4150 General Purpose HART® Communicator
4150X ATEX I.S. Certified HART® Communicator

USER'S MANUAL

meriam
process technologies

a Scott Fetzer company

IMPORTANT NOTICE

Important information on the product is contained in this manual. Read this manual carefully and completely before operating the product. For the safety of the operator and the system, a thorough understanding of this manual is necessary before commissioning, using or maintaining the product.

ASSISTANCE

For customer assistance please contact the local Meriam Representative or Meriam Process Technologies directly. For a geographic listing of Representatives and contact information, visit our web site at www.meriam.com and click on the "Representatives" link. Contact Meriam Process Technologies directly by phone at (216) 281-1100 or by e-mail at meriam@meriam.com. Direct all assistance inquiries to Technical Services.

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Meriam Process Technologies
10920 Madison Avenue
Cleveland, Ohio 44102

TELEPHONE: (216) 281-1100
FAX: (216) 281-0228
E-mail: meriam@meriam.com
Web Site: www.meriam.com
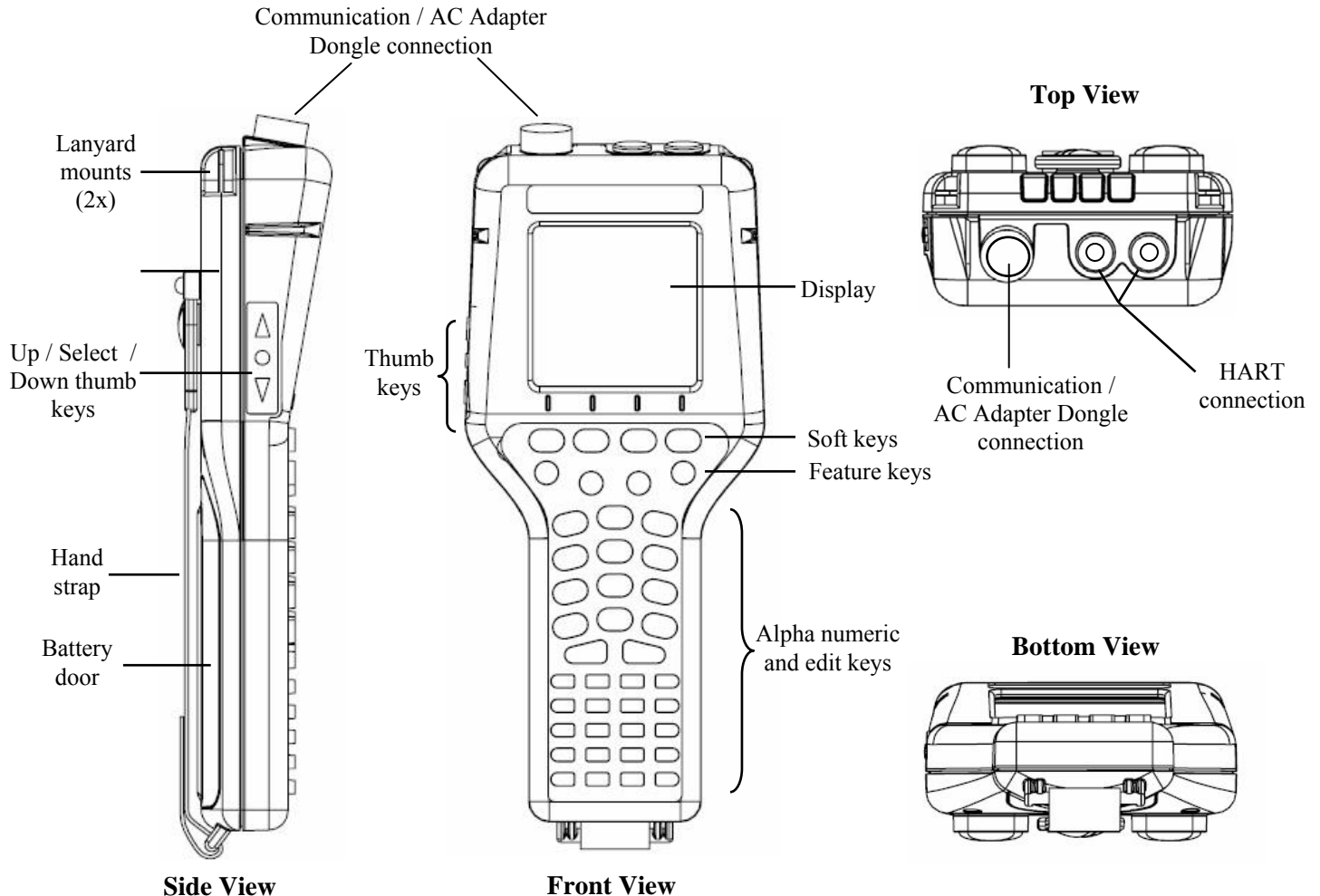
4150 / 4150X HART Communicator
USER'S MANUAL

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4150 / 4150X HART COMMUNICATOR OVERVIEW

The 4150 / 4150X HART Communicator is a full function HART Communicator supporting Universal, Common Practice and Device Specific commands for commissioning, configuration and maintenance operations. HART field devices can be configured, polled, and trimmed using the 4150 / 4150X with HART communications.

Communication / AC Adapter
Dongle connection

Top View

Lanyard
mounts
(2x)

Display

Up / Select /
Down thumb
keys

Thumb
keys

Communication /
AC Adapter Dongle
connection

HART
connection

Soft keys

Feature keys

Hand
strap

Alpha numeric
and edit keys

Bottom View

Battery
door

Side View

Front View

Note: For Intrinsically Safe model 4150X, consult the **Hazardous** **Area** **Use** *section of this manual and the Intrinsic Safety Control Drawing in the Appendix of this manual for specific details on use of approved 4150X and applicable restrictions.*

DISPLAY OVERVIEW

The display of the 4150 / 4150X is a 128 x 128 pixel graphic display with backlight. Viewable area is 2.6" x 2.6" for 13 viewable message lines. The display provides three types of information: 1) header information including display titles, HART communication status indicator, SHIFT indicator, alpha or numeric entry mode indicator and battery gauge, 2) main data display section for display of operating menus, HART menus, and device information, and 3) footer information defining the display's soft key functionality.

Photo below depicts the 4150 / 4150X with initial HART display and Soft keys:

HEADER LINE SYMBOLS

♡ heart symbol indicates active HART communication

↑ up arrow indicates SHIFT key (⇧) is on

\# number sign indicates numeric / symbol entry is the active entry mode for all dual functions keys

A the letter "A" indicates alpha entry is the active entry mode for all dual function keys

▯▬▬▬ battery symbol indicates unit under battery power; filled portion indicates remaining battery

⊐D▬ electrical plug symbol indicates the AC adapter is connected and powering the unit

BUSY text box replaces either power symbol when the microprocessor is busy executing a previously requested task. Do not press keys when this status symbol is displayed.

KEY PAD OVERVIEW

The keypad has three basic key types: single function keys, dual-function keys, and soft keys with changing definitions.

Single function keys control a dedicated 4150 / 4150X function.

Dual function keys, through the use of the Alpha Lock (🔒) or Shift (⇧) keys, toggle between two separate functions as needed to facilitate data entry.

Soft key functions change depending on the operating mode. Soft key definitions are displayed at the bottom of the LCD, just above their respective gray soft keys.

The left hand thumb keys can be used to scroll up, scroll down, and to select menu items.

On/Off

Pressing the ON/OFF key powers up or turns off the unit. As the unit powers up, an internal diagnostic check is performed. Any abnormalities are posted on the display. The unit will briefly display the model number and then check for a HART device with address of zero. If a device with

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zero address is found, the unit immediately goes into online status and displays information about the device. If no device is found, the Main navigation screen is displayed. To turn the 4150 / 4150X off, press and hold the ON/OFF key for approximately .5 seconds. Unit will power down provided a critical HART operation is not in process.
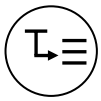
Quick Menu

The Quick Menu key initiates HART communications and then displays ten (10) HART menu choices for the connected device. These menus are used to short cut the traditional HART menus to enable the user to arrive quickly at desired functions. Typical Quick Menu options include: Main Menu, Config Menu, Rerange, Basic Info, Construction Materials, Display, Sensors, Signal Conditioning, Self Test. Quick Menu is disabled while critical HART operations are in process.
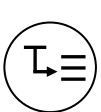
⇪ (Home)

The key sequence ⇑, ⇪ returns the user to the initial or "home" HART menu for the connected device. The Home function is disabled while critical HART operations are in process.

Document

This key provides rapid access to HART communication Save/Send Configs options, List/Edit Configs, and Create Configs functions for all models. For Documenting operations this key also provides documenting functions used with the Meriam Device Management System software. Access to this key is disabled while critical HART communications are in process.
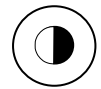
Display Contrast

This key allows the user to adjust the contrast of the LCD display for ambient lighting and user preferences at any time and in any operating mode. Pressing and holding this key cycles through all available contrast settings. After adjusting Display Contrast, wait at least five (5) seconds before turning unit off to insure storage of new contrast setting. Ambient temperature compensation is included.
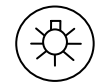
Backlight

This key toggles the backlight feature between Off / Low intensity / High intensity to illuminate the display for ambient light conditions. Battery life is impacted by use of the backlight feature; High intensity is the most aggressive. An automatic shut-off timer is available by pressing the **Cfg** soft key from the main menu.

Alphanumeric / Symbol Entry

The alphanumeric keys have the heaviest population on the keyboard and are the method of entering data into the 4150 / 4150X. Each display type has a default alpha or numeric / symbol entry mode based on the most likely used mode for the display's function. Pressing the ALPHA LOCK (🔒) key activates the other entry mode for alphanumeric keys. Pressing the SHIFT key (⇑) converts the next key stroke to the inactive entry mode and then automatically reverts back to the active mode. The letter "A" in the display header line indicates the alpha input is active while a # sign in the display header indicates the numeric / symbol input is active.

⇑ (Shift)

The ⇑ key is used to activate the secondary functions of the Unit's dual function keys for the next keystroke only. When the Shift key is active, an up arrow ↑ is displayed at the top of the display to the left of the battery power (or AC wall plug) symbol ⇑ is also used to activate the Page Up and Page Down soft key functions while viewing lists of information (installed DOFs, stored configs, etc…).

Alpha Lock
This key changes the keypads dual function keys from numeric/symbol entry mode to alpha character entry mode and back. The active entry mode is indicated in the display header line next to the power supply indicator on the upper right of the screen. The letter "A" in the display header line indicates that alpha entry is active while a # sign in the display header indicates that numeric / symbol entry is active.

Left / Right Arrow keys
These keys support cursor movement forward and backward for text / numeric editing needs. The default edit mode is "overwrite." For navigating functions, the left arrow emulates the **Back** soft key and the right arrow emulates the **Select** soft key.

⊠ *(Delete)*
This editing key will delete the character located above the cursor in a text / numeric string.
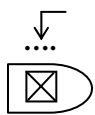
↓ *(Insert)*
The Insert text edit function is activated by pressing the ⇧, ↓ key sequence. Once activated, the next alpha or numeric / symbol keystroke will be inserted into the open text field. The "overwrite" default mode is restored upon completion of the insert operation.

Soft Keys (unlabeled)
The four gray keys located immediately below the display are Soft Keys. The specific functions of these keys change depending on the operating mode. Present definitions are displayed at the bottom of the display. Whenever possible the two Soft Keys on left are used for navigation functions, the third from the left for action functions, and the right most for back function.

The following are examples of Soft Key definitions and their uses:

Up – moves indicator arrow up one line in a menu list
Down – moves indicator arrow down one line in a menu list
Select – selects the indicated menu item
Cfg – provides access to configuration settings (Users, Applications, Lockouts, Clock / Timers, Other)
Back – returns to prior display
Inc – increment the value shown above the cursor
Dec – decrement the value shown above the cursor
Next / **Prev** – these keys move to Next or Previous item within the list function accessed. Next and Prev are for navigation only.
Done – ends data entry session and proceeds with the selected operation
Edit – activate edit function for displayed parameter
Abort – aborts present operation without affecting prior settings or values
Save – saves the present value
Store – stores the present value
Yes – affirmative response to question presented
No – negative response to question presented
Trim – executes the trim function called for by the HART menu option selected
Chng – change the present menu setting
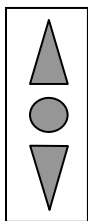
Thumb operated keys

Up, Select, and Down side keys provide convenient alternate methods of menu navigation. Use these in addition to Soft keys and numbered HART menu lines to make menu navigation fast and easy.

△ = Up = Prev
◯ = Select, Edit   Do not use these keys when the ⬛BUSY⬜ symbol is displayed.
▽ = Down = Next

GENERAL OPERATION

Power options

The 4150 general purpose unit can be powered for portable operation by six (6) each AA alkaline or NiMH batteries. The 4150X Intrinsically Safe unit must be powered by approved AA alkaline batteries (see the "Hazardous Area Use" section of this manual and the I.S. Control Drawing shipped with each 4150X for more information). AA alkaline batteries are standard with shipment. Meriam offers NiMH batteries and charger cradles (external charge only) as an option for general purpose (non-I.S.) only. For bench top applications and download operations, the AC adapter (P/N Z9B000007 included with each unit) is recommended. The AC adapter is only for use in safe areas.

Located in the upper right corner of the display, this icon displays the remaining battery power. Fresh batteries produce a full black cell body. As the power drains, the black segment retreats indicating remaining power.
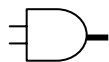
When the optional AC adapter (P/N Z9B000007) is used, the battery circuit is bypassed and a wall plug icon replaces the battery icon on the display header. For AC power use, the AC adapter is connected to the Communication / AC Adapter Dongle and then the dongle is connected to the fitting on the top of the 4150 / 4150X.

NOTE: Power icons may temporarily disappear during certain HART Communication operations

Communication / AC Adapter Dongle

The Communication / AC Adapter Dongle, included with each unit, is used to connect the AC adapter to the 4150 / 4150X when needed. The dongle is also used to connect the unit to a PC for serial communications. See the "Updating 4150 / 4150X Firmware and DOFs" and "Documenting HART Configurations with Meriam DMS Software" sections of this manual for more information on communications.

Note: For 4150X Intrinsically Safe units, the Communication / AC Adapter Dongle can only be used in a safe area. See the "Hazardous Area Use" section of this manual and the Intrinsic Safety Control Drawing in the Appendix of this manual for more information.

Communication / AC Adapter Dongle, P/N Z4150-10A

To mating Communication / AC Adapter connector on the 4150 / 4150X

To AC Adapter, P/N Z9B000007, included with shipment

To PC via serial cable, P/N ZA900447-00052, included with shipment
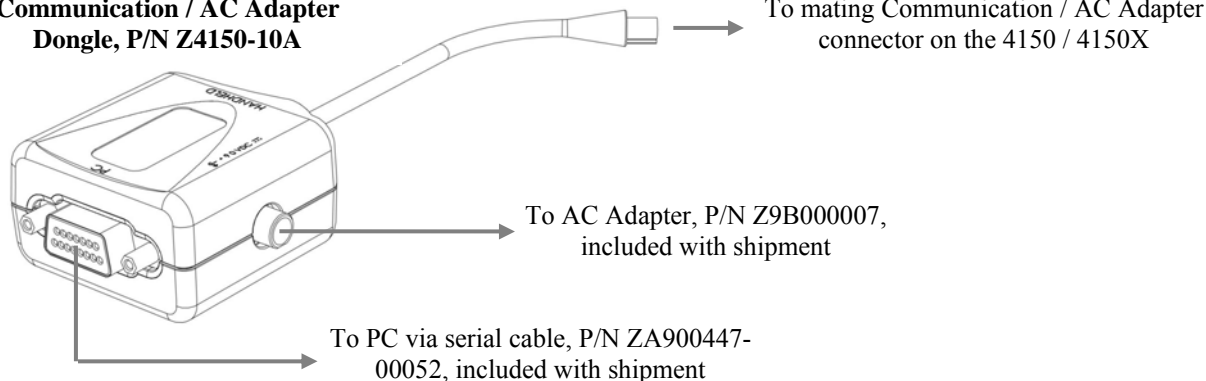
Navigating Menus on the Display

Several methods of navigating through display menus are available to the user for maximum convenience and utility.

1. **Soft keys**: Use **Up** and **Down** Soft Keys to move cursor arrow to the desired menu option. Then use the **Select** soft key to accept the indicated choice. Soft key navigating tools are found throughout the 4150 / 4150X Main displays and HART communication displays.

2. **Side keys**: **Up**, **Down** and **Select** keys are also provided on the left hand side of the unit. These keys are thumb operated and provide a convenient alternative to the Soft Key navigation buttons. Side key functionality is not always available in the HART communication displays.

3. **Multi-page lists**: Multi-page lists have a △ and/or ▽ symbol along the right hand side of the display indicating the existence of information on the previous or next page(s). Several pages of information may need to be viewed when reviewing lists of installed DOFs, stored configuration files or finding a specific device in Offline Mode to create a configuration for. While in these list areas, pressing the SHIFT key (⇧) changes soft key definitions **Select** and **Back** to **PgUp** and **PgDn**, respectively. To quickly advance to the next page of a list, press ⇧ and then the **PgDn** soft key. To retreat to the prior page, press ⇧ and then **PgUp**. **PgUp** and **PgDn** soft keys remain active until the **Up** or **Down** soft key is used or until ⇧ is pressed again.

4. **Numbered HART menus**: All HART displays have numbered menu lines when needed. This gives fast access directly to the desired menu line. 4150 / 4150X displays also have numbered menus with the exception of multi-page list screens.

5. **HART menu HOME key**: To quickly retreat from any location in the HART menu to the initial HART menu screen for a device, press the ⇧, ⌂ key sequence. This will return the display to the initial HART screen. The Home function will be disallowed if a critical HART task is in process.

6. **Left / Right Arrow keys**: Emulate **Back** and **Select** soft keys, respectively

Turning on the 4150 / 4150X

Use the dedicated **ON/OFF** key to power up the unit. A brief diagnostic runs while the Meriam logo, model number, and firmware version is displayed. A message is displayed indicating active scanning for a HART device at address zero. The following scenarios are possible.

1. If the unit is connected to a HART device with address = 0 (and there is sufficient loop resistance), the 4150 / 4150X immediately establishes HART communication with the device. A display similar to the example at right appears. The numbered menus and Soft Keys are then used to commission, re-configure, or maintain the connected device.

Online	▽ # ▬
3051 : PT-1012D	
➡1 Device setup	
2 Pres: 0.01 inH2O	
3 AO: 4.001 mA	
4 LRV: 0.00 inH2O	
5 URV: 250.00 inH2O	

Up	Down	Select	Back

2.   If no HART device is connected, if a HART device with address ≠ 0 is connected, or if a connected device is not found due to wiring or loop resistance problem, the 4150 / 4150X will enter the Main navigation display depicted at right.

Communicator	♡	# ▬
1 Online Setup		
➡2 Offline Menu		
Device 0: Not Found		
Up Down Select Cfg		

    2.1 Select **Online Setup** once a HART device is connected or once the wiring problem is resolved. A proper connection will be indicated when line three changes to "**Device 0: *Online***".

    2.2 Select **Online Setup** if properly connected HART device is setup for Multidrop loop or Burst Mode operation (device address ≠ 0). The 4150 / 4150X will respond with a statement and the Soft Key options shown at right. To initiate a Multidrop poll, press the **Multi** soft key. To retry the address 0 poll after rechecking connections, press the **Retry** soft key. Press the **Exit** soft key to enter Offline mode.

Communicator	♡	# ▬
No device found:		
Press Multi to begin		
multidrop polling.		
Retry to poll addr 0,		
or Exit to go Offline.		
Multi Retry Exit		

Main Display

The Main display provides access to Online Setup, Offline Menu and to 4150 / 4150X configuration settings via the right hand Soft Key (**Cfg**).

```
┌─────────────────────────────┐
│ Communicator      ♡  # ▭▬    │
│                             │
│ ➡1    Online Setup          │
│   2    Offline Menu         │
│                             │
│ Device  0:  *On-Line*       │
│    Rosemount                │
│    3051C                    │
│    Fld Dev Rev 03           │
│    Dof Name 26060309        │
│                             │
│ Up    Down    Select   Cfg  │
└─────────────────────────────┘
```

1. **Online Setup** is described above in Turning On the 4150 / 4150X.

2. **Offline Menu** is selected to provide access to Offline Utilities such as List / Show DOFs, List / Edit Configurations, and Create Configurations. The number of DOFs installed (HART device profiles) and the number of device Configurations stored are also available on Offline Utilities screen. See the Offline section of this manual for more information.

3. **Cfg** Soft Key is selected to configure 4150 / 4150X settings and view unit information such as Model, Serial, and Firmware numbers, DOFs installed and Configurations stored.

```
┌─────────────────────────────┐
│ Configuration        # ▭▬    │
│ Current Settings            │
│ ➡1    Users                 │
│   2    Applications         │
│   3    Lockouts             │
│   4    Clock/Timers         │
│   5    Other                │
│                             │
│                             │
│ Up    Down    Chng    Back  │
└─────────────────────────────┘
```

Configuration Settings

1 Users
Not currently used

2 Applications
Various applications are available here including Digital Poll (polling device addresses 0 – 15) and other user and factory applications.

3 Lockouts
The HART Communicator can be programmed to lockout certain standard functions that a supervisor may wish to control. The functions included are used to set up the 4150 / 4150X for normal use, change online HART device configurations, create offline HART device configurations, update the installed DOFs list (HART device profiles), or to update the Unit's operating firmware. For example, locking out the Configs feature makes the unit a read only HART communicator while locking out DOFs and Firmware prevents unauthorized updates. The lockout can be limited to individual Lockout Details items or all Lockout Details items can be locked out at one time.

To enable the lockout feature, press the "3" key or move the selection cursor ➡ to the **Lockouts** menu option on the Configuration screen (see below left). Choose the **Lockouts** selection by pressing the **Chng** soft key. The 4150 / 4150X will enter the **Lockout Enable / Disable Screen**. The three choices and current status information are provided (see below center):

```
┌─────────────────────────────┐
│ Configuration        # ▭▬    │
│ Current Settings            │
│ ➡1 Users                    │
│   2 Applications            │
│   3 Lockouts                │
│   4 Clock/Timers            │
│   5 Other                   │
│                             │
│ Up    Down    Chng    Back  │
└─────────────────────────────┘
     Configuration Screen
```

```
┌─────────────────────────────┐
│ Configuration        # ▭▬    │
│ Lockouts                    │
│ ➡1 Lockout:      Disable    │
│   2 PV Prompt:   Disable    │
│   3 View Details            │
│                             │
│                             │
│                             │
│ Up    Down    Chng    Back  │
└─────────────────────────────┘
  Lockout Enable / Disable Screen
```

```
┌─────────────────────────────┐
│ Configuration        # ▭▬    │
│ Lockout Details             │
│ ➡1 All       :    Disabled  │
│   2 Setting  :    Enabled   │
│   3 DOFs     :    Disabled  │
│   4 Configs  :    Disabled  │
│   5 Firmware :    Disabled  │
│   6 PV Prompt:    Enabled   │
│ Up    Down    Chng    Back  │
└─────────────────────────────┘
   Lockout View Details Screen
```

1 Lockout: Indicates Enable / Disable status of Master Lockout feature.

2 PV Prompt: In addition to the primary variable, multivariable HART devices have secondary, tertiary, and sometimes more variables. When PV Prompt on the Lockout screen is "Disabled" and a Save command is issued by the 4150 / 4150X, the handheld saves only the primary variable. When PV Prompt is "Enabled" and a Save command is issued, the handheld saves the HART parameter information for all variables present. The factory default for PV Prompt on the Lockout screen is "Disabled".

3 View Details: This option takes the user to the **Lockout Details** screen listing all 4150 / 4150X parameters that can be protected by lockout (see above right). Individual functions can be locked or, if preferred, the lockout can be set to deny unauthorized access to all parameters. Press the number of the desired menu item to toggle between Enabled and Disabled. Once satisfied with the setting, press the **Back** soft key to return to the **Lockouts** screen.

To enable the lockout options selected, be sure the display reads "1 Lockout: Enabled". If it does not, press the **Chng** soft key to toggle from "Disabled" to "Enabled". A prompt will appear to "Enter Code: 0 0 0".

Lockout Code
At this point the user will be prompted to enter a 3-digit lockout code. This code will be required to gain access and change any menu item previously locked out. **The number keys of the unit will not work here.** Use the **Inc**rement, **Dec**rement and **Next** Soft Keys to input a lockout code value. Alternatively you may use the ⬅ ➡ green keys for **Inc**rement and **Dec**rement functions. When you are satisfied with the lockout code value, press **Store.** *IMPORTANT: After the code is entered, the user must cycle the power to activate the lockout! BE SURE TO SAVE THIS CODE IN A SAFE PLACE IN THE EVENT YOU FORGET THE NUMBER. ACCESS TO LOCKED-OUT FEATURES WILL BE DENIED WITHOUT THE PROPER CODE.*

Note: the 4150 / 4150X is shipped with a factory lockout code of 3 2 1. The user must enter this code the first time Lockout is used.

Disable Lockout
When you wish to use a function or edit a value that is protected by the lockout code, enter the three digit Lockout code when prompted and press **Save**. You will now be able to use the function or edit the setting as normal. Entering an incorrect code will display the message "Incorrect Code" and allow you to try again.

Changing the Lockout Code
To change the lockout code, disable the lockout function for all the parameters selected, shut the unit off, and follow the procedures outlined above.

4 Clock / Timers

Clock Edit
The Clock Edit option allows the user to correct the date and time of the Unit's internal clock. To edit the clock, press the "4" key or scroll **Down** to **Clock Edit** and press the **Chng** soft key.

Choose a clock or date option to adjust by scrolling **Up** or **Down.** Press **Chng** to choose that option. Enter the correct value using the numeric keypad. You will be asked if you wish to save the new data. Press **Yes** to accept the new value. Pressing **No** will take you back to the previous menu without making any changes to the 4150 / 4150X clock. When all the changes are complete, press **Chng** to save the new value.
NOTE: When replacing the AA batteries, the date and time will remain active. Date & time information is continuously powered by an internal, 10-year life back-up battery. This battery is not serviceable by the user.

Backlight (off timer)

To conserve battery life, the 4150 / 4150X allows the user to set the backlight to shut off after a certain period of keypad inactivity. To change the backlight off timer on the unit, scroll **Down** to **Backlight** and press **Chng** repeatedly until the desired value is displayed.

The shutoff timer can be disabled or set to shut off after time periods of from 1 minute up to 30 minutes.

NOTE: The Backlight Off Timer is disabled when the optional AC Adapter (P/N Z9B000007) is powering the 4150 / 4150X.

Off Timer (master)

To conserve battery life, the 4150 / 4150X allows the user to set the unit to shut off after a certain period of keypad inactivity. To change the off timer on the unit, scroll **Down** to **Off Timer** and press **Chng** repeatedly until the desired value is displayed.

The shutoff timer can be disabled or set to shut off after time periods of from 1 minute up to 2 hours.

NOTE: The Off Timer is disabled when the optional AC Adapter (P/N Z9B000007) is powering the unit.

5 Other

Model information and special settings are available from this menu item. Press number key "5" or arrow to this menu line and press **Chng** to select. This reveals menu options for the following:

> **1 Model Info** – select to view model number, serial number, firmware revision, last update date, number of DOFs loaded with corresponding free memory space and number of HART configurations saved with corresponding free memory space.

> **2 Battery** – shows present battery setting and optimizes the battery life indicator for the battery type entered. Press number key "2" to scroll through Alkaline (factory default) and NiMH battery options or arrow down to this menu item and press **Chng** soft key repeatedly until the desired value is displayed.

> **3 HART** – shows present HART® communication setting. The 4150 / 4150X is a HART® secondary master. "Compatible" setting means the handheld will inform the user if another secondary master is on line. Such situations will require the removal of the other secondary master before HART communication can occur. "Fast" setting results in faster communications but will cause interference if a HART® primary master is on line (example: a HART® Multiplexer or I/O). In normal operation the 4150 / 4150X automatically selects the best setting.

> **4 Enter PC Comm. Mode** - When the 4150 / 4150X is connected to a PC for updates via DPC Manager (see DPC Manager Utility section in this manual), a DB-9 serial cable is used. Occasionally a DB-9 Serial cable is encountered that does not have a DTR line. The DTR line is important to the update process because it is used to initiate and confirm communication between the two machines. If a DB-9 cable without a DTR line is used, the unit must be manually placed in the **Enter PC Comm. Mode**. Go to the Main display and select **Cfg**. Select menu option **5 Other**. Select the **Enter PC Comm. Mode**. Proceed with update and cycle power when the update is complete. It is recommended to use fresh batteries or an AC adaptor during update procedures. This mode will automatically time-out after approx. 1 minute of inactivity and return to the main display.

> **5 Polling Type** – Two user selectable options are available.

Auto polling directs the 4150 / 4150X to always poll for HART device address 0 (zero) first. When found, communications begin automatically. If address 0 is not found, the unit automatically asks for direction; select **Multi** soft key to start a multi-drop poll from address 1 – 15 or select **Retry** soft key to try to find address 0 again (for more details see the HART Communications section)

Digital polling directs the 4150 / 4150X to always poll for HART device addresses 0 – 15. This polling method is best for 4 – 20 mA loops where one device with address 0 is present and another device with a non-zero address is on the same loop.

Battery Installation & Removal – all models

The 4150 / 4150X monitors battery condition and displays a "REPLACE BATTERY" notice when the batteries get low. The unit will function for approximately one (1) hour after the notice is posted on the display.

To install batteries, remove the 4150 / 4150X from the soft carrying case (if used) and remove the hand strap retaining screw from rear of unit using a flat screw driver or coin. Remove protective boot and turn the unit face down on a work surface. Use a flat screw driver to loosen the captive battery door screw and remove the door. Six (6) AA batteries are required. Install the positive (+) end of each battery first and then press the negative (-) end into place. Follow the + and – signs that are molded into the battery compartment for proper polarity. See details below. Replace the battery door and tighten the captive door screw. Replace the boot and reinstall the hand strap screw.

> *Note: For general purpose models, replace all six (6) AA batteries at once with all alkaline or all NiMH cells. Do not mix alkaline or NiMH batteries with each other or with other battery types. Battery replacement is recommended when the "Replace Batteries" notice is posted on the display; however, the 4150 / 4150X will function for a time after the notice is posted.*

> *Warning: For Intrinsically Safe model 4150X, replace batteries only in Non-Hazardous Areas. Use only approved AA alkaline batteries in Intrinsically Safe units. Replace AA alkaline batteries with approved types only - see the Intrinsic Safety Control Drawing in the Appendix of this manual for a list of approved AA alkaline batteries.*
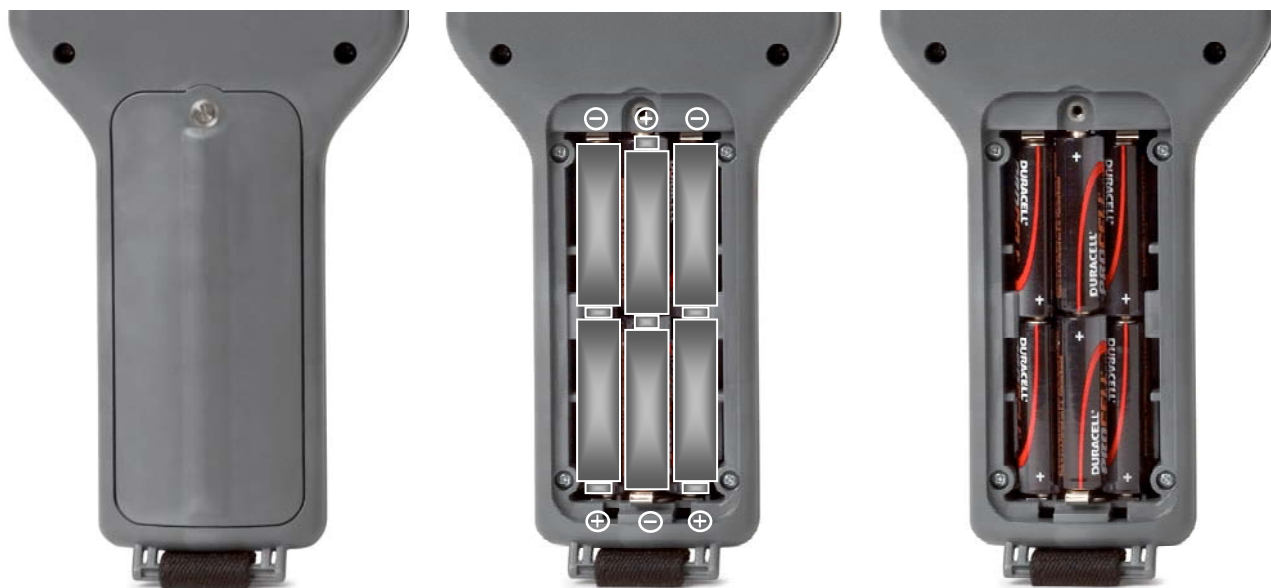
External Connections

1. Connector for Communication / AC Adapter Dongle
Each unit has an electrical connector located at the top of the handheld. The connector provides fast and secure connection to the Communication / AC Adapter Dongle supplied with each handheld. Simply line up the key on the Dongle connector with the white arrow on the MFT's mating connector and insert. To disconnect, pull on the light gray connector (attached to Dongle lead – see photo below).

The Dongle is used to connect the AC adapter to the 4150 / 4150X when AC power is desired. The Dongle is also used to connect the unit to a PC for serial communications. See the "Updating 4150 / 4150X Firmware

and DOFs" and "Documenting HART Configurations with Meriam DMS Software" sections of this manual for more information on communications.

Note: For 4150X Intrinsically Safe units, the Communication / AC Adapter Dongle must be used only in a safe area. See the "Hazardous Area Use" section of this manual and the Intrinsic Safety Control Drawing in the Appendix of this manual for more information.

WARNING: Serious injury or death may result from explosions. Do not make any connection to the Unit's Dongle connector while in a hazardous area. Use the connector / Dongle only in non-hazardous areas.

2. HART Jacks / Lead Set – All models are equipped with a standard size banana jack on 0.75" center. The lead set supplied with the 4150 / 4150X has a standard banana plug on one end and mini-grabbers on the other for convenient connections.

Note: For Intrinsically Safe model 4150X, verify the instruments in the loop are installed in accordance with intrinsically safe field wiring practices before making connection from the field device to the Unit's HART jack. See the Hazardous Area Use Section of this manual and the Intrinsic Safety Control Drawing in the Appendix for more information.

HAZARDOUS AREA USE

Intrinsically Safe Operation

The 4150X HART Communicator includes ATEX certification for Intrinsically Safe operation. Refer to the Intrinsic Safety Control Drawing in the Appendix of this manual for more information.   The following table identifies model numbers and areas of acceptable use.

Model Number	Use Description	Non-hazardous Area	Hazardous Area
4150	General Purpose	√	NO
4150X	Intrinsically Safe	√	√

Units with Intrinsically Safe certification can be identified by model number or by a special name plate on rear of the unit. A sample of the Intrinsically Safe name plate is shown below for reference.
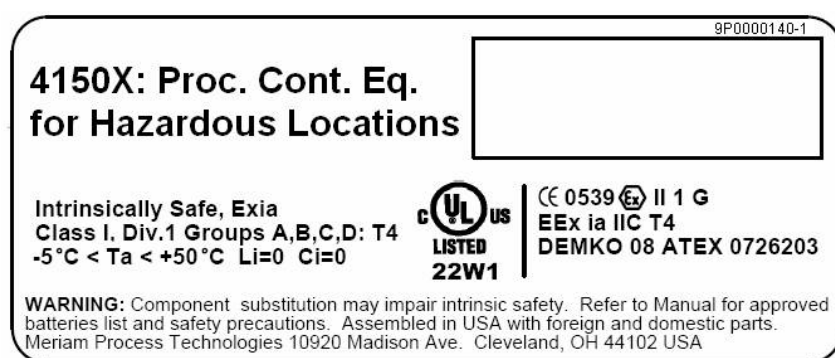
Note the following **WARNINGS and REQUIREMENTS** *for 4150X models*:
- Substitution of components may impair Intrinsic Safety
- To prevent ignition of flammable or explosive atmospheres;
    - Disconnect power before servicing
    - **DO NOT** open the unit, including battery compartment, or attempt to service the unit when located in flammable or potentially explosive atmosphere. Remove to safe area.
    - **DO NOT** mix old batteries with new or mix batteries from different manufacturers
    - **DO NOT** replace batteries while in explosive or hazardous atmospheres
    - **DO NOT** use any battery type other than those listed on the "Intrinsic Safe Control Document" found in the Appendix of this manual.

WARNING: Serious injury or death may result from explosions. Do not connect the Communication / AC Adapter Dongle to a 4150X while in a hazardous area. This warning applies to the Dongle and to both of the external connections to the Dongle – the AC Adapter and Serial Cable.

WARNING: Serious injury or death may result from explosions. Before making electrical connections to an Intrinsically Safe model at the HART jacks, verify the HART instrument of interest is installed in accordance with intrinsically safe field wiring practices.

Note: Restrictions apply to the use of Intrinsically Safe units in hazardous areas. Refer to the Intrinsic Safety Control Drawing in the Appendix of this manual for more information. Meriam reserves the right to revise the Intrinsic Safety Control Drawing without notice. Contact Meriam (phone 216.281.1100) for the current Intrinsic Safety Control Drawing.

For Intrinsically Safe model 4150X, consult the Intrinsic Safety Control Drawing in the Appendix of this manual for restrictions, for special instructions in use, and for electrical connections allowed.

HART® Communications with the 4150 / 4150X

Overview

The 4150 / 4150X HART communicator provides device specific HART communication functions that allow the user to poll, configure and maintain supported HART field devices. The 4150 / 4150X uses Universal, Common Practice and Device Specific commands to facilitate communication with a HART field device. Use the 4150 / 4150X to commission devices, for operational re-configuration needs, or maintain devices through analog and sensor trim adjustments and many other features.

The 4150 / 4150X will communicate with any HART device through Universal and Common Practice Commands using the standard Generic DOF (Device Object File) but must have the DOF for a specific HART device installed before it can execute Device Specific Commands. Consult the large and growing list of available DOFs at www.meriam.com for an up to date list of HART devices with device specific support. The list is found under the Resources tab, Download Center page, by selecting the "Available DOFs" link. When HART device support for new devices becomes available, the 4150 / 4150X can be easily field updated via Internet downloads.

Warning: To avoid damage to a PC serial port, do not connect the Unit's HART leads to an AC powered HART device while the unit is on AC power and a serial cable is connected to a PC. Meriam recommends disconnecting the HART leads from the communicator prior to any communication activity.

HART Commands

Three HART command types are used by the 4150 / 4150X to communicate with HART field devices. First, *Universal Commands* are primarily used to identify a field device by its model number and tag number and to read process data from the device. This communication is referred to as "polling". The 4150 / 4150X can poll any Hart Device. Second, *Common Practice Commands* are used for calibration and maintenance functions that are common to many devices. An example of this would be trims or adjustments for the devices' analog outputs. Third, *Device Specific Commands* are used to handle functions that are unique to a particular device or manufacturer. Examples of these commands include sensor zero, sensor trim, calibration curve characterization, density inputs required for calculations made by the HART device or other configuration functions unique to the specific device.

HART Connections

HART connections are made using two standard banana jacks (3/4" center) located at the top end of the 4150 / 4150X. Refer to the following diagram. Polarity is not a concern for HART connections, therefore, both jack collars are black. Meriam supplies a HART lead kit (P/N ZA900529-00014) complete with mini-grabber connections and a 250 Ω load resistor with each unit.
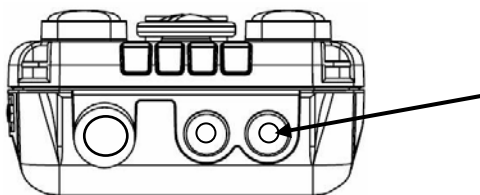
4150 with HART®
HART® connections are standard banana jacks (3/4" center)

For low load loops (less than 250 Ω), a 250 Ω resistor may be needed in the loop to insure reliable HART communications. Meriam supplies a 250 Ω load resistor in the form of a standard adaptor (P/N ZA36821). Refer to the following diagram for connection details.

Hart Device

Loop Power Supply

250 ohm Load Resistor
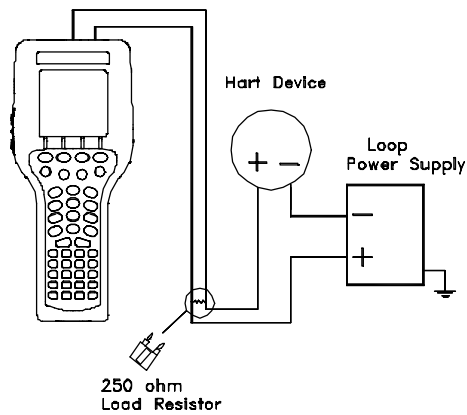
When connecting the 4150 / 4150X to a loop with a resistive load greater than 250 Ωs, the HART jacks may be connected across the loop + and – or to the HART device communication terminals. Refer to the following diagram for connecting across the loop + and -.

Hart Device

$R_L \geq 250$ ohms

Loop Power Supply

214.0
Digital Display Meter
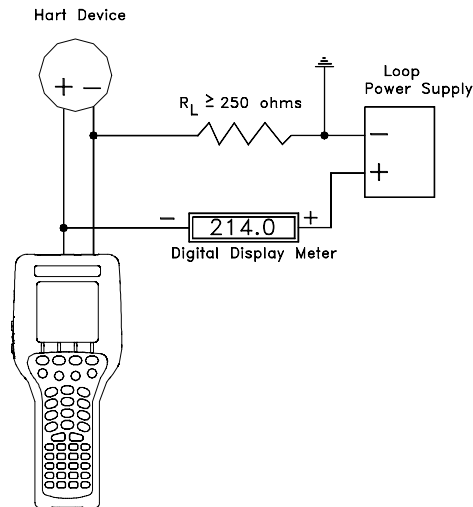
Connecting to communication terminals

HART® Communications
Initial Screens / Online Mode
Upon power up the 4150 / 4150X automatically detects if a field device is connected and attempts to establish HART communications; this is the factory default "**Auto**" poll function. When a device with address zero is found, the 4150 / 4150X provides feedback to the user and starts the initial HART display for the connected device. See an example of Online Mode below.

```
Communicator      ▽  # ▭
➡  1  Online Setup
   2  Offline Menu

Device  0:  *On-Line*
   Rosemount
   3051C
   Fld Dev Rev 03
   Dof Name 26060309
Up    Down    Select    Cfg
```

```
Online           ▽  # ▭
3051 : PT-1012D
➡ 1  Device setup
  2  Pres: 0.01 inH2O
  3  AO: 4.001 mA
  4  LRV: 0.00 inH2O
  5  URV: 250.00 inH2O



Up    Down    Select    Back
```

Main Navigation Screen

Auto Poll Launch; Device "0" found

Initial HART Screen / Online Mode

When no device connection is detected the 4150 / 4150X enters the **Main Navigation Screen** and the message **Device 0: Not Found** is displayed. Upon selecting the "1 Online Setup" option, the unit checks again for Device address 0 and if not found displays the **Multidrop / Retry 0** screen. This screen allows selection of either of three options: launch Multidrop poll by selecting the **Multi** soft key, retry Device 0 communication after re-checking physical connections to the device by the selecting **Retry** soft key, or exit to Offline mode by selecting the **Exit** soft key.

Communicator ♡ # ▭	Communicator ♡ # ▭	Communicator ♡ # ▭
1 Online Setup ➡ 2 Offline Menu Device 0: Not Found	No device found: Press Multi to begin multidrop polling. Retry to poll addr 0, or Exit to go Offline.	Multidrop Polling… 1 3 4 Scanning Address # 7
Up Down Select Cfg	Multi Retry Exit	Stop Abort
Main Navigation Screen No device or Non-zero address found	**Multidrop / Retry 0 Screen** No device or Non-zero address found	**Multidrop Polling Screen** Multidrop & Burst Mode Support

Multidrop Poll (addresses 1 – 15)
To initiate a Multidrop Poll, select the **Online Setup** option from the **Main** screen when the **Device 0: Not Found** message is displayed. Then select **Multi** soft key from the **Multidrop / Retry 0** screen. This function polls for all non-zero addresses (1 – 15). Located addresses are listed on the display as the remaining addresses are checked. When polling is complete, or upon pressing **Stop** after the address of interest is found, use the soft key controls to select the address of interest.   The initial HART menu for the selected device will be displayed.

Digital Poll (addresses 0 – 15) for One Power Cycle Only
Digital Polling is a special feature accessible through the Unit's Main navigation screen and the **Cfg** soft key. Press the **Cfg** soft key and then select the "2 Applications" menu option. Select the "1 Digital Poll" menu option to launch a polling operation that starts with address 0 and ends with address 15. All addresses on the loop will be displayed on the Unit's screen. The address of interest can be selected from the list to launch HART communication with that device. This Digital Poll is for one power cycle only and can only be launched from this location in the handheld's menu structure. Turning the power off will return the unit to the unit's default HART poll setting.

Auto and Digital Poll (addresses 0 – 15) Default Setting Options
Auto Poll is the factory default setting. To set Digital Polling or re-set Auto Polling as the unit's default poll setting, press the **Cfg** soft key and then select the "5 Other" menu option. Select "5 Polling Type." Two user selectable options are available.

> **Auto** polling directs the 4150 / 4150X to always poll for HART device address 0 (zero) first. When found, communications begin automatically. If address 0 is not found, the unit automatically asks for direction; select "**Multi**" from soft key to start a multi-drop poll from address 1 – 15 or select the "**Retry**" soft key to try to find address 0 again.

> **Digital** polling directs the 4150 / 4150X to always poll for HART devices addresses 0 – 15. This polling method is best for 4 – 20 mA loops where a device with address 0 is present and another device with a non-zero address is on the same loop. Selecting Digital Polling here sets it as the Unit's default poll setting.

Manual Launch of Device 0 Poll

When the message **Device 0: *On-line*** is displayed on the Main Navigation Screen, selecting **Online Setup** will launch HART communication with the device. The message indicates that a HART device with address 0 has been detected at the HART connection and the unit is standing by to initiate communications. The **Device 0: *On-line*** message is shown 1) if a physical connection is made to a HART device after the unit power is turned on or 2) if the user exits from a HART communication session without disconnecting the lead wire by using the soft key controls provided.

```
┌─────────────────────────────────┐
│ Communicator      ♡   # ▭       │
│                                 │
│ ➡ 1    Online Setup             │
│   2    Offline Menu             │
│                                 │
│ Device  0:  *On-Line*           │
│                                 │
│                                 │
│                                 │
│                                 │
│ Up    Down     Select    Cfg    │
└─────────────────────────────────┘
```

Main Navigation Screen
Manually launch polling on device 0.

Offline Menu Mode

The **Offline Menu** gives the user access to lists and functions that can be viewed or performed in Offline Mode at the user's convenience for the purposes of reviewing the Unit's DOF list, reviewing stored device configurations or creating HART configurations. Stored configurations can also be edited and then applied later to a connected HART device. When the **Offline Menu** is selected from the **Main Navigation Screen**, the display at right is shown.

```
┌─────────────────────────────────┐
│ Offline               # ▭       │
│ Utilities                       │
│ ➡ 1    List/Show DOFs           │
│   2    List/Edit Configs        │
│   3    Create Configs           │
│   4    Delete All Configs       │
│                                 │
│ DOFs:    401      Free: 20%     │
│ Configs:   3      Free: 99%     │
│                                 │
│ Up    Down     Select    Back   │
└─────────────────────────────────┘
```

HART Offline Menu Screen

1 List / Show DOFs:

Provides a list of installed DOFs (Device Object Files) used by the unit to communicate with HART devices. Lists can be viewed by Manufacturer, by Device Name or by stepping through all Devices one at a time. Use the soft key controls to move through the list. Pressing the ⇧ key changes soft key definitions **Down** and **Up** to **PgUp** and **PgDn.** To quickly advance to the next page of a list, press the **PgDn** soft key. To retreat to the prior page, press the **PgUp** soft key. Once engaged the **PgUp** and **PgDn** soft keys remain active until the **Up** or **Down** soft keys or ⇧ is pressed again.

2 List / Edit Configs:

This screen lists all stored HART configurations by Tag Number. The configurations stored enable fast commissioning of replacement devices, cloning of existing systems, or re-configuring for changes in process conditions or batch runs. Any configuration in the list can be sent to another HART device of the same manufacture and model. The display can show 20 character tag numbers. Truncated tags are listed if more than 20 characters are used. Moving the cursor down to the tag of interest and pressing the **Select** soft key will provide a detailed information screen, including full tag number up to 28 characters, for the tag of interest (see example below, right).

```
┌─────────────────────────────────┐
│ Offline               # ▭       │
│ List/Edit Configs               │
│ ➡ PT-105A                       │
│   PT-105B                       │
│   DPT-201C                      │
│   TT-312A                       │
│   TT-312A                       │
│   FE-201                        │
│   FE-201                        │
│   PT-6174                       │
│                                 │
│ Up    Down     Select    Back   │
└─────────────────────────────────┘
```

**Offline List / Edit
Configs Screen**

The editing function allows review of all HART parameters in a configuration and modification of editable parameters. The edit function can be locked out if desired (see the **Lockout** section of this manual for more information). To view detailed information of a stored configuration, move the cursor to the desired tag number and press the Select soft key. The Config Detail screen (see example at right) provides information to help the user confirm the identity, origin, and save date/time of the configuration. Pressing Select again opens the configuration for review or offline editing.

New configurations saved are added to the bottom of the List / Edit Config list. If multiple entries for one device are shown, the most recently saved configuration is always shown at the bottom.

```
┌─────────────────────────────┐
│ Offline              # ▭    │
│ List/Edit Configs           │
│  Tag:  PT-105A              │
│                             │
│    Device ID 1365           │
│    PV:  Pressure            │
│    Endress + Hauser         │
│    Cerabar S                │
│    Complete Config          │
│    Uses DOF 11070702        │
│    51 Variables             │
│    12/18/03  4:58 PM        │
│                             │
│  Copy   Del    Select   Back│
└─────────────────────────────┘
```

Offline List / Edit Configs Detail Screen

Entries in the List / Edit Config list may have been saved or created from various sources. Possible sources include the save command from a connected HART device, created in Offline Mode using the **Create Configs** function, copied from another configuration and renamed, or created by editing an existing file. The unit will also list configurations downloaded from the separately available Device Management System software from Meriam (see www.meriam.com/dm_solns.htm for more information). Tag numbers, date / time of save, type of configuration stored, and other information are displayed under **List/Edit Configs**. Configuration types are:

Complete Config   = saved from connected device in Online mode, or a
                          complete config that was downloaded from DMS
Default Config   = created by 4150 / 4150X in Offline mode, or created in DMS
                           and downloaded to unit
Edit Vars Only   = created by editing an existing configuration and includes only the edited parameters
MVar Primary Cfg = for multivariable devices – Primary Variable configuration
MVar Sub Config   = for multivariable devices – Sub-configuration (secondary, tertiary, fourth, etc
                          variables)

3 Create Configs:
The **Create Configs** function allows the user to configure a HART device file in Offline Mode for sending to the intended device later when connected in the Online Mode. Use the soft key controls to move through the list and select the device model number required. The menus prompt the user to make the necessary configuration selections, tag the file for later retrieval and use, and edit configuration lines as required. This function can be locked out. See the Lockout Section of this manual for more information.

4 Delete All Configs:
The **Delete All Configs** function clears **all** configurations from memory (including active and hidden configs). When this menu option is selected, the unit will ask "Delete ALL Configs… ARE YOU SURE???" Select **Yes** to clear **all** stored configurations from memory.

Delete Individual Configs / Clearing Configuration Memory:
Individually stored Configurations may be deleted with **Del** soft key function (see example at right). When this menu option is selected, the unit will ask "Delete CURRENT Config… ARE YOU SURE???" Select **Yes** to clear only the selected configuration from memory.

The **Del** key only hides the record from the display screen; it does not clear memory space. This function can be locked out. See the Lockout Section of this manual for more information.

```
┌─────────────────────────────┐
│ Offline              # ▭    │
│ List/Edit Configs           │
│  Tag:  PT-105A              │
│                             │
│    Device ID 1365           │
│    PV:  Pressure            │
│    Endress + Hauser         │
│    Cerabar S                │
│    Complete Config          │
│    Uses DOF 11070702        │
│    51 Variables             │
│    12/18/03  4:58 PM        │
│                             │
│  Copy   Del    Select   Back│
└─────────────────────────────┘
```

Offline List / Edit Configs Detail Screen

Online Setup Mode

Online Setup is the normal HART communication mode for the 4150 / 4150X. This mode enables communication with HART field devices at the Universal, Common Practice and Device Specific Command levels for full device setup and functionality.

Menus displayed for the connected device follow the HART device manufacturer's menu structure for the connected device. Consult the device manual for menu structure details.

The 4150 / 4150X features two unique online features for added convenience to the user.

```
Device Setup        ♡   #▭
3051 :PT-1012D
➡ 1 Process variables
  2 Diag/Service
  3 Basic setup
  4 Detailed setup
  5 Save/Send
  6 Review/Edit


Up    Down    Select   Back
```

Online Device Setup Screen

1. Live HART connection monitor: display lets you know from the Main Navigation Screen when a device is * **On-line** * and ready for communication.

2. **Review/Edit**: this menu option allows the user to review configurations line-by-line. 4150 / 4150X supports editing of the configuration once the parameter of interest is located.

Communications Trouble Shooting

If an operating HART device is connected to the unit but the "Device 0: Not Found" notification is received, a Multidrop Poll may be executed to determine if the connected device has a non-zero address. Select **Online Setup** from the Main Navigation Screen and then select the **Multi** soft key to initiate the Multidrop poll. If the "No Devices Found" message is received, then the loop connections to the 4150 / 4150X should be carefully checked.

If an operating HART device with address zero (0) is connected to the unit but the "Device 0: Not Found" notification is received, the loop connections to the 4150 / 4150X should be carefully checked.

Make sure all connections are correct and secure. Check for shorts, open circuits and multiple grounds.

Determine if the loop resistance is greater than 250Ω and less than 1100Ωs. If less than 250 Ω then use the supplied 250 Ω load resistor in series with the loop (see diagram HART Connections section).

If communication is still not established, check the **List / Show DOFs** menu under **Offline Menu**. Check the list for the presence of the "Generic" DOF under the manufacturer name "Meriam." If "Generic" is found, then HART communication is possible when the device is properly wired and connected to the 4150 / 4150X (see connection troubleshooting details above).

When the message "Generic" is displayed after connecting to a HART device there are two possible causes:
1) No device specific DOF for that device is currently installed in 4150 / 4150X memory. Check for availability of the DOF needed by going to the Available DOFs site at www.meriam.com/customers/past.asp . Sort the list by clicking on any column header. For download instructions, see the DOF / Firmware Download Site section of this manual.

2) The connected HART device supports only HART Universal and Common Practice commands (i.e. generic commands). There are several such devices on the market, particularly level type devices.

More Status Message

HART device events (diagnostic flags) cause the 4150 / 4150X to display a "More Status Message" at the display bottom. This message notifies the user of one or more diagnostic warnings in the Review Status menu option of the connected device. Upon receipt of this message, enter the **HART** mode and select Detailed Setup / Diagnostics – Service / Test – Status / View Status to retrieve the diagnostic information.

Save / Send Configuration Functions

HART device configurations may be saved to 4150 / 4150X memory or sent from memory to a HART device. These functions are useful for cloning a device configuration for use in another transmitter of the same configuration, for recording as-found and as-left configurations for later review, for returning HART devices to previously used configurations, etc…

The Save / Send function may be accessed in one of two ways:

1. Press the Document key (📄) on the 4150 / 4150X for the screen shown at right. Then select the Save/Send Configs" menu option to launch a HART communication poll and use the Save / Send options.

2. Use the Save / Send menu option within the HART device's standard menu. The 4150 / 4150X would be in Online mode in this case. Save / Send is normally found under the "Device Setup" menu option on the initial HART display for the device.

```
Document                    # ▭▬
Utilities
➡  1     Save/Send Configs
    2     List/Edit Configs
    3     Create Configs
    4     Delete All Configs


    Configs Stored:  3


Up     Down      Select     Back
```

Document Key Menu Screen

DOF Memory Maintenance

DOF flash memory will become fragmented after many DOF download sessions to add new or update existing DOFs. Fragmentation reduces the total number of DOFs that can be saved in memory. 560 DOFs is the nominal capacity of the flash memory. When fragmentation becomes extreme, the 4150 / 4150X will not accept additional DOF downloads. Periodic DOF memory maintenance will be needed to optimize DOF memory.

The Offline screen indicates the number of DOF files stored in memory and the percentage of free memory available for additional files. 401 DOFs ideally use about 72% of the available memory, so 28% of DOF memory should be free... The example at right indicates that only 20% of DOF memory is free. This indicates fragmentation.

To optimize DOF flash memory, it is necessary to delete all DOFs and then reload them all in one session. Connect the 4150 / 4150X to a host PC that has DPC Manager installed (see the DPC Manager Utility section of this manual for more information). Launch DPC Manager and select the "Manage DPC Device Driver and Firmware Updates" option. Go to the Tool Bar and click on "Settings", then click on the "Advanced" option. The following screen will appear.

```
Offline                      #
Utilities
➡  1      List/Show DOFs
   2      List/Edit Configs
   3      Create Configs
   4      Delete All Configs

DOFs:    401        Free:  20%
Configs:   3        Free:  99%


Up     Down      Select    Back
```

HART Offline Menu Screen
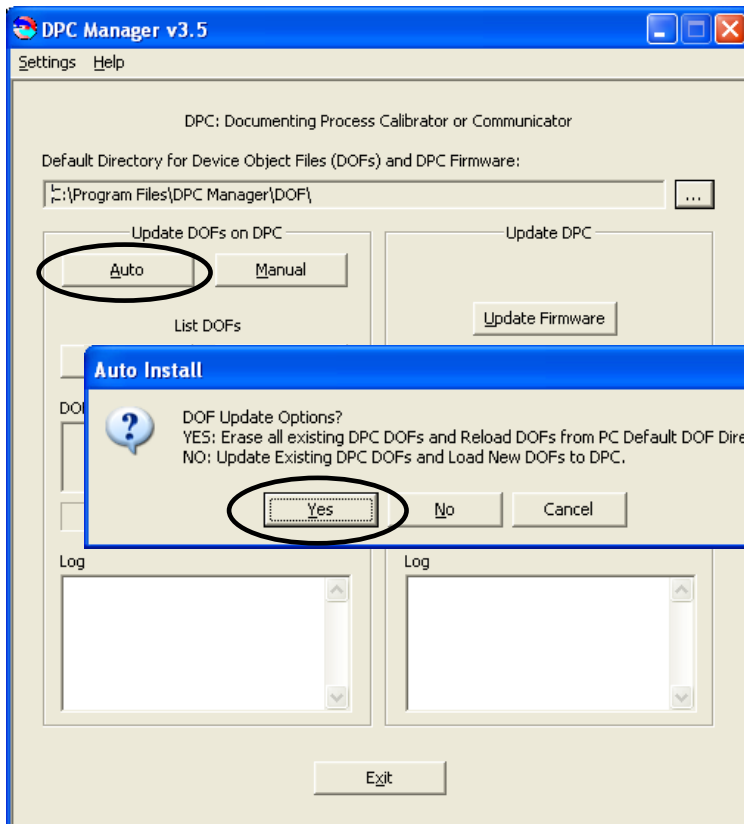
Under "Update DOFs on DPC" section on left side, click on the "Auto" button. An Auto Install dialog box will appear.

Select the "Yes" response to the "DOF Update Options? question to erase all existing DOFs and re-load DOFs from the default DOF directory.

401 DOFs will take approximately 112 minutes to load.

Documenting HART Configurations with Meriam DMS Software

The documentation functions of the 4150 / 4150X provide additional functionality for use with the Meriam Device Management System (DMS) software. DMS is a database product for complete device management services including calibration documentation with the Meriam MFT 4000 Series of multifunction calibrators and HART configuration documentation with the 4150 / 4150X. Complete device histories are maintained in the database. For HART devices these histories can include as-found and as-left HART configuration data to complete this important part of a device's history.

```
Document                    # ▭
 Utilities
➡ 1     Save/Send Configs
   2     List/Edit Configs
   3     Create Configs
   4     Delete All Configs


 Configs Stored:  3

 Up     Down      Select     Back
```

Document Key Menu Screen

**4150 with Meriam Device
Management System**

The Document key ▭ on the 4150 models will save configurations in as-found or as-left categories as selected by the user. These configuration files can be uploaded later to DMS. When the **Save/Send Configs** menu option is selected the unit automatically polls for an online device for subsequent user selections.

DMS can also be used as a configuration repository ready to download stored device configurations for batch runs or changes in operating requirements. New configurations can be downloaded to memory for later recall and use in the field.

4150 / 4150X Device Specific & Generic HART® Communications

Meriam supports a large and growing number of Device Specific DOFs (Device Object Files). For a current listing of HART® devices with full Device Specific communication support, go to www.meriam.com , select the Resources tab, Download Center page, and then select the "Available DOFs" link. Information found there can be sorted by clicking on the column headers (manufacturer name, model number, etc…).

To facilitate communication with HART devices that are not yet supported with Device Specific DOF files or that do not require DOF files, the 4150 / 4150X includes Generic HART Communication capability. This allows the user to communicate with any HART device using Universal and Common Practice commands to poll, configure, and maintain HART devices. Specific functions supported include most polling, tagging, device configuration and trim operations for analog outputs. Generic communications do not support Device Specific commands for higher order HART functions (see the **HART® Commands** section of this manual or the User's Manual for the HART device of interest for more information on the three command levels).

Using Generic HART Communication

The 4150 / 4150X's Generic HART Communication mode starts automatically when HART communication is initiated with a device for which no Device Specific DOF (device object file) is stored in the handhelds flash memory.   When this occurs, line two of the display will indicate "Generic" and the device tag number.

In general, the Generic HART mode operates similarly to its device specific DOF counterpart (see HART Communication section of this manual for more details). However, the 4150 / 4150X does not display Device Specific related communication menus or options when in the Generic communication mode. For example, the Zero and Sensor trim menu options (normally executed by Device Specific commands) are not displayed for pressure transmitters without DOF support. Please see the **Download Site** section of this manual for information on downloading the latest Device Specific DOF files to your 4150 / 4150X.

Updating the 4150 / 4150X Firmware and DOFs

Overview
Firmware upgrades and new DOFs can be downloaded via the Internet in either of two ways. The first way is to use the DPC Manager utility (shipped with each 4150 / 4150X or downloaded from the DOF Download Site) on a PC with Internet access to download files from the DOF Download Site automatically and then update the 4150 / 4150X. The second way is to use the DOF Download Site to download the needed files to the host PC and then use the DPC Manager utility to coordinate the update of the 4150 / 4150X. The Download Site enables users to stay current as new DOF's or revisions of existing ones are posted. Automatic email notices of new DOF postings are sent to all users who have logged on to the Download Site and registered their email address under "Subscriber Options." Firmware updates are free of charge. DOFs are available by subscription.

A list of currently available DOF's for HART device communication can be viewed at the http://www.meriam.com/customers/past.asp . Sort the list by clicking on any column header.

Who has access to the Download Site?

All 4150 / 4150X customers can purchase a subscription to the DOF Download Site. These customers may download any published file from the site to their host PC upon entry of the proper authenticating codes (User Name and Password shipped with each unit). Contact Meriam at 216-281-1100 or Meriam@meriam.com for more information and to purchase subscriptions.

PC Requirements for Download Operations

Meriam recommends IBM compatible Pentium I PCs or higher for download operations. The PC should have an available RS-232 port, minimum modem speed of 28K and access to Internet service. USB ports can be used with USB to serial adapters as well. The RS-232 port must not be shared with other software applications during update operations.

Preparing the 4150 / 4150X

All models come ready to connect to an IBM compatible PC. Connect the supplied Communication / AC Adapter Dongle (P/N Z4150-10A) to the unit. Connect the Dongle to the PC using the supplied six-foot male DB-9 to female DB-9 cable (P/N ZA90047-00052). Similar cables are acceptable. Provide power to the Dongle using the supplied AC Adapter (P/N Z9B000007). The unit is ready for download operations.

Warning: To avoid damage to a PC serial port, do not connect the Unit's HART leads to an AC powered HART device while the 4150 / 4150X is on AC power and a serial cable is connected to a PC. Meriam recommends disconnecting the HART leads from the 4150 / 4150X prior to any communication activity.

Using DPC Manager Utility to Update

The DPC Manager Utility should be installed on the host PC from the User's Manual CD (included with shipment) or from the DOF Download Site where it can be found at the bottom of the **File Download Area** page. DPC Manager coordinates the download operations from the DOF Download Site to the host PC and from the host PC to the unit. Periodic improvements may be incorporated into this Utility. Therefore, Meriam recommends periodic comparison of the DPC Manager version installed on the host PC (see "Help" topic in Tool Bar and "About") to the latest available version listed on the Download Site to insure use of the most up to date utility tool. Directions for using DPC Manager are found under the Help Tool Bar selection.

Prerequisites:
A. DPC Manager is installed on a computer that has Internet access. This software is shipped with each 4150 / 4150X on a CD and is available on the DOF Download Site.
B. The correct PC COM port has been configured (see "Settings" topic in Tool Bar, then "Communications" and then "Port" to select COM port).
C. Dongle and RS-232 Cable are connected to the 4150 / 4150X and the unit is turned on. Note: HART communication cannot occur while communicating using the RS-232 connection.
D. The AC power adapter is connected to the Dongle (required for all RS-232 communications).
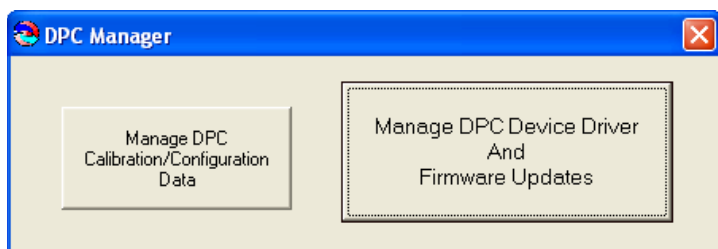
1. Open the DPC Manager Utility and select the "Manage DPC Device Driver and Firmware Updates" button.

2. Click on "Settings" in the toolbar and make sure the "Advance Settings" option is <u>unchecked</u>.
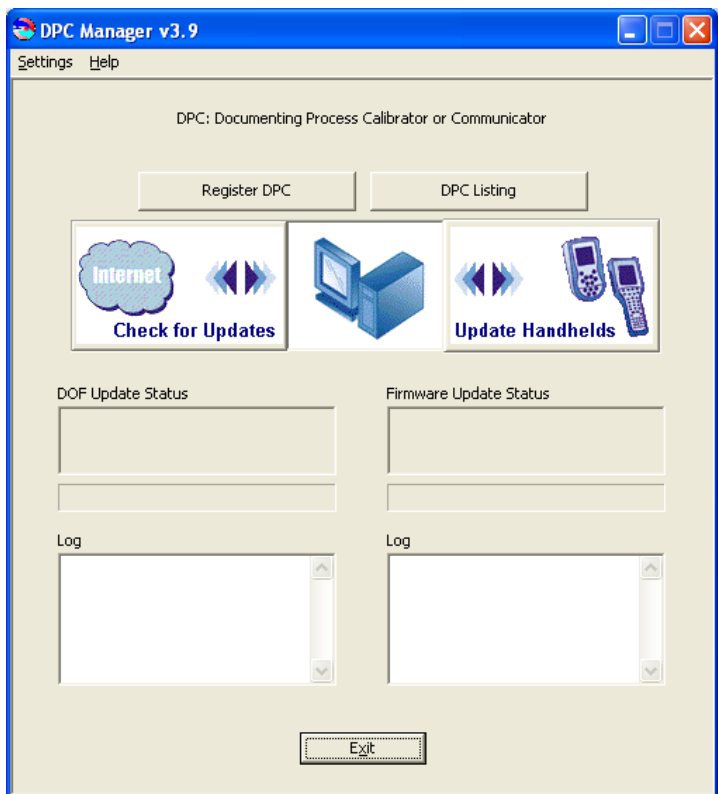
3. Click the "Register DPC" button and the Model Number, Serial Number, Expiration Date and Firmware version of the unit will be retrieved and registered.

4. Click on "Internet Check for Updates" button and DPC Manager will automatically download all firmware and DOF files to your computer. NOTE: Problems here may be due to firewall settings. See "Downloading from the DOF Download Site" and "Using DPC Manager to Update" section below for alternative approach.

5. Click on the "Update Handhelds" button and DPC Manager will automatically update the unit from the computer. The latest firmware and DOFs will be downloaded from the computer to your handheld. First the firmware will be updated (if needed), then the device object files (DOFs) will be updated.

6. The "DPC Listing" button provides a list of all unit's that have been registered with DPC Manager on the host computer.

Using the DOF Download Site Directly

Go to http://www.meriam.com/customers/login.asp. The log in page of the Download Site requires the user to enter a valid User Name and Password to authenticate user identity and permit entry to the Site. These two codes are initially assigned by Meriam and can be found on a card included with shipment. Locate the card and place in a safe place for future reference.

The **Latest Release Notes** screen appears first listing and describing the firmware and DOF releases posted since the user's last download session. Individual files can be downloaded by clicking on the desired hyperlink and then clicking on the hyperlinked file name that appears on the detailed description page of each DOF or firmware file. Also available on this screen are the navigation buttons for **Current Release Notes**, **File Download Area**, and **Subscriber Options**.

The **Current Release Notes** screen describes all DOF and firmware releases available and dates posted. Five (5) columns are shown on this page: Date, Title, Description, Manufacturer, Model. These categories will assist the user in finding the release descriptions of the DOF, DPC Manager or 4150 / 4150X Firmware releases of interest. Each column can be sorted to assist searches of the release database. Individual files can be downloaded from the detailed description page of each DOF or firmware file listed. Also available on this screen are the navigation buttons for **Latest Release Notes**, **File Download Area**, and **Subscriber Options**.

The **File Download Area** screen is the download page for bulk downloads. Select individual files for downloading from a list of downloadable files (including DPC Manager Utility, 4150 / 4150X Firmware, and DOF's) by locating the file name of interest with the PC mouse and clicking on the corresponding selection box. All files can be marked for download by clicking on the "Check All Files" button. Start the download process by scrolling to the bottom of the page and clicking on the "Download Checked Files" button. Dialog boxes guide the user through the process. Also available on this screen are the navigation buttons for **Latest Release Notes**, **Current Release Notes**, and **Subscriber Options**.

Subscriber Options

The **Subscriber Options** screen provides useful account information and is displayed immediately upon first log in. The user should provide contact information and e-mail address that allows Meriam to provide automatic notification of new firmware updates, DOF releases, and subscription period expiration. User Name and Password for the account are listed, as well as the subscription expiration date. In addition, this screen allows the user to change the account Password. Press the "Update Subscriber Options" button to save all **Subscriber Options** changes.

Downloading from the DOF Download Site and Using DPC Manager to Update

1. Establish connection to the DOF Download Site (described above) and go to the **File Download Area** for bulk downloads.

2. Select individual files for downloading from the list of downloadable files (including DPC Manager Utility, 4150 / 4150X Firmware, and DOF's) by locating the file name(s) of interest with the PC mouse and clicking on the corresponding selection box(es). Alternatively, all files can be marked for download by clicking on the "Check All Files" button at the top of the page.

3. Start the download process by scrolling to the bottom of the page and clicking on the "Download Checked Files" button.

4. Follow the dialog boxes to save the downloaded file to a directory on the host PC. Remember the directory location.

5. Once the download is completed, open the file and use the unzip application to extract the individual files.

6. Open DPC Manager and select the "Manage DPC Device Driver and Firmware Updates" button.

7. Click on "Settings" in the toolbar and select "Advance Settings."
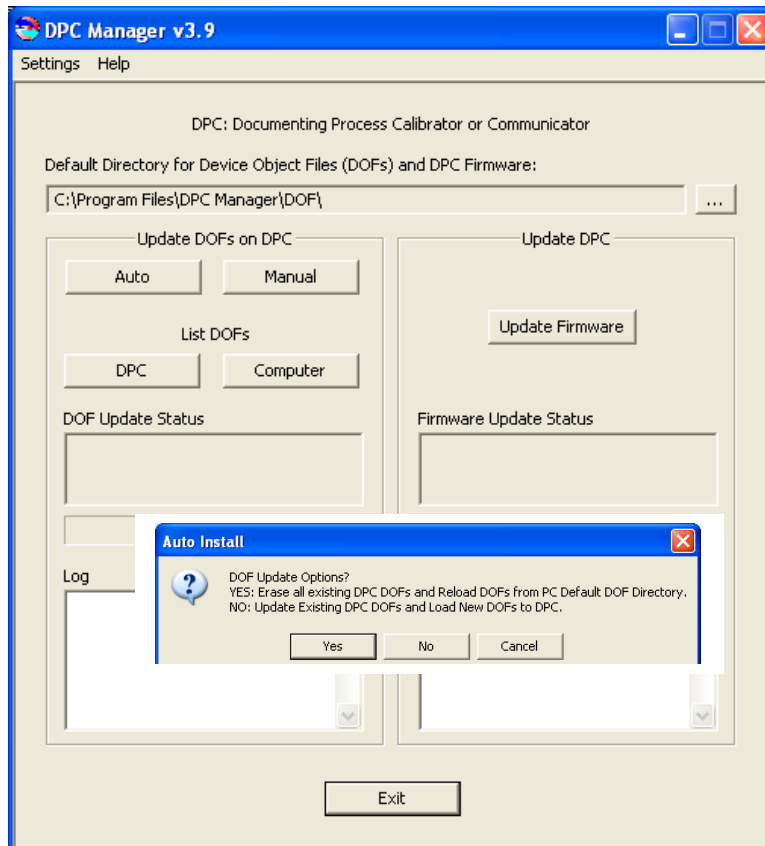
8. Use the browser button to navigate to the location of the DOF files on the host PC.

9. Start a Firmware update by clicking on the "Update Firmware" button under the "Update DPC" header.

10. Start a DOF update by clicking on the "Auto" button under the "Update DOFs on DPC" header.
   a. Answer YES to erase all DOFs in memory and re-install all DOFs.
   b. Answer NO to add any new or revised DOFs to existing memory.

12. DPC Manager will provide updates as firmware or DOFs are being loaded.

To report any difficulties with downloading operations, please contact Meriam at 216-281-1100 or meriam@meriam.com

RETURNING FOR REPAIR

In the event that a 4150 / 4150X requires service and must be returned for repair, please contact Meriam at the numbers listed below.

DO NOT send any unit in for repair without first contacting Meriam for a Return Material Authorization (RMA) number. If this number has not been obtained and clearly marked on the package being shipped back, the unit will be returned at the shipper's expense. This number will be provided by the Meriam Repair Department when you call, fax or e-mail your information. An RMA number must accompany all incoming packages to insure proper tracking, processing and repair work.

To assist us in processing your repair request, please have the Model & Serial Number of the unit available when you call. This information is located on the 4150 / 4150X label. This information can also be obtained directly from the 4150 / 4150X display by pressing the **Cfg** soft key from the **Main** display, then "5 Other" and then "1 Model Info". *See the **Main Display** section in this manual for more details.*

<div align="center">

Meriam Process Technologies
10920 Madison Avenue
Cleveland, Ohio 44102

TELEPHONE: (216) 281-1100
FAX: (216) 281-0228
E-mail: meriam@meriam.com
Web Site: www.meriam.com

</div>

APPENDIX

PRODUCT SPECIFICATIONS

BASE UNIT: 10.375" L, 4.25" W – top, 4.375" W – middle, 1.875" D. Handle: 2.50" W, 1.25"D
ABS plastic case with shock absorbing boot, 1.7 lbs including batteries and boot

DISPLAY: 128 x 128 pixel graphic display, 2.6" x 2.6" viewable area, backlight

POWER: six (6) AA alkaline batteries, six (6) AA NiMH batteries or 100 – 240 Vac universal power adapter (P/N Z9B000007) connected to the 4150 / 4150X via the Communication / AC Adapter Dongle.

> **Note: Use only approved AA alkaline batteries in Intrinsically Safe units. DO NOT USE unapproved AA alkaline batteries, AA NiMH batteries or other types of AA batteries in Intrinsically Safe units. Do not use the Dongle or AC Adapter with Intrinsically Safe units in a potentially hazardous environment. See the "Hazardous Area Use" section of this manual, the specifications below and the Intrinsic Safety Control Drawing in the Appendix for more information.**

BATTERY LIFE (Approximate):   60 hours using AA alkaline batteries without backlight
27 hours using AA alkaline batteries with backlight
65 hours using NiMH alkaline batteries without backlight
28 hours using NiMH alkaline batteries with backlight

TEMPERATURE SPECIFICATIONS:
Storage: -40° F to 140° F (-40° C to 60° C)
Operating: 23° F to 122° F   (-5° C to 50° C)

CONNECTIONS: Standard banana jacks (¾" center) for HART communications
Communication / AC adapter connector for Dongle connection: AC power adapter and serial cable (to PC port) connects to Dongle; Dongle connects to 4150 / 4150X.

APPROVALS: 4150X (ATEX/I.S.)

ATEX Intrinsically Safe   ⟨Ɛx⟩ II 1 G; EEx ia IIC T4

$_c$UL$_{us}$ Listed   Intrinsically Safe, Exia
Class I, Div. 1 Groups A, B, C, D: T4
-5º C < Ta < +50º C

Entity parameters: Li = 0, Ci = 0

 CE CE compliance

Approved Batteries for ATEX/I.S.: (6) AA alkaline Duracell PC1500
(6) AA alkaline Duracell MN1500
(6) AA alkaline Varta 4906

APPROVALS: 4150 (general purpose)

 CE CE compliance

MEMORY – separate, dedicated, non-volatile flash memory for 4150 / 4150X firmware, DOFs, and Configurations
DOF Memory: 560 HART devices (based on average DOF size)
Configuration Memory: 200 HART devices (based on average configuration size)

AUTO SHUT-OFF - occurs after user-selected period of keypad inactivity or can be disabled (both 4150 / 4150X auto shut off and backlight auto shut off are user selectable).

DIAGNOSTICS – 4150 / 4150X self-tests upon power up. Advisories are posted on the display.

MODELS, OPTIONS, ORDERING INFORMATION

MFC MODEL NUMBER		
MFC 4150	HART® Communicator Includes CE Mark, HART Lead Kit, Batteries, Communication / AC Adapter Dongle, RS-232 Serial Cable, Universal Power Adapter, Protective Boot, Soft Carrying Case, Adjustable Shoulder Strap, User's Manual, CD (includes User's Manual and DPC Manager Utility)	
MFC 4150X	Same description as above plus: ATEX certified Intrinsic Safety to $\langle\epsilon_x\rangle$ II 1 G; EEx ia IIC T4; $_c$UL$_{us}$ Listed Intrinsically Safe, Exia Class I, Div. 1 Groups A, B, C, D: T4 -5º C < Ta < +50º C	
	Code	**Download Subscription (DLS) Fee options**
	-00	No DLS
	-01	Standard 3-year DOF Download Subscription
	-02	Discounted DLS Price Based on Volume Discount (See File No. 4300:110)

MFC 4150X	**-01**
HART Cmmunicator	Std. 3 Years DLS

ACCESSORIES LIST

Z4150-7R	Protective red boot provides degree of protection against drop related damage; slip on
ZA900529-00014	HART Test Lead Kit (included w/ unit) - standard banana plugs, mini-grabbers, 250 Ω resistor
ZA36821	Std size 250 Ω shunt resistor (incl'd w/ unit) - req'd for HART low resistance loops
ZA900447-00052	DB-9 cable, Male x Female, 6 ft length (incl'd w/ unit); required for updates / communication
Z4150-13	Soft carrying case (included w/ unit) - custom soft case with adjustable shoulder strap and HART lead compartment
ZA36937	Adjustable, detachable shoulder strap (included w/ unit) clips directly to unit's attachment points
Z4150-10A	Dongle, Communications and AC Adapter input to mating connector
ZA36800	6 pack, AA Alkaline Batteries (included w/ unit, 6 required for operation)
ZA36843	6 pack, AA NiMH Batteries, general purpose use only (6 required for operation, general purpose use, non-hazardous area, only)
ZA37134	NiMH battery charger, 100 – 240 vac, 50/60 Hz, universal plug kit
Z9B000007	Power adapter, 100 Vac to 240 Vac, 50-60 Hz universal plug kit (incl'd with unit)
F/N 4150:440	Paper instructions for 4150 / 4150X (PDF instructions incl'd with unit on CD)

Intrinsic Safety Control Drawing

MFC 4150 SERIES HART COMMUNICATOR

NON-HAZARDOUS LOCATION
MFC 4150
MFC 4150X

HAZARDOUS LOCATION
MFC 4150X

CE 0539 ⟨Ex⟩ II 1 G
EEx ia IIC T4
DEMKO 06 ATEX 0726203

Intrinsically Safe, Exia
Class I Div I Groups A, B, C, D: T4
-5°C<Ta<+60°C

Hart Terminals:
Connect to Certified Intrinsically
Safe circuit only for Hart Comm.
Vmax= 30VDC   Imax= 100mA
Ci = 0   Li = 0

Note: Capacitance and Inductance
values connected to the Intrinsically
safe circuit are not to exceed the
values specified by the entity
parameters. Use Ccable=60pf/ft
and Lcable= 2µH/ft for cable
length used.

DO NOT USE
DONGLE CONNECTOR

WARNINGS:

1. SUBSTITUTING OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY!

2. To prevent ignition of flammable or explosive atmospheres,
- Disconnect power before servicing.
- Do not open or service unit including battery
  compartment, in flammable or explosive atmosphere.
- Do Not mix the old batteries with new or mix batteries
  from different manufacturers.
- Do Not replace batteries in explosive or hazardous
  atmosphere.
- Do not use any battery other than these listed.

(6) AA === Alkaline, Duracell PC1500
Alkaline, Duracell MN1500
Alkaline, Varta 4906

3. Dongle Connector Must Not Be Used.
   a. RS232 comm. port Must Not Be Used.
   b. AC/DC Adapter Must Not Be Used.

NOTE:
1. Pimax (Hazardous Location Use) = 0.7W MAX. with back light on.

1. Batteries:(6) AA === Alkaline battery replacement (removal/installation),
   shall only be performed in a non-hazardous area. Do not mix new with used
   batteries or of different type or manufacture.

2. Dongle Connector may be used, (Meriam P/N Z4150-10A)

3. AC/DC adapter may be used, (Meriam P/N 9B000007) Input 110-240 VAC /
   Output 9VDC === 1A.

4. RS232 port may be used.

5. 0.7W MAX. normal use with back light on.
   MFC Input Voltage 9VDC ===

30 VDC === Max.

Hart Comm.

Hart Terminals:

DONGLE CONNECTOR

RS232 Comm.
to PC

AC/DC
Connector

DONGLE LEAD
TO MFC
CONNECTOR

MFC 4150 Series Intrinsic Safety Control Drawing

EC Declaration of Conformity

This is to declare, in accordance with Directive 94/9/EC, that the following product(s) are designed and manufactured in accordance with Annex II of Directive 94/9/EC.

The manufacturer attests on their own responsibility that the apparatus has been constructed in accordance with the principles of good engineering in safety matters, and that any routine verification and test required by Clause 27 of EN 60079-0:2006 has been successfully completed.

Manufacturer:
Meriam Process Technologies, a Scott Fetzer Company
10920 Madison Avenue, Cleveland, Ohio 44102, USA

Product Description:
Multifunction Calibrator with HART Communication Terminals, Model 4150X series.

Certifying Agency:
UL International DEMKO A/S Testing & Certification (0539)
P.O. Box 514, Lyskaer 8, DK-2730 Herlev, Denmark

This Declaration is based on Compliance with the following Standards:
Regarding Hazardous Environments:
- EN 50020:   Electrical apparatus for explosive gas atmospheres - Intrinsic safety 'i'
- EN 50014:   Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
- EN 60079-0:2006 Electrical apparatus for explosive gas atmospheres – General requirements
- EN 60079-26: Special requirements for construction, test and marking of electrical apparatus of equipment group
        II, Category 1 G.

Regarding Electromagnetic Compatibility (EMC) for Handheld Class A device
Series 4150 hand held unit compliant with EMC Directive 89/336/EEC as amended by 92/31/EEC and 93/68/EEC
- EN 61326:1997 + A1:1998 + A2:2001 + A3:2003
- EN 60529: 2004: Degrees of Protection Provided by Enclosures (IP Code)

For and on behalf of Meriam,

Tim Lint
Standards Engineer

Doc. 9R000051 Rev A 28Jan2008

Generic DOF (HART 5 devices)

"Config Menu"

Process Vars

"Process Vars Menu"
PV
% Range
AO

Sensors

"Sensor Menu"
Rerange
Signal Conditioning

"Rerange Menu"
LRV (edit)
URV (edit)
Set 4mA Range
Set 20mA Range
LSL
USL

"Signal Conditioning"
Transfer Function
Damping Value
Units
Analog Alarm

"Main Menu"
Device Config
PV
AO
LRV
URV
%Range

Analog Trim

"Analog Trim Menu"
4mA Analog Trim
20mA Analog Trim
DAC Trim
Loop Test
Scaled DAC Trim

Basic Info

"Basic Info"
Tag
Date
Descriptor
Message
Private Label
Revisions

"Revisions"
HART Revision
Device Revision
Software Revision
Final Assbly Number

Hart Output

"HART Output"
Polling Address
Burst Mode Select
Burst Command Number
Device ID
Preambles

Diagnostics

Diagnostic Menu"
Self Test
Loop Test

Save Send

Review Edit

1151 Rev. 5 Menu Tree

Process Vars
- Pressure Value
- Pressure Percent Range
- Analog Output

Sensors
- Pressure Trim
- Re Range
- Signal Cond

- Zero Trim
- Lower Sensor Trim
- Upper Sensor Trim
- Lower Sensor Trim Point
- Upper Sensor Trim Point

- Pressure Lower Range Value
- Pressure Upper Range Value
- Set 4mA Range
- Set 20mA Range
- Pressure Lower Range Limit
- Pressure Upper Range Limit

- Pressure Output Transfer Function
- Pressure Damping Value
- Pressure Units
- Analog Output Alarm Select

Device Setup
- PV
- AO
- URV
- LRV
- % of Range

Analog Trim
- Trim 4mA
- Trim 20mA
- Loop Test

Basic Info
- Tag
- Date
- Descriptor
- Message
- Private Label
- Revisions
- Const Mats

- HART Revision
- Device Revision
- Software Revision
- Final Assembly Number

- Module Isolator Material
- Module Fill Fluid
- Gasket Material
- Flange Material
- Drain Vent Material
- Flange Type
- Remote Seal Isolator Material
- Flange Size
- Number of Remote Seals
- Remote Seal Fill Fluid
- Remote Seal Type

Hart Output
- Polling Address
- Burst Mode Select
- Burst Com Number
- Device ID
- Preambles

Diagnostics
- Self Test
- Loop Test

- Perform Test
- Test Results

Save / Send
- Save
- Send

Review / Edit
- Variables

3051C Rev. 2 Menu Tree

Process Vars ——
| Pressure Value |
| Pressure Percent Range |
| Analog Output |
| Temperature Value |

| Zero Trim |
| Lower Sensor Trim |
| Upper Sensor Trim |
| Lower Sensor Trim Point |
| Upper Sensor Trim Point |

Sensors ——
| Sensor Trim |
| Re Range |
| Signal Cond |
| Units |

| Pressure Lower Range Value |
| Pressure Upper Range Value |
| Set 4mA Range |
| Set 20mA Range |
| Pressure Lower Range Limit |
| Pressure Upper Range Limit |

| Pressure Units |
| Temperature Units |

| Pressure Units |
| Pressure Output Transfer Function |
| Pressure Damping Value |
| Analog Output Alarm Select |

Device Setup
Press
AO
URV
LRV

Analog Trim ——
| Trim 4mA |
| Trim 20mA |
| Loop Test |

Basic Info ——
| Tag |
| Date |
| Descriptor |
| Message |
| Revisions |
| Const Mats |

| Universal Revision |
| Transmitter Revision |
| Software Revision |
| Final Assbly Number |

| Module Isolator Material |
| Module Fill Fluid |
| Gasket Material |
| Flange Material |
| Drain Vent Material |
| Flange Type |
| Remote Seal Isolator Material |
| Flange Size |
| Number of Remote Seals |
| Remote Seal Fill Fluid |
| Remote Seal Type |

Hart Output ——
| Device ID |
| Polling Address |
| Request Preambles |
| Burst Mode Select |
| Burst Command Number |

Diagnostics ——
| Self Test |
| Loop Test |

| Self Test |
| Status Display |

Save Send ——
| Save |
| Send |

Review Edit ——
| Variables |

EJA Rev. 2 Menu Tree

Process Vars	Pressure Value Pressure Percent Range Analog Output Temperature Value Static Pressure Value Engr Display Unit Engr Display Value	Zero Trim Lower Sensor Trim Upper Sensor Trim Lower Sensor Trim Point Upper Sensor Trim Point

Device Setup
Press
AO
URV
LRV

Sensors

Sensor Trim
Re Range
Signal Cond
Units

Pressure Lower Range Value
Pressure Upper Range Value
Set 4mA Range
Set 20mA Range
Pressure Lower Range Limit
Pressure Upper Range Limit

Pressure Units
H20 Unit Select
Temperature
Units

Pressure Units
H2O Unit Select
Low Cut Point
Low Cut Mode
Bi Dir Mode
Pressure Output Transfer Function
Pressure Damping Value
Analog Output Alarm Select

Analog Trim

Trim 4mA
Trim 20mA
Loop Test

Basic Info

Tag
Date
Descriptor
Message
ASC Model
Ext SW
Mode
Revisions
Const Mats

Universal
Revision
Transmitter
Revision
Software

Module Isolator
Material
Module Fill Fluid
Gasket Material
Flange Material
Drain Vent
Material
Flange Type
Remote Seal
Isolator Material
Flange Size
Number of Remote

Hart Output

Device ID
Polling Address
Request Preambles
Burst Mode Select
Burst Command Number

Display Cond

Disp Mode
Disp Func
Engr Disp

Engr Display Unit
Engr Disp LRV
Engr Disp URV
Engr Disp Point

Write Protect

Write Protect
Write Enable 10min
New Password

Diagnostics

Self Test
Loop

Self Test
Status Display

Save Send

Save
Send

Review /Edit

Variables