L-PRO 4500 Firmware

v2.4

Release Description

DATE: 2026-08-17

FEATURE ENHANCEMENTS

- **Cyber Security:**
  - None.
- **General:**
  - Added the ability to configure the US curves for the 51, 51N, 51G, 46-51 and 59N functions in the Offliner and LCD setting page.
  - Added the ability to show the milli second information for the fault log data in the LCD HMI.

CORRECTIONS TO ISSUES

- **Cyber Security:**
  - None.
- **General:**
  - None

COMPATIBILITY:

L-PRO Offliner Settings Software	v3.5 or above
Relay Control Panel Software	v3.8 or above
RecordGraph Software	v6.2a Rev 1 or above
ERL 61850 IED Configurator	V4.0 Rev 1 or above
ICD File Version	v4.0 Rev 03
Setting Version	606
L-PRO User Manual	v2.5 Rev 0

Minor releases, designated with a letter suffix (e.g. v3.1a), maintain the same compatibility as the base version (e.g. v3.1=v3.1a).

REVISION HISTORY

v2.3a – 2024-09-10

- **General Enhancements:**
  - Enhancement: Added support for minor changes to the network redundancy hardware to address supply chain issues. This change has no impact on the functionality of the L-PRO 4500 when compared to the v2.3 Firmware release.

v2.3 – 2023-06-19

- **General Enhancements:**
  - Enhancement: Updated the IEEE Curve Constant values in accordance with the IEC 60255-151ed1.0b:2009 standard.
  - Enhancement: Added the fault log data for 81Over/Under-Frequency, 60LOP, 60CTS, 50BF and 46BC functions.
- **General Corrections:**
  - Major: Fixed issue where the distance scheme phase and ground trip were not being asserted for the weak infeed function when configured in the output matrix.
  - Major: Fixed issue where the Prologic was reset by the function reset instead of the output contact reset when the output contact was configured as the Prologic input.
  - Major: Fixed issue where the 50BF initiation status was continuously high, even after disabling the 50BF function and the initiation status was de-asserted.
  - Minor: Fixed issue where LEDs were not resettable when a new setting file was loaded that changed the Target reset type from Self to Latch.
  - Minor: Fixed issue where the weak infeed element text incorrectly displayed 3Vo instead of V0 in the front panel display setting screen.

v2.2 – 2021-09-29

- **General Enhancements:**
  - Added the ability to receive MMS Single Point (latched/pulsed) control commands (SPC) from IEC 61850 clients.
  - Added the reporting of control command status in metering, events, and IEC 61850 messages.
  - Added the ability to reset the Output Contacts and Target LEDs using Single Point control commands.
- **Cyber Security Corrections:**
  - Minor: Applied QNX patch 4844 to address the “BadAlloc” security vulnerability identified in ICS Advisory ICSA-21-119-04.
- **General Corrections:**
  - Minor: Fixed issues with incorrect LED operation when changing from the default to a non-default setting file.
  - Minor: Fixed the handling of event naming for all setting file changes.

- Minor: Fixed issue where the front panel display would become unresponsive after using the front panel to change the SNTP 2 Server IP address.
- Minor: Fixed issue where an error message was displayed on the first attempt to manually change the setting group in the Relay Control Panel > Utilities > Setting Group screen, even though the change was successful.

v2.1 – 2021-03-05

- **Cyber Security Enhancements:**
  - Added a message to the event log for user login attempts.
  - Added support for file transfer using IEC 61850 MMS.

- **General Enhancements:**
  - Enhanced IEC 61850 communication protocol with Edition 2 features.
  - Added support for 61850 Time Quality bits (Clock failure, ClockNotSynchronized, LeapSecondsKnown and TimeAccuracy) for Time Source IRIG-B & SNTP.
  - Added faulted phase information details in the ICD file for 50N, 51N, 46BC, 27 and 59 functions.
  - Added Zone 3 starter element as an option in SOTF and Carrier aided scheme functions.
  - Enhanced the SOTF function:
    - Provided Enable/Disable option for device 50N.
    - Added pick-up delay timer (C1) setting for device 50/50N.
  - Enhanced single phase Auto Reclose function:
    - User configurable Pole Dead/Live status selectable as either CB status or phase current method.
    - Provided the option to initiate the Auto Reclose via External Input, Virtual Input or ProLogic signals.
    - 50G and 51G functions taken into consideration when initiating a single pole trip and reclose.
    - Distance Scheme Trip output separated as Distance Scheme Phase Trip and Distance Scheme Ground Trip.
  - Added the reactance tilt angle setting for reverse quadrilateral phase (21P) and ground (21N) protection functions.
  - Removed the dependency on positive sequence directional supervision during phase-ground faults. This prevents unintended operations of ground overcurrent protection elements during unbalanced operating conditions with sensitive settings.
  - Added the ability to block each function listed in the output matrix individually with External Input, Virtual Input or ProLogic signals.
  - Added the ability to individually configure each output contact reset type as Self Reset, Latched or Pulsed.
  - Added the ability to reset the output contacts via External Input, Virtual Input or ProLogic signals when the contact reset is set as Latched.
  - Enhanced front panel LCD settings edit options for: Line Parameters, Scheme Selector, Directional Element menus, 81, 27, 50LS, 59N, Z Circle Trigger.
  - Added the ability to edit the SNTP server address through front panel LCD.

- Enhanced the LED reset option to allow the user to select whether each LED is Self Reset or Latched.
- Added SNTP time sync to the operation of the front panel Time Sync LED. The LED will be on when time is synchronized to either IRIG-B or SNTP.
- Added per phase DNP 3.0 points for all the protection functions: 21P, 21N, 50, 50N, 51N, 51.

- **General Corrections:**
  - Minor: Fixed issue where 50N log message contained 51N fault data when they operated one after the other.
  - Minor: Fixed issue where LEDs configured for phase operation were not persisting when multiple faults were detected for that phase and one of the faults was reset.
  - Minor: Fixed issue where the IED required a restart after increasing the number of DNP masters.
  - Minor: Fixed issue with 50BF initiation metering not displaying correctly when being initiated via External Input, Virtual Input or ProLogic signals.
  - Minor: Fixed issue where per phase assigned LEDs configured as latched reset mode, don't clear when Relay Control Panel to clear all targets.
  - Minor: Fixed issue where the front panel Time Sync LED remained off after clicking on the Test button in the targets screen in Relay Control Panel.
  - Minor: Fixed issue where Virtual Input status was not updated in metering or the disturbance recording when it was a pulsed signal.
  - Minor: Fixed issue where two fault log messages were created when an output contact was enabled or disabled.
  - Minor: Fixed issue where Virtual Input status was not updated in metering or the disturbance recording when it was a pulsed signal.

v2.0a – 2019-04-05

- **Critical:** Fixed issue where the inverse neutral over voltage function 59N trips instantly instead of following the selected curve for time of operation when the voltage very slowly reaches the exact set value.

v2.0 – 2018-10-17

- **Enhancement:** Added Broken Conductor protection function 46BC.
- **Enhancement:** Added the ability to set and edit protection settings using the front panel display interface.
- **Enhancement:** Added the ability to reset the front panel target LEDs using the following options: External Inputs, Virtual Inputs, ProLogic, Relay Control Panel.
- **Enhancement:** Added the ability to test the front panel target LEDs using Relay Control Panel.
- **Enhancement:** Added the display of phase to phase values when viewing voltage inputs using the front panel display, Relay Control Panel and SCADA.
- **Enhancement:** Added support for the following analog input product variants: 10 CT + 6 VT, 5 CT + 4 VT

- **Enhancement:** Added support for the following External Input and Output Contact product variants, 8 in + 8 out, 16 in + 16 out, 16 in + 24 out, 24 in + 32 out.

v1.0 – 2018-04-16

- **Enhancement:** Initial release for general availability.

CLASSIFICATION OF CHANGES MADE

The issues fixed in software / firmware upgrades are classified as defined below. While the decision to upgrade installed products is the user's, these classifications provide a guideline for the need and priority of the upgrade.

Critical: Critical changes fix issues/problems that prevent the basic operation of the device and have no workaround. Critical changes merit a product upgrade as soon as possible, if that function is being used under the conditions causing the issue

Major: Major changes fix problems that prevent the basic operation of the device but do have a workaround. Any major changes merit a product upgrade as soon as possible if the function is being used under the conditions causing the issue and a workaround is not acceptable.

Minor: Minor changes fix non vital issues that do not prevent the basic operation of the device and may or may not have a workaround. Product upgrades for such changes are not necessary unless they apply to and are needed by the user.

Enhancement: Feature enhancements add a capability or extend existing capabilities of the product. Upgrades for such changes need be made only if and when that feature enhancement is desired**.**