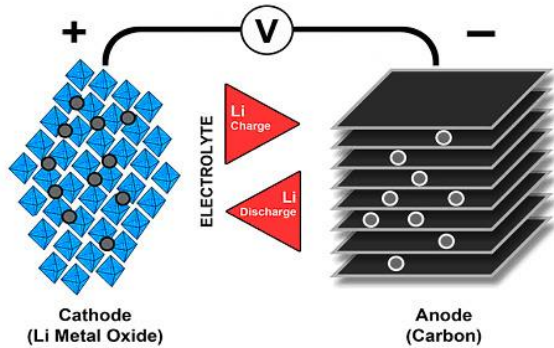




Lithium-ion battery

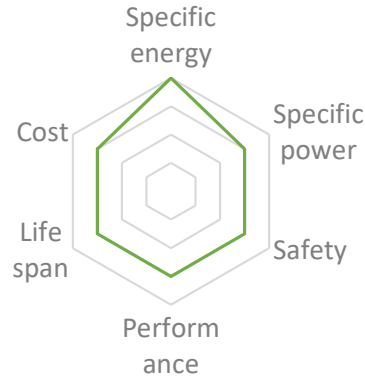
Understanding Lithium-ion



It was not until the early 1970s that the first non-rechargeable lithium batteries became commercially available. Attempts to develop rechargeable lithium batteries followed in the 1980s but the endeavor failed because of instabilities in the metallic lithium used as anode material.

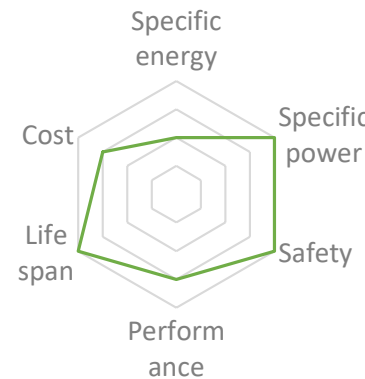
Mixing cathode and anode material allows manufacturers to strengthen intrinsic qualities; however, an enhancement in one area may compromise something else. Battery makers can, for example, optimize specific energy (capacity) for extended runtime, increase specific power for improved current loading, extend service life for better longevity, and enhance safety for strenuous environmental exposure, but, the drawback on higher capacity is reduced loading; optimization for high current handling lowers the specific energy, and making it a rugged cell for long life and improved safety increases battery size and adds to the cost due to a thicker separator. The separator is said to be the most expensive part of a battery.

Lithium Nickel Manganese Cobalt Oxide (LiNiMnCoO₂) – NMC Since 2008



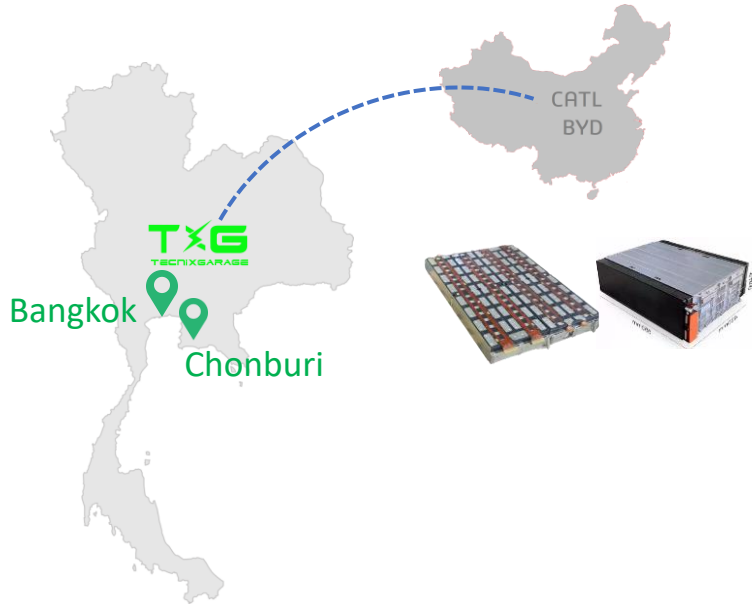
Voltages	3.60V, 3.70V nominal; typical operating range 3.0–4.2V/cell, or higher
Specific energy (capacity)	150–220Wh/kg
Charge (C-rate)	0.7–1C, charges to 4.20V, some go to 4.30V; 3h charge typical. Charge current above 1C shortens battery life.
Discharge (C-rate)	1C; 2C possible on some cells; 2.50V cut-off
Cycle life	1000–2000 (related to depth of discharge, temperature)

Lithium Iron Phosphate(LiFePO₄) – LFP Since 1996



Voltages	3.20, 3.30V nominal; typical operating range 2.5–3.65V/cell
Specific energy (capacity)	90–120Wh/kg
Charge (C-rate)	1C typical, charges to 3.65V; 3h charge time typical
Discharge (C-rate)	1C, 25C on some cells; 40A pulse (2s); 2.50V cut-off (lower than 2V causes damage)
Cycle life	2000 and higher (related to depth of discharge, temperature)

TXG 100% customization



Introduction TXG Battery Part



Battery name plate



Power plug



LCD display

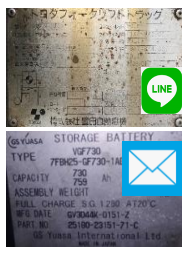


Advice and Caution

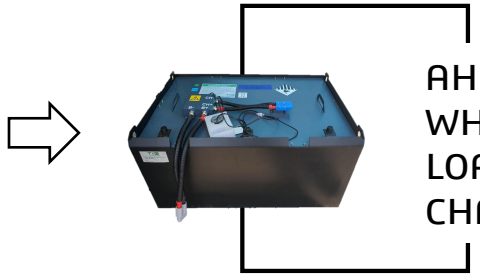


Charger plug

5 step to change battery to Lithium-ion



- Box size
- Weight
- Truck plug
- Working hour



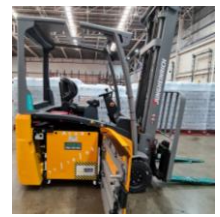
AH
WH
LOAD
CHARGE



Old battery



New battery



Installation

Let's switch to Lithium-ion batteries with **TXG** TECHNIXGARAGE

Lead acid Battery (GEL/AGM/Flooded)

- กรดกำมะถัน อันตรายต่อสุขภาพ
- เติมน้ำกลั่น ตรวจสอบเช็คตามระยะ
- อายุการใช้งาน 2 ปี 1,000 รอบ
- มีขนาดความจุให้เลือกจำกัด

Traction

Lithium-ion Battery (LFP and NMC)

- พลังงานทดแทน แห่งสะอาด ปราศจากเศษกำมะถัน เป็นมิตรกับสิ่งแวดล้อม
- ประหยัดค่าไฟ ค่าบำรุงรักษา ไม่ต้องเติมน้ำกลั่น
- อายุการใช้งานนาน 2,500 รอบ
- มีให้เลือกหลายขนาด สามารถเลือกให้เหมาะสมกับการใช้งาน

Lithium

Battery lithium from TXG are all available for



Counter balance



Reach truck



Power Pallet
Power stacker



Golf Cart



AGV



รถสามล้อไฟฟ้า



How to Apply

Test the battery and assemble it into a weighted tank.
(Counterweight)



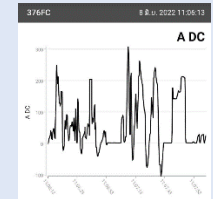
Install the battery on the forklift.



Install a screen to view % battery. The customer can't view the same screen on the forklift because it's a different type of battery. (Calculation is different)



Go live with current measurements while using it. Keep log data as graphs.



	Lead Acid	Lithium-Ion
Charging Time	8 hours	3 – 4 hours
Cool-Down Period	8 Hours	Not Needed
Charging Method	Removed from forklift, placed in charging base and taken to special charging storage room	Plugged directly into the wall, even while the battery is installed in the forklift
Safe Discharge	Down to 30% - 50% capacity	Down to 20% capacity
Opportunity Charge	No	Yes

Lithium-ion batteries have a long life expectancy if used correctly. This is a distinct advantage for operations that rely on efficiency and high production levels.

Contributing to longer lithium-ion life cycles includes:

- Higher power density level
- Slower rate of capacity loss

lithium-ion battery is around 5 year or at least 2,000 charging cycle. But, if well cared for and used in proper condition, lithium-ion batteries can last as long as 3,000 cycles.

แบตเตอรี่ลิเธียมไอออนมีอายุการใช้งานประมาณ 5 ปีหรืออย่างน้อย 2,000 รอบการชาร์จแต่หากได้รับการดูแลและใช้งานในสภาพที่เหมาะสม แบตเตอรี่จะมีอายุการใช้งานยาวนานถึง 3,000 รอบ

Counter balance/Reach truck



Volt	Ah
48	200
48	240
48	320
48	400
80	200
80	240

Power pallet/Stacker



Volt	Ah
24	100
24	120
48	100
48	200

Charger

Lithium-ion battery design for use
Lithium charger only



DO NOT USE
STANDARD
CHARGER!



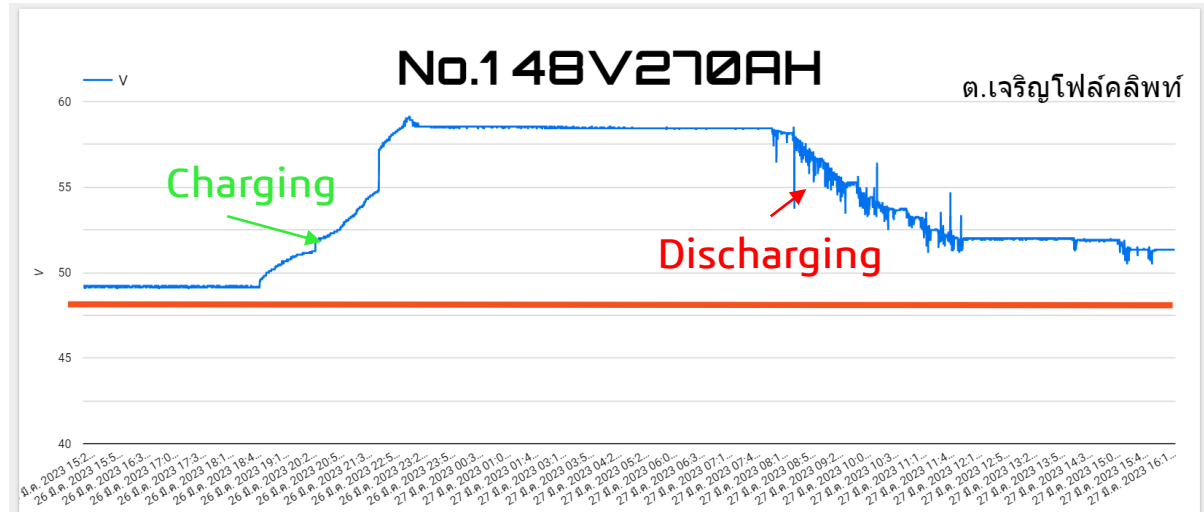
Volt	A
24 ,48, 80	40,50,60,80,100



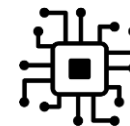
Charge station

Battery voltage data logger

Voltage Data Loggers can be used for a wide variety of applications including monitoring energy consumption, detecting charging and discharging, as well as for recording the low voltage output of sensors.



Picture of graph data show online and real time





www.tecnixgarage.com