Management System
ISO 9001:2008
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tecnifan
Tecnología en Ventilación

# TMD

## Direct Drive Motor

Double inlet series with direct drive motor

Edición 03/2017

The TMD family comprises are double inlet low pressure centrifugal fans manufactured in galvanized steel, quality Z-275. Belong to the TDA light series. Include a forward type impeller with inserted blades wich gives the fan great rigidity and high performance.
On the one hand, the motor shaft is directly coupled to the middle plate of the impeller through the hub. The motor is closed (IP54), single or three phase, 4 or 6 poles, with insulation class F and internal thermal protection. On the other hand the motor is fixed to the side of the fan housing by a specially designed bracket. A rubber shock is inserted to absorb the vibrations. As an optional, three-speed motors can be supplied. Light series allows the assembly with support feet in four different positions. The pruduction range includes sizes from 5/8 to 15/15, with air flow up to 10.000 $m^3$/h and pressures until 520 Pa. Covers a rank of temperatures from -20ºC to +50ºC.

"TECNIFAN fans are manufactured with high precision machinery designed by our I+D+i department (Investigation, Research & Innovation) , under the ISO 9001 Quality Standard Regulation certified by international accredited certification organism".

## Quality features

**Forward type impeller**
Double inlet impeller, with inserted blades, middle plates, lateral gear and hub for the fastening to the shaft.

**Deflector**
Aerodynamically designed to avoid possible turbulences. The connection to the housing is made by means of a system of screws and pinches that allows an easy extraction of the impeller.

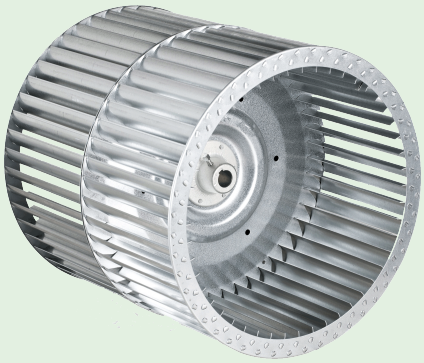
**IP54 Motor**
Motor closed type (IP54), single-phase or three-phase, 4 or 6 poles, 1 or 3-speeds and especially designed and manufactured for the TMD.

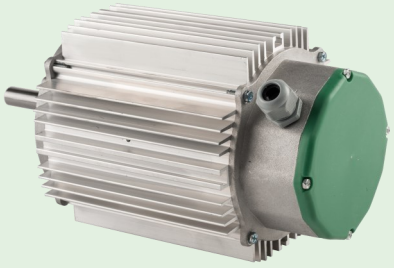
**Support feet (optional)**
Manufactured with galvanized and stamped steel sheet. Gives rigidity and stability to the fan and include antivibration rubbers to avoid noise and vibrations.

## Components that make the difference

### Impeller

The impellers from Tecnifan are manufactured through a system of mechanical latching (tabbed construction), which gives them great rigidity and allows to get an excellent mechanical performance. All the impellers are balanced after its manufacture according to VDI standard 2060 (balance degree Q 6.3).





### IP54 motor

Motor with aluminium housing, asynchronous, closed with insulation class F, 4 or 6 poles. 1-phase 220-240 V 50/60 Hz,1 and 3 speeds. 3-phases 220-240/380-420 V of 1 speed. Specially designed and manufactured for the TMD fans. Provided with integrated junction boxes with cable glands, hosting the power trip conection.

### Directiva ErP 2015 de Ecodiseño

Thanks to the continuous improvement and to the fast adaptation of our products through the development by the department of Reseach, Innovation and Investigation of Tecnifan, all our fans with incorporated motor comply with the Directive Ecodesign ErP2009/125/EC from 1st January 2015.


### Housing and welding system

The housing is composed by two side-plates manufactured in one single piece, pined to the casing by electric spot welding. All the welding spots are covered with an anti-rust painting. The pressed inlet cones are designed aerodynamically to increase the efficiency. This assembly system, together with the used thickness of the sheet and the nerves stamped on the sheet contribute to provide a great strength and rigidity to the housing assembly.

## Limits of employment for fans with direct driven motor TMD

Figure 1 shows a characteristic curve corresponding to a fan with direct driven motor of the TMD family.

For a correct selection of the fan, the required working point must be located inside the limited area by the characteristic curve of the fan and the parabolas 2 and 3. This is the area of employment of the fan.

The working points located on the left of the parabola 1 would be outside the curve and therefore they cannot be selected.

The working points located between the parabolas 1 and 2 represent the area of unstable functioning of the fan, where they can produce phenomena of pumping and fluctuations in flow and load on the fan and the motor (a phenomenon known as pumping, surge or pompage). When a fan operates near a point of pumping, the noise increases due to this phenomenon, and in some cases it sound as if the impeller was being impacted by a solid object (called "hammering"). A fan working in an area of unstable operation or pumping can cause structural fatigue on the impeller and its complete destruction. On the other hand, these conditions of

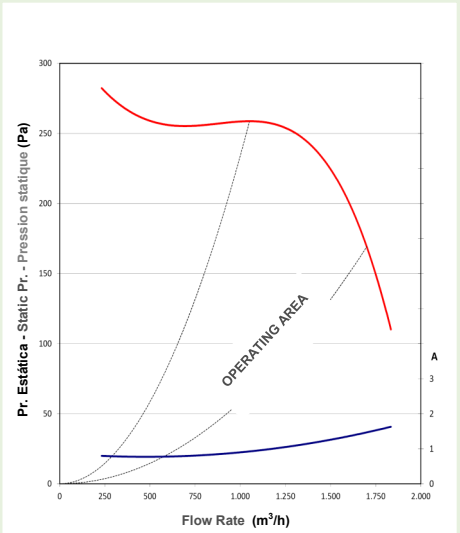



**Figure 1**

low load may cause motor overheating in some cases. Therefore it is not recommended to use a fan when the required working point is located in this area of unstable operation or pumping, limited by the characteristic curve of the fan and the parabolas 1 and 2. It is recommended to select another fan, if possible, or increase the flow rate to move the operating point to the area of employment.

Finally, the points situated on the right side of the parabola 3 are those in which the intensity consumed by the motor exceeds the maximum allowable intensity of the motor. The use of a fan in this area causes overheating of the motor. The motors are equipped with a thermal protector which will shut down the motor in case of overheating. After a time stopped, to cool the motor, the thermal protector is reset and the motor will operate again. However, a motor operating in these conditions is experiencing a steady deterioration in its electrical and mechanical switchgear, being able to get to burn or seize and unusable and therefore you cannot select an operating point to work the fan in these conditions. It is necessary to select another fan or to increase the loss of load in the installation to place the working point inside the operating area of the fan. When installing the fan it is necessary to check that the consumed intensity by the fan does not exceed the permitted maximum intensity.

## Selection example for fans with direct driven motor TMD

Knowing the air flow required to supply or remove in the store and calculated the pressure loss or the static pressure to overcome the installation in relation to the flow, we would proceed to select the corresponding TMD fan depending on the operating point and other selection criteria such as efficiency, sound level, dimensions in relation to the space available and level of cost.

Example for a required working point:

**Air flow = 3.000 $m^3$/h.**
**Static pressure = 200 Pa.**
**Tolerance level = 15%.**
**Temperature = 20ºC.**
**Altitude = 0 masl.**
**Density = 1,2 kg/$m^3$.**

Between the possible results, the two optimal ones are:

1. Fan TMD 10/8 0,37 kW (1/2 CV)-6P-M-IP54-1V, with operating point close to the required working point, 3.030 $m^3$/h and 203 Pa.

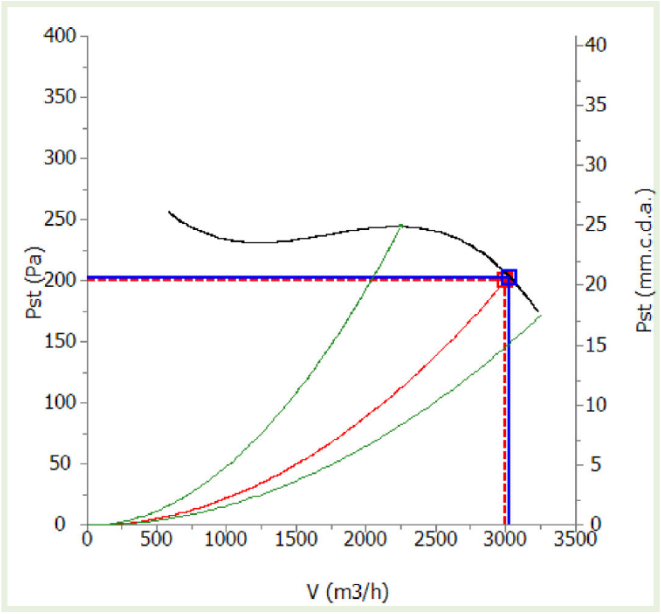
2. FanTMD 9/9 0,25 kW (1/3 CV)-6P-M-IP54-1V, if we focus on lower space and economic saving criteria, with an operating point of 2.680 $m^3$/h and 159 Pa.

In both TMD fan graphs with direct drive motor a single characteristic curve that depends on the speed of rotation of the motor at each of its point can be seen. The given working point is at the intersection between the characteristic curve of the fan and the characteristic curve of the installation.

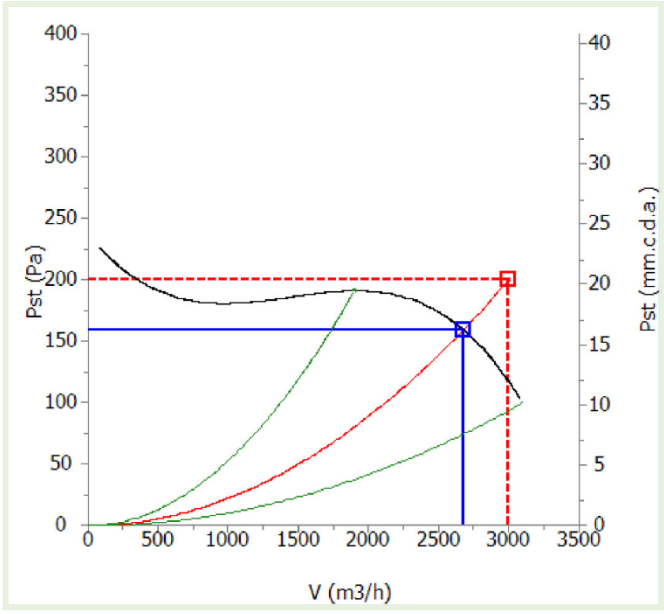
To adjust the operating point of the fan with the required working point, two options exist:

1. Regulate the speed of rotation of the motor with the use of speed regulators (single-phase) or frecuency converters (three-phase). The fan characteristics curve will be modified.

2. Regulate and adjust the operating point of the fan by mounting a regulation damper. Increasing or decreasing the resistance of the installation to the air flow and therefore modifying the characteristic curve of the installation.




TMD 10/8 0,37 kW (1/2 CV)-6P-M-IP54-1V




TMD 9/9 0,25 kW (1/3 CV)-6P-M-IP54-1V

## Fan designation and terminology

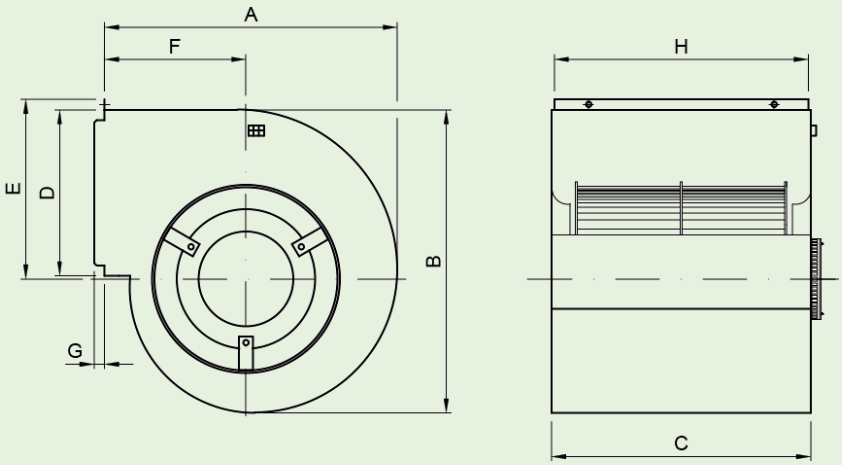
| Type | | Size | | Serie | |
|---|---|---|---|---|---|
| **TMD** | Double inlet with direct drive motor | **1º /** | Nominal impeller diameter in inches | **L** | Light |
| | | **2º /** | Nominal impeller lenght in inches | | |

| Symbols | Units | | Designation | |
|---|---|---|---|---|
| V | $m^3/h$ o $m^3/s$ | | Air flow | |
| Δpt | mm $H_2O$ o Pa | | Total pressure | |
| Δp st | mm $H_2O$ o Pa | | Static pressure | |
| Pd | mm $H_2O$ o Pa | | Dynamic preassure | |
| n | $min^{-1}$ | | Impeller speed | |
| u | m/s | | Tip speed | |
| $c_2$ | m/s | | Flow speed | |
| $P_A$ | kW | | Fan power demand | |
| η | | | Efficiency | |
| I | A | | Absorbed current | |
| g | $m/s^2$ | | Acceleration of gravity | |
| γ | $Kg/m^3$ | | Air density | |
| P | | | Poles | |
| M | V | | Single phase | |
| T | V | | Three phase | |
| V | $min^{-1}$ | | Speed | |

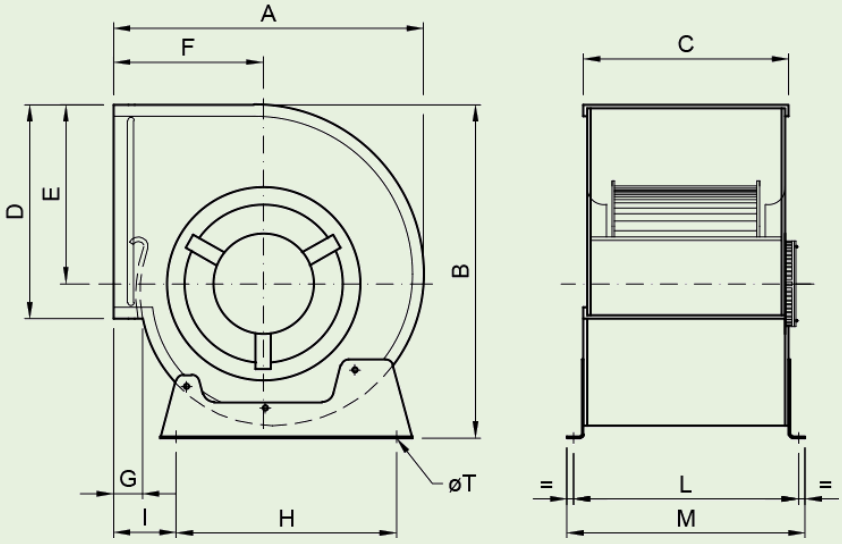
## Selection example

| TMD - 12/12 - 1,1kW (1,5CV) - 6P - M - IP54 - 1V | | | |
|---|---|---|---|
| **TMD** | Type | | |
| **12/12** | Size | | |
| **1,1kW (1,5 CV)-6P-M-1V** | Motor | **1,1kW (1,5 CV)** | Motor power kW and HP |
| | | **6P** | 6 Poles |
| | | **M** | Single-phases |
| | | **IP54** | Close motor |
| | | **1V** | 1 Speed |

# Dimensions



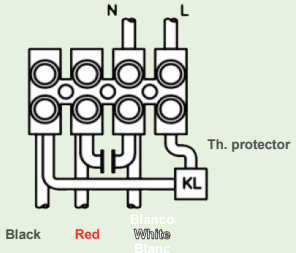

| Fan | A | B | C | D | E | F | G | H | I | L | M | ØT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TMD 5/8 | 198 | 202 | 255 | 100 | 123 | 100 | 5 | 253 | - | - | - | - |



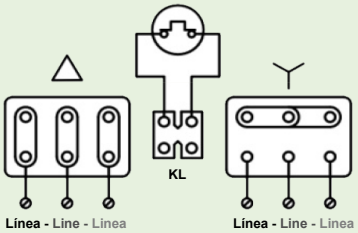

| Fan | A | B | C | D | E | F | G | H | I | L | M | ØT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TMD 7/7 | 307 | 326 | 232 | 208 | 180 | 146 | 27 | 228 | 55 | 258 | 280 | 10x15 |
| TMD 9/7 | 375 | 400 | 249 | 265 | 218 | 180 | 33 | 280 | 75 | 273 | 292 | 10x15 |
| TMD 9/9 | 375 | 400 | 298 | 265 | 218 | 180 | 33 | 280 | 75 | 324 | 342 | 10x15 |
| TMD 10/8 | 427 | 452 | 274 | 290 | 245 | 207 | 38 | 317 | 80 | 296 | 316 | 10x15 |
| TMD 10/10 | 427 | 452 | 326 | 290 | 245 | 207 | 38 | 317 | 80 | 348 | 370 | 10x15 |
| TMD 12/9 | 498 | 530 | 309 | 341 | 292 | 236 | 38 | 400 | 82 | 330 | 355 | 10x16 |
| TMD 12/12 | 498 | 530 | 386 | 341 | 292 | 236 | 38 | 400 | 82 | 406 | 430 | 10x16 |
| TMD 15/15 | 578 | 622 | 473 | 402 | 343 | 271 | 38 | 460 | 91 | 500 | 527 | 12x20 |

## Connection diagram -

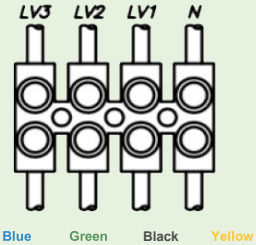
Single phase motor 1 speed




Triple phase motor 1 speed



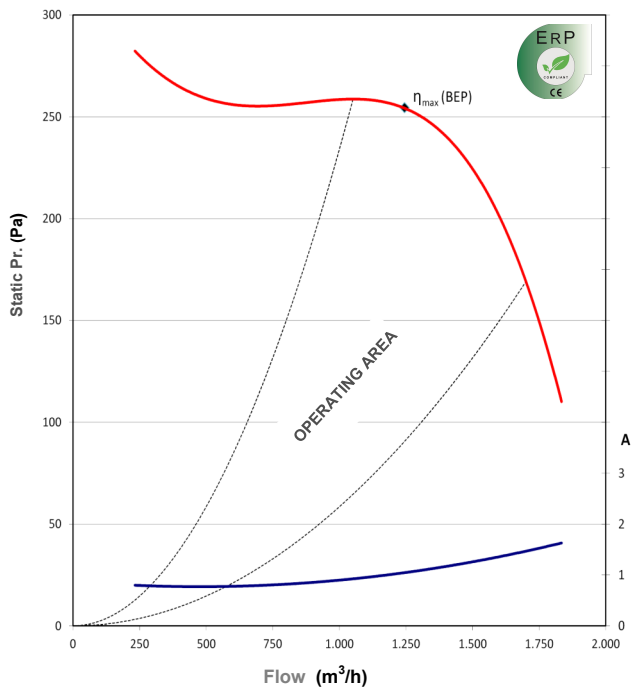

Single phase motor 3 speed



# TMD 7/7

| Class F motor | | | | | | | | | | | Maximun air flow | Max total pressure | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $P_{NOM}$ kW | $P_{NOM}$ CV | Poles | Phases | Speeds | N ($min^{-1}$) | $I_{MAX}$ A | | Tensión | Cond | Cos φ | $m^3/h$ | Pa | Kg |
| | | | | | | 220V 240V | 380V 420V | V-50Hz | µF | | | | |
| 0,15 | 1/5 | 4 | I | 1 | 1230 | 1,4 | - | 220 - 240 | 6 | 0,96 | 1700 | 260 | 8,2 |

## TMD7/7 0,15 kW (1/5 CV)-4P-M-IP54-1V



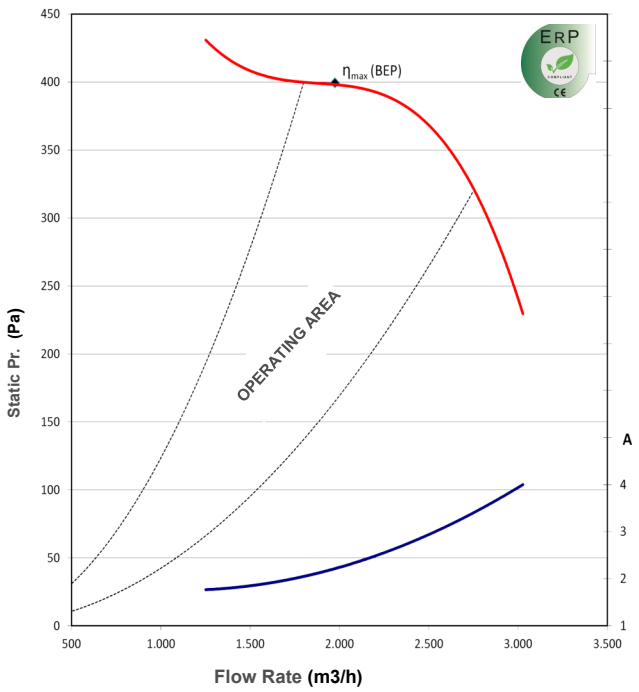

## ErP values (BEP)

| | | |
|---|---|---|
| Fan type | Centrifugal forward curved blades fan | |
| Measurement category | B (free inlet and ducted outlet) | |
| Efficiency category | Total | |
| Variable speed drive | It is not necessary to be installed | |
| | Efficiency grade (N) | Total efficiency (η) (%) |
| ErP 2015 requirements | 49 | 38,63 |
| TECNIFAN values | 54,60 | 44,23 |
| At optimum energy efficiency | Air flow rate ($m^3/h$) | 1264 |
| | Total pressure (Pa) | 289 |
| | Absorbed power (kW) | 0,23 |
| | Speed ($min^{-1}$) | 1355 |
| | Specific ratio | 1,00 |

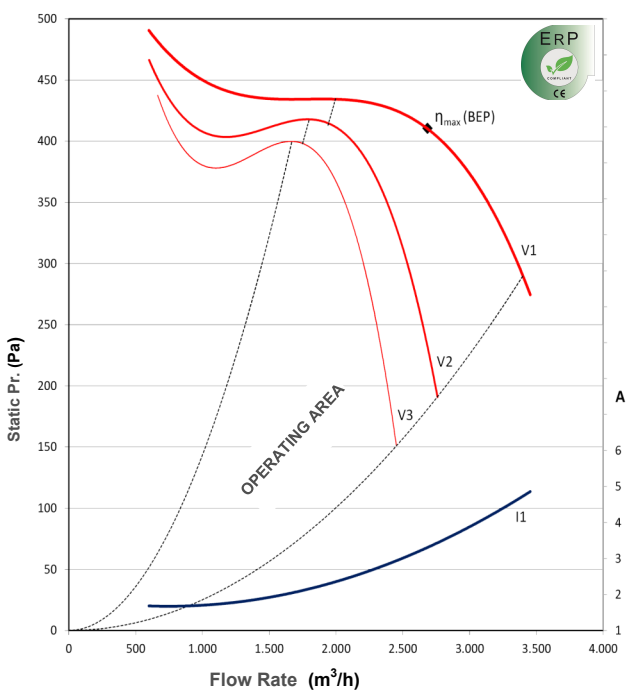
# TMD 9/9

| Class F motor | | | | | | | | | | Maximun air flow | Max total pressure | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $P_{NOM}$ kW | $P_{NOM}$ CV | Poles | Phases | Speeds | N ($min^{-1}$) | $I_{MAX}$ A 220V 240V | $I_{MAX}$ A 380V 420V | Tensión V-50Hz | Cond µF | Cos φ | $m^3/h$ | Pa | Kg |
| 0,37 | 1/2 | 4 | I | 1 | 1320 | 3,3 | - | 220 - 240 | 16 | 0,98 | 2750 | 400 | 14,1 |
| 0,55 | 3/4 | 4 | I | 3 | 1310 | 4,0 | - | 220 - 240 | 16 | 0,96 | 3400 | 440 | 15,4 |

## TMD 9/9 0,37 kW (1/2 CV)-4P-M-IP54-1V




## TMD 9/9 0,55 kW (3/4 CV)-4P-M-IP54-3V




## ErP values (BEP)

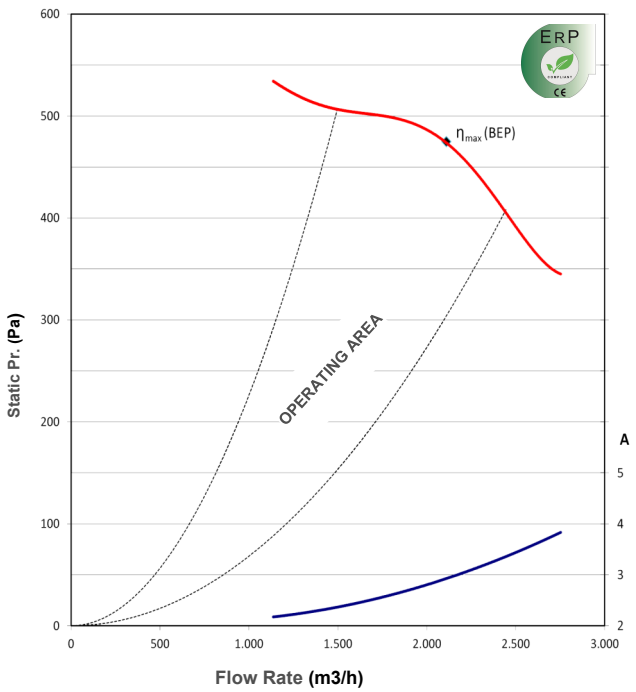
| | | |
|---|---|---|
| Fan type | Centrifugal forward curved blades fan | |
| Measurement category | B (free inlet and ducted outlet) | |
| Efficiency category | Total | |
| Variable speed drive | It is not necessary to be installed | |
| | Efficiency grade (N) | Total efficiency (η) (%) |
| ErP2015 equirements | 49 | 41,02 |
| TECNIFAN values | 52,34 | 44,36 |
| At optimum energy efficiency | Air flow rate ($m^3/h$) | 2004 |
| | Total pressure (Pa) | 436 |
| | Absorbed power (kW) | 0,55 |
| | Speed ($min^{-1}$) | 1384 |
| | Specific ratio | 1,00 |

| | | |
|---|---|---|
| Fan type | Centrifugal forward curved blades fan | |
| Measurement category | B (free inlet and ducted outlet) | |
| Efficiency category | Total | |
| Variable speed drive | It is not necessary to be installed | |
| | Efficiency grade (N) | Total efficiency (η) (%) |
| ErP2015 equirements | 49 | 41,86 |
| TECNIFAN values | 54,61 | 47,47 |
| At optimum energy efficiency | Air flow rate ($m^3/h$) | 2712 |
| | Total pressure (Pa) | 469 |
| | Absorbed power (kW) | 0,75 |
| | Speed ($min^{-1}$) | 1378 |
| | Specific ratio | 1,00 |

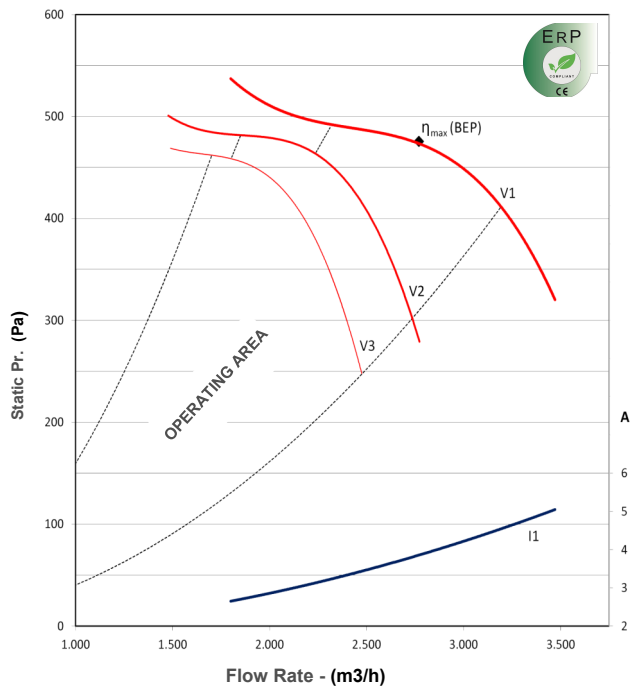
# TMD 10/10

| Class F motor | | | | | | | | | | Maximun air flow | Max total pressure | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $P_{NOM}$ kW | $P_{NOM}$ CV | Polos Poles Pôles | Fases Phases Phases | Vel. Speeds Vitesses | N ($min^{-1}$) | $I_{MAX}$ A 220V 240V | $I_{MAX}$ A 380V 420V | Tensión V-50Hz | Cond µF | Cos φ | $m^3/h$ | Pa | Kg |
| 0,37 | 1/2 | 4 | I | 1 | 1320 | 3,3 | - | 220 - 240 | 16 | 0,98 | 2450 | 510 | 15,5 |
| 0,55 | 3/4 | 4 | I | 3 | 1310 | 4,0 | - | 220 - 240 | 16 | 0,98 | 3170 | 490 | 18,2 |

## TMD 10/10 0,37 kW (1/2 CV)-4P-M-IP54-1V




## TMD 10/10 0,55 kW (3/4 CV)-4P-M-IP54-3V




## ErP values (BEP)

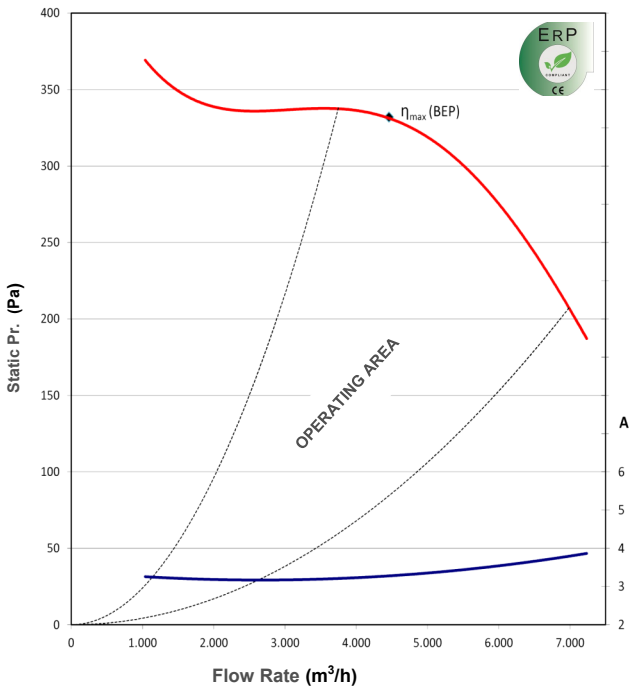
| | | |
|---|---|---|
| Fan type | Centrifugal forward curved blades fan | |
| Measurement category | B (free inlet and ducted outlet) | |
| Efficiency category | Total | |
| Variable speed drive | It is not necessary to be installed | |
| | Efficiency grade (N) | Total efficiency (η) (%) |
| ErP 2015 requirements | 49 | 41,67 |
| TECNIFAN values | 49,36 | 42,03 |
| At optimum energy efficiency | Air flow rate ($m^3/h$) | 2111 |
| | Total pressure (Pa) | 498 |
| | Absorbed power (kW) | 0,70 |
| | Speed ($min^{-1}$) | 1315 |
| | Specific ratio | 1,00 |

| | | |
|---|---|---|
| Fan type | Centrifugal forward curved blades fan | |
| Measurement category | B (free inlet and ducted outlet) | |
| Efficiency category | Total | |
| Variable speed drive | It is not necessary to be installed | |
| | Efficiency grade (N) | Total efficiency (η) (%) |
| ErP 2015 requirements | 49 | 42,49 |
| TECNIFAN values | 49,02 | 42,52 |
| At optimum energy efficiency | Air flow rate ($m^3/h$) | 2777 |
| | Total pressure (Pa) | 517 |
| | Absorbed power (kW) | 0,94 |
| | Speed ($min^{-1}$) | 1315 |
| | Specific ratio | 1,00 |

# TMD 12/12

| Class F motor | | | | | | | | | | | Maximun air flow | Max total pressure | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $P_{NOM}$ kW | $P_{NOM}$ CV | Poles | Phases | Speeds | N ($min^{-1}$) | $I_{MAX}$ A | | Tensión | Cond | Cos φ | $m^3/h$ | Pa | Kg |
| | | | | | | 220V 240V | 380V 420V | V-50Hz | µF | | | | |
| 1,1 | 1,5 | 6 | III | 1 | 850 | 6,6 | 3,8 | 220 - 240<br>380 - 420 | - | 0,62 | 7000 | 340 | 23,2 |

## TMD 12/12 1,1 kW (1,5 CV)-6P-T-IP54-1V



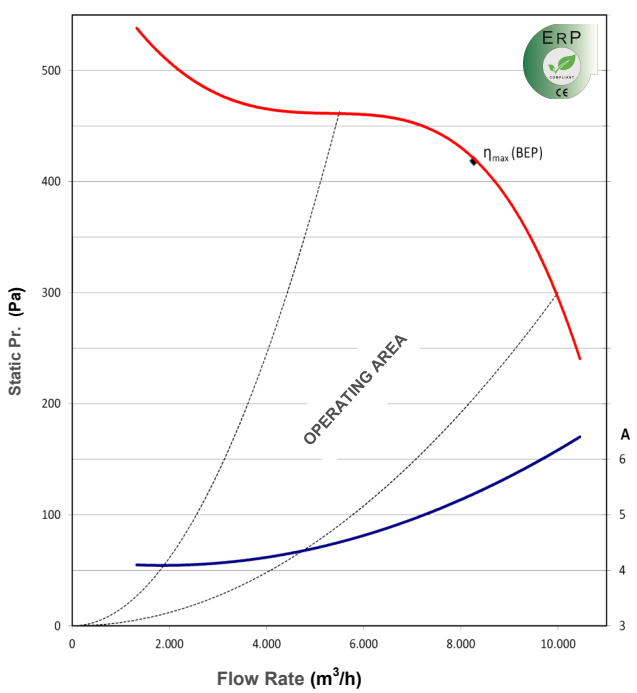

## ErP values (BEP)

| | | |
|---|---|---|
| Fan type | Centrifugal forward curved blades fan | |
| Measurement category | B (free inlet and ducted outlet) | |
| Efficiency category | Total | |
| Variable speed drive | It is not necessary to be installed | |
| | Efficiency grade (N) | Total efficiency (η) (%) |
| ErP 2015 requirements | 49 | 42,88 |
| TECNIFAN values | 50,24 | 44,12 |
| At optimum energy efficiency | Air flow rate ($m^3/h$) | 4459 |
| | Total pressure (Pa) | 385 |
| | Absorbed power (kW) | 1,08 |
| | Speed ($min^{-1}$) | 954 |
| | Specific ratio | 1,00 |

# TMD 15/15

| Class F motor | | | | | | | | | | | Maximun air flow | Max total pressure | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $P_{NOM}$ kW | $P_{NOM}$ CV | Poles | Phases | Speeds | N ($min^{-1}$) | $I_{MAX}$ A 220V 240V | $I_{MAX}$ A 380V 420V | Tensión V-50Hz | Cond µF | Cos φ | $m^3/h$ | Pa | Kg |
| 2,2 | 3 | 6 | III | 1 | 890 | 10,9 | 6,3 | 220 - 240<br>380 - 420 | - | 0,73 | 10000 | 460 | 40,8 |

## TMD 15/15 2,2 kW (3 CV)-6P-T-IP54-1V




## ErP values (BEP)

| | | |
|---|---|---|
| Fan type | Centrifugal forward curved blades fan | |
| Measurement category | B (free inlet and ducted outlet) | |
| Efficiency category | Total | |
| Variable speed drive | It is not necessary to be installed | |
| | Efficiency grade (N) | Total efficiency (η) (%) |
| ErP 2015 requirements | 49 | 45,22 |
| TECNIFAN values | 49,03 | 45,24 |
| At optimum energy efficiency | Air flow rate ($m^3/h$) | 8225 |
| | Total pressure (Pa) | 502 |
| | Absorbed power (kW) | 2,53 |
| | Speed ($min^{-1}$) | 896 |
| | Specific ratio | 1,00 |

## Applications

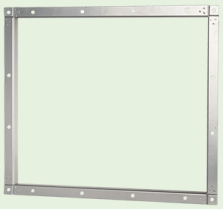
Kitchens

Hostelry

Garages ventilation

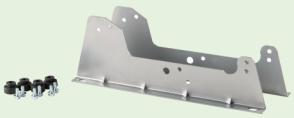
Commercial premises

## Accessories (optional)



Outlet flange

Single phase speed regulator



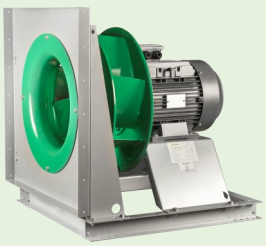
Support feet set

Epoxy Painting

## Other Tecnifan products


TSA 400°C/2h

TDA L



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TDA T2R

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