

Electrical

Families Ribbon Add-in

BIM

**Over 200+ Families in an
easily accessible drop down ribbon**

Last updated in June 2021



Engineering
Pro Guides

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Engineering Pro Guides Manual for Revit®

Last Updated June 2021

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Section 1.0 –Introduction and Electrical Basics for Revit®

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1.0 INTRODUCTION

This manual covers all the information you need to use the Engineering Pro Guides (EPG) Electrical Add-In for Revit®. The add-in is automatically loaded, every time you start-up Revit®. The purpose of this add-in is to first, (1) Provide easy access to the everyday electrical families that your company uses. There may be an occasional family that you need to download from a manufacturer’s website or a family that you need to create. But the majority of the families that you use in a project should hopefully be easily accessed through this add-in. If this is not the case, then please contact Justin at Justin@engproguides.com with a list of the families that you need included on your add-in. Secondly, this module must (2) Standardize the families used throughout the company. The add-in will reference the same Revit® families and so everyone with the add-in will all be accessing the same families. Lastly, (3) this module and manual will create a basis for standardizing Revit® workflow throughout your company.

1. Provide easy access to everyday Families used on a project
2. Standardize families throughout the company
3. Standardize Revit® workflow for electrical engineers & cad personnel throughout your company.

2.0 DISCLAIMER

In no event will Engineering Pro Guides be liable for any incidental, indirect, consequential, punitive or special damages of any kind, or any other damages whatsoever, including, without limitation, those resulting from loss of profit, loss of contracts, loss of reputation, goodwill, data, information, income, anticipated savings or business relationships, whether or not Engineering Pro Guides has been advised of the possibility of such damage, arising out of or in connection with the use of this document or any referenced documents and/or websites.

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3.0 ENGINEERING PRO GUIDES ELECTRICAL REVIT® RIBBON

3.1 INSTALLATION

There are three main parts to the Engineering Pro Guides Electrical Ribbon. The (1) program files, (2) Revit® families and (3) icons. Each one of these is installed into the appropriate location via the .exe file. However, you can customize the location of (2) Revit® families and (3) icons, so this section provides more description on what happens in the installation process.

3.1.1 Install Program Files (.dll and .addin)

There are two program files that contain the Revit® Ribbon. The .dll file and the .addin file. The .addin file is recognized by Revit®, when Revit® starts-up. This .addin tells Revit® to load the .dll file which contains the EPG Electrical Ribbon. The .dll file references the location of the Revit® families and the icons to automatically. During start-up the .dll file will look for all the icons and ensure that all icons are in the correct location. If the icons are missing, then the ribbon will not load.

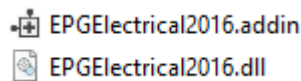


Figure 1: The .addin and .dll files must be installed in the following location, "C:\ProgramData\Autodesk\Revit\Addins\2016."

The year will change from 2016 to the corresponding year that you are using.

The "ProgramData" location is a hidden folder. You have to go to your folder properties in the "C Drive" and click "Show Hidden Files/Folders". Then you can navigate to the "ProgramData" folder.

3.1.2 Install Revit® Families

The .exe file will automatically install the Revit® families in the correct location to be referenced by the ribbon. If the files are not located in the correct place or if the names of the files are incorrect or changed, then the ribbon buttons will be ineffective. The files will not load when the button is pressed. Also if the type names within the families are changed then the button will look for a type that may not exist. The family will still load with the correct file name, but the automatic type will not load. You will have to load the family type by going to the project browser.

- ALARM
- CATV
- CCTV
- COMM
- CONTROL
- GENERAL
- INTERCOM
- LIGHT EXT
- LIGHT INT
- ONE-LINE
- POWER EXT
- POWER INT
- RECEPT
- SECURITY
- SOUND
- SWITCH

Figure 2: All of the Revit® families must be copied into the correct location. This image shows the folders for each system, which corresponds to each drop down menu on the ribbon. Within each folder is the individual Revit® family document in .rfa format. The .dll file will call each family when the user presses the appropriate button.

3.1.3 Install Icons

The last part of the ribbon is the icons that correspond to each system and each family type. The icons are loaded whenever you start-up Revit®. Similar to the Revit® families, these icons must be located in the appropriate location that corresponds to the .dll file.

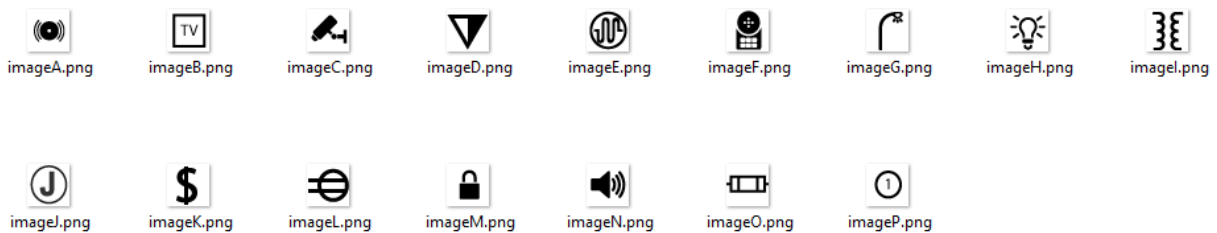


Figure 3: This image shows the drop down menu icons. These correspond to the system folders in the previous image. When these icons are pressed the drop down menu will show more icons which correspond to individual electrical Revit® families.

3.2 MANUAL OUTLINE

The first part, Section 1.0 of this manual will cover the basic information that you must know about families and Revit® in order to properly use the full functions of this add-in and Revit®.

Section 1.0 will cover the parameters, skills, functions and properties of Revit® and Revit® families that pertain to electrical design and engineering.

Sections 2.0 through 17.0 will cover all the systems within Electrical Engineering design for buildings. Revit® is a program that specifically focuses on the design of buildings and the systems within and around buildings. These sections were derived from the

1. Section 1.0: Electrical Basics
2. Section 2.0: Alarm Systems
3. Section 3.0: CATV Systems
4. Section 4.0: CCTV Systems
5. Section 5.0: Communication Systems
6. Section 6.0: Control Systems
7. Section 7.0: General
8. Section 8.0: Intercom Systems
9. Section 9.0: Lighting Systems – Exterior
10. Section 10.0: Lighting Systems – Interior
11. Section 11.0: One-Line Diagrams
12. Section 12.0: Power Systems – Exterior
13. Section 13.0: Power Systems – Interior
14. Section 14.0: Receptacles
15. Section 15.0: Security Systems
16. Section 16.0: Sound Systems
17. Section 17.0: Switches

3.3 TROUBLESHOOTING

This section will cover any frequently asked questions or troubleshooting problems that have been encountered through the use of the Engineering Pro Guides add-in. Please send any issues with screenshots to Justin at Justin@engproguides.com.

- *Unable to load Icon during start-up:* If the ribbon does not load properly, when you start-up Revit®, then there is most likely a missing icon. If you click on the “more details” after the error and send that screenshot to me, then I can decipher which icon is missing.
- *Unable to load Revit® Family when button is pressed:* If the family does not load, then most likely, the Revit® Family is missing and/or not in the proper location. Simply, check the Revit® Families location and ensure that the family is in the correct location and has the same exact name as the one shown in the error.

4.0 BASIC REVIT® FAMILY INFORMATION

In Revit®, families are components that are used in your model and can be thought of as the building blocks of a project. A Revit® project is made up of a bunch of families. Each family is a separate file that contains the makeup of a unique type of object, such as a transformer, panel, ceiling recessed light, or a receptacle. Within each family file you are able to define its shape, functional characteristics, system connectors, materials, and more. When imported, this object

can be duplicated and used throughout your project. Each duplication of a family can then be altered based on certain predefined parameters within the family. Examples of parameters that may vary between instances of a family are the dimensions, symbols, current, voltages, etc. In the end, your project will be made up of a bunch of families and multiple instances of a family. This format allows you to edit a family in a single file, then apply it to all instances in that file. More detail on parameters and instances are discussed below.

Families are typically constructed of a 3-D view and possibly a symbol view. If the 3-D view is sufficient enough to accurately depict the symbol, then a separate symbol view is not added. However, often times this is not the case and a separate detail symbol view is created. This symbol view is assigned parametric properties and is then linked into the main 3-D view.

4.1 FAMILY PARAMETERS

Family parameters are variable inputs that define the characteristics and details of each family. This is what allows the families to be adjustable, to hold information, perform calculations, and be “smart.” In addition to what was previously mentioned, parameters can be lengths, angles, text, material properties, yes/no inputs, data, and more. The available parameters are established when building or editing a family. A user will be able to adjust the parameter details after they import a family into their project. Other parameters can be calculation based and will automatically update. For example, apparent load can be defined as a parameter and set equal to Voltage * Amps.

4.2 SHARED PARAMETERS

Shared parameters are globally defined parameters that can be used by multiple families. The EPG families have pre-defined shared parameters, such as full load amps, voltage, number of poles, etc. To automatically import the information from a family to a schedule, the parameter must be shared.

4.3 INSTANCE VERSUS TYPE

There are two types of parameters: “instance” and “type.” As the name suggests, a type is a subcategory of the family and an instance is a singular occurrence. One family can have multiple types. Then, each type in a family can be individually modified by an instance parameter. So, if you want to be able to change the voltage of a bunch of at the same time, the parameter should be set as a type. If you want the amperage of each family to be unique, without affecting other families in the project, the parameter should be an instance. Type parameters will appear under the “Edit Type” button when a family is selected. Instance parameters will appear under the properties tab.

Example: Let’s say there is a family of a simple box. In that family file, the following parameters are defined: length, width, height, and color. The length, width, and height are set as a type parameter and the color is set as an instance parameter. Two types are created under this

family: type A has dimensions 5"x5"x5" and default color green, type B has dimensions 10"x10"x10" and default color red. The family is loaded into a project. In the project type A is copied three times and type B is copied five times. If the width in type A is changed to 2", then all three type A boxes change to 2"x5"x5" and all type B boxes remain as 10"x10"x10". If the color in one of the type A boxes is changed to blue, then now there is one blue and two green type A boxes.

4.4 HOSTING

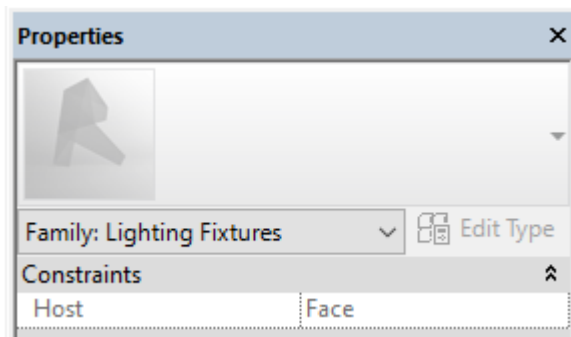
Hosting defines what a family will attach itself to when it is placed in a project. A family's hosting is determined by the template that is used to create the family. The template types are wall, ceiling, floor, roof, line, face, or no hosting. It is important to remember that once the family is created, the hosting cannot be completely changed. You will have to make the family again under the correct hosting template. There are workarounds for converting wall or ceiling based families to face based types, but there will be differences and these workarounds are not recommended.

Wall-based families host to walls, ceiling based families host to ceilings, and so forth. Face based families will host to the face of any detected surface, whether vertical, horizontal, or angled. Face based families can also host to reference planes. The most commonly used hosting types for electrical design is face based or no-hosting as described in the next section.

If the family is not hosted, the object is able to float within the project. You can manually align the family to a plane, but it will not automatically align to a plane (wall, ceiling, floor, etc.) nor will it automatically move when the plane is moved. For example, if an architect shifts the wall of a room, then the panel attached to that wall will move only if it is hosted to that wall.

4.5 HOSTING METHOD

All hosted electrical families are created as face based families and not ceiling or wall hosted families. This is because mechanical, electrical, fire protection, plumbing and telecommunications engineers do not typically create the walls and ceilings. Instead, an architect will usually produce an architectural Revit® model that contains the walls and ceiling and will send this file to the engineer. The engineer will then link this file into their Revit® model. Since the architectural file is a link, the family will not be able to detect a ceiling or a wall. For this reason, the electrical families are created as "face based," which will allow it to host to any surface it detects in the file.

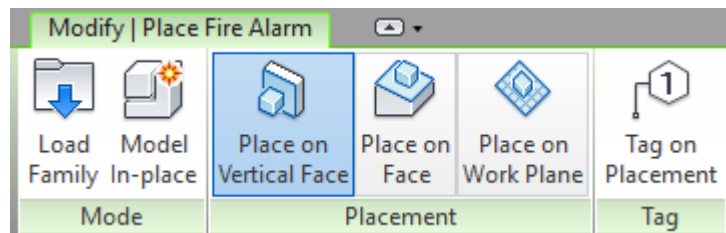


Autodesk screen shots reprinted courtesy of Autodesk, Inc

Figure 4: The families are face hosted. If a family was ceiling or wall hosted in this Property → Constraints section, then the family would not work on linked files. Since architectural files are typically linked, face hosted families must be used.

4.6 HOSTING FACE BASED FAMILIES

When inserting the face based family, select the appropriate placement option under the modify – placement tab. This will determine the orientation that the family comes in at and the type of surface that the family hosts to. The default placement type is “Place on Vertical Face.” Vertical faces are used for hosting on vertical surfaces, such as walls. Under this option, the family will not appear when attempting to mount on a horizontal surface, such as a ceiling or floor. Instead the placement should be adjusted to “Place on Face” to allow for placement on faces other than vertical surfaces.



Autodesk screen shots reprinted courtesy of Autodesk, Inc

Figure 5: Select the placement type when inserting a family. For walls, use vertical face, for ceilings or floor use face.

Place on Vertical Face: For families that are hosted on a wall, use the “Place on Vertical Face” option. Vertical face can also be used for vertical placement on a duct, pipe, valve, or any other vertical surface. The family will be inserted at the default elevation that is defined within the family parameter.

Place on Face: For families that are hosted on a ceiling or floor, use the “Place on Face” option. Be sure that the surface is visible within that view. For example, if you want to place a light fixture on the ceiling, use the ceiling plan view. If you want to place an outlet on the floor, use the floor plan view. The family will be inserted at the elevation of the surface it is hosted on.

Place on Work Plane: When a surface is not available and it is desired to install a family at a specific location, you can create a work plane for the family to host to. The family will follow the location of the work plane.

5.0 ELECTRICAL REVIT® FAMILY CATEGORIES

As an electrical engineer/designer, you should be familiar with all the components that make up an electrical design. These components include receptacles, panels, wiring, conduits, junction boxes, lights, etc. The one thing you may not be familiar with is how these components are organized into Revit®. It is important to correlate the actual electrical components into the appropriate electrical Revit® family category.

5.1 CABLE TRAY FITTINGS

The cable tray fittings family category includes sub-categories for different shapes of channel and ladder type cable trays. Channel cable trays consist of a long piece of metal that has been bent to have two 90 degree edges that create a rectangular U-shape, hence the channel description. Conduits and cables sit along the length of cable tray within the channel. The channel typically comes in widths of 4" or 6" and depths of around 2". These channels are thus used to carry smaller conduits and wires like those serving telephone, data and security systems. The bottom of the channel most likely will have holes on the bottom for ventilation.

Ladder cable trays basically look like ladders that are hung from the ceiling in a horizontal orientation. Ladder cable trays can have various widths, depths, rung spacing and support spacing. The support spacing is based on the weight of the conduits/cables and the cable tray itself. The rung spacing is dependent on the size of the conduits. Smaller conduits require shorter rung spacing to eliminate droop, but larger conduits can span longer rung distances. Sometimes the entire bottom of the ladder has a solid metal trough to support a lot of small conduits as opposed to rungs. Similar to the channel cable trays, these cable trays can also be ventilated.

5.2 COMMUNICATION DEVICES:

These devices are either load type devices or intermediary type devices. Load devices are at the end of the wiring from a communication panel. An example of a load device is a video camera or a speaker. An example of an intermediary device would be an amplifier which is fed from a panel but also has output wires that lead to speakers.

1. 23.85.10.00 General Information Systems
 - a. 23.85.10.11.11 – Sound and Signal Devices (Includes bells, sirens, speakers and other sound/signal accessories)
 - b. 23.85.10.11.14 – Audio Equipment (Includes microphones, loudspeakers, sound amplifiers, audio equalizers, recorders, headphones and other audio information accessories)

2. 23.85.10.14 Visual Information Systems
 - a. 23.85.10.14.11 – Cameras
 - b. 23.85.10.14.14 – Slide Projectors
 - c. 23.85.10.14.17 – Overhead Projectors
 - d. 23.85.10.14.24 – Video Monitors
 - e. 23.85.10.14.27 – Video Walls
 - f. 23.85.10.14.31 – Projection Screens

3. 23.85.10.17 – Audio Visual Systems
 - a. 23.85.10.17.11 – Broadcasting Receiving Equipment
 - b. 23.85.10.17.14 – Audio Visual Recorders
 - c. 23.85.10.17.17 – Film Projectors
 - d. 23.85.10.17.21 – Data/Multi/Media Projectors
 - e. 23.85.10.17.24 – Video Reproduction

5.3 CONDUIT FITTINGS

Conduits are not covered under this manual or product.

5.4 DATA DEVICES

These devices include computer servers, network switches and network routers. These devices are typically connected via Ethernet cable and are connected to data junction boxes and panel boards from the Electrical Equipment category.

1. 23.85.50.00 – Communication Systems
 - a. 23.85.50.17 – Communication and Data Processing Equipment (Includes computer servers, network switches and network routers)

5.5 ELECTRICAL EQUIPMENT:

Uses the Special Equipment Revit® Family:

1. 23.60.00.00 – General Purpose: Services: For the equipment in this category, you must use the specialty equipment family category. You should not use the Electrical Equipment Family Category.
 - a. Utility poles, lighting poles, antenna towers and transmission towers.
2. 23.85.00.00 – Information and Communication
 - a. Refer to fire alarm devices and panels

Uses the Electrical Equipment Revit® Family:

1. 23.80.00.00 – Electric Power and Lighting
 - a. 23.80.10.00 – Generation and Transformation Equipment
 - b. 23.80.10.14 – Transformers
 - c. 23.80.10.17 – Static Power Converters

- d. 23.80.10.21 – Electric Motors
- e. 23.80.10.24 – Power Storage
- 2. 23.80.30.00 – Distribution Devices
 - a. 23.80.30.11 – Power Supply Devices (Includes switches, inverters, distribution boards, control panels and PV arrays)
 - b. 23.80.30.24 – Switchgear
 - c. 23.80.30.27 – Variable Power or Resistance Appliances (Includes commutators, rheostats, dimmers and speed controllers)
- 3. 23.80.40.00 – Electric Power Protection Devices
 - a. 23.80.40.14 – Circuit Breakers
- 4. 23.80.45.00 – Electric Power Treatment Devices
 - a. 23.80.45.14 – Harmonic Control Devices

5.6 ELECTRICAL FIXTURES

In this family category, you can either choose normal, junction box or switches.

- 1. 23.80.30.00 – Distribution Devices (Includes junction boxes)
- 2. 23.80.50.00 – Terminals for Power Supply (Includes switches, receptacles and plug connectors)

5.7 FIRE ALARM DEVICES

In this family category, you can choose normal or junction box.

- 1. 23.85.30.00 – Safety and Security Information Systems (Includes, fire/smoke detectors, heat detectors, gas detectors,

5.8 LIGHTING DEVICES

In this category you can choose normal, switch or junction box.

5.9 LIGHTING FIXTURES

In this category, you can choose normal or junction box.

5.10 NURSE CALL DEVICES

In this family category, you can either choose normal, junction box or switches.

5.11 SECURITY DEVICES

In this family category, you can either choose normal, junction box or switches.

- 23.85.30.00 – Safety and Security Information Systems (Includes access control, electronic keys, pressure mats, security access, door answering, clocking in, movement/vibration detection, surveillance mirrors, IR detectors, door bells, buzzers, CCTV, video surveillance,

5.12 SPECIALTY EQUIPMENT

In this category, you can only choose Normal part type.

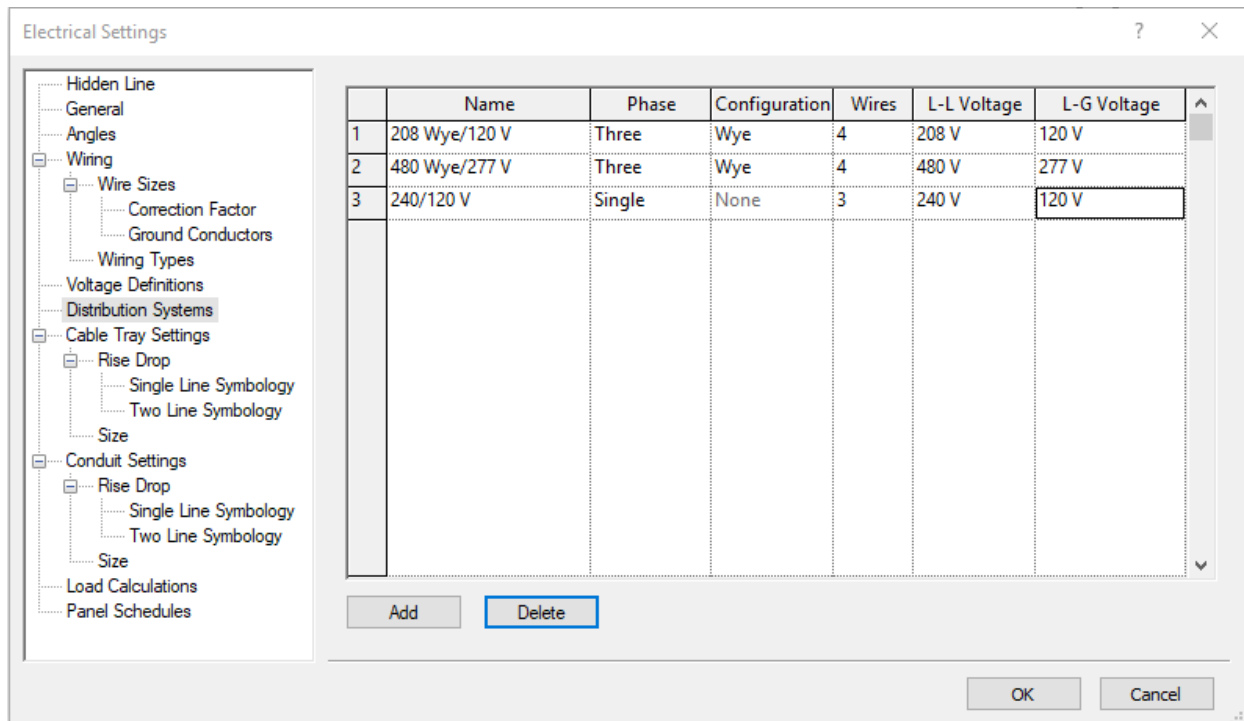
5.13 TELEPHONE DEVICES

In this family category, you can choose normal or junction box part types.

6.0 ELECTRICAL PANELBOARD – POWER

6.1 PANEL BOARD VOLTAGES

Every system should have an electrical panel. Each electrical panel is first defined by its voltage and number of phases. The electrical systems must be defined under the electrical settings before the power connections can be made. The common systems are listed below.



Autodesk screen shots reprinted courtesy of Autodesk, Inc

Figure 6: Define the electrical distribution systems for the Revit® project under Manage → MEP Settings → Electrical Settings.

208 Wye/120 V (3-Phase, 4-Wire)

In this system, the secondary of the transformer feeding the panel is arranged in a wye configuration. Four wires are sent to the panel, excluding the ground. If you were to count the ground then you would have 5 wires, but you typically do not count the ground. There are three phases and one neutral sent to the panel.

The line to line voltage is 208 V and the line to neutral voltage is 120 V.

480 Wye/277 V (3-Phase, 4-Wire)

In this system, the secondary of the transformer feeding the panel is arranged in a wye configuration. Four wires are sent to the panel, excluding the ground. There are three phases (A, B & C) and one neutral sent to the panel.

The line to line voltage is 480 V and the line to neutral voltage is 277 V. Each load can be connected to a single phase (A, B or C) and neutral or a load can be connected to all three phases (A, B & C).

240/120 V (1-Phase, 3 Wire)

In this system, the secondary of the transformer feeding the panel is a single phase at a voltage of 240 V. However, the center of the transformer is tapped and a neutral is run from the center. This creates the second voltage, 120 V.

The amount of current on each wire will be dependent on the loads that are attached to each wire. Remember, you need two wires connected to each load. This could be wire A & B, circuit A & neutral or wire B & neutral.

Wire A & wire B are 180 degrees offset from each other. This means that when one circuit is at its peak, the other circuit is at its trough.

6.2 PANEL BOARD ARRANGEMENTS

There are three ways that the panel board can be arranged.

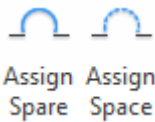

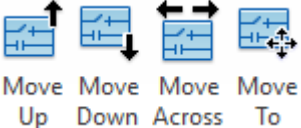
- Two Columns, Circuits Across
- Two Columns, Circuits Down
- One Column

Two Columns, Circuits Across

Two Columns, Circuits Down

6.3 PANEL SCHEDULES

Location	
Supply From	If a panel is an intermediary or load panel, then it is fed from a main panel. In this parameter you must connect this panel to the main panel that is directly upstream of this panel.
Mounting	Possible mounting options include recessed, semi-recessed and surface. Recessed indicates that the entire housing is in the wall, while only the face of the housing is on the surface of the wall. Semi-recessed is in between recessed and surface.
Enclosure	The panel enclosure is based on the NEMA rating, which is discussed in a later section.
Volts	
Phases	Single or three phases. The number of phases is dependent on the voltage system you select. 120 V (1 hot and 1 neutral) is single phase 208 V (2 hot and 1 neutral) is still single phase 240 V (2 hot and 1 neutral) is still single phase 208 V (3 hot and 0 or 1 neutral) is three phase 277 V (1 hot and 1 neutral) is single phase 480 V (3 hot and 0 or 1 neutral) is three phase
Wires	Typically three wires for panels served by a delta secondary. Four wires is the most common for panels served by a wye secondary.
Main Breaker	Use the NEC to size the main breaker of the panel.
Breaker Type	There are typically two types of breakers, Bolt-On and Plug-In. The bolt-on breakers have a flange with a hole. A bolt and nut is used to attach the flange of the circuit breaker to the panel. A plug-in type circuit breaker has a clip that is pushed into a slot on the panel. These two types of breakers are not interchangeable. Smaller panels typical of residences will use plug-in type breakers.
Poles	The number of poles corresponds to the number of hot wires. 120 V (1 hot and 1 neutral) is one pole 208 V (2 hot and 1 neutral) is two poles 240 V (2 hot and 1 neutral) is two poles 208 V (3 hot and 0 or 1 neutral) is 3 poles 277 V (1 hot and 1 neutral) is one pole 480 V (3 hot and 0 or 1 neutral) is 3 poles
Minimum AIC Rating	This is found with fault current analysis. You can use the MVA method to find the three phase bolted short circuit current at this location. Typical sizes include 10 kA, 14 kA, 22 kA, 25 kA, 30 kA, 42 kA, 50 kA, 65 kA, 85 kA, etc.
Mains Type	Not covered at this time.
Mains Rating	Not covered at this time.
MCB Rating	Not covered at this time.

 <p>Assign Spare Assign Space</p>	<p><u>Assign Spare or Space:</u> A spare can be assigned an imaginary load and a circuit breaker size. A space is only a slot for a future circuit and circuit breaker. So you can't assign a load or breaker size.</p>
 <p>Remove Spare/Space</p>	<p><u>Remove Spare/Space:</u> When you remove a spare of space then you are able to add a circuit</p>
 <p>Move Up Move Down Move Across Move To</p>	<p><u>Move:</u> You can't assign loads to a circuit on the layout, but you can move the loads to different circuits on the panel schedule.</p>

Lock/Unlock: When a circuit is locked, then that load, spare or space assigned to that circuit cannot be changed.

Rebalance Loads: The rebalance loads function will move the circuits towards the top and will redistribute the loads so that the loads are distributed as equally as possible on each phase. You can lock circuits and the rebalance function will redistribute the loads without changing the locked circuits.

7.0 ELECTRICAL LOADS - POWER

Not covered at this time.

8.0 ELECTRICAL PANEL BOARD - OTHER

Not covered at this time.

9.0 ELECTRICAL LOADS - OTHER

Not covered at this time.

10.0 ENCLOSURES - NEMA

In the exterior and interior power systems, you must select the NEMA enclosure classification. These classifications are only for nonhazardous conditions, so it does not apply to Class 1 or

Class 2 or Class 3 environments, where enclosures like explosion-proof enclosures may be required.

NEMA 1: The NEMA 1 enclosure is the most basic enclosure and is only used indoors. It only provides protection from incidental contact and falling dirt. All of the following enclosures provide this protection at a minimum. The enclosure is constructed with no sealing type material to protect from liquids or small particles from entering the enclosure. This enclosure is typically used in residences and commercial buildings.

This enclosure can be provided with openings for ventilation.

NEMA 2: NEMA 2 enclosures are intended for indoor use and provide the minimum protections with the addition of protection from falling dirt, liquids and light splashing.

This enclosure can be provided with downward angled openings for ventilation. This enclosure must also have a provision for drainage. Since, this enclosure has openings for ventilation, water may enter the enclosure and there must be a way for the water to be drained.

These enclosures are labeled as *drip-tight*.

NEMA 3: NEMA 3 enclosures are intended for outdoor use primarily to provide a degree of protection against windblown dust, fibers, flyings, lint, rain, sleet, snow and external ice formation. All enclosures that are primarily suited for outdoor use can be used indoors. However, the added cost may not be warranted if these enclosures are used indoor without a substantial reason.

These enclosures are labeled as *rain-tight and dust-tight*.

NEMA 3R: NEMA 3R enclosures are typically used in outdoor applications to provide a degree of protection against falling rain, sleet, snow, and external ice formation. Indoors they protect against dripping water. This style of enclosure does not have a gasketed sealing surface.

This enclosure can be provided with downward angled openings for ventilation. This enclosure must also have a provision for drainage. Since, this enclosure has openings for ventilation, water may enter the enclosure and there must be a way for the water to be drained.

These enclosures are labeled as *rain-tight*.

NEMA 3RX: NEMA 3RX enclosures are typically used in outdoor applications for wiring and junction boxes. This style of enclosure provides protection against falling rain, sleet, snow, and external ice formation and provides an additional level of protection against corrosion. Indoors they protect against dripping water. This style of enclosure does not have a gasketed sealing surface. Some models have hasps for padlocking.

NEMA 3S: NEMA 3S enclosures are intended for outdoor use primarily to provide a degree of protection against windblown dust, rain, sleet, and to provide for operation of external mechanisms when ice laden.

These enclosures are labeled as *rain-proof and dust-tight*.

NEMA 4: NEMA 4 enclosures cover all of the requirements of type 3, but with the addition of hose-down. The enclosure has a gasket and is sealed, so that it can be subject to a pressurized liquid flow and provide no intrusion. The locking mechanism also has a clamp to seal the opening tightly. Whenever you see an enclosure that is labeled as water-tight, then it must have the gasket to ensure that a seal is made.

These enclosures are labeled as *rain-tight and water-tight*.

NEMA 4X: A NEMA 4X enclosure is made of a minimum 304 stainless steel to prevent corrosion. If you have a need for a longer-lasting enclosure in a corrosive environment, then you may need a higher grade stainless steel. This enclosure has all the properties of the NEMA 4 enclosure, like the gasket/sealant, except it also is corrosion resistant.

These enclosures are labeled as *rain-tight, corrosion resistant and water-tight*.

NEMA 5: NEMA 5 enclosures are intended for indoor use primarily to provide a degree of protection against settling airborne dust, falling dirt, and dripping non-corrosive liquids. This enclosure is similar to NEMA 2, with the addition of the protection against settling airborne dust, lint, fibers and flyings. The settling dust test involves circulating dust with a blower around the enclosure, then letting the dust settle, then turning the blow on again and repeating this over and over again. A NEMA 5 enclosure will allow no dust to enter during this test.

These enclosures are labeled as *drip-tight and dust-tight*.

NEMA 6: NEMA 6 enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against the entry of water during occasional, temporary submersion at a limited depth. The test is conducted to a depth of 6 feet, so any higher pressure levels may cause water entry into this enclosure.

These enclosures are labeled as *rain-tight and water-tight*.

NEMA 6P: NEMA 6P enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against the entry of water during prolonged submersion at a limited depth. This type is different from type 6, because of the corrosion resistance requirement (304 stainless steel) and the prolonged submersion requirement. These enclosures must be submersed for 24 hours as opposed to 30 minutes in the type 6 test.

These enclosures are labeled as *rain-tight, corrosion resistant and water-tight*.

NEMA 11: NEMA 11 enclosures are intended for indoor use primarily to provide, by oil submersion, a degree of protection to enclosed equipment against the corrosive effects of liquids and gases.

NEMA 12: NEMA 12 enclosures are intended for indoor use to provide a degree of protection against drips, falling dirt, and dripping non-corrosive liquids. NEMA 12, 12K and 13 are suitable for oil situations.

These enclosures are labeled as *drip-tight and dust-tight*.

NEMA 12K: NEMA 12K is just NEMA 12 enclosures with knockouts.

These enclosures are labeled as *drip-tight and dust-tight*.

NEMA 13: NEMA 13 enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil, and non-corrosive coolant. This one is suitable for oil spraying and splashing, which is not covered by NEMA 12 and 12K.

These enclosures are labeled as *drip-tight and dust-tight*.

NEMA Type 7: These enclosures must be suitable for Class 1, Division 1 (Groups A, B, C & D) locations as defined by NFPA 70.

NEMA Type 8: These enclosures must be suitable for Class 1, Division 1 (Groups A, B, C & D) locations as defined by NFPA 70 and must be suitable for outdoors.

NEMA Type 9: These enclosures must be suitable for Class 2, Division 1 (Groups E, F & G) locations as defined by NFPA 70.

NEMA Type 10: These enclosures must meet the requirements of Mine Safety and Health Administration, 30 CFR, Part 18.

2 – Alarm Systems

Fire alarm panels, initiating devices, notification devices, activation devices, etc.

Section 2.0 –Electrical Alarm Systems Families for Revit®

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1.0 ALARM SYSTEMS

Fire alarm requirements can be found in NFPA 72 – National Fire Alarm and Signaling Code and the appropriate Building Code. Fire alarm systems are often designed by the Fire Protection engineer, but in many states, the Electrical engineer is also tasked with designing the

fire alarm system for a building. A fire alarm system consists of three main parts, (1) Fire alarm panel (2) Initiating Devices and (3) Notification Devices. Occasionally a fourth part is also include, called (4) Activation Devices.

1.1 FIRE ALARM PANEL

The fire alarm panel is the “computer” of the system. It receives signals from the initiating devices and then sends signals to the notification devices and if appropriate the activation devices too.

The fire alarm panel processes the signals it receives and makes the decision as to what to do with the signal. Sometimes a signal could be a “trouble signal” as opposed to an “emergency signal”.

A fire alarm panel is required for nearly all commercial and large buildings. Small buildings less than 22,500 square feet and that meet other requirements may not require a fire alarm panel. An example would be a small residential building.

The fire alarm panel also has the capability to communicate signals to the fire department or some other third party that monitors the buildings for fire.

There are two main types of fire alarm panels, the conventional type and the addressable type.

1.1.1 Conventional Fire Alarm Panel

The conventional type is the analog, older and less expensive version. This version is used for smaller buildings and when an existing building as older, non-addressable devices. Only addressable devices can be used with an addressable fire alarm panel. A conventional fire alarm panel is arranged in zones, each zone can correspond to a circuit that is connected to a series of devices. Whenever a device on this circuit is activated, there will be a change in the electrical current and the panel will detect this change and will activate this zone and make the appropriate notifications.

1.1.2 Addressable Fire Alarm Panel

The addressable type is the digital, newer and more expensive version. This version is used for larger buildings. Each device in an addressable system has its own “address”, this allows the fire alarm panel to determine exactly which device is in “trouble” or “emergency alarm” mode. Unlike the conventional fire alarm panel, the addressable system does not detect a change in current but rather receives a unique signal from a device. That signal corresponds the address and thus the specific device. The addressable fire alarm panel can then send the appropriate signal to the notification/activation devices.

1.2 INITIATING DEVICES

Initiating devices send a signal to the Fire Alarm Panel to indicate that there is an emergency. This category includes control modules, monitor modules, call stations, pull stations, duct smoke detectors, smoke detectors, tamper switches,

1.3 NOTIFICATION DEVICES

Notification devices are used by the Fire Alarm Panel to tell the occupants that there is an emergency. These devices include fire alarm bells, horns, visual flashers and audio speakers.

1.4 ACTIVATION DEVICES

Activation devices are used by the Fire Alarm Panel to turn on or off certain fire protection devices. This would include solenoid valves that release water to a pre-action system or door magnets that open doors. Control modules could be used to turn off/on fans, activate emergency operation for elevators or turning off the power to certain equipment.

2.0 ADDRESSABLE CONTROL MODULE

This family is a face hosted addressable control modules for fire alarm systems. The modules are surface mounted and are imported with a default elevation of 0". The elevation is to be adjusted as necessary, since the module is intended to be installed on piping, valves, or other accessories. The module may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the module does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the module symbol as shown below.



Figure 1: Plan view of the sample addressable control modules (AC).

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface, such as a pipe, valve, etc. or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “AC”.</i>

Instance Parameters:	Elevation	<i>The default elevation is 0". Adjust the module height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Addressable control module (AC)	
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

3.0 ADDRESSABLE MONITOR MODULE

This family is a face hosted addressable monitor modules for fire alarm systems. The modules are surface mounted and are imported with a default elevation of 0". The elevation is to be adjusted as necessary, since the module is intended to be installed on piping, valves, sensors, or other accessories. The module may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the module does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the module symbol as shown below.



Figure 2: Plan view of the sample addressable monitor modules (AM).

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface, such as a pipe, valve, etc. or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as "AM".</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 0". Adjust the module height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Addressable monitor module (AM)	
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

4.0 CALL STATION

This family is a face hosted call station for fire alarm systems. The family is surface mounted and are imported with a default elevation of 48" when mounted on a vertical surface. The elevation is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the call station symbol as shown below.

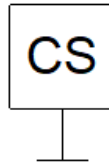


Figure 3: Plan view of the sample call station (CS).

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface. or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height	<i>Within each type you are allowed to adjust the family dimensions.</i>
Instance Parameters:	Elevation	<i>The default elevation is 48" when installed on a vertical face. Adjust the device height as needed.</i>
Built-in Types	Call Station (CS)	
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

5.0 DUCT SMOKE DETECTOR

Duct smoke detector requirements and locations should be coordinated with the Mechanical Engineer.

This family is a face hosted call station for fire alarm systems. The family is surface mounted and is imported with a default elevation of 0". The elevation is to be adjusted as necessary based on the duct elevation it is hosted to. The smoke detector may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the smoke detector does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the duct smoke detector symbol as shown below.

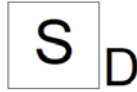


Figure 4: Plan view of the sample duct smoke detector (S_D).

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height	<i>Within each type you are allowed to adjust the family dimensions.</i>
Instance Parameters:	Elevation	<i>The default elevation is 0". Adjust the device height as needed.</i>
Built-in Types	Duct Smoke Detector (S _D)	
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

6.0 FIRE ALARM AUDIO/VISUAL

Visual Mounting Requirements: In general, wall mounted visual fire alarm devices shall be mounted at a height where the entire lens located within 80 in to 96 inches above finished floor. If the ceiling height cannot accommodate this, the device may be within 6 inches of the ceiling, where the strobe coverage is reduced by two times the difference between 80 inches and the actual mounting height.

Audible Mounting Requirements: Audible devices shall be mounted with the top of the device at a height that is not less than 90 inches above the finished floor and not less than 6 inches from the ceiling.

For audible visual alarms, the device mounting height should meet both requirements.

This is a face hosted family for audio only, audio/visual, and visual only fire alarms. The family is surface mounted and are imported with a default elevation of 90" when installed on a vertical face. The elevation is to be adjusted as necessary. The fire alarm may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the fire alarm does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the fire alarm audio/visual symbol as shown below.

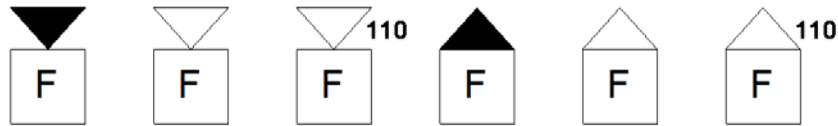


Figure 5: Plan view of the sample fire alarm. From left to right, the types shown are Audio Only, Audio/Visual 30 CD, Audio/Visual 110 CD, Visual Only 15 CD, Visual Only 30 CD, Visual Only 110 CD.

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Candela, Symbol Letter, Visibility – Audio Filled Region, Audio Outline, Visual Filled Region, Visual Outline, Symbol Candela	<i>Within each type you are allowed to adjust the fire alarm dimensions, the candela rating, the symbol letter – default set as “F”, and select the appearance of the family with one of the visibility options. The candela symbol appears as “110” for 110 CD families.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 90” when installed on a vertical face, otherwise the fire alarm will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed. The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Audio Only, Audio/Visual 30 CD, Audio/Visual 110 CD, Visual Only 15 CD, Visual Only 30 CD, Visual Only 110 CD	<i>The symbol will change based on the selected type. Create a new type for ratings that are not listed.</i>
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

7.0 FIRE ALARM BELL

Audible devices shall be mounted with the top of the device at a height that is not less than 90 inches above the finished floor and not less than 6 inches from the ceiling.

This a face hosted fire alarm bell family. The family is intended to be mounted on a wall or vertical surfaces and is imported with a default height of 90”. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

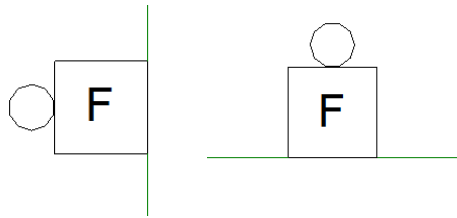


Figure 6: Plan view of the sample fire alarm bell: Left – sideways, Right – upright.

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “F”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 90” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Fire Alarm Bell	
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

8.0 FIRE ALARM HORN

Audible devices shall be mounted with the top of the device at a height that is not less than 90 inches above the finished floor and not less than 6 inches from the ceiling.

This a face hosted fire alarm horn family. The family is intended to be mounted on a wall or vertical surfaces and is imported with a default height of 90”. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

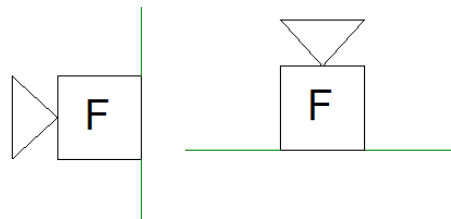


Figure 7: Plan view of the sample fire alarm horn: Left – sideways, Right – upright.

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “F”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 90” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Fire Alarm Horn	
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

9.0 FIREMAN PHONE JACK

This family is a face hosted fireman phone jack for fire alarm systems. The family is surface mounted and is imported with a default elevation of 48” on vertical face surfaces. The elevation is to be adjusted as necessary. The fireman phone jack may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the family does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the fireman phone jack symbol as shown below.

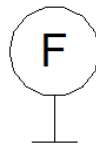


Figure 8: Plan view of the sample fireman phone jack.

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “F”.</i>

Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face, otherwise the fire alarm will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed. The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Fireman Phone Jack	
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

10.0 FLOW SWITCH

This family is a face hosted flow switch connected to the fire alarm system. The family is surface mounted and is imported with a default elevation of 0”. The elevation is to be adjusted as necessary, since the family is intended to be installed on piping or valves. The flow switch may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the flow switch symbol as shown below.



Figure 9: Plan view of the sample flow switch.

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “FS”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 0”. Adjust the device height as needed to match the surface elevation it is mounted on. The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Flow switch	
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

11.0 HEAT DETECTOR CEILING

This family is a face hosted heat detector connected to the fire alarm system. The family is intended to be mounted on the ceiling using the reflected ceiling plan. When inserting the family, be sure to adjust the placement to “face” under the modify → placement tab. The default placement will be “vertical face,” which will not appear on the ceiling. Since the device is mounted on the ceiling, it will take the elevation of the ceiling. The actual outline of the heat detector does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the heat detector symbol as shown below.



Figure 10: Plan view of the sample heat detector for ceiling mount.

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a ceiling and you are on the reflected ceiling plan view. Select “Face” under the modify → placement tab before placing the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “H”.</i>
Instance Parameters:	n/a	<i>The heat detector will be placed on the ceiling and will match the ceiling height, otherwise, the default elevation is 0”.</i>
Built-in Types	Heat Detector Ceiling	
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

12.0 HEAT DETECTOR WALL

This a face hosted heat detector family connected to the fire alarm system. The family is intended to be mounted on a wall or vertical surfaces and is imported with a default height of 48”. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

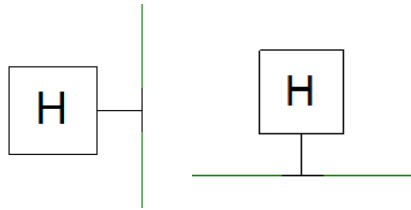


Figure 11: Plan view of the sample heat detector wall: Left – sideways, Right – upright.

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “H”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Heat Detector Wall	
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

13.0 MAGNETIC DOOR HOLDER

This a face hosted magnetic door holder family connected to the fire alarm system. The family is intended to be mounted on a wall or vertical surfaces and is imported with a default height of 48”. There are two different types based on the orientation that the family is installed: upright or sideways. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the magnetic door holder symbol as shown below.

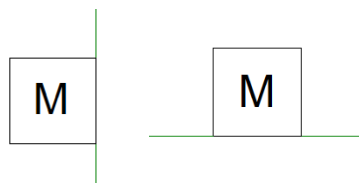


Figure 12: Plan view of the sample magnetic door holder: Left – sideways, Right – upright.

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face - Wall	<i>Make sure there is a wall, and you are in a view that has a wall within its viewing plane.</i>
Types Parameters:	Type, Depth, Width, Height, Visibility – Upright, Sideways, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions, the orientation in which the symbol letters appear, i.e. upright or sideways, and the symbol letter – default set as “M”</i>
Instance Parameters:	Elevation, Electrical Characteristics	<i>The default elevation is 48”. Adjust the height as needed. There is also an option to input electrical characteristics, such as voltage and power.</i>
Built-in Types	Magnetic door holder: Upright or Sideways	<i>Depending on whether the device is mounted on a vertical or horizontal wall, an appropriate type can be selected to allow the symbol letters to be horizontal on the page.</i>

14.0 PROGRAM BELL

This a face hosted program bell family. The family is intended to be mounted on a wall or vertical surfaces and is imported with a default height of 90”. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

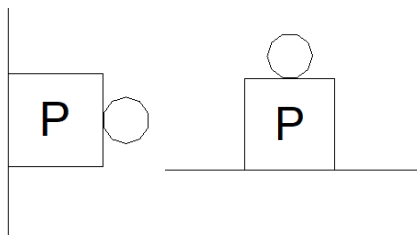


Figure 13: Plan view of the sample program bell: Left – sideways, Right – upright.

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “P”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 90” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed. The visibility checkbox allows you to select the</i>

		<i>orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Program Bell	
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

15.0 PROGRAM HORN

This a face hosted program horn family connected to the fire alarm system. The family is intended to be mounted on a wall or vertical surfaces and is imported with a default height of 90". The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

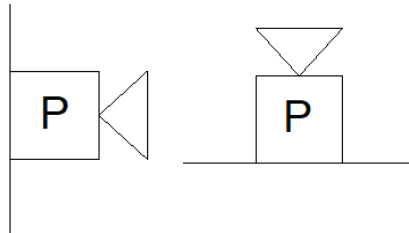


Figure 14: Plan view of the sample program horn: Left – sideways, Right – upright.

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as "P".</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 90" when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Program Horn	
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

16.0 PULL STATION

Location – Manual fire alarm boxes (pull stations) shall be located not more than five feet from the entrance to each exit. Manual fire alarm boxes shall be located in each story including basements. In buildings of Assembly Use Group where a stage is provided, a manual fire alarm box shall be located next to the lighting control panel.

Manual Fire Alarm Boxes (Pull Stations) – The operable part of the manual fire alarm boxes shall be mounted at a minimum height of 42 inches and a maximum of 48 inches measured vertically, from the finished floor to the activating handle or lever of the box. Manual fire alarm boxes shall be red in color.

This a face hosted pull station family connected to the fire alarm system. The family is intended to be mounted on a wall or vertical surfaces and is imported with a default height of 48". The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

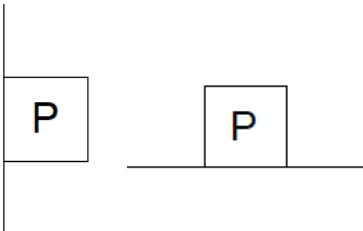


Figure 15: Plan view of the sample pull station: Left – sideways, Right – upright.

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “P”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>

Built-in Types	Fire Alarm Bell	
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

17.0 SMOKE DETECTOR CEILING

You should be careful not to locate the detector near any device that will obstruct its operation like air diffusers and sprinklers. The key is to locate the smoke detector such that it will detect smoke during all situation, like if the air conditioning system is on or off or if a sprinkler is operating or not. In addition, the detectors should be located such that they can be easily maintained and accessed.

This family is a face hosted smoke detector connected to the fire alarm system. The family is intended to be mounted on the ceiling using the reflected ceiling plan. When inserting the family, be sure to adjust the placement to “face” under the modify → placement tab. The default placement will be “vertical face,” which will not appear on the ceiling. Since the device is mounted on the ceiling, it will take the elevation of the ceiling. The actual outline of family does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the smoke detector for ceiling symbol as shown below.



Figure 16: Plan view of the sample smoke detector for ceiling mount.

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a ceiling and you are on the reflected ceiling plan view. Select “Face” under the modify → placement tab before placing the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “S”.</i>
Instance Parameters:	n/a	<i>The smoke detector will be placed on the ceiling and will match the ceiling height, otherwise, the default elevation is 0”.</i>
Built-in Types	Smoke Detector - Ceiling	
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

18.0 SMOKE DETECTOR WALL

Detectors are typically installed near the ceiling, since smoke rises. The detector should be located around 0 to 24 inches from the ceiling. But you should be careful not to locate the detector near any device that will obstruct its operation like air diffusers and sprinklers. In addition, the detectors should be located such that they can be easily maintained and accessed.

This a face hosted smoke detector family connected to the fire alarm system. The family is intended to be mounted on a wall or vertical surfaces and is imported with a default height of 90". The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

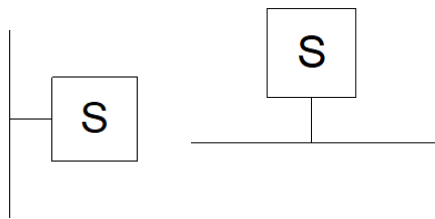


Figure 17: Plan view of the sample wall smoke detector: Left – sideways, Right – upright.

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “S”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 90” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Smoke Detector - Wall	

System Connector	Fire Alarm	Select on the device and add it to a data system and connect it to a circuit and panel.
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19.0 SOLENOID VALVE

This family is a face hosted solenoid valve connected to the fire alarm system. The family is surface mounted. It is imported with a default elevation of 0". The elevation is to be adjusted as necessary, since the family is intended to be installed on piping or valve. The solenoid valve may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the solenoid valve symbol as shown below.



Figure 18: Plan view of the sample solenoid valve.

Family Category:	Device → Fire Alarm	After the family is imported locate it in the following category.
Hosting:	Face	Make sure there is a surface or create a reference plane to place the object.
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	Within each type you are allowed to adjust the family dimensions and the symbol letter – default set as "SV".
Instance Parameters:	Elevation, Visibility – Upright, Sideways	The default elevation is 0". Adjust the object height as needed to match the surface elevation it is mounted on. The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.
Built-in Types	Solenoid Valve	
System Connector	Fire Alarm	Select on the device and add it to a data system and connect it to a circuit and panel.

20.0 TAMPER SWITCH

This family is a face hosted tamper switch connected to the fire alarm system. The family is surface mounted. It is imported with a default elevation of 0". The elevation is to be adjusted as necessary, since the family is intended to be installed on piping or valve. The tamper switch may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the tamper switch symbol as shown below.



Figure 19: Plan view of the sample tamper switch.

Family Category:	Device → Fire Alarm	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the sensor dimensions and the symbol letter – default set as “TS”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 0”. Adjust the switch height as needed to match the surface elevation it is mounted on. The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Tamper Switch	
System Connector	Fire Alarm	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

3 – CATV Systems

TV outlets, Generic CATV equipment

Section 3.0 – Electrical CATV Systems Families for Revit®

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1.0 CATV SYSTEMS

1.1 TV OUTLET, FLUSH FLOOR

This family is a face hosted TV outlet connected to the CATV system. The family is intended to be mounted on the floor. There are two things to be aware of when using this family. (1) When inserting the family, be sure to adjust the placement to “face” under the modify → placement tab. The default placement will be “vertical face,” which will not appear on the floor. (2) The family is imported flush with the floor, where the default elevation of 0” from the top of the object. For this reason, it is important to check your view range to ensure the family is visible on the floor plan. The bottom of the view range must be less than 0’ 0”. Alternatively, the object elevation can be raised slightly to allow it to be visible when the bottom view range is set to 0’ 0”. The elevation can be adjusted under the “offset” parameter in the property menu. The TV outlet may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family, but the symbol is intended for floor mounting. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the TV outlet symbol as shown below.



Figure 1: Plan view of the sample flush floor mounted CATV TV outlet.

Family Category:	Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a floor to place the object. Since the object is imported flush to the floor, make sure the bottom view range of the floor plan is below 0’ 0” or that the object is mounted slightly higher than 0’ 0” to allow the family to be visible.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the family dimensions and the symbol letter – default set as “TS”.</i>

Instance Parameters:	Offset, Elevation – for vertical face host, Visibility – Upright, Sideways	<i>The default elevation is 0.” When mounted on the floor, adjust the elevation using the “offset” parameter.” When mounted on a vertical face, adjust the elevation under the “elevation” parameter. The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	TV Outlet Flush Floor	
System Connector	None	

1.2 TV OUTLET, FLUSH WALL

This a face hosted TV outlet family connected to the CATV system. The family is intended to be mounted flush on a wall or vertical surfaces and is imported with a default height of 16”. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

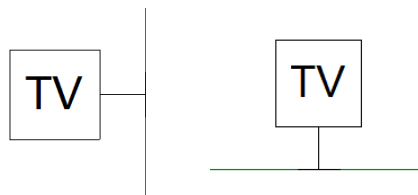


Figure 2: Plan view of the sample flush wall mounted TV outlet: Left – sideways, Right – upright.

Family Category:	Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “TV”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 16” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Flush Wall TV Outlet	
System Connector	None	

4 – CCTV Systems

Cameras, wall, ceiling, generic equipment, etc.

Section 4.0 – Electrical CCTV Systems Families for Revit®

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1.0 CCTV SYSTEMS

1.1 CAMERA

This family is a face hosted camera for CCTV systems. The family is surface mounted and is imported with a default elevation of 80” when mounted on a vertical surface. The elevation is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the camera symbol as shown below.

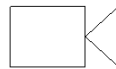


Figure 1: Plan view of the sample camera.

Family Category:	Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a wall, surface. or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height	<i>Within each type you are allowed to adjust the family dimensions.</i>
Instance Parameters:	Elevation	<i>The default elevation is 80” when installed on a vertical face. Adjust the camera height as needed.</i>
Built-in Types	Camera	

5 – Communications Systems

Cabinets, junction boxes, outlet boxes, data, telephone, digital sign, wireless boxes, etc.

Section 5.0 –Electrical Communication Systems Families for Revit®

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1.0 COMMUNICATION SYSTEMS

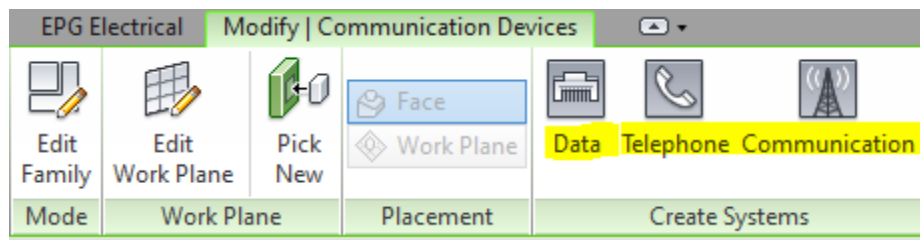
1.1 COMMUNICATION OUTLET, FLOOR

This a face hosted generic communication outlet family. The family is intended to be mounted on a wall or vertical surfaces and is imported with a default height of 18". The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the wall data/telephone outlet symbol as shown below.



Figure 1: Plan view of the sample flush floor mounted data and telephone outlet box.

The family has a communication, data and telephone connection to allow you to connect the outlet box to a circuit and a panel. To do this, click on the device, then select either comm, data or telephone under create system.



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Figure 2: Click on the device, then select “Data,” “Telephone,” or “Communication” under the modify - create systems tab to define a system for the outlet

Family Category:	Device → Communication	After the family is imported locate it in the following category.
Hosting:	Face	Make sure there is a wall or surface and you are in a view that has a surface within its viewing plane.
Types Parameters:	Type, Depth, Width, Height	Within each type you are allowed to adjust the family dimensions.
Instance Parameters:	Elevation	The default elevation is 18” when mounted on a vertical surface. Adjust the height as needed.
Built-in Types	Data and Telephone Outlet Box Flush Floor	
System Connector	Data, Telephone, Communication	Select on the device and add it to a system and connect it to a circuit and panel.

1.2 DATA AND TELEPHONE OUTLET BOX, FLUSH FLOOR

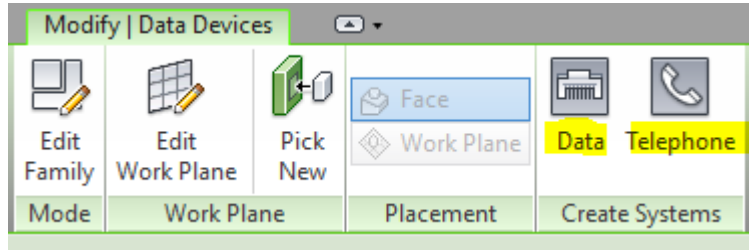
This family is a face hosted data and telephone outlet connected to the communication system. The family is intended to be mounted on the floor. There are two things to be aware of when using this family. (1) When inserting the family, be sure to adjust the placement to “face” under the modify → placement tab. The default placement will be “vertical face,” which will not appear on the floor. (2) The family is imported flush with the floor, where the default elevation of 0” from the top of the object. For this reason, it is important to check your view range to ensure the family is visible on the floor plan. The bottom of the view range must be less than 0’ 0”. Alternatively, the object elevation can be raised slightly to allow it to be visible when the bottom view range is set to 0’ 0”. The elevation can be adjusted under the “offset” parameter in the property menu. The data and telephone outlet box may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family, but the symbol is intended for floor mounting. The actual outline of the object does not appear on the plan view,

this is only visible on elevation and 3D views. Instead, what you will see is the data and telephone outlet symbol as shown below.



Figure 3: Plan view of the sample flush floor mounted data and telephone outlet box.

The family has a data and telephone connection to allow you to connect the outlet box to a circuit and a panel. To do this, click on the device, then select either data or telephone under create system.



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Figure 4: Click on the device, then select “Data” or “Telephone” under the modify - create systems tab to define a system for the outlet

Family Category:	Device → Data	After the family is imported locate it in the following category.
Hosting:	Face	Make sure there is a floor to place the object. Since the object is imported flush to the floor, make sure the bottom view range of the floor plan is below 0' 0" or that the object is mounted slightly higher than 0' 0" to allow the family to be visible.
Types Parameters:	Type, Depth, Width, Height	Within each type you are allowed to adjust the family dimensions.
Instance Parameters:	Offset – for horizontal face host, Elevation – for vertical face host	The default elevation is 0." When mounted on the floor, adjust the elevation using the "offset" parameter." When mounted on a vertical face, adjust the elevation under the "elevation" parameter.
Built-in Types	Data and Telephone Outlet Box Flush Floor	
System Connector	Data and Telephone	Select on the device and add it to a data system and connect it to a circuit and panel.

1.3 DATA AND TELEPHONE OUTLET BOX, WALL

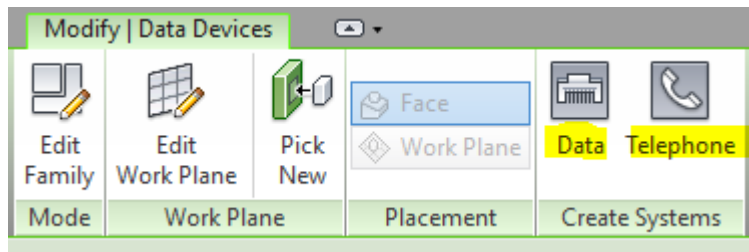
This a face hosted data and telephone outlet family connected to the communication system. The family is intended to be mounted on a wall or vertical surfaces and is imported with a default height of 18". The actual outline of the object does not appear on the plan view, this is

only visible on elevation and 3D views. Instead, what you will see is the wall data/telephone outlet symbol as shown below.



Figure 5: Plan view of the sample wall mounted data and telephone outlet box.

The family has a data and telephone connection to allow you to connect the outlet box to a circuit and a panel. To do this, click on the device, then select either data or telephone under create system.



Autodesk screen shots reprinted courtesy of Autodesk, Inc

Figure 6: Click on the device, then select “Data” or “Telephone” under the modify - create systems tab to define a system for the outlet

Family Category:	Device → Data	After the family is imported locate it in the following category.
Hosting:	Face	Make sure there is a wall or surface and you are in a view that has a surface within its viewing plane.
Types Parameters:	Type, Depth, Width, Height	Within each type you are allowed to adjust the family dimensions.
Instance Parameters:	Elevation	The default elevation is 18” when mounted on a vertical surface. Adjust the height as needed.
Built-in Types	Wall Data and Telephone Outlet	
System Connector	Data, Telephone	Select on the device and add it to a data or telephone system to connect it to a circuit and panel.

1.4 DATA OUTLET BOX, WALL

This a face hosted data outlet family connected to the communication system. The family is intended to be mounted on a wall or vertical surfaces and is imported with a default height of 18”. The actual outline of the object does not appear on the plan view, this is only visible on

elevation and 3D views. Instead, what you will see is the wall data/telephone outlet symbol as shown below.

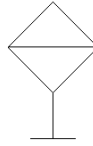
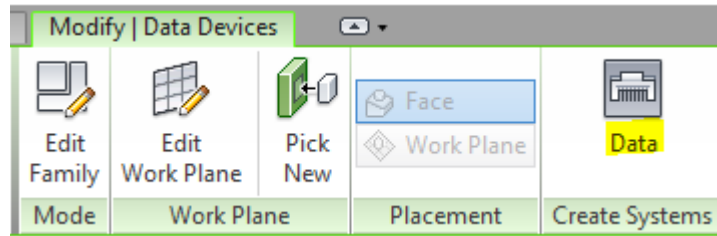


Figure 7: Plan view of the sample wall mounted data outlet box.

The family has a data connection to allow you to connect the outlet box to a circuit and a panel. To do this, click on the device, then select either data under create system.



Autodesk screen shots reprinted courtesy of Autodesk, Inc

Figure 8: Click on the device, then select “Data” under the modify - create systems tab to define a system for the outlet.

Family Category:	Device → Data	After the family is imported locate it in the following category.
Hosting:	Face	Make sure there is a wall or surface and you are in a view that has a surface within its viewing plane.
Types Parameters:	Type, Depth, Width, Height	Within each type you are allowed to adjust the family dimensions.
Instance Parameters:	Elevation	The default elevation is 18” when mounted on a vertical surface. Adjust the height as needed.
Built-in Types	Wall Data Outlet	
System Connector	Data	Select on the device and add it to a data system and connect it to a circuit and panel.

1.5 TELEPHONE OUTLET BOX, FLUSH FLOOR

This family is a face hosted telephone outlet connected to the communication system. The family is intended to be mounted on the floor. There are two things to be aware of when using this family. (1) When inserting the family, be sure to adjust the placement to “face” under the modify → placement tab. The default placement will be “vertical face,” which will not appear on the floor. (2) The family is imported flush with the floor, where the default elevation of 0” from the top of the object. For this reason, it is important to check your view range to ensure the

family is visible on the floor plan. The bottom of the view range must be less than 0' 0". Alternatively, the object elevation can be raised slightly to allow it to be visible when the bottom view range is set to 0' 0". The elevation can be adjusted under the "offset" parameter in the property menu. The telephone outlet box may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family, but the symbol is intended for floor mounting. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the telephone outlet symbol as shown below.

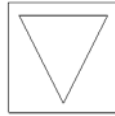
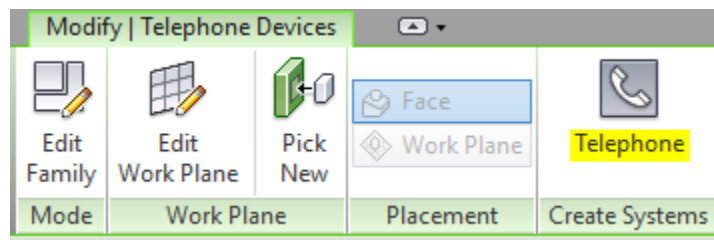


Figure 9: Plan view of the sample flush floor mounted telephone outlet box.

The family has a telephone connection to allow you to connect the outlet box to a circuit and a panel. To do this, click on the device, then select telephone under create system.



Autodesk screen shots reprinted courtesy of Autodesk, Inc

Figure 10: Click on the device, then select "Telephone" under the modify - create systems tab to define a system for the outlet.

Family Category:	Device → Telephone	After the family is imported locate it in the following category.
Hosting:	Face	Make sure there is a floor to place the object. Since the object is imported flush to the floor, make sure the bottom view range of the floor plan is below 0' 0" or that the object is mounted slightly higher than 0' 0" to allow the family to be visible.
Types Parameters:	Type, Depth, Width, Height	Within each type you are allowed to adjust the family dimensions.
Instance Parameters:	Offset – for horizontal face host, Elevation – for vertical face host	The default elevation is 0." When mounted on the floor, adjust the elevation using the "offset" parameter." When mounted on a vertical face, adjust the elevation under the "elevation" parameter.
Built-in Types	Telephone Outlet Box Flush Floor	

System Connector	Telephone	Select on the device and add it to a telephone system and connect it to a circuit and panel.
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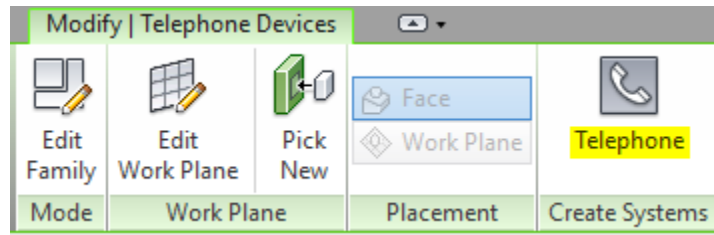
1.6 TELEPHONE OUTLET BOX, WALL

This a face hosted telephone outlet family connected to the communication system. The family is intended to be mounted on a wall or vertical surfaces and is imported with a default height of 18". The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the wall telephone outlet symbol as shown below.



Figure 11: Plan view of the sample wall mounted telephone outlet box.

The family has a telephone connection to allow you to connect the outlet box to a circuit and a panel. To do this, click on the device, then select telephone under create system.



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Figure 12: Click on the device, then select "Telephone" under the modify - create systems tab to define a system for the outlet.

Family Category:	Device → Telephone	After the family is imported locate it in the following category.
Hosting:	Face	Make sure there is a wall or surface and you are in a view that has a surface within its viewing plane.
Types Parameters:	Type, Depth, Width, Height	Within each type you are allowed to adjust the family dimensions.
Instance Parameters:	Elevation	The default elevation is 18" when mounted on a vertical surface. Adjust the height as needed.
Built-in Types	Wall Telephone Outlet	

System Connector	Telephone	Select on the device and add it to a telephone system to connect it to a circuit and panel.
-------------------------	-----------	---------------------------------------------------------------------------------------------

1.7 TELEPHONE CABINET-SURFACE

This family is a face hosted, surface mounted telephone cabinet. The family is intended to be mounted on a vertical surface and is imported with a default height of 48" and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The symbol outline is based on the actual dimensions of the object.

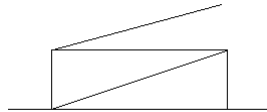


Figure 13: Plan view of the surface mounted telephone cabinet.

Family Category:	Device → Telephone	After the family is imported locate it in the following category.
Hosting:	Face	Make sure there is a surface or create a reference plane to place the object.
Types Parameters:	Depth, Width, Height	Within each type you are allowed to adjust the device dimensions.
Instance Parameters:	Elevation, Offset, Enclosure, Mounting, Panel Name, Visibility – Left Door/Right Door	The default elevation is 48" when installed on a vertical face. The default offset is 0". The default enclosure type is NEMA 1, the default mounting type is surface. Add the panel name. The visibility allows you to switch the orientation of the panel door.
Built-in Types	14x12, 24x36	Select the appropriate cabinet size.
System Connector	Telephone, Conduit	Select the equipment and create a telephone system.

1.8 TELEPHONE BACKBOARD

This family is a face hosted, surface mounted telephone backboard. The family is intended to be mounted on a vertical surface and is imported with a default height of 48" and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The symbol outline is based on the actual width of the object.

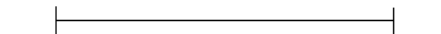


Figure 14: Plan view of the surface mounted telephone cabinet.

Family Category:	Device → Telephone	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Depth, Width, Height, Material	<i>Within each type you are allowed to adjust the device dimensions. The default material is plywood.</i>
Instance Parameters:	Elevation, Offset, Mounting	<i>The default elevation is 48" when installed on a vertical face. The default offset is 0". The default mounting type is surface.</i>
Built-in Types	24x24, 48x24	<i>Select the appropriate backboard size.</i>
System Connector	None	

1.9 TELECOM SPECIAL SYSTEMS CABINET

This family is a face hosted, surface mounted telecom special systems cabinet. The family is intended to be mounted on a vertical surface and is imported with a default height of 48" and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The symbol outline is based on the actual dimensions of the object.

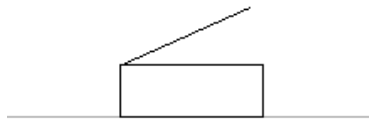


Figure 15: Plan view of the surface mounted telecom, special systems cabinet.

Family Category:	Device → Telephone	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Depth, Width, Height	<i>Within each type you are allowed to adjust the device dimensions.</i>
Instance Parameters:	Elevation, Offset, Enclosure, Mounting, Panel Name, Visibility – Left Door/Right Door	<i>The default elevation is 48" when installed on a vertical face. The default offset is 0". The default enclosure type is NEMA 1, the default mounting type is surface. Add the panel name. The visibility allows you to switch the orientation of the panel door.</i>
Built-in Types	14x12, 24x36	<i>Select the appropriate cabinet size.</i>
System Connector	Telephone, Conduit	<i>Select the equipment and create a telephone system.</i>

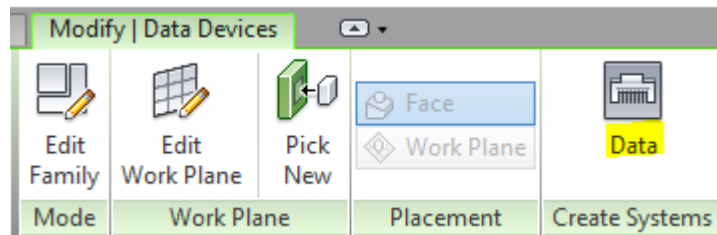
1.10 WIRELESS OUTLET BOX, WALL

This a face hosted wireless outlet box family connected to the communication system. The family is intended to be mounted on a wall or vertical surfaces and is imported with a default height of 18". The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the wall wireless outlet box symbol as shown below.



Figure 16: Plan view of the sample wall mounted wireless outlet box.

The family has a data connection to allow you to connect the outlet box to a circuit and a panel. To do this, click on the device, then select data under create system.



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Figure 17: Click on the device, then select "Data" under the modify - create systems tab to define a system for the outlet.

Family Category:	Device → Data	After the family is imported locate it in the following category.
Hosting:	Face	Make sure there is a wall or surface and you are in a view that has a surface within its viewing plane.
Types Parameters:	Type, Depth, Width, Height	Within each type you are allowed to adjust the family dimensions.
Instance Parameters:	Elevation, Visibility – Upright, Sideways	The default elevation is 18" when mounted on a vertical surface. Adjust the height as needed. The annotative symbol can be rotated by selecting either upright or sideways.
Built-in Types	Duplex RJ-45 Port	This is described under the port notes.
System Connector	Data	Select on the device and add it to a data system and connect it to a circuit and panel.

1.11 WIRELESS OUTLET BOX, CEILING

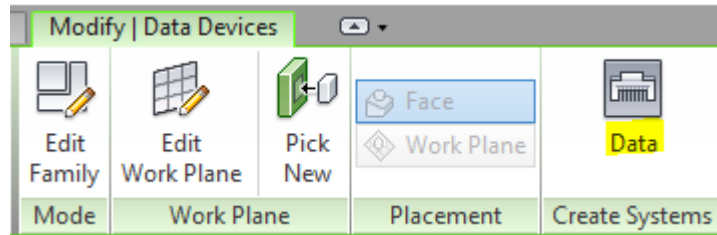
This a face hosted wireless outlet box family connected to the communication system. The family is intended to be mounted on the ceiling or horizontal surface. The actual outline of the

object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the wall wireless outlet box symbol as shown below.



Figure 18: Plan view of the sample ceiling mounted wireless outlet box.

The family has a data connection to allow you to connect the outlet box to a circuit and a panel. To do this, click on the device, then select data under create system.



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Figure 19: Click on the device, then select “Data” under the modify - create systems tab to define a system for the outlet.

Family Category:	Device → Data	After the family is imported locate it in the following category.
Hosting:	Face	Make sure there is a ceiling or surface and you are in a view that has a surface within its viewing plane. Under modify>place component, select place on face.
Types Parameters:	Type, Depth, Width, Height	Within each type you are allowed to adjust the family dimensions.
Instance Parameters:	Visibility – Upright, Sideways	The annotative symbol can be rotated by selecting either upright or sideways.
Built-in Types	Duplex RJ-45 Port	This is described under the port notes.
System Connector	Data	Select on the device and add it to a data system and connect it to a circuit and panel.

1.12 COMMUNICATION CABINET

This family is a non-hosted, communication cabinet. The family is imported at 0' and is intended to be a floor mounted equipment. The object outline is based on the actual dimensions of the cabinet and includes clearance space requirements.

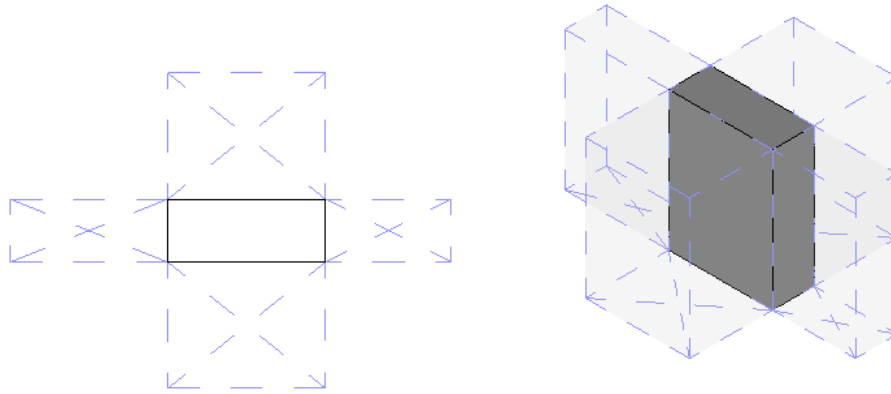


Figure 20: Right - plan view of the comm cabinet. Left – 3D view of the cabinet.

Family Category:	Device → Data	After the family is imported locate it in the following category.
Hosting:	Non-Hosted	The family is imported at 0'.
Types Parameters:	Depth, Width, Height, Clearance (Front, Back, Left, Right), Material	Within each type you are allowed to adjust the cabinet and clearance dimensions. The default material is steel.
Instance Parameters:	Offset, Clearance Visibility (Back/Front, Sides, UFC)	The default offset is 0". The visibility allows you to switch the clearances on and off.
Built-in Types	Default	
System Connector	None	

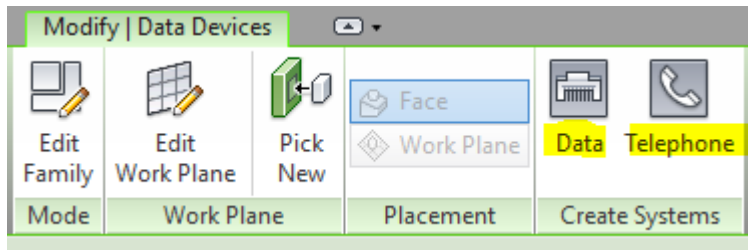
1.13 DATA AND TELEPHONE OUTLET FLOOR MONUMENT

This family is a face hosted data and telephone outlet floor monument connected to the communication system. The family is imported using the 'place on face' option and is inserted at elevation 0'-0." The data and telephone outlet box may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family, but the symbol is intended for floor mounting. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the data and telephone monument outlet symbol as shown below.



Figure 21: Plan view of the sample flush floor mounted data and telephone outlet box.

The family has a data and telephone connection to allow you to connect the outlet box to a circuit and a panel. To do this, click on the device, then select either data or telephone under create system.



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Figure 22: Click on the device, then select “Data” or “Telephone” under the modify - create systems tab to define a system for the outlet

Family Category:	Device → Communication	After the family is imported locate it in the following category.
Hosting:	Face	Make sure there is a floor to place the object. Select place on face, under Modify → Placement
Types Parameters:	Symbol Letter	Within each type you are able to change the symbol letter, the default is T.
Instance Parameters:	Visibility – Upright, Sideways	The annotative symbol can be rotated by selecting either upright or sideways.
Built-in Types	Data and Telephone Outlet Box Monument Floor	
System Connector	Data and Telephone	Select on the device and add it to a data system and connect it to a circuit and panel.

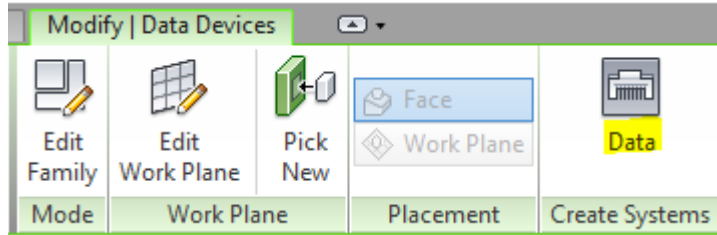
1.14 DIGITAL TEXT SIGN OUTLET, WALL

This family is a face hosted digital text sign outlet connected to the communication system. The family is intended to be mounted on a wall or vertical surfaces and is imported with a default height of 18”. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the wall wireless outlet box symbol as shown below.



Figure 23: Plan view of the digital text sign wall mounted outlet symbol.

The family has a data connection to allow you to connect the outlet box to a circuit and a panel. To do this, click on the device, then select data under create system.



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Figure 24: Click on the device, then select “Data” under the modify - create systems tab to define a system for the outlet

Family Category:	Device → Data	After the family is imported locate it in the following category.
Hosting:	Face	Make sure there is a floor to place the object. Select place on face, under Modify → Placement
Types Parameters:	Symbol Letter	Within each type you are able to change the symbol letter, the default is S.
Instance Parameters:	Visibility – Upright, Sideways	The annotative symbol can be rotated by selecting either upright or sideways.
Built-in Types	Digital Text Sign Outlet, Wall	(1) RJ-45 connection
System Connector	Data	Select on the device and add it to a data system and connect it to a circuit and panel.

1.15 JUNCTION BOX, HORIZONTAL, NO HOST (CONDUIT FITTING)

There are two family categories for the junction box: conduit fitting and communication device. This junction box is a non-hosted conduit fitting, which can be defined as the default bend fitting for a conduit, under the conduit properties → edit type. The family is intended for horizontal applications, and is imported from the ribbon at elevation 0'-0". The symbol appears in the course and medium views, the actual dimensions appear in the fine view.

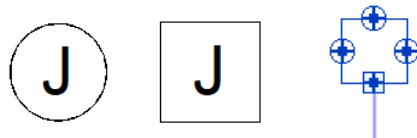
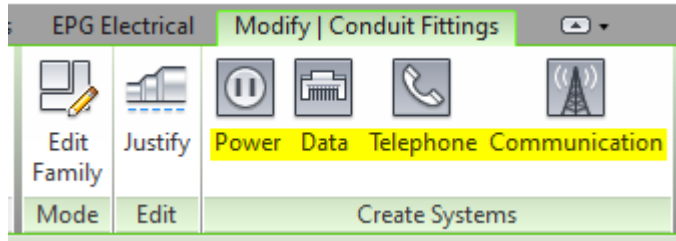


Figure 25: Plan view of the horizontal non-hosted junction box. Small box symbol in course and medium view (left), large box symbol (middle), actual dimensions of box in fine view, with family selected to show connectors (right).

The family has conduit connectors on multiple faces and a data, telephone, communication, and power connector to allow you to connect the outlet box to a circuit and a panel. To do this, click on the device, then select the appropriate system.



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Figure 26: Click on the device, then select the appropriate system under the modify - create systems tab to define a system for the outlet

Family Category:	Conduit Fitting	After the family is imported locate it in the following under systems → electrical → conduit fitting.
Hosting:	Non-Hosted	This family will be imported without a host and may be set as a default fitting under the conduit properties.
Types Parameters:	Symbol Letter, Dimensions	Within each type you are able to change the symbol letter, the default is J. You may also set the length, width, and depth of the junction box.
Instance Parameters:	Visibility – Upright, Sideways	The annotative symbol can be rotated by selecting either upright or sideways.
Built-in Types	12"x12"x6", 4"x4"x1.5", 4"x4"x2.125", 6"x6"x4", 8"x8"x4"	The following j-box dimensions are built into the family.
System Connector	Data, Telephone, Communication, Power	Select on the family, add it to an appropriate system and connect it to a circuit and panel.

1.16 JUNCTION BOX, HORIZONTAL, FACE (DEVICE)

This family is a face hosted communication device. The family is intended to be mounted on the ceiling or horizontal surface. The symbol appears in the course and medium views, the actual dimensions appear in the fine view.

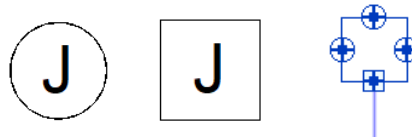
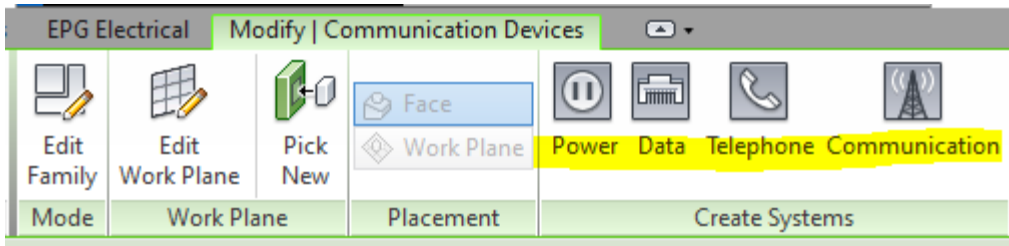


Figure 27: Plan view of the horizontal face-hosted junction box. Small box symbol in course and medium view (left), large box symbol (middle), actual dimensions of box in fine view, with family selected to show connectors (right).

The family has conduit connectors on multiple faces and a data, telephone, communication, and power connector to allow you to connect the outlet box to a circuit and a panel. To do this, click on the device, then select the appropriate system.



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Figure 28: Click on the device, then select the appropriate system under the modify - create systems tab to define a system for the outlet

Family Category:	Device → Communication	After the family is imported locate it in the following category.
Hosting:	Face	Make sure there is a ceiling or surface and you are in a view that has a surface within its viewing plane. Under modify>place component, select place on face.
Types Parameters:	Symbol Letter, Dimensions	Within each type you are able to change the symbol letter, the default is J. You may also set the length, width, and depth of the junction box.
Instance Parameters:	Visibility – Upright, Sideways	The annotative symbol can be rotated by selecting either upright or sideways.
Built-in Types	4"x4"x1.5", 4"x4"x2.125", 6"x6"x4", 8"x8"x4", 8"x8"x6", 12"x12"x6"	The following j-box dimensions are built into the family.
System Connector	Data, Telephone, Communication, Power	Select on the family, add it to an appropriate system and connect it to a circuit and panel.

1.17 JUNCTION BOX, VERTICAL, NO HOST (CONDUIT FITTING)

This junction box is a non-hosted conduit fitting, which can be defined as the default bend fitting for a conduit, under the conduit properties → edit type. The family is intended for vertical applications, and is imported from the ribbon at elevation 0'-0". The symbol appears in the course and medium views, the actual dimensions appear in the fine view.

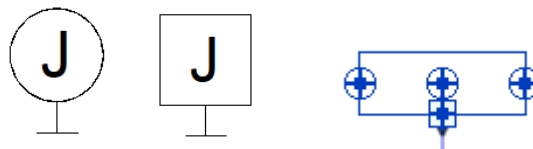
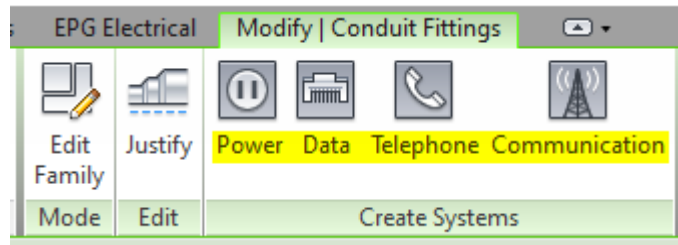


Figure 29: Plan view of the vertical non-hosted junction box. Small box symbol in course and medium view (left), large box symbol (middle), actual dimensions of box in fine view, with family selected to show connectors (right).

The family has conduit connectors on multiple faces and a data, telephone, communication, and power connector to allow you to connect the outlet box to a circuit and a panel. To do this, click on the device, then select the appropriate system.



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Figure 30: Click on the device, then select the appropriate system under the modify - create systems tab to define a system for the outlet

Family Category:	Conduit Fitting	After the family is imported locate it in the following under systems → electrical → conduit fitting.
Hosting:	Non-Hosted	This family will be imported without a host and may be set as a default fitting under the conduit properties.
Types Parameters:	Symbol Letter, Dimensions	Within each type you are able to change the symbol letter, the default is J. You may also set the length, width, and depth of the junction box.
Instance Parameters:	Visibility – Upright, Sideways	The annotative symbol can be rotated by selecting either upright or sideways.
Built-in Types	12"x12"x6", 4"x4"x1.5", 4"x4"x2.125", 6"x6"x4", 8"x8"x4"	The following j-box dimensions are built into the family.
System Connector	Data, Telephone, Communication, Power	Select on the family, add it to an appropriate system and connect it to a circuit and panel.

1.18 JUNCTION BOX, VERTICAL, FACE (CONDUIT FITTING)

This family is a face hosted communication device. The family is intended to be mounted on the wall or a vertical surface and is imported with a default elevation of 4'-0". The symbol appears in the course and medium views, the actual dimensions appear in the fine view.

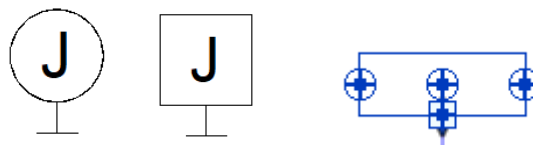
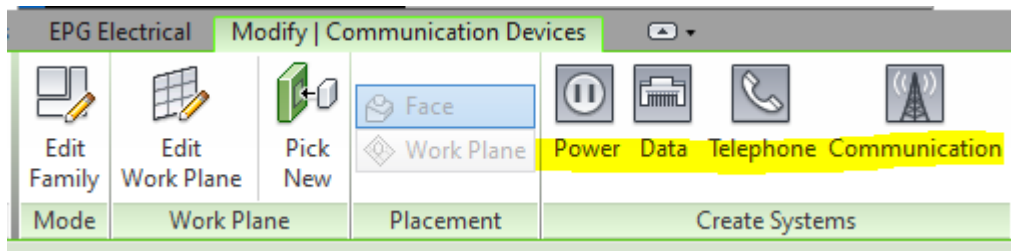


Figure 31: Plan view of the vertical face-hosted junction box. Small box symbol in course and medium view (left), large box symbol (middle), actual dimensions of box in fine view, with family selected to show connectors (right).

The family has conduit connectors on multiple faces and a data, telephone, communication, and power connector to allow you to connect the outlet box to a circuit and a panel. To do this, click on the device, then select the appropriate system.



Autodesk screen shots reprinted courtesy of Autodesk, Inc

Figure 32: Click on the device, then select the appropriate system under the modify - create systems tab to define a system for the outlet

Family Category:	Device → Communication	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a wall or surface and you are in a view that has a surface within its viewing plane. The family is imported at default elevation 4'-0"</i>
Types Parameters:	Symbol Letter, Dimensions	<i>Within each type you are able to change the symbol letter, the default is J. You may also set the length, width, and depth of the junction box.</i>
Instance Parameters:	Visibility – Upright, Sideways	<i>The annotative symbol can be rotated by selecting either upright or sideways.</i>
Built-in Types	4"x4"x1.5", 4"x4"x2.125", 6"x6"x4", 8"x8"x4", 8"x8"x6", 12"x12"x6"	<i>The following j-box dimensions are built into the family.</i>
System Connector	Data, Telephone, Communication, Power	<i>Select on the family, add it to an appropriate system and connect it to a circuit and panel.</i>

6 – Control Systems

Contactors, photoelectric, push buttons, wall, recessed, emergency, relays, time switches, etc.

Section 6.0 – Electrical Control Systems Families for Revit®

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1.0 CONTROL SYSTEMS

1.1 CONTACTOR, WALL SURFACE

Contactors are typically used in control circuits with larger currents. A contactor receives a signal from a relay and opens or closes a circuit to provide or remove power to a device. It is commonly used for turning on and off larger lighting systems and for starting motors. This family is a face hosted contactor. It is intended to be mounted on a wall surface or vertical surfaces and is imported with a default height of 48". The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

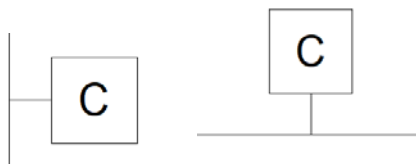


Figure 1: Plan view of the sample flush wall mounted contactor: Left – sideways, Right – upright.

Family Category:	Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
-------------------------	-----------------------------	--------------------------------------------------------------------------

Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “C”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Surface Wall Contactor	
System Connector	Controls	<i>Select on the device and add it to a system to connect it to a circuit and panel.</i>

1.2 RELAY, WALL SURFACE

Relays are similar to contactors, except they are used in the lower current applications of control circuits. Relays can be used as a switch or to send a signal to a contactor. This family is a face hosted relay. It is intended to be mounted on a wall surface or vertical surfaces and is imported with a default height of 48”. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

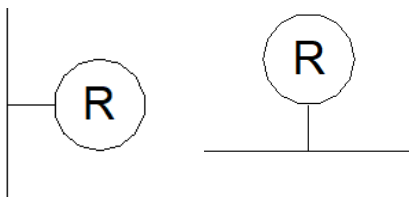


Figure 2: Plan view of the sample flush wall mounted relay: Left – sideways, Right – upright.

Family Category:	Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “R”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Surface Wall Relay	
System Connector	Controls	<i>Select on the device and add it to a system to connect it to a circuit and panel.</i>

1.3 TIME SWITCH, WALL SURFACE

A time switch is used to control power to a circuit based on a timer. This family is a face hosted time switch. It is intended to be mounted on a wall surface or vertical surfaces and is imported with a default height of 48”. There are two different types based on the orientation that the family is installed: upright or sideways. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the wall time switch symbol as shown below.

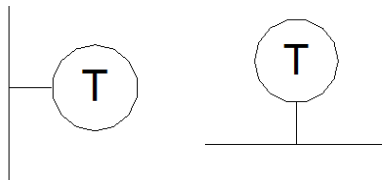


Figure 3: Plan view of the sample flush wall mounted time switch: Left – sideways, Right – upright.

Family Category:	Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “T”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Surface Wall Relay	
System Connector	Controls	<i>Select on the device and add it to a system to connect it to a circuit and panel.</i>

1.4 PHOTOELECTRIC CELL, CEILING, SURFACE

This family is a face hosted photoelectric cell for daylight control of lighting systems. When the sensor in the photoelectric cell reads light levels below a setpoint, it will turn on the lights connected to its control circuit. The family is intended to be mounted on the ceiling using the reflected ceiling plan or a horizontal surface. When inserting the family, be sure to adjust the placement to “face” under the modify → placement tab. The default placement will be “vertical face,” which will appear on the wall, but not on the ceiling. If the device is mounted on the ceiling, it will take the elevation of the ceiling, otherwise the default vertical elevation is 10 ft. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the photoelectric cell for ceiling or wall symbol as shown below.



Figure 4: Plan view of the sample photoelectric for ceiling mount.

Family Category:	Device → Lighting	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>For ceiling mount, make sure there is a ceiling and you are on the reflected ceiling plan view. Select “Face” under the modify → placement tab before placing the object for ceiling mount.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “PE”.</i>
Instance Parameters:	Offset – for horizontal face host, Elevation – for vertical face host, Voltage, Switch ID, Visibility – Upright, Sideways	<p><i>Offset/Elevation - The family assumes the ceiling elevation when mounted on the RCP. Adjust the elevation using the “offset” parameter.” When mounted on a wall, the default elevation is 10’. Adjust the elevation under the “elevation” parameter.</i></p> <p><i>Voltage - Each switch should match the light fixture voltage: 277 or 120 V.</i></p> <p><i>Switch ID - Identify which circuit of lights the photoelectric cell controls (not required, this is typically used if there are multiple light circuits per room).</i></p> <p><i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i></p>
Built-in Types	Photoelectric Cell	
System Connector	Controls	<i>Select on the device and add it to a system to connect it to a circuit and panel.</i>

1.5 PHOTOELECTRIC CELL, WALL SURFACE

This family is a face hosted photoelectric cell for daylight control of lighting systems, intended to be mounted on the wall. When inserting the family, the default placement will be “vertical face,” imported at 10 ft elevation. Be sure there is a wall to host to. The actual outline of the object

does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the photoelectric cell for ceiling or wall symbol as shown below.



Figure 5: Plan view of the sample photoelectric for wall mount.

Family Category:	Device → Lighting	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a wall in view and that the placement is set to vertical face.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “PE”.</i>
Instance Parameters:	Offset – for horizontal face host, Elevation – for vertical face host, Voltage, Switch ID, Visibility – Upright, Sideways	<p><i>Offset/Elevation - Adjust the elevation using the “offset” parameter.” When mounted on a wall, the default elevation is 10’. Adjust the elevation under the “elevation” parameter.</i></p> <p><i>Voltage - Each switch should match the light fixture voltage: 277 or 120 V.</i></p> <p><i>Switch ID - Identify which circuit of lights the photoelectric cell controls (not required, this is typically used if there are multiple light circuits per room).</i></p> <p><i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i></p>
Built-in Types	Photoelectric Cell	
System Connector	Controls	<i>Select on the device and add it to a system to connect it to a circuit and panel.</i>

1.6 PUSH BUTTON CONTROL, SURFACE

This family is a face hosted, surface, wall mounted two push button control device. The device is mounted on a vertical face at a default elevation of 4 ft. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the wall mounted push button symbol as shown below.

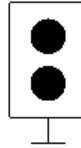


Figure 6: Plan view of the surface mounted, two push button controller.

Family Category:	Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a wall in view and that the placement is set to vertical face.</i>
Types Parameters:	Type, Depth, Width, Height	<i>Within each type you are allowed to adjust the device dimensions.</i>
Instance Parameters:	Elevation – for vertical face host	<i>The default elevation is 4'. Adjust the elevation under the "elevation" parameter.</i>
Built-in Types	Two Push Button Switch 5.5"x3.5"x3.75"	
System Connector	Controls	<i>Select on the device and add it to a system to connect it to a circuit and panel.</i>

1.7 PUSH BUTTON EMERGENCY SHUTDOWN, RECESSED

This family is a face hosted, recessed, wall mounted emergency shutdown push button switch. The device is mounted on a vertical face at a default elevation of 4 ft. During an emergency, a user pushes this button to shutdown a system, such as a fuel pump or HVAC system. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the wall mounted push button symbol as shown below.

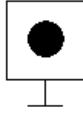


Figure 7: Plan view of the recessed, emergency shutdown switch.

Family Category:	Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a wall in view and that the placement is set to vertical face.</i>
Types Parameters:	Type, Depth, Width, Height	<i>Within each type you are allowed to adjust the device dimensions.</i>
Instance Parameters:	Elevation – for vertical face host	<i>The default elevation is 4'. Adjust the elevation under the "elevation" parameter.</i>
Built-in Types	Push Button Switch 4"x3"x4"	
System Connector	Controls	<i>Select on the device and add it to a system to connect it to a circuit and panel.</i>

1.8 PUSH BUTTON, SURFACE

This family is a face hosted, surface, wall mounted push button switch. The device is mounted on a vertical face at a default elevation of 4 ft. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the wall mounted push button symbol as shown below.



Figure 8: Plan view of the surface mounted push button switch.

Family Category:	Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a wall in view and that the placement is set to vertical face.</i>
Types Parameters:	Type, Depth, Width, Height	<i>Within each type you are allowed to adjust the device dimensions.</i>
Instance Parameters:	Elevation – for vertical face host	<i>The default elevation is 4'. Adjust the elevation under the "elevation" parameter.</i>
Built-in Types	Push Button Switch 2"x1"x2"	
System Connector	Controls	<i>Select on the device and add it to a system to connect it to a circuit and panel.</i>

1.9 PUSH BUTTON, RECESSED

This family is a face hosted, recessed, wall mounted push button switch. The device is mounted on a vertical face at a default elevation of 4 ft. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the wall mounted push button symbol as shown below.



Figure 9: Plan view of the recessed, push button switch.

Family Category:	Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a wall in view and that the placement is set to vertical face.</i>
Types Parameters:	Type, Depth, Width, Height	<i>Within each type you are allowed to adjust the device dimensions.</i>

Instance Parameters:	Elevation – for vertical face host	<i>The default elevation is 4'. Adjust the elevation under the "elevation" parameter.</i>
Built-in Types	Push Button Switch 4"x2"x4"	
System Connector	Controls	<i>Select on the device and add it to a system to connect it to a circuit and panel.</i>

7 – General Electrical

Keynotes, circle, diamond, end cap, hexagon, north arrow, scales, signatures, stamps, triangle revision, etc.

Section 7.0 – Electrical General Families for Revit®

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1.0 GENERAL FAMILIES

Please reach out to Justin@engproguides.com to customize your general families. You can add custom annotation symbols, common general notes, common legends and common work notes that you use on many projects.

2.0 KEYNOTE SYMBOLS

Keynotes do not have hosts. These symbols are used to annotate the various views. They can also be used on the sheet views as well.

2.1 TRIANGLE REVISION TAG

The triangle is most often used as a revision tag. A revision tag corresponds to a revision cloud and highlights when a change has occurred from a previous submittal. This could correspond to an addendum or post contract document. The triangle revision must be used on the sheet view. It cannot be used in the elevation and layout views.



Figure 1: Plan view of the triangle revision tag. This revision tag must be used to annotate a revision cloud.

Family Category:	Annotation Symbols	<i>After the family is imported locate it in the following category.</i>
Hosting:	Host -> Revision cloud.	<i>This symbol must be used to annotate a revision cloud. Click on revision cloud and click on annotate in the ribbon.</i>
Types Parameters:	Leader, Keynote number	<i>You can change the keynote number inside and the leader type.</i>
Instance Parameters:	Leaders	<i>Add or remove leaders</i>
Built-in Types	Tag 1, 2, 3, 4 & 5	<i>You can add more tag by creating more types.</i>
System Connector	None	

2.2 CIRCLE KEYNOTE

The circle keynote is typically used to represent new work. But it can also be used as sheet notes and duct sections. It just depends on your company standard or the standard used by the Architect or Client.



Figure 2: Plan view of the circle keynote. This does not use the built-in keynotes for Revit®.

Family Category:	Annotation Symbols → Circle Keynote	<i>After the family is imported locate it in the following category.</i>
Hosting:	No host	<i>This symbol can be placed on any view (floor, structural, ceiling, section etc.)</i>
Types Parameters:	Leader, Keynote number	<i>You can change the keynote number inside and the leader type.</i>

Instance Parameters:	Leaders	<i>Add or remove leaders</i>
Built-in Types	Keynote 1, 2, 3, 4 & 5	<i>You can add more keynotes by creating more types.</i>
System Connector	None	

2.3 DIAMOND KEYNOTE

The diamond keynote is typically used to represent demolition/removal work. It can also represent a feeder on a one-line diagram.



Figure 3: Plan view of the diamond keynote. This does not use the built-in keynotes for Revit®.

Family Category:	Annotation Symbols → Diamond Keynote	<i>After the family is imported locate it in the following category.</i>
Hosting:	No host	<i>This symbol can be placed on any view (floor, structural, ceiling, section etc.)</i>
Types Parameters:	Leader, Keynote number	<i>You can change the keynote number inside and the leader type.</i>
Instance Parameters:	Leaders	<i>Add or remove leaders</i>
Built-in Types	Keynote 1, 2, 3, 4 & 5	<i>You can add more keynotes by creating more types.</i>
System Connector	None	

2.5 HEXAGON KEYNOTE

A hexagon keynote is typically used to reference sheet locations or to specify an equipment.



Figure 4: Plan view of the hexagon keynote. This does not use the built-in keynotes for Revit®.

Family Category:	Annotation Symbols → Diamond Keynote	<i>After the family is imported locate it in the following category.</i>
Hosting:	No host	<i>This symbol can be placed on any view (floor, structural, ceiling, section etc.)</i>
Types Parameters:	Leader, Keynote number	<i>You can change the keynote number inside and the leader type.</i>
Instance Parameters:	Leaders	<i>Add or remove leaders</i>
Built-in Types	Keynote 1, 2, 3, 4 & 5	<i>You can add more keynotes by creating more types.</i>
System Connector	None	

2.6 OVAL KEYNOTE

An oval keynote can have multiple uses.



Figure 5: Plan view of the oval keynote. This does not use the built-in keynotes for Revit®.

Family Category:	Annotation Symbols → Diamond Keynote	<i>After the family is imported locate it in the following category.</i>
Hosting:	No host	<i>This symbol can be placed on any view (floor, structural, ceiling, section etc.)</i>
Types Parameters:	Leader, Keynote number	<i>You can change the keynote number inside and the leader type.</i>

Instance Parameters:	Leaders	<i>Add or remove leaders</i>
Built-in Types	Keynote 1, 2, 3, 4 & 5	<i>You can add more keynotes by creating more types.</i>
System Connector	None	

3.0 NORTH ARROW

The north arrow allows the reader to orientate themselves with the drawing. Plan north is pointed in the up direction of the sheet. The true north arrow is selected by imagining yourself standing in front of the building and facing the same direction as plan north. You would then look down at an imaginary compass and that direction would be true north. You could also use a map and rotate the map to align with true north and then use the map's compass to find true north, relative to plan north.

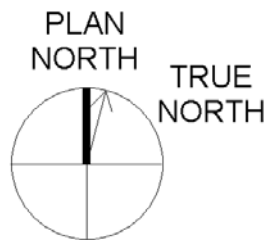


Figure 6: Plan view of the north arrow for Revit®.

Family Category:	Annotation Symbols → North Arrow	<i>After the family is imported locate it in the following category.</i>
Hosting:	No host	<i>This symbol can be placed on any view (floor, structural, ceiling, section etc.)</i>
Types Parameters:	True north degrees	<i>You can change the true north arrow angle. The plan north arrow should not change and should always point upwards as relative to the sheet view.</i>
Instance Parameters:	None	
Built-in Types	True north angle in 15 degree increments.	
System Connector	None	

4.0 SCALES

The scales allow the reader to measure the sizes on the sheet view. English (IP) units are provided by default.

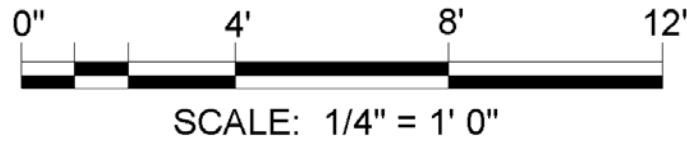


Figure 7: Plan view of the scales for Revit®.

Family Category:	Annotation Symbols → Scales	<i>After the family is imported locate it in the following category.</i>
Hosting:	No host	<i>This symbol can be placed on any view (floor, structural, ceiling, section etc.)</i>
Types Parameters:	Scale values.	<i>You can change the values presented in the picture as 0", 4', 8', 12' and SCALE: 1/4" = 1' 0".</i>
Instance Parameters:	None	
Built-in Types	1" = 1' 0", 1" = 10' 0", 1" = 15' 0", 1" = 20' 0", 1" = 30' 0", 1" = 40' 0", 1" = 50' 0", 1" = 60' 0", 1" = 80' 0",	1" = 100', 1" = 200', 1" = 400', 1" = 500' 1/2" = 1' 0", 1/4" = 1' 0", 1/8" = 1' 0", 1/16" = 1' 0", 1/32" = 1' 0", 6" = 1' 0", 12" = 1' 0",
System Connector	None	

5.0 STAMPS

No stamps are provided. Please reach out to Justin@engproguides.com to customize your stamps family to include your professional engineering stamps.

6.0 SIGNATURES

No signatures are provided. Please reach out to Justin@engproguides.com to customize your signatures family to include your professional engineering stamps.

7.0 MISCELLANEOUS SYMBOLS

Any miscellaneous annotation symbol can be provided as part of a customization package. There are two custom annotative symbols provided by default.



Figure 8: Plan view of miscellaneous symbols for Revit®.

Family Category:	Annotation Symbols → End Cap & Squiggle	<i>After the family is imported locate it in the following category.</i>
Hosting:	No host	<i>This symbol can be placed on any view (floor, structural, ceiling, section etc.)</i>
Types Parameters:	None	<i>None</i>
Instance Parameters:	None	
Built-in Types	None	
System Connector	None	

8 – Intercom Systems

Outlets, master station, microphone, speakers, etc.

Section 8.0 – Electrical Intercom Systems Families for Revit®

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1.0 INTERCOM SYSTEMS

Please reach out to Justin@engproguides.com to customize your intercom families. You can add custom symbols, common general notes, common legends and common work notes that you use on many projects. I can also edit the default families to better match your company's preferences.

1.1 MICROPHONE, WALL RECESSED

This family is a face hosted intercom microphone. It is intended to be mounted on a wall surface or vertical surfaces and is imported with a default height of 48". The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

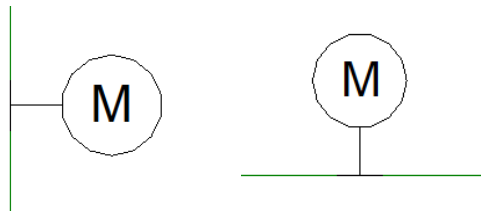


Figure 1: Plan view of the sample recessed wall mounted intercom microphone: Left – sideways, Right – upright.

Family Category:	Device → Communication Device	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>

Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “M”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Intercom Microphone, Wall Recessed	
System Connector	Communication	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

1.2 OUTLET/MASTER STATION, WALL RECESSED

This family is a face hosted intercom master station. It is intended to be mounted on a wall surface or vertical surfaces and is imported with a default height of 48”. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

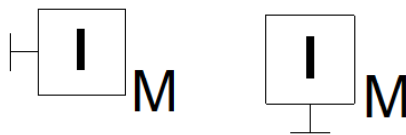


Figure 2: Plan view of the sample wall mounted master intercom: Left – sideways, Right – upright.

Family Category:	Device → Communication Device	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>

Types Parameters:	Type, Depth, Width, Height, Symbol Letter, Subscript	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “I,” subscript “M”</i>
Instance Parameters:	Elevation, Visibility – Up, Down, Left, Right	<i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed. The visibility checkbox allows you to select the orientation of the symbol letter and subscript.</i>
Built-in Types	Intercom Master Station, Wall Recessed	
System Connector	Communication	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

1.3 INTERCOM SUBSTATION, WALL RECESSED

This family is a face hosted intercom substation. It is intended to be mounted on a wall surface or vertical surfaces and is imported with a default height of 48”. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

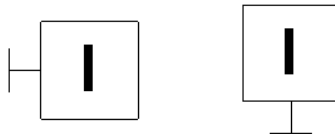


Figure 3: Plan view of the sample recessed wall mounted intercom substation: Left – sideways, Right – upright.

Family Category:	Device → Communication Device	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>

Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “I”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Intercom Sub Station, Wall Recessed	
System Connector	Communication	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

1.4 SPEAKER, CEILING RECESSED

This family is a face hosted intercom speaker. It is intended to be mounted on the ceiling or a horizontal surface. To place on a horizontal surface, select “place on face,” under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.



Figure 4: Plan view of the sample recessed ceiling mounted intercom speaker:

Family Category:	Device → Communication Device	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>

Types Parameters:	Type, Diameter, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “S”.</i>
Instance Parameters:	Visibility – Upright, Sideways	<i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Intercom Speaker, Ceiling Recessed	
System Connector	Communication	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

1.5 SPEAKER, WALL, RECESSED

This family is a face hosted intercom speaker. It is intended to be mounted on a wall surface or vertical surfaces and is imported with a default elevation of 84”. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

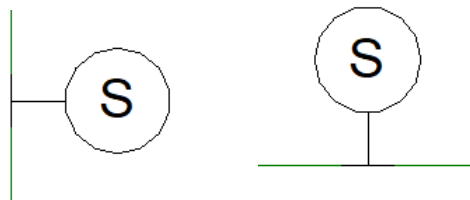


Figure 5: Plan view of the sample recessed wall mounted intercom speaker: Left – sideways, Right – upright.

Family Category:	Device → Communication Device	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Diameter, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “S”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 84” when installed on a vertical face. Adjust the device height as needed.</i>

		<i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Intercom Speaker, Wall Surface	
System Connector	Communication	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

9 – Exterior Lighting Systems

Bollard, rectangular, circular, square, flood lights, obstruction lights, parking lights, poles, pole assembly, step light, wall pack, etc.

Section 9.0 – Electrical Lighting Systems

Exterior Families for Revit®

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1.0 LIGHTING SYSTEMS – EXTERIOR

An exterior lighting system typically consists of light fixtures and switches. The wiring, panels and conduits that connect the systems are included in the Power Systems section. Families are organized by their hosting method and their geometry. Mounted fixtures are face hosted, while free-standing lights are non-hosted.

1.1 BOLLARD LIGHT FIXTURE, ROUND

This family is for round bollard light fixtures. The bollard is a free standing exterior fixture and therefore non-hosted. The full geometric shape is displayed in all views.

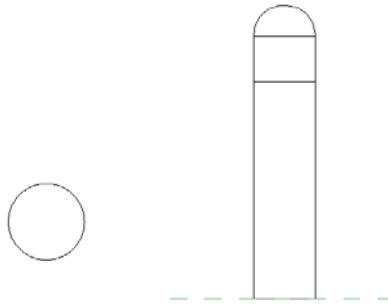


Figure 1: Left: Plan view of the round bollard. Right: Elevation view of the bollard.

Hosting Annotative:	Non-Hosted Partially yes, the layout view is annotative in order to be seen on large site plans.	<i>The bollard is non-hosted and should be placed at grade.</i>
Types Parameters:	Overall Height, Radius, Top Height, Light Height, Photometric values	<i>Adjust the bollard dimensions as necessary. The electrical load is defined in each type.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V or any other voltage.</i>
Built-in Types	4' H x 10" Dia, 3' H x 8" Dia	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>
Default Light Source	BL1A19.IES	<i>Default photometric web file.</i>

1.2 BOLLARD LIGHT FIXTURE, SQUARE

This family is for square bollard light fixtures. The bollard is a free standing exterior fixture and therefore non-hosted. The full geometric shape is displayed in all views.

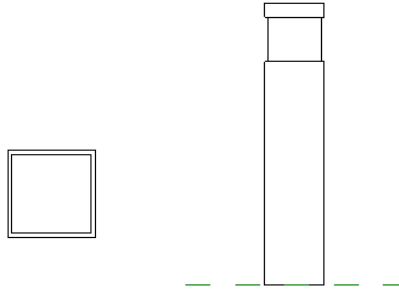


Figure 2: Left: Plan view of the square bollard. Right: Elevation view of the bollard

Hosting Annotative:	Non-Hosted Partially yes, the layout view is annotative in order to be seen on large site plans.	<i>The bollard is non-hosted and should be placed at grade.</i>
Types Parameters:	Overall Height, Width, Top Height, Light Height, Photometric values, Wattage, Apparent Load (VA)	<i>Adjust the bollard dimensions as necessary. The electrical load is defined in each type.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V or any other voltage.</i>
Built-in Types	4' H x 10" W, 3' H x 8" W	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>
Default Light Source	BL1A19.IES	<i>Default photometric web file.</i>

1.3 WALL PACK

This family is for wall pack light fixtures. This family is an annotative family, meaning that it changes size with the scale in the drawing. The full geometric shape is not displayed in all views.



Figure 3: Plan view of the wall pack

Hosting Annotative:	Hosted Yes, it is annotative.	<i>The wall pack is wall hosted. It also defaults at a low elevation, so you need a floor view.</i>
Types Parameters:	Wattage	<i>The types do not change the physical dimensions, since this is an annotative symbol.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V or any other voltage.</i>
Built-in Types	Default only	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>
Default Light Source	BL1A19.IES	<i>Default photometric web file.</i>

1.4 POLE LIGHT ASSEMBLY

This family is for pole light assembly fixtures. The pole light assembly is a free standing exterior fixture and therefore non-hosted. The full geometric shape is displayed in all views.

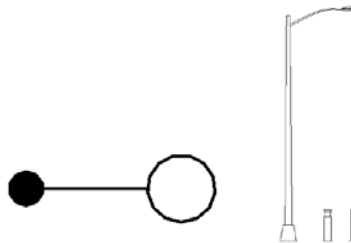


Figure 4: Left: Plan view of the pole light assembly. Right shows the pole light assembly and two small bollards for height reference.

Hosting Annotative:	Non-Hosted Partially yes, the layout view is annotative in order to be seen on large site plans.	<i>The pole light assembly is non-hosted and should be placed at grade.</i>
Types Parameters:	Overall Height, Overall length, arm height, base height, base width, lamp length, lamp width, lamp thickness, symbol arm length, symbol light diameter, symbol pole diameter.	<i>Adjust the dimensions to match your pole light assembly. If you are only worried about the plan view, then you just need to adjust the symbol dimensions.</i>

Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V or any other voltage.</i>
Built-in Types	Default only	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>
Default Light Source	BL1A19.IES	<i>Default photometric web file.</i>

1.5 POLE MOUNTED LUMINAIRE

This family is for pole mounted luminaire fixtures. The pole mounted luminaire is face hosted. The full geometric shape is displayed only in 3d and section views. The layout view only shows the symbol.

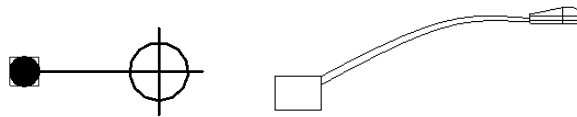


Figure 5: Left: Plan view of the pole mounted luminaire. Right: section view of the pole mounted luminaire. The pole must be provided separately.

Hosting Annotative:	Hosted Partially yes, the layout view is annotative in order to be seen on large site plans.	<i>The pole mounted luminaire is face hosted and should be placed at the top of a pole.</i>
Types Parameters:	Overall length, arm height, connection width, connection height, lamp length, lamp width, lamp thickness, symbol arm length, symbol light diameter, symbol pole diameter.	<i>Adjust the dimensions to match your pole mounted luminaire. If you are only worried about the plan view, then you just need to adjust the symbol dimensions.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V or any other voltage.</i>
Built-in Types	Default	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>
Default Light Source	BL1A19.IES	<i>Default photometric web file.</i>

1.6 STREET LIGHT

This family is for street light fixtures. The street light is a free standing exterior fixture and therefore non-hosted. The full geometric shape is displayed only in the 3d and section views. The plan view only shows the symbol.

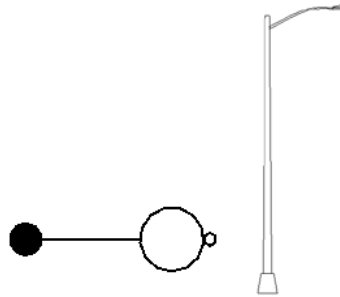


Figure 6: Left: Plan view of the street light. Right: section view of the street light.

Hosting Annotative:	Non-Hosted Partially yes, the layout view is annotative in order to be seen on large site plans.	<i>The street light is non-hosted and should be placed at grade.</i>
Types Parameters:	Overall Height, Overall length, arm height, base height, base width, lamp length, lamp width, lamp thickness, symbol arm length, symbol light diameter, symbol pole diameter.	<i>Adjust the dimensions to match your pole light assembly. If you are only worried about the plan view, then you just need to adjust the symbol dimensions.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V or any other voltage.</i>
Built-in Types	Default	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>
Default Light Source	BL1A19.IES	<i>Default photometric web file.</i>

1.7 FLOOD LIGHT GROUND MOUNT

This family is for flood light ground mount fixtures. The flood light ground mount is a free standing exterior fixture and therefore non-hosted. The full geometric shape is displayed in the 3d and section views. The plan view only shows the symbol view.



Figure 7: Left: Plan view of the flood light ground mount. Right: section view of the flood light ground mount.

Hosting Annotative:	Non-Hosted Partially yes, the layout view is annotative in order to be seen on large site plans.	<i>The fixture is non-hosted. It should be located on the ground.</i>
Types Parameters:	Overall Height, Overall length, arm height, base height, base width, lamp length, lamp width, lamp thickness, symbol arm length, symbol light diameter, symbol pole diameter.	<i>Adjust the dimensions to match your pole light assembly. If you are only worried about the plan view, then you just need to adjust the symbol dimensions.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V or any other voltage.</i>
Built-in Types	Default	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>
Default Light Source	BL1A19.IES	<i>Default photometric web file.</i>

1.8 STEP LIGHT RECESSED WALL

This family is for step light recessed wall fixtures. The bollard requires a wall host. The full geometric shape is displayed in all views.



Figure 8: Left: Plan view of the step light recessed wall fixture. Right: section view of the fixture.

Hosting Annotative:	Non-Hosted No	<i>The fixture is wall hosted. It also defaults at a low elevation, so you need a floor view.</i>
Types Parameters:	Fixture Height, Fixture Width, Fixture Depth, Frame thickness, stem width, wall gap.	<i>Adjust the fixture dimensions to match your fixture, but you can also adjust the symbol view with the stem width and wall</i>

		<i>gap dimensions.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V or any other voltage.</i>
Built-in Types	Default	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>
Default Light Source		<i>Default photometric web file.</i>

1.9 FLOOD LIGHT WALL

This family is for square bollard light fixtures. The bollard is a free standing exterior fixture and therefore non-hosted. The full geometric shape is displayed in the 3d and section views. The plan view only shows the symbol view.

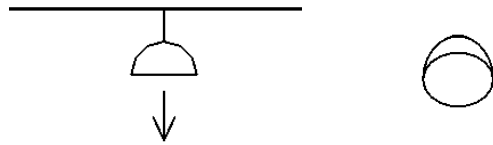


Figure 9: Left: Plan view of the flood light wall fixture. Section view of the flood light wall fixture is shown on the right.

Hosting Annotative:	Non-Hosted Partially yes, the layout view is annotative in order to be seen on large site plans.	<i>The wall pack is wall hosted.</i>
Types Parameters:	Lamp length, lamp diameter, lamp radius, mounting diameter, mounting thickness, stem length, stem diameter	<i>Adjust the bollard dimensions as necessary. The electrical load is defined in each type.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V or any other voltage.</i>
Built-in Types		
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>

Default Light Source		<i>Default photometric web file.</i>
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1.10 BOLLARD RECTANGLE

This family is for square bollard light fixtures. The bollard is a free standing exterior fixture and therefore non-hosted. The full geometric shape is displayed in the 3d and section views. The plan view only shows the symbol view.

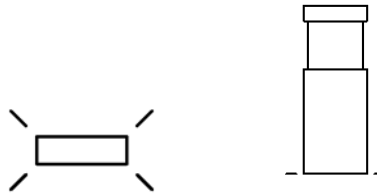


Figure 10: Left: Plan view of the rectangle bollard. Right: Elevation view of the bollard

Hosting Annotative:	Non-Hosted Partially yes, the layout view is annotative in order to be seen on large site plans.	<i>The bollard is non-hosted and should be placed at grade.</i>
Types Parameters:	Overall Height, Width, Top Height, Light Height, Photometric values, Wattage, Apparent Load (VA)	<i>Adjust the bollard dimensions as necessary. The electrical load is defined in each type.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V or any other voltage.</i>
Built-in Types	Default	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>
Default Light Source	BL1A19.IES	<i>Default photometric web file.</i>

1.11 OBSTRUCTION DOUBLE

This family is for obstruction double fixtures. The obstruction double fixture is a free standing exterior fixture and therefore non-hosted. The full geometric shape is displayed in the 3d and section views. The plan view only shows the symbol view.



Figure 11: Left: Plan view of the obstruction double. Right: Elevation view of the fixture.

Hosting Annotative:	Non-Hosted Partially yes, the layout view is annotative in order to be seen on large site plans.	<i>The fixture is wall hosted. It also defaults at a low elevation, so you need a floor view.</i>
Types Parameters:	Overall Height, Width, Top Height, Light Height, Photometric values, Wattage, Apparent Load (VA)	<i>Adjust the bollard dimensions as necessary. The electrical load is defined in each type.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V or any other voltage.</i>
Built-in Types	Default	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>
Default Light Source		<i>Default photometric web file.</i>

1.12 POLE IMPERIAL NON-HOSTED

This family is for pole non-hosted fixtures. The full geometric shape is displayed in the 3d and section views. The plan view only shows the symbol view.



Figure 12: Left: Plan view of the pole non-hosted fixture. There is no light, just the pole.

Hosting Annotative:	Non-Hosted Partially yes, the layout view is annotative in order to be seen on large site plans.	<i>The pole is non-hosted and should be placed at ground level.</i>
Types Parameters:	Overall Height, Width, Top Height, Light Height,	<i>Adjust the bollard dimensions as necessary. The electrical load is defined in each type.</i>

Instance Parameters:		
Built-in Types		
System Connector		
Default Light Source	BL1A19.IES	<i>Default photometric web file.</i>

1.13 POLE, LIGHT ONLY

This family is for pole, light only fixtures. The bollard is a free standing exterior fixture and therefore non-hosted. The full geometric shape is displayed in the 3d and section views. The plan view only shows the symbol view.

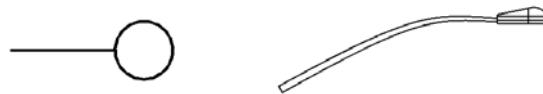


Figure 13: Left: Plan view of the pole, light only fixture. Section view of the light is shown on the right.

Hosting Annotative:	Non-Hosted Partially yes, the layout view is annotative in order to be seen on large site plans.	<i>The pole mounted luminaire is face hosted and should be placed at the top of a pole.</i>
Types Parameters:	Overall Height, Width, Top Height, Light Height, Photometric values	<i>Adjust the bollard dimensions as necessary. The electrical load is defined in each type.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V or any other voltage.</i>
Built-in Types		
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>
Default Light Source	BL1A19.IES	<i>Default photometric web file.</i>

1.14 STEP LIGHT RECESSED NO LEG

This family is for step light recessed no leg fixtures. The fixture requires a wall or vertical face. The fixture is recessed into the wall and is flush with the outer surface of the wall. The full geometric shape is displayed in the 3d and section views. The plan view only shows the symbol view.

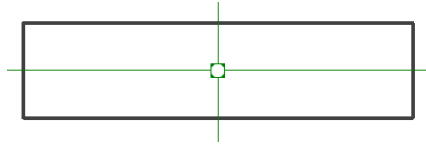


Figure 14: Left: Plan view of the step light, recessed.

Hosting Annotative:	Non-Hosted Partially yes, the layout view is annotative in order to be seen on large site plans.	<i>The fixture is wall hosted. It also defaults at a low elevation, so you need a floor view.</i>
Types Parameters:	Overall Height, Width, Top Height, Light Height, Photometric values, Wattage, Apparent Load (VA)	<i>Adjust the bollard dimensions as necessary. The electrical load is defined in each type.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V or any other voltage.</i>
Built-in Types		
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel.</i>
Default Light Source		<i>Default photometric web file.</i>

10 – Interior Lighting Systems

Ceiling, wall mounted, rectangular, circular, recessed, surface, square, emergency lights, directional, exit signs, pendant, sensors, track, lighting control, strip, fixture, cylindrical, etc.

Section 10.0 –Electrical Lighting Systems Interior Families for Revit®

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1.0 LIGHTING SYSTEMS – INTERIOR

An interior lighting system typically consists of light fixtures and switches. The wiring, panels and conduits that connect the systems are included in the Power Systems section. The lighting fixtures families are organized by their hosting method and their geometry. The hosting methods are all face hosted. The geometries are typically rectangular or circular.

1.1 CEILING CIRCULAR PENDANT

This family is for circular, pendant mounted, face hosted, surface, fluorescent or LED light fixtures. The term surface means that the fixture is not flush with the ceiling. It sticks out from the ceiling. In addition, there is a rod (pendant) that extends from the ceiling to the fixture.

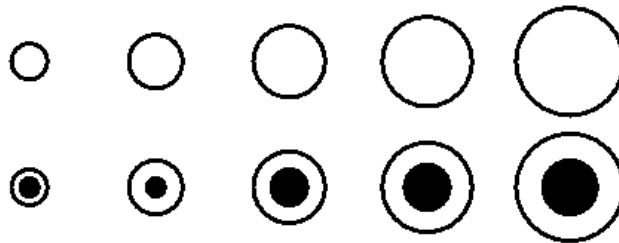


Figure 1: Plan view of the various types of fixtures. The dark circles indicate an emergency light fixture and the un-filled circles indicate a non-emergency fixture.

Hosting Annotative:	Face Not annotative	<i>Make sure there is a ceiling and you are in a view that has a ceiling within its viewing plane.</i>
Types Parameters:	Lamps, Emergency Symbol Radius, Height, Emergency or Normal, Fixture height, radius, rod radius, symbol rod length	<i>Change the diameter to match your light fixture. You can also change the photometric values too.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Number of poles.	<i>Each light fixture can be 277 or 120 V and have varying load based on number of lamps.</i>
Built-in Types	4"D, 6"D, 8"D, 10"D, 12"D, 18"D, 24" D There are also emergency versions of each diameter	The family can be edited to add more types for different diameters.
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.2 CEILING CIRCULAR RECESSED

This family is for circular, ceiling hosted, recessed, fluorescent or LED light fixtures. The term recessed means that the fixture is flush with the ceiling.

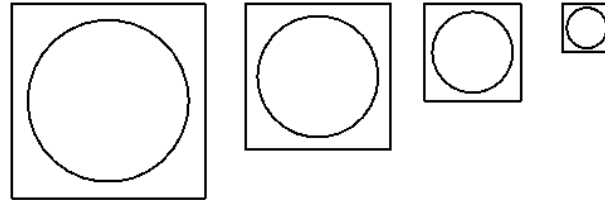


Figure 2: Plan view of the various types of fixtures. The types vary based on size.

Hosting Annotative:	Face Not annotative	<i>Make sure there is a ceiling and you are in a view that has a ceiling within its viewing plane.</i>
Types Parameters:	Lamps, Emergency Symbol Radius, Height, Emergency or Normal, Fixture height, radius,	<i>Change the diameter to match your light fixture. You can also change the photometric values too.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Number of poles	<i>Each light fixture can be 277 or 120 V and have varying load based on number of lamps.</i>
Built-in Types	4"D, 6"D, 8"D, 10"D, 12"D, 18"D, 24" D There are also emergency versions of each diameter	The family can be edited to add more types for different diameters.
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.3 CEILING CIRCULAR RECESSED DIRECTIONAL

This family is for circular, ceiling hosted, recessed, fluorescent or LED light fixtures. The term recessed means that the fixture is flush with the ceiling. There is also an arrow added to show the direction of the light.

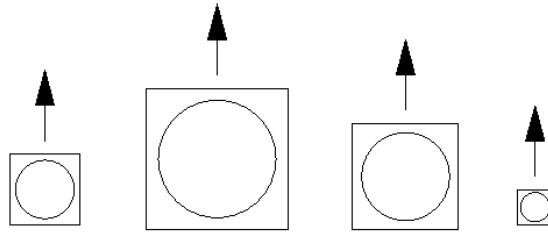


Figure 3: Plan view of the various types of fixtures. There is no emergency operation for this one, since directional lights are not typically used in emergency situations.

Hosting Annotative:	Face Not annotative	<i>Make sure there is a ceiling and you are in a view that has a ceiling within its viewing plane.</i>
Types Parameters:	Lamps, Emergency Symbol Radius, Height, Emergency or Normal, Fixture height, radius,	<i>Change the diameter to match your light fixture. You can also change the photometric values too.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Number of poles	<i>Each light fixture can be 277 or 120 V and have varying load based on number of lamps.</i>
Built-in Types	4"D, 6"D, 8"D, 10"D, 12"D, 18"D, 24" D There are also emergency versions of each diameter	The family can be edited to add more types for different diameters.
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.4 CEILING CIRCULAR SURFACE

This family is for circular, ceiling hosted, surface, fluorescent or LED light fixtures. The term surface means that the fixture is not flush with the ceiling. It sticks out from the ceiling.

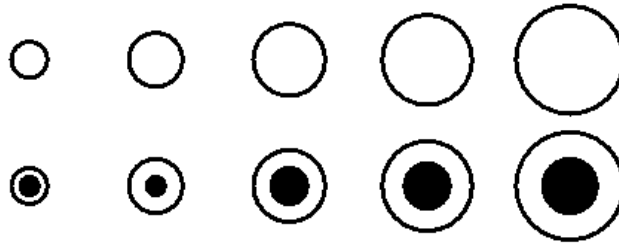


Figure 4: Plan view of the various types of fixtures. The dark circles indicate an emergency light fixture and the un-filled circles indicate a non-emergency fixture.

Hosting Annotative:	Face Not annotative	<i>Make sure there is a ceiling and you are in a view that has a ceiling within its viewing plane.</i>
Types Parameters:	Lamps, Emergency Symbol Radius, Height, Emergency or Normal, Fixture height, radius,	<i>Change the diameter to match your light fixture. You can also change the photometric values too.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Number of poles	<i>Each light fixture can be 277 or 120 V and have varying load based on number of lamps.</i>
Built-in Types	4"D, 6"D, 8"D, 10"D, 12"D, 18"D, 24" D There are also emergency versions of each diameter	The family can be edited to add more types for different diameters.
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.5 CEILING RECTANGULAR PENDANT

This family is for rectangular or square, pendant mounted, fluorescent or LED light fixtures. The fixture is either hosted to the ceiling or work plane.

Ceiling Hosted: For ceiling hosted pendant fixtures, the top of the rod is hosted to the ceiling and the height from the reference level to the bottom of the fixture is varied based on user input. The pendant lengths automatically vary based on the remaining distance from the fixture to the ceiling.

Work Plane Hosted: For work plane based pendant fixtures, the offset of the fixture is based on an arbitrary "ceiling" height. The light fixture floats and its position may be adjusted as desired. The pendant lengths are varied in the properties tab. Make sure the "Place on Work Plane" icon is selected under the "Modify | Place Fixture" tab before inserting the fixture.

In plan view the fixtures will appear as the following.

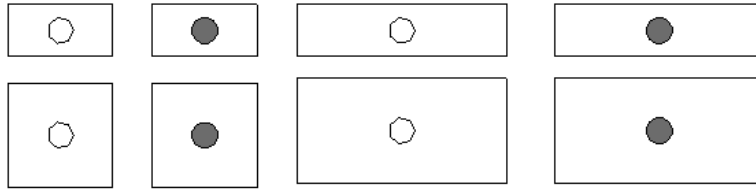


Figure 5: Plan view of the various types of fixtures. The dark circles indicate an emergency light fixture and the un-filled circles indicate a non-emergency fixture.

Hosting Annotative:	Ceiling No	<i>In the ceiling hosted family, make sure there is a ceiling and you are in a view that has a ceiling within its viewing plane.</i>
	Work Plane No	<i>In the work plane hosted family, make sure the "Place on Work Plane" option is selected.</i>
Types Parameters:	Radius, Emergency Symbol Radius, Height, Pendant Location from Edge, Emergency or Normal	<i>You can add more fixture types for the exact dimensions of your actual fixture.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Number of poles.	<i>Each light fixture can be 277 or 120 V and have varying load based on number of lamps. Fixture heights are defined for the ceiling hosted family and pendant lengths are defined for the work plan family.</i>
Built-in Types	1' x 2'; 1' x 2' Emergency; 1' x 4'; 1' x 4' Emergency; 2' x 2'; 2' x 2' Emergency; 2' x 4'; 2' x 4' Emergency;	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.6 CEILING RECTANGULAR RECESSED

This family is for rectangular, ceiling hosted, recessed fluorescent or LED light fixtures. The term recessed means that the fixture is flush with the ceiling.

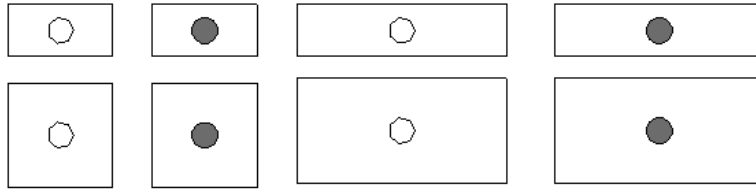


Figure 6: Plan view of the various types of fixtures. The dark circles indicate an emergency light fixture and the un-filled circles indicate a non-emergency fixture.

Hosting Annotative:	Ceiling No	<i>Make sure there is a ceiling and you are in a ceiling view.</i>
Types Parameters:	Type, Length, Width, Height, Emergency or Normal	<i>You can add more fixture types for the exact dimensions of your actual fixture.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Number of poles.	<i>Each light fixture can be 277 or 120 V and have varying load based on number of lamps.</i>
Built-in Types	1' x 2'; 1' x 2' Emergency; 1' x 4'; 1' x 4' Emergency; 2' x 2'; 2' x 2' Emergency; 2' x 4'; 2' x 4' Emergency;	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.7 CEILING RECTANGULAR SURFACE

This family is for rectangular, ceiling hosted, surface mounted, fluorescent or LED light fixtures. The term surface means that the fixture is not flush with the ceiling.

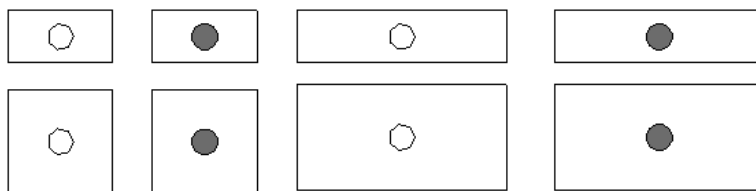


Figure 7: Plan view of the various types of fixtures. The dark circles indicate an emergency light fixture and the un-filled circles indicate a non-emergency fixture.

Hosting Annotative:	Ceiling No	<i>Make sure there is a ceiling and you are in a ceiling view.</i>
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Types Parameters:	Type, Length, Width, Height, Emergency or Normal, Dimensions	<i>You can add more fixture types for the exact dimensions of your actual fixture.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Number of poles.	<i>Each light fixture can be 277 or 120 V and have varying load based on number of lamps.</i>
Built-in Types	1' x 2'; 1' x 2' Emergency; 1' x 4'; 1' x 4' Emergency; 2' x 2'; 2' x 2' Emergency; 2' x 4'; 2' x 4' Emergency;	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.8 CEILING RECTANGULAR STRIP RECESSED

This family is for rectangular-strip, ceiling hosted, recessed fluorescent or LED light fixtures. The term recessed means that the fixture is flush with the ceiling.

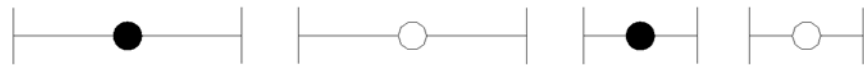


Figure 8: Plan view of the various types of fixtures. The dark circles indicate an emergency light fixture and the un-filled circles indicate a non-emergency fixture.

Hosting Annotative:	Ceiling No	<i>Make sure there is a ceiling and you are in a ceiling view.</i>
Types Parameters:	Type, Length, Width, Height, Emergency or Normal, Dimensions	<i>You can add more fixture types for the exact dimensions of your actual fixture.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Number of poles	<i>Each light fixture can be 277 or 120 V and have varying load based on number of lamps.</i>
Built-in Types	2' x 3"; 2' x 3" Emergency; 2' x 4"; 2' x 4" Emergency; 4' x 3"; 4' x 3" Emergency; 4' x 4"; 4' x 4" Emergency;	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are</i>

		using.
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1.9 CEILING EXIT SIGN SURFACE

This family is for ceiling mounted, surface mounted, fluorescent or LED exit signs. The term surface means that the fixture is not flush with the ceiling. The directional arrow indicates the direction towards the exit.

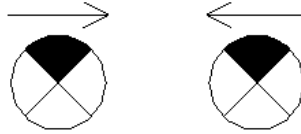


Figure 9: This family is annotative. The exit sign size is typical and does not change, so the symbol only will change for the various annotation scales.

Hosting Annotative:	Ceiling Annotative – Yes.	<i>Make sure there is a ceiling and you are in a ceiling view.</i>
Types Parameters:	None, symbol based so no major changes to dimensions.	
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Directional arrow visibility, Power factor, number of poles	<i>Each light fixture can be 277 or 120 V and have varying load based on number of lamps. You can change which arrows are visible, left or right.</i>
Built-in Types	Default	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.10 WALL RECTANGULAR SURFACE

This family is for rectangular, wall hosted, surface mounted, fluorescent or LED light fixtures. The term surface means that the fixture is not flush with the wall surface. It sticks out from the wall surface

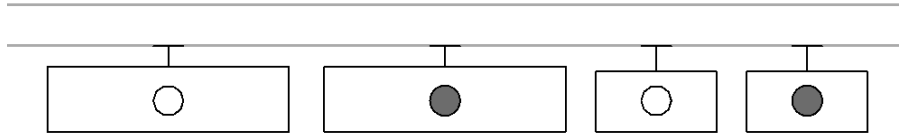


Figure 10: Plan view of the various types of fixtures. The dark circles indicate an emergency light fixture and the un-filled circles indicate a non-emergency fixture.

Hosting Annotative:	Wall No	<i>Make sure there is a wall and you are in a view that has a wall within its viewing plane.</i>
Types Parameters:	Dimensions, length, width, height, symbol gap from wall, symbol radius, symbol stem, photometric values	<i>You can change the dimensions of the symbol and the 3d box to match your actual fixture.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, number of poles.	<i>Each light fixture can be 277 or 120 V and have varying load based on number of lamps.</i>
Built-in Types	1' x 2'; 1' x 2' Emergency; 1' x 4'; 1' x 4' Emergency; 2' x 2'; 2' x 2' Emergency; 2' x 4'; 2' x 4' Emergency;	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.11 WALL RECTANGULAR STRIP SURFACE

This family is for rectangular-strip, wall hosted, surface mounted, fluorescent or LED light fixtures. The term surface means that the fixture is not flush with the wall surface. It sticks out from the surface

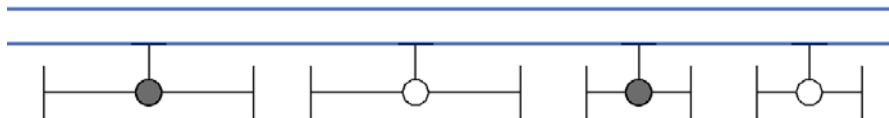


Figure 11: Plan view of the various types of fixtures. The dark circles indicate an emergency light fixture and the un-filled circles indicate a non-emergency fixture.

Hosting Annotative:	Wall No	<i>Make sure there is a wall and you are in a view that has a wall within its viewing plane.</i>
------------------------------	-----------	--------------------------------------------------------------------------------------------------

Types Parameters:	Dimensions, length, width, height, symbol gap from wall, symbol radius, symbol stem, photometric values	<i>You can change the dimensions of the symbol and the 3d box to match your actual fixture.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, number of poles.	<i>Each light fixture can be 277 or 120 V and have varying load based on number of lamps.</i>
Built-in Types	2' x 3"; 2' x 3" Emergency; 2' x 4"; 2' x 4" Emergency; 4' x 3"; 4' x 3" Emergency; 4' x 4"; 4' x 4" Emergency;	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.12 WALL CIRCULAR SURFACE

In this lighting fixture family, you can adjust the symbol radius and symbol stem length and symbol stem width. The actual 3-D fixture radius and depth can also be varied.

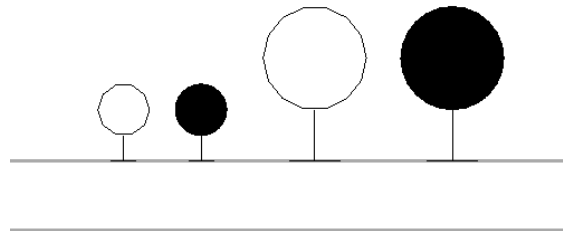


Figure 12: Plan view of the various types of wall circular fixture types. The dark circles indicate an emergency light fixture and the un-filled circles indicate a non-emergency fixture.

Hosting Annotative:	Wall No	<i>Make sure there is a wall and you are in a view that has a wall within its viewing plane.</i>
Types Parameters:	Fixture Radius, Fixture Height, Emergency or Normal, Symbol Stem Width and Symbol Stem Length	<i>You should change the circle size and stem size to match your actual fixture.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V and have varying load based on number of lamps.</i>

Built-in Types	6" Dia, 6" Dia Emergency, 12" Dia, 12" Dia Emergency	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.13 WALL EXIT SIGN SURFACE

This family is for wall mounted, surface mounted, fluorescent or LED exit signs. The term surface means that the fixture is not flush with the ceiling. The directional arrow indicates the direction towards the exit.

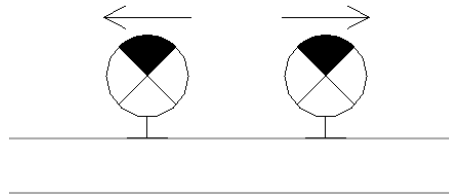


Figure 13: This family is annotative. The exit sign size is typical and does not change, so the symbol only will change for the various annotation scales.

Hosting Annotative:	Wall Annotative – Yes.	<i>Make sure there is a ceiling and you are in a ceiling view.</i>
Types Parameters:	None, symbol based so no major changes to dimensions.	
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Directional arrow visibility, Power factor, number of poles	<i>Each light fixture can be 277 or 120 V and have varying load based on number of lamps. You can change which arrows are visible, left or right.</i>
Built-in Types	Default	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.14 SWITCH

This family is for wall hosted switches. The default height of these switches is at 48”.

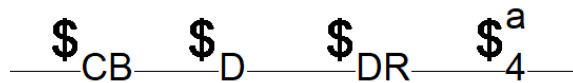
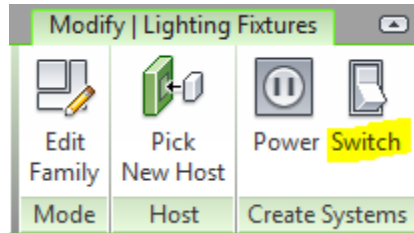


Figure 14: Plan view of the sample switches. The subscript indicates the switch type (circuit breaker, dimmer, door, 4-way, double pole, single pole, etc) and the superscript indicates the switch ID or the controlling circuit. The controlling circuit indicates which lights the switch will control. See the built in types in the table below for a list of available switch types.

Hosting Annotative:	Wall Yes	<i>Make sure there is a wall and you are in a view that has a wall within its viewing plane.</i>
Types Parameters:	Label – Switch Type	<i>Assign a type identifier under “Label – Switch Type” to assign an annotation to a new switch.</i>
Instance Parameters:	Voltage, Elevation, Label – Switch ID	<i>Each switch should match the light fixture voltage: 277 or 120 V. The default elevation is 48”. Adjust the switch height as needed. Add a superscript to the switch under the “Label – Switch ID” input to identify which circuit of lights the switch controls (not required, this is typically used if there are multiple light circuits per room).</i>
Built-in Types	Circuit Breaker (CB), Dimmer (D), Door (DR), Double Pole (2), Fan (F), Four Way (4), Key Operated (K), Low Voltage (LV), Motor (M), Occupancy Sensor (OS), Pilot Lighted (P), Single Pole (), Three Way (3), Timer (T)	

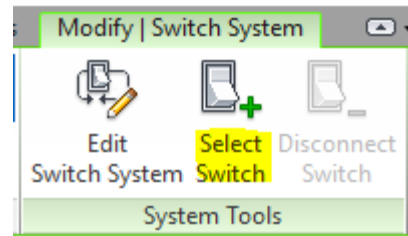
1.4.1 Switch System

A switch system connects multiple lights to a switch. To do this, highlight all the lights that should be connected to the same switch. Then, under “Modify | Light Fixtures”, select the switch icon as highlighted below.



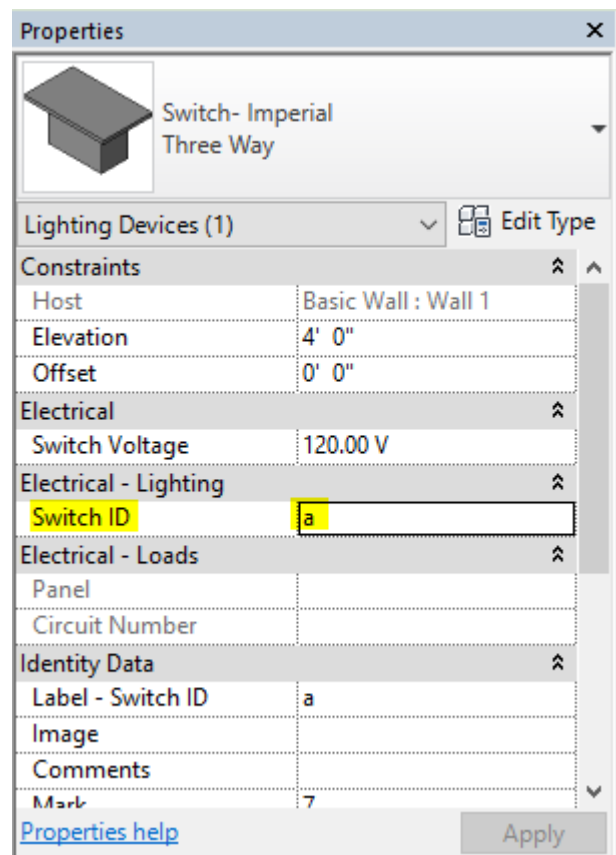
Autodesk screen shots reprinted courtesy of Autodesk, Inc

Then, click the “Select Switch” icon shown below and click on the switch that the lights should be controlled by.



Autodesk screen shots reprinted courtesy of Autodesk, Inc

To create a tag for the controlling circuit, insert an identifier in the Electrical – Lighting → Switch ID parameter as highlighted below. This should be the same identifier as the “Label – Switch ID” used for the switch superscript label.



Autodesk screen shots reprinted courtesy of Autodesk, Inc

Then, all the lights connected to that switch will automatically have with the same Switch ID parameter. Finally, you may tag all the lights. Make sure the lighting tag has a “Switch ID” label included.

1.15 WALL SENSORS

Wall sensors include occupancy sensors, partition sensors, vacancy sensors and daylight sensors. These sensor types can quickly be changed and you can also make your own custom wall sensor type, simply by changing the label. However, you must only use a 2 digit label.

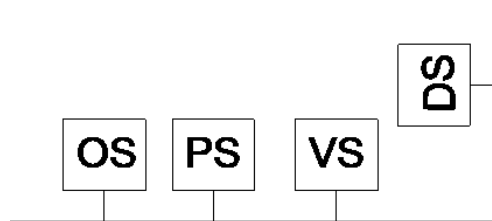


Figure 15: Plan view of the various types of wall sensors. The letters correspond to the various types.

Hosting Annotative:	Wall Yes	<i>Make sure there is a wall and you are in a view that has a wall within its viewing plane.</i>
Types Parameters:	Type, Length, Width & Height	<i>The type is the 2 digit letters that are included in the box. The length, width and height correspond to the 3-d sensor.</i>
Instance Parameters:	The arrows can be changed based on the location of the sensor.	
Built-in Types	Occupancy sensor (OS), Partition sensor (PS), Vacancy sensor (VS), Daylight sensor (DS).	

Type Parameters	
Parameter	
Electrical	
Sensor Type	OS
Dimensions	
Width	0' 6"
Height	0' 4"
Depth	0' 4"

Autodesk screen shots reprinted courtesy of Autodesk, Inc

1.16 CEILING SENSORS

Ceiling sensors include occupancy sensors, partition sensors, vacancy sensors and daylight sensors. These sensor types can quickly be changed and you can also make your own custom wall sensor type, simply by changing the label. However, you must only use a 2 digit label.

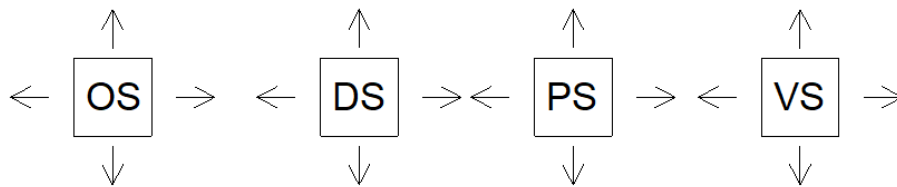


Figure 16: Plan view of the various types of wall sensors. The letters correspond to the various types.

Hosting Annotative:	Wall Yes	<i>Make sure there is a wall and you are in a view that has a wall within its viewing plane.</i>
Types Parameters:	Type, Length, Width & Height	<i>The type is the 2 digit letters that are included in the box. The length, width and height correspond to the 3-d sensor.</i>
Instance Parameters:	The arrows can be changed based on the location of the sensor.	
Built-in Types	Occupancy sensor (OS), Partition sensor (PS), Vacancy sensor (VS), Daylight sensor (DS).	

1.17 CEILING ACCENT LIGHT

This family is for ceiling mounted, surface mounted, fluorescent or LED accent lights. The term surface means that the fixture is not flush with the ceiling. The accent light symbols are annotative.

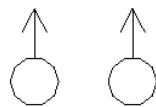


Figure 17: Plan view of the wall accent light.

Hosting Annotative:	Ceiling No, actual dimensions used. The arrow is annotative.	<i>Make sure there is a wall and you are in a view that has a wall within its viewing plane.</i>
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Types Parameters:	Fixture Radius, Fixture Depth	<i>Adjust the radius to match your actual fixture.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V and have varying load based on number of lamps.</i>
Built-in Types	Default	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.18 WALL SCONCE CYLINDER LIGHT

This family is for wall mounted, surface mounted, fluorescent or LED accent lights. The term surface means that the fixture is not flush with the ceiling. The accent light symbols are annotative.

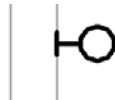


Figure 18: Plan view of the wall sconce cylinder light.

Hosting Annotative:	Wall No	<i>Make sure there is a wall and you are in a view that has a wall within its viewing plane.</i>
Types Parameters:	Fixture Radius, Fixture Height, Emergency or Normal, Symbol Stem Width and Symbol Stem Length	<i>You should change the circle size and stem size to match your actual fixture. You can also change the 3d fixture size too.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V and have varying load based on number of lamps.</i>
Built-in Types	6" Dia, 6" Dia Emergency, 8" Dia, 8" Dia Emergency, all sizes have a 24" height.	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.19 CEILING TRACK LIGHT

This family is for ceiling mounted, track lighting. The fixture is not flush with the ceiling.

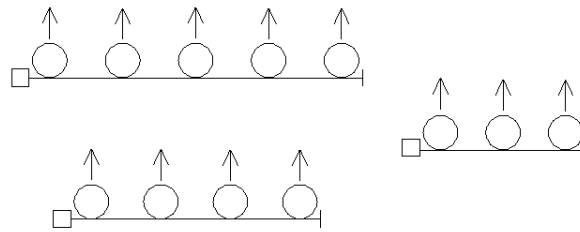


Figure 19: Plan view of the ceiling track light.

Hosting Annotative:	Ceiling No	<i>Make sure there is a wall and you are in a view that has a wall within its viewing plane.</i>
Types Parameters:	Track height, track length, track width, fixture height, fixture radius, light separation, arrow offset,	<i>The type is the 2 digit letters that are included in the box. The length, width and height correspond to the 3-d sensor.</i>
Instance Parameters:	Voltage, Wattage, Apparent Load (VA), Power factor, Number of poles	<i>Each light fixture can be 277 or 120 V.</i>
Built-in Types	3 lights, 4 lights, 5 lights, [4 ft, 6 ft and 8 ft length]	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.20 WALL EMERGENCY LIGHT

This family is for wall mounted, surface mounted, fluorescent or LED accent lights. The term surface means that the fixture is not flush with the ceiling. The accent light symbols are annotative.

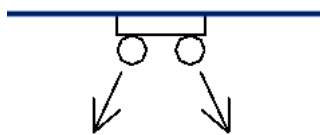


Figure 20: Plan view of the wall emergency light.

Hosting Annotative:	Wall Only arrows are annotative, everything else shows the actual dimensions.	<i>Make sure there is a wall and you are in a view that has a wall within its viewing plane.</i>
Types Parameters:	Dimensions, Distance between lights, circle radius, arrow offset, Electrical load information like VA, PF, number of poles, load classification: lighting	<i>Adjust the dimensions to match the emergency light you select.</i>
Instance Parameters:	None	
Built-in Types	Default only	
System Connector	Power	<i>Select on the device and add it to a data system and connect it to a circuit and panel. Adjust the VA, voltage and poles to match the light fixture you are using.</i>

1.21 LIGHTING CONTROL PANEL

This family is for wall hosted control panels. The panels are surface mounted and are imported with a default height of 48". There are four different types of panels used for dimming or preset lighting. The actual outline of the panel does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the panel symbol as shown below.



Figure 21: Plan view of the sample panels: Dimmer Rack (DR), Dimming System Room Partitioning Assignment Control Panel (ACP), Dimming System Control Station (DCS), and Lighting Control Scene Selector & Preset Panel (SSP)

Hosting:	Wall	<i>Make sure there is a wall and you are in a view that has a wall within its viewing plane.</i>
Types Parameters:	Type, Depth, Width, Height, Number of Relays	<i>You should assign a type letter, to be able to assign an annotation to the panel. The panel size is related to the number of relays that the panel has.</i>

Instance Parameters:	Voltage, Elevation	<p><i>Define the voltage for the panel.</i></p> <p><i>The default elevation is 48". Adjust the switch height as needed.</i></p>
Built-in Types	Dimmer Rack (DR), Dimming System Room Partitioning Assignment Control Panel (ACP), Dimming System Control Station (DCS), and Lighting Control Scene Selector & Preset Panel (SSP)	



11 – One-Line Diagrams

Capacitors, circuit breakers, symbols, contacts, current transformers, potential transformers, disconnects, fuses, grounds, high voltage, overload, push buttons, starters, surge arrestors, transfer switches, transformers, etc.

Section 11.0 – Electrical One Line Diagram Families for Revit®

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1.0 ONE-LINE DIAGRAMS

For these one-line diagram symbols, you need a Drafting View. You cannot draw this directly in your model or on sheets. You need to create a drafting view and you also need to select a 1:1 scale. The purpose of these symbols is to speed up the one-line diagram creation process. You still will need to make custom symbols, but hopefully these standard symbols will increase your efficiency. *All symbols are a part of the Detail Items Family Category.*

Please contact me at Justin@engproguides.com for company-wide, customization options.

1.1 CAPACITOR

One capacitor symbol is provided by default. If you need additional capacitor symbols, please contact Justin@engproguides.com for customization options.

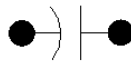


Figure 1: Capacitor, one-line diagram symbol on drafting view (1:1 scale).

1.2 CIRCUIT BREAKER

There are two types of circuit breakers provided, draw-out on the right and molded case on the left.



Figure 2: Circuit breaker, one-line diagram symbol on drafting view (1:1 scale).

1.3 CIRCULAR SYMBOL

The circular symbol can be used as a relay symbol or as a note symbol on your one-line diagram.



Figure 3: Circular, one-line diagram symbol on drafting view (1:1 scale).

1.4 CONTACT

The contact family includes two types, normally open and normally closed. Upon activation (relay coil powered), the corresponding contact will switch positions.



Figure 4: Normally closed and normally open contact, one-line diagram symbols on drafting view (1:1 scale).

1.5 CURRENT TRANSFORMER

A current transformer and potential transformer are provided for use with relays and other purposes.



Figure 5: Current transformer, one-line diagram symbol on drafting view (1:1 scale).

1.6 DISCONNECT SWITCH

There are two types of disconnect switches provided, a fused disconnect and a non-fused disconnect.

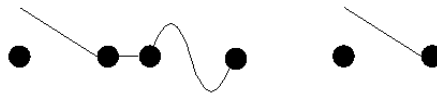


Figure 6: Fused and non-fused disconnect, one-line diagram symbols on drafting view (1:1 scale).

1.7 FUSE

There are two types of fuses provided, a breakaway fuse and a normal fuse.

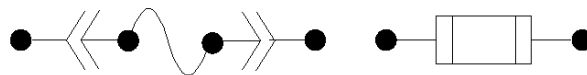


Figure 7: Breakaway and normal fuse, one-line diagram symbols on drafting view (1:1 scale).

1.8 GROUND

There is only one ground type symbol built-in to the family.

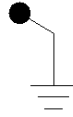


Figure 8: Capacitor, one-line diagram symbol on drafting view (1:1 scale).

1.9 HIGH VOLTAGE TERMINATION

There is only one high voltage termination symbol built-in to the family.

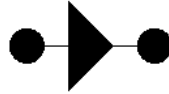


Figure 9: High voltage termination, one-line diagram symbol on drafting view (1:1 scale).

1.10 OVERLOAD

There is only one overload symbol built-in to the family.



Figure 10: Overload, one-line diagram symbol on drafting view (1:1 scale).

1.11 POTENTIAL TRANSFORMER

There is only one potential transformer symbol built-in to the family.

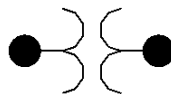


Figure 11: Potential transformer, one-line diagram symbol on drafting view (1:1 scale).

1.12 PUSH BUTTON SWITCH

There are two push button switches built into the family, push to open and push to close.

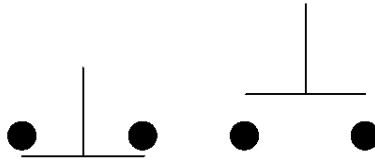


Figure 12: Push to open and push to close, one-line diagram symbols on drafting view (1:1 scale).

1.13 RECTANGULAR SYMBOL

A rectangular symbol can be used for miscellaneous equipment.



Figure 13: Rectangular, one-line diagram symbol on drafting view (1:1 scale).

1.14 SQUARE SYMBOL

A square symbol can be used for miscellaneous equipment.

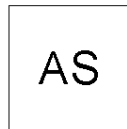


Figure 14: Square, one-line diagram symbol on drafting view (1:1 scale).

1.15 STARTER

There is only one starter symbol built-in to the family.



Figure 15: Starter, one-line diagram symbol on drafting view (1:1 scale).

1.16 SURGE ARRESTOR

There is only one surge arrestor symbol built-in to the family.

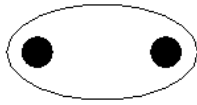


Figure 16: Surge arrester, one-line diagram symbol on drafting view (1:1 scale).

1.17 TRANSFER SWITCH

There is only one transfer switch symbol built-in to the family.

Figure 17: Transfer switch, one-line diagram symbol on drafting view (1: 1 scale).

1.18 TRANSFORMER

There is only one transformer symbol built-in to the family.

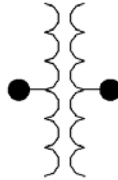


Figure 18: Transformer, one-line diagram symbol on drafting view (1:1 scale).

12 – Exterior Power Systems

Generic outdoor equipment, transformers, pad mounted, wall mounted, hand holes, etc.

Section 12.0 – Revit® Electrical Power Systems Exterior Families

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1.0 POWER SYSTEMS - EXTERIOR

1.1 OUTDOOR TRANSFORMERS

Exterior transformers are typically used to step-down utility voltage down to commercial, industrial or residential type voltages. There are more types of exterior transformers, which can be used for utility distribution, sub-stations and power-plants. However, this document does not focus on those types of transformers. In order to properly use the families, you need to understand the properties that define each transformer.

Manufacturers: The typical manufacturers for outdoor transformers that are used to step down utility distribution voltage down to customer usable voltage include Eaton, ABB, Square D and Siemens.

Cooling Method: The cooling method is very important because it is a big factor in determining the capacity (KVA) of the transformer. Outdoor transformers are typically fluid cooled. Sometimes the transformers can be air cooled, but fluid cooled transformers can have much higher capacities (KVA) for smaller sizes. The oil used can be mineral oil or something more environment friendly like FR3 which is a type of fluid derived from vegetable oil. In the event there is a spill, the FR3 fluid is readily biodegradable and non-toxic. The other types of cooling methods are included below.

Dry-Type: Dry type transformers are typically used indoors and do not include any liquid within the transformer that could possibly leak.

1. AA: AA stands for self-cooled by natural convection. Vents are provided which allow for hot air to naturally rise out of the enclosure and lower vents which allow cool air to enter.
2. FA: The addition of the “F” means that the vents have fans to force the circulation of more air.

3. AA/FA: The slash indicates that there are multiple capacities. So the transformer can operate as an AA at a lower capacity and FA at a higher capacity. The increased cooling due to the fan lets the transformer operate at a higher KVA value.
4. ANV: This cooling method is called self-cooled (A) and not-ventilated (NV). This means that there are no intentional vents, but it does not mean that the unit is completely sealed. The air within the enclosure heats up, but releases its heat through the enclosure and to the outdoors. The amount of cooling provided is much less than the previous cooling methods, because of the vents. Thus these transformers have a smaller KVA for the same dimensions.
5. GA: These transformers are sealed and instead of air, the enclosure space is filled with a gas that has better heat transfer properties. The gas picks up the heat, transfers the heat to the enclosure and then the heat is expelled to the outdoor air.

Liquid Cooled Types: Liquid cooled transformers contain liquid that picks up the heat from the windings and core. These transformers are not typically used indoors because codes may require these transformers to be located in a vault that has the capacity to contain a liquid spill. These transformers are typically located outdoors where a leak can be contained more easily. Liquid cooled transformers can have a higher capacity for the same dimensions as a dry-type transformer.

1. OA: The “O” stands for oil and the “A” is similar to the dry type designation for self-cooled. Heat is transferred to the oil and then to the enclosure where the enclosure is self-cooled by the outside air. The oil may also be routed to a radiator, similar to your car, where the oil can transfer its heat with the best surface area to the outside air.
2. OA/FA: The addition of the “FA” to the “OA” term is the addition of a fan to the radiator. The addition of the fan increases the cooling capacity which also increases the KVA capacity. There will be two KVA capacity values one for just the OA cooling method and the other increase in capacity for the addition of the fan.
3. OA/FA/FA: The second “FA” is the addition of another fan. There will now be three KVA capacity values.
4. OA/FA/FOA: In this cooling method, the third term is the addition of a fan and an oil pump. By circulating more oil and the addition of the fan, cooling will be increased and thus capacity will be increased.
5. OW: In this cooling method, the oil surrounding the core and windings is naturally circulated (similar to the previous methods), but it is circulated to a heat exchanger that transfers heat from the oil to water, hence “OW”. The water is then pumped to a separate cooling mechanism.
6. FOA: This term was discussed previously, but again it is the addition of a pump that is used to pump the oil to a radiator that contains a fan to transfer the heat from the oil to air.
7. FOW: This term includes the oil pump, but also includes an intermediary heat exchanger that transfers the heat to water and then to a radiator. The radiator includes a fan to more effectively transfer heat to the air.

Live-Front or Dead-Front: Bolted cable terminations are called live front and elbow terminated are called dead-front. Both options are safe but some jurisdictions like the federal government

require dead fronts. In the dead front types the cables are shielded on the outer surface and the potentials are not exposed.

Primary Voltages: Typical primary voltages from a utility for USA (60 Hz) include 2,400 V, 4,160 V, 4,800 V (not as popular), 7,200 V (not as popular), 11,500 V, 12,470 V, 13,200 V, 24,940 V and 46,000 V. The primary is typically in a delta-arrangement to allow for separation of ground faults.

Secondary Voltages: The secondary voltages for customers are typically, 480/277 V, 240/120V, and 208/120V. The secondary is typically in a wye-arrangement to allow for these phase to phase voltages and phase to neutral voltages. The first voltage is the phase to phase voltage and the voltage after the “/” is the phase to neutral voltage. A delta-arrangement does not include a neutral, so there is not typically a phase to neutral voltage.

K-Factor: The k-factor describes the transformer’s ability to withstand harmonics by reducing the heating associated with harmonics. The typical k-factors are 4, 9, 13, 20, 30, 40 and 50. The higher k-factors indicate a greater ability to withstand the heating due to harmonics.

Family Category:	Electrical Equipment → Transformer	<i>After the family is imported locate it in the following category.</i>
Hosting:	Not applicable	<i>You need to specify the elevation of the transformer.</i>
Types Parameters:	Depth, Width, Height	<i>Within each type you are allowed to adjust the transformer dimensions.</i>
Instance Parameters:	Elevation, Offset, Voltage, Number of Poles, Load Classification, Enclosure, Mounting	<i>The default elevation is 0” when installed on a horizontal face. Add the voltage, poles, load classification, enclosure and mounting type.</i>
Built-in Types		
System Connector	Power-Unbalanced, Conduit	<i>Select the equipment and create a power system</i>

- Single Phase, Pad Mount
- Single Phase, Pole Mount
- Three Phase Pad Mount (500 – 750 KVA)
- Three Phase Dead Front (75 – 300 KVA)

1.2 SINGLE PHASE, PAD MOUNT TRANSFORMER

This family is non-hosted, single phase, pad mount transformer. The family follows the basic shape of a small transformer. These smaller transformers typically have a box shape, since no external radiator is needed for additional cooling.

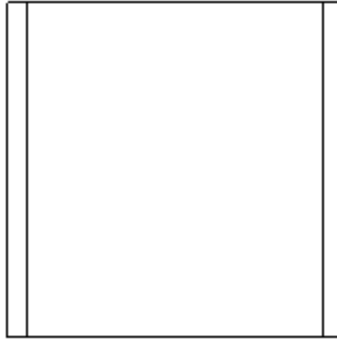


Figure 1: Plan view of the single phase, pad mount, transformer.

Family Category:	Electrical Equipment	<i>After the family is imported locate it in the following category.</i>
Hosting:	No host	<i>Please keep track of the elevation, since there is no host.</i>
Types Parameters:	KVA rating, Apparent power, Frequency, Load Classification – Transformer, Phases, Poles, Primary voltage, Secondary voltage, % impedance, K-factor, Cooling method, Coil material, Core material, Dimensions.	<i>You should create a new type for the specific transformer you are using. The information can be imported into a schedule. The dimensions should be correct for space planning.</i>
Instance Parameters:		
Built-in Types	Default	
System Connector	Power-Unbalanced	<i>Select the equipment and connect to a panel.</i>

You can use this transformer for either single or three phase transformers. The main difference between the single and three phase transformers is the shape. The shape should match as close to your specific transformer as possible.

1.3 THREE PHASE, PAD MOUNT TRANSFORMER

This family is non-hosted, three phase, pad mount transformer. The family follows the basic shape of a larger transformer with a radiator provided for cooling.



Figure 2: Plan view of a three phase, pad mount, transformer. The core and coil are in the main box, while the radiator for cooling is the attached box.

Family Category:	Electrical Equipment	<i>After the family is imported locate it in the following category.</i>
Hosting:	No host	<i>Please keep track of the elevation, since there is no host.</i>
Types Parameters:	KVA rating, Apparent power, Frequency, Load Classification – Transformer, Phases, Poles, Primary voltage, Secondary voltage, % impedance, K-factor, Cooling method, Coil material, Core material, Dimensions.	<i>You should create a new type for the specific transformer you are using. The information can be imported into a schedule. The dimensions should be correct for space planning.</i>
Instance Parameters:		
Built-in Types	Default	
System Connector	Power-Unbalanced	<i>Select the equipment and connect to a panel.</i>

You can use this transformer for either single or three phase transformers. The main difference between the single and three phase transformers is the shape. The shape should match as close to your specific transformer as possible.

1.4 UNDERGROUND CIRCULAR HAND HOLE

This family is non-hosted, circular hand hole. The family is intended for site plans, when you need to route underground conductors.



Figure 3: Plan view of the underground circular hand hole. The rectangular version is shown on the right and circular version shown on the left.

Family Category:	Electrical Fixtures	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Size, dimensions	<i>Adjust the size to meet the actual size you are designing, make sure you meet the NEC and any other requirements.</i>
Instance Parameters:		
Built-in Types	Default	
System Connector	No system	

1.5 UNDERGROUND RECTANGULAR HAND HOLE

This family is non-hosted, rectangular hand hole. The family is intended for site plans, when you need to route underground conductors.



Figure 4: Plan view of the underground rectangular hand hole. The rectangular version is shown on the right and circular version shown on the left.

Family Category:	Electrical Fixtures	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Size, dimensions	<i>Adjust the size to meet the actual size you are designing, make sure you meet the NEC and any other requirements.</i>
Instance Parameters:		
Built-in Types	Default	
System Connector	No system	

1.6 GENERIC ELECTRICAL EQUIPMENT

This family is non-hosted, generic electrical equipment. The family is intended for any equipment that you as an electrical engineer need to power. Often times the equipment does not contain the correct electrical information in order to complete NEC calculations. Here, you can add any equipment that needs power. You can change the dimensions to make the box large or small.

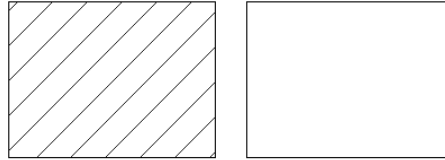


Figure 5: Plan view of the general electrical equipment. It can be displayed hatched or not hatched.

Family Category:	Electrical Fixtures	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Load Classification, Voltage, Phases, Poles, Frequency, Power Factor, FLA, Equipment Dimensions	<i>You should create a new type for the electrical equipment. You can then add the NEC information required to complete your electrical engineering calculations.</i>
Instance Parameters:		
Built-in Types	Default	
System Connector	Power-Unbalanced	<i>Select the equipment and connect to a panel.</i>

13 – Interior Power Systems

Ceiling fan, motor, cabinets, electrified equipment, circuit breaker, fire smoke damper connection, junction boxes, load centers, motorized actuators, outlets, panels, etc.

Section 13.0 –Electrical Power Systems Interior Families for Revit®

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1.0 POWER SYSTEMS - INTERIOR

1.1 DISCONNECT SWITCH

Disconnects are essentially a switch that isolate an equipment from the main power source. Switching the disconnect to the off position ensures that no electrocution will occur when performing maintenance on a piece of equipment, since the power source is no longer connected.

Disconnect requirements for motors are determined by 2017 NEC Article 430, Part IX. Disconnects for air conditioners are determined by NEC Article 440, Part II. Disconnect requirements for other equipment types are found under the specific equipment category in the NEC.

Location: Where practical, the disconnect switch should be in a location where it is in line of sight of the motor/equipment. If the location poses a hazard, then the disconnect may be located out of sight, but must include a lock and labeled. See NEC for additional requirements.

Disconnect Sizing (motors): General motors shall be sized as one of the following: (1) 115% of the motor FLA rating, per NEC 430.110(A). For typical motors, the FLA is found using the HP in table 430.247-250, per NEC 430.6(A)(1). If the motor is low speed, high torque, or multispeed, then the nameplate FLA is used. (2) Shall be a listed unfused motor-circuit switch with a horsepower rating at least the size of the motor, per the exception.

Disconnect Sizing (air conditioning): Disconnects for refrigeration equipment sizing is a two step process. First, the disconnect shall be 115% of the nameplate FLA or the nameplate branch circuit selection current (BCSC), whichever is greater, per NEC 440.12(A)(1). Then, use Table 430.248-250 to find the horsepower associated with that FLA rating. In the second step, find the horsepower that is associated with the nameplate locked rotor current from Table 430.251. The largest horsepower determined shall be used to select the disconnect.

Disconnect Connection (single vs multiple motors): Disconnects are typically required for each motor. However, a single disconnect for multiple motors may be provided if there are multiple motors for a single machine, where the motors are allowed to be connected to a single branch circuit protection device, or where all the motors are in line of site of the disconnect, per NEC 430.112. In the case that multiple motors are connected to one disconnect, then Table 430.251 is used to size the disconnect, in lieu of the section above. See NEC 430.110(C) for an example.

Disconnect Switch Options for Smaller Motors: If the motor is stationary and 1/8 HP or less, the branch-circuit overcurrent device may be used as the disconnect, per NEC 430.109(B). If the motor is stationary and 2 HP or less, then a general switch with FLA rating at least 2 times the motor FLA may be used or an alternating current switch that is 1.25 times the motor FLA, per NEC 430.109(C). See the "Motor Connection with Switch Disconnect" family for this application. See NEC 430.109 for other disconnecting options.

This family is a face hosted disconnect switch. The family is intended to be mounted on a vertical surface and is imported with a default height of 48" and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement

tab when inserting the family. The symbol outline is based on the actual dimensions of the object. The device may be offset from the wall to symbolically show when the switch is stacked.



Figure 1: Plan view of the disconnect switch.

Family Category:	Electrical Equipment → Electrical Switch	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Depth, Width, Height	<i>Within each type you are allowed to adjust the device dimensions.</i>
Instance Parameters:	Elevation, Offset, Voltage, Number of Poles, Load Classification, Enclosure, Mounting	<i>The default elevation is 48" when installed on a vertical face. The default offset is 0". The offset is meant to symbolically show if the objects are stacked. Add the voltage, poles, load classification, enclosure and mounting type.</i>
Built-in Types		
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system</i>

1.2 DISCONNECT SWITCH, OVER JUNCTION BOX

This family is a face hosted disconnect switch, mounted over a flush junction box and back connected. The family is intended to be mounted on a vertical surface and is imported with a default height of 48" and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The symbol outline is based on the actual dimensions of the object.

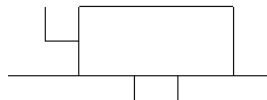


Figure 2: Plan view of the disconnect switch, mounted over flush junction box and back connected.

Family Category:	Electrical Equipment → Electrical Switch	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Disconnect Depth, Disconnect Width, Disconnect Height, JB Depth, JB Width, JB Height	<i>Within each type you are allowed to adjust the device dimensions for the disconnect and junction box.</i>
Instance Parameters:	Elevation, Offset, Voltage, Number of Poles, Load Classification, Enclosure, Mounting	<i>The default elevation is 48" when installed on a vertical face. The default offset is 0". Add the voltage, poles, load classification, enclosure and mounting type.</i>
Built-in Types		
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system</i>

1.3 COMBINATION STARTER-DISCONNECT SWITCH

This family is a face hosted combination starter-disconnect switch. The family is intended to be mounted on a vertical surface and is imported with a default height of 48" and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The symbol outline is based on the actual dimensions of the object. The device may be offset from the wall to symbolically show when the switch is stacked.



Figure 3: Plan view of the combination starter-disconnect switch.

Family Category:	Electrical Equipment → Switchboard	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Depth, Width, Height	<i>Within each type you are allowed to adjust the device dimensions.</i>

Instance Parameters:	Elevation, Offset, Voltage, Number of Poles, Load Classification, Enclosure, Mounting	<i>The default elevation is 48" when installed on a vertical face. The default offset is 0". The offset is meant to symbolically show if the objects are stacked. Add the voltage, poles, load classification, enclosure and mounting type.</i>
Built-in Types		
System Connector	Power-Unbalanced, Conduit	<i>Select the equipment and create a power system</i>

1.4 STARTER

This family is a face hosted starter. The family is intended to be mounted on a vertical surface and is imported with a default height of 48" and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The symbol outline is based on the actual dimensions of the object. The device may be offset from the wall to symbolically show when the switch is stacked.



Figure 4: Plan view of the starter.

Family Category:	Electrical Equipment → Switchboard	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Depth, Width, Height	<i>Within each type you are allowed to adjust the device dimensions.</i>
Instance Parameters:	Elevation, Offset, Voltage, Number of Poles, Load Classification, Enclosure, Mounting	<i>The default elevation is 48" when installed on a vertical face. The default offset is 0". The offset is meant to symbolically show if the objects are stacked. Add the voltage, poles, load classification, enclosure and mounting type.</i>
Built-in Types		

System Connector	Power-Unbalanced	<i>Select the equipment and create a power system</i>
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1.5 ENCLOSED CIRCUIT BREAKER

This family is a face hosted enclosed circuit breaker. The family is intended to be mounted on a vertical surface and is imported with a default height of 48" and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The symbol outline is based on the actual dimensions of the object. The device may be offset from the wall to symbolically show when the circuit breaker is stacked.



Figure 5: Plan view of the enclosed circuit breaker.

Family Category:	Electrical Equipment → Electrical Switch	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Depth, Width, Height	<i>Within each type you are allowed to adjust the device dimensions.</i>
Instance Parameters:	Elevation, Offset, Voltage, Number of Poles, Load Classification, Enclosure, Mounting	<i>The default elevation is 48" when installed on a vertical face. The default offset is 0". The offset is meant to symbolically show if the objects are stacked. Add the voltage, poles, load classification, enclosure and mounting type.</i>
Built-in Types	30A, 60A, 100A, 200A, 400A, 600A	
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system</i>

1.6 PANEL-SURFACE

This family is a face hosted, surface mounted electrical panel. The family is intended to be mounted on a vertical surface and is imported with a default height of 48" and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the

modify → placement tab when inserting the family. The symbol outline is based on the actual dimensions of the object.



Figure 6: Plan view of the surface mounted panel.

Family Category:	Electrical Equipment → Panelboard	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Depth, Width, Circuit Height, Rating, Voltage, Wattage	<i>Within each type you are allowed to adjust the device dimensions. The height is based on the max number of breakers allowed for the panel. The ratings are defined in amperage. The voltage and wattage are built in parameters. The voltage may also be defined in the panel schedule.</i>
Instance Parameters:	Elevation, Offset, Enclosure, Mounting, Panel Name, Max #1 Pole Breakers, Visibility – Left Door/Right Door	<i>The default elevation is 48” when installed on a vertical face. The default offset is 0”. The default enclosure type is NEMA 1, the default mounting type is surface. Add the panel name and the max number of circuit breakers, which will automatically adjust the height. The visibility allows you to switch the orientation of the panel door.</i>
Built-in Types	Capacity: 100A, 225A, 400A, 600A Heights based on max number of circuits: 18, 30, 42, 48, 54, 60, 72, 84	<i>Select the appropriate capacity. When inputting the max number of circuits for the panel, the height will automatically be calculated.</i>
System Connector	Power-Unbalanced, Conduit	<i>Select the equipment and create a power system.</i>

MLO or main lug only indicates that the feeder conductors connect to lugs that connect directly to the panel bus. MLO also indicates that you do not have a main circuit breaker in the panel.

MCB or main circuit breaker indicates that the feeder conductors connect to a main breaker and the breakers connect to the panel bus. MCB indicates that you DO have a main circuit breaker in the panel.

1.7 PANEL-RECESSED

This family is a face hosted, recessed mounted electrical panel. The family is intended to be mounted on a vertical surface and is imported with a default height of 48" and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The symbol outline is based on the actual dimensions of the object.

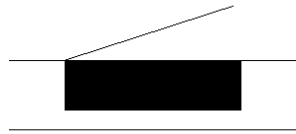


Figure 7: Plan view of the recessed mounted panel.

Family Category:	Electrical Equipment → Panelboard	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Depth, Width, Circuit Height, Rating, Voltage, Wattage	<i>Within each type you are allowed to adjust the device dimensions. The height is based on the max number of breakers allowed for the panel. The ratings are defined in amperage. The voltage and wattage are built in parameters. The voltage may also be defined in the panel schedule.</i>
Instance Parameters:	Elevation, Offset, Enclosure, Mounting, Panel Name, Max #1 Pole Breakers, Visibility – Left Door/Right Door	<i>The default elevation is 48" when installed on a vertical face. The default offset is 0". The default enclosure type is NEMA 1, the default mounting type is recessed. Add the panel name and the max number of circuit breakers, which will automatically adjust the height. The visibility allows you to switch the orientation of the panel door.</i>

Built-in Types	Capacity: 100A, 225A, 400A, 600A Heights based on max number of circuits: 18, 30, 42, 48, 54, 60, 72, 84	Select the appropriate capacity. When inputting the max number of circuits for the panel, the height will automatically be calculated.
System Connector	Power-Unbalanced, Conduit	Select the equipment and create a power system.

MLO or main lug only indicates that the feeder conductors connect to lugs that connect directly to the panel bus. MLO also indicates that you do not have a main circuit breaker in the panel.

MCB or main circuit breaker indicates that the feeder conductors connect to a main breaker and the breakers connect to the panel bus. MCB indicates that you DO have a main circuit breaker in the panel.

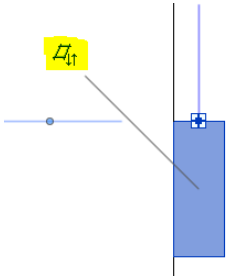
1.8 JUNCTION BOX, VERTICAL – SURFACE

This family is a face hosted, surface mounted junction box. The family is intended to be mounted on a vertical surface. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The object outline does not appear on plan view, only the object symbol.



Figure 8: Plan view of the wall mounted junction box. Left – small J-box symbol, Right – large J-box symbol

To convert the box from a surface mount to a recessed type, select the junction box while in an elevation view and click on the flip icon, highlighted below.



Autodesk screen shots reprinted courtesy of Autodesk, Inc

Figure 9: Convert the junction box to a recessed mount.

Family Category:	Electrical Device → Junction Box	After the family is imported locate it in the following category.
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Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Depth, Width, Height, Symbol Letter, Visibility – Large J-Box, Small J-Box	<i>Within each type you are allowed to adjust the device dimensions and symbol letter, which at default is “J.” You are also able to select which symbol appears for each type: the small or large junction box.</i>
Instance Parameters:	Elevation, Offset, Voltage, Number of Poles, Load Classification, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face. The default voltage is 120V, and poles is 1. The visibility allows you to switch the orientation of the symbol letter.</i>
Built-in Types	Small Symbol: 4” square x 1-1/2”, 4” square x 2-1/8” Large Symbol: 6” square x 4”, 8” square x 4”, 8” square x 6”, 12” square x 6”	<i>Select the appropriate dimensions.</i>
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system.</i>

1.9 JUNCTION BOX, HORIZONTAL – SURFACE

This family is a face hosted, surface mounted junction box. The family is intended to be mounted on a horizontal surface, such as a ceiling or floor. When inserting the family, be sure to adjust the placement to “face” under the modify → placement tab. The default placement will be “vertical face,” which will appear on the wall, but not on the ceiling. The object outline does not appear on plan view, only the object symbol.



Figure 10: Plan view of the ceiling mounted junction box. Left – small J-box symbol, Right – large J-box symbol

Convert the box to a recessed mount by using the instructions in the vertical junction box, as indicated in the previous section.

Family Category:	Electrical Device → Junction Box	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object. If mounting on the ceiling, make sure you are in the reflected ceiling plan. Select “Face” under the modify</i>

		→ placement tab before placing the object for horizontal mount.
Types Parameters:	Depth, Width, Height, Symbol Letter, Visibility – Large J-Box, Small J-Box	Within each type you are allowed to adjust the device dimensions and symbol letter, which at default is “J.” You are also able to select which symbol appears for each type: the small or large junction box.
Instance Parameters:	Elevation, Offset, Voltage, Number of Poles, Load Classification, Visibility – Upright, Sideways	The default elevation is 48” when installed on a vertical face. The default voltage is 120V, and poles is 1. The visibility allows you to switch the orientation of the symbol letter.
Built-in Types	Small Symbol: 4” square x 1-1/2”, 4” square x 2-1/8” Large Symbol: 6” square x 4”, 8” square x 4”, 8” square x 6”, 12” square x 6”	Select the appropriate dimensions.
System Connector	Power-Unbalanced	Select the equipment and create a power system.

1.10 JUNCTION BOX, HORIZONTAL/VERTICAL – NO HOST

This family is a non-hosted, junction box. The horizontal family is intended to be mounted on the ceiling or horizontal surface and the vertical family is intended to be mounted on the wall or vertical surface, but does not have to host to a surface. These boxes are imported as a conduit fitting with conduit connectors. The object outline does not appear on plan view, only the object symbol.



Figure 11: Plan view of the ceiling mounted junction box. Left – small J-box symbol, Right – large J-box symbol



Figure 12: Plan view of the vertical mounted junction box. Left – small J-box symbol, Right – large J-box symbol

Family Category:	Conduit Fitting	After the family is imported locate it in the following category.
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Hosting:	No Host	<i>No hosting surface is required.</i>
Types Parameters:	Depth, Width, Height, Symbol Letter, Visibility – Large J-Box, Small J-Box	<i>Within each type you are allowed to adjust the device dimensions and symbol letter, which at default is “J.” You are also able to select which symbol appears for each type: the small or large junction box.</i>
Instance Parameters:	Elevation, Offset, Voltage, Number of Poles, Load Classification, Visibility – Upright, Sideways	<i>The default elevation is 0” from the reference floor. The default voltage is 120V, and poles is 1. The visibility allows you to switch the orientation of the symbol letter.</i>
Built-in Types	Small Symbol: 4” square x 1-1/2”, 4” square x 2-1/8” Large Symbol: 6” square x 4”, 8” square x 4”, 8” square x 6”, 12” square x 6”	<i>Select the appropriate dimensions.</i>
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system.</i>

1.11 WALL OUTLET, POINT OF SALE

This family is a face hosted, point of sale outlet with blank device plate. The family is intended to be mounted on a wall or a vertical surface. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The object outline does not appear on plan view, only the object symbol.

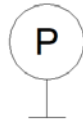


Figure 13: Plan view of the wall mounted, point of sale outlet with blank device plate.

Family Category:	Electrical Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Faceplate and Outlet box dimensions: Depth, Width, Height, Symbol Visibility, Load Classification	<i>Within each type you are allowed to adjust the dimensions and symbol visibility. The default load classification is receptacle, with demand factor of 100% up to 10kVA and 50% above 10kVA. The</i>

		<i>demand factor can be adjusted under the family type window.</i>
Instance Parameters:	Elevation, Voltage, Number of Poles, Apparent Load, Enclosure	<i>The default elevation for the receptacles is 18". Adjust the voltage, poles, load, and enclosure as necessary.</i>
Built-in Types	Point of Sale Outlet	<i>Select the appropriate type. The receptacle symbol will change automatically with the type.</i>
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system.</i>

1.12 WALL OUTLET, BLANK DEVICE WITH STUB-OUT

This family is a face hosted, blank device plate outlet with conduit stub out to ceiling. The family is intended to be mounted on a wall or a vertical surface. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The object outline does not appear on plan view, only the object symbol.

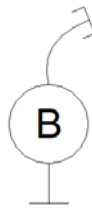


Figure 14: Plan view of the wall mounted, black device plate outlet with conduit stub out to ceiling.

Family Category:	Electrical Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Faceplate and Outlet box dimensions: Depth, Width, Height, Symbol Visibility, Load Classification	<i>Within each type you are allowed to adjust the dimensions and symbol visibility. The default load classification is receptacle, with demand factor of 100% up to 10kVA and 50% above 10kVA. The demand factor can be adjusted under the family type window.</i>
Instance Parameters:	Elevation, Voltage, Number of Poles, Apparent Load, Enclosure	<i>The default elevation for the receptacles is 18". Adjust the voltage, poles, load, and enclosure as necessary.</i>

Built-in Types	Outlet with Blank Device Plate with Conduit Stub to Ceiling	
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system.</i>

1.13 WALL OUTLET, CLOCK

This family is a face hosted, clock outlet. The family is intended to be mounted on a wall or a vertical surface. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The object outline does not appear on plan view, only the object symbol.



Figure 15: Plan view of the wall mounted clock outlet.

Family Category:	Electrical Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Faceplate and Outlet box dimensions: Depth, Width, Height, Symbol Visibility, Load Classification	<i>Within each type you are allowed to adjust the dimensions and symbol visibility. The default load classification is receptacle, with demand factor of 100% up to 10kVA and 50% above 10kVA. The demand factor can be adjusted under the family type window.</i>
Instance Parameters:	Elevation, Voltage, Number of Poles, Apparent Load, Enclosure	<i>The default elevation for the receptacles is 18". Adjust the voltage, poles, load, and enclosure as necessary.</i>
Built-in Types	Clock Outlet	
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system.</i>

1.14 INDOOR TRANSFORMER (WALL MOUNTED)

The transformers shown in this section are only NEMA/ANSI rated, since these standards are commonly used in the USA. The International Electrotechnical Commission (IEC) rated transformers are not included in this section.

This family is a face hosted to a wall. The family is intended to be mounted on a wall or a vertical surface. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The object outline appears on plan view.

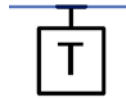


Figure 16: Plan view of the wall mounted, indoor transformer. The transformer family only shows the symbol, not the actual dimensions. This is intended only for small indoor transformers, where the dimensions are too small and so a symbol is used.

Family Category:	Electrical Equipment	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	KVA Rating, Frequency, Load Classification – Transformer, Primary Voltage, Secondary Voltage, Phases, Poles, Current, Percent Impedance, K Factor, Cooling Method, Coil Material, Core Material, Apparent Load, Symbol Letter	
Instance Parameters:	Elevation, Dimensions, Symbol.	<i>The default elevation for transformer is 48". Adjust the elevation, dimensions as necessary.</i>
Built-in Types	3 KVA, 6 KVA, 9 KVA, 15 KVA, 30 KVA	
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system.</i>

1.15 INDOOR TRANSFORMER (PAD MOUNTED)

The transformers shown in this section are only NEMA/ANSI rated, since these standards are commonly used in the USA. The International Electrotechnical Commission (IEC) rated transformers are not included in this section.

This family is non-hosted. The family is intended to be mounted on the ground.



Figure 17: Plan view of the pad mounted, indoor transformer. The transformer family only shows the symbol, not the actual dimensions. This is intended only for small indoor transformers, where the dimensions are too small and so a symbol is used.

Family Category:	Electrical Equipment	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	KVA Rating, Frequency, Load Classification – Transformer, Primary Voltage, Secondary Voltage, Phases, Poles, Current, Percent Impedance, K Factor, Cooling Method, Coil Material, Core Material, Apparent Load, Symbol Letter	
Instance Parameters:	Elevation, Dimensions, Symbol.	<i>The default elevation for transformer is 48". Adjust the elevation, dimensions as necessary.</i>
Built-in Types	15, 30 45, 75, 112.5, 150 KVA	
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system.</i>

1.16 LOAD CENTER-SURFACE

This family is a face hosted, surface mounted electrical load center. The family is intended to be mounted on a vertical surface and is imported with a default height of 48" and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The symbol outline is based on the actual dimensions of the object. A load center is typical for small residential and commercial spaces.



Figure 18: Plan view of the surface mounted load center.

Family Category:	Electrical Equipment → Panelboard	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Depth, Width, Circuit Height, Rating, Voltage, Wattage	<i>Within each type you are allowed to adjust the device dimensions. The height is based on the max number of breakers allowed for the panel. The ratings are defined in amperage. The voltage and wattage are built in parameters. The voltage may</i>

		<i>also be defined in the panel schedule.</i>
Instance Parameters:	Elevation, Offset, Enclosure, Mounting, Panel Name, Max #1 Pole Breakers, Visibility – Left Door/Right Door	<i>The default elevation is 48” when installed on a vertical face. The default offset is 0”. The default enclosure type is NEMA 1, the default mounting type is surface. Add the panel name and the max number of circuit breakers, which will automatically adjust the height. The visibility allows you to switch the orientation of the panel door.</i>
Built-in Types	Capacity: 100A, 225A, 400A, 600A Heights based on max number of circuits: 18, 30, 42, 48, 54, 60, 72, 84	<i>Select the appropriate capacity. When inputting the max number of circuits for the panel, the height will automatically be calculated.</i>
System Connector	Power-Unbalanced, Conduit	<i>Select the equipment and create a power system.</i>

MLO or main lug only indicates that the feeder conductors connect to lugs that connect directly to the panel bus. MLO also indicates that you do not have a main circuit breaker in the panel.

MCB or main circuit breaker indicates that the feeder conductors connect to a main breaker and the breakers connect to the panel bus. MCB indicates that you DO have a main circuit breaker in the panel.

1.17 LOAD CENTER-RECESSED

This family is a face hosted, recessed mounted electrical load center. The family is intended to be mounted on a vertical surface and is imported with a default height of 48” and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The symbol outline is based on the actual dimensions of the object. A load center is typical for small residential and commercial spaces.



Figure 19: Plan view of the recessed mounted load center.

Family Category:	Electrical Equipment → Panelboard	<i>After the family is imported locate it in the following category.</i>
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Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Depth, Width, Circuit Height, Rating, Voltage, Wattage	<i>Within each type you are allowed to adjust the device dimensions. The height is based on the max number of breakers allowed for the panel. The ratings are defined in amperage. The voltage and wattage are built in parameters. The voltage may also be defined in the panel schedule.</i>
Instance Parameters:	Elevation, Offset, Enclosure, Mounting, Panel Name, Max #1 Pole Breakers, Visibility – Left Door/Right Door	<i>The default elevation is 48" when installed on a vertical face. The default offset is 0". The default enclosure type is NEMA 1, the default mounting type is recessed. Add the panel name and the max number of circuit breakers, which will automatically adjust the height. The visibility allows you to switch the orientation of the panel door.</i>
Built-in Types	Capacity: 100A, 225A, 400A, 600A Heights based on max number of circuits: 18, 30, 42, 48, 54, 60, 72, 84	<i>Select the appropriate capacity. When inputting the max number of circuits for the panel, the height will automatically be calculated.</i>
System Connector	Power-Unbalanced, Conduit	<i>Select the equipment and create a power system.</i>

MLO or main lug only indicates that the feeder conductors connect to lugs that connect directly to the panel bus. MLO also indicates that you do not have a main circuit breaker in the panel.

MCB or main circuit breaker indicates that the feeder conductors connect to a main breaker and the breakers connect to the panel bus. MCB indicates that you DO have a main circuit breaker in the panel.

1.17 MOTOR CONNECTIONS (WITH AND WITHOUT DISCONNECT)

This family is a face hosted, motor connection that can come with or without a disconnect. The family is intended to be mounted on an equipment surface. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The family is just a place holder for your electrical data. Often times the equipment does not contain the necessary electrical information for your calculations. Here, you can add your motor connection and adjust the electrical information as you need. There are specific calculations for motors under NEC® Article 430.

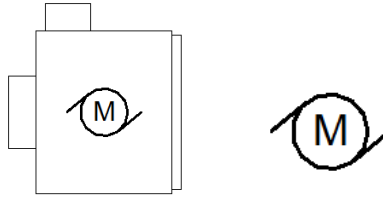



Figure 20: Plan view of the motor connections placed on mechanical equipment and the motor connection by itself.

The family will automatically calculate the motor FLA, LRC, and apparent load based on the motor horsepower, voltage, and phase input, using Tables 430.248 thru 251 of the NEC®. From there the MCA and MOCP are calculated using a default factor of 1.25 and 1.75, respectively. These calculations can be overridden by selecting the Override FLA and Override LRC checkboxes under the constraints section in the properties.

Properties	
	Motor Connection with Disconnect- No Host 120V/1ph
Electrical Fixtures (1)	Edit Type
Constraints	
Override FLA	<input type="checkbox"/>
Override LRC	<input type="checkbox"/>
Level	Level 1
Host	Level : Level 1
Offset	0' 0"
Electrical	
Horsepower	0.500000
Voltage	120.00 V
Number of Phases	1
Power Factor	0.950000
Full Load Amps	9.40 A
FLA Override_x constraint box	0.00 A
Apparent Load	1128.00 VA
Wattage	1071.60 W
Disconnect Size	1P/ __A
Disconnect Type	Non-Fused
Electrical - Loads	
Frequency	60.00 Hz
MCA Factor	1.250000
Minimum Circuit Ampacity	11.75 A
MOCP Factor	1.750000
Max Overcurrent Protection	16.45 A
Disconnect Factor	1.150000
Disconnect Ampacity	10.81 A
Code Letter BCD	<input checked="" type="checkbox"/>
LRC (for sizing multiple moto...	56.40 A
LRC Override_x constraint box	0.00 A
Number of Poles	1
Panel	
Circuit Number	

Autodesk screen shots reprinted courtesy of Autodesk, Inc

Figure 21: A sample motor properties tab is shown above. The FLA, Apparent Load, Wattage, etc are automatically calculated based on the NEC® tables.

Family Category:	Electrical Fixtures	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Dimensions, Load Classification, and Symbol letter	<i>Within each type you are allowed to adjust the motor dimensions as needed.</i>
Instance Parameters:	FLA, LRA, Load Classification, HP, Voltage, Phases, Poles, Frequency, Power Factor, MCA Factor, MOCP Factor, Code Letter, LRC , Visibility – Upright or Sideways	<i>The motor information may be adjusted in each instance as necessary to define the motor size and the appropriate code requirement by NEC. The visibility allows you to switch the orientation of the “M”.</i>
Built-in Types	120V/1 PH, 208V/1ph, 208V/3ph, 240V/1ph, 240V/3ph, 480V/3ph.	<i>Select the appropriate voltage and number of phases. You can create your own type by adjusting the voltage and phases.</i>
System Connector	Power-Unbalanced	<i>Select the equipment and connect to a panel.</i>

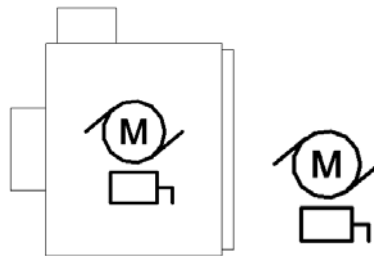


Figure 22: Plan view of the motor connections with disconnect placed on mechanical equipment and the motor connection with disconnect by itself.

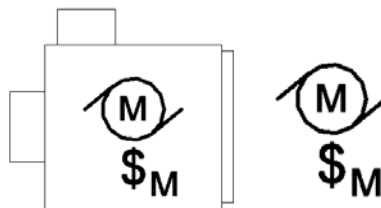


Figure 23: Plan view of the motor connections with switched disconnect placed on mechanical equipment and the motor connection with switched disconnect by itself.

1.18 SMOKE DAMPER CONNECTION

This family is a face hosted, smoke damper. The family is intended to be mounted on a duct or equipment surface. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The family is just a place holder for your electrical data. Often times the equipment does not contain the necessary electrical information to complete NEC calculations. Here, you can add your fan connection and adjust the electrical information as you need.

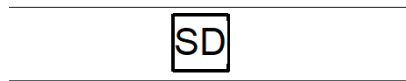


Figure 24: Plan view of the smoke damper connection placed on a duct.

Family Category:	Electrical Fixtures	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Load Classification - HVAC, Voltage, Phases, Poles, Frequency, Power Factor, FLA	<i>Within each type you are allowed to adjust the smoke damper information as needed to match the actual equipment</i>
Instance Parameters:	Visibility – Upright or Sideways	<i>The visibility allows you to switch the orientation of the “SD”.</i>
Built-in Types	Default.	
System Connector	Power-Unbalanced	<i>Select the equipment and connect to a panel.</i>

1.19 CEILING FAN CONNECTION

This family is a face hosted, ceiling fan connection. The family is intended to be mounted on a fan or equipment surface. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The family is just a place holder for your electrical data. Often times the equipment does not contain the necessary electrical information to complete NEC calculations. Here, you can add your fan connection and adjust the electrical information as you need.

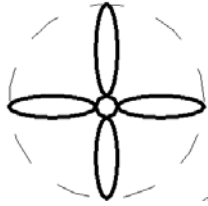


Figure 25: Plan view of the ceiling fan connection

Family Category:	Electrical Fixtures	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Load Classification - HVAC, Voltage, Phases, Poles, Frequency, Power Factor, FLA, Fan Dimensions	<i>Within each type you are allowed to adjust the smoke damper information as needed to match the actual equipment</i>
Instance Parameters:		
Built-in Types	Default.	
System Connector	Power-Unbalanced	<i>Select the equipment and connect to a panel.</i>

1.20 GENERIC ELECTRICAL EQUIPMENT

This family is non-hosted, generic electrical equipment. The family is intended for any equipment that you as an electrical engineer need to power. Often times the equipment does not contain the necessary electrical information to complete NEC calculations. Here, you can add any equipment that needs power. You can change the dimensions to make the box large or small.

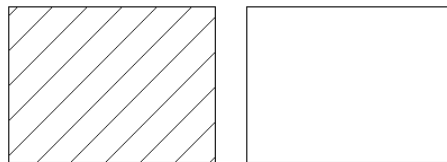


Figure 26: Plan view of the general electrical equipment. It can be displayed hatched or not hatched.

Family Category:	Electrical Fixtures	<i>After the family is imported locate it in the following category.</i>
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Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Load Classification, Equipment Dimensions	<i>The load classification and dimensions are defined under the equipment type.</i>
Instance Parameters:	Voltage, Phases, Poles, Frequency, Power Factor, FLA,	<i>You can add the NEC information required to complete your electrical engineering calculations under each instance.</i>
Built-in Types	Default	
System Connector	Power-Unbalanced	<i>Select the equipment and connect to a panel.</i>

1.21 ELECTRICAL CABINET FLOOR MOUNT

This family is a non-hosted, electrical cabinet. The family is intended to be placed on a concrete slab or on a structural base. The family is non-hosted so please adjust the elevation and also keep track of the cabinet as walls move around. The symbol outline is based on the actual dimensions of the object.

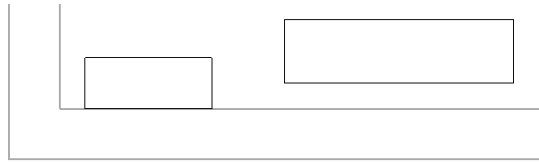


Figure 27: Left shows the wall mounted, right shows the floor mounted.

Family Category:	Electrical Equipment	<i>After the family is imported locate it in the following category.</i>
Hosting:	Non-hosted	
Types Parameters:	Depth, Width, Circuit Height, Rating, Voltage, Wattage	<i>Within each type you are allowed to adjust the cabinet dimensions.</i>
Instance Parameters:		
Built-in Types		<i>Select the appropriate size for the electrical cabinet</i>

System Connector	Power-Unbalanced, Conduit	<i>Select the equipment and create a power system or simply use it as a non-powered cabinet.</i>
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1.22 ELECTRICAL CABINET WALL MOUNT

This family is a face hosted, surface mounted electrical panel. The family is intended to be mounted on a vertical surface and is imported with a default height of 48" and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The symbol outline is based on the actual dimensions of the object.

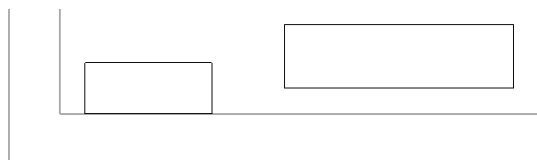


Figure 28: Left shows the wall mounted, right shows the floor mounted.

Family Category:	Electrical Equipment	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Depth, Width, Circuit Height, Rating, Voltage, Wattage	<i>Within each type you are allowed to adjust the cabinet dimensions.</i>
Instance Parameters:		
Built-in Types		<i>Select the appropriate size for the electrical cabinet</i>
System Connector	Power-Unbalanced, Conduit	<i>Select the equipment and create a power system or simply use it as a non-powered cabinet.</i>

1.23 ELECTRIFIED EQUIPMENT CONNECTION (HOST OR NON-HOSTED)

This family can be hosted or non-hosted. The family is intended for any equipment that you as an electrical engineer need to power. Often times the equipment family does not contain the necessary electrical information to complete NEC calculations. Here, you can add the electrical information for any equipment, by placing this connector at the location that the equipment is to

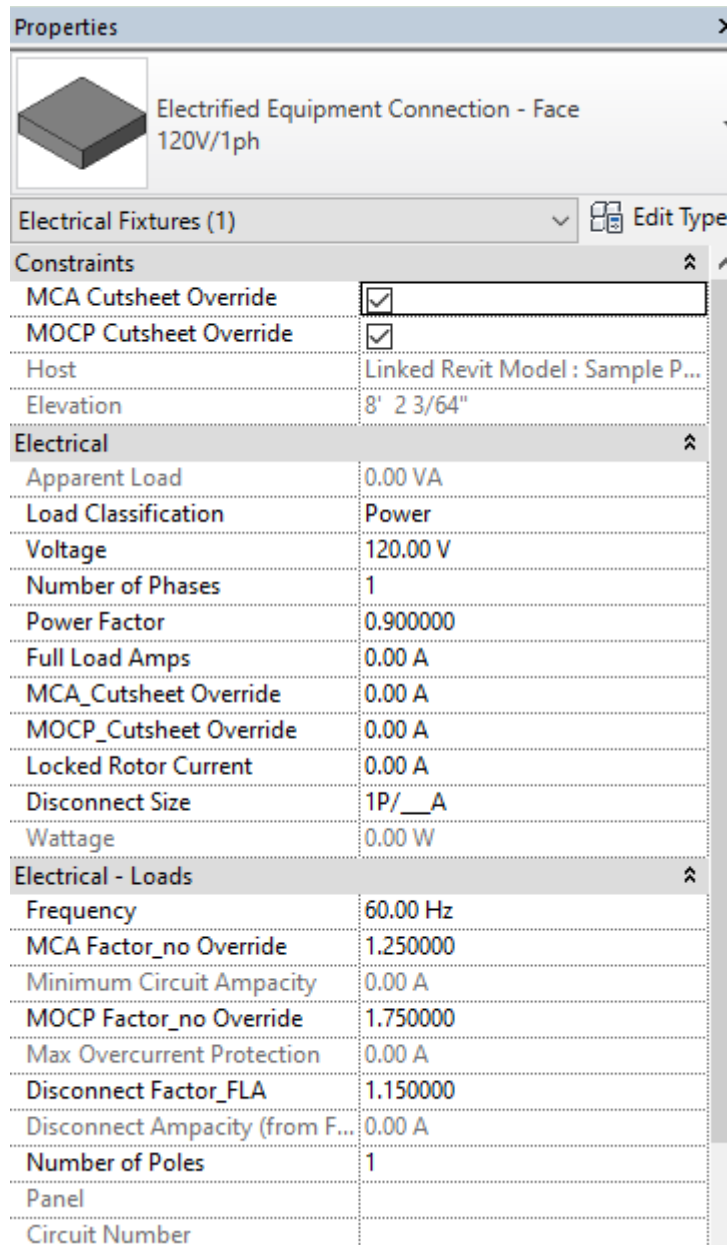
be installed. The family is similar to the motor connection, except a different calculation is required. Example of such equipment are compressors and condensing units. You can also change the dimensions to make the box large or small.



Figure 29: Plan view of the electrified equipment symbol. Non-hosted on left and hosted on right.

Family Category:	Electrical Fixtures	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Equipment Dimensions and Symbol Letter	<i>Create a new type to define a new dimension or symbol letter.</i>
Instance Parameters:	Load Classification, Voltage, Phases, Poles, Frequency, Power Factor, FLA	<i>The electrical information may be adjusted in each instance as necessary. The visibility allows you to switch the orientation of the "E".</i>
Built-in Types	Default	
System Connector	Power-Unbalanced	<i>Select the equipment and connect to a panel.</i>

For equipment other than motors, the FLA is typically provided by the equipment data. The MCA and MOCP are sometimes also provided by the manufacturer. If unavailable, these values can be calculated using the FLA and NEC factors. Unselect the Cutsheet Override check boxes and input the MCA and MOCP factors to calculate these values using the FLA.



Autodesk screen shots reprinted courtesy of Autodesk, Inc

Figure 30: Example of the electrical instance properties for the electrified equipment family.

1.24 FIRE SMOKE DAMPER CONNECTION

This family is a face hosted, fire smoke damper. The family is intended to be mounted on a duct or equipment surface. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The family is just a place holder for your electrical data. Often times the equipment does not contain the necessary electrical information to complete NEC calculations. Here, you can add your fan connection and adjust the electrical information as you need.

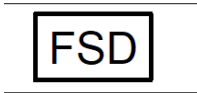


Figure 31: Plan view of the fire smoke damper connection placed on a duct.

Family Category:	Electrical Fixtures	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Load Classification - HVAC, Voltage, Phases, Poles, Frequency, Power Factor, FLA	<i>Within each type you are allowed to adjust the smoke damper information as needed to match the actual equipment</i>
Instance Parameters:	Visibility – Upright or Sideways	<i>The visibility allows you to switch the orientation of the “FSD”.</i>
Built-in Types	Default.	
System Connector	Power-Unbalanced	<i>Select the equipment and connect to a panel.</i>

1.25 MOTORIZED ACTUATOR CONNECTION

This family is a face hosted, motorized actuator. The family is intended to be mounted on an actuator or duct or equipment surface. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The family is just a place holder for your electrical data. Often times the equipment does not contain the necessary electrical information for your calculations. Here, you can add your fan connection and adjust the electrical information as you need.



Figure 32: Plan view of the motorized actuator connection placed on a duct.

Family Category:	Electrical Fixtures	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>

Types Parameters:	Load Classification - HVAC, Voltage, Phases, Poles, Frequency, Power Factor, FLA	<i>Within each type you are allowed to adjust the smoke damper information as needed to match the actual equipment</i>
Instance Parameters:	Visibility – Upright or Sideways	<i>The visibility allows you to switch the orientation of the “MD”.</i>
Built-in Types	Default.	
System Connector	Power-Unbalanced	<i>Select the equipment and connect to a panel.</i>

14 – Receptacles

Single, duplex, GFCI, floor flush, floor pedestal, wall, quadruplex, counters, etc.

Section 14.0 –Electrical Receptacles Families for Revit®

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1.0 RECEPTACLES

1.1 RECEPTACLE SINGLE, WALL

This family is a face hosted, single receptacle. The family is intended to be mounted on a vertical surface. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The object outline does not appear on plan view, only the object symbol.



Figure 1: Plan view of the wall mounted, single receptacles. From left to right – Special Purpose 120V, Special Purpose 240V, Special Purpose Three Phase, and Range.

Family Category:	Electrical Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Faceplate and Receptacle box dimensions: Depth, Width, Height, Symbol Visibility, Load Classification	<i>Within each type you are allowed to adjust the dimensions and symbol visibility. The default load classification is receptacle, with demand factor of 100% up to 10kVA</i>

		<i>and 50% above 10kVA. The demand factor can be adjusted under the family type window.</i>
Instance Parameters:	Elevation, Voltage, Number of Poles, Apparent Load, Enclosure	<i>The default elevation is 18" for special purpose receptacles and 6" for the range receptacle. Adjust the voltage, poles, load, and enclosure as necessary.</i>
Built-in Types	Special Purpose Single Phase 120V, Special Purpose Single Phase 240V, Special Purpose Three Phase, Range	<i>Select the appropriate type. The receptacle symbol will change automatically with the type.</i>
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system.</i>

1.2 RECEPTACLE DUPLEX, WALL

This family is a face hosted, duplex wall receptacle. The family is intended to be mounted on a vertical surface. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The object outline does not appear on plan view, only the object symbol.

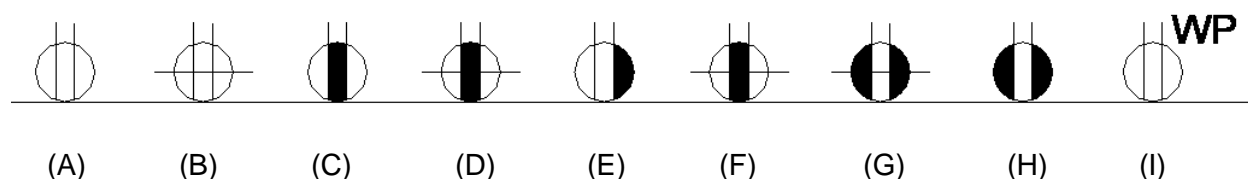


Figure 2: Plan view of the wall mounted, duplex receptacles. (A) Normal Grounding Type, (B) Normal Isolated Grounding Type, (C) GFCI Grounding Type, (D) GFCI Isolated Grounding Type, (E) Half Switched, (F) Hospital Grade Grounding Type, (G) Isolated Grounding Type with Replaceable Surge Protection, (H) Normal Grounding Type-Flush Mounted, (I) Normal Grounding Type-Waterproof

Family Category:	Electrical Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Faceplate and Receptacle box dimensions: Depth, Width, Height, Symbol Visibility, Load Classification	<i>Within each type you are allowed to adjust the dimensions and symbol visibility. The default load classification is receptacle, with demand</i>

		<i>factor of 100% up to 10kVA and 50% above 10kVA. The demand factor can be adjusted under the family type window.</i>
Instance Parameters:	Elevation, Voltage, Number of Poles, Apparent Load, Enclosure	<i>The default elevation for the receptacles is 18". Adjust the voltage, poles, load, and enclosure as necessary.</i>
Built-in Types	Normal Grounding Type, Normal Isolated Grounding Type, GFCI Grounding Type, GFCI Isolated Grounding Type, Half Switched, Hospital Grade Grounding Type, Isolated Grounding Type with Replaceable Surge Protection, Normal Grounding Type-Flush Mount, Normal Grounding Type-Waterproof	<i>Select the appropriate type. The receptacle symbol will change automatically with the type.</i>
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system.</i>

1.3 RECEPTACLE DUPLEX, COUNTER

This family is a face hosted, duplex countertop receptacle. The family is intended to be mounted on a vertical surface, 6" above the counter. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The object outline does not appear on plan view, only the object symbol.

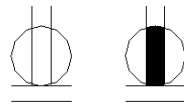


Figure 3: Plan view of the duplex receptacles mounted above the counters. From left to right: normal grounding mounted above counter, GFCI grounding mounted above counter.

Family Category:	Electrical Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Faceplate and Receptacle box dimensions: Depth, Width, Height, Symbol Visibility, Load Classification	<i>Within each type you are allowed to adjust the dimensions and symbol visibility. The default load classification is receptacle, with demand factor of 100% up to 10kVA and 50% above 10kVA. The demand factor can be adjusted under the family type window.</i>

Instance Parameters:	Elevation, Voltage, Number of Poles, Apparent Load, Enclosure	<i>The default elevation for the receptacles is 18". Adjust the voltage, poles, load, and enclosure as necessary.</i>
Built-in Types	Normal Grounding Type, GFCI Grounding Type	<i>Select the appropriate type. The receptacle symbol will change automatically with the type.</i>
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system.</i>

1.4 RECEPTACLE QUADRUPLEX, WALL

This family is a face hosted, quadruplex wall receptacle. The family is intended to be mounted on a vertical surface. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The object outline does not appear on plan view, only the object symbol.



Figure 4: Plan view of the wall mounted, quadruplex receptacle.

Family Category:	Electrical Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Faceplate and Receptacle box dimensions: Depth, Width, Height, Load Classification	<i>Within each type you are allowed to adjust the dimensions and symbol visibility. The default load classification is receptacle, with demand factor of 100% up to 10kVA and 50% above 10kVA. The demand factor can be adjusted under the family type window.</i>
Instance Parameters:	Elevation, Voltage, Number of Poles, Apparent Load, Enclosure	<i>The default elevation for the receptacles is 18". Adjust the voltage, poles, load, and enclosure as necessary.</i>
Built-in Types	Quadruplex Receptacle	

System Connector	Power-Unbalanced	<i>Select the equipment and create a power system.</i>
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1.5 RECEPTACLE, CEILING

This family is a face hosted, ceiling receptacle. The family is intended to be mounted on a horizontal surface. When inserting the family, be sure to adjust the placement to “face” under the modify → placement tab. The default placement will be “vertical face,” which will appear on the wall, but not on the ceiling. The object outline does not appear on plan view, only the object symbol.



Figure 5: Plan view of the ceiling mounted receptacle.

Family Category:	Electrical Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure that you are in the reflected ceiling plan or that there is a surface to place the object.</i>
Types Parameters:	Faceplate and Receptacle box dimensions: Depth, Width, Height, Symbol Visibility, Load Classification	<i>Within each type you are allowed to adjust the dimensions and symbol visibility. The default load classification is receptacle, with demand factor of 100% up to 10kVA and 50% above 10kVA. The demand factor can be adjusted under the family type window.</i>
Instance Parameters:	Voltage, Number of Poles, Apparent Load, Enclosure	<i>Adjust the voltage, poles, load, and enclosure as necessary.</i>
Built-in Types	Ceiling Receptacle	
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system.</i>

1.6 RECEPTACLE, FLOOR MONUMENT

This family is a face hosted, floor monument receptacle. The family is intended to be mounted on a horizontal surface. When inserting the family, be sure to adjust the placement to “face” under the modify → placement tab. The default placement will be “vertical face,” which will appear on the wall, but not on the floor. The object outline does not appear on plan view, only the object symbol.

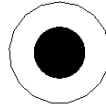


Figure 6: Plan view of the floor monument receptacle.

Family Category:	Electrical Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure that there is a floor or a surface to place the object.</i>
Types Parameters:	Load Classification	<i>The default load classification is receptacle, with demand factor of 100% up to 10kVA and 50% above 10kVA. The demand factor can be adjusted under the family type window.</i>
Instance Parameters:	Voltage, Number of Poles, Apparent Load, Enclosure	<i>Adjust the voltage, poles, load, and enclosure as necessary.</i>
Built-in Types	Floor Monument Receptacle	
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system.</i>

1.7 RECEPTACLE, FLOOR - FLUSH

This family is a face hosted, floor flush receptacle. The family is intended to be hosted on a horizontal surface, but the 3d box is recessed behind the floor surface. When inserting the family, be sure to adjust the placement to “face” under the modify → placement tab. The default placement will be “vertical face,” which will appear on the wall, but not on the floor. The object outline does not appear on plan view, only the object symbol.

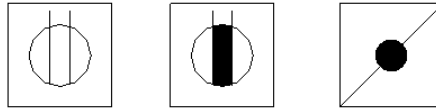


Figure 7: Plan view of the flush, floor mounted receptacles. From left to right: Normal Grounding Type, GFCI Grounding Type, and Normal Isolated Grounding Type

Family Category:	Electrical Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure that there is a floor or a surface to place the object.</i>
Types Parameters:	Faceplate and Receptacle box dimensions, Symbol Visibility, Load Classification	<i>Within each type you are allowed to adjust the dimensions and symbol visibility. The default load classification is receptacle, with demand factor of 100% up to 10kVA and 50% above 10kVA. The demand factor can be adjusted under the family type window.</i>
Instance Parameters:	Voltage, Number of Poles, Apparent Load, Enclosure	<i>Adjust the voltage, poles, load, and enclosure as necessary.</i>
Built-in Types	Normal Grounding Type, GFCI Grounding Type, Normal Isolated Grounding Type	<i>Select the appropriate type. The receptacle symbol will change automatically with the type.</i>
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system.</i>

1.8 RECEPTACLE, QUADRUPLEX FLOOR - FLUSH

This family is a face hosted, floor flush quadruplex receptacle. The family is intended to be mounted on a horizontal surface. When inserting the family, be sure to adjust the placement to “face” under the modify → placement tab. The default placement will be “vertical face,” which will appear on the wall, but not on the floor. The object outline does not appear on plan view, only the object symbol.

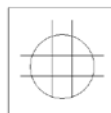


Figure 8: Plan view of the flush, floor mounted quadruplex receptacle.

Family Category:	Electrical Device → Electrical Fixture	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure that there is a floor or a surface to place the object.</i>
Types Parameters:	Faceplate and Receptacle box dimensions, Symbol Visibility, Load Classification	<i>Within each type you are allowed to adjust the dimensions and symbol visibility. The default load classification is receptacle, with demand factor of 100% up to 10kVA and 50% above 10kVA. The demand factor can be adjusted under the family type window.</i>
Instance Parameters:	Voltage, Number of Poles, Apparent Load, Enclosure	<i>Adjust the voltage, poles, load, and enclosure as necessary.</i>
Built-in Types	Quadruplex Floor Receptacle	
System Connector	Power-Unbalanced	<i>Select the equipment and create a power system.</i>

15 – Security Systems

Access control, door status, break glass sensor, card readers, door locks, door sensors, electric strikes, electric hinges, keypads, master units, request to exit, etc.

Section 15.0 – Electrical Security Systems Families for Revit®

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1.0 SECURITY SYSTEMS

1.1 BREAK GLASS SENSOR

This family is a face hosted break glass sensor for security systems. The family is intended to be mounted on a vertical surface and is imported with a default height of 48” and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

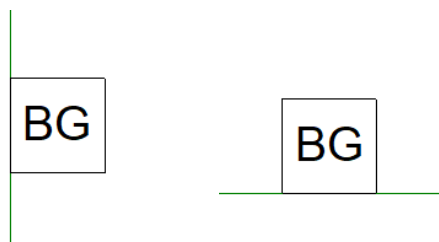


Figure 1: Plan view of the sample break glass sensor (BG): Left – sideways, Right – upright.

Family Category:	Device → Security	<i>After the family is imported locate it in the following category.</i>
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Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “BG”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Break Glass Sensor (BG)	
System Connector	Security	<i>Select on the device and add it to a data system and connect it to a security circuit and panel. This is different from your normal electrical power panel.</i>

1.2 DOOR LOCK

This family is a face hosted magnetic door lock for security systems. The family is intended to be mounted on a vertical surfaces and is imported with a default height of 84” and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

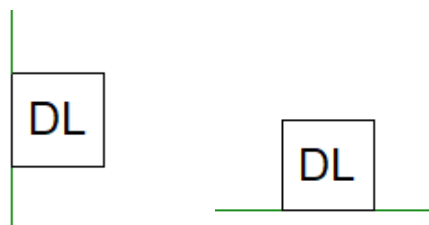


Figure 2: Plan view of the sample door lock (DL): Left – sideways, Right – upright.

Family Category:	Device → Security	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>

Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “DL”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 84” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Door Lock (DL)	
System Connector	Security	<i>Select on the device and add it to a data system and connect it to a security circuit and panel. This is different from your normal electrical power panel.</i>

1.3 DOOR SENSOR

This family is a face hosted door sensor for security systems. The family is intended to be mounted on a vertical surfaces and is imported with a default height of 72” and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view, this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

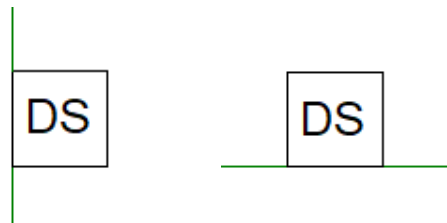


Figure 3: Plan view of the sample door sensor (DS): Left – sideways, Right – upright.

Family Category:	Device → Security	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “DS”.</i>

Instance Parameters:	Elevation, Visibility – Upright, Sideways	<p>The default elevation is 72” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</p> <p>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</p>
Built-in Types	Door Sensor (DS)	
System Connector	Security	<p>Select on the device and add it to a data system and connect it to a security circuit and panel. This is different from your normal electrical power panel.</p>

1.4 CARD READER

This family is a face hosted card reader for security systems. The family is intended to be mounted on vertical surfaces and is imported with a default height of 48” and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view; this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.



Figure 4: Plan view of the card reader (CR): Left – sideways, Right – upright.

Family Category:	Device → Security	After the family is imported locate it in the following category.
Hosting:	Face	Make sure there is a surface or create a reference plane to place the object.
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “CR”.

Instance Parameters:	Elevation, Visibility – Upright, Sideways	<p><i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i></p> <p><i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i></p>
Built-in Types	Card Reader (CR)	
System Connector	Security	<p><i>Select on the device and add it to a data system and connect it to a security circuit and panel. This is different from your normal electrical power panel.</i></p>

1.5 DOUBLE DOOR ELECTRIC STRIKE

This family is a face hosted double door, electric strike for security systems. The family is intended to be mounted on vertical surfaces and is imported with a default height of 48” and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view; this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.



Figure 5: Plan view of the double door, electric strike (ES): Left – sideways, Right – upright.

Family Category:	Device → Security	<p><i>After the family is imported locate it in the following category.</i></p>
Hosting:	Face	<p><i>Make sure there is a surface or create a reference plane to place the object.</i></p>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<p><i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “ES”.</i></p>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<p><i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i></p>

		<i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Electric Strike (ES)	
System Connector	Security	<i>Select on the device and add it to a data system and connect it to a security circuit and panel. This is different from your normal electrical power panel.</i>

1.6 ELECTRIC HINGE

This family is a face hosted electric hinge for security systems. The family is intended to be mounted on vertical surfaces and is imported with a default height of 48” and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view; this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

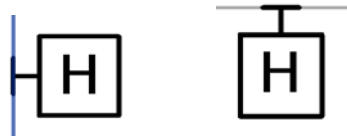


Figure 6: Plan view of the electric hinge (H): Left – sideways, Right – upright.

Family Category:	Device → Security	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “H”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows</i>

		<i>you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Electric Hinge (H)	
System Connector	Security	<i>Select on the device and add it to a data system and connect it to a security circuit and panel. This is different from your normal electrical power panel.</i>

1.7 ACCESS KEYPAD

This family is a face hosted access keypad for security systems. The family is intended to be mounted on vertical surfaces and is imported with a default height of 48” and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view; this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

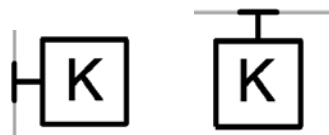


Figure 7: Plan view of the access keypad (K): Left – sideways, Right – upright.

Family Category:	Device → Security	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “K”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>

Built-in Types	Access Keypad (K)	
System Connector	Security	Select on the device and add it to a data system and connect it to a security circuit and panel. This is different from your normal electrical power panel.

1.8 ACCESS MASTER UNIT

This family is a face hosted access master unit for security systems. The family is intended to be mounted on vertical surfaces and is imported with a default height of 48" and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view; this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.



Figure 8: Plan view of the access master unit (CM): Left – sideways, Right – upright.

Family Category:	Device → Security	After the family is imported locate it in the following category.
Hosting:	Face	Make sure there is a surface or create a reference plane to place the object.
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “CM”.
Instance Parameters:	Elevation, Visibility – Upright, Sideways	The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed. The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.
Built-in Types	Access master unit (CM)	
System Connector	Security	Select on the device and add it to a data system and connect it to a security circuit and panel. This is different from your normal electrical power panel.

1.9 SINGLE DOOR ELECTRIC STRIKE

This family is a face hosted single door, electric strike for security systems. The family is intended to be mounted on vertical surfaces and is imported with a default height of 48” and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view; this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.



Figure 9: Plan view of the single door, electric strike (ES): Left – sideways, Right – upright.

Family Category:	Device → Security	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “ES”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Electric Strike (ES)	
System Connector	Security	<i>Select on the device and add it to a data system and connect it to a security circuit and panel. This is different from your normal electrical power panel.</i>

1.10 MAGNETIC SWITCH CONNECTION

This family is a face hosted magnetic switch for security systems. The family is intended to be mounted on vertical surfaces and is imported with a default height of 48” and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not

appear on the plan view; this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.



Figure 10: Plan view of the single door, electric strike (ES): Left – sideways, Right – upright.

Family Category:	Device → Security	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “MS”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Magnetic switch (MS)	
System Connector	Security	<i>Select on the device and add it to a data system and connect it to a security circuit and panel. This is different from your normal electrical power panel.</i>

1.11 REQUEST TO EXIT WALL

This family is a face hosted request to exit button for security systems. The family is intended to be mounted on vertical surfaces and is imported with a default height of 48” and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view; this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.

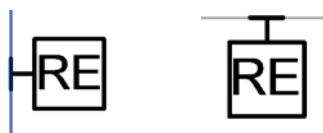


Figure 11: Plan view of the request to exit button (RE): Left – sideways, Right – upright.

Family Category:	Device → Security	<i>After the family is imported locate it in the following category.</i>
Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “RE”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Request to exit button (RE)	
System Connector	Security	<i>Select on the device and add it to a data system and connect it to a security circuit and panel. This is different from your normal electrical power panel.</i>

1.12 ACCESS CONTROL DOOR STATUS MAGNETIC SWITCH

This family is a face hosted access control door status magnetic switch for security systems. The family is intended to be mounted on vertical surfaces and is imported with a default height of 48” and is to be adjusted as necessary. The family may be placed on a vertical face, face, or work plane under the modify → placement tab when inserting the family. The actual outline of the object does not appear on the plan view; this is only visible on elevation and 3D views. Instead, what you will see is the device symbol as shown below.



Figure 12: Plan view of the access control door status magnetic switch (AC): Left – sideways, Right – upright.

Family Category:	Device → Security	<i>After the family is imported locate it in the following category.</i>
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Hosting:	Face	<i>Make sure there is a surface or create a reference plane to place the object.</i>
Types Parameters:	Type, Depth, Width, Height, Symbol Letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “AC”.</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 48” when installed on a vertical face, otherwise the device will take on the elevation of the horizontal surface that it is hosted to. Adjust the device height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Access control, door status, magnetic switch (AC)	
System Connector	Security	<i>Select on the device and add it to a data system and connect it to a security circuit and panel. This is different from your normal electrical power panel.</i>

16 – Sound Systems

Microphone outlet, amplifier, speakers, volume control stations

Section 16.0 – Electrical Sound Systems Families for Revit®

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1.0 SOUND SYSTEMS

1.1 AMPLIFIER

This family is a non-hosted Electrical Fixture. The amplifiers are imported with a default elevation of 0". The elevation is to be adjusted as necessary, since the amplifier does not have a host. The actual outline of the amplifier does not appear on the plan view. The actual dimensions of the amplifier are only visible on elevation and 3D views. Instead, what you will see is the module symbol as shown below.



Figure 1: Plan view of the amplifier.

Family Category:	Electrical Fixtures →	<i>After the family is imported locate it in the following category.</i>
Hosting:	Non-Hosted	<i>Make sure you place the amplifier at the correct elevation. The family is non-hosted, so it will not follow any walls, floors or ceilings.</i>
Types Parameters:	Load Classification, Power Input, Voltage, Power Factor, Frequency, Number of Poles, Dimensions, Symbol letter	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “AM”. You can also adjust the electrical load. When you connect the amplifier to a panel, the VA value will populate within the panel.</i>

Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 0". Adjust the module height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Default	
System Connector	Electrical Loads	<i>Select on the device and add it to a panel. You can change the wattage and voltage.</i>

1.2 MICROPHONE OUTLET WALL

This family is a hosted, Communications Device. The microphone outlets are imported with a default elevation of 18". The elevation is to be adjusted as necessary. The actual outline of the microphone outlet does not appear on the plan view. The actual dimensions of the microphone outlet are only visible on elevation and 3D views. Instead, what you will see is the microphone outlet wall symbol as shown below.

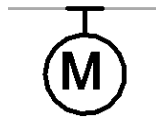


Figure 2: Plan view of the microphone outlet wall mounted.

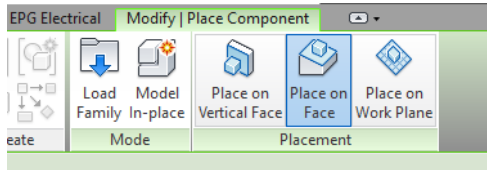
Family Category:	Communications Device →	<i>After the family is imported locate it in the following category.</i>
Hosting:	Hosted, Wall	<i>Make sure you place the microphone outlet at the correct elevation. The family is hosted, so it will follow the hosted wall.</i>
Types Parameters:	Dimensions, Frequency and Symbol Letter.	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as "M".</i>
Instance Parameters:	Elevation, Visibility – Upright, Sideways	<i>The default elevation is 18". Adjust the module height as needed.</i> <i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Default	
System Connector	None	<i>The device is not intended to have power.</i>

1.3 SOUND SPEAKER CEILING

This family is a hosted, Communications Device. The speakers are imported at the ceiling level. The actual outline of the speaker does not appear on the plan view. The actual dimensions of the speaker are only visible on elevation and 3D views. Instead, what you will see is the speaker symbol as shown below.



Figure 3: Plan view of the speaker, ceiling mounted.

Family Category:	Communications Device →	<i>After the family is imported locate it in the following category.</i>
Hosting:	Hosted, Ceiling	<p><i>Make sure you have a ceiling and make sure you are placing the device via face as opposed to vertical face. The family is hosted, so it will follow the hosted ceiling.</i></p>  <p><i>Autodesk screen shots reprinted courtesy of Autodesk, Inc</i></p>
Types Parameters:	Dimensions, Frequency and Symbol Letter.	<i>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “S”.</i>
Instance Parameters:	Visibility – Upright, Sideways	<i>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.</i>
Built-in Types	Default	
System Connector	None	<i>The device is not intended to have power.</i>

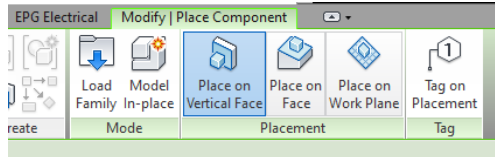
1.4 SOUND SPEAKER WALL

This family is a hosted, Communications Device. The speakers are imported to the wall at an elevation of 18”. The actual outline of the speaker does not appear on the plan view. The

actual dimensions of the speaker are only visible on elevation and 3D views. Instead, what you will see is the speaker symbol as shown below.



Figure 4: Plan view of the speaker, wall mounted. The 3d view of this speaker is recessed into the wall.

Family Category:	Communications Device →	After the family is imported locate it in the following category.
Hosting:	Hosted, Wall	<p>Make sure you have a wall and make sure you are placing the device via vertical face as opposed to face. The family is hosted, so it will follow the hosted wall.</p>  <p>Autodesk screen shots reprinted courtesy of Autodesk, Inc</p>
Types Parameters:	Dimensions, Frequency and Symbol Letter.	Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “S”.
Instance Parameters:	Visibility – Upright, Sideways	The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.
Built-in Types	Default	
System Connector	None	The device is not intended to have power.

1.5 SOUND SPEAKER WALL SURFACE

This family is a hosted, Communications Device. The speakers are imported to the wall at an elevation of 18”. The actual outline of the speaker does not appear on the plan view. The actual dimensions of the speaker are only visible on elevation and 3D views. Instead, what you will see is the speaker symbol as shown below.

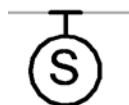
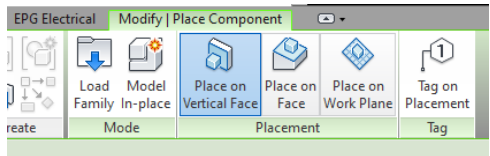


Figure 5: Plan view of the speaker, wall mounted. The 3d view of this speaker is NOT recessed into the wall; it is placed on the surface.

Family Category:	Communications Device →	After the family is imported locate it in the following category.
Hosting:	Hosted, Wall	<p>Make sure you have a wall and make sure you are placing the device via vertical face as opposed to face. The family is hosted, so it will follow the hosted wall.</p>  <p>Autodesk screen shots reprinted courtesy of Autodesk, Inc</p>
Types Parameters:	Dimensions, Frequency and Symbol Letter.	Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “S”.
Instance Parameters:	Visibility – Upright, Sideways	The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways.
Built-in Types	Default	
System Connector	None	The device is not intended to have power.

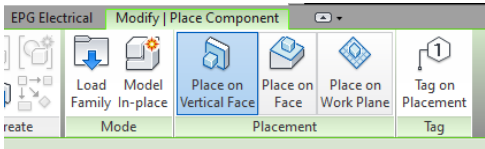
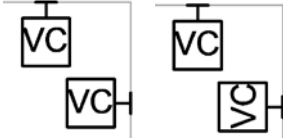
1.6 VOLUME CONTROL WALL SURFACE

This family is a hosted, Communications Device. The volume control stations are imported to the wall at an elevation of 18”. The actual outline of the station does not appear on the plan view. The actual dimensions of the station are only visible on elevation and 3D views. Instead, what you will see is the station symbol as shown below.



Figure 6: Plan view of the volume control station, wall mounted. The 3d view of this station is NOT recessed into the wall; it is placed on the surface.

Family Category:	Communications Device →	After the family is imported locate it in the following category.
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Hosting:	Hosted, Wall	<p>Make sure you have a wall and make sure you are placing the device via vertical face as opposed to face. The family is hosted, so it will follow the hosted wall.</p>  <p>Autodesk screen shots reprinted courtesy of Autodesk, Inc</p>
Types Parameters:	Dimensions, Frequency and Symbol Letter.	<p>Within each type you are allowed to adjust the device dimensions and the symbol letter – default set as “VC”.</p>
Instance Parameters:	Visibility – Upright, Sideways	<p>The visibility checkbox allows you to select the orientation of the symbol letter as upright or sideways. The left picture uses the visibility checkbox correctly, the right picture does not.</p> 
Built-in Types	Default	
System Connector	None	<p>The device is not intended to have power.</p>

17 – Switches

Section 17.0 –Electrical Switches Families for Revit®

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1.1 SWITCH

This family is for wall hosted switches. The default height of these switches is at 48”.



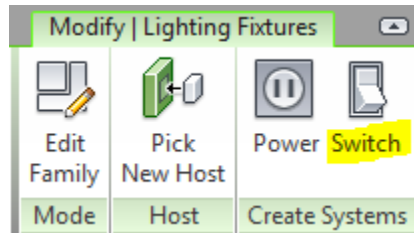
Figure 1: Plan view of the sample switches. The subscript indicates the switch type (circuit breaker, dimmer, door, 4-way, double pole, single pole, etc) and the superscript indicates the switch ID or the controlling circuit. The controlling circuit indicates which lights the switch will control. See the built in types in the table below for a list of available switch types.

Hosting Annotative:	Wall Yes	Make sure there is a wall and you are in a view that has a wall within its viewing plane.
Types Parameters:	Label – Switch Type	Assign a type identifier under “Label – Switch Type” to assign an annotation to a new switch.
Instance Parameters:	Voltage, Elevation, Label – Switch ID	Each switch should match the light fixture voltage: 277 or 120 V. The default elevation is 48”. Adjust the switch height as needed. Add a superscript to the switch under the “Label – Switch ID” input to identify which circuit of lights the switch controls (not required, this is typically used if there are multiple light circuits per room).
Built-in Types	Circuit Breaker (CB), Dimmer (D), Door (DR), Double Pole (2), Fan (F), Four Way (4), Key Operated (K), Low Voltage (LV),	

	Motor (M), Occupancy Sensor (OS), Pilot Lighted (P), Single Pole (), Three Way (3), Timer (T)	
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1.1.1 Switch System

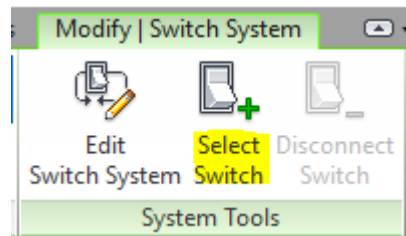
A switch system connects multiple lights to a switch. To do this, highlight all the lights that should be connected to the same switch. Then, under “Modify | Light Fixtures”, select the switch icon as highlighted below.



Autodesk screen shots reprinted courtesy of Autodesk, Inc

Figure 2: The create switch system option appears under the modify tab when selecting lights in a project.

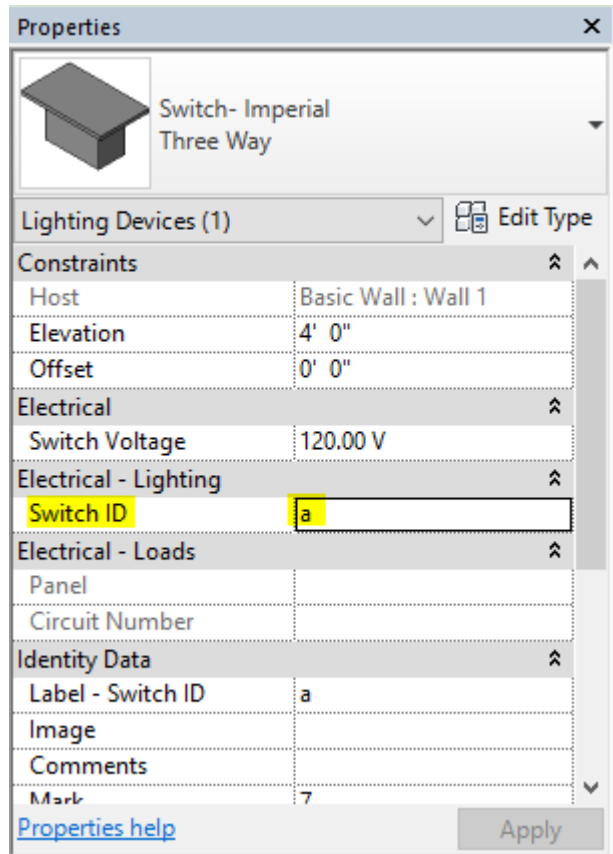
Then, click the “Select Switch” icon shown below and click on the switch that the lights should be controlled by.



Autodesk screen shots reprinted courtesy of Autodesk, Inc

Figure 3: After selecting create switch system, click on the select switch button as highlighted above to connect it to a light switch.

To create a tag for the controlling circuit, insert an identifier in the Electrical – Lighting → Switch ID parameter as highlighted below. This should be the same identifier as the “Label – Switch ID” used for the switch superscript label.



Autodesk screen shots reprinted courtesy of Autodesk, Inc

Figure 4: Properties tab of a switch in a project. Add a switch identifier to create a label for the system.

Then, all the lights connected to that switch will automatically have with the same Switch ID parameter. Finally, you may tag all the lights. Make sure the lighting tag has a “Switch ID” label included.

1.1.2 Switch Views

You can change the view of the switch to match the location on the wall. The switch annotation can be upright, mirrored or flipped. Please see below for the types of situations that you could encounter.

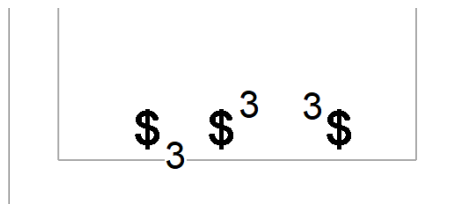
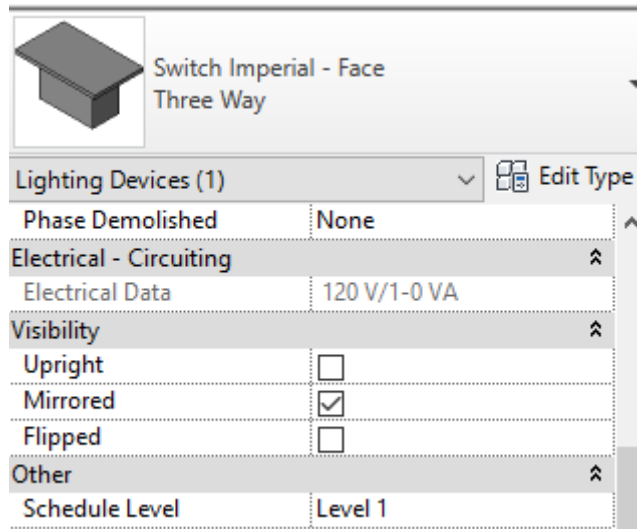


Figure 5: Plan view of the three way switches with different instance views. The instance view can be changed from upright (left), mirrored (middle) to flip (right).

Simply click on the instance and then change the visibility in the properties.



Autodesk screen shots reprinted courtesy of Autodesk, Inc

Figure 6: Plan view of the three way switches with different instance views. The instance visibility can be changed by checking and unchecking boxes.

1.1.3 Switch Types (Built-in)

There are many built-in switch types. You can also create your own by copying the family type and changing the subscript to match your legend. You can also email me at Justin@engproguides.com to inquire about customization of the switches and any other families to better match your company standards.

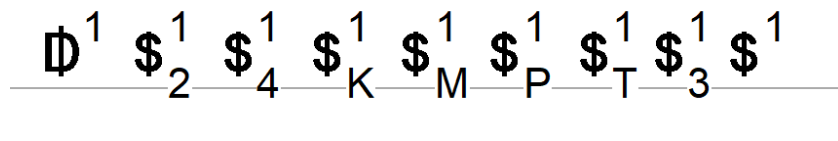


Figure 7: this figure shows some of the built-in switches. Each switch has a switch ID o1, which is shown as the superscript. The subscripts indicate the switch type, from left to right, the switch types are, Dimmer, Double pole, Four way, Key operated, Motor, Pilot, Timer, Three Way and Single pole.