



DSCA8-DM

Destratification controller

Description

Typically, in large indoor spaces such as warehouses, factories and halls, warm air rises to the ceiling level, whereas cool air remains at the floor level. This process, known as stratification, is one of the main causes of ineffective indoor heating and energy inefficiency. Stratification can be avoided with ceiling fans moving the warm air downward and mixing it with the cool air to create a balanced indoor climate — a process known as destratification.

DSCA8-DM is a destratification controller designed for motors equipped with an analogue input (EC motors or fan speed controllers for AC motors). Fan speed control is achieved via a single analogue output. The controller features three application states — Delta control, Summer control and Override control, each specifically designed to provide optimal motor regulation and indoor climate comfort.

- In Delta control, fan speed is regulated based on the temperature difference between the floor and the ceiling levels (ΔT). It has an integrated thermostat function, which allows for the connection of a heating unit for additional heating of the indoor environment.
- Summer control allows for the fan to operate at a fixed speed providing a cooling effect during the warmer seasons. It can be activated manually via a button on the device enclosure or automatically when the floor temperature exceeds a summer setpoint.
- Override control allows the fan speed to be set manually via Modbus communication. When this state is activated, the fan runs at a fixed speed and all automatic application states are suspended. The fan continues operating at the selected speed even if an alarm occurs. To exit this state, a different control state must be selected.

DSCA8-DM is equipped with two temperature probe inputs for connecting two PT500 temperature sensors — one at the floor level and one at the ceiling level, which allow the controller to calculate ΔT and control fan speed accordingly.

Key Features

- Modbus RTU communication for easy device integration into HVAC systems
- One analogue output for fan speed control
- One relay output for heating control
- RGB LED indication for monitoring the device status
- Different application states for indoor heating and cooling
- Button for manual activation of Summer control
- Various alarm states for safe device operation
- Robust enclosure made of Acrylonitrile Butadiene Styrene (ABS) plastic

Area of Use

- Destratification control in buildings with high ceilings, warehouses and industrial environments where stratification occurs.
- Ceiling fan control in HVAC applications.

Standards

- Low Voltage Directive 2014/35/EU
- Electromagnetic Compatibility (EMC) Directive 2014/30/EU
- Commission Delegated Directive (EU) 2015/863 (RoHS 3) of 31 March 2015 amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances
- WEEE Directive 2012/19/EU



Warnings and Attention Points

- Turn off the power supply before servicing and maintenance.
- Avoid mounting the device in locations affected by direct sunlight.
- Do not short-circuit the terminals or the input and output wiring.
- During operation, the unit must be closed.
- If the unit does not work according to the instructions, the wiring connections, supply voltage and settings need to be checked.



Article Codes

Article code	Analogue output	Relay output
DSCA8-DM	1	1

Technical Specifications

Supply voltage	85–264 VAC, 50–60 Hz
Power supply for an external device	24 VDC, 500 mA
Analogue output types	
0–10 VDC	load resistance $\geq 1 \text{ k}\Omega$
2–10 VDC	load resistance $\geq 1 \text{ k}\Omega$
0–5 VDC	load resistance $\geq 1 \text{ k}\Omega$
0–20 mA	load resistance $\leq 500 \Omega$
4–20 mA	load resistance $\leq 500 \Omega$
PWM Push-Pull	frequency = 1 kHz, load resistance $\geq 1 \text{ k}\Omega$, output voltage level = 12 VDC
PWM Open Collector	frequency = 1 kHz, pull-up resistance $\geq 1 \text{ k}\Omega$, pull-up voltage level $\leq 12 \text{ VDC}$
Relay output	
Maximum switching voltage	220 VDC / 250 VAC
Rated current	2 A (resistive load)
Storage conditions	
Temperature	0–20 °C
Relative humidity	15–80 % rH
Operating conditions	
Temperature	-10–60 °C
Relative humidity	15–90 % rH, non-condensing
Enclosure	
Ingress protection	IP54
Material	Acrylonitrile Butadiene Styrene (ABS) plastic
Colour	Grey (RAL 7035)

Global Trade Item Numbers (GTIN 14)

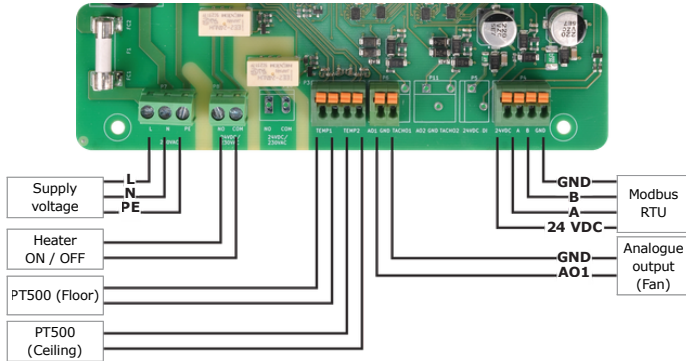
Article code	Unit	Box	Pallet
DSCA8-DM	-	-	-

DSCA8-DM

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Wiring and Connections



Screw terminal block

Supply voltage	
L, N, PE	85–264 VAC, 50 / 60 Hz

Relay output	
NO, COM	250 VAC / 24 VDC
Cable characteristics	cross section $\geq 1,5 \text{ mm}^2$

Spring clamp terminal block

Temperature probe inputs	
TEMP 1	Floor temperature sensor PT500
TEMP 2	Ceiling temperature sensor PT500
Cable characteristics	cross section $\leq 1,5 \text{ mm}^2$

Analogue output	
AO1, GND	12 VDC
Cable characteristics	cross section $\geq 0,5 \text{ mm}^2$

Power supply output	
24 VDC, GND	Power supply for an external device
Cable characteristics	Cat5 / EIB cable

Modbus RTU	
A, /B	Modbus RTU (RS485)
Cable characteristics	Cat5 / EIB cable

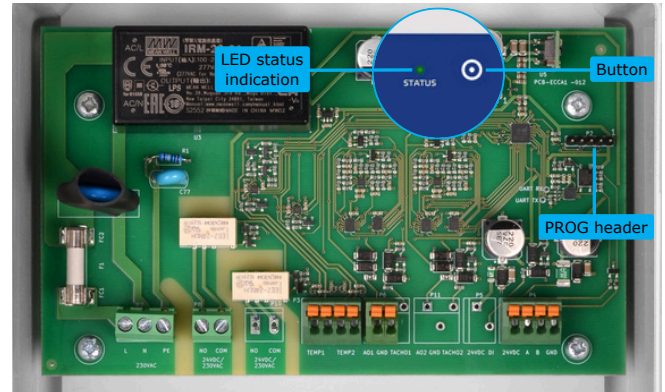
Connect Devices to SenteraWeb



Via a Sentera Internet Gateway you can connect your installation to the SenteraWeb HVAC cloud and:

- Easily change the parameter settings of the connected devices remotely.
 - Define users and give them access to monitor the installation via a standard web browser.
 - Log data - create diagrams and export logged data.
 - Receive alerts or warnings when measured values exceed alert ranges or when errors occur.
 - Create different regimes for your ventilation system - e.g. day-night regime.
- Please refer to the Modbus Register Map of the product for more details regarding the Modbus registers.

Settings and Indications



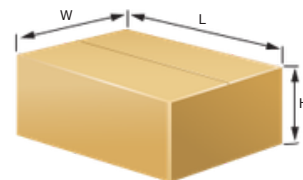
PROG header, P2		Put a jumper onto pins 1 and 2 and wait for at least 5 seconds to reset the Modbus communication parameters
Summer control button		The button activates Summer control

RGB LED indication

Red ON	Critical logical fault detected (see Input register 44). The floor and ceiling sensors have been swapped.
Red blinking	Critical hardware fault detected (see Input register 42). Sensor error or another hardware defect.
Yellow ON	Logical warning (see Input register 45).
Yellow blinking	Hardware warning (see Input register 43). The internal supply voltage is out of range.
Green ON	The system is operating normally in Delta control state.
Blue blinking	A firmware is being uploaded.
White ON	Summer control is activated.

The RGB LED brightness is regulated by setting the value of Holding register 91. The LED can be turned OFF (no indication) by setting the value to "0".

Packaging



Article code	Packaging	Length [mm]	Width [mm]	Height [mm]	Net weight [kg]	Gross weight [kg]
DSCA8-DM	Unit (1 pc.)	270	180	150	1,12	1,32
	Half pallet (102 pcs.)	1.200	800	1.070	113,83	152,71
	Pallet (204 pcs.)	1.200	800	1.690	227,66	287,86



DSCA8-DM

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Application States

The DSCA8-DM controller operates in three main application states, each with a defined priority and operating logic. During normal operation, Delta control is active. Summer control and Override control can temporarily take over the automatic operation when required. In all application states, safety functions (Alarm States) have the highest priority and can interrupt or overtake any current operation. The only exception is the Override control, which bypasses the alarm-related output shutdowns.

Delta Control (with Thermostat Function)

In Delta control, fan operation is controlled based on the temperature difference (ΔT) between the ceiling and floor temperatures. The additional thermostat function controls the relay output for auxiliary heating control.

- The fan starts running at minimum speed (HR16) when the temperature is higher than the setpoint (HR71) plus a fixed hysteresis band of 1 °C.
- If the temperature difference stays above the setpoint, the fan speed increases slowly by 1 % every 10 seconds until it reaches maximum speed or the required temperature difference is reached.
- When the temperature difference drops below the setpoint, the fan speed decreases slowly by 1 % every 30 seconds.
- If the temperature difference rises again above the setpoint, the fan starts increasing speed again.
- When the temperature difference falls below the setpoint minus the hysteresis band, the fan continues running at minimum speed for a set time (HR72) before stopping.

Integrated thermostat function

- If the fan runs at maximum speed continuously for a set time (HR73) and the floor temperature is below the thermostat setpoint minus a fixed hysteresis band of 2,5 °C, a relay output is switched on to enable auxiliary heating.
- The relay stays on until the floor temperature rises above the thermostat setpoint plus the hysteresis band.
- To avoid frequent switching, the relay stays on for a set time (HR75) after activation.

This combined control strategy ensures efficient destratification while enabling auxiliary heating only when necessary, optimising both energy consumption and thermal comfort.

Summer Control

Summer control can be activated manually via a button or automatically when the floor temperature exceeds the summer temperature threshold (HR82). In Summer control, the fan runs at a fixed speed (HR81) and stays at this speed until one of the following conditions occurs:

- The floor temperature drops below the summer temperature threshold.
- The state is switched off manually via the control button.

The state is deactivated automatically when the floor temperature falls below the summer setpoint minus a fixed hysteresis of 1 °C, which prevents frequent switching between Delta and Summer controls. This application state provides air circulation during warm conditions and helps maintain thermal comfort.

Override Control

Override control allows manual control of the fan speed by setting a fixed output, ignoring the automatic control logic. The state is activated when the user selects Override as the analogue output source via Holding register 15. In this state, the fan runs at a fixed speed set by the user (HR14).

- All automatic control functions are suspended while Override control is active.
- The fan keeps running at the fixed speed even if an alarm occurs. This fixed speed is defined in HR14.
- To exit Override control, the user must change the analogue output source from Override to Auto (Application, based on sensor measurements) via HR15.

This state is intended for manual operation scenarios where direct fan speed control is required.

Alarm States

The DSCA8-DM controller continuously checks the validity of the connected sensors and the overall system condition. If an abnormal situation is detected, the controller switches to predefined alarm states to maintain safe and reliable operation.

Alarm State

An alarm state is triggered when either a critical hardware alarm (sensor fault, device error) or a critical logic alarm (incorrect temperature probe connection) is detected.

During an active alarm condition, the analogue output is set to 0 % and the relay output is deactivated, except when Override control is active. The Override control overrules all alarm states preventing them from interfering with the activity of the analogue output.

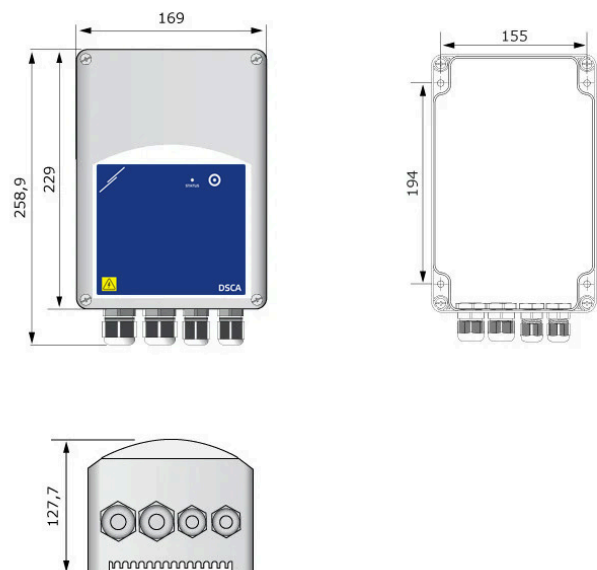
Post-Alarm State

After the alarm condition is cleared, the controller enters a post-alarm state — a timeout (20 seconds) is applied before the controller returns to normal operation. This delay ensures that the fault condition has been fully resolved and prevents rapid transitions between alarm and normal states.

Locked Alarm State

The locked alarm state provides protection against repeated fault conditions. If the system enters an alarm condition more than 10 times after recovery (primarily due to recurring hardware faults), the controller transitions into a locked alarm state. In this state normal operation is inhibited and outputs remain disabled. Recovery from the locked alarm state is only possible by power cycling the device.

Fixing and Dimensions



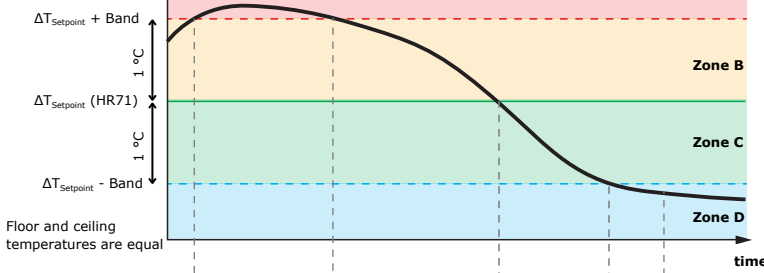


DSCA8-DM

Destratification controller

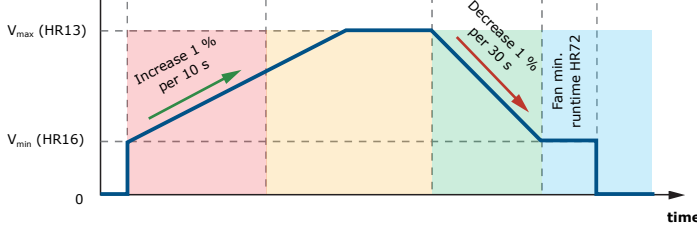
Delta Control

Difference between ceiling and floor temperatures [°C]



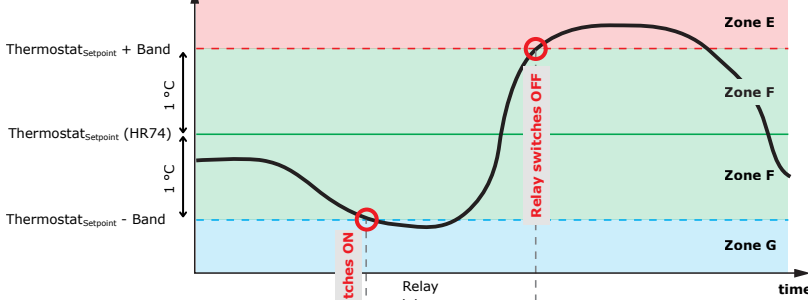
Temperature difference between ceiling and floor	Fan speed
ΔT is too high – more destratification is required.	Ceiling fans accelerate until v_{max} and keep on running at the maximum speed.
ΔT is within the acceptable range. Slightly higher than the setpoint.	Fan speed increases 1 % per 10 s.
ΔT is within the acceptable range. Slightly lower than the setpoint.	Fan speed decreases 1 % per 30 s.
ΔT is too low – no more destratification required.	After Fan min. runtime has elapsed, the ceiling fans stop.

Fan speed [%]



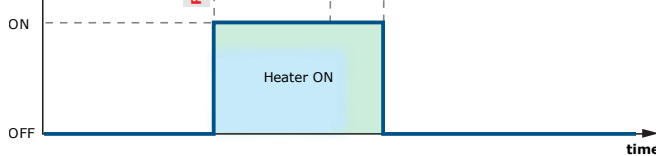
Thermostat Function in Delta Control

Floor temperature [°C]



Floor temperature	Relay output for external heater
Temperature is high enough, no need for extra heating.	Switch the relay OFF.
Floor temperature is close to the Thermostat setpoint.	Relay stays in the same status.
Destratification only is not sufficient to reach the floor Thermostat setpoint. Extra heating is required.	Switch the relay ON. Relay always stays ON during the minimum runtime. After the minimum runtime has expired, it switches OFF when T_{Floor} enters Zone E.

Relay output for external heater

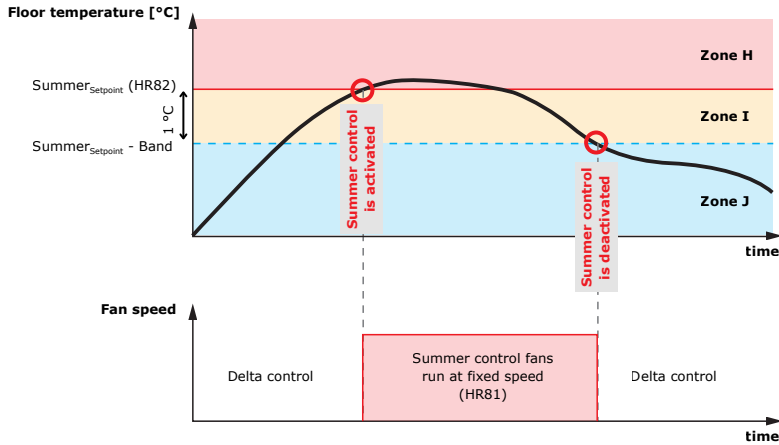




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Summer Control



Floor temperature	Fan speed
Temperature rises above the $Summer_{setpoint}$. It is too warm, summer control is activated to generate a cool breeze.	Ceiling fans run at fixed speed (HR81).
Temperature is close to the $Summer_{setpoint}$.	No change.
Temperature drops below the $Summer_{setpoint} - 1\text{ °C}$. Summer control stops.	Summer control stops, Delta control takes over again.

