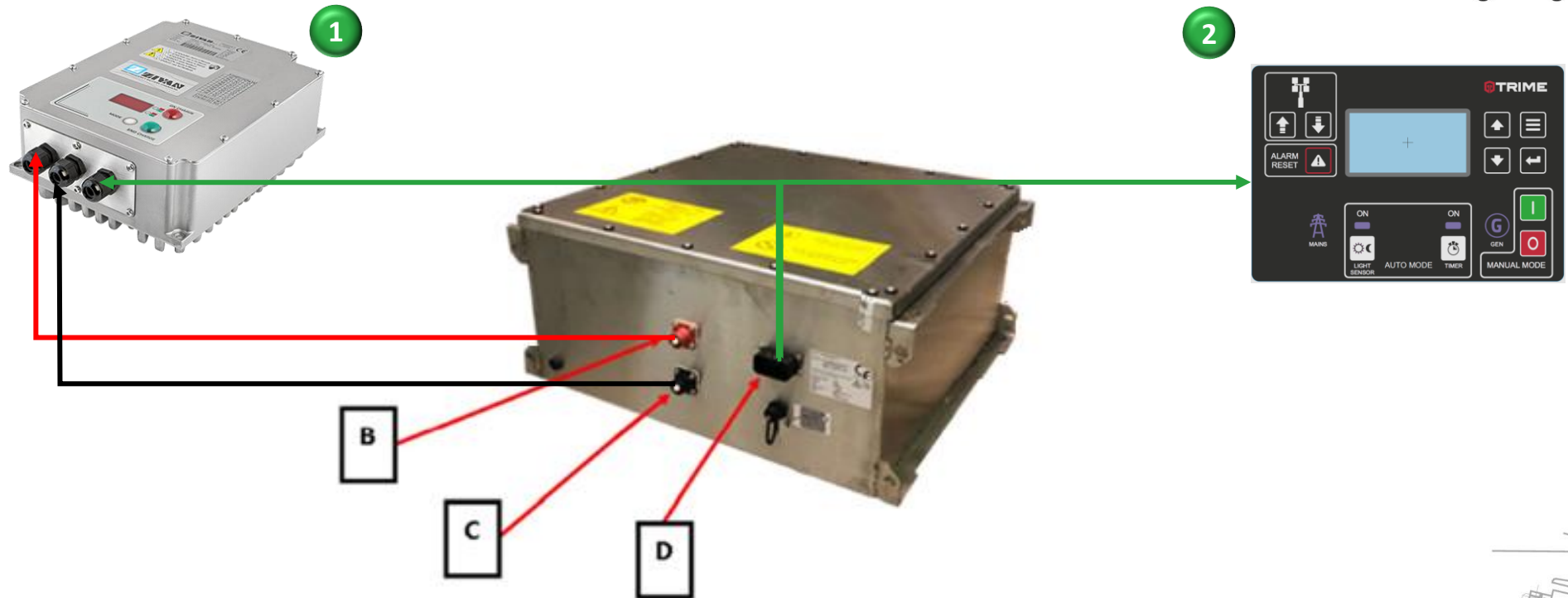
TRIME[®]
Lighting Towers

Main Components



Part	Function
A	Compensation valve
B	SURLOK RECP KW180 RED code SLPIRBTPSR1 power connector
C	SURLOK RECP KW180 BK code SLPIRBTPSB1 power connector
D	AMPSEAL 770680-1 auxiliary connector for switching on, communication and services
E	Type B mini-USB connector for diagnostics
F	Tamper evident label for the Warranty
G	Box lid
H	Battery fixing flanges

How it works



The Lithium battery communicates through port **D** with the Battery charger (1) and the controller (2). Power connectors (**B**, **C**) are connected to the battery charger (2).

Internally in the battery, there is the **BMS** (Battery Management System), that disconnects the battery, with an electrical contactor, to preserve its health, in case of:

- Cells' High/Low Temperature
- Cells' High/Low Voltage
- Internal components malfunction

With the disconnection, no power comes out from the battery (**B**, **C**), so it is not possible to discharge it; also, the communication (through **D** port) is stopped.

General Conditions



USE

The working range temperature is from -20° to +45° C.

The performances of the battery will change on the different temperatures; the capacity, and so the running time, will decrease with temperatures below 0° C.

STORAGE

The lithium battery has a monthly self-discharge of current of 1%; to avoid the complete discharge and its fault, follow the below step:

1. **Storage the unit** with, at least, **50% of SOC** (State Of Charge) of the battery.
2. **Recharge the battery**, at least, once **every 3 months**.
3. **Keep the unit OFF** - Selector (1) in OFF position - to avoid the engine start for battery recharge.
4. In case of **storage with temperature below -10°C**, **keep the unit ON** - Selector (1) in ON position - , to allow the engine start for battery recharge that will keep safe the battery and avoid the unbalancing. Check periodically engine starting battery and fuel level, to allow the engine running.

TRIME RECOMMEND TO STORAGE THE UNIT WITH SOC AT 100% FOR A CORRECT BALANCING OF THE BATTERY

RECHARGE

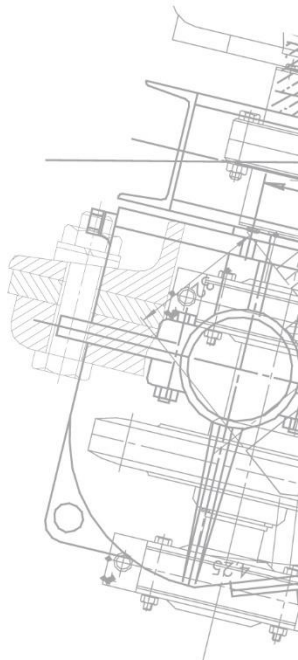
With unit ON - On/Off selector (1) in ON position, the recharge is done automatically when the SOC drops down to 0%. It can be done from the internal engine or from an external power source trough the inlet plug.

With LEDs OFF, the recharge is about 3h, with LEDs ON is about 3,5h.

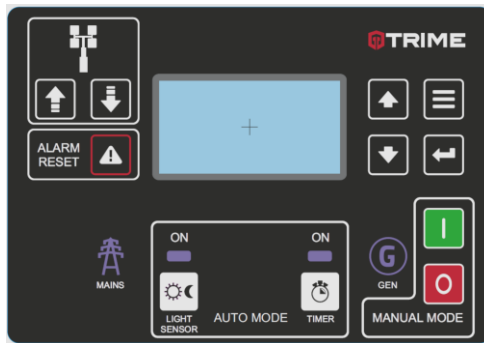
It's possible to force the recharge before the SOC is 0%, pushing the Cranking for forced recharge button (2).

Note: SOC must be >90%.

TRIME RECOMMEND TO NOT STOP THE RECHARGE AND LEAVE THE UNIT TO COMPLETE IT, TO KEEP SAFE THE BATTERY, GUARANTEE THE BEST PERFORMANCES OF THE UNIT AND AVOID THE UNBALANCE OF THE CELLS.



Battery Status check



UP/DOWN
Menu navigation



The information of the Lithium battery, can be checked on the controller, scrolling the pages:



SOC: State of charge of the battery (at 0%, battery is discharged, and engine will start automatically to recharge it)

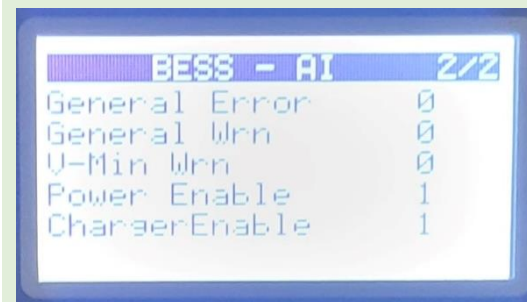
SOH: State of Health of the battery (at 0% battery performances will decrease significantly)

V-Battery: Battery voltage

T-Battery: Battery internal temperature

V-Cell Min: Lower cell voltage

V-Cell Max: Lower cell voltage



General Error: 0 for No error, 1 for active error

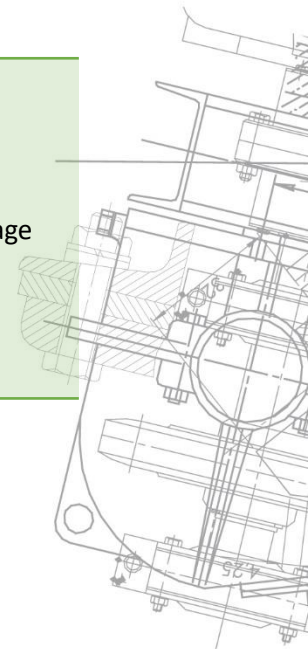
General Warning: 0 for No warning, 1 for active warning

V-Min Wrn: 0 for No warning, 1 for start of the recharge for low voltage

Power Enable: 1 for system enable for discharge, 0 for not enable

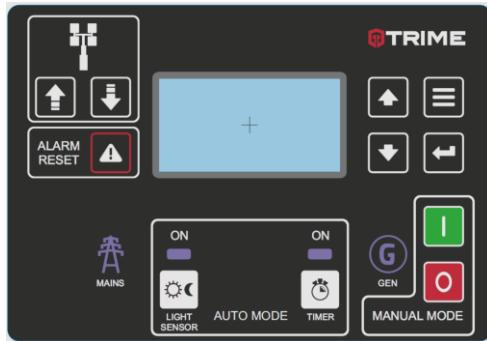
Charger Enable: 1 for unit able to recharge, 0 for not able

Note: These information can be checked always with controller ON and no issues on the communication between battery and controller; otherwise, it's showed #####, instead of the above values.

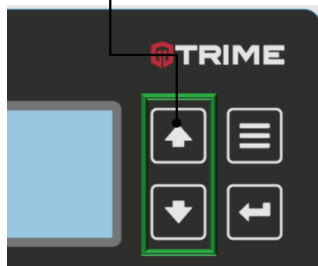


The information of the Lithium battery, can be checked on the controller, scrolling the pages:

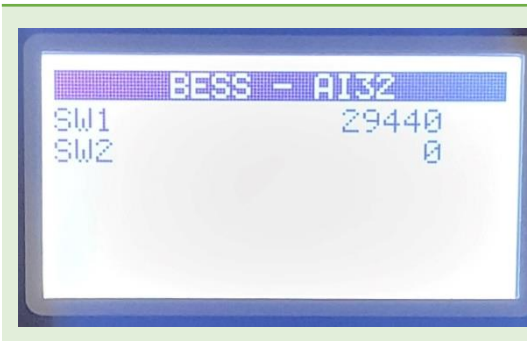
Battery Status check



UP/DOWN
Menu navigation



Current In Range: 1 for Current values OK, 0 for not OK
Battery Enable: 1 for battery enable, 0 for not able
Power On: 1 for battery ON, 0 for OFF
En Discharge: 1 for discharge OK, 0 for not OK
En Charge: 1 for charge OK, 0 for not OK



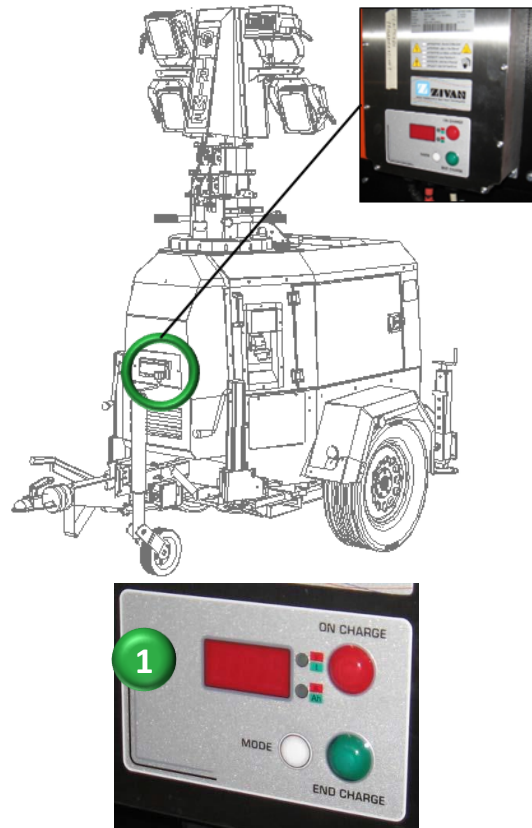
SW1: System Condition 1 status
SW2: System Condition 2 status

Note: The codes indicate a specific status of the battery that includes warnings, status, alarms, functions, exc. (is possible to check with BMS monitor).
 Using this code on BMS monitor program it will be showed the corresponding battery status.

Note: In case of missing communication between battery and controller, it will be showed #####, instead of the above values.



Battery Charger Status check



The charging status can be viewed through the battery charger panel:

- **Red LED ON** (charging in progress)
- **Green LED ON** (recharge done)

On the panel (1) is also indicated a code for each type of operation/alarm, here below the alarm list:

CODE	ALARM TYPE	DESCRIPTION	STOP
A01	LOGIC FAILURE #1	Trouble on current detection	YES
A02	CAN BUS KO	Trouble on CAN communication	No
A03	WATCHDOG	Logic board mis-working	YES
A05	HIGH BATTERY TEMPERATURE	Battery temperature higher than 55°C	Temporary
A07	OVERCURRENT	Over current	Temporary
A08	HIGH TEMPERATURE	Battery charger high temperature	Temporary
A09	MISMATCH VOLTAGE	Battery voltage sensing error	Temporary
A10	TIMEOUT	Phase 1 finished for timeout	YES
A13	BATTERY DISCONNECTED	Battery disconnected	Temporary
A14	PUMP PRESSURE ERROR	Wrong Pump Pressure. Air pump working not properly	No
A15	THERMAL SENSOR FAILURE	Thermal sensor not connected or failed	No
A16	LOGIC FAILURE #2	Logic supply failure	Temporary
A17	FLASH CHECKSUM	Microcontroller Flash memory corrupted	YES
A18	EEPROM CHECKSUM	EEPROM/Flash memory corrupted	YES
A23	POWER FAILURE #1	Output current sensing circuit damaged	YES
A24	WRONG INPUT MAINS	Input mains level out of the operating range	YES
A25	SHORT OUTPUT	Short circuit at the output stage	YES
A26	WRONG MARKER EEP	EEPROM/Flash memory corrupted	YES
A27	NO MAINS	Input grid failure	Temporary
A28	LOW TEMPERATURE	Charger internal temperature below -30°C	Temporary
A29	CLOCK BATTERY OFF	Clock Calendar battery discharged or not connected	No

Notes:

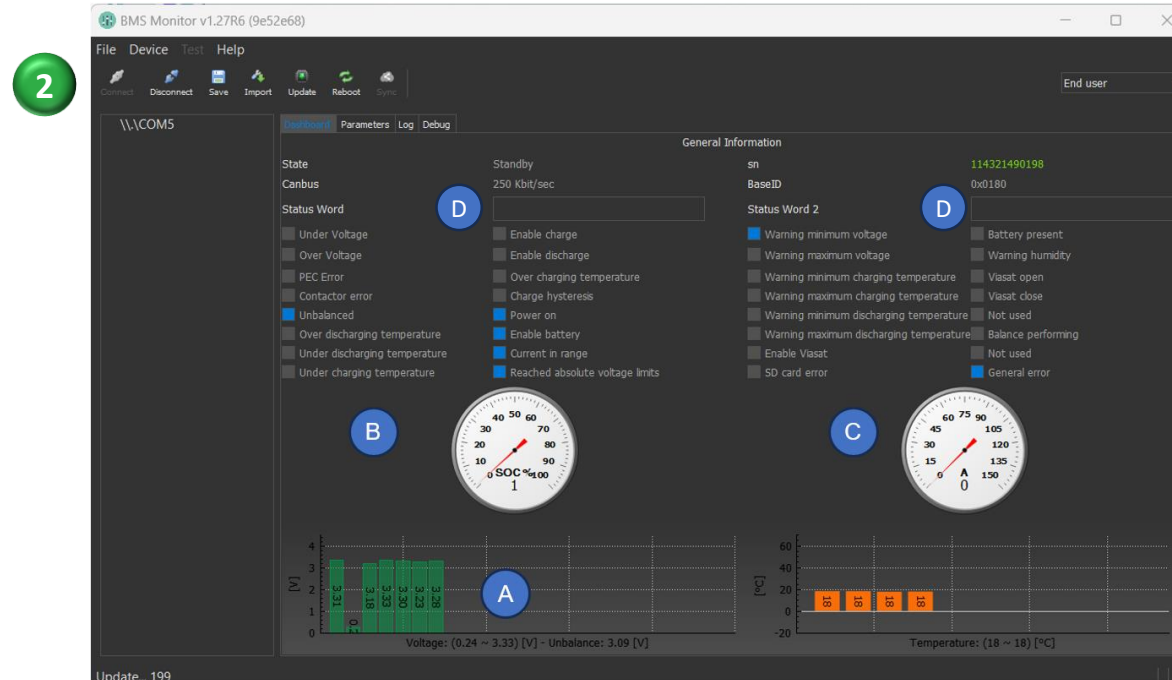
A05: The charge restarts once the battery temperature reaches a value lower than 45°C.

On battery charger, Error code A02 means that there isn't communication between battery and battery charger.

BMS Monitoring



It's also possible to read all the information of the battery, connecting the Laptop to the USB-B port of the Lithium Battery (1), and using the BMS Monitoring program. Once the connection is done, and program open, click on Connect (2).



The program shows:

- Cells voltage (A)
- Battery Status (B)
- Active Alarm/Warning (C)

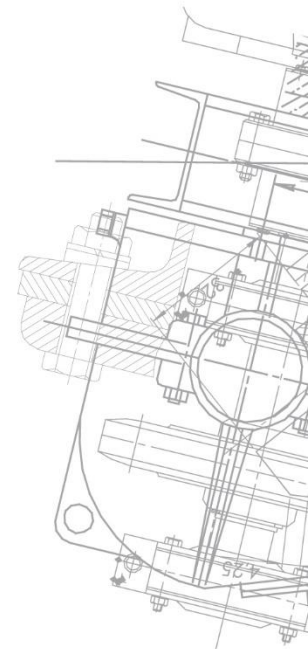
Inserting the code showed on the controller in D, it will be showed the correspondense status (lights on B, C will tur ON)

From the consulting of these information, is possible to understand the current state of the battery, even if on the controller is not possible to read the values (#####)

Troubleshooting

• **CONTROLLER DOESN'T SHOW THE BATTERY INFORMATION (#####)**

Possible cause	Action
Battery unbalance	<ol style="list-style-type: none"> 1. Check on battery charger if there's an alarm and see the alarm-code correspondence, on the previous table 2. Connect the laptop to the battery and check the status with BMS monitor program, if possible, re-balance
Battery alarm	<ol style="list-style-type: none"> 1. Check on battery charger if there's an alarm and see the alarm-code correspondence, on the previous table 2. Connect the laptop to the battery and check the status with BMS monitor program
Communication failure	<ol style="list-style-type: none"> 1. Check cable status and connections 2. Check on battery charger if there's an alarm and see the alarm-code correspondence, on the previous table 3. If the alarm on battery charger is A02, with system OFF check the resistance values: <ul style="list-style-type: none"> • By a multimeter, verify the resistance between the pins 22 and 23, you should find 72-80 kΩ. • By a multimeter, verify the resistance value between the pin 22 and negative and between the pin 23 and negative, you should have 80-86 kΩ. • On battery charger by a multimeter, verify the resistance value between pin 2 and 3 (this on Superseal 5 pole connector) • On battery charger be sure that you have the bridge between pins 4 and 5 (this on Superseal 5 pole connector)



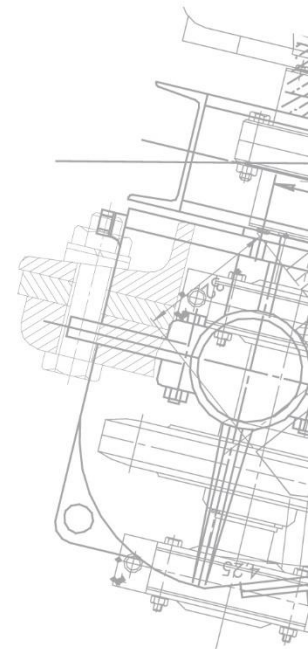
Troubleshooting

- **RECHARGE DOESN'T START**

Possible cause	Action
Engine Alarm/Shutdown active	1. Check on the controller if there's an alarm active for the engine
Battery alarm	<ol style="list-style-type: none"> 1. Check on the controller if there's an alarm active for the battery 2. Check on battery charger if there's an alarm and see the alarm-code correspondence, on the previous table 3. Connect the laptop to the battery and check the status with BMS monitor program
Battery charger fault	1. Check on battery charger if there's an alarm and see the alarm-code correspondence, on the previous table

- **FORCED RECHARGE DOESN'T START**

Possible cause	Action
SOC >90%	1. Check on the controller the SOC%, if >90% forced recharge cannot start
Engine Alarm/Shutdown active	1. Check on the controller if there's an alarm active for the engine
Battery alarm	<ol style="list-style-type: none"> 1. Check on the controller if there's an alarm active for the battery 2. Check on battery charger if there's an alarm and see the alarm-code correspondence, on the previous table 3. Connect the laptop to the battery and check the status with BMS monitor program



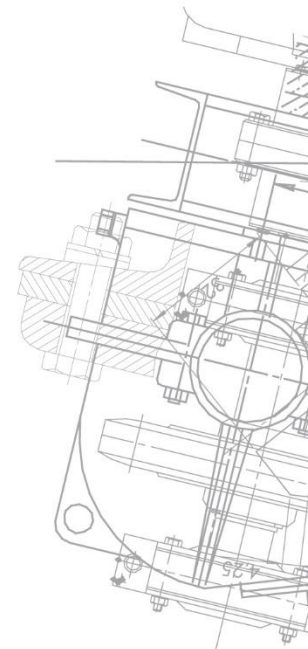
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Troubleshooting

- BATTERY DOESN'T TURN OFF





Possible cause	Action
Contactors' fault	1. Contact manufacturer



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FOR THE ATTENTION



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