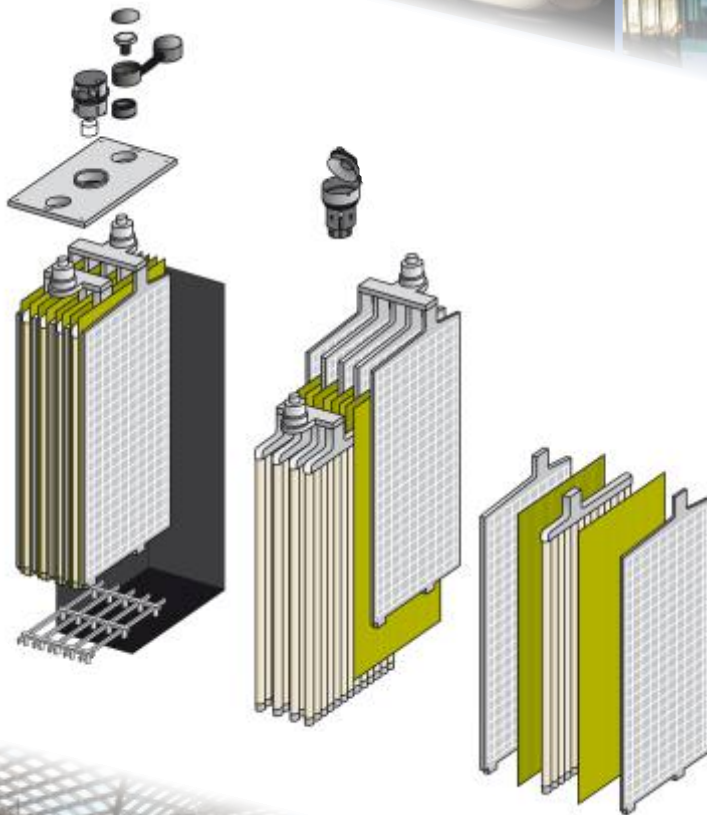


PerfectRail™ 2PzS140



*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™ 2PzS140

Technical specifications

Part number: 3563088

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	145 Ah
Rated capacity C ₅ to 1.70 Vpc at 30 °C	140 Ah
Current/Power for 0.25 h back-up time 1.60 Vpc 20 °C	177.9 A / 290 W
Current/Power for 0.5 h back-up time 1.60 Vpc 20 °C	132.2 A / 223 W
Current/Power for 1.0 h back-up time 1.60 Vpc 20 °C	86.4 A / 153 W
Current/Power for 3.0 h back-up time 1.70 Vpc 20 °C	38.3 A / 72 W
Current/Power for 5.0 h back-up time 1.75 Vpc 20 °C	25.5 A / 48 W
Current/Power for 8.0 h back-up time 1.75 Vpc 20 °C	17.8 A / 34 W
Current/Power for 10.0 h back-up time 1.80 Vpc 20 °C	14.5 A / 28 W
Current/Power for 24.0 h back-up time 1.80 Vpc 20 °C	7.1 A / 15 W
Conversion to capacity at 25 °C	103 % of Current/Power at 20°C
Internal resistance	1.60 mΩ
Short circuit current	1.26 kA
Self discharge at 20 °C	max. 6% / Month
Heat loss during float service at 20°C	≈ 0.19 W

Mechanical Data

Weight	10 kg ±2%
Height of cell / over terminal cover	405 mm / 435 mm
Width	47 mm
Depth	198 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™ 2PzS140

Operating specifications

Figure 1



Figure 2

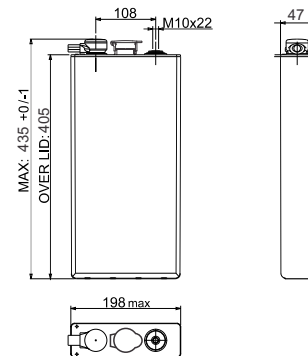
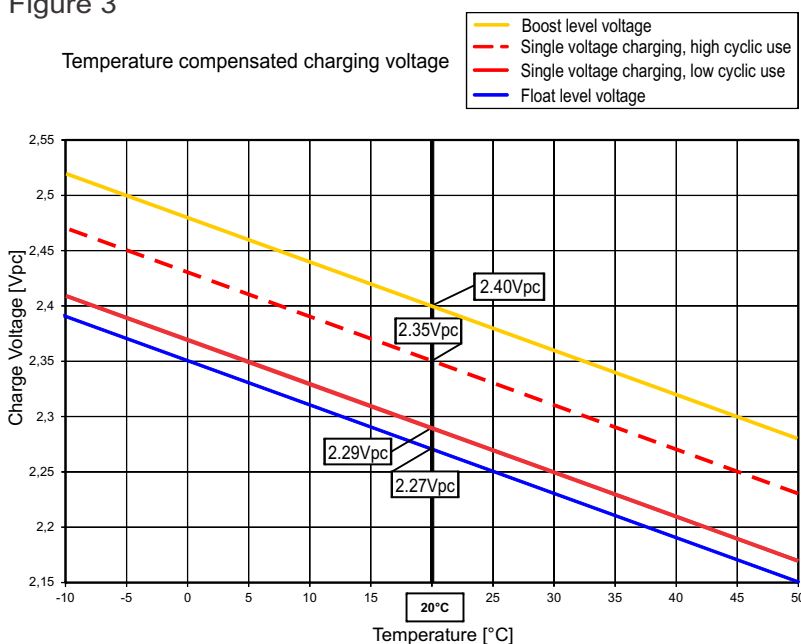


Figure 3



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)	25 ... 38 A (minimum for cyclic use: 32 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	86.2	86.2	86.2	84.0	78.5	73.8	69.7	62.8	57.4	52.9	43.1	36.8	28.7	23.9	20.7	14.8	12.6	10.9	6.2
	25°C	86.2	86.2	86.2	85.3	80.0	75.4	71.3	64.5	59.1	54.5	44.6	38.1	29.8	24.8	21.4	15.3	13.0	11.2	6.4
1.85	20°C	117.3	117.3	111.1	102.3	95.0	88.7	83.4	74.7	67.7	62.0	50.0	42.1	32.5	26.7	22.9	16.3	13.8	11.9	6.8
	25°C	117.3	117.3	112.7	104.2	97.1	90.9	85.6	76.9	70.0	64.2	51.8	43.7	33.7	27.7	23.7	16.9	14.2	12.3	6.9
1.80	20°C	149.7	145.4	130.5	119.3	110.2	102.6	96.1	85.1	76.5	69.7	55.4	46.3	35.2	28.7	24.5	17.3	14.5	12.6	7.1
	25°C	149.7	147.0	132.6	121.8	112.8	105.3	98.9	88.0	79.3	72.4	57.7	48.2	36.7	29.9	25.4	17.9	15.1	13.0	7.3
1.75	20°C	181.9	167.4	149.2	135.4	124.3	115.1	107.1	94.2	84.0	76.0	59.6	49.4	37.2	30.1	25.5	17.8	14.9	12.9	7.2
	25°C	181.9	169.4	151.8	138.5	127.7	118.4	110.7	97.7	87.5	79.3	62.3	51.6	38.8	31.4	26.6	18.5	15.4	13.3	7.4
1.70	20°C	213.3	188.5	166.9	150.5	137.3	126.2	116.8	101.8	90.2	81.0	62.7	51.5	38.3	30.7	25.8	17.8	14.9	12.9	7.2
	25°C	213.3	190.9	170.1	154.3	141.5	130.5	121.1	106.0	94.2	84.7	65.6	53.9	40.1	32.0	26.9	18.5	15.4	13.3	7.4
1.65	20°C	243.7	208.6	183.6	164.8	149.2	136.2	125.2	107.9	95.0	84.7	64.3	52.0	38.3	30.7	25.8	17.8	14.9	12.9	7.2
	25°C	245.1	211.6	187.6	169.3	154.2	141.4	130.4	112.8	99.5	88.9	67.8	54.7	40.1	32.0	26.9	18.5	15.4	13.3	7.4
1.60	20°C	250.1	227.6	199.6	177.9	159.9	144.7	132.2	112.8	98.5	86.4	64.3	52.0	38.3	30.7	25.8	17.8	14.9	12.9	7.2
	25°C	250.1	231.0	204.2	183.4	165.8	150.9	138.2	118.3	103.5	91.3	67.8	54.7	40.1	32.0	26.9	18.5	15.4	13.3	7.4

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	162.9	162.9	162.8	160.0	149.8	141.0	133.5	120.6	110.3	102.0	83.5	71.6	56.2	47.0	40.6	29.4	25.3	22.2	12.9
	25°C	162.9	162.9	162.9	162.4	152.5	144.0	136.4	123.8	113.5	104.9	86.3	73.9	58.2	48.6	42.0	30.3	26.0	22.8	13.2
1.85	20°C	215.6	215.6	205.3	190.0	176.8	165.7	156.1	140.5	127.8	117.3	95.1	80.5	62.6	51.5	44.5	31.8	27.2	23.9	13.9
	25°C	215.6	215.6	208.1	193.2	180.6	169.7	160.0	144.4	131.8	121.4	98.5	83.6	65.0	53.5	46.0	32.9	28.0	24.6	14.3
1.80	20°C	268.9	261.4	235.1	215.7	199.9	186.8	175.4	156.7	141.8	129.8	103.6	87.3	67.1	55.0	47.0	33.3	28.2	24.9	14.5
	25°C	268.9	264.1	238.8	219.9	204.4	191.4	180.4	161.7	146.8	134.5	107.9	90.8	69.8	57.2	48.7	34.5	29.2	25.6	14.9
1.75	20°C	317.3	293.0	262.0	238.7	220.2	204.7	191.5	169.5	152.8	139.2	110.2	91.9	70.0	57.2	48.5	34.1	28.7	25.2	14.7
	25°C	317.3	296.2	266.7	244.0	225.9	210.5	197.4	175.5	158.4	144.7	115.0	95.8	72.9	59.6	50.5	35.4	29.8	26.0	15.1
1.70	20°C	362.3	320.5	285.3	259.1	237.8	219.9	204.8	180.0	160.7	146.0	114.6	94.7	71.5	58.0	48.9	34.1	28.7	25.2	14.7
	25°C	362.3	324.6	290.4	265.5	244.4	226.8	211.8	187.0	167.3	152.0	119.9	99.0	74.8	60.6	51.0	35.5	29.8	26.0	15.1
1.65	20°C	403.0	345.6	305.2	276.1	252.3	232.3	215.4	188.0	166.8	150.4	117.4	95.6	71.5	58.0	48.9	34.1	28.7	25.2	14.7
	25°C	404.1	350.1	311.4	283.0	260.0	240.3	223.3	195.7	174.3	157.1	123.0	100.4	74.9	60.6	51.0	35.5	29.8	26.0	15.1
1.60	20°C	409.9	366.7	323.1	290.4	264.0	241.9	223.3	193.7	171.1	153.0	117.5	95.6	71.5	58.0	48.9	34.1	28.7	25.2	14.7
	25°C	410.7	371.9	330.5	298.4	272.7	250.9	232.2	202.3	179.2	160.7	123.4	100.4	74.9	60.6	51.0	35.5	29.8	26.0	15.1

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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