

# Panasonic

## New Product

“H” Type Nickel Metal Hydride Battery

HHR60AAAH, HHR210AH, HHR370AH, HHR250SCH, HHR300CH

NiMH “H” Type Batteries

September 2004

Matsushita Battery Industrial Co., Ltd.

### Improved Low Rate Charge Characteristics at Higher Temperatures



Model Number	Size	Nominal Voltage	Discharge Capacity <sup>1</sup> (mAh)		Dimensions (mm)		Approx. Weight (g)
			Average	Minimum	Diameter	Height	
HHR60AAAH	AAA	1.2	550	500	10.5 + 0/-0.7	44.5 + 0/-1.0	12
HHR210AH	A	1.2	2050	1900	17.0 + 0/-0.7	50.0 + 0/-1.5	38
HHR370AH	L-fat A (18670)	1.2	3700	3500	18.2 + 0/-0.7	67.0 + 0/-1.5	60
HHR250SCH	SC	1.2	2650	2500	23.0 + 0/-1.0	43.0 + 0/-1.5	55
HHR300CH	C	1.2	3300	3100	25.8 + 0/-1.0	50.0 + 0/-1.5	80

1. 0.2It discharge capacity after charging at 0.1It for 16 hours.

Panasonic introduces a new line of NiMH cells that are superior to standard NiMH products in applications with low-rate charge at high temperatures. Improvements were made in existing Panasonic NiMH cells to the negative plate alloy and, separator fiber density. A new electrolyte composition was achieved to improve performance.

Superior long-life characteristics can be achieved when combined with appropriate intermittent charge control circuitry. The intermittent charge consumes 1/30<sup>th</sup> the electricity compared to trickle charge and more than doubles the expected life of the NiMH cells compared to NiCd cells that have been trickle charged.

#### Features

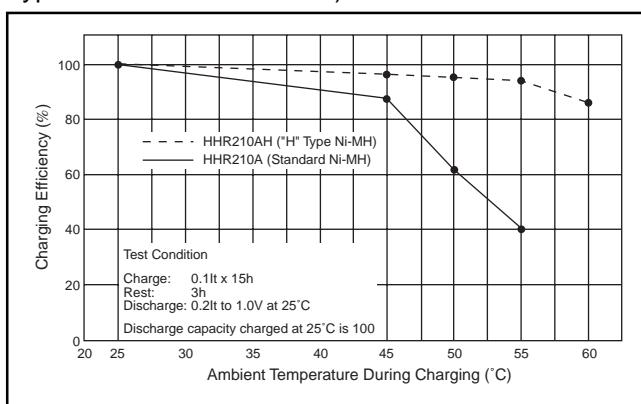
- Higher capacity in a smaller size and lighter weight than other battery back-up solutions (Lead-Acid, NiCd)
- Efficient Charging at high temperatures (up to 60°C)
- 8-12 year expected life when used with the proper charge control circuitry

#### Applications

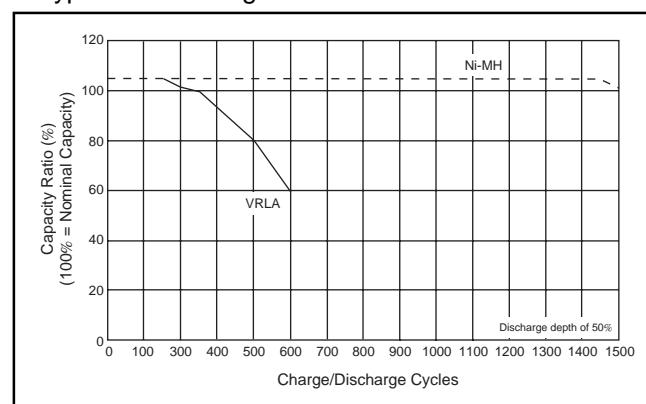
- Network storage-cache memory back-up
- Uninterruptable power supply units (UPS) - (HHR250SCH)
- Emergency lights
- Communication base stations (Micro cell, Pico cell)
- Load leveling

## ■ Examples of characteristics

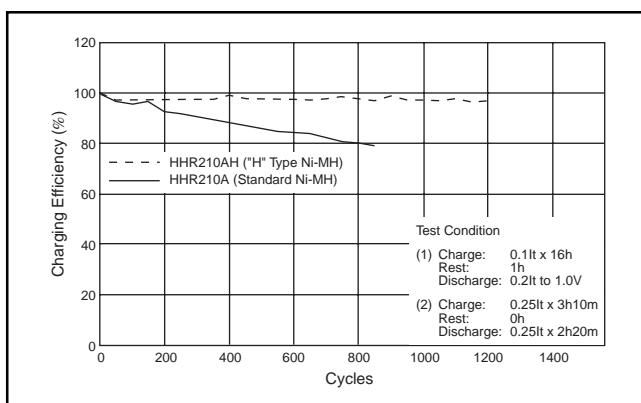
### Charging Characteristics by Temperature (H-Type vs. Standard NiMH Cell)



### Cycle Life Characteristics H-Type vs. Valve Regulated Lead-Acid Batteries



### Cycle Life Characteristics (H-Type vs. Standard NiMH Cell)



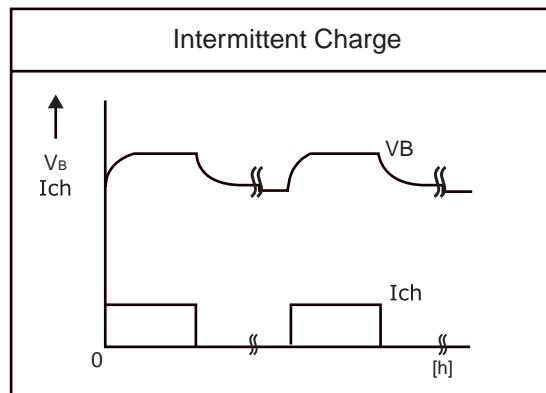
## NiMH "H" Series Recommended Charge System for back-up power applications (Applies to HHR60AAAH, HHR210AH, HHR370AH, HHR250SCH & HHR300CH Cylindrical cells)

The optimal charge system for the NiMH "H" Series for back-up power applications is an intermittent timer charge. An intermittent timer charge improves charge efficiency, extends battery life (-vs- trickle charge) and reduces electricity consumption up to 30% compared to \*trickle charge.

**Intermittent Timer Charge:** (see diagram) At the beginning of the charge, an IC timer is started and charging is activated at a current of 0.1lt until the timer stops and the charge is terminated. When the batteries self discharge down to a set point (1.3V), the timer charge is re-activated.

\*Trickle charge is not recommended for NiMH batteries. Please consult Panasonic on any NiMH applications requiring trickle charge.

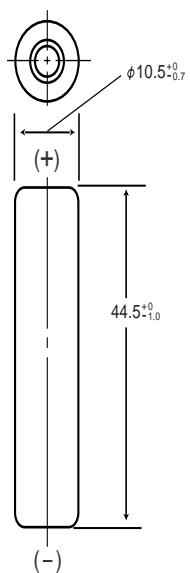
- Example of intermittent timer charger system:  
Average Charge Current: 0.1ltA  
Re-charge Time: 16 hours  
Pulse charging can be used



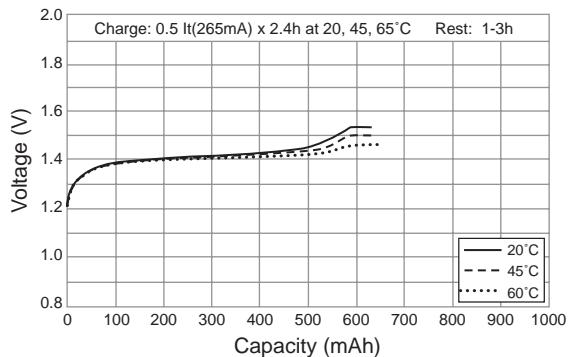
# NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

## HHR60AAA Cylindrical AAA size (HR 11/45)

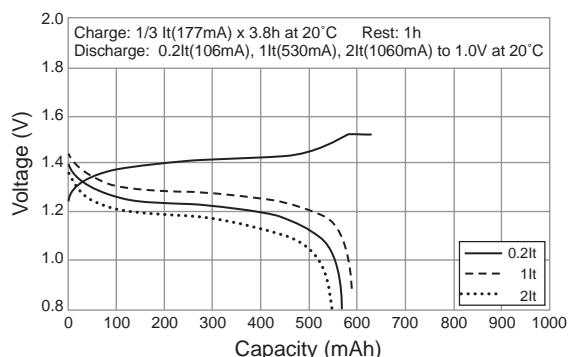
### Dimensions (with Tube) (mm)



### Typical Charge Characteristics



### Typical Discharge Characteristics



### Specifications

	mm	inch
Diameter	10.5 +0/-0.7	0.41 +0/-0.03
Height	44.5 +0/-1.0	1.75 +0/-0.04
Approximate Weight	Grams	Ounces
	12	0.42

Nominal Voltage		1.2V
Discharge Capacity <sup>1</sup>	Average <sup>2</sup>	550 mAh
	Rated (Min.)	500 mAh
Approx. Internal impedance at 1000Hz at charged state.		35mΩ
Charge	Standard	50mA x 16hrs.
	Rapid <sup>3</sup>	250mA x 2.4 hrs. <sup>4</sup>
	Low Rate	25mA x 32 hrs. 17mA x 48 hrs.
Ambient Temperature	Charge	°C      °F
	Standard	-10°C to 60°C      14°F to 140°F
	Rapid	-10°C to 45°C      14°F to 113°F
	Discharge	-10°C to 60°C      14°F to 140°F
	< 1 year	-20°C to 35°C      -4°F to 95°F
	< 6 months	-20°C to 45°C      -4°F to 113°F
Storage	< 1 month	-20°C to 55°C      -4°F to 131°F
	< 1 week	-20°C to 65°C      -4°F to 149°F

1 After charging at 0.1It for 16 hours, discharging at 0.2It.

2 For reference only.

3 Need specially designed control system

#### Control System:

dT/dt cut-off; 1 to 2°C/min

-ΔV cut-off; -ΔV per cell = 5 to 10 mV

T-control; T=65°C

Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

4 With control system

Battery performance and cycle life are strongly affected by how they are used. In order to maximize battery safety, please consult Panasonic when determining charge / discharge specs, warning label contents and unit design.

Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:

$$It(A) = Cn(Ah)/1h$$

\* [It] is the reference test current in amperes

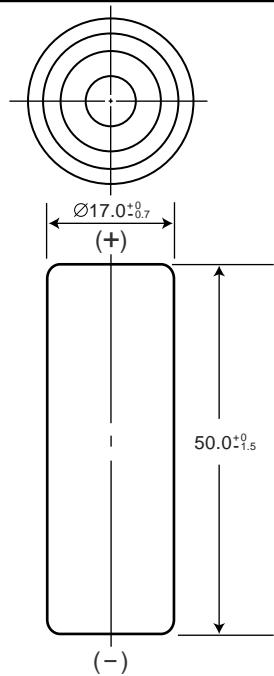
\* [Cn] is the rated capacity of the cell or battery in Ampere-hours.

n = the time base [hours] for which the rated capacity is declared

# NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

## HHR210AH Cylindrical A size (HR 17/50)

### Dimensions (with Tube) (mm)



### Specifications

	mm	inch
Diameter	17.0+0/-0.7	0.67+0/-0.03
Height	50.0+0/-1.5	1.97+0/-0.06
Approximate Weight	Grams	Ounces
	38	1.34

Nominal Voltage		1.2V
Discharge Capacity <sup>1</sup>	Average <sup>2</sup>	2050mAh
	Rated (Min.)	1900mAh
Approx. internal Impedance at 1000Hz at charged state.		20mΩ
Charge	Standard	210mA (0.1It) x 16 hrs.
	Rapid	-
Ambient Temperature	Charge	°C
		-10°C to 60°C
Discharge	Standard	14°F to 140°F
	Rapid	-
Storage	Standard	14°F to 140°F
	< 1 year	-20°C to 35°C
	< 3 months	-20°C to 45°C
	< 1 month	-20°C to 55°C
	< 1 week	-20°C to 60°C
	< 1 year	-4°F to 95°F
	< 3 months	-4°F to 113°F
	< 1 month	-4°F to 131°F
	< 1 week	-4°F to 140°F

<sup>1</sup> After charging at 0.1It for 16 hours, discharging at 0.2It.

<sup>2</sup> For reference only.

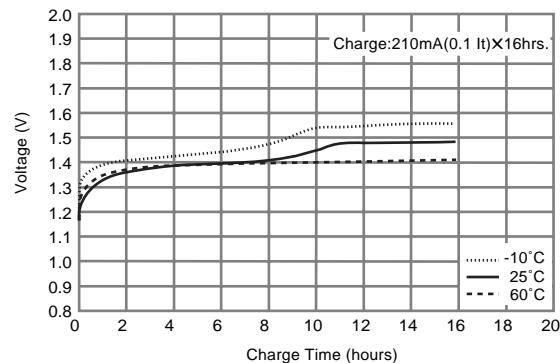
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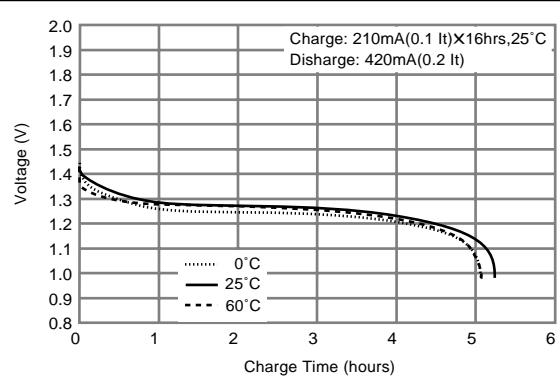
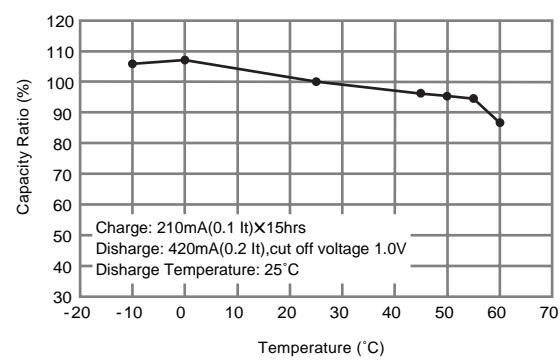
$$It(A) = Cn (Ah)/1h.$$

- [It] is the reference test current in amperes
- [Cn] is the rated capacity of the cell or battery in Ampere-hours.
- n = the time base [hours] for which the rated capacity is declared

### Typical Charge Characteristics



### Typical Discharge Characteristics

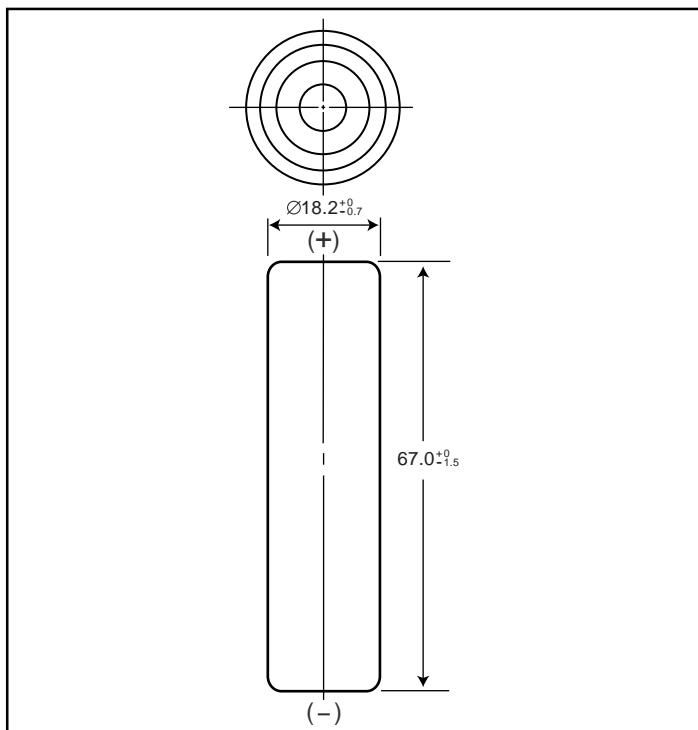


# NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

## HHR370AH Cylindrical L-Fat A size (HR 18/67)

### Dimensions (with Tube)

(mm)



### Specifications

	mm	inch
Diameter	18.2+0/-0.7	0.72+0/-0.03
Height	67.0+0/-1.5	2.64+0/-0.06
Approximate Weight	Grams	Ounces
	60	2.12

Nominal Voltage		1.2V
Discharge Capacity <sup>1</sup>	Average <sup>2</sup>	3700 mAh
	Rated (Min.)	3500 mAh
Approx. Internal impedance at 1000Hz at charged state.		20mΩ
Charge	Standard	370mA x 16hrs.
	Rapid <sup>3</sup>	1750mA x 2.4 hrs. <sup>4</sup>
	Low Rate	185mA x 32 hrs. 123mA x 48 hrs.
Ambient Temperature	Charge	°C      °F
	Standard	-10°C to 60°C      14°F to 140°F
	Rapid	-10°C to 45°C      14°F to 113°F
	Discharge	-10°C to 60°C      14°F to 140°F
Storage	< 1 year	-20°C to 35°C      -4°F to 95°F
	< 6 months	-20°C to 45°C      -4°F to 113°F
	< 1 month	-20°C to 55°C      -4°F to 131°F
	< 1 week	-20°C to 65°C      -4°F to 149°F

<sup>1</sup> After charging at 0.1It for 16 hours, discharging at 0.2It.

<sup>2</sup> For reference only.

<sup>3</sup> Need specially designed control system

#### Control System:

dT/dt cut-off; 1 to 2°C/min

-ΔV cut-off; -ΔV per cell = 5 to 10 mV

T-control; T=65°C

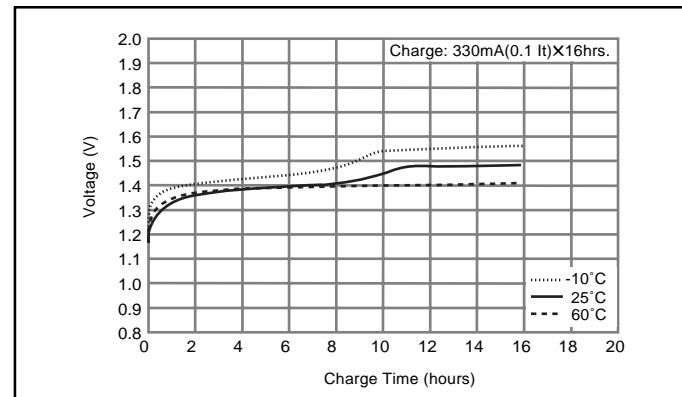
Rapid charger timer; 2.4h (at 1.25a)

Trickle timer; within 2h

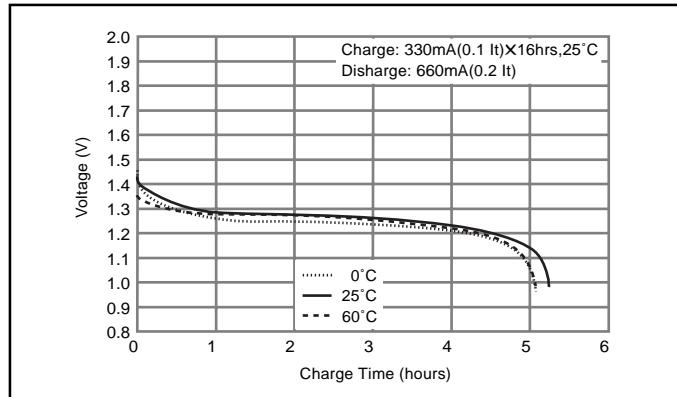
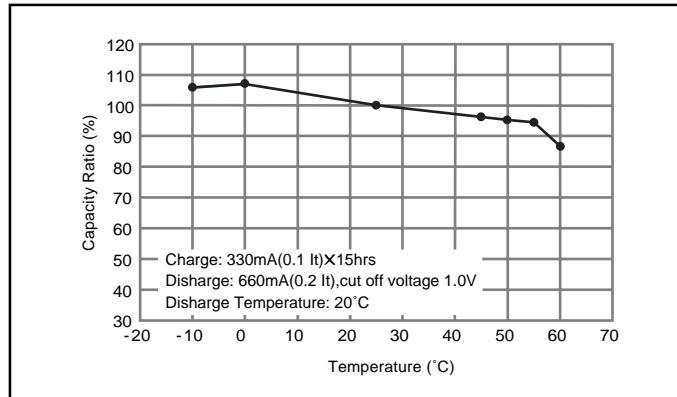
<sup>4</sup> With control system

Battery performance and cycle life are strongly affected by how they are used. In order to maximize battery safety, please consult Panasonic when determining charge / discharge specs, warning label contents and unit design.

### Typical Charge Characteristics



### Typical Discharge Characteristics



**Note:** [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:  $It(A) = Cn(Ah)/1h$ .

- [It] is the reference test current in amperes

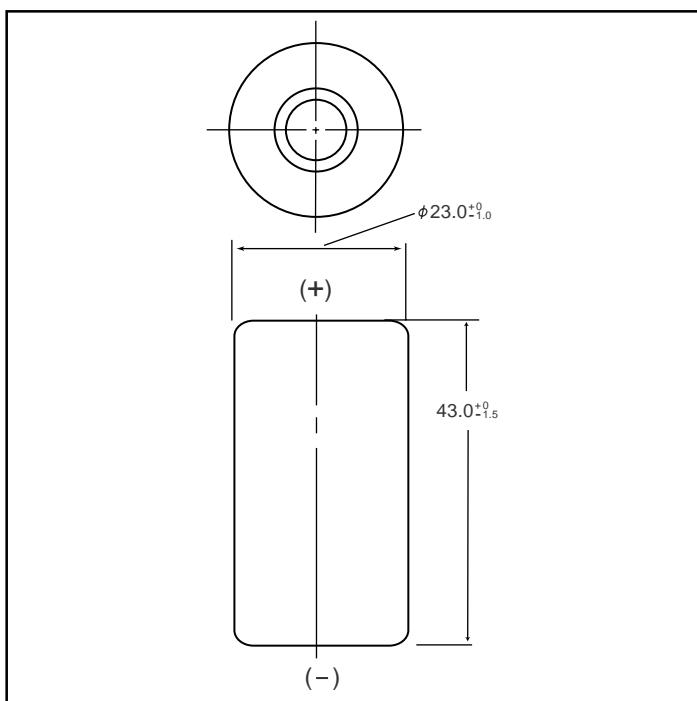
- [Cn] is the rated capacity of the cell or battery in Ampere-hours.  
n = the time base [hours] for which the rated capacity is declared

# NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

## HHR250SCH Cylindrical SC size (HR 23/43)

### Dimensions (with Tube)

(mm)



### Specifications

	mm	inch
Diameter	23.0+0/-1.0	0.91+0/-0.04
Height	43.0+0/-1.5	1.69+0/-0.06
Approximate Weight	Grams	Ounces
	55	1.94

Nominal Voltage		1.2V
Discharge Capacity <sup>1</sup>	Average <sup>2</sup>	2650 mAh
	Rated (Min.)	2500 mAh
Approx. Internal impedance at 1000Hz at charged state.		5mΩ
Charge	Standard	250mA x 16hrs.
	Rapid <sup>3</sup>	1250mA x 2.4 hrs. <sup>4</sup>
	Low Rate	125mA x 32 hrs. 83mA x 48 hrs.
Ambient Temperature	Charge	°C      °F
	Standard	-10°C to 60°C      14°F to 140°F
	Rapid	-10°C to 45°C      14°F to 113°F
	Discharge	-10°C to 60°C      14°F to 140°F
Storage	< 1 year	-20°C to 35°C      -4°F to 95°F
	< 6 months	-20°C to 45°C      -4°F to 113°F
	< 1 month	-20°C to 55°C      -4°F to 131°F
	< 1 week	-20°C to 65°C      -4°F to 149°F

<sup>1</sup> After charging at 0.1It for 16 hours, discharging at 0.2It.

<sup>2</sup> For reference only.

<sup>3</sup> Need specially designed control system

#### Control System:

dT/dt cut-off; 1 to 2°C/min

-ΔV cut-off; -ΔV per cell = 5 to 10 mV

T-control; T=65°C

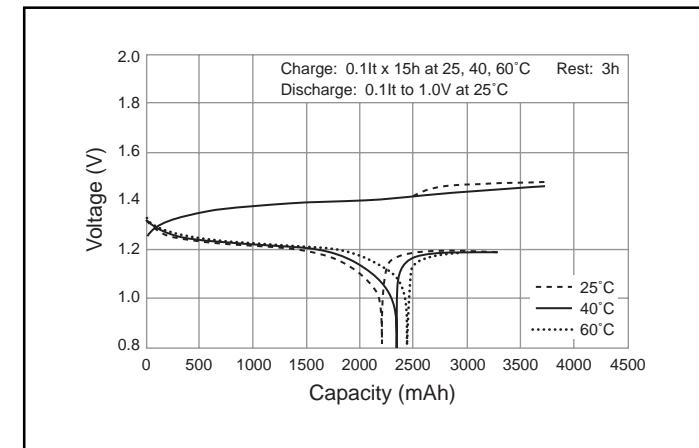
Rapid charger timer; 2.4h (at 1.25A)

Trickle timer; within 2h

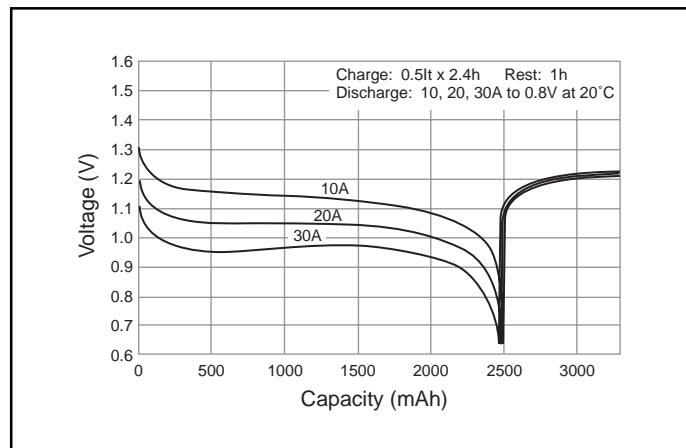
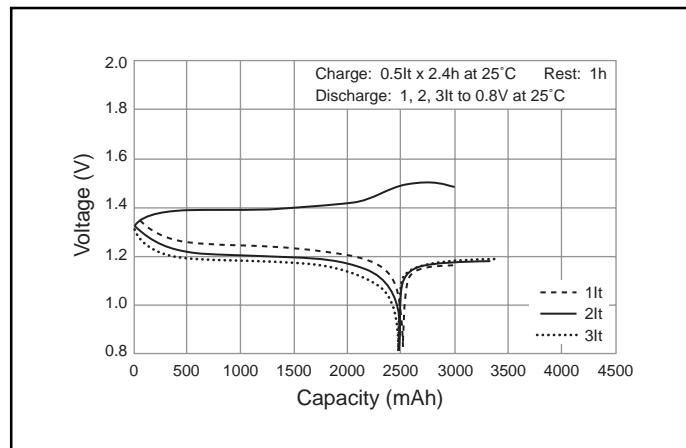
<sup>4</sup> With control system

Battery performance and cycle life are strongly affected by how they are used. In order to maximize battery safety, please consult Panasonic when determining charge / discharge specs, warning label contents and unit design.

### Typical Charge Characteristics



### Typical Discharge Characteristics



Note: [It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:  $It(A) = Cn(Ah)/1h$

\* [It] is the reference test current in amperes

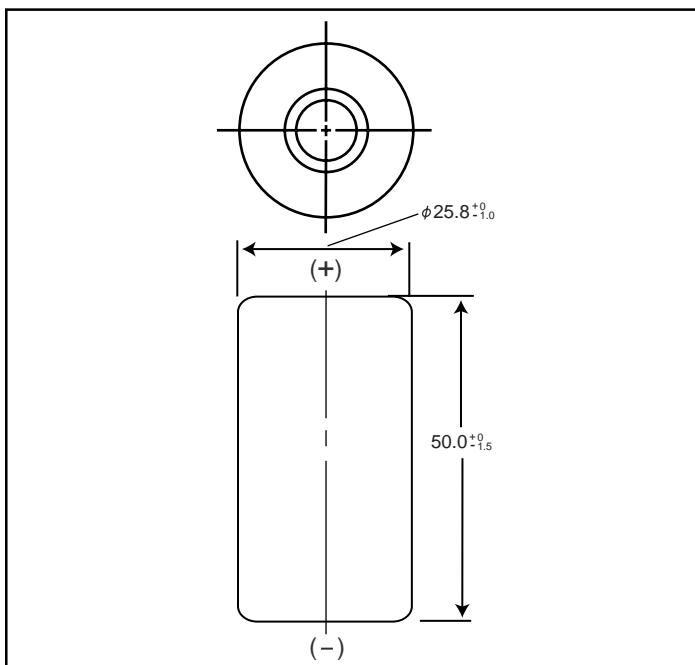
\* [Cn] is the rated capacity of the cell or battery in Ampere-hours.

n = the time base [hours] for which the rated capacity is declared

# NICKEL METAL HYDRIDE BATTERIES: INDIVIDUAL DATA SHEET

## HHR300CH Cylindrical C size (HR 26/50) for backup use

### Dimensions (with Tube) (mm)



### Specifications

	mm	
Diameter	25.8	+0/-1.0
Height	50.0	+0/-1.5
Approximate Weight	Grams	Ounces
	80	2.82

Nominal Voltage		1.2V	
Discharge Capacity <sup>1</sup>	Average <sup>2</sup>	3300 mAh	
	Rated (Min.)	3100 mAh	
Approx. Internal impedance at 1000Hz at charged state.		5mΩ	
Charge	Standard	300mA (0.1It) x 16hrs.	
	Rapid <sup>3</sup>	1500mA (1It) x 2.4 hrs. <sup>4</sup>	
	Low Rate	155mA x 32 hrs. 100mA x 48 hrs.	
Ambient Temperature	Charge	°C	°F
		0°C to 45°C	32°F to 113°F
		10°C to 40°C	32°F to 104°F
	Discharge	-10°C to 45°C	14°F to 149°F
		< 1 year	-20°C to 35°C
		< 3 months	-20°C to 35°C
		< 1 month	-20°C to 55°C
	Storage	< 1 year	-4°F to 95°F
		< 3 months	-4°F to 95°F
		< 1 month	-20°C to 131°F

<sup>1</sup> After charging at 0.1It for 16 hours, discharging at 0.2It.

<sup>2</sup> For reference only.

<sup>3</sup> Need specially designed control system

#### Control System:

dT/dt cut-off; 1 to 2°C/min

-ΔV cut-off; -ΔV per cell = 5 to 10 mV

T-control; T=65°C

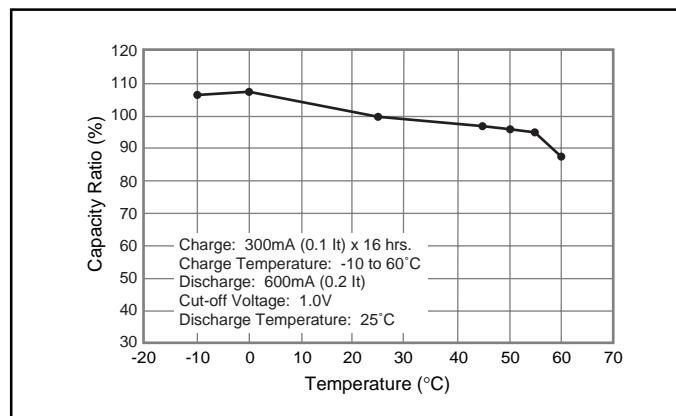
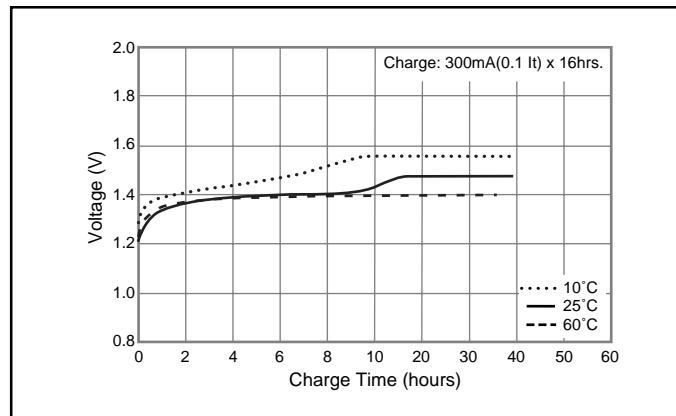
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Trickle timer; within 2h

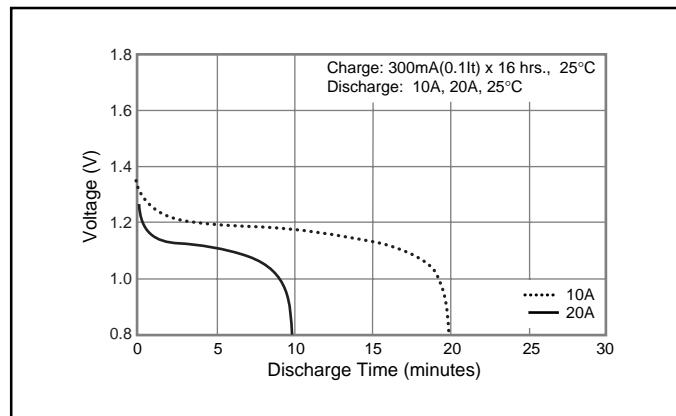
<sup>4</sup> With control system

Battery performance and cycle life are strongly affected by how they are used. In order to maximize battery safety, please consult Panasonic when determining charge / discharge specs, warning label contents and unit design.

### Typical Charge Characteristics



### Typical Discharge Characteristics



**Note:** <sup>1</sup>[It] was previously expressed as [C]. [It] is an IEC standard expression for the amount of charge or discharge current and is expressed as:  $It(A) = Cn(Ah)/1h$ .

• <sup>1</sup>[It] is the reference test current in amperes

• <sup>1</sup>[Cn] is the rated capacity of the cell or battery in Ampere-hours.  $n$  = the time base [hours] for which the rated capacity is declared