

产品规格书

PRODUCT SPECIFICATION

快速响应型冷媒（制冷剂）泄漏监测传感器

Fast-responsive
Refrigerant Leakage Detection Sensor
U9606 series Rev. C0



版本 Version	修订记录 Revision Record	发行日期 Issue Date
A0	初次发放 Initial Release	2023. 4. 12
B1	更新设计以提升精度 Update Design for improving precision	2025. 9. 28
C1	增加产品型号 Add Product P/N	2026. 8. 26

1. 产品介绍 Product Introduction

1.1 产品概述 Product Description

U9606 Series是一系列快速响应型泵吸式光学冷媒泄露监测传感器，本产品利用非色散红外（NDIR）原理探测空气中的A2L或A3冷媒浓度，它采用独特的光学设计和结构设计来缩小测量腔室体积，具有采样量少、响应快的特点。它采用优化的电路设计、数字信号处理算法和补偿算法，相较于市场同类型产品，具有信噪比高、重复性好的特点。得益于其额外的参考通道，它具有更好的稳定性。此外，通过稳健性设计，产品通过了多项严苛的环境测试和寿命测试，具有优越的可靠性。U9606 series is a series of fast-responsive refrigerant leakage detection sensors that utilize the principle of non-dispersive infrared (NDIR) to detect A2L or A3 refrigerant in the air. Because of its dual-beam design, it has better stability compared with single-beam NDIR sensors. This sensor applies unique optical and mechanical design to reduce response time and measuring chamber size, minimizing the sampling gas usage. With optimized optical design, circuit design, digital signal processing algorithm, and compensation algorithm, it has high signal-to-noise ratio and good repeatability. In addition, through the robust design, the product has passed several environmental and life tests that guarantee superior reliability.

1.2 产品特性 Product Features

- ✧ 多温度点/全量程校准 Full-measurement-range calibration at multi-points temperature
- ✧ 双通道设计，漂移少 Dual-beam design for low drift and high stability
- ✧ RMS噪声小至10 ppm @ zero; RMS noise low to 10 ppm @ zero
- ✧ 使用寿命大于10年 Work-life more than 10 years
- ✧ 采样气量可小至10毫升 Sampling gas volume small to 10 mL
- ✧ 响应时间可小至1.5秒 Response time low to 1.5 seconds @ 0.8 L/min flow rate
- ✧ 提供自动校准模式和手工校准模式 Auto-calibration and Manual-calibration available

1.3 应用领域 Application Field

- ✧ 商用空调的冷媒泄露监测 Refrigerant gas leakage monitoring of commercial HVAC system
- ✧ 工业用途的冷媒泄露监测 Refrigerant gas leakage monitoring for industrial application

2. 产品特性 Product Characteristics

2.1 技术指标 Technical Specification

常规量程 Standard Measurement Range

产品型号 Product Number ⁽¹⁾	U9606 0X01	U9606 0X03	U9606 0X02	U9606 0X04	U9606 0X31
检测气体 Target Gas ⁽²⁾	R32	R454A	R454B	R454C	R290
检测范围 Measurement Range	0~50% LFL (extended range to 100% LFL upon request ⁽²⁾)				
检测精度 Accuracy	±3% LFL ⁽³⁾				
零点漂移 Zero Drift	≤ 1% LFL ⁽⁴⁾				
响应时间 Response Time	1.5 ~ 60 seconds depending on digital filtering settings				
工作条件 Operation Conditions	-30~60 °C; 0~95% RH (Non-condensing)				
存储条件 Storage Conditions	-40 °C~85 °C				
供电电压 Power Supply	DC 3.6 V~5.5 V ⁽²⁾ , Ripple voltage < 50 mV				
平均工作电流 Average Current	< 40 mA				
峰值电流 Peak Current	< 300 mA				
通讯接口 Communication Interface	1) UART TTL (3.3 V) 2) Voltage output (0.4 V - 2 V) ⁽²⁾				
产品寿命 Life Expectancy	10 years				
长期稳定性 Long-term Stability	< 2% LFL				
重量 Weight	30 grams				

- (1) "X" in P/N represents tube fitting type, contact Unitense for customized fitting type.
 X→1: NPT 1/16" thread with Swagelok Fitting for 1/16" tube;
 X→2: NPT 1/16" thread with Push-in Fitting for 4 mm tube;
 X→3: M5 thread with Quick-Turn Fitting for 6 mm tube.
 X→4: No thread with plain tube nozzle for 6 mm tube.
- (2) Contact Unitense for customized request.
- (3) Specification is referenced to certificated calibration gas mixture (±2% uncertainty).
- (4) Ambient condition: 20 to 30 °C, 50% to 70%RH.

低量程 Low Measurement Range

产品型号 Product Number ⁽¹⁾	U9606 1X01	U9606 1X03	U9606 1X02	U9606 1X04	U9606 1X31
检测气体 Target Gas ⁽²⁾	R32	R454A	R454B	R454C	R290
检测范围 Measurement Range	0~2000 ppm ⁽²⁾				
检测精度 Accuracy	± (30 ppm + 5% reading) ⁽³⁾				
零点漂移 Zero Drift	< 1% F.S. ⁽⁴⁾				
响应时间 Response Time	1.5 ~ 60 seconds depending on digital filtering settings				
工作条件 Operation Conditions	-20~60 °C; 0~95% RH (Non-condensing)				
存储条件 Storage Conditions	-40 °C~85 °C				
供电电压 Power Supply	DC 3.05 V~5.5 V ⁽²⁾ , Ripple voltage < 50 mV				
平均工作电流 Average Current	< 20 mA				
峰值电流 Peak Current	< 200 mA				
通讯接口 Communication Interface	1) UART TTL (3.3 V) 2) Voltage output (0.4 V - 2 V) ⁽²⁾				
产品寿命 Life Expectancy	10 years				
长期稳定性 Long-term Stability	< 2% F.S.				
重量 Weight	30 grams				

(1) "X" in P/N represents tube fitting type, contact Unitense for customized fitting type.

X→1: NPT 1/16" thread with Swagelok Fitting for 1/16" tube;

X→2: NPT 1/16" thread with Push-in Fitting for 4 mm tube;

X→3: M5 thread with Quick-Turn Fitting for 6 mm tube.

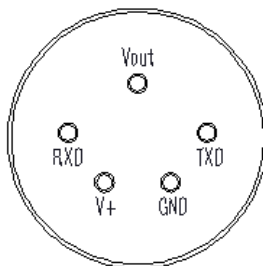
X→4: No thread with plain tube nozzle for 6 mm tube.

(2) Contact Unitense for customized request.

(3) Specification is referenced to certificated calibration gas mixture (±2% uncertainty).

(4) Ambient condition: 20 to 30 °C, 50% to 70%RH.

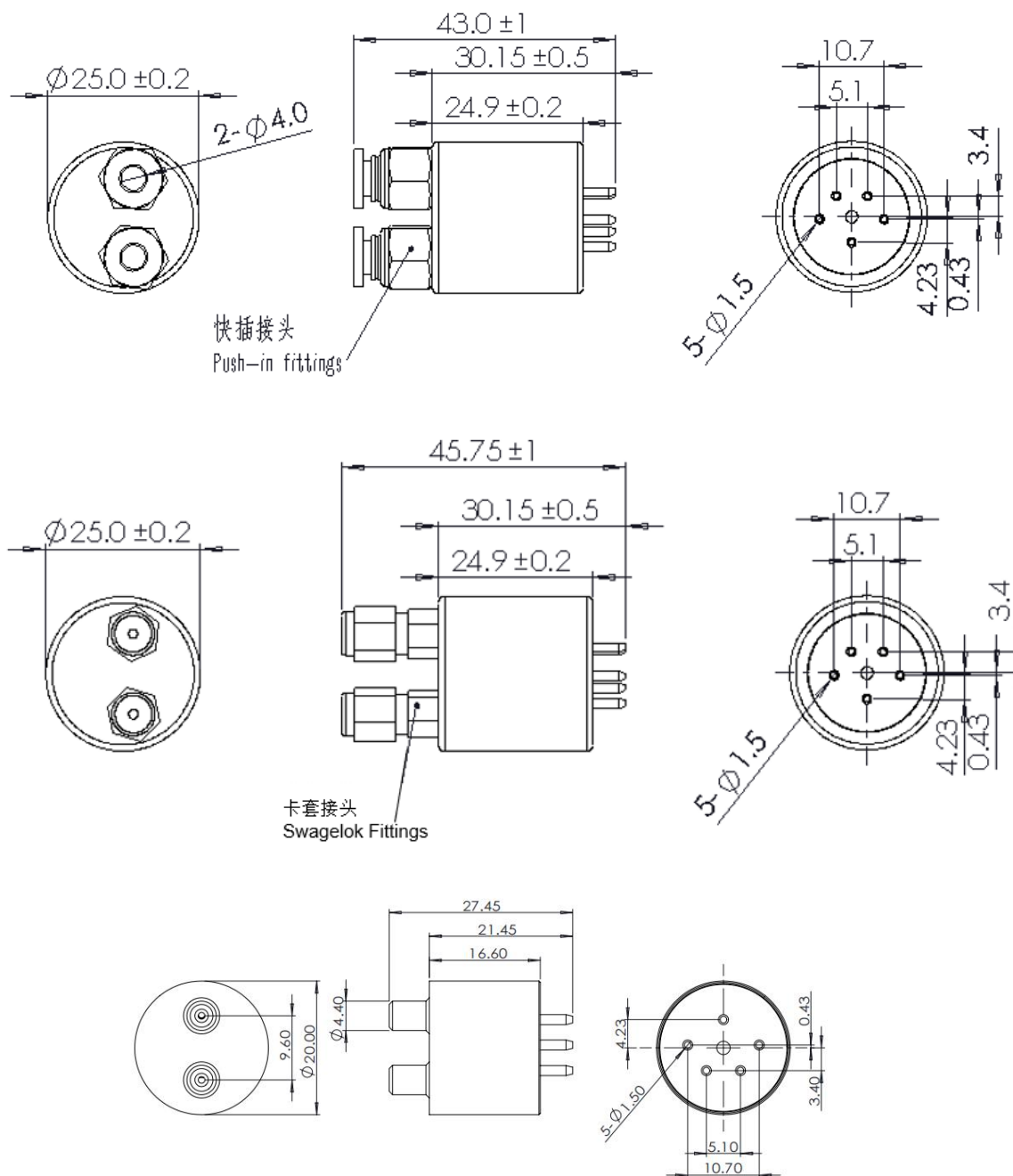
2.1 引脚定义 Pin Definition



Bottom view from pin surface

引脚 Pin-out	描述 Description
GND	GND
V+	DC power supply
RXD	UART_RXD
Vout	Voltage output (0.4 V - 2 V) corresponding to 0 – 100% F.S
TXD	UART_TXD

3. 外形尺寸 Product Outlines (unit: mm)



扫描二维码读取型号和序列号 Scan 2D barcode for P/N and S/N

P/N	Gas Type
U9606XX01XXXXXXXXXX	R32
U9606XX02XXXXXXXXXX	R454B
U9606XX03XXXXXXXXXX	R454A
U9606XX04XXXXXXXXXX	R454C
U9606XX31XXXXXXXXXX	R290