Autodesk® Topobase™ Electric User Guide

Autodesk®

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Autodesk Topobase Electric User Guide

1

Introduction to Topobase Electric

Use Autodesk® Topobase™ Electric to manage and analyze electric networks. You can manage both underground and overhead electric infrastructure. You can also create an internal view of a structure and associate it with external features. Topobase Electric is available in two modules, NA (North America) and CE (Central Europe).

The data models delivered with Topobase Electric NA and CE are usually customized to meet customer or project requirements in different countries and regions. This customization impacts feature class form layout, additional functions, the content of domains, and available reports. This guide describes basic functionality, not specific customizations. There are slight differences between Electric NA and Electric CE. These differences are indicated in this guide.

Electric devices and conductors are grouped as circuits. Each device or conductor stores the relation to a circuit using the CIRCUIT (FID_CIRCUIT) attribute. Circuits are managed by workflows, the Circuit container in the Electric Explorer, feature rules, topology functions, or manually.

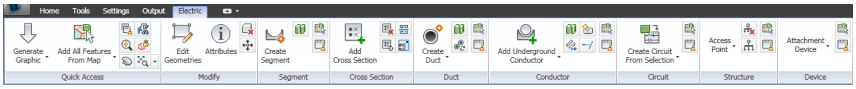
Topobase Electric NA manages phase for devices and conductors. The PHASE (FID_PHASE) attribute stores the phase for each device or conductor. Phases are managed by a workflow, feature rules, topology functions, or manually. For example, the phase is updated whenever a new element is added to the electrical network. Also, use the Reconfigure Phase workflow to trace the electrical network and to modify the phase value. For more information, see Reconfigure Phase (page 51).

Topobase Electric uses cross sections to visualize the contents of a segment or the configuration of conductors on a pole or tower. For example, a segment cross section shows ducts and conductors that run in the segment. Use cross sections in distribution networks to view and position ducts and conductors in segments. Use cross sections in transmission networks to view and position conductors on poles or towers. For transmission networks, the cross section is the view of a pole or tower looking down from the sky. Topobase provides an extended cross section for the elevation view (looking north or east).

NOTE Your administrator must set up cross sections before you can work with Topobase Electric. For more information, see Topobase Electric Cross Sections (page 13).

Topobase Electric Ribbon

When you start Topobase Client and open an Electric CE or NA workspace, the Electric ribbon tab is displayed.



The Electric ribbon tab provides access to the most common operations in Topobase Electric. For example, you can create a segment using the Segment panel, add a Cross Section using the Cross Section panel, and then add ducts and conductors using the Duct and Conductor panels. Use the Circuit panel to define circuits by selecting the feature or by performing a trace. Use the Structure and Device panels to add structures and devices. The features you create using the Electric ribbon are displayed in the appropriate containers in the Electric Explorer. See Topobase Electric Explorer (page 2).

Topobase Electric Explorer

Use the Electric Explorer to view, build, and maintain electric networks. The Electric Explorer provides access to many features at one time. Each class of features is displayed in a separate container. The Electric Explorer displays segments, ducts, conductors, devices, structures, circuits and other electric elements and provides functions and workflows to manage network features.

Populate the Topobase Electric Explorer

To work with the Electric Explorer you must select features in the map or filter the features in the form, and load them into the Electric Explorer. Features are loaded into their corresponding containers. You can select a region of the map or perform a trace to populate all the Electric Explorer containers at once, or you can populate each container individually.

NOTE When you populate containers by individual feature class, you select an entire region in the map. The selected features are filtered by container to add just the feature classes of interest to the container.

To populate containers by selecting features in the map

1. From the Electric Explorer tool bar, click Select Features From Map. 
2. Select a region of interest.

   The Electric Explorer containers are populated with the features in the region you specify.

To populate containers by selecting features using a trace

1. From the Electric Explorer tool bar, click Select Features From Trace. 

   The Find Connected workflow starts.
2. Click Select Start Feature and click the feature at the start of the trace.
3. Click Select Stop Feature and click one or more stop features to end the trace.
4. Under Trace Options, specify the direction to trace.
5. Select Include Stop Features to add the stop features to the containers.
6. Click OK to run the Find Connected workflow and populate the Electric Explorer containers with the traced features.

To populate containers individually

1. In the Segment container, click More ➤ Select From Map. Select one or more segments in the map. Right-click or press ENTER to finish the selection.

You can also click Select From Trace to perform a trace to populate the container.

2. In the Conductor container, click More ➤ Select From Map. Select one or more conductors in the map. Right-click to finish the selection.

   You can also click Select From Trace to perform a trace to populate the container.

3. In the Duct container, click More ➤ Select From Map. Select a duct that is displayed in the cross section or select all ducts in a segment by selecting the segment.

   You can also click Select From Trace to perform a trace to populate the container.

   If no cross sections are available, you can select ducts from the Segment container using Select Child Feature(s). For more information, see View Related Features (page 5).

To populate a container using a feature class form

1. From the Document Explorer, open the feature class form of interest, for example, Breaker.
2. Define any filter to select a set of features.
3. On the feature class form toolbar, click Add The Features In This Dialog To The Electric Explorer. 
4. Open the Electric Explorer. The selected features have been loaded into the appropriate container.

To clear containers

- Click Electric tab ➤ Quick Access panel ➤ Clear All Containers.
  You can also click Clear All Containers in the Electric Explorer.

Auto Highlight and Auto Zoom Features

When you have populated the Electric Explorer containers, you can select features in the containers and automatically highlight and zoom to them in the map.

To auto highlight selected features

- Click Electric tab ➤ Quick Access panel ➤ Auto Highlight. 

To auto zoom to selected features

- Click Electric tab ➤ Quick Access panel ➤ Auto Zoom. 

View Related Features

Use Select Superior and Select Inferior to view, locate, and select associated network features. For example, select a segment in the segment container and use Select Inferior to view all the features within that segment. Alternatively, select a device or conductor and use Select Superior to view the ducts and segments that contain the device or conductor.

To select features within a selected feature

- Right-click a feature in the Electric Explorer. Click Select Inferior.

To select the features that include a selected feature

- Right-click a feature in the Electric Explorer. Click Select Superior.

Connect Features

You can connect segments, ducts, and conductors using drag and drop in the Electric Explorer. This greatly simplifies the process of building your networks. The following procedure describes the process using the example of ducts and segment. The same process applies to conductors, ducts, and segments.

To connect features using drag and drop

1. In the Duct container, select a duct.
2. In the Segment container, select a segment.
3. Drag the selected duct and drop it on the selected segment.

NOTE If you want a duct to span more than one segment, you must preselect them as described. Otherwise, you can simply drag and drop the duct on the segment.

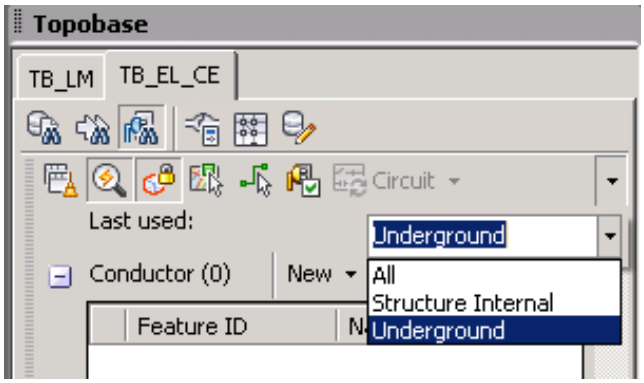
The duct is placed in the segment at an unassigned (not exactly located) position. If the Segment has no unassigned snap points, a message is displayed. Similarly, you can position conductors in ducts and segments using the same process. For more information on assigned and unassigned snap points, see Topobase Electric Cross Section Snap Points (page 15).

Topobase Electric Explorer Profiles

Using Topobase Administrator you can customize the Electric Explorer by creating profiles that display only the containers you need. For example, a Transmission profile would contain poles, towers, conductors, and devices but not ducts. An Underground profile would contain conductors, ducts, and devices but not poles or towers. You can make profiles available to different user groups. To create Electric Explorer profiles, see Create Electric Explorer Profiles (page 7).

To change Electric Explorer profiles

- Select the profile of interest from the drop-down list in the upper right corner of the Electric Explorer.



Create Electric Explorer Profiles

To create Electric explorer profiles and assign them to user groups

1. Start Topobase Administrator and open the workspace. In the tree view, click the Electric document.
2. Click Document menu ➤ Electric.
3. In the right pane, click the Electric Explorer tab. Then click New.
   A new profile appears in the Available Profiles list. Name the new profile.
4. From the Available Containers list, select the container s to display.
5. Under Profile Assignment, select each user group in turn and specify the profiles to make available.

Customize the Topobase Electric Explorer

Use Topobase Client Document Settings to customize the Topobase Electric Explorer. You can control the number of features to store in the Last Used list, the time to pause when inserting ducts and conductors across multiple cross sections, the order of the containers, and feature attributes displayed in the container.

You can specify:

- The number of Last Used features to save per container as you work.
- Whether or not the feature class form should display automatically after you create a new feature.
- The time to pause when inserting ducts or conductors across multiple cross sections. You can set this time to zero to approve all the snap points and insert the ducts or conductors at once.
- The containers to display for each profile and in what order.
- Which attributes are visible in the containers and in what order.

To customize the Topobase Electric Explorer

1. From the Electric Explorer profile list, select a profile, for example, Underground.

2 From the Electric Explorer tool bar, click Show Document Settings. 

3 In the Document Options dialog box, in the left pane, click Electric Explorer or Electric CE Explorer depending on which module you are using.

4 Under Electric Explorer Options, click the General tab. Set any of the following options:

General Tab Option	Description
Last Used Features	Specifies the number of features that are shown in the Last Used section of the containers.
Feature Creation	Specifies the behavior of the application during feature creation. Select Show Form After Create New if you want the form to be opened after feature creation so you can specify attributes. When you are creating features across multiple snap points, you can increase the speed of the process by specifying the delay between snap points in milliseconds. If you set the value to zero, Topobase displays a zoomed out map with all snap points highlighted through the last segment. You can create the duct or conductor in one click.

5 Click the *Profile_Name* Feature Containers tab.

Where *Profile_Name* is the current Electric Explorer profile.

6 Under Visible Feature Containers, specify which containers to display in the Electric Explorer. Use the up and down arrows to arrange the order of containers.

Note that when you select features in the Visible Feature Containers list, the list of attributes in the Attribute Visibility/Order list, update appropriately.

7 Under Visible Feature Containers, select a feature.

8 For the selected feature, under Attribute Visibility/Order, specify the attributes to make available for editing in the container.

9 Use the up and down arrows to specify the order of the attributes.

Repeat steps 7, 8, and 9 for each feature container.

Topobase Electric Topologies

The Topobase Electric data model contains the following two topologies:

- Structural topology—Segments, poles, towers and other structural features build the structural network.
- Electrical topology—Conductors and devices such as breakers and switches build the electrical network.

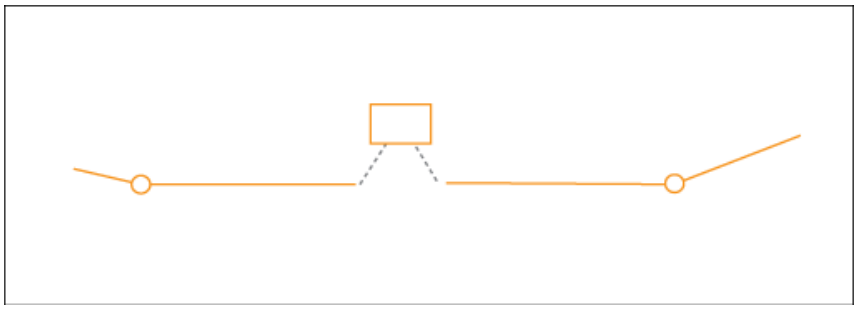
The two networks are related. Segments contain ducts which in turn contain conductors. (Ducts can also contain other ducts.) In the Electric Explorer, you can select a segment (structural element) and show all conductors (electrical elements) that lie within the segment.

The electrical and structural networks are logical topologies, meaning that they support and manage connections between features that are not necessarily spatially connected.

Logical topologies are defined in the Data Model Administrator. Use the Data Model Administrator to view topology information.

Electrical Topology

The Electric topology maintains the connectivity between conductors and devices. Use the Topobase Administrator to configure the topology (which feature classes can be connected with which other feature classes). Use the Connectivity manager to manage the connections in Topobase Client or Topobase Web. For more information about logical topologies, see Logical Topology Introduction.



NOTE Conductors can only be connected to devices, not other conductors. A conductor can be connected to one or more devices, usually one on each end. You cannot connect two devices, for example, a fuse or switch directly to a transformer, you must use an intermediate conductor.

To view or modify Electric topology settings

1. Start Topobase Administrator and open the relevant Topobase Electric workspace.
2. In the Administrator Explorer, click Data Model.
3. In the Data Model Explorer, expand the Topologies node.
   The two topologies, electrical and structural are available.
4. Right-click the electric topology. Click Properties.
5. In the Logical Topology dialog box, click Feature Classes In The Topology to view the feature classes that are part of the topology.
6. Click Connectivity Between Feature Classes to view the connectivity.

Connectivity Tables

Connectivity and flow direction between features is stored in the topology tables, EL_ELECTRIC_CONN and EL_STRUCTURAL_CONN (Topobase Electric NA) and EL_CONN and EL_STR_CONN (Topobase Electric CE). When you digitize new features, the connectivity and flow are updated.

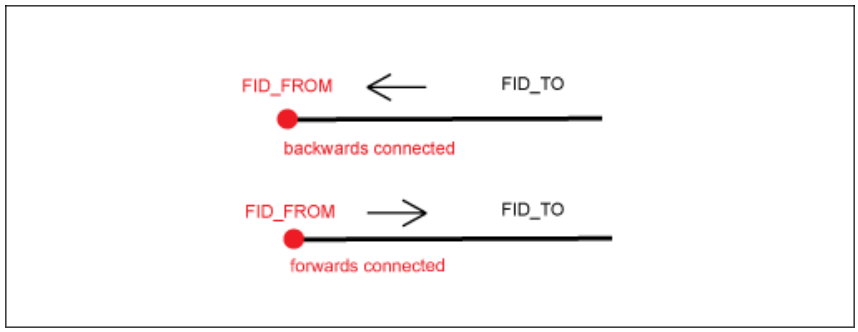
We recommend that you do not use the Initialize Topology function in Topobase Electric unless all connectivity can be determined from the geometry of features in the topology. The connections established from external electric features to electric features inside structure internals are purely logical connections. Therefore, we strongly advise against initializing the electric

topology. You can initialize the structural topology if there are no manually connected features, but this is not recommended as a regular operation.

NOTE Do not manually modify the connectivity tables.

When you insert a group of features using a template, the connectivity for both spatially connected and nonspatially connected features is stored in the connectivity tables.

Connectivity Attribute	Description
FID_FROM	Specifies a particular feature.
F_CLASS_ID_FROM	Specifies a particular feature class.
FID_TO	Specifies the connected feature.
F_CLASS_ID_TO	Specifies the connected feature class.
FLOW	Specifies the flow direction between a particular feature (FID_FROM) and the connected feature (FID_TO). ■ 1 = forward ■ 2= backward ■ 3= both



For spatially connected features, when you insert or update a feature, the connectivity table is maintained automatically. For the electrical topology, the internal topology updater checks consistency of the feature attributes

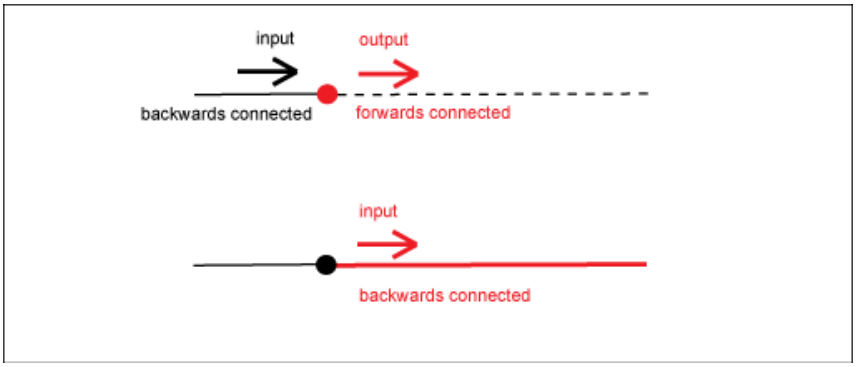
VOLTAGE, PHASE, CIRCUIT. The topology updater does the following operations:

- Defines the flow direction of new features.
- Sets circuit, phase, and voltage values for new or modified features.
  For example, when all connected features have the same value, or the value of the connected features is undefined but at least one feature has a defined value. The values are only set if they are not already defined. Stop features are ignored.
- Sets the circuit, phase, and voltage values of connected features.
  For example, sets the circuit, phase, and voltage value of connected features when you define the values of a new feature. The value of all connected features is the same or null.
- Checks phase, voltage, and circuit.
  If the connection is not valid, a message is shown.

Flow Definition

When you add a feature, an internal topology updater automatically sets the flow between the new feature and connected features. For example, when you connect an existing breaker with a new conductor, the flow is set as follows:

- **Case 1**—The breaker has an input. This means it has a backward connection. The new conductor will be an output which means the breaker will be connected forwards to the conductor or conversely, the new conductor will be connected backwards to the breaker.



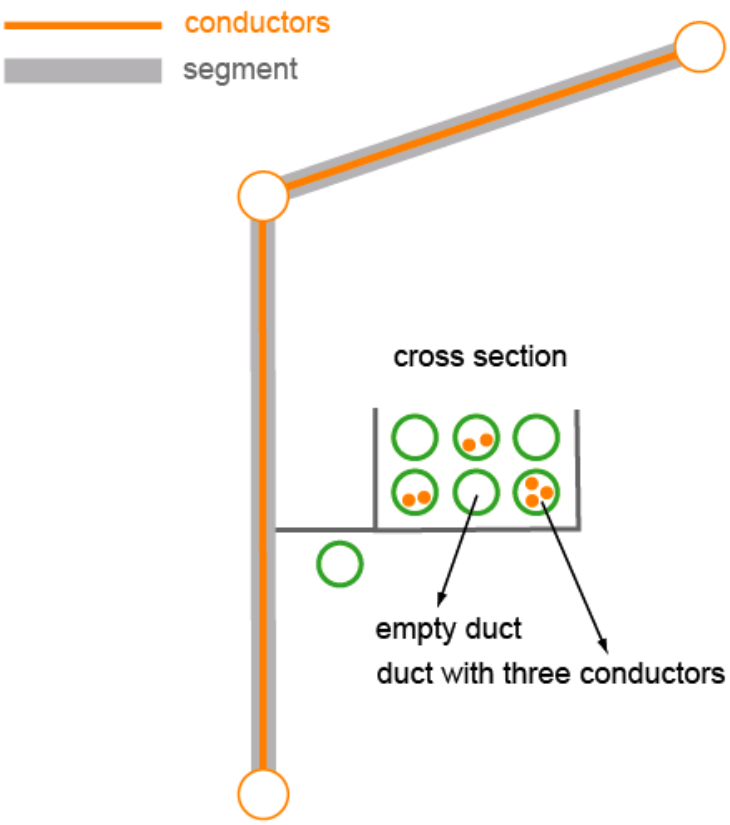
- **Case 2**—The breaker has an output but no input. This means that the breaker has a forward connection. The breaker will be connected backward to the conductor and the new conductor will be connected as an input, forwards to the breaker.
- **Case 3**—The breaker has neither input nor output defined. This means it is not connected to any features or the flow is the default setting of 3 (both).
  If the new conductor has connections to other features, so that it has an input from these features, the flow is set as an output from the new conductor to the feature.

  If the new conductor is connected to one other feature whose flow is defined, the flow is reversed to the interacting feature.

Topobase Electric Cross Sections

For underground networks, cross sections simplify the management of the relationships between segments, ducts, and conductors during data acquisition. Cross sections provide a cross sectional view of the following electrical elements:

- **Segments**—A segment cross section shows the ducts and conductors that lie in the underground network segment. You can edit the conductors and ducts in the cross section. For example, you can place or remove ducts in the segment, and you can place or remove conductors in a duct.
  In underground distribution, segments are equivalent to trenches. In overhead transmission, segments do not have a physical equivalent. They define the pathway for conductors attached to poles. Segment cross sections include snap points to facilitate conductor placement.
- **Poles and Towers**—A pole or a tower cross section shows the conductor snap points associated with the pole or tower. The view is of the pole or tower looking down from the sky.
  In addition, Topobase provides an extended cross section for the elevation view of the pole or tower (looking north or east).



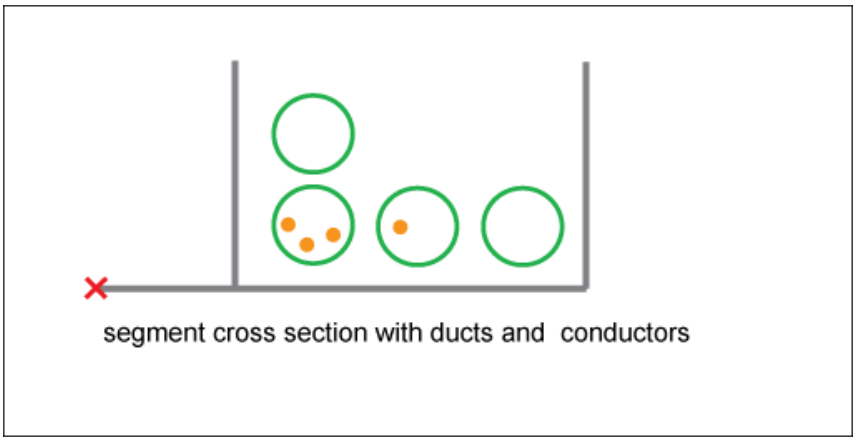
NOTE In Topobase Electric NA, segments and conductors are stored with geometry but ducts are attribute feature classes without geometry. Using cross sections, you can present all elements in the map.

Topobase Electric Cross Section Templates

The layout and arrangement of the cross section elements can be configured. For example, you can define templates with different arrangements of conductors and ducts, or with a varying number of ducts. Add decorations and labels to enhance the cross section appearance. Cross section templates are stored in the document.

A cross section template contains the following components:

- Origin point
- Labels
- Snap points
- Decoration points, lines, and polylines (for example the polyline representing the segment)



When placed in a map, the cross section shows the ducts and conductors of the current segment.

A segment cross section template contains assigned and unassigned snap points for ducts. The snap points are where ducts are inserted and where the duct cross sections are displayed.

Topobase Electric Cross Section Snap Points

In cross section templates (for ducts, segments, poles, and towers) snap points are used to position features. For example, in a segment cross section, snap points help you position ducts within the segment. In a duct cross section, snap points help you position conductors within the duct. The number of snap points determines the number of ducts that can be placed in a segment or conductors in a duct.

During data acquisition, use snap points to place a duct at the specified location in the segment cross section drawing.

NOTE When defining a segment cross section template, you digitize the snap points for the ducts and conductors, not the ducts and conductors themselves. You digitize ducts and conductors during data acquisition. Similarly, for overhead networks, when defining a node cross section template, you digitize the snap points for the conductors, not the conductors themselves.

Snap points can be assigned or unassigned.

- **Assigned**—Use assigned snap points for features whose exact location is known. These are used only in segment cross sections. These are given the numbering scheme, YYYXXX.
- **Unassigned**—Use unassigned snap points for features whose exact position is not known. For example, in duct templates you always use unassigned snap points. Similarly, when you add a conductor whose exact location in the segment is not yet known, use an unassigned snap point.
- **Position Number**—Use Position Number to automatically choose the next available location for contained ducts or conductors, or to specify data for other components of the template, such as labels or legend.
  Position number represents the relative position of the snap point. The position number is the same in the different templates. This allows you to change the template if necessary. When you add new columns or remove rows, the position number of the existing items does not change.

  You can specify the numbering used for position number to be sequential, order, or none. See Set Topobase Electric Options (page 68).
- **Labels**—Use labels for annotations, such as the order number or a legend. You can use both the snap point label feature class or any cross section label feature class.

Segment, Duct, Pole, and Tower Models

For segments, ducts, poles and towers you can create cross sections of different types. For example, a segment cross section varies in the number of ducts, in the order of the ducts, or the way the conductors are displayed in the cross section. Your administrator creates models to provide different types of templates.

NOTE There are no ducts in Transmission segments.

- **Segment Model**—Segment model templates specify the maximum number of ducts and the order of ducts in the diagram, for example, 2x3, 2x2, or 6x3.
- **Duct Model**—Duct model templates specify the maximum number of conductors that can be placed in a duct. The number of conductors matches the number snap points that are defined in the template.
- **Pole Model**—There are two types of pole model templates. The regular template (FID_TEMPLATE) specifies the number of conductors that can be connected to the pole. The number of conductors matches the number snap points defined in the template. This template is used for data acquisition. The extended template (FID_EXTENDED_TEMPLATE) specifies an additional cross section used for visualization only.
- **Tower Model**—There are two types of tower model templates. The regular template (FID_TEMPLATE) specifies the number of conductors connected to the tower. The number of conductors matches the number snap points defined in the template. This template is used for data acquisition. The extended template (FID_EXTENDED_TEMPLATE) specifies an additional cross section used for visualization only.

When you create a segment, you specify the type of cross section by entering the appropriate segment model, such as "2*2 Ducts". The segment model specifies which template to use when you create the cross section.

When you create a tower, you specify the type of cross section by entering the appropriate tower model, such as "Transmission 4*1". The tower model specifies which template to use when you create the cross section.

Create a Segment Cross Section Template in Topobase Electric

Topobase Electric provides a workflow for creating a segment cross section template. To create cross sections for towers and poles, see Define a Pole or Tower Cross Section Template in Topobase Electric (page 24). You can:

- Create a new cross section template from scratch.
- Create a new cross section template from an existing template and apply the modified template to selected segments.

- Update an existing cross section template and replace all original template instances with the new one.

To create a segment cross section template in Topobase Electric

1. Generate Graphics.
2. Display the Electric Explorer. 
3. In the Segment container, click More ➤ Cross Section Template Maintenance.

   You can also start the Cross Section Template Maintenance workflow from the Workflow Explorer.
4. In the Cross Section Template Maintenance workflow, select one of the following options and then click OK:
   - From Scratch—Creates a new cross section template from scratch.
   - From Existing Template—Creates a new template based on an existing cross section template. Select the template to modify. Click Choose and select segments in the map to update any cross sections in use as needed.
   - Redefine Existing Template—Redefines and overwrites an existing cross section template. If the template is being used, you can only add, delete, or modify the cross section template decoration features: snap points and ducts are read only.
5. If you are creating a new template from scratch, do the following:
   - Under Template Name, specify a name for the cross section template.
   - For Origin, click Digitize and specify the origin point of the cross section.
   - As you digitize conductors and ducts, you are prompted with a suggested snap point in each cross section. For symmetric templates, the suggested snap point is determined by the Position Order attribute. For asymmetric templates, suggested snap point is determined using the Position Number attribute.
     Select This Is An Asymmetric Cross Section if appropriate.
   - In the Cs Decoration container, click New. Click Point, Linestring, or Polygon.

6 Draw the cross section decoration geometry. Press Enter to complete each feature.

   The cross section decoration features are displayed in the Cs Decoration container.

7 In the Snappoint container, click New. Click one of the following options:

   - Array—Specifies an array of snap points.
   - Single—Specifies a single snap point.

8 Define the snap points for the cross section.

   For more information on building an array, see Build an Array of Snap Points (page 20).

9 Optional: In the Duct container, click New. Click snap points to create ducts.

   This creates a predefined duct. The ducts are displayed in the Duct container. When you are finished creating ducts, press Enter. Note that predefined ducts cannot be deleted so create them only if you are certain they are needed.

10 Click OK to complete the workflow.

   The cross section template is created and temporary features are deleted.

   If you have updated an existing cross section template and applied it to selected segments, the following rules apply:

   - The new template must have enough unassigned snap points to accommodate cs_ducts and cs_conductors located on unassigned snap points in original template.
   - The assigned position number for cs_duct and cs_conductor in original template must exist in the new template.

To assign the cross section template to a segment model

1 In the Document Explorer, under the group Structural ➤ Pathway ➤ Segment, select the Segment Model feature class.

   NOTE If you create the cross section template using the workflow (in the Workflow Explorer), the cross section template is assigned to the segment model automatically.

2 Right-click and click Show Form.

3 Click  New Record, or filter the segment model you want to assign the template to.

4 Click the Details tab.

5 For the Template attribute, select the cross section template to assign to the segment model.

Build an Array of Snap Points

The Topobase Electric Cross Section Template Maintenance workflow provides a tool for building a snap point array.

To build a snap point array

1 In the Create Cross Section Workflow, in the Snap Point container, click New ➤ Array.

The Create Cross Section Workflow area is replaced by the Array Setting area.

2 For Array Structure, click Rectangular or Polar.

3 For Array Type, click Assigned or Unassigned.

For more information about snap points, see Topobase Electric Cross Section Snap Points (page 15).

4 Specify the rest of the array settings as desired for the array structure you are creating.

5 Click Create. Click in the map to specify the origin (or base point) of the array.

6 Click Close to close the Array Setting area and return to the workflow.

Adding a Cross Section to a Segment in Topobase Electric

After you define a cross section template, you can add cross sections to segments. The segment must have an associated cross section.

To add a cross section to a segment

1. Display the Electric Explorer. 
2. From the profile list at the top of the Electric Explorer, select the profile to use, for example Underground.

   Profiles are created in Topobase Administrator. Profiles control the containers that are visible in the Electric Explorer. For more information, see Create Electric Explorer Profiles (page 7).
3. Click Electric tab ➤ Cross Section panel ➤ Add Cross Section.
4. Select the segment. Press Enter to insert the cross section template on the segment or specify an origin point to position the cross section away from the segment.

   The segment must have an associated cross section model.
5. To position the cross section at an offset from the segment, specify the origin point for the cross section.
6. Specify the anchor point for the legend line.

   To snap the anchor point to the segment, use the OSNAP Nearest setting (enter NE on the Command Line). To draw the legend line perpendicular to the segment, simply press ENTER.

Add Ducts and Conductors to Segment Cross Section

Cross sections are added to the map automatically when you assign a segment model to a segment. If the segment already has a model assigned, the cross section is replaced. Create ducts and conductors by clicking snap points in the cross section.

To add ducts and conductors using segment cross section templates

1. Open the Electric Explorer. 
2. Create a segment and assign a segment model.

   In the Segment container, select the segment and select a model from the Model drop-down list.

You can also right-click the Segment in the container. Click Show Form. On the General tab, use the Model drop down to specify the number of ducts in the segment. Click Update & Close.

3 In the Segment container, select the segment.

4 In the Duct container, click New ➤ Duct. In the drawing, click the snap point for the duct. Assign the duct model.

5 Select the duct, and in the Conductor container, click New ➤ Underground Conductor.

6 In the cross section, click the snap point in the duct. You can place as many conductors in the duct as snap points are defined. When the maximum number of conductors has been created, as message appears.

To delete a segment cross section

- Select any of the cross section features, and click Delete.

Create a Duct Template in Topobase Electric

Create duct cross sections and associate them with segment cross sections.

1 Click Electric Explorer. 

2 In the Duct container, click More ➤ Create Duct Template.
You can also start the Create Duct Template workflow from the Workflow Explorer.

3 Under Template Name, specify a name for the duct template.

4 For Origin, click Digitize and specify the origin point of the duct.
A Cs Origin is inserted in the map at the origin point.

5 In the Snappoint container, click New. Click one of the following options:
- Array—Specifies an array of snap points.
- Single—Specifies a single snap point.

6 Define the snap points for the duct.
For more information, see Build an Array of Snap Points (page 20).

7 Click OK to complete the workflow.

To assign the duct template to a duct model

1 In the Document Explorer, under Structural ➤ Pathway ➤ Duct, select the Duct Model feature class.

NOTE If you create the duct template using the workflow (in the Workflow Explorer), a new duct model is created automatically.

2 Right-click and click Show Form.

3 Click  New Record, or filter the duct model you want to assign the template to.

4 For the Template attribute, select the duct template to assign to the duct model.

Mirror, Rotate, and Scale Cross Sections

Use the Mirror, Rotate, and Scale Cross Section operations to improve the display and readability of your cross sections. You can specify that cross sections are mirrored automatically as needed to preserve readability. For more information, see Set Topobase Electric Options (page 68).

Using Rotate Cross Section, adjust the position of the cross section from 0 to 90 degrees perpendicular to the segment. Note that you cannot rotate the cross section so that it moves beyond 90 degrees perpendicular to the segment and crosses to the opposite side of the segment as that would invalidate the positions of the ducts and conductors inside the cross section.

NOTE It is strongly recommended that you use the Mirror, Rotate, and Scale commands in the Segment More menu in the Electric Explorer or on the Cross Section panel in the Electric ribbon. The AutoCAD MIRROR, ROTATE, AND SCALE commands might yield inconsistent results when used on Topobase Electric cross sections.

To mirror, rotate, and scale cross sections

1 Display the Electric Explorer.

2 Generate Graphics.

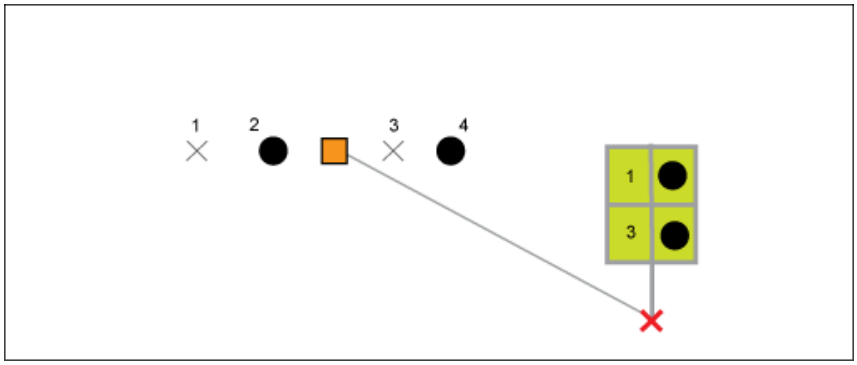
3 In the Segment container, do any of the following:

- Click More ➤ Mirror Cross Section.
  Select the cross section to mirror using a selection window. The cross section is mirrored.
- Click More ➤ Rotate Cross Section.
  Select the cross section to rotate using a selection window. Click to specify the new orientation of the cross section. The cross section is rotated.
- Click More ➤ Scale Cross Section.
  Select the cross section to scale using a selection window. Enter the scale factor. Press Enter.

Define a Pole or Tower Cross Section Template in Topobase Electric

NOTE Pole or Tower cross sections are available in Topobase Electric NA only.

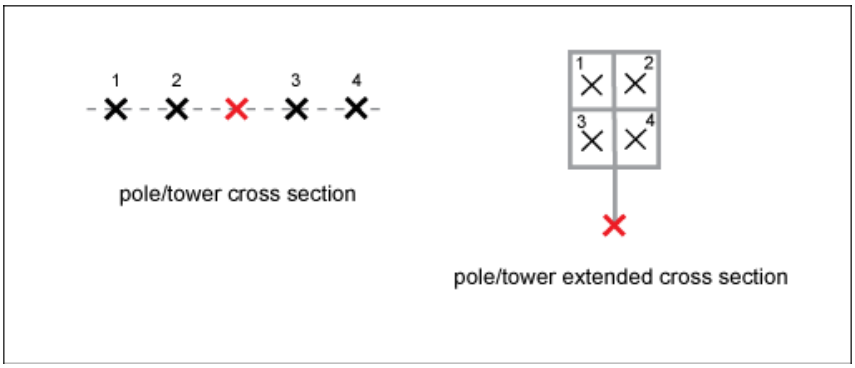
A pole or tower cross section is a view of a pole or tower looking down from the sky.



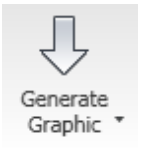
Tower with two conductors. The standard cross section displays two snap points for two more conductors. Use the standard cross section for data acquisition, and the extended cross section is for visualization only.

To define the pole or tower cross section template

1 Design the cross section layout. For example, use AutoCAD tools to draw a pattern, so you can later digitize the template features quickly.



2 Start Topobase Client and open the workspace.



3 Click Home tab ➤ Display panel ➤ Generate Graphic.

4 Zoom to a viewport with an appropriate scale, so you can digitize the features with a suitable size.

5 Digitize the following components using the feature classes under the Cross Section feature class:

- Origin: Right-click the CS Origin feature class. Click Digitize With Form.
- Snap points: Right-click the Snappoint feature class. Click Digitize With Form.

6 For the snap point features, use the feature class forms to enter the following:

- Position Number: On the General tab, enter a number for each snap point. Otherwise conductors cannot be assigned to cross sections automatically.
- CS Origin: On the Details tab, set the FID_CS_ORIGIN attribute to the FID of the CS_ORIGIN.

7 In the map, select the origin. Click Home tab ➤ Quick Access panel ➤ Attributes. 

8 In the Cross Section form, read the FID value. Close the form.

9 In the map, select the template snap points. Click Home tab ➤ Quick Access panel ➤ Attributes. 

10 In the snap point form, click the Details tab, and click the Global Update icon  . Enter the CS Origin by selecting the previously found FID value from the list. Then close the form.

11 In the Document Explorer, under Cross Section, select the CS Origin feature class.

12 Right-click Templates ➤ Create From Selection.

13 In the map, select the features you created before. Press <Enter> to finish the selection.

14 When prompted to select the origin point and orientation, select the previously defined origin, and set the orientation to North (0).

15 In the Create Template dialog box, enter a name, such as Transmission 4*1.

16 On the General tab, select Group Features When Moving, Rotating, Or Deleting.

17 On the General tab, make sure that you selected only the template features. Use the Delete Selected Features icons to remove a feature from the selection.

18 On the Relations tab, make sure that each template feature has a relation to the CS origin.

19 Click Save.

To assign the cross section template to a pole or tower model

1. In the Document Explorer, under Structural, ➤ Pole or Structural ➤ Tower, select the Pole Model or Tower Model feature class.
2. Right-click and click Show Form.
3. Click  New Record, or filter the tower model you want to assign the template to.
4. Click the Details tab.
5. For Template, enter a template name to assign to the pole or tower model.

Use a Pole or Tower Cross Section Template

NOTE Pole or Tower cross sections are available in Topobase Electric NA only.

When you create a tower or pole, and assign the cross section model, a cross section is created automatically. In the drawing, the cross section origin is placed on the tower or pole. Create the conductors by clicking snap points in the cross section. See Create an Overhead Transmission Network (page 35).

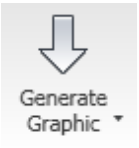
Define Extended Pole or Tower Cross Section Templates

NOTE Extended Pole or Tower cross sections are available in Topobase Electric NA only.

You can manually add extended cross sections to poles and towers. The extended cross section is for additional visualization. You cannot add features using the extended cross section. When you create a new conductor, an existing extended cross section is not updated. To update the display, you must delete the extended cross section and create a new one.

To define the node extended cross section template

1. Design the cross section layout.
2. Start Topobase Client and open the workspace.

3 Click Home tab ➤ Display panel ➤ Generate Graphic. 

Zoom to a viewport with an appropriate scale so you can create the features with a suitable size.

4 Digitize the following components, using the feature classes under Data Model ➤ Cross Section:

- Origin: Use the CS Origin feature class (EL_CS_ORIGIN).
- Snap points: Use the Snap point (EL_SNAPPOINT) feature class.
- Decoration: Use the CS Decoration (EL_SC_DECORATION) feature class.

5 For the snap point features, use the feature class forms to enter the following:

- Snappoint Type “Exactly Located”
- Position Number: Enter a number for each snap point. The numbers must match the position numbers of the standard cross section.

6 Then, assign the template features to the origin point.

In the map, select the origin. Click Home tab ➤ Quick Access panel ➤ Attributes. 

7 In the Cross Section form, read the FID value. Close the form.

8 In the map, select the template snap points and the decoration features.

Click Home tab ➤ Quick Access panel ➤ Attributes. 

9 In the snap point form, click the Details tab, and click the Global Update icon  . Enter the CS Origin by selecting the previously found FID value from the list. Also, in the CS Decoration form, assign the origin.

10 Close the form.

11 In the Document Explorer, under Data Model ➤ Cross Section, select the CS Origin feature class.

12 Right-click and click Templates ➤ Create From Selection.

13 In the map, select the features you created before. Press <Enter> to finish the selection.

14 When prompted to select the origin point and orientation, select the previously defined origin, and set the orientation to North (0).

15 In the Create Template dialog box, enter a name, such as Transmission Extended 4*1.

16 On the General tab, select Group Features When Moving, Rotating, Or Deleting.

17 Click Save.

To assign the extended template to a pole or tower model

1 In the Document Explorer, under Structural, ➤ Pole or Structural ➤ Tower, select the Pole Model or Tower Model feature class.

2 Right-click and click Show Form.

3 Click  New Record, or filter the tower model you want to assign the template to.

4 Click the Details tab.

5 For Extended Template, select an extended template name to assign to the pole or tower.

Manage Topobase Electric Circuits

NOTE Managing phase applies to Topobase Electric NA only.

All features in a circuit must be associated with the circuit using the CIRCUIT (FID_CIRCUIT) attribute. Use the OUTPUT_CIRCUIT (FID_OUTPUT_CIRCUIT) attribute to specify a secondary circuit for a transformer device. Flow and phase must be correct throughout the circuit. To assign features to a circuit and to maintain circuit information, you can use the Reconfigure Circuit and

Flow and Reconfigure Phase workflows. For more information, see Reconfigure Circuit and Flow (page 50) and Reconfigure Phase (page 51).

If you add new elements to the network or modify existing elements, Topobase Electric checks for inconsistencies, updates the circuit whenever possible, and enables you to reconfigure the circuit as needed.

- If you add a new device or conductor to an existing circuit, a feature rule automatically updates the Circuit attribute (FID_CIRCUIT).
  For example, when you add a device by defining a logical connection the connectivity table is updated, and the circuit information as well.
- If you edit the FID_CIRCUIT value using a feature class form, the system detects inconsistencies and provides a workflow to reconfigure the values. When you edit a device using the Electric Explorer to modify the circuit, you are alerted if the circuit information is not consistent. The Circuit dashboard at the top of the Electric Explorer are illuminated and the circuit id is listed. Use the Reconfiguration of Circuit and Flow function to update the circuit. See Reconfigure Circuit and Flow (page 50).

Create a New Circuit

When you create an electric network using the Electric Explorer, you must also create the new circuit. The circuit is an attribute feature class used to identify all the associated electrical elements (conductors and devices) in the network.

There are two ways to create a circuit:

- Create a new circuit using the Circuit form.
- In the Electric Explorer Circuit container, use New ➤ Circuit from Selection or New ➤ Circuit from Trace.

After you create the circuit, you must identify the circuit's origin (feeder) device (breaker, feeder, recloser, transformer). See Associate a Feeder Device with the Circuit and Specify the Origin Device for the Circuit (page 32).

You can identify a secondary circuit for a transformer by completing the Output Circuit attribute in the form. For more information, see Multiple Circuits (page 39).

To create a new circuit using a circuit form

1. In the Topobase task pane, click Document Explorer. 
2. In the Document Explorer, open Data Model ➤ Circuit and right-click the Circuit feature class. Click Show Form.
3. In the Circuit form, click New Record from the toolbar at the bottom of the form.
4. Fill out the form with data about the circuit. Click Insert [F5] and then close the form.

   When you create the feeder device for the circuit, you must associate the feeder with this circuit using the CIRCUIT (FID_CIRCUIT) attribute in the feeder device form or in the Electric Explorer. You must set the feeder device as the Device Origin feature in the Circuit form. See Associate a Feeder Device with the Circuit and Specify the Origin Device for the Circuit (page 32).

   You can display and manage circuits using the Circuit container in the Electric Explorer.

To create a new circuit from a selection

1. In the Topobase task pane, click Electric Explorer. 
2. In the Circuit container, click New ➤ Circuit from Selection.
   - When prompted, select the features in the circuit. Press Enter.

   The circuit is displayed in the Circuit container.

To create a new circuit from a trace

1. In the Topobase task pane, click Electric Explorer. 
2. In the Circuit container, click New ➤ Circuit from Trace.
3. Click Select Start Feature and click the feature at the start of the trace.
4. Follow the prompts on the command line to complete the trace.
   The circuit is displayed in the Circuit container.

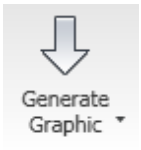
Associate a Feeder Device with the Circuit and Specify the Origin Device for the Circuit

You must assign the feeder device to the circuit in the feeder device form. Similarly, you must specify the origin (feeder) device for the circuit in the circuit form. As you add features, they are automatically assigned to the circuit.

For more information on feeder devices, see Classify Devices (page 64).

To associate the feeder device with the circuit

1. Select the appropriate electric display model.
2. Click Home tab ➤ Display panel ➤ Generate Graphic.



3. Click Electric Explorer.

4. In the Electric Explorer, in the Devices container, click New ➤ Breaker, Feeder, Recloser, Transformer, or any feeder class of device.
5. Click in the map to position the feeder. Press ENTER.

   The feeder is added to the Devices container.
6. Right-click the feeder in the Devices container. Click Show Form.
7. In the feeder device form, locate the Circuit attribute list (Fid Circuit). Select the circuit from the list and close the form.
8. Display the Circuit form and select this feeder device from the Device Origin (Fid Device Origin) list.

   You can also specify the feeder using the context menu in the Electric Explorer circuit container.

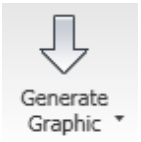
You can now create all the features in the circuit starting from the feeder. They are added to the circuit.

Create an Underground Network

Use the Electric Explorer to create an underground electric network.

To create an underground network

1 Select the appropriate electric display model and generate graphics.



Click Home tab ➤ Display panel ➤ Generate Graphic.

2 Insert structures, for example, manholes and pads.

See Draw Segments, Ducts, Conductors, Devices, and Structures (page 37).

3 Draw segments to link the structures.

In the Segment container, click New. Press ESC to end the command.

See Draw Segments, Ducts, Conductors, Devices, and Structures (page 37).

4 In the Electric Explorer, set the model for each segment according to the duct banks in the segment, for example 2x2.

In the Segment container, select the segment and select a model from the Model drop-down list.

You can also right-click the Segment in the container. Click Show Form. On the General tab, use the Model drop down to specify the number of ducts in the segment. Click Update & Close.

The Model setting specifies the type of cross section to use, for example, a 2x2 cross section with four ducts. When you specify the cross section model to use, a cross section representation of the segment is displayed in the map (unless the segment is shorter than the threshold set in Document Options. For more information, see Set Topobase Electric Options (page 68)). The FID Template attribute displays the selected template in the container.

NOTE The position of the cross section along the segment is midpoint. For more information on defining cross sections, see Topobase Electric Cross Sections (page 13).

For more information, see Segment, Duct, Pole, and Tower Models (page 16).

5 Insert a duct in the segment cross section.

In the Duct container, click New ➤ Duct. Click a snap point to position the duct.

NOTE If the network contains multiple segments, zoom out, locate the next cross section, and click to position the duct in the next cross section. Repeat for each segment.

6 Add conductors to ducts.

In the Conductor container, click New Underground Conductor. Click in the duct. (If you have already selected the duct in the duct container, the conductor is placed in the selected duct.) Geometry is generated for the conductor for each segment.

7 Select the conductor in the container. Set phase and voltage attributes for the conductor. Press ENTER.

Feature rules validate the phase and alert you if there is an inconsistent setting.

NOTE If the Phase dashboard becomes available, a phase setting is inconsistent somewhere in the network. You must reconfigure the phase to correct the inconsistency. For more information, see Reconfigure Phase (page 51).

8 Add devices such as breakers, transformers, and switches where necessary to join the conductors. You can also use a feeder at the start of the network.

See Draw Segments, Ducts, Conductors, Devices, and Structures (page 37).

9 Create structure internals where necessary to handle the device complexity at certain nodes.

10 Create the circuit.

There are a number of ways to create a new circuit. For more information, see Manage Topobase Electric Circuits (page 29). If errors are detected, use the Reconfigure Circuit and Flow workflow to correct them. For more information, see Reconfigure Circuit and Flow (page 50).

11 Display the circuit form and specify the origin device for the circuit.

See Associate a Feeder Device with the Circuit and Specify the Origin Device for the Circuit (page 32).

12 Run the Reconfigure Circuit and Flow workflow. See Reconfigure Circuit and Flow (page 50).

Create an Overhead Distribution Network

Use the Electric Explorer to create an overhead network. When you create an overhead network, you create conductors directly because there are no segments or ducts.

When you create an electric network using the Electric Explorer, you must also create the new circuit. For more information, see Manage Topobase Electric Circuits (page 29). If errors are detected, use the Reconfigure Circuit and Flow workflow to correct them. For more information, see Reconfigure Circuit and Flow (page 50).

To create an overhead distribution network

1 Create a new circuit.

For more information, see Manage Topobase Electric Circuits (page 29).

2 In the Device container, click New ➤ Breaker. Specify the location for the breaker.

3 In the Conductor container, click New ➤ Linestring Conductor. Digitize the conductor.

Draw the conductor from the start breaker, through towers or poles, to the final breaker.

Create an Overhead Transmission Network

NOTE This procedure applies to Topobase Electric NA.

Use the Electric Explorer to create an overhead transmission network.

To create an overhead transmission network

1 Create a new circuit.

For more information, see Manage Topobase Electric Circuits (page 29).

2 Optionally, select the Transmission profile to display feature containers relevant to creating a transmission network.

3 In the Device container, click New ➤ Breaker. Specify the location for the breaker.

   For transmission networks, the breaker must be assigned to a structure, for example a substation.

4 Use the Structure attribute in the Breaker form to create an association between the breaker and the structure.

5 In the Tower container, click New ➤ Tower or create the tower from the Document Explorer.

6 Position the tower.

7 Specify the tower model to display a cross section.

   For more information on pole and tower cross sections, see Define a Pole or Tower Cross Section Template in Topobase Electric (page 24).

8 In the Conductor container, click New ➤ Transmission Conductor.

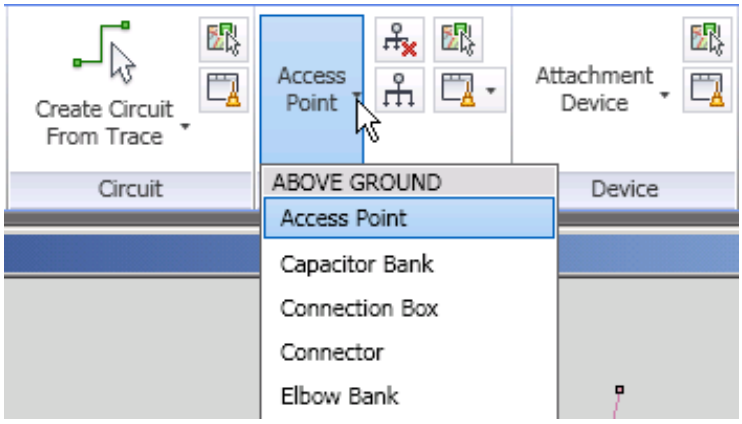
9 Draw the conductor by clicking on snap points in the tower cross section. Start with a breaker. Complete the conductor at the final breaker.

When you digitize a conductor that runs across several towers, segments are created automatically between the towers, if not yet existing. For example, you digitize a conductor that runs from a breaker across several towers to the final breaker. Then, when you digitize a second conductor that runs across the same towers, the system will propose snap points that follow the previously created conductor. You do not have to click all the snap points again. Instead, click the final breaker to accept the proposed snap points.

Draw Segments, Ducts, Conductors, Devices, and Structures

Use any of the following methods to insert new features:

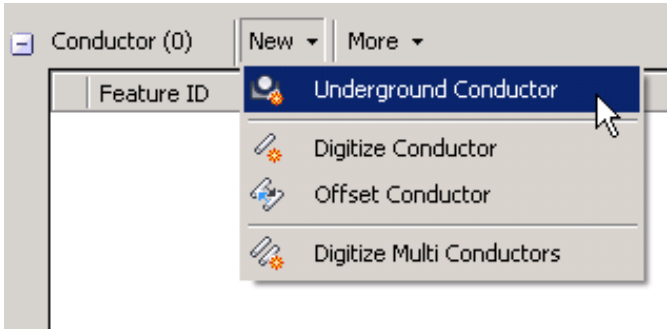
- Use the appropriate tab on the Electric Ribbon. For example, to insert a structure, use the Structure tab.



  You can also select an existing feature in your map and click Duplicate Feature on the appropriate Electric Ribbon panel for the type of feature (segment, conductor, duct, structure, device).

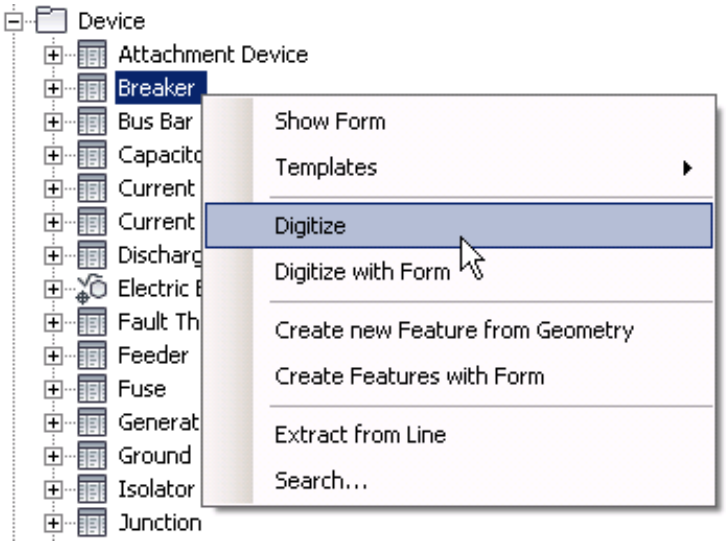
  After you draw a segment, you can use the WIDTH attribute for the segment to create a border. Topobase manages the Segment Border feature class to provide a parallel set of lines such that the distance between them is the width you specify.

- Use the appropriate container in the Electric Explorer and choose features from the New list.



NOTE You can create additional features using the Last Used feature set displayed at the bottom of each container. Overflow Last Used features are available in a drop down list. You can lock the set of Last Used features to preserve a set you will use regularly. Otherwise the Last Used set is updated as you add features.

- Use the Document Explorer, open the feature class node, right click the feature to insert, and click Digitize.



Notes About Devices and Structures

- You cannot connect a conductor to more than one device.
- If more than one device is located at the end of a conductor, you are prompted to create a structure with a structure internal view and move the devices into the structure internal.
- If you insert an underground network device (sleeve, house connector, public lightning, and so forth) onto the structural topology where no structure currently exists, Topobase Electric prompts you to insert a structural feature and to specify the type (for example, vault) or None if you do not want to insert a structure. Enter the first few letters of the feature class name. For example, to insert a handhole, enter hand.
- If there is already a structural feature at the location where you insert the device, Topobase Electric uses the existing structure.

- For devices with a structure internal (transformer, link box) Topobase Electric creates a structural point of the appropriate feature class (transformer station, link box) if it is not already present.
- If you use the Electric Explorer to insert a device where a device is already located, Topobase Electric prompts you to insert a structure and the devices are moved to the structure internal. If there is more than one structure at the location, you are prompted to specify the structure to which to associate the structure internal view. For more information about structure internals, see Create Structure Internal Views (page 53).
  The structure internal device is displayed in the Structure container in the Electric Explorer. A special icon indicates that the structure has an internal view.

  NOTE Your administrator can allow the ability to digitize features on top of each other by disabling the EL_ForbidDuplicateDevice_BIU feature rule in Topobase Administrator. For more information, see Topobase Feature Rules by Module.

Split or Join Segments, Ducts, and Conductors

Split and Join segments, ducts, and conductors using the options in the Electric Ribbon or the More menu for the Segment, Duct, and Conductor containersin the Electric Explorer.

NOTE It is recommended that you use the Electric Explorer to select and split or join segments because it is easier to select the specific features of interest.

When you split a segment, duct, or conductor, Topobase adds a vertex to the feature and creates two segments that both inherit the attribute data of the original feature.

When you join selected segments, ducts, or conductors, the features are merged into one feature. The new feature has the attribute data of the first feature you select when performing the join.

Multiple Circuits

A transformer can have two different circuit FIDs, a primary and a secondary. This allows you to manage a primary circuit (from breaker to transformer) and a secondary circuit (from transformer). Multiple circuits support step down

transformer banks and networked secondary systems. The Transformer feature class has two circuit attributes: Circuit and Output Circuit.

Create Ducts and Conductors Automatically

Once you have created segments and specified cross section models, you can add ducts and conductors quickly by selecting the duct or conductor position in the first segment cross section and in the last segment cross section. The duct or conductor will be generated along the entire network.

To create ducts and conductors automatically

1. Click Electric Explorer. 
2. In the Electric Explorer, click Clear All Containers. 
3. Click Select Features From Map. 
4. Select the segments in your network.

   NOTE There must be a structural node between each segment.

5. Specify the Model to define the layout and number of ducts in the segment.

   In the Segment container, select the segment and select a model from the Model drop-down list.

   You can also right-click the Segment in the container. Click Show Form. On the General tab, use the Model drop down to specify the number of ducts in the segment. Click Update & Close.

   Each segment must have a model assigned to specify the type of cross section to use. For more information on defining cross sections, see Topobase Electric Cross Sections (page 13).

6. In the Duct container, click New.
7. In the first segment, click the snap point for the duct.

   Snap points in all segments are highlighted.

8. In the last segment, click the snap point for the duct.

   The duct is generated along all the segments in the network.

9 Repeat this process to create the conductors automatically.

Create Maintenance and Observation Records

To create maintenance and observation records in Topobase Electric, use the Function menu in the feature class form.

If you start a create maintenance or create observation function from the feature class form, be aware the current filter. You can apply the function to all features in the filter or to the current feature.

Create Maintenance Records

You can create and manage maintenance records for several feature classes. Use this function to add maintenance information to a feature. Maintenance information is stored in the Maintenance feature class (EL_MAINTENANCE).

To create maintenance records

1 Open the form for the feature class for which you want to manage maintenance information, for example, Breaker.

2 Click Function ➤ Create Maintenance.

You can also click Create Maintenance on the Related Tables tab.

The Maintenance feature class form is opened with a new record. Note that in the Details tab, the relation (FID_*) to the feature has already been assigned.

For example, in the General tab, enter the Maintenance Period, and the Maintenance Date. Then, the Next Maintenance Date is calculated by a feature rule. The Compute Next Maintenance Date rule calculates the date using the maintenance period and the date of the last maintenance:

MAINTENANCE_DATE + MAINTENANCE_PERIOD = MAINTENANCE_NEXT_DATE.

See also:

- Event Feature Classes (page 82)

Create Observation Records

You can administer observations for several feature classes.

To add observations

1. Open the form for the feature class for which you want to add an observation, for example, Breaker.
2. Click Function ➤ Create Observation.

   You can also click Create Observation on the Related Tables tab.

   The Observation feature class form is opened with a new record. Note that in the Details tab, the relation (FID_*) to the feature has already been assigned.

See also:

- Event Feature Classes (page 82)

Topobase Electric Workflows

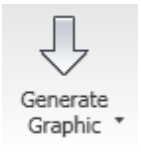
Workflows guide you through the most frequently performed tasks. They contain embedded information and options specific to the task.

- Use the Electric Explorer to create electric network features.  See Topobase Electric Explorer (page 2).
- Use the Workflow Explorer to start analysis and maintenance workflows. 
- For information on the cross section template creation workflows, see Topobase Electric Cross Sections (page 13).

Start Workflows

Before starting a workflow, you must generate graphics.

To start a workflow

1 Click Home tab ➤ Display panel ➤ Generate Graphic. 

2 Click the Workflow Explorer icon to display the workflows. 

3 Do one of the following:
   - Double-click a workflow in the Workflows group.
   - Right-click a workflow. Click Execute.
   - Click a workflow. Click Execute.

Find Fed Devices

Use the Find Fed Devices workflow to find all features that are fed by a particular device. The workflow is designed to trace from the electricity source to any consumer. Start features must be switchable or feeder devices (classes in EL_DEVICE_CLASS with ID_DEVICE_TYPE=SWITCHABLE, PROTECTIVE or FEEDER).

NOTE Administrators: The conditions of the find fed devices tracing template must be inactive because they cannot be used in a normal tracing and are activated temporarily during the workflow execution. They appear as invalid conditions. (Topobase Administrator only allows you to save inactive invalid conditions.) The template itself should also be inactive because it is not used for normal tracing. For more information, see Logical Topology: Tracing Templates.

To find fed devices

1 Click Home tab ➤ Display panel ➤ Generate Graphic. 

2 Click the Workflow Explorer icon  to display the workflows.

3 Under Client Workflows, Analysis workflows, click Find Fed Devices. Click Execute.

4 Click Select Start Feature. Select the start feature (any protective, feeder switchable device class) in the map.

5 Click Select Stop Feature. Select one or more stop features in the map.

NOTE Tracing a network without stop features can take a very long time.

6 Under Direction To Trace, specify the flow direction to trace.

7 Click Include Stop Features to include the stop features in the traces results.

If you clear this checkbox, stop features are not included in the results.

8 Click OK to run the workflow.

When the workflow has finished, the fed conductors and devices are selected in the map. All fed features are displayed in a tree view in the Workflows pane. Use the tools at the top of the Workflows pane to open the feature class form, highlight selected features, and zoom to selected features. See also Topobase Client User Guide, section *Feature Explorer*.

9 Enter REGEN on the command line to clear the selection in the map.

Find Feeders

Use the Find Feeders workflow to find the breaker or transformer that feeds the selected feature. The workflow is designed to trace from the consumer to the electricity source.

To find feeders

1 Click Home tab ➤ Display panel ➤ Generate Graphic. 

2 Click the Workflow Explorer icon  to display the workflows.

3 Under Client Workflows, Analysis workflows, click Find Feeders. Click Execute.

4 Click Select Start Feature. Select the start feature (device or conductor) in the map.

5 Click Select Stop Feature. Select one or more stop features in the map.

NOTE Tracing a network without stop features can take a very long time.

6 Under Stop Condition: Feeder Type, select the Stop Condition feature classes or click All.

7 Click OK to run the workflow.

When the workflow has finished, the feeders are highlighted in the map and listed in a tree view in the Workflows pane. Use the tools at the top of the Workflows pane to open the feature class form, highlight selected features, and zoom to selected features. See also Topobase Client User Guide, section *Feature Explorer*.

8 Enter REGEN on the command line to clear the selection in the map.

Find Connected Features

Use the Find Connected workflow to find all features that are topologically connected to a specified start feature. Select a start feature and zero or more stop conditions. The network is traced from the start feature to the stop features. Features with ID_STATE = "open" are treated as not connected.

Start/Stop Feature—If you select features before you start the workflow, these features are used as start or stop feature. Start and stop features must be part of a structural or electric topology, such as devices or conductors. Select one start feature, and optionally select one or more stop features. Use the tools in the Workflows pane to remove, to highlight or to zoom to the selected feature.

You can also define stop conditions. Click Add to use the Stop Condition Editor to define stop conditions.

Include Stop Features—Select Include Stop Features to list all connected features including the stop features. If this checkbox is cleared, stop features are not included in the result list.

NOTE Tracing a network without stop features can take a very long time.

Phase To Trace—(Topobase Electric NA) If you select a start feature that has a phase information, you can select a phase to trace. Then, the tracing will stop when the feature phase does not match with the selected Phase To Trace.

Direction To Trace—Select the trace direction: Forward, Backward, or Both.

When the tracing has finished, all connected features are displayed in a tree view in the Workflows pane. Use the tools at the top of the Workflows pane to open the feature class form, highlight selected features, and zoom to selected features. See also Topobase Client User Guide, section *Feature Explorer*.

To find connected features

1 Click Home tab ➤ Display panel ➤ Generate Graphic. 

2 Click the Workflow Explorer icon  to display the workflows.

3 Under Client Workflows, Analysis workflows, click Find Connected. Click Execute.

4 Click Select Start Feature. Select the start feature in the map.

Start and stop features must be part of a structural or electric topology. Use the tools in the Workflows pane to remove, to highlight or to zoom to the selected feature.

5 Click Select Stop Feature. Select one or more stop features in the map.

NOTE Tracing a network without stop features can take a very long time.

6 Under Direction To Trace, specify the flow direction to trace.

7 Click Include Stop Features to include the stop features in the traces results.

If you clear this checkbox, stop features are not included in the results.

8 Click OK to run the workflow.

When the workflow has finished, the features are selected in the map. All connected features are displayed in a tree view in the Workflows pane. Use the tools at the top of the Workflows pane to open the feature class form, highlight selected features, and zoom to selected features. See also Topobase Client User Guide, section *Feature Explorer*.

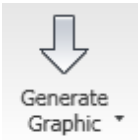
9 Enter REGEN on the command line to clear the selection in the map.

Find Alternative Supply

Use the Find Alternative Supply workflow to highlight alternative sources. For example, you might have a broken cable or station and need to know alternative routes to supply affected households.

To find alternative supply

1 Click Home tab ➤ Display panel ➤ Generate Graphic.



2 Click the Workflow Explorer icon  to display the workflows.

3 Under Client Workflows, Analysis workflows, click Find Alternative Supply. Click Execute.

4 Click Select Start Feature. Select the start feature in the map.

The start feature is the affected device. For example, the start feature might be a house connection if a customer reports loss of power. In another example, the start feature might be a conductor if a customer reports an overhead conductor down.

Start and stop features must be part of a structural or electric topology. Use the tools in the Workflows pane to remove, to highlight or to zoom to the selected feature.

5 Click Select Stop Feature. Select one or more stop features in the map.

NOTE Tracing a network without stop features can take a very long time.

6 Define Stop Conditions as needed.

7 Click OK to run the workflow.

8 Enter REGEN on the command line to clear the selection in the map.

The workflow performs a find connected trace through all devices including open switchable devices, to locate all feeder devices. Source devices are those features identified as FEEDER type in the EL_DEVICE_TYPE meta feature class. See Classify Devices (page 64).

Find Open Devices

Use the Find Open Devices workflow to find open devices in an electric network. Open devices are switchable devices where the State attribute is set to open.

To find open devices

1 Click Home tab ➤ Display panel ➤ Generate Graphic. 

2 Click the Workflow Explorer icon  to display the workflows.

3 Under Client Workflows, Analysis workflows, click Find Open Devices. Click Execute.

4 Click Select Start Feature. Select the start feature in the map.

5 Click OK to run the workflow.

When the workflow has finished, the open devices are selected in the map. All open features are displayed in a tree view in the Workflows pane. Use the tools at the top of the Workflows pane to open the feature class form, highlight selected features, and zoom to selected features. See also Topobase Client User Guide, section *Feature Explorer*.

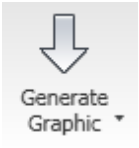
6 Enter REGEN on the command line to clear the selection in the map.

When the tracing has finished, all open devices are displayed in a tree view in the Workflows pane. The order of the resulting features is according to the distance from the start feature. Use the tools at the top of the Workflows pane to open the feature class form, highlight selected features, and zoom to selected features. See also Topobase Client User Guide, section *Feature Explorer*.

Create a House Connection

Use the Create House Connection workflow to create a new house connection in the network. You must specify a cross section template as part of the workflow. To create a cross section template, see Create a Segment Cross Section Template in Topobase Electric (page 17).

To create a house connection



1 Click Home tab ➤ Display panel ➤ Generate Graphic.

2 Click the Workflow Explorer icon  to display the workflows.

3 Under Client Workflows, Acquisition workflows, click Create House Connection. Click Execute.

4 Click either of the following options:
   - Digitize Segment—Prompts you to draw the segment from the house connection to the network segment.
   - Straight segment—Automatically draws a straight segment from the house connection to the network segment.

5 Select the cross section template for the house connection segment.

6 Select the structure to create at the connection to the network segment.
   This structure houses the device at the connection. A structure is required.

7 Under Conductor, click either of the following options:
   - Create Conductor Only In New Segment—Creates a conductor to the device at the connection.
   - Select End Position Of The Conductor—Prompts you to specify the end point of the conductor.

8 Specify the device to create at the connection to the network segment.
   If you create the conductor only in the segment, you must specify the device to create at the connection.

9 Click OK to run the workflow.

Compute Load

NOTE This procedure applies to Topobase Electric NA.

Use this analysis workflow to compute the load of devices that consume power. For example, when you plan to feed the electrical network from another breaker (load transfer), you can compute the load of all devices that belong to a circuit.

Consumers are light, meter, motor, service point, and transformer.

To compute the load

1. Start the Compute Load workflow.
2. In the Workflow pane, click Select Start Feature, and select the feature in the map, such as a breaker.
3. Select the phase.
4. Select the consumers.
5. Click OK.

The tracing finds all connected devices that consume power, and calculates the sum of the Load factor X consumption. The result is displayed in the Workflows pane. Click Open Report to open a more detailed report.

Reconfigure Circuit and Flow

Use the Reconfigure Circuit and Flow workflow when you add new features to a network. The workflow identifies the new features as part of the circuit and corrects any flow errors.

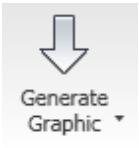
Looped networks are supported. For example, you can run the Reconfigure Circuit and Flow workflow on a circuit in which phase ABC splits into individual phase A, B, C, and then comes back to phase ABC.

NOTE Before you reconfigure circuit and flow, be sure that the feeder device at the start of the circuit is assigned to the circuit. You can specify the circuit in the Device container in the Electric Explorer or in the form for the feeder device.

The Circuit dashboard in the Electric Explorer lists circuits that need to be reconfigured. You can select a circuit to start the workflow. Note that if you close Topobase, this information is lost.

NOTE If a transformer has two different circuits, the transformer acts as a stop condition for circuit propagation. In this case, the circuits are set up differently on either side the transformer. The Reconfigure Circuit and Flow workflow cannot set the two circuit attributes to the same value. To overwrite the circuit value on both sides of the transformer, run the Reconfigure Circuit and Flow for the circuit, then select the transformer and run the workflow a second time.

To reconfigure circuit and flow



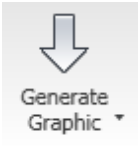
1. Click Home tab ➤ Display panel ➤ Generate Graphic.
2. In the Workflow Explorer, right-click Reconfigure Circuit and Flow. Click Execute.
3. Select the circuit breaker at the start of the network.

Reconfigure Phase

NOTE This procedure applies to Topobase Electric NA.

As you work, Topobase validates phase settings. You are alerted if a phase setting for a feature is incompatible with an associated feature. Use the Reconfigure Phase workflow in the Workflow Explorer to check for phase inconsistencies and correct them. Before you reconfigure phase, be sure the start feature is an Electric device and has the phase information assigned.

To reconfigure phase



1. Click Home tab ➤ Display panel ➤ Generate Graphic.
2. In the Workflow Explorer, right-click Reconfigure Phase. Click Execute.
3. Select a start feature.

   Make sure that the start feature is an electric device and has phase information assigned.

4 Specify the phase setting for the feature.

5 Click OK.

The workflow checks for features with inconsistent phase settings, indicates the device, and highlights the device in the map.

6 Correct phase settings as necessary.

Transfer Load

NOTE This procedure applies to Topobase Electric NA.

Use this maintenance workflow to transfer load from one circuit to another by opening one device and closing another. The two devices must be connected to two different circuits. Otherwise, it is not possible to start the workflow. The open device will break the two circuits. An open device has no circuit assigned (FID_Circuit attribute is not set).

NOTE Before you transfer load, be sure that the breakers selected are assigned to the circuits and are set as the Device Origin for the circuit.

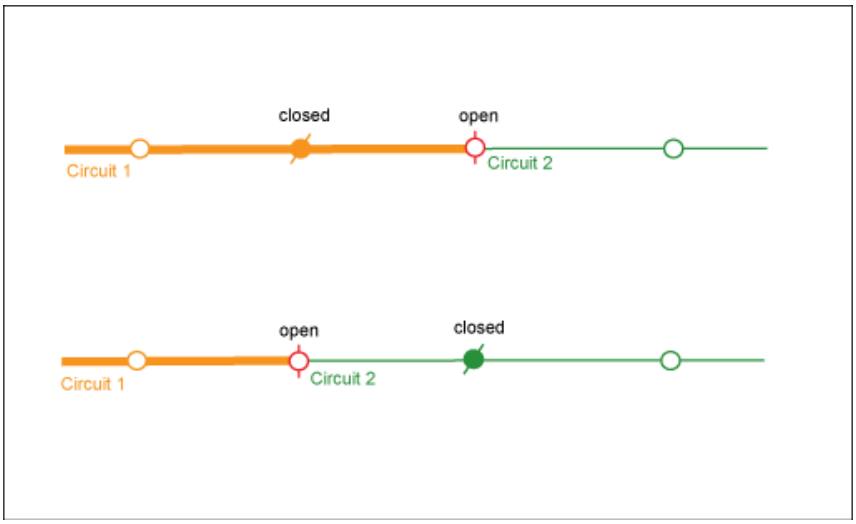
To transfer load

1 Start the Load Transfer workflow.

2 In the Workflow pane, under Select Device To Open, click Choose and select the device in the map.

3 Under Select Device To Close, click Choose and select the device in the map.

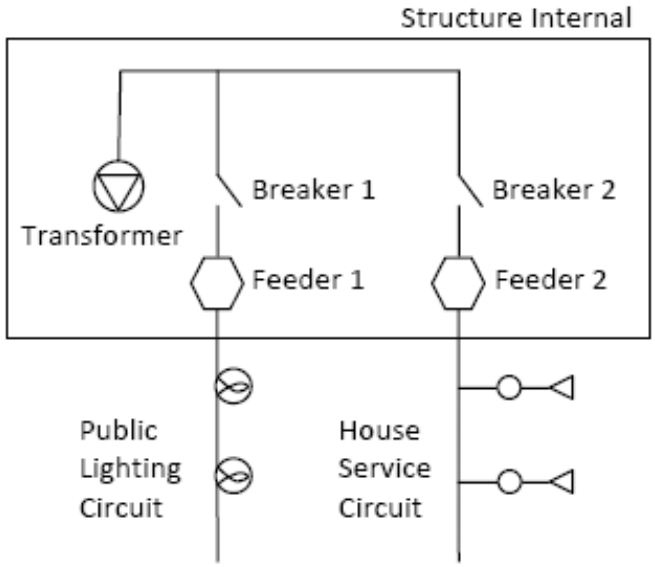
The workflow transfers the load, reconfigures the circuit and flow, and checks for phase inconsistencies. It runs the Reconfigure Circuit And Flow and the Reconfigure Phase workflows.



Create Structure Internal Views

You can create a separate drawing to contain a internal view of a structure. For example, you might have a substation where a conductor in a segment is connected to an internal device (transformer/breaker/fuse). The internal devices

are connected to each other with a conductor.



TIP As you work with the structure internal feature, keep in mind that you are working with two drawings, the main drawing and the structure internal drawing. Be sure the click in the appropriate drawing to activate it before starting an operation. For example, to digitize conductors in the structure internal drawing, click to activate that drawing before starting your work.

Before creating structure internal views, set the display model for the structure internal drawing and specify the size of the structure internal bounding box. See Set Topobase Electric Options (page 68).

If you use the Electric Explorer to insert a device where a device is already located, Topobase Electric prompts you to insert a structure and the devices are moved to the structure internal. If there is more than one structure at the location, you are prompted to specify the structure to which to associate the structure internal view. For more information about structure internals, see Create Structure Internal Views (page 53).

NOTE Your administrator can allow the ability to digitize features on top of each other by disabling the EL_ForbidDuplicateDevice_BIU feature rule in Topobase Administrator. For more information, see Topobase Feature Rules by Module.

To create a structure internal view

1. Define and save two display models, one for the main *.dwg* and one for the structure internal view *.dwg*.

   For more information about display models, see Working with Display Models.

2. Click Home tab ➤ Display panel ➤ Display Model list. Select the display model for the main *.dwg*.

3. Click Home tab ➤ Display panel ➤ Generate Graphic.

4. In the main *.dwg*, create a structural feature to associate with the geometry in the internal view.

5. Draw the feature with which to associate the internal view. For example, a substation.

6. In the Structure container, select the new substation and click More ➤ Structure Internal.

   A second *.dwg* is created for the structure internal.

7. In the structure internal *.dwg*, zoom to view the structure internal area.

   For example, perform a Zoom Center using the center point of the structure internal drawing.

   You can adjust the size of this area in Document Options. For more information, see Set Topobase Electric Options (page 68).

8. Optionally, select the Structure Internal profile to display feature containers relevant to creating a structure internal.

9. In the structure internal *.dwg*, draw the internal features, for example, conductors and devices.

TIP Start with a conductor that has a specific length (for example, 3 meters). If you start digitizing without a value you might create a conductor with a size that is inappropriate to the device you create later.

10 To create a connection between a feature in the structure internal and a feature on the map, use the following procedure:

- In the Electric Explorer, select the feature that you want to associate with a feature in the structure internal *.dwg*.
  For example, in the Conductor container, select a conductor. Use Select From Map  or Select From Trace  to populate the feature container with the correct feature. You can then select this feature in the feature container.

  NOTE The external feature (for example, conductor) must geometrically touch the structure containing the internal features.

- In the Electric Explorer, select the internal feature that you want to associate with a feature in the external *.dwg*.
  For example, in the Conductor container, select a conductor and in the Device container, select a structure internal device. Use Select From Map  or Select From Trace  to populate the feature container with the correct feature. You can then select this feature in the feature container.

- In the Conductor container, click More ➤ Connect With Internal Device.
  Alternatively, in the Device container, click More ➤ Connect With External Conductor. You can also use drag and drop to make the connection.

  A logical connection is made between the external and internal features.

  The structure internal device is displayed in the Structure container in the Electric Explorer. A special icon indicates that the structure has an internal view.

Topobase Electric Reports

Topobase Electric provides several predefined reports. The report templates have been created with the Topobase Report Designer.

- Data Model Description
- Electric Network Statistics

- Observation
- Check Voltage
- Check Phase
- Compute Load
- COGO reports—Only if the COGO extension is available. For example, ARC Intersection, or Center. See Constructions: Reports.

To generate a report

1. Start Topobase Client and open the workspace.
2. Click Output tab ➤ Reports and Profiles panel ➤ Open Report.
3. In the Report dialog box, select a report definition.
4. Click Preview.

   The report is displayed in a secondary window. You can print the report or change its format to html, ascii, or pdf.

For more information about the report designer, see the *Topobase Administrator Guide*.

Multi Conductors

NOTE This procedure applies to Topobase Electric CE.

Multi conductors are a schematic way to display and label conductors. Conductors in a real world segment are only visible in the cross section. Use multi conductors to display the conductors in a schematic view along a path that is analogous to the actual segment where they are located. Use multi conductors in structure internals.

It is recommended that you use different multi conductor displays to represent conductors of different voltages.

To set multi conductor options, see Set Topobase Electric Options (page 68).

To create multi conductors

1. Display the Electric Explorer. 

2 From the profile list at the top of the Electric Explorer, select the profile to use, for example Underground.

   Profiles are created in Topobase Administrator. Profiles control the containers that are visible in the Electric Explorer. For more information, see Create Electric Explorer Profiles (page 7).

3 In the Conductor container, click New ➤ Digitize Multi Conductors.

4 Specify the number of conductors to create.

5 Specify one of the following distribution layout styles:

   - Symmetric—Conductor lines are evenly distributed on either side of the axis.
   - Right—The first conductor is placed on the axis line. Other conductors are placed on the right side of the axis. The right side is determined based on the direction in which you digitized the axis.
   - Left—The first conductor is placed on the axis line. Other conductors are placed on the left side of the axis. The left side is determined based on the direction in which you digitized the axis.

6 Draw the axis line by specifying points on the line. Press Enter to complete the axis line.

   The multi conductors are drawn. Start and end style and offset are specified in Document Options. For more information, see Set Topobase Electric Options (page 68).

7 Press ESC to complete the operation.

Multi conductors are grouped visually but they are standalone conductors.

Offset Multi Conductors

NOTE This procedure applies to Topobase Electric CE.

Use this procedure to create a conductor along an existing conductor.

To offset multi conductors

1 Display the Electric Explorer. 

2 From the profile list at the top of the Electric Explorer, select the profile to use, for example Underground.

   Profiles are created in Topobase Administrator. Profiles control the containers that are visible in the Electric Explorer. For more information, see Create Electric Explorer Profiles (page 7).

3 In the Conductor container, click New ➤ Offset Conductor.

4 Select the reference conductor.

5 Click to specify the direction of the offset conductor relative to the original conductor.

   A new conductor is created. Start and end style and offset are specified in Document Options. For more information, see Set Topobase Electric Options (page 68).

6 Press ESC to complete the operation.

   The new conductor has no attributes unless you created it using a Last Used conductor. Right-click the conductor and click Show Form to enter attribute data.

Merge Multi Conductors

NOTE This procedure applies to Topobase Electric CE.

You can merge two existing conductors. In this procedure you select the conductors in turn. The attributes of the first conductor you select are applied to merged conductor. The second conductor you select is deleted.

To merge multi conductors

1 Display the Electric Explorer. 

2 From the profile list at the top of the Electric Explorer, select the profile to use, for example Underground.

   Profiles are created in Topobase Administrator. Profiles control the containers that are visible in the Electric Explorer. For more information, see Create Electric Explorer Profiles (page 7).

3 In the Conductor container, click More ➤ Merge Conductors.

4 Select the first conductor.

This is the base conductor. The second conductor will be merged with this conductor and will be deleted.

5 Select the conductor to merge with the first conductor.

6 Press ESC to complete the operation.

Extend Multi Conductors

NOTE This procedure applies to Topobase Electric CE.

When you have a set of multi conductors, you can extend some and continue them in a different direction.

To extend multi conductors

1 Display the Electric Explorer. 

2 From the profile list at the top of the Electric Explorer, select the profile to use, for example Underground.

Profiles are created in Topobase Administrator. Profiles control the containers that are visible in the Electric Explorer. For more information, see Create Electric Explorer Profiles (page 7).

3 In the Conductor container, click More ➤ Extend Conductors.

4 Select the conductors to extend. Press Enter.

5 If the conductors end on a structure, you must specify the distribution layout option to use. Specify one of the following distribution layout styles:

- Symmetric—Conductor lines are evenly distributed on either side of the axis.
- Right—The first conductor is placed on the axis line. Other conductors are placed on the right side of the axis. The right side is determined based on the direction in which you digitized the axis.
- Left—The first conductor is placed on the axis line. Other conductors are placed on the left side of the axis. The left side is determined based on the direction in which you digitized the axis.

6 Specify the start point and end point of the axis of the extension. Press Enter.

The axis cannot be parallel and should not start directly at the end point of any of the selected conductors. Extended conductors are created on the newly defined axis and merged with the existing one. The axis of the extension must intersect with the previously selected conductors to extend.

7 Press ESC to complete the operation.

Label Multi Conductors

NOTE This procedure applies to Topobase Electric CE.

The Conductor container provides a way to label multi conductors. You must define the label in Topobase Administrator, then quit and restart Topobase Client.

To label multi conductors

1 Display the Electric Explorer. 

2 From the profile list at the top of the Electric Explorer, select the profile to use, for example Underground.

Profiles are created in Topobase Administrator. Profiles control the containers that are visible in the Electric Explorer. For more information, see Create Electric Explorer Profiles (page 7).

3 In the Conductor container, click More ➤ Label Conductors.

4 Select the first conductor to label. Press Enter.

5 Specify the insertion point of the first label.

NOTE Place the insertion point outside the selected conductors so the labels are in the proper order.

The conductors are labelled using the label definition and offset specified in Document Options. For more information, see Set Topobase Electric Options (page 68).

6 Press ESC to complete the operation.

Create Duct Areas for Multi Conductors

NOTE This procedure applies to Topobase Electric CE.

Multi conductors cannot be placed in ducts like real world underground conductors. They also do not have associated cross sections. You can use an area polygon to represent the duct associated with the conductors. You can create the duct in either of the following two ways:

- Digitize Duct Area—Creates a duct area polygon with the vertices you specify. Optionally, you can select conductors to include in the duct. If you select conductors, they are related to the duct.
- Create Duct Area—Creates a duct area using the geometry of existing conductors (multiconductor or standalone conductor). When you use Create Duct Area, you specify the conductors to include in the duct and the start point and end point of the duct. The duct area is created around the specified conductors. The conductors are related to the duct.
  Due to geometric limitations, sometimes this operation cannot create the duct area in the correct shape. If this happens, use the Digitize Duct Area operation to digitize the duct area manually.

When you create the duct area feature, a duct feature is also created. The duct area is related to the duct feature. The conductors you select during duct area creation are related to the newly created duct.

The duct area is stored in the Duct Area structural feature class. If the duct area is not visible in your map, use the AutoCAD Map 3D Data Connect to load the EL_DUCT_AREA layer. For more information, see Bringing In Features From Topobase.

To create a duct area

1. Display the Electric Explorer. 
2. From the profile list at the top of the Electric Explorer, select the profile to use, for example Underground.

   Profiles are created in Topobase Administrator. Profiles control the containers that are visible in the Electric Explorer. For more information, see Create Electric Explorer Profiles (page 7).

3 In the Duct container, do either of the following:

- Click New ➤ Digitize Duct Area to create a standalone duct area polygon.
- Click New ➤ Create Duct Area. To generate a duct area polygon based on selected conductors.
  If you receive the message, “The geometry of the selected conductor cannot be used to create a Duct Area”, use Digitized Duct Area to create the duct.

4 Select the conductors contained in the duct. Press Enter.

This step is optional if you chose Digitize Duct Area. If you select conductors, a relationship is created between the duct and the child conductors within the duct. If you do not want to create this relationship, press Enter to skip conductor selection.

5 Do either of the following:

- If you clicked New ➤ Digitize Duct Area, specify the vertices of the duct area polygon. Press c to close the polygon.
- If you clicked New ➤ Create Duct Area, specify the start and endpoints of the duct.

  TIP Be sure to click start and end points that are on the inner sides of the two outer conductors, not the outer sides. This way the duct area can be generated around the outer sides of the conductors correctly.

  A Duct area is created using the outer conductors and the start and endpoints you specify.

6 Press ESC to complete the operation.

Create a Standalone Conductor

NOTE This procedure applies to Topobase Electric CE.

Conductors in a real world segment are only visible in the cross section. You can create a single instance of a conductor when using multi conductors or in structure internal views.

To create a standalone conductor

1. Display the Electric Explorer. 
2. From the profile list at the top of the Electric Explorer, select the profile to use, for example Underground.

   Profiles are created in Topobase Administrator. Profiles control the containers that are visible in the Electric Explorer. For more information, see Create Electric Explorer Profiles (page 7).
3. In the Conductor container, click New ➤ Digitize Conductors.
4. Specify points to draw the conductor. Press Enter when you are finished.
5. Press ESC to complete the operation.

Classify Devices

Classification of electric devices such as breakers and switches enables Topobase Electric to model electrical power flow. Topobase Electric workflows depend on this classification. See Topobase Electric Workflows (page 42). Classify devices as LOAD devices which are sinks, FEEDER devices which are sources, and PROTECTIVE and SWITCHABLE which are intermediate devices that can act as sinks or sources depending on the context.

Device classification enables Topobase Electric to trace upstream and downstream (against or with the power flow) to support the reconfigure flow workflow.Once the direction of the connectivity is set by the reconfigure flow workflow, then a number of other workflows are supported such as Find Fed devices, Find Feeder and Find Alternate Feeder.

Device classification settings are stored in Electric meta tables that can be modified in Topobase Administrator.

IMPORTANT Do not modify the meta table settings unless you are defining custom data model enhancements. Meta table settings correspond to the Electric NA and the Electric CE data models. We recommend that you do not modify the meta table settings for the default data models.

To manage Electric meta tables

1. Start Topobase Administrator and open a Topobase Electric NA or CE workspace.

2 In the tree view, click the node for the electric document to modify.

3 Click Document menu ➤ Electric.

4 Click the Meta Tables tab.

5 On the Meta Tables tab, under Device Class, specify the device type for each device feature class.

Meta Tables	Description
Device Class	Displays the device feature classes that are part of the Electric topology. See Electric Device Types (page 66). Device types classify a device as load, switchable, protective or feeder. Several analysis workflows use the device type, such as Find Feeders (page 44), Find Fed Devices (page 43), and Find Alternative Supply (page 47).
Device Type	Specifies the device type. ■ Feeder: A switchable device that can act as the starting feature for a circuit or can separate circuits. ■ Protective: A switchable device that can operate on its own. ■ Switchable: A switchable device that can interrupt current. ■ Load: A load device or termination point. ■ Conductor: Note, this type is included for completeness but conductors are the only features of this type.
Voltage Attribute	Displays all feature classes that have a relation the to the domain table EL_VOLTAGE_TBD. Feature classes can have multiple voltage attributes. These are provided in the drop down list. Voltage attributes are used by some Electric feature rules. For example, when a new feature is connected to the electrical topology, the voltage of the existing feature is propagated to the new feature. Some devices such as transformers have a primary voltage attribute and a secondary voltage attribute.
Voltage Attribute	Specifies the primary voltage attribute.

Secondary Voltage Attribute	Specifies the secondary attribute. For example, a transformer has a primary voltage and a secondary output voltage.

Electric Device Types

The EL_DEVICE_CLASS table contains all feature classes of the Electric data model that participate in the electric topology. If a class in the topology is not included in this table it is assigned the device type Load.

Feature Class	Device Type
Attachment Device	Load
Breaker	Feeder
Bus Bar	Load
Capacitor	Load
Conductor	Conductor
Current Regulator	Load
Elbow	Switchable
Fault Thrower	Protective
Feeder	Feeder
Fuse	Protective
Generator	Load
Ground	Load
Head Bold Outlet	Load
Isolator	Switchable
Junction	Load

Feature Class	Device Type
Light	Load
Lightening Arrester	Load
Load Tap Changer	Load
Meter	Load
Minor Consumer	Load
Motor	Load
Recloser	Feeder
Regulator	Load
Riser	Load
Sectionalizer	Switchable
Secondary Relay	Switchable
Service Point	Load
Sleeve	Load
Switch	Switchable
Termination	Load
Transformer	Feeder
Way	Load

Topobase administrators can add features for any additional custom classes or modify the behavior by adjusting the device type for each feature class.

Set Topobase Electric Options

Use Electric Document Options to specify Electric Explorer behavior, the attributes that are displayed in each container, and settings related to Structure Internals, Cross Sections, and Multi Conductors (Electric CE only).

The Electric options items are only available in electric documents.

To set Topobase Electric options

1. In Topobase Client, open an Electric NA or Electric CE workspace.
2. From the Electric Explorer tool bar, click Show Document Settings. 

   You can also click Settings tab ➤ Setup panel ➤ Document Options.
3. In the Document Options dialog box, in the tree view, click Electric Explorer or Electric CE Explorer depending on your version of the Electric module.
4. In the Electric Explorer Options area, set any of the following options:
   - General: Specify how many features to retain in the Last Used feature lists. Specify whether to show a form automatically upon feature creation. Specify the amount of time to pause before moving to the next cross section when creating conductors.
   - "Transmission" Feature Containers: In Electric NA, specify the display of Transmission feature containers.
   - "Underground" Feature Containers: In Electric CE, specify the display of Underground feature containers.
   - Structure Internal: Specify the display model to use for the structure internal drawing. Define the default structure internal bounding box. Display Model: Use Current One On Main Map applies the same display model in the structure internal drawing as in the main drawing. Use Outer Resource specifies a different display model file (*.tbdm*) to use for the structure internal dwg.

     Structure Internal Size: The structure internal of a structure has a size limitation. If you open a structure internal and zoom out several times, you will observe a black square which indicates the border of the structure internal. You cannot draw outside this square. The Structure Internal Size setting specifies the height and width of the structure internal border.

NOTE Specify Structure Internal Size before creating structure internal views.

5 (Electric CE only) In the Multi Conductor area, set any of the following options:

Multi Conductor Option	Description
Start/Endpoint Connection Layout	Specifies the layout style of the conductor connection to the start or end feature. Select or clear the checkbox as needed for The Connection Layout Is Only Applied On Structural Features. If you select the checkbox, the layout is used by multi conductors whose start and end points are located at Structure Features. If you clear this checkbox, the layout is used for all multi conductors whose start and end points are located anywhere.
Default/Offset Radius	Specifies the length of the offset or radius in either of these two layout settings.
Offset Between Conductors	Specifies the default offset between multi conductors.
Offset Between Duct And Conductor	Specifies the offset from the outer conductors to the border of the duct area.
Label Definition	Specifies the label to use.
Offset Between Labels	Specifies the offset between multi conductor labels.

6 To specify Cross Section behavior, click the Electric CE or Electric NA node.

Click the Cross Section tab. Set any of the following options:

- In the General Settings area, specify whether or not to create cross section features automatically when you assign a cross section template to a segment. If automatically inserting cross sections, you can specify a prompt for segments below a specified minimum length. If not

automatically inserting cross sections, the cross section is assigned but not drawn.

- Specify the default length of the cross section leader line.
- For Scale Factor, specify the default cross section scale factor.
- For Readability, specify whether or not cross sections should be automatically adjusted to maintain readability.
- For Automatic Position Number Update, specify how to number positions for snap points, ducts, and conductors. Simple Sequence Number applies sequential numbers. Position Order applies a number based on position. None specifies that the position number is not specified.

7 When finished, click OK.

Understand and Work with the Topobase Electric NA Data Model

Topobase Electric database tables have the prefix EL_.

Explore the Topobase Electric NA Data Model

Use the Topobase data model administrator to explore the data model feature classes, topologies, and feature rules.

To explore the Topobase Electric NA data model

1 Start Topobase Administrator and open a workspace containing an Electric NA document.

2 In the Administrator Explorer, expand the workspace and the document.

3 Click Data Model.

The Data Model Administrator displays the feature classes, domains, and topologies in the Electric data model. Expand the groups to view the feature classes provided. For more information, see Overview of Data Model Administrator.

Administration Feature Classes

This group contains the feature classes that store and manage contacts, contracts, customer and manufacturer information, and location. In addition, the Administration group includes a polygon feature class for managing administrative areas such as cities, counties, or districts.

Feature class	Type	Table name and description
Administrative Area	Geometry	EL_ADMIN_AREA. Manages the polygon that represents a region of interest such as a city, country, or district. This feature class has a predefined label: EL_ADMIN_AREA_TBL
Contact	Attribute	EL_CONTACT. Manages contact information such as owner, concessionaires, installer, operator, or maintenance person. The Contact form is linked to many other feature class forms using relations. To view the list of related tables, display the Contact form and click the Related Tables tab. From the Contact form you can access several electric network features using the buttons on the Related Tables tab. For example, select a maintenance company and find all electric network features it is responsible for.
Contract	Attribute	EL_CONTRACT. Manages contract information related to an electric fea-

Feature class	Type	Table name and description
		ture. For example, you might use the Contract feature class to manage a joint use agreement for a structure such as a pole, that is shared between two utility companies.
Customer Info	Attribute	EL_CUSTOMER_INFO. Manages customer information associated with a service point or meter.
Location	Attribute	EL_LOCATION. Manages location information such as street name for electric features. From the Location form you can access electric network features and customer information using the link buttons on the Related Tables tab. For example, you can select a location and find all customers associated with this location. This feature class has a predefined label: EL_LOCATION_TBL
Manufacturer	Attribute	EL_MANUFACTURER. Manages manufacturer data for materials and assemblies.

Circuit Feature Class

This group contains one attribute feature class that stores and manages circuit information. A circuit is a group of connected electric devices and conductors.

All device and conductor feature classes are related to a circuit (FID_CIRCUIT). A circuit starts at an origin device such as a circuit breaker (EL_BREAKER.FID).

NOTE Use the Electric Explorer to create and edit features in the electric network.

Feature class	Type	Table name and description
Circuit	Attribute	EL_CIRCUIT. Stores and manages information about the circuit. Every element in the circuit must be associated with the circuit using the Circuit attribute (FID_Circuit) in the form for each element. Related table: EL_BREAKER. The Device Origin attribute in the Circuit form links to the EL_BREAKER table and specifies the device that feeds the circuit.

Cross Section Feature Classes

This group contains the feature classes for cross section templates. They store the geometry components that are used to display cross sections in the map.

NOTE Use the **Electric Explorer** to create and edit cross section templates. Do not modify these forms directly.

Use the Display Manager to style the cross section components. For more information on styling features, see the AutoCAD Map 3D User's Guide.

Feature class	Type	Table name and description
Cross Section Duct View	Point geometry	EL_V_CS_DUCT. View used for stylization.
CS_Conductor View	Point geometry	EL_V_CS_CONDUCTOR. View used for stylization.
CS Origin	Point geometry	EL_CS_ORIGIN. Stores the origin point of the cross section.

Feature class	Type	Table name and description
		Related table: EL_SEGMENT. The cross section is related to a segment (EL_SEGMENT.FID).
CS Conductor	Point geometry	EL_CS_CONDUCTOR. Stores the points that represent the conductors in a cross section. Related tables: EL_CS_ORIGIN, EL_CS_DUCT, EL_SEGMENT_CONDUCTOR, EL_SNAPPOINT. The conductor is related to the cross section (EL_CS_ORIGIN.FID).
CS Decoration	Point, polygon, or line geometry	EL_CS_DECORATION. Stores style information for the cross section, for example, a border line. The cross section decoration is related to the cross section (EL_CS_ORIGIN.FID).
CS Decoration L	Line geometry	EL_CS_DECORATION_L. Stores the line that leads from the cross section origin to the segment. This line is created automatically when you place a cross section that is offset from a segment. The decoration line is related to the cross section (EL_CS_ORIGIN.FID).
CS Duct	Point geometry	EL_CS_DUCT. Stores the points that represent ducts in the cross section. Related tables: EL_CS_ORIGIN, EL_SEGMENT_DUCT, EL_SNAPPOINT. The duct is related to the cross section (EL_CS_ORIGIN.FID).

Feature class	Type	Table name and description
Snappoint	Point geometry	EL_SNAPPOINT. Stores the snap point locations for the cross sections. Snap points are related to the cross section (EL_CS_ORIGIN.FID).
Snappoint view	Point geometry	EL_V_SNAPPOINT. View used for stylization.

See also:

- Topobase Electric Cross Sections (page 13)

Conductor Feature Classes

This group contains the conductor feature classes. A conductor is used to carry electrical energy from point to point. Conductors are related to the circuit (FID_CIRCUIT).

NOTE Use the Electric Explorer to create and edit features in the electric network.

Feature class	Type	Table name and description
Conductor	Line geometry	EL_CONDUCTOR. A conductor is used to carry electric energy from point to point. The conductor is related to a circuit and a structure such as tower, pole, or manhole. Related tables: EL_CIRCUIT, EL_CONTACT_CONCESSIONAIRE, EL_CONTACT_INSTALLER, EL_CONTACT_MAINTENANCE, EL_CONTACT_OPERATOR, EL_CONTACT_OWNER, EL_LOCATION, EL_STRUCTURE This feature class has a predefined label: EL_CONDUCTOR_TBL

Feature class	Type	Table name and description
Conductor Model	Attribute	EL_CONDUCTOR_MODEL. Stores information about the conductor model such as manufacturer and material.
Fiber	Attribute	EL_FIBER. Use this feature class to manage telecommunication fibers if they are included with Electric assets. A fiber is a very thin, flexible, glass or plastic strand along which large quantities of information can be transmitted in the form of light pulses. A conductor can contain several fibres. Fibers are not part of the electrical network.

Conductors are related to the structural network. Conductors can be located in several segments or in several ducts. A segment can contain several ducts and a duct can contain several conductors.

NOTE Use the Electric Explorer to manage conductors.

Construct Feature Classes

Construction (COGO) elements (lines, points, and text) appear temporarily with the help of Construct feature classes. These are removed from the drawing as soon as you save the new elements and quit or close the dialog boxes.

NOTE Use Document Settings in Topobase Administrator to add the Construct feature classes.

Make sure that the newly created feature classes are visible in the selected explorer group and that an appropriate stylization has been defined in the Display Model.

Device Feature Classes

This group contains the device feature classes that make up the electric network. The electric network also includes the Conductor feature class. The Electric_CONN feature class stores flow and connectivity information for the logical topology. Most device feature classes also have predefined label and

model feature classes as well. All devices are related to a circuit (FID_CIRCUIT). See also Circuit Feature Class (page 72).

Feature class	Type	Table name and description
Breaker	Point geometry	EL_BREAKER. A protection device that opens in an overcurrent condition to protect the circuit. A breaker is usually installed in substations at the start of a circuit. Related tables: EL_CIRCUIT, EL_STRUCTURE
Bus Bar	Point, line, and polygon geometry	EL_BUS_BAR. A heavy conductor used to collect, carry, and distribute electric currents. Related tables: EL_CIRCUIT, EL_STRUCTURE
Capacitor	Point geometry	EL_CAPACITOR. An electric circuit element used to store charge temporarily. Related tables: EL_CIRCUIT, EL_STRUCTURE
Current Regulator	Point geometry	EL_CURRENT_REGULATOR. Maintains the current on the network within a given tolerance. Related tables: EL_CIRCUIT, EL_STRUCTURE
Elbow	Point geometry	EL_ELBOW. A terminator for a conductor before it connects to a device. Related tables: EL_CIRCUIT, EL_STRUCTURE
Electric_CONN	Attribute	EL_ELECTRIC_CONN. This table is used internally for logical topology information (connections and flow) for electric networks. Do not modify this table.
Fault Thrower	Point geometry	EL_FAULT_THROWER. An earth switch that is closed by local protection equipment on an energized circuit under fault conditions, remotely tripping

Feature class	Type	Table name and description
		the circuit-breaker(s) controlling the circuit. Related tables: EL_CIRCUIT, EL_STRUCTURE
Feeder	Point geometry	EL_FEEDER. A device at the start of a circuit. Related tables: EL_CIRCUIT, EL_STRUCTURE, EL_MANUFACTURER, EL_CURRENT, EL_MATERIAL, EL_VOLTAGE, EL_STATE, EL_PHASE
Fuse	Point geometry	EL_FUSE. A protection device that opens to protect the upstream circuit sections from faults occurring downstream from the fuse. The fuse opens when the operating current exceeds the cutout current. Related tables: EL_CIRCUIT, EL_CONTACT_CONCESSIONAIRE, EL_CONTACT_INSTALLER, EL_CONTACT_MAINTENANCE, EL_CONTACT_OPERATOR, EL_CONTACT_OWNER, EL_LOCATION, EL_STRUCTURE
Generator	Point geometry	EL_GENERATOR. Converts mechanical energy into electrical energy. Related tables: EL_CIRCUIT, EL_CONTACT_CONCESSIONAIRE, EL_CONTACT_INSTALLER, EL_CONTACT_MAINTENANCE, EL_CONTACT_OPERATOR, EL_CONTACT_OWNER, EL_LOCATION, EL_STRUCTURE
Ground	Point geometry	EL_GROUND. Grounds electrical equipment to earth. Related tables: EL_CIRCUIT, EL_STRUCTURE

Feature class	Type	Table name and description
Head Bolt Outlet	Point geometry	EL_HEAD_BOLT_OUTLET. Supplies electric current for vehicle heating in cold weather climates. Related tables: EL_CIRCUIT, EL_STRUCTURE
Isolator	Point geometry	EL_ISOLATOR. Separates a component, circuit, or system from a source of electricity. Related tables: EL_CIRCUIT, EL_STRUCTURE
Junction	Point geometry	EL_JUNCTION. Links two or more conductors. Related tables: EL_CIRCUIT, EL_STRUCTURE
Light	Point geometry	EL_LIGHT. A street light. Related tables: EL_CIRCUIT, EL_MANUFACTURER, EL_STRUCTURE
Lightning Arrester	Point geometry	EL_LIGHTNING_ARRESTER. Protects the electric network from lightning. Related tables: EL_CIRCUIT, EL_STRUCTURE
Load Tap Changer	Point geometry	EL_LOAD_TAP_CHANGER. On-load tap-changing mechanism for power transformers. Related tables: EL_CIRCUIT, EL_STRUCTURE
Meter	Point geometry	EL_METER. Measures the quantity and rate of electricity through a section of line. Related tables: EL_CIRCUIT, EL_CONTACT_CONCESSIONAIRE, EL_CONTACT_INSTALLER, EL_CONTACT_MAINTENANCE, EL_CONTACT_OPERATOR, EL_CONTACT_OWNER, EL_LOCATION, EL_STRUCTURE

Feature class	Type	Table name and description
Motor	Point geometry	EL_MOTOR. Converts electrical energy into mechanical energy. Related tables: EL_CIRCUIT, EL_STRUCTURE
Recloser	Point geometry	EL_RECLOSER. A protection device that detects downstream faults and interrupts the faulted section. Related tables: EL_CIRCUIT, EL_STRUCTURE
Regulator	Point geometry	EL_REGULATOR. Maintains the current on the network within a given tolerance. Related tables: EL_CIRCUIT, EL_STRUCTURE
Riser	Point geometry	EL_RISER. The connection between underground and overhead networks. Related tables: EL_CIRCUIT, EL_STRUCTURE
Sectionalizer	Point geometry	EL_SECTIONALIZER. A protective device that automatically isolates faulted sections of a circuit. Because it does not have fault-interrupting capability, a sectionalizer is used with a backup device such as a breaker or a recloser. Related tables: EL_CIRCUIT, EL_STRUCTURE
Service Point	Point geometry	EL_SERVICE_POINT. The boundary between the network and the customer. A service point may have many customers associated to it. The symbology of the service point reflects the type of customers fed by the network at that point. Related tables: EL_CIRCUIT, EL_STRUCTURE

Feature class	Type	Table name and description
Sleeve	Point geometry	EL_SLEEVE. Repairs or connects cable. Related tables: EL_CIRCUIT, EL_CONTACT_CONCESSIONAIRE, EL_CONTACT_INSTALLER, EL_CONTACT_MAINTENANCE, EL_CONTACT_OPERATOR, EL_CONTACT_OWNER, EL_LOCATION, EL_STRUCTURE
Switch	Point geometry	EL_SWITCH. Opens or closes to change the load distribution or the configuration of the network. Related tables: EL_CIRCUIT, EL_CONTACT_CONCESSIONAIRE, EL_CONTACT_INSTALLER, EL_CONTACT_MAINTENANCE, EL_CONTACT_OPERATOR, EL_CONTACT_OWNER, EL_LOCATION, EL_STRUCTURE
Termination	Point geometry	EL_TERMINATION. Terminates a loose end of a conductor. Related tables: EL_CIRCUIT, EL_STRUCTURE
Transformer	Point geometry	EL_TRANSFORMER. Converts the generator's low-voltage electricity to higher voltage levels for transmission to the load center, such as a city or factory. Related tables: EL_CIRCUIT, EL_STRUCTURE
Way	Point geometry	EL_WAY. A switchable point within low voltage switchgear. A way is a point of isolation on a low voltage network. The circuits that come from a low voltage board in substations are protected by a fuseway. The connection between the low voltage board and transformer is controlled by a linkway. Related tables: EL_CIRCUIT, EL_STRUCTURE

See also:

- Topobase Electric Topologies (page 9)

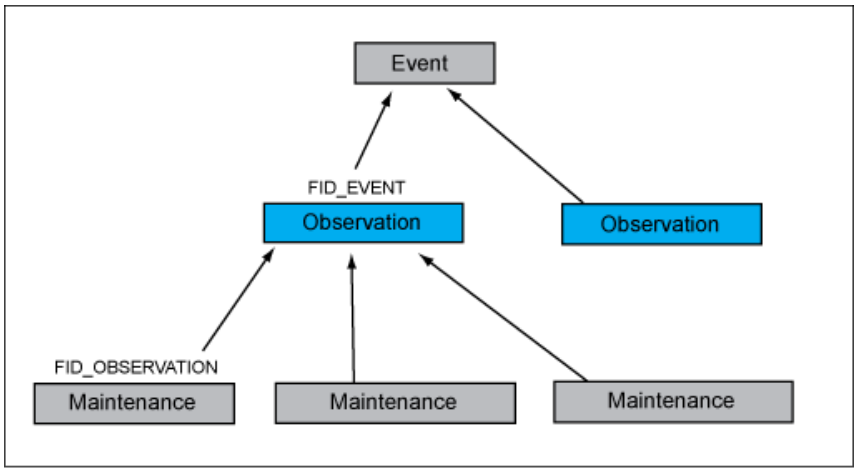
Dimension Feature Classes

This group contains dimension feature classes for storing dimension lines, labels, and points.

For more information about setting up dimensioning, see To add the Dimensioning extension. For more information about using dimensioning, see Adding Dimensions.

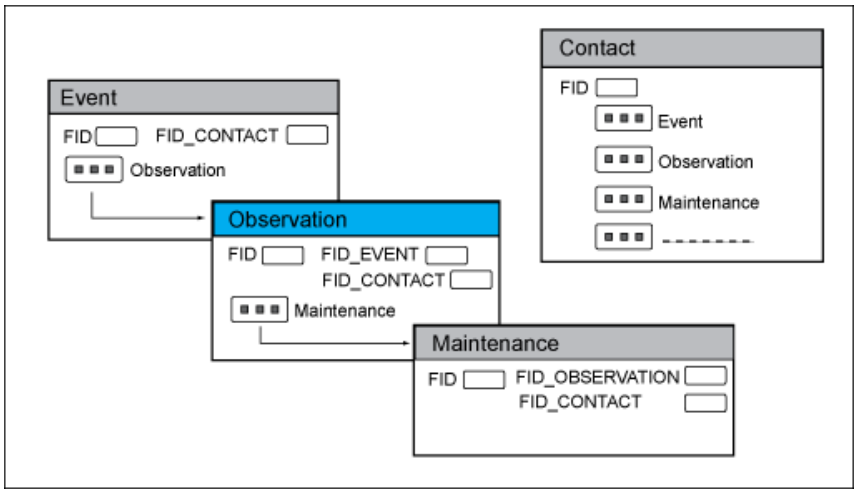
Event Feature Classes

This group contains the feature classes for events and the associated observations and maintenance information related to a feature.



Feature class	Type	Table name and description
Event	Attribute	EL_EVENT. Stores events such as inspections including event type and contact information. An event can be related to sev-

Feature class	Type	Table name and description
		eral observations and an observation can be related to several maintenance activities. For example, for a damage event, the observation might be inspection information and the maintenance might be repair information. Related table: EL_CONTACT
Maintenance	Attribute	EL_MAINTENANCE. Stores maintenance work such as washing, inspection, or function checking. Maintenance can be related to an observation. Related tables: EL_CONTACT, EL_FEATURE, EL_OBSERVATION
Observation	Point, line, and polygon geometry	EL_OBSERVATION. Stores observation activities that apply to a feature, for example, meter reading. Observations can be related to an event. You can use a point, line, or polygon to indicate a location in the map. Related tables: EL_CONTACT, EL_EVENT, EL_FEATURE



In the feature class forms, use the Reference buttons to show the related features. For example, in the Event form, click the Observation Reference button  to show all observations that are related to the current event, or use the Projection button  to show all observations that are related to the events in the filter. Use feature functions to create maintenance records.

See also:

- Create Maintenance Records (page 41)
- Create Observation Records (page 42)

Miscellaneous Feature Classes

Marker

This group contains marker feature classes. A marker can be a sign or a concrete monument installed either directly above or immediately adjacent to underground lines, bends or fittings to indicate the presence of electricity. Markers are not part of the electrical network.

You can assign a marker to a devices. Marker details are stored in a model table.

Feature class	Type	Table name and description
Marker	Point, line, or polygon geometry	EL_MARKER. Stores marker information. This feature class has a predefined label and and associated model table. Markers are related to devices.

Structural Feature Classes

This group contains the structural feature classes that make up the structural network plus some additional structural feature classes. The Structural_CONN feature class stores flow and connectivity information for the logical topology. Most structural feature classes have an associated model table.

Feature class	Type	Table name and description
Access Point	Point geometry	EL_ACCESS_POINT. A structure that provides access to electric facilities.
Anchor	Point geometry	EL_ANCHOR. An anchor associated with a structure. This feature class includes a predefined label feature class (EL_ANCHOR_TBL). Not included in the structural network.
Antenna	Point geometry	EL_ANTENNA. An anchor associated with a structure. This feature class includes a predefined label feature class (EL_ANTENNA_TBL). Not included in the structural network.
Arrestor	Point geometry	EL_ARRESTOR. An anchor associated with a structure. This feature class includes a predefined label feature class (EL_ARRESTOR_TBL). Not included in the structural network.
Capacitor Bank	Point geometry	EL_CAPACITOR_BANK. A set of individual capacitors grouped with each other. This

Feature class	Type	Table name and description
		feature class includes a predefined label feature class (EL_CAPACITOR_BANK_TBL).
Connection Box	Point geometry	EL_CONNECTION_BOX. This feature class includes a predefined label feature class (EL_CONNECTION_BOX_TBL).
Connector	Point geometry	EL_CONNECTOR. This feature class connects two segments. It includes a predefined label feature class (EL_CONNECTOR_TBL).
Elbow Bank	Point geometry	EL_ELBOW_BANK. This feature class includes a predefined label feature class (EL_ELBOW_BANK_TBL).
Enclosure	Point geometry	EL_ENCLOSURE. This feature class includes a predefined label feature class (EL_ENCLOSURE_TBL).
Feeder Pillar	Point geometry	EL_FEEDER_PILLAR. A metal cabinet with opening doors. This feature class includes a predefined label feature class (EL_FEEDER_PILLAR_TBL).
Fuse Bank	Point geometry	EL_FUSE_BANK. This feature class includes a predefined label feature class (EL_FUSE_BANK_TBL).
Guy	Line geometry	EL_GUY. A wire that supports a pole. It acts against the tension provoked by the cables attached to the pole. Not included in the structural network.
Handhole	Point geometry	EL_HANDHOLE. A small underground access point. This feature class includes a predefined label feature class (EL_HANDHOLE_TBL).
Intermediate Structure	Point geometry	EL_INTERMEDIATE_STRUCTURE. This class participates in the EL_STR (STRUCTURAL) topology and is used as an intermediate

Feature class	Type	Table name and description
		topological point for placing structural points where there is a need for a generic structural point feature to join two segments, for example where a device might need to be added without a specific structural feature.
Junction Cabinet	Point geometry	EL_JUNCTION_CABINET. An above ground cabinet used to split a single supply into multiple supplies. This feature class includes a predefined label feature class (EL_JUNCTION_CABINET_TBL).
Link Box	Point geometry	EL_LINK_BOX. A sunken box with a concrete lid at ground level. This feature class includes a predefined label feature class (EL_LINK_BOX_TBL).
LV Board	Point, line, and polygon geometry	EL_LV_BOARD. LV Distribution busbar mounted on the substation wall. This feature class includes a predefined label feature class (EL_LV_BOARD_TBL).
Manhole	Point geometry	EL_MANHOLE. An underground access point. This feature class includes a predefined label feature class (EL_MANHOLE_TBL).
Pad	Point geometry	EL_PAD. A structure that is made of poured concrete, laid over a gravel base, upon which electric facilities (most commonly transformers) are placed. This feature class includes a predefined label feature class (EL_PAD_TBL).
Pathway	Attribute	EL_PATHWAY. A group of segments.
Pedestal	Point geometry	EL_PEDESTAL. This feature class includes a predefined label feature class (EL_PEDESTAL_TBL).

Feature class	Type	Table name and description
Pole	Point geometry	EL_POLE. Supports overhead devices in the electrical system. This feature class includes a predefined label feature class (EL_POLE_TBL).
Recloser Bank	Point geometry	EL_RECLOSER_BANK. This feature class includes a predefined label feature class (EL_RECLOSER_BANK_TBL).
Regulator Bank	Point geometry	EL_REGULATOR_BANK. This feature class includes a predefined label feature class (EL_REGULATOR_BANK_TBL).
Sectionalizer Bank	Point geometry	EL_SECTIONALIZER_BANK. This feature class includes a predefined label feature class (EL_SECTIONALIZER_BANK_TBL).
Structural_CONN	Attribute	EL_STRUCTURAL_CONN. This table is used internally for logical topology information for structural networks. Do not modify this table.
Structure Decoration	Point, line, and polygon geometry	EL_STRUCTURE_DECO. Not included in the structural network. This feature class is used for visualization of structural details, such as a footprint.
Substation	Point geometry	EL_SUBSTATION. A walled structure where voltage transformation takes place. The substation itself is not connected to the electric network. It is part of the structural network. This feature class includes a predefined label feature class (EL_SUBSTATION_TBL).
Support Conductor	Attribute	EL_SUPPORT_CONDUCTOR. Not included in the structural network.
Switch Bank	Point geometry	EL_SWITCH_BANK. This feature class includes a predefined label feature class (EL_SWITCH_BANK_TBL).

Feature class	Type	Table name and description
Switch Board	Point geometry	EL_SWITCH_BOARD. A mechanical device for shifting an electric current to another circuit. This feature class includes a predefined label feature class (EL_SWITCH_BOARD_TBL).
Switchgear	Point geometry	EL_SWITCHGEAR. Switching equipment used in an electric power station. This feature class includes a predefined label feature class (EL_SWITCHGEAR_TBL).
Tower	Point geometry	EL_TOWER. A special type of pole structure, characterized by its size and construction type. It usually supports high voltage conductors. This feature class includes a predefined label feature class (EL_TOWER_TBL).
Transformer Bank	Point geometry	EL_TRANSFORMER_BANK. This feature class includes a predefined label feature class (EL_TRANSFORMER_BANK_TBL).
Transformer Station	Point geometry	EL_TS_STATION. This feature class includes a predefined label feature class (EL_TS_STATION_TBL).
Vault	Point geometry	EL_VAULT. A walled structure that can be underground or on a slab and which houses electric devices. This feature class includes a predefined label feature class (EL_VAULT_TBL).
Warning Light	Point geometry	EL_WARNING_LIGHT. Warning light associated with a structure. This feature class includes a predefined label feature class (EL_WARNING_LIGHT_TBL). Not included in the structural network.

Template Feature Classes

This group contains attribute tables that store the template definitions.

IMPORTANT Do not edit these tables manually. They are managed by the application when you author a template using Topobase Client.

Feature class	Type	Table name and description
Feature Group	Internal	TB_FEATURE_GROUP. Stores the grouping of the template features. When a template is instantiated, a new record is added.
Feature Group Feature	Internal	TB_FEATURE_GROUP_FEATURE. Stores the relation between an instantiated feature and a feature group, indicating that a feature is part of an instantiated template.

See also:

- Working with Templates

Understand and Work with the Topobase Electric CE Data Model

Topobase Electric Central Europe is based on the Utility data model which stores geometry and attribute data separately. The EL_POINT and EL_LINE feature classes represent the points and lines that make up the electric network. EL_POINT features are electrical features such as breakers, switches, transformers and other electrical devices. EL_LINE features are the linestring geometries that represents conductors. These features carry the electric current and control its behavior.

EL_STR_POINT and EL_STR_LINE represent the points and lines that make up the structural network. These are structural features such as segments, poles, manholes for trenches, and so forth. They are the structural elements that house the electrical devices.

EL_CONN and EL_STR_CONN are the tables that store connectivity and flow information. We strongly recommend that you do not modify these tables.

Topobase Electric labels reference label text from the attribute feature class. To obtain the geometry, they reference the associated geometry feature class (EL_POINT, EL_LINE, EL_STR_POINT or EL_STR_LINE).

Explore the Topobase Electric CE Data Model

Use the Topobase data model administrator to explore the data model feature classes, topologies, and feature rules.

To explore the Topobase Electric CE data model

1. Start Topobase Administrator and open a workspace containing an Electric CE document.
2. In the Administrator Explorer, expand the workspace and the document.
3. Click Data Model.

The Data Model Administrator displays the feature classes, domains, and topologies in the Electric data model. Expand the groups to view the feature classes provided. For more information, see Overview of Data Model Administrator.

Administration Feature Classes

This group contains the feature classes that store and manage contacts, contracts, and customer and manufacturer information, and location. In addition, the Administration group includes a polygon feature class for managing administrative areas such as cities, counties, or districts.

Feature class	Type	Table name and description
Administrative Area	Polygon	EL_ADMIN_AREA. Manages the polygon that represents a region of interest such as a city, country, or district. This feature class has a predefined label: EL_ADMIN_AREA_TBL

Feature class	Type	Table name and description
Contact	Attribute	EL_CONTACT. Manages contact information such as owner, concessionaires, installer, operator, or maintenance person. The Contact form is linked to many other feature class forms using relations. To view the list of related tables, display the Contact form and click the Related Tables tab. From the Contact form you can access several electric network features using the buttons on the Related Tables tab. For example, select a maintenance company and find all electric network features it is responsible for.
Contract	Attribute	EL_CONTRACT. Manages contract information related to an electric feature. For example, you might use the Contract feature class to manage a joint use agreement for a structure such as a pole, that is shared between two utility companies.
Customer Info	Attribute	EL_CUSTOMER_INFO. Manages customer information associated with a service point or meter.
Location	Attribute	EL_LOCATION. Manages location information such

Feature class	Type	Table name and description
		as street name for electric features. From the Location form you can access electric network features and customer information using the link buttons on the Related Tables tab. For example, you can select a location and find all customers associated with this location. This feature class has a predefined label: EL_LOCATION_TBL
Manufacturer	Attribute	EL_MANUFACTURER. Manages manufacturer data for materials and assemblies.

Circuit Feature Class

This group contains one attribute feature class that stores and manages circuit information. A circuit is a group of connected electric devices and conductors. All device and conductor feature classes are related to a circuit (FID_CIRCUIT). A circuit starts at an origin device such as a circuit breaker (EL_BREAKER.FID).

NOTE Use the Electric Explorer to create and edit features in the electric network.

Feature class	Type	Table name and description
Circuit	Attribute	EL_CIRCUIT. Identifies a group of connected electric devices and conductors. Every element in the circuit must be associated with the circuit using the CIRCUIT (FID_CIRCUIT) attribute in the form for each element. Related table: EL_BREAKER. The Device Origin attribute in the

Feature class	Type	Table name and description
		Circuit form links to the EL_BREAKER table and specifies the device that feeds the circuit.

Conductor Feature Classes

This group contains the conductor feature classes. A conductor is used to carry electrical energy from point to point.

NOTE Use the Electric Explorer to create and edit features in the electric network.

Feature class	Type	Table name and description
Conductor	Attribute	EL_CONDUCTOR. Carries electric energy from point to point. Related tables: EL_CONTRACT, EL_DUCT_CONDUCTOR, EL_LINE, EL_FIBER, EL_OBSERVATION, EL_GROUND, EL_MAINTENANCE, EL_MARKER, EL_SEGMENT_CONDUCTOR, EL_SUPPORT_CONDUCTOR This feature class has a predefined label: EL_CONDUCTOR_TBL
Conductor Model	Attribute	EL_CONDUCTOR_MODEL. Stores information about the conductor model such as manufacturer and material.
Fiber	Attribute	EL_FIBER. Use this feature class to manage telecommunication fibers if they are included with Electric assets. A fiber is a very thin, flexible, glass or plastic strand along which large quantities of information can be transmitted in the form of light pulses. A conductor can contain several fibres. Fibers are not part of the electrical network.

Conductors are related to the structural network. Conductors can be located in several segments or in several ducts. A segment can contain several ducts and a duct can contain several conductors.

NOTE Use the Electric Explorer to manage conductors.

Construct Feature Classes

Construction (COGO) elements (lines, points, and text) appear temporarily with the help of Construct feature classes. These are removed from the drawing as soon as you save the new elements and quit or close the dialog boxes.

NOTE Use Document Settings in Topobase Administrator to add the Construct feature classes.

Make sure that the newly created feature classes are visible in the selected explorer group and that an appropriate stylization has been defined in the Display Model.

Cross Section Feature Classes

This group contains the feature classes for cross section templates. They store the geometry components that are used to display cross sections in the map.

NOTE Use the Electric Explorer to create and edit cross section templates. Do not modify these forms directly.

Use the Display Manager to style the cross section components. For more information on styling features, see Working with Display Models.

Feature class	Type	Table name and description
CS Origin	Point geometry	EL_CS_ORIGIN. Stores the origin point of the cross section. Related table: EL_SEGMENT. The cross section is related to a segment (EL_SEGMENT.FID).
CS Duct	Point geometry	EL_CS_DUCT. Stores the points that represent ducts in the cross section.

Feature class	Type	Table name and description
		Related tables: EL_CS_ORIGIN, EL_SEGMENT_DUCT, EL_SNAPPOINT. The duct is related to the cross section (EL_CS_ORIGIN.FID).
CS Conductor	Point geometry	EL_CS_CONDUCTOR. Stores the points that represent the conductors in a cross section. Related tables: EL_CS_ORIGIN, EL_CS_DUCT, EL_SEGMENT_CONDUCTOR, EL_SNAPPOINT. The conductor is related to the cross section (EL_CS_ORIGIN.FID).
CS Decoration	Point, polygon, or line geometry	EL_CS_DECORATION. Stores style information for the cross section, for example, a border line. The cross section decoration is related to the cross section (EL_CS_ORIGIN.FID).
CS Decoration L	Line geometry	EL_CS_DECORATION_L. Stores the line that leads from the cross section origin to the segment. This line is created automatically when you place a cross section that is offset from a segment. The decoration line is related to the cross section (EL_CS_ORIGIN.FID).
Snap point	Point geometry	EL_SNAPPOINT. Stores the snap point locations for the cross sections. Snap points are related to the cross section (EL_CS_ORIGIN.FID).

Device Feature Classes

This group contains the device feature classes that make up the electric network. The electric network also includes the Conductor feature class. Most device feature classes also have predefined label and model feature classes as well. All devices are related to a circuit (FID_CIRCUIT).

Feature class	Type	Table name and description
Attachment Device	Attribute	EL_ATTACHMENT_DEVICE. An attachment related to a support. Related tables: EL_CONTRACT, EL_OBSERVATION, EL_MAINTENANCE, EL_MARKER
Breaker	Attribute	EL_BREAKER. A protection device that opens in an overcurrent condition to protect the circuit. A breaker is usually installed in substations at the start of a circuit. Related tables: EL_CIRCUIT, EL_STRUCTURE
Bus Bar	Attribute	EL_BUS_BAR. A heavy conductor used to collect, carry, and distribute electric currents. Related tables: EL_CIRCUIT, EL_STRUCTURE
Capacitor	Attribute	EL_CAPACITOR. An electric circuit element used to store charge temporarily. Related tables: EL_CIRCUIT, EL_STRUCTURE
Current Converter	Attribute	EL_CURRENT_CONVERTER. Converts current usually when a current measurement is required. Related tables: EL_CONTRACT, EL_OBSERVATION, EL_MAINTENANCE, EL_MARKER, EL_GROUND.
Current Regulator	Attribute	EL_CURRENT_REGULATOR. Maintains the current on the network within a given tolerance.

Feature class	Type	Table name and description
		Related tables: EL_CIRCUIT, EL_STRUCTURE
Discharger	Attribute	EL_DISCHARGER. Controls excess voltage. Related tables: EL_CONTRACT, EL_OBSERVATION, EL_MAINTENANCE, EL_MARKER, EL_GROUND
Fault Thrower	Attribute	EL_FAULT_THROWER. An earth switch that is closed by local protection equipment on an energized circuit under fault conditions, remotely tripping the circuit-breaker(s) controlling the circuit. Related tables: EL_CIRCUIT, EL_STRUCTURE, EL_GROUND
Feeder	Attribute	EL_FEEDER. A device at the start of a circuit. Related tables: EL_CIRCUIT, EL_STRUCTURE, EL_MANUFACTURER, EL_CURRENT, EL_MATERIAL, EL_VOLTAGE, EL_STATE, EL_PHASE
Fuse	Attribute	EL_FUSE. A protection device that opens to protect the upstream circuit sections from faults occurring downstream from the fuse. The fuse opens when the operating current exceeds the cutout current. Related tables: EL_CIRCUIT, EL_CONTACT_CONCESSIONAIRE, EL_CONTACT_INSTALLER, EL_CONTACT_MAINTENANCE, EL_CONTACT_OPERATOR, EL_CONTACT_OWNER, EL_LOCATION, EL_STRUCTURE
Generator	Attribute	EL_GENERATOR. Converts mechanical energy into electrical energy.

Feature class	Type	Table name and description
		Related tables: EL_CIRCUIT, EL_CONTACT_CONCESSIONAIRE, EL_CONTACT_INSTALLER, EL_CONTACT_MAINTENANCE, EL_CONTACT_OPERATOR, EL_CONTACT_OWNER, EL_LOCATION, EL_STRUCTURE
Ground	Attribute	EL_GROUND. Grounds electrical equipment to earth. Related tables: EL_CIRCUIT, EL_STRUCTURE
Isolator	Attribute	EL_ISOLATOR. Separates a component, circuit, or system from a source of electricity. Related tables: EL_CIRCUIT, EL_STRUCTURE
Junction	Attribute	EL_JUNCTION. Links two or more conductors. Related tables: EL_CIRCUIT, EL_STRUCTURE
Light	Attribute	EL_LIGHT. A street light. Related tables: EL_CIRCUIT, EL_MANUFACTURER, EL_STRUCTURE
Lightning Arrester	Attribute	EL_LIGHTNING_ARRESTER. Protects the electric network from lightning. Related tables: EL_CIRCUIT, EL_STRUCTURE
Meter	Attribute	EL_METER. Measures the quantity and rate of electricity through a section of line. Related tables: EL_CIRCUIT, EL_CONTACT_CONCESSIONAIRE, EL_CONTACT_INSTALLER, EL_CONTACT_MAINTENANCE, EL_CONTACT_OPERATOR, EL_CONTACT_OWNER, EL_LOCATION, EL_STRUCTURE

Feature class	Type	Table name and description
Minor Consumer	Attribute	EL_MINOR_CONSUMER. Minor power consumer like mobile antenna. Related tables: EL_CONTRACT, EL_OBSERVATION, EL_MAINTENANCE, EL_MARKER, EL_GROUND
Motor	Point geometry	EL_MOTOR. Converts electrical energy into mechanical energy. Related tables: EL_CIRCUIT, EL_STRUCTURE
Recloser	Attribute	EL_RECLOSER. A protection device that detects downstream faults and interrupts the faulted section. Related tables: EL_CIRCUIT, EL_STRUCTURE
Regulator	Attribute	EL_REGULATOR. Maintains the current on the network within a given tolerance. Related tables: EL_CIRCUIT, EL_STRUCTURE
Riser	Attribute	EL_RISER. The connection between underground and overhead networks. Related tables: EL_CIRCUIT, EL_STRUCTURE
Secondary Relay	Attribute	EL_SECONDARY_RELAY. Monitors a measurement system. Related tables: EL_CIRCUIT, EL_STRUCTURE, EL_GROUND
Sectionalizer	Attribute	EL_SECTIONALIZER. A protective device that automatically isolates faulted sections of a circuit. Because it does not have fault-interrupting capability, a sectionalizer is used with a backup device such as a breaker or a recloser. Related tables: EL_CIRCUIT, EL_STRUCTURE

Feature class	Type	Table name and description
Service Point	Attribute	EL_SERVICE_POINT. The boundary between the network and the customer. A service point may have many customers associated to it. The symbology of the service point reflects the type of customers fed by the network at that point. Related tables: EL_CIRCUIT, EL_STRUCTURE
Sleeve	Attribute	EL_SLEEVE. Repairs or connects cable. Related tables: EL_CIRCUIT, EL_CONTACT_CONCESSIONAIRE, EL_CONTACT_INSTALLER, EL_CONTACT_MAINTENANCE, EL_CONTACT_OPERATOR, EL_CONTACT_OWNER, EL_LOCATION, EL_STRUCTURE
Switch	Attribute	EL_SWITCH. Opens or closes to change the load distribution or the configuration of the network. Related tables: EL_CIRCUIT, EL_CONTACT_CONCESSIONAIRE, EL_CONTACT_INSTALLER, EL_CONTACT_MAINTENANCE, EL_CONTACT_OPERATOR, EL_CONTACT_OWNER, EL_LOCATION, EL_STRUCTURE
Termination	Attribute	EL_TERMINATION. Terminates a loose end of a conductor. Related tables: EL_CIRCUIT, EL_STRUCTURE
Transformer	Attribute	EL_TRANSFORMER. Converts the generator's low-voltage electricity to higher voltage levels for transmission to the load center, such as a city or factory. Related tables: EL_CIRCUIT, EL_STRUCTURE

Feature class	Type	Table name and description
Voltage Converter	Attribute	EL_VOLTAGE_CONVERTER. Converts voltage and is usually used when a voltage measurement is required. Related tables: EL_CONTRACT, EL_OBSERVATION, EL_MAINTENANCE, EL_MARKER, EL_GROUND.

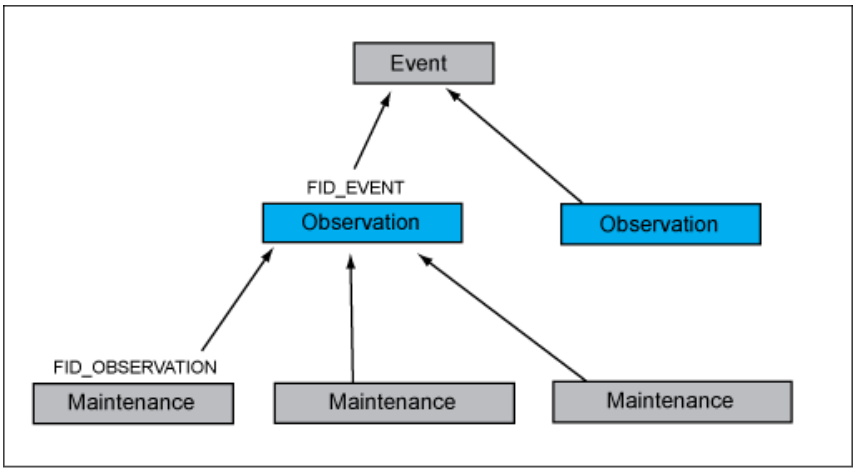
Dimension Feature Classes

This group contains dimension feature classes for storing dimension lines, labels, and points.

For more information about setting up dimensioning, see To add the Dimensioning extension. For more information about using dimensioning, see Adding Dimensions.

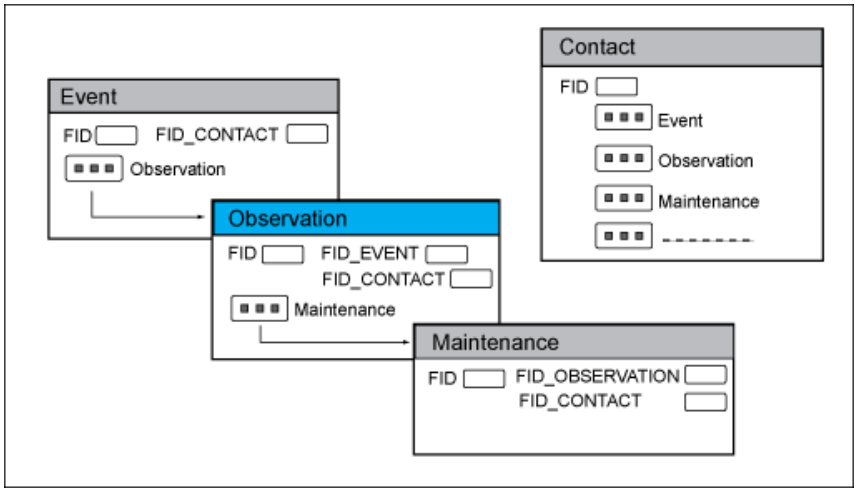
Event Feature Classes

This group contains the feature classes for events and the associated observations and maintenance information related to a feature.



Feature class	Type	Table name and description
Event	Attribute	EL_EVENT. Stores events such as inspections including event type and contact information. An event can be related to several observations and an observation can be related to several maintenance activities. For example, for a damage event, the observation might be inspection information and the maintenance might be repair information. Related table: EL_CONTACT
Maintenance	Attribute	EL_MAINTENANCE. Stores maintenance work such as washing, inspection, or function checking. Maintenance can be related to an observation. Related tables: EL_CONTACT, EL_FEATURE, EL_OBSERVATION

Feature class	Type	Table name and description
Observation	Attribute	EL_OBSERVATION. Stores observation activities that apply to a feature, for example, meter reading. Observations can be related to an event. You can use a point, line, or polygon to indicate a location in the map. Related tables: EL_CONTACT, EL_EVENT, EL_FEATURE



In the feature class forms, use the Reference buttons to show the related features. For example, in the Event form, click the Observation Reference button  to show all observations that are related to the current event, or use the Projection button  to show all observations that are related to the events in the filter. Use feature functions to create maintenance records.

See also:

- Create Maintenance Records (page 41)
- Create Observation Records (page 42)

Miscellaneous Feature Class

Marker

This group contains marker feature classes. A marker can be a sign or a concrete monument installed either directly above or immediately adjacent to underground lines, bends or fittings to indicate the presence of electricity. Markers are not part of the electrical network.

You can assign a marker to a devices.

Feature class	Type	Table name and description
Marker	Point, line, or polygon geometry	EL_MARKER. Stores marker information. This feature class has a predefined label. Markers are related to devices. Related to EL_CONTRACT, EL_OBSERVATION, EL_MAINTENANCE

Structural Feature Classes

This group contains the structural feature classes that make up the structural network plus some additional structural feature classes. The Structural_CONN feature class stores flow and connectivity information for the logical topology.

Feature class	Type	Table name and description
Access Point	Attribute	EL_ACCESS_POINT. A structure that provides access to electric facilities.
Anchor	Attribute	EL_ANCHOR. An anchor associated with a structure. This feature class includes a predefined label feature class (EL_ANCHOR_TBL). Not included in the structural network.
Antenna	Attribute	EL_ANTENNA. An anchor associated with a structure. This feature class includes a predefined label feature class (EL_ANTENNA_TBL). Not included in the structural network.

Feature class	Type	Table name and description
Arrestor	Attribute	EL_ARRESTOR. An anchor associated with a structure. This feature class includes a predefined label feature class (EL_ARRESTOR_TBL). Not included in the structural network.
Conductor Hold	Point	EL_CONDUCTOR_HOLD. An element that supports the conductor against wind.
Connector	Point geometry	EL_CONNECTOR. This feature class connects two segments. It includes a predefined label feature class (EL_CONNECTOR_TBL).
Duct	Line geometry	EL_DUCT. A duct contains one or more conductors and is used to protect the conductors when placed underground. EL_DUCT_AREA is used for ducts in multi conductor mode. EL_DUCT_CONDUCTOR manages the connections between ducts and conductors. EL_DUCT_DUCT manages the connections between ducts within ducts. EL_DUCT_MARKER marks the end of a duct.
Feeder Pillar	Point geometry	EL_FEEDER_PILLAR. A metal cabinet with opening doors. This feature class includes a predefined label feature class (EL_FEEDER_PILLAR_TBL).
Fuse Bank	Point geometry	EL_FUSE_BANK. This feature class includes a predefined label feature class (EL_FUSE_BANK_TBL).
Guy	Line geometry	EL_GUY. A wire that supports a pole. It acts against the tension provoked by the cables attached to the pole. Not included in the structural network.
Handhole	Point geometry	EL_HANDHOLE. A small underground access point. This feature class includes a

Feature class	Type	Table name and description
		predefined label feature class (EL_HAND-HOLE_TBL).
Intermediate Structure	Point geometry	EL_INTERMEDIATE_STRUCTURE. This class participates in the EL_STR (STRUCTURAL) topology and is used as an intermediate topological point for placing structural points where there is a need for a generic structural point feature to join two segments, for example where a device might need to be added without a specific structural feature.
Internal Cell	Polygon geometry	EL_INTERNAL_CELL.
Junction Cabinet	Point geometry	EL_JUNCTION_CABINET. This feature class includes a predefined label feature class (EL_JUNCTION_CABINET_TBL).
Link Box	Point geometry	EL_LINK_BOX. A sunken box with a concrete lid at ground level. This feature class includes a predefined label feature class (EL_LINK_BOX_TBL).
LV Board	Point, line, and polygon geometry	EL_LV_BOARD. LV Distribution busbar mounted on the substation wall. This feature class includes a predefined label feature class (EL_LV_BOARD_TBL).
Manhole	Point geometry	EL_MANHOLE. An underground access point. This feature class includes a predefined label feature class (EL_MAN-HOLE_TBL).
Pad	Point geometry	EL_PAD. A structure that is made of poured concrete, laid over a gravel base, upon which electric facilities (most commonly transformers) are placed. This feature class includes a predefined label feature class (EL_PAD_TBL).

Feature class	Type	Table name and description
Pathway	Attribute	EL_PATHWAY. This feature class stores information about the segment feature classes in the electric network. Use the Electric Explorer to manage the network. Do not edit these tables manually.
Pedestal	Point geometry	EL_PEDESTAL. This feature class includes a predefined label feature class (EL_PEDESTAL_TBL).
Pole	Point geometry	EL_POLE. Supports overhead devices in the electrical system. This feature class includes a predefined label feature class (EL_POLE_TBL).
Structure Decoration	Point, line, and polygon geometry	EL_STRUCTURE_DECO. Not included in the structural network. This feature class is used for visualization of structural details, such as a footprint.
Substation	Point geometry	EL_SUBSTATION. A walled structure where voltage transformation takes place. The substation itself is not connected to the electric network. It is part of the structural network. This feature class includes a predefined label feature class (EL_SUBSTATION_TBL).
Tower	Point geometry	EL_TOWER. A special type of pole structure, characterized by its size and construction type. It usually supports high voltage conductors. This feature class includes a predefined label feature class (EL_TOWER_TBL).
Transformer Bank	Point geometry	EL_TRANSFORMER_BANK. This feature class includes a predefined label feature class (EL_TRANSFORMER_BANK_TBL).

Feature class	Type	Table name and description
Transformer Station	Point geometry	EL_TS_STATION. This feature class includes a predefined label feature class (EL_TS_STATION_TBL).
Vault	Point geometry	EL_VAULT. A walled structure that can be underground or on a slab and which houses electric devices. This feature class includes a predefined label feature class (EL_VAULT_TBL).
Warning Light	Point geometry	EL_WARNING_LIGHT. Warning light associated with a structure. This feature class includes a predefined label feature class (EL_WARNING_LIGHT_TBL). Not included in the structural network.

Template Feature Classes

This group contains attribute tables that store the template definitions.

IMPORTANT Do not edit these tables manually. They are managed by the application, for example when you author a template using Topobase Client.

Feature class	Type	Table name and description
Feature Group	Internal	TB_FEATURE_GROUP. Stores the grouping of the template features. When a template is instantiated, a new record is added.
Feature Group Feature	Internal	TB_FEATURE_GROUP_FEATURE. Stores the relation between an instantiated feature and a feature group, indicating that a feature is part of an instantiated template.

See also:

- Working with Templates

Utility Feature Classes

The Electric_CONN feature class stores flow and connectivity information for the electric topology. The Structural_CONN feature class stores connectivity information for the structural topology. We strongly recommend that you do not modify these tables.

In Topobase Electric CE, geometry and attribute data are separate and connected by relations. The Electric Line and Electric Point feature classes store geometry for conductors and devices, respectively. The Structural Line and Structural Point feature classes store the geometry for segments and structures, respectively. For more information, see Topobase Electric Topologies (page 9).

Feature class	Type	Table name and description
Electric Line	Line geometry	Geometry for conductors. Relation: EL_CONDUCTOR.FID
Electric Point	Point geometry	Geometry for devices. Relations: EL_BREAKER.FID, EL_JUNCTION.FID, EL_FEEDER.FID, EL_FUSE.FID, EL_ATTACHMENT_DEVICE.FID, EL_SECTIONALIZER.FID, EL_GROUND.FID, EL_RECLOSER.FID, EL_GENERATOR.FID, EL_CAPACITOR.FID, EL_TRANSFORMER.FID, EL_ISOLATOR.FID, EL_LIGHT.FID, EL_MOTOR.FID, EL_SWITCH.FID, EL_SERVICE_POINT.FID, EL_SLEEVE.FID, EL_REGULATOR.FID, EL_MINOR_CONSUMER.FID, EL_TERMINATION.FID, EL_LIGHTNING_ARRESTER.FID, EL_METER.FID, EL_RISER.FID, EL_SECONDARY_RELAY.FID, EL_CURRENT_REGULATOR.FID, EL_FAULT_THROWER.FID, EL_BUS_BAR.FID
Structural Line	Line geometry	Geometry for structural lines (segments). Relation: EL_SEGMENT.FID
Structural Point	Point geometry	Geometry for structural points. Relations: EL_LV_BOARD.FID, EL_WARNING_LIGHT.FID, EL_VAULT.FID,

Feature class	Type	Table name and description
		EL_MANHOLE.FID, EL_ACCESS_POINT.FID, EL_TRAFO_STATION.FID, EL_TOWER.FID, EL_PAD.FID, EL_INTERMEDIATE_STRUCTURE.FID, EL_SUBSTATION.FID, EL_CONNECTOR.FID, EL_LINK_BOX.FID, EL_FUSE_BANK.FID, EL_FEEDER_PILLAR.FID, EL_TRANSFORMER_BANK.FID, EL_ANCHOR.FID, EL_ANTENNA.FID, EL_ARRESTOR.FID, EL_PEDESTAL.FID, EL_HANDHOLE.FID, EL_POLE.FID

Glossary

conductor Conductors (cables) are used to carry electrical energy from point to point. Conductors are part of the electrical network that represents the electrical logic. Basically the electric network is independent of the spatial, geographic location of the conductors.

duct A duct contains one or more conductors. It is used to protect the conductors that are placed underground.

Electric explorer Explorer to manage electric network features. Easy way to show relations between the superior and inferior features such as segments, ducts, and conductors.

pathway A pathway is a container for segments. It can contain one or more segments.

segment A segment is where conductors and ducts are placed underground. Several segments can form a pathway. Segments are part of the structural network consisting of segments and other structural objects such as tower, pole, substation, or transformer bank.

template An electric template is an arrangement of recurrent features. The arrangement includes feature attributes, geometry and connectivity. Using templates you can place a feature arrangement in one single step.

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