ZeMaRail™ Batteries 12ZeMa122:
Technical Data

VRLA TPPL+SN BATTERY TECHNOLOGY
FOR ROLLING STOCK APPLICATIONS

HAWKER
ZeMaRail™
12ZeMa122 BATTERIES

KEEPING YOU ON TRACK

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.

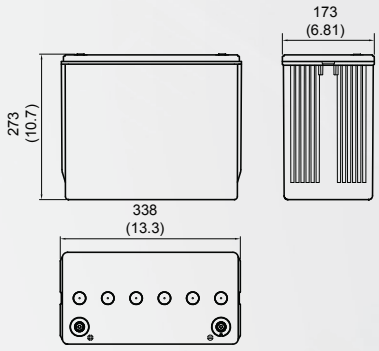
CE UK CA

EnerSys® RAIL
Power/Full Solutions

Electrical Data	
Nominal voltage	12 V
Number of cells	6 (VRLA (AGM), TPPL+Sn Technology)
Rated capacity C_{10} to 1.80 Vpc at 20 °C	122 Ah
Rated capacity C_5 to 1.70 Vpc at 30 °C	121 Ah
Current/Power for 0.25 h back-up time 1.60 Vpc 20 °C	239.8 A / 2679 W
Current/Power for 0.5 h back-up time 1.60 Vpc 20 °C	147.6 A / 1694.5 W
Current/Power for 1.0 h back-up time 1.60 Vpc 20 °C	88.4 A / 1034.5 W
Current/Power for 3.0 h back-up time 1.70 Vpc 20 °C	36.3 A / 433.4 W
Current/Power for 5.0 h back-up time 1.75 Vpc 20 °C	23.1 A / 277.7 W
Current/Power for 8.0 h back-up time 1.75 Vpc 20 °C	15.2 A / 183.3 W
Current/Power for 10.0 h back-up time 1.80 Vpc 20 °C	12.2 A / 147.5 W
Conversion to capacity at 25 °C	102% of Current/Power at 20°C
Internal resistance (± 10%) to IEC/EN 60896-21	4 mΩ
Short circuit current (± 10%) to IEC/EN 60896-21	3.1 kA
Self discharge at 20 °C to IEC/EN 60896-21	1% / Month
Heat loss during float service at 20°C	93 ... 187 mW per cell

Mechanical Data	
Weight	43.2 kg
Height of monobloc / over terminal cover	273 mm / 273 mm
Width	173 mm
Depth	338 mm
Number of terminals	1 (+) / 1 (-)
Dimension of terminal screw hole	M6 x 14 deep, female thread
Torque terminal screw	6.8 Nm ± 0.7 Nm
Terminal insulation class according to IEC/EN 60529	IP 20
Maximum cable cross-section	95 mm²
Complete connector and terminal connection	Accessories Kit available
Connector (copper, tin-coated and insulated)	For Rolling Stock rigid connectors are NOT allowed
Shock + Vibration rating (according)	Category 1, Class B (IEC 61373)

Environmental Data	
Installation	horizontally or laterally
Distance for cooling and ventilation	10 mm between the blocs
Material of case/cover;	PC+ABS FR
Fire behaviour tested (according to)	R7 (EN 45545-2), Approval is subject to functional necessity
Flame barriers at vents	Yes
Rail service life expected at 15°C	7 years (max. 30% Depth of Discharge (DoD) / day)
Cycle Endurance (float service with daily discharges)	650 cycles (IEC 60869-21: Test 6.13)
Design life (Eurobat classification)	12+ Long Life, Eurobat classification
Shipping name	Batteries, wet, non spillable



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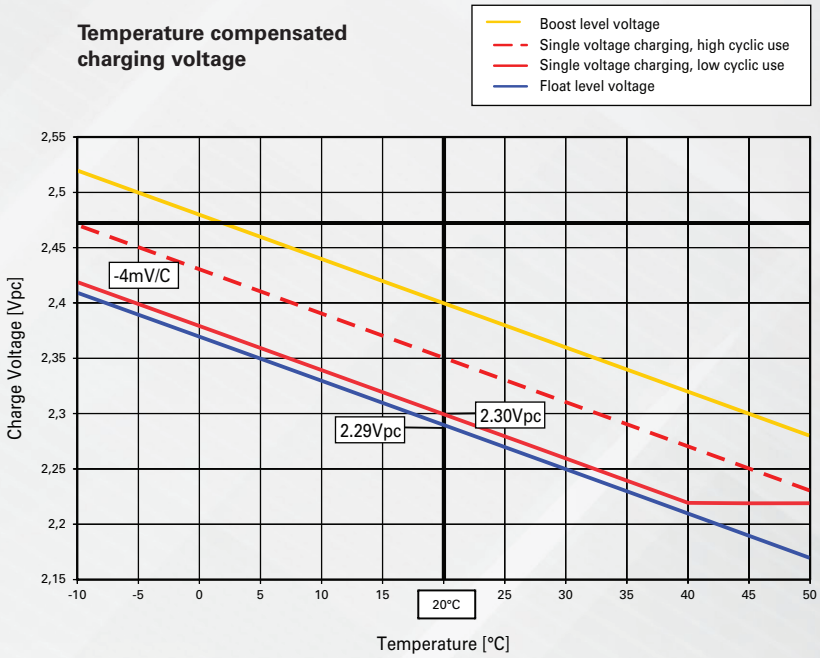
Temperature compensated charging voltage



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
-35	31
-40	25

Estimated Values
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)	53 A (minimum for cyclic use: 34 A)
Voltage compensation in function of temperature	- 4 mV/K per cell
Float level voltage setting at 20°C (± 1%)	2.29 Vpc (also valid for long term trickle charging at workshop and storage)
Air exchange	As a VRLA battery according to EN IEC 62485-2 $Q = 0.05 * N_{cells} * I_{gas} * C_{AhC10} * 10^{-3}$ [m³/h] $I_{gas} = 1$ (at 2.29 Vpc) ; $I_{gas} = 8$ (at 2.40 Vpc)
Preferred operating temperature range	Between 15°C- 25°C
Maximum long term operating temperature	+40°C with ventilation assured (reduced service life)
Maximum short term operating temperature (< 3h)	+50°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	0:02	0:05	0:10	0:15	0:20	0:30	0:45	1:00	2:00	3:00	4:00	5:00	8:00	10:00	20:00
1.85	20°C	384.6	310.1	236.1	193.5	165.3	129.5	99.2	81.1	47.9	34.4	26.9	22.2	14.6	11.9	6.2
	25°C	392.2	316.3	240.8	197.3	168.6	132.1	101.2	82.7	48.8	35.1	27.5	22.7	14.9	12.2	6.4
1.80	20°C	461.0	348.5	256.0	206.5	174.7	135.4	102.8	83.6	49.0	35.1	27.5	22.7	14.9	12.2	6.4
	25°C	470.2	355.5	261.1	210.6	178.2	138.1	104.9	85.3	50.0	35.8	28.1	23.1	15.2	12.4	6.5
1.75	20°C	546.7	386.8	274.4	217.9	182.8	140.3	105.8	85.7	50.0	35.8	28.0	23.1	15.2	12.4	6.5
	25°C	557.7	394.5	279.9	222.3	186.4	143.1	107.9	87.4	51.0	36.5	28.5	23.5	15.5	12.6	6.6
1.70	20°C	641.6	424.1	290.6	227.5	189.2	144.0	107.9	87.2	50.7	36.3	28.4	23.4	15.4	12.6	6.6
	25°C	654.4	432.5	296.4	232.0	193.0	146.9	110.1	88.9	51.7	37.0	29.0	23.9	15.7	12.8	6.7
1.65	20°C	745.0	459.2	304.2	234.8	193.9	146.5	109.3	88.1	51.2	36.6	28.7	23.7	15.6	12.7	6.6
	25°C	759.9	468.4	310.3	239.5	197.8	149.4	111.5	89.9	52.2	37.4	29.3	24.2	15.9	13.0	6.8
1.60	20°C	855.9	491.2	314.6	239.8	196.7	147.6	109.8	88.4	51.4	36.9	29.0	23.9	15.8	12.9	6.7
	25°C	873.0	501.0	320.9	244.6	200.6	150.6	112.0	90.2	52.4	37.6	29.5	24.4	16.1	13.1	6.8

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

Voltage	Temp	Discharge time [h:min]														
Vpc	°C	0:02	0:05	0:10	0:15	0:20	0:30	0:45	1:00	2:00	3:00	4:00	5:00	8:00	10:00	20:00
1.85	20°C	4242.6	3504.0	2710.6	2240.5	1925.0	1520.5	1172.7	962.4	573.7	414.0	325.4	268.7	177.3	144.9	76.0
	25°C	4327.5	3574.1	2764.8	2285.3	1963.5	1550.9	1196.2	981.6	585.2	422.3	331.9	274.1	180.9	147.8	77.6
1.80	20°C	4983.2	3879.1	2906.2	2368.1	2017.6	1578.4	1208.6	987.9	585.5	421.8	331.3	273.5	180.5	147.5	77.4
	25°C	5082.9	3956.6	2964.4	2415.5	2058.0	1610.0	1232.7	1007.7	597.2	430.2	337.9	279.0	184.1	150.4	79.0
1.75	20°C	5777.8	4242.1	3082.4	2478.5	2095.7	1625.7	1237.2	1008.2	595.0	428.3	336.4	277.7	183.3	149.8	78.6
	25°C	5893.3	4326.9	3144.1	2524.3	2137.6	1658.3	1262.0	1028.4	606.9	436.8	343.1	283.2	187.0	152.8	80.2
1.70	20°C	6612.8	4562.7	3234.0	2568.7	2157.2	1661.4	1258.1	1022.9	602.2	433.4	340.5	281.2	185.8	151.8	79.5
	25°C	6745.1	4674.3	3298.7	2620.1	2200.3	1694.6	1283.3	1043.3	614.2	442.1	347.3	286.8	189.5	154.8	81.1
1.65	20°C	7471.1	4890.4	3356.4	2636.2	2200.6	1684.5	1270.3	1031.7	607.0	437.2	343.8	284.0	187.8	153.5	80.2
	25°C	7620.5	4988.2	3423.5	2688.9	2244.6	1718.1	1296.2	1052.3	619.1	445.9	350.6	289.7	191.6	156.5	81.8
1.60	20°C	8332.2	5155.4	3445.9	2679.0	2224.7	1694.5	1275.1	1034.5	609.8	439.6	346.0	286.2	189.4	154.8	80.7
	25°C	8498.9	5258.5	3514.8	2732.6	2269.2	1728.4	1300.6	1055.2	621.5	448.3	352.9	291.9	193.2	157.9	82.3

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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