Smart-Alek® Communicator v2 User Guide

MNL-SA-3 SA Communicator February 2007

zedi

Proprietary Rights Notice

Copyright Notice

Warranty

Zedi inc. warrants this product, the Smart-Alek®, against defects in material and workmanship for a period of *one year* from the date of purchase from Zedi inc. or an authorized Zedi inc. agent or distributor. This warranty applies only to the original purchaser of the Smart-Alek® and is not transferable.

This warranty covers only defects arising under normal use and does not cover malfunctions or failures resulting from abnormal wear and usage, abuse, misuse, inadequate preventative maintenance, unsuitable environmental conditions, problems with electrical power, negligence, non-authorized modifications, or installation of non-authorized parts without prior knowledge and written permission from Zedi inc. This warranty does not extend to damage to the product resulting from improper installation or operation, accident, or misapplication, nor as a result of service to the product by anyone other than Zedi inc. or an authorized agent. This warranty does not extend to wear or damage of wetted parts.

Warranty claims require the return of the product to Zedi inc. within the warranty period. Upon inspection by Zedi inc., any parts found to be defective in material or workmanship will be repaired or replaced by Zedi inc., at its sole option, without charge for parts or labour. Round trip transportation of products for warranty claims to Zedi inc. repair facility is at the expense of the purchaser.

Zedi inc. SHALL NOT BE LIABLE FOR ANY INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS, DAMAGE, OR EXPENSE DIRECTLY OR INDIRECTLY ARISING FROM THE CUSTOMER'S USE OF OR INABILITY TO USE THIS PRODUCT, EITHER SEPARATELY OR IN COMBINATION WITH OTHER EQUIPMENT.

Zedi inc. reserves the right to make changes to this warranty without notice and to make changes in design or additions to or improvements in the Smart-Alek® or any accessory items without obligation to make such changes or to install such additions or improvements in any equipment manufactured prior to the introduction of such changes.

Zedi inc. makes no warranties, express or implied, verbal or otherwise, other than as expressly provided in the above warranty.

Safety Considerations

You must have the proper training to safely install the Field Instrument, as required by applicable federal, provincial, and/or state law.

Additionally, your company also may have safety training program requirements which must be met for instrumentation issues, particularly pressure line installation safety procedures.

Also:

- only work in a location known to be non-hazardous, i.e., by declassifying the zone.
- use hand tools, hand power tools, testing equipment and specialty tools required by the trade.
- ensure you have the proper knowledge and understanding of operating processes and their interrelationship with instrumentation, including:
  - Installing, inspecting, testing, servicing and removing instruments.
  - Installing and removing pneumatic tubing, process tubing and piping.
  - Installing, inspecting, testing, disconnecting and connecting electrical wiring to instrument installations.
  - Incorporating modification to systems and components.
  - Installing, servicing, calibrating and maintaining equipment for calibration, reference or comparison standards.

If you are unsure about any part of the installation, consult an authorized and qualified person at your company, e.g., the Safety Supervisor.

Contact zedi Client Services and Support if you have any questions.

CAUTION

Review, understand, and follow all company Safety Policies and Safe Work Procedures before you perform any work at the site.

CAUTION

Make sure that equipment is rated to the maximum pressure being applied.
If it is not, you could damage the equipment, or cause harm to yourself.

CAUTION

Obtain all required safety certifications before performing any work at the site, e.g., H_2S Alive, First Aid, etc.

CAUTION

Follow all applicable federal, provincial and municipal health and safety standards (e.g., Occupational Safety & Health Administration (OSHA) standards in the USA, Occupational Health and Safety (OHS) standards in Canada).

CAUTION

Wear Personal Protective Equipment (PPE) that is appropriate to the work site.

Smart-Alek Installation in an H_2S Environment

When you are installing the Smart-Alek Field Instrument in an H_2S environment, all of the tubing, valves and fittings must accommodate constant exposure to H_2S. Use of carbon steel equipment is not recommended.

Prior to applying gas to the equipment, or releasing gas to the atmosphere:

CAUTION

- Use the two-man rule. NEVER perform any work alone.
- Have a personal H_2S monitor and make sure the level is never higher than the federal, provincial and state regulations allow. If the H_2S level exceeds this, use the appropriate air system. For example, wear a supplied-air system (SAS).
- Wear Personal Protective Equipment (PPE) that is appropriate to the work site.
- Follow all applicable company safety policies and procedures, including all standard H_2S Safety Procedures.
- Have H_2S Safety Training.
- Be aware of wind conditions and that you are never downwind of the gas.
- Have a 5-minute Escape Pack for an emergency situation, as required by the operating company.
- Have a First Aid Kit.

Protecting from Electrostatic Discharge (ESD)

CAUTION: Static Sensitive Device(s).

Contains components susceptible to damage from Electrostatic Discharge. Handle only using static preventive processes.

A portable static-protective field service kit is the service technician's first line of defense against static. A static-safe work station is a work area in which static charge has been controlled. For conductors, this is accomplished by grounding. However, a charge on nonconductors, such as plastics or synthetics, cannot be removed by grounding. It must either be neutralized by exposure to ionized air or the objects must be physically removed from the area.

In a plant or depot environment, you can permanently safeguard a work station against static by installing grounded static-dissipating table mats and floor mats, conductive wrist straps, static-shielding bins and containers, ionized air blowers and appropriate caution signs.

However, sensitive electronic parts also are at risk when being handled by field service technicians, and they must be properly protected as well.

A portable static-protective field service kit consists of two basic components:

- a grounded wrist strap for the technician to wear
- a grounded mat to use as a static-free work surface.

Of the two, the wrist strap is the more important, because the human body is the greatest generator of static electricity. A conductive wrist strap that is properly fitted and grounded will not only remove any existing static charge from the wearer, but also prevents the generation of any new charge caused by normal movement.

The other component of a static-protective field service kit is the work surface. During the course of a service call, a technician must periodically lay down the parts being handled. Setting sensitive electronic components on the carpet, floor tile or a nearby table top could easily result in catastrophic damage to the devices, because these surfaces all can build up and hold high levels of static charge.

The field service kit work surface helps avoid this problem. Once the mat has been properly grounded, it remains free of static charge, and any sensitive parts laid upon it will be protected. The mat should be large enough to accommodate most PC boards or assemblies, yet be small and lightweight enough so that it can be carried between job sites.

For further information, try the ESD Association (http://www.esda.org).

Table of Contents

Other Functions 47

Chapter 1

Getting Started

Regulatory Information

Electromagnetic Interference (EMI) - United States FCC Information

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Electromagnetic Interference (EMI) - Canada

This digital apparatus does not exceed the Class A limits for radio noise emissions form digital apparatus as set out in the interference causing equipment standard entitled ‘Digital Apparatus’, ICES-003 of the Department of Communications.

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norm sur le matériel brouilleur: ‘Appariels Numériques’, NMB-003 édictée par le ministre des Communications.

FCC RF Exposure Guidelines

While this device is in operation, a separation distance of at least 20 cm must be maintained between the radiating antenna and the body of all persons exposed by the transmitter to meet FCC exposure guidelines.

CAUTION: Static Sensitive Device(s).

Contains components susceptible to damage from Electrostatic Discharge. Handle only using static preventive processes.

Safety Considerations

- **Review and follow all company Safety Policies and Safe Work Procedures before you perform any work at the site.**
- **Obtain all company safety certifications before performing any work at the site (H2S Alive, First Aid, etc.)**
- **Follow all applicable federal, provincial and state health and safety standards,(e.g., Occupational Safety & Health Administration (OSHA) standards in the USA, Occupational Health and Safety (OHS) standards in Canada, etc.)**
- **Wear Personal Protective Equipment (PPE) that is appropriate to the work site.**

Introduction

Smart-Alek® is a self-powered, wireless, digital gas flow meter that delivers accurate production data to the desktop in real-time.

zed.i's Smart-Alek® System replaces mechanical flow meters and paper charts with an intelligent end-to-end digital network that instantly delivers wellsite information. The net result is reduced downtime, increased production, and increased earnings. The Smart-Alek solution represents a significant advance from existing remote monitoring technologies and is the foundation of our evolving business model.

Smart-Alek Communicator Ver. 2.0 is a software program that links your computer to the Smart-Alek V2. It can be found under Downloads at www.smart-alek.com/service. Through Smart-Alek Communicator Ver. 2.0, you can set up, test, operate, calibrate and perform routine maintenance on the Smart-Alek V2.

You can remotely monitor the Field Instrument on an internet website, using your browser. You can monitor readings for static pressure, differential pressure, temperature and gas flow, as well as set up alarms for when those readings reach specific levels.

By using zed.i's technology and solutions, our customers increase business productivity, optimize well and field production, and significantly reduce down time.

Contact Information

zedi Customer Service and Support

(installation set-ups, customer service calls)

During office hours: 403-444-1100.

After Hours and Toll Free: 1-866-732-6967.

If a representative is away or unavailable, press zero during business hours for reception to redirect your call. If outside normal hours, wait for voicemail message to indicate either a cell number to call or an on-call person.

When completing an installation or service call, please call zedi with customer details, programming options put into Field Instrument, signal strength and channel, serial numbers, antenna style, and available sunlight into panels.

Visit our websites at www.zedisolutions.com and www.smart-alek.com for more information.

About the Smart-Alek Field Instrument

Field Instrument Identification

- V2X Field Instruments use a rectangular enclosure.
- **V2** Field Instruments use an oval enclosure.
- **V2 Barton pressure core model** has single multivariable core.
- **V2 Fuji pressure core model** uses two cores with a crossover tube. Do not remove the tube.
- **Cellular units** (1xRTT, GPRS, CDPD) use on-board modem with RF connector on case.
- **Satellite** uses external modem case with multipin connector on case.
- There is a **serial number** and **metal tag** on unit that identifies it.
- There are **pressure core model** and **MFR model** stickers
- Identification on Field Instrument, Packing Slips and Work Orders must match.

Battery

- **V2** 6 volt is a “3 wire white” battery pack.
- **V2** 8 volt is a “2 wire black” battery pack.
- **V2X** 6 volt is a “2 wire” battery.
- All versions use an on-board battery cell for the clock.
- Most units can use a certified 12 volt external accessory battery in low-light apps.

Basic Cellular Components

- Smart-Alek Field Instrument.
- 5W solar panel.
- 7m RF cable with TNC connectors.
- RTD (2.5”, 3.5”, 6.0” universal) with data connector.
- “Phantom” omnidirectional antenna.

Basic Satellite components

- Smart-Alek Field Instrument.
- CID1 or CID2 modem enclosure.
- Data connector cable (SA to ME).
- 5W solar panel.
- Solar panel power cables.
- RTD (2.5”, 3.5”, 6.0” universal) with data connector.
- “Satellite” omnidirectional antenna.

External Accessories

- PolarTek Informer+ Totalizers
- Keller (P and T) sensor
- Canada Tech (P and T) sensor
  Note: Keller sensors cannot be used with the V2X model Field Instrument.
- Central and Remote Junction Boxes
- External Battery
- Secondary 5W solar panel
- RTD with no data connectors

Procedure Outline

The following is one suggested order in which to perform the various Smart-Alek set up tasks.

Step	Description	Page	Notes
1	Test Solar Panel Voltage	8	
2	Unit Power On	14	
3	Connect to Comm Port	14	
4	Start SAComm Software	14	
5	Insert ZID CD	14	
6	Add Tool to Software	15	
7	Enter Serial Number into Software	15	
8	Create and Select Job	16	
9	Software Connect to Tool	16	
10	Enter Configuration Mode	17	
11	Set Internal Tool Clock	18	
12	Modem Initialize – Enter IP Address	18	
13	Set LCD Operation	23	
14	Define Well Information	24	
15	Test Modem	25	
16	Test Host Connection	30	
17	Calibration Check - Zero Verification	36	
18	Calibration Check - Zero Point Calibration	37	
19	Calibration Check – Verify As Found	39	
20	Calibration of Zero and Full Scale Ranges	38	
21	Calibration Check – Verify as Left	39	
22	Data Management – Clear Data Logs	59	
23	Set Operation Parameters	44	
24	Server Data Transmission Selections	45	
25	Set Gas Flow Parameters	41	
26	Define Initial Flow Rate Factor	43	
27	Real Time Monitor Operation	40	
28	Start operation	46	
29	Disconnect Software	46	
30	Remove Cables / Verify LCD Operation	46	
31	Close Software Job	46	
32	Close Software	46	
33	Call Customer Support to Activate Site	46	

Setting-up your laptop

Basic requirements

- A computer with a 9-pin serial port, running Windows 98 or higher.

  If your laptop does not have a serial port or a PC card with a serial port, but it does have a USB port, contact zed.i for a list of approved USB/serial converters.
  Do not run your laptop off of a vehicle power converter while connected to the Field Instrument.

- The latest revision of the Smart-Alek Communicator software.

  The latest revision of Smart-Alek Communicator **must** be loaded into laptops attempting to program units with current firmware revisions. The latest version of Smart-Alek Communicator is available at www.smart-alek.com/service.

- A valid User Profile (.usr file) for Smart-Alek Communicator.

  You should have received a User Profile (.usr file) by e-mail or diskette. If you don't have a User Profile, contact zed.i. To install a .usr file, move it to the application installation directory.

- A 9-pin male-female straight-through serial cable.

  The cable length should be a maximum of 25 feet.

- One of the following:

  - **a Smart-Alek Identification file (.zid file)** matching the serial number of the Field Instrument (e.g., 191249.zid). The Smart-Alek Identification file (.zid file) comes on its own CD-ROM and is specific to the Field Instrument.
  - **a Service Master CD-ROM and an access file (access.zxs) valid for the Field Instrument you're connecting to**.

CAUTION

access.zxs files expire after 60 days. When the file expires, you have to download a new one from https://www.smart-alek.com/service

---

  - a Service Master CD-ROM and a license code from zed.i valid for the Field Instrument you're connecting to. If you have the Service Master CD-ROM, you can call zed.i to receive a licence code.

➢ **To get your access.zxs file:**

1. In your web browser, go to https://www.smart-alek.com/service.
2. Enter your User Name and Password, and click Login.
3. Click on your company directory.
4. Click access.zxs.
5. In the File Download window, click Save.
6. In the Save as window, select the folder (directory) where Smart-Alek Communicator 2 is installed, then click Save.

   Default is C:\Program Files\Zedi\Smart-Alek Communicator 2

CAUTION

You must save access.zxs in the same directory as Smart-Alek Communicator is installed. If you have problems, an access code can be provided by telephone.

Additional requirements for updating Field Instrument firmware

- Procomm Plus terminal emulation software (v4.8 or higher).

  Updating firmware with other terminal emulation software is NOT recommended. We have customized scripts for Procomm Plus to automate much of the process and reduce chances of error.

- Installation script files for Procomm Plus.

  The script files automate the installation of the firmware files. The script files are not the same as the firmware files.

- High level firmware (.srd) file.

- Low level firmware (.srd) files specific to the Field Instrument's pressure core type.

  There are different .srd files for the Barton and Fuji cores. Make sure you have the appropriate firmware file for each core.

Additional hardware requirement for updating V2X Field Instrument firmware

- Program Header Cable.

Installing Firmware Files and Procomm Plus scripts

1 In your web browser, go to:

https://www.smart-alek.com/service/!General Updates/Firmware/Support Files/

2 Enter your User Name and Password and click Login.

3 Click procommscripts.exe

Running the file will install the scripts. Extract the files to the Procomm Plus install directory.

➢ **To download the High Level and Low Level firmware files:**

1 In your web browser, go to:

https://www.smart-alek.com/service/!General Updates/Firmware/

2 Enter your User Name and Password, then click Login.

3 Right-click the High Level .srd file (HL__.srd), then choose Save Target As from the right-click menu.

NOTE Do not left-click the .srd file - this might cause the file to be displayed in your web browser rather than saved on your disk. If the .srd file is displayed in your browser window, do not try to save it to disk. Instead, click your browser's Back button, then right-click the .srd file.

4 In the Save As window, select where to save the file, then click Save.

5 Click the appropriate Low Level subdirectory, then click the directory (Barton or Fuji) that matches the type of pressure core on the field instrument.

6 Right-click the low level .srd, then choose Save Target As from the right-click menu.

Testing the solar panel

CAUTION

Ground yourself with a wrist strap, or at the very least with one hand to the unpainted portion of the metal of the Field Instrument before removing covers or touching internal components.

➢ **To test the solar panel:**

1 Ensure the Field Instrument is in Offline Mode.

2 Disconnect the coaxial power/RF cable from the solar panel at the point it attaches to the Field Instrument.

3 Place the positive lead for the multi-meter on the cable's center pin.

4 Place the negative lead on the outside of the cable's TNC connector.

CAUTION

When testing voltage, be careful not to short the voltmeter leads.

You should get a reading from at least 20 VDC up to 25 VDC in direct sunlight at noon.

You should get a reading from at least 18 VDC up to 25 VDC in cloudy weather.

If a no voltage or low voltage is displayed:

- Perform a continuity check on the coaxial power/RF cable.
- The solar panel may have to be replaced.

NOTE

If the battery's voltage drops below its rating (e.g., if an 8 volt battery drops to 7.9 volts) the Field Instrument will stop communicating with the server (to save power) but will continue to record readings until the battery dies.

If you see a negative voltage:

You've put the wrong leads from your multimeter on the center pin and outside housing, or some connection further up the line is reversed. The most common error is forcing the connector on the two-wire power cable from the back of the solar panel into the bias tee backwards.

5 If voltage is as expected, reconnect the coaxial power/RF cable to the Field Instrument

6 Toggle the Field Instrument power switch to ON.

Noise in the V2 Field Instrument indicates the internal battery charging circuitry operating and is completely normal. V2X Field Instruments should not make noise when charging.

Verifying Field Instrument LCD and Readings

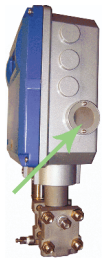
Verify the LCD (liquid crystal display) on the front of the Field Instrument by checking that readings are displayed and checking that the readings are reasonable.

➢ **To verify the Field Instrument LCD and readings:**

1 Lightly touch the magnet to the glass on the front cover of the Field Instrument, directly in front of the magnetic reed switch. The magnet is attached with wire strap to the Field Instrument.

V2X:

Press the button on the lower right side of the enclosure.



V2:

Lightly touch the magnet to the glass cover, directly in front of the magnetic switch. If the glass cover is off, hold up the magnet in front of the switch, but DO NOT touch switch or circuit boards with the magnet.

Magnet

When the Field Instrument display turns on, these initial eight messages display one after the other:

Displayed Message	Description
PI.SA PSIg	Static pressure. Measured in kPag or psig.
PDI.SA IWC	Differential pressure. Measured in IWC (inches of water column).
TFI.SA Deg F	Temperature Flow Indicator. Measured in degrees Fahrenheit or degrees Celsius.
KI.SA mcf/Day	Flow rate. Measured in thousands of cubic feet per day.
YV mcf/Day 01/11/24	Yesterday's Volume Yesterday's Date. Measured in thousands of cubic feet per day.
EI.SA Volts	Voltage of the Field Instrument's Battery. Measured in Volts.
(y/m/d) 01/11/25 12:32:55	The current date (today's date). Format: YY/MM/DD The current time. Format: HH:MM:SS
FiMODE 100009 OFFLINE	Field Instrument Mode and Serial Number
Contact: C1:x -> C2:x <-	Contact closure status, where x is the value (either 0 or 1) and the arrows indicate the exception/alarm.

NOTE V2 Field Instruments - If the LCD clock displays 1999 or 2000, the battery on the LCD board needs replacing. You will have to reset the time on the Field Instrument.

Chapter 2

Configuring the Field Instrument

Smart-Alek Communicator at a glance

To see the sidebar, you must first select a job (see “Associating a job with the Field Instrument” on page 16.) and connect to the instrument (see “Connecting to the Field Instrument with Smart-Alek Communicator v2” on page 16.).

The currently open job is displayed in the window title.

The **Mode** menu is for changing the Mode on the Field Instrument.

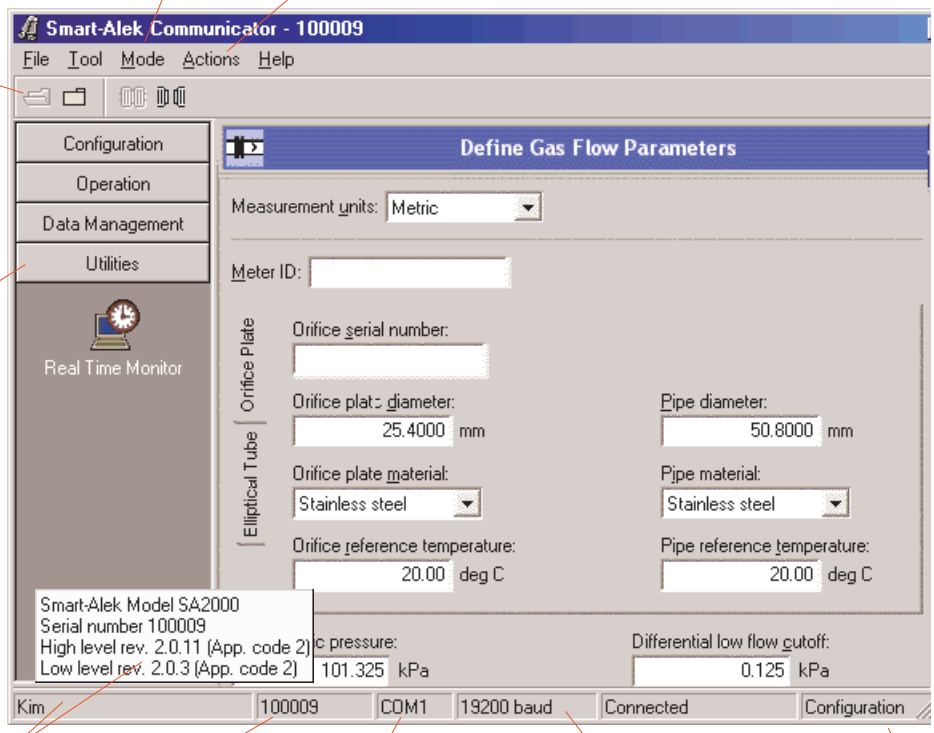
The **Actions** menu provides actions that are specific to the function you’re working on. When you select a different function from the sidebar, the Actions menu will display the appropriate options.

The **toolbar** is for:

- Opening a job.
- Closing a job.
- Connecting to a Field Instrument.
- Disconnecting from a Field Instrument.

The **sidebar menu** organizes tasks that you perform with the Field Instrument.

Click a sidebar button to display a list of functions for that area.



Move the mouse pointer over the **status bar** to see the Field Instrument’s model number, serial number & firmware version numbers (high level and low level)

Field Instrument ID

The **COM port** on your computer that is used to communicate with the Field Instrument.

The **connection speed** that your laptop is using to communicate with the Field Instrument

Shows the current **Operation Mode** of the Field Instrument:

- Offline
- Configuration
- Normal
- Firmware update

Connecting your computer to the Field Instrument

CAUTION: Static Sensitive Device(s).

Contains components susceptible to damage from Electrostatic Discharge. Handle only using static preventive processes.

CAUTION

Before you connect your laptop, make absolutely sure the Field Instrument is properly grounded (connected to the ground rod via the Solar Panel). If the Field Unit is not properly grounded, it can be damaged when you attach the cable.

CAUTION

Work can be performed only in an area known to be non-hazardous. That is, the site must first be declassified.

CAUTION

Connect the Antenna Cable and the RF/Power Extension Cable before you turn the Power Toggle Switch on the Modem Interface PCA (see next page) to ON, or you could damage the Field Instrument.

CAUTION

Do not run vehicle DC/AC power inverters to provide plug-in power to laptops when connected to a Field Instrument. Your computer will not be properly grounded and you could damage the Field Instrument. You may also have problems communicating properly with the Field Instrument.

CAUTION

Whenever you cycle power on the Field Instrument, make sure you wait until the LCD display shuts itself off before you turn the toggle switch to Off.

➢ **To connect the cable from the computer to the Field Instrument:**

1 Connect the RS-232 Communication Cable (serial cable) to the serial port (e.g., COM1) of your computer.

CAUTION

Connect the serial cable to your computer before you connect it to the Field Instrument. Ground the cable shell to an unpainted section of metal on the Field Instrument to “bleed off” static before connecting.

V2

2 Remove the back dome cover from the Field Instrument.

3 If it is not already, set the Power Toggle Switch on the Field Instrument to the ON position.

4 Replace the back dome cover.

5 Remove the front cover (glass dome cover) from the Field Instrument.

6 Connect serial cable to the DB9 connector on the front of the Field Instrument.

V2X

2 Open the front cover by removing the four corner screws.

3 Connect the serial cable to the DB9 connector on the bottom right of the Field Instrument main circuit board.

4 If it is not already, set the Power Toggle Switch on the Field Instrument to the ON position.

Establishing a software connection with the Field Instrument

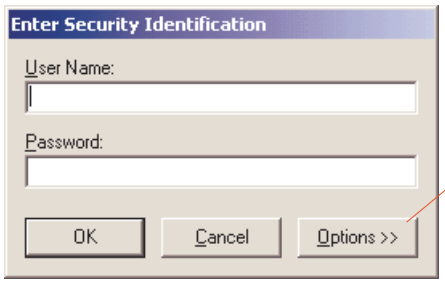
➢ **To launch the Smart-Alek Communicator v2 software and log in:**

1 Double-click the Smart-Alek Communicator 2 icon on your computer desktop.

2 If this is the first time starting the software, or you are a new user:

- Click **Options**, then click **Import Users**.
- In the Import Users window, navigate to your User Profile (.usr file), then select it and click Open.

3 In the Enter Security Identification window, enter your User Name and Password.



To add a user, click here. In the Import Users window, navigate to your User Profile (.usr file), then select it and click Open.

4 Click OK.

Adjusting the Communication Settings

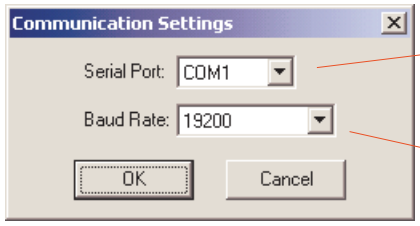
If necessary, you can change the communication port and baud rate settings used by your computer to communicate with the Field Instrument.

You cannot change your communication setting while you are communicating with the Field Instrument. If you're connected, click **Disconnect from tool** on the tool bar.

➢ **To change the communication settings:**

1 From the Tool menu, choose Settings.

You can view the changed communication settings in the Job Details section of the Select Job window.



Select the serial port on your computer that you want to connect to the Field Instrument with.

Select **19200** for the baud rate, unless directed otherwise by zed.i.

2 Select the serial port on your computer that you want to connect to the Field Instrument with.

3 Set the Baud Rate to 19200.

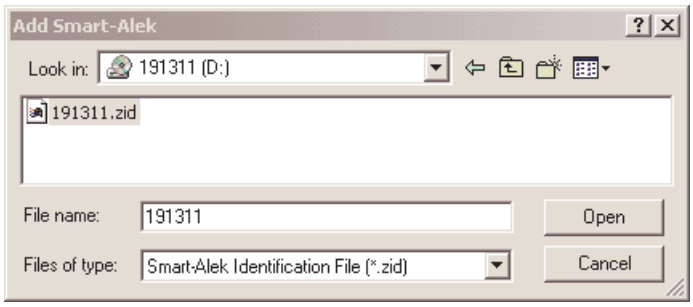
4 Click OK to save the changes.

Adding the Field Instrument to the software database

➢ **To add the Field Instrument:**

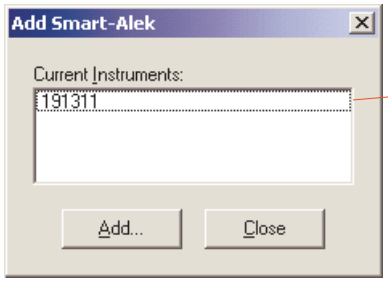
1 Insert the zed.i.solutions CD-ROM containing the Smart-Alek Identification File (.zid file) into the CD-ROM drive.

2 From the Instrument menu, choose Add Smart-Alek.



3 Browse to your CD-ROM drive, select the .zid file on the CD-ROM, then click Open.

The following window appears displaying the Smart-Alek Field Instrument serial number.



This is the serial number from the Field Instrument. This serial number must match the serial number that is in the filename of your .zid file.

4 Verify the serial number in the filename (e.g., 209999.ZID) matches the serial number on the Smart-Alek Field Instrument.

5 Click Close.

Associating a job with the Field Instrument

The next step is to create a job for this instrument, or select an existing job. A "Job" holds all the files for data collected at the well site with a Field Instrument, which Smart-Alek Communicator groups together.

➢ **To select a job or create a new job for this Field Instrument:**

1 From the File menu, choose Select job.

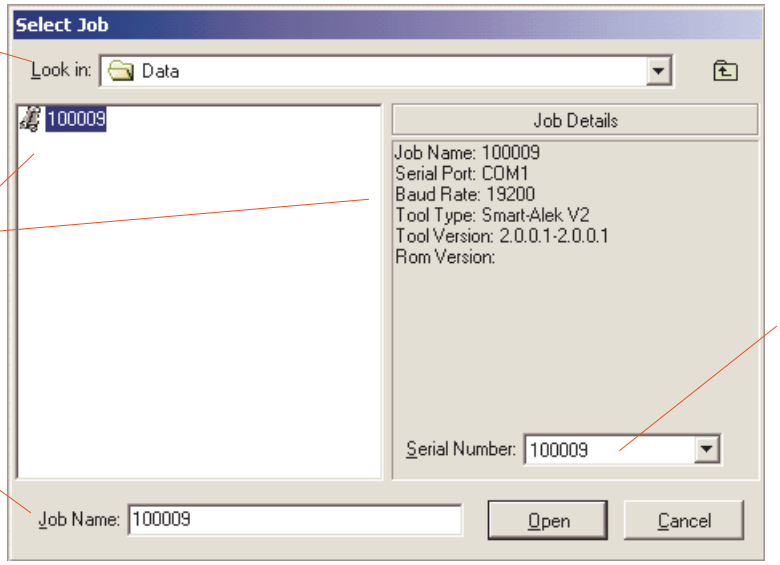
You can also click the Select a job button on the tool bar.

You must have Read/Write/Delete access to the designated folder for jobs.

Existing jobs are listed here. Click on a job to see the details for that job.

If you're creating a new job, type the new job name here **before** selecting a Serial Number.

Selecting a Serial Number overwrites this field.



If you're creating a new job, the serial number you select must match the serial number in filename of the .zid file.

You cannot select a different Serial Number for an existing job.

2 If you're selecting an existing job:

- Select the job by clicking it in the Job List.

The details for the selected job will be displayed in the Job Details area.

3 If you're creating a new job:

- First, enter a job name in the Job Name field. Use a job name you will be able to remember, such as the serial number and the site name. Once you assign a Field Instrument serial number to a job, the association is permanent. You cannot assign a new Field Instrument to an existing job. You can select the same Field Instrument for different new jobs, but there is one Field Instrument per job.
- Next, select the Field Instrument serial number from the Serial Number drop-down menu. The serial number must match the serial number in filename of the .zid file.

4 Click Open.

If you're creating a new job, you will be prompted to create the new job name. Click **OK**.

Connecting to the Field Instrument with Smart-Alek Communicator v2

Once you've selected or created a job, you're ready to start communicating with the Field Instrument.

To begin communicating with the Field Instrument:

Connect to Instrument

1 Click the Connect to Instrument button on the toolbar.

It takes approximately 45 seconds to connect. The LCD on the Field Instrument activates as the process begins.

When a connection is established, the navigation sidebar appears.

Disconnecting from the Field Instrument

CAUTION

If you need to disconnect the Antenna Cable or RF/Power Extension Cable, you must exit from Smart-Alek Communicator and turn off the Field Instrument power or you could damage the Field Instrument.

CAUTION

Wait until the LCD display shuts itself off before you turn the power toggle switch to Off.

➢ **To disconnect the Field Instrument:**

1 Choose an Operating Mode:

- To disconnect and leave this Field Instrument operating (communicating with the server), from the Mode menu, choose Normal.
- To disconnect and leave this Field Instrument offline (not communicating with the server), from the Mode menu, choose Offline.

2 Click Disconnect from tool

Your communication session with the Field Instrument is ended.

3 Click Close a job.

4 Wait until the LCD screen on the Field Instrument shuts itself Off, then turn the power toggle switch on the Field Instrument to Off.

5 Disconnect the serial cable from the front of the Field Instrument.

CAUTION

Disconnect the serial cable from the Field Instrument first.

Disconnect the serial cable from the laptop last.

6 Replace the front (glass dome) cover on the front of the Field Instrument.

7 Disconnect the serial cable from your laptop computer.

Putting the Field Instrument into Configuration Mode

Configuration mode allows you to configure how the Field Instrument collects and transmits data, as well as set the clock and sensor parameters.

Note: The Field Instrument will not power down while in Configuration Mode.

➢ **To select Configuration Mode:**

1 From the Mode menu select Configuration.

The status bar at the bottom of the screen displays Configuration.

Setting the Clock

CAUTION

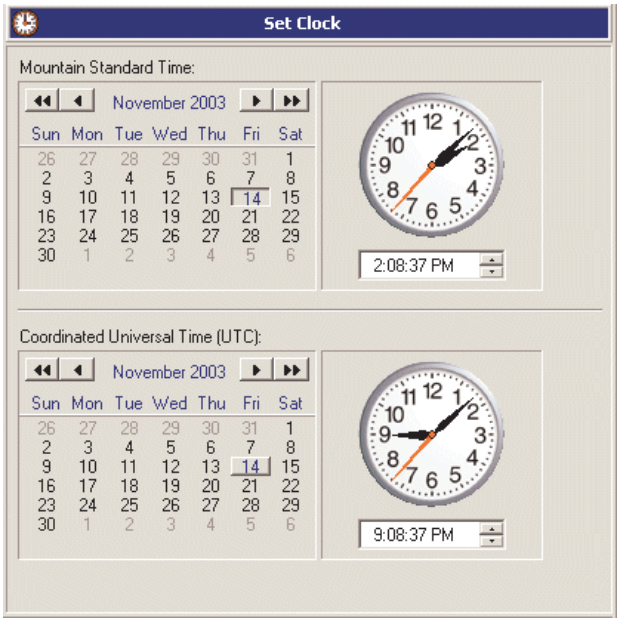
If the Field Instrument clock is wrong, data from the Field Instrument will either not be sent or will be shifted in time on the server.

Set Clock

➢ **To change the Field Instrument clock time and date:**

1 Open the Configuration sidebar, then click Set Clock.

The Field Instrument clock is not updated until you choose Write Time to Smart-Alek from the Actions menu.



The top clock shows the Local Time of the laptop computer, which is calculated by adjusting the UTC time for the time zone of your laptop.

The bottom clock shows UTC time (Coordinated Universal Time), which is the actual time zone used by the Field Instrument. The zed.i server uses UTC time for its calculations.

2 Do one of the following:

- To upload the current time on your computer to the Field Instrument, from the **Actions** menu, choose **Load time from computer**.
- To enter the local time manually (if your computer is incorrect), click the correct date on the calendar and adjust the time using the arrow keys.

3 From the Actions menu, choose Write Time to Smart-Alek.

Click **OK** when prompted that the operation is complete.

Initializing the modem

CAUTION

Make sure the antenna is properly connected first. The antenna must be connected before performing these steps, or the modem can be damaged.

The Field Instrument can use different types of modems for its communication channels: CDPD, Satellite, 1xRTT, and GPRS.

Initializing a 1xRTT Modem

1xRTT is a Digital Spread Spectrum cellular technology. 1xRTT is capable of using both direct and reflected (multipath) signals, which means 1xRTT takes advantage of omnidirectional antennas.

A 1xRTT modem uses a digitially-enhanced signal-to-noise ratio, which means that, generally, there is no linear degradation of signal. This generally means a steady signal level up to a typical limit of 37.5 km.

1xRTT can benefit from a mast, to raise the antenna above obstructions in order to establish line-of-sight between the modem and the tower.

1xRTT modems have a typical limit of 37.5 km to a tower. The signal "lock" may fail rapidly beyond this threshold, unless the distance limitation can be boosted at the tower.

NOTE

A general assessment of the site can be done based on the site's LSD. For example, the LSD may be good for communications (e.g., flat open land) or very challenging (foothills). Contact zed.i Client Service & Support for details. **The only sure way to gauge signal level is to perform an on-site pre-installation modem test.**

➢ **To initialize a 1xRTT modem**

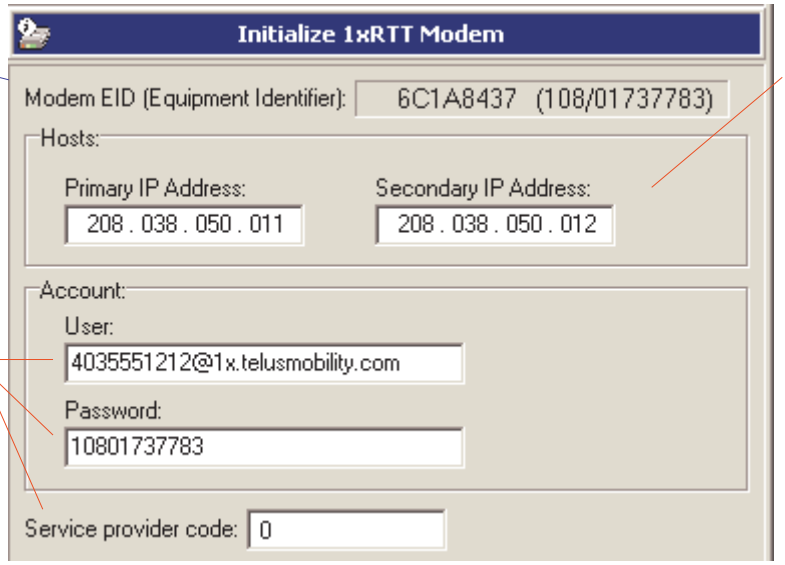
1 Open the Configuration sidebar, then click Initialize Modem.

A message appears prompting you to check the antenna. The antenna **must** be properly connected before continuing or the modem can be damaged.

2 Ensure the antenna is properly connected, then click OK.

The **Modem Equipment Identifier** is unique to that particular unit and must be recorded on field tickets. It was preset at the factory and identifies the modem card to the Telco.

Enter the **User**, **Password**, and **Service provider code** as they appear on your Field Service Report or Smart-Alek Information Form.



The **Primary IP address** and **Secondary IP Address** are the internet address of the Host Server. Enter them as they appear on your Field Service Report or Smart-Alek Information Form.

Note: Sample user account information only.

3 Enter the Primary IP Address and Secondary IP Address fields (nnn.nnn.nnn) as they appear on your Field Service Report or Smart-Alek Information Form (SAIF).

4 In the User field, enter the User ID as it appears on your Field Service Report or Smart-Alek Information Form (SAIF).

5 In the Password field, enter the password as it appears on your Field Service Report or Smart-Alek Information Form (SAIF).

6 In the Service provider code field, enter the Service Provider code as it appears on your Field Service Report or Smart-Alek Information Form (SAIF).

7 From the Actions menu, choose Update Modem Parameters.

Initializing a GPRS Modem

General Packet Radio System (GPRS) is a cellular technology on a GSM nextwork. GPRS is capable of using both direct and reflected (multipath) signals, which means GPRS takes advantage of omnidirectional antennas.

A GPRS modem uses a digitially-enhanced signal-to-noise ratio, which means that, generally, there is no linear degradation of signal. This generally means a steady signal level up to a typical limit of 25-30 km.

GPRS can benefit from a mast, to raise the antenna above obstructions in order to establish line-of-sight between the modem and the tower.

The GPRS modem has a typical limit of 25-30 km to a tower. The signal "lock" may fail rapidly beyond this threshold.

NOTE A general assessment of the site can be done based on the site's LSD. For example, the LSD may be good for communications (e.g., flat open land) or very challenging (foothills). Contact zed.i Client Services & Support for details. The only sure way to gauge signal level is to perform an on-site pre-installation modem test.

➢ **To initialize a GPRS modem**

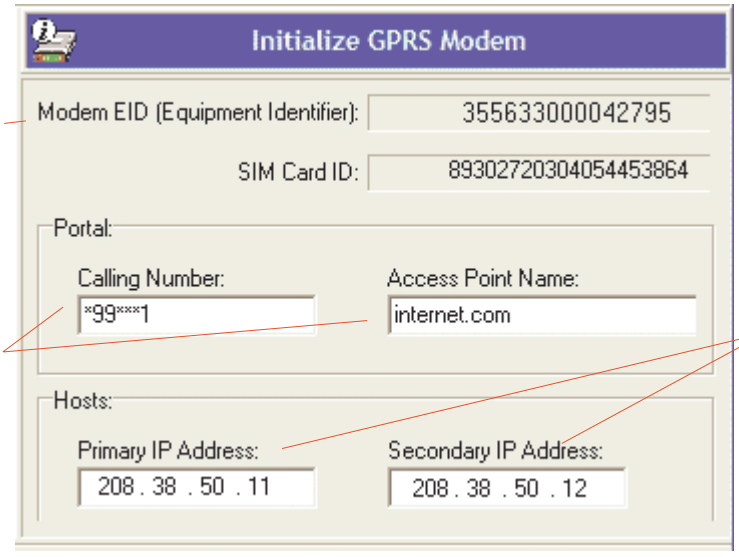
1 Open the Configuration sidebar, then click Initialize Modem.

A message appears prompting you to check the antenna. The antenna **must** be properly connected before continuing or the modem can be damaged.

2 Ensure the antenna is properly connected, then click OK.

The **Modem Equipment Identifier** and **SIM Card ID** are unique to that particular unit. It was preset at the factory and identifies the modem card to the Telco.

Enter the **Calling Number**, and **Access Point Name** as they appear on your Field Service Report or Smart-Alek Information Form.



The **Primary IP address** and **Secondary IP Address** are the internet address of the Host Server. Enter them as they appear on your Field Service Report or Smart-Alek Information Form.

3 Enter the Calling Number, and Access Point Name as they appear on your Field Service Report or Smart-Alek Information Form (SAIF).

4 Enter the Primary IP Address and Secondary IP Address fields (nnn.nnn.nnn) as they appear on your Field Service Report or Smart-Alek Information Form (SAIF).

5 In the Password field, enter the password as it appears on your Field Service Report or Smart-Alek Information Form (SAIF).

6 In the Service provider code field, enter the Service Provider code as it appears on your Field Service Report or Smart-Alek Information Form (SAIF).

7 From the Actions menu, choose Update Modem Parameters.

Initializing a CDPD Modem

➢ **To initialize a CDPD modem:**

1 Open the Configuration sidebar, then click Initialize Modem.

A message appears prompting you to check the antenna. The antenna **must** be properly connected before continuing or the modem can be damaged.

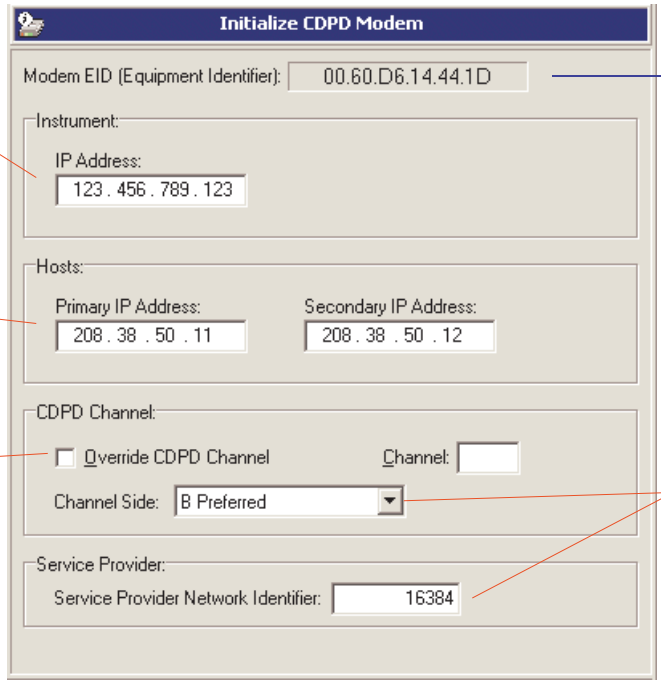
2 Ensure the antenna is properly connected, then click OK.

The **IP address** is unique to each Field Instrument.

It is provided to you with the Field Instrument.

Primary and **Secondary Host** addresses are the internet addresses for the server.

Do not check **Override CDPD Channel** unless directed to do so by zed.i.solutions.



The **Modem Equipment Identifier** is unique to that particular unit and must be recorded on field tickets. It was preset at the factory and identifies the modem card to the Telco.

Values are for Telus (Alberta and BC only). For other cell carriers or provinces, contact zed.i.solutions.

3 Confirm the modem parameters are entered as they appear on your Service Report or Smart-Alek Information Form (SAIF).

4 From the Actions menu, choose Update Modem Parameters.

NOTE

The Field Instrument must look for the right type of CDPD tower first. The Smart-Alek can be set to scan A-side ISP towers first, then B-side ISP towers, or vice-versa. This depends on the setting and the type of tower available. This step is crucial in setup because the Smart-Alek can “time out” before it finds an appropriate tower to lock onto.

This is set by the Service Department at Zedi when the modem was configured and tested. In Alberta, the system is set to option B (preferred) which sets the system to check the high frequency channels (i.e., the TELUS ones in Alberta) first, for a signal lock. If a signal lock does not occur, the system then checks the low frequency channels.

Initializing a Satellite Modem

Satellite units can be easily identified from cellular units as there is no RF antenna cable connector on the satellite Field Instrument. Satellite units use a remote modem box connected to the Field Instrument via a data cable.

NOTE There is a second battery and a power switch in the satellite modem box.

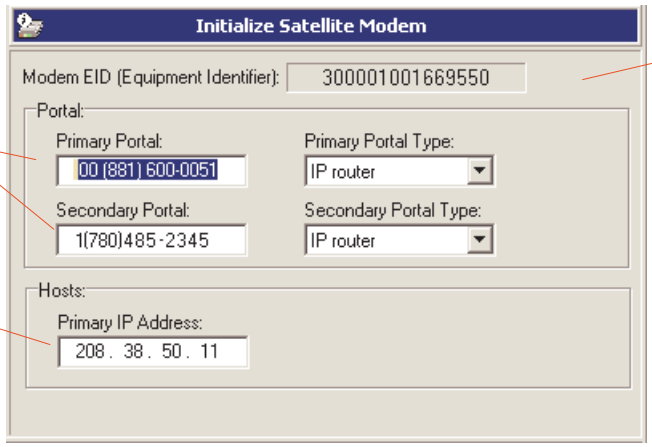
➢ **To initialize a satellite modem**

1 Open the Configuration sidebar, then click Initialize Modem.

A message appears prompting you to check the antenna. The antenna **must** be properly connected before continuing or the modem can be damaged.

2 Ensure the antenna is properly connected, then click OK.

These values must be formatted correctly, or you'll receive an invalid portal type error.



The **Modem Equipment Identifier** is unique to that particular unit and must be recorded on field tickets. It was preset at the factory and identifies the modem card to the Telco.

The Primary Host is assigned at the factory.

3 Select IP router from the Primary Portal Type drop-down menu.

4 In the Primary Portal field, enter 00(881)600-0051.

CAUTION

The Portal values must be formatted as nn(nnn)nnn-nnnn or you'll receive an invalid portal type error.

5 In the Secondary Portal Type field, select zed.i Gateway from the drop-down menu.

6 In the Secondary Portal field, enter 1(780)485-2345.

7 In the Host Primary IP Address field, enter 208.38.50.11.

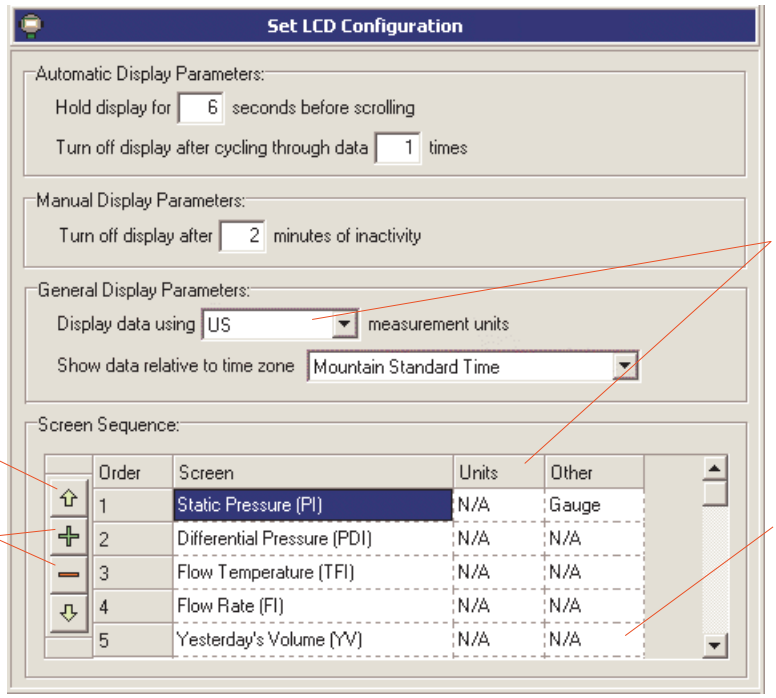
The above values are the same for new units, and should have been preset by the factory.

8 From the Actions menu, choose Update Modem Parameters.

Configuring the LCD Display

➢ **To configure the LCD display:**

1 Open the Configuration sidebar, then click Set LCD Configuration.



Sets the display order.

Add and delete display rows.

Do not delete the default screens.

Select Screen Defined to set individual units of measure for each parameter.

Added rows appear at the bottom. Click to set display type, units, and (if applicable) other information.

2 In the Set LCD Configuration window:

- In the Hold display for n seconds before scrolling field, enter 6, unless instructed otherwise on your Smart-Alek Information Form (SAIF) or Service Report.
- In the Turn off display after cycling through data n times field, enter 2, unless instructed otherwise on your Smart-Alek Information Form (SAIF) or Service Report.
- In the Turn off display after n minutes of inactivity field, enter 2, unless instructed otherwise on your Smart-Alek Information Form (SAIF) or Service Report.
- In the Display data using _____ measurements field, select the units of measure (US or metric) for all parameters in the display, or select Screen Defined to set individual units of measure for each parameter in the display.
- In the Show data relative to time zone field, select the time zone where Smart-Alek unit is located. This does not set the time zone in the Field Instrument; it is to compensate for local time offset from UTC so the LCD shows the local time where the Field Instrument is located.

NOTE The Field Instrument display does not automatically adjust for Daylight Savings Time. You must adjust the time zone to accommodate Daylight Savings by selecting the appropriate time zone to shift the clock forwards or backwards.

3 From the Actions menu, choose Update LCD Configuration.

Smart-Alek Communicator uploads the setting to the Field Instrument.

4 Click OK.

Customizing the display order

➢ **To change the order in which the LCD screens are displayed:**

1 In the Screen Sequence area, click the screen you want to move.

2 Click the arrows to move the screen to a different position.

3 Repeat as necessary until all screens are in the desired order.

4 From the Actions menu, choose Update LCD Configuration.

The change is uploaded to the Field Instrument. A pop-up window indicating the update was successful appears.

➢ **To add a new screen.**

1 Click Add (the plus sign).

A new row is added at the bottom of the Screen Sequence table

2 Click the new field, then select the LCD screen you want to add from the drop-down list.

3 Select the display units of measure from the Units drop-down list.

To change the units of measure for individual LCD screens, ensure you have selected Screen Defined in the General Display Parameters section.

The Other field contains further information specific to the screen you are displaying. The Static Pressure (PI) screen, for example, has the option of selecting Gauge or Atmospheric in the Other field. Not all screens use the Other field - those that don't will show N/A here.

4 From the Actions menu, choose Update LCD Configuration.

➢ **To delete a screen:**

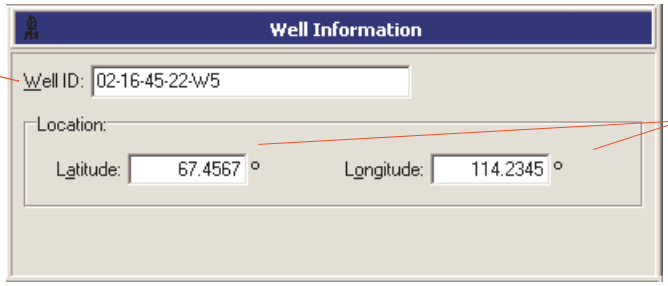
1 Select the LCD screen you want to delete, then click Delete (the minus sign).

Defining Well Information

➢ **To define well information:**

1 Open the Configuration sidebar, then click Define Well Information.

Enter the Legal Site Description in the **Well ID** field.



If coordinates are not available, leave these fields blank.

2 Enter the LSD (Legal Site Description) of the well in the Well ID field.

You can enter up to 30 characters.

3 Enter the Latitude and Longitude.

If the coodinates are not available, leave the Latitude and Longitude fields blank.

4 From the Actions menu, choose Update Location Parameters.

You'll be prompted when the operation is complete.

5 Click OK.

Testing Modems

Testing the modem ensures the modem is performing properly and the signal strength meets requirements.

The modem should be in Offline Mode to perform this procedure.

Testing a 1xRTT modem

CAUTION

Make sure the antenna is properly connected before performing these steps or the modem can be damaged.

➢ **To test a 1xRTT modem:**

1 Make sure the antenna is properly connected.

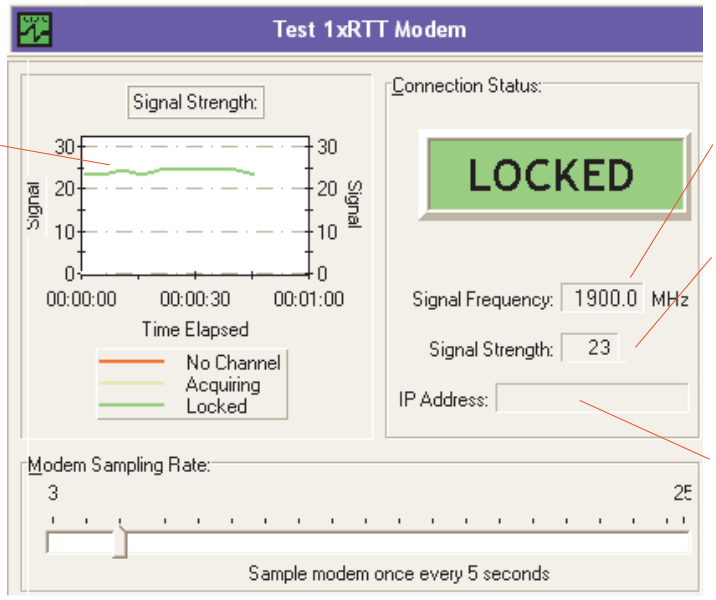
2 Make sure the modem is initialized with the correct parameters.

See “Initializing the modem” on page 18.

3 Open the Verification sidebar, then click Test Modem.

You will be prompted to check the antenna.

4 Ensure the antenna is properly connected, then click OK.



Locked (green) the modem is locked on a tower.

For reliable communications, ensure that the modem stays Locked for a period of **at least 120 seconds**.

No Channel (red) the modem is searching for a tower.

Edmonton, Calgary, and nearby areas show 1900.0 MHz.

Rural areas show 850.0 MHz.

Signal Strength values range from 0 (no signal) to 31. **The Signal Strength must be in the top 1/3 of the chart (i.e., 20 or higher)** for reliable transmission.

Dynamic IP address. (assigned by ISP) means you don’t have to enter a value.

The modem should Lock (green line) within approximately 45 seconds.

The Signal Strength must be in the top 1/3 of the chart (i.e., 20 or higher) to transmit reliably. Although the 1xRTT modem can function with a Signal Strength as low as 3, allowances must be made for changing conditions (e.g., snow, leaves) that could interfere with the signal.

Because the modem is capable of using both direct and reflected (multipath) signals, the Signal Strength may vary considerably over time. This is normal, but for reliable communications, ensure that the modem stays Locked for a period of **at least 120 seconds**.

If the unit does not register or display a signal, troubleshoot the antenna connections. You may have to elevate the antenna using a mast, or consider using a yagi-style antenna to focus the signal.

5 From the Actions menu, choose Stop Sampling once testing is complete.

Testing a GPRS modem

CAUTION

Make sure the antenna is properly connected before performing these steps or the modem can be damaged.

Testing the modem ensures the modem is performing properly and the signal strength meets requirements. The modem should be in Offline Mode to perform this procedure.

➢ **To test a GPRS modem:**

1 Make sure the antenna is properly connected.

2 Make sure you've initialized the modem.

See "Initializing a GPRS Modem" on page 20.

3 Open the Verification sidebar, then click Test Modem.

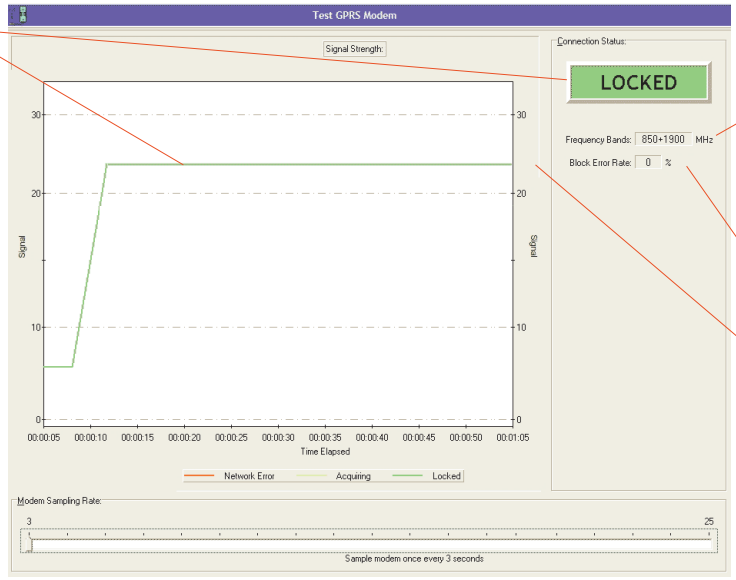
You will be prompted to check the antenna.

4 Ensure the antenna is properly connected, then click OK.

Locked (green) the modem is locked on a tower.

To pass the test, the modem must stay Locked for a period of at least 120 seconds.

Unknown (red) The modem is searching for a tower.



Edmonton, Calgary, and nearby areas will show 1900.0 MHz.

Rural areas will show 850.0 MHz.

Block Error Rate should be 0.

The Signal Strength must be in the top 1/3 of the chart (i.e., 20 or higher) for reliable transmission.

The modem should **Lock** (green line) within approximately 45 seconds. It should not typically take more than sixty seconds. The modem must remain Locked for 120 seconds to pass the test. If the modem status switches to Unknown (even briefly), the test has not passed.

A Signal Strength must be in the top 1/3 of the graph (i.e., 20 or higher) to transmit reliably.

Because the modem is capable of using both direct and reflected (multipath) signals, the Signal Strength may vary considerably over time. This is normal, but for reliable communications, ensure that the modem stays Locked for a period of **at least 120 seconds**.

If the unit does not register or display a signal, troubleshoot the antenna connections. You may have to elevate the antenna using a mast.

5 From the Actions menu, choose Stop Sampling once testing is complete.

Testing a CDPD modem

CAUTION

Make sure the antenna is properly connected first.
The antenna must be connected before performing these steps, or the modem can be damaged.

➢ **To test a CDPD modem:**

1 Make sure the antenna is properly connected.

2 Open the Verification sidebar, then click Test Modem.

You will be prompted to check the antenna. Make sure the antenna is properly connected, then click **OK**.

Scan (red)
the modem is scanning for a cellular tower.

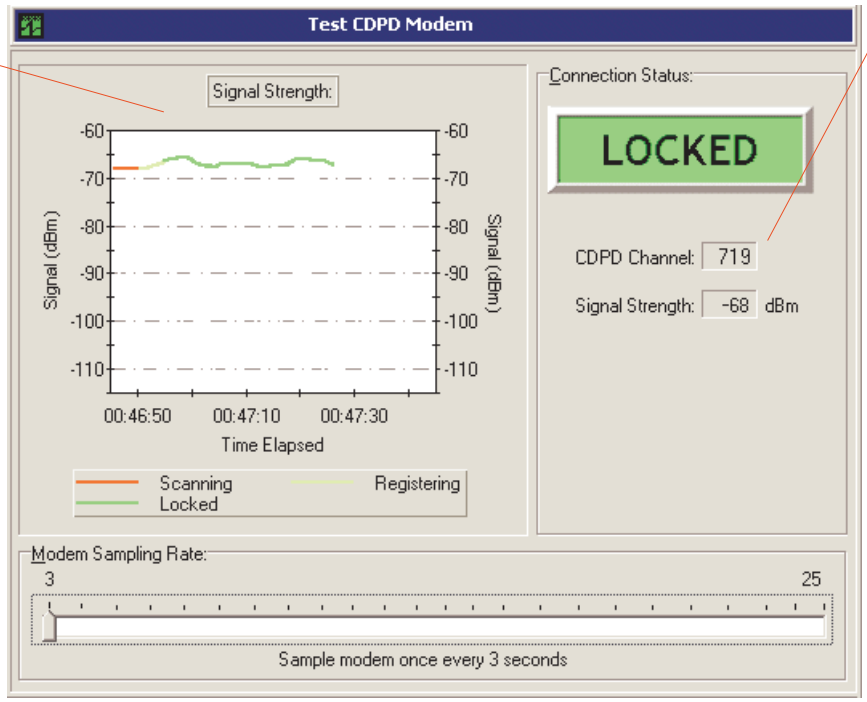
Register (yellow)
the modem has located a cellular tower within range and is resolving (registering) a CDPD channel.

Lock (green)
the modem has resolved (registered) a CDPD channel and is locked into that channel.

The **Channel** should stay consistent to show the modem is locked on this channel, and a confirmed connection to the server. If there is a lock on more than one channel, you will see the channel number jump back and forth (e.g., 719 <-> 650).

Signal Strength:

- -60 to -85 is ideal
- -85 to mid -90's check with zed.i whether to install a directional (yagi) antenna.
- mid -90's to -115 will require a directional (yagi) antenna. If an antenna is already set up, shut the modem off as quickly as possible using the power-down procedures on page 17, then check your antenna connections.



3 In the Test CDPD Modem window:

- Modem should Scan (red), Register (yellow), and Lock (green) within 15 seconds. The trend should be flat.
- Should stay locked over a period of one to two minutes.
- Signal level should be > –85dbm. -60dbm to –85dbm is ideal.
- Signal variance should be low, < 3 dBm is preferred.

- Low signal levels (-85dbm to -115dbm) will require a higher-gain directional “yagi-style” antenna and/or masts for higher-altitude mounting. Contact zed.i Field Services for specific application questions. You can work intermittently with the signal in the mid-nineties, but this is not recommended. If the signal is in the mid-nineties, contact zed.i Customer Service & Support to see if a different antenna configuration is required.
- A repetitive scan and register cycle with signal dropouts and no lock indicates the IP needs to be reset with Telus. Contact zedi Customer Service & Support.
- A signal level of –115 means no signal.
  - The antenna may not be connected. The modem can be damaged if the antenna is not connected. Power off the field instrument as quickly as possible, following the proper procedure. See “Disconnecting from the Field Instrument” on page 17.
  - Check continuity on coaxial cables.
  - Check the connection from the antenna to the bias tee to Field Instrument.

4 (Once testing is complete) From the Actions menu, choose Stop Sampling.

5 Write down tested signal level and tower channel number for calling in to zedi Client Services & Support.

Other Test Modem Options - signal quality audio feedback

Turning on modem sounds provides audio feedback on the signal quality. Turn this option on to help with antenna placement when you cannot see your laptop. You can then “tune” the yagi antenna by ear.

NOTE If you continually test the modem, you will deplete the battery.

➢ **To turn on modem sound:**

1 From the Actions menu, choose Play Sounds

You must have Microsoft DirectX 6.5 or higher installed to play sounds.

Testing a satellite modem

CAUTION

Make sure the antenna is properly connected before performing these steps or the modem can be damaged.

CAUTION

Satellite units require 3 successful modem tests and host tests.

➢ **To test a satellite modem:**

1 **Make sure the antenna is properly connected.**

2 Open the Verification sidebar, then click Test Modem.

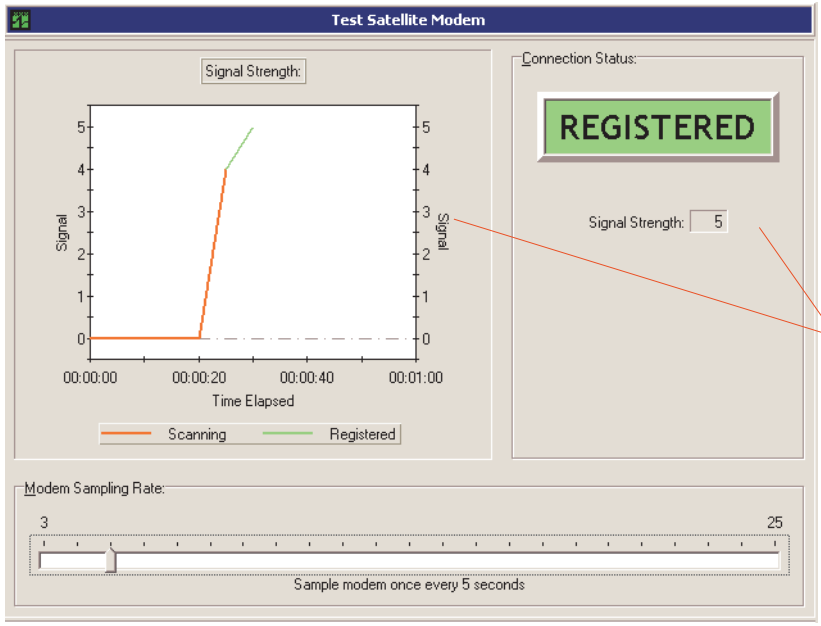
Test Modem

You will be prompted to check the antenna.

3 Ensure the antenna is properly connected, then click OK.

Scan (red) the modem is scanning for a satellite.

Lock (green) the modem is locked on the satellite.



A Signal Strength of at least 3 is required to transmit reliably.

The modem should Scan (red line), and Register (green line) within the three minute period unit is attempting to transmit. A Signal Strength of **3** is required to transmit reliably.

If the unit does not register or display a signal, there may be no satellites available on the horizon to communicate with. Retest in a few minutes.

4 Repeat the test in a few minutes.

Signals frequently move up from a value of 0, and begin spiking up and down as the satellites move into the horizon. This is also normal. As the angle improves, the signal should move up to 4 or 5 and be relatively steady for a few minutes then begin to drop off.

5 From the Actions menu, choose Stop Sampling once testing is complete.

Testing the Host Connection

CAUTION

Satellite units require 3 successful modem tests and host tests.

Testing the host connection ensures the Smart-Alek unit is communicating with Zedi' host server. The connection test should take about 30 seconds (with CDPD), and 30-60 seconds with 1xRTT or GPRS.

If any indicator is not green, the test has not passed.

If all turn green but the test takes more than 60 seconds, it could be an indication of poor signal level or signal quality.

➢ **To test the host connection:**

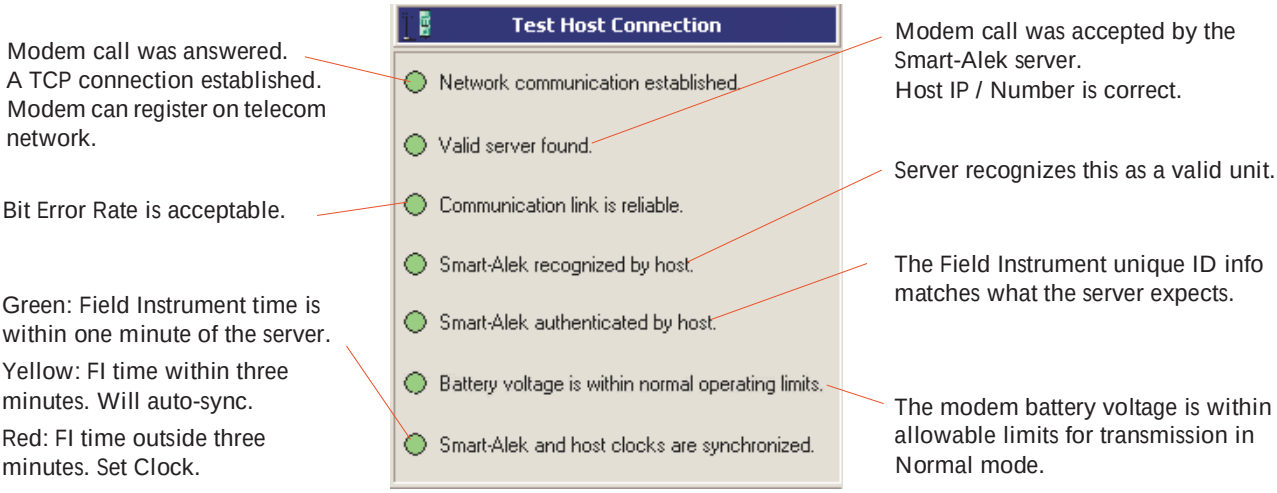
1 Wait 10 seconds after testing the modem.

CAUTION

The 10 second wait is important. The modem requires time to reset itself after initialization.

2 Open the Verification sidebar, then click Test Host Connection.

A message appears telling you the field instrument is attempting to connect with the host.



For CDPD modems, there is a general correlation between how long it takes to establish a connection and the operating performance of the modem. If the connection takes:

- 15 seconds to establish - excellent.
- 16 - 30 seconds to establish - good.
- 31 - 60 seconds to establish - acceptable.
- 60 - 120 seconds - not acceptable and indicates signal strength/quality issues. Improve the position of the antenna or call zed.i Client Services & Support.

3 Check the status of the Test Host Connection window.
If any of the lights is not green, the test has not passed.

Network communication established:

- Check physical RF connection.
- Ensure Modem settings are correct.
- Satellite units - ensure the power switch inside the modem enclosure is set to ON.

Valid server found:

- Ensure the Host IP address is correct in the Initialize Modem screen.
- This is also sometimes caused by a very poor communications connection.

Communication link is reliable:

- Check RF signal strength. Retest the connection. This error is related to the signal strength. If all indicators are green and a problem still seems to exist, it is likely due to poor signal quality. One example is when multi-pathed signals interfere with each other. If the Field Instrument has a CDPD modem, try using a directional antenna. See “General guidelines on antennas” on page 32.

Smart-Alek recognized by host:

- Retest connection (Step 1 of this procedure). If there are still errors after a couple of tries, contact Client Service & Support.

Smart-Alek authenticated by host:

- Disconnect the Smart-Alek Communicator.
- Turn the Field Instrument power toggle switch to OFF, then retest connection.

CAUTION

Whenever you cycle power on the Field Instrument, make sure you wait until the LCD display shuts itself off before you turn the power toggle switch to Off.

NOTE

After a Firmware update, retesting the connection ensures correct identification information is loaded into the Field Instrument flash memory.

- Retest a second time to allow the server to reload and/or refresh the data.

Battery voltage is within normal operating limits:

- The modem will not transmit data in Normal Mode until the modem battery is more fully charged. This means the modem will not attempt to transmit when you disconnect. The modem will attempt to transmit during the Test Host procedure. The Field Instrument will continue collecting and storing data. Ensure the solar panel is properly connected. You may need to replace the modem battery.

Smart-Alek and host clocks are synchronized:

- The clock on the field instrument must be within three minutes of the server time. If the clocks are out of sync, you may have to reset the time on the Field Instrument. See “Setting the Clock” on page 18.

General guidelines on antennas

The following are general guidelines only. Several factors (e.g., terrain, climate, vegetation) can affect signal level and signal quality. Only an onsite pre-installation modem test can confirm signal strength and quality for a particular antenna configuration.

Phantom-style antennas

The antenna that comes in the Smart-Alek box for cellular units is an omnidirectional antenna, capable of scanning 360^{o} for towers.

The “new white” antennas (that come with all new Field Instruments) are dual band (band#1 = 820MHz to 890Mhz, band #2=1850MHz to 1990MHz). The “old black” antennas are single band (820MHz to 890MHz). For 1xRTT, the 800 band is used in rural areas and the 1900 band is used only in Edmonton and Calgary. For Field Instruments installed in rural areas, the black single band will work fine and does not need to be swapped out. The white antenna also works with CDPD. The part # for the dual band antenna assembly (includes bracket) is 13168. The part # for antenna element is 13169.

Yagi-style antennas

Yagi-style antennas are directional. They must be “tuned” to a particular direction.

Generally, each element on a yagi-style antenna adds approximately 1 dbm of gain. For example, suppose your target is -85 dbm, and you’re reading -92 dbm. A 7-element yagi-style antenna would usually work. In this example, an 11-element antenna is good to about -96 dbm, and an 18-element antenna is good to about -103 dbm.

As you increase the number of elements on a yagi-style antenna, you also decrease the width of the antenna’s “target window.” For example, an 18-element yagi-style antenna only has about a 5^{o} to 10^{o} window. You have to sweep the antenna slowly and carefully for the target. Turn around 360^{o}. taking about a minute or two to find towers. It helps to turn on modem sounds so you can “tune” the antenna by ear. See “To turn on modem sound:” on page 28.

Elevating the antenna

Modems can benefit from a mast, to raise the antenna above obstructions in order to establish better line-of-sight to the tower.

If a mast is required for extending an omnidirectional antenna up above obstructions, the recommended cable is the LMR400.

Resetting a Modem Lock Out

Summary of Communications Attempt Algorithm (Normal Mode):

- The Field Instrument turns the modem on and attempts to dial in, up to 3 times within the session.
- If the dial ups are unsuccessful, due to network problems for example, the Field Instrument locks out any scheduled communication attempts for 1 hour to conserve battery power.
- The Field Instrument attempts communication at the first scheduled time that follows the one hour lockout period.
- The lockout is ignored by the Test Host Connection verification.

➢ **To reset a modem lockout:**

1 Open the Operation sidebar menu, then click Define Operation Parameters.

2 From the Actions menu, choose Reset Modem Lockout.

Chapter 3

Calibrating the Field Instrument and Setting Operation Parameters

Overview

The pressure sensor was factory-calibrated but you perform a single-point calibration as part of the Field Instrument installation to make sure the zero-scale offset pressure readings are as accurate as possible. Single point calibration adjusts the zero-scale offset for differential pressure and static pressure for possible differences in ambient conditions between the factory and installation site. It should not be performed at full-scale pressure, nor at the well static pressure. After physical installation, determine if static, or differential offset adjustments are required, then perform the required single-point calibrations.

Notes on calibration:

- You must be in **Configuration Mode** to perform calibrations. See “Putting the Field Instrument into Configuration Mode” on page 17.
- Field Instruments with a Fuji core have a crossover tube that **must** remain in place when you calibrate. Leave the crossover tube intact at all times.
- The Field Instrument must be permanently mounted and level before you calibrate.
- Field Instruments with Fuji cores should have zero lateral angle.
- If you move the Field Instrument after you’ve calibrated, the calibration is invalid. You **must** re-calibrate.
- When calibrating Field Instruments with Fuji cores, pay attention to which core is the high side and which core is the low side.
- Submit a calibration certificate with your field ticket.

A calibration sheet is available as a Microsoft Excel (.xls) file on the CD-ROM you received with your package. The .xls file is also available at www.smart-alek.com/service. When you open this file, enable Macros (if prompted). Some clients will require their own report format to be used.

Measured Error at a specific ambient temperature

Formula for Measured Error

$$\text{Measured Error} = \left(\frac{\text{As-is Pressure} - \text{Applied Pressure}}{\text{Maximum Sensor Range Pressure Rating}}\right) \times 100\% = \%\text{FS}$$

Example of Measured Error for Differential Pressure

$$\text{Measured Error for dP} = \left(\frac{\text{As-is Pressure} - \text{Applied Pressure}}{\text{Maximum Sensor Range Pressure Rating}}\right) \times 100\% = \%\text{FS}$$

$$\text{Measured Error for dP} = \left(\frac{493\ \text{IWC} - 490\ \text{IWC}}{500\ \text{IWC}}\right) \times 100\% = 0.6\%\text{FS}$$

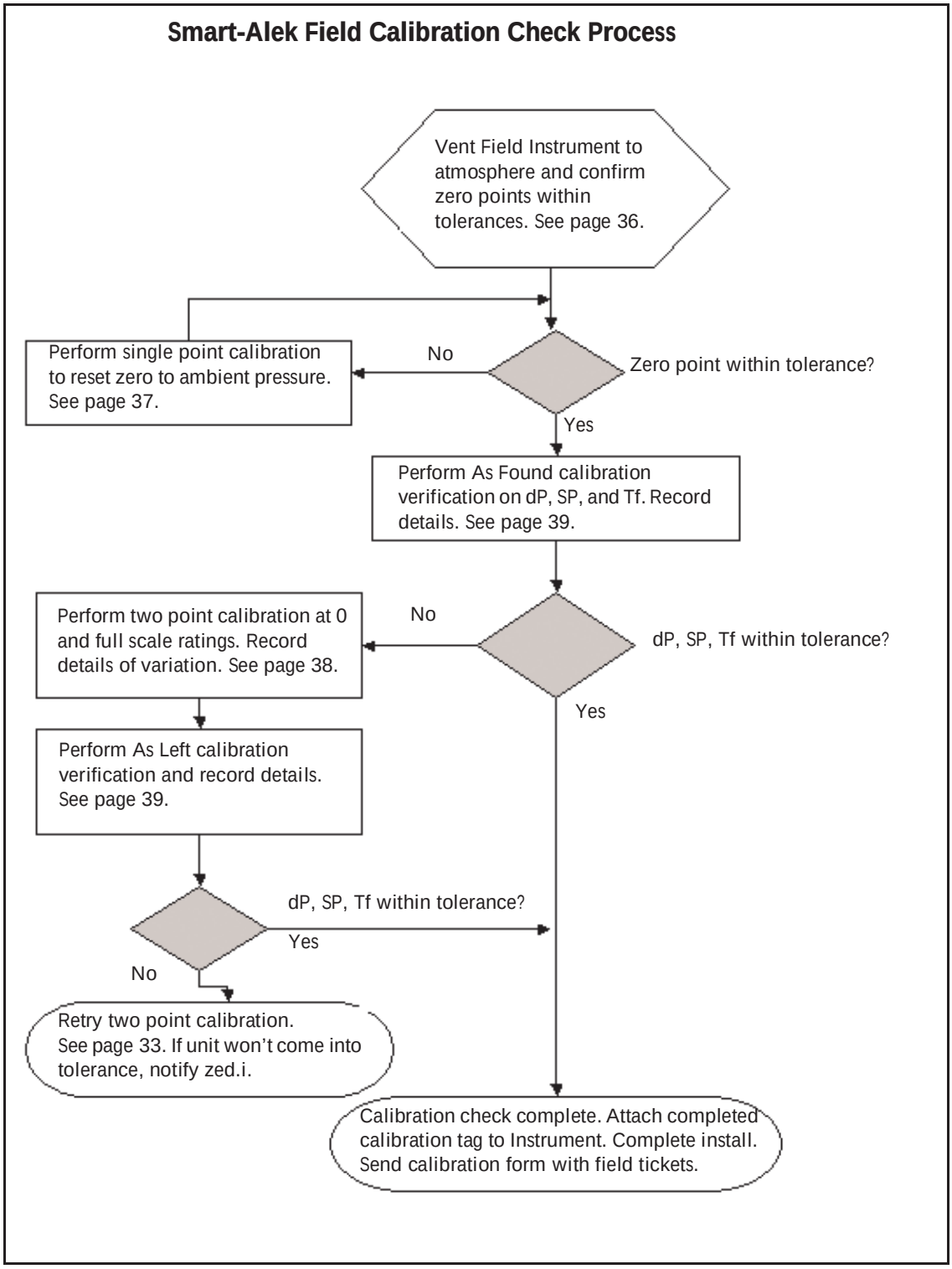
Example of Measured Error for Static Pressure

$$\text{Measured Error for SP} = \left(\frac{950\ \text{psi} - 947\text{psi}}{1000\ \text{psi}}\right) \times 100\% = 0.3\%\text{FS}$$

Comparison

If the “as-is” reading’s Actual Error, is **less than** the Allowable Error calculation, then **do not** perform the calibration unless otherwise instructed. (Some company practices will still require adjustments.)

If the “as-is” reading’s Actual Error is **greater than** the Allowable Error calculation, then perform the calibration adjustment.


Smart-Alek Field Calibration Check Process
Vent Field Instrument to atmosphere and confirm zero points within tolerances. See page 36.
Zero point within tolerance?
No
Perform single point calibration to reset zero to ambient pressure. See page 37.
Yes
Perform As Found calibration verification on dP, SP, and Tf. Record details. See page 39.
dP, SP, Tf within tolerance?
No
Perform two point calibration at 0 and full scale ratings. Record details of variation. See page 38.
Yes
Perform As Left calibration verification and record details. See page 39.
dP, SP, Tf within tolerance?
Yes
No
Retry two point calibration. See page 33. If unit won't come into tolerance, notify zed.i.
Calibration check complete. Attach completed calibration tag to Instrument. Complete install. Send calibration form with field tickets.

Verifying Zero Points

➢ **To verify Zero Points:**

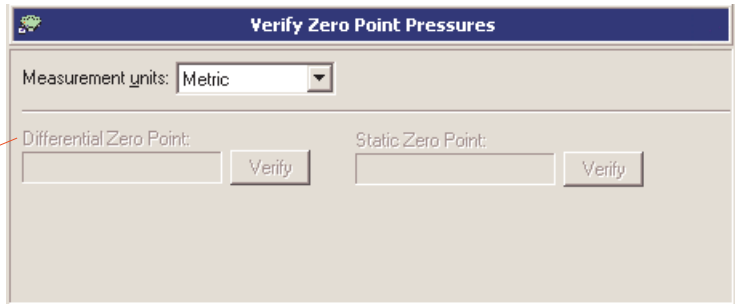
1 From the Mode menu, choose Configuration.

2 Zero out pressure to the Field Instrument.

Close the appropriate valves on the 5-valve manifold so the "zero" is the same on both HP and LP sides of the Smart-Alek's dual pressure sensor.

To ensure that a true zero reading adjustment can be set, open the appropriate valves to vent the HP and LP ports on the sensor so only ambient pressure is applied to the sensor.

3 Open the Calibration sidebar menu, then click Verify Zero Point Pressures.



Verify Differential first, Static second.

4 From the Actions menu, choose Start Verification.

Ensure the Field Instrument has been vented to zero on static and differential before proceeding.

5 Once the pressures are at zero, select Metric or US from the Measurement Units drop down menu.

6 Click Verify for Differential Zero Point.

A single reading will be taken and displayed.

7 Click Verify for Static Zero Point.

A single reading is taken and displayed.

8 From the Actions menu, choose Stop Verification.

9 Check to see whether the displayed readings are within the acceptable tolerance limit:

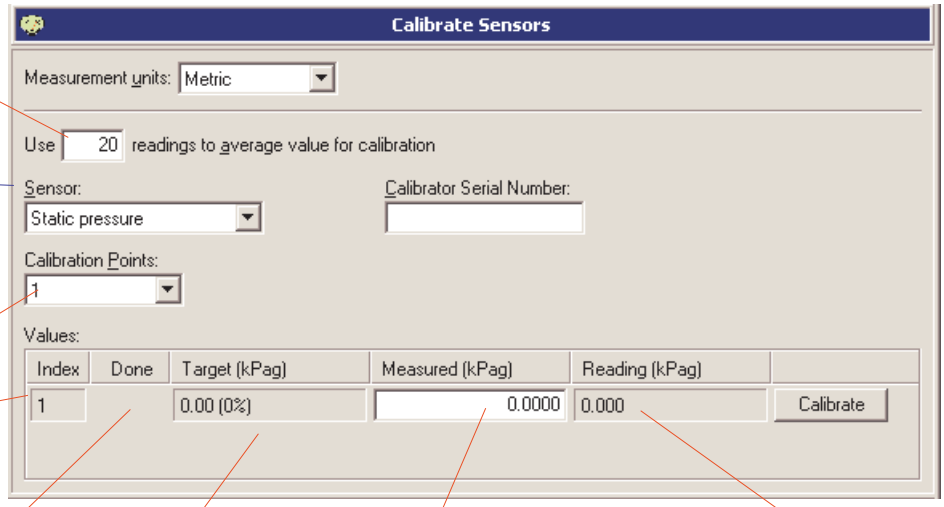
- Compare the applied pressure reading (0"WC) to 0.2% FS (Full Scale) for differential pressure.
- Compare the applied pressure reading (0 psi), to 0.2% FS (Full Scale) for static pressure.

If the difference for static and/or differential pressure is greater than, or equal to, 0.2%FS (e.g., 0.2% FS of 1450 psi FS = 2.9 psi) , calibration is required. Contact Zedi if calibration is required.

Single-point (zero-point) calibration

➢ **To perform a single-point (zero-point) calibration:**

1 Open the Calibration sidebar menu and click Calibrate Sensors.



Enter the number of readings that will be used for averaging. The default is 20.

If both sensors require calibration, do the differential pressure calibration first.

Select **1** for zero scale only calibration.

You should see one row here (Index #1) for zero scale calibration.

A checkmark will appear in the **Done** field when the calibration step has been completed.

The **Target** field shows the pressure or temperature value that should be applied to the field instrument.

The **Measured** field is where you enter the pressure or temperature displayed on your calibrator.

The **Reading** field displays the pressure or temperature value read by the Field Instrument.

2 Select Metric or US from the Measurement units drop-down menu.

3 From the Actions menu, choose Start Calibration.

4 Select Differential Pressure from the Sensor drop-down menu.

5 Enter the calibrator serial number if applicable.

6 Select 1 from the Calibration Points drop-down menu.

7 Ensure both sides of the core have been vented to atmosphere and the Measured value is set to 0.0000.

8 Click Calibrate.

The Smart-Alek takes the set number of pressure readings and displays the average value of these readings in the Reading field.

9 From the Actions menu, choose Apply Calibration to Smart-Alek.

You will be prompted when the operation is successful. Click **OK**.

10 Select Static pressure from the Sensor drop-down list.

11 Click Calibrate.

The Field Instrument runs through the specified number (e.g. 20) differential pressure readings and displays the average value of these readings in the Reading column. A check mark appears in the Done column.

12 From the Actions menu, choose Apply Calibration to Smart-Alek.

You will be prompted when the operation is successful. Click **OK**.

13 From the Actions menu, choose Stop Calibration.

14 Verify the calibration by completing the Verifying Zero Points procedure.

Multi-Point Calibration

➢ **To perform a two-point calibration:**

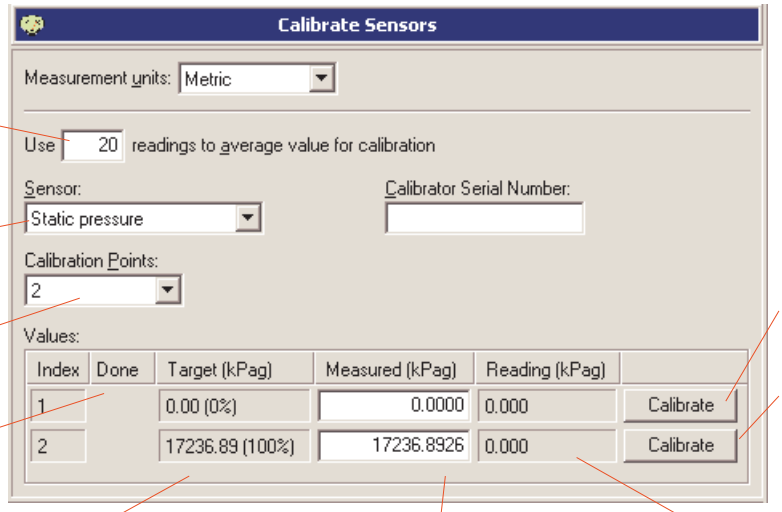
1 Open the Calibration sidebar menu, then click Calibrate Sensors.

Enter the number of readings that will be used for averaging. The default is 20.

If both pressure sensors require calibration, perform differential calibration first.

Select the number of **Calibration Points**.

A checkmark will appear in the **Done** field when the calibration all readings have been completed.



The first row (**Index #1**) is zero scale calibration.

The second row (**Index #2**) is full scale calibration.

The **Target** field shows the pressure or temperature that should be applied to the field instrument.

The **Measured** field is where you enter the pressure or temperature displayed on your calibrator.

The **Reading** field displays the pressure or temperature value read by the field instrument.

2 Select Metric or US from the Measurement units drop-down menu.

3 From the Actions menu, choose Start Calibration.

If both pressure sensors require calibration, perform differential first.

Once at least one calibration step is completed, you can't change the Sensor or Calibration Points fields until all of the calibration steps have been completed and applied to the field instrument

4 Select the pressure to be calibrated from the Sensor drop-down menu.

5 Enter the serial number in the Calibrator Serial Number field, if applicable.

6 Select 2 from the Calibration Points drop-down menu.

Two calibration entry rows are displayed in the Values table. One for zero scale and one for full scale.

7 Apply a 0.0% pressure target.

8 Enter 0.00 into the Measured field (first row).

9 Click Calibrate.

The Field Instrument runs through 20 readings and displays the averaged value of these readings in the Reading column. A check mark appears in the Done column.

10 Apply a full scale (100%) pressure target.

11 Enter the value from your calibrator into the Measured field (second row).

12 Click Calibrate.

The Smart-Alek runs through 20 readings and displays the averaged value of these readings in the Reading column. A check mark appears in the Done column.

13 From the Actions menu, choose Apply Calibration to Smart-Alek.

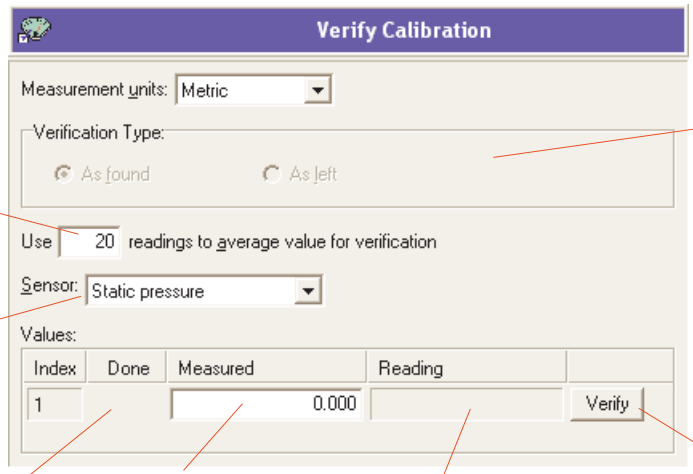
Verifying the Calibration

Method A - Verification with Smart-Alek Reporting

Method A is the preferred method. The Verify Calibration feature now provides multiple readings for calculating an average value for verification. The Verify Calibration feature also lets you generate automated reports on the calibration.

➢ **To verify the calibration:**

1 Open the Calibration menu sidebar, then click Verify Calibration.



Enter the number of readings that will be used for averaging. The default is 20.

Select the sensor to verify. If both pressure sensors require calibration, perform differential calibration first.

A checkmark will appear in the **Done** field when the calibration all readings have been completed.

The **Measured** field is where you enter the pressure or temperature displayed on your calibrator.

The **Reading** field displays the pressure or temperature value read by the field instrument.

Click **Verify** to begin taking readings.

Select **As found** for pre-calibration verification.

Select **As left** for post-calibration verification.

2 Select Metric or US from the Measurement units drop-down menu.

3 Select the Verification Type:

As found (for pre-calibration), or **As left** (for post-calibration).

4 From the Actions menu, choose Verify Calibration.

5 Select differential pressure from the Sensor drop-down menu.

6 Using a Digital Deadweight Tester, apply a 0% pressure target to the Smart-Alek Field Instrument.

7 Enter the value displayed on the calibration device in the Measured field.

8 Click Verify.

The Smart-Alek takes a reading and displays it in the Reading column. A check mark appears in the Done column and a new verification entry row is displayed.

9 Repeat steps 6 to 8 for the other required pressures.

The required pressures (e.g., 50%, 100%, 80%, 20%, and 0%) are listed in your Field Service Report, Smart-Alek Information Sheet (SAIF), or work order .

NOTE Some jurisdictions also require a verification point at the normal operating pressure as an additional requirement to API 21.1.

10 Select static pressure from the Sensor drop-down menu.

11 Repeat steps 6 through 9 for the static pressure verification.

12 Generate a calibration report. See “Retrieving Calibration Data” on page 56.

Method B - Verification Using the Real Time Monitor

You can also verify Field Instrument calibration using the real time monitor.

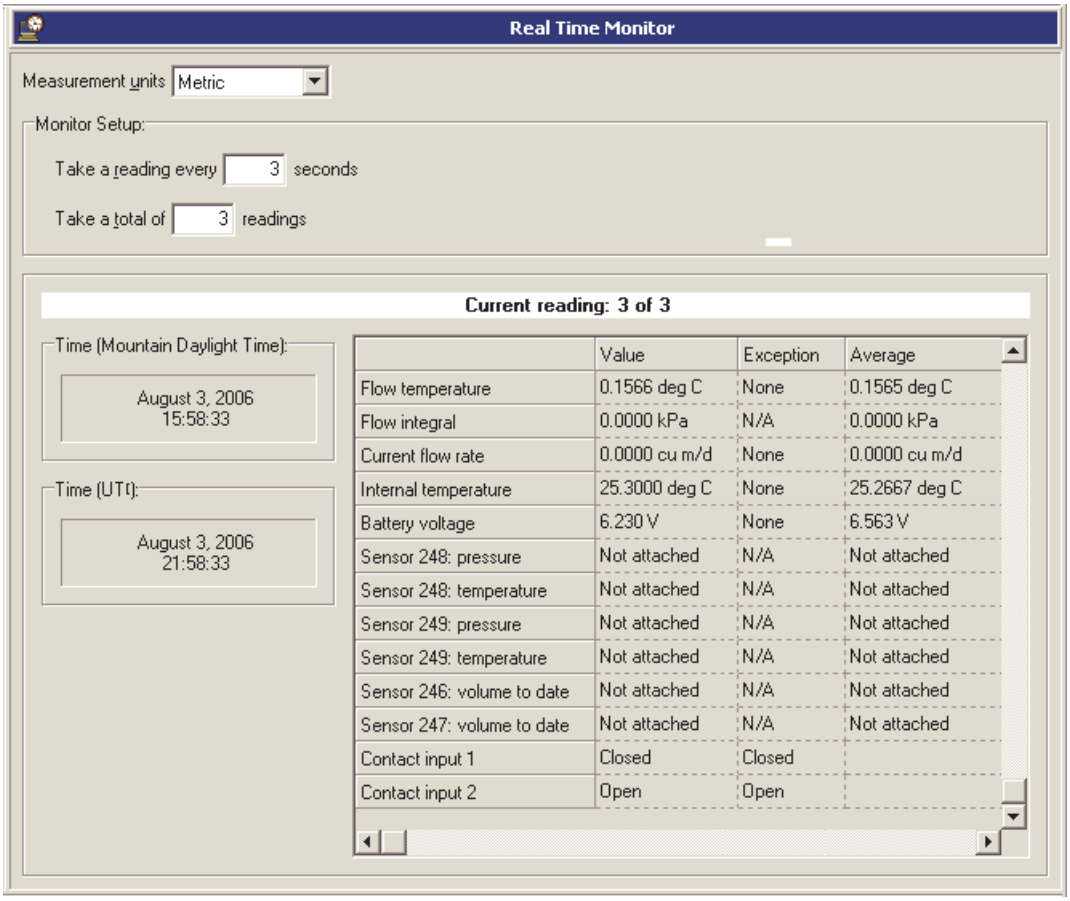
New readings are only taken from the Polartek when the Smart-Alek Field Instrument wakes up at its assigned time to transmit data back to the server, or when a laptop is connecting with the Smart-Alek Communicator software. The reading taken is then stored in a buffer until the new one is taken.

When testing temperature sensors and Informers with the Real Time Monitor, the same number is presented from the buffer continually until it is overwritten by cycling the high level processors. This may give a false indication of a remote accessory being functional or non-functional. The easiest way to test, is to do a soft disconnect with the software, and then reconnect to the tool forcing it to start up its high level processor again.

If you want to be able to generate calibration reports, do not use the Real Time Monitor. Instead, use the Calibrate Sensors method described in Method A (above).

➢ **To verify the calibration using the Real Time Monitor:**

1 Open the Utilities sidebar menu, then click Real Time Monitor.



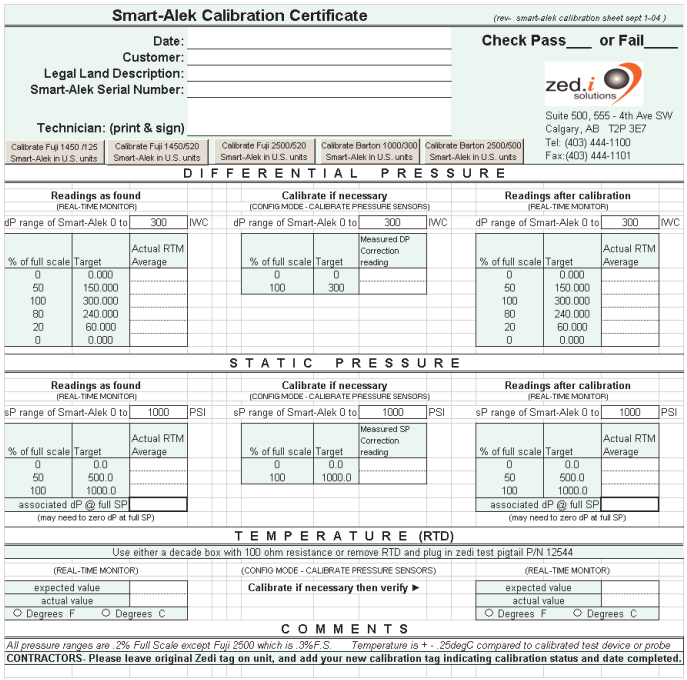
2 Select Metric or US from the Measurement units drop-down menu.

3 Vent both sides of the pressure core to atmosphere.

4 From the Actions menu, choose Start Readings.

The Field Instrument takes 10 readings 3 seconds apart and calculates the average.

5 Record the average readings on the Calibration Certificate.



Smart-Alek Calibration Certificate *(rev- smart-alek calibration sheet sept 1-04)*

Date: _____ Check Pass___ or Fail____
Customer: _____
Legal Land Description: _____
Smart-Alek Serial Number: _____
Technician: (print & sign) _____

zed.i solutions
Suite 500, 555 - 4th Ave SW
Calgary, AB T2P 3E7
Tel: (403) 444-1100
Fax: (403) 444-1101

Calibrate Fuji 1450 /125 Smart-Alek in U.S. units | Calibrate Fuji 1450/520 Smart-Alek in U.S. units | Calibrate Fuji 2500/520 Smart-Alek in U.S. units | Calibrate Barton 1000/300 Smart-Alek in U.S. units | Calibrate Barton 2500/500 Smart-Alek in U.S. units

DIFFERENTIAL PRESSURE

Readings as found (REAL-TIME MONITOR)			Calibrate if necessary (CONFIG MODE - CALIBRATE PRESSURE SENSORS)			Readings after calibration (REAL-TIME MONITOR)		
dP range of Smart-Alek 0 to 300 IWC			dP range of Smart-Alek 0 to 300 IWC			dP range of Smart-Alek 0 to 300 IWC		
% of full scale	Target	Actual RTM Average	% of full scale	Target	Measured DP Correction reading	% of full scale	Target	Actual RTM Average
0	0.000		0	0		0	0.000	
50	150.000		100	300		50	150.000	
100	300.000					100	300.000	
80	240.000					80	240.000	
20	60.000					20	60.000	
0	0.000					0	0.000	

STATIC PRESSURE

Readings as found (REAL-TIME MONITOR)			Calibrate if necessary (CONFIG MODE - CALIBRATE PRESSURE SENSORS)			Readings after calibration (REAL-TIME MONITOR)		
sP range of Smart-Alek 0 to 1000 PSI			sP range of Smart-Alek 0 to 1000 PSI			sP range of Smart-Alek 0 to 1000 PSI		
% of full scale	Target	Actual RTM Average	% of full scale	Target	Measured SP Correction reading	% of full scale	Target	Actual RTM Average
0	0.0		0	0.0		0	0.0	
50	500.0		100	1000.0		50	500.0	
100	1000.0					100	1000.0	
associated dP @ full SP						associated dP @ full SP		
(may need to zero dP at full SP)						(may need to zero dP at full SP)		

TEMPERATURE (RTD)

Use either a decade box with 100 ohm resistance or remove RTD and plug in zedi test pigtail P/N 12544

(REAL-TIME MONITOR)		(CONFIG MODE - CALIBRATE PRESSURE SENSORS)	(REAL-TIME MONITOR)	
expected value		Calibrate if necessary then verify ►	expected value	
actual value			actual value	
○ Degrees F ○ Degrees C			○ Degrees F ○ Degrees C	

COMMENTS

All pressure ranges are .2% Full Scale except Fuji 2500 which is .3%F.S. Temperature is + - .25degC compared to calibrated test device or probe

CONTRACTORS: Please leave original Zedi tag on unit, and add your new calibration tag indicating calibration status and date completed.

If you are calibrating using the Real Time Monitor, refer to your calibration certificate for this Field Instrument.

Some clients will require their own calibration report format to be used.

If you need a calibration sheet, you can download a zed.i certificate in Microsoft Excel (.xls) format from Smart-Alek.com/service. It also comes on the Service Master CD-ROM. When you open this file, enable Macros to use the unit selection buttons.

6 Repeat steps 6 to 8 to apply the other required pressures as indicated on the current version of the Calibration Certificate.

NOTE Some jurisdictions require a verification point at the normal operating pressure as an additional requirement to API 21.1.

Defining Gas Flow Parameters

Atmospheric Pressure and Differential Low Flow Cutoff

Atmospheric pressure is the average local absolute pressure for the site. It is dependent on elevation. 101.325 kPa is the standard value at sea-level. Typical non-sea level values are in the 90 kPa to 101 kPa (12 to 14.7 psi) range.

Atmospheric pressure and Differential Low Flow Cutoff are used in flow rate information that is transmitted to the server.

CAUTION

Barometric pressure given in a weather report is adjusted to a normalized sea-level value and is not the absolute value.

Obtaining Atmospheric Pressure

Atmospheric Pressure can be obtained either directly or by calculating it from the site elevation.

➢ **To calculate the Atmospheric Pressure:**

1 Obtain the elevation of the site.

You can obtain it from your Field Service Report or Smart-Alek Information Form (SAIF), or by contacting Zedi.

2 Open the Gas Flow sidebar menu, then click Define Gas Flow Parameters.

3 From the Actions menu, choose Calculate Atmospheric Pressure.

4 Enter the elevation you obtained from your GPS.

5 Click OK.

Obtaining Differential Low Flow Cutoff

Differential Low Flow Cutoff can be obtained from sources such as:

- SAIF or Field Service Report forms for new installations.
- Operator/Owner of the well.
- Zedi Client Services and Support.
- the default value is 0.125 kPa

Orifice and Pipe Information and Meter ID

This information is optional and is used if an initial flow rate approximation is required during the installation. Meter ID can be used to provide additional well information.

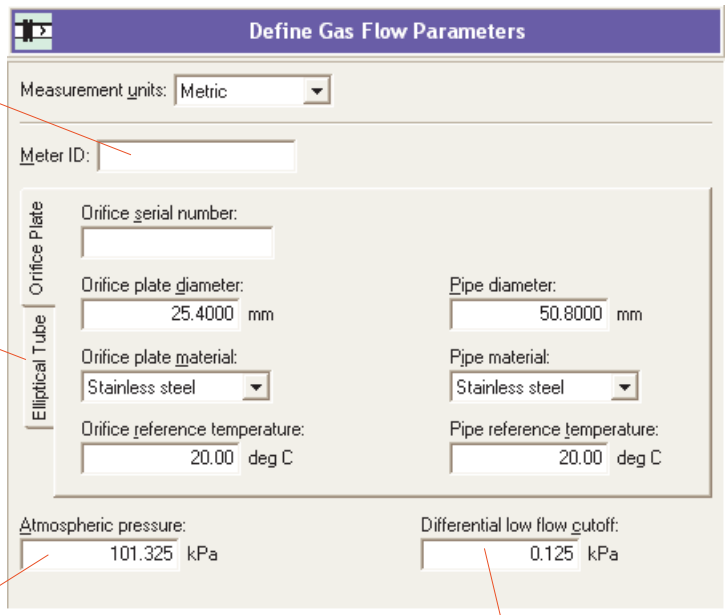

Define Gas Flow Parameters

➢ **To pre-set gas flow parameters or rates:**

1 Open the Gas Flow menu sidebar, then click Define Gas Flow Parameters.

Enter the Meter ID to provide additional well information on reports.

Click on the tab to enter flow parameters for E-Tube.



The optional orifice and pipe information are used if an initial flow rate approximation is desired during installation.

You must enter a value for **Atmospheric Pressure**. See "Obtaining Atmospheric Pressure" on page 41.

You must enter a value for **Differential Low Flow Cutoff**. The default is 0.125 kPa or 0.5 IWC. See "Obtaining Differential Low Flow Cutoff" on page 42.

2 Select Metric or US from the Measurement units drop-down menu.

3 Enter the Meter ID.

The Meter ID can be used to provide additional well information for reports.

4 If an initial flow rate approximation is desired during installation, enter the orifice and pipe information as shown on your Field Service Report or Smart-Alek Information Form.

If this installation uses e-tube instead of an orifice meter, click the Elliptical Tube tab and enter the Elliptical Tube information as shown on your Field Service Report or Smart-Alek Information Form.

5 Enter the Atmospheric pressure at the site.

Atmospheric Pressure can be calculated from the site elevation.

6 Enter a value in the Differential low flow cutoff field.

7 From the Actions menu, choose Update Gas Flow Parameters.

Initial Flow Rate Factor (IMV)

The flow rate equation can be broken into an Integral Value (IV) and an Integral Multiplier Value (IMV). The IV integrates the portion that best describes the condition of continuously changing flow (i.e., square root of SP x dP) while the Integral Multiplier Value (IMV) combines all other (more constant) parameters such as orifice plate diameter. The IMV is listed here as the Flow Rate Factor.

During normal operation the Smart-Alek will receive a Flow Rate Factor from the Server and will use it to calculate the local Flow Rate value that is displayed on the LCD. The first Flow Rate Factor will be sent after a couple of transmit cycles. However, upon installation that value has not been set. Therefore, if you need to confirm flow rate during installation, you will need to set an Initial Flow Rate Factor as follows.

Until the Smart-Alek receives a Flow Factor from the server, which will occur after a couple of transmission cycles, the flow rate on the LCD is incorrect.

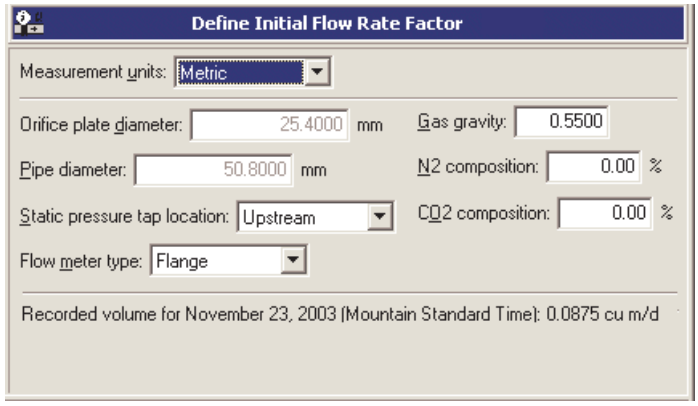
CAUTION

SP and dP must be positive and should be near normal operating values when you update the Flow Rate Factor.


Define Initial Flow Rate Factor

➢ **To define the initial flow rate factor:**

1 Open the Gas Flow sidebar menu, then click Define Initial Flow Rate Factor.



2 Enter the gas properties from the Field Service Report.

3 Ensure the Smart-Alek is under normal well static and differential pressure at this point.

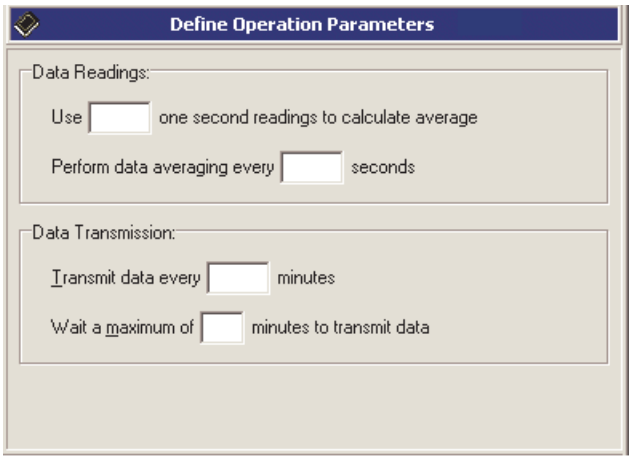
4 Click Actions menu and select Update IMV Value option.

Defining Operation Parameters

Define Operation Parameters

➢ **To define operation parameters:**

1 Open the Operation sidebar menu, then click Define Operation Parameters.



2 In the Define Operation Parameters window, enter the values for each field from the Field Service Report.

CAUTION

These settings are pre-determined in the sales / monitoring package. Unauthorized field changes may result in extra billing charges or return site visits to correct the error. These settings must be confirmed at the time of install with zed.i Client Services & Support

3 From the Actions menu, choose Update Operation Parameters.

Contract Hour Call-In

CAUTION

These settings are pre-determined in the sales / monitoring package. Unauthorized field changes may result in extra billing charges or return site visits to correct the error. These settings must be confirmed at the time of install with zed.i Client Services & Support

The Call-In method for the Smart-Alek changes from the original “interval” call in to structured Dial-In times. This allows dial-ins for Field Instruments with satellite modems to be more focused around normal business hour and reporting needs.

Four pre-configured schedules are programmed into the Smart-Alek firmware (High-level firmware version 2.1.2 or higher).

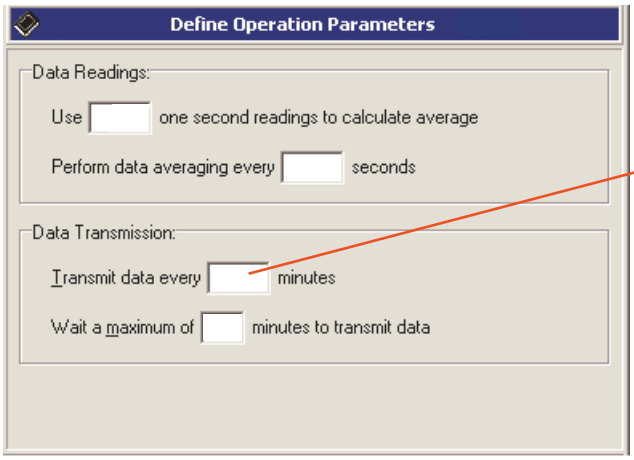
NOTE

Times are in Mountain Standard Time (MST).
Call-in times are not adjusted during Daylight savings time. They will be effectively offset by + one hour in the summer months.
The “Cry-out” function is not affected.


Define Operation Parameters

➢ **To set a preconfigured dial-in schedule:**

1 In Smart-Alek Communicator v2.05 or higher, Open the Operation sidebar menu, then click Define Operation Parameters.



Option A (**2996**) 2 calls after first power-up after 6:00am and then again after 8:00am.

Option B (**2997**) 3 calls = A plus call after first power-up after 3:00pm.

Option C: (**2998**) 4 calls = B plus call after first power-up after 11:00am.

Option D: (**2999**) 6 calls = C plus calls after first power-up after 8:00pm and 1:00am

2 In the Transmit data every __ minutes field, enter a schedule code:

Transmit data every	Thresholds after which to dial-in, MST (UTC-7)
2996 min	06:00, 08:00
2997 min	06:00, 08:00, 15:00
2998 min	06:00, 08:00, 15:00, 11:00
2999 min	06:00, 08:00, 15:00, 11:00, 20:00, 01:00

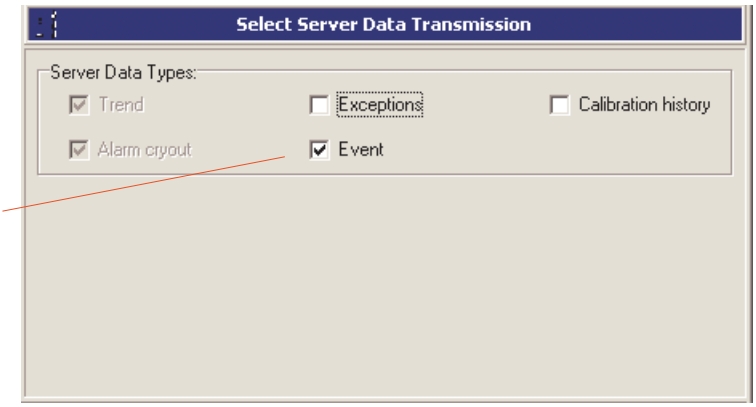
3 From the Actions menu, choose Update Operation Parameters.

To prevent unnecessary loading immediately after the top of any hour, a 'dither function' is used. The Field Instrument calls **within 1 hour** of requested time (max).

Selecting the data types that the Field Instrument will transmit back to the server

➢ **To select server data transmission:**

1 Open the Operations sidebar menu, then click Select Server Data Transmission



Event should be the **only** checkbox that is selected, unless instructed otherwise by Zedi

2 Ensure that only the Event checkbox is selected.

CAUTION

Ensure that the Exceptions and Calibration history checkboxes are NOT checked (unless instructed otherwise by Zedi).

3 From the Actions menu, choose Update Transmission Selections.

Starting Normal Operation and completing the configuration

➢ **To complete the Field Instrument Configuration:**

1 Ensure the antenna is connected.

2 Open the Operation sidebar menu, then click Start Operation.

Normal appears in the status bar at the bottom of the window.

3 Click Disconnect from instrument in the toolbar.

4 Remove the serial cable from the field instrument and reinstall the front cover.

5 Swipe the magnet past the window and observe the LCD display.

6 Verify the LCD is operating and confirm the instrument is in Normal mode. Also ensure the date and time on the LCD display are correct.

7 From the File menu, choose Close Job.

8 Close the Smart-Alek Communicator software.

➢ **When you've completed the configuration:**

1 Provide the following information to zedi solutions Client Services & Support:

- Client name
- LSD
- Serial number of Smart-Alek and PolarTek Flow Totalizer (if installed) and sensors (if installed)
- Pressure range of the Smart-Alek and the sensors (if installed)
- Operation Parameters (usually hourly but occasionally minute data or other)
- IP Address you entered into the Smart-Alek (from the IP Instruction Sheet that comes in the Smart-Alek box).

To contact Client Services & Support, call (403) 444-1100
(Monday – Friday, 8:00am to 5:00pm Mountain Time).

2 Attach a completed calibration tag to the Field Instrument.

If the Field Instrument was calibrated, forward a completed calibration certificate to Zedi

Chapter 4

Other Functions

Changing Orifice Plate Parameters

If you change the orifice plate, you will need to re-define the orifice plate parameters so the IMV used to display the flow rate on the LCD will be based on the new orifice plate size.

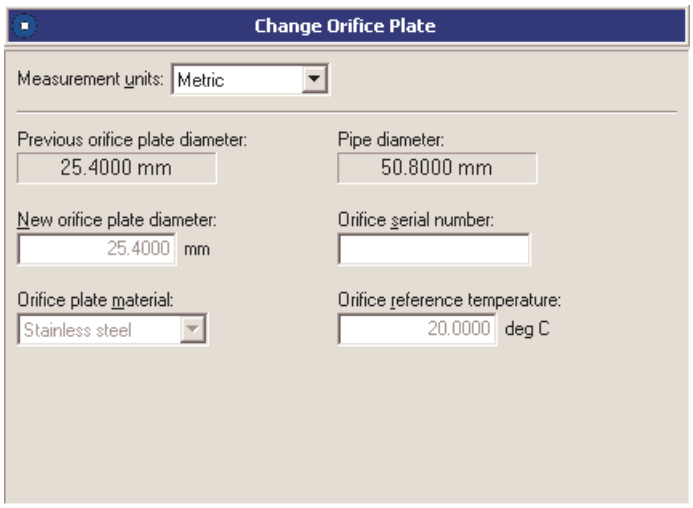
The values entered at this screen are not sent to the server; they are used only used to calculate the Flow Rate for the local display on the Field Instrument, which is used until the Field Instrument gets an updated IMV from the server.

➢ **To change orifice plate parameters:**


Change Orifice Plate

3 From the Mode menu, choose Offline.

4 Open the Gas Flow sidebar, then click Change Orifice Plate.



5 Enter the new orifice plate diameter, orifice plate material, and orifice serial number.

6 From the Actions menu, choose Update Orifice Plate.

7 Click OK.

Cryout Alarms and Exceptions

CAUTION

Ensure the unit being installed is programmed as required. The Alarms and Exceptions options should be confirmed with Zedi during any service calls that may require a unit to be replaced.

In addition to alarms set on the Server, the Smart-Alek Field Instrument can also be programmed to detect and report alarm conditions.

Alarm parameters can include:

- static pressure
- differential pressure
- flow rate
- flow temperature
- internal temperature
- voltage
- contact closure 1
- contact closure 2

Cryout Alarms and Exceptions are not the same thing.

Exceptions occur when a “high” or “low” trip point is exceeded for a specific length of time (set in the Trip Point Exceeded For field). Exceptions do not trigger Cryout alarms. Instead, the Field Instrument logs the Exception for later analysis.

Cryout Alarms cause the Field Instrument to “wake up” and initiate a call home to the zed.i server at the next scheduled averaging period (less than or equal to 1-hour intervals). Cryout Alarms occur when a “high-high” or “low-low” trip point is exceeded for a specific length of time (set in the Trip Point Exceeded For field).

Once a Cryout alarm has been sent, the Field Instrument does not call out again with a repeat alarm unless the well parameter has returned towards its normal operating range past an assigned reset level (Hysterisis). An alarm Cryout can be initiated again if, after a reset, the well parameter again exceeds the trip point for the required amount of time.

Define Alarms and Exceptions

➢ **To set up alarms and exceptions:**

1 From the Mode menu, select Configuration.

2 Open the Operation sidebar and click Define Alarms and Exceptions.

Alarms trigger the Cryout function, if the High-high or Low-low alarm trip point is exceeded for the length of time specified.

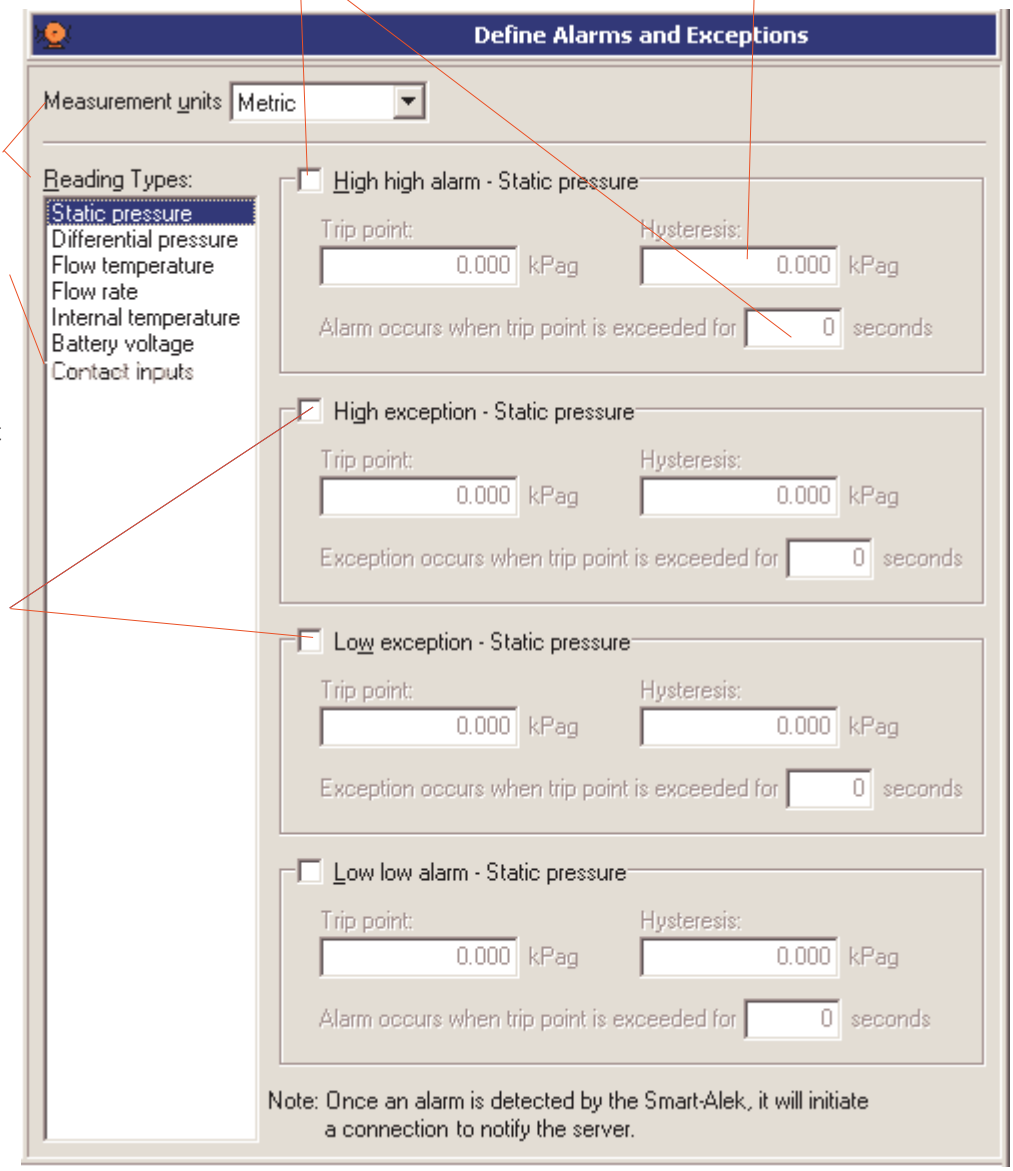
The **Hysteresis** is like a reset gap

Select the **type** of reading that you want to monitor for Exceptions and Cryout Alarms, then select the **measurement units** for that type.

Contact closure setpoints set the amount of time a contact has to be in an alarm trigger state (on or off, depending on the configuration) before an alarm will be triggered. Contact closure setpoints don't use a hysteresis.

Exceptions are recorded by the Field Instrument for later analysis, but do not trigger a Cryout call.

The Alarms and Exceptions options should be confirmed with Zedi if a unit is being replaced.



3 Select the parameter to be monitored from the Reading Types list.

For each parameter:

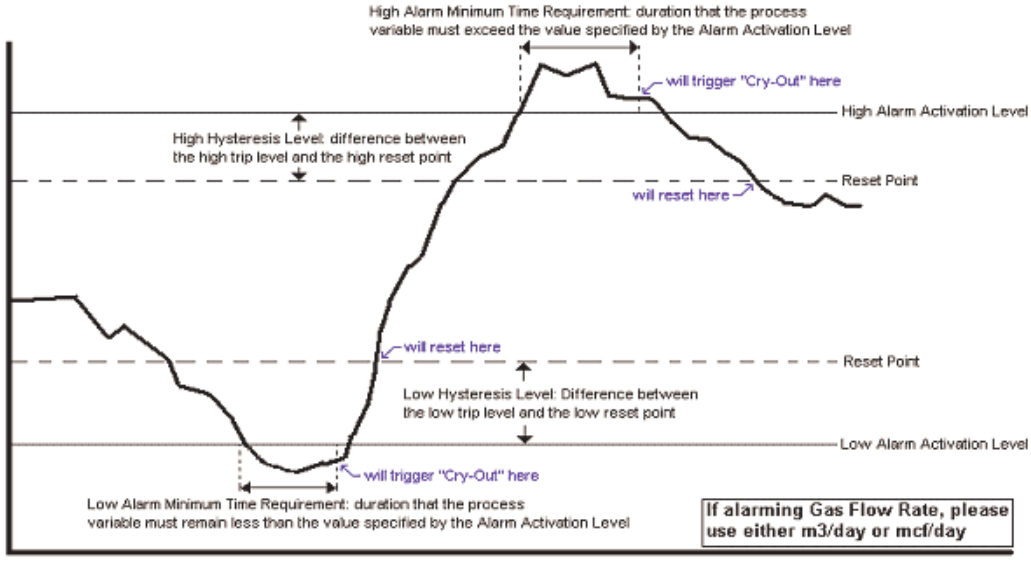
4 Select the appropriate (e.g., US or Metric) units from the Measurement Units drop-down menu.

5 Select which Exceptions and Alarms the Field Instrument should monitor.

6 For each Exception and/or Alarm you select:

- **Trip Point** - enter the threshold that triggers the Alarm or Exception.

- **Hysteresis** - enter the "reset gap" between the Alarm or Exception trip point and the reset point that is used to trigger a second Alarm or Exception.

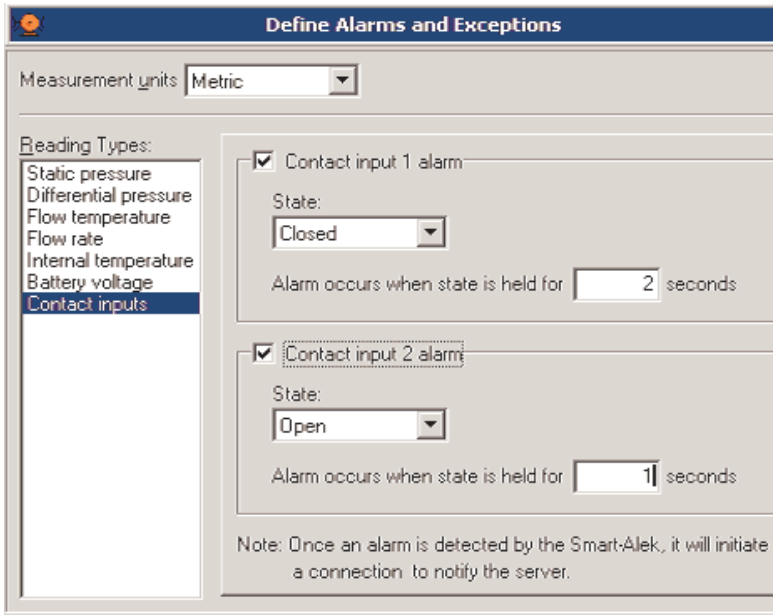


Please look at past trend data before selecting alarm levels

For Cryout alarms, the following information is needed
1) What parameter is being alarmed
2) High Trip Level
3) High Hysteresis Level
4) High Alarm Minimum Time Requirement
5) Low Trip Level
6) Low Hysteresis Level
7) Low Alarm Minimum Time Requirement

Example to explain Hysteresis:
If the Low Alarm Activation Level for Differential Pressure is 10" WC and the desired reset point is 15" WC, the Hysteresis is 5" WC; it is the amount of change towards the "normal" range required before the "Cry-Out" alarm function is reset.

- **Alarm/Exception occurs when trip point is exceeded by** - enter the number of seconds that the Alarm or Exception threshold must be exceeded before an Alarm or Exception event is triggered.



Contact closure setpoints set the amount of time a contact has to be in an alarm trigger state (on or off) depending on the configuration) before an alarm will be triggered. Contact closure setpoints don't use a hysteresis. Enter the values from your Smart-Alek Information Form (SAIF) or Work Order.

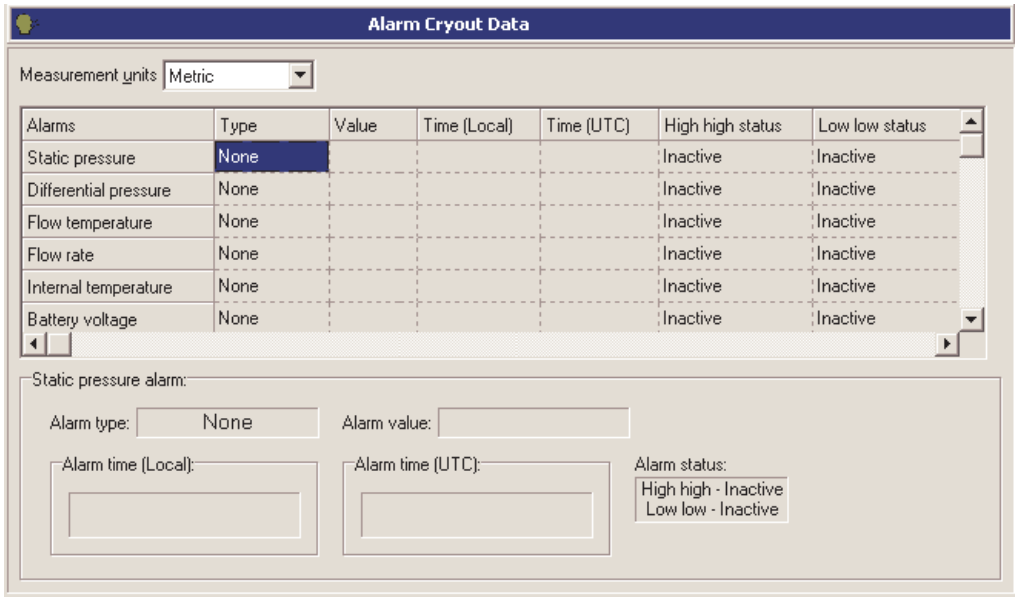
7 From the Actions menu, choose Update Alarm Configuration.

CAUTION

Flow Rate Alarms and Exceptions - On new installs, the IMV flow factor (see page 43) will need to be set so that the initial flow calculations are not likely to trigger an alarm.

➢ **To view current alarms:**

1 Open the Utilities sidebar, then click View Alarm Cryout Values.



Changing Your Password

Periodically, you should change your password. Use a password with both characters and numbers.

CAUTION

Please contact Zedi if you need to add users. Adding new users yourself does not provide those users with your security level. They may be locked out of important functionality.

➢ **To change your password:**

1 From the File menu, choose Change Password.

The Change Password window opens.

2 Type in your new password, then retype your password to confirm.

3 Click OK.

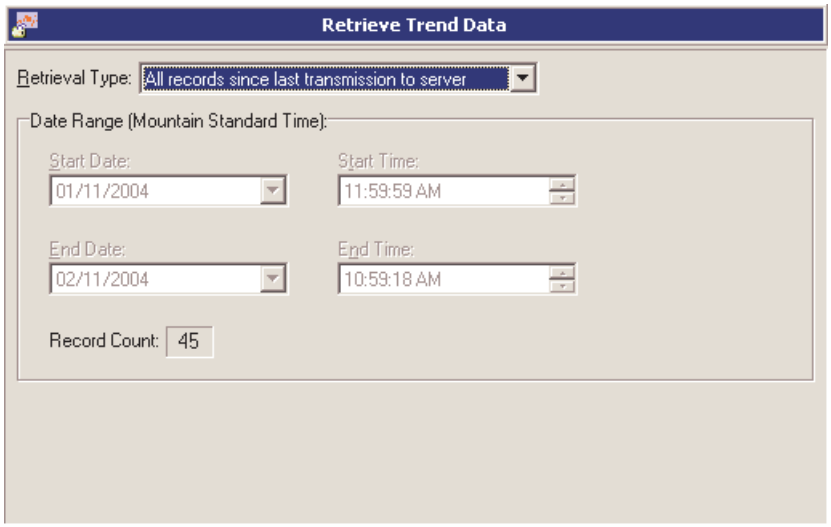
Retrieving data from the Field Instrument

Retrieving Trend Data

➢ **To retrieve trend data from the instrument:**


Retrieve Trend Data

1 Open the Data Management sidebar and click Retrieve Trend Data.

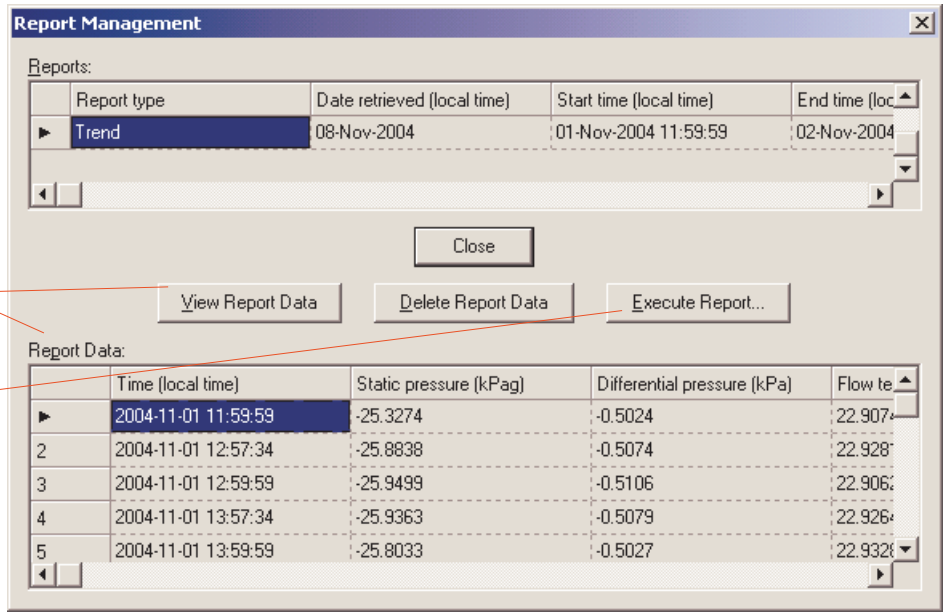


2 Select the Retrieval Type from the drop-down list. The default is All records since last transmission to server.

3 From the Action menu, choose Retrieve Trend Data.

4 From the File menu, choose Reports.

Retrieved trend data records are listed here, in the order they were retrieved.



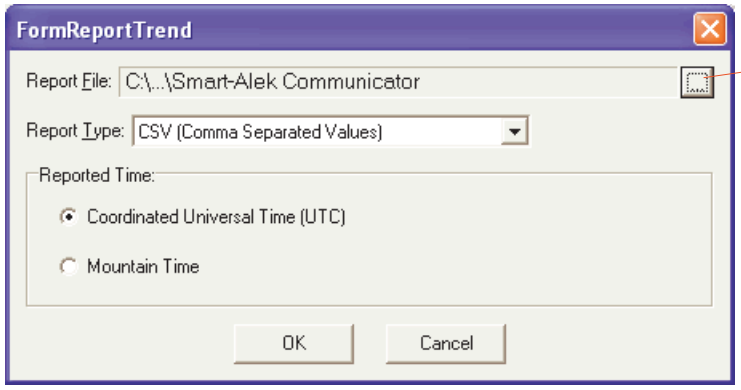
Retrieved trend data records are listed here, in the order they were retrieved. Select the trend data that you just retrieved.

Click **View Report Data** to see the trend data in spreadsheet form.

Click **Execute Report** to create the report in a file format that you can save to disk.

5 Select the trend data that you just retrieved.

6 Click Execute Report.



Click here to select a location on your laptop to save the report. By default, the report is saved to the current job folder.

About the report file formats

Report files can be saved as one of these two file types (that have specific formatting) for later processing:

- **.CSV** (Comma Separated Value). This is a generic format for viewing in Microsoft Excel & database programs. CSV is the default selection.
- **.FAS** (Fekete ASCII Standard). Choose this to view the data in Zedi' ZIPWin Report software.

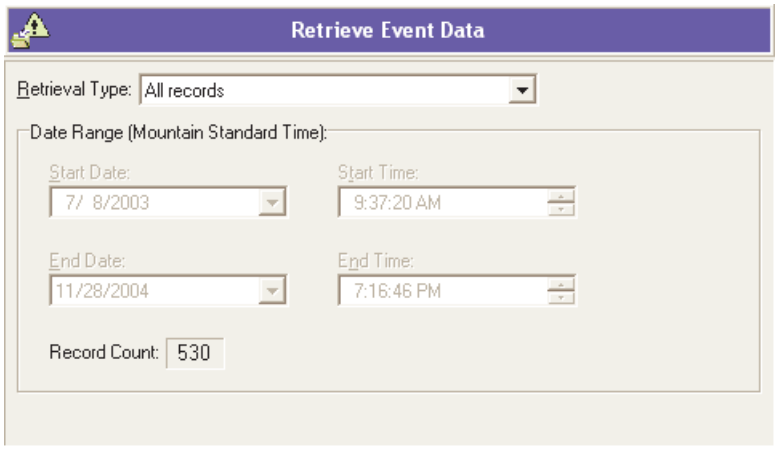
Once you save the data in one of these two file formats, you cannot convert one format into the other format. For example, if you originally saved the file as a .CSV file, but you need the data in the other format, .FAS, you must retrieve the data again from the Smart-Alek and save it as an .FAS file.

Retrieving Event Data

➢ **To retrieve Event data from the instrument:**


Retrieve Event Data

1 Open the Data Management sidebar and click Retrieve Event Data.

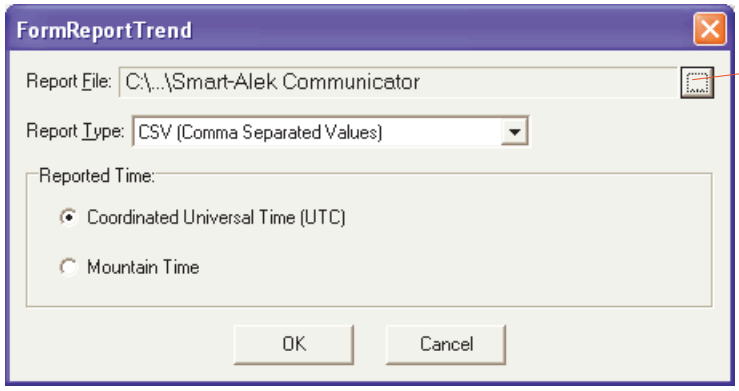


2 Select the Retrieval Type from the drop-down list. The default is All records since last transmission to server.

3 From the Action menu, choose Retrieve Event Data.

4 From the File menu, choose Reports.

5 Click Execute Report.

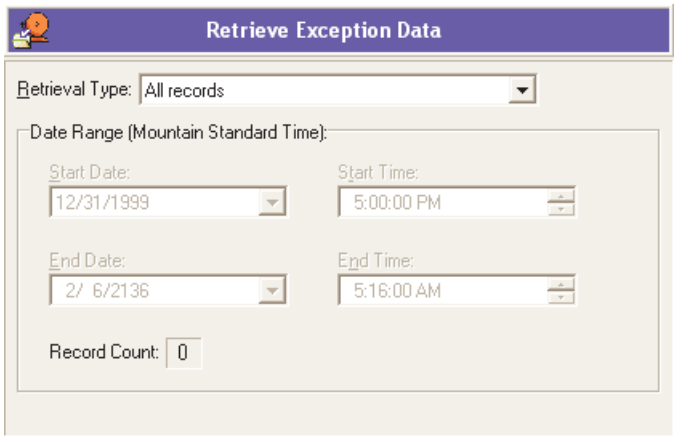


Click here to select a location on your laptop to save the report. By default, the report is saved to the current job folder.

Retrieving Exception Data

➢ **To retrieve Exception data from the instrument:**

1 Open the Data Management sidebar and click Retrieve Exception Data.



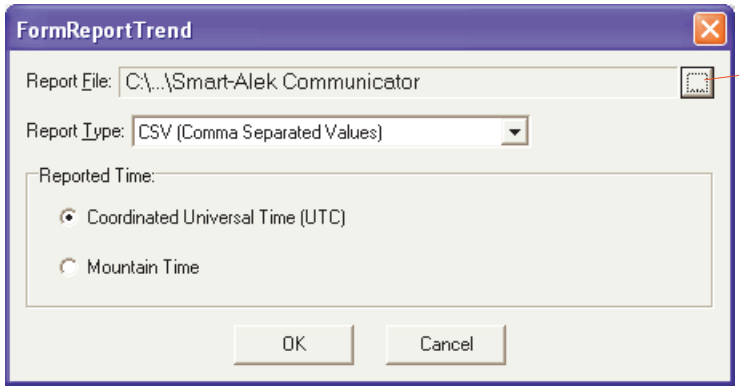
2 Select the Retrieval Type from the drop-down list. The default is All records since last transmission to server.

3 Select the Start and End dates and times for the range you're looking for.

4 From the Action menu, choose Retrieve Exception Data.

5 From the File menu, choose Reports.

6 Click Execute Report.

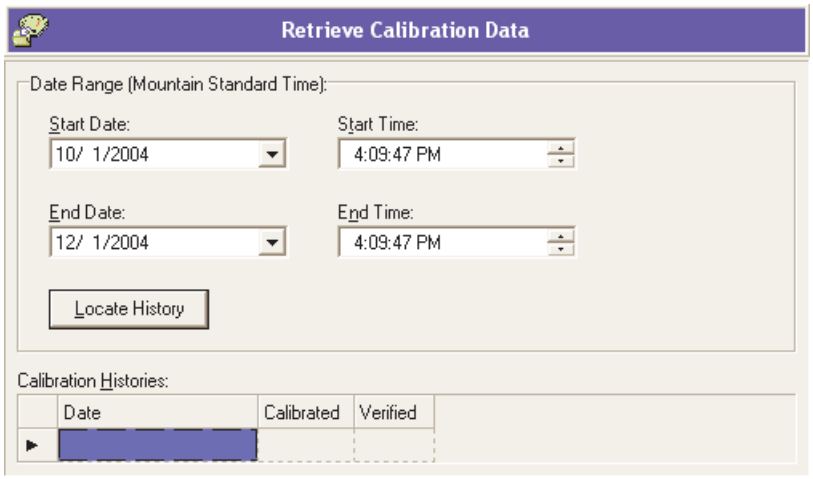


Click here to select a location on your laptop to save the report. By default, the report is saved to the current job folder.

Retrieving Calibration Data

➢ **To retrieve Calibration data from the instrument:**

1 Open the Data Management sidebar and click Retrieve Calibration Data.

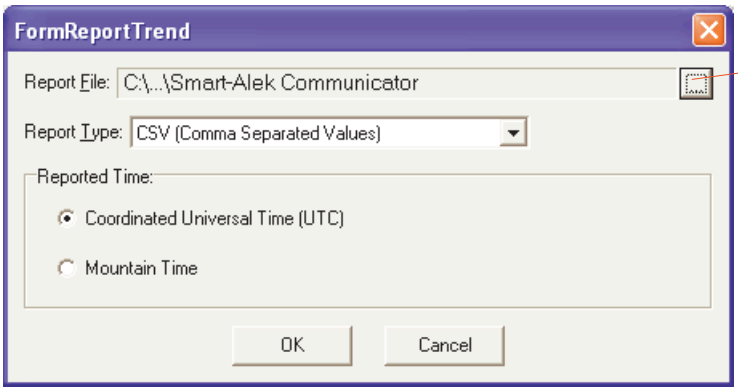


2 Select the date range (dates and times) for the data you want to retrieve.

3 Click Locate History.

4 From the File menu, choose Reports.

5 Click Execute Report.



Click here to select a location on your laptop to save the report. By default, the report is saved to the current job folder.

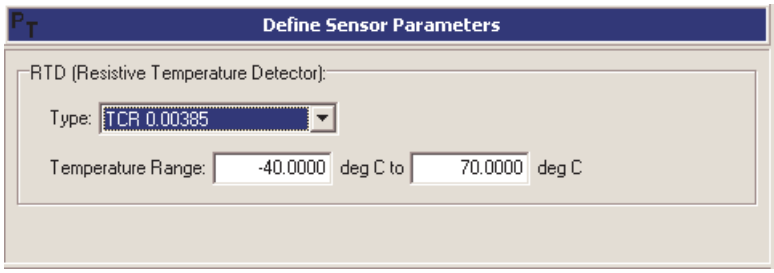
Defining Temperature Sensors

The temperature sensor is defined and the settings are stored with the accompanying Smart-Alek before it is packaged. If a sensor with a different TCR (Temperature Coefficient of Resistance) is installed as a replacement in the field, you need to define and calibrate the new temperature sensor.

➢ **To define the temperature sensor:**

1 From the Mode menu, choose Configuration.

2 Open the Configuration sidebar menu, and click Define Sensor Parameters.



3 Enter the appropriate information from your work order.

4 In the Type field, select the temperature sensor type attached to the Smart-Alek sensor port.

5 In the Temperature Range field, enter the lower range and upper range.

6 From the Actions menu, choose Update RTD Settings.

7 Click OK.

Calibrating Temperature Sensors

➢ **To calibrate a temperature sensor:**

Only single point adjustments are available for temperature calibrations.

1 From the Actions menu, choose Start Calibration.

2 Select temperature from the Sensor drop-down menu.

3 Enter the serial number in the Calibrator Serial Number field, if applicable.

4 Select 1 from the Calibration Points drop-down menu.

A single calibration entry row appears in the Value table.

5 Do one of the following:

- Use a Decade Box to generate 100.00 ohms.

  The specification to meet is: within ± 0.25^{0}C when applying 0^{0}C or 100 ohms at room temperature. Throughout the range of ambient temperature (-40 to +60^{0}C) there is an additional allowable error of 1^{0}C (at the extremes).

- Use an ice water bath to generate 0^{0}C. This is the preferred method, as it includes the RTD element, rather than simulating it. See the Smart-Alek Communicator Help File for details on creating an icebath.

- **V2 Field Instruments only:** Use a temperature calibration pigtail from Zedi to generate 100.00 ohms.

  If using a Zedi temperature calibration pigtail, the value will be very close to but not exactly 0^{0}C. The 100 ohm precision resistor has been accurately measured and the actual value along with the corresponding temperature (near 0^{0}C) is etched on a tag affixed to the pigtail.

6 In the Measured field:

- Enter 0°C (32°F) if using an ice water bath or a decade box.
- Enter the temperature value engraved on the pigtail tag if using a pigtail.

7 Click Calibrate.

The Smart-Alek runs through 20 readings and displayed the averaged value of these readings in the Reading column. A check mark appears in the Done column.

8 From the Actions menu, choose Apply Calibration to Smart-Alek.

9 From the Actions menu, choose Stop Calibration.

NOTE If you have a problem with the calibration equipment, processes, or if the procedure must be stopped before completion, stop the calibration. The software warns you the calibration has not been applied and prompts you to continue. Selecting Yes ends the process without making any changes to current calibration of the unit.

10 Repeat the verification procedure using "As Left."

NOTE Some jurisdictions also require a verification point at the normal operating temperature as an additional requirement to API 21.1.

11 (When you're finished) From the Mode menu, choose Offline.

➢ **To verify the temperature sensor**

1 Select temperature in the Sensor drop-down menu.

A single verification entry row is displayed.

2 Do one of the following:

- Use a Decade Box to generate 100.00 ohms.
- The specification to meet is: within ± 0.25°C when applying 0°C or 100 ohms at room temperature. Throughout the range of ambient temperature (-40 to +60°C) there is an additional allowable error of 1°C (at the extremes).
- Use an ice water bath to generate 0°C. This is the preferred method, as it includes the RTD element, rather than simulating it. See the Smart-Alek Communicator Help File for details on creating an icebath.
- **V2 Field Instruments only**: Use a temperature calibration pigtail from Zedi to generate 100.00 ohms. **Note:** If using a Zedi temperature calibration pigtail, the value will be very close to but not exactly 0°C. The 100 ohm precision resistor has been accurately measured and the actual value along with the corresponding temperature (near 0°C) is etched on a tag affixed to the pigtail.

3 In the Measured field:

- If you're using an ice bath or a decade box enter 0°C.
- If you're using a pigtail, enter the temperature value engraved on its tag.

4 Click Verify.

The Smart-Alek takes a reading which is displayed in the Reading column. A check mark appears in the Done column.

5 From the Actions menu, choose Stop Verification.

Deleting Data Logs

You can remove any previous [and unwanted] data on new units from the manufacturing process at the Zedi facility.

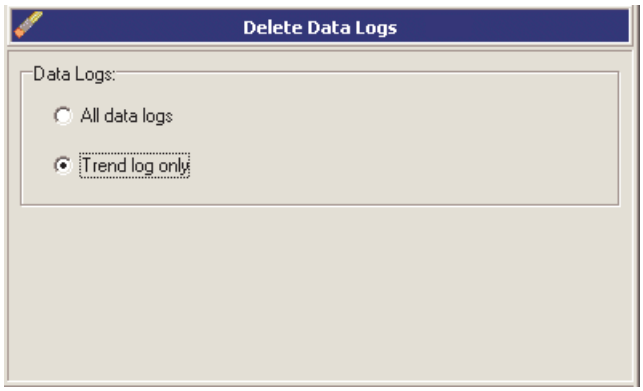
CAUTION

Do not perform this procedure unless instructed to by Zedi.
If you visit a Field Instrument that has been operating in the field, be absolutely sure the trend data is no longer needed before you delete it.

The actual data deletion takes place when the main power is cycled on the Field Instrument. You **must** cycle the main power to complete the deletion. If you don't cycle the power to complete the deletion, data will be deleted the first time the batteries go low.

➢ **To delete data logs:**

1 Open the Data Management sidebar menu, then click Delete Data Logs.



Do not select the All Data Logs option unless instructed to by Zedi.

2 Select Trend log only.

CAUTION

Do not select All Data Logs unless instructed to do so by Zedi.

3 From the Actions menu, choose Delete Selected Data Log.

Appendix A
Smart-Alek Calibration

Smart-Alek Calibration Reference Specifications

Refer to Zedi for current version.

Sample Smart-Alek Calibration Certificate

Refer to Zedi for current version.

Appendix B
Sample Smart-Alek Programming Sheet

Date: _____ Technician Name: _____

Time: _____ Technician's Employer: _____

zed.i solutions

Client name:		IP Address:	
Client contact info:		EID Number:	
Site LSD:	SAMPLE	Program (e.g., 3600/3600/6073):	
Orifice diameter:		LCD setup (e.g., 6/32/Metric/MST):	
Meter run dia. U/S:		Antenna used (select one):	○ omni directional phantom antenna ○ 6 element directional yagi antenna ○ 12 element directional yagi antenna ○ 18 element directional yagi antenna
Meter run dia. D/S:			
Smart-Alek Ser.#:		Was a mast installed?	☐ YES ☐ NO height
Pressure Range:		Modem test signal level:	channel:
RTD (2.5", 3.5", other):		Test host connection result:	

SAComm2 Real Time Monitor Readings (under well pressure)

PARAMETER	please fill out either metric or U.S. values	METRIC		U.S.	
static pres.			kPa		psi
differential pres.			kPa		IWC
flow temp.			°C		°F
flow integral			kPa		psi
current flow rate			cu m/d		mcfd
internal temp.			°C		°F
battery voltage			V		V
248 pres.			kPa		psi
248 temp.			°C		°F
249 pres.			kPa		psi
249 temp.			°C		°F
246 volume to date			cu m		cu f
247 volume to date			cu m		cu f

Barton Chart Readings At Left (under well pressure)

stat. pres. range:	
stat. pres. reading:	
diff. pres. range:	
diff. pres. reading:	
flow temp. range:	
flow temp. reading:	

?	Keller sensor ser.#:		?	parameter measured (i.e., tubing, casing or specify other)			
?	Keller sensor ser.#:		?	parameter measured (i.e., tubing, casing or specify other)			
?	PolarTek totalizer ser.#:		?	parameter measured (i.e., water, condensate or specify other)		?	K factor (pulses per unit)
?	PolarTek totalizer ser.#:		?	parameter measured (i.e., water, condensate or specify other)		?	K factor (pulses per unit)

Appendix C
NuFlo Field Programming

zed.i currently uses NuFlo Totalizers to measure values for liquid production at gas well sites. The Informer connects to the Smart-Alek Field Instrument via a 2 wire cable through a Central Junction Box.

Each Informer is individually identified with a unique data bus address of 246 or 247. These numbers cannot be duplicated on tools connected to the same Smart-Alek unit.

Address 246 is usually the number programmed into an Informer if only a single totalizer is being installed.

Addresses, K factors, and units-of-measure are programmed into the totalizer on the front panel push buttons. The K factor and units are usually obtained from tags on the turbines located on the flow lines.

➢ **To perform a Factory Default Reset:**
(excerpted from the Polartek Informer Plus manual)

1 Press and hold the Enter key and Left arrow for five seconds and release, default appears.

2 Reset all options to factory defaults.

➢ **To program the K Factor:**

1 Press K-Factor Menu once.

2 Press the Up arrow to select K factor units. The units are gal, lit, bbl, ft3 and m3.

Note: Typical values are “m3 if K= 200000” and “USG if K= 900”.

3 Press the Left arrow to move to the next option of selecting decimal point location.

4 Press the Up arrow to select location of decimal point in K factor value.

Allow room for all decimal places required to enter K factor.

5 Press the Left arrow to highlight the first number on the far right.

Note: This is the least significant value.

6 Press the Up arrow to increment numbers up.

7 Press the Left arrow again for the next significant value.

8 Press the Up arrow to increment numbers up.

9 Repeat process until all significant values of the K-Factor are entered.

10 You will be prompted to change the Sensitivity setting. The default is ‘Low’ and should be left there.

11 Press Enter to save.

➢ **To use the Display Options**

1 Press Display Menu.

2 Press the Up arrow to select the display volumetric units (automatic conversion). Select M3 or USG.

3 Use the Left arrow and Up arrow to select the time scale (sec, min, hr, day).

4 Use Left arrow and Up arrow to select flow total decimal location.

5 Use Left arrow and Up arrow to select flow rate decimal location.

6 Press Enter to exit menu and save options.

➢ **To set the Output:**

1 Press Output Menu.

2 Use the Up or Left arrow to toggle off the 4-20 ma.

3 Press Enter to advance to the next selection.

Low should be 000000 / off.

4 Press Enter to advance to the next selection

High should be 000000 / off.

5 Press Enter to advance to next selection

Pulse out should be off.

6 Press Enter to advance to next selection.

7 Set Slave address to 000246 normally (2nd unit is 247).

8 Use the Up arrow to increment the address number, starting with least significant digit on the right being changed to 6 or 7 if the 2nd unit.

9 Press the Left arrow to advance to the second digit.

10 Press the Up arrow to increment the second address number, being changed to 4.

11 Press the Left arrow to advance to the third digit.

12 Press the Up arrow to increment the third address number, being changed to 2.

13 After the address is selected, you will be prompted to change the Speed setting. The default is 9600 and should be left there.

14 Press Enter to save the settings.

➢ **To reset the Totals**

1 Press and hold Left arrow and Enter key together for ten seconds until tones play to reset flow totals on the LCD display and to RS-485 output.

2 Do the wiring:

V2 Field Instrument - Red goes to #1; Black goes to #2 on Central Junction Box (CJB)

V2X Field Instrument - Wiring is done on the terminal block. See the wiring diagram inside the enclosure.

3 Perform the Battery and Temperature Test:

Press and release Temp & Battery Test using the Up arrow and LCD displays voltage and degrees. Expect above 2.9 VDC

Appendix D
RS-485 Pressure and Temperature Sensors

(Reference Information Only)

In applications where an instantaneous pressure / temperature sample reading is required, such as wellhead tubing and casing pressures, the Smart-Alek can connect to up to two RS-485 Pressure/Temperature sensors. The applicable sensors available through zed.i are from Keller and Canada Tech.

NOTE Keller sensors cannot be used with the V2X Field Instrument.

The Sensor is connected to the V2 Field Instrument via a Central Junction Box, or directly to the terminal block of the V2X Field Instrument. At greater distances it is connected through a Remote Junction Box and two pair "armoured" cable. Each sensor is preprogrammed with a unique address or either 248 or 249. For two sensors to be used on the same wiring bus, they must be equipped with different addresses. For single applications, either address will work. Wiring diagrams are provided with each Central or Remote Junction Box sent into the field. If more than one unit is being installed, the second sensor will be wired in parallel with the first. The unique address of each sensor will identify it to the Field Instrument.

Sensors are pre-calibrated in the factory. There are no field adjustments possible. At atmospheric pressure the sensor should provide a sample reading of 0 psi (+ / - 2 psi). Sensors exceeding this should be brought to the attention of zed.i Customer Support.

New readings are only taken from the Sensor when the Smart-Alek is powering up its High Level processor. This occurs when the Field Instrument wakes up at its assigned program time to transmit its data back to the Server, or when a laptop is connecting with the Smart-Alek Communicator software. The reading taken by the Smart-Alek Communicator is then stored in a buffer until the new one is taken.

NOTE When testing Pressure Sensors and Informers with the Real Time Monitor be aware that the same number will be presented from the buffer continually until it is overwritten by cycling the high level processors. This may give a false indication of a remote accessory being functional or non-functional. The easiest way to test, is to do a soft disconnect with the software, and then reconnect to the tool forcing it to start up its high level processor again.

NOTE Do not remove the thread protector coupling at the bottom of the sensor. This part is included to protect the threads on the more expensive sensor.

NOTE The use of ½ inch unions are recommended to prevent unnecessary twisting of cabling during installation and removal of sensors. Cable should also be restrained with tie wraps or screw in P-clips to prevent damage from wind, animals, or other wellhead servicing work.

Appendix E
Updating Firmware in the Field Instrument

CAUTION: Static Sensitive Device(s).

Contains components susceptible to damage from Electrostatic Discharge. Handle only using static preventive processes.

CAUTION

This procedure should only be performed by trained staff and operators. Contact Zedi if you require further information regarding firmware update training.

CAUTION

Make sure your laptop is properly set up before starting this procedure. You need Procomm Plus, two Procomm Plus scripts, four firmware files, and access to Firmware Update Mode in Smart-Alek Communicator to complete these procedures.

CAUTION

All current data stored in the Smart-Alek will be erased (overwritten) when you perform a High Level firmware upgrade. Be sure to make a backup of the configuration by following the steps in the section "Saving the Smart-Alek Configuration and Data" of this document so it can be reloaded on the Smart-Alek after the firmware upgrade is complete.

Introduction

The term **firmware** means the programming instructions that stay resident in the field instrument's memory, and "run" the instrument. Updating the firmware means that you are uploading a new set of instructions to the field instrument. The instructions come in a computer file that has .srd filename extension. You upload the .srd file from your laptop to the Field Instrument.

The Smart-Alek Field Instrument has two kinds of firmware:

- **High Level** firmware is the instruction set that "runs" the High-Level processor, which is responsible for averaging measurements recorded by the Low Level Processor, and for communicating with the remote server.
- **Low Level** firmware is the instruction set that "runs" the Low Level processor, which is responsible for recording the pressure and temperature readings.

Additional laptop requirements for updating Field Instrument firmware

- Procomm Plus terminal emulation software (v4.8 or higher).

  Updating firmware with other terminal emulation software is **NOT** recommended. We have customized scripts for Procomm Plus which automate much of the process and reduce chances of error.

- Installation script files for Procomm Plus.

  The script files automate the installation of the firmware files. The script files are not the same as the firmware files.

- Updated firmware files.

  The firmware files are the actual code that you will upload to the Field Instrument.

Additional hardware requirement for updating V2X Field Instrument Low-Level firmware

- P**rogram Header Cable.**

Note: The Program Header Cable is not required to program the High-Level firmware.

Identifying the Field Instrument's current firmware versions

Connect your laptop to the Field Instrument, following the instructions on page 13. Once you've connected, move the cursor over the status line at the bottom of the Smart-Alek Communicator window to display:

- The Smart-Alek model
- The Smart-Alek serial number
- The version of High Level firmware currently installed (e.g., rev. 2.1.1)
- The version of Low Level firmware currently installed (e.g., rev. 2.2.0).

You can also open the Configuration sidebar menu and click Initialize Instrument. Smart-Alek Communicator 2 displays the current firmware version in the Initialize Instrument window.

Installing Firmware Files and Procomm Plus scripts

➢ **To install the Procomm Plus scripts:**

1 In your web browser, go to:

https://www.smart-alek.com/service/!General Updates/Firmware/Support Files/

2 Enter your Smart-Alek.com User Name and Password, then click Login.

3 Click procommscripts.exe

Running the file will install the scripts. Extract the files to the Procomm Plus install directory on your laptop's hard drive.

➢ **To download the High Level and Low Level firmware files:**

1 In your web browser, go to:

https://www.smart-alek.com/service/!General Updates/Firmware/

2 Enter your User Name and Password, then click Login.

3 Right-click the High Level .srd file (HL__.srd), then choose Save Target As from the right-click menu.

CAUTION

Do not left-click the .srd file - this might cause the file to be displayed in your web browser rather than saved on your disk. If the .srd file is displayed in your browser window, do not try to save it to disk. Instead, click your browser's Back button, then right-click the .srd file and select Save Target As.

4 In the Save As window, select where to save the file, then select All File Types from the Save As drop-down list, then click Save.

5 Click the appropriate Low Level subdirectory, then click the directory (Barton or Fuji) that matches the pressure core type on the field instrument.

6 Right-click the low level .srd, then choose Save Target As from the right-click menu.

CAUTION

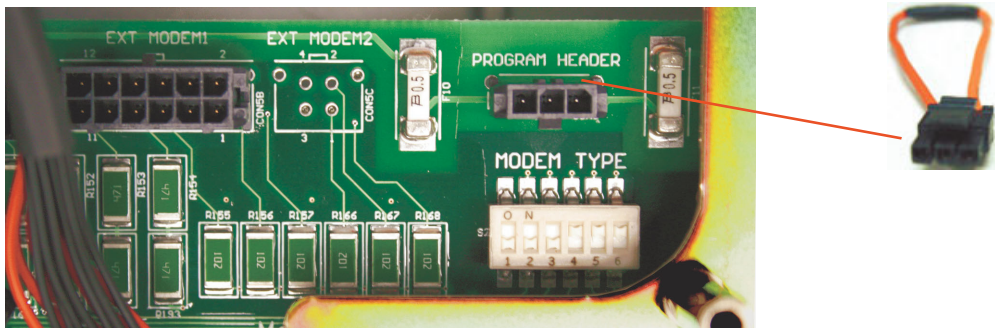
Do not left-click the .srd file - this might cause the file to be displayed in your web browser rather than saved on your disk. If the .srd file is displayed in your browser window, do not try to save it to disk. Instead, click your browser's Back button, then right-click the .srd file and select Save Target As.

Preparing to upgrade the Firmware

1 Connect your laptop to the Field Instrument.

See “Connecting your computer to the Field Instrument” on page 13.

2 V2x FIeld Instruments only - insert the Program Header Cable into the Program Header slot on the main circuit board.



3 Start Smart-Alek Communicator v2, and establish communication with the Field Instrument.

See “Establishing a software connection with the Field Instrument” on page 14.

4 From the Mode menu, choose Offline.

Recording pre-update information

Before you upgrade the firmware, make sure you’ve recorded the following:

- The modem settings from the Initialize Modem window. See “Initializing the modem” on page 18.
- The settings from the Define Operation Parameters window. See “Defining Operation Parameters” on page 44.
- The settings from the Define Alarms and Exceptions window. See “Cryout Alarms and Exceptions” on page 49.
- The Real Time Monitor averages. See “Method B - Verification Using the Real Time Monitor” on page 40.

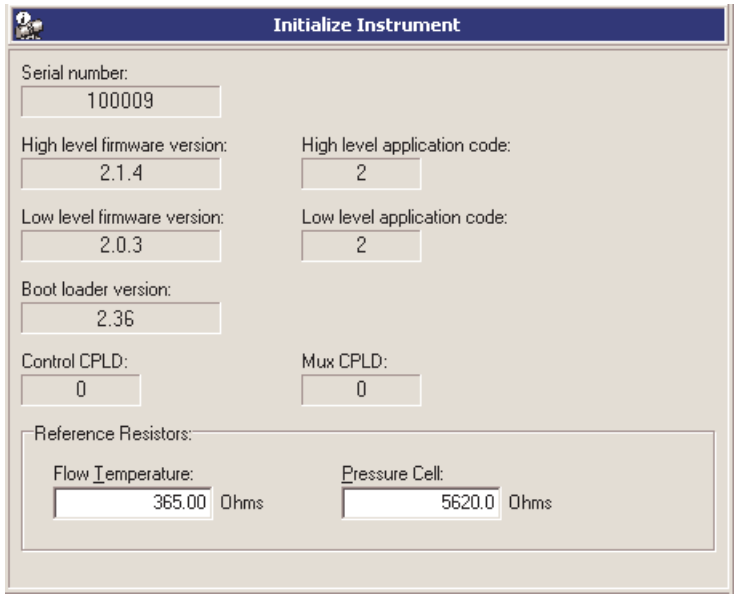
Saving the Smart-Alek Configuration and Data

Note: The following steps apply only if the High Level firmware is being changed. If you are only changing the Low Level firmware, skip this step and proceed toValidating the Firmware Change, 73

CAUTION

Upgrading the High Level firmware may ERASE the data stored in the instrument. Offload all data that needs to be saved, before updating the firmware.

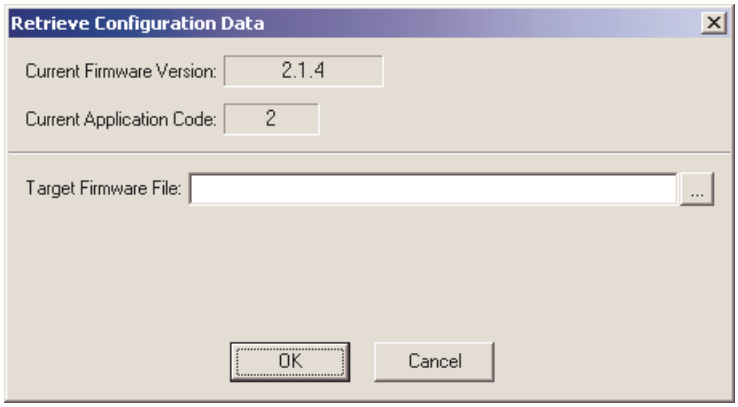
5 Open the Configuration sidebar menu, then click Initialize Instrument.



6 From the Actions menu, choose Retrieve Configuration Data from Smart-Alek.

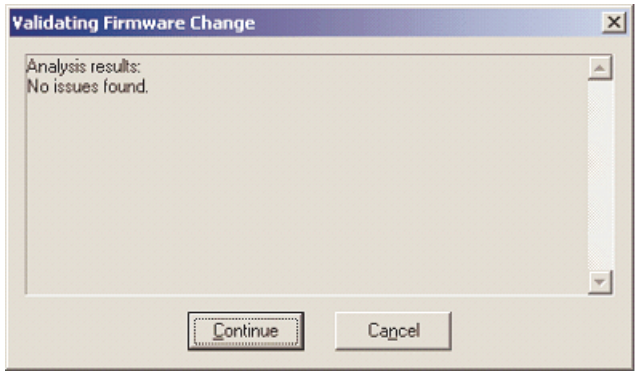
Validating the Firmware Change

1 Select the High Level code you are updating to by clicking "..." and selecting the appropriate ".srd" file.



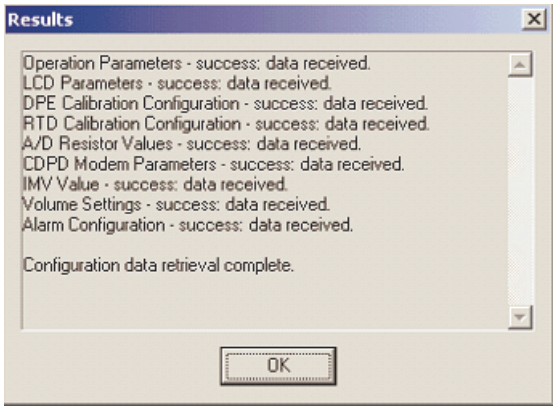
2 Verify the Firmware version is correct, and press OK.

An Analysis of the configuration changes for the upgrade is shown.



3 If there are no issues, click Continue.

A status screen appears:



CAUTION

If there are ANY problems reported on the status screen, DO NOT continue with the upgrade, and consult zed.i

4 If no problems were listed, then click OK.

5 From the Mode menu, choose Firmware Update.

6 Click Disconnect from instrument.

Smart-Alek Communicator will prompt you that you are disconnecting while not in Normal or Offline mode.

7 Click Yes to complete the disconnection.

8 Set the power toggle switch on the Smart-Alek to the OFF position.

Starting Procomm Plus

1 Configure Procomm Plus to talk to the Field Instrument:

- From the Options menu, choose System Options, then choose Modem Connection.
- In the Setup window, choose direct connect for the serial port you're going to use to connect with the Field Instrument from the Current Modem/Connection drop-down menu.
- For example, if you're using COM 1, choose direct connect-Com1.
- Click Modem/Connection Properties
- Select the following in the Modem/Connection Properties window
  - Baud rate 9600
  - Parity None
  - Data bits 8
  - Stop bits 1
- Click OK to close the Modem/Connection Properties window.
- From the Options menu, choose Data options, then Transfer Protocol.
- Select RAW ASCII from the Current Transfer Protocol drop-down menu.
- Click OK to close the Setup window.

The status bar at the bottom of the Procomm Plus Terminal window should now look like this:

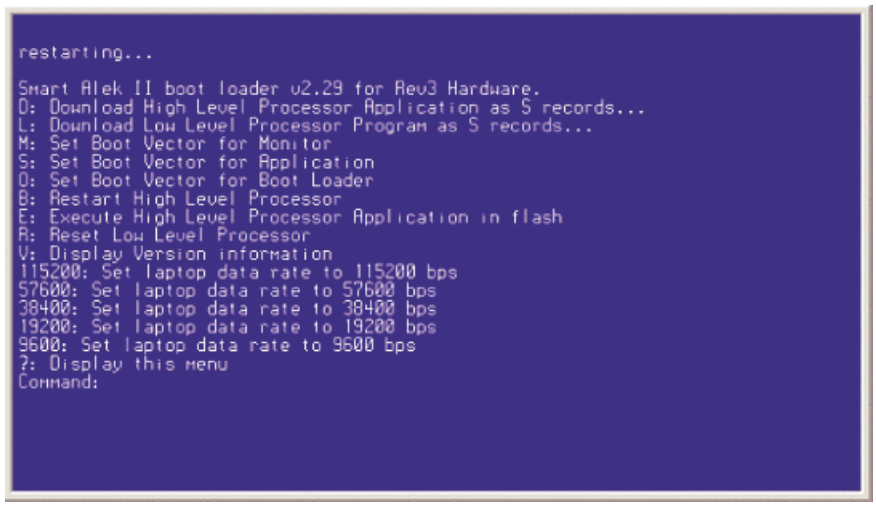
NOTE: If you don't have ProComm Plus Terminal, please see Appendix D instead of the following High Level update section and Low Level update section, and then go to the Completing the Upgrade and Verifying Program Operation section (page 11).

Upgrading the High Level Firmware

➢ **To upgrade the High Level Firmware:**

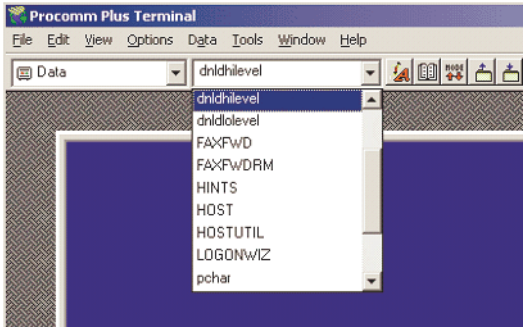
1 Turn on the power to the Field Instrument.

The High Level Bootloader Menu displays.

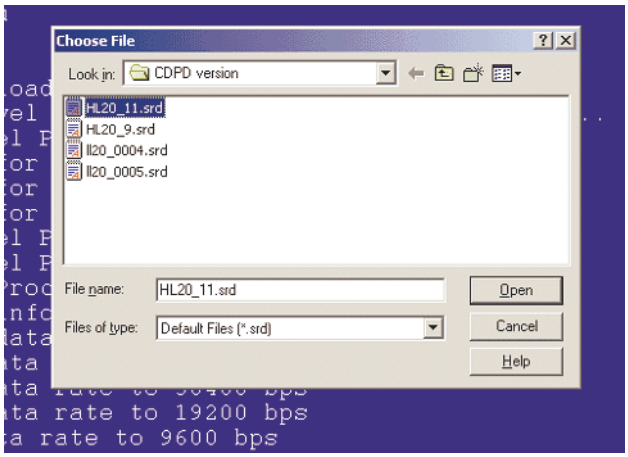


ProComm Plus Terminal displaying the High Level BootLoader Menu

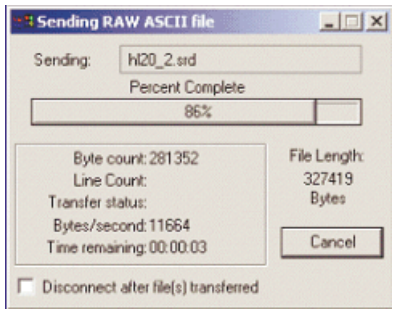
2 Select the dnldhilevel Script from the script selection box:



3 In the Choose File window, select the new high level SRD file



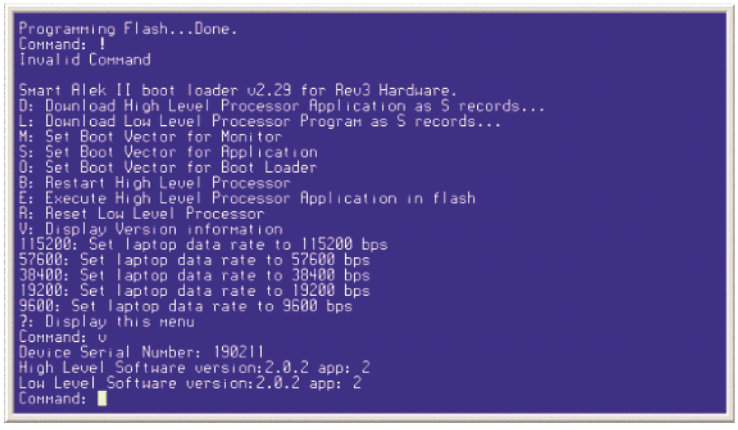
The Sending RAW ASCII File window displays and indicates the progress of the file download.



Monitor the ProComm Plus Terminal display to confirm that the application Erases (the high level processor memory), and Programs the processor. The display indicates "Done" when the process is complete. The screen will then automatically display the version information.

Note: If there is a problem while running the script, stop the script and contact Zedi. To stop the script:

- Press the script "Run/Stop" button on the Procomm Plus toolbar or;
- From the Tools menu, choose Scripts, then Stop Script.

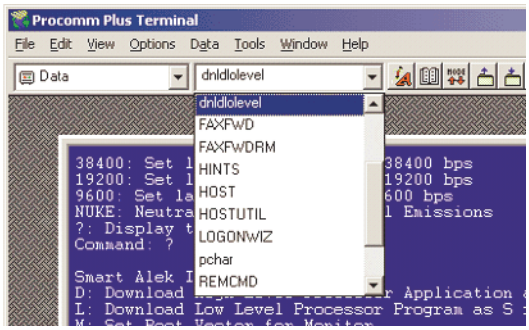


Version information displayed in Procomm Plus Terminal screen

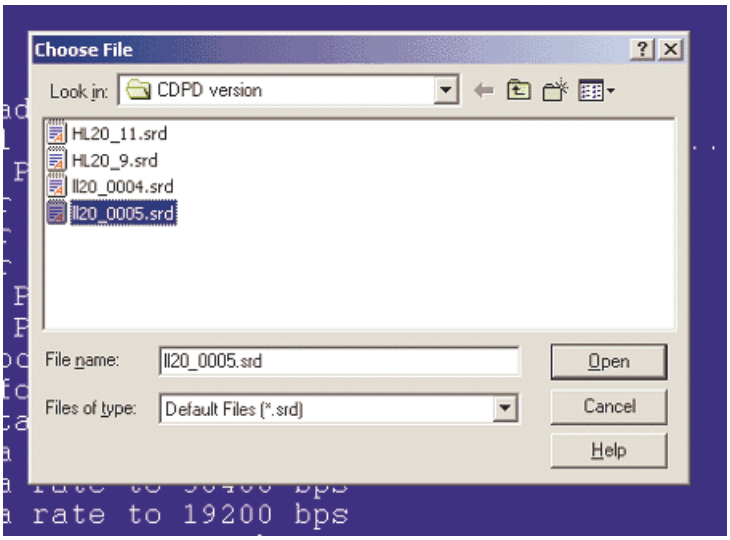
Upgrading the Low Level Processor Program

➢ **To upgrade the Low Level Processor Program:**

1 Select the dnldlolevel Script from the script selection box

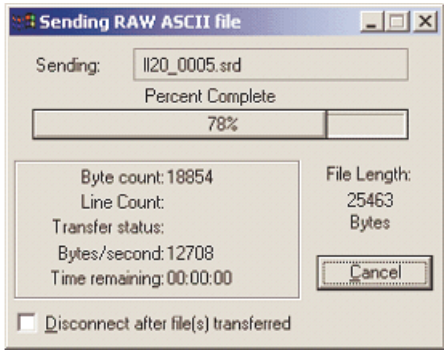


2 In the Choose File window, select the new low level SRD file



Choosing the file in the Procomm Plus Terminal

The Sending RAW ASCII File window displays and indicates the progress of the file download.



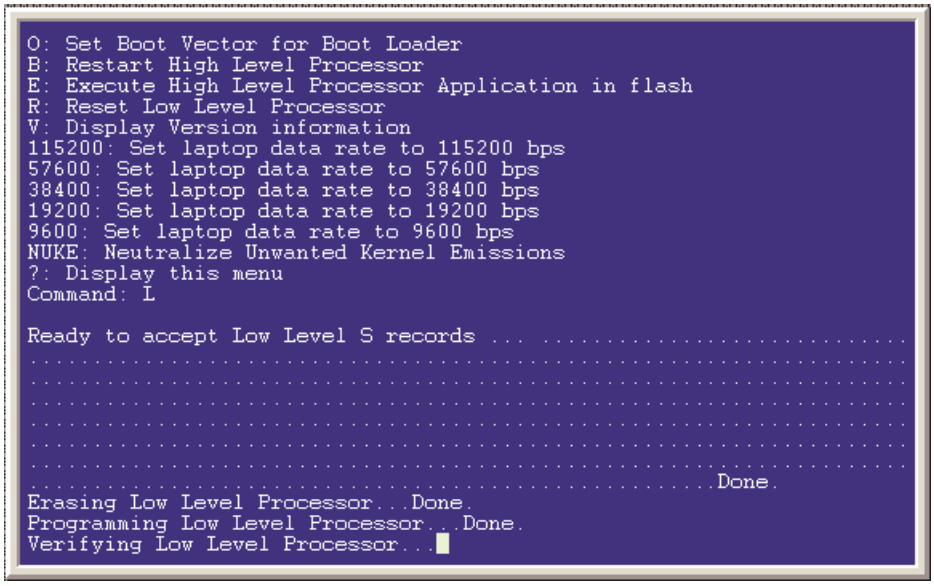
Monitor the ProComm Plus Terminal display to confirm that the application Erases (the low level processor memory), Programs, and Verifies the installation. The display indicates "Done" when the process is complete. The screen will then automatically display the version information)

Note: If there is a problem while running the script, stop the script and contact Zedi. To stop the script:

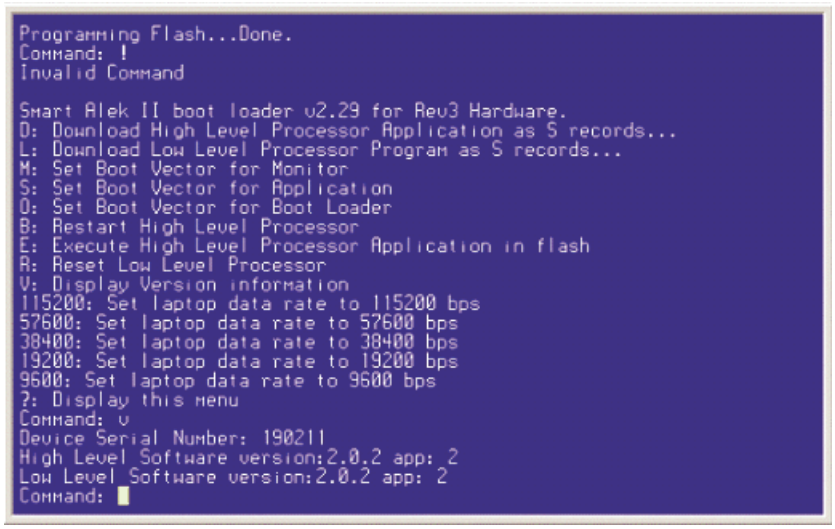
- Press the script "Run/Stop" button on the Procomm Plus toolbar or;

- From the Tools menu, choose Scripts, then Stop Script.

Procomm Plus Terminal screen indicating Erasing, Programming, and Verification is done



Version information displayed in Procomm Plus Terminal screen



Completing the Upgrade and Verifying Program Operation

Perform this procedure at the completion of the programming stage(s) to ensure the Smart-Alek is left in the proper state for continued testing, calibration, storage, or operation.

➢ **To complete the upgrade and verify the program operation:**

1 Close the Procomm Plus terminal window.

2 V2X FIeld Instruments only - Remove the Program Header Cable from the Program Header connector on the main circuit board.

3 Cycle the power on the Field Instrument.

CAUTION

Whenever you cycle power on the Field Instrument, make sure you wait until the LCD display shuts itself off before you turn the toggle switch to Off.

The LCD may display an "Erasing Data" message at this point.

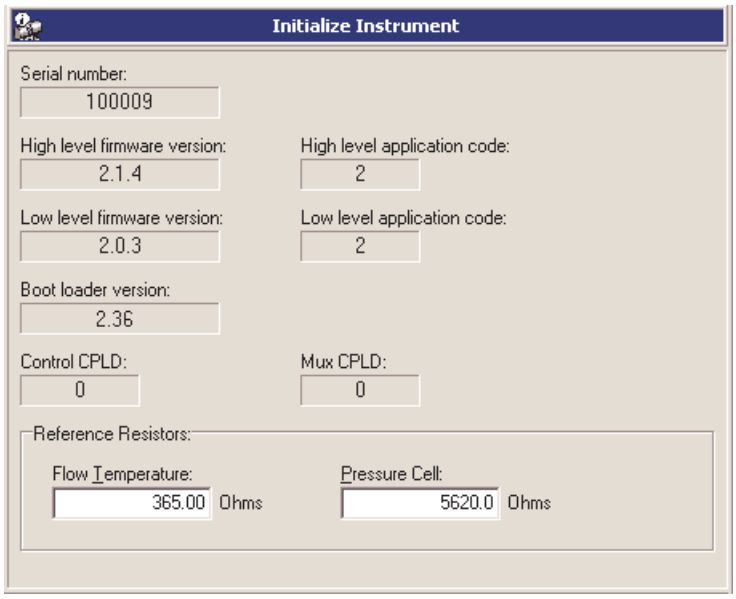
Reloading the Configuration Data

1 If you upgraded the High Level Firmware, complete the following steps to reload the configuration data.

If you have not upgraded the High Level firmware, go to "Finishing the Upgrade" on page 80.

2 Connect to the Smart-Alek with Smart-Alek Communicator 2.

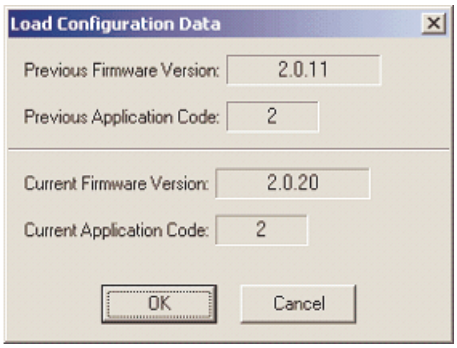
3 Open the Configuration sidebar menu, then click Initialize Instrument



4 From the Mode menu, choose Configuration.

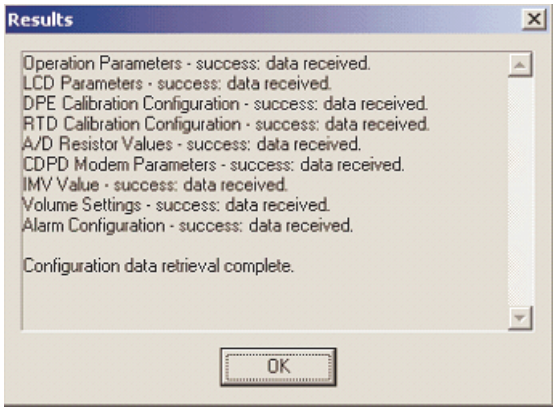
5 From the Actions menu, choose Load Configuration Data to Smart-Alek.

6 Confirm the firmware revisions:



7 Click Continue.

The results screen is displayed.



If there are any issues, (e.g., Modem Parameters not loaded), it is possible to enter them in manually through the appropriate configuration screen.

Finishing the Upgrade

1 From the mode menu, select:

- **Offline** if you have more work to do on the field unit or,
- **Normal** if you're ready to disconnect. See "Disconnecting from the Field Instrument" on page 17.

2 Swipe the reed switch with a magnet to turn on the LCD Display Module to verify that the Smart-Alek is operating.

The LCD Module should display a readout that confirms the Smart-Alek is functioning properly.

3 Allow the LCD Module to cycle through the readouts and turn off by itself.

4 Set the Field Instrument power toggle switch to OFF.

CAUTION

Whenever you cycle power on the Field Instrument, make sure you wait until the LCD display shuts itself off before you turn the toggle switch to Off.

---

5 V2X Field Instruments - remove the Program Header cable from the mainboard.

Upgrading Firmware without Procomm Plus (Not Recommended)

This section assumes you have experience in ASCII transfers and are skilled in a Terminal Emulator Program.

Note: You can use any Terminal Emulator program that allows for ASCII downloads. However, you need to watch the flow control since some programs (e.g. standard Hyperterm) don't seem to implement it correctly.

For this example, we will use Procomm Plus (just substitute a similar step in your program for each step).

➢ **To upgrade the High Level Processor Program**

1 Set or confirm Terminal parameters as follows:

- Direct Connect Port (identify COM port being used)
- Baud Rate = 9600
- Parity = None, Data Bits = 8, Stop Bits = 1 (N-8-1)
- Raw ASCII downloads
- Select Use hardware (hrdw) flow control

2 Turn on power to the Smart-Alek by setting the power switch to the ON position.

The High Level Bootloader Menu displays.

3 Type 115200 and press Enter to set the baud rate on the Smart-Alek.

4 Set the baud rate on Terminal to 115200 (the same baud rate as the Smart-Alek, set in step 3).

5 Type "D" to select option D: Download High Level Processor Program as S records... from the menu and press Enter.

"Ready to accept High Level S records ..." will display.

6 Start an ASCII transfer to get the file selection window.

7 Select the High Level Firmware file on your laptop then click Open.

8 After the file downloads, monitor the Terminal display to confirm that the application Erases (the high level processor memory), and Programs the processor.

The display indicates "Done" when the process is complete.

9 Type "V" in the Terminal screen (to select option V: Display Version Information from the menu), then press Enter.

The Serial Number of the Smart-Alek and Version information for both the High Level and Low Level Firmware will display.

10 Type "S" in the Terminal screen to select option S: Set Boot Vector for Application from the menu and press Enter.

➢ **To upgrade the Low Level Processor Program:**

1 Type "L" to select option L: Download Low Level Processor Program as S records... from the menu and press Enter.

"Ready to accept Low Level S records ..." will display.

2 Start an ASCII transfer to get the file selection window.

3 Select the appropriate Low Level Firmware file on your laptop then click Open.

4 After the file downloads, monitor the Terminal display to confirm that the application Erases (the low level processor memory), Programs the processor, and Verifies installation.

The display indicates "Done" when the process is complete.

5 Type "V" in the Terminal screen to select option V: Display Version Information from the menu and press Enter.

The Serial Number of the Smart-Alek and Version information for both the High Level and Low Level Firmware will display.

6 Type "S" in the Terminal screen (to select option S: Set Boot Vector for Application from the menu), then press Enter.

7 Go to Finishing the Upgrade, on page 88.

Current Code Versions

For current firmware and code versions, please refer to www.Smart-Alek.com/service, or contact Zedi Client Services & Support.

Glossary

Numeric

1xRTT. A version (generation) of CDMA.

A

Antenna Cable. For a unit with a cellular modem, the antenna cable refers to the 10.6-inch N-Plug to N-Plug Coaxial Cable that runs from the Low Profile Antenna to the Solar Panel.

B

Battery Dome Cover. One of three parts of the EP Enclosure.

Battery Pack. This refers to the 2.5 Ahr, Sealed Lead-Acid Battery Pack. The Battery Pack consists of four sealed lead-acid rechargeable batteries.

C

CAL. Abbreviation for calibration.

Cellular Antenna. Refers to Low Profile Antenna used with CDPD communication.

CDMA. Code Division Multiple Access. Known generally as digital spread spectrum standard for a cellular network. It is a modulation technique for carrying many voice channels over a relatively small amount of radio spectrum.

CDPD. Cellular Digital Packet Data. CDPD is an IP-based wireless digital packet network overlaid on the AMPS analog network, supporting wireless access to the Internet and other public packet-switched networks.

CSA. Canadian Standards Association.

CSC. Circuit-Switched Cellular. CSC modems are based on analog cellular networks (as opposed to packet switching).

D

dB. Decibels. A relative measure of sound level.

dBm. A measure of sound (decibels) referenced to 1 milliwatt power.

Dual Pressure Sensor. Sensor to measure static pressure and differential pressure.

E

E3M3. 1000 cubic metres.

EID. Equipment Identifier. The six-character hexadecimal number that identifies a specific modem and is written on the back of the modem.

EP. Explosion-Proof.

EP Body. The EP Body is the central part of the EP Enclosure.

EP Enclosure. The EP Enclosure is the container in which the Smart-Alek is housed. It consists of three parts:

- The EP Body
- The LCD Dome Cover (front dome cover with glass plate)
- The Battery Dome Cover (back dome cover)

ESN. Electronic Serial Number. An Identifier used in mobile phones.

F

F-F. Female-to-Female. Refers to the type of ends on a fitting, connector or standoff.

FS. Full Scale (with respect to % FS).

H

Host The zed.i host server, which communicates with the Field Instrument.

I

IMV. Integral Multiplier Value. Specifically, it is the value resulting from the calculation of all other factors of the flow rate equation not included in the integral value (IV). Both the IMV and IV are used to calculate flow rate. At times referred to in this document as Flow Factor.

I/O Cable Assembly. Input/Output Cable Assembly. Port on the Right side of the Smart-Alek. The EP fitting and internal cable that connects to the wiring board.

I/O Extension Cable. Also called the T-Sensor Cable. Cable that connects from the Smart-Alek to the T-Sensor.

IP Internet Protocol.

ISP Internet Service Provider. A company that provides access to the Internet for a fee.

IV Integral Value. This is the value resulting from the integration of the factored portion of the flow rate equation that best defines the conditions of continuously changing flow over a specified time period. Both the IMV and IV are used to calculate gas flow rate.

L

LCD Liquid Crystal Display. Refers to the module that displays the text message through the glass plate on the LCD Dome Cover (front cover).

LCD Dome Cover. The front dome cover with glass plate. One of three parts of the EP Enclosure.

Low Profile Antenna. Refers to Cellular Antenna used with CDPD communication.

M

mcf 1000 cubic feet.

mmcf 1000000 cubic feet.

M-F Male-to-Female. Refers to the type of ends on a cable, fitting, connector or standoff.

N

N-Plug This refers to a type of RF connector.

NEI Network Entity Identifier. Refers to the Internet Protocol (IP) address that the CDPD Service Provider, (e.g., TELUS Mobility in Alberta and BC) that they give you when you set up a CDPD modem account.

O

OSHA. Occupation Safety & Health Administration.

R

RF/Power Cable Assembly. Port on the Left side of a cellular Field Instrument. The EP fitting and internal cable that connects to the Modem Interface PCA. There is also an RF cable that connects from the Bias Tee to the Solar Panel.

RF/Power Extension Cable. Cable that connects from the Smart-Alek to the Solar Panel.

RS-232 Communication Cable. A straight-through serial cable that connects from the Smart-Alek to the laptop computer, with M-F DB9 connectors.

RTC. Real-Time Clock

RTD Resistance Temperature Detector. Also called T-Sensor or Temperature Sensor but strictly refers to the device inside the T-Sensor.

T

T-Sensor. Temperature Sensor.

Temperature Sensor. Also called T-Sensor or RTD. The temperature sensor that is usually installed in the thermowell that measures flow temperature. The T-Sensor is connected to the I/O Cable Assembly on the Smart-Alek.

TNC Jack or TNC End. Threaded N Connector Jack or End.

V

V2. Version 2 (with respect to the Smart-Alek version/generation).

Ver. 2.0 Version 2.0 (with respect to the Smart-Alek Communicator version)