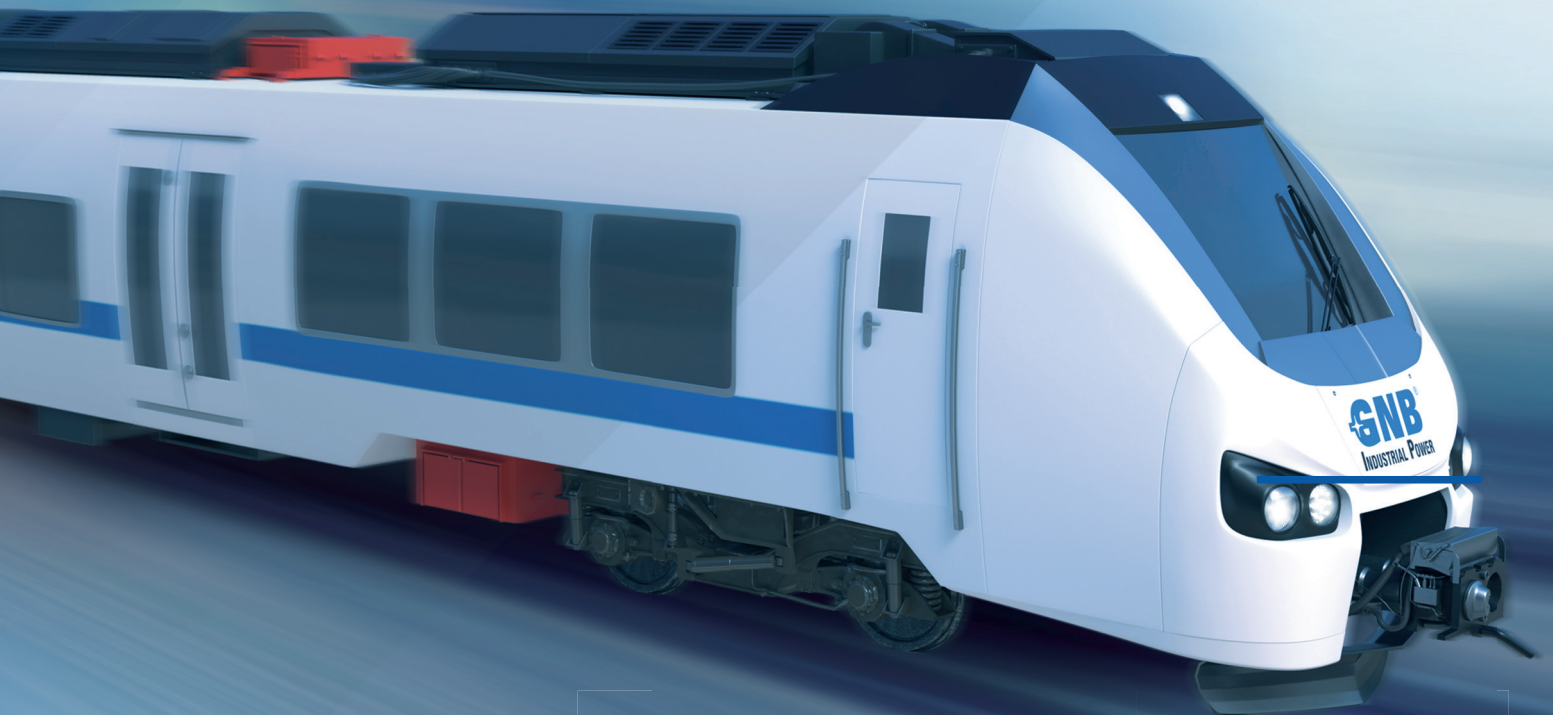


INDUSTRIAL BATTERIES

SYSTEM SOLUTIONS FOR RAILWAYS

Compact Maintenance Free Battery Systems



BATTERIES FOR RAILWAY ROLLING STOCK

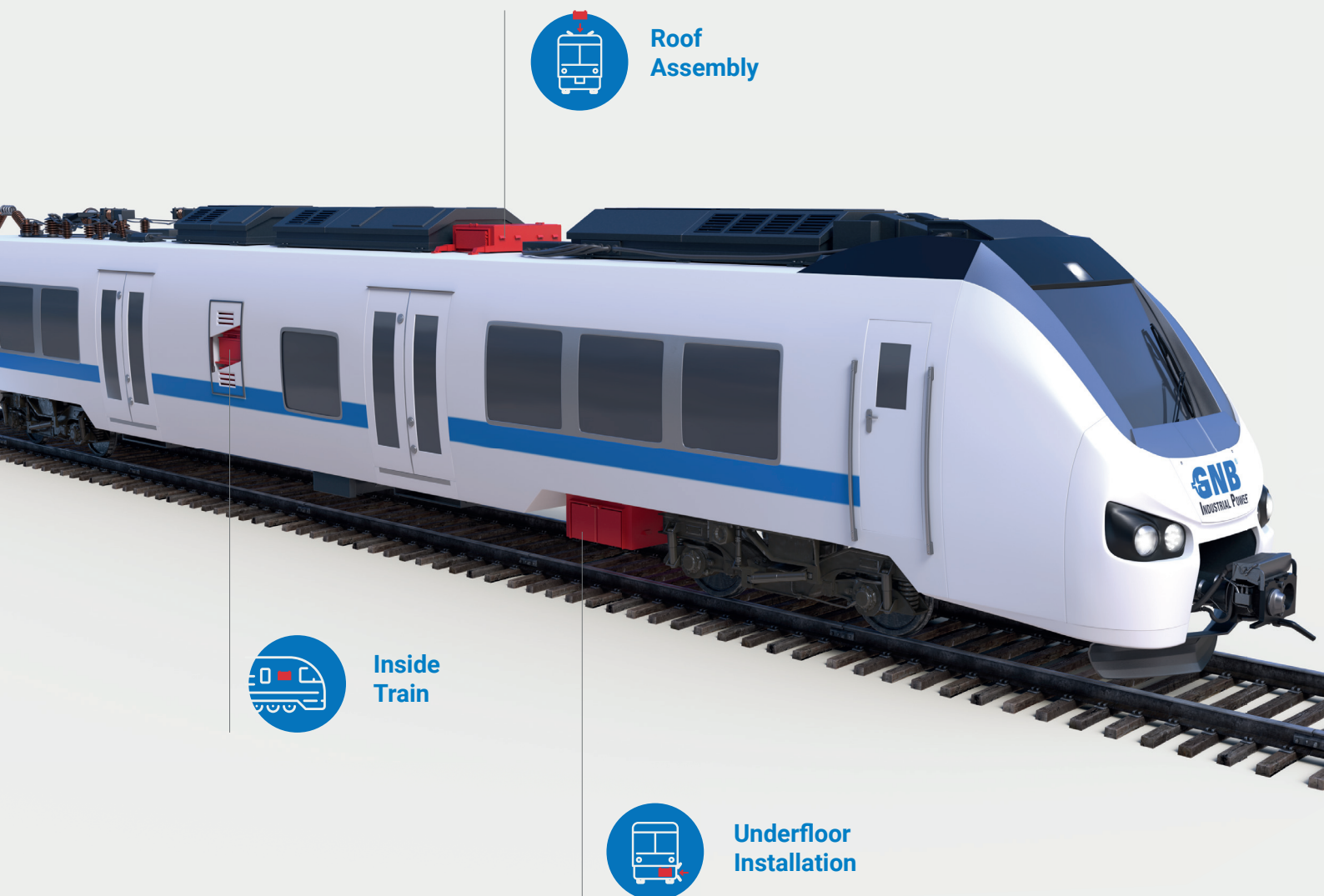
SUPERIOR SYSTEM TECHNOLOGY

World Leading Technology

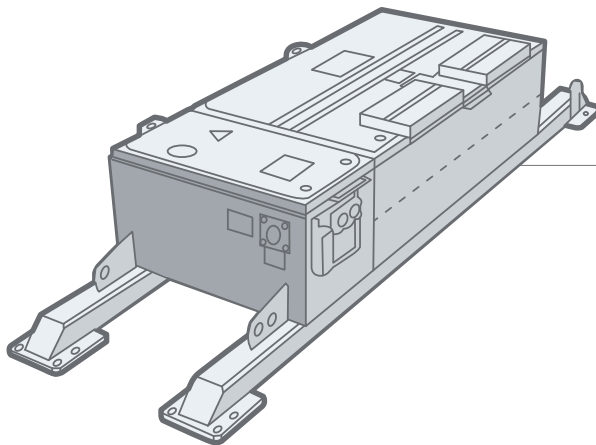
As a worldwide leading manufacturer of lead-acid batteries for railway rolling stock, GNB Industrial Power offers battery systems for typical applications in locomotives, coaches and modern train sets in regional and main-line service. In addition, GNB Industrial Power also produces particularly compact battery systems for international high-speed trains (e.g. Velaro, ICE, ICT, TGV & KTX) and all mass transit applications (e. g. sub and tramways). Furthermore GNB provides also energy storage solutions for Signalling. The batteries are designed according to EN 50547. GNB Industrial Power sets great store on keeping financing and maintenance costs as low as possible to help our OEM and operator customers to reduce costs.

Assembling of Batteries

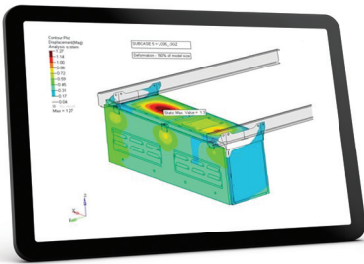
GNB offers various options to install the batteries in the most optimised location for each train, such as roof assembly, underfloor installation and mounting inside the train.



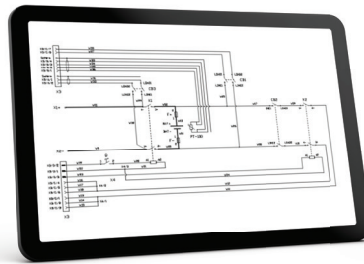
SYSTEM SOLUTIONS OF COMPLETE BATTERY SYSTEMS FOR RAILWAYS



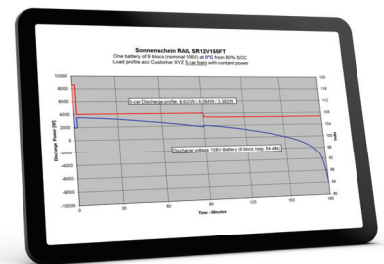
GNB's highly skilled and experienced team can provide bespoke technical advice for an optimised design layout, assembly and maintenance, leading to reduced costs for both original equipment and existing installations.



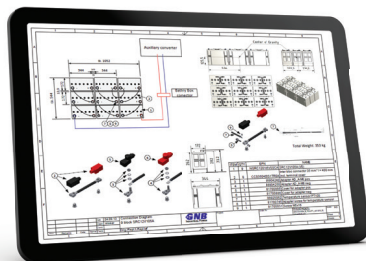
Construction of battery box
3D-models & 2D-FEM-Analysis, etc.
Complete system Integration



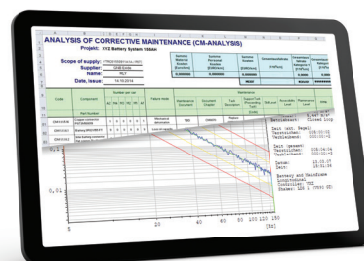
Electronic component sizing
Schematic diagram
Component selection



Battery sizing
Load profile testing
Type testing



Connection diagram



Shock & vibration testing
Analysis of maintainability,
RAMS/LCC

SONNENSCHHEIN RAIL TECHNICAL DATA AND BENEFITS

Sonnenschein batteries are the reference when it comes to valve-regulated lead acid batteries. The dryfit® Gel technology offers a superior reliability and durability, particularly for harsh environments (elevated temperatures, frequent discharges, vibrations...), making it the perfect fit for railway rolling stock applications.



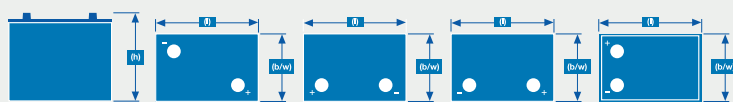
Your benefits:

- Dryfit® Gel – VRLA technology
- Outstanding standby and cycling behaviour – Long life
- Proof against deep discharge – greater long-term energy delivery
- Excellent energy storage capacity – high reliability
- Completely recyclable – low CO₂ footprint
- Improved fire performance according to EN45545 HL3***

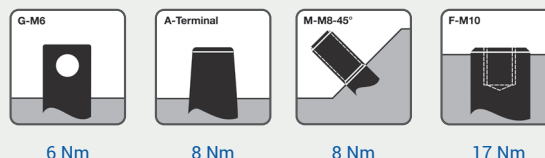
Type*** flame retardant acc. to UL94-V0	Part number	Nominal voltage V	Nominal capacity (30 °C, 1.70 Vpc Ah / C ₂₀)	Dimensions			Weight **** approx. kg	Terminal	Terminal position
				Length (l) max. mm	Width (b/w) max. mm	Height (h) max. mm			
SR 6V 180 A	NGRC060180VS0CA	6	180	244	190	275	30.0	A	1
SR 6V 240 A	NGRC060240VS0CA	6	240	312	182	359	47.0	A	1
SR 12V 33 G	NGRC120033VS0BA	12	33	210	175	175	14.2	G-M6	3
SR 12V 40 A	NGRC120040VS0CA	12	40	242	175	190	17.5	A	3
SR 12V 51 A	NGRC120051VS0CA	12	51	278	175	190	20.3	A	3
SR 12V 61 A	NGRL120061VS0CA	12	61	353	175	190	23.0	A	3
SR 12V 61 F10	NGRL120061VS0FA	12	61	353	175	196*	23.6	F-M10	3
SR 12V 65 A	NGRC120065VS0CA	12	65	353	175	190	25.5	A	3
SR 12V 65 G	NGRC120065VS0BA	12	65	353	175	190	25.5	G-M6	3
SR 12V 80 A	NGRP120080VS0CA	12	80	330	171	236	29.2	A	2
SR 12V 82 A RF	NGRP120075VS0CA	12	82**	330	171	236	29.2	A	2
SR 12V 85 A	NGRL120085VS0CA	12	85	284	267	231	33.0	A	1
SR 12V 85 F10	NGRL120085VS0FA	12	85	284	267	237*	33.5	F-M10	1
SR 12V 88 A RF	NGRP120080VS0CB	12	88**	330	171	236	29.2	A	2
SR 12V 105 A	NGRC120105VS0CA	12	105	345	172	283	36.0	A	3
SR 12V 105 F10	NGRC120105VS0FA	12	105	345	172	289	38.0	F-M10	3
SR 12V 122 A	NGRP120122VS0CA	12	122	513	223	223	47.0	A	4
SR 12V 155 FT	NGRL120155VS0MA	12	155	568	128	320	57.0	M-M8-45°	4
SR 12V 165 A	NGRL120165VS0CA	12	165	518	274	238	63.0	A	4
SR 12V 175 A	NGRP120175VS0CA	12	175	518	274	238	63.5	A	4
SR 12V 175 F10	NGRP120175VS0FA	12	175	518	274	244*	64.0	F-M10	4

* add. 24 mm for connector and screw ** Nominal capacity at 30 °C / C₂₀ / 1.75 V / cell *** EN45545 HL3 and UL94-HB version available on request **** Actual weight may differ by ±5%

Terminal position, terminal and torque



Not to scale!



SONNENSCHN PZV

TECHNICAL DATA AND SPECIFICATION

Sonnenschein PzV

Type*	Nominal capacity C ₅ / Ah	Typical battery systems		Typical battery systems		
		Nominal voltage (V)	Number of crates/trays parts	Length (l) max. mm	Width (b/w) max. mm	Height (h) max. mm
26V 2 PzV 110	110	104	4	712	218	380
18/16V 3 PzV 165	165	104	6	712	218	380
26V 2 PzV 100	100	104	4	653	258	370
54V 3 PzV 210	210	108	2	696	847	460
12V 2 PzV 100	100	24 / 108	2 / 9	384	255	377
8V 3 PzV 165**	165	24 / 112 / 120	3 / 14 / 15	384	255	365
6V 4 PzV 220	220	24 / 120	4 / 20	384	255	377
4V 6 PzV 330**	330	24	6	384	255	365
4V 7 PzV 385**	385	24 / 120	6 / 30	384	255	365
4V 8 PzV 440**	440	24	6	384	255	365
12V 8 PzV 440	440	24	2	800	350	380
14V 3 PzV 210	210	112	8	586	230	465
8V 6 EPzV 420 R	420	64	8	500	215	470
8V 8 EPzV 440 R	440	64	8	700	203	376
		Cells		Dimensions per cell		
2V 5 PzV-BS 145	145	96	48	109	158	275
2V 6 PzV-BS 175	175	18	9	125	158	275

* other DIN & BS cell and battery types are available on request

** positive plate with 23 tubes

Specifications for Sonnenschein RAIL and Sonnenschein PzV



- Designed in accordance with EN 50547
- Maintenance-free (no topping up) during the whole service life
- Very low gassing thanks to the internal gas recombination
- Nominal capacity 33 – 440 Ah C₅
- For RAIL blocs the container material is flame retardant according to UL94-V0 and DIN 5510-2. In addition this material has been tested according to the following, standards: NF F 16-101 & 102, STM S-001, N FX 70-100, N FX 10-702, NF EN ISO 4589, NF EN 60695
- Polypropylene (PP) battery container
- Long-lasting and good cycle performance
- Shock & vibration tests according to IEC 61373 standard on complete integrated systems have been performed with Sonnenschein RAIL reference types
- Different installation positions or combinations possible

MARATHON L / XL AND M - FT

TECHNICAL DATA, SPECIFICATION AND BENEFITS

The Marathon L / XL and M - FT series provide high performance and reliability in railway applications, combined with an enhanced energy density.. For the M - FT the location of the terminals on the front (vs. the top) of the battery greatly facilitates the installation and maintenance of the product.



Technical Data

Range	Type*	Part number	Nom. voltage (V)	Nominal capacity C ₁₀ 1.80 Vpc 20°C (Ah)	Capacity C ₈ 1.75 Vpc 20°C (Ah)	Length (l) (mm)	Width (b/w) (mm)	Height (h) (max. mm)	Weight** (approx. kg)	Terminal
Marathon L / XL	L2V220	NALL020220VM0FA	2	220	214	209	136	265	16.0	F-M8
	L2V270	NALL020270VM0FA	2	270	263	209	136	265	18.3	F-M8
	L2V320	NALL020320VM0FA	2	320	312	209	202	265	24.2	2xF-M8
	L2V375	NALL020375VM0FA	2	375	365	209	202	265	26.5	2xF-M8
	L2V425	NALL020425VM0FA	2	425	414	209	202	265	28.8	2xF-M8
	L2V470	NALL020470VM0FA	2	470	458	209	270	265	32.6	2xF-M8
	L2V520	NALL020520VM0FA	2	520	508	209	270	265	35.0	2xF-M8
	L2V575	NALL020575VM0FA	2	575	560	209	270	265	37.3	2xF-M8
	L6V110	NALL060110VM0MC	6	112	110	272	166	190	23.0	M-M8
XL6V180	NAXL060180VM0FA	6	179	176	309	172	223	30.0	F-M6	
Marathon M - FT	M12V105FT	NAMF120105VM0FA	12	100	100	511	110	238	35.8	F-M6-90°
	M12V155FT	NAMF120155VM0FA	12	150	151	559	124	283	53.8	F-M6-90°

* other types of the Marathon range are available on request

** Actual weight may differ by ±5%

Specifications / Benefits

Valve-regulated batteries (VRLA)

- High-Compression Absorbent Glass Mat (AGM) technology
- Maintenance-free (no topping up) during the whole service life
- No liquid electrolyte – no spilling
- No insulation faults due to wet batteries
- No wet, sticky or corroded battery boxes
- Can be recycled easily and completely
- Full capacity from charge retention (no standby capacity reduction)
- Designed in accordance with EN 50547 and IEC 60896-21 (respectively)
- Very low self-discharge, long storage period
- High mechanical strength thanks to the VRLA design



SONNENSCHN LITHIUM RAIL MEETS HIGH PERFORMANCE



Sonnenschein Lithium modules are ideal when Advanced Energy Systems are required. Long life and high energy density in a zero maintenance package offers end-users significant cost of ownership savings.

Sonnenschein Lithium has been designed with safety as our number one priority. A multi-layer safety approach from chemistry, through cell, module and system design backed up with an extensive test program insure the customer's peace of mind.



Sonnenschein Lithium Battery Management System (BMS) delivers optimized system performance.

Additionally the BMS enables remote monitoring and diagnostics capability allowing complete asset control and removing unnecessary and expensive scheduled maintenance.

GNB Industrial Power offers complete energy storage solutions, from concept design to installation through to commissioning. GNB's longtime experienced team is looking forward to support you!

Exide Technologies, with operations in more than 80 countries and more than 120 years of experience, is one of the world's largest producers and recyclers of lead-acid batteries. The company develops state-of-the-art energy storage solutions for the automotive and industrial market. Leading car, truck and lift truck manufacturers trust in Exide Technologies as an original equipment supplier. Exide also serves the aftermarket through a portfolio of successful and well-known brands.

Exide Transportation manufactures batteries for light and commercial vehicles, as well as agricultural and marine leisure applications. Industrial markets – under the division GNB Industrial Power – include efficient energy storage solutions for motive power applications such as lift trucks, cleaning machines and other commercial electrical vehicles, and network power applications such as telecommunications systems, renewables, and uninterruptible power supply (UPS).

Exide's engineers have always been at the forefront of bringing important innovations to the industry. Exide's ISO/TS-certified manufacturing facilities ensure that customers receive products that are produced with maximum efficiency and fulfill the highest quality standards, while minimizing impact on the environment.

Exide's extensive sales and distribution network provides quality service and delivers on time to its customers. Its world-class recycling facilities ensure that batteries will be reused, helping to make a positive contribution to the environment. Exide also provides services, accessories and energy consulting to its clients.



All production facilities ISO 9001 certified
 Automotive plants ISO/TS 16949 approved
 Manufacturing plants ISO 14001 certified

NXSB8EPDF00220 Subjects to alterations