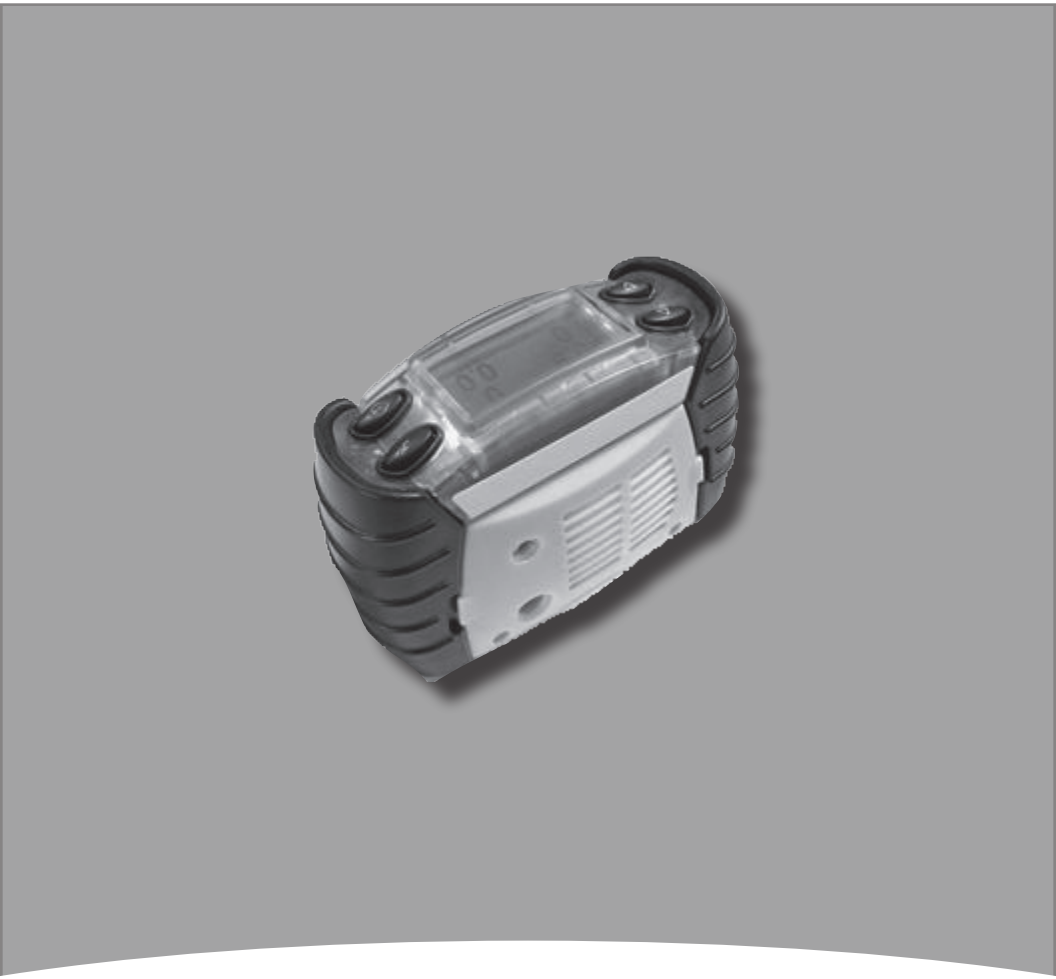
Impact Series



Operating Instructions and Maintenance Manual

Honeywell

Copyright

General Statement of Limited Warranty

Device	Warranty Terms
Impact/Impact Pro multi-gas detector	**24 months** from delivery to customer*
Impact/Impact Pro CO_2 Cartridge (Electrochemical Microcell version)	**6 months** from date of switch on / installation
Impact/Impact Pro CO_2 Cartridge (Electrochemical Surecell version)	**12 months** from date of switch on / installation
Impact Pro CO_2, %LEL, % Vol Sensors (Infrared [IR] version)	**24 months** from date of switch on / installation
Impact disposable cartridge **Impact** serviceable cartridge	**12 months** from date of installation into the instrument provided installation takes place before the 'INSTALL BY' date. Pro rata after 'INSTALL BY' date.
Service	**Warranty Terms**
A. Replacement with new product within the first 90 days of the original warranty period.	**Full warranty period** as specified in Warranty Terms above.
B. Repair (or replacement with new or reconditioned product at HA discretion) after the first 90 days of the original warranty period.	**Pro-rata warranty** realized as balance of original warranty specified in Warranty Terms above, or equivalent discounted price on a new, fully warranted instrument or component.
Components replaced under original product warranty.	Warranted against same fault for **3 months** from date of repair
Repair or Replacement outside of original warranty period.	

***delivery to customer must take place no longer than 3 months from shipment by HA, otherwise warranty period is pro rata reduced.**

Warranty Conditions

1. The HA Limited Product Warranty only extends to the sale of new and unused products to the original buyer where purchased from a HA authorized distributor or service center.
2. Not covered are:
   - consumable items such as dry-cell batteries, filters and fuses or routine replacement parts due to the normal wear and tear of the product;
   - any product which in HA's opinion has been altered, neglected, misused or damaged by accident or abnormal conditions of operation, handling, use or severe sensor poisoning; or failure to maintain and calibrate the product as prescribed in the product documentation;
   - defects attributable to improper installation, repair by an unauthorized person or the use of unauthorized accessories/parts on the product;
3. Any claim under the HA Product Warranty must be made within the warranty period and as soon as reasonably possible after a defect is discovered.
4. If a Warranty claim is being sought it is the responsibility of the buyer to return the product to the distributor or HA authorized service center along with a full description of the fault.
5. A warranty claim will be accepted if conditions contained within this Warranty are met. When, in the opinion of HA, a warranty claim is valid, HA will repair or replace the defective product according to the terms herein.
6. Please note that if, in the opinion of HA the warranty claim is not valid, HA will, at the option of the buyer, return the unit unaltered at the buyer's expense, repair the unit at the then prevailing rates, replace the unit with an appropriate replacement item at the then prevailing price, or discard the unit.
7. In no event shall HA's liability exceed the original purchase price paid by the buyer for the product.
8. HA makes no other warranty expressed or implied except as stated above.

Ensure that you read and understand these Operating Instructions BEFORE installing or operating any part of the equipment.

Please pay particular attention to the Safety Warnings.

WARNING

- **The dry cell battery holder part no. 2302B2016/2302B0770 or rechargeable battery pack part no. 2302B2015/2302B0842 must not be removed, replaced or recharged in the hazardous area.**
- **Only the following alkaline dry cell batteries must be used in the dry cell holder part no. 2302B2016/2302B0770:**

  Duracell® MN1500 or Energizer® E91.
- **Rechargeable cells must not be used in the dry cell battery holder part no. 2302B2016/2302B0770.**
- **Do not mix rechargeable battery packs and dry cell battery packs in the same Impact.**
- **The instrument must be serviced only by qualified personnel trained by Honeywell Analytics or by a Honeywell Analytics Appointed agent. Servicing must be carried out only in a non-hazardous area.**
- **The Impact must not be used in an oxygen enriched atmosphere.**
- **Refer to *Section 4. Operation* for details of restrictions of use of the Impact Series.**
- **The Catalytic Flammable Sensor requires an oxygen content of greater than 10% v/v to operate reliably. In circumstances where the oxygen content of the sample is less than 10% v/v, the reading displayed on the Flammable Channel should be regarded as suspect. In this situation, a Warning 54 (Low O_2 - Flam Inaccurate) will be generated on the instrument.**
- **While Infrared Flammable Sensors can operate in a reduced oxygen content environment, it is important to note that the electrochemical sensors in the same cartridge cannot reliably operate in a low oxygen environment.**

WARNING

Before each day's usage sensitivity must be tested on a known concentration of the gas to be detected equivalent to 25 – 50% of full scale concentration. Accuracy must be within 0 to +20% of actual. Accuracy may be corrected by calibration.

The Catalytic Flammable Sensors sensitivity can be adversely affected by exposure to certain substances (silicon and sulphur compounds are examples). Every effort should be made to avoid exposure to these substances. Following an H_2S alarm or repeated gassing with H_2S a check should be performed on the Catalytic Flammable sensor to verify its accuracy and a calibration performed if necessary.

By default, no alarms are provided for the 0-100%/Volume Flammable IR sensor. The user can set up alarm levels via the ICU software.

Hydrogen (H_2) cannot be detected using the IR principle.

If -0.0% v/v for the electrochemical CO_2 sensor channel is permanently displayed, a sensor zero calibration needs to be performed in clean air. The alarm level A1 for the electrochemical CO_2 range must not exceed 0.5% v/v.

Do not calibrate the electrochemical CO_2 channel if CO_2 is indicated in clean air after the apparatus has been exposed to CO_2 concentrations above the upper limit of the measuring range. In this case leave instrument in clean air overnight before calibration.

The calibration interval for the electrochemical CO_2 sensor shall not exceed 1 month.

Dispose of the spent cartridge and its packaging in accordance with local regulations. Do not dispose of in fire.

For WEEE/RoHS information, see the Honeywell Analytics website: www.honeywellanalytics.com.

IMPORTANT NOTICE

Honeywell Analytics can take no responsibility for installation and/or use of its equipment if this is not done in accordance with the appropriate issue and/or amendment of the relevant manual.

The user of this manual should ensure that it is appropriate in all detail to the exact equipment to be installed and/or operated. If in doubt, the user should contact Honeywell Analytics for advice.

If further details are required which do not appear in this manual, contact Honeywell Analytics or their agent.

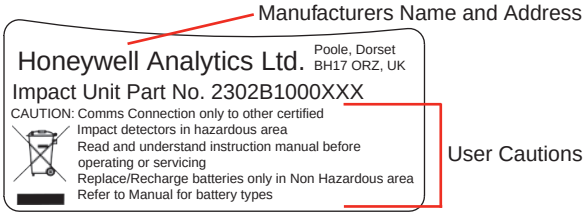
Note

The failure to observe and abide by the above Warnings and Cautions may render void the intrinsic safety approval of the Impact Series, and may remove any right of claim against Honeywell Analytics relating to product liability or consequential damage to any third party.

Contents

Neotronics Equipment Labels

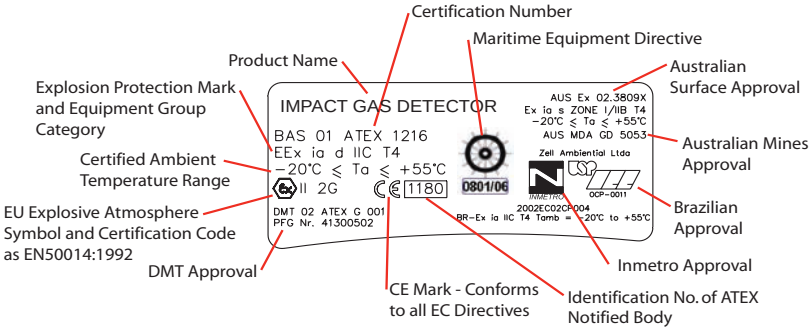
An explanation of the information on the equipment label is shown below.



Neotronics CENELEC (ATEX) Certification Label

An explanation of the information on the CENELEC (ATEX) certification label is shown below.

Neotronics Impact Pro non-IR Label:



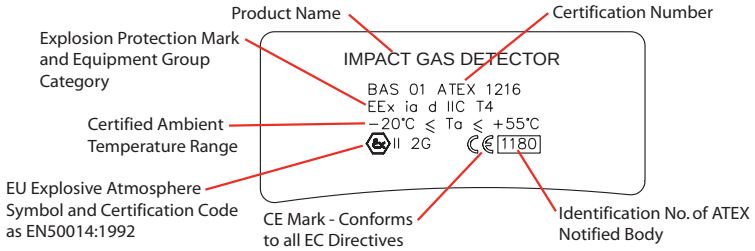
This instrument has been assessed by EXAM (formerly DMT) for performance of Oxygen, Methane, Propane, Carbon Monoxide, Hydrogen Sulfide and Carbon Dioxide (electrochemical cell only) channels.

The label marking indicates this: DMT 02 ATEX G 001
PFG Nr. 41300502

The instrument has been tested in accordance to the following European Standards.

- EN50054 & EN50057: 1998 for Combustible Gases (Methane and Propane).
- EN50104: 2002 for the measurement of Oxygen.
- EN45544-1 & EN45544-2: 1999 for the measurement of Carbon Monoxide, Hydrogen Sulfide and Carbon Dioxide (electrochemical cell only).
- EN50271: 2000 for the assessment of Digital Components and Software.
- MED: Maritime Equipment Directive

Neotronics Impact Pro IR Label:

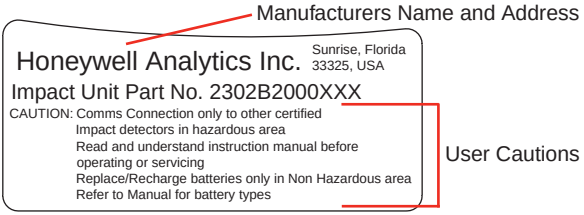


WARNING

Assessment has only been made in the range of 0 to 100%LEL. Use of other ranges of flammable gas measurement on this instrument will invalidate this approval.

Lumidor Equipment Labels

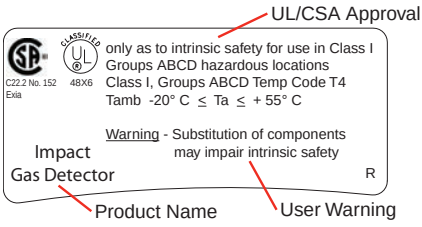
An explanation of the information on the equipment label is shown below.



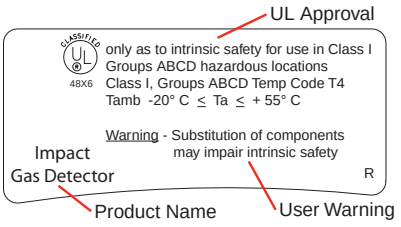
Lumidor UL / CSA Certification Label

An explanation of the information on the UL / CSA certification label is shown below.

Lumidor Impact Pro non-IR Label:



Lumidor Impact Pro IR Label:



WARNING

Only the combustible gas detection portion of this instrument has been assessed by CSA for performance. Furthermore, assessment has only been made in the 0 to 100% LEL scale (catalytic version). Use of other ranges of flammable gas measurement on this instrument will invalidate approval.

1. Introduction

The Impact Series is a compact, portable gas monitor designed to be carried or worn without hindering the user. Its purpose is to monitor the atmosphere continuously for hazardous levels of up to four gases. Audible and visual alarms alert the user to danger when hazardous conditions are detected.

The instrument is usually supplied with four gas sensors, for detecting oxygen (enrichment and deficiency), flammable gases (up to the Lower Explosive Limit) and two toxic gases (for personal safety) all housed in an easily replaceable cartridge. An alternative arrangement using infrared sensors for flammable or carbon dioxide is also available.

Various sensor technologies are used to achieve this. In the vast majority of cases, electrochemical technology is used to detect oxygen and toxic gases while catalytic combustion technology is used to detect flammable gases. Infrared technology is used to detect flammable and carbon dioxide gases.

Two types of cartridge are available. One is disposable where the cartridge has a fixed life and once this has expired the cartridge is disposed of. The other is a Serviceable Cartridge where the sensors can be individually replaced when required. The serviceable cartridge type can only be used in the Impact Pro.

Note

Throughout this manual it is assumed that the Impact Series is equipped with a Disposable Four Sensor Gas Cartridge. References to sensors not fitted in the users instrument should be ignored.

This manual covers all models - some features are not available on all models. Not all models are available in every country.

The instrument is supplied with dry cell batteries and holders as standard. Rechargeable batteries and charger can be purchased separately as a kit.

1.1 Intended Use

The Impact Series has been designed to alert the user to potentially hazardous atmospheres while carrying out his/her normal duties. Therefore, the instrument must be kept switched on and worn as close to the breathing area as possible, and several accessories are provided to allow the instrument to be worn in a number of different ways:

a) On the chest
b) On a belt
c) Attached to a body harness

The instrument is provided with various methods to enable the user to comply safely and easily with confined space regulations.

CAUTION

Hand aspirated remote sampling only provides continuous gas readings as long as the bulb is being operated.

Honeywell Analytics recommends that the instrument be calibrated at least every 6 months or in accordance with customer site procedures, whichever is sooner. Correct operation of the instrument should be confirmed with test gas of known concentration before each use.

If equipped with an electrochemical CO_2 sensor, do not calibrate the CO_2 channel if CO_2 is indicated in clean air after the apparatus has been exposed to CO_2 concentrations above the upper limit of the measuring range. In this case leave the instrument in clean air overnight before calibration.

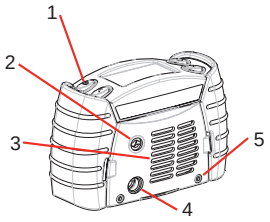
The calibration interval for the electrochemical CO_2 sensor shall not exceed 1 month.

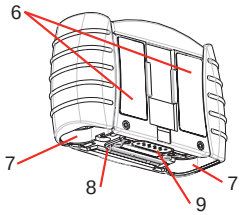
The use of a Honeywell Analytics Enforcer calibration accessory is strongly recommended as it enables this to be performed quickly and easily.

WARNING

A sensor which cannot be calibrated or which is found to be out of tolerance should be replaced immediately. For the disposable cartridge, a replacement cartridge must be fitted.

1.2 Product Overview





1. Buttons
2. Pump Aperture
3. Cartridge and Filter Cover Grille
4. Audible Aperture
5. Cover Grille Screws
6. Equipment and Certification Label
7. Battery Compartments
8. Tool
9. Data Connector

On the top of the unit are four buttons (1). Their functions are summarized below:

▲ (yellow) Moves up through menu screens, and used to increase values

✓ (green) Used as 'OK' in menus. Accepts alarms, and resets peak values

▼ (yellow) Moves down through menu screens and used to decrease values

ⓘ (red) On/Off button. Also used as 'change' in menus

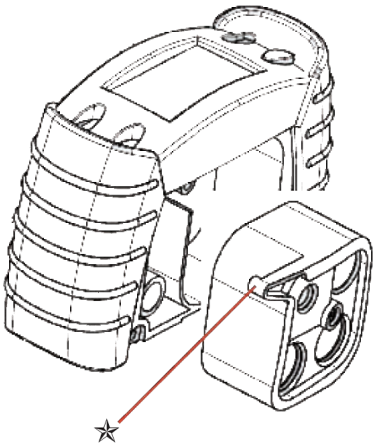
Pressing any key will automatically activate the display backlight for 10 seconds.

There are currently two types of instrument available - Impact and Impact Pro. The main differences between the two instruments is that the Impact Pro supports a range of Serviceable Cartridges (see ***Section 8.1 Serviceable Cartridges***). The other detail differences are the addition of an internal sample pump, vibrating alarm and Safelink feature.

The instrument can be further personalized by use of the Impact Configuration Utility (ICU) PC software, which can be purchased separately as part of the Data Logging Kit. This allows the user to change various settings and features of the instrument including, but not limited to Alarm Levels, Autozero function, latching alarms, vibrating alarm (where fitted), data logging settings and Safelink messages.

2. Getting Started

2.1 Inserting the Cartridge



1. If the instrument is switched on then switch it off by pressing and holding the ⏻ button. Note: if a cartridge is already fitted, check that the instrument clock is correct.
2. Undo the two cover grille screws (5).
3. If a cartridge is already fitted then remove it by undoing the central screw.
4. Insert new cartridge into aperture as shown. Ensure that the point '✶' is located correctly in the pump or molding (depending on model).
5. Gently tighten up the central screw to secure in place.
6. Check the condition of the filter on the cover grille (3), and if necessary, replace it.
7. If the unit is fitted with a pump replace the pump seal.
8. Replace the front cover, and retighten the two screws (5).
9. Wait at least 20 minutes. Then switch the Impact on by pressing the ⏻ button and check no faults are reported by the instrument. If fault 4 occurs refit the cartridge.
10. Once the new cartridge is fitted the instrument will compare it to the cartridge fitted previously. The instrument will alert the user with warning if:
    a) the alarm levels are different
    b) the number of sensors is different
    c) the mix of the sensors is different.
11. Press the OK button to accept the new settings from the cartridge, or press the button to abort the change.
12. If the instrument reports a gas alarm, switch instrument off, wait 20 minutes, and switch unit on again.

2.2 Charge For First Use

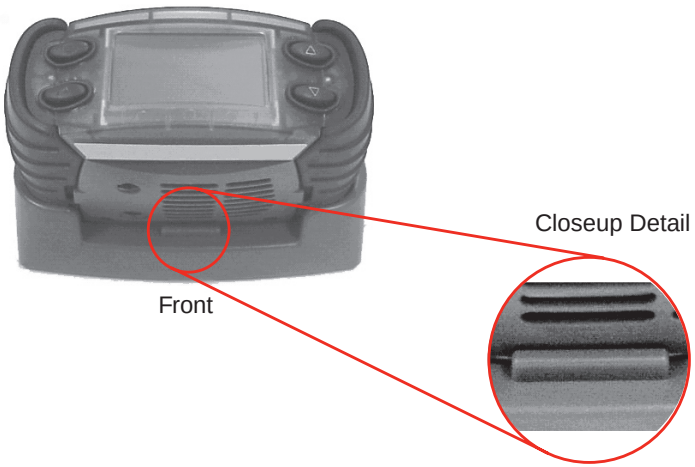
Either a rechargeable battery pack or a dry-cell battery source can power the Impact. For the rechargeable battery it must be charged before first use, to replace any battery capacity used during transit and storage.

1. Ensure the Base Station is connected to a suitable power source.
2. Place the instrument in the Base Station.

   The Base Station employs a locking mechanism to ensure that the Impact is retained under most operating conditions. To ensure this operates correctly the following procedure should be followed:

   a) Ensure that the Impact is oriented such that the instrument lip will be inserted under the locking lip.

   b) Insert the front of the Impact at an angle such that the instrument lip slides under the locking lip.



   c) Push down on the rear of the Impact such that the rear locking catch engages.

Disengaged

Engaged

d) To remove the Impact press down on the rear locking catch.

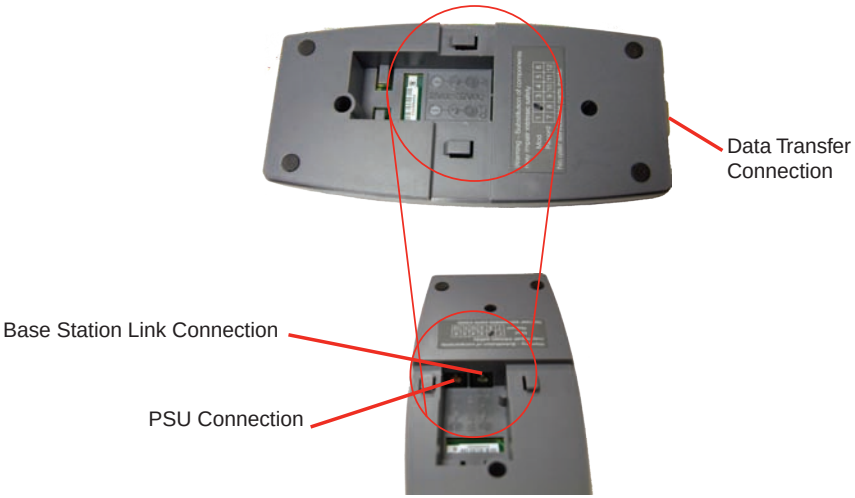
All 4 alarm lights will flash indicating the Impact has started charging.

3. While charging the instrument, the instrument will flash 2 red LEDs approximately every 4 seconds. When charging is complete it will light the green LEDs constantly. A pair of fully discharged battery packs will require 7 hours to recharge fully.

   Charging algorithm is based on a timer function so if the charging cycle is interrupted it will be necessary to leave Impact on Base Station for 7 hours to produce steady green LED light.

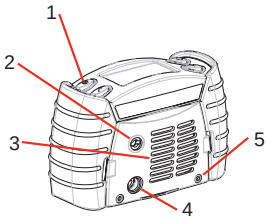
WARNING

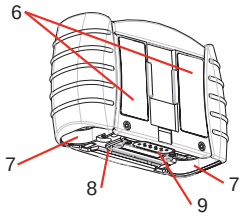
Do not charge the battery pack in a hazardous area.



Power and Base Station Link Connection Locations

2.3 Dry-cell Battery Insertion





1. Buttons
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6. Equipment and Certification Label
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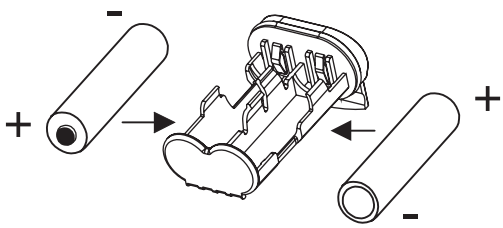
8. Tool
9. Data Connector



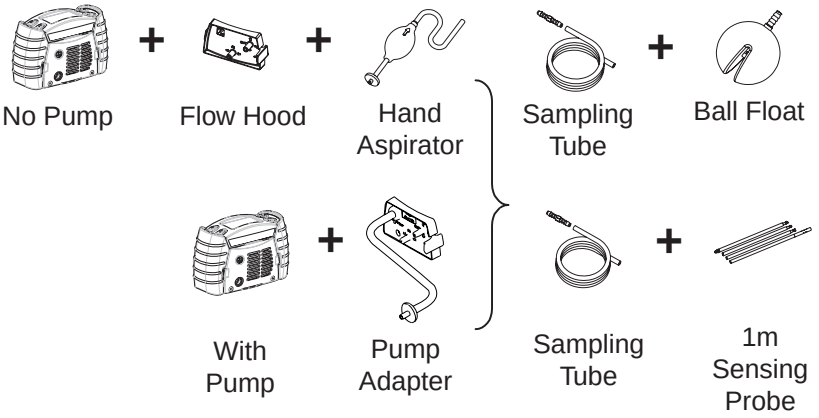
1. Undo the two battery compartments (7) using the supplied Allen wrench (9) provided, on the bottom of each instrument.
2. Release each dry-cell battery holder and remove the cells if fitted.
3. Insert new cells, ensuring correct orientation by checking that the negative terminal is at the same end as indicated on the moulding. Ensure they are of the correct type, to comply with the intrinsic safety requirements.
4. Replace dry-cell holders in the battery compartments, and retighten screws.
5. Instrument is now ready for use.

Note

Use the supplied Allen wrench only to remove the battery compartments. Use of unauthorized tools to attempt to remove the compartments may lead to damage not covered by the instrument warranty. Replacement Allen wrenches are available for purchase.

2.4 Sampling

In normal operation the Impact is worn on the belt, with its harness, or held by hand. Once turned on the Impact monitors the atmosphere continuously, which reaches the sensors by diffusing through the vents of the cover grille or by being pulled through by the internal pump (if fitted). For non-pump instruments normal air movements are sufficient to carry the sample to the sensors, and the sensors react immediately to changes in concentrations of the gases being measured in the atmosphere immediately surrounding the detector. Depending on your application and the options fitted to the instrument the environment can be sampled remotely in a variety of ways, as summarized below:



CAUTION

Hand aspirated remote sampling only provides continuous gas readings while the bulb is being squeezed. Each time a reading is required, it is necessary to squeeze the bulb at a rate of one per second until the readings remain stable.

When using the built-in pump or hand aspirator ensure that the sampling tube is not inserted into a fluid.

2.5 How to turn Impact Series on and off

The Impact has been designed for ease of use, and especially for one-handed operation - only a single button is needed to turn it on and off.

- To turn the instrument on, press the ⏻ button until the instrument activates its audible and visual alarms. It will follow the start-up sequence described in ***Section 3. Instrument Start-up***.

If the instrument displays an error that no cartridge is fitted then follow the procedure in ***Section 2.1 Inserting the Cartridge***.

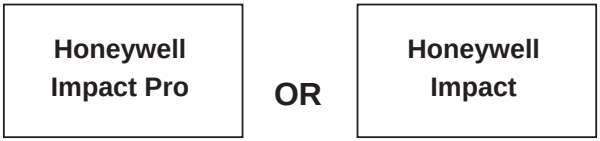
- To turn the instrument off, press and hold the ⏻ button for three seconds, until it switches off. Note that on some models a password must be entered to switch the unit off. Failure to enter the correct password will cause the instrument to continue as though the ⏻ button had not been pressed.

3. Instrument Start-up

3.1 Instrument Information

After turning the instrument on it will display the information in the following auto sequence (depending on model):

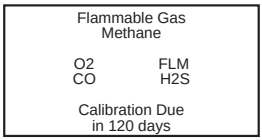
The first display identifies the model. While this is shown the alarms are tested and, if a vibrating alarm is fitted this is also activated.



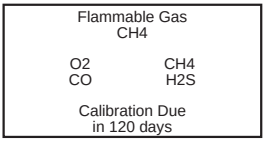
A Language Selection Screen is then shown (first use only). Use the ▲ and ▼ buttons to highlight the required language and press the ✓ key to make the selection. Note that some of the languages may be 'off screen' - use the ▲ and ▼ buttons to access these.

The language can be changed at a later time, if required. See ***Section 4.7.6*** for details.

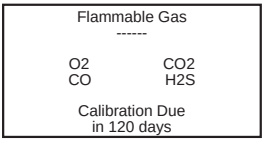
The display then shows the gas that the flammable sensor is set to monitor, the sensors fitted and when calibration is due.



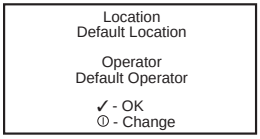
Catalytic Sensor



IR Sensor (CH_4)



IR Sensor (CO_2)

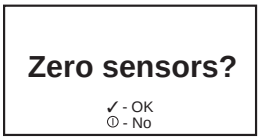


The instrument logs data on the operator's exposure, if any, to measured gases. It achieves this by requesting the operator to confirm his/her identity and the location where the instrument is being used. The screen displays the last location and operator. If these are acceptable then press the ✓ button. Otherwise select a new location and/or operator by pressing the ⓘ button. If the ⓘ button is not pressed within five seconds, the instrument will automatically proceed to the next stage in the power-up sequence.

3.2 Selecting Location / Operator

To change the location and/or operator press the ⓘ button and the display will show the current location. Press the ▲ and ▼ buttons to cycle through the list. Once the correct location has been found then press ✓, and follow the same procedure to select the operator.

3.3 Fresh Air Auto Zeroing Sensors



If enabled, the instrument will prompt if you wish to zero the sensors in fresh air, to adjust for any natural drift that may have occurred. If the ✓ button is pressed the instrument will then ask the user to ensure that it is being zeroed in fresh, uncontaminated air. If the ⓘ button is not pressed within five seconds, the instrument will automatically proceed to the next stage in the power-up sequence.

If the ✓ button is pressed the instrument will attempt to zero the sensors automatically, and display whether the procedure was successful. The oxygen reading will be adjusted to 20.9% v/v – the other sensor readings will be adjusted to 0 ppm and 0% LEL appropriately. If the ⓘ button is pressed instead the instrument will use its current zero values instead and proceed to the monitoring screen.

Note

This is a 'soft' (i.e. temporary) zero which will be discarded when the instrument is switched off. To permanently adjust the zero, the zero via the calibration menu must be used ('hard zero'). See *Section 4.9.2.1* for details.

3.4 Sensor Warm-up Phase

Following display of the Autozero screen it will be noted that the message `'Cell Self Test Please Wait'` is displayed. This is displayed while the sensors are in the warm-up phase of the start-up procedure. If the option of Autozero is declined the main gas measuring screen will be displayed with the message `'Warm Up'` being displayed in place of the gas concentration readings. The instrument should not be used until the `'Warm Up'` message has disappeared. The amount of time that the sensors are in warm up will depend on the sensor type. Table B.3.1 in ***Appendix B*** of this manual gives details of the warm up times for each of the sensors.

3.5 Testing Sensors and Alarms (Calibration and Bump Checks)

To maintain accuracy, the detector should be periodically supplied with a known concentration target test gas (calibration check) and if the readings differ from the applied gas concentration by more than 20%, a span calibration should be performed under conditions of standard temperature (15°C to 25°C/59°F to 77°F), humidity and pressure. Follow local regulations and your company's policy on the frequency of testing.

Note:

If the target gas is not available in a known concentration, or is not available for testing and a surrogate gas is used, the 20% tolerance value will not apply. In this case, verify that the instrument responds to the applied gas and triggers alarms (bump test).

If using the Enforcer for calibration checking or bump testing, refer to ***Section 4.9.4***.

For more information on test gas, contact your local Honeywell Analytics representative.

4. Operation

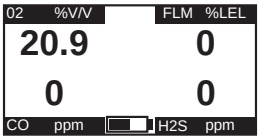
Note

Wherever the manual says 'select', the procedure is to use the ▲ and ▼ buttons to cycle through the list, and then press ✓ to select the required option.

4.1 Monitoring Condition

4.1.1 Display Screens

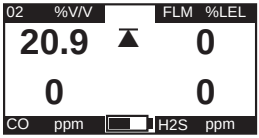
With no alarm conditions the display will typically show:



The gas sensors and their respective units are displayed, complete with a battery gauge monitor at the bottom. For an instrument fitted with less than four sensors each unused sensor position will show '---'.

Several data screens are available and these can be viewed by pressing the ▲ and ▼ buttons to cycle through. The symbol in the center of the screen will identify which screen is active.

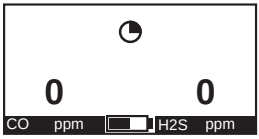
Peak Screen (▲)



This symbol is displayed when the instrument is displaying the peak readings for the sensors, i.e. the highest readings seen since the instrument was switched on or since they were reset. This is useful for pre-entry checks for confined space entry. These readings can be reset by pressing the ✓ button while this display is shown.

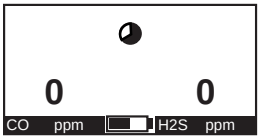
This screen will alternate with a screen showing the minimum value of oxygen. In this case the ▲ is replaced by ▼ .

STEL Screen (◔)



This symbol is displayed when the instrument is displaying the STEL readings for the toxic sensors. The STEL is a time weighted average, measured over a 15 minute reference period. It is used to monitor exposure to toxic gases in line with current regulations and/or legislation.

LTEL Screen (◕)



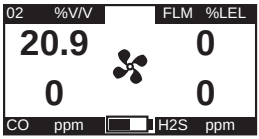
This symbol is displayed when the instrument is displaying the LTEL (TWA) readings for the toxic sensors. The LTEL is a time weighted average, measured over an 8 hour reference period. It is used to monitor exposure to toxic gases in line with current regulations and/or legislation.

This screen shows the current time, date and battery status.

It is possible to change the instrument date and time setting as follows: Press the ✓ key while this screen is displayed and the clock setting function will be activated, with the hour field highlighted. Use the ▲ and ▼ keys to change the value as required and press the ✓ key to move to the minute field. Again use the ▲ and ▼ keys to change the value and continue until all of the fields have been correctly set. Finally press the ✓ key to store the changes. Note that the ⓘ key can be pressed at any time to abort the procedure.

4.1.2 Other Displayed Symbols

If the pump is operating correctly the pump symbol will rotate.



If the pump flow becomes blocked the instrument will warn the user and stop the pump to prevent potential damage. When the user accepts the warning message the instrument will attempt to restart the pump. There is no need to remove and refit the Pump Adapter. At this point, the user should investigate the cause of the blockage alarm. If the blockage is cleared then the pump will successfully restart. If the blockage is still present then the instrument will again warn the user that the pump flow is still blocked. This will repeat until the blockage is removed.

This shows an approximation of the remaining battery capacity within the instrument. If there is less than 20 minutes remaining battery life then the instrument will display a 'Low Battery' warning.

This will be shown instead of the numerical reading for any sensor or channel that is faulty, if a zero or span calibration has failed, in instances of low oxygen and in some cases of high gas concentrations. Switch the instrument off and then back on. If this does not clear the fault then recalibrate the sensor or change the cartridge.

-0

This indicates that the sensor output of the indicated channel has drifted negative. In severe cases of sensor negative drift, a Warning 51 (Excessive Negative Drift) will be shown. Please see ***Appendix A Warning Codes*** for further details on this warning message.

WARNING

If -0.0 v/v% for the electrochemical CO_2 sensor channel is permanently displayed, a sensor zero (during boot procedure) or a zero calibration needs to be performed in clean air. The alarm level A1 for the CO_2 range must not exceed 0.5 v/v%.

4.1.3 Confidence Signal

To ensure correct operation the instrument monitors itself and will confirm correct operation by giving an audible and green visual confidence signal once every 30 seconds. The confidence signal is given when the instrument is able to detect gas (for example the confidence signal will not be given during pump or sensor calibration phases, or if the sensors are in warm-up).

There is a configurable option to silence the audible confidence signal but the visual confidence signal will still operate. If the instrument is in a low battery condition the confidence signal will occur twice every 30 seconds.

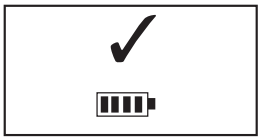
Note

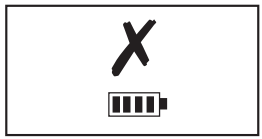
The audible confidence signal is the primary indication that the instrument is functioning correctly. It is therefore strongly recommended that this feature not be disabled.

4.1.4 Go/No Go Option

A configurable option is available which replaces the numeric values with a ✓ symbol when everything is OK and ✘ when there is or has been an alarm or fault, as shown below. All alarms operate as normal, but other functions and menus are disabled.

This display now also shows the battery capacity as follows.





The Go / No Go Option is configured using the Impact Configuration Utility (ICU) PC software from the Configuration Screen.

4.2 Atmospheric Alarm Conditions

CAUTION

The Impact portable gas detector has been designed for the detection of oxygen deficiencies and enrichments, flammable and toxic gas levels. An alarm condition indicating the presence of one or more of these potentially life-threatening hazards should be taken seriously.

In the event an alarm is activated when the measured gas concentration exceeds the pre-set alarm point.

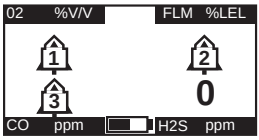
A rapid increase in reading followed by a declining or erratic reading may indicate a hazardous combustible gas concentration that exceeds the measuring range of the Impact (i.e. greater than 100%LEL Methane). In the event of the instrument being exposed to a very high level of flammable gas the following behavior will be noted.

- **Warning 54 (low O_2) and an alarm condition will be indicated. Warning 52 (sensor over-range) and an alarm condition will be indicated.**
- **The flammable reading will be latched to 100%LEL Methane with an alternating cross on the channel.**

For other sensors reading greater than the measurement range, '▲▲▲' alternating with the full-scale reading will be displayed.

4.3 Alarm Condition

There are two modes of alarm: latching and non-latching. However, the display will give the same alarm indication:



An alarm symbol will appear in the relevant section of the display. The alarm symbol contains a number, indicating the increasing severity of the alarm, with increasing frequency of the audible and visual alarms. If there is a STEL/LTEL alarm the relevant icon will appear and flash.

Any alarm will cause the backlight to be switched on automatically.

4.3.1 Latching Alarms (default)

In the latched condition, once an alarm occurs both audible and visual alarms continue to operate even after the atmospheric hazard has cleared. Pressing any of the instrument buttons will clear an alarm. Any subsequent alarm will reactivate the audible and visual alarms.

4.3.2 Non-latching Alarms

In this mode, should a gas alarm occur the instrument would enter an alarm condition. When the readings return to normal levels the audible and visual alarms will stop.

4.3.3 Vibrating Alarm (where fitted)

If this option is fitted to the instrument, any alarm condition that activates the audible and visual alarms will also activate the built-in vibrating alarm.

4.3.4 Resetting an Alarm

If an alarm condition occurs it is possible to cancel the alarm by pressing any of the buttons, once the gas measurements have returned to a safe level. Otherwise, the instrument will remain in the alarm condition, but the audible alarm will be muted. Any subsequent alarms that occur 1 second after the previous alarm has been reset will reactivate the audible alarm.

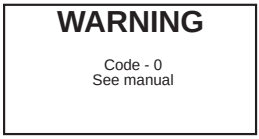
4.4 Fault and Warning Condition

In addition to the gas alarms, the Impact includes a number of auxiliary alarms to safeguard proper use of the instrument. At switch-on, the Impact performs an electronic self-test that assures the user of proper performance. When the Impact detects that an electronic fault or failure condition has occurred, the audible and visual alarms are activated and an explanatory message will be displayed.

CAUTION

As the Impact is designed to protect from potentially life-threatening atmospheric conditions, any alarm conditions must be taken seriously.

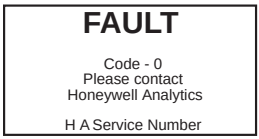
4.4.1 Warning



The instrument displays a warning message for situations where a fault or error has occurred but may be resolved by the user.

The 'Code - 0' shown here is an example only. A full list of codes is given in Appendix A.

4.4.2 Fault Condition



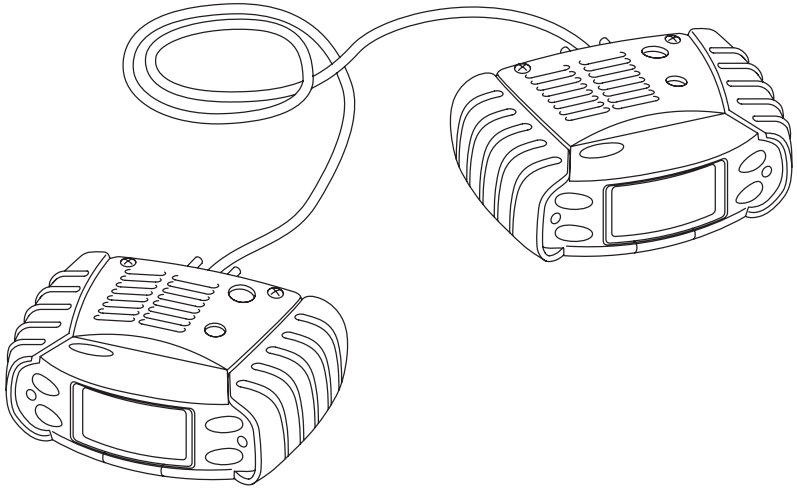
If a fault condition is detected during start-up or subsequently, the instrument will display a fault message warning the user and giving a contact number. This will remain until the instrument is turned off by pressing the ⏻ button for at least 3 seconds.

The 'Code - 0' shown here is an example only. A full list of codes is given in Appendix A.

4.5 Safelink

4.5.1 What is Safelink?

Safelink is a confined space entry communication system between instruments, fitted with the Safelink feature. It allows one instrument (the 'attendant') to display the gas readings measured by the other connected instrument (the 'entrant'), up to a maximum cable length of 100m. Safelink also provides an automatic timed response system requiring the Entrant's instrument to return a signal, activated by the entrant, within a user-specified time interval. Failure of the user to respond will cause an alarm to be raised on the Attendant's instrument. Additionally, any continued pressing on any button on the entrants instrument at any time will cause an 'Emergency' message to appear on the attendant instrument - similar to the action of a panic button. In Safelink mode the entrant instrument can neither be switched off, nor can the pump feature (where fitted) be used on either instrument. It will be found that while the pump is running the Safelink option on the instrument menu system has been removed. Furthermore, if an attempt to start the pump is made (on either the attendant or entrant instrument) during Safelink operation an alarm condition is generated and Safelink Mode has to be exited.

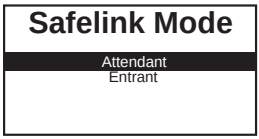


Safelink mode cannot be entered when the batteries are low (i.e. there is less than 1 bar on the battery indication meter).

In some instances a Fault or Warning will not be displayed on the Entrant instrument. In this case it is important to note that gas alarms on the Entrant instrument are still indicated on the Entrant and the Attendant instruments.

4.5.2 Using Safelink

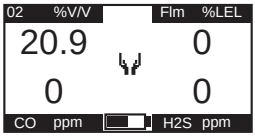
Connect the Safelink cable between two instruments. Turn on each instrument and from the user menu on each instrument select the Safelink mode.



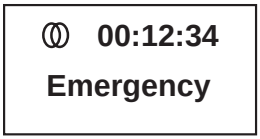
On one instrument select Attendant. When selecting the Attendant on one instrument the instrument will display 'locating' while it attempts to connect with the other instrument. Once established each instrument will briefly display 'Configuring'. The instrument will then show the readings – ensure that the Safelink symbols appear on the display. To check the integrity of the communications it is recommended that a message be sent from the Attendant to the Entrant. Whenever a message must be responded, the instrument will flash its green LEDs and sound its audible alarm at a rate of once per second.

Until the Safelink cable is disconnected both instruments will remain in Safelink mode.

4.5.2.1 Attendant Instrument



The instrument will display the readings being monitored on the Entrant instrument. The symbol is used to indicate the Attendant's instrument. When the symbol is static it indicates that Safelink communications are occurring. When it is flashing the Safelink has become disconnected and the readings will all show '---', until the link is restored or the user exits from Safelink mode. All display modes from the Entrant's instrument (peak, STEL, etc) are available to the Attendant.



The status screen shows the duration that Safelink has been in operation, and the status of the connection as either Normal, Emergency, or Link failure.

By pressing the ✓ button the Attendant has access to a menu, to select a message to send to the Entrant. These are configurable using the PC software.

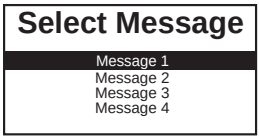
The Select Message menu gives access to two additional actions:

a) Emergency, which immediately issues a 'Get Out' warning to the Entrant.
b) Exit, to enable termination of the Safelink without removing the cable.

4.5.2.2 Entrant instrument

The symbol is used to indicate the Entrant's instrument. When the symbol is static it indicates that Safelink communications are occurring. When it is flashing the Safelink has become disconnected.

Only the instantaneous values are shown, although all alarm conditions will operate as normal.



By pressing the ✓ button the entrant has access to a menu, to select a message to send to the attendant. These are configurable using the PC software, and could be used to indicate work progress, e.g. 'Valve Now Closed'.

4.5.2.3 Timed Response

At a preselected interval the attendant's instrument will prompt for the Entrant to be checked. The Entrant must press any button within a preselected time, otherwise the Safelink system will assume an emergency situation has occurred and raise alarms on both instruments. The default interval is 5 minutes. The default time to respond to a message is 30 seconds. Both of these can be changed using the PC software.

4.5.2.4 Terminating Safelink

To terminate Safelink mode the cable should be disconnected between the instruments. Both instruments will display a menu enabling Safelink mode to be switched off.

Safelink mode must be terminated before attempting to use the instrument in a Base Station (for charging or calibration) or the Enforcer.

4.6 Pump (Impact Pro / Impact Pro IR Only)

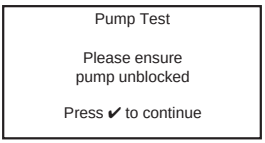
The pump allows gas to be drawn through tubing across the sensors. Fitting the Pump Adapter will automatically switch the pump on.

If the pump is operating correctly the pump symbol will rotate.

Please refer to ***Section 4.1.2 Other Displayed Symbols*** on the operation of the instrument under blocked flow conditions.

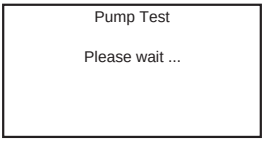
The instrument contains a feature that tests and if necessary dynamically sets the Pump Stall threshold via a calibration routine. Upon fitting the Pump Adapter, the user will see the following sequence of screens. The instrument gives instructions at each stage informing the user as to what operations need to be performed.

Please follow the instructions on screen during the Pump Test and Calibration procedure. Fit the required length of sample tube of the inlet of the Pump Adapter together with the Hydrophobic Filter. Fit the Pump Adapter to the front of the instrument.

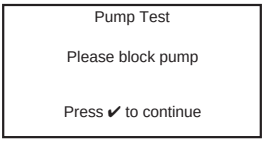


Ensure that there is nothing obstructing the flow into the sample pump and press the ✓ button.

The following screen will be displayed briefly.



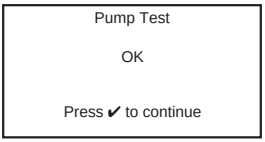
Followed by…



Use a suitable method to block the end of the sample tube and press the ✓ button.

The instrument will now test the pump. Ensure that the blockage is kept in place for the duration of this test.

If the pump test is successful the following screen will be displayed.

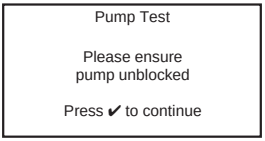


Remove the blockage from the sample tube and press the ✓ button.

The internal sample pump feature is now ready for use.

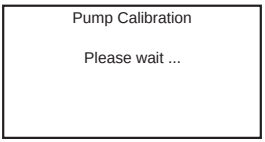
To stop the sample pump, remove the Pump Adapter as described in ***Section 4.6.1 Removal of the Pump Adapter***.

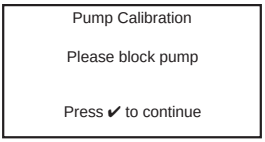
If the Pump Test fails then the pump calibration procedure will start.



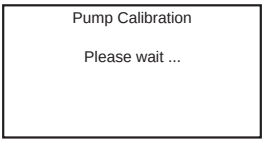
Ensure that there is nothing obstructing the flow into the sample pump and press the ✓ button.

The instrument will then perform the first part of the pump calibration.

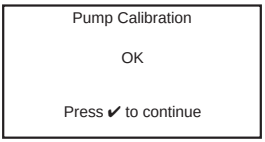




Use a suitable method to block the end of the sample tube and press the ✓ button. The pump calibration will now commence.



Ensure that the pump is kept in a blocked state until the following screen is displayed.



Remove the blockage from the sample tube and press the ✓ button.

The internal sample pump feature is now ready for use.

If the Pump Calibration fails (please see the diagnostic table at the end of this section) then use of the sample pump is inhibited. The Pump Adapter must be removed from

the instrument and the fault investigated. To correctly remove the Pump Adapter, follow the instructions in ***Section 4.6.1***.

Removal of the Pump Adapter will turn the pump off.

Below 0°C the efficiency of the pump will be adversely affected, requiring a longer sampling time.

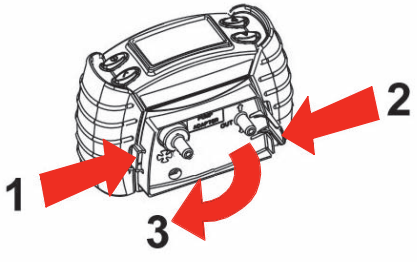
The following is a list of possible problems that could cause the instrument to fail the various tests detailed in this procedure.

Symptom	Possible Cause	Remedy
The instrument reports 'Pump Test Fail'	The sample pump is in an uncalibrated state or the operating conditions of the pump have changed significantly since the last calibration.	Perform the Pump Calibration to recalibrate the pump.
	The pump was not blocked correctly when required.	Remove the Pump Adapter and refit to restart the test. Ensure that the pump is blocked correctly when instructed to.
	A blocked condition was not detected within 30 seconds of the start of the test.	Remove the Pump Adapter and refit to restart the test. Ensure that the pump is blocked as soon as the 'Please block pump screen' is displayed.
The instrument reports 'Pump Calibration Fail'	The pump was not blocked correctly when required.	Remove the Pump Adapter and refit to restart the test. Ensure that the pump is blocked correctly when instructed to.
	There is a leak in the system.	Check that the following items are correctly fitted and/or are not damaged. • Pump Seal (behind front cover) • Sample Tube • Pump Adapter • Cover grille
	A blocked condition was not detected within 30 seconds of the start of the test.	Remove the Pump Adapter and refit to restart the test. Ensure that the pump is blocked as soon as the 'Please block pump screen' is displayed.
	The Pump Assembly is faulty.	Request a new Pump Assembly or contact Honeywell Analytics for assistance.
PUMP FAULT and WARNING 16 'Pump Fault' screens are displayed following the Pump Calibration.	The Pump Calibration has failed.	Remove the Pump Adapter and investigate the fault (see The instrument reports 'Pump Calibration Fail' above).

4.6.1 Removal of the Pump Adapter

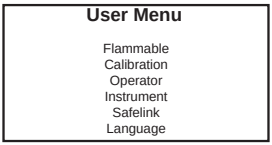
To ease the removal of the Pump Adapter, follow the steps below.

1. Support the end of the Pump Adapter close to the inlet port using the thumb of one hand.
2. Press on the top of the clip using the thumb of the other hand until a click is heard.
3. Lift the Pump Adapter clear of the instrument.



4.7 Menus

While the gas monitoring screen is displayed, pressing the ✓ button will provide access to menus, depending on the model.



Calibration is not permitted until the sensors have warmed-up and been self tested or if the pump is running. If you access the user menu under any of these circumstances the Calibration option will not be available. The Safelink option (where applicable) will not be available when the internal sample pump is running or when the batteries are low (i.e. there is less than 1 bar on the battery indication meter).

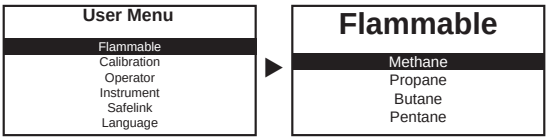
4.7.1 Flammable Gas Selection

For catalytic sensors, it is possible to set the display to read for specific flammable gases. Select the required flammable gas. The instrument will automatically adjust its internal correction factors.

Note that for:

EN50054 100% LEL Methane = 5.0% v/v

EN61779 100% LEL Methane = 4.4% v/v



4.7.1.1 Flammable Cross-Sensitivity Table

Flammable Gas	EN50054 Relative Sensitivity (% of Methane Reading)	EN61779 Relative Sensitivity (% of Methane Reading)
Hydrogen	125	142
Methane	100	100
Ethylene	91	88
Methanol	83	95
Ethane	90	85
Ethanol	67	71
Propane	68	66
Butane	56	59
Pentane	56	63
Octane	42	47

Note

The above data are applicable only to instruments that have catalytic sensors configured to display the Flammable gas in % LEL.

The previous table and the cross-sensitivity feature offered in the Impact and Impact Pro are supplied for indicative purposes only. The following points should be noted when using the table or the software feature.

1. There is variability in sensor cross-sensitivity between methane and other flammable compounds. Therefore, if the instrument is calibrated to Methane (including Enforcer calibrations), the reading when other Flammable gases are selected will be subject to variation.
2. For more accurate detection of non-Methane gases, the Flammable Channel of the instrument should be calibrated to Propane, Pentane or Butane (selectable from the Settings option in the Calibration Menu). In this instance the reading obtained when Methane is selected may be subject to inaccuracy.
3. Maximum accuracy will be obtained by calibrating with the target gas, and is therefore the preferred method.

Target Gas	Recommended Calibration Method
Methane	Enforcer
	UI Calibration (using Methane as the selected calibration gas)
	PC Calibration (using Methane as the selected calibration gas)
Propane	UI Calibration (using Propane as the selected calibration gas)
	PC Calibration (using Propane as the selected calibration gas)
Butane	UI Calibration (using Butane as the selected calibration gas)
	PC Calibration (using Butane as the selected calibration gas)
Pentane	UI Calibration (using Pentane as the selected calibration gas)
	PC Calibration (using Pentane as the selected calibration gas)
Other flammable gases	UI Calibration (using Propane, Butane or Pentane as the selected calibration gas)
	PC Calibration (using Propane or Butane as the selected calibration gas)

4.7.2 Operator

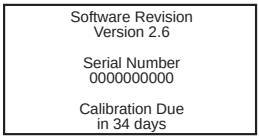
This allows a new operator and/or location to be selected without restarting the instrument.

4.7.3 Calibration

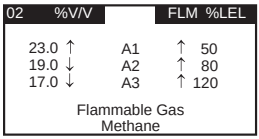
See ***Section 4.9 Calibration*** for full details.

4.7.4 Instrument Details

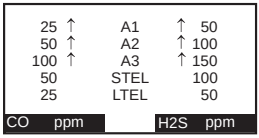
Several screens are available detailing the instrument set-up, such as alarm levels. These can be viewed by pressing the ▲ and ▼ buttons to cycle through them. To access User Menu press ✓ while in monitor mode. Scroll down to highlight Instrument and press ✓ again. Some examples are shown below and these are indicative only. Information shown will vary according to model, country, product application and / or specific requirements.



This information is also available at switch-on of the instrument (see ***Section 3.1*** for details).

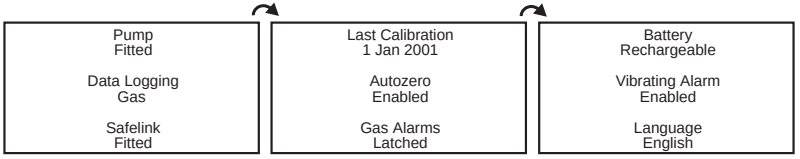


These are the alarm level settings for oxygen and flammable sensors. There are no associated STEL or LTEL alarms for the two gas channels displayed at the top. ↑ indicates a rising alarm and ↓ indicates a falling alarm.

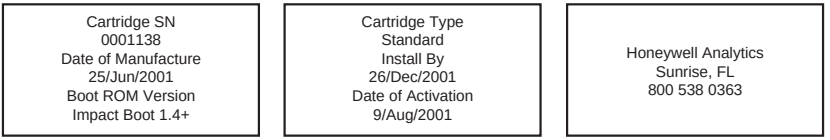


This shows the alarm levels for the toxic sensors.

The following displays indicate whether particular options are fitted and how the instrument is currently configured.



The following additional information is also displayed:



4.7.5 Safelink

For Impact Pro instruments the additional menu for Safelink is available. It is used to initiate communication via Safelink to another Impact Pro instrument.

The Safelink option (where applicable) will not be available in the following situations.

- When the internal sample pump is running.
- When the batteries are low (i.e. there is less than 1 bar on the battery indication meter).

4.7.6 Language

The Impact is supplied pre-loaded with English, French, German, Italian, Spanish and Dutch languages, which can be selected using the ▲, ▼ and ✓ keys of the instrument. In addition one other alternative language can be uploaded to the Impact (currently available are Portuguese, Danish, Swedish, Norwegian and Finnish) using the Impact Configuration Utility (ICU) PC software, which is supplied separately.

4.8 Datalogging

There are two types of datalogging. In both cases the information is accessed by downloading it to a computer using the PC software, which is supplied as part of the Datalogging Kit. The PC software enables this data to be downloaded, stored, printed and analyzed. The data can be exported in a format suitable for use with major spreadsheet software packages. The datalog memory can be automatically cleared after a successful download – note that this will not change any of the alarm levels, instrument settings, or calibration gas settings or values of the instrument. An internal battery will retain the data for 5 years even if the instrument battery is disconnected or the instrument is switched off. Refer to ***Section 4.8.1*** on how to install the PC software.

4.8.1 Installing the PC Software

1. Insert the CD into your CD-ROM drive.
2. From the Impact Series ICU Utility Page, click “Install Impact Configuration Utility”.
3. If the CD does not autorun, click Start, then Run. In the Run dialog box, type *d*:\Documents\ICU\setup.exe, where *d* is the letter assigned to your CD-ROM drive.
4. Click OK, then follow the instructions on your screen.

4.8.2 Event Datalogging

All instruments are supplied complete with event datalogging. This records the time and date whenever an event occurs. When the datalogging memory is full then the earliest data is overwritten. In event mode the datalogging memory can store at least 500 events. An event can be:

- Instrument switch on
- Instrument switch off
- Peak gas reading while switched on
- Any gas alarm (A3, A2, A1, STEL, LTEL)
- Low battery
- Fault

4.8.3 Gas Datalogging

Set-up by the PC software for instruments fitted with this full datalogging option, it enables the instrument to sample at a regular interval (for instance, every 15 seconds).

4.8.4 Output Formats

All the logged data can either be saved to a file with the extension 'imp' for use with the PC Datalogging program or with the extension 'csv' for use with most spreadsheet programs.

Previously, the calibration history, event logging and gas logging was output in a CSV (Comma Separated Variable format) with the file extension '.txt'. Viewing the information in Microsoft Excel®, required following these steps:

1. Open the file using Microsoft Excel®. Note that the 'Files of Type' box must be set to 'All files' to show the files, which have a '.txt' extension.
2. Excel will recognize the format as 'delimited text' and start the 'Text Import Wizard'.
3. For step 1 select 'Delimited'. Then press 'Next'.
4. For step 2, in the Delimiters box, ensure Tab and Commas are enabled. Then press 'Next'.
5. For step 3, ensure Column Data Format is 'General'. Then press 'Finish'.
6. The data will now be shown in consecutive columns, and can be saved, printed and analyzed as required.

Also previously, creating a file, which can be opened directly from Windows Explorer simply by double-clicking on it, required a change to the file extension to '.csv' before downloading and saving the file.

4.9 Calibration

The accuracy of the Impact instrument should be checked with known concentration calibration gas before each day's use. If any sensor fails recalibrate the Impact before using, or replace the cartridge. It is recommended that the instrument be calibrated at least every 6 months. The calibration interval for the CO_2 sensor shall not exceed 1 month.

The Impact instrument provides three methods of calibration, offering flexibility for the user. Flow calibration is the traditional method and can be performed, following instructions displayed on the instrument itself (***Section 4.9.2 Flow Calibration – Instrument***), or when the instrument is connected to a PC via a Base Station, on the PC display (See ***Section 4.9.3 Flow Calibration – PC***). An alternative method for instruments fitted with a combination of oxygen, flammable, carbon monoxide and hydrogen sulfide sensors only is to use the Enforcer accessory. For all other gases the flow calibration method must be used.

CAUTION

Use of non-standard calibration gas and/or calibration components when calibrating the Impact can lead to dangerously inaccurate readings.

The calibration should be carried out in a well-ventilated area to avoid contaminants.

Do not calibrate the electrochemical sensor CO_2 channel if CO_2 is indicated in clean air after the apparatus has been exposed to CO_2 concentrations above the upper limit of the measuring range. In this case leave the instrument in clean air overnight before calibration.

4.9.1 Contaminants

Oxygen sensors may be affected by prolonged exposure to carbon dioxide, and it is recommended the Impact not be subjected to use in atmospheres containing more than 25%v/v carbon dioxide (CO_2). Oxygen sensors may read high in the presence of carbon dioxide.

Flammable sensors may be affected by exposure to Silicone substances; organic phosphorus containing compounds and halogenated organic compounds. Although the flammable sensors used in Impact and Impact Pro have a high resistance to Hydrogen Sulfide (H_2S) poisoning some loss in sensitivity should be expected. Therefore it is strongly recommended repeated gassing with H_2S or gas alarms on the H_2S channel should be followed by checking and if necessary re-calibration of the Flammable sensor. The sensors on average will lose approximately 20% of their sensitivity when subjected to forty applications of H_2S for a period of 1 minute each.

The toxic sensors are designed to be gas specific, minimizing the effects of common cross-interfering gases. The table below summarizes the effect of various gases on the Carbon Monoxide and Hydrogen Sulfide sensors.

Applied Gas	H_2S Response (ppm)	CO Response (ppm)
Acetone (1000 ppm)	0	0
Acetylene (40 ppm)	0	80
Ammonia (50 ppm)	0	0
Carbon Monoxide (50 ppm)	0	50
Carbon Dioxide (5000 ppm)	0	0
Chlorine (0.5 ppm)	0	0
Ethanol (2000 ppm)	0	3
Ethylene (100 ppm)	0	85
Hydrogen (100 ppm)	0	20
Hydrogen Sulfide (10 ppm)	10	0
Iso-Propanol (200 ppm)	0	0
Nitric Oxide (25 ppm)	0	4
Nitrogen Dioxide (3 ppm)	0	0.5
Sulfur Dioxide (2 ppm)	0	0

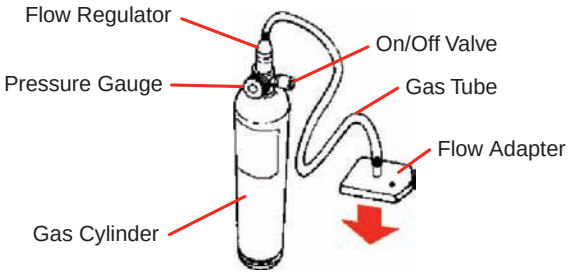
4.9.2 Flow Calibration – Instrument

Note:

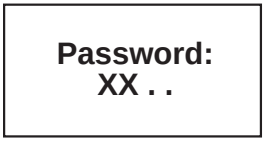
For Cl_2 and NH_3 sensors, see *Section 8 Special Considerations for Cl_2* and *Special Considerations for NH_3* for more information,

The following equipment is required:

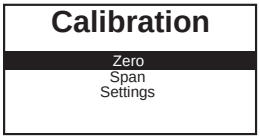
- cylinder of calibration gas (either certified individual gas per sensor or a certified multi-gas mixture)
- flow adapter: ensure that the tubing is fitted to the port marked 'IN' (except for Cl_2 cartridges where the tubing should be fitted to the port marked 'OUT').
- flowmeter/regulator set to 300 ml/min
- tubing



Put the instrument into calibration mode by using the menu. If so configured it will be necessary to enter a password before access to calibration is possible.



The keys must be pressed in the correct sequence, otherwise the password will be rejected. As each key is entered the '.' will be replaced by 'X'.



The calibration procedure requires a zero, followed by a span. The span requires specific concentration of calibration gas that matches those held in the settings. Select the required option.

When performing a flammable span gas concentration the instrument will assume the use of the gas selected. However, after calibration it will revert to the flammable gas that the instrument is set to measure. No intervention by the user is required.

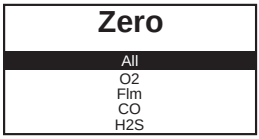
For Methane or Propane calibrations the following conversion should be used.

EN50054 100% LEL Methane = 5.0% v/v
EN50054 100% LEL Propane = 2.0% v/v
EN61779 100% LEL Methane = 4.4% v/v
EN61779 100% LEL Propane = 1.7% v/v

If other values are required, adjustment of the calibration point should be carried out as detailed in ***Section 4.9.2.2 Span***.

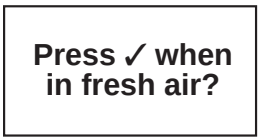
4.9.2.1 Zero

If calibrating the electrochemical CO_2 channel, refer to the CAUTIONS in ***Section 4.9***.



The display will show the sensors fitted in the cartridge, and offer the option to 'hard' zero an individual channel or all four simultaneously. O_2 is automatically highlighted.

Assuming "All" is selected by pressing the ▲ and ✓ keys, the display will show:



The zero must be performed in fresh, uncontaminated air. Alternatively, a supply of compressed air with an oxygen content of 20.9% v/v can be used.

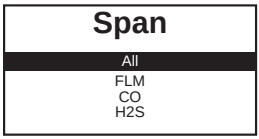
After pressing the ✓ button the instrument will display the following while zeroing the sensor.

Once the zero is complete the instrument will display whether the zero was successful.

or

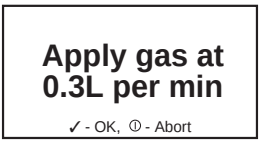
If the zero was unsuccessful repeat the zero ensuring that the instrument is in fresh air. If a second failure occurs contact local service center or Honeywell Analytics for assistance. After a successful zero a span should be performed.

4.9.2.2 Span



The display will show the sensors fitted in the cartridge, and offer the option to span an individual channel or three simultaneously using a gas mix.

Having selected the gas the display will change to show:



Ensure that the Span Calibration Setting matches that of the gas concentration being applied. If not, press the ⏻ button to change the setting. See ***Section 4.9.2.3*** for instructions.

The following table gives the current set allowable range of Span Gas Concentrations:

Gas Type	Allowable Range
Methane (catalytic sensor)	20% LEL to 100% LEL
Carbon Monoxide	50 ppm to 500 ppm
Hydrogen Sulfide	15 ppm to 50 ppm
Carbon Dioxide	0.5% v/v to 2.1% v/v
Chlorine	2 ppm to 10 ppm
Ammonia	10 ppm to 100 ppm

Gas Type	Allowable Range
Sulfur Dioxide	5 ppm to 20 ppm
Nitrogen Dioxide	5 ppm to 20 ppm
Methane (%LEL IR)	20% LEL to 100% LEL
Methane (%v/v IR)	40% v/v to 60% v/v
Carbon Dioxide (%v/v IR)	0.5% v/v to 3% v/v

If calibrating the electrochemical CO_2 channel, turn on the gas 2 minutes before pressing the ✓ button.

After pressing the ✓ button the instrument will display this message while spanning the sensor.

Once the span is complete the instrument will display whether the span was successful.

or

If the span was unsuccessful repeat the span ensuring that the calibration gas used is of the correct concentration, there is sufficient gas in the cylinder and that the flow rate is correct. If a second failure occurs contact local service center or Honeywell Analytics for assistance. If the calibration is successful, the unit will automatically update the next calibration required by date by the predefined calibration interval value (default 180 days).

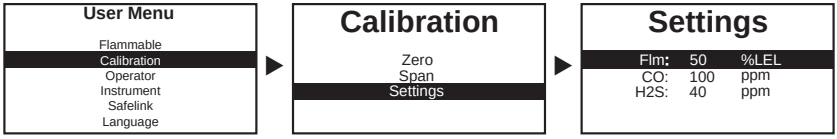
Note:

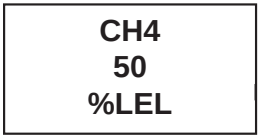
If the 'Hard Zero' is omitted then the calibration is retained only for the current session and the calibration date will not be updated.

4.9.2.3 Calibration Gas Settings

WARNING

Verify that the concentration shown on the calibration gas settings screen is the same as the concentration printed on the label of the calibration gas cylinder that will be used. Using the wrong concentration may cause incorrect adjustment during calibration procedures, and lead to dangerously inaccurate readings during normal operation.

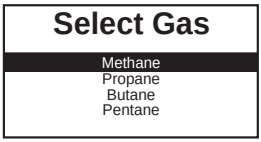




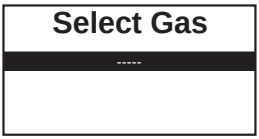
Select the channel to change. The highlighted channel settings can then be altered using the ▲ (increase) and ▼ (decrease) buttons, holding the buttons down to change the setting more rapidly. Press ✓ to store the new settings value.

Assuming catalytic flammable is chosen the instrument will request which calibration gas is being used, irrespective of what the instrument is set to measure.

The calibration gas screen for IR sensors will not display a gas selection as the IR sensors are limited in the selection of flammable gases - See ***Special Notes for IR Sensors*** on page 65.



Catalytic Sensor



IR Sensor

Honeywell Analytics recommends the following calibration gas concentrations:

Gas Type	Concentration
Catalytic Flammable (%LEL):	50% LEL Methane
Flammable (%v/v):	2.5% v/v Methane
Carbon Monoxide:	100 ppm
Hydrogen Sulfide:	40 ppm

Gas Type	Concentration
Carbon Dioxide:	2% v/v
Methane (%LEL IR)	50% LEL Methane
Methane (%v/v IR)	50% v/v Methane
Carbon Dioxide (%v/v IR)	2% v/v

CAUTION

Performing a manual calibration using gases outside these specified values will result in a calibration failure.

4.9.3 Flow Calibration – PC

In addition to the items required for flow adaptor calibration (***Section 4.9.2***), the user will require the Impact Configuration Utility (ICU) PC software, serial cable, Base Station and Power supply. These items can be purchased as part of the Datalogging kit (available separately).

Place the Impact into the Base Station and ensure that the power supply and serial cable are connected. Switch the Impact on, use Impact Configuration Utility (ICU) software to perform calibration.

The instrument will display the readings while the calibration process is occurring and the symbol will be displayed in the center of the display.

Information, such as gas cylinder serial numbers, can also be entered for traceability. Also, calibration reports can be printed.

4.9.4 Enforcer Calibration

This is designed for oxygen, flammable (catalytic or IR LEL sensor), carbon monoxide and hydrogen sulfide, using a special-to-type gas cylinder. It offers quick, simple and safe operation by any user, due to the use of a patented low pressure, low flow rate system.

Note that the Enforcer cylinder contains dangerous gases.

Performing a Calibration Check with Enforcer

To perform a calibration check of your Impact unit using the Enforcer, power the unit on and place it into the Enforcer and follow the on-screen instructions (see ***Section 4.9.4.1 Enforcer On-Screen Instructions***). Then review the peak readings as shown in ***Section 4.1.1 Peak Screen.***

Performing a Bump Test with Enforcer

To perform a bump test of your Impact unit using the Enforcer, power the unit on then place it into the Enforcer and follow the on-screen instructions (See ***Section 4.9.4.1 Enforcer On-Screen Instructions***). A bump test is a check of basic functionality (not a calibration check), so the Impact unit need not remain in the Enforcer for the full ninety seconds; 30 seconds is usually sufficient. Remove the Impact and check that all the fitted sensor channels are showing alarms, and that the visual (red flashing lights) and audible alarms are active.

If there is any doubt about the bump test result, carry out a calibration check as described above, or a full calibration as described below.

Performing full Calibration with Enforcer

Power up the instrument and perform a 'hard zero' (using the zero on the calibration menu - see ***Section 4.9.2.1 Zero***) then follow the steps in ***Section 4.9.4.1***. If the Enforcer calibration is successful, the unit will automatically update the next calibration required by date by the predefined calibration interval value (default 180 days).

Note:

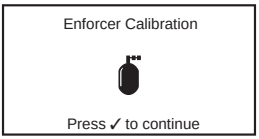
If the 'Hard Zero' is omitted then the calibration is retained only for the current session and the calibration date will not be updated.

4.9.4.1 Enforcer On-Screen Instructions

1. If it is not already fitted, screw the Honeywell Analytics cylinder in tightly (multi-gas mix for Enforcer), check that the pressure gauge shows gas pressure is present, and pull back the instrument drawer.

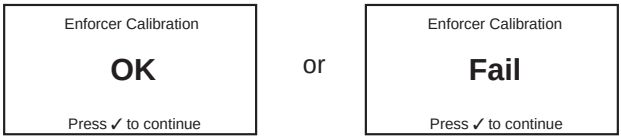
3. Insert the instrument, by tilting at a slight angle, so that the instrument front cover locks under the cover lip in the Enforcer as indicated.
4. Then return the instrument to the vertical. The rear locking mechanism of the Enforcer will retain the instrument. Now close the drawer firmly.

5. The instrument will recognize the Enforcer and display an instruction to press the ✔ button to continue.

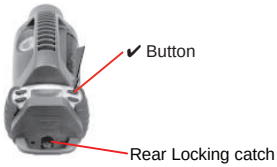


When ✓ is pressed, the user should hear the distinctive ‘click’ of the Enforcer gas delivery solenoid valve.

6. After about 90 seconds the instrument will display either a pass or fail.



7. If the instrument reports a failure then check that the gas cylinder has sufficient pressure. Then repeat once more. Note that the instrument drawer must be opened and then closed to reactivate the Enforcer. If a subsequent failure should occur please have the instrument serviced and calibrated, as it may be due to blocked or dirty filters, or the sensor(s) has failed.
8. When completed and successful remove the instrument by pressing downwards on the rear locking catch and lifting the instrument out. The instrument will activate all its gas alarms as it detects the gas from the cylinder, thereby also performing a bump test.



The cylinder should be removed after use.

The instrument automatically switches to a flammable gas setting of methane while in use with the Enforcer. On completion it will revert to the flammable gas that the instrument is set to measure. No intervention by the user is required.

5. Fault Finding and Procedures

There are two levels of fault within the instrument.

The first level is a warning, from which the user may be able to recover, e.g. a low battery. The user must press the ✓ button to confirm the warning has been seen.

The second level is usually non-recoverable by the user, and in some cases the only action available is to switch the instrument off.

In both cases a warning/fault code number is given with a brief description of the fault, and a contact name/telephone number to enable the user to further assistance if required. Details of the warning and fault codes are given in ***Appendix A***.

6. Accessories

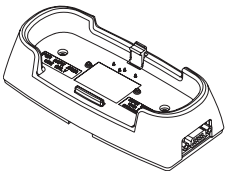
WARNING

Do not attempt to charge the battery pack in the hazardous area.

The following accessories are available for use with Impact Series.

6.1 Base Station

(Part Number: P2302B0800)



This unit provides a smart charging facility for instruments powered by rechargeable NiMH batteries. The instrument is simply inserted into the base station whereby it is fast charged. The instrument controls the charging process and will indicate when it is fully charged, and then change to a trickle charge mode to keep the battery topped up until the instrument is required.

The Base Station also provides a facility to connect the instrument to a PC, for downloading of logged data, viewing or changing instrument configuration information, or as a means of instrument calibration.

Ensure that the instrument is not inserted backwards into the Base Station. Firstly locate the lip at the front of the instrument into the corresponding recess, and then latch the rear catch. To release, pull back the rear catch (see ***Section 2.3 Charge for First Use***).

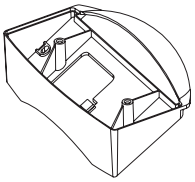
If the instrument is switched on while placed in the Base Station the instrument will not reach full capacity (typically only 85% if switched on for the entire fast charge period).

The Base Station accepts an input of 12VDC to 32VDC.

Base Stations may be daisy-chain linked. See ***Section 6.3 Base Station PSU Link Cable***.

6.2 Base Station Plinth

(Part Number: P2302B0804)



The Base Station can also be mounted on a vertical surface or on a desk by using the optional plinth.

6.3 Base Station PSU Link Cable

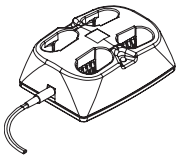
(Part Number: 2302D0821)

Allows Base Stations to be linked together, to a maximum of 5, minimizing cabling and power sockets, and forming a multibank charger.

Daisy-chained linked Base Stations require the use of Power Supply 2302D0787. (Note: this power supply **must not be used** with the Offline Trickle Charger).

6.4 Offline Trickle Charger

(Part Number: 2302B141*x*)



Permits off-instrument charging of 2 or 4 instrument battery packs in 14 hours. It enables 24 hour availability of rechargeable instruments with purchase of additional battery packs.

Battery packs must be charged in pairs. A power supply is included in the trickle charger kit. Specify type when ordering:

UK	EU	US	SAA
X = 4	*X* = 5	*X* = 6	*X* = 7

Example: Trickle Charger for US application = 2302B1416

The red LED indicates the batteries are receiving charge. Please note that the battery packs must be charged in pairs, and may be left inserted indefinitely until required.

WARNING

The standard Power Supply unit must not be used when connecting multiple Base Stations. Overheating of the Power Supply and ultimately failure will result.

6.5 Power Supply for Base Station and Trickle Charger

A range of suitable power adapters is available to power the base station or trickle charger:

	Power Supply	Part Number
	230VAC 50Hz Euro plug format	2302D0816
	230VAC 50Hz UK plug format	2302D0818
	120VAC 60Hz USA plug format	2302D0819
	240VAC 50Hz Australian plug fmt	2302D0820
	12V/24VDC vehicle charger lead	2302D0815

CAUTION

These individual Power Supplies will only supply power to one Base Station or one Trickle Charger.

6.6 Enforcer

(Part Number: 2302B0831 UL Version including gas cylinder)
(Part Number: 2302B1336 ATEX Version including gas cylinder)
(Part Number: 2302B0650 Enforcer only)

This test and calibration accessory is only for use with instruments fitted with any combination of oxygen, flammable (catalytic or IR LEL sensor), carbon monoxide and hydrogen sulfide sensors. Its operation is described in ***Section 4.9.4 Enforcer Calibration***. This is supplied complete with an Enforcer disposable, multigas cylinder.

For EMC/RFI Enforcer is certified to EN 50270:1999 Type 1.

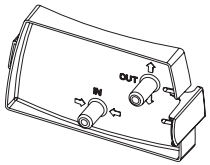
6.7 Enforcer Gas Cylinder

(Part Number: 2302D0833 UL Version, containing 2.5% v/v Methane)
(Part Number: 2302D0761 ATEX Version, containing 2.2% v/v Methane)

The Enforcer requires a gas cylinder with specific concentration values, and a specific valve to maintain the required low pressure and flow rate, which enables the Enforcer to operate quickly and simply.

6.8 Flow Adapter

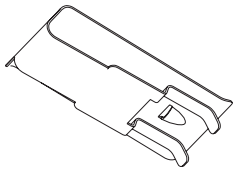
(Part Number: P2302B0810)



Allows aspirator to be fitted to the instrument. It is also used when calibrating using the instrument or a PC. It is colored grey to differentiate it from the pump adapter. See ***Section 6.12 Pump Adapter Kit***.

6.9 Metal Belt Clip

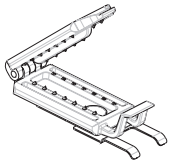
(Part Number: P2302D0826)



Supplied as standard. Enables the instrument to be worn on a belt. Slides into recess at back of unit.

6.10 Instrument Webbing Clip

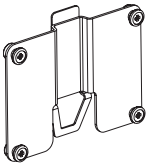
(Part Number: P2302B0382)



Allows the instrument to be clipped to harness webbing.

6.11 Body Harness Kit

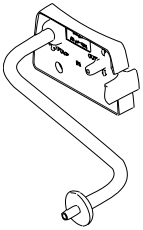
(Part Number: P2302B0822)



Simply clips onto the rear of the instrument. Allows the instrument to be worn on the chest within the breathing zone. Comes with a waist strap and neck strap.

6.12 Pump Adapter Kit

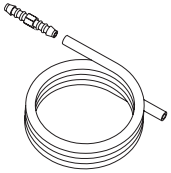
(Part Number: 2302B0814)



When attached to the front of an instrument fitted with a pump, the pump will be automatically activated. Subsequent removal of the adapter will switch the pump off. This maximizes battery life of the instrument, and prolongs the life of the pump. It is colored black to differentiate it from the flow adapter. See ***Section 6.8 Flow Adapter***.

6.13 10m Sample Tube Kit

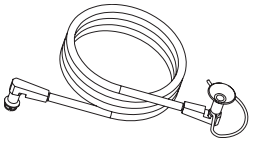
(Part Number: 2302B0828)



Extends the sampling reach of the instrument, and can be used with the hand aspirator or Pump Adapter Kit. Supplied with a coupler it can be extended beyond 10m (30') by purchasing additional kits. The maximum recommended length is 20m and the sample time should be adjusted accordingly.

6.14 Earpiece

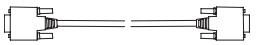
(Part Number: 2302B0841)



For noisy environments the earpiece plugs into the audible aperture, to allow any audible alarms or signals to be heard. The vibrating alarm, if fitted, will still operate. The instrument audible alarm produces a high sound level. Caution should be exercised when using the earpiece.

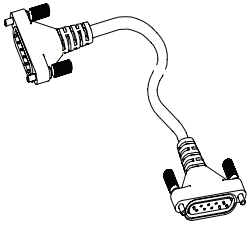
6.15 Base Station PC Link Cable

(Part Number: P2302D0807 RS232 to RS232)
(Part Number: 151-004-555 RS232 to USB)



This is supplied to connect the Base Station to a standard 9-pin D-type RS232 serial port on a PC or laptop, running the ICU software. An RS232 to USB cable is available for PCs not fitted with a serial port.

6.16 Safelink Cable Assembly



This is available in 3 different lengths and allows Safelink enabled instruments to be connected together for communications, see ***Section 4.5 Safelink***.

10m (33') + 2 x Cable Restraints	2302B0735
50m (150') + 2 x Cable Restraints	2302B0737
100m (300') + 2 x Cable Restraints	2302B0746

2302B0746 is supplied with a cable reel and an adapter.

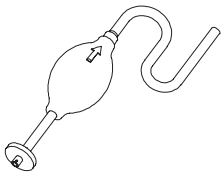
6.17 Safelink Cable Restraint Clip

(Part Number: P2302B0713)

Clips the Safelink cable to a belt to provide a strain relief.

6.18 Hand Aspirator Kit

(Part Number: 2302B0813)



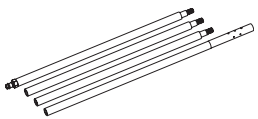
Connects to the flow hood to provide manual aspiration.

The bulb should be squeezed at a rate of once per second, until a stable reading is obtained. As a guideline, the following sample tube lengths will require:

Length m (ft)	Sampling Time (s)
1 (3)	15
5 (15)	20
10 (30)	25
15 (50)	30
30 (100)	40

6.19 Sensing Probe 1m

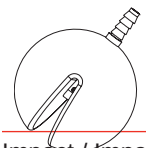
(Part Number: 2302B0847)



Used with the bulb operated hand aspirator or the internal pump if fitted, it allows sampling from above normal height areas or into areas of low accessibility. Ensure that the sections of the sampling probe are tightened to prevent dilution of the sample.

6.20 Ball float

(Part Number: 2302B0846)



Clips to the end of the sampling tube being used, and provides the dual function of preventing liquid entering the instrument and also breaking the surface tension of any liquid to release trapped gas.

7. Routine Maintenance

The Impact Series is designed to operate almost maintenance free under most conditions, except for the need for regular calibration. However, it is recommended that on a regular basis the instrument is cleaned and the filters changed.

7.1 Cleaning

The instrument may need cleaning if exposed to dirty or hostile conditions. This can be easily achieved by wiping over with a damp cloth. Do not use bleaching products or products containing silicon compounds as these can cause damage to the sensors.

7.2 Filters

The Gore-tex filter fitted under the cover grille is manufactured from a water repelling material to protect the sensors from the ingress of water and other contaminants. The life of this filter is dependent on the amount of dust and viscous liquids in the atmosphere. If it becomes dirty (discolored) it will act as a barrier and prevent the diffusion of the atmosphere onto the sensors, and must be replaced. This is easily achieved by removing the cover grille screws (***Section 1.2 Product Overview*** (5)), discarding the old filter and fitting a new filter, using the molded detail to locate it.

Note that for instruments fitted with a chlorine sensor a stainless steel filter (part number P2302D0823) must be used instead of the Gore-tex filter.

7.3 Battery Charging / Replacement

WARNING

Battery Charging and replacement must not be carried out in a hazardous or potentially dangerous area.

A mixture of dry cell and rechargeable battery packs must not be used - the instrument safety system prevents operation in such a situation, and the instrument displays a fault message and activates the audible and visual alarms.

If the instrument is fitted with an electrochemical sensor for CO_2, please refer to the instructions in *Section 8 Charging Procedure for Impact Pro fitted with CO_2 Variant Cartridges*.

INFORMATION

To maintain peak battery performance, Honeywell Analytics strongly recommend that every 4 to 6 months the batteries be fully discharged before recharging. To do this, remove the Impact from the Base Station (if fitted) and switch the Impact on. Leave the Impact to run until it switches off. This may take up to 12 hours depending on the state of charge of the batteries. A Warning 14 (Battery Low) will be generated towards the end of this procedure, which can be acknowledged or ignored. Once the Impact has switched off, fit it into the Base Station and allow the instrument to fully recharge before next use.

In severe cases (e.g. when the instrument has not been used for some time) it may be necessary to repeat this 2 or three times to restore peak battery performance.

Should the batteries in the Impact instrument become excessively discharged (e.g. when unused for some time) there may be occasions when the alarm LEDs and sounder will operate when attempting to switch the instrument on before recharging. In this instance please place the instrument into the powered Base Station and switch the instrument off when Fault 23 is displayed. The Impact will then proceed to charge as normal.

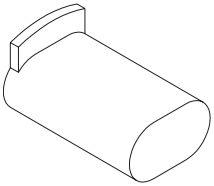
7.3.1 Rechargeable Battery Pack

CAUTION

The rechargeable battery packs are sealed units. Do not attempt to remove the cells from the packs as this will invalidate the safety certification.

Battery packs can be recycled by returning to the nearest Honeywell Analytics Appointed Distributor.

Remove the battery packs if the instrument will not be used for some time.



The Base Station accessory is used to charge rechargeable battery packs, provided it is powered from an appropriate power supply source. The instrument is simply placed in the Base Station, which charges the packs under the control of the instrument.

When first placed in the Base Station all four red LEDs will briefly light, to indicate charging will occur.

While charging, two of the red LEDs will flash at a slow rate. Once fully charged the red LEDs will be switched off and the green LEDs will be constantly lit.

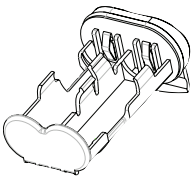
If the instrument is switched on when it is placed in the Base Station the charging progress will be displayed on the instrument.

If a dry-cell instrument is inadvertently placed in the Base Station no damage will occur due to a built-in safety system.

In the event that the rechargeable battery packs needs to be replaced or the dry-cell adapters are to be used to power the instrument, the battery screws (see ***Section 1.2 Product Overview***) are unscrewed using the built-in tool (see ***Section 1.2 Product Overview***) and the sealed units removed. Replacement rechargeable packs are inserted into the compartments and the screws tightened.

The full fast charge time for a pair of fully discharged battery packs is 7 hours indicated by two of the red alarm LEDs flashing approximately every 4 seconds. After this period the instrument will trickle charge the battery packs indefinitely shown by the green LEDs being constantly illuminated. Charging algorithm is based on a timer function so if the charging cycle is interrupted it will be necessary to leave Impact on Base Station for 7 hours to produce steady green LED light

7.3.2 Dry Cell



If dry cells are to be used the specific adapters must be used to comply with certification. Ensure the orientation of the individual cells is correct, and that they are all of the following types:

Duracell® MN1500 or Energizer® E91.

WARNING

Use of any other dry-cell battery will render the intrinsic safety approval of the instrument void.

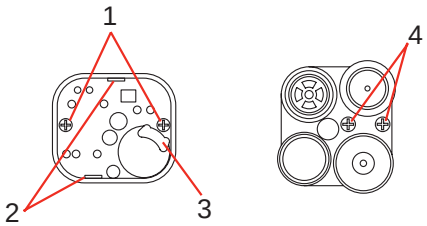
8. Routine Servicing

Apart from the maintenance described in ***Section 7 Routine Maintenance*** the servicing requirements are limited to:

- Calibration
- Changing of the cartridge when required or indicated by the instrument
- Replacing sensors in serviceable cartridges (i.e. non-OFCH combinations where supported by the instrument)

8.1 Serviceable Cartridges

Instruments that support serviceable cartridges can have the individual sensors replaced, instead of replacing the whole cartridge.



The procedure is as follows:

1. Switch the instrument off and remove the cover grille.
2. Unscrew the central cartridge screw and remove the cartridge.
3. On the underneath undo the two screws (1).
4. Lever out the PCB from the locating tabs (2), on the two sides adjacent to the screws. Retain the sensor retainer (3) if fitted.
5. Pull out the PCB.
6. For all sensors except the oxygen, replacing the sensor requires the user to unplug the existing sensor and locate the new sensor in the same position.
7. For the oxygen sensor the two screws (4) must be undone. The tabs of the replacement sensor must be securely screwed to headers. Ensure each sensor tab is secured to the correct header.
8. Replace the PCB in the housing, until it clicks into place.
9. Replace the two screws (1), ensuring the retainer is fitted (3) and insert the cartridge into the instrument.
10. Check the cover grille filter and if necessary replace it.
11. Replace the cover grille and wait at least 20 minutes. Then switch the instrument on.
12. The instrument must be calibrated before use.

Special Notes for Cl_2 Cartridges

It is important that you read all of the notes below before installation or use of your new cartridge.

Installation of your Cl_2 Cartridge

Note

Cartridge Installation or Replacement must never be carried out in a hazardous area.

1. If a cartridge was previously fitted to the Impact Pro into which the Cl_2 cartridge is to be installed, remove the Front Cover Grille using the Allen Key provided in the bottom of the Impact Pro. Unscrew the fixing in the center of the cartridge and lift the cartridge from the Impact Pro.
2. Place the Cl_2 cartridge into the Impact Pro and screw the cartridge fully home using the Allen Key. Guide the cartridge if necessary using your fingers to ensure that it is seated correctly.
3. Replace the Pump Seal with the one provided with your cartridge.
4. Remove the existing Filter Assembly from the inside of the Front Cover Grille by peeling it away. Take the Stainless Steel Filter assembly (supplied in the Cartridge Kit) and remove the protective backing paper. Locate the Filter assembly onto the locating pegs on the inside of the Front Cover Grille and lightly press around the edge of the gasket to secure.
5. Replace the Front Cover Grille and refit the Allen Key into the bottom of the Impact Pro.
6. To complete installation of the cartridge allow at least 20 minutes before operating the Impact Pro.
7. After this period of time switch the Impact Pro on and accept the New Configuration when prompted to do so.

Using your Cl_2 Cartridge

Please ensure that the following points are noted when the cartridge is in service.

1. Always use PTFE tubing (maximum length of 500mm) and a flow rate of 500ml/min when calibrating the Cl_2 channel.
2. Apply all gases to the port marked OUTLET (not INLET) on the Flow Housing.
3. With regard to the actual sensors fitted, please perform span calibrations on the sensors of the Impact Pro cartridge in the following order: Cl_2, NH_3, H_2S, CO, Flammable.
4. When performing a Span Calibration on the Cl_2 channel,it is good practice to flow Cl_2 calibration span gas through connected tubing for a minimum of 15 minutes without the flow adapter fitted to the Impact Pro before attempting a span calibration. Failure to do so may result in a false calibration of the Cl_2 channel.
5. Do not apply Span Calibration gas to the Impact Pro for greater than 5 minutes. Again failure to do so may result in a false calibration of the Cl_2 channel.
6. This cartridge is not suitable for pumped mode operation.
7. Due to the open nature of the Stainless Steel filter, there is a greater risk of water damage occurring to the instrument. Every attempt should be made to keep the instrument dry.
8. Refer to the CAUTION given in ***Section 1.1*** of this manual for details on recommended daily checks on your gas detector.

Applied Gas	Effect on CO Sensor	Effect on H_2S Sensor	Effect on CO_2 Sensor**	Effect on Cl_2 Sensor	Effect on NH_3 Sensor	Effect on SO_2 Sensor
CO (100 ppm)	100 ppm	0 ppm	0% v/v	0 ppm	35 ppm	1 ppm
H_2S (40 ppm)	0 ppm	40 ppm	0% v/v	-25 ppm[1]	50 ppm	1 ppm
CO_2 (0.5% v/v)	0 ppm	0 ppm	0.5% v/v	0 ppm	0 ppm	TBA
Cl_2 (5 ppm)	0 ppm	0 ppm	0% v/v	5 ppm	0 ppm	-2 ppm[1]
NH_3 (50 ppm)	0 ppm	0 ppm	0% v/v	-2 ppm[1]	50 ppm	TBA
Hydrogen (1000 ppm)	200 ppm	0 ppm	0% v/v	TBA	35 ppm	TBA
SO_2 (10 ppm)	0 ppm	0 ppm	0% v/v	2 ppm	0 ppm	10 ppm

[1] Reading displayed as -0ppm.

** Electrochemical CO_2 cell only

Special Notes for NH_3 Cartridges

It is important that you read all of the notes below before installation or use of your new cartridge.

Installation of your NH_3 Cartridge

To install the cartridge, follow the instructions below.

Note

Cartridge Installation or Replacement must never be carried out in a hazardous area.

1. If a cartridge was previously fitted to the Impact Pro into which the NH_3 cartridge is to be installed, remove the Front Cover Grille using the Allen Key provided in the bottom of the Impact Pro. Unscrew the screw in the center of the cartridge and lift the cartridge from the Impact Pro.
2. Place the NH_3 cartridge into the Impact Pro and screw the cartridge fully home using the Allen Key. Guide the cartridge if necessary using your fingers to ensure that it is seated correctly.
3. Replace the Pump Seal with the one provided with your cartridge and replace the Front Cover. Refit the Allen Key into the bottom of the Impact Pro.
4. Allow 20 minutes for the sensors to stabilize before first use.
5. To complete installation of the cartridge, switch the Impact Pro on and accept the New Configuration when prompted to do so.

Using your NH_3 Cartridge

Please ensure that the following points are noted when the cartridge is in service.

1. The Ammonia channel has an extended warm-up time. Although the other channels of the cartridge will be reading correctly, the detector should not be used to measure Ammonia until the 'warm up' message has disappeared.
2. The operating temperature range of the cartridge defaults to that of the lowest sensor fitted. For NH_3 this is -20°C to +40°C.
3. Always use PTFE tubing (maximum length of 500mm) when calibrating the NH_3 channel.
4. When performing a Span Calibration on the NH_3 channel it is good practice to flow NH_3 calibration span gas through connected tubing for a minimum of 15 minutes without the flow adapter fitted to the Impact Pro before attempting a span calibration. Failure to do so may result in a false calibration of the NH_3 channel.
5. The accuracy of the instrument must be checked with known concentration calibration gas before each day's use. If any sensor fails, recalibrate the Impact Pro before using or alternatively replace the cartridge. Please refer to ***Section 4.9*** on general instructions on how to calibrate.
6. Apply calibration span gas at a rate of 300 ml/min for a period of 5 minutes before starting the span calibration on the sensor.
7. With regard to the actual sensors fitted, please perform span calibrations on the sensors of the Impact Pro cartridge in the following order: Cl_2, NH_3, H_2S, CO, Flammable.
8. Purge the system with air for a period of 15 minutes between Cl_2 and NH_3 calibrations to avoid interaction between these two gases.

9. The sensors fitted to Impact Pro may give responses to gases other then the target gas. The table below gives typical sensor responses to various gases and should be used as a guide only. Note: Always use the target gas to perform sensor calibrations.
10. Your attention is drawn to the cross-sensitivity of the NH_3 sensor in the presence of H_2S. This is normal operation and is due to the chemistry of the NH_3 sensor.

Applied Gas	Effect on CO Sensor	Effect on H_2S Sensor	Effect on CO_2 Sensor**	Effect on Cl_2 Sensor	Effect on NH_3 Sensor	Effect on SO_2 Sensor
CO (100 ppm)	100 ppm	0 ppm	0% v/v	0 ppm	35 ppm	1 ppm
H_2S (40 ppm)	0 ppm	40 ppm	0% v/v	-25 ppm[1]	50 ppm	1 ppm
CO_2 (0.5% v/v)	0 ppm	0 ppm	0.5% v/v	0 ppm	0 ppm	TBA
Cl_2 (5 ppm)	0 ppm	0 ppm	0% v/v	5 ppm	0 ppm	-2 ppm[1]
NH_3 (50 ppm)	0 ppm	0 ppm	0% v/v	-2 ppm[1]	50 ppm	TBA
Hydrogen (1000 ppm)	200 ppm	0 ppm	0% v/v	TBA	35 ppm	TBA
SO_2 (10 ppm)	0 ppm	0 ppm	0% v/v	2 ppm	0 ppm	10 ppm

[1] Reading displayed as -0ppm.
** Electrochemical CO_2 cell only

Special Notes for SO_2 Cartridges

It is important that you read all of the notes below before installation or use of your new cartridge.

Installation of your SO_2 Cartridge

Note

Cartridge Installation or Replacement must never be carried out in a hazardous area.

1. If a cartridge was previously fitted to the Impact Pro into which the SO_2 cartridge is to be installed, remove the Front Cover Grille using the Allen Key provided in the bottom of the Impact Pro. Unscrew the screw in the center of the cartridge and lift the cartridge from the Impact Pro.
2. Place the SO_2 cartridge into the Impact Pro and screw the cartridge fully home using the Allen Key. Guide the cartridge if necessary using your fingers to ensure that it is seated correctly.
3. Replace the Pump Seal with the one provided with your cartridge and replace the Front Cover. Refit the Allen Key into the bottom of the Impact Pro.
4. Allow 20 minutes for the sensors to stabilize before first use.
5. To complete installation of the cartridge, switch the Impact Pro on and accept the New Configuration when prompted to do so.

Using your SO_2 Cartridge

1. Please ensure that the following points are noted when the cartridge is in service.
2. The operating temperature range of the cartridge defaults to that of the lowest sensor fitted.
3. Always use PTFE tubing (maximum length of 500mm) when calibrating the SO_2 channel.
4. When performing a Span Calibration on the SO_2 channel it is good practice to flow SO_2 calibration span gas through connected tubing for a minimum of 15 minutes without the flow adapter fitted to the Impact Pro before attempting a span calibration. Failure to do so may result in a false calibration of the SO_2 channel.
5. The accuracy of the instrument must be checked with known concentration calibration gas before each day's use. If any sensor fails, recalibrate the Impact Pro before using or alternatively replace the cartridge. Please refer to ***Section 4.9*** on general instructions on how to calibrate.
6. Apply calibration span gas at a rate of 300 ml/min for a period of 1 minute before starting the span calibration on the sensor.
7. With regard to the actual sensors fitted, please perform span calibrations on the sensors of the Impact Pro cartridge in the following order: Cl_2, NH_3, H_2S, SO_2, CO, Flammable.
8. If the cartridge contains either NH_3 or H_2S sensors purge the system with air for a period of 15 minutes between NH_3 or H_2S and SO_2 calibrations to avoid interaction between these gases.

9. The sensors fitted to Impact Pro may give responses to gases other then the target gas. The table below gives typical sensor responses to various gases and should be used as a guide only. Note: Always use the target gas to perform sensor calibrations.

Applied Gas	Effect on CO Sensor	Effect on H_2S Sensor	Effect on CO_2 Sensor**	Effect on Cl_2 Sensor	Effect on NH_3 Sensor	Effect on SO_2 Sensor
CO (100 ppm)	100 ppm	0 ppm	0% v/v	0 ppm	35 ppm	1 ppm
H_2S (40 ppm)	0 ppm	40 ppm	0% v/v	-25 ppm[1]	50 ppm	1 ppm
CO_2 (0.5% v/v)	0 ppm	0 ppm	0.5% v/v	0 ppm	0 ppm	TBA
Cl_2 (5 ppm)	0 ppm	0 ppm	0% v/v	5 ppm	0 ppm	-2 ppm[1]
NH_3 (50 ppm)	0 ppm	0 ppm	0% v/v	-2 ppm[1]	50 ppm	TBA
Hydrogen (1000 ppm)	200 ppm	0 ppm	0% v/v	TBA	35 ppm	TBA
SO_2 (10 ppm)	0 ppm	0 ppm	0% v/v	2 ppm	0 ppm	10 ppm

[1] Reading displayed as -0ppm.

** Electrochemical CO_2 cell only

Special Notes for Electrochemical CO_2 Cartridges

It is important that you read all of the notes below before installation or use of your new cartridge.

Installation of your electrochemical CO_2 Cartridge

The cartridge is supplied on a Bias PCB to ensure that the sensor is ready to use when installed.

To install the cartridge, follow the instructions below.

Note

Cartridge Installation or Replacement must never be carried out in a hazardous area.

1. If a cartridge was previously fitted to the Impact Pro into which the CO_2 cartridge is to be installed, remove the Front Cover grille using the Allen Key provided in the bottom of the Impact Pro. Unscrew the screw in the center of the cartridge and lift the cartridge from the Impact Pro.
2. Again using the Allen Key provided in the base of the Impact Pro instrument, unscrew the screw in the center of the new CO_2 cartridge. Do not attempt to remove the screw from the bottom of the Bias PCB. Remove the Bias PCB from the Cartridge.
3. Place the CO_2 cartridge into the Impact Pro and screw the cartridge fully home using the Allen Key. Guide the cartridge if necessary using your fingers to ensure that it is seated correctly.
4. Replace the Pump Seal with the one provided with your cartridge and replace the Front Cover. Refit the Allen Key into the bottom of the Impact Pro.
5. To complete installation of the cartridge, switch the Impact Pro on and accept the New Configuration when prompted to do so. Note: This must be done immediately after installation in order to maintain correct bias on the CO_2 sensor.
6. Allow 20 minutes for the sensors to stabilize before use. Note that the Impact Pro may be in alarm condition during this time.

Using your Electrochemical CO_2 Cartridge

Please ensure that the following points are noted when the cartridge is in service.

1. Always keep the instrument batteries charged or keep fresh alkaline cells fitted when the cartridge is installed. Never allow the batteries to become drained.
2. The operating temperature range of this cartridge is 0°C to +40°C. Do not use the cartridge outside this range. The cartridge may be stored safely at temperatures down to -10°C.

3. The CO_2 sensor is suitable for use in barometric pressures of 1013mBar ± 10%. Over this pressure range, the reading is directly proportional to barometric pressure.
4. The calibration interval for the CO_2 sensor shall not exceed 1 month. Owing to the characteristics of the CO_2 sensor a significant increase of reading can be expected at temperatures below +10°C, and a significant decrease at temperatures above +30 °C. To ensure safe operation, always calibrate the instrument between +10 °C and +30 °C.
5. The accuracy of the instrument must be checked with known concentration calibration gas before each day's use. If any sensor fails, recalibrate the Impact Pro before using or replace the cartridge.
6. The sensors fitted to Impact Pro may give responses to gases other then the target gas. The table below gives typical sensor responses to various gases and should be used as a guide only. Note: Always use the target gas to perform sensor calibrations.

Applied Gas	Effect on CO Sensor	Effect on H_2S Sensor	Effect on CO_2 Sensor**	Effect on Cl_2 Sensor	Effect on NH_3 Sensor	Effect on SO_2 Sensor
CO (100 ppm)	100 ppm	0 ppm	0% v/v	0 ppm	35 ppm	1 ppm
H_2S (40 ppm)	0 ppm	40 ppm	0% v/v	-25 ppm[1]	50 ppm	1 ppm
CO_2 (0.5% v/v)	0 ppm	0 ppm	0.5% v/v	0 ppm	0 ppm	TBA
Cl_2 (5 ppm)	0 ppm	0 ppm	0% v/v	5 ppm	0 ppm	-2 ppm[1]
NH_3 (50 ppm)	0 ppm	0 ppm	0% v/v	-2 ppm[1]	50 ppm	TBA
Hydrogen (1000 ppm)	200 ppm	0 ppm	0% v/v	TBA	35 ppm	TBA
SO_2 (10 ppm)	0 ppm	0 ppm	0% v/v	2 ppm	0 ppm	10 ppm

[1] Reading displayed as -0ppm.

** Electrochemical CO_2 cell only

Charging Procedure for Impact Pro fitted with CO_2 Variant Cartridges

If using Rechargeable Ni-MH Battery Packs, charging should always be carried out with the batteries removed from the instrument. This can be achieved by using the Honeywell Analytics Off-Line Charger. Part numbers of the chargers are given in ***Section 6 Accessories***.

1. Remove the exhausted batteries using the special tool found in the base of the instrument.
2. Immediately place the instrument, with the batteries removed, onto the Base Station, which is connected to a Power Supply Unit (PSU). This will ensure that the CO_2 sensor is correctly biased while the Battery Packs are not present. Alternatively, fit fully charged batteries.
3. Place the exhausted batteries into the Off-Line Charger, ensuring that they are charged in pairs (one each side of the red 'Charge' LED). The Off-Line Charger can accept two pairs (4 total) of Rechargeable Battery Packs. The red 'Charge' LED will illuminate while the batteries as present.
4. After charging is complete (12 hours minimum), remove the Battery Packs

from the Off-Line Charger. Remove the instrument from the Base Station and insert the Battery Packs. Tighten the retaining screw using the special tool.

5. The instrument is now ready for use.

Note:

The instrument does not have to be switched on during this procedure, however if it is switched on a Warning 105 (see *Appendix A*) will be shown. This should be accepted. In addition Fault 23 may be reported when the instrument is removed from the Base Station. If this occurs, the instrument should be switched off and back on again to reset the instrument.

Using Alkaline Dry Cells

If using Alkaline Cells (Duracell® MN1500 or Energizer® E91) and they require replacing, ensure that the batteries are not left out of the instrument for more than 15 minutes. This is to ensure correct biasing of the electrochemical CO_2 sensor.

WARNING

The following points should be noted.

1. **The Bias PCB supplied with your electrochemical CO_2 sensor contains a non-rechargeable lithium battery. Do not attempt to recharge the battery under any circumstances.**
2. **Do not reuse the Bias PCB.**
3. **Do not destroy the Bias PCB in fire.**
4. **Dispose of the Bias PCB and cartridge packaging in accordance with Local Regulations.**

Special Notes for NO_2 Cartridges

It is important that you read all of the notes below before installation or use of your new cartridge.

Installation of your NO_2 Cartridge

Note

Cartridge Installation or Replacement must never be carried out in a hazardous area.

1. If a cartridge was previously fitted to the Impact Pro into which the NO_2 cartridge is to be installed, remove the Front Cover Grille using the Allen Key provided in the bottom of the Impact Pro. Unscrew the screw in the center of the cartridge and lift the cartridge from the Impact Pro.
2. Place the NO_2 cartridge into the Impact Pro and screw the cartridge fully home using the Allen Key. Guide the cartridge if necessary using your fingers to ensure that it is seated correctly.
3. Replace the Pump Seal with the one provided with your cartridge and replace the Front Cover. Refit the Allen Key into the bottom of the Impact Pro.
4. Allow 20 minutes for the sensors to stabilize before first use.
5. To complete installation of the cartridge, switch the Impact Pro on and accept the New Configuration when prompted to do so.

Using your NO_2 Cartridge

Please ensure that the following points are noted when the cartridge is in service.

1. The operating temperature range of the cartridge defaults to that of the lowest sensor fitted. The temperature range of the NO_2 Sensor is -20°C to +50°C.
2. Always use PTFE tubing (maximum length of 500mm) when calibrating the NO_2 channel.
3. When sampling remotely (i.e. using the internal sample pump or hand aspirator together with tubing) users should be aware of increased sample times. For NO_2 the sample time will increase by approximately 90 seconds for every 10m of tubing used.
4. When performing a Span Calibration on the NO_2 channel it is good practice to flow NO_2 calibration span gas through connected tubing for a minimum of 15 minutes without the flow adapter fitted to the Impact Pro before attempting a span calibration. Failure to do so may result in a false calibration of the NO_2 channel.
5. The accuracy of the instrument must be checked with known concentration calibration gas before each day's use. If any sensor fails, recalibrate the Impact Pro before using or alternatively replace the cartridge. Please refer to ***Section 4.9*** on general instructions on how to calibrate.
6. Apply calibration span gas at a rate of 300 ml/min for a period of 1 minute before starting the span calibration on the sensor.
7. With regard to the actual sensors fitted, please perform span calibrations on the sensors of the Impact Pro cartridge in the following order: Cl_2, NH_3, H_2S, NO_2, SO_2, CO, Flammable.
8. If the cartridge contains NH_3, H_2S or Cl_2 sensors purge the system with air

for a period of 15 minutes between NH_3, H_2S or Cl_2 and NO_2 calibrations to avoid interaction between these gases.

9. The sensors fitted to Impact Pro may give responses to gases other then the target gas. The table below gives typical sensor responses to various gases and should be used as a guide only. Note: Always use the target gas to perform sensor calibrations.

Applied Gas	Effect on CO Sensor	Effect on H_2S Sensor	Effect on CO_2 Sensor**	Effect on Cl_2 Sensor	Effect on NH_3 Sensor	Effect on SO_2 Sensor	Effect on NO_2 Sensor
CO (100 ppm)	100 ppm	0 ppm	0% v/v	0 ppm	35 ppm	1 ppm	0 ppm
H_2S (40 ppm)	0 ppm	40 ppm	0% v/v	-25 ppm[1]	50 ppm	1 ppm	-3.2 ppm[1]
CO_2 (0.5% v/v)	0 ppm	0 ppm	0.5% v/v	0 ppm	0 ppm	TBA	TBA
Cl_2 (5 ppm)	0 ppm	0 ppm	0% v/v	5 ppm	0 ppm	-2 ppm[1]	5 ppm
NH_3 (50 ppm)	0 ppm	0 ppm	0% v/v	-2 ppm[1]	50 ppm	TBA	TBA
Hydrogen (1000 ppm)	200 ppm	0 ppm	0% v/v	TBA	35 ppm	TBA	TBA
SO_2 (10 ppm)	0 ppm	0 ppm	0% v/v	2 ppm	0 ppm	10 ppm	0 ppm
NO_2 (10 ppm)	0 ppm	0 ppm	0% v/v	0 ppm	-5 ppm[1]	-10 ppm[1]	10 ppm

[1] Reading displayed as -0ppm.

** Electrochemical CO_2 cell only

Special Notes for IR Sensors

The Impact Pro IR offers many benefits that enable the user to achieve drift-free operation and longer-term stability, when compared with catalytic bead (pellistor) or photo ionization detectors (PID). IR sensors are immune to poisons such as silicones that can contaminate Catalytic sensor types. IR sensors can detect hydrocarbon gas levels in the absence of oxygen (O_2), which cannot be achieved with catalytic bead sensors. Typical applications would be to measure hydrocarbon gases under nitrogen storage blankets or other inert atmospheres. IR sensors generally enable users to achieve their application requirements with an overall lower cost of ownership

There are three (3) types of infrared sensor that can be fitted; two for flammable gas (%LEL and %Vol options), and the third for Carbon Dioxide (CO_2). Only one IR sensor can be installed per cartridge. Both IR flammable sensors are calibrated for methane, although they will be sensitive to many hydrocarbon gases. Please note the following:

Hydrogen (H_2) cannot be detected using the IR principle.

By default, no alarms are provided for the 0-100%/Volume IR sensor. The user can setup alarm levels via the ICU software.

WARNING

All IR sensor cartridges require a modified Impact Pro IR cartridge bay, which is designated as modification state 15. If not present, this modification must be performed by your authorized Honeywell Analytics Service Center. Failure to do this may lead to physical damage when attempting to insert the new IR sensor cartridge and will not be covered by warranty.

CAUTION

Infrared sensors for flammable gases cannot detect hydrogen (H_2). If the environment is suspected of containing combustible levels of hydrogen, a cartridge that uses a standard catalytic bead sensor should be used with the Impact Pro instead.

CAUTION

Any electrochemical sensors in this cartridge cannot operate accurately in oxygen deficient environments and should not be used for continuous monitoring in inert atmospheres.

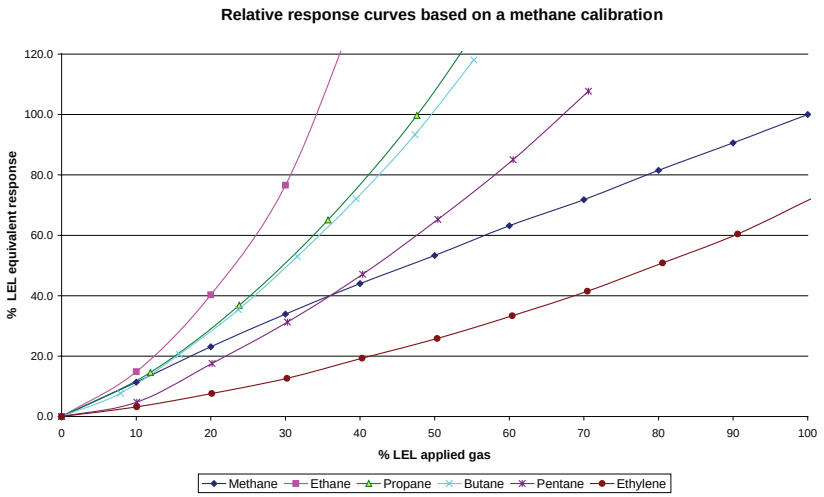
Compatibility

i) The settings for the new IR sensor are stored in the smart cartridge. Those cartridges that house the new IR sensors have a slightly modified internal arrangement. Existing Impact Pro models will need to be returned to an approved service center to make sure the firmware is current and to get updated certification and notification labels applied. In addition, earlier models of Impact Pro will have to have modification of the cartridge-mounting boss. New Impact Pro IR units ordered will be configured with the appropriate labelling prior to shipment (see part numbers below). Contact your approved Honeywell Analytics Service Center for full details of this modification.

   2302B20009UE - Impact Pro IR version, certified UL/CSA only
   2302B10009BER - Impact Pro IR version, certified ATEX only

ii) The flammable (%LEL or %V/V) IR sensors are factory calibrated to respond

linearly to methane (CH_4). Response to other hydrocarbons is non-linear and the Impact Pro IR will not display corrected values for other hydrocarbon gases. The Impact Pro IR will generally (but not always) give a higher reading for heavy hydrocarbons than for methane. See the plot below for more details



The following tables are provided as reference:

Table 1 below shows the concentrations required to achieve the three alarm levels, using the factory default (methane) settings:

TABLE 1	A1	A2	A3
Methane	10	20	50
Ethane	8	12	23
Propane	10	15	30
Butane	10	15	30
Pentane	16	22	42
Ethylene	28	42	80

Table 2 below shows the adjusted alarm settings (using the ICU) to achieve alarms at the usual points:

TABLE 2	A1	A2	A3
Methane	10	20	50
Ethane	15	40	n/a
Propane	10	26	n/a
Butane	10	26	100
Pentane	4	15	62
Ethylene	3	6	23

iii) The %V/V version of the IR methane sensor is supplied with alarm levels not set; alarm levels can be applied using the ICU PC software.

iv) Impact Configuration Utility (ICU) PC software prior to version 3.0 will allow the user to select alternative flammable gases. These alternative settings are not appropriate for IR sensors. It is the user's responsibility to ensure that the flammable gas settings are not changed from methane for IR flammable sensor cartridges.

The latest version of this utility (3.0 or later) is designed for this IR series. This revised version of this utility provides for the IR gases and ranges and prevents selection of Hydrocarbon gases other than Methane, as could be done with the standard Impact employing a catalytic bead. The operator must ensure that if an IR flammable cartridge is fitted, only the new ICU (3.0 or later) is utilized for Downloading/Uploading of the instrument. Check with Honeywell Analytics that you have the appropriate version of the ICU software.

v) STEL and LTEL readings are not available from the infrared CO_2 sensor; therefore STEL and LTEL alarms are not implemented.

Calibration

Only methane %LEL IR sensors can be calibrated using the Enforcer calibration accessory. Methane %V/V and CO_2 IR sensors can be calibrated only by using a separate cylinder and regulator. Contact Honeywell Analytics for full details of calibration gases and accessories.

When performing a calibration (other than with an Enforcer) the gas flow should be started 30 seconds before starting the span calibration sequence.

9. Spare Parts

The following spare parts are available from Honeywell Analytics authorized Service Centers, in addition to the accessories listed in ***Section 6 - Accessories***.

Part Number	Description
Lumidor Spares and Consumables	
2302B0845	In-Line Filter - Package of 10
2302B0866	Cartridge Seal Kit - Package of 10
2302B1307	Impact Pump Seal / Filter - Package of 10
2302B1308	Impact Grille Filter - Package of 10
2302B1309	Impact Sounder Seal / Filter - Package of 10
2302B1317	O-Ring Service Kit - Package of 10
P2302D0823	Spare Stainless Steel Grille Filter for Chlorine Instruments
402-190-070	Replacement 7" Hose
2302D0729	Replacement In-Line Filter
2302B2016	Dry Cell Battery Holder - Package of 2
2302B0809	Pump Adapter
2302B1310	Pump Blank
P2302B0713	Safelink Cable Clip
P2302B0810	Flow Adapter Assembly
2302B2017	Front Cover Grille Assembly
2302B0809	Pump Adapter
2302B1091	Replacement Pump and Seal Kit (including firmware upgrade and instructions)
2302D0744K	Replacement Communication Port Covers - Package of 10
2302B1384	Kit of 10 Allen Wrenches
Replacement Sensors	
052-002-035	Sulfur Dioxide
052-002-044	Nitrogen Dioxide
052-002-027	Ammonia
2125B1004	Carbon Dioxide (SureCell electrochemical)
2115B4530	Oxygen
2118B0106	Flammable (catalytic)
2119B1000	Hydrogen Sulfide
2119B1001	Carbon Monoxide
2119B1002	Chlorine
2302B0769	Toxic Blank Cell - Package of 10
2302B1081	Flammable %LEL (IR)
2302B1082	Flammable %Vol (IR)
2302B1083	Carbon Dioxide %Vol (IR)

Part Number	Description
Neotronics Spares and Consumables	
2302B0845	In-Line Filter - Package of 10
2302B0866	Cartridge Seal Kit - Package of 10
2302B1307	Impact Pump Seal / Filter - Package of 10
2302B1308	Impact Grille Filter - Package of 10
2302B1309	Impact Sounder Seal / Filter - Package of 10
2302B1317	O-Ring Service Kit - Package of 10
P2302D0823	Spare Stainless Steel Grille Filter for Chlorine Instruments
402-190-070	Replacement 7" Hose
2302D0729	Replacement In-Line Filter
2302B0770	Dry Cell Battery Holder - Package of 2
2302B0809	Pump Adapter
2302B1310	Pump Blank
P2302B0713	Safelink Cable Clip
P2302B0810	Flow Adapter Assembly
2302B2017	Front Cover Grille Assembly
2302B0809	Pump Adapter
2302B1091	Replacement Pump and Seal Kit (including firmware upgrade and instructions)
2302D0744K	Replacement Communication Port Covers - Package of 10
2302B1384	Kit of 10 Allen Wrenches
Replacement Sensors	
052-002-035	Sulfur Dioxide
052-002-044	Nitrogen Dioxide
052-002-027	Ammonia
2125B1004	Carbon Dioxide (SureCell electrochemical)
2115B4530	Oxygen
2118B0106	Flammable (catalytic)
2119B1000	Hydrogen Sulfide
2119B1001	Carbon Monoxide
2119B1002	Chlorine
2302B0769	Toxic Blank Cell - Package of 10
2302B1081	Flammable %LEL (IR)
2302B1082	Flammable %Vol (IR)
2302B1083	Carbon Dioxide %Vol (IR)

Note

In order to meet Certification Requirements, fit only Honeywell Analytics component approved flammable sensor.

10. Glossary

BASEEFA	British Approvals Service for Electrical Equipment in Flammable Atmospheres – UK Safety Certification
Bump Test	Check of basic functionality by exposure to test gas, resulting in a gas indication or alarm condition.
Catalytic Sensor	For detection of combustible gases. These are made of an electrically heated platinum wire coil, covered first with a ceramic base such as alumina and then with a final outer coating of palladium or rhidium catalyst dispersed in a substrate of thorium.
CE	Indicates compliance to all relevant European directives
Cell	An individual sensor
CENELEC	Comite Europeen de Normalisation Electrotechnique – European Safety Certification
COSHH	Control of Substances Hazardous to Health
CSA	Canadian Standards Association
dBA	Decibels, relative to the A weighting scale (as perceived by the human ear).
Electrochemical Sensor	A gas sensitive electrode, formed by a permeable membrane and special electrolyte.
EMC	Electromagnetic compatibility.
ESD	Electrostatic discharge.
Gas Analyser	Normally refers to equipment used to measure extremely small concentrations of gas (low or sub ppm) or one specific gas in the presence of several others.
Gas Detector or Monitor	Refers to equipment designed to alert the user to potentially hazardous concentrations of gas in the monitored atmosphere.
Hard Zero	When a hard zero is performed using either the built-in calibration menu or the PC software then any adjustments will remain in place when the instrument is turned off. Performing a hard zero followed by an Enforcer calibration, instrument menu span or PC calibration will adjust the calibration and change the calibration due date.

Hazardous Areas	Areas where there is the possibility of the presence of an explosive mixture of flammable gas or vapor and air are known as 'Hazardous' and other areas as 'safe' or 'non-hazardous'. Any electrical equipment used in hazardous areas must be tested and approved to ensure that, in use even under fault conditions, it can not cause an explosion.
	In Europe, hazardous areas are defined as follows:
	Zone 0: An area where an explosive mixture is likely to be present at all times, under normal operating conditions.
	Zone 1: An area where an explosive mixture is likely to occur in normal operation.
	Zone 2: An area where an explosive mixture is not likely to occur in normal operation, and if it does it is only for short periods.
	In the US, hazardous areas are classified in 2 divisions:
	Division 1: Equates to Zone 0 and Zone 1
	Division 2: Equates to Zone 2
Intrinsically safe	Approval by an appropriate authority to use the instrument in hazardous area.
IP	Ingress Protection – a measure of protection against the ingress of dust and water
IS	See Intrinsically Safe
LED	Light emitting diode.
LEL	Lower Explosive Limit – is the lowest concentration of 'fuel' in air which will burn and for most flammable gases and vapors it is less than 5% by volume.
LEL%	Percentage of the Lower Explosive Limit (for example, 10% LEL of methane is approx 0.5% by volume).
LTEL	Long Term Exposure Limit. The 8 hour LTEL is the time-weighted average concentration for a normal 8 hour day to which most workers may be repeatedly exposed, day after day, without adverse effect. Also known as TWA.
MED	Maritime Equipment Directive
Oz	Ounce (weight).

Peak	Maximum, or minimum, measurement since switch on.
Pellistor	Registered trade name for a commercial device – A very small sensing element used in catalytic sensors and sometimes also called a ‘bead’ or a ‘siegistor’.
Poison resistant	Capability of a catalytic sensor to reduce the effect of inhibiting substances or contaminants, such as silicones.
PPB	Parts per billion concentrations in the atmosphere.
PPM	Parts per million concentrations in the atmosphere.
RFI	Radio frequency interference.
Safe Area	Work area in which there is no danger of contamination with explosive gases.
Soft Zero	When a soft zero is performed (i.e. the autozero on startup) any adjustments will only remain in place while the instrument remains switched on. Performing a soft zero (autozero) followed by an Enforcer calibration or instrument calibration menu span (i.e. not a menu zero first) will adjust the calibration while the instrument remains switched on but will not change the calibration due date.
STEL	Short Term Exposure Limit, usually monitored over 15 minute periods
TWA	Time-Weighted Average
UEL	Upper Explosive Limit
UL	Underwriters Laboratories (USA)
%VOL	Concentration of gas, measured in percentage by volume.
%v/v	Another way of representing % VOL

Appendix A

A.1 Fault/Warning Codes

Number	Message	Action or Reason
1	Clear log to reset.	Log memory error. Clear the event log
2	Clear log to reset.	Log memory error. Clear the gas log
3	See manual	Memory fault
4	Insert valid cartridge	Insert a valid cartridge. If one is fitted, remove and refit.
5	Insert valid cartridge	Memory error. Replace cartridge.
6	Insert valid cartridge	An Impact instrument does not support serviceable cartridges.
7	Insert valid cartridge	Sensor mix incorrect. Replace cartridge for the required type. This is only generated if the user declines to accept the cartridge's alarm settings.
8	Replace batteries.	Battery unchargeable. Replace the battery pack.
9	Cartridge expired	Fit new cartridge.
10	Cartridge expires in nn days	Fit new cartridge.
11	Calibration due	Calibration is due soon. Recalibrate or fit new cartridge.
12	Check batteries	Mixed battery types, i.e. one dry cell, one rechargeable. Fit two of the same type.
13	Battery empty. Check batteries	Battery too low to operate instrument. Recharge battery or fit new battery pack.
14	Battery low	Recharge battery or fit new battery pack.
15	Switch on/off to reset	Memory error.
16	Pump fault	• The pump is expected but not fitted. • The pump calibration has failed.
17	Pump blocked	• Check and remove the blockage. • Check for water or dust in the sampling tube. • Once the above has been checked, press the ✓ button to restart the pump.
18	See manual	Memory error. Incorrect firmware.
19	Passed install by date	Cartridge has exceeded its storage life. Fitting cartridge will reduce lifetime of cartridge and affect warranty.
20	See manual	Cartridge not being activated. Contact Service Center
21	Contact service center	Memory error. An instrument parameter is out of the permitted range.
22	Contact service center	Memory error. A cartridge parameter is out of the permitted range.

Number	Message	Action or Reason
23	Switch on/off to reset	Caused by an unexpected switch off, e.g. poor or intermittent battery contacts. Switch off instrument and switch on again.
24	Please recharge or replace batteries	Insufficient battery voltage to operate the Enforcer. Recharge battery or replace the battery pack.
25	Calibration required.	Recalibrate or fit new cartridge.
26	See manual	Operating temperature specification exceeded. Operate instrument within its specification.
27	See manual	Operating temperature specification exceeded. Operate instrument within its specification.
28	Insert valid cartridge	Cartridge has been removed while instrument is still switched on. Switch off and fit cartridge.
29	Communications error	Check connections to Base Station.
30	Time/date not set	Set clock using PC software
31	Event log nearly full. Clear log to reset.	20% or less remaining. When full the instrument will start overwriting the oldest data. Download the log to retain oldest data.
32	Gas log nearly full. Clear log to reset.	20% or less remaining. When full the instrument will start overwriting the oldest data. Download the log to retain oldest data.
33	Cal log nearly full. Clear log to reset.	20% or less remaining. When full the instrument will start overwriting the oldest data. Download the log to retain oldest data.
34	See manual	Memory error. A sensor parameter is out of the permitted range.
35	Insert valid cartridge	Memory fault. Incorrect format.
36	See manual	Memory error in alternative language. Instrument will revert to English.
50	Switch on/off to reset	• An electronics fault has occurred. • One of the sensors has detected a gas that has caused a large negative cross-sensitivity.
51	Calibration required	Cell is producing an excessive negative reading. Recalibrate.
52	See manual	Sensor overrange. Switch instrument on and off
53	Calibration required	Flammable sensor has been exposed to more than 100ppm H2S. Recalibrate.
54	Low O2 – flam inaccurate	Insufficient oxygen for the flammable sensor to operate accurately. Recalibrate or fit new cartridge.

Number	Message	Action or Reason
56	Switch on/off to reset	• Faulty sensor or poor cartridge contact • Remove and refit cartridge • Replace suspect sensor (serviceable cartridge) • Replace cartridge.
57	Switch on/off to reset	• Software Algorithm Error • Switch instrument off and back on to clear the fault.
58	Switch on/off to reset	• Failure of the ADC has been detected • Switch instrument off and back on to clear the fault. • If fault persists, contact supplier.
104	Switch on/off to reset	Oxygen cell fault. Recalibrate or fit new cartridge.
105	Switch on/off to reset	Flammable cell fault. Possible flammable fuse broken. Recalibrate or fit new cartridge
106	Switch on/off to reset	Toxic 1 cell fault. Recalibrate or fit new cartridge
107	Switch on/off to reset	Toxic 2 cell fault. Recalibrate or fit new cartridge
200	Switch on/off to reset	1. A generic software fault has occurred. 2. Switch instrument off and back on to clear the fault. 3. If fault persists, contact supplier.

Appendix B

B.1 Warranty

Honeywell Analytics operates a standard warranty statement (See Page 3).

B.2 Certification Approvals

B.2.1 Impact/Impact Pro (non-IR) Approvals

Europe	CENELEC (ATEX) BAS 01 ATEX 1216 Ex 112G EEX ia d IIC T4 (-20°C to +55°C)
North America	UL Ex ia Class 1 Div 1 Group ABCD T4 T_{amb} (-4°F to +131°F). See Control Drawing for Safelink Connection
Australia	TestSafe AUS Ex 02.3809X Ex ia s ZONE 0 I/IIB T4 (-20°C to +55°C)
EXAM Performance	DMT 02 ATEX G 001 PFG Nr. 41300502
Canada	CSA Ex ia Class 1 Div 1 Group ABCD T4 T_{amb} (-20°C to +55°C).
Brazil	Inmetro BR-Ex ia d IIC T4 T_{amb} (-20°C to +55°C).
MDA (Australia)	AUS MDA GD 5053

The type-tested measuring ranges for EXAM Performance approval

Measured Gas	Range
Oxygen	0.0 to 25.0% v/v
Methane	0 to 100%LEL
Propane	0 to 100%LEL
Carbon Monoxide	3 to 500ppm
Hydrogen Sulfide	0.4 to 50.0ppm
Carbon Dioxide	0.2 to 2.0% v/v

Zero Variation (CO, H_2S and CO_2 Channels)

Measured Gas	Zero Variation
Carbon Monoxide	6ppm
Hydrogen Sulfide	2ppm
Carbon Dioxide	0.25% v/v

Long Term Drift (CO_2 channel after 1 month)

Measured Gas	Zero Drift	Span Drift
Carbon Dioxide	0.1% v/v	20% (relative)

Long Term Drift (CO and H_2S channels after 3 months)

Measured Gas	Zero Drift	Span Drift
Carbon Monoxide	1ppm	6% (relative)
Hydrogen Sulfide	2ppm	2% (relative)

B.2.2 Impact Pro IR Approvals

Europe	CENELEC (ATEX) BAS 01 ATEX 1216 Ex 112G EEX ia d IIC T4 (-20°C to +55°C)
North America	UL Ex ia Class 1 Div 1 Group ABCD T4 T_{amb} (-4°F to +131°F). See Control Drawing for Safelink Connection
Canada	CSA Ex ia Class 1 Div 1 Group ABCD T4 T_{amb} (-20°C to +55°C).

B.2.3 Exam (DMT) Test Report

DMT/EXAM TEST REPORT

PFG-No. 41300502 NIV

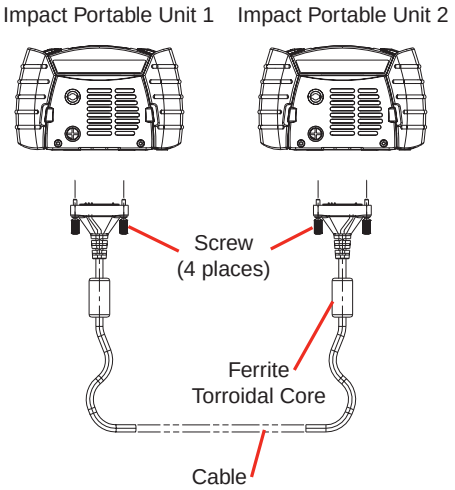
5. Special Conditions for Safe Use

- The portable gas detector Impact Series by Honeywell Analytics Ltd. is based on the information and test results contained in the test reports PFG-No. 41300502P and PFG No. 41300502P NI to 41300502P NIV, suitable for the measurement of Carbon Monoxide up to 500 ppm CO, Hydrogen Sulfide up to 50 ppm H_2S, Carbon Dioxide up to 2% CO_2 and Oxygen up to 25% (based on the use for monitoring the atmosphere of oxygen deficiency and enrichment), if its properties and design conform to the documents listed in the test reports PFG-No. 41300502P and PFG-No. 41300502P NI to 41300502P NIV if it is used accordingly and if the following conditions are met:
- The operating (manual) presented and approved by EXAM is to be followed in detail. It is essential that the instructions for correct use are followed.
- Before operating the gas detector, check whether the response is fast enough to trigger alarms sufficiently quickly to avoid unsafe situations. If necessary, set the alarm levels well below the standard safety-related limit values.
- A calibration for the instrument with a measuring range of 0-2% CO_2 must only be performed at temperatures above 10°C and below 30 °C.
- A permanently displayed value of -0.0 in the measuring range of 0-2% CO_2 requires an immediate calibration of the instrument.
- Following exposure to CO_2 concentrations above the upper limit of the measuring range 0-2% CO_2, leave the instrument in clean air overnight before calibration.
- The first alarm level (A1) in the measuring range of 0-2% CO_2 must not exceed 0.5% CO_2.
- For the measuring range 0-2% CO_2 the STEL and LTEL time weighted average values may exceed the true values due to the behavior of the sensor.
- It should be noted that sampling of oxygen deficient gases using the integrated pump could result in measured/displayed values being slightly higher than permitted.
- When extracting gases with the integrated pump in combination with additional probes the increased response time needs to be taken into consideration.
- The calibration needs to be checked, especially that of the H_2S channel, if the instrument was subjected to excessive mechanical shock (e.g. dropping the instrument from normal operational height).
- The confidence beep must be activated.
- The BG information BGI 518 and BGI 836 (4,5) need to be read and understood.
- The instruments shall be labelled with a permanent label, including information regarding the manufacturer, type and serial number and the inscription:

PFG-No. 41300502

- Additional marking instructions, according to EU Directive 94/9/EG in particular, are unaffected. The manufacturer confirms with this type label that the instrument supplied contains the documented features and technical characteristics as described in this report. Each instrument without such a label does not conform to this report.
- A complete copy of this report and the test reports PFG-No. 41300502 and PFG No. 41300502P NI to 41300502P NIV will be made available upon the request of the user.

B.2.4 Safelink Connection Drawing



Note

1. **Only two units may be permitted to be connected.**
2. **Safelink cable assembly is connected to 'Data Connector' on base of impact portable and retained via 2 position screws into baseplate.**
3. **Cable is 2 connector with overall foil/braid shield.**

Data Connector	Data Connector
PIN 12 (CAN H)	PIN 12 (CAN H)
PIN 13 (CAN L)	PIN 13 (CAN L)
PIN 14 (DGND)	PIN 14 (DGND)

PIN 14 Connects to braid/screen

4. **Alternatively, interconnection may be made between impact units located in hazardous and non hazardous areas.**

B.3 Technical Specifications

B.3.1 Instrument Specification

Weight	520g (18oz) including rechargeable battery packs and pump					
Dimensions	49mm x 84mm x 136mm (1.9" x 3.3" x 5.3")					
Electrochemical/ Catalytic Sensors	**Range**	**Repeatability**	**Response Time (T90)**	**Warm-up Time (s)**	**Impact**	**Impact Pro**
Flammable	0 to 100% LEL	±3% LEL	See B.3.3	70	✓	✓
Methane	0 to 5% v/v (Displayed as %LEL)	±0.1% v/v	<10s	70	✓	✓
Oxygen	0 to 25% v/v	±0.3% v/v	See B.3.3	70	✓	✓
Carbon Monoxide	3 to 500 ppm (Display: 0-500 ppm)	±12.5 ppm	See B.3.3	70	✓	✓
Hydrogen Sulfide	0.4 to 50 ppm (Display: 0-50 ppm)	±2.5 ppm	See B.3.3	70	✓	✓
Sulfur Dioxide	0 to 20 ppm	±1 ppm	<60s	70		✓
Chlorine	0 to 10 ppm	±0.5 ppm	<60s	70		✓
Chlorine Dioxide	0 to 5 ppm	±0.2 ppm	<60s	70		✓
Nitrogen Dioxide	0 to 20 ppm	±1 ppm	<60s	70		✓
Ammonia	0 to 100 ppm	±5 ppm	<90s	250		✓
Carbon Dioxide	0.2 to 2% v/v (Display: 0-2% v/v)	±0.2% v/v	See B.3.3	70		✓
Infrared Sensors	**Range**	**Repeatability**	**Response Time (T90)**	**Warm-up Time (s)**	**Impact**	**Impact Pro**
Flammable (%LEL)	0 to 100% LEL			70		✓
Flammable (%Vol)	0 to 100% v/v			70		✓
Carbon Dioxide	0 to 5% v/v			70		✓
Visual alarm	4 High intensity red LEDs (alarms, fast charge indication) 2 High intensity green LEDs (confidence signal, trickle charge indication)					
Audible alarm	>85dBA at 1m (>90dBA at 1ft)					
Display	Large backlit graphical liquid crystal display					
IP Rating	Instrument IP67 (NEMA 4X), Cartridge IP54 (NEMA 4)					
Operating temperature	-20°C to +55°C (-°4F to +131°F) Carbon Dioxide: 0°C to +40°C (+32°F to +104°F) Ammonia: -20°C to +40°C (-°4F to +104°F)					
Storage Temperature & Time	Instrument, spare parts and accessories: -40°C to +80°C (-40°F to +176°F) Cartridge and replacement sensors: -10°C to +60°C (+14°F to +140°F) 6 months maximum Electrochemical Carbon Dioxide Cartridge and replacement sensors: -10°C to +40°C (+14°F to +104°F) 6 months maximum Ammonia Cartridge and replacement sensors: -10°C to +40°C (+14°F to +104°F) 6 months maximum					
Pressure	800mBar to 1200mBar Carbon Dioxide Cartridge 910mBar to 1110mBar					
Humidity	20 to 90% continuous (non-condensing)					
Pump (where fitted)	0.3 litres/minute over 20m (66') Flow fail detection and pump shutdown system under blocked flow Test and Calibration routine of flow fail detection circuit					
EMC Approvals	EN50270					
Internal Battery (clock and memory)	>5 years operating life.					

B.3.2 Charger Specifications

2302D0816	230VAC 50Hz Euro plug format, 12Vdc 500mA regulated output
2302D0818	230VAC 50Hz UK plug format, 12Vdc 500mA regulated output
2302D0819	120VAC 60Hz USA plug format, 12Vdc 500mA regulated output
2302D0820	240VAC 50Hz Australian plug format, 12Vdc 500mA regulated output
2302D0815	12V/24VDC vehicle charger lead

Storage Temperature (all versions): –20°C to +50°C

Operating Temperature (all versions): 0°C to +35°C

For supplying power to more than one Base Station, linked using the Base Station PSU Link Cable, a power supply capable of supplying 12VDC to 32VDC, rated at 500mA per Base Station, is required.

B.3.3 Specific Speed of Response Data (Rising Gas Levels)

The following values are typical rising speed of response rise times, given in seconds during various gas-sampling modes of the instrument.

	Gas	Sampling Mode (see key) - typical T90 sampling time (seconds)					
		1	2	3	4	5	6
Cat Bead	Methane	15	20	140	80	40	30
Cat Bead	Propane	25	25	140	90	40	35
EC Sensor	Oxygen	25	25	150	90	40	30
EC Sensor	CO	25	20	150	80	40	35
EC Sensor	H_2S	25	40	170	120	50	45

	Gas	Sampling Mode (see key) - typical T80 sampling time (seconds)					
		1	2	3	4	5	6
EC Sensor	CO_2	125	45	235	135	140	110

	Gas	Sampling Mode (see key) - typical T100 sampling time (seconds)					
		1	2	3	4	5	6
EC Sensor	CO_2	590	225	545	420	385	345

B.3.4 Specific Recovery Time Data (Falling Gas Levels)

The following values are typical recovery times, given in seconds during various gas-sampling modes of the instrument.

EC Sensor	Gas	Sampling Mode (see key) - typical T10 recovery time (seconds)	
		1	2
	CO	25	20
	H_2S	35	35

EC Sensor	Gas	Sampling Mode (see key) - typical T20 recovery time (seconds)	
		1	2
	CO_2	190	105

EC Sensor	Gas	Sampling Mode (see key) - typical T0 recovery time (seconds)	
		1	2
	CO_2	1220	490

Key:

1. Diffusion Mode
2. Pumped Mode (no tubing)
3. Pumped Mode (10m of tubing + Ball Float)
4. Pumped Mode (10m of tubing + Sample Probe)
5. Hand Aspirator (10m of tubing + Ball Float)
6. Hand Aspirator (10m of tubing + Sample Probe)

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