

Description

The Modulino® Thermo, featuring the HS3003 sensor, measures both temperature and humidity, making it ideal for environmental monitoring, indoor climate control, and various IoT applications. It provides accurate readings in a compact form factor and integrates seamlessly into the Qwiic ecosystem.

Target Areas

Maker, beginner, education



Contents

1 Application Examples	3
2 Features	4
2.1 Contents	4
3 Related Products	4
4 Rating	4
4.1 Recommended Operating Conditions	4
5 Power Tree	5
6 Block Diagram	5
7 Functional Overview	6
7.1 Technical Specifications	6
7.2 Pinout	7
7.3 Power Specifications	8
7.4 Mechanical Information	8
7.5 I2C Address Reference	9
7.5.1 Pull-up Resistors	9
8 Device Operation	9
8.1 Getting Started	10

1 Application Examples

The Modulino® Thermo node can be used in numerous scenarios within IoT and electronics projects:

- **Indoor Climate Control** Monitor real-time temperature and humidity levels to automatically adjust HVAC systems or trigger alerts.
- **Greenhouse Monitoring** Maintain precise growing conditions by tracking changes in humidity and temperature, ensuring plant health and growth.
- **Smart Home Automation** Combine the Modulino® Thermo with other nodes, such as movement or distance sensors, to create fully automated home systems that respond to environmental changes.



2 Features

- Utilizes the **HS3003** sensor to measure temperature and humidity.
- Communicates via **I2C** (Qwiic connector) at 3.3 V (standard).
- Designed with an **additional header** for optional connections.
- Ideal for **environmental monitoring** in IoT and home automation applications.

2.1 Contents

SKU	Name	Purpose	Quantity
ABX00103	Modulino® Thermo	Measure temperature and humidity	1
	I2C Qwiic cable	Compatible with the Qwiic standard	1

3 Related Products

- *SKU: ASX00027* – Arduino® Sensor Kit
- *SKU: K000007* – Arduino® Starter Kit
- *SKU: AKX00026* – Arduino® Oplà IoT Kit

4 Rating

4.1 Recommended Operating Conditions

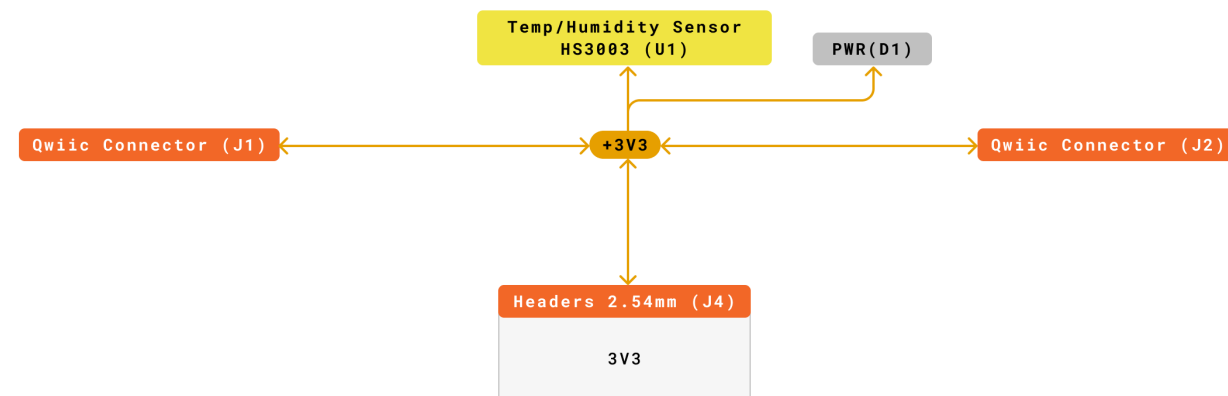
- **Sensor supply range:** 2.3 V – 5.5 V
- **Powered at 3.3 V** through the Qwiic interface (in accordance with the Qwiic standard)
- **Operating temperature:** –40 °C to +125 °C

Typical current consumption:

- ~24.4 µA (at 14-bit resolution, 3.3 V)

5 Power Tree

The power tree for the modulino can be consulted below:



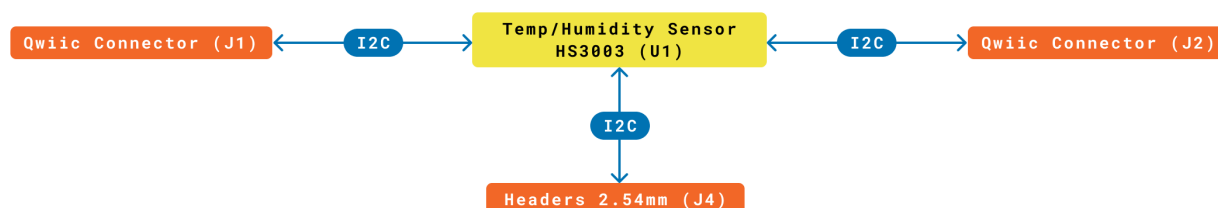
Legend:	■ Connector	■ +3V3
■ VIN	■ Main Part	■ +5V
■ VBUS	■ Internal Part	

Modulino Thermo
 SKU code: ADX00103
 Power Tree
 Last update: 27 Nov, 2024

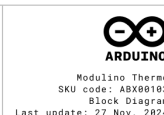
Modulino® Thermo Power Tree

6 Block Diagram

This module is designed to be placed on an I2C bus, allowing the on-board HS3003 sensor to communicate with a host microcontroller via I2C.



Legend:	Connector	I2C/I2S	Other SERIAL
	Main Part	SPI	
	Internal Part	UART	



Modulino® Thermo block diagram

7 Functional Overview

The Modulino® Thermo node uses the HS3003 sensor to measure both temperature and humidity. Data is accessed through I2C (via the Qwiic connector at 3.3 V). It is well-suited for climate control, environmental logging, and wearable IoT.

7.1 Technical Specifications

Specification	Details
Sensor	HS3003
Supply Voltage	Min: 2.3 V, Max: 5.5 V
Power Consumption	24.4 μ A (14-bit resolution, 3.3 V supply)
Range	0–100% RH, –40 °C to +125 °C
Accuracy	Humidity: \pm 2.8% RH, Temperature: \pm 0.25 °C
Resolution	14-bit humidity, 14-bit temperature
Communication	I2C

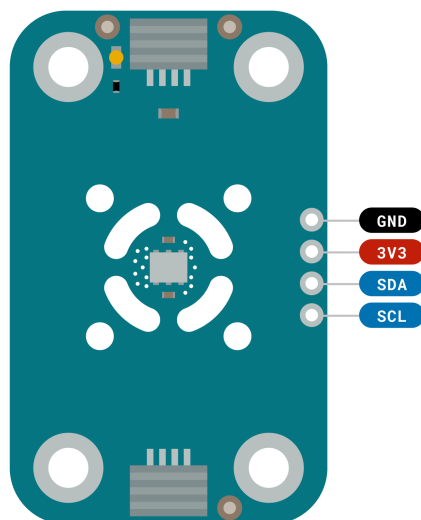
7.2 Pinout

Qwiic / I2C (1×4 Header)

Pin	Function
GND	Ground
3.3 V	Power Supply (3.3 V)
SDA	I2C Data
SCL	I2C Clock

These pads and the Qwiic connectors share the same I2C bus. You can optionally solder header pins here.

Note: The board may also include pads for mounting pull-up resistors, not installed by default.



Legend:			
■ Digital	■ I2C	■ Other SERIAL	
■ Power	■ Analog	■ SPI	■ Analog
■ Ground	■ Main Part	■ UART/USART	■ PWM/Timer

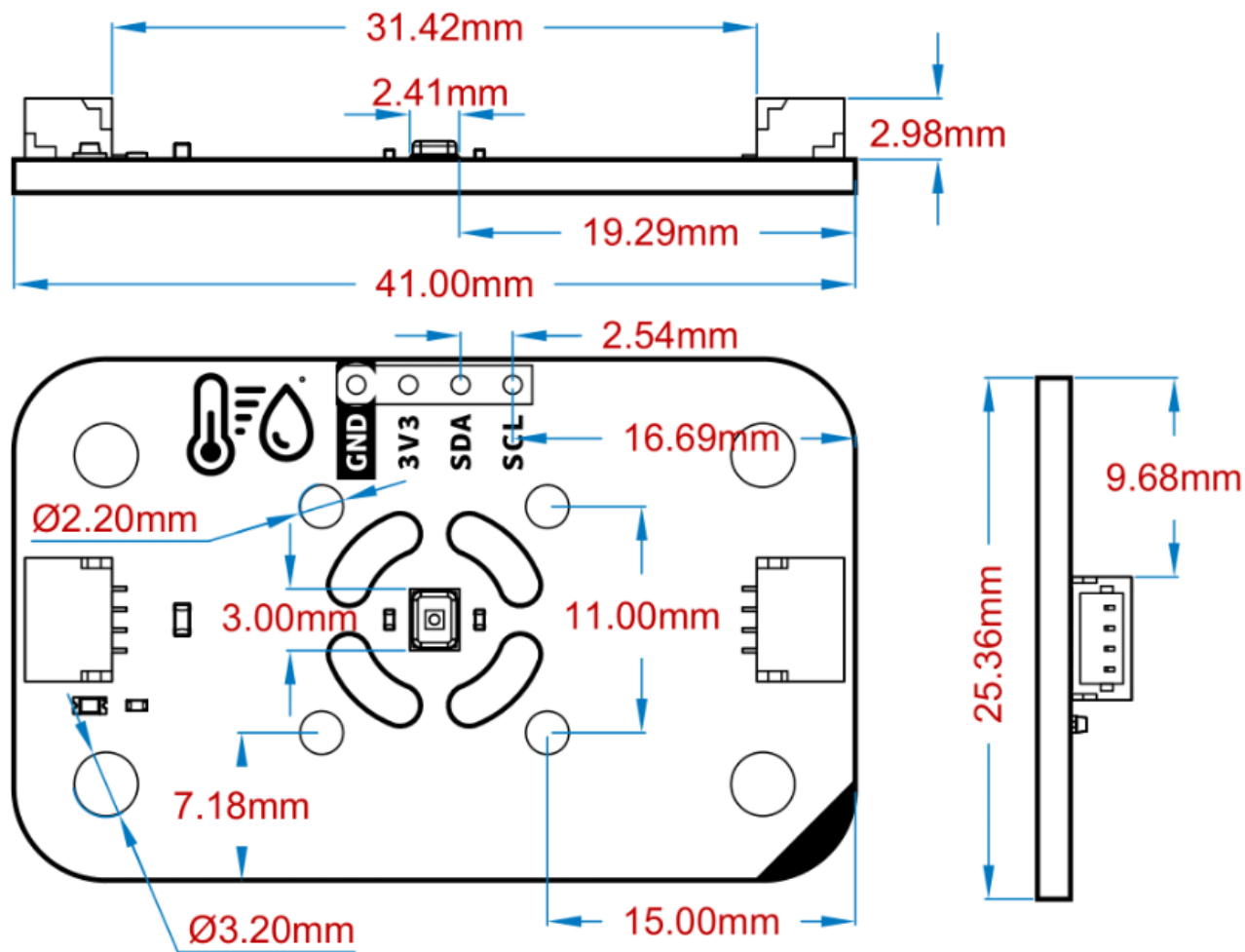
ARDUINO
Modulino Thermo
SKU code: ABX00103
Pinout
Last update: 18 Jun, 2024

Pinout Overview

7.3 Power Specifications

- **Nominal operating voltage:** 3.3 V via Qwiic
- **Sensor voltage range:** 2.3 V–5.5 V

7.4 Mechanical Information



Modulino® Thermo Mechanical Information

- Board dimensions: 41 mm × 25.36 mm
- Thickness: 1.6 mm (±0.2 mm)
- Four mounting holes (Ø 3.2 mm)
 - Hole spacing: 16 mm vertically, 32 mm horizontally

7.5 I2C Address Reference

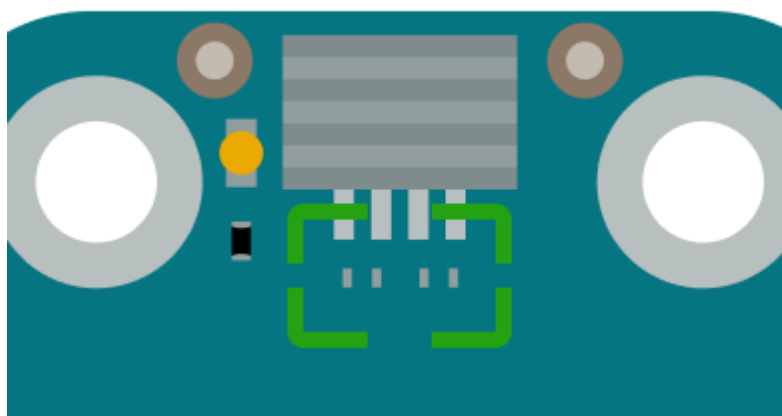
Board Silk Name	Sensor	Modulino I2C Address (HEX)	Editable Addresses (HEX)	Hardware I2C Address (HEX)
MODULINO THERMO	HS3003	0x44	Any custom address (via software config)	0x44

Note: Default address is **0x44**. Adjustments may be made via software if multiple identical sensors are on the same bus.

7.5.1 Pull-up Resistors

The module has pads for optional I2C pull-up mounting in both data lines. No resistors are mounted by default but in case the resistors are need 4.7 K resistors in an SMD 0402 format are recommended.

These are positioned near the Qwiic connector on the power LED side.



Generic pull-up resistor position

8 Device Operation

The Modulino® Thermo node acts as an I2C target device on the Qwiic bus. Simply connect it via a Qwiic cable to the 3.3 V I2C interface of your microcontroller. Read humidity and temperature values via standard I2C transactions.



8.1 Getting Started

Use the Arduino IDE or Arduino Cloud Editor to program your microcontroller. Libraries for HS3003 or generic humidity/temperature sensors can help streamline data acquisition. Ensure your microcontroller and this node operate on the same 3.3 V reference for the Qwiic bus.

Company Information

Company name	Arduino SRL
Company Address	Via Andrea Appiani, 25 - 20900 MONZA (Italy)

Reference Documentation

Ref	Link
Arduino IDE (Desktop)	https://www.arduino.cc/en/Main/Software
Arduino Courses	https://www.arduino.cc/education/courses
Arduino Documentation	https://docs.arduino.cc/
Arduino IDE (Cloud)	https://create.arduino.cc/editor
Cloud IDE Getting Started	https://docs.arduino.cc/cloud/web-editor/tutorials/getting-started/getting-started-web-editor
Project Hub	https://projecthub.arduino.cc/
Library Reference	https://github.com/arduino-libraries/
Online Store	https://store.arduino.cc/

Revision History

Date	Revision	Changes
11/07/2024	1	First release