

HK-H375A HART

Hand Held Communicator

Manual



TEL-TRU
MANUFACTURING CO.
World-Class Instruments

NOTICE

NOTE 1: Please read the manual before working with this product. For personal and system safety and for optimum product performance, make sure you thoroughly understand the contents before using this product or calling for service.

NOTE 2: The service lifetime of the LCD display will be shortened if the device is continuously exposed to direct sunlight.

NOTE 3: If the device will not be used for a long period of time, please make sure that the batteries are removed from the device in order to avoid the damage of battery leakage.



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Section 1 Operation Instruction

1.1 Brief Introduction

Tel-Tru's HK-H375A HART Hand Held Communicator is a hand held interface based on HART protocol, which can perform configuration, management, maintenance and adjustment to all HART compatible instruments (Figure 1).



Figure 1 HK-H375A HART Hand Held Communicator

The HK-H375A HART Hand Held Communicator can be easily connected into 4~20mA loop to achieve the configuration of instrument parameters (upper limit and lower limit etc.), the reading of instrument variables, as well as the diagnosis and maintenance of the instrument. This Communicator supports not only the HART main device (HART multiplexer etc.), but also the peer-to-peer and multidrop HART communication modes.

1.2 Communicator Connections

This HART Communicator can interface with an instrument from the control room, the instrument site, or any wiring termination point in the loop through the clips and cable (which are the accessory of the communicator) (Figure 2).



Figure 2 Clips and Cable

This HART Communicator could be connected in parallel with a HART instrument, or with load resistor. All connections are non-polarized (Figure 3).

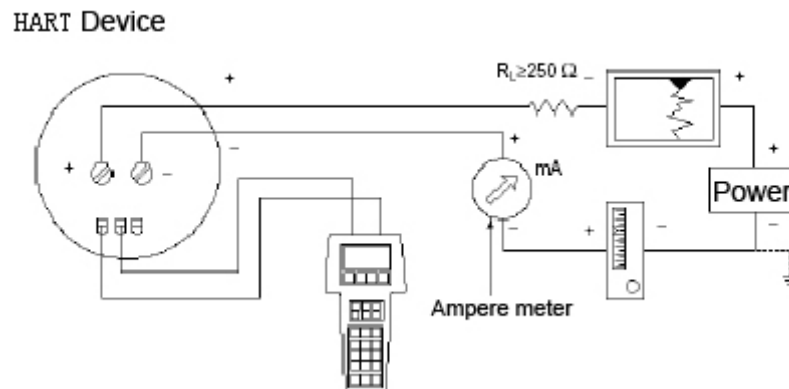



Figure 3 Communicator Connections

NOTE: For the HART Communicator to function properly, a minimum of 250 ohms resistance must be present in the loop. The HART Communicator does not measure loop current directly.

1.3 Power up

First make sure that batteries have been installed appropriately in the Communicator. Then press the On/Off Key  to power up the Communicator (once again for shut down). Approximately for 5 seconds after the startup, the Communicator will automatically poll the HART device (polling address 0) in the 4~20mA loop. If a device is not found, the Communicator will display the message “No device found at address 0, Poll?” If a device is found, the Communicator will display the Online Menu (Figure 4).

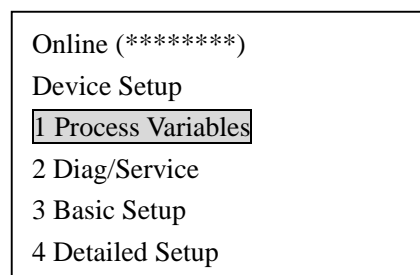


Figure 4 Online Menu

1.4 Quick Startup

1.4.1 Process Variables

When online, follow the menu operation sequence shown below to access Process Variables:

Online Menu → 1 Process Variables.

1.4.2 PV Unit

When online, follow the menu operation sequence shown below to access PV Unit:

Online Menu→4 Detailed Setup→2 Signal Condition→1 PV Unit.

1.4.3 Upper Range Value (URV)

When online, follow the menu operation sequence shown below to access Upper Range Value:

Online Menu→4 Detailed Setup→2 Signal condition→2 PV URV.

1.4.4 Lower Range Value (LRV)

When online, follow the menu operation sequence shown below to access Lower Range Value:

Online Menu→4 Detailed Setup→2 Signal condition→3 PV LRV.

1.4.5 PV Damping

When online, follow the menu operation sequence shown below to access PV Damping:

Online Menu→4 Detailed Setup→2 Signal condition→4 PV Damp.

1.4.6 D/A Trim

When online, follow the menu operation sequence shown below to access D/A Trim:

Online Menu→2 Diag/Service→3 Calibration→2 D/A Trim

NOTE: D/A Trim is usually done before the HART instruments leaves the factory or in the periodic calibration of the instrument. Only qualified personnel should be perform this operation, otherwise any inappropriate operation may increase the output error of the HART instruments.

1.4.7 Zero Trim

When online, follow the menu operation sequence shown below to access Zero Trim:

Online Menu→2 Diag/Service→3 Calibration→3 Sensor Trim→1 Zero Trim

NOTE: Zero Trim can negate the zero error of the instrument caused by installation method. Generally speaking, it is usually done at the first installation of the HART instrument or during the scheduled calibration of the instrument. Only qualified personnel should be designated to perform this operation, otherwise any inappropriate operation may increase the output error of the HART instrument.

Section 2 Technical Specifications

2.1 Dimension

HK-H375A: 228mm x 98mm x 60mm
(Clips and cable not included)

2.2 HART® Connector

- a) In conformity with HART Protocol (HCF);
- b) Operating mode: intercommunication semiduplex 1200bit/s
- c) Receivable voltage: $\pm 40V$
- d) Leakage current less than 1uA at 20°C
- e) Communication distance less than 1500m
- f) Isolation mode: isolation between HART communication connector and power supply
- g) Rating isolation voltage: 500V_{rms}

2.3 PC Connector

This connector is used for software update. Please contact Tel-Tru for information on software updates.

2.4 Power Supply

Power Supply: 4.5V DC;

Power Consumption: 91.3mA (Typical value under working state)
1uA (Typical value under power-off state)

2.5 Battery

Power Supply: Three AA 1.5V alkaline batteries or rechargeable NiCad/NiMH batteries.

Battery Life: 100 hours (AA Alkaline Batteries)

80 hours (1000mA Rechargeable Batteries)

NOTE: The Communicator will shut down automatically if not used within 10 minutes.

2.6 Temperature Limit

Operating Temperature: 0°C ~+50°C

Storage Temperature: -20°C~+55°C

Note: The service lifetime of the LCD display will be shortened if the device is continuously exposed to direct sunlight.

2.7 Liquid Crystal Display (LCD)

The LCD is an 8-line by 21 characters display that provides human-machine interface (HMI). When the communicator is connected to a HART compatible device, the top line of each Online Menu displays the model name and the tag of the device.

Typically, the performance of LCD displays will decrease if the ambient temperature is too


low. In order to meet your requirements for different ambient environments, a temperature compensation circuit is embedded within Tel-Tru's communicator, which enables the LCD to display in good contrast and response time in colder environments.

Section 3 Keypad Instruction


3.1 On/Off Key

- Use this key to power up and power off the HART Communicator. Press this key for at least 2 seconds.


3.2 Up Arrow Key

 Use this key to move the cursor up through a menu or list of options.


3.3 Down Arrow Key

 Use this key to move the cursor down through a menu or list of options.


3.4 Left Arrow/Previous Menu Key

 Use this dual-function key to move the cursor to focus the left option or back to the previous menu.

3.5 Right Arrow/Select Key

 Use this dual-function to move the cursor to focus the right option or to select a menu option.

3.6 Confirmation Key

 Use this key to confirm the cursor-focused option.

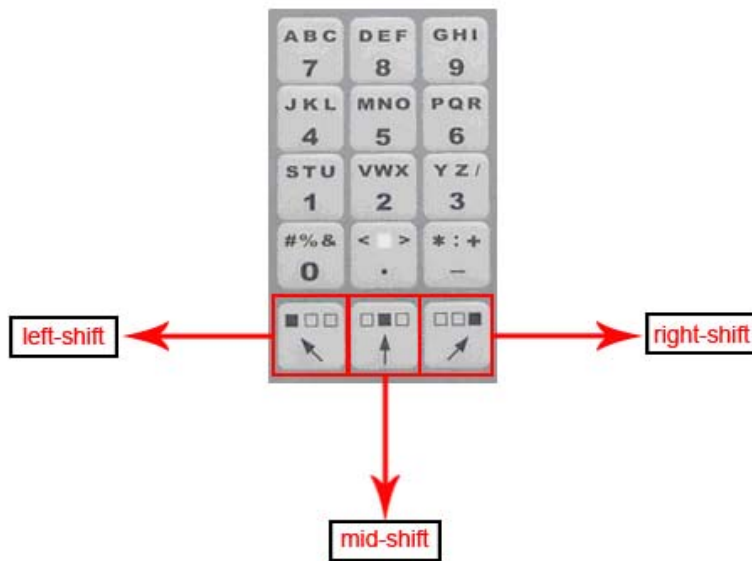


Figure 5 Alphanumeric and Shift Keys

3.7 Alphanumeric & Shift Keys

Use Alphanumeric Keys to input data (Figure 5).

3.8 Using Shift Keys for Data Entry

Some menu requires data entry. Use the Up and Down Arrow Keys when available, or use the Alphanumeric and Shift Keys to enter the alphanumeric information into the HART Communicator.

If you press only the Alphanumeric Key with an edit menu, only the character in the center of each key will be entered. These characters include digits from zero (0) to nine (9), the decimal point (.), and the dash symbol (-). To enter the other characters on the keys, first press and release the Shift Key corresponding to the position of the desired character on the key and then press the Alphanumeric Key. Do not press the keys simultaneously. For example, to enter the letter “R”, press the following key sequence:



Press the Shift Key again to deactivate the shift function.

Section 4 Common Tasks

If the Communicator is powered up when it is not connected to a device, the Communicator will display the message “No device found at address 0, Poll?” Select “No”, and then the Main Menu (Figure 6) appears.

If a device is found, the Communicator will skip the Main Menu, display the Online Menu directly (Figure 7). You can access the Main Menu by pressing the previous menu key (left key).

4.1 Main Menu

There are four functions in the Main Menu:

1. To access Online Menu;
2. To download software;
3. To read the battery capacity;
4. Polling.

You can access the Main Menu by pressing the previous menu key several times whenever an instrument is connected.

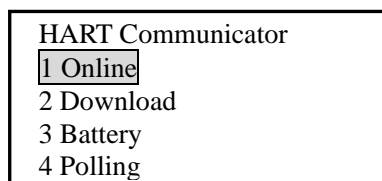


Figure 6 Main Menu

4.2 Online Menu

If the Communicator is connected to a HART instrument, you can access the Online Menu from the Main Menu.

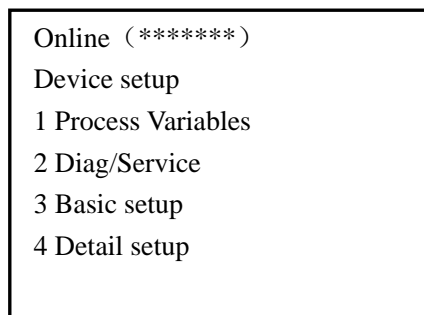


Figure 7 Online Menu

4.3 Process Variables

When online, follow the menu operation sequence shown below to access Process Variables:

Online Menu → 1 Process Variables.

All process variables (PV, AO, PV%) are listed in the menu and updated at real time.

```

Online (*****)
Process variables
1 PV          ** KPA
2 AO          ** mA
3 PV %        ** %

```

Figure 8 Process Variables

4.4 Diag/Service

When online, follow the menu operation sequence shown below to access Process Variables:

Online Menu→2 Diag/Service.

In Diag/Service Menu, there are three items: Test Device, Loop Test and Calibration.

Test Device can initiate a diagnostic routine on the device and report the result.

Loop Test can fix the transmitter output at a specified analogue value, in order to confirm the integrity of the loop.

Calibration can perform sensor trim or analog output trim.

```

Online (*****)
Diag/Service
1 Test Device
2 Loop test
3 Calibration

```

Figure 9 Diag/Service Menu

4.5 Basic Setup

When online, follow the menu operation sequence shown below to access Basic Setup:

Online Menu→3 Basic Setup.

This menu provides quick access to a number of configurable parameters. The parameters available here are the most fundamental tasks that can be simply performed with a given device. These tasks are a subset of the parameters available under the Detailed Setup menu.

There are three types of menu item in this menu:

1. Submenu, access to the subordinate menu by pressing the Right Arrow Key
2. Variable display – note: some are read-only variables and some are writable variables
3. Special functions, you can execute a series of operation here to achieve a specific function, by just following the instructions on LCD.

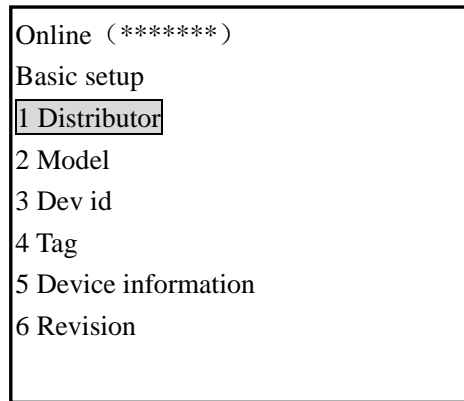


Figure 10 Basic Setup

4.6 Detailed Setup

When online, follow the menu operation sequence shown below to access Detailed Setup:
Online Menu→4 Detailed Setup.

This menu provides access to every editable device parameter and all device functions.
The Detailed Setup menu varies widely from one HART compatible device to another.

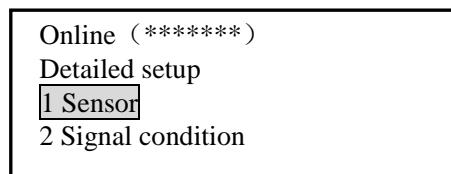


Figure 11 Detailed Setup

The Online Menu displays the name of the device on the top line of the LCD. You have complete functionality for a specific device only when that device description (DD) is preloaded in the HART Communicator.

The Online Menu can be different depending on the connected device. Please refer to the device-specific menu tree in the Appendix for the detailed information. When communicating with a device without DD preloaded, the HART Communicator will display a common menu tree (Figure 12) . This menu tree could deal with all generic functions of all HART compatible instruments.

Please refer to the device-specific menu tree in the Appendix for its special functions.

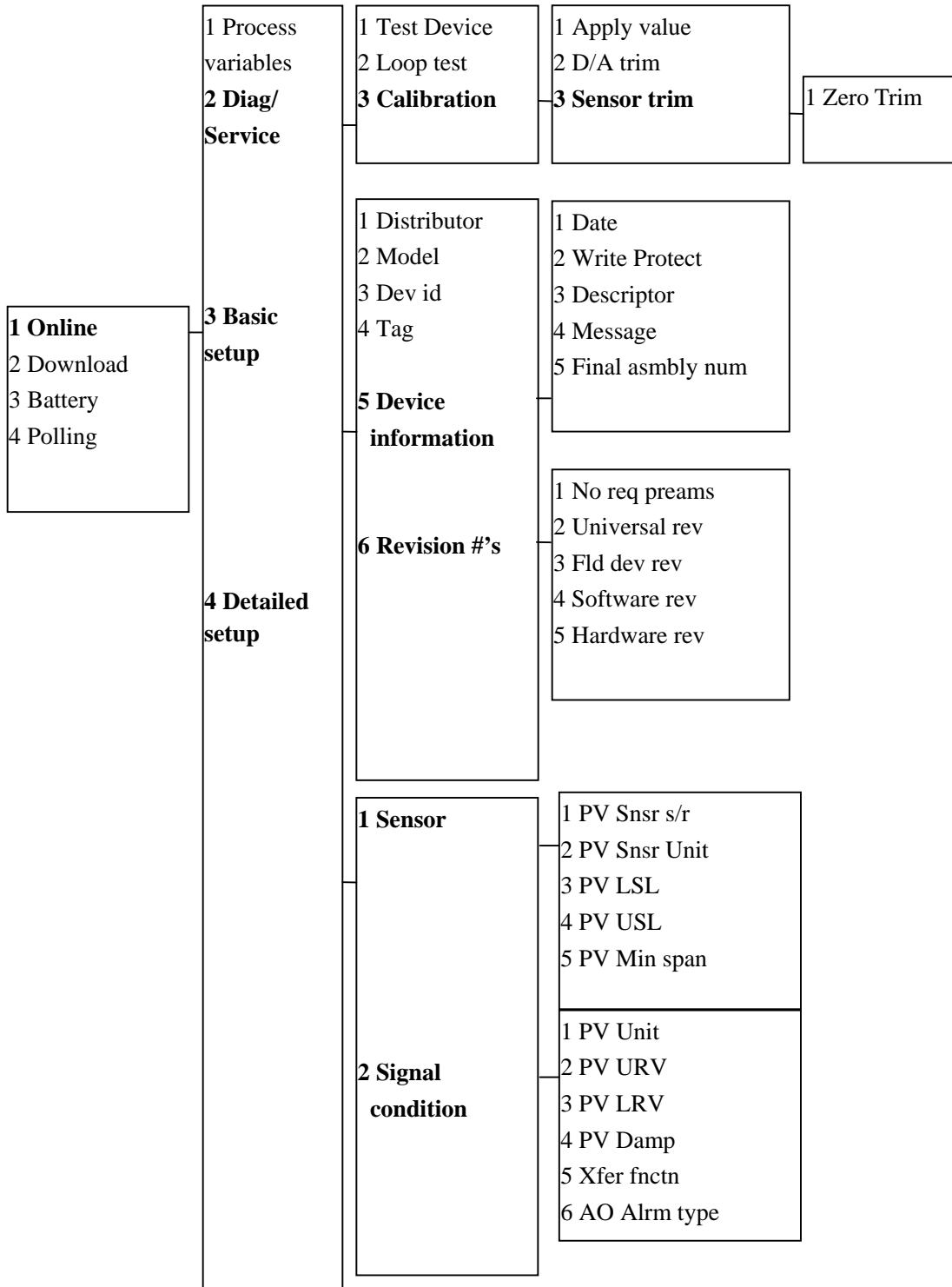


Figure 12 Generic Online Menu Tree

4.7 Other Tasks

4.7.1 Automatic Polling

When online, the HK-H375A Hand Held Communicator will poll automatically the online devices at address 0. If not connected to a device, the Communicator will display the message "No device found at address 0, Poll?" Select "YES", then the Communicator will poll automatically all the devices connected from address1 to address 15.

When several devices are connected in the same loop, each device must be assigned a unique address. If two devices share the same address, the communicator will not be able to find the devices. At this point, the devices will need to be connected separately to correct the polling address. HART Protocol defines the communication mode of connecting several devices in the same loop as multidrop mode. Under multidrop mode, the current in the loop will not be current signal of 4~20mA standard, but the sum of the output current from all the devices.

4.7.2 Download

Follow the menu operation sequence shown below to access Download:
Main Menu→2 Download.

This function is designed for customers to easily update the DD in the HART Communicator. We will update the DD periodically. Please do not hesitate to contact with us for the relevant technical support.

This function is associated with the special PC software, downloading the target file into the HART Communicator at the default baud rate 38400bit/s.

When the interface displays "Download target file", select "OK", then the download starts and the Communicator will display "Please wait a moment..." When the download finished, it will go back to the Main Menu.

Note: Please do not use this function without proper PC software and guidance from the manufacture,

4.7.3 Battery

Follow the menu operation sequence shown below to access the Battery:
Main Menu→3 Battery.

This function will check the remaining battery capacity and display it in percent (%). When the battery capacity is too low, please change the batteries at once to avoid influence on the normal use of the Communicator.

4.7.4 Polling

Follow the menu operation sequence shown below to access Polling:

Main Menu→4 Polling.

When several devices are connected in the same loop (multidrop), you can achieve the communication with the required device by polling (Figure 13).

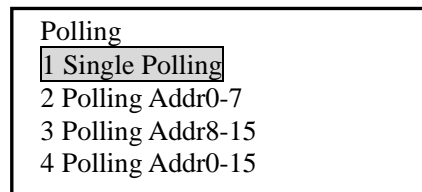


Figure 13 Polling Menu

Item 1 is Single Polling, you can select any address between 0 and 15 to communicate;

Item 2, 3, and 4 is group polling; address 0~15 has been divided into three groups.

When a device is found by group polling, the Online Menu will display and communicate with the lowest address found. To communicate with higher address devices, single polling is necessary.

Section 5 Troubleshooting Communication Problems

5.1 No Communication With Field Device

- ① Check if the resistance in the loop is sufficient; loop resistance should be between 250 and 500 ohms.
- ② Check if the connection between the Communicator and the device is correct.
- ③ Check if the power supply of the device is correct.
- ④ Check if the device address is "0"; if not, select "YES" when it prompts "No device found at address 0, Poll?" to poll all addresses and find online device.

5.2 Communicator Power up Failure

- ① Check if the Communicator has been installed with batteries.
- ② Check if the battery installation of the Communicator is correct.
- ③ Check if the battery capacity is sufficient.

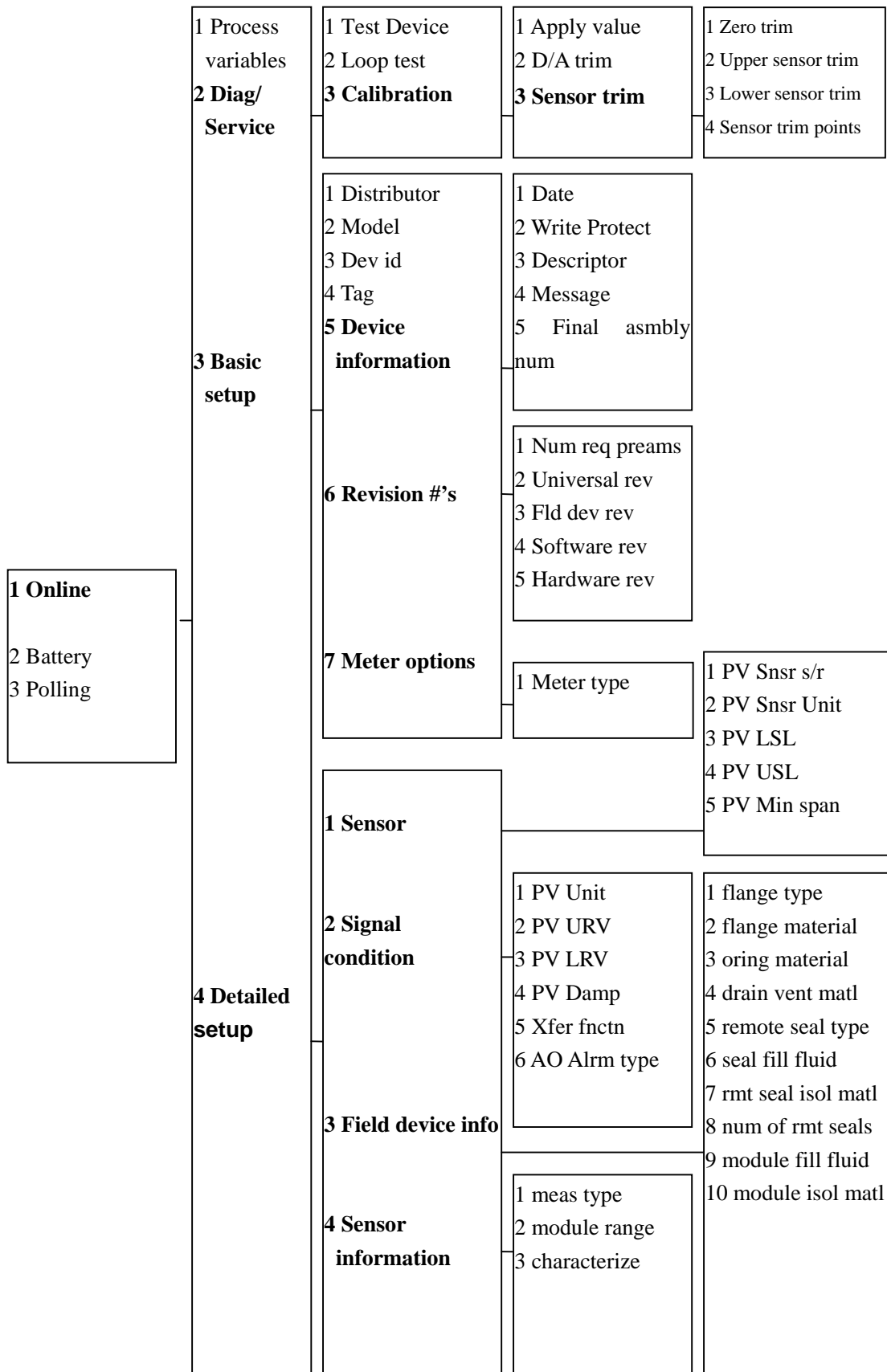
5.3 Special Function Application Failure

You have complete functionality for a specific device only when that device description (DD) is preloaded in the HART Communicator. If the DD is not preloaded in the HART Communicator, please do not hesitate to contact us for the relevant technical support.

NOTE: This manual is subject to Copyright Laws

HART is registered trademark of HCF.

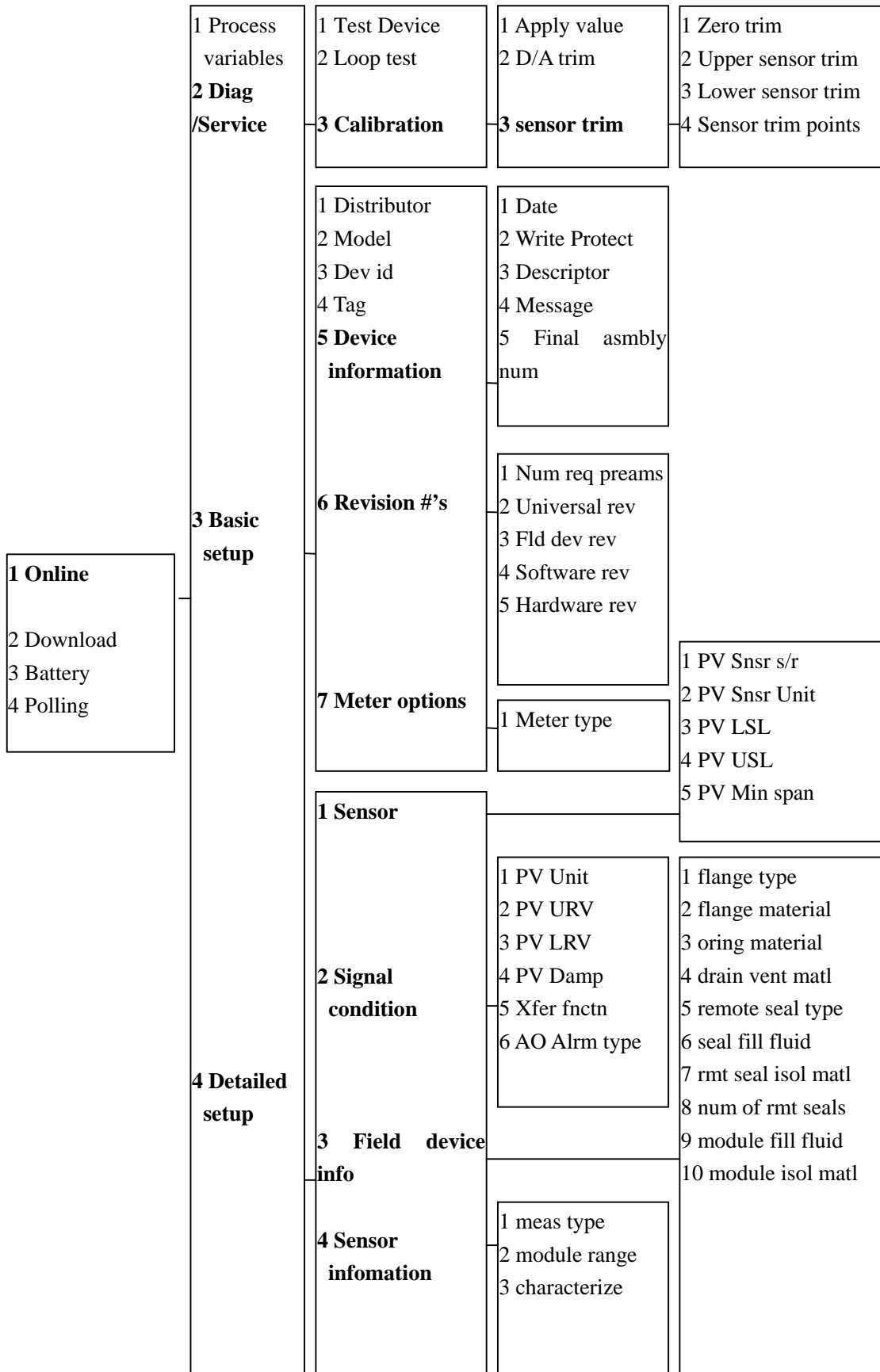
Appendix 1 Tel-Tru's Smart Products Menu Tree



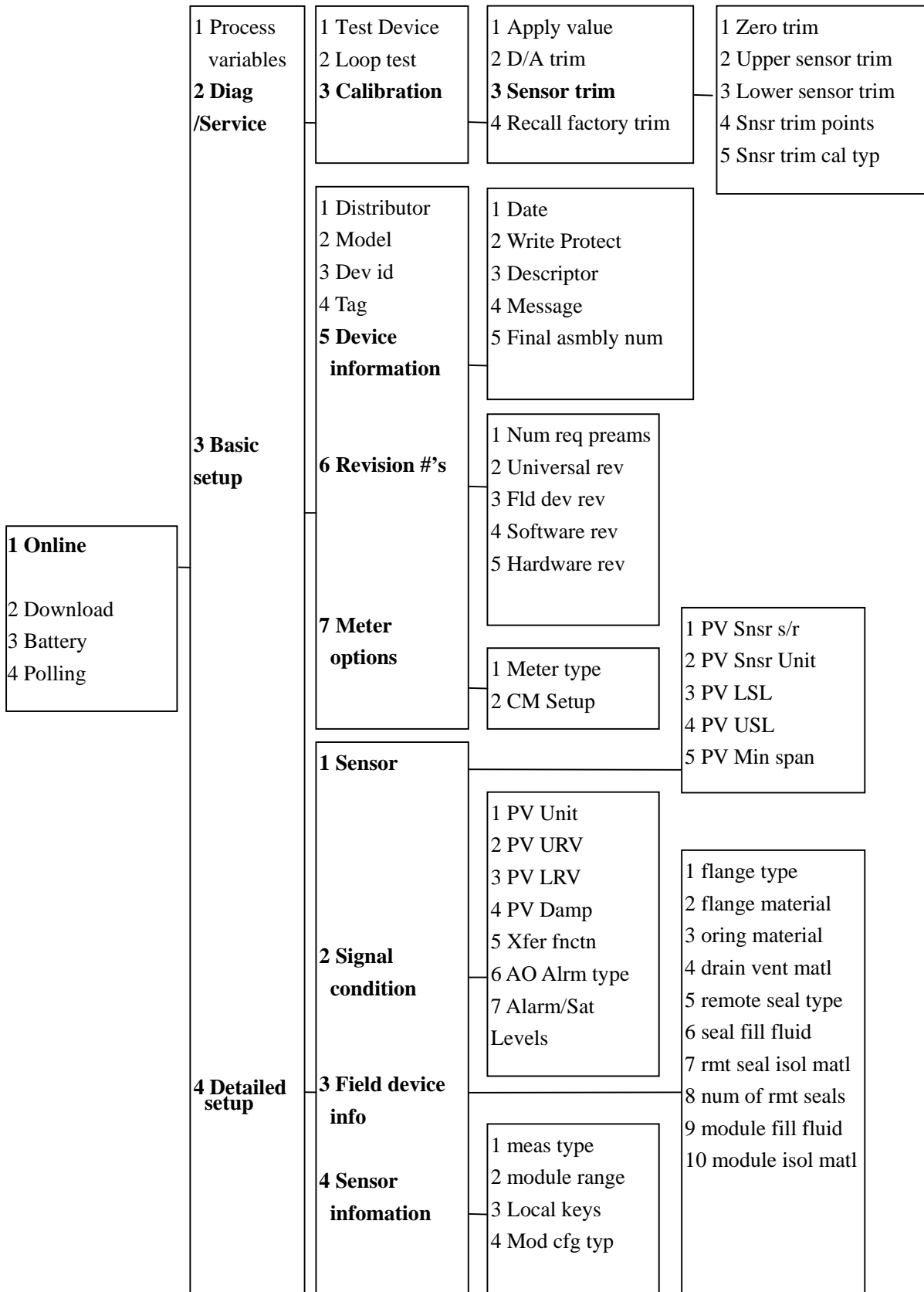
Appendix 2 Tel-Tru's Smart Products Shortcut Key

Function	Shortcut Key
Upper sensor trim	2 , 3 , 3 , 2
Lower sensor trim	2 , 3 , 3 , 3
Meter type	3 , 7 , 1
Field device info	4 , 3
meas type	4 , 4 , 1
module range	4 , 4 , 2
characterize	4 , 4 , 3

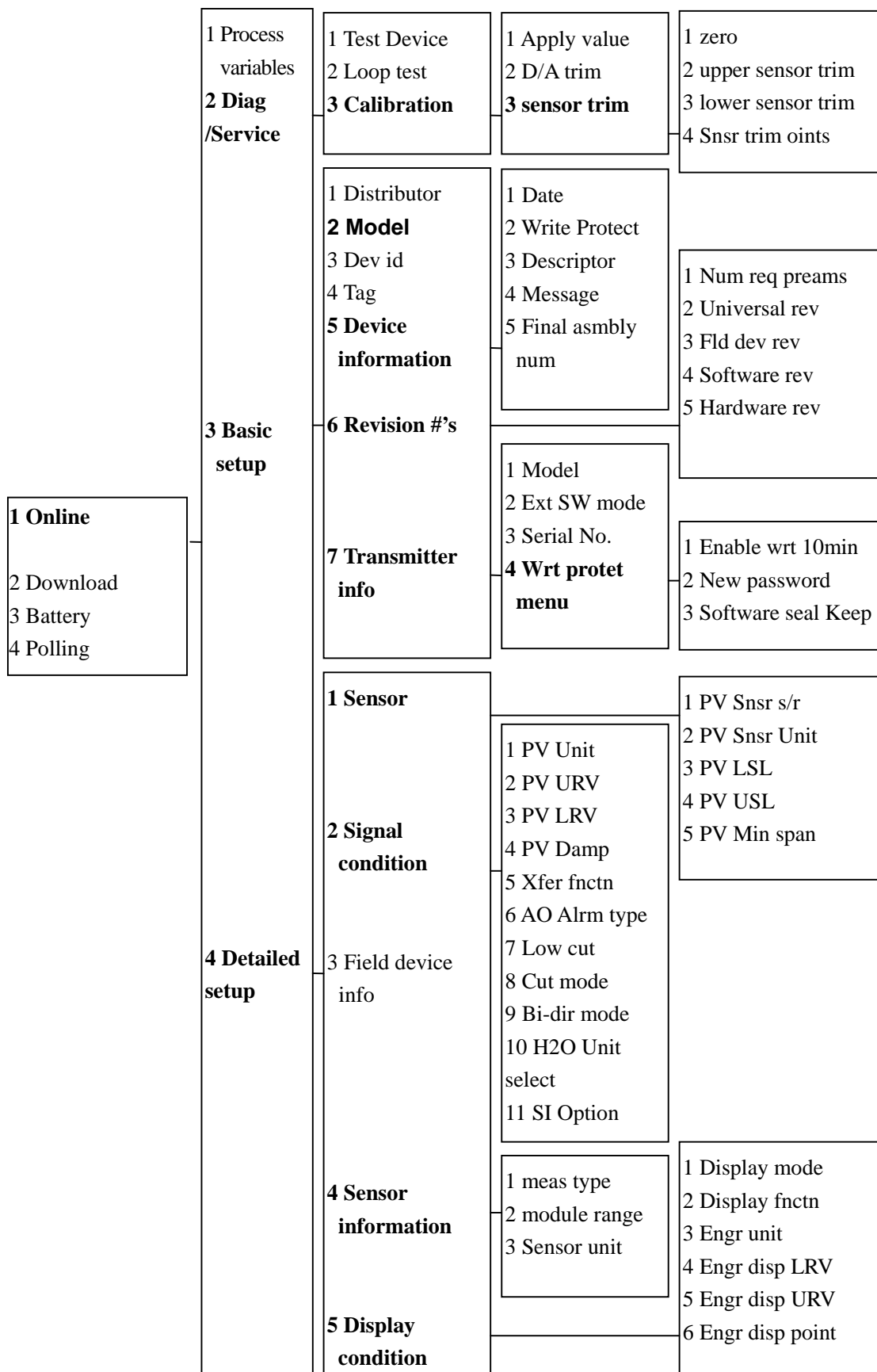
Appendix 3 ROSEMOUNT 1151 Menu Tree



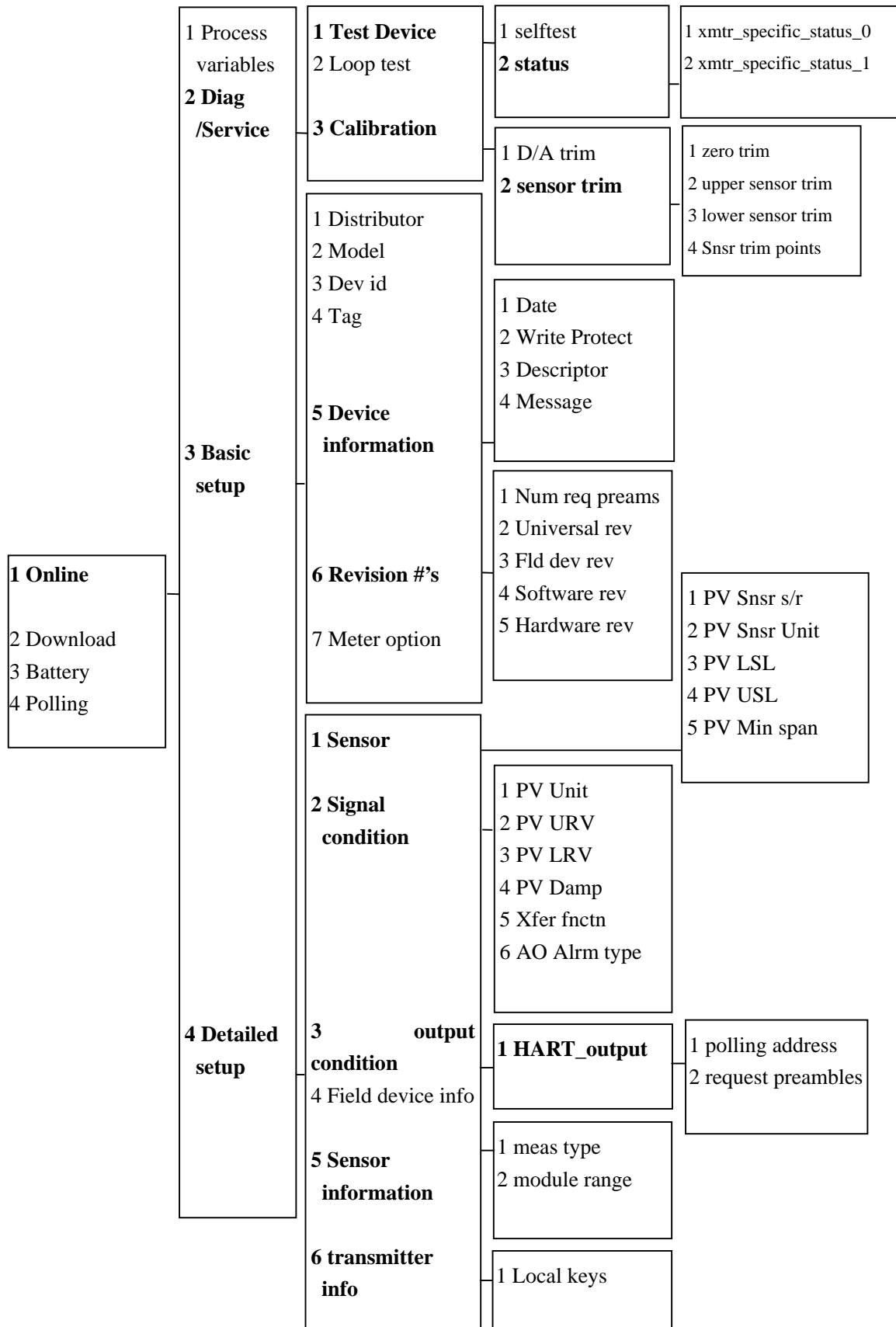
Appendix 4 ROSEMOUNT 3051 Menu Tree



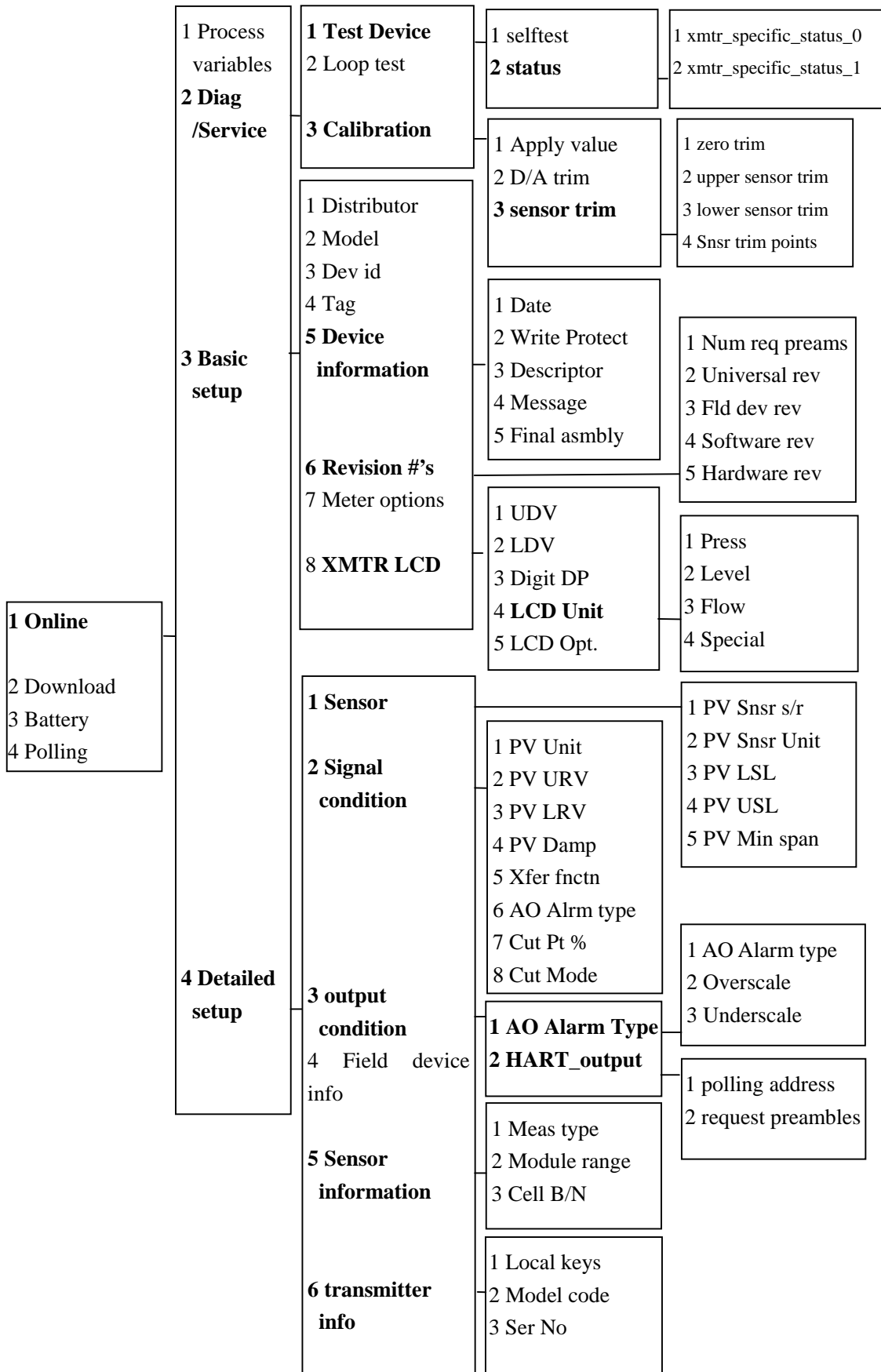
Appendix 5 YOKOGAWA EJA Menu Tree



Appendix 10 FUJI FCX-A/C Menu Tree



Appendix 11 FUJI FCX-A2 Menu Tree



Appendix 12 FUJI FRC Menu Tree

