



## Outdoor Controller and Sensor SOC2-MOD

The SOC2 is a programmable controller and sensor with Modbus fieldbus connection. It is for outdoor sensing with rain protection (IP63). Each control loop may use 2 PI sequences and 2 binary stages. The SOC2 comes with a built in RS485 communication interface that allows peer-to-peer communication with an operation terminal such as OPT1-(2TH)-VC. Complete parameter sets may be copied by use of an accessory called AEC-PM2 or exchanged with a PC using an RS485-USB converter and the Easyset program. The SOC2 uses the universal X2 operating system.

### Applications

- Ventilation control
- Air measurement
- Zone control
- VAV control

### Functions

- Modbus Communication via RS485 RTU or ASCII
- Two universally configurable control loops:
  - Functions for dehumidifying, set point shift and cascade control
  - Multiple auxiliary functions: heat-cool auto changeover, automatic enable, set point compensation
  - Free heating and cooling with economizer function based on enthalpy or temperature
  - Differential, averaging, min and max functions, enthalpy and dew point calculations
  - Transmitter function for sensors and set points
- Universal analog outputs (VDC, mA) and one relay with a normally open and a normally closed contact (SPDT)
- 8 freely assigned alarm conditions, selectable state of outputs on alarm condition
- Password protected programmable user and control parameters
- Measures temperature and humidity

### Ordering

Model	Item	Loop	UI	DO	AO	Functions	A01	A02
SOC2-TH-210.102U-MOD-1	40-300183	2	1	1	2	Temperature- and humidity sensor	Temp.	RH
SOC2-TH-210.102U-OP-MOD-1	40-300186	2	1	1	2		Temp.	RH

A01 and A02 are the analog outputs of the controller/sensor. The device is pre-programmed ex works as a transmitter. The sensors are assigned to the analog outputs according to the table.

Model	Item	Description
OPC2-S	40-500109	Display option for SDC2 and SOC2 devices
AEC-PM2	40-500130	Plug-In memory module

A large range of remote operation terminals may be found on our website. All -VC operation terminals work with this controller.


## Technical specifications

### Important notice and safety advice

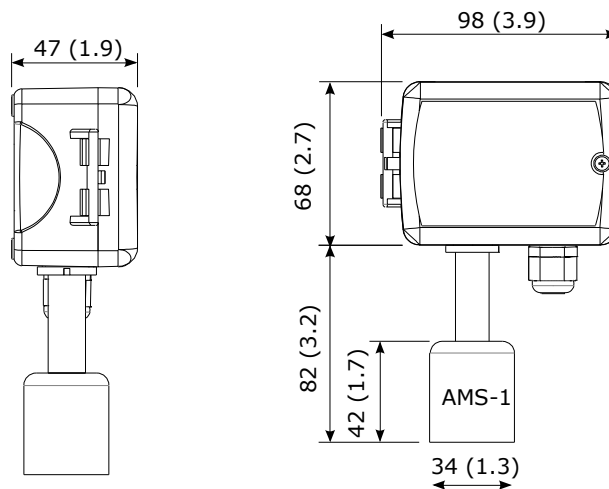
This device is designed for use as a controller or sensor. It's not a safety device! If equipment failure endangers people's lives and/or property, it is the responsibility of the customer, installer and system integrator to add additional safety devices to prevent a system failure caused by such equipment failure. Failure to comply with specifications and local regulations may result in damage to equipment and endanger life and property. Tampering with the device and improper use will void the warranty.

<b>Power supply</b>	Power requirements	24 VAC $\pm 10\%$ , 50/60 Hz, 15..34 VDC SELV to HD 384, Class II, 48VA max
	Power consumption	Max. 5 VA
	Electrical connection	Screw terminal connectors for wire 0.75...1.5 mm <sup>2</sup> (AWG 20...16)
<b>Signal inputs</b>	Temperature sensor	Bandgap sensor
	Range	-40...70 °C (-40...158 °F)
	Measuring accuracy	See Figure 1
	Repeatability	$\pm 0.1$ °C, $\pm 0.2$ °F
	Humidity sensor	Capacity sensor element
	Range	0...100% RH
	Measuring accuracy	See Figure 2
	Hysteresis	$\pm 1\%$
	Repeatability	$\pm 0.1\%$
	Stability	< 0.5% / year
<b>Signal outputs</b>	Passive input	UI6, Passive Temperature NTC or open contact
	Type:	NTC (Sxx-Tn10) 10k $\Omega$ @25°C
	Range	-40...100 °C (-40...212 °F)
	Analog outputs	AO1 to AO2
	Output signal	DC 0...10 V or 0...20 mA
	Resolution	9.76 mV or 0.019 mA (10 bit)
	Maximum load	Voltage: $\geq 1k\Omega$ Current: $\leq 250\Omega$
	Relay outputs:	AC Voltage 0...48 VAC, full-load current 2A. DC Voltage 0...30 VDC, full-load current 2A
	Insulation strength between relays contacts and system electronics: between neighbouring contacts:	1500V AC to EN 60 730-1 800V AC to EN 60 730-1
<b>Network</b>	Hardware interface	RS485 in accordance with EIA/TIA 485
	Max nodes per network	128
	Max nodes per segment	64 (Vector devices only)
	Conductors	Shielded Twisted Pair (STP) cable
	Impedance	100 - 130 ohm
	Nominal capacitance	100 pF/m 16 pF/ft. or lower
	Galvanic isolation	The communication circuitry is isolated
	Line termination	A line termination resistance (120 ohm) shall be connected between the terminals (+) and (-) of the furthestmost node of the network
	Network topology	Daisy chain according EIA/TIA 485 specifications
	Recommended maximum length per chain	1200 m (4000 ft.)
<b>Modbus</b>	Communication standard	Modbus (www.modbus.org)
	Default setting	19200 baud rate, RTU 8 data bits, 1 even parity bit, 1 stop bit
	Communication speed	4800, 9600, 19200, 38400
	Protocol: Data bits Parity – stop bit	RTU - 8 data bits, ASCII – 7 data bits, no parity – 2 stops, even or odd parity – 1 stop
<b>Connection to remote terminal</b>	Hardware interface	RS485 in accordance with EIA/TIA 485
	Cabling	Twisted pair (STP) cable
<b>Environment</b>	Operation	To IEC 721-3-3
	Climatic conditions	class 3K5
	Temperature	0...50 °C (32...122 °F)
	Humidity	<85 % RH non-condensing
	Transport & storage	To IEC 721-3-2 and IEC 721-3-1
	Climatic conditions	class 3K3 and class 1K3
	Temperature	-25...70 °C (-13...158 °F)
	Humidity	<95 % RH non-condensing
<b>Environment</b>	Mechanical conditions	class 2M2

## Technical specifications continued

<b>Standards</b>		conformity	
		EMC directive	2014/30/EU
		Low voltage directive	2014/35/EU
		Product standards: Automatic electrical controls for household and similar use	EN 60 730 -1
		Electromagnetic compatibility for industrial and domestic sector	Emissions: EN 60 730-1 Immunity: EN 60 730-1
		Degree of protection	IP63 to EN 60 529
		Pollution class	II (EN 60 730-1)
		Safety class:	III (IEC 60536)
<b>General</b>		Overvoltage category	II (EN 60 730-1)
		Material	Fire proof ABS plastic (UL94 class V-0)
		Dimensions: (H x W x D)	150 x 98 x 47 mm (5.9 x 3.9 x 1.9 in)
		Weight (including package)	380g (13.4 oz)

## Dimensions, mm (inch)



## Selection of actuators and sensors

### Temperature sensors

Use Vector Controls NTC sensors to achieve maximum accuracy: SDB-Tn10-20 (duct), SRA-Tn10 (room), SDB-Tn10-20 + AMI-S10 as immersion sensor.

### Actuators

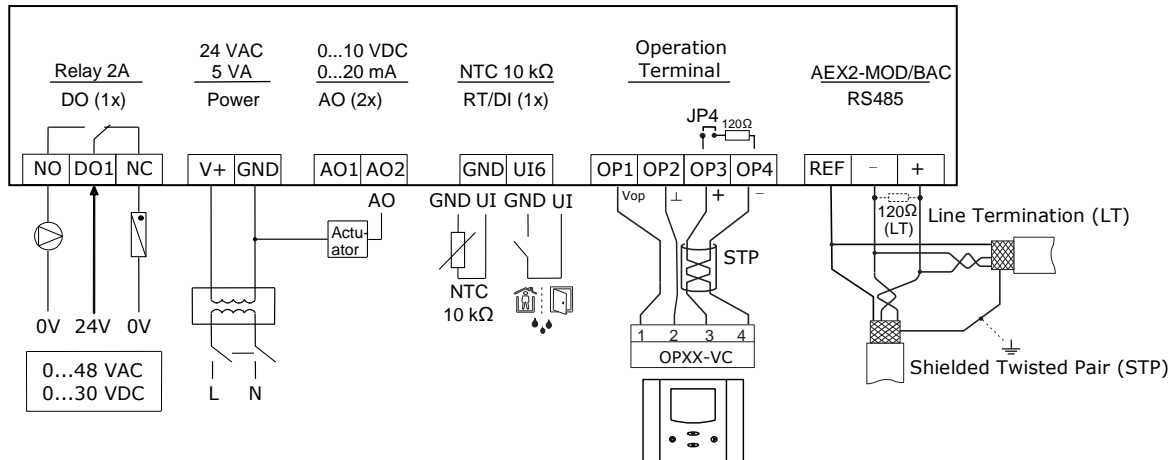
Choose modulating actuators with an input signal type of 0/2-10 VDC.

3-point actuators with constant running time are recommended.

### Binary auxiliary devices (e.g. pumps, fans, on/off valves, humidifiers, etc.)

Do not directly connect devices that exceed specified limits in technical specifications – observe startup current on inductive loads.

## Connection diagram



## LED-indicators

A status LED is located in the controller housing. During normal operation the LED blinks briefly once every 5 seconds. If there is an alarm or fault condition it will blink every second. See installation sheet point D.

The Modbus slave features a green LED and a red LED for indication of traffic on the RS-485 bus. The green LED is lit when an incoming packet is received, and the red LED is lit when an outgoing packet is transmitted to the bus. At power-up, both LED blink twice simultaneously as a sign of the boot process being completed. A constantly lit LED serves as an indication of a fault condition in the reception or sending process.

## Installation

See installation sheet no:

- SOC2-TH-210 70-000687 ( [www.vectorcontrols.com](http://www.vectorcontrols.com) )

## Wire type

An EIA-485 network shall use shielded, twisted-pair cable for data signalling with characteristic impedance between 100 and 130 ohms. Distributed capacitance between conductors shall be less than 100 pF per meter (30 pF per foot). Distributed capacitance between conductors and shield shall be less than 200 pF per meter (60 pF per foot). Foil or braided shields are acceptable.

## Maximum length

The maximum recommended length per segment is 1200 meters (4000 feet) with AWG 18 (0.82 mm<sup>2</sup> conductor area) cable.

## Sensors

### Temperature sensors on -T- types

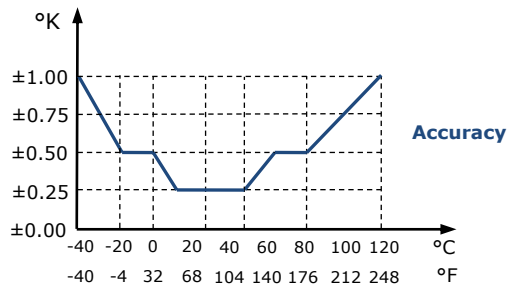


Figure 1: Max T-tolerance by sensor type

### Temperature & Humidity from RH sensor on -HT- type

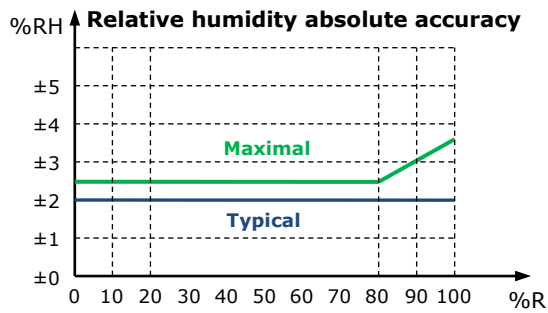


Figure 2: Max RH-tolerance at 25°C (77°F) per sensor type

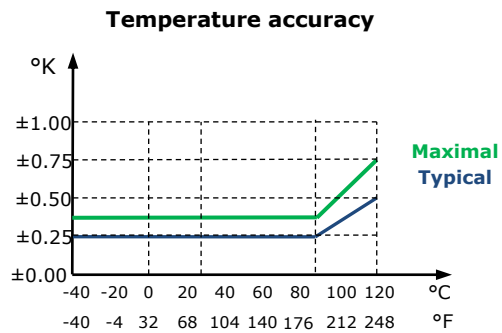


Figure 3: Max T-tolerance by sensor type

## X2 Functional Scope

The controller has the following X2 functions and elements:

Group	Modules	QTY	Description
UP			User and display parameters
UI	01U to 05U	5	Sensor inputs for temperature and humidity
	06U	1	Universal input for RT/DI
	07U to 10U	4	Virtual inputs for operation terminals, bus modules or special functions
AL	1AL to 8AL	8	Alarm conditions
LP	1L to 2L	2	Control loops
Ao	1A to 2A	2	Analog outputs for mA, VDC
FAN	1F	1	Fan or lead lag modules, 1 to 3 fan speeds, up to 3 switching lead-lag stages each
do	1d	1	Binary output with a normally open and a normally closed (SPDT) relays contact
FU	1FU	1	<b>Remote Enable:</b> Activation of the controller based on signal and alarm conditions
	2FU	1	<b>Change Operation Mode:</b> Switching occupied and unoccupied with control signals
	3FU	1	<b>Heat/Cool Change:</b> Switching heating and cooling based on a control signal
	4FU	1	<b>Setpoint Compensation:</b> Summer/winter compensation of setpoint
	5FU	1	<b>Economizer</b> (free heating or cooling due to the condition of outside and room air)
Co			Communication (if a communication module is available)
COPY			Copying complete parameter sets between run, default and external memory with up to 4 memory locations (AEC-PM2)

### Operation manual and configuration

This controller uses the latest generation X2 operating system. Detailed operating instructions for all devices equipped with this operating system can be downloaded here

<http://www.vectorcontrols.com/products/x2>

Also available are programming instructions for technicians and an application database.

**The device can be fully configured using EasySet.**

**EasySet may be downloaded free of charge from [www.vectorcontrols.com](http://www.vectorcontrols.com).**

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**Vector Controls GmbH**

Poststrasse 20, CH-8620 Wetzikon, Schweiz  
Tel: +41 41 740 60 50 Fax: +41 41 740 60 51  
[info@vectorcontrols.com](mailto:info@vectorcontrols.com)  
[www.vectorcontrols.com](http://www.vectorcontrols.com)

