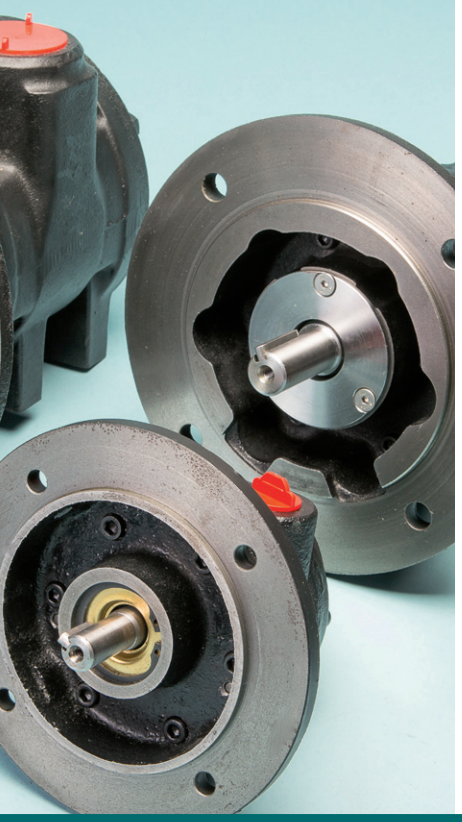
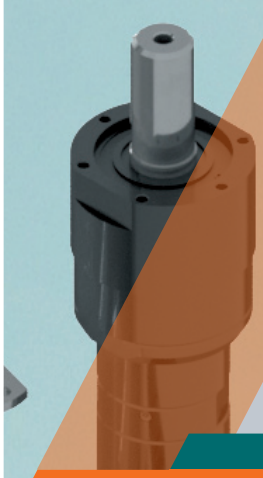




TSA
TECNOLOGIE
SPECIALI
APPLICATE

PNEUMATIC MOTORS

CHARACTERISTICS OF PNEUMATIC MOTORS

TSA TECNOLOGIE SPECIALI APPLICATE

INDICE

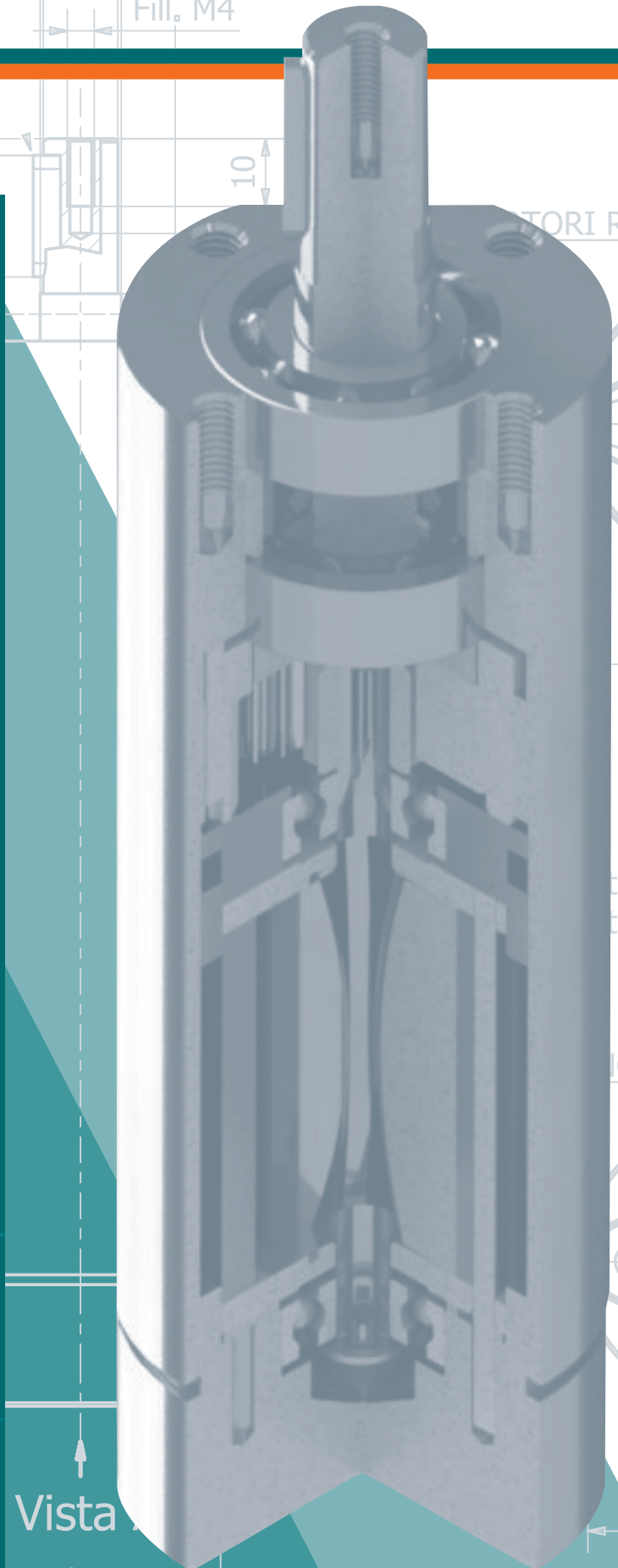
TSA
SPECIAL APPLIED TECHNOLOGIES

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.



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

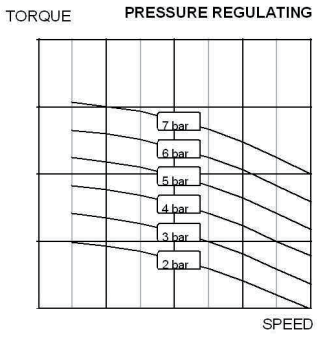
The stall torque is the torque provided by a motor to the shaft during its rotation until it stops completely.

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.

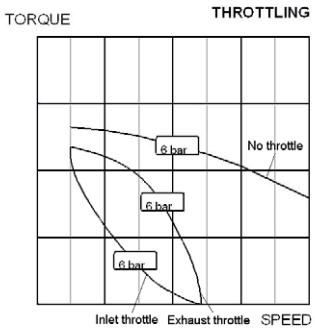
PRESSURE REGULATING

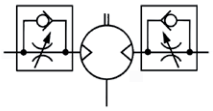
The speed and power can also be reduced by installing a pressure regulator. A pressure regulator, always connected on the entry hole, keeps the inlet air pressure to the motor in check. A pressure regulating system affects the output torque on the shaft, thus making it easier to control the starting 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.





THROTTLING METHOD
Inlet choking, bi-directional motor

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 Nl/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.

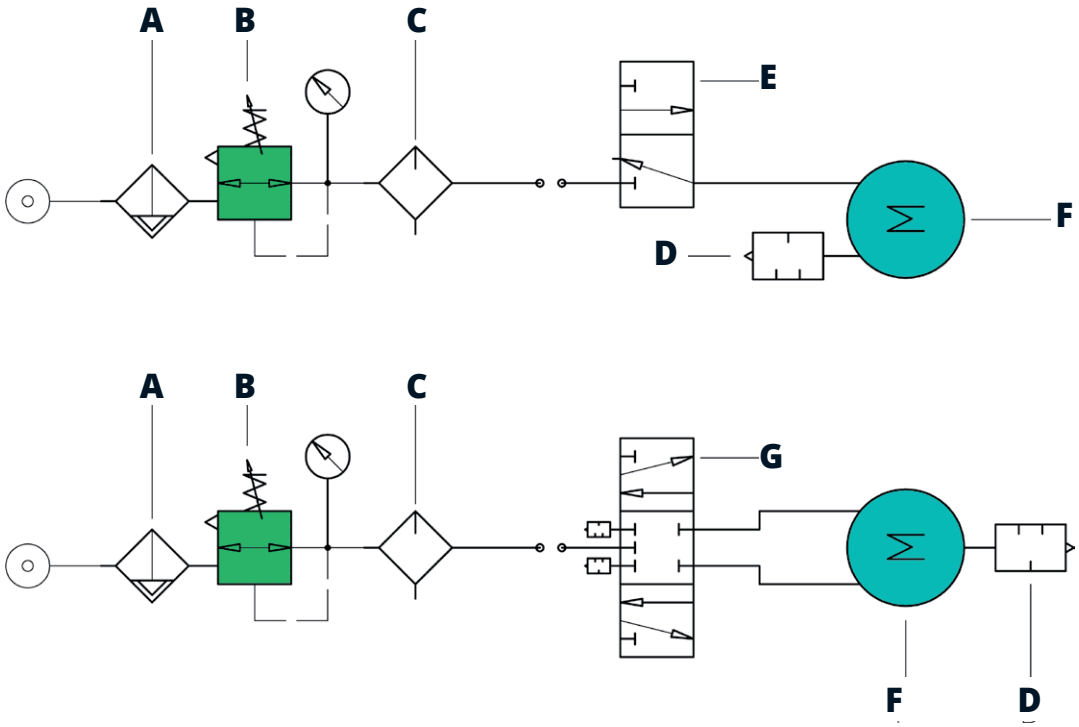
AIR PIPELINE LIMITATIONS

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

A = Filter
B = Regulator of pressure
C = Lubricator
D = Silencer
E = 3/2 valve
F = Engine
G = Valve 5/3



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

PNEUMATIC ACCESSORIES

TSA offers a pneumatic component programme for air treatment and control of pneumatic motors on premium brands, including SMC, BOSCH, NORGREN, WILKERSON. This programme consists of air treatment units, valves and silencers. The available connections range from G1/4" to G2".

AIR TREATMENT UNITS

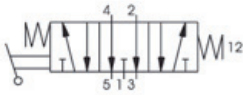
All of the filters used have automated condensation discharge, the FRL units are installation-ready and fitted with a pressure gauge.

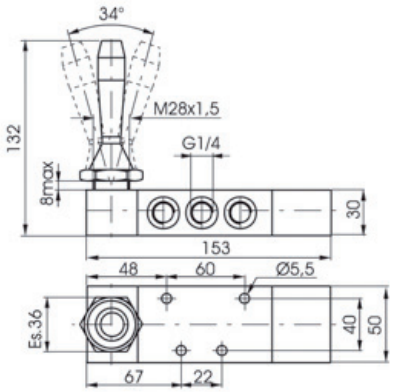
Models	TFRL3/8	TFRL1/2	TFRL3/4	TFRL1	TFRL2
Connection	3/8"	½"	¾"	1"	2"
Max. operating pressure	10 Bar	10 Bar	10 Bar	10 Bar	20 Bar
Max. operating temperature	-5 a +60°C				
Standard filtration rate	8 Micron				
Flow rate in l/sec	56,6	63,2	67,5	149	660

MANUAL OR PNEUMATIC CONTROL VALVES

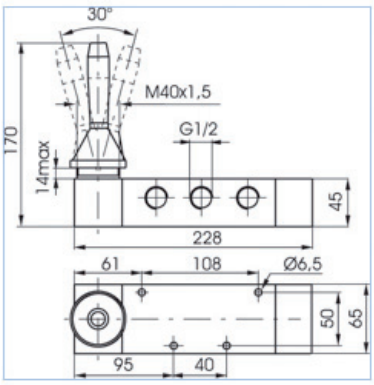
Easy and quick to install, the default valves fitted on TSA pneumatic motors are 5-way 3-position valves with centres open in idle position, with lever or pneumatic control.

Models	VCM1/4	VCM1/2	VCM1	VCP1/4	VCP1/2	VCP1
Connection	G1/4"	G½"	G1"	G1/4"	G½"	G1"
Fluid	Aria filtrata e lubrificata					
Max pressure operating	10 bar					
Temperature	-5°C +70°C					
Flow rate at 6 bar with Δ p = 1 Nl / min	1280	3500	6500	1280	3000	6500
Ø Nominal passage	8mm	15mm	20mm	8mm	15mm	20mm
Body material	Alluminio					
Kg.	0,7	2	5	0,6	1,7	4,2
Minimum pilot pressure	-	-	-	3 bar	3 bar	3 bar
Pilot connection	-	-	-	G1/8"	G1/8"	G1/8"

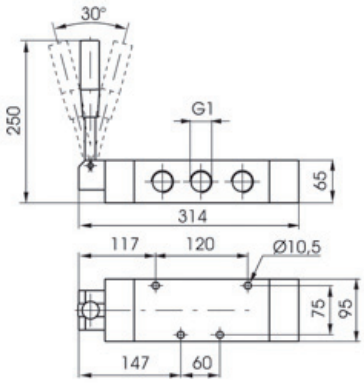




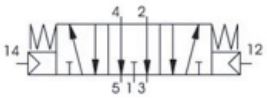
VCM1/4

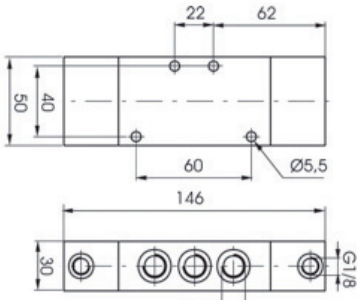


VCM1/2

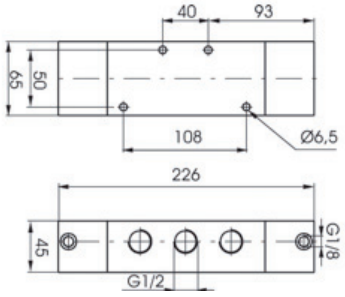


VCM1

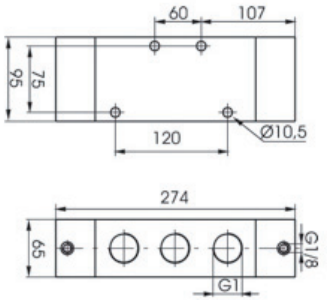




VCP1/4



VCP1/2



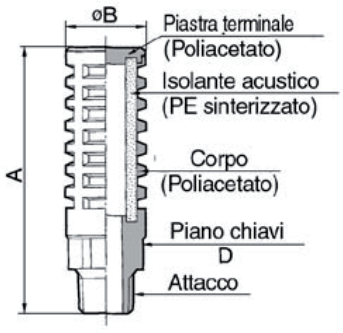
VCP1

SILENCERS

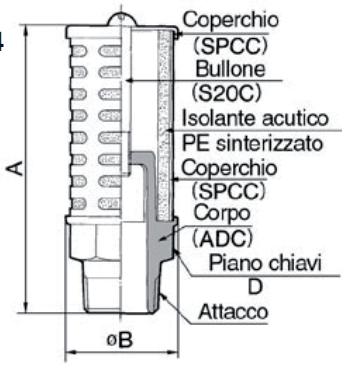
All motors are fitted with a threaded exhaust gate, which makes it possible to add a silencer in order to reduce the noise level. It is also possible to add another hose between exhaust and silencer which will further reduce the noise level.

Models	S1/4	S3/8	S1/2	S3/4	S1	S1 1/4
Connection	¼ NPT	3/8 NPT	½ NPT	¾ NPT	1 NPT	1 ¼ NPT
Noise dB reduction	>30 dB(A)					
Fluid	Compressed air					
Operating temperature	+5° C – 60° C					
Body	Plastic	Plastic	Plastic	Steel + Plastic	Steel + Plastic	Steel + Plastic

Dimensions S1/4 – S1/2



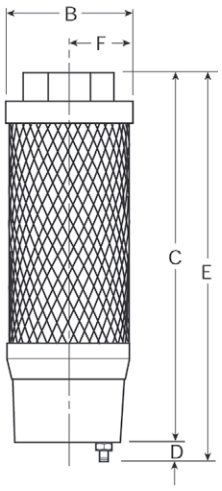
Dimensions S3/4 – S1 1/4



Dimensions	S1/4	S3/8	S1/2	S3/4	S1	S1 1/4
A	63	84	92	107	127	186
B	22	25	30	46	50	74
D	19	22	27	36	41	50

DISSOLATOR / SILENCER FILTER

Models	XMC-C4-000	XMC-C8-000	XMC-CB-000	S3/4	S1	S1 1/4
Connection	½ G	1 G	1 - 1/2 G	107	127	186
Bath capacity	2.2 fl. oz.	5 fl. oz.	5 fl. oz.	46	50	74
Drain	Manuale	22	27	36	41	50
oiling	99.9%					
Operating temperature	2° C – 50° C					
Sound reduction	25 dB(A)					
Kg.	0.4					



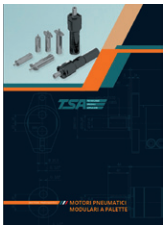
CONSTRUCTION MATERIALS

Threaded cover	Nylon
Filter element	
Primary	borosilicate cloth
Secondary	PVC fiber
Oil cover of waste	Plastic
Sleeve support	Plastic

Model	A	B	C	D	E	F
XMC-C4-000	51	60	100	10	150.9	30
XMC-C8-000	51	60	148	10	198.9	30
XMC-CB-000	76	87	208	11	284	-

PNEUMATIC MOTORS



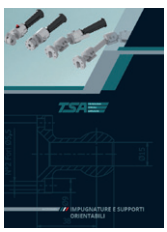


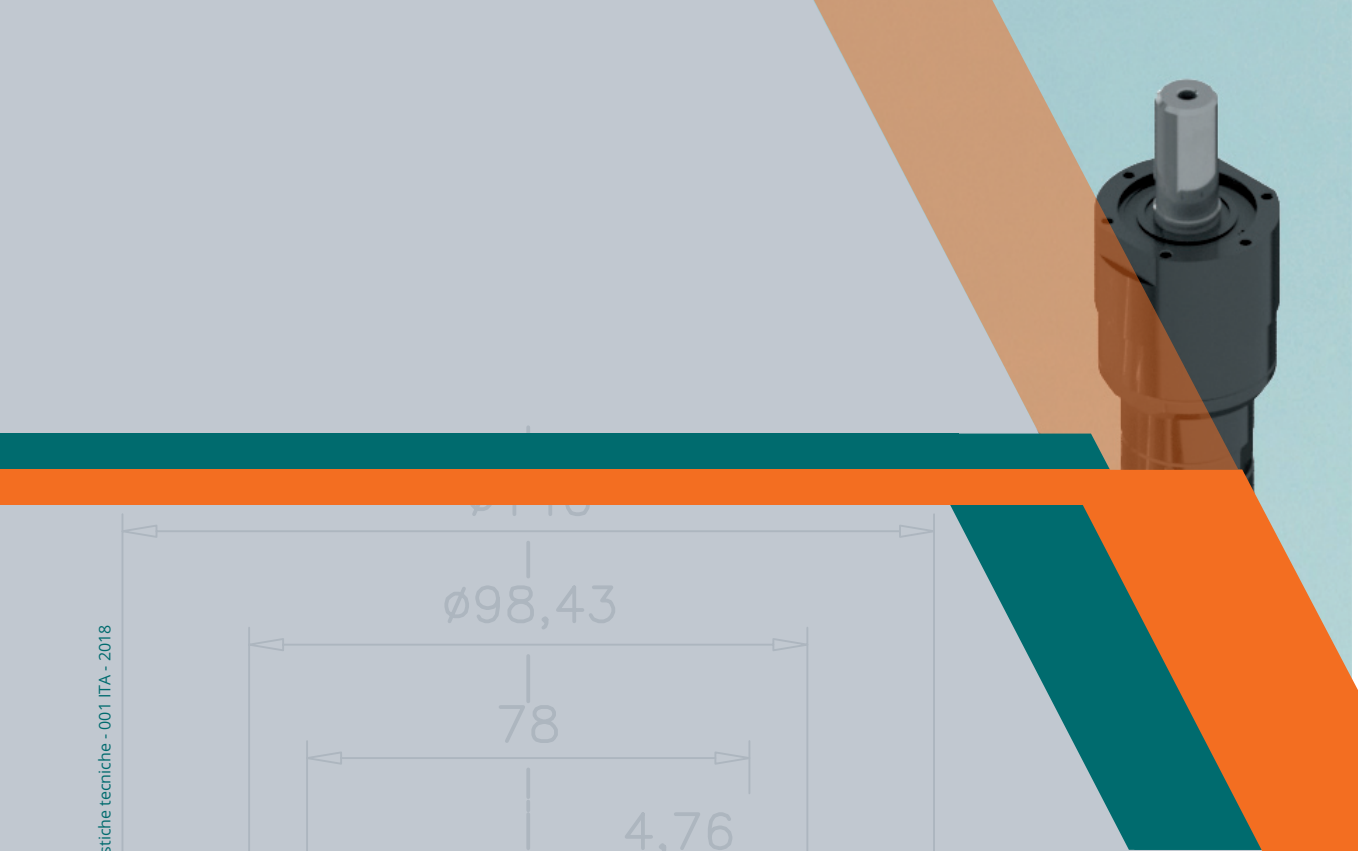
GEAR-MOTORS

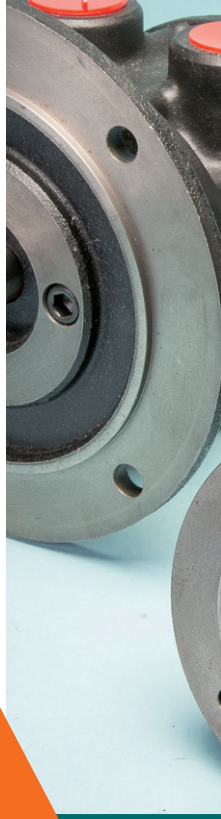
TELESCOPIC BOOMS

ARTICULATED BOOMS

ACCESSORIES







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