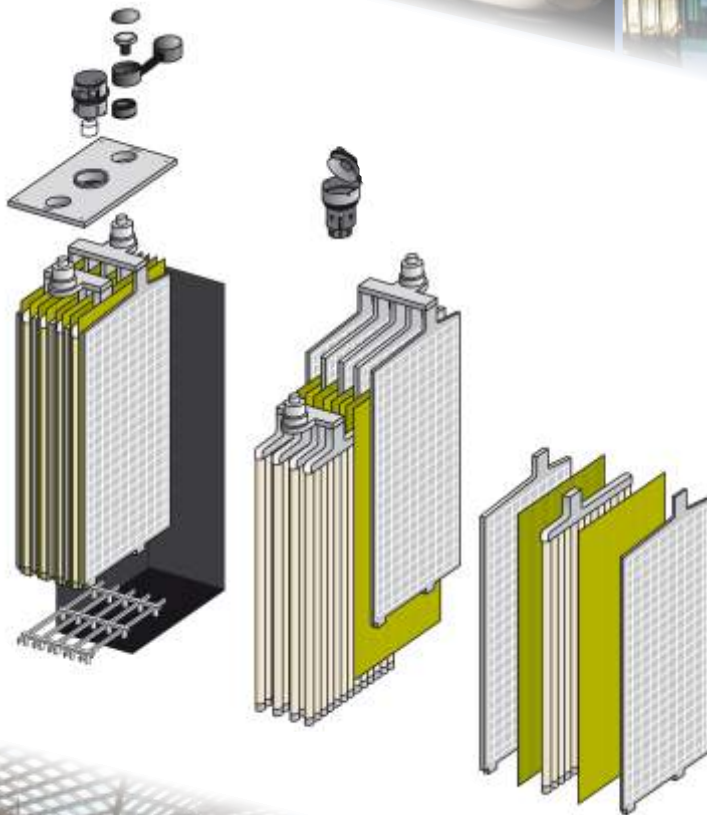


# PerfectRail™ 2PzS110



*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™ 2PzS110

## Technical specifications

Part number: 3562894

### 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 <sub>10</sub> to 1.80 Vpc at 20 °C	114 Ah
Rated capacity C <sub>5</sub> to 1.70 Vpc at 30 °C	110 Ah
Current/Power for 0.25 h back-up time 1.60 Vpc 20 °C	145.6 A / 239 W
Current/Power for 0.5 h back-up time 1.60 Vpc 20 °C	105.8 A / 180 W
Current/Power for 1.0 h back-up time 1.60 Vpc 20 °C	67.6 A / 121 W
Current/Power for 3.0 h back-up time 1.70 Vpc 20 °C	30.1 A / 56 W
Current/Power for 5.0 h back-up time 1.75 Vpc 20 °C	20.1 A / 38 W
Current/Power for 8.0 h back-up time 1.75 Vpc 20 °C	14.0 A / 27 W
Current/Power for 10.0 h back-up time 1.80 Vpc 20 °C	11.4 A / 22 W
Current/Power for 24.0 h back-up time 1.80 Vpc 20 °C	5.4 A / 11 W
Conversion to capacity at 25 °C	103 % of Current/Power at 20°C
Internal resistance	1.85 mΩ
Short circuit current	1.08 kA
Self discharge at 20 °C	max. 6% / Month
Heat loss during float service at 20°C	≈ 0.15 W

### Mechanical Data

Weight	8.5 kg ±2%
Height of cell / over terminal cover	340 mm / 370 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 <sup>2</sup>
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 <sub>nom</sub> after 1'300 cycles
Design life	12+ Long Life, according Eurobat Classification
Shipping name	Batteries, wet, filled with acid

# Hawker® PerfectRail™ 2PzS110

## Operating specifications

Figure 1



Figure 2

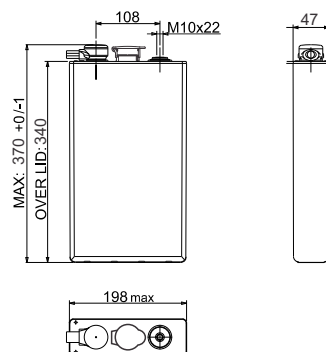
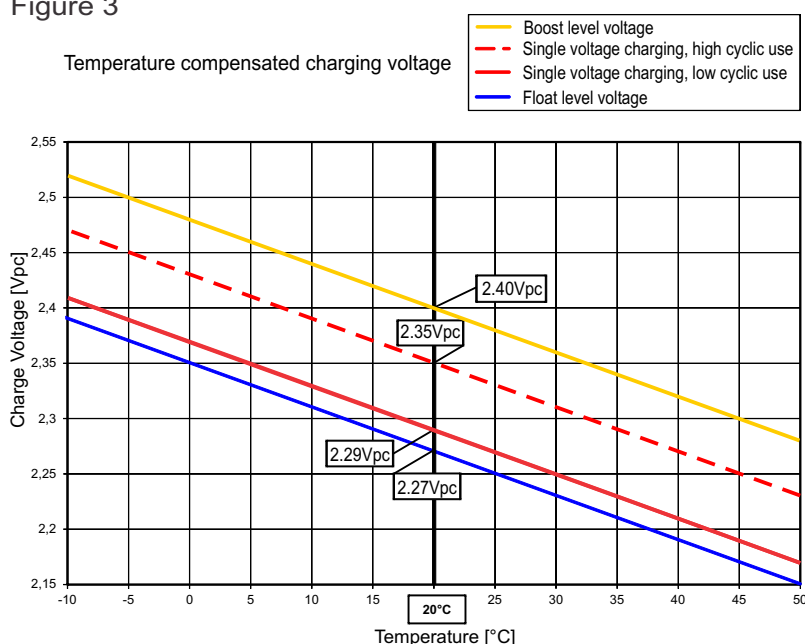


Figure 3



Temperature in °C	Percent of the rated capacity (C <sub>5</sub> )
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)	20 ... 30 A (minimum for cyclic use: 25 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™ 2PzS110

## 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	76.6	76.6	76.6	71.1	65.9	61.6	57.9	51.8	47.2	43.2	35.1	29.7	23.0	19.1	16.4	11.7	9.8	8.5	4.7
	25°C	76.6	76.6	76.6	72.4	67.4	63.1	59.4	53.3	48.6	44.7	36.3	30.8	23.9	19.8	17.0	12.1	10.2	8.8	4.9
1.85	20°C	103.2	103.2	94.3	86.0	79.3	73.6	68.9	61.1	55.1	50.4	40.3	33.8	25.9	21.2	18.2	12.8	10.8	9.3	5.2
	25°C	103.2	103.2	95.9	87.7	81.2	75.6	70.9	63.1	57.1	52.2	41.9	35.2	26.9	22.0	18.9	13.3	11.2	9.6	5.3
1.80	20°C	129.5	124.6	110.3	99.6	91.4	84.4	78.6	69.2	62.0	56.2	44.4	36.9	28.0	22.8	19.4	13.6	11.4	9.8	5.4
	25°C	129.5	126.1	112.3	102.1	93.8	86.9	81.2	71.7	64.4	58.5	46.3	38.5	29.2	23.7	20.1	14.1	11.8	10.2	5.6
1.75	20°C	157.1	142.7	125.4	112.6	102.4	94.1	87.2	76.1	67.6	61.0	47.4	39.2	29.4	23.8	20.1	14.0	11.7	10.1	5.5
	25°C	157.1	144.6	128.0	115.5	105.5	97.2	90.3	79.2	70.5	63.6	49.6	40.9	30.7	24.8	20.9	14.6	12.1	10.4	5.7
1.70	20°C	184.6	160.0	139.5	124.4	112.5	102.7	94.5	81.8	72.1	64.5	49.6	40.7	30.1	24.1	20.3	14.0	11.7	10.1	5.5
	25°C	184.6	162.4	142.6	128.0	116.3	106.5	98.3	85.3	75.5	67.6	52.0	42.6	31.5	25.2	21.1	14.6	12.1	10.4	5.7
1.65	20°C	194.0	176.0	152.9	135.5	121.6	110.2	100.8	86.2	75.5	67.1	50.4	40.8	30.1	24.1	20.3	14.0	11.7	10.1	5.5
	25°C	194.0	178.8	156.6	139.8	126.1	114.7	105.2	90.3	79.2	70.6	53.1	42.9	31.5	25.2	21.1	14.6	12.1	10.4	5.7
1.60	20°C	194.0	190.6	165.3	145.6	129.6	116.5	105.8	89.6	77.1	67.6	50.4	40.8	30.1	24.1	20.3	14.0	11.7	10.1	5.5
	25°C	194.0	194.0	169.5	150.6	134.8	121.8	110.9	94.2	81.4	71.4	53.1	42.9	31.5	25.2	21.1	14.6	12.1	10.4	5.7

### 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	8:00	10:00	12:00	24:00
1.90	20°C	145.2	145.2	145.2	135.6	126.1	118.1	111.1	99.8	90.7	83.4	68.0	57.9	45.1	37.5	32.4	23.1	19.5	16.9	9.3
	25°C	145.1	145.1	145.1	138.0	128.7	120.7	113.9	102.7	93.5	86.1	70.3	59.9	46.7	38.8	33.5	23.9	20.1	17.4	9.6
1.85	20°C	189.8	189.8	174.7	159.6	147.8	137.6	129.1	115.3	104.4	95.6	76.8	64.9	50.1	41.1	35.4	25.1	21.2	18.3	10.2
	25°C	189.8	189.8	177.4	162.8	151.1	141.2	132.7	118.8	107.9	99.0	79.7	67.4	52.1	42.7	36.7	26.0	21.9	18.9	10.4
1.80	20°C	232.8	224.6	199.2	180.8	166.3	154.2	144.1	127.7	115.2	105.1	83.3	69.9	53.4	43.7	37.2	26.4	22.1	19.1	10.6
	25°C	232.8	227.2	202.7	184.8	170.4	158.7	148.5	132.0	119.4	109.1	86.8	72.8	55.6	45.4	38.6	27.3	22.9	19.8	10.9
1.75	20°C	274.6	249.9	220.6	199.2	182.2	168.3	156.6	137.6	123.3	112.0	88.2	73.1	55.4	45.2	38.3	27.0	22.6	19.5	10.8
	25°C	274.6	253.3	224.9	204.1	187.5	173.6	161.9	142.8	128.1	116.6	92.1	76.3	57.8	47.1	39.8	28.1	23.5	20.2	11.1
1.70	20°C	313.5	272.9	238.9	214.8	195.6	179.9	166.7	145.5	129.1	116.9	91.2	75.0	56.4	45.7	38.5	27.0	22.6	19.5	10.8
	25°C	313.5	277.0	244.0	220.5	201.7	186.0	172.8	151.5	134.8	121.9	95.5	78.6	59.0	47.7	40.2	28.1	23.5	20.2	11.1
1.65	20°C	326.5	292.3	255.1	227.9	206.5	189.0	174.5	151.3	133.5	119.9	92.7	75.4	56.4	45.7	38.5	27.0	22.6	19.5	10.8
	25°C	326.5	296.8	261.2	234.5	213.5	196.0	181.3	157.9	139.8	125.4	97.4	79.2	59.0	47.7	40.2	28.1	23.5	20.2	11.1
1.60	20°C	326.4	310.0	268.9	239.0	215.3	195.8	180.1	155.3	136.3	120.9	92.7	75.4	56.4	45.7	38.5	27.0	22.6	19.5	10.8
	25°C	326.4	312.3	275.5	246.6	223.1	203.8	187.7	162.5	143.2	127.3	97.4	79.2	59.0	47.7	40.2	28.1	23.5	20.2	11.1

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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