

GE Panametrics Dual Channel Ultrasonic Flow Meter

The GE Panametrics TransPort Dual Channel Ultrasonic flow meter:

- is a non-intrusive, portable ultrasonic liquid flow meter for chilled and hot water applications
- monitors flow of fluids that are homogenous, single phase, relatively clean and flowing steadily
- has a digital display for instantaneous flow measurements and data logging capabilities



Figure 1: Flow meter installed in the field.

The ultrasonic flow meter uses a pair of transducers, with each transducer sending and receiving coded ultrasonic signals through the fluid. When the fluid is flowing, signal transit time in the downstream direction is shorter than in the upstream direction; the difference between these transit times is proportional to the flow velocity. The flow meter measures this time difference and uses programmed pipe parameters to determine flow rate and direction.

Below are instructions on the procedures for configuring the flow meter with the keypad interface and for the physical installation of the ultrasonic transducers.

Components of the Dual Channel Ultrasonic Flow Meter Kit

1. TransPort portable flow meter
2. Measurement rails
3. Clamping fixtures
4. Ultrasonic transducers
5. Transducer cables



Figure 2: The flow meter kit

Physical Installation Requirements and Pipe Preparation

1. **Install the transducers on a straight run of pipe free of valves, flanges or elbows.**
2. **Locate the transducers so that there is a length of at least 10 pipe diameters of straight, undisturbed pipe upstream from the point of measurement and 5 pipe diameters of straight, undisturbed pipe downstream from the point of measurement.** If less straight, undisturbed pipe is available use the 2/3 up and 1/3 down rule (2/3 of the available straight, undisturbed pipe upstream and 1/3 of the available straight, undisturbed pipe run downstream).

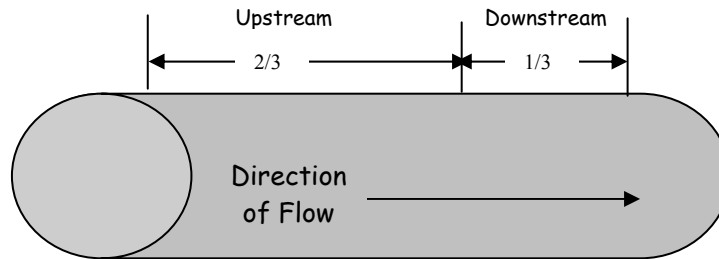


Figure 3: Location of transducers on straight run of pipe.

3. **The transducers can be installed on a horizontal run of pipe or a vertical run of pipe with flow going up. NEVER** install on a vertical run of pipe with flow going down, the excessive turbulence will interfere with the ultrasonic signal.
4. **Prepare the pipe.** On the section of pipe where the clamping fixture, rails and transducers will be installed cut back the insulation and clean and sand the pipe. If the pipe is extremely rough the ultrasonic signal will be scattered by the rough surface and will not be received by the flow meter, preventing flow measurement.

Measure Pipe Thickness with Thickness Gage



Figure 4: The (a) pipe thickness gage is located inside the flow meter case in a small plastic box along with the (b) calibration test block, (c) pipe thickness couplant gel and (d) pipe diameter tape.

The pipe thickness gage is used to measure the actual pipe thickness.

1. **Connect the pipe thickness gage (figure 4a) to the Channel 1 port on the meter.**
2. **Press the [ON] button to turn the unit on.**
3. **Press the [CAL] button.**
4. **Press the [F3] button to choose *Wall Thickness*.**
5. **Press the [F2] button to select *MAT'L*.** Use arrow buttons to scroll through the list of materials (steel, copper, pvc, etc.).
6. **Select the correct pipe material with the appropriate function key.**
7. **Apply couplant to the pipe at the spot you will be making the thickness measurement.** The smoother the pipe surface the thinner the couplant should be applied.
8. **The line on the face of the transducer should be positioned so that it is perpendicular to the flow (figure 5).**

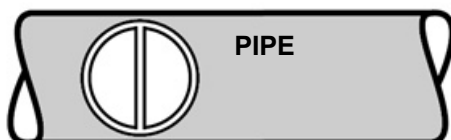


Figure 5: Proper alignment of thickness transducer on cylindrical surfaces

9. **Place the thickness gage firmly against clean, bare pipe.** Keep the transducer face as flat as possible against the surface.
10. **Note the displayed value for the wall thickness.** The meter will prompt for this value during the site setup.

Measure Pipe Diameter with the Plumbers (Diameter) Tape

Measure the actual outside diameter (OD) of the pipe. Note this value. The meter will prompt for this later.

Programming Global Parameters

Program the Global Parameters to set the meter's clock and to select the measurement units.

1. Press the [PROG] button on meter.
2. Press the [F3] button to select **GLOBL**.
3. Press the [F1] button to select **CLOCK**.
4. If the displayed values are correct, accept the displayed values by pressing the [F1] button. If the values are incorrect, edit the values by pressing the [F2] button and edit the values with the keypad.
5. Press the [F2] button to select **SYSTM**.
6. Accept the displayed values by pressing [F1] button or edit values by pressing [F2] button
7. When editing Global Clock and Systems parameters is complete press the [Exit] button one time.
8. Press the [F4] button to select **SAVE**
9. Choose the correct site name with the corresponding function key.
10. Press the [EXIT] button to return to initial flow screen.

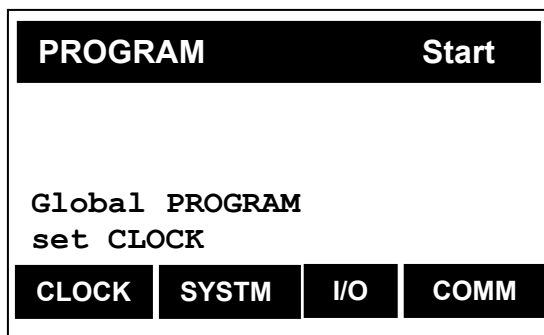


Figure 6: Screen after pressing GLOBL key

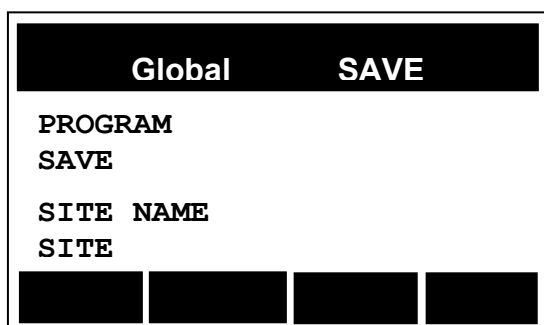


Figure 7: Screen after pressing SAVE key

Programming Site Data for Single Channel Measurements

Program the site data to enter and save parameters for a specific site. The instructions below are for applications using one channel only; enabling Channel 1 and disabling Channel 2. If both channels are required disregard the instructions for disabling Channel 2.

1. Press the [EXIT] button 2X to return to initial flow screen.
2. Press the [PROG] button.

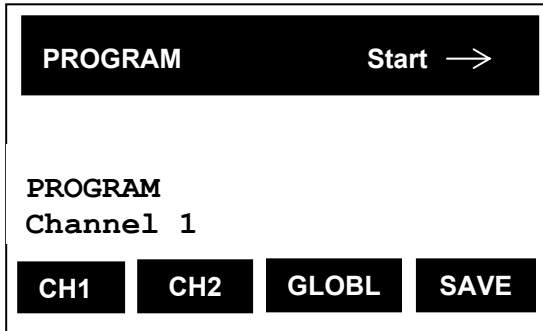


Figure 8: Screen after pressing PROG button

3. Press the [F2] button to select *CH2*.
4. Press the [F1] button to select *Active*.
5. Press the [F1] button to select *Off*.
6. Press the [EXIT] button to return to program menu.
7. Press the [F1] button to select *Ch1*.

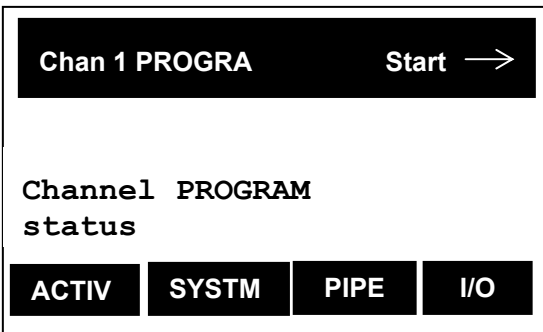


Figure 9: Screen after selecting Channel 1 option

8. Press the [F2] button to select *Active*.
9. Press the [ENTER] button to accept.
10. Press the [F2] button to Select *System*.

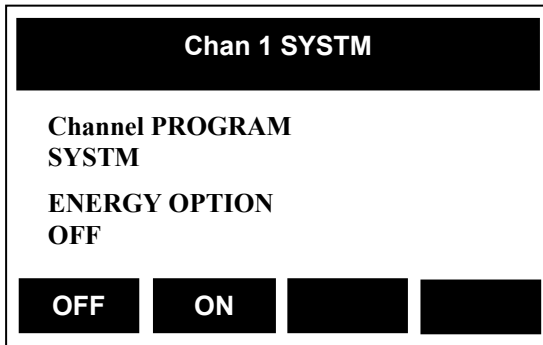


Figure 10: Screen after pressing SYSTM key

11. Press the [F1] button to select Energy Option *Off*.
12. Press the [ENTER] button accept.
13. Enter a *Channel Label*. Use the back arrow key to delete the existing channel label. Press the Orange Key 2× to enter a maximum of 4 characters. Press the [ENTER] button.
14. Enter the *Channel Message*. Press the [ENTER] button.
15. Press the Orange Key to return to numeric entry mode.
16. Select the *Volumetric Units*.

English Volumetric Units	Metric Volumetric Units
GAL/S – U.S. Gallons per Second	L/S – Liter per Second
GAL/M – U.S. Gallons per Minute	L/M – Liters per Minute
GAL/H – U.S. Gallons per Hour	L/H – Liters per Hour
MGD – Millions U.S. Gallons per Day	ML/D – Millions of Liters per Day
ft ³ /s – Cubic Feet per Second	m ³ /s – Cubic Meters per second
ft ³ /m – Cubic Feet per minute	m ³ /m – Cubic Meters per minute
ft ³ /h – Cubic Feet per hour	m ³ /h – Cubic Meters per hour
Mf ³ /d – Millions of Cubic Feet per	Mm ³ /d - Millions of Cubic Meters per Day
BBL/S – Barrels per Second	BBL/S - Barrels per Second
BBL/M – Barrels per Minute	BBL/M – Barrels per Minute
MBL/D – Millions of Barrels per Day	MBL/D – Millions of Barrels per Day

Figure 11: Volumetric Unit Options

17. Use arrow keys to scroll through the volumetric unit options. Use the function keys to select the appropriate units (default is gal/min). Press the [ENTER] button.
18. Select the desired number of *Decimal Digits*. Press the [ENTER] button.
19. Select the desired *Totalizer Units* (default is gallons).
20. Press the [F3] button to select *PIPE*.

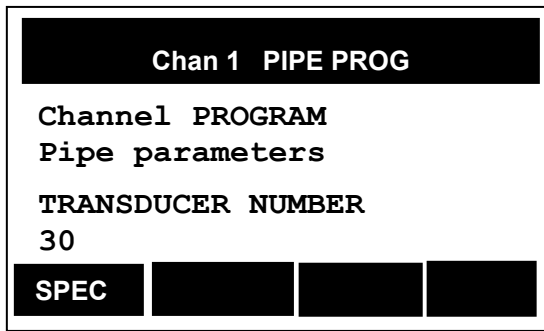


Figure 12: Screen after pressing PIPE key

21. Enter the *Transducer Number* (figure 12). The transducer number is inscribed on the transducer. The standard, red transducer in the kits is #30. Press the [ENTER] button.
22. Select *Pipe Material* with the correct function key. Press the [ENTER] button.
23. Enter the *Pipe OD* (outside diameter measured with the diameter tape). Press the [ENTER] button.
24. Enter the *Pipe Wall Thickness* (obtained with thickness gauge). Press the [ENTER] button.
25. Select the *Lined or Unlined pipe* option with corresponding function key. Press the [ENTER] button.
26. Use the function keys to make *Fluid Type* selections. The fluid type choices are: water, water/glycol mixture, oil, methanol, ethanol, LN2, freon or other. If other is selected the meter will prompt the user to enter the sound speed of the liquid. Refer to the manual for the sound speeds of other liquids. Press the [ENTER] button.
27. Use the numeric keys to enter the actual *Fluid Temperature*. Press the [ENTER] button.
28. Enable the *Reynolds Correction Factor*. The Reynolds Correction Factor is a number based on the viscosity, flow rate and flow profile of the fluid. The Reynolds Correction Factor should be turned ON. To enable the Reynolds Correction Factor press [F2], then press the [ENTER] button.
29. The *Kinematic Viscosity for the selected fluid type at the fluid temperature entered will be displayed*. Press the [ENTER] button.
30. The *Calibration Factor should be left at 1.00*. Press the [ENTER] button.
31. Enter *Number of Traverses*. The simplest physical installation is the Reflect or 2 Traverse (V) setup (figure 13). In a two traverse installation the transducers are installed parallel to each other on the pipe. The signal is sent from one transducer through the liquid, bounces off the backside of the pipe then is received by the other transducer. Select 2 Traverse and press the [ENTER] button.
32. The meter will calculate and display the value for the *Transducer Spacing, the distance between the centers of the transducers*. Note this value and use it when installing the transducers.
33. Press the [EXIT] button 2X to return to the initial flow screen.
34. Select Save and Press the [ORANGE] button 2X to enter a site name, up to 5 characters long. Press the [ENTER] button. If you intend to data log, the site name and log name must be the same
35. Press the [ORANGE] button to resume numeric mode
36. Press the [EXIT] button to return to the flow screen. The initial value displayed on this screen is velocity.

Transducer Installation On Pipe

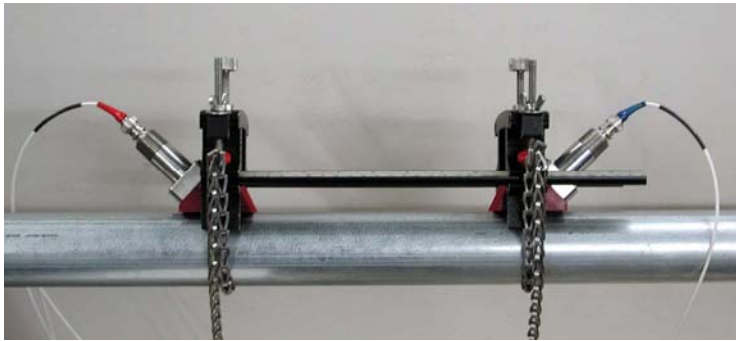


Figure 13: Transducers installed on pipe in a 2 traverse setup

1. Prepare the pipe in the area that the transducers are to be installed by making sure it is clean and free of loose material.
2. Install the clamping fixtures by wrapping the chain around the pipe and attaching it to the hook with the wing nuts. Tighten wing nuts to hold brackets in place. **Hand tighten only!**
3. For horizontal pipe runs, transducers should be placed within a cone 30° above and 30° below the horizontal axis of pipe to avoid signal interference from air and sediment (see figure 14).

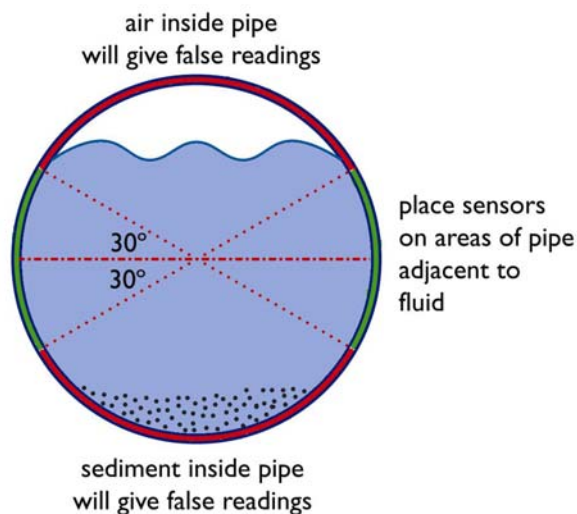


Figure 14: Transducer placement on horizontal pipe run

4. Slide the unmarked rail into the back slots of clamping fixtures.
5. Slide the marked measurement rail into the front slots of clamping fixtures. Line the left edge of the rail up exactly with the left edge of the clamping fixture.
6. Slide the right clamping fixture so that the left edge of the clamping fixture is lined up with the *Transducer Spacing* value on the front measurement rail.
7. Tighten the red screws on the clamping fixtures to secure the rails.
8. Place a large bead of couplant on the surface of the transducers.

9. **The transducers must be placed so that their diagonal sides point toward each other and the metal cable connectors point away from each other.**
 10. **Insert the transducers into the clamping fixtures.** Tighten firmly with the large bolts located in the center of the clamping fixture. **Hand tighten only!**
 11. **Attach the cables to the transducers.** Match the upstream transducer with the upstream cable and the downstream transducer with the downstream cable. The cables are labeled accordingly.
 12. **Attach the other ends of the cables to the upstream and downstream ports on the meter.**
 13. **After the meter settles, a valid flow reading should be displayed on the meter.** If there is a flashing Error Code Message (the letter E followed by a number flashing in the lower section of the display screen) refer to Table 10-1 in the manual to decipher the code and troubleshoot the problem.
 14. **Select the appropriate Channel (Channel 1 is [F1]).**
 15. **Use the arrow keys to scroll through the menu and display different units.**
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Configuring the Flow Meter for Data Logging

Important Note: Use the keypad to configure the meter for logging durations greater than 24 hours. The computer interface has a Y2K bug that does not allow it to be configured for logging for dates after 1999. The computer interface is used to download the data files from the meter.

1. **After the meter has been configured and programmed for the site, press the [LOG] button.**
2. **Press [F1] to enter the PARAMETER sub menu.**
3. **Enter the *same* name for the LOG as the SITE name.** These two names must be *exactly* the same. Press the red button twice to lock the keypad into alphabetic mode. Press the [Enter] button.
4. **(Optional) Enter a Log Message; a description up to 21 characters long.** Press the [Enter] button. Press the [Orange] button to return to numeric mode.
5. **Use the function keys to select the Log Units to record.** The meter will log three parameters. For each channel the parameter choices are: Velocity, Volumetric Flow, Forward Totals, Reverse Totals or Diagnostics. Please refer to the Diagnostics Parameters Table in the manual, section 10-5 for a complete description of the diagnostic parameters. After each choice press the [Enter] button. Use the horizontal arrow keys to access additional menu choices if there is an arrow visible in the upper right corner of the screen.
6. **Press F2; EDIT to enter the Log Start Time.** Use the numeric keypad to edit the start time and [F1] to select AM or [F2] to select PM. Press the [Enter] button after each selection.
7. **Enter the Log Start Date and the Log End Time and Date.**
8. **Select the Time Increment between each log update.** This time is the frequency at which the logger takes a reading. The more frequent or shorter the chosen logging interval the more memory capacity it uses. Press the [Enter] button to return to the initial logging screen.
9. **Press [F2] to select MEM to check the available memory for this logging setup.** The amount of memory programmed to be used by this logging configuration is “pages” pending. The amount of excess memory available is displayed as “pages” free.
10. **Press the [EXIT] button to return to the initial flow screen.** Once the meter and transducers are installed, verify that the values output on the display looks reasonable and that there are no error messages. **When logging has begun an asterisk (*) will flash in the upper right corner of the screen.**

11. Use the RS232 communication cable to download the logged data files from the meter to your computer. The software is called Transport Data Manager (TDM). Please refer to the enclosed TDM manual for software installation instructions. Below is a quick list of steps for working with this computer interface.

EXTREMELY IMPORTANT: *The flow meter's clock must be set before attempting to download the log. If the flow meter's clock is not set, the meter will freeze up and have to be reset. All of the data is cleared when the meter is reset!*

- Open the TDM software
- Choose **System** from the menu bar.
- Choose **Set Flowmeter or PC Clock**
- If the logger fails to communicate with the computer, try a different COM Port by choosing **System; Select Port** and click on the button that corresponds to the correct port number for the PC's 9 pin serial port.
- Click on the **Meter to Current PC Date/Time** Button
- Choose **Logs** from the menu bar
- Choose **Upload/Examine Logged Data Set**
- Select the correct log name and choose **Upload Log**
- In the **Disk Control** dialogue box click the **OK** button to upload the logged data to disk.
- Name the file with no more than 8 characters and use the .log file extension. Choose the directory to save the file to and click **OK**.
- View the data file graphically in the TDM software by choosing; **Data; Graph Logged Data**. Choose the graph type and select the file name from the list.
- To open the data file in EXCEL, choose **Data; Print Table of Logged Data**. Choose the file name from the **Logged data Set to Print** dialogue box. Accept the defaults and click **OK**. This will create a .prt file that can be opened in EXCEL.