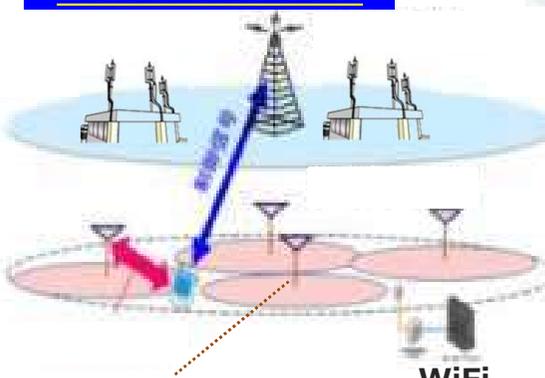


Technical Proposal for IoT Device (Smart Meter)

January, 2025
Technical Support Department
Ni-MH Battery Division
FDK CORPORATION

FDK Target

Base Station



Communication equipment WiFi

Mobility Wheel chair Forklift Container



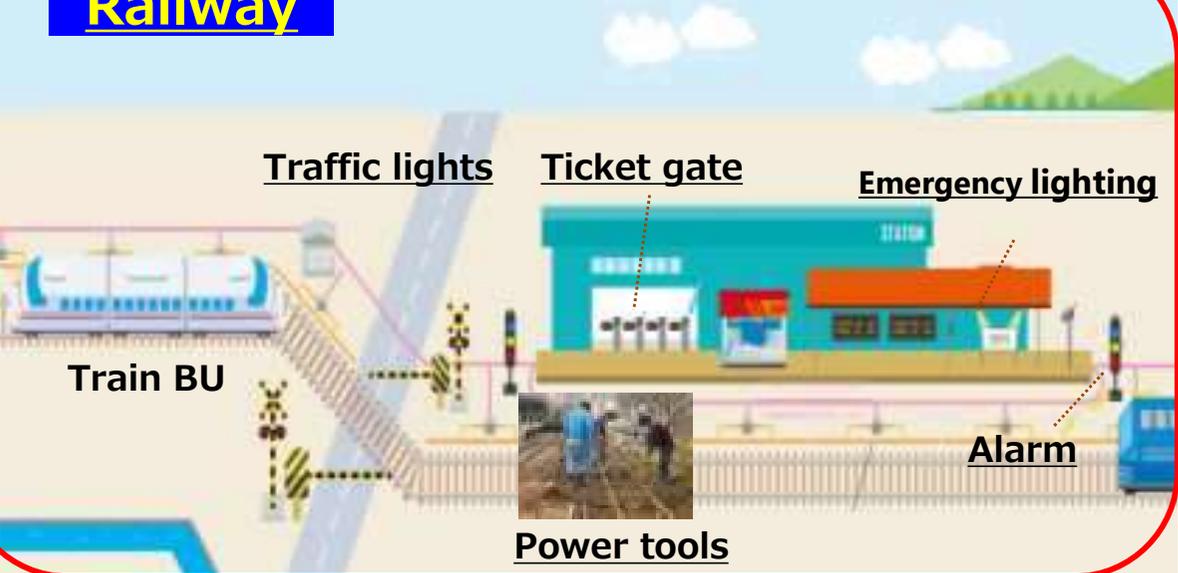
Public facility Public BCP PC Government BCP IoT Device (Smart Meter)

BCP



Vending machine Medical Elevator

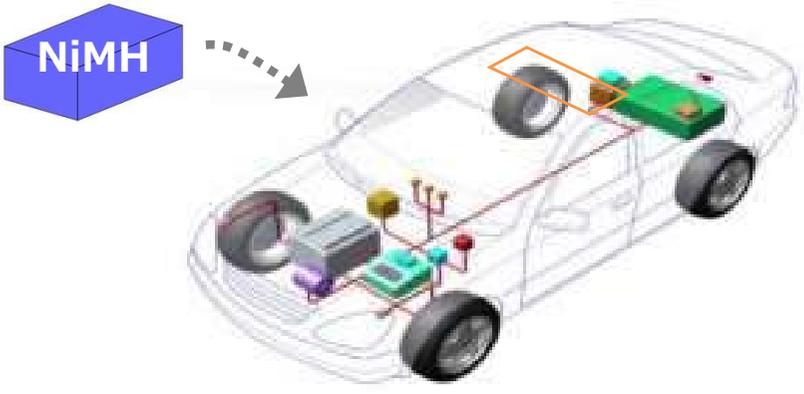
Railway



Traffic lights Ticket gate Emergency lighting

Train BU Power tools Alarm

In-Vehicle • eCall, SVT etc...



NiMH

Back up battery for IoT Device



Blackout / Disaster
Stop electrical supply

Not install
back up battery



IoT Device can't work

Stop operation...
Lose data...
Can't contact...



Trouble...



Install
back up battery



IoT Device can work as usual

Complete operation
Keep data
Can contact



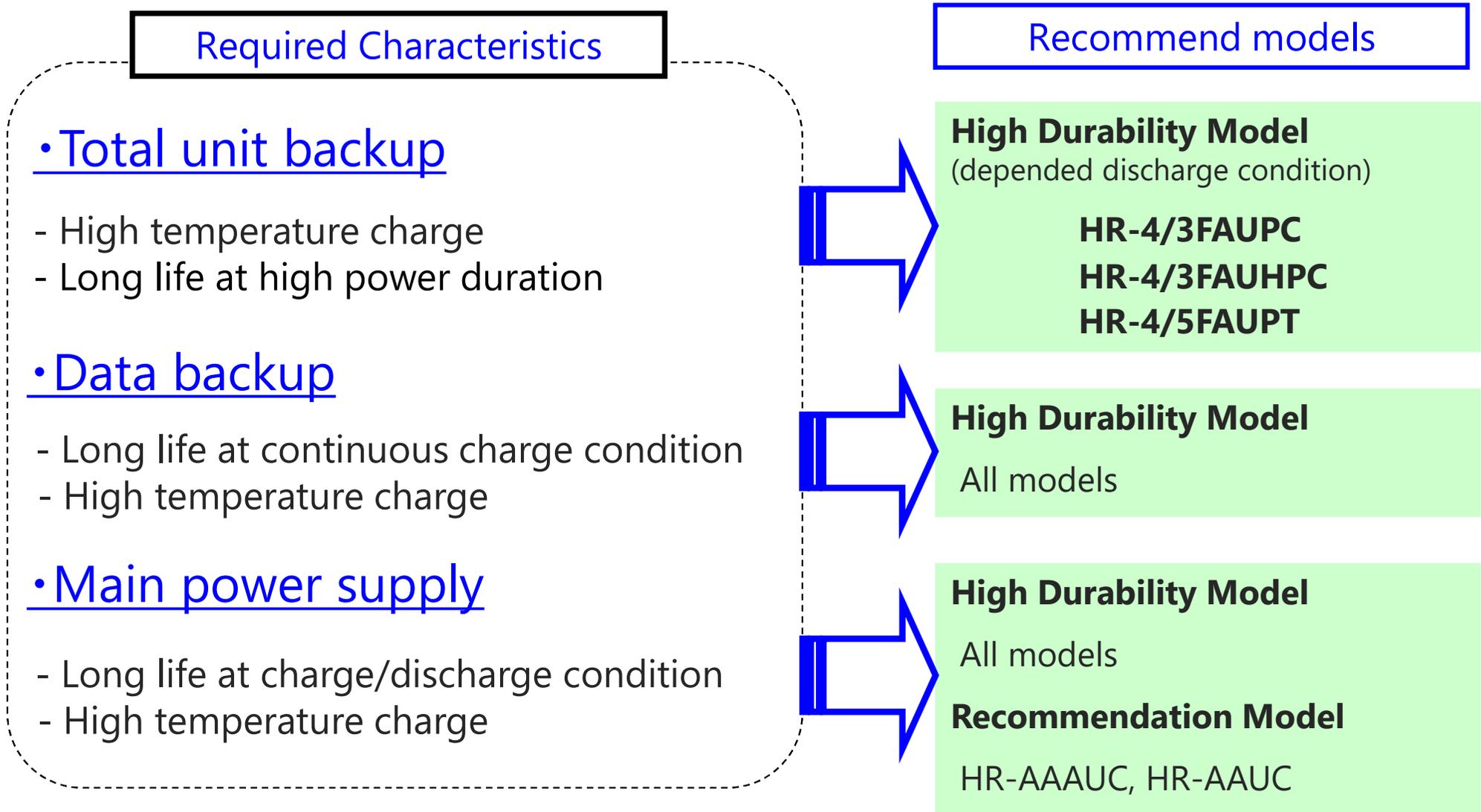
No Trouble

Application of IoT Device for Ni-MH

Ni-MH battery is using several kinds of IoT Device



Battery application in IoT Device



Basically, part of High Durability Model can use for elevator system using Intermittent charging!

High Durability Ni-MH Batteries

For emergency lights, emergency exit lights, security equipment, communication base stations, medical equipment, ATMs, POSs, traffic road studs and various backup power supplies.

Model No.	Capacity(mAh)		Dimensions(mm) ^{*3}	
	Typ. ^{*1}	Min. ^{*2}	Diameter	Height
HR-2/3AAAUTU	220	200	10.5	30.0
HR-AAAUTU	500	460	10.5	44.5
HR-AAULTU	780	700	14.2	49.0
HR-AAULT	1050	1000	14.2	49.0
HR-AATU 	1280	1200	14.5	50.0
HR-AAUT	1580	1500	14.2	50.0
HR-4/5FAUPT	1650	1500	18.1 ^{*4}	43.2 ^{*4}
HR-AUT	2200	2000	17.0	50.0
HR-5/4SCUT	3250	3000	23.0	50.0
HR-4/3FAUT	3700	3500	18.0	67.5

**1. Typical discharge capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16hours.*

**2. Minimum discharge capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16hours.*

**3. Including heat shrink tube. *4. Including paper tube / heat shrink tube.*

• Battery performance and lifespan are greatly affected by usage and temperature conditions. • Test results vary depending on individual batteries.
• Specific values included in this material are intended to describe performance. They are not guaranteed.

High-Rate Discharge Ni-MH Batteries

High-rate discharge model

For home appliances (shavers, electric toothbrushes), measuring instruments, elevator B/U, UPS, server backup systems, vending machines and various backup power supplies.

Model No.	Capacity(mAh)		Dimensions(mm) ^{*3}	
	Typ. ^{*1}	Min. ^{*2}	Diameter	Height
HR-4/3FAUHPC	2700	2500	18.1 ^{*4}	67.0 ^{*4}
HR-4/3FAUPC	3200	3050	18.1 ^{*4}	67.0 ^{*4}
HR-4/3FAUP NEW	4000	3750	18.1 ^{*4}	67.0 ^{*4}

**1. Typical discharge capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16hours.
 *2. Minimum discharge capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16hours.
 *3. Including heat shrink tube. *4. Including paper tube / heat shrink tube.*

FDK recommendation Line-up models

For Suitable for home appliances (shavers, electric toothbrushes etc.), measuring instruments, medical equipment, elevator B/U, UPS, server backup systems, vending machines and various backup power supplies.

Recommended model

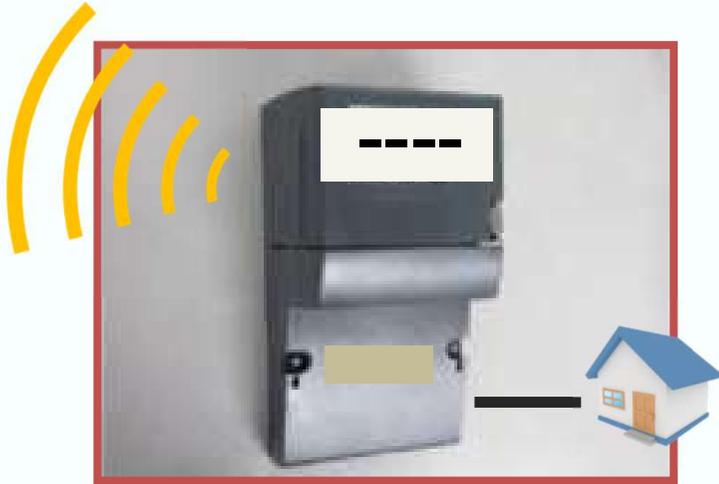


Model No.	Capacity(mAh)		Dimensions(mm) ^{*3}	
	Typ. ^{*1}	Min. ^{*2}	Diameter	Height
HR-AAAUC	700	650	10.5	44.5
HR-AAUC	1200	1100	14.2	50.0
HR-4/5AUC	1700	1550	17.0	43.0
HR-4/3FAUHPC	2700	2500	18.1 ^{*4}	67.0 ^{*4}
HR-4/3FAUPC	3200	3050	18.1 ^{*4}	67.0 ^{*4}

**1. Typical discharge capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16hours.
 *2. Minimum discharge capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16hours.
 *3. Including heat shrink tube. *4. Including paper tube / heat shrink tube.*

Backup Ni-MH for meter applications

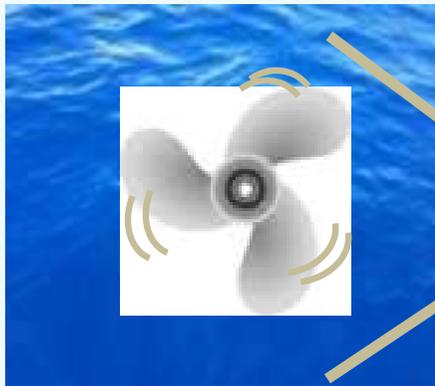
■ Smart meter



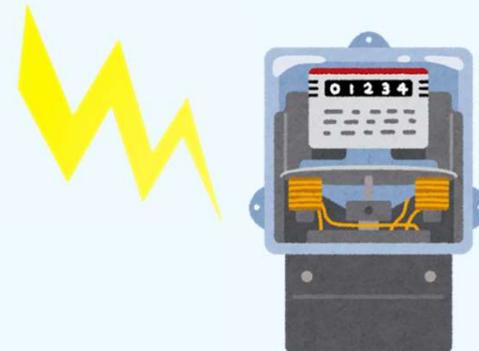
It is suitable Ni-MH battery for smart meter applications.

- ✓ Possible to charge
- ✓ Capable of high current discharge
(Meter equipment emits pulse waves)

■ Water meter



■ Electricity meter

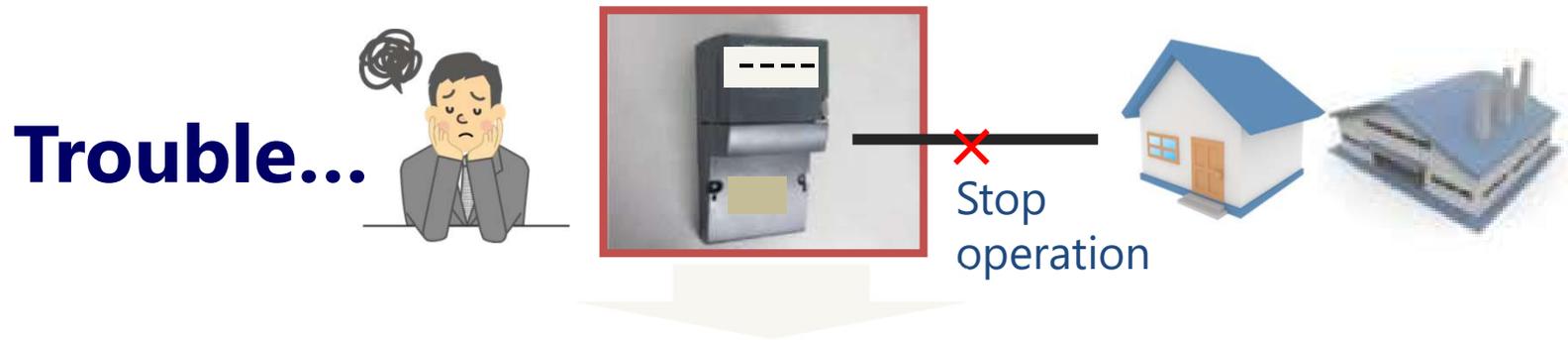


We think that it is Possible to use Ni-MH.

Backup Ni-MH for meter applications

⚡ Sudden blackout and disaster → stop electrical supply
 If backup battery isn't installed, customer and user are not able to use application.

■ Smart meter application



1st : Required item for backup battery

✓ Can it work ✓ Safety ✓ Reliability ✓ Low maintenance cost

★ Secondary battery might need safety and reliability

➔ **We suggest FDK's high durability Ni-MH**

Backup Ni-MH for meter applications

2nd : Required characteristics of Smart meter application

✓ Long life

FDK makes long-life batteries.

✓ Small battery size

Ni-MH can be recharged once and used again, making it smaller.



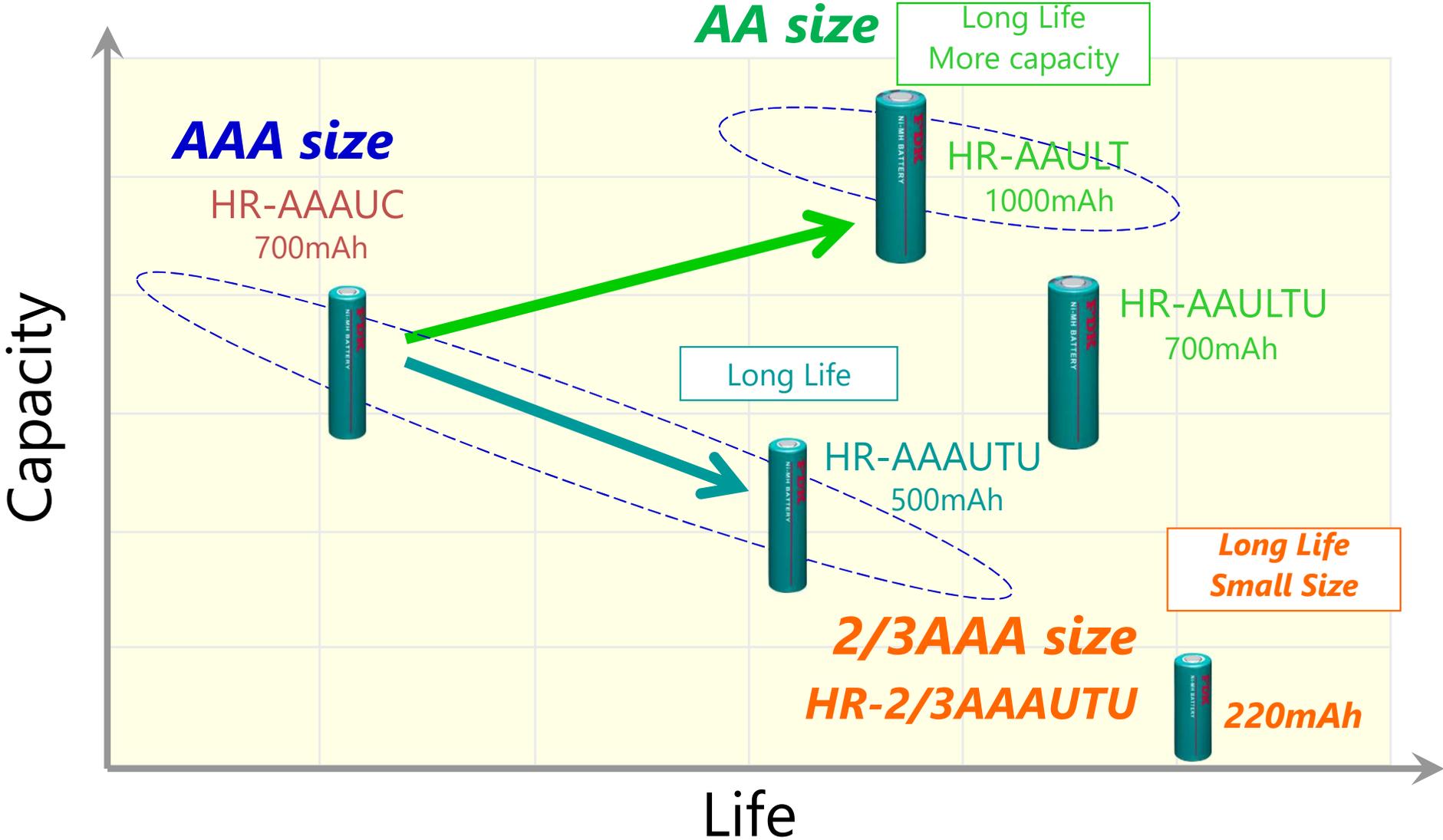
FDK recommendation Lineup model

- ① HR-AAULT (1000mAh)
- ② HR-AAULTU (700mAh)
- ③ HR-AAAUTU (500mAh)
- ④ HR-2/3AAAUTU (220mAh)

We select and propose the suitable battery model from our Ni-MH Lineup, based on the specification information of the meter equipment.

FDK recommendation Line-up model

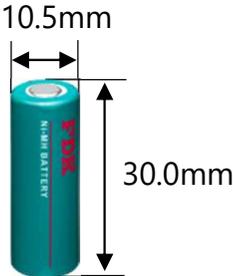
★ Battery Life vs. Capacity - Feature map



FDK recommendation Line-up model

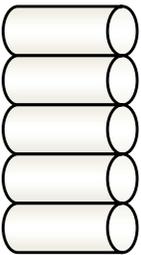
HR-2/3AAAUTU

- Typ.220mAh / Min.200mAh
- High performance at high temperature condition
- Small size
- Long life

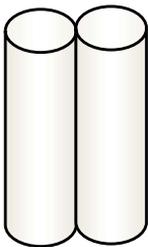


**Small size!
(High Voltage)**

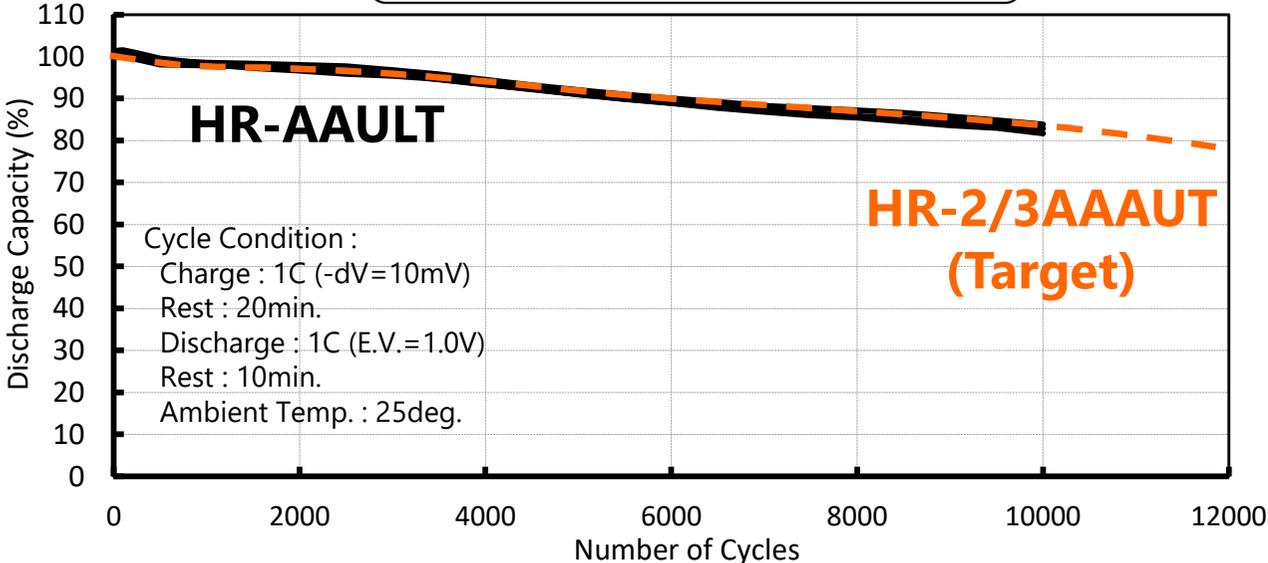
5 cells 2/3AAA



2 cells AA

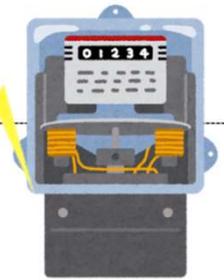
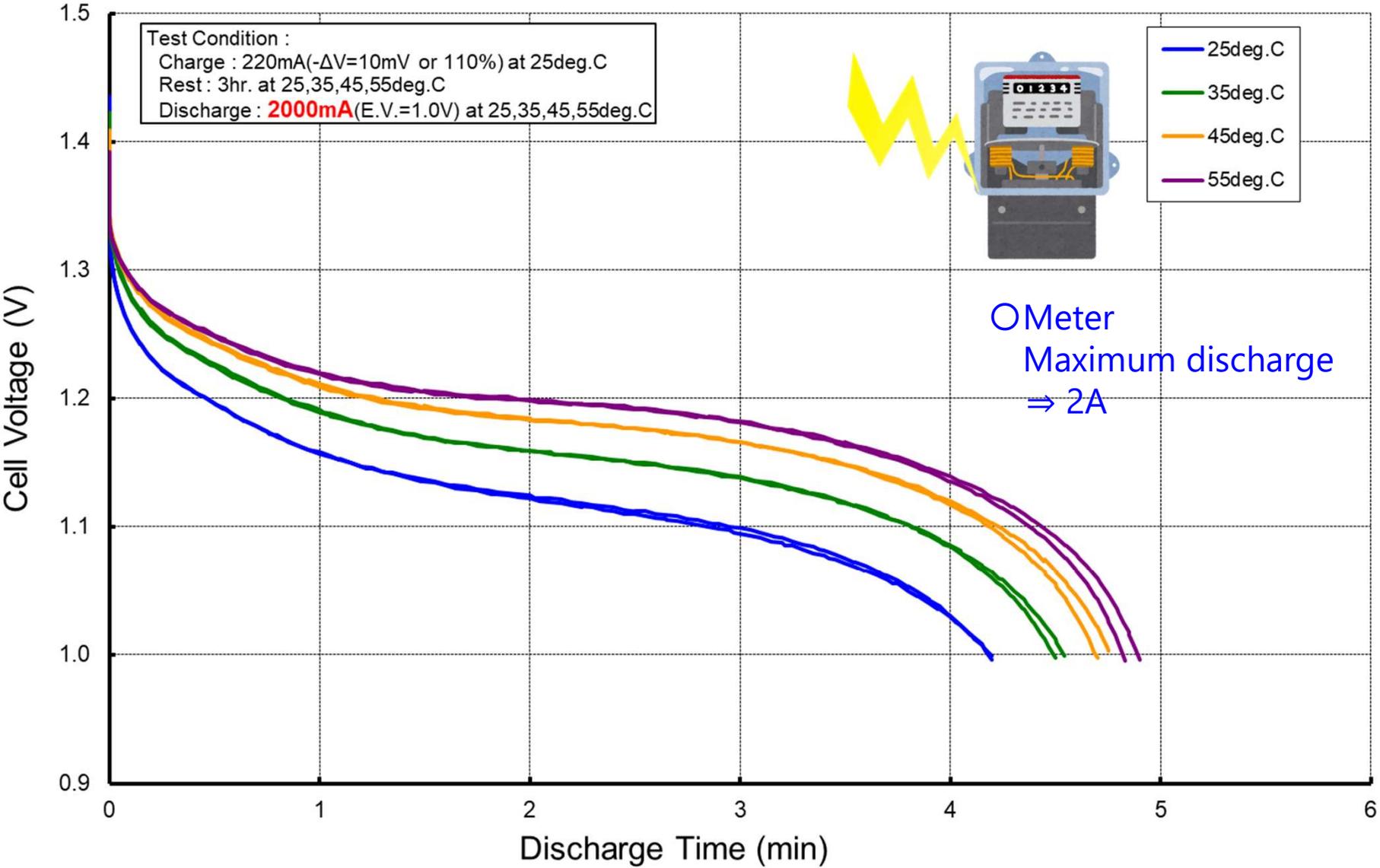


Long life!



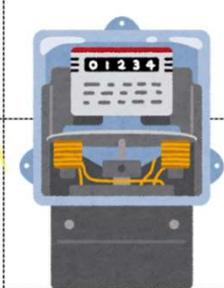
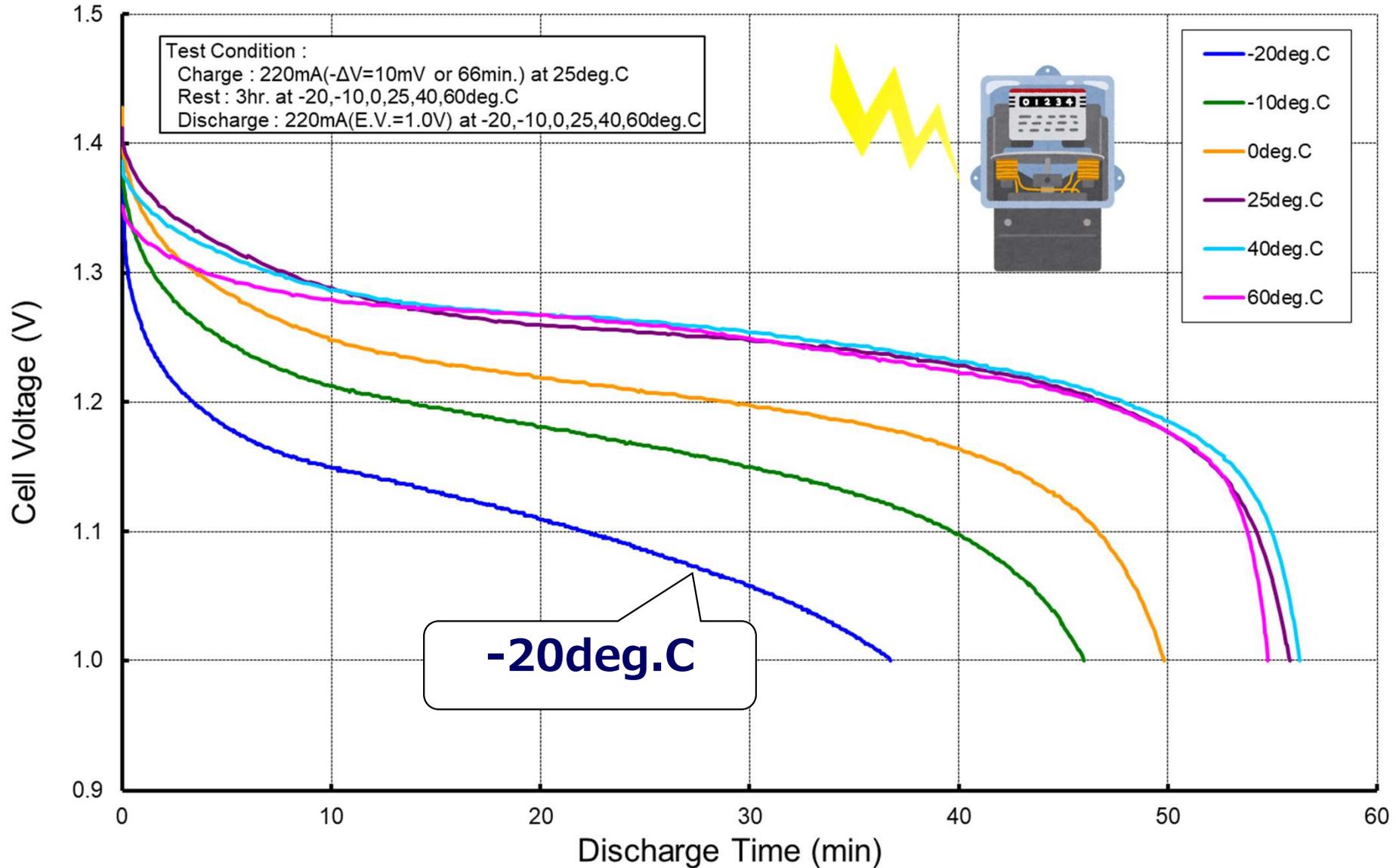
HR-2/3AAAUTU Discharge Characteristics

Excellent high-rate discharge characteristics! <HR-2/3AAAUTU>



HR-2/3AAAUTU Discharge Characteristics

Excellent several Temp. discharge characteristics! <HR-2/3AAAUTU>



-20deg.C

Backup Ni-MH for meter applications

When high capacity is required

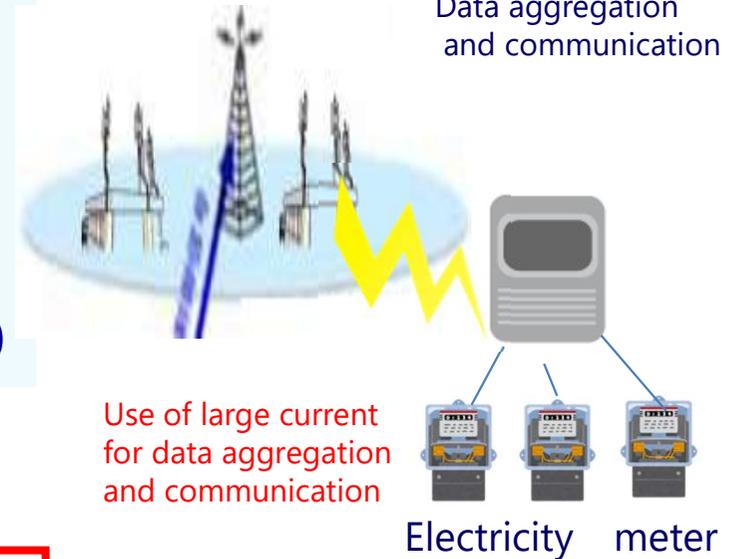
✓ Long life

✓ Large battery size

(large discharge currents or long time working, such as concentrators, require large capacities.)

■ Concentrator

Data aggregation and communication



FDK recommendation Lineup model

① HR-5/4SCUT (3250mAh)

② HR-4/3FAUT (3700mAh)

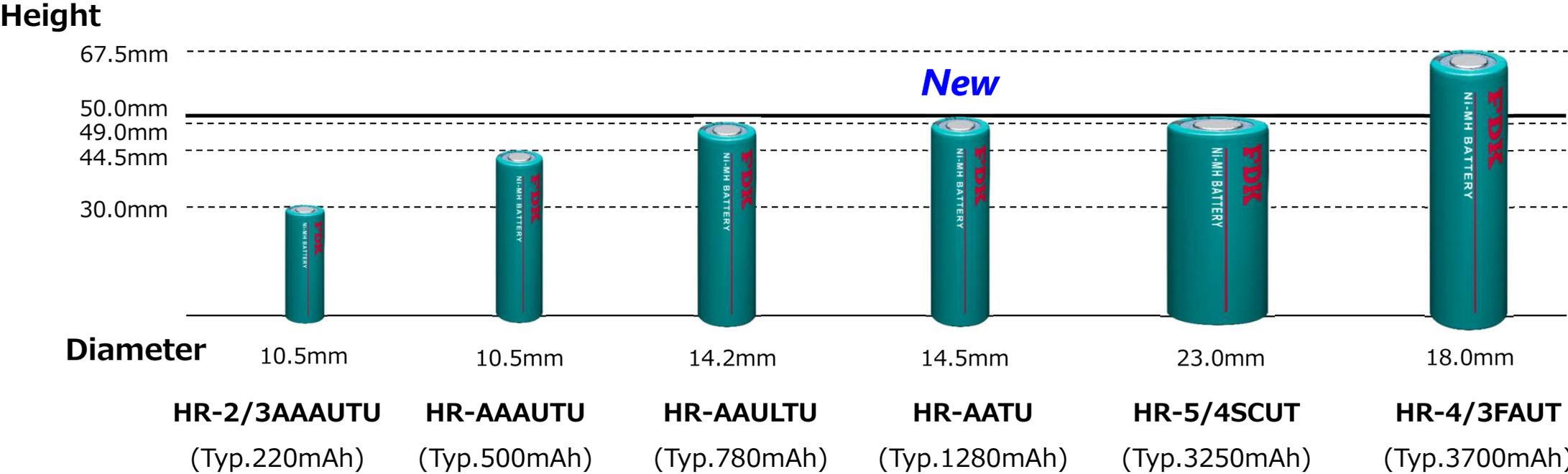
We select and propose the suitable battery model from our Ni-MH Lineup, based on the specification information of the equipment.

Size image of High Durability Ni-MH Batteries

Model No.	Capacity(mAh)		Dimensions(mm) ^{*3}	
	Typ. ^{*1}	Min. ^{*2}	Diameter	Height
HR-2/3AAAUTU	220	200	10.5	30.0
HR-AAAUTU	500	460	10.5	44.5
HR-AAULTU	780	700	14.2	49.0
HR-AAULT	1050	1000	14.2	49.0
HR-AATU <i>New</i>	1280	1200	14.5	50.0
HR-5/4SCUT	3250	3000	23.0	50.0
HR-4/3FAUT	3700	3500	18.0	67.5

**※New model HR-AATU
Samples available**

*1. Typical discharge capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16hours.
 *2. Minimum discharge capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16hours.
 *3. Including heat shrink tube.



FDK

Technology creating a better future