



## Duct Controller and Sensor SDC2

The SDC2 is a programmable controller and sensor with communication capabilities. Each control loop may use 2 PI sequences and 2 binary stages. The SDC2 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 SDC2 uses the universal X2 operating system.

### Applications

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

### Functions

- 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, humidity, CO2 and VOC

### Types and Ordering

Product Name	Product No.	Loop	UI	DO	AO	Functions	AO1	AO2
SDC2-16-C-200.101U-1	40-300167	2	-	1	1	C = CO2 sensor	CO2	-
SDC2-16-TH-210.102U-1	40-300171	2	1	1	2	TH = Temperature- and humidity sensor	Temp.	RH
SDC2-16-THQ-210.102U-1	40-300168	2	1	1	2	THQ = Temperature-, humidity- and VOC sensor	VOC	RH
SDC2-16-THCQ-210.102U-1	40-300164	2	1	1	2	THCQ = Temperature-, humidity-, CO2- and VOC sensor	CO2	VOC

UI = Universal inputs, DO = Digital outputs, AO = Analog outputs

AO1 and AO2 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.

### Accessories

Product Name	Product No.	Description
<i>Built-in Operation Terminal</i>		
OPC2-S	40-500109	Optional built-in operation display for SDC2 devices
<i>External Operation Terminal</i>		
OPT1-xx	40-50xxxx	A large range of external operation terminals may be found on our website <a href="http://www.vectorcontrols.com">www.vectorcontrols.com</a> . All -VC operation terminals work with this controller.
OPA2-xx	40-50xxxx	
<i>Memory</i>		
AEC-PM2	40-500130	Plug-In memory module for fast copying of parameter sets

## Technical specifications

### Important notice and safety advice

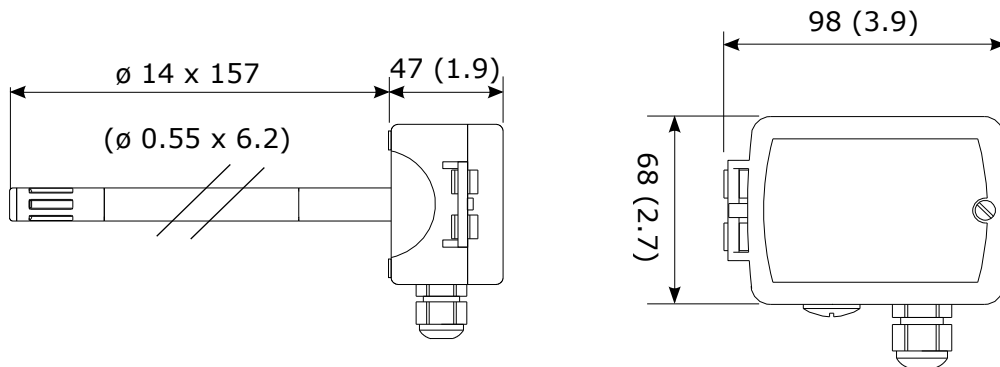
This device is for use as an operating controller or sensor. It is not a safety device. Where a device failure could endanger human life and property, it is the responsibility of the client, installer and system designer to add additional safety devices to prevent such a device failure. Ignoring specifications and local regulations may cause equipment damage and endangers life and property. Tampering with the device and misapplication will void warranty.

<b>Power supply</b>	Operating voltage	24 VAC $\pm$ 10%, 50/60 Hz, 12...34 VDC
	Safety extra-low voltage (SELV)	HD 384, Class II
	Power consumption	Max. 5 VA
<b>Signal inputs</b>	Temperature sensor	Bandgap sensor
	Range	-40...70 °C (-40...158 °F)
	Measuring accuracy	See Figure 1 under chapter sensors
	Repeatability	$\pm$ 0.1 °C, $\pm$ 0.2 °F
	Humidity sensor	Capacity sensor element
	Range	0...100% RH
	Measuring accuracy	See Figure 2 under chapter sensors
	Hysteresis	$\pm$ 1%
	Repeatability	$\pm$ 0.1%
	Stability	< 0.5% / year
	CO2 sensor	Non-dispersive infrared (NDIR) waveguide technology with ABC automatic background calibration algorithm
	Response time (90%)	2 Minutes
	Measurement range	0 - 2000 ppm
	Repeatability	$\pm$ 20 ppm $\pm$ 1 % of measured value
	Accuracy	$\pm$ 40 ppm $\pm$ 3 % of measured value
Pressure dependence	+ 1.6% reading per kPa deviation from normal pressure, 100 kPa	
VOC sensor	MEMS metal oxide sensor with ABC automatic background calibration algorithm	
Sensing range: TVOC (relative) CO2 equivalents (relative)	0 - 2000 ppb 400 - 2000 ppm	
Module	Automatic baseline correction	
Passive input	UI6, Passive Temperature NTC or open contact	
Type:	NTC (Sxx-Tn10) 10k $\Omega$ @25°C	
Range	-40...100 °C (-40...212 °F)	
<b>Signal outputs</b>	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:	1500V AC to EN 60 730-1
	between neighbouring contacts:	800V AC to EN 60 730-1
<b>Electrical connections</b>	Connector type	Screw Terminal connectors for wire 0.75...1.5 mm <sup>2</sup> (AWG 20...16)
	Remote terminal	RS485 in accordance with EIA/TIA 485, Shielded twisted pair 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	
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	IP30 to EN 60 529 with CO <sub>2</sub> / VOC sensor IP60 to EN 60 529 without CO <sub>2</sub> / VOC sensor
	Pollution class	II (EN 60 730-1)
	Safety class	III (IEC 60536)
Overvoltage category	II (EN 60 730-1)	
<b>General</b>	Material	Fire proof ABS plastic (UL94 class V-0)
	Dimensions (H x W x D)	47 x 157 x 68 mm (1.9 x 6.2 x 2.7 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**

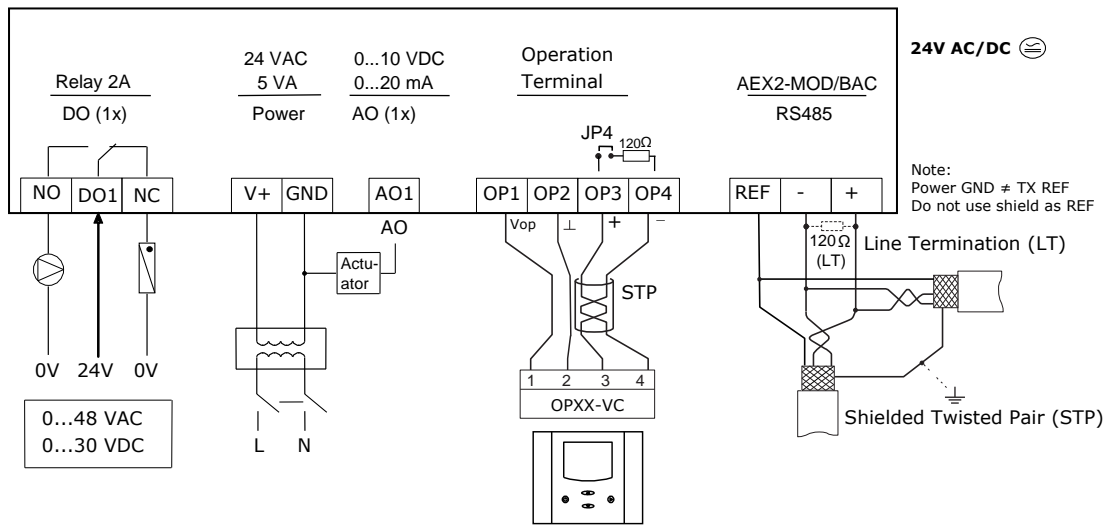
Choose modulating actuators with an input signal type of 0/2-10 VDC.

3-point actuators with constant running time are recommended.

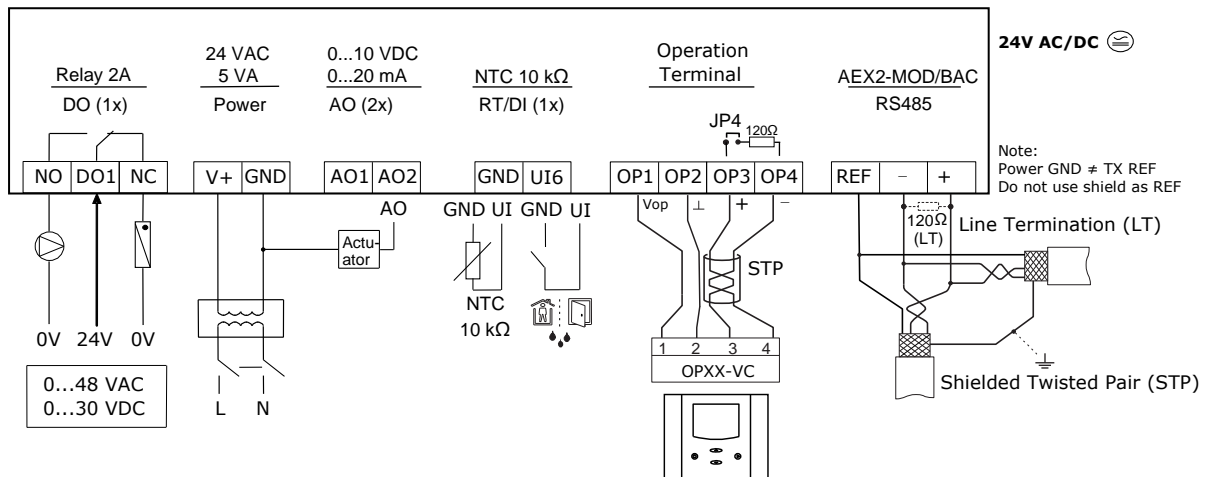
**Binary auxiliary devices** (e.g. pumps, fans, on/off valves, humidifiers, etc.)

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

**Connection diagram SDC2-200**



**Connection diagram SDC2-210**



**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 also installation sheet point number D. The function of the system LED is explained in the engineering manual.

**Installation**

See installation sheet no:

- SDC2-200 70-000707
- SDC2-210 70-000664

**Sensors**

**Temperature sensors on -T- types**

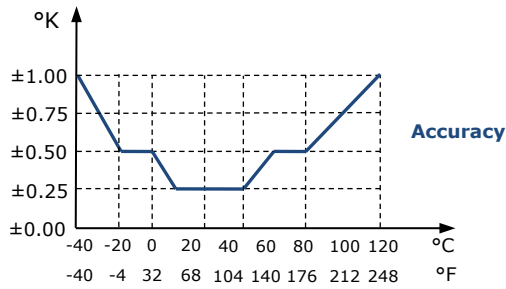


Figure 1: Max T-tolerance by sensor type

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

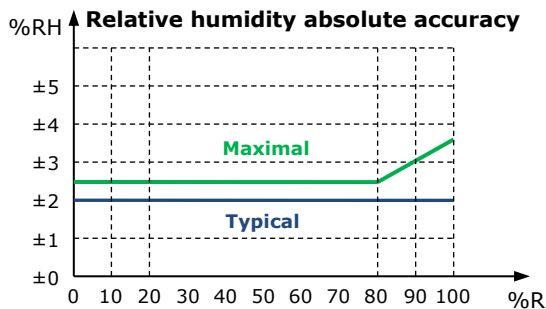


Figure 2: Max RH-tolerance at 25°C (77°F) per sensor type

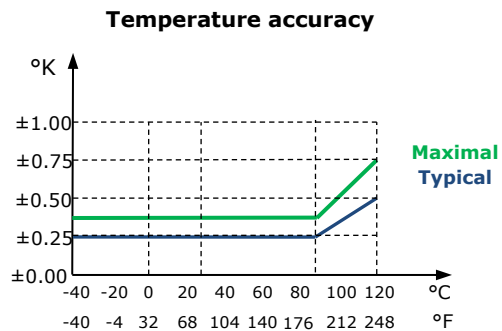


Figure 3: Max T-tolerance by sensor type

**CO2 sensor for -C-types**

The CO2 concentration is measured through non-dispersive infrared (NDIR) waveguide technology with ABC automatic background calibration algorithm. The applied measuring technology guarantees excellent reliability and long-term stability. The microprocessor samples the CO2 once per second. It calculates an averaging signal over a present number of seconds and generates the output signal.

**Automatic baseline calibration ABC**

The ABC background calibration constantly supervises the measured CO2 concentrations. The calibration function expects the CO2 values sink to 400 ppm when the room is not occupied. Over a period of several days the controller tries to reach this value step by step through recalibration of 30ppm per day max. In order to reach the given accuracy, it is required that the Sensor is for at least 3 weeks in operation.

**i** The ABC calibration works only in those applications where the CO2 concentration sinks regularly to fresh air levels of 400 ppm. For special applications such as green houses, animal farms, etc. the ABC calibration should be deactivated and the sensor should be manually calibrated. For details see "X2 Engineering Manual", section "Manual calibration of CO2 sensor", document no. 70-00-0737.

**VOC (Air Quality Sensor) for -Q-types**

Reliable evaluation of indoor air quality:

The sensing element used is a MOS (metal oxide semiconductor) based gas sensor component. It was specifically designed for a broad detection of reducing gases such as VOCs (volatile organic compounds) and CO (carbon monoxide) associated with bad air quality. The sensor has to run at least 24h for reliable VOC values. It has the following features:

- Sensing range: 400 – 2000 ppm CO2 equivalents and 0 – 2000 ppb TVOC equivalents
- High sensitivity and fast response
- Module with automatic baseline correction

**Note**

The VOC sensor is recommended as an actuator for multi-stage ventilation systems. The VOC values can be classified into the following air quality classes:

TVOC concentration [ppb]	0 – 60	60 – 200	200 – 610	610 – 1900	1900 – 2000
air quality class (EPA)	1	2	3	4	5
air quality	very good	good	moderate	unhealthy for sensitive groups	unhealthy

## X2 Functional Scope

The controller SDC2-200 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, humidity, CO2 and VOC
	06U to 09U	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	1	Analog output 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)

The controller SDC2-210 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, humidity, CO2 and VOC
	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: [www.vectorcontrols.com/products/x2](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  
Switzerland

[info@vectorcontrols.com](mailto:info@vectorcontrols.com)  
[www.vectorcontrols.com](http://www.vectorcontrols.com)

