POLI

Multi-Gas Detectors

MP400, 400P & 400S

User's Guide

Rev 1.0

Dec. 2018

Contents

⚠ Warning

Read Before Operating

This manual must be carefully read by all individuals who have or will have the responsibility of using, maintaining or servicing this product. The product will perform as designed only if it is used, maintained and serviced in accordance with the manufacturer's instructions. The user should understand how to set the correct parameters and interpret the obtained results.

CAUTION!

Remove the monitor cover only in area known as non-hazardous.

CAUTION: HIGH OFF-SCALE READINGS MAY INDICATE AN EXPLOSIVE CONCENTRATION.

ATTENTION: DES LECTURES SUPÉRIEURES A L'ÉCHELLE PEUVENT INDIQUER DES CONCENTRATIONS EXPLOSIVES.

WARNINGS

ONLY THE COMBUSTIBLE GAS DETECTION PORTION OF THIS INSTRUMENT HAS BEEN ASSESSED FOR PERFORMANCE.

UNIQUMENT, LA PORTION POUR DÉTECTOR LES GAZ COMBUSTIBLES DE CET INSTRUMENT A ÉTÉ ÉVALUÉE.

CAUTION: BEFORE EACH DAY'S USAGE, SENSITIVITY OF THE COMBUSTIBLE GAS SENSOR MUST BE TESTED ON A KNOWN CONCENTRATION OF METHANE GAS EQUIVALENT TO 20 TO 50% OF FULLSCALE CONCENTRATION. ACCURACY MUST BE WITHIN 0 AND +20% OF ACTUAL. ACCURACY MAY BE CORRECTED BY CALIBRATION PROCEDURE.

ATTENTION: AVANT CHAQUE UTILISATION JOURNALIERE VERIFIER LA SENSIBILITE AVEC UNE CONCENTRATION CONNUE DE METHANE EQUIVALENTE A 20-50% DE LA PLEINE ECHELLE. LA PRECISION DOIT ETRE COMPRISE ENTRE 0-20% DE LA VALEUR VRAIE ET PEUT ETRE CORRIGEE PARUNE PROCEDURE D'ETALONNAGE.

Warning: High off-scale readings may indicate an explosive concentration.

Warning: Substitution of components may impact intrinsic safety.

Note: Users are recommended to refer to ISA -RP12.13, Part II-1987 for general information on installation, operation, and maintenance of combustible gas detection instruments.

WARNINGS

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

Proper Product Disposal at The End Of Life

The Waste Electrical and Electronic Equipment (WEEE) directive (2002/96/EC) is intended to promote recycling of electrical and electronic equipment and their components at end of life. This symbol (crossed-out wheeled bin) indicates separate collection of waste electrical and electronic equipment in the EU countries. This product may contain one or more Nickel-metal hydride (NiMH), Lithium-ion, or Alkaline batteries. Specific battery information is given in this user guide. Batteries must be recycled or disposed of properly. At the end of its life, this product must undergo separate collection and recycling from general or household waste. Please use the return and collection system available in your country for the disposal of this product.

1. General Information

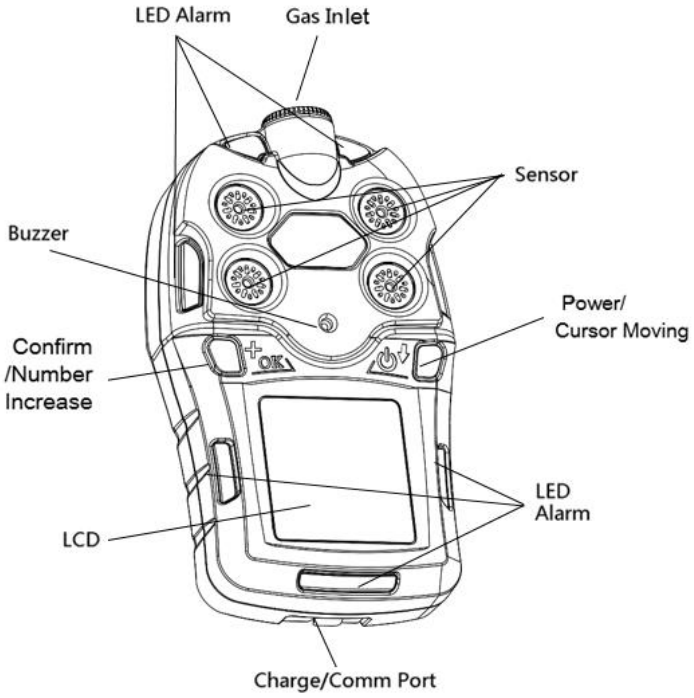
The POLI multi-gas detectors (MP400, 400P & 400S) offer 4 or 5-gas monitoring of oxygen (O2), combustible (LEL), toxic, carbon dioxide (CO2) gases and volatile organic vapors (VOCs). The MP400 is a compliance model of O2, LEL, carbon monoxide (CO) and hydrogen sulfide (H2S) configuration in diffusion. The MP400P is a standard model and adopts a full range of sensor selection, e.g. electrochemical (EC), pellistor, non-dispersive infrared (NDIR) and photo-ionization detector (PID) in pump or diffusion. The MP400S is an advanced model and has a built-in wireless module that sends critical data of Man Down, Gas and Battery Alarms to supervisors and control centers on site or at remote locations for faster responses and maximized safety measures.

1.1 Main Features

- 3 models of diffusion, pump and wireless optimized for compliance, professional and advanced applications.
- Large graphical display icon-driven user interface through intuitive, simple-to-operate two-button user interface
- Over 30 interchangeable sensor configurations, including PID for VOC, NDIR and catalytic for combustibles, and NDIR for CO2
- Intelligent sensors store calibration data ready for installed in the field
- Easy access to pump, sensor, filter and battery
- Man Down, Gas and Battery Alarm notification via ISM wireless at a free of charge
- IP-65/67 water and dust resistant case

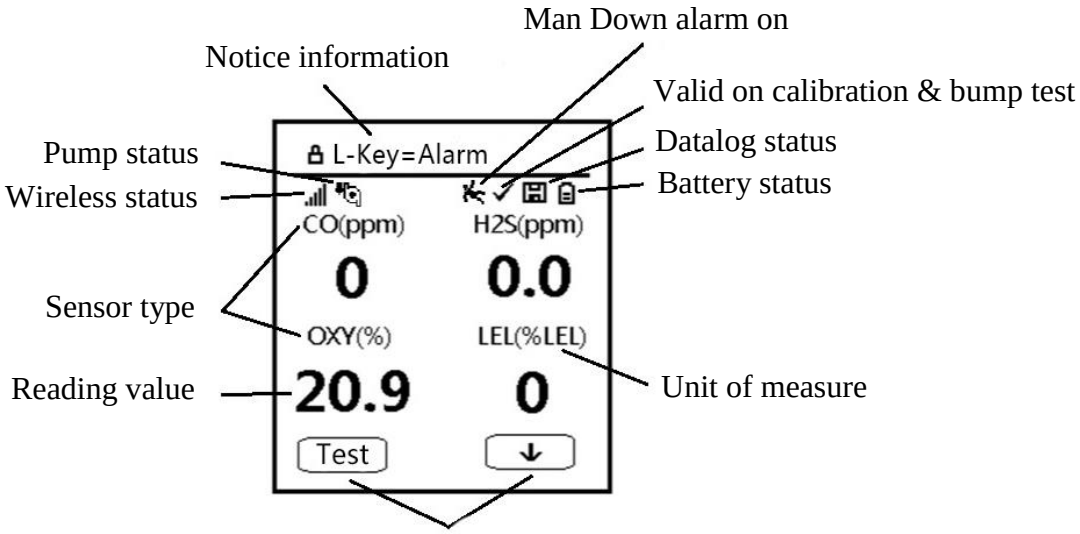
2. User Interface

The POLI's user interface consists of two (2) keys, four (4) sensor sockets, one (1) big LCD - Liquid Crystal Display, eight (8) alarm LEDs - Light Emitting Diodes, one (1) buzzer, and two (2) vibration alarms.



2.1 Displays and Keys

The LCD provides visual information that includes real-time gas readings, sensor types, datalog / battery / pump / wireless status, and others.



2.1.1 Status Indicator Icons

Along the top of most screens are status indicators that tell you whether a function is operating and/or its strength or level.

Icon	Function
	Wireless signal strength at 0-5 level
	Pump status (pump version only)
	Datalogging status (shown when datalogging is on, blank when off)
	Battery voltage status
	Man Down alarm enabled
	All sensors tested and calibrated tick mark (all sensors have been bump tested and calibrated; no sensor is overdue for a bump test or calibration according to the intervals configured on the instrument.

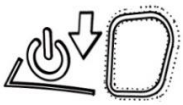
2.1.2 Auto Flip Screen

When positioned up down, the POLI screen is automatically flipped for keeping normal readings.

2.1.3 Keys and Interfaces

The POLI has two keys:

[+/OK] Key
Confirm/Number Increase



[⏻↓] Key
Power/Cursor

Moving

These two keys are marked as [+/OK] and [⏻/↓] for Confirm or Number Increase and Power / Cursor Moving, respectively. They also act as 'soft keys' that changes numbers and make selections under various menus.

Two test and symbol boxes at the LCD bottom are 'mapped to' the [+/OK] and [⏻/↓] keys. The text and symbol in the boxes may vary with the menu.

In addition to the functions described above, either key can be used to manually activate LCD backlighting. Press a key to turn it on when the backlighting is off.

2.2 Active Sensor Displays

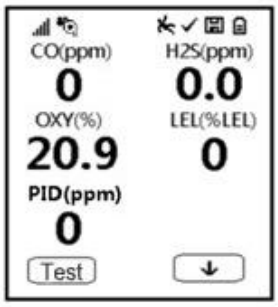
Though having four (4) sensor sockets, the POLI is a flexible platform that accommodates one (1) to five (5) sensors with a dual toxic sensor. When one or more sensors is either not installed or turned off, the display only shows the installed, active sensors:

One Sensor

Two Sensors

Three Sensors

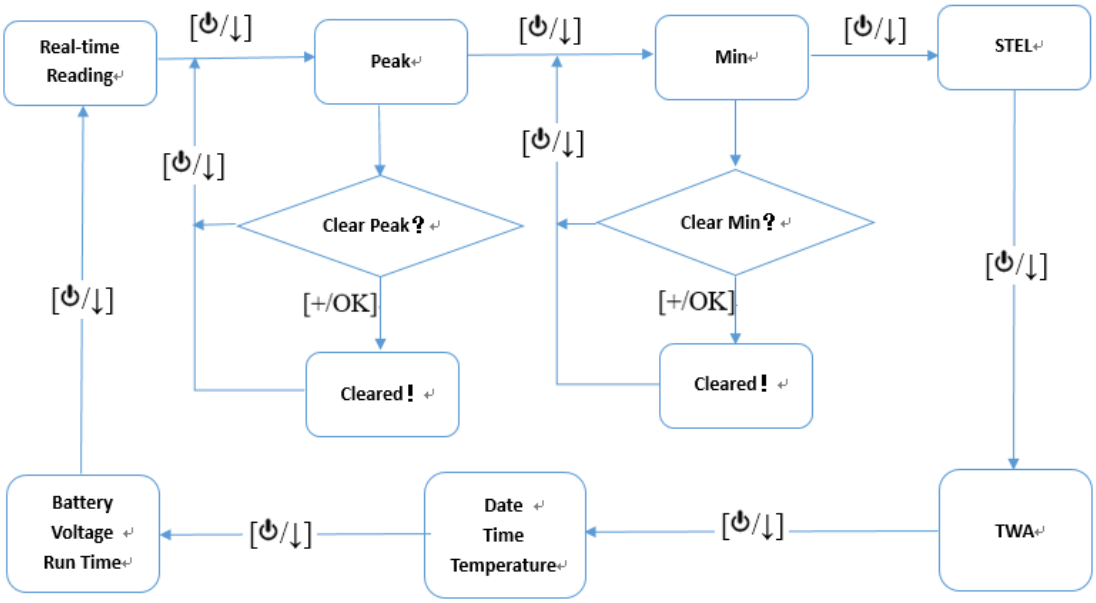
Four Sensors



Five Sensors

2.3 User Menu

The user menu in the reading mode is simple to go through by pressing the [+/OK] and [⏻/↓] key.

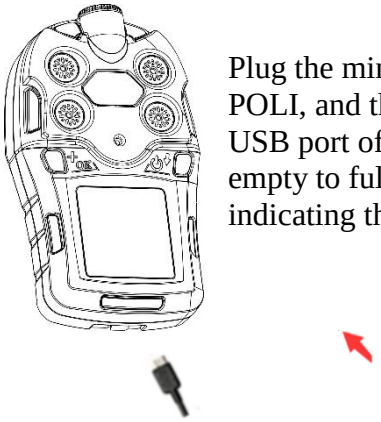


3. Battery

Always fully charge the battery before using the POLI. Its Li-ion battery is charged by a Micro-USB cable.

WARNING

To reduce the risk of ignition of hazardous atmospheres, recharge, remove or replace the battery only in an area known to be non-hazardous!



Plug the mini end of the Micro-USB cable into the charging port of POLI, and the other end is connected to a USB power adaptor or the USB port of computer. The screen will display a battery icon from empty to full. When the battery icon is displayed full grid status indicating the battery is fully charged.

3.1 Replacing A Battery

The Lithium-ion battery pack inside of the POLI is free of maintenance. In case of a battery failure or end operating life, please contact mPower service department or authorized distributors for a battery replacement.

3.2 Battery Status

The battery icon on the display shows how much charge is in the battery, and alerts you if any charging problem.

				blink
Full charge	2/3 charge	1/3 charge	Battery Low	Battery Alarm

When the battery's charge falls below a preset voltage, the instrument warns you by beeping once and flashing once every minute. The instrument automatically powers down within 10 minutes, after which users shall recharge the battery.

4. Turning On or Off

4.1 Turning On

With the instrument turned off, press and hold the [⏻/↓] Key for 3 seconds, until buzzer beeps and red LED on, the unit is powered on. It will show informative screens such as:

- Manufacturer's logo and company name
- Product name, Model No. and Serial No.
- FW version, date, and time
- Battery type, voltage
- Datalog cycle
- Sensor types (High Alarm Limit, Low Alarm Limit, STEL Limit, TWA Limit）

Then the POLI's main reading screen appears. It usually takes 1 to 2 minutes for sensors to show meaningful readings. For some sensors not fully warmed up by the time, the main screen shows '- -' instead of numerical values until the sensor is stablized in a few more minutes typically. Then it displays instantaneous readings similar to the following screen (depending on the sensors installed) and is ready for use.

Note: If the battery has insufficient power, the LCD briefly shows the message 'Battery Fully Discharged' and the POLI shuts off automatically. You should charge the battery or replace it with a fully charged battery before turning it on again.

IMPORTANT!

If a major error that prevents the POLI from functioning occurs during startup, the message 'Contact Service' is shown on the display. The instrument should be shut off and taken to service.

4.2 Turning Off

In normal reading mode, press and hold the [⏻/↓] Key, the unit will show 5 seconds count down, with red LED flash and buzzer beeps once per second. After the last long flash and beep, LCD displays 'Power Off', the unit is powered off.

Caution: The alarm is loud. During startup, you can mute most of the sound by temporarily holding a finger over the buzzer opening hole. Do not put tape over the buzzer opening as it permanently mutes and causes a serious safety problem.

4.3 Testing Alarm Indicators

Under normal-operation mode and non-alarm conditions, the buzzer, vibration alarm, LED, and backlight can be tested at any time by pressing [+/OK] once.

IMPORTANT!

If any of the alarms do not respond to this test, check the Alarm Settings in Programming Mode. It is possible that any or all of the alarms have been turned off. If all of the alarms are turned on, but one or more of them (buzzer, LED lights, or vibration alarm) does not respond to this test, do not use the instrument. Contact your mPower distributor for technical support.

4.4 Pump Status

IMPORTANT!

During operation, make sure the probe inlet and the gas outlet are free of obstructions. Obstructions can cause premature wear on the pump, false readings, or pump stalling. During normal operation, the pump icon alternately shows inflow and outflow as shown here:

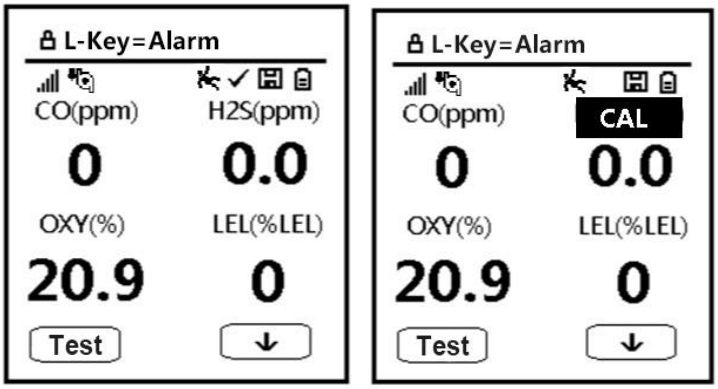
If there is a pump failure or obstruction that disrupts the pump, the alarm sounds and you see this icon blinking on and off:

Once the obstruction is removed, you can restart the pump by pressing the [+/OK] key. If the pump does not restart, and the pump stall alarm continues, consult the Troubleshooting section of this guide or contact your mPower distributor for technical support.

Note: Pump status is not indicated on the diffusion POLI.

4.5 Calibration Status

If one or more sensors requires calibration, then the screen shows a highlighted 'CAL'.

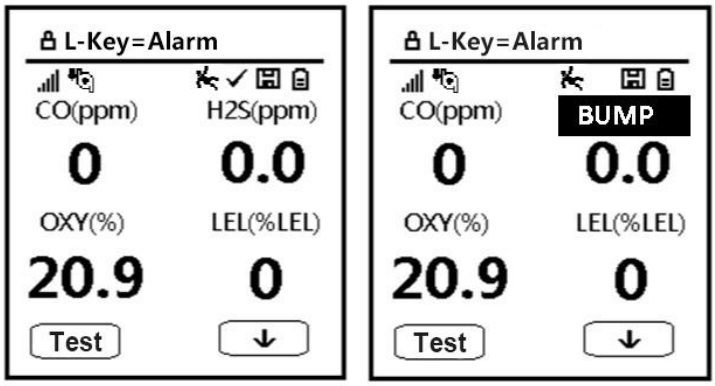


Calibration is required if:

- The sensor module has been replaced with one whose calibration is overdue.
- The defined period of time between calibrations has been exceeded.
- Users have changed the calibration gas type without recalibrating the instrument.
- The sensor has failed in a previous calibration.

4.6 Bump Status

If one or more sensors requires a bump test, then the screen displays the word 'BUMP' at the place of the sensor name, and alternates between the sensor name and the word 'Bump' with a highlighted background:



A bump test is required if the defined period of time between bump tests has been exceeded. This interval is set by an administrator using mPower Suite software.

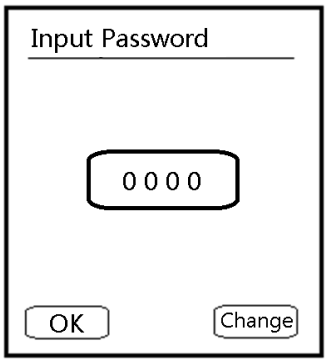
5. Config Mode

The menu in Config Mode is to adjust the POLI's settings and calibrate sensors. It has the following submenus:

- Sensor: Zero Calib, Span Calib, Bump Test, Span Value, Enable/Disable, Cal Interval, Bump Interval, Gas Unit.
- Alarm: High Limit, Low Limit, STEL Limit, TWA Limit, Alarm Device.
- Datalog: Interval, Clear All, Log Sensor Sel.
- Unit Setting: Heart Beat Light, Temperature Unit, LCD Contrast, Pump Speed, Language, Back Light Mode, LCD Auto Rotate, M-Down On/Off, M-Down Timeout, M-Down Thresh.
- Wireless: Wireless On/Off.
- Exit

5.1 Entering Config Mode

To enter Config Mode, the [+/OK] and [⏻/↓] together for 3 seconds until you see the password screen.



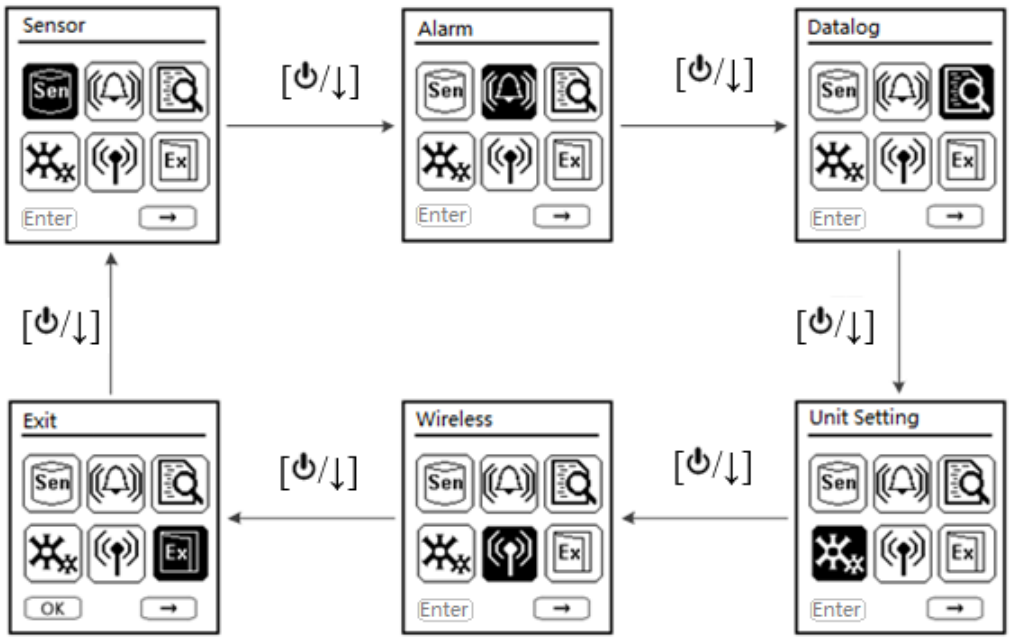
The Config Mode is password protected. The default password is '0000'. After all four (4) digits are inputted, press [⏻/↓] key to enter config mode.

- Increase the number from 0 through 9 by pressing [+/OK].
- Step from digit to digit using [⏻/↓].
- After inputting the password's four (4) digits, advance to 'OK'.
- Press [+/OK] to register the password and enter Config Mode.

If the password input is not correct, you will receive the message 'Incorrect!' and the unit will return to the reading mode automatically.

If the digit input is mistaken, use the [⏻/↓] key to move cursor among four digits and press [+/OK] key to change the inputs.

After entering the config mode, the sensor menu is displayed first. Press [⏻/↓] key to browse the menu under the config interface.



You can enter one menu, view or edit the parameters in its submenu by pressing [+/OK] key.

5.2 Menus and Sub-menus

In config mode, menus and submenus are organized as shown here:

Sensor	**Alarm**	**Datalog**	**Unit Setting**	**Wireless***
Zero Calib	High Limit	Interval	Heart Beat Light	Wireless On/Off
Span Calib	Low Limit	Clear All	Temperature Unit	Return
Bump Test	STEL Limit	Log Sensor Sel	LCD Contrast	
Span Value	TWA Limit	Return	Pump Speed**	
Enable/Disable	Alarm Device		Language	
Cal Interval	Return		Back Light Mode	
Bump Interval			LCD Auto Rotate	
Gas Unit			M-Down On/Off	
Return			M-Down Timeout	
			M-Down Thresh	
			Return	

* Wireless version only.
** Pump version only.

5.2.1 Editing Parameters & Selecting Sensors

There are a few basic ways to edit parameters, select sensors, and perform other activities in the POLI. The actions performed by pressing keys always match 1-to-1 with the boxes along the LCD bottom and the two keys. Some parameters are edited by scrolling and selecting individual items (black bars behind white text act as highlighters). Some include a choice via 'radio keys' where only one item in a list can be selected, while other menus use boxes for you to 'check' with an 'X' and these allow for multiple items in a list to be selected. In all cases of editing, you can save or undo your choice.

5.2.2 Calibration

Use this menu to perform zero or span calibration for one or more sensors, and change the gas concentration values equals to that of gas cylinders used in zero or span calibration.

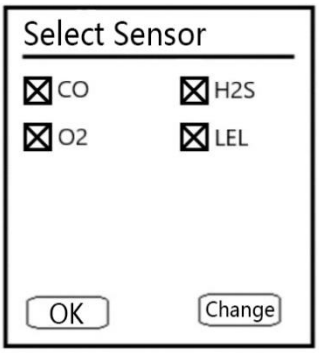
5.2.2.1 Air (Zero) Calibration

A zero calibration should precede a span calibration.

The selected sensors are shown on the screen. Start a multiple zero test by pressing [+/OK]. If you do not want to perform a test, press [⏻/↓].

Zero calibration is to set the base line for the calibration curve, it is done in clean air with 20.9% oxygen. You can calibrate several sensors simultaneously and can also select one or several sensors individually for zero calibration. This procedure determines zero points of most sensors.

At the Calibration menu, select 'Fresh Air' by pressing [+/OK] once to enter fresh air calibration. After a timer countdown, the zero calibration is completed. The LCD shows the sensor names and indicates whether each calibration passed or failed, followed by the sensor readings. Note: You can abort the calibration at any time during the countdown by pressing [⏻/↓].

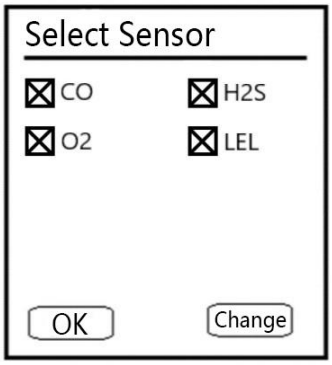


Note: You can abort a zero calibration by pressing [⏻/↓] once testing has started.

When the zero calibration is done, the Calibration Results screen is shown with either 'Pass' or 'Fail' shown. A zero calibration should precede a span calibration.

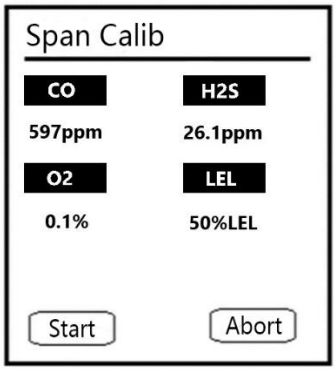
5.2.2.2 Span Calibration

Depending on the configuration of your POLI and the span gas you have, you can perform a span calibration simultaneously on multiple sensors.



The selected sensors and their values are shown on the screen. With calibration gas connected to the instrument and turned on, start a multiple span calibration by pressing [+/OK]. If you do not want to perform a multiple span calibration, press [⏻/↓].

The active sensors' names are shown in a list. Press [+/OK] to highlight the sensor you want to span calibrate, and then press [⏻/↓] to select it.



Note: You can abort a multiple span calibration by pressing [⏻/↓] once testing has started.

When the Multi Span calibration is done, a screen labeled Calibration Results is shown, with the sensor names and either 'Pass' or 'Fail' shown next to them.

Note: You can abort a span calibration by pressing [⏻/↓] once testing has started.

When the span calibration is done, the calibration results screen is shown with either 'Pass' or 'Fail' shown.

5.2.2.3 Bump Testing

Depending on the configuration of your POLI and the span gas you have, you can perform a bump test simultaneously on multiple sensors.

The purpose of a bump test is to ensure that the instrument's sensors respond to gas and all the alarms are enabled and functional.

The selected sensors and their values are shown on the screen. With gas connected to the instrument, start a multiple bump test by pressing [+/OK]. If you do not want to perform a multiple bump test, press [⏻/↓].

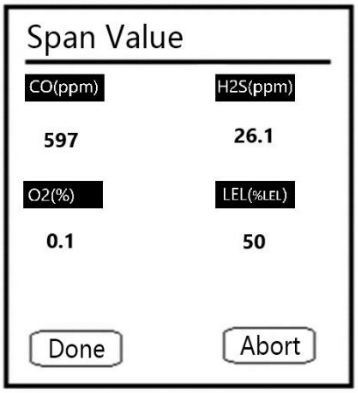
Note: You can abort a multiple bump test by pressing [⏻/↓] once testing has started.

When the Multi Bump test is done, a screen is shown, with the sensor names and either 'Pass' or 'Fail' shown next to them.

5.2.2.4 Set Span Value

In the process of modifying a value, the function of [+/OK] key can be switched between number increase and decrease by pressing the [+/OK] and [⏻/↓] keys together. Then press [+/OK] to increase or decrease numbers.

You can individually set the span gas value for each sensor. Press [⏻/↓] to scroll through the list of active sensor names. Then press [+/OK] to select one. Set the span value by pressing [+/OK] to increase a value.



Once your span value is input, press [⏻/↓] to advance to the next sensor in the list, press [⏻/↓] to advance and highlight 'OK', press [+/OK] to register the change.

5.2.2.5 Enable/Disable Sensor

You can turn sensors on or off via this set of submenus. An 'X' in a box to the left of a sensor's name indicates it is turned on.

1. Press [⏻/↓] to advance down the list of sensors.
2. Press [⏻/↓] to select/deselect a sensor.
3. Press [⏻/↓] until 'OK' is selected.
4. Press [+/OK] to save your selection and exit.

5.2.2.6 Calibration Intervals

The calibration interval of sensor can be set, the maximum calibration interval is 180 days. In the interface of 'Cal Interval', press the [+/OK] key to increase the days, press the [⏻/↓] key to save the settings, and then the 'Save?' screen will appear, press the [+/OK] key to save the setting and press the [⏻/↓] key to abort setting.

Note: the function of calibration interval is cancelled with the input '0'.

5.2.2.7 Bump Test Intervals

The bump test intervals can be set, the maximum calibration interval is 180 days. We recommend that a bump test be conducted every day before using the instrument. In the interface of 'Cal Interval', press the [+/OK] key to increase the days, press the [⏻/↓] key to save the settings, and then the 'Save?' screen will appear, press the [+/OK] key to save the setting and press the [⏻/↓] key to abort setting.

Note: the function of bump test interval is cancelled with the input '0'.

5.2.2.8 Meas. Unit

The measurement unit for displaying data from sensors can be changed. Your options are ppm (parts per million), ppb (parts per billion), mg/m3 (milligrams per cubic meter), ug/m3 (micrograms per cubic meter), µmol/mol (micromoles per mole), $\times 10^{-6}$, and %LEL.

1. Press [⏻/↓] to advance down the list of sensors.
2. Press [+/OK] to select a measurement unit.
3. When the measurement unit is shown below the sensor name, press [⏻/↓] to move to the next sensor.
4. When the change is done, move the cursor to 'Done', and press [+/OK] to save the change and exit.

5.2.3 Alarms

You can adjust High, Low, STEL (Short Term Exposure Limit) and TWA (Time Weighted Average) alarm limits via this set of submenus. You can also enable/disable any combination of light (visual), buzzer (sound) and vibration alarms.

5.2.3.1 Alarm Limits

There are four alarm limits that you can adjust individual sensor for which a particular alarm type is available.

Alarm Limits:

- High
- Low
- STEL
- TWA

Note: Some alarm limits are not applicable to all sensors. For example, Oxygen sensor does not appear in the list of STEL and TWA alarm limit.

5.2.3.2 Alarm Settings

You can enable or disable any combination of light (visual), buzzer (sound) and vibration alarms.

Alarm Settings:

- All Enabled
- Light
- Vibration
- Buzzer
- Buzzer & Light
- Buzzer & Vibration
- Vibration & Light
- All Disabled

5.2.4 Datalog

The instrument displays a floppy disk icon to indicate that gas readings are being recorded in datalog. The instrument stores the measured gas concentration for each sensor, date and time for each measurement, Site ID, User ID, and other parameters. The POLI memory is sufficient to record three (3) months' worth of data for four (4) sensors at one-minute intervals. All data are retained (even after the unit is turned off) in non-volatile memory so that they can be downloaded at a later time to a PC.

5.2.4.1 Datalog Intervals

Intervals are at a default 60 seconds, and can be changed in a range of 1 to 3,600 seconds.

5.2.4.2 Clear Datalog

This operation erases all data stored in the datalog.

Note: Once the datalog is cleared, the data cannot be recovered.

5.2.4.3 Log Sensor Selection

You can choose which sensors' data are included in the datalog. The entire list of installed sensors is shown, and you can individually select whether their data is included.

Note: Turning a sensor off in the list does not change or erase its settings.

5.2.5 Unit Setting

The sub-menus under unit setting control the Heart Beat Light, Temperature Units, LCD Contrast, Pump Speed, Language and other parameters.

5.2.5.1 Heart Beat Light

The interval of heart beat light is at default 1 second and can be increased to 10 seconds. The function of interval is cancelled with the input '0'.

5.2.5.2 Temperature Units

The display unit of the internal temperature sensor can be switched between Fahrenheit and Celsius.

1. Press [⏻/↓] to advance down the list of temperature units.
2. Press [+/OK] to select a temperature unit.
3. Press [⏻/↓] until 'OK' is selected.
4. Press [+/OK] to save your selection and exit.

5.2.5.3 LCD Contrast

The LCD contrast can be increased or decreased from its default setting. You may not need to change the default setting except extreme ambient conditions of temperature and light.

Use the [OK] key to change the LCD contrast. When you are done, press [⏻/↓] to highlight 'OK' and press [⏻/↓] to save your change. Otherwise, highlight 'Cancel' and press [⏻/↓] to abort changes and revert to the original setting.

5.2.5.4 Pump Speeds

If the POLI is equipped with a pump, the pump can operate at two speeds, high and low. Running at low speed is quieter, extends pump lifespan, and conserves a small amount of power. There is almost no difference in sampling accuracy.

5.2.5.5 Languages

Both English and Chinese are available. English is the default language, and Chinese can be selected by users.

5.2.5.6 Backlight Mode

The LCD backlight can be set to illuminate either automatically, based on ambient light conditions, or manually. It can be shut off too.

5.2.5.7 Auto Flip LCD

The LCD can be configured to auto flip automatically when the POLI is positioned upside-down. The auto flip feature can be set off.

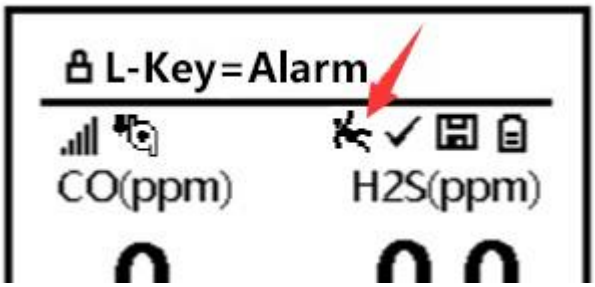
5.2.5.8 Man Down Alarm

Users can enable or disable the Man Down Alarm function according to their jobs.

The POLI offers Man Down Alarm as a critical and potentially lifesaving safety feature for all models. When the instrument carried by a user stops moving, the Man Down Alarm is triggered and the user may be unable to walk or put the POLI away. MP400S transmits various alarms including Man Down to team-mates, supervisors or safety officers on site or nearby via a wireless network for a timely rescue to save lives.

Note: Remote notification requires wireless connection to a network.

The Man Down icon shown on the main screen means the Man Down function is active.



When the Man Down function is active, the POLI senses any motionless in the certain duration of the 'Motionless Time' parameter. If the instrument is not moved during that time, then a pre-alarm is activated to alert the user, and shows the 'OK?' screen. Pressing [+/OK] clears the alarm and returns the POLI to its normal operation. Pressing [⏻/↓] sets it into Man Down Alarm. MP400S wirelessly transmits the Man Down message in real time to remote observers. If neither key is pressed, then after the countdown, it goes into Man Down Alarm and also sends a message to remote observers if wirelessly enabled.

5.2.5.9 Man Down Alarm Timeout

Man Down alarm timeout is at default 30 seconds and can be changed between 10 and 60 seconds.

5.2.5.10 Man Down Sensitivity

Motion sensitivity can be set to low, medium and high in accordance with levels of user's motion.

1. Press [⏻/↓] to advance down the list of sensitivity.
2. Press [+/OK] to select a sensitivity.

3. Press [⏻/↓] until 'OK' is selected.
4. Press [+/OK] to save your selection and exit

5.2.6 Wireless

MP400S has a wireless option while MP400 and 400P have no wireless.

5.2.6.1 Wireless On/Off

Turn the wireless on or off via this menu on MP400S.

1. Move the cursor to 'On' and 'Off' by pressing [⏻/↓].
2. Press [+/OK] after selected the state 'On' or 'Off'.
3. Press [⏻/↓] until Exit is selected.

6. Calibration and Test

6.1 Manual Alarm Test

Under normal operation mode and non-alarm conditions, the buzzer (audible alarm), vibration, visible alarms, and backlight can all be tested anytime by pressing [+/OK]. If any alarm does not respond, check the alarm settings to make sure all alarms are enabled (LED, Buzzer, Vibrator under Config mode/Alarm/Alarm Device should be 'all Enabled'). If any alarms are enabled but not functional, the instrument should not be used. Contact mPower's technical support.

6.2 Bump Testing and Calibration

mPower recommends that a bump test be conducted periodically on the POLI. The purpose of a bump test is to ensure that the instrument's sensors respond to gas and all the alarms are enabled and functional.

- The POLI multi-gas detector must be calibrated if it does not pass a bump test, or at least once every 180 days, depending on use and sensor exposure to poisons and contaminants.
- Calibration intervals and bump test procedures may vary due to national and local legislations or regulations.

A bump test can be performed manually. When a bump test is done manually, the instrument makes a pass/fail decision based on sensor performance, but the user still has the responsibility to make sure all the alarms are enabled and functional.

6.2.1 Bump (Functional) Testing

The same gas is used for a bump test as for calibration. A constant-flow regulator producing 0.5 to 1.0 liters per minute should be used.

Pumped models require a T calibration tube, as illustrated below.

Note: Make sure pressure in the calibration gas cylinder is higher than 100 psi when using a T calibration tube (pumped models only).

1. Turn on your POLI by pressing and holding the [⏻/↓] key, and allow the instrument to boot up fully until the main measurement screen with sensor names and readings is shown.

Important! Make sure all of the instrument's sensors have warmed up before performing the bump test. The instrument will take the time to warm up the sensors prior to enabling access to bump test menus. You can tell a sensor has warmed up if you see a reading next to it name on the display. If it has not yet warmed up, you see three dashes ('--') next to it.

2. Install a calibration adapter on the gas inlet at the top of the diffusion version POLI.
3. Connect the pump version instrument to the T calibration tube and connect it to the calibration gas.
4. Turn on the standard gas to initiate flow.
5. Press [+/OK] key to start the bump test, or press [⏻/↓] to quit. While the bump test is being performed, the readings for each sensor are shown. Once the bump test completes, pass/fail test results and readings are shown for each sensor.

Important! If one or more sensors fail a bump test, be sure to calibrate those sensors.

6. The bump test is now complete. Press [+/OK] to exit and return to the calibration menu.

If all of alarms and sensors have passed and no sensor is due for a calibration, the instrument is now ready for use.

6.2.2 Air (Zero) Calibration

This operation sets the zero point of the sensor calibration curve for clean air. It should be performed before other calibrations.

Note: If you use a zero air cylinder, you must use the Calibration Adapter (and a T calibration tube if the instrument has a pump). Using a calibration adapter is not necessary for calibration in fresh air.

This procedure determines the zero point of the sensor calibration curve for all the sensors that require a zero calibration. The POLI should be zero calibrated in clean ambient air with 20.9% oxygen or with a cylinder of clean zero air.

At the calibration menu, select 'Fresh Air' by pressing [+/OK] once to enter fresh air calibration.

After a timer countdown, the zero calibration is done. The LCD displays the sensor names and tells you whether each calibration passed or failed, followed by the sensor readings.

Note: You can abort the calibration at any time during the countdown by pressing [⏻/↓].

6.2.3 Span Calibration

This procedure determines the second point of the sensor calibration curve for the sensor.

Note: When a manual calibration is performed, the readings shown are in the equivalent units of the calibration gas, and not the measurement gas.

6.2.3.1 POLI Pump Version

The POLI pump draws at a flow rate of between 200cc/min and 450cc/min. The instrument must be connected to a cylinder of calibration gas with supplied tubing featuring a T calibration tube, as illustrated below.

Note: A constant-flow regulator with flow rates from 500cc/min to 1000cc/min should be used

Note: Make sure pressure in the calibration gas cylinder is higher than 100 psi when using a T calibration tube. (Pump version only)

6.2.3.2 POLI Diffusion

The water-trap filter or inlet cover needs to be taken down first if it is a diffusion version. A calibration adaptor with a 15cm hose is used for supplying calibration gas to the inlet at the top of the instrument.

1. Connect gas inlet of the diffusion version POLI to the calibration adaptor and connect it to its gas source.
2. Turn the adaptor clockwise to secure the adaptor to the instrument.
3. Make sure the calibration adapter is securely attached before starting the flow of calibration gas.

6.2.4 Multi-Sensor Span Calibration

This lets you perform a span calibration on multiple sensors simultaneously. It requires using the appropriate span gas and that the concentration labeled on the gas cylinder matches the concentration programmed in the POLI.

1. Start the flow of calibration gas.
2. Attach the calibration adapter and gas to the POLI
3. Press [+/OK] to begin calibration. A countdown screen is shown. You can abort the calibration at any time during the countdown by pressing [⏻/↓].

If the calibration reaches its conclusion, it shows the sensor names and tells you whether the calibration passed or failed, followed by the sensor readings.

6.2.5 Single-Sensor Span Calibration

To perform span calibration of an individual sensor, follow these steps:

1. At the calibration menu, select 'Single Sensor Span'.
2. Select a sensor from the list.
3. Start the flow of calibration gas.
4. Connect the calibration adapter and connect it to a source of calibration gas.
5. Verify that the displayed calibration value meets the concentration label on the gas cylinder.
6. Press [+/OK] to start calibrating. You can abort the calibration at any time during the countdown by pressing [⏻/↓].

After a timer countdown, the span calibration is done. The LCD will display whether the calibration was successful and the reading for that calibration gas.

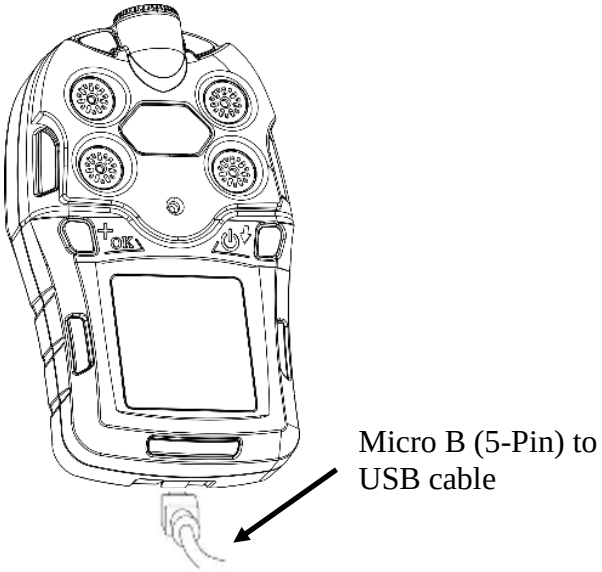
Note: If the sensor calibration fails, try again. If calibration fails again, turn off the power and then replace the sensor.

WARNING: Do not replace sensors in hazardous locations!

7. Data Communication

The datalog can be downloaded from the POLI to a computer, and firmware updates can be uploaded to the POLI via the Micro-USB or Micro B port at the bottom of the POLI. Use the included Micro-USB (5-pin)-to-USB cable to connect the computer running mPower Suite.

You may download the latest version of application software at www.mpowerinc.com .



8. Maintenance

The POLI requires little maintenance, aside from replacing sensors, filters, batteries and pumps if the instrument is equipped.

8.1 Replacing Filters

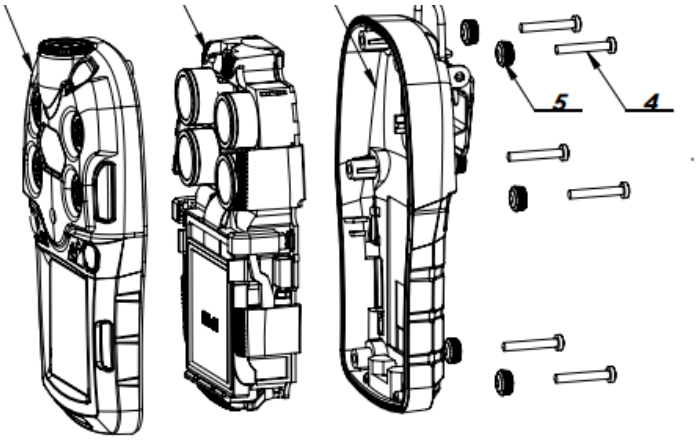
Pump Version
If the external filter is dirty or clogged, remove it by unscrewing it from the inlet. Discard it and replace it with a new water-trap filter.

IMPORTANT! A pumped POLI must not be calibrated or operated without a filter. Operation without a filter may damage the instrument.

8.2 Removing/Cleaning/Replacing Sensor Modules

WARNING! Do not replace sensors in hazardous locations.

All sensors are located inside the sensor compartment in the upper half portion of the POLI PCB assembly. They are accessed by removing the six screws in the back of the POLI and then turning the instrument over and lifting off the sensor cover.



1. Turn off the instrument.
2. Loose and remove the six screws in the back of the instrument.
3. Turn the instrument over, lift off the front cover from the back of the instrument.
4. Carefully lift out each sensor you wish to inspect or replace.
5. Install the replacement sensor. Make sure the electrical contact pins are aligned with the holes in the PC board and that the sensor is seated firmly.
6. Replace the cover and tighten the 6 screws.

IMPORTANT! Always perform a full calibration after replacing sensors.

8.3 Replacing Pumps

If your POLI has a pump and it requires replacement, please contact mPower service department.

9. Alarm Overview

The POLI provides an unmistakable five-way alarm notification that combines local alarms on the device with real-time remote wireless alarm notification to enhance worker safety up to the next level. Local alarms include audible buzzer alarm, visible alarm via bright LED lights, vibration alarm, and an alarm notification on the display. These can be programmed or selectively turned on or off.

9.1 Alarm Signals

During each measurement period, the gas concentration is compared with the programmed alarm limits for Low, High, TWA and STEL alarms. If the concentration exceeds any of the preset limits, the alarms are activated immediately to warn both the POLI user and a remote safety officer (if wireless is enabled) of the alarm condition.

In addition, the POLI alarms when the battery voltage is low, pump is blocked, etc.

When a low-battery alarm occurs, there may be approximately 10 minutes of operating time remaining. However, it is recommended that you promptly change using a fully charged POLI or charge the battery in a non-hazardous location.

9.2 Testing Alarms

Under normal operation mode and non-alarm conditions, the audible, visual, and vibration alarms can be tested at any time by pressing the [OK] key.

10. Troubleshooting

Problem	Possible Reasons & Solutions
Cannot turn on power after charging the battery	**Reasons:** Defective charging circuit. Defective battery. **Solutions:** Try charging the battery again. Replace battery or charger.
Lost password	**Solutions:** Call Technical Support at (408)320-1266
Buzzer, LED lights, and vibration motor inoperative	**Reasons:** Buzzer and/or other alarms disabled. Bad buzzer. **Solutions:** Check under 'Alarm Settings' in Programming Mode that buzzer and/or other alarms are not turned off. Call authorized service centers.
Pump failed message Pump alarm	**Reasons:** Inlet probe blocked. Direct connection to a gas outlet while the gas value is turned off. The external filter might suck in water. The external filter too dirty. Water condensed along the inlet probe. Bad pump or pump circuit. **Solutions:** Remove the blocking objects and then press [OK] key to reset the pump alarm. Replace the contaminated external filter. Be careful not to allow water condensation inside the unit. Replace the failed pump.

If you need replacement parts, please contact an authorized mPower's distributor or mPower's technical support department.

11. Technical Specifications

Instrument Specifications

Size	5.74 x 3.31 x 1.65 in (140 x 84 x 42 mm)
Weight	MP400: 14 oz (400 g) MP400P & 400S: 15 oz (430 g)
Sensor	Over 30 interchangeable and field-replaceable sensors including PID for VOCs, EC for Toxic and O2, Pellistor for LEL, and NDIR for LEL and CO2
Battery	Rechargeable Li-ion pack:18 hours in diffusion with no wireless, 16 hours in diffusion with wireless, 12 hours in pump with no wireless, and 10 hours in pump with wireless
Direct Readout	Real-time reading of gas concentration, PID measurement gas and correction factor, Man Down Alarm on/ off, visual compliance indicator, battery status, datalogging on/off, wireless on/off and reception quality STEL, TWA, peak and minimum values
Display	128 x 128 graphical LCD, 1.77 x 1.73 in (45 x 44 mm), with LED backlight for enhanced display readability. Automatic screen auto-flip feature
Keypad	2 operation keys
Sampling	Bulit-in pump or diffusion
Calibration	Manual or automatic bump test and calibration with CaliCase (separate orders)
Alarm	Wireless remote alarm notification, audible (90dB@30cm), vibration, visual (flashing bright red LEDs), and on-screen indication of alarm conditions Man Down Alarm with pre-alarm and real-time remote wireless notification
Datalogging	Continuous datalogging (6 months for 4 sensors at 1 minute intervals, 24 hours a day and 7 days a week)
Charging and Communication	Charging, data download, instrument setup and firmware upgrades on PC or laptop via Micro-USB.
Temperature	-4° to +122°F (-20°C to +50°C)

Humidity	0% to 95% relative humidity (non-condensing)
IP Rating	IP-65 (pump); IP-67 (diffusion)
Safety Certifications	UL/cUL: Class I, Div 1, Group A, B, C, D T4, -20° C ≤ Tamb ≤ +50° C (pending)
EMC/RFI	EMC directives: 2004/108/EC
Warranty	2-year including most sensors

Sensor Specifications

Sensor	Range	Resolution
PID	0-1,000ppm	0.1ppm
Oxygen (O2)	0-30.0%Vol	0.1%Vol
Combustible (LEL)	0-100%LEL	1%LEL
Carbon Monoxide (CO)	0-1,000ppm	1ppm
Hydrogen Sulfide (H2S)	0-100ppm	0.1ppm
Ethylene Oxide (ETO)	0-100ppm	0.1ppm
Hydrogen Fluoride (HF)	0-10.0ppm	0.1ppm
Nitric Oxide (NO)	0-250ppm	1ppm
Methanethiol (CH3SH)	0-10.0ppm	0.1ppm
Sulfur Dioxide (SO2)	0-20.0ppm	0.1ppm
Hydrogen Cyanide (HCN)	0-100ppm	1ppm
Ammonia (NH3)	0-50ppm	1ppm
Phosphine (PH3)	0-20.0ppm	0.01ppm
Chlorine (Cl2)	0-10.0ppm	0.1ppm
Nitrogen Dioxide (NO2)	0-20.0ppm	0.1ppm
Hydrogen Chloride (HCl)	0-15.0ppm	0.1ppm
Chlorine Dioxide (ClO2)	0-1.00ppm	0.01ppm
Acetaldehyde (C2H4O)	0-20.0ppm	0.1ppm
Combustible (Vol%)	0-100%Vol	0.1%Vol
Carbon Dioxide (CO2)	0-50,000ppm	100ppm
CO+H2S	0-500ppm CO	1ppm
	0-200ppm H2S	0.1ppm

Note：1ppm =1μmol/mol
All specifications and listed sensors are subject to change without notice. Please check updates at www.mpowerinc.com

LEL Range, Resolution & Response Time Range 0 to 100% LEL Resolution 1% Response Time: T90 < 15 sec.

Standard Gas Span Values

Sensor	Standard Span Values
CO	50 µmol/mol (ppm)
H2S	10 µmol/mol (ppm)
OXY	18.0% Vol
LEL	50% LEL CH4
SO2	5 µmol/mol (ppm)
HCN	10 µmol/mol (ppm)
NH3	50 µmol/mol (ppm)
PH3	5 µmol/mol (ppm)
Cl2	10 µmol/mol (ppm)
NO2	5 µmol/mol (ppm)

12. Ordering information

Standard Kit Package:

- POLI instrument (with 4 sensors, lithium battery, water-traps and alligator clip)
- Calibration adapter
- Quick start guide
- Charging cable
- Water-trap filters for pump version
- Calibration report

13. Year of manufacturing

To identify the year of manufacturing, please refer to the serial number of the instrument. The fifth to sixth digit in the serial number indicates the year of manufacturing. 00~99 indicates the manufacturing year is 2000 to 2099.

14. Controlled Part of the Manual for POLI

SAFETY INSTRUCTIONS

Read Before Operating

This Manual must be carefully read by all individuals who have or will have the responsibility of using, maintaining, or servicing this product. The product will perform as designed only if it is used, maintained, and serviced in accordance with the manufacturer's instructions. The user should understand how to set the correct parameters and interpret the obtained results.

CAUTION!

- Use only mPower's rechargeable lithium battery part number：12.01.09.0002
- Recharge the battery only in an area known to be non-hazardous
- Use of non-mPower components will void the warranty and can compromise the safe performance of this product.
- Warning: Substitution of components may impact intrinsic safety.

SPECIAL CONDITIONS FOR SAFE USE

- The POLI multi-gas detector must be calibrated if it does not pass a bump test, when a new sensor has been installed, or at least once every 180 days, depending on use and sensor exposure to poisons and contaminants
- No precautions against electrostatic discharge are necessary for portable equipment that has an enclosure made of plastic, metal or a combination of the two, except where a significant static-generating mechanism has been identified. Activities such as placing the item on a belt, operating a keypad or cleaning with a damp cloth, do not present a significant electrostatic risk. However, where a static-generating mechanism is identified, such as repeated brushing against clothing, then suitable precautions shall be taken, e.g., the use of anti-static footwear.

Note: Users are recommended to refer to ISA -RP12.13, Part II-1987 for general information on installation, operation, and maintenance of combustible gas detection instruments.

Warning！

ONLY THE COMBUSTIBLE GAS DETECTION PORTION OF THIS INSTRUMENT HAS BEEN ASSESSED FOR PERFORMANCE.

UNIQUMENT, LA PORTION POUR DÉTECTOR LES GAZ COMBUSTIBLES DE CET INSTRUMENT A ÉTÉ ÉVALUÉE.

CAUTION: BEFORE EACH DAY'S USAGE, SENSITIVITY OF THE COMBUSTIBLE GAS SENSOR MUST BE TESTED ON A KNOWN CONCENTRATION OF METHANE GAS EQUIVALENT TO 20 TO 50% OF FULLSCALE CONCENTRATION. ACCURACY MUST BE WITHIN 0 AND +20%

OF ACTUAL. ACCURACY MAY BE CORRECTED BY CALIBRATION PROCEDURE.
ATTENTION: AVANT CHAQUE UTILISATION JOURNALIERE VERIFIER LA SENSIBILITE AVEC UNE CONCENTRATION CONNUE DE METHANE EQUIVALENTE A 20-50% DE LA PLEINE ECHELLE. LA PRECISION DOIT ETRE COMPRISE ENTRE 0-20% DE LA VALEUR VRAIE ET PEUT ETRE CORRIGEE PARUNE PROCEDURE D'ETALONNAGE.

High off-scale readings may indicate an explosive concentration.

15. POLI Marking

POLI (MP400, 400P, 400S) is pending for certificates according to the IECEx scheme, ATEX and UL & CSA for US and Canada as protected by intrinsic safety.
Ex ia IIC T4 Ga
Class I, Div 1, Group A, B, C, D
$-20ºC \leq T_{amb} \leq +50ºC$
Um: 6V
Battery Pack: 12.01.09.0002 (Rechargeable Li-Lion Battery)

Warning: Substitution of components may impact intrinsic safety
Avertissement: La substitution de composants peut compromettre la securité intrinsèque

CAUTION: READ AND UNDERSTAND INSTRUCTION MANUAL BEFORE OPERATING OR SERVICING

ATTENTION: LIRE ET COMPRENDRE MANUEL D'INSTRUCTIONS AVANT D'UTILISER OU SERVICE

16. Technical Support and mPower Contacts

mPower Electronics Inc.
3046 Scott Blvd. Santa Clara, CA 95054
Phone: (408)320-1266
Fax: (669)342-7077
info@mpowerinc.com
www.mpowerinc.com

Making Powerful Senses