Honeywell

MC Toolkit (MCT404)

User Manual

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About This Document

Abstract

This document describes how to use MC Toolkit product, which consists of MC Toolkit application software and FDC application software.

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References

The following list identifies all documents that may be sources of reference for material discussed in this publication.

Document Title

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Training Classes

Honeywell Automation College:

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Symbol Definitions

The following table lists those symbols used in this document to denote certain conditions.

Symbol	Definition
	CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.
	CAUTION symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	WARNING: Indicates a potentially hazardous situation, which, if not avoided, could result in serious injury or death.
	WARNING symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	WARNING, Risk of electrical shock: Potential shock hazard where HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 Vpeak, or 60 VDC may be accessible.
	ESD HAZARD: Danger of an electro-static discharge to which equipment may be sensitive. Observe precautions for handling electrostatic sensitive devices.
	Protective Earth (PE) terminal: Provided for connection of the protective earth (green or green/yellow) supply system conductor.
	Functional earth terminal: Used for non-safety purposes such as noise immunity improvement. NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national local electrical code requirements.
	Earth Ground: **Functional earth connection.** NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.
	Chassis Ground: Identifies a connection to the chassis or frame of the equipment shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.
	The Factory Mutual® Approval mark means the equipment has been rigorously tested and certified to be reliable.
	The Ex mark means the equipment complies with the requirements of the European standards that are harmonised with the 94/9/EC Directive (ATEX Directive, named after the French "ATmosphere EXplosible").

MC Toolkit (MCT404) User Manual

Acronyms and definitions

Table 1 Acronyms and Definitions

Term	Description
DD	Device Description File
DDL	Device Description Language
DE	Digitally Enhanced
Device	The hardware that is responsible for sensing the conditions present in a process and communicating this information to the Pocket PC. These conditions may include pressure, temperature. Examples of devices include the ST, STT. Device is also referred to as a Field Instrument
Download	The process of sending data from a Pocket PC to a Device
EDDL	Electronic Device Description Language
Export	Writing / saving parameters into a file
FDC	Field Device Communicator
FDM	Field Device Manager
HCF	HART Communication Foundation
Import	Reading / loading parameters from a file
MCT	Multi Communication Toolkit (MCT404) product that includes MC Toolkit application and FDC application
MCT404	Options include ruggedized version with no approvals, Intrinsically-safe version with Zone1 approvals
Modem	Honeywell HART / DE modem that implements interfaces to the HART and DE network
Offline	The condition present when the MC Toolkit is running but is **not** connected to a live *device*.
Online	The condition present when the MC Toolkit is running and is connected to a live *device*.
Parameter	A piece of information representing a single unit of data in a *device* or database
PPC	Pocket PC
Record	A Set of Configuration parameters that consists of Device Type, Bus Type, Tag ID, Manufacturer, LRV, URV, Transfer Function and other Parameters
ST	Smart Transmitter, pressure - a Honeywell Field Instrument.
STT	Smart Temperature Transmitter – a Honeywell Field Instrument
Upload	The process of sending data from a Device to a Pocket PC
XML	Extensible Markup Language. A file type that provides a format for describing structured data from any application in a standard consistent way

Contents

Tables

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1. Introduction

1.1   Overview of MC Toolkit

Purpose/Scope

This manual is intended to facilitate the use of the Honeywell MC Toolkit communications tool. It is assumed that you are skilled in the use and maintenance of process transmitters in process control, or that you are under direct supervision of others with the appropriate skills.

The MC Toolkit, with MC Toolkit Application Software and FDC Application Software, enables communication with several types of smart transmitters (pressure, temperature, etc) that are available for use in the process control industry.

The emphasis of the information in this manual is directed primarily on the features and use of the MC Toolkit in performing common maintenance tasks relating to transmitter devices, rather than on the features and installation of specific transmitter devices.

It is recommended that you should have the appropriate manuals available for specific transmitter devices.

This manual includes information of two types:

- background material that enables a skilled user to select the appropriate procedures in this manual and to apply them in the appropriate sequence, and

- detailed descriptions of the MC Toolkit regarding functions, features, and procedures for applying them

Product Description

The Honeywell Multi Communication (MC) Toolkit is a handheld communication package that enables convenient and reliable communications with smart field devices such as valves, actuators, transmitters etc. MC Toolkit is a smart solution for configuring, calibrating, monitoring, and diagnosing the devices supporting Honeywell Digitally Enhanced (DE) or HART communication protocols.

The MC Toolkit is available in high level model MCT404

MCT404

The MCT404 has following options:

- Ruggedized version: Environmentally hardened with no approvals.

- Zone 1 approvals: Intrinsically-safe version available with FM Class I, Div 1, IECEx and ATEX Zone 1 approvals.

Figure 1-1 MCT404 Ruggedized and Zone 1 Intrinsically safe models

It includes the following components:

- A PDA with integrated DE/HART modem

- Honeywell MC Toolkit application software (CD ROM)

- Honeywell FDC application software (CD ROM)

- Test leads for the electrical connection from the PDA to the field device

- Connector cables for connecting the PDA to the PC

Software components

The Honeywell MC Toolkit consists of two software applications:

- The MC Toolkit application software is used for configuring, calibrating, monitoring, and diagnosing the Honeywell Digital Enhanced (DE) devices.

- Field Device Configurator (FDC) application software is used for configuring, calibrating, monitoring, and diagnosing HART devices. FDC uses the IEC 61804-3 EDDL standard specification for providing an open solution for supporting any HART device with a registered DD file with HART Communication Foundation (HCF).

Procedural Considerations

⚠	**CAUTION! WARNING!** In some cases, the use of a field communicator with a transmitter that is connected on-line can have an adverse effect on process operations.

Before using the MC Toolkit, be certain that you know the potential consequences of each procedure, and that you use the appropriate safeguards to prevent problems. For example, if the transmitter is an element of a control loop, the loop should be placed in the manual operating mode, and alarms and interlocks ("trips") should be disabled as appropriate before beginning the procedure.

The primary factors to be considered are separated into three categories under the following three headings.

The information under the following headings is intended as background for use of the DE Procedures and HART Procedures, which are given in separate sections of this manual.

1.2   Transmitter Type and Communication Mode

The MC Toolkit can be used with various types of field transmitters, most of which can be operated in more than one mode.

- Honeywell DE transmitter operating in Smart Analog Mode

- Honeywell DE transmitter operating in Digital Enhanced (DE) Mode

- Honeywell (and other) HART transmitter operating in point-to-point (Analog w/ HART digital mode)

- Honeywell (and other) HART transmitter operating in multi-drop (HART-only digital mode)

The salient characteristics of each item listed, and the implications of each characteristic in procedures are described under Transmitter/Communications Characteristics

1.3   Type of Procedure

The MC Toolkit is designed to provide these basic functions:

- Configuration

- Calibration

- Monitoring

- Diagnostics

Depending on combinations of factors such as transmitter type, and communications mode, some procedures such as monitoring the performance of a transmitter can be straightforward and innocuous, but in some cases can also require special preparation and precautions.

1.4   Prerequisites

Special Equipment and/or Environment for Calibration

Typically, a smart transmitter delivered by a major manufacturer today is designed to provide a high degree of precision throughout its operating range, and has been calibrated to a high level of accuracy that is not easy to duplicate in your plant process areas. Moreover, the design, materials, and manufacturing process employed will ensure that the instrument will stay within calibration limits for an extended period.

Typically, calibration of a process-connected transmitter will degrade, rather than augment, the capability of a smart transmitter. For this reason, the calibration procedures in this MC Toolkit User Manual include a recommendation that the transmitter is removed from service and is calibrated only in a controlled laboratory environment, using equipment whose precision is certified.

Software Environment

MC Toolkit runs on the Windows Embedded Handheld 6.5 operating system. A basic familiarity with the OS and the PDA functions is expected.

If you are running Windows XP, download ActiveSync/Mobile Device Center 4.1 or above from the Microsoft Web site and install it on your PC.

If you are running Windows Vista or Windows 7 download Windows Mobile Device center version 6.1 or above from the Microsoft Web site and install it on your PC.

SD Card: At least 1GB memory on the SD Card. Use a SD™ card to increase file storage and install software. The MCT404s support an optional 32 GB maximum capacity microSD card. The SD card is formatted to FAT or FAT32. The MCT404 is despatched with 2GB of memeory

Regional Settings: Before starting the applications, set the Regional Settings to English (United States). To check the Regional Settings of your PDA, select Start/Settings/System/Regional Settings. Make sure it is set to English (United States).

2. Before you begin

2.1 Calibration requirements

Input calibration

Input calibration of pressure transmitters should be done only when necessary, and should be done only under conditions that will ensure accuracy:

- The transmitter should be taken out of service, and should be moved to an area with favorable environmental conditions: clean, dry, and temperature-controlled.

- The source for the input pressure must be very precise, and certified for correct operation.

- The procedures should be done by qualified personnel.

Details of requirements and procedure are given in Table 14.

Output Calibration

The *Loop Test* procedure is intended as a check for continuity and condition of components in the output current loop. The Loop Test procedure is given in Table 15.

The *Trim DAC Current* procedure calibrates the output of the Digital to Analog converter for minimum (0%) and maximum (100%) values of 4 mA and 20 mA, respectively. This procedure is used for transmitters operating on-line in analog mode, to ensure proper operation of the transmitter with all associated circuit components (wiring, power supply, control equipment, etc). It is necessary to use precision test equipment (an ammeter or a voltmeter in parallel with precision resistor). The Trim DAC procedure is given in Table 16.

The *Apply Values* procedure uses actual Process Variable input levels for calibrating the range of a transmitter. To measure a liquid level for example, a sight-glass can be used to determine the minimum (0%) and maximum (100%) level in a vessel. The Process Variable is carefully adjusted to stable minimum and maximum levels, and the LRV and URV values are then set by commands from the MC Toolkit. The DE Apply Values procedure is given in Table 17.

2.2 Transmitter/Communication characteristics

Digital to Analog conversion and transfer

The characteristics of a typical Honeywell Smart Pressure Transmitter (DE Protocol) are summarized in Figure 2-1 through Figure 2-5, following.

Honeywell Transmitter (Analog Mode)

Analog-to-Digital Sensing

As indicated by key number (1) in Figure 2-1, the sensor is a sealed assembly that typically includes three separate sensors: Differential Pressure (DP), Static Pressure (SP) and Temperature (Temp).

Input Characterization

The sensor also includes a PROM, (2), which is Non-Volatile Memory (NVM) that stores "characterization" constants written at the factory, and calibration constants, which can be written at the factory and/or at the user's site. The data in NVM is used in an algorithm in the microprocessor, (3), which is executed continuously to calculate the input value.
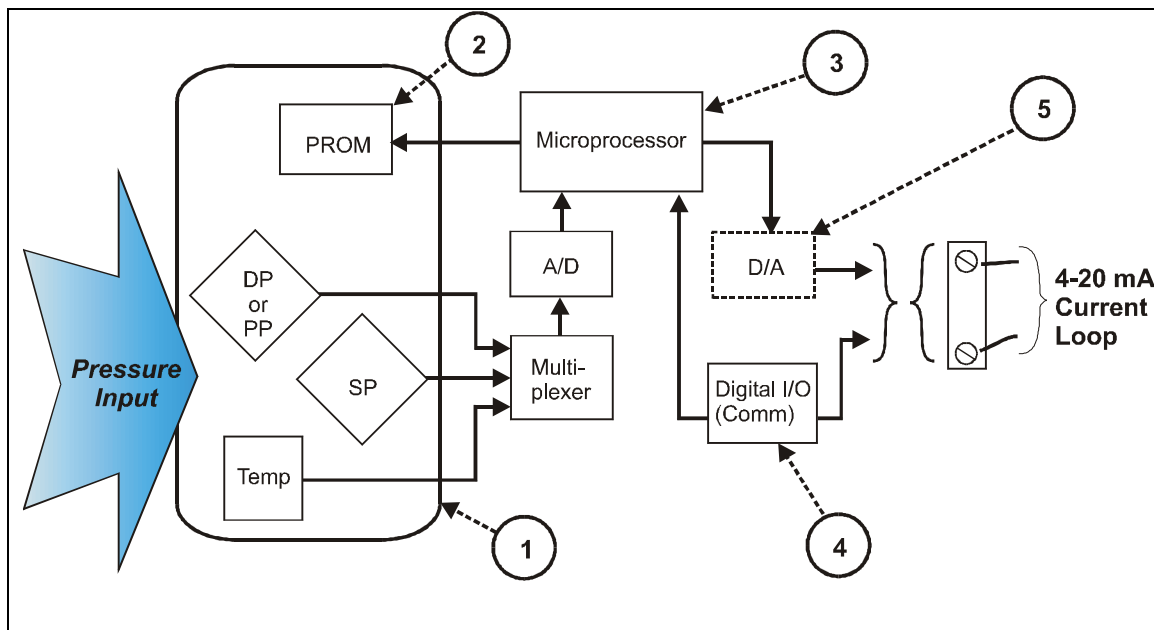
Figure 2-1 Honeywell ST 3000/ ST 800 Smart Transmitter - Analog mode

The characterization constants, which are written at the factory, are derived from highly precise testing of the sensor's response over a range of temperatures, and from the Lower Range Limit (LRL) to the Upper Range Limit (URL) of the sensor. The purpose of the characterization constants is to compensate for very small inaccuracies in the sensor that are introduced by variations inherent in construction materials, and to ensure that the calculated input is a high-fidelity representation of the analog input (linear or square root), with a precise "zero" reference.

Input Calibration ("Corrects")

To optimize accuracy, the PROM includes storage for calibration constants: Correct Input Zero, Correct LRV, and Correct URV.

The corrects constants provide for optimum accuracy in that they enable fine-tuning of the input calculations, by first correcting at zero input, then bounding the input calculations at your operating range. That is, corrections are applied at the Lower Range Value (LRV) and the Upper Range Value (URV).

Factory calibration can be specified in the purchase order. Also, if precision equipment, suitable environment, and required skill are available at your site, input calibration can be done locally.

Reset Corrects

In some cases, the calibration procedure yields unsatisfactory results such that the Corrects constants must be removed from memory. The Reset Corrects erases all three corrects constants, so that only the factory-written characterization constants will be retained in the PROM.

Digital Communication Path

As indicated at key number (4) in Figure 2-2, the Honeywell Smart Transmitter includes a path for digital communications between the sensor (via the microprocessor) and the 4-20 mA current loop that

connects the transmitter to external communications devices such as process control equipment ("receiver") and/or to a MC Toolkit.

Digital to-Analog Conversion and Transfer

The digital-to-analog converter (D/A) shown at key number (5) in Figure 2-1is shown as a box with a dotted line to indicate that analog output mode is a user-selectable feature, for use in an application whose receiving equipment requires an analog input.

Note that the Digital I/O (Comm) (communications) box (4) is shown in Figure 2-1with solid line to indicate that the digital communications path is available at all times, even when analog mode is selected.

Honeywell Transmitter Output - Analog Mode

The diagram in Figure 2-2 provides an overview of a Honeywell transmitter operating in the analog mode.

Analog (PV Signal) Output

The vertical scale at the left of Figure 2-2is an example of the available range (LRL to URL) of a pressure transmitter sensor as built and characterized at the factory. The area of this scale that is highlighted in white represents the configured process operating range (LRV to URV) - in this case, from 100 in H_2O to 225 in H_2O.

Note that Engineering Units (EUs) shown in Figure 2-2 are included here only for reference. The transmitter does not perform any conversion of the base units' value to Engineering Units. All conversion to EUs is performed in the MC Toolkit and/or in other receiving devices such as operating panels associated with control equipment. Default conversion is to inches-H_2O @39°F.)

The output of a Honeywell transmitter operating in the analog mode is a scaled value (0% - 100%) of current (4 mA to 20 mA), whose lower and upper limits correspond to the configured operating range (LRV-URV), respectively.

At the right of Figure 2-2, "PVEULO", "PV", and "PVEUHI" are examples of parameter names that appear on Honeywell control equipment, which are used as follows.

Parameter Name	Parameter Description	Display Examples
PVEULO	Process Value , Engineering Units, Low	`PVEULO    100 in H20`
PV	Process Value	`PV        175 in H20`
PVEUHI	Process Value , Engineering Units, Low	`PVEUHI    225 in H20`

Honeywell transmitter analog value scaling
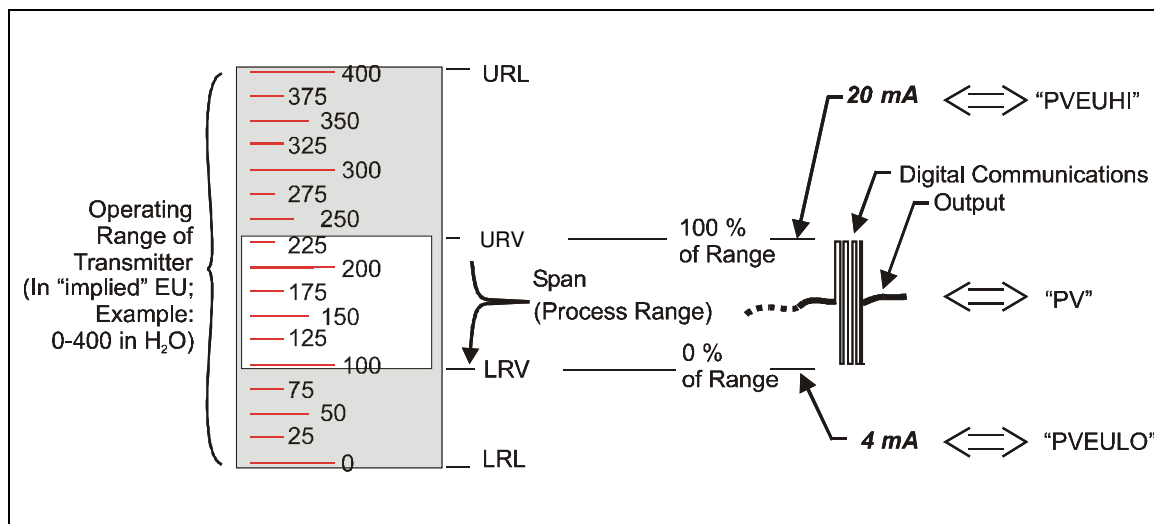
Figure 2-2 Honeywell Analog Value Scaling

Digital (Communications Signal) Input/Output

As indicated at the right of Figure 2-2, communications between the MC Toolkit and the Honeywell Smart Transmitter consist of digital pulse strings, with rapid transitions of current level between (approximately) 4 mA and 20 mA.

⚠	**CAUTION:**
	These rapid transitions provide for effective communications, but will interfere adversely with a transmitter operating on-line in a control loop.
	The MC Toolkit communicates digitally; exercise caution and good judgment when connecting the unit to an on-line transmitter operating in the analog mode.

Honeywell transmitter output-Digital enhanced mode

Most of the operation of the Honeywell Smart Pressure Transmitter Digital Enhanced (DE) mode is similar to that of operation in the analog mode. The essential characteristics of operation in DE mode are shown in Figure 2-3 Honeywell DE Mode Value Scaling

As indicated at the right of Figure 2-3 Honeywell DE Mode Value Scaling, output values of process variables, as well as digital communications, are transferred to a receiving device digitally. The digital coding is Honeywell proprietary, which requires the use of DE-capable Honeywell control equipment.

The use of DE mode offers several advantages:

process safety	Unlike in the analog mode, communications devices do not "bump" the value of the PV.
accuracy is retained with less maintenance	Digital communications are relatively immune to small variations in circuit resistance or supply voltage.
facilitates maintenance tasks	Honeywell control systems include operating displays that enable direct communication with transmitters operating in DE mode.

> ⚠️ **CAUTION:**
> Although it in not necessary to put a control loop in manual before communicating with a transmitter operating in DE mode, caution is required if there is any potential for error in identifying operating mode.

Honeywell HART Transmitters

Transmitters with HART capability have features that vary among manufacturers and with the characteristics of specific devices. The FDC application supports the HART Universal, Common Practice, and Device Specific Commands that are implemented in Honeywell HART transmitters

As the diagram in Figure 2-4 shows, the Honeywell HART Transmitter is virtually identical to non-HART transmitters, except that the HART version includes a Digital I/O Modulator/Demodulator block (key number (4) instead of the Honeywell DE communications block.

As indicated in Figure 2-5, the output of the HART includes two primary modes:

- Point-to-Point Mode, in which one transmitter is connected via a two-conductor, 4-20 mA current loop to one receiver.

- Multi-Drop Mode, in which several transmitters are connected via a two-conductor network to a multiplexed receiver device.

In point-to-point mode, the value of the primary PV is represented by a 4-20 mA current loop, almost identical to that of the Honeywell Transmitter operating in analog mode. In this case however, the analog signal is modulated by Frequency Shift Keying (FSK) methods, using frequencies and a current amplitude that do not affect analog sensing at the receiver.

Note that the accuracy of the analog level must be precisely controlled for accurate sensing, but that HART communications will not "bump" the process variables.

In multi-drop mode, up to 16 transmitters in HART 5 (addresses 0-15) and up to 64 transmitters in HART6/7 (addresses 0-63) can exist on the two-conductor network, which precludes analog transmission methods. In this case, the same FSK modulation method is used for conveying levels of PV (and other variables) and also for communications.

> ⚠️ **CAUTION:**
>
> Before connecting to a HART transmitter, ensure that the MC Toolkit is not set up for DE communications, whose current amplitude can "bump" process variables in either point-to-point mode or in multi-drop mode.

Non-Honeywell HART Transmitters and Devices

HART-capable transmitters from any manufacturer and for any specific purpose are designed to common-agreement standards that provide for inter-operability.

Guidelines published by the HART Communication Foundation enables manufacturers to design devices that communicate via a set of standard commands and responses.

The FDC application software supports the HART Revision 5.0, 6.0 and 7.0 commands that are exposed through the HART Communication Foundation Device Description files. For more information, refer to tables in the Reference Data section 5.8.

The FDC uses Device Descriptions stored in the Pocket PC to communicate to all universal, common and device specific commands. MC Toolkit will come with all HART Registered (updated once per quarter) Device Descriptions pre-loaded.
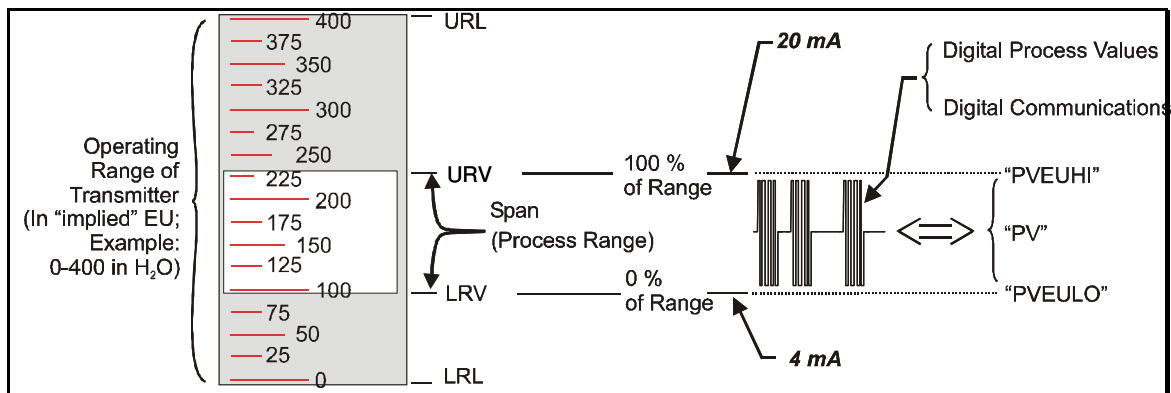
Figure 2-3 Honeywell DE Mode Value Scaling
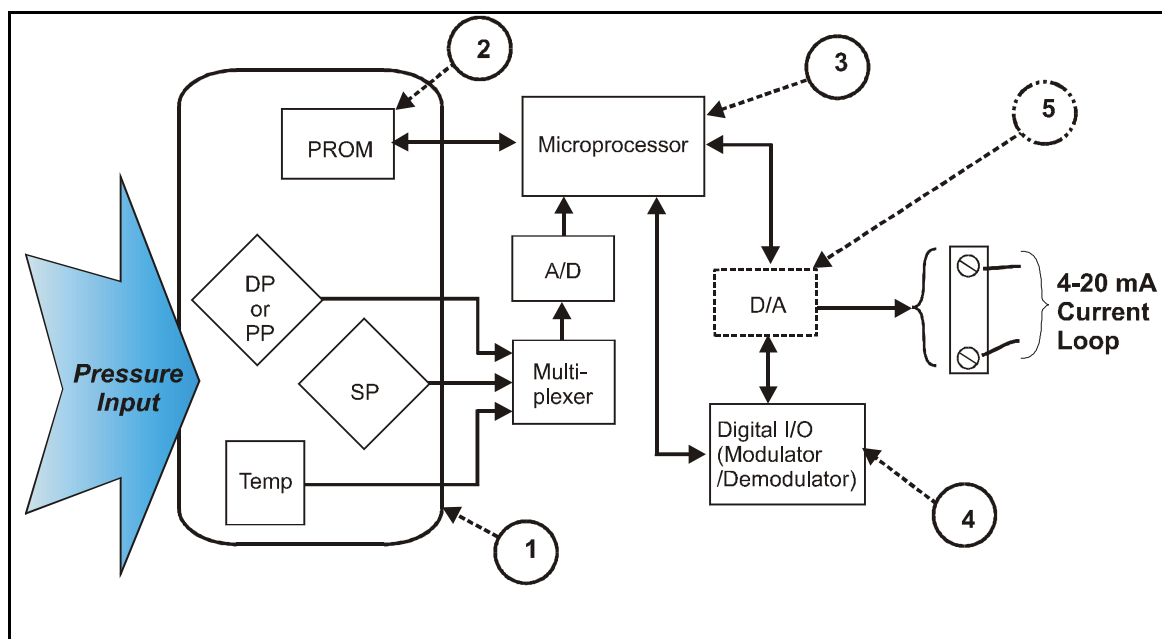
Figure 2-4 Honeywell (HART) Transmitter Diagram
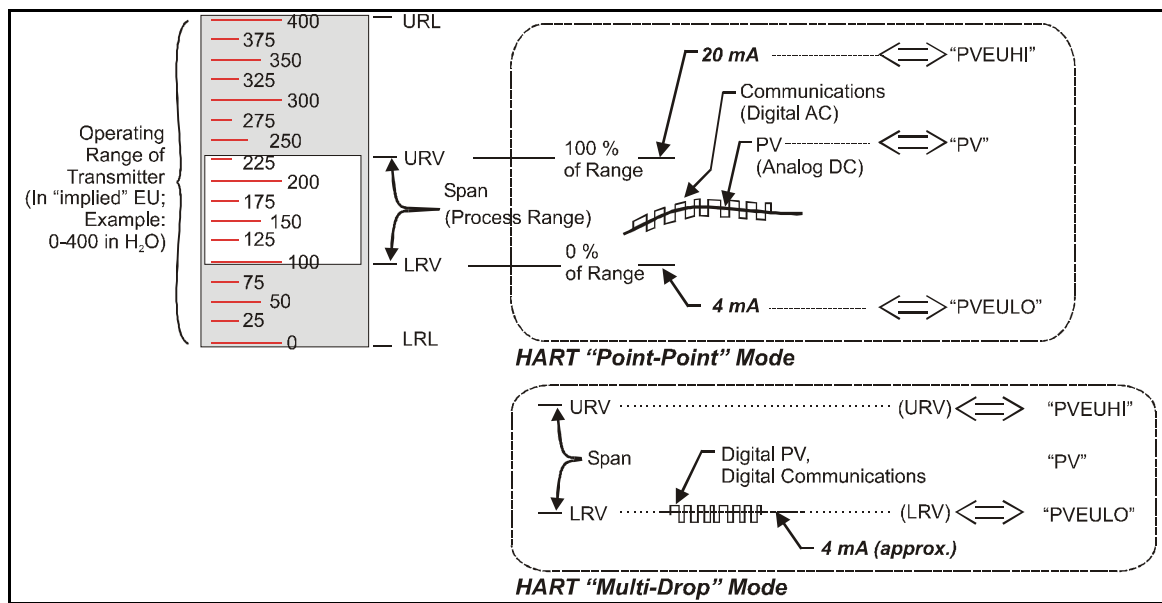
Figure 2-5 HART Point-point and Multi-Drop Value Scaling

2.3　Wi-Fi Connection Support

MCT404 is sold with or without Wi-Fi option.

This section shows you how to connect the handheld to Wi-Fi and then connect to the Internet for example to download the DD files for any Transmitter or connect to a network printer etc.

1.　Make sure the Wi-Fi setting is Turned on
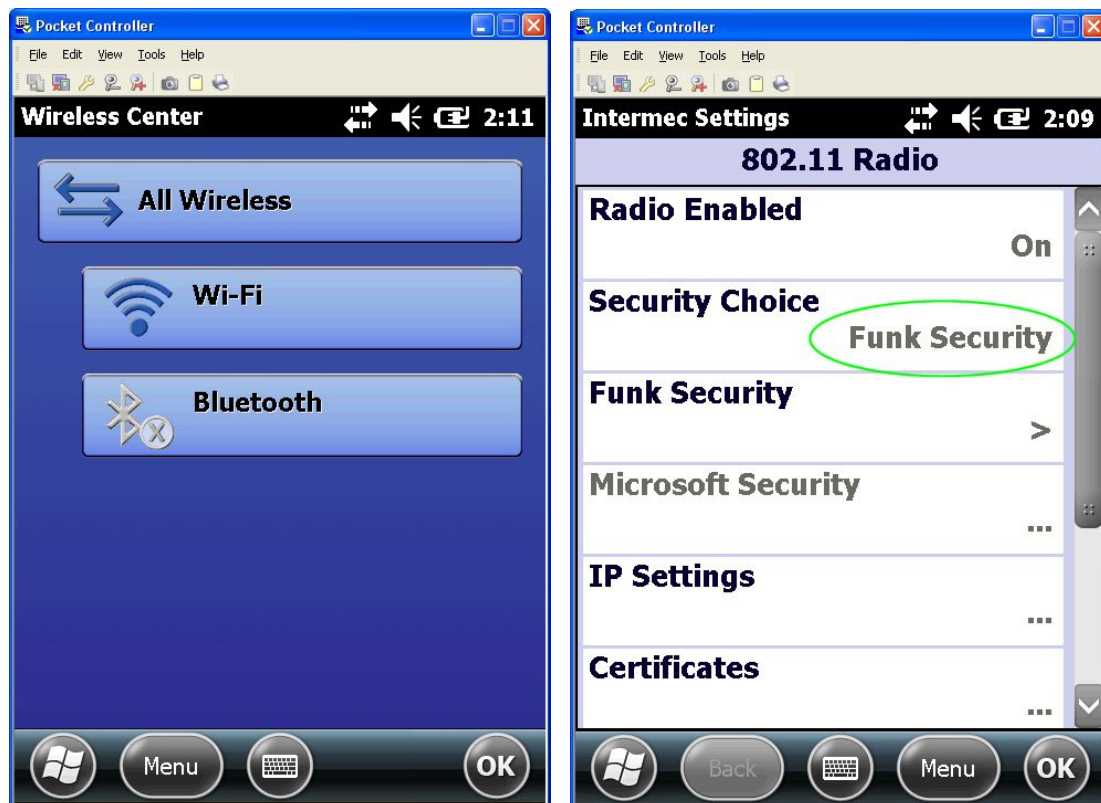
2.　Set the Secutiry Choice to "Func Security"

3. The IP address will be detected automatically. If it is not detected, then find the IP address from your network provider and enter it in the IP Address and Subnet Mask field.
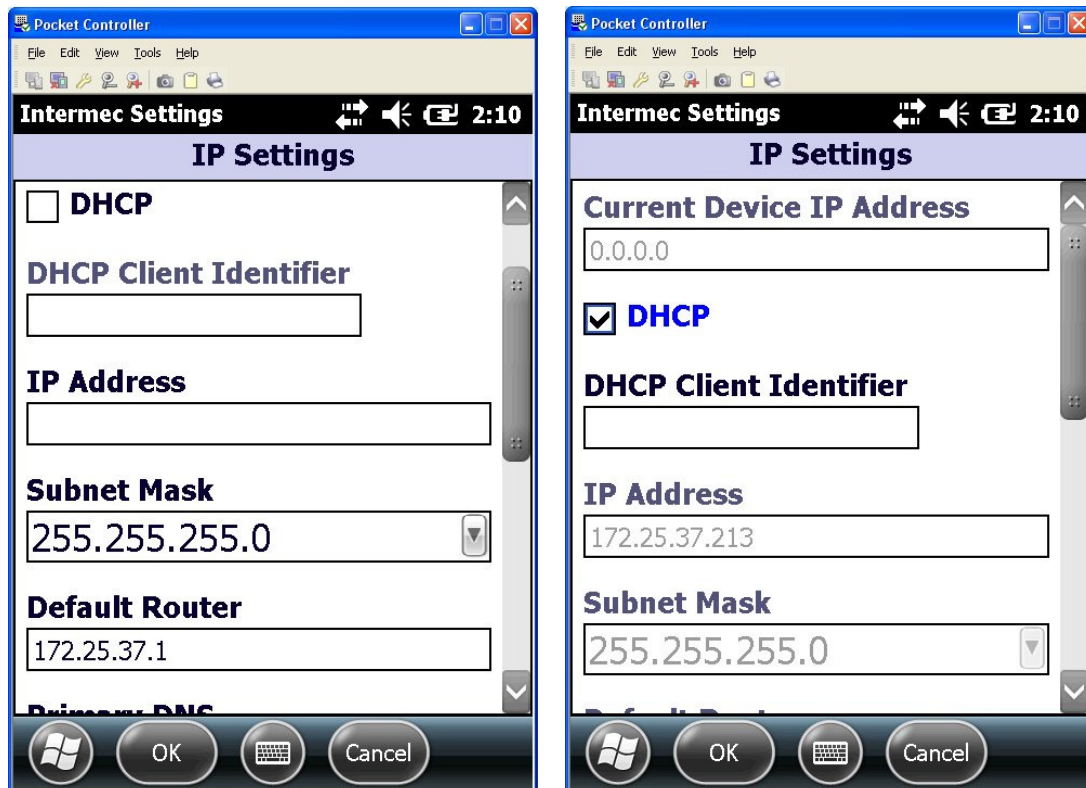
4. Select OK. Once the IP address is entered, you can connect to the network with or without DHCP Enabled.

3. Getting Started

3.1 MC Toolkit Installation

MC Toolkit software is fully loaded in the factory on all new orders.

The installation instruction for the above process is in document 34-ST-33-59.

The above document is available at:
https://www.honeywellprocess.com/transmitter-configuration-tools-and-accessories/mc-toolkit

3.2 MC Toolkit Assembly

MCT404 assembly

Figure 3-1 shows the MCT404 assembly.

Figure 3-1 MCT404 assembly

Table 2 describes the components of the MCT404 assembly.

Table 2 Components of MCT404 assembly

Item	Description
1	Positive and negative test leads.
2	Connecting terminals for test leads.
3	Test leads to connect to the field device.
4	Functional keys which can be configured.
5	Navigational keys.
6	Button for powering on/powering off the MC Toolkit.
7	Pin charging plug with USB connector.
8	Reset buttons. For Soft Reset, press both the buttons simultaneously.

3.3   Safety instructions

General safety instructions

Persons using the unit must observe the standard safety regulations and read the certificate to prevent incorrect operation or misuse of the unit.

For MCT404

For general safety instructions while using MCT404, refer to the "Safety regulations – General safety instructions" section of "*300011CB02A01_instruction_manual_irocCi70-Ex_EN.pdf*" that is shipped with the MCT404 product

The safety instructions from the above Safety Guide have been updated below as they are applicable to MCT404 product. The following additional safety regulations must also be observed:-

- The unit must not be opened within the Ex-area.

- For battery information refer to MCT404 battery replacement section 7.1

- Avoid using the unit in aggressive acidic or alkaline solutions.

- Ensure that the MCT404-X_ Ex unit is not taken in to Zone 0 areas.

- Ensure that the MCT404 - Y_ Ex unit is not taken into Zone 1/0 or 21/20 areas.

- Ensure that the MCT404 - ZZ unit is not taken in to Ex-area.

- Electromagnetic waves, which can arise with the i.roc when using WLAN or Bluetooth functions, can cause disturbances and endanger your health! Since no definite statements can currently be made about the immunity from disturbances of heart pacemakers, we recommend users of pacemakers to avoid using transmitters generally.

- Do not transmit near persons with pacemakers!

- Permission to use electronic devices in airplanes is up to the respective airline.

- Avoid effects of elevated heat: Do not place the device near heat sources, such as radiators, air-conditioner air exit openings, stoves or other devices (including amplifiers) that radiate heat.

- Avoid effects of moisture.

- Do not put any objects into the product: Do not put objects into the housing or other product openings. These openings must not be obstructed, blocked or covered.

- Set-up: Never set up the product on a table, vehicle, stand or holder that is not stable. Follow the manufacturer's instructions when setting up or installing the product, and use the accessories recommended by the manufacturer for installation.

- Adjust loudness: Reduce the volume before using earphones or other audio devices.

3.4   Battery and Power Supply

For battery care of MCT404, refer to MCT404 battery replacement section 7.1
For the Power supply information for MCT404, refer to *"300011CB02A01_instruction_manual_irocCi70-Ex_EN.pdf"* that is shipped with the MCT404 product

3.5   Start up, Shutting down the MC Toolkit

The section explains how to start the MC Toolkit.

Starting the MCT404

Press the Power button on the MC Toolkit to start the MC Toolkit, and wait until the main PDA window appears displaying the **Start** icon.

Shutting down the MCT404

Press the Power button on the MC Toolkit and hold it for few seconds to shutdown.

3.6   Application icons

Select on the **Start** icon. All the available shortcuts will be displayed under the **Start** Menu as shown in Figure 3-2.

Figure 3-2 Start Menu

The icons for the two applications MC Toolkit and FDC are available directly under the "**Start**" Menu. If any or all of these icons are not available under the Start Menu, select '**Programs'**, and locate the **MC Toolkit, FDC** icons.

3.7 Connecting to a device through MC Toolkit (MCT404)

Figure 3-3 shows how a field device is connected through MCT404. Refer to the MCT404 assembly for more details.

Figure 3-3 Connecting to a device through MCT404

Wiring diagrams

Figure 3-4 displays how to connect directly to the terminals of HART/DE device
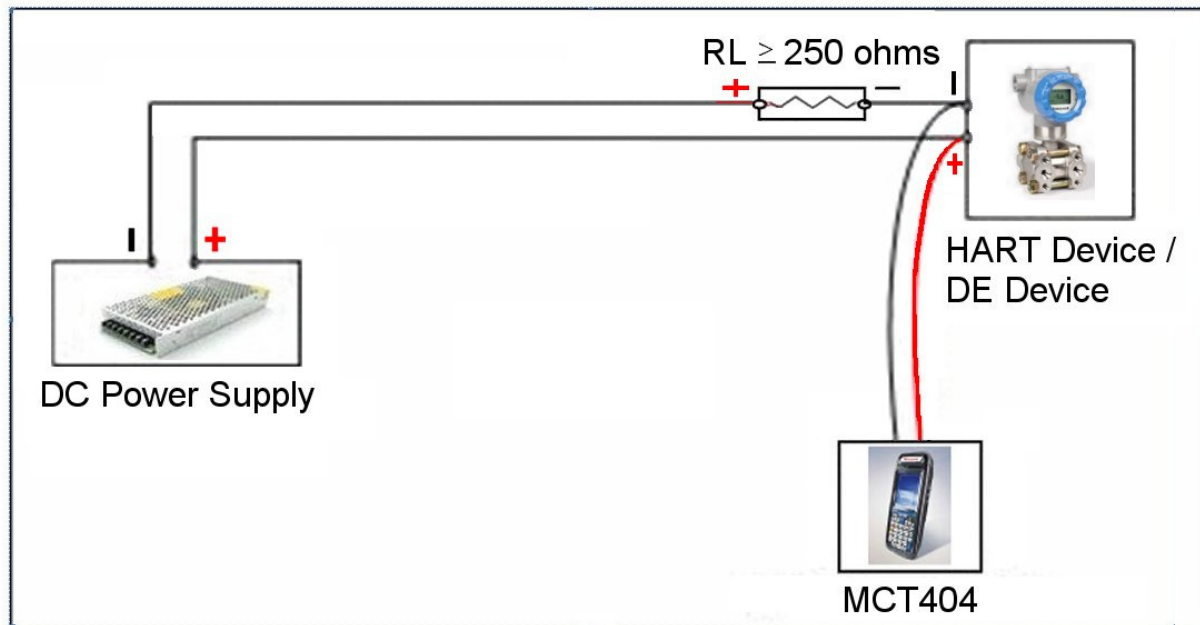
Figure 3-4 MCT404 terminal connections to HART/DE device

Figure 3-5 displays connecting HART device with 250 ohm resistor
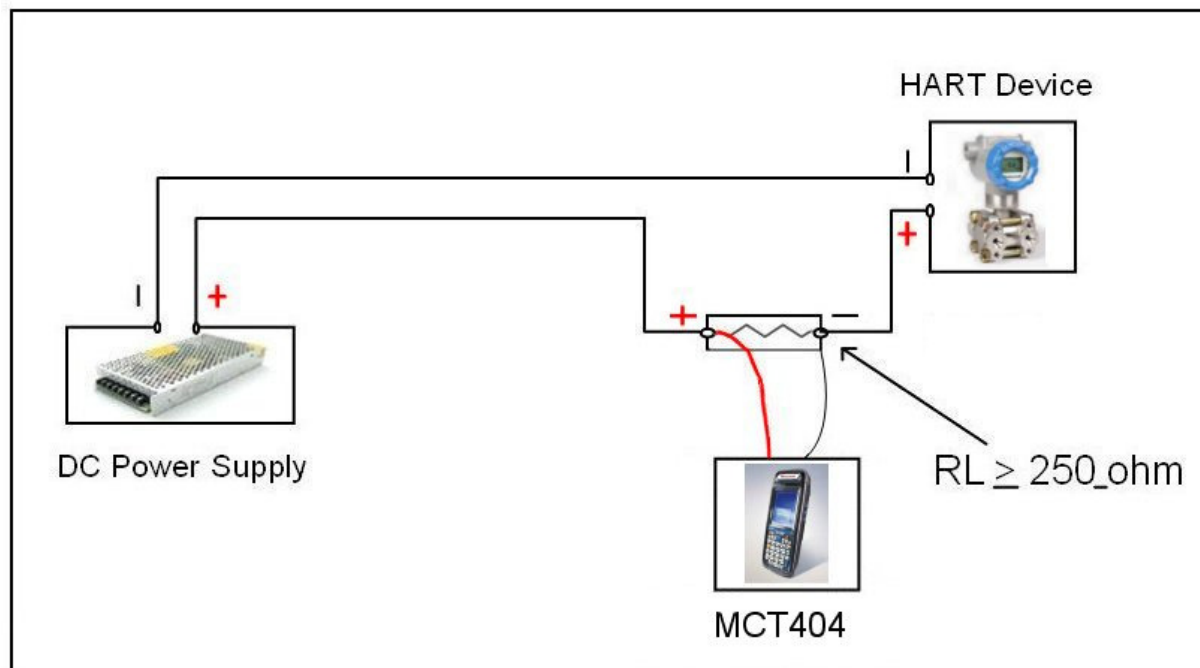
Figure 3-5 MCT404 terminal connections to HART Device

3.8 Connecting MC Toolkit to a PC

Connecting MCT404

1. Connect the USB connection cable to a free USB port on the PC.

2. Insert the MC Toolkit into the docking station.

3. Follow the Active Sync/Mobile Device Center instructions appearing on the screen to establish the connection between the MC Toolkit and the PC.

3.9 Types of input methods

The MC Toolkit application allows you to provide inputs through various mechanisms supported through Windows Mobile platform, they are, Keyboard, Block Recognizer, Letter Recognizer, and Transcriber. On the other hand the FDC application supports the input through a custom keypad which supports numeric or alphanumeric keys depending upon the input context.

In the Keyboard method, you select a text field in display, and then selects a character at a time from a virtual keyboard. Using the keyboard involves familiar concepts that will enable quick and accurate entries.
In the other three methods, the stylus is used to write the desired input directly onto the screen, and each requires some adaptation of user skills. Of these, the Transcriber is probably the most efficient and easiest to use.

Character input using keyboard

For character input using keyboard, perform the following steps.

1. Tap on the arrow [icon] at the bottom right corner of the display and tap on a key on the **Keyboard**.

2. Use the stylus to provide a character at a time from the virtual keypad as shown in Figure 3-6. The familiar QWERTY keypad layout enables quick and accurate entries.

Figure 3-6 Virtual keypad

Character input using Block Recognizer

For character input using block recognizer, perform the following steps.

1. Tap on the arrow [icon] at the bottom right corner of the display and tap on **Block Recognizer**.

2. Use the stylus to provide a character input to the letter pad at the bottom of the screen. The character strokes are then converted to typed text on the screen as shown below in Figure 3-7.
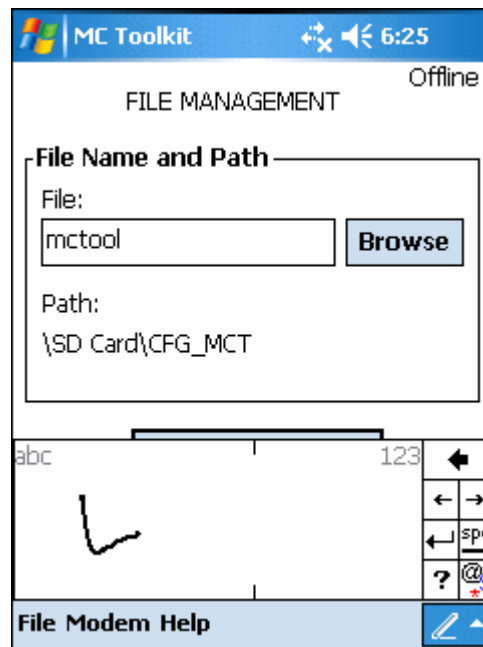
Figure 3-7 Block Recognizer

Note: Tap on **?** icon to view the help for using Block Recognizer, and tap on **@$** icon to view the table of symbols.

Character input using Letter Recognizer

For character input using letter recognizer, perform the following steps.

1. Tap on the arrow [icon] at the bottom right corner of the display and tap on **Letter Recognizer**.

2. Use the stylus to provide character inputs between the lines which appear at the bottom of the screen. The character input is recognized and displayed on the screen as shown in Figure 3-8.
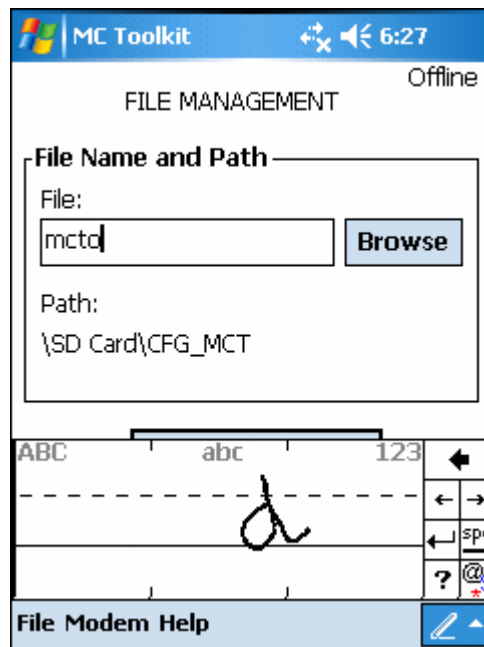
Figure 3-8 Letter recognizer

Character input using Transcriber

For character input using transcriber, perform the following steps.

1. Tap on the arrow [icon] at the bottom right corner of the display and tap on **Transcriber**.
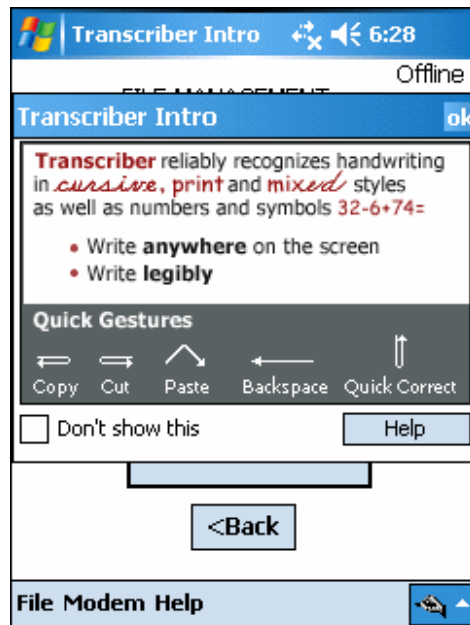
2. Use the stylus to input the characters by writing them on the screen, in cursive, print or, mixed handwriting. The character input is recognized and displayed on the screen as shown in Figure 3-9.
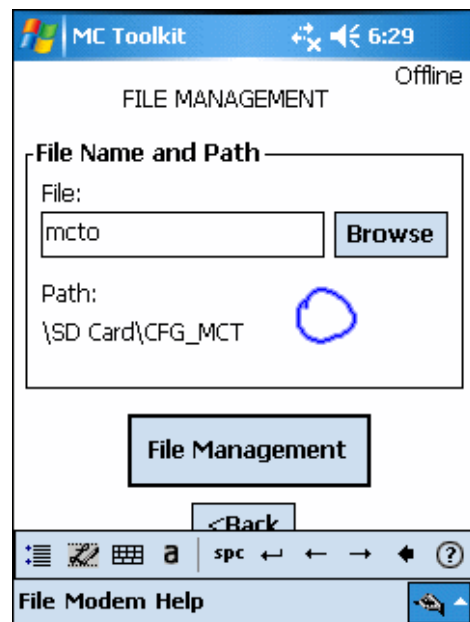
Figure 3-9 Freehand recognition

Input dialog in FDC

Depending upon the context of the data, FDC smartly presents an alphanumeric or numeric keypad for data entry as shown in Figure 3-10.
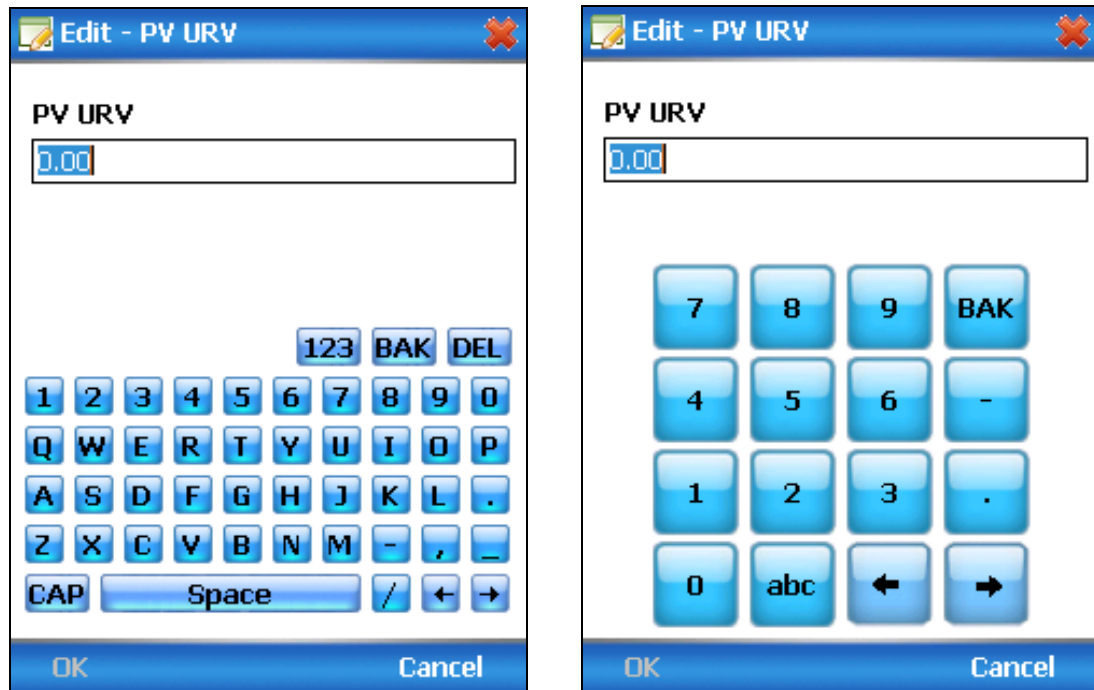
Figure 3-10 Alphanumeric keypads

MCT404 Function Keys

MCT404 supports 2 versions of Keypads: Numeric and Alphanumeric. Numeric keypad has F1 through F10 function keys. Alphanumeric keypad has F1 through F8 function keys. Key assignments in FDC and MC Toolkit applications are shown in theTable 3 below:

Table 3: MCT404 Function Keys

Function key (Numeric)	Function key (AlphaNumeric)	FDC	MC Toolkit
F1	F1	Navigate Forward through Menus	NA
F2	F2	Navigate Forward through Menus	NA
F3	F3	NA	About MC Toolkit
F4	F4	NA	Exit MC Toolkit Application
F5	F5 (Shift+F1)	NA	Modem Diagnostics
F6 (Shift+F1)	F6 (Shift+F2)	Volume Up	Volume Up
F7 (Shift+F2)	F7 (Shift+F3)	Volume Down	Volume Down
F8 (Shift+F3)	F8 (Shift+F4)	NA	File/Options
F9 (Shift+F4)	Not Available	NA	Help Topics General (**)
F10 (Shift+F5)	Not Available	NA	Help Topics DE (**)

(**) Available in Numeric keypad models only

NOTE: In the MC Toolkit application, select Help / About MC Toolkit to find the supported Function keys. In FDC Application, select the "Application Information" icon on the Home page (See Figure 4-2 and Table 5) to find the supported Function keys

4. Managing HART Devices using FDC Application Software

4.1 Starting FDC

To start FDC, perform the following steps.

1. Turn on the MC Toolkit.

    Note: For information on turning on the MC Toolkit, refer to section 3.5 Start up, Shutting down the MC Toolkit and 3.6 Application icons.

2. Select FDC from the Start menu. The FDC homepage appears.

Generic layout of user interface of FDC

The FDC generic layout consists of title bar, workspace, and menu bar, which appear consistently on all screens, and the options may vary depending on the context and selection.

Figure 4-1 Generic layout of user interface

Table 4 describes the UI elements that appear on all FDC pages.

Table 4 Generic UI elements

Items	Description
1	Title bar – Displays the current page title.
2	Page icon – Displays current page icon
3	Icon 1
4	Icon 2
5	Exit button – Tap to quit the current page.
6	Workspace – Consists of various menu items for working with FDC.
7	Menu bar – Consists of options for navigation and selection.

4.2   Overview of FDC homepage

The FDC homepage consists of links for Online Configuration, Offline Configuration, Manage DDs, and Settings. Figure 4-2 shows the FDC homepage.
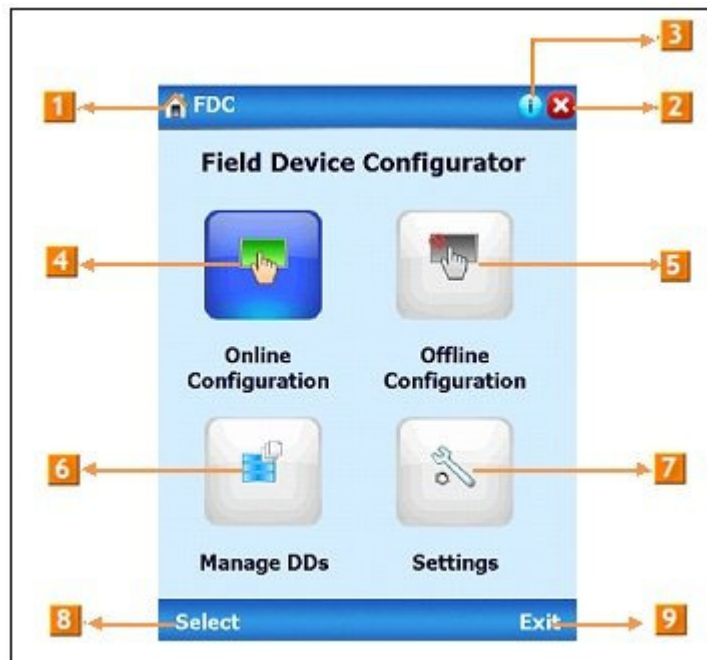
Figure 4-2 FDC homepage

Table 5 lists the items that appear on the FDC homepage and its descriptions.

Table 5 FDC homepage elements

Items	Description
1	Screen title.
2	Tap to quit FDC.
3	Tap to view the application information.
4	Tap to navigate to Online Configuration screen.
5	Tap to navigate to Offline configuration screen.
6	Tap to navigate to Manage DDs screen.
7	Tap to navigate to Settings screen.
8	Tap to select the highlighted menu option.
9	Tap to quit FDC.

Note: To select a particular option in FDC you can either select the option and then tap **Select** or you can directly double-tap the option.

For example, double-tap **Online Configuration** or tap **Online Configuration > Select**. The **Device Configuration** page appears.

Settings

Use this feature to customize FDC. You can customize FDC for device detection, DD selection, and other application settings.

Device Identification

Use the following options to configure FDC to identify a device.

- **COM Port:** It allows selection of COM port to which HART/DE is connected

- **Using Poll Address**

  - **Use poll address 0 only**: Use this to detect a device with the poll address as zero.

  - **Find first poll address and use**: Use this to detect a device with the first available poll address in the range of poll addresses that are available.

  - **Use selected poll address**: Use this to detect a device with a specific poll address in the range of zero to 63.

  - **Use From**: Use this to detect a device based on a range of poll addresses.

- **Using Device TAG**: Use this to detect a device with a known HART tag.

- **Using Device LONG TAG**: Use this to detect a device with a known HART long tag (applicable for devices with HART 6 or later Universal revisions).

Note: If you choose the option **Using Device TAG** or **Using Device LONG TAG**, FDC prompts you to enter a device tag/long tag name during device detection.

DD selection

Use the following options to configure FDC to select DD files when a DD with matching device revision is not available.

– **Use DD file of previous device revision**: Use this option to automatically load a device with a DD file having device revision lower than that of the device.

– **Use generic DD file**: Use this option to automatically load the device with an appropriate generic DD file.

– **Always ask user**: Use this option to always prompt you with a choice for loading the device either with the previous device revision or with generic DD file.

Always Use Generic: Use this option to always load the device using generic DD files even if a DD file with matching device revision as the device is present.

Note: A generic DD file is a DD file that provides access and interface to the universal data and features of a HART device.

Other settings

Low storage notification: Use this option to set a percentage value and to notify you with a warning message when the available storage card space is less than the percentage set.

Application diagnostics: Use this option to enable or disable the logging infrastructure for application diagnostics. With this option enabled, FDC creates necessary log files for troubleshooting and diagnostics. These files are stored in SD Card\FDC folder.

Note: You must not enable this option unless suggested by Honeywell TAC because this may impact the application performance.

Manage DDs

Using this feature, you can manage the DD files installed with FDC. A DD file contains descriptive information about the functionality of a device. By default, a set of DD files are installed with FDC. However, if you do not have a DD for a given device, you can install it using the "Add DD" feature. Similarly, you can uninstall a DD file or a set of DD files using "Delete DD" feature. You can also directly copy the DD files in appropriate hierarchy using a card reader or "Active Sync/Mobile Device Center" mechanisms. In such a case, you should validate the library view using the "Refresh" feature.

Online configuration

Using online configuration, you can configure, calibrate, monitor and diagnose a HART device which is connected to MC Toolkit. FDC provides the features to perform these functions through the various constructs offered through the DD file of the device. Besides there are certain other features available under this link for you to conveniently work with a HART device with live communication. After making changes to the device you can also save a snapshot of the device data as history to later transfer it to FDM for record and audit purposes.

Offline configuration

Offline configuration refers to configuring a device offline (without physically connecting to the device) using a template and then downloading the configuration to the device. Presently, FDC application software does not support creating offline configuration. However, it supports importing of offline configuration from FDM (R310 and above).

4.3 Customizing the settings

Modifying device identification settings

Using the Device Identification settings, you can choose how to detect a device. Devices can be detected using poll address or device tag name. By default, devices are detected using poll address zero. However, you can modify these settings based on how you want to detect devices.

To modify the device detection settings, perform the following steps.

Note: Before modifying the settings, see Settings for more information.

1. On the FDC homepage, tap **Settings > Select**.

    The **Settings** dialog box appears.

2. Tap **Device Identification** tab.

3. If you want to detect a device using the device specific tag name, select **Using Device Tag** checkbox (for HART 5 or later versions) or **Using Device Long Tag** checkbox (for HART 6 or later versions).

4. If you want to detect a device using poll address, select **Using Poll Address** check box.

    – To detect a device using poll address zero, tap **Using poll address 0 only**.

    – To detect a device using first poll address, tap **Find first poll address and use**. With this setting, FDC will detect the first device which responds on any poll address during a scan from 0 to 63.

    – To detect a device using selected poll address, tap **Use selected poll address** and choose the appropriate poll address using the up and down arrow keys.

      For example, if you want to detect a device with poll address 20, press and hold the up or down arrow key until the poll address 20 appears.

    – To detect a device using a range of poll addresses, tap **Use From** to choose the device between the ranges of poll address you want to detect.

      For example, if you want to detect a device within the range of poll address 20 and 25, press and hold the up or down arrows keys to specify the range of poll address.

Modifying DD selection settings

Using the DD selection settings, you can choose how to select a DD file for a device, when a DD with matching device revision is not present. By default, the option **Always ask user** is selected. To modify the DD selection settings, perform the following steps.

Note: Before modifying the DD selection settings, see Settings for more information.

1. On the FDC homepage, tap **Settings > Select**

    The **Settings** dialog box appears.

2. Tap **DD Selection** tab.

3. If the DD file with the current device revision is missing for a device, select one of the following:

    a) Use DD file of previous device revision

    b) Use generic DD file

    c) Always ask user.

4. If you want to load devices with a generic DD files even if a DD matching the device revision is available, select the checkbox under the **Always Use Generic** option.

Modifying other default settings

Using the "Others" tab under settings, you can set the following:

- Threshold percentage for notifying a low storage space warning. By default, the notification for percentage of available storage card space is set as 5%. Note that you cannot reduce the percentage beyond 50%.

- Enable or disable logging option for generating application diagnostic log files.

To modify the settings for low storage warning, perform the following steps.

1. On the FDC homepage, tap **Settings > Select**

   The **Settings** dialog box appears.

2. Tap **Others** tab.

3. Select **Low Storage Space Warning** checkbox.

4. Press and hold the up or down arrow keys to set the notification for percentage of available storage card space, which is available.

   For example, if you want to set the percentage for notifying a low storage card space to 20%, press and hold the up or down arrow keys until the required percentage appears.

To modify the settings for saving log files, perform the following steps.

1. On the FDC homepage, tap **Settings > Select**

   The **Settings** dialog box appears.

2. Tap **Others** tab.

3. Select **Enable** or **Disable** under the **Application Diagnostics** option.

Once you are done with the desired changes in Settings, tap "Save" on the menu bar. The modified settings are then updated successfully in the application. Tap "Return" to return to the FDC home page.

4.4 **Managing DD files**

Overview

Using Manage DDs, you can view, add, or delete DD files for devices. A list of already available DD files is maintained in the DD Library. FDC lists the installed DD files in a hierarchy as below:

Manufacturer

Device Type

DevRev xx, DDRev yy

DevRev pp, DDRev qq

Add a DD file

To add a DD file for a device, perform the following steps.

1.   From the FDC homepage, tap Manage DDs > Select.

The **Manage DDs** dialog box appears.

2.   Tap **Options** > **Add DD**.

Or

Tap.

The **ADD DD files** dialog box appears.

3.   Browse to the location in which the DD file (**.fm8)** is located and tap **OK**.

4.   If the DD file already exists, then the following message appears.
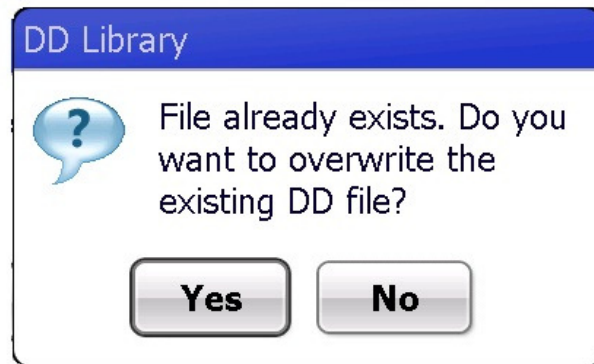
5.   Tap **Yes** to overwrite the existing DD files.

6.   If the DD file is added successfully, a success message appears.

Delete a DD file

Using this option, you can delete a particular version of a DD file. To delete a DD file for a device, perform the following steps.

1. From the FDC homepage, tap **Manage DDs > Select**.

    The **Manage DDs** dialog box appears.

2. You can choose to delete DD(s) in one of the following ways:

    a) By device manufacturer – Select a device manufacturer to delete all device types and DDs associated with the manufacturer's devices.

    b) By device type – Select a device type to delete all DDs associated with the device.

    c) By device revision and DD revision – Select the specific entry of device revision, DD revision to delete the specific DD

3. Tap **Options > Delete DD.**

    Or

    Tap .

    A confirmation message appears.

4. Tap **Yes**.

    If the DD file is deleted successfully, a success message appears.

5. Tap **OK** to return to **DD Library** page.

Validating a manually edited library

Besides using the Add/Delete DD features, advanced users may also manipulate a DD library by directly editing the contents of the FDC\Library folder. DD files can also be transferred directly to this location by accessing the SD Card on MCT404 through a card reader and/or by connecting the MCT404 to a PC. In such cases, you must perform the following steps to validate a DD Library, thus edited manually:

1. From the **FDC homepage**, tap **Manage DDs > Select**

   The **Manage DDs** dialog box appears

2. Tap **Options**.

3. Tap **Refresh Library**.

   Or

   Tap .

   A confirmation message appears.

4. Tap **Yes**. The DD library is now validated and refreshed.

4.5   Overview of device configuration

Device configuration is the process of setting the variables of a device to desired values. Typically, the configuration process is equated with the act of writing values to a device, but procedurally it involves the following:

- Identifying a device

- Reading/observing device variable values

- Editing variables

- Sending edited variables to the device

- Saving the variable values

- Saving and downloading the device configuration.

When performing the above stated procedures and the device being available on an active communication link, the process is generally termed as Online Configuration. On the other hand, you may prepare a set of values for device variables even when the physical device is not present and then you send these values down to the device once the same is available on the communication link. This process is generally termed as Offline Configuration.

4.6   Online configuration

Online Configuration option provides you a set of functions with which you can perform various operations on a device with active communication link. These operations primarily include configuration, calibration, monitoring, and diagnostics of a HART device. Typically, these operations could be realized through various constructs exposed by the DD file of the device. In addition, FDC also provides some additional application functions for you to perform these functions more conveniently.

Detecting and loading a device

When you tap on **Online Configuration**, the device detection and loading process automatically gets started. Depending upon the Device Detection and DD Selection settings you may have chosen, you may be prompted for certain inputs as described in the Settings section.

Overview of Device Homepage

Once the device is detected and loaded successfully, you can view the device homepage for the identified device. The workspace area on the device homepage consists of 4 tabs on the left hand side. Selecting a tab displays functions/information associated with that tab on the right hand side.
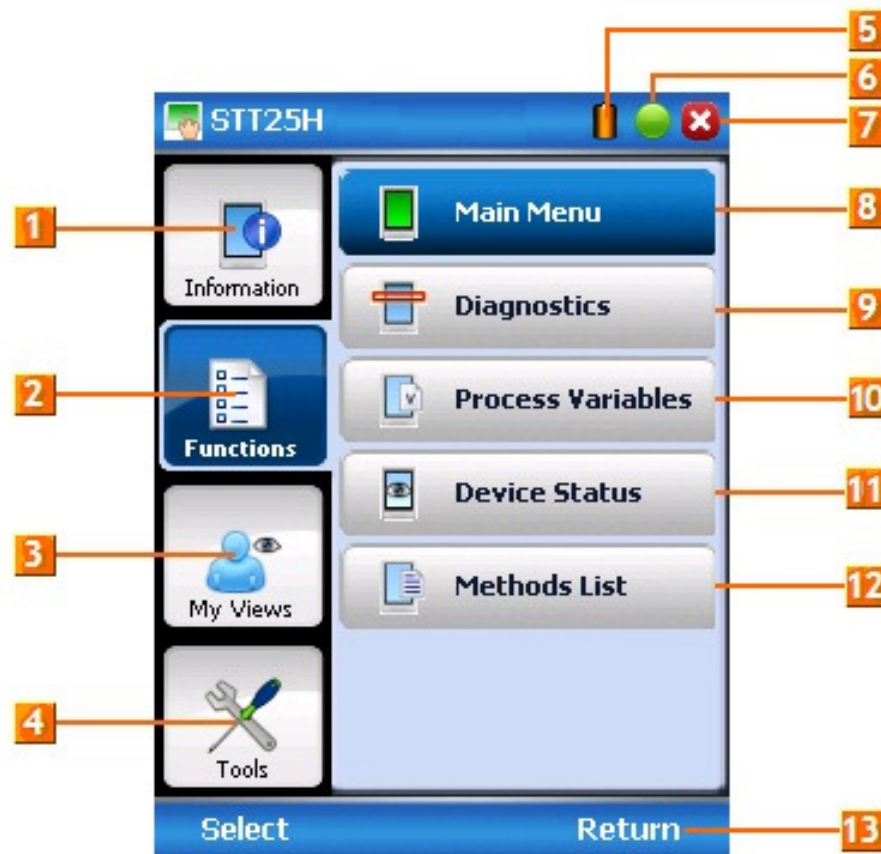
Figure 4-3 Device homepage

Table 6 lists the entry points and its descriptions.

Table 6 Device homepage elements

Items	Description
1	Tap **Information** tab to view the device identity related information.
2	Tap **Functions** tab to choose from various options to configure, calibrate, monitor and diagnose the device
3	Tap **My Views** tab to create and use your own custom views.
4	Tap **Tools** tab to use FDC specific tools applicable to the device.
5	Indicates modem battery status.
6	Indicates device health status, which may need attention
7	Tap to close the device home page
8, **9**, **10**	Device specific "entry points". The number and labels on these entry points may vary from device to device as defined in the DD file.
11	Select this option to view the detailed status of the device with respect to the Communication, Device Status and device specific diagnostic details.
12	Tap **Methods List** to view and execute methods.
13	Tap to close the device home page.

Note: The entry points, **Device Status** and **Methods List** appear for all devices.

Table 7 lists the device health status and their indications.

Table 7 Device health status

Device health icons	Indications
(green icon)	Indicates there's no health or status indicators reported by the device
(red icon)	Indicates that the device is potentially reporting a status which needs attention and further investigation. It is advised that you use Device Status under Functions tab to further investigate the details.
(gray icon)	Indicates that the device has lost communication with MC Toolkit

Tabs on the Device Home page

The following are the options that are available on the device homepage

- **Information tab**: Use this option to view the device identity related information. You can view the manufacturer name, device type, device revision, DD revision, and universal revision of the HART device.

- **Functions tab**: This tab provides various options which you may use for navigating through the device specific user interface and some standard features offered by FDC across all devices. For the sake of explanations, the right side options under this tab shall be referred as "Entry points" throughout the rest of the document.

- **My Views tab:** Quite often, you may be interested only in a set of variables of a device. But navigating through the menu tree of a device may not be helpful because of time and further all variables that you want may not be in the same location. Using this unique feature of FDC, you can now choose what you want to view in a device in your own views. FDC allows you to create two such views per device revision of a specific device type. You can always modify them as per your needs.

- **Tools tab:** This tab is a placeholder for FDC specific tools for providing certain functionality. Currently the only option it provides is called as Save History. Using this option you can save the snapshot of the device variables. This snapshot is saved in a format which can be later imported as a history record in FDM.

Using FDC for various device operations

Typical operations with a smart field device involve configuration, calibration, monitoring, and diagnostics. Any combination of these operations may be required in different phases of a device life cycle in a plant, such as Commissioning, Operations, and Maintenance. FDC enables you to achieve these operations with a HART device via the various interfaces/constructs exposed through the DD file of the device. Configuration involves setting variables to desired values. Calibration is the process of verifying certain aspects of device measurements against set standards and then tuning them to meet the desired limits. Both these operations are enabled through editing (and writing) variables or executing well defined methods. Monitoring is an operation which involves observing values of a set of variables. This could be achieved simply by reading the variable values in different menu groups, or through visual constructs such as Graphs, Charts, and so on.

Diagnosing a device may involve any combination of reading/writing or observing a set of variables through various constructs. Quite often diagnostics may involve executing a method to perform a well defined procedure to see the behavior. All HART devices have special variables which indicate the diagnostic status of a device as well. In common terms, the diagnostic status of a device is often termed as device health as well. Besides these an interface of a device may also contain certain other constructs such as Images, Grids, and so on. These are primarily meant for aiding the above-mentioned operations.

The "Functions" tab under the device home page provides the entry points for navigating through the device specific user interface to perform the above mentioned operations. A device may define up to four entry points in the DD file which are presented as is. All devices shall have at least one entry point and generally it is called as "Online". Besides the device specific entry points FDC provides custom entry points for navigational aids to specific type of information/features. One such entry point is called as Device Status used for reviewing device health and the other one is called as Methods List, used to navigate to all the methods available in a device.

All the device specific entry points present the device interface, as explained using the Online entry point as an example. All the other device specific entry points have the similar interface except for the fact that the variables and other DD constructs provided under each may vary as indicated by the title of each entry point.
For the sake of explanation, the pages that appear on navigating through the device specific entry points

are called as "Device Configuration" pages in this document. However it must be noted that this does not prohibit you from performing other device operations as explained above.

Online Entry Point: When you tap on to open the online tab, the device configuration screen appears as shown in the following figure.
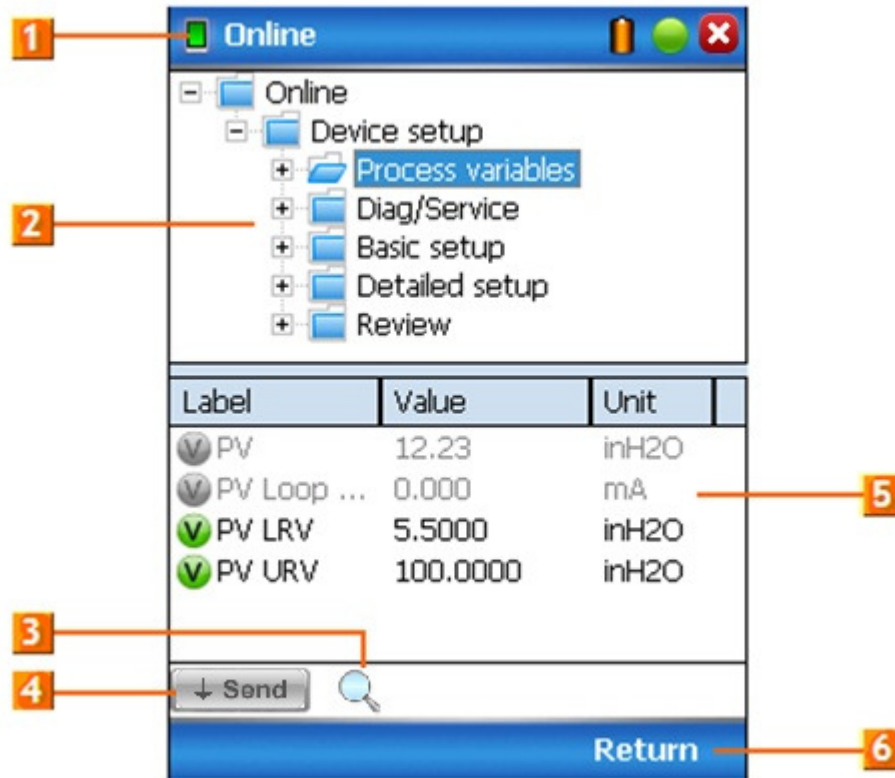
Figure 4-4 Device configuration screen

Table 8 lists the items and its descriptions that appear in the device configuration screen.

Table 8 Device configuration screen elements

Items	Descriptions
1	Device configuration page icon and title.
2	Top pane which consists of set of menu options in hierarchy as defined in the DD file.
3	Tap to search items in the current entry point for the device.
4	Tap to review and send edited variables to the device. This becomes enabled only if at least one variable has been edited.
5	Bottom pane which consists of items corresponding to the selected menu.
6	Tap to return to Device homepage

A **Device Configuration** page is split horizontally into an upper and lower pane. The top pane displays the set of hierarchically organized groups called menus and the bottom pane displays the set of corresponding items under each menu. The bottom pane has three columns: Label, Value, and Unit. FDC also displays an icon against each item to visually identify different types of items. The Value and Unit columns apply only to the items of type "Variables". The items which are read only are displayed in Grey font, whereas others are displayed in Black font.

Table 9 lists the icons that appear in the Device Configuration screen.

Table 9 Device configuration screen icons

Icons	Descriptions
	Indicates a menu or submenu in the navigation tree.
	Indicates a currently selected menu or submenu in the navigation tree.
	Indicates a Method item.
	Indicates a Variable item.
	Indicates an Edit Display item.
	Indicates a Grid item.
	Indicates a Chart item.
	Indicates a Graph item.
	Indicates an Image item.

When you navigate to a specific menu in the top pane, FDC displays the items under that menu in the bottom pane. If the some of the items under the menu are variables (or parameters) then FDC also fetches their corresponding values from the device and updates them. Some of these variables are dynamic in nature which means their value changes without any input from the user. In such cases, FDC synchronizes and refreshes the values on periodic basis when such dynamic variables are on display.

Viewing different type of variables

The variables when present under a menu are typically displayed with their label, value and unit. Note that for some variables, the unit may not be applicable. Some variables just display a hexadecimal value against their labels. When you select such a variable, "View" option gets enabled on the menu bar. Tap View to see the details of the selected variable.

Editing device variables

To edit the variables, perform the following steps.

Note: Consider the following scenario as an example for an entry point. The entry points vary from device to device depending on the DD files.

1. On the **Device Home** page, tap **Functions** tab.

2. Tap **Online > Select**.

3. The **Device Configuration** page appears which displays the top and bottom panes.

4. Navigate to the desired menu. The bottom pane will display items under that menu.

5. Select an editable variable from the list.

   Note: An editable variable can be differentiated from a read only variable, the read only variable is displayed in Grey text, whereas an editable variable is shown in Black text.

6. Tap Edit.

   Note: If the variable has been defined as a Loop Warning Variable then following dialog appears:
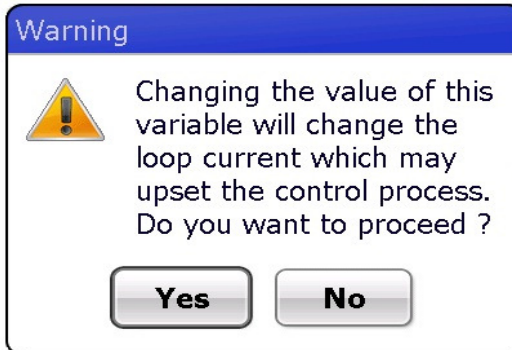
7. Press **Yes** to proceed.

   Further, if there are Pre-Edit Actions defined in the DD file for this variable, method dialog executing those methods appear. Respond to the steps in those methods to proceed to the edit dialog box.

8. The Edit dialog box appears with appropriate key pad as described in <u>Input dialog in FDC</u> section.

9. Modify the value using the keypad and tap **OK**.

   Note: If there are Post-Edit Actions defined in the DD file for this variable, method dialog executing those methods appear. Respond to the steps in those methods to proceed to finish the edit process.

10. Once successfully edited the variable value field turns yellow to indicate that the value has been modified, but not sent to the device.
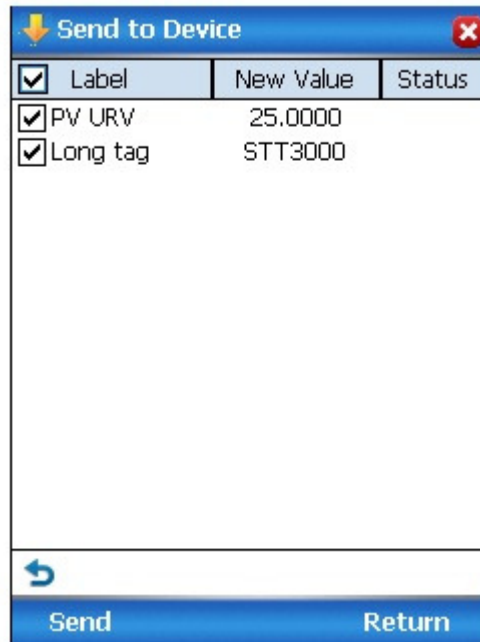
Updating the device with edited variables

Editing the variables does not automatically send them to the device. You must explicitly perform the action of sending the values to the device to update it. Once you have edited one or more variables as explained above, the **↓ Send** icon at the bottom left corner of the page becomes enabled.

To update the device with edited variables, perform the following steps.

1. Tap **↓ Send** to send the edited variables values to the device.

    The **Send to Device** page appears.

This page allows you to review the values you have edited and provides you a choice to either send the values to the device or even canceling your changes. To cancel your changes, simply select a required variable and tap reset, this action will restore the value of that variable(s) to the previous value.

2. Select the variable(s) whose value you want to send to the device.

3. Tap **Send** and the send process starts.

4. Subsequently, the status of the send process is updated against each variable.

If the variables are updated successfully to the device, status appears as **SUCCESS** in green color; and if failed, status appears as **FAILED** in red color.

5. Tap to close the current page and to return to the previous page.

Note: Use to reset the selected variable's values. Double tap on FAILED status to view the reason.

Searching for an item

Often it is very tedious and time consuming to navigate to a specific item through a deeply nested menu structure. FDC allows you to search for an item in a particular entry point.

Using Search option, you can search for a device variable which is specific to the entry point, perform the following steps.

1. Under the **Functions** tab, choose **Online**.

2. Tap ![search icon] icon on the bottom left part of the page.

   The **Item Search** dialog box appears.

3. Under **All or part of the item label**, tap. ![pencil icon]

4. Enter all or part of the item label you want to search using the keypad.

5. Tap **OK**.

6. You can refine your search by selecting the type of item you want to search using **Search In** list.

7. Tap **Search**.

8. Under **Results**, select any of the results.

9. Tap **View**.

The searched item is highlighted in an expanded the tree view of menus in the top pane and the corresponding items in the bottom pane.
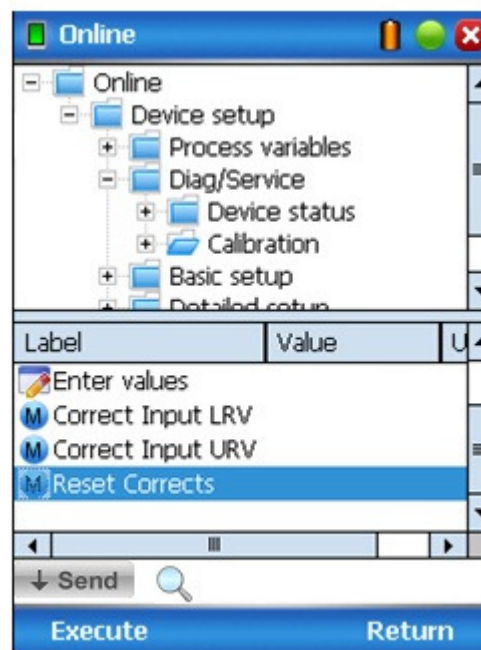
Note: Searched item is not shown if it is invalid in the device.

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Device Health Indicator and Details

Using the standard features of the HART communication protocol FDC provides an indicator of the device's health through a LED indicator on the title bar of each page. Quite often the details of such health indicators are available through different variables under different menus. FDC however provides an entry point on the functions tab to view the details of the device health indicators.

The Device Status entry point under the functions tab provides the details of device as under:

- **Device status**: Indicates the current status of the device with respect to different standard parameters such as process value, analog output, device malfunction and power reset etc. This also indicates if the device has more detailed status information available that may need attention.

- **Communication status**: Indicates the details of communication errors that might have occurred with communication to the device.

- **Extended Device Status**: Each HART device has a set of variables which can indicate an extended status for the device and its health. The numbers, labels and descriptions of such variables varies from device to device. FDC simply presents such variables to you as defined in the DD file. So if the Device Status has an indication that there's more status available for the device, these are the variables you should investigate for further details.

Perform the following steps to view the details of device health.

Note: For example, consider the following scenario.

1. On the **Device Home** page, tap **Functions** tab.

2. Under the **Functions** tab, choose **Device Status**.

    The **Device Status** page appears.

3. From the drop down list select any of the variables to view the details.

4. Tap **Return** to close the Device Status page and return to the Device Home page.

Graphical items in a device interface

Devices using the Electronic Device Description Language (EDDL) constructs often enable you to view the device data as graphical/visual representation. These constructs are described in subsequent sections.

Graphs

A graph is a visual representation of the device data plotted with reference to a set of axes. A graph has a common x-axis for all the data plotted. Each graph has one or more static curves obtained by joining the plotted pair of data points. Such curves are called as Waveforms. A set of waveforms may share a common Y axis. Based on the DD file, different colors for the waveform and axes are displayed. In addition, you can edit the waveforms and view the legends.

To view a graph, perform the following steps.

1. On the **Device Homepage**, tap on **Functions** tab.

2. Tap on **Online > Select**.

3. The **Device Configuration** screen appears which displays the top and bottom panes.

4. Navigate to the desired menu. The bottom pane will display items under that menu Select any graph from the list of available graphs which appear on the bottom pane.

5. Tap on **View**.

The graph screen appears.
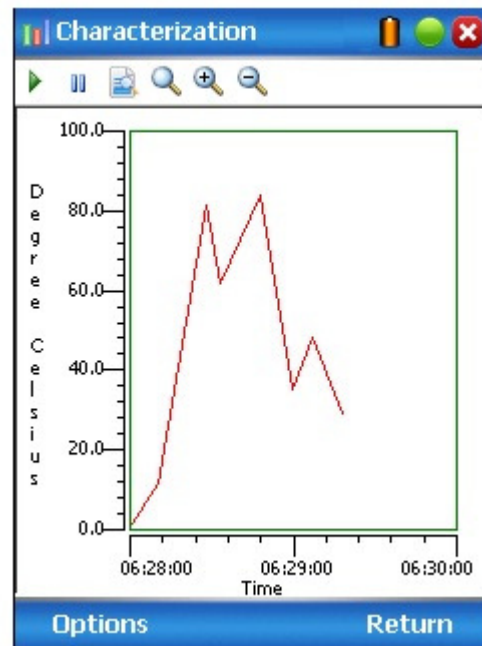
6.   Tap Options > Select Waveform.

     The **Select Waveform** dialog box appears.

7.   Select the required waveform and tap **OK** to view the graph of the selected waveform.

8.   Tap **Options > View Legends**.

     The **View Legends** dialog box appears with the legends.

9.   Tap **Close** to close the **View Legends** dialog box.

10.   Tap **Options > Edit Waveform**.

     The **Edit Waveform** dialog box appears. This lists the x,y pairs for the waveform. The non-editable
     values are shown in grey.

11.   Select the required value and tap **Edit**.

     The **Edit Variable** dialog box appears.

12.   Edit the value and tap **OK** to return to **Edit Waveform** dialog box.

     Note: The edited value is highlighted in yellow color.

13.   Tap **Return** to return to the graph page. The waveform is now updated with the edited value.

14.   Tap **Return** to close the graph page and return to the menu navigation view.

Charts

A chart is a graphical representation of the device data as it changes over time. The x-axis in a chart is always time. A chart may display one or more trends which are collectively called as a Source. Further, a chart may have more than one source which you may select to view. The colors, labels, and axes of charts may vary from device to device as defined in the DD file. The rate at which the chart is refreshed is governed by the DD file. The default refresh rate is 3 seconds.

The following are the types of charts.

- **Strip**: In a Strip chart data scrolls from right to left. New data is updated at the right end of the chart with the historical data shifted to the left. Older historical data scrolls off to the left end of the chart.
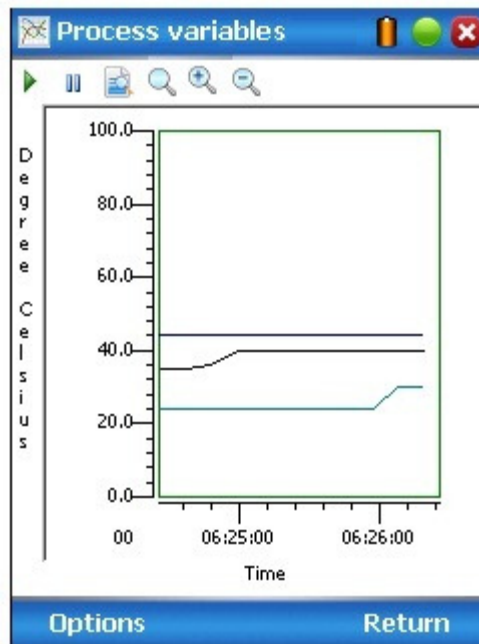
- **Sweep**: A Sweep chart updates from left to right overwriting the oldest displayed historical data in the process. A vertical line separates the old data from the new and scrolls as the new data displays. When the plot reaches the right most end of the chart, the data begins plotting again from the left end of the chart.
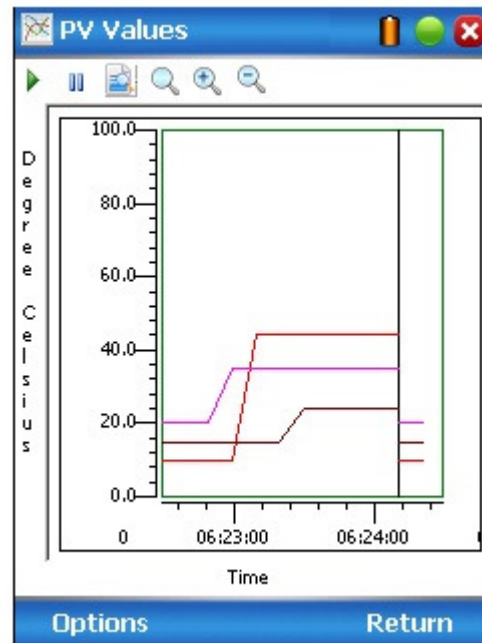
Scope: A Scope chart updates from left to right. When the plot reaches the right most end of the chart, the display is erased and the data begins plotting again from the left end of the chart.
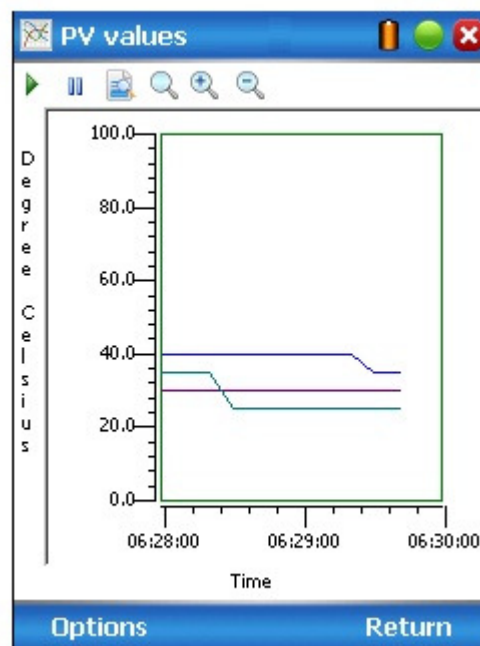
- **Gauge**: A gauge chart formats the device data into a view similar to circular, dial-type analog meter. The indicator is a pointer that rotates as the current value varies with time.
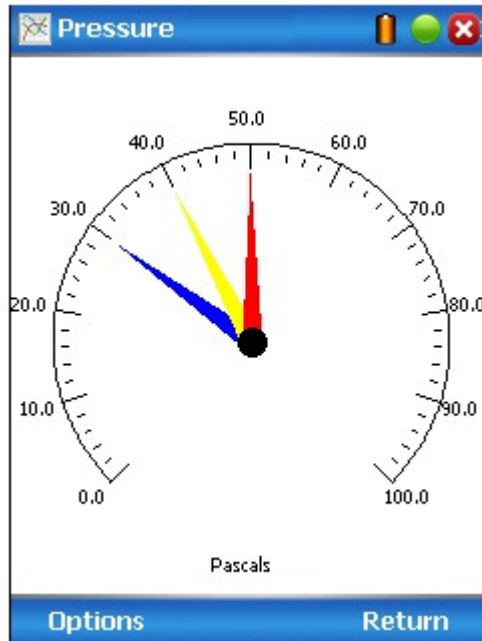
- **Bar Charts**: A bar chart displays the device data in bars varying with time. A bar displays values from bottom to top with its origin (minimum value) at the bottom of the chart Alternately, a bar may also displays values horizontally from left to right with its origin (minimum value) at the left of the chart
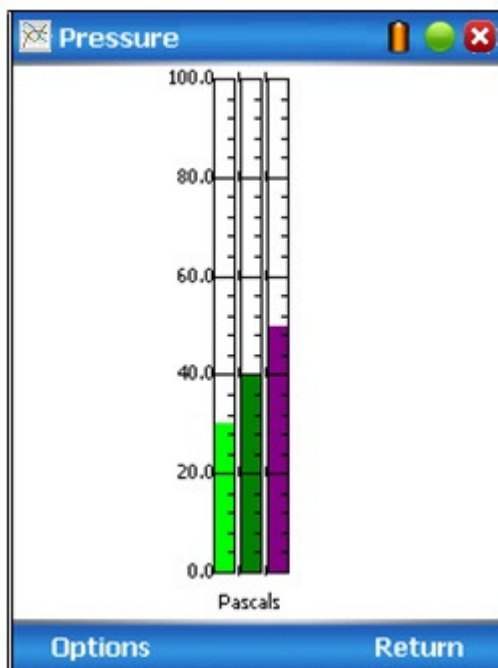
To view a chart, perform the following steps.

1. On the **Device Home** page, tap **Functions** tab.

2. Tap **Online > Select**.

3. The **Device Configuration** page appears which displays the top and bottom panes.

4. Navigate to the desired menu. The bottom pane will display items under that menu. Select any chart from the list of available charts which appear on the bottom pane.

5. Tap **View**.

    The chart page appears.

6. Tap **Options** > **Select Source**.

7. The **Select Source** dialog box appears.

8. Select the required source and tap **OK** to view the chart of the selected source.

9. Tap **Options** > **View Legends.**

10. The **View Legends** dialog box appears with the legends.

11. Tap **Close** to close the **View Legends** dialog box.

12. Tap **Return** to close the chart page and return to the menu navigation view.

Note: The following options are available on the tool bar of the graph/chart page.

Table 10 Tool bar on graph/chart page

Options	Descriptions
	Tap to zoom out.
	Tap to zoom in.
	Tap to change from pan mode to zoom mode.
	Tap to pan.
	Tap to pause trending.
	Tap to resume the normal mode
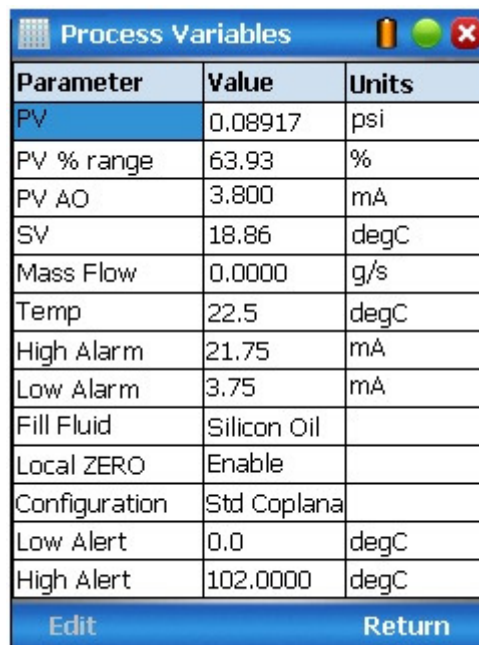
Grids

A grid is a structure to display related device information in tabular form. The data may be organized with either the column headers or with the row headers.

To view a grid, perform the following steps.

1. On the **Device Home** page, tap **Functions** tab.

2. Tap **Online > Select**.

3. The **Device Configuration** page appears which displays the top and bottom panes.

4. Navigate to the desired menu. The bottom pane will display items under that menu. Select any grid from the list of available grids which appear on the bottom pane.

5. Tap **View**.

The grid page appears.

Parameter	Value	Units
PV	0.08917	psi
PV % range	63.93	%
PV AO	3.800	mA
SV	18.86	degC
Mass Flow	0.0000	g/s
Temp	22.5	degC
High Alarm	21.75	mA
Low Alarm	3.75	mA
Fill Fluid	Silicon Oil	
Local ZERO	Enable	
Configuration	Std Coplana	
Low Alert	0.0	degC
High Alert	102.0000	degC

Process Variables — Edit / Return

6. Select a value and tap **Edit**.

The **Edit** dialog box appears.

Note: The **Edit** option is enabled only if the value is editable.

7. Edit the value and tap **OK** to return to grid page.

Note: The edited variable is highlighted in yellow color.

8. Tap Return to close the grid page and return to the menu navigation view

Images

An image is a picture of an object related to the device as defined by the DD file. An image may display anything from company information/logo to device image and drawings, and so on.

To view an image, perform the following steps.

1. On the **Device Home** page, tap **Functions** tab.

2. Tap **Online > Select**.

3. The **Device Configuration** page appears which displays the top and bottom panes.

4. Navigate to the desired menu. The bottom pane will display items under that menu. Select any image from the list of available images which appear on the bottom pane.

5. Tap **View**.

    The image page appears.

7. Tap **Return** to close the image page and return to the menu navigation view.

Executing methods on a device

To execute methods on devices, perform the following steps.

Note: For example, consider the following scenario to execute Loop test.

1.   On the **Device Home** page, tap **Functions** tab.

2.   Tap **Online > Select**.

3.   The **Device Configuration** page appears which displays the top and bottom panes.

4.   Navigate to the desired menu. The bottom pane will display items under that menu.

5.   Select a method from the list. For example, **Loop Test**.

6.   Tap **Execute**.

  A warning message appears displaying a message that loop must be removed from the automatic control.

7.   Tap **OK**.

8.   The **Loop Test** dialog box appears displaying the information to choose analog output level.

9.   Choose the analog output level and tap **OK**.

    Note: To cancel the method execution, tap **Abort**.

10.   A message appears displaying the information that the output value of the device is fixed.

11.   Tap **OK**.

12.   The **Loop Test** dialog box appears displaying information to choose analog output level.

13.   In the Choose analog output level combo box, tap to select **End**.

14.   Tap **OK**.

    The method is executed successfully.

Saving device history

FDC provides you a feature wherein you can save the device configuration snapshot as history. This history record may then be transferred to a central asset management database such as FDM.

Using this feature you can save the device configuration snapshot as device history of a connected device at any given time in a predefined location. The following are the features of save device history option.

- Two formats of history are supported: FDM and DocuMint.

- Only one snapshot per device instance is allowed to be saved and you can save the snapshot of a device any number of times overwriting the existing one.

To save device history, perform the following steps.

1. On Device Home page, tap Tools.

2. Select **Save History** and tap **Select**

   The **Save History** page appears.

3. Enter the **History Record Name** using the keypad and tap **OK**. History Name field accepts alphanumeric characters, underscore, and no other special characters.

4. Enter the **Device Tag** using the keypad and tap **OK**. Device Tag field accepts alphanumeric characters, underscore, and no other special characters.

   Note: The device can be identified with **History Record Name** and **Device Tag** in FDM, once the record is imported in FDM, provided the device is not already present in the FDM network.

5. Select the **Format**. The following are the available formats:

   - FDM

   - DocuMint

6. Tap **Save** to save device history record.

7. If a history record for this device already exists, the following warning message appears.

---
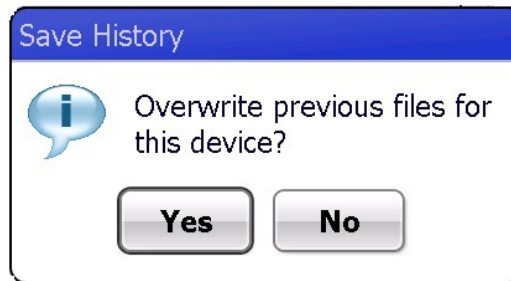
8. Tap **Yes** to overwrite the existing name. A overwrite success message appears.

9. Tap **OK** to return to **Device Home** page.

Exporting device history records to FDM

The history snapshot saved in FDC can be imported into FDM for record and audit purposes. This is enabled by the standard Import/Export wizard in FDM. This way FDM allows to synchronize the device configuration data through the MC Toolkit handheld.

To export device history from FDC and import it in FDM, perform the following steps.

1. Connect your MC Toolkit handheld to your computer as described earlier.

2. Browse to the folder on your computer, **SD Card > FDC > Resources > History**.

3. The FDC history records are named as per the following convention for the primary name: **DeviceTag_ManufacturerIDDeviceTypeDeviceRevisionDDRevision_DeviceID**

4. Copy the desired Device History Record files (with .fdm extension) from the above mentioned location to a temporary location on FDM Client computer.

5. Use FDM Import/Export wizard to import the history records into FDM. After you import successfully:

•   The snapshot would get imported into FDM database and appear as a history record for the corresponding device in FDM.

•   The Audit Trail entry for such a record identifies it as being imported through the MC Toolkit handheld.

•   If the device is not part of any of the FDM configured networks, it would appear under '**Disconnected Devices'** in FDM network view.

•   All operations allowed on Device History Record in FDM will be allowed for the record imported through the MC Toolkit handheld.

    Note: For more details on using FDM Import/Export feature, refer to section Importing and Exporting Device History in FDM User's Guide.

Exporting device history records to Documint

To export device history from FDC and import it in FDM, perform the following steps.

1. Connect your MC Toolkit handheld to your computer as described earlier.

2. Browse to the folder on your computer, **SD Card > FDC > Resources > History**.

3. The FDC history records are named as per the following convention for the primary name:
    DeviceTag_ManufacturerIDDeviceTypeDeviceRevisionDDRevision_DeviceID

4. Copy the desired Device History Record files (with .xml extension) from the above mentioned location to a temporary location on the DocuMint system.

5. For Importing in DocuMint: Select Procedures > Import or the Import option in the tool bar.

    Note: For more details on using DocuMint Import feature, refer to section Importing from XML File in Document Help.

Custom Views

FDC provides you a unique feature wherein you can choose what you want to view in a device and thus creating your own custom views. This is a very convenient utility when you are interested in select few variables in a device and saves you the time for navigating through the menus.

You can create two views per device type with maximum of 10 variables selected for each custom view.

To create/modify the custom views, perform the following.

1. On **Device Home** page, tap **My Views**.

2. Tap Configure and tap Select.

    The Configure My Views dialog box appears.

3. To customize **View1** and **View2**, select the variables by checking the box against desired variables.

4. Tap ⬅ or ➡ to navigate to previous and next set of variables.

5. Once done, tap **Options** to select **Save My Views**.

    Two custom views are ready with selected variables.

    Note: Since a custom view can contain only up to 10 variables each, a warning is displayed if you have selected more than 10 variables.

    To rename the views, perform the following.

6. Tap **Options > Rename View1**.

    A dialog box appears informing you to enter the name.

7. Tap **Ok**.

8. Tap Option>Save to persist the change

9. Tap **Return** to return to My Views page. You would see two options with the names you gave to the newly created views.

Note: To view the custom views, tap **My View 1 > Select**.

The My View 1 page appears.

The editing and other features are as explained in the earlier sections.

4.7   Offline configuration

Overview

Offline Configuration refers to configuring a device when the device is not physically present or communicating with the application. This process enables you to create and save a configuration for a device, even when the device is not there physically. Later when the device becomes available with live communication, the same configuration can be downloaded to the device. This feature enables you to save on device commissioning time and even helps you to replicate the configuration in multiplicity of devices with lesser efforts. Currently, FDC does not support creating offline configuration. However, it supports importing of offline configuration from FDM R310 or later versions. The configurations thus imported can be downloaded to the device from FDC.

The following are the tasks that you need to perform for importing offline configuration in FDC application software and then downloading it to the device.

- Create offline configuration template in FDM

- Save the configuration in FDM in FDM format.

- Import the offline configuration in FDC

- Download the offline configuration to the device

Note: For details on creating and using offline configuration, refer to section Offline configuration in FDM User's Guide.

Importing offline configuration

Using this feature you can import offline configuration template. The offline configuration template has to be created in FDM and saved in FDM format. Copy the .fdm files into the storage location of the FDC.

To import an offline configuration, perform the following steps.

1.   On the FDC homepage, tap Offline Configuration > Select.

     The **Offline Configurations** page appears.

2.   Tap **Options > Import**.

     The **Select a File** dialog box appears.

3.   Navigate to the location where the offline configuration template is stored.

4.   Select the required offline configuration template from the list.

5.   Double-tap and the offline configuration template is imported.

     A success message appears.

     Note: In case if the offline configuration template is already imported, an overwrite message appears.

6.   Tap **OK** to return to the **Offline Configurations** page. The device details appear on the bottom of the page.

Deleting offline configuration

Using this feature you can delete an offline configuration template.

To delete an offline configuration, perform the following steps.

1. On the FDC homepage, tap Offline Configuration > Select.

    The **Offline Configurations** page appears.

2. Select the required offline configuration template from the list.

3. Tap **Options > Delete**. A warning message appears.

4. Tap **Yes** to delete the offline configuration template.

Downloading an offline configuration

Using this feature, you can download the offline configuration when the device is online.

To download an offline configuration, perform the following steps.

1. On the FDC homepage, tap **Offline Configuration > Select**.

    The **Offline Configurations** page appears.

2. Select the required offline configuration template from the list.

3. Tap **Options > Download**.

    The **Offline – Select Variables** page appears with the all the variables.

    Note: By default, all the variables selected in FDM will appear as selected and non-editable variables appear in grey color.

4. Select the required variable. In case you select a dependent variable, then variables on which it is dependent on will also be selected and the following warning appears.
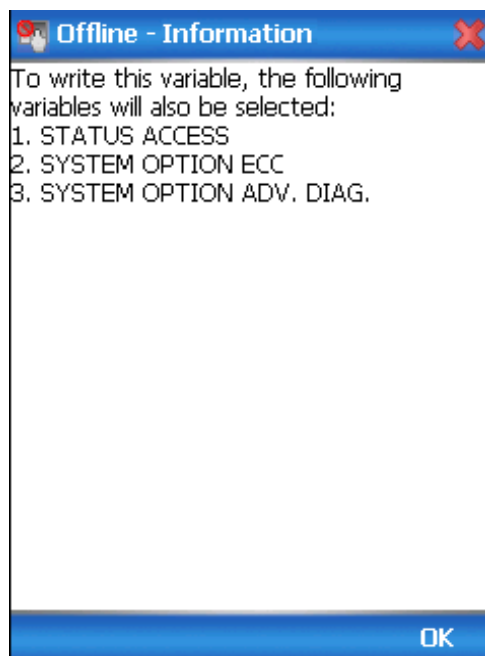
5. Tap **OK** to return to the offline wizard.

6. Tap **Next**.

    The **Offline – Review and Send** page appears with the list of selected variables.

7. Tap **Send** and the process to send the variables to the device starts. Once the downloading is complete, the following page appears.

Note: If the variables are downloaded successfully, status appears as **SUCCESS** in green color; and if failed, status appears as **FAILED** in red color.

8. Tap **Finish** to return to **FDC Homepage**.

5. Managing DE Devices using MC Toolkit Software

5.1   Starting MC Toolkit application

To start the MC Toolkit application, perform the following steps.

1.   Turn on the MC Toolkit.

Note: For information on turning on the MC Toolkit, refer to section 3.5 Start up, Shutting down the MC Toolkit and 3.6 Application icons.

2.   Select the MCToolkit icon

The MC Toolkit homepage appears.

5.2   Overview of MC Toolkit Homepage

MC Toolkit Homepage allows user to select the Configuration Mode; Online or Offline. It also offers menu options; File, Modem and Help. The details of the Menu are given under the Menu Bar topic.
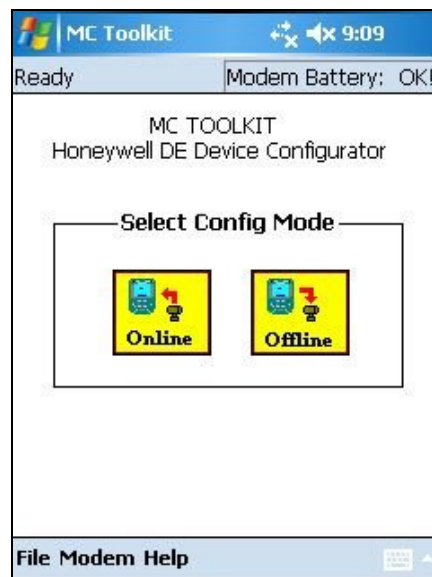
Online and Offline Modes

Online: "Online" button allows you to establish connection to a device and allows following operations:

- upload of the device database
- configuration of parameters,
- Calibration and
- Diagnostics.

In addition, the online configuration allows saving the current configuration to a file

The following devices are supported:

- Honeywell Smart Pressure Transmitters: ST 3000, ST 800
- Honeywell Smart temperature Transmitters: STT25M, STT25D, STT350

Offline: "Offline" button allows you to select a basic offline template, edit the parameters and download to a device after establishing connection. The updates to the parameters can also be saved into the file without actually downloading to the device. Complete detail is provided under "Offline Configuration" section 5.6

MC Toolkit Power ON	Allows DE Operating Procedures

5.3   MC Toolkit Application Software Display Conventions

Navigation

Menu Buttons
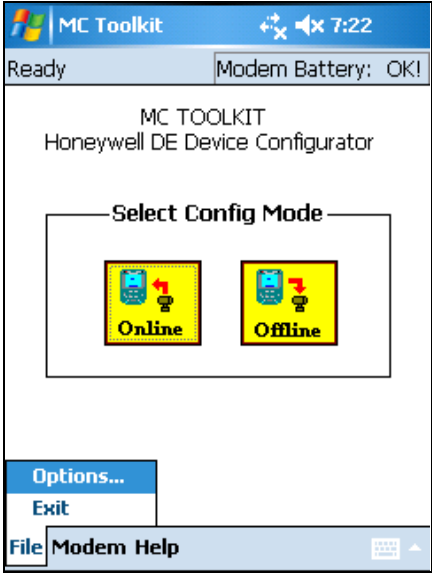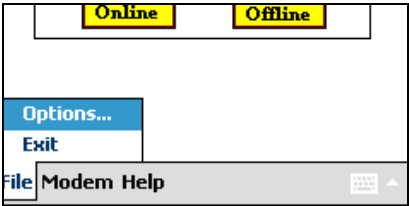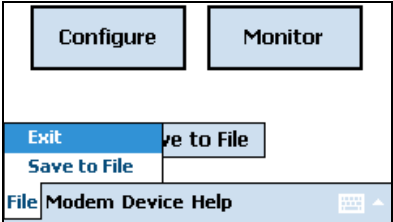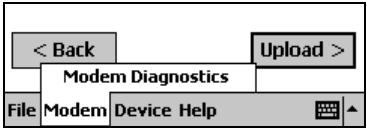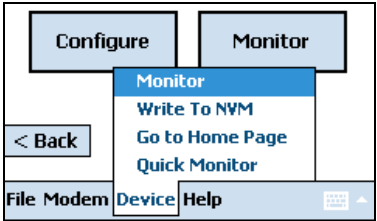
In general, selecting a button in a display will call up the next-lower-level display, whose title is the same or similar to the label on the button. A menu tree for Honeywell DE Displays is given under Menu Bar, Menu Selections and HELP display table.

Back Button

In general, selecting the **Back** button at the bottom of any display will call up the previous display.
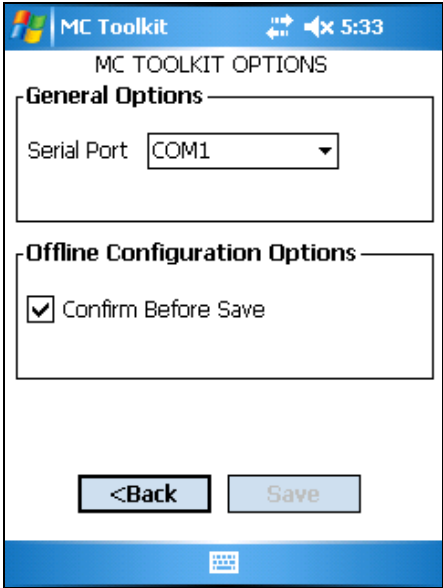
In most displays, the Back button is at bottom-right or bottom-center. When it appears at bottom-left, along with a left-pointing arrow, it indicates that selecting the **Back** button will necessitate a new Upload.

Menu Bar

Menu Bar, Menu Selections, and HELP display		
Menu selections	The menu bar, at the bottom of each display, enables you to perform file, diagnostic, and utility functions. Typical displays are shown below. Menu selections are shown in detail at right. 	File menu on Startup screen: File menu in Online mode:

Menu Bar, Menu Selections, and HELP display
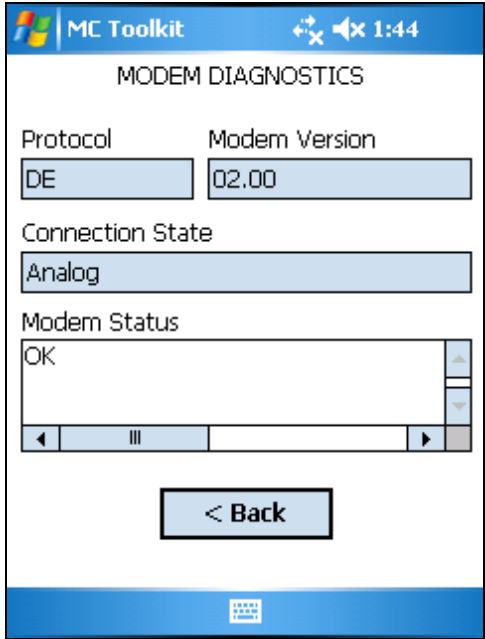
File Menu

File (Startup screen)	**Exit** Closes the MC Toolkit application **Options** Calls up the MC Toolkit OPTIONS Dialog. See <u>MC Toolkit Options dialog</u> for details.	 General Options allows selection of COM Port. For the PDA it is always COM1. Offline Configuration Options has Offline Configuration Settings. The details will be under "**MC Toolkit Options dialog**"" section
File (Online mode)	**Exit** Closes the MC Toolkit application **Save to File** Enables export of database parameters in XML format, which can be used by other programs such as DocuMint. (Refer to the Reference Data section 5.8 for more information.) This selection is not available until a transmitter database has been uploaded.	To export an XML file, select File, Save To File. A popup message appears. Select the **OK** button.
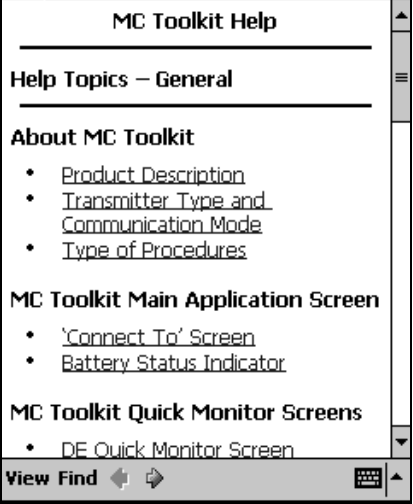
Modem Menu

Note: Before you begin Upload or Download operation it is important to make sure that the modem status is good.

Select Modem\Modem Diagnostics and make sure that BOTH Modem Battery and Modem Status are OK. Do not continue in case of any bad status.

Modem Diagnostics	Modem Battery: Must display Ok to proceed Modem Version: Current Modem firmware version on the xx.xx form Protocol – Always DE (This information is for diagnostic purposes since the modem can handle both HART and DE protocols) The Connection State may be: • Analog • 4 Byte DE • 6 Byte DE Modem status may be Ok to proceed. • Modem ROM Failure! • Modem RAM Failure! • Modem Battery is Low!	

Help Menu

HELP display	The Help display is available whenever the MC Toolkit is active.
	
	It includes three groups of topics, each of Selectable from the **Help** Menu
	
	   - General
	   - DE
	
	Each group includes a list of topics. Each topic (in blue, underlined letters) is selectable to provide direct access to the Help information.
	
	Dragging the cursor in the scrollbar at right enables viewing of all three groups of topics. At the bottom of each group, a Back to Top selection moves the display to the beginning of the first group of topics.
	
	Note:
	The **View, Find** and (arrows) selections at the bottom of the screen apply to the Help that applies to the Pocket PC, and not to the MC Toolkit application.
		MC Toolkit Help
		
		Help Topics – General
		
		About MC Toolkit
		  • Product Description
		  • Transmitter Type and Communication Mode
		  • Type of Procedures
		
		MC Toolkit Main Application Screen
		  • 'Connect To' Screen
		  • Battery Status Indicator
		
		MC Toolkit Quick Monitor Screens
		  • DE Quick Monitor Screen
		
		View Find

About MC Toolkit	Shows the Product Description Type of Transmitter and Communications being used Type of procedures that can be configured	

Data Entry and Display

Key number / Description	Illustration: Key Numbers
1. Box with no arrow and with gray background indicates a read-only (R/) field. Numeric or text values in transmitter are displayed only; user entry or modification is not permitted.	
2. Box with white background and with no arrow indicates Read/Write (R/W) text or numeric input field. Values previously stored in memory (of the transmitter or of the MC Toolkit) are displayed. You can enter or modify values using an appropriate Input Method (e.g., Keyboard).	
	Entering a new value turns the background yellow, indicating that the value in the box is different from the value in memory.
	When the **Send** button **(6)** is selected, the value in the box is copied to memory in the transmitter, and the background color returns to white.
	If you exit the screen before using the Send button, the changes will be ignored.
3. Box with white background and arrow at right indicates a read/write (R/W) selection list. The value previously selected and stored in memory is displayed. Selecting the arrow at right presents a list of available selections, and selecting an item from the list places it in the selection box.	
	If you exit the screen before using the Send button, the changes will be ignored.
4. The label above the box indicates the meaning of the data inside the box.	
5. The **Back** button at the bottom of the display causes the display that was viewed previously to return the screen.	
6. The **Send** button is at half intensity when no values have been changed. It changes to full intensity when one or more of the boxes contain a changed value. Selecting the **Send** button when it is highlighted will copy all changed values to memory, and the button will return to half-intensity.	

5.4   Overview of device configuration

Using online configuration, you can configure, calibrate, monitor and diagnose a DE device which is connected to MC Toolkit. After making changes to the device you can also save the current configuration of the device into a file that can be used in Offline mode to download to other similar devices.

5.5   Online configuration

Detecting and loading a device

"Online" button allows you to establish connection to a device and do Online operations

Online Mode Introduction

This section contains procedures for using the **MC Toolkit application software** to communicate with Honeywell DE Transmitters.

On the Homepage select "Online" button to proceed with Online Configuration features.
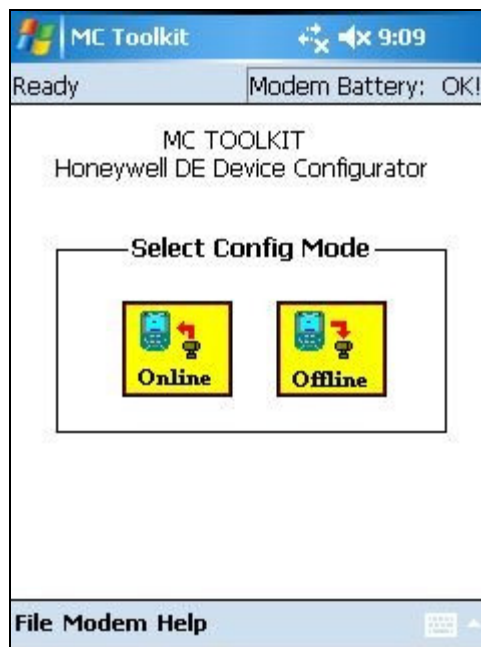
For specific data relating to parameters involved in the procedures, refer to Reference Data in section 5.8
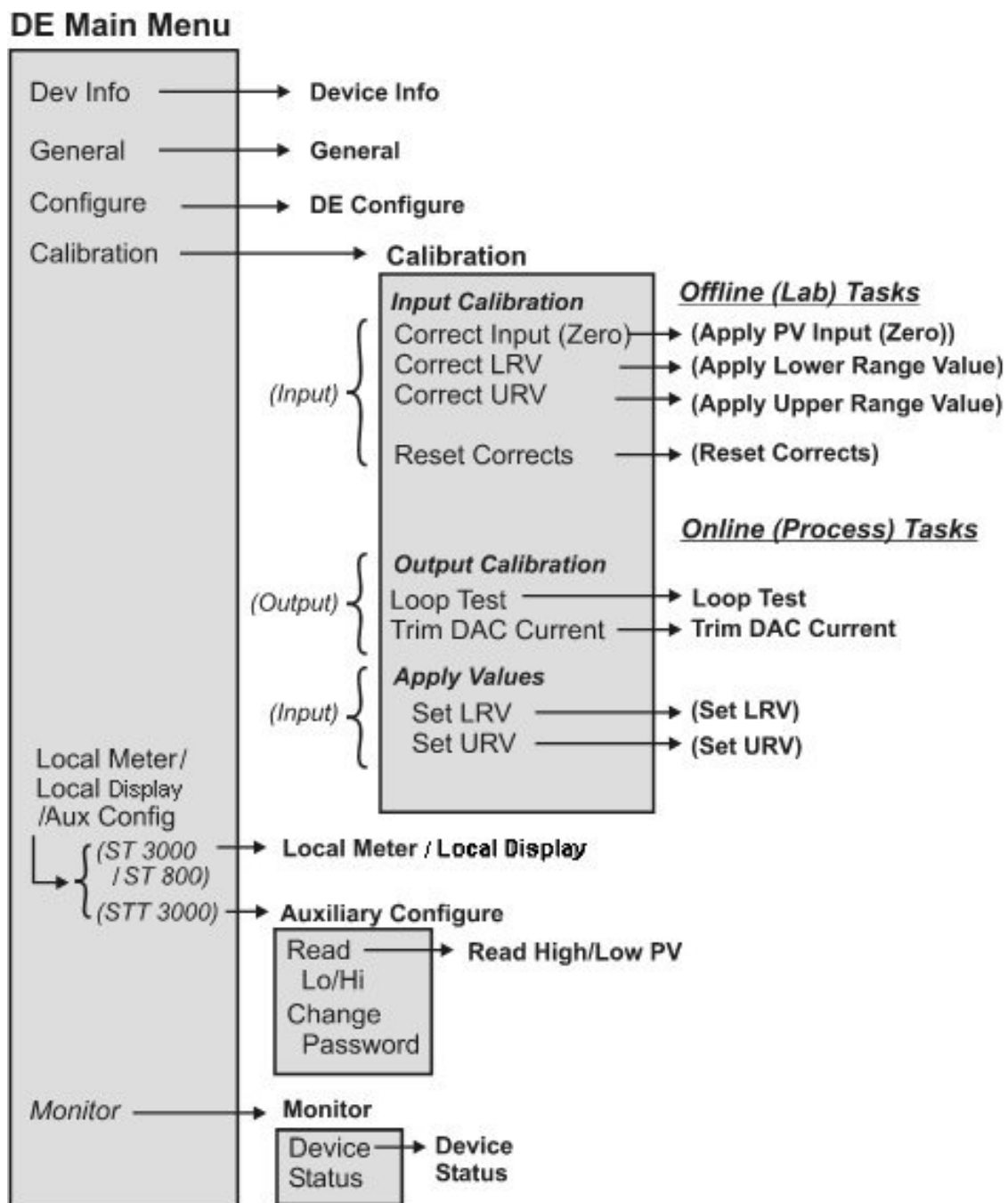
Figure 5-1 Menu Tree - Honeywell DE Displays

Summary of Operating Procedures

To access displays for Honeywell DE Transmitters:

- Start the MC Toolkit application; the MC TOOLKIT ... display will appear. Refer to 5.1 Starting MC Toolkit application.

- Upload the database from the transmitter. (The QUICK MONITOR display will enable viewing of key parameters before taking the time for database uploading.) The DE MAIN MENU appears. (Refer to 5.3 MC Toolkit Application Software Display Conventions in this section.)

- Select the appropriate display from the DE MAIN MENU. (Refer to Table 11 DE Displays / Tasks Summary in this section, and to the list of DE displays.)

The content of each display is summarized in Table 11.

Table 11 DE Displays / Tasks Summary
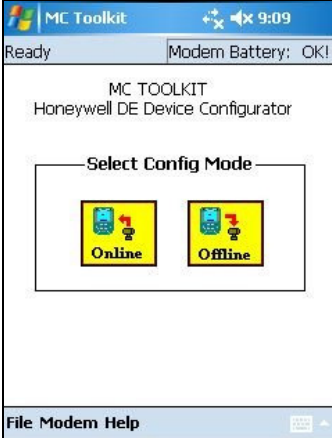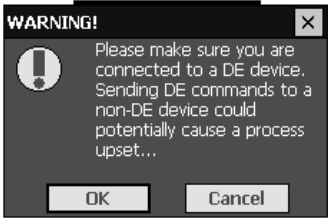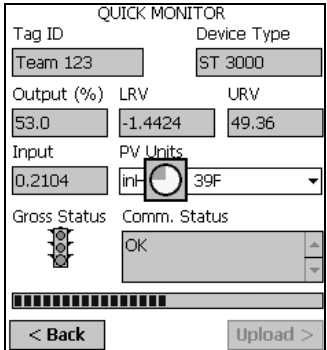
Menu Item	Task	
DEVICE INFO	Enter: Device Type: • Tag ID • Message (in Scratch Pad)	Observe (Read): • Type • Serial Number • Firmware Version
GENERAL	Select: • PV Type Enter: • Comm Mode • Line Filter (STT) • T/C Fault Detect (STT)	Observe (Read): • Failsafe Direction
DE CONFIGURE	Select: • PV Units • SV Units • Conformity (ST) • Damping • Sensor Type (STT) • Linear Enter: • LRV • URV	Observe (Read): • LRL • URL • Span • Sensor Type (ST)
CALIBRATION	Enter/Select: • Correct Input (Zero) • Correct Input (LRV) • Correct Input (URV) • Reset Corrects (Zero, LRV, URV) • Loop Test (Check Analog Output Level) • Trim DAC Current (Calibrate output current) • Apply Values (that is, re-range LRV and URV to PV input)	Observe (Read): • Input at Zero, LRV, and URV • (Verify) Reset Corrects • Loop Current (continuity) • Output Current level (at 0 %, 100%) • Applied values of LRV and URV

Menu Item	Task	
LOCAL METER	Select: • Meter Units (EU) Enter: • Custom Units • (Custom) Flow (EU) value: Upper, Lower	Observe (Read): • Meter Hardware Type •
LOCAL DISPLAY	Select: • Display Units (EU) Enter: • Custom Units • (Custom) Flow (EU) value: Upper, Lower	Observe (Read): • Display Hardware Type
MONITOR		Observe (Read): • Input value • Output value • Secondary (Input) value • Gross Status (code) • Device Status (Messages)
Auxiliary Configuration (STT 3000)	Select: • Critical Status Latching • Write Protection • NAMUR • CJ Compensation Enter: • CJ Temp • Password (Write Protection) • New Password	Observe (Read): • High/Low PV Values

Procedural Considerations

De device Upload, Configuration and Calibration procedures are listed in the tables below.

Table 12 DE Upload Procedures

DE Upload Procedures			
		Select the **Online** button This Warning message appears.	If the MC Toolkit *is* connected to a DE Device, select the **OK** button.
	Note: This Warning appears only if the transmitter is configured for operation in analog mode. **WARNING!** Before proceeding, if the transmitter is part of a control loop, ensure that interlocks and alarms are secured and that the loop is in Manual control. Then, select the **OK** button in the popup message. The display at right appears.	Use this display to - Verify device identification and to monitor Gross Status process conditions - Select the desired Units for the Process Variable input using the **PV Units** drop-down list.	Select the **Upload** button; the wait cursor and progress bar appear. Then, the Main Menu for the Transmitter appears.

DE Upload Procedures
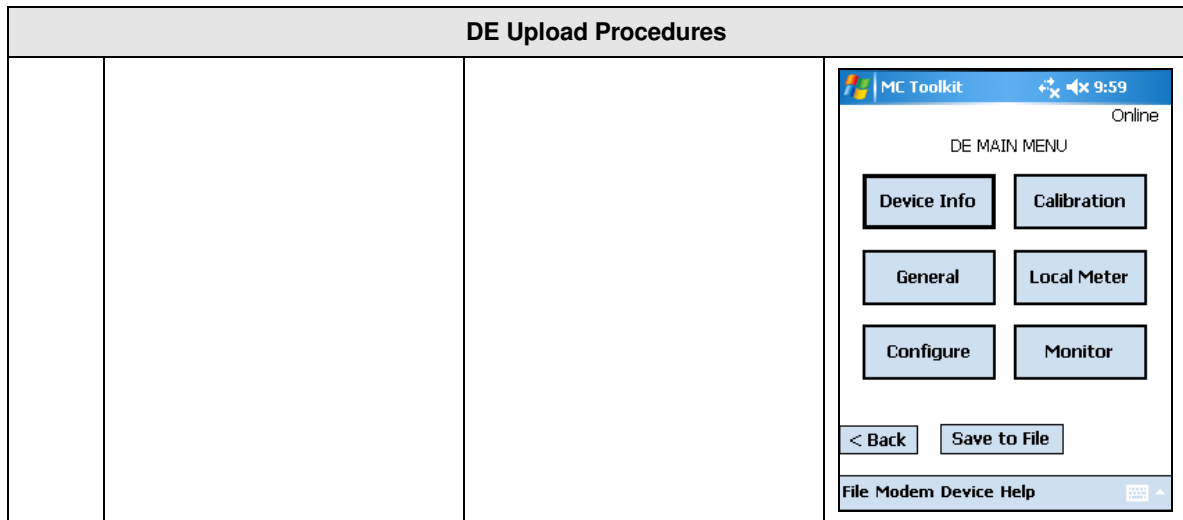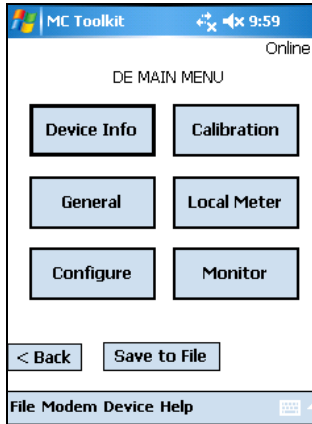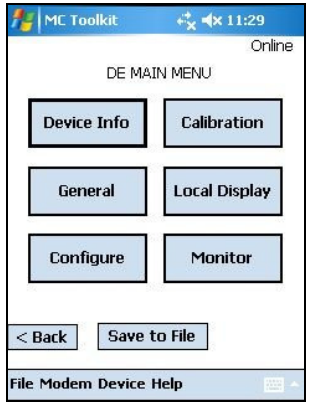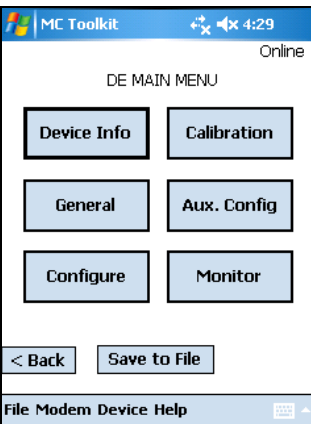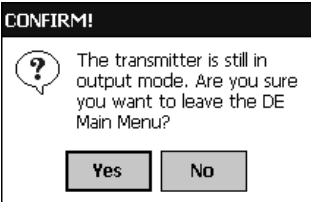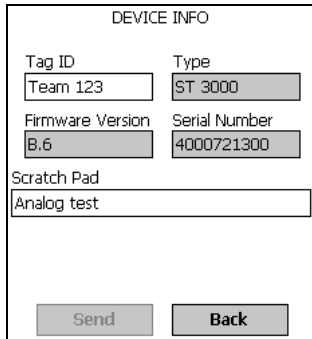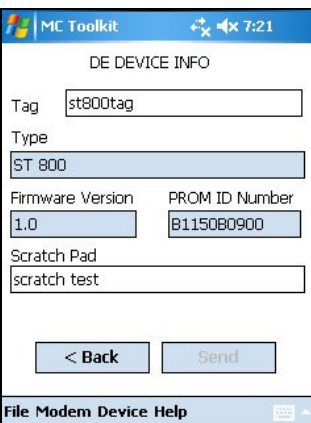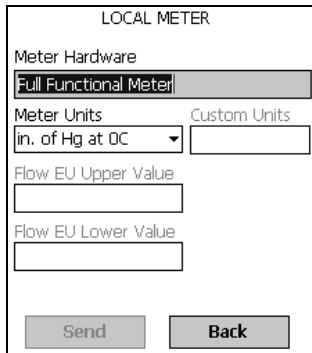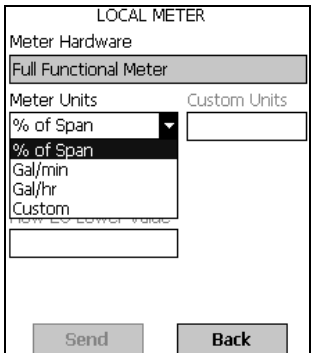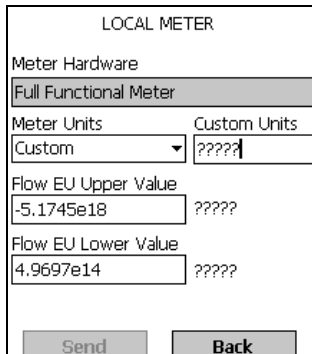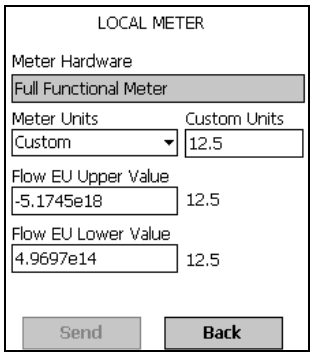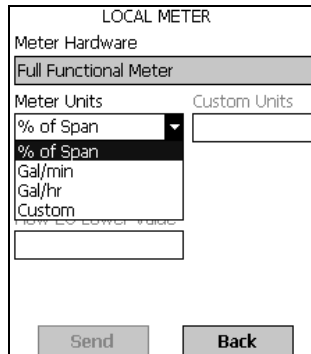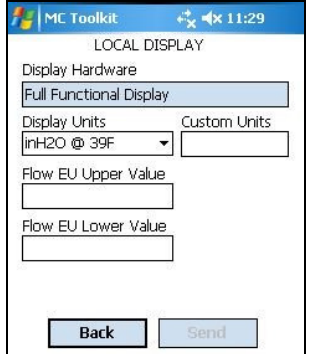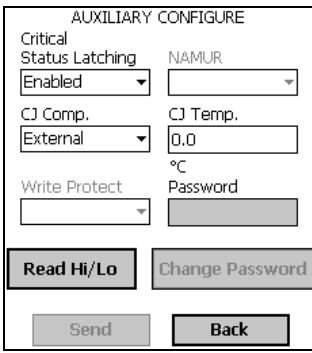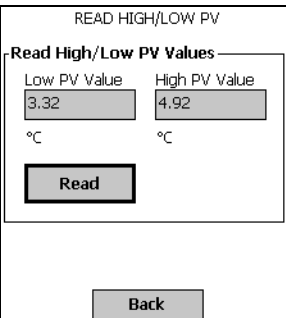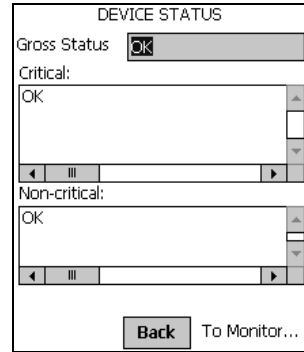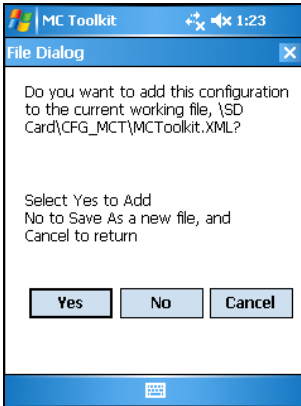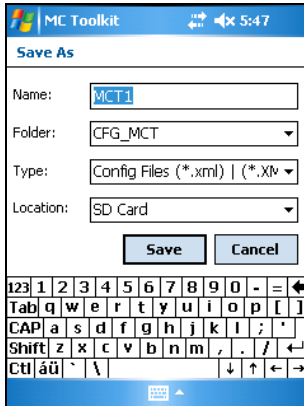
Table 13 DE Main Menu Procedures
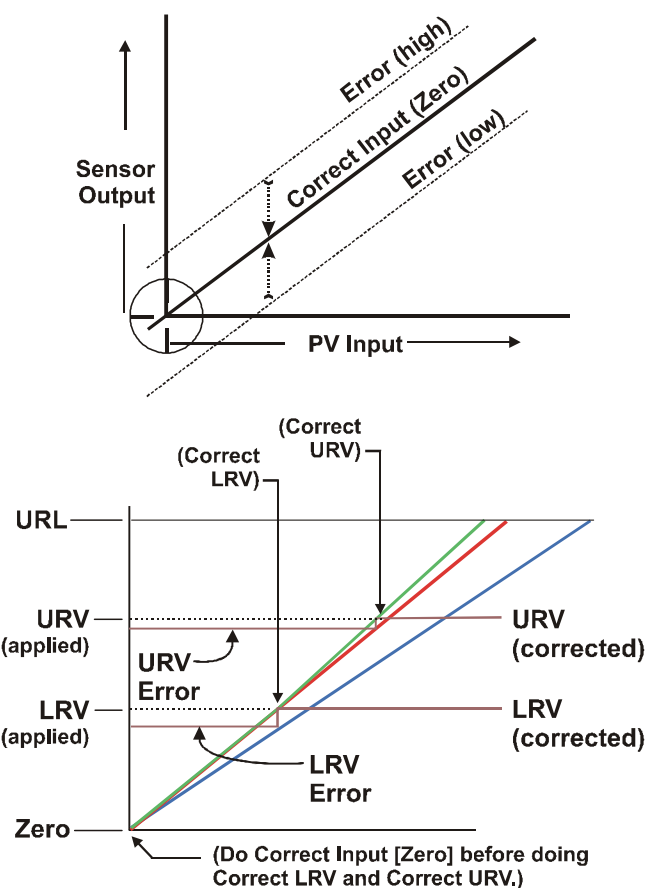
DE Main Menu Procedures			
DE Main Menu	**(ST 3000)** MC Toolkit 9:59 Online DE MAIN MENU Device Info / Calibration General / Local Meter Configure / Monitor < Back / Save to File File Modem Device Help **ST 800** MC Toolkit 11:29 Online DE MAIN MENU Device Info / Calibration General / Local Display Configure / Monitor < Back / Save to File File Modem Device Help	**(STT 3000)** MC Toolkit 4:29 Online DE MAIN MENU Device Info / Calibration General / Aux. Config Configure / Monitor < Back / Save to File File Modem Device Help	**Note:** This message appears if the <**Back** button is selected if the transmitter was set to Output Mode (in Calibration procedures), and the Output was not later cleared. CONFIRM! The transmitter is still in output mode. Are you sure you want to leave the DE Main Menu? Yes / No **Various buttons are provided on the Main Menu to navigate to different screens.** **Save to File allows saving the current device configuration to a file. More detail on this under "Save To File in Online Mode" Procedure**
Device Info	DEVICE INFO Tag ID: Team 123 Type: ST 3000 Firmware Version: B.6 Serial Number: 4000721300 Scratch Pad: Analog test Send / Back	MC Toolkit 7:21 DE DEVICE INFO Tag: st800tag Type: ST 800 Firmware Version: 1.0 PROM ID Number: B1150B0900 Scratch Pad: scratch test < Back / Send File Modem Device Help Type field will show "ST 800" when ST 800 device is connected	**Tag ID** (r/w) User ID up to 8 alphanumeric characters (suggestion: relate to functional process entities and/or plant areas). **Type** (r) Manufacturer's device type identifier (typically, a model number) **Firmware Version** (r)Manufacturer's Firmware version identifier **Serial Number** (r) Manufacturer **Scratch Pad** (r/w) Up to 32 alphanumeric characters (suggestion: messages to control room regarding observed/assigned operational status)

DE Main Menu Procedures			
General	**(ST 3000 / ST 800)** GENERAL PV Type Single Range Communication Mode DE 6 Byte Failsafe Direction Upscale Send Back	**(STT 3000)** GENERAL PV Type Single Range Communication Mode Analog Failsafe Direction Line Filter Upscale 60 Hz T/C Fault Detect Disabled Send Back	**PV Type** (r/w) Select: Dual Range (STDC) or Single Range or Single Range w/SV **Communication Mode** (r/w) Select: Analog or DE 4 Byte or DE 6 Byte **FS Direction** (r) (Upscale or Downscale; selection is jumpered in the transmitter). **Line Filter** (r) Select: 50hz or 60hz. **T/C Fault Detect** (r/w): Select: Enabled or Disabled.
DE Configure	**ST 3000 / ST 800** DE CONFIGURE LRL 0.0 URL 400.0 LRV -0.021553 URV 224.42 PV Units SV Units inH2O @ 39F °C Sensor Type Damping DP 0.48 Span Conformity 224.44 Linear Send Back **STT 3000** DE CONFIGURE LRL 0.0 URL 400.0 LRV -1.4424 URV 49.36 PV Units SV Units °C °C Sensor Type Damping T/C-J 3.10 Span Linearization 50.802 Linear Send Back		**LRL** (r): Lower Range Limit **URL** (r): Upper Range Limit **LRV** (r/w): Lower Range Value **URV** (r/w): Upper Range Value **PV Units** (r/w) Selection of scaling value (default: inches of $H_2O@39°F$) **SV Units** (r/w) Selection of scaling value (°C/°F) **Sensor Type** (r) Sensor Type associated with the transmitter **Damping** (r/w) Selection of level of digital noise reduction **Span** (r) Process Range (URL - LRL) **Conformity** (r/w) (ST 3000 / ST 800) Selection of conformity to input form: Linear or Square Root **Linearization** (r/w) (STT 3000) Selection of conformity to input form: Linear or Non Linear
Calibration	CALIBRATION **Input Calibration** Corr. Input (zero) Correct LRV Reset Corrects Correct URV **Output Calibration** **Apply Values** Loop Test Set LRV Trim DAC Curr. Set URV Back		For more information, refer to: Table 14, Table 15, Table 16, Table 17.

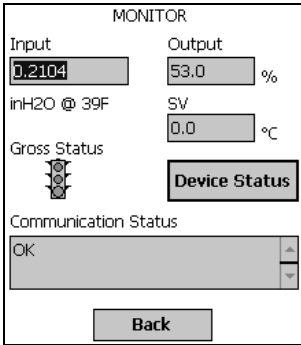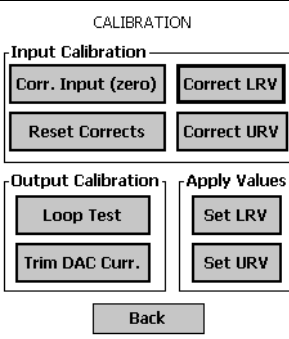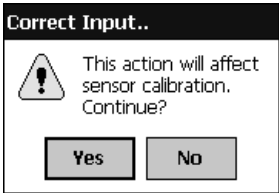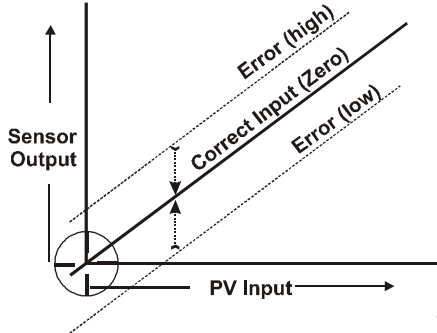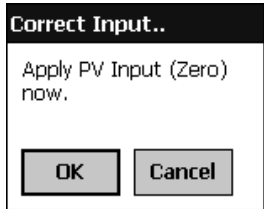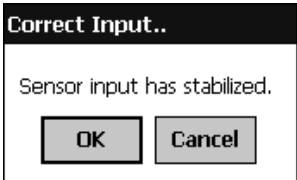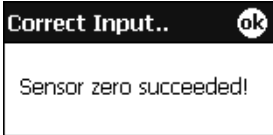| DE Main Menu Procedures			
Local Meter **(ST 3000)**	LOCAL METER Meter Hardware Full Functional Meter Meter Units Custom Units in. of Hg at 0C Flow EU Upper Value Flow EU Lower Value Send Back	LOCAL METER Meter Hardware Full Functional Meter Meter Units Custom Units % of Span % of Span Gal/min Gal/hr Custom Flow EU Lower Value Send Back	**Meter Hardware (r)** Type designation of meter associated with the transmitter **Meter Units (r/w)** Selection EUs for Local Meter **Custom Units (r/w)** (Refer to Transmitter User Manual). **Flow EU Upper Value (r/w)** Selection of standard Engineering Units for Flow Upper Value **Flow EU Lower Value (r/w)** Selection of standard Engineering Units for Flow Lower Value
Local Meter **(ST 3000 example)**	LOCAL METER Meter Hardware Full Functional Meter Meter Units Custom Units Custom ????? Flow EU Upper Value -5.1745e18 ????? Flow EU Lower Value 4.9697e14 ????? Send Back	LOCAL METER Meter Hardware Full Functional Meter Meter Units Custom Units Custom 12.5 Flow EU Upper Value -5.1745e18 12.5 Flow EU Lower Value 4.9697e14 12.5 Send Back	LOCAL METER Meter Hardware Full Functional Meter Meter Units Custom Units % of Span % of Span Gal/min Gal/hr Custom Flow EU Lower Value Send Back
Local Display **(ST 800)***	MC Toolkit 11:29 LOCAL DISPLAY Display Hardware Full Functional Display Display Units Custom Units inH2O @ 39F Flow EU Upper Value Flow EU Lower Value Back Send File Modem Device Help	**Display Hardware (r)** Type designation of display associated with the transmitter **Display Units (r/w)** Selection EUs for Local Display **Custom Units (r/w)** (Refer to Transmitter User Manual). **Flow EU Upper Value (r/w)** Selection of standard Engineering Units for Flow Upper Value **Flow EU Lower Value (r/w)** Selection of standard Engineering Units for Flow Lower Value *ST 800 supports Advanced and Basic Display. Custom Units is Supported only in Advanced Display	
Auxiliary Configure	AUXILIARY CONFIGURE Critical Status Latching NAMUR Enabled CJ Comp. CJ Temp. External 0.0 °C Write Protect Password Read Hi/Lo Change Password Send Back	**Critical Status Latching** Select Enabled or Disabled. **NAMUR** Select Enabled or Disabled. (Disable requires that Write Protect is set to Not Write Protected.) **CJ Temp.** Enter External Cold Junction Temperature. Select the **Read HI/LO** button to call up the **READ**	Select the **Read** button to display the lowest and the highest PV values since last read. READ HIGH/LOW PV **Read High/Low PV Values** Low PV Value High PV Value 3.32 4.92 °C °C Read Back
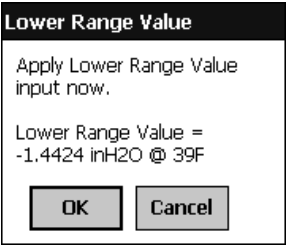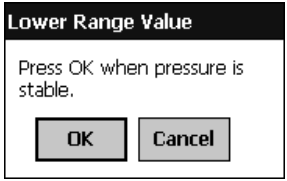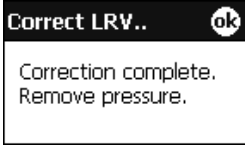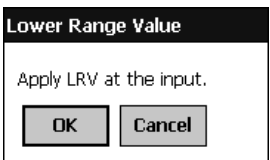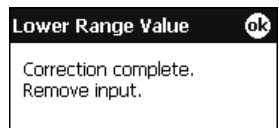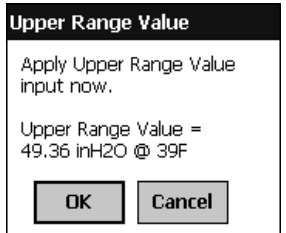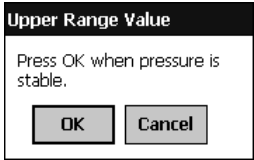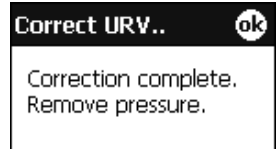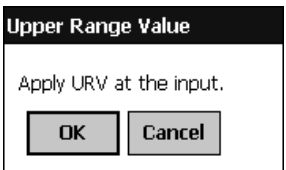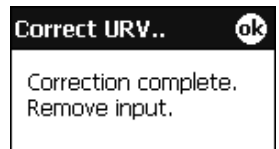
DE Main Menu Procedures			
		HIGH/LOW PV display.	
Monitor	**Input** (r) Sensor input in Engineering Units **Output** (r) Loop output as percent of Span	**SV** (r) Secondary Variable in Engineering Units **Gross Status** (r) Gross transmitter status. Select the **Device Status** button to call up the Device Status display. **Communication Status** (r) For status information, refer to the section on Messages and Diagnostic Codes.	
Save To File in Online Mode			On the MAIN MENU screen the "Save to File" sub menu is listed under the File menu. A Save to File button is also located on the MAIN MENU screen. Both the "Save to File" options provide you with the same functionality. Select "Save to File" and you get the screen on the far left Selecting "Yes" adds the current online configuration into the current working file. Selecting No, brings up the "Save As" screen. The location and folder are set to SD Card and CFG_MCT. You can type in a new name for the file. The default name will be "New1". The configuration will be saved in the *.xml file under SD Card/CFG_MCT folder on your MC Toolkit / MCT 303. You can copy the saved configuration file to PC and view it in a browser as it is, or Import the data into Excel for further file management. Follow "How to view the Saved Configuration file and Import to Excel"? Section 5.6.

Table 14 Input Calibration (DE Transmitters) –

Correct Input (Zero), LRV, URV; Reset Corrects

Input Calibration (DE Transmitters) - Correct Input (Zero), LRV, URV; Reset Corrects	
Requirements: • Input source, with accuracy of at least 0.04% • resistor, at least 250-ohms • Voltmeter or Ammeter • 24 Vdc Power Supply (nominal) • Clean work area with suitable environmental conditions. • Pressure Transmitter must be level. **Overview of Procedures:** The Zero-Correct procedure establishes the correct *vertical positioning* of the response profile. The LRV Correct and URV Correct procedures establish the correct *slope* of the response profile in the process operating range by rotating the response profile around the zero-reference point as a pivot. The Zero-Correct procedure can be done at any time during the Correct LRV and Correct URV procedures in the same calibration session. The Correct LRV and Correct URV procedure should never be performed without first performing the Correct Input (Zero) procedure in the same calibration session.	**Objective(s):** Using a precision PV input source as a reference, command the transmitter to write calibration coefficients to Non-Volatile Memory associated with transmitter input hardware and software. • Correct Input (Zero) • Correct LRV • Correct URV

Input Calibration (DE Transmitters) - Correct Input (Zero), LRV, URV; Reset Corrects

Set-Up On Bench

A typical bench set-up is shown at right.

Connect the MC Toolkit as indicated, and establish communication with the transmitter.

For these procedures, components in the current loop are not critical, provided that they support reliable communication between the transmitter and the MC Toolkit.

If a Honeywell Pressure Transmitter is being calibrated, positioning (leveling) is important, because the meter body contains fluids that can affect zero sensing.

(Diagram: bench set-up showing transmitter connected to 24.0 V and 1.00 V supplies and MC Toolkit)

MC Toolkit

Precision Voltmeter

Power Supply (e.g., 24 Vdc) — + 250 Ohms — Output — Sensor — Precision Input Source — Transmitter

MC Toolkit

Precision Ammeter

Power Supply (e.g., 24 Vdc) — + 250 Ohms — Output — Sensor — Precision Input Source — Transmitter

| **Enter (configure)** **values for LRV and URV** | From the DE MAIN MENU, select **Configure** to call up the DE CONFIGURE display.

a. Use the **PV Units** to select the appropriate Engineering Units.

b. Using the keyboard, enter the desired **LRV** and **URV** values.

c. Select the **Send** button to copy all newly entered values to the transmitter. When the copy operation is complete, **Send** will be displayed in half intensity. | DE CONFIGURE

LRL -10.0   URL 10.0
LRV 0.19371   URV 10.194
PV Units: inH2O @ 39F   SV Units: °C
Sensor Type: DP   Damping 32.00
Span 10.0   Conformity Linear

Send   Back |

Input Calibration (DE Transmitters) - Correct Input (Zero), LRV, URV; Reset Corrects			
Call up Calibration display	Navigate to the DE Calibration display as follows. Select **Back** (go to DE Main Menu), then select the **Calibration** button.	CALIBRATION Input Calibration [Corr. Input (zero)] [Correct LRV] [Reset Corrects] [Correct URV] Output Calibration — Apply Values [Loop Test] [Set LRV] [Trim DAC Curr.] [Set URV] [Back]	
Correct Input at Zero	Select **Corr. Input (zero)**. This message appears. Correct Input.. ⚠ This action will affect sensor calibration. Continue? [Yes] [No] **NOTE:** The PV Input (Zero) refers to a known standard such as zero pressure (e.g.: vent both sides of a DP transmitter).	As indicated below, this procedure will shift the slope up or down to eliminate the error at the zero reference. The slope (angle) of the response is unchanged. 	
	Select **Yes** in the message box above; this message appears. Correct Input.. Apply PV Input (Zero) now. [OK] [Cancel]	At this point, ensure that the *value* of the PV applied at the input *is exactly Zero.* Then, select the **OK** button in the popup message. This action sends the Correct Input (Zero) command to the transmitter, which adjusts the input calculation.	
	Wait until this message appears. Correct Input.. Sensor input has stabilized. [OK] [Cancel]	When the transmitter has completed the Zero Correction, this message appears. Correct Input.. ⓞⓚ Sensor zero succeeded!	Select the **OK** button to acknowledge.

Input Calibration (DE Transmitters) - Correct Input (Zero), LRV, URV; Reset Corrects			
Correct Input at LRV (ST 3000 / ST 800)	Select the **Correct LRV** button. This message appears. **Lower Range Value** Apply Lower Range Value input now. Lower Range Value = -1.4424 inH2O @ 39F OK Cancel Adjust the PV input pressure to the *exact value of the LRV* entered in the DE CONFIGURE display.	Select the **OK** button; this message appears. **Lower Range Value** Press OK when pressure is stable. OK Cancel Observe the input pressure at the applied value; when it is stable, select the **OK** button.	When the transmitter has completed the LRV correction, this message appears. **Correct LRV..** ok Correction complete. Remove pressure. Select **OK** to acknowledge.
Correct Input at LRV (STT 3000)	Select the **Correct LRV** button. This message appears. **Lower Range Value** Apply LRV at the input. OK Cancel	Adjust the input temperature to the *exact value of the LRV* entered in the DE CONFIGURE display.	Select the **OK** button; this message appears. **Lower Range Value** ok Correction complete. Remove input. Select the **OK** button to acknowledge
Correct Input at URV (ST 3000 / ST 800)	Select the **Correct URV** button. This message appears. **Upper Range Value** Apply Upper Range Value input now. Upper Range Value = 49.36 inH2O @ 39F OK Cancel	Adjust the PV input pressure to the *exact value of the URV* entered in the DE CONFIGURE display. **Upper Range Value** Press OK when pressure is stable. OK Cancel Select the **OK** button.	When the transmitter has completed the URV correction, this message appears. **Correct URV..** ok Correction complete. Remove pressure. Select **OK** to acknowledge.
Correct Input at URV (STT 3000)	Select the **Correct URV** button. This message appears. **Upper Range Value** Apply URV at the input. OK Cancel	Adjust the input temperature to the *exact value of the URV* entered in the DE CONFIGURE display.	Select the **OK** button; this message appears. **Correct URV..** ok Correction complete. Remove input. Select the **OK** button to acknowledge
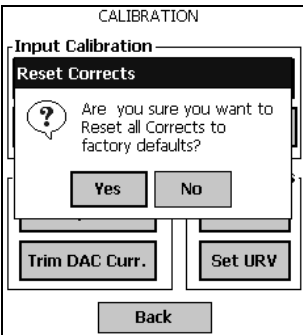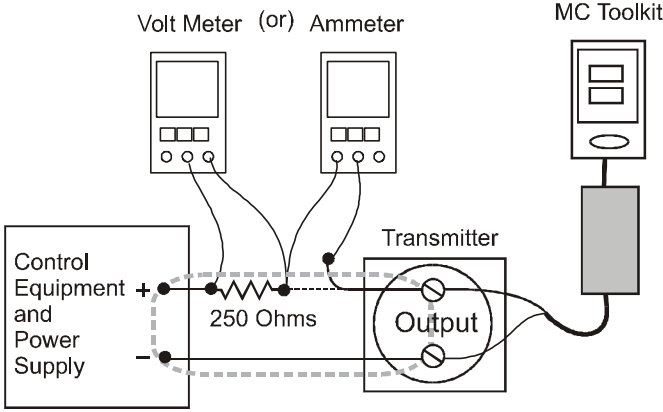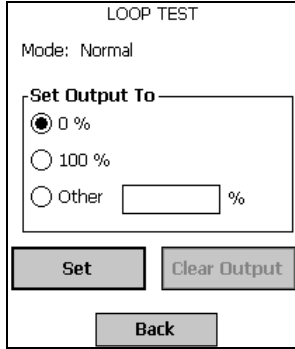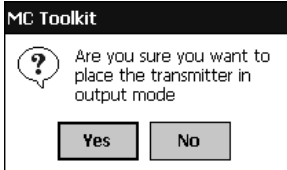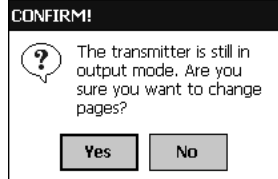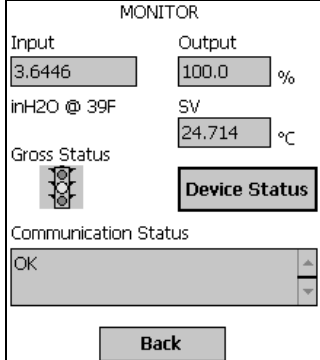
Input Calibration (DE Transmitters) - Correct Input (Zero), LRV, URV; Reset Corrects		
Reset Corrects	**Note:** This function commands the transmitter to overwrite all user input corrections with factory default ("characterization") values. It is intended for use only when excessive corrections render the transmitter inaccurate.		If corrects should not be overwritten with factory values, select the **No** button. If corrects need to be overwritten, select the **Yes** button. The timer will appear briefly, indicating the operation is performed.

Table 15 Output Calibration - Loop Test

Output Calibration - Loop Test		
Objective	Verify the integrity of electrical components in the output current loop. Connect the MC Toolkit as indicated, and establish communication with the transmitter. For these procedures, values of components in the current loop are not critical, provided that they support reliable communication between the transmitter and the MC Toolkit.	
Loop Test	In the Output Calibration box, select the **Loop Test** button; the display at right appears. Select the desired constant-level Output: **0 %**, **100 %**, or **Other** (any of **0 % - 100 %**).		Select the **Set** button. Select the **Yes** button, and observe the output current at 0%, 100%, or Other (user-entered) %.
	Note: If the transmitter is in Analog mode, you can observe the output on an externally connected meter or on a Local Meter. In DE Mode, the output can be observed on the Local Meter or on the Monitor display on the MC Toolkit.	To view the Monitor display, navigate **Back** from the LOOP TEST display and select the MONITOR display. This popup appears; select **Yes** to continue. 	**Example:** DE output (100 %), as viewed on the MC Toolkit.
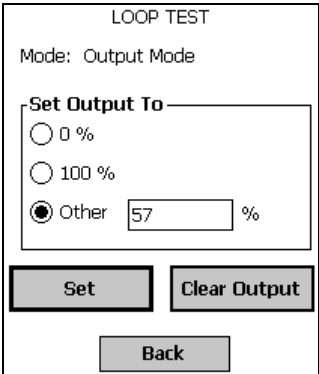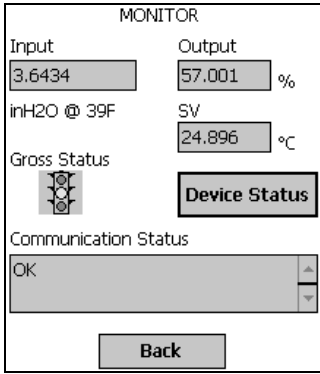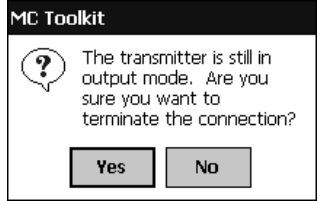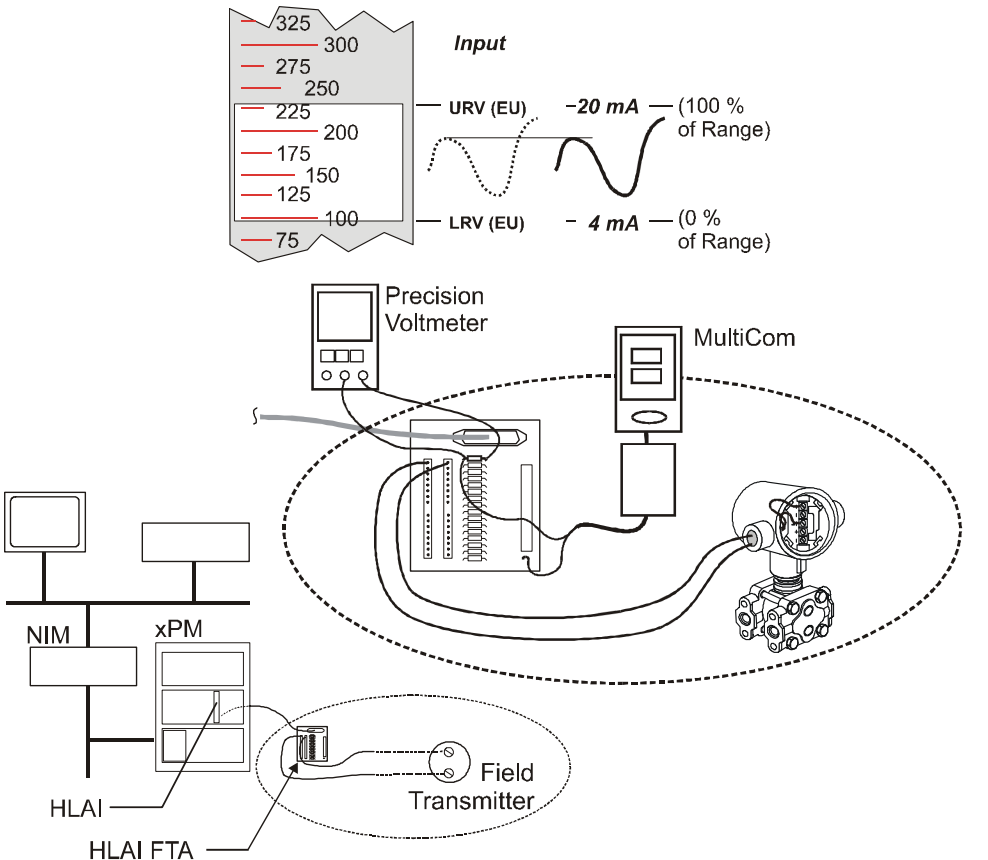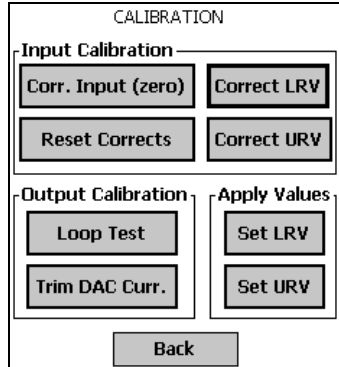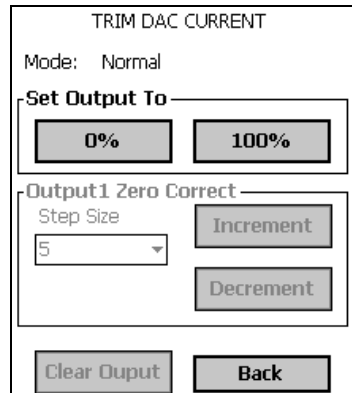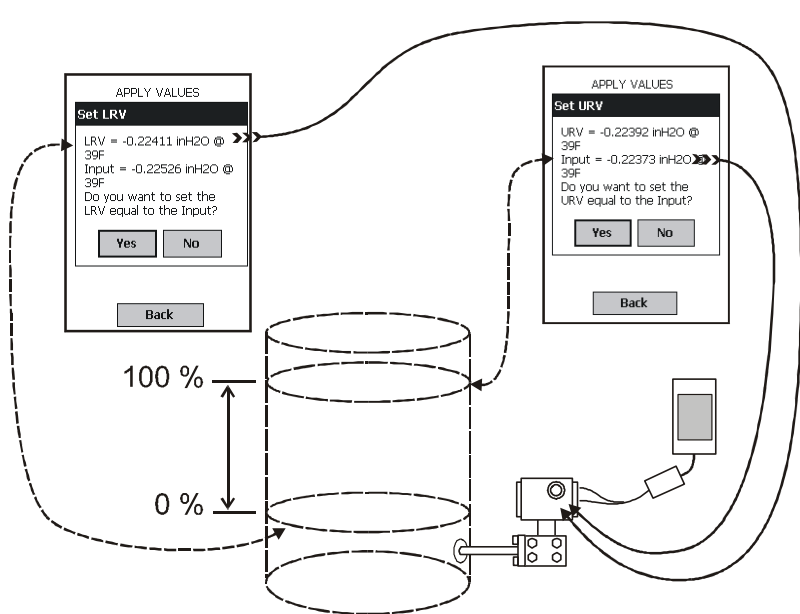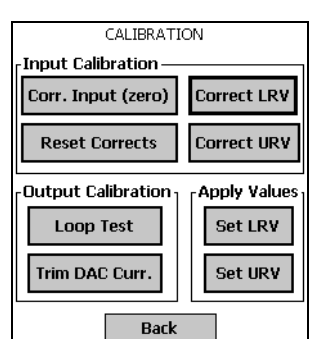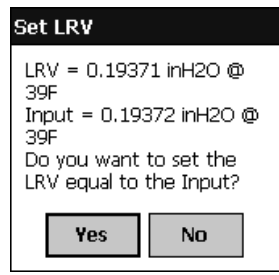
Output Calibration - Loop Test		
Example	The displays at right illustrate a **Set Output** selection and setting of **Other**, at 57 %.	LOOP TEST Mode: Output Mode Set Output To ○ 0 % ○ 100 % ● Other 57 % **Set** **Clear Output** **Back**	MONITOR Input Output 3.6434 57.001 % inH2O @ 39F SV 24.896 °C Gross Status **Device Status** Communication Status OK **Back**
⚠️ **!!** **Unintended exit in Output Mode?** **!!** **Caution:** If **Yes** was selected as above in the **CONFIRM!** popup message, it is possible to exit MC Toolkit application while the Output is fixed at constant current.	This message at right appears if you perform an operation on the MC Toolkit that will terminate the connection to the transmitter while the transmitter is in output mode.	Select **Yes** button only if constant-current Output with the MC Toolkit is intended. MC Toolkit ? The transmitter is still in output mode. Are you sure you want to terminate the connection? **Yes** **No** Otherwise, select the **No** button, go back to the LOOP TEST display, and select the **Clear Output** button.

Table 16 DE Output Calibration - Trim DAC Current

DE Output Calibration - Trim DAC Current	
Overview of Objectives	For a DE transmitter *operating in analog mode* in a user's application, calibrate the *analog output current* to the PV input range. That is, adjust the output such that 4 mA corresponds to 0% (LRV), and 20 mA corresponds to 100% (URV).
Call up display	In the DE MAIN MENU, select the **Calibration** button. The CALIBRATION menu appears. Select the **Trim DAC Curr.** button; this display appears.

DE Output Calibration - Trim DAC Current		
Trim Output Current	Select the **Set Output To 0%** button or the **100%** button. The message popup at right appears. **Caution:** In Output Mode, output current is fixed at 0% or 100%. Ensure that the loop is in Manual control. Select the **Yes** button, and at the meter, observe the level of loop current. **NOTE:** On the voltmeter, 4 mA corresponds to 1 volt. Using the MC Toolkit, adjust the loop current to the Zero Percent level (4 mA). If the current is low, tap on the **Increment** button; if it is high, tap on the **Decrement** button, and observe the change on the meter. **NOTE:** If the error is large, you can accelerate the adjustment rate by changing the Step Size to 10 or to 100. When the zero current level (4 mA) is achieved, select the **Set Output To 100 %** button. **NOTE:** On the voltmeter, 20 mA corresponds to 5 volts. Use the Increment and/or Decrement buttons to adjust the output current to 20 mA. When the 100% current level (20 mA) is achieved, select the **Clear Output** button. (Note that the button changes to half intensity.)	**MC Toolkit** Are you sure you want to place the transmitter in output mode Yes No TRIM DAC CURRENT Mode: Output Mode Set Output To 0% 100% Output1 Zero Correct Step Size 1 1 10 100 Increment Decrement Clear Ouput Back
Change display while in Output Mode	If you select the **Back** button before selecting the **Clear Output** button, the display at right will appear. If you are sure that you want to remain in Output Mode while viewing other displays, select the **Yes** button; otherwise, select the **No** button, and the **Clear Output** button	**CONFIRM!** The transmitter is still in output mode. Are you sure you want to change pages? Yes No

Table 17 DE Calibration - Apply Values

DE Calibration - Apply PV values to Set LRV and Set URV	
Overview of Objectives:	• Manually set the Process Variable **input to 0%**, and apply this value to **Set LRV**; • Manually set the Process Variable **input to 100%**, and apply this value to **Set URV**. **NOTE:** This procedure applies to DE Transmitters operating in DE Mode as well as to those operating in Analog (current) Mode.
	On the DE MAIN MENU, select the **Calibration** button. 	In the Apply Values group, select the **Set LRV** button. The popup message at right appears. **Note:** The value of the Input indicated in this message updates only when the popup message is called up. To update this value, select the **No** button, and again select the **Set LRV** button in the CALIBRATION display.	

DE Calibration - Apply PV values to Set LRV and Set URV		
Set LRV	While observing the PV value at the physical process element, (using a sight glass, for example) adjust the Process Variable to the desired Minimum (0 %) level, then select **Set LRV** If the displayed value is satisfactory, select **Yes** to copy the Input Value to the LRV in the transmitter. If not, select **NO** and repeat this step.	**Set LRV** LRV = 0.19371 inH2O @ 39F Input = 0.19372 inH2O @ 39F Do you want to set the LRV equal to the Input? Yes No
Set URV	While observing the PV value at the physical process element, (using a sight glass, for example) adjust the process variable to the desired Maximum level, then select **Set URV.** If the displayed value is satisfactory, select **Yes** to copy the Input Value to the URV in the transmitter. If not, select **NO** and repeat this step.	**Set URV** URV = 10.192 inH2O @ 39F Input = 10.54 inH2O @ 39F Do you want to set the URV equal to the Input? Yes No
Verify settings	The results of the Set LRV and Set URV actions can be verified by calling up the **DE CONFIGURE** display.	DE CONFIGURE LRL -10.0 URL 10.0 LRV 0.19372 URV 10.194 PV Units SV Units inH2O @ 39F °C Sensor Type Damping DP 32.00 Span Conformity 10.0 Linear Send Back

5.6   How to view the Saved Configuration file and Import to Excel

1. Setup Activesync connection between your PC and MC Toolkit

2. Right click on ActiveSync icon on the System trey and select Explore
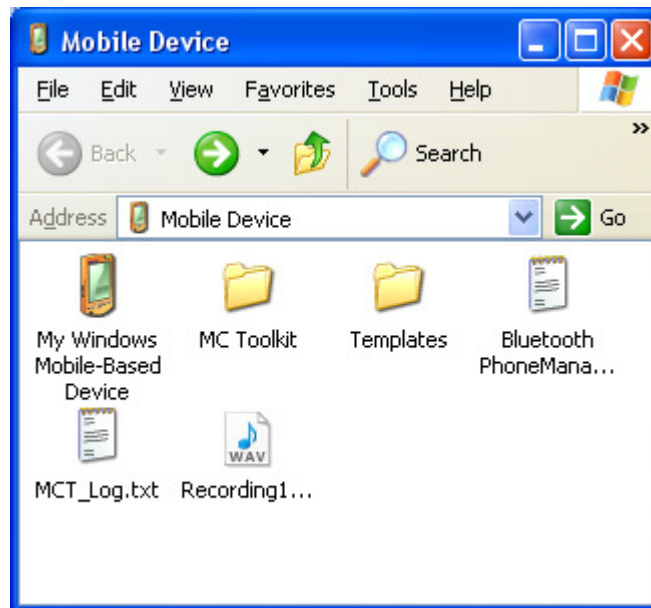
3. Select My Windows Mobile-Based Device\SD Card\CFG_MCT*.XML file that you would like to copy to the PC.
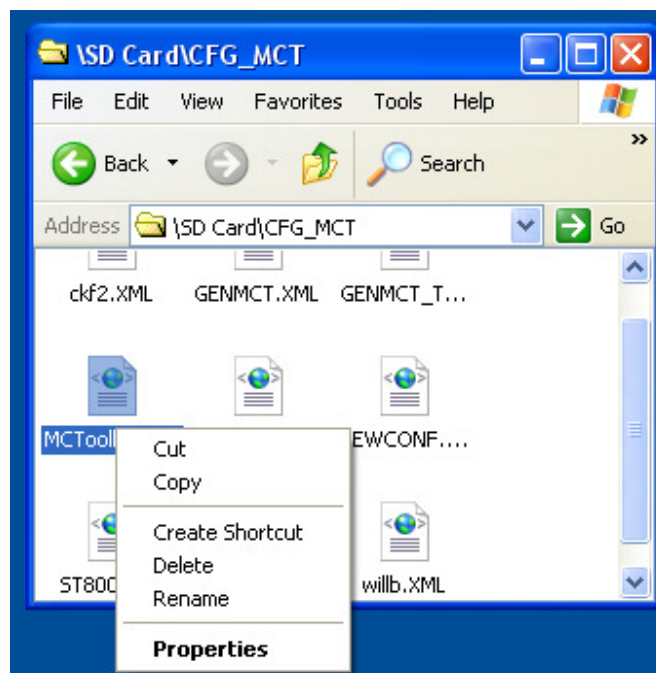
4. Right click on the file and select Copy

5. Go to a location on the PC; for example c:\MCT

6.   Right click and select Paste.
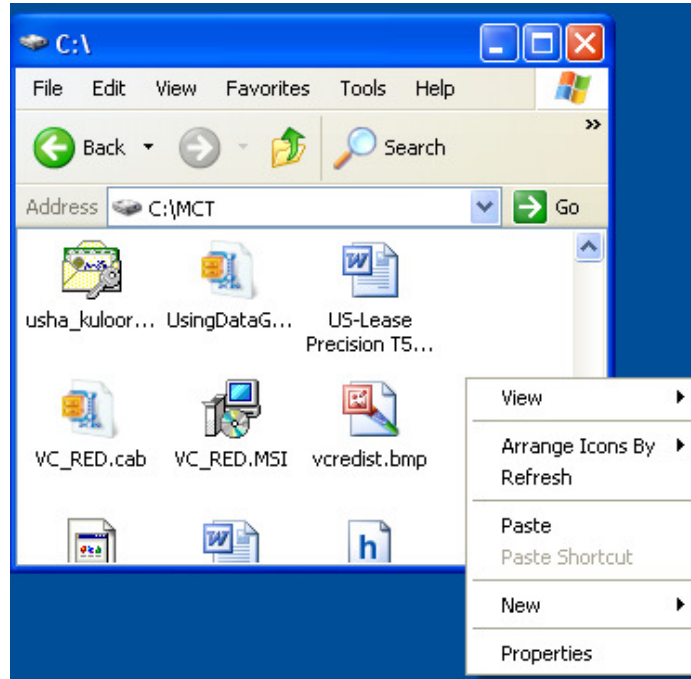
Now you can double click on the .xml file to open in the Internet Explorer Browser. The Configurations are shown as below:
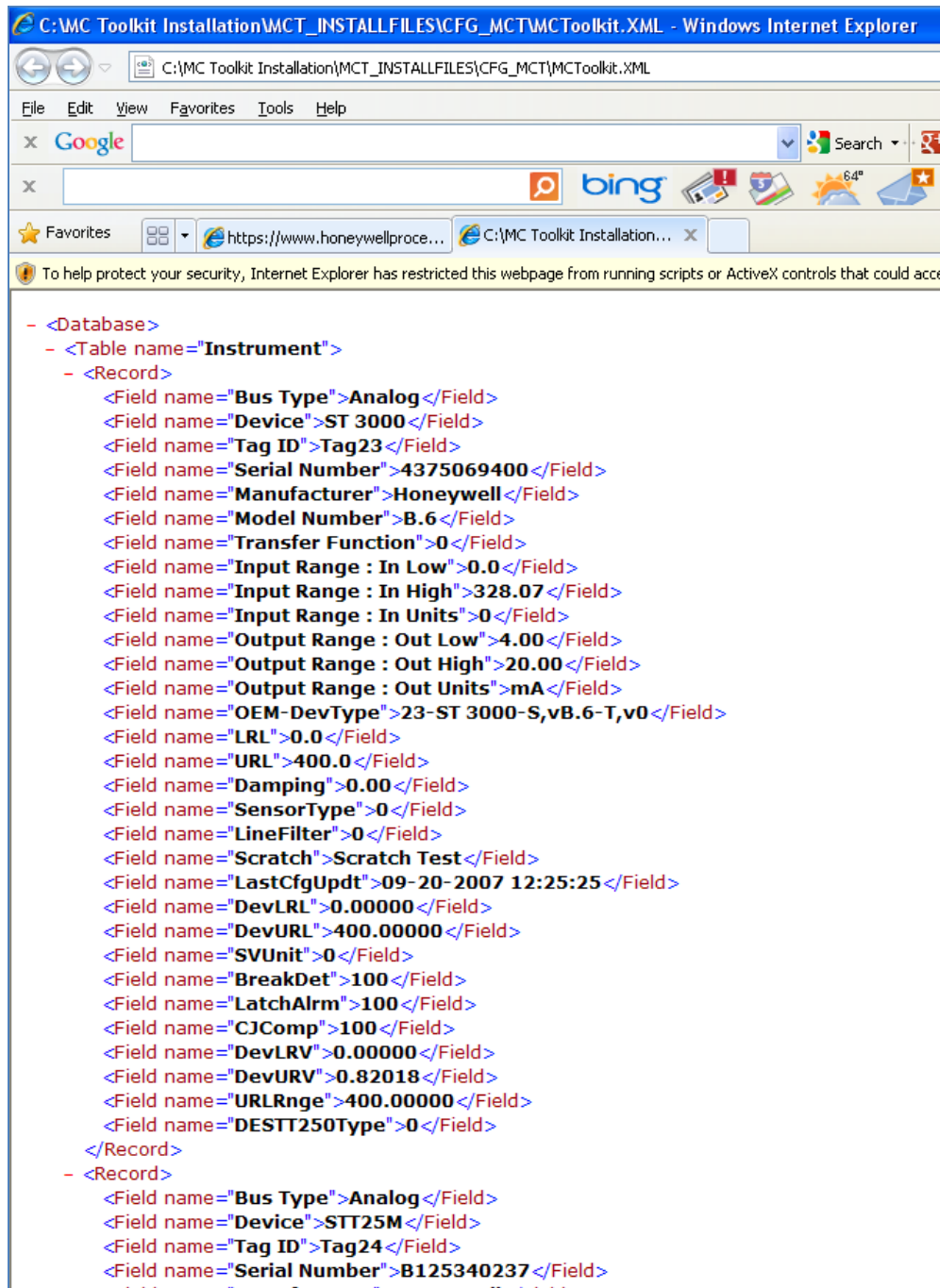
How to Import the data from the xml file to Excel?
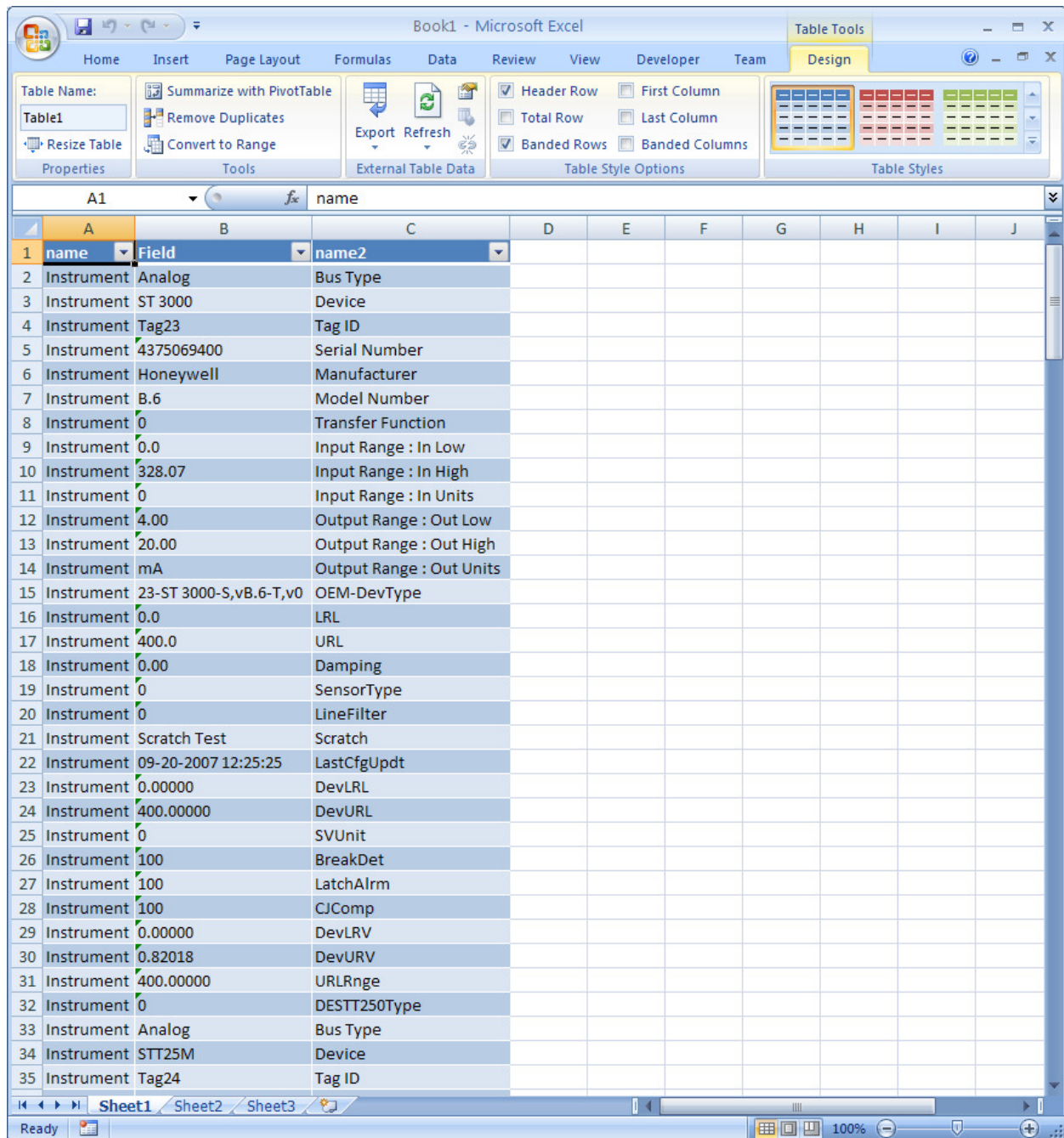
1. Open Microsoft Excel
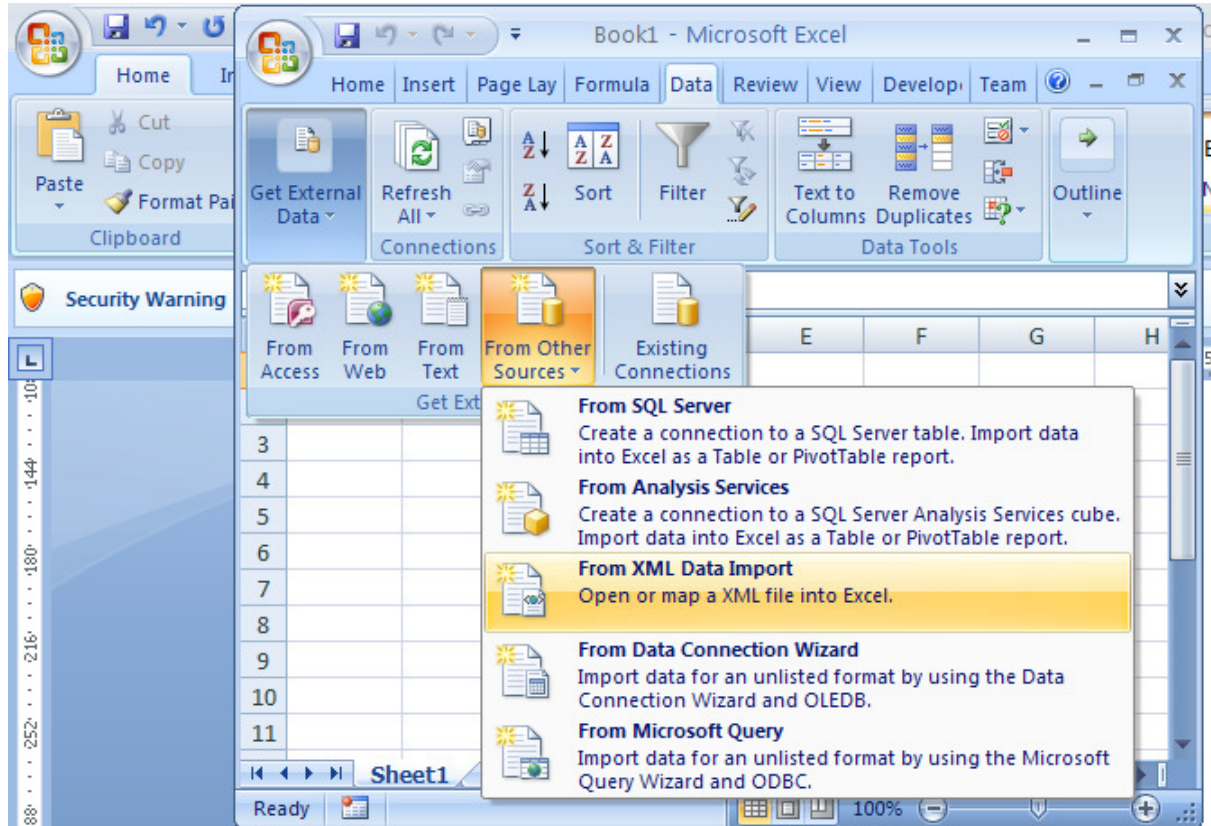
2. Select Data / Get External Data / From Other Sources / From XML Data Import, and Browse to the .xml file you saved on your PC.

This will Import data in the below format.

This can be saved as an Excel file for further file management.

5.7   Offline Configuration

Using Offline configuration, you can select a basic offline template, edit the parameters and download to a device after establishing connection. The updates to the parameters can also be saved into the file without actually downloading to the device.

Offline Mode Introduction

On the MC Toolkit Home page select "Offline" to proceed with Offline Configuration features.
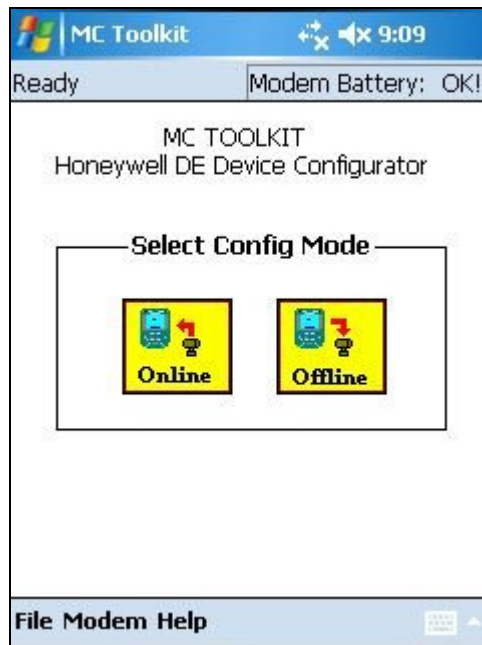
Offline configuration supports the following features:

- File Management : Open an XML file, select a saved configuration for the selected device and edit the parameters

- Save to File: Save the parameters back to the file

- Download: Download current Offline configuration to a device after establishing connection.

The following devices are supported:

- Honeywell Smart Pressure devices: ST 3000, ST 800

- Honeywell Smart Temperature devices: STT25M, STT25D, STT350)

On the Home page select "Offline" button to proceed with Offline Configuration features.

FILE MANAGEMENT screen

On the "FILE MANAGEMENT" screen, accept the last file that was accessed or you can select "Browse" to open up the "Open" dialog and browse for a different file that has the offline configurations. MC Toolkit will be shipped with 2 files MCToolkit.xml and TEMPLMCT.xml. The MCToolkit.xml file consists of default configurations for all the supported DE devices. The available configurations can be updated and saved back to this file. The TEMPLMCT.XML is a Template file and you cannot edit the configuration in this file. To read more about the Template file refer the section **Template File**.
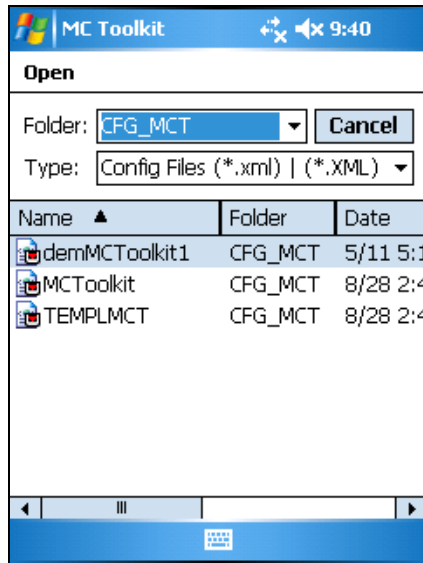
Figure 5-2 Offline Browse / Open File dialog

The file lists all the configurations available for Honeywell DE devices
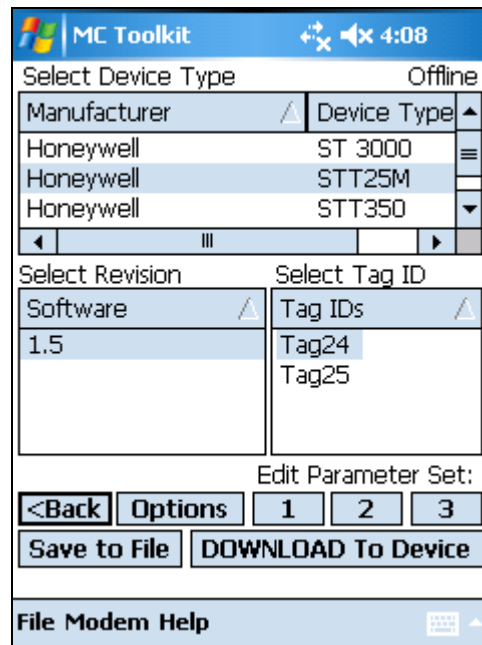
Back button: takes you back to the File Management screen

Options button: Selection of this button opens up the **MC Toolkit Options** dialog

Edit parameter Set, 1, 2, 3: Selection of these buttons open up the **Parameters Screens**

Save to File: Allows you to save the changes made to the offline configuration.

Download to Device: Allows downloading the selected configuration to the device after establishing connection

MC Toolkit Options dialog

Select the File / Options menu or 'Options' button on the Select Device Type dialog to open up the MC TOOLKIT OPTIONS screen. The menu is available on the MC TOOLKIT screen and all of the File Management screens.

The Options dialog provides General Options and Offline Configuration Options
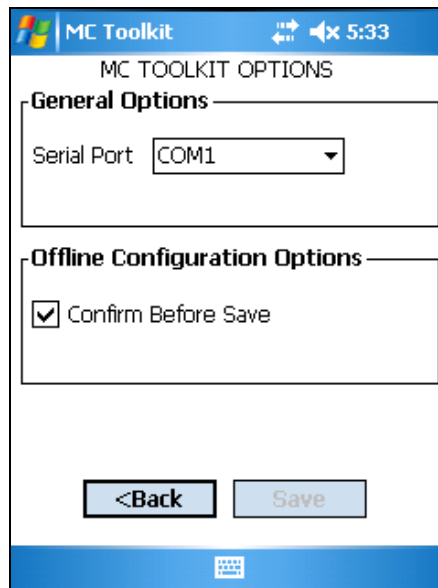
Figure 5-3 MC Toolkit Options

General Options
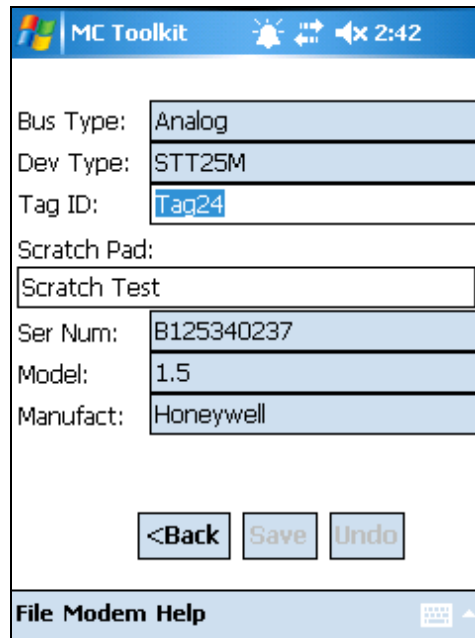
Serial Port - allows you to choose from any of the COM1 through COM8 ports. Currently, the Pocket PC supports only the COM1 port. This option is only for future extension.

Offline Configuration Options

Confirm Before Save - Check this box to prompt a confirmation message "Do you want to save your changes?" before navigating back to the previous screen on the parameters screens. No message will be prompted if the selection box is not checked.

Parameters screens

To access the parameters screens select one of the 3 buttons under the "Edit Parameter Set" caption on the Select Device type dialog.

Parameter set 1

Figure 5-4 DE device

Parameter set 2

Figure 5-5 STT25D and 25M, STT350 models

Figure 5-6 STT25T model

Figure 5-7 ST 3000 / ST 800 models

Parameter set 3

Figure 5-8 STT25M and 25D models

Figure 5-9 ST3000 DE

Figure 5-10 DE STT350

The following options are available on the parameters screens:

- Select the "Save" button to save the changes to the database.

- Select the "Undo" button to undo the last change. Depending upon the parameter, a group of related parameters will be undone on selecting the "Undo" button. Also depending upon the parameters changed, the "Undo" button will be disabled when the Undo option is not appropriate.

- To go back to the previous screen select the <Back button.

Save to File in Offline Mode
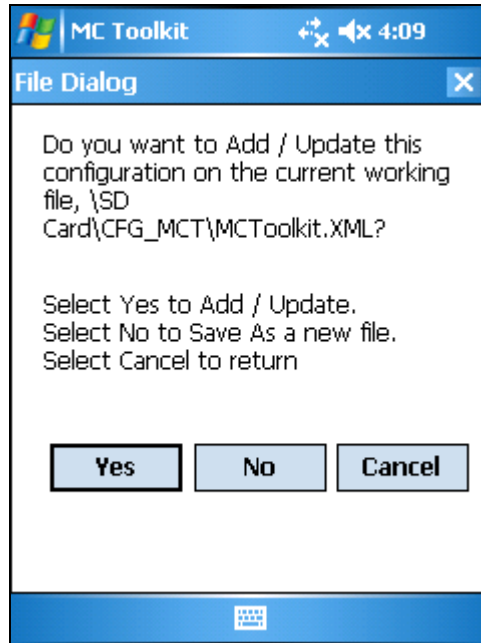
Selecting Yes adds the current configuration into the current working file.

Selecting No, brings up the "Save As" screen. The location and folder are set to SD Card and CFG_MCT. You can type in a new name for the file. The default name will be "New1".
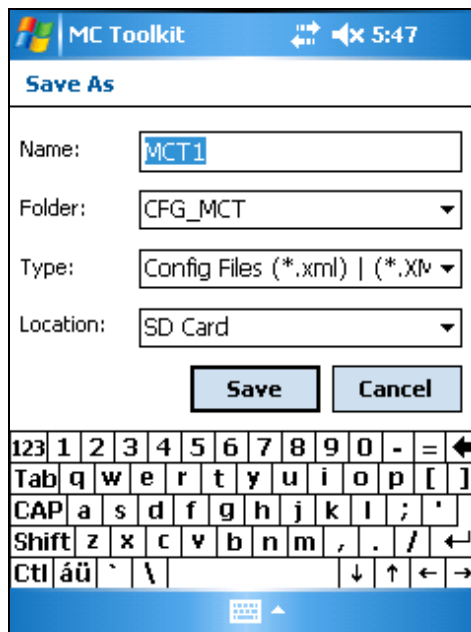
Figure 5-11 Save As File dialog

Template File

MC Toolkit will be shipped with a template file named TEMPLMCT.XML" with some default configurations. The user cannot modify it.

If the user selects this file for loading and editing parameters, he gets the message shown in Figure 5-12 Honewyell DE Save Template Screen.
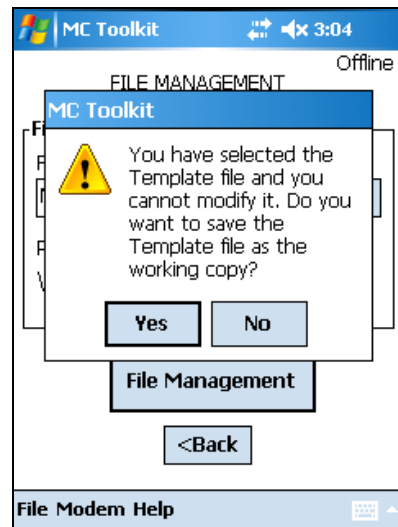
Figure 5-12 Honewyell DE Save Template Screen

The user can select "Yes" to save the Template file as the working copy by giving a new name other than TEMPLMCT.XML in the screen below
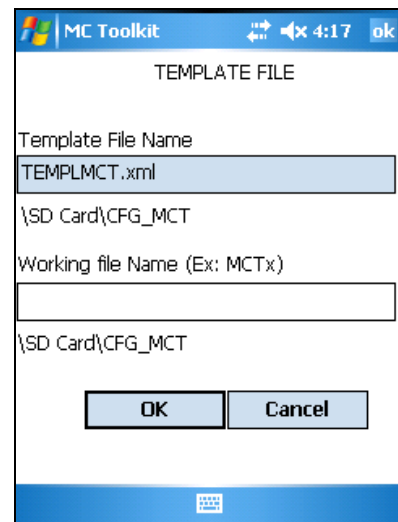
Figure 5-13 Offline Honeywell DE Save Template as working file

In the Working File Name field, enter a file name other than TEMPLMCT.XML without any extensions, and then select OK. The newly named file now will be the Working file.

If you select Cancel, you will go back to the FILE MANAGEMENT dialog without any changes.

Download in Offline mode

Apply power to the device. Connect the PPC to the modem with the serial cable and connect the modem to the device. Select "DOWNLOAD to Device" to establish connection to the device and Download the selected configuration to the connected device. Download confirmation screen will be displayed as in Figure 5-14 Download in Offline Mode.
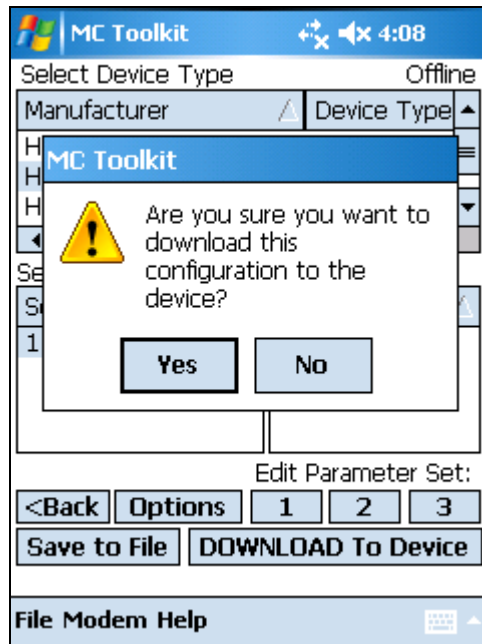
Figure 5-14 Download in Offline Mode

Download Parameter List

The table below lists all the Parameters available+ in the MC Toolkit offline configuration file

Index (Index of the parameters in the configuration file)	Parameters	Example Values	Properties (R – Read only; R/W – Read / Write)
0	Bus Type	DE	R
1	Device	STT 3000	R
2	Tag ID	STT250Ta	R/W
3	Serial Number	B044929237	R
4	Manufacturer	Honeywell	R
5	Model Number	2.0	R
6	Transfer Function (in ST devices) Linearization in STT devices)	ST: Linear and Square root STT: Linear and Non-Linear	R/W
7	LRV	36.98	R/W
8	URV	594.63	R/W
9	PV Units	0	R/W
10	Output Range : Out Low	4	R – not displayed on the screen
11	Output Range : Output High	20	R – not displayed on the screen
12	Output Range : Out Units	ma	R – not displayed on the screen
13	OEM-Device Type Code	23-STT25M-S, v1.5-T, v0 (DE)	R – Not Displayed
14	LRL	-200	R
15	URL	850	R
16	Damping	1.0	R/W
17	Sensor Type	T/C-E	R/W (depends upon the device. On Pressure devices, this field is Read only)
18	Line Filter	60 Hz	R/W
19	Scratch Pad	Scratch Test	R/W
20	Last Cfg Update	04/06/2007 13:59:59	R
21			

Index (Index of the parameters in the configuration file)	Parameters	Example Values	Properties (R – Read only; R/W – Read / Write)
	Device LRL (DE)	Float (DE)	R (not displayed)
22	Device URL (DE)	Float (DE)	R (not displayed)
23	SV Units	0	R/W
24	Break Detect	1	R/W(depends upon the device)
25	Critical Status Latching	0	R/W(depends upon the device)
26	CJ Comp	0	R/W(depends upon the device)
27	Device LRV (DE)	float	R (not displayed)
28	Device URV (DE)	Float (DE)	R (not displayed)
29	URL Range (DE)	Float (DE)	R (not displayed)
30	DE STT250 Type (DE)	0 0,1 or 2	R (not displayed) 0-STT350 1-STT250 2-Unknown

DE Fields and Values

Field	Value		
Bus Type	Analog - for communication mode of Analog (string) DE – for communication mode of 4 byte or 6 byte DE (String)		
Dev Type	Device Type (string)		
Tag ID	Tag id (8 chars string)		
Ser num	Serial number of transmitter (String)		
Manufact	Manufacturer string		
Model	Model Number of transmitter = Firmware Version (String)		
Transfer Function (Called Conformity in ST, Linearization in STT devices)	Linear or Square Root in ST Linear and Non-Linear in STT		
LRV	Transmitter input low in engineering units (floating point)		
URV	Transmitter input high in engineering units (floating point)		
PV Units (STT only)	°C °F	°R K	
PV Units (ST Only)	inH$_2$O @ 39°F inH$_2$O @ 68°F MmHg @ 0°C PSI KPa	MPa mBar bar g/cm² kg/cm²	inHg @ 32°F mmH$_2$O @ 4°C mH$_2$O @ 4°C ATM inH$_2$O @ 60°F
Output Range : Out Low (Not displayed on the parameter screen)	Transmitter output low in percent (floating point)		
Output Range : Out High (Not displayed on the parameter screen)	Transmitter output high in percent (floating point)		
Output Range : Out Units (Not displayed on the parameter screen)	ma (milliamps)		
LRL	Lower Range Limit(Floating point)		
URL	Upper Range Limit(Floating point)		
Damping (STT only) (seconds)	0.00 0.30 0.70 1.50	3.10 6.30 12.70	25.50 51.10 102.30

Field	Value		
Damping (ST only) (seconds)	0.00	1.00	8.00
	0.16	2.00	16.0
	0.32	4.00	32.0
	0.48		
Sensor Type (STT only)	T/C J	T/C N	RTD-Cu10
	T/C K	RTD-PT100J	RTD-Cu25
	T/C T	Millivolts	T/C–RH Radiamatic
	T/C S	RTD-PT100D	T/C–W5W26
	T/C R	RTD-PT200	T/C–W3W25
	T/C E	RTD-PT500	Ohms
	T/C B	RTD-Ni500	T/C-NiNiMo
Sensor Type (ST only)	DP	AP	GP
Line Filter (STT only)	50 Hz		
	60 Hz		
Scratch pad	32 chars.		
Last Cfg Update	Time Stamp in Date and Time format (string)		
SV Units	°C		
	°F		
T/C Fault (Detect)	Disable / Enable		
Critical Status Latching	Enable/ Disable		
CJ Comp.	Internal / External		

5.8   Reference Data

Glossary

Item	Definition	Description
Conformity	Response form of sensor.	User selection of PV conversion algorithm: Linear or Square Root
D/A Trim	Digital to Analog Trim	Adjustment to digital-to analog (output) conversion algorithm that aligns minimum and maximum values of scaled digital range to minimum (0%) and maximum (100%) values of analog output.
Damping		Digital algorithm in transmitter MPU that reduces noise in a PV that is generated in the process or induced in transmitter components.
EU	Engineering Units	A standard scale of values, selected by you from a standard set for convenient display and interpretation.
Input		Physical property (e.g., pressure) applied to a sensor
		Digital value, calculated in the transmitter, that represents magnitude of the physical input
Local Meter		A device associated with a single transmitter and installed locally (in the transmitter housing) or remotely (in a separate housing) that displays variables sensed or calculated in the transmitter.
Loop Test		(In Analog Mode only) a set of commands from the HHC that causes the transmitter to provide 0% (4 mA) and 100% (20 mA) for testing proper operation of all components of the current loop.
LRL	Lower Range Limit	Minimum value in the useful range of the physical property of a transmitter at which a sensor can operate.
LRV	Lower Range Value	Minimum value in a continuous range of "normal" process values.
Match PV's	Toggle for PV Matching	When On, the value of PV2 is set to the value of PV1.
Meter Units		User-selected scale of values that provides for convenient interpretation of values in the associated transmitter.
Output		Analog or digital value, calculated from the input, that is transferred from the transmitter to a receiver (e.g., process control equipment)
PV	Process Variable	Measured magnitude of a primary physical property such as pressure or temperature.
PV Input		Physical property such as pressure or temperature, applied to an input sensor
PV Units	Process Variable Units	Standard scale of values of a PV, selected by you for convenient display and interpretation.
Sensor Type		Standardized designation of the physical design property of a sensor (e.g., DP, AP for pressure TC, RTD for temperature.)
Span		The continuous range of values in the "normal" operating range of PV values (that is, URV-LRV).

Item	Definition	Description
SV	Secondary Variable	A measured physical value of a physical property (e.g., temperature) that relates to the measured primary physical property (e.g., pressure).
SV Units	Secondary Variable Units	Standard scale of values of an SV, chosen by you for convenient display and interpretation.
URL	Upper Range Limit	Minimum value in the useful range of the physical property of a transmitter sensor can operate.
URV	Upper Range Value	Maximum value in a continuous range of "normal" process values.
SEND		Command from the HHC to copy the values of displayed parameters to either the transmitter to which it is connected, or to (NV? memory) in the HHC.
XS Delta Detection	Toggle for Delta Alarm enabling	If XS Delta Detection is On and the Delta Alarm value is exceeded, the PV output goes to the Failsafe value and a Critical Status message is enunciated. If Off and the Delta Alarm value is exceeded, the PV output is not affected and a Non-Critical Status message is enunciated.

Honeywell DE Fields and Values

Dialog	Field	Value		
Device Info	Tag ID	Tag id (8 chars.)		
	Type	Transmitter type		
	Firmware version	Firmware version of the transmitter		
	Serial number	Serial number of transmitter		
	Scratch pad	32 chars.		
General	PV Type	Dual Range (STDC)	Single Range	Single Range w/SV
	Communication mode	Analog	DE 4 byte	DE 6 byte
	Failsafe Direction	Upscale	Downscale	
	Line Filter (STT only)	50 Hz	60 Hz	
	T/C Fault Detect (STT only)	Enabled	Disabled	
DE Configure	LRL, URL, LRV, URV	Floating point		
	PV Units (STT only)	°C °F	K	°R
	PV Units (ST only)	inH$_2$O @ 39°F inH$_2$O @ 68°F MmHg @ 0°C Psi KPa	MPa mBar bar g/cm² kg/cm²	inHg @ 32°F mmH$_2$O @ 4°C mH$_2$O @ 4°C ATM inH$_2$O @ 60°F
	SV Units	°C	°F	
	Sensor Type (STT only)	T/C J T/C K T/C T T/C S T/C R T/C E T/C B	T/C N RTD-PT100J Millivolts RTD-PT100D RTD-PT200 RTD-PT500 RTD-Ni500	RTD-Cu10 RTD-Cu25 T/C–RH Radiamatic T/C–W5W26 T/C–W3W25 Ohms T/C-NiNiMo
	Sensor Type (ST only)	DP	AP	GP
	Damping (STT only) (seconds)	0.00 0.30 0.70 1.50	3.10 6.30 12.70	25.50 51.10 102.30

Dialog	Field	Value		
DE Configure (continued)	Damping (ST only) (seconds)	0.00 0.16 0.32 0.48	1.00 2.00 4.00	8.00 16.0 32.0
	Span	Floating point	(URV – LRV)	
	Linearization (STT only)	Linear	Non-Linear	
	Conformity (ST only)	Linear	Square Root	
Auxiliary Configure (STT only)	Critical Status Latching	Enabled	Disabled	
	NAMUR	Enabled	Disabled	
	CJ Compensation	Internal	External	
	CJ Temperature	Floating point		
	Write Protection	Enabled	Disabled	
	Password	Write protection password (4 digits)		
Change Password (STT only)	New Password	4 digits		
	Confirm New Password	4 digits		
Monitor	Input	Transmitter input in engineering units (floating point)		
	Output	Transmitter output in percent (floating point)		
	SV	Secondary variable (floating point)		
Device Status	Gross Status	Critical	Non-Critical	Invalid Database
	Critical	Critical status strings		
	Non-Critical	Non-critical status strings		
Local Meter (ST 3000)	Meter Hardware	Full Functional Meter Meter, NO Local Span or Zero	No Meter, Local Span & Zero	No Meter Installed
	Meter Units	% inH$_2$O @ 39°F mmHg @ 0°C psi KPa MPa	mBar bar g/cm² kg/cm² mmH$_2$O @ 4°C	mHg @ 0C mH$_2$O 4°C GPM GPH Custom

Dialog	Field	Value		
Local Display (ST 800)	Display Hardware	Display Installed, Display Not detected		
	Display Units	%	mBar	mHg @ 0C
		inH$_2$O @ 39°F	bar	mH$_2$O 4°C
		mmHg @ 0°C	g/cm²	GPM
		psi	kg/cm²	GPH
		KPa	mmH$_2$O @ 4°C	Custom
		MPa		
	Custom Units	8 characters		
	Flow EU Upper Value	Floating point		
	Flow EU Lower Value	Floating point		

5.9 XML Database (Samples)

<Database>

<Table name="Instrument">

<Record>

<Field name="Bus Type">Analog</Field>

<Field name="Device">ST 3000</Field>

<Field name="Tag ID">Tag23</Field>

<Field name="Serial Number">4375069400</Field>

<Field name="Manufacturer">Honeywell</Field>

<Field name="Model Number">B.6</Field>

<Field name="Transfer Function">0</Field>

<Field name="Input Range : In Low">0.0</Field>

<Field name="Input Range : In High">328.07</Field>

<Field name="Input Range : In Units">0</Field>

<Field name="Output Range : Out Low">4.00</Field>

<Field name="Output Range : Out High">20.00</Field>

<Field name="Output Range : Out Units">mA</Field>

<Field name="OEM-DevType">23-ST 3000-S,vB.6-T,v0</Field>

<Field name="LRL">0.0</Field>

<field name="URL">400.0</Field>

<Field name="Damping">0.00</Field>

<Field name="SensorType">0</Field>

<Field name="LineFilter">0</Field>

<Field name="Scratch">Scratch Test</Field>

<Field name="LastCfgUpdt">09-20-2007 12:25:25</Field>

<Field name="DevLRL">0.00000</Field>

<Field name="DevURL">400.00000</Field>

<Field name="SVUnit">0</Field>

<Field name="BreakDet">100</Field>

<Field name="LatchAlrm">100</Field>

<Field name="CJComp">100</Field>

<Field name="DevLRV">0.00000</Field>

<Field name="DevURV">0.82018</Field>

<Field name="URLRnge">400.00000</Field>

<Field name="DESTT250Type">0</Field>

</Record>

</Table>

</Database>

The Field names are explained in section **"Download Parameter List"**

6. Troubleshooting

6.1 MC Toolkit troubleshooting scenarios

MCT404

Start up scenario

Problem	No DE/HART Modem detected
Cause	The cause may be any one of the following: • MCT404 battery charge is low
Resolution	You can resolve by performing the following: • Refer the Battery Care section

6.2 FDC application software troubleshooting scenarios

Application Startup

Problem	Unable to launch or open FDC application.
Cause	The cause may be any one of the following: • .NET CF 3.5 is not installed. • FDC is installed in device memory instead of SD card. • One or more dependent files are corrupt.
Resolution	You can resolve by performing the following: • Installing .NET CF 3.5. • Re-installing FDC in SD card.

DD Library

Problem	File does not exist is displayed while attempting to delete a DD file
Cause	After manual manipulation of the DD library, the library information is not synchronized with the application
Resolution	You can resolve by performing the following: • Open the DD manager and perform Refresh DD Library operation. This will synchronize the DD library.

Device identification

Problem	When you tap Online Configuration option, the application displays "Device identification failed..." message and returns to home page.
Cause	The cause may be any one of the following: • By default, the application is configured to scan the device with specific poll address. If the connected device has different poll address, then application displays detection failed message. • Problem in device connections. • If the connected device is not HART compliant. For example, if the MC Toolkit is connected to HART DE devices, device detection fails and application displays error message and returns to home page.
Resolution	You can resolve by performing the following: • Configure the Device Detection settings, if the device has different poll address. • Confirm that the device connections are proper. • Confirm that the connected device is HART compliant.

Problem	Detection at poll address 63 in case of detection by poll address using range (0-63) failed sometimes
Cause	Potential issue with the modem
Resolution	You can resolve by performing the following: • Retry • Reduce the poll address ranges and try detecting the device

Write parameter

Problem	Sometimes it is observed that Send status in download screen may display failure but actually written to the device.
Cause	Failed to update the Send status
Resolution	You can resolve by performing the following: • Select the failed items from download screen and retry the send operation

Method Execution

Problem	**** Internal Error: **** This method has some constructs which are not supported
Cause	The cause may be any one of the following: • Some internal error • Method code has some error • FDC encountered some construct that's not supported
Resolution	Retry executing the method. If the problem persists, please contact Honeywell TAC

Graphs and Trends

Problem	Sometimes, on selecting another waveform or variable, Invalid data may be displayed or FDC may not respond.
Cause	The cause may be any one of the following: • Failure in communication • One or more action methods associated with trends would have failed.
Resolution	You can resolve by performing the following: • Close the graph/ trend and retry opening again • Or close and reload the device and retry open the graph/ trend again.

Problem	Sometimes the curves in the graphs may not appear as expected.
Cause	FDC has limits on the number of data points it supports for waveforms on Graphs
Resolution	known limitation

Save History

Problem	Save history operation may fail in specific scenarios.
Cause	The cause may be any one of the following: • Communication failure • Application might have run out of memory • Device specific issue
Resolution	Retry the operation. If the problem persists, please contact Honeywell TAC

Custom Views

Problem	Variables configured under custom view are not visible when the view opened
Cause	Variables are not valid in the device at that instance of time
Resolution	This is the expected behavior as per the standard

Close device

Problem	Application shows error message while closing the device screen. It is rarely observed scenario
Cause	The cause may be any one of the following: Application might have run out of memory
Resolution	There is no impact of this error on further device operation. User can proceed with other device operation.

Offline download

Problem	Offline download may fail for some parameters with 'Send command failed or invalid' message
Cause	The cause may be any one of the following: • Send command failure • Potential issue with communication
Resolution	You can resolve by performing the following: • Retry offline download for failed items.

Problem	Manufacturer and Device Type name may not be displayed for a certain scenarios.
Cause	The cause may be any one of the following: • DD file for the device is missing in FDC library
Resolution	Add appropriate DD file

Interoperability with FDM

Problem	Date fields show incorrect date after importing history record to FDM
Cause	Regional settings is mismatch
Resolution	Change the regional setting to English (United states) in FDC PDA and in FDM machine. Then retry saving history again in FDC and re importing in FDM

6.3 MC Toolkit application software troubleshooting scenarios

Login scenario

Problem	Unable to launch or open MC Toolkit application.
Cause	The cause may be any one of the following: • MC Toolkit is installed in device memory instead of SD card. • One or more dependent files are corrupt.
Resolution	You can resolve by performing the following: • Re-installing MC Toolkit in SD card.

Launching Help

Problem	Unable to launch MC Toolkit Help.
Cause	The cause may be any one of the following: • MC Toolkit application along with the Help files are installed in device memory instead of SD card. • One or more dependent files are corrupt.
Resolution	You can resolve by performing the following: • Re-installing MC Toolkit in SD card.

MC TOOLKIT ERROR MESSAGES

MESSAGE	Description	Resolution / CORRECTIVE ACTION
Checksum error on Modem Response!	Erroneous data packet received at the modem	A noisy environment can cause this error. Repeat the command again.
Com Port Read Timeout!	Error associated with the Communication port	Ensure that the Honeywell supplied modem cable is used and that the connections are secure. Make sure the modem has a good battery.
Com read Error!	Error associated with the Communication port	Make sure ActiveSync/Mobile Device Center is not running.
Error writing to Com Port!	Error associated with the Communication port	If several programs are active, try closing one or more open programs.
Error writing to Com Port!	Error associated with the Communication port	Stop the MC Toolkit application by doing File	Exit and restart the program.
EscapeCom function Error!	Error associated with the Communication port	Use the Pocket PC hardware reset. See your Pocket PC documentation reset the unit.
GetCommState Error!	Error associated with the Communication port	
Host Failed to get good response from the Modem!	Error associated with the Communication port	Make sure the modem has a good battery.
Invalid Command number from the Modem!	Error associated with the Communication port	Communications problem between the Pocket PC and the modem. Repeat the command again.
Invalid Handle Value!	Error associated with the Communication port	Make sure ActiveSync/Mobile Device Center is not running. If Several programs are active, try closing one or more open programs. Stop the MC Toolkit application by doing File	Exit and restart the program. Use the Pocket PC hardware reset. See your Pocket PC documentation reset the unit. Make sure you are using a Honeywell approved Pocket PC.

MESSAGE	Description	Resolution / CORRECTIVE ACTION
Memory Error	Host Pocket PC does not have enough memory to run the program	If several programs are active, try closing one or more open programs. Too many programs installed in the Pocket PC. Check the Pocket PC free memory. Uninstall programs if need to release memory. Too many data files in the Pocket PC. Check the Pocket PC free memory. Delete unused data files to release memory. Use the Pocket PC hardware reset. See your Pocket PC documentation reset the unit.
Message length is longer than expected	Communication interruptions between Host Pocket PC and the modem	Communications problem between the Pocket PC computer and the modem. Repeat the command again.
Message length is shorter than expected	Communication interruptions between Host Pocket PC and the modem	
Modem bad checksum	Erroneous data packet received at the modem	This could indicate a defective modem. Repeat the command again. If the problem persist contact Honeywell TAC.
Modem Buffer overflow	Data bytes from Host Pocket PC to modem is more than expected	Communications problem between the Pocket PC computer and the modem. Repeat the command again.
Modem busy	Command request to the modem is faster than expected	
Modem framing error	Erroneous data packet received at the modem	
Modem illegal command	Unexpected command sent to modem	
Modem illegal data	Unexpected data sent to modem	
Modem network error	Data transmission error between the Host Pocket PC and the modem	
Modem Transmitter Serial Error!	Data transmission error between the Host Pocket PC and the modem	

MESSAGE	Description	Resolution / CORRECTIVE ACTION
No Response from the Transmitter	Unable to get any data from the Transmitter	Make sure that the MC Toolkit field connections are connected to the transmitter. Verify the transmitter is wired correctly and that it is powered. If connected to a DE transmitter, make sure the polarity of the cables connecting to the transmitter is correct. If connected to a HART transmitter, make sure the address number is correct. Make sure the correct protocol for the transmitter is selected. A defective transmitter can also cause this error message. Verify that a 250 ohm resistor in series with the transmitter.
Resume Monitor Thread Failed!	Host Pocket PC OS error associated with the Threads	Close all the other running applications. Restart MC Toolkit application.
Serial Port is not Available	Some other application is using the serial port	Make sure ActiveSync/Mobile Device Center is not running.
SetCommMask Error!	Error associated with the Communication port	If Several programs are active, try closing one or more open programs.
SetCommState Error!	Error associated with the Communication port	Stop the MC Toolkit application by doing File | Exit and restart the program.
SetCommTimeouts Error!	Error associated with the Communication port	Use the Pocket PC hardware reset. See your Pocket PC documentation reset the unit. Caution: If the Symbol PPT 2800 computer is reset, it will lose all its installed programs and data. The program will have to be installed again. Make sure you are using a Honeywell approved Pocket PC.
Suspend monitor Thread Failed! Upload Cannot Continue.	Host Pocket PC OS error associated with the Threads	System failed to suspend the monitor function
Too Many bytes received on ComPort!		Repeat the command. If the problem persist contact Honeywell TAC.
Transmitter-Modem Receive Buffer overflow!	Data bytes from the transmitter to the modem is more than expected	This could be the result of having older version of the modem. Upgrade the modem firmware using ModemCodeDownload program
Unknown Error!	Unexpected error	

MESSAGE	Description	Resolution / CORRECTIVE ACTION
COM Port Initialization Failed	Could not initialize the com port	
No HARTDE Modem Present	Could not recognize the presence of the modem	
HARTDE Modem Protocol set failed	Host pocket PC to Modem communication failed	
Error In Communication with Device, Closing the Device.		
No Device found, Do You want to Retry	Could not establish connection to a transmitter	If the above things are perfect, try to change different device detection options from Preference dialog box under Device/Preferences menu, restart the FDC.

DE Device error messages

MESSAGE	Description	Resolution / CORRECTIVE ACTION
Write NVM Failed	Write to transmitter Non-Volatile Memory failed.	Try the operation again, the transmitter was busy doing something else
Unknown Device	MC Toolkit does not support this transmitter.	Check the list of supported devices
Invalid Range	User-entered value is too high or too low.	Enter value within Range
Invalid Request	This transmitter does not support the command requested.	Check the respective device User Manual for supported operations
NACK	MC Toolkit sensed Non-Acknowledgement of message to the Transmitter.	Try the action again
Illegal Operation	Typically caused by an invalid parameter or an attempt to perform an operation in a mode not allowed by the transmitter.	Do not perform this action as it is illegal
Transmitter in Local Mode	Transmitter in Factory Mode	User is not allowed to perform this operation as it is factory only operation
Transmitter is Busy	Transmitter was communicating when MC Toolkit sent message to transmitter.	Retry the action again
Invalid operation on Write Protected Field	Attempt to write to a protected field.	Remove the Write protection if you are the authorized person by providing the right password and disabling the Write Protect mode
Undefined Gross Status Byte from the Transmitter	The transmitter has reported a status indication not understood by MC Toolkit.	Retry the operation, maybe some disturbance or noise caused unexpected byte on the communication line
Gross Status Reserved Bit Set	The transmitter has reported a status indication not understood by MC Toolkit.	Retry the operation, maybe some disturbance or noise caused unexpected byte on the communication line
Data Inaccessible	Unable to access the parameter value.	Same as Description
Bad character in Scratchpad	The scratchpad contains an invalid data byte.	Check the specification to identify the supported character set
Invalid Float value	Value is not a valid floating point value.	Some unacceptable character was entered
Value Out of Range	User-entered number is too high or too low.	Same as Description
Transmitter is in DE Mode. D/A Trim is allowed only in Analog Mode.	DE mode is digital only (no digital-to-analog conversion).	Same as Description

MESSAGE	Description	Resolution / CORRECTIVE ACTION
The transmitter is in Output Mode. Are you sure you want to terminate the connection?	User tried to Exit MC Toolkit application while the DE Transmitter is still in Output Mode.	Same as Description
The changes you have made are about to be sent to the transmitter. Continue?	Values entered into this display will be written into transmitter memory.	Informational message
Please make sure you are connected to a DE device. Sending DE commands to a non-DE device could potentially cause a process upset.	DE communications (~ 4-20 mA amplitude) could cause erroneous transmission in non-DE protocols.	Same as Description
Leaving the Main Menu will require an upload in order to return. Are you sure you want to do this?	A new Upload will require approximately 60-second wait.	Same as Description
Put loop in Manual ... Trips secured?	Changing values of transmitter parameters can cause process upset.	Same as Description
Conformity must be square root to select this unit.	Units for Flow indications are available only when Square Root conformity is selected.	Same as Description
Are you sure you want to Reset All Corrects to factory defaults?	Executing Reset All Corrects will overwrite all user input calibration values (Zero, LRV, URV) with factory-default values.	Same as Description
Are you sure you want to place the transmitter in output mode (?)	In Output Mode, output current will be set to the selected constant value, rather than to calculated	Same as Description
Square Root is not allowed for GP and AP Sensor Types.	Square Root conformity is available only for FLOW (DP) input applications.	Same as Description

Offline configuration Error Messages

MESSAGES	DESCRIPTION	Resolution / Corrective Action
All the options are saved!	Any changes made on the current dialog are saved	Informational message
Invalid file	Selected file name is not found in the Pocket PC	Informational message
You have selected the Template file and you cannot modify it. Do you want to save the Template file as the working copy?	MC Toolkit will be shipped with a template file with some default configurations. User cannot modify it. If you select this file for loading and editing parameters, you get this message. However you can save this Template file as the Working copy by providing a new file name. You can save any of this configuration file as the Template file by selecting the preferred configuration file and Saving it As "TEMPLMCT.XML". From this point on this will remain as the Template file	Same as description
The Template file has been successfully saved as the working copy!	When the Template file is selected and you accept the prompt to save the Template file as the Working copy you get this message on successful save of the file	Same as description
No items are selected!	On the Select Device Type dialog, if no items are selected in any of the 3 List boxes :Select Device Type, Select Revision, and Select Tag ID, you get this message on selecting "Edit Offline Params" button	Same as description
Memory Allocation Error!	If any of the Dynamic memory allocation fails you get this message	Try removing files that are not needed from the SD Card
Do you want to save your changes to the file?	If you made some changes to any of the parameters in any of the 3 Parameter dialogs and you select "<Back" button on the "Select Device Type" dialog without first selecting "Save to File" button, you get this message	Same as description
The Offline config. parameters are saved to the file!	The Offline config. parameters are saved from the program database to the file	Same as description
Could not save Offline config. parameters to the file!	Some error occurred during Save of the file and could not save the Offline config. parameters from the program database to the file	Try the operation again
Are you sure you want to download this configuration to the device?	On selecting "DOWNLOAD to Device" button on the "Select Device Type" dialog user gets this message to confirm his action in Offline Mode	Informational message
Are you sure you want to download this configuration to the current Online device?	On selecting "DOWNLOAD to Device" button on the "Select Device Type" dialog user gets this message to confirm his action in Online Mode	Informational message

Download failed!	Could not download the selected configuration to the Device due to any of the following reasons: Device mismatch Version incompatibility Communication errors	Try downloading to the right device
Version incompatibility found! Some of the parameters in version X of the device are not supported in version Y of the device. Download cannot proceed!	Download of configuration from the file with firmware version X could not be downloaded to the device with version Y of the device where X > Y. This is because there are some parameters in version X that are not supported in version Y	Try downloading to the right device
Device mismatch found! Please make sure that you have connected to the right device...	The device type you trying to download the selected configuration does not match with the device type of the configuration in the file	Try downloading to the right device
Download completed successfully! Do you want to proceed to the MC TOOLKIT screen?	In Offline mode, after completion of the Download, you get this option to go back to MC TOOLKIT screen to do an Upload of the newly downloaded configuration	Informational message
Could not read Tag IDs from the file	On parsing the XML file, there was some error and could not read the Tag IDs from the file	Make sure the configuration file is not corrupted. Reinstall the MC Toolkit if the problem persists
Could not set Tag ID! Do you want to proceed with the rest of the download?	When the Write Tag ID command fails, you get this message. You can abort the rest of the download or continue	Same as the description
Could not set Line Filter! Do you want to proceed with the rest of the download?	When the Write Line Filter command fails, you get this message. you can abort the rest of the download or continue	Same as the description
Could not set one or all of the following parameters: Sensor type, Cold junction compensation, Break Detection, Linearity! Do you want to proceed with the rest of the download?	When the Write of any of the parameters in this list fails, you get this message. You can abort the rest of the download or continue	Same as the description
Could not download LRV / URV. The device will keep the values valid for its Sensor limits	When the Write of LRV / URV fails due to invalid range, you get this message indicating the device will set the values valid for the current sensor	Same as the description
Could not set Damping! Do you want to proceed with the rest of the download?	When the Write Damping command fails, you get this message. You can abort the rest of the download or continue	Same as the description
Could not set the Critical Status Latching configuration! Do you want to proceed with the rest of the download?	When the Critical Status Latching command fails, you get this message. You can abort the rest of the download or continue	Same as the description

Could not set one or all of the following parameters: Conformity, Damping! Do you want to proceed with the rest of the download?	When the Write Conformity and Damping command fails, you get this message. You can abort the rest of the download or continue	Same as the description
Could not set the Scratch Pad!	When the Write Scratch Pad command fails, you get this message.	Same as the description
No device selected! Download cannot proceed!	On the HART device list, you need to select the Device you want to Download the selected configuration. When no device is selected, and you select "Download to Device" button, you get this message	Same as the description
No device found! Download cannot proceed!	On polling the HART network, if no HART devices are found, you get this message	Same as the description
Could not read Delta value!	The Read Delta value command is sent every time you select the "SENSOR" button on the HART MAIN MENU screen before displaying the SENSOR screen. If the command fails you get this message	Same as the description
Could not save Online config. parameters to the file!	In Online mode, you can select "Save to File" to save the current online parameters to the fi le. If it fails, you get this message	Same as the description
The Online config. parameters are saved to the file!	Same as the message	Same as the description
No Device Types found! Please make sure that you have selected the right Config File	The file selected may be the wrong one. Also, if you are in DE mode and you select a file with no Configuration for the DE devices, then you get this message. Similarly, if you are in HART mode and you select a file with no configuration for the HART devices you get this message.	Same as the description
Lower Range Value is greater than the Upper Range Value!	You cannot set a LRV value greater than URV	Same as the description
The Template file name and the Working file name cannot be the same, please provide a different name...	You can save the Template file as his working copy. But the working file name cannot be the same as the Template file name	Same as the description
File name already exists. Do you want to overwrite the existing file?	You can save the Template file as his working copy. If the working file name already exists, then you get this message	Same as the description
File name cannot be blank! Please provide a file name...	You can save the Template file as his working copy. You need to provide a file name for the working copy	Same as the description Same as the description
The system resources are running low. Please close the MC Toolkit program by selecting File/Exit menu!	When a program is stale for a long time without any user inputs, the Pocket PC enters into Hibernation mode. When it enters this mode and the program captures the windows message you may see this message and it is recommended that the program be closed.	
Closing the MC Toolkit program	When you select the File / Exit menu you get this message	Informational Message

The current config. file ….XML has reached its limit of 200 Tag IDs / Records, please save the configuration to a new file	The requirement was to support at least 100 Tag IDs. But the program allows to Save MAX 200 configurations / Tag IDs in the same file. Once it reaches this limit, you get this message if you try to save a new configuration to the same file However you should be able to update any of the 200 configurations without changing the Tag ID.	Same as the description
Are you sure you want to leave the Device List screen?	You get this message when you select Back button on the HART Device List screen. This screen lists all the devices on the HART network. If you select to go back to the previous screen without doing download, the program needs to poll the network again to list the devices	Same as the description
Are you sure you want to cancel the download?	You get this message when you select Back button with a selected device from the list, on the HART Device List screen. This screen lists all the devices on the HART network. If you select to go back to the previous screen without doing download, the program needs to poll the network again to list the devices	Same as the description

7. MC Toolkit Maintenance

7.1 MCT404 battery replacement
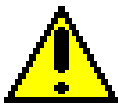
Battery Status

Refer to "About the Battery" section of the "*300011CB02A01_instruction_manual_irocCi70-Ex_EN.pdf*" that is shipped with the MCT404 product

Battery Replacement

The battery is replaceable in the field.

The MCT404 uses following rechargeable Lithium-ion battery pack as the main power source:

- 3.7 V, 4000 mAH (14.8 Wh) battery AM Ci70 –Ex

⚠	**WARNING !!**
	The battery used in this device may present a fire or chemical burn hazard if it is mistreated. Do not disassemble it, heat it above 60 °C (140 °F) or incinerate it. Dispose of used batteries promptly. Keep away from children.

Charge the Battery

You need to fully charge the battery before using your MCT404 for the first time.

Battery care: Refer the "About Battery Life and Conservation" section of the "*300011CB02A01_instruction_manual_irocCi70-Ex_EN.pdf* " that is shipped with the MCT404 product

Replace the Battery

If your battery power is low, you need to either charge the battery in the MCT404, or replace it

with a charged battery.

1. Save your files and close any open applications.

2. Press the Power button and choose Shutdown from the menu to shut down the MCT404.

3. Detach the handstrap from the MCT404. See Figure 7-1

4. Make sure the MCT404 is in hibernate mode and that the screen has turned off.

5. Remove the battery. Unscrew the battery's screw using enclosed screwdriver. Lift lower part of the battery to release it from the MCT404. See Figure 7-2

6. Insert the top end of a fully charged battery into the MCT404, and press down firmly on the bottom of the battery. Then tighten the screw. Make sure that the battery is firmly attached.
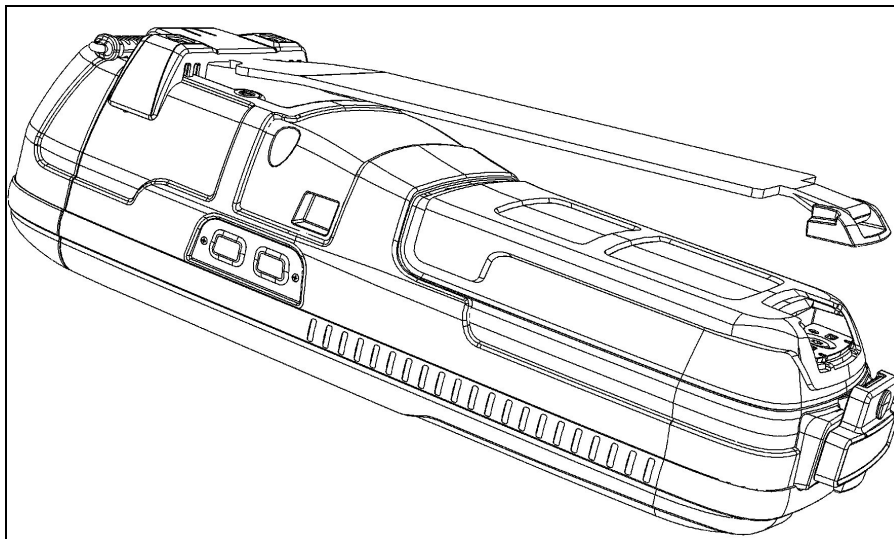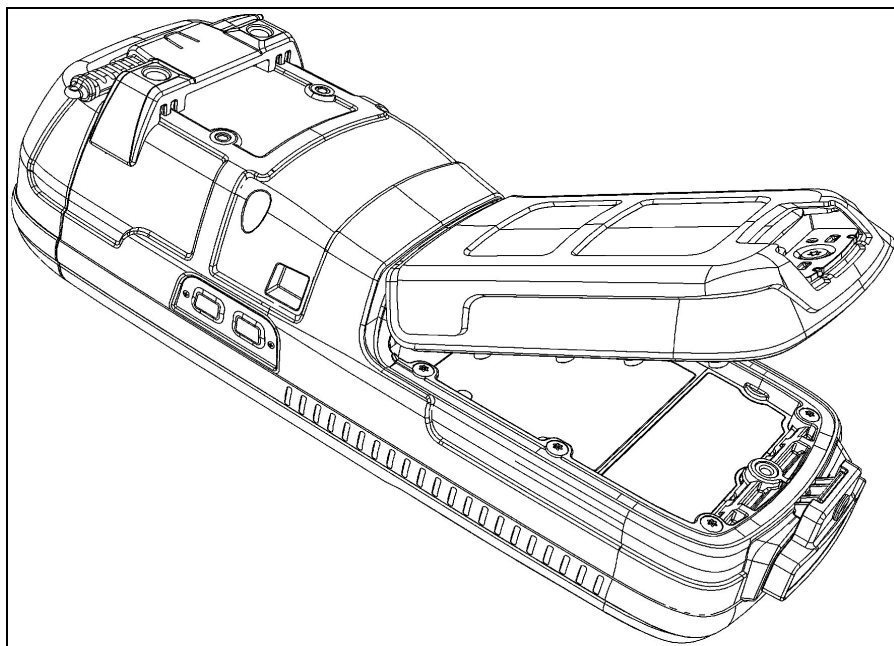
Figure 7-1 Remove Handstrap

**Figure 7-2 Remove Battery Cover**

7.2   SD card replacement

MCT404 SD Card Replacement

Use an SD card to increase file storage and install softwae. The MCT404 supports an optional 32 GB maximum capacity SD card.

1. Press the Power button to turn off the MCT404.
2. Remove the handstrap and the battery. See Figure 7-1
3. Remove the four Phillips screws and open the card access door.
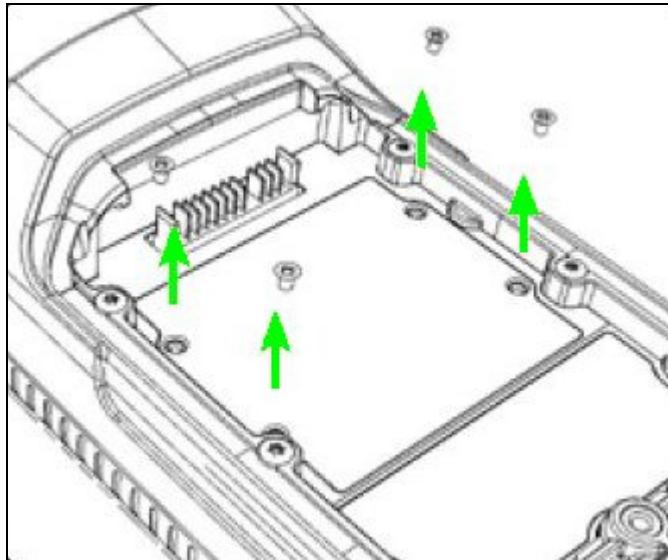
4. Slide the SIM card door to the left to unlock it and open the door.
5. Slide the SD card door towards the top of the computer to unlock it and open the door.
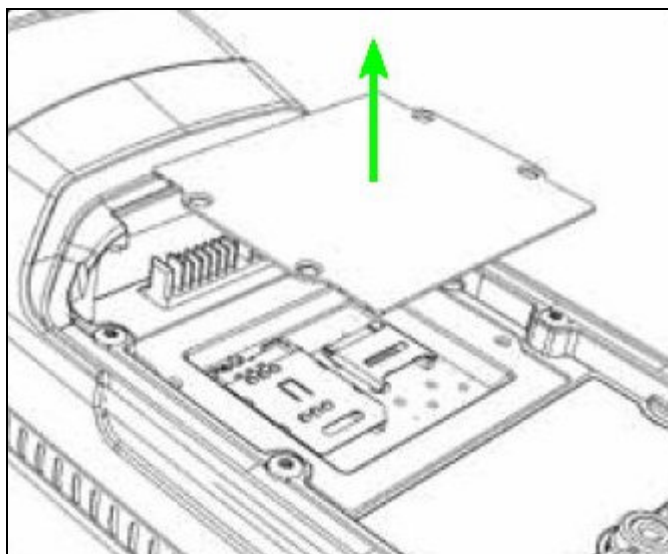
6. Remove any existing SD card,
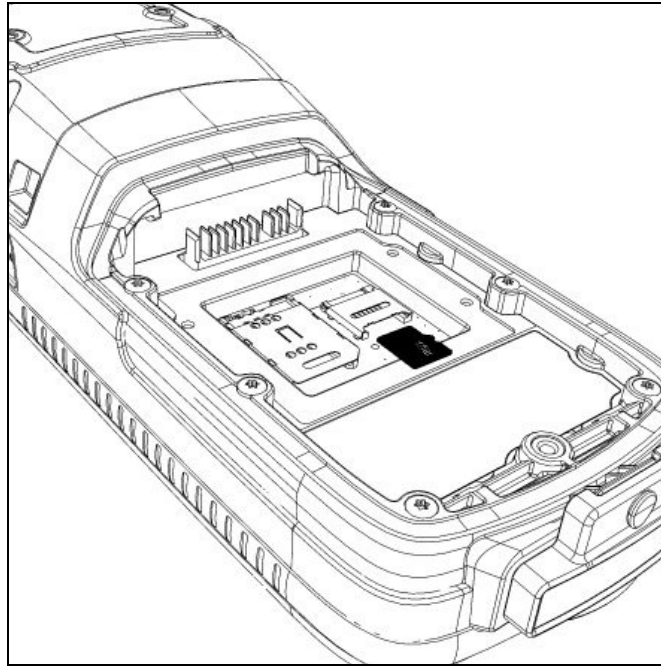7. Slide the new SD card into place.

Figure 7-3 SD Card Replacement

1. Close the SD card door and slide it towards the bottom of the MCT404 to lock it in place.
2. Close the SIM card door and slide it to the right to lock it in place.
3. Close the card access door. Then replace the cover plate and fasten the four screws.
4. Install the battery. Press down firmly on the bottom of the battery. Then tighten the torx screw.
5. Reattach the handstrap.
6. Press the Power button. The MCT404 cold boots.

Note: The MCT404 resets when you open the card access door to insert the SD card. Make sure you completely close the card access door before you use your MCT404.

8. Appendix A: Application Notes

8.1 Application Notes

Synchronization between PDA and PC

Windws XP: ActiveSync/Mobile Device Center connection

Connect the ActiveSync/Mobile Device Center cable from the PDA base to a USB port on the PC.

ActiveSync/Mobile Device Center should start automatically. If your PDA is synched with the PC, you see the Screen Y. If the screen does not come up maximized, you will see the icon on your Desktop Taskbar. Double tap on the icon to maximize.
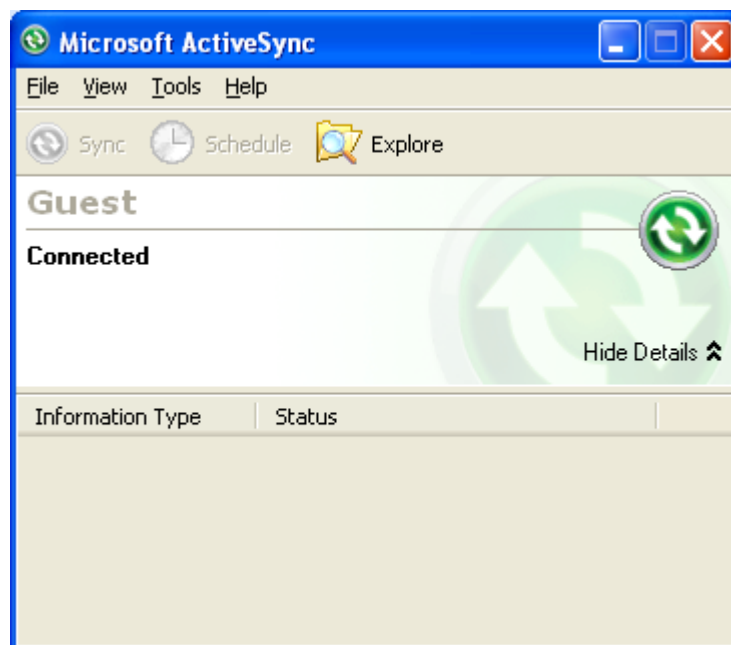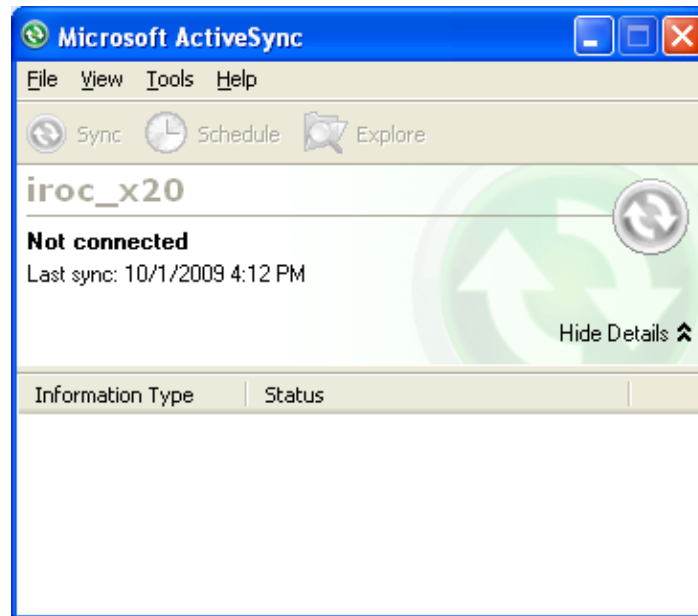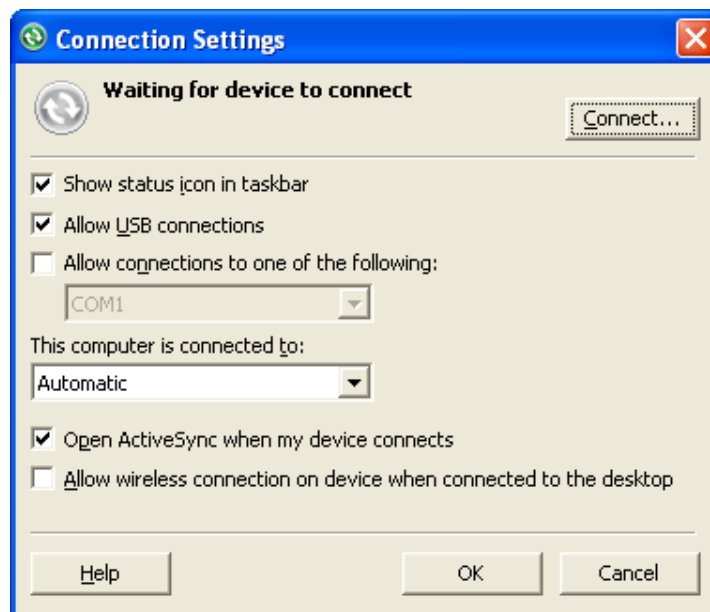

Figure 8-1 Screen Y

If you do not see the **Screen Y**, select Start\All Programs\Microsoft ActiveSync/Mobile Device Center. It is likely that your PDA is not synched up with your PC and you will see the screen below.

Select **File/Connection Settings** and set the Connection settings as below. Select OK.

The Synch process should start now. If you are still not connected, then **Soft Reset the PDA** with the Sync cable still connected between the PDA base and the PC.

This should automatically establish synch connection between the PDA and the PC and you should see the **Screen Y**

Windows Vista and Windows 7: Mobile Device Center connection

Connect the ActiveSync/Mobile Device Center cable from the PDA base to a USB port on the PC.

Windows Mobile Device Center should start automatically. If your PDA is synched with the PC, you see the screen below. If the screen does not come up maximized, you will see the icon on your Desktop Taskbar. Tap on the icon to maximize.
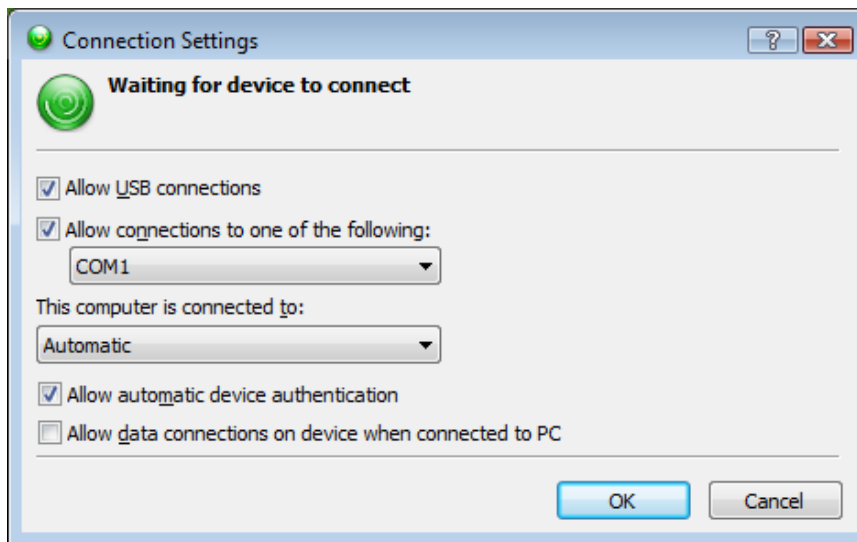

Figure 8-2 Screen X

You can proceed with the MC Toolkit Installation following the Instructions on the 34-ST-33-58

If you do not see the **Screen X**, select Start\All Programs\Windows Mobile Device Center. It is likely that your PDA is not synched up with your PC and you will see the screen below.

Select **Mobile Device Settings** and set the Connection settings as below. Select OK.

The Synch process should start now. If you are still not connected, then **Soft Reset the PDA** with the Sync cable still connected between the PDA base and the PC.

This should automatically establish synch connection between the PDA and the PC and you should see the **Screen X**

File Transfer

File Transfer between Pocket PC and PC is achieved by the ActiveSync/Mobile Device Center interface.
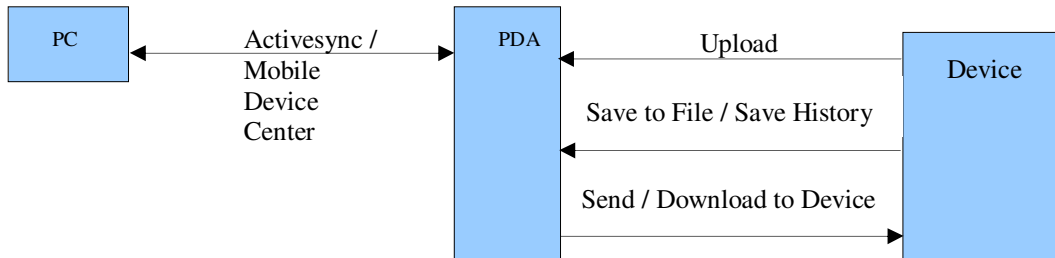

Figure 8-3 ActiveSync/Mobile Device Center file transfer

ActiveSync/Mobile Device Center

Establishes connection between PC and PDA.

Allows you to copy files between PC and PPC once the connection is established.

Allows the MC Toolkit Installation program to install the Application related files

Upload

Allows Upload of Config parameters from the Device to the PDA in Online mode

Save to File

Allows saving current Online configuration to an XML file within the PDA. Also allows editing and saving the Offline Configuration parameters back to the file – applicable to DE devices using MC Toolkit application

Save History

Allows saving current Online configuration as a History file within the PDA – applicable to Universal HART devices using FDC application

Send

Allows writing changes to one or multiple parameters in the Device in Online Mode

Download to Device

In MC Toolkit application, this allows selection of an XML configuration file within the PDA in Offline mode, load the parameters, Edit and send to the device after establishing connection. In FDC application, this allows selection of a FDM configuration file within the PDA in Offline Mode, Load and View the parameters, select the parameters to be sent to the device after establishing connection.

9. Appendix B:

9.1 MCT Power Save Guidelines

When not in use, always turn off the PDA.

Do not leave the MC Toolkit or FDC applications running if not in use; exit the applications to save modem battery.

10. Appendix C: Replacement Parts

10.1 MCT404 Accessories & Spare Parts

Table 18 MCT404 Replacement Parts

Accessories/Spare Parts	Part Number
CD-ROM (FDC 2.X software + MC Toolkit software)	51453286-501
Power supply for docking station	50079567-002
Power Cord(US)	50079567-003
Power Cord (EU)	50079567-004
Power Cord (UK)	50079567-005
Power Cord (AU)	50079567-006
Docking station, Power Supply and USB cable for computer interface	50079567-007
Stylus for the MCT404 Touch screen	50079567-008
Transmitter connector cable (with one set of Alligator Clips and one set of EZ Clips)	50079567-009
Spare Battery	50079567-010
Leather carrying case (Stylus/shoulder strap included)	50079567-011
Hand strap	50079567-012

Sales and Service

For application assistance, current specifications, pricing, or name of the nearest Authorized Distributor, contact one of the offices below.

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Specifications are subject to change without notice.

For more information
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