Duct Controller and Sensor SDC2-BAC

The SDC2 is a programmable controller and sensor with BACnet® fieldbus connection. 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

- BACnet® MS/TP-Communication via RS485
- BACnet® B-ASC device profile
- 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

Ordering

Model	Item	Loop	UI	DO	AO	Functions	AO1	AO2
SDC2-16-TH-210.102U-BAC-1	40-300166	2	1	1	2	Temperature- and humidity sensor	Temp.	RH
SDC2-16-THC-210.102U-BAC-1	40-300173	2	1	1	2	Temperature-, humidity and CO2 sensor	CO2	RH
SDC2-16-THQ-210.102U-BAC-1	40-300161	2	1	1	2	Temperature-, humidity- and VOC sensor	VOC	RH
SDC2-16-THCQ-210.102U-BAC-1	40-300163	2	1	1	2	Temperature-, humidity-, CO2- and VOC sensor	CO2	VOC

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.

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

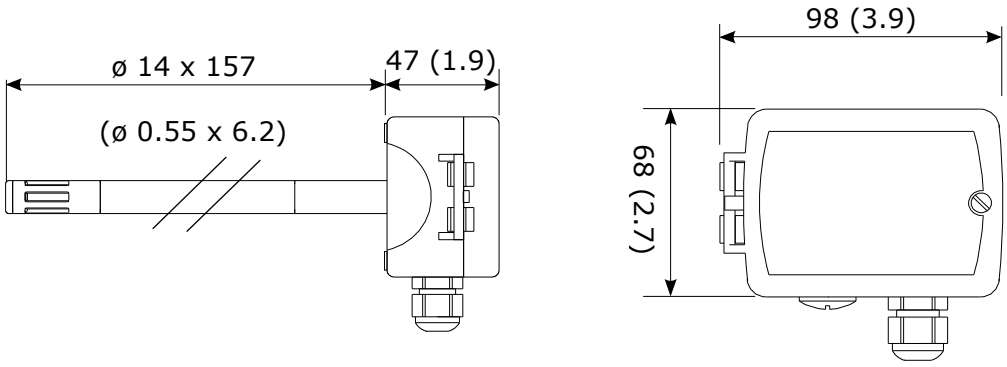
This device is for use as an operating controller or sensor. It is not a safety device. Where a device failure could endanger human life and property, it is the responsibility of the client, installer and system designer to add additional safety devices to prevent such a device failure. Ignoring specifications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

Power supply	Power requirements	24 VAC ±10%, 50/60 Hz, 15..34 VDC SELV to HD 384, Class II, 48VA max
	Power consumption	Max. 10 VA
	Electrical connection	Screw terminal connectors for wire 0.75…1.5 mm² (AWG 20…16)
Signal inputs	Temperature sensor Range Measuring accuracy Repeatability	Bandgap sensor -40…70 °C (-40…158 °F) See Figure 1 under chapter sensors ± 0.1 °C, ± 0.2 °F
	Humidity sensor Range Measuring accuracy Hysteresis Repeatability Stability	Capacity sensor element 0…100% RH See Figure 2 under chapter sensors ± 1% ± 0.1% < 0.5% / year
	CO2 sensor Response time (90%) Measurement range Repeatability Accuracy Pressure dependence	Non-dispersive infrared (NDIR) waveguide technology with ABC automatic background calibration algorithm 2 Minutes 0 - 2000 ppm ± 20 ppm ± 1 % of measured value ± 40 ppm ± 3 % of measured value + 1.6% reading per kPa deviation from normal pressure, 100 kPa
	VOC sensor Sensing range: TVOC (relative) CO2 equivalents (relative) Module	MEMS metal oxide sensor with ABC automatic background calibration algorithm 0 – 2000 ppb 400 – 2000 ppm Automatic baseline correction
	Passive input Type: Range	UI6, Passive Temperature NTC or open contact NTC (Sxx-Tn10) 10kΩ@25°C -40…100 °C (-40…212 °F)
Signal outputs	Analog outputs Output signal Resolution Maximum load	AO1 to AO2 DC 0...10 V or 0...20 mA 9.76 mV or 0.019 mA (10 bit) Voltage: ≥1kΩ Current: ≤250Ω
	Relay outputs: AC Voltage DC Voltage Insulation strength between relays contacts and system electronics: between neighbouring contacts:	0…48 VAC, full-load current 2A 0…30 VDC, full-load current 2A 1500V AC to EN 60 730-1 800V AC to EN 60 730-1
Network	Hardware interface Max nodes per network Max nodes per segment Conductors Impedance Nominal capacitance Galvanic isolation Line termination Network topology Recommended maximum length per chain	RS485 in accordance with EIA/TIA 485 128 64 (Vector devices only) Shielded Twisted Pair (STP) cable 100 - 130 ohm 100 pF/m 16pF/ft. or lower The communication circuitry is isolated A line termination resistance (120 ohm) shall be connected between the terminals (+) and (-) of the furthermost node of the network Daisy chain according EIA/TIA 485 specifications 1200 m (4000 ft.)
BACnet™	Communication standard Communication speed	BACnet™ MS/TP over RS485 9600, 19200, 38400, 57600, 76800, 115200

Technical specifications continued

Connection to remote terminal	Hardware interface Cabling	RS485 in accordance with EIA/TIA 485 Twisted pair (STP) cable
Environment	Operation Climatic conditions Temperature Humidity	To IEC 721-3-3 class 3K5 0…50 °C (32…122 °F) <85 % RH non-condensing
	Transport & storage Climatic conditions Temperature Humidity Mechanical conditions	To IEC 721-3-2 and IEC 721-3-1 class 3K3 and class 1K3 -25…70 °C (-13…158 °F) <95 % RH non-condensing class 2M2
Standards	CE conformity EMC directive Low voltage directive	 2014/30/EU 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 CO2 / VOC sensor IP60 to EN 60 529 without CO2 / VOC sensor
	Pollution class	II (EN 60 730-1)
	Safety class	III (IEC 60536)
	Overvoltage category	II (EN 60 730-1)
General	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)

Dimension, mm (inch)



Selection of actuators and sensors

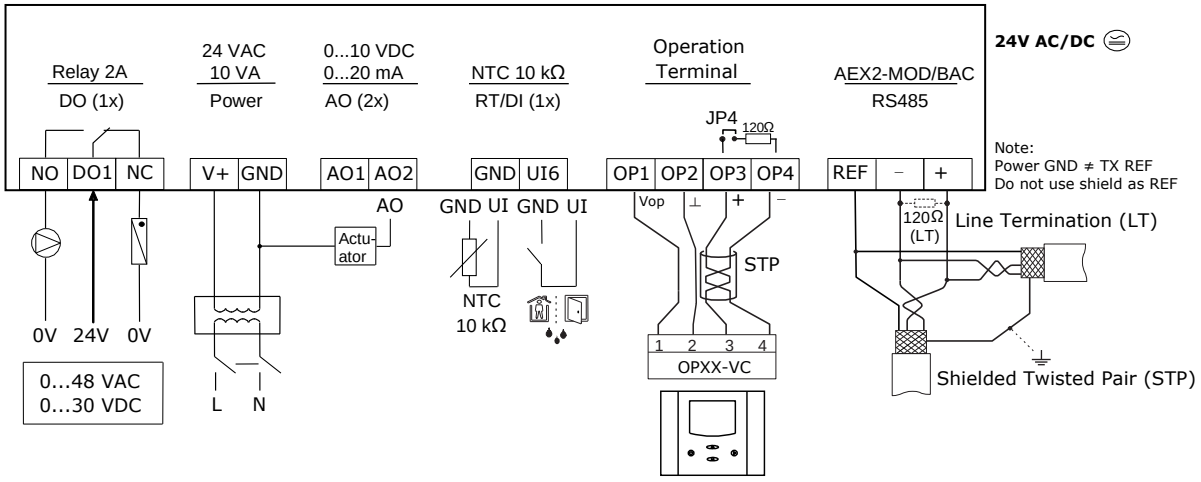
Temperature sensors
Use Vector Controls NTC sensors to achieve maximum accuracy: SDB-Tn10-20 (duct), SRA-Tn10 (room), SDB-Tn10-20 + AMI-S10 as immersion sensor.

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

The BACnet® interface 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:

- SDC2-210 70-000664

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 mm2 conductor area) cable.

SDC2-BAC Protocol Implementation Conformance Statement (PICS)

Vendor Name: Vector Controls
Product Name: SDC2 Controls series
SDC2 product description:
The SDC2 communicating BACnet® controllers are designed as universal controls equipment suitable for a large number of applications. They may be used in zoning and other applications which are monitored by a BACnet® MS/TP network.

Supported BACnet® Interoperability Blocks (BIBB)

The BACnet® interface conforms to the B-ASC device profile (BACnet® Application Specific Controller).
The following BACnet® Interoperability Building Blocks (BIBB) is supported.

BIBB	Type	Name
DS-RP-B	Data sharing	Read property - B
DS-RPM-B	Data sharing	Read property multiple - B
DS-WP-B	Data sharing	Write property - B
DM-DCC-B	Device management	Device communication Control - B
DM-DDB-B	Device management	Dynamic device binding - B
DM-DOB-B	Device management	Dynamic object binding - B
DM-TS-B	Device management	Time synchronisation - B
DM-UTC-B	Device management	UTC Time synchronisation - B
DM-RD-B	Device management	Reinitialize device - B

Supported standard BACnet® application services

- ReadProperty
- ReadPropertyMultiple
- WriteProperty
- DeviceCommunication. Needs a password which is “Vector” (case sensitive and without the quotes).
- I-Am
- I-Have
- TimeSynchronisation
- UTCTimeSynchronisation
- ReinitializeDevice (“cold” or “warm”). Needs a password which is “Vector” (case sensitive and without the quotes).

Supported standard Object types

- Device
- Analog input
- Analog value
- Binary value
- Multi-state Value

Sensors

Temperature sensors on –T- types

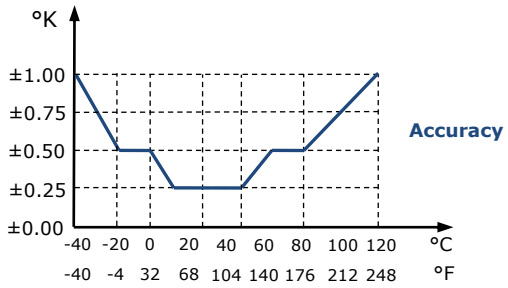


Figure 1: Max T-tolerance by sensor type

Temperature & Humidity from RH sensor on –HT- type

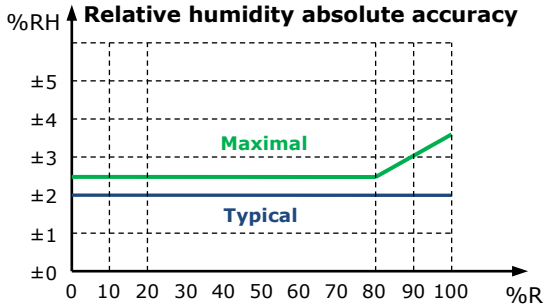


Figure 2: Max RH-tolerance at 25°C (77°F) per sensor type

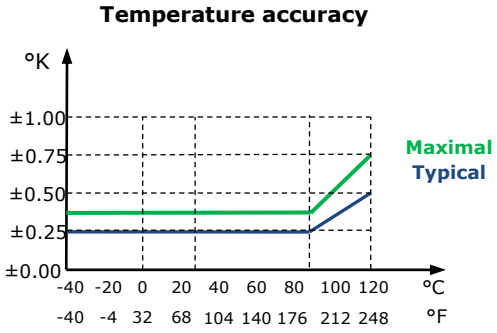


Figure 3: Max T-tolerance by sensor type

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.

Note

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. This deactivation is handled by a technician.

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 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	**Remote Enable**: Activation of the controller based on signal and alarm conditions
	2FU	1	**Change Operation Mode**: Switching occupied and unoccupied with control signals
	3FU	1	**Heat/Cool Change:** Switching heating and cooling based on a control signal
	4FU	1	**Setpoint Compensation:** Summer/winter compensation of setpoint
	5FU	1	**Economizer** (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.

Smart Sensors and Controls Made Easy!

Quality - Innovation – Partnership

Vector Controls GmbH
Switzerland

info@vectorcontrols.com
www.vectorcontrols.com