

E-SOLUTION

Lithium Battery & Energy Solutions for All Industries



E·SOLUTION 

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E-SOLUTION leads high-performance, high-safety lithium battery pack technologies that meet the performance and safety standards required across all industries.

E-SOLUTION is a specialized manufacturer of high-safety lithium battery packs based on AI and ICT technologies.

With a vision to advance the energy industry through lithium battery pack solutions—supporting carbon neutrality, distributed energy, and improved energy efficiency—the company develops and supplies lithium battery packs for a wide range of industries including ESS, Mobility, and Industrial applications, securing a leading position in the market.

The lithium battery packs produced by E-SOLUTION deliver exceptional quality and safety based on advanced engineering technologies. This includes internationally recognized certifications such as KC62619 (Secondary Battery Safety Certification) and NFPC 607 (Fire Suppression Performance Certification), reflecting compliance with the highest global safety standards.

Looking ahead, E-SOLUTION aims to evolve beyond battery packaging technology to become a global leader in next-generation energy solutions by integrating AI, data, and energy management technologies. By continuously advancing battery design optimized for various industries and intelligent energy operation technologies, the company will serve as a trusted partner that enhances both energy efficiency and operational stability for its customers.

Business Segments

Across Mobility, Industrial, and ESS sectors, E-SOLUTION supports operational efficiency and long-term competitiveness with high-performance, high-safety battery technologies.



Mobility

Optimized lithium battery solutions for diverse mobility environments enhance both the efficiency and safety of movement.



Industrial

High-reliability battery solutions designed to meet the demanding requirements of industrial environments enhance both productivity and operational stability.



Energy Storage

With stable and intelligent energy storage technologies, E-SOLUTION maximizes power operation efficiency and enables a sustainable energy environment.

Cumulative Sales MWh

360

Based on its differentiated technological capabilities, E-SOLUTION has supplied products to numerous industrial sectors, including starting, traction, industrial, and energy storage applications. As a result, the company has achieved cumulative sales of 360 MWh, establishing itself as a leader in the small and medium-sized lithium battery industry.

Company History

12

Through 12 years of battery system research and development, manufacturing, and sales, E-SOLUTION has accumulated extensive experience and a vast amount of operational data unmatched by others. Leveraging this expertise, the company delivers the most reliable, safe, and optimized battery solutions to its customers.

Leading Technology Adoption

1

With extensive experience and technological expertise, E-SOLUTION has been at the forefront of developing "high-safety lithium batteries." The company was the first in Korea's small and medium-sized lithium battery industry to introduce an ICT-based remote monitoring system and an AI-powered predictive failure detection system.

R&D Investment (%)

10

E-SOLUTION invests more than 10% of its annual revenue in research and development each year, continuously developing differentiated lithium batteries with high safety and long-life characteristics based on ICT and AI technologies. Leveraging industry-leading products and technical services, the company actively participates in numerous government R&D programs led by the Ministry of SMEs and Startups, the Ministry of Science and ICT, and the Ministry of Trade, Industry and Energy, while also undertaking lithium battery development projects for major corporations.

Proprietary BMS Technology

30+

Top researchers in the BMS field have come together at E-SOLUTION to focus on the development of advanced BMS technologies. Based on 12 years of experience and extensive operational data, the company possesses dozens of high-performance BMS solutions that meet the functional safety requirements of KC62619 certification.



Core Competencies

1

E-SOLUTION has commercialized and supplied lithium-ion batteries for a wide range of industries, including golf carts, cleaning vehicles, distribution automation systems, AGVs, KTX, electric vehicles, forklifts, UPS, and ESS. Through these achievements, the company has secured the No.1 position in the industry based on LFP batteries and is recognized as a leading company driven by differentiated technological capabilities.

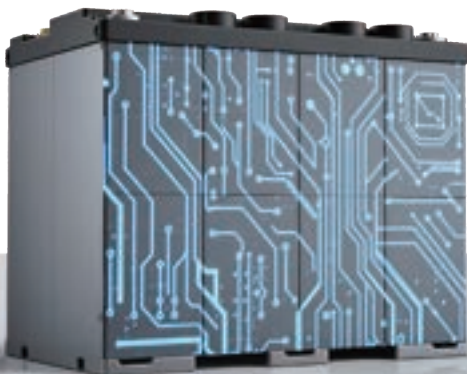
2019

- Daejeon "Emerging Growth Company" Award
- MOTIE R&D Project (HESS)
- MSS R&D Project (High-Safety Lithium)
- 2nd R&D Center Established (Daejeon)
- Lithium Battery Export (\$200K)
- Remote Battery Monitoring System
- AI Battery Fault Prediction (with KAIST)
- Multi BMS Technology for Large Systems
- Lithium Batteries for Hyundai Forklifts & Excavators



2008-2014

- R Co. founded (Predecessor of Korea Powercell)
- Development of lithium battery pack technology
- BMS technology development
- Lithium batteries for electric motorcycles and sprayers
- Modular lithium batteries for mid-large systems



2015-2018

- Korea Powercell Corporation Established
- Factory Relocation (Daejeon, 1,000 pyeong)
- ISO 9001 Certification
- Corporate R&D Center Established
- Venture Company Certification
- Lithium Batteries for Golf Carts, DAS, Sweepers, AGV
- No.1 Market Share in Golf Cart LFP Batteries
- KTX Lithium Battery Certification



2020

- INNOBIZ Certification
- MAINBIZ Certification
- Daejeon Star Company (2020)
- AI Battery Fault Prediction (Phase 1)
- Hitachi Golf Cart OE Supply
- Hitachi Golf Cart & Truck Export Products
- Motorcycle Lithium Batteries
- Electric Road Sweeper Batteries
- ESS Batteries for Drilling Machines
- Cable Car Lithium Batteries (Sacheon)
- Lithium Batteries for Aerial Work Platforms

2024

- Lithium Packs for E-Scooters
- Lithium Packs for E-Bikes
- Lithium Packs for E-Motorcycles
- MOU with LS Electric for C&I ESS
- Marine ESS Development
- All-In-One ESS Development
- POWER KOREA Innovation Leader Award (Lithium Pack)
- Daejeon Secondary Battery Industry Council Member



2025

- Company Renamed to E-SOLUTION
- C&I ESS Development & Commercialization
- AIO ESS Supply with LS Electric Consortium
- Lithium Batteries for G-Bike Mobility
- MOTIE Next-Gen Extreme Environment BESS Project
- MOU with RST Solutions (BESS Business)
- MOU with G&EPS (UPS System)
- Daejeon Sales Tower Award
- KR Certification for Marine ESS
- NFPC 607 Certification (ESS Cabinet Type)
- Domestic MWh-Class B2G ESS Contract
- Lithium Packs for HY Mobility Yakult Cart

2021-2023

- Hyundai Construction Equipment Forklift Battery Supplier
- Forklift Battery Certification (ISO16750 / IEC 61000)
- R&D & Production Facilities Expansion
- Promising SME & Talent Development SME Certification
- Remote Battery Monitoring System Upgrade (Phase 2)
- Regional R&D Project (UPS Lithium Battery)
- MSIT ICT R&D Project (Monitoring System Upgrade)
- MSS Conditional Purchase R&D (KTX Lithium Battery)
- ESS Batteries for Heavy Industry
- Lithium Batteries for Incheon Airport Ticket Machines
- Lithium Batteries for Refrigerated Trucks
- KC62619 Safety Certification
- 50kWh UPS Lithium Battery Development
- Portable ESS & Home ESS Battery Development
- Remote Battery Monitoring System Upgrade (Phase 3)
- Net Zero Project (Second-Life Batteries) – MSS
- Lithium Batteries for Smart Poles & Water Trucks
- ISO 14001 Certification
- Jeju Branch Established
- Employee Stock Ownership Plan (ESOP)
- Company Renamed to INZI E-SOLUTION
- Investment Secured (KRW 7.5B)
- New R&D Center Built (150 pyeong)
- NFPC 607 Fire Safety Certification
- Daejeon Export & Outstanding Company Award
- 4IR Innovation Company Award
- Golf Cart Lithium Packs Export to Japan



ESS, Mobility, and Industrial Applications Across Diverse Sectors



Golfcart

#Mobility #Smart Mobility
#Electrification

- Supplied 22,000 Sets to 160+ Golf Courses (154 MWh)
- No.1 Market Share (Replacement Market)
- Apro Golf Cart LFP Battery Official Registration (2025)
- KIOTI Golf Cart OE Supply (2016–2017)
- Hitachi Golf Cart OE Supply (2020)
- Exported Golf Cart Lithium Packs (Japan, Philippines)



Forklift

#Mobility #Industrial
#Logistics #Smart Factory

- OE Lithium Pack Supplier to Hyundai Site Solutions
- Hyundai Site Solutions Lithium Pack Development (2020)
- Joint Development with Korea Pallet Pool (2017)
- Clark Forklift Lithium Pack Development (2018)



ESS

#EV infra #Industrial
#Renewable Energy #Energy

- Gyeonggi-do Future Energy Activation Project (4.816 MWh)
- LS Electric Shared ESS, etc. (2.064 MWh)
- LS Sauta ESS (0.459 MWh)
- Theham Energy ESS (0.344 MWh)
- Jeju Special Self-Governing Province Mobile ESS (0.23 MWh)
- Other PV ESS Projects (11.2 MWh)



PM

#Mobility #Personal Mobility
#Smart Mobility

- Joint Dev. of Universal PM Lithium Pack with G-Bike
- Cumulative Sales: 3,500 Sets
- G-Bike Gen1 PM Lithium Pack Dev. (2023–2024)
- G-Bike Gen2 PM Lithium Pack Dev. (2025)
- G-Bike B2C E-Bike Lithium Pack Dev. (2025)



E-Scooter

#Mobility #Personal Mobility
#Smart Mobility

- "D" E-Scooter Lithium Pack Dev. (2024–2025)
- Standard Swappable Battery Pack Dev.
- Traction Battery Safety Test Passed (2025)
- KSR 6100 Certified (2026)



DAS

#SystemIntegration #Industrial
#HighCapacity #SmartGrid
#Energy

- First Developer of Distribution Automation Lithium Pack
- 50,000 Sets Supplied (Cumulative)
- No.1 Market Share (as of 2025)
- Supplied to KEPCO HQ
- Supplied to 130+ KEPCO Branches
- Supplied to Major KEPCO Switchgear Makers



KEPCO DAS

#Industrial #Energy
#PowerGrid

- Joint Dev. with KEPCO KDN
- No.1 Market Share
- Supplied to KEPCO KDN
- 7,000 Sets (2017)
- 10,000 Sets (2018)
- 5,000 Sets (2019)



AGV

#Mobility #Smart Factory

- Samsung Semiconductor AGV Pack — 4 Intl. Certs
- 1,000 Sets Supplied
- Key Customers: Hyundai, Samsung, SK hynix
- Customers: Hyundai Mipo, GM Daewoo, CJ, Canon etc.

Achieved 360 MWh Lithium Battery Pack Deliveries (as of 2025)



Vacuum Truck

#Mobility #Industrial
#Electrification

- No.1 Market Share
- 3,000 Sets Supplied
- Indoor Electric Sweeper Lithium Battery Dev. (2015)
- Supplying to No.1 Company "Cleantec"
- Joint Dev. with Dongwoo TS, Gyebaek Motor, YJ Industry



KTX

#Mobility #Industrial
#Infra

- Joint Dev. of KTX Lithium Battery
- Supplying to Hyundai Rotem (Motrex)
- For VOD & Auxiliary Power
- AEC-Q Certified for Railway
- Passed 51 Reliability Tests



Yakult cart

#Mobility
#LifeIntegrated

- Joint Dev. of Korea Yakult Cart Lithium Pack (2024-2025)
- Passed Certified Tests
- Mass Production in 2026 (600 Sets Contract)



Road Vehicle

#Mobility
#Commercial Vehicle
#High-Efficiency

- Road Electric Sweeper Lithium Pack Dev. (2020)
- Korea TS Safety Certified
- Passed Major Safety Tests
- Supplying to Cleantec Road Sweepers



UPS

#Industrial #Energy
#DataCenter

- Supplied to Ministry of National Defense (1,000 Sets)
- Supplied to KEPCO Substations
- Supplied to Commercial Enterprises



SPV

#Mobility #Industrial
#Smart Mobility

- Suseong Heavy Ind. AWP Lithium Pack Dev.
- Life Env. Machinery AWP Lithium Pack Dev.
- Suseong Sebotic AWP Lithium Pack Dev.
- Mobile DST & Engia Connector Smart Pole Pack Dev.



BMS

#Industrial
#IoT #Stability
#Energy

- BMS Mass Supply for Global Shipbuilder "A" (2026)
- BMS Dev. for Aerospace Research Institute (Drone)
- KEPCO KDN BMS Dev.
- KEPCO Distribution Automation BMS Dev.
- HKT BMS Dev. & Multiple Projects



ETC

#Industrial #Mobility
#Electrification
#Energy

- Emergency Rescue Vehicle Lithium Pack
- Incheon Airport Ticketing Lithium Pack
- Sacheon Cable Car & Monorail Lithium Pack
- Tunnel Lighting Lithium Pack
- Drilling Rig Lithium Pack
- Refrigerated Truck Lithium Pack
- ATV Lithium Pack

Li-ion Battery

A battery that offers advantages such as higher energy density, high-efficiency charge and discharge, superior safety, ultra-long lifespan, lighter weight, smaller size, and environmental friendliness compared to conventional lead-acid, NiCd, and NiMH batteries.



E-SOLUTION Battery Cell Features

- ✓ Uses NCM (Lithium Nickel Cobalt Manganese) and LFP (Lithium Iron Phosphate) battery cells
- ✓ LFP battery lifespan is 1.5–2 times longer than NCM
- ✓ Olivine crystal structure minimizes the risk of fire through superior chemical stability
- ✓ Excellent thermal stability, enabling reliable operation across a wide temperature range (LFP cells)
- ✓ Wide range of cell capacities available: 1Ah – 280Ah
- ✓ Utilizes Li-ion cells from Global Top 10 manufacturers
- ✓ Flexible capacity design optimized for various applications

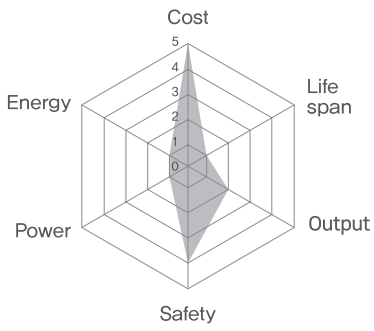
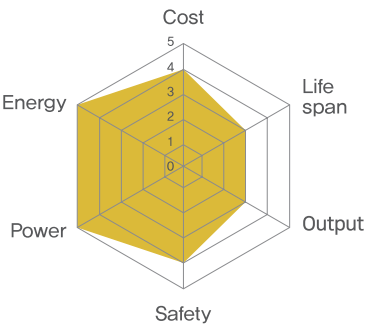
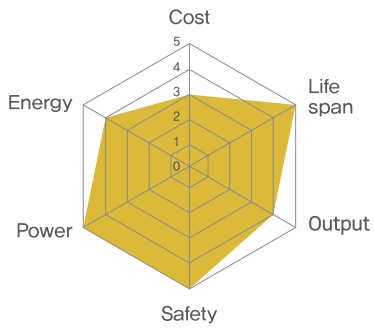
✓ Various lithium cells available beyond those listed in the table below.

manufacturers		A							B				C				
Mode (Capacity)		50	80	100	100	100	113	150	23	30	52	105	24	62	163	230	280
Nominal Voltage [V]		3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Size	Length [mm]	131	135	135	135	161	135	173	146	140	148	200	135	135	174.4	173.9	173.7
	Width [mm]	375	34.6	34.6	34.6	51.5	34.6	42.7	65	100	115	175	29.3	29.3	36.4	53.7	71.7
	Height [mm]	155	216	192	216	161	216	206	22	20.5	28.5	27	180	180	220	204.6	207.2
Internal Resistance [mΩ]		0.7	0.7	0.2	0.7	0.7	0.7	0.4	7	3	2.5	1.5	0.7	0.7	0.3	0.25	0.25
Weight [kg]		1.31	1.9	1.94	2.04	1.93	2.13	3.23	0.435	0.64	0.966	2.06	1.395	1.395	2.97	4.24	5.49
Discharge Conditions	Discharge Current [A]	25	40	20	50	50	50	150	23	30	52	52.5	50	50	163	230	280
	Discharge Cut-off Voltage [V]	2.5															
Charge Conditions	Charge Current [A]	25	40	20	50	50	50	75	23	30	52	52.5	25	25	163	230	280
	Charge Cut-off Voltage [V]	3.65															
Max Continuous Discharge Current [A]		50	80	100	100	100	100	150	23	30	52	105	150	150	163	230	600
Max Pulse Discharge Current (A, 10 sec)		50	80	100	100	100	100	150	23	30	52	105	450	450	650	345	2
Self-Discharge Rate		≤ 1% per month															
Cycle Life (0.5C/DOD80%)		2000–6000 Cycles															
Operating Temperature		0–45	0–45	0–45	0–45	0–45	0–45	0–60	0–55	0–55	0–55	0–55	0–55	0–55	-20–65	0–65	0–60

Advantages of Lithium-Ion Batteries (Compared to Lead-Acid Batteries)

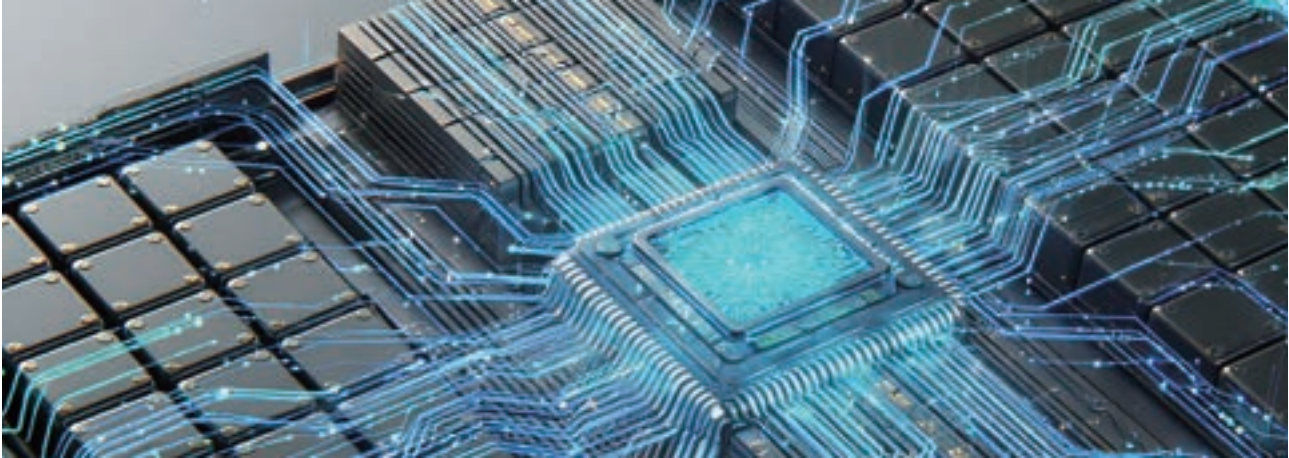
<p>Lifespan Lifespan</p> <p>Provides 3–5 times longer lifespan compared to lead-acid batteries.</p>	<p>Size</p> <p>Approximately 30% smaller in volume than lead-acid batteries.</p>	<p>Weight</p> <p>About 40% lighter than lead-acid batteries.</p>
<p>Output Power</p> <p>Delivers over 3 times higher output power than lead-acid batteries.</p>	<p>Charging Speed</p> <p>Up to 5 times faster charging than lead-acid batteries</p>	<p>Efficiency</p> <p>High-efficiency charge and discharge performance reduces electricity consumption by up to 40%.</p>
<p>Safety</p> <p>Provides high safety performance equivalent to lead-acid batteries.</p>	<p>All-Season Operation</p> <p>Durable and reliable operation in both extreme winter cold and summer heat.</p>	<p>Battery Management</p> <p>BMS-based battery management optimizes battery performance and lifespan.</p>
<p>Self-Discharge</p> <p>Low self-discharge rate ensures excellent long-term storage and capacity retention.</p>	<p>Low-Temp. Performance</p> <p>Maintains over 85% performance even in extremely low temperatures.</p>	<p>Leakage Status</p> <p>Even if the battery is damaged during handling, no electrolyte leakage occurs.</p>

배터리 별 주요 성능 비교

Lead Acid	NCM Batteries	LFP Batteries
 <p>Cost-Effective · High Stability Starting · Industrial · Backup Power</p>	 <p>High Power · Compact Size · Lightweight Design EVs · Power Tools · Industrial Equipment</p>	 <p>Long Cycle Life · High Safety · Superior Low-Temperature Performance Traction · Industrial · Energy Storage</p>
<p>Lead-acid batteries are relatively cost-effective and feature a stable structure. They have long been used in applications that require basic power supply, such as starting batteries, industrial equipment, and backup power systems. However, due to their relatively low energy density and output performance, their applications are somewhat limited.</p>	<p>Lithium-ion batteries (NCM) offer high energy density and excellent output performance. Their compact size and lightweight characteristics make them well suited for applications such as electric vehicles, power tools, home appliances, and industrial equipment where performance-to-weight efficiency is important. However, careful management of safety and battery lifespan is required.</p>	<p>Lithium iron phosphate batteries (LFP) feature long lifespan, high safety, and stable output performance. With excellent thermal stability and a lower risk of fire, they are widely used in applications requiring long-term operation such as industrial equipment, ESS, and logistics equipment. They are particularly preferred in environments where safety and reliability are critical.</p>

BMS Battery Management System

Completed development of BMS solutions applicable to various applications, including traction, industrial, telecommunications, and ESS systems. By leveraging extensive operational data collected from over 360 MWh of cumulative sales, E-SOLUTION optimizes product performance and ensures the highest level of safety and reliability.



E-SOLUTION BMS Features

✓ Low Heat Generation Design

✓ Remote Monitoring

✓ Cell Balancing

✓ GUI Interface

✓ SOC, SOH, Voltage, Current Monitoring & Balancing

✓ KC62619 Functional Safety Test Certified

✓ Data Logging

✓ Diagnostics & Remote Control

✓ Wired / Wireless Communication Module (Optional)





✓ Battery Protection (Overcurrent Cut-off, Overcharge Protection)

✓ Battery Data Black Box (SD Storage)

✓ Fault Cause Tracking & Operation History Management

Category		V.105 rev5.0	V.106 rev5.0	V.105 rev7.0	V.108 rev8.0	V.108 rev10.0	V.13 rev1.3	V.131 rev1.6	V.131 rev2.2	V.131 rev3.0	V.132 rev1.0
Operating Voltage		48-72V	12-36V	48-72V	12-36V	12-36V	12-36V	24V	24V	24V	24-36V
CELL Balancing		●	●	●	●	●	●	●	●	●	●
Charge Cut-off		●	●	●	●	●	●	●	●	●	●
Discharge Cut-off		●	●	●	●	●	●	●	●	●	Alarm
Indicator	State of Charge Indicator			●	●	●			●	●	●
	Volt meter								●	●	
State of Charge Indicator				●	●	●	●	●			●
Communication	RS-232						●	●	●	●	●
	RS-485							●			
	CAN2.0A/B										
Monitoring				●	●	●	●	●	●	●	●
Wireless Network											
Applicable Models		Golf Cart	Samsung / Hyundai AGV etc.	Golf Cart	Hyundai AGV	KEPCO FRTU	Samsung / Hyundai AGV etc.	KTX			Cleaning Vehicle

BMS Development History

V.01	2008~ 2010	<ul style="list-style-type: none"> · Analog-based BMS · First mass-produced BMS applied to golf carts in Korea · Applied to various applications such as AGVs and agricultural machinery 		
V.02	2012~ 2013	<ul style="list-style-type: none"> · 8-bit MCU-based BMS with various communication capabilities · Applied to mass-produced golf cart models · Applied to various applications such as KEPCO FRTU, DAS terminal Samsung AGV, and cleaning vehicles 		
V.03	2013~ 2014	<ul style="list-style-type: none"> · Structure suitable for high-voltage and modular battery pack designs · Applied to UPS systems 		
V.04	2014~ 2016	<ul style="list-style-type: none"> · Enhanced response speed and performance through advanced MCU architecture · Modular BMS structure suitable for high-voltage and modular battery pack design · Applied to UPS and ESS systems 		
V.05	2020~ 2021	<ul style="list-style-type: none"> · 32-bit MCU-based BMS · Advanced standalone BMS architecture · Wireless communication module 	<ul style="list-style-type: none"> · Integration of AI-based solution · EMI shielding SOC data storage capability · Communication support including CAN Bus 	<ul style="list-style-type: none"> · HW Watchdog (BMS Malfunction Prevention) · Current Sensor (2ch) / Relay Control (3ch) · Battery IC-MCU Isolated Communication
V.06	2021~ 2022	<ul style="list-style-type: none"> · 32-bit MCU-based BMS · HW Watchdog (BMS Malfunction Prevention) · Enhanced SOC Storage 	<ul style="list-style-type: none"> · KC62619 Functional Safety Certified · CAN Bus Communication Expansion · EMI Shielding 	<ul style="list-style-type: none"> · Battery IC-MCU Isolation Communication
V.07	2022~2025	<ul style="list-style-type: none"> · 32-bit MCU-based BMS · Wired/Wireless Communication Module · SD Memory Storage · Integration of AI-based solution 	<ul style="list-style-type: none"> · EMI Shielding · Enhanced SOC Storage · Expandable Communication (CAN Bus) · AHW Watchdog (BMS Protection) 	<ul style="list-style-type: none"> · 2ch Current Sensor / 4ch Relay Control · Battery ±-Ground Insulation Resistance · Single-Point Failure Protection (Safe I/O) · KC62619 Functional Safety Certified

V.140 rev2.0	V.151 rev1.0	V.151 rev2.0	V.150 rev1.7	V.120 rev2.0	V.122 rev2.0	V.123 rev1.1	V.124 re1.0	V.131 rev1.3	V.131 rev3.1	V.520	V.530	V031 rev1.0	v640 rev0.1 (Slave)	V031 rev1.3	v640 rev1.0 (Daisy Chain)
24V	24V	24V	24V	48 ~ 72V	48 ~ 72V	48 ~ 72V	48V	24~36V	24V	48 ~ 72V	48, 72V	Master	Module 36~51v	Master	Module 36~51v
●	●	●	●	●	●	●	●	●	●	●	●				●
●	●	●	●	●	●	●	●	●	●	●(OP.)	●(OP.)	●		●	
●	●	●	●	Alarm	●(OP.)	●(OP.)	●(OP.)	●(OP.)	●(OP.)	●	●	●		●	
●	●	●	●							●	●				
				●	●	●	●	●	●	●	●				
●	●	●	●	●(OP.)	●	●	●	●	●	●	●	●		●	
●	●		●	●	●	●	●	●	●	●	●	●		●	
				●			●	●	●	●	●	●		●	
					●	●				●	●	●	●	●	
●	●	●	●	●	●	●	●	●	●	●	●		●		
										●(OP.)	●(OP.)				●
FRTU	KEPCO Equipment Protection	KEPCO Power Supply	Golf Cart / Forklift	Leisure Cart	Forklift	Samsung AGV	Cleaning Vehicle	Samsung AGV	Golf Cart / Forklift	Golf Cart	ESS/UPS	Marine ESS / UPS			

Real-Time Monitoring & AI-Based Fire Incident Prediction

The AI fire prevention solution is an integrated safety management system that continuously collects and analyzes real-time battery data—such as voltage, current, and temperature—to detect anomalies early and predict potential fire risks.

First Mover in BMS Technology

- First company in Korea to launch LFP (Lithium Iron Phosphate) batteries (2010)
- Pioneer in ICT-based lithium battery remote monitoring systems
- Real-time lithium battery big data collection (Cloud System)
- AI-based system for battery life and fault (fire) prediction

Differentiation of High-Safety Battery Technology

High-Safety Lithium	Long-Life Lithium	High-Safety BMS	ICT & Big Data	AI Fault Prediction
Safest Lithium-Ion Battery Structure LFP (Olivine Structure) Zero Explosion Risk	Ultra-Long Life Lithium Battery LFP lithium-ion batteries offer 1.5–2× longer lifespan than conventional NCM lithium-ion batteries	ISO 26262 Functional Safety Design Redundant Architecture for High-Safety & High-Reliability BMS	Real-Time ICT Remote Monitoring via LTE & WiFi Wireless Communication Big Data Collection System	AI-Based Analysis Predictive System for Fault & Fire Incident Prevention

AI-Based Battery Intelligence Platform



REAL-TIME MONITORING

Key battery status data—such as voltage, current, and temperature—are collected and analyzed in real time to continuously monitor operating conditions and immediately detect abnormal signs.

AI FIRE RISK PREDICTION

AI analyzes accumulated data to detect changes and abnormal patterns in battery voltage, current, and temperature, enabling early identification of potential fire risks.

SAFETY CONTROL

Various battery applications—such as ESS, mobility, and industrial equipment—are connected through a single system, enabling centralized monitoring, integrated safety management, and rapid response.



Golf cart batteries are one of E-Solution's flagship battery products and a core part of its production lineup. Designed specifically for the demands of golf carts and light electric mobility, E-Solution's golf cart batteries deliver reliable power, long cycle life, and consistent performance across diverse operating environments.



Mobility Battery

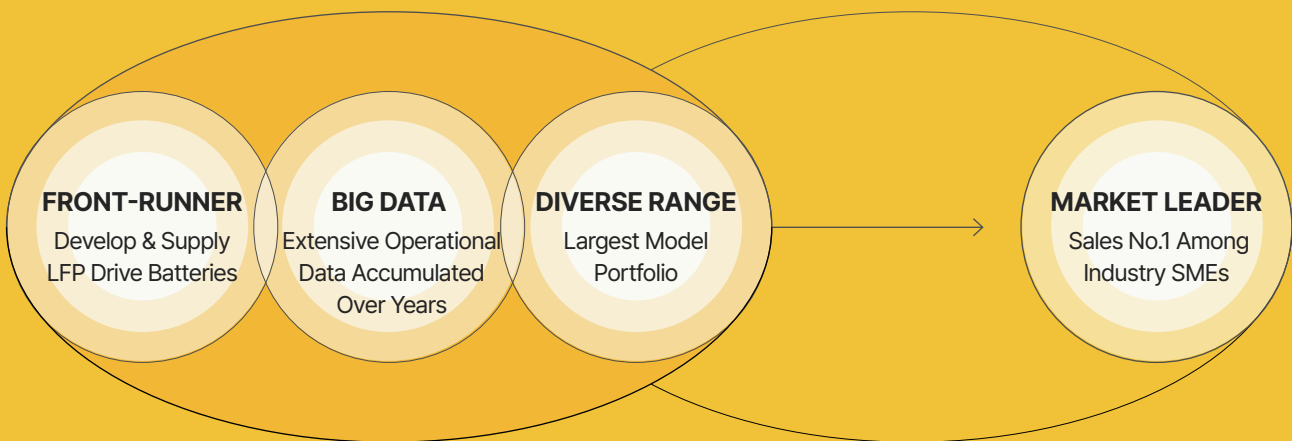


The Standard of Battery Solutions

A proven standard in battery solutions, validated through diverse traction battery applications and extensive supply track records.

Our Specialty

The Undisputed No.1 In The Industry, Leading The Market With A Diverse Product Portfolio, Extensive Accumulated Data, And Broad Technology Development Experience.



Application

Providing Integrated Battery Solutions Across All Electrification Sectors—From Mobility To Industrial, Marine, And Specialized Equipment.

Golf Cart	Aerial Work Platform	Indoor Cleaning Vehicle
Road Sweeper	AGV	E-Bike
E-Scooter	Excavator	Small Power Tools
Marine Vessels	Special Purpose Vehicles	Electric Agricultural Equipment

Golf Cart Lithium Battery



E-SOLUTION Golf Cart Lithium Battery Features

- ✓ Korea's first LFP battery for golf carts (2010): 3–4× longer lifespan vs. lead-acid batteries, 40% lower operating costs
- ✓ 12 years of operational experience, securing extensive technical data across all golf cart platforms
- ✓ Largest lineup of golf cart lithium batteries in Korea (12 models available)
- ✓ Official supplier to Hitachi OE, a major golf cart distributor in Korea
- ✓ 22,000 battery sets supplied and No.1 replacement market share in Korea (as of 2025)

Specifications

Model	Nominal Voltage	Capacity	Length [L]	Width [W]	Height [H]	Weight
GV48100	51.2 V	100 Ah	289.6 mm	580 mm	248 mm	50 kg
GV48113	51.2 V	113 Ah	720 mm	200 mm	250 mm	45 kg
GV48120	51.2 V	120 Ah	289 mm	1080 mm	193 mm	65 kg
GV48124	51.2 V	124 Ah	830 mm	240 mm	270 mm	55 kg
GV48160	51.2 V	160 Ah	640 mm	290 mm	280 mm	69 kg
GV7270	76.8 V	70 Ah	224 mm	1079 mm	193 mm	55 kg
GV7280	76.8 V	80 Ah	730 mm	225 mm	200 mm	48 kg
GV72100	76.8 V	100 Ah	224 mm	1079 mm	248 mm	60 kg
GV72105	76.8 V	105 Ah	830 mm	240 mm	282 mm	65 kg
GV72113	76.8 V	113 Ah	750 mm	240 mm	280 mm	72 kg
GV72120	76.8 V	120 Ah	875 mm	240 mm	280 mm	75 kg

E-SOLUTION's Main Battery Lineup

Golf Cart LFP Batteries

E-SOLUTION's golf cart LFP battery delivers an economical energy solution that reduces operating costs by approximately 40% compared to lead-acid batteries, while significantly lowering maintenance costs and replacement cycles.

With over 12 years of accumulated experience and field expertise, E-SOLUTION has systematically secured operational data across a wide range of golf cart platforms, enabling optimized performance and verified stability in real operating environments. As Korea's leading supplier with the largest lineup of golf cart lithium batteries, E-SOLUTION offers differentiated technology and strong product reliability.

Through strict quality control and continuous R&D, the company continuously enhances product performance and durability. To date, more than 22,000 battery sets have been successfully delivered, achieving No.1 market share in the replacement market in Korea. Supported by extensive operational case studies and accumulated technical data, E-SOLUTION provides lithium battery solutions that maximize operational efficiency and improve long-term profitability for customers.



AWP Lithium Battery



E-SOLUTION Aerial Work Platform Lithium Battery Features

- ✓ Developed AWP lithium batteries (2015): Co-developed with Korea's largest operator with a dedicated BMS.
- ✓ High-performance lithium battery providing strong and stable lifting power
- ✓ Enhanced communication and battery monitoring functions
- ✓ Sleep & Wake-up function for efficient power management
- ✓ IP65 or higher protection rating
- ✓ Compatible with GENIE and JLG platforms

Specifications

✓ Various lithium cells available beyond those listed in the table below.

Model	Nominal Voltage	Capacity	Length [L]	Width [W]	Height [H]	Weight
AW24100-1	24 V	100 Ah	520 mm	180 mm	270.9 mm	57.7 kg
AW24120-2	24 V	120 Ah	360 mm	260 mm	277 mm	50 kg
AW48210	48 V	210 Ah	592 mm	352 mm	410 mm	180 kg
AW051489	48 V	489 Ah	900 mm	630 mm	430 mm	240 kg

AGV Lithium Battery



E-SOLUTION AGV Lithium Battery Features

- ✓ Developed various products and BMS in collaboration with major global companies
- ✓ Customized design and technical support based on AGV specifications
- ✓ Supplied to leading companies including Hyundai Motor, Hyundai Heavy Industries, HD Hyundai Mipo, POSCO, GM Korea (Gunsan), Maru (Japan), Donghee Auto, and Samsung Electronics (Onyang, Pyeongtaek)
- ✓ IEC 62619 certification acquired (2025)

Specifications

✓ Various lithium cells available beyond those listed in the table below.

Model		AGV24	AGV36	AGV48
Capacity		50 ~ 100 AH	50 ~ 100 AH	50 ~ 100 AH
Voltage		25.6V (3.2V×8)	38.4V (3.2V×12)	51.2V (3.2V×16)
Charge Current		Max. 1C	Max. 1C	Max. 1C
Charge Voltage		28.4V (3.55V×8)	42.6V (3.55V×12)	56.8V (3.55V×16)
Charging Method		CC → CV	CC → CV	CC → CV
Max. Discharge Current		2C	2C	2C
Discharge Cut-off Voltage		22.4V (2.8V×8)	33.6V (2.8V×12)	44.8V (2.8V×16)
Communication Interface		RS-232, RS-485	RS-232, RS-485	RS-232, RS-485
Temperature Range	Discharging	-25 ~ 65°C	-25 ~ 65°C	-25 ~ 65°C
	Charging	0 ~ 45°C	0 ~ 45°C	0 ~ 45°C
	Storage	0 ~ 45°C	0 ~ 45°C	0 ~ 45°C

Personal Mobility Lithium Battery



E-SOLUTION Personal Mobility Lithium Battery Features

- ✓ Lithium battery packs for e-scooters and e-bikes: KC 62133 safety certification obtained (2025)
- ✓ BBMS-based protection system: PCM applied for soft-pack batteries (hard-pack products only)
- ✓ Wide range of capacities available for various voltage systems
- ✓ Excellent low-temperature performance, high safety (zero explosion risk), and eco-friendly battery design
- ✓ E-scooter lithium battery packs: Drive battery safety certification obtained (2025), KSR 6100 standard lithium pack certification obtained (2026)

Specifications

✓ Various lithium cells available beyond those listed in the table below.

Model	BIC4816	HB156	BIC4824	BIC4828	MOT7220	MOT7230	E-Scooter KSR6100	
Nominal Voltage	48 V				72 V		48 V	72 V
Voltage Range	38.0 V ~ 56.2 V				57.0 V ~ 84.4 V		39.2 V ~ 58.1V	56 V ~ 83 V
Nominal Capacity	16 Ah	39~54.6 Ah	24 Ah	28 Ah	24 Ah	30 Ah	30 Ah	20 Ah
Dimensions	183×156×159 mm	160×89×328 mm	250×180×125 mm	184×156×265 mm	200×170×280 mm	200×360×170 mm	170×135×310 mm	
Weight	5.6 kg	6.25 kg	7.6 kg	8.6 kg	14 kg	20 kg	9.25 kg	

Floor Scrubber Lithium Battery



E-SOLUTION Indoor Cleaning Vehicle Lithium Battery Features

- ✓ Developed and commercialized LFP batteries for indoor electric cleaning vehicles (2016)
- ✓ Proven LFP battery technology based on over a decade of golf cart battery experience
- ✓ Various LFP battery models available for cleaning vehicles: 24V, 36V, 48V systems
- ✓ Business partnership with Cleantec Co., Ltd. : Official distributor agreement for electric cleaning vehicles

Specifications

✓ Various lithium cells available beyond those listed in the table below.

Model	Nominal Voltage	Capacity	Length [L]	Width [W]	Height [H]	Weight
FM24100	25.6 V	100 Ah	265 mm	323 mm	248 mm	26 kg
FM24113		113 Ah	290 mm	212 mm	252 mm	20 kg
FM24120		120 Ah	265 mm	694.2 mm	197.5 mm	37 kg
FM24140		140 Ah	765 mm	694.2 mm	197.5 mm	37 kg
FM24200		200 Ah	265 mm	694.2 mm	248 mm	52 kg
FM36100	38.4 V	100 Ah	224 mm	566.6 mm	248 mm	39 kg
FM36113		113 Ah	293 mm	240 mm	279 mm	30 kg
FM36120		120 Ah	448 mm	566.6 mm	193.3 mm	55 kg
FM36140		140 Ah	448 mm	566.6 mm	193.3 mm	55 kg
FM36200		200 Ah	448 mm	566.6 mm	248 mm	72 kg

Road Sweeper Lithium Battery



E-SOLUTION Road Sweeper Lithium Battery Features

- ✓ Developed lithium batteries for electric road sweepers (2019)
- ✓ Certified for drive battery safety testing for road-operating vehicles

Specifications

✓ Various lithium cells available beyond those listed in the table below.

Model	FM481000
Battery Type	LiFePo4
Nominal Voltage	48 V
Capacity	1,000 Ah
Operating Voltage	39.8 V ~ 54.8 V
Charge Current	250 A
Max. Continuous Discharge Current	250 A
Max. Discharge Current	500 A
Cycle Life	≤3,000 Cycles @ 80%DOD
Operating Temperature	-20 °C ~ 65 °C
Dimensions	951 mm x 827 mm x 627 mm
Weight	430 kg
Continuous Power Output	12 kw
Peak Power Output	24 kw

Transporter Lithium Battery



E-SOLUTION Transporter Lithium Battery Features

- ✓ Developed lithium batteries for electric transporters (2021)
- ✓ Multi BMS system developed for carbon-reduction lithium battery solutions
- ✓ Diesel engine replaced with lithium battery + motor + inverter system, with 4-parallel configuration for enhanced power stability
- ✓ High safety design with three-stage protection system and IP67 rating
- ✓ Battery data monitoring and logging functions with CAN 2.0 communication

Specifications

✓ Various lithium cells available beyond those listed in the table below.

구분	TP576400
Battery Type	LiFePO4
Voltage	576 V
Capacity	400 Ah
Dimensions	570 mm x 358 mm x 270 mm
Weight	65 kg
Number of Modules	32 ea

Forklift Lithium Battery



E-SOLUTION Forklift Lithium Battery Features

- ✓ Development of lithium batteries for forklifts (2016)
- ✓ Supply of lithium batteries for forklifts of Hyundai Construction Equipment (2021)
- ✓ Development of a Smart BMS system for forklift applications
- ✓ Passed battery performance and safety evaluations
- ✓ 2-parallel configuration designed to enhance output stability, equipped with a Master-Slave automatic switching Smart BMS
- ✓ HCET-200 applied design to enhance battery safety, with battery data monitoring and logging functions
- ✓ CAN 2.0 communication applied and protection performance secured against vibration and shock up to 10G

Specifications

✓ Various lithium cells available beyond those listed in the table below.

Model	Nominal Voltage	Capacity	Length [L]	Width [W]	Height [H]	Weight
FL48300	51.2 V	300 Ah	994 mm	378 mm	582 mm	560 kg
FL48500		500 Ah	984 mm	466 mm	750 mm	1000 kg
FL48600		600 Ah	984 mm	536 mm	750 mm	1150 kg
FL48900		900 Ah	1066 mm	990 mm	537 mm	1320 kg

Excavator Lithium Battery



E-SOLUTION Excavator Lithium Battery Features

- ✓ Supply of lithium batteries for excavators of Hyundai Construction Equipment (2021)
- ✓ Development of a Smart BMS system dedicated to excavator applications
- ✓ Passed battery performance and safety evaluations
- ✓ 2-parallel configuration designed to enhance output stability, equipped with a Master-Slave automatic switching Smart BMS
- ✓ HCET-200 applied design to enhance battery safety, with battery data monitoring and logging functions
- ✓ CAN 2.0 communication applied and protection performance secured against vibration and shock up to 10G

제품 사양

Model	Nominal Voltage	Capacity	Length [L]	Width [W]	Height [H]	Weight
EX7220	76.8 V	200 Ah	575 mm	380 mm	456 mm	120 kg
EX768460	768 V	460 Ah	1385 mm	1470 mm	1560 mm	Approx. 5 ton

UPS batteries are a key product in E-Solution's energy storage portfolio. Designed for uninterruptible power supply applications, they provide reliable backup power, extended lifespan, and stable performance to ensure continuous operation of critical infrastructure under all conditions.



Industrial Battery

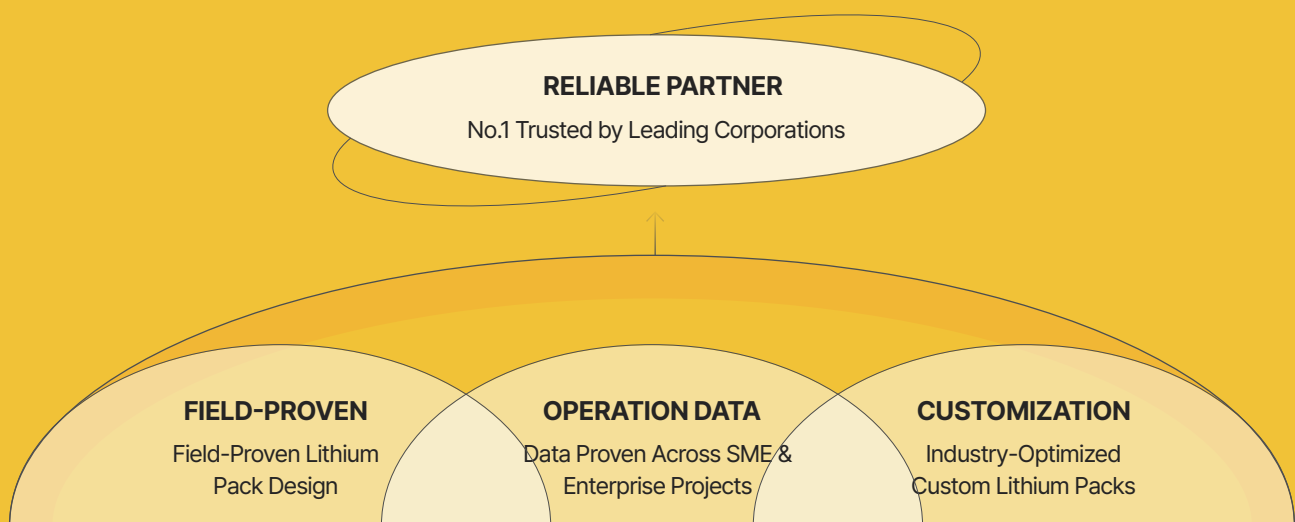


Advanced Technology Proven in the Field

Leading technology built on proven field experience

Our Specialty

Positioned as a reliable business partner based on operational data and a customized product portfolio tailored to each partner's requirements.



Application

Integrated Industrial Lithium Pack Solutions Across Diverse Electrified Industries

Power Plants	Medical Facilities	Distribution Automation
UPS	Switchgear / Distribution Panels	Security & Information Systems
Railways	Generators	Backup Power Supply
Data Centers	Fire Protection Systems	Smart Factories

Smart Pole Lithium Battery



E-SOLUTION Smart Pole Lithium Battery Features

- ✓ Uses wind and solar power in off-grid environments to supply electricity for lighting and CCTV
- ✓ Provides emergency power supply during power outages or emergency situations in urban areas
- ✓ Dedicated smart pole battery designed for flexible integration with MPPT controllers
- ✓ Equipped with a proven lithium battery BMS for smart pole applications

Specifications

✓ Various lithium cells available beyond those listed in the table below.

Model	SP24113
Battery Configuration	8S 1P
Capacity	113 Ah
Nominal Voltage	25.6 V
Voltage Range	24 ~ 28 V
Rated Energy	2.9 kWh
Max. Charging Current	50A
Max. Discharge Current	113 A
Peak Current	170 A
Discharge Temperature	-20°C ~ 65°C
Charging Temperature	0°C ~ 45°C
Module Dimensions	306 mm x 250 mm x 271 mm
Module Weight	20 kg

Refrigerated Truck Lithium Battery



E-SOLUTION Refrigerated Truck Lithium Battery Features

- ✓ Up to 90% fuel savings and reduced emissions through diesel electrification
- ✓ Supplies power to the refrigeration unit using a lithium battery, enabling independent operation even when the engine is off
- ✓ Protection functions provided by the BMS (Battery Management System)
- ✓ Integrated charging communication through an EVCC built into the battery pack
- ✓ Maintains stable refrigeration temperature regardless of power output

Specifications

✓ Various lithium cells available beyond those listed in the table below.

Model	SV33648
Battery Configuration	112S 2P
Capacity	48 Ah
Nominal Voltage	358.4 V
Voltage Range	336 V ~ 392 V
Rated Energy	17.2 kWh
Max. Charging Current	20 A
Max. Discharge Current	10 A
Peak Current	20 A
Discharge Temperature	-20°C ~ 65°C
Charging Temperature	0°C ~ 45°C
Module Dimensions	1320 mm x 210 mm x 678 mm
Module Weight	130 kg

Dust Sweeper Truck Lithium Battery



E-SOLUTION Dust Sweeper Lithium Battery Features

- ✓ Supplies power for dust sweeper operation with reduced emissions through diesel electrification
- ✓ Provides power to the motor and water spraying system, allowing independent operation even when the engine is off
- ✓ Protection functions provided by the BMS (Battery Management System)
- ✓ Vibration-resistant design based on international standards applied

Specifications

✓ Various lithium cells available beyond those listed in the table below.

Model	SV207
Battery Configuration	108S 1P
Capacity	60 Ah
Nominal Voltage	345.6 V
Voltage Range	303.48 V ~ 378 V
Rated Energy	20.7 kWh
Max. Charging Current	60 A
Max. Discharge Current	60 A
Peak Current	60 A
Discharge Temperature	-20°C ~ 65°C
Charging Temperature	0°C ~ 55°C
Module Dimensions	534 mm x 815.7 mm x 532 mm
Module Weight	270 kg

Water Spray Lithium Battery



E-SOLUTION Water Sprinkler Truck Lithium Battery Features

- ✓ Supplies power for water sprinkler truck operation with reduced emissions through diesel electrification
- ✓ Protection functions provided by the BMS (Battery Management System)
- ✓ Vibration-resistant design based on international standards applied

Specifications

✓ Various lithium cells available beyond those listed in the table below.

Model	SV415	SV622
Battery Configuration	108S 2P	108S 3P
Capacity	120 Ah	180 Ah
Nominal Voltage	345.6 V	345.6 V
Voltage Range	303.48 V ~ 378 V	303.48 V ~ 378 V
Rated Energy	41.5 kWh	62.2 kWh
Max. Charging Current	60 A	90 A
Max. Discharge Current	120 A	180 Ah
Peak Current	120 A	180 Ah
Discharge Temperature	-20°C ~ 65°C	-20°C ~ 65°C
Charging Temperature	0°C ~ 55°C	0°C ~ 55°C
Module Dimensions	1149 mm x 815.7 mm x 532 mm	970 mm x 995 mm x 690 mm
Module Weight	540 kg	Approx. 800 kg

Live Line Bucket Truck Lithium Battery



E-SOLUTION Live Line Bucket Truck Lithium Battery Features

- ✓ Supplies power for live-line aerial work platform operation with reduced emissions through diesel electrification
- ✓ Protection functions provided by the BMS (Battery Management System)
- ✓ Vibration-resistant design based on international standards applied

Specifications

✓ Various lithium cells available beyond those listed in the table below.

Model	SV48300
Battery Configuration	16S 3P
Capacity	300 Ah
Nominal Voltage	51.2 V
Voltage Range	48 V ~ 56 V
Rated Energy	15.4 kWh
Max. Charging Current	150 A
Max. Discharge Current	300 Ah
Peak Current	450 A (10sec)
Discharge Temperature	-20°C ~ 50°C
Charging Temperature	0°C ~ 50°C
Module Dimensions	240 mm x 220 mm x 160 mm
Module Weight	Approx. 9.6 kg

Snowplow Lithium Battery



E-SOLUTION Snowplow Lithium Battery Features

- ✓ Supplies power for snow removal vehicle operation with reduced emissions through diesel electrification
- ✓ Protection functions provided by the BMS (Battery Management System)
- ✓ Vibration-resistant design based on international standards applied

Specifications

✓ Various lithium cells available beyond those listed in the table below.

Model	SV48300
Battery Configuration	16S 3P
Capacity	300 Ah
Nominal Voltage	51.2 V
Voltage Range	48 V ~ 56 V
Rated Energy	15.3 kWh
Max. Charging Current	100 A
Max. Charging Current	200 A
Peak Current	200 A
IP Rating	IP67
Discharge Temperature	-20°C ~ 65°C
Charging Temperature	0°C ~ 45°C
Dimensions	927 mm x 378 mm x 560 mm
Weight	488 kg



FRTU Lithium Battery





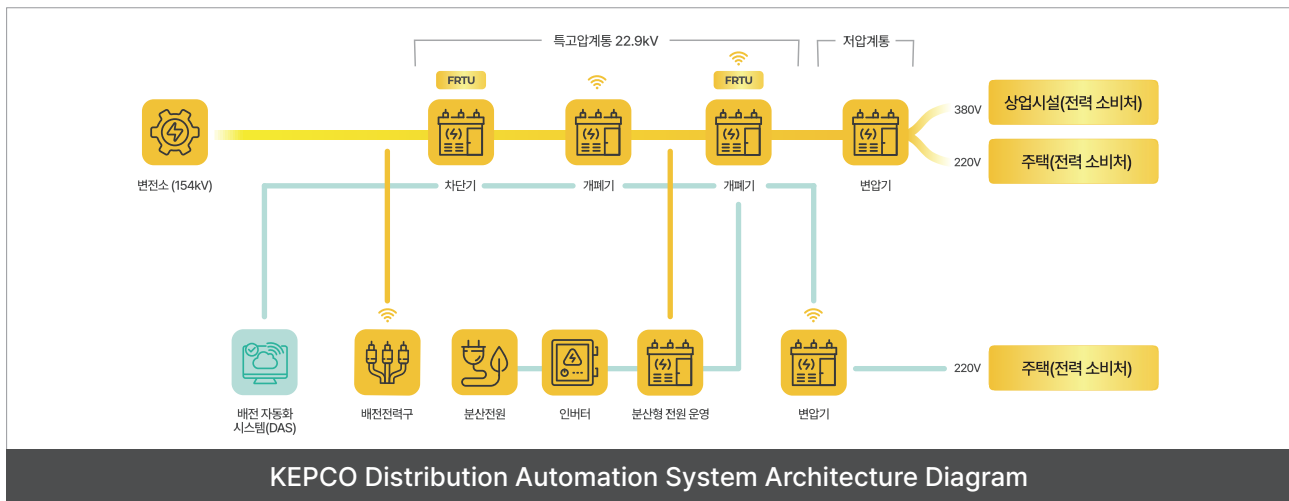
E-SOLUTION FRTU Battery Features

- ✓ First development of lithium-ion battery for distribution automation systems
- ✓ Participation in demonstration projects for distribution automation lithium-ion batteries
- ✓ KEPCO procurement compliant and safety-certified for distribution automation batteries
- ✓ Lithium-ion battery testing conducted with multiple switchgear manufacturers
- ✓ Supports 6C peak current for FRTU operation and enables more than 70 switching operations
- ✓ Abnormal condition detection functions (current, voltage, temperature, BMS power, converter, etc.)
- ✓ EMC compliance (IEC 61000-4-5) and remote monitoring technology applied

Specifications



Model	FRTU	
	FRTU2410	FRTU2420
Appearance		
Application	High-Voltage FRTU	
Nominal Voltage	3.2 × 8 ea	3.2 × 8 ea
Capacity	10 Ah	20 Ah
Charging Current	Max. 5A	Max. 10A
Max. Discharge Current	6C (Over 1 sec)	6C (Over 1 sec)
Weight	2.84 kg	6.50 kg
Dimensions	180×77×166.5 mm	180×154×166.5 mm
Customer	KEPCO	

Model	High Voltage FRTU	Low Voltage FRTU
Example Product Image		
Key Application Environment	Underground / Overhead distribution, inside switchgear panels	Low-voltage switchboards, small distribution equipment
Product Type	Underground / Door-type / Overhead / Integrated type	Standard / Compact
Key Features	Remote monitoring, control, protection, and metering	Low-voltage monitoring and control
Installation Method	Indoor / Outdoor installation	Mainly indoor installation
Features	High reliability and rugged design for various environments	Compact, lightweight design with minimal space requirement
System Integration	DAS (Distribution Automation System) integration	DAS and low-voltage monitoring system integration
Purpose / Application Purpose	Enhanced high-voltage reliability and fault response	Efficient operation and management of low-voltage networks



KEPCO Distribution Automation System Architecture Diagram

Specifications

구분	Low-Voltage DAS	
	FRTU2405	RTU2405C
Appearance		
Application	For Low-Voltage DAS	저압 FRTU용(컴팩트 타입)
Nominal Voltage	3.2 × 8 ea	3.2 × 8 ea
Capacity	5 Ah	5 Ah
Charging Current	Max. 5A	Max. 3A
Max. Discharge Current	6C (Over 1 sec)	6C (Over 1 sec)
Weight	1.5 kg	1.5 kg
Dimensions	150×140×45 mm	150×140×35 mm
Customer	KEPCO KDN	


UPS Lithium Battery







E-SOLUTION UPS Battery Features

- ✓ High Power Output – Up to 3× higher than lead-acid batteries
- ✓ Long Life / Low Cost – 3–5× longer lifespan than lead-acid batteries (up to 15 years)
- ✓ Lightweight / Compact – Reduces installation and operating costs
- ✓ Remote monitoring and management via ICT cloud system
- ✓ KC62619 certified

Specifications

Category	BPU
Appearance	
Model	B605A
Dimensions (W×D×H)	741.4×570×330 mm
Weight	Approx. 32 kg
Configuration	OV / OC / OT / Short-Circuit Protection, Circuit Breaker, Power Switch, Status LED, CAN 2.0A, TCP/IP

Category	Module	UPS		
Appearance				
Model	B605A	ESS484A	ESS058D	ESS215E
Nominal Voltage	57.6 V	460.8 V	115.2 V	358.4 V
Operating Voltage	50.6~62.3 V	404.6 ~ 498.2 V	108~127 V	336~392 V
Nominal Energy	6.05 kWh	48.4 kWh	5.76 kWh	21.5 kWh
Usable Energy	5.44 kWh	43.5 kWh	5.18 kWh	19.35 kWh
Capacity	105 Ah	105A Ah	50 Ah	60 Ah
Dimensions (W×D×H)	366.8×570×231.6 mm	852.4×650×1546.1 mm	800×450×1000 mm	1000×600×2000 mm
Weight	Approx. 50 kg	Approx. 555 kg	Approx. 220 kg	Approx. 530 kg

Protecting AI and Data Infrastructure

LFP UPS Battery

Digital transformation and the rapid expansion of AI technologies have made stable power supply a critical infrastructure across all industries. Advanced systems such as AI servers, data centers, financial platforms, medical equipment, and smart factories can suffer significant losses—including data corruption, system failures, and operational downtime—from even a momentary power interruption.

In response, UPS (Uninterruptible Power Supply) systems have evolved beyond simple backup devices for power outages. They now serve as essential power infrastructure that protects AI-driven computing environments and critical facilities. By maintaining stable voltage and delivering instant backup power, UPS solutions ensure both operational continuity and data integrity.



ESS systems are a core solution in E-Solution's energy storage portfolio. Designed for efficient energy management and reliable power backup, they deliver stable performance, long service life, and enhanced safety to support sustainable and resilient energy infrastructure.



Energy Storage System



The Strength of E-Solution ESS

Proven Technology of E-SOLUTION Energy Storage Systems

Our Specialty

The use of Energy Storage Systems (ESS) is rapidly expanding across a wide range of industries and becoming increasingly common. As adoption grows, more demanding technical requirements are emerging, including operation in diverse geographic environments such as polar regions, deserts, coastal areas, and high-altitude locations, as well as high-power performance and long-duration operation of 6–8 hours or more.

To ensure safe and reliable operation under these conditions, E-SOLUTION ESS adopts LFP (Lithium Iron Phosphate) cells and incorporates advanced safety-focused design across the BMS, cell, module, and rack levels. These include redundant functional safety architecture, cell-to-cell fire propagation prevention design, reinforced structural design, and AI-based fire prediction technology. Through these innovations, E-SOLUTION delivers industry-leading ESS technology that sets a new benchmark for safety and reliability.



NFPC 607 Fire Safety Certification



KC 62619 Safety Certification

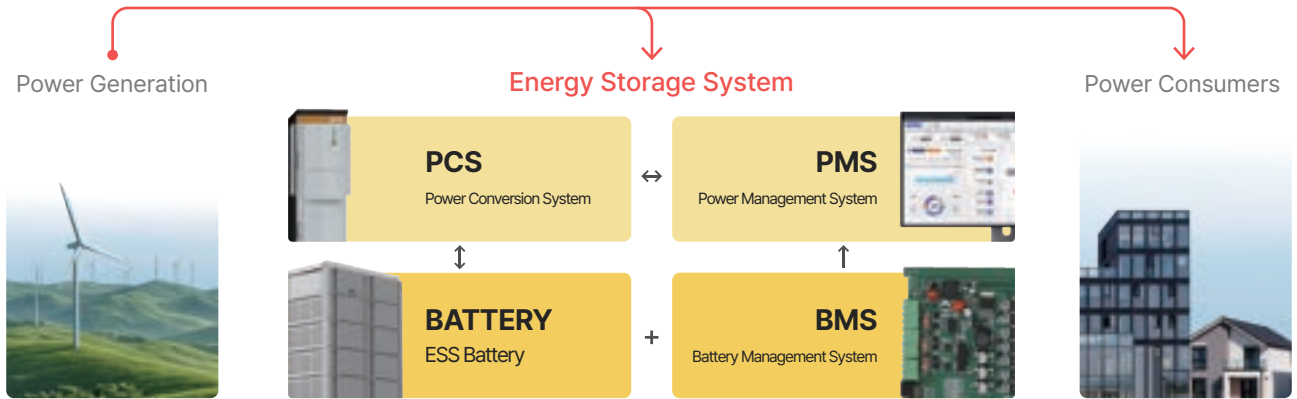
Application

ESS Solutions for Enhanced Power Efficiency and Stability

Solar-Linked ESS	Wind-Linked ESS	Industrial Plant Power Storage
Building Energy Management	Data Center Backup Power	EV Charging Station ESS
Microgrid System	Disaster Response System	Telecom Base Station Power
Off-Grid Power Systems	Military Equipment Power	Marine Energy Storage

Energy Storage System

Energy Storage Systems (ESS) store generated electricity and supply power when needed across various industries and infrastructure sectors. They help stabilize the power grid, enable efficient use of renewable energy, support power demand management and peak shaving for cost reduction, and provide reliable emergency backup power.



BATTERY

Stores electricity using lithium-ion batteries such as NCM and LFP, providing stable energy storage with high efficiency, long lifespan, and excellent safety.



PMS

A monitoring and control system for stable operation of ESS, managing power quality to improve system reliability and operational efficiency.



BMS

Monitoring and control system for stable ESS operation, improving power quality, reliability, and operational efficiency.



PCS

Converts power between AC and DC, enabling energy storage in batteries and stable power supply to the grid or loads.



ESS Key Advantages



Fire-Free	Safe LFP Cells
Long Life	1.5x longer than NCM
Safety Sensors	Overheat protection
Auto Cooling	Overheat protection
Safety Design	Real-time monitoring
AI Analytics	Life & fault prediction
High-Capacity	High energy density
Wide Applications	Flexible output use
Multi-Channel Comms	Real-time monitoring & diagnostics




Utility Energy Storage System



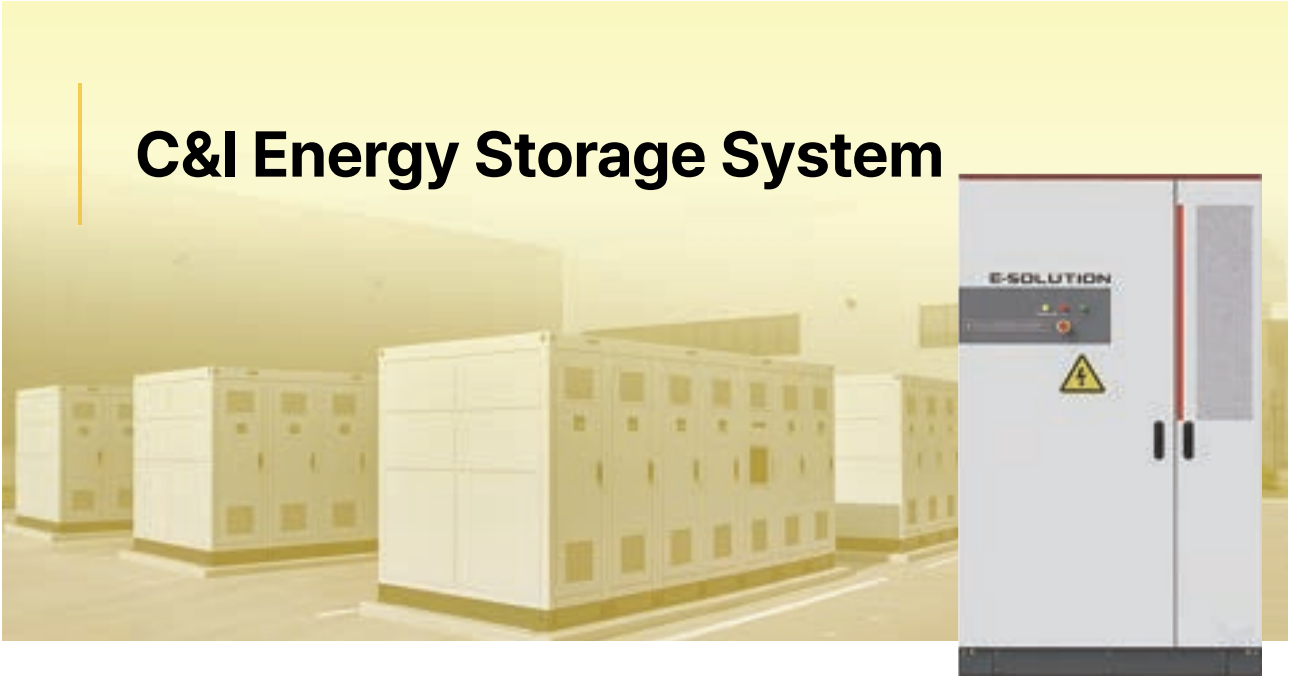
E-SOLUTION BESS Key Features

- ✓ Large Capacity: 3–5 MWh ESS (20ft container)
- ✓ High-Voltage Platform: 1,075–1,498 V for improved transmission efficiency and PCS conversion efficiency
- ✓ Liquid Cooling System: Enhanced stability and extended lifespan in high-temperature environments
- ✓ Global Certification Ready: UL9540 / UL9540A / IEC62619 / UL1973 compliant, suitable for global projects
- ✓ Modular & Standardized Design: 20ft ISO container for easy transport, installation, and expansion
- ✓ Integrated Safety System – BMS, cooling, fire detection, and automatic shutdown

Specifications

Appearance			
Capacity	3.44 MWh	4.0 MWh	5.0 MWh
Battery Cell	280 Ah (LF280K)	306 Ah (MB30)	314 Ah (MB31)
Configuration	10 × 1P 384S	10 × 1P 416S	12P × 416S
Battery Voltage	1,075.2 ~ 1,382.4 V	1,164.8 ~ 1,497.6 V	1,164.8 ~ 1,497.6 V
Thermal Management	Liquid Cooling		
Dimensions	20HC 6,058 × 2,438 × 2,896 mm		
Weight	Approx. 35 t	Approx. 37 t	Approx. 45 t
Operating Temperature	Charge: 0–55 °C / Discharge: –20–55 °C	–30 ~ 55 °C	–30 ~ 55 °C
IP Rating	IP55		




C&I Energy Storage System



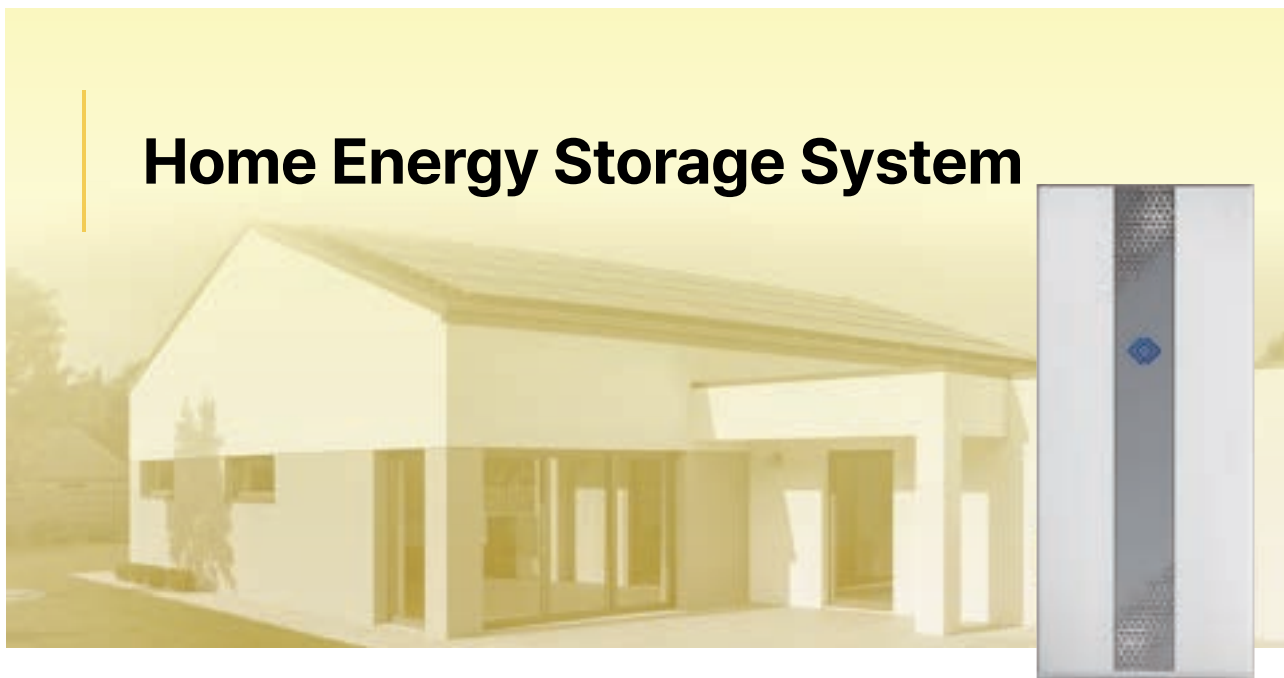
E-SOLUTION C&I ESS Key Features

- ✓ Next-Gen Li Cells: 280Ah high-density cells delivering 215–344 kWh energy
- ✓ Long Life: LFP cells with optimized thermal management and BMS
- ✓ High Safety & Durability: Multi-layer safety design with LFP, safety valves, and MSD
- ✓ Flexible & Scalable: 48S1P modules (5S–8S) with expandable system configuration
- ✓ Efficient Management : Liquid cooling for stable temperature control and easy maintenance

Specifications

Category	1 SET	4 SET	8 SET	10 SET
Expansion Configuration				
Configuration	1P384S × 1	1P384S × 4	1P384S × 8	1P384S × 10
Nominal Energy	344 kWh	1,376 kWh	2,752 kWh	3,440 kWh
Dimensions	1,300 × 1,300 × 2,300 mm	2600 × 2600 × 2300 mm	5200 × 2600 × 2300 mm	6500 × 2600 × 2300 mm
Weight	3,400 kg	13,600 kg	27,200 kg	34,000 kg
Capacity	280 Ah	1,120 Ah	2,240 Ah	2,800 Ah
Battery Cell Voltage	LFP / 2.8~3.6 V			
Battery Voltage Range	1,075.2~1,382.4 V			
Thermal Management	Liquid Cooling			
Operating Temperature	0~55 °C			
IP Rating	IP66			

Home Energy Storage System



E-SOLUTION Home ESS Key Features

- ✓ Commercialized in 2022 and KC62619 certified in 2024
- ✓ Integrated system with Li-battery, EMS, and PV linkage
- ✓ 10 kWh (2P) and 15 kWh (3P) configurations for stable output
- ✓ Three-stage safety protection with battery data monitoring and logging
- ✓ Real-time system status via HMI interface
- ✓ Eco-friendly system supporting greenhouse gas reduction
- ✓ Long cycle life (2,000–3,000 cycles)
- ✓ LFP battery for enhanced fire safety and reliable operation across various temperatures

Specifications

Model	HESS051A	HESS102A	HESS154A
Capacity	100 Ah	200 Ah	300 Ah
Battery Cell Voltage	LFP / 3.2 V	LFP / 3.2 V	LFP / 3.2 V
Configuration	1P16S	2P16S	3P16S
Nominal Energy	5.12 kWh	10.24 kWh	15.36 kWh
Voltage Range	44.96 ~ 55.36 V	44.96~55.36 V	44.96~55.36 V
Thermal Management	Air cooling	Air cooling	Air cooling
Dimensions	274 × 560 × 372 mm	680 × 425 × 1430 mm	680 × 425 × 1430 mm
Weight	Approx. 100 kg	Approx. 135 kg	Approx. 165 kg
Features	OV / OC / OT / Short-Circuit Protection, Circuit Breaker, Power Switch, Status LED, CAN 2.0A, TCP/IP, GUI LCD		

Mobile Storage System



E-SOLUTION Portable ESS Key Features

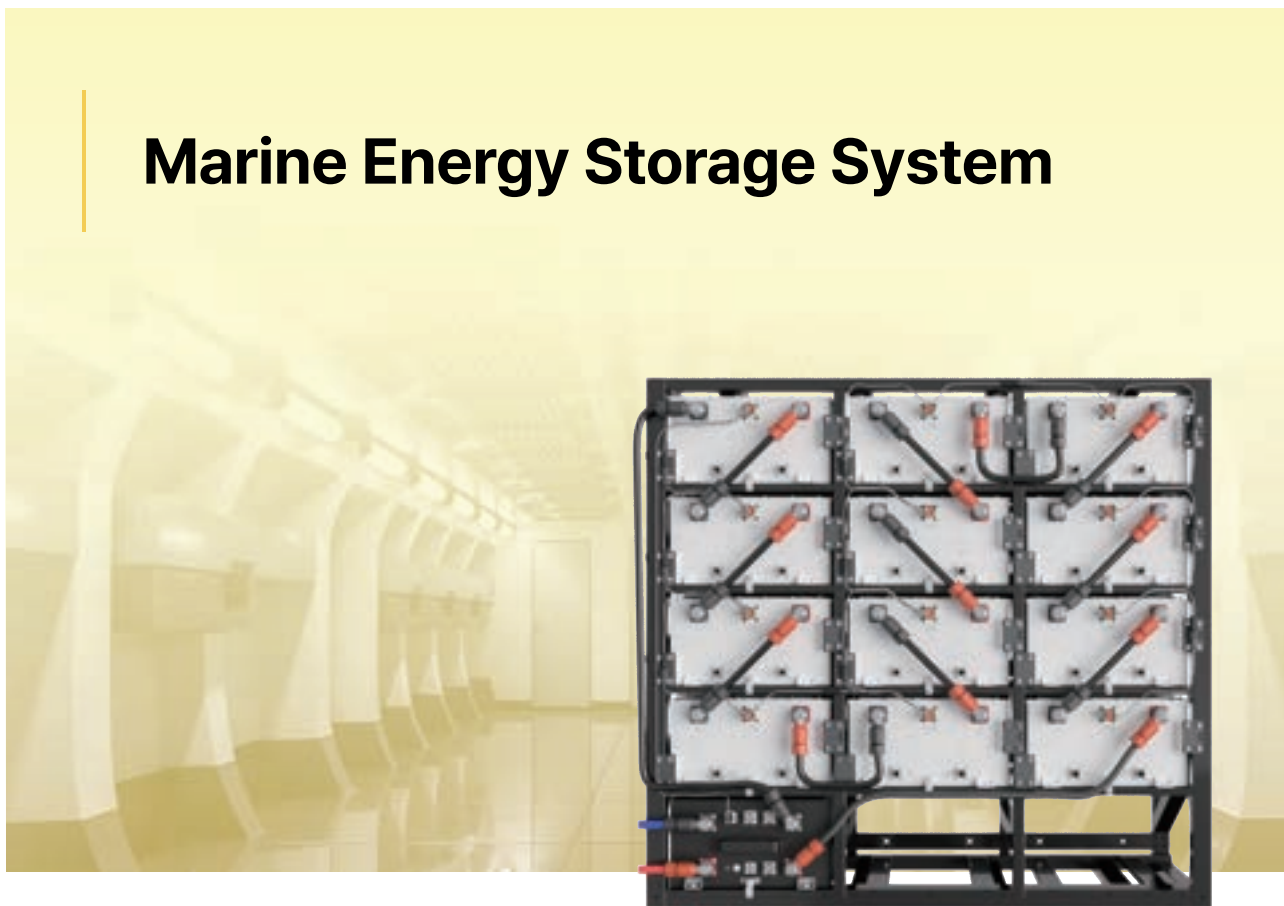
- ✓ Development of portable ESS core technology (2022)
- ✓ Dual-parallel configuration design for enhanced output stability
- ✓ High safety ensured through a three-stage protection mechanism
- ✓ IP55 protection rating with battery data monitoring and logging functions
- ✓ CAN 2.0 communication support and long cycle life (2,000–3,000 cycles)

제품 사양

Model		M768M	Model		B768M
Module	Capacity	150 Ah	BPU	Dimensions	570×450×242
	Cell Capacity	LFP / 3.2 V		Weight	Approx. 25
	Configuration	1P16S		Features	OV / OC / OT / Short-Circuit Protection, MCCB, Power Switch, Status LED, CAN 2.0A, TCP/IP
	Nominal Energy	7.68 kWh			
	Voltage Range	44.96 ~ 55.36 V			
	Dimensions	570 × 450 × 242 mm			
	Weight	Approx. 72 kg			

구분	ESS1152M	ESS2304M
Capacity	150 Ah	300 Ah
Battery Cell Capacity	LFP / 3.2V	LFP / 3.2V
Configuration	M768M 15S + B768M	ESS1152M 2P
Nominal Energy	115.2 kWh	230.4 kWh
Voltage Range	674.4~830.4 V	674.4~830.4
Thermal Management	Air Cooling	Air Cooling
Dimensions	1390×606.4×1668.4 mm	2780×606.4×1668.4 mm
Weight	Approx. 1,255 kg	Approx. 2,510 kg

Marine Energy Storage System



E-SOLUTION Marine ESS Key Features

- ✓ Designed in accordance with KR classification standards and certified by KR (2025)
- ✓ Provides onboard power supply during vessel operation
- ✓ Significant carbon reduction compared to diesel engines, including lower CO₂ emissions
- ✓ Protection functions through BMS (Battery Management System)
- ✓ Vibration-resistant design based on international standards

제품 사양

Model	SV614230G	VS358210D
Capacity	230 Ah	210 Ah
Battery Cell Voltage	LFP / 3.2 V	LFP / 3.2 V
Configuration	1P192S	2P112S
Nominal Energy	141.3 kWh	75.3 kWh
Voltage Range	539.52~664.32 V	314.72~387.52 V
Thermal Management	Air Cooling	Air Cooling
Dimensions	1450×732×1360 mm	1432×1170×517 mm
Weight	Approx. 1290 kg	Approx. 820 kg
Operating Temperature	-30 ~ 65 °C	-20 ~ 60 °C
IP Rating	IP55	IP55

AI Lithium is the Answer!

By combining AI-based monitoring technology with high-performance lithium battery systems, E-SOLUTION is setting a new standard in energy solutions.

From design and manufacturing to testing and verification, we deliver reliable energy solutions through strict quality standard and safety-focused processes.

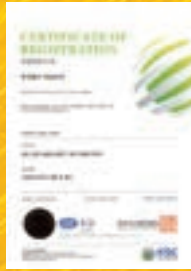
On the journey toward a sustainable future, E-SOLUTION will continue to provide the energy solutions the world needs, driven by advanced technology and proven quality.

E·SOLUTION

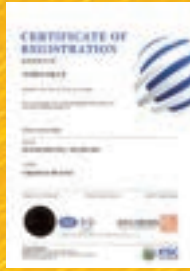
Certifications and Listing Status



Venture Business Certificate



ISO 14001 Certification



ISO 9001 Certification



Corporate R&D Center



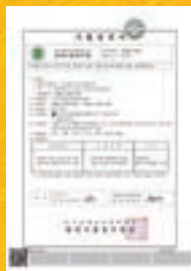
Inno-Biz Technology Innovation SME Certification



Main-Biz Management Innovation SME Certification



Materials & Components Equipment Specialist Confirmation



NFT(P)C 607 Fire Certification



KC62619 Safety Certification



Talent-Fostering SME Designation



KEPCO Expert Committee Appointment



Daejeon Distribution SME Certification



2026 E-SOLUTION Product Catalogue

80-28, Techno 2-ro, Yuseong-gu, Daejeon 30414, Republic of Korea
TEL 042.635.5684 FAX 042.635.5683 WEB www.e-solution.kr