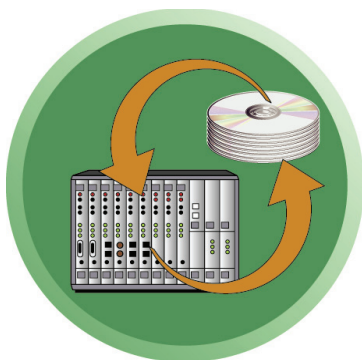


DataWorx P3K

Version 3.0

User Manual



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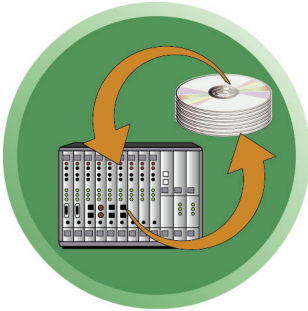
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Document History



DataWorx P3K User Manual DWX-P3K-1

Please include the manual number and the manual issue, both which are shown below, when communicating with Technical Support regarding this publication.

Manual Number:	DWX-P3K-1
Issue Number:	First Edition
Issue Date:	May 2009

Publication History		
<i>Issue</i>	<i>Date</i>	<i>Description of Changes</i>
First Edition	May 2009	Original

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1.0 Introduction

DataWorx P3K provides an easy and inexpensive way to collect data from your Productivity3000 PAC by connecting it to enterprise database systems for Productivity3000/database connectivity. Industrial devices are able to conduct their own database operations, and devices can be programmed and changed from the database. With DataWorx™P3K, settings from industrial devices can even be stored in the database, then retrieved and sent back to the Device for future use. The DataWorx P3K software package is unique because it offers report-by-exception data collection rather than the typical method of data collection through polling. The report-by-exception method allows the Device complete control to store the data to a computer database or to store it locally if the network is down. Report by exception eases network traffic because it sends information only when needed.

Hardware Required	Software Required
· Pentium II with 128 megabytes of ram	· The Server requires Windows NT (SP5 or higher), 2000, XP or Vista
· 10 megabytes of free hard-disk space	· The Server requires Internet Explorer 6.0 or higher
· Productivity3000 PAC	· The Monitor can run on Windows 98, NT, 2000, XP or Vista
	· Compatible with Microsoft Access or Microsoft SQL Server databases

2.0 Installation

Before beginning the software installation, make sure that the devices and Server/Monitor computers are connected to the network. Decide what type of installation you want:

1. Server and Monitor on same computer
 - a. This might be the only option if there is only one computer.
 - b. Even if you plan on hosting the Server and Monitor on different computers, both applications may be installed on the Server for quick and easy installation and configuration.
2. Server and Monitor on different computers
 - a. This option is ideal when the physical location of the Server is not easily accessible.
 - b. If you choose this setup, note the IP address or name of the Server so it can be accessed later

DataWorx P3K software is available on the CD. To install DataWorx P3K, insert the CD into your PC's CD drive. The CD should start automatically and open the installation window.

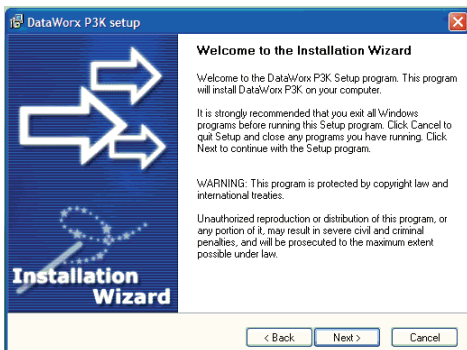


Note: If the CD does not start automatically, go to your Windows START button, select RUN, and type:

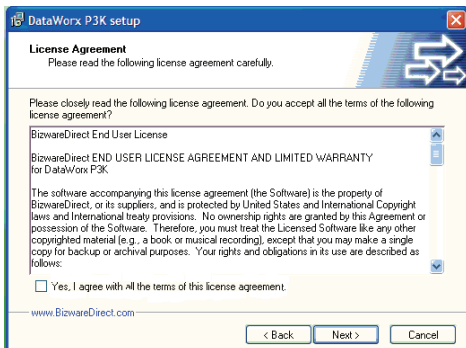
E:\setup.exe

Change the letter "E" to correspond to the letter for your CD drive. Then click OK, and the program will start.

Click on *DataWorx P3K* to start the installation program shown below. Click *Next*:

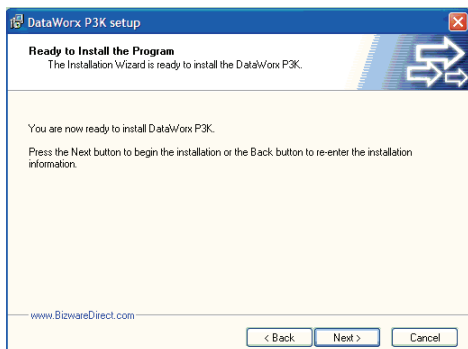


Read the license agreement that appears onscreen. Make sure you understand and agree with the written statement before moving on:

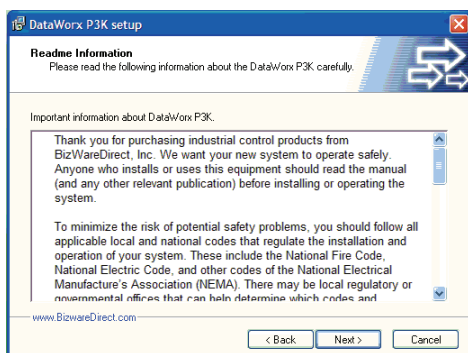


DataWorx P3K

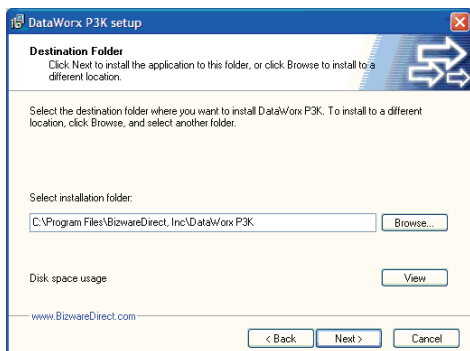
After reading and understanding the license agreement, check the box next to the statement, "Yes, I agree with the terms of this license agreement." Click *Next*:



A screen will appear that says, "Readme Information." This screen contains important information regarding the DataWorx P3K software that may be pertinent to you. After reading the information, click the *Next* button:



A prompt for the DataWorx P3K Destination Folder will appear. By default the Destination Folder path is set to *C:\Program Files\BizwareDirect, Inc\DataWorx P3K*. The location of the DataWorx P3K files can be changes by clicking *Browse* and selecting an alternative folder.

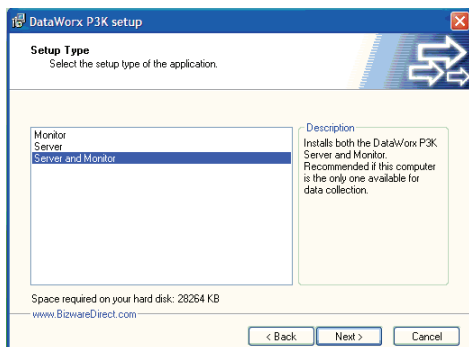


Once the Destination Folder has been determined, click *Next*.

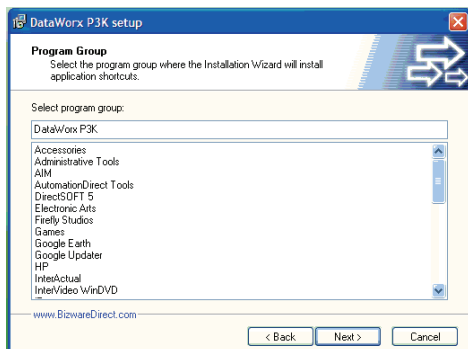
DataWorx P3K

You will now be prompted to enter the Setup Type.

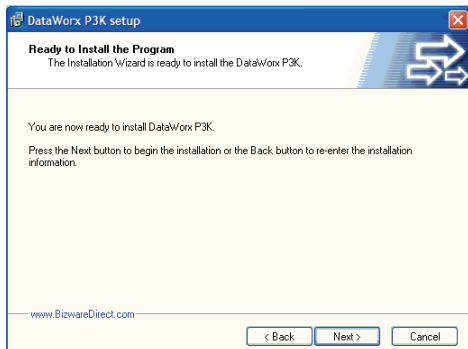
There are three Setup Types: *Monitor*, *Server*, or *Server and Monitor*. If a type from the list is selected, a description of that type will appear on the right-hand side of the screen. If you want the Server and Monitor on the same computer, click on the *Server and Monitor* option. If you want to install only the Server, select *Server*. Or, you may decide to install the Monitor only. Choose this option if remote access to a DataWorx Server is available.



Once the Setup Type has been determined, click *Next*. You will be prompted to input the Program Group. This is where shortcuts will be installed. By default, the program group is **DataWorx P3K**, but the program group may be changed by entering it in the text box:

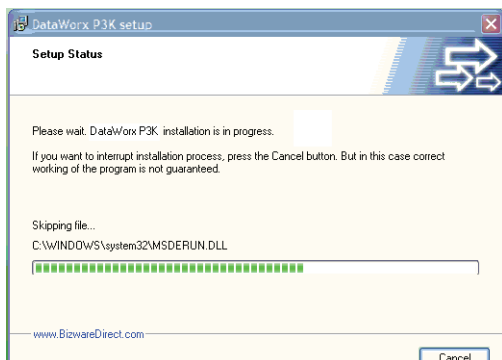


Click *Next*, and you will be prompted to begin the installation process. By clicking the *Back* button, all of the installation settings may be reviewed before continuing with the installation. Once satisfied with the installation settings, click *Next*:



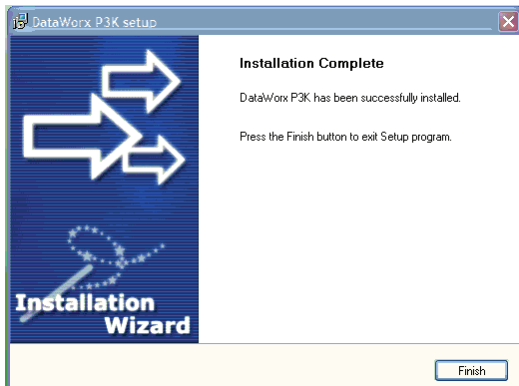
DataWorx P3K

After clicking the *Next* button, a meter which indicates the installation progress will appear:



After the installation is complete, a notification will appear, confirming that the installation has been successful. Click *Finish* to exit the DataWorx P3K installer:

You can stop the installation process by clicking the *Cancel* button.

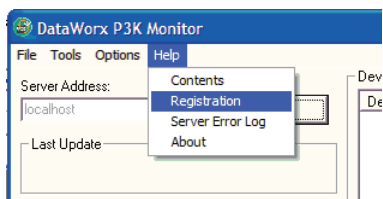


3.0 Registration

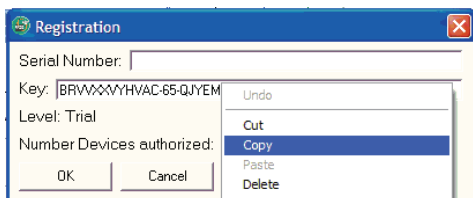
REGISTRATION INSTRUCTIONS

- Ensure that the Server is running
- Start the Monitor and connect to the Server
- Go to

Help -> Registration:



In the registration window, copy the registration key by selecting the key, pressing the right mouse button and selecting copy.



Note: If your PC does not have an active Internet connection, please write down the key provided in the registration window below. Then, go to a PC that does have an Internet connection and type your information into the Web page as described.

Registration Key:

DataWorx P3K

With your Internet browser, go to:

www.bizwaredirect.com/dataworxregistration.aspx.

Paste the registration key into the *Key* field on the Web form. You must also enter the serial number, which is located on the back of the software CD case:

DataWorx Registration Form

Serial Number (From DVD Case)

Key (From DataWorx)

Create Registration

Click the *Create Registration* button. If the information was entered correctly, your newly assigned key will appear in the bottom field:

Create Registration

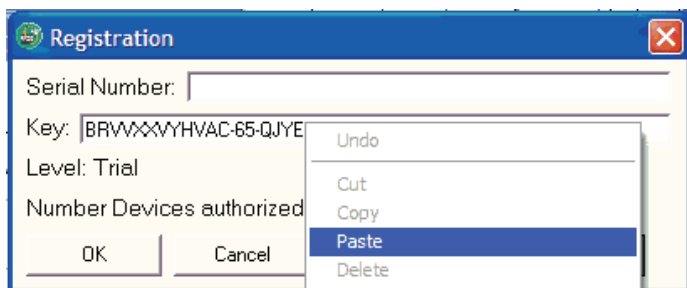
Found registration for 3 device(s).

Your assigned key

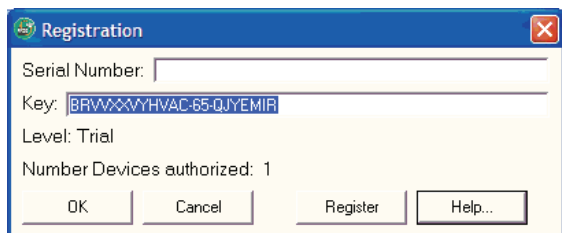
Thank you for registering!

Assigned Key:

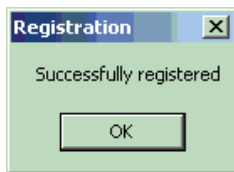
Copy the assigned key. Return to the DataWorx registration screen, and paste the assigned key into the *Key* field. You must also enter the serial number, which is located on the back of the software CD case:



Next, click the *Register* button:



A success message in the registration window should show your registration status:

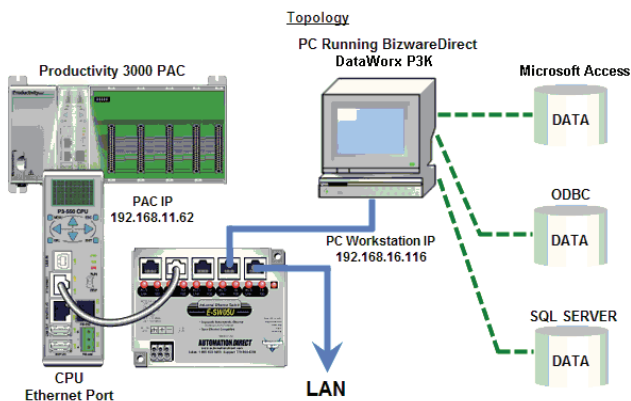


Click *OK*. The registration process is now complete.

4.0 Hardware

REQUIREMENTS

DataWorx P3K will work with the Productivity3000 PAC. Once DataWorx P3K is set up and configured, the PAC can add, retrieve, update and delete database records.



5.0 Ladder Logic

5.1 Report by Exception

OVERVIEW

The DataWorx P3K software package is unique because it offers report-by-exception data collection rather than the typical method of data collection through polling. With report-by-exception technology, the Productivity3000 PAC has complete control over data logging. The device will send information only when needed, whereas with polling, the computer maintains control and constantly queries the device for data. As a result of this architecture, report-by-exception technology eases network traffic.

5.2 Productivity3000

The AutomationDirect Productivity3000 programming environment uses a DataWorx P3K Request Block to communicate with the DataWorx Server. An example DataWorx P3K Request Block is shown below.

DataWorx Request (DWX)

Ethernet Port: CPU-ETH-Ext
Server IP Address: 192.168.1.27
TCP Port Number: 502
DataWorx Server: Shipping
DataWorx Project: C:\Project\192.168.1.211.dwx
Procedure: 1: ShipmentTracking

In Progress: InProgress
Complete: complete
Success: successful
Error: error
Timeout: timeout
Exception Response: exception
Confirmation: confirmation

Mapping Table

DB Field	Source Tag
boxes.trackingNumber	trackingNumber
boxes.weight	weight
boxes.dimensions	dimensions
boxes.numItems	numItems

Where Table

DB Field	Source Tag
boxes.id	id

SQL View

```
UPDATE boxes SET (boxes.trackingNumber, boxes.weight, boxes.dimensions, boxes.numItems) WHERE (boxes.id = id);
```

Automatic Polling every 100 msec. initial poll delay 0 msec.
 Show Instruction Comment

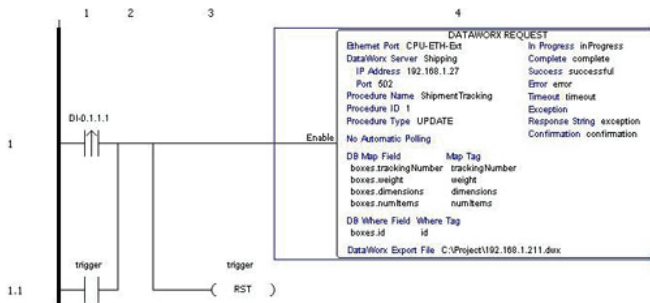
OK Cancel Help

Once the database and the DataWorx P3K Server have been set up and the DataWorx P3K Server configuration has been exported,

DataWorx P3K

insert DWX instructions in the ladder to execute the procedures that were defined. Use the DataWorx Project field to import the DWX file that you just created. Importing this file populates the procedure selector with all the available procedures that were defined in the DataWorx P3K Server. In this case, Procedure 1: Shipment Tracking is selected and will automatically populate the Mapping Table, Where Table and SQL View information.

In this example, shipping box data will be selected from the database and written to Productivity3000 tags. Before this rung is executed, set the value of the Productivity3000 tag *id* to be the desired box id number. Then execute the rung. The Productivity3000 tags in the Mapping field (i.e. *trackingnumber*, *weight*, *dimensions*, *numitems*) will now be updated with the values retrieved from the database for the respective box id.



Note: Please refer to the Productivity3000 manual for complete details on configuring the DataWorx P3K block.

6.0 DataWorx P3K

6.1 Server

OVERVIEW

The DataWorx P3K Server's primary function is to listen to devices and record the data into either a database or text file. DataWorx P3K is also capable of performing database operations.

The desired format of the data file is set using the DataWorx P3K Monitor. For more information on configuring the Server with the Monitor, please refer to section 6.2: Monitor.

6.1.1 Installing Service

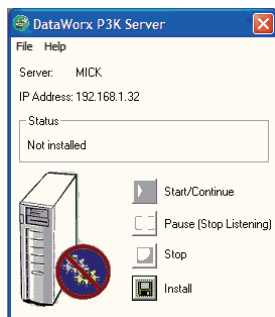
The DataWorx P3K Server needs to be both installed and running, to operate without user intervention.

To install the Server:

Click the *Start* Button -> *Program Files* -> *DataWorx P3K* -> *DataWorx P3K Server*



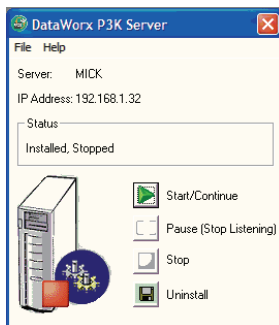
The DataWorx P3K Server window should appear. Click the *Install* button:



When installation is finished, this window should appear. It shows the status of the Server is *"Installed, Stopped."*



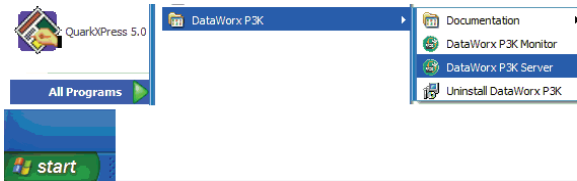
Note: *Installation alone does not start the DataWorx P3K Server. For instructions on starting the Server, please refer to section 6.1.2: Running Service.*



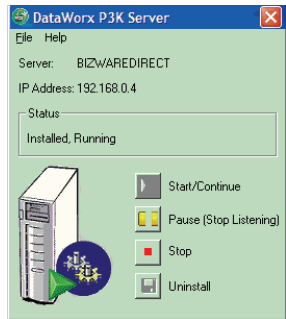
6.1.2 Running Service

Once the DataWorx P3K Server has been installed, it must be activated in order to operate without user intervention. If you do not already have the DataWorx P3K Server window open:

Click the *Start* Button -> *Program Files* -> *DataWorx P3K* -> *DataWorx P3K Server*



In the DataWorx P3K Server window, click the *Start/Continue* button. This window should appear, showing the Server's status as, "Installed, Running." The Server is now running and should operate without user intervention.

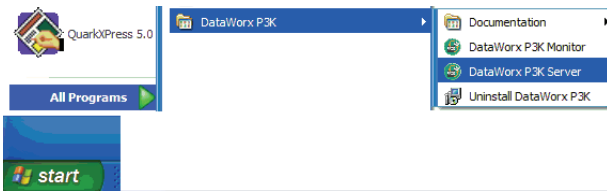


6.1.3 Pausing Service

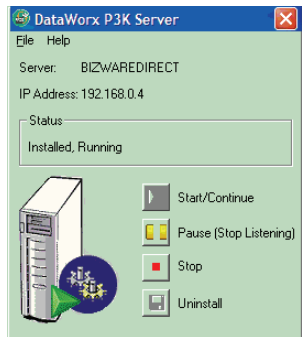
Pausing forces the Server to stop listening for device input. This feature can be useful when making updates or configuring the Server because the Server will temporarily ignore data.

To pause the Server, you must have the DataWorx P3K Server window open. If you do not already have this window open:

Click the *Start Button* -> *Program Files* -> *DataWorx P3K* -> *DataWorx P3K Server*



Assuming the DataWorx P3K Server is currently running, this window will appear onscreen:



Click the *Pause (Stop Listening)* button, and this window should appear. The Server is now paused.



Note: *Pausing does not stop the DataWorx P3K Server from running. To stop the Server, refer to section 6.1.4: Stopping.*

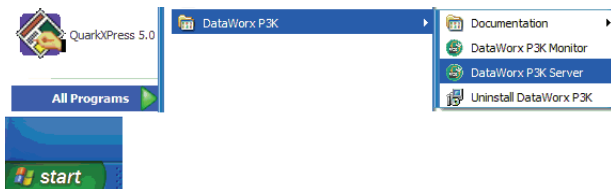


6.1.4 Stopping Service

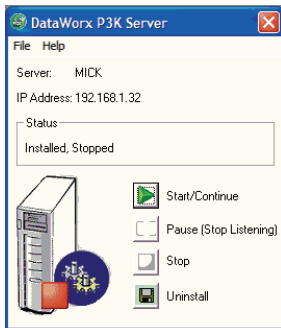
Stopping the DataWorx Server will completely shut it down, rather than just keep it from listening for data. This must be done before the Server can be uninstalled.

If you do not already have the DataWorx P3K Server window open:

Click the *Start Button* -> *Program Files* -> *DataWorx P3K* -> *DataWorx P3K Server*



In the DataWorx P3K Server window, click the *Stop* button. This window should appear. The Server is now stopped.

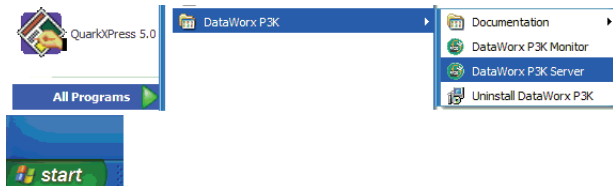


6.1.5 Viewing the Error Log

The DataWorx P3K Server maintains an error log to use as a diagnostic tool for troubleshooting.

If the DataWorx P3K Server Window is not open, open the Start Menu and select:

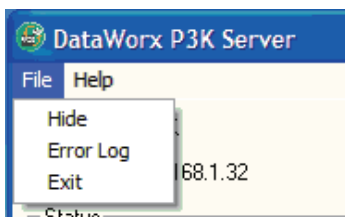
Programs -> DataWorx P3K -> DataWorxP3K Server



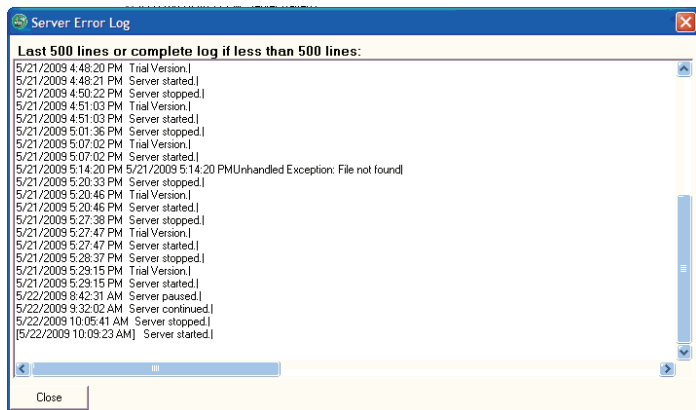
DataWorx P3K

In the DataWorx P3K Server window, go to:

File -> Error Log



The Error Log window will open:

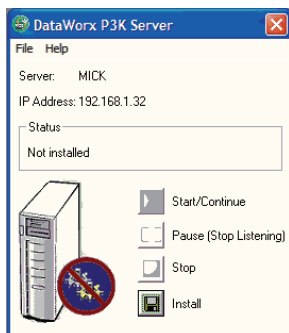
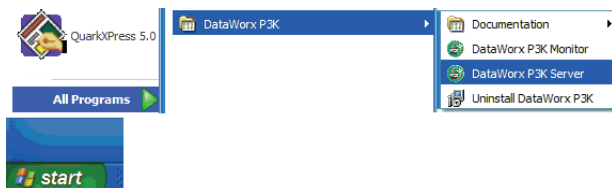


The Error Log window contains any error messages that were generated by the Server and Monitor programs. It serves as a useful troubleshooting tool.

6.1.6 Uninstalling Service

If the DataWorx P3K Server window is not already open:

Click the *Start* Button -> *Program Files* -> *DataWorx P3K* -> *DataWorx P3K Server*

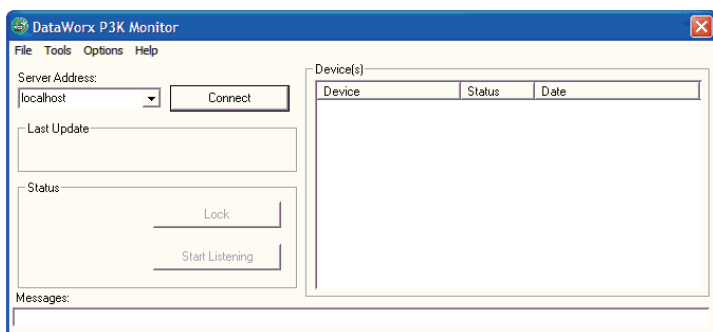


Once the DataWorx P3K Server window is open, click on the *Uninstall* button. This window should appear, showing the status as “Not installed.”

6.2 Monitor

OVERVIEW

The DataWorx Monitor allows you to configure the DataWorx P3K Server and control its view options. It also allows the retrieval of the Server's data files over a network. The Monitor can also be used for troubleshooting. Below is the Monitor's main screen. Following the screen is a brief explanation of each of its fields:



Server Address: This is the field in which to enter the address of the PC on which the DataWorx P3K Server is running.

Last Update: This denotes the most recent device input time.

Status: The Server's locked and listening state is displayed here.

Devices: A list of the devices which are currently configured with the Server, as well as the status of each device, will be displayed here.



Note: *Devices will only list the last update. You need to check the date to verify that you are receiving information as often as you expect.*

Messages: Updates from both the Server and the Monitor itself are displayed in this field.

6.2.1 Connecting

Connecting the Monitor to a DataWorx P3K Server enables you to configure the DataWorx Server and retrieve its data files. To connect to a DataWorx Server, open the DataWorx P3K Monitor window. Once the Monitor's main screen is open, enter the IP address or name of the Server you wish to connect to into the field labeled *Server Address*:



The screenshot shows a light yellow background. On the left, the text "Server Address:" is followed by a text input field containing "localhost" and a small downward-pointing arrow on the right side. To the right of the input field is a rectangular button with a solid border and the text "Connect" centered on it.

Next, press the *Connect* button. The Monitor should now be connected to the Server and configuration and data retrieval can be completed. If the connection has been made successfully, the text on the button will change from *Connect* to *Disconnect*, as shown below:



The screenshot shows the same light yellow background. The "Server Address:" label and the input field containing "localhost" are identical to the previous screenshot. However, the button to the right now has a dashed border and the text "Disconnect" centered on it.

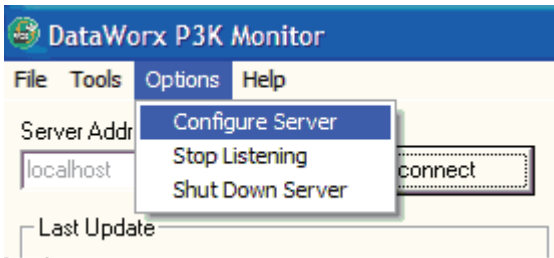
6.2.2 Configuring



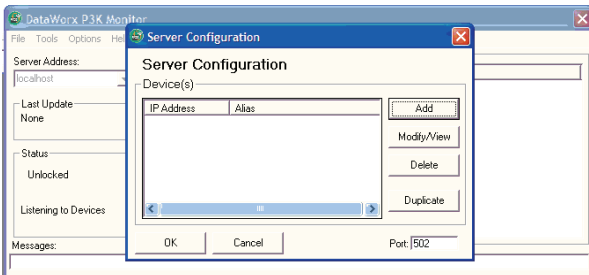
Note: Before configuring the Server, the user must connect to it from the Main Monitor window. See section 6.2.1: Connecting

On the DataWorx P3K Monitor screen, go to:

Options -> Configure Server



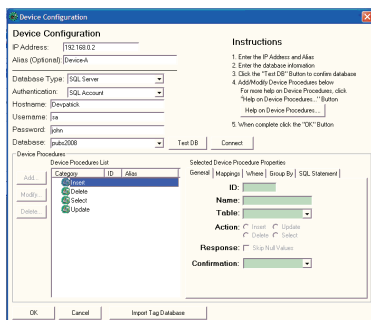
You should now see a list of the devices (if any) which are configured for the Server. Here is an example:



Use the *Port* field to change the port that the DataWorx P3K Server listens on for messages.

To add a device, click *Add*. A device configuration window similar to the following will open.

The example below reflects information that has already been filled in by the user.



Below is an explanation of each field:

IP Address: Denotes the IP Address of the PAC.

Alias (Optional): The user may indicate an alternative name for the PAC, which can be easier to remember than a cryptic IP Address.

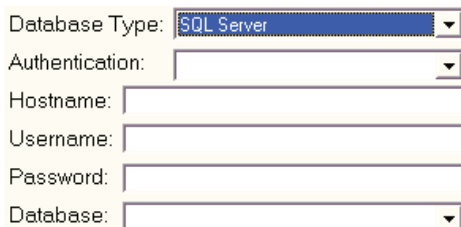
Database Type: Indicates the type of database in which the device data will be stored.

- **Access:** When the Database Type is set to “Access,” then the **Filename** field is available.

Database Type:

The user must specify the path to the Access file either by directly editing the **Filename** field or by clicking “Browse” and selecting a path

- **SQL Server:** When the Database Type is set to “SQL Server,” then additional fields are available, as shown below:



Database Type:

Authentication:

Hostname:

Username:

Password:

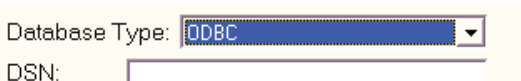
Database:

Authentication:

- If set to “SQL Account,” then the name of the SQL Server host machine must be specified in the **Hostname** field, and both the **Username** and **Password** information for the SQL Account must be filled in.
- Otherwise, if set to “Local system account,” then the user only fills in the **Server** field.

Database: The user must select from the databases available on the specified SQL Server.

- **ODBC:** When the Database Type is set to “ODBC,” then the DSN field is available.



Database Type:

DSN:

The user must specify the DSN (Data Source Name) by directly editing the **DSN** field.

Test DB: Use the “Test DB” button to test the DataWorx server connection to the user-specified database, without establishing a steady connection. If successful, a “Connection Successful” message box will open. Otherwise, a “Connection Failed” message box will open.

Connect: Use the “Connect” button to establish a full connection to the user-specified database. If successful, the “Connect” button label will update to “Disconnect.” Otherwise, a “Connection Failed” message box will open.

Device Procedures List: This section displays a list of currently stored Device Procedures. In the example above, no Device Procedures have been created.

Selected Device Procedure Properties: The tabs in this section display the settings for the highlighted Device Procedure in the Device Procedures List. In the example above, no Device Procedures have been created, therefore the tab fields are empty.

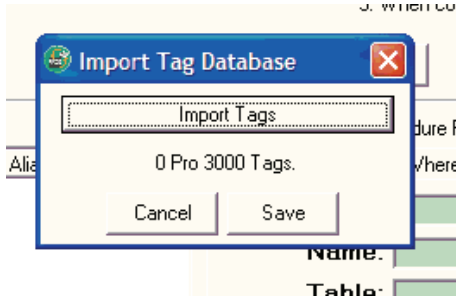


Note: For details on creating Device Procedures and the tabs in the Selected Device Procedure Properties section, refer to “Device Procedures,” Chapter 8.

Productivity3000 PAC Tag Database

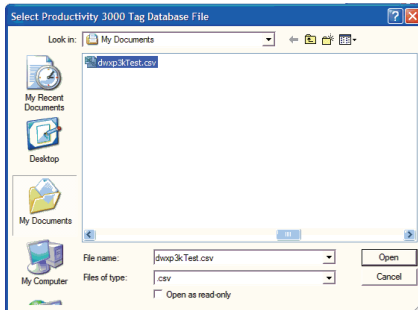
From the Device Configuration window, click “Import Tag Database.”

The Import Tag Database window will open.



Click “Import Tags.”

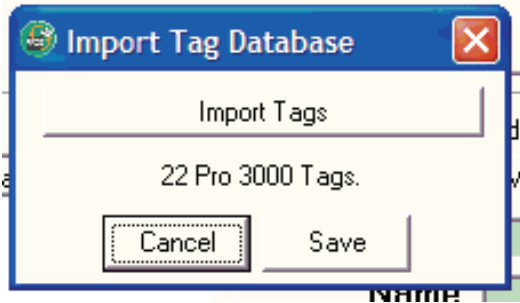
Then, the Select Productivity3000 Tag Database File window will open. Select the desired Productivity3000 tag database CSV file and click “Open.”



DataWorx P3K

The tags from the selected Productivity3000 tag database CSV file will be imported into DataWorx P3K and the imported tag count will display in the Import Tag Database window.

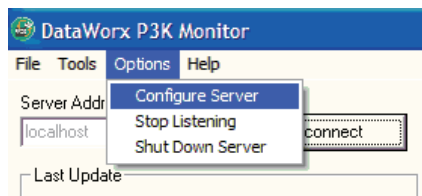
Click “Save” to finish.



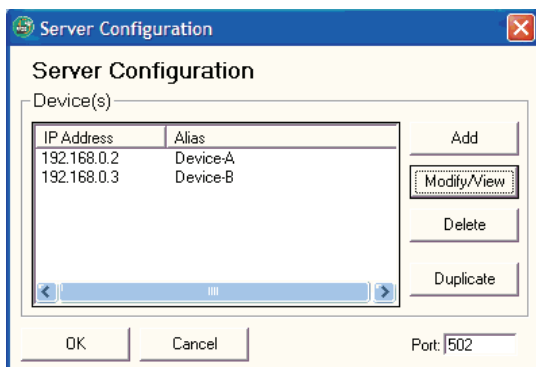
6.2.3 Modifying a Device

A device's configuration can be modified using the DataWorx Monitor. To make changes or updates to a device's configuration, first open the Monitor window. Once open, go to:

Options -> Configure Server



You should now see a list of the devices which are configured to the Server. Here is a sample list of configured devices:



Click on the *Modify/View* button and a device configuration window will appear. This screen displays all relevant device configuration data.

Here is an example of a device configuration window:

Device Configuration

IP Address: 192.168.0.2
Alias (Optional): Device-A
Database Type: SQL Server
Authentication: SQL Account
Hostname: Devpatrick
Username: sa
Password: john
Database: pubs2008 Test DB Connect

Instructions

1. Enter the IP Address and Alias
2. Enter the database information
3. Click the "Test DB" Button to confirm database
4. Add/Modify Device Procedures below
For more help on Device Procedures, click "Help on Device Procedures..." Button
5. When complete click the "OK" Button

Device Procedures

Category	ID	Alias
Insert		
Delete		
Select		
Update		

Selected Device Procedure Properties

General | Mappings | Where | Group By | SQL Statement |

ID:
Name:
Table:
Action: Insert Update
 Delete Select
Response: Skip Null Values
Confirmation:

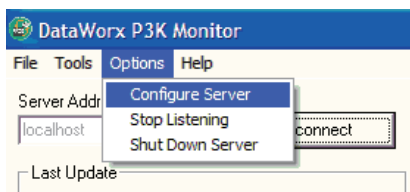
OK Cancel Import Tag Database

On this screen, you are able to make changes and updates in the devices' configurations. Also included here is the DataWorx P3K's database logging option. Once all necessary changes have been made, click the *OK* button to save changes. Or, you may click *Cancel* to discard the changes and return the device's configuration to its previous state.

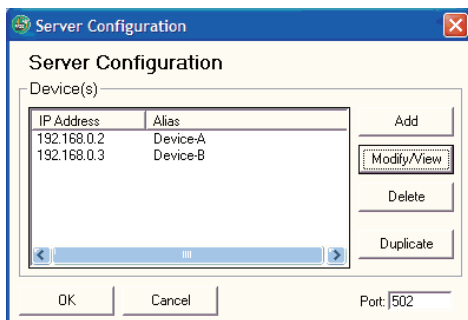
6.2.4 Deleting a Device

To delete a device, you must have the DataWorx P3K Monitor screen open. Once open, go to:

Options -> Configure Server



You will then see a list of devices which are configured to the Server, as in this example:



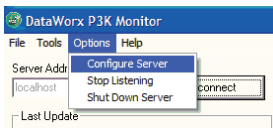
Select the device you wish to delete and click the *Delete* button. If DataWorx receives data from a deleted device it will log an error due to missing configuration.

6.2.5 Duplicating a Device

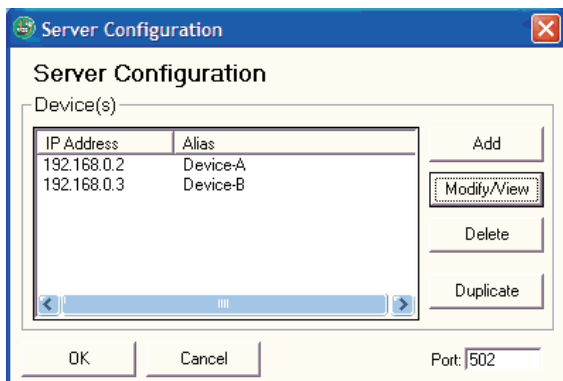
Duplicating is a great time-saving feature for those who have many devices with similar configurations. This option allows you to create one device listing, and make several copies:

In the Monitor window, go to:

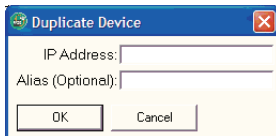
Options -> Configure Server



A list of the devices which are already configured to the Server should appear:



Choose the device you wish to duplicate and click the *Duplicate* button. You should see this window appear, asking for the *Alias* and *IP Address* of the new device. Input the device information. Click *OK* to save and activate the new configuration.

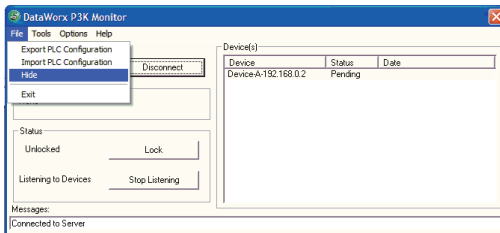


6.2.6 Hiding

Hiding is a convenient feature that allows you to temporarily place the Monitor out of view for later access, without closing the application.

To hide the Monitor, go to:

File -> Hide



The DataWorx P3K icon now appears in the computer's task bar, at the very bottom of the screen:



When you are ready to restore the application back into view again, right-click on the icon and select the *Restore* option from the list:



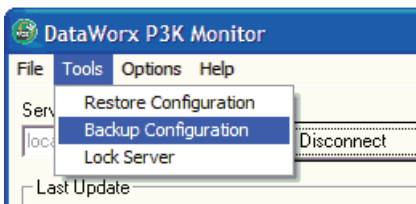
6.2.7 Backing Up and Restoring

Backing up the system's configuration allows you to safely restore all of the changes you have made to the Monitor and Server, in the event of a hardware failure.

To back up the configuration, go to:

Tools -> Backup Configuration

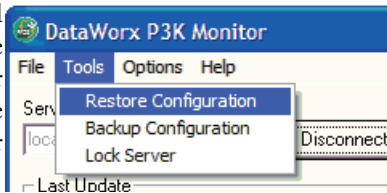
You will be prompted for a filename. Enter the name and click *Save*. Make a note of the filename and location of this backup configuration, in case you need it for a future restoration.



In the event that you need to restore your backup configuration, you can do so by going to:

Tools -> Restore Configuration

You will be prompted for a filename. Enter the filename you chose during the backup process and click *Open*. The Server and Monitor should now be restored to their original states.



6.2.8 Listening

The DataWorx P3K Server maintains *listening* and *not listening* states with regards to device input. You can change the listening state from the Monitor, as well as from the Server.

Changing the listening state can be useful when in the process of installing new devices or changing the configuration of existing devices. You can prevent the Server from receiving irrelevant data during these times of maintenance by stopping its listening state.

To tell the Server to listen, click the *Start Listening* button. (If the button reads “*Stop Listening*,” the Server is already listening for data.)



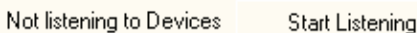
Not listening to Devices Start Listening

If the Server is successfully listening, the status should now read “*Listening to Devices*.”



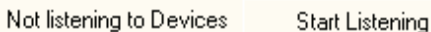
Listening to Devices Stop Listening

To tell the Server to stop listening, click the *Stop Listening* button:



Not listening to Devices Start Listening

If the Server has successfully stopped listening, the status should now read “*Not Listening to Devices*.”



Not listening to Devices Start Listening

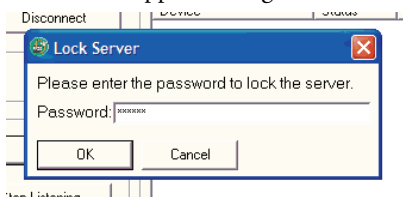
6.2.9 Locking and Unlocking

Locking is a security feature that allows the user to prevent unauthorized or unwanted device configurations, or changes to the Server's listening state. To lock or unlock the Server, have the Monitor window open and follow the steps below.

First, click the *Lock* button:



A screen should appear asking for the lock code (*Password*):



Enter a code that will be easy for you to remember but hard for someone else to figure out. Click *OK*. If the Server has been successfully locked, the window should now display a locked status, which looks like this:



**** WARNING ** *There is no way to circumvent this password protection. Do not lose the lock code.***

When you are ready to unlock the Server for configuration, or to make changes, click the *Unlock* button. Enter your code and click *OK*.

Chapter 7 Database Overview

This section is not intended to teach database concepts, but rather covers basic terminology and operations used in DataWorx P3K. If the user is familiar with database inserts, deletes, updates and selects, skip this section and proceed to Chapter 8, Database Operations Using Device Procedures.

What is a Database?

A database is a collection of tables, and each table stores records in a row-column format similar to a spreadsheet. Each column, or field, in a table has a predefined data-type format. When performing database operations, the user must ensure that the Device data will conform to the table column, or field, format. Column data types include text, integers, floating point numbers and date.

Some types of databases also provide a security system where the user must login with a username and password in order to view or modify the contents of a database. Microsoft SQL Server is one such database that supports logins.



Note: *DataWorx works with both Microsoft Access and Microsoft SQL Server, as well as general ODBC compliant databases. Please check the company web site at www.bizwaredirect.com, to check for the addition of other databases, as the software is made compatible with them.*

Not only does a database provide a convenient storage mechanism for data, but it also provides a commonly used language for performing operations on database tables. That language is called Structured Query Language (SQL). DataWorx P3K uses SQL to perform database operations based on the information that the Device is sending.

It is not necessary for the user to know SQL in order to conduct database operations using DataWorx P3K. DataWorx P3K will automatically generate SQL statements. The user only needs to provide the database table information along with the Device procedure parameters. Details on Device Procedures follow shortly, in Chapter 8.

Database Operations

Overview of Database Operations

The four types of database operations available to the DataWorx P3K user are: **Insert**, **Delete**, **Update** and **Select**.

Insert: Adds new records to a table in a database. The inserted data must conform to the column data type format of the table.

Delete: Removes records from a table in a database. Delete requires filter criteria for specific records to be deleted, otherwise it will delete all records from a table. See the next page for an example illustrating the results for a database table where all rows with an order date prior to 1/1/2007 are deleted.

Update: Modifies existing records in a database table. Update requires filter criteria for specific records to be updated, otherwise it will update fields of all records in the table with a specified value. See the next page for an example illustrating the results for a database table where the row with order code #59 is updated from “In Transit” to “Complete.”

Select: Retrieves records from a database table that meet the filter criteria. The Select operation allows the user to view data in a database table without modifying the records. Select requires filter criteria so that only data from a specific record will be retrieved; otherwise, it typically returns all records in the table. However, DataWorx will only return the first record; therefore, using a where clause will help to return only the specific record needed. For further details, please refer to “Adding a Device Procedure,” in Chapter 8.

Database Operation Examples - Delete and Update

ORDERS : Table				
	ID	ORDERDATE	CODE	STATUS
	1	1/5/2006	16	WAREHOUSE
	2	2/10/2006	27	IN TRANSIT
	3	5/5/2007	58	COMPLETE
	4	6/3/2007	59	IN TRANSIT
	5	7/21/2007	60	COMPLETE

- **Delete Results:** All rows, in the database table above, with an order date prior to 1/1/2007 have been deleted. In this case, two rows have been deleted.

ORDERS : Table				
	ID	ORDERDATE	CODE	STATUS
	3	5/5/2007	58	COMPLETE
	4	6/3/2007	59	IN TRANSIT
	5	7/21/2007	60	COMPLETE

- **Update Results:** The row, in the database table above, with Order Code #59 has been updated from “In Transit” to “Complete.”

ORDERS : Table				
	ID	ORDERDATE	CODE	STATUS
	3	5/5/2007	58	COMPLETE
	4	6/3/2007	59	COMPLETE
	5	7/21/2007	60	COMPLETE

Chapter 8 Database Operations Using Device Procedures

Overview

A Device Procedure created in DataWorx:

- Allows a user to trigger a database operation from the Device, based on information provided by the Device.
- Provides a way for the Device to perform a database operation using the DataWorx P3K Server as its proxy.
- Enables users to easily and quickly define a database operation with the Device.



Note: Device Procedures are independent of the database with which DataWorx is communicating. DataWorx Device Procedures are NOT stored procedures in SQL.

The screenshot shows a web-based interface for DataWorx. It features three input fields: 'DataWorx Server' with the value 'Pro3k', 'DataWorx Project' with the value 'ProductionProject.dwx', and 'Procedure' with a dropdown menu showing '1: Insert Production Data'. To the right of the 'DataWorx Project' field is a 'Read' button. Below the 'Procedure' dropdown, a list of three items is visible: '1: Insert Production Data', '2: Update Order', and '3: Lookup Part'. At the bottom left of the interface, the text 'Manning Tah...' is partially visible.



Note: The amount of data allowed in a DataWorx Request instruction is limited to 120 words (240 bytes).

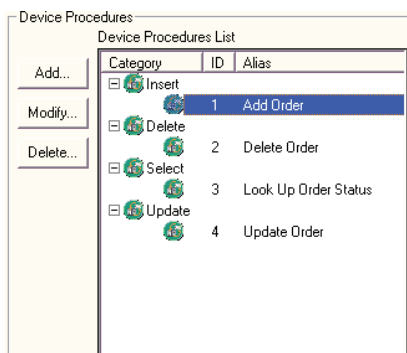
The Device Procedure **ID** is used by the Device to tell the DataWorx P3K Server which DataWorx Device Procedure to execute.

As shown below, there are four types of Device Procedures in DataWorx, each performing a distinct database operation.

The DataWorx P3K Server determines which Device Procedure to run based on the value of the first word of information sent by the Device.

Per the above example, DataWorx will do the following, based on the first word:

- If = 1, then DataWorx will run “Add Order”
- If = 2, then DataWorx will run “Delete Order”
- If = 3, then DataWorx will run “Update Order”
- If = 4, then DataWorx will run “Look Up Order Status”



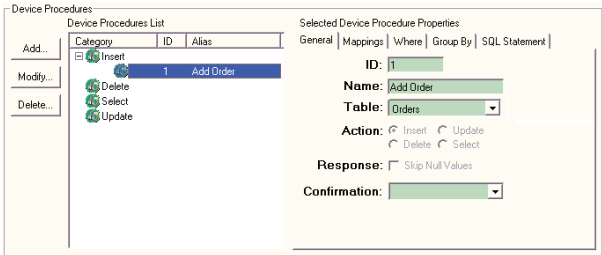
The screenshot shows a window titled "Device Procedures" with a "Device Procedures List" table. On the left side of the window, there are three buttons: "Add...", "Modify...", and "Delete...". The table has three columns: "Category", "ID", and "Alias". The rows are as follows:

Category	ID	Alias
Insert	1	Add Order
Delete	2	Delete Order
Select	3	Look Up Order Status
Update	4	Update Order

8.1 Viewing a Device Procedure

Once a user has connected to the database from the Device Configuration window, any Device Procedures that have been created will display under the following categories: Insert, Delete, Select and Update. The category names are based on the types of available database operations.

In the example below, one Device Procedure has been created. It is designated to perform an Insert database operation, its unique ID is 1 and its Alias is “Add Order.” If the Device sends DataWorx information starting with 1, the Device is instructing DataWorx to execute the Device Procedure that has an ID of 1 and use the rest of the Device’s data in the operation.



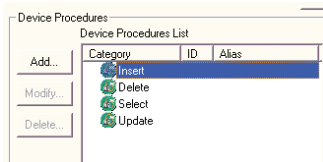
When a Device Procedure is selected from the Device Procedures List, its properties will be displayed in the read-only, tabbed Selected Device Procedure Properties section to the right.

In the example above, the selected Device Procedure will perform an Insert database operation. As indicated on the General tab, the Device Procedure will insert into the ORDERS database Table.

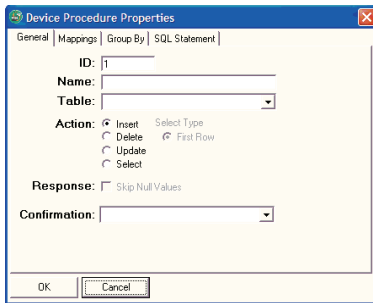
8.2 Adding a Device Procedure

In order to add a new Device Procedure, the user must first connect to the user-specified database.

Then, click "Add" from the Device Procedures section of the Device Configuration window.



The Device Procedure Properties window will open



In the General tab, the user will specify the database **Table** that the Device Procedure will use, its unique **ID**, an optional **Alias** and the type of database operation, or **Action**, that the Device Procedure will perform. Other tabs, such as Mappings, will be used as well, depending on the Action selected.

Once the applicable tabs have been filled in, click "OK" to save the new Device Procedure, or click "Cancel" to discard the new Device Procedure.

The following pages provide examples for each database operation: Insert, Delete, Update and Select.

8.2.1 Database Operation - Insert

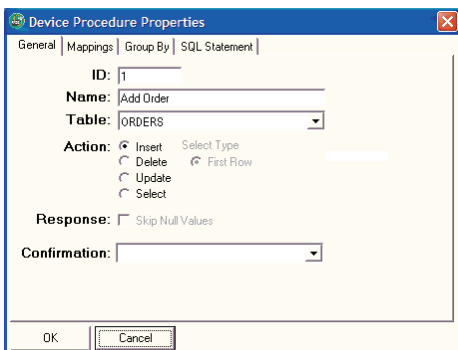
The Insert operation allows Device data to be directly added to a database table.

General Tab

To create a Device Procedure that will perform an Insert database operation:

- Provide the Device Procedure with a unique integer **ID**.
- Enter a meaningful **Name** (optional).
- Specify the **Table** into which the Device data will be inserted.
- Set the **Action** to be Insert.
- Select a 32-bit Signed Integer tags for writing a **Confirmation**. Refer to 8.2.5 for details.

In the example below, the DataWorx Device Procedure will insert Device data into the ORDERS table, has a unique ID of 1, has been given the meaningful Name “Add Order” and has its Action set to Insert.

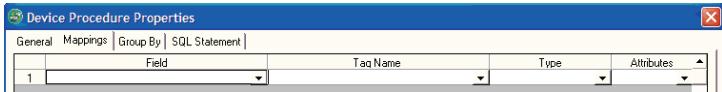


Next, click the "Mappings" tab.

Mappings Tab

In the Mappings tab, the user will map the Device tags to the appropriate database table fields for the Insert operation.

Initially, the fields in the Mappings tab for the new Insert Device Procedure will be empty. The user must specify the information in each column and add a row for each piece of data provided by the Device.



Below is a description of how each column in the Mappings tab is used for the Insert database operation:

Field: Offers a list of database table fields that are available in the user-specified database. The user must select the database field into which data from the Device will be stored.

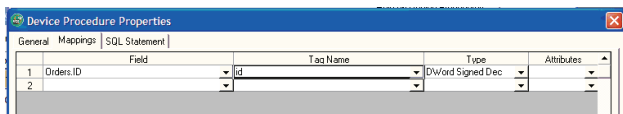
Tag Name: For an Insert operation, it indicates the Productivity3000 Tag Name of the data being supplied by the Device. Data in this Tag Name will be inserted into the database location specified in the Field column.

Type: Specifies the data type of the Device information, which is expected to match the data type of the database table field selected in the Field column.

Attributes: If the Type column is set to “Binary,” then this field lists a choice of bit positions. Otherwise, if the Type column is set to “ASCII,” then this field lists a choice of character lengths.

In the example below, two mappings to database table fields have been created for the new Insert Device Procedure.

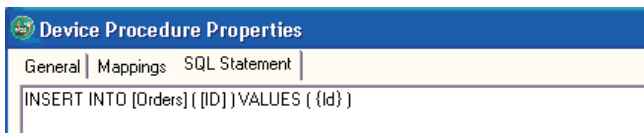
- The data from the Productivity3000 Tag Name will be stored in the ORDERS table, in the field named ID.



	Field	Tag Name	Type	Attributes
1	Orders.ID	id	DWord Signed Dec	
2				

SQL Statement Tab

The user may use the SQL Statement tab to review the Insert database operation. This tab presents the SQL query statement that DataWorx has created based on the user-specified settings made so far in the “General” and “Mappings” tabs.



8.2.2 Database Operation - Delete

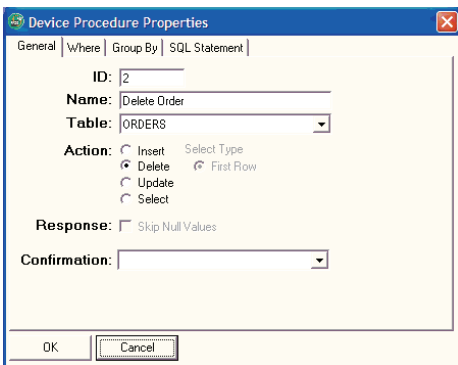
The Delete operation allows database table entries to be deleted based on data sent by the Device.

General Tab

To create a Device Procedure that will perform a Delete database operation:

- Provide the Device Procedure with a unique integer **ID**.
- Enter a meaningful **Name** (optional).
- Specify the **Table** from which the entry will be deleted.
- Set the **Action** to be Delete.
- Select a 32-bit Signed Integer tags for writing a **Confirmation**. Refer to 8.2.5 for details.

In the example below, the DataWorx Device Procedure will delete information from the ORDERS table, has a unique ID of 2, has been given the meaningful Name “Delete Order” and has its Action set to Delete.



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Next, click the "Where" tab.

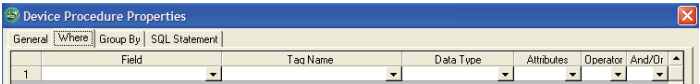
Where Tab

In the Where tab, the user will specify filter criteria for the Delete operation based on the Device data.

Initially, the fields in the Where tab for the new Delete Device Procedure will be empty. The user may add a row for each filter criterion that will apply, based on the data sent by the Device.



**** WARNING **** *While filter criteria are optional, if NO filter criteria are specified in the Where tab for the Delete operation, then when the Device Procedure runs it will delete ALL entries in the database table chosen in the General tab.*



Below is a description of how each column in the Where tab is used for the Delete database operation:

Field: Offers a list of database table fields that are available in the user-specified database. The user will select the database fields being compared to Device data, as part of each filter criterion.

Tag Name: For a Delete operation, indicates the Productivity3000 database Tag Name of the data being supplied by the Device. Data in this tag will be compared to the database field specified in the Field column.

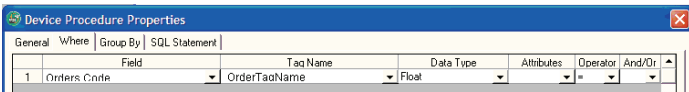
Data Type: Specifies the data-type of the Device information, which is expected to match the data-type of the database table field selected in the Field column.

Attributes: If the Data Type column is set to “Binary,” then this field lists a choice of bit positions. Otherwise, if the Data Type column is set to “ASCII,” then this field lists a choice of character lengths.

Operator: Allows the user to specify the mathematical operator that DataWorx will use to compare the Device data to the information in the database table field. The options are: = (Equal To), > (Greater Than), >= (Greater Than or Equal To), < (Less Than), <= (Less Than or Equal To) and <> (Not Equal To).

And/Or: When there are multiple filter criteria, it allows the user to specify what combination of the user-defined criteria must be met in order to delete a database entry based on the Device data. The available options are “And” and “Or.”

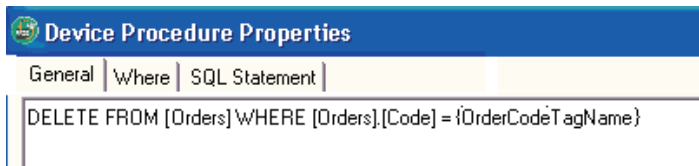
In the example below, one filter criterion has been created for the new Delete Device Procedure.



- In this case, the purpose of the Device Procedure is to delete orders that have a specific order code.
- The new Delete Device Procedure will compare the contents of the Productivity3000 Tag Name to the CODE field in the ORDERS database table.
- Since the Operator is set to “=,” then the Device Procedure will delete only those entries from the ORDERS table where the CODE field equals the Tag Name value .

SQL Statement Tab

The user may use the SQL Statement tab to review the Delete database operation. This tab presents the delete SQL query statement that DataWorx has created based on the user-specified settings made so far in the “General” and “Where” tabs.



Device Procedure Properties

General | Where | SQL Statement |

```
DELETE FROM [Orders] WHERE [Orders].[Code] = {OrderCodeTagName}
```

8.2.3 Database Operation - Update

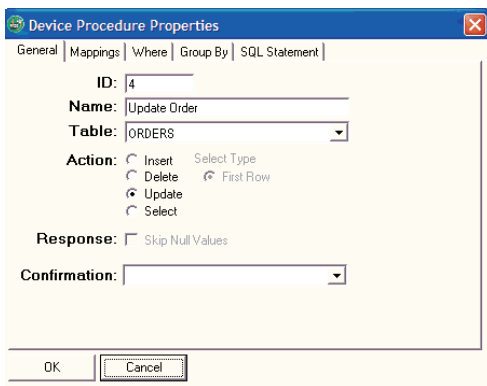
The Update operation allows a database table to be updated based on data sent by the Device.

General Tab

To create a Device Procedure that will perform an Update database operation:

- Provide the Device Procedure with a unique integer ID.
- Enter a meaningful **Name** (optional).
- Specify the **Table** whose entries will be updated.
- Set the **Action** to be Update.
- Select a 32-bit Signed Integer tags for writing a **Confirmation**. Refer to 8.2.5 for details.

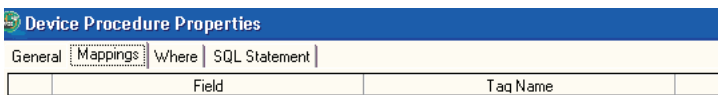
In the example below, the DataWorx Device Procedure will update information in the ORDERS table, has a unique ID of 4, has the meaningful Name “Update Order” and has its Action set to Update.



Mappings Tab

In the Mappings tab, the user will map the Device tags to the database table fields that will be updated by the Update operation.

Initially, the fields in the Mappings tab for the new Update Device Procedure will be empty. The user must specify the information in each column and add a row for each database table field that will be updated based on the Device tag.



Device Procedure Properties			
General	Mappings	Where	SQL Statement
	Field		Tag Name

Below is a description of how each column in the Mappings tab is used for the Update database operation:

Field: Offers a list of database table fields that are available in the user-specified database. The user must select the database table field that will be updated.

Tag Name: For an Update operation, indicates the Productivity3000 Tag Name of the data being supplied by the Device. Data in this Tag Name will replace the contents of the database table field specified in the Field column.

Type: Specifies the data type of the Device information, which is expected to match the data type of the database table field selected in the Field column.

Attributes: If the Type column is set to “Binary,” then this field lists a choice of bit positions. Otherwise, if the Type column is set to “ASCII,” then this field lists a choice of character lengths.

In the example below, one mapping to a database table field has been created for the new Update Device Procedure.

- In this case, the purpose of the Device Procedure is to update the status of an order.
- The value in the Productivity3000 Tag Name, the latest new order status, will replace the contents of the STATUS field in the ORDERS table.

Device Procedure Properties			
General	Mappings	Where	SQL Statement
		Field	Tag Name

Where Tab

In the Where tab, the user will specify filter criteria for the Update operation based on the Device data, so that only specific entries in the database table will be updated.

Initially, the fields in the Where tab for the new Update Device Procedure will be empty. The user may add a row for each filter criterion that will apply, based on the data sent by the Device.



**** WARNING **** While filter criteria are optional, if **NO** filter criteria are specified in the Where tab for the Update operation, then when the Device Procedure runs, it will Update the Mappings field for ALL entries in the database table chosen in the General tab.

Device Procedure Properties						
General	Mappings	Where	SQL Statement			
	Field	Tag Name	Data Type	Attributes	Operator	And/Or
1						

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Below is a description of how each column in the Where tab is used for the Update database operation:

Field: Offers a list of database table fields that are available in the user-specified database. The user will select the database fields being compared to Device data, as part of each filter criterion.

Tag Name: For an Update operation, it indicates the Productivity3000 Tag Name of the data being supplied by the Device. Data in this Tag Name will be compared to the database field specified in the Field column.

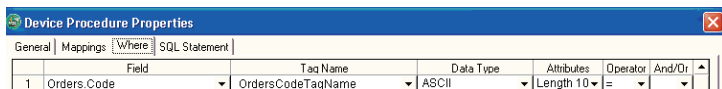
Data Type: Specifies the data-type of the Device information, which is expected to match the data-type of the database table field selected in the Field column.

Attributes: If the Data Type column is set to “Binary,” then this field lists a choice of bit positions. Otherwise, if the Data Type column is set to “ASCII,” then this field lists a choice of character lengths.

Operator: Allows the user to specify the mathematical operator that DataWorx will use to compare the Device data to the information in the database table field. The options are: = (Equal To), > (Greater Than), >= (Greater Than or Equal To), < (Less Than), <= (Less Than or Equal To) and <> (Not Equal To).

And/Or: When there are multiple filter criteria, it allows the user to specify what combination of the user-defined criteria must be met in order to update a database entry based on the Device data. The available options are “And” and “Or.”

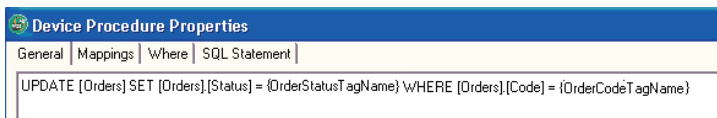
In the example below, one filter criterion has been created for the new Update Device Procedure.



- In this case, the purpose of the Device Procedure is to update the status of an order.
- The new Update Device Procedure will compare the contents of the Productivity3000 Tag Name to the CODE field in the ORDERS database table.
- Since the Operator is set to “=,” then the Device Procedure will update only those entries in the ORDERS table where the CODE field equals the value of the Productivity3000 Tag Name.

SQL Statement Tab

The user may use the SQL Statement tab to review the Update database operation. This tab presents the Update SQL query statement that DataWorx has created based on the user-specified settings made so far in the “General,” “Mappings” and “Where” tabs.



8.2.4 Database Operation - Select

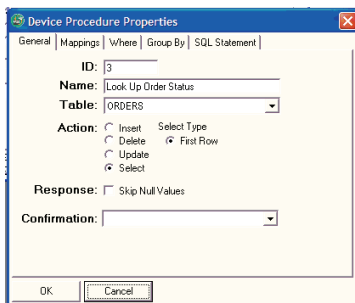
The Select operation allows data from a database table to be communicated back to the Device, based on a request from the Device.

General Tab

To create a Device Procedure that will perform a Select database operation:

- Provide the Device Procedure with a unique integer **ID**.
- Provide a meaningful **Name** (optional).
- Specify the **Table** whose data the Device needs to retrieve.
- Set the **Action** to be Select. In this case, the Select Type option button is automatically set to “First Row,” indicating that DataWorx will retrieve only data found in the first row in the database that satisfies the user-specified filter criteria.
- Select a 32-bit Signed Integer tags for writing a **Confirmation**. Refer to 8.2.5 for details.
- If checked, the **Skip Null Values** check box indicates that DataWorx will not write null values found in the database fields back to a user-specified Tag.

In the example below, the DataWorx Device Procedure will select information from a row in the ORDERS table, has a unique ID of 3, has the meaningful Alias “Look Up Order Status,” and has its Action set to Select.

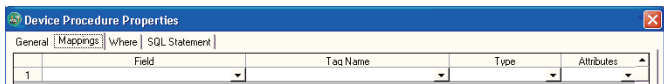


Next, click the “*Mappings*” tab.

Mappings Tab

In the Mappings tab, the user will map the appropriate database table fields to the Device Tag for the Select operation.

Initially, the fields in the Mappings tab for the new Select Device Procedure will be empty. The user must specify the information in each column and add a row for each database table field whose contents will be retrieved and written back to a user-specified Device Tag.



Below is a description of how each column in the Mappings tab is used for the Select database operation:

Field: Offers a list of database table fields that are available in the user-specified database. The user must select the database table field whose data will be retrieved.

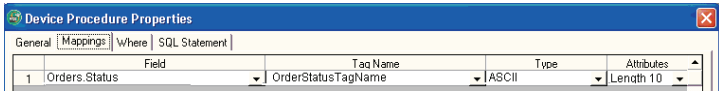
Tag Name: For a Select operation, indicates the Productivity3000 Tag Name to which the retrieved database data will be written. Any pre-existing data in this Tag Name will be replaced with the contents of the database table field specified in the Field column. Recall that for a Select operation, the Response type is automatically set to Direct. Therefore, the user will directly enter the desired Productivity3000 Tag Name into the Tag Name field in the Mappings tab.

Type: Specifies the data type of the Device information, which is expected to match the data type of the database table field selected in the Field column.

Attributes: If the Type column is set to "Binary," then this field lists a choice of bit positions. Otherwise, if the Type column is set to "ASCII," then this field lists a choice of character lengths.

In the example below, one mapping to a database table field has been created for the new Select Device Procedure.

- In this case, the purpose of the Device Procedure is to retrieve the status of an order from the database.
- The value in the Productivity3000 Tag Name will be replaced with the contents of the STATUS field in the ORDERS table.



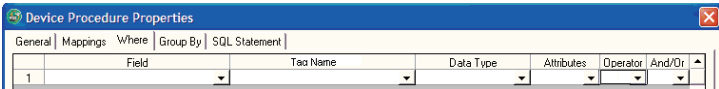
Where Tab

In the Where tab, the user will specify filter criteria for the Select operation based on the Device data, so that only data from a specific entry in the database table will be retrieved.

Initially, the fields in the Where tab for the new Select Device Procedure will be empty. The user may add a row for each filter criterion that will apply, based on the data sent by the Device.



**** WARNING **** While filter criteria are optional, if **NO filter criteria are specified in the Where tab for the Select operation, then when the Device Procedure runs it will merely retrieve data from the first record in database table chosen in the General tab.**



Below is a description of how each column in the Where tab is used for the Select database operation:

Field: Offers a list of database table fields that are available in the user-specified database. The user will select the database fields being compared to Device data, as part of each filter criterion.

Tag Name: For a Select operation, indicates the Productivity3000 Tag Name of the data being supplied by the Device. Data in this Tag will be compared to the database table field specified in the Field column.

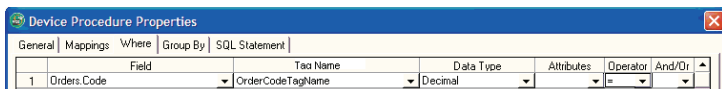
Data Type: Specifies the data-type of the Device information, which is expected to match the data-type of the database table field selected in the Field column.

Attributes: If the Data Type column is set to “Binary,” then this field lists a choice of bit positions. Otherwise, if the Data Type column is set to “ASCII,” then this field lists a choice of character lengths.

Operator: Allows the user to specify the mathematical operator that DataWorx will use to compare the Device data to the information in the database table field. The options are: = (Equal To), > (Greater Than), >= (Greater Than or Equal To), < (Less Than), <= (Less Than or Equal To) and <> (Not Equal To).

And/Or: When there are multiple filter criteria, it allows the user to specify what combination of the user-defined criteria must be met in order to retrieve data from the database table entry based on the Device data. The available options are “And” and “Or.”

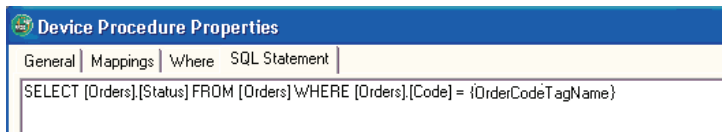
In the example below, one filter criterion has been created for the new Select Device Procedure.



- In this case, the purpose of the Device Procedure is to retrieve the status of an order that has a specific order code.
- The new Select Device Procedure will compare the contents of the Productivity3000 Tag Name to the CODE field in the ORDERS database table.
- Since the Operator is set to “=,” then the Device Procedure will retrieve only the entry in the ORDERS table where the CODE field equals the value of the Productivity3000 Tag Name.

SQL Statement Tab

The user may use the SQL Statement tab to review the Select database operation. This tab presents the Select SQL query statement that DataWorx has created based on the user-specified settings made so far in the “General,” “Mappings” and “Where” tabs.



8.2.5 Procedure Confirmation

The confirmation operation could send one of two types of results: A non-negative number for successful execution and a negative number when the procedure produces an error. The value “-1” is the recommended default value for the confirmation tags because it does not refer to any errors.

If the procedure executed successfully, the confirmation operation will send a non-negative number to the specified 32-bit integer tag. This non-negative number is the number of records affected:

Select: The number of records returned.

Insert: The number of new records created.

Delete: The number of records deleted.

Update: The number of existing records that were modified.

If the procedure produces an error, the confirmation number will be a pre-defined negative number. Some of the more likely errors are listed below:

-2146824564 Data value cannot be converted for reasons other than sign mismatch or data overflow. For example, conversion would have truncated data.

-2146824563 Data value cannot be set or retrieved because the field data type was unknown, or the provider had insufficient resources to perform the operation.

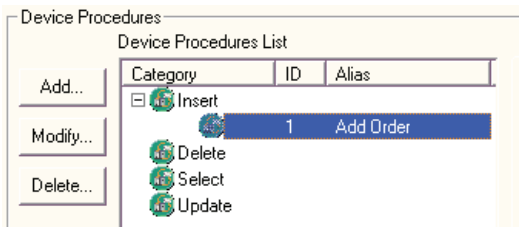
-2146824562 Record does not contain this field.

-2146824567 Data value is too large to be represented by the field data type.

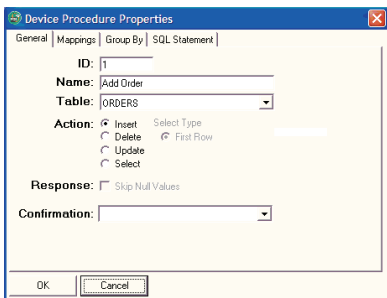
- 2146824569 Data value conflicts with the integrity constraints of the field.
- 2146824554 Operation cannot be performed. Provider cannot obtain enough storage space.
- 2146824568 Insufficient permission prevents writing to the field.
- 2146824566 Data value conflicts with the data type or constraints of the field.
- 2146824565 Conversion failed because the data value was signed and the field data type used by the provider was unsigned.
- 2147217900 The statement contains an unknown field.

8.3 Modifying a Device Procedure

To modify a Device Procedure, select it from the Device Procedures List in the Device Configuration window, and click “Modify.”



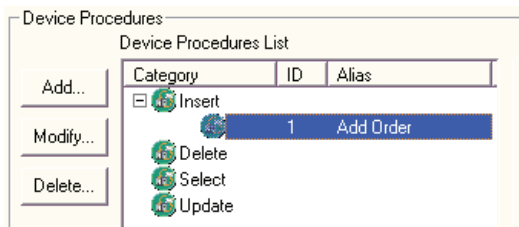
The Device Procedure Properties window will open and display the Device Procedure’s settings.



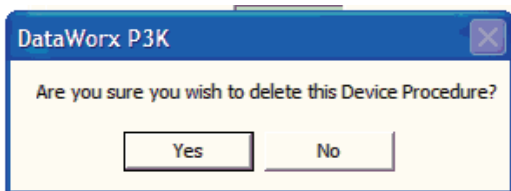
Once the necessary edits have been made in tabs of the Device Procedure Properties window, either click "OK" to save the changes to the Device Procedure, or click "Cancel" to discard the changes to the Device Procedure.

8.4 Deleting a Device Procedure

To delete a Device Procedure, select it from the Device Procedures List in the Device Configuration window, and click "Delete."



A dialog box will open, asking for confirmation.



Click "Yes" to confirm that the selected Device Procedure should be deleted. Otherwise, click "No," and the selected Device Procedure will remain in the Device Procedures List.

9.0 Troubleshooting and Miscellaneous Items

Problem	Solutions
Cannot connect to the Server	<ul style="list-style-type: none"> • Double check the Server address. It may be entered incorrectly. • Verify that both the Server and Monitor computers are online and can access network facilities such as e-mail and Internet. <ul style="list-style-type: none"> • Ensure that cables are connected • Verify that computers can access the Internet by going to a test web site such as www.yahoo.com
Device is sending data, but DataWorx is not receiving updates	<ul style="list-style-type: none"> • Verify that the Server is in <i>Listening</i> mode. You can check this by noting the status. It should state "Listening to Devices." If not listening, click the <i>Start Listening</i> button.
Server is running, but not receiving data from device	<ul style="list-style-type: none"> • Verify that the Server is running, and not paused. <ul style="list-style-type: none"> • If the Server is paused, press the <i>Run</i> button • If the Server is running, verify that the device is correctly configured to send the right data to the Server
Data files contain error messages stating an incorrect format	<ul style="list-style-type: none"> • Verify that the device's configured fields match the Server's configuration by starting up the Monitor and going to the Server configuration.

Please visit us at www.bizwaredirect.com for the latest updates in troubleshooting tips.