BENNING
World Class Charging Systems

AGVs

Agricultural machinery

Forklifts

Lawn tractors

Working platforms

Sweepers

Construc-tion machinery

Lift trucks

Lithium energy systems liflex NG

- Higher efficiency
- Longer lifetime with Q-Leveling
- Smart, future-proof and innovative

longevity ensured by Q-Leveling

Economical and smart, designed for industrial, mobile and stationary applications

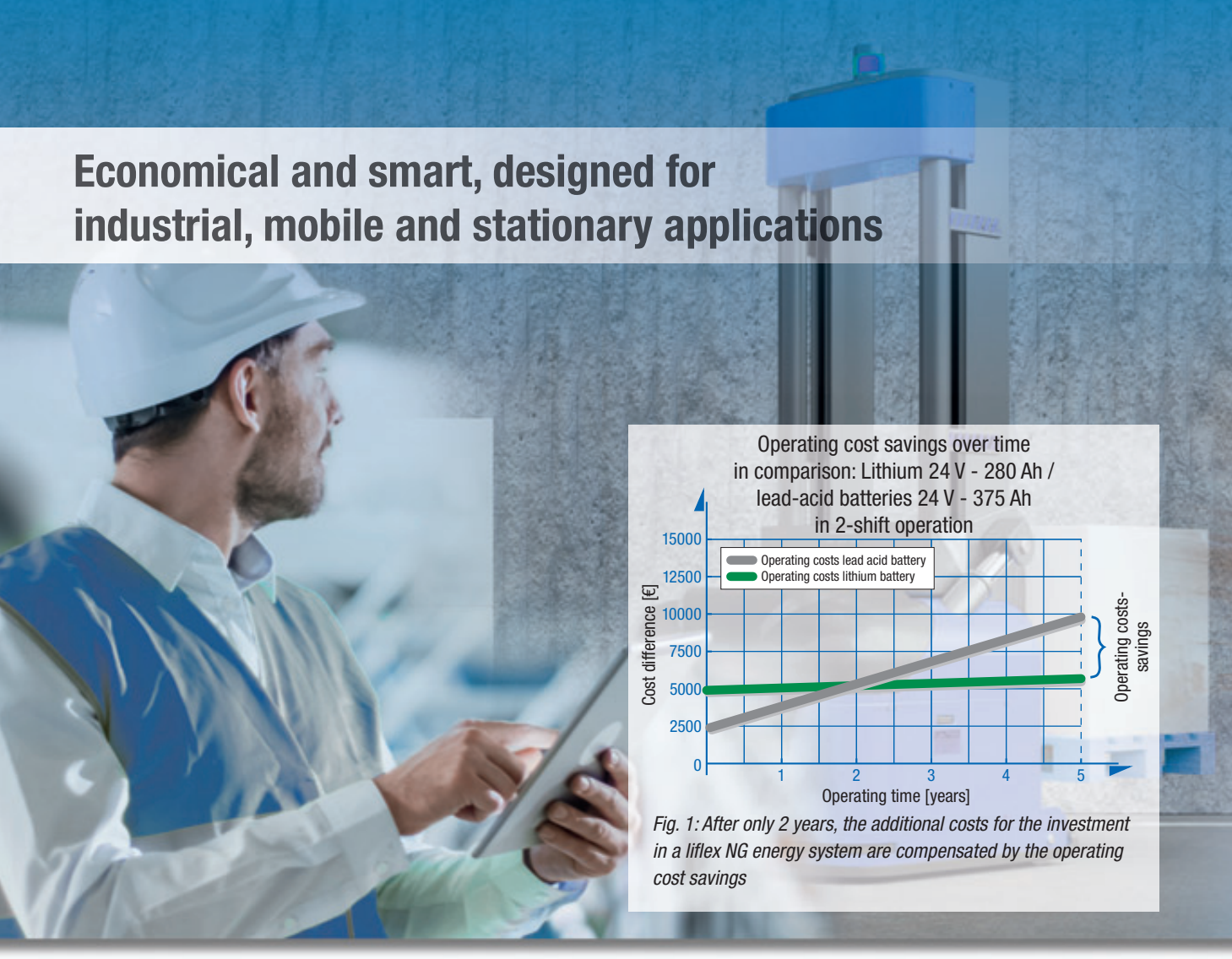


Fig. 1: After only 2 years, the additional costs for the investment in a liflex NG energy system are compensated by the operating cost savings

- One point of contact for the entire project
- Delivery of system technology from a single source
  - energy storage system
  - charger
  - software
  - BMS
  - Proactive service

- **Long service life**
- **Maximum availability of equipment**
- **Highest economic efficiency**
- **High flexibility over the entire service life**
- **Independence from**
  - **cell manufacturers**
  - **cell parameters**
- **Environmentally friendly and sustainable (refurbishing or recycling)**

Everything from a single source: Hardware and software, charger and BMS

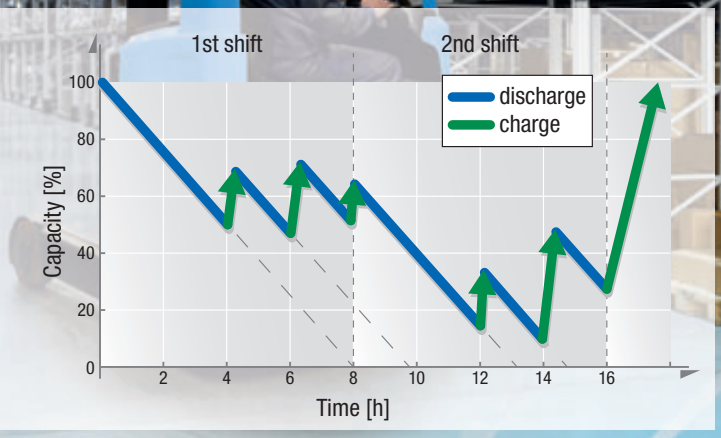


Fig. 2: Capacity curve of a liflex NG energy system in 2-shift operation with opportunity charges

Fig. 3: liflex NG 24 V with external SoC display

liflex NG – Added value with method, now and in the future

- Longer lifetime with Q-Leveling
- Maintenance-free and reliable operation
- High voltage capable
- Lower operating costs
- High efficiency, lower energy consumption, reduced energy costs
- Emission-free
- Low self-discharge
- Recuperable
- Recyclable
- Stand-by mode
- Environmentally friendly

Q-LEVELING

Short distances – Charging on site, no central charging station necessary

Since no gassing occurs during charging the special regulations for central battery charging stations (e.g. DIN 50272-3, BGHW, ZVEI bulletin) do not apply to the charging of liflex NG energy systems in many respects.

The systems are fast-charging capable and can be used very effectively for intermediate charging (see Fig. 2).

There are positive effects on the economic use of your equipment, e.g.:

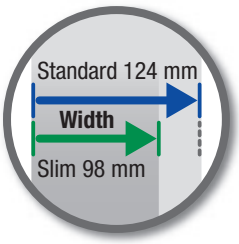
- Lower investment costs, as cargo holds with complex aeration / deaeration as well as central water filling are no longer required
- Higher resource utilization
- No exchange batteries necessary
- Fast and intermediate charging capable with Boost Charge, intermediate charging possible at any time (25 % charge in 20 min, 100 % charge in 2 h)

Fig. 4: liflex NG 24 V / 3.6 kWh (140 Ah)

Fig. 5: Chargers of the BELATRON Li+ series, 24 V to 96 V, various options are available e.g. protection class IP54 and higher, or different communication interfaces

liflex NG types: Standard and Slim – Flexible installation

The liflex NG series is available in two module types: Standard and Slim. Both module types have the same capacity.
The different housing sizes are achieved by different cell arrangement.



The systems/modules can be used both vertically and horizontally. This gives users added flexibility depending on the installation.

Flexibility and maximum availability at a fixed monthly price

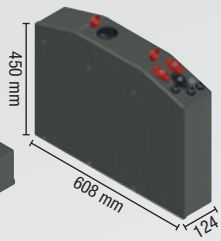
Perfectly matched to your company's specific operating processes, the BENNING rental model give the operator planning security and enable the use of state-of-the-art products. It is aimed at vehicle and battery dealers as well as operators of industrial trucks. High initial investment costs are eliminated, as are incalculable expenses for service, maintenance or replacement.

Examples of liflex NG module configurations*

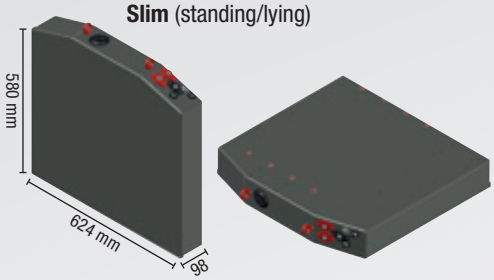
MP = Modules Parallel
MS = Modules Serial

liflex NG 1 module		
Variant	Voltage	Capacity
1MP1MS	24 V	140 Ah

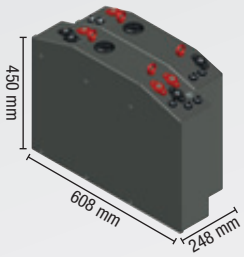
Standard (lying/standing)

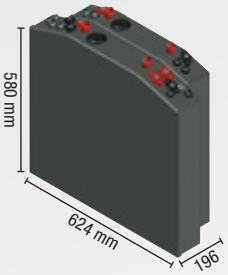


Slim (standing/lying)

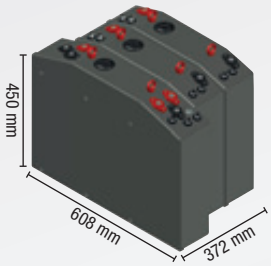


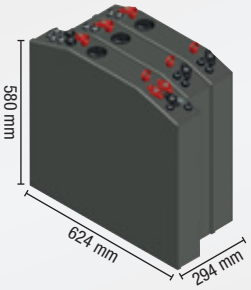
liflex NG 2 modules		
Variant	Voltage	Capacity
2MP1MS	24 V	280 Ah
1MP2MS	48 V	140 Ah



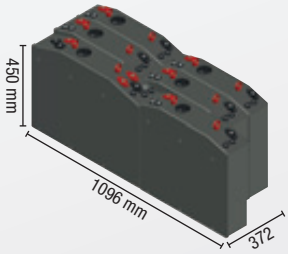


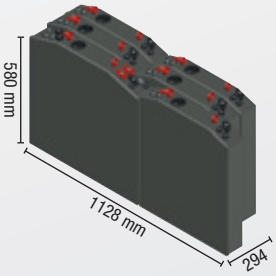
liflex NG 3 modules		
Variant	Voltage	Capacity
3MP1MS	24 V	420 Ah
1MP3MS	72 V	140 Ah



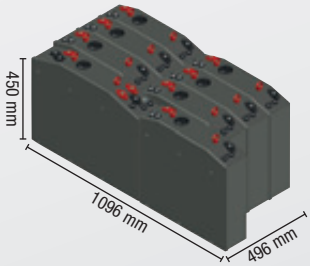


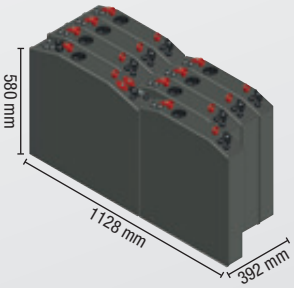
liflex NG 6 modules		
Variant	Voltage	Capacity
6MP1MS	24 V	840 Ah
3MP2MS	48 V	420 Ah
2MP3MS	72 V	280 Ah



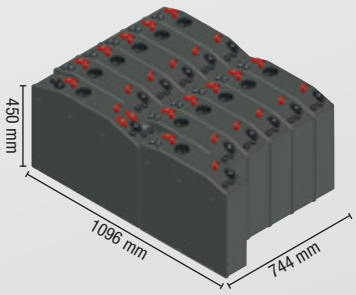


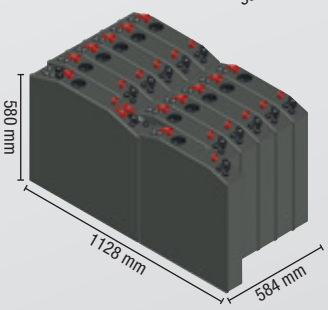
liflex NG 8 modules		
Variant	Voltage	Capacity
8MP1MS	24 V	1120 Ah
4MP2MS	48 V	560 Ah
2MP4MS	96 V (80 V)	280 Ah





liflex NG 12 modules		
Variant	Voltage	Capacity
12MP1MS	24 V	1680 Ah
6MP2MS	48 V	840 Ah
4MP3MS	72 V	560 Ah
3MP4MS	96 V (80 V)	420 Ah





* Further configurations on request
Subject to technical changes.

Technical data: Battery

U_N [V]	Capacity [Ah]	E [kWh]	U_{Min} [V]	U_{Max} [V]	I_N [A]	Can Charger	Number modules Series	Number modules	Dimensions* Standard H x W x D [mm]	Dimensions* *Slim H x W x D [mm]*	Weight Standard [kg]	Weight *Slim [kg]*
24	140	3,6	21	29	70	REMA 160	1	1	450 x 608 x 124	*580 x 624 x 98*	57	*70*
24	280	7,2	21	29	140	REMA 160	1	2	450 x 608 x 248	*580 x 624 x 196*	104	*128*
24	420	10,8	21	29	210	REMA 320	1	3	450 x 608 x 372	*580 x 624 x 294*	151	*186*
24	560	14,3	21	29	280	REMA 320	1	4	450 x 608 x 496	*580 x 624 x 392*	198	*244*
48	140	7,2	42	58	70	REMA 160	2	2	450 x 608 x 248	*580 x 624 x 196*	104	*128*
48	280	14,3	42	58	140	REMA 160	2	4	450 x 608 x 496	*580 x 624 x 392*	198	*244*
48	420	21,5	42	58	210	REMA 320	2	6	450 x 1096 x 372	*580 x 1128 x 294*	292	*360*
48	560	28,7	42	58	280	REMA 320	2	8	450 x 1096 x 496	*580 x 1128 x 392*	386	*476*
80	140	14,3	83	115	70	REMA 160	4	4	450 x 608 x 496	*580 x 624 x 392*	198	*244*
80	280	28,7	83	115	140	REMA 320	4	8	450 x 1096 x 496	*580 x 1128 x 392*	386	*476*
80	420	43,0	83	115	210	REMA 320	4	12	450 x 1096 x 744	*580 x 1128 x 584*	574	*708*
80	560	57,3	83	115	280	REMA 320	4	16	450 x 1096 x 992	*580 x 1128 x 784*	762	*940*

Higher voltages, capacities and currents on request

* Other dimensions on request

Battery cell types: LFP / $LiFePO_4$ (lithium iron phosphate)
Operating temperature: 0 °C to +40 °C
Nominal temperature: +23 °C
Storage temperature range: -20 °C to +35 °C (max. 6 months in charged condition)
Number of cycles: 3000 @ 80 % DOD
Operation: at ≤ 0 °C optional (integrated heating)

Technical data: Charger

Battery liflex NG	Charging time* @ 25 °C [h]	**Charger BELATRON Li+ liflex**	Mains-voltage [V]	Mains-power [kVA]	Mains current per phase [A]	Mains-fuse (slow-blow) [A]	Mains plug	DC plug	Dimensions H x W x D [mm]	Housing	Weight [kg]
24 V / 140 Ah	2.80	24 V / 50 A	230 V	1.57	6.8	10	Schuko	REMA160	352/400.5 x 220 x 127.5	WT16	5
24 V / 140 Ah	1.75	24 V / 80 A	230 V	2.52	10.9	16	Schuko	REMA160	400.5 x 220 x 237.5	WT32	11
24 V / 280 Ah	2.24	24 V / 125 A	3 x 400 V	3.88	5.6	16	CEE16	REMA160	603 x 312 x 201	WT60	20
24 V / 280 Ah	1.87	24 V / 150 A	3 x 400 V	4.68	6.7	16	CEE16	REMA160	603 x 312 x 201	WT60	20
24 V / 280 Ah	1.65	24 V / 170 A	3 x 400 V	5.30	7.6	16	CEE16	REMA320	603 x 312 x 305	WT120	31
24 V / 420 Ah	2.10	24 V / 200 A	3 x 400 V	6.24	9.0	16	CEE16	REMA320	603 x 312 x 305	WT120	31
24 V / 420 Ah	1.68	24 V / 250 A	3 x 400 V	7.79	11.2	16	CEE16	REMA320	603 x 312 x 305	WT120	31
24 V / 560 Ah	1.87	24 V / 300 A	3 x 400 V	9.35	13.5	16	CEE16	REMA320	603 x 312 x 409	WT180	31
48 V / 140 Ah	2.00	48 V / 70 A	3 x 400 V	4.70	6.8	16	CEE16	REMA160	603 x 312 x 201	WT60	20
48 V / 140 Ah	1.40	48 V / 100 A	3 x 400 V	6.19	8.9	16	CEE16	REMA160	603 x 312 x 201	WT60	20
48 V / 280 Ah	2.33	48 V / 120 A	3 x 400 V	8.07	11.6	16	CEE16	REMA160	603 x 312 x 305	WT120	31
48 V / 280 Ah	2.00	48 V / 140 A	3 x 400 V	8.67	12.5	16	CEE16	REMA160	603 x 312 x 305	WT120	31
48 V / 280 Ah	1.65	48 V / 170 A	3 x 400 V	10.53	15.2	16	CEE16	REMA320	603 x 312 x 305	WT120	31
48 V / 420 Ah	2.10	48 V / 200 A	3 x 400 V	12.38	17.9	20	CEE32	REMA320	603 x 312 x 305	WT120	31
48 V / 420 Ah	1.75	48 V / 240 A	3 x 400 V	14.86	21.4	25	CEE32	REMA320	603 x 312 x 409	WT180	45
48 V / 560 Ah	2.07	48 V / 270 A	3 x 400 V	16.72	24.1	32	CEE32	REMA320	603 x 312 x 409	WT180	45
48 V / 560 Ah	1.87	48 V / 300 A	3 x 400 V	18.58	26.8	32	CEE32	REMA320	603 x 312 x 409	WT180	45
80 V / 140 Ah	2.33	80 V / 60 A	3 x 400 V	7.39	10.7	16	CEE16	REMA160	603 x 312 x 201	WT60	20
80 V / 140 Ah	2.00	80 V / 70 A	3 x 400 V	8.63	12.5	16	CEE16	REMA160	603 x 312 x 201	WT60	20
80 V / 140 Ah	1.75	80 V / 80 A	3 x 400 V	9.86	14.2	16	CEE16	REMA160	603 x 312 x 305	WT120	31
80 V / 280 Ah	2.80	80 V / 100 A	3 x 400 V	12.32	17.8	20	CEE32	REMA160	603 x 312 x 305	WT120	31
80 V / 280 Ah	2.00	80 V / 140 A	3 x 400 V	17.25	24.9	25	CEE32	REMA160	603 x 312 x 409	WT180	45
80 V / 280 Ah	1.75	80 V / 160 A	3 x 400 V	19.72	28.5	32	CEE32	REMA320	603 x 312 x 409	WT180	45
80 V / 420 Ah	2.33	80 V / 180 A	3 x 400 V	22.18	32.0	32	CEE32	REMA320	603 x 312 x 409	WT180	45
80 V / 420 Ah	1.75	80 V / 240 A	3 x 400 V	29.58	42.7	50	CEE63	REMA320	1600 x 600 x 600	UC1666	o.r.
80 V / 560 Ah	1.87	80 V / 300 A	3 x 400 V	36.97	53.4	63	CEE63	REMA320	1600 x 600 x 600	UC1666	o.r.

* Charging time depending on cell temperature

liflex NG – The energy system with operating cost advantages

Fig. 6: liflex NG energy system 24 V / 3.6 kWh (140 Ah)

Fig. 7: Chargers of the BELATRON Li+ series, 24 V / 80 A

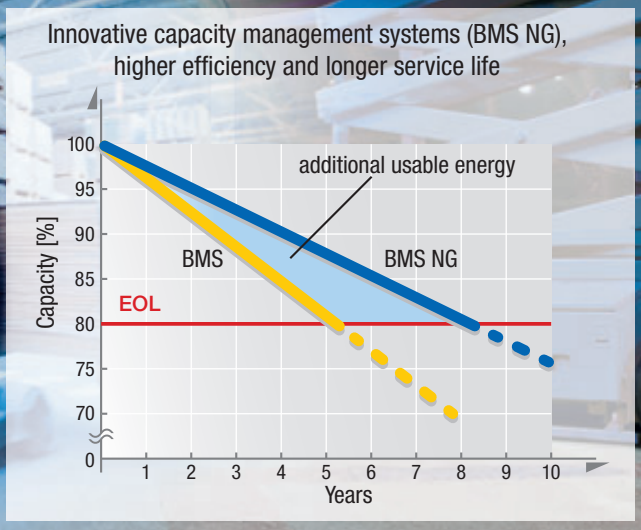


Fig. 8: Comparison of the lifetime of a lithium-ion battery (LFP 8S1P) equipped with a BMS or a BMS NG. The comparison shows the effect of the energy loss of a cell on the overall system. With the BMS NG, the loss is significantly lower.

Sustainably reduce operating costs, increase efficiency and availability

Smart energy management combines increasing resource availability and efficiency with a sustainable reduction in operating costs.

Compared to lead-acid batteries the following results when using a liflex NG energy system:

- **Approx. 30 % reduction in energy costs**
- **No maintenance costs**
- **No handling costs**

liflex NG – Future-proof system
liflex NG is a modular battery system from 24 V to 96 V. This battery complies with DIN EN 1175 and is therefore future-proof.

The system consists of a master module 24 V/140 Ah and depending on voltage and capacity, if necessary, several slave modules of 24 V/140 Ah. The master module is equipped with a cell module and the BMS with Q-Leveling.

BMS NG – More efficient, safer and more economical with Q-Leveling

liflex NG energy systems are using the patented Q-Leveling process.

It not only measures and monitors the cell voltages, but also the capacity and fill level (SoC) of each individual cell.

Innovative algorithms compensate for the capacity differences between the individual cells by individually controlled charging currents already during the entire charging or discharging phases.

The usable capacity of the battery is significantly increased compared to control via a BMS.

The natural aging process of battery systems can be significantly slowed with the help of the BMS NG (see Fig. 8).

This results in an increase in economic efficiency.

Battery and charging technology, part of our DNA for decades

For more than half a century BENNING products have improved the safe and efficient utilisation of energy resources.
Smart solutions for the conversion of energy in multi-purpose or storable energy defines the company.

Manufacturing – Quality made in Germany
Our lithium energy systems and chargers are German engineered and designed. We have thousands of our lithium energy systems in the market.

Service and preventive maintenance guarantee a long service life
Our lithium energy systems are largely maintenance-free. Nevertheless, every system should be checked regularly. If you do not have qualified personnel, we offer our service as a service. If you have your own service technicians, we will be happy to train your staff.

BENNING – One contact person during the entire product lifecycle

You get the most economical solution and benefit in the long term from the direct link to BENNING as the manufacturer.

BENNING

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