PCS-Explorer

IED Configuration & Debugging Tool

The PCS-Explorer is a software tool designed for IED configuration & debugging in commissioning stage of PCS series devices. It configures the inputs, outputs and parameters of PCS series devices in visual and graphic display to facilitate project configuration.

Functions

- Configuration Management for All Devices in Substation
  The PCS-Explorer can manage the configuration of PCS series devices and the operations of project files in PCS-Explorer.
- Device Creation based on Template Driver
  PCS-Explorer provides users with standard templates of PCS series devices to simplify device configuration to standardize device configurations and simplify project installation and maintenance.
- Off-line Configuration
  Device hardware configurations can be configured through PCS-Explorer. Users can edit contents on LCD display window and change device settings of PCS series devices by this software in order to meet the site requirements.
- Visualized Device Configuration
  PCS-Explorer provides visualized device configuration functions to simplify and improve configuration processes. Users are capable of enabling and disabling device protection functions and programming the required logic functions.
- On-line Debugging and Downloading
  PCS-Explorer offers downloading and on-line debugging functions to check device state. The pre-configured files can be compressed into driver package and downloaded to PCS series devices.

Offline Configuration

- Device Setup
  In the device setup edit window, users can set device information, configure hardware module, system level options and function groups respectively.
  - Device Information
    All the device basic information are default settings in the selected driver package for creating the device. Basic information such as Project Name, User File Version and User Modify Time can be modified.

PCS-978 Device Information:

Device Name	TRANSFORMER_RELAY
Devcie Type	PCS-978
Project Name	OverSeas_version
Program Main Version	R1.50
Area Code	
User File Version	000
User Modify Time	2014-02-26 10:44:00
SUBQ	00104585
ECKFD	

Figure 1 Setting device information

- Hardware Configuration
  The hardware configuration page is subject to the project configuration situation. Hardware configuration includes the information on slot number, module name, module type and module description.
- Market Ordering Table (MOT) Configuration
  In MOT configuration interface, users can select the program language, the communication protocol, the software version and hardware etc. The MOT configuration can be export into an Excel file.

Figure 2 MOT configuration

- Function Configuration
  Users can perform function configuration in function configuration interface. For detailed device function configuration, please refer to corresponding device manual.
- Function Group Configuration
  Function group configuration can enable or disable different functions in the device.

- Signal Grouping (Signal Setup)
  The signal grouping function can redefine some user signal names. Currently, only the UserDefine group can be edited.
- LCD Configuration (LCD Config)
  - Basic settings
    PCS series devices have 2 types of LCD resolution: 320×240 and 240×128. This parameter is preset and requires no further change.
  - LCD graph import
    PCS-Explorer can import an existed LCD graph into the current project.
  - LCD toolbar
    When clicking on the LCD main interface node, a graph toolbar will appear on top of the editing window. The user may edit and modify graphs according to the project's requirements.
  - Shortcut key configuration
    The device's seven function keys on the LCD panel, "▲", "▼", "◄", "►", "+", "-" and "ENT", can be configured as function shortcut keys by PCS-Explorer. By pressing shortcut key, the corresponding extended command can be executed quickly to fulfill some control or operation.
- IEC61850 Configuration
  Parameters related to IEC61850 communication will be displayed in the IEC61850 edit window. The edit window has three sub-windows, which are IED, access point and LDevice. Users can modify the properties of IEC61850 communications such as names of access point and LDevice in different sub-windows.

IED Settings:

Name	TEMPLATE
Description	
ConfigVersion	1.00
Type	PCS
Manufacturer	NRR
cidRuleVersion	
IEC61850_Edition	

Figure 3 IEC61850 communication configuration

- User Configuration Import
  Import User Configurations function can import driver file from other driver file (offline ways) or from a running device (online ways) to update current driver file.

  Import may change device configurations, but not affect the internal fixed configurations. Normally, when the user has several identical devices or multiple devices with similar functions, Import function can be used to import the configured information from other devices.
- Upgrade to New Driver
  Upgrade to New Driver function is an operation on the currently configured device, which use driver file from other driver file (offline ways) or from a running device (online ways) to upgrade current driver file.

  Upgrade to New Driver does not change current configurations. It only upgrades internal fixed configurations of the device. Once the internal fixed configurations have been upgraded, please upgrade configurations of the current device using Upgrade function.
- DNP 3.0 Protocol Configuration
  If the device supports DNP 3.0 protocol, PCS-Explorer can be used to configure communication information map based on DNP 3.0 protocol. DNP communication information file can be exported, imported, downloaded or uploaded.

- RIO File Export
  PCS-Explorer can export RIO (Relay data Interchange format by Omicron) from offline configuration or online device to be used by OMICRON Tester (Currently only the RIO file of distance protection function of PCS-902 and PCS-931 can be exported).

- Multi-user Authority Management
  PCS-Explorer can set different operation authority for different user by configuring user information, including user name, password and operation authority.

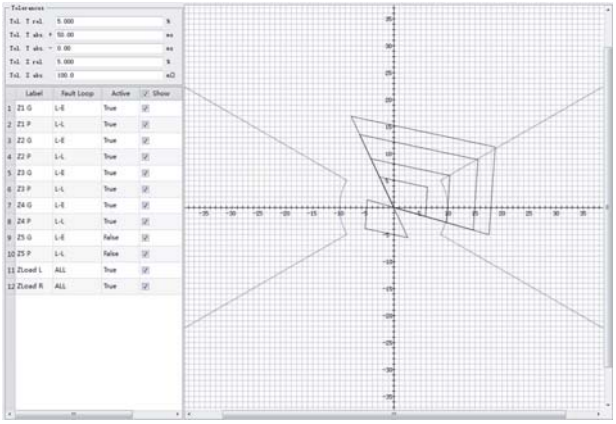

Figure 4 Distance protection function displaying with graph

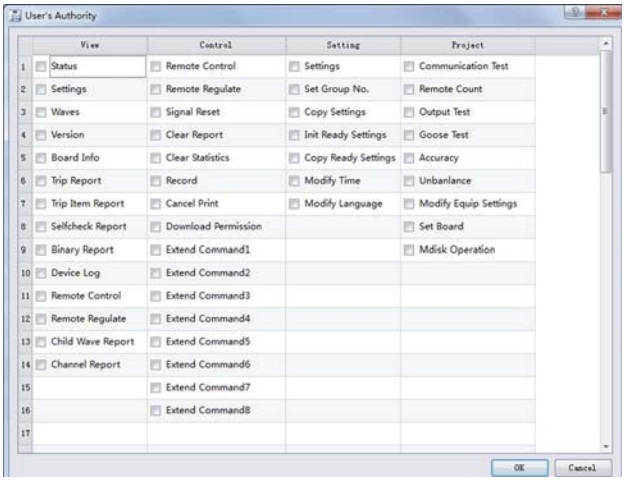

Figure 5 Multi-user authority configuration

- User Level HMI Configuration
  User level HMI configuration supports configuring two groups of analog quantity, status quantity group and user level settings group, it can select the new added logic programmed output variable to be configured to binary state change reports, self-check reports and binary quantity waveforms.

- Communication Information Export
  All the IEC61850 dataset signals and remote control signals can be exported, the DNP communication information map signals can also be exported.

- Offline Settings Configuration
  The PCS-Explorer software offers offline device settings configuration, including the selection of active setting group, setting configuration, printing settings, importing/exporting settings, uploading/downloading settings, etc.

- Active Setting Group Selection
  There are two types of settings: global setting (Global) and group setting (Group 1-30). Global setting cannot be replaced in the device. In setting groups Group1~Group30, only one group is active in device operation. The active setting group can be switched among the 30 groups when required.

- Settings Configuration
  There are two types of settings: global settings (Global) and group settings (Group1-30). Global settings include system settings, function logic links, device parameters and communication parameters (number of sub-nodes may vary with different device models). Group settings are mainly protection settings. Users can modify the value of each setting according to the actual situation on site and the protection requirement.

- Operations of Setting File
  To facilitate browsing and other operations of settings, the PCS-Explorer also provides with various operations of setting files, e.g. print/print preview settings, and import/export setting file etc.

- Settings Downloading and Uploading
  - Settings downloading
    At settings nodes, users are allowed to directly download settings to the device. After successful downloading of settings, PCS-Explorer will automatically reboot the device to validate them.
  - Settings uploading
    Users can call settings file from specified device, and compare them with current project settings. After successful uploading, settings comparison window will be opened automatically. In this window, users can apply settings being used in the device to current project.

Online Debugging

In addition to offline device configuration, PCS-Explorer can perform online debugging on devices.

- IEC103Tool
  IEC103Tool is the communication program of PCS-Explorer based on IEC 60870-5-103. Users can select and use View

Online Status menu under the device node, or run this program directly in the Start menu. Via this tool, users can accomplish following functions:

- Check real-time information of the device, including basic device information, sampling values, all sorts of status, reports and settings etc.;
- Save basic device information, status or measurement values to local directory;
- Display, refresh, export and delete device reports;
- Automatically open waveform file analysis software and upload waveform files;
- Modify, download, print, export and import settings;
- Management settings download password;
- Remote control;
- Binary output test;
- Signal reset;
- Time synchronization etc.

• Visible Debugging

Run PCS-Explorer and the default mode is edit mode. However, PCS-Explorer also provides online debugging function.

After entering debugging mode, double click connection lines, the operating value of corresponding variable for connection lines will be uploaded from device. Double click again to close connection line debugging. Up to 20 signals can be debugged simultaneously under one window. It shall be noticed that for connection lines with same signal source in one window, the variables are only displayed where the lines are double clicked.

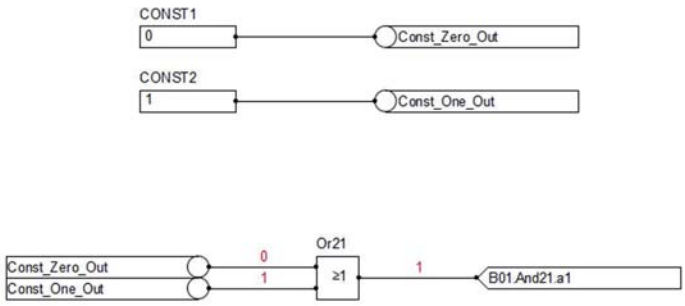

Figure 6 Visual debugging example

PCS-Explorer also supports batch debug variable operation and batch close variable operation.

• Device Diagnose

Device diagnose function enables PCS-Explorer sending diagnose command to the device, and the device will check its current state and report the result to PCS-Explorer.

• On-line Virtual LCD Debugging

Virtual LCD can accomplish all the operations of the conventional LCD panel, it provides more comprehensive and convenient browsing and searching function, it can resolve the debugging problem of the devices without LCD.

Virtual LCD tool can be used to view the analog quantity, status quantity, settings, reports, information of the device, LED lights etc. It can also be used to set the settings.