
SKM Power*Tools[®] **for Windows[™]** **Version 6.0** **Enhancements**

**Electrical Engineering Analysis Software
for Windows**

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PTW Users Guide

Version 6.0 Enhancements

Key features in PTW 6.0:

- UNDO feature with unlimited steps in one-line diagrams.
- Ability to automatically generate the associated one-line diagram for the TCC drawing by using the “Go to TCC” feature.
- Display associated one-line diagrams within TCC window as a new tab with dynamic datablocks based on the most recent study results including: Arc Flash incident energy, boundary, PPE, etc.
- New Crystal Reports contain industry accepted formats for protective device settings.
- Ability to plot multiple protection functions of a single device on a TCC drawing.
- New option in “TCC Settings” > “Fault Current” tab to select a Reference Device and use its fault current as the reference for shifting and coordination of the TCCs based on the ratio of the fault current through each device and the referenced device.
- New Template Library stores typical designs of sub-systems with the one-line layout and component data. Companies may create templates and set internal design standard to be used as the building blocks for all projects.
- Contains more than 4,000 new protective device data entries for the Captor Protective Device Library.
- New VAR Compensation Components: Static VAR Compensator (SVC), Dynamic VAR Compensator (DVC) and Power Factor Correction Equipment (PFC).
- New Uninterruptible Power Supply (UPS) Component.
- Added several new Transformer sub-type components: Standard Shell, Standard Core, Auto-Transformer Shell, Auto-Transformer Core and Zig-Zag Transformer.
- Generator and synchronous motor fault contribution decay is now represented in the calculation of Arc Flash incident energy.

- Automatically display the Arcing Fault Current flag associated with the worse case incident energy on TCC drawings.
- Option to combine the “Bus and Line Side” results in Arc Flash Reports and Labels.
- Option in Arc Flash for status of breakers: Open (racked out) or Closed (stuck/ failed to open) at the time of arcing fault.
- Print Preview Option for Custom Arc Flash Labels. Multiple labels printing capability can save time and money.
- Expansion of user-defined fields in Arc Flash PPE Table and Custom Labels.
- New Cable Sizing study program based on IEE Wiring Regulations.
- Display the Maximum or Minimum value from all Scenarios in the Data Visualizer.
- Includes more global user-defined fields to be automatically used in Print Forms.
- DC Systems Analysis module contains new NiCAD Battery type and Battery Sizing based on IEEE 1115-2000 standard.
- I*SIM contains new Double Fed Induction Generator model. Also includes Wind Generator controller and SVC user-defined graphical models.

PTW Interface:

1. UNDO feature is now available in the one-line diagram with unlimited steps. Undo for Destroy, Connect/Disconnect, etc. is also available.
2. New VAR Compensator component with 3 sub-types: Static VAR Compensator (SVC), Dynamic VAR Compensator (DVC) voltage controlled PQ Generator and Power Factor Correction Equipment (PFC).
3. New Uninterruptible Power Supply (UPS) component.
4. Added several new Pi-Equivalent sub-types: Standard, Tie Breaker, Series Reactor and Series Capacitor.
5. Added several new Transformer sub-types: Standard Shell, Standard Core, Auto-Transformer Shell, Auto-Transformer Core and Zig-Zag Transformer.
 - For Standard Shell and Auto Transformer Shell, if the connection is YG/Y or Y/YG, the zero sequence is considered open circuit.

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- For Standard Core and Auto Transformer Core, if the connection is YG/Y or Y/YG, the zero sequence is considered 5 times the values of the positive sequence impedance.
- For all other Delta/Y, Y/Delta, Y/Y, and Delta/Delta, zero sequence is considered open circuit.
- For Zig-Zag transformer, the positive sequence is considered open circuit.

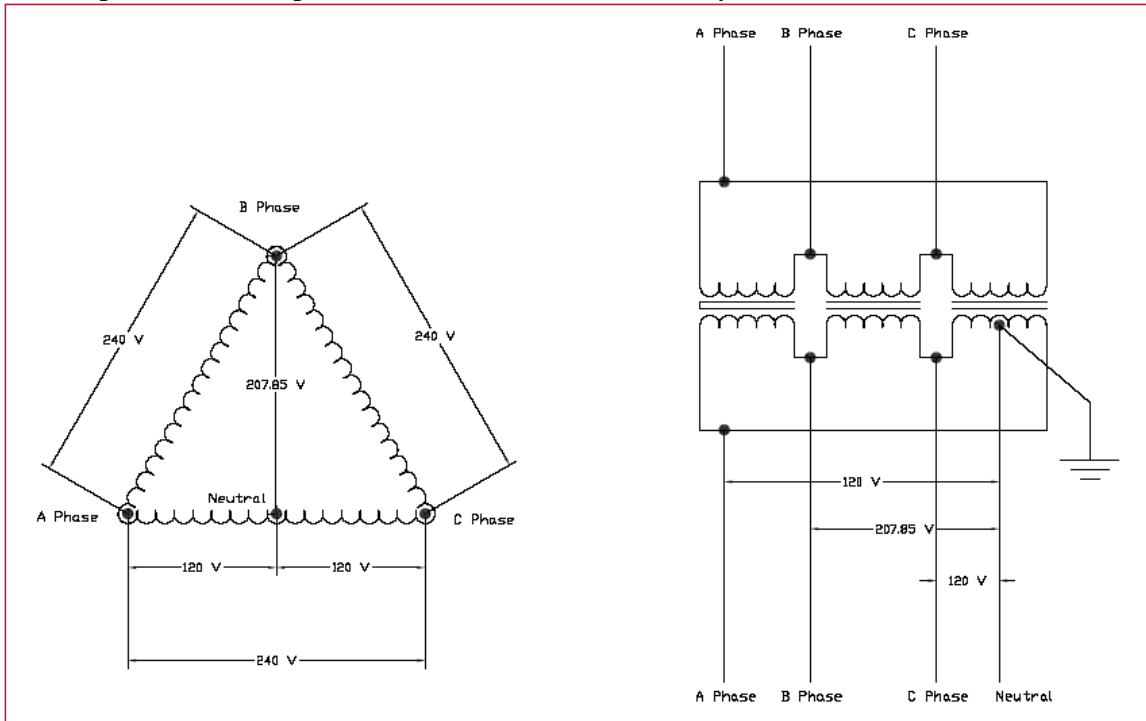
PTW will automatically set the sequence impedance based on the connections and transformer sub-type selected. Each sub-type has a default symbol associated and the one-line symbol will be updated as sub-type is changed in the Component Editor.

6. Transformer Automatic LTC Set Point Voltage to be entered as percent of nominal system voltage and +/- Tolerance for control bandwidth.

7. Added Transformer zero sequence impedance in the transformer library.

8. Added 3-Winding transformer zero sequence impedance data in the Component Editor

9. New option for single-phase transformer to be connected as AB-ab, BC-bc, CA-ca-Mid-Tap to model a 3-phase 4-wire 240V/208V/120V system.



10. Ability to find a selected component in all existing one-lines by bringing up the one-line and zooming in to the component.

11. Global “Go To” feature. For instance, evaluate selected components by “Going To” Data Visualizer from the one-line, TCC, Component Editor, Arc Flash, or Equipment Evaluation and vice-versa. This will help identify problem areas quickly.

12. Added mouse wheel zooming (by rolling mouse wheel) and panning (by clicking mouse wheel) on one-line diagrams.

13. Automatically highlight component sub-types when using Symbol Selection dialog.

14. Destroy multiple components with one action from the Component Editor.

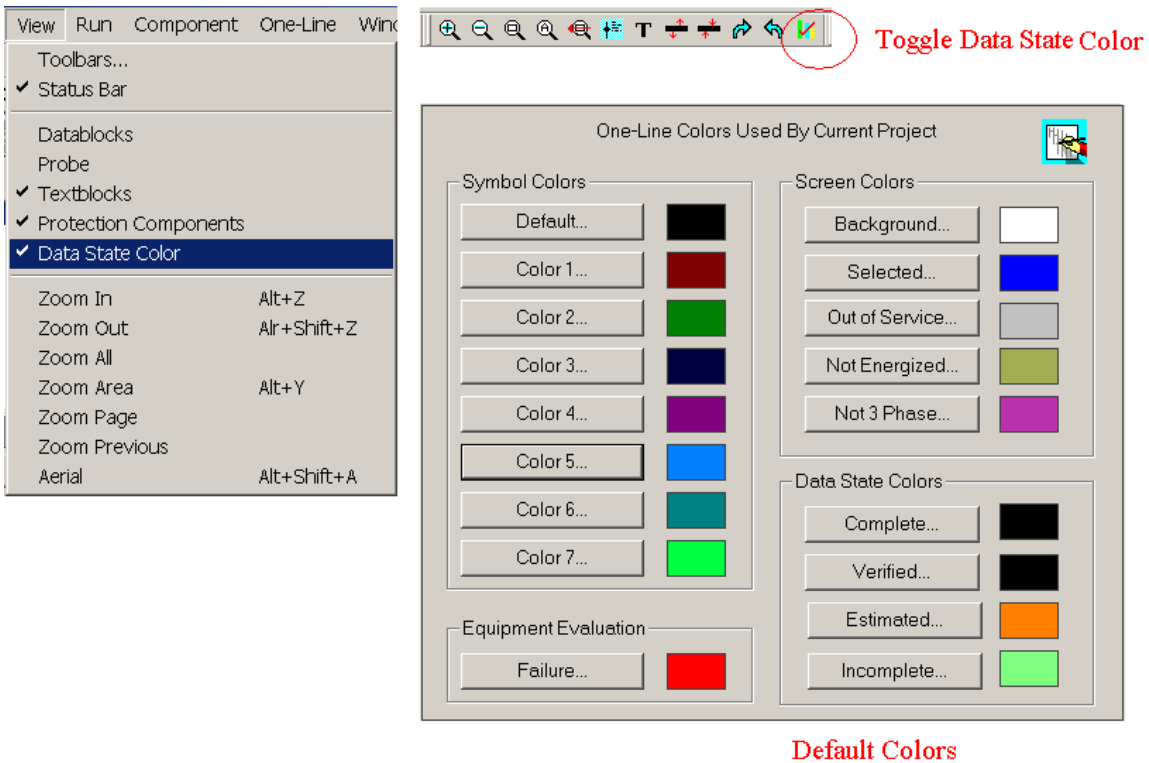
15. Ability to rename Base Projects from the Scenario Manger.

16. Modified new component promoting behavior from the Base Project to Scenarios. If the "Do Not Promote Base Changes to Scenarios" is selected, the newly added component will not be added to any of the scenarios.

17. Increased the length of component names to 30 characters. Report option may print devices with 14 or 30 characters.

18. Apply prefix of the same component type from the "Default" project when creating new components.

19. New "Data State" drop-down list in Component Editor and TCC to identify data entry status including: Incomplete, Estimated, Complete and Verified. Users can query components with "Incomplete" Data State and continue work; or globally change the 'state' of all selected components in the Data Visualizer. A toggle switch is provided on the One-line Toolbar and View menu so the Data State Colors can be turn on or off. Symbol Colors will take effect when the Data State Colors is off.



20. Display the Maximum or Minimum value from all scenarios in the Data Visualizer.

21. Schedule footer for Connected, Demand, and Design Amps are saved for Datablock display.

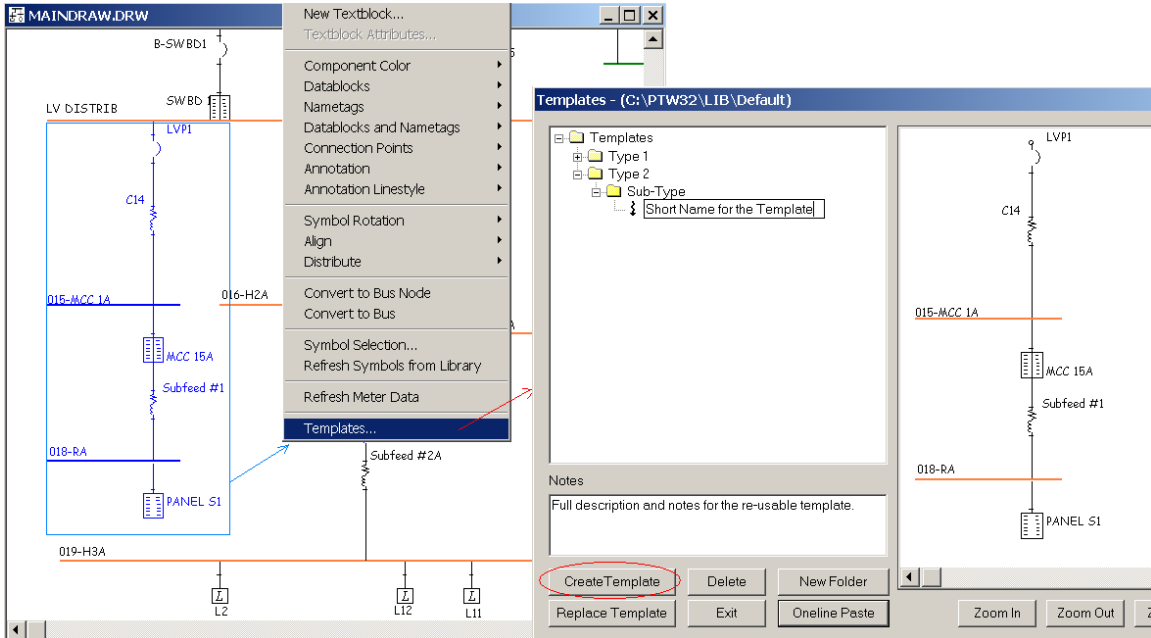
22. Report Amps and Poles in the Switchboard Schedule Summary for each circuit. Previously reported Amps only.

23. New Shunt Admittance tab page in the Cable Library. Allows input of G/2 and B/2 in different units.

24. Expanded the B/2 Calculator in the Cable Component Editor to calculate both G/2 and B/2.

25. Updated all Crystal Reports to include all 5 Project Titles. Project titles can be used to document the project location, job #, revision, engineer, etc. The titles can be entered under Project > Options > Titles and Logo. Project Titles are also available for the Arc Flash Custom Label.

26. Template Library – select a group of components from a one-line and create re-usable template to be used with other projects. One-line layout, component data, and naming conventions are saved and made re-usable. Companies can set internal design standards by creating Templates to be used as building blocks for new systems.



The New Folder button allows for creation of folders within folders for better management of the user-define templates. The Notes field associated with each folder or template allows for better documentation of the purpose and application of the templates. To use, select a template from the Template Tree and press the One-line Paste button to paste the template into any one-line within any project. To rename a template or folder, left click on any template or folder name.

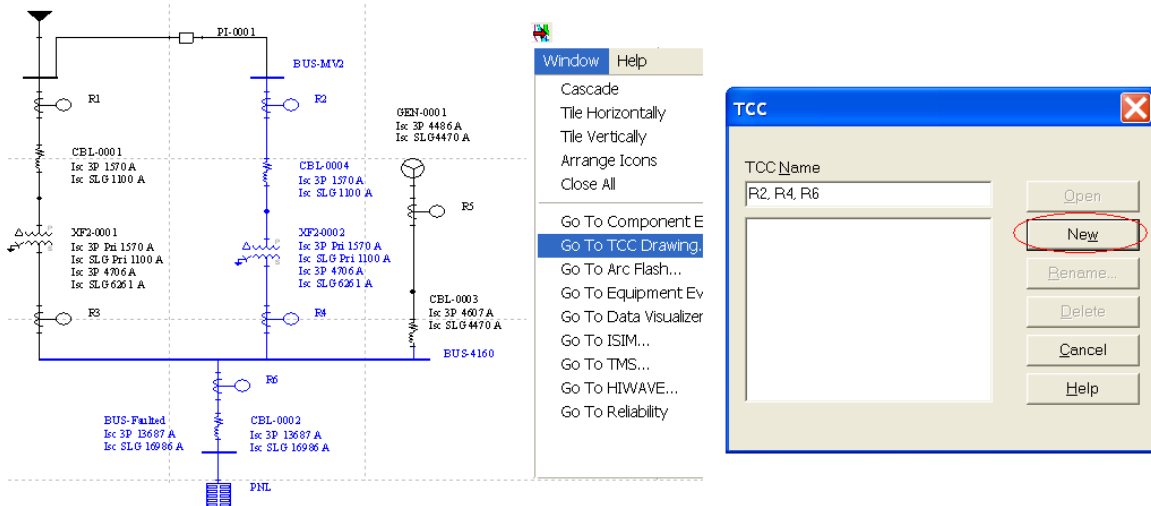
27. Option for clone naming convention in Project > Options > Application 2 page. Cloned component name could be incremented from the existing component name or re-assigned as new component name.

28. Option for schedule “Fed From” in Project > Options > Application 2 page. The Fed From field in the schedule can now be an upstream bus or schedule now. Also provide option to list the available buses or schedules that are 1, 2 or 3 branches away from the current schedule.

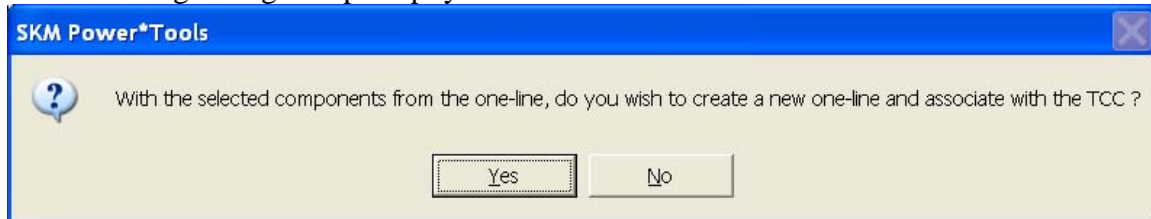
Enhancements in CAPTOR Study Module

1) One-line integration into TCC drawings

a) Select an area from the one-line and use the “Go To TCC Drawing” command from the toolbar or right mouse menu, enter a name for the TCC and click the New button.

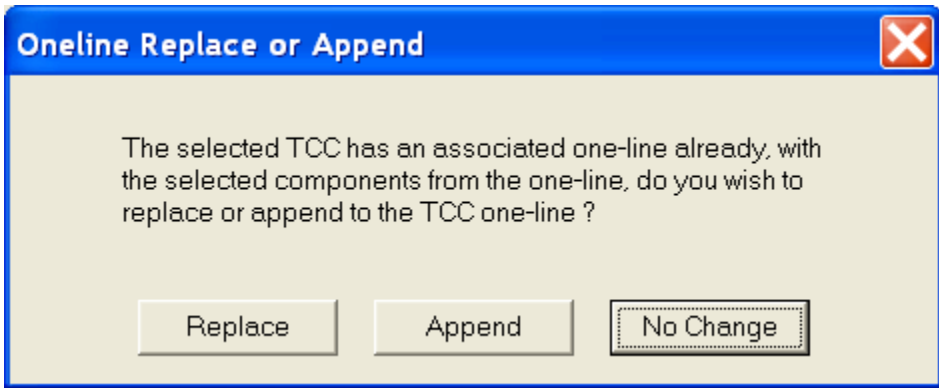
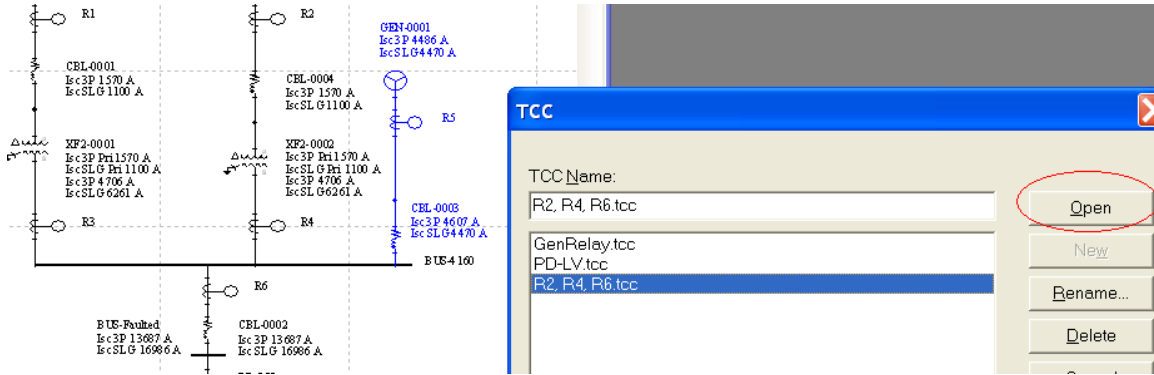


The following dialog will prompt you with a choice to create a new one-line.



Answer YES to allow PTW to automatically create a small one-line with the same name as the TCC with the selected components from the main one-line. It will also associate it with the new TCC. The new one-line will have a .drw extension.

b) Select an area from the one-line and use the “Go To TCC Drawing” command. Select an existing TCC drawing and click the Open button. The Replace or Append dialog will prompt you to replace or append the selected symbols to the existing one-line.

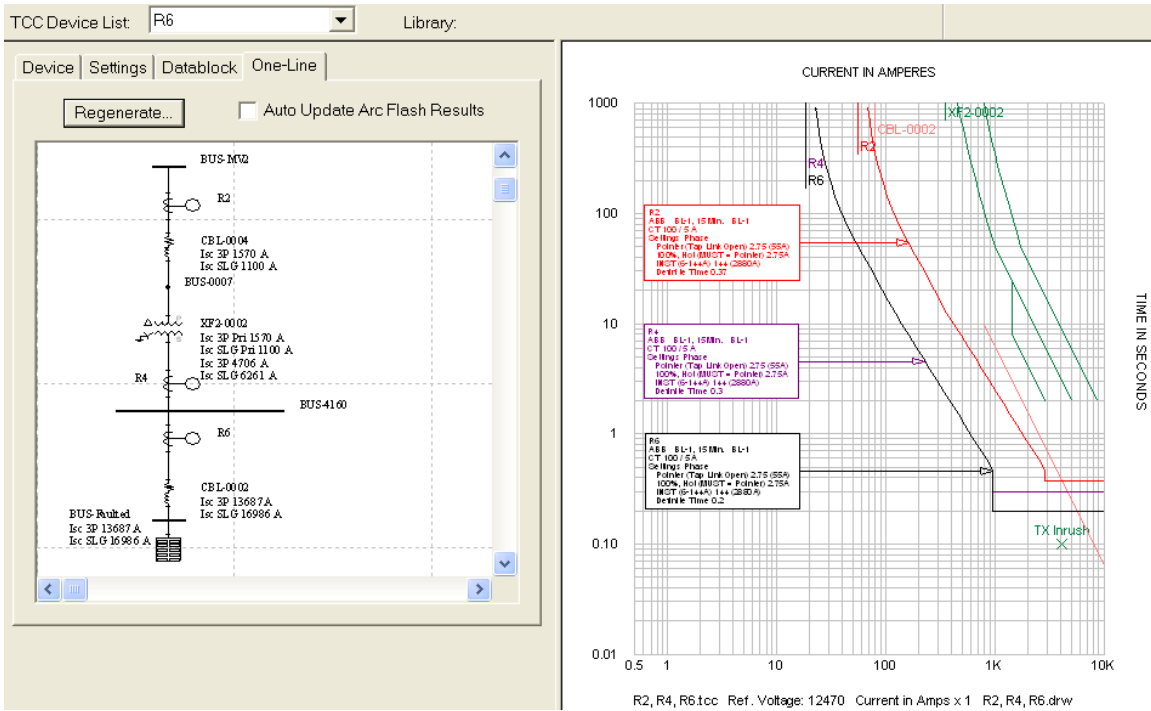


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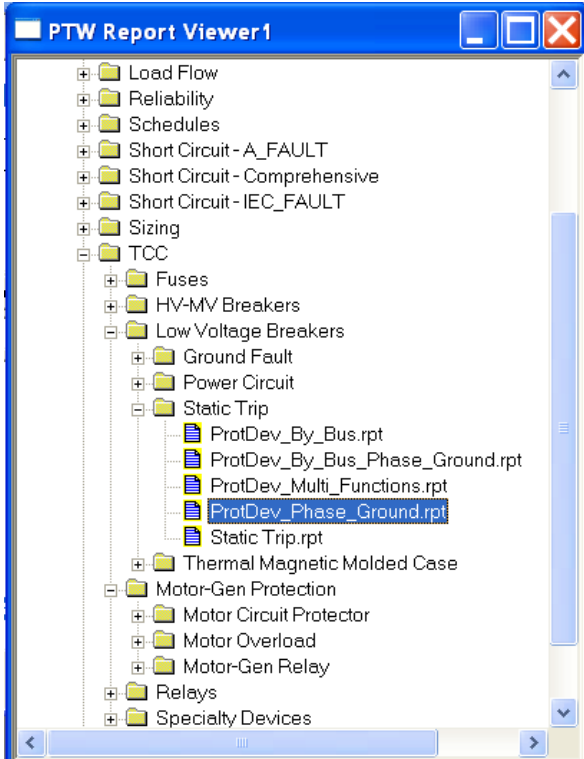
2) Apply the “TCC Settings” datablock in the TCC view and the “Branch Fault Currents (Comprehensive)” datablock in the one-line view.



Tip: Use toolbar or menu item for one-line operations such as Zoom or Expand feature. Hot Keys such as Ctrl+E for Expand or Ctrl+Z for Undo will not work in the TCC one-line.



3) New TCC Setting Report in Crystal Reports will include the Low Voltage Static Trip devices with Phase and Ground functions.



ProtDev_By_Bus.rpt
Lists protective devices by bus, each protection function is listed in a separate row.

ProtDev_By_Bus_Phase_Ground.rpt
Lists protective devices by bus, Phase and Ground functions are listed in the same row.

ProtDev_Multi_Functions.rpt
Lists all protective devices in one table, each protection function is listed as a separate row.

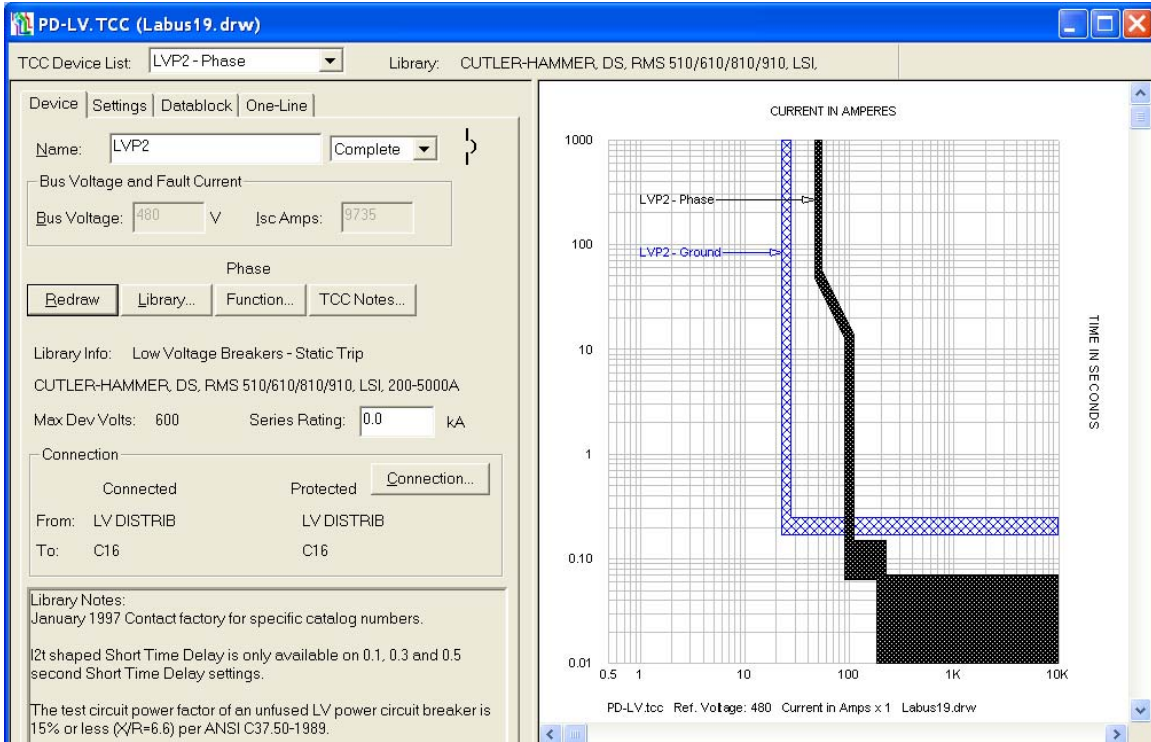
ProtDev_Phase_Ground.rpt
Lists all protective devices in one table, Phase and Ground functions are listed in the same row.

DESIGNATION		FRAME		TRIP UNIT												
Location/Name	AMPS	MFR	TYPE/MODEL	AMPS	Description	TYPE/MODEL	SETTINGS									
							L.T. P.U.	L.D. TIME	S.D. P.U.	S.D. TIME	S.D. IZT	INST P.U.	GFPU	GFD	IZT	
028-MTR 28 B, LVP5	200	ABB	LK-16	100	MPS-C5 LSI	LK	0.5	MIN	2.0	MIN	In	3.0	0.5	0.35	In	
BLDG 115 SERV, TXE SEC	800	SIEMENS-AL LIS	RL-300	80	LSI, 80-400A	RL, Static Trip II	A	1	5.0	MIN		12.0	1	0.5	In	
LV DISTRIB, B-SWBD1	600	GE	TJH	600	LSI, 60-600A	TJH, MVT RMS-9	0.8	2	1.5	Min	In	10	A	0.15	Out	
LV DISTRIB, LVP1	400	MERLIN GERIN	CK 400H	400	LSI, 400-800A Sensors	Compact CK, STR 55UP	1	15	1.5	0.3	In	5	100A	0.06		
LV DISTRIB, LVP2	250	SQUARE D	LE	250	LSI, 100-600A	LE, Micrologic	0.5	2	2	0.1	Out	2.5	0.2	0.1	Out	
LV DISTRIB, LVP3	800	CUTLER-HA MMER	HND	800	LS (LTD=14), 400-1200A	HND, Optim 550/750/1050	0.4	1	1.5	0.1	Out	Fixed	0.2	0.1	Out	

4) Multiple Protection Functions may be plotted in the same TCC drawing.



Tip: After placing the first function (Phase) in the TCC, go to the Component menu, click “Existing” and select the same protective device. Choose the second function (Ground) from the Function button.



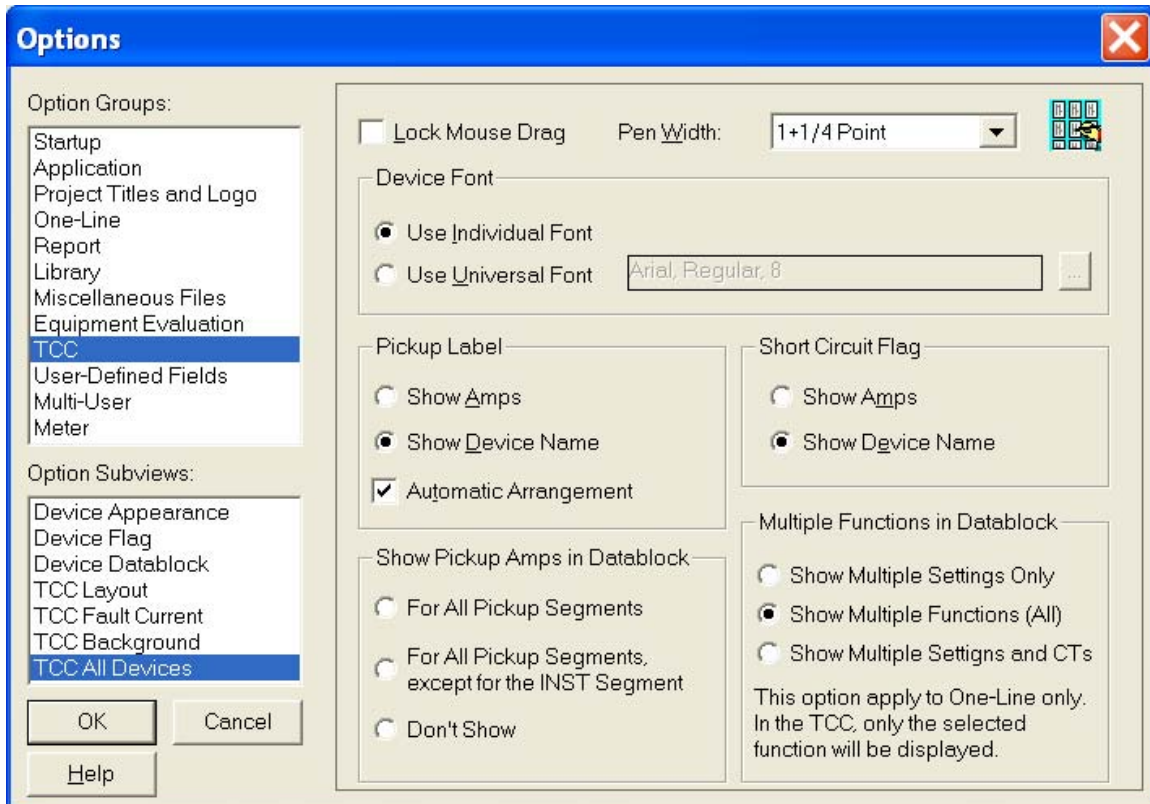
Tip: Read the Protection Function Library Notes while setting the device.

5) Project>Options>TCC options contains defaults for TCC drawings and new curves.



Tip: If “Show Pickup Amps in Datablock” is checked, a LTPU segment with a setting of 2.0 and an equivalent amps value of 400 will be displayed as “LTPU 2 (400A)”.

If “Show Pickup Amps in Datablock” is unchecked, datablock will be displayed as “LTPU 2”.



6. New option to display the Multiple Protection Functions on the one-line and Component Editor Datablock and datablock Report.

- If “Show Multiple Settings Only” is selected, settings for all protection functions will be displayed in the one-line datablock, but function specific data such as CT Ratio, Manufacturer, Type, Description, Frame, Sensor, and Plug will be displayed for the first function only.

- If “Show Multiple Functions (All)” is selected, all function specific data such as Settings, CT Ratio, Manufacturer, Type, Description, Frame, Sensor, and Plug will be displayed for every function on the one-line and Datablock Report.

- If “Show Multiple Settings and CTs” is selected, Settings and CT Ratios will be displayed for every function. However, Manufacturer, Type, Description, Frame, Sensor, and Plug will be displayed for the first function only.

7) TCC Setting Properties > Fault Current Tab contain a new option to shift the TCC based on the fault current through the Reference Device.

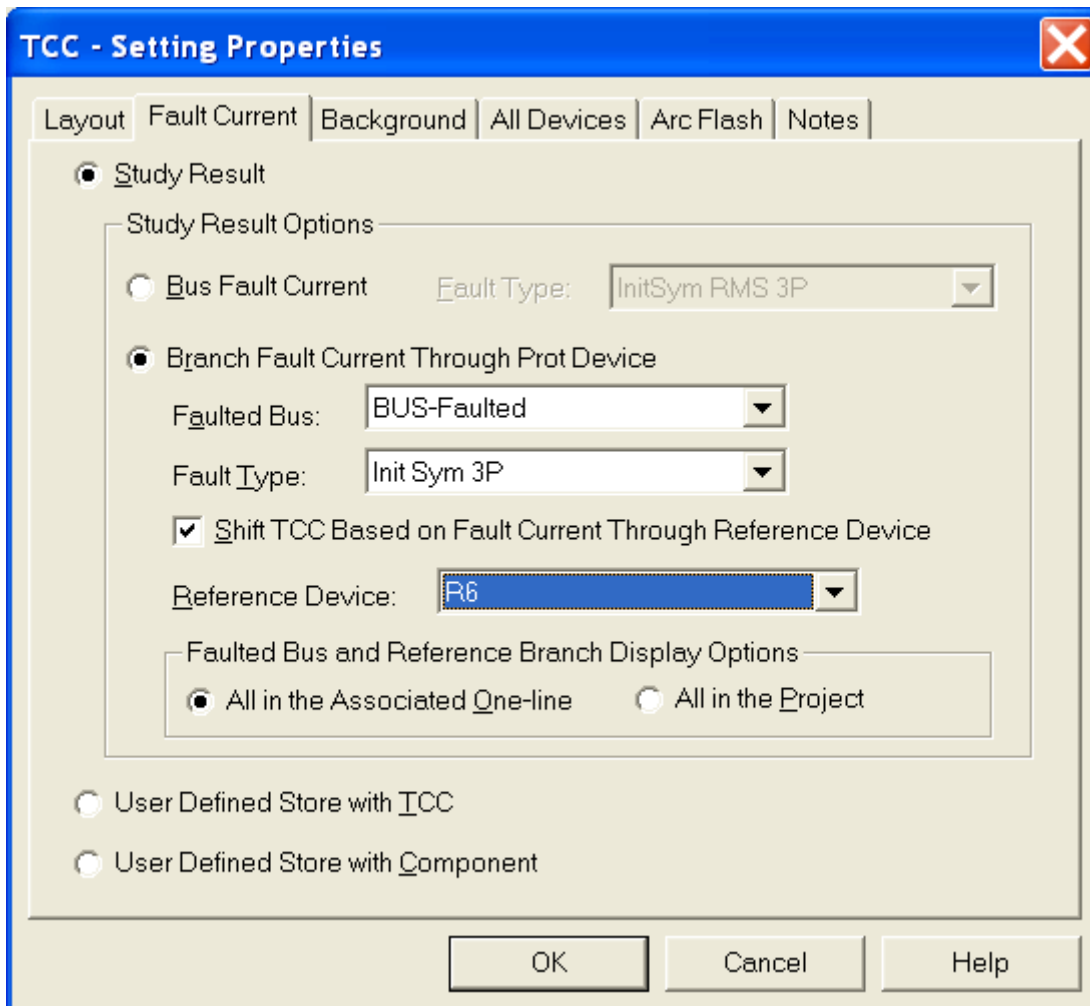


Tip: This is a useful feature in the case of a multiple source or loop system. The Reference Voltage of the TCC will be set to the connected bus voltage of the reference device.

Question: What's the difference between PTW V5.0 and V6.0?

Answer: In V5.0, the "Shift TCC Based on Fault Current Through Reference Device" option is not available. The user will have to determine the shifting factor and use the "Curve Multiplier" in the Selected Device Setting page to shift each curve.

In V6.0, the shifting is done automatically.



Example System: Using the branch fault current as SC Flag with identical settings for relays R6, R4, and R2, compare the TCC with and without shifting the curves based on the fault current through the reference device R6.

8) Selected Device Settings > Arc Flash Tab provides the option to select a faulted bus and plot an arcing fault current flag related to the worse case incident energy. The option to enter a user-defined arcing fault current at user-defined time is also available.

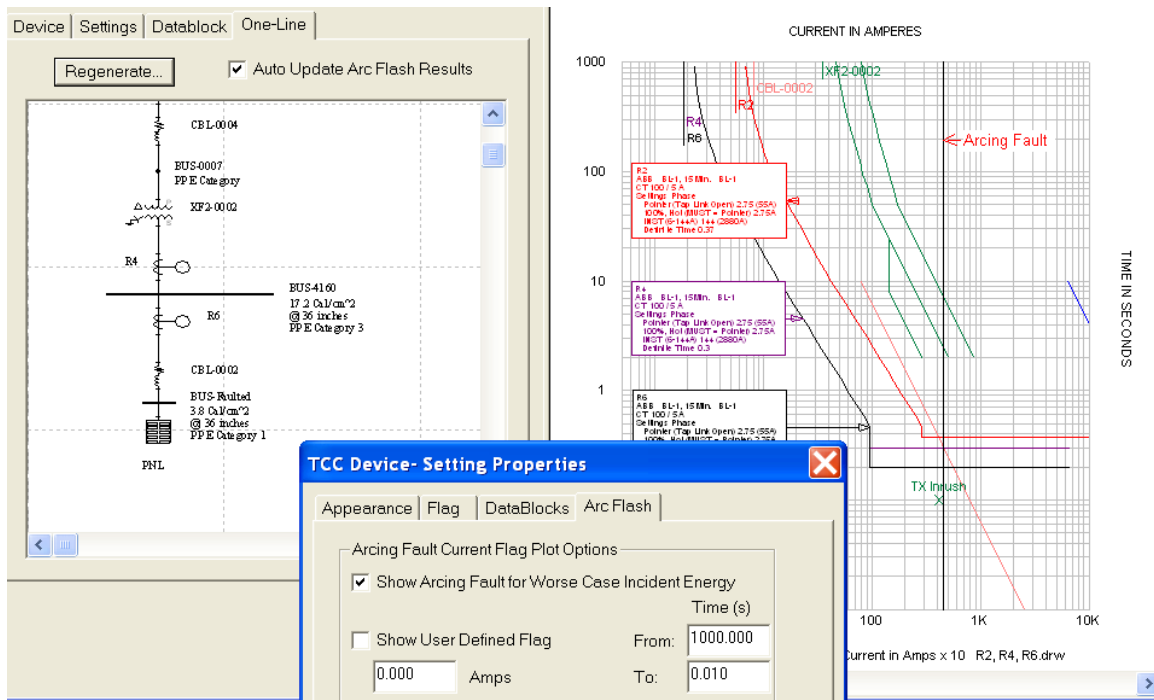


Tip: Check “Auto Update Arc Flash Results” to automatically update the arc flash results on the one-line view as you graphically change the protective device settings.

Question: Why do I need to pick a Faulted Bus for the selected device to plot the Arcing Fault Current?

Answer: The arcing fault current through the protective device is different depending on the location of the fault.

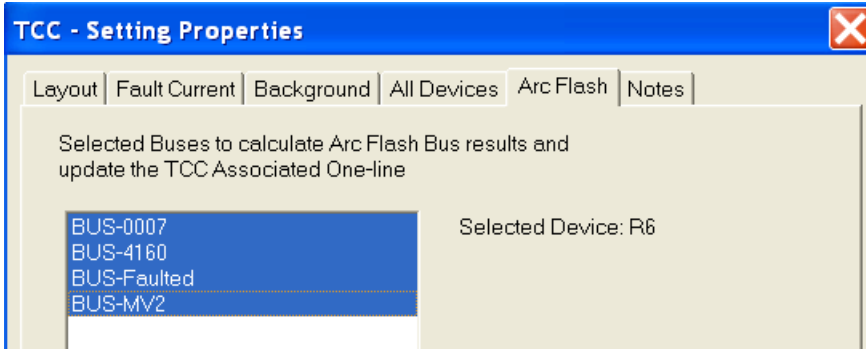
Check or uncheck the “Auto Update Arc Flash Results” to turn ON/OFF the automatic updating of Arc Flash study results on the one-line tab. If this check box is checked, graphically adjusting the protective device settings will trigger an Arc Flash calculation on the buses selected from the TCC Settings > Arc Flash tab. Results will be updated on the one-line instantly.



9) Users may select buses that require the Arc Flash results to be automatically updated through the TCC Settings Properties > Arc Flash Tab.



Tip: For a very large system where calculation speed is an issue, this feature will confine the arc flash calculations to the selected buses.

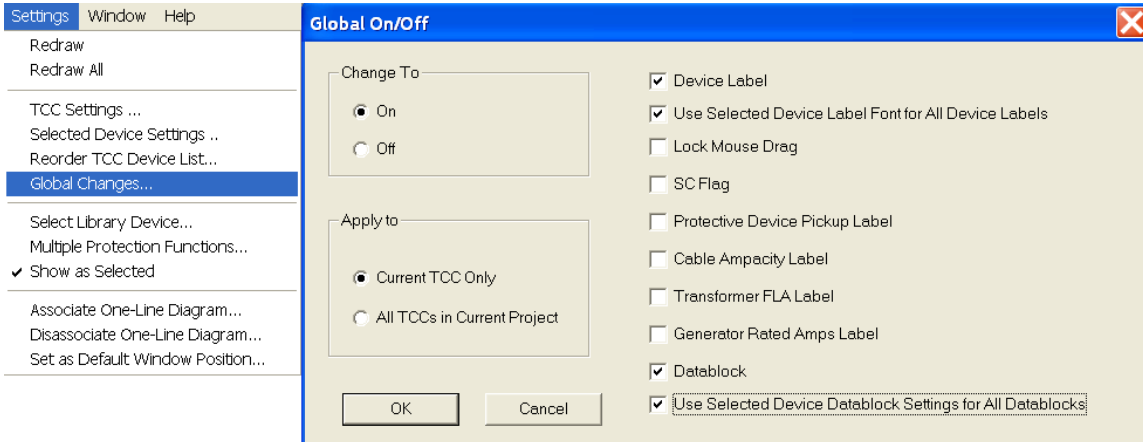


10) New option in the “TCC Global Change” dialog to apply the Font size/style of the selected device to all device labels. Global change is a powerful feature to make modifications to all devices in the TCC or the entire project.



Tip: To make global changes, select the check boxes for each label or flag to be changed. Choose the On or Off option to invoke the changes.

For unchecked labels or flags, no modification will be applied.



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11) New option for breaker and relay delay segments in the library to plot the delay curve independent of the short time pickup and short time delay. For the same setting in the TCC, the curve on the left shows the LTPU, VERY INV, DEFINITE TIME, and INST segments if the option is unchecked. The curve on the right shows the LTPU, VERY INV, and DEFINITE TIME, followed by the VERY INV again before the INST.

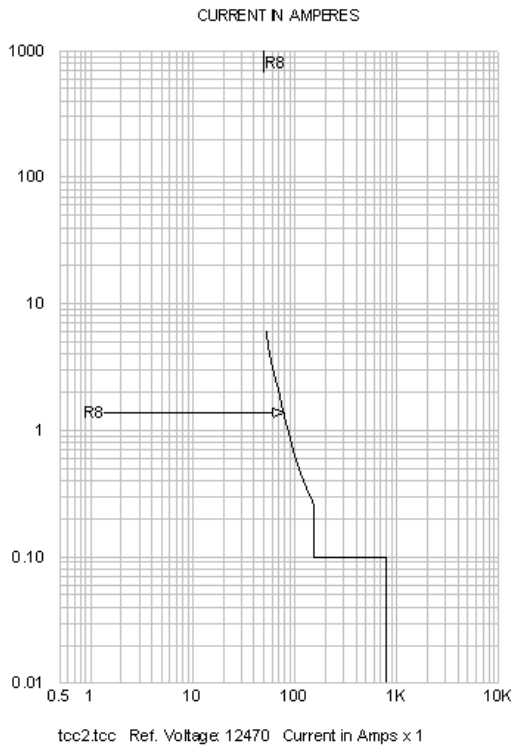


Tip: The “Independent Delay/Time Dial” indicates that the TCC will plot the portion with a faster trip time.

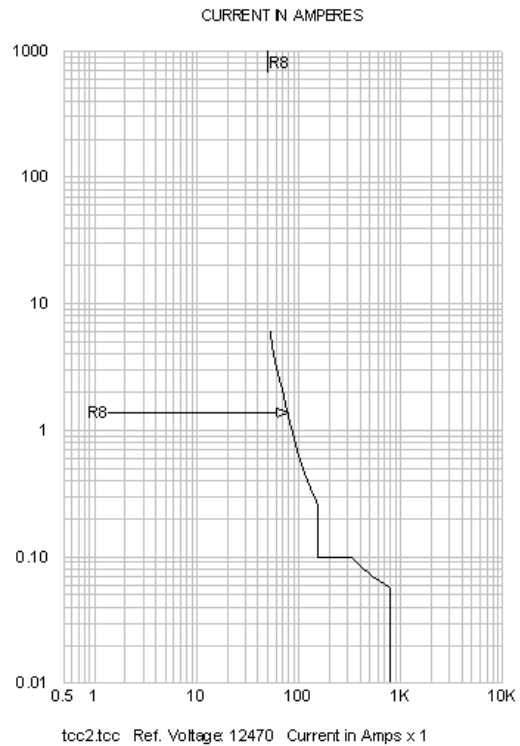
Question: What’s the difference between PTW V5.0 and V6.0?

The Independent Delay/Time Dial option is not available in V5.0 so the TCC on the left will always be plotted. In V6.0, this new option allows plotting to the left or right on the TCC.

	Segment	Setting1	Setting2
<input checked="" type="checkbox"/>	1 Pickup(Lo)	50 %	
<input checked="" type="checkbox"/>	2 VERY INV	0.5	1
<input checked="" type="checkbox"/>	3 STPU	1.55	
<input checked="" type="checkbox"/>	4 DEFINITE	0.1	
<input checked="" type="checkbox"/>	5 INST	8.0	

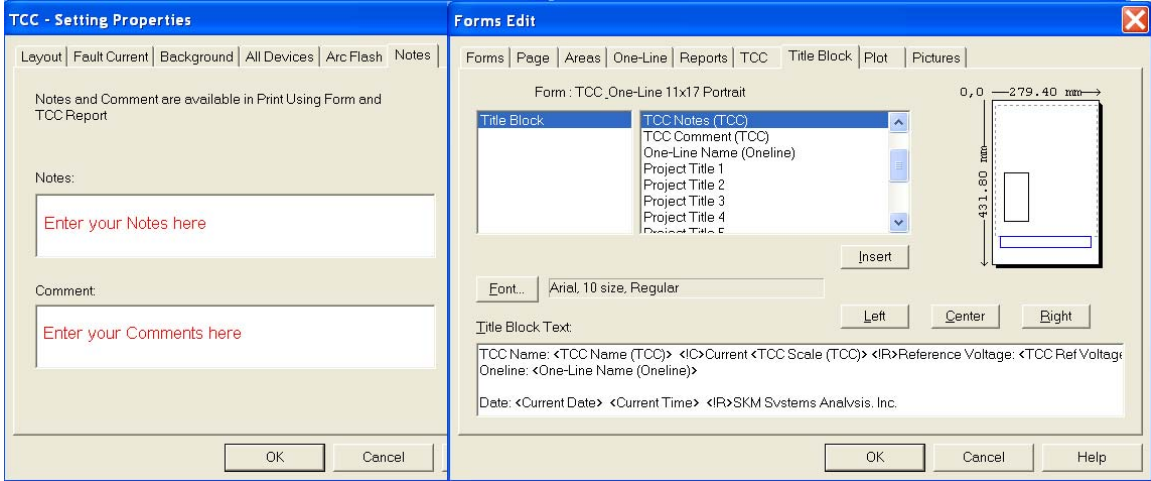


Independent Delay/Time Dial

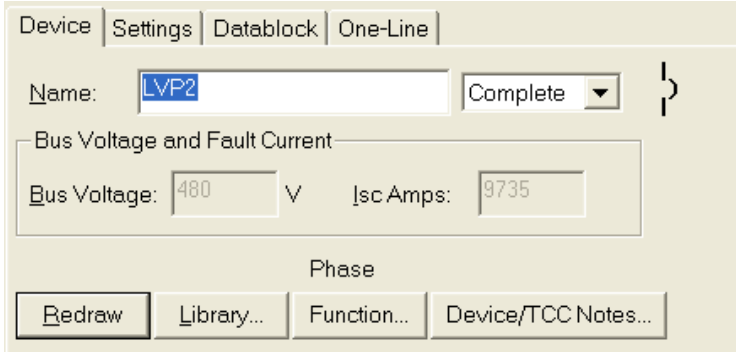


Independent Delay/Time Dial

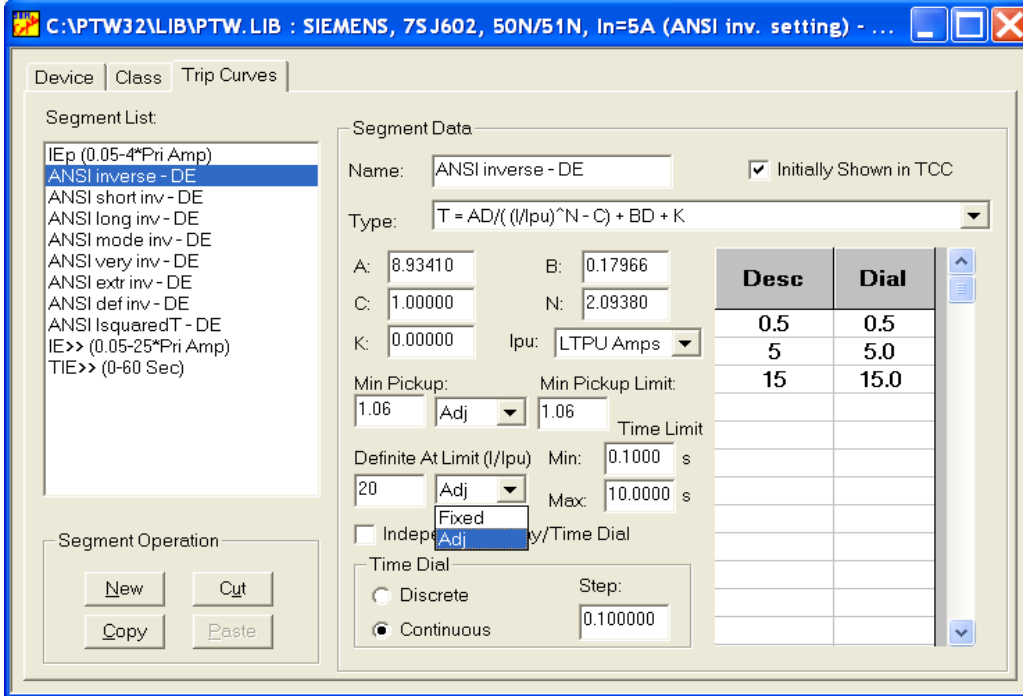
12) TCC Notes and Comments are available in the Print Form and TCC Report functions. Users can enter this information for each TCC.



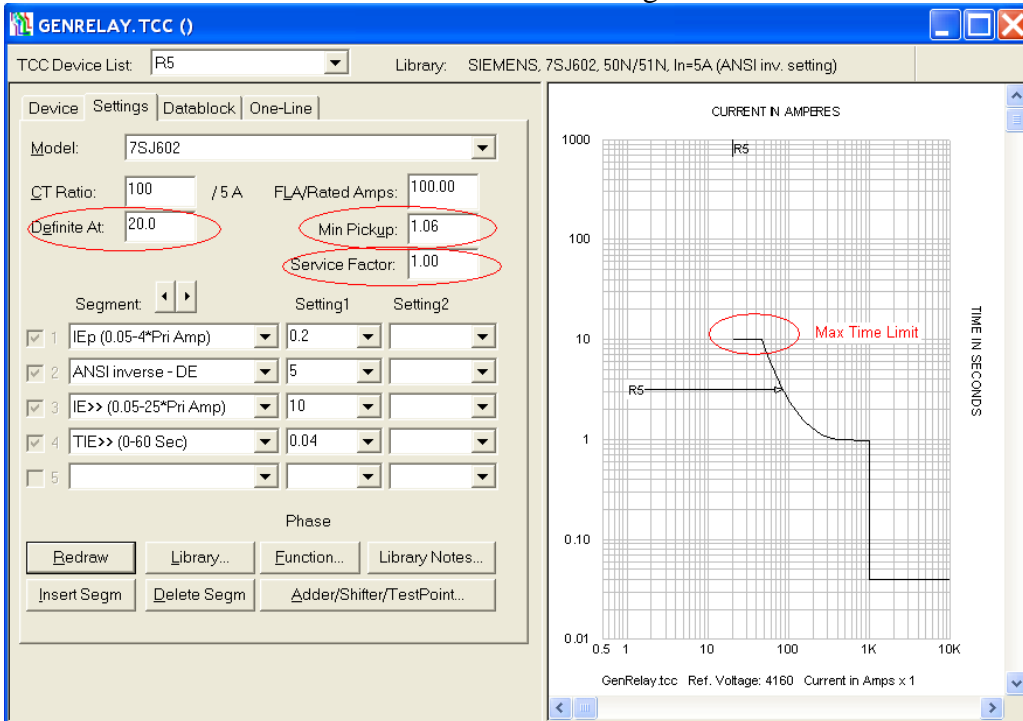
13) Device/TCC Notes allows for additional notes and comments for each protection function. Device/TCC Notes is also available in the TCC Report and Datablock.



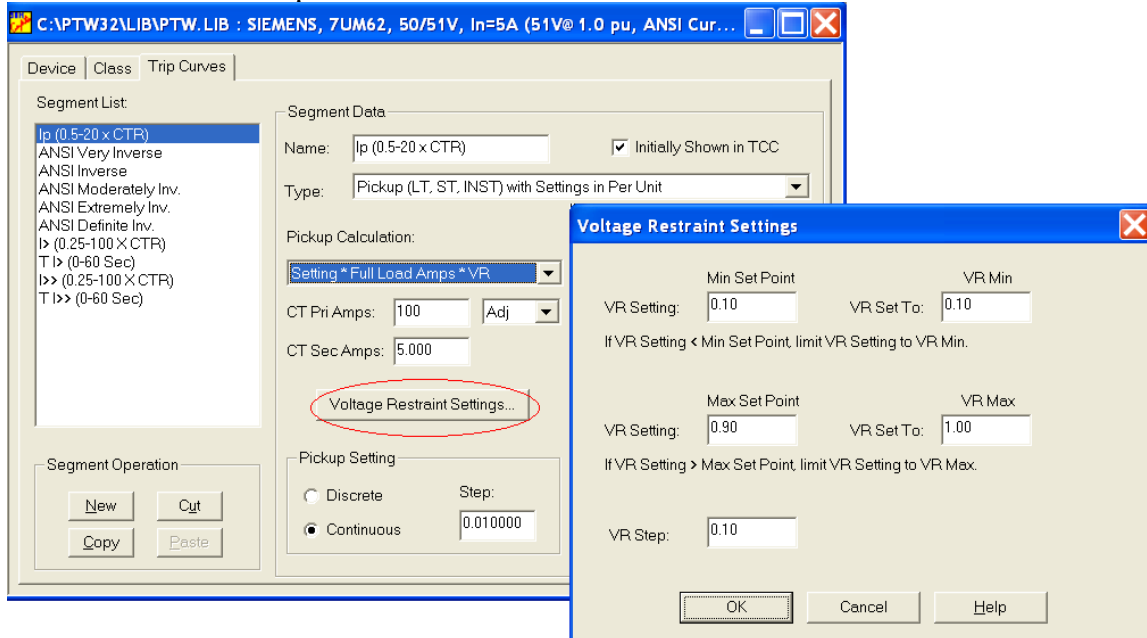
14) “Min. Pickup” and “Definite At Limit” for relays now contain an “Adj” or “Fixed” selection. The “Adj” option allows for modification of the library defaults in the TCC within the library range. In V5.0, “Fixed” is the only option available and no change is allowed in the TCC. Motor/Gen relays delay segment also contains an upper and lower Time Limit.



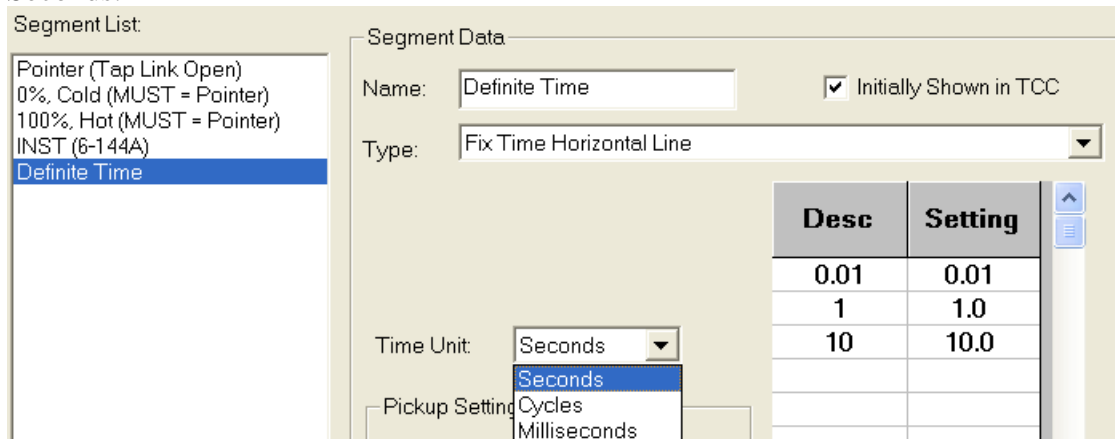
Service Factor is also available on the TCC Setting view.



15) New option for the Long Time Pickup segment to model the Pickup Calculation as a function of the Voltage Restraint Setting for all relays. The voltage restraint setting comes with a range and any value entered outside the range will be set to the VR Min or VR Max value. The user can adjust the VR setting in the TCC in the “Setting2” field and the value will be multiplied with the LTPU.



16) Time Unit for Horizontal Definite Time segment can be in Cycles, Milliseconds, or Seconds.



17. Added "Current * Frame" function for all "Pickup with Open-Clear Curves/Bands" segment types for all Breaker categories in the protective device library.
18. Added adjustable "Definite At" specification in the TCC for relays. Adjustable capability is defined in the library.
19. Specialty Device library curve with a single point is drawn as "+" in the TCC drawing to model a damage point.
20. New option to use the Neutral Fault Current to terminate the TCC.
21. Added STD with I2t segment type to the HV/MV breaker with integral trip-unit.
22. Allow Copy/Paste between Static Trip, Ground Fault, and HV/MV section for breakers with integral trip-units.
23. Added Pickup Label to relays that has a Definite Time segment after the LTPU.
24. Allow for values of zero for relay Test Points, where the zero value Test Points are not shown in the TCC Report.
25. Increased the number of digits after the decimal point to 3 digits for the CT Secondary current.
26. New option for Pickup segments to have a fixed or adjustable CT Primary Amps.
27. New Pickup Calculation options for the Voltage Restrained pickup segment for Generator/Motor relays.
28. New Pickup Calculation options to represent Setting as a function of Interrupting Rating.
29. Added STD with I2t segment type to HV/MV breakers with integral trip-units.
30. New Relay Equation $T = (A/((I/I_{pu})^p - C) + B) * (14D - 5) / 9$ in Library and TCC
31. Motor/Gen Relay Library now contains Time Limits in the Delay segment. TCC will plot the Max Time Limit follow by the delay curve and the Min Time Limit.
32. Added Time-Current Points with Multiple Curves segment in the Recloser library.
33. Option to model a Fuse as a Cable Protector if the fuse is connected to a cable. If the TCC Settings > Fault Current is set to use Branch Fault Current, the branch fault current through the branch will be divided by the number of conductors in parallel and used for terminating the TCC.

Enhancements in Arc Flash Study Module:

1. Ability to represent generator and synchronous motor decay and accumulated incident energy by using the initial fault contribution for the specified duration in cycles. The reduced fault contribution (entered as a percentage of the Rated Current) is used for the remaining time.

Reduce Generator / Synchronous Motor Fault Contribution To

300.0 % of Rated Current after 10.0 cycles

Apply To Generators Apply To Synchronous Motors

2. “Bus and Line Side” results can now be combined in Arc Flash Reports and Labels.

Report Options

Bus

Prot. Load Side

Prot. Line Side

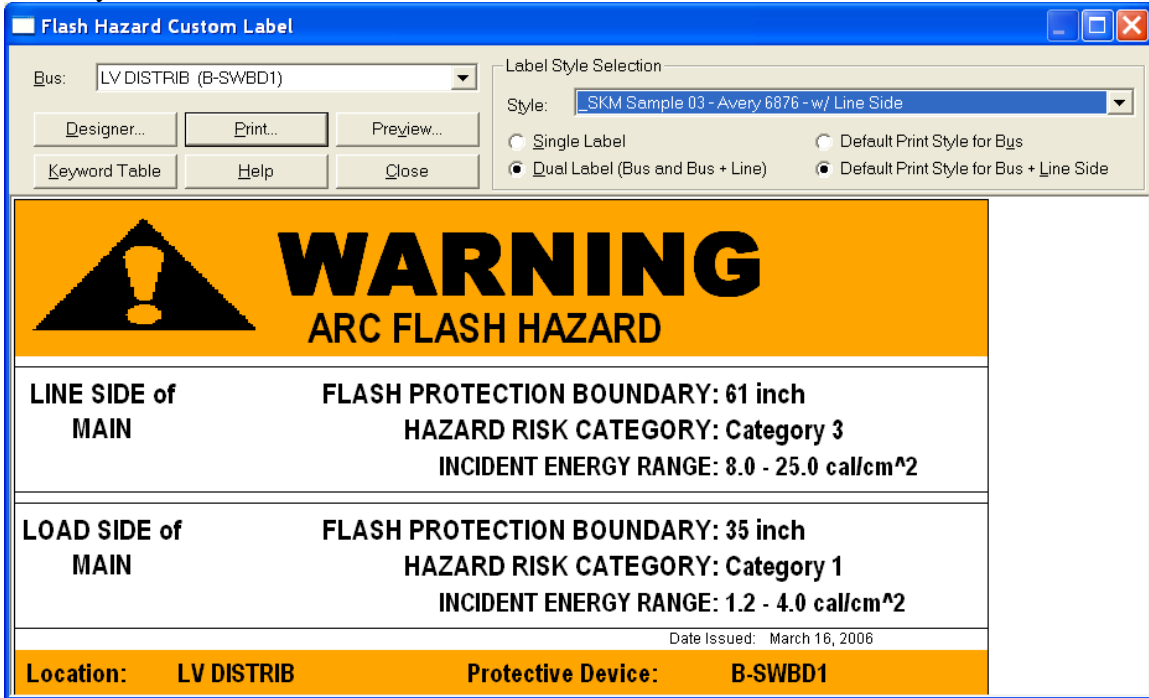
Bus + Line Side

The Line Side results are now displayed after the Bus results to easily identifies the worse case scenario.

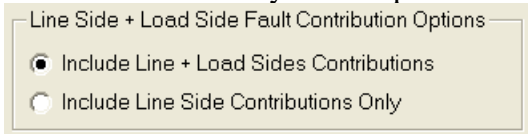
	Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time (sec.)	Ground	Equip Type	Gap (mm)	Arc Flash Boundary (in)	Working Distance (in)	Incident Energy (cal/cm2)	Required Protective FR Clothing Category
31	027-DSB 3	F TX G SEC	0.48	32.17	24.28	11.42	0.697	0.000	Yes	PNL	25	118	18	26	Category 4 (*N3)
32	027-DSB 3 (F TX G SEC LineSide)	F 4	0.48	32.17	24.28	13.43	2	0.000	Yes	PNL	25	245	18	87	Dangerous! (*N9)
33	028-MTR 28 A	LVP4	0.48	21.94	18.26	10.68	0.05	0.000	Yes	PNL	25	26	18	2.2	Category 1
34	028-MTR 28 A (LVP4 LineSide)	F TX G SEC	0.48	21.94	15.71	9.19	1.955	0.000	Yes	PNL	25	200	18	62	Dangerous!
35															
36	028-MTR 28 B	LVP5	0.48	21.94	18.26	10.68	0.05	0.000	Yes	PNL	25	26	18	2.2	Category 1
37	028-MTR 28 B (LVP5 LineSide)	F TX G SEC	0.48	21.94	15.71	9.19	1.955	0.000	Yes	PNL	25	200	18	62	Dangerous!
38	029-TX D SEC	R7 SEC	4.16	6.70	4.81	4.00	1.412	0.083	Yes	SWG	102	198	18	12	Category 3 (*N3)
39	BLDG 115 SERV	R7 SEC	4.16	7.01	5.03	4.18	1.312	0.083	Yes	SWG	102	192	18	12	Category 3 (*N3)
40															
41	BLDG 115 SERV (R7 SEC LineSide)	R7	4.16	7.01	5.30	5.17	1.622	0.083	Yes	SWG	102	280	18	17	Category 3
42	LV DISTRIB	B-SWBD1	0.48	9.73	9.02	5.05	0.217	0.000	Yes	PNL	25	35	18	3.5	Category 1 (*N3)
43	LV DISTRIB (B-SWBD1 LineSide)	F TX 3	0.48	9.73	9.02	5.05	0.562	0.000	Yes	PNL	25	61	18	8.8	Category 3 (*N3)

For “Bus + Line Side” option, the Custom Label dialog will display a Dual Label option. Users will select one default label style for printing both Bus and Line Side results together when the bus has a main breaker, and select another default label style for printing just the Bus results when the bus doesn’t have a main device. Alternatively, you may select the Single Label option and use a single label style for all labels.

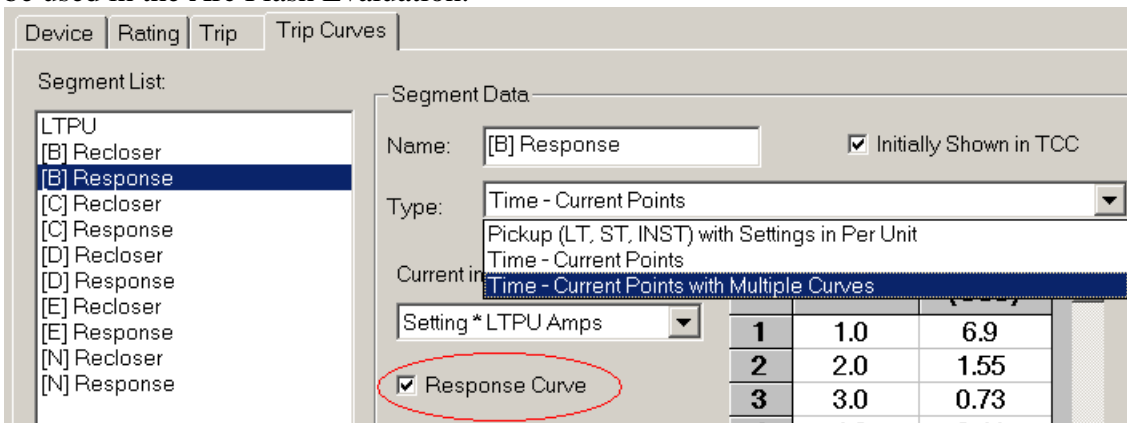
When Dual Labels are used, all labels with Bus and Line Side results will be printed first using its default label style. Labels with Bus results only will be printed afterwards. In the case of printing to a PDF file, two PDF files will be generated. The two default label styles will be saved and restored the next time PTW is launched.



3. Option for the Line Side and Load Side Arc Flash study to include both line and load side contribution to represent a protective device that fails to open; or to include the line side contribution only when a protective device is being racked-out.



4. Recloser is included in the Arc Flash Evaluation. The Response Curve must be identified in the library first. The trip time from the first Response Curve in the TCC will be used in the Arc Flash Evaluation.



5. Pre-Fault Voltage Settings allows for a user-defined per unit value for each or all buses. Also option to use “Load Flow Voltage” or “No Load with Tap” pre-fault voltage in the Arc Flash Fault Study.

The screenshot shows the 'Pre-Fault Voltage' dialog box with the following settings:

- Load Flow Results
- Per Unit Voltage: 1.0 For All Buses
- Per Unit Voltage: Enter for Each Bus...
- No Load with Tap

The 'Enter Pre Fault Voltage for Each Bus' dialog box displays the following table:

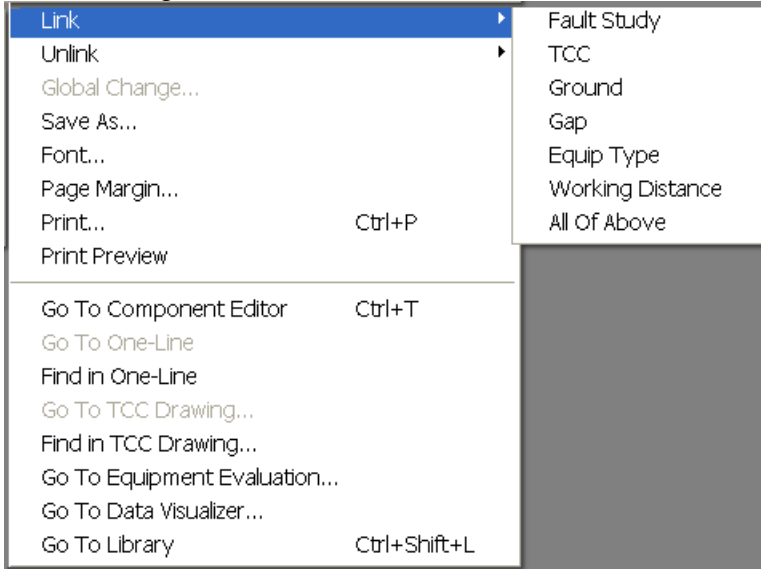
	Bus Name	Nominal Voltage	Pre-Fault Voltage (pu)
1	001-UTILITY CO	69000.0	1.050
2	002-TX A PRI	69000.0	1.050
3	003-HV SWGR	13800.0	1.000
4	004-TX B PRI	13800.0	1.000
5	005-TXD PRI	13800.0	1.000
6	006-TX3 PRI	13800.0	1.000
7	007-TX E PRI	13800.0	1.000
8	008-DS SWG1	4160.0	0.950
9	009-TX C PRI	4160.0	0.950
10	010-MTR 10	4160.0	1.000
11	011-TX3 SEC	4160.0	1.000
12	012-TX3 TER	4160.0	1.000
13	013-DS SWG2	4160.0	1.000
14	015-MCC 1A	480.0	1.000



Question: Which study setup settings are used for the Fault Study within Arc Flash?

Answer: Transformer Tap is always included; Transformer Phase Shift is read from the Arc Flash Options; Line Shunt, Filter, and Var Compensator are always excluded.

6. Global Link/Unlink for all or selected Arc Flash functions. This includes bus/branch Bolted Fault Current, TCC Trip Time, Ground, Gap, Equip Type and Working Distance. Global changes of the above values are available.



Tips and Advantages of LINK:

- Link “Fault Study” allows PTW to calculate the bus/branch bolted fault current automatically. The arcing fault current is calculated based on the IEEE1584 or NFPA 70E standard.
- Link “TCC” allows PTW to read the Trip Time from the coordination curves by using the arcing fault current.
- Link “Ground” allows PTW to calculate a Single Line to Ground Fault and compare it with the 3-phase fault at each bus. Grounded will be automatically determined based on the definition in the Study Options:
 Defined Grounded as SLG/3P Fault >= : %
- Link “Gap” will automatically determine the bus bar gap based on the voltage level and equipment type.
- Link “Equip Type” will automatically determine the of equipment type based on the voltage level.
- Link “Equip Type” will automatically determine the working distance based on the equipment type and voltage level.

Tips and Advantages of UNLINK:

- Allows for any user-definable value based on sound engineering judgment.

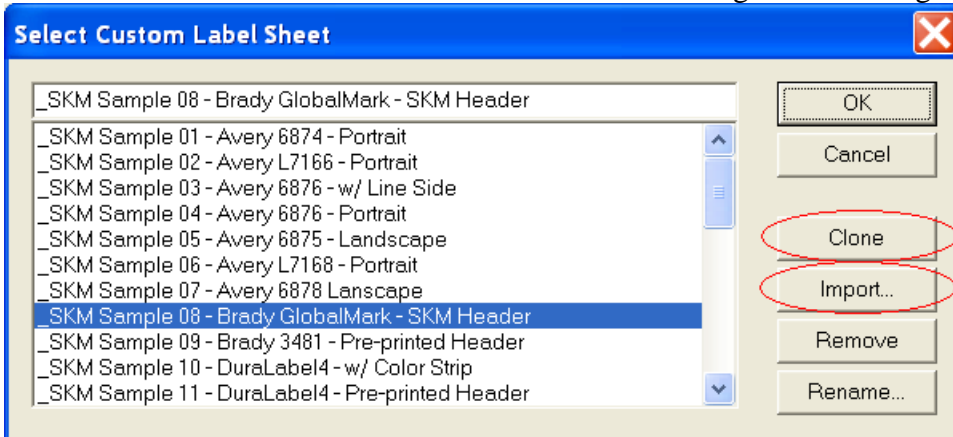
7. Custom Label button in the Arc Flash main screen displays custom label templates and makes label design a great experience. *What you see is what you get! PTW prints directly to Thermal Printers with no additional cost for printer software!*



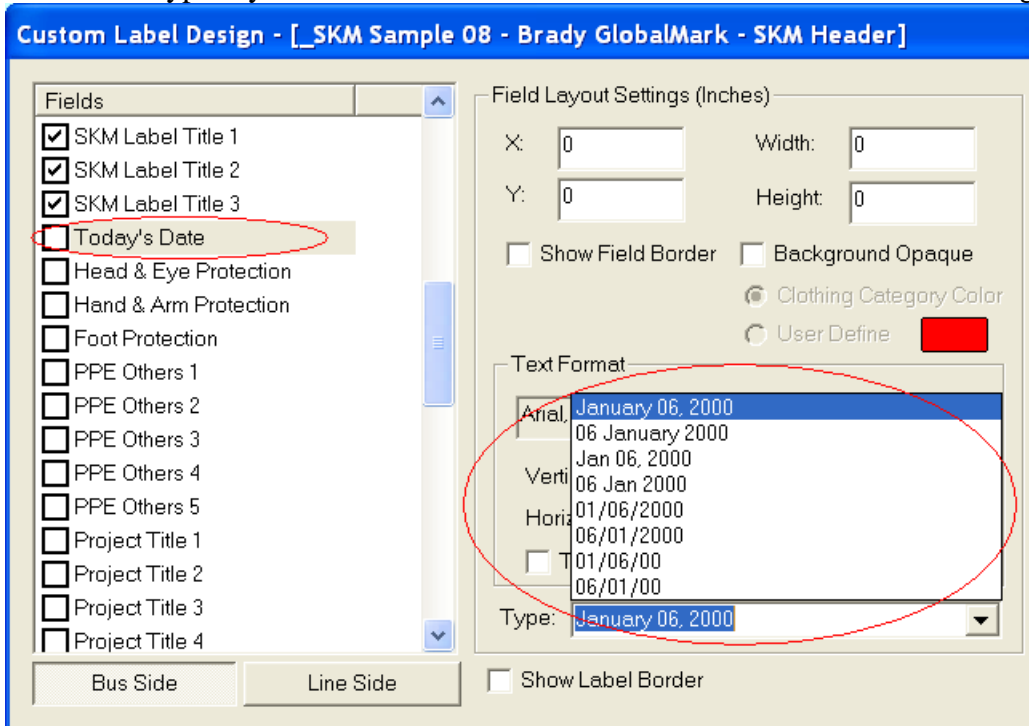
The previously used Custom Label will be automatically saved as the default selection for future usage.

8. Import function found in the Custom Labels window allows for importing of labels from other CustomLabel.dat files to the current CustomLabel.dat file.

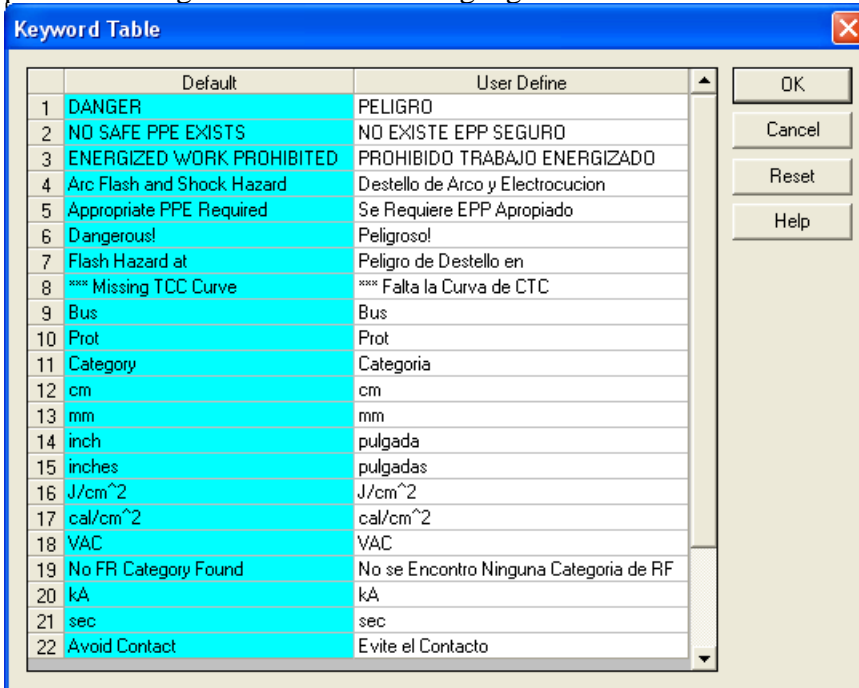
9. Clone function in the Custom Labels allows for cloning of an existing Custom Label.



10. Added Type/Style selection list for the Date field in the Custom Label Designer.



11. Keyword Table in Custom Labels. User can now replace Keywords with different phrases in English or with other languages.



12. Added user-defined background and foreground color, Warning Label text, Head & Eye Protection, Hand & Arm Protection, Foot Protection and five additional user-defined PPE Protection for each category in the PPE Table.

13. Save button in the PPE table allows saving PPE table to a file. “Load” button will load a different PPE table from a previously saved file.

14. Insert and Delete a Row/Category in the PPE Table available in the right mouse-click menu.

	Incident Energy From (J/cm2)	Incident Energy To (J/cm2)	Hazard Risk Category	Clothing Description	Clothing Layers	Required Minimum Arc Rating of PPE (J/cm2)	Notes	Category Background Color	Category Foreground Color	Warning Label Text	Head & Eye Protection	Hand & Arm Protection	Foot Protection	PPE Others
1	0.00	5.00	0	Untreated Cotton	1	N/A				WARNING	Hardhat + Polycarbonate Face Shield + Safety Glasses	Voltage Rated Electrical Gloves	Rubber Soled Leather Boots	
2	5.00	16.74	1	FR Shirt & Pants	1	16.74				WARNING	Hardhat + Polycarbonate Face Shield + Safety Glasses	Voltage Rated Electrical Gloves	Rubber Soled Leather Boots	
3	16.74	33.47	2	Cotton Underwear + FR Shirt & Pants	1 or 2	33.47				WARNING	Hardhat + Polycarbonate Face Shield + Safety Glasses	Voltage Rated Electrical Gloves	Rubber Soled Leather Boots	
4	33.47	104.60	3	Cotton Underwear + FR Shirt & Pant + FR Coverall	2 or 3	104.6				WARNING	Hardhat + Polycarbonate Face Shield + Safety Glasses	Voltage Rated Electrical Gloves	Rubber Soled Leather Boots	

Dangerous Category:

Buttons: Load, Save, Reset, OK, Cancel, Print, Help

15. Bus Bolted Fault Current, Arcing Fault Current, Arcing Duration, Bus Bar Gap, Project Titles, Scenario Name, and more user-defined text fields now available for Custom Labels.

Custom Label Design - [_SKM Sample 01 - Avery 6874 - Portrait]

Fields

- Bus Bolted Fault
- Bus Arcing Fault
- Arcing Duration
- SKM Label Exclamation
- SKM Label Title 1
- SKM Label Title 2
- SKM Label Title 3
- Today's Date
- Head & Eye Protection
- Hand & Arm Protection
- Foot Protection
- PPE Others 1
- PPE Others 2
- PPE Others 3
- PPE Others 4
- PPE Others 5

Field Layout Settings (Inches)

X: 0.05 Width: 3.7
 Y: 2.67 Height: 0.33

Show Field Border Background Opaque

Clothing Category Color User Define

Text Format

Arial Black, 10, Bold Font...

Vertical Alignment: Center

Horizontal Alignment: Left

Text Wrapping

Show Label Border Copy Paste Reset

16. Sort and Stop feature in the Custom Label allows for sorting by PPE category and to stop printing at the end of each category to switch to different pre-printed labels with proper category header colors.

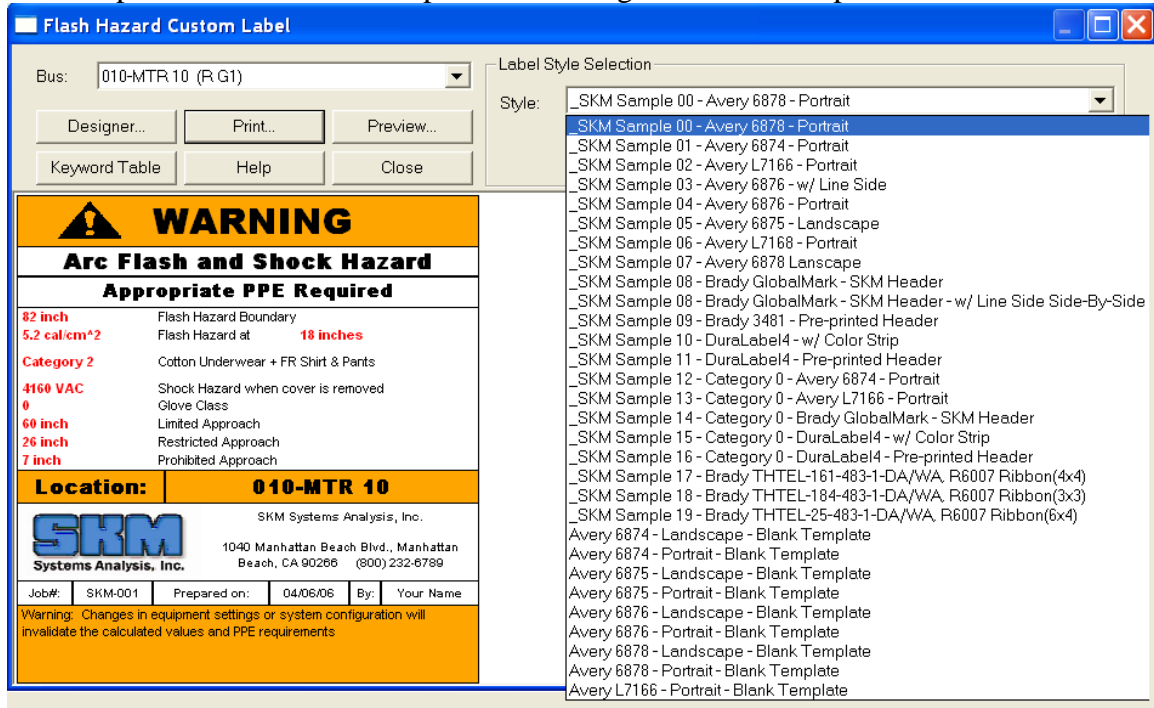
17. Included protective devices that have one end connected to a bus and the other end open in the Arc Flash Load Side Report.

18. Allow modifying the "Breaker Opening Time" for relays in the Component Editor.

19. Renamed the "Page Margin" dialog to "Print/Export Options". Added an option to enable the Arc Flash main spreadsheet column and row headings to export to Excel. Displaying the column and row heading will make selection and sorting within Excel easier. Column headings take up space and PTW may not be able to fit all columns in the Arc Flash main report to a single page even in landscape view. Users may need to adjust the column width or uncheck the "Row and column headings" option box in Excel – View > Header and Footer > Sheet page to exclude the headings from printing in order to fit all the columns onto one page.

20. Updated the Arc Flash Crystal reports to report all study options and project titles.

21. New Custom Label Styles for special thermal printers and new Label Styles for weather proof labels that can be printed from regular laser color printers.



22. Crystal Report with Project Titles and Arc Flash Study Options.

Arc Flash Evaluation Report

Date: 6 April 2006
Time: 7:18:55 PM

Project: PLANT

Project Title	Project Location	Job #	Project Engineer	Project Revision

Arc Flash Study Options

Standard: IEEE 1584
Unit: English
Clear Fault Threshold: 80 %
Check Upstream Miscoordination: Yes

Max Arcing Duration: 2.0 seconds
Include Transformer Phase Shift: No
Define Grounded as SLG/3P Fault >=: 5.0 %

Flash Boundary Calculation Adjustment Option
For voltage above 1 kV and trip time <= 0.1s, use 1.5 cal/cm² *(6.276 J/cm²) for flash boundary calculation.

Incident Energy Report Option for Equipment Below 240 V
Report calculated incident energy from equation.

Generator and Synchronous Motor Decay Option
Include induction motors for 5 cycles.

Induction Motor Decay Option
Include induction motors for 5 cycles.

Fuse Current Limiting Option
All fuses are assumed as Current Limiting fuses, manufacturer's equipment-specific Incident Energy equations will be used if available.

Report Option
Report Bus Results
Report last trip device

23. User-defined Arc Flash Table for low voltage locations that are not modeled in the system. Enter any user-defined bus voltage, fault current, and arcing duration to produce Arc Flash Labels. Linked with the Study Options.

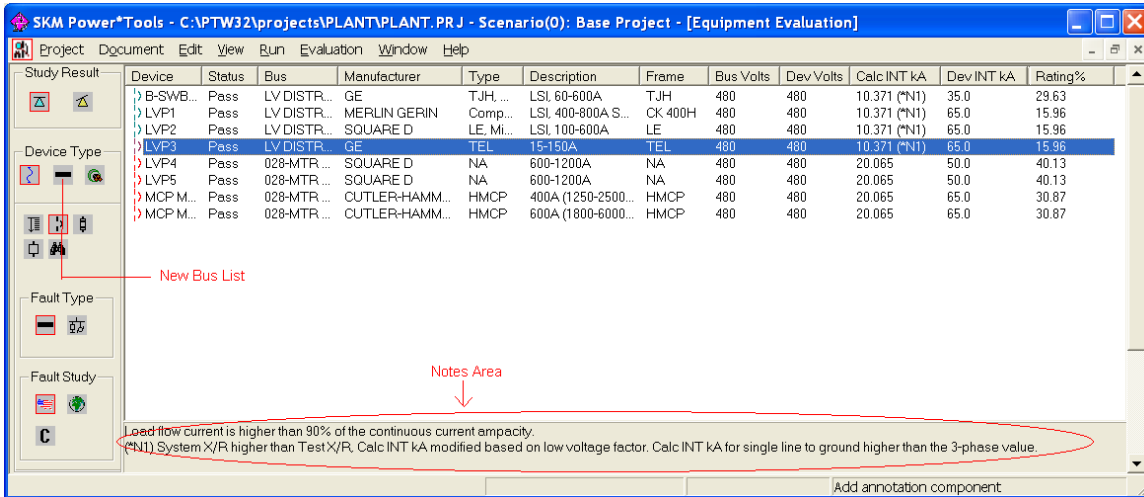
Link
Unlink
Global Change...
Export To...
User-defined Arc Flash Table...

	Bus Name	kV	Bus Bolted Fault (kA)	Arcing Fault (kA)	Duration of Arc (sec)	Ground	Equip Type	Gap (mm)	Working Distance (in)	Working Distance (mm)	Arc Flash Boundary (in)	Incident Energy (cal/cm ²)	Required Protective FR
1	PANEL 1	0.208				No	PNL	25	18	457	18	< 1.2	Category 0, Untreated Cotton
2	PANEL 2	0.208				No	PNL	25	18	457	18	< 1.2	Category 0, Untreated Cotton
3	PANEL 3	0.208	9.00	4.04	0.100	No	PNL	25	18	457	18	1.2	Category 0, Untreated Cotton
4	PANEL 4	0.208	15.00	5.78	0.100	No	PNL	25	18	457	27	2.4	Category 1, FR Shirt & Pants
5													
6													
7													

Print... Custom Label... OK Cancel

24. Option to model a Fuse as a Cable Protector if the fuse is connected to a cable. The Arcing Fault Current through the branch will be divided by the number of conductors in parallel and used for reporting and reading the Trip Time for Arc Flash calculations.

Enhancements in Equipment Evaluation:



1. New Bus list to display bus evaluation results.
2. Added “*” to identify the devices in the Protective Device list that failed to pass the evaluation criteria.
3. Added (*N1) to Calc INT kA if it is modified by the low voltage factor due to system X/R > Test X/R.
4. Added (*N2) to Dev Isc kA if it is modified due to K factor and Max Rating Voltage from the device library.
5. Added (*) to the data columns that failed the evaluation in the Protective Devices, Buses, and Non-Protective device list.
6. Added Notes area to help explain why the device failed the evaluation and to notify in cases when the single line to ground current is higher than the 3-phase or when Series Rating is used, etc.
7. Included all evaluation Notes in the output report and export functions.
8. User-definable Test X/R, Series Rating, and K Factor for Buses in the Component Editor when unlinked with the library.

Equip. Category:	MV Switchgear	Library...	<input type="checkbox"/> Link to Lib
Manufacturer:	ANSI C37.06-1979	Max Voltage:	38000
Description:	1200-2000A	Type:	Indoor Oil Circuit Bre
Rating Description:	1200A 25800V 1200.0A 25.0kA 15.000		
Continuous Rating:	1200.0	A	Rating Voltage: 25800
Short Circuit Rating:	25.0	kA	Test X/R: 15.000
Momentary Rating:	40.0	kA	Series Rating: 0.0 kA
<input type="checkbox"/> Exclude From Arc Flash Bus Side Report	K Factor:	1.00	

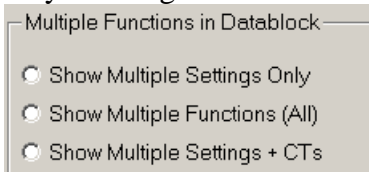
9. Option for Bus Evaluation to exclude evaluation for continuous operating condition.
10. Ability to display and modify the Equipment Evaluation Options from the evaluation window.

Enhancements in Print Using Form:

1. New drop-down menu in the Form Layout Designer > Area tab screen. Users may use the “Border Line Width” option to change the line thickness from 0-10 pixels.
2. Expanded the width of the Group Print Dialog in Print Using Form to allow for more characters for longer file names.
3. Added the Starting Page Number as one of the available fields to be selected in the Form Print > Layout > Title Block. The Starting Page Number is user-definable.
4. Added a Scenario description for each Scenario in the Scenario Manager. Made the Scenario Description available in the Form Print Layout > Title Block screen.
5. Added four Project Titles for project related information such as: Client Name, Project Number, P.O. Number, Revision Number, Project Engineer, Location, etc. Project Titles and Scenario Name are available in the Form Print > Layout > Title Block screen and Arc Flash Custom Labels.
6. TCC Notes and Comments available in Form Print.
7. New column in Form Print - Group Print to allow user-definable printing order when printing documents. Also added additional options to "Sort By Order" or "Sort by Document Name".

Enhancements in Project Options:

1. Auto Arrange Toolbars option under Application for PTW to auto-arrange toolbars.
2. Sizing option under Application for selecting ANSI/NEC or IEE Wiring.
3. Lock Mouse Drag option under TCC > All Devices to disable mouse drag for new TCC drawings.
4. Show/Hide Device Label option under TCC > Device Appearance for new TCC devices.
5. Show “Pickup Amps” in Datablock option under TCC > All Devices. This will show/hide pickup amps in the datablock for all pickup segments, or for All Pickup Segments except the INST.
6. Multiple Protection Functions in the Datablock to show all function specific data such as: Manufacturer, Type, Description, and CT Ratio. Also available for the first function only. Settings for all functions will always be displayed on the one-line and datablocks.



7. New option under One-line Default Symbol Assignment to set the defaults for Datablock and Name Tag to be ON or OFF based on the device type and sub-type. This default will be applied when creating new symbols on the one-line.

Enhancements in Load Flow and TMS:

Option to use the generator sub-transient or transient impedance in Load Flow and TMS Study Setup.

Enhancements in I*SIM:

1. Double-Fed Induction Generator model.
2. User-defined graphical models of Wind Generator model controllers.
3. SVC user-defined graphical models in I*SIM
4. Capability in I*SIM to use the Newton method as the Pre-Disturbance Load Flow with transformer LTC included.
5. New switch event type to change transformer tap at a user-defined time.

Enhancements in HI WAVE:

1. Report harmonic losses in the HI_WAVE report.

Enhancements in Comprehensive Fault Study:

1. Added Comprehensive Fault SLG X/R to the available datablock attributes for buses.
2. New option to select Pre-Fault Voltage Settings based on: user-defined per unit value for all buses, user-defined per unit value for each bus, the Load Flow voltage or the No Load with Tap pre-fault voltage for the fault study.
3. New option to include Filters, VAR Compensators, and Transmission Line/Cable Shunts in the Comprehensive Fault study setup.
4. Added 30-cycle fault current for Low Voltage, Interrupting, and Momentary reports.

Enhancements in DC Systems Analysis:

1. New DC NiCAD Battery Type for Battery Sizing that complies with the IEEE 1115-2000 standard.
2. New option in the DC Battery library to enter curves in either one of the three formats (Rt, Discharge, or Kt curves) and calculates the other set of the curves using the Rated Amp-Hours per Positive Plate value.
3. New DC Lead-Acid Battery and NiCAD Battery libraries.

Enhancements in IEC363 Enhancements:

1. Include IEC363 specific input data in the Input Report.
2. Calculate IEC363 induction motor Td" and Tdc using Xd", X/R, and Rs/Rr.
3. Calculate and report the zero current crossing time in IEC363.

Enhancements in Protective Device Library:

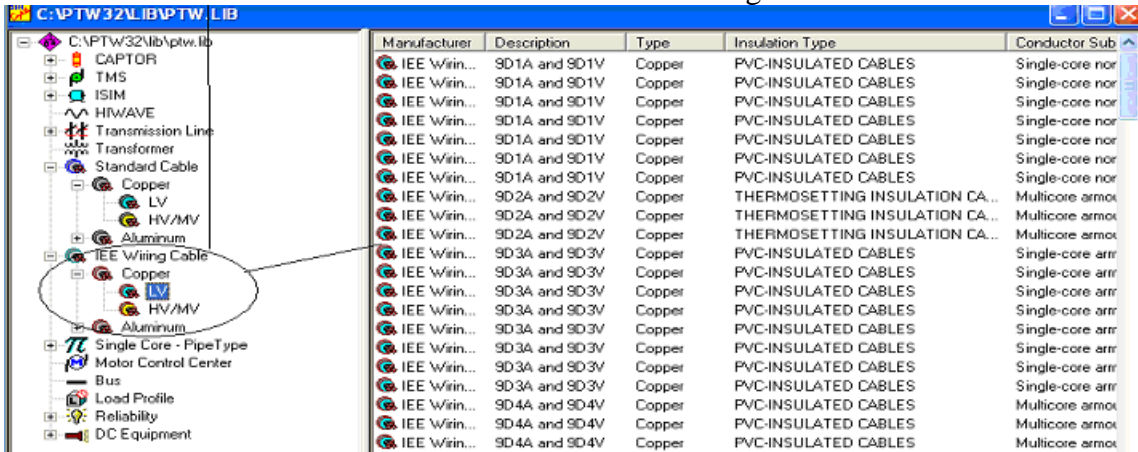
Refer to Changes *Readme V60 PDLibChanges.doc* for thousands of new devices added in V6.0 and modifications.

IEE Wiring Cable Sizing:

The IEE Wiring Regulations Cable Sizing study module is based on the 15th Edition of the 1981 IEE Wiring Regulations.

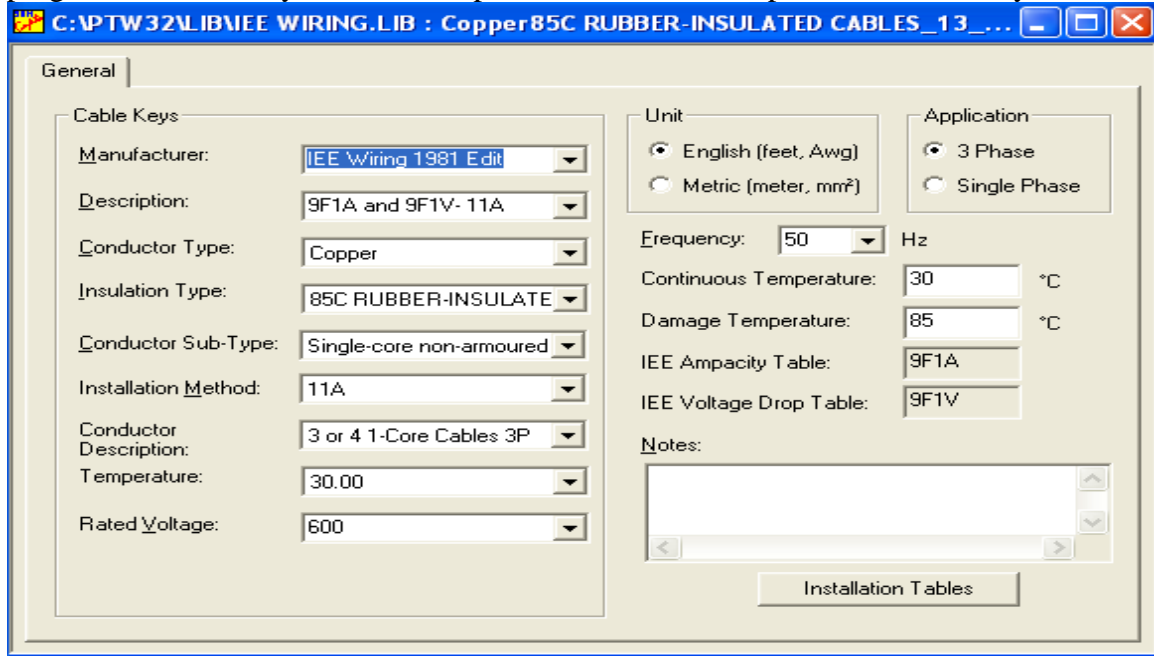
IEE Wiring Regulations cable sizing depends on the ambient temperature, grouping, thermal insulation, wiring ampacity, voltage drop tables based on wiring type, insulation type, and layout method. Effective current-carrying capacity can be calculated based on these factors. Design current can be calculated from the Demand Load Analysis program similar to the ANSI/NEC cable sizing.

To access the IEE Wiring library, press the Library button on the toolbar or select Document > Library to open the library. Similar to the Standard Cable library, the IEE Wiring Cable branch includes a Copper and Aluminum category which is further subdivided into LV or HV/MV sub-folders for different voltage levels.

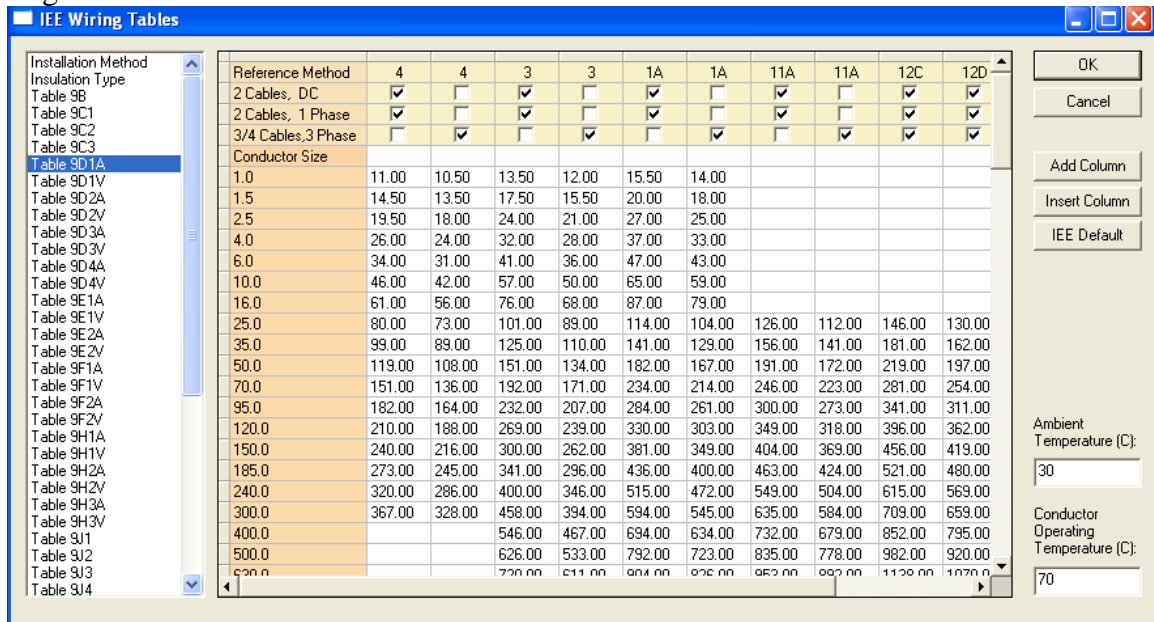


PTW V6.0 Enhancement Guide

All cable entries are managed by selecting a set of combination of parameters within the following Cable Key group. The proper tables for current carrying capability – IEE Ampacity Table and voltage drop – IEE Voltage Drop Table will be identified by the program automatically based on the parameters selected as part of the cable key.

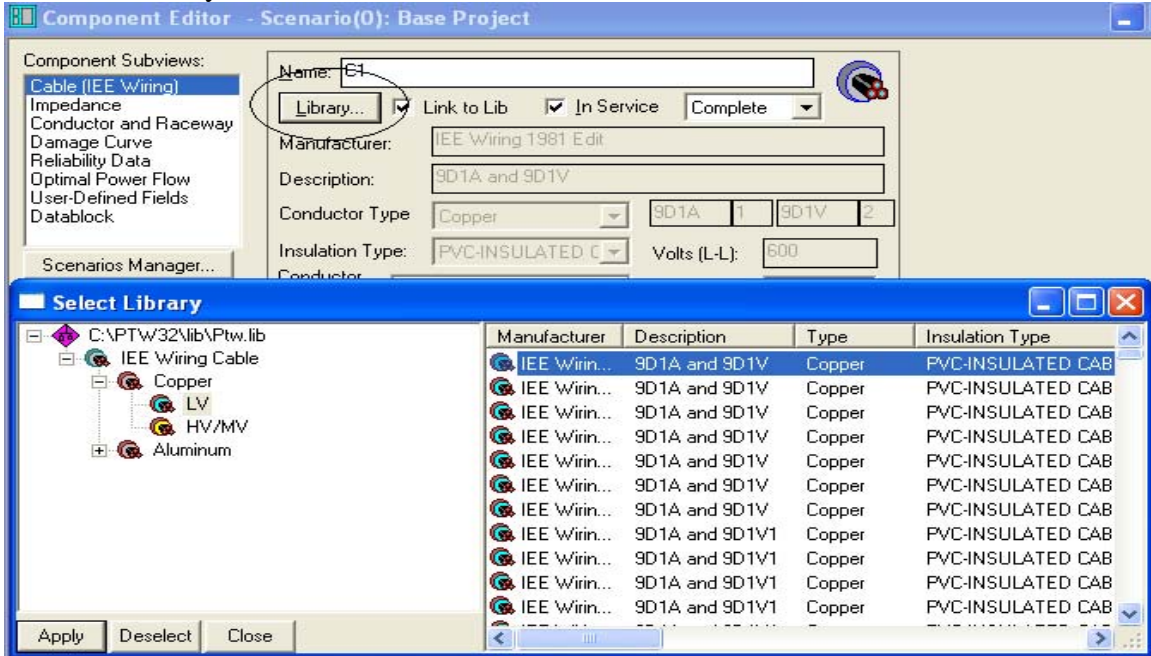


Press the “Installation Tables” button from any cable library entry to access the user-definable tables for different installation, insulation, current carrying capabilities, and impedance. The default library data supplied by PTW is based from the IEE Wiring Regulation.

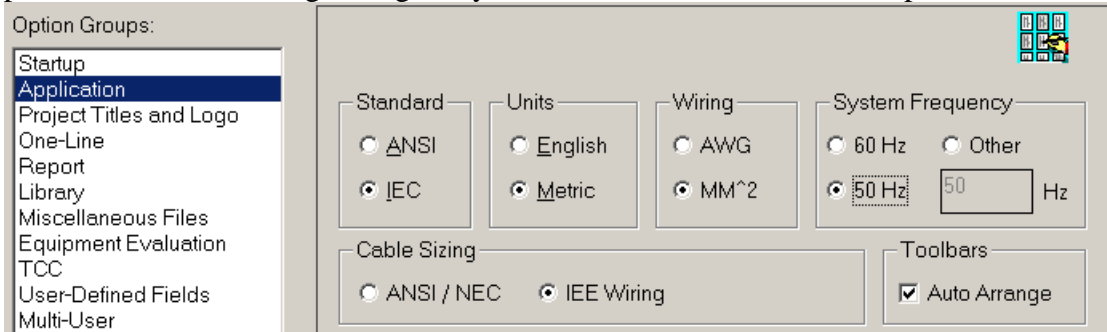


These tables are accessed through the Component Editor and the IEE Wiring Sizing program through a key that relates to the functionalities.

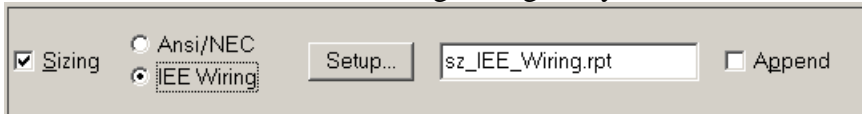
From the Component Editor, press the “Library” button to select an IEE Wiring cable from the library.



To use IEE Wiring Regulations, activate IEE Wiring Regulation radio button from PTW Project > Options > Application by selecting IEE Wiring radio button. You will need to purchase the IEE Wiring Sizing study module in order to enable this option.



From the Study dialog, select the IEE Wiring radio button to access the Setup information and to run IEE Wiring Sizing study.



From the IEE Wiring Regulation Sizing program setup dialog, you can click the Default Cable button to set a default cable library for different voltage levels.

These default cable libraries will be used when a new cable is created in the Component Editor and the “Do Not Size” box is not checked. The default cable libraries will be used to select a proper cable size that meets the requirement of ampacity and voltage drop. You can also UNLINK with the library to enter your own data.