(1/3) Specification

Lithium-ion Battery Pack / TD Series

For AGV drive, industrial use 7S (25V) / 14S (50V)

*** Application of EVE 18650 Cylindrical Cell ***

◇ New products are shipped with a 30% charge. Charge and use.
◇ Documents required for export = MSDS (UN3481 , Class9) English/Chinese version and UN38.3 certificate
Export HS Code : 8507.60.9000 / Classification : Lithium ion storage battery/Others

index

***Application in vertical conveying systems: Even if a hydraulic AGV is used, the AGV must be a speed-adjustable type such as BLDC and servo AGVs. Conventionally used hydraulic AGV packs that cannot control AGV speed cannot be used. This is because the starting current is excessive when directly starting the hydraulic AGV, so the battery often cuts off the overcurrent.**

◇ Model name Basic structure : TD-AGV-□□V□□□AH -(case model number) / (option)

* Models with 'COM' in the model number have a battery status communication port. COM = communication

* Among the certifications below, UN certification means UN38.3 certification, and this certification is essential for overseas transportation.

* Case drawings for each model are uploaded on the Tadames website.. (pdf, dwg, 3D (stp, igs))

Design and production of Tadames / Made in Vietnam / Application of EVE lithium-ion battery cell (cylindrical 18650), Note: In addition to the standard specifications below, customized production may be possible through consultation.

index number	Product model name (Order Number) COM = Status communication device mounting option	Certification	Applied BLDC AGV output (W) Soft_Start (ΔT ≥ 1.5 seconds)		Battery Energy (Wh)	Discharge Current		Charging current / Charger		Weight, Size		Note
			(AGV driving AGV) When maximum output occurs intermittently	Vertical transfer, hydraulic AGV) maximum output		Instantaneous maximum discharge current (A) (for 1.5 seconds)	Maximum allowable discharge current (A)(5 minutes)	Maximum charge current (A) (C_Rate)	TADA charger recommended maximum capacity(low current -> life extension)	Weight(kg)	Size (mm) (Length X Width X Height) (L X W X H)	Vertical transfer, hydraulic AGV) maximum output
Below: 25V Battery / Nominal Voltage 25.8V (Using Voltage: Minimum 24V ~ Maximum 29V)												
25V-01	TD-AGV-25V-17AH -CV190	CE	680	410	440	60	34	13 (0.75C)	TC-300W-□	3	242 X 90 X 142	C: Aluminum case V: Vertical mounting
25V-02	TD-AGV-25V-17AH -CVCOM230	CE	680	410	440	60	34	13 (0.75C)	TC-300W-□	3.3	282 X 90 X 142	C: Aluminum case V: Vertical mounting
25V-03	TD-AGV-25V-17AH -CH190	CE	680	410	440	3/25 60	34	13 (0.75C)	TC-300W-□	3	242 X 139 X 93	C: Aluminum case V: Vertical mounting
25V-04	TD-AGV-25V-17AH -CHCOM230	CE	680	410	440	60	34	13 (0.75C)	TC-300W-□	3.3	282 X 139 X 93	C: Aluminum case V: Vertical mounting
25V-05	TD-AGV-25V-35AH -CV330	ISO	1400	840	880	123	70	26 (0.75C)	TC-700W-□	5	382 X 90 X 142	C: Aluminum case V: Vertical mounting

*Caution: Direct start of hydraulic AGV is not possible

index number	Product model name (Order Number) COM = Status communication device mounting option	Certification	Applied BLDC AGV output (W) Soft_Start (ΔT ≥ 1.5 seconds)		Battery Energy (Wh)	Discharge Current		Charging current / Charger		Weight, Size		Note
			(AGV driving AGV) When maximum output occurs intermittently	Vertical transfer, hydraulic AGV) maximum output		Instantaneous maximum discharge current (A) (for 1.5 seconds)	Maximum allowable discharge current (A)(5 minutes)	Maximum charge current (A) (C_Rate)	TADA charger recommended maximum capacity(low current -> life extension)	Weight(kg)	Size (mm) (Length X Width X Height) (L X W X H)	
25V-06	TD-AGV-25V-35AH -CVCOM370	ISO	1400	840	880	123	70	26 (0.75C)	TC-700W-□	5.5	422 X 90 X 142	C: Aluminum case V: Vertical mounting
25V-07	TD-AGV-25V-35AH -CH330	ISO	1400	840	880	123	70	26 (0.75C)	TC-700W-□	5	382 X 139 X 93	C: Aluminum case V: Vertical mounting
25V-08	TD-AGV-25V-35AH -CHCOM370	ISO	1400	840	880	123	70	26 (0.75C)	TC-700W-□	5.5	422 X 139 X 93	C: Aluminum case V: Vertical mounting
25V-09	TD-AGV-25V-52AH -CV470	ISO	1800	1080	1,320	158	90	39 (0.75C)	TC-1500W-□	7	522 X 90 X 142	C: Aluminum case V: Vertical mounting
25V-10	TD-AGV-25V-52AH -CVCOM510	ISO	1600	960	1,320	140	90	39 (0.75C)	TC-1500W-□	7.5	562 X 90 X 142	C: Aluminum case V: Vertical mounting
25V-11	TD-AGV-25V-52AH -CH470	ISO	1800	1080	1,320	158	90	39 (0.75C)	TC-1500W-□	7	522 X 139 X 93	C: Aluminum case V: Vertical mounting
25V-12	TD-AGV-25V-52AH -CHCOM510	ISO	1600	960	1,320	140	90	39 (0.75C)	TC-1500W-□	7.5	562 X 139 X 93	C: Aluminum case V: Vertical mounting
25V-13	TD-AGV-25V-70AH -W2L300	ISO	800	500	1,760	80 4/25	60	26 (0.35C)	TC-700W-□	11.0	328 X 305 X 84	C: Aluminum case V: Vertical mounting
25V-14	TD-AGV-25V-70AH - W2	ISO	1800	1080	1,760	158	90	52 (0.75C)	TC-1500W-□ TC-2000W-□	11.3	390 X 300 X 88	C: Aluminum case V: Vertical mounting
25V-15	TD-AGV-25V-70AH - W2COM	ISO	1600	960	1,760	140	90	52 (0.75C)	TC-1500W-□ TC-2000W-□	11.7	430 X 300 X 88	C: Aluminum case V: Vertical mounting

index number	Product model name (Order Number) COM = Status communication device mounting option	Certification	Applied BLDC AGV output (W) Soft_Start (ΔT ≥ 1.5 seconds)		Battery Energy (Wh)	Discharge Current		Charging current / Charger		Weight, Size		Note
			(AGV driving AGV) When maximum output occurs intermittently	Vertical transfer, hydraulic AGV) maximum output		Instantaneous maximum discharge current (A) (for 1.5 seconds)	Maximum allowable discharge current (A)(5 minutes)	Maximum charge current (A) (C_Rate)	TADA charger recommended maximum capacity(low current -> life extension)	Weight(kg)	Size (mm) (Length X Width X Height) (L X W X H)	
25V-16	TD-AGV-25V-70AH -X2	ISO	1800	1080	1,760	158	90	52 (0.75C)	TC-1500W-□ TC-2000W-□	11.0	390 X 165 X 146	Handle option available
25V-17	TD-AGV-25V-70AH - X2COM	ISO	1600	960	1,760	140	90	52 (0.75C)	TC-1500W-□ TC-2000W-□	11.4	430 X 165 X 146	Handle option available
25V-18	TD-AGV-25V-104AH -W3	((no plan)	1800	1080	2,650	158	90	78 (0.75C)	TC-2000W-□	17.4	390 X 441 X 88	Handle option available
25V-19	TD-AGV-25V-104AH -W3COM	(no plan)	1600	960	2,650	140	90	78 (0.75C)	TC-2000W-□	17.8	430 X 441 X 88	Handle option available
25V-20	TD-AGV-25V-104AH -X3	ISO	1800	1080	2,650	158	90	78 (0.75C)	TC-2000W-□	16.0	390 X 238 X 146	Handle option available
25V-21	TD-AGV-25V-104AH -X3COM	ISO	1600	960	2,650	140	90	78 (0.75C)	TC-2000W-□	16.4	430 X 238 X 146	Handle option available
25V-22	TD-AGV-25V-139AH -X4	ISO	1800	1080	3,530	158	90	104 (0.75C)	TC-4000W-□	20.8	390 X 309 X 146	Handle option available
25V-23	TD-AGV-25V-139AH -X4COM	ISO	1600	960	3,530	140	90	104 (0.75C)	TC-4000W-□	21.8	430 X 309 X 146	Handle option available

LiFePO4 Battery

* Cell LiFePO4

index number	Product model name (Order Number) COM = Status communication device mounting option	Certification	Applied BLDC AGV output (W) Soft_Start (ΔT ≥ 1.5 seconds)		Battery Energy (Wh)	Discharge Current		Charging current / Charger		Weight, Size		Note
			(AGV driving AGV) When maximum output occurs intermittently	Vertical transfer, hydraulic AGV) maximum output		Instantaneous maximum discharge current (A) (for 1.5 seconds)	Maximum allowable discharge current (A)(5 minutes)	Maximum charge current (A) (C_Rate)	TADA charger recommended maximum capacity(low current -> life extension)	Weight(kg)	Size (mm) (Length X Width X Height) (L X W X H)	
25V-16	TD-AGV-25V-70AH -X2	ISO	1800	1080	1,760	158	90	52 (0.75C)	TC-1500W-□ TC-2000W-□	11.0	390 X 165 X 146	Handle option available
25V-17	TD-AGV-25V-70AH - X2COM	ISO	1600	960	1,760	140	90	52 (0.75C)	TC-1500W-□ TC-2000W-□	11.4	430 X 165 X 146	Handle option available
25V-18	TD-AGV-25V-104AH -LFP	((no plan)	1800	1080	2,650	158	90	78 (0.75C)	TC-2000W-□	17.4	390 X 441 X 88	Handle option available
25V-19	TD-AGV-25V-104AH -LFP	(no plan)	1600	960	2,650	140	90	78 (0.75C)	TC-2000W-□	17.8	430 X 441 X 88	Handle option available
25V-20	TD-AGV-25V-104AH -LFP	ISO	1800	1080	2,650	158	90	78 (0.75C)	TC-2000W-□	16.0	390 X 238 X 146	Handle option available
25V-21	TD-AGV-25V-104AH -LFP	ISO	1600	960	2,650	140	90	78 (0.75C)	TC-2000W-□	16.4	430 X 238 X 146	Handle option available
25V-22	TD-AGV-25V-139AH -LFP	ISO	1800	1080	3,530	158	90	104 (0.75C)	TC-4000W-□	20.8	390 X 309 X 146	Handle option available
25V-23	TD-AGV-25V-139AH -LFP	ISO	1600	960	3,530	140	90	104 (0.75C)	TC-4000W-□	21.8	430 X 309 X 146	Handle option available

index number	Product model name (Order Number) COM = Status communication device mounting option	Certification	Applied BLDC AGV output (W) Soft_Start (ΔT ≥ 1.5 seconds) (AGV driving AGV) When maximum output occurs intermittently	Vertical transfer, hydraulic AGV) maximum output	Battery Energy (Wh)	Discharge Current Instantaneous maximum discharge current (A) (for 1.5 seconds)	Maximum allowable discharge current (A)(5 minutes)	Charging current / Charger Maximum charge current (A) (C_Rate)	TADA charger recommended maximum capacity(low current -> life extension)	Weight, Size Weight(kg)	Size (mm) (Length X Width X Height) (L X W X H)	Note
Below: 50V battery / nominal voltage 51.7V (used voltage: minimum 48V ~ maximum 58V)												
50V-01	TD-AGV-50V-17AH -CV330	(no plan)	1360	820	880	60	34	13 (0.75C)	TC-700W-□	5	374 X 90 X 142	C: Aluminum case V: Vertical mounting
50V-02	TD-AGV-50V-17AH -CVCOM370	(no plan)	1360	820	880	60	34	13 (0.75C)	TC-700W-□	5.5	414 X 90 X 142	C: Aluminum case V: Vertical mounting
50V-03	TD-AGV-50V-17AH -CH330	(no plan)	1360	820	880	60	34	13 (0.75C)	TC-700W-□	5	374 X 139 X 93	C:Aluminum case H: Horizontal mounting
50V-04	TD-AGV-50V-17AH -CHCOM370	(no plan)	1360	820	880	60	34	13 (0.75C)	TC-700W-□	5.5	414 X 90 X 142	C:Aluminum case H: Horizontal mounting
50V-05	TD-AGV-50V-35AH -W2	(no plan)	2800	1680	1,760	123	70	26 (0.75C)	TC-1500W-□	11.3	390 X 300 X 88	W: wide, slim
50V-06	TD-AGV-50V-35AH -W2COM	(no plan)	2800	1680	1,760	123	70	26 (0.75C)	TC-1500W-□	11.7	430 X 300 X 88	W: wide, slim
50V-07	TD-AGV-50V-35AH -X2	ISO	2800	1680	1,760	123	70	26 (0.75C	TC-1500W-□	11.0	390 X 165 X 146	Handle option available
50V-08	TD-AGV-50V-35AH -X2COM	ISO	2800	1680	1,760	123	70	26 (0.75C	TC-1500W-□	11.4	430 X 165 X 146	Handle option available
50V-09	TD-AGV-50V-52AH -W3	(no plan)	3600	2160	2,650	158	90	39 (0.75C)	TC-1500W-□ TC-3500W-□	17.4	390 X 441 X 88	W: wide, slim
50V-10	TD-AGV-50V-52AH -W3COM	(no plan)	3200	1920	2,650	140	90	39 (0.75C)	TC-1500W-□ TC-3500W-□	17.8	430 X 441 X 88	W: wide, slim

index number	Product model name (Order Number) COM = Status communication device mounting option	Certification	Applied BLDC AGV output (W) Soft_Start (ΔT ≥ 1.5 seconds)		Battery Energy (Wh)	Discharge Current		Charging current / Charger		Weight, Size		Note
			(AGV driving AGV) When maximum output occurs intermittently	Vertical transfer, hydraulic AGV) maximum output		Ilnstantaneous maximum discharge current (A) (for 1.5 seconds)	Maximum allowable discharge current (A)(5 minutes)	Maximum charge current (A) (C_Rate)	TADA charger recommended maximum capacity(low current -> life extension)	Weight(kg)	Size (mm) (Length X Width X Height) (L X W X H)	
50V-11	TD-AGV-50V-52AH -X3	ISO	3600	2160	2,650	158	90	39 (0.75C)	TC-1500W-□ TC-3500W-□	16.0	390 X 238 X 146	Handle option available
50V-12	TD-AGV-50V-52AH -X3COM	ISO	3200	1920	2,650	140	90	39 (0.75C)	TC-1500W-□ TC-3500W-□	16.4	430 X 238 X 146	Handle option available
50V-13	TD-AGV-50V-70AH -X4	ISO	3600	2160	3,530	158	90	53 (0.75C)	TC-3500W-□	20.8	390 X 309 X 146	Handle option available
50V-14	TD-AGV-50V-70AH -X4COM	ISO	3200	1920	3,530	140	90	53 (0.75C)	TC-3500W-□	21.8	430 X 309 X 146	Handle option available

LiFePO4 Battery

* Cell LiFePO4

index number	Product model name (Order Number) COM = Status communication device mounting option	Certification	Applied BLDC AGV output (W) Soft_Start (ΔT ≥ 1.5 seconds)		Battery Energy (Wh)	Discharge Current		Charging current / Charger		Weight, Size		Note
			(AGV driving AGV) When maximum output occurs intermittently	Vertical transfer, hydraulic AGV) maximum output		Instantaneous maximum discharge current (A) (for 1.5 seconds)	Maximum allowable discharge current (A)(5 minutes)	Maximum charge current (A) (C_Rate)	TADA charger recommended maximum capacity(low current -> life extension)	Weight(kg)	Size (mm) (Length X Width X Height) (L X W X H)	
50V-11	TD-AGV-50V-52AH -X3	ISO	3600	2160	2,650	158	90	39 (0.75C)	TC-1500W-□ TC-3500W-□	16.0	390 X 238 X 146	Handle option available
50V-12	TD-AGV-50V-52AH -X3COM	ISO	3200	1920	2,650	140	90	39 (0.75C)	TC-1500W-□ TC-3500W-□	16.4	430 X 238 X 146	Handle option available
50V-13	TD-AGV-50V-70AH -X4	ISO	3600	2160	3,530	158	90	53 (0.75C)	TC-3500W-□	20.8	390 X 309 X 146	Handle option available
50V-14	TD-AGV-50V-70AH -X4COM	ISO	3200	1920	3,530	140	90	53 (0.75C)	TC-3500W-□	21.8	430 X 309 X 146	Handle option available
50V-15	TD-AGV-50V-130AH -SS	ISO	3600	2160	3,530	158	90	53 (0.75C)	TC-3500W-□	28.8	250 x 300 x 400	Handle option available
50V-16	TD-AGV-50V-150AH -SS	ISO	3200	1920	3,530	140	90	53 (0.75C)	TC-3500W-□	30.8	250 x 300 x 400	Handle option available

5. General application to all models

1) General

Lithium-Ion Battery Pack Design Criteria

Safety is our top priority. TADA battery packs are produced by carefully selecting only those whose safety has been proven from cell selection.

In addition to the battery protection circuit (BMS), it is equipped with additional safety devices against things that cannot be solved by BMS.

2) Safety and protection features

✧ **Overcurrent protection (limiting charging current and discharging current)**

The battery's protection circuit (BMS) limits the input/output current to the set value (refer to the specification sheet for each model)..

Due to this function, the battery can be safely protected by preventing the output of excessive current..

✧ **Output cut-off control in case of short circuit (short circuit): Return to normal when short circuit is terminated**

In case of short circuit between output terminals due to careless handling, the protection circuit (BMS) immediately cuts off the output. When the short circuit is terminated, it returns to normal and outputs normally.

✧ **(Over Voltage Protection)**

The battery's protection circuit (BMS) monitors the voltage of each group of lithium-ion battery cells. During charging, charging stops when each cell group exceeds the specified voltage level, and charging resumes when the specified voltage is restored..

✧ **(Under Voltage Protection)**

The battery's protection circuit (BMS) monitors the voltage of each group of lithium-ion battery cells. When each cell group falls below the specified voltage, discharging is stopped, and when the specified voltage is restored, discharging resumes.

3) List of Common Specifications

Development and production of TADA / Vietnam made, EVE lithium-ion battery cell application

Main Category	Characteristic	Detail
Life expectancy	LV series: 5000 Cycles TD series: 4000 Cycles (Estimated value, depending on conditions of use)	Life Expectancy Conditions: 1) When the battery cell is used at a temperature of about 20°C. 2) Must be charging and discharging 0.2C Rate condition. 3) When charging and discharging between 30% or more of the remaining amount ↔ 90% of the remaining amount, Life expectancy varies depending on usage conditions. battery temperature at room temperature The closer, the smaller the charge current and discharge current are compared to the battery capacity, the longer lifespan.
Charging Capacity	Change in charging capacity according to the change in charging voltage of the charger	[Attention] The maximum charging capacity (Ah) and nominal energy (Wh) indicated on this product are the maximum charging capacity (Ah) and nominal energy (Wh) When charging, the charging capacity decreases proportionally. This should be taken into account when selecting the battery capacity..
Operating temperature conditions (The temperature on the right is the temperature of the battery cell)	Charge : 0°C ~ 45°C Discharge : -20°C ~ 60°C	Charge and discharge closer to room temperature, life cycle will be longer Life cycles is shortened at low and high temperatures.
Protection function	BMS	Cell balancing function, overcharge (OVP), overdischarge (UVP), overcurrent (OCP), short-circuit cutoff (SCP), overheat control (OTP), automatic cooling control
Battery status communication port (optional)	Communication content: : Information necessary for battery use, such as battery voltage, remaining capacity, temperature, expected charging time, expected discharging time, error status, etc.	1.When multiple batteries are connected in series or parallel, it is implemented as a Master Slave method.Master The battery finally transmits the battery status information. 2. Provide pin map and protocol of communication port connector 3. RS232C / RS422 / RS485 / CAN (user selectable).
cooling system	Automatic ON/OFF cooling fan	When the internal temperature of the battery is over 40 degrees, the cooling fan operates. When the temperature goes down, the fan stops working after a certain period of time. [Note]: There is a cooling fan in the battery
Charging method	Constant voltage (CV) + Constant current (CC)	The charging current is charged at an appropriate value below the rated charging current, and charging with the lowest possible current can extend the life of the battery. Set the maximum voltage (charging maximum voltage) as the charging voltage upper limit (CV) and charge with constant current (CC) below the rated charging current

6. COM Optional Product / Battery Status BMS communication data contents

1) Battery information

순번	Data	Type	High/Low Byte	Unit	Scale	Range
1	Data 1	Voltage	High	V	0.01	0 ~ 655.35
	Data 2		Low			
2	Data 3	Electric current	High	A	0.01	-327.68 ~ 327.67
	Data 4		Low			
3	Data 5	SOC (State Of Charge)	High	%	1	0 ~ 100
	Data 6		Low			
4	Data 7	Battery status	High			
	Data 8		Low			
5	Data 9	Charging completion time	High	min	1	0 ~ 65535
	Data 10		Low			
6	Data 11	Discharge completion time	High	min	1	0 ~ 65535
	Data 12		Low			
7	Data 13	Temperature	High	℃	0.1	-3276.8 ~ 3276.7
	Data 14		Low			
8	Data 15	SOH (State Of Health)	High	%	1	0 ~ 100
	Data 16		Low			
9	Data 17	Remain capacity	High	Ah	0.01	0 ~ 655.35
	Data 18		Low			
10	Data 19	Remain Energy	High	Wh	0.1	0 ~ 6553.5
	Data 20		Low			

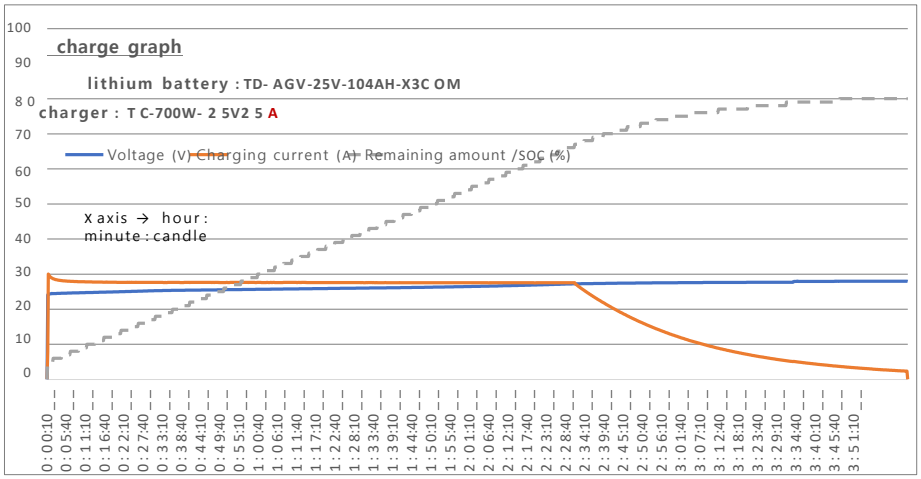
2) Battery status information

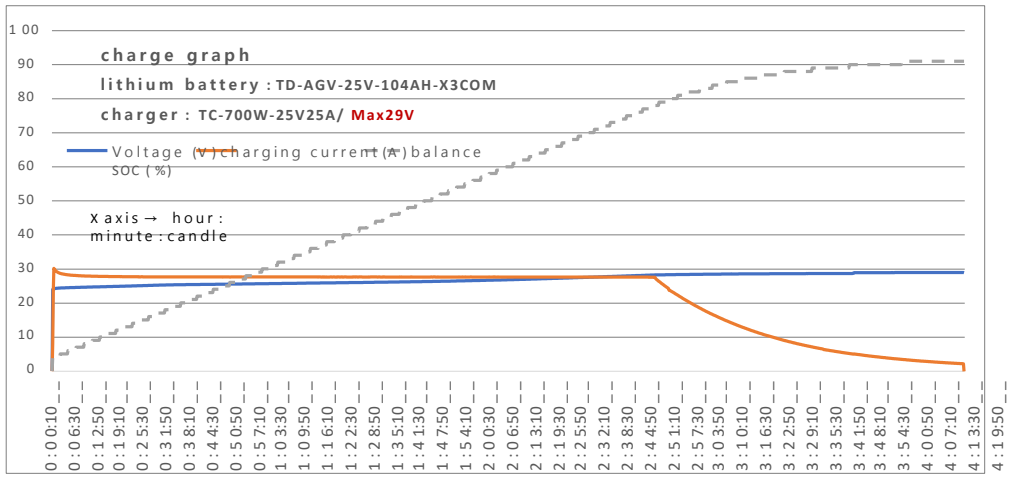
Bit	Explanation	Bit
0	battery overvoltage	8
1	Battery low voltage	9
2	Excessive charging current	10
3	Excessive discharge current	11
4	High temperature	12
5	Low temperature	13

Charge and discharge graph

[Appendix-1]. Charge Experiment data

Slow charging (0.25C, 4 hours) : LC-AGV-25V-104AH-X3COM, (700W class TADA charger apply test)





charge hour	situation		Battery voltage (V)	charging current (A)	balance SOC (%)	health SOH (%)	internal temperature (°C)	current capacity (Ah)
basic atmosphere situation	over discharge block situation	BMS locked	0	0	0	0	0	0
charge 10 seconds lapse	Block BMS clear	recovery	24.07	7.91	5	100	27.2	4.65
10 minutes lapse			24.71	27.8	9	100	25.3	9.16
30 minutes lapse			25.27	27.61	18	100	23.9	18.36
1 hours lapse			25.69	27.6	31	100	23.6	32.12
1 hour 30 minutes lapse			26.05	27.55	43	100	25.5	45.88
2 hours lapse			26.56	27.5	56	100	25.9	59.61
2 hours 30 minutes lapse	charging current stem start	approximately 70% charge	27.33	22.87	69	100	24.8	73.08
3 hours lapse			27.6	9.61	76	100	22.8	80.72
3 hours 30 minutes lapse			27.93	4.25	79	100	22.9	83.97
3 hours 54 minutes lapse		charge end	27.97	2.29	80	100	23.2	85.25
3 hours 55 minutes lapse	voltage is a little fall	80% charge	27.92	0	80	100	23.1	85.25

* charging time calculate (when charging 80%) = 104AH/25A = 4 hours, real approximately 4 hours , 70% charge is approximately 2.5 hours

* SOH (State Of Health) is battery charge and discharge hundreds of times ~Thousands of times going through fall. SOH 70% --> capacity 70%

* temperature : in general When charging battery interior temperature go up copy Model (COM model in other words BMS communication port installed model)cooling fan through Automatic temperature control function there is to charge previously at discharge occurred temperature rather fell

charge hour	situation		Battery voltage (V)	charging current (A)	balance SOC (%)	health SOH (%)	internal temperature (°C)	current capacity (Ah)
basic atmosphere situation	over discharge block situation	BMS locked	0	0	0	0	0	0
charge 10 seconds lapse	Block BMS clear	recovery	23.98	8.02	4	100	27.3	3.32
10 minutes lapse			24.66	27.9	8	100	24.2	7.85
30 minutes lapse			25.24	27.66	16	100	23.8	17.08
1 hours lapse			25.67	27.64	29	100	22.6	30.88
1 hour 30 minutes lapse			26.06	27.62	42	100	22.9	44.69
2 hours lapse			26.57	27.63	55	100	22.9	58.49
2 hours 30 minutes lapse			27.44	27.61	68	100	22.7	72.29
3 hours lapse	charging current stem start	approximately 80% charge	28.37	21.84	81	100	22.8	85.69
3 hours 30 minutes lapse			28.63	8.97	88	100	22.1	92.93
4 hours lapse			28.95	3.79	90	100	22.3	95.9
4 hours 21 minutes lapse		charge end	28.99	2.16	91	100	22.7	96.92
4 hours 23 minutes lapse	voltage is a little fall	91% charge	28.94	0	91	100	22.8	96.92

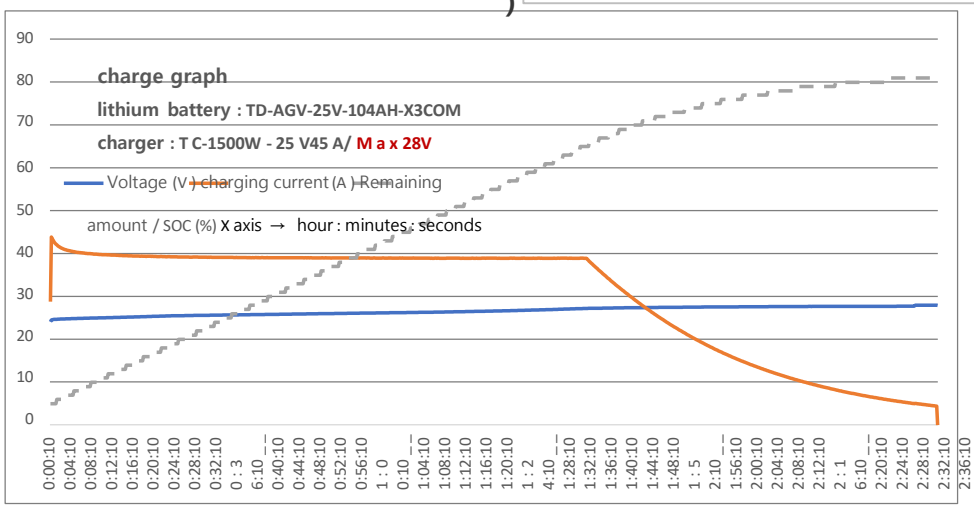
* charging time calculate (when charging 90%) = 104AH/25A = 4 hours, real approximately 4 hours, 80% charge is approximately 3 hours

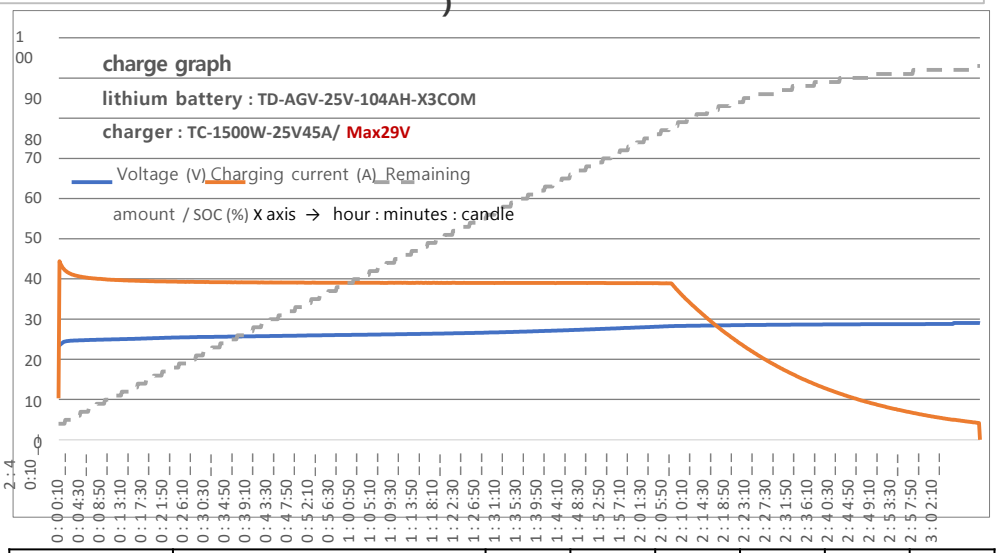
* SOH (State Of Health) is battery charge and discharge hundreds of times ~Thousands of times going through fall. SOH 70% --> capacity 70%

* temperature : Generally When charging battery interior temperature go up copy Model (COM model in other words BMS communication port installed model)cooling fan through Automatic temperature control function there is to charge previously at discharge occurred temperature rather fell

[Appendix-2]. charge Experiment data

Normal charging (0.5C,2 hours : TD-AGV-25V-104AH-X3COM , (1500W class TADA charger apply test)





charge hour	situation		battery Voltage (V)	charging current (A)	balance SOC (%)	health SOH (%)	internal temperature (°C)	current capacity (Ah)
basic atmosphere situation	over discharge block situation	BMS locked	0	0	0	0	0.0	4.6
charge 10 seconds lapse	Block BMS clear	recovery	25.03	39.74	11	100	29.7	3.32
1 min lapse			24.66	42.44	5	100	29.8	5.19
10 minutes lapse			25.03	39.74	11	100	29.7	11.25
30 minutes lapse			25.62	39.12	23	100	30.0	24.34
1 hours lapse			26.14	38.95	41	100	30.5	43.79
1 hour 30 minutes lapse			26.84	38.9	60	100	30.6	63.21
1 hour 48 minutes lapse		70% charge	27.36	28.95	70	100	305.0	7428
2 hours lapse			27.51	19.55	74	100	29.8	78.93
2 hours 30 minutes lapse		80% charge	27.68	6.96	80	100	28.4	85.03
2 hours 44 minutes elapsed	charge end	81% charge	27.95	4.42	81	100	28.5	86.31

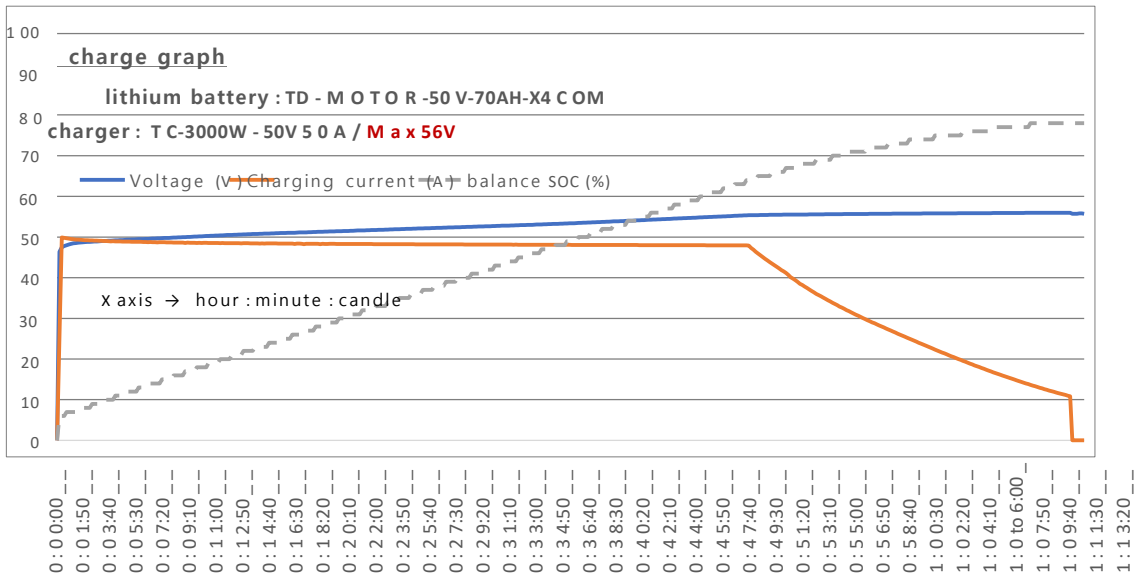
* around temperature : 28.5 degrees
* charging time calculate (when charging 80%) = 104AH/45A = 2.3 hours, real approximately 2.5 hours; 70% charge is approximately 2.8 hours
* SOH (State Of Health) is battery charge and discharge hundreds of times ~Thousands of times going through fall. SOH 70% --> capacity 70%
* temperature : Generally When charging battery interior temperature go up copy Model (COM model in other words BMS communication port installed model)cooling fan It has an automatic temperature management function through The temperature generated during discharge rather fell.

charge hour	situation		Battery voltage (V)	charging current (A)	balance SOC (%)	health SOH (%)	internal temperature (°C)	current capacity (Ah)
basic atmosphere situation	over discharge block situation	BMS locked	0	0	0	0	0	4.4
charge 10 seconds lapse	Block BMS clear	recovery	23.35	10.34	4	100	31.7	3.46
1 min lapse			24.32	42.77	4	100	31.1	4.01
10 minutes lapse			24.94	39.84	10	100	29.6	10.1
30 minutes lapse			25.58	39.22	22	100	28.9	23.22
1 hours lapse			26.12	39.06	40	100	29.4	42.73
1 hour 30 minutes lapse			26.81	39.02	59	100	29.4	62.2
2 hours 04 minutes lapse		80% charge	28.33	34.67	80	100	29.3	84.47
2 hours 34 minutes lapse		90% charge	28.69	11.5	90	100	28.0	95.1
3 hours 02 minutes passed	charge end	93% charge	29.02	4.19	93	100	27.9	98.39

* around temperature : 27.2 degrees
* charging time calculate (when charging 90%) = 104AH/45A = 2.3 hours; real approximately 2.6 hours , 80% charge is approximately 2 hours
* SOH (State Of Health) is battery charge and discharge hundreds of times ~Thousands of times going through fall. SOH 70% --> capacity 70%
* temperature : Generally When charging battery interior temperature go up copy Model (COM model in other words BMS communication port installed model)cooling fan through Automatic temperature control function there is to charge previously at discharge occurred temperature rather fell

[Appendix-3]. charge Experiment data

Rapid charge (0 . 7 C , 1 hour) : L M - M O T O R - 50 V - 7 0 A H - X 4 C O M , (3 0 00 W class TADA__ charger_ application_ exam_)



charge hour	situation		battery Voltage (V)	charging current (A)	balance SOC (%)	health SOH (%)	internal temperature (°C)	current capacity (Ah)
basic atmosphere situation	over discharge block situation	BMS locked	0	0	0	0	0	0
charge 10 seconds lapse	Block BMS clear	recovery	46.35	25.35	6	97	26.8	3.75
10 minutes lapse			50.12	48.52	18	97	28.8	11.74
30 minutes lapse			52.55	48.12	41	97	32.1	27.84
50 minutes lapse	charging current stem start	64% charge	55.37	46.36	64	97	34.6	43.8
55 minutes lapse			55.6	33.82	70	97	34.2	47.43
1 hours lapse			55.73	26.48	73	97	33.5	49.68
1 hour 10 minutes lapse		70% charge	55.94	13.11	78	97	31.6	52.97
1 hour 12 minutes lapse		charge end	55.95	10.84	78	97	31.2	53.43
1 hour 13 minutes lapse	voltage is a little fall	78% charge	55.69	0	78	97	31.8	53.43

* charging time calculate (when charging 78%) = 70AH (Battery) / 50A (charger) = 1 hour 24 minutes, real 1 hour 12 minutes , 70% charge is 55 minutes

* SOH (State Of Health) is battery charge and discharge hundreds of times ~Thousands of times going through fall. SOH 70% --> capacity 70%

* cooling fan through Automatic temperature control function there is temperature rise big without 27 degrees --> 32 degrees to the extent littleness.