



**Air motors**

**Make your choice**

**Fiam**  
INDUSTRIAL AIR TOOLS

# How to choose a Fiam air motor

## Air motors and productivity

The compressed air, in use for quite a long time in many industries, allows to use the pneumatic motors. Their use, in respect to those driven by electric power, offers many advantages in connection to the features of compressed air, which permits the regular function of the motor even if it undergoes continual overloads. The pneumatic motor is **light in weight and limited in size**, it provides the maximum operator **safety**, which is a vital feature, mainly where inflammable or explosive substances are present, and, anyhow, in damp places.



To adequately meet the demand of an ever increasingly competitive market, new, modern, reliable, efficient and easy-to-use tools should always be available.

Therefore, it is of crucial importance to rely on those whose wide experience in this field will ensure an efficient and qualified service of assistance and advice, at the same time granting a well balanced relation between performance and prices.

FIAM has been producing pneumatic motors for the industries trade for almost 50 years. The constant research and the efforts for the improvement of quality guarantee the maximum reliability and durability ever under the heaviest working conditions.

All materials and components are of the highest quality. Strict controls are carried out at each phase of the production process, and the most scrupulous tests are made at intermediate stages and on the finished product by FIAM's R & D Department which, further to running the modern testing and experiment laboratory, also takes part in the activities of international work groups (ISO, CEN, UNI) concerning safety and ergonomics.

The FIAM pneumatic motors incorporate the most advanced techniques to ensure the best possible working conditions: instant starting ensured at all times; smooth, elastic, vibration-free running; capability of standing sudden loads as well as unexpected instant standstills; intermittent startings; rotation reversal and continuous duty; maximum damping of noise and air drafts; light weight, compact design and ease of installation even with small machines; absolute safety in operation in damp, explosive and high-temperature environments.

## The range

Reversible and non-reversible motors of 90, 100, 140, 150, 180, 190, 240, 260, 375, 645, 800 Watt in power and speeds from 45 to 24.000 r.p.m.

Special motors are designed and manufactured to meet particular requirements.

## The applications

FIAM pneumatic motors are profitably used for mixing, moving, screwing, drilling, milling, grinding, sawing and so on.

They can therefore be used in mixers, conveyor belts, machine tools, feed devices and in bottling, button, glass, knitting, coating, bookbinding, plastic, packing, painting, assembling, drilling, threading, grinding, stud screwing machines and others.

## The service

The service provided by FIAM is highly qualified. The technical staff is at your disposal for advice and assistance before and after sale; depots in every area are stocked regularly; all spare parts are, and will be, available and interchangeable for years to come at limited costs; maintenance and repairs are rapid, accurate, economical and guaranteed.

The modular assembly and the high degree of interchangeability in components will facilitate both supply of spare parts and inventory management, thus reducing the storage costs considerably.

The leaflets of the motors are meant to be of help in selecting the proper motor consistently with the operation being carried out.

However, FIAM is at the customer's disposal at any moment to study – without obligation on the customer – any particular requirements and to recommend the most appropriate solution.

When selecting a motor, three interdependent fundamental parameters should be considered, i.e. **speed, torque and power**.

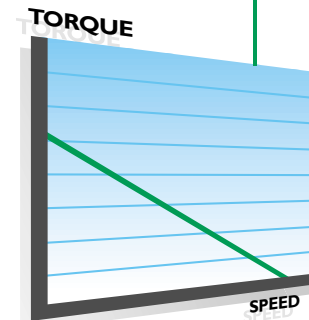
## The speed

Every FIAM pneumatic motor has an idling speed – as indicated in the catalogue – which is obtained by inserting one or more reduction gears – depending on the reduction ratio – between the driving unit and the output shaft.

At the maximum speed ("idling speed") the torque (the turning moment) as taken at the output shaft, is nil, while, as load is applied, the speed will decrease inversely proportional to the torque (see beside graph).

Where higher speed is required with equal torque, a motor having higher r.p.m. rating should be preferred or, if not available, use a motor having higher power rating.

**Speed regulation.** The speed can be varied continually by means of a pressure – or capacity – regulator, which decreases or increases the amount of air delivered to the motor. The ensuing decrease or increase in the power or torque values can be calculated with the aid of the coefficients listed in Table 1.



## The torque

The maximum torque ratings with FIAM pneumatic motors range between 5 and 90 Nm, compatibly with the size of the reduction gears and the power developed; the highest value ("stall torque") is obtained under load, with a still motor (see speed graph).

Where higher torque is required, with equal speed, use a motor having higher r.p.m. rating or – if not available – a motor having higher power rating.

**Torque regulation.** Where the motor is used as a screwdriver, the driving torque can be varied by means of a pressure regulator (see Table 1), or a clutch fitted between the motor and the socket, or by some other devices.

## The power

The FIAM pneumatic motors can develop a maximum power of 90, 100, 140, 150, 180, 190, 240, 260, 375, 645, 800 Watts. As can be noticed from the beside diagram, the power curve of the two motors shows an increasing value up to about one half of the idling speed. To select a motor, the power rating of which is known, at a given speed, or torque, proceed as follows: consult the table covering the motors having the given – or higher – power rating in connection with the speed, or torque, required a the maximum power. If the values indicated do not coincide with the desired values, check the diagrams, of the two motors which are closer to the desired characteristics, to find a performance in agreement with your requirements.

If the known values is the torque rating at a given speed, the following formulae should be applied to calculate the required power rating:

$$P = M \cdot \omega \quad \text{or} \quad P = \frac{M \cdot n}{716,2}$$

where P = Power in Watt  
M = Torque or turning moment, in Nm  
 $\omega$  = Frequency of rotation in Rad/s

where P = Power in HP (metric)  
M = Torque or turning moment, in Kgm  
n = r.p.m.

## Conversion coefficients:

1 Watt = 0.00136 HP    1 Hp = 735.5 Watt

1 Nm = 0.102 Kgm    1 Kgm = 9.81 Nm

1 Rad/s = 9.55 r.p.m.    1 R.P.M. = 0.105 Rad/s

For **example**, a motor has torque rating = 7 Nm (0.714 Kgm) and frequency of rotation = 100 Rad/s (9.55 r.p.m.). Its power rating is obtained by the formulae:

$$P = 7 \times 100 = 700 \text{ Watt} \quad \text{or} \quad P = \frac{0.714 \times 9.55}{716.2} = 0.95 \text{ HP} = 700 \text{ Watt}$$

From the table of the 800 W motors and the graphs, you will find that the suitable motor is Mod. MO1300. In fact, it can be noticed that 700 Watt in power correspond to a torque value of approx. 7 Nm and a speed of approx. 9.55 r.p.m. The above formulae also apply where the unknown quantity is either the torque or the speed.

Additionally, the graphs provided in the following pages are of help in determining the speed or the torque corresponding to a given power value, so as to ascertain the compatibility with the performance requirements. However, we would recommend using a motor rated not under 30% of the idling speed, to allow for a further margin of torque in the event of possible overloads while, if the motor is used as a screwdriver, please adhere to the static torque indicated in the catalogue or call for further information.

## Direction of rotation, control and installation

The FIAM pneumatic motors are supplied in reversible or non-reversible version and can be remote-controlled by means of pneumatic circuits. Bear in mind that in the reversible motors, the two inlets should alternately provide air intake and exhaust. As to the installation, we would recommend securing the motor to the outside casing, preferably on to the front (see accessories page).

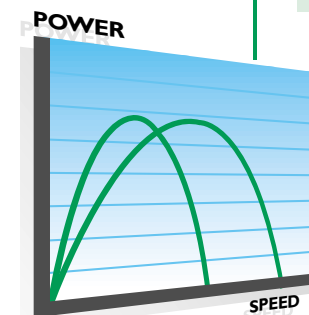
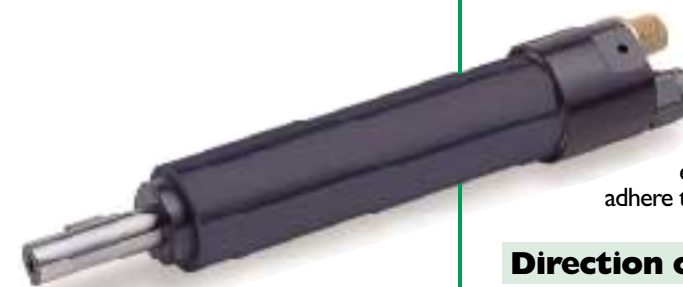


TABLE 1

Pressure (bar)	Power	Torque	Speed	Consumption
7	1,21	1,17	1,03	1,15
6	1,00	1,00	1,00	1,00
5	0,77	0,83	0,95	0,82
4	0,55	0,67	0,87	0,65
3	0,37	0,50	0,74	0,47

Coefficients of variation of the characteristics parameters in a pneumatic motor as a function of the boost pressure.



## Selecting the motor





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