

K60 CPU Firmware Version Changelog

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Version 1.48

1. Reactive Power values had 3 digits after the decimal point, instead of 2; this was fixed.
2. Reactive Power did not have units of measure appended to the value; this was fixed.
3. The ALMBACK command (Trap Alarm Backoff Time) did not have write access. It can now be changed using admin access.
4. The Modbus values that had a data type of double are now switchable to float, by changing UCR Bit 17 from 0 to 1, or by using the Config/Modbus webpage.
5. Requires webpage version UEC022 or earlier.
6. Requires UEC_v22.mib or earlier.

Version 1.51

1. Modbus registers 21-22 and 25-26 decimal were changed from data type uint to data type sint. The "Infeed Total Active Power" and the "Infeed Total Reactive Power" Modbus variables now support negative values. In previous versions, these two variables reported zero, in place of a negative number.
2. The passwords may be up to 15 characters long, but the webserver's authentication dialog box only accepted 9 characters. The webserver now accepts up to 15 characters.
3. The OTLID command was changed from user access to admin access.
4. Requires webpage version UEC022 or earlier.
5. Requires UEC_v22.mib or earlier.

Version 3.13

1. BACnet protocol was added. It requires a meter with 512K of RAM. If this firmware is loaded into a meter with 128K of RAM, the PWR LED will blink amber instead of green to indicate the meter doesn't have enough RAM, and BACnet will be disabled.
2. The following Telnet commands were added: BBMDIP, BBMDTTL, BDI, BIPORT, and RAM.
3. Added support for M50 Dual Ethernet Meter.
4. Product Serial Number maximum length changed from 15 to 23.
5. Fixed issue with reading Modbus registers over a group boundary. This would cause all registers after the first group to return 0xFFFF.
6. Accessing an undefined Modbus TCP register could stop the data collection process; this has been fixed.
7. Modbus TCP socket handling was improved to prevent lockout when a user improperly closes connections.
8. Added Measured Neutral parameters: min, max, min alarm, max alarm, demand, peak demand, and % of rated.
9. About once a day an erroneous data point value would be reported; this has been fixed.
10. Webpage timestamp changed from date/time to elapsed time since last reset, using the format: "days hours:minutes:seconds".
11. Requires webpage version UEC023 or later.
12. Requires UEC_v23.mib or later.

Version 3.22

Released September 11, 2015

1. Added ability to customize LCD logo.
2. Energy above 1,000 kWh would be miscalculated due to a rollover issue; this has been fixed.
3. Requires webpage version UEC023 or later.
4. Requires UEC_v23.mib or later.

Version 3.36

Released April 28, 2016

1. The data collection process could be stopped when the CPU experiences a high loading condition; to recover, a reboot was required; this has been fixed.
2. In the Modbus interface, the Model Number and the Serial Number were shifted by 4 bytes causing incorrect values to be read; this has been fixed.
3. Added support for the M50 series 7-segment display.
4. To physically locate a meter, the BLKPWRLED Telnet command was added. This command alternates the PWR LED between red and green at a rate of 5 times per second, with a duration of 5 seconds.
5. BACnet Disable added as User Configuration Register (UCR) bit 24.
6. BACnet Device Object Name and Device Object Location are now linked to the CPM's Device Name and Device Location parameters.
7. The BACnet Application Software Version data object now reports the BACnet stack version, instead of the meter's Firmware Version.
8. The default web pages were changed to just a Device Info page and an Upload page. The home page of the default web pages is a redirection page to the Device Info page.
9. Webpage upload file size is now checked. The file will be discarded if it's too large.
10. Requires webpage version UEC023 or later.
11. Requires UEC_v23.mib or later.

Version 3.39

Released September 7, 2016

1. In the Modbus interface, when a block of data is read, some data points may report incorrect values. The data points affected will change based on the block start address and the block end address; this has been fixed.
2. 2-Phase feature added. The LCD and 7-segment display don't display disabled values, and disabled data points are set to all 9's.
3. Previously, the Delta/Wye configuration was forced to Delta when the reset button was held for 5 seconds. Now holding the reset button for 5 seconds, no longer effects the Delta/Wye configuration.
4. The M50's Status LED no longer stays yellow following a 5 second hold of the reset button.
5. OTLTRACP had 3 digits after the decimal point instead of 2; this has been fixed.
6. Requires webpage version UEC023 or later.
7. Requires UEC_v23.mib or later.

Version 3.43

Released June 7, 2017

1. L3-L1 outlets will now report positive active power and will now accumulate energy.
2. SCR1 (Swap Configuration Register 1) added. It allows the polarity of each CT to be reversed.
3. SCR2 (Swap Configuration Register 2) added. It allows the CT line mapping to be changed.
4. 2-phase line-to-line meters now report all 9's for line-to-neutral voltages instead of virtual calculated values.
5. The 7-segment display driver IC may power-up into an invalid state causing: (a) the digit scan rate to be very low; only one digit will be lit at a time for a 2.5 second interval. (b) blink mode turned on. (c) display turned off. This has been fixed.
6. Measured Neutral Current was zero for Split-Phase, Single Phase L2-N, Single Phase L3-N, and 2-Phase L2-L3-N configurations; this has been fixed.
7. In the Modbus interface, the CPM was occasionally responding too quickly, violating the dead time space between packets required by the Modbus specification. This has been fixed.
8. Requires webpage version UEC025 or later.
9. Requires UEC_v23.mib or later.

Version 3.64

Released January 23, 2018

1. In the BACnet interface, the CPM was not reporting Analog Input as a supported object type. This has been fixed.
2. Some AC single phase configurations would show zero amps for neutral current; this has been fixed.
3. Updated SSH/SSL routines.
4. Fixed reboot button on webpage interface (changed from immediate action to 2 second delay).
5. Made modifications to SNMP as a result of conformance testing.
6. Firmware uploader now rejects files larger than the internal flash image size.
7. DHCP, fixed security vulnerability.
8. In SNMP, changed 4to20ma Value from read-write to read-only.
9. Added UCR bit to disable Modbus/SNMPv1/SNMPv2c.
10. SNMP communities and passwords now require admin access level to read.
11. Fixed unit suffix display issue in SNMPv3.
12. Added "x-frame-options: DENY" to HTTP header to prevent clickjacking.
13. Changed the number of outlets from 4 to 6.
14. Added the Telnet command \$OUTALM2 for outlets 5 and 6.
15. Added Frequency Min/Max to Telnet and Modbus.
16. Added Line-to-Neutral Voltage Min/Max to Telnet and Modbus.
17. Added Line-to-Neutral Voltage Min/Max Alarms to Telnet and Modbus.
18. IEEE Power Factor Sign Convention implemented.
19. SCR2 (Swap Configuration Register 2) was not working correctly; this has been fixed.
20. Added Temperature Monitor alarms.
21. Added Temperature Monitor UCR bit 10 for switching between Fahrenheit and Celsius.
22. Added Temperature Monitor LCD screen.
23. Added Temperature Monitor webserver CGI interface.
24. Added Line-to-Neutral Voltage Min/Max parameters.
25. Added Frequency Min/Max parameters.
26. Added group reset command \$RESETGRP.
27. Updated SNMP to latest MIB (Temperature, Outlet 5&6, Line-to-Neutral Voltage Min/Max, Frequency Min/Max, Reset Group).
28. Updated BACnet objects (Temperature, Outlet 5&6, Line-to-Neutral Voltage Min/Max, Frequency Min/Max, Reset Group).
29. Updated webserver CGI interface (Temperature, Outlet 5&6, Line-to-Neutral Voltage Min/Max, Frequency Min/Max, timestamp is now in a fixed location).
30. Updated LCD sequence for consolidated outlet page and temperature data.
31. Added group reset to Modbus and fixed register padding.
32. Fixed issue with maximum parameter element to allow Outlet 5&6 to work properly.
33. SSL/SSH updated.
34. \$ENERGY,R command works with monitor login issue fixed.

- 35. SSL/SSH stops working and requires a reboot issue fixed.
- 36. Requires webpage version UEC026 or later.
- 37. Requires UEC_v26.mib or later.

Version 3.87

Released June 28, 2018

- Added support for the Temperature Monitor.
- Sometimes a single Ethernet meter, with firmware version 3.64, would lockup during power-up. If the reset button was pressed, the meter would unlock and begin normal operation. This has been fixed.
- Made some improvements to the MODBUS protocol to increase performance.
- Made some improvements to the webserver to increase performance.
- Set sysDescr and sysObjectID values in the SNMP communication protocol.
- Added UCR bit 27, Modbus protocol disable.
- Added UCR bit 26, SNMPv1/SNMPv2C protocol disable.
- LCD no longer displays outlet alarms if meter is configured as a feed.
- Increased hardware version from 20 to 32 bytes.
- Added \$SCR Telnet command to allow CT polarity reversal.
- Energy accumulators are no longer corrupted during a firmware update.
- Alarm is now triggered by INFALM, OUTALM, OUTALM2 and TMPALM. Previously it was only triggered by INFALM and OUTALM.
- Added \$INFNCR (Infeed Neutral Current Rating) command.
- Added a DHCP control screen to the settings menu on the LCD.
- Added a reboot control screen to the settings menu on the LCD.
- Changed splash screen title to "Starline CPM Version Numbers".
- If the configuration data exceeded 4KB, some settings would be lost after a firmware update. This has been fixed.
- Frequency Min and Max were swapped in SNMP. This has been fixed.
- Requires webpage version UEC027 or later.
- Requires UEC_v26.mib or later.

Version 4.07

Released August 5, 2019

1. Uploads via the internal webpage would occasionally fail due to incorrect TCP packet sizes; this has been corrected
2. SNMP notifications fixed. There were issues with the following:
outletUnderCurrentDeassertEvent, outletOverCurrentDeassertEvent, and
outletUnderCurrentAssertEvent
3. Device ID length changed from 24 to 32 characters
4. Added the ability to disable factory access through the UCR (bit 1)
5. Added WLAN RSSI (\$WLANRSSI) parameter to check received signal strength
6. Added support for breakers sensing including current status, alarms/traps, and the ability to disable alarms in UCR (bit 2)
7. Added Modbus Security Disable to the UCR (bit 23); this will allow all write transactions without first writing to the Modbus Access Register
8. If a CPM was configured with an invalid trap destination address and did not receive a response, it would wait 5 minutes for a timeout to occur and prevent other alarm conditions from being updated; this has been fixed
9. Corrected units for \$LCDPDT (now seconds)
10. Designed for UEC_AC_029 webpage.
11. Designed for UEC_v27.mib.

Version 4.21

1. This version of firmware is equivalent to K66 firmware versions 5.02 but does not have SNMPv3 enabled. To use SNMPv3 the customer must update to v4.21A.
2. LAN & WLAN DHCP
 - a. Fixed an issue where DHCP would stop requesting an IP address. DHCP will now reissue the DHCP discover request between 4 and 32 seconds, until a response is received.
3. SSL, Telnet, and SSH
 - a. SSL was not working properly due to an out-of-date certificate. Updated the default certificate to fix this issue.
 - b. Improved SSL speed. This resulted in a noticeable improvement in how fast the webpages will load.
 - c. Fixed an issue where SSH/SSL (TCP ports 22 and 443) would lock-up if the user opened too many sessions of SSH or if the user disconnected their laptop while the SSH sessions were still opened. The meter would think that the sessions were still opened so next user that tries to connect would not be able to. There have been multiple features added to fix these issues:
 - i. The webpage lockup was occurring due to the meter running out of memory. This has been resolved by optimizing the internal memory resource pools. The webpage (TCP port 443) will no longer lock up.
 1. With the improvements made to the memory pool the customer will also be able to establish 4 simultaneous SSH sessions (this was previously 2).
 - ii. The telnet and SSH servers now support timers to detect inactivity and/or broken connections:
 1. The keepalive timer, fixed at 60 seconds
 2. The connect timeout, fixed at 100 seconds
 3. The inactivity timeout (or receive timeout), which is user settable using the \$SITO command. This is a good security measure in case the user forgets to close their session and walks away from their machine. More info on the new command:
 - a. Telnet/SSH command = \$SITO
 - b. This is only changeable with admin credentials.
 - c. A reboot must be performed for the change to take effect.
 - d. By default, this is set to 3 minutes

- e. Minimum value can be set to 30 seconds.
- d. Update TLS from version 1.0 to 1.2.

4. LEDs:

- a. Added feature to keep LEDs on when firmware is uploading.

5. Wifi:

- a. The issue where WiFi connectivity would periodically lock-up has been resolved.
- b. On previous firmware versions the meter could stop communicating over WiFi for about 15 minutes. This did not happen all the time and on most units it would not happen at all. After 15 minutes the entire meter would reboot to bring the connection back online. The meter now handles the connectivity issue internally in the firmware without having to reboot the entire device.
- c. There are now two levels of recovery if WiFi stops working.
 - i. Attempt to reconnect to the access point.
 - 1. The meter will attempt to reconnect to the access point before doing anything else.
 - ii. Attempt to restart the WiFi chip on the meter.
 - 1. This has been implemented as a last resort. If the WiFi chip on the meter stops communicating to the main processor then the main processor will reset the WiFi chip. This will result in the meter appearing to be "offline" for approximately 3 minutes. During this time the meter is still operational and recording data (**no data will be lost including energy**).
 - 2. During testing it was found that the meter never had to restart the WiFi chip. Attempting to reconnect to the access point seems to have fixed the issued (the first level of recovery). The WiFi chip restart feature was left in the firmware just in case the WiFi chip truly does lock up (even though it was not able to be reproduced during testing).

6. MISC:

- a. Added in a feature so that the K66 will reject K60 firmware. This makes sure that the customer cannot accidentally load the wrong firmware into the meter.

Version 4.21A (SNMPv3)

1. This version of firmware is equivalent to K66 firmware version 5.02 but does not have BACnet or Modbus TCP enabled. To use BACnet or Modbus TCP the customer must use v4.21.
2. Based on K60 v4.21 but has SNMPV3 enabled.
3. Fixed an issue from v3.87A where the sysDescr OID's was not supported. The meter now supports all system OIDs.
 - a. sysDescr
 - i. OID = .1.3.6.1.2.1.1.1
4. Fixed a bug where the SNMPv3 Engine ID command was not working.
5. Changed the way the SNMPv3 Engine ID Command Works (\$SNMPEID):
 - a. If the user leaves the engine ID blank, then the CPM will auto-generate one for the user.
 - b. The user can now enter a custom Engine ID which is 32 hex bytes and needs to be formatted like this:
 - i. XX:XX:XX:XX:XX:XX:XX:XX:XX:XX:XX:XX
6. Added bit 30 to the UCR to enable/disable SNMPv3.
 - c. Changing bit 30 to a 1 enables SNMPv3.
 - d. Changing bit 30 to a 0 disables SNMPv3.
7. Added a telnet command to keep track of the SNMP engine boots.
 - e. \$SNMPEB
 - f. This value increases every time SNMP is restarted and should be reset by the user if the engine id is changed.
8. Fixed a bug where the default Auth/No Priv credentials were not working.
 - g. Once the default parameters were changed, they would start working properly.
 - h. The user can now use the default parameters, but it is recommended to change these.
9. Fixed a bug where SNMPv3 traps were not working.
10. Fixed a typo in OID 1.3.6.1.2.1.1.1 (sysDescr). This parameter used to show up as "UEC CMP AC Meter". This has been fixed so that it will now show up as "UEC CPM AC Meter".
11. Fixed a bug where SNMPv1 and v2c traps would still get sent even if SNMPv1 and v2 were disabled in the UCR.

12. Removed the SNMPv3 Context Name Command (\$SNMPCN). This command was unnecessary and was not being used by the CPM.
13. Removed the SNMP Trap Engine ID commands (\$SNMPT1EID and \$SNMPT2EID). These commands are only necessary for SNMP informs which the CPM does not currently support.
14. Added support for AES128 for privacy algorithms for both Auth/Priv and Trap credentials:
 - i. \$SNMPAPPA
 - j. \$SNMPTPA
15. Changed how the authentication and privacy algorithm commands work.
 - k. Privacy Algorithms will now **only** accept AES or DES
 - i. AES means AES128. AES192 and AES256 are not supported.
 - ii. If the user enters anything other than AES or DES then the CPM will treat it as an error and reject it.
 - l. Authentication Algorithms will now **only** accept MD5 or SHA
 - i. If the user enters anything other than MD5 or SHA then the CPM will treat it as an error and reject it.
16. Changed the way trap authentication and privacy algorithms work:
 - m. Privacy Algorithms will now **only** accept AES, DES, or -
 - i. AES means AES128. AES192 and AES256 are not supported.
 - ii. - means that the user does not want to use the privacy algorithm with the CPM.
 - iii. If the user enters anything other than AES, DES, or - then the CPM will treat it as an error and reject it.
 - n. Authentication Algorithms will now **only** accept MD5, SHA, or -
 - i. The - means that the user does not wish to use authentication algorithms.
 - ii. If the user enters anything other than MD5, SHA, or - then the CPM will treat it as an error and reject it.
17. Changed factory default Trap Privacy Password from "-" to TPrivPass
 - a. \$SNMPTPP
18. Unauthenticated credentials (no auth/no priv) have been updated so that the user can only read OIDs. The user will not be able to write to any OIDs when accessing the CPM with an unauthenticated username.
19. Added a feature to prevent the user from using the same username for no auth/no priv, auth/no priv, and auth/priv.
 - b. If the same username was used on more than 1 security level, then SNMP would not work correctly.
20. Enabled Ring Mode in this build. On previous SNMPv3 builds Ring Mode was disabled.

Version 4.22

1. SSH
 - a. Fixed a vulnerability where port 22 would lock-up. This issue was found during vulnerability and penetration testing.
2. SSL (HTTPS):
 - a. Fixed a vulnerability where port 443 would lock-up. This issue was found during vulnerability and penetration testing.

Version 4.22A (SNMPv3)

1. This version of firmware is equivalent to K60 firmware version 4.22 but does not have BACnet or Modbus TCP enabled. To use BACnet or Modbus TCP the customer must use v4.22.
2. SNMPV3:
 - a. Fixed an Issue where the Engine ID was not unique:
 - i. If the customer leaves the engine ID blank then the engine ID is autogenerated per RFC 3411, as follows:
 1. bytes 0-3 contain UEC enterprise number, as well as byte 0 having high bit set
 2. byte 4 contains a 3, indicating that MAC address follows.
 3. byte 5 is zero
 4. bytes 6-11 contain LAN MAC address if LAN MAC is set, otherwise WLAN MAC address if WLAN MAC is set, otherwise these will be zero
 - b. Added a feature to disable each of the login credentials by changing the username to *
 - i. This was necessary so that the customer could disable the noAuth/noPriv and Auth/no Priv credentials if they aren't being used:
 1. \$SNMPUUU
 2. \$SNMPAUU
 3. \$SNMPAPUU
 - c. Modified the SNMPv3 trap username functionality (\$SNMPTUU):
 - i. If the user sets \$SNMPTUU = \$SNMPAPUU then the traps will piggyback off these registers:
 1. \$SNMPAPUU
 2. \$SNMPAPA

3. \$SNMPAPP
 4. \$SNMPAPPA
 5. \$SNMPAPP
 6. These registers will be ignored:
 - a. \$SNMPTAA
 - b. \$SNMPTAP
 - c. \$SNMPTPA
 7. \$SNMPTPP
- ii. If the user sets \$SNMPTUU = \$SNMPAUU then the traps will piggyback off these registers:
1. \$SNMPAUU
 2. \$SNMPAA
 3. \$SNMPAP
 4. These registers will be ignored:
 - a. \$SNMPTAA
 - b. \$SNMPTAP
 - c. \$SNMPTPA
 - d. \$SNMPTPP
- iii. If the user sets \$SNMPTUU to anything else, then the Traps will use these commands:
1. \$SNMPTUU
 2. \$SNMPTAA
 3. \$SNMPTAP
 4. \$SNMPTPA
 5. \$SNMPTPP

Version 4.24

1. Resolved an issue where parameters could not be changed in Google Chrome or Edge.
 - a. The HTTP header maximum line length in the firmware was set to 128 bytes.
 - b. In a recent update Chrome changed their maximum line length to 144.
 - c. Modified the firmware to allow a line length of 256.
2. Removed outdated/unsecure ciphers from the firmware:
 - a. diffie-hellman-group1-sha1
 - b. 3DES
 - c. Blowfish

Version 4.24A (SNMPv3)

1. Same changes as v4.24.

Version 4.25

1. Skipped this version.

Version 4.25A (SNMPv3)

1. Skipped this version.

Version 4.26

1. M50, 3 Digit 7-Segment Display:
 - a. Added feed total active power and feed total apparent power. Each datapoint will display the first 6 digits. These features can be turned on via the \$DCR command in Telnet/SSH. See the user manual for more detail.

Active Power - Example showing 277,153 Watts:



0.5 second delay



Active Power - Example showing 333,333 Watts



0.5 second delay



Apparent Power - Example showing 277,153 VA:



Apparent Power - Example showing 333,333 VA



Version 4.26A

1. Same changes as v4.26.

Version 4.33A

1. Disable SSH keys:
 - a. dh-group14 key exchange
 - b. aes128-cbc
 - c. rijndael128-cbc
 - d. aes256-cbc
 - e. rijndael256-cbc
 - f. aes192-cbc
 - g. rijndael192-cbc
2. Add Resetrequest and UCR parameters to BACnet, Modbus and SNMP
3. Refactored DHCP Client
4. Update TCP timers from 32 bits to 64 bits
5. Fix issue with timer rollover at 50 days
6. Fix race condition with TCP event queue
7. Ensure changes in Ethernet and WLAN settings are reflected in parameters

8. Replaced Modbus/TCP implementation with refactored implementation from M70, to address issues with malformed or too large Modbus packets which would cause meter to fault.
9. Update M50 DHCP implementation to match M70 implementation (changes to diagnostic messages, code comments, set renew to rebind time if renew disabled, set rebind to lease time if rebind disabled).
10. Add \$rcerts command to reset certificates
11. Zero upload buffer prior to use to ensure no stale data is saved to flash.
12. Fixed issue with randomization of renew and rebind time.
13. Fixed issue with DNS IP address not being set to gateway IP.
14. Fixed issue with re-adding same default gateway.
15. Maximum number of concurrent gateways set to 8.