



## Product Update Notice for Rechargeable Batteries and Firmware 15.20

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### A. PRODUCTS AFFECTED

OCS	U.S. Product Part Numbers	European Product Part Numbers
<b>XL4</b>	HE-XC1Ex	HEXT251C1xx
<b>XL7</b>	HE-XW1Ex	HEXT391C1xx
<b>EXL6</b>	HE-EXL1Ex	HEXT371C1xx
<b>EXL10</b>	HE-EXV1Ex	HEXT505C1xx
<b>RCC1410</b>	HE-RCC1410	HE-RCC1410
<b>RCC2414</b>	HE-RCC2414	HE-RCC2414
<b>RCC8842</b>	HE-RCC8842	HE-RCC8842

### B. ISSUE

Controller batteries not properly recharging. Possible symptoms include:

- Register Backup Error Message on Power-up
- Register values reverting to old values
- Loss of Current Time and Date for the Real-time Clock

## C. IMPROVEMENTS IN FIRMWARE 15.20

1. Improvements to the battery charging algorithm, including handling temperatures from -10°C to +50°C ambient. Most OCS products are rated to +60°C ambient. It is expected that these products are run at temperatures at or below +50°C for 8 to 40 hours per year so that the battery is charged.

**NOTE:** Products that are rated to -40°C contain a special rechargeable battery and can handle charging from -40°C to +60°C.

2. The register backup process on power-down was improved. In some cases, powering down a unit with a partially discharged battery did not backup registers correctly.
3. Eliminated false Register Backup Error Messages on power-up. In some cases, registers were backed up properly, but an error message was shown that indicated the backup did not complete on the previous power-down.
4. The Register Backup Error Message is now suppressed if the Pop-up Status is set to OFF in the Set Screen section of the System Menu.
5. The Register Backup Error Message now has a universal date format.
6. Added support in the RCC for automatic restore of register values after battery failure if a backup exists and AutoRun is enabled.

## D. DESCRIPTION OF BATTERY FUNCTION

The OCS Controllers with rechargeable batteries maintain register data in high-speed RAM when connected to DC power. When this power is lost, critical circuits switch over and run on battery power for about 100mS. During this time, register and other retentive data is saved away to FLASH memory. After this time the real-time clock continues to run on the battery at a very low power level. The battery is designed to maintain the real-time clock for well over a year in the powered-down state. Once DC power is restored, the battery will recharge as necessary. The battery will recharge in about 8 to 40 hours depending on temperature and state of charge.

## E. BATTERY LIFE

The battery is designed to last 300 full charge cycles, 1000 partial charge cycles, or 7 to 10 years. Because typical operation does not drain the battery, the 7 to 10-year aging of the battery would limit its useful life. The battery is designed to be replaceable.

## F. BATTERY CHARGING CYCLE

1. Standard temperature controllers charge the battery between -10°C and +50°C ambient. Typically, 8 to 40 hours of charging time per year is required.
2. The battery management firmware may cycle between different states depending on the temperature, charge level and other conditions. Those charge states are listed in Table 1 on the following page and have been updated for Firmware 15.20.
3. If a standard temperature controller experiences temperature above +50°C ambient, it will need to run below +50°C ambient for 8 to 40 hours for charging to occur. This is usually not a problem in most applications.
4. For the controllers listed in this PUN, the application program is not battery backed. The program is stored in FLASH memory at the time of download. The battery plays no part in program retention.

## G. BATTERY STATUS IN SYSTEM REGISTERS

Table 2 - Battery Status	
%SR195	Max CPU temperature
%SR196	Charge State; Refer to Table 1
%SR197	Charging Current Max mA
%SR198	Battery Voltage in mV

**NOTE:** Battery Health Status, %SR55.13, is updated at power-down.

**IMPORTANT:** The battery voltage shown in the System Menu and in %SR198 is ONLY valid if the battery is not in the Charging State. To check battery voltage, power cycle the controller and check the battery voltage within the first two minutes of power-up. The controller will not charge during the first two minutes after a power-up.

## H. BATTERY CHARGING STATUS

Viewed in the System Menu under “View Battery Status” or read as a numeric value in %SR196:

Table 1 - Charging State Table		
State	Name	Description
0	Final Charge to 4.2V	The battery is fully charged
1	Normal Charging	Battery is fast charging
2	Hot Charging	Battery is slow charging
3	Battery Won't Charge	Battery has not completed charging in 8/40 hours
4	Battery Too Hot	The ambient conditions are too high, and the battery will not be charged
5	Cold Charging	Battery is slow charging
6	Battery Too Cold	The ambient conditions are too low, and the battery will not be charged
7	Error No Battery	No battery was detected at power up. It will not attempt to charge until the next power cycle.
8	Final Charge to 4.1V	The battery has completed charging while warm.
10	Error: Voltage Too Low	The battery voltage was too low at power up. It will not attempt to charge until the next power cycle. Make sure a proper battery is installed.
11	State Reset / Waiting / Waiting Discharging	The unit has powered up and is waiting 2 minutes before attempting to charge.
12	Wait Discharging	The battery has been charged and the system is waiting for the voltage to drop before charging again.

## I. REPLACEMENT BATTERY

The Horner part number for the LI-ION rechargeable battery is **BAT00019**.

## J. CONTACT INFORMATION

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