TRACE™ 700 Building Energy Modeling Guide for LG Multi V™
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This Guide


Disclaimer

The Building Energy Modeling Guide and Trane Trace 700 library files are for comparisons and should be used as a guideline only. Building load/energy has been approximated for modeling purposes or input value of equipment (capacity, power input, etc.), and actual results may vary depending on the situation. The conclusions of this Modeling Guide and Trane Trace 700 library file do not guarantee actual energy costs or savings.

This Modeling Guide and Trane Trace 700 library file are intended as a design-and analysis guide to help designers optimize the design of the LG Multi V VRF system based on energy utilization. Modeling accuracy is highly dependent on user-supplied data. It is the user’s responsibility to understand how the data entered affects program output, and to understand that any predefined libraries are to be used only as guidelines and Trane Trace 700 library file for entering that data. The calculation results and reports by this guide and Trane Trace 700 library file are meant to aid the system designer and are not a substitute for design services, judgment, or experience.
Import Library

The TRACE 700 program includes a separate Library/Template Editor application that lets users view the detailed information found in the standard templates and libraries. Use the TRACE700 “Library Template Editor” to import the library file accompanying this document.

To Import the library:

1. Click Equipment on the Libraries menu.
2. Select “Export Custom Library” from the “File” Menu.
3. Rename the library .exp file to original_library.exp. This allows users the ability to return to the default file if needed.
4. Close the dialog box.

**Testing the Library File**

To test the library file:

1. Click Equipment on the Libraries menu.
2. Click Cooling on the Equipment menu. The Library/Template Editors program will display the Cooling Equipment window.

4. Close the dialog box.
5. Close the Library/Template Editors.
Import the Multi V Library File

To import the Multi V library file into TRACE 700:

1. Obtain the Multi V library file (MultiVIII_NA.EXP and Water2_NA.EXP) from your LG Sales Representative.
2. Double click the Trace 700 icon on your desktop to launch Trace 700. Or From the Start menu, select Program Files > C.D.S. > Applications > TRACE 700 > TRACE 700
3. Click the TRACE 700 “Library Template Editor. The Library/Template Editors appears:

4. Select the path where the library file was copied to and select “Import Custom Library” from the “File” Menu.
Note: During library file import, if shown an option to overwrite an existing duplicate library data for LG Multi V products from the import file, set to "yes" this option will allow to overwrite an existing database.

5. Close the dialog box.
7. In TRACE 700, click File > Exit to close the program.
Multi V III (Air Source) System

Create Systems

The following procedure demonstrates how to model the Multi V system, cooling and heating equipment, as well as assigning the coil loads.

To create a system:

1. The Multi V system type in TRACE is listed under the “Variable Volume” system category under the “Create Systems” section.
2. Pick Variable Refrigerant Volume as the system type.
3. Click Apply to save your entries.
**Fan selection**

To select a fan:

2. Enter the total static pressure and fan energy rate used. The total static pressure and fan energy rate is different for each type of Multi V indoor unit. No library files have been provided for the zone level indoor VRF equipment.
3. Select an indoor unit (IDU) for each zone/space using LG Multi V Product Lineup.
4. Set total static pressure of the indoor unit fan at design flow rate. Refer to the LG’s engineering manual for Multi V Indoor units and building design data. Pressure losses should include filters, coils, and distribution system. Design full-load power of the supply fan per unit of supply air flow rate at sea level.

TRACE 700 currently does not utilize library files for zone level air side equipment. Instead, a system type is defined in TRACE, and that system is assigned to the appropriate TRACE “Plant” (each individual outdoor VRF compressor unit). At the system level only a single fan definition exists for the entire system, so an average assumed fan power density must be used for the system which is an average representation of the associated zones attached to that system.
Create Plants

Next, describe the cooling and heating plants represented by the VRF system and backup electric resistance heat. VRF plants are considered Air-Cooled Unitary plants.

To create plants:

1. Drag the appropriate icons from the Equipment Category section to define each plant.
2. Rename the cooling plant as VRF and the heating plant as Backup electric resistance by selecting the plant and clicking the Edit button.
3. Select the cooling plant and click on the Cooling Equipment tab.
4. Choose the VRF plant that best matches the target performance and operation. There are two categories of plant available: VRF Heat Pump and VRF Heat Recovery.
5. Specify Backup electric resistance as the backup heat source.
6. If necessary, on the Heating Equipment tab, refine a backup heating plant.
7. Finally, assign each coil load to the appropriate plant.
Note¹: The VRF Heat Recovery option is able to recover heat from one VRF indoor unit and share it with other indoor units that are connected to the same refrigerant circuit. TRACE assumes that heat can be recovered between all zones that are assigned to the system. However, heat recovery outdoor units are available only up to a certain capacity (20 tons). To accurately model VRF heat recovery, the design capacity of all the indoor units (zones) assigned to the system should be no larger than the available capacity of the VRF Heat Recovery outdoor unit. This might require the creation of several systems and several cooling plants.
Multi V Water II (Water Source) System

A WLHP loop is primarily intended to serve water-loop heat-pump systems. Individual WLHP units operate according to their zone thermostats, and reject heat to or take heat from this loop. Depending on the relative number of units operating in the heating or cooling mode, the loop will be thermally unbalanced and the loop temperature will either rise or fall. One or more boilers and one or more cooling towers operate to keep the loop within specified limits. In addition to WLHP units, any cooling unit with a water cooled condenser may be assigned to this loop.

Create Systems

To model an applied WSHP system, begin by defining air distribution:

1. Pick Water Source Heat Pump as the system type.
2. Click Apply to save entries.
Fan selection

To select a fan:

1. On the Fans tab of the “Create Systems” dialog box, select Hydronic in heat pump fan and enter the total static pressure and fan energy rate used. The total static pressure and fan energy rate will be different for each type of Multi V indoor unit.
2. Set the total static pressure of the indoor unit fan at design flow rate. Refer to the LG’s engineering manual for Multi V Indoor units and building design data. Pressure losses should include filters, coils, and distribution system.

Create Plants

To create a plant:

1. Next, describe the cooling and heating plants represented by the WSHP system and backup boiler.
2. Drag the appropriate icons from the Equipment Category section to define each plant.
3. Rename the cooling plant as WSHP and the heating plant as Backup boiler.
4. Select the cooling plant and click the Cooling Equipment tab.
5. Choose the water-source heat pump that best matches the target performance.
6. Enter the full-load consumption of the pump that serves the common water loop—the primary chilled-water pump, in this case.

7. Click Controls to assign the excess heat from the common water loop to loads served by the heating plant identified as the energy source.

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**Note:** Do not remove thermal storage. The water loop is modeled as a special thermal storage type in TRACE 700. Removing the thermal storage eliminates the water loop from the simulation.

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8. Be sure to apply your changes. On the Heating Equipment tab, pick the boiler that most closely matches the anticipated performance.
9. Enter the full-load consumption of the pump that circulates hot water from the boiler.

Note: The minimum operating condenser temperature of the selected heat pump determines when the boiler turns on to maintain the condenser water temperature. To view or alter this entry, use the Library/Template Editors program.

10. Finally, assign each coil load to the appropriate plant.
Appendix: Multi V performance Data Library

Please contact to http://www.lg-vrf.com or LG Multi V Sales Representatives.
References