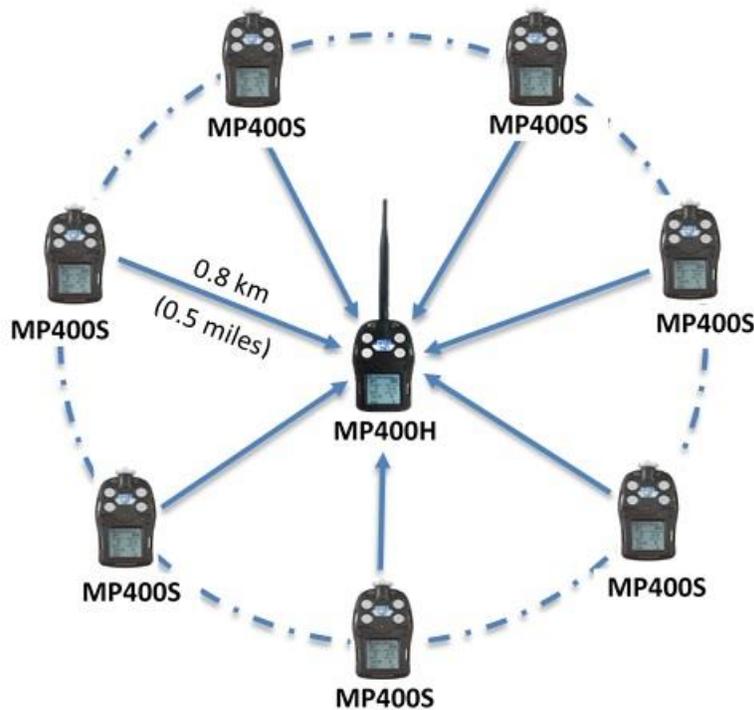


# mSQUAD

## Mobile Wireless Multi-Gas Team Warning System

### MP400S & MP400H

## User's Guide



Rev 1.0  
January, 2020

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## 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 MONITOR COVER ONLY IN AREA KNOWN TO BE NON-HAZARDOUS.
- RECHARGE BATTERY ONLY IN AN AREA KNOWN TO BE NON- HAZARDOUS.
- USE ONLY mPOWER'S RECHARGEABLE LITHIUM BATTERY P/N M004-3002-000.
- USE OF NON-mPower COMPONENTS WILL VOID THE WARRANTY AND CAN COMPROMISE THE SAFE PERFORMANCE OF THIS PRODUCT
- SUBSTITUTION OF COMPONENTS MAY IMPACT INTRINSIC SAFETY.

**CAUTION:** HIGH OFF-SCALE READINGS MAY INDICATE AN EXPLOSIVE CONCENTRATION. ANY RAPID UP-SCALE READING FOLLOWED BY A DECLINING OR ERRATIC READING MAY INDICATE A GAS CONCENTRATION BEYOND UPPER SCALE LIMIT WHICH MAY BE HAZARDOUS.

**ATTENTION:** DES LECTURES SUPÉRIEURES A L'ÉCHELLE PEUVENT INDIQUER DES CONCENTRATIONS EXPLOSIVES. TOUTE LECTURE RAPIDE ET POSITIVE, SUIVIE D'UNE BAISSSE SUBITE AU ERRATIQUE DE LA VALEUR, PEUT INDIQUER UNE CONCENTRATION DE GAZ HORS GAMME DE DÉTECTION QUI PEUT ÊTRE DANGEREUSE.

### WARNINGS !

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

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

**CAUTION:** BEFORE EACH DAY'S USE, THE 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 A 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.

## **⚠ 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.

## **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.

## **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 mSquad System is a quickly-deployable set of mobile multi-gas meters that communicate wirelessly to a Squad leader up to 0.8 km (0.5 miles) distant line of sight. The system is ideal for hazmat response, firefighters, temporary venue protection, tank entry, plant turn-around, and other high-risk jobs. An mSquad consists of one Head monitor (MP400H) and up to 7 Soldier monitors (MP400S) that communicate with each other via built-in wireless modules at ISM band (902-928 MHz, FCC Part 15 approved). Each 4- or 5-gas monitor has options for a full range of sensors for toxic gases, oxygen (O<sub>2</sub>), combustibles (LEL), carbon dioxide (CO<sub>2</sub>) and PID for volatile organic compounds (VOCs). In addition to high gas concentration alarms, all Squad units receive any Man-Down alarms to notify them remotely of a worker in distress. All the Squad monitors are Class I Division I certified to operate in hazardous zones. The entire mSquad is mobile, running on batteries for up to 12 hours. Each mSquad comes preconfigured for immediate deployment and the Head user can assign monitor names for ease of recognition.

The Head/Host MP400H monitor always samples by diffusion because the communications antenna is attached to the pump inlet port, while MP400S Soldier units have a built-in sampling pump for active gas sampling, and thus a somewhat faster response time.

Detailed operations and maintenance for the MP400S and MP400H as individual monitors are described in the POLI User's Guide. The present Guide highlights the features required to connect multiple instruments to function as a system that communicates wirelessly for an entire team. Users should familiarize themselves with the basic POLI User's Guide before reading this manual.

## 1.1 mSquad 4 and mSquad 8

mSquads are currently available in two options: mSquad 4 with one host/head (MP400H) and three soldiers (MP400S), and mSquad 8 with one host/head and seven soldiers. Each system comes in (a) carry case(s) holding four units and arrives fully configured at ready for use after charging and calibration.

## 1.2 Main Features

- Remote, wireless real-time readings and alarms including Man-down
- Up to 8 remote 4- or 5-gas monitors
- Up to 0.8 km (0.5 miles) distance to Squad Head
- All mSquad units alarm if any one unit has an alarm condition
- Mobile system operation
- 12-hour continuous operation on single Li-ion battery charge.
- Micro-USB cable for battery charging and direct PC communication
- Convenient 4-unit carry case with built-in 4-unit charger
- Wide selection of sensor types

## 2. Battery

Fully charge the POLI batteries upon receiving the mSquad and before each day's use. The Li-ion batteries are charged using a Micro-USB cable.

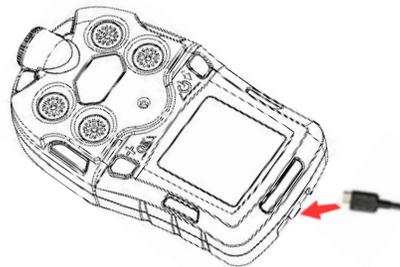
**⚠ WARNING**

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

### 2.1 Battery Charging

Up to four POLI monitors can be charged simultaneously using the cables inside the mSquad carry case. Plug the mini ends of the Micro-USB cables into the charging port of each POLI, and the power adapter into a wall socket (100-240 VAC). The POLIs can also be charged individually on a personal computer using the USB power/communications cables provided.

**NOTE:** Any locally-obtained USB A to Micro B USB cable works for charging, but does not work for communication with mPower Suite configuration and data transfer software. The mPower USB cable P/N M-011-3003-000 is required for a PC to recognize the instrument and communicate with mPower Suite.



The screen will display a battery icon from empty to full and one alarm LED will remain yellow. When the battery is fully charged, the icon displays full grid status (see Section 3.1), and the alarm LED turns green.

### 2.2 Battery Status

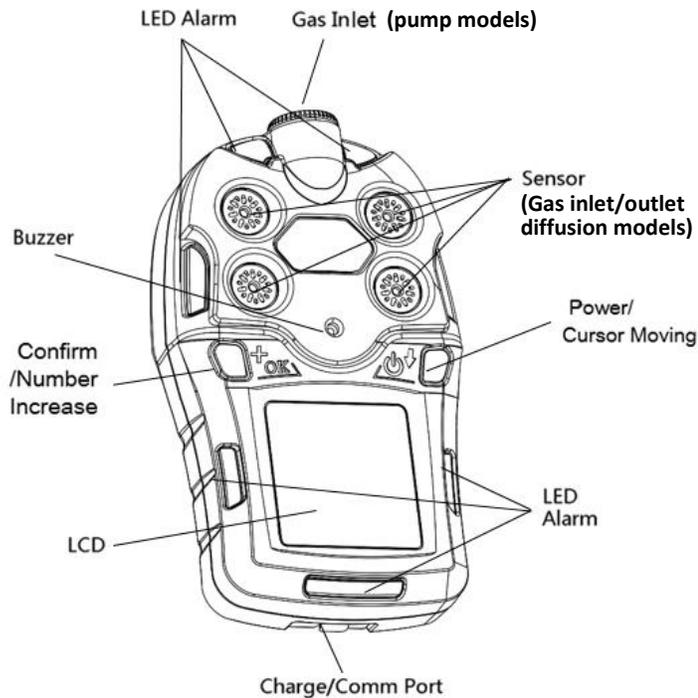
The battery icon on the display shows the battery level, and alerts of any charging problem.

				 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 by beeping once and flashing once every minute. The instrument automatically powers down within 10 minutes, after which the battery must be recharged. When a low-battery alarm occurs, we recommended promptly switching instruments to a fully charged POLI, and/or charging the battery in a non-hazardous location.

## 3. User Interface

The POLI user interface consists of two keys, four sensor sockets, one large Liquid Crystal Display (LCD), eight alarm LEDs, one buzzer, and two vibration alarms.



### 3.1 Turning On & Off

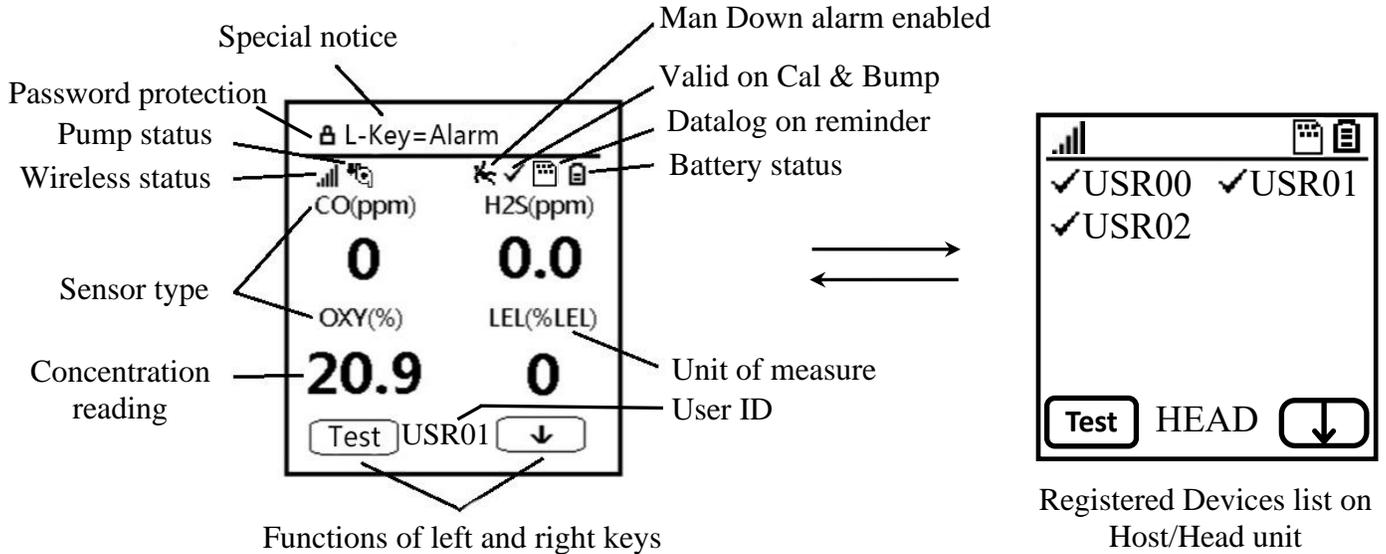
To turn on, press and hold the [⏻/↓] Key for 3 seconds, until the buzzer beeps and the red LED turns on. To turn off, in normal reading mode, press and hold the [⏻/↓] key for a 5-second count down until the unit displays 'Power Off'.

### 3.2 Main User Menu

See the POLI User Guide for a full description of the main user menu.

### 3.3 Displays and Keys

The LCD provides visual information that includes real-time gas readings, sensor types, datalog / battery / pump / wireless status, and others. The main user screen is shown below. On the Host/Head unit this main screen alternates with a second screen listing the Registered Devices.



#### 3.3.1 Status Indicator Icons

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

Icon	Function
	Password protection enabled
	Wireless signal strength at 0-5 level
	Pump status (pump versions only)
	Datalogging enabled (cannot turn off)
	Battery voltage status
	Man-down alarm enabled
	All sensors have been bump tested and calibrated and none are overdue. On the registered devices list the checkmark means unit is communicating and all is OK.

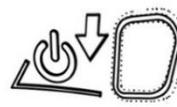
#### 3.3.2 Keys and Interface

The POLI has two keys:



Left [+ / OK] Key

Confirm Operation/Increase Number



Right [Power / ↓] Key

Power On-Off/Move Cursor

These two keys are marked as [+ / OK] to Confirm Operations or Increase Number and [⏻ / ↓] to Power On-Off / Move Cursor. They also act as 'soft keys' mapped to two text or symbol boxes at the LCD bottom that change numbers and make selections under various menus.

In addition to the functions described above, the Left [+ / OK] key can be used to manually activate the LCD backlight when it is off, and to manually test the LED, audio and vibration alarms from the main display.

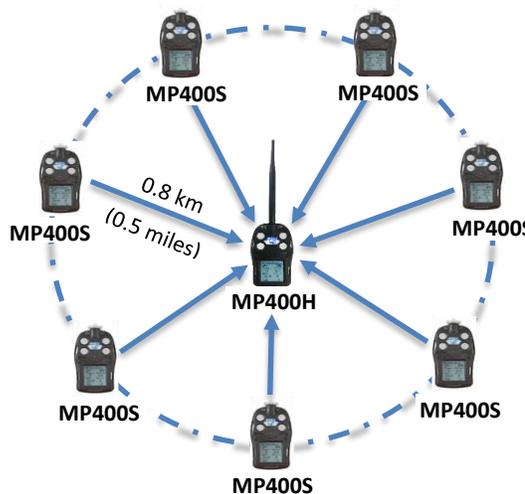
## 4. Operation

See the POLI User's Guide for basic operation information for POLI multi-gas monitors. Special considerations for mSquad POLI monitors include:

- Alarm notifications and field physical set-up
- Calibration of the Head/Host unit
- Wireless communication set-up in Configuration Mode and in mPower Suite

### 4.1 Field Set-up

Before beginning operations, the field set-up should be checked to ensure good wireless connection. The Head/Host communicates directly with each Soldier monitor, while communication between Soldiers occurs indirectly via the Head/Host. The maximum line-of-sight distance between a Soldier and Head is about 0.5 miles, and thus two Soldiers could be as far as 1 mile apart and still communicate. However, in many cases the practical operating distances are on the order of a few hundred yards because hills, buildings and other structures (especially metal and concrete barriers) impede wireless transmission. Communication can be improved by operating the Head unit at the highest point of the arena and/or placing it on a pole or other elevated structure. If a Soldier moves out of communication range for more than one minute, it will alarm. A quicker test of connectivity can be done by sending a Panic Alarm (Hold Left key for 3 seconds.)



### 4.2 Alarm Notifications

The POLI provides alarms including audible buzzer, visible bright LEDs, vibration, and text notification on the display. These can be programmed or selectively turned on or off. If an alarm occurs in any one unit, all units within an mSquad also go into alarm for a short period (about 15 seconds) and then stop, but the alarm continues on the affected unit and the Head/Host until the alarm condition is cleared. If the alarm does not silence automatically after the issue has been resolved, in most cases it can be cleared by pressing the Left Key.

#### 4.2.1 Alarm Testing

Under normal operation mode and non-alarm conditions, the audible (buzzer) alarm, vibration alarm, LED, and backlight can be tested at any time by pressing Left [+ / OK] once. This alarm is given only on the local instrument.

#### 4.2.2 Gas Alarms

When the gas concentration is outside the alarm preprogrammed Low, High, TWA and STEL alarm limits on any one monitor, all units within the mSquad are alarmed. The Host/Head displays a bell symbol  next to the User Name in place of the check mark to indicate a gas alarm, and other Soldiers display NAME-Gas in the top bar, where NAME is the user in alarm. Alarms on other Soldiers cease after about 15 seconds but the  continues to pulse as a

reminder that another worker had an alarm. The pulsing  can be cleared by cycling through the main menu.

**CAUTION:** As of Firmware 6.1, a gas alarm on the Host/Head does not alarm on any other unit.

If two Soldiers experience gas alarms at the same time, both names are highlighted with a bell  on the Head/Host, but only the first to alarm is shown on the other Soldiers.

### 4.2.3 Function Alarms

When an instrument malfunction errors occur, such as a low battery, pump stall or sensor fault, all units within the mSquad are alarmed. The Host/Head displays a triangle symbol  next to the user name in place of the check mark to indicate a function alarm, and other Soldiers display NAME-Fault in the top bar, where NAME is the user in alarm. Alarms on other Soldiers cease after about 15 seconds as described above for Gas Alarms.

### 4.2.4 Communication Loss

When a monitor moves out of communication range or is otherwise disconnected, it alarms on the local Soldier instrument and Head/Host. This alarm can be silenced by pressing the Left Key while still showing the Host? warning. If the Host/Head is turned off, the local Soldier alarms immediately with HEAD OFF!, followed by flashing Host? if the alarm is silenced. If a Soldier is turned off, other Soldiers alarm immediately for 15 seconds. The Host/Head is alarmed with a  symbol displayed next to the user name after the communication-lost timer runs out (about 2.5 minutes). Once the soldier is turned back on, the alarm disappears immediately.

### 4.2.5 Panic Alarm

If a Soldier recognizes an emergency situation, he or she can notify all mSquad members by holding down the Left Key for 3 seconds to initiate a Panic Alarm. This condition is indicated by a large **X** appearing next to the user name on the Host/Head and NAME-Panic on the top bar of each Soldier. A Panic Alarm is cleared by holding down both Left and Right Keys simultaneously for 3 seconds.

### 4.2.6 Man-Down Alarm

When a user who is carrying the instrument stops moving or shifts to an abnormal position for a set period of time, the Man-Down Alarm is triggered, notifying all mSquad members immediately. A large **X** appears next to the user name on the Host/Head and each Soldier displays NAME-Mandown on the top bar. The alarms cease as soon as the Man-Down condition is cleared either automatically or manually.

The Man-Down function also has features to warn nearby co-workers who are not connected to the mSquad network. The user is pre-warned by visual and audio alarms at 2 pulses per second that the Man-Down condition has been detected. He then has a set time to clear the warning by



pressing '✓' if he is OK. If not cleared in time, a louder Man-Down Alarm starts, consisting of a short vibration followed by a pitch-rising, once-per-second alarm to warn co-workers within earshot that the user may need rescue. During the warning period the user can also press 'X' if he is in distress, to start the full Man-Down Alarm immediately. These alarms are very different from high-gas alarms, so that nearby co-workers can easily distinguish them. If a full Man-Down Alarm starts but the user is OK, it can be stopped using the Left key (Clear).

### **⚠ WARNING!**

The Man-Down feature cannot detect a worker in distress in all situations even if they have collapsed. The Man-Down function should not be used to supplant other safety precautions.

## 4.3 Head/Host Calibration

For general MP400 calibration procedures, including mSquad Soldiers, see the POLI User Guide. The mSquad Head/Host requires a special calibration adapter because the antenna blocks the pump inlet port. Calibrate a Head/Host as for any other POLI diffusion instrument except for connecting the calibration cap to the front face of the monitor, as shown below, and using a fixed-flow regulator with a flowrate of about 0.3 to 0.5 LPM.

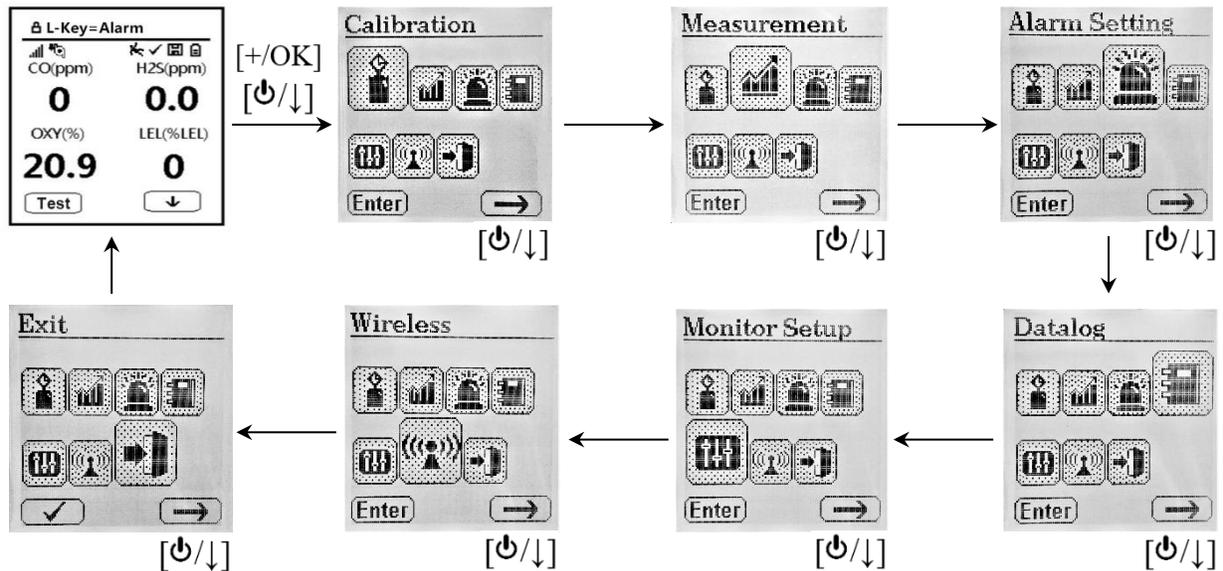


## 5. Configuration Mode

The Configuration Mode (Config Mode) is used to adjust the POLI's operation settings and calibrate sensors. For mSquads, this mode is additionally used to select the wireless channel, register devices, and assign worker names. See the POLI User's Guide for instructions on how to enter, navigate, and exit Configuration Mode. Only configurations relevant to wireless operations are described here.

### 5.1 Navigating Configuration Mode to Edit Parameters

After entering Config Mode, the calibration menu is displayed first. Press [⏻/↓] (→) to step through the menus and [+ / OK] (Enter) to enter a menu to edit the parameters in its submenu.



#### 5.1.1 Configuration Mode Menus and Sub-menus

Calibration	Measurement	Alarm	Datalog	Monitor Setup	Wireless**	Exit
Fresh Air Calib	Enable/Disable	High Limit	Clear All	LCD Contrast	Register Devices	
Nitrogen Calib	PID Meas. Gas	Low Limit	Interval	Pump Speed*	Assign Worker <sup>¥</sup>	
Span Calib	Set Custom CF (for PID only)	STEL Limit	Sensor Select	Pump Stall*	Register	
Bump Test	Gas Unit	TWA Limit	Exit	Temp. Unit	Host ID	
Span Value	Exit	Alarm Device		Language	Channel	
Exit		Heart Beat Light		Back Light Mode	Exit	
		M-D <sup>†</sup> On/Off		LCD Auto Flip		
		M-D <sup>†</sup> Warn Time		Policy Check		
		M-D <sup>†</sup> Threshold		Real-Time Clock		
		M-D <sup>†</sup> Tmotionless		3-Point Cal.		
		Exit		Exit		

\* Operational in Pump versions only \*\* Operational in Wireless versions only † M-D = Man-Down ¥ Host only

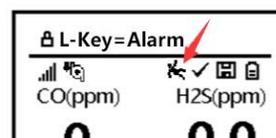
## 5.2 Man-Down Function

### 5.2.1 Man-Down On/Off

The Man-Down On/Off function has 4 settings:

- **Off**
- **On** Alarm is triggered with insufficient movement in any direction. The pre-warn or alarm can be cleared by quickly tilting, or by pressing the Left [+ /OK] key.
- **Vertical Off** The alarm stays off as long as the instrument is held in a vertical position, such as clipped to a belt (or straight upside-down), and triggers when in any other position including held sideways or laying face up or down. A pre-warn can be cleared by quickly returning the POLI to a vertical position, or pressing the Left [+ /OK] key.
- **Horizontal Off** The alarm stays off as long as the instrument is held in a horizontal position, such as laying face up on a table, and triggers when in any other position. A pre-warn can be cleared by quickly returning the POLI to a horizontal position, or pressing the Left [+ /OK] key.

The Man-Down icon on the main screen verifies that the Man-Down function is enabled.



### 5.2.2 Man-Down Warn Time

This menu allows adjustment of the time allowed for the user to clear a pre-warn signal before the unit goes into full Man-Down Alarm. The pre-warn time can be adjusted between 10 and 60 seconds and the default value is 30 seconds.

### 5.2.3 Man-Down Threshold (Sensitivity)

This menu allows adjustment of the sensitivity to motion (On Mode) or position changes (Vertical or Horizontal Off Modes) for detecting a Man-Down condition. Low sensitivity means fewer alarms and High sensitivity means a greater likelihood of triggering an alarm.

### 5.2.4 Man-Down Motionless Time

This menu allows adjustment of the time allowed for stopped motion (On Mode) or position changes (Vertical or Horizontal Off Modes), before a Man-Down condition is detected. The motionless or position-change time can be adjusted between 10 and 60 seconds and the default value is 30 seconds.

### 5.3 Registering Soldier MP400S POLIs

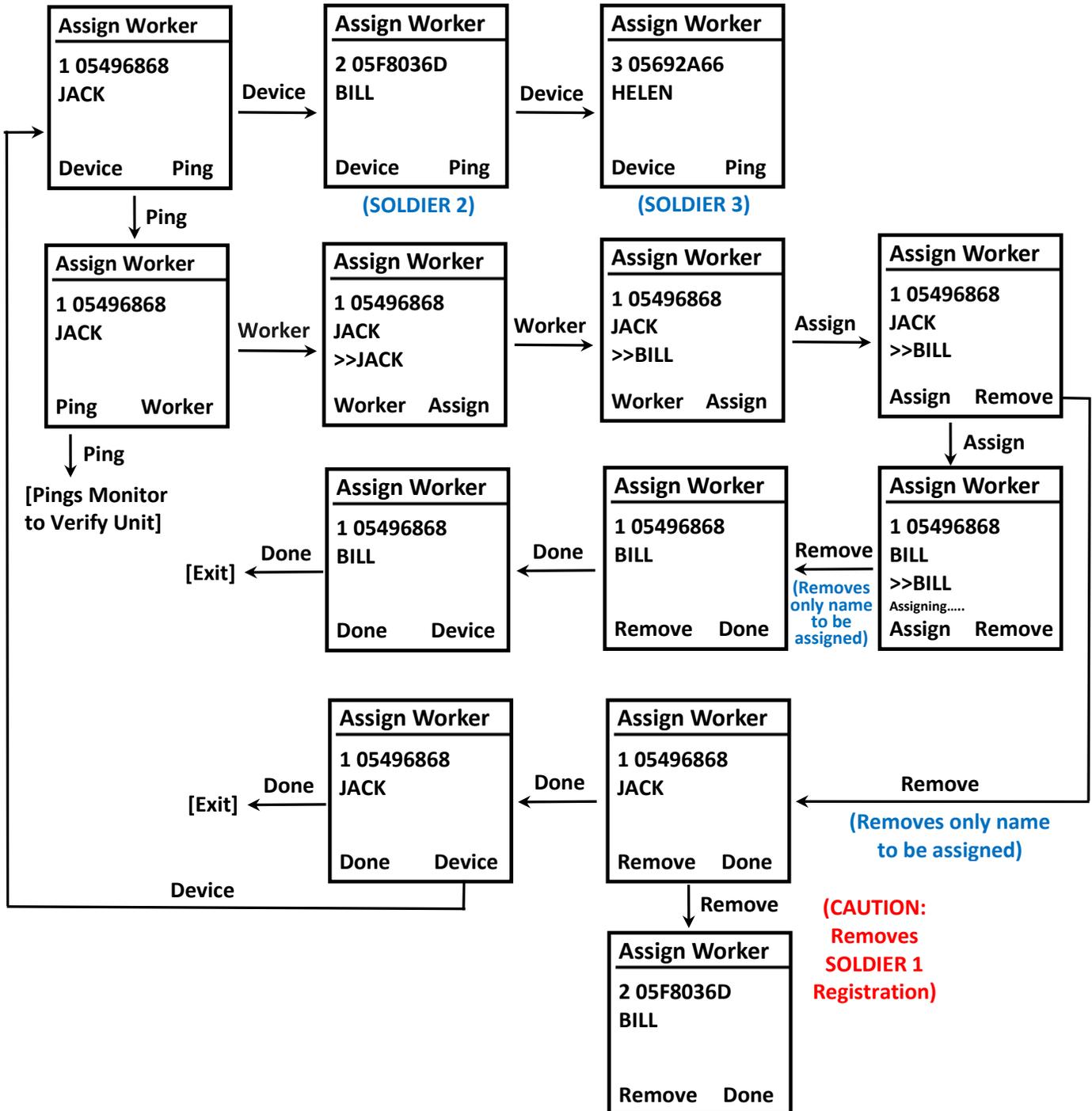
Before the mSquad units can communicate with each other, each Soldier (MP400S) must be registered with the Head (MP400H). If an mSquad Soldier is not registered with a Head, it will alarm and flash the query “Host?” on the top bar, beginning about one minute after turn-on. The alarm can be silenced by pressing the Left [+ /OK] (ACK) key, while the “Host?” query remains.

To register, place both the Head and the Soldier into Configuration mode and enter the Wireless sub-menu.

- Ensure that all monitors are on the same wireless channel: Wireless → Channel. Scroll to one of the 16 channels offered and press Enter → Select → Save.
- On the Host, enter Wireless → Register Devices
- On the Soldier, enter Wireless → Register → Enter → Start
- The Soldier and Head/Host will beep once to acknowledge the registration, and the Soldier will display the Registration Address (1 to 8) above the message “Registered”. The new Soldier name will appear on the Host/Head Registered Device List with a ✓ next to the name. The Host assigns default user names in the order they are registered, e.g. USR00, USR01, USR02....
- To enter a personalized user name of up to 5 letters/digits, use mPower Suite software. Connect the Host to a personal computer equipped with mPower Suite version 1.2.2 or higher. Search for the Host, click on the POLI serial number and click on the Squad Users tab on top. Type in the desired names for up to 7 users, preferably 5 letters or less for ease of reading on the displays. After saving to the Head/Host (see Section 6.1.3), the new Soldier names will update on the Soldiers next time they communicate with the Head/Host (this may take a few minutes). Alternatively, put both Host and Soldier back into Register Device mode and re-register each Soldier to receive its new name.
- If a Soldier get disconnected, the “Host?” query re-appears on the Soldier, and the Head/Host unit is alarmed by audiovisual alarm plus the  symbol appearing next to the user name on the Connected Devices list.
- On the Head/Host, the Register Menu allows connection to a larger network using an mLink.

## 5.4 Assigning Workers

Each day or on a shift change, it may be desirable to transfer a monitor to a different worker or remove workers. This can be done using the Assign Worker function on the Head/Host. Turn on all monitors and set the Head/Host in to the Wireless configuration menu. Select the Assign Worker sub-menu and follow the flowchart below.



To summarize the keystrokes: Assign Worker → Device → Ping (R) → Ping (L) (beeps on both to confirm) → Worker (R) → Worker (L) (scroll L to select worker) → Assign (R) → Assign (L) to assign (beeps to confirm) → Remove (R) → Remove (L) to remove registration or Done (R & L) to exit.

### 5.5 Host ID

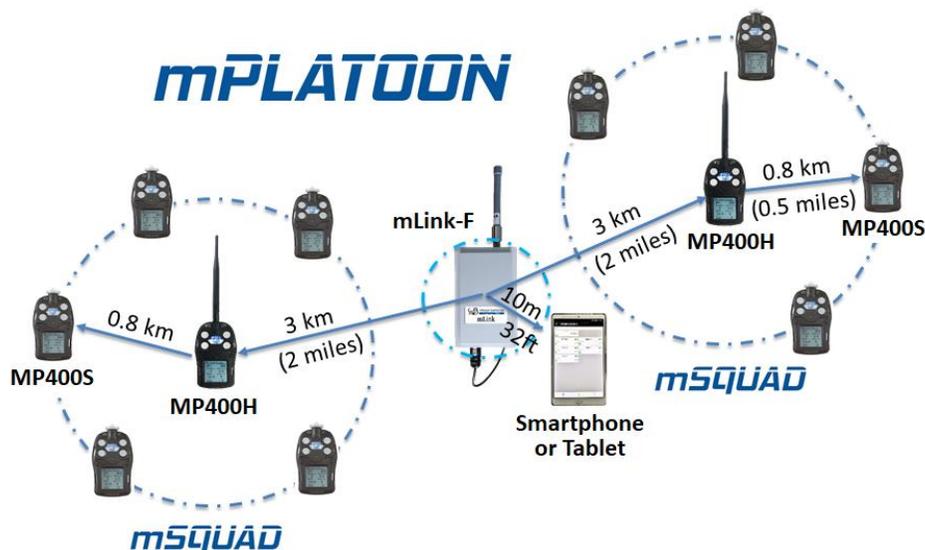
Displays the Head Monitor or mLink ID. For Soldiers, it is its registered Head ID; for a Head, it is its registered mLink ID when part of an mPlatoon wireless network.

### 5.6 Channel

Select the operating Channel, from CH1 to CH16. Ensure that the same selection is made on the Head/Host as on all Soldiers in the mSquad.

### 5.7 mPlatoon Wireless Networks

Future systems will allow multiple (up to 8) mSquads can be connected to form an mPlatoon using the mLink-F modem, which communicates up to 2 miles (3 km) with each Host/Head(MP400H). The mLink is controlled using the mPower Suite mobile App on a smartphone or tablet via Bluetooth within 32 ft (10 m). If an mLink is used, the alarm is also transmitted to the command center and displayed on the mobile phone or tablet. Contact mPower for availability.



## 6. Data Communication

The mPower Suite software can be used to select wireless channels and define mSquad User names. For other configurations, data downloads, real time monitoring and upgrading instrument firmware, see the POLI User's Guide. mPower Suite and instrument firmware can be downloaded from our website at <https://www.mpowerinc.com/software-downloads/>.

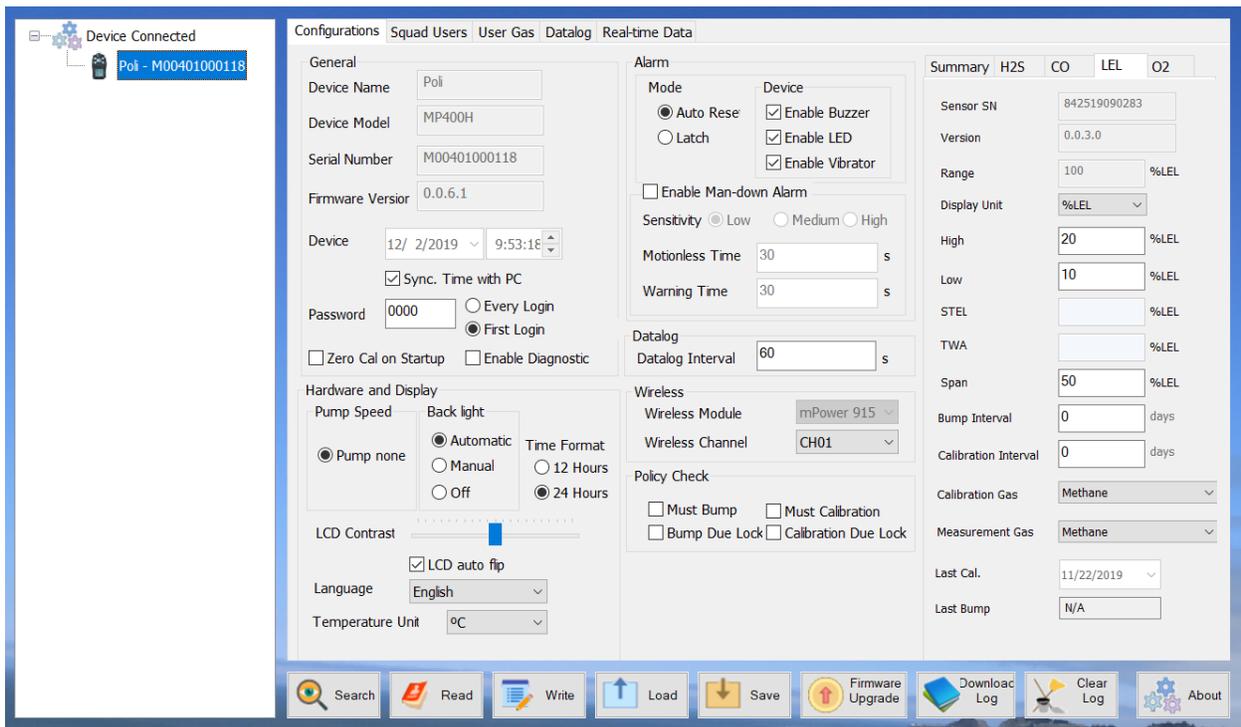


Micro B (5-Pin) to USB cable

### 6.1 Connecting and Configuring

- Turn on the instrument, cycle through the Main User Mode and enter PC Comm.
- Connect the USB cable to the PC and the Micro-USB end to the instrument.\*
- **⚠WARNING!** Connect only in non-hazardous environments!
- Start mPower Suite on the PC and click the “Search” button to find the instrument.
- Find the instrument in the left bar Device Connected list. Click on the S/N to get the configuration file from the instrument.
- Edit the configuration parameters as desired including those under the tabs for each sensor in the upper right. Click “Write” to upload the configuration to the instrument.
- “Read” allows downloading the current configuration file from the instrument.
- “Save” allows storing the current configuration file to the PC.
- “Load” allows calling up a stored configuration file from the PC to mPower Suite.
- To update the instrument firmware, select “Firmware Upgrade”. The firmware must first be downloaded to the PC from the mPower website [www.mPowerinc.com](http://www.mPowerinc.com).

\*NOTE: Any locally-obtained USB A to Micro B USB cable works for battery charging, but the mPower USB cable P/N M-011-3003-000 is required for a PC to recognize the instrument and communicate with mPower Suite software. The Wireless configuration on BLE-enabled instruments using the Android App requires an Android tablet or smartphone (OS 6.0 or above) and is not currently supported on Windows.



mPower Suite Main Configuration Screen for Wireless Monitors

## 6.1.1 General Instrument Configurations

Use the main configuration window to set general instrument parameters including Man-Down features (see POLI User Guide for details).

## 6.1.2 Wireless Channels

In the “Wireless” panel box, select the channel desired for the mSquad. Ensure that all units in the mSquad are on the same channel. Select a different channel from other nearby mSquads to avoid interference, or the same channel if cross-communication is desired.

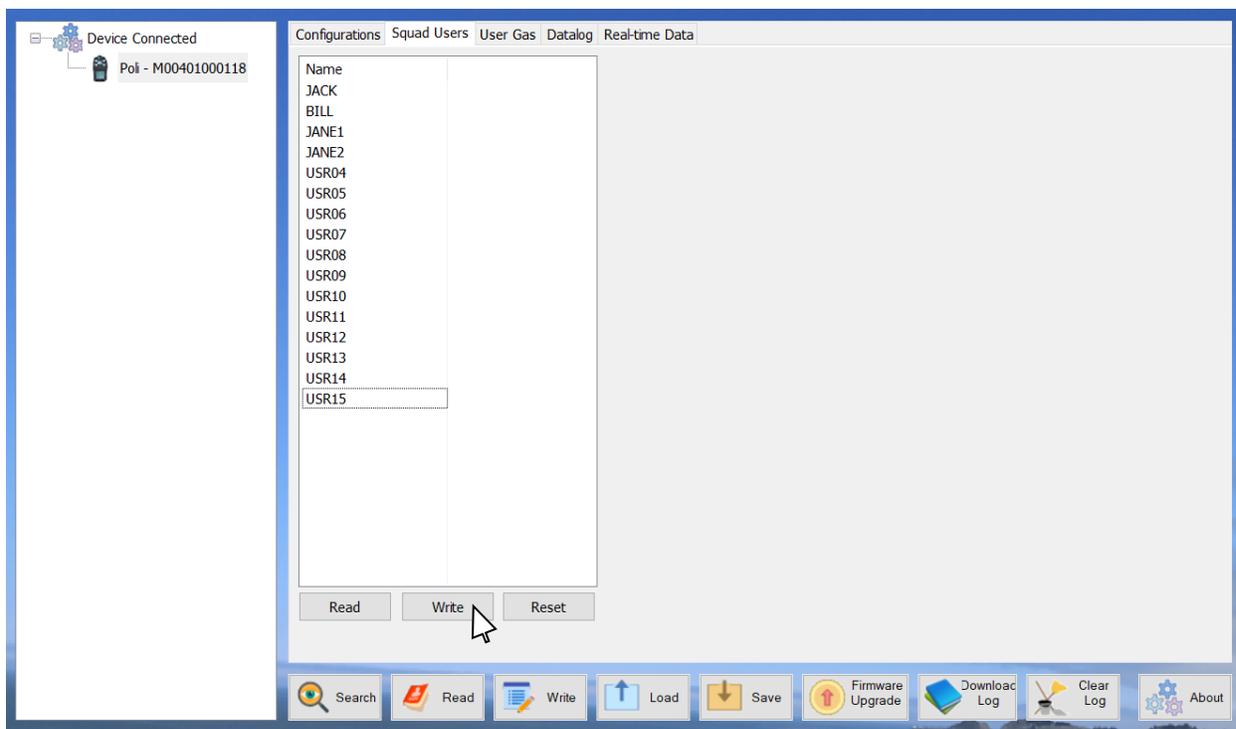
## 6.1.3 mSquad User Names

To enter a personalized user name of up to 5 letters/digits, click on the Squad Users tab on top.

- Type in the desired names for up to 7 users, preferably 5 letters or less for ease of reading on the displays.
- Click “Write” on the bottom of the Name panel to send the user names to the Host/Head. (If the Write and Reset buttons are greyed out, first click “Read” to enable them, type in the new names, and then click “Write”.)

**NOTE:** There are two “Write” buttons on this page, and only the one at the bottom of the Name panel sends the names to the instrument; the “Write” bottom at the very bottom of the page sends the parameters on the main Configuration page but not the mSquad user names.

- After saving to the Head/Host, the new Soldier names will update on the Soldiers next time they communicate with the Head/Host (this may take a few minutes). Alternatively, re-register each Soldier to receive its new name: Exit mPower Suite, enter Configuration Mode on both Host and Soldier, and scroll to the Wireless/Register Device menus.



mPower mSquad Users Configuration Screen

## 7. Maintenance and Troubleshooting

For maintenance and troubleshooting, please see the POLI User Guide.

## 8. mSquad Technical Specifications

### MP400S and MP400H Specifications

Size	5.7 x 3.3 x 1.7 in (140 x 84 x 42 mm) w/o Antenna
Weight	15.5 oz (435 g)
Sensors	Interchangeable and field-replaceable: PID for VOCs (MP400S only), EC for Toxic & O <sub>2</sub> , Pellistor for LEL, and NDIR for LEL, Vol% & CO <sub>2</sub>
Response time (t90)	<ul style="list-style-type: none"> <li>• 15 s (LEL/CO/H<sub>2</sub>S/O<sub>2</sub>) MP400S</li> <li>• 20 s (LEL/CO/H<sub>2</sub>S/O<sub>2</sub>) MP400H</li> <li>• Others vary up to 120 s</li> </ul>
Sampling	MP400S - Internal pump; MP400H - Diffusion
Battery	12 hr (depending on sensors and pump installed)
Direct Readout	<ul style="list-style-type: none"> <li>• Real-time reading of gas concentration</li> <li>• PID measurement gas and correction factor,</li> <li>• Battery status</li> <li>• STEL, TWA, peak and minimum values</li> <li>• Man-Down alarm on/off</li> </ul>
Display	128 x 128 graphical LCD, 1.77 x 1.73 in (45 x 44 mm), with LED backlight and auto "flip" screen
Range	0.8 km (1/2 mile) between MP400H and MP400S
Frequency	ISM band (902-928 MHz) FCC Part 15 approved
Calibration	Zero and span calibration. Single or multiple sensor simultaneous calibration settings
Monitors	Up to 8 per mSquad (1 MP400H plus 7 MP400S)
Alarms	<ul style="list-style-type: none"> <li>• Audible (95 dB @ 30 cm)</li> <li>• Visual (flashing bright red LEDs)</li> <li>• Vibration</li> <li>• On-screen indication of alarm conditions</li> <li>• Man-Down alarm with pre-alarm</li> </ul>
Wireless Alarm Notification	Alarm on any monitor sent to all others in mSquad for 5 seconds, then remains on at MP400H
Datalogging	Continuous datalogging (6 months for 4 sensors at 1-minute intervals, 24 hours/day and 7 days/week)
Direct PC Comm and Charging	USB cable for charging, data download, instrument setup and firmware upgrades on PC or 100-240V AC charger, or CaliCase.
Temperature	-4° to 122°F (-20° to 50°C)
Humidity	0% to 95% Relative humidity (non-condensing)
IP Rating	IP-65 MP400S (pump); IP-67 MP400H (diffusion)
Safety Certifications	 Class I, Div 1, Group ABCD T4, -20°C ≤ T <sub>amb</sub> ≤ +50°C  Ex ia IIC T4 Ga  II 1G Ex ia IIC T4 Ga (pending)  European Conformity (pending)
EMC/RFI	EMC directive: 2014/30/EU
Warranty	<ul style="list-style-type: none"> <li>• 2 Years on instruments</li> <li>• 2 Years on sensors for pellister LEL, and O<sub>2</sub>, CO, H<sub>2</sub>S, SO<sub>2</sub>, HCN, NO, NO<sub>2</sub>, and PH<sub>3</sub> EC sensors</li> <li>• 1 Year on other sensors</li> </ul>

### Sensor Options

Sensor	Range	Resolution
PID	0-2000 ppm	0.1 ppm
Oxygen (O <sub>2</sub> )	0-30%Vol	0.1%Vol
Combustibles (LEL%)	0-100%LEL	1%LEL
Hydrocarbons (Vol%)	0-100%Vol	0.1%Vol
CO <sub>2</sub> (Carbon Dioxide)	0-50000 ppr	100 ppm
CO (Carbon Monoxide)	0-1000 ppm	1 ppm
H <sub>2</sub> S (Hydrogen Sulfide)	0-100 ppm	0.1 ppm
	0-1000 ppm	1 ppm
CO + H <sub>2</sub> S	CO 0-500 ppm	1 ppm
	H <sub>2</sub> S 0-200 ppm	0.1 ppm
SO <sub>2</sub> + H <sub>2</sub> S	SO <sub>2</sub> 0-20 ppm	0.1 ppm
	H <sub>2</sub> S 0-100 ppm	0.1 ppm
NH <sub>3</sub> (Ammonia)	0-100 ppm	1 ppm
Cl <sub>2</sub> (Chlorine)	0-50 ppm	0.1 ppm
ClO <sub>2</sub> (Chlorine Dioxide)	0-1 ppm	0.01 ppm
H <sub>2</sub> (Hydrogen)	0-1000 ppm	10 ppm
HCl (Hydrogen Chloride)	0-15 ppm	0.1 ppm
HCN (Hydrogen Cyanide)	0-100 ppm	1 ppm
NO (Nitric Oxide)	0-250 ppm	1 ppm
NO <sub>2</sub> (Nitrogen Dioxide)	0-20 ppm	0.1 ppm
PH <sub>3</sub> (Phosphine)	0-20 ppm	0.01 ppm
SO <sub>2</sub> (Sulfur Dioxide)	0-20 ppm	0.1 ppm
ETO (Ethylene Oxide)	0-100 ppm	0.1 ppm
CH <sub>3</sub> SH (Methyl Mercaptan)	0-10 ppm	0.1 ppm

All specifications and listed sensors are subject to change without notice. Please check for updates at [www.mpowerinc.com](http://www.mpowerinc.com).

## Technical Support and mPower Contacts

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