ADS® PrimeProbe®2 User Manual

October 2009 **QR 775016 A0**

ADS Water Loss Control Products powered by Primayer

ADS LLC

4940 Research Drive

Huntsville, Alabama 35805

Telephone: 1-800-430-3366 / Fax: 1-800-430-6633

www.adsenv.com

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CHAPTER 1

Introduction

The PrimeProbe®2 flow meter measures flow rate in closed pipes with clean water having a conductivity greater than 5 microsiemens. It is not suitable for measuring wastewater, gases, petroleum, or other fluids with low conductivity.

System Components

> **Note:** Please be careful when removing the PrimeProbe2 product from its original container. Fully inspect the equipment for damage. If damage exists, notify the carrier and ADS immediately.

The system consists of two primary components: the insertion-type sensor and the converter. Two types of PrimeProbe2 are available:

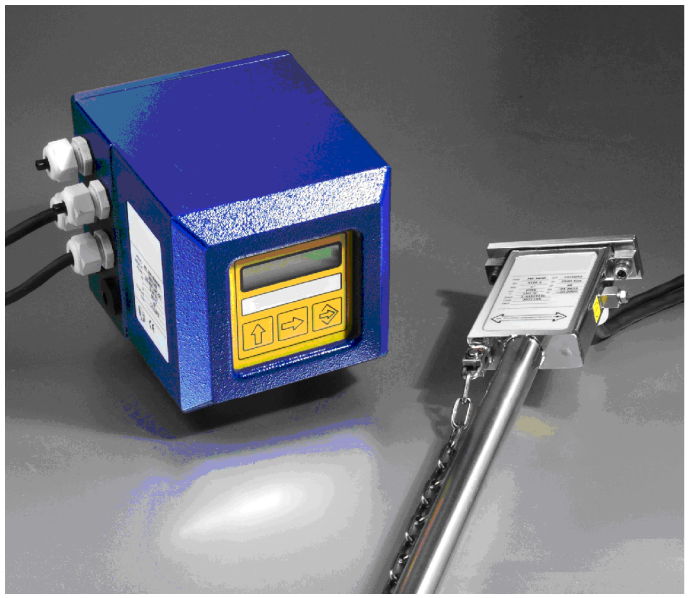
- Compact
- Remote

Compact

For the compact version, the converter is integrated into the sensor. This version is battery powered.

Remote

For the remote version, the converter connects to the sensor by a cable. This unit can be battery or externally powered.



PrimeProbe2 Length Dimensions

Model	Insertion Length	Overall Length (Compact)	Overall Length (Remote)	Use in Pipe Sizes*
Size 1	11.8 inches (300 mm)	29.0 inches (737 mm)	30.2 inches (767 mm)	≤ 23.6 inches (600 mm)
Size 2	19.7 inches (500 mm)	36.9 inches (937 mm)	38.1 inches (967 mm)	≤ 39.4 inches (1000 mm)
Size 3	27.6 inches (700 mm)	44.8 inches (1137 mm)	45.9 inches (1167 mm)	≤ 55.1 inches (1400 mm)
Size 4	39.4 inches (1000 mm)	56.6 inches (1437 mm)	57.8 inches (1467 mm)	≤ 78.7 inches (2000 mm)

*** Assumes operation on the centerline of the pipe**

Technical Specifications

Parameter	Specification
Pipe Sizes	3.2 to 315.0 inches (80 mm to 8000 mm) – at 1/8 pipe diameter (insertion depth) installation
Measurement Range	Bi-directional from 0.03 to 16.40 feet per second (0.01 m/s to 5 m/s) (Maximum may be lower based on insertion length and pipe position.)
Accuracy; Point Velocity **Flow**	±0.0066 feet per second (± 2mm/sec) or ± 2%, whichever is the greater. Refer to ISO 7145-1982
Repeatability	± 0.5% of velocity
Flow Determination	Assumes fully developed flow profile; ISO 7145-1982 reference
Measurement Sampling	Continuous or programmable from 1 to 90 seconds
Minimum Fluid Conductivity	5µS/cm
Process Connection	1-inch (25-mm) BSP (British Standard Pipe)
Pipeline Pressure Rating	232 psi
Sensor Material	PTFE (polytetrafluoroethylene)
Body Material	SS304
Electrode Materials	SS316
Flow Temperature	32º to 176º F (0 to 80º C)
Safety	Probe fitted with anti-bounce chain
Pressure Tapping	Female quick-release connector
Adjustment Method	5 mm Allen key (supplied by ADS) – fits all screws
Protection	IP68
Batteries	Type: Lithium batteries Life: ≤3 years (depending on sampling period and usage)
Output: Signal **Units** **Connection**	Pulses proportional to velocity/flow rate - maximum frequency 32 Hz User-selectable MIL-spec connector
Communications	USB

CHAPTER 2

Installation

This chapter provides instructions on powering up the PrimeProbe2, determining the appropriate length and position for the insertion sensor, selecting a suitable location for measurement, and installing the PrimeProbe2.

Turning On the Unit

ADS delivers the PrimeProbe2 in the **OFF** condition. The user must turn it on before going to the first installation site, as described in the following sections.

Compact Version (*units acquired since June 2008*)

1. Launch the **PrimeWorks®** software.
2. Connect the PrimeProbe2 to the PC/laptop running the software using the communications cable.
3. Select the **PrimeProbe2 > Shipping > Wake up** menu option. The software will initiate communications with the PrimeProbe2 to bring it out of *Sleep* mode. The probe is now ready for use.

Compact Version (*units acquired prior to June 2008*)

1. Using the 5mm Allen key (supplied by ADS), remove the 4 screws securing the rear cover of the converter.
2. Locate the two small switches left of center of the circuit board and in front of the battery. Place them in the **LEFT** position.
3. Replace the cover and the 4 screws, and then tighten the screws with the Allen key securely and evenly.

Remote Version

1. Using the 5mm Allen key (supplied by ADS), remove the 4 screws securing the rear cover of the converter.
2. Locate the two small switches immediately behind the communications jack socket. Place these switches in the **LEFT** position.
3. Replace the cover and the 4 screws, and then tighten the screws with the Allen key securely and evenly.

Note: Tighten all the screws fully to prevent water ingress from occurring.

Site Selection

The PrimeProbe2 can be used on pipes with internal diameters from 3.15 to 314.96 inches (80 to 8000mm) at 1/8 diameter insertion depth, based on the insertion length of the selected probe. The following table indicates the 4 different insertion lengths of the PrimeProbe2 and the pipe sizes in which they can operate. The PrimeProbe2 can be located at one of three depth positions: ½-pipe diameter, 1/8-pipe diameter, or 7/8-pipe diameter.

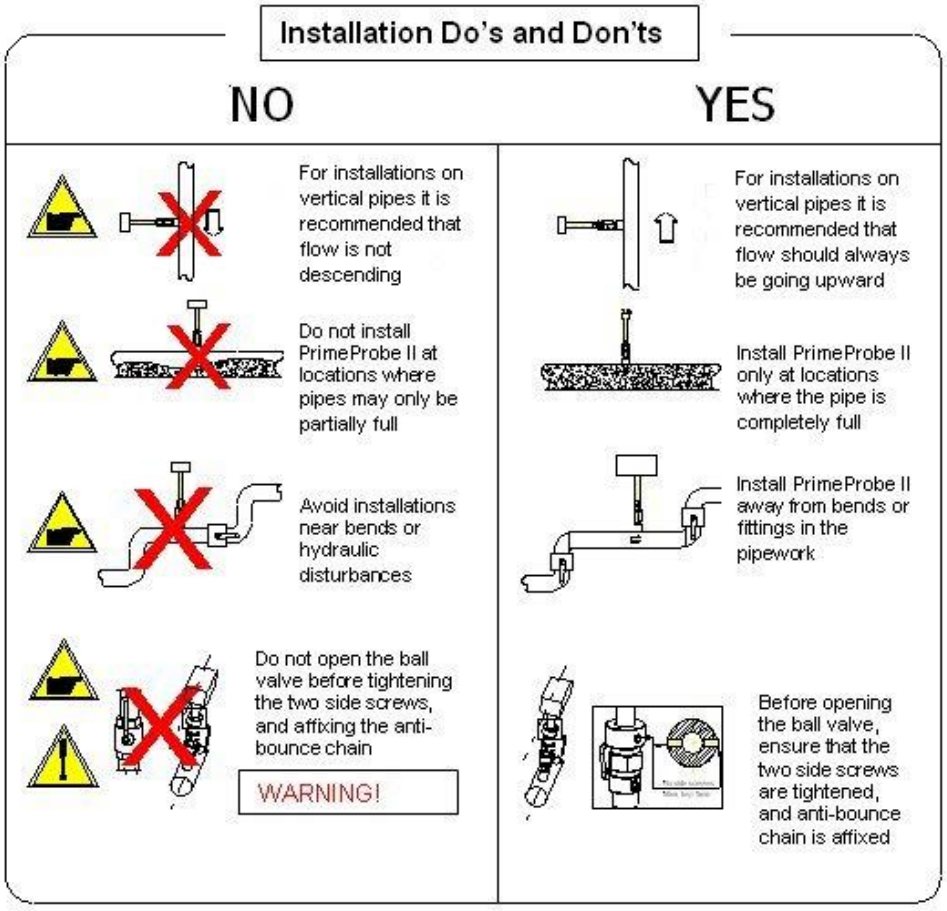
Size of PrimeProbe2	Internal Diameters of Pipes at 1/8 Diameter Insertion Depth
11.81 inches (300 mm)	3.15 to 78.74 inches (80 to 2000 mm)
19.69 inches (500 mm)	3.15 to 78.74 inches (80 to 2000 mm)
27.56 inches (700 mm)	3.15 to 220.47 inches (80 to 5600 mm)
39.37 inches (1000 mm)	3.15 to 314.96 inches (80 to 8000 mm)

Size of PrimeProbe2	Internal Diameters of Pipes at 1/2 Diameter Insertion Depth
11.81 inches (300 mm)	3.15 to 23.62 inches (80mm to 600mm)
19.69 inches (500 mm)	3.15 to 39.37 inches (80 to 1000 mm)
27.56 inches (700 mm)	3.15 to 55.12 inches (80 to 1400 mm)
39.37 inches (1000 mm)	3.15 to 78.74 inches (80 to 2000 mm)

Before installing the PrimeProbe2, determine the direction of the flow in the pipe. The PrimeProbe2 must be installed in the correct direction. Using the symbols on the nameplate of the sensor (– to +**)** for reference, the PrimeProbe2 is installed correctly when the flow in the pipe travels from – to +.

Installation and Operational Considerations

- Install the sensor away from any bends in the pipe and hydraulic fittings (disturbances). For the best results, install the sensor of the PrimeProbe2 at a location with at least 25 times the pipe diameter in distance of straight unrestricted pipe upstream of the sensor and 10 times the pipe diameter in distance of straight unrestricted pipe downstream of the sensor.
- Operate the PrimeProbe2 only in full pipes. The converter performs flow calculations based on full pipe.
- Before opening the valve to insert the PrimeProbe2, make sure the safety mechanism is engaged. Some pipes are under considerable pressure. Failure to *lock-down* the probe could allow pressure to force the sensor upward like a projectile, potentially causing injury to the installer.
- Although it is not always necessary to install the sensor at the *12 o'clock* position on the pipe, it is always necessary to install the probe at a *90°* angle to the length of the pipe.
- The PrimeProbe2, configured with a remote converter, can receive power from an AC mains supply. When using AC power, terminal connections with the mains supply should be made only by qualified technicians familiar with all current procedures and local codes. Connection to mains power should always occur through a RCD (residual current device) and should be the last step in the installation process.


Installation Do's and Don'ts
NO
YES
For installations on vertical pipes it is recommended that flow is not descending
For installations on vertical pipes it is recommended that flow should always be going upward
Do not install PrimeProbe II at locations where pipes may only be partially full
Install PrimeProbe II only at locations where the pipe is completely full
Avoid installations near bends or hydraulic disturbances
Install PrimeProbe II away from bends or fittings in the pipework
Do not open the ball valve before tightening the two side screws, and affixing the anti-bounce chain
WARNING!
Before opening the ball valve, ensure that the two side screws are tightened, and anti-bounce chain is affixed

International Standard of Flow Measurement

The following table has been reproduced, with permission, from ISO 7145 (BS 1042) Section 2.2 1982. Complete copies are available from BSI Publications, Linford Wood, Milton Keynes, MK14 6LE.

Type of Disturbance Upstream from the Cross-Section of Measurement	Minimum Upstream Straight Length*	
	For Measurement at the Point of Mean Axial Velocity	For Measurement on the Axis of the Conduit
90-degree elbow or a t-bend	50	25
Several 90-degree coplanar bends	50	25
Several 90-degree non-coplanar bends	80	50
Total angle convergent 18 to 36 degrees	30	10
Total angle convergent 14 to 28 degrees	55	25
Fully-opened butterfly valve	45	25
Fully-opened plug valve	30	15

*** Expressed in multiples of the diameter of the conduit.**

Mechanical Considerations for Sensor Installation

Install the probe into the pipe through a pre-drilled 1-inch (25-mm) hole in the pipe using a 1-inch (25-mm) Ball Valve (*included*). A 1.5-inch or 2-inch ball valve may be used with reducers.

Installing in plastic or AC (asbestos cement) pipes with smaller diameters and steel pipes with larger diameters requires different methods.

Plastic or AC Pipes (*Fitting Gate Valve*)

Plastic or AC pipes require a gate valve; however, no welding is required to install the gate valve onto a 7.87- to 15.75-inch (200- to 400-mm) diameter plastic or AC pipe. Simply mount a saddle to the existing pipe, tighten the lug nuts, and connect the 1.57-inch (40-mm) gate valve. Note that a 1.57-inch (40-mm) drill bit must be used when boring a hole in the pipe. Do not install reducers if they will interfere with a protruding drill bit.

Steel Pipes (*Fitting Gate Valve*)

To connect a gate valve to a large-diameter steel pipe, first weld a carbon steel *boss* directly to the pipe. After welding the boss to the pipe and pressure-testing the weld, attach a 1.57-inch (40-mm) gate valve.

> **Note:** A carbon steel boss cannot be welded effectively to a ductile iron pipe. When using the PrimeProbe2 with ductile iron pipes, use a pipe saddle.

Measuring the Internal Diameter of the Pipe

After successfully attaching the 1-inch (25-mm) boss to the pipe, it is critical to take an accurate measurement of the internal diameter of the pipe (pipe ID). This can be done using one of the following:

- Pipe thickness gauge
- Tape measure
- Gauging rod

Pipe Thickness Gauge

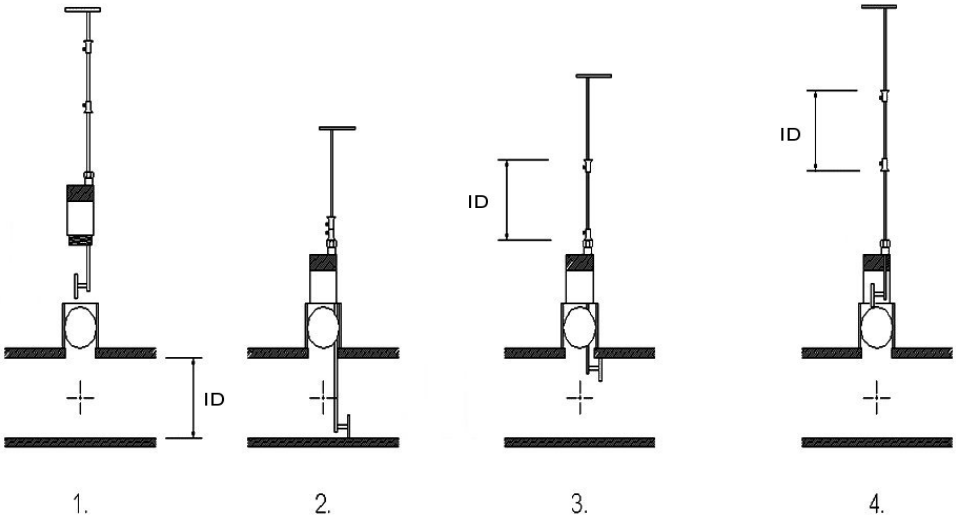
Use an Ultrasonic Pipe Thickness Gauge to measure the ID of the pipe in the following way:

1. Measure the circumference of the pipe using a measuring tape.
2. Divide the measured circumference by π (pi) to obtain the outside diameter of the pipe.
3. Use the ultrasonic pipe thickness gauge to measure the thickness of the pipe wall.
4. Multiply the pipe thickness by 2 and subtract the result from the outside diameter.

Gauging Rod

Use a gauging rod to measure the pipe ID in the following way:

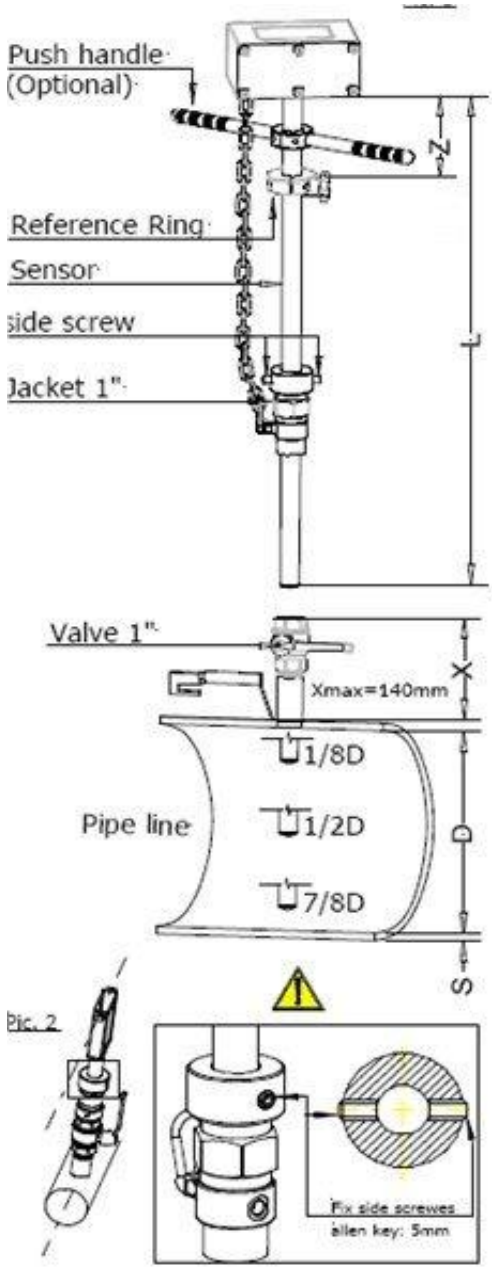
1. With the valve closed, connect the gauging rod to the ball valve. Make sure the measuring arm is aligned correctly with the pipe (*see step 1 in the following figure*).
2. Open the valve completely, and lower the gauging rod until it touches the bottom of the pipe. With the gauging rod touching the bottom of the pipe, rotate the gauging rod 180 degrees and then lock-down the upper *measuring-lip* (*see step 2*).
3. Withdraw the gauging rod until it touches the top of the pipe wall. With the gauging rod touching the top of the pipe wall, lock-down the lower measuring lip. The distance between the two knife-edges of the measuring lips is the internal diameter of the pipe (*see step 3*).
4. Rotate the gauging rod 180-degrees, and withdraw the gauging rod the rest of the distance (i.e., clearing the valve). Close the ball valve completely. Remove the gauging rod (*see step 4*).


ID
ID
ID
1.
2.
3.
4.

Installing the PrimeProbe2

Once the boss/valve is installed, insert the PrimeProbe2 into the pipe. To do this, first determine whether to install the PrimeProbe2 on the centerline of the pipe (1/2-pipe) or at the mean velocity point (1/8 or 7/8-pipe). Centerline installation is the preferred method because it allows for a greater margin of error if installation does not occur exactly on the centerline. Choose the 1/8- or 7/8-pipe (mean velocity) method only when the PrimeProbe2 is not long enough to reach the centerline or the flow velocity is excessive.

Use caution when using 7/8 insertion on larger diameter pipes because excessive velocity can bend the instrument.



Installation Procedure

1. Determine the appropriate Z-value for the selected insertion depth, and then secure the *reference ring* at that value.

Available Insertion Depths	
Insertion	**"Z-value"**
1/8D	L - (X + S + 1/8D + 110)
1/2D	L - (X + S + 1/2D + 110)
7/8D	L - (X + S + 7/8D + 110)

S = pipe thickness

D = internal diameter of pipe

X = distance between (outside) top of pipe and top edge of ball valve

Z = distance between top edge of reference ring and bottom edge of converter box

L = see following table

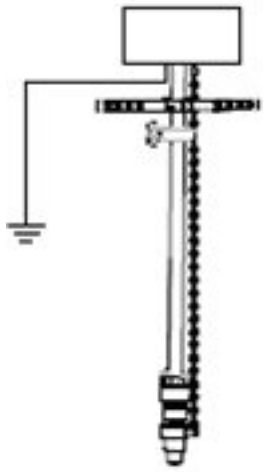
Insertion Length	L
11.81 inches (300 mm)	25.59 inches (650 mm)
19.69 inches (500 mm)	33.46 inches (850 mm)
27.56 inches (700 mm)	41.34 inches (1050 mm)
39.37 inches (1000 mm)	53.15 inches (1350 mm)

Caution: Before continuing, make sure the anti-bounce chain is attached and secure.

2. With PrimeProbe2 fully retracted, screw the 1-inch sensor sleeve into the pipe.
3. Make sure the chain is at full extent.
4. Slowly open the ball valve. Make sure the valve is 100% open.
5. Slowly push the sensor through the open valve into the pipe until the reference ring touches the *locking collar*.
6. Verify that the *push handles* of the PrimeProbe2 are in alignment with the pipe axis (±2 degrees).
7. Tighten the two side screws.

Grounding the Sensor and the Converter

For accurate results, both the sensor and the flow must be at the same potential. To achieve this, always connect both the sensor and the transmitter to ground. Contact ADS concerning pipes with cathodic protection.

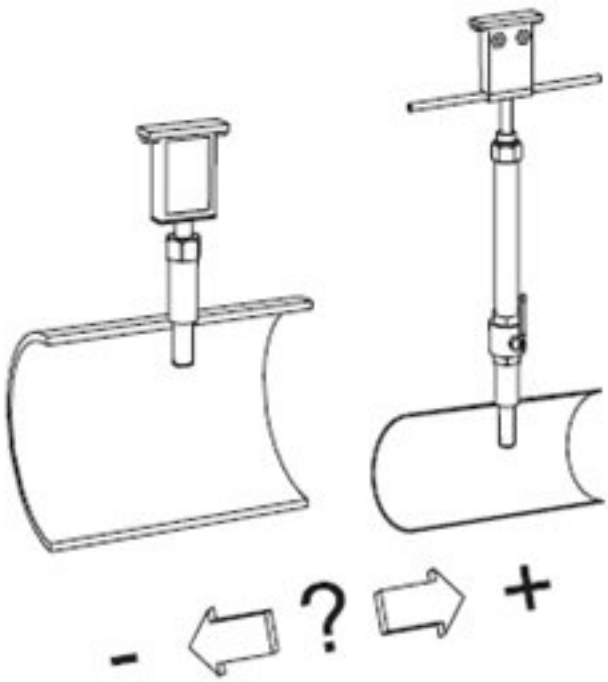


Note: Fluctuating flow rates usually are an indication of poor grounding.

Flow Direction

Prior to completing installation, confirm the direction of the flow in the pipe. Using the nameplate as a reference, flow direction is positive when the flow travels from – to +.

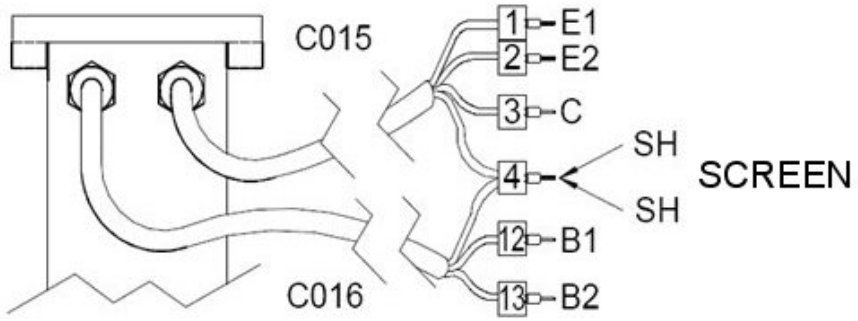
If the flow occurs in reverse following installation, reverse the probe by rotating it 180 degrees. Another option is to reverse the sign of the **KA Factor** (refer to the *Programming the Converter*); however, ADS does not recommend this option.



Connecting the Converter to the Sensor

> **Note:** Only the remote version requires the user to connect the sensor to the converter; the compact version is connected internally at the factory.

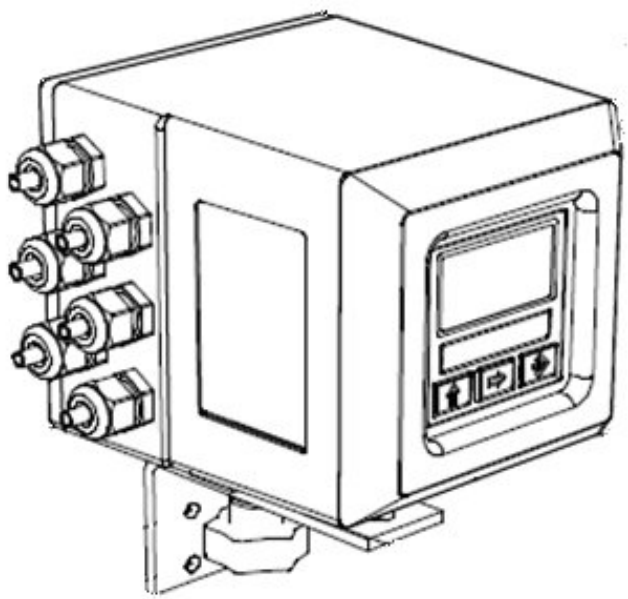
ADS delivers the remote PrimeProbe2 with the sensor cables terminated and potted at the sensor-end. Therefore, no further user intervention at the sensor terminal box should be necessary. However, ADS has intentionally left the converter-end of the cables loose, allowing the user to cut the sensor cables length to accommodate the application. ADS does not recommend extending the cables because each cable has a separate screen.



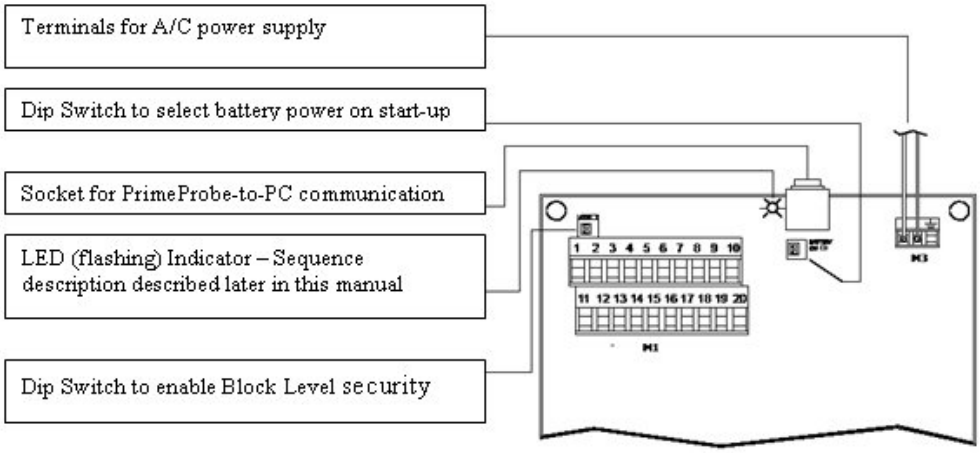
Connect the converter to the sensor in the following way:

1. Loosen the two lowest cable glands on the side of the converter.

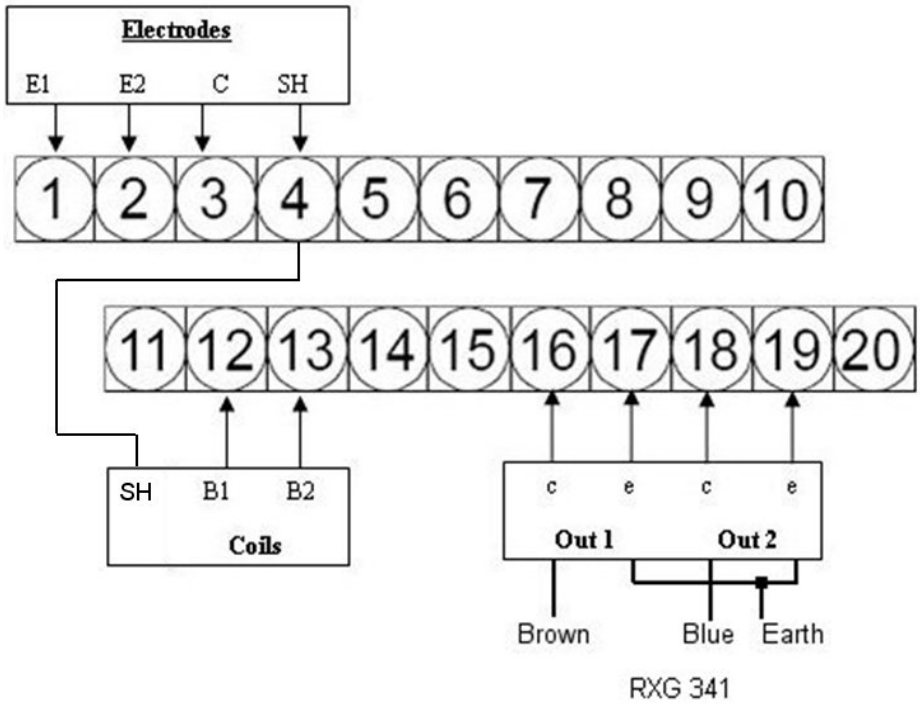
> **Warning:** Be sure that power is not connected to the converter.



2. Remove the back panel from the converter.



3. Insert the two sensor cables through the cable glands into the termination area of the converter.
4. With the back removed and the terminals exposed, terminate the appropriate wires at the numbered terminals.



5. To use the pulse output of the PrimeProbe2, connect the appropriate digital output cable to terminals **16** & **17** (*output 1*) and **18** & **19** (*output 2*).

Pulse Output Characteristics

The pulse output has the following technical characteristics:

- Opto-insulated output with floating collector and emitter terminals, freely connectable
- Maximum switching voltage: 40Vdc

- Maximum switching current: 10mA
- Maximum switching frequency: 32Hz
- Insulation from other secondary circuits: 500 Vdc

Powering-up the PrimeProbe2 Sensor

The PrimeProbe2 Remote can receive power from either lithium (*non-rechargeable*) batteries or mains power.

Battery

To avoid rapid depletion of the battery(s), the sampling rate is preset to 5 seconds (refer to the **E. saving** setting description in the ***Measure*** sub-menu section beginning on page 26). The user can adjust this rate, but this may sacrifice battery life. Refer to the battery life specification (*Chapter 5, Battery Life*, on page 44) to determine the expected battery life for different sampling regimens. ADS supplies 4 lithium batteries: a single pack and a 3-pack of batteries.

Mains

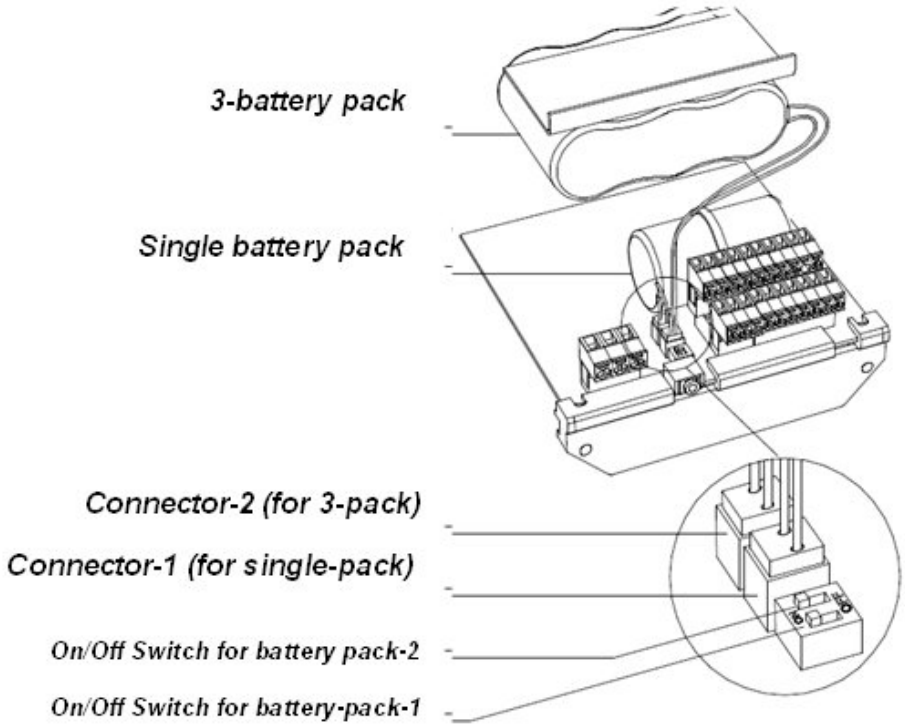
When using mains power, the PrimeProbe2 operates in continuous sampling mode. The user may leave one lithium battery (single-pack) installed under mains power to serve as a backup battery in the event of a mains failure. If the mains power becomes unavailable, the unit will automatically switch over to the backup battery as the power source.

Connecting the Battery Packs

In battery mode, the user can connect either 1 lithium battery or 4 lithium batteries. One battery can serve as either the sole power source or the backup power supply to a mains-powered unit. Using 4 batteries can provide up to a 10-year battery life. Refer to the Battery Life table in *Chapter 5, Battery Life*, on page 44.

To activate the batteries as the main power source, first activate the applicable dip switch. In the **Off** mode, the PrimeProbe2 will not use the battery pack connected to that terminal. In the **ON** mode, the PrimeProbe2 will use the battery pack as the main source of power.

With the batteries connected (*and no mains power*), turning the dip switch to **ON** will power-up the converter (similar to an On/Off switch).



Note: With the battery packs connected and the dip switches **ON**, the PrimeProbe2 is now functional. The next step is to configure the converter corresponding to the specific application.

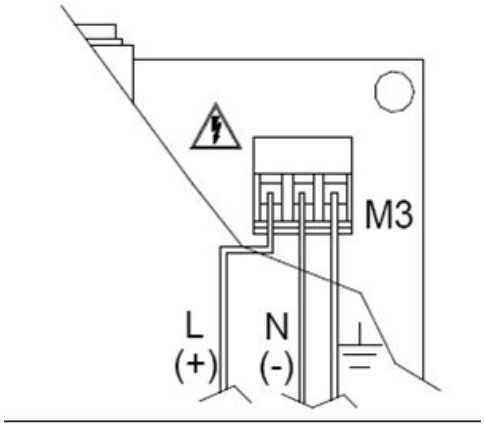
Connecting Mains Power

Important Precautions to Consider Before Connecting to Mains Power

- Only qualified technicians with appropriate knowledge of local codes and practices should make connections to mains power.
- Verify the mains voltage falls within the limits stated on the tag plate.
- Use appropriate fireproof wire and connectors in accordance with local code.
- Equip mains power supply line with external protection for current overload (i.e., fuse or automatic line breaker with limiting capacity of less than or equal to 3A @ 240V).
- Circuit breaker should be located within close proximity to the PrimeProbe converter.

1. Shut off the mains power supply at the closest circuit breaker.
2. Remove the back from the PrimeProbe Converter.
3. Loosen the topmost gland on the side of the converter.
4. Slide the mains cable through the gland and into the termination area of the converter.

5. Connect the mains cable to the **M3** terminal in the termination area of the converter.

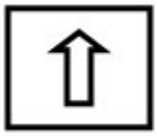
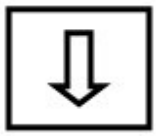
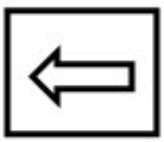
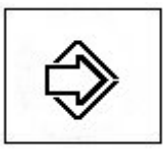
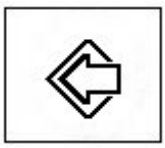


6. Allow a little bit of slack for all cables (i.e., sensor, power, and digital) and tighten all the cable glands on the outside of the PrimeProbe2 converter. Tighten the glands by hand, and then give them an extra ½-turn using a crescent wrench.
7. Replace the back cover onto the PrimeProbe2 converter.

After successful installing the sensor and connecting the converter to the PrimeProbe2 sensor, configure the converter. Program a PrimeProbe2 with an integrated converter using the **PrimeWorks** software on a PC/laptop. A PrimeProbe2 with a remote converter can be programmed using either the **PrimeWorks** software or the 3-key membrane keypad on the front of the converter. Instructions on programming the PrimeProbe2 using **PrimeWorks** are at the end of this section.

Menu Access System

This section applies only to the *remote* PrimeProbe2. Navigate through the menu system using the keypad. The following table describes the 6 key functions:

	**Short Press <1 Second** • Increases the numeric value or parameter selected by the cursor • Goes to the previous item in the menu
	**Long Press >1 Second** • Decreases the numeric value or parameter selected by the cursor • Goes to the next item in the menu
	**Short Press <1 Second** • Moves the cursor to the right in an input field • Goes to the next item in the menu • Changes the display of the process data
	**Long Press >1 Second** • Moves the cursor to the left in an input field • Goes to the previous item in the menu
	**Short press <1 Second** • Enters/edits the selected function • Enables the Main Menu for system configuration • Cancels the selected function in progress
	**Long Press >1 Second** • Exits the current menu • Confirms/enables the selected function • Enables Totalizer Reset Request

Factory Presets

The PrimeProbe2 comes from the factory with the following configuration:

- Dip switches in the **OFF** position
- Access Code L2 = 00000 (*ADS recommends leaving for **PrimeWorks** programming*)

With the access code set at 00000, the user has access to all levels of the Menu Access System without needing a password. The parameters available depend on the dip switches inside the converter.

When first powered **ON**, the display will show the **Quick Start Screen**. Press the  key on the keypad. Scroll through the Quick Start Options until reaching the Main Menu. The sequence occurs as follows:

QUICK START

- Full Scale
- Total Multiplier Units
- Pulse-1
- Pulse-2
- Tpls-1 (time of pulse)
- Tpls-2
- Language

Main Menu

The Main Menu contains the following 11 sub-menus:

1. Sensor
2. Scales
3. Measure
4. Alarms
5. Inputs
6. Outputs
7. Communication
8. Display
9. Data logger
10. Diagnostic
11. Internal Data

Many of the sub-menus have been preset at the factory and, therefore, require no user input.

Sensor

- **ND = mm** Represents the internal pipe bore diameter of the pipe in which the PrimeProbe2 will be inserted. Using the keypad, insert the pipe ID at this position.

- **KA =** Represents the calibration data of the sensor. This is set at the factory and also is available on the nameplate. **Changing this parameter will invalidate the calibration**.
- **S. model =** Represents the sensor model and is set at the factory. Verify that the numbers here are the same as the first two characters of the serial number on the sensor. *Do not change these numbers.*
- **Ins. Position** Represents the depth at which the PrimeProbe2 will be inserted. Use the following numbers to indicate the insertion position:

  0 for 1/8-pipe insertion depth

  1 for ½-pipe insertion depth

  2 for 7/8-pipe insertion depth

  The probe stores values of F_1 and F_p.
- **KL+ and KL-** Represent factory parameters and require no user intervention.
- **E.P. Detection** Represents the function that enables/disables the *Empty Pipe Detection* feature. The setting toggles between **On** and **OFF**. If it is set to **ON** when the converter detects the pipe is empty, the following occurs:

  ❑ **EMPTY PIPE** displays on the screen.

  ❑ The flow rate indicator drops to zero.

  ❑ The totalizers stop advancing.

  ❑ An alarm is sent to either OUT1 or OUT2, as configured.
- **E.P. Calibration** Enables the automatic calibration procedure for the Empty Pipe Detection feature. Please note that the E.P. Detection function should remain OFF until this calibration is performed.
- **Autozero Cal.** Initiates the *automatic zero calibration* function. Please note that this function must be performed at startup or when the pipe has been empty for a long period of time.

  To perform this function, the pipe must be completely full and exhibit no movement of flow. Even small movements in the flow can cause inaccuracies.

  Perform the following to proceed with this function:

  With the cursor on **Autozero Cal.**, press the up-arrow for more than one second and then release. Verify that the flow rate drops to (and stabilizes at) zero. If it does, then repeat this procedure. If the flow rate does not stabilize at/around zero, clean the probe tip. If a problem still occurs, check for cable damage and make sure both the sensor and the converter are properly grounded.

Scales

Unlike many conventional measurement instruments, the PrimeProbe2 has two ranges (N.1 and N.2). Fs2 is more likely to be used with 4-20mA outputs, but one of the outputs must be configured to indicate a change in range.

The **Scales** menu includes the following parameters:

- **Fs1** Represents the Full Scale value for Range N.1
- **Fs2** Represents the Full Scale value for Range N.2

For normal operation, select **Fs1** to be a value (depending on the pipe size entered) equivalent to a flow velocity of 16 feet per second (5 m/s).

> **Note:** It is very important to select the appropriate values for Fs1 and Fs2. These numbers will be the basis for future parameters (e.g., both Flow Cutoffs and Thresholds are described as a percentage of Full Scale)

- **Tot. MU** Represents the units of measure as well as the number of decimal places in the totalizers. Change these parameters in the same way used to change any other parameter. Position the cursor over the appropriate parameter, press **Enter**, and then use the up-arrow to change the values.
- **Imp1** Represents the pulse value of channel-1, the volume of each pulse. Complete three fields for IMP1:
  - ❑ Unit of Measurement
  - ❑ Type of Unit
  - ❑ Numeric Value

  Use the right-arrow to position the cursor between the units of measurement and the numerical value and then use the up-arrow to change the units of measure.

  Pressing the right-arrow for 1 second will confirm the changes to the units of measure. Next, use the right-arrow to move to the numerical values, and use the up-arrow to scroll through each location 0-9. Pressing the up-arrow for more than a second will confirm the numerical selection and move the cursor to the right.
- **Imp2** Represents the pulse value for channel-2. Configure it in the same manner as Imp2. For ADS data loggers, keep this value the same as IMP1.
- **Tpul1** Represents the duration of the pulse generated on Channel-1. This parameter is measured in milliseconds (ms) and must be between 16 and 9999.99 ms. Use the up-arrow and the right-arrow to set these values. The value should be 16 ms for a PrimeLog®.

> **Note:** The user must determine whether the duration of the pulse is compatible with the external device to which it is connected.

- **Tpul2** Represents the duration of the pulse generated on Channel-2. Set up the same way as Tpul1.

Note: Setting the Imp1/Imp2 and Tpul1/Tpul2 incorrectly may result in sending erroneous signals to the external device.

Measure

- **Tconst=s** Effects the response time between the measured value and the displayed/output value.
- **Cut-off = %** Represents the low-flow threshold. Its nominal value is a percentage of Full Scale (set for **Fs1** in the **Scales** sub-menu). When the flow rate drops below this value, the flow is assumed to be zero and totalizers and output respond accordingly. This value can be set from **0 to 25%** (of full scale).
- **AutoCal =** Represents the auto calibration feature and toggles between **On** and **OFF**. When enabled, the PrimeProbe2 performs an auto-calibration cycle once every hour. The procedure lasts from 9 to 15 seconds. During this period, the flow rate is *frozen*, but not lost. This means that during the autocal process, the PrimeProbe2 registers the same flow rate as the last reading taken before the autocal process began. Use auto calibration to remove temperature-induced errors and at locations that experience large temperature variations.
- **Autorange=** Allows the PrimeProbe2 to switch automatically from the Fs1 to Fs2 range (N.1 to N.2). This function is useful for pipes with large variations in flow rate. Fs2 must be set at a greater value than Fs1. Toggle this feature **On** and **Off**. Any external device connected to the PrimeProbe2 must acknowledge changes in range.
- **E. saving** Represents an *energy saving* feature and works in conjunction with the time constant. The default setting is **ON**. This allows for 5-second sampling intervals.

  If turned off, the probe will sample at 20Hz, which may cause rapid battery depletion. Use only when connected to a mains power source.

Alarms

Typically, PrimeProbe2 users will connect the instrument to an ADS data logger, using both outputs (one for forward flow; one for reverse flow). Under this configuration, the data logger (*not the PrimeProbe*) will manage the threshold alarms.

If the user chooses not to use the PrimeProbe2's alarm capabilities, the user must allocate one of the outputs (typically, OUT2) for this task. The **Alarm** menu contains the following:

- **Max Thr+=%** Represents the alarm setting for maximum forward flow. When the flow rate exceeds this setting, an alarm event will be generated. Enter the value of this alarm as a percentage of Fs1, from 0 to 125%. To disable the alarm, set the percentage to zero.
- **Max thr-=%** Represents the alarm setting for the maximum reverse flow. Setup this parameter similar to **Max Thr+=%**.
- **Min thr+=%** Represents the alarm setting for the minimum threshold value for forward flow. When the flow rate drops below this value, an alarm will be generated. Set this parameter at a value between 0 to 125% of Fs1.
- **Min thr-=%** Represents the alarm setting for the minimum threshold of reverse flow. Configure this parameter in the same way as **Min thr+=%**.
- **Hyst.=%** Represents the Hysteresis threshold, or *dead-zone*, for the Max/Min thresholds. Enter this threshold as a percentage of Fs1. For example, when the Hysteresis threshold is set at 10, the flow rate must drop above/below the Min/Max thresholds by more than 10% before generating an alarm. All ADS data loggers (included in the *Water Loss Control Products* family) have the same feature.
- **E.p. thr.=** Represents the empty pipe threshold and is set automatically by the **E.P. Calibr.** parameter in the **Sensor** sub-menu.

Inputs

Currently, the PrimeProbe2 does not include ports for inputs. However, this device may support this capability sometime in the future.

Outputs

The PrimeProbe2 comes preconfigured to provide both forward and reverse pulses through an ADS digital cable. Therefore, modifying the **Outputs** parameters in should not be necessary unless the application requires connection to a different device. However, following is a brief description of the menu options:

- **Out1 =** Represents the menu for setting the output functions of Output-1. The following table lists the available functions:

OFF	Disabled
#1 IMP+	Pulse on N.1 for forward flow
#1 IMP -	Pulse on N1 for reverse flow
#1 IMP +/-	Pulse on N.1 for Net flow
#2 IMP +	Pulse on N.2 for forward flow
#2 IMP -	Pulse on N.2 for reverse flow

#2 IMP +/-	Pulse on N.2 for net flow
Sign	Flow direction output
Range	Range Indication output
Max. Al+	Flow exceeds Maximum Threshold+
Max Al-	Flow exceeds Minimum Threshold -
Max +/-	Flow exceeds Net threshold
Min Al+	Flow below Minimum Threshold +
Min Al -	Flow below Minimum threshold -
Min Al +/-	Flow below net threshold
P. pipe	Empty Pipe alarm

- **Out2 =** Is set to the output functions of Out2 and is configured using the same procedures as Out1.

Communications

Besides the integrated keypad of the PrimeProbe2 with remote display, only one other communication protocol exists. This protocol, *IF2*, uses a PrimeProbe-PC link cable (USB) for configuration. The user can also configure the PrimeProbe2 using the **PrimeWorks** software with this protocol.

Set this parameter to **HTP** for **PrimeWorks** communication.

Display

- **Language** Allows the user to select from among several languages for the PrimeProbe2 display:
  - ❑ E = English
  - ❑ I = Italian
  - ❑ F = French
  - ❑ S = Spanish
- **T+ reset** Allows the user to reset the Forward Totalizer using the keypad. Simply press **Enter**, and the **Execute?** message will appear. HOLD **Enter again**, and a **Done** message will display.
- **P+ reset** Allows the user to reset the Partial fFrward totalizer. Use the same procedure as described in **T+ reset**.
- **T- reset** Allows the user to reset the Reverse Totalizer. Use the same procedure as described in **T+ reset**.
- **P- reset** Allows the user to reset the Partial Reverse Totalizer. Use the same procedure as described in **T+ reset**.
- **D. Times** Allows the user to set the amount of time, since the keypad was last used, before the display turns itself OFF. Enter this value in seconds. To turn the display back ON, simply hold

down any key on the keypad for more than 1 second. After releasing the key, characters will appear on the display.

> **Note:** When the display is on, *energy save* mode goes off, reducing battery life significantly.

Please keep in mind that even though the display may be OFF, the PrimeProbe is still in operation and measuring flow. If the PrimeProbe2 will not be used for an extended period of time, place the instrument in standby mode (described in Stand-by under Diagnostics).

- **Quick Start =** Allows the user to toggle On or Off the Quick Start Menu.
- **Net Total =** Allows the user to turn On or Off the display of Net Totals.
- **Currency =** Activates the currency functions. When activated, a currency value appears on the display in place of the totalizers (i.e., a monetary value appears that is equivalent to the totals). This corresponds to the Partial Totalizers. When the partial totalizers are reset, the currency totalizers are also reset.
- **Curr. Decim. =** Allows the user to select the number of decimal places in the Currency display. Choose from 0 to 3.

Data Logger

PrimeProbe2 does not have an internal data logger. Program the external data logger separately from the PrimeProbe2 using **PrimeWorks** software. This menu exists for possible future functionality.

Diagnostics

- **Calibration** Allows the user to calibrate the sensor. Press the **Enter** key with the cursor on **Calibration**. **Execute?** will appear on the display. Press **Enter** to confirm, or any other key to cancel the operation.
- **Self Test** Allows the user to test all the functions of the PrimeProbe2, including all the input circuits and the excitation generator. Initiate the test by pressing the **Enter** key. When **Execute?** appears on the display, press **Enter** to confirm.

  After completion, the results from the test will appear on the display. This test occurs every time the user turns on (powers up) the unit.
- **Simulation** Facilitates flow rate simulation. This function is useful when testing external units connected to the PrimeProbe2. Toggle **On/Off** to start/stop this feature.
- **Stand-by** Allows the user to place the PrimeProbe2 in standby mode when it will not be used for an extended period of time. To activate this function, press the **Enter** key. When the **Execute?**

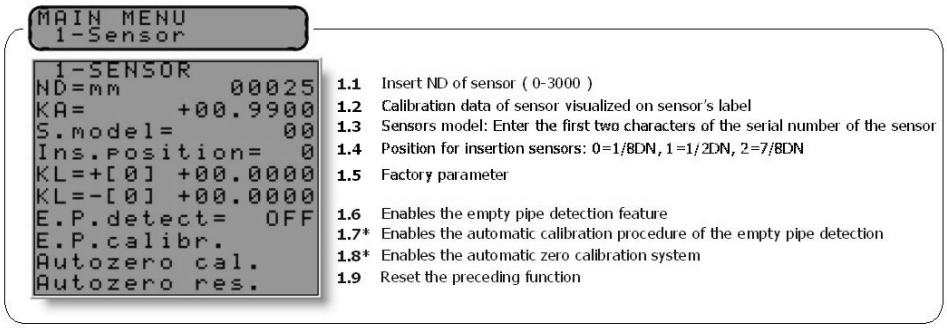
message displays, press **Enter** again. The instrument will switch over to standby mode. To re-activate the PrimeProbe2, hold down any one of the three keys on the keyboard for more than 1 second. In standby mode, the PrimeProbe2 consumes about 50 mA of power.

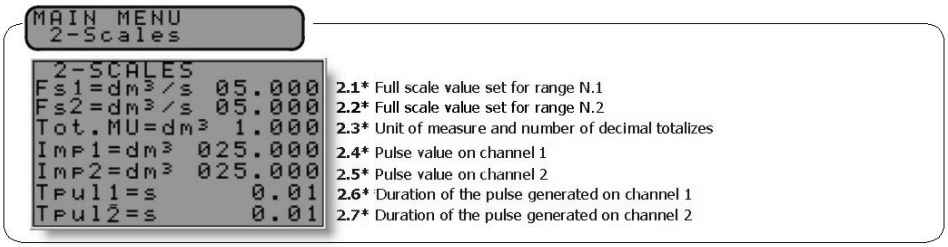
Internal Data

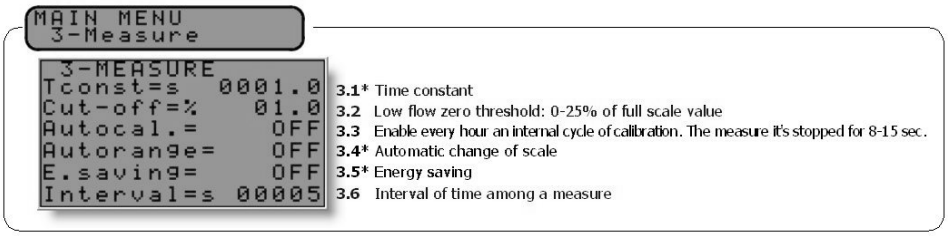
- **L2 keycode** Allows the user to set a Level-2 access code. This code may range from 00001 to 65535.
- **Block Level** Allows the user to set a level from 0 to 3. Each level enables and disables certain functions.
- **Load fact. Pres.** Allows the user to reset the factory default settings, eliminating previous settings entered by the user.
- **Load user pres.** Allows the user to save the current settings as user pre-settings in the **Save user pres.** fields.
- **Hours** Represents the total amount of time the PrimeProbe2 has been in operation. The user cannot edit this field.
- **KS =** Represents a sensor calibration factor and should not be changed under any circumstances.

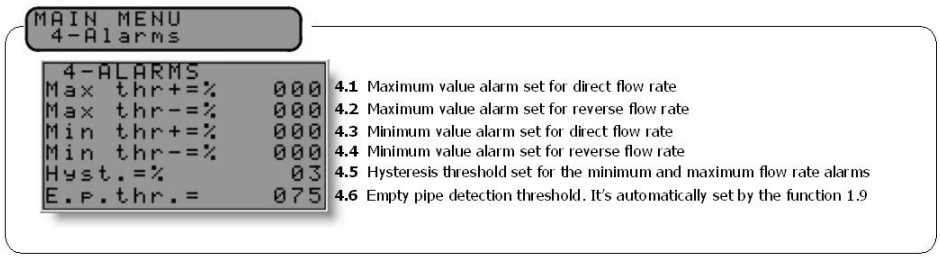
Converter Functions

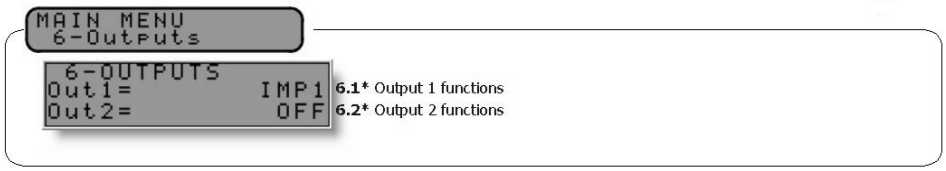
This section shows the functions and descriptions of the PrimeProbe2 settings. The entries in blue represent advanced entries (used in the **PrimeWorks** software).

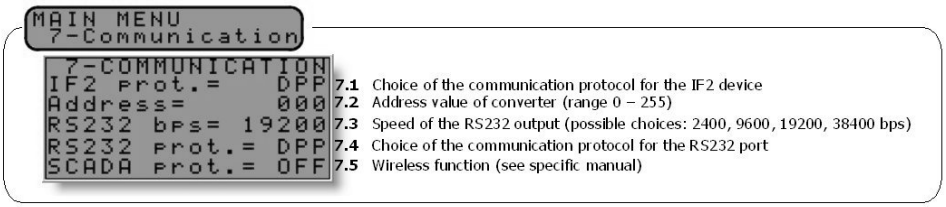


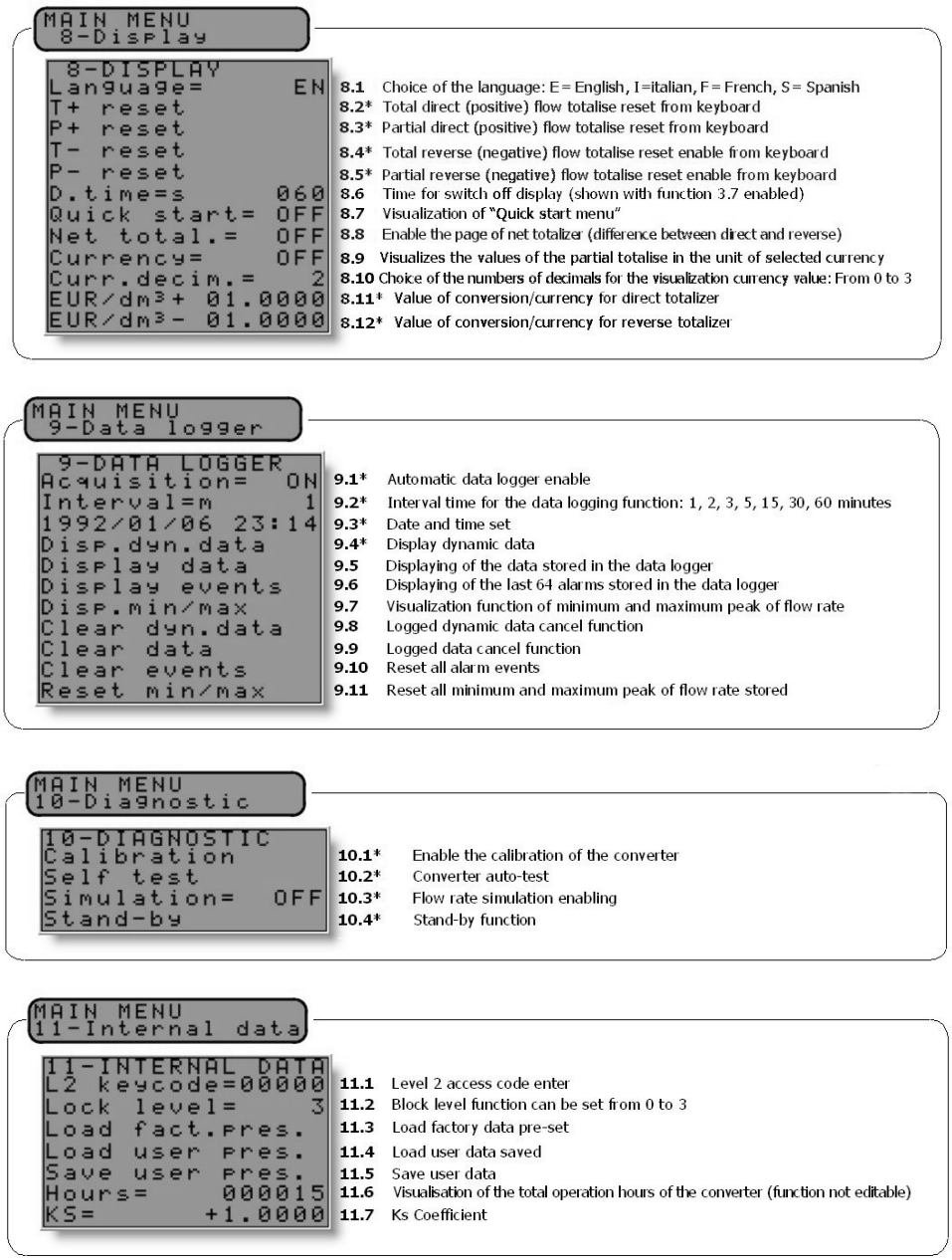












Default Values

This section details the default values.

Sensor

ND = 200 mm (7.87 inches)

Ins Position = 0

Scales

FS1 = m3/h 342

Tot. MU = m3 1.0000

Imp1 = m3 0.01 (i.e., 10 l/sec)

Imp2 = m3 0.01 (i.e., 10 l/sec)

Tpul1 = s 0.016

Tpul2 = s 0.016

Measure

Tconst=s 45

Step through = 50%

Outputs

Out1 = Imp1+

Out2 = Imp2-

Communication

IF2 = HTP

Display

Quick Start = On

Net Total = On

Entry Definitions

MENU 1.SENSOR

(POS. 1.7) "empty pipe" calibration **[E.P. CALIBR.]**

This function enables/disables the automatic calibration procedure of the empty pipe detection function. Before enabling this function, the Empty Pipe test should be enabled first as above described. Before performing this function, the sensor has to be completely filled with the liquid so that both the lining and the electrodes are wetted. The sensor has then to be emptied again and then you should press the key [◆] : the operation will have to be confirmed by pressing the key [◆] or cancelled by pressing the key [◆]. By this function the system sets the value of a parameter that could also be manually changed (see function "E.P.thr" menu 4-ALARMS).

(POS. 1.8) "Autozero" calibration **[AUTOZERO CAL.]**

Enables/disables the automatic zero calibration system. It is necessary to perform this function at the first sensor installation or after a long period the sensor has been empty. To perform the sensor it is absolutely necessary the sensor is full of liquid and that the liquid is perfectly still. Even very small movement of the liquid may affect the result of this function, and, consequently, the accuracy of the system. Once you are sure the a.m. conditions are fulfilled press for more than one second the key [▼] ; will start one counter for 60s, after that check if the zero is correct , otherwise repeat the operation again. Press [◆] to go out the function.

MENU 2.SCALES

(POS. 2.1-2.2) Full scale n° 1-2 **[FS1-2=*dm³/S* X.XXXX]**

Full scale value set for range N.1-2. There are four fields to fill in order to set this parameter, from left to right: 1) volume unit of measure, 2) type of unit, 3) time unit of measure and 4) numeric value. The selection is made by positioning the cursor on the field to modify. To change the type of unit of measure (metric, British or American, mass or volume) the cursor has to be positioned on the symbol "/" (field N. 2). When the nominal diameter is set to zero it is possible to modify only the numeric field, since the unit of measure stays at m/sec. The following tables show the units of measure available and the conversion factor by comparison with 1 dm^3 and 1 kg. The converter accepts any kind of combination of units of measure satisfying both the following conditions:

- Numeric field value $\leq$ 99999
- $^1/_{25}$ $fs_{max} \leq$ numeric field value $\leq fs_{max}$.

where fs_{max} is the maximum full scale value corresponding to the sensor, equal to a 10 m/sec liquid speed. The units of measure are shown as appear on the display. The British and American units are diversified by using capital and small characters.

When a mass unit of measure is set, the specific gravity function is automatically enabled by the system. Please, note that the temperature heavily affects the mass measure and therefore with certain liquids this may cause significant measure errors. The units of measure of time may be chosen among the following values: **s** = second, **m** = minute, **h** = hour, **d** = day.

(POS. 2.3) Unit of measure and number of decimal totaliz. **[tot. UM.:dm³ X.XXX]**

Setting the unit of measure and number of decimals for visualized the totalizer

For set the unit of measure , position the cursor on field of the actual unit of measure; For set the type of unit, position the cursor on the blank space between the unit of measure and the numeric value; For set the number of decimal totaliz . position the cursor on numeric field and choose one of the possible combinations: 1000-01.00-001.0-00001.

(POS. 2.4-2.5) Pulse value channel 1 and unit of totaliz . **[IMP1-2=dm³X.XXXXX]**

Setting of the pulse volume corresponding to channel 1-2 and of the totalizers measure units. There are three fields to fill in to set this parameter, from left to right: 1) measure unit, 2) unit type and 3) numeric value. The selection is performed by positioning the cursor on the field to be modified. To change the unit type (metric, British or American, mass or volume) just position the cursor on the blank space between the measure unit and the numeric value. When the nominal diameter is set to zero it is possible to modify only the numeric field since the measure unit stays at meter (m) or feet (ft). The possible measure units are those above described

(POS. 2.6-2.7) Pulse duration channel 1 **[TPUL1-2=msXXXX.XX]**

Setting of the duration of the pulse generated on channel 1. Its value is expressed in milliseconds and has to be between 0.4 and 9999.99.

(POS.2.8-2.9) Minimum/maximum value for input 4÷20mA **[I. IS=*bar* ±XXX.XX]**

Setting the minimum/maximum value for external device with 4÷20mA output. There are four fields to fill in to set this parameter, from left to right: 1) unit of measure, 2) type of unit of measure and 3) sign, 4) numeric value. The selection is performed positioning the cursor on the field to modify. To change the type of unit of measure (pressure, temperature or percentage of f.s) just position the cursor on the blank space between the unit of measure and the numeric value. This functions is active only with additional module.

Available units of mass and volume

cm^3	Cubic centimetre
ml	Millilitre
l	Litre
dm^3	Cubic decimetre
dal	Decalitre
hl	Hectolitre
m^3	Cubic metre

in^3	Cubic inch
Gal	American gallon
GAL	British gallon
ft^3	Cubic foot
Bbl	Standard barrel
BBL	Oil barrel
yd^3	Cubic yard
kgl	KAmerican gallon
KGL	KBritish gallon

Oz	Ounce
Lb	Pound
Ton	short tons

G	Gram
Kg	Kilogram
T	Ton

MENU 3. - MEASURE

(POS. 3.1) Time constant **[T. COST=sXXXX.X]**

Time constant set. This parameter affects the integrating filter making the instrument response quicker or slower, depend to the set value. A higher value corresponds to a more stable but slower measure, a smaller value the opposite. The most common values are from 1 to 5 seconds. The value of this parameter has to be within the range from 0 (integral filter disabled) to 6000.0 seconds. The following diagram shows the response of the instrument for a flow rate variation from 0 to 100% within the T time constant period.

(POS. 3.4) Automatic scale change enable **[AUTORANGE=ON/OFF]**

Enables the automatic change of scale. The meter may have two different working ranges in order to suit to the variable process conditions. In order to get the best results out of this function it is important that range N.2 is bigger than N.1. When the flow rate increases and reaches the 100% of the full scale 1, then the meter automatically switches to scale 2. When the flow rate decreases again reaching a value on scale 2 equal to the 90% of full scale N.1, then the active scale is 1

again. Allowed values for this parameter: ON / OFF. **N.B.:** the autorange doesn't allow using the manual change of range (see pos. 5.8)

(POS. 3.5) Energy saving enable **[E.SAVING=ON/OFF]**

Enable automatic energy saving function. This function IF ON, ENABLES THE OPERATION OF THE METER IN ACCORDANCE WITH INTERVALS OF FIXED TIME WITH THE FOLLOWING FUNCTION; if OFF the measure is continuous at 10 Hz of frequency. Allowed values for this parameter: ON/OFF

MENU 6. OUTPUT

(POS. 6.1-6.2) Function corresponding to on/off output 1-2 **[OUT 1-2=XXXXXX]**

Choice of the function corresponding to digital Output 1-2. The functions are listed in the table below

FUNCTION FOR OUTPUT 1, 2,3

- OFF: DISABLED
- #1 IMP+: PULSE ON CHANNEL 1 FOR POSITIVE FLOW RATE
- #1 IMP-: PULSE ON CHANNEL 1 FOR NEGATIVE FLOW RATE
- #1 IMP±: PULSE ON CHANNEL 1 FOR POSITIVE AND NEGATIVE FLOW RATE
- #2 IMP+: PULSE ON CHANNEL 2 FOR POSITIVE FLOW RATE
- #2 IMP-: PULSE ON CHANNEL 2 FOR NEGATIVE FLOW RATE
- #2 IMP±: PULSE ON CHANNEL 2 FOR POSITIVE AND NEGATIVE FLOW RATE
- SIGN: FLOW DIRECTION OUTPUT (ENERGISED = -)
- RANGE: RANGE INDICATION OUTPUT (ENERGISED = SCALE 2)
- MAX AL+: MAX DIRECT FLOW RATE OUTPUT (ENERGISED = AL. OFF)
- MAX AL-: MAX REVERSE FLOW RATE OUTPUT (ENERGISED = AL. OFF)
- MAX AL±: MAX DIRECT/REVERSE FLOW RATE OUTPUT(ENERGISED = AL. OFF)
- MIN AL+: MIN DIRECT FLOW RATE OUTPUT(ENERGISED = AL. OFF)
- MIN AL-: MIN REVERSE FLOW RATE OUTPUT(ENERGISED = AL. OFF)
- MIN AL±: MIN DIRECT/REVERSE FLOW RATE OUTPUT(ENERGISED = AL. OFF)
- MAX+MIN±: MAX AND MIN FLOW RATE ALARM OUTPUT (ENERGISED = AL. OFF)
- EMPTY PIPE: EMPTY PIPE ALARM OUTPUT (ENERGISED = FULL PIPE)
- OVERFLOW.: OUT OF RANGE ALARM OUTPUT (ENERGISED = FLOW RATE OK)
- HW ALARM: CUMULATIVE ALARM OUT interrupt coils, empty pipe, meas. error (ENERG. = NO ALARMS)
- EXT. COMM.: ONLY AVAILABLE WITH DATA LOGGER MODULE

MENU 8.DISPLAY

(POS. 8.2-8.3-8.4-8.5) Reset totalizer **[T/P+/- RESET=ON/OFF]**

Reset of totalizer by key board;

N.B.: The reset of the totaliz . may be done from the function listed upon pushing the key and the key . The reset of partial totalizer /currency may be done also from the visualization pages at page 12 like this . Push the key Set the L2 CODE if request and then push the key . At the question "RESET TOTALIZ.?". Push the key to proceed with the zeroing. Push any other key to cancel this operation.

(POS. 8.9) Enable conversion currency **[CURRENCY =ON/OFF]**

This function shows the values of the partial totalizators converts in the selected unit of currency.

(POS. 8.10) Decimal currency **[CURR DECIM =X]**

This function allows the choice of the numbers of decimals to use for the visualization of the numerical value converted in the currency. The allows values are from 0 to 3. The function is active only if the currency function is enabled.

(POS. 8.11-8.12) Conversion factor for flow rate totalizers **[EUR/dm³+ =X]**

Set the value of conversion/currency for totalizers. There are three fields for this parameter, from left to right:1) monetary token, 2) default/personalized monetary token, 3) conversion coefficient. For the selection setting the cursor over the field to modify. The mode set of monetary token could be two:

- choice of one of the 7 predetermined monetary tokens (standard ISO 4217-REV81):
  EUR = Eur, USD = USA dollar, CAD = Canadian dollar, AUD = Australian dollar, GPB = English pound, CHF = Swissfranc, JPY = Japanese yen.

MENU 9.DATA LOGGER

(POS. 9.1) Automatic data logging enable **[ACQUISITION =ON/OFF]**

Enable data logging; 8192 values in packets with flow rate, partial volumes + and - , input 4/20mA or pressure, date and time of record.

(POS. 9.2) Data logging time interval set **[INTERV.(h)=X]**

Sampling time interval for the data logging function and their printing. The allowed values are: 1, 1, 2, 3, 5, 15, 30, 60 minutes **(only for Eeprom data logger)**

(POS. 9.3) Date and time set **[⏲ = DD/MM/YY hh:mm]**

Date and time set. If the real time clock optional module is present, then the time setting is kept also when the power supply is off, otherwise it is frozen till the power supply is back. For example, if the power supply has been off for one hour, when switched on the instrument will be one hour late. The calendar is valid till year 2091.

N.B.: Date and time are visualized only if data logger is ON.

(POS. 9.4) Logged data display in RAM **[DISP. DYN DATA]**

Displaying of the data stored in the RAM memory of data logger. This values are the last 512 sample (shift register): min time. 1 s, or to intervals according to the sampling time (example: 1 sampling every 15 s); is possible scroll down the data stored.

MENU 10. DIAGNOSTIC

(POS. 10.1) Meter "calibration" **[CALIBRATION]**

Enable the calibration of the meter. With this function the measure doesn't interrupted but start a cycle calibration of the input circuit of the converter.

The activation of this function happens pressing the key during the visualization of the function.

Will be visualized the following question: " EXECUTE?" press the key to proceed . Press any other key to delete the operation

(POS. 10.2) "Autotest" function enable **[SELF TEST]**

Meter auto test function. This function stops the normal functions of the meter and performs a complete test cycle on the measure input circuits and on the excitation generator. To activate this function, after select it, push key , at the question: "EXECUTE?" push the key for start autotest, or any other key for delete operation. The result of the test is shown on the display. At the end of operation will have visualized one of visualization page. This function is automatically performed when switching the device on.

(POS. 10.3) Flow rate simulation **[SIMULATION]**

Flow rate simulation enabling. With this function it is possible to generate an internal signal that simulates the flow rate, allowing the outputs and all the connected instruments test.

After enabling it, the flow rate simulation can be:

set: by pushing for more 1 second the key from one of four visualization pages

started: by pushing the key after set it

finished: by pushing for more 1 second the key from visualization pages and then pushing for more 1 second the key .

N.B.: the enable of flow rate simulation disable the contrast regulation.

(POS. 10.4) Stand-by of meter **[STAND-BY]**

Enable the stand-by of the meter. To activate this function, after select it, press the key and at the request "Execute?" press the key to activate the stand-by of the instrument, any other key to delete the operation. To reactivate the instrument is enough press any key of the keyboard. The consumption of the instrument in stand by is about 50 µA

NOTE : we recommend to enable this function when the meter will be off for long term.

MENU 11.INTERNAL DATA

(POS. 11.1) Level 2 access code set **[L2 KEYCODE=XXXXX]**
Level 2 access code enter. This code is programmable by the user within the range 00001 - 65535. Setting such a value at 22222 the access code for levels lower than level 3 is disabled. (see pag. 18)

(POS. 11.2) Block level **[BLOCK LEVEL =X]**
Block level function can be set from 0 to 3. Every level enables and disables specific functions (see pag. 23).
N.B.: the block levels are enabled only if the dip-switches on the back of converter are on

(POS. 11.3) Factory pre-set data loading **[LOAD FACT PRES.]**
Re-set the default factory data. Any previous programming is cancelled getting back to the manufacturer's standard values

(POS. 11.4) User pre-settings loading **[LOAD USER PRES.]**
This function recalls the values saved from the user.

(POS. 11.5) User pre-settings saving **[LOAD USER PRES.]**
This function saves the current programming as user pre-settings.

(POS. 11.6) Operation time **[HOURS=XXXXXX]**
This function allows the visualisation of the total operation hours of the converter

(POS. 11.7) Set KS **[KS=±X.XXXX]**
Set KS. These parameters give the possibility to change the calibration of the instrument without change the values of plate (KA)

(POS. 11.8) Ignore calibration error **[Ign.cal.err= ON/OFF.]**
This function if ON , ignore the calibration error during the switch on test. Default setting OFF, the converter give alarm if present during the initial test.

CHAPTER 3

Operation

This section includes instructions on setting up the PrimeProbe2 using the **PrimeWorks** software.

Software Setup

The PrimeProbe2 software is part of the **PrimeWorks** software application. To access PrimeProbe2, launch the **PrimeWorks** software and select the **PrimeProbe2** menu.

Two methods of software setup are available:

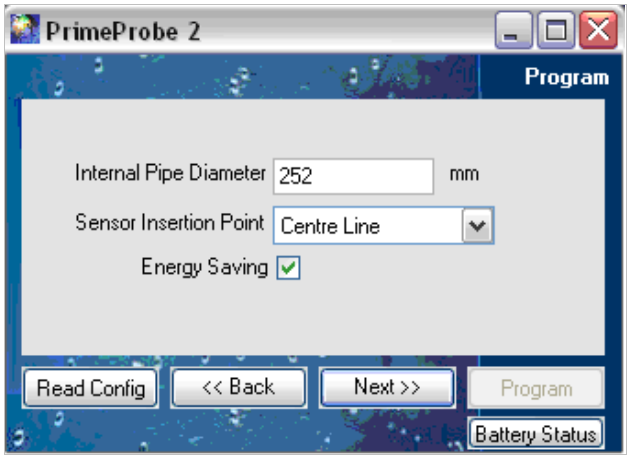
- **Basic** This option runs a wizard.
- **Advanced** This option allows the user to enter and change various parameters as required.

Setup Wizard

Selecting the *basic* option displays the wizard screen. The setup must be read from the PrimeProbe2 before changes can be made.

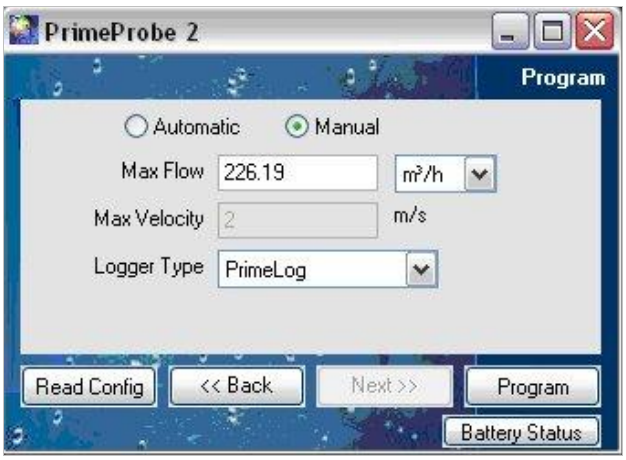
1. Install the probe mechanically in the chosen position in the pipe.
2. Wake up the probe from the menu.
3. Choose the program/compact setup wizard.
4. Select the required mode.

5. Click on the **Next** button. The second wizard screen displays:



- ❑ Enter the **Internal Pipe Diameter** and select the **Sensor Insertion Point**. ADS recommends *centerline* (**Centre Line**).
- ❑ ADS recommends selecting the **Energy Saving** checkbox. Leaving it unselected will cause the rapid depletion of the battery. This option is available only when **Permanent** is selected on the first screen.

6. Click **Next** to go to the last wizard screen.
7. Enter the maximum flow value either by selecting a flow rate (**Manual**) or specifying a velocity (**Automatic**). This scales the output pulses deriving an FCAL value that will be programmed into the attached logger. The maximum output from the PrimeProbe2 is 32Hz. If the maximum flow for a site is unknown, ADS recommends selecting **Automatic** and setting the velocity to 7 feet per second (2 m/s). Velocity is unlikely to exceed this value.



8. Click **Program** to display the FCAL value. This is the value that will be programmed into the connected logger. When using an ADS PrimeLog, make sure the logger is programmed with the sensor type PrimeProbe2 and this FCAL value.

CHAPTER 4

Part Numbers

This chapter includes the part numbers for the compact and remote versions of the PrimeProbe2.

PrimeProbe2 (*Compact*) Part Numbers

Part	ADS Part Number
PrimeProbe2 Compact – Length: 11.81 inches (300 mm)	RXG810-001
PrimeProbe2 Compact – Length: 19.69 inches (500 mm)	RXG811-001
PrimeProbe2 Compact – Length: 27.56 inches (700 mm)	RXG812-001
PrimeProbe2 Compact – Length: 39.37 inches (1000 mm)	RXG813-001
PrimeProbe2 Compact – Communications Cable	RXG820-001
PrimeProbe2 Compact – Output Cable to PrimeLog Logger	RXG921-001
PrimeProbe2 Compact – Output Cable to Bare Wires (for connection to other devices)	RXG826-001
Gauging Rod – 1-inch (25 mm) BSP Connection – Length: 19.69 inches (500 mm)	TXG101/3-001
Gauging Rod – 1-inch (25 mm) BSP Connection – Length: 39.37 inches (1000 mm)	TXG101/6-001
Transport Case – 11.81-inch (300-mm) Insertion Length	RXG822-001
Transport Case – 19.69-inch (500-mm) Insertion Length	RXG823-001
Transport Case – 27.56-inch (700-mm) Insertion Length	RXG827-001

PrimeProbe2 (*Remote*) Part Numbers

Part	ADS Part Number
PrimeProbe2 Remote (Sensor + Converter) – Length: 11.81 inches (300 mm); Cable Length:16 feet (5 m)	RXG814-001
PrimeProbe2 Remote (Sensor + Converter) – Length: 19.69 inches (500 mm); Cable Length: 16 feet (5 m)	RXG815-001
PrimeProbe2 Remote (Sensor + Converter) – Length: 27.56 inches (700 mm); Cable Length: 16 feet (5 m)	RXG816-001
PrimeProbe2 Remote (Sensor + Converter) – Length: 39.37 inches (1000 mm); Cable Length: 16 feet (5 m)	RXG817-001
PrimeProbe2 Remote – Communications Cable	RXG821-001
PrimeProbe2 Remote – Output Cable to PrimeLog Logger	RXG925-001
Gauging Rod – 1-inch (25 mm) BSP Connection – Length: 19.69 inches (500 mm)	TXG101/3-001
Gauging Rod – 1-inch (25 mm) BSP Connection – Length: 39.37 inches (1000 mm)	TXG101/6-001

CHAPTER 5

Battery Life

The following table provides the battery life based on the sampling interval and number of batteries in use. However, whatever the results, the maximum battery life is limited to 10 years.

Sampling Time (seconds)	Battery Life – 1 Battery (years)	Battery Life 'N' batteries (years)
1	0.7	0.7 * N
2	1.3	1.3 * N
5	2.1	2.1 * N
10	2.7	2.7 * N
15	3.0	3.0 * N
>=30	5	5.0 * N

CHAPTER 6

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