

# PowerSafe Planté

Prolonged Life  
High Performance Cells  
**YAP/YCP/YHP**



## RANGE SUMMARY

# PowerSafe Planté

The EnerSys range of PowerSafe Planté YAP, YCP and YHP cells has been designed for standby power applications wherever high performance and long life are absolute requirements.

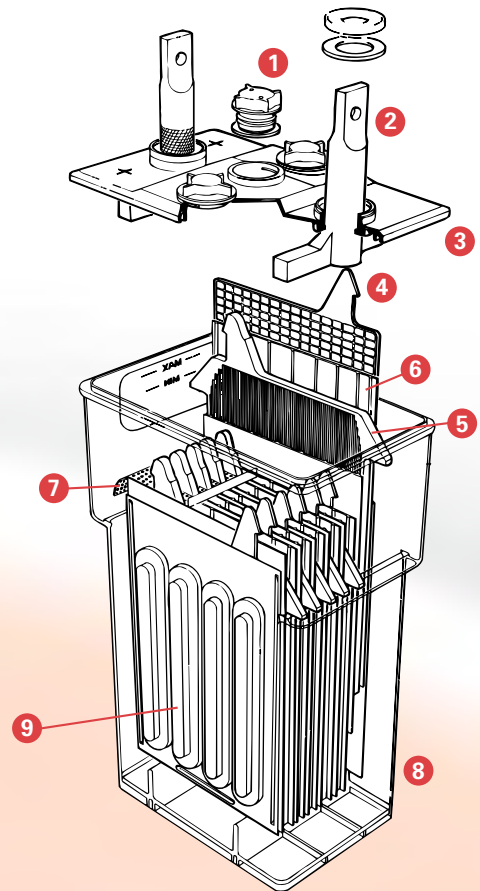
Using the traditional Planté positive plate design, refined by more than 100 years of EnerSys' battery manufacturing experience, Planté's specifications make it the ideal choice for a wide range of applications such as telecommunications, power generation and distribution, UPS, emergency lighting and security systems.

The Planté cell is unique in that it delivers 100% of its rated capacity throughout its entire life, a claim unmatched by any other lead acid battery technology. This eliminates the need to oversize the battery to allow for reduced performance towards the end of service life.

The capacity range covered by EnerSys high performance PowerSafe Planté products is 15 to 2000 ampere-hours (10h to 1.85Vpc at 15°C). YAP types cover 15 to 75Ah; YCP types 100 to 425Ah and YHP types 500 to 2000Ah.

## Construction

- 1 Vent plug
- 2 Cell pillar
- 3 Cell lid
- 4 Negative plate
- 5 Positive plate
- 6 Separator
- 7 Bar guard
- 8 Container
- 9 End buffer



## Features

- **Vent plugs** - designed to allow free exit of gasses, yet eliminate acid spray. Explosion minimising vent plugs are available as an option
- **Cell pillars** - lead alloy (YAP) with copper insert (YCP/YHP) designed to give minimum resistance and maximum current flow
- **Cell containers** - moulded from durable, transparent styrene acrylonitrile (SAN) to allow electrolyte level and cell condition to be monitored visually
- **Cell lids** - moulded from durable, opaque SAN sealed to container to ensure no electrolyte leakage
- **Negative plates** - pasted grids provide perfect balance with the positive plates to give maximum performance and service life
- **Positive plates** - unique, pure lead construction ensures 100% capacity throughout long service life
- **Separators** - made from natural ribbed microporous rubber for minimum resistance
- **Bar guards** - safeguard against short circuits
- **End buffers** - provide additional lateral support at each end of the element, ensuring a compact assembly to prevent plate movement during transit

## Benefits

- High performance cells
- First choice for long life and reliability
- Excellent performance at both high and low rates of discharge
- Low internal resistance
- Retain 100% capacity throughout life
- Proven service life in excess of 20 years on float or trickle charge
- Low maintenance (periods between water addition up to 3 years) due to large electrolyte reserve

## Standards

- Compliant with IEC 60896-11 and BS6290 Part 2
- Manufactured to ISO9001 quality standard

## General Specifications

Cell Type	Nominal Capacity (Ah)			Nominal Dimensions (mm)				Typical Weight (kg)		Electrolyte Volume S.G. = 1.210 (litres)	Pillars per Pole (3)	Internal Resistance ( $\mu\Omega$ )
	3h to 1.80Vpc @ 20°C	10h to 1.85Vpc @ 15°C	8h to 1.75Vpc @ 25°C	Length (1)	Width (2)	Box Height	Overall Height of Cell	Filled	Dry			
YAP 5	12.5	15	17	76	133	212	260	3.8	2.6	1.0	1	5195
YAP 9	25	30	34	114	133	212	260	6.3	4.4	1.6	1	2597
YAP 13	37.5	45	50	190	133	212	260	10.0	6.6	2.8	1	1732
YAP 17	50	60	67	190	133	212	260	11.5	8.2	2.7	1	1299
YAP 21	62.5	75	84	228	133	212	260	13.6	9.8	3.2	1	1039
YCP 9	83	100	112	134	203	349	423	18.6	13.1	4.5	1	923
YCP 11	103.5	125	141	172	203	349	423	22.2	14.7	6.2	1	754
YCP 13	124	150	169	172	203	349	423	24.9	17.7	5.9	1	640
YCP 17	165.5	200	225	210	203	349	423	30.6	21.9	7.2	1	500
YCP 21	207	250	281	248	203	349	423	36.9	26.5	8.6	1	417
YCP 25	248	300	338	286	203	349	423	43.4	31.3	10.0	1	364
YCP 27	269	325	365	362	203	349	423	52.6	36.0	13.7	1	344
YCP 29	290	350	394	362	203	349	423	54.4	38.2	13.4	1	327
YCP 33	331	400	450	362	203	349	423	58.4	42.9	12.8	1	300
YCP 35	352	425	478	362	203	349	423	60.3	45.2	12.5	1	290
YHP 11	422	500	577	230	368	592	682	95.2	63.0	27.1	1	351
YHP 13	506	600	692	230	368	592	682	106.2	75.6	25.7	1	293
YHP 15	591	700	807	306	368	592	682	133.5	88.2	38.1	2	251
YHP 17	675	800	923	306	368	592	682	144.5	100.8	36.7	2	220
YHP 19	760	900	1038	306	368	592	682	155.5	113.4	35.4	2	195
YHP 21	844	1000	1153	357	368	592	682	179.3	126.0	44.8	2	176
YHP 23	928	1100	1269	357	368	592	682	190.4	138.6	43.5	2	160
YHP 25	1013	1200	1384	433	368	592	682	218.0	151.2	56.1	2	146
YHP 27	1097	1300	1500	433	368	592	682	229.0	163.8	54.8	2	135
YHP 29	1182	1400	1615	433	368	592	682	240.1	176.4	53.5	2	126
YHP 31	1266	1500	1730	509	368	592	682	268.3	189.0	66.6	3	117
YHP 33	1351	1600	1845	509	368	592	682	279.2	201.6	65.2	3	110
YHP 35	1435	1700	1960	509	368	592	682	290.2	214.2	63.9	3	104
YHP 37	1519	1800	2077	585	368	592	682	318.2	226.8	76.8	3	98
YHP 39	1604	1900	2192	585	368	592	682	329.2	239.4	75.5	3	93
YHP 41	1689	2000	2307	585	368	592	682	340.2	252.0	74.1	3	88

Notes: (1) The length of a box or cell is measured at right angles to the plates.

(2) The width of a cell is measured parallel to the plates.

(3) YAP cells: M6 fasteners - YCP/YHP: M8 fasteners

## Operating Characteristics

### Voltage

The nominal voltage is 2 volts per cell, i.e. a nominal 110V battery will have 55 cells. On discharge, the recommended final voltage at which the discharge should be terminated depends on the discharge rate. For example, the final voltage for the three hour rate of discharge is 1.80 volts. After final voltage has been reached, the voltage will fall away at an increasing rate.

### Capacity

The capacity which can be taken from a cell varies with the discharge rate as indicated in the capacity tables. Capacity is also affected by temperature.

### Trickle Charge

Trickle charging is a method of keeping the cells in a fully charged condition by passing a small current through them. The correct trickle charge current is that which neither allows the cell to gas nor the gravity to fall over a period of time. It is normally in the region of 1 milliampere per ampere hour of the 10 hour capacity for YAP cells, and 0.3 x capacity at the 10 hour rate + 70 milliamperes for YCP and YHP cells. With this small current flowing, the cell voltage will be approximately 2.25 volts.

### Float Charge

Constant voltage float charging at 2.25 volts per cell will maintain full capacity with minimal water loss. Lower float voltage levels may be used but must be complemented with regular freshening charges. A simple hydrometer reading indicates the state of charge. A fully charged cell will have a specific gravity in the range 1.205 to 1.215 at 15°C.

### Recharge

A YHP 11 cell discharged at the 1 hour rate (300 amperes for 1 hour) will require a minimum of 300 +11%, i.e. 333 ampere hours recharge. At the finishing rate of charge (7% C<sub>10</sub> amperes) this will take 9½ hours.

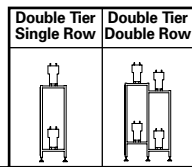
It is possible to recharge in a shorter time by starting the charge at the 'starting rate' (14% C<sub>10</sub> amperes) but this should be reduced to the finishing rate of charge when the voltage per cell reaches 2.3 volts.

On recharge, the voltage increases as the charge proceeds. The highest voltage reached with the finishing rate of charge flowing is approximately 2.70 volts per cell. It is possible to recharge a cell by limiting the voltage of the charging equipment to a lower value than 2.70 volts per cell, 2.4 volts per cell being the minimum recommended value. This will result in an extended recharge period, as the battery will automatically limit the charge current irrespective of the charger output.

## Battery Accommodation

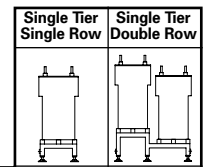
By following the guidelines hereafter, the user can readily calculate the space required by the various standard range of steel stand options to make best use of the accommodation available.

### Stand Dimensions for YAP/YCP Ranges



		Double Tier Single Row	Double Tier Double Row
YAP 5 (F)	Cell centres	83	83
	Width of stand	320	615
	Height over cells	1200	1300
	Overall height required (min.)	1360	1460
	Length of stand	12 cells	525
24 cells		1020	525
55 cells		-	1190
YAP 9 (F)	Cell centres	121	121
	Width of stand	320	615
	Height over cells	1200	1300
	Overall height required (min.)	1360	1460
	Length of stand	12 cells	750
24 cells		1480	750
55 cells		-	1720
YAP 13, 17, 21 (E)	Cell centres	140	140
	Width of stand	320	615
	Height over cells	1200	1300
	Overall height required (min.)	1360	1460
	Length of stand	12 cells	865
24 cells		1710	865
55 cells		-	1990
YCP 9 (F)	Cell centres	140	140
	Width of stand	320	615
	Height over cells	1370	1470
	Overall height required (min.)	1620	1720
	Length of stand	12 cells	865
24 cells		1710	865
55 cells		-	1990
YCP 11, 13, (F)	Cell centres	178	178
	Width of stand	320	615
	Height over cells	1370	1470
	Overall height required (min.)	1620	1720
	Length of stand	12 cells	1095
24 cells		2165	1095
55 cells		-	2510
YCP 17, 21 (E)	Cell centres	209	209
	Width of stand	320	615
	Height over cells	1370	1470
	Overall height required (min.)	1620	1720
	Length of stand	12 cells	1270
24 cells		2540	1270
55 cells		-	2960
YCP 25, 27, 29 33, 35 (E)	Cell centres	209	209
	Width of stand	430	835
	Height over cells	1370	1470
	Overall height required (min.)	1620	1720
	Length of stand	12 cells	1270
24 cells		2540	1270
55 cells		-	2960

### Stand Dimensions for YHP Range



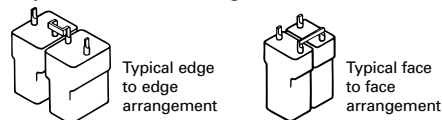
		Single Tier Single Row	Single Tier Double Row
YHP 11, 13 (F)	Cell centres	255	255
	Width of stand	340	760
	Height over cells	880	980
	Overall height required (min.)	1130	1230
	Length of stand	6 cells	1550
12 cells		3080	1550
YHP 15, 17, 19 (F)	Cell centres	330	330
	Width of stand	340	760
	Height over cells	880	980
	Overall height required (min.)	1130	1230
	Length of stand	6 cells	2000
12 cells		-	2000
YHP 21, 23 (E)	Cell centres	394	394
	Width of stand	360	760
	Height over cells	880	980
	Overall height required (min.)	1130	1230
Length of stand	6 cells	2375	1210
	12 cells	-	2375
YHP 25, 27, 29 (E)	Cell centres	394	394
	Width of stand	435	920
	Height over cells	880	980
	Overall height required (min.)	1130	1230
Length of stand	6 cells	2375	1210
	12 cells	-	2375
YHP 31, 33, 35 (E)	Cell centres	394	394
	Width of stand	510	1070
	Height over cells	880	980
	Overall height required (min.)	1130	1230
	Length of stand	6 cells	2375
12 cells		-	2375
YHP 37, 39, 41 (E)	Cell centres	394	394
	Width of stand	585	1220
	Height over cells	880	980
	Overall height required (min.)	1130	1230
	Length of stand	6 cells	2375
12 cells		-	2375

#### Notes:

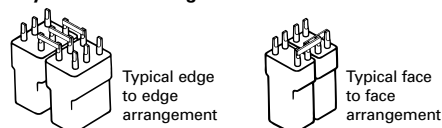
The suffixes 'E' and 'F' refer to the layout of the cells on the stand:

- the suffix 'E' signifies that the cells are arranged with the plates edge to edge
- the suffix 'F' signifies that they are arranged with the plates face to face

#### Layout for YAP/YCP Ranges



#### Layout for YHP Range



#### Calculating other lengths of stands:

- For Double tier single row length =  $C \times N/2 + 25\text{mm}$
  - For Double tier double row length =  $C \times N/4 + 25\text{mm}$ , where C = cell centre and N = number of cells
- If N/2 or N/4 contains a fraction, increase to next whole number.



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