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1 Introduction

This manual is intended to help you gain a basic understanding of LEO databases, their configuration and operation. You will also find information for solving problems that you may encounter with LEO databases.

This manual applies to LEO databases as used with the LEO 8 software package.

1.1 Overview

A LEO database is used to store measured values and parameters of RSW devices. It also contains configuration settings for the LEO client applications. A newly installed LEO 8 software package will by default have one LEO database that is ready to be used. For reasons why you may want to use more than one database read section 4.

LEO databases are based on the FlashFiler2 database technology, which utilizes one file per database table in one common directory. FlashFiler2 allows access to database tables either by direct file access or access via a FlashFiler2 database server. Note: RSW strongly discourages the use of direct file access because it does not allow the simultaneous use of the database by more than one client application! In the LEO software package the LEO Server application is the FlashFiler2 database server. For references on FlashFiler2 read section 11.

1.2 Prerequisites

The LEO 8 software package contains everything you need to use LEO databases, so no extra downloads or installations are necessary. If you intend to use the FlashFiler2 ODBC driver for importing data into f.e. Microsoft Excel make sure that you select the driver in the installation process.

Note: LEO databases are supported by RSW only on Microsoft Windows XP and later Microsoft operating systems!

2 Howto

This section explains in a few steps the most important tasks you may want to do with LEO Databases. For the more conceptual background read section 3.

2.1 Open LEO Server for Configuration Tasks

Since LEO Server is an application that runs in the background it might not always be clear how to open it for configuration tasks.
1. The server only shows itself by its icon in the Windows status area, by default in the bottom right corner of the desktop. If the icon is not directly visible you may need to click the small triangle to display hidden icons. Right-click the servers icon and select Open.

2. If the server runs as a system service you need to stop the service, change to Standard Mode, do your configuration, change to Service Mode again and restart the service. **Note:** for these steps you need administrative rights!

### 2.2 Create a New LEO Database Connection

1. Use Windows Explorer to create a new empty directory on the computer that runs the LEO Server application. In this Howto we name the directory `MyData`

2. Open the main window of the LEO Server as described in **subsection 2.1**. In the Database Aliases area of the window click Change. In the upcoming database aliases window click Add. In the following window enter `MyData` as the database aliasname and select the path to your newly created directory. Close the windows and minimize the server again.

3. On the computer that runs the LEO client applications, open LEO Startcenter and select the Database Connection Wizard from the Tools section.

4. Press the Start button. On the following page press the Add button to start the wizard for a new database connection. Enter the name `MyData` and press OK. Follow the remaining steps as instructed by the wizard.

5. The LEO Startcenter will now contain the new database connection in its list. Select the new database connection to make it the active one.

6. Start LeoCfg, which will automatically create all the necessary tables.

7. Your new database is now ready to be filled with data by applications like DEM, CKS-DA or FFValuesImport.

### 2.3 Backup a LEO Database

1. Use Windows Explorer to navigate to the directory of the desired database. In case you don’t remember the directory, open the main window of LEO Server as described in **subsection 2.1**. In the list of existing database aliases you will see the directory that contains the database tables.

2. Copy or zip all files as needed.
2.4 Copy a LEO Database

1. Proceed as described in subsection 2.2, except that leave out steps 5 and 6.
2. Open the directory of the existing database as described in the previous Howto.
3. Copy all files from the existing database directory to the directory of the newly created database connection.
4. Your copy of the existing database is now ready to be modified by client programs.

2.5 Repair a LEO Database

1. Open LEO Startcenter and select the FlashFilerExplorer from the Tools section.
2. Expand the desired database server node from the servers list. In case the server is not visible read section 9.
3. Expand the database node from the servers available databases.
4. Right-click the table you want to repair and select Compress/Reindex all. Depending on the size of the database table this process might take several minutes.

3 Managing LEO databases

The connection to LEO databases consists of four parts

1. The physical directory that contains the files for the database tables.
2. The database aliasname that is created in the LEO Server.
3. The database connection that is created with the Database Connection Wizard.
4. The active database connection that is selected in LEO Startcenter.

The database aliasname serves the following purpose: clients will always only use the aliasname and do not know of the actual directory that contains the database files. The directory may perhaps be located on another computer! An administrator may move the directory to another location. With the aliasname no changes are necessary for the clients. All that is needed, is that the administrator changes the mapping from aliasname to directory in the LEO Server.

The database connection, as configured with the Database Connection Wizard, serves the following purpose: besides the aliasname the LEO client programs need further information to connect to the LEO server. These are:

- Which computer runs the LEO server
• The name of the LEO server on the given computer

• Which communication protocol to use

As with the aliasname the database connection allows to change these parameters without the client programs being affected by the change. The client programs only need to know the name of the database connection.

To summarize:

1. Use Windows Explorer to create a database directory.

2. Use LEO Server to create an aliasname.

3. Use Database Connection Wizard to create a database connection.

4. Use LEO Startcenter to make the new database connection the active one. Client programs will then (by default) use this active database connection.

4 Reasons for Using More Than One Database

There are several reasons why you may want to create specific LEO Databases beyond the default database.

• You want to create groups of devices and each group should be contained in its own database.

• You already have a very large database and want to start a new database for future data. The benefit is that the new database will have better performance. The downside is that you will always have to change the active database in LEO Startcenter when you want to query old data.

• You want to create a copy of an existing database and want to use this database in parallel for diagnostic and testing purposes.

• You want to access another database that you received by someone else besides your already existing database.

5 Using DEM with a Specific Database

By default the DEM program imports data using the database connection that is selected in the LEO Startcenter! If you have created more than one database you may, however, want DEM to import the data into a specific database, regardless of the database connection selected in LEO Startcenter. Starting with version 2.46.12 DEM supports this via the command line option DBCON.

Example: Assume you have created two databases and the database connection names (as they appear in LEO Startcenter) are LEO Data and LEO Data Test. Since
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**LEO Data Test** is only for testing purposes you don’t want DEM to import data into this test database. Instead DEM should always import data into the LEO Data database. To enable this call DEM with the following command line `DEM.exe DBCON="LEO Data"`. For further information read the DEM manual.

## 6 Running LEO Server as a System Service

If you want to provide data to many users in your corporate network it is recommended that you install the LEO Server on a central server computer and install the LEO client applications on each individual user computer.

On a server computer there usually does not exist a specific user that is logged on all the time. Therefore the LEO Server must run as a system service. System services are started when the computer starts up and run independent of any logged on user such that client computers from the network can access the service, i.e. LEO Server, at any time.

By default LEO Server runs in **Standard Mode** and is started by Autostart when a user logs on. To run LEO Server as a system service open the servers main window as described in subsection 2.1 and switch to **Service Mode**.

**Note:** you need administrative rights to install and start the service mode! If LEO Server is already running with standard rights you need to close it and restart it with administrative rights. To do so look for the LEO Server icon as described in subsection 2.1. Right-click the icon and click **Exit**. Then right-click the LEO Server icon on your desktop and select **Run as administrator**. Then you are allowed to change the mode.

## 7 Important Database Tables

While it is usually not necessary to know the names and contents of all LEO database tables, a few tables that are of special interest shall be listed here. For exploring the contents of these and further tables use the FlashFilerExplorer from the section Tools in LEO Startcenter.

- **PSPmoduletable:** this table contains the definition of RSW devices. Note that the interface definitions in this table are not used by LEO 8 anymore! Instead the more flexible table *GeraeteSchnittstellen* is used to store possibly more than one interface for a device.

- **mpoints:** this table contains the definitions of the measuring points. Each measuring point is associated with a device in *PSPmoduletable*.

- **PerV:** this table contains the measured values for power consumption, i.e. the load profile or load curve.
• **Tageswerte**: this table contains maximal and average power consumption values for individual days. These values are calculated by the DEM application from the values contained in the *PerV* table every time values are read from the devices.

• **Monatswerte**: this table contains maximal and average power consumption values for individual months. These values are calculated by the DEM application from the values contained in the *PerV* table every time values are read from the devices.

### 8 Updating LEO 7 Databases

If you have a running installation of LEO 7 with an according database and want to use this database with a newly installed LEO 8 the following steps are recommended

• Uninstall the LEO 7 Server (note: in LEO 7 the program was called *RswServer*). Uninstall the FlashFiler2 system service if it is installed.

• Install the LEO 8 Server from the LEO 8 installation CD. The new server will be configured to manage the existing database for the LEO 7 client applications as well as a copy of the old database for use by the LEO 8 client applications.

• Copy the entire contents of the directory that contains your LEO 7 database tables to a new empty directory

• Create two new databases/aliases as described in the Howto section. Name one of them f.e. *LEO 7 Data*, name the other one *LEO 8 Data*. If there were already other alias entries, you may want to delete these. One of them may be the default alias for the newly installed LEO 8, named *LEO Data*. If you intend to work with the existing data from LEO 7 you don’t need the default alias, so delete it. Any previous entry for the existing LEO 7 database is also superfluous since you just created a new one with a more precise name, such that you don’t mix up the databases later.

• Start LEO Startcenter and make the new LEO 8 database the active one.

• Start LeoCfg which will automatically update the database to the LEO 8 format.

• Start the LEO 7 database connection configuration to update the aliasname to *LEO 7 Data*, as named above.

• You can now start LEO 7 client applications which will use the original database. LEO 8 client applications will use the new database. So, LEO Server serves both LEO installations in parallel. If you later don’t need LEO 7 and the original database anymore you can remove the LEO 7 database connection and the LEO 7 database directory.
9 The FlashFilerExplorer Application

The FlashFilerExplorer (FFE) application is available in the Tools section of the LEO Startcenter. FFE allows you to list LEO servers, databases and tables. It also lets you perform specialized SQL queries and commands on particular tables.

Note: you should not usually edit data or table definitions directly with FFE except you have strong reasons to do so. If unsure, contact the RSW support before you do any changes.

Note: for FFE to be able to list LEO servers it needs to be configured as a program exception in the Windows firewall, if one is active!

Note: FFE has two limitations that you should be aware of

• If your LEO Server runs as a system service FFE will not automatically list it in its server list. To connect to the service you need to manually add it to the list. To do so select Server ➤ Manually Register Server from the FFE main menu.

• FFE does not allow direct access to a LEO database directory. It always needs a LEO Server to connect to! To access a database you will always have to create a database connection as described in subsection 2.2 until FFE does allow direct access to a database directory.

10 Exporting and Importing Data

To export and import data from a LEO Database you have five choices

1. Use the LEO FFValuesImport tool to import data.

2. Use the LEO FFValuesExport tool to export data.

3. Use the FlashFiler2 ODBC driver to export/import data from/to a LEO Database with applications that can handle ODBC database sources.

4. Download the FlashFiler2 programming source code to develop your own application that directly accesses the database.

5. Ask RSW to develop a custom import/export solution for your specialized needs.

11 FlashFiler2 References

For SQL and programming references on the FlashFiler2 technology either contact the RSW support or visit the FlashFiler2 website at http://sourceforge.net/projects/tpflashfiler
12 The FlashFiler2 ODBC Driver

The FlashFiler2 software provides an ODBC driver that allows you to connect to FlashFiler2 database servers. This driver is included in the LEO 8 installer. The driver allows applications like f.e. Microsoft Excel to query data from a LEO Database.

Note: the ODBC driver is not actively maintained anymore and has serious problems with Microsoft Office 2010! Therefore you may want to choose another solution from the ones listed in section 10.

13 Contacting the RSW Support

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