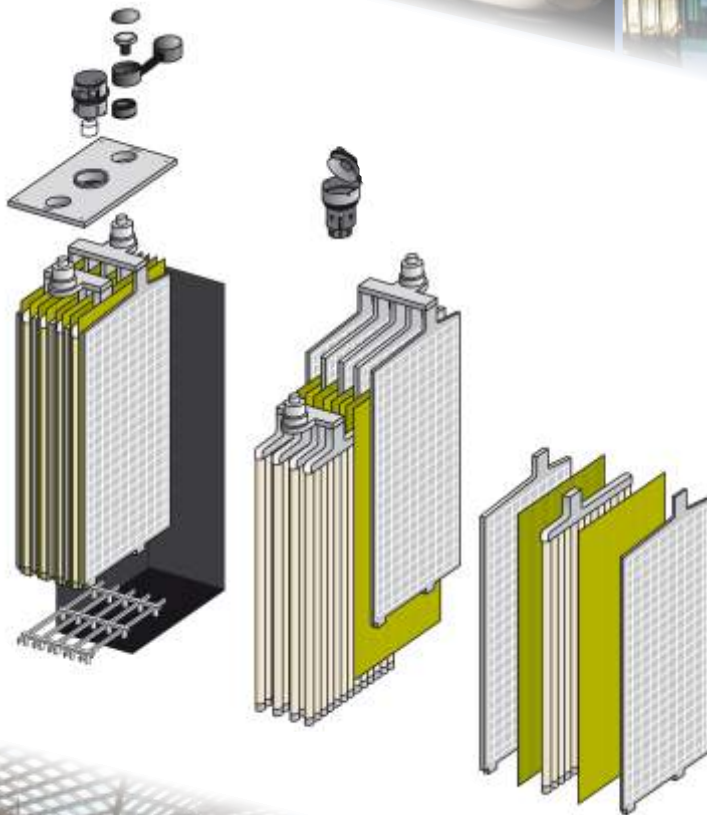


PerfectRail™ 8PzS440



*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™ 8PzS440

Technical specifications

Part number: 3563055

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	455 Ah
Rated capacity C ₅ to 1.70 Vpc at 30 °C	440 Ah
Current/Power for 0.25 h back-up time 1.60 Vpc 20 °C	582.5 A / 956 W
Current/Power for 0.5 h back-up time 1.60 Vpc 20 °C	423.2 A / 720 W
Current/Power for 1.0 h back-up time 1.60 Vpc 20 °C	270.4 A / 484 W
Current/Power for 3.0 h back-up time 1.70 Vpc 20 °C	120.2 A / 226 W
Current/Power for 5.0 h back-up time 1.75 Vpc 20 °C	80.5 A / 153 W
Current/Power for 8.0 h back-up time 1.75 Vpc 20 °C	56.1 A / 108 W
Current/Power for 10.0 h back-up time 1.80 Vpc 20 °C	45.5 A / 88 W
Current/Power for 24.0 h back-up time 1.80 Vpc 20 °C	21.7 A / 42 W
Conversion to capacity at 25 °C	103 % of Current/Power at 20°C
Internal resistance	0.46 mΩ
Short circuit current	4.32 kA
Self discharge at 20 °C	max 6% / Month
Heat loss during float service at 20°C	≈ 0.60 W

Mechanical Data

Weight	29.5 kg ±2%
Height of cell / over terminal cover	340 mm / 370 mm
Width	198 mm
Depth	155 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™ 8PzS440

Operating specifications

Figure 1



Figure 2

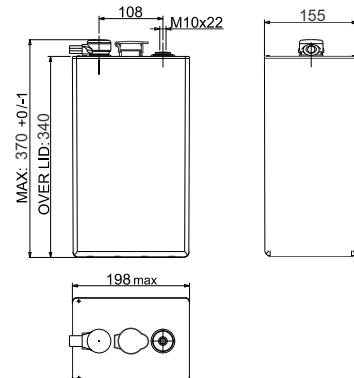
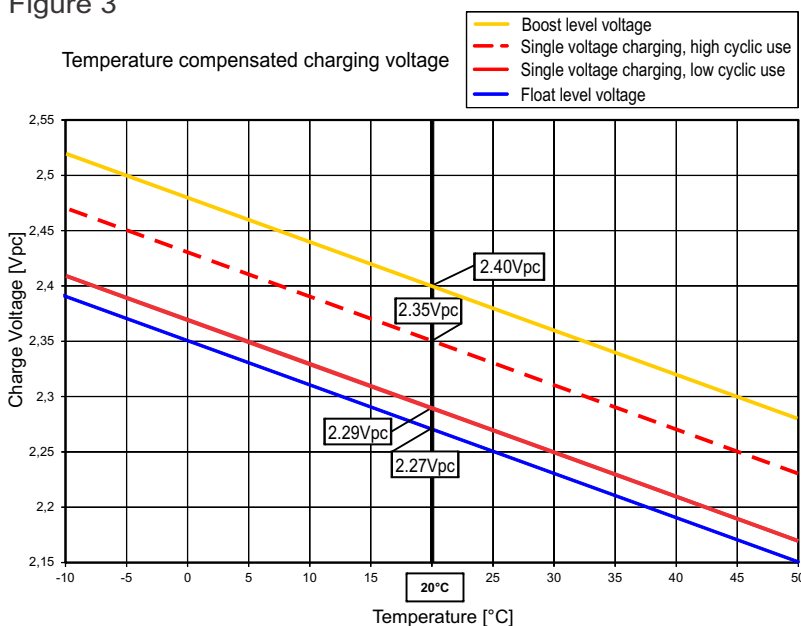


Figure 3



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)	80 ... 120 A (minimum for cyclic use: 100 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)

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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	8:00	10:00	12:00	24:00
1.90	20°C	306.2	306.2	306.2	284.5	263.5	246.5	231.4	207.2	188.6	172.9	140.3	118.7	92.1	76.4	65.7	46.7	39.3	34.0	18.9
	25°C	306.2	306.2	306.2	289.6	269.5	252.3	237.5	213.2	194.5	178.7	145.2	123.1	95.4	79.1	68.0	48.4	40.6	35.1	19.5
1.85	20°C	412.7	412.7	377.3	344.0	317.0	294.4	275.4	244.4	220.5	201.4	161.1	135.3	103.7	85.0	72.8	51.4	43.1	37.2	20.7
	25°C	412.7	412.7	383.5	350.8	324.9	302.5	283.5	252.3	228.2	208.6	167.5	140.6	107.8	88.2	75.4	53.2	44.7	38.5	21.3
1.80	20°C	517.9	498.3	441.1	398.6	365.5	337.6	314.5	276.8	247.8	224.9	177.7	147.8	111.9	91.1	77.5	54.3	45.5	39.3	21.7
	25°C	517.9	504.3	449.1	408.2	375.2	347.6	324.8	286.8	257.5	233.9	185.1	154.1	116.6	94.8	80.5	56.4	47.2	40.7	22.5
1.75	20°C	628.5	570.7	501.5	450.5	409.5	376.3	348.7	304.6	270.3	243.8	189.8	156.7	117.5	95.1	80.5	56.1	46.8	40.2	22.1
	25°C	628.5	578.5	511.9	462.1	421.9	389.0	361.3	316.6	281.9	254.5	198.5	163.8	122.7	99.1	83.8	58.2	48.5	41.7	22.9
1.70	20°C	738.6	639.8	558.2	497.6	450.0	410.9	378.2	327.2	288.4	258.0	198.4	162.6	120.2	96.4	81.1	56.1	46.8	40.2	22.1
	25°C	738.6	649.6	570.5	512.2	465.1	426.0	393.3	341.3	301.8	270.4	208.0	170.3	125.9	100.6	84.5	58.2	48.5	41.7	22.9
1.65	20°C	776.1	703.8	611.4	542.0	486.3	440.6	403.1	344.8	302.1	268.5	201.7	163.2	120.2	96.4	81.1	56.1	46.8	40.2	22.1
	25°C	776.1	715.2	626.5	559.3	504.3	458.7	420.9	361.1	316.9	282.3	212.3	171.4	125.9	100.6	84.5	58.2	48.5	41.7	22.9
1.60	20°C	776.1	762.5	661.0	582.5	518.2	466.1	423.2	358.3	308.2	270.4	201.7	163.2	120.2	96.4	81.1	56.1	46.8	40.2	22.1
	25°C	776.1	775.9	678.2	602.3	539.3	487.0	443.6	376.6	325.7	285.8	212.3	171.4	125.9	100.6	84.5	58.2	48.5	41.7	22.9

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	580.7	580.7	580.6	542.5	504.3	472.2	444.5	399.2	362.8	333.7	272.1	231.5	180.2	150.1	129.6	92.4	77.9	67.4	37.3
	25°C	580.6	580.6	580.5	551.8	514.7	482.6	455.5	410.6	374.0	344.2	281.4	239.6	186.8	155.1	134.0	95.5	80.4	69.4	38.3
1.85	20°C	759.2	759.1	699.0	638.6	591.2	550.5	516.6	461.1	417.7	382.5	307.4	259.4	200.5	164.3	141.7	100.5	84.6	73.3	40.6
	25°C	759.1	759.0	709.5	651.2	604.3	564.9	530.8	475.1	431.8	395.8	318.9	269.5	208.3	170.8	146.7	104.2	87.5	75.6	41.7
1.80	20°C	931.1	898.3	796.7	723.3	665.3	616.8	576.3	510.8	460.9	420.3	333.1	279.5	213.7	174.6	148.9	105.4	88.5	76.6	42.5
	25°C	931.2	908.7	810.7	739.4	681.6	634.6	594.0	527.9	477.6	436.2	347.3	291.1	222.3	181.8	154.4	109.4	91.7	79.2	43.6
1.75	20°C	1098.6	999.5	882.4	796.8	728.8	673.3	626.5	550.5	493.3	448.1	352.6	292.5	221.8	180.8	153.0	108.1	90.3	78.0	43.1
	25°C	1098.6	1013.0	899.6	816.3	749.9	694.4	647.4	571.4	512.5	466.4	368.3	305.2	231.1	188.5	159.4	112.2	93.8	80.8	44.3
1.70	20°C	1254.1	1091.5	955.6	859.1	782.4	719.6	666.8	581.9	516.4	467.6	365.0	300.1	225.6	182.9	154.1	108.2	90.3	78.0	43.1
	25°C	1254.2	1108.2	975.8	882.2	806.9	743.8	691.2	605.9	539.2	487.8	382.0	314.3	236.0	190.9	160.8	112.4	93.8	80.8	44.3
1.65	20°C	1305.8	1169.0	1020.3	911.8	826.2	756.0	697.9	605.3	534.1	479.7	370.9	301.6	225.6	182.9	154.1	108.2	90.3	78.0	43.1
	25°C	1305.8	1187.3	1044.6	938.0	853.9	783.8	725.3	631.8	559.3	501.6	389.6	316.9	236.0	190.9	160.8	112.4	93.8	80.8	44.3
1.60	20°C	1305.8	1239.9	1075.6	956.1	861.1	783.4	720.4	621.2	545.2	483.5	370.9	301.6	225.6	182.9	154.1	108.2	90.3	78.0	43.1
	25°C	1305.8	1249.1	1102.2	986.4	892.5	815.1	751.0	649.8	572.7	509.0	389.6	316.9	236.0	190.9	160.8	112.4	93.8	80.8	44.3

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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