WOLF

Technik, die dem Menschen dient.

# Ceiling fan LD

# Ceiling fan LD 15

- **High air circulation**
- **Low power consumption**
- **Noiseless operation**
- **Energy saving through warm air return in winter operation**
- **Cooling in summer operation**
- **Long lifetime and operational reliability**

## Function

With the use of ceiling fans in winter operation, the accumulation of heat in the ceiling area is pushed back down into the residence zone. Due to the better temperature distribution, the comfort increases and energy saving can be achieved at the same time. In summer, air circulation creates a pleasant room climate.

## Technical data LD 15

| Type | | LD 15 |
|---|---|---|
| Blade number | | 3 |
| Colour | | white RAL 9016 |
| Diameter | cm | Ø 142 |
| Overall height | cm | 69 |
| Air circulation | $m^3/h$ | 15,000 |
| Speed | $min^{-1}$ | 285 |
| Operating voltage | | 230 V / 50 Hz |
| Power consumption | W | 60 |
| Current consumption max. | A | 0.35 |
| Sound pressure level* | dB(A) | 34 |
| Total weight | kg | 10.5 |

* Sound pressure level at 5m distance, measured in an room of medium absorption, room size approx. 1500$m^3$.

## Temperature difference control

With the temperature difference control, one temperature sensor each measures the ambient temperature in the floor and ceiling area. Switching the ceiling fan is done according to the switch-on and switch-off temperature difference settings.

| | |
|---|---|
| Permissible ambient temperature | -10 to 50°C |
| Operating voltage | 230 V / 50 Hz |
| Max. permissible switching current | 8 A (4 A motor power) |
| Switch contact | 1 changeover contact, relay contact pot-free |
| Switch-on temperature difference $\Delta t$ On | 1 to 10 K (6K recommended) |
| Switch-off temperature difference $\Delta t$ Off | 1 to 10 K (4K recommended) |

## 5-position switch

5-position switch for 5-speed operation of **one** ceiling fan.

| | |
|---|---|
| Permissible ambient temperature | -10 to 50°C |
| Operating voltage | 230 V / 50 Hz |
| Max. permissible switching current | 0.6 A |

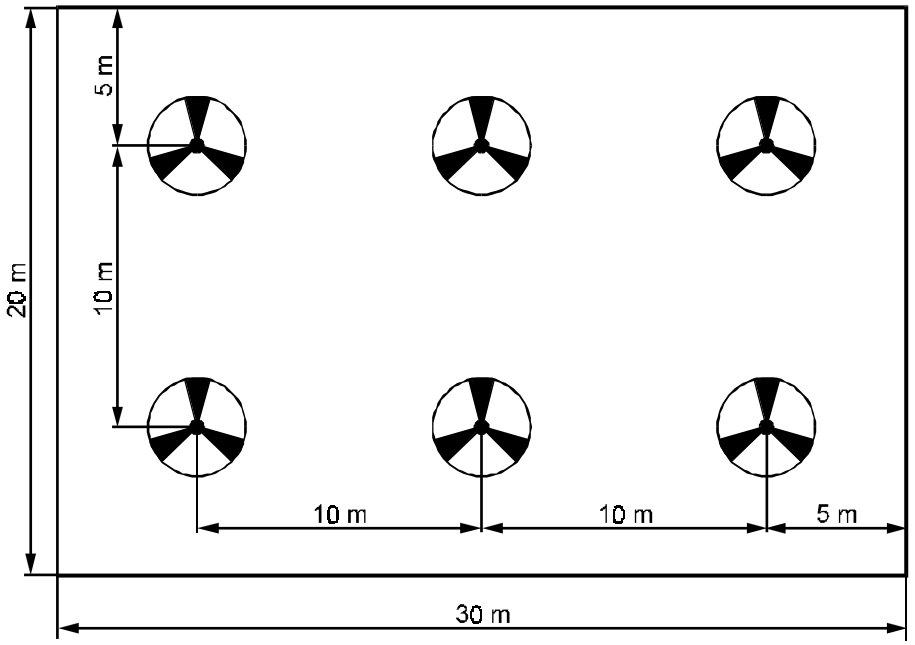
## Continuous speed controller

Speed controller for continuous operation of a maximum of **five** ceiling fans.

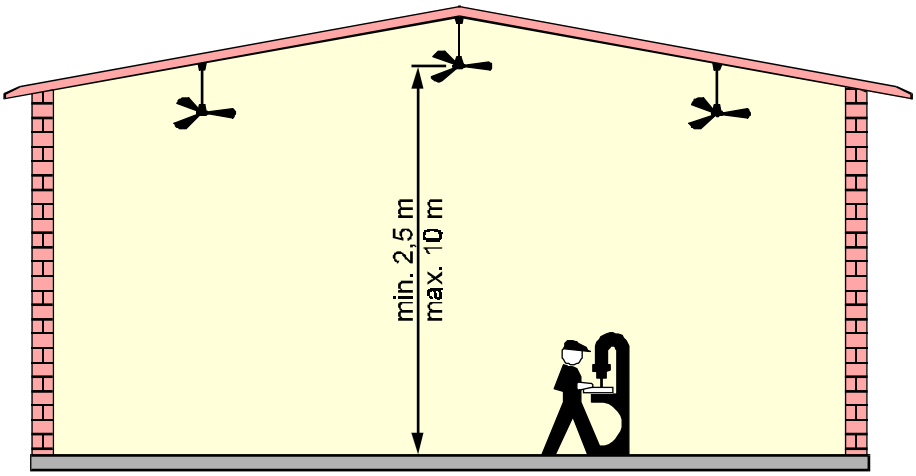
| | |
|---|---|
| Permissible ambient temperature | -10 to 35°C |
| Operating voltage | 230 V / 50 Hz |
| Max. permissible switching current | 2.5 A |

## Equipment clearances

The equipment clearances between the LD 15 units should not be more than 10m and the clearances from the side walls should not be more than 5m.
Roughly 1 LD 15 unit can be planned for approx. 100m² surface area.
Depending on room height and local conditions, possibly 2 units/100m².




## Mounting height




## General planning notes

- The jet range of the LD 15 without temperature stratification is approx. 10m.
- Starting from a room height of 7m, the LD 15 units should be mounted at staggered heights to achieve sufficient jet ranges.
- One LD 15 must be mounted in the highest position of the room, so that no warm air cushion remains under the ceiling.
- When using temperature difference controls, the sensors should not be mounted in the proximity of gates, windows, or non insulated hot water pipes. The positioning of the sensors and the setting of temperature spreading Δt-On and Δt-Off of the temperature difference controller are of crucial importance for the comfort. If necessary this should be optimised by trial and error.
- By priority switch-off of the fans while the hall doors are temporarily opened (e.g. with door switches), the warm air is better kept in the building.
- The positioning of the ceiling fans should always be in such a way that no work places are directly in the blow-out cone.

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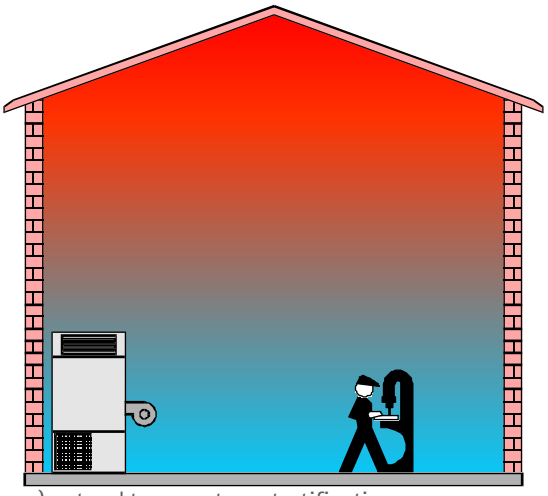
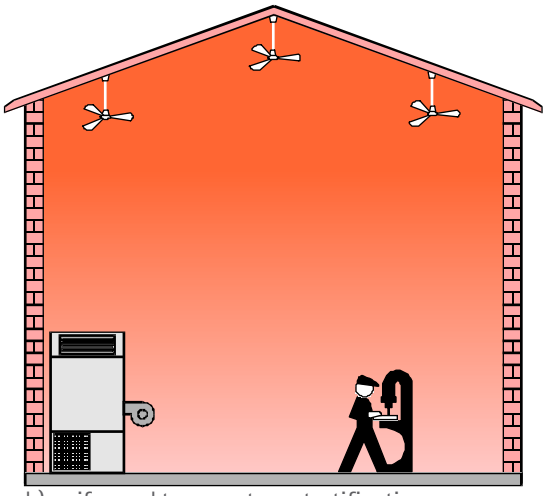
# Profitability comparison LD 15



a) natural temperature stratification



b) uniformed temperature stratification

The transmission and ventilation heat losses can be substantially lowered due to a uniformed temperature stratification over the total room height.

The heat loss due to transmission in the ceiling area range ($\dot{Q}_{TD}$) is directly dependent on the temperature difference between the room air temperature in the ceiling area ($t_D$) and the outside temperature ($t_A$) and is calculated with formula [1].

$$\dot{Q}_{tD} = k \bullet A \bullet (t_D - t_A) \quad [1]$$

$$\frac{\dot{Q}_{tD1}}{\dot{Q}_{tD2}} = \frac{(t_{D1} - t_A)}{(t_{D2} - t_A)} \quad [2]$$

By using of ceiling air heaters, the thermal transmission coefficient (k) and the heat transmission area (A) remain unchanged. The transmission heat loss is therefore directly proportionally to the change of temperature and is calculated with formula [2].

**Example:** - Temperature reduction in the ceiling area from 35°C to 25°C through the use of ceiling air heaters
- Outside temperature -15°C

$$\frac{\dot{Q}_{tD1}}{\dot{Q}_{tD2}} = \frac{(t_{D1} - t_A)}{(t_{D2} - t_A)} = \frac{25°C - (-15°C)}{35°C - (-15°C)} = \frac{40°C}{50°C}$$ = 0.8, i.e. the transmission loss is reduced by 20%.

$\dot{Q}_{tD1}$ = transmission heat loss in the ceiling area for uniformed temperature stratification
$\dot{Q}_{tD2}$ = transmission heat loss in the ceiling area for natural temperature stratification
k = thermal transmission coefficient
A = heat transmission area
$t_{D1}$ = temperature for uniformed temperature stratification in the ceiling area
$t_{D2}$ = temperature for natural temperature stratification in the ceiling area
$t_A$ = outside temperature

## Tendering Text

**Ceiling fan**
for operation with circulating air and ceiling mounting with statically and dynamically balanced wings.
Colour: white RAL 9016

**Single-phase motor** 1 x 230V, 50Hz, 60W.
Control permissible only in connection with Wolf accessories.

## Accessories

**Temperature difference control** for the automatic activation of the ceiling fan depending on the adjustable temperature differences DT-On, DT-Off.

**5-position switch** for the controlling of **one** ceiling fan

**Continuous speed controller** for up to **five** ceiling fans.

**Suspension rods** length 20cm, 90cm, 150cm, 200cm (on request)

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