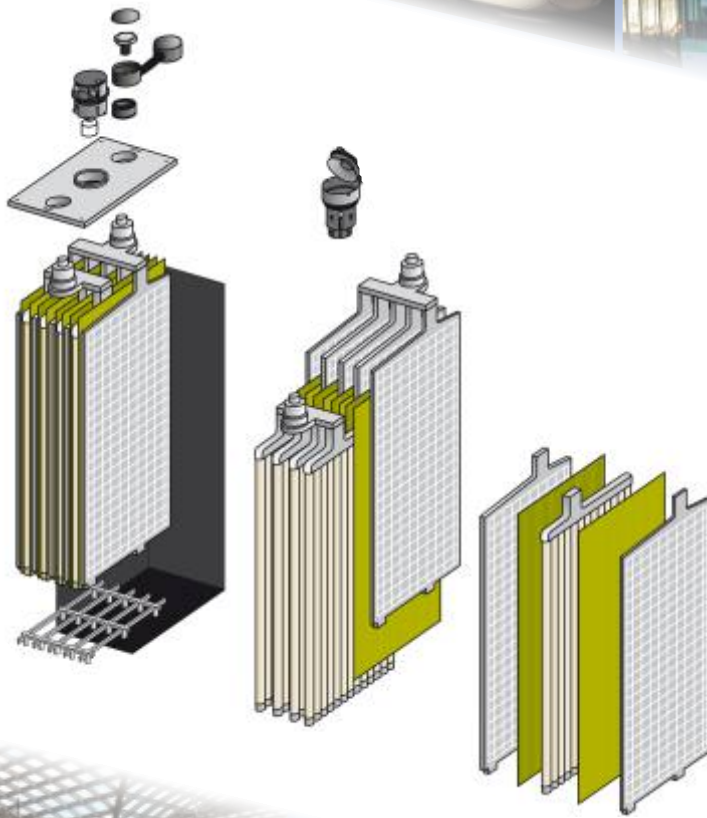


PerfectRail™ 3PzS165



*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™ 3PzS165

Technical specifications

Part number: 4427706

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	171 Ah
Rated capacity C ₅ to 1.70 Vpc at 30 °C	165 Ah
Current/Power for 0.25 h back-up time 1.60 Vpc 20 °C	218.4 A / 359 W
Current/Power for 0.5 h back-up time 1.60 Vpc 20 °C	158.7 A / 270 W
Current/Power for 1.0 h back-up time 1.60 Vpc 20 °C	101.4 A / 181 W
Current/Power for 3.0 h back-up time 1.70 Vpc 20 °C	45.1 A / 85 W
Current/Power for 5.0 h back-up time 1.75 Vpc 20 °C	30.2 A / 57 W
Current/Power for 8.0 h back-up time 1.75 Vpc 20 °C	21.0 A / 41 W
Current/Power for 10.0 h back-up time 1.80 Vpc 20 °C	17.1 A / 33 W
Current/Power for 24.0 h back-up time 1.80 Vpc 20 °C	8.2 A / 16 W
Conversion to capacity at 25 °C	103 % of Current/Power at 20°C
Internal resistance	1.23 mΩ
Short circuit current	1.62 kA
Self discharge at 20 °C	max 6% / Month
Heat loss during float service at 20°C	≈ 0.23 W

Mechanical Data

Weight	12 kg ±2%
Height of cell / over terminal cover	340 mm / 370 mm
Width	198 mm
Depth	65 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

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Operating specifications

Figure



Figure 2

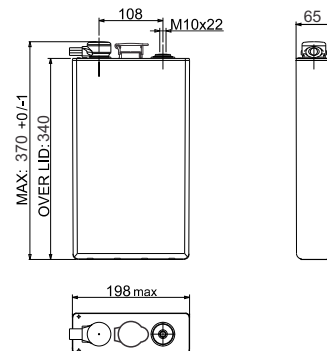
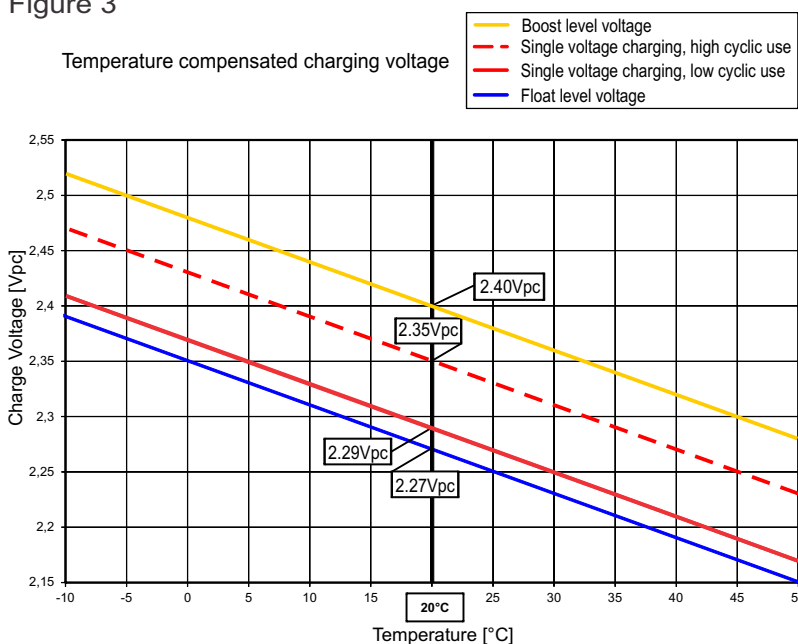


Figure 3



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)	30 ... 45 A (minimum for cyclic use: 38 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	114.8	114.8	114.8	106.7	98.8	92.4	86.8	77.7	70.7	64.8	52.6	44.5	34.5	28.7	24.6	17.5	14.7	12.7	7.1
	25°C	114.8	114.8	114.8	108.6	101.0	94.6	89.1	79.9	72.9	67.0	54.4	46.1	35.8	29.7	25.5	18.1	15.2	13.2	7.3
1.85	20°C	154.8	154.8	141.5	129.0	118.9	110.4	103.3	91.7	82.7	75.5	60.4	50.8	38.9	31.9	27.3	19.3	16.2	14.0	7.7
	25°C	154.8	154.8	143.8	131.6	121.8	113.4	106.3	94.6	85.6	78.2	62.8	52.7	40.4	33.1	28.3	20.0	16.7	14.5	8.0
1.80	20°C	194.2	186.9	165.4	149.5	137.0	126.6	117.9	103.8	92.9	84.3	66.6	55.4	42.0	34.2	29.1	20.4	17.1	14.7	8.2
	25°C	194.2	189.1	168.4	153.1	140.7	130.4	121.8	107.6	96.6	87.7	69.4	57.8	43.7	35.5	30.2	21.1	17.7	15.3	8.4
1.75	20°C	235.7	214.0	188.1	168.9	153.6	141.1	130.7	114.2	101.4	91.4	71.2	58.8	44.1	35.7	30.2	21.0	17.5	15.1	8.3
	25°C	235.7	216.9	192.0	173.3	158.2	145.9	135.5	118.7	105.7	95.4	74.4	61.4	46.0	37.2	31.4	21.8	18.2	15.6	8.6
1.70	20°C	277.0	239.9	209.3	186.6	168.7	154.1	141.8	122.7	108.2	96.8	74.4	61.0	45.1	36.1	30.4	21.0	17.5	15.1	8.3
	25°C	277.0	243.6	213.9	192.1	174.4	159.8	147.5	128.0	113.2	101.4	78.0	63.9	47.2	37.7	31.7	21.8	18.2	15.6	8.6
1.65	20°C	291.0	263.9	229.3	203.3	182.4	165.2	151.2	129.3	113.3	100.7	75.6	61.2	45.1	36.1	30.4	21.0	17.5	15.1	8.3
	25°C	291.0	268.2	235.0	209.7	189.1	172.0	157.8	135.4	118.8	105.9	79.6	64.3	47.2	37.7	31.7	21.8	18.2	15.6	8.6
1.60	20°C	291.0	286.0	247.9	218.4	194.3	174.8	158.7	134.4	115.6	101.4	75.6	61.2	45.1	36.1	30.4	21.0	17.5	15.1	8.3
	25°C	291.1	290.9	254.3	225.9	202.2	182.6	166.3	141.2	122.1	107.2	79.6	64.3	47.2	37.7	31.7	21.8	18.2	15.6	8.6

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	217.8	217.7	217.7	203.4	189.1	177.1	166.7	149.7	136.1	125.1	102.0	86.8	67.6	56.3	48.6	34.6	29.2	25.3	14.0
	25°C	217.7	217.7	217.7	206.9	193.0	181.0	170.8	154.0	140.3	129.1	105.5	89.8	70.1	58.2	50.3	35.8	30.2	26.0	14.4
1.85	20°C	284.7	284.7	262.1	239.5	221.7	206.4	193.7	172.9	156.7	143.5	115.3	97.3	75.2	61.6	53.1	37.7	31.7	27.5	15.2
	25°C	284.7	284.6	266.1	244.2	226.6	211.8	199.1	178.2	161.9	148.4	119.6	101.1	78.1	64.0	55.0	39.1	32.8	28.4	15.6
1.80	20°C	349.2	336.9	298.8	271.2	249.5	231.3	216.1	191.6	172.9	157.6	124.9	104.8	80.1	65.5	55.8	39.5	33.2	28.7	15.9
	25°C	349.2	340.8	304.0	277.3	255.6	238.0	222.8	198.0	179.1	163.6	130.2	109.2	83.4	68.2	57.9	41.0	34.4	29.7	16.4
1.75	20°C	412.0	374.8	330.9	298.8	273.3	252.5	234.9	206.4	185.0	168.1	132.2	109.7	83.2	67.8	57.4	40.5	33.9	29.3	16.2
	25°C	412.0	379.9	337.4	306.1	281.2	260.4	242.8	214.3	192.2	174.9	138.1	114.5	86.7	70.7	59.8	42.1	35.2	30.3	16.6
1.70	20°C	470.3	409.3	358.3	322.1	293.4	269.9	250.0	218.2	193.6	175.3	136.9	112.6	84.6	68.6	57.8	40.6	33.9	29.3	16.2
	25°C	470.3	415.6	365.9	330.8	302.6	278.9	259.2	227.2	202.2	182.9	143.3	117.9	88.5	71.6	60.3	42.1	35.2	30.3	16.6
1.65	20°C	489.7	438.4	382.6	341.9	309.8	283.5	261.7	227.0	200.3	179.9	139.1	113.1	84.6	68.6	57.8	40.6	33.9	29.3	16.2
	25°C	489.7	445.2	391.7	351.7	320.2	293.9	272.0	236.9	209.7	188.1	146.1	118.8	88.5	71.6	60.3	42.1	35.2	30.3	16.6
1.60	20°C	489.7	465.0	403.4	358.5	322.9	293.8	270.2	232.9	204.4	181.3	139.1	113.1	84.6	68.6	57.8	40.6	33.9	29.3	16.2
	25°C	489.7	468.4	413.3	369.9	334.7	305.7	281.6	243.7	214.7	190.9	146.1	118.8	88.5	71.6	60.3	42.1	35.2	30.3	16.6

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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