TECHNICAL BULLETIN

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[Title] MELSEC-A/QnA series CPU module battery life shortening and the corrective actions **[Date of Issue]** Nov., '06

[Relevant Models] A1SHCPU, A1SJHCPU, A1SJHCPU-S8, A2USHCPU-S1, A2SHCPU, A2SHCPU-S1, Q4ACPU, Q4ARCPU, Q2ASHCPU, Q2ASHCPU-S1

Thank you for your continued support of Mitsubishi programmable logic controllers, MELSEC-A/QnA series.
Please be advised that the A2SHCPU and the A2SHCPU-S1 are added to the target models that need attention regarding the battery life informed before.

1. Precautions

As the memory (SRAM) for sequence program storage was discontinued, different one has been used in the CPU modules as described in item 2 (1).
The new memory (SRAM) satisfies the life (including battery life) value guaranteed by Mitsubishi. However, with the memory change, the actual service value of battery life has been drastically shorter as described in item 2 (2); this is caused by the memory's characteristics, i.e., it requires more current for backup at power failure than the former one. Note that the guaranteed value of battery life has not been changed.
It is recommended to eliminate the affect of shorter battery life on the system by carrying out the corrective actions in item 3.

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2. Relevant Models and Changes

(1) Relevant models

Table 1 below shows the CPU module models with new memory (SRAM).

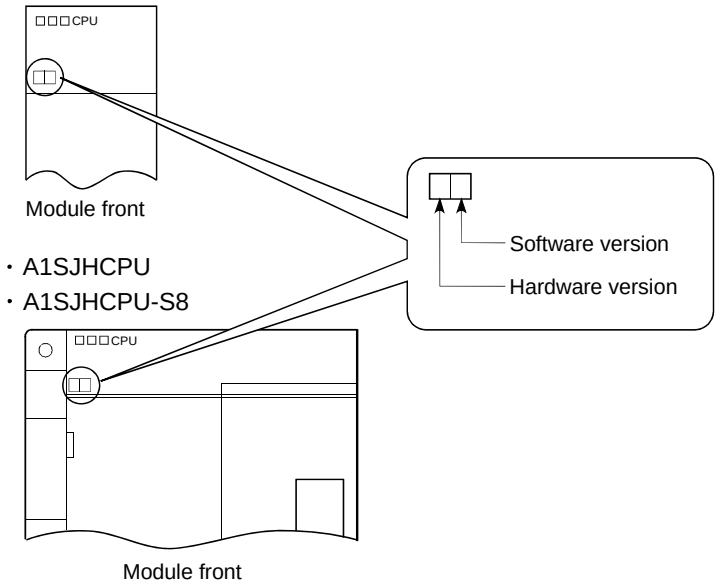
Table 1 Models with new memory (SRAM)

Model	Memory change time	Hardware version *1	
		Before change	After change
Q2ASHCPU	Manufactured from July, 2002	G or earlier	H or later
Q2ASHCPU-S1	Manufactured from July, 2002	G or earlier	H or later
Q4ACPU	Manufactured from March, 2003	N or earlier	P or later
Q4ARCPU	Manufactured from December, 2002	K or earlier	L or later
A2USHCPU-S1	Manufactured from October, 2003	E or earlier	F or later
A1SHCPU	Manufactured from July, 2005	H or earlier	J or later
A1SJHCPU	Manufactured from July, 2005	R or earlier	S or later
A1SJHCPU-S8	Manufactured from July, 2005	H or earlier	J or later
A2SHCPU	Manufactured from December, 2006	F or earlier	G or later
A2SHCPU-S1	Manufactured from December, 2006	F or earlier	G or later

*1: Checking the hardware version

The hardware version is shown on the version seal, which is located on the module front.

・Q2ASHCPU ・Q2ASHCPU-S1 ・Q4ACPU ・Q4ARCPU
・A2USHCPU-S1 ・A1SHCPU ・A2SHCPU ・A2SHCPU-S1



・A1SJHCPU
・A1SJHCPU-S8

(2) Changes
Table 2 below shows the changes in battery life with the memory (SRAM) change for each CPU module.

Table 2 Changes in actual service value

Model	Guaranteed value*2	Actual service value (Reference value) *3			
		Ambient temperature 40℃		Ambient temperature 25℃	
		Before change	After change	Before change	After change
Q2ASHCPU	1,050 hours 0.1 years	8,800 hours 1 years	3,400 hours 0.4 years	43,800 hours 5 years	4,000 hours 0.5 years
Q2ASHCPU-S1	860 hours 0.1 years	7,600 hours 0.9 years	3,400 hours 0.4 years	40,000 hours 4.6 years	4,000 hours 0.5 years
Q4ACPU	1,750 hours 0.2 years	22,000 hours 2.5 years	3,300 hours 0.4 years	43,800 hours 5 years	4,000 hours 0.5 years
Q4ARCPU	1,350 hours 0.2 years	22,000 hours 2.5 years	3,300 hours 0.4 years	43,800 hours 5 years	4,000 hours 0.5 years
A2USHCPU-S1	3,600 hours 0.4 years	39,000 hours 4.5 years	9,400 hours 1.1 years	43,800 hours 5 years	10,800 hours 1.2 years
A1SHCPU	4,000 hours 0.5 years	43,800 hours 5 years	24,500 hours 2.8 years	43,800 hours 5 years	27,000 hours 3.1 years
A1SJHCPU	4,000 hours 0.5 years	43,800 hours 5 years	24,500 hours 2.8 years	43,800 hours 5 years	27,000 hours 3.1 years
A1SJHCPU-S8	4,000 hours 0.5 years	43,800 hours 5 years	24,500 hours 2.8 years	43,800 hours 5 years	27,000 hours 3.1 years
A2SHCPU	4,000 hours 0.5 years	43,800 hours 5 years	24,500 hours 2.8 years	43,800 hours 5 years	27,000 hours 3.1 years
A2SHCPU-S1	2,200 hours 0.2 years	43,800 hours 5 years	15,500 hours 1.7 years	43,800 hours 5 years	19,200 hours 2.2 years

*2: The guaranteed battery service life; equivalent to the total power failure time that is calculated based on the characteristics value of the memory (SRAM) supplied by the manufacturer and under the storage ambient temperature range of -25 to 75℃ (operating ambient temperature of 0 to 55℃).
This value has not been changed with the memory change.

*3: The actual battery service life; equivalent to the total power failure time that is calculated based on the measured value and under the storage ambient temperature of 40℃ and 25℃. This value is intended for reference only, as it varies with characteristics of the memory.
Note that the actual service value calculated in this method will be replaced with the one provided in a manual, which indicates the battery life that is calculated based on the data supplied by the manufacturer and under the specific condition (consumption current at the storage ambient temperature of 40℃).

3. Corrective Actions for shorter battery life

The relevant corrective actions are provided here.

(1) Do not use a battery longer than the guaranteed time (total power failure time) *4 in item 2 (2) and replace with new one regularly.

(2) When the battery may be used longer than the guaranteed time (total power failure time) *4 in item 2 (2), carry out either of the following corrective actions.

(a) When the special relay for battery error in Table 3 turns ON, back up programs and data within the battery life in Table 3.
The memory will not be cleared while the PLC system power is ON, even if a battery error occurs.

Table 3 The battery life after special relay turns ON and applicable special relay for each CPU module

Model	Battery life after special relay turns ON	Special relay that turns ON
		Battery error
Q2ASHCPU	24 hours	SM51, SM52
Q2ASHCPU-S1	19 hours	
Q4ACPU	44 hours	
Q4ARCPU	34 hours	
A2USHCPU-S1	168 hours	M9006, M9007
A1SHCPU	100 hours	
A1SJHCPU	100 hours	
A1SJHCPU-S8	100 hours	
A2SHCPU	100 hours	
A2SHCPU-S1	56 hours	

Note: Make the settings so that a battery error can be checked with the special relays in Table 3, and replace the battery as necessary. When a battery error occurs, immediately carry out the corrective action (a) without stopping the system, in order to prevent the memory clear.

*4: Battery consumption time (total power failure time)
Battery life is equivalent to the total power failure time. A battery is not consumed while the PLC power is ON. The battery consumption can be minimized by increasing the ratio of energization time as shown in the table 4.

Example) Q2ASHCPU, ambient temperature 25℃, actual service value after change: 4000 hours

Table 4 Battery life by the ratio of energization time

Energization time ratio	Reference value of time until the battery reaches its maximum life (Total power failure: 4000 hours)
0%	Approx. 5.6 months
30%	Approx. 7.8 months
50%	Approx. 11 months
100%	Approx. 5 years (guaranteed time)

Note: Energization time ratio indicates the ratio of PLC system power ON time per day (24 hours).
For example, in case power ON time is 12 hours and power OFF time is 12 hours a day, the energization time ratio is 50%.

(b) Run the PLC from ROM or boot it from a memory card, in order that programs and parameters will be protected when the PLC is powered OFF, even if the battery voltage drops.
However, the above operations cannot hold latch devices, clock data and failure history if the CPU module battery voltage drops.
For details, refer to the corresponding CPU module manual.

- In the case of Q2ASHCPU, Q2ASHCPU-S1, Q4ARCPU, Q4ARCPU
  Set a memory card to a CPU module and store programs and parameters into the E2PROM or RAM section of the memory card.
- In the case of A2USHCPU-S1, A1SHCPU, A1SJHCPU, A1SJHCPU-S8, A2SHCPU, A2SHCPU-S1
  Set a memory card (E2PROM) to a CPU module and store programs and parameters into the E2PROM section of the memory card.

(3) Using large capacity battery of A8BAT can extend battery life.
A8BAT, the battery module is mounted at outer side of the CPU module.
For details of A8BAT, Please consult your local Mitsubishi service center or representative.

4. A8BAT battery

(1) Specifications
Specifications of A8BAT-SET battery are described in the table 5.

Table 5 Specifications

Item		Specification
Model name		A8BAT
Battery type		Lithium/Thionyl chloride primary battery (assembled battery)
Initial voltage		3.6V
Nominal current capacity		15300mAh (1700mAh×9 pcs)
Storage life		5 years (at normal temperature)
Backup time after power OFF		Refer to section 4 (3)
Application		For memory backup of IC-RAM and retention of power failure
Dimensions	A8BAT battery	130mm(5.12 inch)(H) ×34.5mm(1.36 inch)(W) ×109.6mm(4.31 inch) (D)
	A8BAT connection cable	800mm(31.5 inch)
Accessory		A8BAT connection cable (AC08BAT) ×1

(2) Applicable CPU modules
The CPU modules applicable with A8BAT are shown in the table 6.

Table 6 Applicable CPU modules

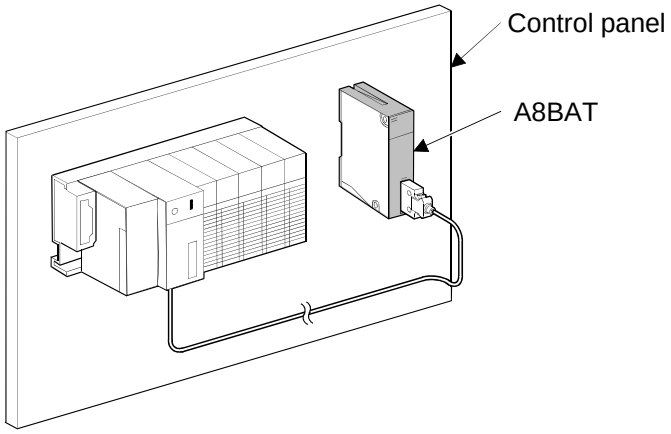
Model	Target hardware version
Q2ASHCPU	H or later
Q2ASHCPU-S1	H or later
Q4ACPU	P or later
Q4ARCPU	L or later
A2USHCPU-S1	G or later
A1SHCPU	J or later
A1SJHCPU	S or later
A1SJHCPU-S8	J or later
A2SHCPU	F or later
A2SHCPU-S1	F or later

(3) A8BAT battery life
Battery life for each CPU module is shown in the table 7.

Table 7 A8BAT battery life

Model	Guaranteed value	Actual value (reference value)	
		Ambient temperature 40℃	Ambient temperature 25℃
Q2ASHCPU	8,500 hours 1 years	27,500 hours 3.1 years	32,400 hours 3.7 years
Q2ASHCPU-S1	6,900 hours 0.8 years	27,500 hours 3.1 years	32,400 hours 3.7 years
Q4ACPU	14,100 hours 1.6 years	27,300 hours 3.1 years	32,400 hours 3.7 years
Q4ARCPU	10,900 hours 1.2 years	27,300 hours 3.1 years	32,400 hours 3.7 years
A2USHCPU-S1	29,100 hours 3.3 years	43,800 hours 5 years	43,800 hours 5 years
A1SHCPU	32,400 hours 3.7 years	43,800 hours 5 years	43,800 hours 5 years
A1SJHCPU	32,400 hours 3.7 years	43,800 hours 5 years	43,800 hours 5 years
A1SJHCPU-S8	32,400 hours 3.7 years	43,800 hours 5 years	43,800 hours 5 years
A2SHCPU	32,400 hours 3.7 years	43,800 hours 5 years	43,800 hours 5 years
A2SHCPU-S1	17,800 hours 2 years	43,800 hours 5 years	43,800 hours 5 years

(4) Mounting image of A8BAT
The mounting image onto the board of when using A8BAT is described below.



Sub No.	Revision
A	• A1SHCPU, A1SJHCPU and A1SJHCPU-S8 are added as relevant models. • Descriptions of A8BAT are added.
B	• A2SHCPU and A2SHCPU-S1 are added as relevant models.