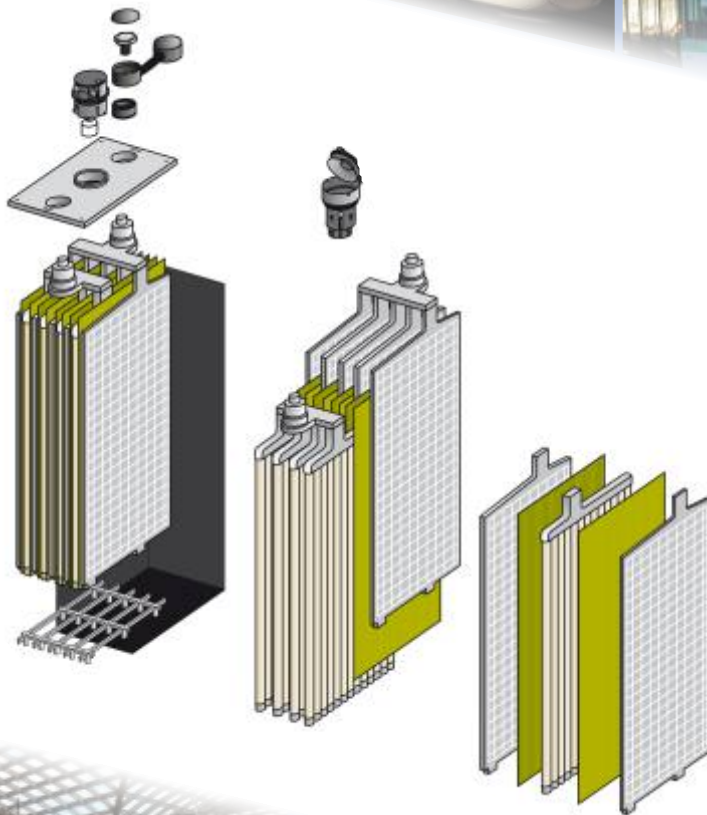


# PerfectRail™ 4PzS280



*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™ 4PzS280

## Technical specifications

Part number: 3563103

### 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	291 Ah
Rated capacity C <sub>5</sub> to 1.70 Vpc at 30 °C	280 Ah
Current/Power for 0.25 h back-up time 1.60 Vpc 20 °C	355.8 A / 581 W
Current/Power for 0.5 h back-up time 1.60 Vpc 20 °C	264.5 A / 447 W
Current/Power for 1.0 h back-up time 1.60 Vpc 20 °C	172.7 A / 306 W
Current/Power for 3.0 h back-up time 1.70 Vpc 20 °C	76.6 A / 143 W
Current/Power for 5.0 h back-up time 1.75 Vpc 20 °C	51.0 A / 97 W
Current/Power for 8.0 h back-up time 1.75 Vpc 20 °C	35.6 A / 68 W
Current/Power for 10.0 h back-up time 1.80 Vpc 20 °C	29.1 A / 56 W
Current/Power for 24.0 h back-up time 1.80 Vpc 20 °C	14.2 A / 29 W
Conversion to capacity at 25 °C	103 % of Current/Power at 20°C
Internal resistance	0.80 mΩ
Short circuit current	2.53 kA
Self discharge at 20 °C	max. 6% / Month
Heat loss during float service at 20°C	≈ 0.38 W

### Mechanical Data

Weight	18.4 kg ±2%
Height of cell / over terminal cover	405 mm / 435 mm
Width	198 mm
Depth	83 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™ 4PzS280

## Operating specifications

Figure 1



Figure 2

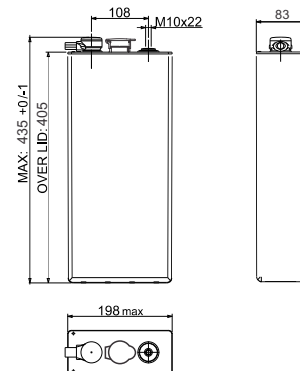
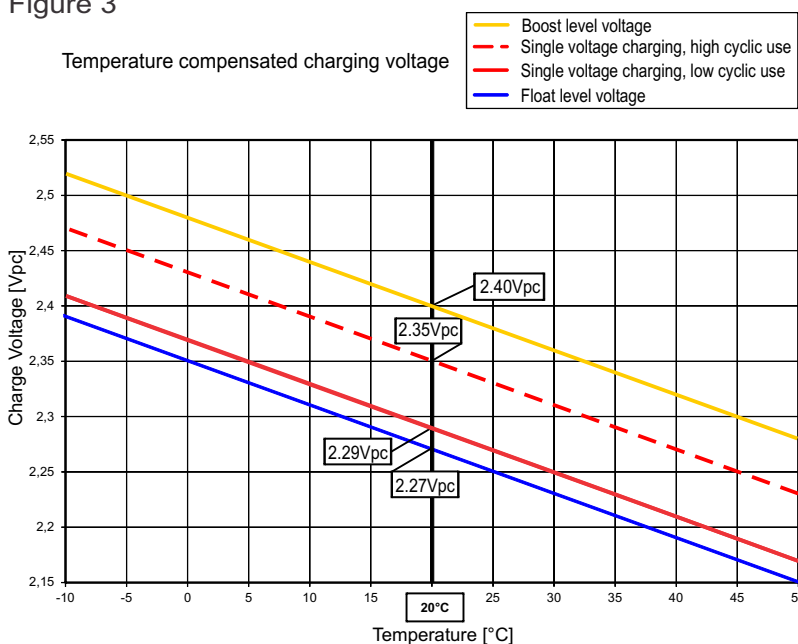


Figure 3



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)	51 ... 76 A (minimum for cyclic use: 64 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™ 4PzS280

## 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	172.4	172.3	172.3	167.9	157.1	147.6	139.3	125.7	114.8	105.8	86.3	73.6	57.5	47.9	41.3	29.7	25.1	21.8	12.4
	25°C	172.4	172.3	172.3	170.6	160.0	150.8	142.7	129.0	118.2	109.0	89.2	76.1	59.5	49.5	42.7	30.7	25.9	22.5	12.7
1.85	20°C	234.7	234.7	222.2	204.7	190.0	177.4	166.8	149.3	135.5	124.0	99.9	84.2	64.9	53.4	45.8	32.6	27.5	23.9	13.5
	25°C	234.7	234.7	225.4	208.5	194.2	181.9	171.2	153.8	139.9	128.4	103.7	87.5	67.4	55.4	47.5	33.7	28.4	24.7	13.9
1.80	20°C	299.5	290.9	261.0	238.7	220.4	205.3	192.1	170.1	153.1	139.4	110.9	92.6	70.5	57.5	48.9	34.5	29.1	25.2	14.2
	25°C	299.5	294.0	265.3	243.6	225.6	210.6	197.8	176.0	158.7	144.8	115.4	96.4	73.4	59.8	50.8	35.8	30.1	26.0	14.6
1.75	20°C	363.9	334.8	298.3	270.8	248.7	230.1	214.3	188.4	168.1	152.0	119.3	98.7	74.4	60.3	51.0	35.6	29.8	25.7	14.4
	25°C	363.9	338.8	303.7	277.0	255.3	236.8	221.3	195.5	175.0	158.5	124.6	103.1	77.6	62.8	53.1	36.9	30.9	26.6	14.8
1.70	20°C	426.7	376.9	333.7	301.1	274.7	252.4	233.7	203.6	180.4	162.0	125.3	103.0	76.6	61.4	51.5	35.6	29.8	25.7	14.4
	25°C	426.7	381.9	340.3	308.7	283.0	261.0	242.3	212.0	188.3	169.4	131.2	107.8	80.2	64.1	53.8	36.9	30.9	26.6	14.8
1.65	20°C	487.5	417.2	367.3	329.6	298.4	272.3	250.5	215.9	190.0	169.4	128.7	104.0	76.6	61.4	51.5	35.6	29.8	25.7	14.4
	25°C	490.2	423.1	375.1	338.5	308.3	282.7	260.8	225.6	199.0	177.8	135.5	109.3	80.2	64.1	53.8	36.9	30.9	26.6	14.8
1.60	20°C	500.2	455.1	399.2	355.8	319.7	289.5	264.5	225.5	197.1	172.7	128.7	104.0	76.6	61.4	51.5	35.6	29.8	25.7	14.4
	25°C	500.2	462.0	408.5	366.7	331.6	301.8	276.4	236.5	207.0	182.7	135.5	109.3	80.2	64.1	53.8	36.9	30.9	26.6	14.8

### 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	325.7	325.7	325.7	320.0	299.7	282.0	267.0	241.2	220.6	203.9	167.1	143.2	112.3	94.0	81.2	58.8	50.6	44.5	25.8
	25°C	325.7	325.7	325.7	324.8	305.0	288.0	272.9	247.6	227.0	209.8	172.7	147.8	116.4	97.2	84.0	60.6	52.1	45.7	26.4
1.85	20°C	431.2	431.2	410.7	380.0	353.5	331.4	312.3	280.9	255.6	234.7	190.3	161.1	125.3	103.0	88.9	63.6	54.4	47.9	27.9
	25°C	431.1	431.1	416.3	386.4	361.2	339.5	320.1	288.8	263.6	242.8	197.0	167.3	130.0	106.9	92.1	65.8	56.0	49.2	28.6
1.80	20°C	537.8	522.8	470.2	431.4	399.8	373.6	350.9	313.4	283.7	259.6	207.3	174.6	134.2	110.0	93.9	66.6	56.5	49.8	29.1
	25°C	537.9	528.2	477.7	439.8	408.9	382.8	360.7	323.3	293.5	269.0	215.7	181.7	139.6	114.4	97.4	69.0	58.4	51.2	29.8
1.75	20°C	634.6	586.0	524.1	477.4	440.4	409.5	382.9	338.9	305.6	278.4	220.4	183.7	139.9	114.3	96.9	68.2	57.4	50.4	29.4
	25°C	634.7	592.5	533.5	487.9	451.8	421.1	394.9	351.0	316.9	289.4	229.9	191.5	145.8	119.1	100.9	70.9	59.5	52.0	30.1
1.70	20°C	724.6	641.0	570.6	518.1	475.5	439.8	409.5	360.1	321.5	291.9	229.2	189.4	143.1	116.1	97.8	68.3	57.4	50.4	29.4
	25°C	724.6	649.3	580.8	531.1	488.8	453.6	423.6	373.9	334.7	304.1	239.7	198.0	149.6	121.2	102.1	71.0	59.5	52.0	30.1
1.65	20°C	805.9	691.2	610.5	552.1	504.7	464.5	430.7	375.9	333.6	300.9	234.8	191.2	143.1	116.1	97.8	68.3	57.4	50.4	29.4
	25°C	808.3	700.2	622.8	566.0	520.0	480.5	446.5	391.5	348.5	314.2	246.0	200.9	149.7	121.2	102.1	71.0	59.5	52.0	30.1
1.60	20°C	819.9	733.4	646.2	580.8	527.9	483.8	446.6	387.5	342.2	305.9	234.9	191.2	143.1	116.1	97.8	68.3	57.4	50.4	29.4
	25°C	821.4	743.8	660.9	596.9	545.4	501.8	464.3	404.6	358.3	321.5	246.7	200.9	149.7	121.2	102.1	71.0	59.5	52.0	30.1

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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