

EnerSys[®]

Power/Full Solutions



 **HAWKER**[®]
ZeMaRail™

ZeMa270P12

VRLA TPPL+Sn Battery Technology for Rolling Stock Applications

Hawker[®] ZeMaRail[™] ZeMa270P12

Technical specifications

Electrical Data

Nominal voltage	2 V
Number of cells	1 (VRLA (AGM), TPPL+Sn Technology)
Rated capacity C ₁₀ to 1.80 Vpc at 20 °C	270 Ah
Current/Power for 0.25 h back-up time 1.60 Vpc 20 °C	430.7 A / 732.6 W
Current/Power for 0.5 h back-up time 1.60 Vpc 20 °C	287.2 A / 507.6 W
Current/Power for 1.0 h back-up time 1.60 Vpc 20 °C	175.2 A / 323.8 W
Current/Power for 3.0 h back-up time 1.70 Vpc 20 °C	74.5 A / 142.8 W
Current/Power for 5.0 h back-up time 1.75 Vpc 20 °C	48.8 A / 94.8 W
Current/Power for 8.0 h back-up time 1.75 Vpc 20 °C	32.8 A / 64.0 W
Current/Power for 10.0 h back-up time 1.80 Vpc 20 °C	27.0 A / 52.9 W
Current/Power for 24.0 h back-up time 1.80 Vpc 20 °C	12.4 A / 24.5 W
Internal resistance (± 10%) to IEC/EN 60896-21	0.48 mΩ
Short circuit current (± 10%) to IEC/EN 60896-21	4.4 kA
Self discharge at 20 °C to IEC/EN 60896-21	max. 1.25% / Month

Mechanical Data

Weight	16.3 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 (IEC61373:2011)

Environmental Data

Installation	vertically
Cell assembly distance	The cells must be installed within a solid battery tray, usespacers to secure required fixation and compression
Material of case/cover; Flame retardancy rating (according to)	PP-FR or PP (on special request) R7 (EN 45545-2)* or HB (UL94) *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% 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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Operating specifications

Figure 1



Figure 2

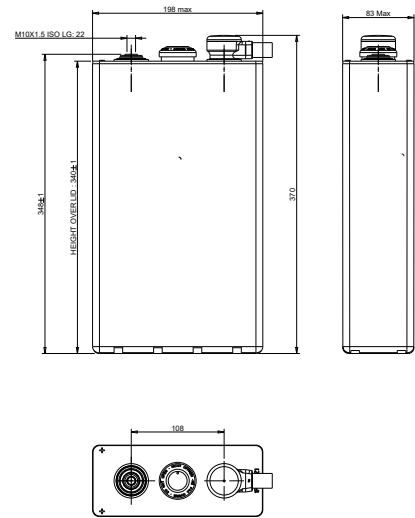
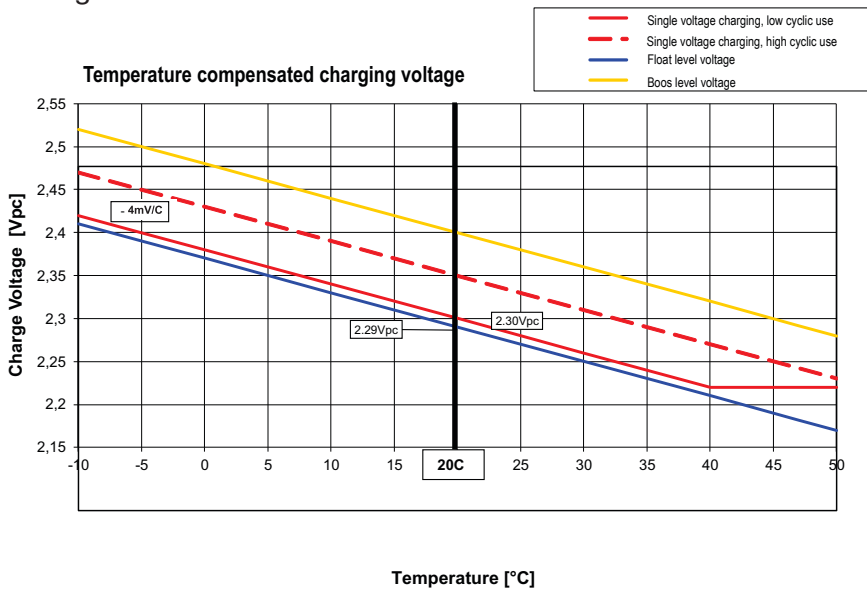


Figure 3



Temperature in °C	Percent of the rated capacity (C5)
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)	108 A (minimum for cyclic use: 54 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 62485-2:2019
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)

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Discharge data per cell

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

Voltage [Vpc]	Temp	Discharge time [h:min]																			
		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	122.5	122.5	122.5	122.5	116.3	108.4	101.5	90.8	81.9	74.9	59.8	50.0	38.0	30.8	25.9	22.5	17.8	14.8	12.7	6.9
	25°C	122.5	122.5	122.5	122.5	117.8	109.9	103.0	92.4	83.4	76.4	61.1	51.1	38.9	31.5	26.5	23.0	18.2	15.1	13.0	7.0
1.95	20°C	221.0	220.9	213.1	191.8	174.6	160.4	148.5	129.7	115.7	104.6	81.7	67.7	50.8	41.1	34.5	29.9	23.6	19.6	16.8	9.1
	25°C	221.0	220.9	215.4	194.6	177.7	163.2	151.5	132.6	118.4	107.2	83.8	69.4	52.1	42.1	35.4	30.6	24.2	20.1	17.2	9.3
1.90	20°C	344.7	326.7	282.7	268.3	223.9	204.1	187.7	162.3	143.6	129.0	99.9	81.9	61.1	49.1	41.2	35.6	28.1	23.3	19.9	10.9
	25°C	344.7	329.3	286.4	284.4	228.3	208.4	192.0	166.3	147.3	132.5	102.7	84.22	62.8	50.4	42.3	36.5	28.81	23.86	20.4	11.1
1.85	20°C	465.7	402.8	341.1	319.3	265.6	240.3	219.6	188.6	165.6	148.0	113.1	92.2	68.2	54.6	45.7	39.4	31.0	25.7	22.0	12.0
	25°C	465.7	407.1	346.6	338.4	271.6	246.0	225.2	193.6	170.4	152.3	116.5	95.0	70.23	56.1	46.9	40.5	31.84	26.37	22.5	12.2
1.80	20°C	573.5	471.4	392.7	358.8	299.9	269.4	244.8	207.7	181.3	160.9	121.7	98.7	72.4	57.7	48.2	41.5	32.7	27.0	23.0	12.4
	25°C	575.1	477.1	400.1	380.3	307.1	276.6	251.5	213.8	186.7	166.0	125.5	101.8	74.62	59.4	49.5	42.7	33.52	21.2	23.6	12.7
1.75	20°C	664.1	533.7	436.8	387.9	326.1	290.6	262.2	220.4	191.1	169.0	126.6	102.3	74.5	58.8	48.8	41.9	32.8	27.0	23.0	12.4
	25°C	667.1	540.8	445.9	411.2	335.0	298.9	270.3	227.4	197.2	174.6	130.8	105.5	76.86	60.6	50.2	43.1	33.64	27.7	23.6	12.7
1.70	20°C	749.7	587.5	472.9	409.8	344.8	305.2	274.2	228.8	197.3	174.0	128.8	103.0	74.5	58.8	48.8	41.9	32.8	27.0	23.0	12.4
	25°C	753.7	660.2	483.6	434.3	355.0	314.6	283.2	236.4	203.9	179.8	133.3	106.5	76.83	60.6	50.2	43.1	33.64	27.7	23.6	12.7
1.65	20°C	828.5	633.8	501.4	423.3	358.3	315.5	282.5	234.4	200.2	175.2	128.8	103.0	74.5	58.8	48.8	41.9	32.8	27.0	23.0	12.4
	25°C	833.2	644.5	513.8	448.7	369.5	325.7	292.0	242.4	207.3	181.4	133.3	106.5	76.83	60.6	50.2	43.1	33.64	27.7	23.6	12.7
1.60	20°C	898.0	672.8	523.1	431.6	368.5	323.1	287.2	234.9	200.2	175.2	128.8	103.0	74.5	58.8	48.8	41.9	32.8	27.0	23.0	12.4
	25°C	904.1	685.4	537.2	457.5	380.4	334.0	297.8	243.4	207.3	181.4	133.3	106.5	76.83	60.6	50.2	43.1	33.64	27.7	23.6	12.7

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

Voltage [Vpc]	Temp	Discharge time [h:min]																			
		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	243,8	243,8	243,7	243,7	232,8	216,9	203,3	182,6	164,9	150,7	121,0	101,2	77,1	62,5	52,9	45,9	36,5	30,2	26,0	14,2
	25°C	243,7	243,7	243,7	243,7	235,5	220,1	206,3	185,7	168,0	153,5	123,6	103,5	78,8	63,9	54,1	46,9	37,2	30,9	26,5	14,5
1.95	20°C	430,1	430,0	415,9	375,2	341,9	315,3	292,4	256,2	228,7	206,5	162,5	134,8	101,5	82,2	69,3	60,0	47,7	39,7	34,0	18,6
	25°C	430,0	430,0	420,4	380,9	348,0	320,7	298,2	261,7	233,9	211,7	166,5	138,2	104,2	84,3	71,0	61,5	48,8	40,6	34,8	19,0
1.90	20°C	654,6	620,4	539,0	477,9	430,0	392,7	361,9	314,2	279,2	251,4	195,0	160,7	120,6	97,0	81,5	70,6	55,9	46,5	39,9	21,8
	25°C	654,6	625,7	546,6	485,7	438,1	400,8	370,1	321,6	286,2	258,0	200,4	165,2	123,9	99,6	83,7	72,4	57,3	47,6	40,8	22,3
1.85	20°C	860,9	746,8	635,3	557,7	499,6	453,0	415,9	358,2	315,9	283,7	218,4	178,5	132,8	106,7	89,4	77,3	61,1	50,7	43,5	23,8
	25°C	860,9	754,9	645,3	568,4	510,1	463,5	426,1	367,7	324,3	291,6	224,9	183,7	136,6	109,8	91,9	79,4	62,7	52,0	44,6	24,3
1.80	20°C	1032,0	851,5	714,5	620,7	551,4	497,9	455,3	389,4	340,6	303,7	232,4	188,6	139,5	111,9	93,6	80,7	63,7	52,9	45,3	24,5
	25°C	1035,0	861,7	727,3	633,8	564,4	510,3	467,3	400,4	350,9	312,6	239,5	194,6	143,7	115,1	96,3	83,0	65,5	54,2	46,4	25,1
1.75	20°C	1158,0	939,4	776,5	667,6	588,8	527,8	479,9	407,8	355,2	315,1	239,7	194,1	142,8	113,7	94,8	81,4	64,0	52,9	45,3	24,5
	25°C	1163,0	952,0	791,9	683,4	603,8	542,4	493,3	420,0	366,4	325,3	247,3	200,4	147,4	117,1	97,6	83,8	65,7	54,3	46,4	25,1
1.70	20°C	1272,0	1008,0	822,4	700,2	612,5	546,5	494,1	418,2	363,3	321,6	243,0	195,6	142,8	113,7	94,8	81,4	64,0	52,9	45,3	24,5
	25°C	1279,0	1022,0	839,9	717,7	629,5	562,5	509,2	431,1	375,0	332,2	251,0	202,2	147,4	117,1	97,6	83,8	65,7	54,3	46,4	25,1
1.65	20°C	1367,0	1058,0	853,9	720,5	626,8	557,4	502,7	423,8	367,5	323,8	243,0	195,6	142,8	113,7	94,8	81,4	64,0	52,9	45,3	24,5
	25°C	1375,0	1074,0	873,7	740,0	645,1	574,2	518,5	437,2	379,7	335,0	251,0	202,2	147,4	117,1	97,6	83,8	65,7	54,3	46,4	25,1
1.60	20°C	1437,0	1096,0	874,2	732,6	635,1	563,5	507,6	425,2	367,5	323,8	243,0	195,6	142,8	113,7	94,8	81,4	64,0	52,9	45,3	24,5
	25°C	1447,0	1115,0	895,7	753,3	654,3	581,1	524,0	439,1	379,9	335,0	251,0	202,2	147,4	117,1	97,6	83,8	65,7	54,3	46,4	25,1

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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