



# PT. SELATAN JADI JAYA

FACTORY :  
 Jl. Raya Panjunan No.8  
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## FORCE SERIES VRLA (12V18 AH)



### Product Specification

|                                  |  |  |
|----------------------------------|--|--|
| Nominal Voltage                  | 12V  |  |
| Nominal Capacity (20HR)          | 18 AH  |  |
| Dimensions                       | Length   | 181±1mm (7.13 Inches)                                |
|                                  | Width  | 77±1mm (3.03 Inches)                                 |
|                                  | Container Height   | 167±1mm (6.57 Inches)                                |
|                                  | Total Height (with terminal)   | 167±1mm (6.57 Inches)                                |
| Approx Weight                    | Approx 5.42 kg (11.94 lbs)   |  |
| Terminal                         | F4 Terminal  |  |
| Container & Cover Material       | ABS Copolymer (UL-94 HB)   |  |
| Lead Material                    | Purity Lead 99.995%  |  |
| Sulfuric Acid                    | Distilled Sulfuric Acid (Zero metal content)   |  |
| Separator                        | AGM  |  |
| Rated Capacity                   | 18.0 AH/0.90A  | (20hr, 1.80V/cell, 25°C/77°F)                        |
|                                  | 16.8AH/1.68A   | (10hr, 1.80V/cell, 25°C/77°F)                        |
|                                  | 15.3AH/3.06A   | (5hr, 1.75V/cell, 25°C/77°F)                         |
|                                  | 13.8AH/4.59A   | (3hr, 1.75V/cell, 25°C/77°F)                         |
| Max. Discharge Current           | 11.3AH/11.30A  | (1hr, 1.60V/cell, 25°C/77°F)                         |
|                                  | 270A (5s)  |  |
| Internal Resistance              | Approx 16mΩ  |  |
| Operating Temp. Range            | Discharge:   | -15~50°C (5~122°F)                                   |
|                                  | Charge :   | 0~40°C (32~104°F)                                    |
|                                  | Storage :  | -15~40°C (5~104°F)                                   |
| Nominal Operating Temp. Range    | 25±3°C (77±5°F)  |  |
| Cycle Use                        | Initial Charging Current less than 5.4A. Voltage   | 14.4V~15.0V at 25°C (77°F) Temp.Coefficient -30mV/°C |
|                                  | No limit on Initial Charging Current Voltage   | 13.5V~13.8V at 25°C (77°F) Temp.Coefficient -20mV/°C |
| Stand by Use                     | 40°C (104°F)   | 103%   |
|                                  | 25°C (77°F)  | 100%   |
|                                  | 0°C (32°F)   | 86%  |
| Capacity affected by Temperature | Force series batteries may be stored for up to 6 months at 25°C(77°F) and then a freshening charge is required. For higher temperatures the time interval will be shorter. |  |
| Self Discharge                   |  |  |

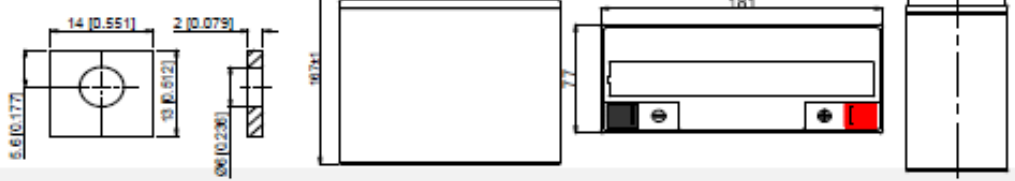
### Applications

- All purpose
- Uninterruptable Power Supply (UPS)
- Electric Power System (EPS)
- Emergency backup power supply
- Emergency light
- Railway signal
- Aircraft signal
- Alarm and security system
- Electronic apparatus and equipment
- Communication power supply
- DC power supply
- Auto control system

### Dimensions

#### F4 Terminal

Unit : mm (Inches)



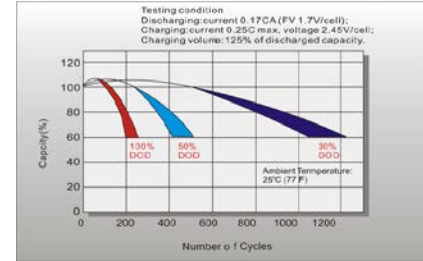
### Constant Current Discharge (Amperes) at 25°C (77°F)

| F.V/Time   | 5min | 10min | 15min | 20min | 30min | 45min | 1h   | 2h   | 3h   | 4h   | 5h   | 6h   | 8h   | 10h  | 20h  |
|------------|------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|
| 1.85V/cell | 34.5 | 26.0  | 22.7  | 19.9  | 15.6  | 11.6  | 9.36 | 5.96 | 4.17 | 3.39 | 2.87 | 2.49 | 1.98 | 1.63 | 0.89 |
| 1.80V/cell | 41.9 | 30.8  | 26.5  | 22.7  | 17.2  | 12.7  | 10.1 | 5.97 | 4.39 | 3.54 | 2.98 | 2.57 | 2.09 | 1.67 | 0.90 |
| 1.75V/cell | 47.5 | 33.8  | 28.4  | 24.1  | 18.1  | 13.3  | 10.6 | 6.18 | 4.55 | 3.64 | 3.04 | 2.62 | 2.07 | 1.70 | 0.91 |
| 1.70V/cell | 52.7 | 36.8  | 30.3  | 25.4  | 18.9  | 13.8  | 10.9 | 6.34 | 4.67 | 3.73 | 3.11 | 2.68 | 2.10 | 1.72 | 0.92 |
| 1.65V/cell | 57.2 | 39.2  | 32.2  | 26.6  | 19.8  | 14.3  | 11.3 | 6.51 | 4.75 | 3.79 | 3.17 | 2.72 | 2.12 | 1.74 | 0.93 |
| 1.60V/cell | 60.9 | 41.7  | 34.1  | 28.0  | 20.5  | 14.9  | 11.7 | 6.69 | 4.86 | 3.87 | 3.22 | 2.76 | 2.15 | 1.76 | 0.94 |

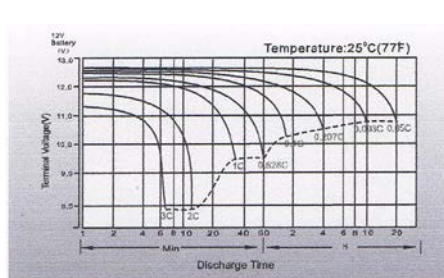
### Constant Power Discharge (Watts/cell) at 25°C (77°F)

| F.V/Time   | 5min  | 10min | 15min | 20min | 30min | 45min | 1h   | 2h   | 3h   | 4h   | 5h   | 6h   | 8h   | 10h  | 20h  |
|------------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|
| 1.85V/cell | 65.0  | 49.8  | 43.8  | 38.7  | 30.5  | 22.9  | 18.5 | 11.1 | 8.33 | 6.79 | 5.77 | 5.01 | 3.99 | 3.31 | 1.81 |
| 1.80V/cell | 78.7  | 58.5  | 50.9  | 43.9  | 33.5  | 24.9  | 20.0 | 11.8 | 8.74 | 7.08 | 5.97 | 5.16 | 4.10 | 3.38 | 1.82 |
| 1.75V/cell | 88.4  | 63.7  | 54.3  | 46.4  | 35.1  | 26.0  | 20.9 | 12.2 | 9.02 | 7.24 | 6.07 | 5.25 | 4.15 | 3.41 | 1.83 |
| 1.70V/cell | 97.2  | 68.9  | 57.5  | 48.7  | 36.6  | 26.9  | 21.5 | 12.5 | 9.24 | 7.40 | 6.20 | 5.34 | 4.20 | 3.45 | 1.84 |
| 1.65V/cell | 104.7 | 72.8  | 60.7  | 50.8  | 38.1  | 27.8  | 22.2 | 12.8 | 9.39 | 7.51 | 6.30 | 5.41 | 4.24 | 3.48 | 1.86 |
| 1.60V/cell | 110.4 | 77.0  | 63.9  | 53.2  | 39.4  | 28.8  | 22.9 | 13.1 | 9.57 | 7.65 | 6.38 | 5.47 | 4.28 | 3.51 | 1.87 |

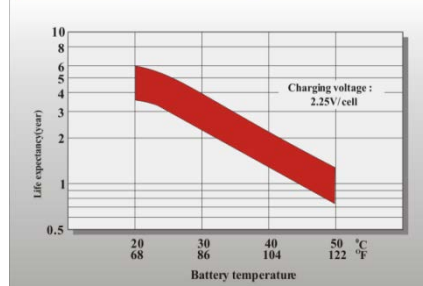
### Cycle Life in Relation to Depth of Discharge



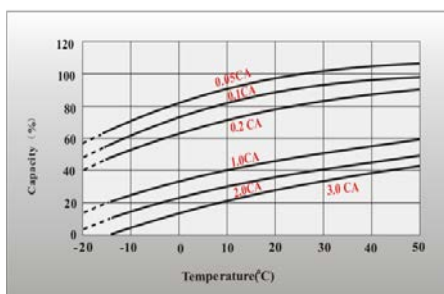
### Discharge Characteristics



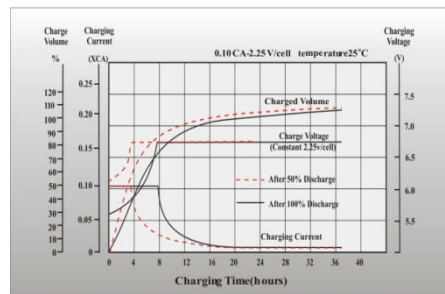
### Effect of Temperature on Long Term Float Life



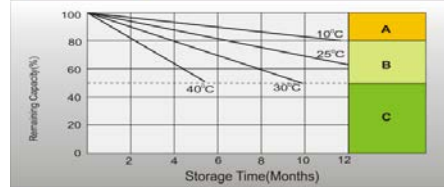
### Temperature Effects in Relation to Battery Capacity



### Float Charging Characteristics



### Self Discharge Characteristics



- A** No supplementary charge required (Carry out supplementary charge before use if 100% capacity is required.)
- B** Supplementary charge required before use. Optional charging way as follows the table of charging system.
- C** Supplementary charge may often fail to recover the capacity. The battery should never be left standing till this is reached.

### State of Charge (SOC)

| Open Circuit Voltage (V/cell) | Open Circuit Voltage (12V Battery) | Open Circuit Voltage (6V Battery) | State of Charge (% of full charge capacity) |
|-------------------------------|------------------------------------|-----------------------------------|---|
| 2.14-2.15                     | 12.84-12.90                        | 6.42-6.46                         | 100   |
| 2.12-2.13                     | 12.72-12.78                        | 6.36-6.39                         | 90  |
| 2.11                          | 12.66                              | 6.33                              | 80  |
| 2.09                          | 12.54                              | 6.27                              | 70  |
| 2.07                          | 12.42                              | 6.21                              | 60  |
| 2.05                          | 12.30                              | 6.15                              | 50  |

### Charging System

| D o D | Current Limit (A)   | Constant Voltage (V) | Fully Charged Time (h) |
|-------|---------------------|----------------------|------------------------|
| 20    | 0.15C <sub>10</sub> | 13.5-13.8 vpc (12V)  | 10                     |
|       | 0.20C <sub>10</sub> | 6.75-6.9 vpc (6V)    | 8                      |
| 50    | 0.15C <sub>10</sub> | 13.5-13.8 vpc (12V)  | 15                     |
|       | 0.20C <sub>10</sub> | 6.75-6.9 vpc (6V)    | 12                     |
| 80    | 0.15C <sub>10</sub> | 13.5-13.8 vpc (12V)  | 16                     |
|       | 0.20C <sub>10</sub> | 6.75-6.9 vpc (6V)    | 14                     |
| 100   | 0.15C <sub>10</sub> | 13.5-13.8 vpc (12V)  | 20                     |
|       | 0.20C <sub>10</sub> | 6.75-6.9 vpc (6V)    | 18                     |