T40 II RATTLER

Portable Single Gas Monitor

Product Manual

The Essential Guide for Safety Teams and Instrument Operators

Edition: 5.1
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INDUSTRIAL SCIENTIFIC

Content

1. Certifications

Directive or CB	Area Classifications	Approved Temperature Range	Standards
IECEx	Ex ia IIC T4 Ga Ex ia I Ma	-40°C to +50°C -40°F to +122°F	IEC 60079-0:2017 Ed.7.0 IEC 60079-11:2011 Ed.6.0 IEC 60079-26 :2021 Ed.4.0
ATEX	Ex ia IIC T4 Ga Ex ia I Ma	-40°C to +50°C -40°F to +122°F	EN IEC 60079-0:2018 EN 60079-11:2012
UL	Class I, Division 1, Groups A, B, C, D, T4 Class I, Zone 0, AEx ia IIC T4 Ga	-40°C to +50°C -40°F to +122°F	ANSI/UL 60079-0-2020 Ed.7 ANSI/UL 60079-11-2018 Ed.6 ANSI/UL 913-2019 Ed.8; UL 61010-1 3rd Edition (2012), AMD1: 2018
CSA	Ex ia IIC T4; Class I, Division 1, Groups A, B, C, D, T4	-40°C to +50°C -40°F to +122°F	CAN/CSA C22.2 No. 60079-0:19; CAN/CSA-C22.2 No. 60079-11:14 (r2018); CAN/CSA C22.2 No.61010-1-12, UPD1: 2015, UPD2: 2016, AMD1: 2018
PESO	Ex ia IIC T4 Ga	-40°C to +50°C -40°F to +122°F	IEC 60079-0:2017 IEC 60079-11:2011 IEC 60079-26:2021
INMETRO	Ex ia I Ma Ex ia IIC T4 Ga	-40°C to +50°C -40°F to +122°F	ABNT NBR IEC 60079-0:2020 ABNT NBR IEC 60079-11:2013
China Ex	Ex ia IIC T4 Ga	-40°C to +50°C -40°F to +122°F	GB/T 3836.1- 2021 GB/T 3836.4- 2021 GB/T 4208-2017
China MA	Ex ia I Ma	-20°C to +40°C -4°F to +104°F	MT 703-2008 Q/JT07-2022 GB/T 3836.1-2021 GB/T 3836.4-2021

MED 	MED 2014/90/EU Marine Directive		EN 50104:2019 EN IEC 60079-0:2018,incl.AC:2020 EN 60079-1:2014, incl. AC:2018-09 EN 60079-11-2012 EN 60079-26:2015 EN 60945:2002 incl. IEC 60945 Corr. 1:2008 IEC 60945:2002 incl. IEC 60945 Corr. 1:2008 IEC 60092-504:2016 IEC 60533:2015
China CPA 	Metrological	-10°C to +40°C +14°F to +104°F	JJF 1363-2019 JJF 1421-2013

2. Warnings and cautionary statements

⚠ For maximum safety and optimal performance, read and understand the manual before operating or servicing the unit. Failure to perform certain procedures or note certain conditions may impair the performance of this product.

⚠ For safety reasons, this equipment must be operated and serviced by qualified personnel only. Customer site assembly is not recommended, improper disassembly may impair the performance of the instrument.

⚠ Substitution of components may impair intrinsic safety and may cause an unsafe condition.

⚠ DO NOT REPLACE BATTERY WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT. USE ONLY BATTERIES APPROVED BY INDUSTRIAL SCIENTIFIC.

⚠ Before use, ensure that the ESD film on the LCD display and label is not damaged or peeled.

⚠ Obstruction of sensor openings–due to dust, dirt, water, or other causes–can inhibit the unit's ability to measure gas concentrations accurately. When this occurs, readings may appear lower than the actual gas concentration. Keep sensor openings clean, dry, and properly exposed to the ambient air.

⚠ Obstructed, contaminated, or damaged sensor water barriers (or their gaskets) can inhibit the unit's ability to measure gas concentrations accurately. When this occurs, readings may appear lower than the actual gas concentration. Contact after-sales service to replace the sensor water barriers and gaskets as needed.

⚠ Service the unit, use its communications port, and change its battery cell only in non-hazardous locations. Do not use in oxygen-enriched atmospheres.

⚠ Contact your service representative immediately if you suspect that the unit is working abnormally.

3. Product Overview

T40 II single gas monitor is compact, easy to carry and use. It is specially designed to detect the concentration of toxic and oxygen gases and is mainly used in petrochemical industry and coal mine. The monitor can continuously monitor the concentration of harmful gas. Once the gas concentration exceeds the low alarm, high alarm or TWA/STEL alarm setpoint, T40 II will initiate visual, audible and vibration alarms.

3.1 Product Specifications

Item	Description		
Display	Segment LCD		
Keypad buttons	Two buttons		
Technology	Electrochemical		
Battery Pack	Replaceable 3.6 V Primary Lithium-thionyl chloride (Li-$SOCl_2$) battery cell, 1.65AH, 2/3AA. Two-year[a] run time		
Case materials	Polycarbonate with a protective rubber over-mold		
Alarms	Visual alarm (two red LEDs), Audible alarm (95 dB), Vibration alarm		
Ranges	Oxygen (O_2)	Carbon Monoxide (CO)	Hydrogen Sulfide (H_2S)
	0-30% vol	0-1000/2000 ppm	0-20/40/50/80/100/150/ 200/300/500 ppm
Display resolution	0.1% vol	1 ppm	0.1 ppm
Calibration gas concentration[c]	20.9% vol	100 ppm	25.0 ppm
Response Time	< 10 s	< 10 s	< 10 s
Dimensions	82 x 60 x 27 mm (3.23" x 2.36" x 1.07")		
Weight	85 g (3.0 oz.), typical		
Ingress protection	IP66 / IP68		
Operating Temp[b]	-40°C to +50°C (-40°F to +122°F)		
Operating humidity	5 to 95% relative humidity (RH) noncondensing		
Pollution Degree	2		
Max. use altitude	5000 m above sea level		

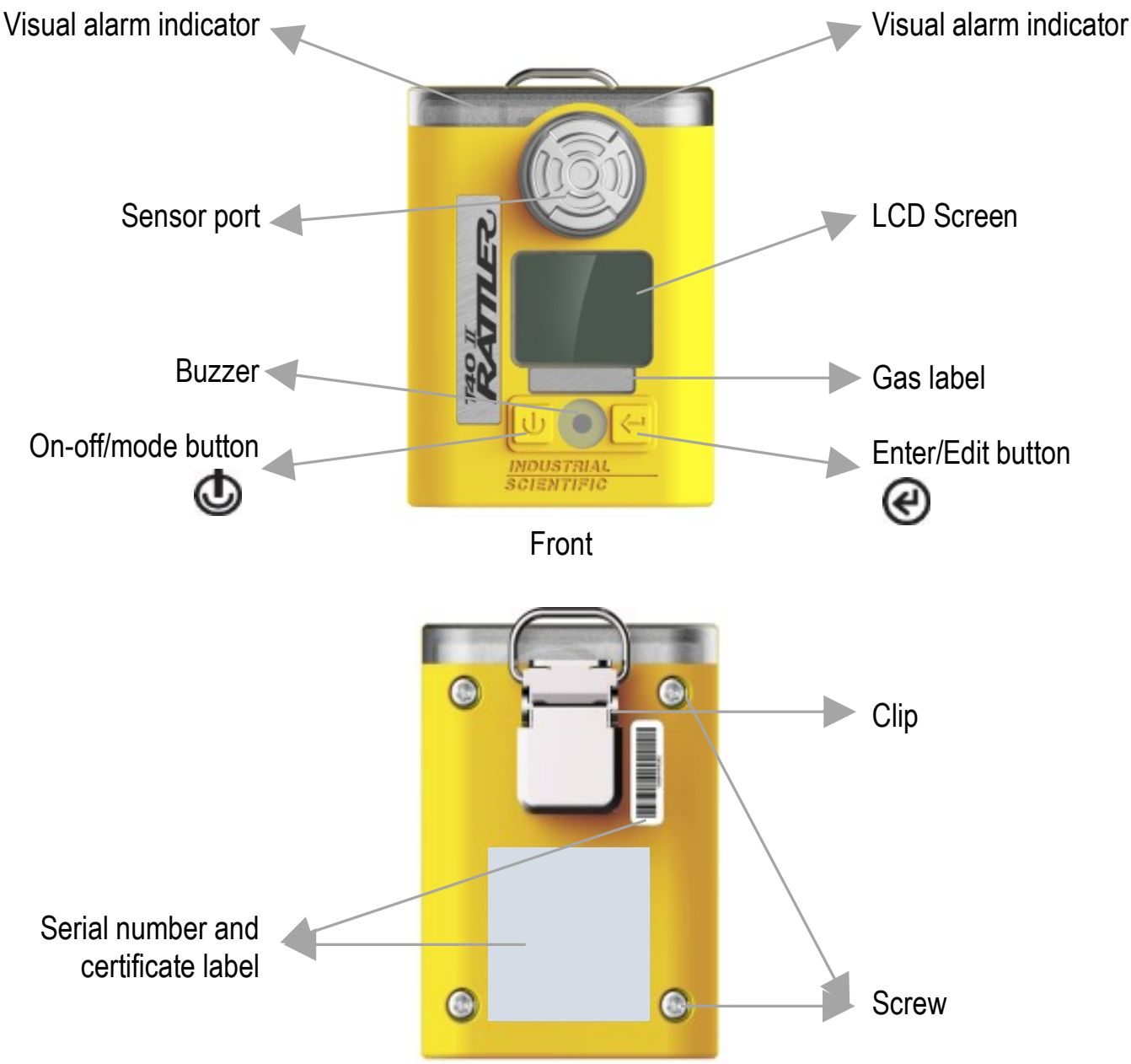
[a] Depending on operating conditions, the length of time the instrument was in alarm; and the enablement of instrument's confidence indicator, bump test due alert, calibration due alert,

[b] Operating temperatures below -20°C may cause reduced instrument accuracy and affect display and alarm performance.

[c] For H2S gas monitor with a range of 0-20 ppm, the calibration gas concentration is 10.0 ppm.

3.2 Hardware Overview

T40 II



Hardware overview

4. Operation and Instructions

The table below lists Industrial Scientific's minimum frequency recommendation for each procedure. These recommendations are based on field data, safe work procedures, industry best practices and regulatory standards to help ensure worker safety. Users may reduce the frequency of the following procedures as appropriate according to the safety policy of local government or company. Industrial Scientific is not responsible for determining security practices and policies.

Procedure	Recommended minimum frequency
Configuration	Before first use, when there is a change in the installed sensor type, and as needed.
Calibration	Before first use and at least every 6 months, depending on use and exposure to gas and contaminants, such as vibration, dropping or sensor replacement, multiple high concentration gas shocks, etc.
Bump test	Prior to each day's use.

4.1 Display Overview

The visual test screen at right shows all the graphic symbols that can appear on the display screen. Each symbol is static and appears only when relevant to the procedure being performed.

Display screens, indicators, and abbreviations	
Status symbols	
✓	Instrument is operational
!	Instrument failure
	The instrument is in configuration mode.
Alarm symbols	
	The alarm icon is used in combination with other symbols to indicate a variety of conditions.
 and ▲	High-level gas alarm
 and ▼	Low-level gas alarm
 and STEL	STEL alarm

and TWA	TWA alarm
and Or	Positive over range gas alarm
and -Or	Negative over range gas alarm
	Low battery alarm
	Instrument maintenance required (bump test shown)

Process and time-based symbols

Ø	The zeroing icon is used in combination with other symbols to indicate sensor zeroing information.
	The bump test icon is used in combination with other symbols to indicate bump test information.
	The calibration icon is used in combination with other symbols to indicate calibration information.
	The peak reading is the highest detected gas reading. Always clear the peak reading after calibration.
	A procedure is in progress. In configuration mode, it indicates a time-based setting (e.g., bump test response time).

Gas name and unit-of-measure abbreviations

CO	Carbon Monoxide (CO)
H2S	Hydrogen Sulfide (H2S)
% VOL	Percent by volume refers to a defined amount of the gas in 100 parts of air.
PPM	Parts per million is the unit of measure for CO and H_2S.

Other abbreviations

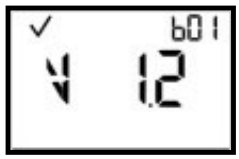
	Vibration alarm enabled.
STEL	Short-term exposure limit, default time 15 minutes.
TWA	Time-weighted average, default time 8 hours.

4.2 Start-up, Shutdown and Always on

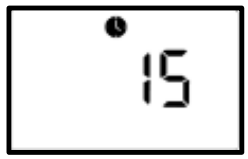
Start-up

Press and hold the button for 3 seconds, the instrument starts to power on. Upon power-on, the instrument automatically enters the visual test, firmware version, 20-second countdown and the second visual test screen, accompanied by audible test and light test. After an initial warm-up, the instrument automatically enters the real-time gas monitoring screen.

Visual test screen

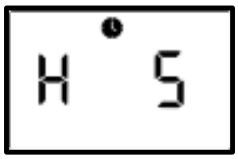


Version



Countdown

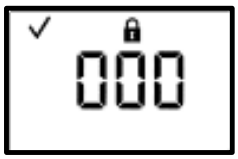
Shutdown and always on



Countdown

Press and hold for five seconds. After a five-second countdown, the instrument powers off if:

- the always-on feature is disabled, or
- the always-on feature is enabled and the security code is set to 000.



Enter security code

This screen indicates the shutdown process is security-code protected. To complete shutdown, the correct three-digit code must be entered.
Value range: 000 to 999

4.3 Configuration mode

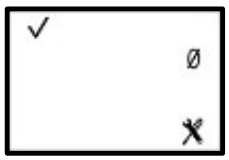
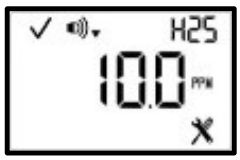
Configuration mode can only be accessed during startup. Press and hold both buttons simultaneously at the countdown screen to enter configuration mode.

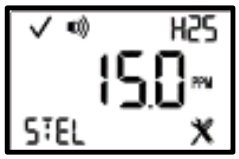
When the instrument is in configuration mode, the following applies:

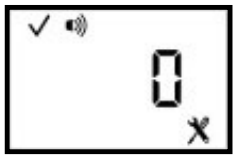
- The tool icon displays in the lower right corner of the screen.
- By pressing the on-off button , the user can scroll through the configuration list.
- The enter/edit button is used to edit values or initiate procedures.
- When editing a value, the enter/edit button increments the value and the on-off button ( )saves the value.

- When editing a value, once the highest value in the range is reached, the display starts over with the lowest value.
- When the on-off button is pressed and held for more than 1 second, the instrument turns from configuration mode to operation mode and the home screen is activated.
- Unless otherwise noted, if no button is pressed for 30 seconds, the unit enters operation mode and the home screen is activated.
- Any changes made in configuration mode are automatically saved to the unit and take effect immediately.

Configuration instructions

Buttons or Screen	Button effects or Screen Description
	Saves the currently displayed value or activates the next configuration screen. Increase value or activate the value (at first press). Press and hold to speed up the increment.
	Initiate zeroing This screen allows the technician to complete the zeroing and calibration process from configuration mode. Note: O_2 instrument displays "initiate calibration".
	Low gas alarm setpoint This screen features the status, low alarm, sensor type, and configuration icons, with the alarm's current setpoint and unit of measure. Edit the alarm setpoint based on the following: Value range = between the minimum measuring resolution and the highest measuring range. Value increment = sensor measuring resolution
	High gas alarm setpoint This screen features the status, high alarm, sensor type, and configuration icons, with the alarm's current setpoint and unit of measure. Edit the alarm setpoint based on the following: Value range = between low alarm setpoint the highest measuring range. Value increment = sensor measuring resolution

	TWA alarm setpoint (not applicable for O_2 instruments) This screen features the status, alarm, sensor type, configuration, and TWA icons, with the alarm's current setpoint and unit of measure. The alarm setpoint can be edited. Value increment = sensor measuring resolution
	STEL alarm setpoint (not applicable for O_2 instruments) This screen features the status, alarm, sensor type, configuration, and STEL icons, with the alarm's current setpoint and unit of measure. The alarm setpoint can be edited. Value increment: sensor measuring resolution
	Calibration gas This screen features the status, sensor type, configuration, and calibration icons, with the current calibration gas in the center. This setting reflects the concentration of calibration gas that the instrument expects to read when calibrated; it should be edited to match the cylinder's gas concentration. Value range: within the sensor measuring range Value increment: sensor measuring resolution
	Time This screen features the status, clock, and configuration icons, with the current time setting. The instrument's clock uses a 24-hour time format. The values are edited in these range: Hours: 00 to 24 Minutes: 00 to 59 Value increment: 1
	Date This screen features the status, configuration, and calendar icons, with the current date setting. The year is displayed in the lower left corner. In the main display, the first two digits represent the day and the second two digits represent the month. The values are edited in these range: Year: 2023 to 2099 Day: 00 to 31 Month: 00 to 12



Confidence indicator

This screen features the status, alarm, and configuration icons, with the selected setting value displayed in the center. The technician can disable or enable the indicator and choose the indicator type.

When enabled, the instrument will emit the selected signal every 90 seconds in operation mode.

Note: When options 1, 2, or 3 are selected, the expected battery life will be reduced.

Values:

0 = disabled

1 = audible chirp enabled

2 = LED flash enabled

3 = audible chirp and LED flash enabled

Operation mode bump test

This screen features the status, lock, configuration, and bump test icons, with the selected setting value displayed in the center. The technician can enable or disable this feature.

When enabled, the instrument operator can bump test the instrument in operation mode.

Values:

0 = disabled

1 = enabled

Bump test due warning

This display screen features the status, alarm, configuration, bump test, and warning icons. The technician can disable or enable the warning and choose the warning type. When enabled, the alert screen will be activated, and the unit will emit the selected indicator every 60 seconds to notify its user that a bump test is due; the instrument will continue to operate.

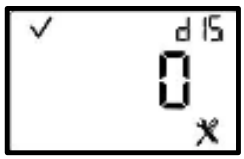
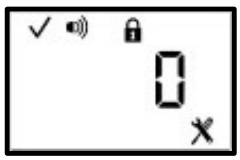
Values:

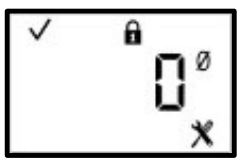
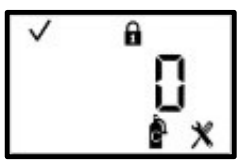
0 = disabled

1 = audible chirp enabled

2 = blue LED flash enabled

3 = combination of audible chirp and blue LED flash enabled

	Bump test interval This display screen features the status, configuration, bump test and calendar icons. The technician can set the interval at which the bump test due warning is to be activated. Value range: 1 to 30 Value increment: 0.5
	Bump test percentage This screen features the status, configuration, and bump test icons, with the current setting value displayed in the center. The technician can set the percentage of calibration gas that the unit will respond to. Value range: 50% to 95% Value increment: 1%
	Bump test response-time This screen features the status, clock, configuration, and bump test icons, with the current setting value in seconds displayed in the center. A sensor passes a bump test if it detects the specified percentage of calibration gas within the specified response time setting. Value range: 30 to 120 seconds Value increment: 5 seconds
	Display style This screen features the status, “dIS”, and configuration icons, with the selected setting value displayed in the center. This setting allows the technician to choose the display style for the home screen. A numeric display will feature the numeric gas reading and the sensor type icon. A text display will feature the sensor type in place of the numeric gas reading. Values: 0 = Numeric display, 1 = Text display
	Alarm latch This screen features the status, alarm, lock, and configuration icons, with the current setting displayed in the main area. The technician can enable or disable this feature. When disabled, an instrument in alarm will turn off its alarm when the alarm-causing gas concentration is no longer detected.

	When enabled, an instrument in alarm will remain in alarm until it is manually reset. Values: 0 = disabled, 1 = enabled
	Vibration alarm This screen features the status, alarm, “Vlb”, and configuration icons, with the selected setting value displayed in the center. When enabled, the vibrating alarm will be activated when the instrument is in alarm. Values: 0 = disabled, 1 = enabled
	Operation mode zeroing (not applicable for O_2 instruments) This screen features the status, lock, zeroing, and configuration icons. The technician can enable or disable this feature. When enabled, the instrument operator can zero the instrument in operation mode. Values: 0 = disabled, 1 = enabled
	Operation mode calibration This screen features the status, lock, configuration, and calibration icons. The technician can enable or disable this feature. When enabled, the instrument operator can calibrate the unit from operation mode. Values:0 = disabled, 1 = enabled
	Calibration due warning This screen features the status, configuration, alarm, calibration, calendar, and warning icons. The technician can disable or enable the warning and choose the warning type. When enabled, the unit will notify the user that calibration is due, based on the selected option. The instrument will continue to operate. Values: 0 = disabled 1 = audible chirp enabled 2 = blue LED flash enabled 3 = combination of audible chirp and blue LED flash enabled

Calibration interval

This screen features the status, configuration, calibration and calendar icons, and the current interval setting. The technician can set the interval at which the calibration due warning is to be activated.

Value range: 1 to 365 days

Value increment: 1

Calibration date

This screen features the status, up and down arrow, configuration, calibration, warning, and calendar icons. The technician can choose whether the operation-mode calibration date screen will display the due date for next calibration or the date of the last calibration.

The up arrow (▲) displays when the date is set to the next calibration due. The down arrow (▼) displays when the date is set to the last calibration date.

Values:

0 = date of last calibration

1 = next calibration due date

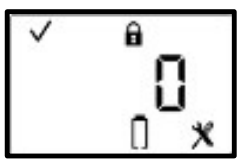
Security code

This screen features the status, lock, and configuration icons, with the current security code displayed in the center. The security code controls access to the configuration mode and the ability to turn off an instrument that is configured to always-on.

If the security code is set to 000, configuration mode is not security-code protected, and an always-on instrument can be turned off without a security code. Any other value will enable the security code.

Value range: 000 to 999

Value increment: 1



Always-on

This screen features the status, lock, configuration, and the battery icon. The technician can enable or disable this feature.

When enabled, the entry of the unit's security code (if the security code is not 000) will be required to complete the shutdown process.

Values:

0 = disabled, 1 = enabled

	Alarm on dock This display screen features the status, alarm, lock, configuration, and "dOC" icons, with the current setting displayed in the center. The technician can enable or disable the alarm. When disabled, the instrument mutes its alarms during the bump test and calibration on T-Dock. Values:0 = disable, 1 = enable

4.4 Operation mode

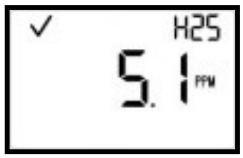
In the operation mode, the user can scroll through the operation mode loop by continuously pressing the on-off button. The zeroing, calibration, and bump test procedures can only be completed if these features are enabled for operating mode access.

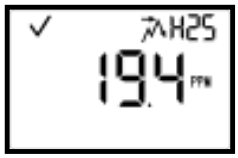
TWA, STEL (if operating mode access is enabled) and peak readings can also be viewed and cleared. When the reading summary is cleared, CO and H_2S value resets to zero, O_2 value resets to 20.9% vol.

In operation mode, the following applies:

- Press to scroll through the operation mode loop.
- Press to initiate a procedure or to clear the reading.
- A long press on will reset a latched alarm; it does not disable an enabled latch.
- Except where noted, if no button is pressed for 30 seconds, the home screen is activated.

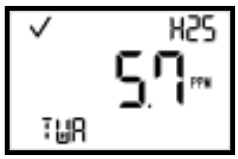
Operation instructions

Buttons or Screen	Button effects or Screen Description
	Saves the currently displayed value or activates the next configuration mode screen.
	Increase value or activate the value (at first press). Press and hold to speed up the increment.
	Gas monitoring (numeric mode) This screen features the check mark and sensor type icon, the current gas reading, and unit of measure. The check mark indicates the unit is operational and there are no sensor faults.



Peak reading

This screen features the check mark, peak, and sensor type icon, and the most recent peak reading. Press ↵ to reset the reading to 0. For O_2 sensor, the reading will be reset to 20.9%vol.

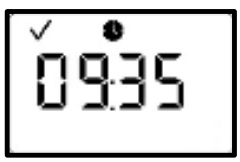


TWA reading (not applicable for O_2 instruments)

This screen displays when the TWA reading is enabled in operation mode. The screen features the check mark, sensor type, TWA icons, and the current TWA reading. Press ↵ to reset the reading to 0.

STEL reading (not applicable for O_2 instruments)

This screen displays when the STEL reading is enabled in operation mode. The screen features the check mark, sensor type and STEL icon, and the current STEL reading. Press ↵ to reset the reading to 0.



Time display

This screen displays the current time and also features the check mark and clock icons.

Calibration date

This screen features the calibration, calendar, and check mark icons, an up or down arrow, and a date value.

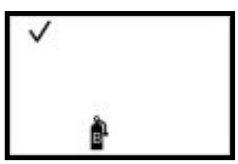
When the up arrow (▲) displays, the next calibration date is displayed.

When the down arrow (▼) displays, the last calibration date is displayed.

Values:

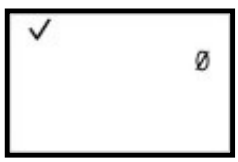
Date: XX (day) and XX (month)

Year: XXXX



Initiate bump test

This screen displays when bump test in operation mode is enabled. The screen features the check mark and bump test icon.



Initiate zeroing

This screen displays when zeroing in operation mode is enabled. It features check mark and zeroing icon.

Note: O_2 instrument shows as initiate calibration screen.

	Bump test required warning The instrument requires a bump test. The warning may appear because the unit is past due for its scheduled bump test, or because the instrument has detected that a bump test is required for another reason. Depending on the instrument's configured settings, some combination of visual and audible indicators may be activated every 60 seconds.
	Calibration required warning The instrument requires a calibration. The warning may appear because the unit is past due for its scheduled calibration, or because the instrument has detected that a calibration is required for another reason. Depending on the instrument's configured settings, some combination of visual and audible indicators may turn on every 60 seconds.

4.5 Bump test (or "Functional Test")

Bump testing is a functional test in which an instrument's installed sensors are to be briefly exposed to (or “bumped” by) calibration gases at concentrations greater than the sensors’ low alarm setpoints. This causes the instrument to go into low alarm and indicates which sensors pass or fail this basic test of responsiveness to gas.

Note: If the bump test fails, please perform a calibration. If the calibration failes, please contact Industrial Sicentific after-sales service.

Bump test instructions

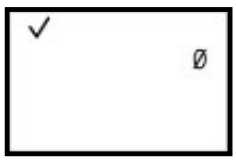
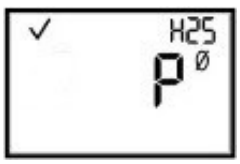
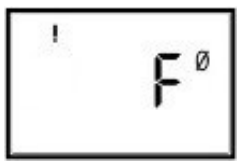
Screen	Screen Description
	Initiate bump test From anywhere in the operation mode loop, press ⏻ until the initiate bump test screen is activated. Press ↵ to start the bump test process. Press ⏻ to cancel the bump test.
	Bump test apply gas When the bump test is initiated, the apply gas screen is activated and displays the expected type and concentration of calibration gas. For O_2 sensor, the applied gas concentration should be below low alarm setpoint. This screen remains active for up to 5 minutes while the instrument awaits the applying of calibration gas.
	Bump test in progress
 	Bump test results If the bump test fails, please calibrate the instrument. If the bump test passes, the home screen will automatically activate. *Note: Close the cylinder and remove the calibration cup after bump test.*

4.6 Zeroing

Zeroing adjusts the sensors' "baseline" readings, which become the points of comparison for subsequent gas readings. It is a prerequisite to calibration. Zeroing involves exposing the installed sensors to an air sample from a zero-grade-air cylinder or ambient air that is known to be clean air. If there are gases in the air sample that are below the lowest alarm level, the instrument will set them as zero; its task is to read the air sample as clean air. The user's task is to ensure the air is clean.

Note: O_2 instrument only displays calibration screen.

Zeroing instructions

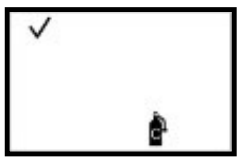
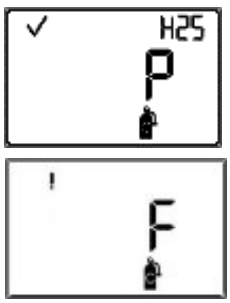
Screen	Screen Description
	Initiate zeroing From anywhere in the operation mode loop, press ⏻ until the initiate zeroing screen is activated. At the initiate zeroing screen, press ↵ to start the zeroing process.
	Zeroing in progress While the sensors are being zeroed, the zeroing in progress screen is activated. *Note: Instruments must be zeroed in fresh air.*
 	Zeroing results After the sensors are zeroed, the zeroing results screen is activated, and an audible alert is emitted. If the result is an "F" (fail), press ⏻ to repeat the zeroing process. If the result is a "P" (pass), press ⏻ to display the initiate calibration screen. If calibration is not desired, press ⏻ twice or wait approximately 30 seconds to active home screen.

4.7 Calibration

Regular calibration promotes the accurate measurement of gas concentration. Calibration involves exposing the sensor to the preset concentration of calibration gas. Based on the sensor's response, the instrument will self-adjust to compensate for declining sensor sensitivity, which naturally occurs as the installed sensor is used or "consumed".

Note: When O_2 sensor is replaced, wait at least 30 minutes to warm up.

Calibration instructions

Screen	Screen Description
	Initiate calibration Press ⏻ button at zeroing results screen to enter the initiate calibration screen, then press ↵ button to start the calibration. Note: For O_2 sensor, press ↵ button to start calibration without zeroing.
	Calibration apply gas When the calibration is initiated, the apply gas screen is activated and display the expected type and concentration of calibration gas. This screen remains active for up to 5 minutes as the unit awaits the applying of calibration gas. To cancel calibration, press ⏻ button.
	Calibration in progress *Note: Make sure to open the calibration gas cylinder regulator before calibration.*
	Calibration results If calibration passes, the result screen is activated and displays the span reserve value. If calibration fails, the audible, visual, and vibrating alarms are activated. The failure results screen and span reserve screen are alternately activated. *Note: Close the cylinder and remove the calibration cup after calibration.*

5. Alarms and Notifications

Alarms alert the instrument operator to hazards. Warnings indicate a condition that requires attention. Take all alarms, warnings, and indicators seriously, and respond to each according to company policy.

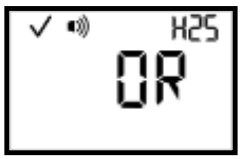
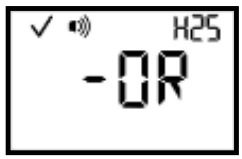
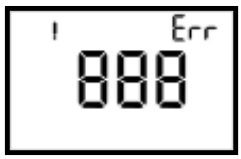
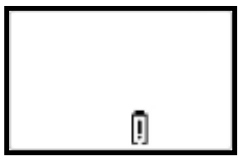
Alarms

T40 II gas monitors have alarms of two different intensities, high and low. Alarms are persistent: they turn off when the alarm causing event is no longer detected. However, if the instrument's alarm latch is enabled, an alarm will remain on until the user presses ↵ to turn it off.

When all alarm signals are on:

- The high alarm features red lights and steady sound, fast paced.
- The low alarm is similar to the high alarm, but medium paced.

Note: Signals (visual, audible, and vibration) vary based on instrument settings.

Alarm Level: High			
Gas Present (H_2S is shown)			
			
Gas present, over range alarm	Gas present, negative over range alarm	Gas present, high alarm	STEL alarm
Non Gas High Alarm			
			–
System alarm	Critical low-battery alarm	No sensor installed （O2 sensor）	

Alarm Level: Low			
Gas Present			
		–	–
Gas present, low alarm	TWA alarm		

Warnings and failures

Warning remains until the event is resolved. In some cases, an unresolved warning becomes more urgent in frequency. For example, a low battery warning that is not resolved will turn to alarm status indicating a critical low battery condition.

Warnings			
			—
Low battery warning	Calibration due	Bump test due	

6. Replace the battery

When the battery has 12 to 72 hours of life remaining, T40 II displays low battery warning and emits 1 beep, visual and vibration alarm every 1 minute. Please contact Industrial Scientific or qualified person to replace the battery.

1. Using a T10 Torx screwdriver, remove all four screws from the case bottom, set aside the screws.
2. Lift the battery out of its cradle. Dispose of it according to company policy.
3. Orient the replacement battery so that the positive and negative ends align with the "+" and "-" cradle markings, respectively. Place the new battery into the cradle, negative end first. Press down on the battery to secure it in the cradle.

Note:

- ⚠ Use battery that approved by Industrial Scientific only.
- ⚠ Do not replace battery in explosive atmosphere.
- ⚠ Work on a non-conductive surface in a well-lit area.
- ⚠ Wear grounding straps to prevent electrostatic discharge, which can cause damage to the instrument's electronics.
- ⚠ Be sure to turn off the instrument before servicing the unit or replacing the battery.

7. Warranty Policy

Industrial Scientific Corporation’s portable T40 II gas monitors are guaranteed for 2 years from the date of shipment, warranted to be free from defects in material and workmanship, under normal and proper use and service.

8. Limitation of Liability

Industrial Scientific makes no other warranties, express or implied, including but not limited to warranties for sale or for special needs.

If products do not meet the warranty above, the user's sole remedy and Industrial Scientific's sole obligation (Industrial Scientific's sole and only action) is to replace or repair such products that do not meet the warranty, or as purchased the original price of the product.

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