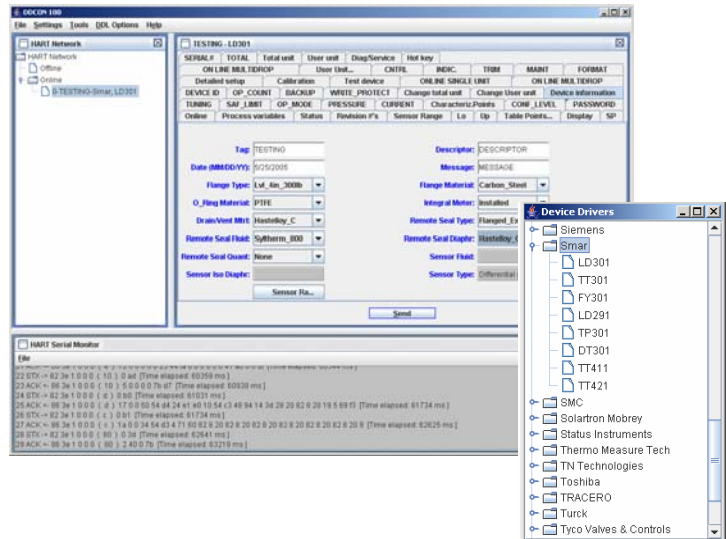


Windows Configurator for HART - DDL Technology

DDCON 100

Getting Started Guide

HART®
Fieldbus
Profibus
Intrinsic Safety
Configuration Tools
Semiconductors
Training
Custom Design



Congratulations!

You have purchased one of the most robust and versatile HART configuration packages on the market, DDCON 100. This getting started guide will provide you with detailed instructions on the setup and initialization of DDCON 100 as well as cover the basics of navigating through the software. Thank you for purchasing Smar!

DDCON 100 Features

- Turns your PC or laptop into a universal HART device configuration platform
- Includes all software and hardware needed to quickly and easily enable communication and configuration of HART devices via your PC or laptop
- Based on Device Description (DD) technology to fully support HART devices from multiple manufacturers
- Intuitive, easy to use graphical interface
- Supports over 100 HART devices out of the box
- New devices can be downloaded via www.smarresearch.com and then easily added or removed directly within the software
- Supports multidrop operations and off-line configurations that can be saved for later use
- Bus monitoring via the integrated HART serial monitor software
- Supports Windows 2000, XP machines with USB 1.0 or above
- Interface is system powered: no external power supply required
- "Smart Interface" allows firmware downloads via USB port for future upgrades
- No hardkey required, integrated directly into the HART interface

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technology center at:
www.smarresearch.com

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1. General Overview

1.1 General Principles

DDCON 100 is a comprehensive communication and configuration tool package compatible with all HART devices. The DDCON 100 package enables the user to use one package to configure their entire HART network regardless of the device model or manufacturer of the instruments they may have in their plant. This is accomplished with the use of DDL. Device Description Language (DDL) is the recently ratified IEC 61804-2 standard specification that enables HART device manufacturers to create uniform driver interfaces for their devices. This allows access to any HART device based upon their device description (DD) file provided by the device manufacturer. DDCON 100 takes advantage of this standard by integrating DDL technology into its software. Based upon DDL files, DDCON 100 is able to work with devices already on the market as well as with the many devices to be released in the future.

Included in the package is the DDCON 100 software CD and the DDCON 100 HART interface. The DDCON 100 software CD includes all necessary files for installation of DDCON 100 on your Windows 2000/XP PC or laptop. Also included on the disk is the HART interface USB drivers and the device files for over 100 HART devices. In the following sections, the DDCON 100 hardware and software will be briefly discussed along with the installation and operating procedures.



Fig. 1 – DDCON 100 Package Contents

1.2 Hardware Overview

The Smar Research DDCON 100 HART USB interface provides a complete physical link between any HART compliant field instrument and a Windows 2000/XP PC with USB ports. The interface is fully self contained and requires no external power supply. Combined with the DDCON 100 software, the DDCON 100 interface enables communication and configuration of any HART compliant device from anywhere on the HART network via your PC. The DDCON 100 interface connects to your PC or laptop via the integrated USB connector at one end, and to the HART network via its pinch connector cable at the other end. Connection and driver installation details are discussed in the following sections.

1.3 Software Overview

The DDCON 100 software enables the communication and configuration of HART devices via the DDCON 100 USB interface from any Windows 2000/XP compatible PC. The software is based upon DDL technology, which allows it to be compatible with hundreds of devices on the market. DDCON 100 supports many useful features such as DD defined multidrop operation, polling by tag or address, off-line configuration and HART serial monitoring to name a few. Because DDCON 100 uses the device description files which are created by the device manufacturer, all parameters, commands, and menus are supported just as the manufacturer intended. Installation and use of the DDCON 100 software is discussed in the following sections.

2. Setup & Installation

2.1 Hardware Setup & Installation

Connecting the DDCON 100 interface to your computer:

Connect the USB connector of the DDCON 100 interface to an available USB port of your computer. If this is the first time you have connected the DDCON 100 interface to your computer, the USB Drivers must be installed. Please read *Installing the Windows Driver* section below. Otherwise, the DDCON 100 interface is now ready to communicate. Please refer to *Connecting to a HART Network* for further details.

NOTE:

Connection of the DDCON 100 interface through a USB hub is not recommended, and proper functionality cannot be guaranteed. If using a USB hub is required, it must be a powered hub.

Installing the Windows USB Driver:

The first time the DDCON 100 is connected on your Windows computer, the Windows USB driver must be installed. To properly install the USB drivers, the Smar Research Product CD that was included with DDCON 100 is required. Please follow the instructions below:

1. After connecting the DDCON 100 interface to your computer, a Found New Hardware window will pop-up followed by the Found New Hardware Wizard. Click “Next” to continue.

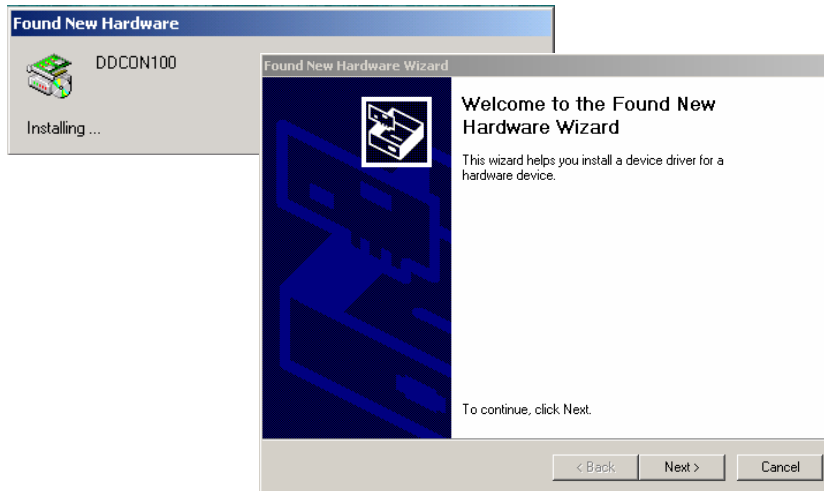


Fig. 2 – Found New Hardware Windows

2. In the following window, make sure the “Search for a suitable driver for my device” button is selected and click “Next”.



Fig. 3 – Install Hardware Device Drivers Window

3. In the next window, select the “Specify a Location” box and click “Next”. This will open another window which prompts the user to enter the location of the driver files. Click the browse button and browse to the CD-ROM drive containing the Smar Research Product CD. Locate the “DDCON100 Drivers” folder on the Smar Research Product CD and click “OK”. For Example, if the CD-ROM drive letter containing the Smar Research Product CD is D, browse to the following directory: D:\DDCON100 Drivers\

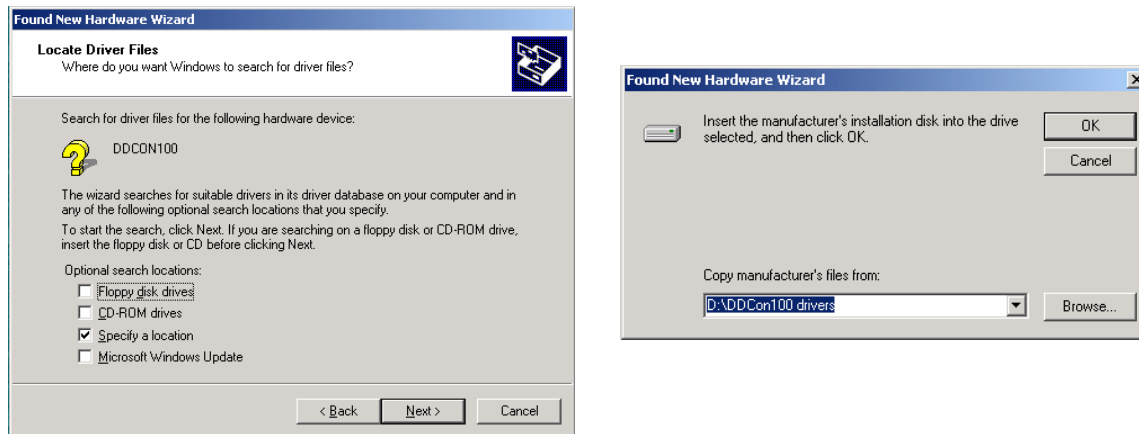


Fig. 4 – Locate Driver Files Windows

4. A new window should indicate that the wizard has found a driver for the DDCON100. Click “Next”. This completes the Found New Hardware Wizard. Click “Finish” to complete the installation. At this point the DDCON 100 interface is installed and can be used with the DDCON 100 software. For setup and installation procedures of the DDCON 100 software, please refer to the *Software Setup & Installation* section.

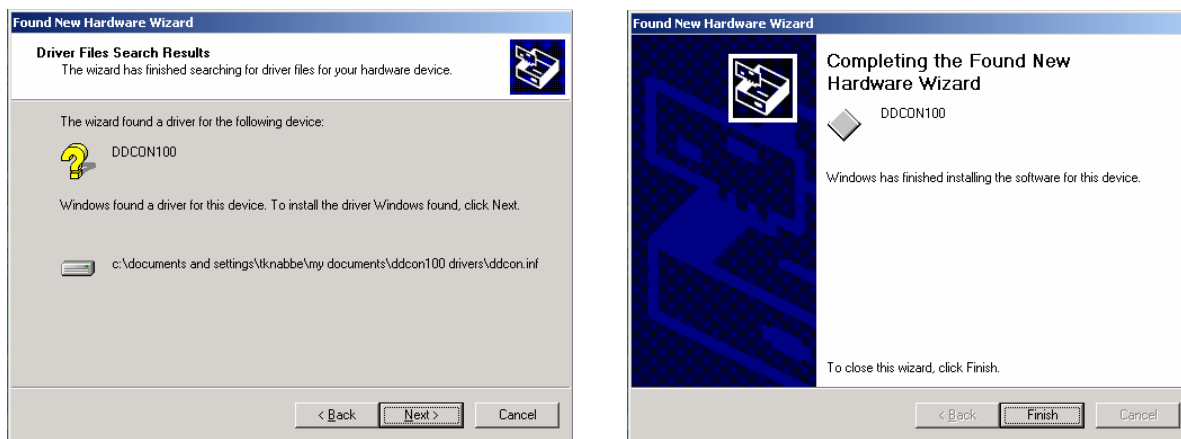


Fig. 5 – Driver Files Found Windows

2.2 Software Setup & Installation

Follow the steps below to install DDCON 100 onto your PC or laptop:

1. Insert the DDCON 100 Product CD into your CD-ROM drive.
2. The DDCON 100 Setup window should automatically open.
3. Select *Install DDCON100* and follow the on screen direction to complete installation.

If the CD does not autorun, browse to your CD-ROM directory and double click the file named autorun.exe.

2.3 Connecting to a HART Network

Once the DDCON 100 software and hardware interface have been installed on your PC, DDCON 100 can be connected to your HART network as shown below. The pinch connectors of the interface should be connected across the positive and negative leads of the 4-20mA HART wiring. The DDCON 100 interface can be connected anywhere along the HART network. This enables DDCON 100 to configure devices on the network locally and remotely. Proper communication requires a minimum load of 250 Ohms on the line. In cases where this condition is not met, a 250 Ohm resistor can be put in series with the HART line.

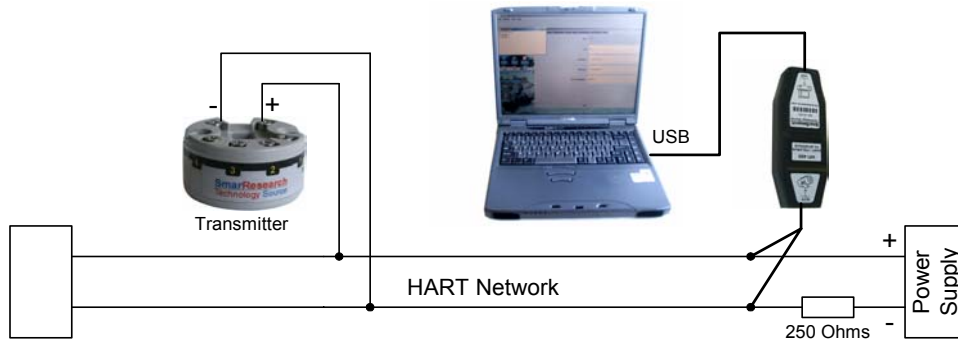


Fig. 6 – Typical DDCON 100 HART Network Connection

3. Getting Started

3.1 Opening the DDCON 100 Software

Once the DDCON 100 software and hardware interface have been installed and connected to a HART network, you are ready to communicate with and configure your HART devices. To start the DDCON 100 software follow the instructions below:

From the Windows Start menu:

1. Select Programs
2. Select DDCON 100 folder
3. Click on DDCON 100

From the Windows desktop:

1. Double click the DDCON 100 icon

If you do not have the DDCON 100 hardware interface connected to the PC, you will see the following message:

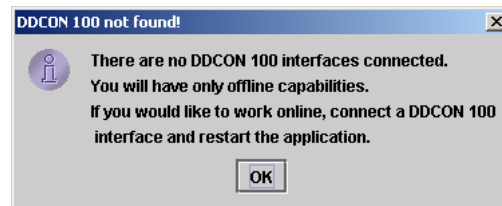


Fig. 7 – DDCON 100 Interface Not Found Message

To continue working in the program with only offline capabilities, click the OK button.

To work with online capabilities, click the OK button, exit the DDCON 100 software, properly attach the DDCON 100 hardware interface, insure the USB drivers have been installed and re-open the DDCON 100 software following the instructions above.

If you still get this error message after you have properly installed your DDCON 100 interface, contact Smar Research for further assistance.

3.2 Navigating the DDCON 100 Software Interface

The startup screen of the DDCON 100 software includes three main sections: the DDCON 100 Main Menu, the HART Network Window, and the HART Serial Monitor Window. The layout of the startup screen can be seen in the figure below.

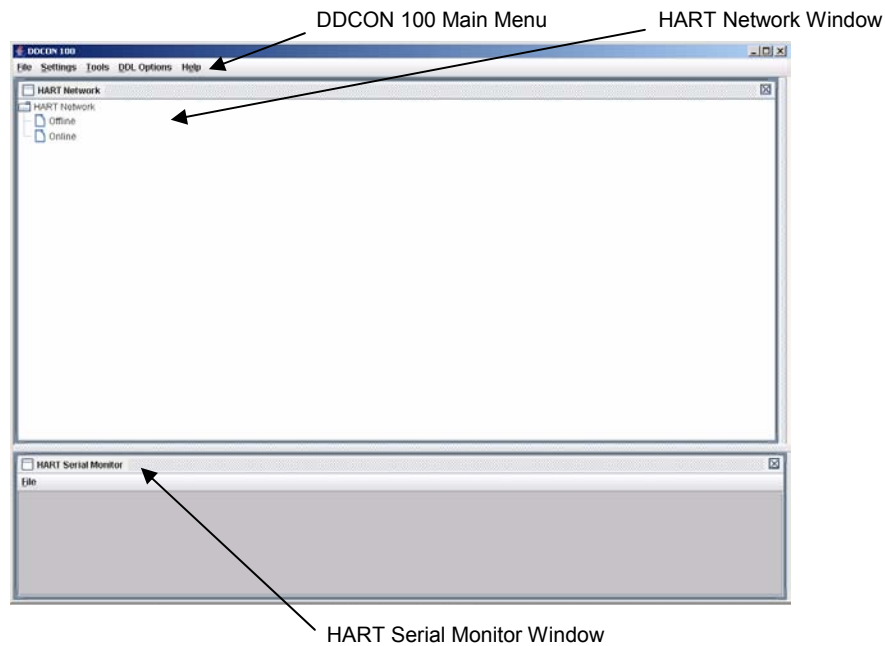


Fig. 8 – DDCON 100 Startup Screen

DDCON 100 Main Menu

The DDCON 100 Main Menu consists of 5 sub menus: File, Settings, Tools, DDL Options, and Help. These menus provide access to the basic DDCON 100 functions. Below is the hierarchical structure of the various sub menus.

File Menu

- New Offline Device
- Open Offline Device
- Close Device
- Save
- Save As
- Polling Window
- HART Network Window
- Exit

Settings Menu

- Communication Port
- Language
- Preferences

DDL Options

- Add Device Drivers
- Remove Device Drivers
- List Device Drivers

Tools Menu

- HART Serial Monitor
- HART Messaging

Help

- About

HART Network Window

This window displays a hierarchical view of open online and offline devices. By right clicking “Offline” you may choose to open an offline device or create a new offline device. By right clicking “Online” you may select to open the polling window. This will allow you to poll for devices on the HART network. For more information on polling, see the *Polling For Devices* section of this manual. For more information on offline devices, see the *Offline Devices* section of this manual.

HART Serial Monitor Window

The HART Serial Monitor window monitors the send and receive traffic on the HART network. Each send and acknowledge message is displayed in sequence and may be shown in decimal or hexadecimal format. This window is an excellent tool for monitoring exactly what the HART network is doing.

3.3 Polling for Devices

DDCON 100 can locate HART devices via the polling window. The polling window can be opened various ways. To open the polling window via the Main Menu, select "File" -> "Polling Window". To open the polling window via the HART Network window, right click "Online" in the HART Network and select "Polling Window".

As seen below, the polling window allows you the choice of polling by device address, address range (0-15) or by tag. The details of each method are below. After DDCON 100 polls the network, all found devices will be listed under the Online folder in the HART Network. To open a device, simply double click it. Details on navigating the device parameters are discussed in the *Navigating Device Parameters* section of this document.

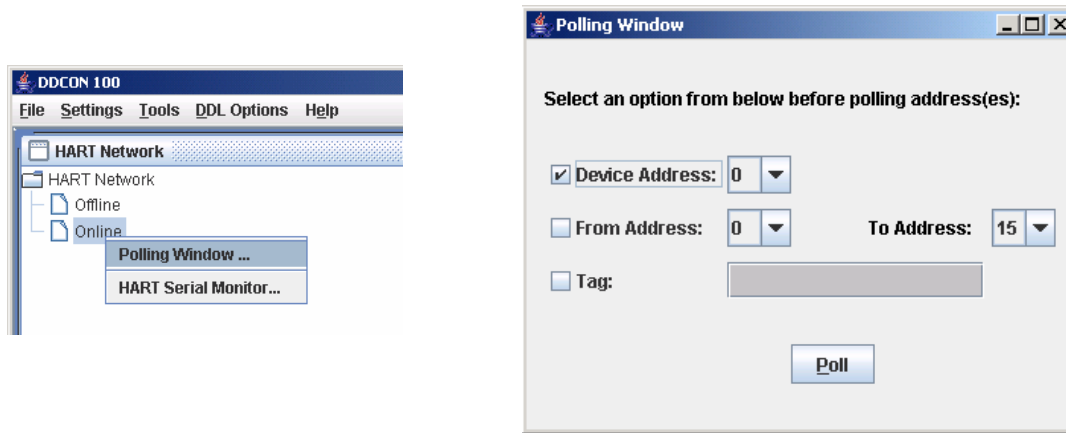


Fig. 9 – Opening the Polling Window

3.3.1 Polling for a Single Device

To poll for a single online device by address:

1. Check the "Device Address" box in the polling window
2. Choose the address of the device by selecting it from the option box located next to the "Device Address" checkbox
3. Click the "Poll" button

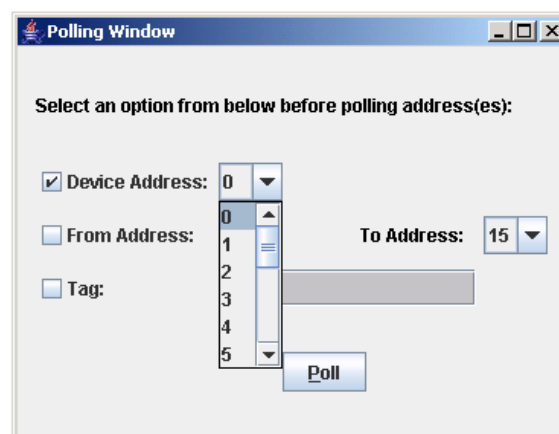


Fig. 10 – Polling for a Single Device

The device, if found, will be added to the "Online" directory tree of HART Network window.

3.3.2 Polling for Multiple Devices

To poll for multiple devices:

1. Check the “From Addresses” box in the polling window.
2. Select the start and end address range for your search from the corresponding drop down boxes located next to the “From Addresses” label.
3. Click the “Poll” button.

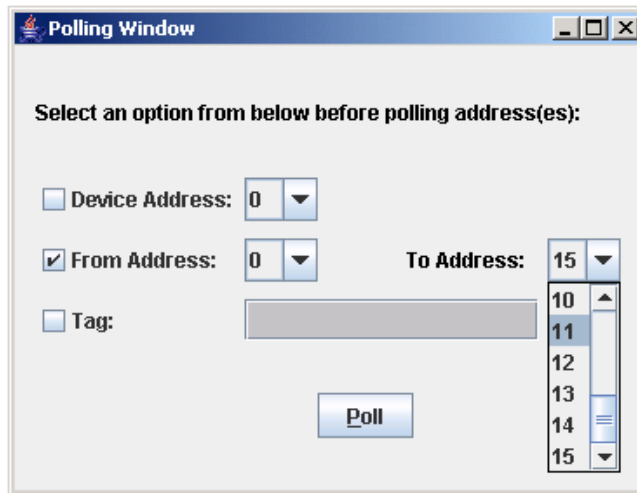


Fig. 11 – Polling for Multiple Devices

If any devices are found within the address range specified, they will all be added to the “Online” directory tree of the HART Network window

3.3.3 Polling by Tag

To poll for an online device by its Tag description:

1. Check the “Tag” box in the polling window.
2. Enter the Tag of the device you are looking for in the field located to the right of the “Tag” box.
3. Click the “Poll” button.

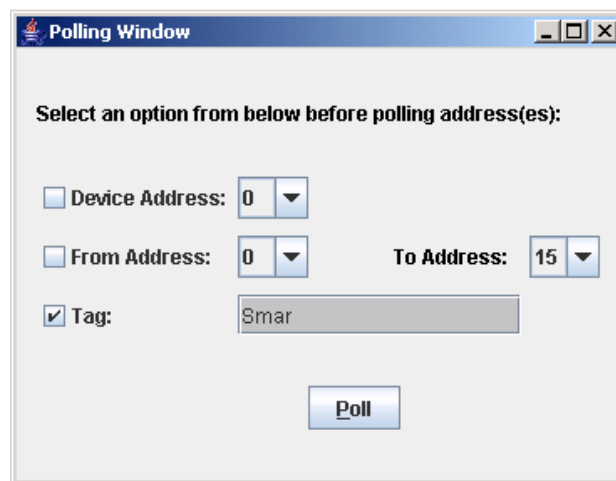


Fig. 12 – Polling by Tag

The device, if found, will be added to the “Online” directory tree of HART Network window.

3.4 Navigating Device Parameters

Devices listed in the HART Network window can be opened by double clicking them or by right clicking the device and selecting "Open Device". Once they are double clicked a Device window will load to the right of the HART Network window. The contents of this device window will vary dependant on the device manufacturer and model. However, the general layout of a device window is common to all devices. Below is an example of a typical device window.

The device tag and title is listed at the top of the window. This identifies the device and helps keep track of windows when multiple devices are listed in the HART network directory tree. Below this is a number of tabs. These tabs are each associated with a specific device panel. When a device tab is selected, the associated device variables and parameter fields will appear below the tab. Each panel contains the variables, functions and parameters as specified in the manufacturer device description. Each field has a label and a parameter. Editable fields are indicated by a white background. Non editable fields are grayed out. Drop down lists are indicated by a triangle. To send or save changes to the fields of a particular panel, select the Send/Save button at the bottom of the panel.

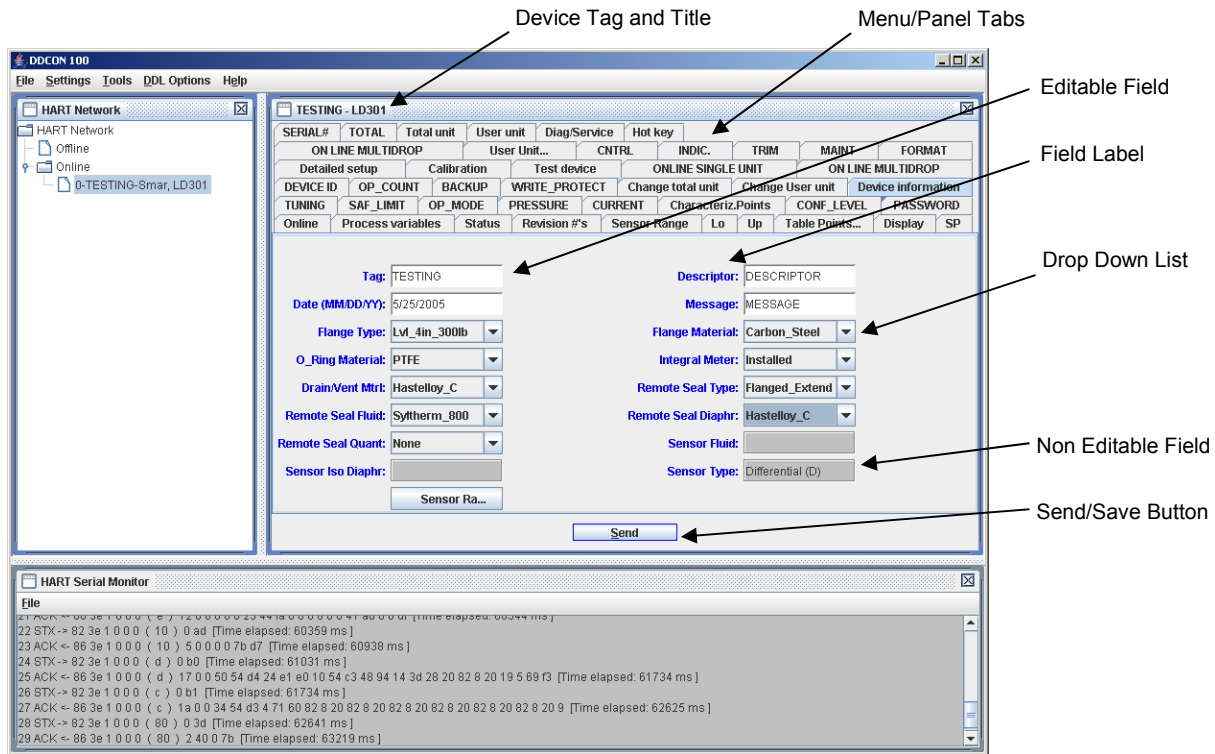


Fig. 13 – Typical Device Window

3.5 DDL Options

DDCON 100 is based on the Device Description Language (DDL). This language was created to offer a standardized method of detailing all the variables, commands and parameters of a specific device as well as to describe the basic menu structure and layout that the end user should see when communicating with a manufacturers device. DDL allows DDCON 100 to be compatible with hundreds of HART devices.

DDCON 100 is pre-loaded with support for over 100 devices. Supported device drivers can be listed, added, and removed by following the simple procedures in the following sections. All these options are available via the main menu “DDL Options”.

Device drivers which are not currently supported can be requested for addition into the DDCON 100 data-base by contacting Smar Research.

3.5.1 Listing Device Drivers

A list of all the currently installed and supported device drivers can be viewed from within DDCON 100. The list is categorized by device manufacturer. This list is indicative only of the devices installed on your computer. Additional devices may be available for download via the DDCON 100 product page at www.smarresearch.com or on your DDCON 100 install CD. To view a list of currently installed and supported devices, follow this procedure:

1. Select “DDL Options” from the DDCON 100 Main Menu.
2. Select “List Device Drivers” from the drop down list.
3. Navigate the Device Drivers window and double click the manufacturer folders to view the installed devices for each manufacturer.

NOTE:

The Device Drivers window only displays installed devices. To add or remove devices, see sections 3.5.2 and 3.5.3 respectively.

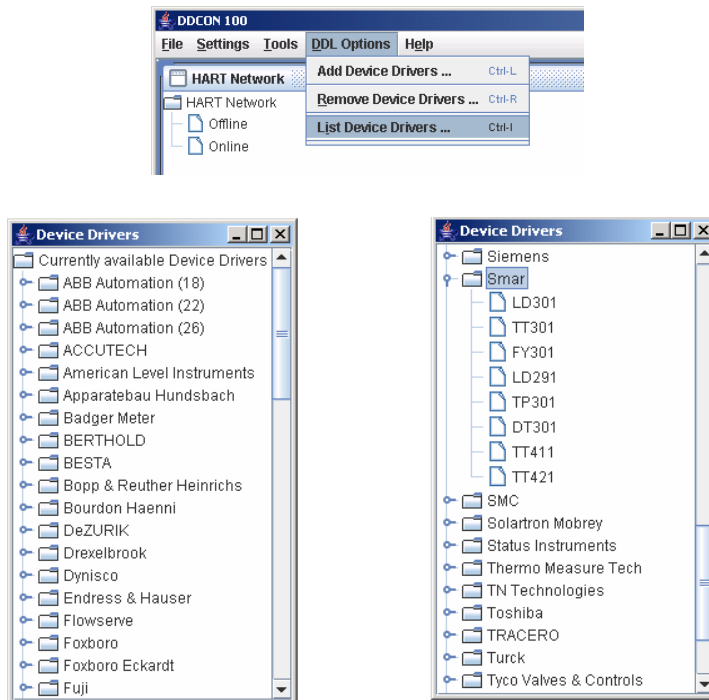


Fig. 14 – Device Drivers List

3.5.2 Adding Device Drivers

While DDCON 100 is available with over 100 DDL devices on the installation CD, there may be additional devices you wish to add. The full list of available device drivers is maintained at www.smarresearch.com. Here device drivers can easily be downloaded and saved to your hard drive for integration into DDCON 100. Each device driver has its own zip file. This file contains the device information for that particular device. To add a device driver to DDCON 100, follow the procedure below:

1. Select “DDL Options” from the DDCON 100 Main Menu.
2. Select “Add Device Drivers” from the drop down list.
3. Browse to the folder where the device you wish to integrate is located. (On your local hard drive downloaded via www.smarresearch.com or on the DDCON 100 Installation CD “DeviceDrivers” folder)
4. Select “Open”. At this time, you will be shown all the available device drivers contained in the selected folder.
5. Select the devices you wish to add by highlighting them (for multiple selections hold down the Shift key) and select “Add To List”. All devices listed under a specific manufacturer can easily be added at once by highlighting the manufacturer folder and selecting “Add To List”. A device in the “Add To List” may be deselected by highlighting the device and selecting the “Remove From List” button.
6. Select “Finish” to complete the addition.

The new device(s) can now be configured using DDCON 100 and will be shown in the Device Drivers list.

NOTE:

The Device Driver files follow a naming convention of “_mmddrrDEVICE.zip” where:
 mm = HART Manufacturer Code
 dd = Device Code
 rr = Hardware Revision Code

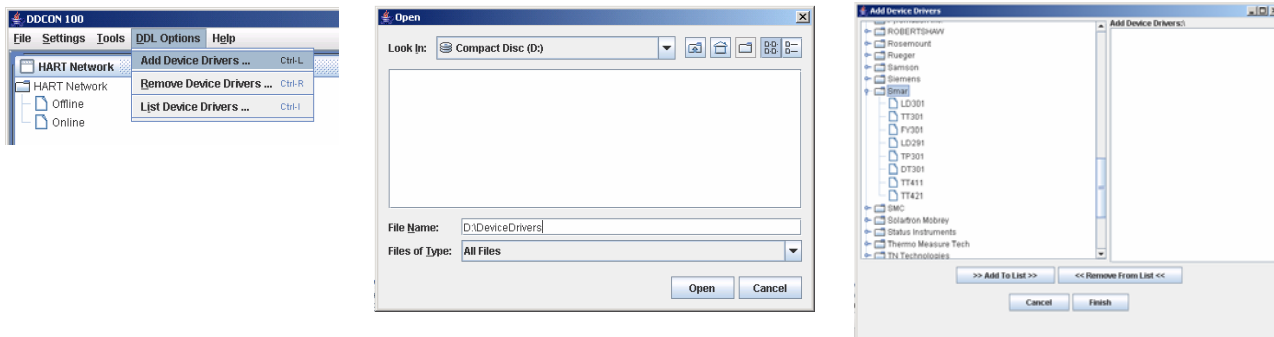


Fig. 15 – Adding a DDL Device

3.5.3 Removing Device Drivers

In some instances it may be desirable to remove device drivers from DDCON 100. Removing a device driver will disable support for that particular device and free space on your hard drive. To remove a device driver from DDCON 100, follow the procedure below:

1. Select “DDL Options” from the DDCON 100 Main Menu.
2. Select “Remove Device Drivers” from the drop down list.
3. The Remove Device Drivers window will appear. On the left side of the window is a list of installed device drivers. On the right side of the window is a list of device drivers selected to be removed. Browse the Device Drivers list for the device driver(s) you wish to remove.
4. Highlight the device driver(s) to remove and select the “Add To List” button. This will move the device to the Remove Devices List.
5. If you wish to move a device back to the available Device Drivers list, highlight the device driver from the Remove Devices List and select “Remove From List”
6. Click “Finish” to complete the operation, or click “Cancel” to cancel the remove operation.

The device drivers you selected are now removed from DDCON 100. If you wish to add a device back, see the *Adding Device Drivers* section of the manual.

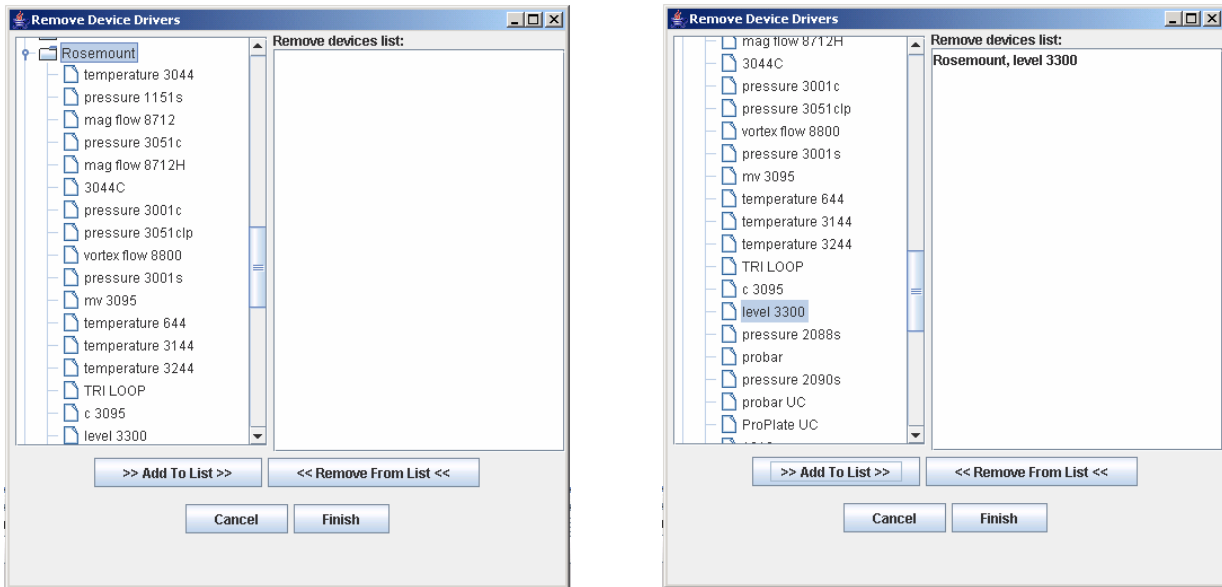


Fig. 16 – Removing a DDL Device

3.5.4 Requesting Device Drivers

When connecting to a device that is not currently loaded into DDCON 100, a message similar to the one in Fig. 17 will be displayed. The device can still be configured as a generic device, but all proprietary menus, commands and parameters will not be accessible. Receiving this message can indicate either the device driver is simply not loaded into your copy of DDCON 100, or that the device driver is not yet supported by DDCON 100. Devices which are not currently supported can be requested. Before requesting the addition of a device driver, be sure to check www.smarresearch.com for the latest updates and device driver downloads as this device driver may already be available. If the device is not listed in your device drivers list or on the www.smarresearch.com website, you may request the addition of the device by following the procedure below:

1. Copy the Manufacturer, Device Type and Revision codes as shown in the “Device not recognized” window. (see example in Fig. 17: Manufacturer = 3e, Device Type = 1, Revision = 3)
2. Send this information along with your complete contact information in an email to DDCON@smarresearch.com. Note: If possible, attach the DDL file of the device to the email.
3. A technical support agent will contact you shortly. Most requests can be accommodated within 1 week. The DDCON 100 DDL device driver files will be emailed to you and added to the Smar Research website.

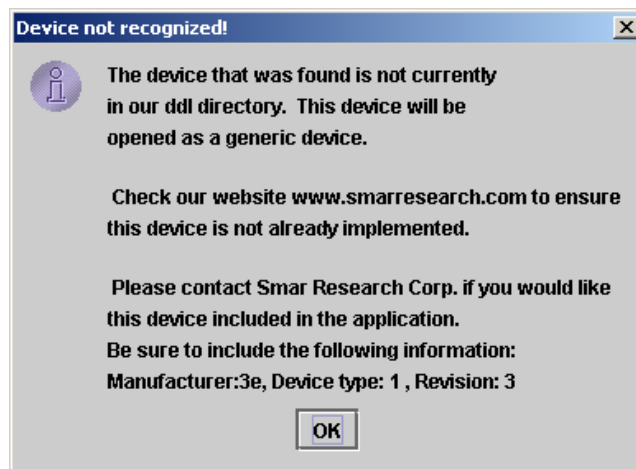


Fig. 17 – Device Not Recognized Message

3.6 Offline Devices

DDCON 100 has the ability to configure devices offline and save the configuration as a file for later use. This allows a user to setup particular parameters of a specific device while not in the field. Because these offline devices can be saved, the configurations can be loaded at a later time and downloaded to an online device. This can especially help automate cases where multiple devices use the same configuration.

Offline devices are configured in the same manner as online devices with a few key differences. Offline devices will only allow access to offline variables. These variables are defined by the manufacturer and will vary accordingly. Some devices may not have any offline variables defined by the manufacturer. In these cases, a message window will indicate this.

3.6.1 Creating an Offline Device

To create a new offline device, follow the procedure below:

1. Right click "Offline" in the HART Network window and select "New Offline Device" from the pop-up menu.
2. Select the desired device type from the New Device window. Only device drivers which are currently loaded into DDCON 100 will be available.
3. Click "OK" to create the new offline device you have chosen or "Cancel" to close the New Device window. After selecting "OK", the device will be added to the Offline directory tree of the HART Network window and the new Device window will be opened.

NOTE:

The "New Offline Device" option may also be selected via the main menu "File" -> "New Offline Device".

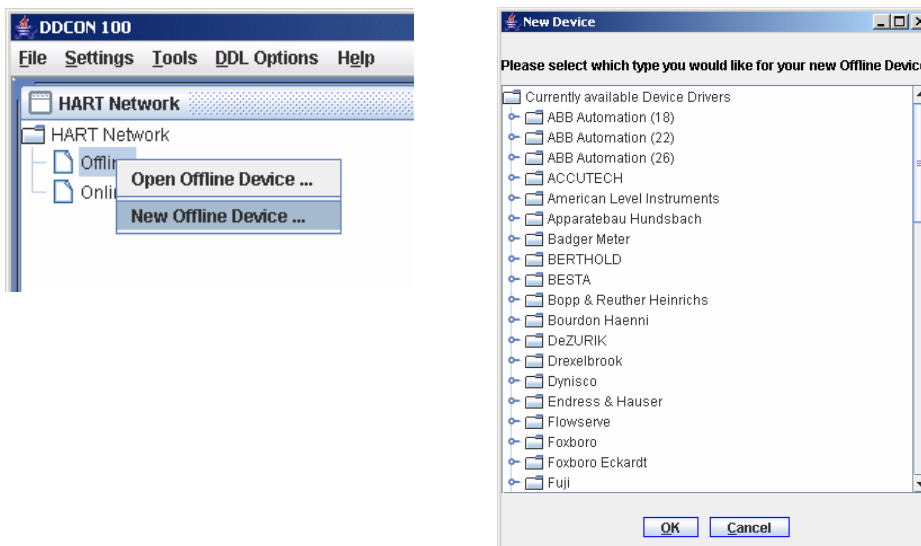


Fig. 18 – Creating an Offline Device

3.6.2 Opening an Offline Device

To open an offline device, follow this procedure:

1. Right click "Offline" in the HART Network window and select "Open Offline Device" from the options.
2. Browse to the location of the *.ddev offline device configuration you wish to open.
3. Click "Open". The device file you selected will be added to the Offline directory tree of the HART Network window and the selected device frame window will appear.

NOTE:

The "Open Offline Device" option may also be selected via the main menu "File" -> "Open Offline Device".

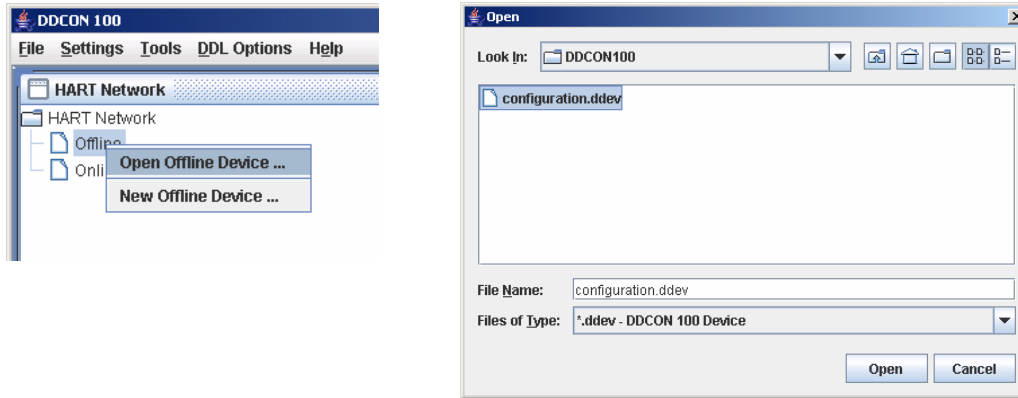


Fig. 19– Opening an Offline Device

4. Technical Information

System Requirements

Windows 2000, XP

1 USB 1.0 (or greater) port

CD-ROM drive

256 MB RAM

Aprox. 220MB of hard drive space for typical installation (varies dependant on amount installed DDL devices)

Interface Dimensions

Box Length: 3 $\frac{3}{4}$ "

Box Width: 1 $\frac{3}{8}$ "

Box Height: $\frac{3}{4}$ "

Connections

To PC: USB Type B connector

To HART Network: probe cable with 2 pinch connectors

Cable

Integrated 5' 2-wire HART cable with 2 pinch connector probes

Integrated 11" USB B Cable

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