iH2S **GAS SENSOR**

Hydrogen Sulfide (H₂S) Intelligent Series Gas Sensor (iseries)

DOCUMENT PURPOSE

The purpose of this document is to present the performance specification of the intelligent iH₂S hydrogen sulfide gas sensor. 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

2 YEAR WARRANTY (24 months from date of despatch)



002706 Issue 3

Hydrogen Sulfide (H₂S) Sensor: iH2S Part Number: AC400-R00D-CIT

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 -

calibrated during

manufacturing and

written in the sensor.

calibration data is

Sensor will output

gas concentration

Sensors will be



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



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 92.00.01



Predictive calibration - The recalibration alarm will be triggered when the countdown timer is reached



End-of-life indication - The alarm will be flagged when the sensor has taken/lost a considerable amount of water (electrolyte concentration is above or below limits)



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

when interrogated by instrument

Compact form factor

Five-year life

RoHS compliant

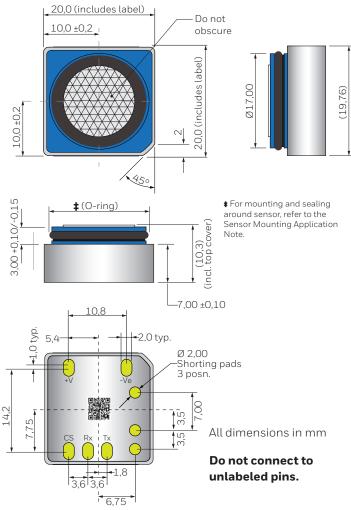


INTELLIGENT SERIES GAS SENSORS (ISERIES) IH2S SERIES

| MEASUREMENTOperating PrincipleElectrochemicalTarget GasH2SRangeOppm to 200 ppmAccuracy±5 % of measuring valueT90* Response Time<30 seconds, typ.T50* Response Time:15 secondsGotputppm compensated for temperature rangeOutputppm compensated for temperature rangeOverload (maximum concentration that can be reached before damaging the sensor):180 secondsRecovery Time rom 200 ppm to <4 ppm:180 secondsLinearity*Linear (±5 % from linear, up to 200 ppm)Measurement Interval1 sample per second (1 H2)Resolution0.1 ppmBaseline Offset*:43 ppmShift from -40°C to Go°C:43 ppmChrientation SensitivityNoneSerial ComunicationUART with Chip SelectEnsating Theseure ange:40°C to 60°COperating Temperature sensor:40°C to 60°COperating Temperature sensor:40°C to 60°COperating Temperature sensor:40°C to 60°COperating Pressure ange:00 mbar to 1200 mbarPoperating Pressure ange:00 mbar to 1200 mbarFlow Rate:00 mbar to 1200 mbarChrister Sensor Mounting xpplication Note).LIFETIME:10% signal life per annumEvertod Operating Life sensor Mounting xpplication Note).Evertod Operating Life signal life per annumEvertod Operating Life signal life per annumEvertod Operating Life signal life per annumEvertod | MEASUREMENT Deprating Principle Electrochemical Target Gas H_S Range 0 ppm to 200 ppm Accuracy ±5 % of measuring value T90* Response Time <30 seconds, typ. 15 Seconds <30 seconds across temperature range Output ppm compensated for temperature Dutput 1000 ppm Resolution 0.180 seconds Equilibrium Baseline <±10.5 ppm H_2S equivalent Equilibrium Baseline <±20.5 ppm H_2S equivalent Equilibrium Baseline <±3 ppm Sore UART with Chip Select ENVIRONMENTAL OPC to 60°C Operating Pressure 0°C to 20°C Recommended Storage 0°C to 20°C | TABLE 1. TECHNICAL SE | PECIFICATIONS |
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| Baseline Offset*<±0.5 ppm H2S equivalent | Baseline Offset*<±0.5 ppm H2S equivalent | Measurement Interval | 1 sample per second (1 Hz) |
| Equilibrium Baseline Shift from -40°C to 60°C< | Equilibrium Baseline Shift from -40°C to So°C<±3 ppm | Resolution | 0.1 ppm |
| Shift from -40°C to 60°C<±3 ppm | Shift from -40°C to 60°C<±3 ppm | Baseline Offset* | <±0.5 ppm H_2S equivalent |
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| RangeS % RH to 9S % RH (non-condensing)Operating Pressure Range600 mbar to 1200 mbarRecommended Storage Temperature0°C to 20°CFlow RateTypical: 200 mL/min when using recommended gassing hood. (Consult iseries Sensor Mounting Application Note).LIFETIMELong-Term Output Drift*<10% signal life per annum | Range5 % RH to 95 % RH (non-condensing)Operating Pressure Range600 mbar to 1200 mbarRecommended Storage Temperature0°C to 20°CFlow RateTypical: 200 ml/min when using recommended gassing hood. (Consult iseries Sensor Mounting Application Note).LIFETIME<10% signal life per annumExpected Operating Life5 years in airPHYSICAL CHARACTERISTICSGold platedWeight<6 gContact MaterialGold platedO-Ring MaterialFKM60 ±5 shore AOuter Plastic BodyModified PPO | · · · | -40°C to 60°C |
| RangeSoutmaar to 1200 mbarRecommended Storage Temperature0°C to 20°CFlow RateTypical: 200 mL/min when using recommended gassing hood. (Consult iseries Sensor Mounting Application Note).LIFETIMELong-Term Output Drift*<10% signal life per annum | Range600 mbar to 1200 mbarRecommended Storage Temperature0°C to 20°CFlow RateTypical: 200 ml/min when using recommended gassing hood. (Consult iseries Sensor Mounting Application Note).LIFETIME10% signal life per annumLong-Term Output Drift*<10% signal life per annum | | 5 % RH to 95 % RH (non-condensing) |
| TemperatureOver to 20% TemperatureTypical: 200 mL/min when using recommended gassing hood. (Consult iseries Sensor Mounting Application Note).LIFETIMELong-Term Output Drift*<10% signal life per annum | Temperature Over to 2000 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 Modified PPO | | 600 mbar to 1200 mbar |
| Flow Raterecommended gassing hood. (Consult iseries Sensor Mounting Application Note).LIFETIMELong-Term Output Drift*<10% signal life per annum | Flow Rate recommended gassing hood. (Consult iseries Sensor Mounting Application Note). LIFETIME <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 Modified PPO | • | 0°C to 20°C |
| Long-Term Output Drift*<10% signal life per annum | Long-Term Output Drift*<10% signal life per annum | Flow Rate | recommended gassing hood. (Consult iseries Sensor Mounting |
| Drift* <10% signal life per annum Expected Operating Life 5 years in air PHYSICAL CHARACTERIST Weight <6 g Contact Material Gold plated | Contact Material Cold 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 Modified PPO | LIFETIME | |
| PHYSICAL CHARACTERISTICS Weight <6 g Contact Material Gold plated | PHYSICAL CHARACTERISTICS Weight <6 g Contact Material Gold plated O-Ring Material FKM60 ±5 shore A Outer Plastic Body Modified PPO | • | <10% signal life per annum |
| Weight <6 g Contact Material Gold plated | Weight <6 g Contact Material Gold plated D-Ring Material FKM60 ±5 shore A Outer Plastic Body Modified PPO | Expected Operating Life | 5 years in air |
| Contact Material Gold plated | Contact Material Gold plated O-Ring Material FKM60 ±5 shore A Outer Plastic Body Modified PPO | PHYSICAL CHARACTERIS | rics |
| | O-Ring Material FKM60 ±5 shore A Outer Plastic Body Modified PPO | Weight | <6 g |
| O-Ding Material EVM60 JE share A | Outer Plastic Body Modified PPO | Contact Material | Gold plated |
| O-King Material PKMO0 ±3 shore A | Modified PP() | O-Ring Material | FKM60 ±5 shore A |
| Outer Plastic Body Material Modified PPO | | | 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



| TABLE 2. ELECTRICAL SPECIFICATIONS | | | | |
|---------------------------------------|-------|------|-------|------|
| | Min. | Max. | Тур. | 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 | μΑ |
| Current: at active mode | - | - | 26.67 | μΑ |
| 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 | | |
| Тх | Data transmitted from sensor to instrument | | |
| CS | Chip Select | | |
| Other Deale | Device the second set of the line is the second set of the | | |

Other Pads Do not connect, shorting link contacts only

 $\mbox{NOTE:}\ \mbox{H}_2\mbox{S}$ cells are shipped with a shorting clip which must be removed prior to installation.

INTELLIGENT SERIES GAS SENSORS (iSERIES) iH2S SERIES

| TABLE 4. IH2S PARAMETERS | | | | | | |
|---------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| iH | 2S 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) | V | | * OEM code will be set by Honeywell during sensor manufacturing. Code to be provided by OEM |
| Ö | Partner code (Second level) | - | No more than 6 characters (ASCII format) | | \checkmark | Once this code has been set by user, it is not possible to change it |
| User Factor | | User factor 0: 100 User factor 1: 95 UF 2-3: Reserved UF 4-9: Customisable User factors can be added to include auto- compensation for using different membranes or instruments | 10 allocated slots 2 user factors are already implemented (no additional membrane and with recommended membrane), 2 are reserved and the remaining 6 can be customised | √* | √** | * User factor 0 and 1 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 |
| Cali | Span (target gas) | target gas) 20 ppm 🗸 the target gas. The span concentral | | 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 | | |
| | Low | 10 ppm | Limit LOW lower: 0.5 Limit LOW upper: 100 | | \checkmark | |
| | High | 20 ppm | Limit HIGH lower: 0.5 Limit HIGH upper: 100 | | \checkmark | |
| Alarms | STEL | 15 ppm over 15 minutes | Limit STEL lower: 0.5 Limit STEL upper: 100 | | \checkmark | 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: 0.5 Limit TWA upper: 100 | | * | 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 |
| | The recalibration at | larm will be triggered whe | en either the countdown or the | accuracy th | reshold are r | eached (whichever is triggered first). |
| tive | (Cal due days) | 180 days | | | \checkmark | The alarm will be flagged when the countdown reaches 0. The countdown restarts when the sensor is calibrated |
| Predictive Calibration | 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 |
| Je | | be triggered when either | the countdown or the future p | rediction alg | orithm cond | |
| End of Life | 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 |
| Dea | Incoming | 0.1 ppm | Whole measurement range | | \checkmark | Incoming: As the reading decays down it will read zero once it has fallen below the incoming threshold |
| | Outgoing | 0.2 ppm | Incoming ≤ Outgoing | | \checkmark | 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. |

INTELLIGENT SERIES GAS SENSORS (iSERIES) iH2S SERIES

| 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 | <a>x | l M1 ll 1G Ex ia l Ma Ex ia lIC 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.

A 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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