iH2S HC GAS SENSOR

002785
Issue 3

High Concentration Hydrogen Sulfide (H_2S) Intelligent Series Gas Sensor (iseries)

DOCUMENT PURPOSE

The purpose of this document is to present the performance specification of the intelligent high concentration hydrogen sulfide gas sensor (iH2S HC).
This document should be used in conjunction with the Product Safety Datasheet (PSDS 5). For guidance on the safe use of the sensor, please refer to the Communication Protocol (SDCS) and Sensor Mounting Application Note.

PORTFOLIO
Compact, digital and intelligent gas sensors, iseries sensors are precalibrated, interchangeable and feature digital traceability. These sensors are rated for longer life and are designed to operate in extreme environmental conditions.

2 YEAR WARRANTY
(24 months from date of despatch)

Hydrogen Sulfide (H_2S)
Sensor: **iH2S HC**
Part Number: AE400-R00D

FEATURES AND BENEFITS

Digital interface – The sensor has a UART protocol to communicate with the instrument with chip select option as described in the Communication Protocol (SDCS)

Interchangeable – All intelligent sensors have the same dimensions and communication protocol. All sensors in the range will work with a supply voltage from 3.1 V to 3.3 V

Digital traceability – Sensors contain the following data: serial number, manufacturing date, and gas type for quick and easy identification of the sensor

Pre-calibrated – Sensors will be calibrated during manufacturing and calibration data is written in the sensor. Sensor will output gas concentration when interrogated by instrument

OEM lock – Sensors have two levels of lock codes. The first one is an OEM specific code programmed in during manufacture and cannot be modified. This lock code is provided by the OEM. Instrument can check if the sensor has the unique code – if not the instrument can refuse the sensor. The second level of lock code is left blank and can be updated by OEM/Partners during sensor integration into the instrument as needed

Predictive calibration – Sensors can predict in advance when its accuracy is becoming too poor to give a reliable, accurate reading (advanced warning of when recalibration is needed)

End-of-life indication – Sensors can predict in advance when its sensitivity is falling too low to give a reliable, accurate reading (advanced warning for sensor replacement)

Fault indication – Intelligent sensors can detect several internal faults like drift/ fault in reference electrode, electrolyte concentration out of range, counter electrode fault; therefore notifying the user to take corrective actions

Compact form factor

Five-year life

RoHS compliant

Designed to meet global performance standards

ATEX and IEC Ex Certified per EN IEC 60079-0 and EN IEC 60079-11

Designed to meet performance standards: BS EN 45544-1, AS/NZS 4641 and ANSI/ISA 92.00.0

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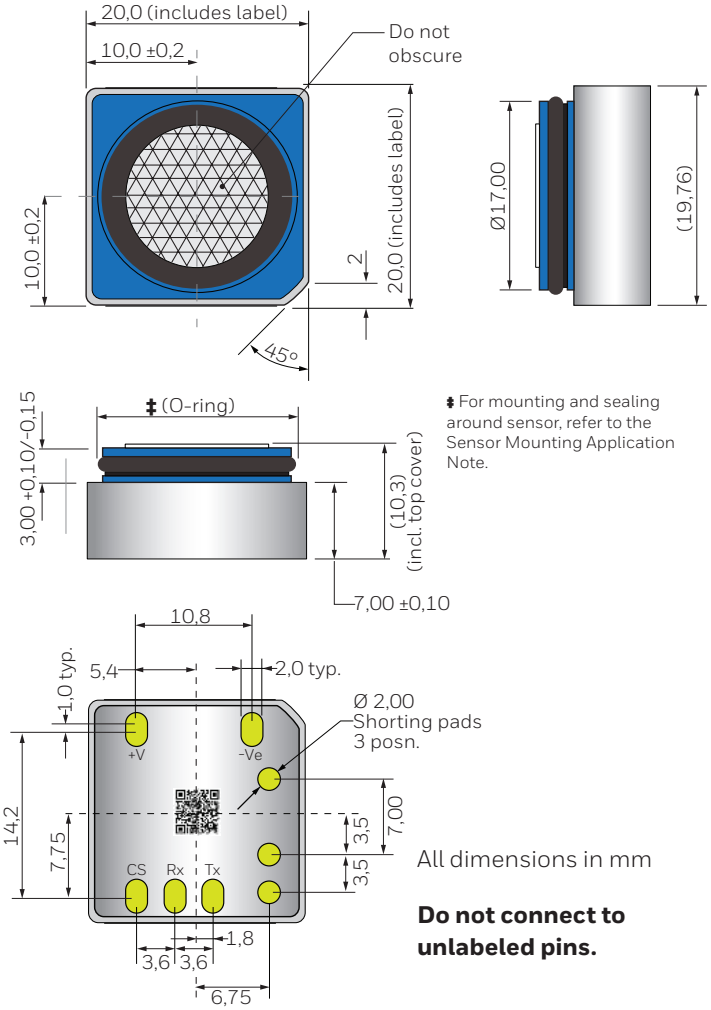
INTELLIGENT SERIES GAS SENSORS (iSERIES)
iH2S HC SERIES

TABLE 1. TECHNICAL SPECIFICATIONS	
MEASUREMENT	
Operating Principle	Electrochemical
Target Gas	H_2S
Range	0 ppm to 2000 ppm
Accuracy	±5 % of measuring value
T90* Response Time	<30 seconds, typ.
T50* Response Time	<15 seconds <30 seconds across temperature range
Output	ppm compensated for temperature
Overload (maximum concentration that can be reached before damaging the sensor)	3000 ppm
T-90* Recovery Time	<32 seconds
Linearity*	Linear (±5 % from linear, up to 2000 ppm)
Measurement Interval	1 sample per second (1 Hz)
Resolution	1 ppm
Baseline Offset*	<±2 ppm H_2S equivalent
Equilibrium Baseline (Shift from -40°C to 60°C)	<±10 ppm
Repeatability* (@ 500 ppm)	±5% of measured value
Orientation Sensitivity	None
Serial Comunication	UART with Chip Select
ENVIRONMENTAL	
Operating Temperature Range	-40°C to 60°C
Operating Humidity Range	5 % RH to 95 % RH (non-condensing)
Operating Pressure Range	600 mbar to 1200 mbar
Recommended Storage Temperature	0°C to 20°C
Flow Rate	Typical: 200 ml/min when using recommended gassing hood. (Consult iseries Sensor Mounting Application Note).
LIFETIME	
Long-Term Output Drift*	<10% signal life per annum
Expected Operating Life	5 years in air
PHYSICAL CHARACTERISTICS	
Weight	<6 g
Contact Material	Gold plated
O-Ring Material	FKM60 ±5 shore A
Outer Plastic Body Material	Modified PPO

* Specifications are valid at 20°C, 50 % RH, and 1013 mbar using Honeywell recommended circuitry. Performance characteristics outline the performance of sensors supplied within the first three months. Output signal can drift below the lower limit over time.

Product Dimensions



‡ For mounting and sealing around sensor, refer to the Sensor Mounting Application Note.

All dimensions in mm

Do not connect to unlabeled pins.

TABLE 2. ELECTRICAL SPECIFICATIONS				
	Min.	**Max.**	**Typ.**	**Unit**
Supply Voltage (Vdd)	3	3.6	3.3	Vdc
Voltage of any pin relative to ground	0	3.6	–	Vdc
Peak supply current (typ. volt)		25		mA
Current: at stand-by mode	–	–	15.49	µA
Current: at active mode	–	–	26.67	µA
Average power consumption	0.046	90	0.088	mW

For compatibility with the whole iseries range, the supply voltage should be between 3.1 V and 3.3 V.

TABLE 3. PINOUT	
Pin	**Description**
+V	Positive power supply
-V	Ground
Rx	Data transmitted from instrument to sensor
Tx	Data transmitted from sensor to instrument
CS	Chip Select
Other Pads	Do not connect, shorting link contacts only

NOTE: H_2S cells are shipped with a shorting clip which must be removed prior to installation.

INTELLIGENT SERIES GAS SENSORS (iSERIES)
iH2S HC SERIES

TABLE 4. iH2S HC PARAMETERS

	iH2S HC parameters	Default Values	Configurable Range	**Customisable:** Implemented by Honeywell (Non-configurable through the communication protocol)	**Configurable:** The parameter can be changed through the communication protocol by users	Notes
OEM Lock	OEM code (First level)	Password is customisable.* (**NoLock** will be set by default in case the OEM lock is not required)	No more than 6 characters (ASCII format)	✓		* OEM code will be set by Honeywell during sensor manufacturing. Code to be provided by OEM
	Partner code (Second level)	–	No more than 6 characters (ASCII format)		✓	Once this code has been set by user, it is not possible to change it
User Factor		User factor 0: 100 UF 1-3: Reserved UF 4-9: Customisable –––––––––– User factors can be added to include auto-compensation for using different membranes or instruments	10 allocated slots –––––––––– 1 user factor is already implemented (no additional membrane), 3 are reserved and the remaining 6 can be customised	✓*	✓**	* User factor 0 is programmed into the sensor during manufacturing. Additional User Factors can be added to the selectable list during the manufacturing process. This user factor has to be provided by the user. ** Users can select the desired user factor from the selectable list
Calibration	Zero (clean air)	0 ppm			×	Calibration is performed at two points throughout the operating range of the sensor. The calibration points are defined by the zero and span values. The zero value represent the response of the sensor in clean air
	Span (target gas)	200 ppm			✓	Span is the calibration point that is done in the presence of the target gas. The span concentration can be configured through the communication protocol
Alarms	Low	10 ppm	Limit LOW lower: 1 Limit LOW upper: 1000		✓	
	High	20 ppm	Limit HIGH lower: 1 Limit HIGH upper: 1000		✓	
	STEL	15 ppm over 15 minutes	Limit STEL lower: 1 Limit STEL upper: 1000		✓	Short-Term Exposure Limit: STEL is a limit value above which exposure to a chemical substance should not occur. It usually references a 15-minute period. STEL works to prevent adverse health effects along with other unwanted effects due to peak exposure that could possibly not be controlled by the application of an 8 hour TWA limit
	TWA	10 ppm over 8 hours	Limit TWA lower: 1 Limit TWA upper: 500		✓	Time-Weighted Average: TWA for chemical exposure can be used when each of the chemical concentration and time for exposure varies over time. It conveys the average exposure to a contaminant to which workers may be exposed without adverse effect over a period of time such as an 8-hour day or 40-hour week (an average work shift). The measurement is expressed in units of ppm
Predictive Calibration	***The recalibration alarm will be triggered when either the countdown or the accuracy threshold are reached (whichever is triggered first).***					
	Countdown timer (Cal due days)	180 days			✓	The alarm will be flagged when the countdown reaches 0. The countdown restarts when the sensor is calibrated
	Accuracy threshold	±20 %	±10 % to ±50 %		✓	The predictive calibration estimation will depend on the accuracy of the sensor (this parameter can be configured by the user). The tighter the accuracy value, the more frequent calibration needed. The sensor will request a recalibration when the default accuracy(±20% of measuring value) is reached
End of Life	***The EoL alarm will be triggered when either the countdown or the future prediction algorithm conditions are met***					
	Future prediction algorithm				×	The algorithm triggers an alarm when the sensitivity < 50% of original sensitivity at minimum recent temperature
	Countdown timer	1825 days			×	The countdown timer is set for 1825 days, i.e. 5 years
Deadband	Active by default	✓			✓	With the deadband enabled the sensor will read zero until the concentration exceeds the deadband value. Is normally used to prevent measurement oscillations. This function can be configured to different limits
	Incoming	1 ppm	Whole measurement range		✓	Incoming: As the reading decays down it will read zero once it has fallen below the incoming threshold
	Outgoing	2 ppm	Incoming ≤ Outgoing		✓	Outgoing: As the reading increases it will read zero until it exceeds the outgoing threshold
Bump Due Days		1 day			✓	A bump test is a brief exposure of the sensor to the target gas. The test has the objective of verifying that the sensor responds and the instrument acts accordingly. The sensor will tell the user when the bump interval has been exceeded.

TABLE 5. INTRINSIC SAFETY CERTIFICATIONS	
Intrinsic Safety	
Entity Parameters	Ui = 5.88 V, Ii = 1.1 A, Pi = 1.2 W, Ci = 13.14 uF, Li = 0 uH
Intrinsic Safety Rating	IIC T4, ia, 60°C
ATEX Marking	I M1 II 1G Ex ia I Ma Ex ia IIC Ga

Poisoning

Gas sensors are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments, and operation. When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted.

Do not glue directly on or near the sensor as the solvent may cause crazing of the plastic.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship during the applicable warranty period. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgment or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items that Honeywell, in its sole discretion, finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While Honeywell may provide application assistance personally, through our literature and the Honeywell web site, it is buyer's sole responsibility to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this writing. However, Honeywell assumes no responsibility for its use.

⚠ WARNING
MISUSE OF DOCUMENTATION

- The information presented in this product sheet 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.

SAFETY NOTE

This sensor is designed to be used in safety-critical applications. To ensure that the sensor and/or instrument in which it is used, are operating properly, it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument. Failure to carry out such tests may jeopardize the safety of people and property.

Under no circumstances should intelligent sensor pads be soldered to, as this can cause leakage of electrolyte. Connection should be made via a mounting socket and spring connector.

WARNING: SOLDERING TO PADS WILL RENDER YOUR WARRANTY VOID.

FOR MORE INFORMATION

Honeywell Advanced Sensing Technologies services its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing, or the nearest Authorized Distributor, visit sps.honeywell.com/ast or call:

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