Planning instructions

Industrial ceiling fans for destratification





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Planning instructions recirculation of warm air

Function

You can equalize the room temperature in high halls and rooms with the help of our ceiling fans by pushing down the warm air from the ceiling. Air stratification with temperature differences 10 degrees and more is completely eliminated and you can reduce heating costs by up to 30%.

In addition, this also counteracts heat loss at the ceiling (transmission). The smaller temperature difference between the inside temperature at the ceiling and the outside temperature has a directly proportional effect on the transmission. Example: If you have an outside temperature of 0°C and a reduced temperature of 34°C to 22°C at the ceiling, the transmission is reduced by 35 %.

The third advantage of de-stratification is the rapid and even heating of the entire hall. Previously cold areas are immediately flooded with warm air. People appreciate the constant and comfortable temperature throughout the hall. If the hall is only used temporarily, the preheating time can be greatly reduced (or the night setback period is extended), which brings further energy savings.

Other advantages are the prevention of mold and rust and a dry floor.

Basic planning considerations

Throwing distance of the fans
The type of fan must be suitable for the hall height so that the heat reliably reaches the hall floor. This is important because otherwise a "pool of cold" remains on the floor.

Do not place fans above permanent workplaces
Installation across corridors and open spaces enables temperature equalization with minimal air movement at workplaces. Our fans are designed for a narrow air cone that efficiently brings the warm air to the floor. There the warm air spreads out gently in a wide, circular manner. This means that reliable mixing is achieved in just a few minutes.

Do not let fans run continuously
With our fans, the temperature balance will be achieved quickly. It therefore makes sense to only run the fans as long as the temperature difference requires it. Solutions and exceptions to this, from simple to perfect, can be found in the corresponding section.

Planning instructions recirculation of warm air

Choice of fan type

Recirculation of warm air - hall height up to 10m

Industrial ceiling fans 03.210 bis 03.224



- **03.210** – Industrial-Ceiling-Fan, white
- **03.211** – Industrial-Ceiling-Fan, black

In case of barriers concerning the height (e.g. overhead crane runway):
- **03.214** – height 44 cm

Heights under 44cm and over 69cm on demand.

Suspending fans 03.210–03.260 from a chain is technically impossible and not permitted.

The following fans with IP protection IP54 are special splash-water proof and dust proof (certificated by the German certification authority TÜV). IPx4 = splash-water proof, IP5x = dust proof



- **03.222** – protection IP54, height 69 cm
- **03.224** – protection IP54, height 44 cm

Recirculation of warm air - hall height higher than 10m



- **03.310** – Ceiling Fan with safety guard, IP protection IP54, up to 14m hall height, completely assembled



- **03.295** – Ceiling Fan with safety guard, up to 20 m hall height, completely assembled



- **03.312** – Ceiling Fan with safety guard, IP protection IP54, up to 20 m hall height, completely assembled

Fans with safety guards may also be necessary in halls with a ceiling height of less than 10 m, for example in forklift areas or in ball sports halls..

Planning instructions recirculation of warm air

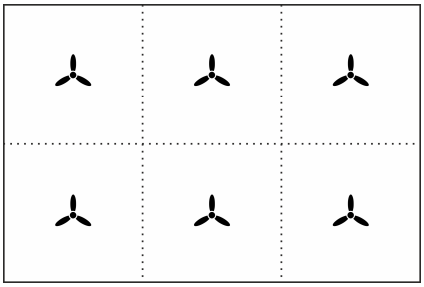
Number of ceiling fans



Depending on the circumstances, install one fan for 125 m² to 250 m² for the destratification.

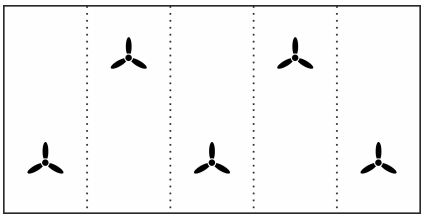
To determine the number of fans, use our planning tool which you can find on our website:
https://fenne-kg.de/auslegung/
Enter ground space (Grundfläche) and hall height (Hallenhöhe) and you´ll get a recommendation.

Positions of the ceiling fans - generally

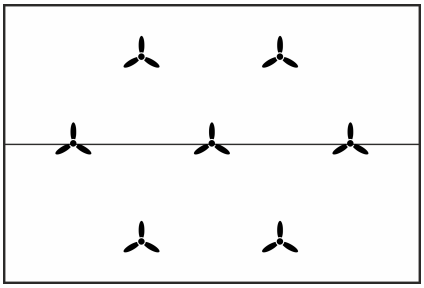


The fans are distributed equally on the surface.

Ideally divide the room into rectangles, as equally sized as possible, for the number of fans to be installed. In the middle of each zone you can place one fan.



If it is not possible to create equilateral rectangles, you can take another shape.



Important: You should always install some ceiling fans at the highest position of the room, to be sure no warmer air remains under the ceiling.

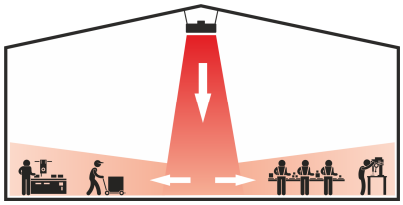
Planning instructions recirculation of warm air

Positions of the ceiling fans - practical considerations

The way the hall is set up will sometimes result in uneven fan positions. This is not a problem to a large extent. It will usually just take a little longer until the temperature differences are balanced out everywhere.

Do not install above fixed workplaces

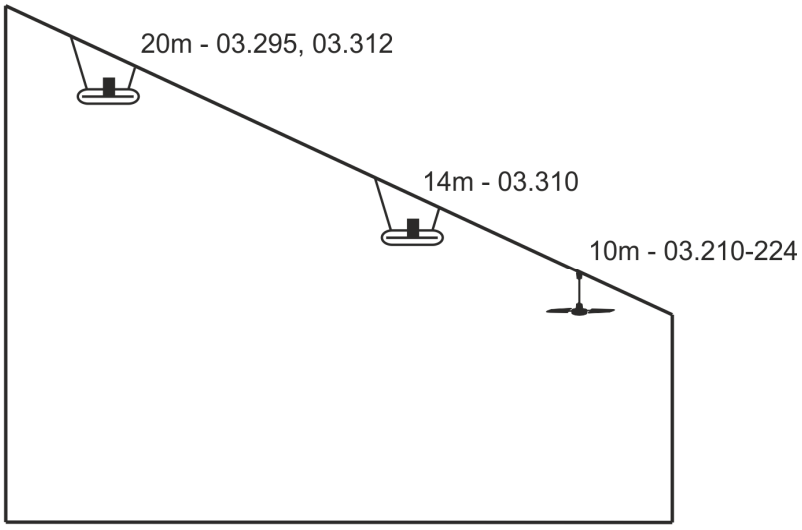
Especially in winter, the temperature compensation should be as unnoticed as possible. Our fans are designed for a narrow air cone. Choose corridors and open spaces for placing the fans above.



The narrow airflow only hits a smaller area under which there is no permanent workplace. On the ground, the warm air flows circularly and gentle into the target areas. This means that reliable mixing is achieved in just a few minutes.

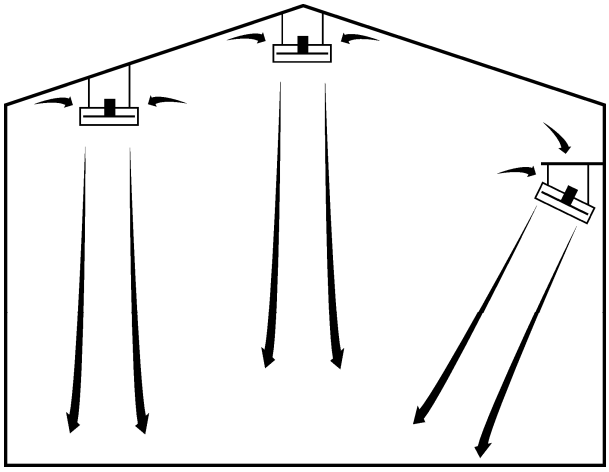
Height of the hall

The performance of the ceiling fans is (without temperature stratification):

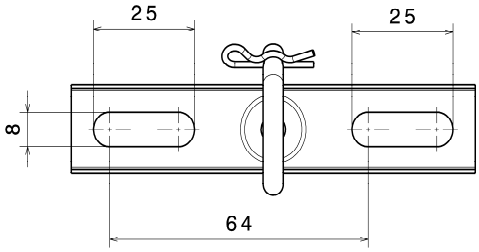


Planning instructions recirculation of warm air

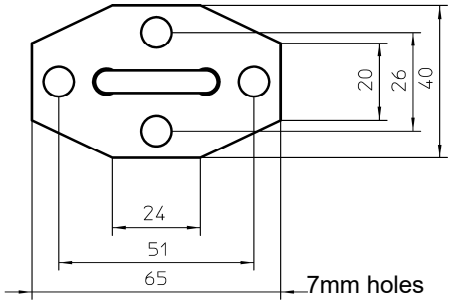
Even in halls that are higher than the maximum throw of the fans, perfect destratification down to the floor is possible. To do this, some of the fans are installed at the highest point and some of the fans are installed lower. If ceiling installation at different levels is not possible, you can install fans at the side wall in slant position.



Mounting the devices



Fans 03.210 - 03.260
You'll find enclosed to the fans one ceiling j-hook with safety pin. To mount the safety wire of the fan, you'll need a suitable fixation for the kind of ceiling.



Fans 03.295, 03.310 and 03.312
You'll find enclosed to the fans 3 ceiling j-hooks and 3 chains 0,80 m length.
The ceiling j-hooks are installed preferably at the ceiling in the corners of a triangle whose sides are 120 cm till 150 cm long. Alternatively you can choose the three fastening points at a straight line with a distance of 80-100cm.

Planning instructions recirculation of warm air

Main switch of the ceiling fan circuit

The activation of the whole fan circuit can be realized via a main switch, via the main switch of the heating system and/or via a time switch.

Control of the fans

The temperature difference will be balanced a short period after switching on the fans. You should therefore switch the fans completely off in order to reduce power wastage and air movement. You can use the following solutions, which are described in more detail below:
- Controller recirculation warm air
- Coupling with the blower of the warm air heater

Controller: Controller recirculation warm air



The controller recirculation warm air 03.431 provides appropriate control of the fans. The device measures the temperature near the floor and the ceiling with two temperature sensors. In order to switch on or off the speed controller and fans.
If the temperature difference goes higher the set point, the relay switches the ceiling fans on. The switch off temperature can be defined separately. The performance of the fans is depending to the air stratification. So it is recommend to switch on the fans before the temperature difference is too high. Factory setting temperature difference is 3 degrees for switching on and 2 degrees for switching off.

The positioning of the sensors (near the ceiling and floor) and the testing of the settings in practice is important for a maximum reduction of the heating costs while having the lowest possible power consumption. It is important that the sensors measure the average temperatures near the ceiling and floor. The sensors should not be installed near gates, windows, water lines as well as strong air circulations. It is possible to extend the maximum amperage of 4 A by an electric contactor.

Control: Run the fan together with the warm air heater

In this case, the fans will work automatically during the heating cycle. The warm air is immediately distributed throughout the room. This is usually achieved technically using a potential-free relay.

This type of control is not as perfect as the above-mentioned warm air recirculation control 03.431, but it is a sensible measure at low cost.

Regulation of the air flow



Speed controller, stepless

You can regulate the air flow with the following speed controller. The air flow should reach the floor area without draft nuisance. Especially next to standing work areas it is necessary to regulate the speed. The installation of the fans near to seated work areas must be prevented.

You can control the fans in split groups, if you have one of the following cases:

- Areas of the room are used differently (work area, storage area)
- Different heights of mounting for the fans
- Different kind of fans

The speed controller is equipped with an internal trimpot to adjust the minimum speed. It is recommended to connect the stepless speed controller near the maximum of the allowed amperage (e.g. 4 A fans with a 5 A speed controller). Especially at lower speeds, stepless controllers can result (as a matter of principle) a humming sound ("line-frequency hum"). E.g. 1 A fans with a 5 A speed controller.

Number of ceiling fans per speed controller, stepless

		03.210-260
03.403	Speed controller, stepless, 0,3 - 1,5 A	1- 4
03.404	Speed controller, stepless, 0,8 - 3,0 A	3- 8
03.405	Speed controller, stepless, 1,3 - 5,0 A	4-12
03.406	Speed controller, stepless, 2,6 - 10,0 A	8-24



Transformer speed controller, 5-steps

Transformer regulate the fans extra silent and smooth.

Another advantage is the fact that you do not need to consider a minimum load. You can e.g. regulate with a 5 A regulator a 0,1 A motor.

Number of ceiling fans per transformer speed controller

		03.210-260	03.284-285	03.295	03.310	03.312
03.423	Speed controller, 5-steps, 2,2 A	1- 5	1- 3	1	1-2	1
03.425	Speed controller, 5-steps, 5,0 A	1-10	1- 7	1-3	1-4	1-3
03.426	Speed controller, 5-steps, 7,5 A	1-21	1-10	1-5	1-6	1-5

Speed controller 0-10V input

e.g. for building automation systems, are also available in both versions: Stepless and 5-steps.

Planning instructions recirculation of warm air

Optimization options through hall door switches

Depending on local conditions, the fan control system for warehouse doors can be optimized:

- Door switches ensure that the fans remain off when the door is open, preventing heat from being forced out.

- If employees near open doors are significantly affected by the incoming cold air, fans positioned between the work area and the warehouse door while the door is open can significantly improve the situation.

- If a problematic pool of cold air forms at a warehouse door: As soon as the door closes again, the fans (primarily for thermostat control) can start immediately and dissipate the pool of cold air without delay.

Use winter fans in summer too

Our ceiling fans for destratification (winter operation) can also be used in summer for refreshing air movement. To do this, the speed is set higher as desired and no changes to the installation are necessary.

Direction of rotation of the fans
In halls and large/high rooms, the direction of air flow downwards is optimal even in summer. A change in the direction of rotation is therefore not necessary and would not make sense.

Warm air recirculation control
The warm air recirculation control 03.431 is only required in winter operation. For summer operation, the warm air recirculation controller is set to "ON" (= relay permanently on) using the mode button in the device. After a power failure, however, the warm air recirculation controller switches back to automatic operation.
So a standard surface-mounted switch on the wall for "summer/winter" can be a practical simplification.

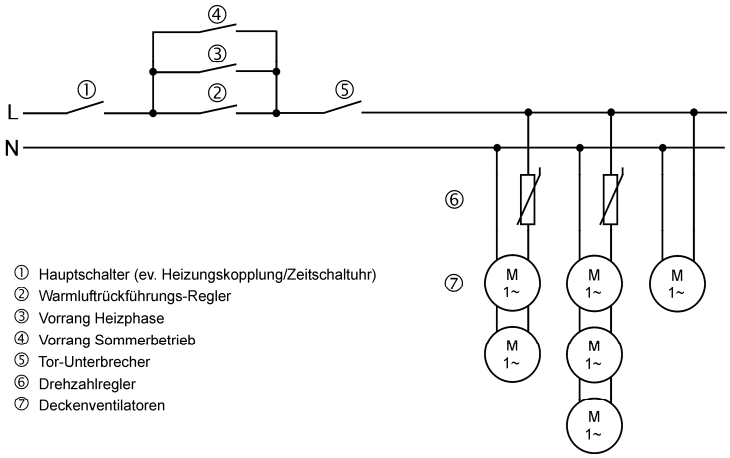
Room height and fan type
While in winter the warm air return should take place unnoticed, in summer a pleasantly noticeable air movement is desired. This means that a higher fan output should be available as a reserve for the summer use.
The following device recommendation is for winter and summer use:

03.210 to 03.224	Hall height up to 7 m
03.295	Hall height up to 10 m
03.310	Hall height up to 8 m
03.312	Hall height up to 12 m

Number of fans
The information on calculating the number of fans given on page 2 applies to warm air recirculation in winter operation while also being able to be used in summer.
If the fans are primarily intended for summer, a higher number of fans is needed. Depending on the use of the hall and the heat load, one fan per 50m² to 150m² is sensible. For example, more devices in a fitness center and fewer devices in a warehouse.

Number of speed controllers
Depending on the use of the hall, smaller control groups should be provided for individual speed control for primarily summer operation. For example, in a fitness center there is one controller for each fan and in a warehouse, there is one controller for four fans.
The speed controls should be accessible and allow for an individually comfortable setting.

Connection scheme



Cabling



Subject to alterations
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