



# **SPECIFICATIONS**Top Terminal Batteries



INDUSTRIAL POWER

# From the World Leader in VRLA Battery Technology

Designed for durability in Telecommunications and Electric Utility applications, the GNB **TOP Terminal**  $MARATHON^{TM}$  series provides high performance and reliability in long duration discharge applications. The  $MARATHON^{TM}$  family of batteries highlights another example of GNB's extensive experience and world wide leadership in VRLA technology.

# "Designed in" Quality Manufacturing

Quality manufacturing processes for the *MARATHON*™ series batteries incorporate the industry's most advanced technologies including: an automated helium leak detection system, a computer controlled "fill by weight" acid filler, and a temperature controlled water bath formation process. Each and every unit is capacity tested.

# High Performance MARATHON™ Series Features

- Standard: Reinforced polypropylene container and cover
- Optional:Flame-retardant reinforced container and cover compliant with UL94 V-0, 28% L.O.I.
- Integrated Flash-arrester ultrasonically welded into cover.
- Patented "Diamond Side-Wall" design to maintain structural integrity in higher operating temperatures
- Heat sealed case-to-cover bond to ensure a leak proof seal
- High-Compression Absorbent Glass Mat (AGM) technology for greater than 99% recombination efficiency
- High-tin, calcium, silver, lead positive plate design for maximum service float life; 10 year design life @ 25°C (77°F)
- Heavy duty copper alloy terminals for ease of assembly and reduced maintenance
- Reliable one-way, self-resealing safety vents
- Multicell design for faster installation and reduced maintenance
- Horizontal or vertical operation
- Removable carry handles for ease of installation.

# **Applications**

MARATHON™ series batteries incorporate GNB's advanced VRLA technology designed for long life and high performance in:

# **Telecommunications**

- Distributed Power
- PCS
- Cellular
- Broadband

## Electric Utility

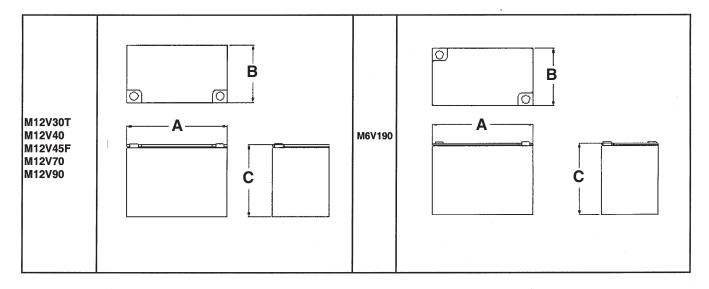
- Switchgear Control Power
- Communications



MARATHON<sup>TM</sup> Specifications

|                      |         | Capac                      | ity (AH)                    |       | No       | minal D | imensic | ons      |     | Non  | ninal |
|----------------------|---------|----------------------------|-----------------------------|-------|----------|---------|---------|----------|-----|------|-------|
| Model                |         | 011. 7. 4.75               | 401 - 7 4 00                | ٠.    | Inches   |         | M       | illimete | rs  | We   | ight  |
| Number#              | Voltage | 8 Hr To 1.75<br>VPC @ 25°C | 10 hr To 1.80<br>VPC @ 20°C | Α     | В        | *C      | Α       | В        | *C  | lbs. | Kg    |
|                      |         | VPC @ 25 C                 | VPC @ 20 C                  |       | <u> </u> | C       | _ ^     |          |     | ibs. | Ng    |
| M12V30T <sup>%</sup> | 12      | 28                         | 28                          | 6.75  | 5.13     | 6.90    | 171     | 130      | 175 | 24   | 10.7  |
| M12V40               | 12      | 40                         | 37                          | 7.81  | 6.58     | 7.01    | 198     | 167      | 178 | 39   | 17.8  |
| M12V45F <sup>%</sup> | 12      | 46                         | 45                          | 8.68  | 4.78     | 9.58    | 220     | 121      | 243 | 38   | 17.5  |
| M12V70               | .12     | 72                         | 71                          | 10.25 | 6.85     | 8.80    | 260     | 174      | 224 | 61   | 27.8  |
| M12V90               | 12      | 90                         | 88                          | 12.05 | 6.85     | 8.80    | 306     | 174      | 224 | 72   | 32.8  |
| M6V190               | 6       | 190                        | 186                         | 12.05 | 6.85     | 8.80    | 306     | 174      | 224 | 74   | 33.5  |

<sup>\*</sup> Bolt, washer, and connector typically increase height by 0.45 in. (11 mm)



# Float Voltage & Charging

Constant Voltage charging is recommended

Recommended float voltage: 2.27 VPC @ 25°C (77°F)

Float Voltage Range: 2.25 to 2.30 VPC @ 25°C (77°F)

**Equalize voltage: 2.35 VPC for 24 Hours** 

# MARATHON<sup>TM</sup> Electrical Data

| Model Number | Short Circuit Current (Amps) | Internal Resistance<br>(mOhms) |
|--------------|------------------------------|--------------------------------|
| M12V30T      | 1576                         | 7.7                            |
| M12V40       | 2341                         | 5.3                            |
| M12V45F      | 2162                         | 5.4                            |
| M12V70       | 3271                         | 3.7                            |
| M12V90       | 3365                         | 3.7                            |
| M6V190       | 6343                         | 1.0                            |

NOTE: Design and/or specifications subject to change without notice. If questions arise, contact your local GNB sales representative for clarification

<sup>#</sup> Add suffix "F" to model number for flame retardant version OPTION 
% Available in flame retardant version ONLY

MARATHON TM Performance Specifications Amperes @ 25°C (77°F)

1.75 Final VPC

| Model     |       |       |       |      |      |      |      | Time |      |      |        |      |        |       |        |
|-----------|-------|-------|-------|------|------|------|------|------|------|------|--------|------|--------|-------|--------|
| Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 7 hr | 6 hr | 5 hr | 4 hr | 3 hr | 2.5 hr | 2 hr | 1.5 hr | 1 hr  | 0.5 hr |
| M12V30T   | 1.3   | 2.5   | 2.9   | 3.2  | 3.6  | 4.1  | 4.7  | 5.5  | 6.6  | 8.4  | 9.8    | 11.9 | 15.1   | 21.2  | 36.9   |
| M12V40(F) | 1.7   | 3.4   | 4.1   | 4.4  | 5.0  | 5.6  | 6.4  | 7.6  | 9.3  | 11.9 | 14.0   | 16.9 | 21.5   | 30.5  | 51.3   |
| M12V45F   | 2.1   | 4.0   | 4.7   | 5.2  | 5.8  | 6.5  | 7.5  | 8.7  | 10.6 | 13.5 | 15.8   | 19.1 | 24.0   | 33.2  | 57.8   |
| M12V70(F) | 3.2   | 6.2   | 7.4   | 8.2  | 9.1  | 10.1 | 11.6 | 13.4 | 16.2 | 20.6 | 24.0   | 28.9 | 36.8   | 51.6  | 90.8   |
| M12V90(F) | 4.2   | 7.8   | 9.2   | 10.1 | 11.2 | 12.7 | 14.3 | 16.7 | 20.2 | 25.9 | 30.2   | 36.5 | 46.6   | 65.7  | 107.0  |
| M6V190(F) | 9.1   | 16.6  | 19.5  | 21.4 | 23.7 | 26.7 | 30.6 | 35.9 | 43.7 | 56.0 | 65.6   | 79.5 | 102.0  | 144.9 | 246.0  |

1.78 Final VPC

| Model     |       |       |       |      |      |      |      | Time |      |      |        |      |        |       |        |
|-----------|-------|-------|-------|------|------|------|------|------|------|------|--------|------|--------|-------|--------|
| Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 7 hr | 6 hr | 5 hr | 4 hr | 3 hr | 2.5 hr | 2 hr | 1.5 hr | 1 hr  | 0.5 hr |
| M12V30T   | 1.3   | 2.4   | 2.9   | 3.2  | 3.6  | 4.1  | 4.7  | 5.4  | 6.6  | 8.3  | 9.7    | 11.7 | 14.9   | 21.0  | 36.6   |
| M12V40(F) | 1.7   | 3.4   | 4.0   | 4.3  | 4.9  | 5.5  | 6.3  | 7.5  | 9.2  | 11.8 | 13.9   | 16.8 | 21.3   | 30.2  | 50.7   |
| M12V45F   | 2.1   | 4.0   | 4.7   | 5.2  | 5.7  | 6.5  | 7.5  | 8.7  | 10.5 | 13.5 | 15.7   | 18.9 | 23.8   | 32.9  | 57.0   |
| M12V70(F) | 3.2   | 6.2   | 7.4   | 8.1  | 9.0  | 10.0 | 11.4 | 13.3 | 16.0 | 20.4 | 23.8   | 28.7 | 36.5   | 51.3  | 90.0   |
| M12V90(F) | 4.1   | 7.7   | 9.1   | 10.0 | 11.2 | 12.6 | 14.2 | 16.6 | 20.0 | 25.5 | 29.8   | 36.0 | 45.9   | 64.7  | 105.2  |
| M6V190(F) | 9.0   | 16.5  | 19.4  | 21.2 | 23.6 | 26.5 | 30.3 | 35.6 | 43.3 | 55.5 | 65.0   | 78.8 | 101.1  | 143.5 | 241.6  |

1.80 Final VPC

| Model     |       |       |       |      |      | •    |      | Time |      |      |        |      |        |       |        |
|-----------|-------|-------|-------|------|------|------|------|------|------|------|--------|------|--------|-------|--------|
| Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 7 hr | 6 hr | 5 hr | 4 hr | 3 hr | 2.5 hr | 2 hr | 1.5 hr | 1 hr  | 0.5 hr |
| M12V30T   | 1.3   | 2.4   | 2.9   | 3.2  | 3.6  | 4.0  | 4.6  | 5.4  | 6.5  | 8.3  | 9.6    | 11.6 | 14.8   | 20.8  | 36.0   |
| M12V40(F) | 1.7   | 3.4   | 4.0   | 4.3  | 4.9  | 5.5  | 6.3  | 7.5  | 9.2  | 11.8 | 13.8   | 16.7 | 21.2   | 30.0  | 50.0   |
| M12V45F   | 2.1   | 3.9   | 4.7   | 5.1  | 5.7  | 6.4  | 7.4  | 8.6  | 10.4 | 13.3 | 15.5   | 18.8 | 23.6   | 32.5  | 56.0   |
| M12V70(F) | 3.2   | 6.2   | 7.4   | 8.0  | 8.9  | 9.9  | 11.3 | 13.2 | 15.9 | 20.3 | 23.6   | 28.5 | 36.3   | 51.0  | 89.0   |
| M12V90(F) | 4.1   | 7.7   | 9.1   | 10.0 | 11.1 | 12.5 | 14.1 | 16.5 | 19.9 | 25.3 | 29.5   | 35.7 | 45.5   | 64.0  | 103.3  |
| M6V190(F) | 8.9   | 16.4  | 19.2  | 21.1 | 23.4 | 26.3 | 30.1 | 35.3 | 43.0 | 55.0 | 64.3   | 77.9 | 99.9   | 142.0 | 236.5  |

1.81 Final VPC

| - ' | Model     | i     |       |       |      |      |      |      | Time |      |      |        |      |        |       |        |
|-----|-----------|-------|-------|-------|------|------|------|------|------|------|------|--------|------|--------|-------|--------|
|     | Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 7 hr | 6 hr | 5 hr | 4 hr | 3 hr | 2.5 hr | 2 hr | 1.5 hr | 1 hr  | 0.5 hr |
|     | M12V30T   | 1.3   | 2.4   | 2.9   | 3.2  | 3.5  | 4.0  | 4.6  | 5.3  | 6.4  | 8.2  | 9.5    | 11.4 | 14.6   | 20.5  | 35.4   |
|     | M12V40(F) | 1.7   | 3.4   | 4.0   | 4.3  | 4.8  | 5.4  | 6.2  | 7.4  | 9.1  | 11.7 | 13.7   | 16.6 | 21.1   | 29.9  | 49.6   |
|     | M12V45F   | 2.1   | 3.9   | 4.6   | 5.1  | 5.6  | 6.4  | 7.3  | 8.5  | 10.3 | 13.2 | 15.4   | 18.6 | 23.3   | 32.0  | 54.8   |
|     | M12V70(F) | 3.1   | 6.1   | 7.3   | 8.0  | 8.8  | 9.9  | 11.2 | 13.1 | 15.8 | 20.1 | 23.4   | 28.2 | 35.9   | 50.6  | 87.4   |
| -   | M12V90(F) | 4.1   | 7.6   | 9.0   | 9.9  | 11.0 | 12.4 | 14.0 | 16.3 | 19.7 | 25.1 | 29.3   | 35.4 | 45.1   | 63.5  | 101.8  |
|     | M6V190(F) | 8.8   | 16.2  | 19.0  | 20.9 | 23.2 | 26.1 | 29.9 | 35.1 | 42.6 | 54.5 | 63.6   | 76.9 | 98.5   | 139.5 | 231.0  |

1.83 Final VPC

| Model     |       |       |       |      |      |      |      | Time |      |      |        |      |        |       |        |
|-----------|-------|-------|-------|------|------|------|------|------|------|------|--------|------|--------|-------|--------|
| Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 7 hr | 6 hr | 5 hr | 4 hr | 3 hr | 2.5 hr | 2 hr | 1.5 hr | 1 hr  | 0.5 hr |
| M12V30T   | 1.2   | 2.4   | 2.8   | 3.1  | 3.5  | 3.9  | 4.5  | 5.2  | 6.3  | 8.0  | 9.4    | 11.3 | 14.4   | 20.2  | 34.8   |
| M12V40(F) | 1.6   | 3.3   | 3.9   | 4.2  | 4.7  | 5.3  | 6.1  | 7.3  | 9.0  | 11.6 | 13.6   | 16.4 | 20.9   | 29.5  | 48.5   |
| M12V45F   | 2.0   | 3.8   | 4.5   | 5.0  | 5.6  | 6.3  | 7.3  | 8.4  | 10.2 | 13.0 | 15.2   | 18.3 | 22.9   | 31.4  | 53.5   |
| M12V70(F) | 3.1   | 6.0   | 7.1   | 7.9  | 8.8  | 9.8  | 11.1 | 12.9 | 15.6 | 19.9 | 23.2   | 27.9 | 35.6   | 50.1  | 85.6   |
| M12V90(F) | 4.0   | 7.5   | 8.9   | 9.8  | 10.8 | 12.2 | 13.8 | 16.1 | 19.4 | 24.7 | 28.8   | 34.8 | 44.3   | 62.4  | 100.3  |
| M6V190(F) | 8.6   | 16.0  | 18.8  | 20.7 | 23.0 | 25.9 | 29.6 | 34.8 | 42.2 | 53.7 | 62.7   | 75.8 | 96.8   | 136.5 | 224.3  |

MARATHON TM Performance Specifications Amperes @ 25°C (77°F)

1.85 Final VPC

| Model     |       |       |       |      |      |      |      | Time |      |      |        |      |        |       |        |
|-----------|-------|-------|-------|------|------|------|------|------|------|------|--------|------|--------|-------|--------|
| Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 7 hr | 6 hr | 5 hr | 4 hr | 3 hr | 2.5 hr | 2 hr | 1.5 hr | 1 hr  | 0.5 hr |
| M12V30T   | 1.2   | 2.3   | 2.8   | 3.1  | 3.4  | 3.9  | 4.5  | 5.1  | 6.2  | 7.9  | 9.2    | 11.1 | 14.1   | 19.9  | 34.0   |
| M12V40(F) | 1.6   | 3.3   | 3.9   | 4.2  | 4.7  | 5.3  | 6.1  | 7.2  | 8.8  | 11.4 | 13.3   | 16.0 | 20.4   | 28.8  | 47.2   |
| M12V45F   | 2.0   | 3.8   | 4.5   | 4.9  | 5.5  | 6.2  | 7.1  | 8.3  | 10.0 | 12.8 | 14.9   | 18.0 | 22.5   | 30.7  | 52.0   |
| M12V70(F) | 3.0   | 5.9   | 7.0   | 7.7  | 8.6  | 9.6  | 10.9 | 12.8 | 15.4 | 19.6 | 22.9   | 27.6 | 35.1   | 49.4  | 83.0   |
| M12V90(F) | 4.0   | 7.4   | 8.7   | 9.6  | 10.7 | 12.0 | 13.6 | 15.8 | 19.1 | 24.3 | 28.3   | 34.2 | 43.6   | 61.3  | 98.0   |
| M6V190(F) | 8.5   | 15.7  | 18.5  | 20.3 | 22.6 | 25.4 | 29.2 | 34.4 | 41.5 | 52.7 | 61.5   | 74.2 | 94.6   | 133.1 | 216.6  |

1.87 Final VPC

| -1 | Model     |       |       |       |      |      |      |      | Time |      |      |        |      |        |       |        |
|----|-----------|-------|-------|-------|------|------|------|------|------|------|------|--------|------|--------|-------|--------|
| -1 | Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 7 hr | 6 hr | 5 hr | 4 hr | 3 hr | 2.5 hr | 2 hr | 1.5 hr | 1 hr  | 0.5 hr |
|    | M12V30T   | 1.2   | 2.3   | 2.7   | 3.0  | 3.3  | 3.7  | 4.3  | 5.0  | 6.0  | 7.6  | 8.9    | 10.7 | 13.7   | 19.3  | 33.0   |
| [  | M12V40(F) | 1.6   | 3.1   | 3.6   | 4.0  | 4.5  | 5.1  | 5.8  | 6.9  | 8.4  | 10.9 | 12.7   | 15.4 | 19.5   | 27.3  | 44.6   |
| [  | M12V45F   | 2.0   | 3.7   | 4.3   | 4.8  | 5.3  | 6.0  | 6.9  | 8.0  | 9.7  | 12.4 | 14.5   | 17.5 | 21.8   | 29.6  | 49.5   |
|    | M12V70(F) | 3.0   | 5.7   | 6.8   | 7.5  | 8.3  | 9.3  | 10.6 | 12.4 | 14.9 | 18.9 | 22.0   | 26.6 | 33.8   | 47.4  | 78.6   |
|    | M12V90(F) | 3.9   | 7.2   | 8.5   | 9.3  | 10.3 | 11.6 | 13.1 | 15.3 | 18.5 | 23.5 | 27.4   | 33.0 | 41.9   | 58.8  | 93.7   |
| [  | M6V190(F) | 8.2   | 15.2  | 17.9  | 19.7 | 21.8 | 24.6 | 28.2 | 33.1 | 40.0 | 50.8 | 59.2   | 71.3 | 90.7   | 127.3 | 204.3  |

1.90 Final VPC

|   | Model     |       |       |       |      |      |      |      | Time |      |      |        |      |        |       |        |
|---|-----------|-------|-------|-------|------|------|------|------|------|------|------|--------|------|--------|-------|--------|
|   | Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 7 hr | 6 hr | 5 hr | 4 hr | 3 hr | 2.5 hr | 2 hr | 1.5 hr | 1 hr  | 0.5 hr |
| Ì | M12V30T   | 1.1   | 2.2   | 2.6   | 2.8  | 3.1  | 3.6  | 4.1  | 4.7  | 5.7  | 7.2  | 8.4    | 10.2 | 13.0   | 18.3  | 31.0   |
|   | M12V40(F) | 1.5   | 2.9   | 3.4   | 3.8  | 4.2  | 4.8  | 5.6  | 6.6  | 8.0  | 10.4 | 12.2   | 14.7 | 18.6   | 25.9  | 42.4   |
|   | M12V45F   | 1.9   | 3.5   | 4.1   | 4.5  | 5.0  | 5.7  | 6.5  | 7.6  | 9.3  | 12.0 | 13.9   | 16.7 | 20.7   | 28.0  | 45.9   |
|   | M12V70(F) | 2.8   | 5.4   | 6.4   | 7.1  | 7.9  | 9.0  | 10.1 | 11.7 | 14.1 | 17.9 | 20.8   | 25.1 | 31.8   | 44.4  | 72.5   |
|   | M12V90(F) | 3.7   | 6.8   | 8.0   | 8.8  | 9.8  | 11.0 | 12.6 | 14.6 | 17.5 | 22.2 | 25.8   | 31.1 | 39.5   | 55.2  | 87.6   |
|   | M6V190(F) | 7.8   | 14.5  | 17.0  | 18.7 | 20.8 | 23.4 | 26.8 | 31.5 | 37.8 | 47.9 | 55.7   | 67.0 | 84.9   | 118.7 | 187.8  |

1.92 Final VPC

| Model     |       |       |       |      |      |      |      | Time |      |      |        |      |        |       | 4.     |
|-----------|-------|-------|-------|------|------|------|------|------|------|------|--------|------|--------|-------|--------|
| Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 7 hr | 6 hr | 5 hr | 4 hr | 3 hr | 2.5 hr | 2 hr | 1.5 hr | 1 hr  | 0.5 hr |
| M12V30T   | 1.1   | 2.0   | 2.4   | 2.6  | 2.9  | 3.3  | 3.8  | 4.5  | 5.4  | 6.9  | 8.0    | 9.6  | 12.3   | 17.2  | 29.1   |
| M12V40(F) | 1.4   | 2.8   | 3.2   | 3.6  | 4.0  | 4.5  | 5.2  | 6.2  | 7.6  | 9.8  | 11.5   | 13.9 | 17.6   | 24.4  | 39.8   |
| M12V45F   | 1.8   | 3.3   | 3.9   | 4.3  | 4.8  | 5.4  | 6.1  | 7.2  | 8.8  | 11.4 | 13.2   | 15.7 | 19.4   | 26.2  | 42.6   |
| M12V70(F) | 2.7   | 5.1   | 6.1   | 6.7  | 7.4  | 8.4  | 9.5  | 11.1 | 13.3 | 16.8 | 19.5   | 23.5 | 29.7   | 41.4  | 64.6   |
| M12V90(F) | 3.6   | 6.5   | 7.6   | 8.3  | 9.2  | 10.3 | 11.8 | 13.8 | 16.7 | 21.2 | 24.6   | 29.6 | 37.2   | 51.4  | 81.9   |
| M6V190(F) | 7.5   | 13.7  | 16.1  | 17.7 | 19.6 | 22.1 | 25.3 | 29.7 | 36.0 | 45.1 | 52.3   | 62.8 | 79.4   | 110.4 | 146.8  |

1.94 Final VPC

| Model     |       |       |       |      |      |      |      | Time |      |      |        |      |        |       |        |
|-----------|-------|-------|-------|------|------|------|------|------|------|------|--------|------|--------|-------|--------|
| Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 7 hr | 6 hr | 5 hr | 4 hr | 3 hr | 2.5 hr | 2 hr | 1.5 hr | 1 hr  | 0.5 hr |
| M12V30T   | 1.0   | 1.9   | 2.2   | 2.5  | 2.8  | 3.1  | 3.6  | 4.2  | 5.1  | 6.4  | 7.5    | 9.0  | 11.5   | 16.1  | 26.8   |
| M12V40(F) | 1.3   | 2.5   | 3.0   | 3.3  | 3.7  | 4.2  | 4.9  | 5.7  | 7.0  | 9.1  | 10.7   | 12.9 | 16.3   | 22.5  | 36.7   |
| M12V45F   | 1.7   | 3.1   | 3.7   | 4.1  | 4.5  | 5.1  | 5.8  | 6.8  | 8.3  | 10.8 | 12.4   | 14.8 | 18.2   | 24.5  | 39.4   |
| M12V70(F) | 2.5   | 4.8   | 5.7   | 6.3  | 7.0  | 8.0  | 9.0  | 10.4 | 12.5 | 15.8 | 18.3   | 21.9 | 27.6   | 38.4  | 54.9   |
| M12V90(F) | 3.3   | 6.1   | 7.1   | 7.8  | 8.7  | 9.7  | 11.1 | 13.0 | 15.8 | 20.2 | 23.5   | 28.2 | 35.1   | 47.8  | 76.4   |
| M6V190(F) | 7.0   | 13.0  | 15.3  | 16.7 | 18.6 | 20.9 | 23.9 | 28.1 | 33.5 | 42.3 | 49.0   | 58.6 | 73.8   | 102.3 | 128.6  |

MARATHON<sup>TM</sup> Performance Specifications Watts per Cell @ 25°C (77°F)

> 1.75 Final VPC

| Model     |       | Time  |       |      |      |      |      |       |       |        |       |        |  |
|-----------|-------|-------|-------|------|------|------|------|-------|-------|--------|-------|--------|--|
| Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 6 hr | 4 hr | 3 hr  | 2 hr  | 1.5 hr | 1 hr  | 0.5 hr |  |
| M12V30T   | 2.4   | 4.8   | 5.7   | 6.4  | 7.0  | 9.0  | 12.6 | 16.1  | 22.7  | 29.0   | 40.8  | 71.6   |  |
| M12V40(F) | 2.9   | 5.5   | 6.6   | 7.2  | 8.1  | 10.6 | 15.4 | 20.1  | 29.2  | 38.0   | 54.6  | 96.5   |  |
| M12V45F   | 4.2   | 7.8   | 9.2   | 10.1 | 11.2 | 14.5 | 20.4 | 26.1  | 36.7  | 46.5   | 65.0  | 107.8  |  |
| M12V70(F) | 6.7   | 12.6  | 14.9  | 16.4 | 18.3 | 23.2 | 32.3 | 40.8  | 56.8  | 71.8   | 100.0 | 174.0  |  |
| M12V90(F) | 7.7   | 14.9  | 17.7  | 19.6 | 21.9 | 27.7 | 39.3 | 50.3  | 71.2  | 91.0   | 128.7 | 209.0  |  |
| M6V190(F) | 17.8  | 33.3  | 39.2  | 43.2 | 48.0 | 62.4 | 90.0 | 112.4 | 155.8 | 197.1  | 274.7 | 465.0  |  |

1.78 Final **VPC** 

|   | Model     |       | Time  |       |      |      |      |      |       |       |        |       |        |
|---|-----------|-------|-------|-------|------|------|------|------|-------|-------|--------|-------|--------|
|   | Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 6 hr | 4 hr | 3 hr  | 2 hr  | 1.5 hr | 1 hr  | 0.5 hr |
|   | M12V30T   | 2.4   | 4.8   | 5.7   | 6.3  | 7.0  | 8.9  | 12.6 | 16.0  | 22.5  | 28.7   | 40.5  | 71.0   |
|   | M12V40(F) | 2.8   | 5.5   | 6.5   | 7.2  | 8.1  | 10.5 | 15.3 | 20.0  | 29.1  | 37.8   | 54.3  | 96.0   |
| ı | M12V45F   | 4.1   | 7.7   | 9.1   | 10.0 | 11.2 | 14.5 | 20.3 | 25.9  | 36.4  | 46.2   | 64.5  | 106.6  |
| ; | M12V70(F) | 6.7   | 12.6  | 14.8  | 16.3 | 18.2 | 23.0 | 32.1 | 40.6  | 56.5  | 71.5   | 99.5  | 172.0  |
|   | M12V90(F) | 7.6   | 14.8  | 17.5  | 19.4 | 21.7 | 27.5 | 38.9 | 49.8  | 70.4  | 90.0   | 127.3 | 206.0  |
|   | M6V190(F) | 17.6  | 33.0  | 38.9  | 42.8 | 47.6 | 61.8 | 89.3 | 111.1 | 154.5 | 195.4  | 272.0 | 456.1  |

1.80 Final VPC

| - | Model      |       | Time  |       |      |      |      |      |       |       |        |       |        |
|---|------------|-------|-------|-------|------|------|------|------|-------|-------|--------|-------|--------|
|   | Number     | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 6 hr | 4 hr | 3 hr  | 2 hr  | 1.5 hr | 1 hr  | 0.5 hr |
| N | /12V30T    | 2.4   | 4.7   | 5.7   | 6.3  | 7.0  | 8.9  | 12.5 | 15.9  | 22.4  | 28.6   | 40.3  | 70.4   |
|   | /12V40(F)  | 2.8   | 5.5   | 6.5   | 7.2  | 8.0  | 10.5 | 15.3 | 19.9  | 29.0  | 37.6   | 54.0  | 95.1   |
| N | /12V45F    | 4.1   | 7.7   | 9.1   | 10.0 | 11.1 | 14.4 | 20.2 | 25.7  | 36.0  | 45.7   | 64.0  | 105.2  |
| M | /12V70(F)  | 6.7   | 12.5  | 14.8  | 16.2 | 18.1 | 23.0 | 31.9 | 40.4  | 56.2  | 71.0   | 98.9  | 170.0  |
| Ī | /112V90(F) | 7.6   | 14.7  | 17.4  | 19.3 | 21.6 | 27.3 | 38.6 | 49.4  | 69.8  | 89.2   | 126.2 | 203.1  |
|   | //6V190(F) | 17.5  | 32.8  | 38.7  | 42.5 | 47.3 | 61.4 | 88.7 | 110.4 | 153.4 | 193.7  | 269.0 | 447.1  |

1.83 Final **VPC** 

| Model     |       | Time  |       |      |      |      |      |       |       |        |       |        |
|-----------|-------|-------|-------|------|------|------|------|-------|-------|--------|-------|--------|
| Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 6 hr | 4 hr | 3 hr  | 2 hr  | 1.5 hr | 1 hr  | 0.5 hr |
| M12V30T   | 2.4   | 4.7   | 5.6   | 6.2  | 6.8  | 8.7  | 12.3 | 15.6  | 22.0  | 28.0   | 39.3  | 68.2   |
| M12V40(F) | 2.8   | 5.5   | 6.5   | 7.2  | 8.0  | 10.4 | 15.2 | 19.8  | 28.7  | 37.3   | 53.3  | 93.5   |
| M12V45F   | 4.0   | 7.6   | 8.9   | 9.8  | 10.9 | 14.2 | 19.7 | 25.0  | 35.1  | 44.5   | 62.3  | 101.3  |
| M12V70(F) | 6.5   | 12.2  | 14.4  | 15.9 | 17.7 | 22.6 | 31.3 | 39.5  | 55.0  | 69.6   | 96.9  | 164.0  |
| M12V90(F) | 7.4   | 14.3  | 17.1  | 18.9 | 21.1 | 26.8 | 37.7 | 48.2  | 67.9  | 86.7   | 122.2 | 195.1  |
| M6V190(F) | 17.2  | 32.1  | 37.8  | 41.6 | 46.2 | 59.9 | 86.2 | 108.5 | 151.0 | 189.2  | 260.0 | 424.4  |

MARATHON<sup>TM</sup> Performance Specifications Watts per Cell @ 25°C (77°F)

1.85 Final VPC

| Model     |       | Time  |       |      |      |      |      |       |       |        |       |        |  |
|-----------|-------|-------|-------|------|------|------|------|-------|-------|--------|-------|--------|--|
| Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 6 hr | 4 hr | 3 hr  | 2 hr  | 1.5 hr | 1 hr  | 0.5 hr |  |
| M12V30T   | 2.4   | 4.6   | 5.5   | 6.1  | 6.8  | 8.6  | 12.1 | 15.4  | 21.7  | 27.6   | 38.8  | 67.2   |  |
| M12V40(F) | 2.8   | 5.4   | 6.5   | 7.1  | 8.0  | 10.4 | 15.1 | 19.7  | 28.5  | 37.0   | 52.8  | 92.0   |  |
| M12V45F   | 4.0   | 7.4   | 8.8   | 9.7  | 10.8 | 14.0 | 19.4 | 24.6  | 34.5  | 43.7   | 60.9  | 98.7   |  |
| M12V70(F) | 6.5   | 12.1  | 14.2  | 15.7 | 17.4 | 22.3 | 30.9 | 39.0  | 54.1  | 68.5   | 95.4  | 160.0  |  |
| M12V90(F) | 7.3   | 14.1  | 16.8  | 18.6 | 20.8 | 26.4 | 37.1 | 47.3  | 66.6  | 84.9   | 119.6 | 190.0  |  |
| M6V190(F) | 16.9  | 31.7  | 37.4  | 41.1 | 45.8 | 59.3 | 85.0 | 107.0 | 149.0 | 186.2  | 254.9 | 410.1  |  |

1.87 Final VPC

| Model     |       |       |       |      |      | Tiı  | ne   |       |       |        |       |        |
|-----------|-------|-------|-------|------|------|------|------|-------|-------|--------|-------|--------|
| Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 6 hr | 4 hr | 3 hr  | 2 hr  | 1.5 hr | 1 hr  | 0.5 hr |
| M12V30T   | 2.3   | 4.5   | 5.4   | 5.9  | 6.6  | 8.4  | 11.7 | 14.9  | 20.9  | 26.6   | 37.4  | 64.4   |
| M12V40(F) | 2.8   | 5.4   | 6.4   | 7.1  | 7.9  | 10.3 | 14.9 | 19.4  | 28.1  | 36.3   | 51.4  | 89.3   |
| M12V45F   | 3.9   | 7.2   | 8.5   | 9.4  | 10.4 | 13.5 | 18.8 | 23.8  | 33.3  | 42.2   | 59.0  | 94.8   |
| M12V70(F) | 6.3   | 11.7  | 13.8  | 15.2 | 16.9 | 21.5 | 30.0 | 37.9  | 52.9  | 66.9   | 93.3  | 154.9  |
| M12V90(F) | 7.1   | 13.7  | 16.2  | 17.9 | 20.1 | 25.6 | 36.0 | 45.8  | 64.3  | 81.9   | 115.1 | 181.7  |
| M6V190(F) | 16.6  | 30.8  | 36.2  | 39.7 | 44.1 | 56.8 | 81.4 | 105.0 | 145.4 | 180.6  | 245.0 | 388.3  |

1.90 Final VPC

| Model     |       | Time  |       |      |      |      |      |       |       |        |       |        |  |  |  |
|-----------|-------|-------|-------|------|------|------|------|-------|-------|--------|-------|--------|--|--|--|
| Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 6 hr | 4 hr | 3 hr  | 2 hr  | 1.5 hr | 1 hr  | 0.5 hr |  |  |  |
| M12V30T   | 2.2   | 4.3   | 5.1   | 5.7  | 6.3  | 8.0  | 11.2 | 14.3  | 20.1  | 25.6   | 36.0  | 61.2   |  |  |  |
| M12V40(F) | 2.7   | 5.2   | 6.2   | 6.9  | 7.6  | 10.0 | 14.4 | 16.7  | 26.8  | 34.5   | 48.7  | 84.2   |  |  |  |
| M12V45F   | 3.7   | 6.9   | 8.1   | 9.0  | 10.0 | 12.7 | 17.8 | 22.6  | 31.6  | 40.1   | 56.1  | 89.3   |  |  |  |
| M12V70(F) | 6.0   | 11.2  | 13.2  | 14.5 | 16.1 | 20.8 | 28.6 | 36.1  | 50.2  | 63.4   | 88.1  | 144.6  |  |  |  |
| M12V90(F) | 6.8   | 13.0  | 15.4  | 17.0 | 19.0 | 24.4 | 34.2 | 43.5  | 60.9  | 77.4   | 108.4 | 169.9  |  |  |  |
| M6V190(F) | 16.1  | 29.5  | 34.6  | 37.9 | 42.0 | 54.1 | 77.1 | 100.0 | 140.0 | 172.4  | 231.3 | 358.1  |  |  |  |

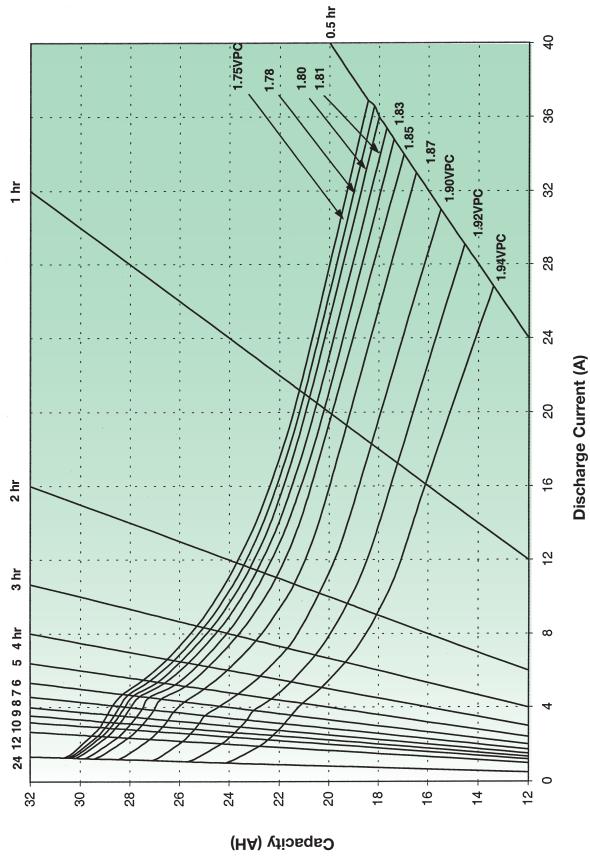
1.92 Final VPC

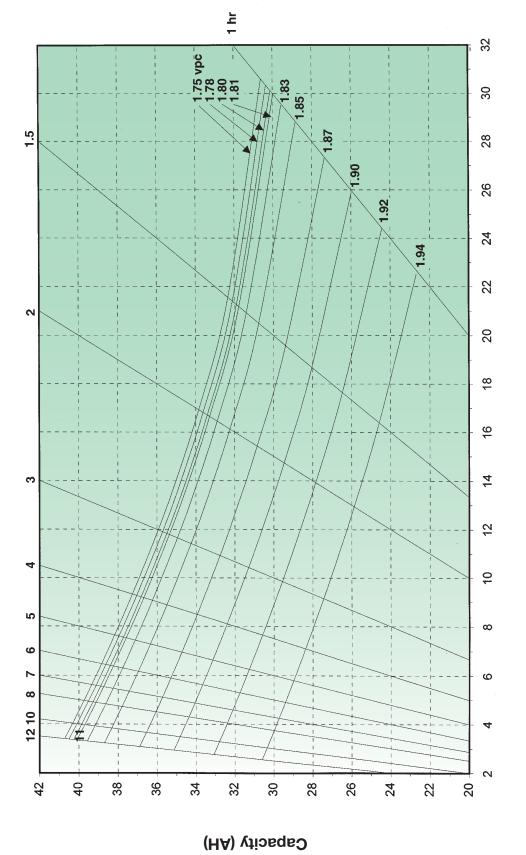
| Model     | Time  |       |       |      |      |      |      |      |       |        |       |        |
|-----------|-------|-------|-------|------|------|------|------|------|-------|--------|-------|--------|
| Number    | 24 hr | 12 hr | 10 hr | 9 hr | 8 hr | 6 hr | 4 hr | 3 hr | 2 hr  | 1.5 hr | 1 hr  | 0.5 hr |
| M12V30T   | 2.1   | 4.0   | 4.8   | 5.3  | 5.9  | 7.5  | 10.6 | 13.4 | 18.9  | 24.0   | 33.7  | 57.3   |
| M12V40(F) | 2.6   | 5.0   | 6.0   | 6.6  | 7.3  | 9.5  | 13.8 | 17.8 | 25.5  | 32.7   | 45.9  | 79.3   |
| M12V45F   | 3.5   | 6.5   | 7.7   | 8.5  | 9.4  | 12.1 | 16.9 | 21.4 | 29.9  | 37.9   | 53.0  | 84.4   |
| M12V70(F) | 5.7   | 10.6  | 12.5  | 13.7 | 15.2 | 19.7 | 27.1 | 34.2 | 47.4  | 59.7   | 82.7  | 134.7  |
| M12V90(F) | 6.4   | 12.3  | 14.5  | 16.1 | 17.9 | 23.3 | 32.4 | 41.1 | 57.3  | 72.5   | 101.1 | 155.4  |
| M6V190(F) | 15.4  | 28.2  | 33.0  | 36.2 | 40.1 | 51.5 | 73.4 | 95.0 | 132.0 | 162.4  | 217.4 | 296.7  |

1.94 Final VPC

| Model     |       | Time  |             |      |      |      |      |      |       |        |       |        |  |
|-----------|-------|-------|-------------|------|------|------|------|------|-------|--------|-------|--------|--|
| Number    | 24 hr | 12 hr | 10 hr       | 9 hr | 8 hr | 6 hr | 4 hr | 3 hr | 2 hr  | 1.5 hr | 1 hr  | 0.5 hr |  |
| M12V30T   | 1.9   | 3.8   | <b>\4.5</b> | 5.0  | 5.6  | 7.1  | 9.9  | 12.6 | 17.6  | 22.4   | 31.3  | 53.0   |  |
| M12V40(F) | 2.5   | 4.8   | 5.6         | 6.2  | 6.9  | 9.0  | 12.9 | 16.7 | 23.9  | 30.6   | 42.8  | 73.7   |  |
| M12V45F   | 3.3   | 6.2   | 7.3         | 8.0  | 8.9  | 11.6 | 16.1 | 20.3 | 28.3  | 35.8   | 49.9  | 79.6   |  |
| M12V70(F) | 5.4   | 10.0  | 11.8        | 12.9 | 14.4 | 18.6 | 25.7 | 32.3 | 44.6  | 56.1   | 77.3  | 125.5  |  |
| M12V90(F) | 6.1   | 11.6  | 13.7        | 15.1 | 16.8 | 21.8 | 30.8 | 38.8 | 53.7  | 67.7   | 93.8  | 144.3  |  |
| M6V190(F) | 14.6  | 26.8  | 31.4        | 34.5 | 38.2 | 49.2 | 70.3 | 90.5 | 125.2 | 153.4  | 204.1 | 262.8  |  |

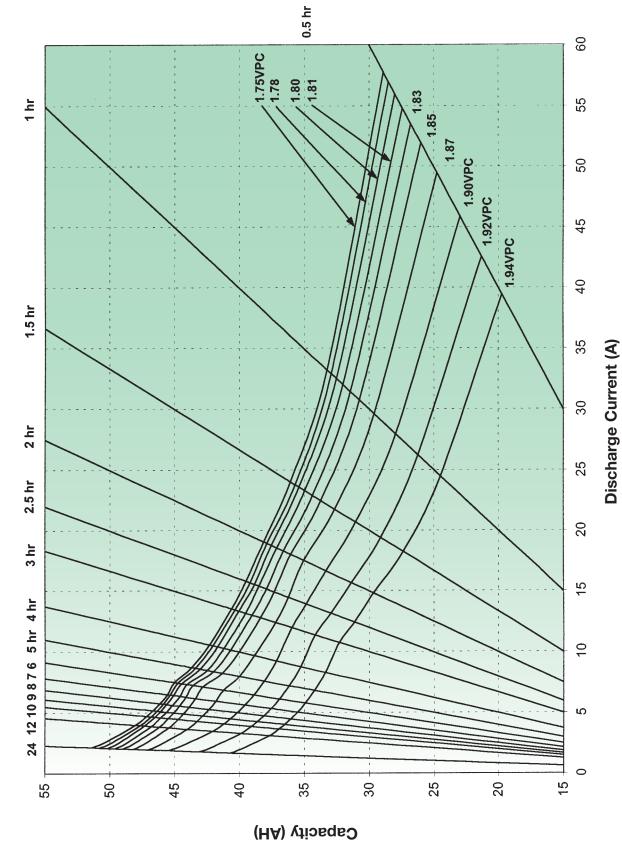
M12V30T - Performance Curves Amperes @ 25°C (77°F)



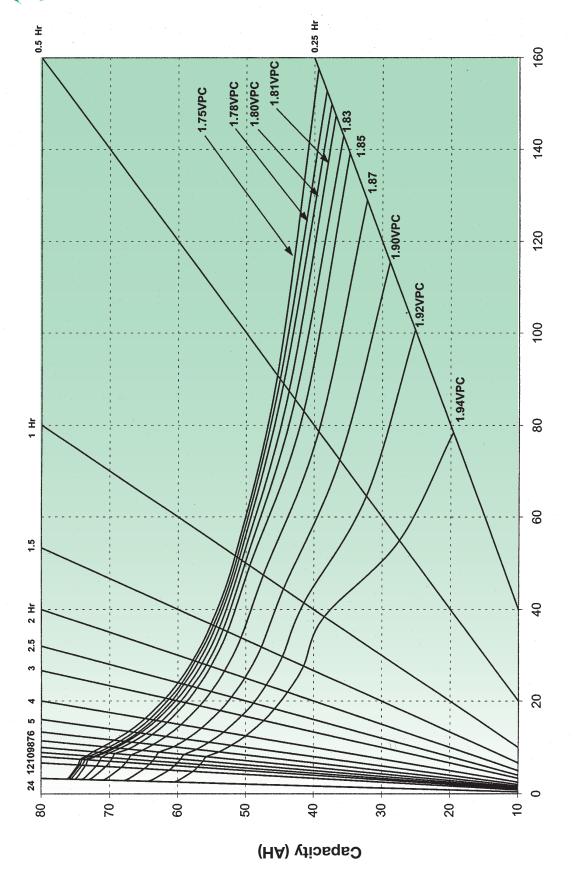


Discharge Current (A)

M12V45F - Performance Curves Amperes @ 25°C (77°F)

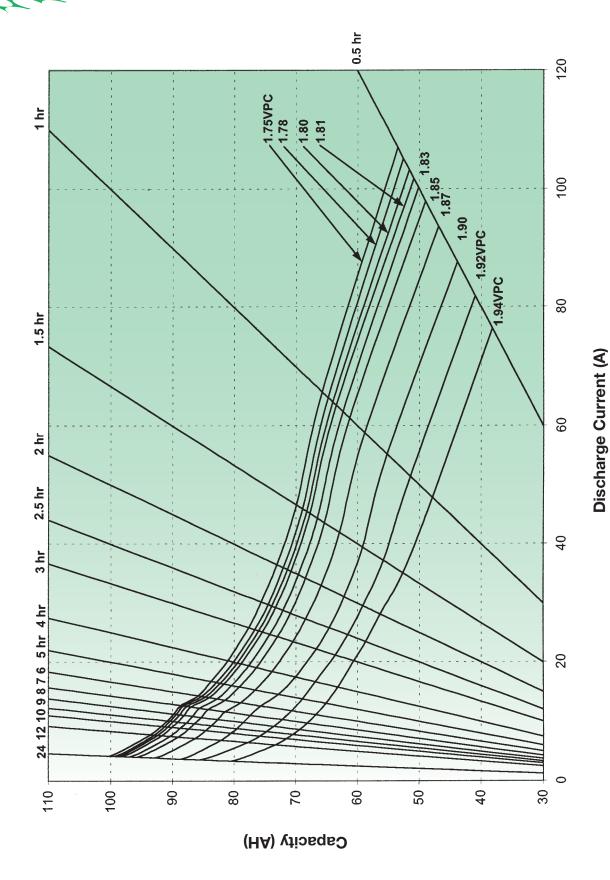


M12V70(F) - Performance Curves Amperes @ 25°C (77°F)

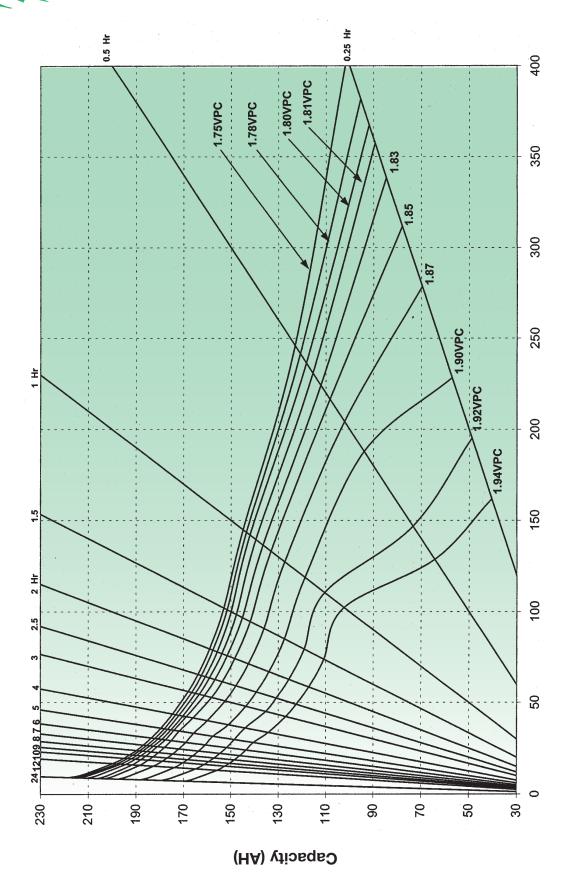


Discharge Current (A)

M12V90(F) - Performance Curves Amperes @ 25°C (77°F)



M6V190(F) - Performance Curves Amperes @ 25°C (77°F)



Discharge Current (A)



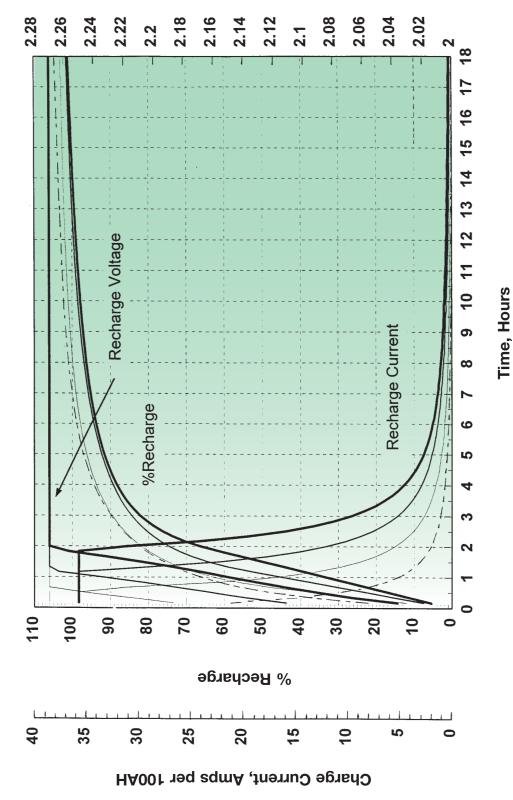
100%DOD

80%DOD

50%DOD

20% DOD

Voltage, VPC



Recharge Characterization 2.27 VPC Float @ 25°C (77°F)



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