



ZeMaRail™ Batteries 340P12: Technical Data

VRLA TPPL+SN BATTERY TECHNOLOGY FOR ROLLING STOCK APPLICATIONS

Designed specifically for rolling stock railway vehicle applications, the ZeMaRail™ batteries deliver reliable, maintenance-free performance.

Featuring advanced Thin Plate Pure Lead (TPPL) technology, the ZeMaRail™ range of Valve-Regulated Lead-Acid (VRLA) TPPL+Sn (tin addition) batteries pack more power into the same space compared to conventional batteries.

- **High Energy Density:** Delivers more power in a compact design, maximizing efficiency without compromising space.
- **Maintenance-Free:** No water topping required, offering you hassle-free, reliable performance.
- **Long Service Life:** Ensures durable, long-lasting energy.
- **Excellent Deep Discharge Recovery:** Advanced TPPL ZeMaRail™ battery technology, with a small addition of tin to the positive plates, ensures superior recovery from accidental deep discharges.

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ZeMaRail™
340P12 BATTERIES

KEEPING YOU ON TRACK



Electrical Data

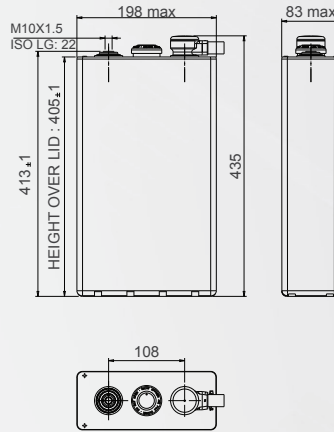
Nominal voltage	2 V
Number of cells	1 (VRLA (AGM), TPPL+Sn Technology)
Rated capacity C₁₀ to 1.80 Vpc at 20 °C	340 Ah
Current/Power for 0.25 h back-up time 1.60 Vpc 20 °C	480.6 A / 818.7 W
Current/Power for 0.5 h back-up time 1.60 Vpc 20 °C	329.5 A / 585.0 W
Current/Power for 1.0 h back-up time 1.60 Vpc 20 °C	209.9 A / 386.9 W
Current/Power for 3.0 h back-up time 1.70 Vpc 20 °C	92.8 A / 177.8 W
Current/Power for 5.0 h back-up time 1.75 Vpc 20 °C	61.3 A / 119.3 W
Current/Power for 8.0 h back-up time 1.75 Vpc 20 °C	41.3 A / 81.1 W
Current/Power for 10.0 h back-up time 1.80 Vpc 20 °C	33.9 A / 66.9 W
Current/Power for 24.0 h back-up time 1.80 Vpc 20 °C	15.5 A / 30.9 W
Internal resistance (± 10%) to IEC/EN 60896-21	0.49 mΩ
Short circuit current (± 10%) to IEC/EN 60896-21	4.24 kA
Self discharge at 20 °C to IEC/EN 60896-21	max. 1.25% / Month

Mechanical Data

Weight	19.5 kg +/-3%
Height over terminal	370 mm
Width	198 mm
Depth	83 mm
Number of terminals	1 (+) / 1 (-)
Dimension of terminal screw hole	M10 x 22 deep, female thread
Connection torque	25 Nm
Terminal insulation class according to IEC/EN 60529	IP 20
Diameter of diagnostic hole for voltage probe	2 mm
Complete connector and terminal connection	use flexible EVO or PerfectPlus- connectors
Connector (copper, tin-coated and insulated)	For Rolling Stock flexible connectors are recommended
Shock + Vibration rating (according)	Category 1, Class B (IEC 61373)

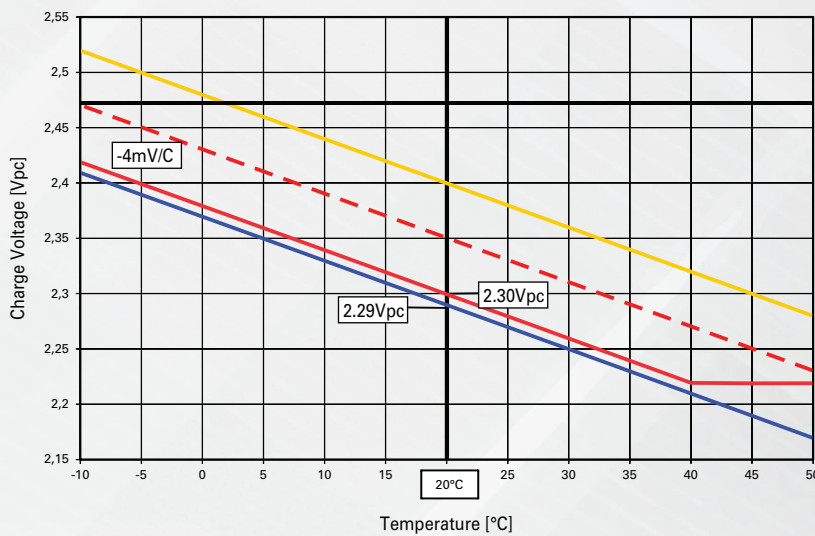
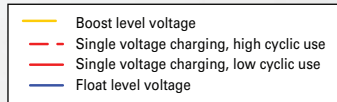
Environmental Data

Installation	Vertical
Cell assembly distance	The cells must be installed within a solid battery tray, use spacers to secure required fixation and compression
Material of case/ cover	PP-FR or PP (on special request)
Flame retardancy rating	R7 (EN 45545-2)* *Approval is subject to functional necessity (clause 4.7)
Flame barriers at vents	Yes
Rail service life expected at 15 °C	8-10 years (max. 30% Depth of Discharge (DoD) / day)
Cycle Endurance (60% DoD or 80% DoD)	1'500 / 1000 Cycles
Design life (Eurobat classification)	>12 years - Very Long Life
Shipping name	Batteries, wet, non spillable



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Temperature compensated charging voltage



Temperature compensated charging voltage	
Temperature in °C	Percentage of the rated capacity (C ₅)
40	106
35	105
30	104
25	102
20	100
15	98
10	96
5	92
0	89
-5	84
-10	71
-15	58
-20	51
-25	44
-30	38

*Estimated Values (early design status!)
 Should be verified with actual load profile*

Battery Installation and Operation

Recommended charging for rolling stock applications (standby parallel operation)	IU0U- charging: 2 level charging (acc. DIN 41773) with current limitation and temperature compensation
Boost level voltage setting at 20°C	2.40 Vpc
Lower or single level voltage setting at 20°C	2.30 ... 2.35 Vpc (low ... high cyclic use)
Charge current for IU or IU0U-charging (DIN 41773)	136 A (minimum for cyclic use: 68 A)
Voltage compensation in function of temperature	-4mV/K per cell
Float level voltage setting at 20°C (± 1%)	2.29 V/Z (also valid for long term trickle charging at workshop and storage)
Ventilation requirements	As a VRLA battery according to EN 62485-2
Maximum long term operating temperature	+40°C with ventilation assured (reduced service life)
Maximum short term operating temperature (< 3h)	+55°C with ventilation assured (reduced service life)
Minimum operating and storage temperature	- 40°C (in charged condition)

Constant current performance [Ampere] to the defined end of discharge voltage

Voltage	Temp	Discharge time [h:min]																					
		Vpc	°C	0:01	0:05	0:10	0:15	0:20	0:25	0:30	0:40	0:50	1:00	1:30	2:00	3:00	4:00	5:00	6:00	8:00	10:00	12:00	24:00
2.00	20°C	1876	1875	1872	170.2	1575	146.0	136.5	120.8	109.7	100.2	81.0	68.1	52.4	43.1	36.5	31.7	25.2	21.0	18.0	9.8		
	25°C	1876	1875	1875	172.0	159.6	148.3	138.7	122.9	111.7	102.3	82.6	69.6	53.6	44.0	37.3	32.4	25.8	15.1	21.4	10.0		
1.95	20°C	335.1	320.6	276.9	244.7	221.1	202.3	186.8	163.6	145.7	131.7	104.0	86.7	65.9	53.6	45.5	39.5	31.3	26.0	22.3	12.1		
	25°C	335.1	323.4	280.5	248.9	225.2	206.2	190.7	167.1	149.2	134.9	106.6	88.8	67.6	55.0	46.6	40.4	32.1	26.6	22.8	12.4		
1.90	20°C	472.2	415.4	352.5	307.3	275.0	249.4	229.2	198.5	176.0	158.7	123.5	102.0	76.8	62.1	52.4	45.4	36.0	30.0	25.7			
	25°C	472.2	419.5	358.1	313.2	280.7	255.0	234.4	203.5	180.5	162.8	126.9	104.8	78.8	63.7	53.8	49.6	36.9	30.7	26.3	14.3		
1.85	20°C	592.0	497.9	414.8	357.4	317.1	286.7	262.5	225.8	199.3	178.7	138.1	113.5	84.8	68.3	57.4	39.4	39.2	32.5	27.8	15.0		
	25°C	594.0	503.2	422.4	365.4	324.4	293.6	269.0	231.7	204.7	183.7	142.1	116.7	87.2	70.2	58.9	51.0	40.2	33.3	28.5	15.4		
1.80	20°C	689.8	566.9	463.3	397.2	350.6	315.6	287.6	246.1	216.2	193.3	148.2	121.2	89.9	72.0	60.3	52.0	41.0	33.9	29.0	15.5		
	25°C	692.6	575.0	472.8	406.4	359.3	323.7	295.3	253.0	222.4	198.9	152.7	124.8	92.5	74.1	62.0	53.5	42.1	34.8	29.7	15.8		
1.75	20°C	777.8	620.3	502.1	428.2	376.2	336.9	306.1	260.4	227.7	202.9	154.3	125.6	92.7	73.6	61.3	52.7	41.3	34.0	29.0	15.5		
	25°C	780.9	630.0	512.9	438.7	386.1	346.2	314.7	268.0	234.6	209.2	159.1	129.5	95.4	75.8	63.1	54.2	42.4	34.9	29.7	15.8		
1.70	20°C	846.1	660.8	532.5	451.4	394.5	352.3	319.1	269.9	235.0	208.7	157.2	127.0	92.8	73.6	61.3	52.7	41.3	34.0	29.0	15.5		
	25°C	850.1	671.7	544.6	463.1	405.4	362.4	328.6	278.2	242.3	215.3	162.3	131.0	95.6	75.8	63.1	54.2	42.4	34.9	29.7	15.8		
1.65	20°C	887.3	693.8	555.0	468.2	407.9	363.0	328.0	274.9	237.4	209.9	157.2	127.0	92.8	73.6	61.3	52.7	41.3	34.0	29.0	15.5		
	25°C	890.9	705.5	568.3	480.7	419.6	373.8	338.1	284.0	242.3	216.8	162.3	131.0	95.6	75.8	63.1	54.2	42.4	34.9	29.7	15.8		
1.60	20°C	908.9	718.7	571.7	480.6	417.0	367.3	329.5	274.9	237.4	209.9	157.2	127.0	92.8	73.6	61.3	52.7	41.3	34.0	29.0	15.5		
	25°C	908.9	731.2	585.8	494.0	429.7	379.3	340.3	284.0	242.3	216.8	162.3	131.0	95.6	75.8	63.1	54.2	42.4	34.9	29.7	15.8		

Constant power performance [Watt per cell] to the defined end of discharge voltage

Voltage	Temp	Discharge time [h:min]																					
		Vpc	°C	0:01	0:05	0:10	0:15	0:20	0:25	0:30	0:40	0:50	1:00	1:30	2:00	3:00	4:00	5:00	6:00	8:00	10:00	12:00	24:00
2.00	20°C	375.9	375.9	373.1	342.0	315.8	293.3	274.3	242.7	221.2	202.0	164.0	138.3	106.5	88.0	74.6	64.9	51.8	43.2	37.1	20.2		
	25°C	375.9	375.9	375.9	345.7	320.0	297.7	278.7	246.9	225.0	206.2	167.2	141.4	108.9	89.9	76.3	66.3	53.0	44.1	37.9	20.6		
1.95	20°C	653.3	625.0	541.7	480.2	434.0	397.6	368.6	323.5	289.2	261.4	206.8	172.7	132.2	107.8	91.6	79.7	63.5	53.0	45.4	24.7		
	25°C	653.3	630.0	549.2	488.2	441.7	404.8	376.0	330.3	295.9	267.7	211.9	176.7	135.6	110.4	93.8	81.6	65.0	54.2	46.5	25.2		
1.90	20°C	896.7	791.0	673.5	590.2	529.2	481.1	442.5	384.5	342.7	309.7	241.6	200.7	151.9	123.1	104.1	90.6	72.1	60.1	51.6	28.1		
	25°C	896.7	798.7	683.9	601.2	539.8	491.8	452.6	393.7	351.0	317.5	248.3	206.1	155.8	106.8	106.8	92.9	73.8	61.6	52.9	28.7		
1.85	20°C	1096.0	923.3	774.2	671.2	597.2	542.6	498.4	430.0	380.2	343.2	267.0	219.9	165.3	134.0	112.7	97.9	77.6	64.6	55.4	30.1		
	25°C	1100.0	933.0	610.3	685.0	610.3	555.0	510.4	441.2	390.2	352.3	274.7	226.0	169.8	115.8	115.8	100.5	79.7	66.2	56.8	30.8		
1.80	20°C	1240.0	1026.0	845.8	729.8	647.4	584.8	536.4	461.9	406.5	364.7	283.1	231.9	173.4	140.0	117.6	101.7	80.6	66.9	57.4	30.9		
	25°C	1245.0	1040.0	862.4	745.8	663.0	599.3	550.1	474.4	418.2	374.7	291.4	239.0	178.5	120.9	120.9	104.5	82.7	68.6	58.8	31.6		
1.75	20°C	1360.0	1095.0	896.6	770.7	681.7	614.0	560.2	481.7	423.2	377.9	291.8	238.5	177.4	142.6	119.3	102.8	81.1	67.1	57.4	30.9		
	25°C	1366.0	1111.0	915.0	788.9	698.7	630.3	575.0	495.1	435.7	389.4	300.5	245.9	182.7	122.8	122.8	105.7	83.3	68.9	58.8	31.6		
1.70	20°C	1438.0	1138.0	930.8	797.1	702.1	631.5	574.8	492.5	432.1	385.1	295.5	240.5	177.8	142.6	119.3	102.8	81.1	67.1	57.4	30.9		
	25°C	1445.0	1155.0	950.5	816.6	720.7	648.8	591.2	506.6	445.1	397.1	304.7	248.2	183.2	122.8	122.8	105.7	83.3	68.9	58.8	31.6		
1.65	20°C	1466.0	1166.0	950.3	811.7	714.0	641.0	583.1	497.7	435.1	386.9	295.5	240.5	177.8	142.6	119.3	102.8	81.1	67.1	57.4	30.9		
	25°C	1472.0	1184.0	971.0	832.1	733.4	658.9	600.1	512.2	448.7	399.3	304.7	248.2	183.2	122.8	122.8	105.7	83.3	68.9	58.8	31.6		
1.60	20°C	1466.0	1096.0	958.9	818.7	719.1	641.5	585.0	497.7	435.1	386.9	295.5	240.5	177.8	142.6	119.3	102.8	81.1	67.1	57.4	30.9		
	25°C	1476.0	1198.0	980.0	839.7	739.1	663.0	602.6	512.5	448.7	399.3	304.7	248.2	183.2	122.8	122.8	105.7	83.3	68.9	58.8	31.6		

Constant discharge values without voltage loss in connectors and cables!
 Our technical support offers to calculate the discharge curve for a specific load profile.



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