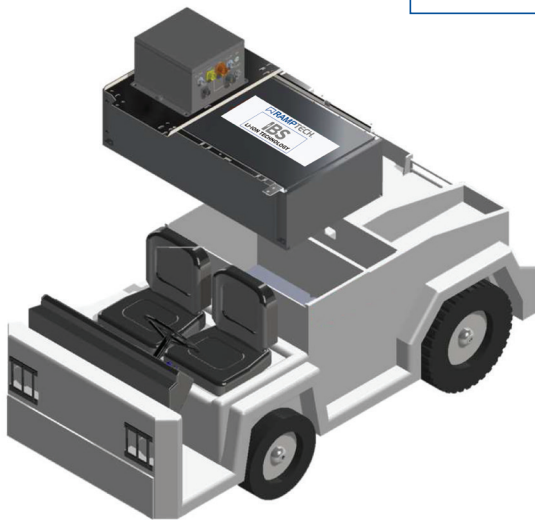
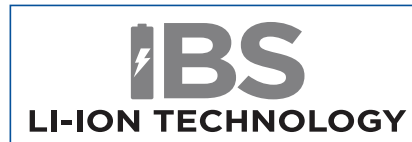


## IBS – INTELLIGENT BATTERY SYSTEMS

LONGER LIFE / QUICK CHARGING



### DROP-IN SOLUTION

Replace your lead acid battery



### MODULAR ADVANTAGE

Can expand capacity up to 176 kWh

## IBS HAS SUPERIOR RELIABILITY AND EFFICIENCY COMPARED TO LEAD ACID BATTERIES

### FEATURES

- EXTENDED BATTERY LIFETIME
- BUILT-IN BATTERY MANAGEMENT SYSTEM (BMS)
- HIGH PERFORMANCE
- MAINTENANCE FREE
- BETTER FOR THE ENVIRONMENT
- USES SAFE & STABLE LITHIUM IRON PHOSPHATE (LFP) TECHNOLOGY
- LIFECYCLE MANAGEMENT DESIGN FOR MAXIMUM PERFORMANCE AND MINIMIZED TOTAL COST OF OWNERSHIP
- FLEXIBLE OPPORTUNITY CHARGING

### THE IBS SOLUTION ADVANTAGE

Converting your old batteries to the lithium

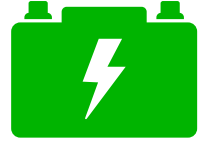
- REDUCE GSE DOWNTIME
- LOWER YOUR OPERATIONAL COST
- LONGER LIFE

[www.sageparts.com/ibs](http://www.sageparts.com/ibs)








## A COMPARISON OF LEAD ACID vs LI-ON BATTERIES WHY LITHIUM-ION IS BETTER



LEAD ACID



LITHIUM-ION

<b>LIFE</b>	Highly dependent on maintenance and charge cycles (~3-5 year) 500-1000 charge cycles	Longer life with minimal power loss (~7-10 years) 2,000-5,000 charge cycles
<b>ENERGY CAPACITY</b>	80% useable charge capacity (use at below 20% charge can cause damage) 	Close to 95% of available charge capacity without damage 
<b>CHARGING</b>	Requires continuous charging (7-10 hours) 	Flexible opportunity charging capability (from minutes up to 3 hours) 
<b>MAINTENANCE</b>	Strict maintenance and monitoring required (fluid level, charge)	Maintenance Free (No fluid fill required, no ventilation needed, lighter weight)
<b>SAFETY</b>	Risks from acid spills, fumes, and heavy weight 	Completely sealed and contained package 
<b>WORK ENVIRONMENT</b>	Adversely affected by extreme climates conditions	Wide temperature range -13°F to 131°F (-25°C to 55°C)
<b>COST</b>	Lower initial cost, reduced performance, and a shorter life span	Higher initial cost, significantly lower cost of ownership 

## RAMPTECH® IBS MODULAR ADVANTAGE CAN BE USED LIKE BUILDING BLOCKS IN 22 KWH INCREMENTS



RAMPTECH® IBS consists of 80 VDC packs that can be combined like building blocks, to create batteries in 22 kWh increments (44, 66, 88 kWh or higher).

Additional packs can be easily installed on-site to increase capacity of the battery for higher duty requirements, allowing for optimization.

Size and dimensions of the packs are designed to match the size and space of most existing battery compartments as a GSE “drop-in” solution.

## MINIMIZING THE TOTAL COST OF OWNERSHIP INNOVATIVE LIFE CYCLE MANAGEMENT



RAMPTECH® IBS is designed with advanced life cycle management that allows a significant decrease on the total cost of ownership. Due to its flexible design the battery life can be extended by changing its application.

### ADVANCED LIFE CYCLE USAGE MANAGEMENT



#### STEP 1 - NEW

New IBS batteries can be used on the most demanding GSE applications.

*Baggage and Cargo Tractors. Driving long distance.*



#### STEP 2 - INTO ITS LIFECYCLE

As the IBS battery performance decreases, it can be installed in less demanding applications.

*Like Cargo Loaders or Aircraft Tractors.*















#### STEP 3 - TOWARDS THE END OF ITS LIFECYCLE

Eventually, IBS batteries can be used on lighter duty equipment.

*Like Belt Loaders or Passenger Steps.*



## SUGGESTED APPLICATIONS RECOMMENDED AND AVAILABLE COMBINATIONS

												
	BAGGAGE TRACTOR/ TOW	TOW TRACTOR BAG/TOW/ CARGO TRAILER	BELT LOADER	GROUND POWER UNIT	PASSENGER STAIRS	LAV SERVICE/ WATER SERVICE TRUCK	AIRCRAFT PUSHBACK TRACTOR NARROW BODY - UP TO 757	AIRCRAFT TOWBARLESS TRACTOR SMALL AIRCRAFT	AIRCRAFT TOWBARLESS TRACTOR WINDE BODY AC 350/B777	CARGO LOADER SMALL-MEDIUM	CARGO LOADER MEDIUM-LARGE	CONTAINER/ PALLET TRANSPORTER
1 Pack (22 kWh)												
2 Packs (44 kWh)												
3 Packs (66 kWh)												
4 Packs (88 kWh)												
4 Packs+ (88 kWh high current)												
5 Packs (110 kWh)												
6 Packs (132 kWh)												
7 Pack (154 kWh)												
8 Packs (176 kWh high current)												

- DUTY CYCLE AND ACCESS TO OPPORTUNITY CHARGING ARE KEY CRITERIA FOR CAPACITY SELECTION

### CHARGING

ITEM	1 PACK - 22 kWh	2 PACKS - 44 kWh	3 PACKS - 66 kWh	4 PACKS - 88 kWh	5 PACKS - 110 kWh	6 PACKS - 132 kWh
PDU2	80 min	150 min				
PDU4		80 min	110 min	150 min		
PDU4+				150 min		
PDU5					180 min	
PDU6						220 min

- CHARGE ANYTIME/ANYWHERE
- OPPORTUNITY AND QUICK CHARGING
- LESS CONSTRAINT ON CHARGER INSTALLATION AND "PLACE SPECIFIC" CHARGING COMPARED TO LEAD ACID BATTERIES

### SPECIFICATIONS

Configuration	Type	LFP (LiFePO4)
	Arrangement	5 cells per module 5 modules per pack
Capacity	Nominal Capacity	277 Ah
	Power Capacity	22 kWh
Power Supply Voltage	Nominal Voltage	80 V
	Voltage range	62.5 - 91.25V
Charging mode	Max. continuous recharge current	0.5C
	Max. peak recharge current	300 A
	Operation temperature range	0° to +55 °C Integrated heating system to charge in cold weather (<0°C)
Discharging mode	Max. continuous discharge current	1C
	Max. peak discharge current	400 A
	Operation temperature range	-25 to +55°C (1C) -50 to -25°C, +55 to +100°C (0.3C)
Dimensions	Size	D550 x L970 x H270 mm
	Weight	182 Kg
Safety	IP Rating	IP67
	Transportation standard	UN38.3
	Fire suppression system	Fire detection system as standard, optional fire suppression system

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