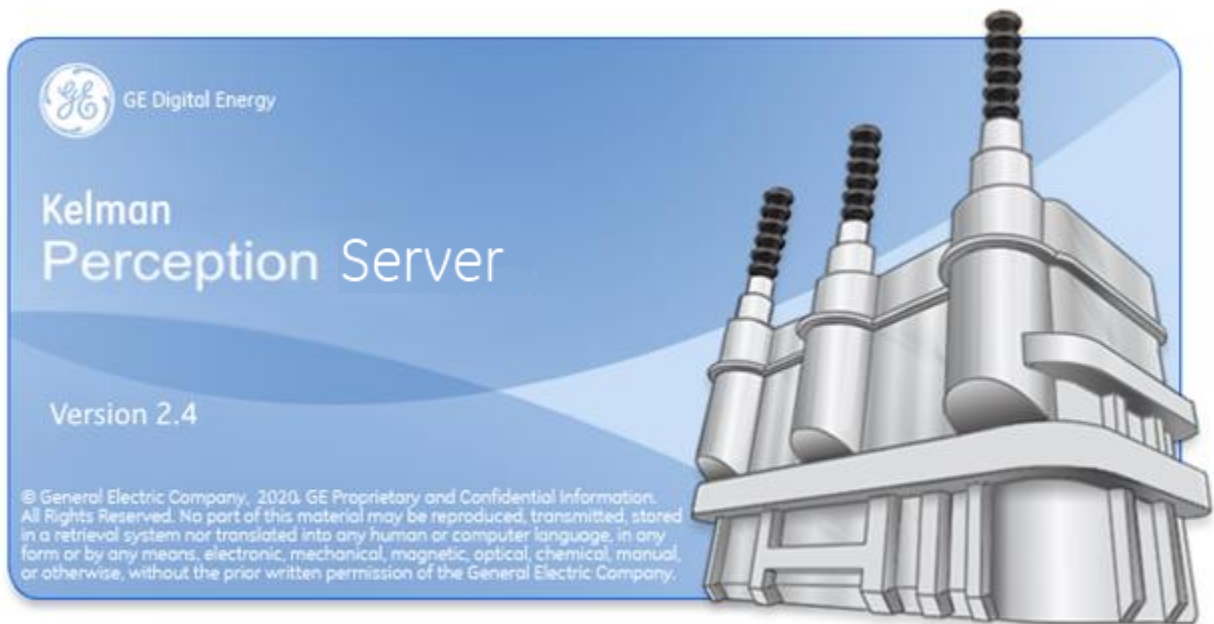


GE
Grid Solutions

Perception Server Configuration Tool

Version 2.4

Installation & User Guide



Building a world that works

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Related Documents

| Ref# | Title |
|--------|--|
| MA-020 | Perception Desktop - Installation & User Guide |
| MA-022 | Perception Web - Installation & User Guide |
| MA-023 | Perception Workflow Designer - Installation & User Guide |

Abbreviations & Definitions

| Abbreviation | Meaning |
|--------------|--|
| KPD | file suffix for a Perception Database file (stored in a SQL format) |
| TOA | file suffix for a device configuration file (stored in a CSV format) |
| DGA | Dissolved Gas Analysis |
| CSV | Comma Separated Variable – an industry-standard neutral data exchange format |
| SQL | Structured Query Language – an industry-standard database format |

1 INTRODUCTION

1.1 Product Overview

Perception is a software product designed to assist power plant personnel in the maintenance and management of oil-insulated equipment used in the transmission and distribution of electrical power. It is used primarily for diagnosing fault conditions as well as trending measurements taken from transformers, circuit breakers and tap-changers.

Perception Server is designed for fleet-wide monitoring and provides time saving scheduled downloading to automatically collect measurement data from devices, and then store it in a central database for simultaneous user access. The centralized location increases data integrity by creating a single point for data backup. OPC UA architecture provides secure network communication between client and server. Access control prevents unauthorized access to monitoring devices, limiting unit and configuration setting changes to designated personnel.

If a discrete, ratio or rate of change alarm is triggered on the device, Perception Server will automatically send an email alert to notify the user of the change. The email notification system provides details on the current asset state, including gas levels and historical measurements. When exceeded, caution and alarm limits are highlighted, using a predefined colour-coding system. Email alerts can be configured at a unit level for critical transformers. Perception also has the capability to generate more detailed e-mails on the overall transformer state via the Expert analysis e-mail feature.

Although Perception is an expert analysis and information system, it is only an aid and should not be regarded as a replacement for the knowledge of someone who is an expert in the analysis of insulating oil used in electrical equipment and the operation of oil filled power equipment.

1.2 Software Family

There are four members of the Perception family.

- Perception Desktop — A standalone software application that provides customized access to the centrally located asset database. It provides advanced diagnostic profiles on device data, a multi-page transformer report containing key transformer information as well as the facility to launch external applications. Additionally, Perception Desktop can operate standalone or as part of a larger centralized asset management suite in conjunction with Perception Server.
- Perception Server — The pinnacle of transformer asset management software. Perception Server provides a fleet-wide network overview via a wallboard display, automatic data downloading with configurable scheduling, email notifications of device condition changes and a TOA4 data export facility. It uses a centralized data storage location based on SQL Server to which Perception Desktop links seamlessly via secure OPC UA communications.
- Perception Web — A web-based solution that provides *read-only* access to the centrally located asset database. This offers a convenient way to obtain readings and consolidated data analysis across a variety of platforms including mobile devices. This includes transformer dashboards, wallboards and an overview to the status of the entire transformer fleet.

- Perception Workflow Designer — The workflow designer uses common flowcharting techniques to express transformer diagnostic processes as a model. These models are known as workflows and in turn drive the Perception dashboard. The Designer brings easily modifiable workflow-enabled capabilities to the Perception software suite allowing control over the diagnostic process and customization of how data is presented on the Perception dashboard.

1.3 What's New?

- Perception Server database schema updated. The new schema number is 22441. Databases created before this release must be updated using the Perception.Database.Upgrade.Tool.exe. **Note: If you are unfamiliar with the database upgrade process, contact GE M&D support.**
- Perception applications are supported in Windows 7, Windows 8, Windows 8.1, Windows 10, Windows Server 2003, Windows Server 2008, Windows Server 2012, Windows Server 2016, Windows Server 2019, SQL Server 2008 R2, SQL Server 2012, SQL Server 2014, SQL Server 2016, SQL Server 2017 and SQL Server 2019.
- DGA 900 Plus with Bushing Monitoring – addition of 9 bushing functionality
- DGA 900 Rate Of Change worksheet
- DGA 900 Plus with Models OLTC Tap Position
- Support for 8 series relays (845, 850, & 869). New installer, ranking workflows and diagnostic tools including COMTRADE download
- DGA 900 MultiTank products, MultiTrans and TapTrans
- New Motor asset and corresponding Dashboard
- Lots of minor enhancements and bug fixes

Note: If upgrading to Perception Desktop/Server 2.4. X from version 1.X, please contact GE Support before commencing as depending upon the size and complexity of the existing database, a service visit may be required to make the transition.

1.4 Server Features

Perception Server offers the following:

- Automatic scheduled results downloading
- Wallboard facility gives an overview to the entire fleet
- Facilitates transformer risk evaluation, fleet ranking and transformer and fleet dashboards
- Centralised data source allowing multiple Perception Desktop instances to connect, gather and manipulate the same data
- E-Mail condition notifications when devices raise condition alerts, communication issues, service or rate of change alarms
- SQL Server database storage
- Access control security with login permission level access settings
- OPC UA Server
- Ability to define a custom CSV file format for import and export, including out-of-the-box support for Perception, TOA4 and TransConnect CSV formats

1.5 Architecture

The Perception Server architecture consists of one or more client PCs running Perception Desktop and a remote server machine running the Perception Server software as illustrated in Figure 1-1.

Perception Server utilises OPC UA Discovery Server to establish a secure encrypted connection to a centralised repository for multiple Perception Desktop clients. This combination allows users to add DGA devices (and other GE transformer monitoring devices) and download the same devices and data. Perception Server uses SQL server to host the database. SQL Server can be hosted on the same server machine as Perception Server or on a separate dedicated server machine.

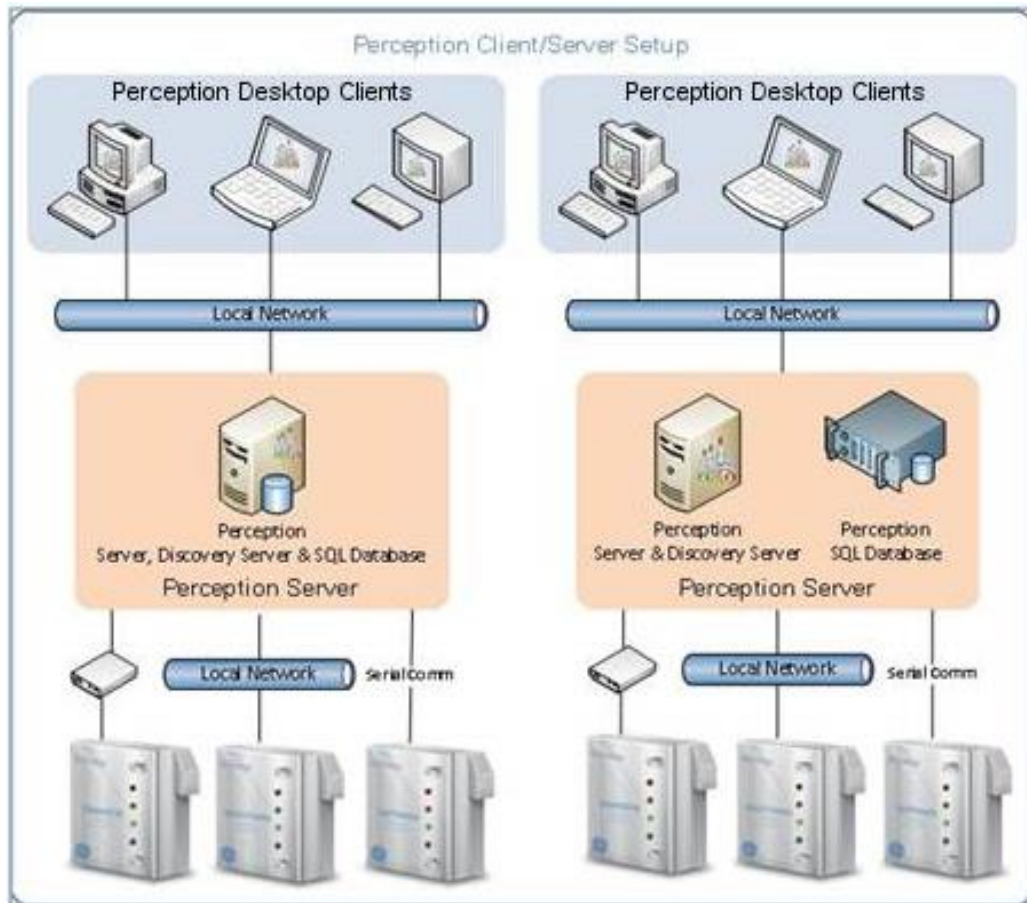


Figure 1-1: System architecture

1.6 System Requirements

Prior to installing Perception Server, ensure that the SQL Server bit type matches the operating system bit type. A 64-bit Windows operating system requires a 64-bit SQL application. Perception Server must be installed with an appropriate database connection and then the server license must be activated to avail of full functionality (refer to Section 2).

The minimum PC and system requirements for Perception Server are:

| | |
|-------------------|--|
| Operating System: | Windows Server 2008 with .NET Framework 3.5 sp1, 4.0 & 4.5 |
| Database: | SQL Server or SQL Express 2008 R2 |
| CPU: | 3 GHz 32-bit (x86) or 64-bit (x64) processor |
| Memory: | 4 GB RAM |
| HDD: | 500 GB free |

Note: Perception Server requires FILESTREAM to be enabled on the Microsoft SQL Server instance. This can be done during the install of Microsoft SQL Server or retrospectively using the Microsoft SQL Server Configuration Manager. Ensure that the correct bit version of Microsoft SQL Server is installed to match the bit version of the operating system, e.g. 64-bit Microsoft Windows 10 must have 64-bit Microsoft SQL Server installed. If there is a mismatch in bit versions FILESTREAM will not work. Visit <https://msdn.microsoft.com/en-us/library/cc645923.aspx> for more details.

Note: Windows Server 2012 does not enable Microsoft .NET 3.5 features by default. However, all Perception installers require .NET 3.5.

Note: It is possible to exceed the SQL Express database size limit of 10 GB so upgrading to SQL Server is recommended if there are many monitoring devices and/or large data imports expected.

1.7 Software Licensing

Perception Desktop uses a tier-licensing model when used with Perception Server. This provides greater flexibility to add devices and manage license expiry. There are six tiers in the model, as listed in Table 1-1, with each tier supporting an increasing number of devices according to a range of accumulated device weightings.

Table 1-1: Tier scores

| Tier | Accumulated weightings |
|------|------------------------|
| 1 | 0-50 |
| 2 | 51-100 |
| 3 | 101-150 |
| 4 | 151-250 |
| 5 | 251-500 |
| 6 | 501+ |

The weighting scores for each type of device are listed in Table 1-2.

Table 1-2: Device scores

| Device | Weighting Score |
|---------------------------------|-----------------|
| Offline | 1 |
| 201Ti | 2 |
| Hydran M2 / M2-X | 3 |
| 8 series relays | 3 |
| MO150 | 4 |
| MiniTrans | 4 |
| CB Watch3 | 4 |
| Transfix | 5 |
| DGA 500 | 5 |
| DGA 900 | 5 |
| BMT 300 | 5 |
| DualTrans | 6 |
| TapTrans / DGA 900 TapTrans | 6 |
| MultiTrans / DGA 900 MultiTrans | 6 |
| Transfix Plus | 6 |
| DGA 900 Plus | 6 |
| TMS | 7 |
| MS 3000 | 7 |

You can add any number of devices and assets within the limits set by the Perception fleet license tier. To add further devices or assets requires a license upgrade — contact Customer Support.

Note: Customers on an existing annual fleet licensing agreement can add assets and devices beyond the limits set by the new license tier. However, once the annual fleet license agreement expires, the license tier is recalculated and may require an upgrade to service all devices.

Note: When connected to Perception Server, the Fleet Summary window becomes available in Perception Desktop and provides details on the Perception license tier including expiry date and a summary of the devices and assets that have been added to the database.

1.7.1 License Expiry

A License Expiry message appears in Perception Desktop 90 days before the Perception fleet license is due to expire as shown in Figure 1-2. Reminder messages are automatically scheduled to reappear at 60 days, 30 days, 15 days and 5 days, or on each first launch of the application within the set days of the expiration period.

Note: This reminder applies to annual license agreements only.

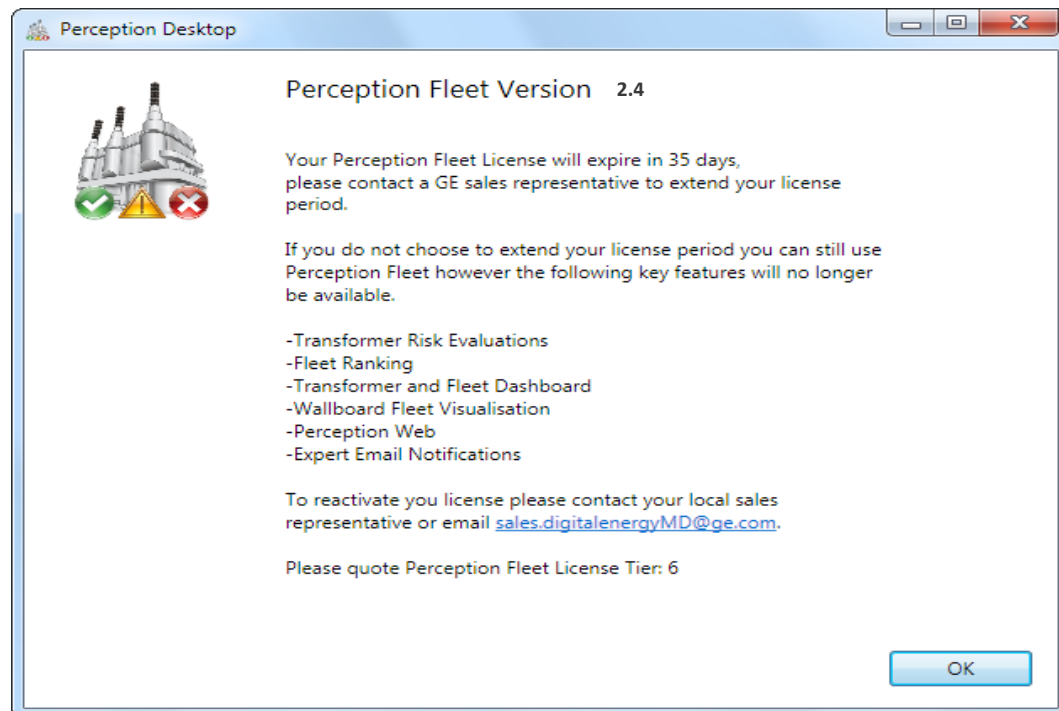


Figure 1-2: License expiry notification

A yellow warning icon also appears in the lower right corner of the application window with a tooltip when you rest the mouse pointer over it as shown in Figure 1-3.

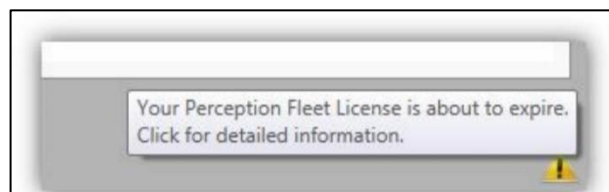


Figure 1-3: License warning indicator

Perception Server restricts functionality after license expiration. The following features are disabled:

- Transformer Risk Evaluations
- Fleet Ranking
- Transformer and Fleet Dashboard
- Wallboard Fleet Visualisation
- Perception Web
- Expert Email Notifications

1.7.2 Fleet Summary

Perception provides a useful summary dialog with license tier details and all assets and devices that comprise the Perception Fleet. Select **Help > Fleet Summary** as shown in Figure 1-4.

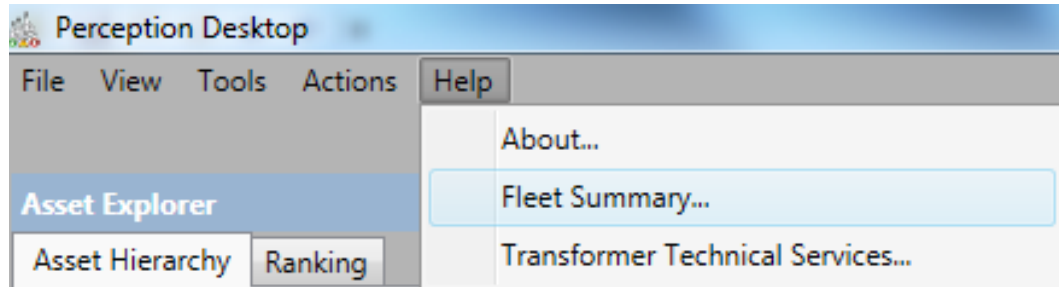


Figure 1-4: Help menu

The Fleet Summary dialog displays as shown in Figure 1-5.

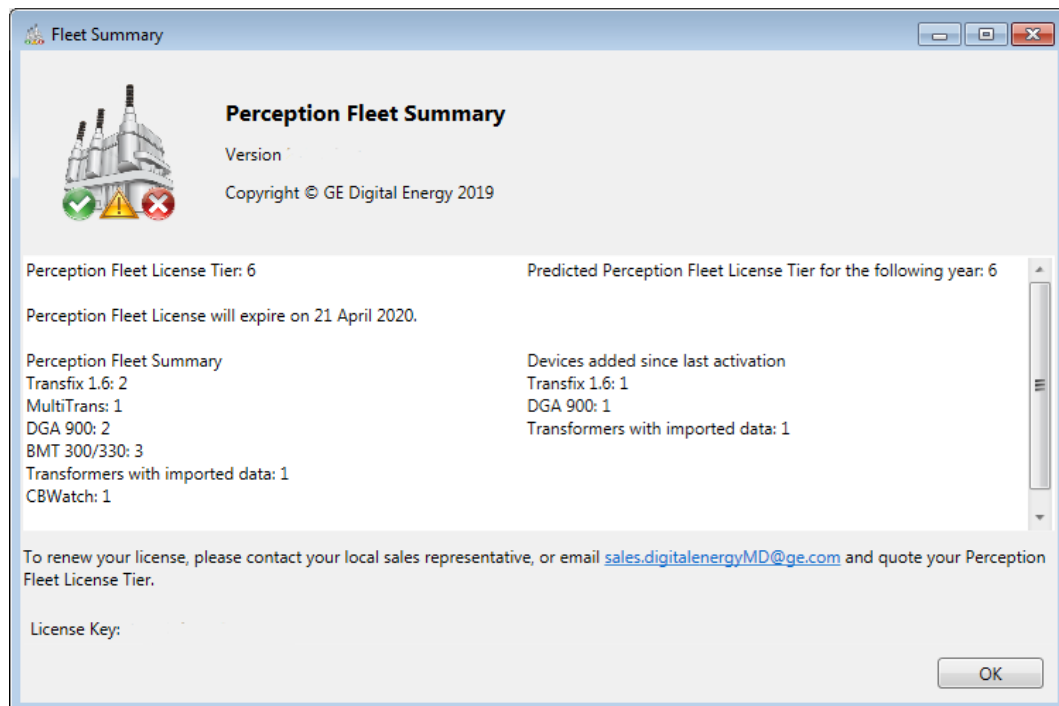


Figure 1-5: Fleet Summary dialog

1.8 Customer Support

E-mail: GA.support@ge.com

United Kingdom +44 1785-250-070

North America toll-free: 1-800-361-3652

Worldwide: +1 514-420-7460

2 INSTALLATION

2.1 Overview

The Perception Server Installer installs Perception Server and the Perception Server Configuration Tool. If the UA Local Discovery Server service is also installed, it is bound to the Perception Server, so restarting the UA Local Discovery Server also restarts the Perception Server. The Perception Server and Desktop are supplied on separate installation CDs.

2.2 Run the Perception Server installer

To install Perception Server, insert the Perception Server CD into the CD drive and double click the **Perception.Server.Setup.exe** file in the root directory of the CD. The Setup Wizard opens as shown in Figure 2-1. Click **Next** to proceed to the License Agreement.

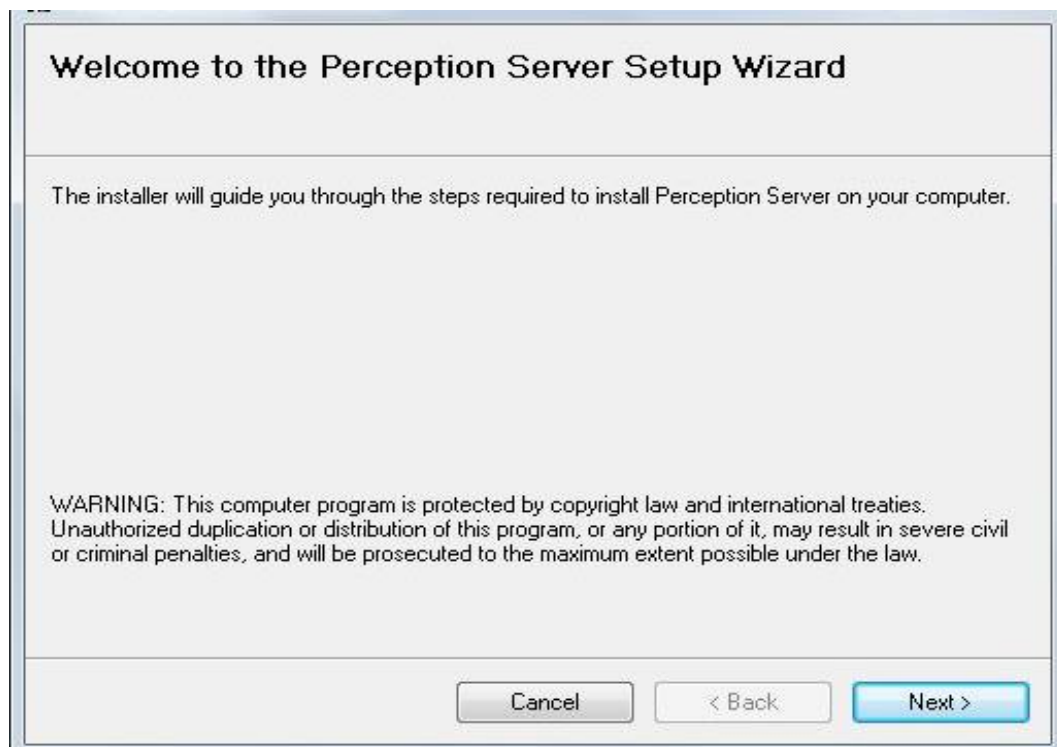


Figure 2-1: Welcome to the Perception Server Setup Wizard

If the License Agreement is acceptable, select **I accept the terms in the License Agreement** and click **Next** as shown in Figure 2-2.



Figure 2-2: License Agreement

Browse to select the installation folder or accept the default folder and click **Next** to continue as shown in Figure 2-3.

Note: If the PC is shared with other users, you can choose to install Perception Server for use under the current login account only, or for all user accounts on the PC.

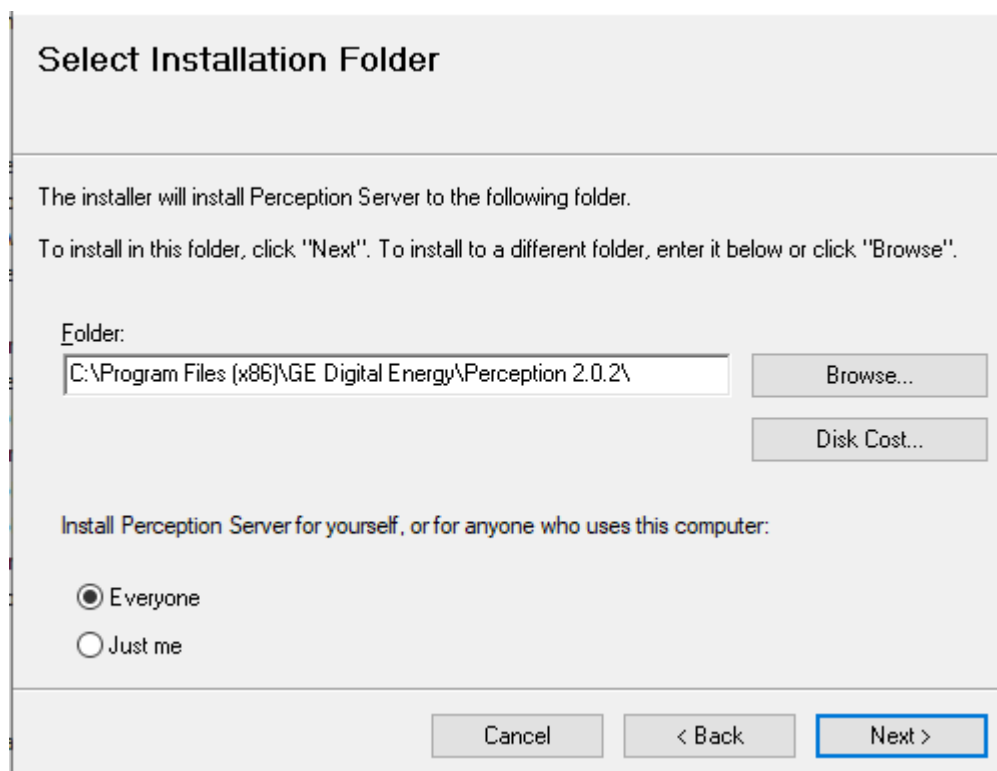


Figure 2-3: Select Installation Folder

Click **Next** to start the installation, **Back** to backtrack and change some of the selections, or **Cancel** to quit the process entirely, as shown in Figure 2-4.

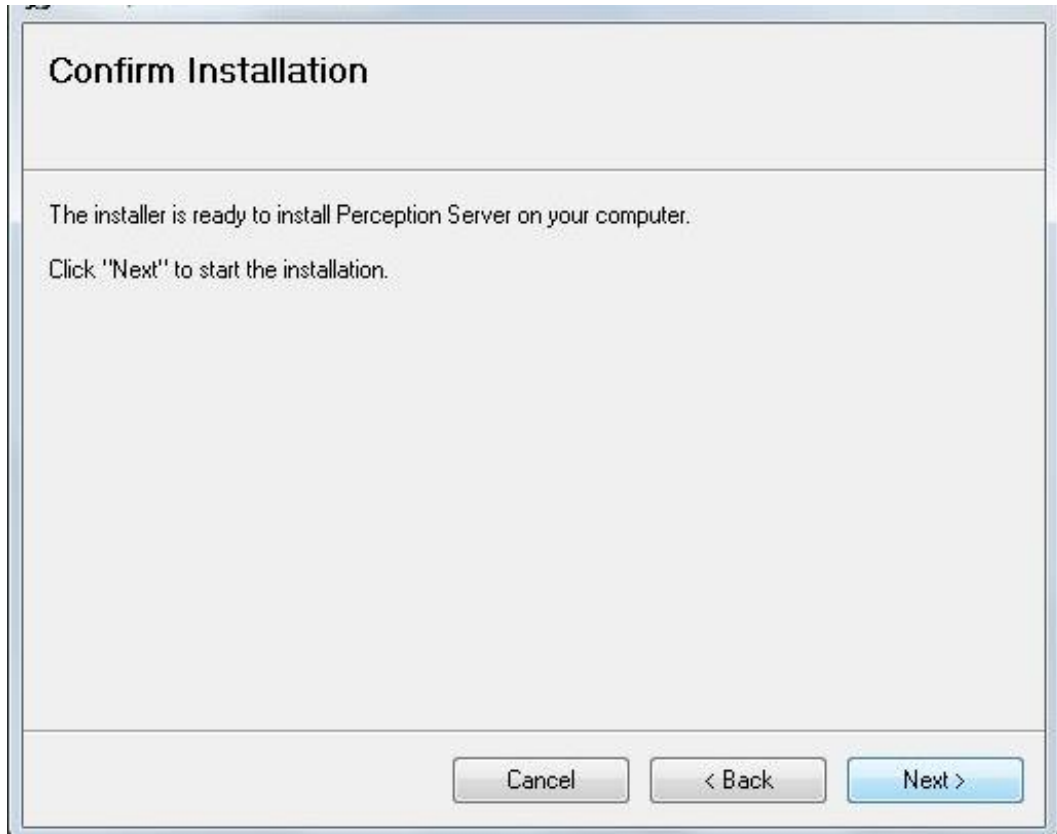


Figure 2-4: Confirm Installation

Click **Next** and a progress bar indicates the progress as shown in Figure 2-5. The installation may take some minutes.

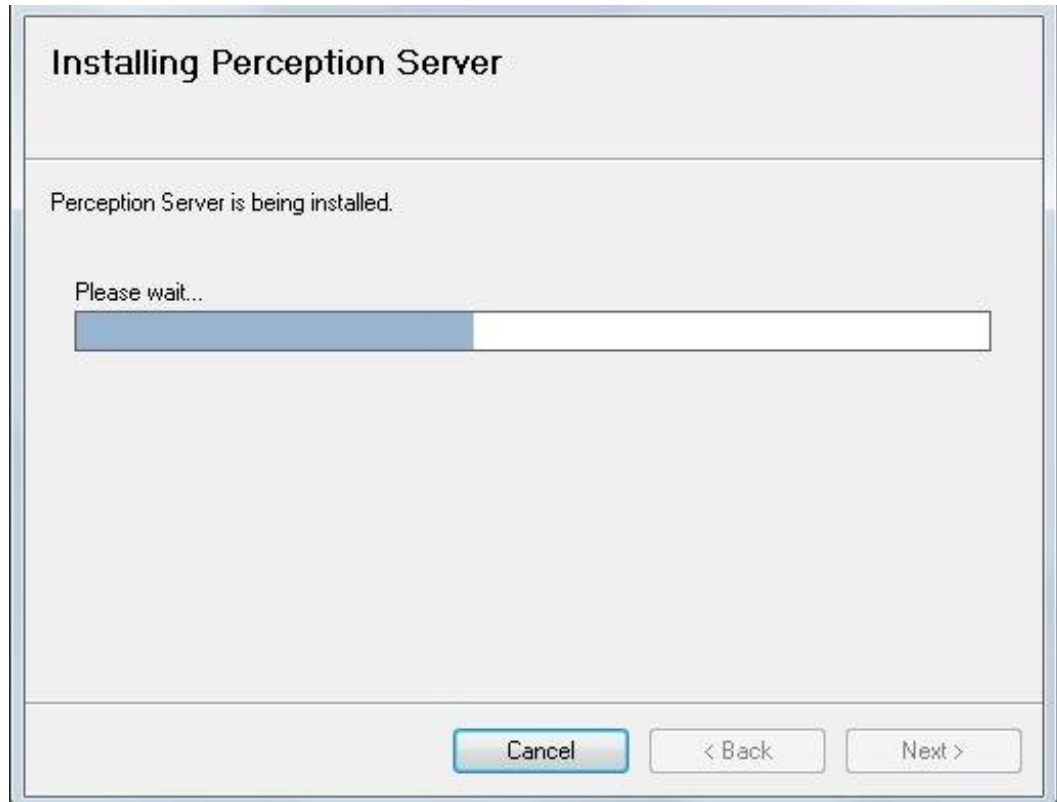


Figure 2-5: Installing Perception Server

The Setup Wizard completes the installation and presents the following message as shown in Figure 2-6. Click **Finish** to exit.

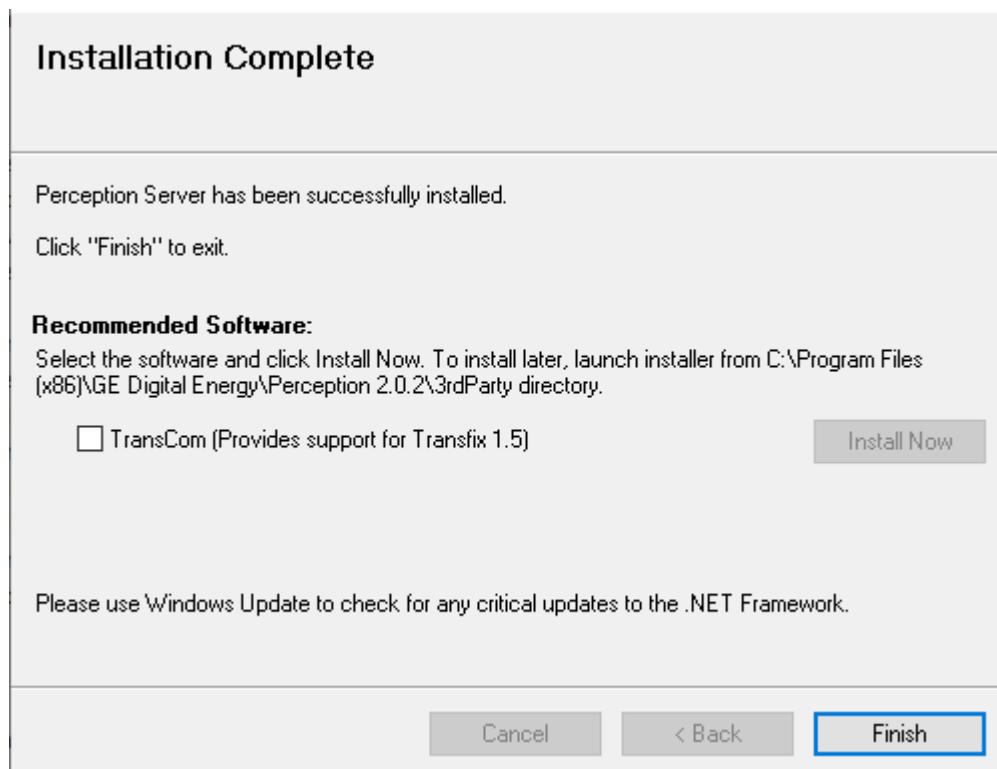


Figure 2-6: Installation Complete

To install the TransCom software for TRANSFIX 1.0/1.5 device support, select the **TransCom** option and click **Install Now**.

2.3 Create the Perception Server database

Perception Server uses SQL server to host the Perception Server database.

Note: SQL Server can be hosted on the same server as the Perception Server or on a separate dedicated server machine.

To create the Perception Server database:

- Open SQL Server Management Studio.
- Log in using an Administrator account as shown in Figure 2-7.



Figure 2-7: SQL Server login

- Run the `CreateSQLServer2005Schema.sql` file in the Perception Server installation folder. Typically found in `C:\Program Files\GE Energy\Perception\SQL Schema`.
- To apply the changes made by the schema, including manual database changes to the Perception Server, restart the Perception Server service.

By default, a database called 'Kelman' is created in the SQL database list — this database is used by Perception Server to host the data.

A specified SQL user account must be configured with 'db_owner' rights to the specified database. These account details are added using the Perception Server Configuration Tool to establish a connection between Perception Server and SQL. See Section 2.5 Connect Perception Server to the database.

Note: SQL Server 2012 and 2014 do not give 'NT AUTHORITY\SYSTEM' 'sysadmin' permissions by default – users should assign this permission manually in SQL Management Studio - Logins.

2.4 Enable MS-DTC Service

To communicate with the SQL Server databases, the MS-DTC service must be enabled on the Perception Server.

Select **Start > Run**, type `services.msc` and click **OK**.

In the Services window, select the **Distributed Transaction Coordinator** service and click the **Start Service** button as shown in Figure 2-8.

Note: To ensure that the service always runs if the PC restarts, right click on the service and select **Properties**. Set the **Startup type** to **Automatic** and click **OK**.

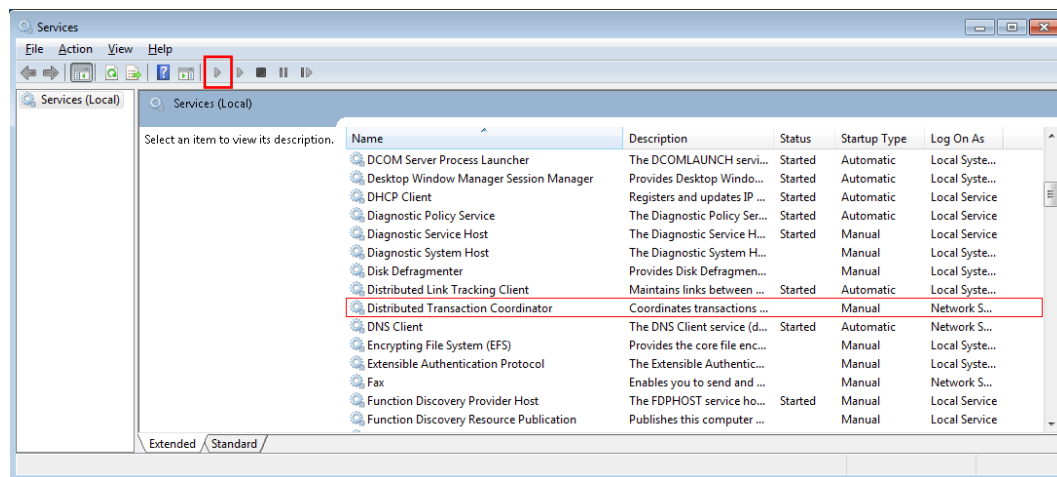


Figure 2-8: Services - Select the Distributed Transaction Coordinator Service

2.5 Connect Perception Server to the database

Open the Perception Server Configuration Tool and select the **Database** tab as shown in Figure 2-9. **Note:** All other tabs are disabled if the database is yet to be configured.

Perception Server Configuration Tool

File Help

GE Digital Energy

Alarm Modem **Database** User Activation Export Map

Please restart the server after changing the database configuration.

User Access

Integrated Security

User Id

Password

Server Location

Vendor

Db Instance

Database

Port

Behaviour settings

Disable device data download

Save Reset

Figure 2-9: Perception Server Configuration Tool – Database tab

The recommendation is to use 'Integrated Security' (Windows Authentication) to connect to the Perception Database, since Perception Server uses 'FILESTREAM' which does not support SQL Authentication.

Currently Integrated Security doesn't support Active Directory so this requires that you manually create the same Windows user on the SQL Server machine to match the credentials of the user on the Perception Server machine.

The **Disable device data download** checkbox disables data download from the device. This prevents measurement data from being downloaded each time the unit connects with Perception, but still allows Perception to poll for the service information from the

device and receive operational status information. This is useful in organisations where other applications, such as data historians are used to store measurements, as it prevents the storage of duplicate measurement data.

Note: If Perception Server is installed on a different machine to the database, ensure that the account used to run Perception Server has access rights for FILESTREAM access on the Microsoft SQL Server instance. (Perception Server logs this fact in the Server.log file).

2.5.1 User Access

Select the security connection method defined by your System Administrator. An 'Integrated Security' connection uses the profile of the currently logged-in user.

If your MS SQL setup requires login credentials for access control, uncheck 'Integrated Security' and enter the user ID and password of the SQL user who has permission to access the Kelman database. The MS SQL login used must have the "db_owner" membership role for the Kelman database.

2.5.2 Server Location

Enter your SQL Server instance information into the **Db Instance** box. Typically, this is the computer name of the SQL Server host and the SQL Server instance name (i.e. `SQLServerHost\SQLExpress`). Finally, type `Kelman` into the **Database** box and click **Save**.

2.6 Activate the Perception Server

Before the Perception Server Service can be started, the Perception Server must be activated with a license key. Open the Perception Server Configuration Tool and select the **Activation** tab as shown in Figure 2-10.

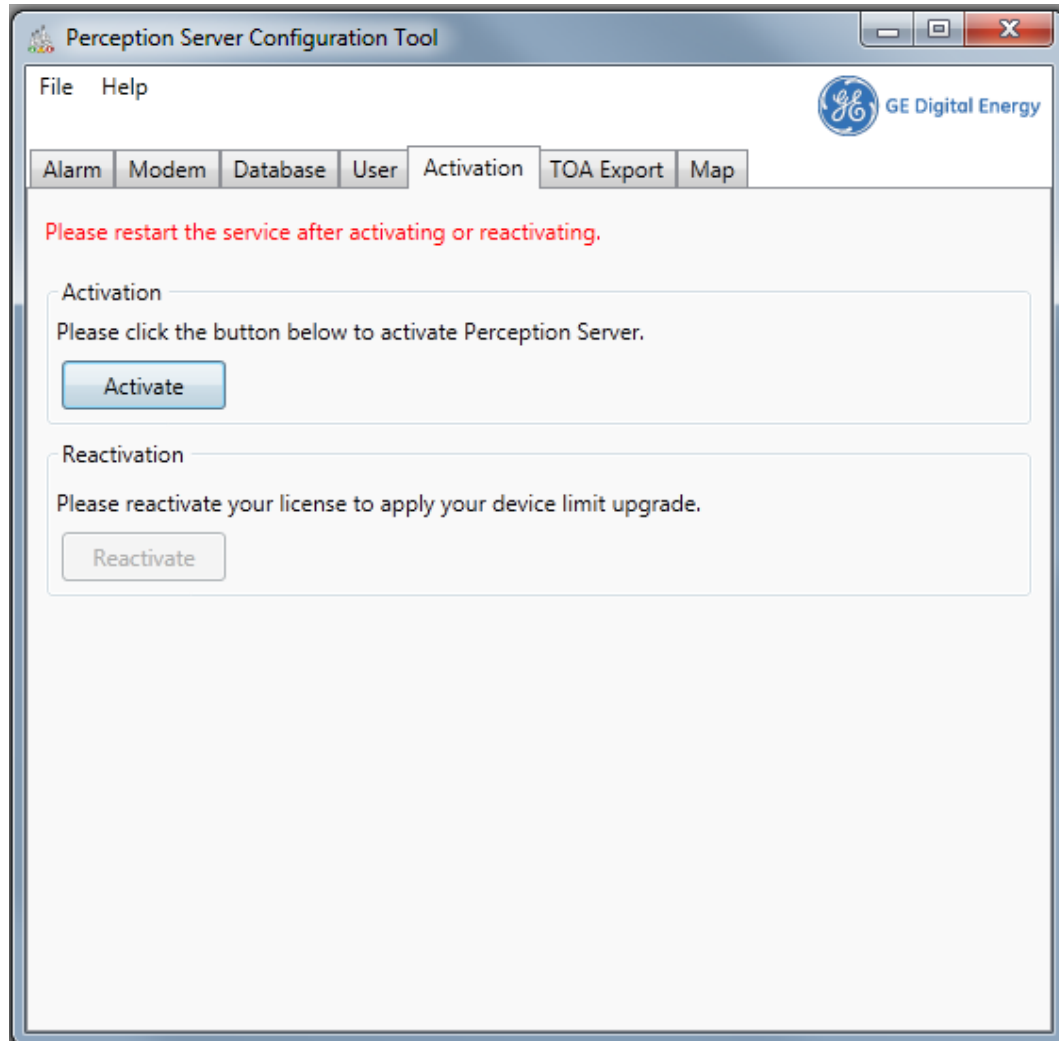


Figure 2-10: Activate the Perception Server

Then click the **Activate** button to open the license key activation wizard and follow the onscreen instructions (see Section 2.8).

2.7 Reactivate the Perception Server

If the Perception Server needs to be reactivated (i.e. if the device limit has been changed), open the Perception Server Configuration Tool and select the **Activation** tab as shown in Figure 2-11 below.

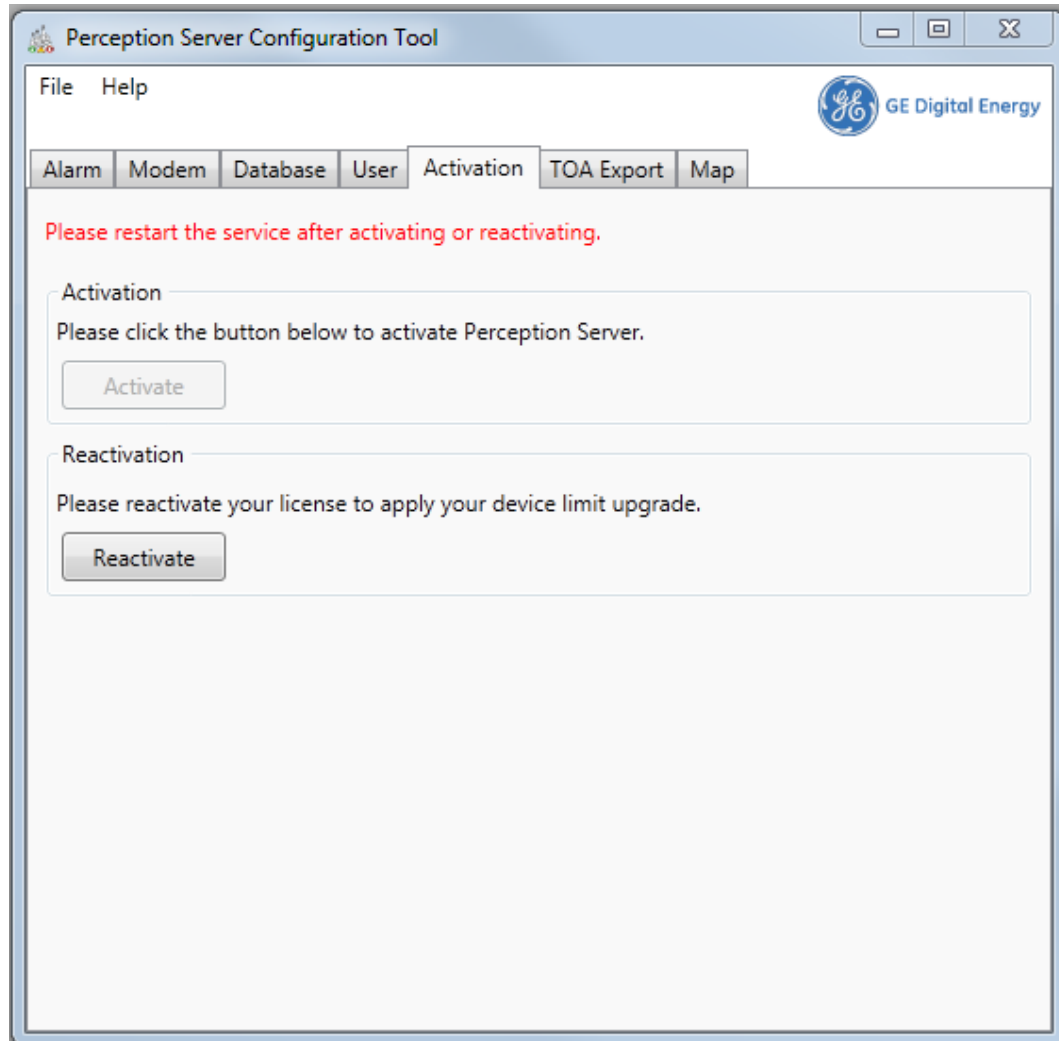


Figure 2-11: Reactivate the Perception Server

Then click the **Reactivate** button to open the license key activation wizard and follow the onscreen instructions (see Section 2.8).

2.8 Perception Server Software Activation Wizard

The Activation Wizard is shown in Figure 2-12. Click **Next** to proceed.

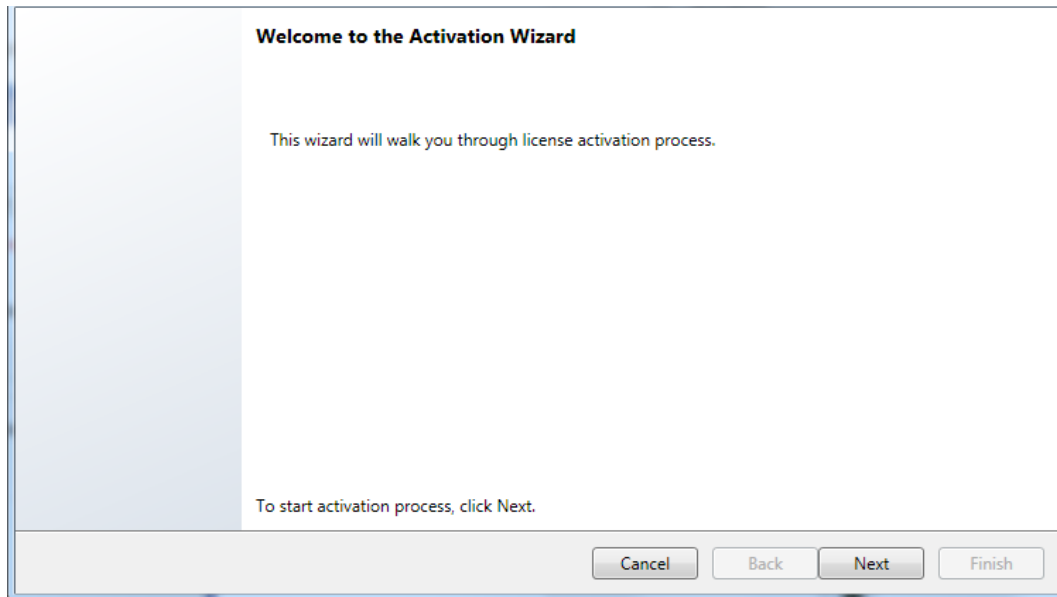


Figure 2-12: Welcome to the activation wizard

Enter the license key provided with the Perception Server software and click **Next** as shown in Figure 2-13.

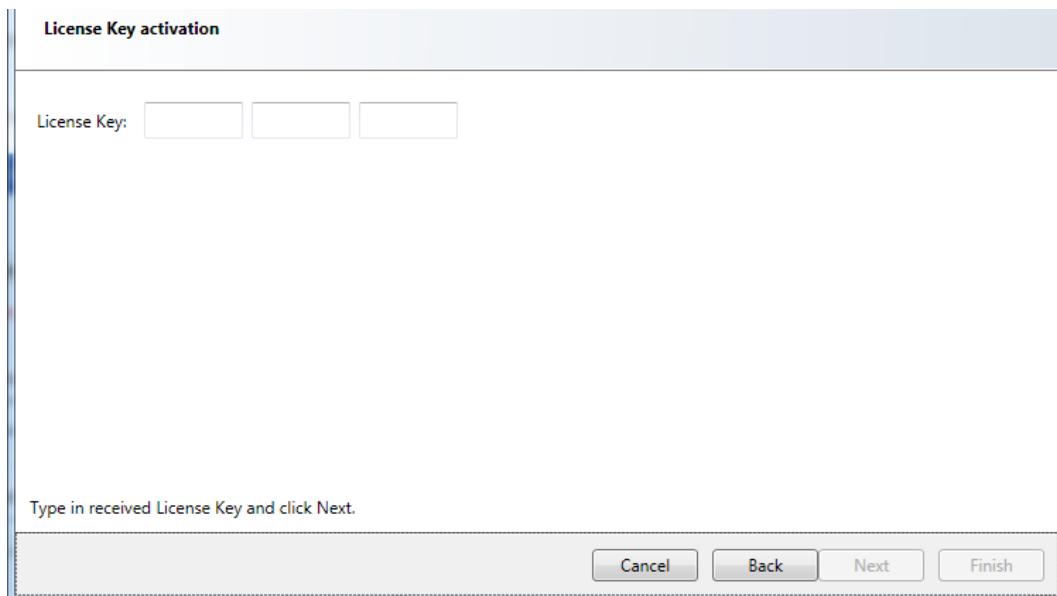


Figure 2-13: License key activation

Select the Activation Method either **Automatic** (see Section 2.8.1) or **Manual** (see Section 2.8.2) as shown in Figure 2-14.

License Key Activation.

Select Activation Method:

Automatic (Internet Connection Required)

Requires Proxy Authentication

User Identification

Password

Manual

After selecting activation option click Next.

Cancel Back Next Finish

Figure 2-14: Select automatic or manual activation

2.8.1 Automatic Activation

An active Internet connection is required for automatic activation.

Note: If your company Internet security requires the use of a secure proxy server to connect to the Internet, then select the **Requires Proxy Authentication** checkbox and enter your user identification and password.

Click **Next** to continue.

Complete the required information fields as shown in Figure 2-15 and click **Next**.

Note: The * denotes mandatory fields.

License Key activation

To complete the activation process, please provide information in the required fields below.

Company Name*

Country*

Area

First Name*

Last Name*

Email*

Position

Receive Newsletter

GE Energy will not pass your information on to any 3rd parties

Cancel Back Next Finish

Figure 2-15: Company details

The software now attempts to validate the license key. If successful, a message displays as shown in Figure 2-16. Click **Next** to continue.

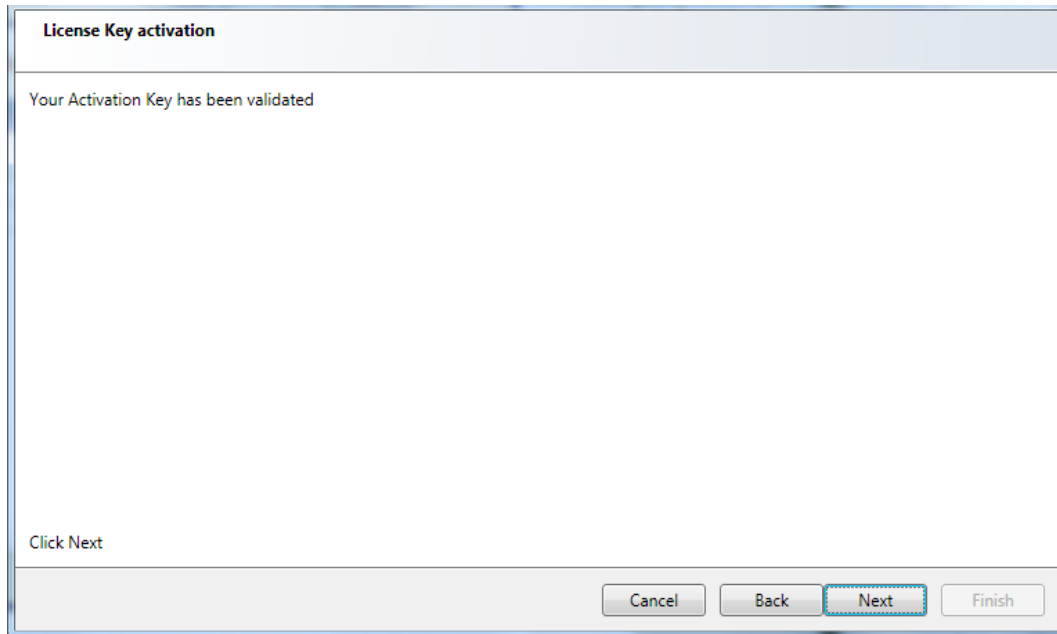


Figure 2-16: Automatic validation of the key successful

Confirmation of successful license activation is shown in Figure 2-17. Click **Finish** to exit the Activation Wizard. To add a user, see Section 3.3.1.

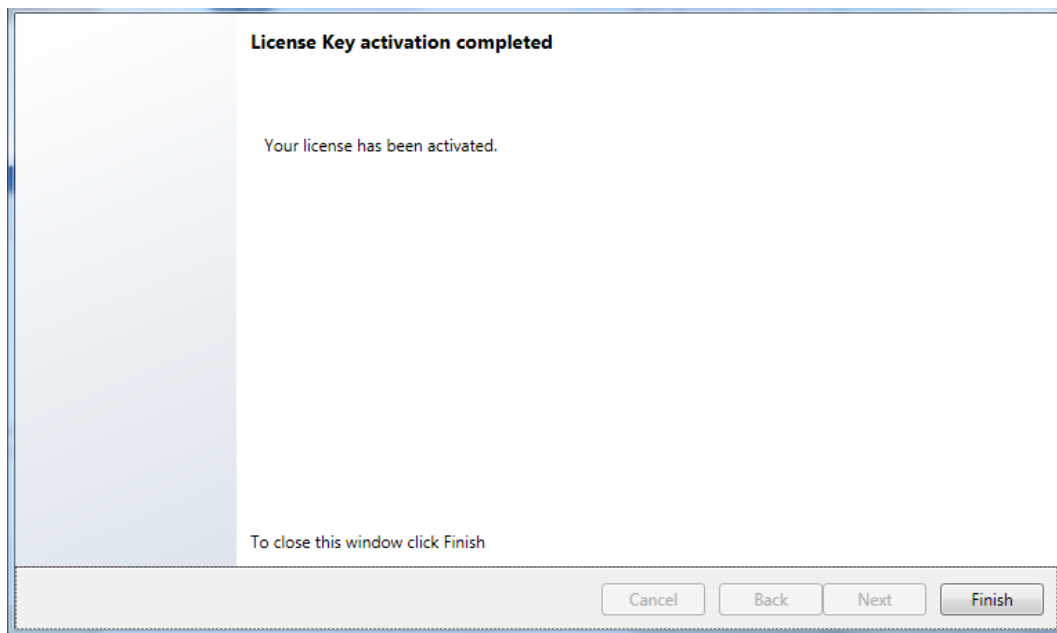


Figure 2-17: Automatic validation complete

If the key could not be validated due to a communication error (for example, if the Internet was down or the GE Digital Energy server was unobtainable) then a message displays as shown in Figure 2-18.

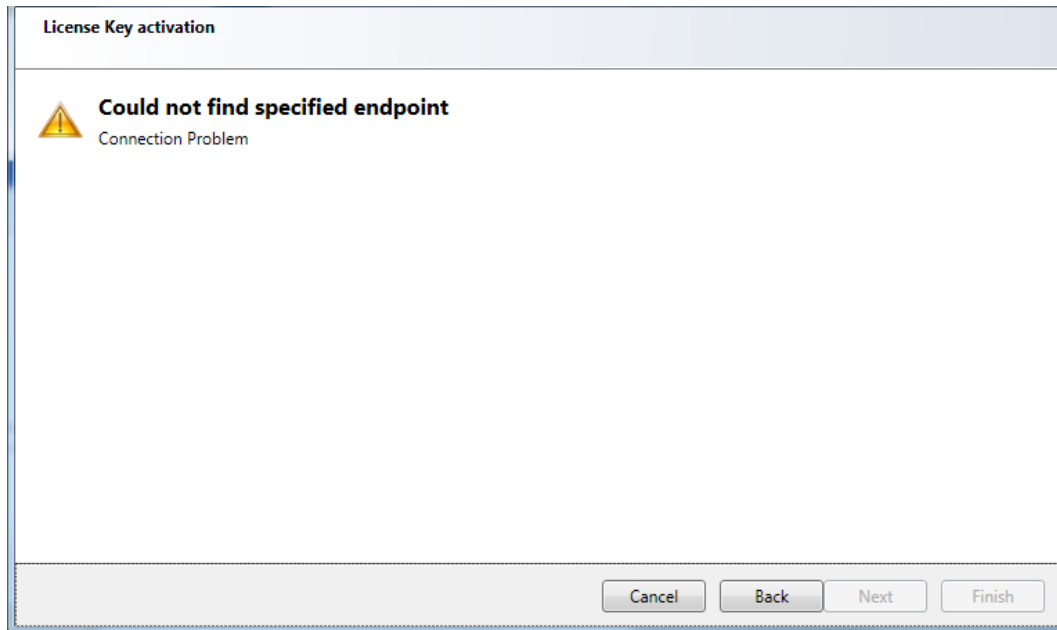


Figure 2-18: Automatic validation failed

To resolve, repeatedly click the **Back** button until the 'Select Activation Method' screen displays as shown in Figure 2-14 and instead select the **Manual** method.

2.8.2 Manual Activation

The manual method generates a unique 'installation key' that will need to be entered in the GE Digital Energy website along with your company details. The website will return a matching 'activation key' which should be pasted into the activation key field displayed on the license wizard. Follow these steps to manually activate Perception Server:

In the Select Activation Method screen, select **Manual** and click **Next** as shown in Figure 2-19.

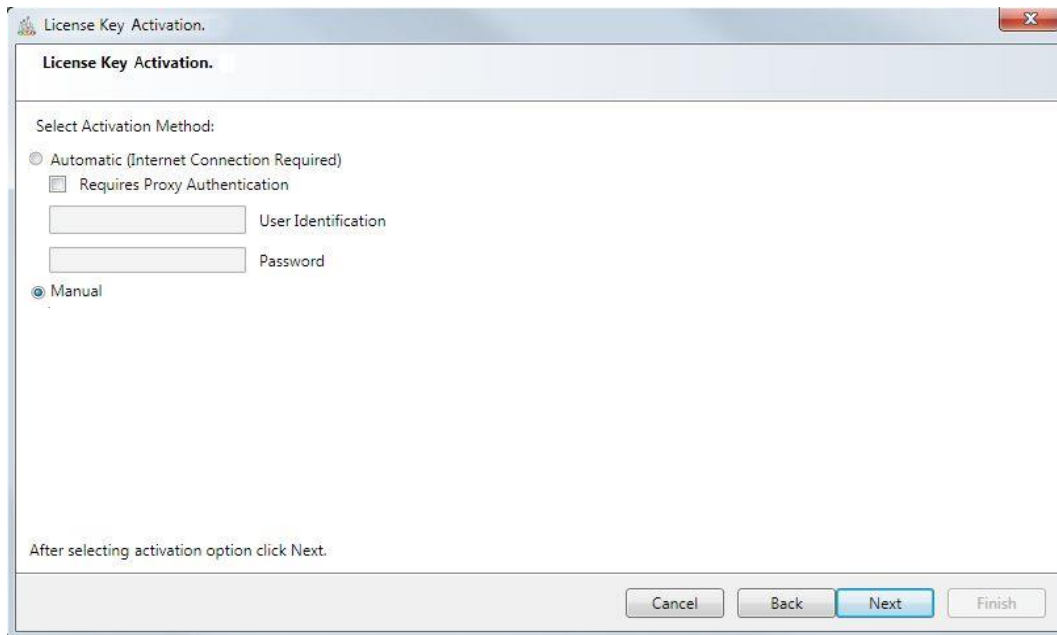


Figure 2-19: Select Manual Activation

The software's unique installation key is displayed in the 6 boxes shown at the top of Figure 2-20. Click the **Copy Installation Key** link to copy the displayed installation key to the Windows clipboard.

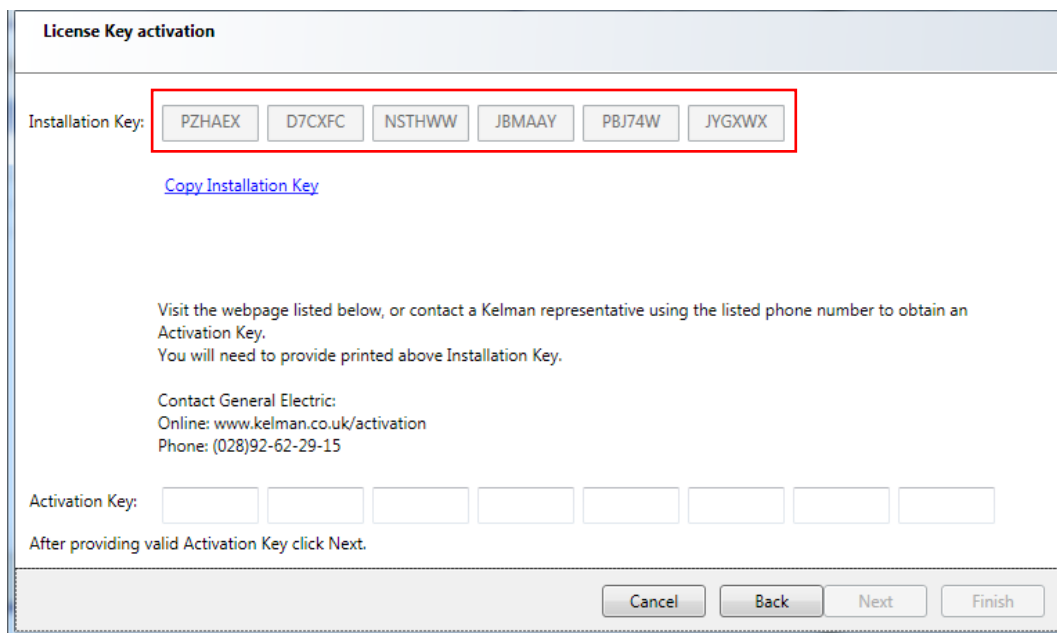


Figure 2-20: Obtaining Installation key

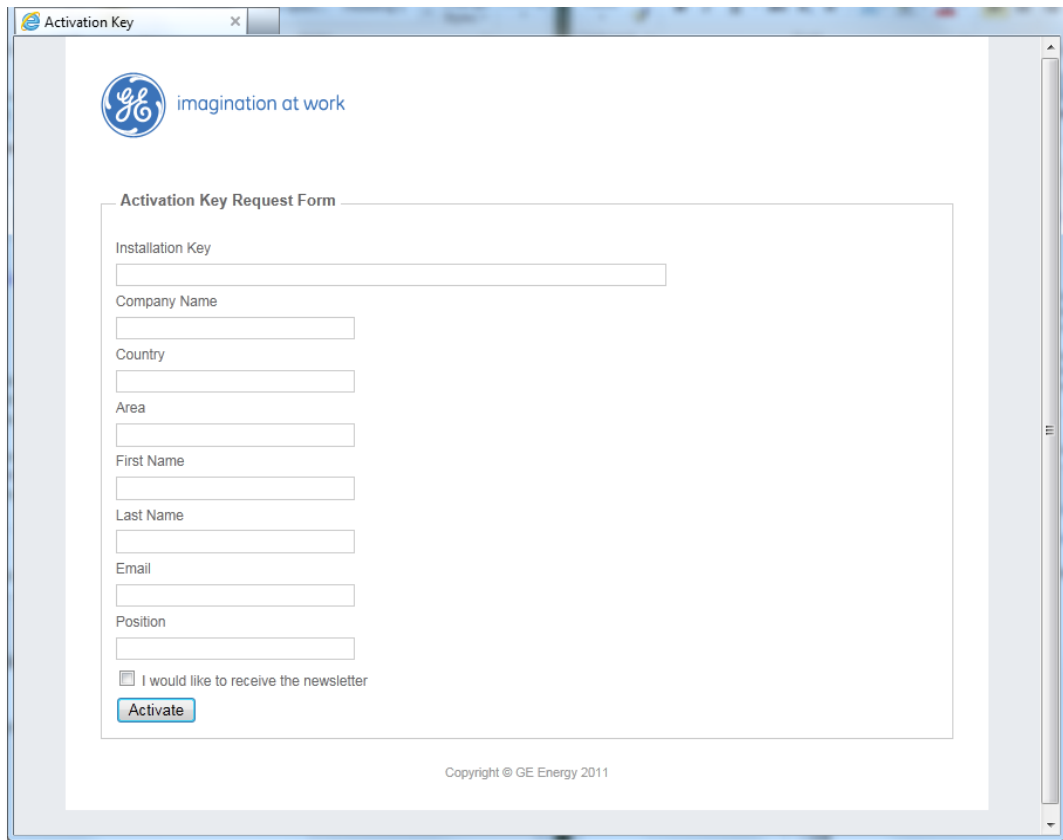
Next use a web browser to visit the activation website:

www.gedigitalenergy.com/perception/activation

If there is a problem with the Internet connection, contact GE Digital Energy Support to obtain the activation key at:

E-Mail: GA.support@ge.com
 North America toll-free: 1-800-361-3652
 Worldwide: 1-514-420-7460

On the Activation Key Request Form, click into the **Installation Key** field as shown in Figure 2-21 and right click to **Paste** the installation key into the entry field.



The screenshot shows a web browser window titled "Activation Key". The page features the GE logo and the slogan "imagination at work". Below this is the "Activation Key Request Form". The form contains several input fields: "Installation Key", "Company Name", "Country", "Area", "First Name", "Last Name", "Email", and "Position". There is also a checkbox labeled "I would like to receive the newsletter" and an "Activate" button. At the bottom of the form area, it says "Copyright © GE Energy 2011".

Figure 2-21: GE Digital Energy activation website

Complete the remaining details and click **Activate**.

Note: All fields except 'Area' and 'Position' are mandatory. The web page will generate an error message if mandatory fields are not completed.

If successful, an activation key is generated that is specific to this installation of Perception Server. An example is shown in Figure 2-22.



The screenshot shows the same web browser window as Figure 2-21, but now the form is filled with a success message. The message reads: "Activation Key for your product has been successfully generated. Use it in the product activation form when prompted." Below this message, the "Activation Key:" is displayed as "QACBND-JAXYMG-A7LBEQ-XKF4QW-YTX344-GJQXE7-SWAL3Q-KCWYWR". This key is enclosed in a red rectangular box. At the bottom of the page, it says "Copyright © GE Energy 2011".

Figure 2-22: Copy the key onto the clipboard

Copy the activation key from the web page and paste it into the Activation Wizard and click **Next** as shown in Figure 2-23.

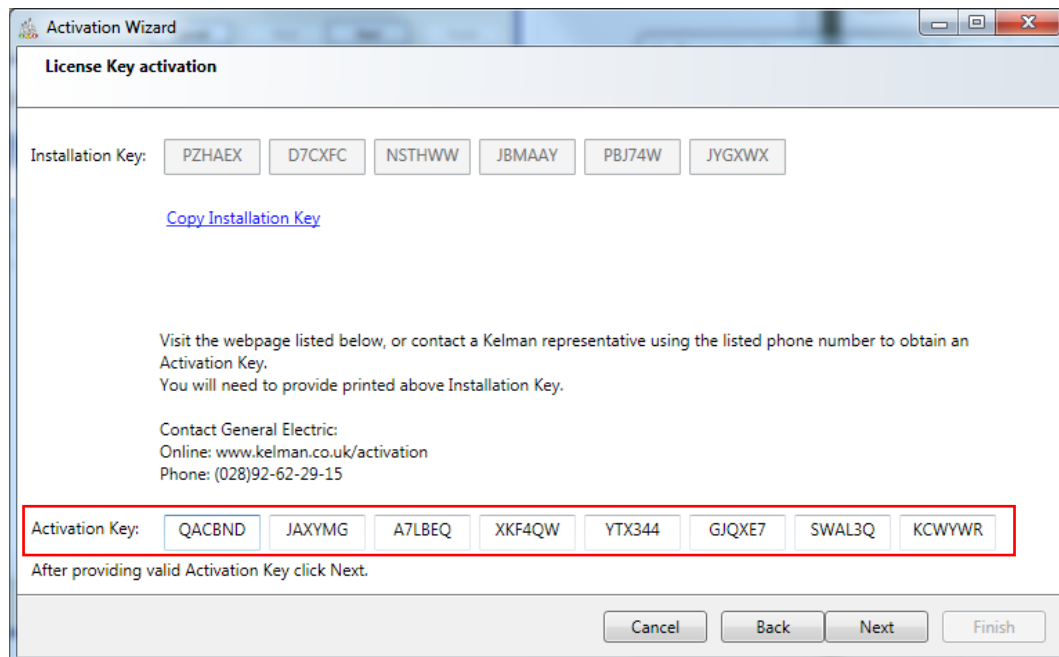


Figure 2-23: Manually paste the key from the activation web page

The software validates the license key. If successful, a message displays as shown in Figure 2-24. Click **Next** to continue.

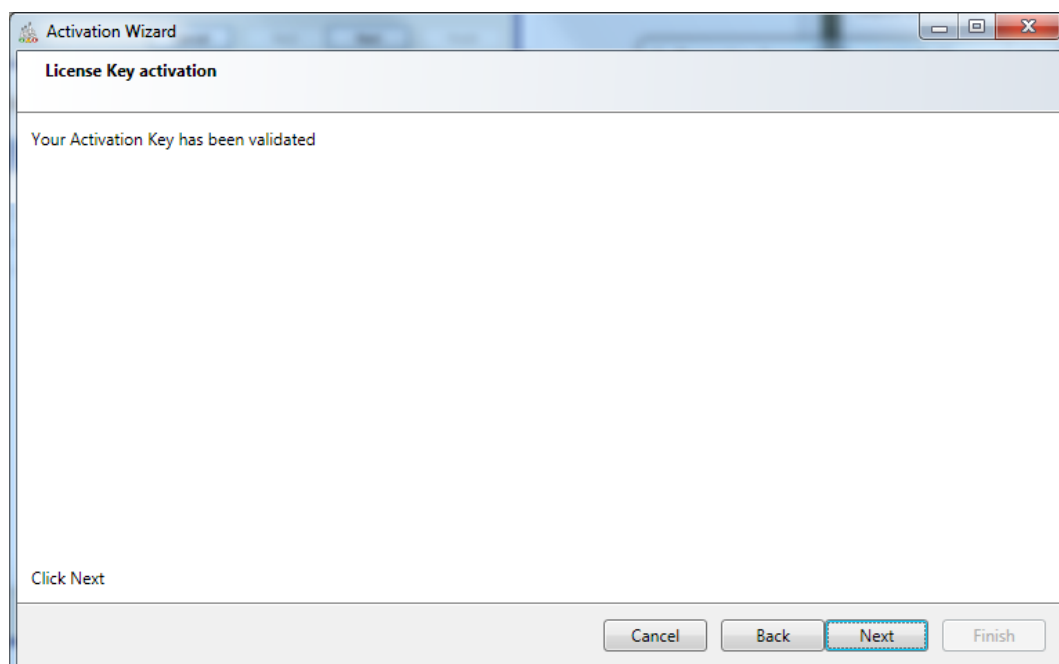


Figure 2-24: Manual validation of the key successful

Confirmation of successful license activation is shown in Figure 2-25. Click **Finish** to exit the Activation Wizard. To add a user, see Section 3.3.1.

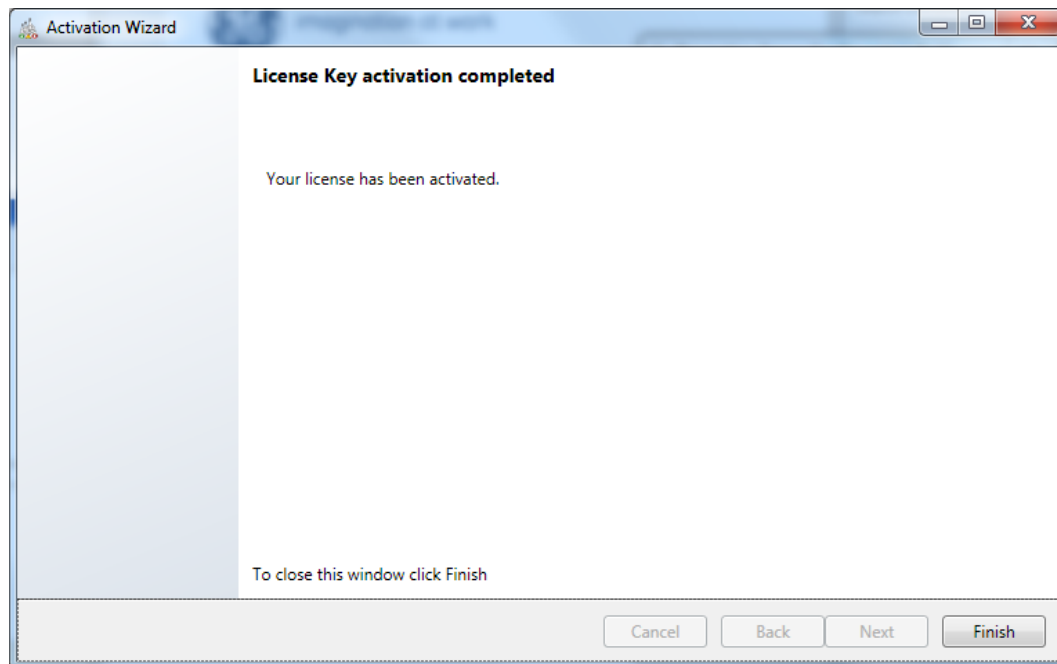


Figure 2-25: Manual validation complete

2.9 Establish Client Connections

There are several prerequisite steps to perform before client\server communications are operative:

- The client PC must have Perception Desktop installed.
- A user must be created in the Perception Server Configuration Tool.
- The user must attempt to open the connection with the Perception Server.
- Both the client user and the server administrator then must override their respective trust certificates before the client-server link can work.
- Every time a new client user is added, both the user and the server administrator must act together to override their trust certificates.

2.9.1 Trust the Client Certificate

The first time that a Perception Desktop client attempts to connect with the server, the connection is rejected as shown in Figure 2-26. This is because the *client* does not trust the server. To trust the server certificate, the certificate must be moved from the rejected certificate folder and added to the trusted certificate folder.



Figure 2-26: Server certificate not trusted

Subsequently another connection error occurs as shown in Figure 2-27. This time because the *server* does not trust the client. To trust the client certificate, the certificate must be moved from the rejected certificate store and added to the trusted certificate store.

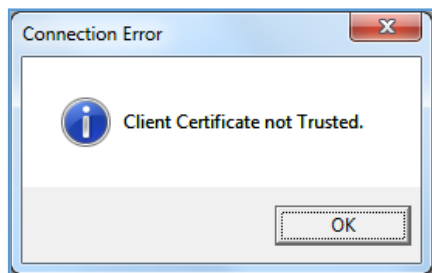


Figure 2-27: Client certificate not trusted

This will occur with every first connection attempt of a new user and so needs both the client user and server administrator to be logged in so that both can move the respective certificates to the trusted certificate store. To do this, follow these steps:

In Windows 7/Server 2008, open Windows Explorer and navigate to the following location:

```
C:\ProgramData\GE_Energy\Perception\RejectedCertificates
```

Look for a certificate with this format: `Perception.Desktop.<computer name>[key]`, where `<computer name>` is the computer name of the client and `[key]` is the public certificate key.

Move the certificate from the rejected certificates folder to the trusted certificates folder at this location in Windows 7/Server 2008:

```
C:\ProgramData\GE_Energy\Perception\TrustedCertificates\certs
```

2.10 Firewall Settings

In order that the client and server successfully communicate, Perception Desktop must be allowed to communicate through the firewall. A firewall program is usually accessed via the Windows Control Panel. In the advanced settings for Perception Server, ensure that ports 4840, 4841 & 62541 are open for inbound connection on the Perception Server machine.

If the UA Discovery Server application is installed, it should be added as a program that can send and receive through the firewall.

2.11 Perception Database Upgrade Tool

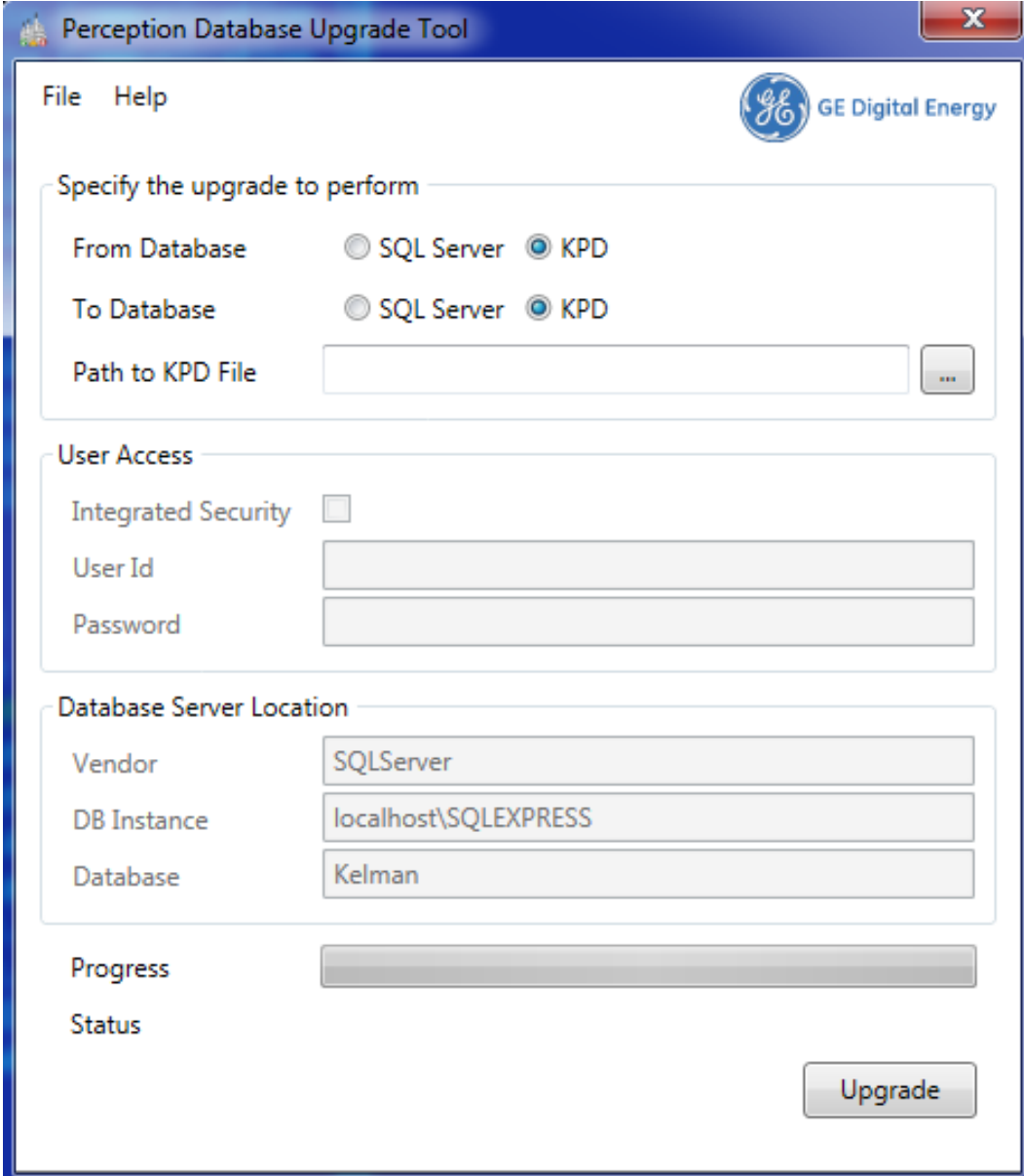
If migrating from a previous version of Perception or if you wish to import data from a legacy database, you must use the Perception Database Upgrade Tool to convert the database to a compatible format. The Perception Database Upgrade Tool can be used in several migration scenarios, such as converting:

- an older local (KPD) database to a Perception 2.0 local (KPD) database
- an older local (KPD) database to a Perception 2.0 SQL Server database
- an older Perception SQL Server database to a Perception 2.0 SQL Server database

The Perception Database Upgrade Tool can be found at the following location:

C:\Program Files (x86)\GE Digital Energy\Perception 2.4.2

Double click the **Perception.Database.Upgrade.Tool.exe** file to open the tool as shown in Figure 2-28.



The screenshot shows the Perception Database Upgrade Tool window. The title bar reads "Perception Database Upgrade Tool" and includes a GE Digital Energy logo. The interface is divided into several sections:

- Specify the upgrade to perform:** This section contains two rows of radio buttons. The first row is for "From Database" with "SQL Server" and "KPD" options, where "KPD" is selected. The second row is for "To Database" with "SQL Server" and "KPD" options, where "KPD" is selected. Below these is a text field for "Path to KPD File" with a browse button (three dots).
- User Access:** This section includes a checkbox for "Integrated Security" (unchecked), a text field for "User Id", and a text field for "Password".
- Database Server Location:** This section contains three text fields: "Vendor" (containing "SQLServer"), "DB Instance" (containing "localhost\SQLEXPRESS"), and "Database" (containing "Kelman").
- Progress:** A horizontal progress bar.
- Status:** A text field.
- Upgrade:** A large button at the bottom right.

Figure 2-28: Perception Database Upgrade Tool

Use the tool to specify the source and destination database formats.

Note: Depending on the type of upgrade, a path or database connection details may also be required.

If moving from a local KPD database to a SQL Server database, use the tool to add appropriate user access.

Finally, in the Database Server Location section, ensure that the tool is pointing to the newly updated database.

Click **Upgrade** to start the upgrade process.

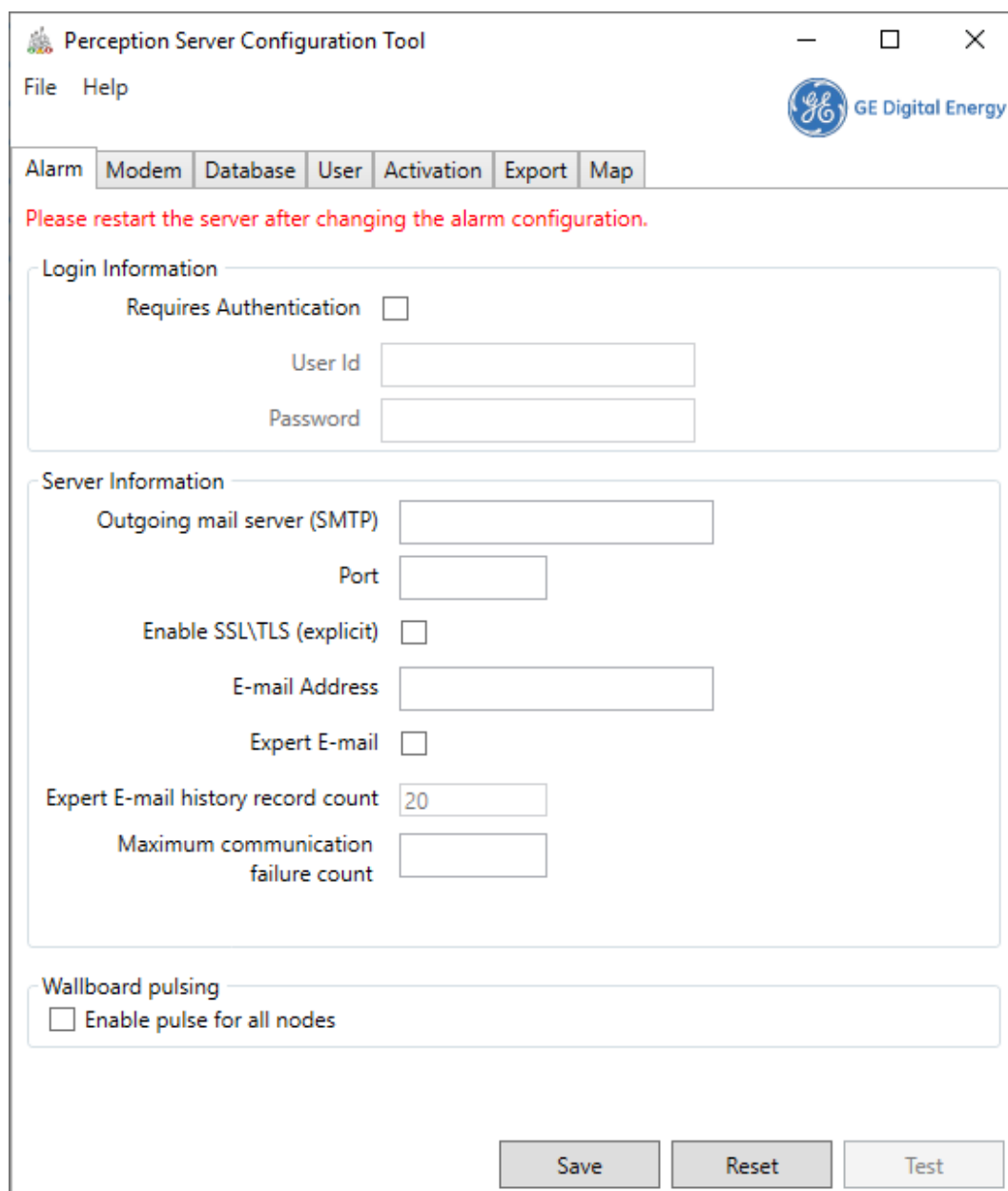
Note: Customers should be aware that Perception does not support the 'merging' of databases.

Note: If any issues occur during the migration of Server data, contact Customer Support.

3 CONFIGURATION

3.1 Functionality Overview

The Perception Server Configuration Tool allows complete configuration of the Perception Server. Once installed, the user interface presents seven tabs as shown in Figure 3-1.



The screenshot shows the Perception Server Configuration Tool window. The title bar reads "Perception Server Configuration Tool" and includes standard window controls. Below the title bar is a menu bar with "File" and "Help". The GE Digital Energy logo is in the top right corner. A tabbed interface is visible with tabs for "Alarm", "Modem", "Database", "User", "Activation", "Export", and "Map". The "Alarm" tab is selected. A red message states: "Please restart the server after changing the alarm configuration." The configuration area is divided into three sections: "Login Information" with a "Requires Authentication" checkbox, "User Id" and "Password" text boxes; "Server Information" with "Outgoing mail server (SMTP)", "Port", "Enable SSL/TLS (explicit)", "E-mail Address", "Expert E-mail", "Expert E-mail history record count" (set to 20), and "Maximum communication failure count" text boxes; and "Wallboard pulsing" with an "Enable pulse for all nodes" checkbox. At the bottom right are "Save", "Reset", and "Test" buttons.

Figure 3-1: Perception Server Configuration Tool

The seven tabs provide access to the different configuration themes of Perception Server as outlined below:

- Alarm: See Section 3.4 Configure Alarm Emails.
- Modem: See Section 3.5 Configure Modems.

- Database: See Section 2.5 Connect Perception Server to the database (performed during the initial installation).
- User: See Section 3.3 Configure Users.
- Activation: See Section 2.6 Activate the Perception Server.
- TOA Export: See Section 3.6 Export Download Data to TOA.
- Map: See Section 3.7 Define Custom CSV Mappings.

3.2 Menu Options

The menu bar consists of two menus — **File** and **Help**.

- **File > Exit:** Closes the Perception Server Configuration Tool.
- **Help > About:** Displays an information dialog containing the Release notes, License agreement and Component version numbers.

3.3 Configure Users

By default, the Perception Server allows anonymous connections from Perception Desktop. This is less secure as access is not restricted to requiring valid login credentials. It is recommended that all users are configured on the Perception Server to provide an audit trail of all user actions. See Appendix A for details on how to remove anonymous users. To configure users on the Perception Server, open the Perception Server Configuration Tool and select the **User** tab as shown in Figure 3-2.

As a security precaution, the user session in Perception Desktop can be controlled from Perception Server to automatically close in the case of a period of inactivity. The User Session Settings define the Inactivity timeout in minutes, where 5 minutes is the default. To turn off the inactivity timeout period, change this value to 0 to ensure that the session stays open.

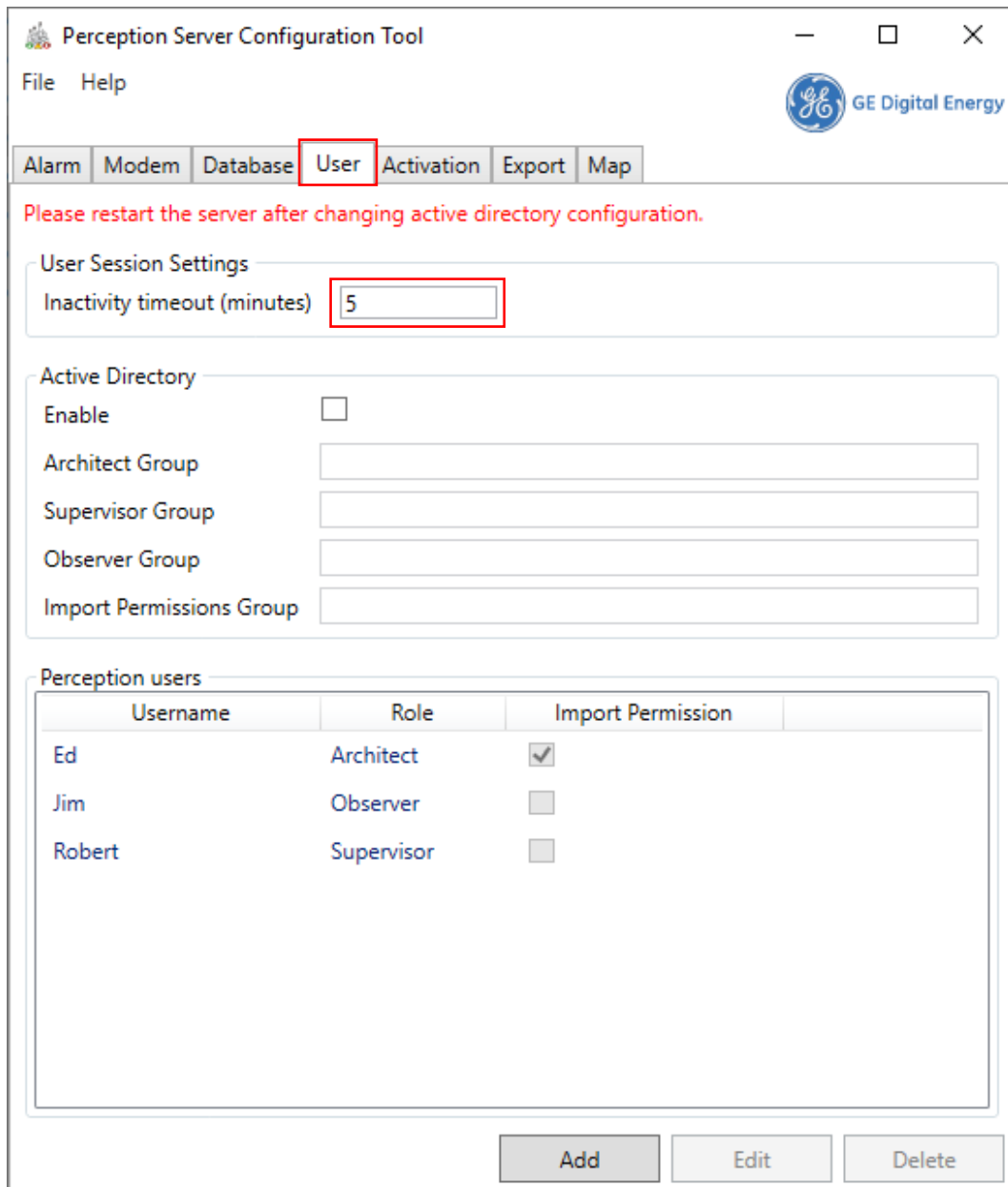


Figure 3-2: Configure users

In the example above, Ed is of 'Architect' status (full read-write with workflow permissions), Jim is of 'Observer' status (read-only permissions) and Robert is of 'Supervisor' status (full read-write permissions).

By default, users are authenticated internally against the list of Perception Users as shown, for example, in Figure 3-2, but alternatively can be authenticated using the operating system's Active Directory. To enable Active Directory, select the **Active Directory** checkbox and type the predefined network group names in the respective text fields to map the Active Directory users to Perception roles. For example, if the user is in the network Architect User Group, then it will resolve as a user of the 'Architect' role in Perception.

If Active Directory is enabled, Perception will first attempt to authentic users using Active Directory and if not found, then attempts authentication against the internal list of Perception Users.

Note: The Import permission is an additional right that can be assigned to any role. Inadvertently importing the wrong data could overwrite valid data, so this right should be assigned with caution.

3.3.1 Add a user

To add a new user, click the **Add** button. The **Add User** dialog displays as shown in Figure 3-3.

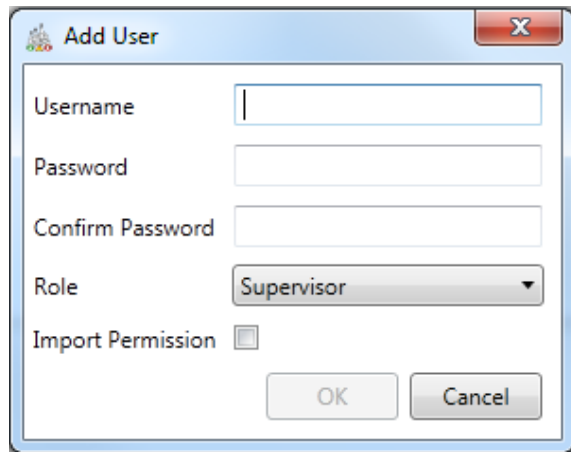


Figure 3-3: Add user dialog

Specify a username and password. Assign a role according to the required permissions outlined in Table 3-1. If the user requires **Import Permission**, select the **Import Permission** checkbox. Click **OK** to add the new configured user.

Table 3-1: Role permissions

| Role | Permission |
|------------|--|
| Supervisor | Full read / write access |
| Observer | Read Access only |
| Architect | Full read / write access with workflow |

The new user is added to the list of users as shown in Figure 3-4.

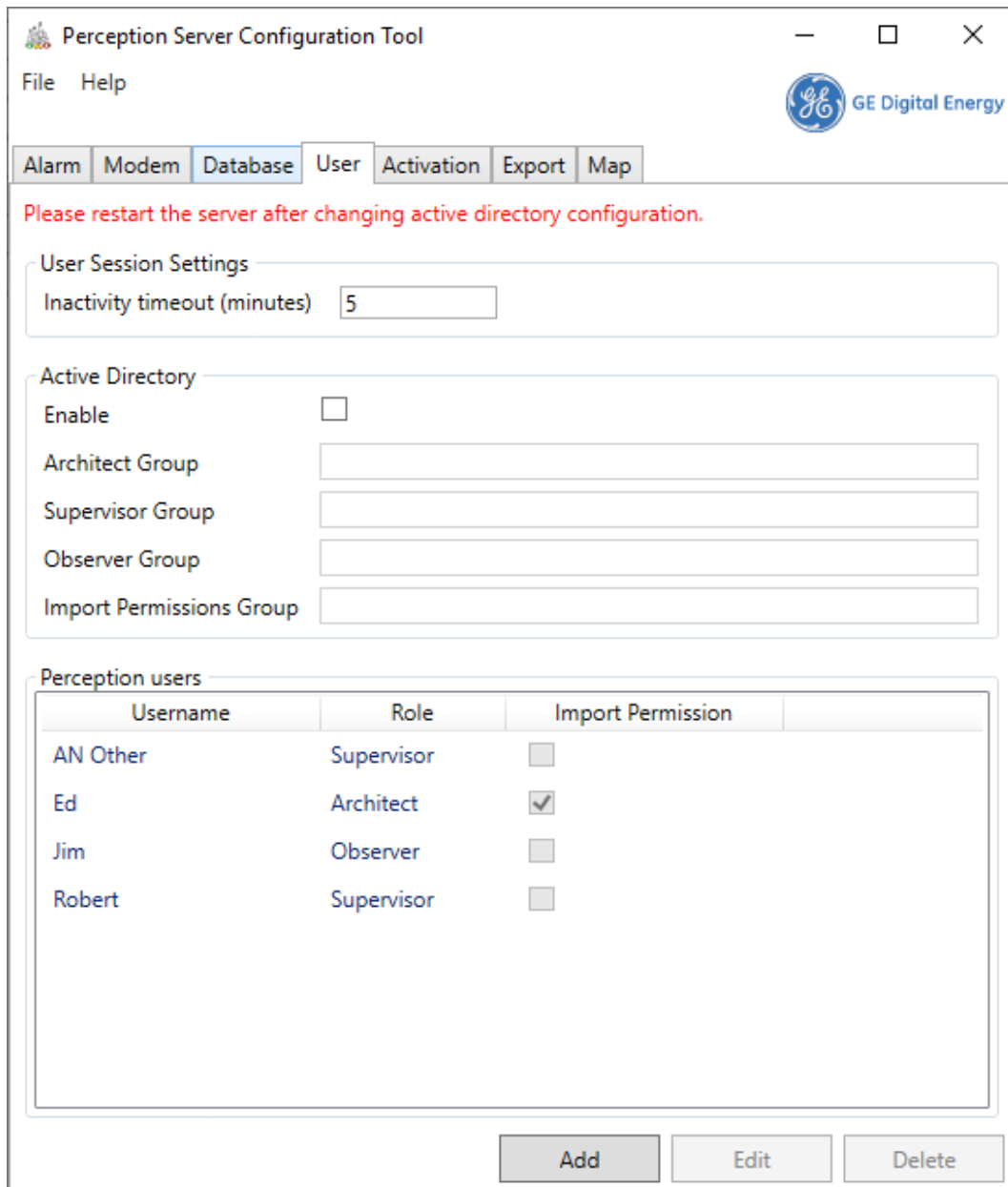


Figure 3-4: List of users

3.3.2 Edit a user

To edit a user, open the Perception Server Configuration Tool and select the **User** tab as shown in Figure 3-4. Select a user and click the **Edit** button. The Edit User dialogue is displayed as shown in Figure 3-5.

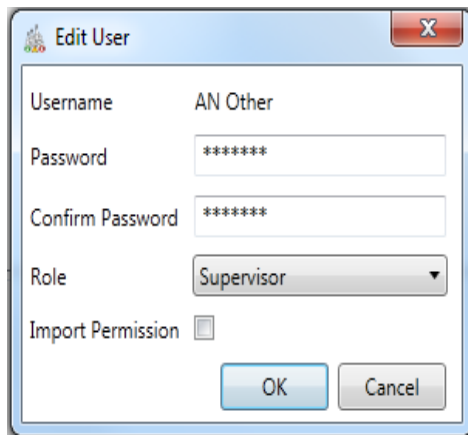


Figure 3-5: Edit user details

It is possible to change all details except the Username. Click **OK** to confirm the change.

3.3.3 Delete a user

To delete a user, open the Perception Server Configuration Tool and select the **User** tab as shown in Figure 3-4. Select a user and click the **Delete** button.

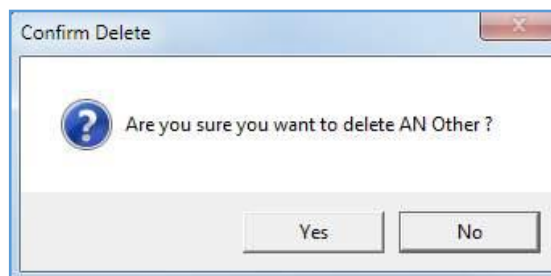


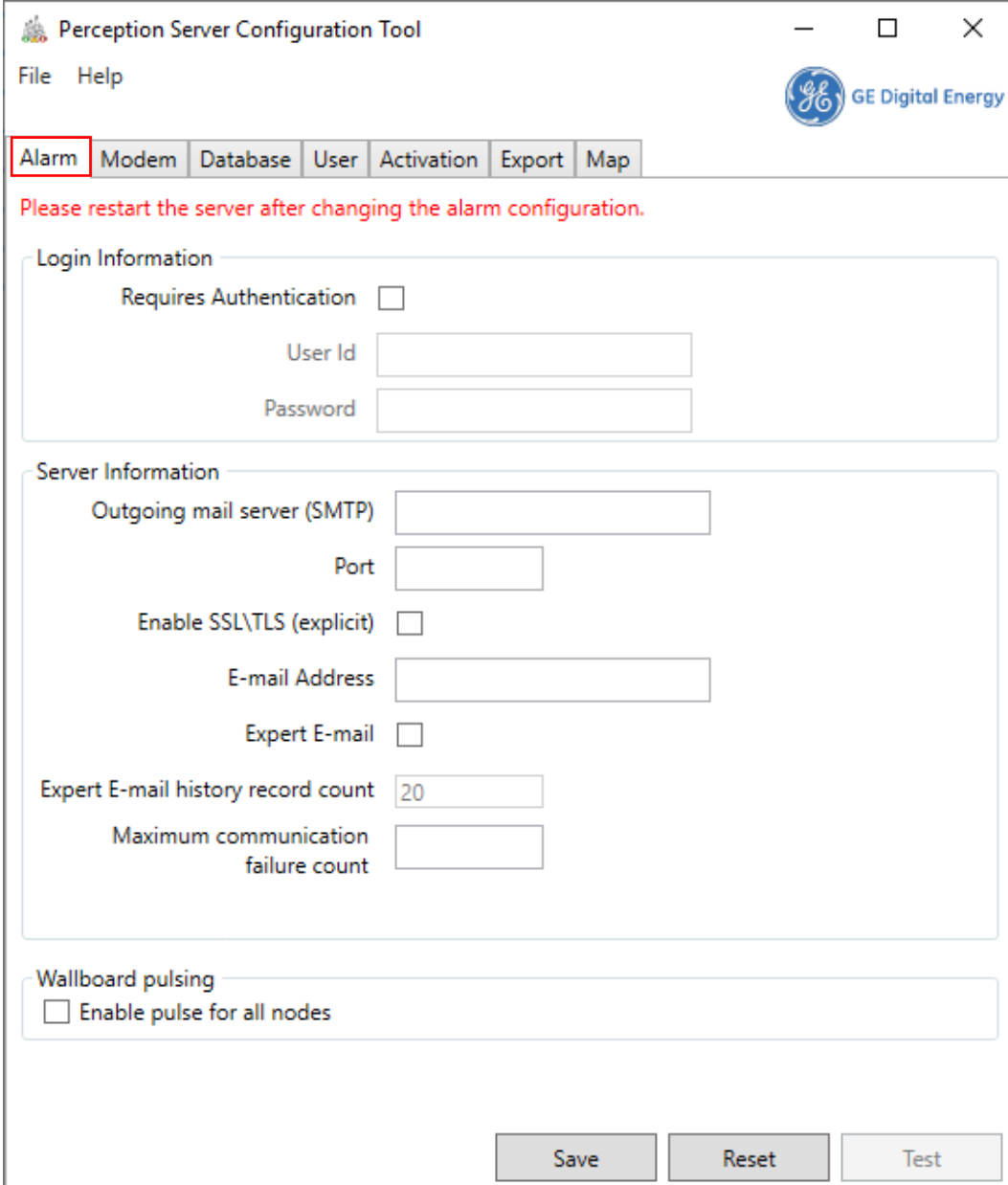
Figure 3-6: Delete a user

A confirmation message appears. Click **Yes** to delete the user.

3.4 Configure Alarm Emails

Emails can be issued to alert users of device condition or communication issues. To configure the server to issue emails, open the Perception Server Configuration Tool and select the **Alarm** tab as shown in Figure 3-7.

Note: To receive such emails, Perception Desktop must be configured with an email address in the Notification E-mail Address box via the device's Properties tab. See Section 3.8.4 Device Properties in the Perception Desktop Installation & User Guide.



The screenshot shows the Perception Server Configuration Tool window. The title bar reads "Perception Server Configuration Tool" and includes standard window controls. Below the title bar is a menu bar with "File" and "Help". A GE Digital Energy logo is in the top right corner. A tabbed interface is visible, with the "Alarm" tab selected and highlighted with a red box. Other tabs include "Modem", "Database", "User", "Activation", "Export", and "Map". A red warning message states: "Please restart the server after changing the alarm configuration." The configuration area is divided into three sections: "Login Information" with a "Requires Authentication" checkbox, "User Id" and "Password" text boxes; "Server Information" with "Outgoing mail server (SMTP)", "Port", "Enable SSL/TLS (explicit)", "E-mail Address", "Expert E-mail" checkboxes, "Expert E-mail history record count" (set to 20), and "Maximum communication failure count" text boxes; and "Wallboard pulsing" with an "Enable pulse for all nodes" checkbox. At the bottom right are "Save", "Reset", and "Test" buttons.

Figure 3-7: Alarm email configuration

The following details need to be completed:

Login Information: Enter the authentication details to allow access to the SMTP server.

Note: Consult with your IT Administrator to see if authentication is required.

Server Information:

In the **Outgoing mail server (SMTP)** box, enter the SMTP server address.

In the **Port** box, enter the email port — typically 25.

In the **Enable SSL\TLS (explicit)** checkbox, select the checkbox to enable this feature. This provides support for an encryption protocol to secure SMTP connections over ports 25/587.

In the **E-mail Address** box, enter the email address of the sender of the emails E.g. 'noreply@yourcompany.com'. **Note:** The email address does not have to exist.

In the **Expert E-mail** checkbox, select the checkbox to enable this feature. See Section 3.4.1 below.

In the **Maximum communication failure count** box, specify the number of failures required before an email is sent. This is designed to limit the number of emails recipients receive about a communication issue.

Wallboard pulsing:

In the **Enable pulse for all nodes** checkbox, select the checkbox to enable the dynamic animations such as pulsing or rippling on all assets on the Perception Desktop wallboard (when an alarm is triggered or a risk index changes). The default is Off.

3.4.1 Expert analysis emails

A further email can be issued to nominated persons containing more detailed information on the alarm.

To enable this feature, select the **Expert E-mail** checkbox in the Perception Server Configuration Tool.

In the **Expert E-mail history record count**, specify the number of records to be included as a CSV attachment in the email. The default is 20.

Note: To receive such emails, Perception Desktop must be configured with an email address in the Expert E-mail Address box via the device's Properties tab. See the Perception Desktop Installation & User Guide for 'Setting up Asset Properties > Device Properties > Email'.

3.5 Configure Modems

To configure the modems used by Perception Server, open the Perception Server Configuration Tool and select the **Modem** tab as shown in Figure 3-8.

All available modems to the Perception server are listed. Select the checkbox next to each modem you want the Perception Server to use.

When Perception Server attempts a data download, the Server will use the first available modem in the list. If that modem is busy, the server will try the next selected modem on the list until an available modem is found.

Note: Ensure that selected modems are exclusive to Perception Server and not used by any other applications running on the Perception Server host.

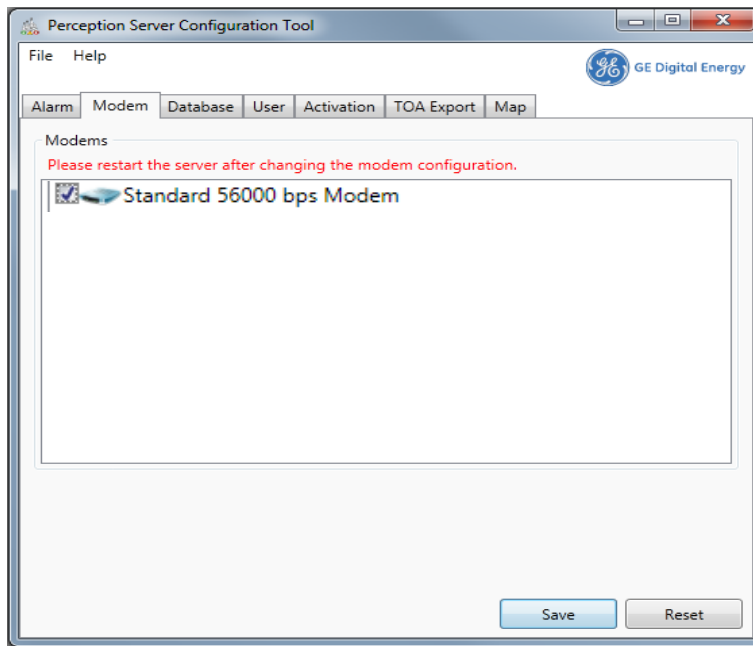


Figure 3-8: Modem configuration

3.6 Export Download Data to TOA

If interrogation and analysis is required using other tools, the Server can be configured to export all downloaded data to the universal TOA format.

Select the **Export** tab and select the **Export download data to TOA files** checkbox as shown in Figure 3-9.

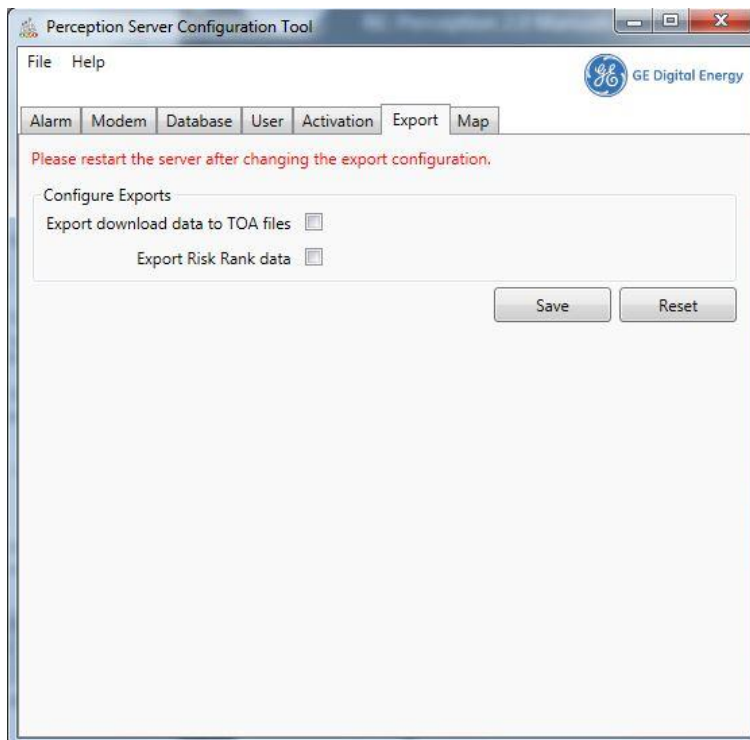


Figure 3-9: TOA Export

The files are stored at the following location:

C:\ProgramData\GE_Energy\Perception\Export\TOA

The files are named as follows:

```
<device serial number>_YYYYMMDD_Time.TOA
```

Where YYYYMMDD is the date in reverse order so that it is listed in the correct chronological order in Windows Explorer.

3.7 Define Custom CSV Mappings

The Map page allows you to define custom CSV mappings for imports and exports. Click the **Import** tab to specify the source and destination field names to ensure correlation of the imported data.

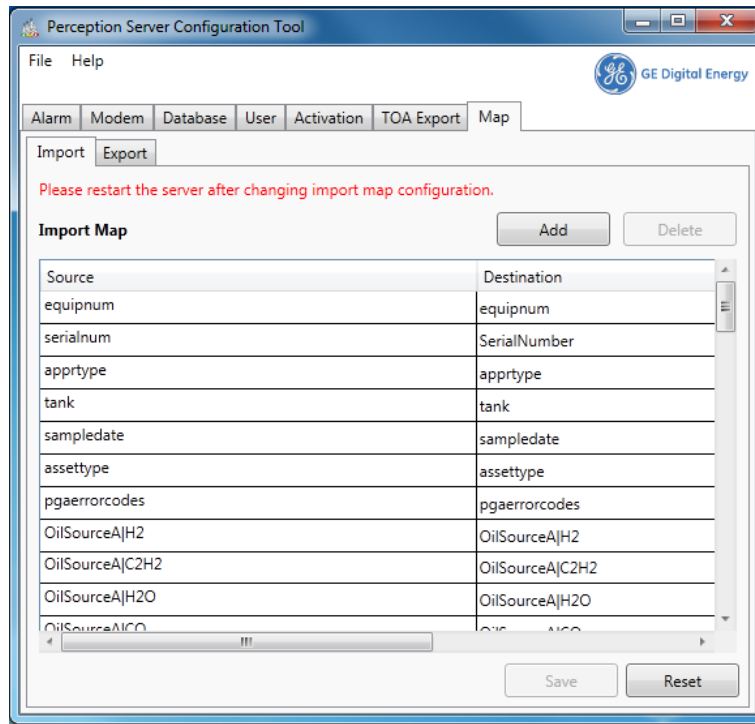


Figure 3-10: Import Mappings

Note: The import map now includes alarms and engineering units.

Click the **Export** tab to customise the export in a similar way.

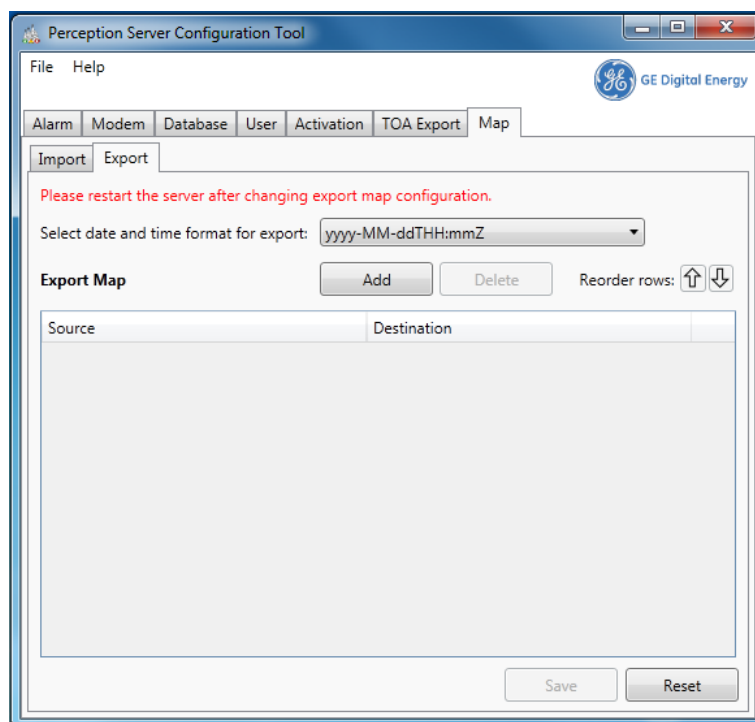


Figure 3-11: Export Mappings

If the export table is empty, click **Add** to add the default fields `serialnum`, `sampledate` and `assettype` to the table as shown in Figure 3-12. Additionally, you can select a date and time format and reorder the rows accordingly.

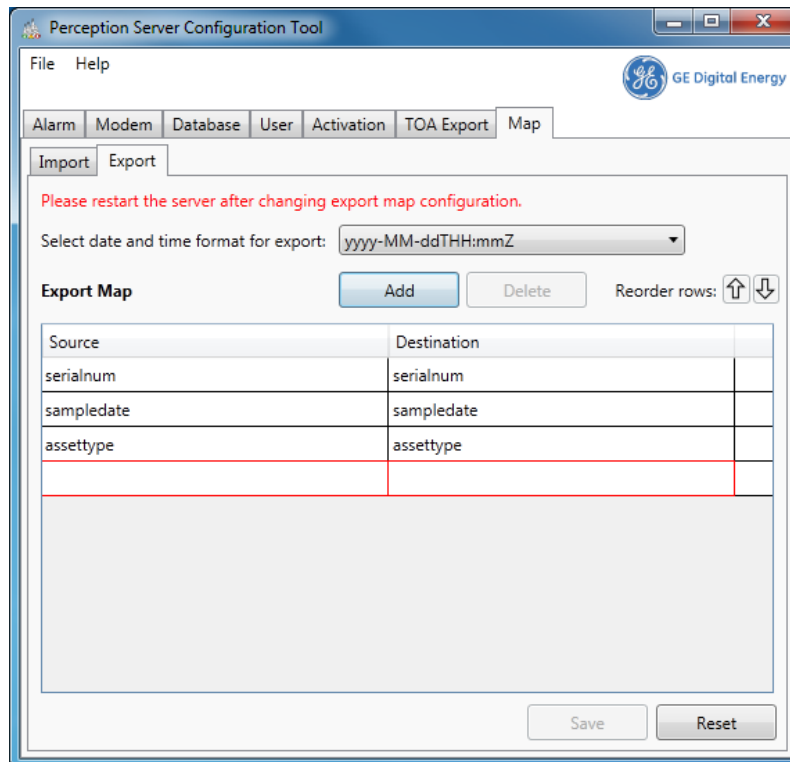


Figure 3-12: Custom CSV mappings

Appendix A Removing anonymous user permissions

Anonymous user access is enabled by default. This means users do not have to supply a username or password to login to the server, but are limited to Observer (read-only) status. However, for security reasons it may be prudent to remove anonymous user access.

The user token permissions are in the "perception.server.config.xml" file which can be found in the following folder on Windows 7 or Server 2008:

```
C:\ProgramData\GE_Energy\Perception
```

The anonymous user token policy code is as below:

```
-<UserTokenPolicies
xmlns:d2p1="http://opcfoundation.org/UA/2008/02/Types.xsd">
  -<d2p1:UserTokenPolicy>
    <d2p1:PolicyId
xmlns:i="http://www.w3.org/2001/XMLSchema-instance"
i:nil="true"/>
    <d2p1:TokenType>Anonymous_0</d2p1:TokenType>
    <d2p1:IssuedTokenType
xmlns:i="http://www.w3.org/2001/XMLSchema-instance"
i:nil="true"/>
    <d2p1:IssuerEndpointUrl
xmlns:i="http://www.w3.org/2001/XMLSchema-instance"
i:nil="true"/>
    <d2p1:SecurityPolicyUri
xmlns:i="http://www.w3.org/2001/XMLSchema-instance"
i:nil="true"/>
  </d2p1:UserTokenPolicy>
```

The d2p1 section is repeated for 'Observer' and 'Supervisor' tokens. You can delete all between, and including the lines d2p1 to /d2p1 or comment it out by changing

```
<d2p1:UserTokenPolicy> to <!--d2p1:UserTokenPolicy> and
</d2p1:UserTokenPolicy> to </d2p1:UserTokenPolicy>-->
```

Appendix B Communicating with Perception Server via OPC UA

Perception Server utilizes OPC UA to establish secure client\server communications to and from Perception Desktop.

OPC UA also provides a standardised secure communication protocol that third party applications can use to communicate directly with the Perception Server. This allows other products to read, write and poll information from Perception Server.

Refer to the online OPC foundation documentation for technical information on communicating using OPC UA. Visit <https://opcfoundation.org/>.

C.1 Tabs not enabled on the Perception Server Configuration Tool

For the Perception Server and Perception Server Configuration Tool to run in the Windows 7 environment with multiple users, the SQL Server/ SQL Express login must be given “sysadmin” rights. The following steps outline the process to make the necessary changes in the database security settings:

1. Launch Microsoft SQL Server Management Studio application.
2. Expand the **Security** node as shown in Figure C-1.
3. To create the required login, right click on the **Logins** node and select **New Login**.

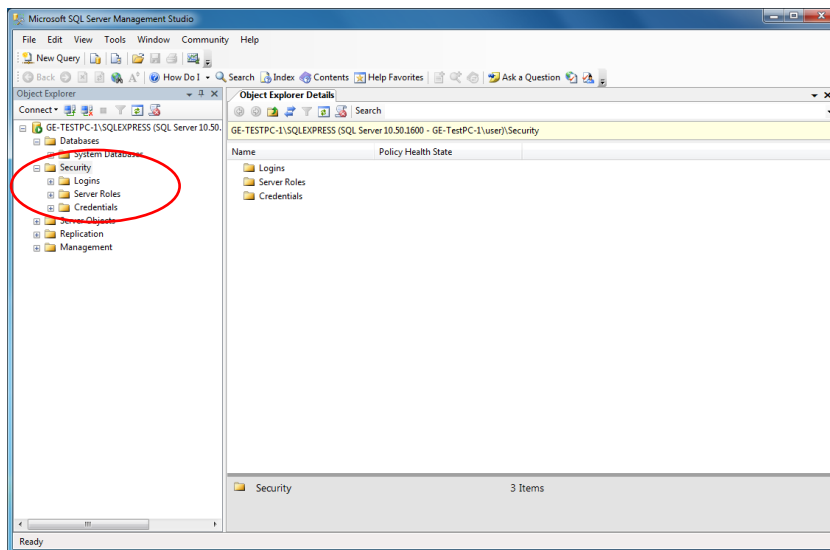


Figure C-1: SQL Server Management Studio Express Tool

The Login - New dialog appears as shown in Figure C-2. Select the **General** node and then click the **Search** button.

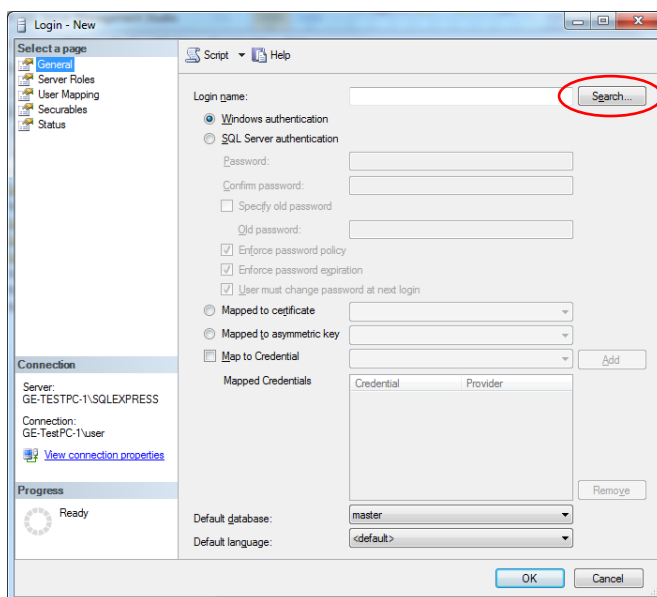


Figure C-2: Login > New Dialog

The 'Select User or Group' dialog appears as shown in Figure C-3. Click the **Advanced** button to expand the dialog as shown in Figure C-3.

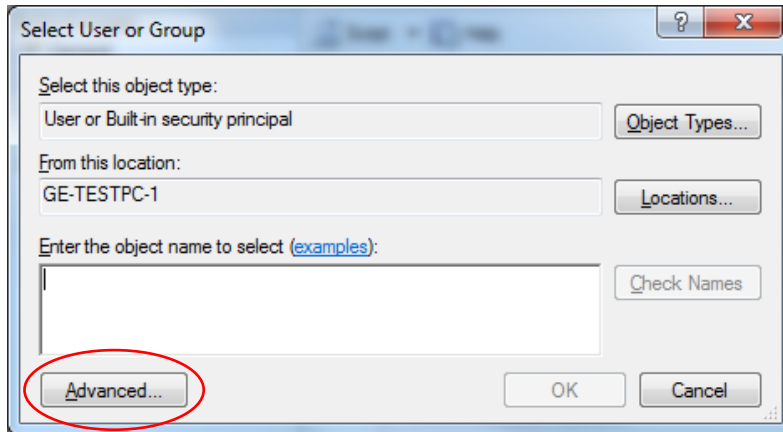


Figure C-3: Select User or Group dialog

Click the **Find Now** button as shown in Figure C-4 to list all the Users and User Groups in the lower section of the window.

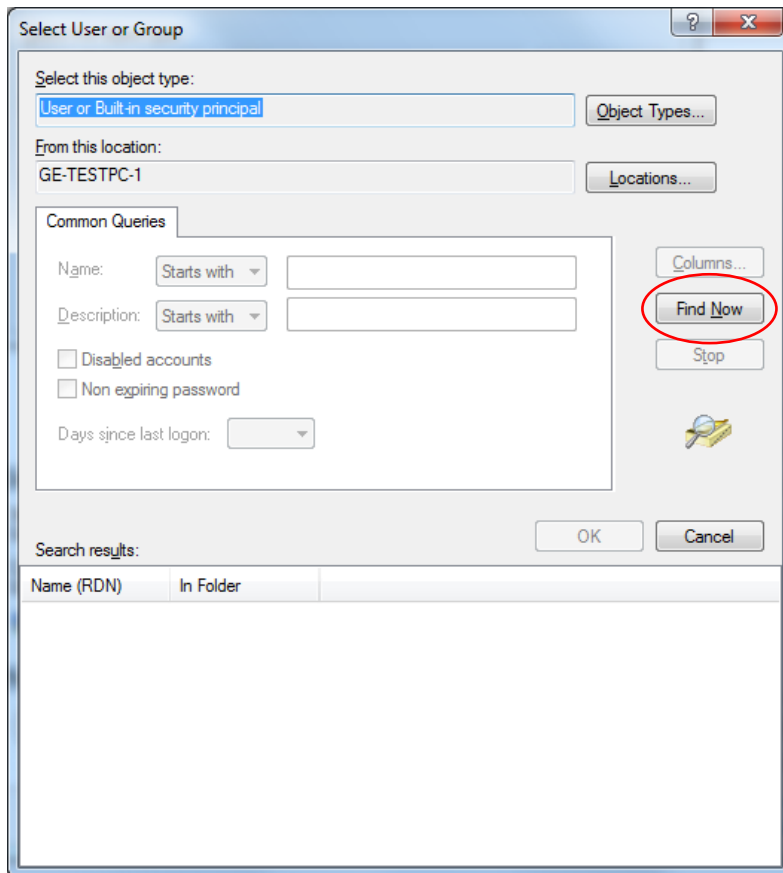


Figure C-4: Select User or Group dialog – expanded

Select **Authenticated Users** as shown in Figure C-5 and click **OK** to continue.

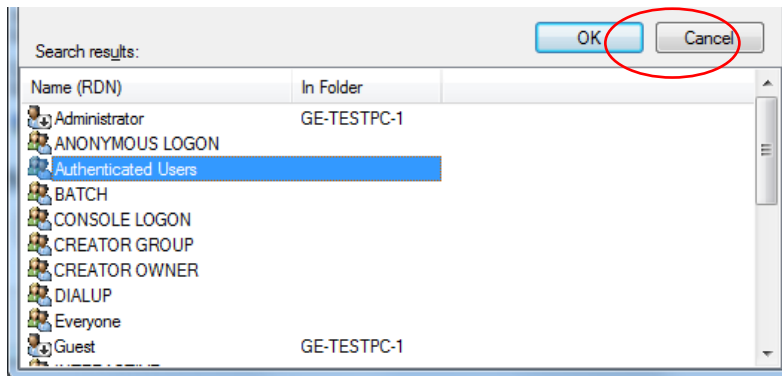


Figure C-5: List of users and groups

In the 'Login - New' dialog, select the **Server > Roles** node, then select the **sysadmin** checkbox and finally click **OK** to complete the process as shown in Figure C-6.

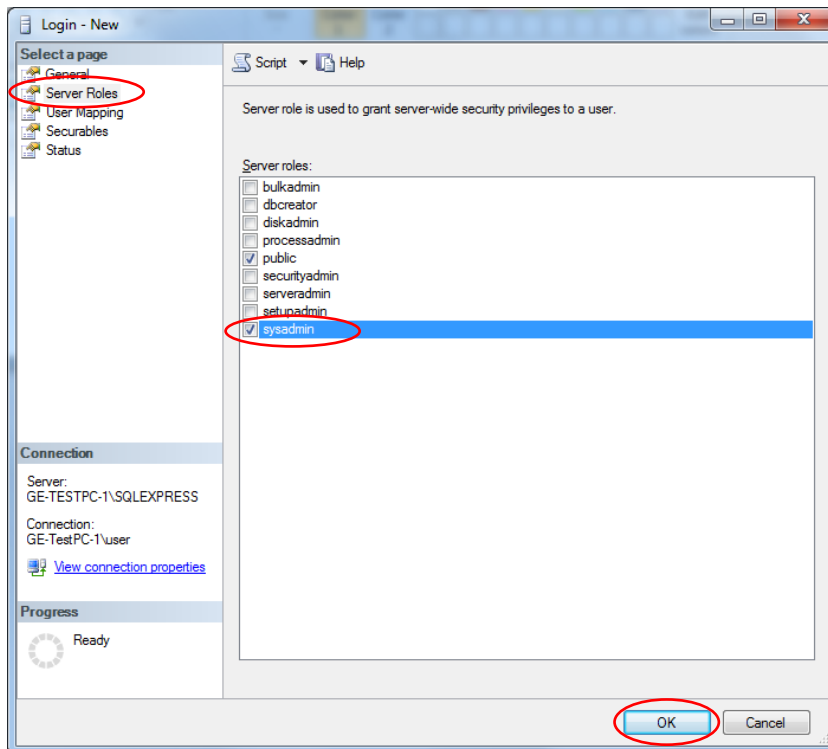


Figure C-6: Sysadmin server role assigned

The SQL Server/ SQL Express login now has the required 'sysadmin' rights.

C.2 General Faults

Table C-1 lists several problems and resolutions.

Table C-1: Problems & Resolutions

| Problem | Resolution |
|--|--|
| Perception Server service starts and then stops within a few seconds. | This happens if the Perception Server service is started without first using the license key to activate the software. See Section 2.6 to activate the software. Perception Server will fail to start if FILESTREAM is not enabled for the Microsoft SQL Server instance. If using Microsoft SQL Server 2012, this can happen if the NT Authority\System account does not have 'sysadmin' privileges. |
| Users are no longer able to log in even though usernames and passwords are correct | This can occur if a new server certificate has been created on the Perception Server host. For example, if Perception Server has been migrated to another machine. To resolve, delete and recreate the users. |
| Perception Service does not appear in Desktop Discovery wizard. | This can be caused by several incorrect configurations. <ul style="list-style-type: none"> ▪ Ensure that the IP Address or Hostname of the Perception Server is correct. ▪ For Perception version 1.18 or greater, ensure that the UA Local Discovery Server service is stopped. Verify in services.msc. ▪ Ensure that the Perception Server Service is running. Verify in services.msc. ▪ Ensure that the SQL Service is running. Verify in services.msc. ▪ Ensure that the Kelman database is configured in the Perception Server Config Tool. ▪ Ensure MS-DTC is configured correctly: ▪ For Windows Server 2008, see http://support.microsoft.com/kb/817064 ▪ Ensure that the Perception Server and Discovery Server certificates exist in the trusted certificate folder and are configured correctly within the services configuration files. To correct the configuration, run the Perception Server installer and select the repair option. |
| Database Upgrade Tool – upgrade fails from KPD to SQL Server when data from one of the assets already exists on the Server | First export the data from a KPD database to a CSV file. Use the Database Upgrade Tool to convert to the new database. Import the data into the new database. |
| Perception Server Configuration Tool tabs not enabled | When using the Perception Server Configuration Tool across multiple users on the same Microsoft Windows PC the 'Authenticated Users' in Microsoft SQL must have 'sysadmin' profligates |
| Perception Server installation fails error – 'Console Error'. | Intermittent error - Perception Server installer fails to complete and gives a 'console error', when installing on a PC which has already had Perception Desktop or Server installed previously. To resolve this issue: |

| | |
|---|--|
| | <ol style="list-style-type: none"> 1. Browse to C:\ProgramData\ 2. Delete the 'OPC Foundation' folder 3. Browse to C:\Program Files (x86)\Common Files (on x64 OS) 4. Delete the 'OPC Foundation' folder 5. Browse to C:\Program Files\Common Files (on x86 OS) 6. Delete the 'OPC Foundation' folder 7. Uninstall Perception Desktop & Server 8. Re-install Perception Server 9. Re-install Perception Desktop |
| Unable to restore Kelman database in SQL Server | This occurs if FILESTREAM is not enabled for the Microsoft SQL Server instance. |

The following events are recorded in an audit log to assist organizations with NERC-CIP compliance:

- Adding nodes.
- Deleting nodes.
- Add/delete references (drag-and-drop nodes).
- Import events.
- Export events.
- Import export mapping changes (add, update and delete events).
- Server start stop events.
- Workflow configuration in transformer properties (adding, updating and removing).
- Uploading workflow events on the server and deleting workflow events.
- Uploading wallboards.
- Save the wallboard configuration event, such as when moving a node position on the wallboard.
- Write events for the configuration changes.
- Device setup event when launching setup.
- Login, logout events.
- Perception Server Configuration Tool changes.

Audit data is recorded in the following files:

- Audit-Server.log — contains audit data maintained by Perception Server.
- Audit-ServerConfiguration.log — contains audit data on the Perception Server Configuration Tool.

The log files can be found at this location:

`C:\ProgramData\GE_Energy\Perception\Logs`

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