

PNEUMATIC MOTORS



**PNEUMATIC MOTORS  
FOR WINCHES**



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# TSA

## SPECIAL APPLIED TECHNOLOGIES

**TSA** founded in 1984, for over 30 years has been designing, manufacturing and distributing pneumatic motors, articulated arms for torque reaction, assembling systems and special equipment.

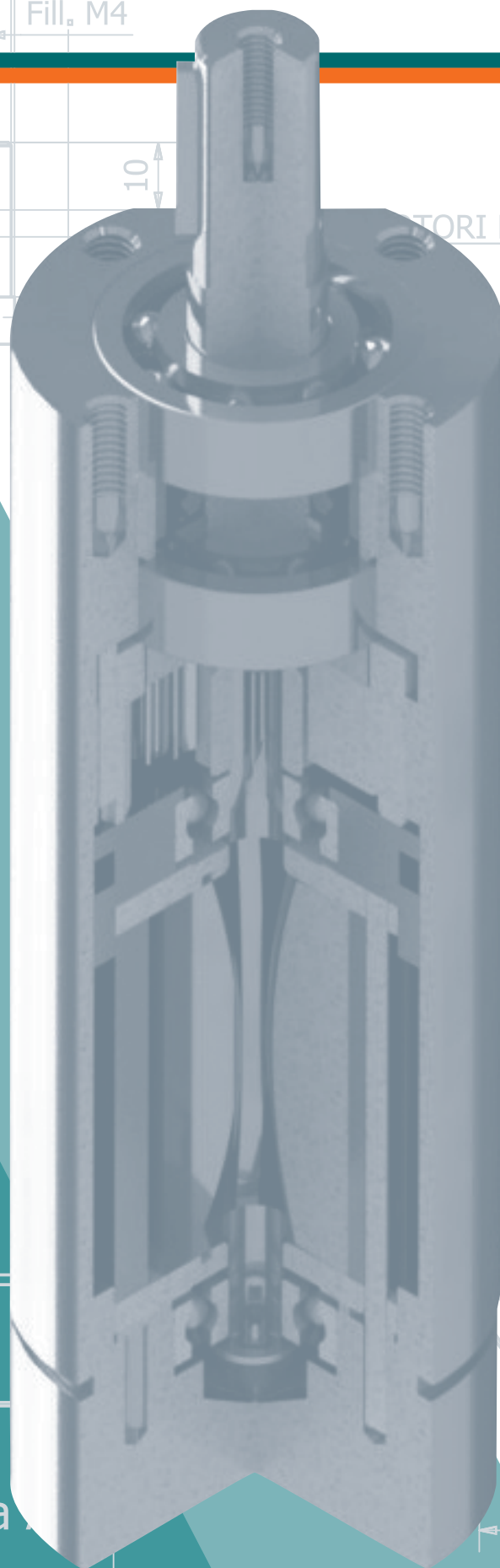
Its technical design office is in charge of studying all of the required characteristics to guarantee maximum reliability and high productivity, according to modern ergonomic principles. Product quality and safety are now a consolidated standard for TSA.

Just-in-time deliveries, a wide, flexible range of products, including diversified motors and arms, an efficient spare parts warehouse and effective before- and after sales: these are the services offered by TSA to its customers. Thanks to its constant commitment and to the professionalism of its technicians,

**TSA** has gained the trust of major companies on the market. Its aim is to meet customer requirements in all respects: **QUALITY, PERFORMANCE AND COST EFFECTIVENESS.**

Vista

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## CHARACTERISTICS OF PNEUMATIC MOTORS

The outlet power of a pneumatic motor varies depending on its speed and torque. The performance levels of a pneumatic motor depend on the inlet air pressure level measured at the entry point in the motor; this means that it is sufficient to regulate the incoming air to substantially change the torque and speed values in a pneumatic motor.

The choice of a pneumatic motor is based on three fundamental parameters: POWER, SPEED and TORQUE.

### POWER

Pneumatic motors produce a characteristic power curve whose maximum value is obtained at approximately 50% of idle speed. The resulting torque is known as maximum power torque.

### SPEED

By idle speed in a pneumatic motor reference is made to a moment when there is no load on the outlet shaft, therefore no torque is produced (moment of force). If the load on the shaft is increased, the speed is reduced in a way which is inversely proportional to the torque.

### SPEED

The speed at maximum power is reached when the motor reaches its torque at maximum power.

### TORQUE AT MAXIMUM SPEED

The maximum speed torque is reached at approximately 50% of the idle speed of the motor, which equals its maximum power.

### STARTING TORQUE

The starting torque is the torque provided by a motor to the loaded shaft when it is started with the maximum air inlet.

### STALL TORQUE

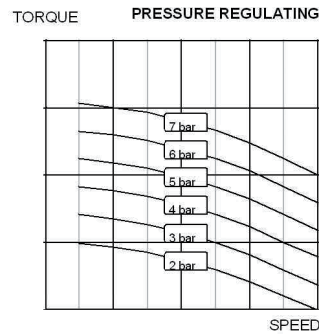
The stall torque is the torque provided by a motor to the shaft during its rotation until it stops completely.

## WAYS OF CHANGING THE MOTOR'S PERFORMANCE

The speed and torque in a pneumatic motor can be adjusted by regulating the pressure or throttling the air flow.

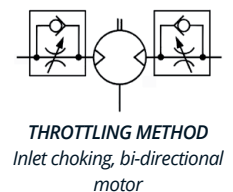
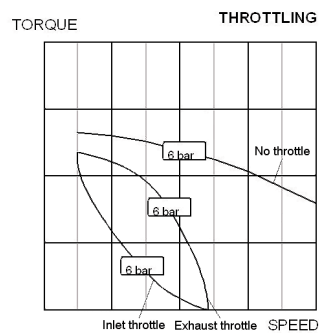
### PRESSURE REGULATING

The speed and power can also be reduced by installing a pressure regulator. A pressure regulator, always connected on the entry hole, keeps the inlet air pressure to the motor in check. A pressure regulating system affects the output torque on the shaft, thus making it easier to control the starting torque. If the speed and torque need to be controlled, the best configuration consists in a pressure regulator to the motor inlet and a check valve for the exhaust flow. This means that each point in the speed-torque diagram can be established in a precise way.



### FLOW REGULATING

A flow regulator allows adjustment of both the inlet and exhaust flow. It is advisable to work on the exhaust flow in order to achieve a slightly higher starting torque. The diagram shows the difference between these two options.



## INLET AIR CONDITIONS

### CONSUMPTION

The air consumption in a pneumatic motor is proportional to the speed, therefore it reaches its peak at idle speed.

Air consumption is measured in NI/s, however the conventional unit is l/s.

### AIR QUALITY

In order to ensure optimal working conditions for pneumatic motors it is necessary to guarantee the appropriate air inlet and exhaust at all times. In order to ensure its proper operation it is advisable to install an air treatment unit (5-micron filter, regulator and lubricator, unless the motor requires no lubrication), as appropriate for the specific motor.

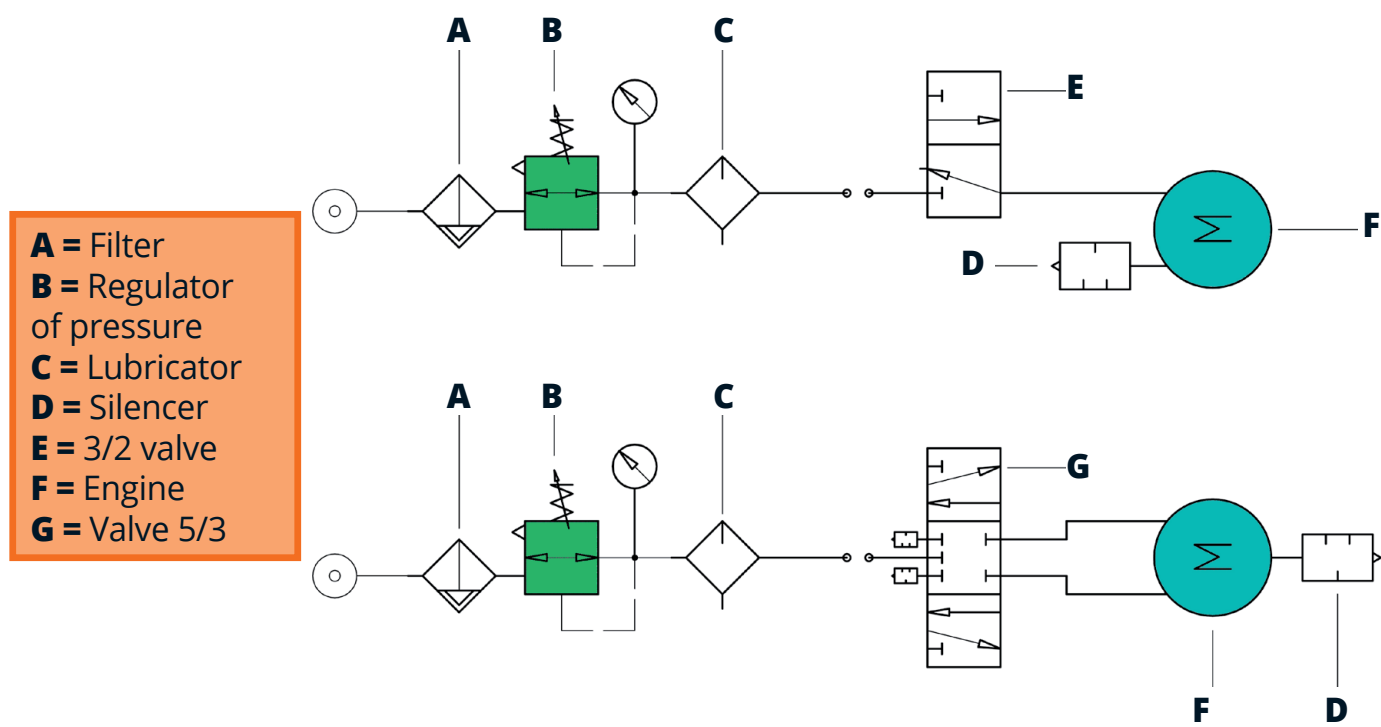
## AIR PIPELINE LIMITATIONS

Any limitations in the air inlet line on the motor are bound to reduce its performance levels. Therefore it is especially important to make sure that the required air pressure is available to the motor at all times while it is being operated. Always check the air inlet because if the pipeline is too narrow this might

cause a pressure drop. The air exhaust pipe needs to be larger than the inlet pipe. It is advisable to connect the exhaust pipes to a suitable oil separator filter with an incorporated silencer, in order to allow for appropriate lubrication without the room becoming saturated with polluted air.

## PNEUMATIC DIAGRAM (POWER – MOTOR CONTROL)

### Non-reversible motor operation with 3/2 valve



### Non-reversible motor operation with 5/3 closed-center valve

## APPLICATION

This unit includes a strong blade motor, fitted with BN safety brake and proportional directional control valve.

The blade motor is strong and suitable for difficult conditions.

The BN brake is spring-loaded, therefore the operation (release) is pneumatically controlled. The maintenance torque is 1.5-2 times the maximum motor torque.

A proportional control valve is fitted above the motor, it can be either a remote-controlled proportional valve or a manually-controlled proportional valve. The proportional valve controls the motor's direction and speed.

The negative brake is operated by the proportional valve only after the motor has been started.

The proportional valves, as standard, can be provided in two versions: with constant spool operation or with differential spool operation; the latter is suitable for lifting operations.

With a differential spool valve the load of the weight being lowered will not move at a speed higher than the set value.

The motor unit is compliant with the NEN-EN 13463-1 European standard for non-electric devices and equipment for explosive atmospheres ATEX GROUP II cat. 2 GDC T4.

The specifications for the three main components – pneumatic blade motor, pneumatic brake, proportional valve are as follows:

### PNEUMATIC BLADE MOTOR

Blade motors have the following advantages:

- No pivots or hinges
- Safe starting is guaranteed
- Easy adjustment of torque and output speed
- Able to withstand stalling, without damage
- Long life and low cost, thanks to its user-friendly design
- Immediately reversible
- Possibility of working without lubrication (oil-free version)

### BN BRAKES

BN brakes have the following advantages:

- These brakes can be used for static applications;
- On-the field maintenance;
- Easy flange connection using IEC standards;
- Low maintenance required because very few parts are subject to wear and tear;
- Compact design;
- Easy to change thanks to the self-standing brake module;
- Steel casing with excellent thermal properties for heavy-duty operation;
- Long life

### PROPORTIONAL CONTROL VALVE REMOTE-CONTROLLED (RCV) OR HAND-CONTROLLED (HCV):

These valves have the following advantages:

- Strong and with a molten steel body;
- High flow for low pressures
- Low-attrition spool and operation.
- Accurate proportional control;
- Available with constant spool or differential spool operation

The proportional valves, as standard, can be provided in two versions: with constant spool operation or with differential spool operation; the latter is suitable for lifting operations.

With a differential spool valve the load of the weight being lowered will not move at a speed higher than the set value.

The reduced power direction needs to be indicated when the control is given: clockwise rotation (CW) or counterclockwise rotation (CCW) looking from the motor output shaft.

### REMOTE-CONTROLLED VALVE (RCV)

This option is usually operated from a remote position using a PC or an LC2 remote control. A variable pneumatic signal is applied at both ends of the spool on the valve, depending on the motor rotation direction. The pressure field of the signal



is included between 1.4 bar (20 psi) and 4.8 bar (70 psi); by increasing the pressure, the speed also goes up. The valve is kept in a central (idle) position by means of springs.

#### **PROPORTIONAL HAND-CONTROLLED VALVE (HCV)**

The control valve cursor can be operated directly using a lever mechanism. It is possible to increase the motor speed, depending on how the lever is moved in both directions starting from the central position (idle).

#### **PRESSURE DROP**

The slightest pressure drop will be neutralised by the valves; as a result the output torque is maintained and the motor speed reduced by about 10-15% to 6 bar (90 psi) at maximum power. The starting torque remains unchanged.



## ORDER CODE

**N**  
No Lube Standard

### Pneumatic Brakes

**BN71** – Brakes 14 Nm per 95-250

**BN90** – Brakes 29 Nm 410-620

**BN110** – Brakes 75 Nm 1100

**N - M - 95 - BN71 - H**

**M**  
Pneumatic motors

### Control valve

**H** – Hand-controlled (HCV):

**R** – Remote-controlled (RCV)

### Engine Size

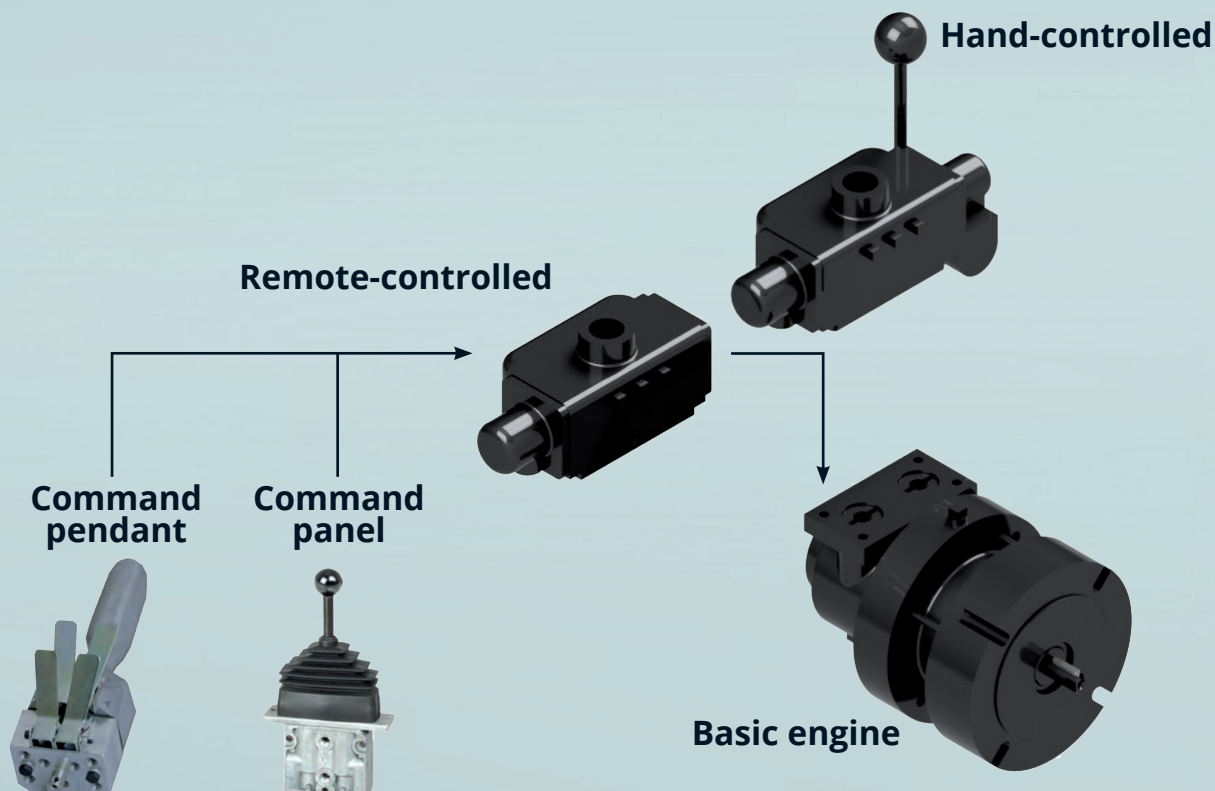
**95** – 0,73 KW / 1,06 hp

**250** – 1,9 KW / 2,72 hp

**410** – 3,4 KW / 4,6 hp

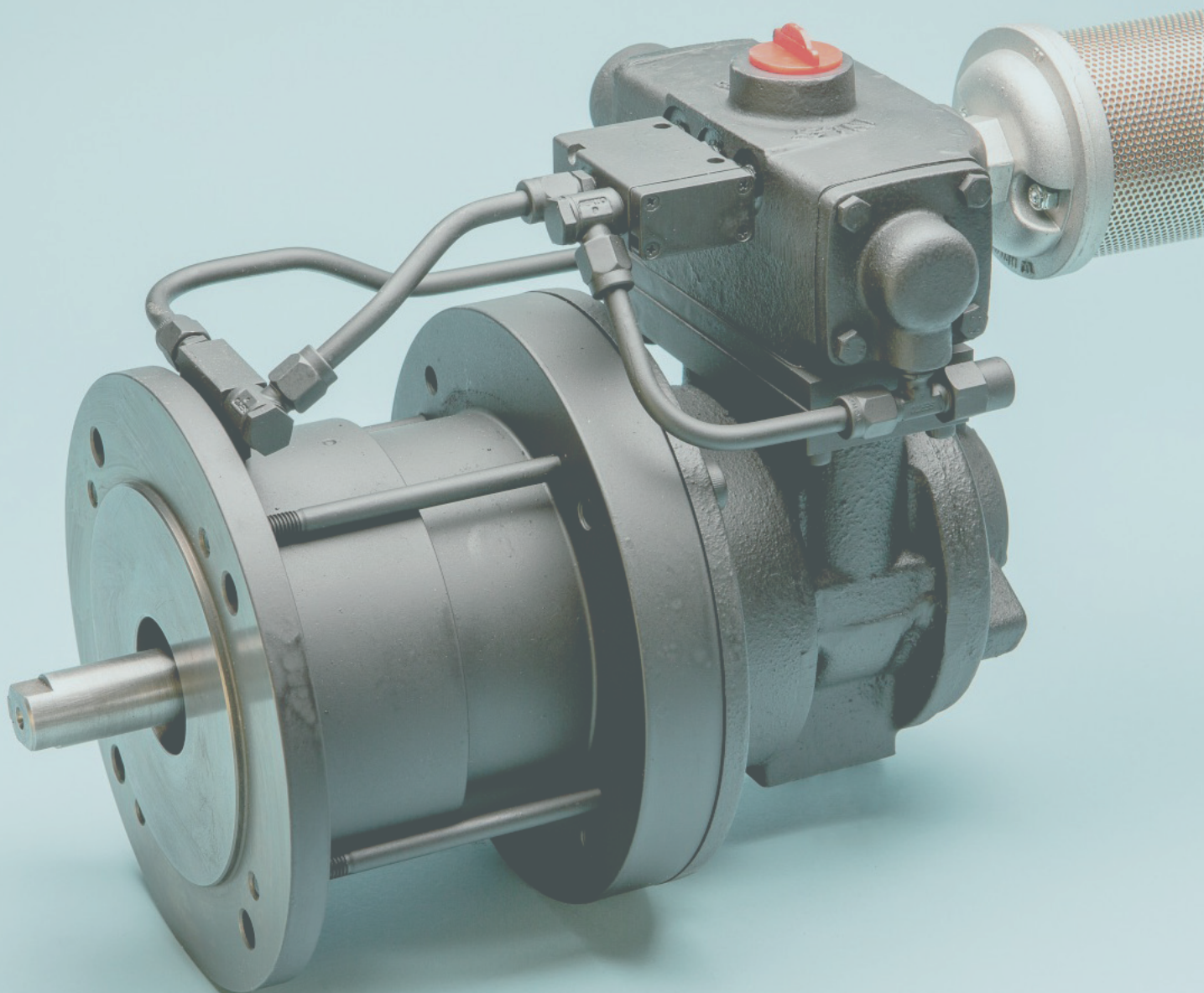
**620** – 5,1 KW / 6,94 hp

**1100** – 9,2 KW / 12,53 hp



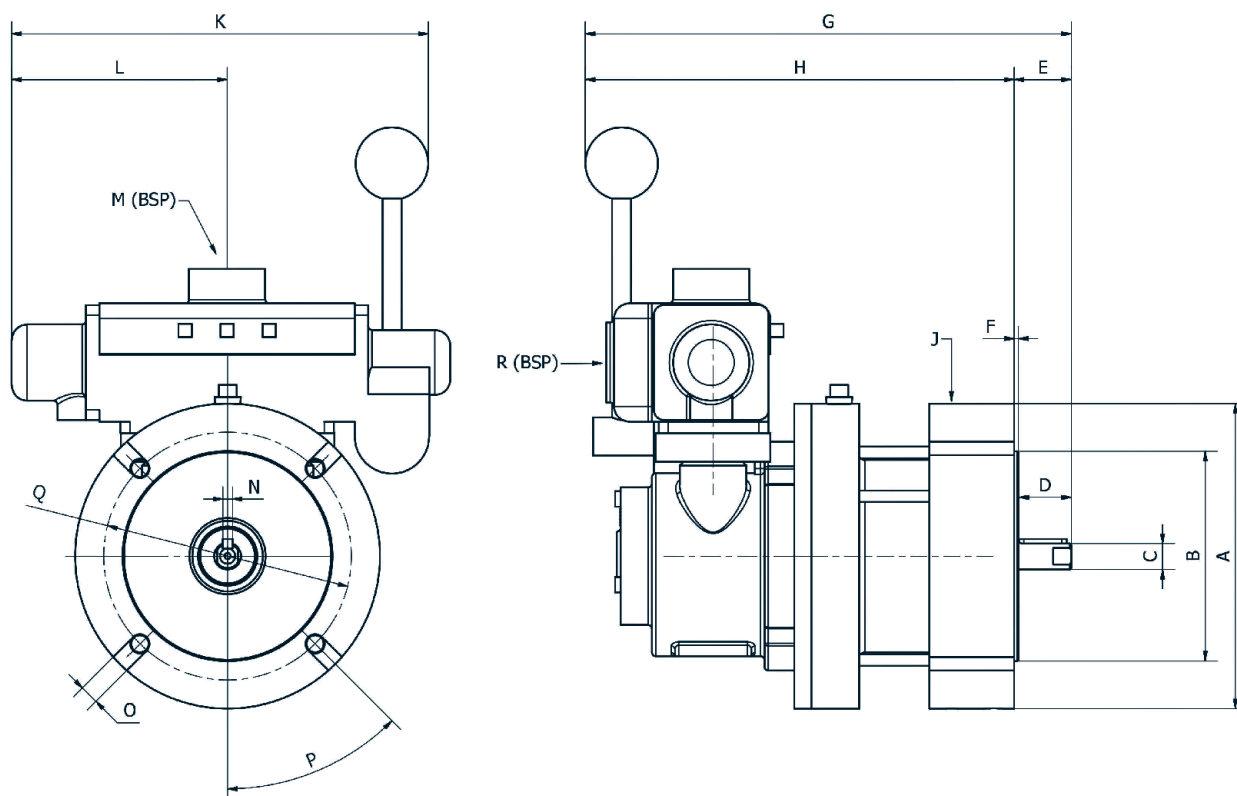
## PNEUMATIC MOTORS FOR WINCHES

Features, dimensions and performance



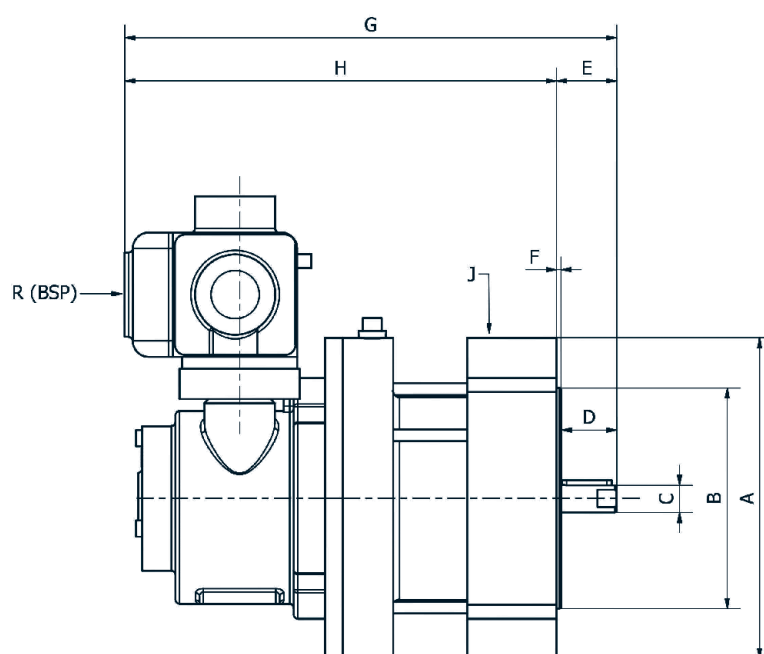
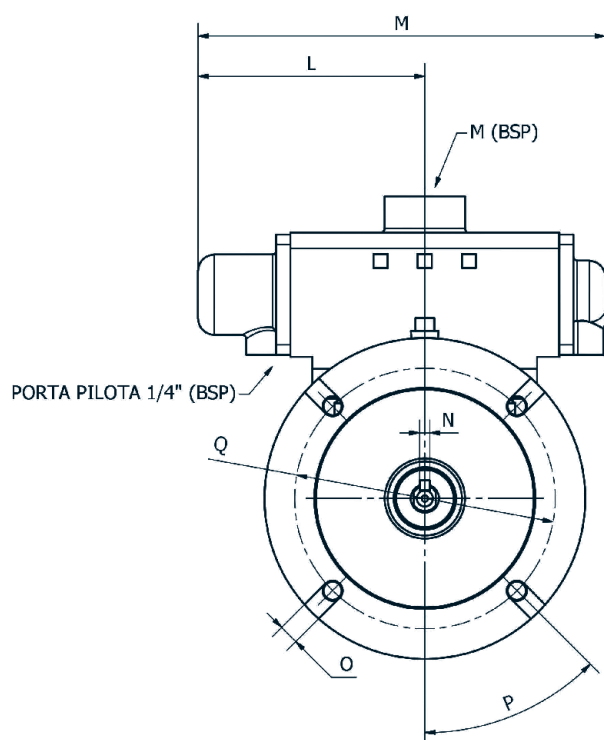
## DIMENSIONS

Engine with brake and manual control valve, including valves and piping for brake control (not shown)



	A	B	C	D	E	F	G	H	J	K	L	M	N	O Ø	P	Q	R
<b>M95BN71H2 M95BN71R2</b>	160	110	14	20	30	3.5	240	210	1/8"	270	118	3/4"	5	10	45°	110h7	3/4"
<b>M250BN71H2 M250BN71R2</b>	160	110	14	20	30	3.5	240	210	1/8"	270	118	3/4"	5	10	45°	110h7	3/4"
<b>M410BN90H2 M410BN90R2</b>	200	130	24	30	50	3.5	347	297	1/8"	270	118	3/4"	8	12	45°	130h7	3/4"
<b>M620BN90H3 M620BN90R3</b>	200	130	24	30	50	3.5	350	300	1/8"	365	160	1"	8	12	45°	130h7	1"
<b>M1100BN100R4</b>	250	180	28	50	60	4	459	399	1/8"	365	160	1 1/4"	10	14	45°	180h7	1 1/4"

Engine with valve brake with remote control, including valves and piping for brake control (not shown)

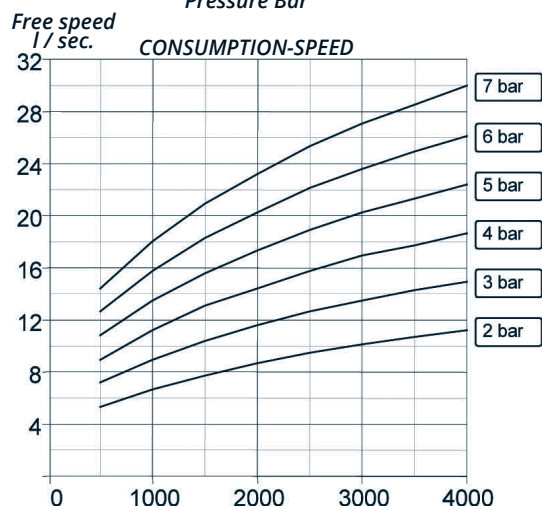
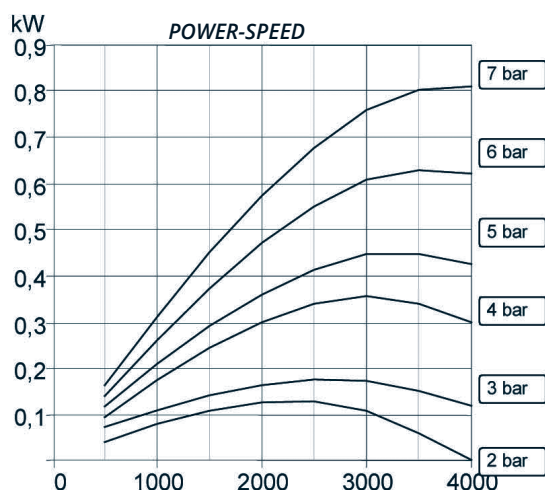
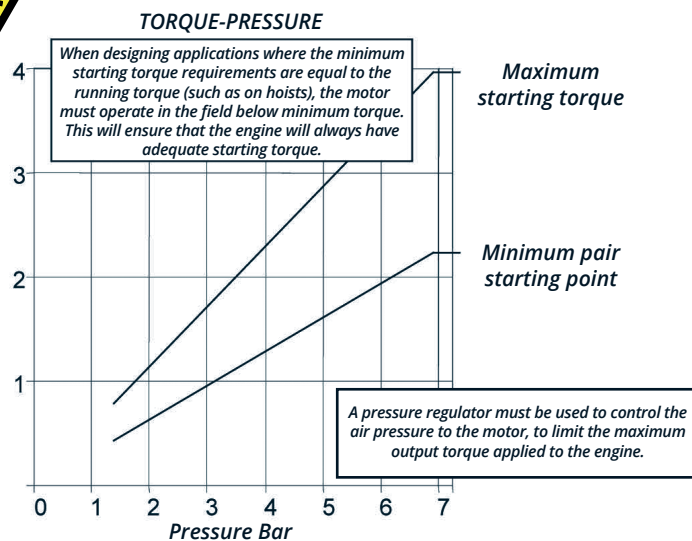
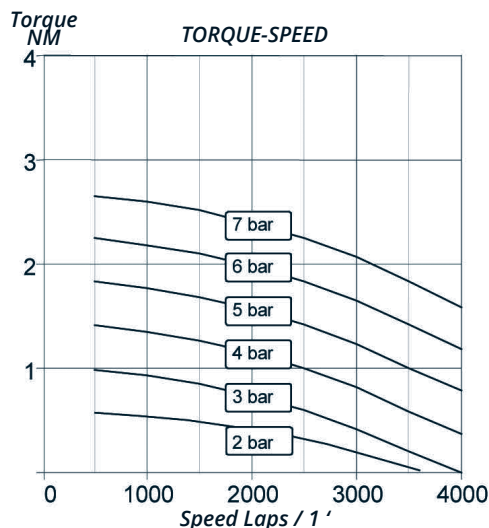


## NOISE

The sound pressure values are measured at the maximum speed and power at a working pressure of 5.5 bar. TSA recommends connecting the exhaust pipes to a suitable oil separator filter with built-in silencer, to allow an adequate lubrication without saturating the polluted air environment.



## M95BN71H2/R2



Silencer delivered with the motor.

**Noise level:** 83 dB

The motor is reversible.

**Position:** the motor can be used in any position.

**Temperature range**

from -20 °C to +80 °C (-4 °F to +176 °F).

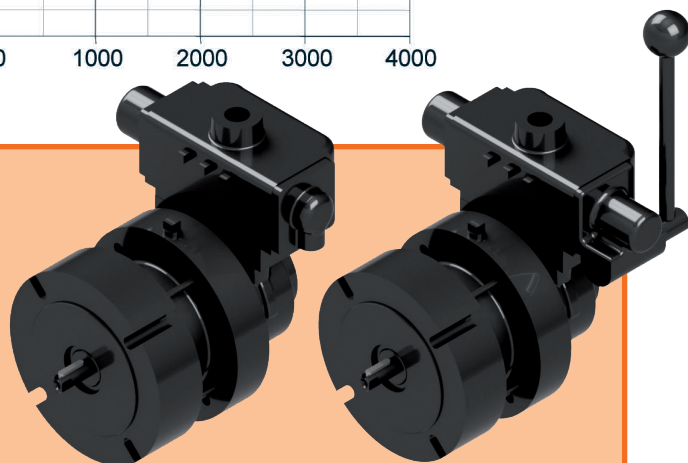
### FILTERING AND LUBRICATION

Filtering rate 64 micron or higher. Choose a lubricator suitable for the required flow rate. When first starting the motor, inject the oil into the inlet gate.  
Lubricator continuous drop rate: 4-5 drops / minute  
Lubricator intermittent drop rate: 9-12 drops / minute

**Maximum continuous speed** 4000 rpm

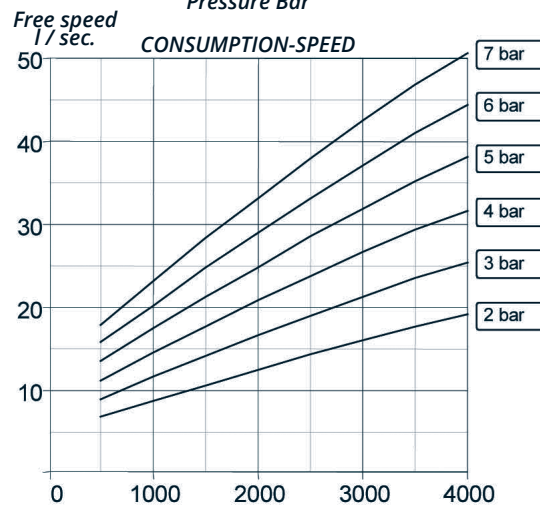
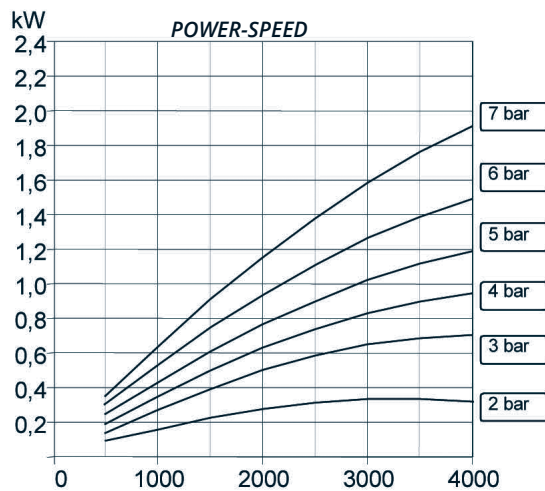
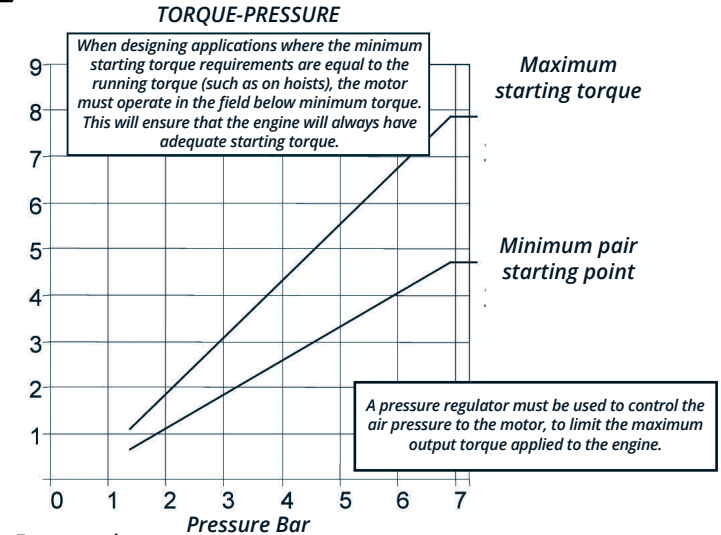
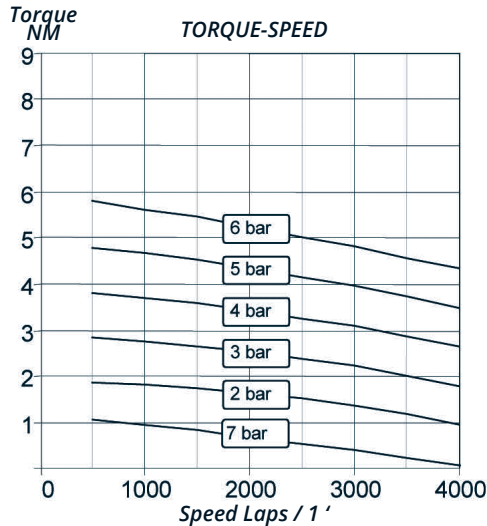
**Maximum radial load on the motor shaft** 400 N (90 lbf.).

**Axial loads** need to be kept to a minimum.





## M250BN71H2/R2



Silencer delivered with the motor.

**Noise level:** 84 dB

The motor is reversible.

**Position:** the motor can be used in any position.

**Temperature range**

from -20 °C to +80 °C (-4 °F to +176 °F).

### FILTERING AND LUBRICATION

Filtering rate 64 micron or higher. Choose a lubricator suitable for the required flow rate. When first starting the motor, inject the oil into the inlet gate.

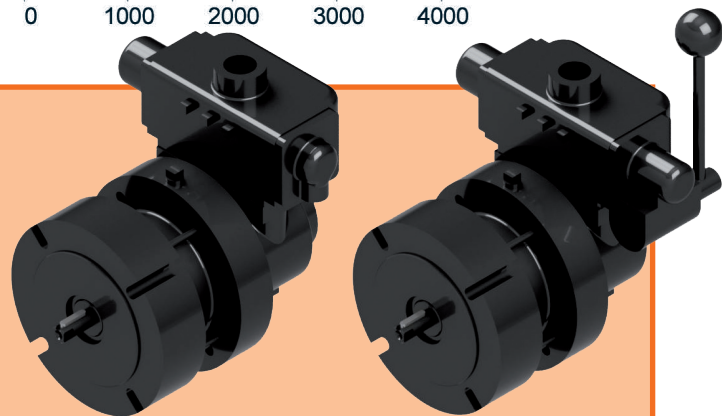
Lubricator continuous drop rate: 4-5 drops / minute

Lubricator intermittent drop rate: 9-12 drops / minute

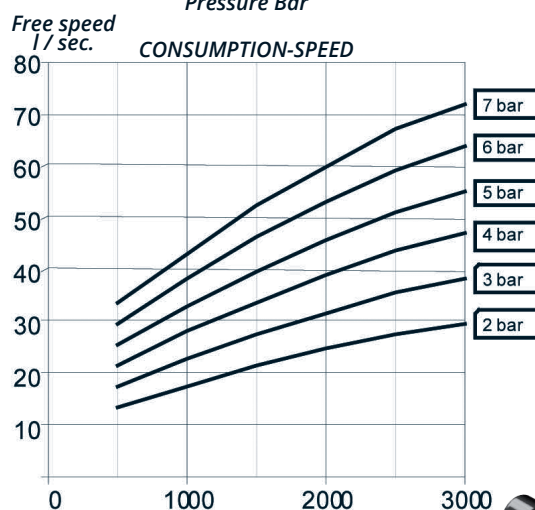
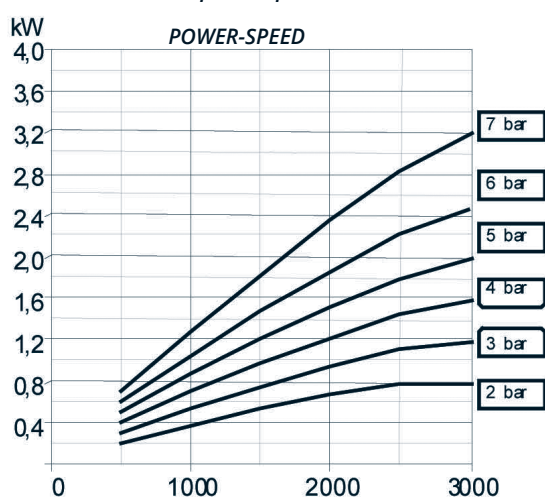
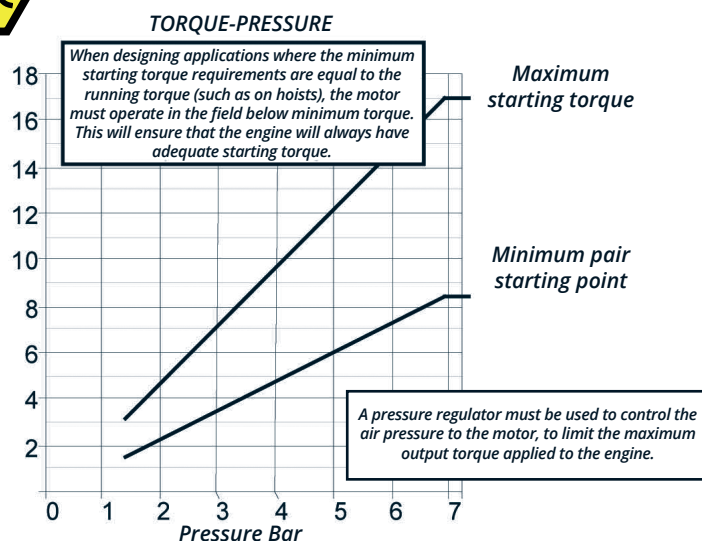
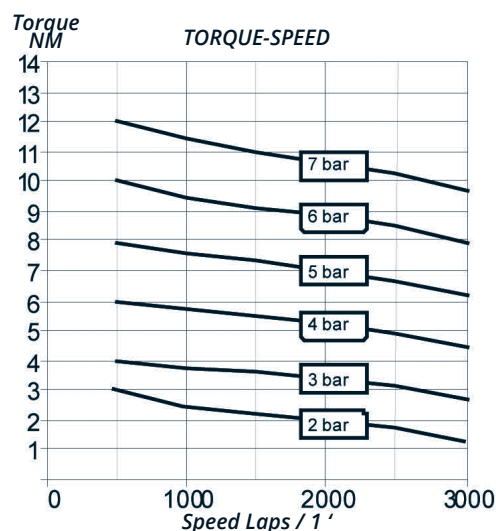
**Maximum continuous speed** 4000 rpm

**Maximum radial load on the motor shaft** 170 N (40 lbf.).

**Axial loads** need to be kept to a minimum.



## M410BN90H2/R2



Silencer delivered with the motor.

**Noise level:** 84 dB

The motor is reversible.

**Position:** the motor can be used in any position.

**Temperature range**

from -20 ° C to +80 ° C (-4 ° F to +176 ° F).

### FILTERING AND LUBRICATION

Filtering rate 64 micron or higher. Choose a lubricator suitable for the required flow rate. When first starting the motor , inject the oil into the inlet gate.

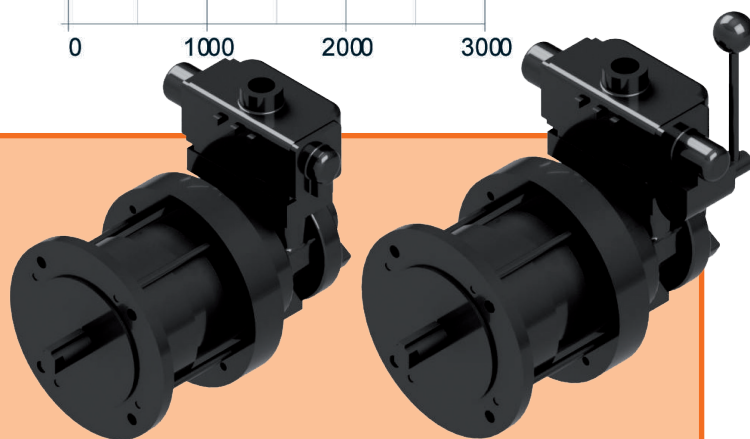
Lubricator continuous drop rate: 5-6 drops / minute

Lubricator intermittent drop rate: 10-12 drops / minute

**Maximum continuous speed** 3000 rpm

**Maximum radial load on the motor shaft** 300 N (70 lbf.).

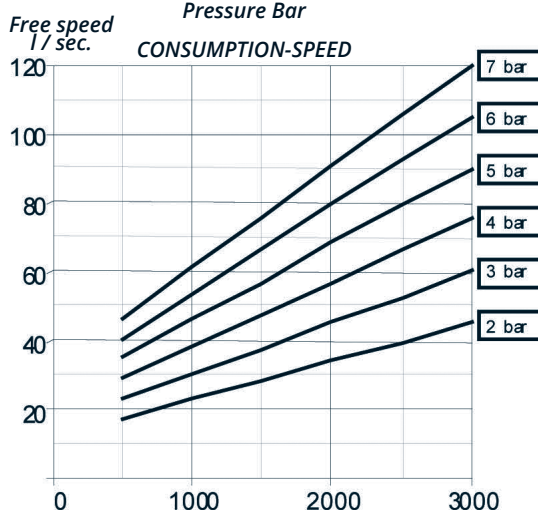
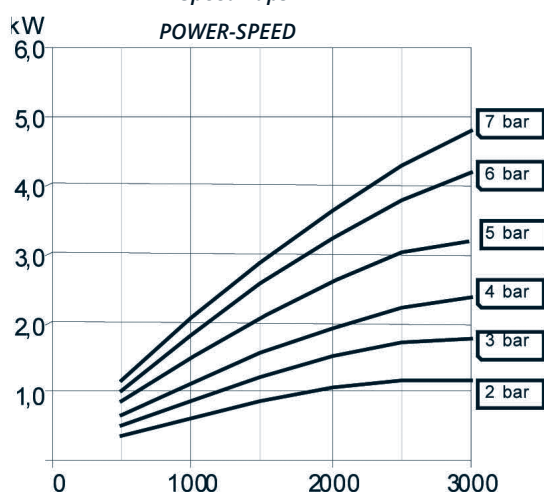
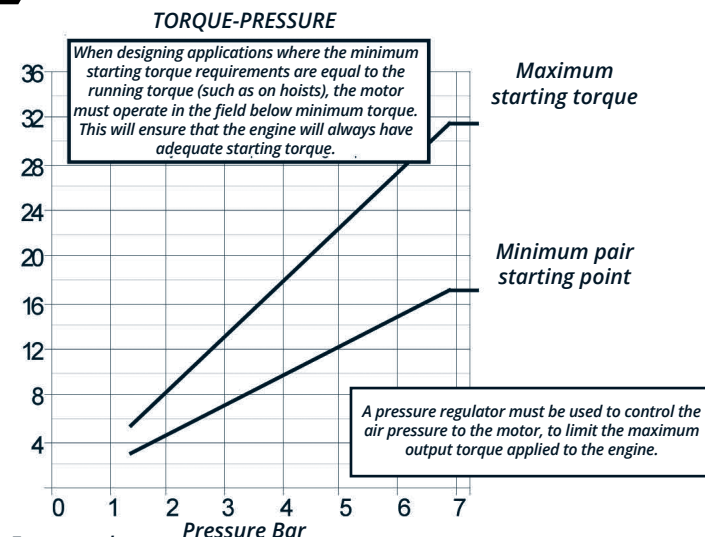
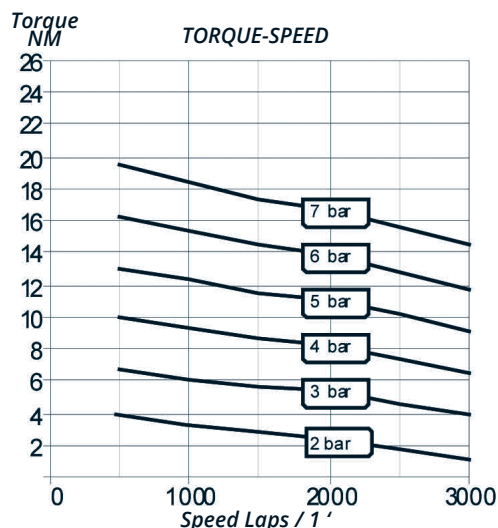
**Axial loads** need to be kept to a minimum.







## M620BN90H3/R3



Silencer delivered with the motor.

**Noise level:** 84 dB

The motor is reversible.

**Position:** the motor can be used in any position.

**Temperature range**

from -20 ° C to +80 ° C (-4 ° F to +176 ° F).

### FILTERING AND LUBRICATION

Filtering rate 64 micron or higher. Choose a lubricator suitable for the required flow rate. When first starting the motor, inject the oil into the inlet gate.

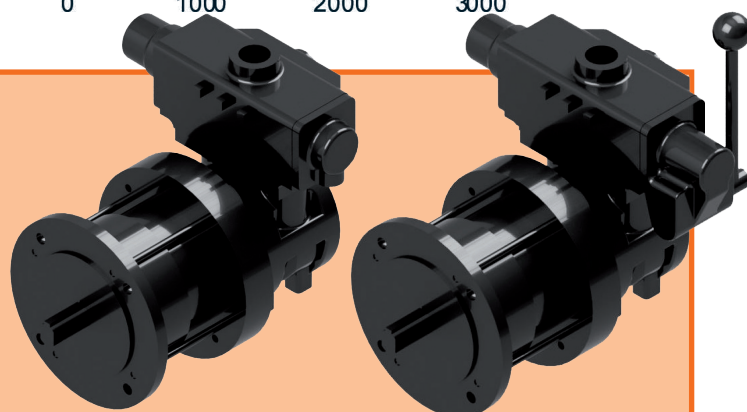
Lubricator continuous drop rate: 6-7 drops / minute

Lubricator intermittent drop rate: 12-15 drops / minute

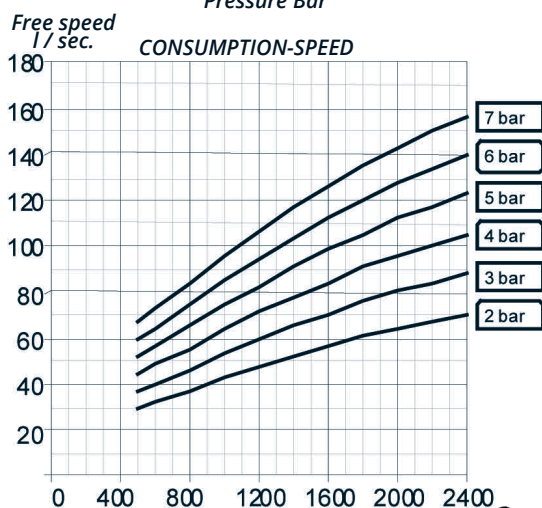
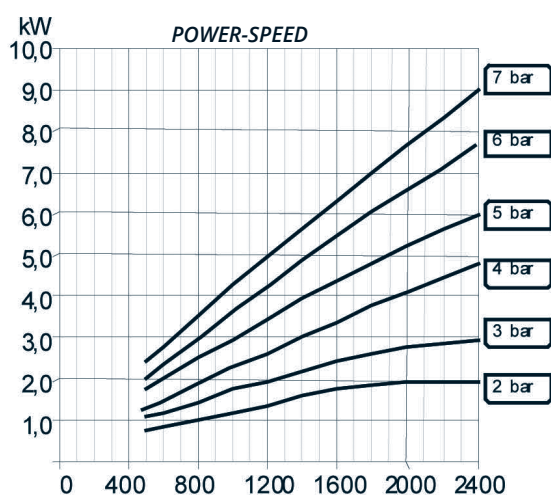
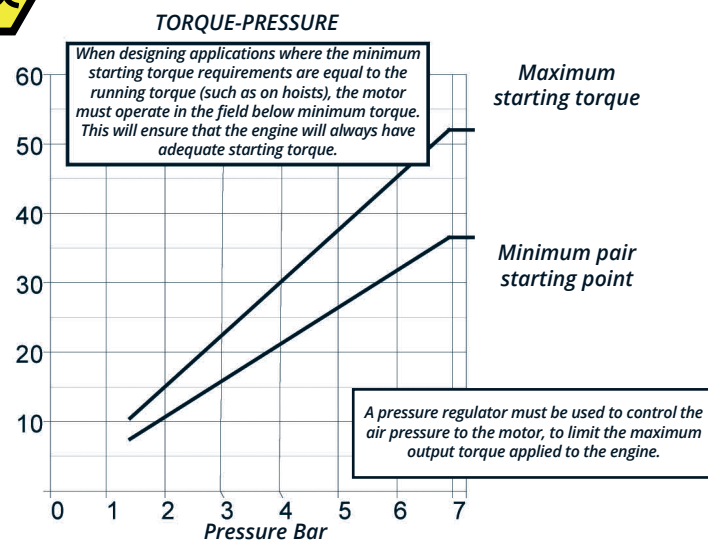
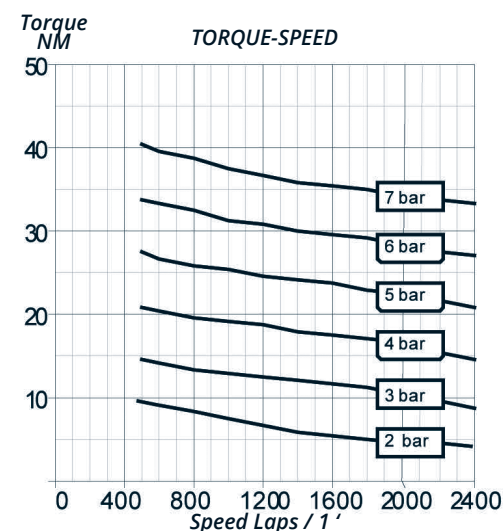
**Maximum continuous speed** 300 rpm

**Maximum radial load on the motor shaft** 620 N (140 lbf.).

**Axial loads** need to be kept to a minimum.



## M1100BN100H4/R4



Silencer delivered with the motor.

**Noise level:** 86 dB

The motor is reversible.

**Position:** the motor can be used in any position.

**Temperature range**

from -20 ° C to +80 ° C (-4 ° F to +176 ° F).

### FILTERING AND LUBRICATION

Filtering rate 64 micron or higher. Choose a lubricator suitable for the required flow rate. When first starting the motor , inject the oil into the inlet gate.

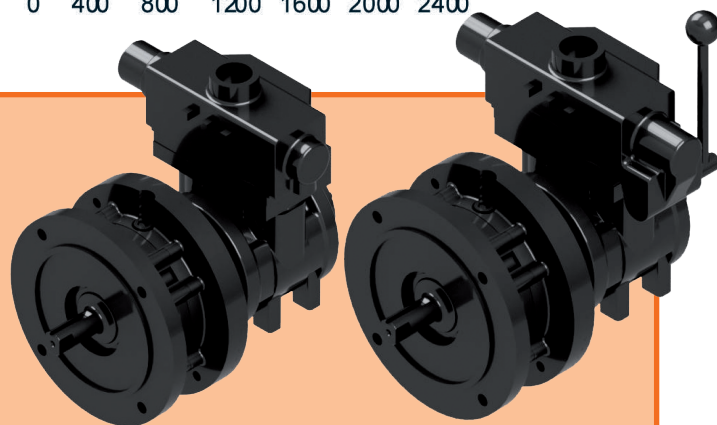
Lubricator continuous drop rate: 8-10 drops / minute

Lubricator intermittent drop rate: 14-16 drops / minute

**Maximum continuous speed** 2400 rpm

**Maximum radial load on the motor shaft** 620 N (140 lbf.).

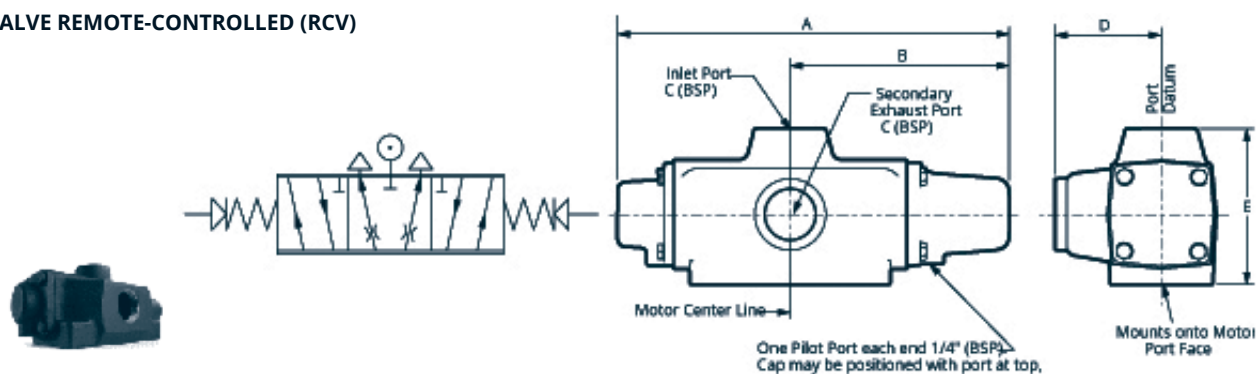
**Axial loads** need to be kept to a minimum.



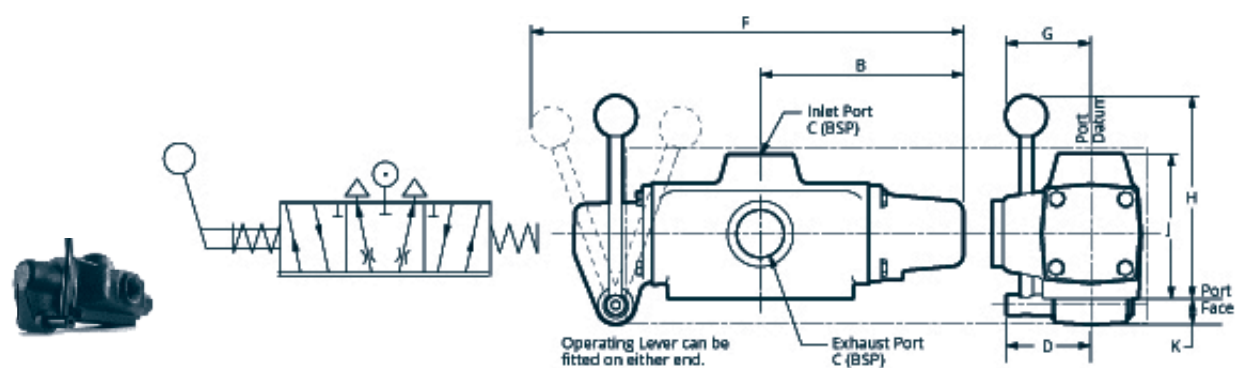
## ACCESSORIES

### PROPORTIONAL CONTROL VALVE REMOTE-CONTROLLED (RCV) OR HAND-CONTROLLED (HCV):

#### VALVE REMOTE-CONTROLLED (RCV)



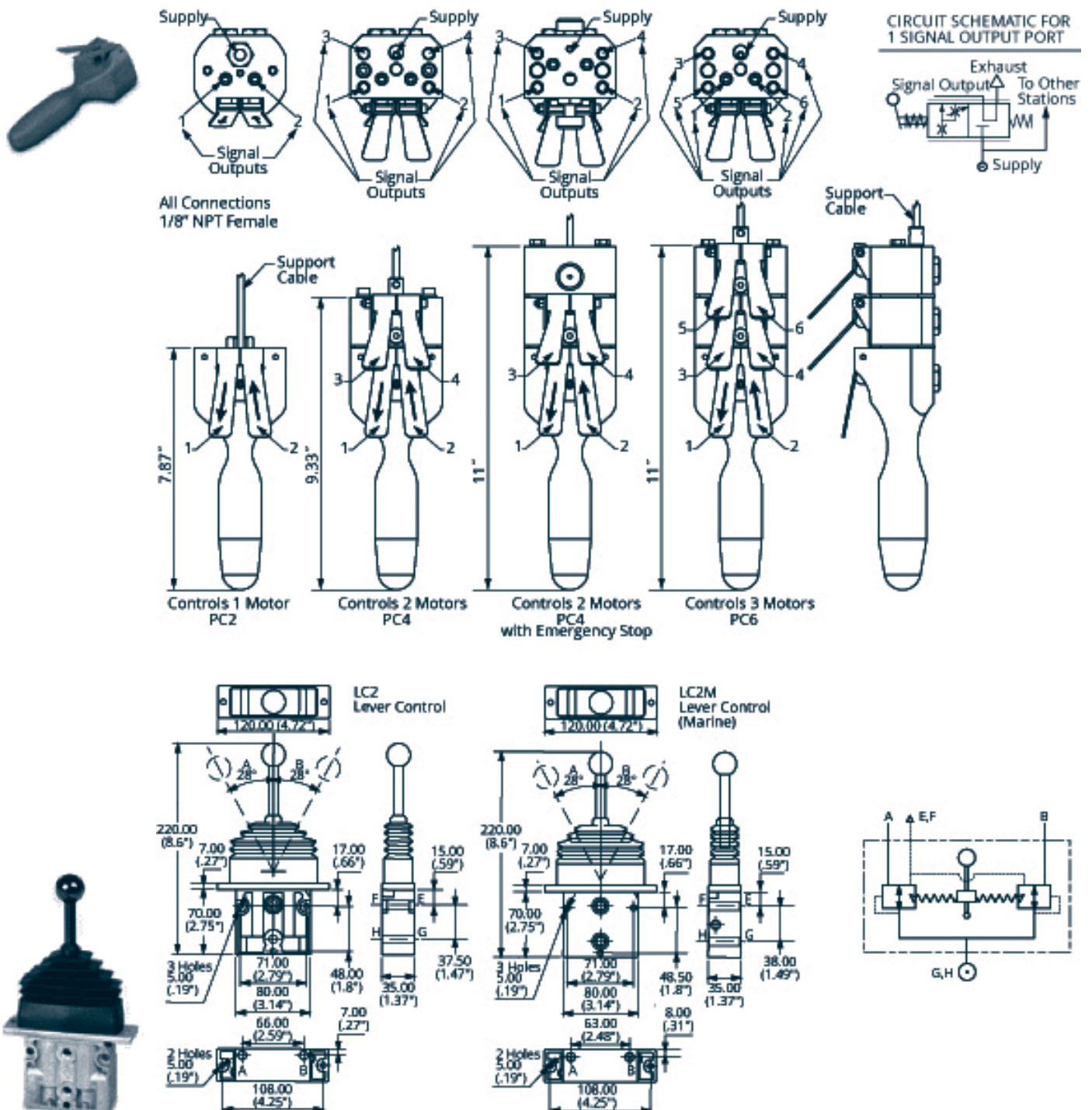
#### HAND-CONTROLLED (HCV)



Motors	A	B	C (BSP)	D	E	F	G	H	J	K
<b>M95-250</b>	210	118	½"	61	84	270	61	162	84	21
<b>M410</b>	210	118	¾"	61	84	270	61	162	84	21
<b>M620</b>	280	160	1"	72	103	365	75	193	103	27
<b>M1100</b>	280	160	1 1/4"	72	114	365	75	198	112	22


## REMOTE CONTROLS

The PC2, 4 and 6 remote controls are specifically designed for RCV modules. They provide the correct driving pressure interval necessary to operate RCV units, as well as ensuring excellent control of the motor speed. The PC2 model can control one motor; PC4 is able to control two motors independently; PC6 can control three motors independently. The same units control differently sized motors. They respond in an excellent way with line lengths up to 36m.



## SILENCERS

Our silencers are screwed directly onto the secondary outlet gate. Note: The control valves are fitted with secondary outlet gates. These silencers are designed for intermittent use; if continuous operation is required, please refer to TSA. If necessary, move the silencer away from the motor, use suitably sized piping to prevent any counterpressures in the system.

		M95-250	M410	M620	M1100
	Size	12.70	19.05	31.75	31.75
	L	139.7	171.45	209.55	209.55

Usually delivered as a kit with connections.

## PNEUMATIC MOTORS



## GEAR-MOTORS



## TELESCOPIC BOOMS



## ARTICULATED BOOMS



## ACCESSORIES







Motori pneumatici per argani - 001 ITA - 2018

M (BSP)

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SPECIALI  
APPLICATE

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