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### SERVOPRO HFID Gas Analyzer

SERVOMEX.COM

### Quick Start Guide PN 221196Q



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#### IMPORTANT INFORMATION

Continued safe and reliable operation of this equipment is conditional on all installation, operation and maintenance procedures being carried out in accordance with the appropriate manuals, by personnel having appropriate qualifications, experience and training. Failure to observe the requirements of the manual may result in the user being held responsible for the consequences and may invalidate any warranty. Servomex accepts no liability for unauthorized modifications to Servomex supplied equipment.

Servomex has paid particular attention to Health and Safety throughout this manual. Where special precautions need to be taken due to the nature of the equipment or product, an appropriate safety icon and warning message is shown. Special attention should be made to section 2 – Safety, where all such messages are summarized.

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#### INTRODUCTION

#### About this Quick Start Guide

This guide covers the basics of the installation, connections, software interface overview and routine maintenance of the SERVOPRO HFID. It is not intended to be a full installation manual but is a quick guide for those that are familiar with the use and maintenance of analytical or process instrumentation.

A separate SERVOPRO HFID Installation and Operations manual is supplied with the analyzer providing details on the software configuration and operation of the analyzer.

The information in this guide is general therefore use this manual for:

| Installation:  | To take commissioning to the point where the analyzer is powered and            |  |
|----------------|---|--|
|                | operational. The installer is advised to read the full manual completely before |  |
|                | completing installation.  |  |
| Configuration: | How to set up the clock, alarm levels, analogue outputs, relays and other       |  |
|                | parameters.   |  |

#### SAFETY

#### **Safety information**

Read this Quick Start Guide and the full SERVOPRO HFID Installation and Operations manual. Make sure you fully understand its contents before you attempt to install or operate the analyzer.

The following icons are used throughout the manuals to identify any potential hazards that could cause serious injury to people. Always follow the safety instructions and be aware of the hazard.



This symbol precedes a general safety CAUTION or WARNING statement and warns of specific hazards which, if not taken into account, may result in personal injury or death.



This symbol precedes an electrical shock hazard CAUTION or WARNING statement warns of specific hazards due to high voltages which, if not taken into account, may result in personal injury or death.



This symbol precedes an elevated temperature hazard CAUTION or WARNING statement warns of specific hazards due to high temperatures which, if not taken into account, may result in personal injury or death.

A "NOTE" marks a short message to alert you to an important detail.

A "CAUTION" safety alert appears with information that is important for protecting your equipment and its performance.

A "**WARNING**" safety alert appears with information that is important for protecting you, other people and equipment from damage. Pay especially close attention to all warnings that apply to your application.

Some or all of the above symbols may appear in tis manual or on the equipment. The main manual should be consulted whenever one of these symbols is encountered on the equipment.

#### OVERVIEW

The Servomex SERVOPRO HFID analyzer is an exceptionally accurate Flame Ionization Detection (FID) gas analyzer designed for measuring hydrocarbons concentrations in gaseous samples. The analyzer utilizes a highly sensitive flame ionization detector for measuring volatile hydrocarbon concentrations in industrial stationary source or mobile source (such as vehicle or engine certification) emission applications.

The SERVOPRO HFID family of heated analyzers includes the standard unit reporting only total hydrocarbon (THC) or it can be equipped with a non-methane hydrocarbon "cutter" that removes all hydrocarbons except methane from the sample gas. This capability allows the operator to obtain the methane (CH<sub>4</sub>), non-methane hydrocarbon (NMHC) and total hydrocarbon (THC) concentrations of the sample.

The heated sample gas is maintained above the typical volatile hydrocarbon dew point by a selfcontained, internally adjustable oven. The oven temperature is factory-set to be controlled at 191°C until it exits via the bypass outlet, preventing any loss of heavier hydrocarbons before reaching the FID detector.

#### FEATURES

- The standard analyzer measures THC from 1 to 30,000 ppmc full-scale
- The NMHC analyzer measures THC/CH4/NMHC from 1 to 30,000 ppmc full-scale
- Heated to 191°C for maximum THC accuracy providing "hot/wet" direct sampling
- Temperature-stabilized FID detector
- Electronic flow control
- Selectable analog output options: current in mA or volts in DC of 0 -1, 0-5 or 0 10
- Digital Output options: Modbus via TCP/IP, and AK Protocol via RS232 or TCP/IP
- Automatic fuel and air shutoffs
- Automatic calibration and ranging

- Fast response time
- ETL listed conforms to UL STD 61010-1, certified to CAN/CSA
  C22.2 STD 61010.1
- EPA 40 CFR Part 1065/1066 and Euro VI HD and Euro 6 LD compliant configurations

The analyzer offers four basic factory ranges 30/300/3,000/30,000 (C1 as ppm or mg/m<sup>3</sup>) or 10/100/1,000/10,000 (C3 as ppm or mg/m<sup>3</sup>) which can be scaled and preset to either ppm or mg/m3 at the factory per customer specifications. The ranges can also be re-scaled in the field at any time via the analyzer keypad but conversion from ppm to mg/m<sup>3</sup> is more involved so should be determined upon ordering. The customer requested analog output signal (0 – 1 0 – 5, 0-10 VDC, 4-20 mA or 0-20 mA) is scaled at the factor according to the selected range but it can be rescaled to different concentration ranges or different analog outputs in the field by the customer. The operating range of the analyzer can be selected through the keypad, by a contact closure, via the RS232 or TCP/IP interface, or automatically when the analyzer is placed in the Auto Range mode.

The SERVOPRO HFID can be optionally configured with an internal heated sample pump, and internal zero and span solenoids for automatic zero and calibrations. It includes a backlit 3 x 5 inch liquid-crystal display and a 20-key data/operation input keypad.

The SERVOPRO HFID can be configured to use either 100% H<sub>2</sub> or a 40/60 % H<sub>2</sub>/He fuel blend. In the NMHC version that uses 100% H<sub>2</sub> as the fuel, the air inject circuits have been eliminated which requires all of the applications that will use this analyzer to ensure that the moisture content does not fluctuate more than a few % and that the O<sub>2</sub> levels in the sample are always maintained at 10% or above in order for the FID to remain lit. If these conditions are not met then the analyzer performance will be adversely affected and/or it may damage the cutter material.



If using 100% H2 fuel and running the CH4 mode in the NMHC version, make sure the moisture content does not fluctuate more than a few % or lower and that the O<sub>2</sub> levels are always maintained at 10% or above, if not

#### HEATED OVEN

The heated sample gas is maintained above its dew point by a self-contained internal oven. The oven temperature is adjusted at the factory to be controlled at 191°C. The sample gas is maintained at this elevated temperature until it exits the analyzer's bypass outlet, preventing any loss of hydrocarbon concentration in the sample due to condensation.



Because the sample gas is analyzed HOT/WET you must make sure to keep the vent tubing on the bypass outlet short and pointed downwards to avoid plugging the vent line with condensed moisture.

#### FLOW SYSTEM

Combustion air and fuel used by the instrument are controlled by an Electronic Proportional Control (EPC) valve whose function is to maintain a constant pressure for combustion air at the inlet to a capillary. The pressure is factory-set for optimum analyzer performance.

**NOTE** The correct pressures are determined by the factory for optimal analyzer performance and measured with NIST traceable standards. They are recorded on the analyzer's <u>Factory Settings Screen</u>.

#### OVERVIEW OF POTENTIAL HAZARDS

### WARNING: ALWAYS DISCONNECT THE POWER BEFORE CONNECTING OR DISCONNECTING SIGNAL CABLES OR WHEN SERVICING THE EQUIPMENT.

### Potential Explosion Hazard



WARNING: This analyzer uses a fuel that contains a FLAMMABLE LEVEL OF HYDROGEN. Any leakage from this fuel can result in an explosion. Carefully check the fuel supply system for leaks upon installation, before initial startup, during any maintenance or after the integrity of the system is compromised.

Do not apply power to the analyzer or attempt to ignite the burner until ALL leak checks are performed and the analyzer environment is verified as non-hazardous. This analyzer is NOT designed for use with a hazardous sample.

Use of substitute components may cause a safety hazard. Use only factory-authorized replacement parts.



CAUTION: Use of substitute components may cause a safety hazard. Use only factory-authorized replacement parts.

# Electrical Shock Hazard

Do not operate the analyzer without the cover secured. Servicing the analyzer requires access to live electrical circuits that can cause death or serious injury. Refer servicing to qualified service personnel. For safety and proper performance, connect this instrument to a properly grounded three-wire receptacle.

# Fuel Requirements

The SERVOMEX factory configures the SERVOPRO HFID analyzer for either 100% Hydrogen or 40%/60% Hydrogen/Helium fuel. Please make sure to use the correct fuel as specified on the fuel label affixed to the back panel of the analyzer.

WARNING: Use of incorrect fuel will damage the instrument and could cause an explosion. Before initial startup, carefully check the fuel supply system to the analyzer for leaks. The operating technician should be properly trained for working with hazardous materials.

### Potential Sample Pump Damage

The analyzer can be calibrated using the optional zero and span gas ports located on the back panel. It can also be calibrated using the internal sample pump. Care must be taken to ensure that the sample pump is not exposed to excessive pressure using this calibration method.

 $\triangle$ 

WARNING: Any pressure exceeding 2.0 psig can result in a NON-WARRANTY failure.

### **Removing Protective Caps**

Do not apply AC power to this analyzer until you have removed the plastic <sup>1</sup>/<sub>4</sub>-inch caps from the sample/zero/span/fuel fittings on the rear panel.



CAUTION: Failure to remove the Protective Caps will result in analyzer contamination.

#### FILTER HOUSING MAINTENANCE

 Whenever you replace the filter element, always apply a liberal coating of hydrocarbonfree silicone lubricant to the threads of the filter housing before re-assembly to prevent galling and seizing of the threads.

*NOTE* Use a silicone lubricant that is free of hydrocarbons to eliminate contamination of the analyzer and measurement errors.

- 2. Always use a second wrench on the body of the filter housing when attempting to inspect or replace the filter.
- 3. Always allow the filter housing to cool to room temperature before attempting any maintenance.

## WARNING: Never attempt to disassemble or reassemble the filter housing while it is hot.

4. The sealing of the filter housing is accomplished with the o-ring. **Do not** over tighten. Reassembly of the filter housing should be sealed just past finger-tight and only when the filter housing is at room temperature.

#### UNPACKING INSTRUCTIONS

Open the shipping container and carefully remove the analyzer from the packing materials. Inspect the instrument for any sign of damage. Remove the top-cover retaining screws. Visually check for loose parts or connectors that are not properly seated. Verify that all circuit boards and circuit board connections are secure. If all internal components and their alignments look correct, re-install the cover.

| NOTE | Save the original shipping container your analyzer arrives in. The shipping  |
|------|--|
|      | container and packaging are specially designed to protect the analyzer in    |
|      | transport. If you ever need to return the analyzer to SERVOMEX for repair or |
|      | any other reason, the original shipping container and packaging should be    |
|      | used.  |

#### **Reporting Damage**

Should there be any apparent damage to either the inside or outside of the instrument due to shipping or handling, immediately notify the shipping company and SERVOMEX. The shipping container or packing materials should be retained for inspection by the shipper. See the Warranty section for details on returns and contacts.

#### MOUNTING OPTIONS AND CONNECTIONS

#### **Rack Mounting**

The front panel is designed for mounting into a standard 19-inch rack enclosure. Holes are located on the left and right side to allow the panel to be secured in the rack by screws. Optional rack slides allow the analyzer to be pulled out of the rack enclosure for access.

#### **Rear Panel**



The rear panel includes the following:

- 1) Sample Gas Bypass outlet (vent) for exhaust of sample <sup>1</sup>/<sub>4</sub>-inch (6mm) tube.
- 2) Sample Gas inlet for delivering gas to the analyzer <sup>1</sup>/<sub>4</sub>-inch (6mm) tube.
- 3) Zero Gas inlet for delivering zero calibration gas to the analyzer (optional).
- 4) Label identifies the proper fuel to be used with this analyzer.
- 5) Fuel Gas inlet delivers fuel to the burner for combustion.
- 6) Connectors for analog and digital outputs and inputs.
- 7) Sample inlet filter access.
- 8) Exhaust vent from FID burner.
- 9) Span Gas inlet for delivering calibration gas to the analyzer.
- 10) Air inlet for delivering hydrocarbon-free air to the analyzer for burner combustion.
- 11) TCP/IP RJ-47connection to network cable.
- 12) RS232 Serial connection to serial cable.
- 13) Power Entry module for power connection, power switch, fuse compartment.
- 14) Rear-panel ON/OFF switch.

#### **Site Selection and Mounting**



**CAUTION:** The following precautions must be carefully observed

1. Select a site free from direct sunlight, radiation from a high-temperature surface, or abrupt temperature variations.

- 2. This analyzer is *not* suitable for installation outdoors.
- 3. Select a site where the air is clean. Avoid exposing the instrument to corrosive or combustible gases.
- 4. Do not subject the analyzer to severe vibration. If severe vibration is present, use isolation mounts.
- 5. The instrument is designed for rack mounting. Optional rack-mount slides are available.

| NOTE | A front and rear supporting brace or equivalent are required if the optional |
|------|--|
|      | rack mount slides were not purchased.  |

6. Do not install the SERVOPRO HFID near equipment that emits electromagnetic interference (EMI).



#### ELECTRICAL

All wiring is connected at the rear of the analyzer. The AC power cord is connected to the power entry as shown below:



AC Power Switch, Connector and Fuse.

*NOTE* A defective ground may affect the analyzer's operation. Shielded wiring is recommended for output signals.

#### **OUTPUT CONNECTIONS**

See the <u>Analog and Digital Interface</u> section of the Operations Manual for instructions for the various output selection options. Shielded wiring is recommended for output signals.

#### GAS REQUIRMENTS AND HANDLING EQUIPMENT

- 1. Air (zero calibration gas and burner air, < 1 ppm C) in pressurized cylinder.
- 2. Fuel 40% H<sub>2</sub>/60% He or 100% H<sub>2</sub> in pressurized cylinder (as specified).
- 3. Standard span gas near full-scale concentration (typically 80-95% of the analyzer's measuring range) with an air balance in a pressurized, certified cylinder.
- 4. Pressure regulators for the zero, span, combustion air and fuel gas cylinders.
- 5. Corrosive-resistant gas tubing.
- 6. Heated pump, if not supplied as an analyzer option.
- 7. Heated sample line.

Calibration gases can be introduced through either the calibration ports on the back of the analyzer (if optional solenoid valves have been installed) or through the sample inlet. Gases introduced through a calibration port should be at 20-25 PSIG. If introduced through the sample port, pressures should be as follows:

- a. Without sample pump, pressure should be 10-25 PSIG.
- b. With sample pump no pressure.

#### **Gas Connections**

CAUTION: Be sure tubing and joints are clean. Dust entering the instrument may cause it to malfunction. Be sure that all tubing, fittings and other gas handling equipment are completely free of any type of hydrocarbon contamination.

If optional solenoid valves have been installed and the calibration gases are not connected to calibration inlets on the back of the analyzer, the calibration gases will need to be delivered through the sample port at pressure settings listed above.

The tubing from the sampling system to the gas analyzer should be made from corrosive-resistant material such as Teflon<sup>®</sup> or stainless steel. Rubber or soft vinyl tubing should not be used since readings may be inaccurate due to gas absorption into the tubing material. For fast response, the

tubing should be as short as possible. Optimum tube internal diameter is 0.16 inch (4 mm). Couplings to the instrument use <sup>1</sup>/<sub>4</sub>-inch (6mm) tubing.

A sample gas bypass fitting is located on the rear panel. Keep pressure at this outlet at atmospheric level. Vent this gas away from the analyzer and ensure a safe atmospheric discharge. In general, use heated sample lines for measuring heavy hydrocarbons and for the transportation of hot, wet gases. This instrument does not control the temperature in the external heated lines. There are provisions to terminate heated sample lines at the rear of the instrument. However, adequate precautions should be taken to eliminate the possibility of 'cold spots' between the end of the heated sample line and the inlet of the analyzer.

#### SAMPLING REQUIREMENTS

#### Filtration

The SERVOPRO HFID contains an internal 0.01 micron filter in the sample input. It also has 0.7 micron filters on each of the air, fuel and optional zero/span gas solenoid valves. The final filter must be capable of removing any particles larger than 4 microns.

#### Condensation

The analyzer is designed to measure hot wet (raw) sample gases. Unheated sample lines (or cold spots in heated lines) will cause the moisture contained in the sample gas to condensate. Any liquids entering the analyzer could damage it.

The dew point of the sample gases must be lower than the instrument temperature to prevent accidental condensation within the instrument. If necessary, bypass the sample through a dehumidifier to reduce the dew point to 4°C or less. If the sample contains an acid mist, use an acid-mist filter, cooler or similar device to remove all traces of the mist.

#### **Presence of Corrosive Gases**

The useful service life of the instrument will be shortened if high concentrations of corrosive gases such as  $Cl_2$ ,  $SO_2$ ,  $F_2$ , HCl etc. are present in the sampled gas.

#### **Gas Temperature**

The SERVOPRO HFID temperature is factory set at 191°C unless specified otherwise by the customer. When measuring high-temperature gas streams, do not exceed the instrument's maximum temperature rating of 410°F (210°C).

#### **Pressure and Flow Rates**

The sample gas flow entering the instrument is regulated by an electronic proportional control (EPC) valve to ensure that constant pressure is maintained at the sample capillary. The pressure is factory set for optimal analyzer performance. The fuel and air entering the instrument are also controlled by a factory-set EPC valve. The supply pressures should be set at approximately 25 PSIG.

- If the analyzer does not contain the optional internal sample pump, the sample gas entering the instrument should be between 8 and 25 PSIG with a minimum flow capacity of 3 liters/min.
- If the analyzer does contain the optional sample pump, **DO NOT** pressurize sample inlet.



CAUTION: If the analyzer contains an optional internal sample pump, the introduction of a sample gas with pressure in excess of 2.0 PSIG will damage the pump.

The optional pump is capable of drawing a sample through a <sup>1</sup>/<sub>4</sub>-inch (6mm) heated sample line of approximately 85 feet (~26 meters).

#### Sample Gas Bypass Outlet and Vent

A sample gas bypass outlet connector is located on the analyzer's rear panel ¼-inch (6mm) tube. Pressure at this outlet (Exhaust port) should be kept at atmospheric level. **ANY** backpressure will cause an error in reading. Vent the bypass gas away from the analyzer.

CAUTION: Vent the bypass gas using larger diameter tubing to prevent ANY backpressure which will cause an error in reading.

#### **GENERAL STARTUP INFORMATION**

Before using the SERVOPRO HFID, make sure the external plumbing and wiring have been connected correctly as shown in the Rear Panel description. All connections (combustion air, combustion fuel, zero gas and span gas) should be leak tight, and inlet pressure settings adjusted as previously described. To aid flame ignition, purge the fuel line at the analyzer to remove any residual air.

| NOTE | DO NOT energize the sample pump or introduce any sample that contains    |
|------|--|
|      | moisture until the oven has reached an operating temperature of at least |
|      | 191°C. Before Ignition is attempted, the oven temperature should be a    |
|      | minimum of 120°C.  |

Turn on the Power switch on the analyzer's rear panel. After the analyzer is turned on, it needs at least 30 seconds for initialization. After a short delay, the digital display should illuminate. If the display does not come on, check the power source and the fuse. If the problem persists, call SERVOMEX Technical Support.

Refer to the <u>Using the Keypad</u> section and review the complete Operator's Manual for detailed instructions on proper setup and operation of the SERVOPRO HFID analyzer.

#### SHUTDOWN PROCEDURE

- 1. Turn off the tank valves on the zero and span cylinders.
- 2. If the analyzer contains the optional internal sample pump, disconnect the sample line from the rear inlet port.



CAUTION: Do NOT turn off the sample pump or analyzer power at this point. Any pressurization of the pump could cause damage.

- 3. Allow the analyzer to draw in room air for approximately 10 minutes, or flush out any remaining sample that could cause condensation as the analyzer cools.
- 4. Turn off the optional internal sample pump by setting the analyzer to <u>Standby</u>.
- 5. Turn off the analyzer power.

#### STORAGE

After power down, allow the heated analyzer components to cool to room temperature before preparing for storage.

If the original shipping box was retained, the analyzer should be stored in the box in the packing material supplied. If the original box is not available and another appropriate box cannot be obtained, the analyzer can be placed in a clean, dry plastic bag.

Storage should be in a reasonably temperature-controlled environment and away from any possible exposure to dust and water or other liquids.

#### MENU NAVIGATION CHART

The menu flow chart is a handy reference that will help you familiarize yourself with the

operation of the SERVOMEX System SERVOPRO HFID Analyzer. Start by pressing 1 to access the Main Menu to quickly find any screen.

NOTE:In the diagram below all functions are available except under the Measure<br/>Mode (F2) function where the CH4 Mode (F2) and the THC/CH4/ NMHC<br/>Mode (F3) are only available when the SERVOPRO HFID equipped with the<br/>THC/CH4/ NMHC model is purchased.

#### MAIN MENU



#### **CALIBRATION MENU**



#### **RANGE MENU**



Security Level Legend

Security Level 1 STANDARD I Security I I Level 2 ı I SETUP I . . Г Security Level 3 FACTORY I . . . . - - '

#### **DIAGNOSTICS MENU**



#### **SETUP MENU**



#### ALARMS MENU



#### **SERVICE MENU**



#### SECURITY MENU



#### USING THE MAIN MENU

#### **USING THE KEYPAD**



When the Measure screen is displayed, the ten **Function keys (F1 through F10)** are shortcuts to commonly used screens. On other screens, these keys can either be used as function keys or to enter numeric values. This is why each number key includes both the larger **Function number** at the top (for example,) and the smaller number underneath for **numeric value** (for example, 1)



**NOTE** An N will be displayed in the bottom-right corner of the screen when the analyzer is in Numeric Entry mode. An F is displayed when the analyzer is being used for Function mode.

The Light key is used to turn the display's backlight on and off.

This button serves two purposes:

- 1. In the Number Entry (N) mode, this key is used to set a decimal in place.
- 2. Any other time the analyzer is in the Function mode (**F**) and the key is used to return you to the measurement screen.



The Menu key is used to bring you to the Main Menu at any time.

+

The Back key is used to return to the previous screen.



- 1. In Function mode  $(\mathbf{F})$ , the Enter key selects the highlighted function.
- 2. In Numeric mode (**N**), when a field is highlighted for numeric input, pressing the Enter key opens the selected field for numeric entry with a blinking cursor. Pressing the Enter key a second time exits the Numeric Entry field.

**NOTE** An N will be displayed in the bottom-right corner of the screen when the analyzer is in Numeric Entry mode. An F is displayed when the analyzer is being used for Function mode.

### Arrow Keys

- 1. In Function mode (**F**)
  - a. The arrow keys move the highlight up, down, left and right.
  - b. Press the Enter key to accept the highlighted function.
- 2. In Numeric mode (N)
  - a. These keys control the cursor and are also used to scroll the input possibilities and edit the numbers.
  - b. Arrow key functions will vary depending upon the screen.
  - c. The left and right arrow keys allow you to move the blinking cursor.
  - d. The up and down arrow keys C change the value within a field that has the cursor underneath it.

#### MAIN MENU SCREEN

#### î

*NOTE* The Main Menu is your gateway to operational, setup and maintenance functions on the SERVOPRO HFID analyzer via the corresponding function keys

| Main Menu         |      |
|-------------------|------|
| F1 Measure        |      |
| F2 Measure Mode   |      |
| F3 Menus          |      |
| F4 Analyzer Info. |      |
| F5 Remote/Manual  | SREM |
| F6 Standby        |      |
| F7 Ignition       |      |

All software functions of the SERVOPRO HFID analyzer can be reached via the menu above from the Main Menu screen.

Operation starts by pressing the Menu key it bring up the Main Menu. Use the Arrow keys

also access the desired function by pressing the corresponding function key.

#### SHORTCUT MENU

Scrollable list of shortcut functions available from the Measurement screen. See the shortcuts below:

| Shortcut Tag                       | Description  |
|------------------------------------|--|
|                                    | Left or right arrows are used to scroll through the shortcut menu.   |
| <b>F1</b> Measure Mode             | Allows the operator to change the analyzer's mode to THC, CH4 or THC/CH4/NMHC if using the NMHC Model analyzer.  |
| F2<br>Raw Values                   | An advanced diagnostic tool used for troubleshooting.  |
| F3 Diags                           | Diagnostic Values is used to view Temperatures, Pressures,<br>EPC Percent Full scale and Flows.                  |
| F4 Auto Range                      | Allows operators to turn Auto Range ON or OFF.   |
| <b>F5</b><br>Manual Cal            | Allows operators to Zero or Span the analyzer from the Manual Calibration menu.                                  |
| F6 <sub>6</sub> Menus              | The Menus screen is the starting point for advanced setup and functions.   |
| <b>F7</b><br>Standby               | When the analyzer is in Standby mode, it closes all valves<br>and turns off the analyzer's optional sample pump. |
| <b>F</b> <sup>8</sup> Range Limits | This screen allows operators to customize the analyzer's ranges.   |

| <b>F9</b> Span Conc | Operators can change Span gas concentrations for multiple ranges.  |
|---------------------|--|
| F19 CH4 Factors     | Allows operators to set or adjust the CH <sub>4</sub> Correction Factors if using the NMHC Model analyzer. |

#### MEASURE SCREEN

in Function Mode (F)

**NOTE** The Measure Screen provides a visual of the current concentration of the gas being analyzed, along with other pertinent information.

The Measure Screen is accessed by pressing the key. To access the Measure Screen from the

Main Menu, press



**NOTE** If the analyzer is equipped with a pump, the pump will not start until the oven, pump and burner temperatures are within the alarm settings.

Please review the following descriptions (corresponding with the callouts on the illustration above) to familiarize yourself with the Measure Screen.

| Diagram Above                  | Description   |
|--------------------------------|---|
| Call Outs                      |   |
| Screen Name                    | The name of the active screen the Analyzer is in; in this case the  |
|                                | Measure screen.   |
| Second Log On                  | SEC appears when the Second log is enabled. See <u>Data Logging</u><br><u>Time</u> .  |
| AK Status Line                 | When the AK Status line is enabled, it will scroll through the analyzer's present state using AK Protocol. See <u>AK Protocol</u> . |
| Analyzer Mode                  | The active mode the analyzer is in (1) THC (2) CH4 or (3) THC/CH4/NMHC.   |
| Measured                       | The current concentration that is displayed on the screen.  |
| Concentration                  |   |
| Current Range                  | The range currently being used by the analyzer. Auto Range is indicated by an (A) in front of the range number.                     |
|                                | Up and down arrows $\frown$ $\frown$ to change the analyzer's current range.  |
| Range Limit                    | The analyzer's full-scale value of the range currently in use.  |
| Current Time/<br>Active Alarms | Scrolls between Time and Date and any active alarms.  |
| Keypad Status                  | Indicates how the keypad input is currently being used. ( <b>F</b> ) is for functions, ( <b>N</b> ) is for numeric input.           |

#### MEASURE MODE



| Measure Mode         |   |
|----------------------|---|
| F1 THC Mode          |   |
| F2 CH4 Mode          |   |
| F3 THC/CH4/NMHC Mode |   |
|                      |   |
|                      |   |
|                      |   |
|                      | F |

|      | NOTE            | The Measure Mode menu is used to select one of three measurement modes:  |
|------|-----------------|--|
|      |                 | THC, CH <sub>4</sub> or THC/CH <sub>4</sub> /NMHC if using the NMHC Model analyzers                              |
|      |                 | otherwise only the THC Mode is allowed.  |
| The  | Measure         | Mode menu is accessed by pressing the $\begin{bmatrix} F_2^2 \\ 2 \end{bmatrix}$ key on the Main Menu. This menu |
| will | affect ho       | w the analyzer operates and what is displayed in the Measure screen.   |
|      |                 |  |
| Pres | $rac{F1}{1}$ to | set the analyzer in THC only mode. (Total Hydrocarbons)  |
| Pres | $rac{F2}{2}$ to | o set the analyzer in CH4 only mode. (Methane) NMHC Model analyzers  |
| Pres | s F3 to         | set the analyzer in THC/CH4/NMHC mode. NMHC Model analyzers  |
|      | NOTE            | The standard SERVOPRO HFID analyzers only offers the Total   |
|      |                 | Hydrocarbon Mode. Pressing <i>will bring the analyzer back to the</i>  |
|      |                 | Measure screen.  |

#### THC MODE (NMHC MODEL ONLY)





To move to the THC mode, press  $[F_1]$  while in the Measure Mode menu. In THC mode, the sample gas does not pass through the analyzer's non-methane cutter. The final reading is Total Hydrocarbons or THC.

#### CH<sub>4</sub> MODE (NMHC MODEL ONLY)





To change to the CH<sub>4</sub> mode, press  $\begin{bmatrix} F_2 \\ 2 \end{bmatrix}$  while in the Measure Mode menu. In CH<sub>4</sub> mode, the sample gas passes through the non-methane cutter and the analyzer measures Methane.



*NOTE* The THC/CH<sub>4</sub>/NMHC mode activates the "sample and hold" feature which allows the analyzer to automatically cycle between THC and CH<sub>4</sub> measurement.

To change to the THC/CH<sub>4</sub>/NMHC mode, press  $\begin{bmatrix} F_3 \\ 3 \end{bmatrix}$  from the Measure Mode menu. The current measuring mode (cycle) is indicated above the analyzer range on the right hand side of the display (**Example above: CH<sub>4</sub>**).

The cycle times of the sample read are set on the <u>THC/CH<sub>4</sub>/NMHC Mode Times</u> screen. All THC and CH<sub>4</sub> readings are displayed as averaged values.

The cycle begins with the CH<sub>4</sub> reading. When the CH<sub>4</sub> (through the non-methane cutter) reading is completed, the analyzer switches to the THC mode. When the THC cycle is completed, the analyzer updates the averaged CH<sub>4</sub> and THC values on the screen and the analog outputs. At that point, the difference between the averaged value of THC and CH<sub>4</sub> is calculated as the NMHC (Non-Methane Hydrocarbon) concentration. The cycle continues to repeat.

For advanced calibration and operation in THC/CH4/NMHC mode, see CH4 Correction Factors in the main Operation Manual.

#### ANALYZER INFO



| Analyzer Info    | 192.168.002.092 |  |
|------------------|-----------------|--|
| Model            | SERVOPRO HFID   |  |
| S∕N              | 1412001         |  |
| Sample Pres      | 1.50PSI/11cc    |  |
| Fuel Pres        | 8.00PSI/139cc   |  |
| Air Pres         | 7.00PSI/317cc   |  |
| Software Version |                 |  |
| FMAIN            | 7.100           |  |
| FUSER            | 7.666           |  |
| OSMSR            | 63.024          |  |

*NOTE* The Analyzer Info screen contains the basic identity of your SERVOPRO *HFID Analyzer*.

The Analyzer Info screen is accessed by pressing the  $\begin{bmatrix} F_4 \\ 4 \end{bmatrix}$  key on the Main Menu.

This screen includes the Model and Serial Number of your analyzer (for easy identification if you are discussing your analyzer with SERVOMEX), factory settings for Sample pressure, Fuel pressure and Air pressure, and the software versions being used. The analyzer's current IP address appears in the upper-right corner of the screen.

#### **REMOTE/MANUAL**



| Remote∕Manual | SREM |
|---------------|------|
| F1 Manual     |      |
| F2 Remote     |      |
|               |      |
|               |      |
|               |      |
|               |      |
|               |      |

# *NOTE* The Remote/Manual menu gives the operator the ability to control the instrument manually using the keypad or via a remote computer.

The Remote/Manual menu is accessed by pressing the  $\begin{bmatrix} F_5 \\ 5 \end{bmatrix}$  key on the Main Menu. The current setting (Remote Mode) is displayed in the upper right-hand corner of the screen. **Example:** 

#### SREM.

The analyzer can be controlled remotely via:

- TCP/IP Modbus
- RS-232 AK Protocol
- Digital inputs (contact closure) located on the rear of the analyzer.

*NOTE* AK Protocol works with both TCP/IP and Serial. Modbus only works with TCP/IP.





*NOTE* When the analyzer is in Standby Mode, the pump is turned off and the solenoid valves are closed.

The SERVOMEX logo is displayed along with the Serial Number. Standby mode is accessed by

pressing the  $\begin{bmatrix} F6\\ 6 \end{bmatrix}$  key from the Main Menu.

#### IGNITION



Ignition Ignition sequence started... Flame Temperature :180.00 Fuel Pressure :8.00 Air Pressure :7.01

NOTE Before Ignition is attempted the oven temperature should be a minimum of 120°C.

To start the ignition sequence, press  $\begin{bmatrix} F_7 \\ 7 \end{bmatrix}$  from the Main Menu.

At the start of the ignition sequence the fuel valve will open five seconds before the air valve to prime the burner. The analyzer will try to ignite up to five times (280 seconds). Once the flame temperature reaches above 250° C, the analyzer is lit and will return to the Main Menu.

#### Notes:

- If the air pressure is not within the alarm limits, the fuel valve will close and the burner will not ignite.
- If the analyzer fails to ignite, it will be indicated by a No Flame and Check Burner Temperature alarm.

#### WARRANTY

Servomex instruments are warranted to be free from defects in workmanship and materials. Liability under this warranty is limited to servicing, calibrating, and replacing any defective parts of the instrument returned to an authorized Servomex Service Center for that purpose. Fuses are specifically excluded from any liability.

This warranty is effective from the date of delivery to the original purchaser. The equipment must be determined by Servomex to have been defective for the warranty to be valid.

This warranty applies as follows:

- one year for electronics
- one year for mechanical failures

If damage is determined to have been caused by misuse or abnormal conditions of operation, the owner will be notified, and repairs will be billed at standard rates after approval.

Servomex Group Limited warrants each instrument manufactured by them to be free from defects in material and workmanship at the F.O.B. point specified in the order, its liability under this warranty being limited to repairing or replacing, at the Seller's option, items which are returned to it prepaid within one year from delivery to the carrier and found, to the Seller's satisfaction, to have been so defective.

In no event shall the Seller be liable for consequential damages. NO PRODUCT IS WARRANTED AS BEING FIT FOR A PARTICULAR PURPOSE AND THERE IS NO WARRANTY OF MERCHANTABILITY.

Additionally, this warranty applies only if: (i) the items are used solely under the operating conditions and in the manner recommended in the Seller's instruction manual, specifications, or other literature; (ii) the items have not been misused or abused in any manner or repairs attempted thereon; (iii) written notice of the failure within the warranty period is forwarded to the Seller and the directions received for properly identifying items returned under warranty are followed; and (iv) with return, notice authorizes the Seller to examine and disassemble returned products to the extent the Seller deems necessary to ascertain the cause of failure. The warranties stated herein are exclusive. THERE ARE NO OTHER WARRANTIES, EITHER EXPRESSED OR

IMPLIED, BEYOND THOSE SET FORTH HEREIN, and the Seller does not assume any other obligation or liability in connection with the sale or use of said products.

#### MAINTENANCE POLICY

In cases when equipment fault is suspected, please notify your representative of the problem and provide them with model and serial numbers.

If the problem cannot be resolved, then ask for a Return Product Authorization Number (RPA) and shipping instructions. The issue of an RPA does not automatically imply that the equipment is covered by our warranty - that will be determined after we receive the equipment.

Pack the equipment in a suitable box with sufficient padding, include the RPA number on your paperwork, and send the equipment, prepaid, to the designated address. Servomex will not accept equipment returned without a RPA, or with reversed shipping or import/export charges.

If the warranty has expired, or the damage is due to improper use or exposure of the equipment, Servomex will provide an estimate and wait for approval before commencing repairs.

#### **RETURN AUTHORIZATION REQUEST**

Servomex must approve and sign a Return Product Authorization Number (RPA) to any instrument being returned. The RPA must appear on all paperwork and packaging.

The issuance of an RPA does not automatically imply that the instrument is covered by our warranty.

In order to serve you better and to protect our employees from any potentially hazardous contaminants, Servomex must return, unopened and at the sender's expense, all items that do not have an RPA and a signed and filled out Decontamination Form.

OSHA Hazard Communication Standard 29CFR 1920.1200 mandated that we take specific steps to protect our employees from exposure to potential hazards. Therefore, a letter certifying that the equipment has been decontaminated must accompany all equipment exposed to hazardous contamination. To obtain an RPA form, email your regional Servomex Service Center at the following addresses:

- 1. North and South America:
- 2. Asia, Australia, New Zealand:
- 3. Europe, Middle East, Africa, India:

americas\_service@servomex.com asia\_service@servomex.com EMEAI\_service@servomex.com