MicroStation FDO Reader

USER´S MANUAL

MicroStation FDO Reader - User's Manual, 2019-11-10

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Content

Terms

In this document the following terms and expressions are used:

MicroStation	An advanced 2D/3D multi discipline CAD software.
Design file	The file used to store the drawing. Also called a dgn file.
Model	Each design file can contain one or more models. These can be used store multiple real-world models, annotations and sheets for printing.
Seed file	An (often empty) template file used for creating new design files.
Data button	Left mouse button. Used to place data points, select from menus etc..
Reset button	Right mouse button. Used to terminate or abort commands and display context menus.

Typography

The following typography are used in this document:

Screen text	Screen text and user input. E.g. Enter *fdo dialog* to start FDO Reader.
<KEYS>	All keys and mouse actions. E.g. Press <ENTER> to go to the next field.
[Menu selections]	Marks a menu selection. E.g. Select **[File - New]** to open a new file.
Push buttons	Used to mark a push button. E.g. Click Ok to start the command.
Key words	Important key words are display this way. E.g. These keys are called *wild cards*.

Tips and other important information are display like this.

About this document

This document describes how to use and configure FDO Reader for MicroStation.

Most functions are the same for the MicroStation V8i and the MicroStation CONNECT version of FDO Reader. In cases where the functionality differs it will be noted in the text.

About FDO Reader

MicroStation FDO Reader is a MicroStation add-on for reading spatial data from a variety of data sources directly from MicroStation. The program is available for MicroStation v8i and MicroStation CONNECT. FDO Reader for MicroStation CONNECT can optionally write data back to the data sources. The term *FDO Reader* will be used throughout this document for both versions. Some functionality is only available for the CONNECT version.

MicroStation FDO Reader makes it easy to load geometries and attributes from databases, text files, shapefiles, and many other sources from plain MicroStation. No configuration is needed. Symbology and text styles can be set for individual layers. Data from multiple data sources can be combined into maps which can be loaded for selected areas.

FDO Reader is an ideal solution for mixed environments where other software is used for maintaining map data and MicroStation users need quick and easy access to data for further processing or as background data.

FDO Reader is not a replacement for Bentley Map. Bentley Map is an advanced software for GIS-analyze, networking, creating thematic maps and building standalone editing solutions. FDO Reader is a quick and easy way to get spatial data into MicroStation.

Installation and Setup

FDO Reader/Writer are available in two versions, one for MicroStation V8i and one for MicroStation CONNECT. The v8i version is FDO Reader only and the CONNECT version optionally supports writing data. There are two installers, one for each version. Use *setup_fdo32.exe* for MicroStation V8i and *setup_fdo64.exe* for MicroStation CONNECT. The installation process is the same.

Installation

Run the installer file, *setup_fdo32.exe* for MicroStation V8i and *setup_fdo64.exe* for MicroStation CONNECT.

The installer might ask for Administrator privileges since it needs to access the registry during installation.

If you have a serial number this should be provided during installation. If a valid serial number is not entered, the program will be run in demo mode and will expire after 30 days. The program can still be started, but data cannot be loaded to MicroStation.

Accept the default installation folder or select another location. The installer will install FDO Reader files to *$(ProgramFiles)\Surell Consulting\FDO Reader* by default. Configuration files are installed to *$(_USTN_BENTLEY_ROOT)MicroStation\config\appl*. The files may be moved after installation.

See the chapter *Configuration Variables* for more details regarding setup.

If this is the first time the program is installed both the FDO Reader and the Providers should be selected during install. The Example data is optional.

After a successful install the FDO Reader should be updated. Download the latest version (v8i or CONNECT) by selecting *FDO Reader only* from the MicroStation FDO Download page. Replace the file *fdo32.dll* or *fdo64.dll*.

Additional Providers

Additional Data Providers are provided through *OSGeo.org*s. These are available in 32-bit and 64- bit versions and can be downloaded at http://fdo.osgeo.org/content/downloads.

The v8i version uses FDO version 3.6.0 and the CONNECT version uses FDO version 4.0.0.

Download and unpack the files and put them in the same directory as the original providers and fdo dll files.

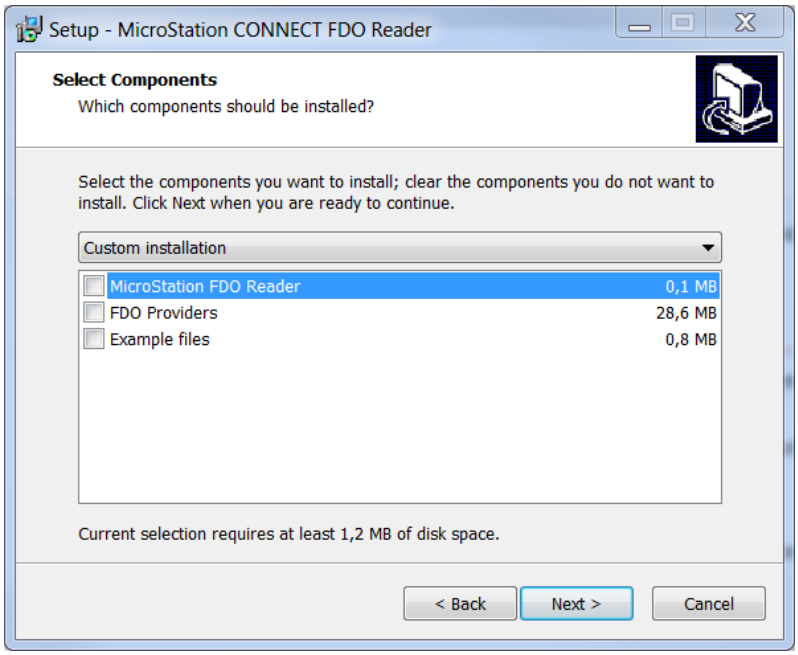
Network install

MicroStation FDO Reader is a C# program and there might be problem running the software from a network drive due to .NET security issues.

Please read https://support.microsoft.com/en-us/kb/832742 for more information.

Register the software

It is possible to license an existing demo version. This can be done by running the installer and entering a valid license key. Uncheck all components and continue the installation. Only the license information will be updated.



It is also possible to update the license from MicroStation by using the command *FDO UPDATELICENSE* followed by a valid license key.

FDO UPDATELICENSE 0000000000000

MicroStation needs to run as Administrator for this command to work.

About FDO

Background

Feature Data Objects (FDO) was developed by Autodesk to provide a technology that enabled clients to access various spatial data sources in a generic way. In 2006 this API was published as Open Source. The FDO API makes it possible for different clients (MicroStation, AutoCAD, Topocad etc.) to read, write and administrate spatial data sources without knowing the format of the underlying data source.

Read more about the background of FDO at http://fdo.osgeo.org/history.html.

Providers

An important part of FDO is the concept of Providers. A Provider acts as a bridge between FDO and the underlying data source. To access data from a data source the corresponding Provider must be installed.

MicroStation FDO Reader installs the following providers during setup:

- Oracle Spatial
- PostGreSQL (PostGIS)
- Shape
- ODBC
- WFS

Install Providers

To install additional provider simply download the desired provider from http://fdo.osgeo.org/content/downloads, unpack the files and put them in the same directory as the original files (see the configuration files for path). Remember to download the binaries for the correct version.

FDO Reader for MicroStation v8i uses *FDO 32-bit version 3.6*.

FDO Reader for MicroStation CONNECT uses *FDO 64-bit version 4.0*.

List of Providers

- ArcSDE
- GDAL
- KingOracle
- MySQL
- ODBC
- OGR
- PostGreSQL
- SDF
- Shape
- SQLite
- SQl Server
- WFS
- WMS

Go to http://fdo.osgeo.org/OSProviderOverviews.html for an updated list of providers.

Not all providers have been tested and no raster providers are currently supported. Use MicroStation Raster Manager to attach raster files and WMS-services.

Open FDO Reader

Start MicroStation and open a design file. If the data source you want to read are 3D, the design files should be 3D. If not, Z values are lost if data are written back to the data source.

If the configuration variable MS_DGNAPPS is not defined the program is loaded by the following key-in:

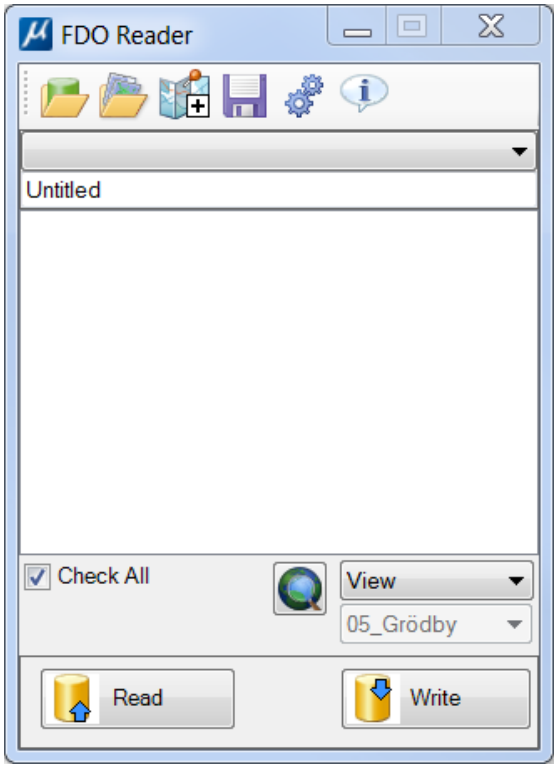
mdl load fdo64 (for MicroStation CONNECT)

or

mdl load fdo32 (for MicroStation v8i)

To open the dialog the following command is used:

fdo dialog



If no default map is specified (see *Configuration Variables*), the dialog will be empty.

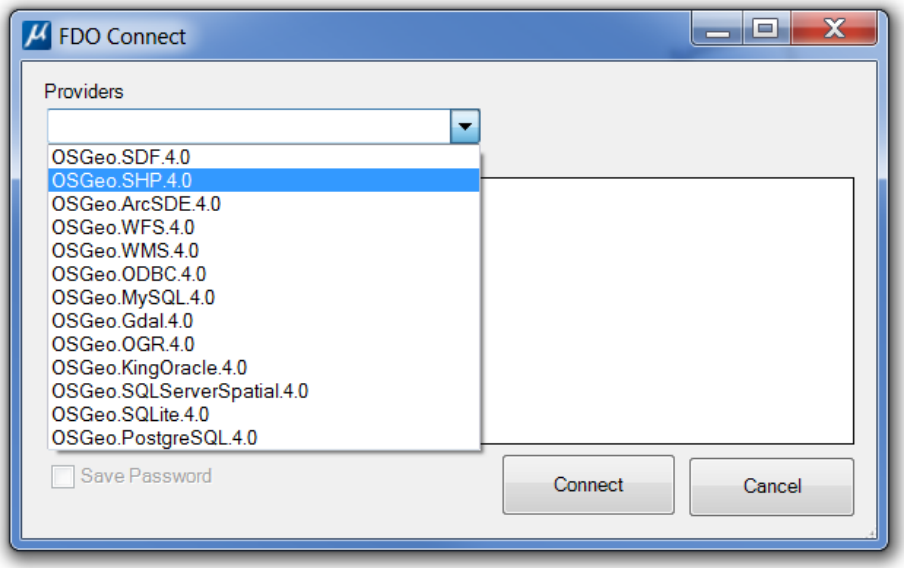
The dialog can be docked to either side of the screen.

Open a Data Source

Data sources can be files or databases in any of the supported formats. A Provider must be installed for each data source you want to access.

To open a new data source, click the icon *Open Data Source*.

The FDO Connect dialog is opened.



Select the desired provider from the dropdown list.

Remember that only *Oracle*, *Shape*, *WFS*, *ODBC* and *PostGreSQL* is delivered with the demo. Download additional providers from http://fdo.osgeo.org/content/downloads.

Enter the connect parameters for the data source. Each data source has a different set of parameters (see chapter *Connection Examples*).

When a data source is loaded, a temporary map is created, and map layers are created for each spatial feature in the data source. All map layers will get a default symbology to make it easier

to identify geometries belonging to different map layers. This map is referred to as the active map.

Save password

Some data sources require a password. The password can be saved for future connections. The password is saved for the current user as an encrypted string.

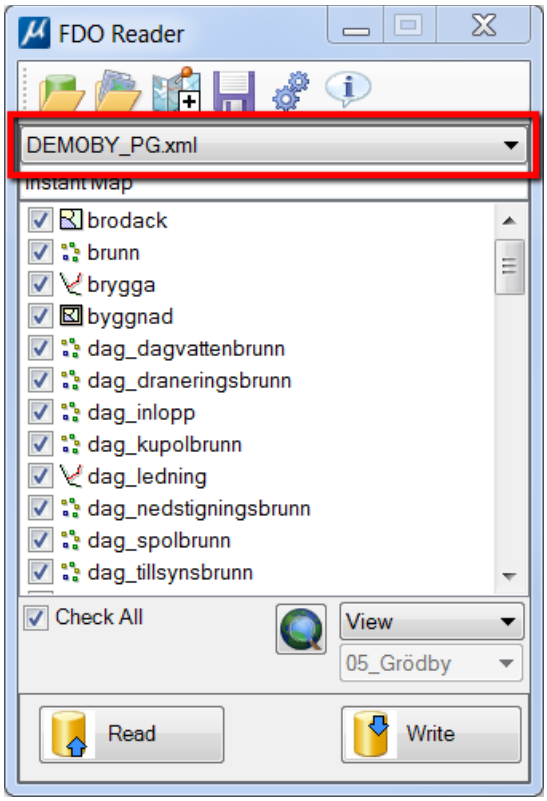
Open a Map Definition

Customized maps are saved to xml-files called *Map Definitions*. These files contain all information needed to connect to the data sources together with a list of map layers from one or more of the data sources.

To open an existing map definition, click the icon *Open Map Definition* and select a file.

A couple of examples are included with the installation. All existing maps will be listed in the drop-down menu for easy access.

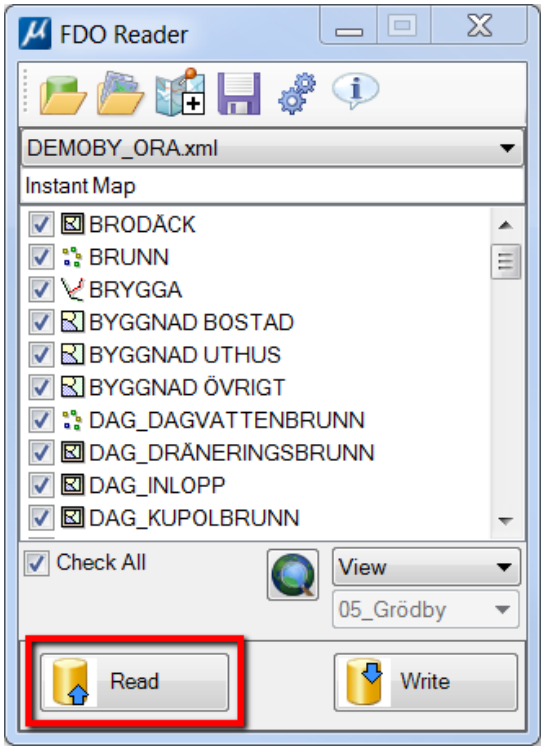
The default directory for the map list are set by the configuration variable *FDO_MAP_LIST_DIR*.



A default map can be specified using the configuration variable *FDO_DEFAULT_MAP* (see the chapter *Configuration Variables*). The default map will always be loaded when the dialog is opened.

Reading Map Data

When a map has been loaded to the dialog (by *Open Data Source* or *Open Map Definition*), map data may be loaded into the active design file. A specific output model can be specified in the Settings dialog.



Read data

Clicking the button Read will load the checked map layers for the selected area. Make sure a suitable area is selected to avoid reading too much data.

Elements will be loaded to the model specified as output model in Reader Settings.

Check All

Only the checked layers are read. Click the check mark to toggle a layer or use *Check All* to check/uncheck all layers.

Levels

A design level is created for each defined map layer (FDO Feature) during read. The symbology of the map layer is used to define the symbology for the level. All elements will have the symbology set to *ByLevel*. The level description is set to layer type (*Point*, Line, *Polygon* etc.).

Spatial constraint

The geographic area to load is specified by the menu setting under the list of map layers.

Select *View*, *Fence, Map View* or *All* from the menu.

View

The area of the active view is used to select data.

If multiple views are open. Make sure a top view is set as the active view.

Fence

The active fence is used to select data.

Always place the fence in a top view.

Map View

The area defined by the selected *Map View* is used to select data (see *Map Views*).

All

All data from the all checked layers are selected.

Use with care! This might result in large amount of data and might cause the program to run out of memory.

The icon left of the area type list defines area settings, and the function depends on the selected area type. Clicking the button `Define Area` has the following functions:

View: Opens *Saved View* dialog

Fence: Starts the command *Create Fence*

Map View: Opens the *Define Map View* dialog

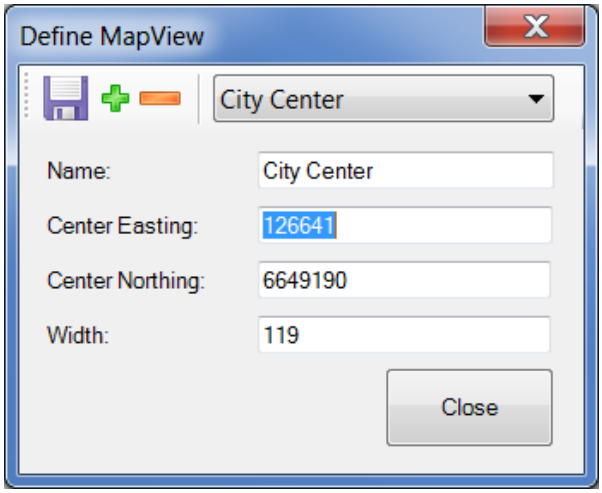
All: No command defined

Map Views

Map Views are named locations that are used to load data for predefined areas.

Map Views can be created, deleted and modified using the dialog *Define Map View* which is opened by clicking `Define Area` when active area is *Map View*.

Map Views are saved in a file called *FdoMapViews.xml* in the folder defined by the variable FDO_MAP_DIR.



Each Map View is defined by a name, a center point and a width. The width is the size of the square for which data is loaded.

Add Map View

Click the icon `Add Map View` to add a new Map View.

The center and width of the active view is used. Make sure a top view is active before defining new map views.

Edit the name and adjust the position and width if necessary.

Delete Map View

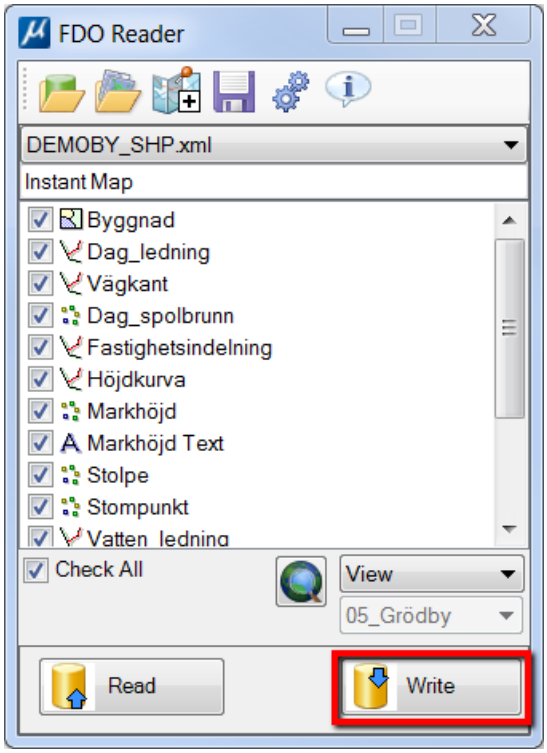
Click the icon Delete Map View to delete the selected Map View.

Save Map Views

Click the icon Save Map Views to permanently save any changes to the list of Map Views.

Writing Geometries

The MicroStation CONNECT version of the FDO Reader can optionally write data back to the data sources. The `Write` button will be enabled for the CONNECT version only.



Prerequisites

Before writing data, a Read must be done. This will initiate design history and reset log files.

Any map layer that should be edited must have a primary key column (unique constraint).

FDO Reader does currently not handle transactions or concurrent editing. It simply posts data back to the data source. Use with care!

Editing data

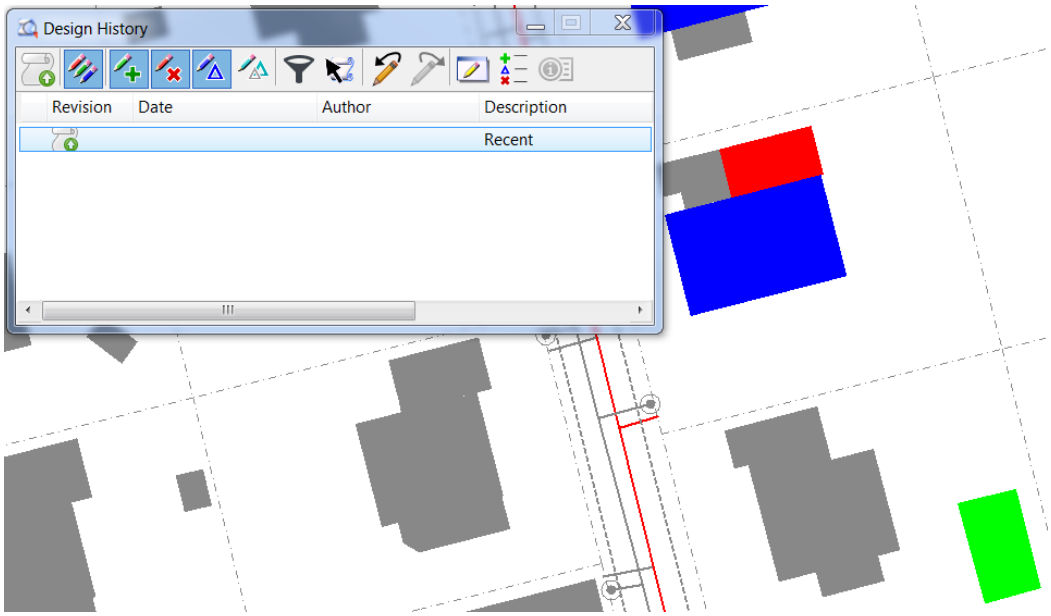
Any MicroStation command can be used to edit, create and delete elements.

Attributes can be edited using the Properties dialog or the Details view. Currently Pick Lists can only be used for text properties. If a pick list is attached to a non-text property an error message will be displayed when the pick list is used.

If the reader is configured to read data to a separate model, this model must be activated or opened to edit data. Right click and hold on an element and select *Activate* or *Exchange* from the context menu.

Tracking changes

FDO Reader uses MicroStation's build in *Design History* to track changes. When a map is read, the design history is reset. All changes to the geometries and attributes are tracked by MicroStation.



Changes can be review using the Design History dialog.

Create new geometries

Since FDO Reader maps MicroStation level to map layers, it is crucial that new geometries end up on the correct level. To help the user, FDO Reader will automatically active the correct level and setup basic settings when the user double clicks a map layer in the FDO dialog.

It will also start a placement command depending on the layer type.

Read only map layers cannot be activated.

Point Layer

Different MicroStation commands will be started based on the point type.

Point Element

The command *Place Point* will be started.

Symbol

The command *Place Active Cell* will be started.

Corresponding cell and cell scale will be activated.

Text

The command *Place Text* will be started.

The corresponding Text Style or text settings will be activated.

Line Layer

The command *Place SmartLine* will be started.

Polygon Layer

The command *Place Shape* will be started.

Write Data

When writing data FDO Reader will query Design History for any changes and post these changes back to the correct data source. Since each map layer keep track of its data source it is possible to edit and write data to several data sources simultaneously. If the data source is Read Only or the map layer is marked as read only, data cannot be saved.

After a successful write the Design History is reset.

A Read will verify that the changes has been successful and reset the change logging.

Creating a map

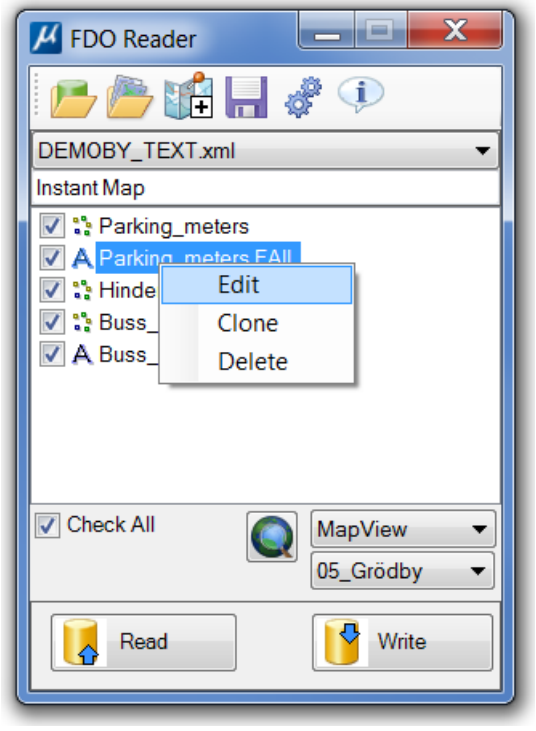
What is a Map?

A map is a collection of map layers. These map layers can belong to different data sources. Each data source is defined by a specific connection, i.e. the information provided when connecting to the data source. These connections are stored together with the map. All information needed to connect to the data source is stored in the connection except for a possible password.

Administrating map layers

Each map layers can be customized to change symbology, layer display, attributes and query filter. Layers can also be added and removed.

Right click on a map layer in the list to select operation.



Clone

A copy of the selected layer is added to the map.

This could be used to create multiple map layers from the same base feature. These could then be separated by a query filter or to place both text and a symbol for a specific feature.

Delete

The selected layer is removed from the map.

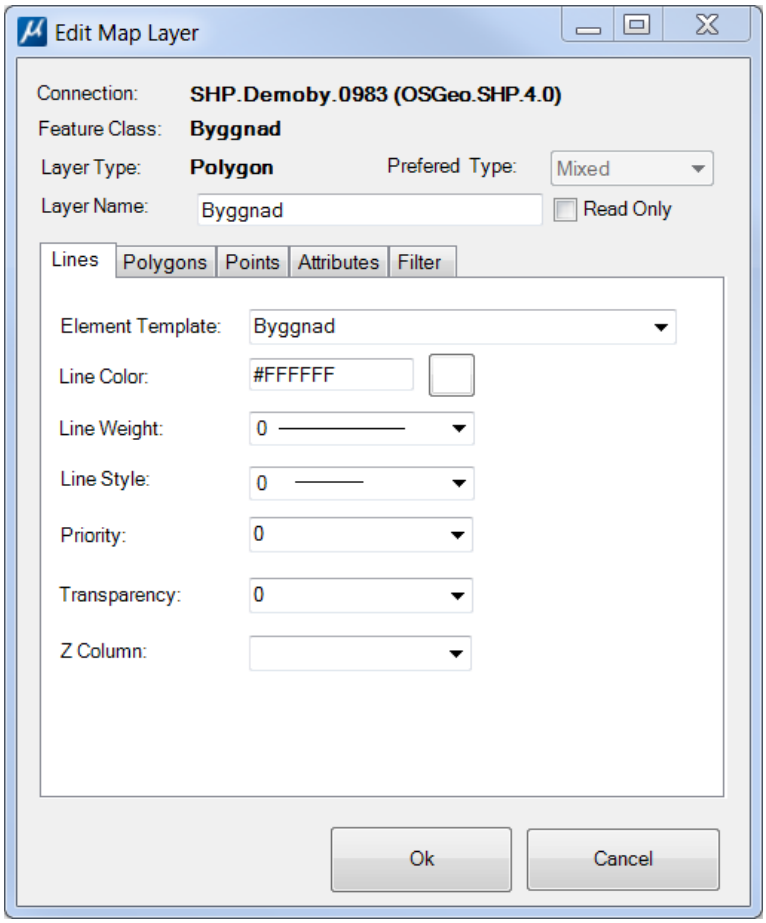
Edit

The dialog *Edit Map Layer* is displayed.

The map must be re-read to reflect the changes.

If the map is not saved, the changes will be lost when a new map or data source is opened.

Editing a Map Layer



Common parameters

The dialog displays some basic information about the map layer.

Connection, *Feature Class* and *Layer Type* cannot be changed. These are defined by the data source.

Preferred Type

If the layer contains several geometry types, this setting can be used to limit the display to the selected type only. If set to *Mixed*, all geometry types will be read.

Layer Name

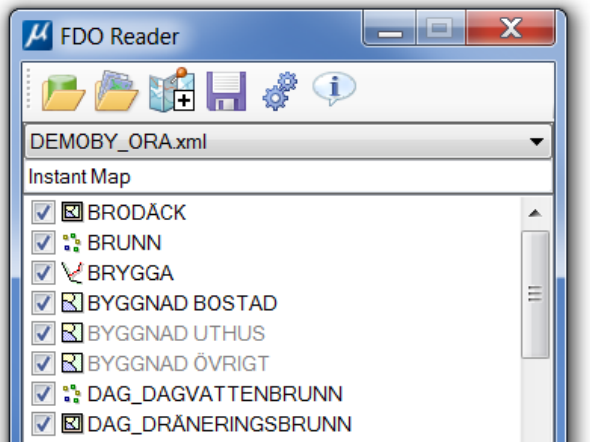
Set to the file or table name by default. Can be changed to anything that translates to a valid MicroStation level name.

Read Only

If writing is enabled (CONNECT version only) it is possible set the property *Read Only* for individual layers. This will be used to lock selected layers for editing and writing. It will only be used if the Map setting *Read Only Mode* is set to *From Map Layer*.

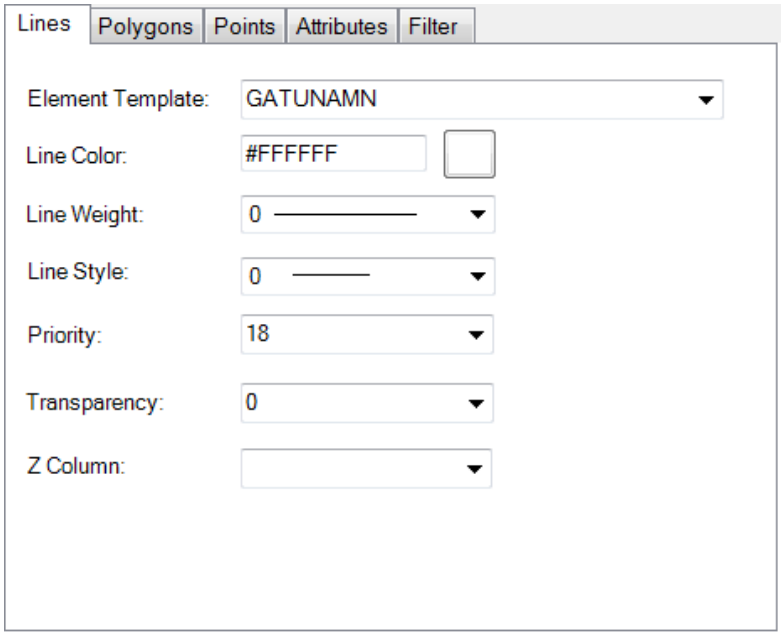
If checked and the active map read only setting is set to *From Map Layer*, it will lock the layer from editing and exclude it from any write operations.

Read only map layers will be gray in the FDO dialog and cannot be activated by double clicking.



Lines

These are parameters common to all features and sets the basic symbology for the map layer (design file level).



Element Template

If an *Element Template* with this name exists it will be used for all element settings. By default, set to the same name as the layer. It will only be used if the element template exists.

Line Color

The line color for the map layer.

This will always be stored as an RGB value. It is possible to handle pure black and white as index colors by specifying Use Index Color in Settings.

Line Weight

The line weight for the map layer.

Line Style

The line style for the map layer.

Priority (2D only)

The element priority for the map layer.

By default, the priority is set to the order in the map list, i.e. first layer will have priority 1 and so on.

Transparency

Element transparency for the map layer.

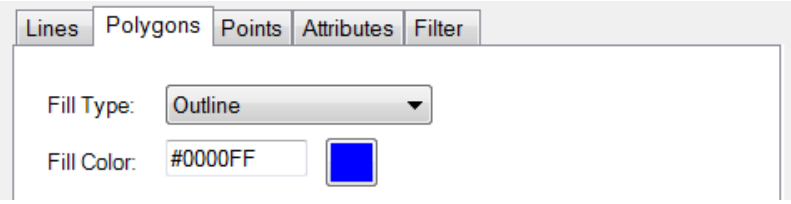
Z Column

Used to assign Z values for 2D layers. Shape files and other 2D data sources might set the Z value as a property. Select the column that should be used to set the Z value for the geometry.

A fixed height could be specified instead of a column name. This could be used separate polygon layers or to move pipes to a desired offset.

Polygons

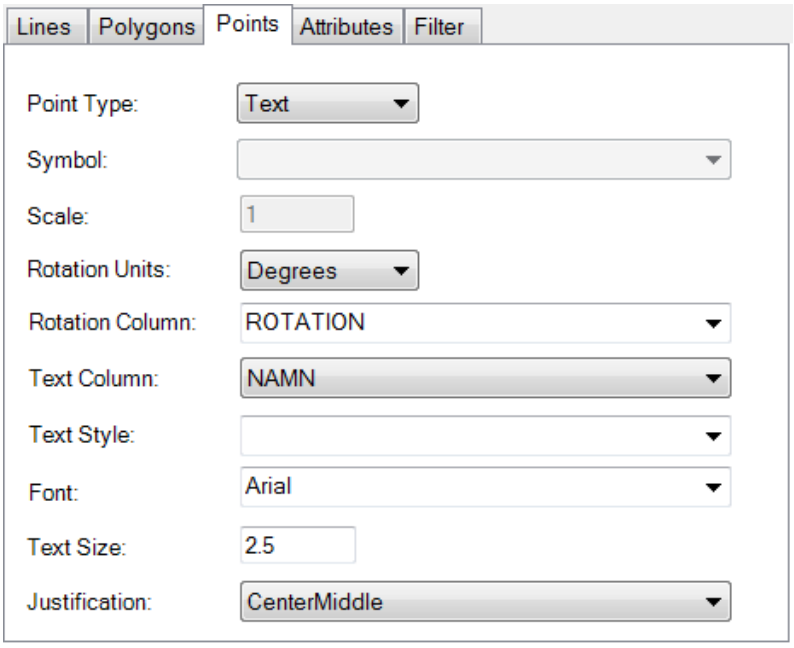
For polygons features an additional fill color can be defined.



Define *Fill Type* and *Fill Color*.

This will always be stored as an RGB value. It is possible to handle pure black and white as index colors by specifying Use Index Color in Settings.

Points



Point type

Point features can be displayed as *Point elements*, *Symbols (cells)* or *Text*.

Point Element

Point Element has no additional parameters. It will use the symbology from Lines tab.

Text

Text is used to place a text annotation using the value from one of the attributes.

If Text is selected for a non-point geometry layer the selected text will be displayed at the geometric center of the geometry. For Lines and LineStrings the text will be placed rotated along the center of the line.

Rotation Units

Define if the rotation is given as *Angles* or *Radians*.

Rotation Column (optional)

Select the column used to specifying rotation.

It is also possible enter an angle instead of a column name. In this case all elements will have the specified rotation.

Text Column

The attribute column containing the text to be displayed.

This field can contain several column names and/or arbitrary text to create the final annotation text. Each column and/or text is separated by the '|' character. It is also possible to add a newline by inserting the string "\n" (CONNECT version only).

Example:

DIMENSION| / |MATERIAL|\n|YEAR

Result:

225 / CONCRETE
2012

Text Style (optional)

Text Style used to display the element.

If a Text Style is used all other formatting parameters are ignored.

Font (optional)

Not used if a Text Style is specified.

Text Size

Text size is given in Master Units.

Not used if a Text Style is used.

Justification

Not used if a Text Style is used.

Symbol

The point is displayed as a symbol using a cell.

Symbol

Select a cell from list.

All cell in the visible to MicroStation in the current configuration are listed.

Scale

Cell scale.

Rotation Units

Define if the rotation is *Angles* or *Radians*.

Rotation Column

Select the column used for specifying rotation.

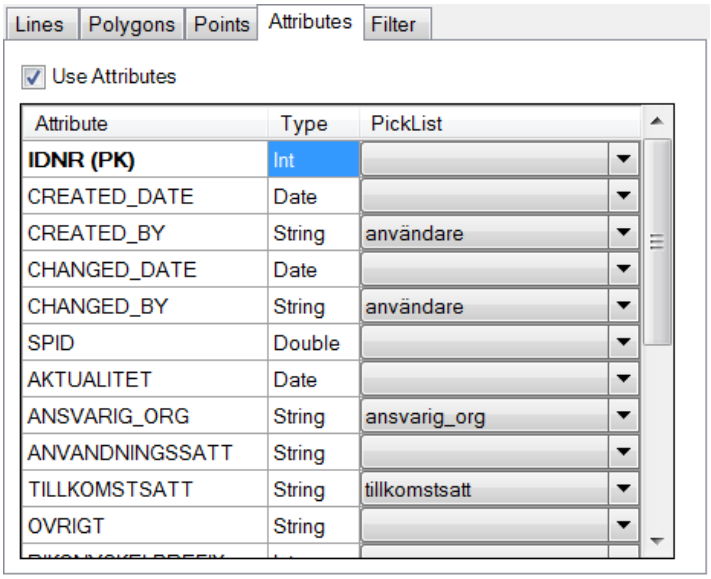
It is also possible enter an angle instead of a column name. In this case all elements will have the specified rotation.

Attributes

This tab lists all attributes for the selected map layer.

The data type is the data type used by MicroStation's Item Type which might be is a subset of the data types in the data source.

The primary key column is in bold.



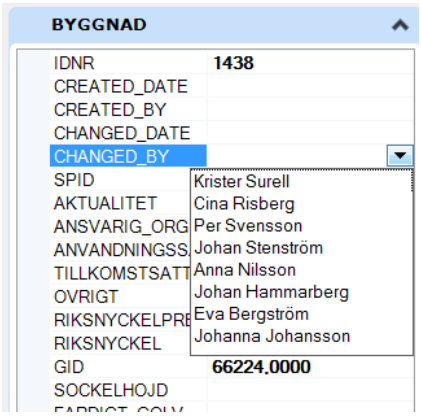
Use Attributes

If checked, each geometry will have attributes attached. If unchecked no attributes will be created for geometries on this map layer.

This can be overridden by the global setting *Use Attributes* in the settings dialog.

PickList

If Pick Lists are defined for the active map, they can be assigned for selection in the MicroStation Properties dialog. The same Pick List can be used to multiple attributes.

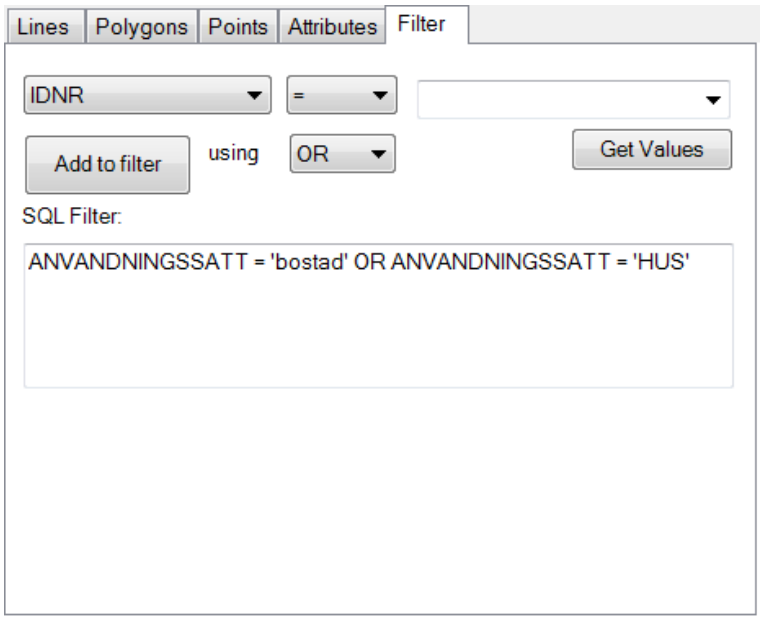


The PickList is assigned to a property of an Item Type which corresponds to a feature in the data source. The map might contain several layers from the same feature, e.q. by using SQL-filters. If a PickList is assigned to a map layer, it will be used for all layers belonging to the same feature.

Filter

Filters are used to define a query that is used when a feature class is loaded. Not all data sources support queries.

This is useful for creating multiple map layers from the same feature or filter geometries by status etc. Building might have an attribute called TYPE. By selecting one type per map layer several layers can be created from the same base feature (table).



Select column and criteria by using the lists.

The button Get Values can be used to obtain a list of unique values from the selected column. Not all data sources support this.

Add to Filter will add the current criteria to the filter.

The SQL-filter can also be specified by typing directly into the textbox.

Note: Not all SQL-statements can be used in the filter due to limitations in the FDO API.

SQL Syntax exceptions

There are a few notable exceptions from the standard SQL syntax.

SQL SYNTAX	**FDO SYNTAX**
COLUMN_NAME IS NULL	COLUMN_NAME NULL
COLUMN_NAME IS NOT NULL	NOT COLUMN_NAME NULL

Global filters

If the same criteria should be included in every filter (e.q. STATUS=0) this can be set in a global SQL. This is done under Settings (see below) and will be appended to the map layer filter using AND.

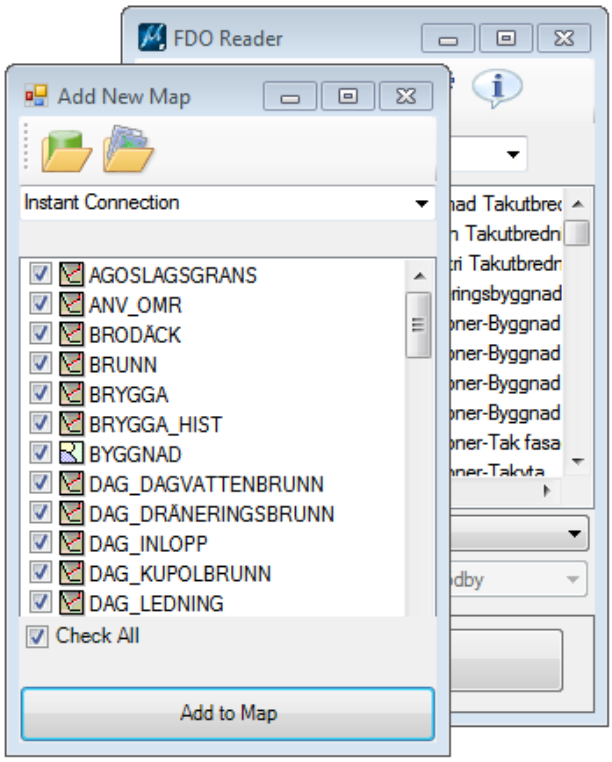
Add Map Layers

Existing map layers can be added to the current map. These map layers can belong to pre-configured maps or other data sources.

Click the icon Add New Map.

This will open a new dialog where data sources and maps can be opened.

Open a new data source or select an existing map.



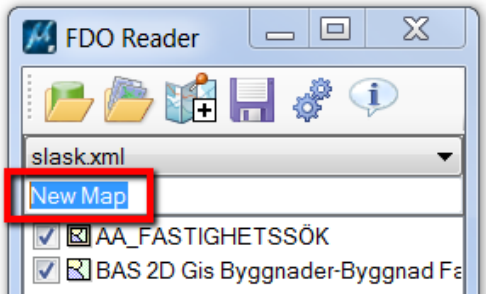
Check all layers or only the layers you want to add to the current map.

Click Add to Map to add the checked layers to the current map. The layers will be appended to the end of the map.

Save a Map

To save changes to the active map, click on the icon *Save Map Definition.*

The name of the map can be set by editing the text field before clicking on the Save icon.



Enter a filename for the new map and select Save.

Only checked layers will be saved to the file

The default directory for saving maps are set by the configuration variable *FDO_MAP_DIR*.

Settings

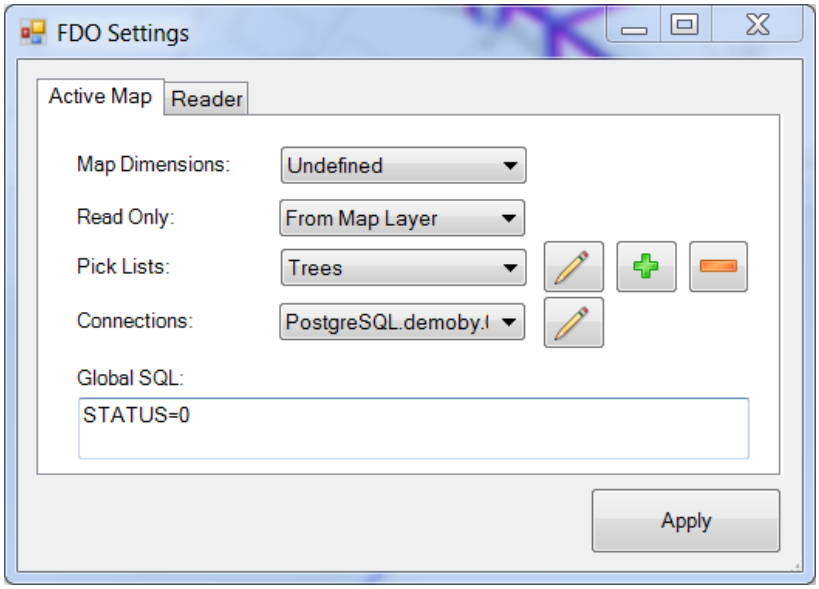
Settings affect how FDO Reader operates and let you customize the behavior.

Click the Settings icon to open the Settings dialog.

The settings dialog has two tabs, one for *Active Map* settings and one for *Reader* settings.

Active Map Settings

These settings affects the active map. If there is no map selected, these settings are disabled.



Map Dimensions

This defines the minimum dimension (2D or 3D) for the map. This is used by the Writer to warn if a 3D map is loaded into a 2D model. This will result in loss of data when posted back to the data source.

Read Only

If writer functionality is activated (CONNECT version only) you can enable read/write for the map or individual map layers. The following read only settings are available:

- **Yes** – The map is read only. Write is disabled.
- **No** – The map is writable. Applies to all layers.
- **From Map Layer** – Read/Write setting is by map layer.

The default is *From Map Layer*.

Pick Lists

Pick Lists are lists of values used to enter property values. These Pick Lists can be attached to attributes and are used in the MicroStation Properties dialog for entering property values.

The available Pick Lists are listed in the menu.

Add a Pick List

Click [+] to add a new Pick List.

An unnamed Pick List is added to the menu.

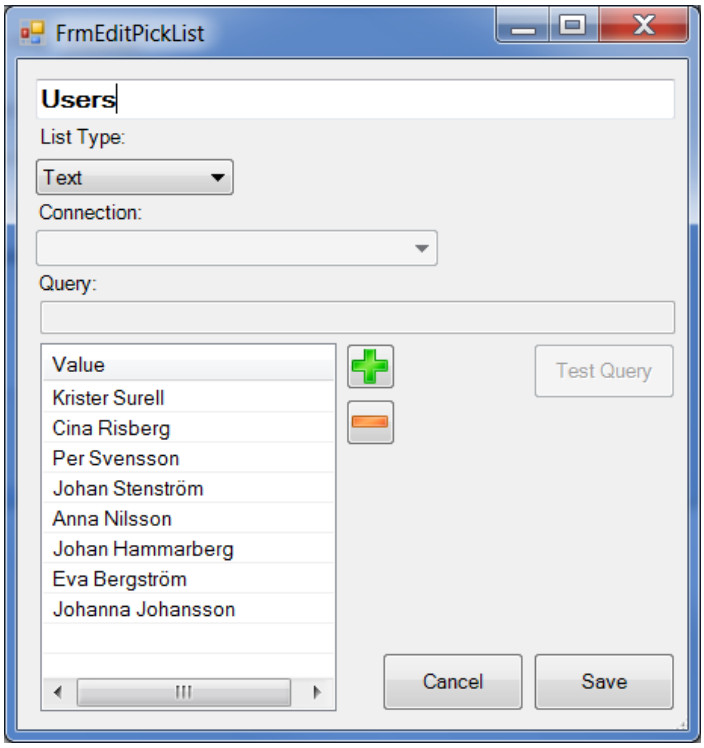
Delete a Pick List

Click [-] to remove a Pick List.

The selected Pick List is removed from the menu.

Edit a Pick List

Click [Edit] to edit the selected Pick List.



Set the name of the Pick List.

List Type

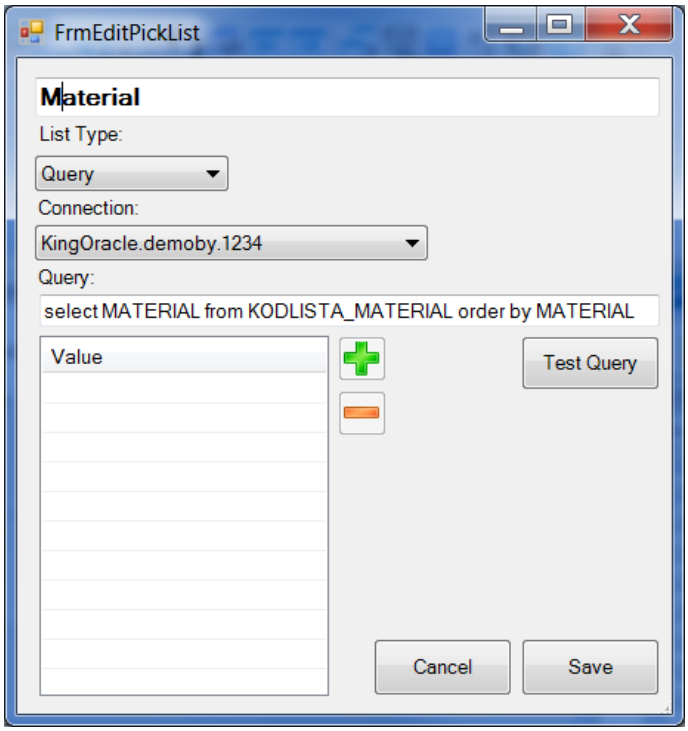
Pick Lists can be static Text lists or based on a Query.

Text

Add and remove items from the static list by clicking the + and – and editing the text in the list.

Query

The list can be based on a query. The list is initialized each time a map is read.



Enter a valid query in the Query text field.

Test the query by clicking Test Query.

Create Text list from Query

It is possible to automatically create a Text list by first selecting Query and running a query, e.q.

select distinct TYPE from MATERIAL order by TYPE

Test the query to display the result.

Switch back to List Type: Text

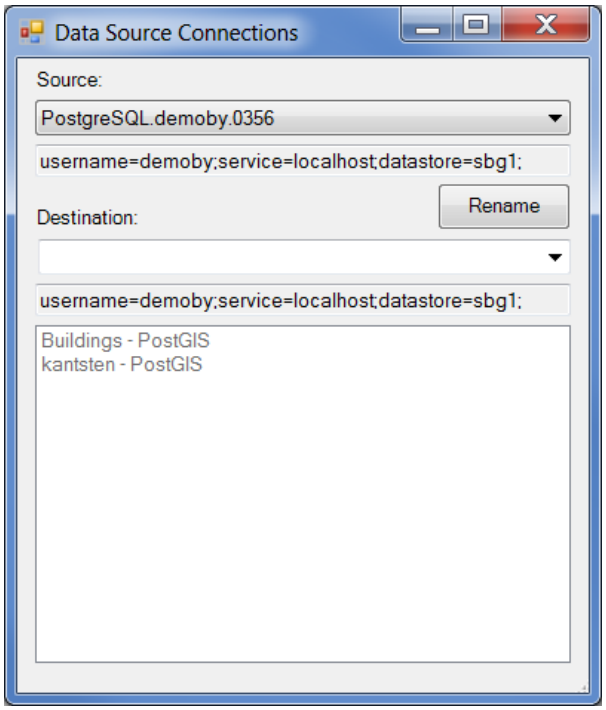
Save the Pick List.

Connections

The list displays a list of all connections in the active map.

To edit connections klick the button Edit active map Connections.

This will open the connections editor.



Source

The source list contains all connections for the active map.

The connection parameters are displayed under the selected connection.

Destination

Destination is the new name of the selected source connection.

This can be an existing connection or a new name.

The connection parameters are displayed under the selected connection. If a new name is entered, the parameters will be the same as for the source connection.

Feature list

The feature list displays all features belonging to the selected source connection.

Rename

The button Rename is used to rename an existing connection.

If a connection is renamed to another existing connection these must have the same connection parameters. There are occasions when a map contains different connections to the same data source and this can be used to clean up the number of connections.

If a new connection name is entered the selected source connection is renamed. All connection data will be the same.

Global SQL

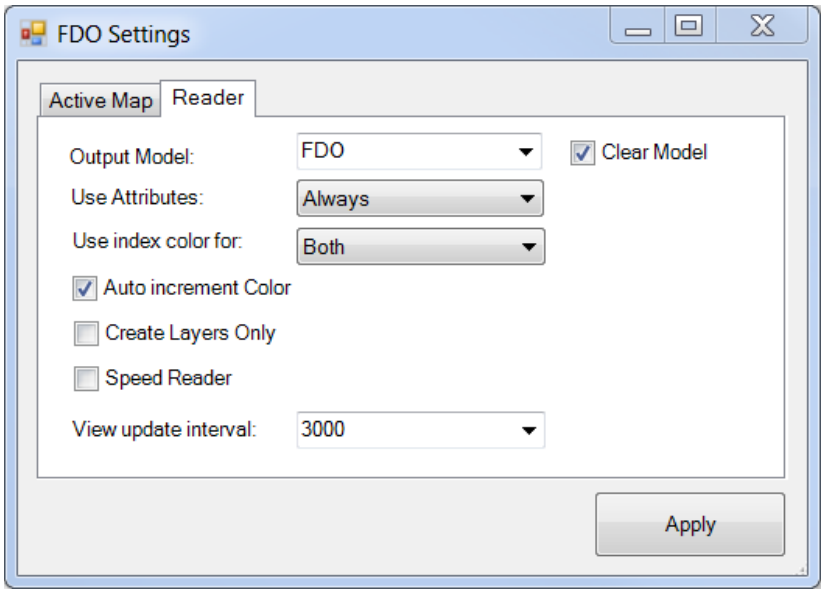
A global SQL is a query filter used for all map layers. This could be used if all layers should be filtered using the same criteria, e.q. to select only layers with a specific date or status.

status=0

This criterion is added to the query filter for each individual map layer. The statement is added using the AND keyword.

Reader Settings

Reader setting affect different aspect of the reader.



Output model

It is possible to specify a separate output model for the reader than the active model. If an output model is specified all reads will go to the specified model and that model will also be attached as a reference to the active model.

Clear model

If checked and an output model is specified, this will clear the output model before each new read.

This is useful when you want to move around and reload data or when testing symbology since the data is deleted automatically.

Use Attributes

Attributes can be read and attached to the geometries. If no attributes are needed unchecking this option will speed up reading significantly.

- Always – always attach attributes (default)
- Never – never attach attributes
- Use MapLayer – map layer settings decide

The configuration variable FDO_USE_ATTRIBUTES can be used to set a default value. See Configuration Variables.

Use index colors

Since all colors in the map definitions are RGB-colors, this could cause problems when changing background color or exporting to dwg. This option makes it possible to select index colors for white, black or both. Settings this to index color will set the color value (black, white, both) to index 0.

Auto increment color

When reading a data source directly, each layer gets a unique color and fill color if this option is checked. Points are also set to weight 10 for visibility.

This setting is only applied when a layer is created, i.e. when the data source is read. Changing this setting after the data source has been read will have no affect the layers.

Create Layers Only

This could be used to create level standards. All levels will be created using the settings for the map layer, but no geometries will be read.

Speed Reader

This is the fastest way to read geometries. No attributes, levels or formatting is done.

This will override the setting *Use Attributes*.

View Update Interval

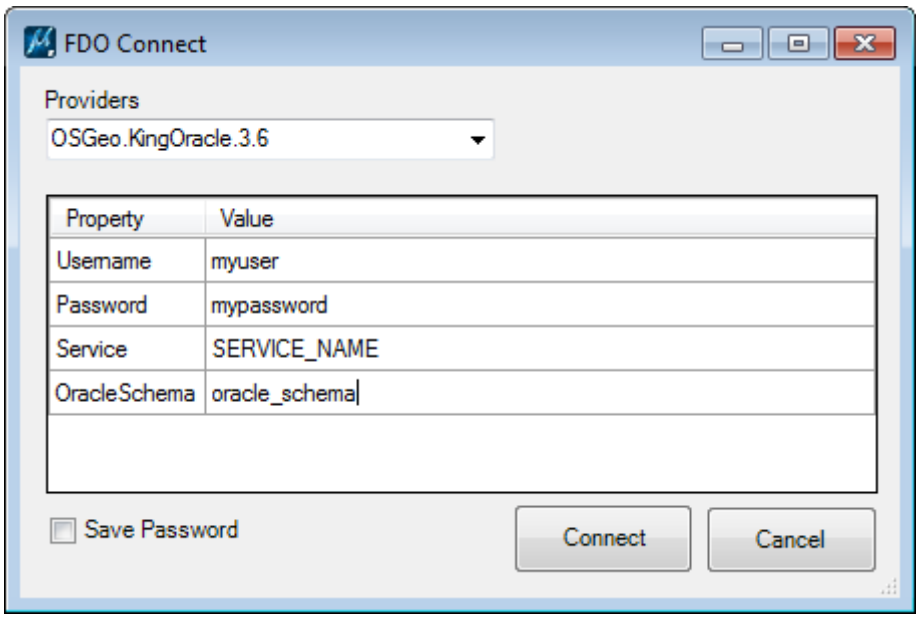
This will set the number of elements that should be created before updating the view. This is useful for showing progress when reading large data sets. Using a low value will increase updates and slow down reading. A value between 1000 and 5000 could be a good start. Default is 0, i.e. no view updates during read.

Connection examples

In the following paragraphs some example connections are listed.

Oracle

Provides read/write access to Oracle Spatial/Locator data in Oracle Spatial/Locator data source.

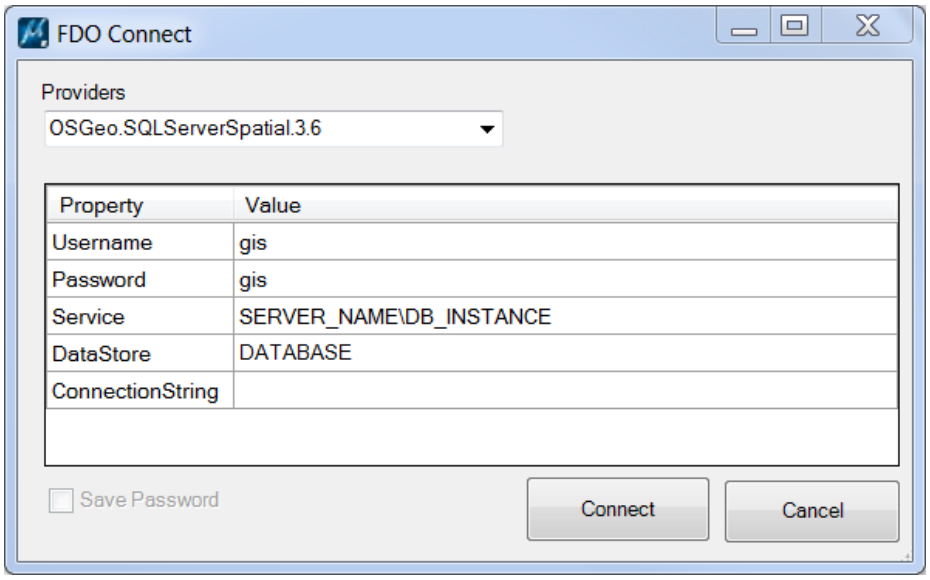


If *OracleSchema* is defined only the tables belonging to that schema is listed. If empty, all tables visible to the user is listed.

Read more about this provider at http://www.sl-king.com/fdooracle/

SQL Server

Read/write access to feature data in a SQL Server data store.



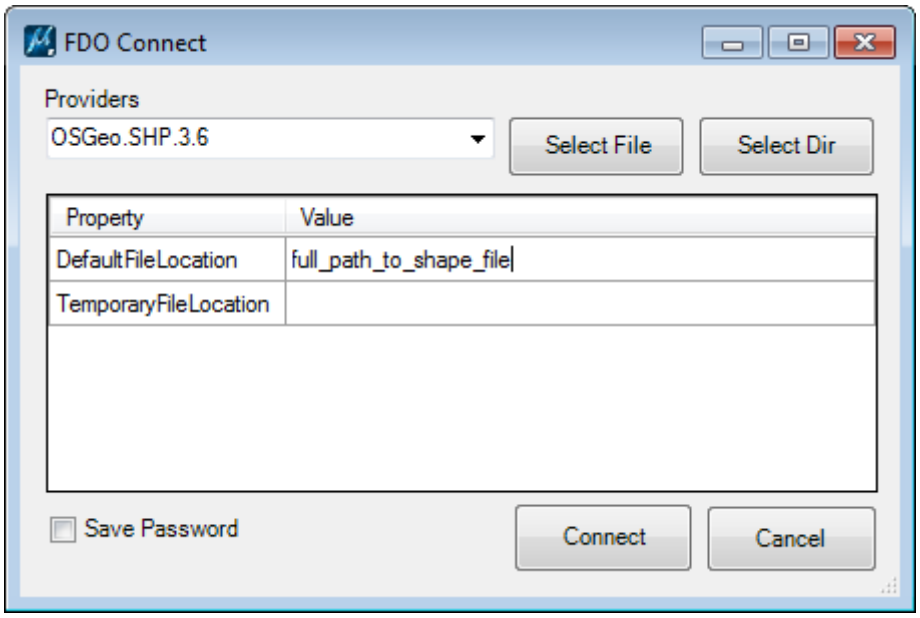
If the datastore contains multiple schemas, the first schema is listed. To specify a specific schema use the configuration variable FDO_DEFAULT_SCHEMA.

The provider need read access to the sys schema, therefore the user used to login need access to the sys and dbo schemas.

Read more about the provider at https://trac.osgeo.org/fdo/wiki/FdoSQLServerSpatialNotesand http://fdo.osgeo.org/sites/fdo.osgeo.org/files/docs/Providers/SQLServerSpatial/index.htm.

Shape

Read/write access to existing spatial and attribute data in an ESRI SHP-based data store.



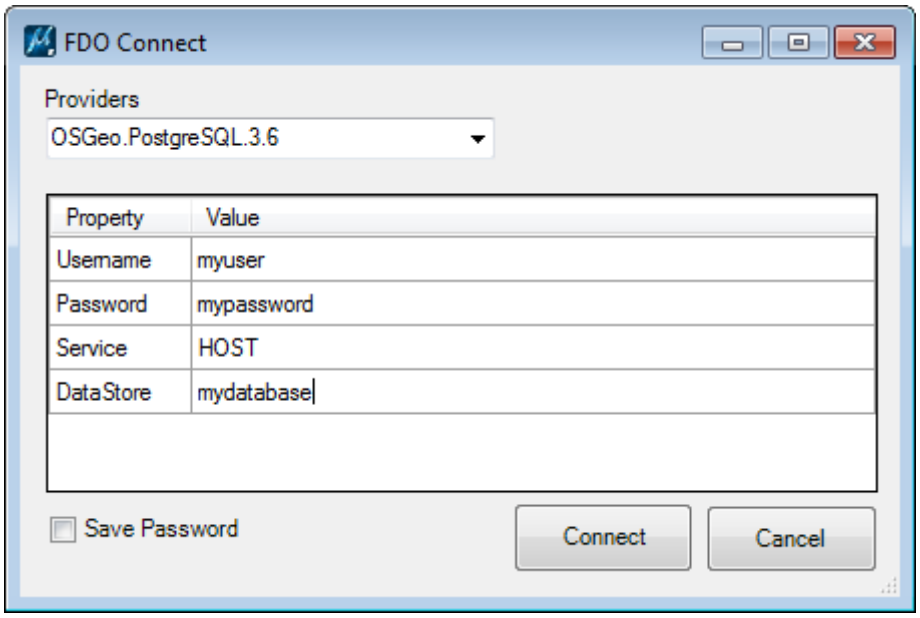
DefaultFileLocation specifies either a single shape file or an entire directory. Use the buttons or select the file path.

TemporaryFileLocation is optional an specifies a directory where FDO stores temporary files.

Read more about this provider at https://fdo.osgeo.org/fdoshp/index.html.

PostGreSQL

Read/write access to existing spatial and attribute data in a PostGreSQL/PostGIS data store.

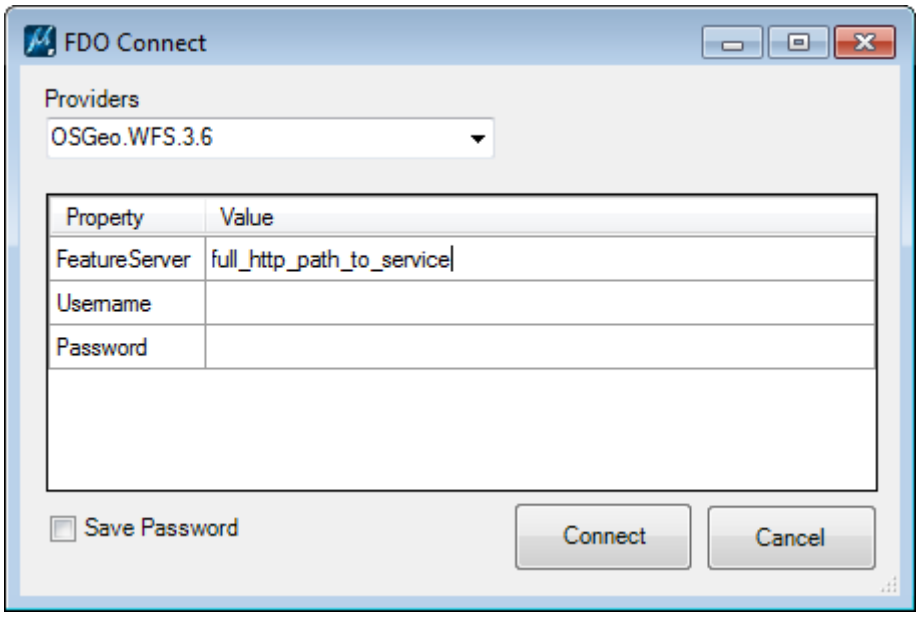


Service could be *localhost,* or a hostname followed by a port number, e.q: *myhost:4096*.

Read more about this provider at https://trac.osgeo.org/fdo/wiki/FdoPostgreSQLNotes.

WFS

Read-only access to feature data in an OGC WFS-based data store.



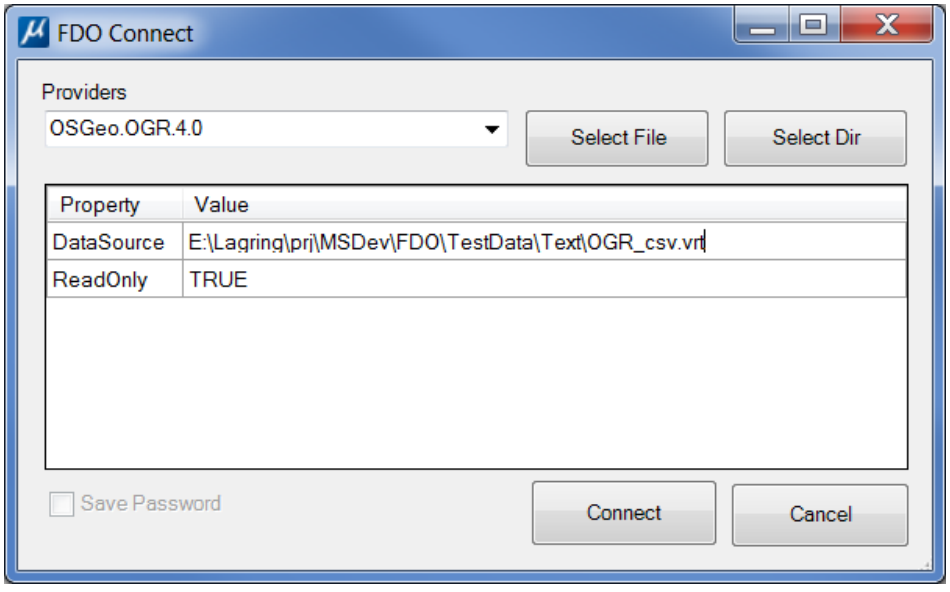
FeatureServer is the full url to the service. E.g.:

http://mrdata.usgs.gov/services/mt?request=getcapabilities&service=WFS&version=1.0.0&

Read more about this provider at https://fdo.osgeo.org/fdowfs/index.html

OGR

OGR is an open source library. Read and write access is provided to vector data from the OGR library.



DataSource is the path to the vrt-file (Virtual Vector Format) that specifies the OGR connection.

The vrt file is used to define one or more features connections. Not all data sources supported by OGR has been tested. Following is an example two examples.

A connection to three csv text files containing X,Y points and attributes. *Parking meters* and *Buss stops* uses the minimum parameters. *Hinder* also specifies data types for all attributes.

This is file *MultiLayers.vrt*

```
<?xml version="1.0"?>
<OGRVRTDataSource>

    <OGRVRTLayer name="Parking_meters">
        <SrcDataSource  relativeToVRT="1">Parking_meters.csv</SrcDataSource>
        <GeometryType>wkbPoint</GeometryType>
        <GeometryField encoding="PointFromColumns" x="X" y="Y"/>
    </OGRVRTLayer>

    <OGRVRTLayer name="Hinder">
        <SrcDataSource  relativeToVRT="1">Hinder.csv</SrcDataSource>
        <GeometryType>wkbPoint</GeometryType>
        <GeometryField encoding="PointFromColumns" x="X" y="Y"/>
        <Field name="TYPE" type="String" />
        <Field name="SUPPLIER" type="String" />
        <Field name="INSTALL_DATE" type="Date" />
        <Field name="LENGTH" type="Real" />
    </OGRVRTLayer>

    <OGRVRTLayer name="Buss_stops">
        <SrcDataSource  relativeToVRT="1">Buss_stops.csv</SrcDataSource>
        <GeometryType>wkbPoint</GeometryType>
        <GeometryField encoding="PointFromColumns" x="X" y="Y"/>
        <Field name="NAME" type="String" />
    </OGRVRTLayer>

</OGRVRTDataSource>
```

This is one of the data files (*Hinder.csv*)

```
ID;X;Y;TYPE;INSTALL_DATE;SUPPLIER;LENGTH
1;124653,9003;6648608,047;Flexibump;2014-02-03;ProVia;3,5
2;124396,9358;6648544,495;Flexibump;2014-02-03;ProVia;3,5
3;124428,789;6648202,437;Flexibump;2014-02-03;ProVia;3,5
4;123995,8492;6648169,764;Rullstopp;2008-12-17;Seton;4
5;123891,1732;6648408,532;Rullstopp;2008-12-17;Seton;4
6;126030,8761;6649551,406;Rullstopp;2014-02-03;Seton;4
```

A connection to WKT text file containing line geometries.

The file *PipesWKT.vrt*

```
<?xml version="1.0"?>
<OGRVRTDataSource>
    <OGRVRTLayer name="lineWKT">
       <SrcDataSource>E:\Lagring\prj\MSDev\FDO\TestData\Text\lineWKT.csv</SrcDataSource>
        <GeometryType>wkbLineString</GeometryType>
        <GeometryField encoding="WKT" field="GEOM" />
     </OGRVRTLayer>
</OGRVRTDataSource>
```

The csv file *lineWKT.csv*

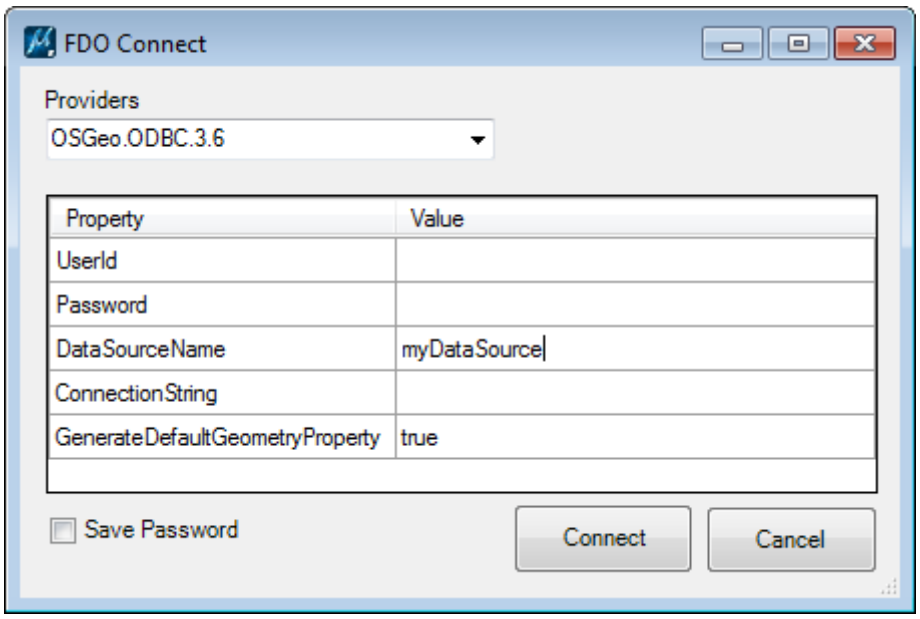
```
ID;GEOM
1;LINESTRING (126762.087240329 6649304.40643138, 126768.826790939 6649288.71334715, 126776.020044466 6649272.14008994)
2;LINESTRING (126794.3248949 6649189.97394147, 126805.255010638 6649139.37399684)
3;LINESTRING (126805.255010638 6649139.37399684, 126771.697493035 6649124.06098731)
4;LINESTRING (126771.697493035 6649124.06098731, 126739.327852161 6649116.77955626, 126729.734097743 6649114.56912184)
5;LINESTRING (126739.327852161 6649116.77955626, 126739.286606441 6649117.99979608)
6;LINESTRING (126779.146470025 6649257.9673045, 126777.455395514 6649256.08693494)
```

Not all OGR supported formats will work with the FDO Provider.

Read more about OGR and VRT-files at http://www.gdal.org/drv_vrt.html.

ODBC

Read/write to feature data in an ODBC-based data store. Supports XYZ feature objects and can define feature classes for any relational database table with X, Y, and optionally, Z columns.



DataSourceName is the only required parameter. Enter the name of the ODBC data source.

If you use the 64-bit version the 64-bit ODBC is required.

Read more about this provider at https://fdo.osgeo.org/fdordbms/index.html.

Configuration Variables

You can define configuration variables to configure the behavior of the MicroStation FDO Reader.

These could be set at any configuration level, i.e. Site, Project or User.

 # Default directory for map files (Open and Save map)
FDO_MAP_DIR = $(_USTN_WORKSETSTANDARDS)/data/

 # (Optional) Disable Writer
 # This will disable the Write button in the FDO Dialog for the Writer version
FDO_READ_ONLY = 1

 # (Optional) Directory for the map list.
 # Default will be the same as the FDO_MAP_DIR
FDO_MAP_LIST_DIR = $(_USTN_WORKSETSTANDARDS)/data/

 # Default map definition file
 # (Optional) If defined, this map will be loaded automatically
 # If no file path is defined it will default to FDO_MAP_LIST_DIR
FDO_DEFAULT_MAP = StandardMap.xml

 # (Optional) Map view file. Default
is $(FDO_MAP_LIST_DIR)FdoMapViews.xml
FDO_DEFAULT_MAPVIEW = C:/FDO/MyViews.xml

 # (Optional) Default text size
 # Text size when nothing else is specified. Default is 1.0.
FDO_MAP_DEFAULT_TEXT_SIZE = 2.5

 # (Optional) Color settings for black and white colors
 # 0 = use RGB (default), 1 = use index for white, 2 = use index for black, 3 use index for both
FDO_USE_INDEX_COLOR = 3

 # (Optional) Default connection
 # The actual parameters depends on the provider specified in the first parameter
 # Provider;user;password;service;schema;

FDO_DEFAULT_CONNECT =
OSGeo.KingOracle.3.8:username=myuser;password=mypassword;service=
mydatabase;oracleschema=myschema;

 # (Optional) Create attributes or not. 0 = Always create attributes (default),
1 = Never create attributes, 2 = MapLayer decides
FDO_USE_ATTRIBUTES = 1

 # (Optional) View update interval specified by number of elements
 # Default is 0 which means that the view is updated after the layer has been
read
FDO_VIEW_UPDATE_INTERVAL = 3000

 # (Optional) If set (any value will do), this will rotate all texts to a readable
angle from left to right
FDO_ROTATE_TEXT = 1

 # (Optional) Output model for created elements.
 # Default will be active model
FDO_OUTPUT_MODEL = FDO

 # (Optional) Should output model be cleared before new read (0 = no, 1 0 =
yes).
 # Only used if FDO_OUTPUT_MODEL is specified. Default is True
FDO_CLEAR_OUTPUT_MODEL = 1

 # (Optional) Defaulr schema name is the data source contains multiple
schemas

FDO_DEFAULT_SCHEMA = SchemaName

 # (Optional) If output is written to a references model
#(see Settings) it is recommended to set the following
MS_LEVEL_AUTO_SYNC_ATTRIBUTE_LIST > ByLevelSymbology,
ByLevelColor, ByLevelStyle, ByLevelWeight

 # MicroStation variables that need to be set to run FDO Reader

 # Writer only
MS_DESIGN_HISTORY = delete=1

MS_ADDINPATH < $(_USTN_WORKSETSTANDARDS)mdlapps/
MS_LIBRARY_PATH < $(_USTN_WORKSETSTANDARDS)mdlapps/
MS_DGNAPPS > FDO64