

Nonstop in motion.
Solving intralogistical tasks
with *liflex*.



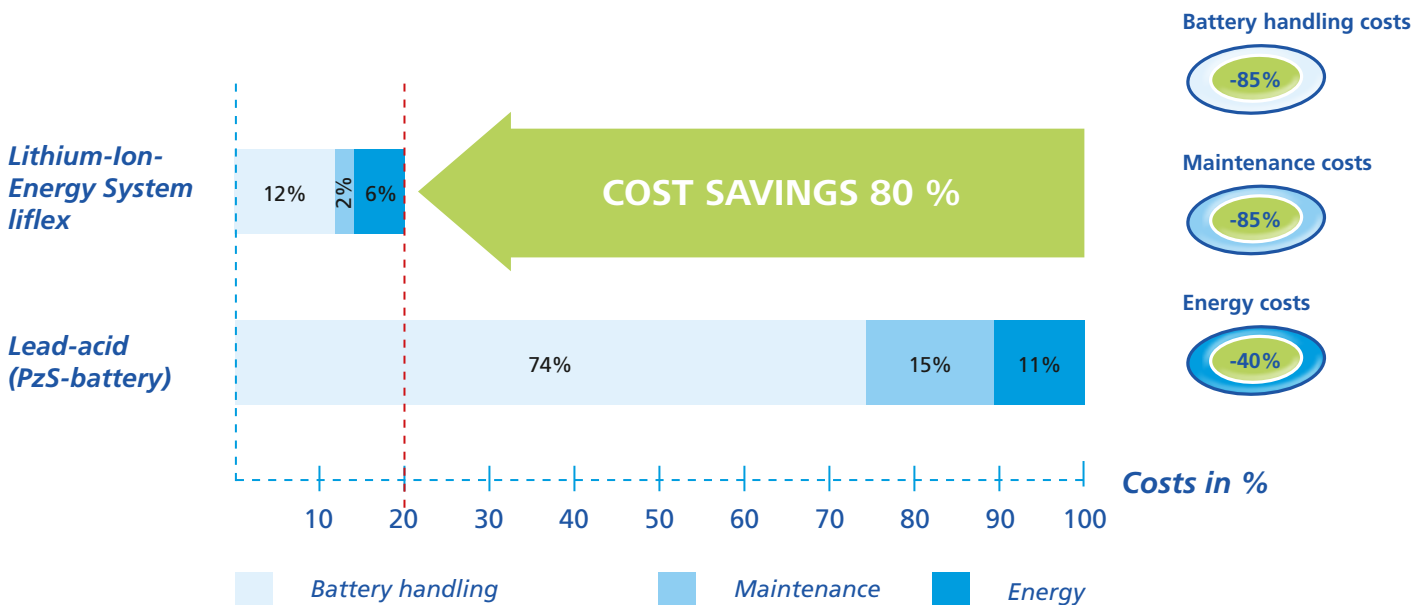
25% in 20 MIN



liflex.
Lithium-Ion-Energy Systems

- Significant reduction of total cost of ownership
- Great potential for optimisation of all intralogistics processes
- More efficient total system

Total Operating Costs Lead-acid (PzS-battery) versus Lithium



The calculation is based on the application example with a truck fleet of 25 vehicles (see p. 7). Only battery handling, maintenance and energy have been taken in account. According to the application there could be additional facts.



For traction applications

- Short down time of vehicles
- No maintenance of batteries any more
- Less need of infrastructure
- Energy saving
- Long battery life
- High reliability of intralogistics processes

liflex. What is liflex?

A modular lithium-ion energy system – economic, totally closed, maintenance free, emission free - as an innovative power source for electric trucks

- Available for a great part of 24V- and 48V-warehouse trucks
- Systems for higher voltages in preparation

How to use liflex?

- Integration into existing standard battery containers
- Fits directly, without any changes to the truck (Plug 'n Play)
- The counterweight is integrated into the container
- No changes in existing truck features in terms of stability and handling characteristics of the vehicle
- CAN communication possible (option)



powertron liflex.

HF-Charging Technology for liflex-Lithium-Ion-Energy Systems

CHARGER DATA

Voltage	Charger	Mains voltage	Mains power rating	Mains current	Mains fuse (slow)	Power line & plug	Housing	Gross weight
V	V/A	V	kVA	A/Phase	A	mm ²	Type	ca. kg
24V	E 24V/70A	E 230V	1,9	8,8	10	1,5 Schuko	H2	19
	E 24V/100A	E 230V	2,8	12,2	16	1,5 Schuko	H3	38
	D 24V/120A	D 400V	3,7	5,4	16	1,5 CEE 16	H3	46
	D 24V/160A	D 400V	4,9	7,7	16	1,5 CEE 16	H3	56
	D 24V/200A	D 400V	6,2	8,9	16	1,5 CEE 16	H3	56
	D 24V/240A	D 400V	7,4	10,7	16	1,5 CEE 16	H4	87
	D 24V/300A	D 400V	9,3	13,3	16	1,5 CEE 16	G40	110
48V	D 48V/120A	D 400V	7,4	10,1	16	1,5 CEE 16	H3	56
	D 48V/160A	D 400V	9,9	14,4	16	1,5 CEE 16	H3	56
	D 48V/200A	D 400V	12,4	17,8	20	2,5 CEE 32	H4	87
	D 48V/240A	D 400V	14,8	21,1	25	4,0 CEE 32	G40	110
	D 48V/300A	D 400V	18,5	26,7	32	6,0 CEE 32	G40	110

E 230V:
D 400V:
Ambient temperature:
Protection mode:

Single phase, 1 x 230V 50Hz (1/N/PE)
Three phase, 3 x 400V 50Hz (3/N/PE)
0° C to 40° C
IP 21

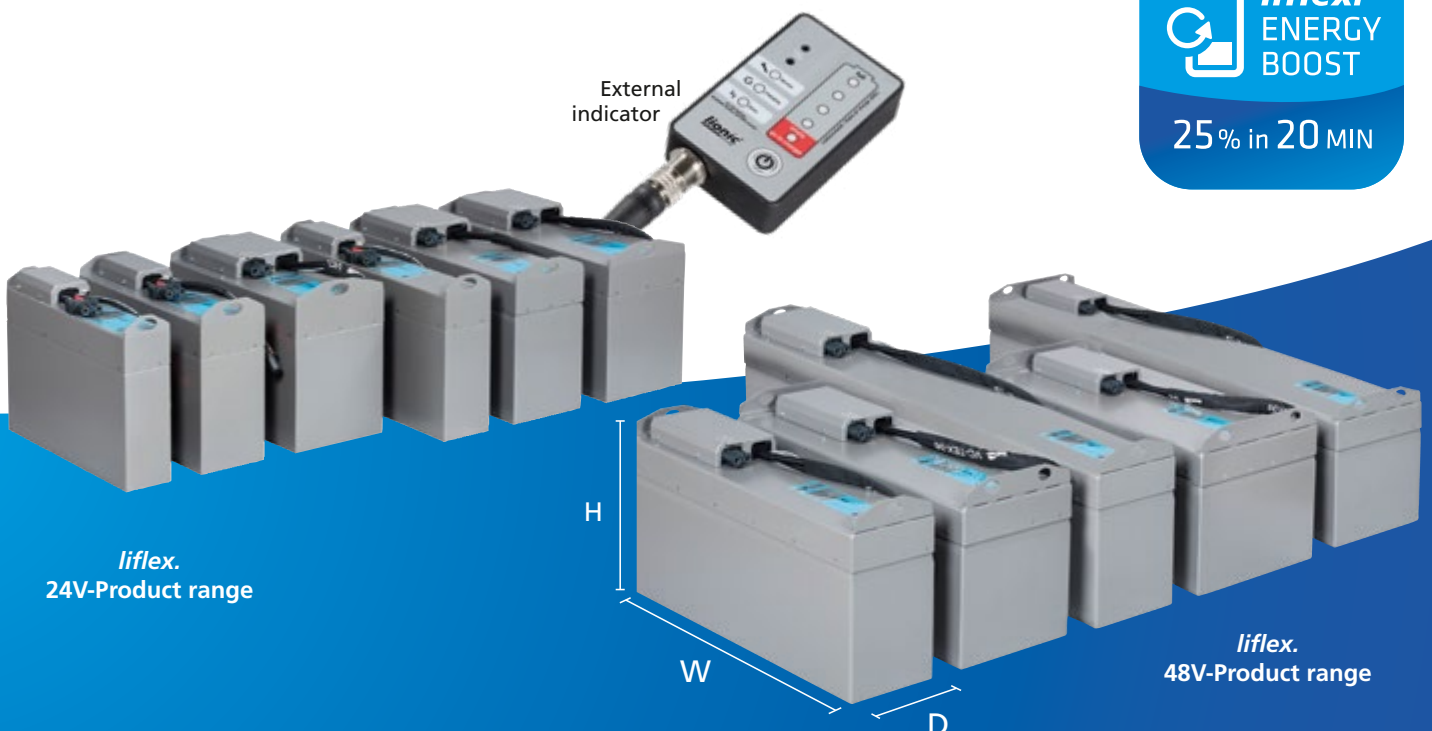
Dim. (mm)			
Housing	Height	Width	Depth
H2	360	450	200
H3	560	520	260
H4	960	520	260
G40	660	575	615



SYSTEM DATA

Voltage	Capacity	Power	Energy	Charger	Charging time	Battery socket	Housing without tray in tray			Weight
							Width (mm)	Depth (mm)	Height (mm)	
V	Ah	Type	kWh	V/A	≤ h	A				Approx. kg
24V	120	24V/3kWh	3,1	E 24V/70A	2	MRC 160	608	138	455	52
	240	24V/6kWh	6,2	D 24V/120A	2	MRC 160	608	202	455	86
	240	24V/6kWh-L	6,2	D 24V/120A	2	MRC 160	772	160	455	86
	360	24V/9kWh	9,2	D 24V/200A	2	DIN 320	608	296	455	125
	360	24V/9kWh-L	9,2	D 24V/200A	2	DIN 320	765	252	455	125
	480	24V/12kWh	12,3	D 24V/240A	2	DIN 320	772	306	455	165
48V	240	48V/12kWh	12,4	D 48V/120A	2	DIN 320	775	315	470	175
	360	48V/18kWh	18,4	D 48V/200A	2	DIN 320	784	466	470	258
	360	48V/18kWh-L	18,4	D 48V/200A	2	DIN 320	1210	308	470	258
	480	48V/25kWh	24,6	D 48V/240A	2	DIN 320	784	614	470	330
	480	48V/25kWh-L	24,6	D 48V/240A	2	DIN 320	1210	408	470	330

Cell type: LFP / LiFePO₄ (Lithium iron phosphate)
 Operating temperature: 0° C to +40° C
 Storage temperature: -20° C to +35° C (max. 6 months in charged condition)



STANDARD EQUIPMENT AND OPTIONS

Type		24V liflex				48V liflex		
Power		3kWh	6kWh 6kWh-L	9kWh 9kWh-L	12kWh	12kWh	18kWh	25kWh
Standard	IP 54 (only liflex-housing without plug connection)	●	●	●	●	●	●	●
	External indicator	●	●	●	●	●	●	●
	Data memory and read out via infrared interface InfraComm / CAN	●	●	●	●	●	●	●
	Charge current plus (Charging time ≤ 2h)			●	●		●	●
Option	Easy opportunity charge Version: Vertical - Horizontal - External	○	○	○	○	○	○	○
	NEW! Energy Boost (Boost charge approx. 25% in 20 Min.)	○	○	○	○	○	○	○
	IP 64 (only liflex-housing without plug connection)	○	○	○	○	○	○	○
	CAN/CANopen	○	○	○	○	○	○	○
	Tray in tray Standard tray (RAL 7021) + additional weight	○	○	○	○	○	○	○
	Adapter cable 80A/160A/320A	○	○	○	○	○	○	○
	liflex-housing in stainless steel	○	○	○	○	○	○	○
Tray in special colour	○	○	○	○	○	○	○	

● Standard equipment ○ Option

liflex. Onboard Solution

Compact Lithium-Ion-Energy System with integrated HF-Charger

Tray in Tray, with additional weight, external indicator,
plug connection and built-in charger
Protection mode IP 64 (without plug connection)

- Highly flexible
- User friendly
- Fast charging
- Independent plug-in charging 230V
- No external charger
- Flexible opportunity charging



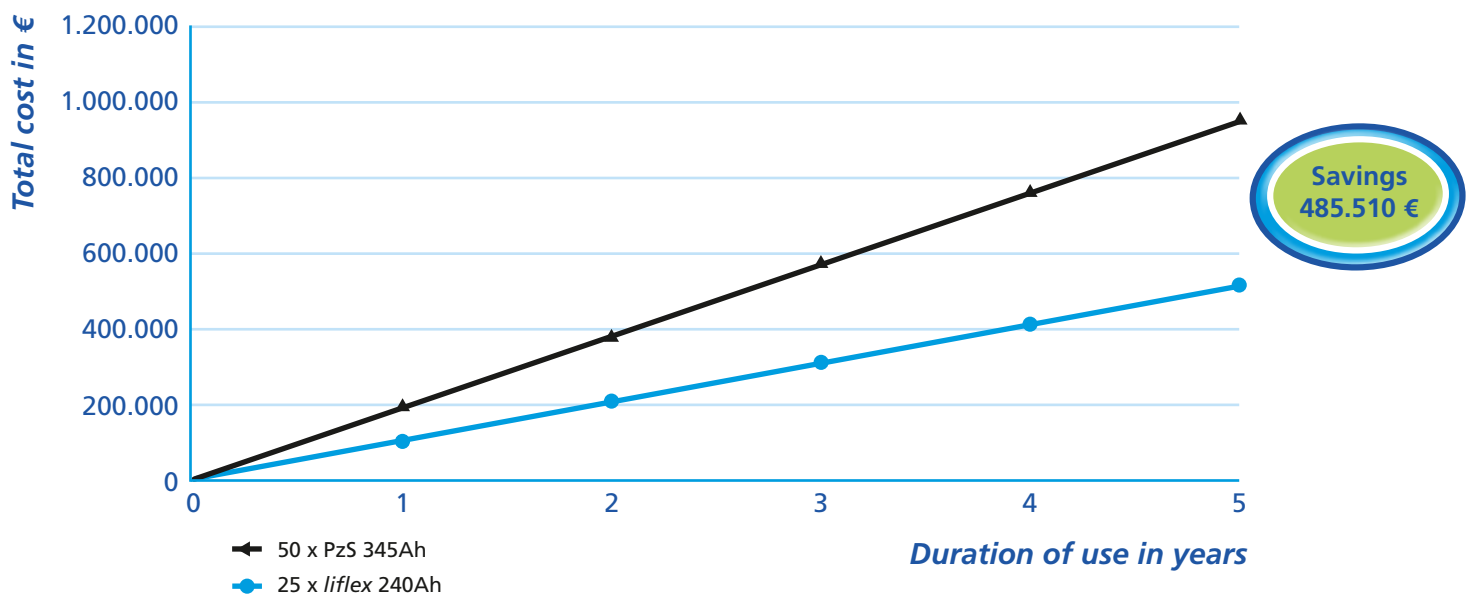
Economic efficiency calculation (ROI)

Application example

TRUCK FLEET WITH 25 VEHICLES, 2-SHIFT-OPERATION LEAD ACID (PzS-BATTERY) VERSUS LITHIUM

Truck: Pallet truck
 Use: 2-shift-operation
 Period of use: 8h per shift / 5 days per week / 240 days per year
 Lead acid battery: 2x PzS 24V / 345 Ah with battery change per truck
 liflex-Energy System: 1x 24V-liflex-240Ah with easy opportunity charge per truck

COST PERFORMANCE LEAD ACID (PzS-BATTERY) VERSUS LITHIUM



Economic efficiency			Profitability	
	PzS	liflex		
Investment	97.050 €	258.750 €	Additional investment	161.700 €
Operating costs p.a.	169.540 €	34.800 €		
Energy	18.000 €	11.050 €		
Maintenance	25.540 €	3.750 €		
Battery handling	126.000 €	20.000 €		
Capital costs	19.587 €	57.225 €		
Depreciation	15.705 €	46.875 €		
Interest 8%	3.882 €	10.350 €		
Total Costs p.a.	189.127 €	92.025 €		
Cost savings p.a.		97.102 €	Return on investment	200,3 %
Cost savings over 5 years		485.510 €	Pay off time in years	1,67

* Calculation base: VDI 2695 (Calculation of operating cost for diesel and electrical fork-lift trucks)

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