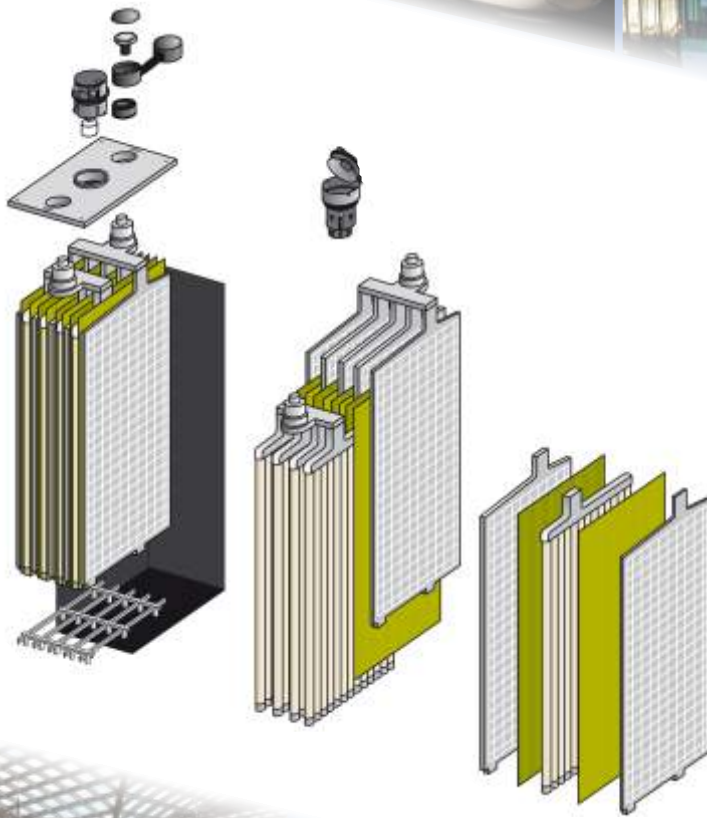


PerfectRail™ 5PzS350



*Lead-Acid Battery Technology
for Rolling Stock Applications*



Robust cell construction

Low maintenance

Shock and vibration resistant

Very high cycle performance

V-0 Flame retardant



Keeping you on track

Hawker® PerfectRail™ 5PzS350

Technical specifications

Part number: 3563111

Electrical Data

Nominal voltage	2 V
Number of cells	1 (Lead-Acid tubular Technology)
Specific gravity of acid	1.24 kg/l (at 30°C) on request 1.27 and 1.29 available
Rated capacity C ₁₀ to 1.80 Vpc at 20 °C	364 Ah
Rated capacity C ₅ to 1.70 Vpc at 30 °C	350 Ah
Current/Power for 0.25 h back-up time 1.60 Vpc 20 °C	444.8 A / 726 W
Current/Power for 0.5 h back-up time 1.60 Vpc 20 °C	330.6 A / 558 W
Current/Power for 1.0 h back-up time 1.60 Vpc 20 °C	215.9 A / 382 W
Current/Power for 3.0 h back-up time 1.70 Vpc 20 °C	95.7 A / 179 W
Current/Power for 5.0 h back-up time 1.75 Vpc 20 °C	63.8 A / 121 W
Current/Power for 8.0 h back-up time 1.75 Vpc 20 °C	44.5 A / 85.W
Current/Power for 10.0 h back-up time 1.80 Vpc 20 °C	36.4 A / 71 W
Current/Power for 24.0 h back-up time 1.80 Vpc 20 °C	17.8 A / 36 W
Conversion to capacity at 25 °C	103 % of Current/Power at 20°C
Internal resistance	0.64 mΩ
Short circuit current	3.16 kA
Self discharge at 20 °C	max. 6% / Month
Heat loss during float service at 20°C	≈ 0.48 W

Mechanical Data

Weight	22.6 kg ±2%
Height of cell / over terminal cover	405 mm / 435 mm
Width	198 mm
Depth	101 mm
Number of terminals	1 + / 1 -
Dimension of terminal screw hole	M10 x 22 deep, female thread
Torque terminal screw	25 Nm ±2
Terminal insulation class according to IEC/EN 60529	IP 20
Diameter of diagnostic hole for voltage probe	2 mm
Maximum cable cross-section	95 mm ²
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 61373:2011)

Environmental Data

Installation	vertically
Cell assembly distance	not required; for higher loads 5-10 mm recommended for cooling
Material of case/cover; Flame retardancy rating (according to)	PP - FR or PP (on request) V-0 (UL94); I2 / F1 (NF F 16-101) or HB (UL94)
Rail service life expected at 15 °C	6 Years (max 30% DoD / day)
Cycle Endurance (DB Test : 30% DOD/8h)	> 80% C _{nom} after 1'300 cycles
Design life	12+ Long Life, according Eurobat Classification
Shipping name	Batteries, wet, filled with acid

Hawker® PerfectRail™ 5PzS350

Operating specifications

Figure 1



Figure 2

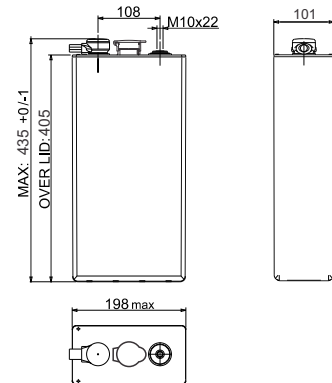
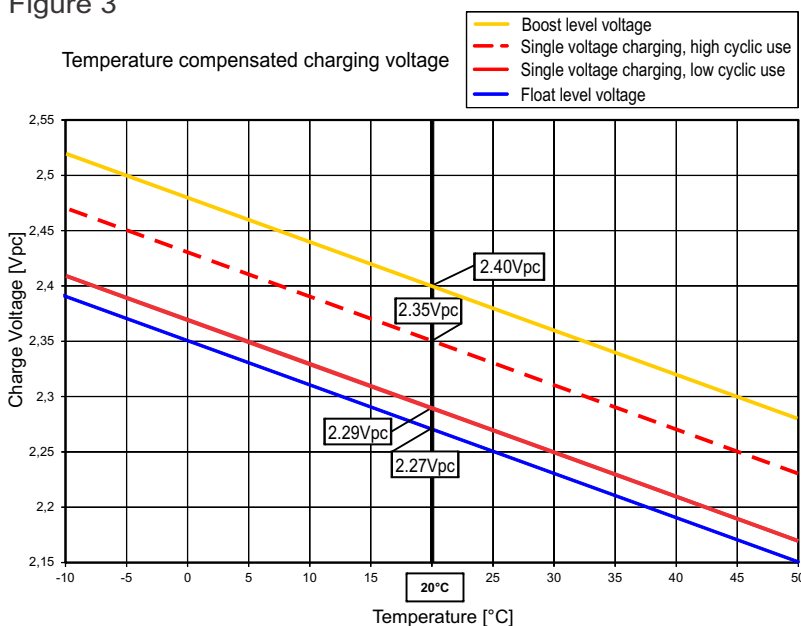


Figure 3



Temperature in °C	Percent of the rated capacity (C ₅)
40	113
35	109
30	106
25	103
20	100
15	97
10	93
5	89
0	84
-5	77
-10	70
-15	62
-20	52
-25	40
-30	29

*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 (Volt per cell)
Lower or single level voltage setting at 20°C	2.29 ... 2.35 Vpc (low ... high cyclic use)
Charge current for IU or IU0U-charging (DIN 41773)	64 ... 95 A (minimum for cyclic use: 80 A)
Voltage compensation in function of temperature	- 4 mV/K per cell
Float level voltage setting at 20°C (± 1%)	2.27 Vpc (valid for long term trickle charging at workshop and storage)
Air exchange	According to EN 50272-2 : 2001 $Q = 0.05 * N_{cells} * I_{gas} * C_{AhC10} * 10^{-3} [m^3/h]$ $I_{gas} = 5$ (at 2.29 Vpc) ; $I_{gas} = 20$ (at 2.40 Vpc)
Water refill	manual / optional 'aquamatic' system
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)

Hawker® PerfectRail™ 5PzS350

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	8:00	10:00	12:00	24:00
1.90	20°C	215.4	215.4	215.4	209.9	196.3	184.5	174.2	157.1	143.5	132.2	107.8	92.0	71.9	59.8	51.6	37.1	31.4	27.3	15.5
	25°C	215.4	215.4	215.4	213.2	200.0	188.4	178.3	161.3	147.7	136.2	111.4	95.2	74.4	61.9	53.4	38.3	32.4	28.1	15.9
1.85	20°C	293.4	293.4	277.8	255.9	237.6	221.8	208.5	186.7	169.3	155.1	124.9	105.3	81.1	66.7	57.2	40.7	34.4	29.9	16.9
	25°C	293.3	293.3	281.7	260.6	242.7	227.3	214.0	192.3	174.9	160.5	129.6	109.3	84.3	69.2	59.3	42.2	35.6	30.8	17.4
1.80	20°C	374.3	363.6	326.3	298.3	275.5	256.6	240.2	212.7	191.3	174.3	138.6	115.7	88.1	71.8	61.1	43.1	36.4	31.5	17.8
	25°C	374.3	367.5	331.6	304.5	282.0	263.3	247.3	220.0	198.4	181.0	144.3	120.5	91.8	74.7	63.6	44.7	37.6	32.6	18.3
1.75	20°C	454.9	418.5	372.9	338.5	310.8	287.7	267.8	235.4	210.1	190.1	149.1	123.4	93.0	75.4	63.8	44.5	37.2	32.1	18.0
	25°C	454.9	423.5	379.6	346.3	319.2	296.1	276.7	244.4	218.7	198.2	155.7	128.9	97.0	78.6	66.4	46.2	38.6	33.3	18.5
1.70	20°C	533.3	471.1	417.1	376.4	343.4	315.6	292.1	254.5	225.4	202.4	156.7	128.8	95.7	76.7	64.4	44.5	37.2	32.1	18.0
	25°C	533.3	477.4	425.3	385.8	353.7	326.3	302.8	264.9	235.4	211.8	164.0	134.8	100.2	80.1	67.2	46.2	38.6	33.3	18.5
1.65	20°C	609.4	521.5	459.1	412.0	373.1	340.4	313.1	269.8	237.4	211.8	160.9	130.1	95.7	76.7	64.4	44.5	37.2	32.1	18.0
	25°C	612.7	528.9	468.9	423.2	385.4	353.4	325.9	282.0	248.8	222.3	169.4	136.6	100.2	80.1	67.2	46.2	38.6	33.3	18.5
1.60	20°C	625.3	568.9	499.0	444.8	399.6	361.9	330.6	281.9	246.3	215.9	160.9	130.1	95.7	76.7	64.4	44.5	37.2	32.1	18.0
	25°C	625.3	577.5	510.6	458.4	414.5	377.2	345.5	295.6	258.8	228.3	169.4	136.6	100.2	80.1	67.2	46.2	38.6	33.3	18.5

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	8:00	10:00	12:00	24:00
1.90	20°C	407.1	407.1	407.1	400.0	374.6	352.6	333.7	301.5	275.8	254.9	208.8	178.9	140.4	117.5	101.5	73.6	63.3	55.6	32.3
	25°C	407.2	407.1	407.1	406.0	381.3	360.1	341.1	309.5	283.7	262.2	215.9	184.8	145.5	121.4	105.0	75.7	65.1	57.1	33.1
1.85	20°C	539.0	539.0	513.4	475.0	441.9	414.2	390.3	351.1	319.5	293.4	237.8	201.3	156.6	128.8	111.1	79.5	68.0	59.8	34.8
	25°C	538.9	538.9	520.3	483.0	451.5	424.3	400.1	361.0	329.5	303.4	246.3	209.1	162.5	133.7	115.1	82.3	70.0	61.6	35.7
1.80	20°C	672.2	653.5	587.8	539.2	499.8	467.0	438.6	391.7	354.6	324.5	259.1	218.3	167.8	137.5	117.4	83.3	70.6	62.2	36.3
	25°C	672.3	660.3	597.1	549.8	511.1	478.5	450.9	404.2	366.9	336.3	269.7	227.1	174.5	143.0	121.8	86.3	73.0	64.1	37.3
1.75	20°C	793.3	732.4	655.1	596.8	550.5	511.9	478.7	423.7	382.0	348.1	275.5	229.7	174.9	142.9	121.1	85.2	71.8	63.0	36.7
	25°C	793.4	740.6	666.8	609.9	564.8	526.4	493.6	438.8	396.1	361.8	287.4	239.4	182.2	148.9	126.1	88.6	74.4	64.9	37.7
1.70	20°C	905.7	801.2	713.2	647.7	594.4	549.8	511.9	450.1	401.9	364.9	286.5	236.7	178.9	145.1	122.3	85.3	71.8	63.0	36.7
	25°C	905.7	811.6	726.0	663.9	611.0	567.1	529.5	467.4	418.4	380.1	299.7	247.5	186.9	151.4	127.6	88.7	74.4	64.9	37.7
1.65	20°C	1007.4	863.9	763.1	690.1	630.8	580.7	538.4	469.9	417.0	376.1	293.5	239.0	178.9	145.1	122.3	85.3	71.8	63.0	36.7
	25°C	1010.3	875.3	778.5	707.5	650.0	600.7	558.1	489.3	435.6	392.7	307.5	251.1	187.1	151.4	127.6	88.7	74.4	64.9	37.7
1.60	20°C	1024.8	916.7	807.8	726.0	659.9	604.7	558.3	484.4	427.8	382.4	293.7	239.0	178.9	145.1	122.3	85.3	71.8	63.0	36.7
	25°C	1026.7	929.8	826.1	746.1	681.7	627.2	580.4	505.7	447.9	401.8	308.4	251.1	187.1	151.4	127.6	88.7	74.4	64.9	37.7

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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