



Specification

Model:COMVOLT-12165TR



Energy Freedom LLC

Address:4618 Covert Ave, Ste D, Evansville,IN47714

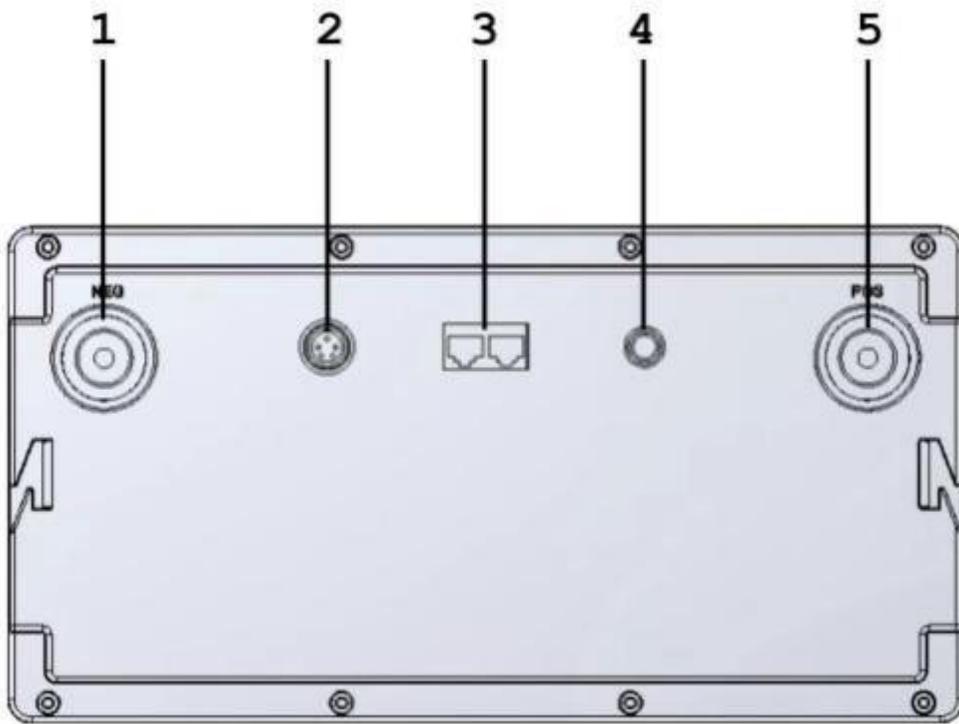
Website: www.energyfreedomllc.com

Compile	Changqing Cao	Customer Name	
Audit	Hongwei Guo	Product Model	Model:COMVOLT-12165TR
Ratify	Mike Mao		
Release Date	2024-02-02		
Release Version	V01	Customer Countersignature:	

I. Summarize

This specification is applicable to COMVOLT-12165TR developed by Energyfreedom LLC, and describes its dimensions, characteristics, technical requirements and precautions for use.

II. Component function description



Functional description	
1	Charge, discharge negative pile head (M8 screw)
2	Maintenance interface (M16F-5 core, 1:B1-,2:B1+,3:B2 +,4:B3+,5:B4+)
3	Communication interface RS485(RJ45)
4	Reset button (pressed for 1 second)
5	Charge, discharge positive pile head (M8 screw)

III. Battery parameters

No.	Project		Describe
Basic specifications			
1	Nominal voltage		12.8V
2	Nominal capacity		165Ah
3	Cell type		lithium iron phosphate
4	Cell internal resistance		$\leq 0.5\text{m}\Omega$
5	Single battery cells		3.2V55Ah
6	Serial-parallel mode		3P4S
7	Gross energy		2112KWh
Recharge			
8	Battery charging temperature		35.6~131°F
9	Maximum allowable charging voltage		14.4 \pm 0.2V
10	Floating Charge Application Recommended Charging Voltage		13.9 \pm 0.2V
11	Standard charging current		40A
12	Maximum allowable charging current		120A
13	Charging method		Electricity, solar energy, vehicle charging
14	Low temperature charging heating (optional)	Starting condition	Temperature <35.6°F and charger connected, charging power should be greater than heating power
		Demand voltage	14.0~14.6V
		Heating power	14.4V 180W
		Heating stop	Battery has discharge current or temperature >42.8°F
Discharge			
15	Battery discharge temperature		-13~149°F
16	Output voltage range		11.5~14.0V
17	Standard discharge current		40A
18	Permissible maximum discharge current		120A
19	Pulse current		Can withstand 250A/1S
20	Discharge heating		/
Construction			
21	Number of battery packs		1 group
22	Single group size		L13.0*W6.8*H8.5in
23	Single group weight		39.3lbs
Storage			
	Storage temperature,	Short-term (within one month)	14~104°F, 45~75%RH
		Long-term (more than one	32~95°F, 45~75%RH

24	humidity	month)	
		Recommended storage temperature	50~95°F, 45~75%RH
<p>Long-term storage: When the battery needs to be stored for a long time, it should be charged to close to 60% SOC and placed under recommended storage conditions. Complete charge and discharge cycles at least once every 3 months.</p>			
Else			
25	Cycle life	≥3000 (100%DOD)	Repeat the cycle in the standard charge and discharge mode until the battery capacity decays to 80% of the rated capacity, and define the cycle number as the cycle life.
26	Discharge Temperature Characteristics(0.2C)	-4°F	≥60%
		32°F	≥80%
		77°F	100%
		131°F	≥95%
27	Secondary hardware protection		Yes
28	Viewing screen		Optional external display, 2.8/4.3in
29	Means of communication		RS485
30	Communication interface		RJ45
31	Bluetooth		Yes
32	BMS		Containing BMS
33	Breaker		/
34	Output interface		M8 terminal pile head
35	Output switch		Yes (weak current switch)
36	Output line		/
37	Output line specification		/

IV. Battery electrical performance and auxiliary functions

Unless otherwise specified, the test shall be conducted in an environment with a temperature of $77 \pm 41^{\circ}\text{F}$, a relative humidity of 45%~75% and an atmospheric pressure of 86Kpa~106Kpa. The room temperature mentioned in this specification refers to $77 \pm 35.6^{\circ}\text{F}$.

1. standard charging

At room temperature, the battery pack is discharged to the cut-off voltage with a current of 40A, and then charged to 13.9V with a constant current of 40A. Then, the battery pack is charged in a constant voltage charging mode. When the charging current drops to 0.01C, the battery pack is stopped charging, and the battery pack is placed aside for 1h.

At room temperature, the battery pack was charged by standard charging method, and then discharged to cut-off voltage with 40A discharge current after charging. After discharge, it was placed aside for 1h.

No.	project	standard	test condition
1	Battery internal resistance	$\leq 12\text{m}\Omega$	Measured with AC internal resistance tester with frequency of (1kHz) under 50% SOC state of battery.
2	Battery capacity	$165\text{Ah} \pm 5\%$	Charge and discharge in standard charging and discharging mode, and record discharge capacity
3	Charge retention	<p>The discharge capacity of charge retention is not less than 85% of rated capacity</p> <p>Discharge recovery capacity not less than 90% of rated capacity</p>	After standard charging, the battery shall be placed in open circuit for 28 days at $77 \pm 41^{\circ}\text{F}$, and discharged to cut-off voltage at constant current of 0.2C at normal temperature. The discharge capacity shall comply with the test requirements. Then charge according to the standard, and then discharge to the termination voltage at 0.2C current under the ambient temperature of $77 \pm 41^{\circ}\text{F}$. The discharge capacity shall comply with the test requirements.

v. BMS Protection Parameters

The battery is equipped with BMS, which can monitor the battery operation status in real time, provide overcharge, over discharge, over current, short-circuit, over-temperature and equalization protection when necessary, and cut off the input and output of the battery when necessary.

No.	Project	Content	Standard
1	Overcharge	Single string overcharge protection voltage	$3.60 \pm 0.05V$
		single-string overcharge recovery voltage	$3.45 \pm 0.05V$
		overcharge delay time	$1000 \pm 300mS$
		Overcharge protection recovery method	discharge recovery
2	Over-discharge	single string over discharge protection voltage	$2.8 \pm 0.05V$
		single-string over discharge recovery voltage	$3.0 \pm 0.05V$
		Over discharge delay time	$1000 \pm 300mS$
		Over discharge protection recovery method	charge resumption
3	Overcurrent	Charge over current protection value	$>130A$
		Charge over current protection delay	$2000 \pm 300mS$
		Charging over current protection recovery method	discharge recovery
		discharge over current protection value	$>130A$
		Discharge over current protection delay	$5000 \pm 300mS$
		Recovery method of discharge over current protection	charge resumption
4	In parallel	multi-group parallel	support
5	Short circuit	short-circuit protection	With/without short circuit
		short-circuit protection delay	$100 \pm 10uS$
		short circuit protection recovery	Delay 30S recovery
		short-circuit protection lockout	6 consecutive
6	Equilibrium	equalization mode	Charge equalization, static equalization
		turn-on voltage	Monomer $>3260mV$
		opening differential pressure	$>10 mV$
		equalizing current	120mA
7	Communication	RS485	support
8	Low current switch	control the discharge	nonsupport

9	Consumable	working state	Max 20mA
		dormant state	100uA
		deep sleep state	10uA
10	Over-temperature	Charging high temperature protection	$131 \pm 33.8^{\circ}\text{F}$
		Charging, high temperature protection, recovery.	$113 \pm 33.8^{\circ}\text{F}$
		charging low temperature protection	$35.6 \pm 33.8^{\circ}\text{F}$
		Charging Low Temperature Protection Recovery	$42.8 \pm 33.8^{\circ}\text{F}$
		discharge high temperature protection	$149 \pm 33.8^{\circ}\text{F}$
		discharge high temperature protection recovery	$131 \pm 33.8^{\circ}\text{F}$
		discharge cryogenic protection	$-13 \pm 33.8^{\circ}\text{F}$
		Low temperature over temperature protection recovery	$-4 \pm 33.8^{\circ}\text{F}$

vi. Storage and transport

- *Battery long-term storage needs to be placed in a dry, clean, light-proof, well-ventilated indoor environment; storage temperature refer to the table above;
- *The battery should be stored and transported under the state of <50% SOC;
- *For long-term storage, fully charge the battery pack, and then charge and discharge once every 3 months;
- *During transportation or loading and unloading of batteries, please be careful not to drop them, do not stack them in multiple layers, turn them upside down, and ensure that they are facing up.

VII. Cautions and precautions

Read the specifications carefully before using the battery pack. Improper use of battery pack may cause battery pack damage. Energyfreedom LLC. shall not bear any responsibility for any accident caused by operation not according to specifications.

Warning! Please strictly follow the following rules during use, otherwise no warranty will be given.

- *Do not use metal objects to short-circuit the positive and negative terminals of the battery pack;
- *Do not connect the positive and negative terminals of the battery pack in reverse;
- *Avoid battery water and other liquids, including corrosive liquids;
- * Keep the battery pack away from heat sources, fire sources, high-pressure places, and avoid long-term exposure;
- *Do not hit, drop or step on the battery pack;
- *It is strictly prohibited to disassemble or change the battery pack circuit and structure, as well as the appearance without the manufacturer's permission and guidance;
- *When charging or discharging multiple battery packs in parallel, please observe whether each battery pack has charging or discharging current. If there is no charging or discharging current in the battery pack, please contact the manufacturer in time;
- *Please use the factory supporting or identified lithium iron phosphate battery pack dedicated charger for charging, please contact the manufacturer for consultation;
- *This battery pack is forbidden to be used in series.

Attention!

- *When electrolyte leaks into skin or eyes, rinse with clean water and seek medical advice immediately;
- *When the battery pack has abnormal smell, abnormal sound, leakage, serious deformation and other abnormal situations, please stop using;
- *Do not throw the battery pack into water or fire;
- *At the end of battery life, please send the battery pack to a qualified local battery recycling company for disposal;
- *Keep the battery pack out of reach of children.