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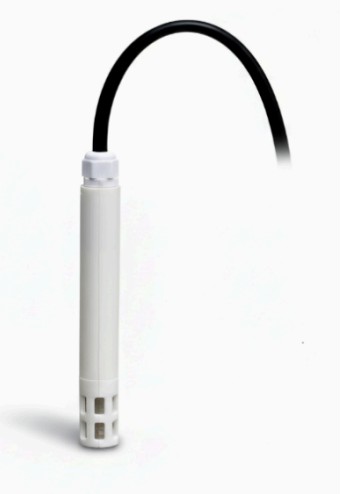
TEMPERATURE AND HUMIDITY SENSOR PROBE

This advanced environmental monitoring module combines a high-precision PT100 RTD temperature sensor and an SHT45 humidity sensor, controlled by an nRF52833 microcontroller. It delivers accurate temperature measurements across an extended range of –40 °C to +100 °C and relative humidity from 1% to 100% RH. The unit features flexible output options, converting digital readings to analog signals while supporting robust MODBUS RTU communication over RS485. Designed for reliability in demanding conditions, it is ideally suited for industrial automation, IoT applications, and embedded systems requiring durable, high-accuracy environmental sensing.



Key Features

- **Dual-Sensor Technology**: PT100 RTD for temperature and SHT45 for humidity
- **Industrial Communication**: RS485/MODBUS RTU protocol with CRC validation
- **Dual Output Options**: Simultaneous analog and digital signal outputs
- **High Precision Measurement**: Laboratory-grade accuracy for critical applications
- **Low Power Architecture**: Optimized for continuous IoT and embedded operation
- **Robust Data Integrity**: Error detection and correction protocols
- **Environmental Resilience**: Weather-sealed construction for harsh conditions

Technical Specifications

Parameter	Specification
Temperature Range	–40°C to +100°C (extendable range available)
Humidity Range	1% to 100% RH
Temperature Sensor	PT100 RTD with MAX31865 signal conditioning (SPI)
Humidity Sensor	SHT45 high-accuracy sensor (I²C)
Processing Unit	nRF52833 microcontroller with ARM Cortex-M4 core

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Parameter	Specification
Digital-to-Analog Conversion	2 × MCP4725 12-bit DAC (I²C)
Analog Output Range	0–1 V DC (linear scaling)
Digital Communication	UART/RS485 interface
Communication Protocol	MODBUS RTU with CRC16 error checking
Temperature Accuracy	±0.1°C
Humidity Accuracy	±1.0% RH
Power Supply	5–12 V DC external power
Response Time	<15 seconds (63% of final value)

Mechanical Specifications

Characteristic	Specification
Enclosure Material	UV-stabilized Acrylonitrile Butadiene Styrene
Probe Dimensions	155 mm length × 18.90 mm diameter
Total Weight	70 grams
External Finish	Solar-reflective glossy white
Cable Entry	Weather-sealed PG7/PG9 cable glands
UV Resistance	>5 years outdoor exposure rating
Ingress Protection	IP67 equivalent (when properly installed)
Installation	Immersion, insertion, or surface mounting

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Applications

- **Industrial Automation**: Process control and environmental monitoring
- **Agricultural Technology**: Precision irrigation and greenhouse management
- **Healthcare Systems**: Medical facility environmental monitoring

- **Food Industry**: Cold chain monitoring and storage facility management
- **Logistics Operations**: Transportation environmental conditioning
- **Building Management**: HVAC system monitoring and optimization
- **Research Facilities**: Laboratory environmental control systems
- **Meteorological Stations**: Weather and climate monitoring networks

Quality & Compliance

- Industrial-grade component selection
- EMI/RFI protection for noisy environments
- Long-term calibration stability
- Traceable measurement accuracy
- RoHS compliant materials
- Designed for continuous 24/7 operation

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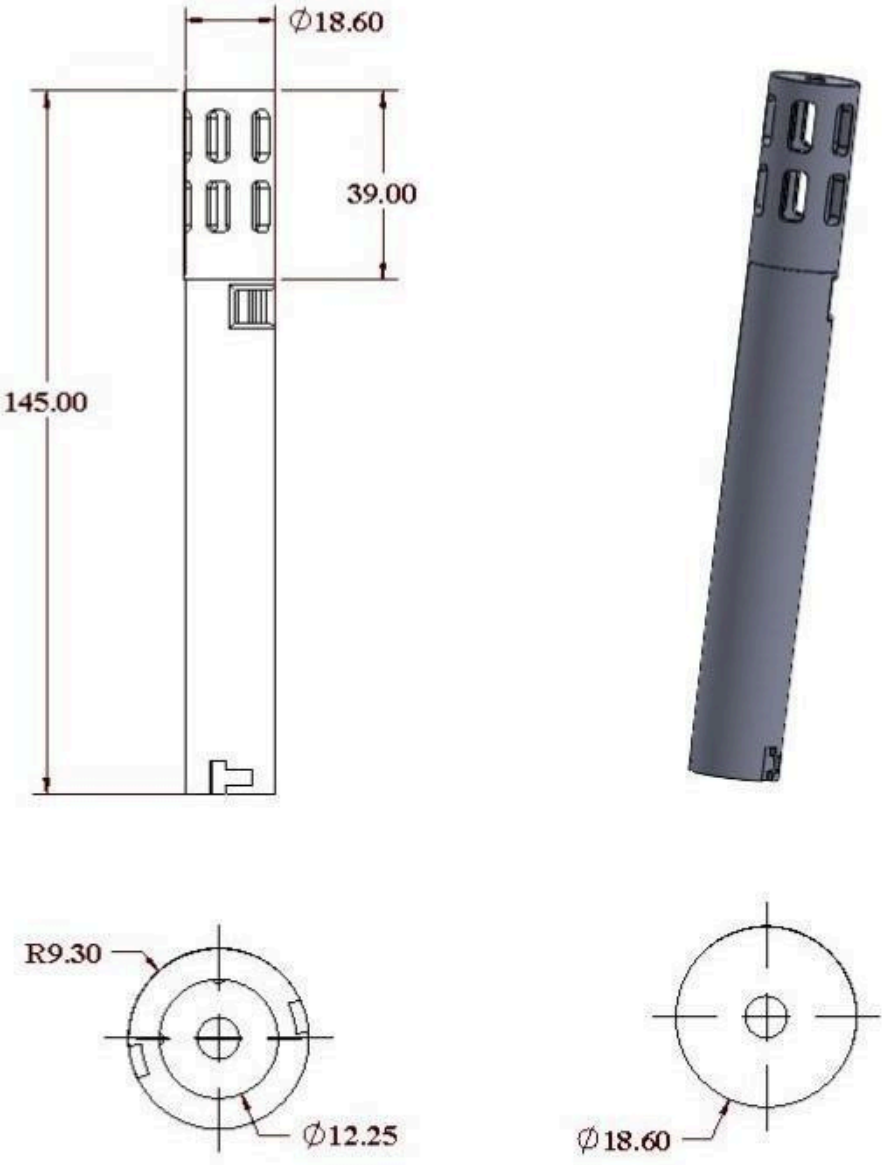

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(All the Dimensions are In mm)