KESENS

制冷剂干度传感器
Refrigerant Capacity Sensor



产品介绍 Product Description

制冷剂干度传感器可检测车载、工业制冷系统中制冷剂的气液组分，提供量化的状态参数

The refrigerant vapor quality sensor detects the vapor-liquid composition of refrigerant in vehicle-mounted and industrial refrigeration systems and provides quantitative state parameters.

产品特征及优势 Feature and Benefits

- **非侵入式设计：**
  传感器阵列贴合于管道外壁，无需开孔或插入探头，可直接接入系统管路，易拆装，不破坏流体状态，避免介质泄漏风险。
  Non-intrusive design:
  The sensor array is mounted on the outer wall of the pipeline without pipe drilling or probe insertion. It can be directly installed on system pipelines with easy assembly and disassembly. This design causes no disturbance to the internal flow state and eliminates the risk of medium leakage.
- **实时动态监测能力：**
  可捕捉高速流场，配合动态算法，实时预警两相流状态。
  Real-time dynamic monitoring capability:
  The system captures high-speed flow field variations. Combined with dynamic inversion algorithms, it realizes real-time state early warning for refrigerant two-phase flow.
- **硬件定制：**
  可根据管道直径、材质定制传感器阵列。
  Customizable hardware:
  The sensor array can be customized according to pipeline diameters and pipe material properties to adapt to different application conditions.
- **场景适用：**
  支持多种制冷剂标定，可根据使用场景要求提供解决方案。
  Wide scenario adaptability:
  Calibration for multiple refrigerants is supported. Customized technical solutions can be provided to meet the requirements of diverse operating scenarios.

产品应用 Product Application

制冷剂干度传感器测量管路内制冷剂两相干度，用于压缩机防液击保护、电子膨胀阀闭环控制、热管理系统能效提升、故障诊断以及台架标定试验，解决传统过热度间接估算在变工况下精度不足的痛点。

The refrigerant vapor quality sensor measures the two-phase vapor quality of refrigerant inside the pipeline. It is applied for compressor liquid slugging protection, closed-loop control of electronic expansion valves, energy efficiency improvement of thermal management systems, fault diagnosis and bench calibration tests. It addresses the pain point of insufficient accuracy of the traditional superheat indirect estimation under variable operating conditions.

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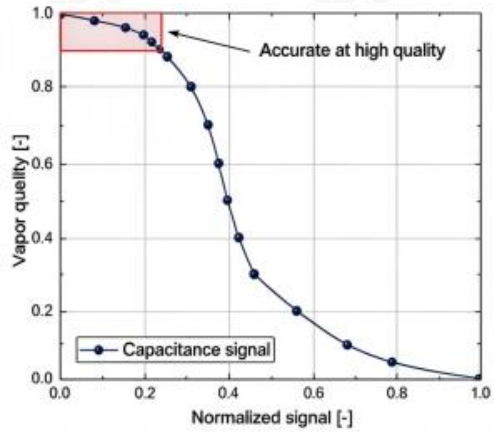
操作 Operation

基本原理 Basic Principle

制冷剂干度传感器感知管道内两相流气液占比变化带来的介电常数空间分布变化，传感器电极捕捉该介电特性变化，输出对应的电容信号，再结合制冷剂物性模型与两相流标定关系，通过信号分析与反演计算，最终得到管路内制冷剂的干度，同时也可进一步获取空隙率与两相流分布信息。

The refrigerant vapor quality sensor senses changes in the spatial distribution of dielectric constant induced by variations in the gas-liquid fraction of two-phase flow inside the pipeline. Its electrodes capture such dielectric property variations and output the corresponding capacitance signals. Combined with the refrigerant property model and two-phase flow calibration correlation, vapor quality of the refrigerant in the pipeline can be obtained through signal analysis and inversion calculation. Furthermore, void fraction and two-phase flow distribution information can also be acquired.



连接选项 Connection Options

根据客户选择定制连接系统。

Customized to customer choice of connection system.

包装选项 Packaging Options

可提供定制包装以满足任何需要，请联系KESENS技术部了解详情。

Custom packaging can be provided to meet any need, please contact KESENS Engineering for details.

技术参数 Functional Characteristics

项目 Item	参数PARAMETER
工作电压OPERATION VOLTAGE RANGE	DC 9V – DC 16V
测量范围（可定制）PRESSURE RANGE (Customizable)	0~100%（Refrigerant Quality）
输出精度OUTPUT ACCURACY	0~20%（Quality）：±2.5% 20~85%（Quality）：±5% 85~100%（Quality）：±2.5%
响应时间RESPONSE TIME	<0.1 s
流道特征FLOW CHANNEL	16 mm

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项目 Item	参数PARAMETER
工作介质WORKING MEDIUM	R134a，R410A and etc.
运行温度OPERATION TEMPERATURE	-40℃ ~ 125℃
外部泄露EXTERNAL LEAKAGE	≤1.5 g/y (2.0MPa)
运行压力OPERATION PRESSURE	0 ~ 5 MPa
通讯方式COMMUNICATION	LIN/ANALOG
爆破压力BURST PRESSURE	21 MPa
绝缘性能INSULATION RESISTANCE	≥10MQ (DC500V)
防水防尘性能WATER DUST RESISTANCE	IP68

可根据客户需求定制产品，如有需求请联系我们。
Customized products available upon request. Contact us for details.

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