

Sensor Evaluation Kit Quick Start Guide for use with Intelligent Sensors (*iseries*) Gas Sensors

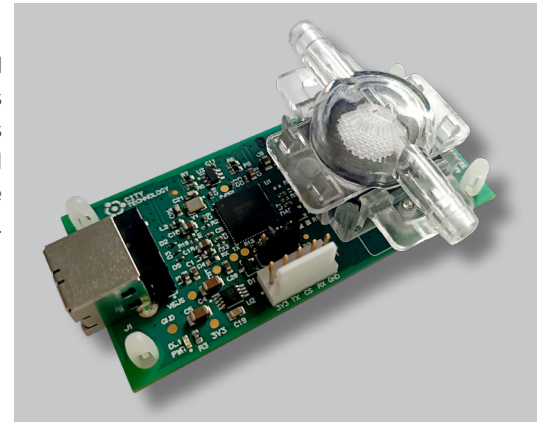
Part Number: 32341488-001

DESCRIPTION

The Sensor Evaluation Kit, provides an easier way to demonstrate, simulate, and evaluate all City Technology iseries digital sensors. The kit interfaces a digital gas sensor to a board. The software controls the board to take readings from the gas sensors. Sensor measurements and communication commands are displayed on the user's PC and can be recorded to a .CSV file for further analysis. The board can also be used in simulation mode, where it behaves as a virtual sensor.

VALUE TO CUSTOMERS

- **Quicker, easier sensor evaluation:** The Evaluation Kit and associated City Technology software simplify sensor evaluation and demonstration by eliminating the need for the customers to write any code.
- **Command set window:** This function allows the user to visualize how the packets of data are being transferred and how the commands are executed, reducing considerably the development process.
- **Simulation mode:** This mode allows the user to simulate the response of different sensors and their response to gases without the need of having the physical sensor. Additionally, it is possible to simulate different sensor status, gas concentration readings, alarms and errors.
- **Expedite development:** The response of a virtual sensor can be emulated by using the simulation mode and connecting the board to your instrument. The simulated response is configurable through the software.



FEATURES

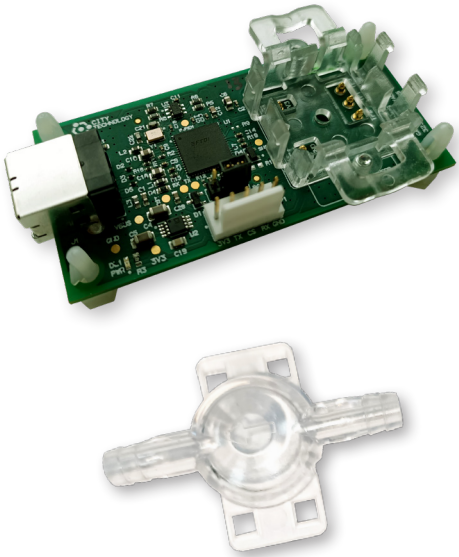



- The Evaluation Kit has a socket which fits all iseries digital gas sensors
- Digital output for all sensors: ppm, %O₂, %LEL or %vol (depending on the type of sensor)
- OEM/partner code lock
- Configurable alarm settings
- Compatible with a wide range of sensors that are currently on development
- Allows the user to test the whole set of features and commands available for the iseries platform

POTENTIAL APPLICATIONS

- Sensor demonstration
- Sensor testing and evaluation
- Proof-of-concept testing
- Gas instrument development
- Data logger



Table 1. Sensor Evaluation Kit and User-Provided Items

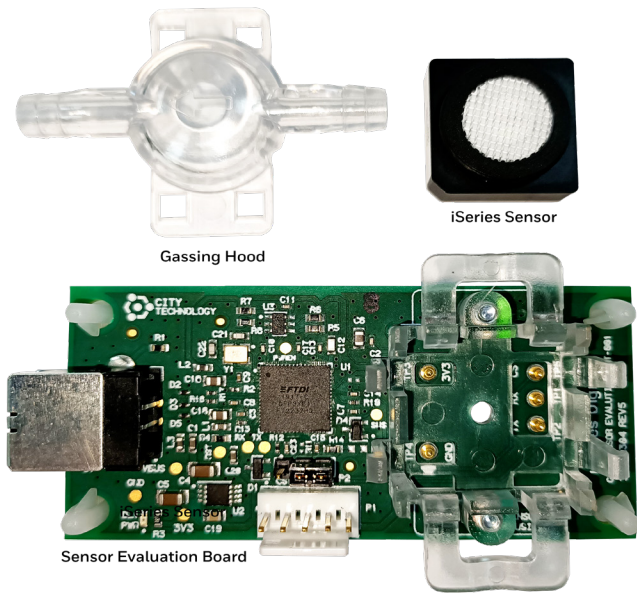
CITY TECHNOLOGY SENSOR EVALUATION KIT	USER-PROVIDED COMPONENTS	
Includes Sensor Evaluation Board and Gassing Hood	USB to Evaluation Kit cable: USB Type A B	PC
		
		<p>Note: if using a docking-station computer, ensure that the computer is not in its docking station when installing and running the software)</p>
	<p>iseries sensors*</p> 	

* City Technology sensors are sold separately.

Table 2. Evaluation Kit Specifications

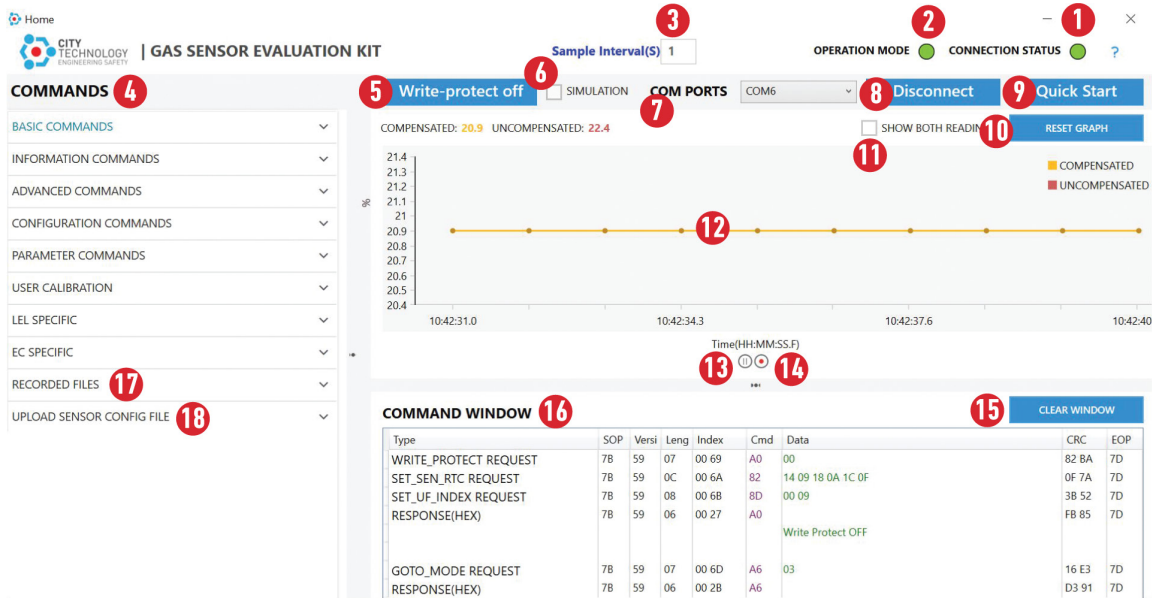
CHARACTERISTICS	PARAMETER
Temperature range	-40°C to 60°C
Storage temperature range	0°C to 20°C
Operating humidity range	5 % to 95 % RH
Operating pressure range	600 mbar to 1200 mbar
ESD sensitivity	Class 2
Power supply	through USB port
Compatible sensors	iseries: digital gas sensors
Associated software	Gas Sensor Evaluation Kit

Evaluation Kit with Sensor



1.0 DESKTOP APP

Figure 1. Graphical User Interface: Measurement Screen for iSeries Digital Sensors



DESCRIPTION

1. **Connection status (indicator)** – Indicates the connection status of a sensor to the evaluation kit. Green indicates that a sensor is connected and red means an unconnected sensor.
2. **Operation mode (indicator)** – Indicates whether the sensor is in 'Sleep' mode (red), 'Warmup' mode (amber) or normal operation 'Work' mode (green). Note that the operation mode indicator only updates when communicating with the sensor.
3. **Sample interval** – Period of time used to generate the real time graph. The chart is generated by requesting gas concentration readings in the background.

NOTE

Note that, although the evaluation kit is continuously sending and receiving data from the sensor using the 'GET_DATA_PACK' command during data logging, these commands and responses are not echoed to avoid cluttering up the Command Window.

4. **Command section** – There are different tabs in the command window: basic, information, advanced, configuration, parameter, calibration, LEL and EC specific. Section 3 provides a description of the commands.
5. **Write-protect off** – To use any set command, it is necessary to set write-protect off. This button allows the user a quick access to this command.
6. **Simulation mode** – This function allows the evaluation kit to behave like a virtual sensor. The user can connect the evaluation kit to their instruments to assist in instrument development/debugging.
7. **COM ports** – This will display a drop-down window with the communication ports available.
8. **Connect/disconnect button** – Starts/stops the communication between the computer and the evaluation kit. The communication port (COM) needs to be selected first.
9. **Quick start** – After establishing the connection with the COM port, you can start taking measurements by pressing this button. The function automatically disables the write-protection, changes the sensor from sleep to work mode, sets the real-time clock and user factor (UF0) and starts taking gas measurements (data pack is executed in the background without displaying it in the command window) to generate real-time graph.
10. **Reset graph** – Clears the previously plotted points by restarting the graph.
11. **Compensated and uncompensated readings** – When the user selects this option, both readings (compensated for temperature and drift correction, and not compensated readings) will be displayed in the real time graph and recorded files.
12. **Graph** – Shows the real-time measurements of the digital gas sensor
13. **Pause/play** – Starts/pauses the live streaming gas concentration reading.
14. **Record** – When the button is pressed, the icon will turn blue which indicates that the gas readings are being recorded. Once the button is pressed again, the Evaluation Kit will stop recording.
15. **Clear (command window)** – Removes all previously used commands from the command window
16. **Command window** – Displays the command and response packets sent between the PC and the Evaluation Kit.
17. **Recorded files tab** – The recorded files are located in this section.
18. **Upload sensor configuration file** – When new sensors are released they can be added to simulation mode by uploading the corresponding sensor file to this section.

2.0 QUICK START GUIDE

The following gives the sequence of commands needed to start up and take readings from the sensor:

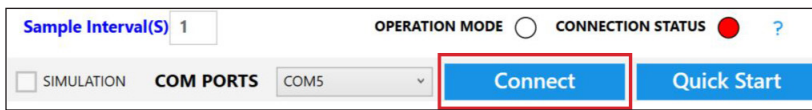
1. After installing the evaluation kit software, plug a sensor into the evaluation kit and connect to the PC using a USB cable.
2. Run the evaluation kit software.

STOP IMPORTANT

On some PCs the COM port doesn't appear automatically when the evaluation kit is installed. If this happens, you need to manually install the driver. For additional instructions consult the Evaluation Kit Installation Guide Appendix.

3. Select the COM port that the sensor is connected to (will probably be the last number in the pull-down menu) then press the 'Connect' button:

Figure 2. Connect Button Location



4. The 'connection status' indicator should go green, indicating that the connection from PC to sensor has been made. If this does not happen it may be that you have selected the wrong COM port.

Figure 3. Connection Status Indicator



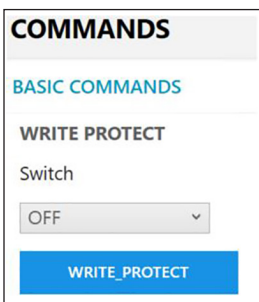
5. **To set up the sensor manually, proceed to step 6.** For immediate gas readings press the "Quick Start" button and consult the next subsection (Quick start function).

Figure 4. Quick Start Button Location



6. By default, the sensor is in 'sleep' mode when it is first powered up, this is analogous to an instrument being in its 'off' state when it has first been recharged from a fully discharged state. If you ask the sensor for readings in this state, it will respond in the command window with a message stating that it is in 'sleep' mode and as a fail-safe precaution will output full scale gas concentration reading. When in sleep mode the 'operation mode' indicator will be red.
7. To wake up the sensor and start taking readings, first turn off the write protect mode, in the 'basic commands' tab, select 'off' from the drop-down window and click on the 'write_protect' button.

Figure 5. Write Protect Mode Button



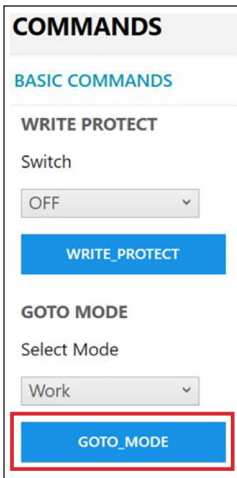
The sensor will respond in the 'command window' with a message to confirm that the Write Protect has been turned off:

Figure 6. Command Window: Write Protect Turned Off

COMMAND WINDOW									
Type	SOP	Versi	Leng	Index	Cmd	Data	CRC	EOP	
WRITE_PROTECT REQUEST	7B	59	07	00 01	A0	00	05 99	7D	
RESPONSE(HEX)	7B	59	06	0A 6F	A0		CB 08	7D	
						Write Protect OFF			

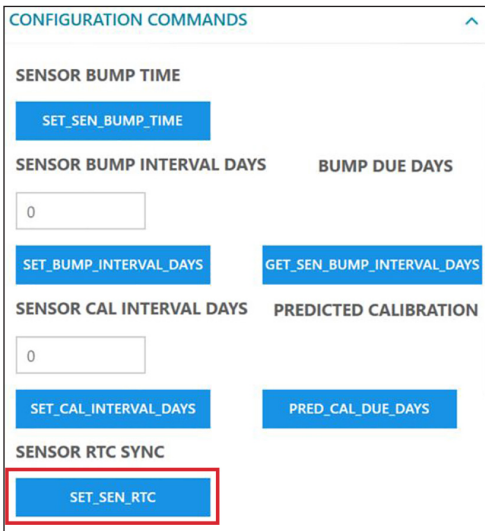
- Note that the write protect function will automatically turn back on after 300 seconds of if the sensor is restarted. Now select 'Work' mode and press the 'Goto mode' button:

Figure 7. Goto Mode Button Location



- To synchronise the sensor internal real-time clock with the PC, use the 'SET_SEN_RTC' command in the 'Configuration Commands' tab. If you do not do this, then the sensor will report a 'Time Not Synchronised' warning when you ask for a gas reading. There is no built in battery backup for the sensor RTC.

Figure 8. SET_SEN_RTC Command



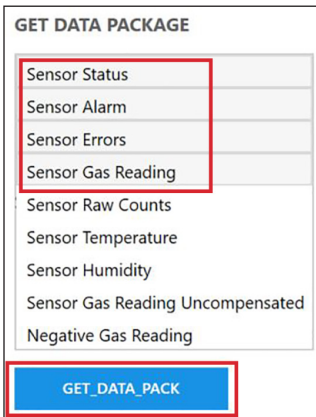
10. To set the User factor index, use the 'SET_UF_IDX' command in the 'Configuration Commands' tab. If you do not do this, then the sensor will report the following message: 'User factor not set' warning when you ask for a gas reading.

Figure 9. User Factor Index



11. To read data from the sensor, use the 'GET_DATA_PACK' button. You can also select what information you would like the evaluation kit to display. The example below displays 'Sensor Status' (whether the sensor is in Sleep, Warm up or normal work mode), 'Sensor Alarm' (whether any of the alarm thresholds have been reached), 'Sensor Errors' (whether any faults have been detected), and the gas reading (e.g. in ppm for a toxic sensors):

Figure 10. GET_DATA_PACK Button



Response in Command Window:

Figure 11. Command Window Response

COMMAND WINDOW									
Type	SOP	Versi	Leng	Index	Cmd	Data	CRC	EOP	
GET_DATA_PACK REQUEST	7B	59	09	00 05	30	00 00 0F	D2 4D	7D	
RESPONSE(HEX)	7B	59	0E	0A 73	30	00 00 01 6E 00 00 08 2A	35 60	7D	
RESPONSE						Sensor Status Normal Sensor Alarm No Alarms Sensor Error: Bump test is due Reading 20.9%			

Consider that for the first second(s)* after setting the sensor into 'work' mode from a cold start (unpowered), the 'sensor status' will report that it is in 'warmup mode', the 'operation mode' indicator will be amber, and the concentration reading will be full scale. After this initial warmup period the 'sensor status' will be indicated as 'normal' (as above) and the correct gas concentration will be shown.

Note*: The warmup time depends on the sensor technology: Catalytic sensors have a warmup time of 15 second, whereas electrochemical sensors have a warmup time of 1 second.

2.1 QUICK START FUNCTION

STOP IMPORTANT

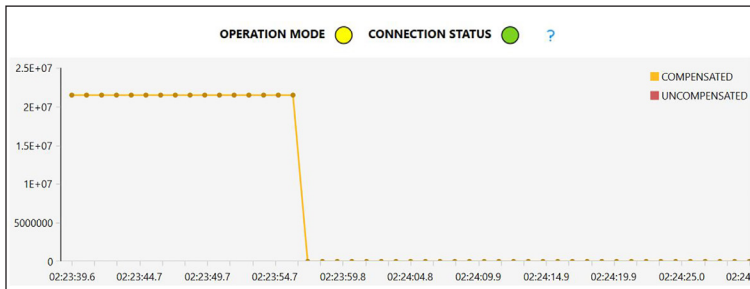
When the quick start button is pressed, an automatic sequence of commands is executed. The quick start function does not exist in the communication standard as such; instead, this function is integrated by single commands.

The quick start sequence works by following the sequence enlisted below:

- a) Disable write protection
- b) Set real-time clock. The RTC of the sensor will be set based on the RTC of your computer.
- c) Set user factor. Note that user factor 0 (UFO) accounts for a sensor that has no additional membrane on top of it.
- d) **Gas reading measurements will be displayed on real-time graph.** Bear in mind that during the warmup time a non-valid value (0x FF FF) will be displayed on the graph.

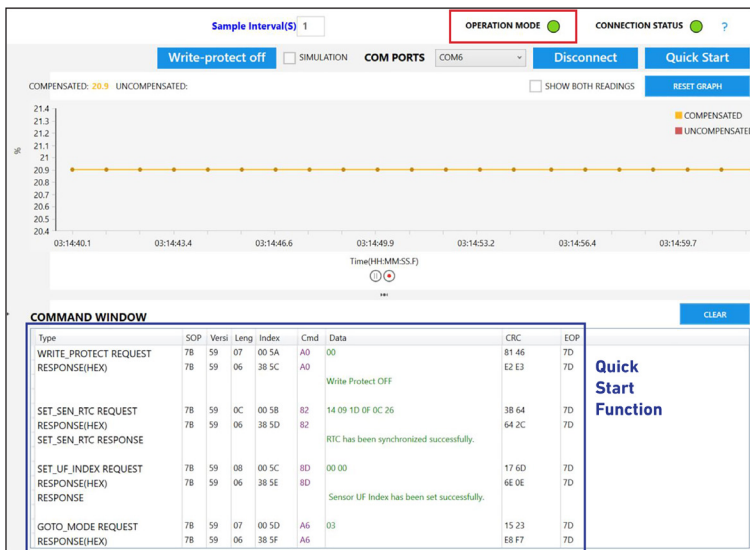
During the warm-up time, the operation mode indicator will be coloured in yellow:

Figure 12. Operation Mode: Yellow



After the warm-up period has passed, the indicator will be coloured in green, signifying that the sensor is actively taking gas concentrations readings:

Figure 13. Operation Mode: Green



2.2 LOGGING SENSOR DATA

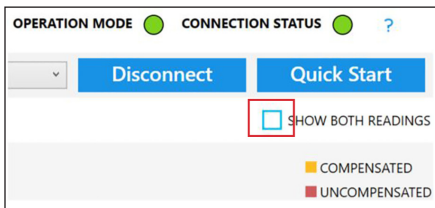
To display a chart of sensor response, after completing the start-up procedure above, press the 'play' button:

Figure 14. Play Button Location



You can also select whether to just display the fully compensated sensor reading (yellow trace) or both the compensated and uncompensated reading (read trace) by selecting the 'Show both readings' tick box:

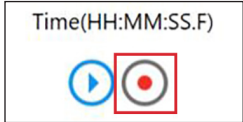
Figure 15. Show Both Readings Check Box



The reason for providing the display of uncompensated readings is to allow the user to see the effects of the built-in temperature and drift correction features of the sensor. Normally only the compensated reading is needed.

The data can be logged to a file by pressing the 'record' button:

Figure 16. Record Button Location



You will notice that when this is done, the evaluation kit automatically sends a sequence of commands to the sensor, to ask for its gas type and serial number, these are added to the header of the recorded data file:

Figure 17. Sequence of Commands Added to Recorded Data File

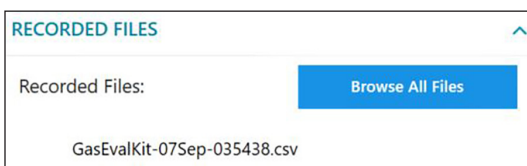
GET_SEN_GAS_NAME REQUEST	7B	59	07	00 13	35	00		7A FB	7D
RESPONSE						02			
GET_PROD_SN REQUEST	7B	59	06	00 C2	13			26 20	7D
RESPONSE(HEX)	7B	59	12	03 81	13	39 32 33 33 38 38 36 35 36 34 33 00		33 02	7D
RESPONSE						92338865643			

Note that, although the evaluation kit is continuously sending and receiving data from the sensor using the 'GET_DATA_PACK' command during data logging, these commands and responses are not echoed, to avoid cluttering up the Command Window. The user can still manually send other commands to the sensor while it is logging.

To stop recording and save the data to a CSV file, press the record button a second time.

The CSV files can be viewed in the 'RECORDED FILES' menu:

Figure 18. Recorded Files Menu



3. COMMANDS

The commands are categorised in different groups: basic, information, advanced, configuration, parameter, LEL specific (exclusive set of commands for Lower Explosive Limit sensors), EC specific (exclusive set of commands for electrochemical sensors), and user calibration. The following subsections categorises the commands and summarises the function of each command.

For a complete description of the architecture of the commands (in terms of bytes), consult the technical note (Communication Protocol SDCS: Smart device communication standard).

3.1 BASIC COMMANDS

The basic commands provide the most important elementary information about the sensor to be evaluated. Data pack displays the status of the sensor and the gas reading measurement.

Table 3. Basic Commands

COMMANDS	DESCRIPTION
WRITE_PROTECT	<p>Enables or disables the write protect mode – write protect is enabled by default. Write protect has to be disabled to change sensor mode or perform tasks such as calibration. The write protect mode defaults back to enabled after 300 seconds or if the sensor is powered off.</p> <p>Note: Please note than a button which deactivates the write-protect function can be also found next to the simulation button.</p>
GOTO_MODE	<p>Allows the sensor to be set to 'Sleep' mode (lowest powered mode with no gas readings taken), 'Work' mode (normal operating mode with readings taken once a second) or reset.</p> <p>Note: If the sensor is reset, it will be required to set the RTC and UF correspondingly.</p>
GET_DATA_PACK	<p>Displays the sensor's status, alarm, sensor faults and the gas reading measurement. Raw ADC counts, Temperature, Humidity (if supported) and uncompensated gas reading can also be displayed for debugging purposes if required.</p> <p>Note: By default, no data package elements are selected. You'll need to manually select the information that you require by clicking on the element(s) of interest.</p>

3.2 INFORMATION COMMANDS

Most of these commands are used to retrieve and display the stored information in the sensor regarding its ID. The required command is selected from the pull down menu and the 'invoke command' button pressed to send the command. See the Communication Protocol document for details.

Table 4. Information Commands

COMMANDS	DESCRIPTION
GET_GAS_NAME	Displays the target gas of the sensor (e.g. CO, O ₂ , SO ₂)
GET_PROD_NAME	Product name of the sensor (e.g. iCO, iO2, iSO2, iLEL)
GET_PROD_DATE	Manufacturing day of the sensor
GET_FW_VER	Version number of the firmware in the sensor
GET_SEN_SN	Serial number of the sensor
GET_SEN_SUM	Number of channels or detected gases in the sensor (e.g. 1 for a single CO sensor, 2 for dual CO+H2S sensor)
GET_DATA_FMT	Information needed to correctly interpret the data sent from the sensor (concentration units).
GET_END_OF_LIFE	Number of days remaining until sensor end of life
GET_CAL_DUE_DAYS	Number of days until the next calibration is due. This commands displays either the predicted calibration days or the user's set up countdown timer (whichever is lower)
GET_CAL_TIME	Duration of calibration gas exposure (seconds)
GET_CAL_DATA	Detailed record of latest calibration data and parameters
GET_BUMP_DUE_DAYS	Number of days until next bump test is due
GET_CAL_ERRORS	This command provides a detailed diagnostic of an unsuccessful calibration
GET_PRED_CAL_DUE_DAYS	Displays the predicted time for calibration and the user's set up count down timer for calibration

3.3 ADVANCED COMMANDS

Commands that allow OEM lock parameters to be read and configured.

This tab also has aloha mode. **Aloha mode** is a function in which a sensor can be configured to automatically send readings to the instrument at certain configurable intervals and/or to send a warning if a gas threshold has been reached. This option allows the instrument to go into a sleep mode itself and rely on the sensor to wake it up when necessary.

IMPORTANT

Aloha mode configuration is automatically switched off when a command other than get aloha mode is sent from the instrument to the sensor. To test aloha on the evaluation kit it is necessary to stop the real-time graph (The reason is that the real-time graph function request data packs (CMD 0x30) on the background).

Aloha mode is only available when interfacing with a **single sensor**.

Table 5. Advanced Commands

COMMANDS	DESCRIPTION
ALOHA_CONFIG	<p>The sensor can constantly send packets of data without the instrument request when a certain gas concentration is exceeded (aloha by period) and/ or after certain period has passed (aloha by period).</p> <p>Aloha mode by period configures the sampling rate in seconds (with a maximum of 1 sample per second) and aloha mode by threshold is activated once the threshold is exceeded.</p> <p>Note: Both modes, period and threshold, can be activated individually or at the same time.</p> <p>Important: To use this mode in the evaluation kit, the real-time graph must be switched off.</p>
GET_ALOHA_MODE	<p>This command request whether the aloha mode is being used or not. In case the function is used, it will display the ALOHA_CONFIG parameters: period and threshold.</p>
GET/SET_PARTNER_CODE	<p>Allows the second level OEM lock to be set and read (up to six ASCII characters). Note that this can only be set once, and cannot be changed once set. The 'SET_PARTNER_CODE' command will report an error if the user attempts to set is a second time.</p>
GET/SET_OEM_CODE	<p>Allows the first level OEM lock to be read. Note that the OEM code will always be set during manufacture, so the 'SET_OEM_CODE' command will always report an error since it cannot be modified once it has been set.</p>

3.4 CONFIGURATION COMMANDS

The following options allows to configure the sensor's internal clock, set/get gas unit, set user factor, get/set bump interval days, reset the bump time period and configure the sensor's deadband.

Table 6. Configuration Commands

COMMANDS	DESCRIPTION
SET_BUMP_TIME	Reset the countdown timer of bump due days. Note: This function assumes that the bump test has been successfully done by the user.
SET_BUMP_INTERVAL_DAYS	Sets the period for the countdown timer corresponding to the next bump test. When the counter is 0 an alarm will be flagged in data pack.
GET_BUMP_INTERVAL_DAYS	Due days to get a new bump test.
SET_CAL_INTERVAL_DAYS	Set the period for the countdown timer for the next calibration. When the counter is 0 an alarm will be flagged in data pack.
PRED_CAL_DUE_DAYS	Displays the predicted time for calibration and the user's set up count down timer for calibration.
SET_SEN_RTC	Synchronises the sensor's internal real time clock with that on the PC.
SET_GASUNIT	Allows the concentration units for the sensor output to be selected from the pulldown list (only units supported by the sensor will be in the list).
GET_GASUNIT_LIST	Requests from the sensor the list of possible gas concentration units that it supports (eg ppm, ppb, %vol, %LEL etc). Pressing this button populates the 'GAS UNIT' pulldown menu.
SET_UF_IDX (User factor index)	Allows selection of the correction factor for the sensor, based on the instrument and gas access design, so that pre-calibrated sensor will read correctly in the instrument. Contact City Technology for more information. Note: UF0 is the default option where the compensation is not required.
GET/SET_DEADBAND	Sensor dead-band can be enabled or disabled, and limits set. When 'on', the gas concentration has to exceed the 'outgoing' limit before a non-zero reading starts to be displayed. As the gas concentration falls, it will only read zero once it has fallen below the 'incoming' limit (incoming limit < outgoing limit.). Note that if the dead band is turned off the sensor will display negative concentration readings if the signal drops below the baseline. With the dead band turned on, the sensor will not display negative readings. To prevent displaying negative readings without a dead band, set the dead band to 'on' but set both limits to zero.

3.5 PARAMETER COMMAND SECTION

The iseries digital sensors can be configured by changing the sensors parameters, such specification parameters allow the configuration of alarms and operational conditions.

The following table describes the elements that are found in the parameter tab:

Table 7. Get/Set Parameter Commands

COMMANDS	DESCRIPTION
Span	Sets the concentration of the gas that will be used for calibration
Low	Sets the concentration threshold for the lower (first) alarm. For oxygen, this parameter indicates a concentration level below clear air
High	Sets the concentration threshold for the higher (second) alarm. For oxygen, this parameter indicates a concentration level above clear air
OverRange (Read-only)	Maximum concentration that the sensor can measure up to
STEL	Sets the concentration threshold for the Short Term Exposure Limit alarm (15 minute time weighted average)
TWA	Sets the concentration threshold for the Long Term Exposure Limit alarm (8 hour time weighted average)
Fresh air (Only for O₂)	This parameter is exclusive for oxygen (iO ₂). The parameter is defined as the oxygen concentration found in clean air. Typically, this value is 20.9% O ₂
Drift (Read-only)	Small and non-deterministic temporal variation of the sensor output. This parameter is flagged when the apparent gas concentration reading has gone too far negative

The parameters that can be configured by the user are span, low, high, span high, STEL and TWA. Some other parameters can only be read, such as overrange and drift. Please bear in mind that by default no data package elements are selected. The user needs to manually select the information that is require by clicking on the element(s) of interest.

Note: The parameter commands change depending on the type of sensor. For example, there are no TWA and STEL alarms for oxygen (iO₂) and catalytic LEL sensor (iLEL75).

3.6 USER CALIBRATION

This command allows the user to calibrate the sensor using the target gas and ambient air.

Note that for all sensors 'zero' represents clean air and 'span' is the target gas at the concentration defined by the 'Span' parameter. Please consult Section 3.5 for additional information.

- Select either 'zero point' or 'span point' as required and press the 'user cal' button
- When this command is invoked, a warning window will pop-up to ensure that the gas inlets/outlets are connected to the sensor accordingly.
- When the calibration is started, a window containing the count-down will pop up.

Figure 19. Warning Window

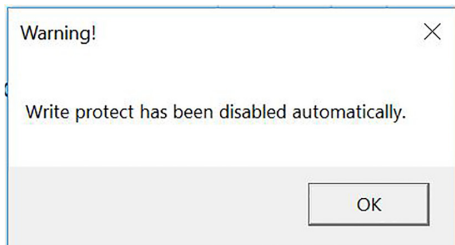
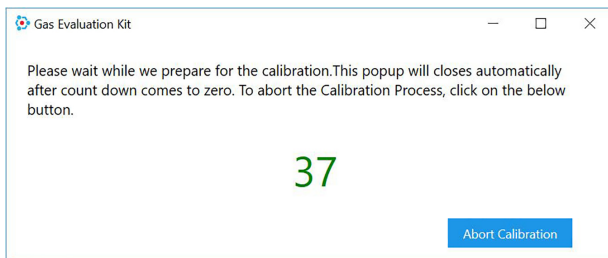


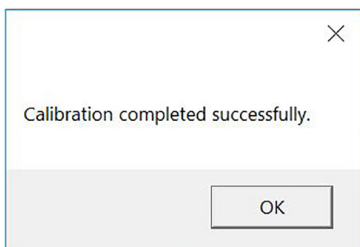
Figure 20. Calibration Countdown



The calibration can be aborted at any point during the calibration.

Once the calibration timer has finished, a window with the message "calibration completed successfully" will confirm that the procedure has been completed.

Figure 21. Calibration Notification



Important: To calibrate the iseries digital sensors in an instrument it is necessary to set the **write-protect off** first. The calibration function implemented in the evaluation kit does this automatically for convenience only.

Note: For oxygen, 'zero' calibration is also clean air (the typical oxygen concentration in clean air is 20.9 % O₂); however, unlike other sensors (toxic gases) the default 'span' value is 0 (0 % O₂), which represents the absence of air (e.g. 100% N₂).

3.7 LEL SPECIFIC

The following commands are used for Lower Explosive Limit sensors. In general, an LEL sensor has 3 main specific parameters: Gas used during calibration (CAL gas), target gas (MES gas) and its corresponding compliance standard (either EN 50054 or EN 60079-20-1).

Table 9. LEL Specific Commands

COMMANDS	DESCRIPTION
GET_GAS_LIST	The sensor can be configured to detect different target gases. This command displays the list of gases at which the sensor can be configured.
GET_GAS_CAL_MES	The command requests the gas at which the sensor was calibrated with and the target gas at which the sensor is set to detect.
SET_GAS_CAL_MES	Configures the calibration gas and target gas. Both variables can be selected from the drop-down window (CAL gas and MES gas). Note: To populate the drop-down windows it is necessary to request the available gases list (Get_GasList)
SET_CMPL_STD	Can be configured to comply with either EN 50054 or EN 60079-20-1 standards.

3.8 EC SPECIFIC

The following commands can be used only for electrochemical sensors.

Table 10. EC Specific Commands

COMMANDS	DESCRIPTION
GET_ACCURACY_PERCENT	Displays the accuracy of electrochemical sensors. The result is given in percent accuracy (%).
SET_ACCURACY_PERCENT	Set the accuracy of the electrochemical sensor. The smaller the percent accuracy the shorter the period required to perform span and zero calibrations.
GET_EC_DATALOG_INDEX	This function requests the number of diagnostic test stored within the sensor. Every element in the array corresponds to a single diagnostic report. The elements in the array are arranged by their field data indexes.
FROM_CURRENT_INDEX GET_EC_DATALOG	This function requests a single diagnostic test log . To request this data, it is necessary to provide the field data index number. Note: To download the whole field data stored within the sensor, it is necessary to use this command as many times as the number of stored diagnostic tests. (The number of elements can be accessed through GET_EC_DATALOG_INDEX)
CLEAR_STEL/TWA_COUNT	Resets STEL and/or TWA internal counter. This command should be used when the instrument is passed from one individual to another after either a 15-minute period for STEL or an 8-hour working shift for TWA.

4. EXPORTING DATA

The evaluation kit has the option of tracking the gas measurements and export this data to a CSV file by simply pressing the record button at the beginning and at the end of the gas measurement session.

The exported file has the following information in the header: date, sensor name, sensor serial number, units and measurement date. The data recorded in the columns is the time of the measurements, the compensated gas reading, and optionally the uncompensated gas concentration reading (if the 'show both readings' tick box has been selected).

Figure 22. Captured file clip sample for iseries evaluation software

	A	B
1	DATE	Sep-07-2020 03:49:07
2	SENSOR NAME	O2
3	SENSOR SERIAL NUMBER	92338865643
4	UNITS	%
5	TIME(hh:mm:ss:ms)	COMPENSATED GAS READING
6	03:49:07:497	20.9
7	03:49:08:498	20.9
8	03:49:10:4910	20.9
9	03:49:11:4911	20.9
10	03:49:12:4912	20.9
11	03:49:13:4913	20.9
12	03:49:14:4914	20.9
13	03:49:15:4915	20.9
14	03:49:17:4917	20.9
15	03:49:18:4918	20.9
16	03:49:19:4919	20.9
17	03:49:20:4920	20.9
18	03:49:21:4921	20.9
19	03:49:22:4922	20.9
20	03:49:23:4923	20.9
21	03:49:24:4924	20.9
22	03:49:25:4925	20.9
23	03:49:26:4926	20.9
24	03:49:28:4928	20.9
25	03:49:29:4929	20.9

GasEvalKit-07Sep-035438

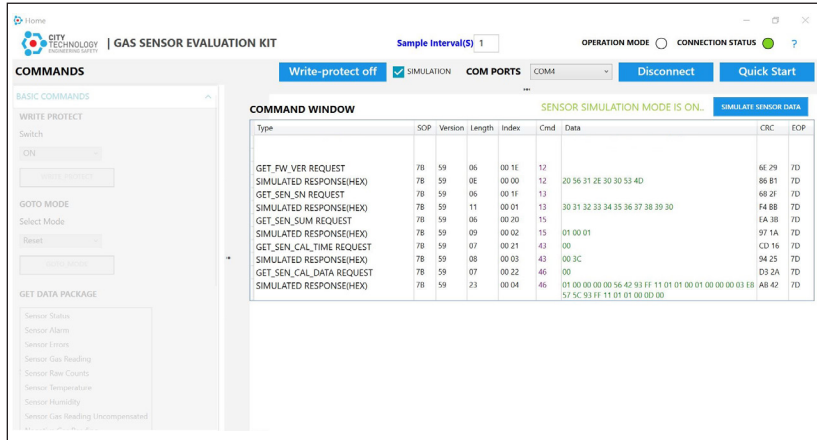
5. SIMULATION MODE

In simulation mode, the board behaves like a virtual sensor. Your instrument can be evaluated by sending commands to the evaluation kit and it will respond as if it was a sensor. To initiate the simulation mode, connect your instrument to the board through the external terminals (CS, Tx & Rx) and proceed to click on the simulation mode tick-box. Once the evaluation kit is in simulation mode, a confirmation will be shown on the screen.

Bear in mind that the behaviour of the simulated sensor will resemble the functioning of a real sensor. For instance, when the evaluation kit starts operating in simulation mode, the virtual sensor will be in sleep mode and write protect will be on. In other words, to start evaluating some of the functions of the virtual sensor (such as the gas concentration readings) it is necessary to follow the regular start up procedure.

In simulation mode, some commands will reply to the instrument with a generic response. For example, the simulated firmware version is “V1.00SM”, and this resembles a generic response for version 1 of the Simulation Mode. Other commands that have a generic response include serial number, sensor sum, calibration time, calibration data, FW version, etc. (as depicted in Figure 23).

Figure 23. Command Window



For other commands, the **sensor response can be modified through the evaluation kit software**. To access to this option, click on simulate sensor data.

Figure 24. Command Window



For instance, **a simulated data pack** can be modified. In this case, the gas readings, temperature, **sensor status, alarms and errors can be directly assigned** so you can ensure that your instrument reacts to these flags correspondingly. Other commands that allow the user to modify the response of the virtual sensor through the software include: gas type, sensor format, deadband, calibration errors, End of Life and Predictive Calibration. Please bear in mind that when the gas type is changed, other parameters will be modified automatically. i.e. the sensor format, gas name and parameter commands will change depending on the select gas.

Figure 25. Simulation mode: The commands are sent from the instrument to the virtual sensor (evaluation kit). In simulation mode, the command section and the real-time graph cannot be accessed since they are not functional.

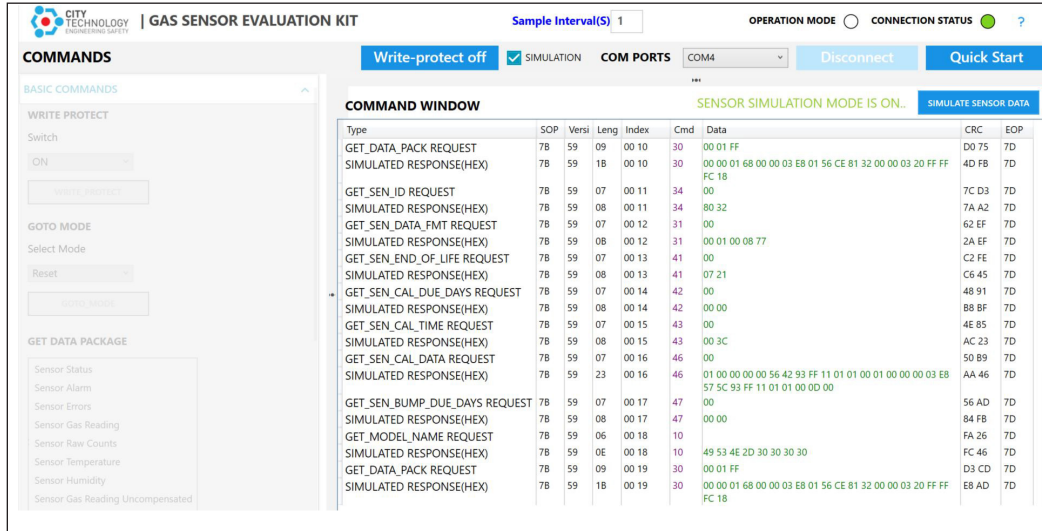


Figure 26. Simulate Sensor Data Button

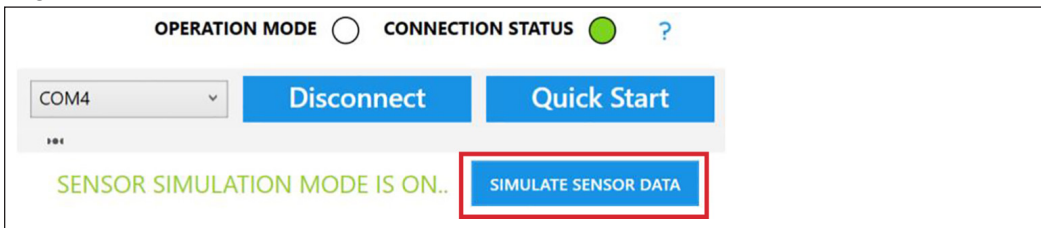


Figure 27. Parameters that can be configured as a default data pack response in the simulation mode.

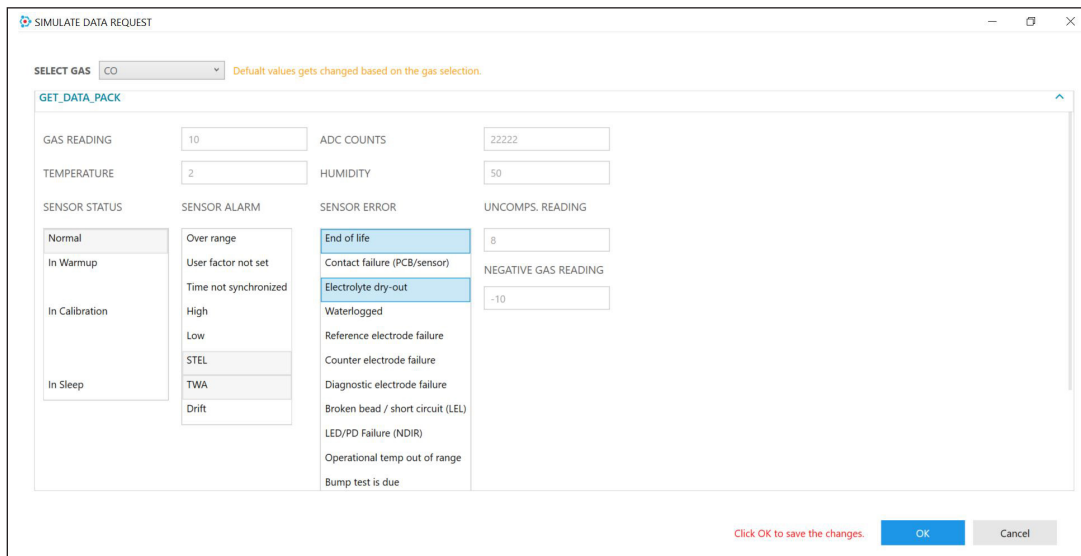
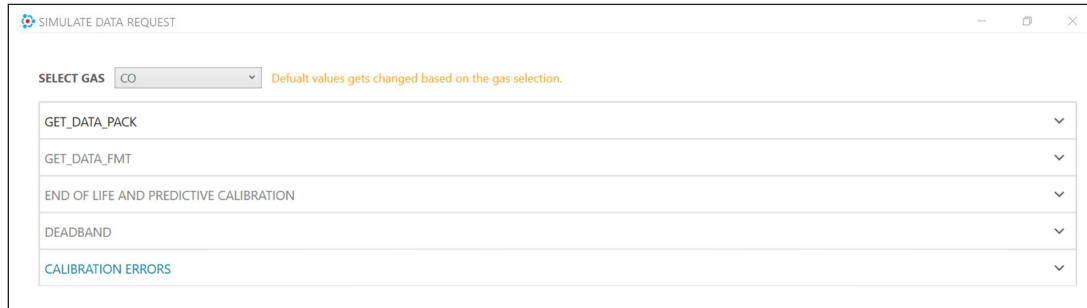


Figure 28. Simulated data request window – The list of commands that allow the modification of the virtual sensor response through the evaluation kit software.



STOP IMPORTANT

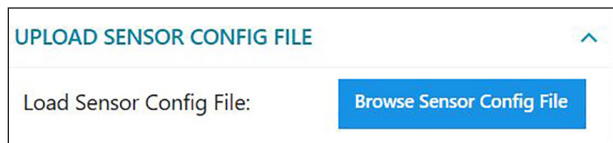
For simplicity, the deadband is deactivated by default (in simulation mode). To enable this function in simulation mode it is necessary to configure it through the simulated data request window or by using SET_DEADBAND (0x8A).

5.1 ADDING NEXT GENERATION SENSORS

The iseries will be launching different type of sensors in the near future. When a new type of sensor is released, a new file containing the characteristics and parameters of such sensor will be uploaded to our main webpage.

To add the new sensor to the simulation mode identify the 'Upload sensor configuration file' section (located in the Command window). Then proceed to click on 'Browse Sensor Config File' and select the file corresponding to the sensor(s) to be added.

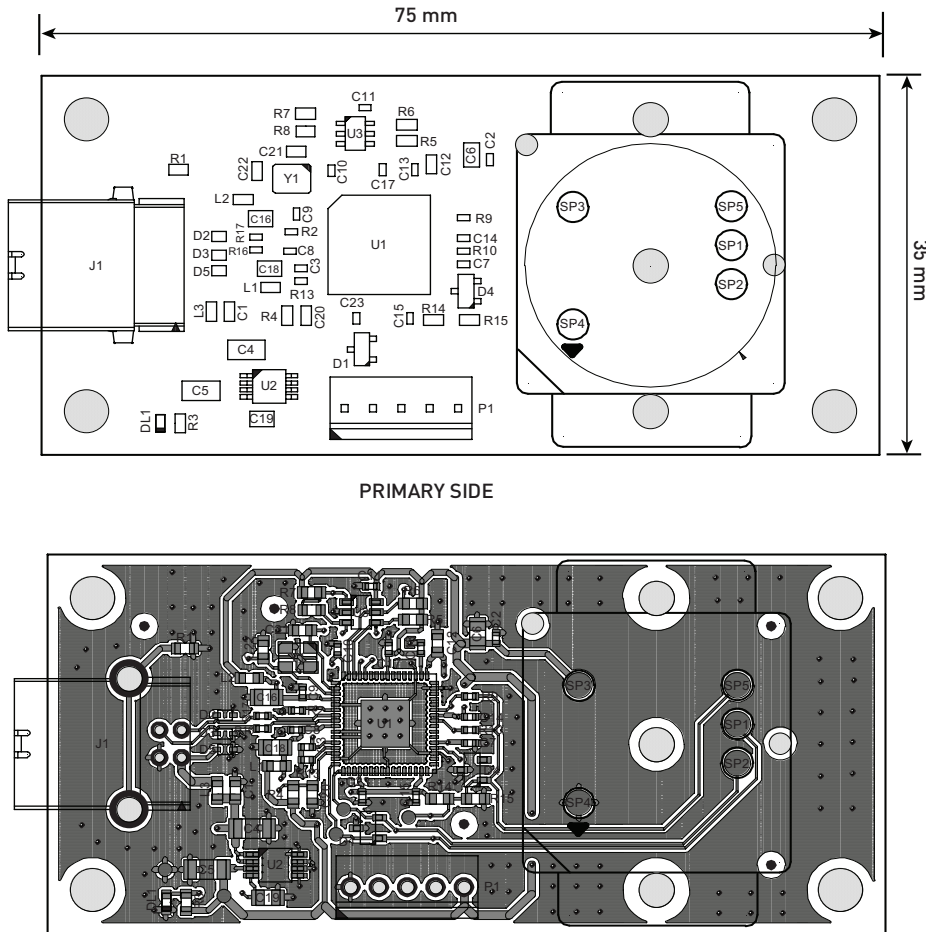
Figure 29. Upload Sensor Config File Window.



Note: Once the sensor(s) is added, there is no need to repeat this procedure (unless the software is uninstalled).

6. BOARD LAYOUT

Figure 30. Evaluation kit board layout (front and back) and dimensions



ADDITIONAL INFORMATION

The following associated literature is available on request.

- iseries: Digital Sensor datasheets
- Smart Device Communication Standard – Communication protocol for the iseries: Digital Gas Sensors

WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this datasheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

NOTICE: EVALUATION PRODUCTS

THESE PRODUCTS ARE PROTOTYPE PRE-PRODUCTION ITEMS THAT HAVE YET TO COMPLETE ALL PHASES OF PRODUCT RELEASE TESTINGS AND ARE FOR CUSTOMER EVALUATION ONLY. THESE ITEMS ARE SOLD "AS IS" WITHOUT WARRANTY EXPRESSED OR IMPLIED, INCLUDING THAT OF MERCHANTABILITY OR FITNESS FOR A PURPOSE. IN NO EVENT WILL CITY TECHNOLOGY, BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, OR DIRECT DAMAGES.

Sensor Evaluation Kit Quick Start Guide

Appendix 1: Installation Instructions

PRODUCT SPECIFICATIONS

This publication does not constitute a contract between City Technology and its customers. The contents may be changed at any time without notice. It is the customer's responsibility to ensure safe installation and operation of the products. Detailed mounting drawings of all products illustrated are available upon request.

1. DESKTOP APP INSTALLATION OR UPDATE INSTRUCTIONS

1. Download the Gas Sensor Evaluation Kit software from the link provided.
2. Open the setup file.
3. Follow the instructions displayed in the installation wizard and proceed with the software installation. Once this process is completed, click on the Gas Sensor Evaluation Kit shortcut on your desktop to open the application.

2. MANUAL DRIVER INSTALLATION (IF NOT INSTALLED AUTOMATICALLY).

On some PCs the COM port doesn't appear automatically when the evaluation kit is installed. This occurs when the evaluation kit software has encountered some installation restrictions. When this happens, the user would need to manually install the driver.

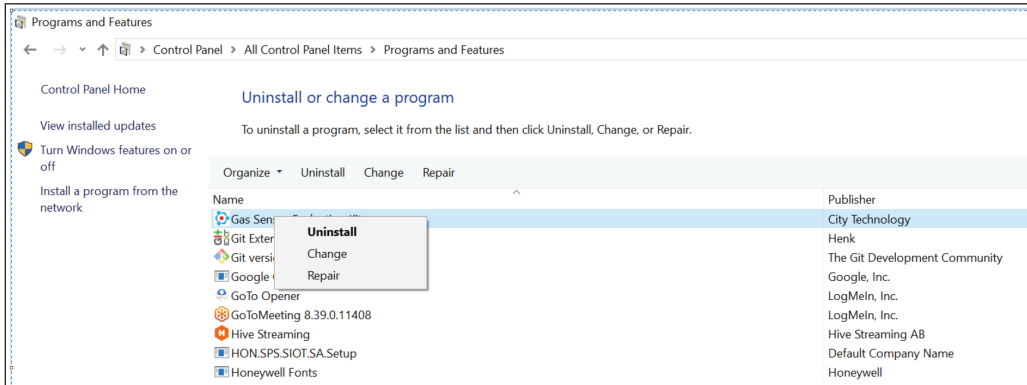
1. Download the driver from the following URL: https://www.ftdichip.com/Drivers/CDM/CDM21228_Setup.zip
2. Locate the downloaded file and right click on it to extract the installer file.
3. Execute the installer file: CDM21228_Setup.
4. Follow the instructions for the Installation Wizard to install the driver.

Note: If the user has installed the evaluation kit software in a Windows® 10 operating system, the driver should be installed automatically when the Gas sensor evaluation kit is connected to the computer.

3. DESKTOP APP UNINSTALLATION INSTRUCTIONS.

1. Open control panel and then Open 'Programs and Features'.
2. Find the Gas Sensor Evaluation Kit in the Programs list.
3. Right click on Gas Sensor Evaluation Kit and select Uninstall then follow the wizard to uninstall. Find the screenshot below for more information.

Figure 31. Uninstall Window



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