



**T-PRO 4500**  
**Firmware v2.2a**  
**Release Description**

**DATE: 2021-10-18**

**FEATURE ENHANCEMENTS**

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

**CORRECTIONS TO ISSUES**

- Cyber Security:
  - None.
- General:
  - Critical: Fixed issue introduced in firmware version v2.2 where the IED fails to capture recordings under the following conditions:
    - The unit External Input and Relay Output hardware configuration is one of the following: 8 in/8 out, 16 in/16 out, 16 in/24 out.
    - A new setting file is loaded, followed by a unit restart or power cycle.

**COMPATIBILITY:**

T-PRO Offliner Settings Software:	v1.7 and above
Relay Control Panel Software:	v3.2 and above
RecordBase Central Station Software:	v5.2 and above
RecordBase View Software:	v5.2 and above
RecordGraph Software:	v5.9 and above
ERL 61850 IED Configurator:	v3.4 Rev 1 and above
ICD File Version:	v4.0 Rev 02
Setting Version	604
T-PRO 4500 User Manual	v2.2 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).

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## REVISION HISTORY

### v2.2 – 2021-09-29

- Enhancements (General):
  - 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 commands.
- Corrections (Cyber Security):
  - Minor: Applied QNX patch 4844 to address the “BadAlloc” security vulnerability identified in ICS Advisory ICSA-21-119-04.
- Corrections (General):
  - Major: Fixed issue where the front panel display became unresponsive, and the IED could not be accessed using Relay Control Panel, after the fault log was accessed when fault log storage was full. A power cycle was required to regain access.
  - Minor: Fixed the handling of event naming for all setting file changes.
  - Minor: Fixed issue where the front panel display would become unresponsive after changing the SNTP 2 Server IP address.
  - Minor: Fixed issue where the event message created by changing to a new setting group did not include the new setting group number.
  - Minor: Fixed issue where the front panel display became unresponsive when accessing the 49 protection function in setting group 2.
  - 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.

### v2.1a – 2021-04-19

- Minor: Fixed a production automation issue introduced in v2.1 that resulted in not being able to load 61850 CID files to the IED using the 61850 IED Configurator. Units built with v2.1 were manually corrected prior to shipping. This issue did not impact units updated from any version earlier than v2.1.

### v2.1 – 2021-03-05

- Enhancements (Cyber Security):
  - Added a message to the event log for user login attempts.
  - Added support for file transfer using IEC 61850 MMS.
- Enhancements (General):
  - 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 support for the IEC 61850 Communication Alarm.
  - Added per phase logic inputs to the ProLogic input list for the following: 2nd Harmonic restraint , 5th harmonic restraint , High Set (Unrestrained), ROCOD and 87 Delta phase, and 87N Delta phase.

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- Added support for selecting the input type to be either winding current or input current for all back-up functions including 50, 51, 67, 67N, 49 and Through Fault Monitor. Previously only winding current was supported.
- Added the option to select RMS measurement for 50G/51G protection functions. Previously only DFT measurement was available.
- Added the ability to disable 2nd harmonic restraint blocking completely in 87, as well as the ability to enable 2nd harmonic restraint blocking on a per phase basis without cross-blocking.
- Added per phase LED assignment for the High Set (Unrestrained) element.
- Added the ability to block each function listed in the output matrix individually with an External Input, Virtual Input or ProLogic.
- Added the ability to configure the reset option for each LED to be either Self Reset or Latched.
- Added SNTP time sync to the 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 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 when the contact reset is set as Latched.
- Changed from per unit (pu) to equivalent secondary Amp calculation for 50, 51, 67, 67N, 49 and Through Fault.
- Added the ability to edit the SNTP server address through front panel LCD.
- Added an alarm setting for CT open condition detection for 87 differential.
- Added the following per phase signals to the disturbance records: 87 Unrestrained, 2nd Harmonic Restraint, 5th Harmonic Restraint, ROCOD, Delta phase and High Set (Unrestrained).
- Removed the positive sequence quantity from the 21N protection function to improve the reliability of the directional element for unbalanced faults and load conditions.
- Enabled the ROCOD element to operate at the slope area.
- Enhanced front panel display:
  - Added settings edit options for: System Parameters, 49, 50, 51, 50G/51G, 50BF, 67, 67N, TFM, and 87.
  - Added Clear Output menu for clearing Latched Output Contacts.
- Added display of user defined names created in T-PRO Offliner for Output Contacts, Virtual Inputs and Setting Groups.
- Corrections (General):
  - Major: Fixed issue where the V2 24DEF-1 function used V1 as its positive sequence input instead of V2, resulting in some incorrect 24DEF-1 operations.
  - Major: Fixed issue where the MHO and Quad characteristics were not operating correctly in the reverse zone for 21N/21P.
  - Minor: Fixed issue where the TV IA, TV IB and TV IC metering values didn't match the through fault peak values during a through fault.
  - Minor: Fixed issue where polling would not start automatically without restarting the IED when a new DNP3 master was added.
  - Minor: Fixed issue where some DNP points may not report correctly when there are gaps in the points list.

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- Minor: Fixed issue where the 87 Trip output contact operation in the events list and RecordGraph was approximately 2ms slower than the actual fault. Phase output contacts were operating properly.
- Minor: Fixed issue where the MODBUS sequence current channels used a scaling factor of 1 instead of 0.1, resulting in saturation of the metering values in some applications.
- Minor: Fixed issue where a trend record could not be manually triggered until at least one event was triggered after initial IED startup.
- 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 issues with protection function interdependencies when changing between different CT formats.
- Minor: Fixed issue where the event log displayed "51G-HV : Alarm" instead of "51G-LV: Alarm" for a 51G-LV trip.
- 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 LEDs configured for latched reset mode, and assigned for Phase Indication Tripping, don't clear when Relay Control Panel is used to clear all targets.
- Minor: Fixed issue where a 21N2 trip was not reported in D21N2PDIS5.Op.general unless 21N1 also tripped at the same time.
- Minor: Fixed issue where it was possible to use the front panel display interface to configure the CT Secondary of the two inputs of a two winding transformer differently, one as 1A and other as 5A. The two inputs must be configured to the same CT Secondary setting.
- Minor: Fixed issue where the ProLogic result and the record trigger time are incorrect when 21N C phase trip and 21N Alarms are configured as Prologic inputs.

#### **v2.0b – 2020-05-06**

- Critical: Fixed issue where the 61850 IED Configurator was not able to load CID files to the IED. This issue only impacted new units shipped from the manufacturing facility in Canada.

#### **v2.0a – 2019-04-05**

- Critical: Fixed issue where the inverse protection function trips instantly instead of following the selected curve for time of operation when the current/voltage very slowly reaches the exact set value. This issue was present in 67-HV, 67-LV, 67N-HV, 67N-LV, 59N-V1, 59N-V2, 24INV-V1 and 24INV-V2 functions.
- Critical: Fixed issue where the CID file could not be loaded to IEDs when configured for 50Hz.

#### **v2.0 – 2018-10-17**

- Enhancement: Added 3 Zone Backup Impedance Protection (21) with Load Encroachment feature.
- Enhancement: Added 68 Power Swing Block function.
- Enhancement: Enhanced the 60 Loss of Potential function.
- Enhancement: Added the ability to disable Neutral Inputs IN1 and IN2 via an External Input.

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- Enhancement: Enhanced the security of the 87T protection function in the event of simultaneous, close-in external faults occurring with extensive current transformer saturations on multiple feeders connected to a winding (HV, LV or TV).
- Enhancement: Added support for two different CT secondary ratings to support a mix of 1A and 5A CTs.
- 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 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: Changed the pick-up value units from PU to A for the 49, 50/51, and 67 functions and the through fault monitor.
- 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.
- Minor: Fixed the issue where the primary values were being calculated and shown incorrectly for delta connected CTs.
- Minor: Fixed issue where the 50BF event didn't show phase information.

#### **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.