

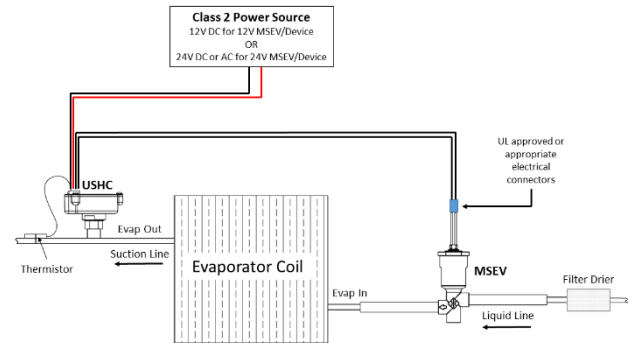


Introduction

The **Universal SuperHeat Sensor-Controller (USHX)** is a refrigerant superheat measuring device that may be used as a standalone sensor or as a valve controller. As a **Sensor (USHS)**, the device will measure and report the temperature, pressure and superheat for a multitude of refrigerants. As a **Controller (USHC)**, in addition to the capabilities of the USHS, it can be used to control the **Modular Silicon Expansion Valve (MSEV)** to maintain a desired system superheat for HVAC/R applications. The hardware is comprised of a MEMS based pressure sensor and an intelligent microprocessing unit. The USHX wiring harness includes an external temperature sensor, communication lines, power input, PWM output and general purpose wires. Users can utilize MODBUS RTU communication protocol or a Windows based graphical user interface to communicate with the USHX.

Principle of Operation

The USHX and the external temperature sensor are installed on a ¼” access fitting along the evaporator outlet. The USHX uses the pressure and temperature readings at the evaporator outlet to calculate the superheat in real-time. As a Controller, the USHC compares the calculated superheat against a user defined target superheat. It then sends a PWM output signal to the MSEV to adjust the valve orifice opening until the target superheat is met. Ultimately, the USHC functions as a close-loop feedback device to achieve precise superheat control.



Features and Benefits

- Pressure and temperature sensing device
- Real-time superheat calculation
- Palm size compact design with plug and play capability
- Precise superheat control when used as a controller for MSEV
- Embedded software with bootloading capability that is customizable to customer needs
- Extensive fault detection embedded software: Low/High pressure, Vacuum detected, Low/High temperature, etc.
- Upgradable with future refrigerant database
- Windows based Graphical User Interface
- MODBUS RTU Communication Protocol

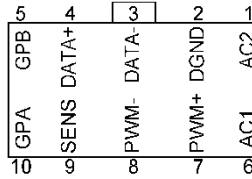
Technical Specifications

Suitable Environmental Temperature	-40°F ~ 158°F (-40°C ~ 70°C)
Suitable Environmental Humidity	< 95% RH
Voltage Input	12VDC ±15% for (12V device/MSEV control) or 24VAC ±15% (50/60 Hz ± 1%) or 24VDC ±15% for (24V device/MSEV control)
Power Consumption	USHC: P ≤ 40W Load @ 95% Duty Cycle @ 24VDC USHS: No Load: P < 500mW @ 24VDC
Operating Pressure	21 to 240 psia (145 KPa to 1.65 MPa)
Pressure Accuracy	± 1.5 psi for 20 psia < P ≤ 200 psia, -4°F ~ 104°F (-20°C ~ 40°C)
External Temperature Sensor Accuracy	± 2.2°F for -40°F to +158°F (-40°C to +70°C)
Proof Pressure	600 psi (4.14 MPa)
Burst Pressure	1500 psi (10.34 MPa)
Refrigerant Compatibility	R134A, R22, R404A, R410A call for all other refrigerants.
Refrigerant Oil Compatibility	Polyolester (POE); Polyalkylene Glycol (PAG); Mineral Oil (MO); Polyvinylether (PVE)
Communication Hardware Layer	Non-Isolated RS-485 Half-Duplex. An external isolated RS-485 adapter is required when communicating with the USHX
Fluid Connections	Female ¼” SAE Flare – (7/16”-20)
Service Life	5 years
Weight	75g
Dimensions	2.15”x1.78”x1.41” (54.6mm x 45.1mm x 35.8mm)
Product listing and certifications	UL, FCC, IP67

USHX and Wiring Harness Pin Assignments

Pin Number	Pin Name	Pin Function	Type of Wire	Wiring Harness Model WH-USHX-AX
Pin 1	AC2	Power Input	Red, 18 AWG	✓
Pin 6	AC1	Power Input	Black, 18 AWG	✓
Pin 3	DATA-	RS485- Communication	Black, 24 AWG, Shielded	✓
Pin 4	DATA+	RS485+ Communication	Red, 24 AWG, Shielded	✓
Pin 2	DGND	Digital Signal Ground and Thermistor Signal Ground	Green, 22 AWG	✓
Pin 9	SENS	Thermistor Power	Black, 24 AWG	✓
Pin 7	PWM+	PWM Output	White, 18 AWG	✓
Pin 8	PWM-	PWM Output	White, 18 AWG	✓
Pin 5	GPB	General Purpose (Not Utilized)	Brown, 20 AWG	✓
Pin 10	GPA	General Purpose (Not Utilized)	Purple, 20 AWG	✓

USHX-G1.3b Series Model Numbers
(UL listed)
USHC-G1.3b-BAAAXXX
USHS-G1.3b-BAAAXXX



Note: ✓ = Available Option, – = Not Available Option

Physical Dimensions and Product Markings

