OPERATION MANUAL

JEROME® J405
MERCURY VAPOR ANALYZER

700-0099 Revision 4.0

JEROME® J405
Mercury Vapor Analyzer
Operation Manual

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All section numbers, titles, and page numbers in **BOLD** in this manual are hyperlinks and can be clicked to simplify navigation within the PDF version of the manual. The BACK button found in most PDF software programs is also very helpful when navigating using the hyperlinks.

An up-to-date electronic copy of this manual can be found at:
https://store.brookfieldengineering.com/manuals/jerome-manuals/

NOTE: For EPA clean-up levels less than 3 $\mu g/m^3$, it is necessary to run a warm-up routine before sampling. To initiate the automatic five minute warm-up, install a **Zero Air Filter (P/N: Z2600 3905)** in the intake and select **Warmup** from the **REGEN menu**. Refer to the **Daily Operations** section for more information.

1. UNPACKING THE INSTRUMENT

This manual contains details that will optimize the results and the life of your instrument. Read and refer to the manual for complete details on operation, maintenance and troubleshooting, special voltage inputs and data output.

The Jerome® J405 is easy to operate and ready for use upon receipt from the factory.

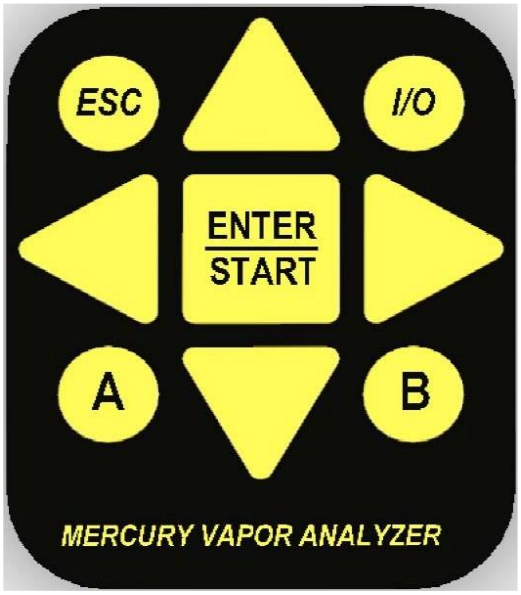
- Remove the instrument from the packing material.

Retain all packaging materials for any future shipment of the instrument.
If the instrument is returned to AMETEK BROOKFIELD for any reason, it must be placed in the original packaging materials that have been tested and proven to be effective protection during shipment.

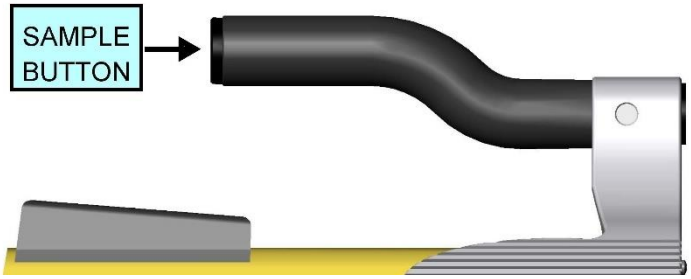
- Call Customer Service at 800-528-7411 or 602-470-1414 or go to the AMETEK Brookfield website https://www.brookfieldengineering.com/ for Return Material Authorization (RMA) information prior to returning a unit.
- Boxes and packing materials for all shipments are available from AMETEK Brookfield.
- Pack the Jerome® instrument only in a Jerome® shipping container.

AMETEK BROOKFIELD WILL NOT BE RESPONSIBLE FOR SHIPPING DAMAGE.
IF YOU RETURN THE INSTRUMENT IMPROPERLY PACKAGED OR SHIPPED,
YOU SHOULD INSURE IT FOR FULL VALUE.

- Check for any damage and confirm receipt of all parts on your packing list. Contact AMETEK Brookfield Customer Service at (800) 528-7411 or (602) 470 -1414 if you have any questions.
- Press the **I/O** button. The display will light up and show instrument serial number and software revision.
  - ➢ If necessary, press **ESC** to clear any calibration reminders. Call Customer Service at 800-528-7411 or 602-470-1414, or e-mail customerservice.jerome@ametek.com, to schedule instrument calibration.
- The digital meter displays 0.00 µg/m^3 (or 0.000 mg/m^3).
- Look at the battery icon in the top center of the display to determine the current battery level.
  - ➢ If the battery icon is empty and flashing, recharge the battery. See page **28**.



- The included AC power supply/charger can utilize 110V or 220V AC power, and it is not necessary to manually select the input voltage.
- The J405 contains an auto-resetting fuse that does not require care, maintenance, or replacement by the user.
- Perform a sensor regeneration by following these steps:
  - Connect the AC power supply/charger between the matching (DIN) connector on the back of the J405 and an AC power outlet or connect the external battery pack to the back of the J405.
  - If the J405 is turned off, press the **I/O** power button to turn the instrument on.
  - Press the RIGHT arrow button (►) to enter the main menu.
  - Press the DOWN arrow button (▼) to move the cursor to **Regen**.
  - Press the RIGHT arrow button (►) to select **Regen** from the menu.
  - Press the **ENTER/START** button on the keypad to select **Regen Now** from the Regen menu.
    - The instrument will respond with "Perform Regen Using EXTERNAL POWER?"
    - Press **ENTER/START** to proceed or **ESC** to exit.
    - The instrument display will warn "Do Not Disconnect External Power while Heating".
    - Press **ENTER/START** to proceed or **ESC** to exit.
    - The instrument will now begin a 45-minute regeneration cycle, indicated by Regeneration in Progress on the display. **Do not interrupt this cycle.** For a complete description of this process, see page **23**.
    - If any error message appears on the display, see the "Troubleshooting" section beginning on page **38**.
- Ensure the instrument has been powered on for at least five (5) minutes prior to sampling.
- The instrument is now ready to sample.
- Press the SAMPLE BUTTON at the end of the handle of the J405 to start a 16-second sampling cycle.



- When the instrument measures mercury vapor, the 0.00 µg/m^3 (or 0.000 mg/m^3) display will be replaced with a value.
- To ensure the input to the instrument contains no mercury vapor or mercaptans, use a Zero Air Filter (P/N: Z2600 3905). The Zero Air Filter cleans the air sample and should produce sample readings of 0.00 µg/m^3 (or 0.000 mg/m^3). Therefore, use the filter to:
  - Equilibrate the instrument to temperatures that are higher or lower than the instrument. Sample every 15 seconds with the filter installed until the reading is 0.00 µg/m^3 (or 0.000 mg/m^3).
  - Identify contamination within the unit if it is suspected.
  - Confirm the presence of mercury vapor when readings are elevated. Install the filter and verify that the readings decrease with the filter installed.
- The instrument is designed for ambient air monitoring.

WARNING

DO NOT allow the probe or the instrument's intake to be exposed to <u>any</u> liquid.
DO NOT obstruct the intake or exhaust ports of the J405, as this could cause errors in readings and damage to the flow control system.

- The instrument is not explosion proof.
- Perform sensor regeneration before each day's use.
- Perform another sensor regeneration after each day's use.
- During periods of storage or inactivity, perform sensor regeneration every 30 days.

Call Customer Service at (800) 528-7411 or (602) 470-1414 if you have any questions.
If you prefer, you may send e-mail to customerservice.jerome@ametek.com.

2. INTRODUCTION

The Jerome® J405 Mercury Vapor Analyzer is an ambient air analyzer with a range of 0.5 to 999 micrograms of mercury vapor per cubic meter (µg/m^3 Hg).

CAUTION:

The Jerome® J405 is for gaseous vapor use only.
DO NOT allow the probe or the instrument's intake to be exposed to any liquid, dust or other foreign material.

The J405 is designed to be easy to operate for quick and accurate analysis of mercury vapor levels. It has few maintenance requirements. However, please take a moment to read this manual before attempting operation. If you have any questions about your application or operation, please call Customer Service at (800) 528-7411 or (602) 470-1414 or e-mail customerservice.jerome@ametek.com for assistance.

J405 Features

- Much lower detection levels than the previous Jerome® models.
- 3 ½ inch (9 cm) backlit display, showing everything, you need to be confident in the instrument, including 5/8 inch (1.6 cm) tall character readout, battery charge indicator, and sensor saturation percentage.
- Choice of units for results: micrograms per cubic meter (µg/m^3) (default) or milligrams per cubic meter (mg/m^3).
- Easy to understand diagnostic and error detection.
- Auto zero bridge adjustment.
- Updated electronics including 24-bit a/d conversion and on-board storage for 20,000 samples.
- Controlled temperature film heat ensures the sensor removes all mercury and returns to its original state.
- The Jerome® J405 can be operated for 24 hours from the internal 12V battery source, or it can be operated using the external AC power supply/charger.

Accessories and Maintenance Parts

The Accessories and optional items available to support the J405 are listed and pictured beginning on page **41**.

Applications

- Regulatory detection compliance
- Regulatory clean up compliance
- Ambient air analysis
- Quality control
- Scrubber efficiency testing
- Accuracy checks for other mercury vapor monitors and control systems
- Mercury vapor source detection
- Leak detection
- Portable mercury vapor detection. (The Jerome® J405 is operated from an internal 12V battery source. For charging the batteries, an external AC power supply/charger is included.)

3. JEROME® J405 TECHNICAL SPECIFICATIONS

	Units: µg/m^3	Units: mg/m^3
Display Range*	0.5 µg/m^3 to 999 µg/m^3	0.001 mg/m^3 to 0.999 mg/m^3
Resolution	0.01 µg/m^3 Hg	0.001 mg/m^3 Hg
Response time-sample mode	16 seconds	
Response time-survey mode	2 seconds	
Flow rate	750 ± 50 cc/min (0.75 ± 0.05 liters/min)	
Power requirements	12 VDC for the instrument (Provided by the internal battery, AC power supply/charger, external battery pack or car accessory adapter) 100-240VAC, 47-63Hz, 3.2A for the AC power supply/charger	
Fuse	Auto-resetting fuse	
Internal battery pack	Rechargeable nickel metal hydride (NiMH)	
Operating environment	0 °C to 45 °C, non-condensing, non-explosive	
Case construction	Aluminum, powder coated	
Dimensions	11 in L x 6 in W x 6.5 in H (28 cm L x 16 cm W x 17 cm H)	
Weight	5.3 pounds (2.4 kilograms)	
Digital meter display	3 ½ inch (9 cm) liquid crystal display (LCD)	
Data storage capacity	20,000 samples	
Output	Digital: USB serial data to PC, printer, or USB flash drive Analog: 4-20mA current loop (requires external power source) Accurate to 0.3% of output	
Certifications	TUV 61010, CE	

Accuracy and Precision:

Calibration Point	Accuracy**	Precision (RSD)
1.0 µg/m^3	± 10%	15%
25 µg/m^3	± 5%	3%
100+ µg/m^3	± 5%	3%

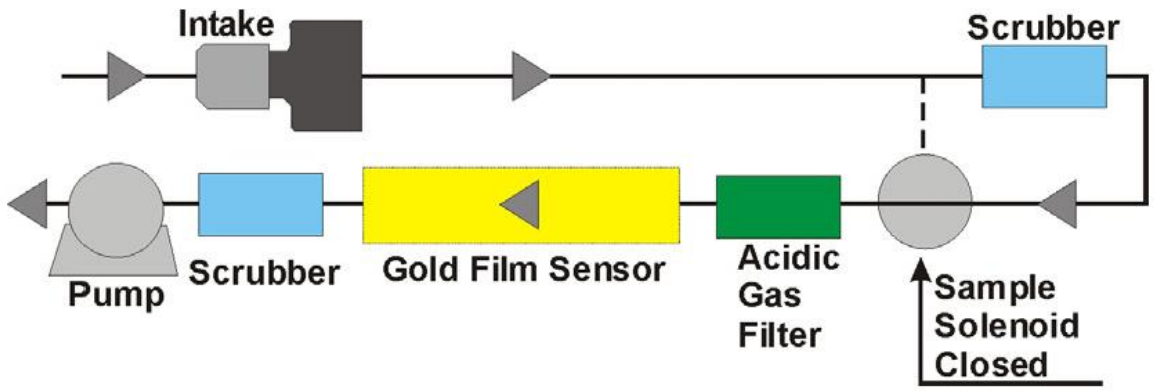
*Sample values below 0.5 µg/m^3 or 0.001 mg/ m^3 will be recorded and displayed as 0.00 µg/m^3 or 0.000 mg/m^3 respectively by the J405. Sample values above 999 µg/m^3 (0.999 mg/m^3) will be recorded and displayed as "High Concentration."

**After changing the AG filter, accuracy at 1.0 µg/m^3 may change from ±10% to ±20%, and accuracy at 25 µg/m^3 and 100µg/m^3 may change from ±5% to ±7%. RSD is unchanged.

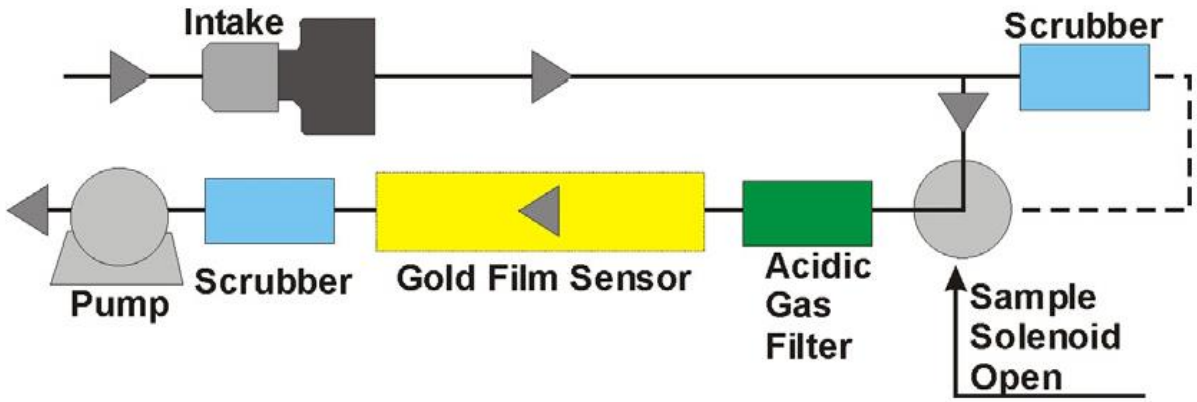
4. PRINCIPLE OF OPERATION

The heart of the J405 is the well-proven gold film sensing technology. A thin gold film, in the presence of mercury vapor, undergoes an increase in electrical resistance proportional to the mass of mercury vapor in the sample.

When the SAMPLE button is pressed, an internal pump pulls ambient air through a scrubber filter (P/N: 600-0262) and into the flow system.



After three seconds, the sample solenoid bypass opens, closing off the scrubber filter from the flow system.



The sample air passes through the AG filter (P/N: 600-0293), an acidic gas filter that removes any acidic gases that interfere with the sensor's response to mercury. Then the sample air is drawn over the gold film sensor. The sensor absorbs the mercury vapor. Eleven seconds after starting, the sample solenoid bypass closes, and the remainder of the sample is drawn through the scrubber filter and the flow system. The instrument determines the amount of mercury adsorbed and displays the measured mercury concentration on the digital meter in micrograms per cubic meter ($\mu g/m^3$) or milligrams per cubic meter (mg/m^3) of mercury.

The instrument's microprocessor automatically re-zeroes the digital meter at the start of each sample cycle and holds the meter reading until the next sample cycle is activated, thus eliminating drift between samples.

During the sample mode cycle, a sensor saturation meter on the LCD represents the percentage of sensor saturation, or adsorbed mercury collected on the gold film. With use, the sensor becomes saturated and needs to be cleaned. This is accomplished by a manually activated 45-minute sensor regeneration cycle, which removes the mercury from the sensor. The solenoid bypass closes during the sensor regeneration cycle, causing the air to pass through the scrubber filter, providing clean air for the regeneration process. The closed loop film heat cycle ensures the sensor is cleaned to original values. The mercury released during regeneration is absorbed by the flow system's final scrubber filter (P/N: Z2600 3930) to prevent any external contamination from the desorbed mercury. The 45-minute regeneration process includes a cool-down phase, so the instrument is ready for use as soon as the regeneration process finishes.

Zero Air Filter (P/N: Z2600 3905)

The Zero Air Filter (P/N: Z2600 3905) removes mercury vapor, mercaptans, and hydrogen sulfide from the air sample. Readings with the filter installed should be near 0.00 $\mu g/m^3$. For maximum accuracy, wait 15 seconds between samples to allow the sensor to restabilize.

Because air that is cooler than the instrument will cause low readings and warmer air will cause higher readings, the Zero Air Filter should be used to equilibrate the instrument to ambient air. Repeated sampling with clean air will not cause saturation of the gold film sensor but will equalize temperatures faster to allow accurate analysis to begin sooner. For maximum accuracy, wait 15 seconds between samples to allow the sensor to restabilize.

The Zero Air Filter can also be used to identify contamination within the instrument. If the readings do not reduce to near 0.00 $\mu g/m^3$ with the filter installed, contamination within the filter should be suspected. If the readings do drop to near 0.00 $\mu g/m^3$ with the new filter installed, internal contamination of the old ZAF is confirmed, then dispose of the OLD ZAF. If the readings do drop to near 0.00 $\mu g/m^3$ with the new filter installed but elevate with the filter removed, the presence of mercury vapor at the sampled location is confirmed. Again, for maximum accuracy, wait 15 seconds between samples to allow the sensor to restabilize.

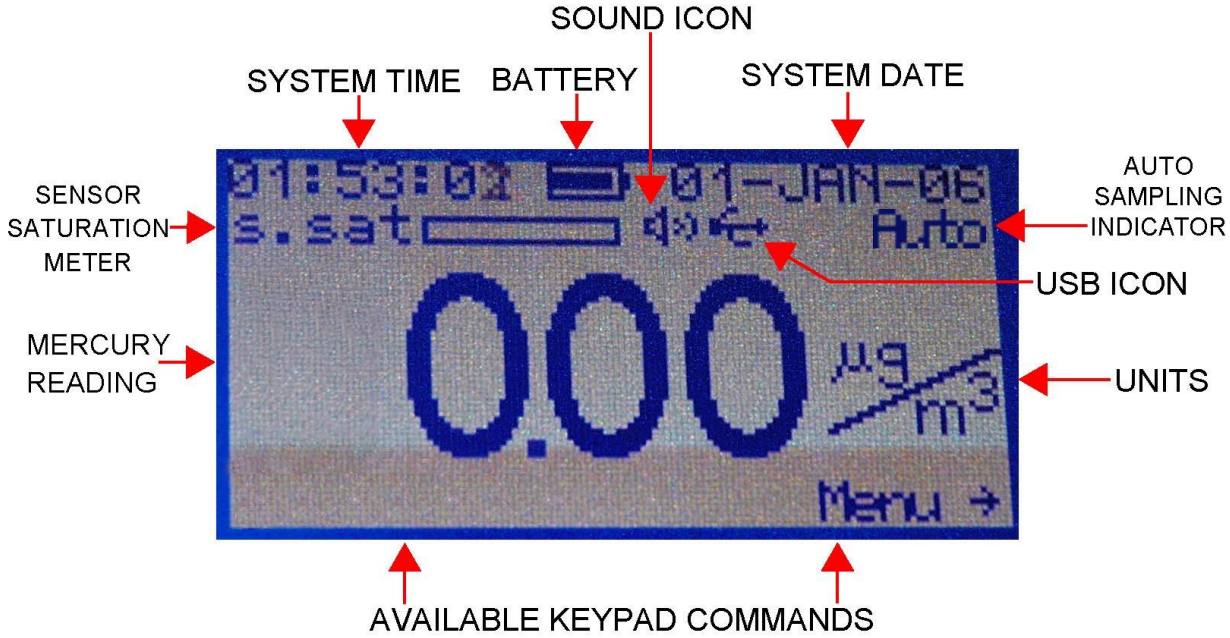
The Zero Air Filter should be inserted into the intake of the instrument when running the instrument Warm-up. See Warm-up in the section **REGEN menu** on page **17** for more information.

For more information on the use of the Zero Air Filter, contact Customer Service at 1-800-528-7411 or 602-470-1414.

5. INSTRUMENT OPERATION

J405 Main Screen Display

The J405 Main Screen is depicted below, followed by explanations of the labeled items.



SYSTEM TIME – As set in the SYSTEM menu. (See **SYSTEM menu** on page **20**).

BATTERY – Indicates current charge level and charging status (See **Charging Internal Battery** on page **28**)

SOUND ICON – Indicates if the audible alarm is turned on or muted, as set in the SYSTEM menu. (See **SYSTEM menu** on page **20**).

SYSTEM DATE – As set in the SYSTEM menu. (See **SYSTEM menu** on page **20**).

SENSOR SATURATION METER – Graphically indicates mercury saturation level of J405 sensor. (See **REGEN menu** on page **17**).

USB ICON – Indicates proper functioning of USB ports, and flashes during USB transmission of data. (See **Retrieving Data** on page **29**). If the USB icon is not present, this option is not activated. Contact your Sales Representative for details on the USB option.

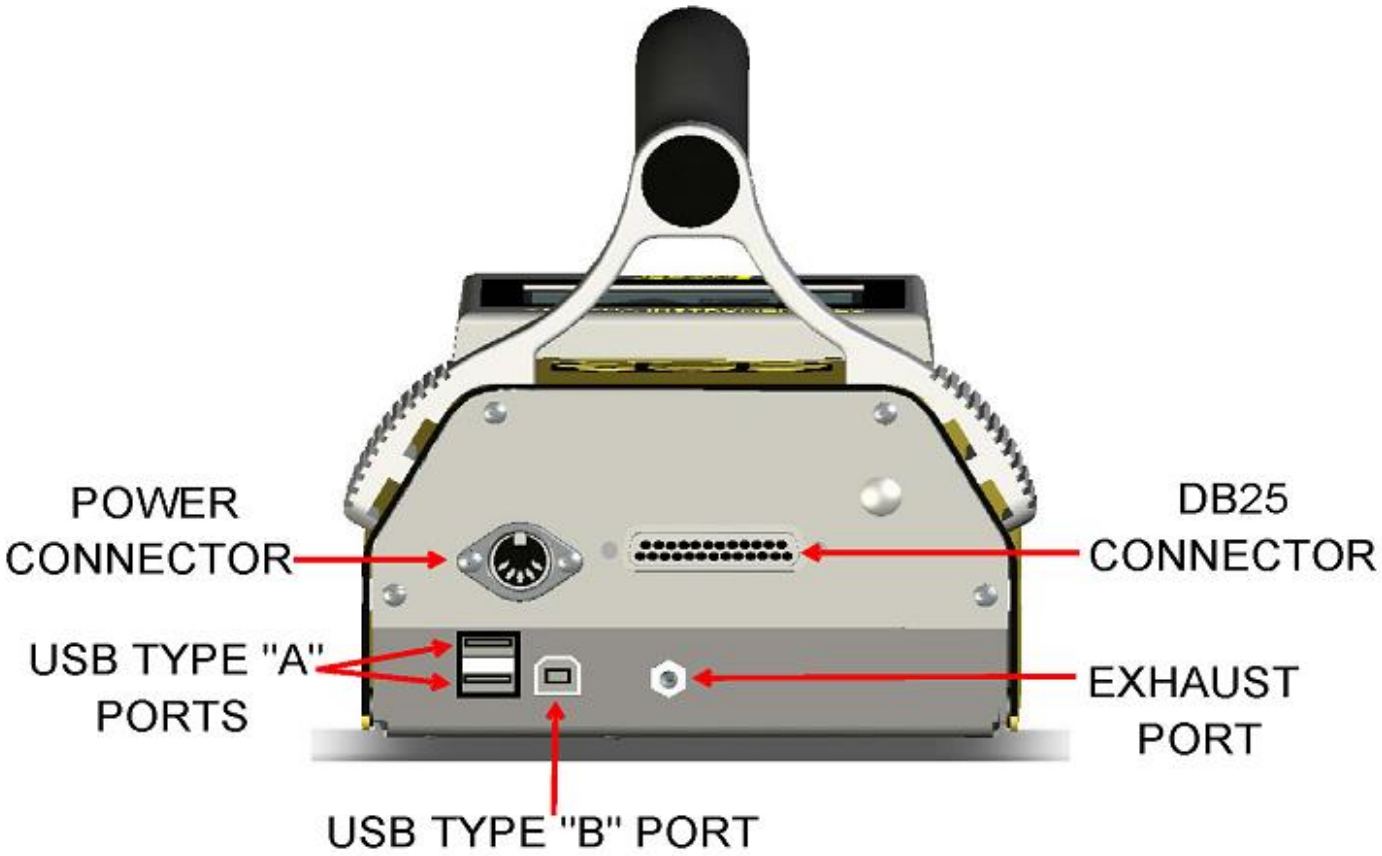
AUTO SAMPLING INDICATOR – Indicates if the J405 is set to sample automatically at regular intervals, as set in Sample Mode in the SAMPLE menu. (See **SAMPLE menu** on page **15**).

MERCURY READING – The mercury concentration detected by the J405, in the units indicated.

UNITS – Units of mercury concentration reading, either micrograms per cubic meter ($\mu g/m^3$) or milligrams per cubic meter (mg/m^3), as set in the **SAMPLE menu**.

AVAILABLE KEYPAD COMMANDS – The bottom line of the screen indicates the currently available keypad commands. From the main screen, as shown here, the Main Menu can be accessed using the ► key.

J405 Back Panel Connections



The above-labeled connections are available from the back panel of the J405. If the USB option has not been activated, the USB ports will not be present. Contact your Sales Representative for information on the USB option.

POWER CONNECTOR – Connect the supplied AC power supply/charger, the optional external battery pack (P/N: 990-0214), or the optional car accessory jack (P/N: 200-0170) here to provide power to the instrument or to recharge the battery.

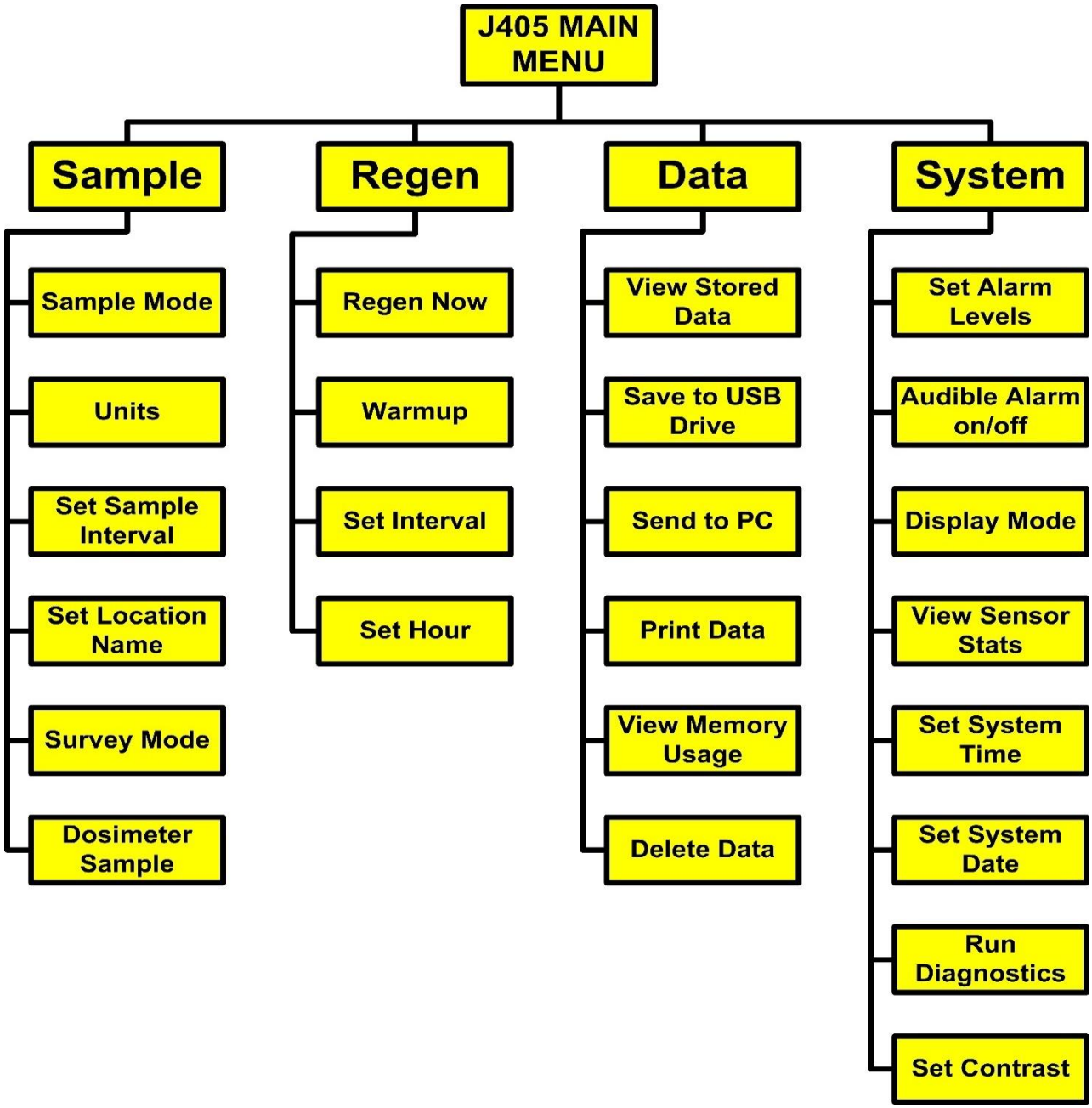
USB TYPE "A" PORTS – The USB Type "A" ports are used to connect a USB printer or USB flash drive for printing or saving sample data or to connect a USB keyboard for menu navigation or data entry. The two ports are identical, and either can be used. For more information, see **DATA menu** on page **18**.

USB TYPE "B" PORT – The USB Type "B" port is used to connect the J405 directly to the USB port of a computer, using the included USB A to B cable (P/N: 200-0165). For more information see **DATA menu** on page **18**.

DB25 CONNECTOR – There are multiple specialized uses for the DB25 connector. See **Instrument I/O Interface** on page **30** for more information. **NOTE: This is not a printer port.**

EXHAUST PORT – After sampling, the sampled air is cleaned of any mercury and expelled from the exhaust port on the back of the J405.

J405 User Interface Main Menu Structure



NOTE: The main menu also contains a selection labeled "Factory." This option is for factory use only and is not accessible by the end user.

A USB keyboard (P/N: 990-0230) can be used to navigate the menu system and for data entry for items such as Location Names. Connect the USB keyboard to one of the two USB Type "A" ports on the back of the instrument. Either upper- or lower-case characters may be entered when using a USB keyboard, while only upper-case letters are available from the J405 keypad.

SAMPLE menu

SAMPLE MODE

The Sample Mode setting provides the choice between auto-sampling and manual sampling. For normal use, use manual sampling, which is the instrument default setting. If auto-sampling is selected, the instrument will automatically sample at the interval set in **SET SAMPLE INTERVAL** (below) without monitoring or attendance by the user. Use the ▲and ▼arrows to toggle between Manual and Auto, and use **ENTER/START** to save the selection. Use the **ESC** key to exit without saving changes. If auto-sampling is selected, the word Auto will appear below the system date on the instrument's main screen.

UNITS

Sample results can be displayed in micrograms per cubic meter ($\mu g/m^3$) or milligrams per cubic meter (mg/m^3). To change the displayed units, select **UNITS** from the **SAMPLE** menu. Use the ▲and ▼ arrows to toggle the selection, and press **ENTER/START** to save the selection. Use the **ESC** key to exit without saving changes. The default selection is $\mu g/m^3$, and $\mu g/m^3$ is used throughout this manual for consistency. The relationship between $\mu g/m^3$ and mg/m^3 is as follows:

$$1000\ \mu g/m^3 = 1\ mg/m^3 \text{ and } 1\ \mu g/m^3 = 0.001\ mg/m^3$$

When the selected unit is changed with the **UNITS** menu item, all internally stored samples are converted and displayed with the new selected unit, regardless of what unit was in use when the sample was taken originally.

SET SAMPLE INTERVAL

If auto-sampling is being used (as set in **SAMPLE MODE** above), the sample interval determines how often the J405 will automatically take samples. Use the ▲and ▼arrow keys to scroll through the available sample intervals of 1, 2, 5, 10, 15, 30, 45, 60, 90 and 120 minutes, and use **ENTER/START** to save the selected interval. Use the **ESC** key to exit without saving changes.

The sample intervals refer to specific times on the instrument clock as measured in whole multiples of the selected interval. For example, selecting a 10-minute sample interval will result in samples being taken on the hour, 10 minutes after the hour, 20 minutes after the hour, etc., not every ten minutes from when auto-sampling is initiated. Refer to the chart on the next page for examples of how these intervals work. When the clock reads :00 seconds at the appropriate time, the sample will be taken.

Interval	Samples on the:	Examples:
1 minute	1-minute marks	12:00, 12:01, 12:02, 12:03, 12:04, 12:05, 12:06, etc.
2 minutes	2-minute marks	12:00, 12:02, 12:04, 12:06, 12:08, 12:10, 12:12, etc.
5 minutes	5-minute marks	12:00, 12:05, 12:10, 12:15, 12:20, 12:25, 12:30, etc.
10 minutes	10-minute marks	12:00, 12:10, 12:20, 12:30, 12:40, 12:50, 1:00, etc.
15 minutes	Quarter hour	12:00, 12:15, 12:30, 12:45, 1:00, 1:15, 1:30, etc.
30 minutes	Half hour	12:00, 12:30, 1:00, 1:30, 2:00, 2:30, 3:00, etc.
45 minutes	Times that are an even 45 minutes from midnight or noon	12:00, 12:45, 1:30, 2:15, 3:00, 3:45, 4:30, 5:15, 6:00, 6:45, 7:30, 8:15, 9:00, 9:45, 10:30, 11:15, etc.
60 minutes	Hour	12:00, 1:00, 2:00, 3:00, 4:00, 5:00, 6:00, etc.
90 minutes	Times that are an even 90 minutes from midnight or noon	12:00, 1:30, 3:00, 4:30, 6:00, 7:30, 9:00, 10:30, etc.
120 minutes	Times that are an even 120 minutes from midnight or noon	12:00, 2:00, 4:00, 6:00, 8:00, 10:00, etc.

WARNING

The J405 is not intended for continuous sampling 24 hours a day / 7 days a week. Continuous sampling may reduce sensor life and may affect your warranty.

SET LOCATION NAME

Up to 80 unique location presets are available using the J405. This feature is useful if sampling is done in multiple locations and there is a need to record which readings came from which locations. Use the ▲and ▼arrows to scroll through the list of 80 presets until the location to be edited is highlighted. Press **ENTER/START** to begin editing the name of the selected location. Use the ▲and ▼arrows to scroll through the available alphanumeric characters and punctuation. When the desired character is displayed, use the ► arrow to move to the next character field. If a mistake is made, the ◄ arrow can be used to return to the previous character. When the location has been named as desired, press **ENTER/START** to save the location name, and return to the list of locations. To select an existing location from the list for the samples to be taken, use the ▲and ▼arrows to scroll to the desired location, and press **ENTER/START** twice. Note the asterisk (*) located to the left of the currently selected location. The selected location name will be stored with the sample data for all samples taken until a different location is selected instead. After deleting data, it is necessary to re-select the Location Name before taking any samples, otherwise the location will not be recorded. Use **ESC** to return to the sample menu. See **Retrieving Data** on page **29** for more info.

DOSIMETER SAMPLE

Not currently available.

SURVEY MODE

Highlight **SURVEY MODE** in the **SAMPLE** menu and press **ENTER/START** to begin immediate sampling in survey mode. In survey mode, after an initial two-second pause to purge the flow system, the J405 will sample continuously. For complete information on survey mode, see **Survey Mode** on page **25**.

REGEN menu

The sensor saturation meter on the main screen (to the right of **s. sat**) indicates the current level of saturation of the sensor with mercury.

Clean/Regenerated Sensor

Partially Saturated Sensor

Saturated Sensor – Regen Required

When the sensor becomes saturated with mercury, as indicated by the sensor saturation meter, a regeneration (regen) must be performed on the sensor to release the accumulated mercury, before additional samples can be taken. See **Sensor Regeneration** on page **23** for more information on the regen procedure.

The AC power supply/charger or the external battery pack must be plugged into the back of the instrument before a regen can be performed.

The following options are available from the REGEN menu:

REGEN NOW

Connect external power to the instrument before performing a regen.

Highlighting **REGEN NOW** and pressing **ENTER/START** will start the sensor regeneration process. Press **ENTER/START** again on the next screen to confirm your choice, and press **ENTER/START** again after reading the warning that appears. The regeneration will now begin. **Do not disconnect external power during the regeneration.**

WARMUP

To ensure maximum accuracy when sampling at cleanup levels less than 3 µg/m^3, the J405 must be warmed up with the Zero Air Filter in the intake, at the location to be sampled. To run the warm-up, insert the Zero Air Filter in the intake, highlight **WARMUP** and press **ENTER/START**. While warming up, the pump will run and the J405 will display a 5-minute countdown. When the warm-up finishes, remove the Zero Air Filter, and begin normal sampling. If the J405 is idle for more than 20 minutes, another warm-up is required to maintain maximum accuracy at these low levels.

SET INTERVAL

If auto-sampling is being used (as set in **SAMPLE MODE** above), the J405 can be configured to automatically perform sensor regenerations at a predetermined interval. Use the ▲and ▼arrows to scroll through the available intervals of 6, 12, 24 and 48 hours and Saturation, and press **ENTER/START** to save the selected interval. The J405 will now automatically perform a sample followed by a regen every 6, 12, 24, or 48 hours starting at the time set in **SET HOUR** below or when the sensor is saturated, as selected. Use **ESC** to exit without saving.

SET HOUR

Use the ▲and ▼arrow keys to select the hour of the day (using a 24-hr clock) to start regeneration. Press **ENTER/START** to save the setting. At the time set, if auto-sampling is being used, the J405 will automatically take one sample and then perform a sensor regeneration. This process will repeat at the interval indicated in **SET INTERVAL** above. Use **ESC** to exit without saving.

NOTE: If the sensor is saturated and a regeneration cycle is performed and completed before the set hour, the instrument will perform another regeneration at the set hour. However, if the regeneration cycle does not complete prior to the set hour, the regeneration at the set hour will be skipped.

DATA menu

Sample data can be stored within the instrument, up to a maximum of twenty thousand (20,000) data points. On instruments that have the USB Communications option, data can be retrieved from the instrument in one of three ways:

1. SEND TO PC
2. SAVE TO USB FLASH DRIVE
3. PRINT DIRECTLY TO AN AMETEK BROOKFIELD APPROVED PRINTER (P/N: Y990-0210

The presence of the USB icon on the main screen indicates that the Communications option has been purchased and that the USB ports are functioning properly. The USB icon will flash during data transmission. See **J405 Main Screen Display** on page **12** for the location of the USB icon. The data is stored in non-volatile memory and will not be affected if the battery is changed or disconnected.

VIEW STORED DATA

Select **VIEW STORED DATA** to view previous sample and regeneration history on the screen of the J405. The Location Name (if specified) corresponding to the data is displayed at the top of the screen and three sample values at a time are displayed at the bottom of the screen, along with the date and time the sample was taken. The most recent sample is displayed at the top of the list, and regenerations are indicated by the word "Regen" instead of a sample value. Use the ▲ and ▼ arrow keys to scroll through the data. If Location Names are used, the Location Name displayed will automatically update during scrolling to reflect the sampling location of the data being displayed. The J405 will beep-beep upon reaching the end of the list. After viewing the data, press **ESC** to exit and return to the **DATA** menu.

On instruments that have the USB Communications option, all of the data is accessible from the **VIEW STORED DATA** menu selection. On instruments that do not have the USB Communications option, only the previous two samples are stored.

SAVE TO USB DRIVE

Before selecting **SAVE TO USB DRIVE**, connect the target USB flash drive (P/N: 990-0219) to either USB TYPE "A" PORT on the back panel of the J405. When **ENTER/START** is pressed, all of the stored data on the J405 will be transmitted to the target drive as a comma-delimited text file. See **Retrieving Data** on page **29** for more information.

NOTE: The J405 is **NOT** compatible with USB flash drives that have the U3 program pre-installed. Do not use USB flash drives that have the U3 program with the J405.

SEND TO PC

Before using **SEND TO PC**, the USB driver must be installed on the target PC, and HyperTerminal must be configured on the target PC. The USB driver is on the AMETEK Brookfield Documents USB Drive, and on the AMETEK Brookfield website at www.brookfieldengineering.com. See **APPENDIX A – USB/HYPERTERMINAL SETUP** on page **47** for detailed instructions on installing the USB driver, configuring HyperTerminal (if being used), and downloading data from the J405. Once the target PC has been configured, connect the included USB A to B cable (P/N: 200-0165) between the USB TYPE "B" PORT on the back panel of the J405 and the USB PORT of the target computer, and launch HyperTerminal. On the J405, with **SEND TO PC** highlighted, press **ENTER/START**, and all of the stored data on the J405 will be transmitted to the target computer as a comma-delimited text file. See **Retrieving Data** on page **30** for more information.

PRINT DATA

Before selecting **PRINT DATA**, connect an AMETEK Brookfield printer (P/N: Y990-0210) to either USB TYPE "A" PORT on the back panel of the J405 using the cable supplied with the printer. When **ENTER/START** is pressed, all of the stored data on the J405 will be printed on the attached printer. See **Retrieving Data** on page **29** for more information.

VIEW MEMORY USAGE

The J405 can store up to 20,000 data points. Selecting **VIEW MEMORY USAGE** will display what percentage of the data storage area is in use. Once the data memory is full, no additional data can be stored until the data on the instrument is deleted. If the memory is full, the J405 will continue to perform as expected, but it will indicate that the memory is full and no new sample data will be retained. The storage area can be cleared using **DELETE DATA** as described below.

DELETE DATA

Selecting **DELETE DATA** will delete all sample data stored on the J405. Prior to deletion, the J405 will prompt the user for confirmation as a precaution.

SYSTEM menu

The SYSTEM menu is password protected to prevent unwanted or accidental changes to operating parameters. The default initial password is AZI but should be changed to something unique if restricted access to the SYSTEM menu is desired. The password can be up to 10 characters long.

When the SYSTEM menu is selected from the Main Menu, the J405 will prompt for the password. Input the password using ▲ and ▼ to change the alphanumeric character, and ► and ◄ to move between characters. Press **ENTER/START** to proceed after entering the password.

When the correct password is entered, the J405 will offer the option to change the password by pressing the **A** key or to proceed to the SYSTEM menu by pressing **ENTER/START**. The SYSTEM menu will then remain unlocked until the instrument is powered off and back on.

SET ALARM LEVELS

When sampling, if the mercury level exceeds the selected alarm level, the word "ALARM" will flash on the J405 display. If AUDIBLE ALARM is set ON, the J405 will also beep three times. Two different alarm levels can be set using this menu option. Use the ▲and ▼arrow keys to change the value of the blinking field, and the ► arrow to move to the next character in the alarm level setting. Typically, the high alarm is used for an industrial alarm level, while the low alarm is set to a residential value. Use the **A** and **B** buttons to switch between the high and low alarm settings by pressing **A** to select the high alarm or **B** to select the low alarm. Once the alarm level has been set, press **ENTER/START** to select the highlighted alarm level as the current alarm level to be used. Upon returning to the **SET ALARM LEVELS** screen, there will be asterisk next to the currently selected alarm level (either high or low). It is recommended to set the alarm level higher than 0.5 $\mu g/m^3$. The alarm can be muted using **AUDIBLE ALARM ON/OFF** in the **SYSTEM** menu.

AUDIBLE ALARM ON/OFF

Use the ▲and ▼arrow keys to toggle the audible alarm on or off, and use **ENTER/START** to save the desired setting. Press **ESC** to exit without saving changes. The main screen display has a sound icon that indicates if the alarm is currently turned on or muted. The action lines in front

of the sound icon will disappear when the audible alarm is muted. See **J405 Main Screen Display** on page **12** to locate the sound icon.

DISPLAY MODE

From the **DISPLAY MODE** screen, use the ▲and ▼arrow keys to toggle between Threshold and Scientific display modes, and press **ENTER/START** to save the setting. In Scientific display mode, the J405 displays the sample reading for every sample taken. In Threshold display mode, the sample reading must be within 85% of the set alarm level to be displayed. Results below 85% of the alarm level value will be displayed as 0.00 $\mu g/m^3$ instead. Use **ESC** to exit without saving. See **SET ALARM LEVELS** above to set Threshold limits.

NOTE: Threshold display mode cannot be used with auto-sampling. If this combination is accidentally used, testing may halt. If this occurs, cycle power to the instrument and then turn off either Threshold display mode or auto-sampling.

VIEW SENSOR STATS

Use **VIEW SENSOR STATS** to display the current saturation level of the sensor, the number of regenerations performed on the sensor, and the total number of samples read by the sensor. Press any key to exit the screen when finished.

SET SYSTEM TIME

The J405 maintains the system time using a 24-hr clock format. Use the ▲and ▼arrow keys to change the value in the field where the cursor is flashing. Use the ◄ and ► arrow keys to move between the two digits within the hour or minute fields and use the **A** and **B** keys to switch between the hour and minute fields. Use **ENTER/START** to save the indicated time as the system time or **ESC** to exit without saving.

SET SYSTEM DATE

Use the ▲and ▼arrow keys to change the highlighted field, and the ◄ and ► arrow keys to move between characters within the day or year fields. Use the **A** and **B** keys to move between the day, month, and year fields. Press **ENTER/START** to save the system date or **ESC** to exit without saving.

RUN DIAGNOSTICS

Selecting **RUN DIAGNOSTICS** will start the J405**'**s self-diagnostic procedure. As the instrument proceeds through each diagnostic check, **follow the on-screen prompts**, and the instrument will display the specific check being performed and the pass/fail result of the check. If the check is not applicable to the current configuration of the instrument, the result field will be blank instead of indicating pass or fail.

- After viewing each result, press any key (except I/O or ESC) to move to the next diagnostic check. (I/O should not be used during the diagnostics because I/O will power off the instrument and ESC should only be used when specifically indicated by the instrument.)
- When testing the keypad, follow the on-screen prompts to press each of the keys in turn. The J405 will not indicate a pass/fail for this test. Instead, if all of the key's work and the instrument proceeds to the next diagnostic test, the keypad diagnostic has passed.

- When testing 80V power, press ENTER/START to pass the test and proceed to the next test. Pressing ESC will stop the test and return a Fail.
- If the 4-20mA output function of the J405 is not in use, press ENTER/START to cycle through the 4, 8, 12, 16 and 20mA checks in the diagnostic routine. If the 4-20mA output is in use, the diagnostics can be used to verify proper operation. Refer to **4-20mA Output** on page **30** for more information.

After the last diagnostic result has been displayed, the instrument will display "Done," and pressing any key will return to the main screen of the J405.

SET CONTRAST

The display contrast can be set from 0 (highest contrast) to 127 (least contrast) by using ▲ and ▼ to adjust the contrast. By default, ▲ and ▼ will adjust the contrast in increments of 1 unit. Press **B** to switch to a coarse adjustment of 10 units for each press of ▲ or ▼. Press **A** to switch back to the default fine adjustment mode. Press **ENTER/START** to save the contrast setting and exit.

Daily Operations

Before each day's use of the Jerome® J405, perform the following steps to verify proper instrument operation:

- Press the power **I/O** button.
  - The display will light up and show instrument serial number and software revision.
  - If necessary, press **ESC** to clear any calibration reminders. Call Customer Service at 800-528-7411 or 602-470-1414, or e-mail customerservice.jerome@ametek.com, to schedule instrument calibration.
  - The digital meter displays 0.00 $\mu g/m^3$.
  - Check the battery level as indicated by the battery icon at the top center of the instrument display.
    - If the battery meter is empty and flashing, refer to **Charging Internal Battery** on page **28**.
    - If the battery meter is not empty, but is flashing, then the instrument is currently charging the battery.
    - When the instrument is plugged in and powered off, the display will stay active and indicate "Charging."
  - To ensure the instrument's electronics have stabilized, allow a 5-minute warm up before beginning the next step.
- Perform sensor regeneration. Refer to **Sensor Regeneration** on page **23** for the procedure.
- Ensure the instrument has been powered on for at least five (5) minutes prior to sampling.
- Use the Zero Air Filter to equilibrate the instrument to ambient air temperature.
  - Install the Zero Air Filter in the instrument's intake.
  - Sample repeatedly every 15 seconds until the readings stabilize, then remove the Zero Air Filter.

NOTE: For EPA clean-up levels less than 3 $\mu g/m^3$, it is necessary to run a warm-up routine before sampling. To initiate the automatic five minute warm-up, install a **Zero Air Filter (P/N: Z2600 3905**) in the intake, and select **Warmup** from the **REGEN menu**.
For levels of 3 $\mu g/m^3$ and above, the warm-up routine is not necessary.

- Press the SAMPLE button (at the end of the handle).

- At the end of the sampling cycle, read the digital meter.
  - The number shown on the digital meter is the mercury vapor concentration in $\mu g/m^3$.
  - This sampled mercury value remains on the display until the next sample is taken.
  - The digital meter automatically re-zeroes at the start of each sample.
- At the end of each day's use, perform sensor regeneration as described in the next section.

DO NOT ALLOW MERCURY VAPOR TO STAY ON THE GOLD FILM SENSOR OVERNIGHT.

Sensor Regeneration

Sensor regeneration is needed to clean the J405 sensor of any accumulated mercury vapor and to prolong the life of the sensor. This simple procedure should be done:

- At the beginning of the day on which the instrument is to be used.
- During the day when the sensor becomes saturated.
- At the end of the day before storing the instrument.
- At a minimum of 30-day intervals while the instrument is in storage.

To perform sensor regeneration:

- Plug the AC power supply/charger or the external battery pack into the back of the instrument.
- Press the power **I/O** button to power on the instrument.
- If necessary, press **ESC** to clear any calibration reminders. Call Customer Service at 800-528-7411 or 602-470-1414, or e-mail customerservice.jerome@ametek.com, to schedule instrument calibration.
- From the Main Screen, press the RIGHT arrow button (►) to enter the main menu.
- Press the DOWN arrow button (▼) to move the cursor to **Regen**.
- Press the RIGHT arrow button (►) to select **Regen** from the menu.
- Press the **ENTER/START** button on the keypad to select **Regen Now** from the Regen menu.
  - The instrument will respond with "Perform Regen Using EXTERNAL POWER?"
    - Press **ENTER/START** to proceed or **ESC** to exit.
  - The instrument display will warn "Do Not Disconnect External Power while Heating".
    - Press **ENTER/START** to proceed or **ESC** to exit.
  - The instrument will begin a 45-minute regeneration cycle, indicated by "Regeneration in Progress" on the display. **Do not interrupt this cycle.**
  - If any error message appears on the display, see the **J405 TROUBLESHOOTING** section beginning on page **38**.
- The LCD screen displays Regeneration in Progress for the duration of the 45-minute cycle and displays a countdown timer as well once the instrument enters the cooling process of the regeneration. When the cycle is completed, the instrument returns to the main screen.

DO NOT INTERRUPT THIS CYCLE.
Wait until the cycle is completed before continuing with the next step.

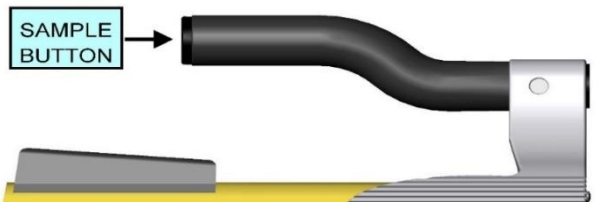
- **The instrument can be used immediately following the sensor regeneration if necessary**.
- The Jerome® J405 is ready for sampling.

CAUTION:
The Jerome® J405 is intended for gaseous vapor use only. DO NOT allow the probe or the instrument's intake to be exposed to liquids, dust, or other foreign material. Moisture or liquids drawn into the instrument can damage the sensor and flow system.

Sample Mode

This mode, used for standard operation, produces optimum accuracy with the Jerome® J405. See **JEROME® J405 TECHNICAL SPECIFICATIONS** on page **9** for the accuracy specifications.

- Press the power **I/O** button. The display will light up and briefly show the instrument serial number and software revision. If necessary, press **ESC** to clear any calibration reminders.
  - Next, the digital meter displays 0.00 µg/m^3. If the battery meter is empty and flashing, recharge the battery. See the section **Charging Internal Battery** on page **28**.
- To ensure the instrument's electronics have stabilized, allow a 5-minute warm up before beginning the next step.
- Press the SAMPLE button (located at the end of the handle).
- At the end of the 16-second cycle, read the digital meter.
  - The number shown on the digital meter is the mercury concentration in µg/m^3. This value remains displayed until the next sample is taken. The digital meter automatically re-zeroes at the start of each sample.
- When the sensor is completely saturated, the digital meter displays Sensor Regeneration Required when sampling is attempted. No further operation is possible until a sensor regeneration is performed. (Refer to the **Sensor Regeneration** procedure on page **23**.)



- Press the **I/O** button to turn the power OFF when not in use.

Sampling Notes

- The Jerome® J405 is intended for vapor use only. **DO NOT** allow the probe or the instrument's intake to come in contact with liquids, dust, or other foreign material. Moisture or liquids drawn into the instrument can damage the sensor and flow system.
- Ensure the instrument has been powered on for at least five (5) minutes prior to sampling.
- For maximum accuracy, wait 15 seconds between samples to allow the sensor to restabilize.
- The Jerome® J405 operates a minimum of 24 hours on a fully charged battery.
- Use the probe (P/N: 1400-2002) to locate mercury vapor in hard-to-reach places. Plug the probe directly into the instrument's intake.
- Accessing the menus during sampling can corrupt current sample data and should be avoided.

Survey Mode

The survey mode takes samples and displays the result every 2 seconds automatically. Use this mode to locate mercury spills or to assess areas of potentially high mercury concentrations. Sampling in the survey mode is not as accurate.

- Press the power **I/O** button.
- The display will light up and show the instrument serial number and software revision.
  - If necessary, press **ESC** to clear any calibration reminders.
  - Next, the digital meter displays 0.00 μg/m^3. If the battery meter is empty and flashing, recharge the battery. See **Charging Internal Battery** on page **28**.
  - To ensure the instrument's electronics have stabilized, allow a 5-minute warm up before beginning the next step.
- From the Main Screen, press ► to enter the Main Menu.
- From the Main Menu, select the Sample menu.
- Scroll through the Sample menu to Survey Mode.
- Press **ENTER/START** to select Survey Mode and begin sampling.
  - The instrument performs a 2-second purge of the flow system, and then begins survey mode sampling.
  - The display updates the measured concentrations at the end of each 2-second sample cycle.

NOTE: Approximately 65 samples at 100 μg/m^3 may be taken before a sensor regeneration is required.

  - The pump will continue to run, and the display will update with a new mercury concentration reading every 2 seconds.
  - Press any button to stop survey mode sampling and perform a final purge of the flow system.
  - The instrument remains in the survey mode until one of the following occurs:
    - A button is pressed on the keypad.
    - The sensor is saturated
    - A low battery signal is encountered
    - The instrument is turned OFF.
  - The final survey value remains displayed on the main screen until the next sample is taken.

Press the power **I/O** button to turn the instrument off when not in use.

Operating on AC Power or Generator

- For stationary use, the J405 may be operated on AC power.
  - Operating the instrument on AC power at all times eliminates the need for the battery pack and its necessary maintenance.
  - The battery may be disconnected internally or removed completely whenever the instrument is operating on AC power.

Operating on Internal Battery Power

For portable use, the J405 may be operated on battery power.

- When you operate the instrument on battery power, please be aware of the following:
  - A fully charged battery pack (P/N: 200-0143) provides power for a minimum of twenty-four (24) hours of operation.
  - For operating more than twenty-four (24) hours, an extra fully charged battery pack is needed.
  - Complete battery recharging takes 3 hours. Refer to **Charging Internal Battery** on page **28**.
  - The J405 uses a rechargeable Nickel Metal Hydride battery. Dispose of worn-out batteries properly when you are replacing the battery pack.

When operating on battery power, the J405 will shut down after twenty (20) minutes of non-usage. However, if the instrument is running in Survey Mode or Auto-Sampling mode, the instrument will not shut off after twenty minutes. If the J405 is reading low levels of mercury in Survey or Auto-Sampling mode, it will continue to sample until the battery runs out. However, if the J405 is reading high levels of mercury in Survey mode, when the sensor reaches saturation, a message will appear indicating that sensor regeneration is required, and twenty minutes later the instrument will automatically power off. In Auto-Sampling mode, the instrument will regen automatically when the sensor is saturated, provided external power is connected. If external power is not connected, the instrument will indicate “External Power Required to Regen” and the regeneration will not be performed until power is restored.

Battery Management

With all handheld and battery powered instruments, there is a need to keep the battery properly charged and ready for use. Proper battery management will not only ensure the instrument is ready when needed but will also extend the life of the battery.

There are 3 different battery management methods recommended based on the frequency of instrument use. An additional option to ensure the instrument is ready to go at a moment’s notice is to purchase a Jerome external battery pack (P/N: 990-0214). See **External Battery Power** on page **27** for more information on the External Battery Pack.

High Frequency user: Daily and weekly usage.

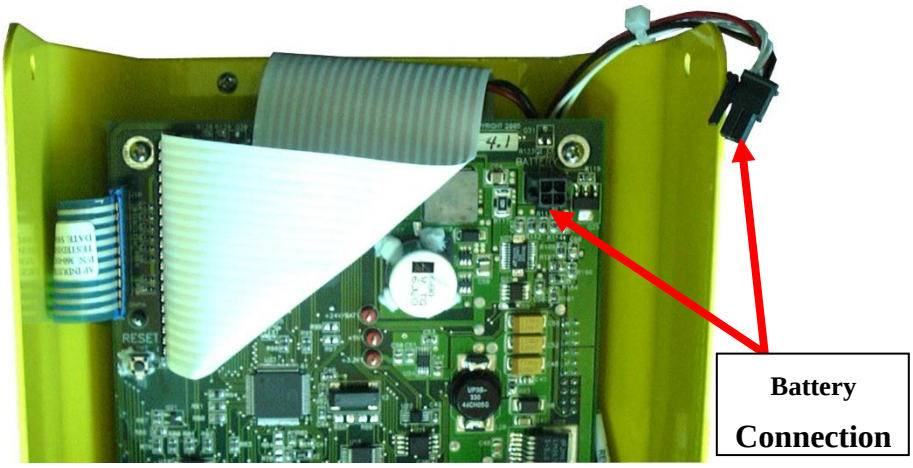
For this type of user, the instrument should be plugged in anytime the instrument is not being used.

Medium Frequency user: Once per month usage.

For this type of user, the instrument should be plugged in for a minimum of three (3) hours prior to use. Otherwise, the instrument can be left unplugged.

Infrequent user: Greater than one month between uses or long-term storage.

For this type of user, the instrument should be fully charged, and the battery should be disconnected. Make sure nothing is plugged into the back of the J405, then remove the front 2 screws near the intake and open the instrument. On the front most part of the main circuit board, there is a black 4 pin connector, as shown here. Depress the safety latch on the connector and pull it out to disconnect the battery. Close the instrument and replace the 2 screws in the front of the instrument. Reverse these steps to reconnect the battery if the instrument is going to be used. The time and date will need to be reset when the battery is reconnected for instrument use. See **SYSTEM menu** on page **20** for instructions.



If the instrument will be in storage for more than 4 months, it will need to be taken out of storage and fully charged every 4 months before being placed back in storage. To do so, reconnect the battery and connect the AC power supply/charger to charge the instrument for a minimum of 3 hours. See **Charging Internal Battery** on page **28** for charging instructions. After charging, disconnect the battery before returning the instrument to storage. Again, the time and date will need to be reset if the battery is reconnected so the instrument can be put into service.

Sample data is stored in non-volatile memory and will not be lost or affected when the battery is disconnected or replaced.

External Battery Power

An optional external battery pack (P/N: 990-0214) is available to power the J405, but it is not recommended for routine use. The external battery pack should be reserved for sensor regenerations or sampling when the internal battery is nearly discharged and AC current for recharging the internal battery pack is unavailable. The external battery pack will not recharge the J405's internal battery pack.

The external battery pack is recharged by connecting the J405's AC power supply/charger between an AC outlet and the female DIN connector on the external battery pack. The green LED on the external battery pack will light up during charging of the external battery pack, and then go out once the external battery pack is fully charged; this takes approximately 4 hours. The red LED on the external battery pack will only light up if there is a battery fault or error. Should this occur, call Customer Service at 800-528-7411, 602-470-1414, or e-mail

customerservice.jerome@ametek.com for additional information. If the AC power supply/charger is connected to the external battery pack while the external battery pack is connected to the J405, both the J405 and the external battery pack will be recharged.
When operating using the external battery pack, the J405 will shut down after twenty (20) minutes of non-usage. However, if the instrument is running in Survey Mode or Auto-Sampling mode, the instrument will not shut off after twenty minutes. If the J405 is reading low levels of mercury in Survey or Auto-Sampling mode, it will continue to sample until the battery runs out. However, if the J405 is reading high levels of mercury in Survey mode, when the sensor reaches saturation, a message will appear indicating that sensor regeneration is required, and twenty minutes later the instrument will automatically power off. In Auto-Sampling mode, the instrument will regen automatically when the sensor is saturated.

Additionally, using the optional Car Accessory Cable (P/N: 200-0170), the J405 may be powered from a car accessory jack (cigarette lighter) and draw power directly from the battery of a vehicle. The Car Accessory Cable can be used for sensor regeneration or sampling when the internal battery pack is nearly discharged and AC current for recharging the internal battery pack is unavailable. The Car Accessory Cable will not recharge the J405's internal battery pack.

In order to use the external battery pack or the Car Accessory Cable, the J405's internal battery pack must be installed in the instrument. If the internal battery pack is disconnected or removed, neither of these accessories will be able to provide power to the instrument.

To order either of these accessories or for additional information, call Customer Service at 800-528-7411, 602-470-1414, or e-mail customerservice.jerome@ametek.com.

Charging Internal Battery

- The internal battery needs to be charged if the battery indicator icon on the main screen is empty and flashing.
- Connect the AC power supply/charger between the J405 power receptacle and an AC power source.
- The battery icon will flash during charging and show as half full until fully charged.
    - Complete battery recharging takes 3 hours.
    - The J405 contains a trickle charger so it may be continually plugged into an AC power source without damaging the battery pack.
    - When the instrument is plugged in and powered off, the display will stay active and indicate "Charging."

Flashing Icon: Battery Needs to be Charged

Partially Full Battery (If Flashing, Battery is Charging)

Fully Charged Battery (If Flashing, Battery is Charging)

When the battery fails to hold a charge, the battery pack should be replaced.

- Battery life under normal usage is approximately 1 year, depending on the number of charge and discharge cycles. See **Replacing the Battery Pack** on page **36**.

Retrieving Data

On instruments that have the USB Communications option, sample data can be transmitted from the J405 for analysis using the USB connections on the back panel of the J405. Data may be transmitted directly to a PC, saved to a USB drive plugged into the J405 or printed to a Jerome printer connected to the J405. See the **DATA menu** section on page **18** for the specific data transmission options available. If the USB Communications option has not been purchased, the USB ports will not be present. Contact your Sales Representative for information on the USB option.

The data is transmitted in a comma-delimited text file named "serialnumber.txt" (for example 40500411.txt) with a four-line header indicating the model and serial number of the instrument, the date and time of the report, and the gas being detected. The first line of the data indicates the contents of each data field, as shown below. The USB icon on the main screen will flash during data transmission. If an instrument data file with the same filename already exists on the USB drive, the current data will be appended to the existing file.

The data file will look like this example:

```
Jerome Model: J405-0007
Serial Number: 405-00411
Date: 01-OCT-2010  14:27:54
Gas: Hg

dd-MMM-yyyy,hh:mm:ss,Reading,Units,Temp-C,Type,Location
01-OCT-2010,13:36:03,  25.04, ug/m3, 25.43,M,LAB
01-OCT-2010,13:36:32,  24.72, ug/m3, 25.43,M,LAB
01-OCT-2010,13:38:12,  24.31, ug/m3, 25.50,A,LAB
01-OCT-2010,13:39:12,  24.31, ug/m3, 25.68,A,LAB
01-OCT-2010,13:40:38,  25.11, ug/m3, 25.80,S,LAB
01-OCT-2010,13:40:40,  25.21, ug/m3, 25.80,S,LAB
01-OCT-2010,13:41:24,   0.00, ug/m3, 25.68,R,LAB
```

- The Temp field lists the internal temperature of the instrument in degrees Celsius at the time of sampling.
- The Type field lists a single letter code that indicates the type of sample taken, as follows:
  M: Manual Sample
  A: Auto Sample
  S: Survey Mode Sample
  d: Intermediate Dosimeter Result (not currently available)
  D: Final Dosimeter Result (not currently available)
  R: Regeneration (indicates date and time of regeneration).
  (For regenerations, the sample value listed will always be 0.00 $\mu g/m^3$.)
- The Location field lists the location where the sample was taken, as set using **SET LOCATION NAME** in the SAMPLE menu. See the **SAMPLE menu** section on page **15** for more details. If Location Names are used and the data is output to a printer from the J405, consecutive samples at the same location will be grouped together.

- If the data is transmitted directly to a PC, there will be one additional line at the end of the file indicating the number of records. This line will be in the form **[DATA:####]** with the #### indicating the number of records, as shown on page **54**.

Instrument I/O Interface

The J405 I/O port is a DB-25F connector on the back of the instrument that provides numerous specialized functions for specific industrial applications and for factory use. System integration utilizing the 4-20mA output feature is the most common use of the I/O port.

NOTE: This is NOT a printer connection.
It is a specialized interface. Connecting any unauthorized device to this connector may damage both the device and the J405 and may void the warranty on the J405.

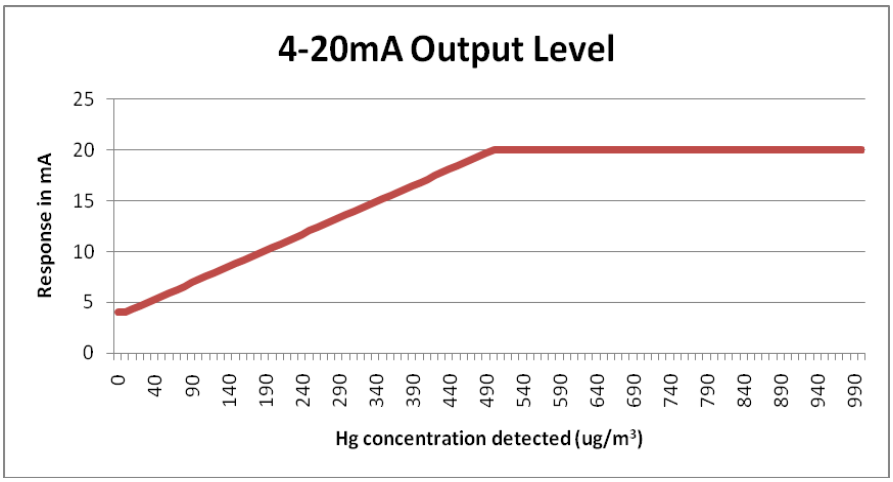
4-20mA Output

The 4-20 mA output can be used to indicate the Hg reading level on a proportional scale from 4-20 milliamps for connection to certain industrial systems, such as SCADA. A 4 mA current level always corresponds to a Hg reading of 0.5 µg/m^3 or less, while a 20 mA current level corresponds to a Hg reading of 500 µg/m^3 or higher. Current levels between 4 and 20 mA correspond to Hg readings between 0.5 and 500 µg/m^3 on a proportional scale, as determined by this equation:

$$\boldsymbol{Hg\ concentration\ detected} = \frac{[(\boldsymbol{current\ in\ mA} - \mathbf{4})\ \boldsymbol{X}\ \mathbf{500}]}{\mathbf{16}}$$

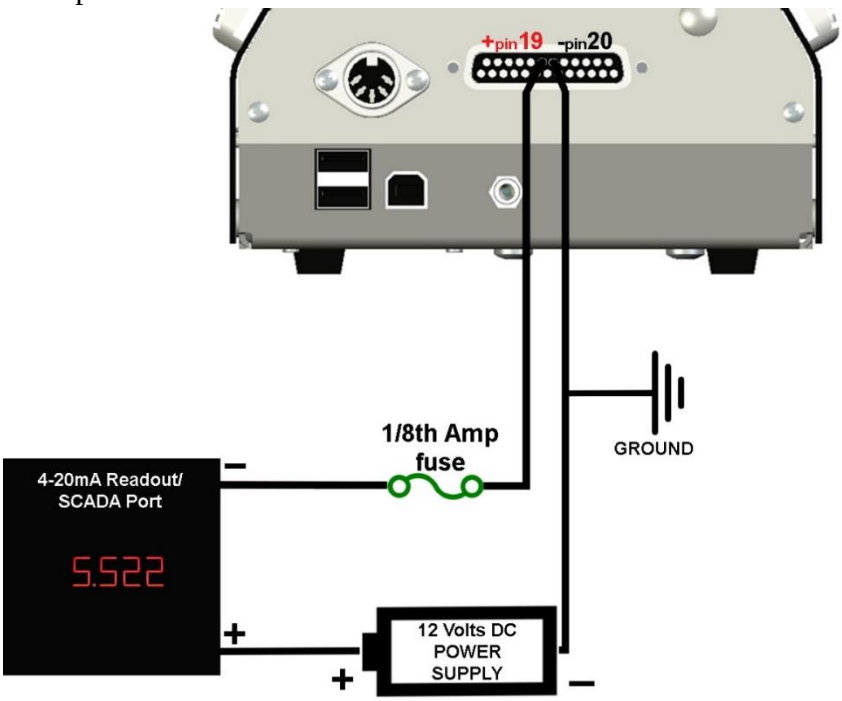
When the J405 is powered off, either manually or automatically, the output current will drop to 3.5mA to indicate this condition. However, if the J405 is operating with the internal battery disconnected and loses AC power, the J405's 4-20mA circuit will continue to output the last current value as long as power to the external current loop is maintained.

The relationship between the Hg concentration detected and the current level present can be represented graphically as follows:



To utilize the 4-20mA output, connect the positive wire of your 4-20mA system to pin 19 of the I/O ports on the J405, and the negative wire to pin 20. The number of each pin of the I/O port is labeled on the port itself, and the locations of pins 19 and 20 can also be seen in the diagram below. The 4-20 mA connection is passive and must be powered by an external 12 V DC power supply.

An example setup is shown below.



In this example, the 5.522mA current level displayed above would correspond to a Hg concentration of 47.56 µg/m^3.

After configuring your system, the J405 Diagnostics feature can be used to test your setup. When the 4-20mA test portion of the diagnostics is reached, the instrument will output current levels of 4, 8, 12, 16 and 20mA, and the current level displayed on the J405 should match the readout of

your 4-20mA system. See **SYSTEM menu** for additional info on running the diagnostics feature. After confirming that the system is configured correctly, use the instrument as normal, and the 4-20mA signal will be output automatically by the J405.

The 4-20mA output is accurate to within ±1.5% of the full scale.

6. MAINTENANCE

Preventive Maintenance Schedule

To keep the Jerome® J405 operating at peak performance, follow the maintenance schedule below as a guide. Since maintenance is more a function of application and amount of use rather than time, your requirements may be different from the listed schedule. Call Customer Service at 800-528-7411 or 602-470-1414, or e-mail customerservice.jerome@ametek.com for additional guidance for your environment and operation.

PART/COMPONENT	MAINTENANCE CYCLE	REFER TO PAGE
Charge battery	Depends on usage. See **Battery Management** section for guidelines.	Page 26
Change fritware	Weekly or **as needed**	Page 33
Change AG Filter[1]	Every 500 samples	Page 35
Change internal filters and tubing[1, 2]	After 6 months of use or as needed	Page 35
Replace Zero Air Filter[2]	Annually	N/A
Factory calibration	Annually	Page 37
Functional check	Monthly or as needed	Appendix B, Page 5
Replace battery	Annually or as needed. The battery pack contains NiMH batteries. Please dispose of properly.	Page 36

FUSE – The J405 utilizes an auto-resetting fuse that does not require care, maintenance, or replacement by the user. If the fuse is tripped by electrical power anomalies, it will automatically reset itself once it detects that electrical power conditions have returned to normal.

[1] AG filters contain Sofnolime™. For safety information see the supplier's Safety Data Sheet (SDS) or call Customer Service at 800-528-7411 or 602-470-1414, or e-mail customerservice.jerome@ametek.com for a copy. Dispose of all filters properly.

[2] Zero Air Filters and scrubber filters contain Chemsorb® 1321. For safety information see the supplier's Safety Data Sheet (SDS) or call Customer Service at 800-528-7411 or 602-470-1414, or e-mail customerservice.jerome@ametek.com for a copy. Dispose of all filters properly.

Flow System

The Jerome® J405's flow system is the crucial link between the sensor and the sample. For the instrument to perform correctly, the flow system must be properly maintained. The user maintainable components of this system are the intake filter, an AG Filter, two scrubber filters and connecting tubing. NOTE: Make sure nothing is plugged into the back of the instrument before opening the instrument case.

Check the **Preventive Maintenance** on page **32** for a suggested schedule for changing fritware and internal filters. The Tygon® tubing in the system must be free of crimps for proper flow.

Flow System Parts	Part Number
Scrubber Filter 1 (1 Elbow, 1 Straight Barb)	Z2600 3930
Scrubber Filter 2 (2 Elbow Barbs)	600-0262
AG Filter	600-0293
Fritware Filter	345-0241
Tygon® Tubing - 1/8" I.D. (2')	345-0050

Fritware Filter

Replace the fritware filter once each week **or as needed**. In dusty environments, the fritware filter may need to be replaced as often as once a day. Replacement fritware filters are available from Jerome Consumable Sales at 800-528-7411 or 602-470-1414.

- Make sure nothing is plugged into the back of the instrument, then remove the two (2) side screws from the intake end of the instrument and open the case.
- Gently pull the inner portion of the intake out of the intake port in the direction of the arrow, as shown in Figure 1 below.
- Gently unscrew the Intake Cap and remove from instrument.
- Using tweezers, or another tool, to remove the O-ring that is visible around the fritware as shown in Figure 2 below.
- Remove fritware by using a blunt object to push fritware from the front of the Intake Cap as shown in Figure 3 below.
- Place the new fritware in the intake port with the smooth side facing out of the instrument and replace O-ring, as shown in Figure 4 below.
- Once the fritware has been replaced and the intake reattached, close the case, and replace the two (2) side screws removed above.

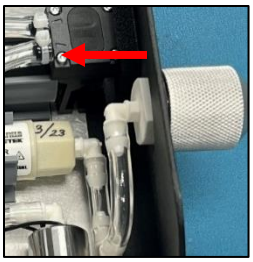


Figure 1

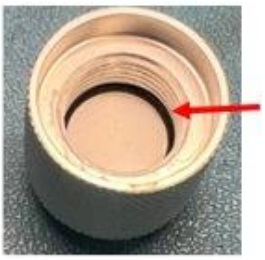


Figure 2

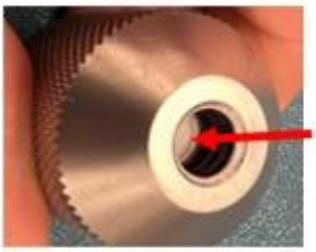


Figure 3

Figure 4

The increased sensitivity of the Jerome® J405 requires the replacement of the AG filter (P/N: 600-0293) every 500 samples to ensure the accuracy of the readings. If your application will require in excess of six (6) months to reach 500 samples, the AG filter should still be changed every six months along with the other internal filters.

To check the AG filter:

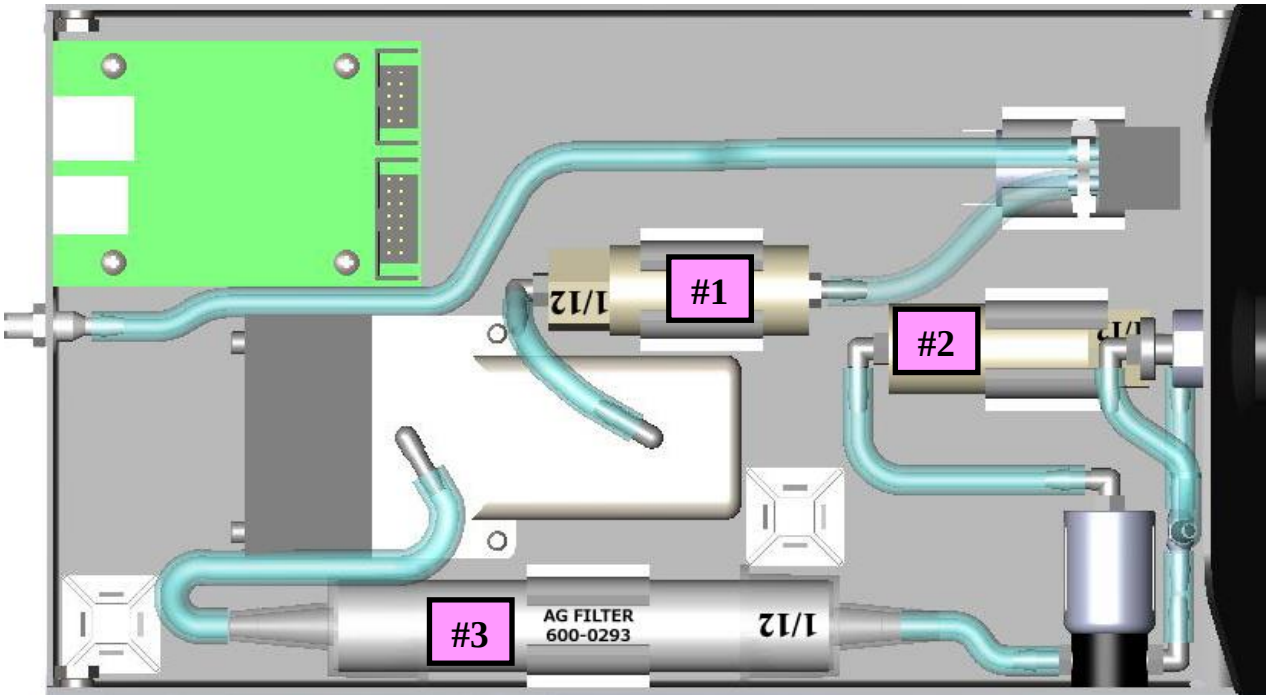
- Take 5 samples with Zero Air Filter (P/N: Z2600-3905) connected to front of instrument. Readings should decrease with at least 3 of the 5 readings at 0.00 µg/m^3. For maximum accuracy, wait 15 seconds between samples to allow the sensor to restabilize.
- If readings are not 0.00 µg/m^3, then the internal AG filter (P/N: 600-0293) needs to be replaced. After replacement, the new AG filter will need to be acclimated to the system by performing a sensor regeneration followed by twenty (20) manual samples. See page **35** for filter change instructions.
- **The number of samples can be monitored by viewing the Sensor Stats within the instrument:**

From the MAIN Screen:

- Press the RIGHT arrow button (▶) to enter the main menu.
- Press the DOWN arrow button (▼) to move the cursor to **System**.
- Press the RIGHT arrow button (▶) to select **System**.
- Press the DOWN arrow button (▼) to move the cursor to **View Sensor Stats**
- Press **ENTER/START** to select **View Sensor Stats** on the System menu.
- The screen will display Sensor samples on the last line.

After changing the AG filter, accuracy at 1.0 µg/m^3 may change from ±10% to ±20%, and accuracy at 25 µg/m^3 and 100 µg/m^3 may change from ±5% to ±7%. RSD is unchanged.

CAUTION:
Internal filters contain Sofnolime™ or Chemsorb® 1321. Used filters will contain trace amounts of Mercury also. Use proper methods when disposing of used filters. Call Customer Service at 800-528-7411, 602-470-1414, or e-mail customerservice.jerome@ametek.com for a copy of the Sofnolime™ or Chemsorb® 1321 SDS or for other questions.

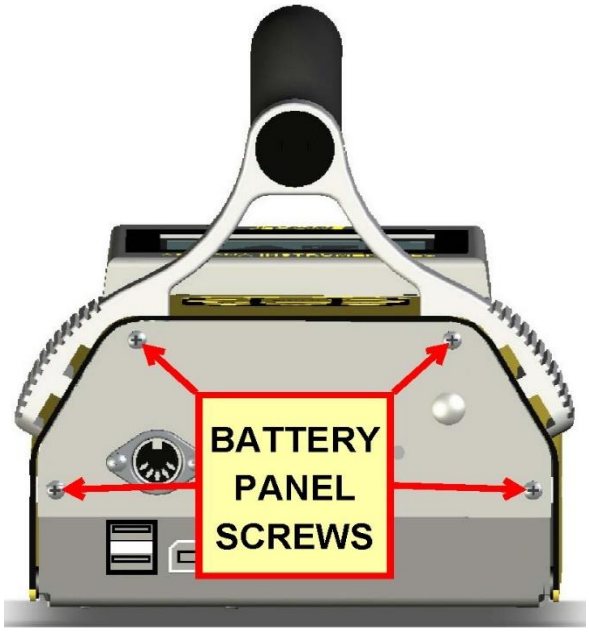


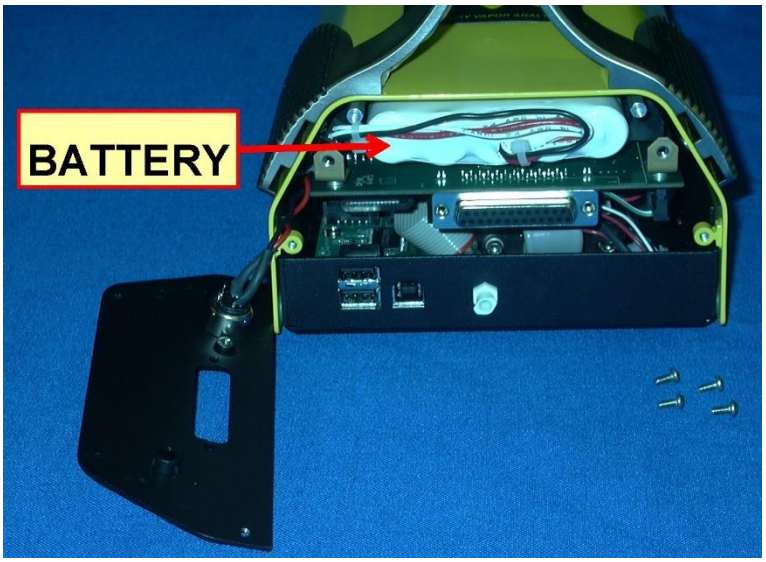
Internal Filters	Part Number
1. Scrubber Filter (1 elbow, 1 straight barb)	Z2600 3930
2. Scrubber Filter (2 elbow barbs)	600-0262
3. AG Filter	600-0293

Internal Filters

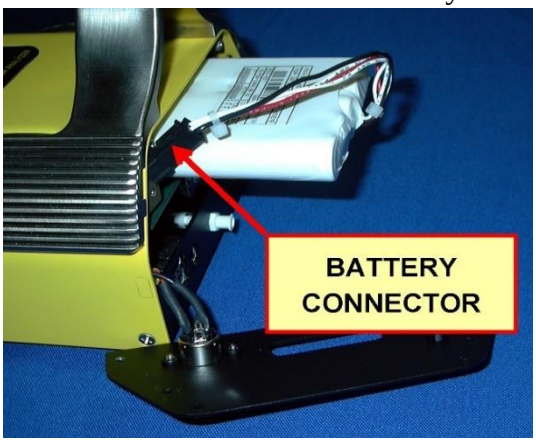
- Replace the internal filters after six (6) months of use, or as needed.
  - The AG filter should be replaced every six (6) months or every 500 samples, whichever comes first, based on your instrument usage schedule.
- Press the **I/O** button to turn the power OFF and unplug the power cord.
- Remove the two (2) side screws from the intake end of the instrument and open the case.
- Carefully disconnect the Tygon® tubing from both ends of the filters and discard the old filters.
- Replace the old filters with new filters, oriented as shown in the diagram above.
  - Push the Tygon® tubing as far as it will go onto the filter fittings.
  - Note that the marked flow direction on the AG filter goes toward the sensor, or to the left in the diagram above.
- Push the filters into the mounting clips.
- Remove any crimps or twists in the tubing and ensure that tubing connections are secure. If the tubing is loose, readings may not be accurate. Replace any tubing that has deteriorated due to heat and/or age.
- Close the case and replace the screws.
- If the AG filter is replaced, the new filter must be acclimated to the system by performing a sensor regeneration, followed by twenty (20) manual samples using the sample button. See page **23** for sensor regeneration instructions.
- Dispose of all filters in accordance with state and federal environmental regulations.

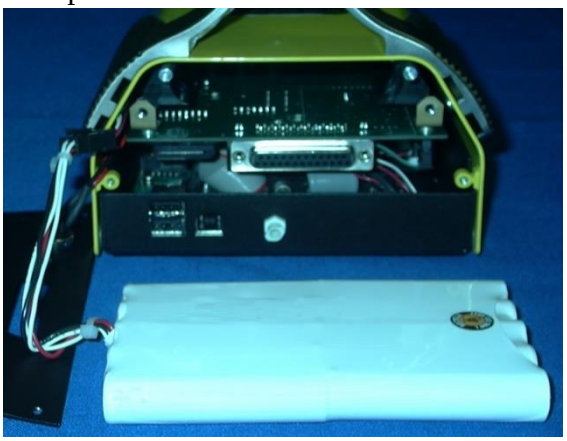
Replacing the Battery Pack





- Press the **I/O** button to turn the power OFF.
- Unplug the power cord.
- Use a Phillips screwdriver to remove the four (4) screws securing the battery panel as shown above.
- After removing the screws, carefully set the panel to the side. Note that it is still connected to the instrument via the power connector.
- Slide the battery pack out of the J405.
- Disconnect the battery connector to detach the old battery.
- Install the new battery by connecting it to the battery connector and sliding it into the J405.
- Tuck any excess cabling into the gap between the battery and the case.
- Replace the battery panel and secure with the four (4) screws removed above.
- Dispose of the old nickel metal hydride (NiMH) battery in accordance with state and federal regulations.
- After battery replacement, the date and time will need to be updated. See the **SYSTEM menu** on page **20** for directions. Sample data is stored in non-volatile memory and will not be lost or affected when the battery is disconnected or replaced.





7. CALIBRATION

Factory Calibration Service

The Jerome® J405's gold film sensor is inherently stable and does not require frequent calibration. The interval between calibrations depends upon the application and frequency of use; however, the recommended interval is every 12 months.

The Jerome® J405 has been factory calibrated using laboratory equipment containing NIST traceable permeation tubes. In order to calibrate the Jerome® J405, a sophisticated calibration system is required that ensures stability of the calibration gas source, eliminates any pressure in the calibration gas stream, and controls the temperature of the calibration environment.

We strongly recommend you take advantage of our calibration and maintenance service at AMETEK Brookfield. Service includes filter replacement, component testing, and instrument calibration to NIST traceable standards. A certificate of calibration is issued by AMETEK BROOKFIELD when your instrument is factory calibrated.

For scheduling and shipping authorization, call Customer Service at (800) 528-7411 or (602) 470-1414 or visit our website at www.brookfieldengineering.com**.**

Verification of Functionality

The Functional Test Kit (FTK), P/N: Y431-0902, is used to verify that your instrument is functioning correctly between recommended annual factory calibrations. It allows you to have complete confidence in the sample results. This test verifies proper instrument operation through the introduction of a known concentration of mercury vapor into the Jerome® analyzer.

THIS IS A FIELD CHECK OF THE FUNCTIONALITY OF THE INSTRUMENT. THIS TEST DOES NOT CALIBRATE THE INSTRUMENT.

If your application requires frequent verification of instrument function, this test demonstrates the instrument's proper operation and function. Recording FTK results in an instrument log provides a quality control/quality assurance record of instrument function between regular calibrations. If test results fall within the expected range, you may assume the instrument is functioning correctly.

See **APPENDIX B – J405 FUNCTIONAL TEST KIT** on page **55** for more information about the FTK procedures. Complete instructions for use are supplied with the test kit, (P/N: Y431-0902).

To order the FTK, contact your Sales Representative at (800) 528-7411 or (602) 470-1414.

8. J405 TROUBLESHOOTING

Symptom	Possible Cause	Solution
Power Problems		
Instrument does not turn ON. Battery will not hold a charge.	Discharged battery or Dead battery.	Recharge battery for a minimum of 3 hours. Refer to page **28**. Replace battery. Refer to page **36**.
Instrument does not turn on when connected to AC power supply/charger.	Open fuse. Insufficient power. Internal component failure.	Wait for fuse to automatically reset itself. Use a voltmeter to verify there is power to the AC outlet. Call Customer Service for information at 800-528-7411 or 602-470-1414.
Sampling Problems		
Airflow is restricted during the sensor regeneration cycle, causing possible permanent damage.	Kinks and crimps in the Tygon® tubing. Obstructed intake or exhaust. Clogged intake filter	Periodically check the Tygon® tubing in the instrument. Refer to page **35**. Verify ports are not obstructed. Change intake fritware filter. Refer to page **33**.
High erratic results.	Internal mercury vapor contamination.	1. Install Zero Air Filter in intake. Press SAMPLE button. After three samples, if readings are over 2 $\mu g/m^3$, replace fritware filter and Tygon® tubing. Refer to page **33**. 2. Perform sensor regeneration with the Zero Air Filter in intake. Refer to page 23. Retest if necessary. Replace scrubber filters and Tygon® tubing. Refer to page **33**.

Symptom	Possible Cause	Solution
High or erratic results	Intake and internal filters may become clogged and need replacement when sampling in a dusty area.	1. Open instrument and check for pinched, crimped or disconnected internal tubing. 2. In extreme conditions, an additional particle filter may be installed on the intake.
Low response or erratic readings after a long period of non-use.	May need a second regeneration cycle.	1. Wait 30 minutes and perform another sensor regeneration. 2. Test with FTK. Refer to page **55**. 3. If still unresponsive, call Customer Service at 800-528-7411 or 602-470-1414 for assistance.
False readings	Extremely cold or extremely warm air sampled into unit.	If sampling under these conditions, install Zero Air Filter in intake. Sample every 15 seconds until the display reads 2 $\mu g/m^3$ or less to equilibrate sensor temperature with the temperature of the sample air stream. Remove filter and take samples. or Run the Warm-up as described in the **REGEN menu**.
Display Warnings and Error Messages		
Sensor Failure		Call Customer Service at 800-528-7411 or 602-470-1414.
Sensor out of Range	The sensor resistance has changed.	Call Customer Service at 800-528-7411 or 602-470-1414.
Data Memory Full	Data memory full	Save and then delete data. See **Retrieving Data** on page **29.**
External Power Required to Regen	Power from the AC adapter, external battery or car adapter is required to regenerate the sensor.	Connect external power and restart the regeneration.
Incomplete Regen. Check battery/AC power supply.	External power was interrupted before regeneration could complete.	Reconnect external power, allow sensor to cool, then restart regeneration.
Regen High Temp Error. Incomplete Regen.	Sensor temperature too high during regeneration.	Allow sensor to cool, then restart regeneration.

Symptom	Possible Cause	Solution
Sensor Regeneration Required	Sensor is saturated with mercury.	Perform Sensor Regeneration. See page **23**.
A USB Printer is not responding or not connected.	The instrument has not received a response from the printer in over 30 seconds.	Turn the printer off and back on, and make sure the printer is connected to the J405 and online.
No USB Drive is connected, or USB Drive is full.	USB drive not connected or USB drive full	Make sure space is available on USB drive and drive is connected.
Battery Fault	1. Turn off the J405, then disconnect the AC power supply/charger from the J405. 2. Turn the J405 back on, then reconnect the AC power supply/charger to the J405.	
Calibration due soon		Call Customer Service at 800-528-7411 or 602-470-1414 to schedule factory calibration.
Calibration past due		Call Customer Service at 800-528-7411 or 602-470-1414 to schedule factory calibration.
High Concentration	Sampled mercury concentration is greater than 999.9µg/m^3.	

Potential Interferences

Potential interferences to the Jerome® mercury vapor analyzers are rare and most of these can be eliminated with proper maintenance procedures. However, erroneously high readings can sometimes occur. Here are a few things to be aware of when using the instrument:

The gold film sensors used in the Jerome® mercury vapor analyzers do not respond to the following compounds:

- Hydrocarbons
- CO, CO_2, and SO_2
- Water vapor (Note that water vapor condensation on the gold film can cause irreparable harm to the sensor and must be avoided.)

The AG filter (P/N: 600-0293), an acidic gas filter contained in the internal filter system, removes the following compounds that cause the gold film sensor to respond:

- Chlorine
- NO_2
- Hydrogen Sulfide (H_2S)
- Most mercaptans (organic sulfur compounds or “thiols”)

In areas containing these highly volatile compounds, the filter can quickly become saturated. In such situations, it is recommended that these gases be allowed to dissipate before sampling for the less volatile, more persistent mercury vapor. In addition, a special filter designed to remove chlorine gas from the sample stream is available from AMETEK Brookfield and may be ordered as Chlorine Filter, P/N: Z2600-3940.

Ammonia in very high concentrations can cause an off gassing of accumulated acidic fumes from the internal acidic gas filter, resulting in positive readings on the instrument. In these cases, the ammonia odors are very strong. A special filter designed to remove ammonia gas from the sample stream is available from AMETEK Brookfield and may be ordered as Ammonia Filter, P/N: 990-0193. Again, either allow the vapors to dissipate or use the ammonia filter. Filter replacement at regular intervals, or when unexpectedly high readings are encountered in areas of these potential interferences, may resolve these problems.

Visit the "Technical Notes" section at www.brookfieldengineering.com for more information concerning the chlorine and ammonia filters.

Volatile mercury compounds in general will cause the gold film to respond. Alkyl organic mercuries such as methyl mercury (and other "straight chained" compounds) are typically extremely volatile and change the electrical resistance of the gold film sensor. Any such responses should be considered "qualitative," **not** quantitative. The instruments are designed and calibrated to elemental mercury vapor only.

Inorganic mercury salts such as mercuric chloride are not very volatile. However, they may generate some minute level of elemental mercury vapor to which the instruments will respond. This response, again, should be considered a qualitative response only.

9. ACCESSORIES & MAINTENANCE PARTS

PART #		ITEM DESCRIPTION
Y405-0901	**J405 Accessory Kit, Communications Package Instruments (See pictures beginning on page 43)**	
	1400 2002	Probe
	1400 3010	Tubing Adapter, 1/4" to 1/8"
	345-0241	Filter, Fritware
	Z2600 3905	Filter, Zero Air Filter
	200-0165	USB Cable, Type A to Type B, 6 ft.
	990-0219	USB Flash Drive (for instrument use) Note: this is in addition to the Documents USB Drive
	4000-1025	AC Adapter Power Supply (power supply/charger)
	6000 4003	Line Cord, 115 VAC - USA and Canada
alternate	200-0003	Line Cord, 220-240 VAC – England
alternate	200-0008	Line Cord, 220-240 VAC – Europe
Y405-0904	**J405 Accessory Kit, Non-Communications Package Instruments (See pictures beginning on page 43)**	

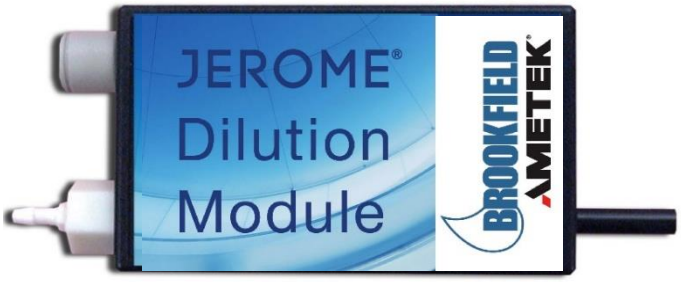
	1400 2002	Probe
	1400 3010	Tubing Adapter, 1/4” to 1/8”
	345-0241	Filter, Fritware
	Z2600 3905	Filter, Zero Air Filter
	4000-1025	AC Adapter Power Supply (power supply/charger)
	6000 4003	Line Cord, 115 VAC - USA and Canada
alternate	200-0003	Line Cord, 220-240 VAC - England
alternate	200-0008	Line Cord, 220-240 VAC - Europe

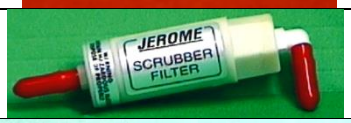
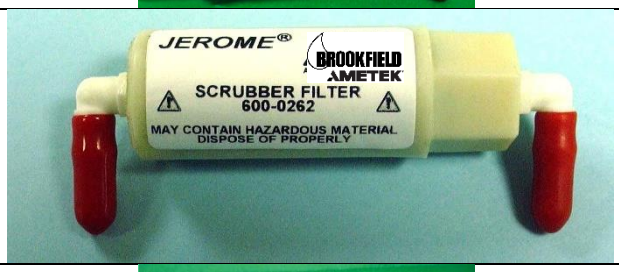
Y431-0902	**J405 Functional Test Kit (See pictures beginning on page 43)**	
	A2600 0902	Stopper Assembly
	A2600 0903	Syringe Assembly
	A2600 0904	Mercury Vial
	2600 0022	Syringe Needles, 22 Ga. Reusable
	2600 0030	FTK Vessel, Thermos
	3200 0011	Septa (20)
	Z2600 3914	Septum Holder

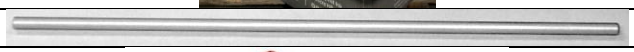
Y405-0903	**J405 Maintenance Kit (See pictures beginning on page 43)**	
	345-0050	2' of 1/8" Tygon® tubing
	345-0241	Filter, Fritware
	Z2600 3905	Filter, Zero Air Filter
	600-0293	Filter, AG Filter
	Z2600 3930	Filter, Scrubber Filter
	600-0262	Filter, Scrubber Filter with 2 elbows

990-0217	**Hard Side Carry Case** Includes a molded case with die cut foam rubber inserts to hold the Jerome® J405 and accessories.	
990-0220	**Soft Side Carry Case** Includes a shoulder strap for easy carrying, a clear plastic window over the instrument display, and pockets to hold supplies or accessories.	

Spare Parts and Accessories

4000-1025	AC Adapter Power Supply (supply/charger)	
200-0143	Battery Pack Assembly	
200-0170	Car Accessory Cable	
990-0223	10-to-1 Dilution Module	

990-0214	External Battery Pack	
600-0293	Filter, AG Filter	
990-0193	Filter, Ammonia Filter	
Z2600 3940	Filter, Chlorine Filter	
345-0241	Filter, Fritware	
Z2600 3930	Filter, Scrubber Filter	
600-0262	Filter, Scrubber Filter with 2 elbows	
Z2600 3905	Filter, Zero Air Filter	
6000 4003 (200-0003) (200-0008)	Line Cord (100-120 VAC) (220 VAC Line Cord – UK) (220 VAC Line Cord – Europe)	

Y990-0210	Printer Kit	
1400 2002	Probe	
3200 0011	Septa	
Z2600 3914	Septum Holder	
A2600 0902	Stopper Assembly	
A2600 0903	Syringe Assembly	
2600 0022	Syringe Needles, 22 Ga.	
1400 3010	Tubing adapter	
345-0050	Tygon® tubing 1/8" I.D. (1 foot)	

200-0165	USB Communication Cable (Type A to Type B)	
990-0230	USB Keyboard	

For current prices and delivery information, call Customer Service at (800) 528-7411 or (602) 470-1414.

10. APPENDIX A – USB/HYPERTERMINAL SETUP

Installing the J405 USB Driver

The AMETEK USB Driver is compatible with Windows® XP (32-bit), Windows® Vista (64-bit), Windows® 7 (32 and 64-bit), Windows® 8/8.1 (64-bit) and Windows® 10 (64-bit). Depending on the configuration of the computer to be used, administrator privileges may be required to install the driver. If this configuration applies to you, contact your local IT department for assistance.

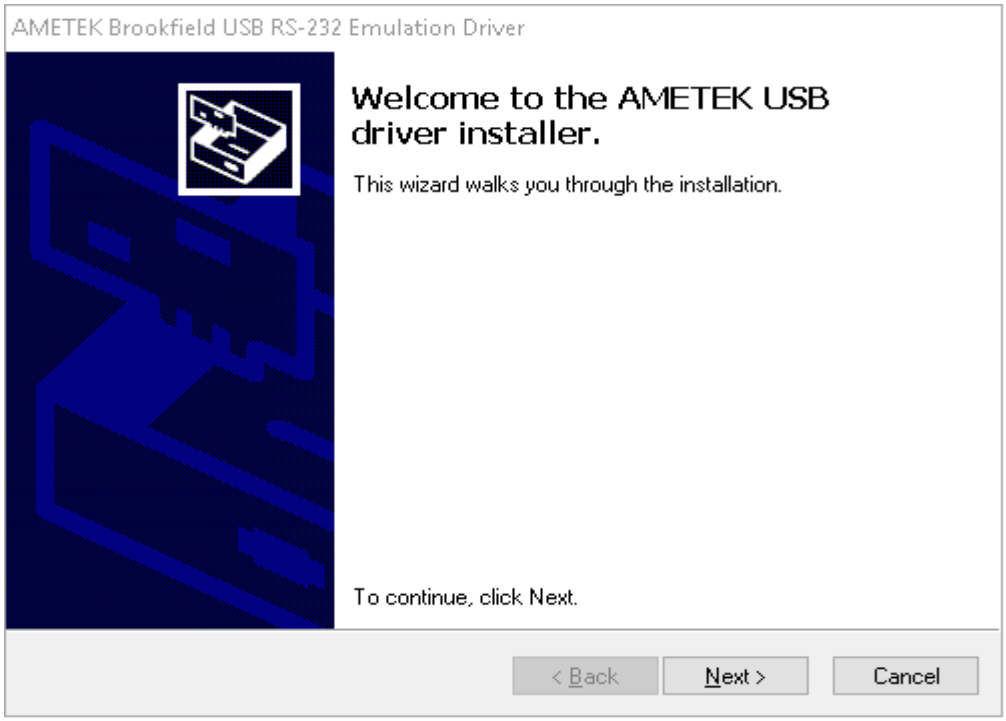
If the AMETEK BROOKFIELD Documents USB Drive is available:

- Insert the USB drive into a USB port on the PC.
- Use Windows® to browse to the USB drive, locate the driver file (AMETEK_USB_Driver.zip), and copy it to your desktop.

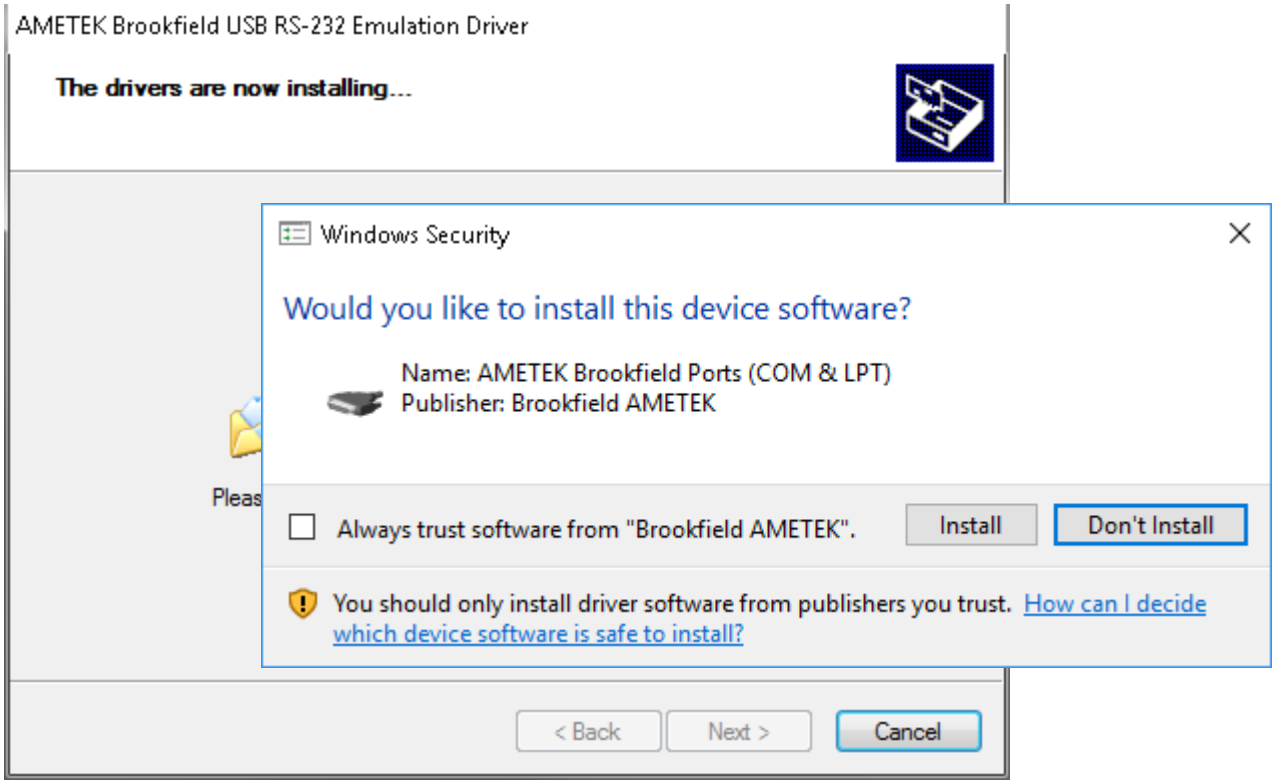
- If the Documents USB Drive is not available, go to the AMETEK Brookfield website at https://www.brookfieldengineering.com/downloads/computrac-and-jerome-downloads and select Driver Downloads from the menu. Download the USB Driver from this page and save it to your desktop. If you received these instructions and the driver in an email, save the attached file (AMETEK_USB_Driver.zip) to your desktop.

Once the driver file (AMETEK_USB_Driver.zip) is on your desktop:

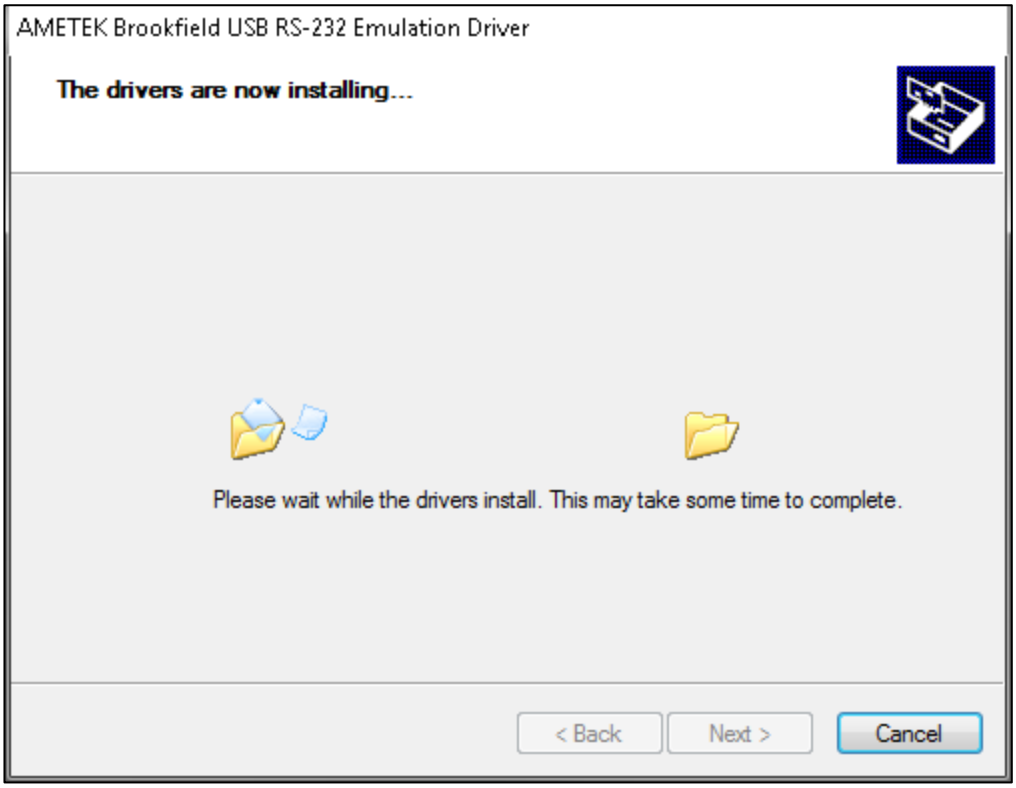
1) Launch the AMETEK Driver Installer wizard:
   - Double-click the zip file to open it.
   - Drag the "Driver Install" directory from the zip file to the desktop.
   - Double-click the "Driver Install" folder to open it.
   - Double-click the "Install Driver" shortcut to launch the Driver Installer wizard.
     - Note: The description and screenshots pictured are for installation in Windows® 10. Other versions of Windows® will be similar.



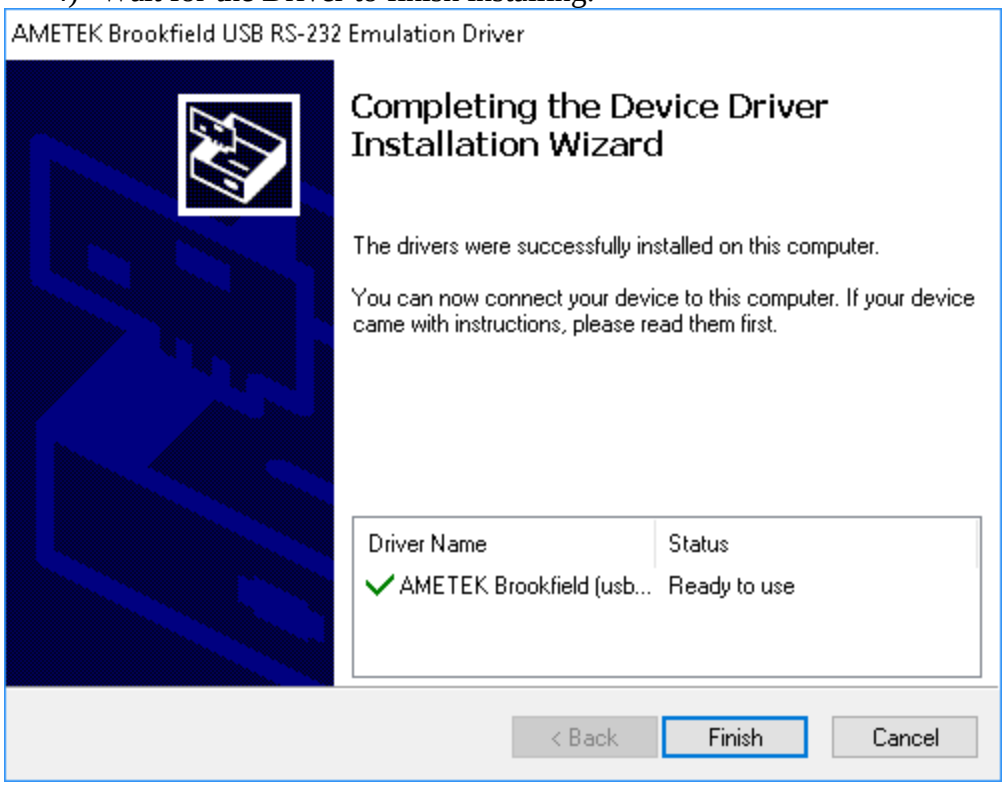
2) Follow the instructions in the AMETEK Driver Installer wizard. Click Next. Windows® will start installing the driver and then typically display a message indicating that the driver is from an "Unknown Publisher".



3) Depending on the version of Windows® being used, one or more warning messages may appear. It is safe to ignore these warnings. Click "Install" to continue.

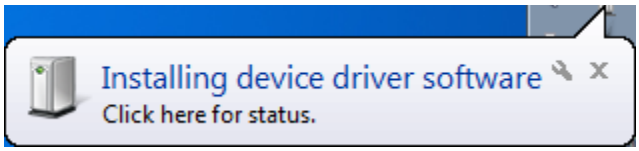


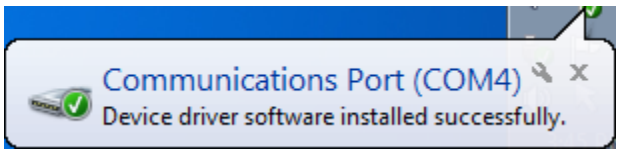
4) Wait for the Driver to finish installing.



5) When the installation completes, click Finish.

6) Turn on the J405 and connect it to the target computer using the included USB cable (P/N: 200-0165). Windows® will detect the J405 and its Communications Port and automatically start 'Device Setup'. When 'Device Setup' completes, the instrument-to-USB interface is complete and ready for use.





On older versions of Windows®, the 'New Hardware' wizard will launch instead of 'Device Setup'. Follow the on-screen prompts, bypass any warnings that may appear, and do not connect to Windows® Update if prompted. Windows® will indicate when the hardware has been installed successfully.

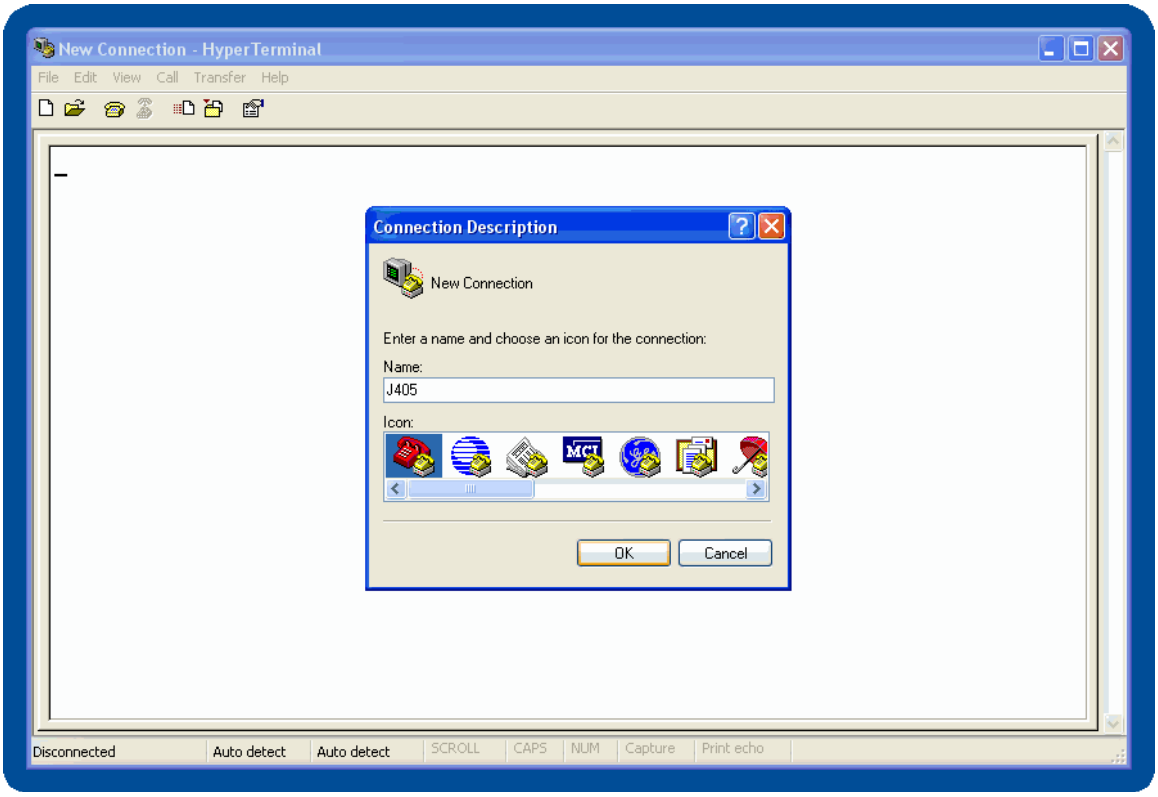
Using a terminal emulation program to receive data from the J405

The steps below illustrate the data reception process using HyperTerminal, the terminal emulation program included with Windows® XP. Numerous alternative terminal emulation programs are available online for later versions of Windows®. When using other terminal emulation programs, the general process will be similar to that shown below; once connected, select **Send to PC** from the J405's **DATA** menu and press **ENTER/START** to transmit the data.

1) The J405 should be connected to the PC's USB port and powered on before HyperTerminal is launched or HyperTerminal may not see the COM port in use.

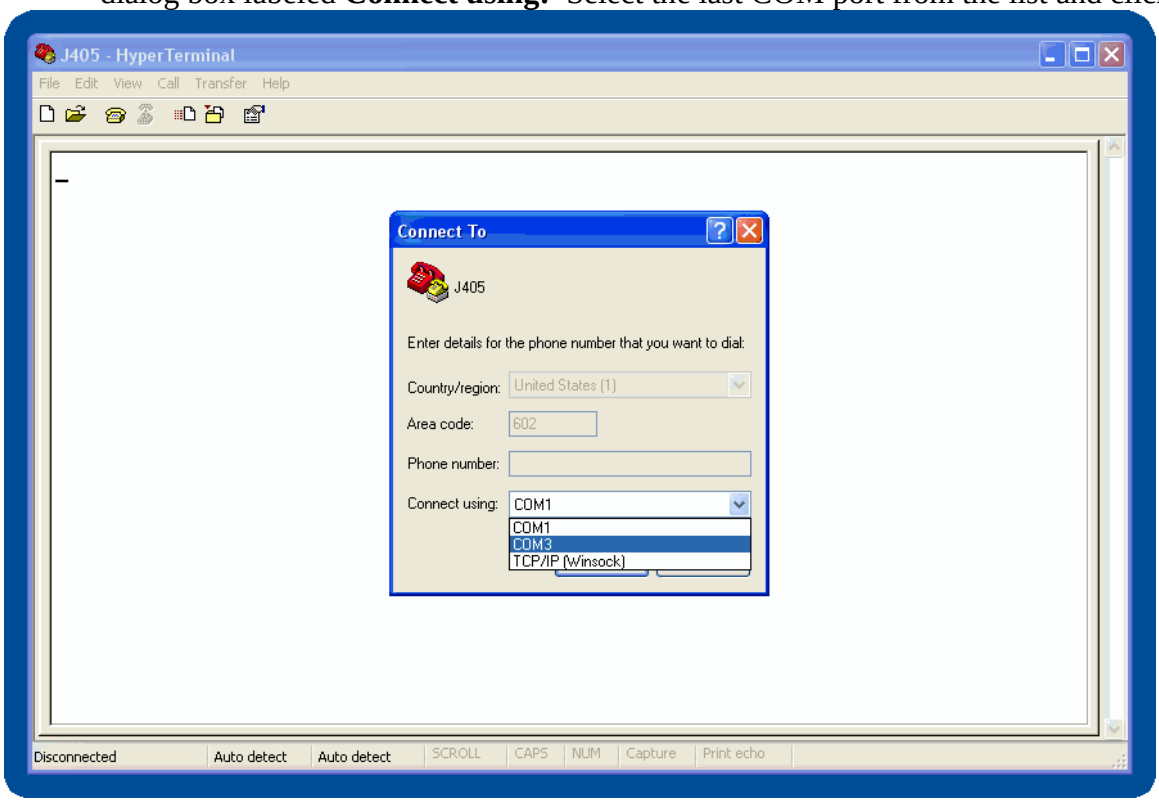
2) Start HyperTerminal (Start → All Programs → Accessories → Communications → HyperTerminal). If prompted to make HyperTerminal the default telnet application, click **No**.

3) When prompted for a name for this connection, enter **J405** and click **OK**.

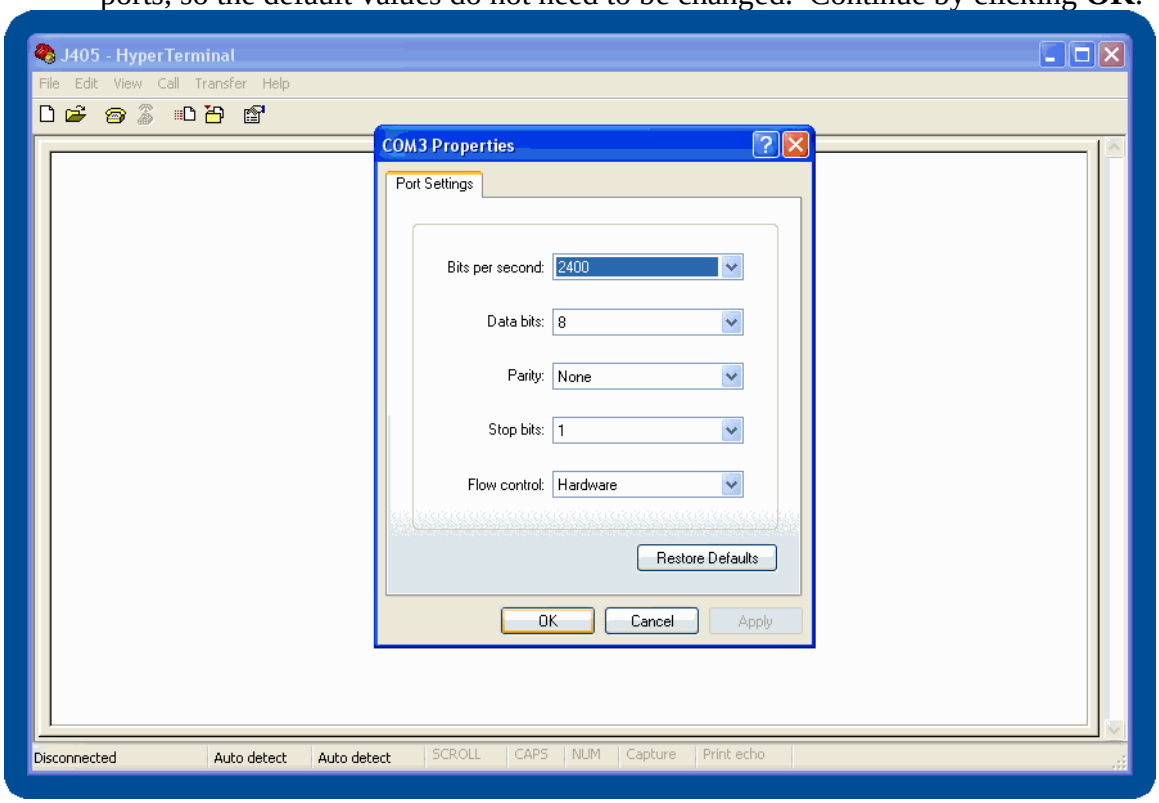


4) If HyperTerminal has not been run previously on the target PC, it will ask for an area code, etc. Enter that information as appropriate and click **OK**.

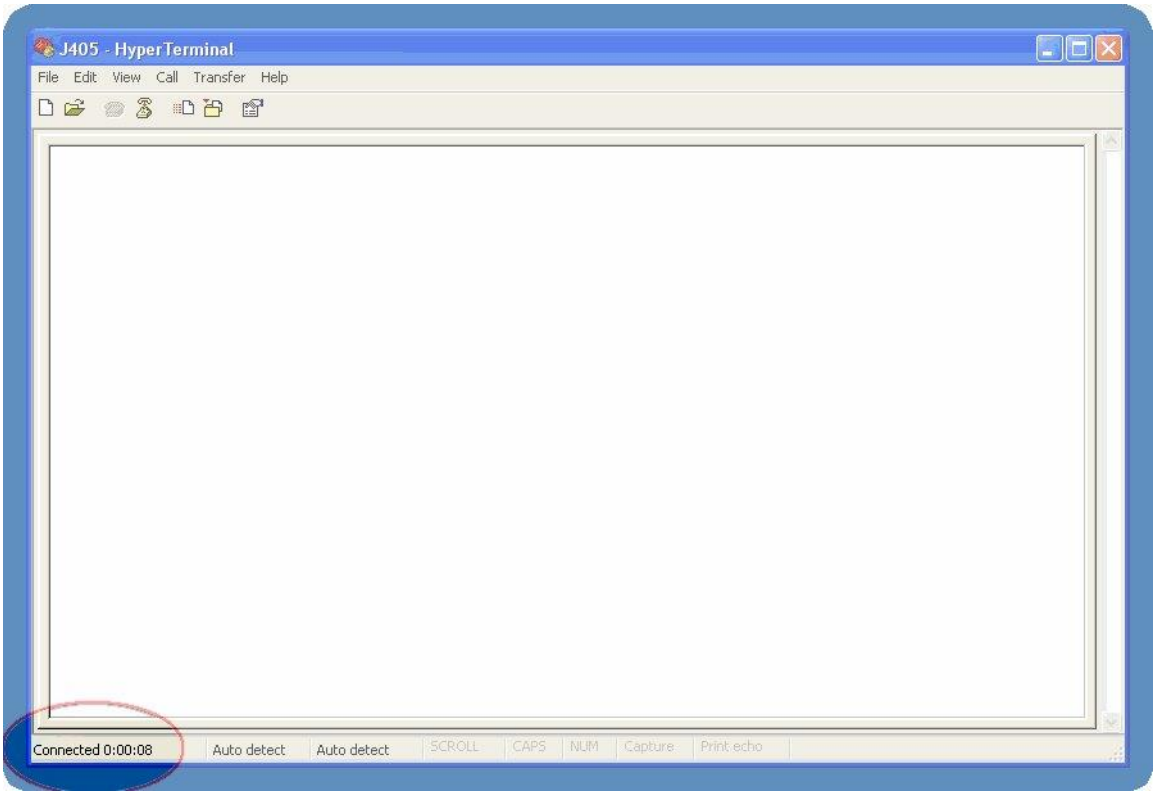
5) Next, a window labeled **Connect To** will be displayed. Find the last dropdown list in the dialog box labeled **Connect using:** Select the last COM port from the list and click **OK**.



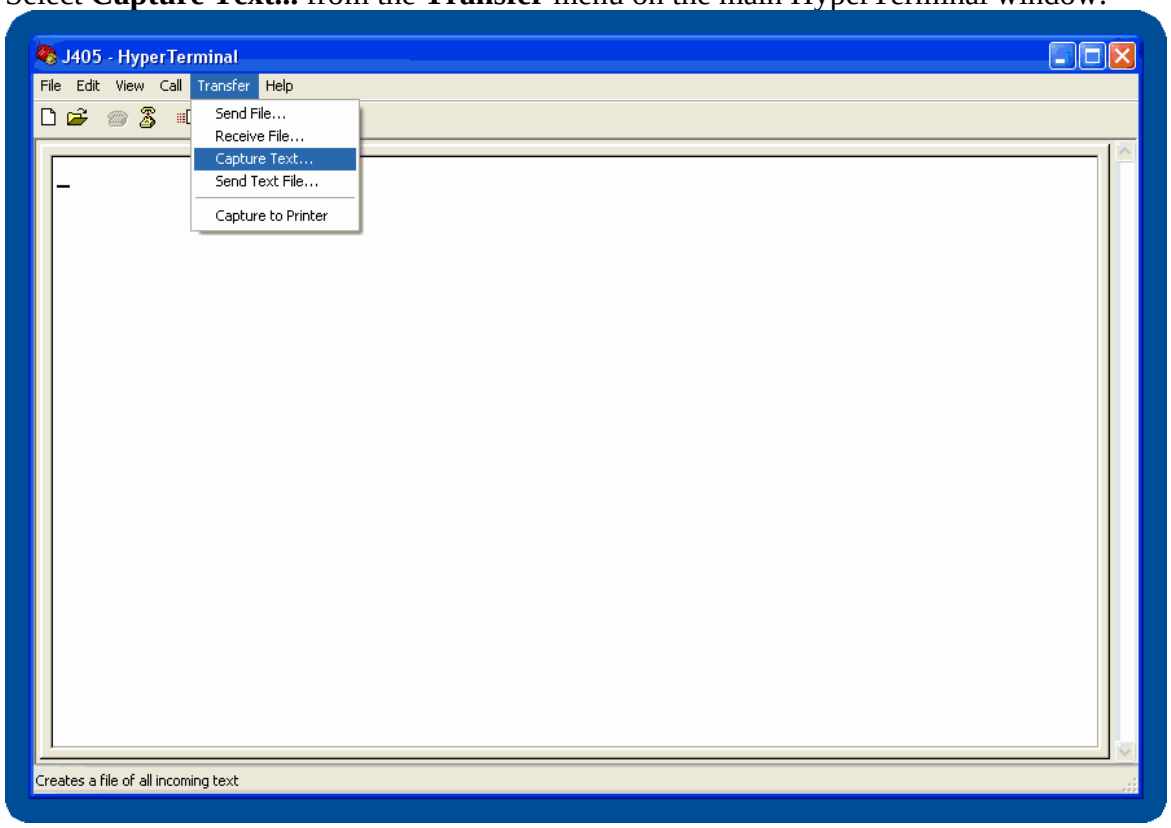
6) Next, HyperTerminal will prompt for Port Settings. These settings do not apply to USB ports, so the default values do not need to be changed. Continue by clicking **OK**.



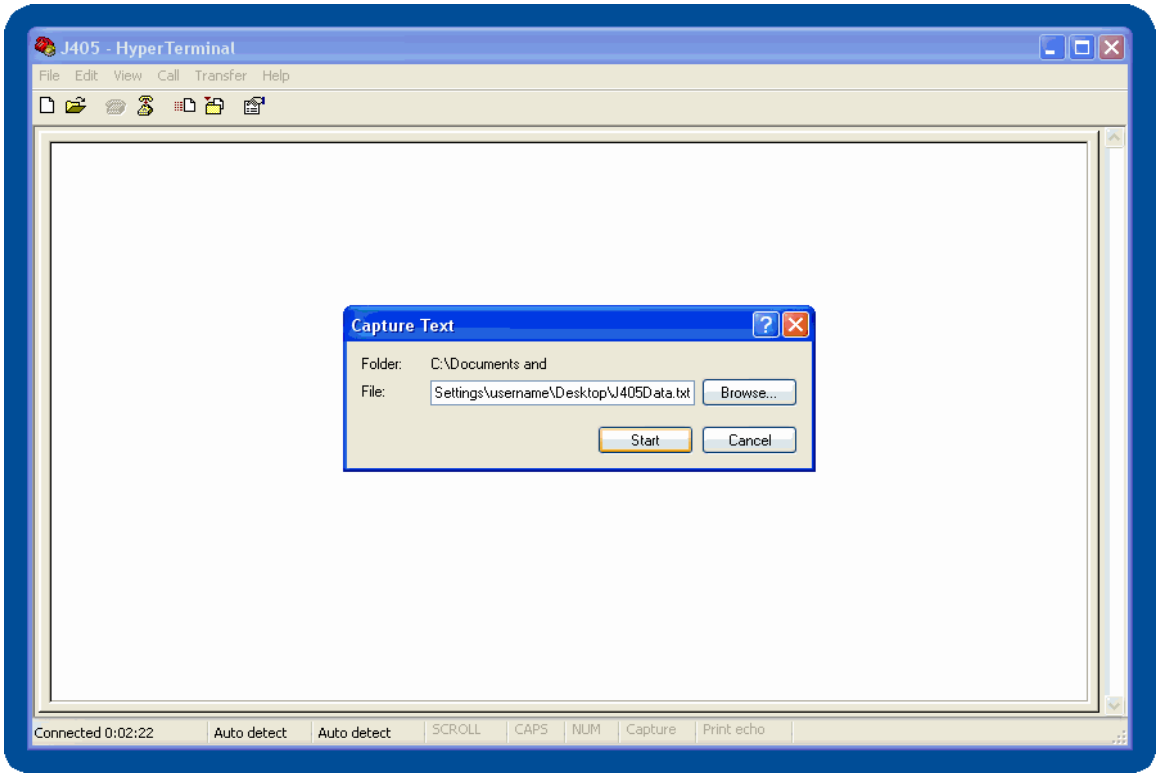
A blank HyperTerminal screen will be displayed. On the status bar in the lower left-hand corner, it should say **Connected**.



7) Select **Capture Text...** from the **Transfer** menu on the main HyperTerminal window.



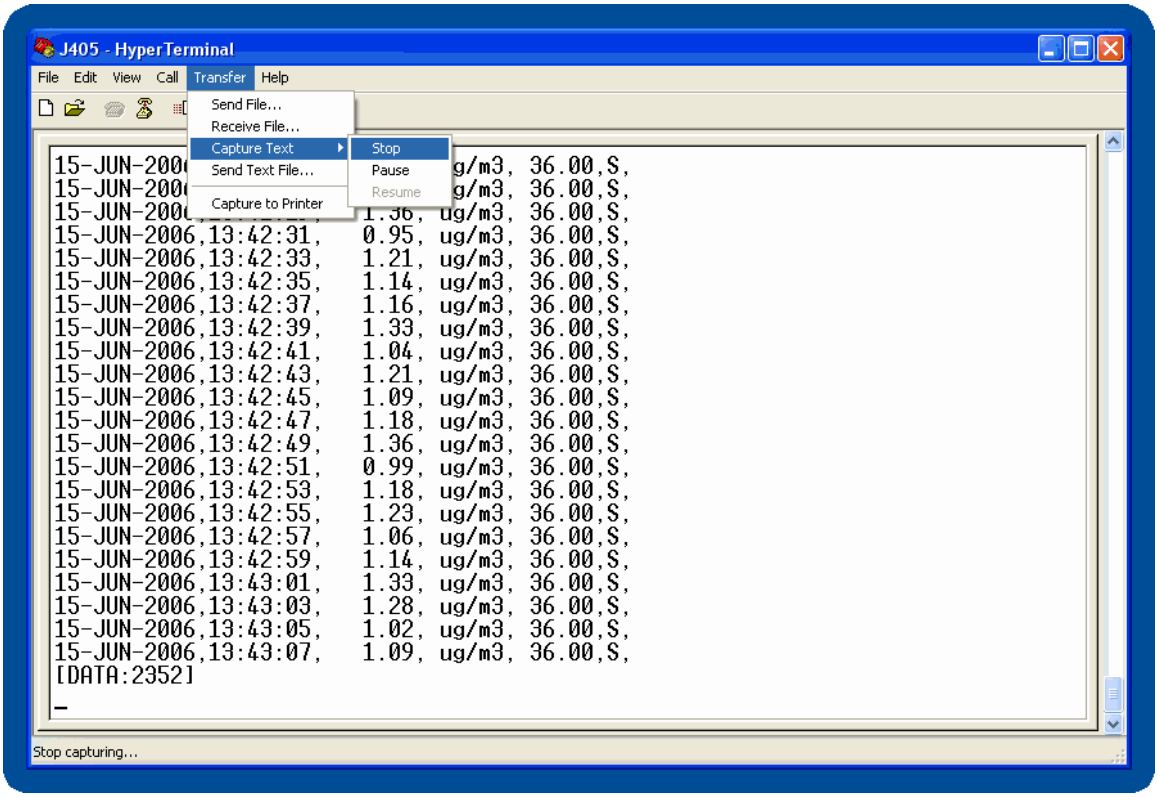
8) HyperTerminal will prompt for a file to save the data. It is recommended that the data be saved to either the Desktop or My Documents.



9) Go to the J405 and navigate to the **DATA** menu, then highlight **Send to PC** and press **ENTER/START.**

10) You should see your data scrolling in the HyperTerminal window. If you do not see anything in the HyperTerminal window, go to step 12).

11) When the J405 stops sending data, Click HyperTerminal's **Transfer** menu again and click **Capture Text**, then **Stop**



12) If you did not receive any text from the J405:

- Go to the **Call** menu, click **Disconnect**
- Go to the **File** menu, click **Properties**
- You will see the same window as in step 4) above. Try selecting a different COM port and continue from step 4). Keep trying each COM port in the list. If you have tried all of them and still cannot receive data from the J405, try re-installing the J405 USB driver. If that does not solve the problem, call Customer Service at 800-528-7411 or 602-470-1414 or email customerservice.jerome@ametek.com.

See **Retrieving Data** on page **29** for an explanation of the fields in the data file.

11. APPENDIX B – J405 FUNCTIONAL TEST KIT

If your application requires frequent verification of instrument functionality, this test will benefit you. If the test results fall within the expected range, you may assume the instrument is functioning properly.

THIS IS A FIELD CHECK OF THE FUNCTIONALITY OF THE INSTRUMENT.

THIS TEST DOES NOT CALIBRATE THE INSTRUMENT.

Testing with the Functional Test Kit (FTK) should always be done with the instrument set to display in micrograms per cubic meter (µg/m^3). If your instrument is displaying results in milligrams per cubic meter (mg/m^3), switch to µg/m^3 by selecting Units from the **SAMPLE menu**, before doing any testing with the FTK. See **SAMPLE menu** on page **15** for more information on changing the display units.

NOTE: Perform the functional test ONLY after a sensor regeneration.

The J405 Functional Test Kit contains all accessories necessary to perform the functional test. See the complete list on page **41** and verify that all the parts to the kit are present.

CAUTION:
The vial and thermometer contain liquid mercury and are possible sources of mercury contamination. Follow the instructions for handling or transferring the mercury into the Functional Test Kit Vessel carefully.
For safety information, see the supplier's Safety Data Sheets (SDS) or call Customer Service at 1-800-528-7411 or 1-602-470-1414 for assistance in obtaining the SDS.

Preparation

- Carefully unpack and inspect the parts of the kit.
- ENSURE that the mercury shipping container and mercury filled thermometer are not broken.
- In a ventilated area, preferably under a fume hood, remove the mercury vial from its shipping container.
- Place the functional test kit vessel and the mercury vial close to each other and open the mercury vial.

Mercury Transfer

- CAREFULLY pour the mercury into the center of the functional test kit vessel's opening.
  - ENSURE that no mercury residue is on the outside of the vessel. See the supplier's Safety Data Sheets (SDS) or call Customer Service at 1-800-528-7411 or 1-602-470-1414 for clean-up instructions.
- INSTALL the stopper assembly into the functional test kit vessel carefully, to prevent breakage of the thermometer.
  - PRESS the stopper assembly into the vessel to achieve a good seal.
- USE the J405 instrument to verify that the outside of the vessel is not contaminated and the mercury vapor emission level, if any, is below the OSHA TLV for mercury.
- ALLOW the kit to adjust to room temperature for at least two (2) hours before using.
  - The temperature range for the test is 16-24 °C. Avoid temperature fluctuations.

CAUTION:
Do not use the FTK vessel as a portable container. If the vessel is upset or greatly agitated, mercury droplets will cling to the thermometer stem, the rubber stopper, the mouth of the vessel and the needle guide.

Replacing Mercury

An oxide coating will form on the drop of mercury and will cause lower readings in your testing. Gently swirl the vessel to disturb the outer oxidized surface of the droplet. If this does not restore higher readings, it may be necessary to replace the mercury.

- Carefully remove the stopper assembly from the FTK vessel.

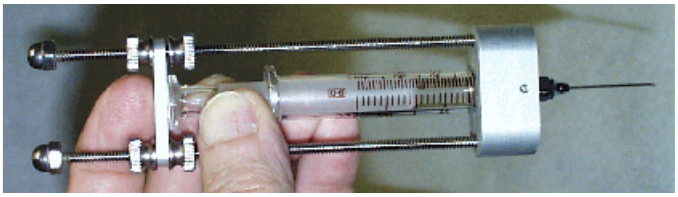
CAUTION:
BE SURE NEEDLE GUIDE IS FREE OF LIQUID MERCURY.

- Replace the oxidized mercury with approximately ½ cc fresh mercury.
  (P/N: A2600-0904)

  - Do NOT use the syringe for measuring liquid mercury. Dispose of oxidized mercury properly.

- Reinstall the stopper assembly.

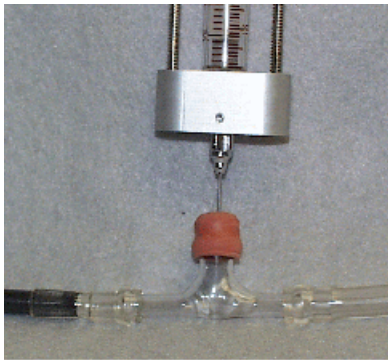
Syringe Technique



- Pull and hold the syringe plunger against the bar-stop.
- Verify that the black mark on the syringe plunger aligns with the 1cc mark on the syringe barrel.
    - If it does not, the holder assembly must be adjusted. Call Customer Service at 602-470-1414 or 800-528-7411 for assistance.
- Insert the needle into the needle-guide of the bottle stopper.

- Operate the plunger two or three times to pump mercury vapor into the syringe. On the final stroke, pull and hold the plunger against the bar-stop.
- Holding the plunger against the bar-stop, remove the syringe from the bottle and move it to the septum attached to the instrument intake.

- Continue to hold the plunger against the bar-stop and insert the syringe needle into the septum.



- Press the SAMPLE button on the instrument, and "Sampling" and "Purging" will appear on the J405 display.

- When "Purging" disappears from the display, release the plunger, and allow gravity to feed the mercury vapor into the airstream. If the plunger stops, gently press it completely closed.
- Remove the syringe needle from the septum.

Functional Test Procedure

NOTE: Perform the functional test ONLY after sensor regeneration.

- Allow the FTK vessel to remain stable at room temperature for at least 2 hours.
  - The temperature range for the test is 16 °C- 24 °C.
  - Temperature fluctuations during the test procedure will produce erratic results.
- Replace the fritware (**if necessary**).
  - Fritware should be replaced when:
    - Dirt or debris can be seen on the fritware. This can cause a change in flow and accuracy.
    - When expected readings change significantly (troubleshooting)
    - Every 3 to 6 months depending upon environmental conditions
    - Refer to page **33** for instructions.
- Replace the septum on the septum holder assembly (**if necessary**).
  - Septum or septum covers should be replaced when:
    - A crack or damage to the septum causing readings to go lower than expected
    - Septum cover should be replaced weekly if FTK checks are performed daily. Otherwise, the cover can be replaced when worn or becomes brittle.
- Plug the tubing adapter end of the septum assembly firmly into the instrument's intake.
- Attach a Zero Air Filter to the septum assembly.
- Press power ON.
- Take 3 samples.

- If the average meter reading is greater than 2 μg/m^3, stop here. The instrument may be contaminated. See **J405 TROUBLESHOOTING** on page **38**.
- If the average meter reading is less than 2 μg/m^3, continue to the next step.

- Note the temperature of the vessel.
- Press the SAMPLE button, and "Sampling" and "Purging" will appear on the instrument display.
- Wait 2 seconds and **when "Purging" disappears from the display**, inject 1 cc of mercury vapor according to the syringe technique described on page **57**. Be sure all mercury vapor has been injected before the solenoid closes.

CAUTION:
Carefully follow these instructions to minimize error.

- Record the meter reading.
- Repeat the instructions for mercury injection three more times.
  - The readings obtained for the last three 1cc injections should be within ± 5% of each other.
- Refer to the J405 FTK Instrument Response Chart, below, for the acceptable range.
  - The average of the last three readings should fall within the range shown on the chart.

If the average is within range, the JEROME® J405 is functioning properly.

- If the last three readings are not within ± 5% of each other,
  - Perform sensor regeneration. (Refer to page **23** for the complete sensor regeneration procedure).
  - Wait for Sensor Regeneration to complete before proceeding to the next step.
  - Repeat the mercury injection test procedure.
  - If the average of the last three readings is still not within range, refer to the section on Functional Test Troubleshooting below.

J405 FTK Instrument Response Chart

Temperature in °C	Digital Meter Response (μg/m^3)
16	91 to 123
17	100 to 135
18	108 to 146
19	118 to 159
20	129 to 174
21	138 to 187
22	151 to 204
23	164 to 222
24	177 to 240

Functional Test Troubleshooting

If you do not achieve good results with the functional test procedure, check the following:

Results	**Solution**
Typically, too high	Ensure the FTK vessel temperature is stable.
Too Low	Be sure to inject the Hg vapor ONLY after "Purging" disappears from the display (approximately 2 seconds after SAMPLE is pressed).
	Ensure there is no oxidation on the mercury drop in the vessel. Gently swirl the mercury drop in the vessel. Replace if necessary.
	Ensure the instrument's intake is not blocked with foreign matter. Check flow with a flow meter.
	Ensure syringe is calibrated to 1cc. Use a new syringe needle. Straighten or replace crimped or blocked internal tubing.

If you find the above does not solve your problem, please call Customer Service at 800-528-7411 or 602-470-1414.

12. BROCHURE INFORMATION

The Jerome® J405 portable mercury vapor monitor is vapor analyzer
market. Significant performance enhancements and modern communications capabilities have been combined to create a new option for mercury spill detection and cleanupanalysis. The J405 utilizes the industry-proven, inherently stable, and reliable gold film sensor technology and simple, one-button operation. The ergonomically designed handle, lighter exterior case and significantly lower detection capabilities (0.5 $\mu g/m^3$) make it a portable, easy to use, low-level mercury detection instrument.

FEATURES

- Meets EPA & ATSDR Cleanup Levels
- Battery Powered Sensor Regeneration | 24 Hour Battery Life
- On-board Data Logging (20,000 data points) (communications option)
  Auto Time/Date Stamp | USB data output (communications option)
  SCADA Interface Capabilities via 4-20ma
- Functional Test Kit (FTK) verifies instrument functions correctly between recommendedannual factory calibrations

SPECIFICATIONS

Resolution	0.01 μg/m^3 (0.001 mg/m^3)
Detection Range	0.5 μg/m^3 - 999 μg/m^3 (0.001 mg/m^3 to 0.999 mg/m^3)Data
Storage Capacity	20,000 samples
Operating Environment	0-45°C non-condensing, non-explosive
Accuracy	1.0 μg/m^3 ±10%
	25 μg/m^3 ±5%
	100 μg/m^3 ±5%
Typical Response Time	SURVEY MODE: 2 seconds
	SAMPLE MODE: 16 seconds
Flow Rate	750 ± 50 cc/min (0.75 ± 0.05 liters/min)
Power Requirements	12 VDC for the instrument
	(Provided by the internal battery, AC power supply/charger, external battery pack or car accessory cable
	100-240VAC, 47-63Hz, 3.2A for the AC power supply/charger

Internal Battery Pack	Rechargeable nickel metal hydride (NiMH)
Dimensions	11” L x 6” W x 6.5” H
Weight	5.3 lbs.
Output	Digital: USB serial data to PC, printer, or USB flash drive Analog: 4-20mA current loop (requires external power source) accurate to 0.3% of output
Warranty	1 year, factory parts and labor

ACCESSORIES

1400 2002	Probe
990-0193	Ammonia Filter
990-0214	External Battery Pack Assembly
990-0217	Jerome Hard Carrying Case
990-0220	Jerome Soft Carrying Case
Y405-0903	Maintenance Kit
Y431 0902	Mercury Functional Test Kit w/Mercury
Y990-0191	Mercury Functional Test Kit w/o Mercury
Z2600 3940	Chlorine Filter

PARTS

345-0241	Fritware
600-0262	Scrubber Filter Assembly
600-0293	AG Filter
Z2600 3905	Zero Air Filter

13. WARRANTY

AMETEK Brookfield (seller) warrants to buyer that Jerome® products delivered pursuant to this agreement shall, at the time of delivery, and for a period of one (1) year thereafter (the Internal Battery Pack, where applicable, is warranted for a period of ninety [90] days only), be free from defects in material or workmanship and shall conform to seller's specifications or such other specifications as seller has agreed to in writing. Seller's obligations with respect to claims under this warranty shall be limited, at seller's option, either to the replacement of defective or non-conforming product or to an appropriate credit for the purchase price thereof subject to the provisions of seller's Warranty Policy as amended from time to time, said Policy being incorporated herein by reference. All defective parts replaced become the property of AMETEK BROOKFIELD.

Returned products under warranty claims will be shipped to seller's plant by buyer at buyer's expense and shall be accompanied by a statement of the reason for the return and an approved Return Material Authorization Number issued by seller. Buyer remains responsible for payment for products not accepted for warranty adjustment, handling costs, and freight costs associated therewith.

Notwithstanding the foregoing, no warranty shall be enforceable in the event that product has been subjected to environmental or stress testing by buyer or any third party without written approval of seller prior to such testing. Further, no warranty shall be enforceable if the alleged defect is found to have occurred because of misuse, neglect, improper installation, repair, alteration, accident, or improper return handling procedure by buyer.

Discontinued product is warranted only for a credit or replacement at seller's option.

THE EXPRESS WARRANTIES GRANTED ABOVE SHALL EXTEND DIRECTLY TO BUYER AND NOT TO BUYER'S CUSTOMERS, AGENTS, OR REPRESENTATIVES AND, EXCEPT FOR WARRANTY OF TITLE, IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY, SUCH OTHER WARRANTIES BEING SPECIFICALLY DISCLAIMED BY SELLER. IN NO EVENT SHALL EITHER PARTY'S LIABILITY FOR ANY BREACH OR ALLEGED BREACH OF THIS AGREEMENT EXCEED THE TOTAL EXTENDED PRICE OR PRICES SHOWN ON UNFILLED ORDERS, NOR SHALL EITHER PARTY BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM BREACH OR ALLEGED BREACH.

Notwithstanding the foregoing, if any product covered by order(s) placed hereunder is designated as "developmental," "prototype" or "experimental," no warranty whatsoever except a warranty of title to component materials, will be applicable thereto and buyer shall indemnify seller for any claims for liability asserted seller in connection therewith.

The foregoing state the entire liability of seller in connection with products supplied hereunder.

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Instrument firmware is copyright protected.
All specifications are subject to change without notice.

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Windows® is a registered trademark of Microsoft Corporation in the United States and other countries.

AMETEK Brookfield
Jerome® J405 Mercury Vapor Analyzer Operation Manual
Part Number 700-0099 Revision 4.0

If you have any questions regarding the operation of this instrument, please call our toll-free number (800) 528-7411. Internationally, call (602) 470-1414 or fax (602) 281-1745.