ZeMaRail™ Batteries 12ZeMa170:
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.

HAWKER

ZeMaRail™

12ZeMa170 BATTERIES

KEEPING YOU ON TRACK

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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	170 Ah
Rated capacity C_5 to 1.70 Vpc at 30 °C	167 Ah
Current/Power for 0.25 h back-up time 1.60 Vpc 20 °C	335.8 A / 3486 W
Current/Power for 0.5 h back-up time 1.60 Vpc 20 °C	211.9 A / 2285 W
Current/Power for 1.0 h back-up time 1.60 Vpc 20 °C	125.5 A / 1380 W
Current/Power for 3.0 h back-up time 1.70 Vpc 20 °C	50.2 A / 576 W
Current/Power for 5.0 h back-up time 1.75 Vpc 20 °C	31.8 A / 366 W
Current/Power for 8.0 h back-up time 1.75 Vpc 20 °C	21.1 A / 246 W
Current/Power for 10.0 h back-up time 1.80 Vpc 20 °C	16.9 A / 198 W
Current/Power for 24.0 h back-up time 1.80 Vpc 20 °C	7.8 A / 90.6 W
Conversion to capacity at 25 °C	102% of Current/Power at 20°C
Internal resistance (± 10%) to IEC/EN 60896-21	4.0 mΩ
Short circuit current (± 10%) to IEC/EN 60896-21	3.4 kA
Self discharge at 20 °C to IEC/EN 60896-21	1% / Month
Heat loss during float service at 20°C	125 ... 250 mW per cell

Mechanical Data	
Weight	52.5 kg
Height of monobloc / over terminal cover	283 mm / 297 mm
Width	125 mm
Depth	561 mm
Number of terminals	1 (+) / 1 (-)
Dimension of terminal screw hole	M8 x 13 deep, female thread
Torque terminal screw	9.0 Nm ± 0.9 Nm
Terminal insulation class according to IEC/EN 60529	IP 20
Diameter of diagnostic hole for voltage probe	5 mm
Maximum cable cross-section	95 mm²
Complete connector and terminal connection	Accessories Kit (Rear-Take off) 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
Flame retardancy rating (according to)	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	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
Shipping name	Batteries, wet, non spillable

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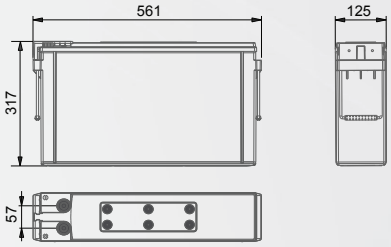

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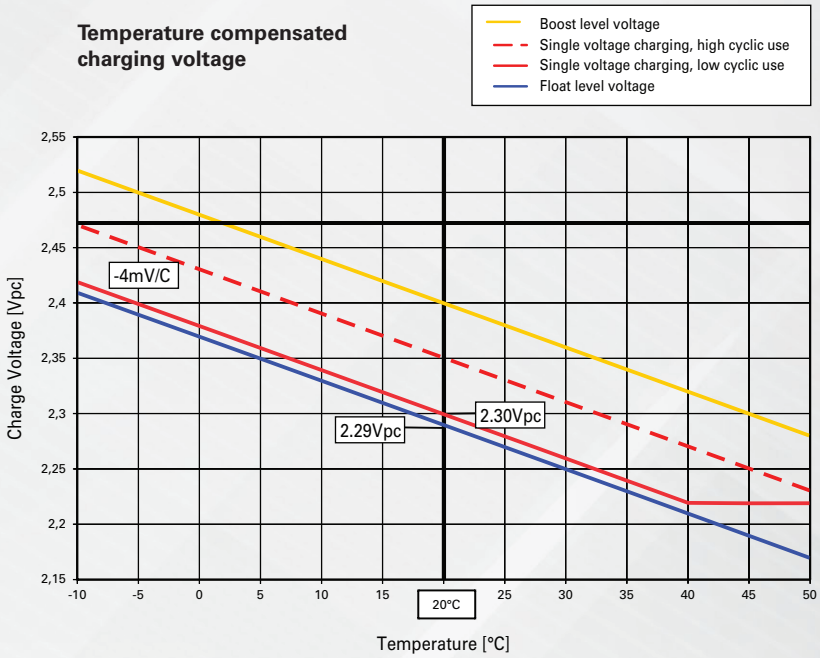
Temperature compensated charging voltage



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)	75 A (minimum for cyclic use: 47 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	0:01	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	170.4	167.6	129.4	104.7	88.4	76.9	68.2	55.9	47.3	40.7	29.0	22.5	15.7	12.2	10.0	8.8	7.3	6.2	5.5	3.1
	25°C	170.4	169.8	132.3	107.4	90.8	79.0	70.1	57.5	48.8	42.0	29.8	23.2	16.1	12.5	10.2	8.9	7.4	6.3	5.6	3.2
1.95	20°C	291.2	249.8	197.7	164.0	140.8	123.4	109.6	90.1	76.9	67.2	48.8	38.4	27.1	21.0	17.2	14.6	11.3	9.4	8.2	4.8
	25°C	291.3	253.5	202.1	168.0	144.7	127.2	113.0	92.9	79.3	69.3	50.4	39.6	27.9	21.6	17.6	15.0	11.6	9.5	8.3	4.9
1.90	20°C	365.7	312.1	253.6	213.3	184.1	162.8	145.8	120.8	103.3	90.5	66.5	52.8	37.7	29.3	24.2	20.6	15.9	13.0	11.1	6.3
	25°C	365.7	315.7	259.0	218.5	189.2	167.5	150.4	124.7	106.7	93.5	68.7	54.5	38.9	30.2	24.8	21.1	16.3	13.4	11.4	6.4
1.85	20°C	431.0	362.3	299.9	253.2	221.1	194.3	174.7	146.6	126.4	110.6	81.8	65.6	47.0	36.8	30.3	25.8	20.0	16.4	14.0	7.6
	25°C	431.0	366.7	305.0	260.0	226.6	200.4	179.9	151.8	130.4	114.5	84.4	67.8	48.6	37.9	31.2	26.6	20.6	16.8	14.3	7.8
1.80	20°C	431.2	406.7	330.9	279.0	239.6	209.8	187.5	155.2	132.9	116.5	85.7	68.1	48.6	38.0	31.3	26.7	20.7	16.9	14.4	7.8
	25°C	431.2	412.6	337.8	286.6	247.1	216.7	193.7	160.6	137.5	120.5	88.7	70.4	50.3	39.2	32.3	27.5	21.3	17.4	14.8	8.0
1.75	20°C	431.2	431.0	358.3	298.2	254.0	220.9	196.1	161.0	137.3	120.0	87.8	69.5	49.5	38.7	31.8	27.2	21.1	17.2	14.7	8.0
	25°C	431.2	431.0	366.6	306.8	262.4	228.7	202.9	166.8	142.2	124.3	90.9	72.0	51.2	39.9	32.8	27.9	21.6	17.7	15.0	8.1
1.70	20°C	431.2	431.0	381.1	314.6	266.1	230.0	203.1	165.7	140.8	122.7	89.3	70.6	50.2	39.1	32.2	27.5	21.3	17.4	14.8	8.0
	25°C	431.2	431.0	390.2	324.1	275.3	238.5	210.6	171.9	146.0	127.2	92.5	73.1	51.9	40.4	33.2	28.3	21.9	17.9	15.2	8.2
1.65	20°C	431.2	431.0	397.9	327.5	275.4	237.1	208.5	169.2	143.3	124.6	90.4	71.4	50.6	39.4	32.4	27.7	21.4	17.6	14.9	8.1
	25°C	431.2	431.1	407.6	337.8	285.4	246.2	216.5	175.7	148.6	129.3	93.7	73.9	52.3	40.7	33.4	28.5	22.0	18.0	15.3	8.3
1.60	20°C	431.2	431.1	408.4	335.8	281.3	241.4	211.9	171.2	144.6	125.5	90.8	71.7	50.8	39.6	32.6	27.8	21.5	17.6	15.0	8.1
	25°C	431.2	431.1	418.4	346.7	291.7	250.8	220.2	177.8	150.1	130.3	94.1	74.3	52.5	40.8	33.6	28.6	22.1	18.1	15.4	8.3

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	340.0	335.8	260.0	211.2	178.6	155.1	137.5	113.0	95.6	82.4	58.8	45.7	31.9	24.8	20.3	17.8	14.7	12.6	11.0	6.2
	25°C	340.0	339.6	265.8	216.5	183.4	159.4	141.3	116.2	98.6	85.0	60.5	47.0	32.7	25.4	20.8	18.0	14.9	12.7	11.1	6.3
1.95	20°C	567.4	488.3	388.5	323.1	278.0	244.2	217.5	179.3	153.0	133.7	97.4	76.7	54.2	41.9	34.3	29.4	22.8	18.6	16.3	9.4
	25°C	567.5	495.3	397.0	331.0	285.6	251.3	224.1	184.9	157.8	137.9	100.5	79.1	55.8	43.1	35.3	30.1	23.3	19.0	16.6	9.6
1.90	20°C	646.4	594.4	486.4	410.8	356.2	315.6	283.2	235.4	202.3	177.6	130.5	103.8	74.2	57.8	47.6	40.5	31.4	25.9	22.0	12.4
	25°C	646.4	601.2	496.6	420.7	365.9	324.6	292.0	242.8	208.8	183.4	134.8	107.2	76.5	59.5	49.0	41.6	32.2	26.5	22.5	12.6
1.85	20°C	646.5	646.0	560.1	477.6	417.4	369.8	332.8	281.0	242.2	213.2	157.8	127.2	91.7	71.7	59.0	50.4	39.0	32.0	27.3	14.8
	25°C	646.5	646.1	569.6	490.3	427.8	381.3	342.6	290.1	249.8	220.4	163.0	131.7	94.8	73.9	60.8	51.9	40.1	32.8	28.0	15.1
1.80	20°C	646.6	646.2	605.5	516.2	446.7	393.5	352.8	293.6	252.3	221.7	164.4	130.7	93.7	73.4	60.5	51.7	40.1	32.8	28.0	15.1
	25°C	646.6	646.2	618.1	529.2	459.8	406.2	364.0	303.6	260.9	229.3	170.1	135.3	96.9	75.8	62.4	53.2	41.2	33.7	28.7	15.5
1.75	20°C	646.6	646.3	644.8	541.5	466.8	409.3	364.6	302.0	258.3	226.4	167.3	132.8	95.0	74.3	61.2	52.3	40.6	33.2	28.3	15.3
	25°C	646.6	646.3	645.9	555.9	481.2	422.9	377.0	312.6	267.3	234.5	173.2	137.5	98.2	76.7	63.1	53.8	41.7	34.1	29.0	15.7
1.70	20°C	646.6	646.3	646.0	561.5	482.4	421.3	374.0	308.2	262.6	229.9	169.0	134.2	95.8	74.9	61.7	52.6	40.9	33.5	28.5	15.4
	25°C	646.6	646.3	646.0	577.2	497.7	435.9	387.5	319.3	272.1	238.3	175.0	139.0	99.1	77.3	63.6	54.1	42.0	34.4	29.2	15.8
1.65	20°C	646.6	646.3	646.0	576.1	492.5	429.5	380.7	310.8	264.1	230.0	169.0	134.6	96.1	75.1	61.8	52.7	40.9	33.5	28.6	15.5
	25°C	646.6	646.4	646.1	593.6	508.7	444.8	394.8	322.6	274.2	238.7	175.0	139.5	99.5	77.6	63.8	54.2	42.1	34.5	29.3	15.8
1.60	20°C	646.6	646.4	646.0	581.3	493.7	430.1	380.8	310.8	264.1	230.0	169.0	134.6	96.1	75.1	61.8	52.7	41.0	33.6	28.6	15.5
	25°C	646.6	646.4	646.1	599.8	510.5	445.6	395.2	322.6	274.2	238.7	175.0	139.5	99.5	77.6	63.8	54.4	42.2	34.5	29.3	15.9

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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